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SOW – PIER AND TOWER REPLACEMENTS

**LL 1380 GULL ROCK
LL 1405 BLACK FOREST SHOAL**

GRAVENHURST, ON

MARITIME AND CIVIL INFRASTRUCTURE

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SECTION: 011100 GENERAL INSTRUCTIONS

PART 1 - GENERAL

1.1 Minimum Standards

- .1 Perform work in accordance with National Building Code of Canada (NBC) and any other code of provincial or local application. In the case of any conflict or discrepancy, the more stringent requirements shall apply
 - .1 Meet or exceed requirements of:
 - .1 Contract documents;
 - .2 Specified standards, codes and referenced documents.

1.2 Description of Work

- .1 Work under this Contract includes but is not limited to the provision of all labour, materials, and equipment required to:
 - .1 Mobilize to sites with a work barge of appropriate size and certification;
 - .2 Clearing of rubble to expose bedrock.
 - .1 CCG staff shall be on site to determine new tower locations.
 - .3 Install two [2] new concrete piers;
 - .1 Bidder shall assume water depth of 1.22m at LL1380 and 0.915m at LL1405 for bidding purposes.
 - .4 Arrange and pay for concrete testing on the day of the concrete pour;
 - .5 Transportation and installation of two [2] new CCG supplied aid to navigation (ATON) towers and daymarks;
 - .6 Salvage and return existing ATON towers complete with all appurtenances and lighting equipment;
 - .7 Demolish and dispose of two [2] existing foundations located at LL1405;
 - .8 Demobilize.
- .2 The following work will be undertaken by others and is hereby excluded:
 - .1 Supply two [2] ATON towers;
 - .1 Towers are to be transported to site from staging location by contractor.
 - .2 Supply and installation of lantern, battery and solar panel onto new ATON towers.



1.3 Submittals

- .1 Mandatory submittals and schedule for submission are detailed below and in Appendix B2. The following identifies general requirements only. The relevant sections must be consulted for a complete listing of mandatory content
- .2 Detailed Schedule:
 - .1 Deadline:
 - .1 No later than ten (10) working days following award.
 - .2 Deliverables:
 - .1 The contractor shall furnish a high level schedule outlining the major construction milestones. Schedule shall clearly define the anticipated start and finish of the project.
- .3 Mandatory Technical Criteria Sheet:
 - .1 Deadline:
 - .1 With bid.
 - .2 Deliverables:
 - .1 Contractor shall fill out mandatory technical criteria sheet in Appendix B2 and supply all appropriate documentation with bid.
 - .1 Contractor shall furnish copy of vessel registration, and photo of vessel with registration number with bid. (Section 011100 1.3.4.1)
- .4 Proof of Qualifications:
 - .1 Deadline:
 - .1 No more than ten (10) working days following award.
 - .2 Deliverables:
 - .1 Contractor shall furnish listing of all subcontractors within ten (10) working days following award. (Section 011100 1.4)
- .5 Construction Plan:
 - .1 Deadline:
 - .1 No less than ten [10] working days prior to mobilization.
 - .2 Deliverables:



.1 A Construction Plan of sufficient detail to demonstrate that the Contractor has considered all the challenges of the project and is prepared to undertake the works in a competent and professional manner in accordance with all legislation, including:

- .1 Project specific safety program (Section 013530);
- .2 Project environmental protection plan (Section 013543);
- .3 Dewatering Plan (Section 033000);
- .4 Foundation construction plan (Section 033000); and
- .5 Drilling Plan (Section 055000).

.6 As Built and QA/QC:

.1 Deadline:

.1 No more than twenty eight [28] calendar days after construction.

.2 Deliverables:

.1 The following documents shall be forwarded upon completion of the contract:

- .1 Set of red-lined as built drawings;
- .2 Concrete test results (Section 033000 1.4.4)

1.4 Contractor Qualifications

- .1 The work shall be carried out under the supervision and responsibility of a sole specialized Contractor, capable of performing installations of offshore drilled foundations.
- .2 The Contractor shall designate a project manager or main point of contact for the contract.
- .3 The Contractor shall provide a detailed list of all subcontractors being used to complete the work described herein.

1.5 Site Location

.1 The location of the sites are as follows:

.1 Gull Rock: Lat./Long.: 44° 59'58.00"N, 79°26'17.00"W.

.1 The closest major settlement is Gravenhurst, Ontario.

.2 The site is located on a shallow shoal, offshore in Lake Muskoka.

.2 Black Forest Shoal: Lat./Long.: 45° 8'20.43"N, 79°41'50.71"W

.1 The closest major settlement is Foot's Bay, Ontario.



.2 The site is located on a shallow shoal, offshore in Lake Joseph.

1.6 Existing Conditions

- .1 Bidders must make their own estimate of the difficulties associated with all phases of the works.
- .2 Bidders must include in their costs all expenses related to the difficulties of working at the sites.
 - .1 Both sites are located on natural rock shoals. Bidders shall consider the nature of the site and shall not assume in any way that the site will be perfectly flat or level. Difficulties associated with working on a natural rock shoal shall be included in the bid price.
- .3 Photographs of the existing site are included in Appendix B1.

1.7 Contractor's Access to Site

- .1 Contractor is responsible for transportation of all labour, materials, and equipment to and from the site, including any and all material furnished or itemized for salvage by Coast Guard.
- .2 The Site is accessible by water.
 - .1 The Contractor is responsible for sourcing appropriate marine access to support all construction work. Contractors are also responsible for ensuring that all the requirements of Appendix B5 – Marine Access Requirements are met, failure to do so will result in the bid being deemed non-compliant.
 - .2 Vessels not previously approved by Coast Guard are prohibited. All vessels used, no matter how the vessel is used, or for what duration, shall be previously approved by Coast Guard in writing. Additional vessels than those submitted at time of bid may be used if Coast Guard approval is obtained prior to their use. Failure to comply with this clause may result in termination of your contract.

1.8 Completion, Scheduling and Planning of the Works

- .1 Work shall commence as early as practical following Coast Guards acceptance and approval of mandatory submissions.
- .2 Site work shall not commence without written authorization of Coast Guard Project Authority.
 - .1 Advise Project Authority at least two [2] weeks in advance of proposed installation date.
 - .2 Field work shall not commence until all mandatory submittals have been received and approved by CCG.
- .3 Work shall be complete by August 31, 2019. However, consideration should be taken to address the difficulties associated with in-water work with marine traffic during the summer season.
- .4 Demolition of the existing tower at LL1405 Black Forest Shoal shall not commence until the new tower is erected and CCG staff has installed the light.



- .5 The Contractor is responsible for securing the site if the works are to be left unattended for any duration of time.
 - .1 Specifically the Contractor must ensure that following are not left in a condition that could be hazardous to the works or the general public:
 - .1 Exposed rock anchors and reinforcement are suitably marked and/or barricaded;
 - .2 Open forms, cofferdams, or enclosed spaces.
 - .2 All materials and/or equipment left at the site are to be properly secured against vandalism, erosion, and any other associated mechanism of displacement in order to not present a hazard to the general public or the surrounding environment.

1.9 Coast Guard Staging Location

- .1 Items itemized as supplied by, or salvaged to Coast Guard shall be collected by or delivered to the following staging location by the contractor. The Contractor shall be responsible for all transportation costs between the project site and the identified staging location. Material drop off or access to stored goods outside of regular operating hours shall be at the discretion of Coast Guard and may be subject to cost recovery:
 - .1 Staging location: CCG Base – Parry Sound, 28 Waubeek St, Parry Sound, ON P2A 1B9.
 - .2 Advise Coast Guard Project Authority at least three (3) working days prior to pick-up / delivery.
 - .1 Shipping/Receiving hours: Monday through Friday, 9:00AM to 3:00PM.

1.10 Temporary Facilities

- .1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.
- .2 Arrange, pay for, and maintain temporary electrical power supply as required for construction, and water supply as required, in accordance with governing regulations and ordinances.
- .3 Maintain emergency spills kit on-site at all times.

1.11 Fees, Permits, Certificates and Information

- .1 Contractor shall provide authorities having jurisdiction with all information requested.
 - .1 Contractor shall provide copies to Coast Guard of any documentation submitted to other authorities related to the work described in this document.
- .2 Contractor shall pay fees and obtain certificates and permits required.
- .3 Contractor shall furnish certificates and permits when requested.



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1.12 Reference Documents

- .1 The most recent publication or edition of any document referenced in this specification should be used unless the referencing clause states that this clause does not apply.

1.13 Required Submissions

- .1 A summary of the minimum mandatory submissions required can be found in Appendix B2. This summary is not an exhaustive list of all submissions required for the duration of the project. Additional submissions may be required after award.



SECTION: 013300 SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 General

- .1 This section specifies general requirements and procedures for the Contractor's submissions of documents to Coast Guard for review.
- .2 For each phase of the project, work shall not progress until all mandatory submittals required before the start of that phase have been received, reviewed and accepted by CCG
- .3 Where items or information is not produced in SI Metric units, converted values are acceptable.
- .4 Contractor's responsibility for errors and omissions in submission is not relieved by Coast Guard's review of the submitted documents.
- .5 Notify Coast Guard, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
- .6 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Coast Guard's review of submission, unless Coast Guard gives written acceptance of specific deviations.
- .7 Make any changes to submissions that Coast Guard may require consistent with Contract Documents and resubmit as directed by Coast Guard.
- .8 Provide Coast Guard with a written notice, when resubmitting, of any revisions other than those requested Coast Guard.

1.2 Submission Requirements

- .1 Coordinate each submission with requirements of work and Contract Documents. Individual submissions will not be reviewed until all related information is available.
- .2 Allow three (3) working days, or as stipulated in the specifications, for Coast Guard to review the submission.
- .3 The Contractor's Engineer shall stamp and sign any submissions requiring a Professional Engineer's seal certifying his approval of samples, verification of field measurements, and compliance with Contract Documents.



SECTION: 013530 HEALTH AND SAFETY REQUIREMENTS

PART 1 - GENERAL

1.1 Scope

- .1 The Contractor shall be responsible to develop, implement and enforce a safety program which addresses all elements of the work.

1.2 References

- .1 Work under this section shall be undertaken in strict conformance with all listed references, In the case of any conflict or discrepancy the more stringent requirements shall apply.
 - .1 Canada Labour Code Part II - January 2008
 - .2 NRC-CNRC National Building Code of Canada
 - .3 Ontario Occupational Health and Safety Act and Regulations, 2009
 - .4 Any and all other Provincial/Territorial Regulations and Policies; Worker's Compensation Board Policies; Local municipal regulations; pertaining to safety of the contractors workers.

1.3 Submittals

- .1 Project Specific Safety Program

- .1 Deadline:

- .1 With Construction Plan.

- .2 Deliverables:

- .1 Safety Program Document, include:

- .1 A listing of all activities specific to this phase of the project and their Health & Safety risks or hazards;
- .1 Detailed descriptions of how the activities are to be carried out as well as methods for mitigating hazards and risks.
 - .1 Contractor shall be familiar with O. Reg 213/91 Construction Projects. Special attention shall be paid to sections regarding cofferdams and formwork, as related to this project.
 - .2 It should be noted that as per this regulation cofferdams and formwork must be engineered.



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- .2 A listing of personnel responsible for health and safety measures, and emergency procedures.
- .3 Material Safety Data Sheets for hazardous products to be utilized in the execution of the works.
- .4 A copy of the Notice of Project filed with the Ontario Ministry of Labour.

1.4 Existing Conditions

- .1 Existing pier at LL1405 Black Forest Shoal has deteriorated and a gap has formed beneath the existing concrete base making this tower unstable. Contractors must ensure the tower is dismantled and removed in a safe manner.



SECTION: 013543 ENVIRONMENTAL PROCEDURES

PART 1 - GENERAL

1.1 Scope of Work

- .1 The Contractor must implement and enforce the following procedures throughout the duration of the work to mitigate potential negative impacts on the surrounding environment.

1.2 References

- .1 Work under this section shall be undertaken in strict conformance with all listed references, In the case of any conflict or discrepancy the more stringent requirements shall apply.

