



Public Works and Government Services Canada

Quai de la Reine – Reconstruction of Wharves 97 and 98

No : R-052833.001

Technical Specifications for Tender Call

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March 2014



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PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
QUAI DE LA REINE – RECONSTRUCTION OF WHARVES 97 AND 98

MARITIME STRUCTURES

MARCH 2014



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PART 1 - GENERAL

1.1 Work under the Contract Documents

- .1 The work covered by this contract includes, without being necessarily limited:
 - .1 Partial demolition of existing wharf
 - .2 Dredging
 - .3 Steel pile driving
 - .4 Steel sheet pile driving
 - .5 Construction of a copewall, concrete slab and asphalt paving
 - .6 Construction of a berm
 - .7 New paving
 - .8 Dock equipment: bollards, fenders, ladders, hoist.
 - .9 Electricity, wharf lighting, drainage and water distribution
 - .10 Installation of cathodic protection conduits
 - .11 Fabrication and installation of gangway and pontoon

1.2 Work sequence

- .1 Execute the work in stages, so that the Departmental Representative may use the premises continuously during the work.
 - .1 Coordinate the work schedule in accordance with site occupancy.
 - .2 Steps to predict.
 - .1 Access to Building 500 must remain free to users as long as possible.
 - .2 Maintain access for fire protection.

1.3 Contractor use of premises

- .1 Unrestricted use of site until Substantial Performance.
- .2 Limit use of premises for Work,for storage,and for access,to allow:
 - .1 The Departmental Representative occupancy.
- .3 Co-ordinate use of premises under direction of Departmental Representative.
- .4 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.

1.4 Occupancy by the Departmental Representative

- .1 The Departmental Representative will occupy Building 500 during entire construction period for execution of normal operations.
- .2 Co-operate with the Departmental Representative in scheduling operations to minimize conflict and to facilitate the Departmental Representative usage.

1.5 Pre-ordered products

- .1 The Departmental Representative has ordered, from manufacturers, some products required for works in a way to accelerate work execution and also for other reasons in its own interest. Skyline (PHP) Canada ULC is the supplier which has obtained the contract of supplying piles and sheet piles for the project. Products ordered will be delivered on a storage site owned by the Contractor. The storage site must be located at a maximum distance of 100 km from Quebec City. Products unloading on storage site will be realized by the Contractor and at its own expense. Obtain shop drawings required from Departmental Representative; coordinate details related to the installation requirements, delivery, unloading, transportation to work site for installation.
- .2 Refer to Section specifications and drawings for details and installation.
- .3 Contractor responsibility for purchase, handling, and installation for pre-ordered products is same as for other Contractor-furnished products.
- .4 Schedule of Pre-ordered Products.
 - .1 Pile.
 - .2 Sheet-pile
- .5 Obtain necessary shop drawings from Departmental Representative for inclusion in maintenance manual in accordance with Section 01 33 00 – Submittal Procedures.

1.6 Items supplied by the departmental representative

- .1 Departmental Representative Responsibilities:
 - .1 Arrange for delivery of shop drawings, product data, samples, manufacturer's instructions, and certificates to Contractor
 - .2 Deliver supplier's bill of materials to Contractor
 - .3 Arrange and pay for delivery to site storage of contractor. Complete delivery of ordered materials will be realized in less than 2 weeks following the notice of accepted tender.
 - .4 Inspect deliveries jointly with Contractor.
 - .5 Submit claims for transportation damage.

- .6 Arrange for replacement of damaged, defective or missing items.
- .2 Contractor Responsibilities:
 - .1 Review shop drawings, product data, samples, and other submittals. Submit to Departmental Representative notification of observed discrepancies or problems anticipated due to non-conformance with Contract Documents.
 - .2 Receive and unload products at site and pay for it.
 - .3 Inspect deliveries jointly with the Departmental Representative; record shortages, and damaged or defective items.
 - .4 Handle products at site, including unpacking and storage.
 - .5 Protect products from damage, and from exposure to elements.
 - .6 Assemble, install, connect, adjust, and finish products.
 - .7 Provide installation inspections required by public authorities.
 - .8 Repair or replace items damaged by Contractor or subcontractor on site (under his control).
 - .9 Provide and pay, in a maximum delay of 5 days following the notice of tender acceptance, a delivery and storage area for the total quantity of piles and sheet piles. This area must be free of debris and obstructions, with a leveled and flat surface composed of granular materials, pavage or concrete.
- .3 List of the Departmental Representative furnished items:
 - .1 Pile.
 - .2 Sheet-Pile.

1.7 Required documents

- .1 Maintain at job site, one copy each document as follows:
 - .1 Contract Drawings.
 - .2 Specifications.
 - .3 Addenda.
 - .4 Reviewed Shop Drawings.
 - .5 List of Outstanding Shop Drawings.
 - .6 Change Orders.
 - .7 Other Modifications to Contract.
 - .8 Field Test Reports.
 - .9 Copy of Approved Work Schedule.
 - .10 Health and Safety Plan and Other Safety Related Documents.

.11 Other documents as specified.

1.8 Measurement for payment

- .1 The supply of materials, labor, tools, equipment, protection, transportation, administrative expenses, profit, financing, etc. necessary to perform the work of this specification document, are included in each of the items described below, unless otherwise indicated.
- .2 Items subject to a global unit must be ventilated and submitted in a 48 hours delay following the demand to contracting authority before awarding the contract or submitted to the Departmental Representative within two weeks of notification of acceptance of the tender as the case may be.
- .3 The items are :

Item 1 – Mobilization and demobilization

- .1 This item is measured as a global unit. It includes all the elements required for the mobilization and demobilization of the contractor.

Item 2 – Worksite Organization

- .1 This item is measured as a global unit. It includes all the elements of Division 01, as well as all elements not described in any other item.
- .2 The site organization during the work is paid in proportion to the monthly estimates of work.

Item 3 – Demolition and excavation

- .1 This item will be measured as a global unit and includes all the work required for the demolition, dismantling, as well as excavation of soil, in land and underwater, for the installation of tie rods and/or granular foundations as well as for the construction of the berm, all as described in the plans and specifications. This item also includes the removal and disposal in authorized sites of all materials from the excavation that cannot be reintroduced in the work. This item includes trenches for water, electricity, cathodic protection and other type of conduit.
- .2 More specifically, this item includes, without limitation, demolition, dismantling and excavation of the following works:
 - .1 All existing surface elements to be dismantled and / or demolished;
 - .2 Excavation of the sea bed for the implementation of the berm and reaching of level -4.00 m in the pit, and the excavation of the existing wharf for the installation of tie rods and/or foundations;

- .3 Temporary stockpiling, drying, transport and disposal of excess or contaminated material in accordance with applicable laws and regulations;
- .4 Demolition and disposal of creosoted wood in accordance with applicable laws and regulations;
- .5 Profiling required at the bottom of Wharf 97 for the construction of the berm;
- .6 Temporary excavation, reprofiling and riprap replacing as required to prepare driving corridors. Any modification to the stones of the south wall of the heliport to reach the required water depth is included in this item;
- .7 Demolition of reinforced concrete walls including anchor blocks, and reinforced concrete or creosoted wood slabs and asphalt paving;
- .8 Partial demolition of sheet piling;
- .9 Control of drainage waters and contaminated sediments on the platform.

Item 4 – Granular materials

- .1 This item is measured in theoretical cubic meter according to indications in plans. Voids filling under the various relieving platforms will be measured by the ton. This item includes the supply, installation and compaction of granular materials.
- .2 This item is subdivided as follows :
 - .1 Stone 20-200 mm
 - .2 Stone 20-200 mm for filling voids under relieving platform
 - .3 Stone 50-25 mm
 - .4 Granular Foundation MG-56
 - .5 Granular Foundation MG-20

Item 5 – Berm Stone 400-600 mm

- .1 This item is measured in theoretical cubic meter according to the indications of the plans. It includes supply and installation of the protection stone over the 0-300 mm quarry run stone.

Item 6 – Quarry run stone 0-300 mm

- .1 This item is measured in theoretical cubic meter for the berm and as a global unit for the materials behind the wall, all according to the indications of the plans. It includes supply and installation of 0-300 mm quarry run stone regardless of its origin (excavated or new materials). It includes all operations required for sorting, drying and sieving of excavated material to conform to specification requirements.
- .2 The final payable quantities for berm will be the theoretical volume based on the bathymetric

survey after leveling et before berm construction. Any backfilling due to over excavation below -11 meters before construction of berm is not payable.

- .3 This item is subdivided as follows:
 - .1 Quarry run stone for berm
 - .2 Quarry run stone between new and existing walls

Item 7 – Geotextile Membrane

- .1 This item is measured in square meter of covered area as indicated on plans. It includes materials and installation.
- .2 The overlapping area is included in this item but is not measured for payment.

Item 8 – Concrete

- .1 Concrete is measured in theoretical cubic meter, as indicated on plans. Concrete is measured in an overall unit for connection to Wharf 96. It includes the supply, transportation and installation of concrete, cement, aggregates, reinforcement, anchors, embedded steel assemblies, additives and formwork. No volume deduction will be made for reinforcement and openings less than 0.1 square meter of surface.

Water heating, aggregates heating or concrete cooling if required are included under this item.

Precaution measures taken to protect the concrete in cold or hot weather are included under this item.

- .2 Marking of the heliport is part of the ground concrete slab item.
- .3 The pegging of the existing sheet pile of south wall of Wharf 98 to the anchor wall is part of sub-item 8.5 of the unit price list.
- .4 The concrete of the block bases and any other bases is part of sub-item 8.1 of the unit price list.
- .5 The concrete of the wheelchair ramp is part of sub-item 8.1 of the unit price list.
- .6 The pegging of the existing plates and steel and all other work of the connection to Wharf 96 is included in sub-item 8.7 of the unit price list.
- .7 This item is sub-divided as follows:
 - .1 Concrete slab on ground
 - .2 Concrete of the copewall of the pile-sheet pile and sheet piling sections (including the bollard bases)
 - .3 Pile filling concrete

- .4 Concrete of type 1 and type 2 deadmen
- .5 Concrete of the anchor wall of wharf 98 (type 3)
- .6 Concrete of the type 4 block
- .7 Concrete of wharf 96 connection

Item 9 – Piles

- .1 This item is measured at the unit for installation. It includes the transportation and installation of steel piles according to the depths indicated on plans.
- .2 Any variation in the rock level with respect to information provided in the plans is included in the price.
- .3 Welds, pile caps and other required equipment are included under this item.
- .4 Pile cleaning for concrete placement is included under this item.
- .5 Piles cutting back to reach elevations indicated in plans is part of this item.
- .6 Cutting in piles for the installation of tie rods is part of this item.
- .7 The pile filling concrete and re-bar is part of another item.
- .8 The rock anchors for piles are part of another item.

Item 10 – Rock sockets for piles

- .1 This item is measured at the pile unit. It includes all work necessary to complete drilling in rock.
- .2 The removal of sediment inside the piles and sealing of the end and cleaning are included in this item.
- .3 The supply and installation of anchors and steel hardware is included in this item.
- .4 The grout for the anchorages to the level indicated in the plans is included in this item.
- .5 Any adjustments required with respect to the rock profile are included in this item.

Item 11 – Pair of steel sheet piles

- .1 This item is measured at the unit (a pair of piles constituting a unit). It includes the transportation and installation of piles according to the depths indicated on plans.
- .2 Any variation of rock in relation to information provided in the plans is included in the price.
- .3 Welds, pile caps and other necessary equipment are included in this item.

- .4 Wailings, plates and bolts are part of another item.
- .5 Cutting drainage holes in sheet piles is part of this item.
- .6 Cutting back sheet piles to reach elevations indicated in the plans forms part of this item.

Item 12 – Wailings

- .1 This item is measured by the meter of quay. It includes materials, labor and equipment required for a complete installation as specified in the plans. Plates and bolts are also part of this item.

Item 13 – Tie rods

- .1 This item is measured by the meter for the supply and transportation of tie rods and by the unit for the installation. It includes materials, hardware, plates, labor and equipment required for complete installation of tie rods as indicated in the plans.
- .2 The tie rod part anchored to the rock, drilled and inclined, is included in the price of installation.
- .3 Ducts and injections of drilled and inclined anchors and any concrete of the section between the old wall and the new quay wall are included in the price of installation.
- .4 All required equipments and temporary installations for tests on drilled and inclined tie rods are included in the price of installation. Laboratory testing is at Minister expense.
- .5 Metallization for horizontal bollards and tie rods as well as their hardware is part of this item.
- .6 Aggregate 50-25 mm as cushion for tie rods and geotextile are not part of this item.
- .7 Any required shim is included in this item.
- .8 This item is sub-divided as follows:
 - .1 Supply of drilled and inclined tie rods
 - .2 Supply of horizontal tie rods
 - .3 Supply of tie rods for bollards
 - .4 Installation of drilled and inclined tie rods
 - .5 Installation of horizontal tie rods
 - .6 Installation of tie rods for bollards

Item 14 – Connections of tie rods to piles

- .1 This item is measured at the pile unit. It includes the supply and installation of the assembly of the tie rods in the pile heads.

- .2 The cost of the design of connections is included in this item.
- .3 Metallization is included in this item.

Item 15 – Bituminous pavement

- .1 This item is measured per square meter installed within the limits specified in plans. It includes materials, labor and equipment required for the installation of pavement.

Item 16 – Fenders

- .1 This item is measured at the unit supplied and installed in the work.
- .2 It includes materials, labor and equipment required for the installation of the fenders.
- .3 All supply and transportation of required hardware is included in this item.
- .4 Supply and installation of anchors and steel plates with pegs and all pegging required for the existing wall elements are included in this item.
- .5 Concrete, reinforcement and embedded elements are included in this item.
- .6 This item is sub-divided as follows:
 - .1 Cylindrical fenders, anchors and plates of Wharf 97
 - .2 Trapezoidal fenders, anchors and plates of Wharves 97-96
 - .3 Anchors and plates of Wharf 98

Item 17 – Bollards and cleats

- .1 This item is measured at the unit. It includes materials and equipment required for the installation of bollards and cleats.
- .2 All hardware and non-shrink grout required for a complete installation are included in this item.
- .3 Bollards and cleats painting is included in this item.
- .4 Concrete for the bollard bases is in another item.
- .5 This item is sub-divided as follows :
 - .1 Supply of painted bollards
 - .2 Installation of bollards
 - .3 Supply and installation of cleats

Item 18 – Ladders

- .1 This item is measured at the unit. It includes materials and equipment required for the installation of ladders.
- .2 Supply and installation of all hardware and required steel for a complete installation are part of this item.

Item 19 – Protection bollards

- .1 This item is measured at the unit. It includes materials and equipment required for the installation of the protection posts.
- .2 Supply and installation of all hardware, concrete, paint required steel for a complete installation are part of this item.

This item is sub-divided as follows :

- .1 Supply of protection bollards for slabs
- .2 Installation of protection bollards on slabs
- .3 Supply of protection bollards on pavement
- .4 Installation of protection bollards on pavement

Item 20 – Pedestrian gangway

- .1 This item is measured as a global unit. It includes all materials, labor, transport and equipment required for the supply and complete installation in accordance with performance specifications.
- .2 The supply and installation of the lifting system are part of another item.
- .3 The cost of the gangway design is included in this item.

Item 21 – Floating dock

- .1 This item is measured as a global unit. It includes all materials, labor, transport and equipment required for the supply and complete installation in accordance with plans and specifications.
- .2 The supply and installation of the fastening system (guide pile) required on the dock wall for a complete installation is included in this item.
- .3 The supply and installation of a shed on the dock is included in this item.
- .4 The cost of floating dock design is included in this item.

Item 22 – Hoisting system (West wall of pit)

- .1 This item is measured as a global unit. It includes, without being limited to, the supply, transport and installation of the new hoist, including controls, carriage and all accessories for a complete installation.
- .2 All adjustments, required tests and training are included in this item.
- .3 All electrical work required to operate the hoist lifting system and its connection are part of another item (Block 98).
- .4 Trenching for electrical wiring are included in item 2.
- .5 The cost of hoisting system design is included in this item.

Item 23 – Lifting system for gangway

- .1 This item is measured as a global unit. It includes, without being limited to, the supply, transport and installation of the new hoisting system along with all accessories required for a complete installation, including stem, carriage, gantry to fasten the walkway, manual controls, radio and all accessories.
- .2 All adjustments, required tests and training are included in this item.
- .3 All electrical work required to operate the hoist lifting system and its connection are part of another item (Block 98).
- .4 Trenching for electrical wiring are included in item 3.
- .5 The cost of walkway design is included in this item.

Item 24 – Guardrails

- .1 This item is measured by the meter. It includes materials and equipment required for the implementation of the guardrails of the pit and wheelchair ramp.
- .2 Supply and installation of all hardware and steel required for a complete installation are included in this item.

This item is subdivided as follows :

- .1 Guardrails of the pit
- .2 Guardrails of the ramp

Item 25 – Safety net

- .1 This item is measured by the meter. It includes all materials and installation of the safety net

at wharf 98.

- .2 Supply and installation of all hardware and steel required for a complete installation are included in this item.

Item 26 – Block 97A

- .1 This item is measured as a global unit and includes, without limitation, the dismantling of the existing block as well as all wiring, conduit and associated accessories. In addition, this item also includes the supply and installation of the new block 97A including electrical appliances included such as distribution panels, transformers, MALT, connection sockets, etc., And conduits, pulling boxes, wiring, circuit breaker etc.
- .2 This item excludes excavation of trenches and concrete bases.

Item 27 – Block 97B

- .1 This item is measured as a global unit and includes, without limitation, the dismantling of the existing block as well as all wiring, conduit and associated accessories. In addition, this item also includes the supply and installation of the new block 97B including electrical appliances included such as distribution panels, transformers, MALT, connection sockets, etc., And conduits, pulling boxes, wiring, circuit breaker etc..
- .2 This item excludes excavation of trenches and concrete bases.

Item 28 – Block 98

- .1 This item is measured as a global unit and includes, without limitation, the dismantling of the existing block and storage during work, as well as all wiring, conduit and associated accessories. In addition, this item also includes reinstallation and modification of the existing block including conduits, pulling boxes, wiring, circuit breaker, power supply and connection of various associated equipment, a new lamp post, etc.
- .2 This item excludes excavation of trenches and concrete bases.

Item 29 – Landing pad lights

- .1 This item is measured as a global unit and includes, without limitation, the dismantling of the existing landing pad lights and all wiring, conduit and associated accessories. In addition, this item also includes supply and installation of new landing pas lights along with conduits, pulling boxes, wiring, etc., and connection to existing control system.
- .2 This item excludes excavation of trenches.

Item 30 – Stormceptor STC-750 treatment manholes

- .1 This item includes complete supply and installation of stormwater treatment units. The work includes, but is not limited to, excavation, backfill, the crushed stone bedding, all the needed geotextile, Stormceptors units, manhole frames and lids, the manufacturer user guide..., as described on drawings.

Item 31 – Precast concrete manholes

- .1 This item includes complete supply and installation of stormwater precast manhole. The work includes, but is not limited to, excavation, backfill, the crushed stone bedding, all the needed geotextile, the concrete manhole, manhole frames and lids..., as described on drawings.

Item 32 – Storm sewer pipes

- .1 This item includes complete supply and installation of stormwater sewer pipes. The work includes, but is not limited to, trench excavation, trench backfill, the crushed stone bedding, all the needed geotextile, backfilling of the pipe zone area with a CG-14 material, ovalisation test (for PVC pipe), television inspection..., as described on drawings.

Item 33 – Potable water pipes

- .1 This item includes complete supply and installation of potable water pipes. The work includes, but is not limited to, trench excavation, trench backfill, the crushed stone bedding, all the needed geotextile, the butt fused HDPE pipe, backfilling of the pipe zone area with a CG-14 material, the draining manhole, tap on existing pipe..., as described on drawings.

Item 34 – Gutter grates

- .1 This item includes complete supply and installation of potable water pipes. The work includes, but is not limited to, the steel corner anchored in the gutter groove, grates, anchoring device for grates (wharf 98 only)..., as described on drawings.

Item 35 – Water pipe for service station

- .1 This item includes complete supply and installation of all materials for the water distribution outlet located on service stations. The work includes, but is not limited to, pipes, accessories, valves, tap on the HDPE pipe, commissioning..., as described on drawings.

Item 36 – Supply and installation of cathodic protection elements

- .1 This item is measured as a global unit for the whole supplying and installation of all elements required for cathodic protection as indicated on cathodical protection and electricity plans.

- .2 Excavation and backfilling for pipes and manholes are not in this pricing item.

PART 2 - PRODUCTS

2.1 Not used

- .1 Not used.

PART 3 - EXECUTION

3.1 Not used

- .1 Not used.

END OF SECTION

PART 1 – GENERAL

1.1 Related requirements

- .1 Section 01 51 00 – Temporary utilities.
- .2 Section 01 52 00 – Construction facilities.
- .3 Section 01 56 00 – Temporary barriers and enclosures.

1.2 Access and egress

- .1 Design, construct and maintain temporary "access to" and "egress from" work areas, including ramps and scaffolding, independent of finished surfaces and in accordance with relevant municipal, provincial and other regulations.

1.3 Use of site and facilities

- .1 Execute work with least possible interference or disturbance to normal use of premises. Make arrangements with Departmental Representative to facilitate work as stated.
- .2 The building 900 will not be occupied during works. Building 500 will be occupied by users who will use the access out of the work limits. The building 500 parking will be relocate out of the work limits by the Minister.
- .3 Maintain existing services to building 500 and 600 and provide for personnel using building 600 a vehicle access. A safe vehicle access must be provide to users to building 600 during all works duration.
- .4 Where security is reduced by work provide temporary means to maintain security.
- .5 Pay attention that boats can be berthed on wharf 96 during works.

1.4 Existing services

- .1 Notify Departmental Representative of intended interruption of services for building 500 and 600 and obtain required permission.
- .2 Where Work involves breaking into or connecting to existing services, give Departmental Representative 72 hours of notice for necessary interruption of mechanical or electrical service throughout course of work. Keep duration of interruptions minimum. Carry out interruptions after normal working hours of occupants, preferably on weekends.
- .3 Provide for personnel and vehicular traffic a safety access for buildings 500 and 600.
- .4 Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

1.5 Special requirements

- .1 Ensure Contractor's personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.
- .2 Keep within limits of work and avenues of ingress and egress.
- .3 Vehicular access for Contractor will be the south entrance. Minister will notify Contractor regarding restrictions on using those entrances. North access will be used for emergencies. Minister will inform Contractor regarding the access procedures.

1.6 Security

- .1 Where security has been reduced by Work of Contract, provide temporary means to maintain security.
- .2 Security clearances:
 - .1 Personnel employed on this project may be subject to security check. Obtain clearance, as instructed, for each individual who will require to enter premises.
 - .2 Obtain requisite clearance, as instructed, for each individual required to enter premises.

1.7 Interference to Navigation

- .1 Contractor to be familiar with vessel movements and fishery activities in the area that may be affected by construction operations. Plan and execute Work in manner that will not interfere with commercial and fishing operations or limit access to harbour facilities by land or water.
- .2 Contractor is responsible for loss of time, material, equipment or any other cost related to interference with moored vessels, displacements of ships in harbour or other impacts caused by Contractor's operations.
- .3 Contractor shall continuously and accurately report all floating equipment movements to Marine Communications and Traffic Services of Québec (MCTS Québec). Contractor shall also report to MCTS the start and end times of all construction periods.
- .4 The Contractor must notify the Departmental Representative of all movements of floating equipment in order that Notices to Mariners can be issued.
- .5 Should any equipment belonging to the Contractor cause interference with navigation for any reason, the Contractor shall immediately do the following:
 - .1 advise the Marine Communications and Traffic Services (MCTS) of the GCC at Québec, Wharfinger and Departmental Representative;
 - .2 comply with Article 3.1.1 of this section;
 - .3 remove the plant immediately at the Contractor's expense.

- .6 Should the Contactor fail to comply with the above requirement, removal will be undertaken by the Departmental Representative and all costs related thereto shall be charged to the Contractor.

1.8 Floating Plant

- .1 The Contractor shall provide equipment of sufficient size and capacity to undertake the Work as described in the Contract Drawings, including excavation of existing materials, and transport and placement of materials. All required equipment to the execution of the Contract shall be approved by Departmental Representative.
- .2 All plant and equipment must be maintained in good and seaworthy condition throughout the duration of the Contract. Any required maintenance and repair work shall be completed promptly.

PART 2 - PRODUCTS

2.1 Not used

- .1 Not Used.

PART 3 - EXECUTION

3.1 Floating Plant

- .1 Mark floating plant with lights in accordance with the most stringent of the following regulations:
 - .1 International Rules of the Road;
 - .2 Regulations for the Prevention of Collisions;
 - .3 Rules of the Road for the Great Lakes.
- .2 Maintain radio watch on board.
- .3 Place and maintain buoys and lights as required to define the limits of the Work throughout the duration of the Contract.
- .4 The Contractor shall supply, place/moor in position and maintain all buoys/markers required to properly execute the work. In the event that any of these buoys/markers sink or go adrift, by chance or by accident, they shall be re-floated and/or recovered by the Contractor at its own expense to the satisfaction of the Departmental Representative. The Contractor shall assume responsibility for all accidents of any kind whatsoever due to the buoys/markers being improperly placed or insufficiently visible during the day or improperly lighted during the night or for any other reason.

- .5 Keep all signals and lights required to be installed on all floating plant required for the work in accordance with the Collision Regulations and the Navigation Safety Regulations for the Great Lakes. All equipment required for the work shall be properly identified and visible at all times.

END OF SECTION

PART 1 - GENERAL

1.1 Section content

- .1 Inspection and testing by inspection firms or laboratory as designated by the Department Representative.

1.2 Appointment and payment

- .1 Departmental Representative will appoint and pay for services of testing laboratory except follows:
 - .1 Inspection and testing required by laws, ordinances, rules, regulations or orders of public authorities.
 - .2 Inspection and testing performed exclusively for Contractor's convenience.
 - .3 Testing, adjustment and balancing of conveying systems, mechanical and electrical equipment and systems.
 - .4 Mill tests and certificates of compliance.
 - .5 Tests specified to be carried out by Contractor under supervision of the Departmental Representative.
 - .6 Additional tests as specified.
- .2 Where tests or inspections by designated testing laboratory reveal Work not in accordance with contract requirements, the Contractor is to pay costs for additional tests or inspections as required by the Departmental Representative to verify acceptability of corrected work.

1.3 Contractor's responsibilities

- .1 Provide labour, equipment and facilities to:
 - .1 Provide access to Work for inspection and testing.
 - .2 Facilitate inspections and tests.
 - .3 Make good Work disturbed by inspection and test.
 - .4 Provide storage on site for laboratory's exclusive use to store equipment and cure test samples.
- .2 Notify the Departmental Representative sufficiently in advance of operations to allow for assignment of laboratory personnel and scheduling of test.
- .3 Where materials are specified to be tested, deliver representative samples in required quantity to testing laboratory.
- .4 Pay costs for uncovering and making good Work that is covered before required inspection or testing is completed and approved by Departmental Representative.

PART 2 - PRODUCTS

2.1 Not used

.1 Not Used.

PART 3 - EXECUTION

3.1 Not used

.1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 Definitions

- .1 Activity: element of Work performed during course of Project. Activity normally has expected duration, and expected cost and expected resource requirements. Activities can be subdivided into tasks.
- .2 Bar Chart (GANTT Chart): graphic display of schedule-related information. In typical bar chart, activities or other Project elements are listed down left side of chart, dates are shown across top, and activity durations are shown as date-placed horizontal bars. Generally Bar Chart should be derived from commercially available computerized project management system.
- .3 Baseline: original approved plan (for project, work package, or activity), plus or minus approved scope changes.
- .4 Construction Work Week: Monday to Friday or Saturday, inclusive, will provide five or six day work week and define schedule calendar working days as part of Bar (GANTT) Chart submission.
- .5 Duration: number of work periods (not including holidays or other nonworking periods) required to complete activity or other project element. Usually expressed as workdays or workweeks.
- .6 Master Plan: summary-level schedule that identifies major activities and key milestones.
- .7 Milestone: significant event in project, usually completion of major deliverable.
- .8 Project Schedule: planned dates for performing activities and the planned dates for meeting milestones. Dynamic, detailed record of tasks or activities that must be accomplished to satisfy Project objectives. Monitoring and control process involves using Project Schedule in executing and controlling activities and is used as basis for decision making throughout project life cycle.
- .9 Project Planning, Monitoring and Control System: overall system operated by Departmental Representative to enable monitoring of project work in relation to established milestones.

1.2 Requirements

- .1 Ensure Master Plan and Detail Schedules are practical and remain within specified Contract duration.
- .2 Plan to complete Work in accordance with prescribed milestones and time frame.
- .3 Limit activity durations to maximum of approximately 10 working days, to allow for progress reporting.

- .4 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Interim Certificate and Final Certificate as defined times of completion are of essence of this contract.

1.3 Action and informational submittals

- .1 Submit to the Departmental Representative within five (5) working days of Tender acceptance, an Execution Calendar describing the planification and work following on the first 4 piles.
- .2 Submit to the Departmental Representative within five (5) working days of Award of Contract Bar (GANTT) Chart as Master Plan for planning, monitoring and reporting of project progress.
- .3 Submit Project Schedule of all other works to the Departmental Representative within five (5) working days of receipt of acceptance of Master Plan.

1.4 Project milestones

- .1 Work shall be completed as mentioned in the SA06 article of the Tender Documents.

1.5 Master plan

- .1 Structure schedule to allow orderly planning, organizing and execution of Work as Bar Chart (GANTT).
- .2 The Consultant will review and return revised schedules within four (4) working days.
- .3 Revise impractical schedule and resubmit within three (3) working days.
- .4 Accepted revised schedule will become the Master Plan and be used as baseline for updates.

1.6 Project schedule

- .1 Develop a detailed Project Schedule derived from Master Plan.
- .2 Ensure detailed Project Schedule includes as minimum milestone and activity types as follows:
 - .1 Award.
 - .2 Shop Drawings, Samples.
 - .3 Mobilization.
 - .4 Demolition and excavation
 - .5 Dredging.
 - .6 Material delivery.
 - .7 Inclined and drilled tie-rods

- .8 Pile driving.
- .9 Sheet piling driving.
- .10 Horizontal tie-rods
- .11 Installation of the concrete wall and slab.
- .12 Berm construction
- .13 Wharf accessories: bollards, fenders, ladders.
- .14 Wharf lighting and water distribution.
- .15 Installation of cathodic protection conduits
- .16 Gangway and floating dock
- .17 Mechanical winch
- .18 Asphalt
- .19 Demobilization.

1.7 Project schedule reporting

- .1 Update Project Schedule on a monthly basis reflecting activity changes and completions, as well as activities in progress.
- .2 Include as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays and impact with possible mitigation.

1.8 Project meetings

- .1 Discuss Project Schedule at regular site meetings, identify activities that are behind schedule and provide measures to regain slippage. Activities considered behind schedule are those with projected start or completion dates later than current approved dates shown on baseline schedule.
- .2 Weather related delays with their remedial measures will be discussed and negotiated.

PART 2 - PRODUCTS

2.1 Not used

- .1 Not used.

PART 3 - EXECUTION

3.1 Not used

- .1 Not used.

END OF SECTION

PART 1 - GENERAL

1.1 Related requirements

- .1 Section 01 45 00 – Quality control.

1.2 Administrative

- .1 Submit to Departmental Representative submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .2 Do not proceed with Work affected by submittal until review is complete.
- .3 Present shop drawings, product data, samples and mock-ups in SI Metric units.
- .4 Where items or information is not produced in SI Metric units converted values are acceptable.
- .5 Review submittals prior to submission to Departmental Representative. This review represents that necessary requirements have been determined and verified by Contractor, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.
- .6 Notify the Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
- .7 Verify field measurements and affected adjacent Work are co-ordinated.
- .8 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative's review of submittals.
- .9 Keep one reviewed copy of each submission on site.

1.3 Shop drawings and product data

- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.
- .2 Shop drawing of regarding structural items which are different of plans indications or related to Contractor's method of work must be signed and sealed of an Engineer member of OIQ. Departmental Representative will be the only authority to determine which shop drawing requires a seal and signature.

- .3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.
- .4 Allow five (5) days for Departmental Representative's review of each submission.
- .5 Adjustments made on shop drawings by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.
- .6 Make changes in shop drawings as Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of revisions other than those requested.
- .7 Submissions include:
 - .1 Date and revision dates.
 - .2 Project title and number.
 - .3 Name and address of:
 - .1 Subcontractor.
 - .2 Supplier.
 - .3 Manufacturer.
 - .4 The title of each drawing, technical sheet and samples and the number submitted;
 - .5 Any other required information.
- .8 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
- .9 Details of appropriate portions of Work as applicable:
 - .1 Fabrication.
 - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
 - .3 Setting or erection details.
 - .4 Capacities.
 - .5 Performance characteristics.
 - .6 Standards.
 - .7 Operating weight.
 - .8 Wiring diagrams.
 - .9 Single line and schematic diagrams.
 - .10 Relationship to adjacent work.
- .10 After Departmental Representative's review, distribute copies.
- .11 It is possible that the Departmental Representative requires that some shop drawings be sealed and signed by a member of the l'Ordre des Ingénieurs du Québec (OIQ). The Contractor shall comply to this requirement and assume the related expenses.

- .12 Submit copies of product data sheets or brochures for requirements requested in specification Sections and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.
- .13 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- .14 Delete information not applicable to project.
- .15 Supplement standard information to provide details applicable to project.
- .16 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, one copy will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.
- .17 The review of shop drawings by the Departmental Representative is for sole purpose of ascertaining conformance with general concept. This review shall not mean that the Departmental Representative approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract Documents. Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of sub-trades.

1.4 Samples

- .1 Submit for review samples as requested in respective specification Sections. Label samples with origin and intended use.
- .2 Deliver samples prepaid to Departmental Representative.
- .3 Notify Departmental Representative in writing, at time of submission of deviations in samples from requirements of Contract Documents.
- .4 Where colour, pattern or texture is criterion, submit full range of samples.
- .5 Adjustments made on samples by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.
- .6 Make changes in samples which Departmental Representative may require, consistent with Contract Documents.
- .7 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.5 Mock-ups

- .1 Erect mock-ups in accordance with 01 45 00 - Quality Control.

1.6 Certificates and transcripts

- .1 Immediately after award of Contract, submit Workers' Compensation Board status.
- .2 Submit transcription of insurance immediately after Tender acceptance Notice.

PART 2 - PRODUCTS

2.1 Not used

- .1 Not Used.

PART 3 - EXECUTION

3.1 Not used

- .1 Not Used.

END OF SECTION

PART 1 – GENERAL

1.1 Related requirements

- .1 Section 01 35 43 – Environmental Protection.

1.2 References

- .1 Canadian General Standards Board (CGSB)
 - .1 CGSB 51-GP-51M-[81], Polyethylene Sheet for Use in Building Construction.
- .2 Transportation and Dangerous Goods Act (1999)
- .3 Canadian Council of Ministers of the Environment (CCME) Documentation

1.3 Action and informational submittals

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit, prior to start of work, plan detailing management of hazardous wastes.
- .3 Submittals for Progress Meetings: make submittals at least 24 hours prior to scheduled progress meetings as follows:
 - .1 Copies of transport manifests, trip tickets, and disposal receipts for waste materials removed from work area.
 - .2 Other information required by Departmental Representative or relevant to agenda for upcoming progress meeting.
- .4 Site Layout: within 7 days after date of Notice to Proceed and prior to mobilization to site, submit site layout drawings showing existing conditions and facilities, construction facilities and temporary controls provided by Contractor including following:
 - .1 Soil stockpile areas.

1.4 Regulatory requirements

- .1 Provide erosion and sediment control.
- .2 Comply with federal, provincial, and local anti-pollution laws, ordinances, codes, and regulations when disposing of waste materials, debris, and rubbish.

- .3 Work to meet or exceed minimum requirements established by federal, provincial, and local laws and regulations which are applicable.
 - .1 Contractor: responsible for complying with amendments as they become effective.
- .4 In event that compliance exceeds scope of work or conflicts with specific requirements of contract notify Departmental Representative immediately.

1.5 Soil stockpiling facilities

- .1 Provide, maintain, and operate storage/stockpiling facilities as required.
- .2 Install liner below proposed stockpile locations to prevent contact between stockpile material and ground. Equip facility with tarps capable of covering stockpiled material until dispose of material off site.

1.6 Vehicular access and parking

- .1 Maintenance and Use:
 - .1 Prevent contamination of access roads. Immediately scrape up debris or material on access roads which is suspected to be contaminated as determined by Departmental Representative; transport and place into designated area approved.
 - .2 Departmental Representative may collect soil samples for chemical analyses from traveling surfaces of constructed and existing access routes prior to, during, and upon completion of Work. Excavate and dispose of clean soil contaminated by Contractor's activities at no additional cost to Departmental Representative.

1.7 Dust and particulate control

- .1 Execute Work by methods to minimize raising dust from construction operations.
- .2 Implement and maintain dust and particulate control measures.
- .3 Provide positive means to prevent airborne dust from dispersing into atmosphere. Use water for dust and particulate control.
- .4 Use chemical means for water misting system for dust and particulate control only with Departmental Representative's prior written approval.
- .5 As minimum, use appropriate covers on trucks hauling fine or dusty material. Use watertight vehicles to haul wet materials.
- .6 Prevent dust from spreading to adjacent property sites.

- .7 Departmental Representative will stop work at any time when Contractor's control of dusts and particulates is inadequate for wind conditions present at site, or when air quality monitoring indicates that release of fugitive dusts and particulates into atmosphere equals or exceeds specified levels.
- .8 If Contractor's dust and particulate control is not sufficient for controlling dusts and particulates into atmosphere, stop work. Contractor must discuss procedures that Contractor proposes to resolve problem. Make necessary changes to operations prior to resuming excavation, handling, processing, or other work that may cause release of dusts or particulates.

1.8 Pollution control

- .1 Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious toxic substances and pollutants produced by construction operations.
- .2 Be prepared to intercept, clean up, and dispose of spills or releases that may occur whether on land or water. Maintain materials and equipment required for cleanup of spills or releases readily accessible on site.
- .3 Promptly report spills and releases potentially causing damage to environment to:
 - .1 Authority having jurisdiction or interest in spill or release including conservation authority, water supply authorities, drainage authority, road authority, and fire department.
 - .2 Owner of pollutant, if known.
 - .3 Person having control over pollutant, if known.
 - .4 Departmental Representative.
- .4 Contact manufacturer of pollutant if known and ascertain hazards involved, precautions required, and measures used in cleanup or mitigating action.
- .5 Take immediate action using available resources to contain and mitigate effects on environment and persons from spill or release.
- .6 Provide spill response materials including, containers, adsorbent, shovels, and personal protective equipment. Make spill response materials available at all times in which hazardous materials or wastes are being handled or transported. Spill response materials: compatible with type of material being handled.

1.9 Progress cleaning

- .1 Maintain cleanliness of Work and surrounding site to comply with federal, provincial, and local fire and safety laws, ordinances, codes, and regulations.
- .2 Co-ordinate cleaning operations with disposal operations to prevent accumulation of dust, dirt, debris, rubbish, and waste materials.

1.10 Final decontamination

- .1 Perform final decontamination of construction facilities, equipment, and materials which may have come in contact with potentially contaminated materials prior to removal from site.
- .2 Perform decontamination as specified to satisfaction of Departmental Representative.

1.11 Excavated soils management

- .1 Excave and sieve contaminated soils in a way to take apart coarse non-contaminated granular material. Dispose excavated granular materials according to their metal and/or petroleum hydrocarbon C10-C50 and/or polycyclic aromatic hydrocarbon (PAH) concentrations in authorized sites and conform to the MDDEFP regulation. Table 1 (jointed to the present section) show an estimated volume of filling to manage in the excavation works according to their contamination levels measured and according to the excavation depth. Boreholes localization is presented on figure 1 (jointed to the present section). Material transportation must be realized in waterproofed containers or in dump trucks with a protective cloth. Soils quality classification is according to the excavated soil management table of *Contaminated soils rehabilitation and soils protection politics* (recent edition) of MDDEFP. Based on this specification document, granular materials which can be used, after sorting, as 0-300 mm backfilling, are the ones which are conform to the CEO regulation criteria. Other granular material are disposed in authorized sites according to their concentrations and regulations.

PART 2 – PRODUCTS

2.1 Not used

- .1 Not Used.

PART 3 – EXECUTION

3.1 Not used

- .1 Not Used.

END OF SECTION

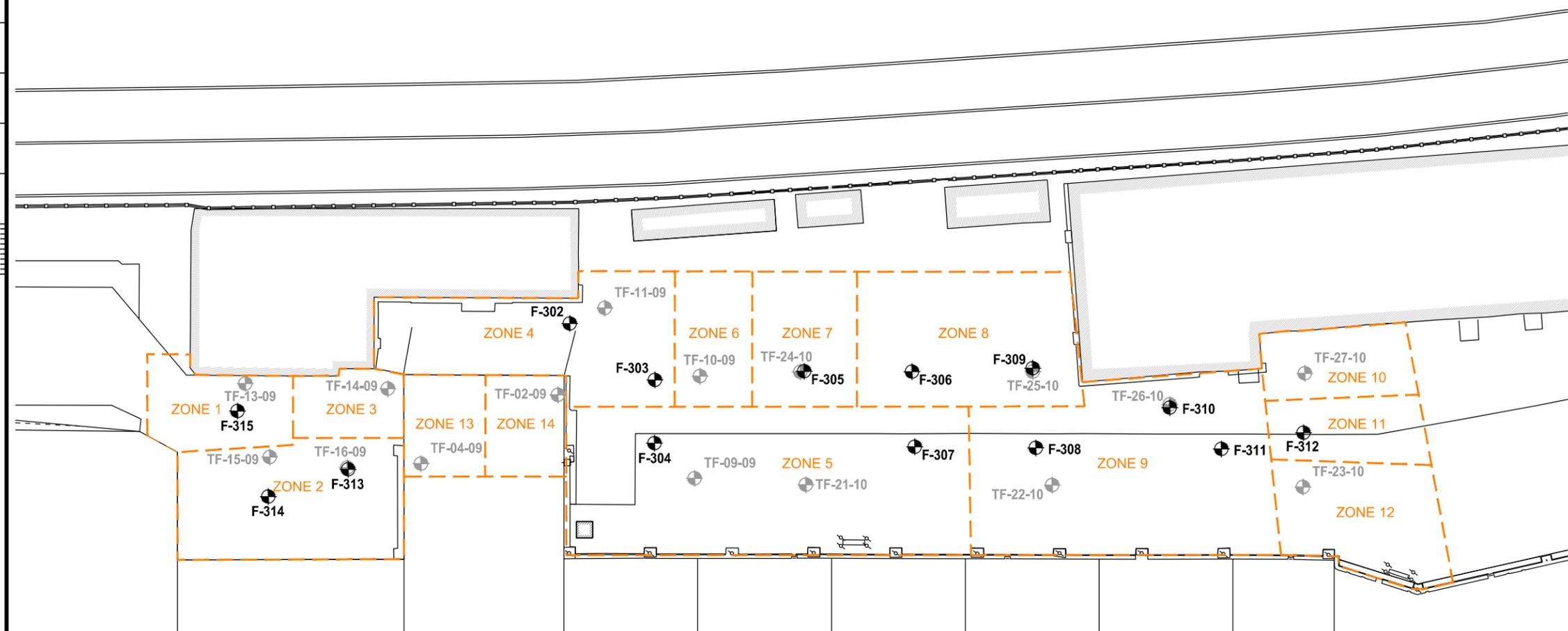
Figure 1 - Section 01 35 13.43 - Special Project Procedures for Contaminated Sites

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 5
 4
 3
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 1
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Legend

- Curbside
- Building
- Existing Borehole (LVM, 2010)
- Borehole (LVM, 2013)
- Extent of the Zone (See the Table for Volume)



Client
ROCHE LTÉE, GROUPE-CONSEIL

Project
ADDITIONAL ENVIRONMENTAL SOIL INVESTIGATION
SECTIONS 93, 97 AND 98
QUAI DE LA REINE, QUEBEC, QUEBEC

Title
**FIGURE 1
LOCATION PLAN OF AREAS SHOWING IMPACTED SOILS AND BOREHOLES LOCATION**

LVM inc.
1260, Lebourgneuf Blvd, suite 250
Québec (Québec) G2K 2G2
Phone : 418.626.1688
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Prepared G. Lemieux	Discipline Environment	Project Manager L. Gauthier, eng.
Drawn G. Godmaire	Scale 1 : 750	Sequence No. 01 of 02
Checked L. Gauthier, eng.	Date 02-10-2014	



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References
PLAN PROVIDED BY THE CLIENT

Proj. No.	Project	Wbs	Disc.	Type	Drawing No.	Rev.
129	B-0007458	2	HG	D	0201	00

Table 1 - Section 01 35 13.43 - Special Project Procedures for Contaminated Sites



Table 4 : Evaluation of Volumes of Soils to be Managed Based on the MDDEFP Criteria, the CCME-CSQG and DFO's Recommendations

Zone	Elevation of the Surface - Tidal Elevation ¹	Elevation CGVD-28 ²	Influence Area of the Sounding (m ²)	Estimated Depth (m)		Elevation of the excavation (elevation CGVD-28)		Estimated Thickness (m)	Parametres Exceeding Applicable Criteria ³ / Applicable Standards ⁴	Estimated Volumes of Materials (m ³ in place) ⁵				Excavated Material Management Mode
				from	to	from	to			MDDEFP ³			Not Determined	
										<A	A-B	B-C		
1	6,50	4,76	255	0,20	0,76	4,56	4,00	0,56	PAH	85				Reuse on the site (Terrestrial)
				0,76	1,52	4,00	3,24	0,76	PAH		84			Reuse on the site (Terrestrial)
				1,52	Exc. Bottom	3,24			N/D				43	On site characterization (stockpile)
2	6,50	4,77	587	0,20	4,57	4,57	0,20	4,37	-	2 269				Reuse by immersion (Berm)
				4,57	Exc. Bottom	0,20			N/D				268	On site characterization (stockpile)
3	6,50	4,82	162	0,20	1,00	4,62	3,82	0,80	PAH		85			Reuse on the site (Terrestrial)
				1,00	1,20	3,82	3,62	0,20	PAH	16				Reuse on the site (Terrestrial)
				1,20	Exc. Bottom	3,62			N/D				54	On site characterization (stockpile)
4	6,50	4,76	651	0,08	0,76	4,68	4,00	0,68	-	225				Reuse by immersion (Berm)
				0,76	5,33	4,00	-0,57	4,57	PAH/Metals		318			Reuse on the site (Terrestrial)
5	6,50	4,63	1 337	0,20	1,52	4,43	3,11	1,32	-	1 765				Reuse by immersion (Berm)
				1,52	5,33	3,11	-0,70	3,81	PAH		3 942			Reuse on the site (Terrestrial)
6	6,50	4,78	233	0,09	0,70	4,69	4,08	0,61	PAH / Metals/ PH C10-C50			101		Off-Site Disposal
				0,70	Exc. Bottom	4,08			PAH		366			Reuse on the site (Terrestrial)
7	6,50	4,88	316	0,08	0,76	4,80	4,12	0,68	Metals		154			Reuse on the site (Terrestrial)
				0,76	1,52	4,12	3,36	0,76	-	126				Reuse by immersion (Berm)
				1,52	2,29	3,36	2,59	0,77	PAH		117			Reuse on the site (Terrestrial)
				2,29	3,05	2,59	1,83	0,76	PAH		105			Reuse by immersion (Berm)
8	6,50	4,90	662	3,05	4,88	1,83	0,00	1,83	PAH		128			Reuse on the site (Terrestrial)
				0,08	0,76	4,82	4,14	0,68	-	273				Reuse by immersion (Berm)
				0,76	1,52	4,14	3,38	0,76	Metals		155			Reuse on the site (Terrestrial)
				1,52	2,29	3,38	2,61	0,77	PAH		137			Reuse by immersion (Berm)
9	6,50	4,65	1 129	2,29	3,05	2,61	1,85	0,76	-	117				Reuse on the site (Terrestrial)
				3,05	5,33	1,85	-0,43	2,28	PAH/Metals		134			Reuse on the site (Terrestrial)
				0,14	0,76	4,51	3,89	0,62	-	517				Reuse by immersion (Berm)
				0,76	1,52	3,89	3,13	0,76	PAH		449			Reuse by immersion (Berm)
10	6,50	4,77	235	1,52	Exc. Bottom	3,13			N/D				1 586	On site characterization (stockpile)
				0,08	0,80	4,69	3,97	0,72	Metals			67		Off-Site disposal
11	6,50	4,75	226	0,08	1,07	4,67	3,68	0,99	-	70				Reuse by immersion (Berm)
				0,08	0,76	4,59	3,91	0,68	Metals			231		Off-Site disposal
12	6,50	4,67	403	0,76	3,00	3,91	0,76	2,24	-	549				Reuse on the site (Terrestrial)
				3,00	Exc. Bottom	1,67			N/D				393	On site characterization (stockpile)
13*	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	PAH			165		Off-Site disposal
14*	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	PAH			165		Reuse on the site (Terrestrial)

TOTAL : 6 012 6 339 564 2 344

Notes :

- 1: The value of the elevation of 6.5 meters (Sea Level) is the elevation of the top of the concrete slab as shown on the plans provided by Roche.
 - 2: The value of the CGVD-28 elevation corresponds to the average elevation of the shown area. The survey was conducted using a Leica DGPS using RTK cellular (network Smartnet - Geoid HT 2.0).
 - 3: Refers to generic criteria of the *Politique de protection des sols et de réhabilitation des terrains contaminés* of the MDDEFP.
 - 4: Refers to the *Règlement sur la protection et la réhabilitation des terrains* and the *Règlement sur l'enfouissement des sols contaminés* du Québec.
 - 5: The volumes are calculated considering the bottom of excavations as shown on the plans and reporting the depths of samples to the top of the slab (tidal elevation). The model was performed on Civil 3D. The volumes of the existing structures (wood and concrete) are included in the volumes.
 - * The evaluation of the volumes was performed by the client.
- N/D : Not Determined

Management Mode	m3
Off-Site Disposal	564
Reuse on the Site (Terrestrial)	6 416
Reuse by Immersion (Berm)	5 936
On site Characterization (stockpile)	2 344

Total 15 260

PART 1 – GENERAL

1.1 Section content

- .1 Operations shall be managed so that the safety and security of the public and of site workers always take precedence over cost and scheduling considerations.

1.2 Related section

- .1 Section 01 33 00 – Submittal Procedures.

1.3 References

- .1 Canada Labour Code - Part II, Canadian Occupational Safety and Health Regulations
- .2 Canadian Standards Association (CAN/CSA)
- .3 Canadian General Standards Board (CAN/CGSB)
- .4 Workplace Hazardous Materials Information System (WHMIS)
- .5 Occupational Health and Safety Act, R.S.Q. Chapter S-2.1
- .6 Construction Safety Code, S-2.1, r.6

1.4 Submittals

- .1 Submit the documents required according to section 01 33 00 – Submittal Procedures.
- .2 Submit to Departmental Representative, the “Commission de la santé et de la sécurité au travail” and the “Association paritaire en santé et sécurité du secteur de la construction” (ASP Construction) the site-specific safety program, as outlined in Clause 1.9.2 at least 30 days prior to start of work. The Contractor must review his program during the course of the project if any change occurs in work methods or site conditions. The Departmental Representative may, after receiving the program or at any time during the project, ask the Contractor to update or modify the program in order to better reflect the actual conditions or activities at the construction site. The Contractor must make the required changes before work begins.
- .3 Submit to Departmental Representative the site inspection sheet, duly completed weekly.
- .4 Submit to Departmental Representative within 24 hours a copy of any inspection report, correction notice or recommendation issued by federal or provincial inspectors.
- .5 Submit to Departmental Representative within 24 hours an investigation report for any accident involving injury and any incident exposing a potential hazard.

- .6 Submit to Departmental Representative all safety data sheets for hazardous materials to be used at the site at least 3 days before they are to be used.
- .7 Submit to Departmental Representative copies of all training certificates required for application of the safety program, in particular:
 - .1 General construction site safety and health courses;
 - .2 Safety officer attestations;
 - .3 First aid in the workplace and cardiopulmonary resuscitation;
 - .4 Work in confined spaces;
 - .5 Lockout procedures;
 - .6 Wearing and fitting of individual protective gear;
 - .7 Forklift truck;
 - .8 Positioning platform;
 - .9 Work near water with drowning risk;
 - .10 Work involving third party;
 - .11 Any other training required by regulations or safety programs.
- .8 Medical examinations: Wherever legislation, regulations, directives, specification or a safety program require medical examinations, Contractor must:
 - .1 Prior to start-up, submit to Departmental Representative certificates of medical examination for all concerned supervisory staff and employees who will be on duty when the site opens.
 - .2 Thereafter, submit without delay certificates of medical examination for any newly hired concerned personnel as and when they start work at the site.
- .9 Emergency plan: The emergency plan, as defined in 1.9.3, shall be submitted to Departmental Representative at the same time as the site-specific safety program.
- .10 Notice of site opening: Notice of site opening shall be submitted to the "Commission de la santé et de la sécurité au travail" (CSST) before work begins. A copy of such notice shall be submitted to Departmental Representative at the same time and another posted in full view at the site. During demobilization, a notice of site closing shall be submitted to the CSST, with copy to Departmental Representative.
- .11 Permits: Obtain all required municipal, provincial and federal permits according to contractual clauses. Send a copy of each permit request and each permit to Departmental Representative without delay.
- .12 Plans and certificates of compliance: Submit to the CSST and to Engineer a copy signed and sealed by an engineer of all plans and certificates of compliance required pursuant to the Construction Safety Code (S 2.1, r. 6), or by any other legislation or regulation or by any other clause in the specifications or in this contract. Copies of these documents must be on hand at the site at all times.
- .13 Certificate of compliance delivered by the CSST: The certificate of compliance is a document delivered by the CSST confirming that the Contractor is acting in accordance with the CSST, i.e. that he has paid out all the benefits concerning this contract. This document must be delivered to the Departmental Representative at the end of the work.

