

SPECIFICATION  
WHARF #404 RECONSTRUCTION  
CODROY, NL  
Project No.: 704074  
Issued for Tender

PREPARED FOR:


Department of Fisheries and Oceans  
Small Craft Harbours

DATE:

January 2017

 PROVINCE OF NEWFOUNDLAND PERMIT HOLDER
This Permit Allows
<u>ANDERSON ENGINEERING CONSULTANTS LTD.</u>
To practice Professional Engineering in Newfoundland and Labrador. Permit No. as issued by APEG-NL <u>R0092</u> which is valid for the year <u>2017</u> .



 PROVINCE OF NEWFOUNDLAND PERMIT HOLDER Class "A"
This Permit Allows
<u>CROSBIE ENGINEERING LIMITED</u>
To practice Professional Engineering in Newfoundland and Labrador Permit No. as issued by PEG-NL <u>D0123</u> which is valid for the year <u>2017</u> .



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PART 1 - GENERAL

1.1 SCOPE

- .1 The work covered under this contract consists of, but is not limited to, the furnishing of all plant, labour, equipment and material for wharf reconstruction at Codroy, Newfoundland and Labrador, in strict accordance with specifications and accompanying drawings and subject to all terms and conditions of contract.

1.2 DESCRIPTION OF WORK

- .1 In general, work under this contract consists of, but will not necessarily be limited to, the following:
- .1 Demolition and removal of a 61.6 m timber pile wharf.
  - .2 Supply and installation of a new 48.8 m treated timber crib wharf with timber coping and reinforced concrete deck to the dimensions as indicated on drawings.
  - .3 Supply and installation of Type "B1" mooring cleats, Type "A" mooring cleats, fenders, ladders, wheelguards, and wheelguard blocking.
  - .4 Supply and install three wooden lighting poles c/w bollards.
  - .5 Supply and installation of new electrical shed as shown on accompanying drawings.
  - .6 Supply and installation of scour protection as outlined in project drawings.
  - .7 Supply and installation of rock and gravel fill and shoreline rip rap for uplands developed as shown on drawings.
  - .8 Supply and placement of surface course asphalt as indicated on drawings.
- .2 The new electrical building to be operational prior to removal and decommissioning of the existing electrical systems and existing building.
- .3 All as indicated on accompanying drawings and specifications hereto.

1.3 SITE OF WORK

- .1 Work will be carried out at Codroy, Long Range Mountains District, Newfoundland and Labrador in the location as shown on the accompanying drawings.
-

1.4 DATUM

- .1 Datum used for this project is Lowest Normal Tides (LNT) and is assumed to be 3.072 metres, PWC, BM 2-87, bolt cemented in concrete deck of wharf.
- .2 Bidders are advised to consult the Tide Tables issued by Fisheries and Oceans in order to make sure of the tidal conditions affecting work.
- .3 Confirm BM with Departmental Representative prior to construction.

1.5 FAMILIARIZATION  
WITH SITE

- .1 Before submitting a bid, it is recommended that bidders visit the site and its surroundings to review and verify the form, nature and extent of the work, materials needed for the completion of the work, the means of access to the site, severity, exposure and uncertainty of weather, soil conditions, any accommodations they may require, and in general shall obtain all necessary information as to risks, contingencies and other circumstances which may influence or affect their bid. No allowance shall be made subsequently in this connection on account of error or negligence to properly observe and determine the conditions that will apply.
- .2 Contractors, bidders or those they invite to site are to review specification Section 01 35 29 - Health and Safety Requirements before visiting site. Take all appropriate safety measures for any visit to site, either before or after acceptance of bid.

1.6 CODES AND  
STANDARDS

- .1 Perform work in accordance with the latest edition of the National Building Code of Canada (2015), FCC Standard 373 - Standard for Piers and Wharves and any other code of provincial or local application including all amendments up to project bid closing date provided that in any case of conflict or discrepancy, the more stringent requirements shall apply.
- .2 Materials and workmanship must meet or exceed requirements of specified standards, codes and referenced documents.

- 1.7 TERM ENGINEER .1 Unless specifically stated otherwise, the term Engineer where used in the Specifications and on the Drawings shall mean the Departmental Representative as defined in the General Conditions of the Contract.
- 1.8 SETTING OUT WORK .1 Set grades and layout work in detail from control points and grades established by Departmental Representative.
- .2 Assume full responsibility for and execute complete layout of work to locations, lines and elevations indicated or as directed by Departmental Representative.
- .3 Provide devices needed to layout and construct work.
- .4 Supply such devices as straight edges and templates required to facilitate Departmental Representative's inspection of work.
- .5 Supply stakes and other survey markers required for laying out work.
- 1.9 COST BREAKDOWN .1 Before submitting first progress claim submit breakdown of Contract price in detail as directed by Departmental Representative and aggregating contract price. Departmental Representative will provide the required forms for application of progress payment.
- .2 Provide cost breakdown in same format as the numerical and subject title system used in this specification project manual and thereafter sub-divided into major work components as directed by Departmental Representative.
- .3 Upon approval by Departmental Representative, cost breakdown will be used as basis for progress payment.
- .4 All work items not designated in the unit price table as a measurement for payment, are to be included in the lump sum arrangement, as noted on the Bid and Acceptance Form.
-

1.10 WORK SCHEDULE

- .1 Submit within 7 work days of notification of acceptance of bid, a construction schedule showing commencement and completion of all work within the time stated on the Bid and Acceptance Form and the date stated in the bid acceptance letter.
- .2 Provide sufficient details in schedule to clearly illustrate entire implementation plan, depicting efficient coordination of tasks and resources, to achieve completion of work on time and permit effective monitoring of work progress in relation to established milestones.
- .3 As a minimum, work schedule to be prepared and submitted in the form of Bar (GANTT) Charts, indicating work activities, tasks and other project elements, their anticipated durations and planned dates for achieving key activities and major project milestones provided in sufficient details and supported by narratives to demonstrate a reasonable plan for completion of project within designated time, e.g., show target dates for the placement of each crib, if applicable. Generally Bar Charts derived from commercially available computerized project management system are preferred but not mandatory.
- .4 Submit schedule updates on a minimum monthly basis and more often, when requested by Departmental Representative, due to frequent changing project conditions. Provide a narrative explanation of necessary changes and schedule revisions at each update.
- .5 The schedule, including all updates, shall be to Departmental Representative's approval. Take necessary measures to complete work within approved time. Do not change schedule without Departmental Representative's approval.
- .6 All work on the project will be completed within the time indicated on the Bid and Acceptance Form.

1.11 ABBREVIATIONS

- .1 Following abbreviations of standard specifications have been used in this specification and on the drawings:
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CGSB - Canadian Government Specifications Board  
CSA - Canadian Standards Association  
NLGA - National Lumber Grades Authority  
ASTM - American Society for Testing and Materials

- .2 Where these abbreviations and standards are used in this project, latest edition in effect on date of bid call will be considered applicable.

1.12 QUARRY AND EXPLOSIVES

- .1 Make own arrangements with Provincial authorities and owners of private properties, for the quarrying and transportation of rock and all materials and machinery necessary for work over their property, roads or streets as case may be.

1.13 SITE OPERATIONS

- .1 Arrange for sufficient space adjacent to project site for conduct of operations, storage of materials and so on. Exercise care so as not to obstruct or damage public or private property in area. Do not interfere with normal day-to-day operations in progress at site. All arrangements for space and access will be made by Contractor.
- .2 Remove snow and ice as required to maintain safe access in a manner that does not damage existing structures or interfere with the operations of others.

1.14 PROJECT MEETINGS

- .1 Departmental Representative will arrange project meetings and assume responsibility for setting times and recording minutes.
  - .2 Project meetings will take place on site of work unless so directed by the Departmental Representative.
  - .3 Departmental Representative will assume responsibility for recording minutes of meetings and forwarding copies to all parties present at the meetings.
-

- .4 Have a responsible member of firm present at all project meetings.

1.15 PROTECTION

- .1 Store all materials and equipment to be incorporated into work to prevent damage by any means.
- .2 Repair or replace all materials or equipment damaged in transit or storage to the satisfaction of Departmental Representative and at no cost to Canada.

1.16 DOCUMENTS  
REQUIRED

- .1 Maintain at job site, one copy of the following:
  - .1 Contract Drawings
  - .2 Specifications
  - .3 Addenda
  - .4 Reviewed Shop Drawing
  - .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 Site specific Health and Safety Plan and other safety related documents
  - .11 Other documents as stipulated elsewhere in the Contract Documents.

1.17 PERMITS

- .1 Obtain and pay for all permits, certificates and licenses as required by Municipal, Provincial, Federal and other Authorities.
  - .2 Provide appropriate notifications of project to municipal and provincial inspection authorities.
  - .3 Obtain compliance certificates as prescribed by legislative and regulatory provisions of municipal, provincial and federal authorities as applicable to the performance of work.
  - .4 Submit to Departmental Representative, copy of application submissions and approval documents received for above referenced authorities.
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- .5 Submit to Departmental Representative, copy of quarry permit, if applicable, prior to start of quarry operations.
- .6 Comply with all requirements, recommendations and advise by all regulatory authorities unless otherwise agreed in writing by Departmental Representative. Make requests for such deviations to these requirements sufficiently in advance of related work.

1.18 CUTTING,  
FITTING AND  
PATCHING

- .1 Execute cutting, including excavation, fitting and patching required to make work fit properly.
- .2 Where new work connects with existing and where existing work is altered, cut, patch and make good to match existing work. This includes patching of openings in existing work resulting from removal of existing services.
- .3 Do not cut, bore, or sleeve load-bearing members.
- .4 Make cuts with clean, true, smooth edges. Make patches inconspicuous in final assembly.

1.19 EXISTING SUB-  
SURFACE CONDITIONS

- .1 Information pertaining to the existing sub-surface conditions may be available by contacting the Departmental Representative.
  - .2 Contractors are cautioned that any previous investigations that may be available for review, were intended to provide general site information only. Any interpolation and/or assumptions made relative to any previous investigations is the Contractor's responsibility.
  - .3 See Appendix A - Geotechnical Factual Report, Codroy, NL by Fracflow Consultants Ltd.
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1.20 LOCATION OF  
EQUIPMENT

- .1 Location of cleats, ladders, mooring rings, electrical pedestals, etc., shown or specified shall be considered as approximate. Actual location shall be as required to suit conditions at time of installation and as is reasonable. Obtain approval of Departmental Representative.
- .2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space and in accordance with manufacturer's recommendations for safety, access and maintenance.
- .3 Inform Departmental Representative when impending installation conflicts with other new or existing components. Follow directives for actual location.
- .4 Submit field drawings to indicate relative position of various services and equipment when required by Departmental Representative.

1.21 FISH HABITAT

- .1 This work is being conducted in an area where fish habitat may be affected. Perform work to conform with rules and regulations governing fish habitat and in accordance with authorization for work or undertakings affecting fish habitat.
- .2 Contact the Department of Fisheries and Oceans Fisheries Protection Program at (709) 772-3521, at least 10 days in advance of starting any work on site.

1.22 NOTICE TO  
SHIPPING/MARINERS

- .1 Notify the Marine Communications and Traffic Services' Centre, of Fisheries and Oceans Canada, at (709) 772-2083, ten (10) days prior to commencement and upon completion of the work, in order to allow for the issuance of Notices to Shipping/Mariners.
  - .2 During construction any vessels or barges utilized must be marked in accordance with the provisions of the Canada Shipping Act Collision Regulations.
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1.23 ACCEPTANCE

- .1 Prior to the issuance of the Certificate of Substantial Performance, in company with Departmental Representative, make a check of all work. Correct all discrepancies before final inspection and acceptance.

1.24 WORKS  
COORDINATION

- .1 Responsible for coordinating the work of the various trades, where the work of such trades interfaces with each other.
- .2 Convene meetings between trades whose work interfaces and ensure that they are fully aware of the areas and the extent of where interfacing is required. Provide each trade with the plans and specifications of the interfacing trade, as required, to assist them in planning and carrying out their respective work.
- .3 Canada will not be responsible for or held accountable for any extra costs incurred as a result of the failure to carry out coordination work. Disputes between the various trades as a result of those trades not being informed of the areas and extent of interface work shall be the sole responsibility of the General Contractor and shall be resolved at no extra cost to Canada.

1.25 CONTRACTOR'S  
USE OF SITE

- .1 Construction operations, including storage of materials for this contract, not to interfere with the fishing activity and/or operations at this harbour facility.
  - .2 Responsible for arranging the storage of materials on or off site, and any materials stored at the site which interfere with any of the day to day activities at or near the site will be moved promptly at the Contractor's expense, upon request by Departmental Representative.
  - .3 Contractor will take adequate precautions to protect existing concrete decks and asphalt when operating tracked equipment.
  - .4 Exercise care so as not to obstruct or damage public or private property in the area.
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- .5 At completion of work, restore area to its original condition. Damage to ground and property will be repaired by Contractor. Remove all construction materials, residue, excess, etc., and leave site in a condition acceptable to Departmental Representative.

1.26 WORK  
COMMENCEMENT

- .1 Mobilization to project site is to commence immediately after acceptance of bid and submission of Site Specific Safety Plan, unless otherwise agreed by Departmental Representative.
- .2 Project work on site is to commence as soon as possible, with a continuous reasonable work force, unless otherwise agreed by Departmental Representative.
- .3 Weather conditions, short construction season, delivery challenges and the location of the work site may require the use of longer working days and additional work force to complete the project within the specified completion time.
- .4 Make every effort to ensure that sufficient material and equipment is delivered to site at the earliest possible date after acceptance of bid and replenished as required.

1.27 FACILITY  
SMOKING ENVIRONMENT

- .1 Comply with smoking restrictions.

1.28 INTERPRETATION  
OF DOCUMENTS

- .1 Supplementary to the Order of Precedence article of the General Conditions of the Contract, the Division 01 sections take precedence over the technical specification sections in other Divisions of the Specification Manual.

PART 1 - GENERAL

1.1 GENERAL

- .1 Canada will supply certain material and equipment in the Contract for installation and incorporation into the Work by the Contractor.

1.2 MATERIAL SUPPLIED

- .1 Canada will supply the following materials to the Contract:
- .1 3 - Roadway style light fixtures (686 mm x 257 mm x 330 mm) c/w ballast.
  - .2 3 - Wood pole mounting upswing arms c/w mounting brackets. (1200mm long x 32 mm diameter.

Note: the above noted items are correctly stored at the following address to be picked up by contractor.

DFO Storage Facility  
121 Glencoe Drive  
Donovan's Industrial Park  
Mount Pearl, NL A1N 4S7

Contact Person:

Dion Upward  
Small Craft Harbours, St. John's  
Ph. 709-772-3244  
dion.upward@dfo-mpo.gc.ca

1.3 DELIVERY REQUIREMENTS

- .1 Materials supplied by the Canada will be turned over to the Contractor.
- .2 Within three (3) calendar days after pick-up of Canada-supplied material, the Contractor must:
- .1 Conduct a complete and full verification audit of all materials received, including loose parts and individual components associated with a particular item supplied;
  - .2 Acknowledge, in writing, receipt of such items and;
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.3 Provide copy of any delivery or transportation slips submitted by manufacturer and shipping company.

- .3 Unless shortage of material or damaged items are identified in writing to the Departmental Representative within the above specified verification period, the Contractor will become responsible to supply all missing materials and repair or replace damaged items and missing parts discovered thereafter at own expense.
- .4 Failure of the Contractor to make a complete check of the Canada-supplied material and to acknowledge receipt of same within the specified verification period, shall not relieve contractor of this contractual responsibility to replace or repair any item subsequently found to be missing or damage.
- .5 Departmental Representative will make final determination as to whether an item can be repaired or must be replaced.
- .6 In the event of failure on the part of the Contractor to submit written proof within the specified verification period, Departmental Representative reserves the right to:
  - .1 Proceed with the supply or repair of missing items through independent sources and;
  - .2 Charge costs of such items, including related shipping charges, to Contractor by conduction a financial holdback assessment against the Contract.

1.4 CONTRACTOR'S  
DUTIES

- .1 Pick-up Canada-supplied material, at location indicated.
  - .2 Promptly inspect material. Report missing, damaged or defective items in writing to Departmental Representative in accordance with delivery requirements specified above.
  - .3 Obtain and pay for services to load and transport to site.
  - .4 Unload and handle at site, including lifting, uncrating, etc.
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- .5 Store material on site at a location approved by Departmental Representative. Provide protection against inclement weather and site damage by use of appropriate covers.
- .6 Make all arrangements and pay associated costs to provide temporary storage from date of receipt and until final incorporation into project.
  - .1 Type and location of storage to meet with Departmental Representative's approval.
- .7 Be responsible for the protection of such material against damage, loss, theft and fire from date of receipt, during transportation, loading, unloading, temporary storage and until final installation of work is accepted by the Departmental Representative.
- .8 Any damage or loss of such material shall result in the Contractor being responsible for replacement or repair of equipment at no cost to Canada.
- .9 The decision as to whether damage items may be repaired or must be replaced with new equipment shall be the Departmental Representative's decision.
- .10 Install such material and equipment and incorporate into the work. Perform assembly and make all connections as required to make item functional.
- .11 Dispose of containers, crating and protective covering at an approved disposal site, or as directed by the Departmental Representative.
- .12 All unused components supplied by Canada to be returned to location as identified by Departmental Representative.