- .1 Canadian Environmental Protection Act
- .2 Canadian Council of Ministers of the Environment (CCME) Documentation
- .3 Canadian General Standards Board

1.3 Submittals

- .1 Contractor shall submit an environmental protection plan.
 - .1 Deadline:
 - .1 With Construction Plan.
 - .2 Deliverables:
 - .1 Submit a plan addressing procedures to be implemented to mitigate any negative impact on the environment. Detail:
 - .1 Equipment features (age, spill containment);
 - .2 Staging, refueling, and cleaning areas;
 - .3 Clean-up and/or containment procedures (including concrete/grout);
 - .4 Waste disposal methods and sites;
 - .5 De-watering plan (if relevant).

PART 2 - PRODUCTS

2.1 General

- .1 Avoid use of hazardous products. Use environmentally friendly products where practical.



PART 3 - EXECUTION

3.1 Construction Area

- .1 Confine construction activities to as small an area as practical.
- .2 Establish material storage, cleaning, and refueling areas where impacts to the surrounding environment will be negligible or readily mitigated.

3.2 Stockpiling of materials

- .1 Materials must be stockpiled as far from the shoreline as practical. Tarps must be used to control dust and run-off.
- .2 Stockpiled excavated materials shall be skirted using filter fabric to control run-off of fines during rain.

3.3 Disposal of Wastes

- .1 Clean-up the site at the end of each working day.
- .2 All waste material to be disposed of in a legal manner at a site approved by local authorities. Transporter/hauler must be appropriately licensed.
 - .1 Recycle or reuse materials where possible.
- .3 Fires and burning of rubbish on site not permitted.
- .4 Do not bury rubbish and waste materials on site.
- .5 Waste materials must not enter watercourse in any capacity.

3.4 Drainage

- .1 Provide temporary drainage and pumping as necessary to keep excavations and site free from water.
 - .1 Suspend works during periods of heavy rainfall and add temporary covers to discourage run-off.
 - .2 Water pumped from excavation shall be adequately treated to ensure that water returning to the watercourse contains minimal fines. Procedures anticipated for preventing the pumping of fines shall be identified in the environmental protection plan, and may include the following:
 - .1 The use of filter bags;
 - .2 Straw bale check dams or silt fence;
 - .3 The means for controlling silt run-off shall be dependent on the site and the quantity of water pumped, and shall be to the discretion of the CCG site staff.



- .4 Sediment control measures shall be inspected and improved/cleaned/replaced as necessary.

3.5 Pollution Control

- .1 Provide methods, means, and facilities to prevent the contamination of soil, water, and atmosphere from the discharge of pollutants produced by construction operations.
- .2 Vehicles, machinery, and equipment shall be in good repair, equipped with emission controls as applicable and operated within regulatory requirements.
- .3 Abide by local noise by-laws.
- .4 Avoid unnecessary idling of vehicles or heavy machinery.
- .5 Limit use of equipment around the shoreline where possible.
- .6 Implement and maintain dust and particulate control measures in accordance with provincial requirements:
 - .1 All bulk material haul equipment shall be appropriately tarped. Watertight vehicles shall be used to haul wet materials.
- .7 Designate a cleaning area for tools to limit water use and runoff. Do not allow deleterious materials to enter waterways. Ensure emptied containers are sealed and stored safely for disposal.
- .8 The contractor shall take all necessary precautions to guard against the release of any noxious substance or pollutant to the environment. In the event of any spill the Contractor shall take immediate action to contain the release and mitigate any impact.
 - .1 Materials and equipment to intercept contain, and clean-up any spill or other release shall be maintained on site throughout the construction period and must be readily accessible at all times.
 - .2 Any uncontrolled release of a known contaminant (spills, fire/smoke) shall be reported to appropriate Provincial Authority and Coast Guard. Spills of deleterious substances to be immediately contained and cleaned up in accordance with provincial regulatory requirements.
 - .3 Provincial Authority: Ontario Spills Action Centre 1-800-268-6060.



SECTION: 014500 QUALITY CONTROL

PART 1 - GENERAL

1.1 Inspection

- .1 Canadian Coast Guard (CCG) or its representative shall have access to the work at all times. If parts of the work are prepared off-site or in a shop, access shall be given to such work throughout the duration of the project.
- .2 In the event the work must be submitted to special testing, inspection or approvals prescribed by CCG in these specifications or provided for in work-site regulations, the request for inspection must be made without unreasonable delay.
- .3 The below list identifies key milestones where the CCG will require an opportunity to take samples/inspect:
 - .1 Location verification: The Coast Guard will confirm correct location for installation upon arrival of the contractor at site. The contractor shall be required to provide access to the site at all times to CCG site staff.
 - .2 Drilling: The Coast Guard shall witness the drilling of holes for vertical rebar installation.
 - .3 Concreting: The Coast Guard shall verify rebar placement before concrete pour and witness concrete pour and testing.
 - .4 Installation of tower: The Coast Guard shall witness the erection of the new nav-aid tower and witness correct operation of the new light.

1.2 Procedures

- .1 Provide CCG with advance notice whenever testing is required in accordance with these specifications, so that all parties involved can be present.
- .2 Provide necessary manpower and installations for obtaining and handling samples and material on site.
- .3 Provide access to site if the site is of remote nature whereby the contractor is responsible for providing access to the site.

1.3 Rejected Work

- .1 Remove defective work, whether incorporated into the work or not, which has been rejected by CCG as failing to comply with the contract documents. Replace or re-execute in accordance with the Contract Documents.

1.4 Tests and Mixture Formulas

- .1 Supply test reports and required mixture formulas.



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1.5 Factory Tests

- .1 Submit test certificates as prescribed in the relevant section of the specifications.

1.6 Acceptance of Work

- .1 CCG will make acceptance visits of work executed by the Contractor at critical milestones identified in the following sections.
- .2 The Contractor shall inform CCG at least three (3) working days before these inspection visits.
- .3 All work shall be completed in compliance with the specifications before requesting the visit for inspection. If the work is not completed or deemed non-compliant, the Contractor shall be responsible for all costs incurred for subsequent inspections.



SECTION: 016100 COMMON PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 General

- .1 Secure Coast Guard approval of all products to be incorporated into the works. Work shall not commence until product data and/or samples have received Coast Guard approval.
- .2 Supply and/or fabricate material and equipment of prescribed quality, with performance conforming to established standards.
- .3 Use new material and equipment unless otherwise specified.
- .4 Use products from one manufacturer for material and equipment of same type or classification, unless otherwise specified.

1.2 Manufacturer's Instructions

- .1 Unless otherwise specified, comply with manufacturer's latest printed instructions for materials and installation methods.
- .2 Notify CCG in writing of any conflict between these specifications and manufacturer's instructions; CCG will designate which document is to be followed.

1.3 Compliance

- .1 When material or equipment is specified by standard or performance specifications, upon request of CCG, obtain an independent testing laboratory report from the manufacturer, stating that material or equipment meets or exceeds specified requirements.

1.4 Substitution

- .1 Where specific products have been specified, proposals for substitution shall only be submitted after award of contract. Such requests must include statements of respective costs of items originally specified and the proposed substitution.
- .2 No substitutions will be permitted without prior written approval of CCG. Substitutions will be considered by CCG only when:
 - .1 Materials specified in Contract Documents, are not available; or,
 - .2 Delivery date of materials selected from those materials specified would unduly delay completion of contract; or,
 - .3 Alternative materials to those specified which are brought to the attention of and considered by CCG as equivalent to the material specified will result in a credit to the Contract amount.



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- .3 Should the proposed substitution be accepted either in whole or in part, the Contractor must assume full responsibility and costs when such substitution affects other work on the project including any and all design or drawing changes required as a result of substitution.

1.5 Submittals

- .1 Provide product specifications and/or samples upon request from Coast Guard.



SECTION: 024116 DEMOLITION OF STRUCTURES

PART 1 - GENERAL

1.1 Scope of Work

- .1 Work under this section consists of the provision of all labour, materials, and equipment necessary to complete the following activities:
 - .1 Salvage and transport of existing towers, lighting equipment and all related appurtenances to Parry Sound CCG Base;
 - .2 Demolition of two [2] existing concrete piers located at LL1405;
 - .3 Disposal of all waste at a licensed waste disposal facility.

1.2 References

- .1 Work under this section shall be undertaken in strict conformance with the most recent version of all listed references, In the case of any conflict or discrepancy the more stringent requirements shall apply.
 - .1 Canada Labour Code Part II
 - .2 NRC-CNRC National Building Code of Canada
 - .3 Ontario Occupational Health and Safety Act and Regulations
 - .4 CSA S350-[M1980(R1998)], Code of Practice for Safety in Demolition of Structures.

1.3 Submittals

- .1 Contractor to provide demolition plan.
 - .1 Deadline:
 - .1 With Construction Plan.
 - .2 Deliverables:
 - .1 Method of demolition including all associated tasks and schedule;
 - .2 Methods for protecting the site from demolition debris;
 - .3 The ultimate disposal location of all waste materials and debris.
 - .1 Include documentation detailing regulatory approval for waste disposal facility and transporter.
- .2 Work under this section shall not proceed until written approval of the demolition plan has been received from the Coast Guard.



- .3 Submit copies of certified receipts from the disposal sites for all material removed from the work site upon disposal. Receipts are required unless specified in writing by CCG Project Authority.

1.4 Existing Conditions

- .1 Existing pier has deteriorated and has been upheaved from bedrock below, causing the tower to be unstable and unsafe to climb. Contractor must ensure the tower is dismantled and removed in a safe manner.
 - .1 Photos of the existing pier and tower are included in Appendix B1.

PART 2 - PRODUCTS

- 2.1 Not used.

PART 3 - PART 3 - EXECUTION

3.1 General

- .1 Work under this section must be performed directly following the installation of the new ATON tower and all appurtenances unless otherwise approved by Coast Guard.
 - .1 Schedule to provide CCG 2-3 days to install lantern and appurtenances onto new tower before beginning demolition of the existing tower.
- .2 It is preferred that all pieces are lifted onto the barge as a single unit to minimize environmental impacts.

3.2 Protection

- .1 Implement effective controls to catch/collect all tower debris during demolition, specifically paint.
- .2 Implement effective controls to prevent injury to workers, and mariners.

3.3 Preparation

- .1 Erect warning signs and barricades as applicable.
- .2 Ensure all environmental protection/mitigation measures are in place.
- .3 Ensure all items identified for salvage have been removed and stored.

3.4 Demolition

- .1 Salvage existing tower including all lighting equipment and related appurtenances. Ensure that lighting equipment and related appurtenances do not get damaged.
- .2 Demolish existing concrete foundation in its entirety.
 - .1 All existing exposed rebar shall be cut flush to grade.



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- .3 Ensure that demolition does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air and noise pollution.
- .4 Ensure demolition is undertaken safely. If at any period during demolition the safety of the Contractor's staff cannot be maintained take preventative measures, stop work and immediately notify Coast Guard.

3.5 Disposal

- .1 All material is to be disposed of off-site and a licensed disposal/recycling facility.



SECTION: 033000 CONCRETE WORK

1.1 Scope of Work

- .1 Work of this section includes the supply of all labour, material, and equipment, necessary to complete the following:
 - .1 Installation of concrete foundations as per STEM foundation drawings, available in Appendix B3.
 - .1 LL1380: A southern design with water depth of 1.220m shall be assumed for bidding purposes.
 - .2 LL1405: A southern design with a water depth of 0.915 m shall be assumed for bidding purposes.
 - .1 The actual water depth measured in June 2018 at one location suitable for tower erection on the shoal was approximately 0.45 m. High water level is estimated to be 0.915m. the entire shoal was not measured during the site visit, just one test location. Depth may vary.
 - .2 A square or round pier design is to be chosen by the contractor and the choice should be noted in the submitted foundation construction plan.
 - .3 Any and all provisions necessary to ensure that the anticipated performance of the placed concrete will be obtained regardless of the conditions under which pour occurs and during the curing phase.

1.2 Related Sections

- .1 Section 055000 Adhesive Anchors
 - .1 Section details installation requirements for vertical dowels installed into existing bedrock.