1.5 Hazards assesment

- .1 Identify all hazards inherent in each task to be carried out at the site.
- .2 Plan and organize work so as to eliminate hazards at source or promote mutual protection so that reliance on individual protective gear can be kept to a minimum. Where individual protection against falling is required, workers shall use safety harness that meets standard CAN/CSA- Z-259.10 - M90. Safety belts shall not be used as protection against falling.
- .3 Equipment, tools and protective gear which cannot be installed, fitted or used without compromising the health or safety of workers or the public, shall be deemed inadequate for the work to be executed.
- .4 All mechanical equipment shall be inspected before delivery to the site. Before using any mechanical equipment, submit to Departmental Representative a certificate of compliance signed by a qualified mechanic. Whenever he suspects a defect or accident risk, Departmental Representative may at any time order the immediate shut-down of equipment and require a new inspection by a specialist of his own choosing.

1.6 Meetings

- .1 Contractor's decisional representative must attend any meetings at which site safety and health issues are to be discussed.
- .2 Set up a site safety committee, and convene meetings every 2 weeks in accordance with the Construction Safety Code.

1.7 Legal and regulatory requirements

- .1 Comply with all legislation, regulations and standards applicable to the site and its related activities.
- .2 Comply with specified standards and regulations to ensure safe operations at site containing hazardous or toxic materials.
- .3 Regardless of the publication date shown in the Construction Safety Code, always use the most recent version.

1.8 Site/implementation conditions

- .1 The Contractor shall take into account, while scheduling works, the load restrictions to wharves 97&98 and carrying capacity of 25 Kpa on wharf 96, and the presence of buildings near the work area.
- .2 Personnel in charge of works on work-site are exposed to the following elements:
 - .1 Works close to a water course;
 - .2 Works implying drowning hazards;

- .3 Works implying falling out hazards;
 - .4 Works in closed spaces as described in Canada Occupational Health and Safety Regulations, article 11.1, Part II.
- .3 At the site, take account of the following specific conditions:
- .1 Marine work with difference of tide of around 6.50 metre and variable water depth that can go up to 12.0 metres under the zero of nautical charts;
 - .2 The weather conditions may be difficult, including the possibility of strong winds, waves, cold temperatures and large moving ice floes;
 - .3 Maintain the continuity of various services in a safe manner throughout the duration of the works.
 - .4 La protection des ouvrages au fur et à mesure de l'avancement des travaux pour la sécurité des ouvriers et la stabilité des ouvrages jusqu'à l'acceptation finale des travaux demeure à l'entière responsabilité de l'Entrepreneur.

1.9 Safety and health management

- .1 Acknowledge and assume all the tasks and obligations which customarily devolve upon a principal Contractor under the terms of the Occupational Health and Safety Act (R.S.Q., chapter S-2.1) and the Construction Safety Code (S-2.1, r.6).
- .2 Develop a site-specific safety program based on the hazards identified and apply it from the start of project work until close-out is completed. The safety program must take account of all information appearing in 1.8 and must be submitted to all parties concerned, in accordance with the provisions set forth in 1.4. At a minimum, the site-specific safety program must include:
 - .1 Company safety and health policy;
 - .2 A description of the work, total costs, schedule and projected workforce curve;
 - .3 Flow chart of safety and health responsibility;
 - .4 The physical and material layout of the site;
 - .5 First-aid and first-line treatment standards;
 - .6 Identification of site-specific hazards;
 - .7 Risk assessment for the tasks to be carried out, including preventive measures and the procedures for applying them;
 - .8 Training requirements;
 - .9 Procedures in case of accident/injury;
 - .10 Written commitment from all parties to comply with the prevention program;
 - .11 Scheduled site inspection based on the preventive measures.
- .3 The Contractor must draw up an effective emergency plan based on the characteristics and constraints of the site and its surroundings. Submit the emergency plan to all parties concerned, pursuant to the provisions of 1.4. The emergency plan must include:
 - .1 Complete evacuation procedure, including planned means to evacuate personnel inside caissons cells, if required;
 - .2 Identification of resources (police, firefighters, ambulance services, etc.);

- .3 Identification of persons in charge at the site;
 - .4 Identification of those with first-aid training;
 - .5 Training required for those responsible for applying the plan;
 - .6 Any other information needed, in the light of the site characteristics.
- .4 For all works implying falling out hazards, comply with the following requirements:
- .1 The Contractor shall ensure all workers exposed to fall out hazard of more than 2.4 m are protected against falling.
 - .2 Plan and organize works in order to help eliminating dangers or to ensure collective protection and thus reduce individual protection equipment needs to a minimum. When individual protection to avoid falling is required, workers must use a security harness in compliance with CAN-CSA-Z-259.10-M90. A safety belt shall not be used as protection to avoid falling.
 - .3 Wearing a safety harness is obligatory on all elevating platform with telescoping mast, articulated or swivel.
 - .4 Define danger zones every places where equipment for working in height is required.
 - .5 As principal contractor, the Contractor will comply with requirements of Canada Occupational Health and Safety Regulations, part XI, for works accomplished in closed spaces.

1.10 Responsibilities

- .1 No matter the size of the construction site or how many workers are present at the workplace, designate a competent person to supervise and take responsibility for health and safety. Take all necessary measures to ensure the health and safety of persons and property at or in the immediate vicinity of the site and are affected by the course of works.
- .2 Take all necessary measures to ensure application of and compliance with the safety and health requirements of the Contract Documents, applicable Federal and Provincial regulations and standards as well as the site-specific safety program, complying without delay with any order or correction notice issued by the “Commission de la santé et de la sécurité au travail (CSST)”.
- .3 Take all necessary measures to keep the site clean and in good order throughout the course of the work.

1.11 Communications and posting

- .1 Make all necessary arrangements to ensure effective communication of safety and health information at the site. As they arrive on site, all workers must be informed of their rights and obligations pertaining to the site specific safety program. Insist on their right to refuse to perform work which they feel may threaten their own health, safety or physical integrity or that of other persons at the site. Keep and update a written record of all information transmitted with signatures of all affected workers.
- .2 Ensure that workers be aware of environmental and safety measures.

- .3 The following information and documents must be posted in a location readily accessible to all workers:
 - .1 Notice of site opening;
 - .2 Identification of main Contractor;
 - .3 Company SST policy;
 - .4 Site-specific safety program;
 - .5 Emergency plan;
 - .6 Data sheets for all hazardous material used at the site;
 - .7 Minutes of site committee meetings;
 - .8 Names of site committee representatives;
 - .9 Names of those with first-aid training;
 - .10 Action reports and correction notices issued by the CSST.

1.12 Unforeseen circumstances

- .1 Whenever a source of danger not defined in the specifications or identified in the preliminary site inspection arises as a result of or in the course of the work, immediately suspend work, take appropriate temporary measures to protect the workers and the public and notify Departmental Representative, both verbally and in writing. Modify or update the site specific safety program in order to resume work in safe conditions.

1.13 Inspection of site and correction of hazardous situations

- .1 Inspect the work site and complete the site inspection sheet at least once a week.
- .2 Immediately take all necessary measures to correct any lapses from legislative or regulatory requirements and any hazards identified by a government inspector, by the Departmental Representative, by the site safety and health coordinator or during routine inspections.
- .3 Submit to Departmental Representative written confirmation of all measures taken to correct lapses and hazardous situations.
- .4 Give the safety officer or, where there is no safety officer, the person assigned to safety and health responsibilities, full authority to order interruption and resuming of work as and when deemed necessary or desirable in the interests of safety and health. Act always so that the safety and health of the public and site workers and environmental protection take precedence over cost and scheduling considerations.
- .5 Without limiting the scope of sections 1.9 and 1.10, Departmental Representative may order cessation of work if, in his/her view, there is any hazard or threat to the safety or health of site workers or the public or to the environment.

1.14 Blasting

- .1 Blasting and other use of explosives are forbidden unless authorized in writing by Departmental Representative

1.15 Powder actuated devices

- .1 L'utilisation de pistolets de scellement ou d'autres dispositifs à cartouches doit être autorisée par le Représentant ministériel.
- .2 Toute personne qui utilise un pistolet de scellement doit détenir un certificat de formation et satisfaire à toutes les exigences de la section 7 du Code de sécurité pour les travaux de construction (S-2.1, r. 6).
- .3 Tout autre dispositif à cartouche doit être utilisé selon les indications du fabricant et selon les normes et règlements applicables.

1.16 Hot work

- .1 Hot work means any work where a flame is used or a source of ignition may be produced, i.e., riveting, welding, cutting, grinding, burning and heating.
- .2 Before work begins, obtain the "Hot Work Permit" of PWGSC (ELF 102) completed by the Manager in Charge of Worksite when the duties to be undertaken involve hot work.
- .3 Work on construction sites must be carried out in compliance with Fire Commissioner of Canada Standard CI 301, Standard for Construction Operations, June 1982.
- .4 A working portable fire extinguisher suitable to the fire risk shall be available and easily accessible within a 5 m radius from any flame, spark source or intense heat.
- .5 An individual shall be appointed to go on rounds (fire) for a period of 30 minutes after the end of the shift. This individual shall countersign the permit and give it to the person in charge of the work site (or the individual he/she appoints) after the 30 minutes period.
- .6 The storage of propane cylinders shall comply with the CAN/CSA-B149.2-F00 Propane Storage and Handling Code and meet the specific conditions outlined in this document. The cylinders shall be stored outdoors, in a safe place, away from any unauthorized handling, in a storage cabinet specially designed for this purpose. The cylinders shall be securely kept upright and locked at all times in a place where no vehicles are allowed, unless the cylinders are protected by bars or the equivalent.
- .7 All of the cylinders used or stored on the work site shall be equipped with a collar designed to protect the valve.
- .8 Filling the cylinders on the work site is forbidden, unless a procedure compliant with the CAN/CSA B149.2 standard is approved and authorized by the Engineer.

1.17 Welding and cutting

Note: For welding and cutting activities, make sure that that the following conditions are met in addition to the ones mentioned above.

- .1 The works must be carried out in accordance with the articles “3.13 Compressed gas supply” and “3.14 Welding and cutting” of the Safety Code for the construction industry, S-2.1, r. 6.
- .2 Work on construction sites must be carried out in compliance with Fire Commissioner of Canada Standard CI 302, Standard for Welding and Cutting, May 1979.
- .3 Welding and cutting devices are excessively dangerous with regard to fire risk. The following precautions must be taken at the time of this type of work:
 - .1 Store all compressed gas cylinders on fireproof fabrics and make sure that the room is well ventilated.
 - .2 Store all oxygen cylinders more than 6 metres from a flammable gas cylinder (ex: acetylene) or a combustible such as oil or grease, unless the oxygen cylinder is separated from it by a wall made of non-combustible material as mentioned in the article 3.13.4 of the Safety Code for the construction industry, S-2.1, r. 6.
 - .3 Set up fireproof fabrics when welding is done in superposition and there is risk of spark fall.
 - .4 Ensure to store bottles away from all heat sources.
 - .5 Do not store bottles close to staircases, exits, corridors and elevators.
 - .6 Do not put acetylene in contact with metals such as silver, mercury, copper and alloys of brass having more than 65 % copper, to avoid the risk of an explosive reaction.
 - .7 Check that electric arc welding equipment has the necessary tension and is properly grounded.
 - .8 Ensure that the conducting wires of electric welding equipment are not damaged.
 - .9 Place the welding equipment on flat ground and cover/protect from the elements.
 - .10 Move away or protect combustible materials which are near welding equipment.
 - .11 Prohibit to welding or cutting any closed container.
 - .12 Implement suitable protection measures when welding or cutting is carried out near drains, tanks or other receptacle of flammable material.
 - .13 Do not perform any cutting, welding or work with a naked flame on a container, a tank, a pipe or other container containing a flammable or explosive substance unless:
 - .1 Air Samples indicating that work can be made without danger have been taken; or
 - .2 Provisions to ensure the safety of the workers have been implemented.

1.18 Lifting devices and operations

- .1 Position lifting devices in such a way that loads are not carried over workers, occupants or the public.

- .2 The Contractor must transmit to the Departmental Representative a work procedure, signed and sealed by an engineer, including the position of the crane, a sketch of the trajectory of the transported loads, the length of the mast and a plan of lifting for the handling of loads above occupied buildings. Departmental Representative can, if judge necessary, impose work of evening and weekend.
- .3 All mobile cranes manufactured after January 1, 1980 must be equipped with a safety device against overload.
- .4 All mobile cranes with cables manufactured after January 1, 1980, must be provided with a safety device against two-blocking.
- .5 Provide the Departmental Representative with a mechanical service inspection certificate for each lifting device. Inspections must be carried out just prior to the delivery of the equipment to the work site.
- .6 For all winch installations, provide the Departmental Representative with the installation method recommended by the manufacturer. If unavailable, the Contractor shall provide an installation procedure signed and sealed by an engineer. The installation procedure must take into account the load bearing capacity, the amount, weight and location of counterweight and any other detail that may affect the capacity and stability of the device.
- .7 In addition to the mechanical service inspection certificate, the annual inspection certificate and the crane logbook must be aboard all crane and crane-truck cabs.
- .8 The entire lifting area shall be closed off to prevent non-authorized people from entering it.
- .9 Obtain any required permits, at its own expense, in the event the work area must be temporarily closed off to meet the requirements stipulated in the preceding paragraph or for any other reason pertaining to the safety of workers, occupants or the public.
- .10 Inspect carefully all of the slings and lifting accessories and make sure that those in poor condition are destroyed or scrapped.
- .11 Compressed-gas cylinders shall be lifted with a basket specially designed for this purpose.

1.19 Scaffolding

- .1 Foundation:
 - .1 Scaffolding shall be installed on a solid foundation so that it does not slip or rock.
- .2 Assembly, bracing and mooring:
 - .1 All scaffolding shall be assembled, braced and moored in accordance with the manufacturer's instructions and the provisions of the Safety Code for the construction industry.

- .2 Where a situation requires the removal of part of the scaffolding (e.g., crosspieces), submit an assembly procedure signed and sealed by an engineer certifying that the scaffolding assembled in that manner will allow the work to be done safely given the loads to which it will be subject.
 - .3 For scaffolding where the span between two supports is greater than 3 m, provide an assembly plan signed and sealed by an engineer.
- .3 Platforms:
- .1 Scaffolding platforms shall be designed and installed in accordance with the provisions of the Safety Code for the construction industry.
 - .2 If planks are used, they shall be approved and stamped in accordance with section 3.9.8 of the Safety Code for the construction industry (in force January 1, 2002).
 - .3 The platforms shall cover the entire surface protected by the guardrails.
 - .4 The above notwithstanding, scaffolding 4 sections (or 6 metres) high or higher shall have a full platform covering the entire surface of the putlogs every 3 m or fraction thereof, and the components of that platform shall not be moved at any time to create an intermediate landing.
- .4 Guardrails:
- .1 A guardrail shall be installed on every landing.
 - .2 Cross braces shall not be considered guardrails.
 - .3 Where scaffolding 4 sections (or 6 metres) high or higher requiring full platforms is used, guardrails shall be installed on each landing at the start of work and shall remain in place until the work is completed.
- .5 Access:
- .1 Ensure that access to the scaffolding does not compromise worker safety.
 - .2 Where the platforms of the scaffolding are comprised of planks, ladders shall be installed in such a way that planks extending beyond the platform do not block the way up or down.
 - .3 Notwithstanding the provisions of the Safety Code for the construction industry, stairs shall be installed on all scaffolding that has 6 or more rows of uprights or is 6 sections (or 9 metres) high or higher.
- .6 Protection of the public and occupants:
- .1 Identify the boundaries of and barricade the work area so as to limit access to authorized workers only.
 - .2 Install covered walkways, nets or other similar devices to protect the public or the occupants against falling objects.

.7 Use of public thoroughfares:

- .1 Where it is necessary to encroach on a public thoroughfare, obtain at its own's expense any authorizations and permits required by the competent authority.
- .2 Install all required signage, barricades or other devices needed to ensure the safety and security of the public and its own facilities.

1.20 Special conditions for work involving drowning hazards

.1 The following requirements shall be met for work involving drowning risks:

- .1 Comply with section 2.10.13 of the Safety Code for the construction industry.
- .2 (a) Wear a life jacket or buoyancy device that meets the standard set out in the Canadian General Standards Board Standard:
 - .1 CAN/CGSB-65.7-M88, Life Jackets, Inherently Buoyant Type, dated April, 1988.
 - .2 Or for few exceptions, be accepted by Transport Canada.
- (b) or be protected by a safety net or a fall protection system.
- .3 Obtain and forward to the Departmental Representative a letter of compliance issued by Transport Canada for the approval of any vessel (transportation, rescue, inspection, etc.) before work begins. (refer to: Guy Rondeau, Transport Canada, (418) 648 5334).
- .4 Ensure that a rescue vessel moored and in the water is available for each workstation. However, where the vessel is accessible by land, it may serve more than one workstation provided the distance between any workstation and the vessel is less than 100 m.
- .5 Ensure that the vessel has the necessary features to accommodate persons likely to be part of a rescue operation.
- .6 Ensure that the rescue vessel is available for workers at all times in case of an emergency.
- .7 Ensure that a qualified person is available to use the emergency equipment. That person must have a pleasure craft operator card for the length of vessel being used.
- .8 Establish written emergency procedures containing the following information and ensure that all workers subject to those procedures have the training and information needed to apply them:
 - .1 A full description of the procedures, including the responsibilities of the people who have access to the work site;
 - .2 Emergency equipment location.

- .9 Where the work site is a pier, a basin, a jetty, a wharf or any similar structure, a ladder with at least two rungs below the surface of the water shall be installed on the front of the structure every 60 m. This measure shall apply even if the project is a construction project, in which case a temporary (or portable) ladder may be used and removed when the work is complete if the owner does not own the basic facilities.

PART 2 – PRODUCTS

2.1 Not used

- .1 Not Used.

PART 3 – EXECUTION

3.1 Not used

- .1 Not Used.

FIN DE LA SECTION

PART 1 - GENERAL

1.1 Related requirements

- .1 Section 01 11 01 – Work Related General Information.
- .2 Section 01 35 13.43 – Special Procedures: Contaminated Sites.
- .3 Section 01 74 21 – Construction/Demolition Waste Management and Disposal.
- .4 Section 03 30 00 – Cast-in-place Concrete.

1.2 Definitions

- .1 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade environment aesthetically, culturally and/or historically.
- .2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction. Control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.

1.3 Submittals procedures

- .1 Submittals: in accordance with Section 01 33 00 (Submittal Procedures).
- .2 Prior to commencing construction activities or delivery of materials to site, submit Environmental Protection Plan for review and approval by Departmental Representative. Environmental Protection Plan is to present comprehensive overview of known or potential environmental issues which must be addressed during construction.
- .3 The Environmental Protection Plan shall address topics at level of detail commensurate with environmental issues at hand, including required construction task.
- .4 Take into account any requirements specified in related sections.
- .5 Environmental Protection Plan shall include:
 - .1 Name of persons responsible for ensuring adherence to Environmental Protection Plan.
 - .2 Name and qualifications of persons responsible for manifesting hazardous waste to be removed from site.
 - .3 Names and qualifications of persons responsible for training site personnel.

- .4 Descriptions of environmental protection personnel training program.
- .5 Drawings showing locations of proposed temporary excavations or material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on site.
- .6 Traffic control plans include measures to minimize amount of mud transported onto paved public roads by vehicles.
- .7 Spill Control Plan: includes the procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.
- .8 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.
- .9 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, do not become air borne and travel off project site.
- .10 Contaminants prevention plan that: identifies potentially hazardous substances to be used on job site; identifies intended actions to prevent introduction of such materials into air or ground; and detailed provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.
- .11 Historical, archaeological, cultural resources biological resources and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources.

1.4 Fires

- .1 Fires and burning of rubbish on site not permitted.

1.5 Waste management

- .1 Contractor becomes the owner of all non reusable demolition and excavation materials that must be dispose off work site.
- .2 Do not bury rubbish and waste materials on site.
- .3 Grade and classify all non reusable demolition and excavation materials from wharf to manage their future utilisation or disposal in compliance with all applicable environmental regulations.
- .4 All necessary installations for the use of grading and classification of reusable or disposal materials must be plan out of work site and in a safe and predetermined area.
- .5 Reuse as much as possible backfill as well as broken concrete pieces from excavation for new works on site. Prior to proceed with the reuse of material from demolition, obtain the approval from the Departmental Representative.

- .6 Reusable and recyclable materials from demolition are as follows:
 - .1 Metal pieces (bolts, steel plates, fence, etc.) must be recycled;
 - .2 Reusable broken concrete pieces from demolition of slab and walls for work shall respect the following:
 - .1 Be smaller than 30 cm;
 - .2 Not be contaminated by hazardous material. They shall be graded to exclude any non-compatible material to the use;
 - .3 Existing reinforcing bars shall not exceed size of concrete pieces.
 - .3 Creosote wood from cribwork, slab, piles and others of existing wharf cannot be reuse as backfilling.
- .7 Gradually dispose of the non-reusable material from demolition or excavation off work site to authorized sites.
- .8 Waste materials from demolition (non reusable in the new structure) or excavation shall be recycled if possible, and if not, the site of disposal shall be approved by the Quebec ministère du Développement durable, de l'Environnement et des Parcs (MDDEFP). Upon request, the MDDEFP can provide information on the active sites. This includes any dry material, waste or rubbish from demolition or construction.
- .9 All creosote wood shall be disposed to site authorized by the MDDEFP.
- .10 Creosote wood on site shall be stored in a leak-proof container in an approved site by the Departmental Representative. Creosote wood shall be kept inside the container and transported, at the end of works, to an active site authorized by the MDDEFP.
- .11 Excavated and contaminated soils must be managed properly in order not to contaminate clean soil. To eliminate the impact of contaminated soil on clean soil, contaminated soil will be excavated and preferentially placed directly in leakproof containers without prior piling. If this is not possible, the contaminated soil must at least be placed in piles on waterproof sheeting and covered with waterproof sheets. Soils must be managed according to the guidelines of the MDDEFP (Management Grid for Excavated Contaminated Soils). At no time shall the water contained within the contaminated soil come into contact with the marine environment outside the right-of-way of the wharf.
- .12 Contaminated sediments in the trench area cannot be moved in the marine environment in order to be used as backfill, such as construction of the berm. They must be must be excavated.
- .13 In table 1 of 01 35 13.43 section Contaminated Sites- Special Procedures, when mentioned milieu terrestre, this includes the area between the new and old wharf facade.
- .14 Contaminated water from excavated material shall be analysed prior to disposal
- .15 Take all necessary precautions (ditch, channel, etc.) to avoid runoff water contact with the piled contaminated materials at the temporary storage site.

- .16 Prior to seeking Departmental Representative's authorization to remove waste materials from work site, submit a copy of official authorization and permits.

1.6 Work adjacent to watercourse

- .1 Do not reject any construction material in watercourse.
- .2 Do not use the bed of a watercourse to borrow material.
- .3 Do not blast under or outside water, without Departmental Representative's approval.
- .4 Equipment maintenance is not allowed in the water.
- .5 Do not excavate or strip aquatic environment material, except in the anticipated excavation zone.
- .6 Do not discharge any dry material, waste or rubbish in watercourse, storm sewer or sanitary sewer.
- .7 General maintenance, cleaning and gas supplying of engines and vehicles and also hydrocarbons or other dangerous substances handling and storage shall be undertaken at least 30 m away from the shore.
- .8 If for some reasons, certain equipment or hazardous products should stay beneath 30 m from the water body, the Contractor shall submit a contingency plan to the Departmental Representative and make it approved by the Minister prior to the beginning of the works. The plan shall provide details, but not limited to it, as follows:
 - .1 Designated inner limits of work area for the use of determined operations.
 - .2 Hazardous products stored (ex.: diesel, wasted oils, etc.).
 - .3 Methods of containment used in order to limit contamination during maintenance and gas supplying of equipments and vehicles (in case of oil leakage).
 - .4 The presence of emergency equipment in case of a spill near to the supplying zone and to the maintenance area planned.
- .9 Before the beginning and after the end of the work, make, at his own expense, a chemical characterization of soils for area used as supplying, maintenance and storage area for equipments, and machineries, for heavy vehicles storage and for demolition and construction material storage area.
- .10 The soil characterization shall be made by a reputable firm and in compliance with prescribed procedures by the MDDEFP and the CCME. The sampling protocol and plan shall be approved by the Minister.
- .11 If there should be any soil or air contamination resulting from the work project activities, restore the affected areas in order to recover the normal use of them on site. Dispose the contaminated soils in an authorized site by the MDDEFP.
- .12 Respect prescribed conditions by the Protection of Navigable Waters Division of Transport Canada.

1.7 Pollution control

- .1 Materials used shall be inert and shall not contain harmful substances. For imported soils from off site, Contractor shall provide to the Departmental Representative physicochemical analysis results showing no contamination.
- .2 Protect sediment, soil, air and water from fines particles and other material.
- .3 Cover dry materials and rubbish to prevent blowing dust and debris. . If necessary wet down with water if there is no olfactory or visual obvious fact of contamination.
- .4 Ensure the control of emissions from heavy equipment and plant in compliance with local authorities' emission requirements.
- .5 Make sure that equipment is in good working order to avoid oil, grease and gas spills.
- .6 Don't let unnecessarily run trucks and heavy equipments engines.
- .7 All heavy equipments (excavator, crane, etc.) shall be inspected by a certified mechanic before the beginning of the works, in order to ensure that no breakage could lead to a leakage of hydrocarbons or other harmful product, and that the mufflers are in order. Restore non-conformities as soon as possible. Submit to the Departmental Representative an inspection certificate.
- .8 Take cognizance of the effective emergency plan for the Canadian Coast Guard (CCG) base in Québec City;
- .9 Prior to the commencement of Work at the site, prepare a written spill contingency plan that includes a list of name, address and phone number of interveners, authorities to contact and a list of follow-up actions.
- .10 Keep on site suitable emergency equipments in case of an accidental spill and ensure the appropriate use of it.
- .11 Keep on site, near the work zone and near the supplying zone established, an emergency spill response kit. The emergency spill response kit shall contain absorbent material in adequate quantities to remove petroleum from site.
- .12 In the event of a hydrocarbons spill or other hazardous material, remove immediately the hydrocarbons and any contaminant accidentally spilled from environment as well as contaminated soils, and dispose off site in compliance with effective legislation.
- .13 In the event of a hydrocarbons spill or other hazardous material, advise the Departmental Representative and the competent authorities mentioned by the emergency plan. Report immediately the situation to Environment Canada Emergency services (1-866-283-2333), Environment Emergency of Québec (1-866-694-5454) and to Canadian Coast Guard-Accidental Spill Incidents (1-800-363-4735).
- .14 Hazardous products, wasted oils and other contaminated wastes shall be managed in compliance with effective regulation. This included storage at site, transportation and elimination.

- .15 Do not dispose of waste or volatile materials, such as mineral spirits, oil or paint produces on site or in the watercourse, storm sewer or sanitary sewer.
- .16 All hazardous waste (solvent, paint, etc.) produce in work site shall be disposed off work site to an authorized site by the MDDEFP.
- .17 Storage and transportation of hazardous waste shall be made in compliance with effective regulation in order to not contaminate the environment.
- .18 Prior to seeking Departmental Representative 's authorization to remove waste materials from work site, submit a copy of official authorization and permits from owners or managers of hazardous waste disposal site.
- .19 Dispose of contaminated soils in compliance with Soil Protection and Rehabilitation of Contaminated Sites Standards of the MDDEFP.
- .20 Storage tank of petroleum products shall conform to pertinent laws and regulations.
- .21 Monitor on a consistent basis all fuel, oil, other petroleum products or contaminants handling, including transfer, to avoid accidental spills and respond as soon as possible where appropriate.
- .22 Keep equipment in top running order. Ccheck every day the possibility of contaminant leakage on equipment and repair where appropriate.

1.8 Transportation of material

- .1 Material may be transported to the construction site on public roads from Monday to Friday inclusive, unless otherwise instructed by competent authorities. Transportation is prohibited on week-ends and legal holidays. Obtain an authorization from municipality to transport outside these hours.
- .2 Transportation of materials through the municipality may begin at 7:00 hr and end at 19:00 hr. Obtain an authorization from municipality to transport outside these hours.
- .3 Ensure that trucks used run properly.
- .4 Use adequate signalization and cooperate with municipal authorities, Departmental representative or other competent authorities, in order to minimize the impact of transportation activities on persons living in the vicinity of truck routes and the construction site.
- .5 Use a tarpaulin to cover granular materials during transportation.
- .6 Limit traffic of material transportation to roads and areas identified in specifications.
- .7 Always maintain runways in good condition and take the necessary measures to ensure their safe use by other users.
- .8 After works, put runways in a condition at least equal to the condition prior to the works.

1.9 Protection of the aquatic environment in the work area

- .1 The work area must be under control.
- .2 Do not store stone or rubbish generated from demolition in the aquatic environment or on the shore.
- .3 Throughout the work, perform complete cleaning of the aquatic environment in order to recover all rubbish generated during the work.
- .4 Plan appropriate measures to keep chips and sawdust from creosote wood away from aquatic environment.
- .5 Minimize the impact of operations on the aquatic environment, shore and beaches. Heavy equipment shall not operate in the aquatic environment outside the work area at any time.
- .6 For underwater works required, assure that all equipment pieces involved are free of contamination and of any oil leakage (see 1.7.7).
- .7 Land-based equipment storage shall be made in any time above high tides level and as conditions described in section 1.7.
- .8 non-contaminated Sediments from cleaning of the interior of the piles, shall be send to the area between the new wharf and the old wharf.
- .9 Recover and eliminate residue from the cleaning of equipment used for concrete.
- .10 Maintain construction machines and muffler in top running order to limit noise.
- .11 In order to avoid the introduction of invasive alien marine species in natural ecosystems, the following measures must be taken:
 - .1 For marine equipment cleaned and stored overland, before commencement of the Work, Contractor shall provide in writing to the Departmental Representative, a floating equipment list, the storage site and the target date of launching. Departmental Representative shall be able to verify if the equipment is clean and stored overland before commencement of the Work.
 - .2 For equipement already in the water, before its mobilization, Contractor shall demonstrate at his own expense that the floating equipment is free of invasive alien marine species. He shall present an inspection report certifying that the equipment is free of invasive alien marine species. Report shall be produced by a qualified biologist in the identification of the benthic fauna and the sampling realized by the divers. Report shall include, but is not limited to, the list of the inspected equipments, date, inspection site, summary of the protocol sampling and identification, results, photos, certificate signed by the biologist concerning the presence or the absence of species and submitted to the Departmental Representative before equipment mobilization at the work site.

- .3 If the inspection report confirms the presence of invasive alien species, Contractor shall replace equipment or proceed at his own expense to the complete cleaning of the equipment. The description of the cleaning works carried out shall be included in a new inspection report to certify the absence of invasive alien species.
- .4 Departmental Representative reserves the right to conduct a counter-expertise at his own expense at any time. If the presence of alien species is observed, Contractor shall stop the works and clean at his own expense the equipment referred and produce a new report.

1.10 Concrete work (demolition of existing slab and walls and construction of new concrete elements)

- .1 Concrete work must be realized in order to avoid the ending of concrete or concrete particulate matter into the aquatic environment.
- .2 Protect concrete from rain throughout all concrete work.
- .3 Do not spill directly or collaterally waters that has been in contact with fresh concrete, partially set concrete or cement into the aquatic environment.

1.11 Sheet pile and pile planting

- .1 Sheet pile driving with a hammer is allowed only if the Contactor shows the inefficiency of the other methods.
- .2 The requirements of the Enforcement Policy for the Habitat Protection of Fisheries and Ocean Canada applicable only during the sheet pile and pile planting work are as follows:
 - .1 In order to minimise impacts on marine wildlife, pile driving and steel sheet pile sinking by vibration or ramming shall not be performed at night between 20h00 and 6h00 from April 1st to October 31st.
 - 2 In order to minimise impacts on marine wildlife, pile and steel sheet pile driving shall not be performed at night in October to protect the migration of the American eel and the Atlantic tomcod.

1.12 Work monitoring

- .1 Mitigation measures from the prerequisite assessment report and mentioned in the present Section will be subject to constant monitoring on work site by the Departmental Representative.
- .2 The Departmental Representative must complete a environmental control data record of the site given by the Minister. This control data record shall be given to the Departmental Representative and of the Contractor on a weekly basis.

PART 2 - PRODUCTS

2.1 Not used

.1 Not Used.

PART 3 - EXECUTION

3.1 Not used

.1 Not Used.

END OF SECTION

PART 1 – GENERAL

1.1 Section content

- .1 References and Codes.

1.2 Related sections

- .1 Not used.

1.3 References and codes

- .1 All work shall meet or exceed the requirements of the latest edition of the standards of the Canadian Government Specifications Board (CGSB), the Canadian Standards Association (CSA), the National Building Code of Canada (NBC), the American Society for Testing and Materials (ASTM), the Canadian Standard Association (CSA), the American Concrete Institute (ACI) and the other standards and codes referred to herein.
- .2 At no time shall the requirements of the standards referred to on the drawings and in the specifications be violated on pretext that Provincial and local regulations are less stringent. Where conflict arises in the course of work, the strictest standards shall apply.
- .3 At any time when the specifications refer to the standards, the standard to be applied shall be the latest edition available, regardless of the edition referred to on the specification.
- .4 Meet or exceed requirements of:
 - .1 Contract documents.
 - .2 Specified standards, codes and referenced documents.

1.4 Laws, by-laws and ordinances

- .1 Contractor shall comply with rights and privileges of others and federal, provincial and municipal laws, by-laws and ordinances; ensure also that his employees in law or in fact, including subcontractors, comply with.
- .2 Before undertaking the work, Contractor shall obtain permits and approvals.

1.5 Smoke-free environment

- .1 Smoking restrictions and municipal by-laws shall be respected.

1.6 Fees, permits and taxes

- .1 Contractor shall give all notices, obtain and pay all construction permits for demolition, construction and other services as required by local authorities.
- .2 Contractor is liable for damage and cost related to failing to obtain required fees and permits.

PART 2 – PRODUCTS

2.1 Not used

- .1 Not Used.

PART 3 – EXECUTION

3.1 Not used

- .1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 Related requirements

- .1 Section 01 33 00 – Submittal procedures.
- .2 Section 01 29 83 – Payment laboratory testing

1.2 Inspection

- .1 Allow Departmental Representative access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.
- .2 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Departmental Representative instructions, or law of Place of Work.
- .3 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.
- .4 Departmental Representative can order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction.

1.3 Independent inspection agencies

- .1 Independent Inspection/Testing Agencies will be engaged by Departmental Representative for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by Departmental Representative, unless indicated otherwise in other sections of the technical specifications.
- .2 Provide equipment required for executing inspection and testing by appointed agencies.
- .3 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.
- .4 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Departmental Representative at no cost to the Departmental Representative. Pay costs for retesting and reinspection.

1.4 Access to work

- .1 Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants.
- .2 Co-operate to provide reasonable facilities for such access.

1.5 Procedures

- .1 Notify appropriate agency and the Departmental Representative in advance of requirement for tests, in order that attendance arrangements can be made.
- .2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in orderly sequence to not cause delays in Work.
- .3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

1.6 Rejected work

- .1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by the Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.
- .2 Make good other Contractor's work damaged by such removals or replacements promptly.
- .3 If in opinion of the Departmental Representative it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Owner will deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which will be determined by the Departmental Representative.

1.7 Tests and mix designs

- .1 Furnish test results and mix designs as requested.

1.8 Mock-ups

- .1 Prepare mock-ups for Work specifically requested in specifications. Include for Work of Sections required to provide mock-ups.
- .2 Construct in locations acceptable to the Departmental Representative.
- .3 Prepare mock-ups for Departmental Representative's review with reasonable promptness and in orderly sequence, to not cause delays in Work.

- .4 Failure to prepare mock-ups in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .5 If requested, the Departmental Representative will assist in preparing schedule fixing dates for preparation.
- .6 The Departmental Representative will identifies whether mock-up may remain as part of Work or if it is to be removed and when.

1.9 Mill tests

- .1 Submit mill test certificates as required of specification Sections.

1.10 Equipment and systems

- .1 Submit adjustment and balancing reports for mechanical, electrical and other systems.

PART 2 - PRODUCTS

2.1 Not used

- .1 Not Used.

PART 3 - EXECUTION

3.1 Not used

- .1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 Related requirements

- .1 Section 01 52 00 – Construction facilities.
- .2 Section 01 56 00 – Temporary barriers and enclosures.

1.2 Installation and removal

- .1 Provide temporary utilities controls in order to execute work expeditiously.
- .2 Remove from site all such work after use.

1.3 Water supply

- .1 Contractor is to provide continuous supply of potable water for construction use.
- .2 Arrange for connection of existing network to new dock and pay costs for installation, maintenance and removal.
- .3 Note that buildings 500 and 900 must continue to be provided with water supply as before works, and for all works duration.

1.4 Temporary power and light

- .1 Power on site will not be supplied to contractor.
- .2 Pay costs for installation, maintenance and removal.
- .3 Provide and maintain safe temporary lighting throughout project.
- .4 Note that buildings 500 and 900 must continue to be provided with electrical supply as before works, and for all works duration.

1.5 Temporary communication facilities

- .1 Contractor is to provide and pay for temporary telephone, fax, printers, data hook up, internet including lines and equipment necessary for own use and use of Departmental Representative.
- .2 Communication facilities must be functional 24/7 during construction.

1.6 Fire protection

- .1 Provide and maintain temporary fire protection equipment during performance of Work required by [insurance companies having jurisdiction] [and] governing codes, regulations and bylaws.

PART 2 - PRODUCTS

2.1 Not used

- .1 Not Used.

PART 3 - EXECUTION

3.1 Not used

- .1 Not used

END OF SECTION

PART 1 - GENERAL

1.1 Related requirements

- .1 Section 01 51 00 – Temporary utilities.
- .2 Section 01 56 00 – Temporary barriers and enclosures.

1.2 Installation and removal

- .1 Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, access to fenced area and details of fence installation. The south fence location is presented on the plan jointed to the present section.
- .2 This plan must be conform to the plan supplied by Minister for storage and traffic areas.
- .3 Provide construction facilities in order to execute work expeditiously.
- .4 Remove from site all such work after use.

1.3 Scaffolding

- .1 Scaffolding in accordance with CAN/CSA-S269.2.
- .2 Provide and maintain scaffolding, ramps, ladders, platforms required to execute work. All temporary equipment must be conform to security legislations. Minister may require signed and sealed plans for any temporary installation.

1.4 Hoisting

- .1 Provide, install, operate and maintain machinery required for moving of workers, materials and equipment.
- .2 Machinery to be operated by qualified operator.

1.5 Site storage/loading

- .1 Confine work and operations of employees within limits of Contract Documents. Do not unreasonably encumber premises with products. Contractor is responsible for any extra areas required and shall assume cost.
- .2 Do not load or permit to load any part of Work with weight or force that will endanger Work.

1.6 Construction parking

- .1 Parking will be permitted on site provided it does not disrupt performance of Work.
- .2 If access to site by existing roads is permitted, provide and maintain these roads for duration of works, and repair any damage occurred.
- .3 Clean access roads areas where used by Contractor's equipment.
- .4 Parking on site is not allowed outside the area reserved to Contractor.

1.7 Offices

- .1 Provide office heated to 22 degrees C, lighted 750 lx and ventilated, of sufficient size to accommodate site meetings, telephone and fax and furnished with drawing table. Minister can provide the contractor for his construction facility a water supply of 19 mm that Contractor should protect against freeze. There will also be a possibility to connect on a 120/208 Volt 100 Amper circuit with a breaker to protect the site circuit.
- .2 Provide marked and fully stocked first-aid case in a readily available location.
- .3 Subcontractors to provide their own offices as necessary. Direct location of these offices.
- .4 Departmental Representative's Site office:
 - .1 Provide temporary office for Departmental Representative.
 - .2 Inside dimensions minimum 3.6 m long x 3 m wide x 2.4 m high, with floor 0.3 m above grade, complete with four 50% opening windows and one lockable door.
 - .3 Insulate building and provide heating system to maintain 22 degrees C inside temperature at -20 degrees C outside temperature. Office to be air-conditioned during summer.
 - .4 Finish inside walls and ceiling with plywood, hardboard or wallboard. Finish floor with 19 mm thick plywood.
 - .5 Install electrical lighting system to provide min 750 lx.
 - .6 Equip office with two tables 1500 mm x 900 mm with drawers, 2 rotative chairs, 4 chairs, 1 drawing table, 1 stool, 1 plan rack, 1 water cooler, 1 scoreboard of minimum dimension 750 mm x 900 mm fixed on wall, one 3 drawer filing cabinet, 1 coat rack. The filing cabinet will be supplied with an efficient key lock, which prevent easy access. Maintain in clean condition.
 - .7 Install a private toilet near the office and install a chemical or water W.C., a sink and mirror, and ensure supply of toilet paper.

- .8 Supply and pay for two phone lines with different numbers and internet services. One phone line must have a phone speaker and answering machine. The other line must have a fax/automatic answering system.
- .9 Maintain a suitable drinking water fountain, a chemical toilet, electrical, phones and fax services, internet link, heating and lighting systems and maintain a clean place during all work duration.
- .5 Site for offices must be inside the work limits, as indicated on plans. Contractor must supply a security fence around offices to protect buildings and personnel from its operations. Contractor must also maintain safe access to offices all along work duration.
- .6 Offices must be installed prior to work beginning.

1.8 Equipment, tool and materials storage

- .1 Provide and maintain, in clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials.
- .2 Locate materials not required to be stored in weatherproof sheds on site in manner to cause least interference with work activities.

1.9 Sanitary facilities

- .1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.
- .2 Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition.

1.10 Protection and maintenance of traffic

- .1 Provide access and temporary detour roads as necessary to maintain traffic.
- .2 Maintain and protect traffic on affected roads during construction period except as otherwise specifically directed by Departmental Representative.
- .3 Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs
- .4 Protect travelling public from damage to person and property.
- .5 Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.

- .6 Verify adequacy of existing roads and allowable load limit on these roads. Contractor is responsible for repair of damage to roads caused by construction operations.
- .7 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.
- .8 Dust control to be adequate to ensure safe operation at all times.
- .9 Provide snow removal during period of Work.
- .10 Remove, upon completion of work, haul roads designated by Departmental Representative.

1.11 Clean-up

- .1 Remove construction debris, waste materials, packaging material from work site daily.
- .2 Clean dirt or mud tracked onto paved or surfaced roadways.
- .3 Store materials resulting from demolition activities that are salvageable.
- .4 Stack stored new or salvaged material not in construction facilities.

PART 2 - PRODUCTS

2.1 Not used

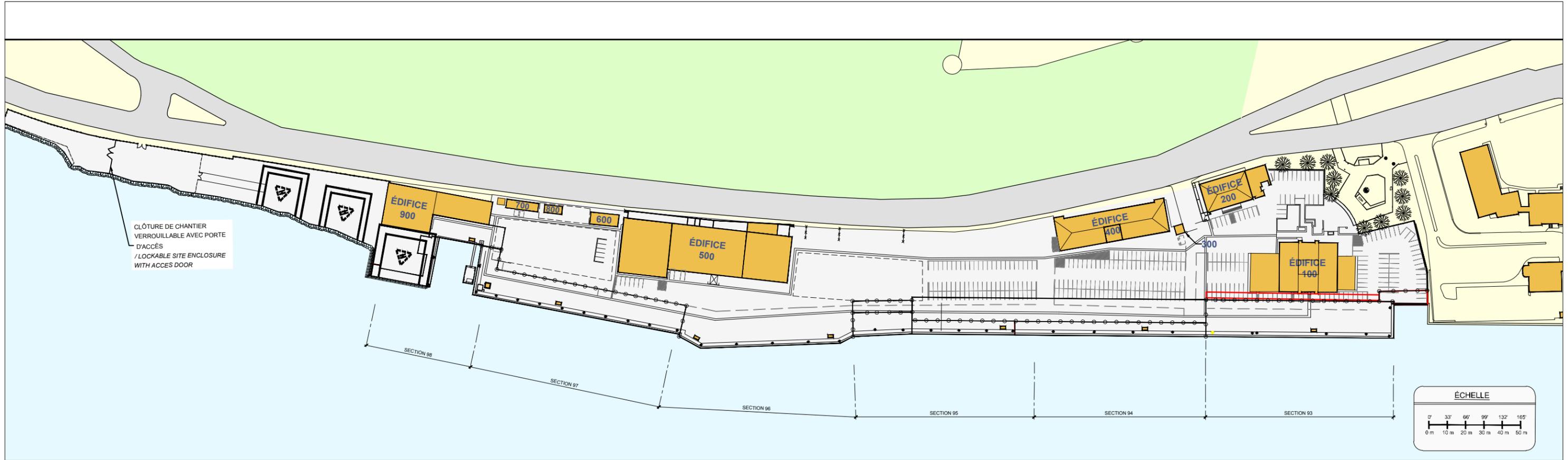
- .1 Not Used.

PART 3 - EXECUTION

3.1 Not used

- .1 Not used.

END OF SECTION



PART 1 - GENERAL

1.1 Related requirements

- .1 Section 01 51 00 – Temporary utilities.
- .2 Section 01 52 00 – Construction facilities

1.2 References

- .1 Canadian General Standards Board (CGSB)
- .2 Canadian Standards Association (CSA International)

1.3 Access restriction

- .1 Provide, erect or arrange all access roads, temporary protection work, in order to execute Work expeditiously.
- .2 Contractor shall restrict site access to non-authorized people. Appropriate safety measures shall be taken during works to limit public access to site.
- .3 Remove from site all such work after use.

1.4 Access to site

- .1 Provide and maintain access roads, sidewalk crossings, ramps and construction runways as may be required for access to Work.
- .2 Provide access and required clearances for emergency vehicles.
- .3 In that purpose, the wharf 98 platform must be maintained as long as possible.

1.5 Protection for off-site and public property

- .1 Protect surrounding private and public property from damage during performance of Work.
- .2 Buildings 500 and 900 foundations must not be destabilized or excavated. Retaining wall systems must be installed, if required, to reach that goal.
- .3 Contractor is to be responsible for damage incurred.

1.6 Protection of building finishes

- .1 Provide protection for finished and partially finished building finishes and equipment during performance of Work.
- .2 Provide necessary screens, covers, and hoardings.
- .3 Contractor is to be responsible for damage incurred due to lack of or improper protection.
- .4 It is expected that storms may occur during construction. Contractor shall develop his own method of work accordingly. All damages incurred due to weather conditions shall be the Contractor responsibility.

PART 2 - PRODUCTS

2.1 Not used

- .1 Not Used.

PART 3 - EXECUTION

3.1 Not used

- .1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 Related requirements

- .1 Section 01 45 00 – Quality Control.

1.2 References

- .1 Conform to these reference standards, in whole or in part as specifically requested in specifications. Always conform to the latest reference standards even if not specified.
- .2 If there is question as to whether products or systems are in conformance with applicable standards, Departmental Representative reserves right to have such products or systems tested to prove or disprove conformance.
- .3 Cost for such testing will be assumed by Departmental Representative in event of conformance with Contract Documents or by Contractor in event of non-conformance.
- .4 Use latest standard edition available at submission of Tender if no date or edition specified.

1.3 Quality

- .1 Products, materials, equipment and articles incorporated in Work (herein named “products”) shall be new, not damaged or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.
- .2 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve Contractor from his responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.
- .3 Should disputes arise as to quality or fitness of products, decision rests strictly with Departmental Representative based upon requirements of Contract Documents.
- .4 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.

1.4 Availability

- .1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, notify Departmental Representative of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.

- .2 In event of failure to notify Departmental Representative at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Departmental Representative reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

1.5 Storage, handling and protection

- .1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.
- .2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.
- .3 Store products subject to damage from weather in weatherproof enclosures.
- .4 Store cementitious products clear of earth or concrete floors, and away from walls.
- .5 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.
- .6 Store sheet materials, lumber on flat, solid supports and keep clear of ground. Slope to shed moisture.
- .7 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.
- .8 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.
- .9 Touch-up damaged factory finished surfaces to Departmental Representative's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

1.6 Transportation

- .1 Contractor is to pay costs of transportation of products required in performance of Work.
- .2 Transportation fees from the storage area for piles and sheet piles which are supplied by the Minister will be assumed by the Contractor. The storage site must be located less than 100 km from the construction site.

1.7 Manufacturer's instructions

- .1 Unless otherwise indicated in specifications, install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.

- .2 Notify Departmental Representative in writing, of conflicts between specifications and manufacturer's instructions, so that Departmental Representative will establish course of action.
- .3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Departmental Representative to require removal and re-installation at no increase in Contract Price or Contract Time.

1.8 Quality of work

- .1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Departmental Representative if required Work is such as to make it impractical to produce required results.
- .2 Do not employ anyone unskilled in their required duties. Departmental Representative reserves right to require dismissal from site, workers deemed incompetent or careless.
- .3 Decisions, as to standard of Quality of Work or workers' competency in cases of dispute, rest solely with Departmental Representative whose decision is final.

1.9 Co-ordination

- .1 Ensure co-operation of workers in laying out Work. Maintain efficient and continuous supervision.
- .2 Contractor is responsible for coordination of Work.

1.10 Remedial work

- .1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Co-ordinate adjacent affected Work as required.
- .2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

1.11 Fastenings

- .1 Provide metal fastenings and accessories in same texture, color and finish as adjacent materials, unless indicated otherwise.
- .2 Prevent electrolytic action between dissimilar metals and materials.
- .3 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.
- .4 Keep exposed fastenings to a minimum, space evenly and install neatly.

- .5 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

1.12 Fastenings - Equipment

- .1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.
- .2 Bolts may not project more than one diameter beyond nuts.

1.13 Protection of work in progress

- .1 Prevent overloading of parts of building. Do not cut, drill or sleeve load bearing structural member, unless specifically indicated without written approval of Departmental Representative.

1.14 Existing utilities

- .1 Protect, relocate or maintain existing active services. When services are encountered, cap off in manner approved by authority having jurisdiction. Stake and record location of capped service.
- .2 When connecting to existing networks, execute work during hours fixed by experienced local authorities as to minimize impact on Work.

PART 2 - PRODUCTS

2.1 Not used

- .1 Not Used.

PART 3 - EXECUTION

3.1 Not used

- .1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 Section content

- .1 Surveying work for site measurement and staking.
- .2 Surveying work for establishing or confirming structures locations (combined wall, tie-rods, lighting, pipes etc.) and their conformity according to plans.
- .3 Recording of subsurface conditions.

1.2 Qualifications of surveyor

- .1 Qualified registered land surveyor, licensed to practice in Place of Work, acceptable to Departmental Representative.

1.3 Survey reference points

- .1 Principal existing vertical and horizontal control points (reference point or BM) are indicated on plans.
- .2 Locate, confirm and protect control points prior to starting site work. Preserve permanent reference points during construction.
- .3 Make no changes or relocations without prior written notice to Departmental Representative.
- .4 Report to Departmental Representative when reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.
- .5 Require surveyor to replace control points in accordance with original survey control.
- .6 Consult tides tables published by Fisheries and Oceans Canada, to validate impacts of tides on works.

1.4 Survey requirements

- .1 Establish two (2) permanent bench marks on site, referenced to established bench marks by survey control points. Record locations, with horizontal and vertical data in Project Record Documents.
- .2 Establish lines and grades, locate and lay out by survey instrumentation.
- .3 Stake out the site for pilling, drilling, pouring, leveling and filling work to be completed.
- .4 Stake out embankments and berms.

- .5 Establish pipe invert elevations, when applicable.
- .6 Establish lines and grades for mechanical and electrical work.
- .7 Proceed horizontal and vertical survey of buildings 500 and 900 before works as required by the Minister. A building inspection (interior and exterior) with a photographic survey is also required in a way to make a status of the buildings condition before works.
- .8 Contractor will assume entire responsibility of work survey and execution of works according to locations, lines and elevations indicated.
- .9 Supply material required for surveying.
- .10 Supply required material, like rulers and templates, to ease Departmental Representative work inspection.

1.5 Existing services

- .1 Before starting work, establish location and extent of service lines in area of Work and notify Departmental Representative of findings.
- .2 Remove abandoned service lines in proximity of structures. Cap or otherwise seal lines at cut-off points as directed by Departmental Representative.

1.6 Location of equipment and fixtures

- .1 Location of equipment, fixtures and outlets indicated or specified are to be considered as approximate.
- .2 Inform Departmental Representative of impending installation and obtain approval for actual location.
- .3 Submit field drawings to indicate relative position of various services and equipment when required by Departmental Representative.

1.7 Records

- .1 Maintain a complete, accurate log of control and survey work as it progresses.
- .2 On completion of foundations and major site improvements, prepare a certified survey showing dimensions, locations, angles and elevations of Work.
- .3 Record locations of maintained, re-routed and abandoned service lines.

1.8 Action and informational submittals

- .1 Submit name and address of Surveyor to Departmental Representative.
- .2 Submit certificate signed by surveyor certifying and noting those elevations and locations of completed Work that conform and do not conform with Contract Documents.

1.9 Subsurface conditions

- .1 Promptly notify Departmental Representative in writing if subsurface conditions at Place of Work differ materially from those indicated in Contract Documents, or a reasonable assumption of probable conditions based thereon.
- .2 After prompt investigation, should Departmental Representative determine that conditions do differ considerably, instructions will be issued for changes in Work as provided in Changes and Change Orders.

1.10 Site inspection

- .1 Prior to submitting, Contractor must, if he judges it necessary, visit work site to validate existing conditions et take into account any detail which could affect cost, duration and execution methods. Ignorance of these local conditions will not be considered as a valid reason to claim for an extra amount of money.

PART 2 - PRODUCTS

2.1 Not used

- .1 Not Used.