PART 1 - GENERAL

- 1.1 SECTION INCLUDES .1 Inspecting and testing by inspecting firms or testing laboratories designated by Departmental Representative.
- 1.2 RELATED REQUIREMENTS SPECIFIED ELSEWHERE .1 Particular requirements for inspection and testing to be carried out by testing laboratory designated by Departmental Representative are specified under various sections.
- 1.3 APPOINTMENT AND PAYMENT .1 Departmental Representative will appoint and pay for services of testing laboratory except for the following:  
.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 Mill tests and certificates of compliance.  
.4 Tests specified to be carried out by Contractor under the supervision of Departmental Representative.  
.5 Tests requested by Departmental Representative to confirm material specifications when the applicable manufacturer's documentation or test results are unavailable.  
.6 Additional tests specified in the following paragraph.
- .2 Where tests or inspections by designated testing laboratory reveal Work not in accordance with contract requirements, pay costs for additional tests or inspections as required by Departmental Representative to verify acceptability of corrected work.
- 1.4 CONTRACTOR'S RESPONSIBILITIES .1 Provide labour, equipment and facilities to: testing.  
.1 Provide access to Work to be inspected and tested.  
.2 Facilitate inspections and tests.
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- .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 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.

PART 1 - GENERAL

1.1 SECTION  
INCLUDES

- .1 Shop drawings and product data.
- .2 Samples.
- .3 Certificates.

1.2 SUBMITTAL  
GENERAL REQUIREMENTS

- .1 Submit to Departmental Representative for review submittals listed, including shop drawings, samples, certificates and other data, as specified in other sections of the Specifications.
  - .2 Submit with reasonable promptness and in orderly sequence so as to allow for Departmental Representative's review and not cause delay in Work. Failure to submit in ample time will not be considered sufficient reason for an extension of Contract Time and no claim for extension by reason of such default will be allowed.
  - .3 Do not proceed with Work until relevant submissions are reviewed by Departmental Representative.
  - .4 Present shop drawings, product data, samples and mock-ups in Metric units.
  - .5 Where items or information is not produced in Metric units, provide soft converted values.
  - .6 Review submittals prior to submission to Departmental Representative. Ensure during review that necessary requirements have been determined and verified, required field measurements or data have been taken, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents.
    - .1 Submittals not stamped, signed, dated and identified as to specific project will be returned unexamined by Departmental Representative and considered rejected.
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- .7 Notify Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
- .8 Verify field measurements and affected adjacent Work are co-ordinated.
- .9 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative's review of submittals.
- .10 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative's review.
- .11 Submit format: paper originals, or alternatively clear and fully legible photocopies of originals. Facsimiles are not acceptable, except in special circumstances pre-approved by Departmental Representative. Poorly printed non-legible photocopies or facsimiles will not be accepted and be returned for resubmission.
- .12 Make changes or revision to submissions which Departmental Representative may require, consistent with Contract Documents and resubmit as directed by Departmental Representative. When resubmitting, notify Departmental Representative in writing of any revisions other than those requested.
- .13 Keep one reviewed copy of each submittal document on site for duration of Work.

1.3 SHOP DRAWINGS  
AND PRODUCT DATA

- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, product data, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.

- .2 Number of Shop Drawings: submit sufficient copies of shop drawings which are required by the General Contractor and sub-contractors plus (2) copies which will be retained by Departmental Representative. Ensure sufficient numbers are submitted to enable one complete set to be included in each of the maintenance manuals specified, if applicable.
- .3 Shop Drawings Content and Format:
  - .1 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where items or equipment attach or connect to other items or equipment, confirm that all interrelated work have been coordinated, regardless of section or trade from which the adjacent work is being supplied and installed.
  - .2 Shop Drawings Format:
    - .1 Opaque white prints or photocopies of original drawings or standard drawings modified to clearly illustrate work specific to project requirements. Maximum sheet size to be 1000 x 707 mm.
    - .2 Product Data from manufacturer's standard catalogue sheets, brochures, literature, performance charts and diagrams, used to illustrate standard manufactured products, to be original full colour brochures, clearly marked indicating applicable data and deleting information not applicable to project.
    - .3 Non or poorly legible drawings, photocopies or facsimiles will not be accepted and returned not reviewed.
  - .3 Supplement manufacturer's standard drawings and literature with additional information to provide details applicable to project.
  - .4 Delete information not applicable to project on all submittals.
- .4 Allow 14 calendar days for Departmental Representative's review of each submission.
- .5 Adjustments or corrections made on shop drawings by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, advise Departmental Representative in writing prior to proceeding with Work.

- .6 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections and comments are made, fabrication and installation may proceed upon receipt of shop drawings. If shop drawings are rejected and noted to be Resubmitted, do not proceed with that portion of work until resubmission and review of corrected shop drawings, through same submission procedures indicated above.
- .7 Accompany submissions with transmittal letter, containing:
  - .1 Date.
  - .2 Project title and number.
  - .3 Contractor's name and address.
  - .4 Identification and quantity of each shop drawing, product data and sample.
  - .5 Other pertinent data.
- .8 Submissions include:
  - .1 Date and revision dates.
  - .2 Project title and number.
  - .3 Name and address of:
    - .1 Subcontractor.
    - .2 Supplier.
    - .3 Manufacturer.
  - .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
  - .5 Cross references to particular details of contract drawings and specifications section number for which shop drawing submission addresses.
  - .6 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.

- .9 After Departmental Representative's review, distribute copies.
- .10 The review of shop drawings by the Departmental Representative or their delegated representative is for sole purpose of ascertaining conformance with general concept. This review shall not mean that Department of Fisheries and Oceans approves the detail design inherent in the 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 the 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 all sub-trades.

1.4 SCHEDULE,  
PERMITS AND  
CERTIFICATES

- .1 Upon acceptance of bid, submit to Departmental Representative copy of Work Schedule and various other schedules, permits, certification documents and project management plans as specified in other sections of the Specifications.
- .2 Submit copy of permits, notices, compliance Certificates received by Regulatory Agencies having jurisdiction and as applicable to the Work.
- .3 Submission of above documents to be in accordance with Submittal General Requirements procedures specified in this section



PART 1 - GENERAL

- 1.1 SECTION INCLUDES .1 Fire Safety Requirements.  
.2 Hot Work Permit.
- 1.2 RELATED WORK .1 Section 01 35 29 - Health and Safety Requirements.
- 1.3 REFERENCES .1 Fire Protection Standards issued by Fire Protection Services of Human Resources Development Canada as follows:  
.1 FCC No. 301-June 1982 Standard for Construction Operations ([http://ccinfoweb2.ccohs.ca/legislation/documents/fp/fcstde/fc301\\_e.htm](http://ccinfoweb2.ccohs.ca/legislation/documents/fp/fcstde/fc301_e.htm)).  
.2 FCC No. 302-June 1982 Standard for Welding and Cutting ([http://ccinfoweb2.ccohs.ca/legislation/documents/fp/fcstde/fc302\\_e.htm](http://ccinfoweb2.ccohs.ca/legislation/documents/fp/fcstde/fc302_e.htm)).  
.2 National Fire Code 2015.  
.3 National Building Code 2015.
- 1.4 DEFINITIONS .1 Hot Work defined as:  
.1 Welding work.  
.2 Cutting of materials by use of torch or other open flame devices.  
.3 Grinding with equipment which produces sparks.  
.4 Use of open flame torches such as for roofing work.
- 1.5 SUBMITTALS .1 Submit copy of Hot Work Procedures and sample of Hot Work permit to Departmental Representative for review, within 14 calendar days after notification of acceptance of bid.
-

1.5 SUBMITTALS  
(Cont'd)

- .2 Submit in accordance with the Submittal General Requirements specified in Section 01 33 00-Submittal Procedures.

1.6 FIRE SAFETY  
REQUIREMENTS

- .1 Implement and follow fire safety measures during Work. Comply with following:
  - .1 National Fire Code, 2015
  - .2 Fire Protection Standards FCC 301 and FCC 302.
  - .3 Federal and Provincial Occupational Health and Safety Acts and Regulations as specified in Section 01 35 29 - Health and Safety Requirements.
- .2 In event of conflict between any provisions of above authorities the most stringent provision will apply. Should a dispute arise in determining the most stringent requirement, Departmental Representative will advise on the course of action to be followed.

1.7 HOT WORK  
AUTHORIZATION

- .1 Obtain Departmental Representative's written "Authorization to Proceed" before conducting any form of Hot work on site.
  - .2 To obtain authorization submit to Departmental Representative:
    - .1 Contractor's typewritten Hot Work Procedures to be followed on site as specified below.
    - .2 Description of the type and frequency of Hot Work required.
    - .3 Sample Hot Work Permit to be used.
  - .3 Upon review and confirmation that effective fire safety measures will be implemented during performance of hot work, Departmental Representative will provide authorization to proceed as follows:
    - .1 Issue one written "Authorization to Proceed" covering the entire project for duration of work or;
    - .2 Separate work, or segregate certain parts of work, into individual entities. Each entity requiring a separately written "Authorization to Proceed" from Departmental Representative. Follow Departmental Representative's directives in this regard.
-

1.7 HOT WORK  
AUTHORIZATION  
(Cont'd)

- .4 Requirement for individual authorization based on:
  - .1 Nature or phasing of work;
  - .2 Risk to Facility operations;
  - .3 Quantity of various trades needing to perform hot work on project or;
  - .4 Other situation deemed necessary by Departmental Representative to ensure fire safety on premises.
- .5 Do not perform any Hot Work until receipt of Departmental Representative's written "Authorization to Proceed" for that portion of work.

1.8 HOT WORK  
PROCEDURES

- .1 Develop and implement safety procedures and work practices to be followed during the performance of Hot Work.
- .2 Procedures to include:
  - .1 Requirement to perform hazard assessment of site and immediate hot work area for each hot work event in accordance with Hazard Assessment and Safety Plan requirements of Section 01 35 29 - Health and Safety Requirements.
  - .2 Use of a Hot Work Permit system for each hot work event.
  - .3 The step by step process of how to prepare and issue permit.
  - .4 Permit shall be issued by Contractor's site Superintendent, or other authorized person designated by Contractor, granting permission to worker or subcontractor to proceed with hot work.
  - .5 Provision of a designated person to carryout a Fire Safety Watch for a minimum of 60 minutes immediately upon completion of the hot work.
  - .6 Compliance with fire safety codes and standards specified herein and occupational health and safety regulations specified in Section 01 35 29 - Health and Safety Requirements.
- .3 Generic procedures, if used, must be edited and supplemented with pertinent information tailored to reflect specific project conditions. Clearly label as being the Hot Work Procedures applicable to this contract.
- .4 Hot Work Procedures shall clearly establish worker instructions and allocate responsibilities of:

- 
- 1.8 HOT WORK PROCEDURES (Cont'd)
- .4 (Cont'd)
    - .1 Worker(s),
    - .2 Authorized person issuing the Hot Work Permit,
    - .3 Fire Safety Watcher,
    - .4 Subcontractors and Contractor.
  - .5 Brief all workers and subcontractors on Hot Work Procedures and Permit system established for project. Stringently enforce compliance.
    - .1 Failure to comply with the established procedures may result in the issuance of a Non-Compliance Notification at Departmental Representative's discretion with possible disciplinary measures imposed as specified in Section 01 35 29 - Health and Safety Requirements.
- 1.9 HOT WORK PERMIT
- 
- .1 Hot Work Permit to include, as a minimum, the following data:
    - .1 Project name and project number.
    - .2 Building name, address and specific room or area where hot work will be performed.
    - .3 Date when permit issued.
    - .4 Description of hot work type to be performed.
    - .5 Special precautions required, including type of fire extinguisher needed.
    - .6 Name and signature of person authorized to issue the permit.
    - .7 Name of worker (clearly printed) to which the permit is being issued.
    - .8 Time Duration that permit is valid (not to exceed 8 hours). Indicate start time and date, and completion time and date.
    - .9 Worker signature with date and time upon hot work termination.
    - .10 Specified time period requiring safety watch.
    - .11 Name and signature of designated Fire Safety Watcher, complete with time and date when safety watch terminated, certifying that surrounding area was under continual surveillance and inspection during the full watch time period specified in Permit and commenced immediately upon completion of Hot Work.
  - .2 Permit to be typewritten form. Industry Standard forms shall only be used if all data specified above is included on form.
-

1.9 HOT WORK  
PERMIT  
(Cont'd)

- .3 Each Hot Work Permit to be completed in full and signed as follows:
  - .1 Authorized person issuing Permit before hot work commences.
  - .2 Worker upon completion of Hot Work.
  - .3 Fire Safety Watcher upon termination of safety watch.
  - .4 Returned to Contractor's Site Superintendent for safe keeping.

1.10 FIRE  
PROTECTION AND  
ALARM SYSTEM

- .1 Fire protection and alarm systems shall not be:
  - .1 Obstructed.
  - .2 Shut-off, unless approved by Departmental Representative.
  - .3 Left inactive at the end of a working day or shift.
- .2 Do not use fire hydrants, standpipes and hose systems for purposes other than firefighting.
- .3 Costs incurred, from the fire department, Facility owner (and tenants), resulting from negligently setting off false alarms will be charged to the Contractor in the form of financial progress payment reductions and holdback assessments against the Contract.

1.11 DOCUMENTS ON  
SITE

- .1 Keep Hot Work Permits and Hazard assessment documentation on site for duration of Work.
- .2 Upon request, make available to Departmental Representative or to authorized safety representative for inspection.

PART 1 - GENERAL

- 1.1 SECTION INCLUDES .1 Procedures to isolate and lockout electrical facility or other equipment from energy source.
- 1.2 RELATED WORK .1 Section 01 35 24 - Special Procedures On Fire Safety Requirements.  
.2 Section 01 35 29 - Health and Safety Requirements.
- 1.3 REFERENCES .1 C22.1-15 - Canadian Electrical Code, Part 1, Safety Standard for Electrical Installations.  
.2 CAN/CSA C22.3 No. 1-15 - Overhead Systems.  
.3 CAN/CSA C22.3 No. 7-15 - Underground Systems.  
.4 COHS, Canada Occupational Health and Safety Regulations made under Part II of the Canada Labour Code.
- 1.4 DEFINITIONS .1 Electrical Facility: means any system, equipment, device, apparatus, wiring, conductor, assembly or part thereof that is used for the generation, transformation, transmission, distribution, storage, control, measurement or utilization of electrical energy, and that has an amperage and voltage that is dangerous to persons.  
.2 Guarantee of Isolation: means a guarantee by a competent person in control or in charge that a particular facility or equipment is isolated.  
.3 De-energize: in the electrical sense, that a piece of equipment is isolated and grounded, e.g. if the equipment is not grounded, it cannot be considered de-energized (DEAD).
-

- .4 Guarded: means that an equipment or facility is covered, shielded, fenced, enclosed, inaccessible by location, or otherwise protected in a manner that, to the extent that is reasonably practicable, will prevent or reduce danger to any person who might touch or go near such item.
- .5 Isolate: means that an electrical facility, mechanical equipment or machinery is separated or disconnected from every source of electrical, mechanical, hydraulic, pneumatic or other kind of energy that is capable of making it dangerous.
- .6 Live/alive: means that an electrical facility produces, contains, stores or is electrically connected to a source of alternating or direct current of an amperage and voltage that is dangerous or contains any hydraulic, pneumatic or other kind of energy that is capable of making the facility dangerous to persons.

1.5 COMPLIANCE  
REQUIREMENTS

- .1 Perform lockouts in compliance with:
  - .1 Canadian Electrical Code (R2015).
  - .2 Federal and Provincial Occupational Health and Safety Acts and Regulations as specified in Section 01 35 29 - Health and Safety Requirements.
  - .3 Regulations and code of practice as applicable to mechanical equipment or other machinery being de-energized.
  - .4 Procedures specified herein.
- .2 In event of conflict between any provisions of above authorities the most stringent provision will apply. Should a dispute arise in determining the most stringent requirement, Departmental Representative will advise on the course of action to be followed.

1.6 SUBMITTALS

- .1 Submit copy of proposed Lockout Procedures and sample form of lockout permit or lockout tags for review.
  - .2 Submit documentation within 7 calendar days of acceptance of bid. Do not proceed with work until submittal has been reviewed by Departmental Representative.
-

- .3 Submit above documents in accordance with the submittal requirements specified in Section 01 33 00- Submittal Procedures.
- .4 Resubmit Lockout Procedures with noted revisions as may result from Departmental Representative's review.