1.3 References

- .1 Work under this section shall be undertaken in strict conformance with all listed references. In the case of any conflict or discrepancy, the more stringent requirements shall apply.
 - .1 Canada Labour Code Part II
 - .2 NRC-CNRC National Building Code of Canada
 - .3 Ontario Occupational Health and Safety Act and Regulations
 - .4 CAN/CSA A23.1 Concrete Materials and Methods of Concrete Construction
 - .5 CAN/CSA A23.2 Methods of Test and Standard Practices for Concrete
 - .6 CAN/CSA S269.3 Concrete Formwork
 - .7 ACI Specification 306 Cold Weather Concreting (if relevant)



1.4 Submittals

- .1 The following submittals are to be provided to the CCG PA:
- .2 Dewatering Plan (if relevant):
 - .1 Deadline: with Construction Plan
 - .2 Deliverables:
 - .1 Cofferdam and/or other relevant drawings
 - .1 Drawings must detail:
 - .1 Plan, elevation and relevant section views of the proposed installation;
 - .2 Any pertinent commentary concerning construction and implementation of dewatering plan.
 - .3 Drawing must be stamped by a Professional Engineer.
 - .2 Summary Report (if necessary):
 - .1 The summary report shall contain all additional technical references and requirements not otherwise detailed within the engineered drawings.
- .3 Concrete Placement Plan:
 - .1 Deadline:
 - .1 With Construction Plan
 - .2 Deliverables:
 - .1 Provide high level summary of mix properties and admixtures to demonstrate compliance with CCG criteria and STEM foundation design;
 - .2 Provide MSDS, (pre-mixed products only).
 - .3 Concrete placement methods and curing procedures, detail:
 - .1 Source of concrete, including mix plan;
 - .2 Shop drawings for formwork and false-work;
 - .1 Drawings must be stamped by a professional engineer.
 - .3 Placement methods and procedures to control consolidation/segregation;
 - .1 If dewatering will not occur detailed Tremie concrete pour details must be provided to CCG.



- .4 Location of necessary cold joints;
- .5 Finishing procedures;
- .6 Mill test certificates for rebar, piles or any other steel used in the foundations;
- .7 Curing methods and schedule;
- .8 Strength requirements for structural stability (removal of forms);
- .9 Clean-up procedures;
- .10 Mitigation measures to account for hot or cold temperatures where reasonably anticipated during the construction period.

.4 As-built and Quality Control

.1 Deadline:

- .1 28 days following completion of construction activities

.2 Deliverables:

- .1 Red-lined drawings showing all changes from the sealed design drawings (if any);
- .1 Drawing or sketch indicating the position of the constructed pier relative to the former installation, detail:
 - .1 Height of former pier, bedrock to top of foundation;
 - .2 Difference in elevation from top of former pier to top of new pier;
 - .3 Highest high water mark of indicated former pier, relative to bedrock grade;
 - .4 Height of new pier, bedrock to top of foundation;
 - .5 Water level above bedrock for new pier;
 - .6 Horizontal offsets to the center of new pier (north, south, east, & west) relative to former pier.
- .2 Concrete test results.

1.5 Quality Assurance

- .1 CCG's minimum inspection requirements are detailed below. The Contractor shall be responsible to notify CCG of the date and time that the works shall be inspected. Notice must be provided no less than three [3] working days in advance to permit scheduling of quality assurance testing. All deficiencies in the works identified at the time of inspection shall be remedied to the satisfaction of CCG, by the Contractor at their expense. Work shall not progress until inspections have been completed and the Contractor has been provided with written notice to proceed with the works.



- .1 Upon completion of formwork and placement of reinforcement.
- .2 During execution of concrete placement.
- .2 The Contractor shall be responsible to arrange for concrete testing on site the day of the pour. This shall include at minimum a test for slump, air entrainment and strength (three [3] cylinders: one [1] 7-day, and two [2] 28-day).
- .1 Extra concrete cylinders shall be cast and broken to determine foundation strength prior to tower erection.
- .2 Testing is to be completed by a third-party independent Consultant and is to be completed by a certified technician in accordance with CSA Code A23.2.

PART 2 - MATERIALS

2.1 General

- .1 All materials shall conform to requirements of CAN/CSA-A23.1 and appended STEM drawings.

2.2 Formwork

- .1 Shall be in accordance with CAN/CSA S269.3.
 - .1 If formwork is to be dewatered, formwork should be watertight.

2.3 Reinforcing Steel

- .1 Reinforcing steel shall conform to the attached drawings and to the following standards:
 - .1 CAN/CSA A23.1-04 - Concrete Materials and Methods of Concrete Construction
 - .2 CAN/CSA-G30.18-09 - Carbon Steel Bars for Concrete Reinforcement
- .2 All reinforcing steel is to be epoxy coated as per CSA-G30.18-09;
 - .1 Reinforcing cage to be tied with plastic or plastic coated rebar tie wire.

2.4 Anchors

- .1 All anchor bolts and accompanying appurtenances must be hot dip galvanized with minimum yield strength of 400 MPa, conforming to ASTM A325;
 - .1 Anchor bolts to be supplied as per STEM drawing, CCG must be notified as to style of anchor bolt.

2.5 Concrete

- .1 Concrete shall possess the minimum characteristic detailed in the Contract Drawings and attached STEM foundation drawings, provided in Appendix B3.



- .1 Pre-proportioned or bagged concrete must be approved by CCG PA.
- .2 For concrete placement via Tremie method, concrete supplier must verify concrete mix is intended for use in a Tremie application.

2.6 Water

- .1 Water utilized for the production of concrete must be potable, unless otherwise approved in writing by CCG.

PART 3 - EXECUTION

3.1 General

- .1 Concrete must be placed, finished, and cured in accordance with the Contractor's submitted construction plan.
 - .1 Ensure that the top of the concrete is no less than 600mm (24 in) above high water level.
 - .2 Installation shall be undertaken in accordance with attached STEM foundation drawings and contractors concrete placement plan.
 - .3 Exposed concrete edges shall be chamfered.
 - .1 If cylindrical design is chosen top edge to be rounded over with use of hand trowel or equivalent.
 - .4 If form is not completely sealed and waterproof, tremie method must be used, unless otherwise approved in writing by CCG Project Authority. Using a traditional concrete pouring method under tremie conditions without express consent will result in rejection of the work.

3.2 Preparation

- .1 Preparation shall not commence until bearing surfaces have been inspected by CCG PA.
- .2 Remove all loose and deleterious material.
- .3 Construct forms as detailed in the submitted construction plan.
- .4 Place reinforcement in accordance with Contract Drawings.
- .5 Concrete cover must be as indicated in the attached STEM foundation drawings.

3.3 Placement

- .1 Concrete placement shall not commence until formwork and reinforcement have been inspected by CCG PA.
- .2 Contractor shall place finish and cure concrete as per CAN/CSA A23.1 making all adjustments necessary to account for climatic conditions anticipated during the curing period.



- .3 Concrete shall be placed in one continuous pour.
 - .1 The development of cold joints shall be avoided. Alternatively, cold joints must be previously approved in writing by CCG.
- .4 Finish exposed concrete surfaces to provide a lightly brushed non-skid surface.
- .5 Cut control joints where specified.
- .6 Contractor shall provide samples as required during placement operation for the performance of quality assurance testing.
- .7 Concrete shall be finished so as to slope gently away from the center of the slab. No water shall pond on the finished surface.
- .8 All exposed 90° edges shall be chamfered.

3.4 Curing

- .1 Shall be undertaken in accordance with CAN/CSA A23.1 and the Contractor's approved Construction Plan.
 - .1 Curing regimen employed must take into account local climatic conditions reasonably anticipated to occur during the curing period.



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3.5 Grout

- .1 Supply and install load bearing grout between the top of the completed foundation and the tower base/anchor plate.
- .1 Edges of grout shall be chamfered.



SECTION: 055000 ADHESIVE ANCHORS

1.1 Scope of Work

- .1 Work of this section includes the supply of all labour, material, and equipment, necessary to complete the following activities:
 - .1 Drilling and installation of vertical dowel bars in to competent bedrock as per STEM foundation drawings;

1.2 Related Sections

- .1 Section 033000 Concrete Work
 - .1 Section details further requirements for the installation of the required foundation elements.

1.3 References

- .1 Work under this section shall be undertaken in strict conformance with all listed references, In the case of any conflict or discrepancy the more stringent requirements shall apply.
 - .1 Canada Labour Code Part II - January 2008
 - .2 NRC-CNRC National Building Code of Canada 2010
 - .3 Ontario Occupational Health and Safety Act and Regulations

1.4 Submittals

- .1 Submittals shall be forwarded to Coast Guard in accordance with the provisions of section 013530.
- .2 Drilling Plan:
 - .1 Deadline:
 - .1 With Construction Plan.
 - .2 Deliverables:
 - .1 Description of the equipment that will be utilized to drill into bedrock;
 - .2 Description of the methods that will be implemented to stabilize the drilling equipment, and to ensure verticality of holes;
 - .3 Description of how epoxying activities will occur;
 - .4 Provide material specifications for the epoxy adhesive to be used;
 - .5 Provide cut-sheets for the reinforcing bars to be used;



- .6 Describe how works will be undertaken to mitigate impacts on the surrounding watercourse.

1.5 Quality Assurance

- .1 Coast Guards minimum inspection requirements are detailed below. The Contractor shall be responsible to notify Coast Guard of the date and time that the works may be inspected. Notice must be provided no less than three (3) working days in advance to permit scheduling of quality assurance testing. All deficiencies in the works identified at the time of inspection shall be remedied to the satisfaction of Coast Guard, by the Contractor at their expense. Work shall not progress until inspections have been completed and the Contractor has been provided with written notice to proceed with the works.
 - .1 Coast Guard is to confirm location of foundation prior to drilling;
 - .2 Coast Guard is to witness drilling and epoxying of vertical bars;

PART 2 - PRODUCTS

2.1 Dowels

- .1 Vertical bars installed in existing bedrock are to be as detailed in Appendix C, Drawings.

2.2 Epoxy Adhesive

- .1 Epoxy Adhesive used for vertical bars to be HILTI HIT-RE 500 V3 as per STEM drawings;
 - .1 Alternates must be approved by CCG PA.

PART 3 - EXECUTION

3.1 Fabrication

- .1 Vertical rebar to be epoxyed in to bedrock prior to installation of remaining rebar.

3.2 Installation

- .1 Installation shall be carried out as per the installation directions on the appended drawings.
- .2 The location for foundation placement to be verified by on-site CCG staff.
- .3 The elevation of the top of the pier will be as determined by CCG staff. Please refer to foundation drawing in Appendix B3.
 - .1 Provisions shall be made to allow for variance in the lengths of the drilled rebar from that of the drawings, based on water depth and field conditions.



SECTION: 133613 METAL TOWERS

PART 1 - GENERAL

1.1 Scope of Work

- .1 Work under this section includes the supply of all labour, material, and equipment required to complete:
 - .1 The transportation of the towers, dayboards and all associated hardware to site from the designated staging area;
 - .2 The installation of the towers detailed in the Appendix B3;
 - .1 LL1405 requires a 20' tower.
 - .2 LL1380 requires a 16' tower.
- .2 Work of this section excludes:
 - .1 Fabrication and supply of the tower (CCG)
 - .2 Supply of the navigational lantern and appurtenant equipment (CCG)
 - .3 The installation and commissioning of a lantern on each the towers (CCG).

1.2 References

- .1 Work under this section shall be undertaken in strict conformance with all listed references. In the case of any conflict or discrepancy the more stringent requirements shall apply.
 - .1 Canada Labour Code Part II
 - .2 NRC-CNRC National Building Code of Canada

1.3 Quality Assurance

- 1.4 CCG's minimum inspection requirements are detailed below. The Contractor shall be responsible to notify CCG of the date and time that the works shall be inspected. Notice must be provided no less than three [3] working days in advance to permit scheduling of quality assurance testing. All deficiencies in the works identified at the time of inspection shall be remedied to the satisfaction of CCG, by the Contractor at their expense. Work shall not progress until inspections have been completed and the Contractor has been provided with written notice to proceed with the works.
 - .1 Upon completion of the work an inspection will take place to ensure tower is plumb and that light is operating correctly.



PART 2 - PRODUCTS

2.1 Materials

- .1 All materials shall be by CCG.