PART 3 - EXECUTION

3.1 Not used

- .1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 Related requirements

- .1 Section 01 74 21 – Construction / demolition waste management and disposal.
- .2 Section 01 35 43 – Environmental Procedures

1.2 Project cleanliness

- .1 Maintain Work in tidy condition, free from accumulation of waste products and debris, including that caused by Owner or other Contractors.
- .2 Remove waste materials from site at daily regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site.
- .3 Clear snow and ice from access to building, remove from site if required.
- .4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .5 Provide on-site containers for collection of waste materials and debris.
- .6 Store volatile waste in covered metal containers, and remove from premises at end of each working day.
- .7 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
- .8 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

1.3 Final cleaning

- .1 When Work is substantially performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
- .2 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.
- .3 Prior to final review remove surplus products, tools, construction machinery and equipment.
- .4 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.

- .5 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.
- .6 Clean buildings 500 and 900 as their initial conditions, before works.

PART 2 - PRODUCTS

2.1 Not used

- .1 Not Used.

PART 3 - EXECUTION

3.1 Not used

- .1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 Related requirements

- .1 Section 01 74 11 – Cleaning
- .2 Section 02 41 16 – Structure Demolition

1.2 Waste disposal workplan

- .1 Prepare a waste disposal workplan prior to Project start-up. Note that transfer slab and piles are creosote-treated wood. Pay attention that the transfer slab and piles in the existing wharves areas are in creosoted wood. A part of the transfer slab in the wharf 98 area is in concrete. It is possible that crib is in creosoted wood.
- .2 Waste disposal workplan should include but not limited to:
 - .1 Destination of materials listed.
 - .2 Demolition techniques and sequencing.
 - .3 Schedule for demolition.
 - .4 Location.
 - .5 Safety measures.
 - .6 Protection measures.
 - .7 Clear labeling of storage areas.
 - .8 Details on waste materials handling and removal procedures.
 - .9 Quantities for materials to be salvaged for reuse.

1.3 Submittals

- .1 Provide receipts, scale tickets, waybills, and show quantities and types of waste materials disposed of.
- .2 Provide proof that waste materials were disposed of in a proper site/facility.

1.4 Materials source separation program (mssp)

- .1 Provide on-site facilities for collection, handling, and storage of anticipated quantities of waste materials.
- .2 Take necessary precautions to avoid soil contamination and aquatic life. The Engineer can, at his will, verify soil quality after Work is done. Contractor shall assume costs of any decontamination work resulting from verification.
- .3 Note that contaminated granular materials in wharf and dredging area will have to be disposed. No contaminated material will be allowed into the water area.

- .4 Provide different locations for each type of waste materials, depending on where they will be disposed of.
- .5 Locate containers in locations, to facilitate deposit of materials without hindering daily operations.
- .6 Locate separated materials in areas which minimize material damage.
- .7 Transport waste materials to approved and authorized MSSP Facility.

1.5 Storage, handling and protection

- .1 Store materials to be transported off-site in locations as directed by Consultant.
- .2 Unless specified otherwise, materials for removal do not become Contractor's property. They shall be transported to an approved site.
- .3 Components not removed for demolition are to remain to Consultant satisfaction.
- .4 Support affected structures. If safety of building is endangered, cease operations and immediately notify Consultant.
- .5 Protect mechanical and electrical facilities that are to remain.
- .6 Separate and store materials produced during dismantling of structures in designated areas.

1.6 Disposal of wastes

- .1 Do not bury rubbish or waste materials, unless advised otherwise by Engineer.
- .2 Do not dispose of any materials into waterways, storm, or sanitary sewers.
- .3 Keep records of construction waste.
- .4 Remove materials from demolition Work progresses.

1.7 Scheduling

- .1 Co-ordinate Work with other activities at site to ensure timely and orderly progress of Work.

PART 2 - PRODUCTS

2.1 Not used

- .1 Not Used.

PART 3 - EXECUTION

3.1 General

- .1 Handle waste materials in accordance with appropriate regulations and codes, based on their contamination level.

3.2 Cleaning

- .1 Remove tools and waste materials on completion of Work, and leave work area in clean and orderly condition.
- .2 Clean-up work area as work progresses.

END OF SECTION

PART 1 – GENERAL

1.1 Administrative requirements

- .1 Acceptance of Work Procedures:
 - .1 Contractor's Inspection: Contractor conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
 - .1 Notify Departmental Representative in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.
 - .2 Request Departmental Representative inspection.
 - .2 Departmental Representative Inspection:
 - .1 Departmental Representative and Contractor to inspect Work and identify defects and deficiencies.
 - .2 Contractor to correct Work as directed.
 - .3 Completion Tasks: submit written certificates that tasks have been performed as follows:
 - .1 Work: completed and inspected for compliance with Contract Documents.
 - .2 Defects: corrected and deficiencies completed.
 - .3 Equipment and systems: tested, and fully operational.
 - .4 Certificates required: submitted.
 - .5 Operation of systems: demonstrated to Owner's personnel.
 - .6 Commissioning of Mechanical systems: completed in accordance with 01 91 13 - General Commissioning (Cx) Requirements and and copies of final Commissioning Report submitted to Departmental Representative.
 - .7 Work: complete and ready for final inspection.
 - .4 Final Inspection:
 - .1 When completion tasks are done, request final inspection of Work by Departmental Representative, and Contractor.
 - .2 When Work incomplete according to Owner and Departmental Representative, complete outstanding items and request re-inspection.
 - .5 Declaration of Substantial Performance: when Departmental Representative considers deficiencies and defects corrected and requirements of Contract substantially performed, make application for Certificate of Substantial Performance.
 - .6 Commencement of Lien and Warranty Periods: date of Owner's acceptance of submitted declaration of Substantial Performance to be date for commencement for warranty period and commencement of lien period unless required otherwise by lien statute of Place of Work.

.7 Final Payment:

- .1 When Departmental Representative considers final deficiencies and defects corrected and requirements of Contract met, make application for final payment.
 - .2 When Work deemed incomplete by Departmental Representative, complete outstanding items and request re-inspection.
- .8 Payment of Holdback: after issuance of Certificate of Substantial Performance of Work, submit application for payment of holdback amount in accordance with contractual agreement.

1.2 Final cleaning

- .1 Clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.
- .2 Waste Management: separate waste materials for [reuse] [and] [recycling] in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 – PRODUCTS

2.1 Not used

- .1 Not Used.

PART 3 – EXECUTION

3.1 Not used

- .1 Not Used.

END OF SECTION

PART 1 – GENERAL

1.1 Related requirements

- .1 Section 01 78 00 – Closeout procedures.

1.2 Administrative requirements

- .1 Pre-warranty Meeting:
 - .1 Convene meeting one week prior to contract completion with Departmental Representative to:
 - .1 Verify Project requirements.
 - .2 Review manufacturer's installation instructions and warranty requirements.
 - .2 Departmental Representative to establish communication procedures for:
 - .1 Notifying construction warranty defects.
 - .2 Determine priorities for type of defects.
 - .3 Determine reasonable response time.
 - .3 Contact information for bonded and licensed company for warranty work action: provide name, telephone number and address of company authorized for construction warranty work action.
 - .4 Ensure contact is located within local service area of warranted construction, is continuously available, and is responsive to inquiries for warranty work action.

1.3 Action and informational submittals

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Two weeks prior to Substantial Performance of the Work, submit to the Departmental Representative, four final copies of operating and maintenance manuals.
- .3 Provide spare parts, maintenance materials and special tools of same quality and manufacture as products provided in Work.
- .4 Provide evidence, if requested, for type, source and quality of products supplied.

1.4 Format

- .1 Organize data as instructional manual.

- .2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.
- .3 When multiple binders are used correlate data into related consistent groupings.
 - .1 Identify contents of each binder on spine.
- .4 Cover: identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.
- .5 Arrange content by systems under Section numbers and sequence of Table of Contents.
- .6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
- .7 Text: manufacturer's printed data, or typewritten data.
- .8 Drawings: provide with reinforced punched binder tab.
 - .1 Bind in with text; fold larger drawings to size of text pages.
- .9 Provide 1:1 scaled CAD files in dwg format on CD.

1.5 Contents - project record documents

- .1 Table of Contents for Each Volume: provide title of project;
 - .1 Date of submission; names.
 - .2 Addresses, and telephone numbers of Consultant and Contractor with name of responsible parties.
 - .3 Schedule of products and systems, indexed to content of volume.
- .2 For each product or system:
 - .1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.
- .3 Product Data: mark each sheet to identify specific products and component parts, and data applicable to installation; delete inapplicable information.
- .4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.
- .5 Typewritten Text: as required to supplement product data.
 - .1 Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00 - Quality Control.

1.6 As -built documents and samples

- .1 Maintain, at site for Departmental Representative one record copy of:
 - .1 Contract Drawings.
 - .2 Specifications.
 - .3 Addenda.
 - .4 Change Orders and other modifications to Contract.
 - .5 Reviewed shop drawings, product data, and samples.
 - .6 Field test records.
 - .7 Inspection certificates.
 - .8 Manufacturer's certificates.
- .2 Store record documents and samples in field office apart from documents used for construction.
 - .1 Provide files, racks, and secure storage.
- .3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual.
 - .1 Label each document "PROJECT RECORD" in neat, large, printed letters.
- .4 Maintain record documents in clean, dry and legible condition.
 - .1 Do not use record documents for construction purposes.
- .5 Keep record documents and samples available for inspection by Departmental Representative.

1.7 Recording information on project record documents

- .1 Record information on set of black line opaque drawings.
- .2 Use felt tip marking pens, maintaining separate colours for each major system, for recording information.
- .3 Record information concurrently with construction progress.
 - .1 Do not conceal Work until required information is recorded.
- .4 Contract Drawings and shop drawings: mark each item to record actual construction, including:
 - .1 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - .2 Field changes of dimension and detail.
 - .3 Changes made by change orders.

- .4 Details not on original Contract Drawings.
- .5 References to related shop drawings and modifications.
- .5 Specifications: mark each item to record actual construction, including:
 - .1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
 - .2 Changes made by Addenda and change orders.
- .6 Other Documents: maintain [manufacturer's certifications,] [inspection certifications,] [field test records,] required by individual specifications sections.
- .7 Provide digital photos, if requested, for site records.

1.8 Final survey

- .1 Submit final site survey certificate in accordance with Section 01 71 00 - Examination and Preparation, certifying that elevations and locations of completed Work are in conformance, or non-conformance with Contract Documents.

1.9 Equipment and systems

- .1 For each item of equipment and each system include description of unit or system, and component parts.
 - .1 Give function, normal operation characteristics and limiting conditions.
 - .2 Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.
- .2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.
- .3 Include installed colour coded wiring diagrams.
- .4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences.
 - .1 Include regulation, control, stopping, shut-down, and emergency instructions.
 - .2 Include summer, winter, and any special operating instructions.
- .5 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- .6 Provide servicing and lubrication schedule, and list of lubricants required.
- .7 Include manufacturer's printed operation and maintenance instructions.

- .8 Include sequence of operation by controls manufacturer.
- .9 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- .10 Provide installed control diagrams by controls manufacturer.
- .11 Provide Contractor's co-ordination drawings, with installed colour coded piping diagrams.
- .12 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- .13 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- .14 Include test and balancing reports as specified in Section 01 45 00 - Quality Control and 01 91 13 - General Commissioning (Cx) Requirements.
- .15 Additional requirements: as specified in individual specification sections.

1.10 Materials and finishes

- .1 Building products, applied materials, and finishes: include product data, with catalogue number, size, composition, and colour and texture designations.
 - .1 Provide information for re-ordering custom manufactured products.
- .2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- .3 Moisture-protection and weather-exposed products: include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- .4 Additional requirements: as specified in individual specifications sections.

1.11 Maintenance materials

- .1 Spare Parts:
 - .1 Provide spare parts, in quantities specified in individual specification sections.
 - .2 Provide items of same manufacture and quality as items in Work.
 - .3 Deliver to location as directed; place and store.
 - .4 Receive and catalogue items.
 - .1 Submit inventory listing to Departmental Representative.
 - .2 Include approved listings in Maintenance Manual.
- .5 Obtain receipt for delivered products and submit prior to final payment.

- .2 Extra Stock Materials:
 - .1 Provide maintenance and extra materials, in quantities specified in individual specification sections.
 - .2 Provide items of same manufacture and quality as items in Work.
 - .3 Deliver to location as directed; place and store.
 - .4 Receive and catalogue items.
 - .1 Submit inventory listing to Departmental Representative.
 - .2 Include approved listings in Maintenance Manual.
 - .5 Obtain receipt for delivered products and submit prior to final payment.

1.12 Delivery, storage and handling

- .1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.
- .2 Store in original and undamaged condition with manufacturer's seal and labels intact.
- .3 Store components subject to damage from weather in weatherproof enclosures.
- .4 Store paints and freezable materials in a heated and ventilated room.
- .5 Remove and replace damaged products at own expense and for review by Departmental Representative.

1.13 Warranties and bonds

- .1 Develop warranty management plan to contain information relevant to Warranties.
- .2 Submit warranty management plan, 30 days before planned pre-warranty conference, to Departmental Representative.
- .3 Warranty management plan to include required actions and documents to assure that Minister receives warranties to which it is entitled.
- .4 Provide plan in narrative form and contain sufficient detail to make it suitable for use by future maintenance and repair personnel.
- .5 Submit, warranty information made available during construction phase, to Departmental Representative for approval prior to each monthly pay estimate.
- .6 Assemble approved information in binder, submit upon acceptance of work and organize binder as follows:
 - .1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.
 - .2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

- .3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within [ten] days after completion of applicable item of work.
 - .4 Verify that documents are in proper form, contain full information, and are notarized.
 - .5 Co-execute submittals when required.
 - .6 Retain warranties and bonds until time specified for submittal.
- .7 Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.
 - .8 Conduct a warranty inspection, with Minister.
 - .9 Include information contained in warranty management plan as follows:
 - .1 Roles and responsibilities of personnel associated with warranty process, including points of contact and telephone numbers within the organizations of Contractors, subcontractors, manufacturers or suppliers involved.
 - .2 Listing and status of delivery of Certificates of Warranty for extended warranty items.
 - .3 Provide list for each warranted equipment, item, feature of construction or system indicating:
 - .1 Name of item.
 - .2 Model and serial numbers.
 - .3 Location where installed.
 - .4 Name and phone numbers of manufacturers or suppliers.
 - .5 Names, addresses and telephone numbers of sources of spare parts.
 - .6 Warranties and terms of warranty: include one-year overall warranty of construction. Indicate items that have extended warranties and show separate warranty expiration dates.
 - .7 Cross-reference to warranty certificates as applicable.
 - .8 Starting point and duration of warranty period.
 - .9 Summary of maintenance procedures required to continue warranty in force.
 - .10 Cross-Reference to specific pertinent Operation and Maintenance manuals.
 - .11 Organization, names and phone numbers of persons to call for warranty service.
 - .12 Typical response time and repair time expected for various warranted equipment.
 - .4 Contractor's plans for attendance at post-construction warranty inspections.
 - .5 Procedure and status of tagging of equipment covered by extended warranties.
 - .6 Post copies of instructions near selected pieces of equipment where operation is critical for warranty and/or safety reasons.
 - .10 Respond in timely manner to oral or written notification of required construction warranty repair work.
 - .11 Written verification to follow oral instructions.
 - .1 Failure to respond will be cause for the Minister to proceed with action against Contractor.

PART 2 – PRODUCTS

2.1 Not used

.1 Not Used.

PART 3 – EXECUTION

3.1 Not used

.1 Not Used.

END OF SECTION

PART 1 – GENERAL

1.1 Summary

- .1 Section Includes:
 - .1 General requirements relating to commissioning of project's components and systems, specifying general requirements to PV of components, equipment, sub-systems, systems, and integrated systems.
 - .2 Related Requirements
 - .1 Section 01 78 00- Closeout submittals .
 - .3 Acronyms:
 - .1 Cx - Commissioning.
 - .2 O&M - Operation and Maintenance.
 - .3 PI - Product Information.
 - .4 PV - Performance Verification.
 - .5 TAB - Testing, Adjusting and Balancing.

1.2 General

- .1 Cx is a planned program of tests, procedures and checks carried out systematically on systems and integrated systems of the finished Project. Cx is performed after systems and integrated systems are completely installed, functional and Contractor's Performance Verification responsibilities have been completed and approved. Objectives:
 - .1 Verify installed equipment, systems and integrated systems operate in accordance with contract documents and design criteria and intent.
 - .2 Ensure appropriate documentation is compiled into the BMM.
 - .3 Effectively train O&M staff.
- .2 Contractor assists in Cx process, operating equipment and systems, troubleshooting and making adjustments as required.
 - .1 Systems to be operated at full capacity under various modes to determine if they function correctly and consistently at peak efficiency. Systems to be interactively with each other as intended in accordance with Contract Documents and design criteria.
 - .2 During these checks, adjustments to be made to enhance performance to meet environmental or user requirements.
- .3 Design Criteria: as per client's requirements or determined by designer. To meet Project functional and operational requirements.

1.3 Commissioning overview

- .1 Cx to be a line item of Contractor's cost breakdown.
- .2 Cx activities supplement field quality and testing procedures described in relevant technical sections.
- .3 Cx is conducted in concert with activities performed during stage of project delivery. Cx identifies issues in Planning and Design stages which are addressed during Construction and Cx stages to ensure the built [facility] is constructed and proven to operate satisfactorily under weather, environmental and occupancy conditions to meet functional and operational requirements. Cx activities includes transfer of critical knowledge to facility operational personnel.
- .4 Departmental Representative will issue Interim Acceptance Certificate when:
 - .1 Completed Cx documentation has been received, reviewed for suitability and approved by Departmental Representative.
 - .2 Equipment, components and systems have been commissioned.
 - .3 O&M training has been completed.

1.4 Non-conformance to performance verification requirements

- .1 Should equipment, system components, and associated controls be incorrectly installed or malfunction during Cx, correct deficiencies, re-verify equipment and components within the unfunctional system, including related systems as deemed required by Departmental Representative, to ensure effective performance.
- .2 Costs for corrective work, additional tests, inspections, to determine acceptability and proper performance of such items to be borne by Contractor. Above costs to be in form of progress payment reductions or hold-back assessments.

1.5 Pre-Cx review

- .1 Before Construction:
 - .1 Review contract documents, confirm by writing to Departmental Representative.
 - .1 Adequacy of provisions for Cx.
 - .2 Aspects of design and installation pertinent to success of Cx.
- .2 During Construction:
 - .1 Co-ordinate provision, location and installation of provisions for Cx.
- .3 Before start of Cx:
 - .1 Have completed Cx Plan up-to-date.

- .2 Ensure installation of related components, equipment, sub-systems, systems is complete.
 - .3 Fully understand Cx requirements and procedures.
 - .4 Have Cx documentation shelf-ready.
 - .5 Understand completely design criteria and intent and special features.
 - .6 Submit complete start-up documentation to Departmental Representative.
 - .7 Have Cx schedules up-to-date.
 - .8 Ensure systems have been cleaned thoroughly.
 - .9 Complete TAB procedures on systems, submit TAB reports to Departmental Representative for review and approval.
 - .10 Ensure "As-Built" system schematics are available.
- .4 Inform Departmental Representative in writing of discrepancies and deficiencies on finished works.

1.6 Conflicts

- .1 Report conflicts between requirements of this section and other sections to Departmental Representative before start-up and obtain clarification.
- .2 Failure to report conflict and obtain clarification will result in application of most stringent requirement.

1.7 Action and informational submittals

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Submit no later than 4 weeks after award of Contract:
 - .1 Name of Contractor's Cx agent.
 - .2 Draft Cx documentation.
 - .3 Preliminary Cx schedule.
 - .2 Request in writing to Departmental Representative for changes to submittals and obtain written approval at least 8 weeks prior to start of Cx.
 - .3 Submit proposed Cx procedures to Departmental Representative where not specified and obtain written approval at least (8) weeks prior to start of Cx.
 - .4 Provide additional documentation relating to Cx process required by Departmental Representative.

1.8 Commissioning documentation

- .1 Provide completed and approved Cx documentation to Departmental Representative.

1.9 Starting and testing

- .1 Contractor assumes liabilities and costs for inspections. Including disassembly and re-assembly after approval, starting, testing and adjusting, including supply of testing equipment.

1.10 Witnessing of starting and testing

- .1 Provide 14 days notice prior to commencement.
- .2 Departmental Representative to witness of start-up and testing.
- .3 Contractor's Cx Agent to be present at tests performed and documented by sub-trades, suppliers and equipment manufacturers.

1.11 Procedures

- .1 Verify that equipment and systems are complete, clean, and operating in normal and safe manner prior to conducting start-up, testing and Cx.
- .2 Conduct start-up and testing in following distinct phases:
 - .1 Included in delivery and installation:
 - .1 Verification of conformity to specification, approved shop drawings and completion of PI report forms.
 - .2 Visual inspection of quality of installation.
 - .2 Start-up: follow accepted start-up procedures.
 - .3 Operational testing: document equipment performance.
 - .4 System PV: include repetition of tests after correcting deficiencies.
 - .5 Post-substantial performance verification: to include fine-tuning.
- .3 Correct deficiencies and obtain approval from Departmental Representative after distinct phases have been completed and before commencing next phase.
- .4 Document require tests on approved PV forms.
- .5 Failure to follow accepted start-up procedures will result in re-evaluation of equipment by an independent testing agency selected by Departmental Representative. If results reveal that equipment start-up was not in accordance with requirements, and resulted in damage to equipment, implement following:
 - .1 Minor equipment/systems: implement corrective measures approved by Departmental Representative.
 - .2 Major equipment/systems: if evaluation report concludes that damage is minor, implement corrective measures approved by Departmental Representative.

- .3 If evaluation report concludes that major damage has occurred, Departmental Representative shall reject equipment.
 - .1 Rejected equipment to be remove from site and replace with new.
 - .2 Subject new equipment/systems to specified start-up procedures.

1.12 Start-up documentation

- .1 Assemble start-up documentation and submit to Departmental Representative for approval before commencement of commissioning.
- .2 Start-up documentation to include:
 - .1 Factory and on-site test certificates for specified equipment.
 - .2 Pre-start-up inspection reports.
 - .3 Signed installation/start-up check lists.
 - .4 Start-up reports,
 - .5 Step-by-step description of complete start-up procedures, to permit Departmental Representative to repeat start-up at any time.

1.13 Operation and maintenance of equipment and systems

- .1 After start-up, operate and maintain equipment and systems as directed by equipment/system manufacturer.
- .2 With assistance of manufacturer develop written maintenance program and submit Departmental Representative for approval before implementation.
- .3 Operate and maintain systems for length of time required for commissioning to be completed.
- .4 After completion of commissioning, operate and maintain systems until issuance of certificate of interim acceptance.

1.14 Test results

- .1 If start-up, testing and/or PV produce unacceptable results, repair, replace or repeat specified starting and/or PV procedures until acceptable results are achieved.
- .2 Provide manpower and materials, assume costs for re-commissioning.

1.15 Start of commissioning

- .1 Notify Departmental Representative at least 21 days prior to start of Cx.
- .2 Start Cx after elements of building affecting start-up and performance verification of systems have been completed.

1.16 Commissioning performance verification

- .1 Carry out Cx:
 - .1 Under actual operating conditions, over entire operating range, in all modes.
 - .2 On independent systems and interacting systems.
- .2 Cx procedures to be repeatable and reported results are to be verifiable.
- .3 Follow equipment manufacturer's operating instructions.
- .4 EMCS trending to be available as supporting documentation for performance verification.

1.17 Witnessing commissioning

- .1 Departmental Representative to witness activities and verify results.

1.18 Deficiencies, faults, defects

- .1 Correct deficiencies found during start-up and Cx to satisfaction of Departmental Representative.
- .2 Report problems, faults or defects affecting Cx to Departmental Representative in writing. Stop Cx until problems are rectified. Proceed with written approval from Departmental Representative.

1.19 Completion of commissioning

- .1 Upon completion of Cx leave systems in normal operating mode.
- .2 Except for warranty and seasonal verification activities specified in Cx specifications, complete Cx prior to issuance of Interim Certificate of Completion.
- .3 Cx to be considered complete when contract Cx deliverables have been submitted and accepted by Departmental Representative.

1.20 Activities upon completion of commissioning

- .1 When changes are made to baseline components or system settings established during Cx process, provide updated Cx form for affected item.

1.21 Training

- .1 Ensure training as required by the Minister.

1.22 Maintenance materials, spare parts, special tools

- .1 Supply, deliver, and document maintenance materials, spare parts, and special tools as specified in contract.

1.23 Owner's performance testing

- .1 Performance testing of equipment or system by Departmental Representative will not relieve Contractor from compliance with specified start-up and testing procedures.

PART 2 – PRODUCTS

2.1 Not used

- .1 Not Used.

PART 3 – EXECUTION

3.1 Not used

- .1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 Section content

- .1 This section covers methods and procedures for demolition of any structure indicated in Contract Drawings.

1.2 Related requirements

- .1 Section 01 74 21 – Construction/demolition waste management and disposal
- .2 Section 01 35 43 – Environmental procedures
- .3 Section 01 35 29.06 – Health and safety requirements

1.3 References

- .1 Canadian Standard Association (CSA)/CSA International
 - .1 CSA S350-FM1980(R2003), Code of Practice for Safety in Demolition of Structures.
- .2 Department of Justice Canada (Jus)
 - .1 Canadian Environmental Assessment Act (CEAA), 1995, c. 37.
 - .2 Canadian Environmental Protection Act (CEPA), 1999, c. 33.

1.4 Action and informational submittals

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures and Section 01 74 21 - Construction/Demolition Waste Management Disposal.
- .2 Prior to beginning of Work on site submit to Departmental Representative the following information:
 - .1 Descriptions of and anticipated quantities of materials to be landfilled.
 - .2 Schedule of selective demolition.
 - .3 Number and location of dumpsters.
 - .4 Anticipated frequency of waste pickup.
 - .5 Name and address of waste receiving organizations.
- .3 Written authorization from Departmental Representative is required to deviate from receiving organizations listed in Waste Reduction Workplan.

- .4 When required by governing authorities, submit to Departmental Representative demolition drawings, diagrams or details showing sequence of demolition work and supporting structures and underpinning, if applicable. If such documents are required, they shall be stamped and signed by professional engineer registered or licensed in Province of Quebec, Canada.

1.5 Construction/demolition waste management and disposal

- .1 Sort waste materials as required to transport to a licensed facility in accordance to section 01 74 19 – Construction/Demolition waste management and disposal.

1.6 Environmental protection

- .1 Ensure Work is done in accordance with Section 01 35 43 - Environmental Procedures.
- .2 Ensure Work does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air and noise pollution.
- .3 Fires and burning of waste or materials is not permitted on site.
- .4 Do not bury rubbish waste materials.
- .5 Do not dispose of waste or volatile materials including but not limited to: mineral spirits, oil, petroleum based lubricants, or toxic cleaning solutions into watercourses, storm or sanitary sewers.
 - .1 Contractor is responsible for enforcement of appropriate elimination method of this type of waste during work duration.
- .6 Cover or wet down dry materials and waste to prevent blowing dust and debris. Control dust on all temporary roads.

1.7 Existing conditions

- .1 Verify hazardous material registry and take necessary measures to protect the environment.
- .2 If material listed as hazardous be encountered in course of demolition, stop work, take preventative measures, and notify Departmental Representative immediately.
 - .1 Proceed only after receipt of written instructions have been received from Departmental Representative.
- .3 Structures to be demolished are based on their condition on date that tender is accepted.
- .4 Contractor will have to take into account the various loads restrictions indicated on plans. His construction methods will necessary take into account these aspects.

PART 2 - PRODUCTS

2.1 Not used

- .1 Not used

PART 3 - EXECUTION

3.1 Preparation

- .1 Work in accordance with Section 01 35 30 – Health and safety requirements and demolition standards in place.
- .2 Disconnect electrical lines entering buildings to be demolished.
 - .1 Post warning signs on electrical lines and equipment which must remain energized to serve other properties during period of demolition.
- .3 Disconnect and cap designated mechanical services in areas to be demolished, as required.
 - .1 Remove sewer and water lines as directed by Departmental Representative
- .4 Do not disrupt active or energized utilities designated to remain undisturbed. If disruption is inevitable, notify Departmental Representative and take necessary measures such as to minimize impact and interruption period.

3.2 Demolition

- .1 Remove contaminated or dangerous materials as defined by authorities having jurisdiction, relating to environmental protection, from site and dispose of in safe manner to minimize danger at site or during disposal.
- .2 Demolish structures as per Contract Drawings.
- .3 Take necessary measures to keep structures to remain from displacement or collapsing and to prevent any damages to such structures. Put in place some temporary retaining walls if necessary. There is a possibility that the Departmental Representative ask for signed and sealed Engineer methods.
- .4 Repair damages caused during demolition, if required and as indicated by Departmental Representative.
- .5 Contractor shall take into consideration the condition of structures prior to start of Demolition.
- .6 Ensure that mechanical and electrical facilities remains operational during demolition work.

END OF SECTION

PART 1 – GENERAL

1.1 Related requirements

- .1 Section 01 35 43 – Environmental procedures.
- .2 Section 01 74 21 – Construction/Demolition waste management and disposal.
- .3 Section 01 35 29.06 – Health and safety requirements.

1.2 References

- .1 Definitions
 - .1 Dangerous Goods: product, substance, or organism specifically listed or meets hazard criteria established in Transportation of Dangerous Goods Regulations.
 - .2 Hazardous Material: product, substance, or organism used for its original purpose; and is either dangerous goods or material that will cause adverse impact to environment or adversely affect health of persons, animals, or plant life when released into the environment.
 - .3 Hazardous Waste: hazardous material no longer used for its original purpose and that is intended for recycling, treatment or disposal.
- .2 Reference Standards
 - .1 Canadian Environmental Protection Act, 1999 (CEPA 1999)
 - .1 Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations (SOR/2005-149).
 - .2 Department of Justice Canada (Jus)
 - .1 Transportation of Dangerous Goods Act, 1992 (TDG Act) [1992], (c. 34).
 - .2 Transportation of Dangerous Goods Regulations (T-19.01-SOR/2001-286).
 - .3 Green Seal Environmental Standards (GS)
 - .1 GS-11-[2008, 2nd Edition], Paints and Coatings.
 - .2 GS-36-[00], Commercial Adhesives.
 - .4 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).

- .5 National Research Council Canada Institute for Research in Construction (NRC-IRC)
 - .1 National Fire Code of Canada-[2005].

1.3 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 hazardous materials and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit two copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements and 01 35 43 - Environmental Procedures to Departmental Representative for each hazardous material required prior to bringing hazardous material on site.
 - .3 Submit hazardous materials management plan to Departmental Representative that identifies hazardous materials, usage, location, personal protective equipment requirements, and disposal arrangements.

1.4 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 Transport hazardous materials and wastes in accordance with Transportation of Dangerous Goods Act, Transportation of Dangerous Goods Regulations, and applicable provincial regulations.
 - .1 When exporting hazardous waste to another country, ensure compliance with Export and Import of Hazardous Waste and Hazardous Recyclable Materials Regulations.
- .4 Storage and Handling Requirements
 - .1 Co-ordinate storage of hazardous materials with Departmental Representative and abide by internal requirements for labelling and storage of materials and wastes.
 - .2 Store and handle hazardous materials and wastes in accordance with applicable federal and provincial laws, regulations, codes, and guidelines.
 - .3 Store and handle flammable and combustible materials in accordance with National Fire Code of Canada requirements.
 - .4 Keep no more than 45 litres of flammable and combustible liquids such as gasoline, kerosene and naphtha for ready use.

- .1 Store flammable and combustible liquids in approved safety cans bearing the Underwriters' Laboratory of Canada or Factory Mutual seal of approval.
- .2 Storage of quantities of flammable and combustible liquids exceeding 45 litres for work purposes requires the written approval of the Departmental Representative.
- .5 Transfer of flammable and combustible liquids is prohibited within buildings.
- .6 Transfer flammable and combustible liquids away from open flames or heat-producing devices.
- .7 Solvents or cleaning agents must be non-flammable or have flash point above 38 degrees C.
- .8 Store flammable and combustible waste liquids for disposal in approved containers located in safe, ventilated area. Keep quantities to minimum.
- .9 Observe smoking regulations, smoking is prohibited in areas where hazardous materials are stored, used, or handled.
- .10 Storage requirements for quantities of hazardous materials and wastes in excess of 5 kg for solids, and 5 litres for liquids:
 - .1 Store hazardous materials and wastes in closed and sealed containers.
 - .2 Label containers of hazardous materials and wastes in accordance with WHMIS.
 - .3 Store hazardous materials and wastes in containers compatible with that material or waste.
 - .4 Segregate incompatible materials and wastes.
 - .5 Ensure that different hazardous materials or hazardous wastes are stored in separate containers.
 - .6 Store hazardous materials and wastes in secure storage area with controlled access.
 - .7 Maintain clear egress from storage area.
 - .8 Store hazardous materials and wastes in location that will prevent them from spilling into environment.
 - .9 Have appropriate emergency spill response equipment available near storage area, including personal protective equipment.
 - .10 Maintain inventory of hazardous materials and wastes, including product name, quantity, and date when storage began.
 - .11 When hazardous waste is generated on site:
 - .1 Co-ordinate transportation and disposal with Departmental Representative.
 - .2 Comply with applicable federal, provincial and municipal laws and regulations for generators of hazardous waste.
 - .3 Use licensed carrier authorized by provincial authorities to accept subject material.
 - .4 Before shipping material obtain written notice from intended hazardous waste treatment or disposal facility it will accept material and it is licensed to accept this material.
 - .5 Label container with legible, visible safety marks as prescribed by federal and provincial regulations.
 - .6 Only trained personnel handle, offer for transport, or transport dangerous goods.
 - .7 Provide photocopy of shipping documents and waste manifests to Departmental Representative.
 - .8 Track receipt of completed manifest from consignee after shipping dangerous goods. Provide photocopy of completed manifest to Departmental Representative.

- .9 Report discharge, emission, or escape of hazardous materials immediately to Departmental Representative and appropriate provincial authority. Take reasonable measures to control release.
- .12 Ensure personnel have been trained in accordance with Workplace Hazardous Materials Information System (WHMIS) requirements.
- .13 Report spills or accidents immediately to Departmental Representative. Submit a written spill report to Departmental Representative within 24 hours of incident.

PART 2 – PRODUCTS

2.1 Materials

- .1 Description
 - .1 Bring on site only quantities hazardous material required to perform Work.
 - .2 Maintain MSDS in proximity to where materials are being used. Communicate this location to personnel who may have contact with hazardous materials.

PART 3 – EXECUTION

3.1 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.
 - .1 Dispose of hazardous waste materials in accordance with applicable federal and provincial acts, regulations, and guidelines.
 - .2 Recycle hazardous wastes for which there is approved, cost effective recycling process available.
 - .3 Send hazardous wastes to authorized hazardous waste disposal or treatment facilities.
 - .4 Burning, diluting, or mixing hazardous wastes for purpose of disposal is prohibited.
 - .5 Disposal of hazardous materials in waterways, storm or sanitary sewers, or in municipal solid waste landfills is prohibited.
 - .6 Dispose of hazardous wastes in timely fashion in accordance with applicable provincial regulations.
 - .7 Minimize generation of hazardous waste to maximum extent practicable. Take necessary precautions to avoid mixing clean and contaminated wastes.

- .8 Identify and evaluate recycling and reclamation options as alternatives to land disposal, such as:
 - .1 Hazardous wastes recycled in manner constituting disposal.
 - .2 Hazardous waste burned for energy recovery.
 - .3 Lead-acid battery recycling.
 - .4 Hazardous wastes with economically recoverable precious metals.

END OF SECTION

PART 1 - GENERAL

1.1 Related requirements

- .1 Section 03 30 00 – Cast in place concrete.

1.2 References

- .1 Canadian Standards Association (CSA)
 - .1 CSA-A23.1-04 Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
 - .2 CSA-O86.1-01 (C2006) Department Representative Design in Wood.
 - .3 CSA O121-FM1978(C2003), Douglas Fir Plywood.
 - .4 CSA O151-F04, Canadian Softwood Plywood.
 - .5 CSA O153-FM1980(C2003), Poplar Plywood.
 - .6 CSA O437 Series-F93(C2006), Standards for OSB and Waferboard.
 - .7 CSA S269.1-1975(R2003), Falsework for Construction Purposes.
 - .8 CAN/CSA-S269.3-M92(C2003), Concrete Formwork, National Standard of Canada

1.3 Action and informational submittals

- .1 Submit shop drawings for formwork and falsework in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Indicate method and schedule of construction, shoring, stripping and re-shoring procedures, materials, arrangement of joints, special architectural exposed finishes, ties, liners, and locations of temporary embedded parts. Comply with CAN/CSA-S269.3 for formwork drawings.
- .3 Indicate formwork design data: permissible rate of concrete placement, and temperature of concrete, in forms.
- .4 Indicate sequence of erection and removal of formwork/falsework as directed by Department Representative.
- .5 Submit drawings stamped and signed by professional Engineer registered in Province of Quebec, Canada.

PART 2 - PRODUCTS

2.1 Materials

- .1 Formwork materials:
 - .1 Use new wood and wood product formwork materials to CAN/CSA-O86.1 or use steel form.
- .2 Form ties:
 - .1 Use removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25 mm diameter in concrete surface.
- .3 Form release agent: non-toxic, biodegradable, low VOC.
- .4 Form stripping agent: colorless mineral oil, non-toxic, biodegradable, low VOC and free of kerosene.
- .5 Falsework materials: to CSA-S269.1.
- .6 Sealant: Use appropriate sealant.

PART 3 - EXECUTION

3.1 Fabrication and erection

- .1 Verify lines, levels and centers before proceeding with formwork/falsework and ensure dimensions agree with drawings.
- .2 Obtain Department Representative's approval prior to pouring concrete directly on ground or for use of earth forms framing openings not indicated on drawings.
- .3 Fabricate and erect falsework in accordance with CSA S269.1.
- .4 Do not place shores and mud sills on frozen ground.
- .5 Fabricate and erect formwork in accordance with CAN/CSA-S269.3 to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CSA-A23.1.
- .6 Align form joints and make watertight. Keep form joints to minimum.
- .7 Use 25 mm chamfer strips on external corners and/or 25 mm fillets at interior corners, joints, unless specified otherwise.

- .8 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated and conform.
- .9 Build in anchors, sleeves, and other inserts required to accommodate Work specified in other sections.

Ensure that anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.
- .10 When contractor must provide falsework plans, after their construction, and after their inspection by an Engineer member of OIQ and prior to concrete pouring, he must provide the Departmental Representative a writing, signed by this engineer notifying that forming are conform to the provided plans. This writing must also notify hour and date of the inspection.
- .11 Clean formwork in accordance with CSA-A23.1/A23.2, before placing concrete.

3.2 Removal and reshoring

- .1 Leave formwork in place for following minimum periods of time after placing concrete.
 - .1 1 days for slabs on grade.
 - .2 7 days for all other methods.
- .2 Remove formwork when concrete has reached 70 % of its design strength or minimum period noted above, whichever comes prior, and replace immediately with adequate reshoring for 28 days or 35 MPa (along the first of these two conditions) following pour.
- .3 Re-use formwork and falsework subject to requirements of CSA-A23.1/A23.2.

END OF SECTION

PART 1 - GENERAL

1.1 Related requirements

- .1 Section 03 30 00 – Cast-in-place concrete.

1.2 References

- .1 American Concrete Institute (ACI)
 - .1 SP-66-04, ACI Detailing Manual 2004.
- .2 CSA International
 - .1 CSA-A23.1-F09/A23.2-F09, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
 - .2 CAN/CSA-A23.3-F04(R2010), Design of Concrete Structures.
 - .3 CAN/CSA G30.3-M1983(R1991), Cold-drawn annealed steel wire ties for concrete reinforcement.
 - .4 CSA G30.14-M1983(R1991), Deformed steel wire for concrete reinforcement.
 - .5 CSA-G30.18-M92, Carbon Steel Bars for Concrete Reinforcement.
 - .6 CSA-G40.21-F04(C2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .7 CAN/CSA-G164-FM92(C2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .8 CSA W186-FM1990(C2007), Welding of Reinforcing Bars in Reinforced Concrete Construction.
- .3 ASTM International
 - .1 ASTM A 82/A 82M-07, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
 - .2 ASTM A 143/A 143M-07, Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.
 - .3 ASTM A 185/A 185M-07, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
 - .4 ASTM A 775/A 775M-07b, Standard Specification for Epoxy-Coated Reinforcing Steel Bars.
- .4 Reinforcing Steel Institute of Canada (RSIC)
 - .1 RSIC-2004, Reinforcing Steel Manual of Standard Practice.

1.3 Action and informational submittals

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

- .2 Prepare reinforcement drawings in accordance with RSIC Manual of Standard Practice and SP-66.
- .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered by OIQ, when required by the Departmental Representative.
 - .1 Indicate placing of reinforcement and:
 - .1 Bar bending details.
 - .2 Lists.
 - .3 Quantities of reinforcement.
 - .4 Sizes, spacings, locations of reinforcement and mechanical splices if approved by Departmental Representative, with identifying code marks to permit correct placement without reference to structural drawings.
 - .5 Indicate sizes, spacings and locations of chairs, spacers and hangers.
 - .2 Detail lap lengths and bar development lengths to CAN/CSA-A23.3, unless otherwise indicated.

1.4 Quality assurance

- .1 Submit in accordance with Section 01 45 00 - Quality Control and as described in PART 2 - SOURCE QUALITY CONTROL.
 - .1 Mill Test Report: Provide Departmental Representative with certified copy of mill test report of reinforcing steel, minimum 4 weeks prior to beginning reinforcing work.

1.5 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 off ground and in accordance with manufacturer's recommendations.
 - .2 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 Materials

- .1 Substitute different size bars only if permitted in writing by Departmental Representative.
- .2 Reinforcing steel: billet steel, grade 400W, deformed bars to CAN/CSA-G30.18, unless indicated otherwise.
- .3 Cold-drawn annealed steel wire ties: to CAN/CSA G30.3 or ASTM A82.
- .4 Chairs, bolsters, bar supports, spacers: to CAN/CSA-A23.1/A23.2.
- .5 Mechanical splices: subject to approval of Departmental Representative.
- .6 Galvanizing of non-prestressed reinforcement: to CAN/CSA-G164, minimum zinc coating 610 g/m².

2.2 Fabrication

- .1 Fabricate reinforcing steel in accordance with CAN/CSA-A23.1/A23.2, SP-66 and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.
- .2 Obtain Departmental Representative's written approval for locations of reinforcement splices other than those shown on placing drawings.
- .3 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.

2.3 Source quality control

- .1 Provide the Consultant with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, minimum two (2) weeks prior to beginning reinforcing work.
- .2 Inform the Consultant of proposed source of material to be supplied.

PART 3 - EXECUTION

3.1 Preparation

- .1 Galvanizing to include chromate treatment.
 - .1 Duration of treatment to be 1 hour per 25 mm of bar diameter.

- .2 Conduct bending tests to verify galvanized bar fragility in accordance with ASTM A 143/A 143M.

3.2 Field bending

- .1 Do not field bend or field weld reinforcement except where indicated or authorized by Departmental Representative.
- .2 When field bending is authorized, bend without heat, applying slow and steady pressure.
- .3 Replace bars, which develop cracks or splits.

3.3 Placing reinforcement

- .1 Place reinforcing steel as indicated on placing drawings and in accordance with CAN/CSA-A23.1/A23.2.
- .2 After reinforcing installation and prior to placing concrete, Contractor must give the Departmental Representative a writing from an Engineer member of OIQ, that all reinforcing, anchors are installed in conformity with contract documents regarding the steel manufacturer, grade, type of protection, diameter, length, localization, concrete protection and wires spacing. This writing must also indicate the date and hour of the inspection.
- .3 Protect coated portions of bars with covering during transportation and handling.

3.4 Field touch-up

- .1 Touch up damaged and cut ends of epoxy coated or galvanized reinforcing steel with compatible finish to provide continuous coating.

END OF SECTION

PART 1 - GENERAL

1.1 Related requirements

- .1 Section 03 10 00 – Concrete forming and accessories.
- .2 Section 03 20 00 – Concrete reinforcing.

1.2 References

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM C 109/C 109M-95, Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 in. or 50 mm Cube Specimens).
 - .2 ASTM C 260-10A, Standard Specification for Air-Entraining Admixtures for Concrete.
 - .3 ASTM C 309-07, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - .4 ASTM C 494/C 494M-10, Standard Specification for Chemical Admixtures for Concrete.
 - .5 ASTM C 827-95a, Test Method for Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures.
 - .6 ASTM C 939-94a, Test Method for Flow of Grout Preplaced-Aggregate Concrete.
- .2 Canadian Standard Association (CSA)
 - .1 CSA A23.1-F09, Concrete Materials and Methods of Concrete Construction.
 - .2 CSA A23.2-F09, Methods of Test and Standard Practices for Concrete
 - .3 CSA A283-06, Qualification Code for Concrete Testing Laboratories.
 - .4 CSA A3000-F08, Cementitious Materials Compendium(Consists of A3001, A3002, A3003, A3004 and A3005).

1.3 Action and informational submittals

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

1.4 Quality assurance

- .1 In accordance with Section 01 45 00 - Quality Control.
- .2 Provide to the Departmental Representative a minimum 4 weeks prior to starting concrete work, with valid and recognized certificate from plant delivering concrete.
- .3 Provide certificate in accordance with Section 01 33 00 – Submittal Procedures.

- .4 Minimum 4 weeks prior to starting concrete work, provide manufacturer's test reports and qualified independent laboratory certificate for review by Departmental Representative, attesting that following items are compliant to specifications:
 - .1 Portland Cement.
 - .2 Cementitious Mixtures.
 - .3 Grout.
 - .4 Admixtures.
 - .5 Aggregates.
 - .6 Water.
 - .7 Joints sealant.
- .5 Minimum 2 weeks prior to starting concrete work, provide Concrete Mix chosen to have quality, strength and performances specified, and in accordance with CSA-A23.1.
- .6 Minimum 6 weeks prior to starting concrete work, provide proposed quality control procedures for review by Departmental Representative, in accordance with Section 01 45 00 – Quality Control, on following items:
 - .1 Falsework erection.
 - .2 Hot weather concrete.
 - .3 Cold weather concrete.
 - .4 Curing.
 - .5 Finishes.
 - .6 Formwork removal.
 - .7 Joints execution.

1.5 Delivery, storage and handling

- .1 Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1/A23.2.
- .2 Contractor must ensure that delivery duration will allow concrete to meet the specifications.

PART 2 - PRODUCTS

2.1 Materials

- .1 Hydraulic cement: to CSA A3001, type GUb-SF.
- .2 Water: to CSA A23.1.
- .3 Aggregates: to CSA A23.1.
- .4 Air entraining admixture: to ASTM C 260.
- .5 Chemical admixture: to ASTM C 494. Departmental Representative to approve accelerating or set retarding admixtures during cold and hot weather placing.

- .6 Shrinkage compensating grout: premixed compound consisting of Portland cement, water reducing and plasticizing agents to CSA A23.1/A23.2.
 - .1 Compressive strength: 35 MPa at 28 days.
- .7 Curing compound: to CSA A23.1 and ASTM C 309.
- .8 Premolded joint filers:
 - .1 Bituminous impregnated fiber board: to ASTM D 1751.

2.2 Mixes

- .1 Medium density concrete to CSA A23.1, and to meet the following performance criteria unless otherwise noted.
 - .1 Cement:
 - .1 Portland cement type GUB-SF.
 - .2 Minimum compressive strength at 28 days: 35 MPa.
 - .3 Aggregate size: 20 mm Maximum.
 - .4 Slump: at time and point of discharge 50 to 110 mm.
 - .5 Air-entraining: $6\frac{1}{2}\% \pm 1\frac{1}{2}\%$.
 - .6 Chemical admixtures: Water reducing, set retarding, set accelerating, strength enhancer, air entraining, plasticizing agents to ASTM C 494.
 - .7 Water/cement maximum ratio: 0.45.
 - .8 Minimum cement quantity: 340 kg/m³.

PART 3 - EXECUTION

3.1 Preparation

- .1 Obtain Departmental Representative's approval before placing concrete. Provide 24 hours minimum notice prior to placing of concrete.
- .2 Place concrete reinforcing in accordance with Section 03 20 00 - Concrete Reinforcing.
- .3 During concreting operations, ensure concrete delivery and handling facilitates placing with minimum of re-handling, and without damage to existing structure or Work.
- .4 Provide a spare pump on the construction site to prevent pouring interruption in case of a broken pump.
- .5 Pumping of concrete is permitted only after approval of equipment and mix.
- .6 Ensure reinforcement and inserts are not disturbed during concrete placement.

- .7 Prior to placing of concrete obtain Departmental Representative's approval of proposed method for protection of concrete during placing and curing.
- .8 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.
- .9 Do not place load upon new concrete until authorized by Departmental Representative.

3.2 Installation, application

- .1 Do cast-in-place concrete work to CSA A23.1.
- .2 Sleeves and inserts:
 - .1 Do not permit penetrations, sleeves, ducts, pipes or other openings to pass through beams except where indicated or approved by Departmental Representative.
 - .2 Where approved by Departmental Representative, set sleeves, ties, pipe hangers and other inserts and openings as indicated or specified elsewhere. Sleeves not indicated must be approved by Departmental Representative.
 - .3 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain written approval of modifications from Departmental Representative before placing of concrete.
 - .4 Confirm locations and sizes of sleeves and openings shown on drawings.
- .3 Anchor bolts:
 - .1 Set anchor bolts to templates in co-ordination with appropriate trade prior to placing concrete.
 - .2 Grout anchor bolts in preformed holes or holes drilled after concrete has set only after receipt of approval from Departmental Representative.
 - .3 Protect anchor bolt holes from water accumulations, snow and ice build-ups.
 - .4 Drainage holes and weep holes:
 - .1 Form weep holes and drainage holes in accordance with Section 03 10 00 - Concrete Forming and Accessories. If wood forms are used, remove them after concrete has set.
 - .5 Pouring joints: Obtain Departmental Representative approval for any pouring joint which is not indicated on plans.
 - .6 Finishing:
 - .1 Finish concrete to CSA A23.1. Broom finish required on rolling surfaces.

.7 Joint fillers:

- .1 Furnish filler for each joint in single piece for depth and width required for joint, unless otherwise authorized by Departmental Representative.

When more than one piece is required for joint, fasten abutting ends and hold securely to shape by stapling or other positive fastening.

- .2 Locate and execute construction joints as per indication. Install joint fillers.
- .8 Put some grout below equipment base as the manufacturer instructions, in a way to obtain a full contact area from the base.
- .9 Curing must meet the CSA A23.1 procedures. Humid cure is required for concrete slabs.

3.3 Surface tolerance

- .1 Concrete tolerance to CSA A23.1.

3.4 Field quality control

- .1 Site tests: conduct tests as follows in accordance with Section 01 45 00 - Quality Control
- .2 Department will pay for costs of tests as specified in Section 01 29 83 - Payment Procedures for Testing Laboratory Services.
- .3 Departmental Representative will take additional test cylinders during cold weather concreting. Cure cylinders on job site under same conditions as concrete which they represent.
- .4 Non-Destructive Methods for Testing Concrete: to CSA A23.2.
- .5 Inspection or testing by Departmental Representative will not augment or replace Contractor quality control nor relieve Contractor of his contractual responsibility.

END OF SECTION

PART 1 - GENERAL

1.1 Related requirements

- .1 Section 03 20 00 – Concrete Reinforcing.
- .2 Section 03 30 00 – Cast-in-place Concrete.

1.2 References

- .1 Canadian Standards Association (CSA)/CSA International.
 - .1 CAN/CSA-A23.1/A23.2-Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete.

1.3 Definitions

- .1 Tremie concrete is placed underwater through a tube called tremie pipe.
- .2 Tremie pipe has a hopper at upper end and may be open ended or may have foot valve, plug or travelling plug to control flow of concrete.
 - .1 Concrete is placed in hopper and sufficient head of concrete is maintained in tremie pipe to provide desired rate of flow.
- .3 Pumped concrete method consist of placing concrete underwater using a concrete pump with discharge line used in similar manner to a tremie pipe.

1.4 Structures concerned

- .1 Structures concerned by this section are the pipes and junctions with existing structures.

PART 2 - PRODUCTS

2.1 Materials

- .1 Concrete materials: to Section 03 30 00 - Cast-in-Place Concrete.

2.2 Mixes

- .1 Use 35 MPa mix as stated in Section 03 30 00 except if otherwise specified.

- .2 Anti-washout admixtures and/or superplasticizers and/or other admixtures must be used to make underwater pouring possible without any piping clogging.
- .3 Contractor will have to adjust cement content, water/cement ratio, coarse granular size.
- .4 Contractor is responsible to supply concrete mix formulation to the Departmental Representative for examination.
- .5 For the area between old and new wharf on the south part of wharf 96, an anti-washout admixture is required in the concrete mix.

PART 3 - EXECUTION

3.1 Preparation

- .1 Where concrete must bond to existing surfaces, clean surfaces just prior to starting concrete placement.
 - .1 Use water jets, mechanical scrapers or other means, and when quantities of mud or rock cuttings are present, remove by air lift.
- .2 As indicated on plans, pouring of piles which do not include a rock anchor will begin at the bottom of sea level. No cleaning of pile is required below the natural sea level.

3.2 Installation

- .1 Do concrete work in accordance with Section 03 30 00 - Cast-in-Place Concrete and to CAN/CSA-A23.1/A23.2. Testing for concrete to CAN/CSA-A23.1/A23.2, except where specified otherwise.
- .2 Where concrete placement extends above water surface, protect concrete from direct contact with air at temperature below 5 degrees Celsius in accordance with CAN//CSA-A23.1.
- .3 Place concrete in one continuous operation to full depth required. Pouring joints must have been previously approved by the Departmental Representative.
 - .1 Supply complete equipment for every phase of operation until the required elevation. Cast joints must be submitted to Departmental Representative prior pour.
 - .2 Provide sufficient supply of concrete to complete pour without interruption.
- .4 Take necessary measures to prevent concrete from being dropped in marine environment.
- .5 Tremie method.
 - .1 Provide water-tight tremie pipe sized to allow free flow of concrete.
 - .2 Provide hopper at top of tremie pipe and provide a mean to raise and lower tremie pipe.