1.7 ISOLATION OF  
EXISTING SERVICES

- .1 Obtain Departmental Representative's written authorization prior to conducting work on an existing active, energized service or facility required as part of the work and before proceeding with lockout of such services or facility.
  - .2 To obtain authorization, submit to Departmental Representative the following documentation:
    - .1 Written Request for Isolation of the service or facility and;
    - .2 Copy of Contractor's Lockout Procedures.
  - .3 Make a Request for Isolation for each event, unless directed otherwise by Departmental Representative, and as follows:
    - .1 Fill-out standard forms in current use at the Facility when so directed by Departmental Representative or;
    - .2 Where no form exists at Facility, make request in writing identifying:
      - .1 Identification of system or equipment to be isolated, including it's location;
      - .2 Time duration, indicating Start time and date, and Completion time and date when isolation will be in effect;
      - .3 Voltage of service feed to system or equipment being isolated;
      - .4 Name of person making the request.
    - .3 Document to be in typewritten format.
  - .4 Do not proceed until receipt of written notification from Departmental Representative granting the Isolation Request and authorizing to proceed with the isolation of designated equipment or facility. Departmental Representative may designate other individual at the Facility as the person authorized to grant the Isolation Request.
-



- .5 Conduct safe, orderly shut down of equipment or facilities, de-energize and isolate power and other sources of energy and lockout items in accordance with requirement of clause 1.8 below.
- .6 Plan and schedule shut down of existing services in consultation with the Departmental Representative and the Facility Manager. Minimize impact and downtime of facility operations.
- .7 Determine in advance, as much as possible, in cooperation with the Departmental Representative, the type and frequency of situations which will require a Request for Isolation. Follow Departmental Representative's directives in this regard.
- .8 Conduct hazard assessment as part of the planning process of isolating existing equipment and facilities. Hazard Assessments to conform with requirements of Health and Safety Section 01 35 29- Health and Safety Requirements.

1.8 LOCKOUTS

- .1 Isolate and lockout electrical facilities, mechanical equipment and machinery from all potential energy sources prior to starting work on such items.
  - .2 Develop and implement lockout procedures to be followed on site as an integral part of the Work.
  - .3 Use energy isolation lockout devices specifically designed and appropriate for type of facility or equipment being locked out.
  - .4 Use industry standard lockout tags.
  - .5 Provide appropriate safety grounding and guards as required.
  - .6 Prepare Lockout Procedures in writing. Describe safe work practices, work functions and sequence of activities to be followed on site to safely isolate all potential energy sources and lockout/tagout facilities and equipment.
-

- .7 Include within procedures a system of worker request and issuance of individual lockout permit by a person, employed by Contractor, designated to be "in-charge" and being responsible for:
    - .1 Controlling issuance of permits or tags to workers.
    - .2 Determining permit duration.
    - .3 Maintaining record of permits and tags issued.
    - .4 Submitting a Request for Isolation to Departmental Representative when required in accordance with Clause 1.7 above.
    - .5 Designating a Safety Watcher, when one is required based on type of work.
    - .6 Ensuring equipment or facility has been properly isolated, providing a Guarantee of Isolation to worker(s) prior to proceeding with work.
    - .7 Collecting and safekeeping lockout tags, returned by workers, as a record of the event.
  - .8 Clearly establish, describe and allocate, within procedures, the responsibilities of:
    - .1 Workers.
    - .2 Designated person controlling issuance of lockout tags/permits.
    - .3 Safety Watcher.
    - .4 Subcontractors and General Contractor.
  - .9 Procedures shall meet the requirements of Codes and Regulations specified in clause 1.5 above.
  - .10 Generic procedures, if used, must be edited, supplemented with pertinent information and tailored to reflect specific project conditions. Clearly label as being the procedures applicable to this contract.
    - .1 Incorporate site specific rules and procedures established by Facility Manager and in force at site. Obtain such procedures through Departmental Representative.
  - .11 Procedures to be in typewritten format.
  - .12 Submit copy of Lockout Procedures to Departmental Representative, in accordance with submittal requirements of clause 1.6 herein, prior to commencement of work.
-

1.9 CONFORMANCE

- .1 Ensure that lockout procedures, as established for project on site, are stringently followed. Enforce use and compliance by all workers.
- .2 Brief all persons working on electrical facilities, mechanical and other equipment fed by an energy source on requirements of this section.
- .3 Failure to perform lockouts in accordance with regulatory requirements or follow procedures specified herein may result in the issuance of a Non-Compliance Notification at Departmental Representative's discretion with possible disciplinary measures imposed as specified in Section 01 35 29 - Health and Safety Requirements.

1.10 DOCUMENTS ON  
SITE

- .1 Post Lockout Procedures on site in common location for viewing by workers.
- .2 Keep copies of Request for Isolation submitted to Departmental Representative and lockout permits or tags issued to workers during the course of work for full project duration.
- .3 Upon request, make such data available to Departmental Representative or to authorized safety representative for inspection.

PART 1 - GENERAL

- 1.1 RELATED WORK .1 Section 01 35 24 - Special Procedures on Fire Safety Requirements.
- 1.2 DEFINITIONS .1 COSH: Canada Occupational Health and Safety Regulations made under Part II of the Canada Labour Code.
- .2 Competent Person: means a person who is:  
.1 Qaulified by virtue of personal knowledge, training and experience to perform assigned work in a manner that will ensure the health and safety of persons in the workplace, and;  
.2 Knowledge about the provisions of occupational health and safety statutes and regulations that apply to the Work and;  
.3 Knowledgeable about potential or actual danger to health and safety associated with the Work.
- .3 Medical Aid Injury: any minor injury for which medical treatment was provided and the cost of which is covered by Workers' Compensation Board of the province in which the injury was incurred.
- .4 PPE: personal protective equipment.
- .5 Work Site: where used in this section shall mean areas, located at the premises where Work is undertaken, used by Contractor to perform all of the activities associated with the performance of the Work.
- 1.3 SUBMITTALS .1 Make submittals in accordance with Section 01 33 00.
- .2 Submit site-specific Health and Safety Plan prior to commencement of Work.  
.1 Submit within 10 work days of notification of Bid Acceptance. Provide 3 copies. Allow for 5-10 days for Departmental review and recommendations prior to the commencement of work.
-

1.3 SUBMITTALS  
(Cont'd)

- .2 (Cont'd)
  - .2 Departmental Representative will review Health and Safety Plan and provide comments.
  - .3 Revise the Plan as appropriate and resubmit within 5 work days after receipt of comments.
  - .4 Departmental Representative's review and comments made of the Plan shall not be construed as an endorsement, approval or implied warranty of any kind by Canada and does not reduce Contractor's overall responsibility for Occupational Health and Safety of the Work.
  - .5 Submit revisions and updates made to the Plan during the course of Work.
- .3 Submit name of designated Health & Safety Site Representative and support documentation specified in the Safety Plan.
- .4 Submit building permit, compliance certificates and other permits obtained.
- .5 Submit copy of Letter in Good Standing from Provincial Workers Compensation or other department of labour organization.
  - .1 Submit update of Letter of Good Standing whenever expiration date occurs during the period of Work.
- .6 Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.
- .7 Submit copies of incident reports.
- .8 Submit WHMIS MSDS - Material Safety Data Sheets.

1.4 COMPLIANCE  
REQUIREMENTS

- .1 Comply with the Occupational Health and Safety Act for the Province of Newfoundland and Labrador, and the Occupational Health and Safety Regulations made pursuant to the Act.
  - .2 Comply with Canada Labour Code Part II, (entitled Occupational Health and Safety) and the Canada Occupational Safety and Health Regulations (COSH) as well as any other regulations made pursuant to the Act.
    - .1 The Canada Labour Code can be viewed at:  
<http://laws.justice.gc.ca/eng/L-2/>.
-

1.4 COMPLIANCE  
REQUIREMENTS  
(Cont'd)

- .2 (Cont'd)
  - .2 COSH can be viewed at:  
<http://laws.justice.gc.ca/eng/SOR-86-304/ne.html>.
  - .3 A copy may be obtained at: Canadian Government Publishing Public & Works & Government Services Canada Ottawa, Ontario, K1A 0S9 Tel: (819) 956-4800 (1-800-635-7943) Publication No. L31-85/2000 E or F).
- .3 Treasury Board of Canada Secretariat (TBS):
  - .1 Treasury Board, Fire Protection Standard April 1, 2010  
[www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=17316&section=text](http://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=17316&section=text).
- .4 Canadian Standards Association (CSA):
  - .1 CSA S350-M1980(R2003), Code of Practice for Safety in Demolition of Structures.
- .5 Observe construction safety measures of:
  - .1 Part 8 of National Building Code 2015.
  - .2 Provincial Worker's Compensation Board.
  - .3 Municipal by-laws and ordinances.
- .6 In case of conflict or discrepancy between any specified requirements, the more stringent shall apply.
- .7 Maintain Workers Compensation Coverage in good standing for duration of Contract. Provide proof of clearance through submission of Letter of Good Standing.
- .8 Medical Surveillance: Where prescribed by legislation or regulation, obtain and maintain worker medical surveillance documentation.

1.5 RESPONSIBILITY

- .1 Be responsible for health and safety of persons on site, safety of property and for protection of persons and environment adjacent to the site to extent that they may be affected by conduct of the Work.
-

1.5 RESPONSIBILITY  
(Cont'd)

- .2 Comply with and enforce compliance by all workers, sub-contractors and other persons granted access to work site with safety requirements of Contract Documents, applicable Federal, Provincial, and local by-laws, regulations, and ordinances, and with site specific Health and Safety Plan.

1.6 SITE CONTROL  
AND ACCESS

- .1 Control the work and entry points to Work Site. Approve and grant access only to workers and authorized persons.
- .1 Departmental Representative will provide names of those persons authorized by Departmental Representative to enter onto Work Site and will ensure that such authorized personnel have the required knowledge and training on Health and Safety pertinent to their reason for being at the site, however, Contractor remains responsible for the health and safety of authorized persons while at the Work Site.
- .2 Isolate work site from other areas of the premises by use of appropriate means.
- .1 Erect fences, hoarding, barricades and temporary lighting as required to effectively delineate the Work Site, stop non-authorized entry, and to protect pedestrians and vehicular traffic around and adjacent to the Work and create a safe environment.
- .2 Post signage at entry points and other strategic locations indicating restricted access and conditions for access.
- .3 Use professionally made signs with bilingual message in the 2 official languages or international know graphic symbols.
- .3 Provide safety orientation session to persons granted access to Work site. Advise of hazards and safety rules to be observed while on site.
- .4 Ensure persons granted site access wear appropriate personal protective equipment (PPE). Supply PPE to inspection authorities who require access to conduct tests or perform inspections.
- .5 Secure Work Site against entry when inactive or unoccupied and to protect persons against harm. Provide security guard where adequate protection cannot be achieved by other means.
-

- 1.7 PROTECTION
- .1 Give precedence to safety and health of persons and protection of environment over cost and schedule considerations for Work.
  - .2 Should unforeseen or peculiar safety related hazard or condition become evident during performance of work, immediately take measures to rectify the situation and prevent damage or harm. Advise Departmental Representative verbally and in writing.
- 1.8 FILING OF NOTICE
- .1 File Notice of Project with pertinent provincial health and safety authorities prior to beginning of Work.
    - .1 Departmental Representative will assist in locating address if needed.
- 1.9 PERMITS
- .1 Post permits, licenses and compliance certificates, specified in Section 01 10 10 at work site.
  - .2 Where particular permit or compliance certificate cannot be obtained, notify Departmental Representative in writing and obtain approval to proceed before carrying out application portion of work.
- 1.10 HAZARD ASSESSMENTS
- .1 Perform site specific health and safety hazard assessment of the work and its site.
  - .2 Carry out initial assessment prior to commencement of work with further assessments as needed during progress of work, including when new trades and subcontractors arrive on site.
  - .3 Record results and address in Health and Safety Plan.
  - .4 Keep documentation on site for entire duration of the Work.
-



1.11 PROJECT/SITE  
CONDITIONS

- .1 The following are known for potential project related safety hazards at site:
  - .1 Working in close proximity of water.
  - .2 Wet and slippery conditions.
  - .3 Inclement weather.
  - .4 Rock moving activities involving large armour stone.
  - .5 Heavy equipment activity.
  - .6 Heavy lifting.
  - .7 Working at heights.
  - .8 Cutting tools and other construction power tools.
  - .9 Overhead and underground power/utility lines.
  - .10 Risk of electric shock.
  - .11 Vehicular and pedestrian traffic.
  - .12 Hot/cold temperature extremes.
  - .13 Work with hazardous products.
- .2 Above list shall not be construed as being complete and inclusive of potential health, and safety hazards encountered during work.
- .3 Include above items into hazard assessment process.
- .4 MSDS Data sheets of pertinent hazardous and controlled products stored on site can be obtained from Departmental Representative.

1.12 MEETING

- .1 Attend pre-construction health and safety meeting, convened and chaired by Departmental Representative, prior to commencement of Work, at time, date and location determined by Departmental Representative. Ensure attendance of:
    - .1 Superintendent of work.
    - .2 Designated Health and Safety Site Representative.
    - .3 Subcontractors.
  - .2 Conduct regularly scheduled tool box and safety meetings during the work in conformance with Occupational Health and Safety Regulations.
  - .3 Keep documents on site.
-

1.13 HEALTH AND  
SAFETY PLAN

- .1 Prior to commencement of Work, develop written Health and Safety Plan specific to the Work. Implement, maintain, and enforce Plan for entire duration of Work and until final demobilization from site:
  - .2 Health and Safety Plan shall include the following components:
    - .1 List of health risks and safety hazards identified by hazard assessment.
    - .2 Control measures used to mitigate risks and hazards identified.
    - .3 On-Site Contingency and Emergency Response Plan as specified below.
    - .4 On-Site Communications Plan as specified below.
    - .5 Name of Contractor's designated Health & Safety Site Representative and information showing proof of his/her competence and reporting relationship in Contractor's company.
    - .6 Names, competence and reporting relationship of other supervisory personnel used in the Work for occupational health and safety purposes.
  - .3 On-site Contingency and Emergency Response Plan shall include:
    - .1 Operational procedures, evacuation measures and communication process to be implemented in the event of an emergency.
    - .2 Evacuation Plan: site and floor plan layouts showing escape routes, marshaling areas. Details on alarm notification methods, fire drills, location of fire fighting equipment and other related data.
    - .3 Name, duties and responsibilities of persons designated as Emergency Warden(s) and deputies.
    - .4 Emergency Contacts: name and telephone number of officials from:
      - .1 General Contractor and subcontractors.
      - .2 Pertinent Federal and Provincial Departments and Authorities having jurisdiction.
      - .3 Local emergency resource organizations.
    - .5 Harmonize Plan with Facility's Emergency Response and Evacuation Plan. Departmental Representative will provide pertinent data including name or DFO and Facility Management contacts.
  - .4 On-site Communication Plan:
-



1.14 SAFETY  
SUPERVISION  
(Cont'd)

- .3 Health & Safety Site Representative must:
  - .1 Be qualified and competent person in occupational health and safety.
  - .2 Have site-related working experience specific to activities of the Work.
  - .3 Be on Work Site at all times during execution of the Work.
  - .4 All supervisory personnel assigned to the Work shall also be competent persons.
  - .5 Inspections:
    - .1 Conduct regularly scheduled safety inspections of the Work on a minimum bi-weekly basis. Record deficiencies and remedial action taken.
    - .2 Conduct Formal Inspections on a minimum monthly basis. Use standardized safety inspection forms. Distribute to subcontractors.
    - .3 Follow-up and ensure corrective measures are taken.
  - .6 Cooperate with Facility's Occupational Health and Safety representative should one be designated by Departmental Representative.
  - .7 Keep inspection reports and supervision related documentation on site.

1.15 TRAINING

- .1 Use only skilled workers on Work Site who are effectively trained in occupational health and safety procedures and practices pertinent to their assigned task.
- .2 Maintain employee records and evidence of training received. Make data available to Departmental Representative upon request.
- .3 When unforeseen or peculiar safety-related hazard, or condition occur during performance or Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of Province having jurisdiction and advise Departmental Representative verbally and in writing.

1.16 MINIMUM SITE  
SAFETY RULES

- .1 Notwithstanding the requirement to abide by federal and provincial health and safety regulations; ensure the following minimum safety rules are obeyed by persons granted access to Work Site:
  - .1 Wear appropriate personnel protective equipment (PPE) pertinent to the work or assigned task; minimum being hard hat, safety footwear, safety glasses and hearing protection.
  - .2 Immediately report unsafe condition at site, near-miss accident, injury and damage.
  - .3 Maintain site and storage areas in a tidy condition free of hazards causing injury.
  - .4 Obey warning signs and safety tags.
- .2 Brief persons of disciplinary protocols to be taken for non-compliance. Post rules on site.