PART 3 - EXECUTION

3.1 Fabrication

- .1 Fabrication has been completed by the CCG. This includes everything shown on the drawing which comprises the tower in Appendix B3.

3.2 Protective Coatings

- .1 The tower and all hardware are hot dip galvanized. The contractor shall be prepared to make repairs to the coating as needed.

3.3 Handling of Material and Transportation

- .1 Estimated weight of the tower is 375 kg (+/- 825 lbs.)
- .2 Estimated weight of a dayboard is 25 kg (55lbs).
- .3 The Contractor must take all necessary precautions to avoid damage to the tower members or to tower coating during transport, unloading and erection. All components or damaged members must be replaced to the satisfaction of Coast Guard at the expense of the Contractor.
- .4 It is the responsibility of the Contractor to ensure that the tower sections, particularly the joints are protected from bending and alignment damage.
- .5 The contractor shall identify how they would like the tower packaged for shipping shortly after award. This will be coordinated by CCG.

3.4 Placement of Tower

- .1 The tower shall be fitted to the foundation anchor bolts.
 - .1 Each bolt shall have one [1] heavy hex levelling nut below tower base and two [2] heavy hex nuts above base.
 - .2 Heavy flat washers shall be placed between heavy hex nuts and tower base (top and bottom)
- .2 Contractor must ensure a 50 mm gap between pier and tower base as per appended drawings.
- .3 Contractor shall tighten the first nut using turn of nut method associated to the length of bolt provided. The second nuts shall be snug tight to lock into place the two nuts.



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.4 Non-shrink, gassing, cementitious grout shall be placed between top of foundation and tower base.

.1 Sika M-Bed Standard or equal.



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APPENDIX B1: SITE LOCATION AND PHOTOGRAPHS

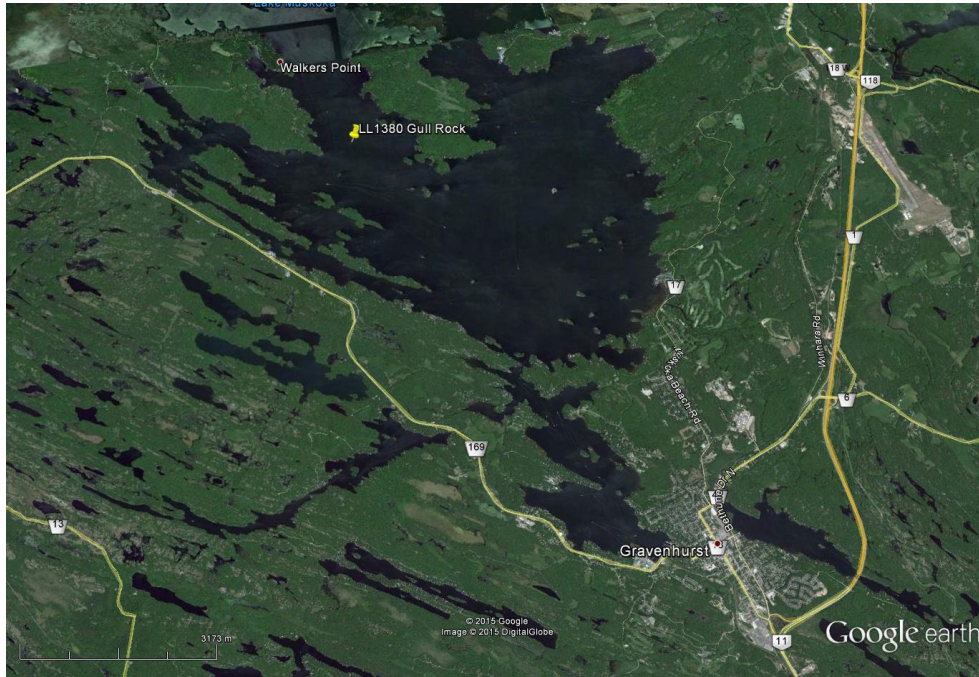


Figure 1:
LL 1380 Gull Rock
44°59'58.00"N, 79°26'17.00"W



Figure 2: LL 1380 Gull Rock

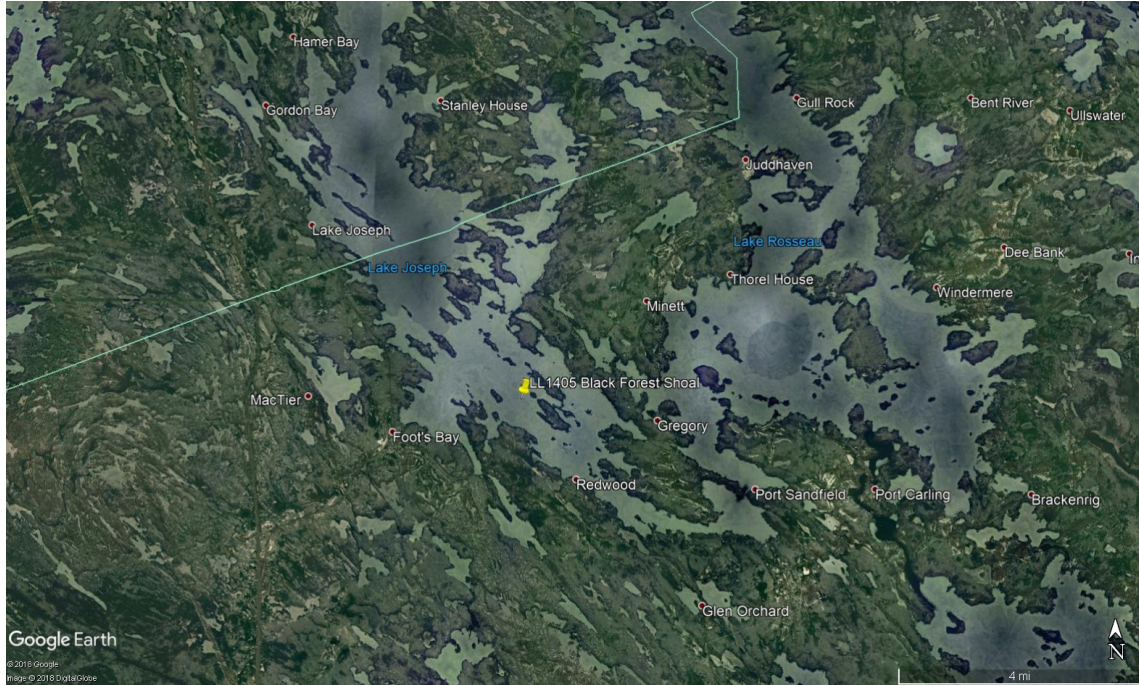


Figure 3:
LL 1405 Black Forest Shoal
45° 8'20.43"N, 79°41'50.71"W



Figure 4: LL1405 Black Forest Shoal



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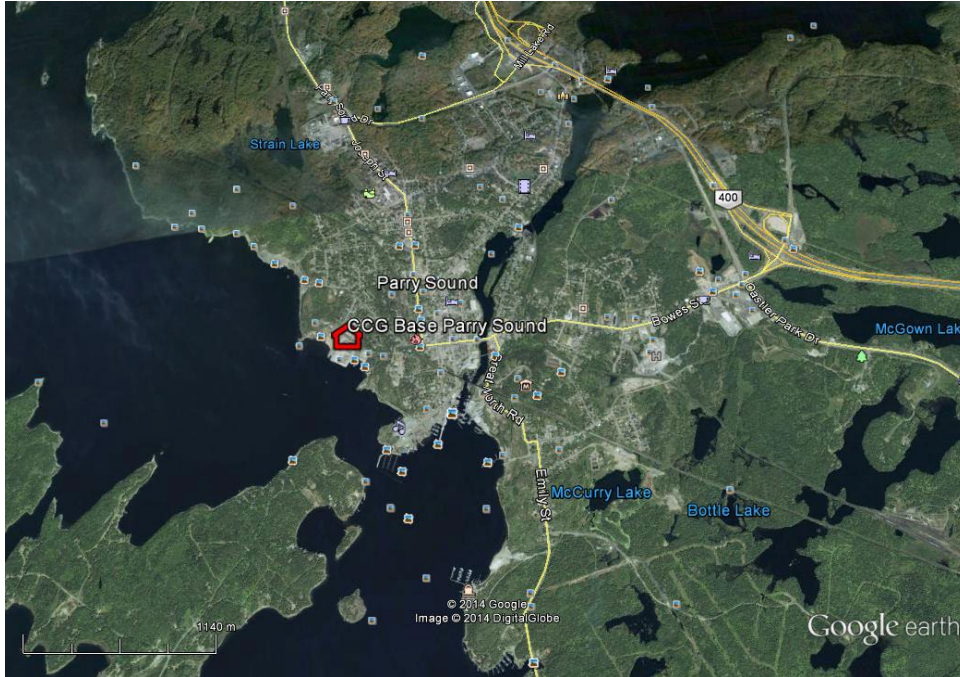


Figure 5: Coast Guard Staging Area
CCG Base Parry Sound
28 Waubeek St. Parry Sound, ON P2A 1B9
45°20'38.93"N - 80°2'34.46"W



Figure 6: Coast Guard Staging Area



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Figure 7 – LL1380 Existing Navaid (to be removed)



Figure 8 – LL1380 Existing Navaid and Steel Structure (to be removed)



Figure 9: LL1405 Showing Existing Tower and Two Foundations



Figure 10: Typical Rock Shoal Conditions at LL1405 Black Forest Shoal



APPENDIX B2: SUMMARY OF SUBMITTALS

Following Contract Award	
Submission Description	Section(s)
Deadline: With bid	
Mandatory technical Criteria Sheet	011100
Vessel Registration	011100
Vessel Photo	011100
Deadline: 10 working days following award	
Detailed schedule	011100
Proof of qualifications	
Deadline: 10 working days prior to mobilization	
Construction Plan	
a) Project specific safety plan	011100
b) Project environmental protection program	013543
c) Detailed Demolition Plan	024116
d) Dewatering Plan	033000
e) Drilling plan	055000
f) Concrete Placement Plan	033000
Deadline: 21 calendar days following acceptance of the works	
Waste disposal receipts	024116
As-built drawings	055000
Upon Request of Coast Guard	
Completed Field Level Hazard Assessment (FLHA) Forms	013530
Product Specifications or Samples	



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APPENDIX B3: DRAWINGS

CONCRETE & EPOXY

FORMS MAY EITHER BE KEPT DE-WATERED OR CONTAIN STANDING WATER DURING CONSTRUCTION, PROVIDED REQUIREMENTS FOR EACH CASE ARE MET AS FOLLOWS:

IF INSIDE OF FORM IS KEPT DE-WATERED AND DRY DURING PLACEMENT OF REINFORCING AND POURING OF CONCRETE, CONCRETE MAY BE POURED IN CONVENTIONAL MANNER (CHUTE). ENSURE DRILLED HOLES ARE FREE OF STANDING WATER WHEN EPOXYING THE VERTICAL REBAR.

IF INSIDE OF FORM IS NOT KEPT DEWATERED AND WILL HAVE STANDING WATER DURING PLACEMENT OF REINFORCING AND POURING OF CONCRETE, THEN A TEMPLATE FOR DRILLING THE HOLES FOR THE VERTICAL BARS SHALL BE USED. ALSO, THE CONCRETE SHALL BE PLACED USING THE TREMIE METHOD, AND THE MIX DESIGN TO HAVE ANTI-WASH ADDITIVE.

IN GENERAL, CONTRACTOR SHALL BE EXPERIENCED IN PLACING EPOXYED REBAR IN WET OR SUBMERGED CONDITIONS AS REQUIRED.

CONFORM TO CSA STANDARDS CAN3-A23.1-A23.3 AND THEIR SUPPLEMENTS.

TOLERANCES: CONFORM TO CSA STANDARD CAN3-A23.1

PORTLAND CEMENT WATER AND AGGREGATES TO CONFORM TO CSA A23.1 AND CAN3-A5.

AIR ENTRAINMENT ADMIXTURE: TO CSA STANDARD A266.1.

CHEMICAL ADMIXTURES: TO CSA STANDARD A266.2.

CURING/SEALING COMPOUND: TO ASTM C309.

ALL REINFORCING STEEL SHALL BE GRADE 400 MPa, CSA G30.18, EPOXY COATED.