- .3 Provide plug or foot valve at bottom of tremie pipe to permit initial filling of pipe with concrete.
 - .4 Provide minimum of one tremie pipe for every pile. Do not move tremie pipes laterally through concrete.
 - .5 Start concrete placement with full tremie pipe. Keep bottom of pipe buried minimum 900 mm in freshly placed concrete. Control rate of flow by varying depth of pipe bottom in concrete.
 - .6 If seal is lost, allowing water to enter pipe, withdraw pipe immediately. Refill pipe, and continue placing as specified.
 - .7 If tremie operation is interrupted so that horizontal construction joint has to be made, cut surface laitance by jetting, within 24 to 36 hours and remove loose material by pumping or air lifting before placing next lift.
 - .8 Do not vibrate, disturb or puddle concrete after placement.
- .6 Pumped concrete method.
- .1 Follow procedures as for tremie method in placing concrete using discharge line from concrete pump as tremie pipe.

END OF SECTION

PART 1 – GENERAL

1.1 Related requirements

- .1 Section 03 30 00 – Cast-in-place concrete.
- .2 Section 03 20 00 – Concrete reinforcing.
- .3 Section 03 10 00 – Concrete forming and accessories.

1.2 References

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM A 185/A 185M-05a, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
 - .2 ASTM C 260-01, Standard Specification for Air-Entraining Admixtures for Concrete.
- .2 Canadian Standards Association (CSA International)
 - .1 CSA-A23.1/A23.2-F2004, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
 - .2 CSA-A23.3-F04, Design of Concrete Structures.
 - .3 CSA-A23.4-F05, Precast Concrete - Materials and Construction.
 - .4 CAN/CSA-A3000-F03, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
 - .1 CSA-A3001-F03, Cementitious Materials for Use in Concrete.
 - .5 CAN/CSA-G30.18-FM92(R2002), Billet-Steel Bars for Concrete Reinforcement.
 - .6 CAN/CSA-G40.20/G40.21-F2004, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .7 CAN/CSA-G164-FM92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .8 CAN/CSA-S6-F2005, Canadian Highway Bridge Design Code.
 - .9 CSA-W47.1-F03, Certification of Companies for Fusion Welding for Steel.
 - .10 CAN/CSA W48-F01(R2006), Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).
 - .11 CSA-W59-F03, Welded Steel Construction (Metal Arc Welding) (Metric version).
 - .12 CSA-W186-FM1990(R2002), Welding of Reinforcing Bars in Reinforced Concrete Construction.

1.3 Design requirements

- .1 Provide detailed calculations and design drawings for typical precast elements and connections as described in PART 1 - SUBMITTALS.

1.4 Performance requirements

- .1 Tolerance of precast elements to CSA-A23.4.

1.5 Action and informational submittals

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit shop drawings in accordance with CSA-A23.3 and CSA-A23.4 and include following items:
 - .1 Design calculations for items designed by manufacturer.
 - .2 Finishing schedules.
 - .3 Methods of handling and erection.
 - .4 Openings, sleeves, inserts and related reinforcement.
- .3 Submit 3 copies of detailed calculations and design drawings for typical precast elements and connections for review by Departmental Representative 4 weeks prior to manufacture.
- .4 Shop Drawings: submit drawings stamped and signed by qualified professional engineer registered or licensed in Province of Quebec, Canada.
- .5 Submit samples in accordance with Section 01 33 00 - Submittal Procedures to Departmental Representative.

1.6 Quality assurance

- .1 Quality Control Plan: submit written report, as described in PART 3 - VERIFICATION, to Departmental Representative verifying compliance that concrete provided meets performance requirements of concrete as established in PART 2 - PRODUCTS.

1.7 Qualifications

- .1 Fabricate and erect precast concrete elements by manufacturing plant certified in appropriate category according to CSA-A23.4
- .2 Precast concrete manufacturer to be certified in accordance with CSA's certification procedures for precast concrete plants to specifically verify as part that plant is currently certified in appropriate category, Structural.
- .3 Only precast elements fabricated in such certified plants to be acceptable to Departmental Representative and plant certification to be maintained for duration of fabrication, erection until warranty expires.
- .4 Welding companies certified to CSA-W47.1.

1.8 Delivery, storage and handling

- .1 Deliver, handle and store precast units according to manufacturer's instructions.

PART 2 – PRODUCTS

2.1 Materials

- .1 Pre-cast concrete elements must conform to section 03 30 00 – Cast-in –place Concrete

2.2 Mixes

- .1 Concrete: The concrete mix must conform to section 03 30 00 – Cast in place concrete unless otherwise specified.

2.3 Manufactured units

- .1 Manufacture units in accordance with CSA-A23.4.
- .2 Mark each precast unit to correspond to identification mark on shop drawings for location with date cast on part of unit not to be exposed.
- .3 Provide hardware suitable for handling elements.

2.4 Source quality control

- .1 Provide Departmental Representative with certified copies of quality control tests related to this project as specified in CSA-A23.4.
- .3 Provide records from in-house quality control programme based upon plant certification requirements to Departmental Representative for inspection and review.
- .4 Upon request, provide Departmental Representative with certified copy of mill test report of reinforcing steel supplied, showing physical and chemical analysis.
- .5 Precast plants should keep complete records of supply source of concrete material, steel reinforcement, and provide to Departmental Representative for review upon request.

PART 3 - EXECUTION

3.1 Erection

- .1 Do precast concrete work in accordance with CSA-A23.4 and CSA-A23.3.
- .2 Do welding in accordance with CSA-W59, for welding to steel structures and CSA-W186, for welding of reinforcement.
- .3 Erect precast elements within allowable tolerances as specified.
- .4 Non-cumulative erection tolerances in accordance with CSA-A23-4.
- .5 Set elevations and alignment between units to within allowable tolerances before connecting units.
- .6 Fasten precast units in place as indicated on reviewed shop drawings.

3.2 Verification

- .1 Quality Control Plan: ensure concrete supplier meets performance criteria of concrete as established in PART 2 - PRODUCTS, by Departmental Representative and provide verification of compliance as described in PART 1 - QUALITY ASSURANCE.

3.3 Cleaning

- .1 Use cleaning methods as reviewed by Departmental Representative before cleaning soiled precast concrete surfaces.

END OF SECTION

PART 1 - GENERAL

1.1 Related requirements

- .1 Section 01 33 00 – Submittal Procedures.
- .2 Section 01 61 00 – Common Product Requirements.
- .3 Section 09 97 20 – Painting.

1.2 References

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM A 36/A 36M-1, Standard Specification for Structural Steel.
 - .2 ASTM A 307-07 B, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - .3 ASTM A 325-02, Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
 - .4 ASTM A 325M-05, Standard Specification for High-Strength Bolts for Structural Steel Joints.
 - .5 ASTM A 490M-00, Standard Specification for High-Strength Steel Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints (Metric).
- .2 Canadian Standard Association (CSA)/CSA International
 - .1 CSA G40.20/F40.21-04(2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CAN/CSA G164-FM92 (2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .3 CSA S16-09, Design of Steel Structures.
 - .4 CSA W48-F06, Filler Metals and Allied Materials for Metal Arc Welding.
 - .5 CSA W59-F03 Welded Steel Construction (Metal Arc Welding)(Metric).
 - .6 CAN/CSA-S136-07 Steel structural cold-formed
- .3 Underwater weldings: ANSI/AWS D3.6

1.3 Action and informational submittals

- .1 Submit required shop drawings, including fabrication and erection drawings and bills of materials, in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for sections, plates, pipe, tubing, bolts, and include product characteristics, performance criteria, physical size, finish and limitations.

- .3 Shop Drawings:
 - .1 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories. Welding symbols in accordance with CSA W59.
- .4 Welding Methods Documents to be approved and stamped by the Canadian Welding Bureau, or a certified welding engineer.

1.4 Quality assurance

- .1 Submit certified test reports showing compliance with specified performance characteristics and physical properties.
- .2 Submit test reports and certifications signed by a competent Canadian certified manufacturer's metallurgist certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.5 Delivery, storage and handling

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Provide and install wedges for material delivery, lifting or storage purposes.
 - .1 Take necessary measures as to prevent damages to steel during fabrication, shipping or erection.
 - .2 Do not notch webs or flanges.
 - .3 Do not put excessive loads on materials.
- .3 Mark any material weighting over 3 metric tons.
- .4 Submit to Engineer delivery schedule minimum 7 days prior to shipping of material.

PART 2 - PRODUCTS

2.1 Materials

- .1 Steel sections: to CSA G40.20/G40.21, Grade 350W.
- .2 Steel plates: to CSA G40.20/G40.21, Grade 300W.
- .3 Anchor bolts: to ASTM A 307.
- .4 Bolts, nuts and washers: to ASTM A 325M. Nuts lubricated according to A563.

- .5 Welding materials: to CSA W48 and CSA W59 and certified by the Canadian Welding Bureau. Conform to underwater welding requirements and AWS D 3.6.
- .6 Shear studs: to CSA W59, appendix H.
- .7 Safety net: must be galvanized and meet the following requirements:
 - .1 Width: 1.5 meter
 - .2 Capacity: 1.2 kPa
 - .3 Minimum and maximum mesh size: between 150 mm and 250 mm (two directions)
 - .4 Higher elevation of safety net: Must not be higher than the copewall elevation in its drainage slope direction.
 - .5 Contractor must take into consideration the ice impact on the safety net in its supporting members selection.
 - .6 Anchor system in concrete must be submit to Departmental Representative for approval.
- .8 Tie rods, sleeve nuts and turnbuckles:
 - .1 Tie rods: Tie-rods must be threaded rods. If diameter and steel grade is not indicated on plans, required capacity must meet a minimum capacity of 4400 kN per tie-rod.

This capacity is defined as the elastic limit of tie-rod.
 - .2 Sleeve nuts and connector sleeves: to have load capacity in excess of capacity of tie rod.
 - .3 Take into account that the wale spacing and plates design are based on a 85mm tie-rod diameter (nominal diameter). Any modification regarding a larger diameter must be considered by the Contractor. Sealed and signed shop drawing must be provided.
 - .4 Tie-rods which are not inclined and drilled must be metalized according to the CSA-G189 Sprayed Metal Coating for Atmosphere Corrosion Protection normalization. Minimum thickness: 130 microns.
 - .5 The pile tie-rod junction must be in 350W steel must be designed to meet a capacity of 4400 kN per junction. This system must be able to let the tie-rod move vertically (spherical eye). The pile tie-rod junction must be metallized.

2.2 Weldings

- .1 Welding out of water must be conform to CAN/CSA W59.
- .2 Under water weldings must be conform to ANSI/AWS D3.6. Weldings must be of type B.

PART 3 - EXECUTION

3.1 General

- .1 Structural steel work: in accordance with CAN/CSA-S16 and CAN/CSA-S136.
- .2 Welding: in accordance with CSA W59 and AWS D 3.6.
- .3 Companies to be certified under Division 1 or 2.1 of CSA W47.1 for fusion welding of steel structures and/or CSA W55.3 for resistance welding of structural components.
- .4 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for metal fabrications installation in accordance with manufacturer's written instructions.
- .5 Visually inspect substrate in presence of Departmental Representative
- .6 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
- .7 Proceed with installation only after unacceptable conditions have been remedied.

3.2 Connection to existing work

- .1 Verify dimensions and condition of existing work, report discrepancies and potential problem areas to Departmental Representative for direction before commencing fabrication.

3.3 Marking

- .1 Mark materials in accordance with CSA G40.20/G40.21. Do not use die stamping. When steel is to be left in unpainted condition, place marking at locations not visible from exterior after erection.
- .2 Match marking: shop mark bearing assemblies and splices for fit and match.

3.4 Erection

- .1 Erect structural steel, as indicated and in accordance with CAN/CSA-S16 CAN/CSA-S136 and in accordance with erection drawings. Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.
- .2 Do welding work in accordance with CSA W59 unless specified otherwise.
- .3 Clean surfaces from dust and debris to Departmental Representative's satisfaction.
- .4 Validate structure components position and location of bolts prior to erection. Any discrepancies shall be brought to Departmental Representative's attention.

- .5 Minimize stress during erection to prevent holes deformation, torsion, flexion or warp of steel components.
 - .1 Bore holes as needed only if approved by engineer.
 - .2 Bored holes to be maximum 2 mm more than bolt diameter used.
- .6 During erection, structure shall be assembled in a way to resist dead loads, construction loads, wind or earthquake or any natural conditions loads and erection stress.
- .7 Field cutting or altering structural members to approval of Departmental Representative.
- .8 Place appropriate anchor bolts to elevations and locations indicated.
 - .1 Keep water and foreign matters from entering holes.
 - .2 Ensure heating and protection as indicated by Engineer and fully grout around anchor bolts.
 - .3 Clean with mechanical brush and touch up shop primer to bolts, rivets, welds and burned or scratched surfaces at completion of erection.

3.5 Finish

- .1 Finish: Components in accordance with specified alignments and exempt from torsion, bending, open splices, as well as sharp edges.
- .2 Galvanizing: hot dipped galvanizing with zinc coating 600 g/m² to CAN/CSA-G164.
 - .1 Galvanizing shall be completely removed where welding is required.
 - .2 Touch-up welds with “Galvicon” Type product. Follow Manufacturer’s instruction.
 - .3 Painting applied in shop according to Section 09 97 20 –Painting.
 - .4 Metallisation: must be conform to requirements of sections 15.14.3.1 and 15.14.3.2 of CCDG (.Transportation Minister of Quebec General Specifications)

3.6 Tolerance

- .1 Admissible tolerances for bolt holes and rivets.
 - .1 Unless otherwise indicated by Engineer, holes diameter shall be maximum 2 mm more than bolt size.
 - .2 Holes shall not be offset more than 1 mm of each other centreline when in same group.
 - .3 Hole centerline between two groups of holes shall be to the following:

Centreline (in m)	Tolerance (+/- mm)
Less than 10	1
10 to 20	2
20 to 30	3

- .4 Correct components poorly drilled or punch to Engineer satisfaction.

3.7 Welding quality control and inspection

- .1 Give a written description of welding methods to Departmental Representative at least four (4) weeks prior to Works.
- .2 For under water weldings, weldings will be qualified by the Departmental Representative. Fees for those tests will be at the Contractor charge. Welders who will not meet the requirements will not be allowed to work.
- .3 Department is allowed to proceed to quality control on weldings done on site. Tests fees will be on Department charge.
- .4 Contractor will have to supply the Department Representative all the facilities required for the weldings quality control, including underwater video camera, at the Contractor charge.
- .5 If quality control detect a default to repair, the welding will have to be fixed and controlled again. The Contractor will have to modify his method to eliminate defaults. The repair and second inspection will be at the Contractor charge.
- .6 Allow Departmental Representative to inspect at the shop also.
- .7 Report to Departmental Representative any default in the material or any problem of erection on work site. Corrections will be realized at the Departmental Representative satisfaction.
- .8 The submarine welders will be qualified by the Departmental Representative. The cost of the coupons and testing will be paid by the Contractor. The welders that will not be qualified will not be authorized to proceed.

END OF SECTION

PART 1 – GENERAL

1.1 Scope of work

- .1 The work forming this section involves the design, manufacture and installation of an aluminium gangway for pedestrians for the trench floating dock as specified in the plans and specifications.
- .2 This section constitutes a performance specification for the access gangway to the floating dock and is a turnkey element provided by the contractor.

1.2 Workshop drawings

- .1 Submit to the department representative three (3) copies of the complete construction plans and specifications and the workshop drawings in three (3) copies.
- .2 All plans, specifications and drawings must be signed and sealed by a professional engineer member of the Order of engineers of Quebec.
- .3 Provide all manufacturer information such as catalogue, brochure, calculation notes, performance charts and diagrams
- .4 Provide samples of materials, finishes and colors at the request of the Departmental Representative

1.3 Gangway design

- .1 Gangway length: anticipated gangway length of 14 meters.

1.4 Codes and standards

- .1 All elements forming part of the manufacture of the gangway shall be designed and constructed in accordance with all codes and standards in force. It is the responsibility of the contractor to refer to all relevant codes and standards concerning the various construction elements and their materials. Other codes and standards are mentioned elsewhere in the specification and bid documents; the contractor must also take these into account. The last edition and revision of all documents should be used

PART 2 - PRODUCTS

2.1 Technical data & details for the gangway

- .1 The gangway shall include without limitation:
 - .1 Aluminium gangway structure and guardrails.
 - .2 Decking shall be a non-skid type grating material.
 - .3 Attachment system to the concrete wheelgard.
 - .4 A PVC half-conduit 150 mm shall be attached to the guardrail to allow the passage of cables.
 - .5 Provide access step/ramp at top and bottom of gangway.
- .2 Gateway
 - .1 Gangway length: 14 meters
 - .2 Clear width between railings: 1200 mm
 - .3 Wheel diameter: 127 mm
 - .4 The upper bracket of the gangway must allow vertical movement.
 - .5 Lower gangway bracket: two UHMW wheels, 127 mm dia on springs

2.2 Materials

- .1 Materials used in the construction of the bridge will be:
 - .1 Aluminium : the aluminium structure will be a modular type consisting of an assembly of 6061-T6 aluminium alloy profiles. The structure shall be MIG welded using a filler metal certified according to the standard CSA W47.2.
 - .2 Stainless steel A-316 for all hardware.
 - .3 Decking shall be non-slip grating.
 - .4 A 150 mm diameter PVC half-conduit must be attached to the entire length of the railing to allow passage of wiring.
 - .5 Non-slip access step/ramp with a maximum slope of 3H: 1V.
- .2 Operating conditions
 - .1 Uniformly distributed load of 2.4 kPa.
 - .2 Horizontal load on the upper part of each guardrail of 0.75 kN/m or 1.0 kN concentrated at any point of the guardrail.
 - .3 The structure must include elements to allowing safe lifting for eventual storage and lifting in operation.
- .3 Gangway provider folder
 - .1 Design
 - .1 The folder must contain the workshop drawings, dimensions and characteristics of all parts of the gangway. It shall respond to each of the above design elements. Calculations shall be performed by an engineer member of the OIQ and shall be presented to support the design capacity of the gangway.

PART 3 – EXECUTION

3.1 Handling and implementation

- .1 Confirm on-site the required length of the gangway before commencing production.
- .2 Provide all necessary manpower and equipment for unloading and installation of the gangway according to the location specified in the plans. Make the required adjustments to position the gangway in the space provided on the floating dock.
- .3 Ensure the proper functioning of the gangway on a complete tidal cycle and make the required adjustments and provide assistance when in operation.

END OF SECTION

PART 1 – GENERAL

1.1 Precision and references

- .1 This section constitutes a performance specification for the floating dock. It is a turnkey element provided by the contractor.
- .2 The required dimensions of the floating dock are 4 m wide x 12 metres long. The floating dock will be built as a single section.
- .3 All elements that constitute part of the manufacture of the floating docks shall be constructed in compliance with all codes and standards in force.
- .4 The structures and components of the floating docks must be designed with a minimum safety factor as specified in the CSA standard: Strength Design in Aluminum S-157 M83.
- .5 Welding should be carried out by a company certified by the Canadian Welding Bureau in accordance with the procedures of standard W47.2.
- .6 It is the responsibility of the contractor to refer to all relevant codes and standards concerning the various construction elements and their materials. Other codes and standards are mentioned elsewhere in the specification and bid documents; the contractor must also take these into account.
- .7 The last edition and revision of all documents should be used.

1.2 Shop drawings

- .1 Submit to the engineer three (3) copies of the complete construction plans, specifications and shop drawings according to section 01 33 00 - Documents and samples. These drawings should include:
 - .1 general drawing of installation;
 - .2 overall drawing of the anchoring system showing the position of anchors and their dimensions;
 - .3 drawing of the floating dock;
 - .4 drawing showing the method of fastening of the floats.
- .2 All plans, specifications and drawings must be signed and sealed by a professional engineer member of the Order of engineers of Quebec.
- .3 Provide all manufacturer information such as catalogue, brochure, calculation notes, performance charts and diagrams.
- .4 If required by the Departmental Representative, the contractor shall provide calculations of resistance and buoyancy for the floating docks and the anchoring system according to the specifications of this quote, 15 days after the award of the contract. Calculations must be approved by a professional engineer member of the Order of engineers of Quebec.

- .5 Provide samples of materials, finishes and colors at the request of the Departmental Representative.

PART 2 - PRODUCTS

2.1 Materials

- .1 Flotation unit
 - .1 The floats shall be polyethylene filled with structural foam;
 - .2 The floats shall be moulded in one piece;
 - .3 Polyethylene thickness: 5 mm
Color: black UV-resistant
 - .4 Structural foam: expanded polystyrene in the floats with a minimum density of $16 \text{ kg/m}^3 \pm 5\%$;
 - .5 The floats shall meet the following standards: ASTM 1603, ASTM D638, ASTM D1525, ASTM D746, ASTM D790;
 - .6 The floats and their attachments shall be designed to withstand the loads imposed by the waves.
- .2 Aluminium : the aluminium structure at Warren farm will be a modular type consisting of an assembly of 6061-T6 aluminium alloy profiles. The structure shall be MIG welded using a filler metal certified according to the standard CSA W47.2.
- .3 The shore profiles shall be a closed tubular type with a minimum weight of 14 kg/linear meter.
- .4 Fasteners and bolts : bolts used to connect hardware to the floating docks will be of type ALRA, 16 mm diam. 316 stainless steel.
- .5 Decking : decking used for the floating docks will be a non-slip type. A sample shall be provided to the Departmental Representative.
- .6 Stainless steel A-316 for all hardware.
- .7 6 tabs with a capacity of 10 tons shall be installed on the edge of the floating dock to moor the design vessel.
- .8 A rubber protection system shall be installed on the periphery of the floating dock.
- .9 Supply and install on the floating dock a small shed to store small materials.

2.2 Operating conditions

- .1 The contractor shall take in to account the following data in the design and manufacture of the dock and in the design of the anchor system:
 - .1 HHWLT (higher high water large tide): 6.1 m

- .2 LLWLT (lower low water large tide): 0.2 m
 - .3 Waves: the floating dock system shall withstand the forces generated by waves of 1500 mm amplitude without damage.
- .2 The floating dock will be removed during the winter.
- .3 Dead load:
- .1 The dead load includes, without limitation, the weight of the structures, ties, as well as the weight of the walkways and anchoring methods.
 - .2 The nominal freeboard under dead load shall be indicated on the drawings provided by the manufacturer. The dead load freeboard will be minimally 550 mm.
 - .3 The freeboard under dead load after installation shall not vary by more than 25 mm from the nominal freeboard.
 - .4 The extreme variation of the freeboard measured at 2 points of a single section of the wharves shall be less than 25 mm.
 - .5 The buoyancy of a section of wharf which supports a walkway shall be increased to ensure that the freeboard at the walkway support point does not differ more than 25 mm from the basic freeboard.
- .4 Live loads:
- .1 The dock structure and decking shall support a uniformly distributed vertical live load of 2.4 kN/m^2
 - .2 The net buoyancy reserve (including the weight of the docks, floats and equipment) shall be minimally 244 kg/m^2 taking into account the use of this type of dock.
 - .3 The floating dock shall withstand the forces generated by continuous waves of 300 mm amplitude, and occasional waves of 1,500 mm amplitude without damage.
 - .4 The floating dock structure shall withstand the impact of a boat 14 meters long (15 metric tons) hitting the dock at a speed of 1 m/s at an angle of 45 degrees.

PART 3 – EXECUTION

3.1 Installation

- .1 Install the floating dock as indicated on the plans.
- .2 Make adjustments as required for proper operation at any tide conditions.
- .3 A representative of the floating dock manufacturer shall be on-site for the final acceptance.

END OF SECTION

PART 1 – GENERAL

1.1 Related sections

- .1 Section 01 33 00 – Submittal procedures.
- .2 Section 01 35 43 – Environmental procedures.

1.2 Work description

- .1 Works include, but not is not necessary limited to:
 - .1 Shop painting of wharf's bollards and on the site paint retouching.
- .2 All requirements of these specifications apply to painting works in shop or on site.

1.3 Standard, regulations, codes, publications

- .1 The Contractor must comply with the codes, standards and regulations, as well as with the good practice rules as recommended by the following associations, related to the Work to be executed. The federal laws and regulations prevail on the other codes and standards.
 - ANSI, American National Standards Institute
 - API, American Petroleum Institute
 - ASME, American Society of Mechanical Engineers
 - ASM, American Society for Metals
 - ASTM, American Society for Testing and Materials
 - AWWA, American Water Works Association
 - BNQ, Bureau de Normalisation du Québec
 - CNB, Code National du Bâtiment
 - CSA, Canadian Standards Association
 - CSST, Code de sécurité pour les travaux en construction
 - MENVIQ, Ministère de l'Environnement du Québec
 - NACE, National Association of Corrosion Engineers
 - NFPA, National Fire Protection Association
 - ONGC, Office des Normes du Gouvernement Canadien
 - SSPC, Steel Structures Painting Council
 - ULC, Underwriters Laboratory of Canada

The edition prevailing for the above-mentioned standards, laws and regulations is the one in force at the time of the Call for Tenders. However, the Contractor must not restrict himself to the application of the above-mentioned standards only, but he must rather comply with all the standards to which his work could be related to.

- .2 Except when specifically indicated, execute the work according to the present specifications requirements and according to the products manufacturers' instructions.

1.4 Documents/samples to be submitted

- .1 Submit required technical data sheet as well as manufacturers' specifications and documentation regarding products, as per section 01 33 00.

PART 2 - PRODUCTS

2.1 Materials/supplies

- .1 For the bollards, coating consist in an epoxy paint (color choose by the owner) Interzone 485 type or equivalent, specially designed for marine environment and for abrasion caused by boat's docking lines.
- .2 The Contractor must make sure the selected paint complies with the environmental laws and standards.

PART 3 – EXECUTION

3.1 Surfaces preparation

- .1 Oxide removal

When necessary, the rust layers should be removed with the appropriate hand or machine tools, without damaging the sound metal finish. The surfaces to be painted must be scraped by abrasive blasting according to standard SSPC-SP10.

The Contractor must use traps and separators between the compressor and the air ducts so that the compressed air be oil free and condensed water free.

The cleaned surfaces must comply with the requirements described in the NACE, SSPC and BNQ standards concerning the cleanliness criteria.

The profile created by the abrasive blasting cleaning should have a roughness of 75 to 100 microns. The worn-out abrasive should not be reused.

The Contractor must make sure that the selected abrasive complies with the environmental laws and standards and he must make sure to recuperate the abrasive in order to avoid all pollution hazards.

When cleaning the sheet piles surfaces, the Contractor should provide adequate and safe shelters depending of the products used and waste expected (waterproof shelter with an in and out exits dust and wind proof), shelters provided of an immediate vacuum mechanism of residual dust/water, diluents, abrasives and other any residual polluted material, to be recuperate to avoid possible pollution. The vacuum cleaner must be of sufficient capacity to maintain the shelter at the atmospheric pressure.

An emergency kit to recover accidental spillage should be available on site at any time. Control the evacuation of salvage in a secure and safe way in accordance with the local authority's requirements.

.2 Final cleaning

After the abrasive blasting cleaning, the surface must be degreased in order to remove the dust and to dry it out before the paint application.

Work site waste (solids or liquids) and soiled materials (Ex. Empty cans, rags, masks, etc.) must be recover, store in a safe way (waterproof shelters, installed minimum 15 m away from water and away from traffic as well) and must be eliminated according to safety requirements.

3.2 Delay for paint applications

- .1 The paint must be applied immediately after the final cleaning phase. None of the cleaned surface will be painted after a maximum 4-hour delay. If this delay is exceeded, the Contractor must start over the cleaning operation for the surface to be painted.
- .2 However, if during this period the surface to be painted has been contaminated or dampened, the Contractor is also required to clean the surface accordingly in order to comply with the above-mentioned clauses of these specifications.
- .3 In such an instance, the surface should be cleaned with a water jet and also dry-air blasted so that it is dried out perfectly.

- .4 Upon paint application, the Contractor should allow a minimum time of 30 minutes between the paint application and surface immersion in sea water upon flood tide.

3.3 Paint application

- .1 Paint preparation

Before starting the paint application, the Contractor must mix both components as follows:

- properly stir component A with a mechanical mixer according to the manufacturer's specifications;
- mix the whole component A with the whole component B and stir with a mechanical mixer according to the paint manufacturer's specifications.
- mix preparation must be made just prior to the application, according to the manufacturer's specifications.

- .2 Surface conditions before the paint application

The surface to be painted must be completely dry upon the paint application.

- .3 Painting of the bollards

Follow the manufacturer's technical requirements to avoid cracking of paint layers.

Dilute paint after mixing of the 2 elements as advice by manufacturer to obtain a good viscosity to facilitate its application.

Apply a final minimum coat of 2000 sec/microns (2020 wet microns) of the product with a Graco airless pump type or its equivalent.

- .4 The Contractor is informed by the article 3.8 of the present section to take all precautions to avoid environmental damages.

3.4 Climatic conditions

- .1 Upon the paint application, the surface to be painted must be at least 5°C above the dew-point, and the relative humidity should be lower than 85%. The mixing of the 2 components must be done when the room temperature is between 20°C and 30°C. The paint application must be done when the surface temperature is higher than 10°C. However, verify, in technical sheet, manufacturer's recommendations of both paints concerning paint application's constraints. The same conditions apply for the two components paint mixture preparation.

- .2 In the case climatic conditions change during the paint application, the works must be stopped immediately and the cleaned but non-painted surface must be prepared again so that it complies with the specifications before the paint application.

3.5 Equipment cleaning

- .1 The equipment must be cleaned immediately after use, with the thinner recommended by the paint manufacturer's specifications. The cleaning frequency depends on the weather and on the working and waiting periods during the day.

Work site waste (solids or liquids) and soiled materials (Ex. Empty cans, rags, masks, etc.) must be recover, store in a safe way (waterproof shelters, installed minimum 15 m away from water and away from traffic as well) and must be eliminated according to safety requirements.

During the interruptions, the paint mixture must be continuously stirred up according to the paint manufacturer's specifications.

3.6 Paint storage

- .1 Both paint components, before being mixed, must be stored in sealed containers and in safe places, and the storage temperature should be maintained between 20° C and 35° C. If the storage temperature becomes lower than 20° C, the containers will not be used for the works, ask the manufacturer's endorsement for re using and inform the surveyor. The Contractor should verify with the paint manufacturer the particular storage specifications of his product. Products should be store at 15 m or more from water, in an area away from traffic, identified and protected from potential damage.

3.7 Safety measures during the works

- .1 The Contractor must require from the manufacturer the technical data sheet of the paint and must give copy of this data sheet to the Department Representative. He must be sure to comply with the storage and handling safety regulations to avoid any work hazard on the site.

3.8 Property damage

- .1 All property damages due to the action or omission of the Contractor during the works, whether it is to the owner's property or to the wharf users' property, will be repaired and paid for by the Contractor.

The Contractor must cover the installation to avoid dust infiltrations during the abrasive blasting cleaning, and he must provide some shelters depending on the winds direction.

During the sheet piling cleaning, the Contractor must provide an adequate sheltering system equipped with a dust vacuum cleaner in order to recuperate the abrasive used and the dust so as to avoid any pollution. The vacuum cleaners should have a sufficient power to compensate for the compressed air introduced inside the shelter during the works.

During the touching-up of a paint coating on the site, the Contractor must immediately proceed with appropriate cleaning if a product is spilled.

During on site paint application, the Contractor must provide appropriate shelters in order to avoid any paint spillage in the sea-water or on the wharf. If a spillage occurs, the Contractor must immediately clean, either it be in the sea-water or on the wharf.

3.9 Working equipment

- .1 The Contractor must provide all the necessary equipment for the work he has to do. The owner is not committed to supply any equipment to the Contractor for the works execution.

Also, the Contractor must make sure that his equipment is safe for his own employees as well as for other people who will have access to the wharf during the works.

3.10 Site cleanliness and harbour activities

- .1 The Contractor should maintain the site in a good and clean condition. He must provide a garbage container. This container must be located outside of the wharf site.

3.11 Paint technical data sheet

- .1 The Contractor must take into account all the paint technical specifications and comply with the paint manufacturer's requirements. The paint's technical sheet is part of present specifications. In case of an incompatibility between the paint technical data sheet and the present specifications, immediately contact the Department Representative before beginning the work. In case of discordance between the present specifications and the paint technical data sheet,. The most severe criterion applies for the work execution

3.12 Appraisal procedure

- .1 The appraisal of the paint application performance will be made through inspections during the works and at the end of the works.

3.13 Working schedule

- .1 In order to insure a better quality of the works, the Department Representative can demand that the Contractor pursues his work according to a working schedule different from the one provided by the Contractor.

3.14 Inspection after the end of the works

- .1 The paint application will be inspected one year after the works will have been completed.

The inspection will be made by the owner's representatives, by the Department Representative, and by the Contractor. For this inspection, the Contractor must pay for his representative's incurred expenses. The Contractor must therefore include in his bid for two days minimum on the site, considering the tide and climatic conditions constraints.

Any pain damages that will be noted will be repaired by the Contractor's own cost, except for any paint damages due to the ships rubbing or hitting the wharf.

The repairs should be made by the Contractor during the same year, except if the climatic conditions do not allow it. In such a case, the repairs will be made during the next summer.

These repairs form an integral part of the contractual clauses of the present specifications and all the clauses of the present specifications also apply for the repairs works.

END OF SECTION

PART 1 - GENERAL

1.1 Related requirements

- .1 Section 01 33 00 – Submittal Procedures.
- .2 Section 32 11 16.01 – Granular Sub-base.

1.2 References

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM D 4791-99, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.

1.3 Samples

- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Allow continual sampling by Departmental Representative during production.
- .3 Provide Departmental Representative with access to source and processed material for sampling.
- .4 Pay cost of sampling and testing of aggregates which fail to meet specified requirements.

1.4 Waste management and disposal

- .1 Divert unused granular to local quarry as approved by Departmental Representative.

PART 2 - PRODUCTS

2.1 Materials

- .1 Aggregate quality: sound, hard, durable material free from soft, thin, elongated or laminated particles, organic material, clay lumps or minerals, or other substances that would act in deleterious manner for use intended.
- .2 Flat and elongated particles of coarse aggregate: to ASTM D 4791.
 - .1 Greatest dimension to exceed five times least dimension.

- .3 Coarse aggregates satisfying requirements of applicable section to be one of or blend of following:
 - .1 Crushed rock.
 - .2 Gravel composed of naturally formed stone particles.

2.2 Source quality control

- .1 Inform Departmental Representative of proposed source of aggregates and provide access for sampling at least 3 weeks prior to commencing production.
- .2 If, in opinion of Departmental Representative materials from proposed source do not meet, or cannot reasonably be processed to meet, specified requirements, locate an alternative source or demonstrate that material from source in question can be processed to meet specified requirements.
- .3 Advise Departmental Representative 2 weeks in advance of proposed change of material source.
- .4 Acceptance of material at source does not preclude future rejection if it fails to conform to requirements specified, lacks uniformity, or if its field performance is found to be unsatisfactory.

PART 3 - EXECUTION

3.1 Preparation

- .1 Aggregate source preparation
 - .1 Prior to excavating materials for aggregate production, clear and grub area to be worked, and strip unsuitable surface materials. Dispose of cleared, grubbed and unsuitable materials as directed by Departmental Representative.
 - .2 Clear, grub and strip area ahead of quarrying or excavating operation sufficient to prevent contamination of aggregate by deleterious materials.
- .2 Processing
 - .1 Process aggregate uniformly using methods that prevent contamination, segregation and degradation.
 - .2 Blend aggregates, if required, to obtain gradation requirements, percentage of crushed particles, or particle shapes, as specified. Use methods and equipment approved by Departmental Representative.
 - .3 Wash aggregates, if required to meet specifications. Use only equipment approved by Departmental Representative.

- .4 When operating in stratified deposits use excavation equipment and methods that produce uniform, homogeneous aggregate.
- .3 Handling
 - .1 Handle and transport aggregates to avoid segregation, contamination and degradation.
- .4 Stockpiling
 - .1 Stockpile aggregates on site in locations as indicated unless directed otherwise by Departmental Representative. Do not stockpile on completed pavement surfaces.
 - .2 Stockpile aggregates in sufficient quantities to meet Project schedules.
 - .3 Stockpiling sites to be level, well drained, and of adequate bearing capacity and stability to support stockpiled materials and handling equipment.
 - .4 Except where stockpiled on acceptably stabilized areas, provide compacted sand base not less than 200 mm in depth to prevent contamination of aggregate. Stockpile aggregates on ground but do not incorporate bottom 200 mm of pile into Work.
 - .5 Separate different aggregates by strong, full depth bulkheads, or stockpile far enough apart to prevent intermixing.
 - .6 Do not use intermixed or contaminated materials. Remove and dispose of rejected materials as directed by Departmental Representative within 48 h of rejection.
 - .7 Stockpile materials in uniform layers of thickness as follows:
 - .1 Max 1.5 m for coarse aggregate and base course materials.
 - .2 Max 1.5 m for fine aggregate and sub-base materials.
 - .3 Max 1.5 m for other materials.
 - .8 Uniformly spot-dump aggregates delivered to stockpile in trucks and build up stockpile as specified.
 - .9 Do not cone piles or spill material over edges of piles.
 - .10 Do not use conveying stackers.
 - .11 During winter operations, prevent ice and snow from becoming mixed into stockpile or in material being removed from stockpile.

3.2 Cleaning

- .1 Leave aggregate stockpile site in tidy, well drained condition, free of standing surface water.
- .2 Leave any unused aggregates in neat compact stockpiles as directed by Departmental Representative.

END OF SECTION

PART 1 - GENERAL

1.1 Related requirements

- .1 Section 05 50 00 – Metal fabrication.
- .2 Section 31 61 16 – Pile foundations – General requirements.

1.2 References

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM A 252-98(2002), Standard Specification for Welded and Seamless Steel Pipe Piles.
 - .2 ASTM A 307-04, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile.
 - .3 ASTM A 325M-05, Standard Specification for Structural Steel Bolts, Steel, Heat Treated 830 Mpa Minimum Tensile Strength [Metric].
- .2 Canadian Standards Association (CSA International)
 - .1 CAN/CSA-G40.20/G40.21-F2004, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steels.
 - .2 CAN/CSA-S16-01, Consolidated (Consists of the CAN/CSA-S16-01, along with S16S1-05 and Updates # 1 and # 2 to CAN/CSA-S16-01).
 - .1 CAN/CSA-S16-F01, Limit States Design of Steel Structures.
 - .3 CSA W47.1-F03, Certification of Companies for Fusion Welding of Steel Structures.
 - .4 CSA W48-01(R2006), Filler Metals and Allied Materials for Metal Arc Welding.
 - .5 CSA W59-F03, Welded Steel Construction (Metal Arc Welding) (metric version).

1.3 System description

- .1 Design Requirements: design templates to safely withstand following loads:
 - .1 Gravity loads to which template are subjected.
 - .2 Lateral loads to firmly hold pile in position when driving.

1.4 Action and informational submittals

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit shop drawings and indicate following items:
 - .1 Material.

- .2 Template plan.
- .3 Anchorage, field control and alignment methods for piles and sheet piling.
- .4 Tolerance for driving pile and sheet piling.

PART 2 - PRODUCTS

2.1 Materials

- .1 Steel sections and plates: to CAN/CSA-G40.20/G40.21, Type 300W and 350W.
- .2 Welding materials: to CSA W48 and CSA W59.
- .3 Bolts, nuts and washers: to ASTM A 307 and ASTM A 325M.

2.2 Fabrication

- .1 Fabricate structural steel for templates: to CAN/CSA-S16 as indicated on shop drawings.
- .2 Welding: to CSA W59.
- .3 Use welding companies qualified under CSA W47.1.

PART 3 - EXECUTION

3.1 Positioning

- .1 Position and hold template in location to receive piles and sheet piling.
 - .1 Ensure pile positions are within tolerances specified.

3.2 Removal of templates

- .1 Avoid damage to piling when removing templates.
- .2 When instructed by Departmental Representative, remove templates from Project site.

END OF SECTION

PART 1 – GENERAL

1.1 Related requirements

- .1 Section 01 33 00 – Submittal Procedures
- .2 Section 01 74 21 – Construction/Demolition Waste Management and Disposal
- .3 Section 01 35 43 – Environmental Procedures
- .4 Section 31 32 19.01 – Geotextiles
- .5 Section 02 41 16.01 – Structure Demolition
- .6 Section 31 05 16 – Aggregate Materials

1.2 References

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM C 117-04, Standard Test Method for Material Finer Than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.
 - .2 ASTM C 136-05, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .3 ASTM D 422-63 (2002), Standard Test Method for Particle-Size Analysis of Soils.
 - .4 ASTM D 1557-02, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³) (2,700 kN-m/m³).
 - .5 ASTM D 4318-05, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
 - .6 ASTM C 127-88(2001), Standard Test Method for Specific Gravity and Absorption of Coarse Aggregate.
 - .7 ASTM C 535-96e1, Standard Test Method for Resistance to Degradation of Large Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

1.3 Documentation and sample submittals

- .1 Samples:
 - .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Inform Departmental Representative at least 4 weeks prior to beginning Work, of proposed source of fill materials and provide access for sampling.

1.4 Waste management and disposal

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

1.5 Protection of existing structures

- .1 Protect existing structures in accordance with Section 01 56 00 - Access and temporary protection works and local regulations that apply.
- .2 Buried structures and services:
 - .1 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.
 - .2 Maintain and protect from damage electric and other utilities and structures encountered.
 - .3 Where utility lines or structures exist in area of excavation, obtain direction of Departmental Representative before removing.
 - .4 Record location of maintained, re-routed and abandoned underground lines.
- .3 Existing buildings and surface features:
 - .1 Conduct, with Departmental Representative, condition survey of existing buildings, wires, rail tracks, pavement, survey bench marks and monuments which may be affected by Work.
 - .2 Protect existing buildings and surface features from damage while Work is in progress. In event of damage, immediately make repair as directed by Departmental Representative.

PART 2 – PRODUCTS

2.1 Materials

- .1 Stone used in wharf and berm construction must meet the following requirements:
 - .1 Hard, durable and resistant to abrasion, which does not disintegrate under the action of waves, or as a result of freeze-thaw cycles or wet-dry cycles, and approved by departmental Representative.
 - .2 Relative density (formerly Density): at least 2.5, according to ASTM C 127.
 - .3 Absorption factor: 2.0% maximum, according to ASTM C127.
 - .4 Test of resistance to disintegration of aggregates with a solution of magnesium sulfate (MgSO₄): maximum loss 10% after 7 cycles according to BNQ 2560-450.

.2 Stone 20-200 mm:

- .1 Grain size in compliance with the limits specified when tested in accordance with ASTM C 136 and standard dimensions of the sieve openings at CAN/CGSB-8.2 standard.
- .2 The following grain size must be encountered:

Dimension	Percentage passing
Below 360 mm	100
Below 200 mm	85-99
Below 112 mm	33-66
Below 20 mm	1-15
Below 14 mm	0-5

.3 Stone 25-50 mm: stone of variable grain size between 25 and 50 mm.

- .4 Excavation 0-300 mm or backfilling 0-300 mm material: non-frozen and non-contaminated material (if contaminated, only A-B level material is acceptable and only in locations specified in drawings and in Section 01 35 43 – Environmental Protection) from wharf excavation or new backfill material, approved by Departmental Representative for the proposed utilization and exempt of waste or otherwise harmful material.

Excavation materials can be used only below 0 (Z.D.C) (berm and filling between existing wall and new wharf facade as indicated on plans). The excavated material will be used as fill only below the tidal zero level (berm and filling between existing and new walls as indicated in plans).

- .1 The following grain size distribution must be met:

Dimension	Percentage passing
Below 250 mm	85
Below 150 mm	50
Below 50 mm	15

.5 Class A granular material: clean sand.

PART 3 – EXECUTION

3.1 Site preparation

- .1 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.
- .2 Cut pavement or sidewalk neatly along limits of proposed excavation in order that surface may break evenly and cleanly.

- .3 Protect existing features in accordance with Section 01 56 00 - Temporary Barriers and Enclosures and applicable local regulations.
- .4 Keep excavations clean, free of standing water, and loose soil.
- .5 Protect buried services that are required to remain undisturbed.
- .6 For some areas, existing deadmen which ensure wharf stability will be exposed during new wharf construction. Contractor must adjust his working method to take care of this aspect and ensure existing structure stability during works.

3.2 Stockpiling

- .1 Stockpile fill materials in such a way to avoid overloading existing structures and prevent segregation.
- .2 Protect fill materials from contamination.

3.3 Bracing

- .1 Build temporary structures, if required in the trenching areas.
- .2 During backfill operation:
 - .1 Unless otherwise indicated or directed by Departmental Representative, remove bracing and shoring from excavations.
 - .2 Pull sheeting in increments that will ensure compacted backfill is maintained.
- .3 Remove surplus materials from the site.

3.4 Dewatering and heave prevention

- .1 Out of the tidal zone, keep excavations free of water while work is in progress.
- .2 Protect open excavations against flooding and damage due to surface run-off.

3.5 Excavation

- .1 Excavate to lines, grades, elevations and dimensions as indicated in plans.
- .2 Remove any obstructions encountered during excavation and evacuate from site if not proper for backfilling.
- .3 Excavation must not interfere with bearing capacity of adjacent foundations.

- .4 For trench excavation, unless otherwise authorized in writing by Departmental Representative, do not excavate more than 30 m of trench in advance of installation operations and do not leave open more than 15 m at end of day's operation.
- .5 Keep excavated and stockpiled materials at a safe distance from edge of trench as directed by Departmental Representative.
- .6 Limit the work done with construction equipment in close proximity to non-backfilled trenches.
- .7 Dispose of surplus and unsuitable excavated material off site.
- .8 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.
- .9 Notify Departmental Representative when bottom of excavation is reached.
- .10 Obtain Departmental Representative approval of completed excavation.
- .11 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed by Departmental Representative.
- .12 If required, excavate a trench for driving sheet piles and piles and use the excavated materials as core materials in the berm if these materials are not contaminated and meet the particle size criteria. Trenching may be required if obstacles or stone prevent driving. When geotechnical conditions do not indicate such obstacles, driving in undisturbed soil is required. A multi-beam survey is jointed to the present section as a complementary information.
- .13 Hand trim, make firm sides and remove loose material and debris from excavations. Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil.
- .14 Install geotextiles in accordance with Section 31 32 19.01 - Geotextiles.

3.6 Archeology

- .1 Contractor must expect an archeological inspection during excavation works. This inspection is supplied and paid by the Minister.
- .2 If, during excavation, archeological elements are discovered and works must be temporarily stopped, waiting time will be paid to the contractor if the following condition occurs:
 - .1 Machinery and labour are working in this area and cannot be transferred to other type of labour.
- .3 Only the machinery and labour which are working in the area and directly involved in the waiting because of the archeological discovers may be paid.

3.7 Fill types and compaction

- .1 Use types of fill as indicated or specified below. Compaction densities are percentages of maximum densities obtained from ASTM D 1557.
- .2 Stone 20 -200 mm and 25-50 mm must be stabilized by mechanical compaction by machinery or any other method mentioned by the Departmental Representative. The obtained result must ensure that no soil compression will occur. Machinery shall not circulate less than 1 meter above the tie rods to prevent damage.

3.8 Bedding and surround of underground services

- .1 Place and compact granular material for bedding and surround of underground services and compact as indicated.
- .2 Place bedding and surround material in unfrozen condition.

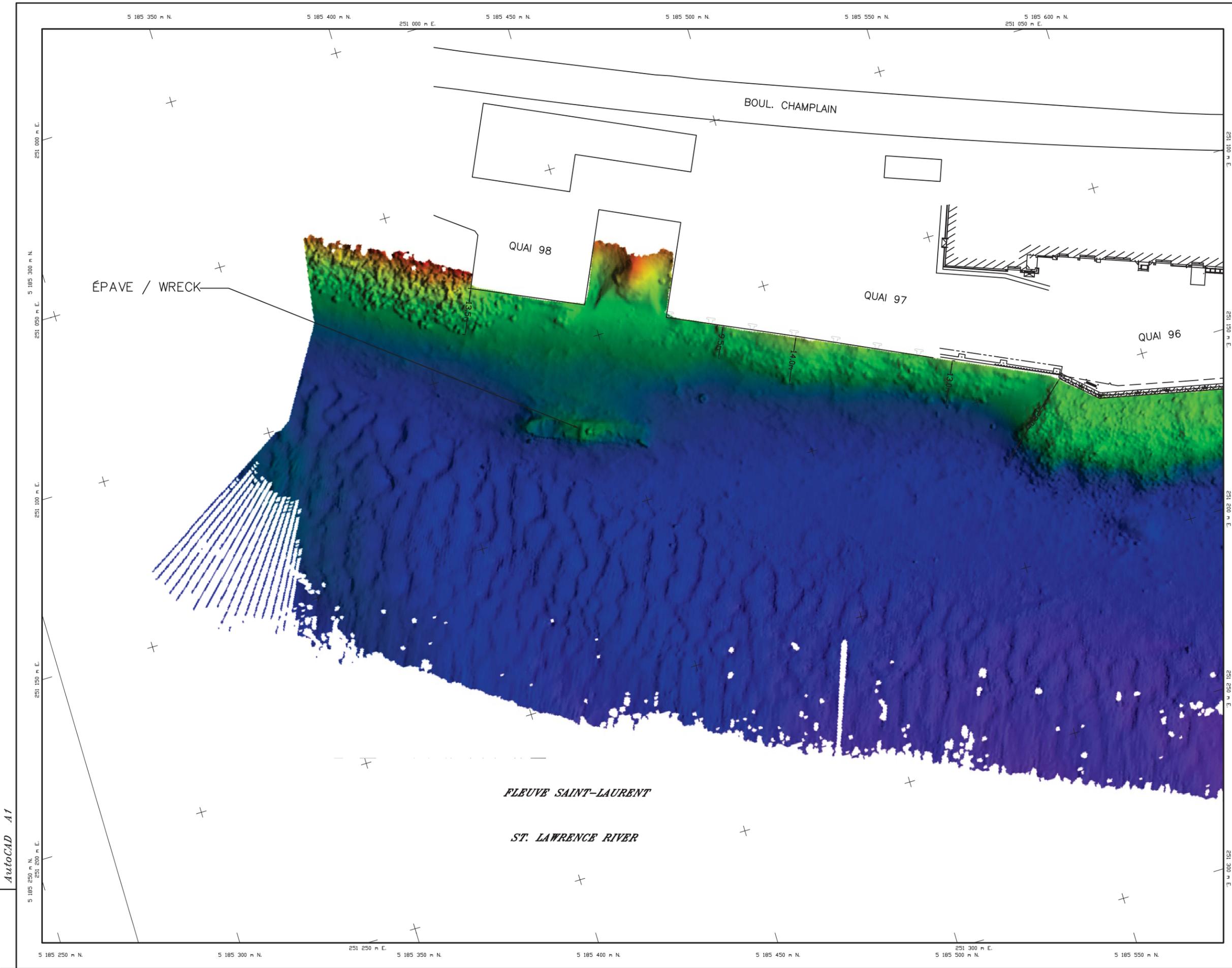
3.9 Backfilling

- .1 Do not proceed with backfilling operations prior to approval by Departmental Representative
- .2 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.
- .3 Do not use backfill material which is frozen or contains ice, snow or debris.
- .4 Place backfill material in uniform layers not exceeding 300 mm compacted thickness up to grades indicated. MG20 and MG56 stones must be compacted in layers not exceeding 150 mm in thickness. Compact each layer before placing succeeding layer.
- .5 Contractor will have to fill holes below transfert slab with 20-200 mm stone after demolition.

3.10 Restoration

- .1 Upon completion of Work, remove waste materials and debris in accordance to Section 01 74 21 - Construction/Demolition Waste Management and Disposal. Correct slopes and defects as directed by the Departmental Representative.
- .2 Clean and reinstate areas affected by Work as directed by Departmental Representative.

END OF SECTION



Référence géodésique / Geodetic Reference : N.A.D. 1983 Projection : M.T.M. Fuseau / Zone : 7 Méridien central / Central Meridian : 70-30-00									
Stations de référence / Reference Stations <table border="1"> <thead> <tr> <th>Nom ou no. / Name or No.</th> <th>Org. / Org.</th> <th>Coord. Nord / North</th> <th>Coord. Est / Easting</th> </tr> </thead> <tbody> <tr> <td>6823052</td> <td>S.G.Q.</td> <td>5183557.844</td> <td>249404.851</td> </tr> </tbody> </table>		Nom ou no. / Name or No.	Org. / Org.	Coord. Nord / North	Coord. Est / Easting	6823052	S.G.Q.	5183557.844	249404.851
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Nom / Name	Org. / Org.	Élévation (mètre) / Elevation (meter)							
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Profondeurs en mètres et décimètres Depths in meters and decimeters									
Notes de références / Reference Notes Système de positionnement : GPS (RTK) Carnet(s) de notes : N/A Mode de collecte : 512 faisceaux à égale distance Cellule : Minimum des sondes espacées de 1.75 mètre Fréquence du multifaisceaux : 400 kHz Courbes de niveau : Intervalle : 1.0 mètre Positioning system : GPS (RTK) Notebook : N/A Acquisition mode : 512 beams equi-distant Cell : Minimum soundings spaced 1.75 meter. Multibeam frequency : 400 kHz Depth contour : Interval : 1.0 meter									
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A	A								
C	BC								
project	projet								
QUÉBEC QUAI DE LA REINE									
drawing	dessin								
SONDAGE DE VÉRIFICATION VERIFICATION SOUNDING									
ÉCHELLE / SCALE 1 : 500									
designed	conçu								
Sondage(s) : 2012-11-16									
date									
drawn	dessiné								
Mise en plan : 2013-03-01									
date									
approved	approuvé								
date									
Tender	Soumission								
PWC Project Manager	Administrateur de projets TPC								
project number	no. du projet								
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	feuille no. / sheet no.								
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AutoCAD A1

PART 1 - GENERAL

1.1 Related requirements

- .1 Section 01 33 00 – Submittal procedures.