1.17 CORRECTION OF  
NON-COMPLIANCE

- .1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Departmental Representative.
- .2 Provide Departmental Representative with written report of action taken to correct non-compliance of health and safety issues identified.
- .3 Departmental Representative will stop Work if non-compliance of health and safety regulations is not corrected in a timely manner.

1.18 INCIDENT  
REPORTING

- .1 Investigate and report the following incidents to Departmental Representative:
    - .1 Incidents requiring notification to Provincial Department of Occupational Safety and Health, Workers Compensation Board or to other regulatory Agency.
    - .2 Medical aid injuries.
    - .3 Property damage in excess of \$10,000.00.
    - .4 Interruptions to Facility operations resulting in an operational loss to a Federal Department in excess of \$5000.00.
  - .2 Submit report in writing.
-

1.19 HAZARDOUS  
PRODUCTS

- .1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS).
- .2 Keep MSDS data sheets for all products delivered to site.
  - .1 Post on site.
  - .2 Submit copy to Departmental Representative.

1.20 TOOL AND  
EQUIPMENT SAFETY

- .1 Routinely check and maintain tools, equipment and machinery for safe operation.
- .2 Conduct checks as part of site safety inspections. When requested, submit proof that checks and maintenance have been carried out.
- .3 Tag and immediately remove from site items found faulty or defective.

1.21 BLASTING

- .1 Blasting or other use of explosives is not permitted on site without prior receipt of written permission and instructions from Departmental Representative.
- .2 Do blasting operations in accordance with local and provincial codes.

1.22 POWDER  
ACTUATED DEVICES

- .1 Use powder actuated fastening devices only after receipt of written permission from Departmental Representative.

1.23 CONFINED  
SPACES

- .1 Abide by occupational health and safety regulations regarding work in confined spaces.
  - .2 Obtain an Entry Permit in accordance with Part XI of the Canada Occupational Health and Safety Regulations for entry into an existing identified confined space located at the Facility or premises of Work.
    - .1 Obtain permit from Facility Manager.
    - .2 Keep copy of permit issued.
    - .3 Safety for Inspectors:
-

1.23 CONFINED  
SPACES  
(Cont'd)

- .2 (Cont'd)
- .3 (Cont'd)
  - .1 Provide PPE and training to Departmental Representative and other persons who require entry into confined space to perform inspections.
  - .2 Be responsible for efficacy of equipment and safety of persons during their entry and occupancy in the confined space.

1.24 SITE RECORDS

- .1 Maintain on work site a copy of safety regulated documentation and reports stipulated to be produced in compliance with Acts and Regulations of authorities having jurisdiction and of those documents specified herein.
- .2 Upon request, make available to Departmental Representative, or authorized safety officer for inspection.

1.25 POSTING OF  
DOCUMENTS

- .1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on Work Site in accordance with Acts and Regulations of Province having jurisdiction.
- .2 Post other documents as specified herein, including:
  - .1 Site specific Health and Safety Plan.
  - .2 WHMIS data sheets.

1.26 DIVING  
OPERATIONS

- .1 All diving work to comply fully with the requirements of CSA Z275.2-11, "Occupational Safety Code for Diving Operations", CSA Z275.4-12, "Competency Standards for Diving Operations" and CSA Z180.1-13, "Compressed Breathing Air and Systems."
  - .2 Dive personnel must meet the minimum competency requirements of the CSA Z275.4-12 and all divers must possess a valid Category 1 Diving Certificate or an Unrestricted Surface-supplied Certificate.
  - .3 Diving in free-swim mode is not permitted at the work site.
-

1.26 DIVING  
OPERATIONS  
(Cont'd)

- .4 Divers must have a current (less than one year) validated medical examination certificate(s) from a licensed Diving Physician in Newfoundland and Labrador who is knowledgeable and competent in diving and hyperbaric medicine, for all dives.



PART 1 - GENERAL

- 1.1 RELATED SECTIONS .1 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- 1.2 DEFINITIONS .1 Hazardous Material: Product, substance, or organism that is used for its original purpose; and that is either dangerous goods or a material that may cause adverse impact to the environment or adversely affect health of persons, animals, or plant life when released into the environment.
- 1.3 FIRES .1 Fires and burning of rubbish on site are not permitted.
- 1.4 DISPOSAL OF WASTES AND HAZARDOUS MATERIALS .1 All creosote/CCA or preservative treated timber obtained from the demolition of the existing structure is to be transported and disposed of at the Norris Arm Regional Waste Disposal Facility only, pending prior approval from the site owner/operator (Norris Arm WMF 709-653-2900) and in accordance with applicable federal/provincial and municipal legislation and regulations. Reuse/storage of creosote/CCA or preservative treated timbers outside of the work site is strictly prohibited. See Appendix B - Project Effects Determination Report.
- .2 Dredged/excavated sediments/soils from the project are to be disposed of at an approved provincial landfill only, pending approval from the site owner/operator. Disposal of sediments must be done so in accordance with applicable federal/provincial legislation. Sediments are not permitted to be reused or disposed of at any other location other than a provincial landfill. See Appendix B - Project Effects Determination Report.
- .3 Do not bury rubbish and waste materials on site. Dispose at approved landfill sites as specified in Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
-

1.4 DISPOSAL OF  
WASTES AND  
HAZARDOUS MATERIALS  
(Cont'd)

- .4 Do not dispose of hazardous waste or volatile materials, such as mineral spirits, paints, thinners, oil or fuel into waterways, storm or sanitary sewers or waste landfill sites.
- .5 Store, handle and dispose of hazardous materials and hazardous waste in accordance with applicable federal and provincial laws, regulations, codes and guidelines.
- .6 Dispose of construction waste materials and demolition debris, resulting from work, at approved landfill sites only. Carryout such disposal in strict accordance with provincial and municipal rules and regulations. Separate out and prevent improper disposal of items banned from landfills.
- .7 Establish methods and undertake construction practices which will minimize waste and optimize use of construction materials. Separate at source all construction waste materials, demolition debris and product packaging and delivery containers into various waste categories in order to maximize recycling abilities of various materials and avoid disposal of debris at landfill site(s) in a "mixed state". Where recycling firms, specializing in recycling of specific materials exist, transport such materials to the recycling facility and avoid disposal at landfill sites.
- .8 Communicate with landfill operator prior to commencement of work, to determine what specific construction, demolition and renovation waste materials have been banned from disposal at the landfill and at transfer stations.

1.5 DRAINAGE

- .1 Provide temporary drainage and pumping as necessary to keep excavations and site free from water.
- .2 Do not pump water containing suspended materials into waterways, sewer or drainage systems.
- .3 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with governing regulations and requirements.

- 1.5 DRAINAGE  
(Cont'd)
- .4 Pumped water must meet applicable federal, provincial, and municipal standards before it can be discharged to a surface water body. If regulatory guidelines exceedences are noted, the Departmental Representative has the right to issue stop pumping instructions to the Contractor. Contractor will not be compensated for any delays associated with retrofitting equipment to meet guidelines.
  - .5 Provide control devices such as filter fabrics, sediment traps and settling ponds to control drainage and prevent erosion of adjacent land. Maintain in good order for duration of work.
- 1.6 PERMIT
- .1 All guidelines and instructions stated on permits must be strictly adhered to.
- 1.7 WORK ADJACENT  
TO WATERWAYS
- .1 Do not operate construction equipment in waterways.
  - .2 Do not use waterway beds for borrow material.
  - .3 Do not dump excavated fill, waste material or debris in waterways.
  - .4 At borrow sites, design and construct temporary crossings to minimize erosion to waterways in strict conformance with provincial and federal environmental regulations.
  - .5 Do not skid logs or construction materials across waterways.
  - .6 Do not refuel any type of equipment within 100 m of a water body. Maintain equipment in good working condition with no fluid leaks, loose hoses or fittings.
- 1.8 POLLUTION  
CONTROL
- .1 Maintain temporary erosion and pollution control features installed under this contract.
  - .2 Control emissions from equipment and plant to local authorities' emission requirements.
-



PART 1 - GENERAL

1.1 SECTION  
INCLUDES

- .1 Inspection and testing, administrative and enforcement requirements.
- .2 Tests and mix designs.
- .3 Mock-ups.
- .4 Mill tests.
- .5 Equipment and system adjust and balance.

1.2 RELATED  
SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 78 00 - Closeout Submittals.

1.3 INSPECTION

- .1 Facilitate Departmental Representative's access to Work. If part of Work is being fabricated at locations other than construction site, make preparations to allow access to such Work whenever it is in progress.
  - .2 Give timely notice requesting inspection of Work designated for special tests, inspections or approvals by Departmental Representative or by inspection authorities having jurisdiction.
  - .3 If Contractor covers or permits to be covered Work designated for special tests, inspections or approvals before such is made, uncover Work until particular inspections or tests have been fully and satisfactorily completed and until such time as Departmental Representative gives permission to proceed. Pay costs to uncover and make good such Work.
  - .4 In accordance with the General Conditions, Departmental Representative may order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents.
-

1.4 INDEPENDENT  
INSPECTION AGENCIES

- .1 Departmental Representative will engage and pay for service of Independent Inspection and Testing Agencies for purpose of inspecting and testing portions of Work except for the following which remain part of Contractor's responsibilities:
  - .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 as specified within various sections designated to be carried out by Contractor under the supervision of Departmental Representative.
  - .6 Additional tests specified in Clause 1.4.2.
- .2 Where tests or inspections by designated Testing Agency reveal work not in accordance with contract requirements, Contractor shall pay costs for additional tests or inspections as Departmental Representative may require to verify acceptability of corrected work.
- .3 Employment of inspection and testing agencies by Departmental Representative does not relax responsibility to perform Work in accordance with Contract Documents.

1.5 ACCESS TO WORK

- .1 Furnish labour and facility to provide access to the work being inspected and tested.
- .2 Co-operate to facilitate such inspections and tests.
- .3 Make good work disturbed by inspections and tests.

1.6 PROCEDURES

- .1 Notify Departmental Representative sufficiently in advance of when work is ready for tests, in order for Departmental Representative to make attendance arrangements with Testing Agency. When directed by Departmental Representative, notify such Agency directly.
-

- .2 Submit representative samples of materials specified to be tested. Deliver in required quantities to Testing Agency. Submit with reasonable promptness and in an orderly sequence so as not to cause delay in Work.
- .3 Provide labour and facilities to obtain and handle samples on site. Provide sufficient space on site for Testing Agency's exclusive use to store equipment and cure test samples.

1.7 REJECTED WORK

- .1 Remove and replace defective Work, whether result of poor workmanship, use of defective or damaged products and whether incorporated in Work or not, which has been identified by Departmental Representative as failing to conform to Contract Documents.
- .2 Make good damages to existing or new work, including work of other Contracts, resulting from removal or replacement of defective work.

1.8 TESTING BY CONTRACTOR

- .1 Provide all necessary instruments, equipment and qualified personnel to perform tests designated as Contractor's responsibilities herein or elsewhere in the Contract Documents.
- .2 At completion of test, turn over 2 copies of fully documented test reports to Departmental Representative. Additionally, obtain other copies in sufficient quantities to enable one complete set of test reports to be placed in each of the maintenance manuals specified in Section 01 78 00 - Closeout Submittals.
- .3 Submit mill test certificates and other certificates as specified in various sections.
- .4 Furnish test results and mix designs as specified in various sections.

1.9 MOCK-UPS

- .1 Prepare mock-ups for Work specifically requested in various trade sections. Include in each mock-up all related work components representative of final assembly.
- .2 Construct in locations acceptable to Departmental Representative.
- .3 Prepare mock-ups for Departmental Representative's review with reasonable promptness and in orderly sequence, so as not not to cause any delay 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, Departmental Representative will assist in preparing schedule fixing dates for preparation.
- .6 Remove mock-up at conclusion of Work or when acceptable to Departmental Representative unless approval is given to remain as part of Work.



PART 1 - GENERAL

- 1.1 ACCESS
- .1 Provide and maintain adequate access to project site.
  - .2 Maintain access roads for duration of contract and make good damage resulting from Contractors' use of roads.
- 1.2 CONTRACTOR'S SITE OFFICE
- .1 Be responsible for and provide own site office, if required, including electricity, heat, lights and telephone. Locate site office as directed by Departmental Representative.
- 1.3 DEPARTMENTAL REPRESENTATIVE'S SITE OFFICE
- .1 Provide or construct a separate site office for the use of the Departmental Representative and the Site Representative. The building must be in place prior to commencement of work.
  - .2 Provide heating system to maintain 22°C inside temperature at -20°C outside temperature.
  - .3 The building will be approximately 2400 mm x 3600 mm. It will have a suitable frame covered with a weatherproof siding and lined with plywood or other approved material. The floor will be of 19 mm thick material. It will be provided with suitable window with at least 1 m<sup>2</sup> of glass and arranged to provide at least 0.5 m<sup>2</sup> of screened opening. The door will be fitted with a lockset and 2 keys.
  - .4 The office will be equipped with a drafting chair and a 900 mm x 1500 mm table having a hinged, smooth wooden top suitable for drafting.
  - .5 Install electrical lighting system to provide minimum 750 lux using surface mounted, shielded commercial fixtures with 10% upward light component.
  - .6 Maintain office in clean condition.
-

- .7 Arrange and pay for telephone and facsimile machine in the Departmental Representative's Office for Site Representative's exclusive use. Long distance calls or faxes placed on this phone by the Departmental Representative or the Site Representative will be paid by the Contractor.
- .8 Contractor may, on approval of Departmental Representative, provide cellular or mobile phone. If approval to use cellular or mobile phone is granted, be responsible for all services, airtime, license and network access fees, and all other fees or charges required to utilize the phone as intended by the manufacturer.

1.4 SANITARY FACILITIES

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

1.5 POWER

- .1 Arrange, pay for and maintain temporary electrical power supply in accordance with governing regulations and ordinances.
- .2 Supply and install all temporary facilities for power such as pole lines and underground cables to approval of local power supply authority.

1.6 WATER SUPPLY

- .1 Arrange, pay for and maintain temporary water supply in accordance with governing regulations and ordinances.

1.7 SCAFFOLDING

- .1 Design, construct and maintain scaffolding in rigid, secure and safe manner in accordance with Z797-09 (R 2014).
- .2 Erect scaffolding independent of walls. Remove when no longer required.

1.8 CONSTRUCTION  
SIGN AND NOTICES

- .1 Contractor or subcontractor advertisement signboards are not permitted on site.
- .2 Only notices of safety or instructions are permitted on site.
- .3 Safety and Instruction Signs and Notices:
  - .1 Signs and notices for safety and instruction shall be in both official languages. Graphic symbols shall conform to CAN/CSA-Z321-96 (R2006).
- .4 Maintenance and Disposal of Site Signs:
  - .1 Maintain approved signs and notices in good condition for duration of project and dispose of off site on completion of project or earlier if directed by Departmental Representative.

1.9 REMOVAL OF  
TEMPORARY  
FACILITIES

- .1 Remove temporary facilities from site when directed by Departmental Representative.

PART 1 - GENERAL

- 1.1 SECTION INCLUDES
- .1 Barriers.
  - .2 Traffic Controls.
- 1.2 INSTALLATION AND REMOVAL
- .1 Provide temporary controls in order to execute Work expeditiously.
  - .2 Remove from site all such work after use.
- 1.3 HOARDING
- .1 Erect temporary site enclosures using 1.8 m high x 2.4 m long welded wire galvanized mesh panel with end post of 32 mm dia. galvanized tubes. Each panel shall have a "hook" end or clamp system to engage the top of the adjoining panel post. Panel support base plate of 12 ga. galvanized steel plate with double "stems" to engage and support tube frame ends.
  - .2 Provide (2) swing frame gates using galvanized steel tube 50 mm and vertical and horizontal bars rigid frame wire mesh to match fence panels. Provide hinge to structurally support all gates without deformation during opening and closing. Latch to be clamp on gravity system that is self-latching. Provide one drop bar to secure in closed position and padlock for night security. Keys to be supplied to Departmental Representative.
  - .3 Secure fencing at established boundary lines inside property lines as shown on drawings and/or determined by Departmental Representative. Second base plates to ground with 15 mm x 250 mm long (2 per plate) lag screws placed into existing asphalt. After removal, fill holes with cold patch.
- 1.4 GUARD RAILS AND BARRICADES
- .1 Provide secure, rigid guard rails and barricades around open excavations.
-

- .2 Provide barricades along wharf structure when wheelguard is not in place.
- .3 Provide as required by governing authorities.

1.5 ACCESS TO SITE

- .1 Provide and maintain access to adjacent harbour facilities.