INSTALL EPOXY ADHESIVE IN CONFORMANCE WITH MANUFACTURER'S INSTRUCTIONS. EPOXY ADHESIVE TO BE HILTI HIT-RE 500 V3.

USE VIBRATORS FOR PLACEMENT OF CONCRETE.

FOR READY-MIX CONCRETE THE MAXIMUM TIME PERMITTED BETWEEN CHARGING THE MIXER AND FINAL DEPOSIT IS 90 MINUTES. THERE IS NO TOLERANCE FOR ADDITIONAL TIME SPANS UNLESS A CONCRETE RETARDER IS USED.

EXPOSED CONCRETE SHALL BE FREE FROM HONEYCOMBING, VOIDS, LOSS OF FINES, VISIBLE FLOW LINES AND COLD JOINTS, CHIPS AND SPALLS.

PROTECT FRESH CONCRETE FROM PREMATURE DRYING, SUNSHINE, EXCESSIVELY HOT OR COLD TEMPERATURES AND MECHANICAL INJURY, MAINTAIN AT A RELATIVELY CONSTANT TEMPERATURE FOR AS LONG AS REQUIRED FOR HYDRATION OF THE CEMENT AND CURING OF THE CONCRETE.

SUPPLEMENTAL ADMIXTURES IMPACTING PLASTIC AND HARDENED PERFORMANCE SHALL BE SUBJECT TO APPROVAL OF COAST GUARD.

PLACEMENT OF REINFORCEMENT TO BE CONFIRMED BY COAST GUARD PRIOR TO CONCRETE PLACEMENT.

CONTRACTOR TO PROVIDE CONCRETE TESTING FOR 7 DAY AND 28 DAY COMPRESSIVE STRENGTH. ALSO PROVIDE TESTING FOR SLUMP AND AIR CONTENT. TESTING REPORTS TO BE SUBMITTED TO COAST GUARD FOR REVIEW.

TOWER SHALL NOT BE ERECTED UNTIL CONCRETE TESTING INDICATES AT LEAST 75% OF 28 DAY COMPRESSIVE STRENGTH

REFER TO COAST GUARD SPECIFICATIONS FOR FURTHER CONCRETE REQUIREMENTS

CLASS OF CONCRETE

PROVIDE NORMAL DENSITY CONCRETE TO ACHIEVE THE FOLLOWING PROPERTIES:

- CLASS OF EXPOSURE: C-1
- CEMENT TYPE: 10
- MINIMUM COMPRESSIVE STRENGTH: 5076psi (35MPa)
- MAXIMUM WATER CEMENT RATIO: 0.50
- AIR ENTRAINMENT: 5%-8%
- NOMINAL SIZE OF COURSE AGGREGATE: 3/4" (20MM)
- SLUMP AT 3" ±1" (75MM ±25MM)
- CURING REGIME TYPE: 2, (7 DAYS TOTAL AT >10°C)

SUBMITTALS

CONTRACTOR SHALL SUBMIT A SUMMARY OF CONCRETE PROPERTIES WITH CONSTRUCTION PLAN. SUBMIT TO COAST GUARD FOR REVIEW.

SUBMIT REBAR SHOP DRAWINGS FOR COAST GUARD REVIEW

FORMWORK AND FALSEWORK SHALL BE AS DETAILED IN APPROVED CONSTRUCTION PLAN. FOR DE-WATERED INSTALLATION, THE CONSTRUCTION PLAN SHALL SHOW ENGINEERED METHOD OF KEEPING WATER OUT OF THE FORM, EITHER WITH CAISSON AROUND FORM, OR USING THE FORM ITSELF.

CURING SHALL BE COMPLETED IN ACCORDANCE WITH APPROVED CONSTRUCTION PLAN

ANY ALTERNATE PRODUCTS OR PROCEDURES MUST BE APPROVED BY THE COAST GUARD

BEDROCK

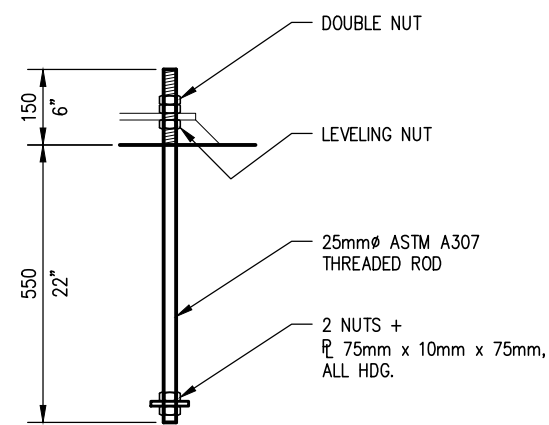
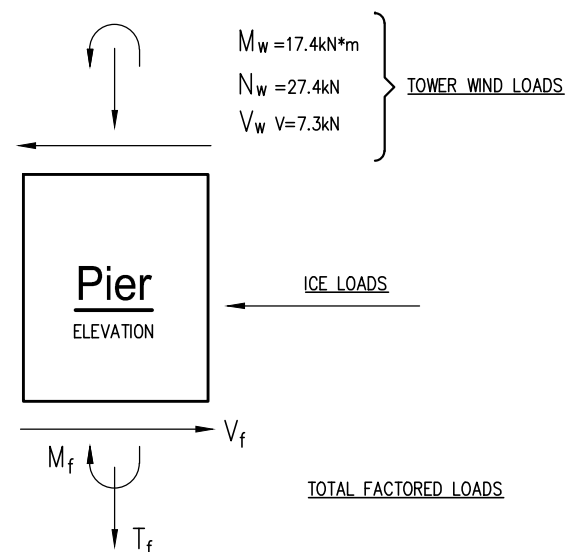
VERTICAL REBAR SHALL BE EMBEDDED IN COMPETENT BEDROCK HAVING A MINIMUM COMPRESSIVE STRENGTH OF 5076 psi (35 MPa). SUITABILITY OF BEDROCK TO EITHER BE VERIFIED BY A GEOTECHNICAL ENGINEER, OR APPROVED BY COAST GUARD PERSONNEL.

DESIGN LOAD NOTES

TOWER WIND LOADS: WIND TOWER LOADS AS PROVIDED BY CANADIAN COAST GUARD, AND ARE SHOWN FACTORED

ICE LOADS: ICE LOADS HAVE BEEN DETERMINED IN ACCORDANCE WITH THE CANADIAN HIGHWAY BRIDGE DESIGN CODE CAN/CSA-S6.

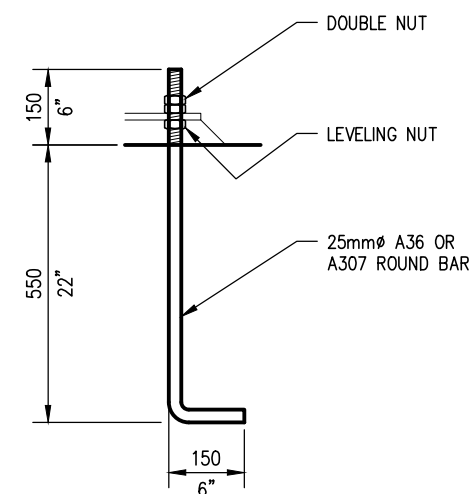
TOTAL FACTORED LOADS: FOR TOTAL FACTORED DESIGN FORCES AND MOMENTS ON BASE OF PIER, SEE DWGS. s2.0 AND s3.0 AS APPLICABLE.



* ALL COMPONENTS HOT DIP GALVANIZED.

Typ. Anchor Bolt Detail

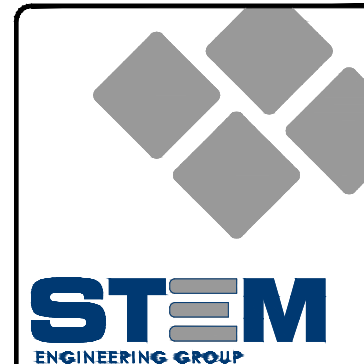
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* ALL COMPONENTS HOT DIP GALVANIZED.

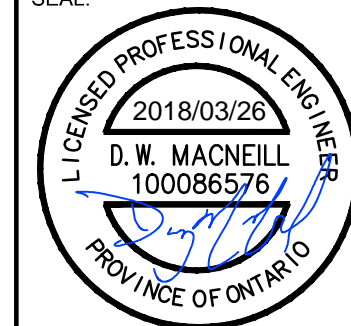
Alternate Anchor Bolt Detail

SCALE: 1:15



REVISIONS:		
NO.	DESCRIPTION	DATE

SEAL:



CLIENT:

FISHERIES AND OCEANS
CANADIAN COAST GUARD

PROJECT:

FOUNDATION FOR 16'-0"
PIPEMAST NAVIGATION
BEACONS

DRAWING:

GENERAL NOTES
DESIGN LOADS
ANCHOR BOLT DETAIL

SCALE: N.T.S.

PLOT SCALE: 1:1

STEM PROJ. NO: 17266

CAD FILE: 17266 s0.0

FORMAT SIZE: 280mmx432mm

DRAWN: TAB

DESIGNED: DMAC

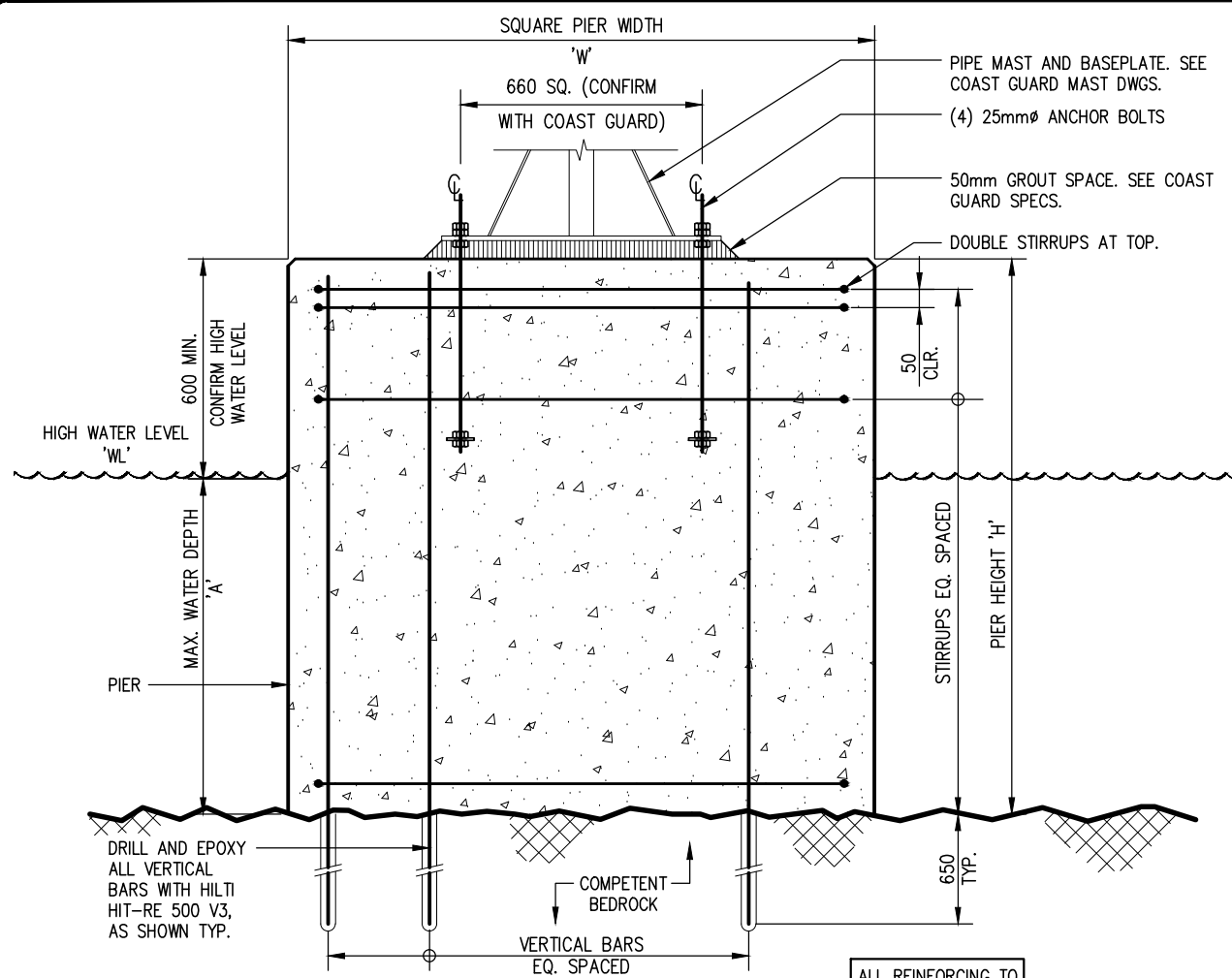
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DATE: 18.03.26