1.2 References

- .1 American Society for Testing and Materials International, (ASTM)
 - .1 ASTM D 4491-99a, Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-4.2 No. 11.2-M2004, Textile Test Methods - Bursting Strength - Ball Burst Test (Extension of September 1989).
 - .2 CAN/CGSB-148.1, Methods of Testing Geotextiles and Complete Geomembranes.
 - .1 No.2-M85, Methods of Testing Geosynthetics - Mass per Unit Area.
 - .2 No.3-M85, Methods of Testing Geosynthetics - Thickness of Geotextiles.
 - .3 No.6.1-93, Methods of Testing Geotextiles and Geomembranes - Bursting Strength of Geotextiles Under No Compressive Load.
 - .4 No.7.3-92, Methods of Testing Geotextiles and Geomembranes - Grab Tensile Test for Geotextiles.
 - .5 No. 10-94, Methods of Testing Geosynthetics - Geotextiles - Filtration Opening Size.

1.3 Action and informational submittals

- .1 Submit to Engineer copies of mill test data and certificate at least 2 weeks prior to start of Work, and in accordance with Section 01 33 00 - Submittal Procedures.

1.4 Delivery, storage and handling

- .1 During delivery and storage, protect geotextiles from direct sunlight, ultraviolet rays, excessive heat, mud, dirt, dust, debris and rodents.

PART 2 - PRODUCTS

2.1 Material

- .1 Geotextile: Non-woven synthetic fibre fabric, supplied in rolls.
 - .1 Composed of minimum 85% by mass of polypropylene.
- .2 Physical properties
 - .1 Thickness: to CAN/CGSB-148.1, No.3, minimum 3.5 mm.
 - .2 Grab tensile strength and elongation: to CAN/CGSB-148.1, No.7.3.
 - .1 Breaking force: minimum 1450 N, wet condition.
 - .2 Elongation at rupture: 70-110%.
 - .3 Bursting strength: to CAN/CGSB-148.1, No.6.1, minimum 3500 kPa, wet condition.
 - .4 Hydraulic properties:
 - .1 Filtration opening size (FOS): to CAN/CGSB-148.1 No.10, 40-110 microns.

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 geotextile material 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 approval to proceed from Departmental Representative.

3.2 Installation

- .1 Place geotextile material by unrolling onto graded surface in orientation, manner and locations indicated and retain in position appropriately.
- .2 Place geotextile material smooth and free of tension stress, folds, wrinkles and creases.
- .3 Place geotextile material on sloping surfaces in one continuous length from toe of slope to upper extent of geotextile.
- .4 Overlap each successive strip of geotextile 600 mm over previously laid strip.

- .5 Protect installed geotextile material from displacement, damage or deterioration before, during and after placement of material layers.
- .6 After installation, cover with overlying layer within 24 h of placement.
- .7 Replace damaged or deteriorated geotextile to approval of Departmental Representative.
- .8 Place underlying stone layers without damaging geotextile.

3.3 Protection

- .1 Vehicular traffic not permitted directly on geotextile.

END OF SECTION

PART 1 - GENERAL

1.1 Related requirements

- .1 Section 31 62 16.19 – Tubular steel pipes.
- .2 Section 31 62 16.13 – Steel Sheet Piles.

1.2 Action and informational submittals

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit schedule of planned sequence of driving to Departmental Representative for review, as specified.
- .3 Equipment:
 - .1 Submit prior to piles/sheet piling installation for review by Departmental Representative list and details of equipment for use in installation of piles/sheet pilings/sheet pilings.
 - .2 Impact hammers: submit manufacturer's written data as specified.
 - .3 Non-impact methods; submit characteristics to evaluate performance.
 - .4 Submit driveability analysis as specified, to Departmental Representative for approval of hammers.

1.3 Delivery, storage and handling

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and manufacturer's instructions.
- .2 Protect piles/sheet pilings/sheet pilings/sheet piling from damage due to excessive bending stresses, impact, abrasion or other causes during delivery, storage and handling.
- .3 Replace damaged piles/sheet pilings/sheet pilings as directed by Departmental Representative.

1.4 Existing conditions

- .1 Contractor must refer to all geotechnical studies available. These studies are available in the tender call documents.
- .2 Notify Departmental Representative in writing if subsurface conditions at site differ from those indicated and await further instructions from Departmental Representative

PART 2 - PRODUCTS

2.1 Materials

- .1 Material requirements for piles/sheet pilings/sheet pilings installation are specified in sections 31 62 16.19 – Tubular steel pipes and 31 62 17 –Sheet pilings.

2.2 Equipment

- .1 Submit prior to piles/sheet piling installation for review by Department Representative list and details of equipment for use in installation of piles/sheet pilings/sheet pilings.
 - .1 Impact hammers: provide manufacturer's name, type, rated energy per blow at normal working rate, mass of striking parts of hammer, mass of driving cap and type and elastic properties of hammer and piles/sheet piling cushions.
 - .2 Non-impact methods of installation such as vibratory hammers or other means provide full details of characteristics necessary to evaluate performance.
- .2 Hammer:
 - .1 Hammers to be selected on basis of driveability analysis using wave equation theory, performed to show that piles/sheet pilings/sheet pilings can be driven to levels indicated.
 - .2 Driveability analysis to include, but not be limited to, following: hammer, cushion, and cap block details; static soil parameters; quake and damping factors, total soil resistance, blow count, piles/sheet piling stresses and energy throughput at representative penetrations.
 - .3 When required criteria cannot be achieved with the proposed hammer, use larger hammer and take other measures as required.
- .3 Building considerations
 - .1 Ensure that the selection of method and equipment used will not create any displacement of buildings 500 and 900. Those buildings will be surveyed during works. Any displacement may be a demand to modify method and/or equipment utilization. Contractor must accept Minister decision regarding this aspect without any extra fee for the Minister.

PART 3 - EXECUTION

3.1 Preparation

- .1 Ensure that ground conditions at piles/sheet piling locations are adequate to support piles/sheet piling driving operation and load testing operation. Make provision for access and support of piling equipment during performance of Work.
- .2 Followers:
 - .1 Provide followers of such size, shape, length and mass to permit driving piles/sheet piling in desired location to required depth and resistance. Provide followers with socket or hood carefully fitted to top of piles/sheet piling to minimize loss of energy and prevent damage to piles/sheet piling.
- .3 Installation of each piles/sheet piling will be subject to review of Departmental Representative.
 - .1 Departmental Representative Representative will be sole judge of acceptability of each piles/sheet piling with respect to final driving resistance, depth of penetration or other criteria used to determine load capacity.
 - .2 Drive each piles/sheet piling to depth specified by Department Representative during dynamic testing.

3.2 Application / driving

- .1 Use driving caps and cushions to protect piles/sheet pilings/sheet pilings. Piles/ sheet pilings with damaged heads as determined by Departmental Representative will be rejected. To prevent pile damage at the bottom, depending on the selected piling method, Contractor will be responsible to plan a reinforcement on the pile bottom perimeter according to Departmental Representative satisfaction.
- .2 Hold piles/sheet pilings securely and accurately in position while driving.
- .3 Deliver hammer blows along axis of piles/sheet piling.
- .4 Restrike already driven piles/sheet pilings lifted during driving of adjacent piles/sheet pilings to assure set.
- .5 The pile/sheet piling installation must be examined by the Departmental Representative.
 - .1 The Departemental Representative will be the only judge to decide if each pile/sheet piling is accepted regarding the final depth.
 - .2 Pile each pile/sheet piling in accordance with the depth indicated on plans (rock or other). Ensure that pile/sheet piling is adequately installed in rock, when rock level is specified.

- .6 Cut off piles/sheet pilings neatly and squarely at elevations as indicated. Provide sufficient length above cut-off elevation so that part damaged during driving is cut off. Do not cut tendons or other reinforcement, which will be used to tie piles/sheet piling caps to piles/sheet piling.
- .7 Remove cut-off lengths from site on completion of work.

3.3 Driving tolerances

- .1 Piles/sheet piling heads to be within 25 mm of locations as indicated. An accurate installation is required to allow sheet piling installation without any modification.

3.4 Obstructions

- .1 Where obstruction is encountered that causes sudden unexpected change in penetration resistance or deviation from specified tolerances, remove obstruction

3.5 Repair and restoration

- .1 Pull out rejected piles/sheet pilings and replace with new piles/sheet pilings.
- .2 No extra compensation will be made for removing and replacing or other work made necessary through rejection of defective piles/sheet pilings.

3.6 Field quality control

- .1 Maintain accurate records of driving for each piles/sheet piling, including:
 - .1 Type and make of hammer, stroke or related energy.
 - .2 Other driving equipment including water jet, driving cap, cushion.
 - .3 Piles/sheet piling size and length, location of piles/sheet piling in piles/sheet piling group, location or designation of piles/sheet piling group.
 - .4 Sequence of driving piles/sheet pilings in group.
 - .5 Number of blows per metre for entire length of piles/sheet piling.
 - .6 Final tip and cut-off elevations.
 - .7 Other pertinent information such as interruption of continuous driving, piles/sheet piling damage.
 - .8 Record elevation taken on adjacent piles/sheet pilings before and after driving of each piles/sheet piling.
- .2 Provide Departmental Representative with one copy of records.

END OF SECTION

PART 1 – GENERAL

1.1 Related requirements

- .1 Section 01 33 00 – Submittal Procedures.
- .2 Section 31 61 13 – Piles/Sheet Piling Foundations, General Requirements.
- .3 Section 05 50 00 – Steel.

1.2 References

- .1 ASTM International
- .2 CSA International
 - .1 CSA G40.20/G40.21-[04(R2009)], General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CSA W47.1-09, Certification of Companies for Fusion Welding of Steel Structures.
 - .3 CSA W59-03(R2008), Welded Steel Construction (Metal Arc Welding).

1.3 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. Sheet piling will be supplied by the Minister.
- .2 Use slings for lifting piling make sure mass is evenly distributed and piling is not subjected to excessive bending stresses.
- .3 Store sheet piling on level ground or provide supports so that sheet piling is level when stored.
 - .1 Provide blocking at spacing not exceeding 5 m so that there is no excessive sagging in piling.
 - .2 Overhang at ends not to exceed 0.5 m.
 - .3 Block between lifts directly above blocking in lower lift.
- .4 If material is stock-piled on structure, ensure structure is not overloaded.

PART 2 – PRODUCTS

2.1 Materials

- .1 Structural steel for wales, bearing plates, wales splices, capping channels, support angles and miscellaneous steel: to CSA G40.21, Grade 350 W and 300 W (for steel plates).
- .2 Nuts and bolts: hexagon nuts, bolts, and washers: to ASTM A 325.
- .3 Backfill material: to Section 31 23 33.01 - Excavating, Trenching and Backfilling.

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 steel sheet piles 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.

3.2 Installation

- .1 Do pile installation Work in accordance with Section 31 61 13 – Pile/sheetpiling Foundations, General Requirements except where otherwise specified.
- .2 Do welding in accordance with CSA W59.
- .3 Submit full details of method and sequence of installation of piling to Departmental Representative for approval prior to start of pile installation work. Details must include templates, bracing, setting and driving sequence and number of piles in panels for driving.
- .4 When installing sheet piles in bulkhead wall, use procedure as follows:
 - .1 Provide temporary templates or bracing to hold piles in alignment during setting and driving.
 - .2 Drive piles two at a time. Drive first double pile to full depth, then place panel of five to eight double sheet piles in templates and secure last (end) double pile in location to prevent spreading of piles in panel.

- .3 Drive end double pile in panel sufficiently deep into ground to ensure that it will remain plumb, then, drive remaining double piles in panel to full depth beginning with double pile next to end double pile and finishing with double pile next to double pile first driven.
- .4 After one panel has been driven, place and drive succeeding panels in similar manner. Complete driving of end double pile of first panel after double piles of second panel have been driven.
- .5 When installation is complete, face of wall at top of sheet piles to be within 75 mm of location as indicated and deviation from vertical not to exceed 1 in 100 and allow conform installation of sheet piling between piles.
- .6 Cut drain holes and install steel pipe elbows as indicated. Include filter material in area of drain holes as indicated.

3.3 Obstructions

- .1 If obstruction encountered during driving, leave obstructed pile and proceed to drive remaining piles. Return and attempt to complete driving of obstructed pile later.
- .2 Contractor must considerer to proceed to a piling lane in the berm 96 area and also along the south face of wharf 98, because of the stone embankment. Those stone will have to be reinstall after works.
- .3 The stone between new wharf and existing wharf can be replace by backfilling.

3.4 Holes

- .1 Patch holes in sheet pile wall, except where permanent holes are indicated.
 - .1 Use 12 mm thick plate of material equal to that of piling to patch holes and overlap not less than hole diameter.
 - .2 Weld to develop full strength of plate.
- .2 Drill any required holes in piling. Do not use flame cutting without permission of Departmental Representative.

3.5 Cutting

- .1 When flame cutting tops of piles, and flame cutting holes in piles approved by Departmental Representative use following procedure:
 - .1 When air temperature is above 0 degrees C, no pre-heat is necessary.
 - .2 When air temperature is below 0 degrees C, pre-heat until steel 25 mm on each side of line of cut has reached a temperature very warm to hand (approximately 35 degrees C). Temperature indicating crayon marks may be used to measure temperature.
 - .3 Use torch guiding device to ensure smooth round holes or straight edges.

- .4 Make cut smooth and free from notches throughout thickness. If grinding is employed to remove notch or crack, finished radius to be minimum 5 mm.

3.6 Splicing

- .1 Use full length piles unless splicing is approved on site by Departmental Representative.

3.7 Tie rod anchorage system

- .1 Do not place backfill behind anchored bulkhead until piles have been completely driven, adjusted and secured in final position by anchorage system.
 - .1 Fit and adjust tie rod systems so that connections at waling and anchor end of tie rods are tight before backfilling.

3.8 Backfilling

- .1 Backfill in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling and as indicated.
- .2 Protect piling tie rods and anchorage systems from damage or displacement during backfilling operations.

END OF SECTION

PART 1 - GENERAL

1.1 Related requirements

- .1 Section 01 33 00 – Submittal procedures.
- .2 Section 31 61 13 – Piles foundations – General requirements.
- .3 Section 03 20 00 – Concrete reinforcing.
- .4 Section 03 37 26 – Underwater placed concrete.
- .5 Section 05 50 00 - Steel

1.2 References

- .1 Canadian Standards Association (CSA International)
 - .1 CSA-G40.20/G40.21-F2004, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CSA W47.1-F03, Certification of Companies for Fusion Welding of Steel Structures.
 - .3 CSA W48-06, Filler Metals and Allied Materials for Metal Arc Welding.

1.3 Delivery, storage, and handling

- .1 Deliver, store and handle in accordance with Section 01 61 00 - Common Product Requirements. Take into account that piles will be supplied to the Contractor.
- .2 Make sure the stress exercised during the handling and the installation remain below acceptable thresholds.
- .3 Avoid damaging piles during handling, insertion in the templates and driving process.
- .4 Support piles to avoid excessive flexion stress during the driving process.
- .5 Square, with regard to its longitudinal axis, the head of the pile.
 - .1 Hold the axial alignment of the driving equipment with the pile axis.

PART 2 - PRODUCTS

2.1 Materials

- .1 Steel pile caps: to CSA-G40.20/G40.21, Grade 350W and Grade 300W (steel plates).
- .2 Welding electrodes: to CSA W48 series.
- .3 Concrete: in accordance with Section 03 30 00 - Cast-in-Place Concrete and 03 37 26 – Underwater placed concrete.
- .4 Reinforcing steel: in accordance with Section 03 20 00 - Concrete Reinforcing
- .5 Nuts and bolts: hexagon nuts, bolts, and washers: to ASTM A 325.
- .6 Backfill material: to Section 31 23 33.01 - Excavating, Trenching and Backfilling.

PART 3 - EXECUTION

3.1 Manufacturer's instructions

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 Fabrication

- .1 In case an additional weld is required on construction site, only one single circumferential weld will be accepted. This implies that the pile can only be spliced with two sections of pile, considering that the supplied pipe is considered as one section (even if a welding has been realized in shop).
- .2 Notify that in case of splicing, the Departmental Representative reserves the right to proceed with a complete quality control of the welds. This control will be at the expense of the Departmental Representative. In case of rejection of the weld, the subsequent quality controls will be at the Contractor's expense.
- .3 Submit details of planned use of pile material stock to Departmental Representative for approval prior to start of fabrication.
- .4 Repair defective welds as approved by Departmental Representative and to CSA W59 standard. Unauthorized weld repairs may be rejected.

3.3 Installation

- .1 Install piling in accordance with Section 31 61 13 – Pile/sheet piling Foundations, General Requirements.
- .2 If approved by Departmental Representative, splice piles in place during installation by welding. To prevent distortion, tack opposite points first and then weld opposite sections. Hold members in alignment during splicing operation.
- .3 Perform internal visual inspection of steel pipe, joints and base prior to placing of concrete. Ensure pipe inside is free from foreign matter.
- .4 Assemble and install reinforcement cages as indicated.
- .5 Install concrete in accordance with Section 03 37 26 – Underwater Placed Concrete.
- .6 Fill steel pipe pile with concrete using methods to limit free fall and to prevent segregation. Ensure adequate vibration to completely fill cross section of pipe. Ensure adequate vibration to completely fill cross section of pipe.
- .7 Install reinforcement cages as indicated in shop drawings. Secure until concrete is set.
- .8 Install pile caps as indicated.

3.4 Welding

- .1 Weld to CSA W59.
- .2 Welding certification of companies: to CSA W47.1.
- .3 Welding certification of companies welding steel reinforcing bars placed in reinforced concrete: in accordance with CSA W186.

END OF SECTION

PART 1 – GENERAL

1.1 Related requirements

- .1 Section 03 30 00 – Cast in place concrete.
- .2 Section 03 37 26 – Concrete cast under water.

1.2 References

- .1 Canadian Standards Association (CSA International)
 - .1 CSA W47.1-03, Certification of Companies for Fusion Welding of Steel Structures.
 - .2 CSA W59-03, Welded Steel Construction (Metal Arc Welding).
 - .3 CAN/CSA-G30.18-M92(R2002), Billet-Steel Bars for Concrete Reinforcement.
 - .4 CSA-G40.20/G40.21-04, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steels.

1.3 Waste management and disposal

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

1.4 Concerned elements

- .1 Elements concerned by the present section are the inclined and drilled anchors.

PART 2 – PRODUCTS

2.1 Materials

- .1 Concrete: in accordance with the 03 30 00 – Cast in place Concrete.
- .2 Grout (no shrinkage): no shrinkage grout.
- .3 Steel: in accordance with 05 50 00 –Metal Fabrication.
- .4 Concrete reinforcing: in accordance with 03 20 00 – Concrete reinforcing.
- .5 Additional material for tie-rods installation.

2.2 Equipment

- .1 Prior to works, submit Departmental Representative an equipment list to use for the drilled tie-rods installation.
- .2 Provide details concerning equipment required for excavation and drilling works, inclined hole cleaning, tie-rods installation and anchor grouting.

PART 3 – EXECUTION

3.1 Anchor holes

- .1 Secure equipment in position during drilling.
- .2 Drill sockets into sound bedrock as indicated and at the depth indicated. Percussion drilling is required.
- .3 After drilling is completed, clean out socket.
- .4 Water flow in the anchor hole must be sufficient to evacuate drilled debris for any anchor depth.
- .5 The selected hole diameter must ensure that tie-rod and his hardware are completely bounded with grout during injection. A minimum 32 mm grout thickness is required on the whole tie-rod perimeter.
- .6 Any obstructed or damaged inclined drill holes for tie-rods must be sealed and another hole must be drilled nearby unless otherwise specified by a Departmental Representative.
- .7 Drilled and inclined anchor holes must be drilled so that the hole deviation with respect to the specified path does not exceed 5% of the drilled length. All drillings that does not meet this requirement must be abandoned and filled with grout, and another hole must be drilled nearby.
- .8 Prior to the placement of grout and concrete, the hole must be washed by means of a tube inserted to the bottom of the hole to remove any accumulation of drilling mud, waste and debris. The washing of the hole is considered acceptable when the return water is limpid.
- .9 Holes must be emptied of their cleaning water by pumping immediately before the placement of the grout and concrete.
- .10 The water temperature used for washing must be between 4°C and 20°C. The temperature of return water should not be below 4°C.
- .11 The sealing length in solid rock as indicated on plans is for information purpose only but represents a minimum length to respect. Contractor will have to ensure that this length is sufficient.

3.2 Placement of steel tie-rods

- .1 Place tie-rods in the borehole as indicated in plans. They must be aligned with respect to the hole axis.
- .2 Use positioning devices to center tie-rods in drillings in the bedrock. Maintain them in the desired position until concrete is set.
3. Before the second grouting second and at least 3 days after the first grouting first, apply a minimum tensile of 200 kN, which means 5% of the tie-rod elastic limit.

3.3 Placement of grout

- .1 Introduce injection grout according to manufacturer's instructions.
- .2 The placement of injected grout must only be executed in conditions in which the temperature is over 4°C.
- .3 The Contractor shall take all necessary measures to provide a grout and concrete with a minimum temperature of 4°C.
- .4 Grouting cannot take place if the temperature is not above 4°C for a period of at least 24 hours after the introduction of the tie-rods and the grout.
- .5 Securely fasten the stake in the correct position so it stays in place during the casting of concrete and until prescribed concrete resistance is reached.
- .6 For inclined drilled tie-rods, grouting must be performed in two steps: casting of the bottom of the hole up to 1 meter above the bedrock and a second to the existing sheet pile wall.
- .7 The section of the tie-rod between the old and the new quay wall must be protected against corrosion by means of a profile or a grout injected sheath, according to the method chosen by the contractor. The result will ensure that the tie-rod is fully protected within a grout. The spherical eye must not be grouted.

3.4 Inspection and testing

- .1 Use the appropriate method and provide the necessary inspection equipment to verify that all piles and drillings are cleaned properly. Work with the Ministry Representative and supply him with the desired help for the inspection of each pile anchorage performed.

If required by the Departmental Representative, thermocouples must be installed in the drilled holes, and this, at the Departmental Representative satisfaction.

- .2 The level of quality control testing carries out by the Contractor for each dowel grouting operation shall be as follows:
 - .1 Bleeding and expansion tests on grout of pourable consistency, on every third batch.

- .2 Compressive strength tests on one batch of grout consisting of three cubes tested at 7 days and three cubes at 28 days. One set of cubes shall be taken every shift.
- .3 Temperature measurements on each batch of grout.
- .4 The Contractor shall complete and submit to Departmental Representative a daily grout log for each shift which shall contain the following:
 - .1 Date and shift.
 - .2 Batching and mixing plant used.
 - .3 Identification of the Contractor's personnel employed in the grouting operation.
 - .4 Identification of the grout material used.
 - .5 Identification of dowels grouted each shift.
 - .6 Test data for grout tests defined in this section.
 - .7 Temperature readings, ambient, grout before placing and thermocouple temperatures where applicable.
- .3 Loading tests:
 - .1 Contractor must realize a loading test on 20% of inclined tie-rods after first grouting but obligatory on the 3 first installed inclined tie-rod. Tested tie-rods will be determined by the Departmental Representative. Testing load will be 90% of the tie-rod elastic resistance, which means 3 960 kN. Contractor will be responsible for all fees related to set-up, equipment, labour to realize loading tests. Minister will pay for the laboratory which will supervise testing.
 - .2 Test only after cube tests of grout indicate at least 20 MPa compressive strength.
 - .3 Should a failure occur in any test, every rock anchor that was installed after the previous successful load test shall be tested. All rock anchors failing to carry the load, as defined above, shall be cored out and reinstalled at the Contractor's expense. Replace tested rock anchors if the strength of the rock anchors was compromised during testing.

END OF SECTION

PART 1 – GENERAL

1.1 Related requirements

- .1 Section 31 61 13 - Piles/Sheet Piling Foundations, General Requirements.
- .2 Section 31 62 16.19 - Unfilled Tubular Steel Piles.

1.2 References

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM A 252-98(2002), Standard Specification for Welded and Seamless Steel Pipe Piles.
- .2 Canadian Standards Association (CSA International)
 - .1 CSA W47.1-03, Certification of Companies for Fusion Welding of Steel Structures.
 - .2 CSA W59-03, Welded Steel Construction (Metal Arc Welding).
 - .3 CAN/CSA-G30.18-M92(R2002), Billet-Steel Bars for Concrete Reinforcement.
 - .4 CSA-G40.20/G40.21-04, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steels.

1.3 Action and informational submittals

- .1 Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Product data: submit manufacturer's printed product literature, specifications and datasheet.
- .3 Shop Drawings:
 - .1 Indicate: operational sequence.
- .4 Quality assurance submittals:
 - .1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
 - .2 Instructions: submit manufacturer's installation instructions.
 - .3 Equipment lists: submit to Departmental Representative, list of equipment for installation of anchor dowels before beginning work.

1.4 Waste management and disposal

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

PART 2 – PRODUCTS

2.1 Materials

- .1 Grout: in accordance with manufacturer's recommendations and Section 03 30 00 - Cast-in-Place Concrete.
- .2 Underwater concreting: in accordance with Section 03 37 26 - Underwater Placed Concrete.
- .3 Material for anchor dowels: tubular sections to CSA-G40.20/G40.21, grade 300 W.
- .4 Additional material, including spiders, spacers and anchor dowels installation guides, as the Contractor method.

PART 3 – EXECUTION

3.1 Manufacturer's instructions

- .1 Compliance: comply with manufacturer's written recommendations or specifications.

3.2 Preparation/pile clean-out

- .1 After pile is driven to bedrock, remove overburden inside pile down to tip of pile.
 - .1 Clean out material adhering to inside surface of pile by high pressure water jets or airlifts.
- .2 Protect open piles from intrusion of foreign materials.

3.3 Installation /sockets

- .1 Secure equipment in position during drilling.
- .2 Drill socket to minimum depth as indicated.
- .3 After drilling is completed, clean out socket.

3.4 Installation/anchor dowel

- .1 Install fabricated anchor dowels in drilled socket and in pile.
 - .1 Locate relative to pile tip as indicated.
- .2 Use locating devices as indicated for centering anchor dowels in pile and rock socket.

3.5 Grouting

- .1 Grout in accordance with manufacturer's instructions and procedures.
- .2 Grout anchor dowels inside pipe piles, in drilled socket and up to elevation as indicated, as soon as possible after installing anchor dowels.
- .3 Use grout mix that has been demonstrated to produce required strength at temperature prevailing in socket and pile in specified time.
 - .1 Grout mix and grouting pressure to approval of Departmental Representative.
- .4 Hold pile securely in position so that it does not move during grouting and until grout has attained specified strength.
- .5 Place grout in one continuous operation to fill socket and pile up to specified level.

END OF SECTION

PART 1 - GENERAL

1.1 Related requirements

- .1 Section 31 05 16 – Aggregate materials.

1.2 References

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM C 117-04, Standard Test Methods for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.
 - .2 ASTM C 131-06, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
 - .3 ASTM C 136-06a, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .4 ASTM D 422-63(2007), Standard Test Method for Particle-Size Analysis of Soils.
 - .5 ASTM D 698-07e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft³) (600kN-m/m³).
 - .6 ASTM D 1557-00, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft-lbf/ft³) (2,700kN-m/m³).
 - .7 ASTM D 1883-07 e2, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
 - .2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

PART 2 - PRODUCTS

2.1 Materials

- .1 Granular sub-base material: in accordance with Section 31 05 16 - Aggregate Materials and following requirements:
 - .1 Gradations to be within limits specified when tested to ASTM C 136 and ASTM C 117. Sieve sizes to CAN/CGSB-8.1 and CAN/CGSB-8.2.

.2 MG-20 Table

Sieve designation	% Passing
31.5 mm	100
20 mm	90-100
14 mm	68-93
5 mm	35-60
1.25 mm	19-38
0.315 mm	9-17
0.08 mm	2-7

.3 MG-56 Table

Sieve designation	% Passing
80 mm	100
56 mm	82-100
31,5 mm	55-85
5 mm	25-50
1.25 mm	11-30
0.315 mm	4-18
0.08 mm	2-7

.4 Other Properties as follows:

- .1 Los Angeles degradation: to ASTM C 131, maximum loss by mass of 50%.

PART 3 - EXECUTION

3.1 Examination

- .1 Verification of Conditions: verify conditions of substrate previously installed under other Sections or Contracts are acceptable for granular sub-base installation.
 - .1 Visually inspect substrate in presence of Departmental Representative.
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
- .2 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 Placing

- .1 Place granular sub-base after subgrade is inspected and approved by Departmental Representative.

- .2 Construct granular sub-base to depth and grade in areas indicated.
- .3 Ensure no frozen material is placed.
- .4 Place material only on clean unfrozen surface, free from snow or ice.
- .5 Place material to full width in uniform layers not exceeding 150 mm compacted thickness. Departmental Representative may authorize thicker layers if specified compaction can be achieved.
- .6 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
- .7 Remove and replace portion of layer in which material has become segregated during spreading.

3.3 Compaction

- .1 Compaction equipment to be capable of obtaining required material densities.
- .2 Compact to density of not less than 98% maximum dry density in accordance with ASTM D 1557 for MG-20 and MG-56, unless indicated otherwise on drawings. Contractor may have to compact bottom of excavation to achieve compaction.
- .3 Shape and roll alternately to obtain smooth, even and uniformly compacted sub-base.
- .4 Apply water as necessary during compaction to obtain specified density.
- .5 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by Departmental Representative.
- .6 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

3.4 Site Tolerances

- .1 Finished sub-base surface to be within 10 mm of elevation as indicated but not uniformly high or low.

3.5 Protection

- .1 Maintain finished sub-base in condition conforming to this section until succeeding base is constructed, or until granular sub-base is accepted by the Departmental Representative.

END OF SECTION

PART 1 – GENERAL

1.1 Not used

- .1 Not Used.

PART 2 – PRODUCTS

2.1 Materials

- .1 Aggregates to: in accordance with CCDG.
- .2 Prime coat: RC-30, in accordance with CCDG.
- .3 Tack coat: SS-1, in accordance with CCDG.
- .4 Asphalt, in accordance with CCDG
- .5 Asphalt bond: PG 58-34 type.

PART 3 – EXECUTION

3.1 Pavement thickness

- .1 Two layers
 - .1 Base course: 60 mm: mix ESG-14.
 - .2 Wear course: 40 mm: mix ESG-10.

3.2 Pavement construction

- .1 Surface preparation: CCDG.
- .2 Application of prime coat and tack coat: CCDG.
- .3 Construction of asphalt concrete: CCDG.

END OF SECTION

PART 1 – GENERAL

1.1 References

- .1 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.5-99, Low Flash Petroleum Spirits Thinner.
 - .2 CAN/CGSB 1.74-01, Alkyde Traffic Paint.
- .2 Green Seal Environmental Standards (GS)
 - .1 GS-11-[2008, 2nd Edition], Paints and Coatings.
- .3 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .4 American Society for Testing and Material
 - .1 ASTM D913 Standard Practice for Evaluating Degree of Traffic Paint Line Wear.
 - .2 ASTM D2244 Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates.
 - .3 ASTM E303 Standard Test Method for Measuring Surface Frictional Properties Using the British Pendulum Tester.
 - .4 ASTM E1347 Standard Test Method for Color and Color-Difference Measurement by Tristimulus Colorimetry.
 - .5 ASTM E1710 Standard Test Method for Measurement of Retroreflective Pavement Marking Materials with CEN-Prescribed Geometry Using a Portable Retroreflectometer.

1.2 Action and informational submittals

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature and data sheets for pavement markings and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit two copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements and 01 35 43 - Environmental Procedures.
- .3 Certificates:
 - .1 Submit to Departmental Representative conformity certificates of paint and glass reflective beads at least 2 weeks prior to commencing work.

1.3 Closeout submittals

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operations and Maintenance Data: submit information on materials relative to work of this Section for inclusion in operations and maintenance manual.

1.4 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 off ground in dry location and in accordance with manufacturer's recommendations.
 - .2 Replace defective or damaged materials with new.

PART 2 – PRODUCTS

2.1 Materials

- .1 Paint:
 - .1 Paints: The marking product must be an epoxy resin in accordance with The “Tome VII – Material 10203 standard “of Quebec Minister of Transportation.
 - .2 Contractor must ensure that product used are suitable for the proposed utilization regarding the revetment type, texture and other surface conditions.
 - .3 Colour: white, according to MPI.
 - .4 Glass reflective beads: type suitable for application to wet paint surface for light reflectance. Glass reflective beads must contain at least 40% beads.

PART 3 - EXECUTION

3.1 Examination

- .1 Verification of Conditions: verify conditions of substrates and surfaces to receive pavement markings previously installed under other Sections or Contracts are acceptable for product installation in accordance with MPI instructions prior to pavement markings installation.
- .2 Pavement surface: dry, free from water, frost, ice, dust, oil, grease and other deleterious materials.
- .3 Proceed with Work only after unacceptable conditions have been rectified.

3.2 Equipment requirements

- .1 Paint applicator: approved pressure type mobile with positive shut-off distributor capable of applying paint in single, double and dashed lines and capable of applying marking components uniformly, at rates specified, and to dimensions as indicated.
- .2 Distributor: capable of applying reflective glass beads as overlay on freshly applied paint.

3.3 Application

- .1 Pavement markings: laid out by Departmental Representative Lay out pavement markings. In this purpose, a marking lay out is jointed to the present specification section.
- .2 Unless otherwise approved by Manufacturer, apply paint only when air temperature is above 10 degrees C, wind speed is less than 60 km/h and no rain is forecast within next 4 hours.
- .3 Apply traffic paint evenly at rate of 25 m/liter is applied in two (2) layers or 50 m/liter if applied in one (1) layer or any other rate specified by the Manufacturer.
- .4 Do not thin paint unless approved by Departmental Representative.
- .5 Symbols and letters to dimensions indicated.
- .6 Paint lines: of uniform colour and density with sharp edges.
- .7 Thoroughly clean distributor tank before refilling with paint of different colour.
- .8 If marking are expected after October 15 th, they must be reported to the next spring, unless if meteorological conditions are conform and under Departmental Representative approval.

3.4 Tolerance

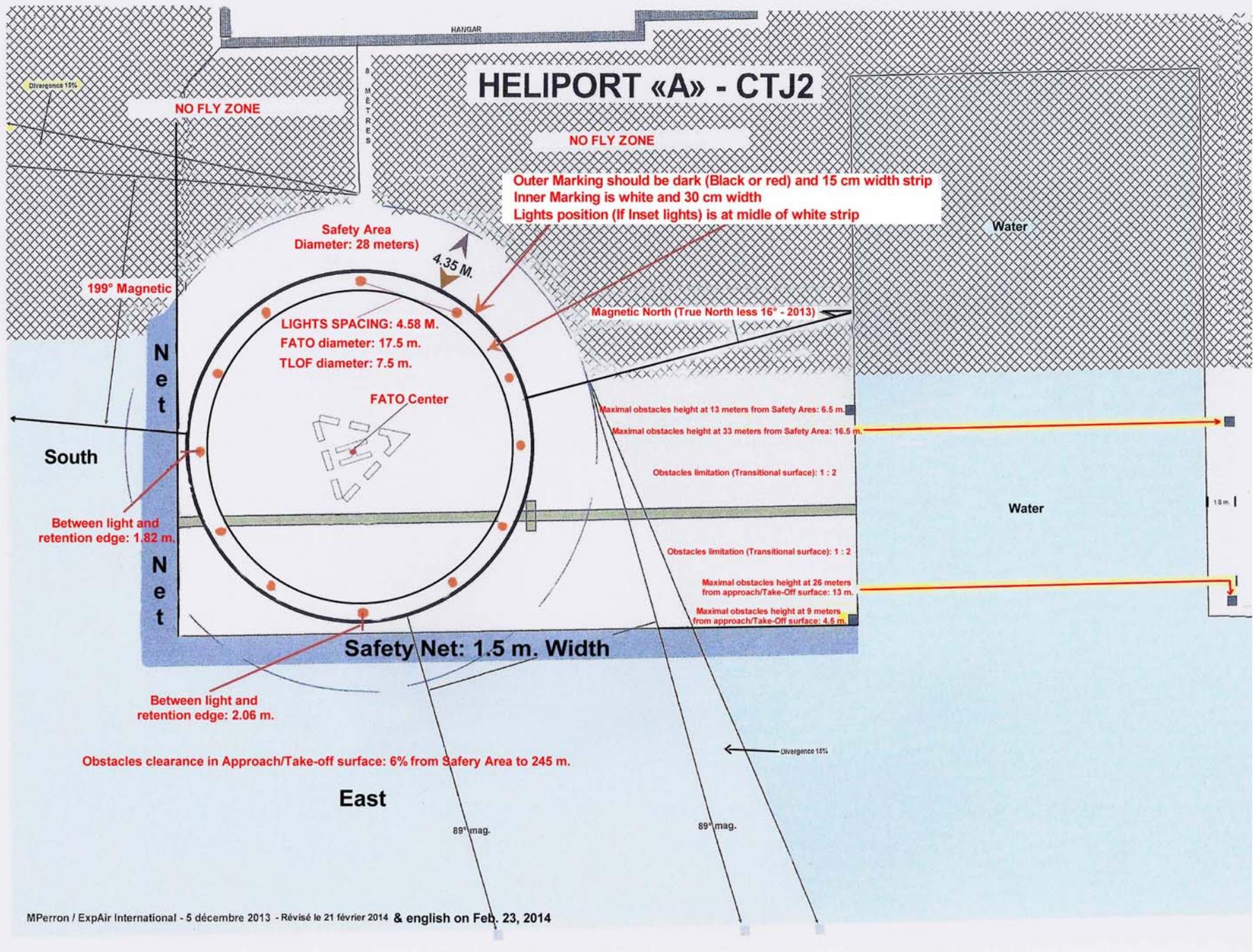
- .1 Paint markings: within plus or minus 12 mm of dimensions indicated.
- .2 Remove incorrect markings in accordance with the Departmental Representative.

3.5 Protection of completed work

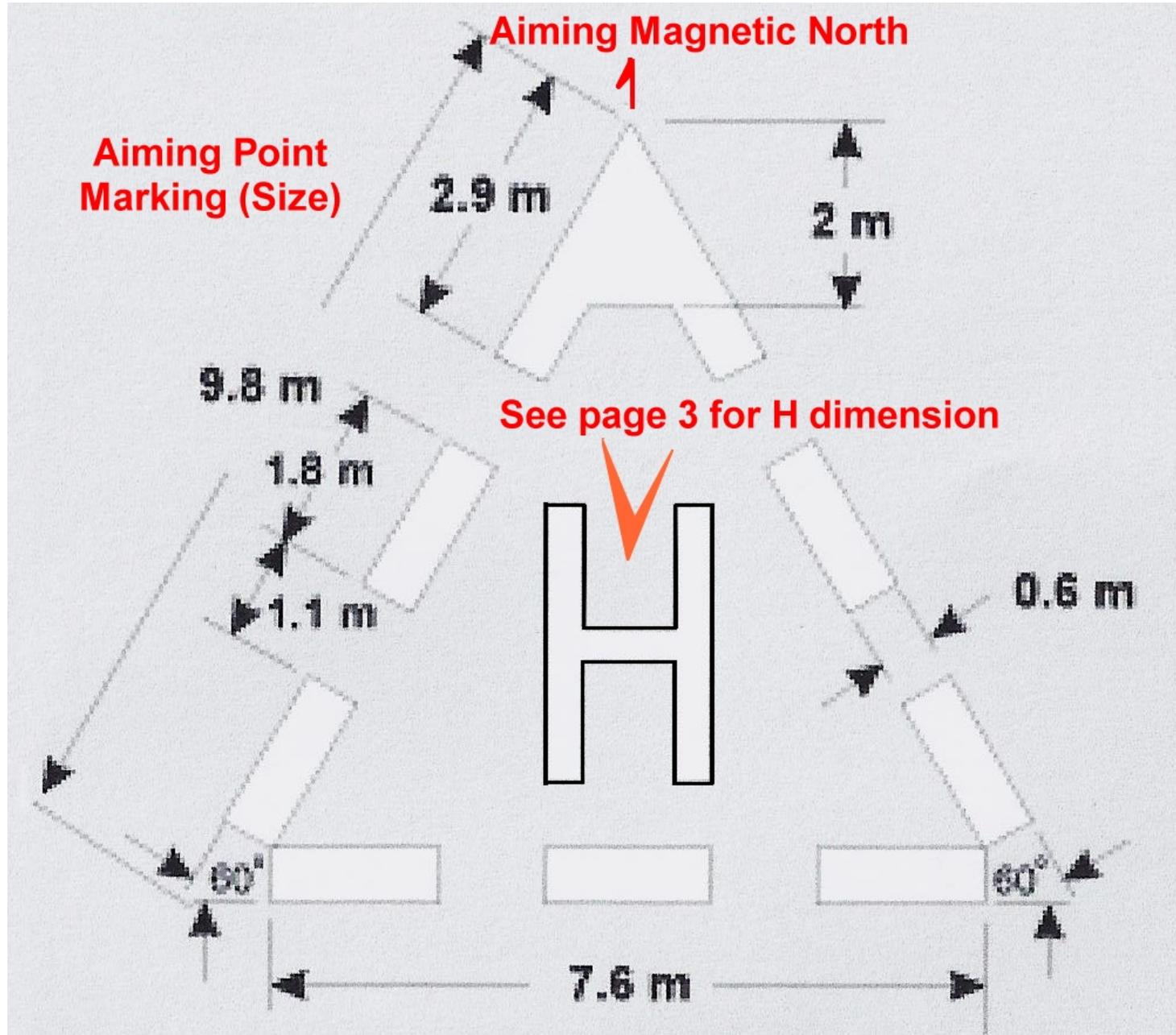
- .1 Protect pavement markings until dry.
- .2 Repair damage to adjacent materials caused by pavement marking application.

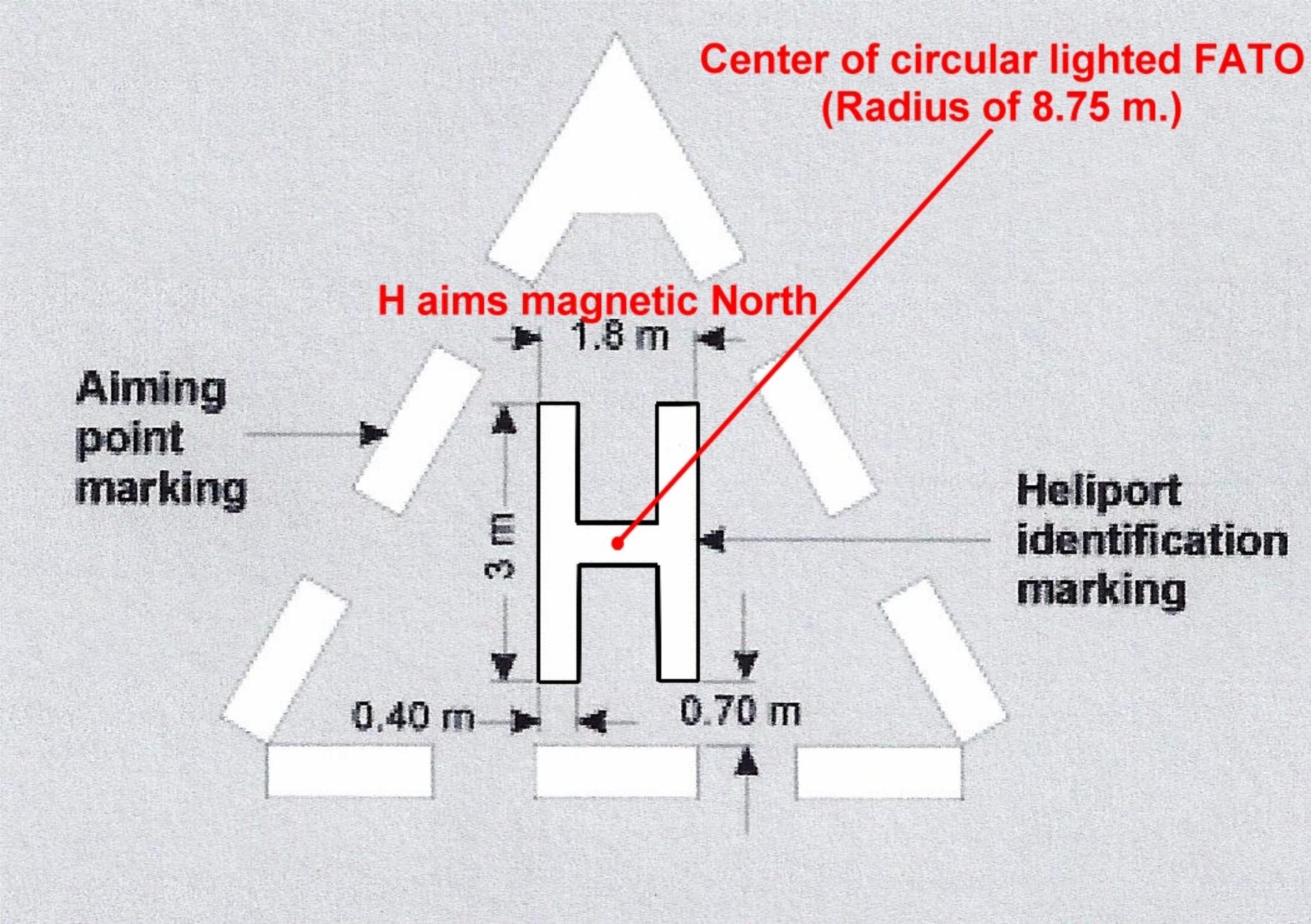
END OF SECTION

HELIPORT «A» - CTJ2



Note: White marking can be surrounded with a dark band of 5 to 15 cm to increase contrast with pad surface.





PART 1 - GENERAL

1.1 Related requirements

- .1 Section 01 74 21 – Construction/Demolition waste management and disposal.
- .2 Section 01 35 43 – Environmental Procedures.

1.2 References

- .1 Definitions:
 - .1 Dredging: excavating, transporting and disposing of underwater materials.
 - .2 Class B material: loose or shale rock, silt, sand, quick sand, mud, shingle, gravel, clay, sand, gumbo, boulders, hardpan and debris of individual volumes less than 2.0 m³.
 - .3 Obstructions: material other than class A, having individual volumes of 2.0 m³ or more.
 - .4 Debris: pieces of wood, wire rope, scrap steel, pieces of concrete and other waste materials.
 - .5 Grade: plane above which material is to be dredged.
 - .6 Sub-grade: plane parallel to and 300 mm below grade.
 - .7 Chart Datum: permanently established plane from which soundings or tide heights are referenced, usually Lowest Normal Tide (LNT).
 - .8 Matrix Block: each dredge area is presented as number of long blocks. Dependent on position of sounding, block may have 0 to 4 soundings contained within it.
 - .9 Least of Minimum Plan: hydrographic survey plan in which least sounding in grouping of matrix blocks is plotted.
 - .10 Instantaneous Mode: mode of operation of hydrographic survey equipment where only sounding observed at predetermined distance interval is retained in memory.
 - .11 Average of Instantaneous Plan: hydrographic survey plan in which average sounding in appropriate grouping of matrix blocks is plotted.
 - .12 Cleared Area: area of dredging accepted as complying with plans and specifications.

1.3 Quality assurance

- .1 Regulatory agency sustainability approvals:
 - .1 Comply with municipal, provincial and national codes and regulations relating to project.
 - .2 Mark floating equipment with lights in accordance with appropriate regulations.

1.4 Site conditions

- .1 Results of prior geotechnical investigations and sediment chemical analysis are available in the tender documents.

- .2 Results of prior geotechnical investigations are made available for tendering purposes only. This information may differ from site condition. Take this into consideration when submitting tender.
- .3 Take necessary steps to become fully familiar with potential inclement weather and sea conditions in this area.

PART 2 - PRODUCTS

2.1 Dredging equipment

- .1 Contractor to determine required equipment necessary to dredge material specified and to dispose of dredged material at locations indicated.
- .2 Contractor must pay attention that large diameter stone are to excavate for the pile lane. Any obstruction or class B material are possibly in the dredging zone and Contractor must take this into account in his bidding and method.

PART 3 - EXECUTION

3.1 Examination

- .1 Verification of location:
 - .1 Work comprises dredging of areas and berm construction as indicated and as specified herein.

3.2 Examination

- .1 Surveys and acceptance of work:
 - .1 Surveys will be undertaken by Departmental Representative upon completion of different berm steps of construction. Survey will confirm if dredging and berm is completed as specified and whether area can be considered cleared area.

Survey will be by electronic sweep equipment. Survey plan plotting least of minimum depths obtained in this survey will identify areas requiring reworking.

Note that there will be three surveys: one for the dredging before filling for berm construction, another before stone for berm and a last one after stone for berm installation.

- .2 Additional surveys required to clear areas will be undertaken by Departmental Representative at Contractor's cost.
- .3 All elevations obtained in minimum mode within specified areas of dredging must be at or deeper than before area will be considered completed.

3.3 Dredging

- .1 Mark floating equipment with lights in accordance with International Rules of Road and maintain radio watch on board.
- .2 Remove materials above specified grade depths, within limits indicated. Material removed from below subgrade depth or outside specified area will not be paid.
- .3 Remove shoaling which occurs as result of Work at no expense to Canada.
- .4 Reuse dredged material as backfill if acceptable and approved by the Departmental Representative. All material not approved for backfill will be disposed in approved waste sites.
- .5 Remove infilling in dredge areas which occurs prior to acceptance by Departmental Representative.

3.4 Removal of dredged material

- .1 Remove excavated material using methods approved by the Departmental Representative.

3.5 Dredging close to existing work

- .1 Take all necessary precautions when dredging close to existing work.

3.6 Non conforming work

- .1 Non-conforming work:
 - .1 Re-dredge unsatisfactory Work and verify depths with additional sounding or sweeping to approval of Departmental Representative.

3.7 Site quality control

- .1 Site test and inspections:
 - .1 Co-operate with Departmental Representative on inspection of Work and provide assistance requested.

- .2 Upon request of Departmental Representative, furnish use of such boats, equipment, labour and materials forming ordinary and usual part of dredging plant as may be reasonably necessary to inspect and supervise Work.

END OF SECTION

PART 1 – GENERAL

1.1 Related requirements

- .1 Section 35 20 23 – Dredging.
- .2 Section 31 23 10.01 – Excavating, Trenching and Backfilling.

1.2 References

- .1 American Association of State Highway and Transportation Officials (AASHTO) / Standard Specifications for Transportation Materials and Methods of Sampling and Testing, 25th Edition, 2005.
 - .1 AASHTO M 288-05, Geotextile Specification for Highway Applications.
- .2 American Society for Testing and Materials International (ASTM)
 - .1 ASTM C 117-04, Standard Test Method for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.
 - .2 ASTM C 127-04, Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate.
 - .3 ASTM C 535-03e1, Standard Test Method for Resistance to Degradation of Large Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
 - .4 ASTM C 136-05, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .5 ASTM D 698-00ae1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/fü (600kN-m/mü)).
- .3 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
 - .2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

PART 2 – PRODUCTS

2.1 Material

- .1 Stone use for berm protection must meet the following requirements:
 - .1 Crushed, pit run or screened stone, gravel or sand, not sensible to freeze-thaw cycles, or wet-dry cycles and approved by Departmental Representative.
 - .2 Relative density: between 2.65 and 2.85, according to ASTM C 127.
 - .3 Absorption factor: 0.5 % maximum, according to ASTM C127.
 - .4 Mg SO₄: loss of 1.5% maximum, after 7 cycles according to BNQ 2560-450.

.2 Stone 400-600 mm : Stone of variable dimensions between 400 and 600 mm.

.1 The following granulometry must be encountered:

Dimension	Percentage of stone
Below 550 mm	85
Below 500 mm	50
Below à 450 mm	15

2.2 Source quality control

.1 Inform Departmental Representative of proposed source of aggregates and provide access for sampling at least 4 weeks prior to commencing production.

PART 3 - EXECUTION

3.1 Leveling works

- .1 Level embankment according to lines et level indicated.
- .2 Contractor must take into account that he has to rebuilt wharf 96 berm after piling works. This berm must be rebuilt according to the existing.
- .3 Contractor must take into account that stone along the south face of wharf 98 must be temporary excavated for the piling lane and then rebuilt. The water depth of -10 meters along the East façade of wharf 98 must be respected, that means the Contractor must slightly change the slope to meet that request and obtain a stable slope.

3.2 Armour stone

- .1 Avoid disturbing the existing materials in the implementation of the stones forming the armour layer. Do not unload the stones by tilting the truck bed without the approval of the Departmental Representative.
- .2 Shape the armour layer according to the specified thickness.
- .3 Place in tight layers the stones of the protection berms and slopes.
- .4 Put down each stone. Do not dump the stones from the rear of the truck. Start placing lower elevation and then progress upward, row by row. Place each stone so that it is stable and rests firmly on the underlying stones. Place the stones so as to obtain a uniform and continuous protection structure consisting of overlapping stones.

3.3 Cleaning

- .1 Perform cleanup according to section 01 74 11 – Cleaning.

END OF SECTION

PART 1 – GENERAL

1.1 Related requirements

- .1 Section 01 33 00 – Submittal Procedures
- .2 Section 05 50 00 – Metal Fabrications

1.2 References

- .1 ASTM International
 - .1 ASTM D 412-06ae2, Standard Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers-Tension.
 - .2 ASTM D 429-08, Standard Test Methods for Rubber Property - Adhesion to Rigid Substrates.
 - .3 ASTM D 2240-05(2010)], Standard Test Method for Rubber Property-Durometer Hardness.