1.6 PUBLIC TRAFFIC FLOW

- .1 Provide and maintain competent signal flag operators, traffic signals, barricades and flares, lights, or lanterns as required to perform Work and protect the public.

1.7 FIRE ROUTES

- .1 Maintain access to property including overhead clearances for use by emergency response vehicles.

1.8 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

- .1 Protect surrounding private and public property from damage during performance of Work.
- .2 Be responsible for damage incurred.

PART 1 - GENERAL

1.1 DESCRIPTION

- .1 This section specifies requirements for board, lodgings and related services to be provided by the Contractor for the Inspector.
- .2 Due to the location of this site, it is a requirement of this contract that the Contractor provide and pay for all board and lodgings for the Inspector's sole use for the duration of the project. Provide for and maintain acceptable living accommodations on site for the Inspector's sole use. The minimum requirement would be a self-contained unit with private sleeping accommodation and shower or bath or other arrangement approved by the Inspector.

1.2 BOARD AND LODGINGS

- .1 For the purpose of this contract board and lodgings shall include but not necessarily be limited to: sleeping accommodation, meals and dining facilities, washroom facilities, laundry facilities, electrical and heating service, linens and bedding, etc. and any reasonable service as directed by the Inspector.
- .2 Board and lodgings must be approved by the Inspector and Contractor will cooperate in providing all services required to maintain an acceptable standard of living during construction period.
- .3 The Contractor shall include all calendar days, including weekends and statutory holidays in determining the cost.

1.3 REQUIREMENTS OF REGULATORY AGENCIES

- .1 Comply with any or all applicable Agencies regulation of the Province of Newfoundland and Labrador, relating to the set up, servicing and maintenance of accommodations for the Inspector.
- .2 Obtain and pay for any permits which may be required and comply to regulations of same.

PART 1 - GENERAL

1.1 GENERAL

- .1 Use new material and equipment unless otherwise specified.
- .2 Within 7 days of written request by Departmental Representative, submit following information for any materials and products proposed for supply:
  - .1 name and address of manufacturer;
  - .2 trade name, model and catalogue number;
  - .3 performance, descriptive and test data;
  - .4 manufacturer's installation or application instructions;
  - .5 evidence of arrangements to procure;
  - .6 evidence of manufacturer delivery problems or unforeseen delays.
- .3 Provide material and equipment of specified design and quality, performing to published ratings and for which replacement parts are readily available.
- .4 Use products of one manufacturer for equipment or material of same type or classifications unless otherwise specified.
- .5 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.2 PRODUCT QUALITY  
AND REFERENCED  
STANDARDS

- .1 Contractor shall be solely responsible for submitting relevant technical data and independent test reports to confirm whether a product or system proposed for use meets contract requirements and specified standards.
- .2 Final decision as to whether a product or system meets contract requirements rest solely with the Departmental Representative in accordance with the General Conditions.

1.3 ACCEPTABLE  
MATERIALS AND  
ALTERNATIVES

- .1 Acceptable Materials: When materials specified include trade names or trade marks or manufacturer's or supplier's name as part of the material description, select and only use one of the names listed for incorporation into the Work.
- .2 Alternative Materials: Submission of alternative materials to trade names or manufacturer's names specified must be done during the bidding period following procedures indicated in the Instructions to Bidders.
- .3 Substitutions: After acceptance of bid, substitution of a specified material will be dealt with as a change to the Work in accordance with the General Conditions of the Contract.

1.4 MANUFACTURERS  
INSTRUCTIONS

- .1 Unless otherwise specified, comply with manufacturer's latest printed instructions for materials and installation methods to be used. Do not rely on labels or enclosure provided with products. Obtain written instructions directly from manufacturers.
- .2 Notify Departmental Representative in writing of any conflict between these specifications and manufacturers instructions, so that Departmental Representative will designate which document is to be followed.

1.5 AVAILABILITY

- .1 Immediately notify Departmental Representative in writing of unforeseen or unanticipated material delivery problems by manufacturer. Provide support documentation as per Clause 1.1.2 above.

1.6 WORKMANSHIP

- .1 Ensure quality of work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed.
  - .2 Remove unsuitable or incompetent workers from site as stipulated in General Conditions.
-



- .3 Ensure cooperation of workers in laying out work. Maintain efficient and continuous supervision on site at all times.
- .4 Coordinate work between trades and subcontractors.
- .5 Coordinate placement of openings, sleeves and accessories.

1.7 FASTENINGS -  
GENERAL

- .1 Provide metal fastenings and accessories in same texture, colour and finish as base metal in which they occur. Prevent electrolytic action between dissimilar metals. Use non-corrosive fasteners, anchors and spacers for securing exterior work and in humid areas.
- .2 Space anchors within limits of load bearing or shear capacity and ensure that they provide positive permanent anchorage. Wood or organic material plugs not acceptable.
- .3 Keep exposed fastenings to minimum, space evenly and lay out neatly.
- .4 Fastenings which cause spalling or cracking of material to which anchorage is made, are not acceptable.
- .5 Do not use explosive actuated fastening devices unless approved by Departmental Representative. See Section 01 35 29 - Health and Safety Requirements in this regard.

1.8 FASTENINGS -  
EQUIPMENT

- .1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.
  - .2 Use heavy hexagon heads, semi-finished unless otherwise specified.
  - .3 Bolts may not project more than one diameter beyond nuts.
  - .4 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.
-

1.9 STORAGE,  
HANDLING AND  
PROTECTION

- .1 Deliver, handle and store materials in manner to prevent deterioration and soiling and in accordance with manufacturer's instructions when applicable.
- .2 Store packaged or bundled materials in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work. Provide additional cover where manufacturer's packaging is insufficient to provide adequate protection.
- .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 and 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 Immediately remove damaged or rejected materials from site.
- .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.

PART 1 - GENERAL

- 1.1 GENERAL
- .1 Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.
  - .2 Store volatile waste in covered metal containers, and remove from premises at end of each working day.
  - .3 Prevent accumulation of wastes which create hazardous conditions.
  - .4 Provide adequate ventilation during use of volatile or noxious substances.
- 1.2 MATERIALS
- .1 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- 1.3 CLEANING DURING CONSTRUCTION
- .1 Maintain project grounds and public properties in condition, free from accumulations of waste material and debris. Clean areas on a daily basis.
  - .2 Provide on-site garbage containers for collection of waste materials and debris.
  - .3 Remove waste materials and debris from site on a daily basis.
- 1.4 FINAL CLEANING
- .1 In preparation for acceptance of the Work perform final cleaning.
  - .2 Inspect finishes, fitments and equipment. Ensure specified workmanship and operation.
  - .3 Broom clean exterior paved and concrete surfaces; rake clean other surfaces of grounds.

PART 1 - GENERAL

- 1.1 RELATED SECTIONS
- .1 Section 01 35 43 - Environmental Procedures.
  - .2 Section 02 41 16 - Sitework, Demolition and Removal.
- 1.2 WASTE MANAGEMENT PLAN
- .1 Prior to commencement of work, prepare waste Management Workplan.
  - .2 Workplan to include:
    - .1 Waste audit.
    - .2 Waste reduction practices.
    - .3 Material source separation process.
    - .4 Procedures for sending recyclables to recycling facilities.
    - .5 Procedures for sending non-salvageable items and waste to approved waste processing facility or landfill site.
    - .6 Training and supervising workforce on waste management at site.
  - .3 Workplan to incorporate waste management requirements specified herein and in other sections of the Specifications.
  - .4 Develop Workplan in collaboration with all subcontractors to ensure all waste management issues and opportunities are addressed.
- 1.3 WASTE AUDIT
- .1 At project start-up, conduct waste audit of:
    - .1 Site conditions identifying salvageable and non-salvageable items and waste resulting from demolition and removal work.
    - .2 Projected waste resulting from product packaging and from material leftover after installation work.
  - .2 Develop written list. Record type, composition and quantity of various salvageable items and waste anticipated, reasons for waste generation and operational factors which contribute to waste.
-

- 1.4 WASTE REDUCTION
- .1 Based on waste audit, develop waste reduction program.
  - .2 Structure program to prioritize actions, with waste reduction as first priority, followed by salvage and recycling effort, then disposal as solid waste.
  - .3 Identify materials and equipment to be:
    - .1 Protected and turned over to Departmental Representative when indicated.
    - .2 Salvaged for resale by Contractor.
    - .3 Sent to recycling facility.
    - .4 Sent to waste processing/landfill site for their recycling effort.
    - .5 Disposed of in approved landfill site.
  - .4 Reduce construction waste during installation work. Undertake practices which will minimize waste and optimize full use of new materials on site, such as:
    - .1 Use of a central cutting area to allow for easy access to off-cuts;
    - .2 Use of off-cuts for blocking and bridging elsewhere.
    - .3 Use of effective and strategically placed facilities on site for storage and staging of left-over or partially cut materials to allow for easy incorporation into work whenever possible avoiding unnecessary waste.
  - .5 Develop other strategies and innovative procedures to reduce waste such as minimizing the extent of packaging used for delivery of materials to site, etc.
- 1.5 MATERIALS SOURCE SEPARATION PROCESS
- .1 Develop and implement material source separation process at commencement of work as part of mobilization and waste management at site.
  - .2 Provide on-site facilities to collect, handle, and store anticipated quantities of reusable, salvageable and recyclable materials.
    - .1 Use suitable containers for individual collection of items based on intended purpose.
    - .2 Locate to facilitate deposit but without hindering daily operations of existing building tenants.
-

.3 Clearly mark containers and stockpiles as to purpose and use.

- .3 Perform demolition and removal of existing components and equipment following a systematic deconstruction process.
    - .1 Separate materials and equipment at source, carefully dismantling, labelling and stockpiling alike items for the following purposes:
      - .1 Reinstallation into the work where indicated.
      - .2 Salvaging reusable items not needed in project which Contractor may sell to other parties. Sale of such items not permitted on site.
      - .3 Sending as many items as possible to locally available recycling facility.
      - .4 Segregating remaining waste and debris into various individual waste categories for disposal in a "non-mixed state" as recommended by waste processing/landfill sites.
  - .4 Isolate product packaging and delivery containers from general waste stream. Send to recycling facility or return to supplier/manufacturer.
  - .5 Send leftover material resulting from installation work for recycling whenever possible.
  - .6 Establish methods whereby hazardous and toxic waste materials, and their containers, encountered or used in the course work are properly isolated, stored on site and disposed in accordance with applicable laws and regulations from authorities having jurisdiction.
  - .7 Isolate and store existing materials and equipment identified for re-incorporation into the Work. Protect against damage.
- 
- 1.6 WORKER TRAINING AND SUPERVISION
    - .1 Provide adequate training to workforce, through meetings and demonstrations, to emphasize purpose and worker responsibilities in carrying out the Waste Management Plan.

- .2 Waste Management Coordinator: designate full-time person on site, experienced in waste management and having knowledge of the purpose and content of Waste Management Plan to:
  - .1 Oversee and supervise waste management during work.
  - .2 Provide instructions and directions to all workers and subcontractors on waste reduction, source separation and disposal practices.
- .3 Post a copy of Plan in a prominent location on site for review by workers.

1.7 CERTIFICATION  
OF MATERIAL  
DIVERSION

- .1 Submit to Departmental Representative, copies of certified weigh bills from authorized waste processing sites and sale receipts from recycling/reuse facilities confirming receipt of building materials and quantity of waste diverted from landfill.
- .2 Submit data at pre-determined project milestones as determined by Departmental Representative.
- .3 Compare actual quantities diverted from landfill with projections made during waste audit.

1.8 DISPOSAL  
REQUIREMENTS

- .1 All creosote/CCA or preservative treated timber obtained from the demolition of the existing structure is to be transported and disposed of at the Norris Arm Regional Waste Disposal Facility only, pending prior approval from the site owner/operator (Norris Arm WMF 709-653-2900) and in accordance with applicable federal/provincial and municipal legislation and regulations. Reuse/storage of creosote/CCA or preservative treated timbers outside of the work site is strictly prohibited.
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1.8 DISPOSAL  
REQUIREMENTS  
(Cont'd)

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- .2 "Dredged/excavated sediments from the project are to be disposed of at an approved provincial landfill only, pending prior approval from the site owner/operator. Disposal of sediments must be done so in accordance with applicable federal/provincial legislation. Sediments are not permitted to be reused or disposed of at any other location other than a provincial landfill. Appendix B - Project Affects Determination Report.
  - .3 Burying or burning of rubbish and waste materials is prohibited.
  - .4 Disposal of waste, volatile materials, mineral spirits, oil, paint, paint thinner or unused preservative material into waterways, storm, or sanitary sewers is prohibited.
  - .5 Do not dispose of preservative treated wood through incineration.
  - .6 Do not dispose of preservative treated wood with other materials destined for recycling or reuse.
  - .7 Dispose of treated wood, end pieces, wood scraps and sawdust at a sanitary landfill.
  - .8 Dispose of waste only at approved waste processing facility or landfill sites approved by authority having jurisdiction.
  - .9 Contact the authority having jurisdiction prior to commencement of work, to determine what, if any, demolition and construction waste materials have been banned from disposal in landfills and at transfer stations. Take appropriate action to isolate such banned materials at site of work and dispose in strict accordance with provincial and municipal regulations.
  - .10 Transport waste intended for landfill in separated condition, following rules and recommendations of Landfill Operator in support of their effort to divert, recycle and reduce amount of solid waste placed in landfill.
-



- .11 Collect, bundle and transport salvaged materials to be recycled in separated categories and condition as directed by recycling facility. Ship materials only to approved recycling facilities.
- .12 Sale of salvaged items by Contractor to other parties not permitted on site.

PART 1 - GENERAL

1.1 SECTION  
INCLUDES

- .1 Project Record Documents as follows:
  - .1 As-built drawings;
  - .2 As-built specifications;
  - .3 Reviewed shop drawings.

1.2 PROJECT RECORD  
DOCUMENTS

- .1 Departmental Representative will provide two white print sets of contract drawings and two copies of Specifications Manual specifically for "as-built" purposes.
- .2 Maintain at site one set of the contract drawings and specifications to record actual as-built site conditions.
- .3 Maintain up-to-date, real time as-built drawings and specifications in good condition and make available for inspection by the Departmental Representative at any time during construction.
- .4 As-Built Drawings:
  - .1 Record changes in red ink on the prints. Mark only on one set of prints and at completion of project and prior to final inspection, neatly transfer notations to second set (also by use of red ink). Submit both sets to Departmental Representative. All drawings of both sets shall be stamped "As-Built Drawings" and be signed and dated by Contractor.
  - .2 Show all modifications, substitutions and deviations from what is shown on the contract drawings or in specifications.
  - .3 Record following information:
    - .1 Horizontal and vertical location of various elements in relation to CHS Chart Datum.
    - .2 Field changes of dimension and detail.
    - .3 All design elevations, sections, and details dimensioned and marked-up to consistently report finished installation conditions.

.4 Any details produced in the course of the contract by the Departmental Representative to supplement or to change existing design drawings must also be marked-up and dimensioned to reflect final as-built conditions and appended to the as-built drawing document.

.5 All change orders issued over the course of the contract must be documented on the finished as-built documents, accurately and consistently depicting the changed condition as it applies to all affected drawing details.

- .5 As-built Specifications: legibly mark in red each item to record actual construction, including:
  - .1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly items substituted from that specified.
  - .2 Changes made by Addenda and Change Orders.
  - .3 Mark up both copies of specifications; stamp "as-built", sign and date similarly to drawings as per above clause.
- .6 Maintain As-built documents current as the contract progresses. Departmental Representative will conduct reviews and inspections of the documents on a regular basis. Frequency of reviews will be subject to Departmental Representative's discretion. Failure to maintain as-builts current and complete to satisfaction of the Departmental Representative shall be subject to financial penalties in the form of progress payment reductions and holdback assessments.
- .7 Record information concurrently with construction progress.
  - .1 Do not conceal Work until required information is recorded.
- .8 Provide digital photos, if requested, for site records.

1.3 EQUIPMENT AND SYSTEMS

- .1 For each item of equipment and each system include description of unit or system and component specifications.

- .2 Panel board circuit directories: provide electrical service characteristics, controls, and communication.
- .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 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- .9 Provide installed control diagrams by controls manufacturer.
- .10 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- .11 Additional requirements: as specified in individual specification sections.

1.4 WARRANTIES AND BONDS

- .1 Develop warranty management plan to contain information relevant to Warranties.
- .2 Warranty management plan to include required actions and documents to assure that Departmental Representative receives warranties to which it is entitled.

- .3 Submit Warranty information made available during construction phase to Departmental Representative for approval prior to each monthly pay estimate.
- .4 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 Retain warranties and bonds until time specified for submittal.
- .5 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.
- .6 Respond in a timely manner to oral or written notification of required construction warranty repair work.