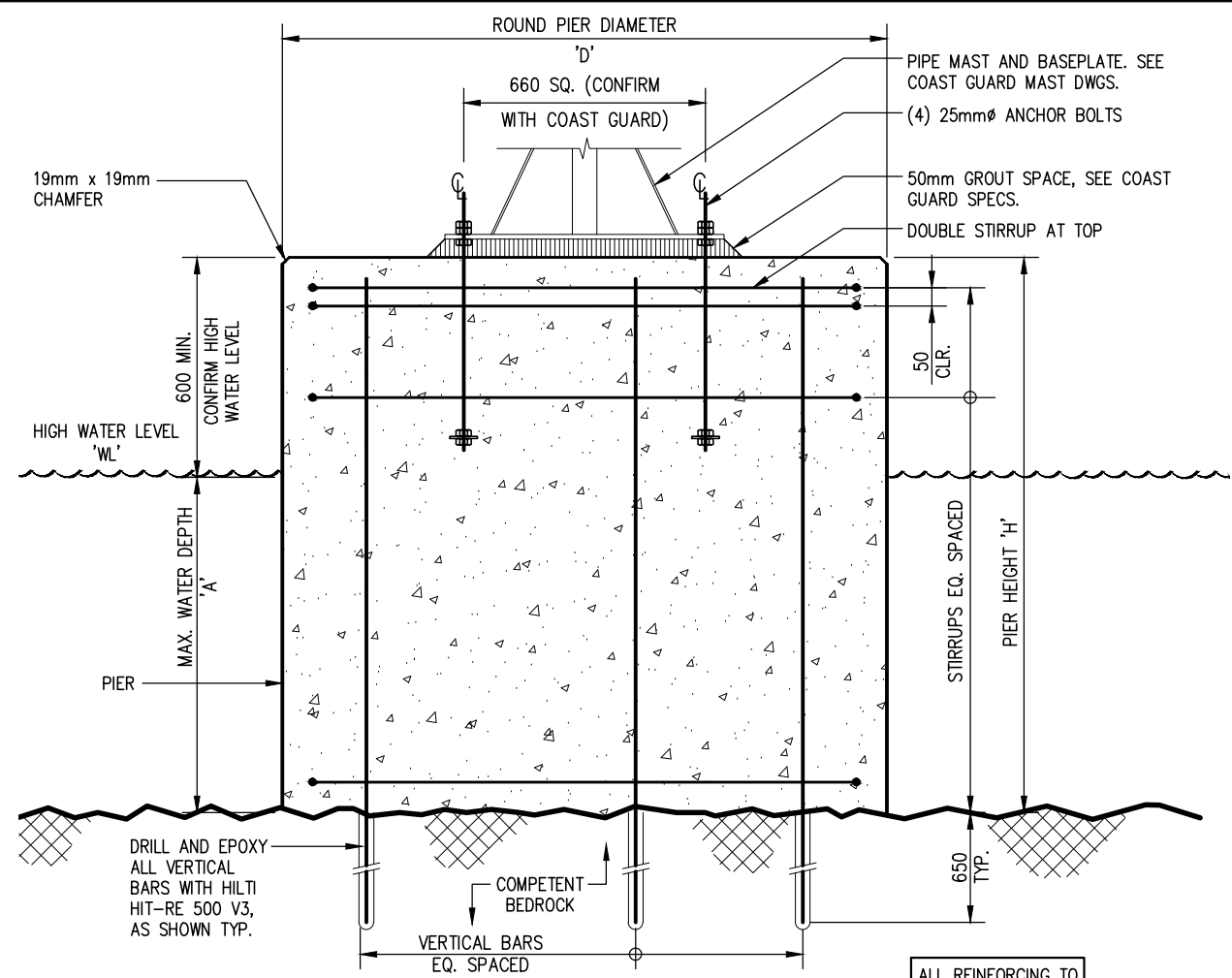
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1 OF 4

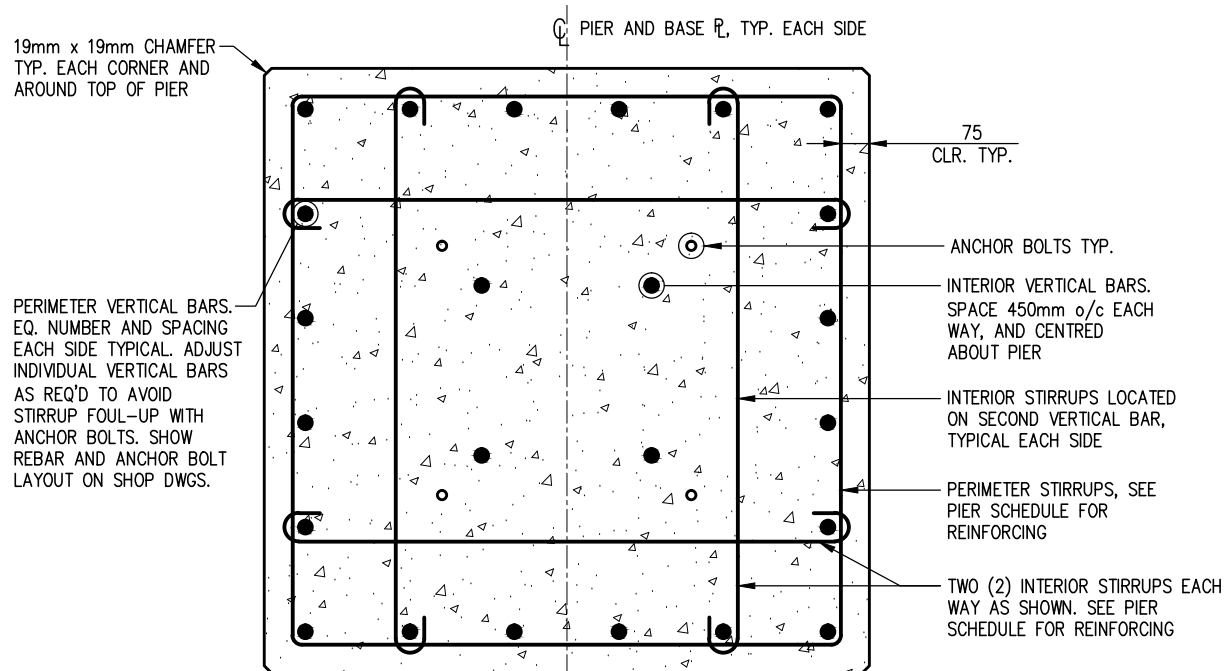
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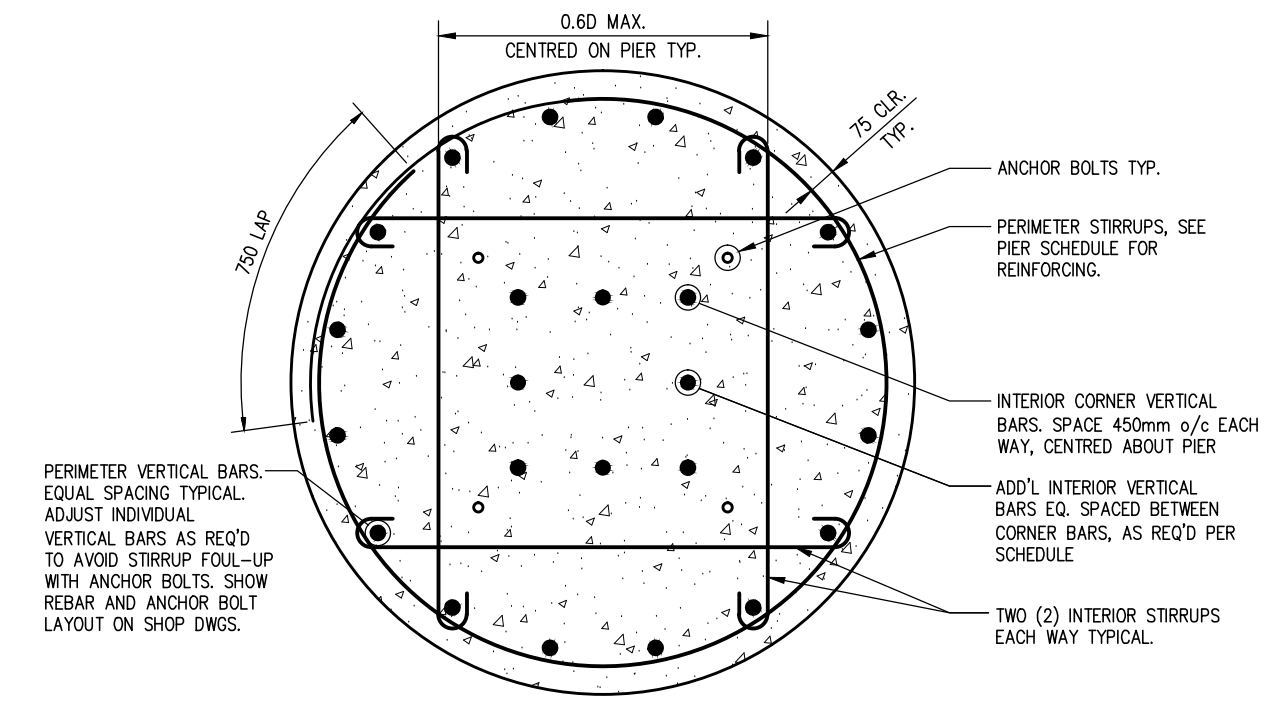
SECTION-VIEW (SQUARE PIER)



SECTION-VIEW (ROUND PIER)



PLAN-VIEW (SQUARE PIER)



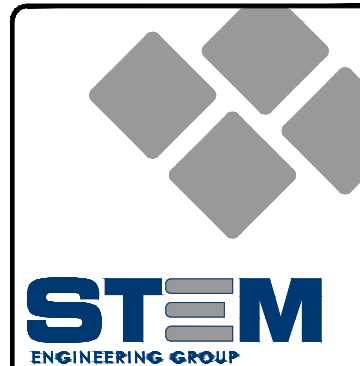
PLAN-VIEW (ROUND PIER)

4.87m (16') PIPEMAST FOUNDATION PIER

SOUTHERN ONTARIO PIER SCHEDULE, SEE DWG. s2.0.
NORTHERN ONTARIO PIER SCHEDULE, SEE DWG. s3.0.

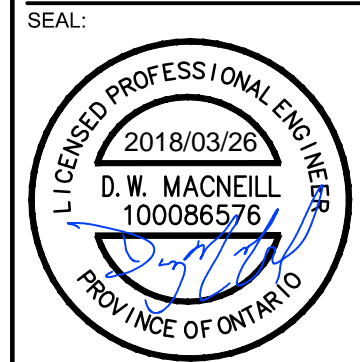
4.87m (16') PIPEMAST FOUNDATION PIER

SOUTHERN ONTARIO PIER SCHEDULE, SEE DWG. s2.0.
NORTHERN ONTARIO PIER SCHEDULE, SEE DWG. s3.0.