1.3 Action and informational submittals

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

PART 2 – PRODUCTS

2.1 Materials

- .1 Fender type: rubber cylindrical or lambda, as indicated on plans.
 - .1 Material: rubber.
 - .1 Physical properties (before aging):

<u>Property</u>	<u>Test Method</u>	<u>Requirements</u>
Minimum Tensile Strength	ASTM D 412	160 kgf/cm ²
Minimum Elongation at Break	ASTM D 412	350%
Hardness, Shore (A) Durometer	ASTM D 2240	76Hs max (72 Hs max for lambda)

.2 Physical properties (after aging):

<u>Property</u>	<u>Test Method</u>	<u>Requirements</u>
Minimum Tensile Strength	ASTM D 865	Superior to 80% of the original value
Minimum Elongation at Break	ASTM D865	Superior to 80% of the original value
Hardness, Shore (A) Durometer	ASTM D865	Not more than the original value +8°

.3 Other properties

Minimum Tearing Strength	ASTM D 624	70 kgf/cm
Compression	ASTM D 395	30% max

.2 Cylindrical fenders of 600 mm outside diameter(as indicated on plans):

Energy absorption capacity at 50 % deflection: 3.9 ton-m/ meter long

.3 600 mm thick lambda fender (as indicated on plans):

Energy absorption capacity at 50 % deflection: 9.5 ton-m/ meter long

PART 3 – EXECUTION

3.1 Installation

- .1 Install in accordance with manufacturer's instructions and as indicated.
- .2 Do not modify any part of the fender system without the Departmental Representative approval.

END OF SECTION

PART 1 - GENERAL

1.1 Related requirements

- .1 Section 01 33 00 – Submittal procedures.
- .2 Section 09 97 20 – Painting.

1.2 References

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM A 27/A 27M-05, Standard Specification for Steel Castings, Carbon, for General Application.
 - .2 ASTM A 48/A 148M-05, Standard Specification for Steel Castings, High-Strength, for Structural Purposes.
- .2 Canadian Standards Association (CSA International)
 - .1 CSA G40.20/G40.21-F2004, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

1.3 Action and informational submittals

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product data: submit manufacturer's printed product literature, specifications and datasheet.
- .3 Submit shop drawings, indicating following items:
 - .1 Mooring devices details, including dimensions and installation procedures.
 - .2 Locations, sizes and installation tolerances of anchor bolts.
 - .3 Capacity of mooring devices.
 - .4 Submit anchors calculations.

PART 2 - PRODUCTS

2.1 Materials

- .1 Metal parts: construction steel grade as per CSA G40.21 standard.

- .2 Bollards: 80-40 carbon steel casting, with 3J minimal resilience at -25 Celcius, as per ASTM A148/A48M standard.
 - .1 Maximum working pull: 100 tons.
- .3 Cleats: ductile iron. Maximum working pull: 5 tons.
- .4 Paint: as per section 09 97 20– Painting.
- .5 Grout: shrinkage compensating non-metallic.

2.2 Quality control

- .1 The Departmental Representative reserves the right to proceed to destructive or non-destructive tests. The tests will be at the expense of the Departmental Representative, unless the results show a non-compliance of mooring devices as per the plans and specifications. The Contractor shall supply the manufacturing schedule of the mooring devices to the Departmental Representative.
- .2 The Contractor shall supply to the Departmental Representative the steel certificates, traction and resilience test results for each casting as per ASTM A781-M-02 standard and provide assistance necessary for additional testing free of charge to the Department's Representative.
- .3 Visual magnetic particles inspections: All accessible surfaces of mooring devices must be visually inspected and magnetic particles tested as per the latest edition of ASTM E709 standard. No abrupt (steep) section change will be tolerated.
 - .1 Mooring device surface of borders shall be smooth, free of sand, slag, crack or the other harmful defect.
 - .2 Visual and magnetic particles inspections acceptance criteria are as per ASME, section VIII, Division 1, Appendix 6 standard, latest edition.
- .4 Radiography: if the visual and/or magnetic particles inspections show signs of defects, the base plate and neck of one out of three identical model mooring device must be verified by radiography, at the Contractor's expense. For every mooring device found defective by the radiographic examination, two other borders will be X-rayed in the same way at the Contractor's expense.
 - .1 X-rays must be compared with ASTM E446 standard (Standard Reference Radiographs for Steel Castings up to 2 in. In Thickness) referencing to ASTM E446 (Standard Reference Radiographs for Steel Castings up to 2 in. In Thickness) ou ASTM E186 standard (Standard Reference Radiographs for Heavy-Walled (2 to 4,5 in. Steel Casting) depending on the X-rayed thickness. The maximum acceptable severity levels of are defined in the ASME, article 7-3 (Examination Requirements), appendix 7 (Examination of Steel Castings), VIII section, Division 1 standard.
 - .2 The acceptance criteria are as per ASME, section 8, Division 1, Appendix 7 standard, latest edition.

- .5 If the control inspection reveals a defect, the defective part will be discarded or the Contractor will propose a repair method to satisfaction of the Departmental Representative. Such repairs and all other inspections of the defective part will be at the Contractor's expense.

PART 3 - EXECUTION

3.1 Setting and grouting

- .1 Set mooring devices at locations and elevations as indicated.
 - .1 After tightening of anchor bolts or positioning wedges, grout under base.
 - .2 Ensure that temperatures of foundation, air, base and grout are within range specified by grout manufacturer.
- .2 Do not grout until location of anchor bolts, bollards and cleats have been approved by Departmental Representative.

END OF SECTION

PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

QUAI DE LA REINE – RECONSTRUCTION OF WHARVES 97 AND 98

ELECTRICITY

MARCH 2014

By :


Marc Despins, Eng.

PART 1 – GENERAL**1.1 Related requirements**

- .1 This section includes requirements common to the various section of the Electrical specifications
- .2 The list given in this document is not limited and all devices or accessories needed to complete installation must be provided and installed by the contractor even if they are not specifically described.
- .3 In case of disagreement or inconsistency between documents, the most restrictive clause will be given priority.

1.2 References

- .1 Unless otherwise stated, wherever there is mention of a code or standard of the tender documents, use the latest edition at the moment more recent to amendments
- .2 Provincial Labor Standards codes and regulations.
- .3 Building regulations, zoning and provincial codes.
- .4 Applicable regulations for Environmental Protection Services of the Ministry of Municipal Affairs.
- .5 Perform all the installation according to the Quebec Construction code – Chapter V – Standards of Electricity and Hydro Québec
- .6 All equipment, installation and testing must comply with standards, codes or regulations of the Federal, Municipal and Provincial Government.
- .7 All equipment, testing and quality assurance must comply with standards and codes of the following associations:

Canadian Standards Association (CSA International)

- .1 CSA C22.1, Canadian Electrical Code, Part 1 (current Edition), Safety Standard for Electrical Installations.
- .2 CSA C22.2.
- .3 CAN/CSA-C22.3 no.1 Overhead Systems.
- .4 CAN3-C235, Preferred Voltage Levels for AC Systems, 0 to 50,000 V.
- .5 CSA C22.10-10, Québec Construction Code Chapter V-Electricity.
- .6 CSA-B651-04, Accessible design for the built environment.

And all Québec Regulations and Recommendations

AMEEC: Electrical and Electronic Manufacturer's Association of Canada (EEMAC)

EEMAC 2Y-1, Light Gray Colour for Indoor Switch Gear.

ANSI: American Electrical Manufacturer's Association

IEEE: Institute of Electrical and Electronics (IEEE) /National Electrical Safety Code Product Line (NESC)

.1 IEEE SP1122, The Authoritative Dictionary of IEEE Standards Terms

ICEA: insulated Power Cable Engineers Association.

1.3 Definitions

.1 Specific terms:

A verb in the infinitive form, beginning a sentence or a proposition to imply words (contractor shall provide, install and connect...) ex: provide and install or provide and place... means (contractor shall provide, install and connect all material.

« **ELECTRICITY** » in the header for plans and specs relates to the field of « Electricity ».

« **PROVIDE** » means to supply install and connect.

« **ACCORDING TO INSTRUCTIONS** » means indicated on the plans and specifications as part of the contract.

« **SPECIFICATIONS** » means collectively all the latest revisions attached to this specification and the revised or additional drawings that will be provided later.

« **IN THIS SPECIFICATION** » means the contents or a section or division in which this term appears.

The terms « **CONTRACTOR** » or « **CURRENT CONTRACTOR** » or «**SPECIALIZED CONTRACTOR**», mentioned in different sections of the specs and plans in the Electrical section, means the contractor in charge of or responsible for the specs and plans in which they appear.

.2 Electric and Electronic Terms:

Unless otherwise indicated, the terminology used in the section of the specs and plans is based on that defined in the standard IEEE SP1122.

1.4 Review of plans, specifications and locations

.1 The bidder shall carefully study the plans and specifications for structural, architectural and other specialties to ensure that the work of this contract may be executed in a satisfactory manner, as shown on the plans. Before starting work, review the work of other specialties and report to the Departmental Representative of any defects or impede the execution of the work described in this specification or affecting the security required.

.2 These reviews by the Contractor shall be made in order to coordinate the execution of its work. The Contractor shall interpret the documents in line with the strictest requirements.

- .3 No allowance will be granted to the contractor for the consequences of his failure to make such examinations.

1.5 Plans and specifications

- .1 All contract documents complement each other and any instructions found in one of them is enforceable as if it is found in all documents.
- .2 The plans serve only to guide the contractor and subcontractors on the number and approximate location of the conduits, receptacles, lighting or other.
- .3 For purposes of enforcement in the event and an obstacle to overcome, the location of pipes, cables, lighting fixture or other equipment can be moved within (3) meters from the location indicated without additional charge.

1.6 Design, requirements

- .1 The operating voltages shall conform to CAN3-C235
- .2 Motors, electric heaters, devices command / control / regulation and distribution must operate in a satisfactory manner at a frequency of 60 Hz and within the limits established in this standard.
 - .1 Equipment must be able to operate without sustaining damage under extreme conditions identified in this standard.
- .3 All electrical equipment must also operate within the conditions of supply of electricity from the power company.
- .4 In any event, the equipment must operate normally with minimal variation of voltages 15% and 10% of the nominal voltage of equipment.
- .5 Operating language and display: provide identification and display of signs and tags in French for control devices / control.
- .6 All electrical equipment located in an electrical equipment room, protected by sprinklers, must conform to with Article 26-008 "Apparatus protected by sprinklers" of the Quebec Construction Code, Chapter V - Electricity.

List limited to major appliances covered by this article:

- Connection Center.
- Distribution Panel.
- Transformers.
- Motor Control Centers.
- Main distribution centers (substation).
- Control Relay.
- Isolating switches.

- Starter motors and variable frequency drive.
- Two control.
- Centre for power factor correction.
- Generator and transfer switch.

1.7 Material requirements for establishments

- .1 To maintain consistency, use only products from one manufacturer when it comes of material or equipment of the same type or class and, unless otherwise indicated.
- .2 Follow manufacturer's recommendations in regard to security, opportunities, access, maintenance and repairs.
- .3 Ensure maintenance and dismounting can be done without injury to the elements of the building or other facilities.
- .4 Provide means to access the hardware, for maintenance purposes.
- .5 Where possible, align the edges of pieces of equipment with the building walls.

1.8 Responsibility for the trial testing

- .1 Protect the work against loss or damage until its acceptance.
- .2 During the temporary use, the warranty period will not be affected.
- .3 The owner can use the facilities and equipment for testing before they have accepted. Provide labor, equipment and instruments required for testing.
- .4 Clean and refurbish and leave in good working the facilities and equipment used before their acceptance and isolate equipment that could be damaged.
- .5 Prevent dust, dirt and other foreign matter from entering openings of facilities and equipment during installation and temporary use.

1.9 Concealed work

- .1 No work shall be concealed without approval.
- .2 In the event that the specialty contractor breaches this clause, this one may be forced to discover the concealed work. The costs incurred will be the responsibility of offender, that the work is well executed or not.

1.10 Documents and samples

- .1 Submit documents and samples in accordance with this section and section 01 33 00 – Submittal Procedures.
- .2 Submit material safety data sheets required, consistent with the Information System Hazardous Materials (WHMIS), under Section 02 88 01 - Hazardous Materials.

- .3 Submit, for review, the single line diagrams framed under glass or Plexiglas, and place in areas below:
 - .1 Electrical Distribution network: at the main electrical installations.
 - .2 Network production and distribution of electricity: in the local generators.
- .4 Provide, for review, a vertical distribution plan of the fire alarm system that show plan and zoning of the building, framed under glass or Plexiglas, and place it near the control panel and fire alarm annunciation panel.
- .5 Shop drawings
 - .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data that must be provided to show in detail a portion of the work
 - .2 The drawings submitted, where required, must be signed by an authorized qualified Departmental Representative or entitled to practice in Canada, in the province of Quebec.
 - .3 The Contractor shall make the necessary steps for the preparation of shop drawings as required by the contract documents or the Departmental Representative may reasonably request. These drawings must, show only the devices, materials, systems, etc., Project-specific. Drawings should be arranged to release a minimum clearance of 75 mm x 75 mm (3 in. x 3 in.) to allow the Departmental Representative to affix the stamp of review.
 - .4 Wiring diagrams and installation details of equipment must indicate the location, layout, capacity, weight, route and proposed layout, control panels, accessories, piping, ducts, details of stands, brackets, bolts and all other elements that must be displayed to ensure that we can achieve a coordinated installation.
 - .5 Wiring diagrams shall indicate the circuit terminals, the internal wiring of each unit as well as interconnections between devices, and structures within other disciplines.
 - .6 The drawings shall indicate clearances required for the operation, maintenance and replacement of equipment.
 - .7 Before placing orders for materials, submit to the Departmental Representative, for verification, one (1) electronic copy (PDF file) of the shop drawing of the equipment chosen. An electronic copy will be returned to the contractor. Other copies required will be prepared and distributed by the Contractor from the copy reviewed by the Departmental Representative.
 - .8 Do not undertake work until you receive written notice from the Departmental Representative certifying the review of the submitted drawings.
 - .9 Include all drawings of any chart, graph, detail, description, sample (if required by the Departmental Representative), to check the appearance, quality, performance, durability of the equipment chosen.

- .10 The drawings submitted must be identified for this specific project. They must indicate the project name, the name of Departmental Representative, contractor, date and refer to an item number of the specs or a detail in the plans.
 - .11 Check in advance these drawings prior to submission to the Departmental Representative. Check dimensions on site. Ensure the installation criteria and catalogue numbers. If changes are required, inform the Departmental Representative before they are made.
 - .12 The review of Departmental Representative is limited to monitoring compliance with shop drawings and conceptual studies the general layout. This review does not absolve the Contractor from responsibility for errors or omissions in shop drawings or his responsibility to comply with all requirements of contract documents and site conditions, unless exemption clearly indicated on shop drawings have been approved in writing by the Departmental Representative.
 - .13 The Contractor shall provide shop drawings with all corrections and modifications as the Departmental Representative requires in accordance with the Contract Documents and resubmit unless a Departmental Representative in the exemption.

When re-submitting shop drawings, the contractor must inform the Departmental Representative in writing revisions, other than those requested by the Departmental Representative, which have been made.
 - .14 Do not distribute copies of the drawings submitted until receipt of written notice of revision from the Departmental Representative.
 - .15 The study of coordination, where required, must be issued simultaneously with shop drawings. Any issue will delay even more the review of drawings by the Departmental Representative.
 - .16 Shop drawings must be in French.
- .6 Quality Assurance: in accordance with Section 01 45 00 - Quality Control.
- .1 Provide equipment and materials that are CSA approved.
 - .2 In cases where we can get equipment and materials CSA certified, submit the proposed equipment and materials to the competent authority and the inspection authorities, for approval, before delivering them to the site and to defray costs.
 - .3 Submit the test results of electrical systems and instruments installed in the form of a written report.
 - .4 Permits and fees: under the general conditions of contract, and this section.
 - .5 Once completed, submit a report of load balancing in accordance with article "Quality control on site" in Part 3 of this section.
 - .6 Once completed, submit to the Departmental Representative the certificate of approval issued by the competent authority.
 - .7 Molded Case Circuit Breakers

- .1 The contractor, electrical subcontractor must deliver to the Departmental Representative a certification of the authenticity of all molded case circuit breakers used in the project and before any installation thereof to the site.
- .2 The certificate must indicate at least the following information:
 - Name of the electrical contractor
 - Project identification and address of site installation
 - The brand, the electrical characteristics of circuit breakers for circuit breakers and 60A and the serial number.
 - The name and signature of the authorized distributor for the manufacturer who supplied the circuit breakers.
 - The number of circuit-breakers at licensed dealer.
 - The signature of the local representative of the manufacturer.
- .7 In case reports of controls must be made by the manufacturer to the Departmental Representative : within three days after the checks and tests the installation and electric instruments prescribed in Article FIELD QUALITY CONTROL, PART 3 of this section, a written report of the manufacturer showing that the research meets the criteria specified.

1.11 Interference schematics

- .1 If necessary, prepare schemes to ensure that electrical equipment can be mounted in space and where indicated without disturbing the other sections and equipment while leaving space for the proper maintenance of these equipment.
- .2 If a Departmental Representative considers that there may be interference in a particular location; they may require the Contractor to prepare plans of interference of these places.

1.12 Quality assurance

- .1 The Contractor shall have full control of his own work including those of the subcontractors.
- .2 The Contractor shall direct and supervise the work adequately in order to ensure compliance with plans and specifications.
- .3 The Contractor shall be solely responsible for the methods, techniques and sequences for carrying out the work.
- .4 The contractor must have a site supervisor that can represent him in his absence. Any notice, order, direction, etc.. given to the supervisor shall be construed as given to the contractor himself.
- .5 The Contractor shall ensure that its work will be done promptly before pouring concrete or performing other similar work. Supply and install sleeves required. If it is necessary to cut or repair work completed or not, to use his own expense, a specialist in the part of the work involved making cuts and repairs.

- .6 If the materials supplied by the Contractor must be incorporated into the work of other contractors such as masonry, carpentry or plastering, the contractor will be responsible for providing the equipment and to incorporate measures for necessary openings to develop.
- .7 If the Contractor covers or permits to cover work before tests and inspections have been made, the Contractor shall, upon request, uncover the work in question, to complete the inspections and tests in a satisfactory manner and deliver such part of the work in the condition at the contractor`s own cost.
- .8 The Contractor shall protect his own work, finished or unfinished, and that of other contractors against any damages resulting from the execution of his own work. Cover floors, etc., as needed with heavy fabric. Repair, without cost and to the satisfaction of the Departmental Representative, all damages on floors or other parts of the building resulting from the execution of his own work.
- .9 When the work is completed, all tools, surplus materials or waste will be removed and the premises will be left perfectly clean.
- .10 Quality Assurance: according to Section 01 45 00 - Quality Control.
- .11 Qualification: electrical work must be performed by authorized, qualified by a master electrician or an electrical contractor holding a license issued by the province in which the work will be performed or by apprentices in accordance with the relevant authorities and in accordance with the terms of provincial legislation concerning territorial vocational training and qualification of the workforce.
 - .1 Employees enrolled in a provincial apprenticeship program can perform specific tasks if they are under the direct supervision of a qualified licensed electrician.
 - .2 Tasks permitted: depending on the degree of training and according to the demonstrated ability to perform specific tasks.
- .12 Site meetings
 - .1 in the case where site meeting are made by the manufacturer as part of Manufacturer's Field Services described in Part 3 - FIELD QUALITY CONTROL, in appropriate NMS Section , schedule site visits, to review Work, at stages listed.
 - .1 After delivery and storage of products, and when preparatory Work is complete but before installation begins.
 - .2 Twice during progress of Work at 25% and 60% complete.
 - .3 Upon completion of Work, after cleaning is carried out.
- .13 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.13 Delivery, storage and handling

- .1 Material Delivery Schedule: provide Departmental Representative with schedule within [2] weeks after award of Contract.

- .2 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .3 Materials must be delivered and stored according to manufacturer's instructions and ensure that their labels and seals are intact.
- .4 Ship and store in a standing position, the equipment to assemble.
- .5 Ship sections and assembly anchoring patterns before hardware.
- .6 Close the doors of the equipment and keep them locked. Protect equipment against damage and dust.
- .7 If necessary, shim moving parts to avoid damage when moving or shipping the material. The guidelines for the removal of wedges before commissioning should be displayed in French clearly and prominently.
- .8 Store electrical equipment inside unless otherwise indicated.

1.14 System startup

- .1 In accordance with section 01 91 13 – General Commissioning (Cx) Requirements
- .2 Instruct Departmental Representative and operating personnel in operation, care and maintenance of systems, system equipment and components.
- .3 Provide written notice of 5 working days of the date of testing.
- .4 All equipment as well as the various systems, must be turned on, adjusted and calibrated by the contractor so as to provide the capacity and performance required of plans and specifications.
- .5 perform startup tests in the presence of the people responsible and the owner`s representative.
- .6 Arrange and pay for services of manufacturer's factory service engineer to supervise start-up of installation, check, adjust, balance and calibrate components and instruct operating personnel.
- .7 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant will aspects of its care and operation.

1.15 Operating instructions

- .1 Submit three (3) copies (unless otherwise indicated) of the operations manual and maintenance in binders identified for this purpose. These manuals will consist of a hardcover three-ring and identified with an electronic printing device such as "P-Touch" on the front cover and the vertical side.
- .2 Operating instructions to include following:
 - .1 The details of the components, construction features, function and maintenance requirements of the various components to facilitate the starting, operation, maintenance, repair, alteration, extension and expansion of or any part characteristic of the installation.

- .2 Technical data and product characteristics must be accompanied by supplementary information such as newsletters, illustrations and exploded views of component parts, technical descriptions and parts lists. The flyers advertising or brochures are not accepted.
 - .3 Wiring diagrams, circuit diagrams, control sequence for each main system and for each device, the principle diagrams and yield curves, startup procedures, adjusting, adjustment, lubrication, operation and stop, security measures, procedures to follow in case of failure, and other instructions, as recommended by the manufacturer of each body system.
 - .4 The names and addresses of the local suppliers of products mentioned in manuals.
 - .5 A copy of each shop drawings revised with comments made to them for approval and changes during construction.
 - .6 Warranties, factory test reports, verification certificates, certificates of circuit breakers, etc.
 - .7 Data sheets must be in French.
 - .8 The entire manual should be in electronic (Autocad (latest version), Word, Excel or Acrobat (PDF)).
 - .9 All drawings and / or drawings types used in the Autocad format will also be provided in electronic DWG format.
- .3 Provide tools, equipment and services of qualified instructors for the training of operating personnel and maintenance for the operation, the control, adjustment, diagnosis of problems and maintenance of all systems and equipment, during normal hours of work and before acceptance and delivery of systems and equipment.
 - .4 When other additional requirements specifies this, manufacturers must carry out demonstrations and train staff according to the requirements for training hours specified in each relevant section.
 - .5 Training courses should be based on the contents of the operations manual and maintenance and as-built drawings.

1.16 Software and computer DATA

- .1 With all equipment provided with a processor whose parameters are programmable, the Contractor shall provide the owner of software programming and settings stored in the memory of the equipment. Training on the equipment in question should also cover how the software works.

1.17 Rights, permits and inspection

- .1 Submit to the authorities concerned, the required number of copies of drawings and specifications to enable them to study and approve before work begins.
- .2 Pay all related costs.
- .3 The contractor is responsible to apply for connection to the electricity distributor.
- .4 If applicable, drawings and specifications required by the authorities will be provided directly by

the Departmental Representative to cost to the contractor.

- .5 At the end of the work, provide the required certificates, including a copy to Departmental Representative. Pay all charges for additional copies required by the authorities concerned.

1.18 Specific requirements - Commissioning

- .1 In addition to the requirements mentioned in sections of the discipline "Electricity", the Contractor shall collaborate with the Departmental Representative to meet the requirements of the commissioning plan, Section 01 91 13 - General Commissioning (Cx) Requirements.

PART 2 – PRODUCTS

2.1 Materials and equipment

- .1 Provide material and equipment in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Material and equipment to be CSA certified. Where CSA certified material and equipment are not available, obtain special approval from authority having jurisdiction before delivery to site and submit such approval as described in PART 1 - SUBMITTALS.
- .3 Control panels and component should be factory assembled.
- .4 Provide materials, equipment and new sets of design and of known quality, recent model, whose characteristics are known and which replacement parts are available upon request.
- .5 Control panels and components shall be factory assembled.
- .6 Unless otherwise specified, to maintain consistency, use only products from one manufacturer when it comes to material or equipment of the same type or class.
- .7 Follow manufacturer's recommendations in regard to safety, inspection doors, maintenance and repairs.
- .8 Ensure the maintenance and dismantling may be done without hindering to the elements of the construction or other installations.
- .9 Provide means for accessing material, for maintenance purpose.
- .10 Wherever possible, align the edges of pieces of equipment as well as other items with walls of the building.
- .11 Check the joints made in the factory and tighten if necessary to ensure continuity of installation.
- .12 Identify and comply with manufacturers' recommendations regarding storage and hardware installation.

2.2 Electric motors, equipment and controls

- .1 Check responsibilities regarding installation and coordination with regard to motors, equipment and command / control, as indicated. Unless otherwise specified, starters and starter centers are supplied and installed by the discipline "Electricity". Section of mechanics, supplies and installs

engines and equipment under its discipline.

- .2 Unless otherwise specified in the plans, the control wiring and conduit will be provided related discipline under "Electricity", with the exception of ducts, wiring and connections operating at voltages below 120 V and related systems control prescribed in sections for mechanical systems and on the drawings of mechanical systems.
- .3 Ensure that the phase sequence is adequate for the driving forces and have a direction of rotation in the clockwise direction.

2.3 Warning signs

- .1 Warning Signs: in accordance with requirements of inspection authorities and Departmental Representative.

2.4 Wiring terminations

- .1 Ensure lugs, terminals, screws used for termination of wiring are suitable for either copper or aluminum conductors.

2.5 Equipment identification

- .1 Identify electrical equipment with nameplates and labels as follows:
 - .1 Nameplates: Unless otherwise specified, use plates made of plastic lamincoid 3 mm (1/8 inch) thick, mechanically fastened using self-tapping screws with engraved inscription in white on black for the normal network, in white on red for emergency panels and equipment connected to the emergency equipment and for fire alarm, white on orange panels for computer and related equipment and white on blue for uninterruptible power supplies (UPS), signs and any other equipment serviced by UPS.

- .2 Sizes as follows:

NAMEPLATE SIZES

Size 1	10 x 50 mm	1 line	3 mm high letters
Size 2	12 x 70 mm	1 line	5 mm high letters
Size 3	12 x 70 mm	2 lines	3 mm high letters
Size 4	20 x 90 mm	1 line	8 mm high letters
Size 5	20 x 90 mm	2 lines	5 mm high letters
Size 6	25 x 100 mm	1 line	12 mm high letters
Size 7	25 x 100 mm	2 lines	6 mm high letters

- .2 Labels: embossed plastic labels with 6 mm high letters unless specified otherwise.
- .3 Wording on nameplates and labels to be approved by Departmental Representative prior to manufacture.

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- .4 Allow for minimum of twenty-five 25 letters per nameplate and label.
 - .5 The nameplates of terminal boxes and junction boxes must indicate the characteristics of the network and / or voltage, identification, and the circuit panel from which the supply and indicate what is being fed downstream (after).
 - .6 Instructions must be in French.
 - .7 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.
 - .8 The nameplates of terminal boxes and junction boxes must indicate the characteristics of the network and / or voltage, identification, and the circuit panel from which it is fed and indicate what is fed downstream (after).
 - .9 The transformer nameplates shall indicate the identification, the panel and the circuit from which the power is supplied, numbers of circuits and the panel which is supplied by the transformer.
 - .10 Nameplates on junction box and fire alarm should indicate network characteristics: fire alarm detection.
 - .11 Side panels 120/208 V and 120/240 V and 347/600 V:
 - .1 For new projects, the contractor must identify the circuit breakers used in referring to the numbers on the doors of the premises. Panels on the cards, identification of the file should appear (name of panel-year-month-day.XLS), each panel must have a Excel file. At the end of the project, the Contractor shall deliver them to the Departmental Representative identified the computer files.
 - .2 For existing panels, the contractor should note that each sheet panels affected will be updated either by computer or legible handwriting.
 - .12 Electrical Appliances
 - .1 All panels, disconnects, fuses, junction boxes and pull, starters, center starters, contactors, each circuit of the main panels and other equipment provided by this division will all wear a name plate engraved in white lamincoid on black or red background for emergency, according to the formats given in section 2.6.1.2 of this section. This identification will correspond to the date shown on the plans.
 - .13 List of formats nameplates to use:
 - .1 Main service chart: 7
 - .2 Junction box, pulling box: 5
 - .3 Automatic diverter: 7
 - .4 Meter, alarm: 5 / fusible: 2
 - .5 Switch: 5
 - .6 Magnetic starters: 5

- .7 Manual starters: 5
- .8 Main breaker: 5
- .9 Generator: 7
- .10 Pilot-light: 5
- .11 Control panel: 7
- .12 Motor control center: 7
- .13 Breakers: 5
- .14 Transformers: 5
- .15 Junction cabinets and fire alarm pulling cabinets : 2
- .16 Panel board
- .17 Switch gear 25 kV:7
- .18 UPS (uninterrupted power supply): 7
- .19 Unit 125 V DC: 7
- .20 Control panel and electrical management: 7
- .21 Motors: 5
- .14 Control Pannel
 - .1 Within each of the main panel and on the gutters, the identification phase "A", "B", "C", "N", will be affixed with letters of 50 mm (2 in.) high minimum.
- .15 Motors
 - .1 For each motor, make marking on the motor identifying the isolating device and its location and the starter or the engine controller.
- .16 Boxes
 - .1 All junction and pulling boxes used for branch circuits shall be identified as follows: number of electrical panel and circuit numbers. Registration shall be enforced by an adhesive tape-type P-Touch.
- .17 Systems
 - .1 All boxes of the different systems must carry the name of the system (eg telephone, computer).
- .18 Sockets and switches
 - .1 Each outlet and switch shall bear the following identification: no. panel and no. circuit.

- .2 The low voltage switch must bear the following identification: No. of panel relay, No. relay on another line and have no. panel and no. circuit.
 - .3 The identification will be as follows: P-Touch (electronic lettering machine type P-Touch) c / w self adhesive strip under pressure effect of 12 mm wide No. TC-201.

The adhesive tape will do the complete opposite of the plate and part of the back so that the band does not come off. Before sticking the tape, clean the plates of all impurities.
 - .4 The colors will be as followed:

Normal: Black letters with clear background

Urgency: Red letters with clear background

U.P.S.: blue letters on clear background
 - .5 In addition, the Contractor shall install an identification P Touch adhesive on the device itself, but in the back of the plate and fold behind the ear devices outlets and switches. This identification will be the same as on the plate (No. panel and No. circuit).
- .19 Emergency lighting, exit sign, battery lighting, fire alarm, etc.
- .1 All appliances must carry the following markings: No. panel and No. circuit, the text will be white on red.

2.6 Wiring identification

- .1 Identify wiring with permanent indelible identifying markings, numbered and coloured plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.
- .2 Maintain phase sequence and colour coding throughout.
- .3 Colour coding: in compliance with Code de Construction du Québec, chapter V- Electrical.
- .4 Use colour coded wires in communication cables, matched throughout system.
- .5 In each panel, in all junction boxes, each conductor (including neutral) will be identified by the (No. panel and No. circuit) or its function (alarm circuits 1, 2, 3, etc..) by using ring-marks.

2.7 Conduit and cable identification

- .1 Colour code conduits, boxes and metallic sheathed cables.
- .2 Code with plastic tape or paint at points where conduit or cable enters wall, ceiling, or floor, and at 15 m intervals.
- .3 Colours: 25 mm wide prime colour and 50 mm wide auxiliary colour.

	Prime	Auxiliary		
up to 250 V	Yellow			
up to 600 V	Yellow	Green		
up to 5 kV	Yellow	Blue		
up to 15 kV	Yellow	Red		
Telephone	Green			
Other Communication Systems	Green	Blue		
Fire Alarm	Red			
Emergency Voice	Red	Red	Blue	
Security Systems	Other	Red	Yellow	

- .4 In addition to the color code, each main distribution systems, main roads, secondary electrical distribution, telephone distribution line, will be given an identification vinyl (plastic) attached by stainless steel fasteners at every 15 m and at points of cross walls, ceilings and floors.

Entries will be according to the designations given to plans.

- .5 Plastic cards of 50 mm x 150 mm perforated around and fastened with "TY-RAP" fasteners.

2.8 Finishes

- .1 Comply with the requirements of the architect. The color of all electromechanical equipment is apparent in the choice of the architect in the range of all standard colors and non-manufacturer standards, including special colors.
- .2 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel. Paint outdoor and indoor electrical equipment switchgear and distribution enclosures light gray ASA-61 to EEMAC 2Y-1.
- .3 Clean and touch up the painted surfaces in the workshop that were scratched or damaged during shipping and installation. Use a paint that matches the original painting.
- .4 Clean and prime the hooks, brackets, fasteners and other devices visible, not galvanized to protect against rust.

PART 3 – EXECUTION

3.1 Installation

- .1 Do complete installation in accordance with Code de Construction du Québec, chapter V-Electrical.

3.2 Nameplates and labels

- .1 Ensure manufacturer's nameplates, CSA labels and identification nameplates are visible and legible after equipment is installed.

3.3 Opening and crossing of architectural and structural elements

- .1 Make the necessary arrangements for openings in the roof and exterior walls are equipped with flashing and protected against the elements. Coordinate the requirements of this section with those of the Division 07 - Thermal and Moisture.
- .2 All work described below for the installation of sleeves, openings or closing of openings in an existing building and new construction will be implemented by:
 - The electrical contractor, except openings indicated on the plans of structure and / or architecture.
- .3 The work of opening foundations includes any drilling, casing, floors and interior walls as well as all drilling required for installation of equipment, piping and their supports, inserts, bolts, etc..
- .4 As recommended by the architect, not all existing openings reused must be sealed, made watertight and / or flame retardant composition to make them equivalent to the element passed through.
- .5 Place the sleeves where pipes go through masonry or concrete, or structures listed for their fire resistance.
- .6 All sleeves, inserts, bolts, etc., Will be installed before the walls and floors are constructed and the concrete is poured.
- .7 Use as sleeves of steel pipe, Schedule 40 with anchors set in the center, Ø 12 mm above the pipes. Steel sleeves welded 16 gauge, may be used only when the required internal diameter of the sleeve will not match a standard diameter schedule 40 pipe. Apply prior to installation, a coat of paint dry zinc.
- .8 When using plastic sleeves for penetrations of walls or floors with a degree of fire resistance, remove them before installing the ducts.
- .9 Install cables, conduits and fittings to be embedded or plastered neatly against the building structure so as to minimize the thickness of fur.
- .10 Openings and materials must be of sufficient size for the installation of thermal and acoustical insulation and should allow for thermal movement. Openings and sleeves shall be completely independent ducts to be subsequently installed.

- .11 If an additional piercing is required, it may occur after it has requested and obtained written permission from the owner and / or his representative and / or consultant in structure.
- .12 The piercing of the holes by air hammer or electric vibratory action as well as the drilling by hand and any other means by mechanical shocks are prohibited. The holes should be drilled using a rotary drill with water or other device approved by the consultant structure.
- .13 For crossings of the exterior walls and watertight basins, using sleeves with flange secured to the center by continuous welding.
- .14 Dimensions: leave an annular gap of at least 12mm between the sleeve and the pipe without insulation or between the sleeve and the insulation.
- .15 Lay the sleeves so they are flush with the surfaces of concrete and masonry and concrete floors poured directly on the ground that they exceed 50 mm all other types of floors.
- .16 The Contractor shall fill all the gaps around ducts using prefabricated seals when the sleeves pass through foundation walls, exterior walls, concrete walls, the walls of watertight basins and slabs with waterproof membrane.
- .17 In the case of passing through walls or floors rated for fire resistance; see item 3.4 in the present section.
- .18 Any piercing of the enclosure of the building floors or interior walls should be sealed as directed by the architect to maintain quality of the soundproofing, insulation and / or fireproofing. The architect may apply to products other than those proposed in the previous sub-sections. The specialist contractor shall comply with the approval and the final decision of the architect.
- .19 Any piercing in steel beams must be coordinated between the contractor and the contractor specialized in structure and final details will be specified on shop drawings in structure according to specific needs.

3.4 Fireproofing

- .1 Where cables or conduits pass through floors and firewalls, provide fire stop systems in compliance with local codes. The Contractor shall require the supplier of fire stop materials, technical bulletins corresponding to firestop materials for use with the ULC listing number (SP) corresponding to the assembly which will be performed on site.

3.5 Soundproffing

- .1 Unless otherwise indicated fill all the spaces left free between the sleeves and / or conduits and walls and / or floors with wool acoustic low density and seal the periphery of each side with an acoustic sealer silicone.
- .2 Once all conductors are installed and for all empty conduits, seal on each side of openings of the conduits with low density acoustic wool to a depth of 50 mm. Install the latter so as to remove for the passage of other drivers.

3.6 Mounting heights

- .1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise.
- .2 If mounting height of equipment is not specified or indicated, verify with Departmental Representative before proceeding with installation.

3.8 Protection

- .1 During construction, protect the exposed and live material to ensure staff safety.
- .2 Enclose and mark live (energized) parts by the inscription "live circuit 120 volts" (or the appropriate voltage), in French.
- .3 Provide for the installation of temporary doors to close the rooms containing electrical distribution equipment. Keep these doors locked except when the electrician provides direct supervision.

3.9 Coordination of protective devices

- .1 The Contractor shall conduct a study of coordination. Note that the study should be sent to the Departmental Representative along with shop drawings. This study must include all the curves on logarithmic paper showing coordination between existing protections at connections between devices and protection of electrical installations covered by this estimate.
- .2 The Contractor shall obtain approval for the study of coordination by the Departmental Representative.
- .3 When the study is approved, the contractor must make the adjustment and installation of all protective devices such as triggers overcurrent relays and fuses. The Contractor shall recheck and make sure that all these adjustments are set to values required before powering various devices.

3.10 Field quality control

- .1 Make the following tests and pay all costs
 - .1 Load Balance:
 - .1 Measure phase current to panelboards with normal loads (lighting) operating at time of acceptance; adjust branch circuit connections as required to obtain best balance of current between phases and record changes.
 - .2 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.
 - .3 Provide upon completion of work, load balance report as directed in PART 1 - SUBMITTALS: phase and neutral currents on panelboards, dry-core transformers and motor control centres, operating under normal load, as well as hour and date on which each load was measured, and voltage at time of test.
 - .2 Conduct following tests in accordance with Section 01 45 00 - Quality Control.

- .1 Power generation and distribution system including phasing, voltage, grounding and load balancing.
- .2 Circuits originating from branch distribution panels.
- .3 Lighting and its control.
- .4 Motors, heaters and associated control equipment including sequenced operation of systems where applicable.
- .5 Any other system: Fire alarm system, communication network, monitoring of doors, intrusion, etc.. by specialized firms.
- .6 Insulation resistance testing:
 - .1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.
 - .2 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.
 - .3 Check resistance to ground before energizing.
- .3 Carry out tests in presence of Departmental Representative.
- .4 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.
- .5 Submit the test results to the Departmental Representative in the form of a written report.
- .6 Manufacturer's Field Services:
 - .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.
 - .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
 - .3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.
- .7 Tests
 - .1 Make tests to check that no wires or circuit does not contain a ground. Also do with the acting Departmental Representative, tests to prove that connections are made everywhere and offer no resistance, such a voltage drop exceeding 3% when all appliances are in use.

Finally, balance the lighting circuits on the tables and side tables so that the main phases of the building are perfectly balanced.

3.11 Cleaning

- .1 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.

- .2 Clean and prime exposed non-galvanized hangers, racks and fastenings to prevent rusting.
- .3 Clean all duct systems and their boxes before pulling conductors.
- .4 Clean the inside of all boxes of wiring devices and lighting fixtures and heating systems special.
- .5 Prior to commissioning, clean all equipment, panels, transformers, starters, etc..., Their control panel and accessories.
- .6 When the final cleaning, cleaning of the reflectors, diffusers, globes and other lighting products that have been exposed to dust and dirt.

3.12 Plans « With construction annotations »

- .1 During the execution of the work, to record all changes on a copy of site in red.
- .2 At the end of the work, transcribe all the changes in red color legibly on a clean copy. Identify each plan in the lower right corner in letters at least 12 mm high, as follows: "CERTIFIED AS BUILT" THIS PLAN HAS BEEN REVISED AND SHOWS SYSTEMS / ELECTRICAL EQUIPMENT AS THEY HAVE BEEN INSTALLED (Signature of Contractor) (Date).

3.13 Responsibilities during temporary trial testing

- .1 Protect the work against loss or damage until its acceptance.
- .2 During the temporary use, the warranty period will not be affected.
- .3 The owner can use the facilities and equipment for testing before they have accepted. Provide labor, materials and necessary instruments for testing.
- .4 Facility and equipment should be cleaned, refurbished and in good working condition before their acceptance and isolate equipment that could be damaged.
- .5 Prevent dust, dirt and other foreign matter from entering openings of facilities and equipment for temporary use.

3.14 Reception of work disciplinary « Electricity »

- .1 This procedure of acceptance of work does not prevent the taking possession of the building by the owner and if the occupation is conducted prior to approval of work, the systems must be put in operation and kept in service until at the time of receipt of the work.
- .2 Acceptance of the work will be required by the general contractor when the work under will be fully completed. The general contractor will make a joint written request with its subcontractor identifying the work of the subcontractor of the discipline "Electricity" are fully completed and ready for the reception. In the event that certain works are not completed, they must be clearly identified by the Contractor's request and justification to be appended.

The Departmental Representative will then determine whether the acceptance of work. Upon receipt of the request of the Contractor General, the Departmental Representative will, on schedule with the general conditions, a site visit and prepare a list of deficiencies. If it happened that there remains work to be completed or that the list of deficiencies is too great to justify the reception of the work (more than 0.5% of the value of work covered), the Contractor shall complete and / or correct its work before a list of deficiencies is issued.

- .3 Whichever occurs first, either under clause turnaround or from the date the Contractor General has asked the reception of the work and confirmed that these are completed, it will reimburse the owner of all fees and additional costs it must pay to the Departmental Representative in relation to extended services including surveillance, without limitation, all costs incurred for monitoring (in the office and on site) and travel expenses, subsistence and accommodation, for all additional visits to the scheduled visit to make a list of deficiencies and to that provided to ensure that all deficiencies have been corrected. The pace of site visits will be maintained as during the execution of works if the original schedule is exceeded.
- .4 The visit to check if all deficiencies are corrected will be done one month after issuing the list of deficiencies, in order to allow a reasonable time to correct deficiencies.

3.15 Electrical equipment support

- .1 In the general purpose areas, all electrical devices (switch, gutter, distribution panel, starter, box measuring, etc.) Must be installed on a plywood 19 mm thick, fireproof, painted gray, or media profiles. Use a fireproof paint.
- .2 In fire resistant areas, use metal supports such as galvanized steel profiles for mounting electrical appliances.
- .3 All wall-mounted plates are to be supplied and installed by general contractor.

3.16 Excavation, filling and concrete

- .1 Ensure that the excavation for electrical services is buried along the outline and depth indicated. Install protective materials around and over electrical services at the scene, and at all times during excavation and backfill.
- .2 The work must comply with Section 12 of the Quebec Construction Code, Chapter V, Electricity.
- .3 The excavation, backfilling are under the responsibility from other disciplines.

3.17 Extended future plans

- .1 In any place where a space was left free for future use, the Contractor shall see that this space is free, but must also install conduit and other equipment relating to its work so that future connections of equipment can be added without having to redo some of the facilities of electricity.

3.18 Access doors

- .1 The Contractor shall provide access panels as they are manufactured by a recognized manufacturer either located on floors, walls or ceilings. Each device is identified and its function will be described on a framed picture.

- .2 These accesses, wall and ceiling, will be made of steel with a base paint finishing and with doors and frames. The hatch can be mounted with concealed hinges and lock and key and barrel (a common key for all hatches for electricity). These traps will be 30 cm x 30 cm or more as minimum access to reach.
- .3 These access panels will be installed by the general contractor at the places indicated by the contractor of this field.
- .4 In places where suspended ceilings are provided in removable tiles, these will then be used as access hatches.
- .5 Access panels that are installed in walls and ceilings will have the same fire resistance as the wall or ceiling where they are installed.
- .6 Access panels must comply with the Building Code of Quebec, Chapter 1, Building and NBC, latest edition.

3.19 Uniformity and consistency

- .1 The Contractor shall comply perfect uniformity between the different systems for each specialty.
- .2 The Departmental Representative may at any time, prior to installation, if deemed necessary, move within 3 m any equipment such as equipment of ancillary services, fans, lights, switches, sockets, breakers circuits, transformers, lighting, etc.. at no additional cost. It is incumbent upon the contractor to coordinate with other trades and contractors representative and get the necessary approvals from Departmental Representative.
- .3 No light fixture shall be placed above the pipes, ducts or other obstructions.
- .4 All fittings used as pull boxes and junction boxes must be selected according to the requirements of the Building Code of Québec, chapter V, latest edition taking into account the number and the conductor and conduit involved.
- .5 Pull boxes and junction boxes must be located in protected areas and easily accessible.
- .6 Contractors should note that the plans provided to him as a guide and are sometimes on a smaller scale and do not always have Dimension. He must use his judgment and ensure that the accessories of these systems integrate well with the structure and architecture of the building.
- .7 For the same specialty or same trade, the equipment of the same type (eg, fluorescent fixtures, incandescent, starters, etc.) must come from a single manufacturer.

END OF SECTION

PART 1 – GENERAL

- .1 Generally, the plans and specifications are intended to describe the work required such as the establishment, installation, testing, material requirements, etc. to ensure full implementation of the work. Run all in accordance with standards, laws and regulations
- .2 The contractor is responsible for the proper execution of all work described in plans and specifications.
- .3 The general contractor is responsible to supply temporary services for electricity and telephone services for himself and the sub-contractors during the time of construction.
- .4 The contractor is responsible to ensure adequate coordination with subcontractors.
- .5 The equipment and specified materials establish minimum requirements of quality and performance.
- .6 Not limited to, the work is summarized in section 26 05 05.

1.1 Demand for power supply

- .1 The application form for demand of power supply issued by the « *Régie du Bâtiment, Québec, Installations électriques* » is, in part, completed by the Departmental Representative.
- .2 The contractor shall obtain from the Departmental Representative «a copy» of the application for supply of power to complete it and deliver the services. In addition, the contractor must «confirm» to *Valcartier Engineering* the contract obtained, the date of work commencement and the expected date of electrical service required for the site.

For all questions pertaining to the « demand of power supply» the contractor must contact the Departmental Representative.

Note that temporary electrical services including construction, if required, are excluded from this application and are the responsibility of the general contractor.

1.2 Other utilities

- .1 Request for service of other utilities (telephone, cable, municipal electric services, if applicable), are under the sole responsibility of the contractor.
- .2 Other requests for public services, « temporary » required for construction period covered by the general contractor.

1.3 Relations between architectural, structural, mechanical and electrical documents

- .1 Plans, specifications and addenda of architectural, structural, mechanical or electricity complement each other and must be consulted and studied together to be aware of how this may affect the particular work of each trade. No additional amount will be paid to the contractor for not foreseeing the cost of all the work, travel and other similar work, etc. which are necessitated by the structure of the building or equipment, pipes and conduits, accessories or other items or work required.

1.4 Organisation of the specifications

- .1 This document covers the description and installation of all equipment which are generally used for making all types of electrical work.
- .2 The scope of work relating to these works is outlined in the plans and section 26 05 05 of the specifications.

END OF SECTION

PART 1 – GENERAL**1.1 General**

- .1 This section covers electrical works to perform.
- .2 Contractor to provide necessary labour, equipments, cables, electrical conductors and ducts, documentation, devices, machinery, scaffolding supports, services, testing equipments, materials and all related components for building, delivery, installation, connection, testing, commissioning and warranty of equipments and materials for all works described in this section.
- .3 Conductors for each power supply of required caliber and disconnection for a steady state voltage drop under 3% between its corresponding transformer and all equipments powered by said transformer.
- .4 Contractor to perform works in accordance with any and all contractual requirements and must examine worksite and gather all details pertaining to existing conditions and limitations. Contractor to know of problems that may arise during works; in no case will any claims be accepted if conditions are not respected due to negligence.
- .5 Contractor to verify all plans of every discipline of current project to fully know every connections of which contractor is responsible. Should any electrical equipment become faulty after bad connections, electrical contractor will be held responsible along with contractor who provided said equipment.
- .6 Contractor to start all connected equipments in presence of contractor who provided said equipments, to prevent defects or failures.

1.2 Scope of work

- .1 Works as described hereunder are not exhaustive. Works are described more specifically in documents, plans and drawings. All components or accessories necessary for a full and complete installation must be provided and installed, even if not specifically described to on documents.
 - .1 Supply, install and connect all needed material to carry out the following work :
 - Demolishing work.
 - Temporarily remove the existing equipment to be retained and store them to carry out work on wharfs.
 - Reinstall the stored equipments when the progress of the work allows it.
 - Supply and install a new services kiosk at Wharf 97A.
 - Supply and install a new services kiosk at Wharf 97B.
 - Supply and install the electrical feeder for the services kiosk and reserved conduits.
 - Supply and install the empty conduits with pulling rope for the cathodic system.
 - Modify and relocate the services kiosk at Wharf 98 (New LED3 and replace distribution panel).
 - Supply and install a lamp post along with a obstruction light at Wharf 98.

- Supply and install lights relating to the helicopter landing pad ‘‘PAD ALPHA’’ (Wharf 98).
- Supply and connect the hoist power supply system at Wharf 98.
- Conduct an electrical short-circuit, coordination and arc fault study. This study will examine all the new breakers added in this project along with the existing breakers 5R-DP6-N-1, 5R-DP6-N-2, 5R-DP6-N-12 and 5R-D6-N-18. Proceed to the inspections required to conduct this study. If needed, recommendations on the breakers adjustment to be included in the study report. The adjustment of new breakers is to be optimized regarding the existing breakers characteristics.
- The complete installation comply with Quebec Construction Code, Chapter 5, art. 26-008 ‘‘Apparatus protected by sprinklers’’.
- The complete installation must assure a level of corrosion resistance. In order to achieve this, all mounting accessories exposed to weather must be stainless steel and conduits must be threaded black steel PVC covered when installed above ground, and PVC when installed underground.
- Perform a close coordination with trades.
- Shutdown must be as limited as possible. When a shutdown is required, it must be performed between 9h (PM) and 6h (AM) (Weekdays) and/or weekend. Also, shutdown must be coordinate 7 days in advance with the Ministry Representative.

1.3 General contractor

- .1 General contractor is responsible for providing materials and completing the following works:
 - .1 Installation of required concrete for electrical equipment bases;
 - .2 Excavation, backfilling, compaction and concreting;
 - .3 Concrete molds.

1.4 Shop drawings for submittal

- .1 List of shop drawings to submit included as appendice to section 01 33 00 – Submittals.

1.5 On site verification list

- .1 N/A

PART 2 – PRODUCTS

2.1 Electrical equipments

- .1 All main electrical equipments are described on following lists. Lists are not exhaustive.

2.2 Lighting equipments list

- .1 Contractor to coordinate lighting equipments and accessories voltages as described on plans.
- .2 List of lighting equipments in Appendice "A".

2.3 Heating equipments list

N/A

2.4 Panelboard

- .1 List of panelboards in Appendice "B".

2.5 Motors/starters

- .1 N/A

2.6 Specific electrical equipment

- .1 Particular electrical equipment in Appendice "C".

2.7 List of materials to submit to owner

- .1 Non exhaustive list of materials in Appendice "D".

PART 3 – EXECUTION

3.1 Neutral conductor

- .1 Connect neutral conductors to common neutral omnibus bar. Identify each neutral conductor appropriately.
- .2 Fit every 120ACV circuit with own neutral conductor. Do not use a common neutral conductor for multiple circuits. Branches may be fitted with a common neutral in accordance with Code de Construction du Québec.

3.2 Circuit breakers rupture capacity

- .1 Rupture capacity of circuit breakers to meet the following:
 - A) To full nominal value.

END OF SECTION

APPENDICE A

List of heating equipments

APPENDICE A

LIST OF HEATING EQUIPMENTS

LED 1 DEL 4000°K type, black painted lamp post, life 100 000hrs min., light distribution type III, 20 500 lumens, 209 watts @ 120V and photometric cell, mounted on a aluminum pole of around of 8.38m and stem of around of 2.44m. Red double obstruction light, 360° horizontal and 3°min. vertical, ≥ 32 candela, aluminum box painted aviation orange. The installation angle will be so that the prior light to light up is on the river side.

Important notice : Design Notes regarding the pole/stem/lighting set up for the Québec Region must be submitted signed and sealed by and Engineer member of the OIQ.

Indicate the presence of two separate electrical supplies.

LED 2 DEL type lamp, with yellow omnidirectional concealed light for helicopter landing pad ‘‘PAD ALPHA’’ FATO delimitation at 120V c/w base and watertight gasket as ‘‘Point Lighting’’ #PRL-97004-120-H-Y-PLB, Advances Light, Naskys or equivalent.

Important notice : All external hardware must be in stainless steel (316) and the lens must be sealed and past impact test per IEC 60079-0:2007.

Compliances :

- ETL listed to UL 1598A
- CSA C22.2N.137-M1981 and No. 250.0-8
- FAA AC 150/5390-2B Heliport Design Guide
- Transport Canada TP14371, AGA 7.17

LED 3 DEL 4000°K type, wall mount, black painted lamp post, 60 000hrs min., light distribution type III, 3000 lumens, 70 watts @ 120V and photometric.

APPENDICE B

List of panelboards

Panneau : **PP97A**

Abrév :

Voltage: **600**

Phases 3 phase

Fils 3 fils

Barre omnibus

1200 A

Accessoire :

Pièce :

Disj.: 1200 A

Capacité d'interruption

35 kA

*	Description	Autres			Moteur			Volts-Ampères			Disjoncteur		Phase	Disjoncteur		Volts-Ampères			Moteur			Autres	Description	*
		VA	VA	HP	Chauf.	Éclair	Prise	Amp	CT	CT	Amp	Prise		Éclair	Chauf.	HP	VA	VA						
1	BAT. BRISE GLACE/ICEBR. BOAT							400	1	A		2	400										BAT. BRISE GLACE/ICEBR. BOAT	1
									3	B		4												
									5	C		6												
1	PRISE/OUTLET							60	7	A		8	30										PS97A/PS97A	
									9	B		10												
									11	C		12												
									13	A		14												
									15	B		16												
									17	C		18												
2	DISJ. PRICP./MAIN BREAKER							1200	19	A		20												
									21	B		22												
									23	C		24												
									Neutre															

Grand total 0 Volts-Ampères **Total** 0 Ampères

* Description

- 1 -
- 1 - RELAIS DE DÉCLENCHEMENT DE TYPE "SHUNT" POUR ENTREBARRAGE AVEC LA PRISE DE RACCORDEMENT ASSOCIÉE /SHUNT TRIP TO BE CONNECTED WITH THE ASSOCIATED OUTLET
- 2 - AJUSTÉ À 1000A. / SET TO 1000A.