1.5 REVIEWED SHOP  
DRAWINGS

- .1 Compile 2 full sets of all reviewed shop drawings.

PART 1 - GENERAL

- 1.1 DESCRIPTION .1 This section specifies requirements for demolishing and removing wholly or in part various items designated to be removed or partially removed.
- 1.2 RELATED SECTION .1 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- 1.3 GENERAL REQUIREMENTS .1 A Notice to Shipping is to be issued prior to commencement and upon completion of work.
- .2 During construction, any vessels or barges utilized must be marked in accordance with the provisions of the Canada Shipping Act Collision Regulations.
- .3 Upon completion of the project, a written Notice to Mariners must be issued.
- 1.4 PROTECTION .1 Protect existing objects designated to remain. In event of damage, immediately replace or make repairs to approval of and at no additional cost to Canada.
- .2 Place a floating boom around entire demolition site to prevent loss of any materials.
- .3 Remove all floating debris from water on a routine and timely basis.
- 1.5 MEASUREMENT FOR PAYMENT .1 All cost associated for items in this section is to be measured in fixed price items including all plant, labour, materials required to complete this work as indicated on drawings.
-

PART 2 - EXECUTION

2.1 EXECUTION

- .1 Inspect site and verify with Departmental Representative objects designated for removal.
- .2 Locate and protect utility lines. Preserve in operating condition active utilities traversing site.

2.2 REMOVAL

- .1 Demolition and removal will consist of, but not necessarily be limited to, the following:
    - .1 Demolition, removal, and disposal of treated dimension timber wheelguard, wheelguard blocking, coping, posts, pilecaps, beams, wales, wale splice blocking, wale supports, cross bracing, associated hardware, and timber remnants..
    - .2 Demolition, removal, and disposal of treated or untreated dimension hardwood timber fenders, chocks, associated hardware and timber remnants.
    - .3 Demolition, removal, and disposal of treated or untreated ladders, ladder handgrips, mooring rings, associated hardware, and timber remnants.
    - .4 Demolition, removal, and disposal of mooring cleats, reinforced concrete mooring cleat pedestals, and associated hardware.
    - .5 Demolition, removal, and disposal of reinforced concrete deck. Thickness varies from 200 mm to 250 mm at coping.
    - .6 Removal of the existing concrete jib crane base.
    - .7 Demolition, removal, and disposal of the existing lighting poles.
    - .8 Demolition and removal of existing electrical shed including electrical systems as outlined on electrical drawings.
    - .9 Demolition and removal of existing reinforced concrete slab and bollards as shown on drawings.
    - .10 Sawcut existing asphalt parking area, remove and dispose at an approved dumpsite as shown on accompanying drawings.
    - .11 Remove in their entirety all materials and objects specified for removal.
    - .12 Do not disturb adjacent work designated to remain in place.
-

2.3 DISPOSAL OF MATERIAL

- .1 All demolished materials, except materials designated to be reused or turned over to owner, will become property of contractor and will be removed from site and disposed of to satisfaction of Departmental Representative and in accordance with environmental guidelines. It is the sole responsibility of the contractor to dispose of all demolished materials at an approved disposal site. Ensure that disposal site is approved and willing to accommodate any materials disposed of from work site. Refer to Appendix B in specifications.
- .2 Contractor shall obtain and pay for all necessary permits and disposal fees for use of an approved waste disposal site.

2.4 RESTORATION

- .1 Upon completion of work, remove debris, trim surfaces and leave work site in clean condition.
- .2 Reinstate areas and existing works outside areas of demolition to conditions that existed prior to commencement of work.



PART 1 - GENERAL

1.1 RELATED  
SECTIONS

- .1 Section 03 20 00 - Concrete Reinforcing.
- .2 Section 03 30 00 - Cast-in-Place Concrete.
- .3 Section 07 92 10 - Joint Sealing.

1.2 REFERENCES

- .1 Canadian Standards Association (CSA)
  - .1 CAN/CSA-A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction.
  - .2 CAN/CSA-086-14, Engineering Design in Wood.
  - .3 CSA O121-08 (R2013), Douglas Fir Plywood.
  - .4 CSA O151-09, Canadian Softwood Plywood.
  - .5 CSA O153-13, Poplar Plywood.
  - .6 CAN3-0188.0-M78, Standard Test Methods for Mat-Formed Wood Particleboards and Waferboard.
  - .7 CSA O437 Series-93 (R2011), Standards for OSB and Waferboard.
  - .8 CSA S269.1-16 (R2003), Falsework and Formwork for Construction Purposes.

1.3 SHOP DRAWINGS

- .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 CSA S269.1-16, for falsework drawings Comply with CAN/CSA-S269.1-16 for formwork drawings.
- .3 Indicate formwork design data, such as permissible rate of concrete placement, and temperature of concrete, in forms.
- .4 Indicate sequence of erection and removal of formwork/falsework as directed by Departmental Representative.

- .5 Each shop drawing submission shall bear stamp and signature of qualified Professional Engineer registered or licensed in Province of Newfoundland and Labrador, Canada.

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 and the Waste Reduction Workplan.
- .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.
- .4 Use sealers, form release and stripping agents that are non-toxic, biodegradable and have zero or low VOC's.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Formwork materials:
    - .1 Use formwork materials to CAN/CSA-A23.1-16.
  - .2 Form ties:
    - .1 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, chemically active release agents containing compounds that react with free lime present in concrete to provide water insoluble soaps, preventing set of film of concrete in contact with form.
  - .4 Falsework materials: to CSA-S269.1-16.
    - .1 Materials required to bear grade marks, or be accompanied with certificates, test reports or other proof of conformity.
  - .5 Premoulded joint fillers:
    - .1 Bituminous impregnated fiberboard to ASTM D1751.
-

- .6 Bond Breaker:
  - .1 Impermeable tube formed of polyvinylchloride, rubber or similar material to the approval of the Departmental Representative. Internal diameter equal to dowels.
- .7 Sealant: to Section 07 92 10 - Joint Sealing.

PART 3 - EXECUTION

3.1 FABRICATION AND  
ERECTION

- .1 Verify lines, levels and centres before proceeding with formwork/falsework and ensure dimensions agree with drawings.
- .2 Obtain Departmental Representative's approval for use of earth forms framing openings not indicated on drawings.
- .3 Hand trim sides and bottoms and remove loose earth from earth forms before placing concrete.
- .4 Fabricate and erect falsework in accordance with CSA S269.1-16.
- .5 Fabricate and erect formwork in accordance with CAN/CSA-S269.-16 to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CAN/CSA-A23.1-16.
- .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.
- .9 Build in anchors, sleeves, and other inserts required to accommodate Work specified in other sections. Assure that all anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.

- .10 Clean formwork in accordance with CAN/CSA-A23.1-16, before placing concrete.

3.2 REMOVAL AND  
RESHORING

- .1 Leave formwork in place for following minimum periods of time after placing concrete.
  - .1 5 days for beam soffits, slabs, decks and other structural members, or 3 days when replaced immediately with adequate shoring to standard specified for falsework.
  - .2 Remove formwork when concrete has reached 75% of its design strength or minimum period noted above, whichever comes later, and replace immediately with adequate reshoring.
  - .3 Provide all necessary reshoring of members where early removal of forms may be required or where members may be subjected to additional loads during construction as required.
  - .4 Space reshoring in each principal direction at not more than 3000 mm apart.
  - .5 Re-use formwork and falsework subject to requirements of CAN/CSA-A23.1-16.

3.3 JOINT FILLERS

- .1 Locate and form expansion joints as indicated. Install joint filler in all joints.
- .2 Use 13 mm thick joint filler to separate slab-on-grade and extend joint filler from bottom of slab to within 25 mm of finished slab surface unless indicated otherwise.

3.4 JOINT SEALANT

- .1 Fill expansion and control joints with sealer as per manufacturer instructions.

PART 1 - GENERAL

1.1 RELATED  
SECTIONS

- .1 Section 03 10 00 - Concrete Forming and Accessories.
- .2 Section 03 30 00 - Cast-in-Place Concrete.
- .3 Section 35 59 29 - Mooring Devices.

1.2 REFERENCES

- .1 American Concrete Institute (ACI)
    - .1 SP-66-04, ACI Detailing Manual 2004.
      - .1 ACI 315-99, Details and Detailing of Concrete Reinforcement.
      - .2 ACI 315R-04, Manual of Engineering and Placing Drawings for Reinforced Concrete Structures.
    - .2 ASTM International
      - .1 ASTM A1064/A1064M-16b, Standard for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
      - .2 ASTM A143/A143M-07(2014), Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.
      - .3 ASTM A775/A775M-16, Standard Specification for Epoxy-Coated Reinforcing Steel Bars.
      - .4 ASTM-A123/A123M-15, Standard Specification for Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products.
    - .3 CSA International
      - .1 CSA-A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
      - .2 CSA-A23.3-14, Design of Concrete Structures.
      - .3 CSA G30.18-09, Carbon Steel Bars for Concrete Reinforcement.
      - .4 CSA G40.20-13/G40.21-13, General Requirement for Rolled or Welded Structural Quality Steels/Structural Quality Steel.
      - .5 CSA W186-M1990 (R2012), Welding of Reinforcing Bars in Reinforced Concrete Construction.
    - .4 Reinforcing Steel Institute of Canada (RSIC)
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- 1.2 REFERENCES (Cont'd)
- .4 (Cont'd)
- .1 RSIC-2004, Reinforcing Steel Manual of Standard Practice.
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- 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 ACI 315.
- .3 Shop Drawings:
- .1 Submit drawings stamped and signed by professional engineer registered or licensed in Newfoundland and Labrador.
- .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 CSA-A23.3.
- 
- 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: Upon request, provide Departmental Representative with certified copy of mill test report of reinforcing steel, minimum 4 weeks prior to beginning reinforcing work.
- .2 Upon request submit in writing to Departmental Representative proposed source of reinforcement material to be supplied.
-

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, indoors, in dry location, and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Replace defective or damaged materials with new.

1.6 WASTE  
MANAGEMENT AND  
DISPOSAL

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

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 400, deformed bars to CAN/CSA-G30.18, unless indicated otherwise.
- .3 Reinforcing steel: weldable low alloy steel deformed bars to CAN/CSA-G30.18.
- .4 Cold-drawn annealed steel wire ties: to CSA G30.3.
- .5 Welded steel wire fabric: to CSA G30.5. Provide in flat sheets only.
- .6 Chairs, bolsters, bar supports, spacers: to CAN/CSA-A23.1.
- .7 Mechanical splices: subject to approval of Departmental Representative.

2.2 FABRICATION

- .1 Fabricate reinforcing steel in accordance with CAN/CSA-A23.1, ANSI/ACI 315, and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada. ACI 315R, Manual of Engineering and Placing Drawings for Reinforced Concrete Structures unless indicated otherwise.
- .2 Obtain Departmental Representative's approval for locations of reinforcement splices other than those shown on placing drawings.
- .3 Upon approval of Departmental Representative, weld reinforcement in accordance with CSA W186.
- .4 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.

2.3 SOURCE QUALITY CONTROL

- .1 Provide Departmental Representative with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, minimum 2 weeks prior to commencing reinforcing work.
- .2 Upon request inform Departmental Representative of proposed source of material to be supplied.

PART 3 - EXECUTION

3.1 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.

3.2 PLACING REINFORCEMENT

- .1 Place reinforcing steel as indicated on reviewed placing drawings and in accordance with CAN/CSA-A23.1.
- .2 Use approved type chairs to locate the reinforcing steel at the proper grade.



3.2 PLACING  
REINFORCEMENT  
(Cont'd)

- .3 Tie reinforcement where spacing in each direction is:
  - .1 Less than 300 mm: tie at alternate intersections.
  - .2 300 mm or more: tie at each intersection.
- .4 Prior to placing concrete, obtain Departmental Representative's approval of reinforcing material and placement.
- .5 Ensure cover to reinforcement is maintained during concrete pour.

3.3 CLEANING

- .1 Clean reinforcing before placing concrete to CAN/CSA-A23.1.

PART 1 - GENERAL

- 1.1 DESCRIPTION .1 This section specifies requirements for supply, placing, finishing, protecting and curing cast-in-place concrete for mooring cleat blocks, and wharf decks.
- 1.2 RELATED SECTIONS .1 Section 03 10 00 - Concrete Forming and Accessories.  
.2 Section 03 20 00 - Concrete Reinforcing.  
.3 Section 35 59 29 - Mooring Devices.
- 1.3 REFERENCES .1 ASTM International  
.1 ASTM C109/C109M-16a, Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 in. or 50 mm Cube Specimens).  
.2 ASTM C260/C260M-10a(2016), Standard Specification for Air-Entraining Admixtures for Concrete.  
.3 ASTM C494/C494M-16, Standard Specification for Chemical Admixtures for Concrete.  
.4 ASTM C1017/C1017M-e1, Standard Specification for Preformed Chemical Admixtures for Use in Producing Flowing Concrete.  
.5 ASTM D1751-04(2013e1), Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).  
.6 ASTM D1752-04a(2013), Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.  
.2 Canadian General Standards Board (CGSB)  
.1 CAN/CGSB-51.34-M86, Vapour Barrier, Polyethylene Sheet for Use in Building Construction.  
.3 Canadian Standards Association (CSA International)  
.1 CSA/CAN-A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete.
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- 1.3 REFERENCES .3 (Cont'd)
- 1.3 REFERENCES  
(Cont'd)
- .2 CSA A283-06 (R2016), Qualification Code for Concrete Testing Laboratories.
  - .3 CSA-A3000-13, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
    - .1 CSA-A3001-13, Cementitious Materials for Use in Concrete.
- 1.4 CERTIFICATES .1 Submit certificates in accordance with Section 01 33 00 Submittal Procedures.
- .2 Minimum 2 weeks prior to starting concrete work submit to Departmental Representative manufacturer's test data and certification by qualified independent inspection and testing laboratory that following materials will meet specified requirements:
- .1 Portland cement.
  - .2 Blended hydraulic cement.
  - .3 Supplementary cementing materials.
  - .4 Grout.
  - .5 Admixtures.
  - .6 Aggregates.
  - .7 Water.
  - .8 Joint filler.
  - .9 Joint Sealant.
- .3 Provide certification that mix proportions selected will produce concrete of quality, yield and strength as specified in concrete mixes, and will comply with CSA/CAN-A23.1/A23.2.
- .4 Provide certification that plant, equipment, and materials to be used in concrete comply with requirements of CSA-A23.1/A23.2.
- 1.5 STORAGE OF MATERIALS .1 Store materials to prevent contamination or deterioration.
- 1.5 STORAGE OF MATERIALS
- .2 Provide adequate storage facilities for materials to ensure a continuous supply of these materials during batching operations.
  - .3 Store cement in weathertight facility.
-

- 
- 1.6 QUALITY ASSURANCE
- .1 Quality Assurance: in accordance with Section 01 45 00 - Quality Control.
  - .2 Provide Departmental Representative, minimum 2 weeks prior to starting concrete work, with valid and recognized certificate from plant delivering concrete.
    - .1 Provide test data and certification by qualified independent inspection and testing laboratory that materials and mix designs used in concrete mixture will meet specified requirements.
  - .3 Minimum 2 weeks prior to starting concrete work, provide proposed quality control procedures for review by Departmental Representative on following items:
    - .1 Falsework erection.
    - .2 Hot weather concrete.
    - .3 Cold weather concrete.
    - .4 Curing.
    - .5 Finishes.
    - .6 Formwork removal.
    - .7 Joints.
- 1.7 DELIVERY, STORAGE AND HANDLING
- .1 Delivery and Acceptance Requirements:
    - .1 Concrete hauling time: deliver to site of work and discharged within 120 minutes maximum after batching.
      - .1 Do not modify maximum time limit without receipt of prior written agreement from Departmental Representative and concrete producer as described in CSA A23.1/A23.2.
      - .2 Deviations to be submitted for review by Departmental Representative.
    - .2 Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1/A23.2.
- 1.8 WASTE MANAGEMENT AND DISPOSAL
- .1 Use trigger operated spray nozzles for water hoses.
  - .2 Designate a cleaning area for tools to limit water use and runoff.
  - .3 Carefully coordinate the specified concrete work with weather conditions.
-

1.8 WASTE  
MANAGEMENT AND  
DISPOSAL  
(Cont'd)

- .4 Ensure emptied containers are sealed and stored safely for disposal away from children.
- .5 Prevent plasticizers, water-reducing agents and air-entraining agents from entering drinking water supplies or streams. Using appropriate safety precautions, collect liquid or solidify liquid with an inert, noncombustible material and remove for disposal. Dispose of all waste in accordance with applicable local, provincial and national regulations.
- .6 Choose least harmful, appropriate cleaning method which will perform adequately.