REVISIONS:

NO.	DESCRIPTION	DATE



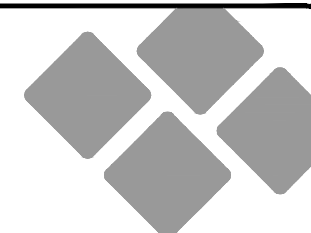
CLIENT:
FISHERIES AND OCEANS
CANADIAN COAST GUARD

PROJECT:
FOUNDATION FOR 16'-0"
PIPEMAST NAVIGATION
BEACONS

DRAWING:
SQUARE PIER DETAILS
ROUND PIER DETAILS

SCALE: AS NOTED
PLOT SCALE: 1:1
STEM PROJ. NO: 17266
CAD FILE: 17266 s1.0
FORMAT SIZE: 280mmx432mm
DRAWN: TAB
DESIGNED: DMAC
CHECKED: DMAC
DATE: 18.03.26

DRAWING:
2 OF 4 **s1.0**



STEM
ENGINEERING GROUP

REVISIONS:		
NO.	DESCRIPTION	DATE

SEAL:



CLIENT:

FISHERIES AND OCEANS
CANADIAN COAST GUARD

PROJECT:

FOUNDATION FOR 16'-0"
PIPEMAST NAVIGATION
BEACONS

DRAWING:

PIER SCHEDULES
NORTHERN ONTARIO

SCALE: AS NOTED
PLOT SCALE: 1:1
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FORMAT SIZE: 280mmx432mm
DRAWN: TAB
DESIGNED: DMAC
CHECKED: DMAC
DATE: 18.03.26

DRAWING:
4 OF 4 **s3.0**

Square Pier: 'Northern Ontario' Classification: North of Ottawa and Extends to Kenora & Big Woods Lake as the Limit



Freezing Index 3000 F° Deg. Days

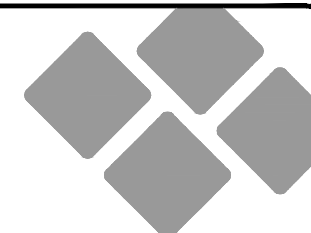
Pier Geometry			Pier Reinforcing				Total Factored Ice & Wind Forces on Base of Pier (S6-06 Bridge Code)			
Water Depth 'A' (m)	Pier Height 'H' (m)	Square Pier Width 'W' (m)	Perimeter Vertical Bars Total	Interior Vertical Bars Total	Perimeter Stirrups Typical	Interior Stirrups Typical	Design Ice thickness (mm)	Vf (kN)	Mf (kN-m)	Tf (kN)
0.000	0.600	1.050	8-25M's	0	15M's @300	0	0	9	22	-43
0.305	0.905	1.050	12-25M's	0	15M's @300	0	305	630	114	139
0.610	1.210	1.200	16-30M's	4-30M's	15M's @300	0	610	1433	456	651
0.915	1.515	1.500	20-35M's	4-35M's	15M's @300	15M's @300	832	2438	1237	1233
1.220	1.820	1.800	24-35M's	4-35M's	15M's @300	15M's @300	832	2924	2373	1220
1.525	2.125	1.900	28-35M's	4-35M's	15M's @300	15M's @300	832	3086	3447	1202
1.830	2.430	2.000	32-35M's	4-35M's	15M's @300	15M's @300	832	3248	4619	1180

Round Pier: 'Northern Ontario' Classification: North of Ottawa and Extends to Kenora & Big Woods Lake as the Limit



Freezing Index 3000 F° Deg. Days

Pier Geometry			Pier Reinforcing				Total Factored Ice & Wind Forces on Base of Pier (S6-06 Bridge Code)			
Water Depth 'A' (m)	Pier Height 'H' (m)	Round Pier Diameter 'D' (m)	Perimeter Vertical Bars Total	Interior Vertical Bars Total	Perimeter Stirrups Typical	Interior Stirrups Typical	Design Ice thickness (mm)	Vf (kN)	Mf (kN-m)	Tf (kN)
0.000	0.600	1.350	8-25M's	0	15M's @300	0	0	9	22	-48
0.305	0.905	1.350	12-25M's	0	15M's @300	0	305	620	113	137
0.610	1.210	1.350	12-30M's	4-30M's	15M's @300	15M's @300	610	1235	396	651
0.915	1.515	1.650	16-35M's	4-35M's	15M's @300	15M's @300	832	2055	1046	1232
1.220	1.820	1.800	20-35M's	4-35M's	15M's @300	15M's @300	832	2241	1824	1223
1.525	2.125	2.000	24-35M's	6-35M's	15M's @300	15M's @300	832	2490	2785	1207
1.830	2.430	2.000	24-35M's	8-35M's	15M's @300	15M's @300	832	2490	3546	1193

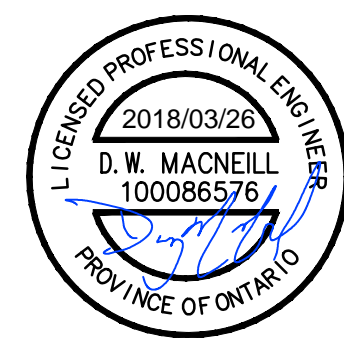


STEM
ENGINEERING GROUP

REVISIONS:

NO.	DESCRIPTION	DATE

SEAL:



CLIENT:
FISHERIES AND OCEANS
CANADIAN COAST GUARD

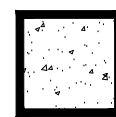
PROJECT:
FOUNDATION FOR 16'-0"
PIPEMAST NAVIGATION
BEACONS

DRAWING:
PIER SCHEDULES
SOUTHERN ONTARIO

SCALE: AS NOTED
PLOT SCALE: 1:1
STEM PROJ. NO: 17266
CAD FILE: 17266 s2.0
FORMAT SIZE: 280mmx432mm
DRAWN: TAB
DESIGNED: DMAC
CHECKED: DMAC
DATE: 18.03.26

DRAWING:
3 OF 4 **s2.0**

Square Pier: 'Southern Ontario' Classification: Ottawa & Huntsville Inclusive and All Areas Extending Southwards



Freezing Index 1800 F° Deg. Days

Pier Geometry			Pier Reinforcing				Total Factored Ice & Wind Forces on Base of Pier (S6-06 Bridge Code)			
Water Depth 'A' (m)	Pier Height 'H' (m)	Square Pier Width 'W' (m)	Perimeter Vertical Bars Total	Interior Vertical Bars Total	Perimeter Stirrups Typical	Interior Stirrups Typical	Design Ice thickness (mm)	Vf (kN)	Mf (kN-m)	Tf (kN)
0.000	0.600	1.050	8-25M's	0	15M's @300	0	0	9	22	-43
0.305	0.905	1.050	12-25M's	0	15M's @300	0	305	630	114	139
0.610	1.210	1.200	16-30M's	0	15M's @300	0	610	1433	456	651
0.915	1.515	1.200	12-35M's	4-35M's	15M's @300	0	644	1512	917	724
1.220	1.820	1.400	16-35M's	4-35M's	15M's @300	0	644	1764	1606	715
1.525	2.125	1.600	20-35M's	4-35M's	15M's @300	15M's @300	644	2015	2447	698
1.830	2.430	1.800	24-35M's	4-35M's	15M's @300	15M's @300	644	2266	3442	674

Round Pier: 'Southern Ontario' Classification: Ottawa & Huntsville Inclusive and All Areas Extending Southwards

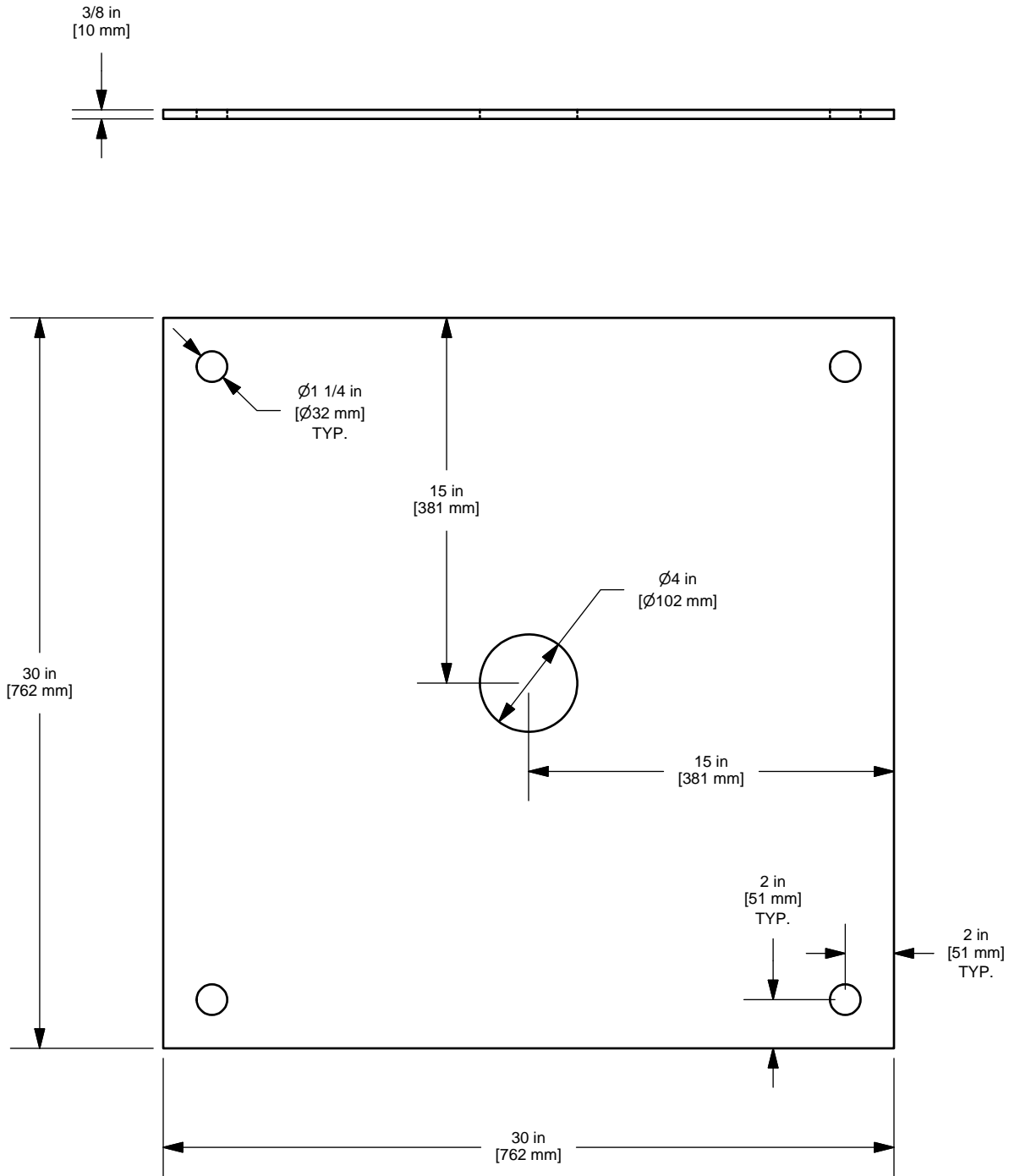


Freezing Index 1800 F° Deg. Days

Pier Geometry			Pier Reinforcing				Total Factored Ice & Wind Forces on Base of Pier (S6-06 Bridge Code)			
Water Depth 'A' (m)	Pier Height 'H' (m)	Round Pier Diameter 'D' (m)	Perimeter Vertical Bars Total	Interior Vertical Bars Total	Perimeter Stirrups Typical	Interior Stirrups Typical	Design Ice thickness (mm)	Vf (kN)	Mf (kN-m)	Tf (kN)
0.000	0.600	1.350	8-25M's	0	15M's @300	0	0	9	22	-48
0.305	0.905	1.350	12-25M's	0	15M's @300	0	305	620	113	137
0.610	1.210	1.350	12-30M's	4-30M's	15M's @300	15M's @300	610	1235	396	651
0.915	1.515	1.500	12-35M's	4-35M's	15M's @300	15M's @300	644	1449	879	724
1.220	1.820	1.500	16-35M's	4-35M's	15M's @300	15M's @300	644	1449	1323	716
1.525	2.125	1.650	18-35M's	4-35M's	15M's @300	15M's @300	644	1593	1940	704
1.830	2.430	1.800	20-35M's	4-35M's	15M's @300	15M's @300	644	1737	2645	688