Panneau : **PP97B**

Abrév :

Voltage: **600**

Phases 3 phase

Fils 3 fils

Barre omnibus

1200 A

Accessoire :

Pièce :

Disj.: 1200 A

Capacité d'interruption

35 kA

*	Description	Autres	Moteur		Volts-Ampères			Disjoncteur		Phase	Disjoncteur		Volts-Ampères			Moteur		Autres	Description	*
		VA	VA	HP	Chauf.	Éclair	Prise	Amp	CT		CT	Amp	Prise	Éclair	Chauf.	HP	VA	VA		
1	BAT. BRISE GLACE/ICEBR. BOAT							400	1	A		2	400						BAT. BRISE GLACE/ICEBR. BOAT	1
									3	B		4								
									5	C		6								
1	PRISE/OUTLET							60	7	A		8	30						PS97B/PS97B	
									9	B		10								
									11	C		12								
									13	A		14								
									15	B		16								
									17	C		18								
2	DISJ. PRICP./MAIN BREAKER							1200	19	A		20								
									21	B		22								
									23	C		24								
									Neutre											

Grand total 0 Volts-Ampères Total 0 Ampères

* Description

1 -

1 - RELAIS DE DÉCLANCHEMENT DE TYPE "SHUNT" POUR ENTREBARRAGE AVEC LA PRISE DE RACCORDEMENT ASSOCIÉE./SHUNT TRIP TO BE CONNECTED WITH THE ASSOCIATED OUTLET

2 - AJUSTÉ À 1000A. / SET TO 1000A.

Panneau : **PS97A**

Abrév :

Voltage: **120/240**

Phases 1 phase

Fils 3 fils

Barre omnibus

125 A

Accessoire :

Pièce :

Disj.: A

Capacité d'interruption

10 kA

*	Description	Autres	Moteur		Volts-Ampères			Disjoncteur		Phase	Disjoncteur		Volts-Ampères			Moteur		Autres	Description	*
		VA	VA	HP	Chauf.	Éclair	Prise	Amp	CT		CT	Amp	Prise	Éclair	Chauf.	HP	VA	VA		
	PRISE/OUTLET							30	1	A	2	15							ÉCLAIRAGE/LIGHT	1
									3	B	4	15							/HEATING	
	PRISE/OULET							20	5	A	6	15							LIBRE/FREE	
	LIBRE/FREE							15	7	B	8	15							LIBRE/FREE	
	LIBRE/FREE							15	9	A	10	15							LIBRE/FREE	
	LIBRE/FREE							15	11	B	12	15							LIBRE/FREE	
	LIBRE/FREE							15	13	A	14	15							LIBRE/FREE	
	LIBRE/FREE							15	15	B	16	15							LIBRE/FREE	
	LIBRE/FREE							15	17	A	18	15							LIBRE/FREE	
									19	B	20									
									21	A	22									
									23	B	24									
										Neutre										

Grand total 0 Volts-Ampères **Total** 0 Ampères

* Description

1 - DISJONCTEUR AVEC PROTECTION DE FAUTE À LA TERRE (DDFT)/ GROUND FAULT BRAKER

Panneau : **PS97B**

Abrév :

Voltage: **120/240**

Phases 1 phase

Fils

3 fils

Barre omnibus

125 A

Accessoire :

Pièce :

Disj.: **A**

Capacité d'interruption

10 kA

*	Description	Autres	Moteur		Volts-Ampères			Disjoncteur		Phase	Disjoncteur		Volts-Ampères			Moteur		Autres	Description	*
		VA	VA	HP	Chauf.	Éclair	Prise	Amp	CT		CT	Amp	Prise	Éclair	Chauf.	HP	VA	VA		
	PRISE/OUTLET							30	1	A		2	15						ÉCLAIRAGE/LIGHT	1
									3		B	4	15						/HEATING	
	PRISE/OULET							20	5	A		6	15						LIBRE/FREE	
	LIBRE/FREE							15	7		B	8	15						LIBRE/FREE	
	LIBRE/FREE							15	9	A		10	15						LIBRE/FREE	
	LIBRE/FREE							15	11		B	12	15						LIBRE/FREE	
	LIBRE/FREE							15	13	A		14	15						LIBRE/FREE	
	LIBRE/FREE							15	15		B	16	15						LIBRE/FREE	
	LIBRE/FREE							15	17	A		18	15						LIBRE/FREE	
									19		B	20								
									21	A		22								
									23		B	24								
										Neutre										

Grand total 0 Volts-Ampères **Total** 0 Ampères

* Description

1 - DISJONCTEUR AVEC PROTECTION DE FAUTE À LA TERRE (DDFT)/ GROUND FAULT BRAKER

Panneau : **PS98**

Abrév :

Voltage: **120/208**

Phases 3 phase

Fils 4 fils

Barre omnibus

125 A

Accessoire :

Pièce : Quai 98

Disj.: 100 A

Capacité d'interruption

10 kA

*	Description	Autres	Moteur		Volts-Ampères			Disjoncteur		Phase	Disjoncteur		Volts-Ampères			Moteur		Autres	Description	*
		VA	VA	HP	Chauf.	Éclai	Prise	Amp	CT		CT	Amp	Prise	Éclai	Chauf.	HP	VA	VA		
	ESPACE/SPACE							1	A		2	20				3	4055		TREUIL/JIB CRANE	
	ESPACE/SPACE							3	B		4									
	ESPACE/SPACE							5	C		6									
	ESPACE/SPACE							7	A		8	40				5	6340		PASSERELLE/FOOTBRIDGE	
	ESPACE/SPACE							9	B		10									
	ESPACE/SPACE							11	C		12									
	ESPACE/SPACE							13	A		14	15							LIBRE/FREE	
	ESPACE/SPACE							15	B		16	15							ÉCLAIRAGE/LIGHT	
	BATEAU/BOAT						100	17	C		18	15							PRISE/OUTLET	
								19	A		20								ESAPCE/SPACE	
	N/A							21	B		22								N/A	
	N/A							23	C		24								N/A	
								Neutre								10395				

Grand total 10 395 Volts-Ampères

Total 28 Ampères

* Description

APPENDICE C

Particular electrical equipment

APPENDICE C

EXTERIOR PROTECTION CABINET FOR ELECTRICAL APPARATUS	
MARK :	Eurobex, Métafab, Industrie G.R.C. inc. or equivalent
MODEL :	Stainless steel protection cabinet
<u>GENERAL POINTS :</u>	
<p>The cabinet must insulated as indicated, NEMA 3R, stainless steel 12 gauge, 304, finish N°4.</p> <p>The maximum height of the services kiosk shall not exceed 2200 mm excluding the concrete base.</p> <p>All weld must be invisible and maintain a corrosion resistance rate equal or higher to stainless steel.</p> <p>Doors shall be rigid enough to avoid deformation when opened. If needed, reinforcement plates must be welded inside the doors for strength.</p> <p>Door locks and door restraint system mechanism must include :</p> <ul style="list-style-type: none">- Handle hasp with nylon wheels in the top and bottom of the door. Central mechanism with adjustable nylon rolls.- "T" shaped, foldable, concealed handle- Key lock, adapted to the handle,.- Mechanical ¼ turn fixation, when required. <p>The cabinet doors must be equipped with a key lock and 90° open position restraint mechanism allowing 180° opening.</p> <p>All attached or welded accessories to the cabinet must be supplied and installed by the manufacturer of the cabinet.</p> <p>These accessories are :</p> <ul style="list-style-type: none">- Bolts, grounded threaded rod, borings- Aluminum mounting plate non painted (4.7 mm) in the bottom- Stainless steel corner plate (4.36 mm thick)- Seal and stainless steel profiles- Stainless steel separator plates to subdivide the cabinet- Document holder inside a door (300mm X 300mm)- Insulation RX, 1in thick, with a reflecting aluminum film, R7.2 as indications.- Ventilation, as indications, with a 304, 14G stainless steel plate, welded on the wall with grille and filter box inside. <p>Note : The cabinet dimensions, shown on the drawings, are for information purposes only. The contractor is fully responsible of the design for final dimensions of the cabinet regarding the selected equipment and setup. A shop drawing is to be provided before the final approbation of the equipments. This shop drawing must be signed and sealed by an Engineer OIQ member.</p>	

APPENDICE C

Services kiosk Wharf 97A and 97B :

Side A (river side elevation)

- Compartment for water services. See drawings.
- Electrical sockets and services. Cabinet reinforcement needed for sockets installation. See drawings

Side B (wharf side elevation)

Heating and ventilation

- Supply and install a grille, at the bottom on the side (air intake) and a grille at the top on the opposite side (air outlet by fan) to allow air flow.
- Supply and install filters to be water, snow and dust tight.
- Supply and install fans "3400 RPM, 230 CFM @ Ø" H2O, 31 Watts @ 120V, along with all accessories for operation: cable, plug, etc. Also, a airtight motorized damper (N.F.) to allow opening of the damper during fan operation.
- Install and connect an electronic regulator (options and specifications as needed) to control ventilation and heating. The regulator activates the fan and the damper on cooling (25°C) or heating (10°) demand.
- 2 units heater with fan 400W @120V.

Insulated

Electrical distribution panel, transformer, repartition box, etc. See drawings.

Services inside cabinet :

- Double receptacle 120V, 15/20 A with ground fault mounted on a box FS CPV type.
- Two waterproof fluorescent lighting IP65, 1x32W T8, electronic ballast to start-up at -30°C @120V and switch/timer 0-2hrs controlled.

APPENDICE D

List of materials to submit to owner

PART 1 – GENERALITIES

1.1 This section include

- .1 The studies must be provided to the engineer before reception of the final authorization for the distribution equipment's shop drawings.
- .2 The studies should imply all of the distribution network from the supplier power income and/or emergency supply to the smallest settable breaker that is part of the electrical distribution network. The normal connection to the supplier network as well as the ones associated to the maximum fault will be used in the study.
- .3 The studies must be done by a specialized enterprise and must be approved and signed by an engineer member in rule of O.I.Q. The titles and references of the or those in charge of the study must be presented to engineer for authorization prior the beginning of the study.

1.2 DATA collection for the study

- .1 The specialized enterprise must get all the data required for the study.
- .2 The specialized enterprise must get all the data quickly to insure the production of the studies to meet the planed schedule for shop drawings approval concerning the distribution equipment and/or before the authorization to precede with manufacturing.

PART 2 – PRODUCT

2.1 Coordination study, short circuit estimate and protection relays

- .1 The short circuit study will be done using a digital computer program that meet the latest IEEE and ANSI standard.
- .2 For the short circuit study, provide the calculation methods and hypotheses, the base unit used, the single line diagrams, the impedance data including the distributor's and/or client's network, the typical calculation, the calculation tables with the quantity, results, conclusions and recommendations. Calculate the value of opening and instantaneous short circuit (when adequate) considering a solid three phase's short circuit at each switch sets, primary and secondary terminals of the sub-station, of the low voltage switch gear, of the panel boards, of the motor control centers, of the distribution panels, of the appropriate secondary panel boards and other relevant network points. Provide a short circuit to ground study for the same network points including the data relative to single pole impedance. Include in the tables the default impedance, the X/R ratio, the asymmetric factors, the motors inputs, the short circuit value in kVA, and the defaults symmetrical and asymmetrical currents.
- .3 For the protective devices coordination study, provide the time-current curves with graphical illustration showing the proposed network coordination using full length standard log-log graphic. Attach to each curve the full title and the single line diagram with the legend showing the exact network parts considered on the showed curves. Include a detailed description of each protective device by identifying the type, the function, the manufacturer, and the time-current characteristics. Provide the recommended settings concerning the sensors, the dial set up, the start-up, the instantaneous and delays values.

- .4 The curves should also show the electrical distributor's and/or client's relays and fuses characteristics, the medium voltage network relays and fuses characteristics, the breakers relays of the low voltage equipment, the transformers characteristics, the motors and generators characteristics and the characteristics of any others load protective equipment on the network. Include at least all the protective devices up to the most important secondary distribution breaker and to each motor control centers and to each distribution panel main breakers'. Include all the set values for the protective's devices in case of a ground fault. Provide the allowance from the manufacturer and the damaging curves using a drawing showing the fuses characteristics. Show the full load current of the transformer and the 150%, 400% or 600% current, the magnetizing inrush transformer current, the ANSI holding parameters of the transformer, the symmetrical and asymmetrical meaningful fault currents'. Complete the protective devices curves by showing in a single point the maximum symmetrical or asymmetrical short circuit current that the devices can get.
- .5 Select every protection devices for the primary of DELTA-Y transformers so that the characteristic and the protection curve operate within the transformers' characteristic, including the 58% of the ANSI holding value to protect the secondary line- ground fault. Provide the damage curve of the transformer if the primary protection device characteristics' is not within the transformer's characteristics. Leave a 16% distance between the protective devices primary curves' of a transformer and the secondary protection devices' to insure the coordination and an adequate protection from a possible line-line fault at the secondary. Leave a 0.4 second space between the medium voltage protection curves and the other protection devices.
- .6 Provide all the calculations concerning the faults current cover in section for all proposed power sources or combination of them. Notice that the combination may include the feeding circuits, the big motors, or generators, existing or to come as per the single line diagram.
- .7 The titles and references of the/or/those in charge of the study must be presented for authorization prior the beginning of the study. Provide the studies using the proposed equipment to check up the required functional characteristics. Propose the study's results to Departmental Representative for approval. Do the changes and additions if required.
- .8 For the study's need, use the equipment loads form the contract documents.
- .9 The study must include the motor faults values. Indicate by writing to the Departmental Representative any circuit protective devices' that do not meet its calculated fault value.
- .10 Provide the starters set values of the cooling motors or get them from the mechanical contractor, incorporate and comment them in the study.
- .11 When an emergency generator is part of the furniture, include a coordination study phases and ground of the generator protective device. Provide the reducing and damage curves of the generator and its protective devices operating characteristics. Obtain from the manufacturer the information about the impedance, time constants and current pulse, show them in the study. **Do not** use typical values for the generator.
- .12 Check-up for adequate operation of ground fault relays for four wires networks that have more than one main breaker or when generators are provided, indicate the neutral grounding locations and the fault current path in case of a neutral ground fault.

- .13 For the motors feeders circuits, show the MCC full load current, the symmetrical and asymmetrical starting current of the biggest motor, the delay required to prevent protective devices from tripping on a single or a motors' group start-up.

2.2 Studys' report

- .1 The electrical network studies' reports will be resumed in a final report. This final report will be presented in a PDF format.
- .2 The report will include the following sections:
 - .1 Descriptions, object, bases and range of the study
 - .2 Spread sheets showing breakers', fuses and other protective's devices' nominal values, in comparison with the corresponding calculated short-circuit values and related comments.
 - .3 Protection devices' time-current coordination's curves, breakers' and relays' settings tables, fuses choices and related comments.
 - .4 The faults currents calculation including terms' definition and an interpretation guide for the computers' print outs.

2.3 Arc flash fault calculation

- .1 Using the above short circuit and coordination study, an Arc flash fault analyses will be done as per IEEE 1584 standard mathematical equations and showed in NFPA70E latest edition.
- .2 When adequate, the short circuit and fault clearing time of the protection equipment will be chosen using the short circuit calculations and coordination curves.
- .3 The minimum safe reach distance, the restricted reach distance, the prohibited reach distance, the energy level calculations' for the normal and emergency sub-stations, shielded bus-bars, motor control centers, main 600V distribution panels, transformers (bigger than 45kVA) and main 208V panels.
- .4 The working distance should be calculated in regard of 1.2 calorie per square centimeter energy's.
- .5 The study must include the minimum and maximum applicable values in regard to short circuit faults available including the motors contribution.
- .6 The study must be based in regard to the protective devices with a maximum fault clearing time of two (2) seconds as per IEEE 1584.
- .7 The report will include the following information's:
 - .1 Public supplier and/or client contribution's for three phases, phase-ground faults with X/R ratio.
 - .2 The reactive short circuit calculation's from motor contribution.

- .3 The used cables, size, length, alloy, conduit length, etc.
- .4 Used bus-bar types', sizes, quantity, alloys, length of conduits, etc.
- .5 Primary and secondary transformers' voltage, size, impedance and coils configuration.
- .6 Generators' contribution.
- .7 Motors' contribution.
- .8 Available fault level in symmetrical and asymmetrical kVA.
- .9 Setting recommendations for the components short circuit protective devices.
- .10 Energy level for each cabinet, panels, sub-stations, motor control centers, including the arc fault clearance time, the fault size, the minimum operation distance, the nominal safe distance, the required personnel protection level (PPE), the voltage level, the risk level and recommendations.

PART 3 – CARRYING OUT

3.1 Electrical distributor authorization

- .1 Final report copies' will be submitted to Departmental Representative for studies and approval. The approved copies will be submitted to the Departmental Representative.

3.2 ON SITE SETTINGS

- .1 The contractor will set the protective devices' on site to leave the equipment in a final operation condition. The settings should match the result of the approved short circuit, protective devices and coordination studies.
- .2 The contractor will do on site and at his own charge the minor settings to the protective devices' and the required equipment modifications to insure conformity to the approved short circuit, protective devices and coordination studies .
- .3 90 mm x 125 mm minimum labels' will be provided for each equipment part of the studies as per IEEE 1584 standard. They will be orange for all level rating of 3 and less. For the level rating of 4, they must be red. No hand written labels will be accepted. The labels will indicate the component location, the operating voltage, the risk level, the energy at this point, the minimum working distance, the safe protection distance, the provider number including its reference.

3.3 Inspection of specialist contractor

- .1 At the end of construction the specialist contractor will verify the electrical installation and the protection settings.
- .2 The specialist contractor will transmit a conformity report signed and sealed by an engineer relative to his studies' recommendation of the installation

END OF SECTION

PART 1 – GENERAL

1.1 Related requirements

- .1 Wire and Box connectors, materials, related materials and their installations

1.2 References

- .1 Canadian Standards Association (CSA International)
 - .1 CAN/CSA-C22.2 No.18, Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware.
 - .2 CSA C22.2 No.65-Wire Connectors.
- .2 Electrical and Electronic Manufacturers' Association of Canada (EEMAC)
 - .1 EEMAC 1Y-2, 1961 Bushing Stud Connectors and Aluminum Adapters (1200 Ampere Maximum Rating).
- .3 National Electrical Manufacturers Association (NEMA)

1.3 Waste management and disposal

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
- .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic polystyrene, corrugated cardboard, packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .4 Divert unused wiring materials from landfill to metal recycling facility as approved by Departmental Representative.

PART 2 – PRODUCTS

2.1 Materials

- .1 Pressure type wire connectors to: with current carrying parts of copper sized to fit copper conductors as required.
- .2 Fixture type splicing connectors with current carrying parts of copper sized to fit copper conductors 10 AWG or less.
- .3 Bushing stud connectors: to EEMAC 1Y-2 NEMA to consist of:
 - .1 Connector body and stud clamp for copper
 - .2 Clamp for stranded copper conductors.
 - .3 Clamp for stranded aluminum ACSR conductors

- .4 Stud clamp bolts.
- .5 Bolts for copper conductor or bar.
- .6 Bolts for aluminum conductor bar.
- .7 Sized for conductors and bars as indicated.
- .4 Clamps or connectors for armoured cable, aluminum sheathed cable, mineral insulated cable, flexible conduit, non-metallic sheathed cable as required
- .5 Watertight approved for TECK Cable

PART 3 – EXECUTION

3.1 Installation

- .1 Install the connectors as per manufacturer`s recommendations for bar connection.
- .2 Remove insulation carefully from ends of conductors and:
 - .1 Apply coat of zinc joint compound on aluminum conductors prior to installation of connectors.
 - .2 Install mechanical pressure type connectors and tighten screws [with appropriate compression tool recommended by manufacturer]. Installation shall meet secureness tests in accordance with CSA C22.2 No.65.
 - .3 Install fixture type connectors and tighten. Replace insulating cap.
 - .4 Install bushing stud connectors in accordance with EEMAC 1Y-2, NEMA.
 - .5 Contractor must prove that each screw has been tightened as per manufacturer`s recommendation.

END OF SECTION

PART 1 - GENERAL**1.1 Related requirements**

- .1 This section applies to copper conductors, ACM Alloy conductors and aluminum conductors designed for nominal voltages from 0 to 1000 volts, and the ducts and most common electrical insulators.

1.2 References

- .1 Québec Construction Code, Chapter V, Electricital.
- .2 CSA C22.2 no 0.3, Testing methods for Electrical Cables and Wires.

1.3 Product DATA

- .1 Provide product data in accordance with Section 01 33 00 - Submittal Procedures et 26 05 00 – Electrical General Requirements.
- .2 Perform electrical test methods in accordance with section 26 05 00 – Electrical General Requirements.

1.4 Delivery, storage and handling

- .1 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding and packaging materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 – PRODUCTS**2.1 Building wires**

- .1 Where cables assemblies are specified to have a PVC overall covering it may be required to comply to the Vertical Tray Fire Test of CSA C22.2 No.0.3 for the applicable Building Code classification of the project as it relates to the actual installed location.
- .2 Conductors: stranded for 10 AWG and larger. Minimum size: 12 AWG.
- .3 Copper conductors: size as indicated, with 1000V insulation of cross-linked thermosetting polyethylene material rated RWU90 XLPE.
- .4 Use insulated wiring of 1000 V for motors controlled by variable frequency.
- .5 An insulated GREEN conductor of minimum size 12 AWG is required.

2.2 Teck 90 cable

- .1 Cable: in accordance with Section 26 05 00 - Common Work Results for Electrical.
 - .1 Grounding conductor: copper.

- .2 Circuit conductors: copper size as indicated.
- .3 Insulation: Cross-linked polyethylene XLPE. Rating: 1 000 V. Inner jacket: polyvinyl chloride material. Armour: aluminum sheet.
- .4 All Teck Cables will be of type 90 with exterior PVC sheathing. Comply with CAN/CSA-C22.2 no 131 and 174 for hazardous locations (HL) and Fire retardant (FT-4).
- .5 Teck Cables, when installed in cable trays, must meet the Québec Standards Building Code, Chapter V – *Electricité* section 4 and 12, as well as adjustment factors relevant to tables 5A and 5D.
- .6 Fastenings:
 - .1 One-hole steel straps to secure surface cables 50 mm and smaller. Two-hole steel straps for cables larger than 50 mm.
 - .2 Channel type supports for two or more cables at 1.5 mm centers.
 - .3 Threaded rods: 6 mm diameter to support suspended channels.
- .7 Connectors:
 - .1 Watertight, explosion-proof approved for TECK cable.

2.3 Conductors exposed to sunlight

- .1 Insulated wires and power cables directly exposed to sunlight have to be protected specifically approved for such use and be labeled accordingly.

PART 3 – EXECUTION

3.1 Field quality control

- .1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.
- .2 Perform tests using method appropriate to site conditions and to approval of Departmental Representative and local authority having jurisdiction over installation.
- .3 Perform tests before energizing electrical system.

3.2 General cable installation

- .1 Terminate cables in accordance with Section 26 05 20 - Wire and Box Connectors - (0-1000 V).
- .2 Cable Colour Coding: to Section 26 05 00 Common Work Results for Electrical.
- .3 Conductor length for parallel feeders to be identical.
- .4 Lace or clip groups of feeder cables at distribution centres, pull boxes, and termination points.

- .5 Wiring in walls: typically drop or loop vertically from above to better facilitate future renovations. Generally wiring from below and horizontal wiring in walls to be avoided unless indicated.
- .6 Provide numbered wire collars for control wiring. Numbers to correspond to control shop drawing legend. Obtain wiring diagram for control wiring.
- .7 Drop cables in trenches in accordance with section 33 71 73.02 – Underground electrical service.
- .8 Drop cables in cable trays in accordance with section 26 05 36 – Cable Trays for Electrical Systems
- .9 Branch circuit wiring for surge suppression receptacles and permanently wired computer and electronic equipment to be 2-wire circuits only, i.e. common neutrals not permitted.

3.3 Installation of building wires

- .1 Unless otherwise stated, all wiring must be under conduit.
- .2 Use the types of conduits or pipe in accordance to the requirements of the respective section.

3.4 Installation of teck 90 cable (0-1000 V)

- .1 Install cable as indicated securely supported by staples, straps or hangers.
- .2 when there are 2 cables in the same course, bind them in a «U».
- .3 When there are two cables on the same path in the building, Teck cables must be installed in cable shelves.
- .4 Cable terminations in accordance with section 26 05 20 - Wire and Box Connectors 0 - 1000V.

END OF SECTION

PART 1 – GENERAL

1.1 References

- .1 Canadian Standards Association, (CSA International)
- .2 Grounding equipment based on CSA C22.2 No. 41.
- .3 CAN/CSA Z32, Electrical Safety and Essential Electrical Systems in Health Care Facilities.

1.2 Waste management and disposal

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
- .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic polystyrene, corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .4 Divert unused metal materials from landfill to metal recycling facility as approved by Departmental Representative.
- .5 Fold up metal banding, flatten and place in designated area for recycling.

PART 2 – PRODUCTS

2.1 Equipment

- .1 Clamps for grounding of conductor: size as required to electrically conductive underground water pipe.
- .2 Copper conductor: minimum 6 m long for each concrete encased electrode, bare, stranded, tinned, soft annealed, size as indicated.
- .3 Rod electrodes: copper clad steel 19 mm diameter by 3 m long.
- .4 Plate electrodes: copper, surface area 0.2 m², 1.6 mm thick.
- .5 Grounding conductors: bare stranded copper, tinned, soft annealed size as indicated.
- .6 Insulated grounding conductors: green, type RWU-90 when ground or surroundings are humid and type RW-90 in other areas, size as indicated.
- .7 Ground bus: copper, size as indicated, complete with insulated supports, fastenings, connectors.
- .8 Non-corroding accessories necessary for grounding system, type, size, material as indicated, including but not necessarily limited to:
 - .1 Grounding and bonding bushings.

- .2 Protective type clamps.
- .3 Bolted type conductor connectors.
- .4 Thermit welded type conductor connectors.
- .5 Bonding jumpers, straps.
- .6 Pressure wire connectors.
- .7 Compression connectors

2.2 Manufacturer

- .1 Accepted Manufacturers: Thomas & Betts for mechanical joints and Cadwell or Thermoweld for welded joints by aluminothermy or Burndy

PART 3 – EXECUTION

3.1 Installation general

- .1 Install complete permanent, continuous grounding system including, electrodes (minimum 3 per site), conductors, connectors, as indicated, to satisfy the requirements of the Departmental Representative and local authorities.
- .2 Install connectors in accordance with manufacturer's instructions.
- .3 Protect exposed grounding conductors from mechanical injury.
- .4 Make buried connections, and connections to conductive water main, electrodes, using copper welding by thermit process.
- .5 Use mechanical connectors for grounding connections to equipment provided with lugs.
- .6 Soldered joints not permitted unless they complete the installation of a compression joint.
- .7 Install bonding wire for flexible conduit, connected at both ends to grounding bushing, solderless lug, clamp or cup washer and screw. Neatly cleat bonding wire to exterior of flexible conduit.
- .8 Install flexible ground straps for bus duct enclosure joints, where such bonding is not inherently provided with equipment.
- .9 Install separate ground conductor to outdoor lighting standards.
- .10 Install zig-zag grounding transformer [on line side of main interrupter].
- .11 Make grounding connections in radial configuration only, with connections terminating at street side of water pipe. Avoid loop connections.

- .12 Bond single conductor, metallic armoured cables to cabinet at supply end, and provide non-metallic entry plate at load end.
- .13 Ground secondary service pedestals.

3.2 Manholes

- .1 Install conveniently located grounding stud, electrode, stranded copper conductor in each manhole.
- .2 Install ground rod in each manhole so that top projects through bottom of manhole. Provide with lug to which grounding connection can be made.

3.3 Electrodes

- .1 Make ground connections to continuously conductive underground water pipe on street side of water meter.
- .2 Install water meter shunt.
- .3 Make the connection for continuity of mass with at minimum a 6 AWG conductor at the nearest point of entry from the connection of all metallic network of water when it is not used as a ground.
- .4 Also ensure that continuity of all gas distributing metal piping under pressure and make connection to conductors of the main ground.
- .5 Install electrode embedded in concrete footings of the foundation of the building, and connect the terminals to the grounding network.
- .6 Install the electrode plates or rods and make connections to ground as indicated. Coordinate with the general contractor of the rock drilling rods for installation.
- .7 Bond separate, multiple electrodes together.
- .8 Use copper conductors for connections to electrodes, size as indicated.
- .9 Make special provision for installing electrodes that will give acceptable resistance to ground value where rock or sand terrain prevail as per Quebec Construction Code. Make connections as indicated.
- .10 Install a junction box (access) bottomless fiber on each rod in order to simplify the location in the soil. The box must not exceed 150 mm, finished grade.

3.4 System and circuit grounding

- .1 Install system and circuit grounding connections to neutral of primary 347/600 V system, secondary 120/208 V, 120/240 V system.

3.5 Equipment grounding

- .1 Install grounding connections to typical equipment included in, but not necessarily limited to following list. Service equipment, transformers, switchgear, duct systems, frames of motors, motor control centres, starters, control panels, building steel work, generators, elevators and escalators, distribution panels, outdoor lighting.

3.6 Grounding bus

- .1 Install copper grounding bus mounted on insulated supports on wall of electrical room.
- .2 Ground items of electrical equipment in electrical room to ground bus with individual bare stranded copper connections, size as indicated.

3.7 Communication systems

- .1 Install grounding connections for telephone, sound, fire alarm, intercommunication systems as follows:
 - .1 Telephones: make telephone grounding system in accordance with telephone company's requirements or manufacturer.
 - .2 Sound System and Intercom: ground all lines and cable tray under the guidance and direction of manufacturer.
 - .3 Sound, fire alarm, intercommunication systems as indicated by manufacturer.

3.8 Field quality control

- .1 Perform tests in accordance with Section 26 05 00 - Common Work Results - Electrical.
- .2 Perform ground continuity and resistance tests using method appropriate to site conditions and to approval of Departmental Representative and local authority having jurisdiction over installation. Give a copy of the results to the Departmental Representative. Tests should be performed by a specialized firm and signed by an engineer.
- .3 Perform tests before energizing electrical system.
- .4 Disconnect ground fault indicator during tests.

END OF SECTION

PART 1 – GENERAL

1.1 Related requirements

- .1 This Section specifies U shape support channels either surface mounted, suspended or set in poured concrete walls and ceilings.

1.2 Waste management and disposal

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
- .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard and packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .4 Divert unused metal materials from landfill to metal recycling facility as approved by Departmental Representative.
- .5 Fold up metal banding, flatten and place in designated area for recycling.

PART 2 – PRODUCTS

2.1 Support channels

- .1 U shape, size 41 x 41 mm, 2.5 mm thick, surface mounted, suspended, or set in poured concrete walls and ceilings.
- .2 Installation accessories such as threaded rods, bolts, washers, nuts, spring nuts, etc., or steel plated, chrome or zinc.
- .3 Galvanized products according to CAN/CSA-G164 standards.
- .4 Fasteners used outdoors or in wet areas must be stainless steel.
- .5 Fasteners, brackets and installation accessories must conform to the requirements of section 26 10 00 – Seismic Mountings.

PART 3 – EXECUTION

3.1 Installation

- .1 Refer to Section 01 61 00 - Common Product Requirements for fastenings and supports.
- .2 Secure equipment to hollow, solid, masonry, tile and plaster surfaces with lead anchors or nylon shields.

- .3 Secure equipment to poured concrete with expandable inserts.
- .4 Secure equipment to hollow masonry walls or suspended ceilings with toggle bolts.
- .5 Secure surface mounted equipment with twist clip fasteners to inverted T bar ceilings. Ensure that T bars are adequately supported to carry weight of equipment specified before installation.
- .6 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.
- .7 Fasten exposed conduit or cables to building construction or support system using straps.
 - .1 One-hole steel straps to secure surface conduits and cables 50 mm and smaller.
 - .2 Two-hole steel straps for conduits and cables larger than 50 mm.
 - .3 Beam clamps to secure conduit to exposed steel work.
- .8 Suspended support systems.
 - .1 Support individual cable or conduit runs with 6 mm dia threaded rods and spring clips.
 - .2 Support 2 or more cables or conduits on channels supported by 6 mm dia threaded rod hangers where direct fastening to building construction is impractical.
- .9 For surface mounting of two or more conduits use channels at 1 m on centre spacing.
- .10 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.
- .11 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.
- .12 Do not use wire lashing or perforated strap to support or secure raceways or cables.
- .13 Do not use supports or equipment installed for other trades for conduit or cable support except with permission of other trade and approval of Departmental Representative.
- .14 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.
- .15 Coat with galvanized parts all surfaces that are scratched, altered or cut.

END OF SECTION

PART 1 – GENERAL**1.1 References**

- .1 Canadian Standards Association (CSA International)
 - .1 CSA C22.1-[06], Canadian Electrical Code, Part 1, current edition.
 - .2 Splitters are referenced to comply with CSA C22.2 No. 76.
 - .3 Junction and pull boxes are referenced to comply with CSA C22.2 No. 40.

1.2 Action and informational submittals

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures and 26 05 00 – Common Work Results For Electrical.
- .2 Product Data:
 - .1 Provide manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Provide shop drawings: in accordance with Section 26 05 00 - Common Work Results For Electrical.

1.3 Delivery, storage and handling

- .1 Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.4 Electrical equipment protected by sprinklers

- .1 Supply and install the equipment in accordance with section 26 05 00 - Common Work Results For Electrical.

PART 2 – PRODUCTS**2.1 Splitters**

- .1 Construction: sheet metal enclosure, welded corners and formed hinged cover suitable for locking in closed position.
- .2 Terminations: main and branch lugs, connection blocks to match required size and number of incoming and outgoing conductors as indicated.
- .3 Spare Terminals: minimum three spare terminals or lugs on each connection or lug block sized less than 400 A.

2.2 Junction and pull boxes

- .1 Construction: welded steel enclosure.
- .2 Covers Flush Mounted: 25 mm minimum extension all around.
- .3 Covers Surface Mounted: 150 x 150, must be fitted with hinges.

2.3 Cabinets

- .1 Type E Empty: Sheet steel enclosure for surface mounting with sides and folded edges overlapping fitted with hinged door, handle, lock and a latch.
- .2 Type T Terminal: surface return flange, flush overlapping sides mounting as indicated containing 19 mm thick, sheet steel backboard.
- .3 Construction: welded [sheet steel] [aluminum] [as indicated] hinged door, [handle], [latch] [lock 2 keys] and catch

2.4 Connections

- .1 Insulated metal bushings and connectors with nylon insulated groove, size no. 8 AWG or more.
- .2 Pressure pads to prevent debris to penetrate the outlets.
- .3 Access fittings for pipes up to 35 mm in diameter and pull boxes for larger conduits.
- .4 Locking nuts and insulated metal bushings on sheet metal box.

PART 3 – EXECUTION

3.1 Splitter installation

- .1 Mount plumb, true and square to building lines.
- .2 Extend splitters full length of equipment arrangement except where indicated otherwise.

3.2 Junction, pull boxes and cabinets installation

- .1 Install pull boxes in inconspicuous but accessible locations.
- .2 Mount cabinets with top not higher than 2 m above finished floor except where indicated otherwise.
- .3 Install terminal block as indicated in Type T cabinets.
- .4 Only main junction and pull boxes are indicated. Install additional pull boxes so as not to exceed 30 m of conduit run between pull boxes or 4-90 degree elbows.
- .5 supply thermal blocks in the junction boxes containing more than 4 joints.

3.3 Identification

- .1 Equipment Identification: to Section 26 05 00- Common Work Results for Electrical.
- .2 Identification Labels: size 2 indicating system name voltage and phase or as indicated.

END OF SECTION

PART 1 – GENERAL

1.1 References

- .1 Canadian Standards Association (CSA International)
 - .1 CSA C22.1, Canadian Electrical Code, Part 1, 20th Edition.
 - .2 Outlet boxes, conduit boxes and fittings are based on CSA C22.2 No. 18.

1.2 Action and informational submittals

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures and Section 26 05 00 – Common work results for electrical
- .2 Submit samples for floor box in accordance with Section 01 33 00 - Submittal Procedures and Section 26 05 00 – Common work result for electrical.

1.3 Delivery, storage and handling

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 – PRODUCTS

2.1 Outlet and conduit boxes general

- .1 Size boxes in accordance with the Quebec construction code, chapter V, Electrical.
- .2 102 mm square or larger outlet boxes as required.
- .3 Gang boxes where wiring devices are grouped.
- .4 Blank cover plates for boxes without wiring devices.
- .5 347 V outlet boxes for 347 V switching devices.
- .6 Combination boxes with barriers where outlets for more than one system are grouped.

2.2 Galvanized steel outlet boxes

- .1 One-piece electro-galvanized construction. Single and multi gang flush device boxes for flush installation, minimum size 76 x 50 x 38 mm or as indicated. 102 mm square outlet boxes when more than one conduit enters one side with extension and plaster rings as required.
- .2 Utility boxes for outlets connected to surface-mounted EMT conduit, minimum size 102 x 54 x 48 mm.

- .3 102 mm square or octagonal outlet boxes for lighting fixture outlets.
- .4 102 mm extension and plaster rings for flush mounting devices in finished plaster or tile walls.

2.3 Masonry boxes

- .1 Electro-galvanized steel masonry single and multi gang boxes for devices flush mounted in exposed block walls.

2.4 Concrete boxes

- .1 Electro-galvanized sheet steel concrete type boxes for flush mount in concrete with matching extension and plaster rings as required.

2.8 Fittings – General

- .1 Bushing and connectors with nylon insulated throats for n° 8 AWG caliber and up.
- .2 Knock-out fillers to prevent entry of debris.
- .3 Conduit outlet bodies for conduit up to 35 mm and pull boxes for larger conduits.
- .4 Double locknuts and insulated bushings on sheet metal boxes.

PART 3 – EXECUTION

3.1 Installation

- .1 Support boxes independently of connecting conduits.
- .2 Fill boxes with paper, sponges or foam or similar approved material to prevent entry of debris during construction. Remove upon completion of work.
- .3 For flush installations mount outlets flush with finished wall using plaster rings to permit wall finish to come within 6 mm of opening.
- .4 Provide correct size of openings in boxes for conduit, mineral insulated and armoured cable connections. Do not install reducing washers.
- .5 Vacuum clean interior of outlet boxes before installation of wiring devices.
- .6 Identify systems for outlet boxes as required.

END OF SECTION

PART 1 – GENERAL

1.1 Section contents

This section specifies rigid and flexible fasteners, fittings and installation.

1.2 Ducts location

.1 All ducts are not shown on the drawings. Those who are represented are on a schematic form.

1.3 Seismic fasteners

.1 Supply and install all necessary equipment for seismic mountings as indicated in Section 26 10 00 – Seismic Fasteners.

1.3 Electrical apparatus protected by spray nozzles

.1 Provide and install material in accordance with Section 26 05 00 – General Requirements.

1.4 References

- .1 Canadian Standards Association (CSA International).
- .1 CAN/CSA-C22.2 No. 18, Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware, A National Standard of Canada.
 - .2 CSA C22.2 No. 45, Rigid Metal Conduit.
 - .3 CSA C22.2 No. 56, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
 - .4 CSA C22.2 No. 83, Electrical Metallic Tubing.
 - .5 CSA C22.2 No. 211.2, Rigid PVC Unplasticized Conduit.
 - .6 CAN/CSA-C22.2 No. 227.3, Nonmetallic Mechanical Protection Tubing (NMPT), A National Standard of Canada.
- .2 Construction Code of Quebec, Chapter V, Electrical.

1.5 Action and informational submittals

- .1 Submit required samples and documents in accordance with Sections 01 33 00 – Submittal Procedures and 26 05 00 – General Requirements.
- .2 Product data: submit manufacturer's printed product literature, specifications and datasheets.

1.7 Waste management and disposal

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.
- .2 Place materials defined as hazardous or toxic waste in designated containers.
- .3 Ensure emptied containers are sealed and stored safely for disposal away from children.

PART 2 – PRODUCTS

2.1 Conduits

- .1 Rigid metallic conduits: in accordance with standard CSA C22.2 no 45, threaded galvanized steel.
- .2 Epoxy coated conduits: in accordance with standard CSA C22.2 no 45, with zinc coating and anti-corrosive finishing coat with an epoxy based resin, inside and outside.
- .3 Electrical metallic tubing (EMT): in accordance with standard CSA C22.2 no 83, equipped with “Raintight” connectors.
- .4 Rigid PVC conduits: in accordance with standard CSA C22.2 no 211.2.
- .5 Flexible metal conduit: to CSA C22.2 no 56, liquid-tight flexible metal.
- .6 FRE conduit: CSA C22.2
- .7 Flexible PVC conduit: to CAN/CSA-C22.2 no 227.3.

2.2 Conduit fastenings

- .1 One hole steel straps to secure surface conduits 50mm and smaller.
Two hole steel straps for conduits larger than 50mm.
Use stainless steel fasteners when installed outside or in damp locations.
- .2 Beam clamps to secure conduits to exposed steel work.
- .3 Channel type supports for two or more conduits at 2m on centre.
- .4 Threaded rods, 6mm diameter, to support suspended channels.
- .5 Quantities and dimensions mentioned above for various fasteners are a minimum and must meet the requirements of the section on seismic fasteners.

2.3 Conduit fittings – General

- .1 Connectors: to CAN/CSA C22.2 no 18 manufactured for use with conduit specified. Coating: same as conduit.
- .2 Ensure factory “ells” where 90 degrees bends for 25mm and larger conduits.
- .3 Watertight connectors and couplings for EMT.
 - .1 Set-screws are not acceptable.
- .4 Ferrules for fittings in boxes, when required, to Construction Code of Quebec, Chapter V - Electricity, metal type and nylon isolated.

2.4 Expansion fittings

- .1 Provide expansion fittings required for all conduits:
 - embedded in concrete and crossing expansion joints through the building;
 - apparent and undergoing significant changes in temperature;
 - exceeds the limit allowed by the manufacturers.
- .2 Weatherproof expansion fittings with internal bonding assembly suitable for 200mm linear expansion.
- .3 Watertight expansion fittings with integral bonding jumper suitable for linear expansion and 19mm deflection.
- .4 Weatherproof expansion fittings for linear expansion at entry of panel.

2.5 Fish cord

- .1 Polypropylene 6mm.

2.6 Bonding

- .1 IN all conduits, a green insulated conductor with a minimum calibre of 12 AWG must be installed.

2.7 Conduits exposed to sun light

- .1 Non-metallic pipes that are entirely exposed to sunlight have to be specifically approved for this usage and be marked in accordance.

PART 3 – EXECUTION

3.1 Manufacturer's instructions

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 Installation

- .1 Install the visible conduits so as to diminish the part's head-way and by using the least amount of space possible.
- .2 Conceal conduits except those which are installed in mechanical and electrical facility rooms.
- .3 Use electrical metallic tubes (EMT) with tight connectors in technical rooms, warehouses, service garages etc. and standard fittings for ordinary locations.
- .4 Use rigid PVC conduits in underground facilities.

- .5 Use rigid threaded galvanized steel conduit in places classified explosion proof, in tunnels and wetlands.
- .6 Use epoxy coated conduit in corrosive or saline installations.
- .7 Use over a maximum length of 3m flexible metallic conduits when connecting to motors, transformers and equipment capable of vibration located in dry areas, incandescent bulbs, built-in and without pre-threaded outlet box, mounted fluorescent light fixture connection, projecting or built-in, works or elements in movable metal partitions.
- .8 Use flexible metal conduit and liquid-tight connections when connecting to motors and / or equipment which may vibrate or transformers located in damp or wet or corrosive environments.
- .9 Use explosion proof flexible connections for connection to explosion proof motors.
- .10 Install waterproof connections on conduits installed in dangerous locations. Fill them with sealing compound.
- .11 Bend conduit cold. Replace conduit if kinked or flattened more than 1/10th of its original diameter.
- .12 Mechanically bend steel conduit over 21mm diameter.
- .13 Use conduits of at least 21 mm for lighting and power circuits.
- .14 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.
- .15 Install fish cord in empty conduits.
- .16 Remove and replace blocked conduit sections. Do not use liquids to clean out conduits.
- .17 Dry conduits out before installing wire.

3.3 Visible conduits

- .1 Unless indicated otherwise, install the conduits parallel or perpendicular to the building's layout lines.
- .2 Behind infrared or gas radiators, install conduits by leaving a space of 1.5m.
- .3 Make the conduits pass through the wings of the steel framework elements, if needed.
- .4 In locations where this is not possible, group the conduits into U-bend stirrups.
- .5 Unless otherwise specified, the conduits should not cross through framework elements.
- .6 In the case of conduits placed parallel to steam or hot water pipes, make provisions for a lateral space of at least 75mm; also make provisions for a space of at least 25mm in the case of crossings.
- .7 Install PVC expansion joints on conduit when installed in places where the temperature varies from 10 degrees and more. It must have an expansion joint for each length of 7.5m and 15m between each joint.

3.4 Concealed conduits

- .1 Install conduits parallel or perpendicular to the building's layout lines.
- .2 It is forbidden to install horizontal conduits in masonry walls.
- .3 It is forbidden to embed the conduits into terrazzo works and concrete toppings.
- .4 No horizontal conduits will be accepted in drywall. Only vertical conduits will be tolerated.

3.5 Conduits in cast-in-place concrete

- .1 Do not install conduits in concrete structures unless otherwise specified in the shop drawings and specifications.
- .2 Locate to suit reinforcing steel. Install in centre one third of slab.
- .3 Protect conduits at their exit points from a concrete work.
- .4 Install sleeves where conduits pass through slab or wall.
- .5 Before covering a concrete work with a water repellent membrane, install oversized joints in the locations where conduits have to pass through the latter. Apply a cold compound between the joints and conduits.
- .6 Conduits in slabs: minimum slab thickness 4 times conduit diameter.
- .7 Encase conduits completely in concrete with minimum 25mm concrete cover.
- .8 Organize conduits in slab to minimize cross-overs.
- .9 Aluminum conduits shall not be concealed in concrete structures.

3.6 Conduits underground

- .1 Slope conduits to provide drainage.
- .2 Waterproof the joints using a thick layer of bituminous paint.
- .3 Install conduit at 1m from the surface or as directed.
- .4 The underground conduits shall be of rigid PVC 41mm minimum.
- .5 The underground conduits must be surrounded by a 150mm layer of fine sand unless otherwise stated.

3.7 Firewall crossing conduits

- .1 Caulk all gaps between the firewall and the conduit. Fire resistance shall be equal to surface crossing. The product manufacturer shall make an inspection of the work and issue a certificate stating that the facilities are inspected and comply with its recommendations and meet the requirements of ULC fire resistance characteristics.

END OF SECTION

PART 1 – GENERAL

1.1 Description

- .1 This Section specifies the installation of direct buried cables and cables in ducts including protection, markers and testing.

1.2 References

- .1 Canadian Standards Association, (CSA International)
- .2 Insulated Cable Engineers Association, Inc. (ICEA)

1.3 Waste management and disposal

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
- .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper plastic polystyrene corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .4 Unused sealant material must not be disposed of into sewer system, into streams, lakes, onto ground or in other location where it will pose health or environmental hazard.
- .5 Divert unused metal and wiring materials from landfill to metal recycling facility as approved by a Departmental Representative.
- .6 Do not dispose of preservative treated wood through incineration.
- .7 Do not dispose of preservative treated wood with other materials destined for recycling or reuse.
- .8 Dispose of treated wood, end pieces, wood scraps and sawdust at sanitary landfill approved by a Departmental Representative.
- .9 Fold up metal banding, flatten and place in designated area for recycling.

PART 2 – PRODUCTS

2.1 Cable protection

- .1 38 x 140 mm planks pressure treated with clear copper naphthenate or 5% pentachlorophenol solution, water repellent preservative.
- .2 Two different plastic tape marked « Danger Électricité » and « Warning Electric line below » installed side by side.

2.2 Markers

- .1 Concrete type cable markers: 600 x 600 x 100 mm with words: cable, joint or conduit impressed in top surface, with arrows to indicate change in direction of cable and duct runs.
- .2 Cedar post type markers: 89 x 89] mm, 1.5 m long, pressure treated with clear copper napthenate or 5% pentachlorophenol solution, water repellent preservative, with nameplate fastened near post top, on side facing cable or conduit to indicate depth and direction of duct and cable runs.
 - .1 Nameplate: aluminum anodized 89 x 125 mm, 1.5 mm thick mounted on cedar post with mylar label 0.125 mm thick with words Cable, Joint or Conduit with arrows to indicate change in direction.

PART 3 – EXECUTION

3.1 Direct burial of cables

- .1 After sand bed specified in Section 31 23 33.01 - Excavating, Trenching and Backfilling, is in place, lay cables maintaining 75 mm clearance from each side of trench to nearest cable. Do not pull cable into trench.
- .2 Provide offsets for thermal action and minor earth movements. Offset cables 150 mm for each 60 m run, maintaining minimum cable separation and bending radius requirements.
- .3 Underground cable splices not acceptable.
- .4 Minimum permitted radius at cable bends for rubber, plastic or lead covered cables, 8 times diameter of cable; for metallic armoured cables, 12 times diameter of cables or in accordance with manufacturer's instructions.
- .5 Cable separation:
 - .1 Maintain 75 mm minimum separation between cables of different circuits.
 - .2 Maintain 300 mm horizontal separation between low and high voltage cables.
 - .3 When low voltage cables cross high voltage cables maintain 300 mm vertical separation with low voltage cables in upper position.
 - .4 At crossover, maintain 75 mm minimum vertical separation between low voltage cables and 150 mm between high voltage cables.
 - .5 Maintain 300 mm minimum lateral and vertical separation for fire alarm and control cables when crossing other cables, with fire alarm and control cables in upper position.
 - .6 Install treated planks on lower cables 0.6 m in each direction at crossings.
 - .7 After sand protective cover specified in Section 31 23 33.01 - Excavating, Trenching and Backfilling, is in place, install caution tape as indicated to cover length of run.

3.2 Cable installation in ducts

- .1 Install cables as indicated in ducts.
- .2 Do not pull spliced cables inside ducts.
- .3 Install multiple cables in duct simultaneously.
- .4 Use ACNOR approved lubricants of type compatible with cable jacket to reduce pulling tension.
- .5 To facilitate matching of colour coded multiconductor control cables reel off in same direction during installation.
- .6 Before pulling cable into ducts and until cables are properly terminated, seal ends of lead covered cables with wiping solder; seal ends of non-leaded cables with moisture seal tape.
- .7 After installation of cables, seal duct ends with duct sealing compound.

3.3 Cable installation in cabletrough

- .1 Install cables separately in cabletrough or as indicated.
- .2 Splices are not acceptable in cabletrough unless indicated otherwise. If spliced, joints and fittings must isolated and accessible in cabletrough.
- .3 Cables must be installed in cabletrough as much as possible.
- .4 Use proper pulley to fish cables.
- .5 Radii of cables must not be less than three times the diameter of cables or as directed by manufacturer. Radii of pulleys and cables must me these requirements.
- .6 When fishing cables, use socks simultaneously around both ducts and eyelets fixed to conductors.
- .7 Identify cables after installment as indicated in Section 26 05 00 – Common Work Results - Electrical.
- .8 Fasten the cables with nylon ties every 6 meters in the horizontal cable trays.
- .9 Fasten cables with the appropriate metal fasteners for cables / cable trays, every 1.5 meters in the vertical cable trays.
- .10 Install metal separators between different voltage cables.
- .11 Protect cables with appropriate cover over cable trays in areas subject to mechanical damage and as indicated.

3.4 Markers

- .1 Mark cable every 150 m along cable duct runs and changes in direction.

- .2 Where markers are removed to permit installation of additional cables, reinstall existing markers.
- .3 Install concrete cable markers within 180 m from each side of runway centreline; 45 m from each side of taxi way centreline; 50 m from edge of taxi ramps or aprons.
- .4 Install cedar post type markers.
- .5 Lay concrete markers flat and centred over cable with top flush with finish grade.

3.5 Field quality control

- .1 Perform tests in accordance with Section 26 05 00 - Common Work Results - Electrical.
- .2 Perform tests using qualified personnel. Provide necessary instruments and equipment.
- .3 For three-phase circuits, verify and establish a phase sequence A-B-C from left to right, from top to bottom and front to back and keep it for the entire system with the exception of the equipment installed in reverse and electrically connected.
- .4 Check phase rotation and identify each phase conductor of each feeder.
- .5 Check each feeder for continuity, short circuits and grounds. Ensure resistance to ground of circuits is not less than 50 megohms.
- .6 Pre-acceptance tests.
 - .1 After installing cable but before splicing and terminating, perform insulation resistance test with 1000 V megger on each phase conductor.
 - .2 Check insulation resistance after each splice and/or termination to ensure that cable system is ready for acceptance testing.
- .7 Acceptance Tests
 - .1 Ensure that terminations and accessory equipment are disconnected.
 - .2 Ground shields, ground wires, metallic armour and conductors not under test.
 - .3 High Potential (Hipot) Testing.
 - .1 Conduct hipot testing at original factory test voltage in accordance with manufacturer's recommendations.
 - .4 Leakage Current Testing.
 - .1 Raise voltage in steps from zero to maximum values as specified by manufacturer for type of cable being tested.
 - .2 Hold maximum voltage for specified time period by manufacturer.
 - .3 Record leakage current at each step.

- .8 Provide Departmental Representative with list of test results showing location at which each test was made, circuit tested and result of each test.
- .9 Remove and replace entire length of cable if cable fails to meet any of test criteria.