1.9 MEASUREMENT FOR  
PAYMENT

- .1 Reinforced Concrete Deck: Supply and installation of reinforced concrete deck to be measured in square metres (m<sup>2</sup>) calculated from actual field measurements, excluding area occupied by mooring cleat pedestals, and coping. Contractor to provide all plant, equipment, material, and labour including concrete, reinforcing steel, expansion and control joints. Actual concrete deck thickness varies to accommodate deck slope, cost for which shall be included in the unit price.
  - .2 Cleat Pedestals: No measurement for payment to be made under this section. Include costs incidental to unit price for Type "A" and "B1" mooring cleats.
  - .3 No separate payment will be made for any other ingredient or feature of concrete work, and all factors, including cold weather placement, reinforcing steel, anchor bolts, joint filler for control joints, cement, plant and labour will be considered as being included in the unit price for item.
  - .4 Mobilization to, accommodations at, and demobilization from the individual identified project locations to be incidental to the above pay items.
-

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Cement: to CAN/CSA-A3001, Type GUb.
- .2 Supplementary cementing materials: to CAN/CSA-A3001.
- .3 Cementitious hydraulic slag: to CAN/CSA-A3001.
- .4 Water: to CAN/CSA-A23.1/A23.2.
- .5 Aggregates: to CAN/CSA-A23.1/A23.2. Coarse aggregate to be normal density.
- .6 Air entraining admixture: to ASTM C260.
- .7 Chemical admixtures: to ASTM C494/C494M. Departmental Representative to approve accelerating or set retarding admixtures during cold and hot weather placing.
- .8 Concrete retarders: to ASTM C494/C494M. Do not allow moisture of any kind to come in contact with the retarder film.
- .9 Curing compound: curing compounds are not to be used.
- .10 Premoulded joint fillers:
  - .1 Bituminous impregnated fiber board: to ASTM D1751.
  - .2 Sponge rubber: to ASTM D1752, Type I, flexible grade.

2.2 MIXES

- .1 Proportion concrete in accordance with CAN/CSA-A23.1.
  - .2 Proportion concrete to comply with Alternate 1, Table 2 in CAN/CSA-A23.1 and following requirements:
    - .1 Cement:
      - .1 Type GUb Portland Cement.
    - .2 Minimum compressive strength: 35 MPa at 28 days.
    - .3 Class of exposure: C1.
    - .4 20 mm nominal size coarse aggregate.
-

- 2.2 MIXES  
(Cont'd)
- .2 (Cont'd)
- .5 Air content 5% to 8%.
- .6 Density of air-dry concrete in range of 2240 kg/m<sup>3</sup> to 2400 kg/m<sup>3</sup>.
- .7 Slump at time and point of discharge 50 mm to 100 mm.
- .3 When the Contractor wishes to purchase concrete from a ready mix concrete supplier, submit a letter from the supplier certifying the following:
- .1 That plant and equipment is certified and all materials to be used in the concrete comply with the requirements of CAN/CSA-A23.1.
- .2 That the mix proportions selected will produce concrete of the specified quality and yield. Indicate mix proportions and sources of all materials.
- .3 That the strengths will comply with the strengths specified herein.
- .4 When the Contractor wishes to mix concrete on site, identify the source of aggregates and submit samples of fine and coarse aggregates to a testing laboratory for testing and trial mixes in order to determine a suitable mix design. The testing laboratory, at Contractor's cost, will test the trial mix for slump, air content, density and strength. The results of these tests will be submitted to the Departmental Representative to be reviewed for compliance with the specification. This review must be completed before permission to place concrete is given.
- .1 The sand, gravel, water and air entraining agent should be mixed prior to the addition of cement and water reducer.
- .5 Weigh aggregates, cement, water and admixture when batching. No alternative methods of measuring will be permitted.
- .6 Do not use calcium chloride.

PART 3 - EXECUTION

- 3.1 PREPARATION
- .1 Obtain Departmental Representative's approval before placing concrete. Provide 24 hours notice prior to placing of concrete.

3.1 PREPARATION  
(Cont'd)

- .2 Place concrete reinforcing in accordance with Section 03 20 00 - Concrete Reinforcing.
- .3 Pumping of concrete is permitted only after approval of equipment and mix.
- .4 Ensure reinforcement and inserts are not disturbed during concrete placement.
- .5 Prior to placing of concrete obtain Departmental Representative's approval of proposed method for protection of concrete during placing and curing in adverse weather.
- .6 Protect previous work from staining.
- .7 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.
- .8 Do not place load upon new concrete until authorized by Departmental Representative.

3.2 CONSTRUCTION

- .1 Comply with additional requirements of CAN/CSA-A23.1, Clause 4.1.1.5, for concrete exposed to seawater environments.
  - .2 Minimum concrete cover over reinforcing steel bars to be 65 mm.
  - .3 Place concrete in hot weather to CAN/CSA-A23.1.
  - .4 Place concrete in cold weather to CAN/CSA-A23.1.
  - .5 Keep concrete surfaces moist continually during protection stage.
  - .6 Place, consolidate, finish, cure and protect concrete to CAN/CSA-A23.1.
  - .7 Do not commence placing concrete until Departmental Representative has inspected and approved forms, foundations, reinforcing steel, joints, conveying, spreading, consolidation and finishing equipment and curing and protective methods.
-



- 
- 3.3 FORMWORK .1 Install and strip formwork to CAN/CSA-A23.1 and Section 03 10 00 - Concrete Forming and Accessories.
- 3.4 INSERTS .1 Position and secure anchor bolts in formwork to maintain line and grades.
- 3.5 CONTROL JOINTS .1 Construct control joints in locations shown on drawings or directed by Departmental Representative.
- .2 All joints will be centered over a support. Joints will be made in a perfectly straight line.
- .3 Cut control joint when concrete has hardened.
- .4 Fill saw cut with joint sealer as specified.
- 3.6 PLACING CONCRETE .1 Place and consolidate concrete to CAN/CSA-A23.1.
- .2 Do not place concrete on or against frozen material.
- .3 Place concrete continuously from joint to joint.
- .4 Place concrete in a uniform heading, normal to the centreline. Limit rate of placing to that which can be finished before beginning of initial set.
- 3.7 STRIKE OFF AND CONSOLIDATION .1 High speed internal poker vibrators shall be used to consolidate the concrete during placing. Final compaction of the surfaces shall be done by beam-type vibratory air screed as approved by Departmental Representative. A surcharge of approximately 65 mm of concrete will be maintained at the screed face during consolidation.
- .2 Strikeoff and consolidation must be completed before excess water bleeds to the surface.
-

3.7 STRIKE OFF AND  
CONSOLIDATION  
(Cont'd)

- .3 Ensure that the concrete deck conforms to the elevations and slopes as shown on the drawings so that satisfactory drainage will result.

3.8 FINISHING

- .1 Only ACI certified or other pre-approved concrete finishers are to be utilized in finishing all concrete works. All work is to be finished to CAN/CSA-A23.1 and as specified below.
- .2 The surface will be brought to the specified level by means of darbying or bull floating which will be carried out immediately following screeding and must be completed before any bleed water is present on the surface. Surface tolerance to be 8 mm under a 3 metre straight edge.
- .3 Provide slope as shown on the drawings to permit proper drainage of the concrete deck.
- .4 Finish slabs to elevations indicated on drawings.
- .5 Strike off the surface with a straight edge.
- .6 Hand tamp low slump concrete with jitterbug.
- .7 Darby or bull float the surface to smooth and level the concrete.
- .8 Allow bleed water or sheen to disappear.
- .9 Float the surface by means of power and/or hand float where the concrete has hardened enough for a man to leave only slight footprints on the surface.
- .10 Do not bring water and fines to the surface by over floating. Where extra floating is required the floating operation shall be repeated after the time interval necessary for any sheen to disappear and for concrete to set further.
- .11 Steel trowel the concrete surfaces by means of power and/or hand trowel. Do not leave any hard, smooth, polished or burnished surface area.
- .12 Do not bring water and fines to the surface by overtrowelling.

3.8 FINISHING  
(Cont'd)

- .13 After slight interval necessary for concrete to further harden, repeat the trowelling operation.
- .14 Lightly broom surface with a soft bristle broom obtaining a fine and even textured finish with a non-slip finish. All brush strokes to be perpendicular to the wharf face across the full width of deck to promote free drainage of the deck finish.
- .15 The surface shall be true and accurate to a maximum tolerance of 1 mm in 500 mm.

3.9 PROTECTION AND  
CURING

- .1 Cure to CAN/CSA-A23.1.
- .2 Cure concrete by protecting it against loss of moisture, rapid temperature change and mechanical injury for at least 7 days after placement. After finishing operations have been completed, the entire surface of the newly placed concrete shall be covered by whatever curing medium is applicable to local conditions and approved by the Departmental Representative. The edges of concrete slabs exposed by removal of forms shall be protected with continuous curing treatment equal to the method selected for curing the slab and curb surfaces. Cure to CAN/CSA-A23.1. Have the equipment needed for adequate curing at hand and ready to install before actual concrete placement begins.
- .3 When air temperature is at or below 5°C or when there is a probability of its falling to that limit within 24 hours of placing (as forecast by the nearest official meteorological office) cold weather protection as per CAN/CSA-A23.1 will be provided and the following:
  - .1 Housing - Protect concrete by a windproof shelter of canvas or other material to allow free circulation of inside air around fresh touch formwork and provide sufficient space for removal of formwork for finishing. Supply approved heating equipment capable of keeping inside air at a constant temperature sufficiently high to maintain concrete at following curing temperatures.
    - .1 For initial 3 days at a temperature of not less than 15°C nor more than 27°C at surface.

3.9 PROTECTION AND  
CURING  
(Cont'd)

- .3 (Cont'd)  
.1 (Cont'd)  
.2 Maintain concrete at 10°C for an extra 4 days plus the initial 3 days.  
.3 In addition to the protective housing, the concrete must be cured as outlined in Clause 3.9.2 above.

3.10 TESTING

- .1 Departmental Representative will appoint a concrete testing company to test all work under this section of specification as per CAN/CSA-A23.1.  
.2 Cost of compressive strength tests shall be paid for by the Departmental Representative.  
.3 Testing company shall issue reports to Departmental Representative on quality of test cylinders.  
.4 Notify Departmental Representative at least 7 days prior to start of placing concrete. Provide for testing purposes an adequate quantity of approved test cylinders.  
.5 At least 1 set of 3 cylinders each shall be taken from 25 m<sup>3</sup> or fraction thereof of each day's pour, whichever is less. 1 cylinder shall be tested at 7 days and other 2 tested at 28 days.  
.6 Crate cylinders and deliver to the testing laboratory within 48 hours after casting in accordance with CAN/CSA-A23.1. Contractor will pay for crating and delivery of cylinders to the laboratory.  
.7 If strength tests of test cylinder for any portion of the work falls below the specified compressive strength at 28 days, the Departmental Representative reserves the right to determine the acceptability of the concrete by performing additional field testing as outlined in CSA-A23.1.  
.8 If concrete does not conform to drawings or specifications, take measures as directed to correct the deficiency. All costs of correctional measures will be at the expense of the Contractor.

PART 1 - GENERAL

1.1 RELATED  
SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .3 Section 03 30 00 - Cast-in-Place Concrete.

1.2 REFERENCES

- .1 American Society for Testing and Materials International, (ASTM)
  - .1 ASTM A53/A53M-12, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
  - .2 ASTM A269-12, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
  - .3 ASTM A307-14, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
  - .4 ASTM B241/B241 M-16, Standard Specification for Aluminum and Aluminum Alloy Seamless Pipe and Seamless Extended Tube.
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-1.40-97, Anti-corrosive Structural Steel Alkyd Primer.
  - .2 CAN/CGSB-1.181-92, Ready-Mixed, Organic Zinc-Rich Coating.
- .3 Canadian Standards Association (CSA International)
  - .1 CAN/CSA-G40.20-13/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
  - .2 CAN/CSA-G164-M92 (R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
  - .3 CAN/CSA-S16 CAN/CSA-S16-14, Design of Steel Structures.
  - .4 CSA W48-14, Filler Metals and Allied Materials for Metal Arc Welding.
  - .5 CSA W59-13, Welded Steel Construction (Metal Arc Welding).
  - .6 CAN/CSA-S157-05/S157.1-05 (R2015), Strength Design in Aluminum.
  - .7 CSA W59.2-M1991 (R2013), Welded Aluminum Construction.

1.2 REFERENCES  
(Cont'd)

- .4 The Environmental Choice Program
  - .1 CCD-047a-98, Paints, Surface Coatings.
  - .2 CCD-048-98, Surface Coatings - Recycled Water-borne.

1.3 SUBMITTALS

- .1 Product Data:
  - .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
  - .2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOC's:
    - .1 For finishes, coatings, primers and paints.
- .2 Shop Drawings
  - .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
  - .2 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

1.4 QUALITY ASSURANCE

- .1 Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
- .2 Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

- .1 Packing, Shipping, Handling and Unloading:
    - .1 Deliver, store, handle and protect materials in accordance with Section 01 61 00 - Common Product Requirements.
  - .2 Storage and Protection:
    - .1 Cover exposed stainless steel surfaces with pressure sensitive heavy protection paper or apply strippable plastic coating, before shipping to job site.
-

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- 1.5 DELIVERY, STORAGE, AND HANDLING  
(Cont'd)
- .2 (Cont'd)  
.2 Leave protective covering in place until final cleaning of building. Provide instructions for removal of protective covering.
- 
- 1.6 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 packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper plastic polystyrene corrugated cardboard packaging material for recycling in accordance with Waste Management Plan.
- .4 Divert unused metal materials from landfill to metal recycling facility approved by Departmental Representative.
- 
- 1.7 MEASUREMENT FOR PAYMENT
- .1 Bollards (Type 1) (6 Req'd): All costs associated with the supply and placement of bollards will be measured in fixed price, items including all plant, labour, material required to complete this work.
- .2 Bollards (Type 2) (6 Req'd): All costs associated with the supply and placement of bollards will be measured in fixed price, items including all plant, labour, material required to complete this work.
- .3 Electrical pedestals (2 Req'd): All costs associated with the supply and placement of electrical pedestals will be measured in fixed price items including plant, labour, material required to complete work as indicated on drawings and specifications.
-

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Steel sections and plates: to CAN/CSA-G40.20/G40.21, Grade 350W.
- .2 Aluminum and Aluminum Alloy Sheet Plate to: CAN/CSA W59.2-M1991 (R2013).
- .3 Welding materials: to CSA W59.
- .4 Welding electrodes: to CSA W48 Series.
- .5 Bolts and anchor bolts: to ASTM A307.
- .6 Grout: non-shrink, non-metallic, flowable, 15 MPa at 24 hours.

2.2 FABRICATION

- .1 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.
- .2 Where possible, fit and shop assemble work, ready for erection.
- .3 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush.

2.3 FINISHES

- .1 Galvanizing: hot dipped galvanizing with zinc coating 600 g/m<sup>2</sup> to CAN/CSA-G164.
- .2 Shop coat primer: to CAN/CGSB-1.40.
- .3 Zinc primer: zinc rich, ready mix to CAN/CGSB-1.181.
- .4 Finish exposed surfaces of aluminum components in accordance with Aluminum Association (AA), Designation System for Aluminum Finishes.

2.4 SHOP PAINTING

- .1 Apply one shop coat of primer to metal items, with exception of aluminum or concrete encased items.



2.4 SHOP PAINTING  
(Cont'd)

- .2 Use primer unadulterated, as prepared by manufacturer. Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7 degrees C.
- .3 Clean surfaces to be field welded; do not paint.
- .4 Prepare and coat outdoor fabrications as follows:
  - .1 Surface Preparation: Abrasive blast to SSPC-SP-10 near white metal to achieve an anchor profile of 2.0 mils.
  - .2 Primer: One coat of Amercoat 68A zinc epoxy primer to 3 mils dry film thickness, or approved equal.
  - .3 Intermediate Coat: One coat of Amerlock # 2 surface tolerant epoxy to 6 mils dry film thickness, or approved equal.
  - .4 Top Coat: One coat of Amershield abrasion resistant urethane to 4 mils dry film thickness, or approved equal. Colour to be safety yellow for bollards, black for other applications unless noted.

2.5 BOLLARDS (TYPE  
1)

- .1 Steel pipe: 125 mm dia. x 1200 mm long Schedule 40 galvanized nominal outside diameter pipe. Install bollards at locations as shown on drawings.
- .2 Base Plate: 305 mm x 305 mm x 15 mm thick plate, weld to steel pipe, complete with openings for anchoring devices.
- .3 Finish: Galvanized, paint two coats marine enamel, safety yellow.
- .4 Supply and install reflector tape, 50 mm wide, color red.

2.6 BOLLARDS (TYPE  
2)

- .1 168.3 mm dia O.D. x 6.4 mm thick pipe.
- .2 152 mm dia x 9.53 mm concrete filled support.
- .3 400 mm dia concrete pier x 1200 mm deep.
- .4 Finish: galvanized, paint 2 coats marine safety yellow.