inches
0
1
2
3
4

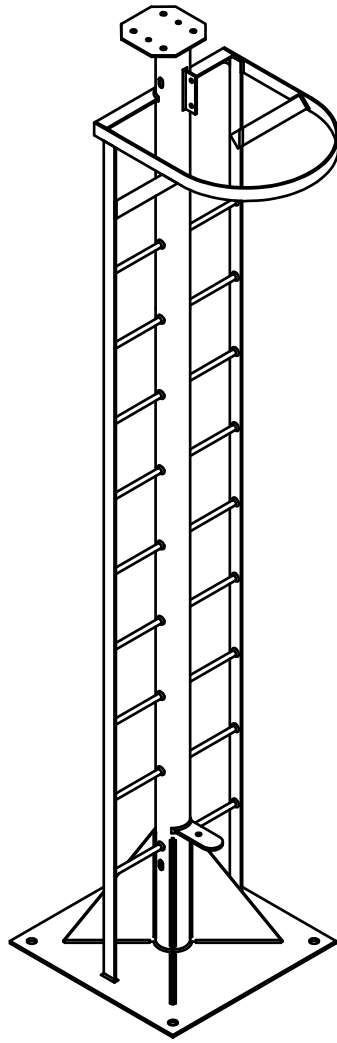
millimètres
0
1
2
3
4
5
6
7
8



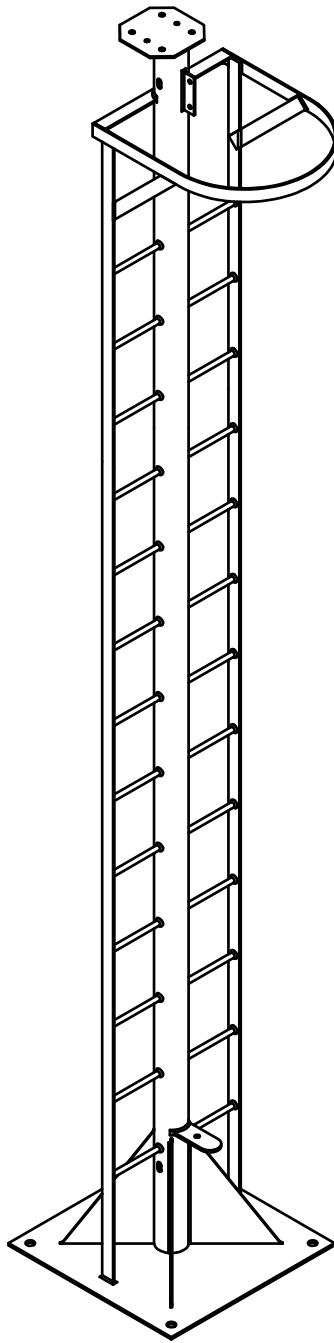
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Asset - Actif 12', 16', AND 20' PIPEMASTS
Drawing - Dessin P5 - BASE PLATE

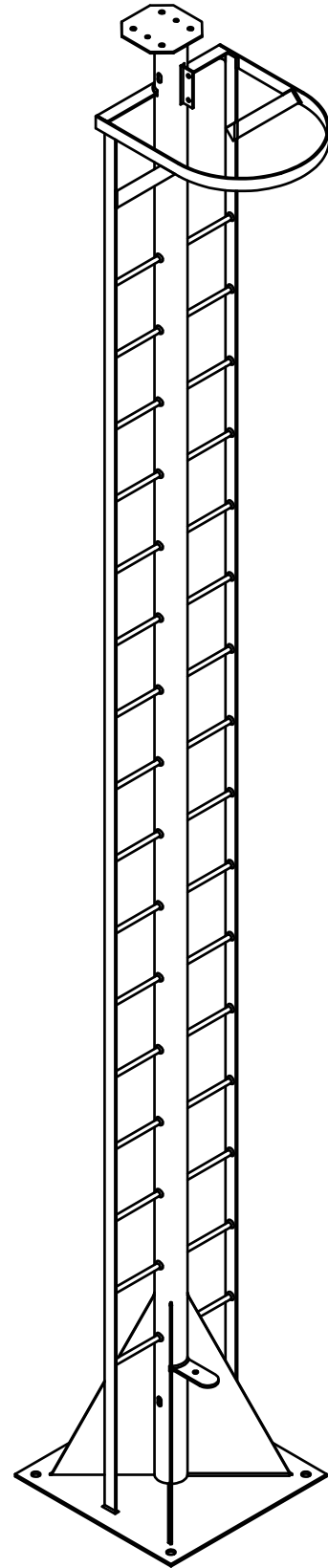
designed - conception BH	date 2017-12-11
approved - approuvé BY	date 2017-12-11
drawing no. - no. dessin EWTM-8010-6	sheet-feuille 10/25
	rev 0



12' PIPEMAST



16' PIPEMAST



20' PIPEMAST

inches 0 1 2 3 4

millimeters 0 1 2 3 4 5 6 7 8

 Fisheries and Oceans
Canada
Canadian
Coast Guard

Pêches et Océans
Canada
Garde côtière
Canadienne

Asset - Actif

12', 16', AND 20' PIPEMASTS

Drawing - Dessin

designed - conception

BH 2017-12-11

approved - approuvé

BY 2017-12-11

drawing no. - no. dessin

EWTM-8010-6

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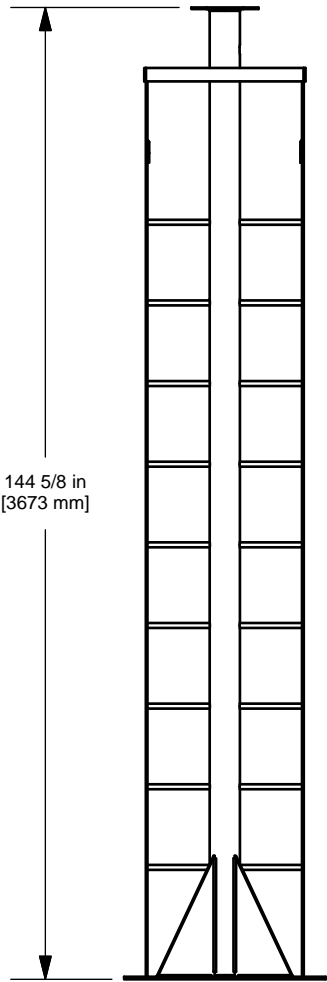
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EWTM-8010-6

scale - échelle
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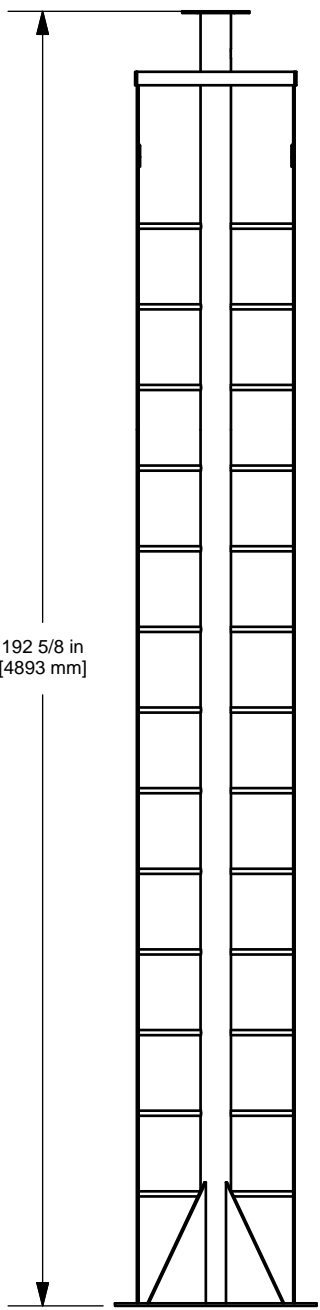
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inches
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1
2
3
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pouces

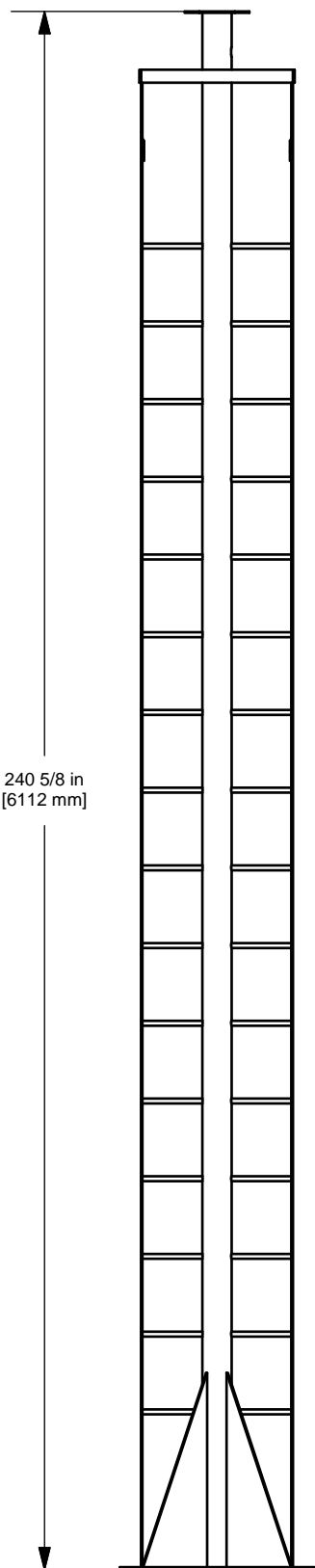
millimeters
0
1
2
3
4
5
6
7
8
millimètres




144 5/8 in
[3673 mm]



192 5/8 in
[4893 mm]



240 5/8 in
[6112 mm]

 Fisheries and Oceans Canada Canadian Coast Guard	Pêches et Océans Canada Garde côtière Canadienne

Asset - Actif	<h3>12', 16', AND 20' PIPEMASTS</h3>		designed - conception	date
Drawing - Dessin			PIPEMAST SIZES	BH
			approved - approuvé	date
			BY	2017-12-11
			drawing no. - no. dessin	sheet-feuille
			EWTM-8010-6	2/25
				rev
				0



Fisheries and Oceans
Canada

Pêches et Océans
Canada

Canadian
Coast Guard

Garde côtière
canadienne



APPENDIX B4: MARINE ACCESS REQUIREMENTS

.1 Marine Access

- .1 Vessel(s) employed in the performance of the contract shall be certified as required by the Canada Shipping Act 2001 and its applicable regulations including Marine Personnel Regulation.
 - .1 The bidder shall ensure that the vessel(s) proposed for the work meets all requirements of the Canada Shipping Act 2001 and the applicable Regulations under the Canada Shipping Act.
 - .2 Bidders shall provide copies of the following documentation to facilitate evaluation and award:
 - .1 Proof of vessel registration as a commercial vessel in accordance with the Canada Shipping Act 2001. Either one of two registrations will be accepted:
 - .1 Proof of commercial vessel registration in the Small Vessel Register (SVR) if less than 15 Gross Tons or;
 - .2 Proof of commercial vessel registration in the Canadian Register of Vessels (CRV) if more than 15 Gross Tons.
 - .3 NOTE: Pleasure Craft and Fishing Vessels are not acceptable for the performance of this work – it must be a commercially registered vessel.
 - .2 Where the vessel is registered in the SVR the bidder shall also provide the following:
 - .1 Copy of vessel certification and any limitations the vessel is operating under. Where the vessel is restricted, the operator shall ensure that the vessel can be used to safely perform the work in this specification;
 - .2 Copy of inspection according to the Small Vessel Compliance Program; Bidder shall submit proof of enrolment in the compliance program and;
 - .3 Either a copy of the initial inspection report or the most recent copy of an annual inspection report and;
 - .4 Copy of the crew certification that will be operating the vessel. Crewing and certification of crew shall be in accordance with the Marine Personnel Regulations, latest edition.
 - .3 Where the vessel is registered in the CRV the bidder shall also provide the following:
 - .1 Copy of the latest Annual Inspection Certificate endorsement and;

- .2 Copy of any restrictions that the vessel is operating under and the general sailing limitations of the vessel. Where the vessel is restricted, the operator shall ensure that the vessel can be used to safely perform the work in this specification;
 - .3 Copies of the crew certification that will be operating the vessel. Crewing and certification of crew shall be in accordance with the Marine Personnel Regulations, latest edition.
- .2 Vessels and crew found to be in contravention of the act will not be permitted to be engaged in any elements of the works identified herein. In the event that a vessel or crew is found non compliant a suitable replacement vessel and/or crew will be retained by the Contractor at their sole expense.