END OF SECTION

PART 1 – GENERALITIES

1.1 This section include

- .1 All motors are provided and installed by other sections. The electrical connection of the motors is part of this section.
- .2 For the safety switches provided and installed by other sections, the electrical connection is part of this section.

1.2 Electrical equipment protected by sprinkler

- .1 Provide and install equipment in respect to the section 26 05 00 – General requirements.

PART 2 – PRODUCTS

- .1 Connection and isolation's accessories.

PART 3 – ACCOMPLISHMENT

3.1 Work involved

- .1 Connect the equipment following the instructions. Use a flexible metallic conduit between the rigid conduit and the motor to hook it up as per section 26 05 34 – Conduits, attach and connections of conduits.
- .2 The flexible metallic conduit shall be long enough to permit the placement of the motor from one end to the other of the adjustment slots.
- .3 The motor rotation check up must be done before it gets connected to its mechanical load
- .4 Before powering up the motor:
 - .1 Make sure that the overload relay are well set to insure the required protection and that they interlock the operating circuitry;
 - .2 Make sure that the remote command circuitry is check up. Note any changes of control wiring to the schematic diagram.
- .5 Coordinate the installation and the location of disconnects given the spare space. Disconnects must be at 1 200 mm minimum from the motors. Coordinate the given wire's insulating temperature rating with the given motors insulating class.

3.2 Quality control

- .1 Test the equipment as per section 26 05 00 – General requirements.

END OF SECTION

PART 1 – GENERAL

1.1 References

- .1 Seismic protection measures must meet the requirements of the Code de construction du Québec.
- .2 The design must comply with the following documents:
 - SMACNA, Seismic Restraint Manual Guidelines for Mechanical Systems.
 - Code de construction du Québec, chapitre 1.
 - NBC 2010

1.2 Scope of work

- .1 Design, supply and install a complete seismic system, vibration insulated or not as needed for electrical material and related system.
- .2 Design must be accomplished by an Engineer, member of “Ordre des ingénieurs du Québec” specialized in seismic system. The documents must be signed and sealed by the Engineer.
- .3 Seismic system shall be completely integrated and compatible with the noise reduction requirements, antivibration system of electrical material and related systems as showned on drawings and others.
- .4 Siesmic system shall bu fully compatible with electrical and structural design considerations.
- .5 During and after an earthquake, the material doesn’t have to keep operating in normal conditions. The requirements are the the electrical material doesn’t result in serious injuries to people.
- .6 Supply and install the following equipements :
 - Antivibration devices with seismic shock absorbers
 - Seismic shock absorbers
 - Mounting hardware for loose cables
 - Any other devices or material needed for an complete result.

1.3 Shop drawings

- .1 Present shop drawings in accordance with Section 26 05 00 - General Requirements.
- .2 Provide shop drawings and data sheets for each of the separate systems and fixing devices for seismic equipment.
- .3 Shop drawings shall be sealed by an engineer specializing in earthquake fasteners and current member of the Order of Engineers of Quebec.

PART 2 – PRODUCTS

2.1 General

- .1 The size and shape of the bases and the performance characteristics of anti-vibration devices must comply with manufacturer's recommendations and instructions.
- .2 Performs fabrication and installation of protective devices against earthquakes as recommended by the Code de construction du Québec, current edition.
- .3 Fasteners installed seismic networks of pipes, bars and sheathed cable shelves must be compatible with the requirements guide anchor these networks.
- .4 The seismic devices placed on networks of conduits, bus ducts, cable shelves and other related fasteners attached to the equipment must be compatible with the vibration and seismic devices for the component.
- .5 The seismic protection devices must not interfere with some firewall devices or compromising their integrity.

Manufacturer: Korfund Dynamics, Vibro-Acoustics, Kinectics Noise Conrol, Tecoustics, Vibra-Sonic controls or equivalent.

PART 3 – EXECUTION

3.1 Installation

- .1 According to articles and details of the Annex to this section on " Devis d'exécution fixations parasismiques. Électricité »

3.2 Inspection

- .1 At the end of the work, the engineer will inspect seismic systems. It will issue a report or a signed letter certifying compliance of facilities with regard to seismic standards specified and to the various manufacturers' recommendations.

END OF SECTION

PART 1 – GENERAL

1.1 Section contents

This section specifies the materials and components for dry type transformers up to 600 V primary, equipment identification and transformer installation.

It does not include isolation transformers, boosters and transformers equipped with a special envelope.

1.2 References

- .1 Canadian Standard Association (CSA International).
 - .1 CAN/CSA-C22.2 No.47, Air-Cooled Transformers (Dry Type).
 - .2 CSA C9, Dry-Type Transformers.
 - .3 When available, transformers will be required to comply with energy efficiency standard CSA C802.2 current edition, and bear the certification label CSA verified on the transformer.
- .2 National Electrical Manufacturers Association (NEMA).

1.3 Shop drawings and product DATA

- .1 Submit shop drawings and product data in accordance with Sections 01 33 00 – Submittal Procedures and 26 05 00 – General Requirements.

1.4 Waste management and disposal

- .1 Separate waste materials in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.
- .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic, polystyrene and corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .4 Divert unused wiring materials from landfill to metal recycling facility as approved by Departmental Representative.
- .5 Fold up banding, flatten and place in designated area for recycling.

1.5 Seismic fasteners

- .1 Supply and install all necessary equipment for seismic mountings as described in Section 26 10 00 – Seismic Fasteners.

1.6 Electrical apparatus protected by spray nozzles

- .1 Provide and install necessary materials in accordance with Section 26 05 00 – General Requirements.

PART 2 – PRODUCTS

2.1 Transformers

- .1 Use transformers of one manufacturer throughout project.
- .2 Description:
 - .1 Type: ANN.
 - .2 Single phase, power as indicated, input voltage of 600 V and output voltage of 120/240 V, 60 Hz frequency
 - .3 Insulation at temperature elevation of 115°C. and 30-40°C speaker, ventilated steel, isomode vibration damper up to 1 200 V, 25 kV for more than 1 200 V.

Insulation system 220 class as per UL-1446 (epoxy impregnation).
 - .4 Voltage impulse: 10 kV.
 - .5 Standard electric strength.
 - .6 Average sound level:
 - .1 Single phase:

50 dB(A) maximum for 10 kVA to 50 kVA ;

55 dB(A) maximum for 51 kVA to 100 kVA ;

60 dB(A) for 101 kVA to 167 kVA.
 - .7 Impedance at 150°C of heating of the coil in a room temperature between 30-40 ° C
 - .1 Three-phase transformers of 150 kVA and less: 4,0 % min. to 6,5 % max.
 - .2 The impedance described above is based on Delta transformers.
 - .8 35% efficiency of 75°C load:
 - .1 For transformers up to 50 kVA : 97 % minimum.
 - .2 For transformers from 75 kVA to 300 kVA : 98 % minimum.
 - .9 Enclosure: NEMA 3R.
 - .10 Mounting: wall.
 - .11 Light gray finish ASA n° 61, as indicated in Section 26 05 00 – General Requirements.
 - .12 Center tap 2FCAN and 2FCBN, 4 x 2,5 %.
 - .13 Winding: copper.
 - .14 Testing: in accordance with Chapter 7, ACNOR C9 standard, current edition, dry type transformers.

- .15 10 year prorated warranty.
- .16 The coils and core of all transformers must be mounted on vibration dampers.

2.2 Equipment identification

- .1 Provide equipment identification in accordance with Section 26 05 00 – General Requirements.
- .2 Label: format 7 with identification as indicated.

2.3 Manufacturers

- .1 Accepted products: Delta, Square-D, Hammond, Marcus, Siemens or equivalent.

PART 3 – EXECUTION

3.1 Installation

- .1 Mount dry type transformers on wall as indicated.
- .2 Ensure adequate clearance around transformer for ventilation in accordance with Construction Code of Québec, Chapter V – Electricity (current edition).
- .3 Install transformers in level upright position.
- .4 Remove shipping supports only after transformer is installed and just before putting into service.
- .5 Loosen isolation pad bolts until no compression is visible.
- .6 Install transformers on anti-vibration pads.

3.2 Terminations

- .1 Make connections using flexible metal conduit in primary and secondary as indicated on wiring diagram.
- .2 If possible, switch transformers on immediately after installation.

END OF SECTION

PART 1 – GENERAL

1.1 Section contents

This section specifies standard and custom panelboards and their installation.

1.2 References

- .1 Canadian Standard Association (CSA International).
 - .1 CSA C22.2 No 29, Panelboards and Enclosed Panelboards.

1.3 Shop drawings and product DATA

- .1 Submit shop drawings and product data in accordance with Sections 26 05 00 – General Requirements and 01 33 00 – Submittal Procedures.
- .2 Drawings to include electrical detail of panel, branch breaker type, quantity, ampacity and enclosure dimensions.

1.4 Panelboards description

- .1 To see panelboards description, refer to Section 26 05 05 – Scope of work, Specific Clauses, Descriptions and Lists.

1.5 Seismic fasteners

- .1 Provide and install all necessary seismic fasteners in accordance with Section 26 10 00.

1.6 Electric gear protected by sprinklers

- .1 Provide and install materials in accordance with Section 26 05 00 – General Requirements.

1.7 Waste management and disposal

- .1 Separate and recycle waste materials in accordance with Section 01 74 00 – Construction/Demolition Waste Management and Disposal.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic, polystyrene, and corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .4 Divert unused metal and wiring materials from landfill to metal recycling facility approved by Departmental Representative.

PART 2 – PRODUCTS

2.1 Panelboards

- .1 Panelboards of one manufacturer.
 - .1 Install circuit breakers in panelboards before shipment.

- .2 In addition to CSA requirements, manufacturer's nameplate must show fault current that panel including breakers has been built to withstand.
- .2 250V and 600V Panelboards: A symmetrical interrupting capacity 25 000 A @ 600V and 22 000 A or as indicated.
- .3 Sequence phase bussing with odd numbered breakers on left and even on right, with each breaker identified by permanent number identification as to circuit number and phase.
- .4 Panelboards: mains, number of circuits, and number and size of branch circuit breakers as indicated.
- .5 Two keys for each panelboards and key panelboards alike.
- .6 Copper bus with neutral of same ampere rating as mains.
- .7 All tables must have bar grounding.
- .8 Mains: suitable for bolt-on breakers.
- .9 Trim with concealed front bolts and hinges.
- .10 The front panel must be fitted with hinged left and right retaining bolts (door in door) to facilitate access for maintenance personnel.
- .11 Trim and door finish: baked grey enamel.
- .12 For all unused spaces, install devices for adding breakers later.

2.2 Serial protection

- .1 No integral protection (series) will be accepted if the sum of the rated currents of motors connected directly between the devices connected in series is greater than 1% of rated breaking capacity of the downstream circuit breaker.

2.3 Breakers

- .1 Breakers: to Section 26 28 21 – Moulded Case Circuit Breakers.
- .2 Breakers with thermal and magnetic stripping in panelboards except as indicated otherwise.
- .3 Main breaker: separately mounted on top or bottom of panel to suit cable entry. When mounted vertically, down position should open breaker.
- .4 Lock-on devices for receptacles, fire alarm clock outlet, emergency, door supervisory, intercom, stairway, exit and night light circuits.

2.4 Equipment identification

- .1 Provide equipment identification in accordance with Section 26 05 00 – Common Work Results – Electrical.
- .2 Nameplate for each panelboard size 4 engraved as indicated.
- .3 Nameplate for each circuit in distribution panelboards size 2 as indicated.

- .4 Complete circuit directory with typewritten legend showing location and load of each circuit.

2.5 Manufacturers

- .1 Accepted products: Cutler-Hammer, Siemens, Square D, GE or equivalent.

PART 3 – EXECUTION

3.1 Installation

- .1 Locate panelboards as indicated and mount securely, plumb, true and square, to adjoining surfaces.
- .2 Install surface mounted on panelboards on plywood backboards. Where practical, group panelboards on common backboards.
- .3 Mount panelboards to height specified in Section 26 05 00 – Common Work Results – Electrical or as indicated.
- .4 Connect all circuits to load elements.
- .5 Connect neutral conductors to common neutral bus with respective neutral identified.
- .6 When there are distribution panels installed side by side, boxes must be welded together and be of same size, lids must be separated, doors of the same size and must be perfectly aligned.
- .7 Provide each circuit taken at 120 VAC and services of its own neutral conductor and do not use common neutral multi-circuit. The derivations of lighting can be provided with a common neutral with the Code of Construction of Québec, chapter V, electricity.
- .8 Each time the panel will be installed flush, install three Ø 27 mm empty ducts into the ceiling space and three Ø 27 mm ducts into the ceiling space of the lower floor (if applicable). If no ceiling was provided, finish the ducts as high as possible between the floor structure or provide an access door 300 x 600 mm to 300 mm above the panel.
- .9 The connection of branch lines to the panel should be made on the sides of the distribution panels. Only the supply conduits can be connected to the top or bottom.

END OF SECTION

PART 1 – GENERAL**1.1 Section content**

- .1 Switches, outlets, cover plates and other wiring devices and their installation.

1.2 References

- .1 Canadian Standards Association (CSA International).
 - .1 CSA-C22.2 No. 42, General Use Receptacles, Attachment Plugs and Similar Devices.
 - .2 CSA-C22.2 No. 42.1, Cover Plates for Flush-Mounted Wiring Devices (Bi-national standard, with UL 514D).
 - .3 CSA-C22.2 No. 55, Special Use Switches.
 - .4 CSA-C22.2 No. 111, General-Use Snap Switches (National standard, with UL 20, current edition).

1.3 Shop drawings and product DATA

- .1 Submit shop drawings and product data in accordance with Sections 01 33 00 – Submittal Procedures and 26 05 00 – General Requirements.
- .2 Submit a set of drawings for each model of electrical outlets and switches specified.
- .3 The drawings shall clearly identify the following:
 - Manufacturer
 - Model
 - Description
 - Amperage and voltage
 - Nema Configuration
 - Catalog Number
 - Color
 - Performance:
 - . Electrical
 - . Mechanical
 - . Environmental
 - Material:
 - . Front
 - . Rear body

. Contact

- Dimensions

1.4 Waste management and disposal

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.
- .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic, polystyrene, and corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .4 Divert unused metal and wiring materials from landfill to metal recycling facility proposed by Consultant and approved by engineer.

PART 2 – PRODUCTS

2.1 Switches

- .1 Switches: single pole, double pole, three-way or four-way switches, 15 or 20 amp, 120-277 V ac or 347 V ac as indicated.
- .2 Manually-operated general purpose ac switches with following features:
 - .1 Terminal holes approved for No. 10 AWG wire.
 - .2 Silver alloy contacts.
 - .3 Urea or melamine moulding for parts subject to carbon tracking.
 - .4 Suitable for back and side wiring.
 - .5 Toggles: in white or as indicated by the Architect.
- .3 Toggles operated fully rated for tungsten filament and fluorescent lamps, and up to 120% of rated capacity for motor loads.
- .4 For all of the installation, use only switches manufactured by a single manufacturer.

.5 Accepted products:

		Hubbell	Leviton	Seymour
.1	120V 15A 1 pole	HBL1201W	1201-2W	PS15AC1W
.2	120V 20A 1 pole	HBL1221W	1221-2W	PS20AC1W
.3	347V 15A 1 pole	HBL18201WCN	18201-W	PS371510W
.4	347V 15A 1 pole	HBL18203WCN	18221-W	PS372010W

or equivalent

2.2 Outlets

.1 Outlets to 125 VAC, depending on the following accepted manufacturers:

		Hubbell	Leviton	Pass & Seymour
.1	Single 15 A			
	Conf. 5-15R	HBL5251	5251-W	5261
.2	Double 15 A			
	Conf. 5-15R	HBL5262W	5262-W	5262AW
.3	Double 15 A			
	Conf. 5-15R	HBL5262R	5262-R	5262ARED
	Emergency			
.4	Double 15 A			
	Conf. 5-15R	IG5262	5262-IG	IG5262
	Computer Room			
.5	Double 20 A			
	Conf. 5-20R	HBL5362W	5362-W	5362AW
.6	Single 30 A			
	Conf. 5-30R	HBL9308	5371	3802
.7	Single 15 A			
	Lockable	HBL4710	4710	4710
	Conf. L5-15R			

		<u>Hubbell</u>	<u>Leviton</u>	<u>Pass & Seymour</u>
.8	Double 15 A Lockable Conf. L5-15R	HBL4700	4700	4700
.9	Single 20 A Lockable Conf. L5-20R	HBL2310	2310	L520-R
.10	Double 15 A DDFT Conf. 5-15R	GF5262WA	7599-W	N/A
.11	Double 20 A DDFT Conf. 5-20R	GF5362WA	7899-W	N/A
.12	Double 15 A Hospital Grade Conf. 5-15R	HBL8200W	8200-W	8200W
.13	Double 20 A Hospital Grade Conf. 5-20R	HBL8300W	8300-W	8300W
.14	Double 15 A DDFT (Hospital Grade) Conf. 5-15R	GF8200WA	7599-HGW	1595-HGW
.15	Double 20 A DDFT (Hospital Grade) Conf. 5-20R	GF8300WA	7899-HGW	2095-HGW

or equivalent

		<u>Hubbell</u>	<u>Leviton</u>	<u>Pass & Seymour</u>
.2	120/240 V ac outlets:			
.1	Single 30 A Conf. 14-30R	HBL9430A	278	3864
.2	Single 50 A Conf. 14-50R or equivalent	HBL9450A	279	3894
.3	Outlets: white, or as indicated by the Architect (except emergency network UPS, computer).			
.4	Special network outlets:			
	- Red : Emergency network			
	- Blue: UPS network			
	- Orange (with isolated grounding) : Computer			

2.3 Special wiring devices

- .1 Special wiring devices
 - .1 Clock hanger outlets, 15 A, 125 V, 3 wire, grounding type, suitable for No. 10 AWG for installation in flush outlet box.
 - .2 Lamps: as indicated, equipped with an LED lamp or neon of 0,04 W, 125 V red plastic, built-in.
 - .3 Motion Detectors: as indicated, infrared and/or ultrasound for wall or ceiling complete with all necessary accessories for a complete assembly.
 - .4 Tape clear plastic identification, typed in black, as indicated.

2.4 Cover plates

- .1 Cover all devices and wiring boxes for telephone, cable and computer conduit systems with cover plates.
- .2 For the entire system, use only cover plates made by a single manufacturer: Hubbell, Leviton, Pass & Seymour or equivalent.
- .3 Plate lids galvanized steel junction boxes for surface-mounted.
- .4 Plate covers nonmagnetic stainless steel (# 302) brushed vertically 1 mm thick for wiring devices hospital grade type mounted in outlet boxes or recessed surface.

- .5 Stainless steel cover plate (# 430) brushed vertically 1 mm thick for wiring devices mounted in outlet boxes or recessed surface.
- .6 Cover plate moulded aluminum, weatherproof, double-leaf spring with gaskets for electrical outlets doubles, as indicated.
- .7 Cast aluminum cover plate, spring, weather-resistant, with gaskets for electrical outlets and switches simple, as indicated.
- .8 Nylon or plastic plates, as indicated, the same color as the device wiring for homes.

PART 3 – EXECUTION

3.1 Installation

- .1 Switches and dimmers:
 - .1 Install single throw switches with handle in “UP” position when switch closed.
 - .2 Install switches in gang type outlet box when more than one switch is required in one location.
 - .3 Mount toggle switches and dimmers at height in accordance with Section 26 05 00 – Common Work Results – Electrical.
- .2 Outlets:
 - .1 Install outlets in gang type outlet box when more than one outlet is required in one location.
 - .2 Mount outlets at height, in accordance with Section 26 05 00 – Common Work Results – Electrical.
 - .3 Where split outlets has one portion switched, mount vertically and switch upper portion.
- .3 Cover plates:
 - .1 Protect stainless steel cover plates finish with paper or plastic film until painting and other work is finished.
 - .2 Install suitable common cover plates where wiring devices are grouped.
 - .3 Do not use cover plates meant for flush outlet boxes on surface-mounted boxes.
 - .4 Identify the panel number and circuit number corresponding to all devices and wiring junction boxes, using an adhesive tape white plastic type P-Touch. The adhesive tape shall exceed the width of the plate, 10 mm on each side, to return and paste in the back.

Lettering color:

Normal type network: black

Emergency type network: red

Other networks: to coordinate.

- .4 FS and FD box types:
 - .1 Coordinate with the general contractor install recessed cans so that the surface of the box is flush with the wall surface. Provide a seal around the box before installing the cover plate.
- .5 General:
 - .1 Outputs and dimmers location in accordance with Section 26 05 00 – General requirements, or as indicated.

FIN DE LA SECTION

PART 1 – GENERAL

1.1 Sections contents

- .1 Moulded case circuit breakers materials, circuit breakers and protection against ground fault, circuit breakers, fuse and protective accessories against the high fault currents.

1.2 References

- .1 Canadian Standards Association (CSA International)
 - .1 CSA-C22.2 No. 5-02, Moulded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures (Tri-national standard with UL 489, current edition).

1.3 Shop drawings and product DATA

- .1 Submit shop drawings and product data in accordance with Sections 26 05 00 – General Requirements, and 01 33 00 – Submittal Procedures.
- .2 Include the characteristic curves established according to the constant time-current for circuit breakers with a capacity of 100 A or more, or with a breaking capacity of 22 000 A symmetrical and over, to the line voltage.
- .3 Provide all available data regarding the values of the capacity of power failure and short circuit I^2t maximum allowable values for all circuit breakers.
- .4 Provide the certificate of authenticity and fabrication of the circuit breaker.

1.4 Authentication

- .1 Before proceeding with any installation of circuit breakers in a new or existing installation, the electrical contractor must submit three (3) copies of a certificate of authenticity from the manufacturer, in French, signed by the factory and the local representative of that manufacturer certifying that all circuit breakers are new and that they meet the standards and regulations. These certificates must be submitted to the Departmental Representative for acceptance.
- .2 A delay in the production of the certificate of authentication will not justify an extension of the contract and no additional compensation.
- .3 Any work of manufacturing, assembly or installation should begin only after acceptance of the certificate of authentication by the Departmental Representative. Failure to comply with this requirement, the Departmental Representative and / or the client user has the right to mandate the manufacturer listed on the circuit breakers to authenticate all new circuit breakers under the contract, and that, at the expense of contractor electrician.
- .4 In general, the certificate of authentication must contain:
 - .1 The name and address of the manufacturer and the person responsible for the authentication. The responsible person must sign and date the certificate;
 - .2 The name and address of the licensed dealer and distributor of the person responsible for the count of the contractor.

- .3 The name and address of the contractor and the person in charge of the project.
- .4 The name and address of the building where the circuit breakers will be installed:
 - .1 Project title (title of the specifications or plans);
 - .2 Client's reference number;
 - .3 List of circuit breakers in tabular form when required.

1.5 Waste management and disposal

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.
- .2 Collect and separate for disposal paper, plastic, polystyrene, and corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .3 Separate for reuse and recycling and place in designated containers steel, metal, and plastic waste in accordance with Waste Management Plan.

PART 2 – PRODUCTS

2.1 General requirements

- .1 Moulded case circuit breakers, switches, and devices for protection against ground fault, circuit breakers, fuse and protective accessories against the high fault currents.
- .2 Moulded Case Circuit Breakers, bolted or plug to the bus bars, quick-closing type and snap-action, manually operated and automatic, with compensation for an ambient temperature of 40°C.
- .3 Common-trip circuit breakers, equipped with a single handle for multi-pole circuits.
- .4 Breakers equipped with magnetic snap-action trips, designed to act only when the current value reaches the setting value.
- .5 Circuit breakers equipped with interchangeable trips, as indicated.

2.2 Thermal magnetic breakers (design A)

- .1 Moulded case circuit breaker, to operate automatically, by means of thermal and magnetic tripping devices, to provide inverse time current tripping, and instantaneous tripping for short circuit protection.

2.3 Magnetic breakers (design B)

- .1 Moulded case circuit breaker to operate automatically by means of magnetic tripping devices to provide instantaneous tripping for short circuit protection.
- .2 Use these circuit breakers for starter combination with magnetic circuit breakers.

2.4 Current limiting and series rated thermal magnetic breakers (design C)

- .1 Thermal magnetic breakers with current limiters.
 - .1 Coordinate protection features, depending on time / current limiting fuses with those of circuit breakers.
 - .2 Coordination should be established so that the circuit breaker cuts off the fault current to the maximum value of its breaking.
 - .3 Fuses can be removed separately and are bonded to the circuit breaker. The circuit breaker tripping occurs when removing a fuse or its lid or when a fuse blows.
- .2 Indications and guidelines for manufacturers, circuit breakers and current limiting circuit breakers to be installed in series are used when the value of short-circuit may exceed the breaking capacity of circuit breakers thermomagnetic standards.
- .3 Magnetic circuit breakers will be used only in ensuring protection against short circuits.
- .4 Circuit breakers for installation in series are recommended for installations likely to leakage currents. Before prescribing for installation of circuit breakers in series, one must examine the requirements for coordination and system reliability.
- .5 Circuit breakers to be installed in series must have been audited by the manufacturer and must be approved. The installation and use of these circuit breakers shall conform to the guidelines of the manufacturer and recognized methods.
- .6 Refer to Section 26 05 05 – Specific Clauses.

2.5 Solid state trip breakers (design D)

- .1 Moulded case circuit breaker to operate by means of solid-state trip unit with associated current monitors and self-powered shunt trip to provide inverse time current trip under overload condition, and long time, short time, instantaneous tripping for ground fault short circuit protection.

2.6 Insulated case circuit breakers

- .1 Insulated case circuit breakers operated by triggers transistor capable of operating without external source and producing a trigger time / current reversed in overload conditions and triggering long delay, short delay and instantaneous as protection against short circuits of the phase conductors and leakage to ground.
- .2 The insulated case circuit breakers must have the following characteristics:
 - .1 Direct delayed shutter, fitted with coils designed for a nominal range cut-off of 80 to 160% of their nominal value, under conditions of overload.
 - .2 Instant trigger action designed to cut a nominal range of 500 to 1500% of the rated circuit breaker to protect against short circuits.
 - .3 Mechanism common maneuver by stored energy, allowing a fast closing.

- .4 Operating mechanism with stored energy, reset motor, allowing a fast closing, with a manual reset lever spring in an emergency and a switch to shut off the engine to reset the spring.
- .5 On-off and spring reset indicators.

2.7 Optional features

- .1 Include:
 - .1 Shunt trip.
 - .2 Auxiliary switch.
 - .3 Motor-operated mechanism.
 - .4 Under-voltage release.
 - .5 On-off locking devices.
 - .6 Handle mechanism.

2.8 Manufacturers

- .1 Accepted products: Cutler-Hammer, Siemens, Scheider Electric, GE or equivalent.

PART 3 – EXECUTION

3.1 Installation

- .1 Install circuit breakers as indicated.
- .2 Install locking devices on circuits listed in Section 26 24 16.01 – Panelboards Breaker Type.
- .3 The order in which circuit breakers should be installed in the panels must meet the one shown in the plans.
- .4 Make adjustments on electronic and magnetic triggers in accordance with the short-circuit coordination diagram in Section 26 05 15 – Study of coordination, verification, testing and commissioning.

FIN DE LA SECTION

PARTIE 1 – GÉNÉRALITÉS

1.1 Section contents

- .1 This section is intended for protective equipment against ground leakage and its components.

1.2 Payment

- .1 Payments for field testing of ground fault equipment performed by the Contractor in accordance with Section 01 29 83 – Payment Procedures: Testing Laboratory Services.

1.3 References

- .1 Canadian Standard Association (CSA International)
 - .1 CAN/CSA-C22.2 No. 144, Ground Fault Circuit Interrupters.
 - .2 National Electrical Manufacturers Association (NEMA).
 - .1 NEMA PG 2.2, Application Guide for Ground Fault Protection Devices for Equipment.

1.5 Action and informational submittals

- .1 Submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit product data and shop drawings required of each element of the protection system.
- .3 Submit test report for field testing of ground fault equipment to the Consultant and a certificate that system as installed meets criteria specified herein.

1.6 Waste management and disposal

- .1 Separate and recycle waste materials in accordance with Section 01 74 19 – Construction/Demolition Waste Management and Disposal.
- .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic, polystyrene, and corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .4 Divert unused metal and wiring materials from landfill to metal recycling facility proposed by the Contractor and approved by DCC Representative.
- .5 Fold up metal banding, flatten and place in designated area for recycling.

PART 2 – PRODUCTS

2.1 Description

- .1 Duplex receptacles protected. Only for ground networks (Class "A") less than 6 mA.

- .2 Heating cable network. Only by the heating cable networks for food (Class "B") 30 mA.

2.2 Materials

- .1 Equipment and components for ground fault circuits to be of same manufacturer.

2.3 By-pass circuit breaker

- .1 By-pass circuit, single-pole or double-pole, with test device and reset, capacity as indicated.

2.4 Circuit breaker distribution

- .1 Circuit breaker single-pole or double-pole, capacity as indicated, used to supply a distribution panel and including:
 - .1 Circuit breaker with shunt trip;
 - .2 Residual current detector;
 - .3 Test device and reset;
 - .4 CSA approved box, type as indicated, surface-mounted;
 - .5 Light signal triggered by ground leakage.

2.5 Outlets protected against ground leakage

- .1 Duplex receptacles, protected, for circuit 15 A, 120 V, including:
 - .1 Ground leakage detectors, with semiconductors;
 - .2 Test device and reset;
 - .3 CSA approved case, mounted flush with front plate in stainless steel (# 430).

2.6 Network protection panels against ground leakage

- .1 Panel suitable for autonomous power supply as indicated and with the following characteristics:
 - .1 Breaker as indicated with shunt trip.
 - .2 Relay leakage current to ground factory set at 10 mA and with a characteristic inverse time adjustable from 1 second to 0.025 seconds from the time of detection of the leak.
 - .3 Zero sequence current detector.
 - .4 Test devices and reset.
 - .5 CSA approved box, type 1, surface-mounted.
- And in the case of networks not grounded:
- .6 Light signal triggered by ground leakage.
 - .7 Artificial neutral high-strength, fused.

2.7 Pump protection panels against ground leakage

- .1 The material described below is used to protect people against electric shock on the supply circuits of the pumps. These panels do not include circuit breaker and therefore require an external protection. The device is designed to open the engine start switch.
- .2 Safety panel pump circuits as indicated and with the following characteristics:
 - .1 Test button, light signal triggered by ground leakage, and reset button.
 - .2 Platelets circuit connection and power charging circuit and the control circuit of the starter.
 - .3 Detector Sensitivity: 10 mA.
 - .4 CSA approved box, type 1, surface-mounted.
 - .5 Contactor Ratings: 5 A, 120 V, 60 Hz.And in the case of not grounded networks:
 - .6 Artificial neutral high resistance, protected by fuses.

PART 3 – EXECUTION

3.1 Installation

- .1 Do not ground neutral on loading side of ground fault relay.
- .2 Pass phase conductors, including neutral, through zero sequence transformers.
- .3 Connect supply and load wiring to equipment in accordance with manufacturer's recommendations.

3.2 Field quality control

- .1 Perform tests in accordance with Section 26 05 00 – General Requirements and coordinate if necessary with Section 01 45 00 – Quality Control.
- .2 Arrange for field testing of ground fault equipment by independent testing laboratory or Contractor before commissioning service.
- .3 Submit test reports to CDC representative and provide a certificate stating that the entire protection system installed meets the criteria specified in this quotation.
- .4 Test the system by simulating ground leakage.

FIN DE LA SECTION

PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

QUAI DE LA REINE – RECONSTRUCTION OF WHARVES 97 AND 98

MECHANICS

MARCH 2014

Bernard Landry

2014-03-25

By :

Bernard Landry, Eng.

PART 1 – GENERAL

1.1 Objectives

- .1 Supply, install and start-up of a new electric lifting (hoist) system for the new gangway of wharf 98.
- .2 The location of the hoist is indicated in the plans.

1.2 Scope of work

- .1 The work associated with this project includes the provision of all materials, labor, tools, equipment, protection, transport and services required to satisfactorily perform the work requested. All work shall be in accordance with the requirements specified on the plans and this specification.
- .2 This work list is not necessarily complete and does not relieve the contractor from their responsibility to do any work and provide all labor, services and materials required to perform the work described in the plans and specifications as well as changes or modifications necessary to complete the work in a satisfactory manner.
- .3 The coordination and distribution of the work to any subcontractors is entirely the responsibility of the general contractor

1.3 Related requirements

- .1 Section 05 51 20 - Section Pedestrian Gangway
- .2 Section 01 77 00 - Closeout Procedures
- .3 Section 01 78 00 - Closeout Submittals
- .4 Section 01 91 13 - General Commissioning (Cx) Requirements

1.4 Reference standards

- .1 CSA, ASTM, SSPC, PC 3 (1995) Power Tool Cleaning
- .2 NRC National Building Code
- .3 Régie du bâtiment du Québec
- .4 CAN/CSA-S16, Design of Steel Structures

- .5 CSA S826-01 Ferry Boarding Facilities
- .6 CAN/CGSB 1.711 - 98 Inorganic Zinc Coating

All other codes and standards in force in Quebec concerning this kind of work.

1.5 Description of the lift system

- .1 The lift system will be carried out using a freestanding type jib structure on which will be installed an electric winch which will be connected to the gangway and that can move it vertically according to the needs of the users.

The gangway will mainly serve the movements of the coast guard boat crews to supply and transport and/or move people related to rescue operations for which they are responsible.

- .2 A winch, prefabricated in the factory, including a drum, a gear and an electric motor that will wind and lead, through a set of pulleys installed in a suitable enclosure, a cable or chain that is connected to the gangway to raise or lower it as needed. The winch will be equipped with a transport trolley which will move it for maintenance and repair.
- .3 Appropriate controls move the winch and control its operation within limits.

1.6 Operating mode

- .1 Physical link

The gangway is pivoted at its upper point secured to the coping of the concrete wall.

- .2 Operating mode

In sleep mode, the gangway may remain in the raised position to allow free movement of the pontoon.

In operation or according to needs, the gangway will be lowered towards the floating dock to the required height to provide easy access to the staff that use it. It is then raised to the desired position when the transshipment operations are completed.

The gangway is operated using a set of push buttons installed on the upper part of the gangway and also at the bottom of the gangway or from the boat or elsewhere via a wireless electronic system.

1.7 Operation in various seasons and weather

- .1 Protection of the system and mechanism. The winch and its components will be installed under a shelter which will move with the winch during the translation movements for maintenance and repair work. To protect the mechanism from exposure to water and ice

accumulation during storms or cold periods, two separate electric heaters will protect the shelter and the winch motor. Control/push buttons or other exposed emergency equipment, shall be installed in watertight housings that will protect and ensure the operation. These boxes shall also be electrically heated.

1.8 Design drawings

- .1 The contractor shall use an engineer certified by the OIQ and by each of the provinces where the work will be carried out to develop the design drawings, detail drawings, manufacturing and workshop drawings based on the arrangements shown in the contract documents and this specification.
- .2 The contractor shall submit three (3) copies of the design drawings and calculation record to the department's representative. Each copy of the submitted drawings will bear the seal and signature of the engineer engaged by the contractor to perform the design.
- .3 The contractor shall allow three weeks to receive the comments of the engineer in charge of project on their calculation records.

PART 2 - PRODUCTS

2.1 Prerequisites

- .1 The contractor shall provide all the equipment required to supply a complete and operational lifting system according to the specification and the full satisfaction of the department representative.

The contractor shall provide further detail on:

- the self-supporting structure of the gangway;
- the winch and its shelter;
- the attachment of the portal structure linking the gangway to the winch cable or chain;
- the entire control system;
- all electrical connections.

2.2 Structural elements

- .1 The structure supporting the lifting system (jib) will be a self-supporting type bolted to the concrete base provided for this purpose. It will be designed, fabricated and supplied by the contractor.

2.3 Jib

.1 General information

The jib shall be freestanding to support at its base and shall be equipped with an “I-beam” type boom of the required dimensions to handle a hoist equipped with a translation trolley. It shall be constructed of steel and capable of withstanding the winch and the loads specified. It will be galvanized.

- The boom shall be able to rotate 360 ° about its central axis and will be not be motorized.
- The trolley shall move the winch the length of the boom and will be not be motorized.
- The winch can lower the gangway onto the pontoon and return it to the level of the dock as required.
- As equipped, the winch can perform all travel operations required for the gangway and can be maintained and/or repaired over the wharf.

.2 Characteristics of jib

- Capacity: 3,000 kg load plus the winch and a safety factor
- Radius of the jib: 4.5 metres
- Free height under hook: 5.5 m
- Non-motorized rotation: 360 °
- Rotation speed: manual

It will be mounted on a steel base which can be bolted to the concrete base as indicated on the plans.

.3 Suppliers

- The jib shall be equivalent to the models: Capital BR03.204.505.5
 O’Brien Major
 ECL Services – MR2

2.4 Winch

.1 General information

The winch shall be a standard, industrial type for work robust 'heavy duty' for outdoor operation in a marine saline environment. It will equipped with a chain operated non-motorized trolley. It will be provided with a heated shelter which will follow the travel of the winch. The motor shall be equipped with a heater (strip heater) which will keep the winch ready to operate at all times. It will be provided with limit switches and an overload switch. Drive components shall be steel or nickel.

.2 Features

- Capacity: 3,000 kg
- Lifting speed: ± 17 FPM
- Non-motorized speed cart: manual push
- Lifting height: 10.4 m
- Chain: MTL: nickel alloy steel
factor: 5: 1
with basket
- Motor: Capacity: $\square 4.7$ HP
Power: 208/3/60
Service: 60%
Insulation: IP55
Operating temperature: -20°C to $+40^{\circ}\text{C}$
- Clutch: friction
- Brake (warranty): 10 years
- Approximate frequency of operation: 5 departures per hour
- Class: H4
-

.3 Suppliers

- The winch will be equivalent to the models:
Capital - Kito ER0305
O'Brien - Budgit
ECL Services - Kito XXX

2.5 Electricity

- .1 The electrical connections will be made according to the supplier instructions and the plans and specifications for the installation of the gangway lifting system.

2.6 Controls

Both manual and remote controls will be supplied. Manual controls will be installed at the top and the bottom of the gangway to raise and lower the winch. The operation of the gangway can also be performed by radio (wireless) control from the boat and / or the pontoon and also on the dock within prescribed area.

Control shall be "heavy duty" and be installed in NEMA 4X enclosures.
The winch motor will be equipped with a thermal and an overload switch.

PART 3 - EXECUTION

3.1 General

- .1 The contractor, after previously providing all required materials, shall provide all labor required to provide a complete lifting system conforming to the contract documents and operating to the satisfaction of the department.
 - They must have licences and permits required in Quebec for this type of construction.
 - They shall provide all tools and equipment necessary to carry out the work

3.2 Operational control

- .1 Control system (type)

The operation of the gangway can be done remotely using push buttons or an electronic control system. It should be noted that only the winch is powered; the trolley and rotation will be non-motorized (manual).

- .1 Electrical system

Two sets of push buttons will be supplied and installed; one at the top and one at the bottom of the gangway.

Each of these sets of buttons will be installed in a suitable watertight, stainless steel enclosure.

Each set of controls shall have an ON / OFF button and a sprung selector with three positions (up, down & stop at the centre) and an emergency stop button.

- .2 Electronic system

The electronic control system (radio) shall be an industrial type (heavy duty) and shall be able to operate the gangway in the same manner and within the same limits as the mechanical system using the winch and its components. These radio controls shall also be push button operated; four radio controls shall be provided.

- .3 Control Panel

A single control panel where the mechanical, electrical and electronic components will be grouped shall be provided and installed. It shall be waterproof and heated.

- .2 Operation and limits

Limit switches shall be installed at the end of the drum, stopping the winch in order to keep the gangway within its limits of operation

3.3 Welds

- .1 The design, execution and inspection of welds shall comply with the requirements of the standards CSA W59 and W48.1.

3.4 Supports for electrical conduits

- .1 Piping and electrical conduit supports shall be attached to mechanical assemblies only. No welding or drilling of frames will be accepted.
- .2 Rigid conduits shall be supported by anti-vibration supports spaced according to the following table:

Outside diameter	Distance between supports
mm (inches)	m (feet)
6-12 (1/4-1/2)	0.9 (3)
16-22 (5/8-7/8)	1.22 (4)
25 (1)	1.5 (5)
32-38 (1 1/4-1 1/2)	2.13 (7)

See electrical specifications for all electrical installations.

3.5 Surface protection

- .1 The winch, structure and carbon steel parts shall be protected, in the workshop, by an epoxy resin finish.
- .2 At the completion of the work, remove the protective coating of machined surfaces and clean them.

3.6 Spare parts

- .1 At the completion of the work, the contractor shall provide a list of recommended spare parts required for the normal maintenance of the lifting system.

3.7 Testing and reporting

- .1 The contractor shall send two copies of each testing procedure they intend to use to the project engineer.
- .2 The contractor shall allow a period of three weeks for the review and approval of their procedures.
- .3 An initial procedure shall be submitted for testing of the gangway without load.

- .4 Operational tests of the lifting system and the gangway shall be performed in place in the presence of representatives designated by the department. Provide at least one weeks' notice shall be provided before the tests are to be performed.
- .5 Verify that all the required positions of the gangway can be reached, the limits of operation and behaviour of mechanical equipment: winch, sheaves, cable, structure, etc.
- .6 The contractor shall be required to submit a report for each test conducted before the following be test can be performed. Test reports must conform to the ANSI standard B93.74 latest edition.
- .7 A second test shall be performed with anticipated loads used in the calculations. The verifications previously described shall be recorded in a report.
- .8 The test shall be successful. In the case of failure, the corrective work shall be performed and a new test undertaken.
- .9 Provide all necessary instruments and equipment for the tests.
- .10 Provide all test certificates.
- .11 The detailed results of the performance tests shall be documented and copies shall be submitted to the department.
- .12 The design engineer shall be present at the tests.

3.8 Training

- .1 At the work site, the contractor shall provide training to personnel identified by the department.

This training shall include a tour of the facility, a presentation, question period and a period of practical operation.
- .2 The contractor shall also provide training to the department personnel specializing in electrical and controls.

3.9 Commissioning

- .1 When all work is completed and all test reports, operation manuals, etc. have been received, commissioning will be carried out in accordance with section 01 91 13 Commissioning - General requirements.

3.10 Reception of the work

- .1 The procedure for the reception of the work by the department will be performed according to the requirements of specification 01 77 00 Completion of work.

3.11 Operation and maintenance manual

- .1 The contractor shall comply with the requirements of section 01 78 00 – Documents/elements for the completion of the work.
- .2 No more than two (2) weeks after the commissioning of the gangway, the contractor shall submit, for review and approval, five (5) copies of the operation and maintenance manual, "as built" workshop drawings and the catalogue of spare parts.

Each operation and maintenance manual shall be divided into two sections: the 'Operation' section and the 'Maintenance' section.

- .1 The 'Operation' section shall contain a full description of the operating procedures, steps to follow, precautions to take and security measures to respect.
- .2 The 'Maintenance' section shall contain all the approved detailed data sheets of all components used. On each of these datasheets the model number of the corresponding component must be highlighted in fluorescent yellow. The number that each component on the contractor plans should be indicated in the upper right of its datasheet.

This section should contain a maintenance program and a troubleshooting guide, both taking into account the particularities of the equipment and its use.

Note: For maintenance of the winch, the rotation of the jib and the displacement of the winch on its trolley will be done manually to position the winch over the wharf.

- .3 The contractor shall allow a period of two weeks for the review and approval of the Operation and Maintenance manuals.

END OF SECTION

PART 1 – GENERAL

1.1 Objectives

- .1 Provide, install and start a new electric lifting system that will serve the operations located in the Coast Guard basin at wharf 98 adjacent to wharf 97 of Queens Wharf in the Port of Quebec.
- .2 The freestanding base of the hoist will be installed on wharf 98 at the location shown on plans.

1.2 Scope of work

- .1 The work associated with this project includes supplying of all materials, labor, tools, equipment, protection, transport and services required to satisfactorily perform the work requested. All work shall be in accordance with the requirements specified on the plans and this specification.
- .2 This work list is not necessarily complete and does not relieve the contractor from their responsibility to do any work and provide all labor, services and materials required to perform the work described in the plans and specifications as well as changes or modifications necessary to complete the work in a satisfactory manner.
- .3 The coordination and distribution of the work to any subcontractors is entirely the responsibility of the general contractor.

1.3 Related requirements

- .1 Closeout Procedures - Section 01 77 00
- .2 Closeout Submittals - Section 01 78 00
- .3 General Commissioning (CX) Requirements - Section 01 91 13

1.4 Reference standards

- .1 CSA, ASTM, SSPC, PC 3 (1995) Power Tool Cleaning
- .2 NRC National Building Code
- .3 Régie du bâtiment du Québec
- .4 CAN/CSA-S16, Design of Steel Structures
- .5 CSA S826-01 Ferry Boarding Facilities

- .6 CAN/CGSB 1.711 - 98 Inorganic Zinc Coating
- .7 All other codes and standards in force in Quebec concerning this kind of work.

1.5 Description of the lift system

- .1 The lift system (hoist) will be carried out using a freestanding type jib structure on which will be installed an electric winch which will be connected to the gangway and that can move it vertically according to the needs of the users.
- .2 A winch, prefabricated in the factory, including a drum, a gear and an electric motor that will wind and lead, through a set of pulleys installed in a suitable enclosure, a cable or chain with hook that is connected to the loads to raise or lower it as needed. The winch will be equipped with a transport trolley which will move it for work, or maintenance and repair.
- .3 Appropriate controls move the winch and control its operation within pre-set limits.

1.6 Operating mode

- .1 Physical link

The lift will be used to lower or raise equipment or goods between the top of the wharf and the water level at the time of operations.

- .2 Operating mode

In sleep mode, the hoist is positioned close to the central support post.

In operation mode, the boom of the hoist system is returned above the wharf, the hoist is lowered over the load to be transported, and before performing the descent in the basin, the arrow is brought above the water and then the descent may be accomplished.

The boom, the hoist carriage and the winch are placed alternately in operation by means of a push button station connected to the control panels installed on the support column of the lifting system.

1.7 Operation in various seasons and weather

- .1 The winch and its components will be installed under a shelter which will move with the winch during the translation movements for operations, to protect the mechanism from exposure to water and ice accumulation during storms or cold periods. Two separate electric heaters will protect the shelter and the winch motor separately. Control/push buttons or other exposed emergency equipment, shall be installed in watertight housings that will protect and ensure operation. These boxes shall also be electrically heated. A watertight box located separately will be supplied and installed on the central column to store the push button station.

1.8 Design and performance

.1 Design

- .1 The system (structure, winches, chains and fasteners, etc.) shall be designed to carry loads whose maximum weight is 700 kg or 1,500 pounds (see item 2.2 for structural elements).
- .2 The safety factors specified in codes must be respected.
- .3 The system will consist of a freestanding structure bolted to a concrete slab, in the concrete surface of the dock which will be equipped with a pivoting boom and winch installed on a trolley which will allow its horizontal displacements.
- .4 The arrow can be rotated 360 ° on its axis and be motorized.
- .5 The winch is equipped with a motorized carriage that can travel on a "I- beam". The winch shall be of the trolley and hook type and can carry at all times, loads of at least 700 kg or 1,500 pounds.
- .6 The components are selected and / or treated so as not to deteriorate in marine and saline environment.

1.9 Control of operations

- .1 The operation of the hoist will be done using a push button station that can operate separately the rotation of the arrow, the winch carriage and winch up and down.

See 2.6 for details.

1.10 Design drawings

- .1 The contractor shall use an engineer certified by the OIQ and by each of the provinces where the work will be carried out to develop the design drawings, detail drawings, manufacturing and workshop drawings based on the arrangements shown in the contract documents and this specification.
- .2 The contractor shall submit three (3) copies of the design drawings and calculation record to the Departmental Representative. Each copy of the submitted drawings will bear the seal and signature of the engineer hired by the contractor to perform the design.
- .3 The contractor shall allow three weeks to receive the comments of the Departmental Representative on their calculation records.

PART 2 - PRODUCTS

2.1 Prerequisites

- .1 The contractor shall provide all the equipment required to supply a complete and operational lifting system according to the specification and the full satisfaction of the Departmental Representative.

The contractor shall provide further detail on:

- .1 the self-supporting structure of the hoist system;
- .2 the winch and its shelter;
- .3 the entire control system;
- .4 all electrical equipment and connections.

Note 1: The electrical connections are made according to the plans and electrical specifications for the work carried out under his responsibility.

Note 2: The lift system shall be supplied complete and ready to operate according to customer demand.

2.2 Structural elements

- .1 The structure supporting the lifting system (jib) will be a self-supporting type bolted to the concrete base provided for this purpose. It will be designed, fabricated and supplied by the contractor.

2.3 Jib

- .1 General information

The jib shall be freestanding to support at its base and shall be equipped with an “I-beam” type boom of the required dimensions to handle a hoist equipped with a translation trolley. It shall be constructed of steel and capable of withstanding the winch and the loads specified. It will be galvanized.

- The boom shall be able to rotate 360 ° about its central axis and will be motorized.
- The trolley shall move the winch over the length of the boom and will be motorized.
- The winch can lower the load to reach the water level and return it to the level of the dock as required.
- As equipped, the winch can perform all travel operations required for the loads and can be maintained and/or repaired as required.

.2 Characteristics of jib

- Capacity: 1,000 kg load plus the winch and a safety factor
- Radius of the jib: 4.0 metres
- Free height under hook: 4.0 m
- Non-motorized rotation: 360 °
- Rotation speed: 10°/second

It will be mounted on a steel base which can be bolted to the concrete base as indicated on the plans.

.3 Suppliers

- The jib shall be equivalent to the models: Capital BR0104.504
O'Brien Major
ECL Services – FS 300

2.4 Winch

.1 General information

The winch shall be a standard, industrial type for work robust 'heavy duty' for outdoor operation in a marine saline environment. It will be equipped with a chain operated non-motorized trolley. It will be provided with a heated shelter which will follow the travel of the winch. The motor shall be equipped with a heater (strip heater) which will keep the winch ready to operate at all times. It will be provided with limit switches and an overload switch. Drive components shall be steel or nickel.

.2 Features

- Capacity: 1,000 kg
- Lifting speed: ±28 FPM
- Non-motorized speed cart: 40 FPM
- Lifting height: 10.40 m
- Chain: MTL: nickel alloy steel
factor: 5: 1
with basket

- .10 View specifications and electrical drawings for performing work related to this discipline.
- .2 Operation and limitations
 - .1 The limit switches installed at the end of the drum, stopping the winch to keep the bridge between its operating limits.

PART 3 - EXECUTION

3.1 General

- .1 The contractor, after previously providing all required materials, shall provide all labor required to provide a complete lifting system conforming to the contract documents and operating to the satisfaction of the Departmental Representative.
 - .1 They shall have licences and permits required in Quebec for this type of construction.
 - .2 They shall provide all tools and equipment necessary to carry out the work.

3.2 Welds

- .1 The design, execution and inspection of welds shall comply with the requirements of standards CSA W59 and W48.1.

3.3 Supports for electrical conduits

- .1 Piping and electrical conduit supports shall be attached to mechanical assemblies only. No welding or drilling of frames will be accepted.
- .2 Rigid conduits shall be supported by anti-vibration supports spaced according to the following table:

Outside diameter	Distance between supports
mm (inches)	m (feet)
6-12 (1/4-1/2)	0.9 (3)
16-22 (5/8-7/8)	1.22 (4)
25 (1)	1.5 (5)
32-38 (1 1/4-1 1/2)	2.13 (7)

See electrical specifications for all electrical installations.

3.4 Surface protection

- .1 The winch, structure and carbon steel parts shall be protected, in the workshop, by an epoxy resin finish.
- .2 At the completion of the work, remove the protective coating of machined surfaces and clean them.

3.5 Spare parts

- .1 At the completion of the work, the contractor shall provide a list of recommended spare parts required for the normal maintenance of the lifting system.

3.6 Testing and reporting

- .1 Hoist Operational tests shall be performed in place in the presence of representatives designated by the Minister, Departmental representative and users. Provide at least one weeks' notice shall be provided before the tests are to be performed.
- .2 The test shall be successful. In the case of failure, the corrective work shall be performed and a new test undertaken.
- .3 Provide all necessary instruments and equipment for the tests.
- .4 Provide all test certificates.
- .5 The detailed results of the performance tests shall be documented and copies shall be submitted to the Departmental Representative.
- .6 The design engineer shall be present at the tests and shall receive notification at least two days prior to a test.

3.7 Training

- .1 At the work site, the contractor shall provide training to personnel identified by the Minister.

This training shall include a tour of the facility, a presentation, question period and a period of practical operation. A minimum of two hours should be allowed for this training.
- .2 The contractor shall also provide training to the department personnel specializing in electrical and controls. This session will be much more detailed than that given to the users, at the technical level. A minimum of two hours should be allowed for this training.

3.8 Operation and maintenance manual

- .1 No more than two (2) weeks after the commissioning of the hoist, the contractor shall submit, for review and approval, five (5) copies of the operation and maintenance manual, "as built" workshop drawings and the catalogue of spare parts.

Each operation and maintenance manual shall be divided into two sections: the 'Operation' section and the 'Maintenance' section.

- .1 The 'Operation' section shall contain a full description of the operating procedures, steps to follow, precautions to take and security measures to respect.
- .2 The 'Maintenance' section shall contain all the approved detailed data sheets of all components used. On each of these datasheets the model number of the corresponding component must be highlighted in fluorescent yellow. The number that each component on the contractor plans should be indicated in the upper right of its datasheet.

This section should contain a maintenance program and a troubleshooting guide, both taking into account the particularities of the equipment and its use.

- .2 The contractor shall allow a period of two weeks for the review and approval of the Operation and Maintenance manuals.

3.9 Commissioning

- .1 When all work is completed and all test reports, operation manuals, etc. have been received, commissioning will be carried out in accordance with section 01 91 13 - General Commissioning (CX) Requirements.

3.10 Reception of the work

- .1 The procedure for the reception of the work by the department will be performed according to the requirements of specification 01 77 00 - Closeout Procedures.

END OF SECTION



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