2.6 BOLLARDS (TYPE 2)  
(Cont'd)

.5 Supply and install reflector tape, 50 mm wide, color red.

2.7 ELECTRICAL PEDESTALS

.1 168 mm dia x 11 mm Schedule 80 aluminum piping.

.2 15 mm aluminum base plate.

.3 400 mm x 400 mm x 15 mm aluminum base plate.

.4 Refer to details on construction drawings.

PART 3 - EXECUTION

3.1 ERECTION

.1 Do welding work in accordance with CSA W59 unless specified otherwise.

.2 Erect metal work square, plumb, straight, and true, accurately fitted, with tight joints and intersections.

.3 Provide suitable means of anchorage acceptable to Departmental Representative such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.

.4 The joints will be spaced such that two (2) 12mm fillet welds can be made all around each channel.

.5 Exposed fastening devices to match finish and be compatible with material through which they pass.

.6 Make field connections with bolts to CAN/CSA-S16.1, or weld.

.7 Touch-up rivets, field welds, bolts and burnt or scratched surfaces after completion of erection with primer.

.8 Touch-up galvanized surfaces with zinc rich primer where burned by field welding.

3.2 BOLLARDS .1 Install bollards at all locations, as indicated on drawings.

3.3 ELECTRICAL PEDESTALS .1 Install electrical pedestals as indicated on drawings.  
.2 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

PART 1 - GENERAL

1.1 REFERENCES

- .1 American Wood-Preservers' Association (AWPA)
  - .1 AWPA M2-16, Standard Inspection of Treated Wood Products.
  - .2 AWPA M4-15, Standard for the Care of Preservative-Treated Wood Products.
- .2 Canadian Standards Association (CSA)
  - .1 CSA O80 Series-15 - Wood Preservation.
  - .2 CSA O80.201-97, Standard for Hydrocarbon Solvents for Preservatives. This Standard covers hydrocarbon solvents for preparing solutions of preservatives. This is not stand alone specification.
  - .3 CSA O322-15, Procedure for Certification of Pressure-Treated Wood Materials for Use in Preserved Wood Foundations.

1.2 QUALITY  
ASSURANCE

- .1 Testing of products treated with preservative by pressure impregnation will be carried out by the manufacturer's testing laboratory to AWPA M2, and revisions specified in CSA O80 Series, Supplementary Requirements to AWPA M2.
- .2 Inspection and testing of timber materials will be carried out by the manufacturer.

1.3 CERTIFICATES  
AND ASSAY  
RETENTION RESULTS

- .1 Submit certificates and assay retention results in accordance with Section 01 33 00 - Submittal Procedures.
  - .2 For products treated with preservative by pressure impregnation submit following information certified by authorized signing officer of treatment plant:
    - .1 Information listed in AWPA M2 and revisions specified in CSA O80 Series, Supplementary Requirement to AWPA M2 applicable to specified treatment.
    - .2 Moisture content after drying following treatment with water-borne preservative.
    - .3 Assay retentions results representing each treated batch of supplied timber.
-

.4 Acceptable types of paint, stain, and clear finishes that may be used over treated materials to be finished after treatment.

1.4 WASTE  
MANAGEMENT AND  
DISPOSAL

- .1 Do not dispose of preservative treated wood through incineration.
- .2 Do not dispose of preservative treated wood with other materials destined for recycling or reuse.
- .3 Dispose of treated wood, end pieces, wood scraps and sawdust at sanitary landfill approved by Departmental Representative.
- .4 Dispose of unused wood preservative material at official hazardous material collections site approved by Departmental Representative.
- .5 Do not dispose of unused preservative material into sewer system, into streams, lakes, onto ground or in other location where they will pose health or environmental hazard.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Preservative: to CSA-080 Series.
- .2 Solvent: to CSA-080.201.

2.2 PRESERVATIVE  
TREATMENTS

- .1 Treat to CSA 080, commodity standard 080.18, Table 1 and its referenced standards, with the following minimum assay retentions:

Species	CCA kg/m <sup>3</sup>	ACA kg/m <sup>3</sup>
Dimension Timber		
-Coast Douglas Fir	24	24
-Western/Eastern Hemlock	24	24
-Hemlock, Douglas Fir Wheelguard, Wheelguard Blocking)	10	10
-Birch or Maple	Treat to Refusal	

-Birch or Maple

Treat to Refusal

Note: Birch or maple must be air dried for six (6) months in weather protected environment or kiln dried.

PART 3 - EXECUTION

3.1 FIELD TREATMENT

- .1 Handle pressure treated material in a manner that will avoid damage which may expose untreated material. Rejection of any damaged material may result and replacement will be at the Contractor's expense.
- .2 Fill all bored bolt holes with preservative immediately after boring. Use a pressurized container with hose to apply preservative, or some alternate method acceptable to the Departmental Representative.
- .3 Fill all unused bored holes and spike holes with tight fitting treated wooden plugs.

3.2 CUTTING

- .1 Field cuts, if authorized, are to receive three (3) liberal coats of the applicable preservative applied to dry wood on each application.

3.3 FIELD QUALITY

- .1 Timber which contain rot, splits exposing untreated wood, excessive wane, or timbers which cannot be fastened in the work so as to be structurally sound are unacceptable.
- .2 The Departmental Representative reserves the right to carry out field testing of treated timber for penetration and retention of preservative. Timber not meeting the requirements of the specification may be rejected for use under the contract.

PART 1 - GENERAL

1.1 RELATED  
SECTIONS

- .1 Section 06 20 00 - Finished Carpentry.
- .2 Section 06 17 53 - Shop Fabricated Wood Truss.

1.2 REFERENCES

- .1 American National Standards Institute (ANSI)
    - .1 ANSI/NPA A208.1-2009, Particleboard, Mat Formed Wood.
  - .2 American Society for Testing and Materials International (ASTM)
    - .1 ASTM A 653/A 653M-11, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealed) by the Hot-Dip Process.
    - .2 ASTM D 1761-06, Standard Test Methods for Mechanical Fasteners in Wood.
    - .3 ASTM D 5456-11, Standard Specification for Evaluation of Structural Composite Lumber Products.
  - .3 Canadian General Standards Board (CGSB)
    - .1 CAN/CGSB-11.3-M87, Hardboard.
    - .2 CAN/CGSB-51.32-M77, Sheathing, Membrane, Breather Type.
    - .3 CAN/CGSB-51.34-M86, Vapour Barrier, Polyethylene Sheet for Use in Building Construction.
  - .4 Canadian Standards Association (CSA International)
    - .1 CSA A123.2-03 (R2008), Asphalt Coated Roofing Sheets.
    - .2 CSA B111-1974 (R2003), Wire Nails, Spikes and Staples.
    - .3 CSA O112 Series-M1977 (R2006), CSA Standards for Wood Adhesives.
    - .4 CSA O121-M1978 (R2003), Douglas Fir Plywood.
    - .5 CSA O141-05, Softwood Lumber.
    - .6 CSA O151-04, Canadian Softwood Plywood.
    - .7 CSA O153-M1980 (R2003), Poplar Plywood.
    - .8 CAN/CSA-O325.0-92 (R2003), Construction Sheathing.
    - .9 CSA O437 Series-93 (R2006), Standards on OSB and Waferboard.
  - .5 National Lumber Grades Authority (NLGA)
-

.1 Standard Grading Rules for Canadian Lumber  
2005.

.6 Truss Design and Procedures for Light Metal  
Connected Wood Trusses, Truss Plate Institute of  
Canada.

1.3 SUBMITTALS

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

1.4 QUALITY  
ASSURANCE

.1 Lumber by grade stamp of an agency certified by  
Canadian Lumber Standards Accreditation Board.

.2 Plywood, particleboard, OSB and wood based composite  
panels in accordance with CSA and ANSI standards.

1.5 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.

.2 Protect materials from weather while in transit to  
the job site. Store materials on site in such a way  
as to prevent deterioration or the loss or  
impairment of their structural and other essential  
properties. Ensure that the wood is kept dry,  
ventilated and free from wrapping, bending and  
surface damage.

PART 2 - PRODUCTS

2.1 FRAMING AND  
STRUCTURAL  
MATERIALS

.1 Lumber: unless specified otherwise, softwood, S4S,  
moisture content 19% (S-dry) or less in accordance  
with following standards:

.1 CSA 0141.

.2 NLGA Standard Grading Rules for Canadian  
Lumber.

.3 Forestry Stewardship Council (FSC) certified.

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- .2 Light-frame trusses in accordance with "Truss Design and Procedures for Light Metal Connected Wood Trusses", Truss Plate Institute of Canada.
- .3 Wood shall be sound and free from shakes, loose or dead knots and warping.
- .3 Spruce: Eastern Spruce No. 2 or better. Use for general framing, rough carpentry where wood type is not indicated and for sheathing where indicated on drawings and/or scope of work.
- .4 Plywood: Spruce plywood sheathing grade conforming to CSA 0121M. Use waterproof bonded type for exterior work.
- .5 Wood Preservative: Pigmented Pentox, or approved equal. Colour to be selected by Engineer.
- .6 All wood below grade: Preserved wood meeting or exceeding CSA -3022 requirements.
- .7 All rough hardware such as nails, screws, bolts, dowels and straps of exterior application shall be hot dipped galvanized alumina or stainless steel.
- .8 Nails: Zinc coated steel and annular ring to CSA B111-1974, sized as required.
- .9 Screws: Cadmium plated steel, purpose made to CSA B35.4.
- .10 Sill gasket: expanded polystyrene.

2.2 PANEL MATERIALS

- .1 Plywood, OSB and wood based composite panels: to CAN/CSA-O325.0.
    - .1 Forest Stewardship Council (FSC) certified.
  - .2 Douglas fir plywood (DFP): to CSA 0121, standard construction.
    - .1 Forest Stewardship Council (FSC) certified.
  - .3 Canadian softwood plywood (CSP): to CSA 0151, standard construction.
    - .1 Forest Stewardship Council (FSC) certified.
-

- 2.3 ACCESSORIES
- .1 Polyethylene film: to CAN/CGSB-51.34, Type 1, 0.15 mm thick.
  - .2 Roll roofing: to CSA A123.2, Type S.
  - .3 Air seal: closed cell polyurethane or polyethylene.
  - .4 Sealants: in accordance with Section 07 92 10 - Joint Sealing SCAQMD Rule 1168- Adhesives and Sealants Applications.
  - .5 General purpose adhesive: to CSA O112 Series.
    - .1 Maximum allowable VOC limit 140 g/L.
  - .6 Nails, spikes and staples: to CSA B111.
  - .7 Bolts: 12.5 mm diameter unless indicated otherwise, complete with nuts and washers.
  - .8 Proprietary fasteners: toggle bolts, expansion shields and lag bolts, screws and lead or inorganic fibre plugs.
  - .9 Nailing discs: flat caps, minimum 25 mm diameter, minimum 0.4 mm thick, sheet metal, fibre, formed to prevent dishing. Bell or cup shapes not acceptable.
  - .10 Roof sheathing H-Clips: formed "H" shape, thickness to suit panel material, extruded 6063-T6 aluminum alloy type approved by Departmental Representative Engineer Consultant.

- 2.4 FASTENER FINISHES
- .1 Galvanizing: to CAN/CSA-G164, use galvanized fasteners for exterior work interior highly humid areas pressure-preservative fire-retardant treated lumber.

PART 3 - EXECUTION

- 3.1 PREPARATION
- .1 Store wood products.

- 3.2 INSTALLATION
- .1 Comply with requirements of NBC 2015 Part 9 supplemented by following paragraphs.

- .2 Install members true to line, levels and elevations, square and plumb.
- .3 Construct continuous members from pieces of longest practical length.
- .4 Install spanning members with "crown-edge" up.
- .5 Select exposed framing for appearance. Install lumber and panel materials so that grade-marks and other defacing marks are concealed or are removed by sanding where materials are left exposed.
- .6 Install wall sheathing in accordance with manufacturer's printed instructions.
- .7 Install roof sheathing in accordance with requirements of NBC.
- .8 Install furring and blocking as required to space-out and support casework, cabinets, wall and ceiling finishes, facings, fascia, soffit, siding electrical equipment mounting boards, and other work as required.
- .9 Install furring to support siding applied vertically where there is no blocking and where sheathing is not suitable for direct nailing.
  - .1 Align and plumb faces of furring and blocking to tolerance of 1:600.
- .10 Install rough bucks, nailers and linings to rough openings as required to provide backing for frames and other work.
- .11 Use dust collectors and high quality respirator masks when cutting or sanding wood panels.

### 3.3 ERECTION

- .1 Frame, anchor, fasten, tie and brace members to provide necessary strength and rigidity.
  - .2 Countersink bolts where necessary to provide clearance for other work.
  - .3 Use nailing disks for soft sheathing as recommended by sheathing manufacturer.
-

3.4 SCHEDULES

- .1 Roof sheathing:
  - .1 Plywood, standard sheathing grade, T&G edge, 15 mm thick.
  - .2 Construction sheathing product: end use mark.
  
- .2 Exterior wall sheathing:
  - .1 Plywood, CSP sheathing standard sheathing grade, 12 mm thick.
  
- .3 Electrical equipment mounting boards:
  - .1 Plywood, CSP grade, square edge 19 mm thick.

PART 1 - GENERAL

1.1 SUMMARY

- .1 Section Includes:
  - .1 Material and installation for prefabricated wood trusses.
  - .2 Sustainable requirements for construction and verification:
- .2 Related Sections:
  - .1 Section 01 33 00 - Submittal Procedures.
  - .2 Section 01 35 29 - Health and Safety Requirements.
  - .3 Section 01 61 00 - Common Product Requirements.
  - .4 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.2 REFERENCES

- .1 Canadian Standards Association (CSA International)
    - .1 CSA O80 Series-97(R2002), Wood Preservation.
    - .2 CAN/CSA-O86-14 (Series 15), Engineering Design in Wood.
    - .3 CAN/CSA-O141-0141-05(R2014), Softwood Lumber.
    - .4 CSA S307-M1980(R2001), Load Test Procedure for Wood Roof Trusses for Houses and Small Buildings.
    - .5 CSA S347-14, Method of Test for Evaluation of Truss Plates Used in Lumber Joints.
    - .6 CSA W47.1-09(R2014), Certification of Companies for Fusion Welding of Steel.
  - .2 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
    - .1 Material Safety Data Sheets (MSDS).
  - .3 National Lumber Grades Authority (NLGA)
    - .1 NLGA-03, Standard Grading Rules for Canadian Lumber.
  - .4 National Research Council (NRC)/Institute for Research in Construction (IRC) - Canadian Construction Materials Centre (CCMC)
    - .1 CCMC-2002, Registry of Product Evaluations.
  - .5 Truss Plate Institute of Canada (TPIC)
-

1.2 REFERENCES  
(Cont'd)

- .5 (Cont'd)
  - .1 TPIC - 2011, Truss Design Procedures and Specifications for Light Metal Plate Connected Wood Trusses (Limit States Design).

1.3 DESIGN  
REQUIREMENTS

- .1 Design light metal plate connected wood trusses in accordance with TPIC truss design procedures for wood truss chords and webs in accordance with engineering properties in CAN/CSA-086.
- .2 Design light metal plate connected wood trusses in accordance with TPIC truss design procedures for truss joint designs to test engineering properties in accordance with CSA S347 and listed in CCMC Registry of Product Evaluations.
- .3 Design trusses, bracing in accordance with CAN/CSA-086.1 for loads indicated for building locality as ascertained by NBC, Climatic Information for Building Design in Canada and minimum uniform and minimum concentrated loadings stipulated in NBC commentary.
- .4 Limit live load deflection to 1/360th of span where plaster gypsum board ceilings are hung directly from trusses.
- .5 Limit live load deflections to 1/240th of span unless otherwise specified or indicated.
- .6 Provide camber for trusses as indicated.

1.4 QUALITY  
ASSURANCE

- .1 Qualifications:
    - .1 Fabricator for trusses to show evidence of quality control program such as provided by regional wood truss associations, or equivalent.
    - .2 Fabricator for welded steel connections to be certified in accordance with CSA W47.1.
  - .2 Health and Safety:
    - .1 Do construction occupational health and safety in accordance with Section 01 35 29 - Health and Safety Requirements.
-

1.5 SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 - Submittal Procedures.
- .3 Shop Drawings:
- .4 Each shop erection drawing submission showing connection details to be signed and stamped by professional engineer registered or licensed in province of NL, Canada.
- .5 Indicate TPIC Truss Design Procedure and CSA 086 Engineering Design in Wood and specific CCMC Product Registry number of the truss plates
- .6 Indicate species, sizes, and stress grades of lumber used as truss members. Show pitch, span, camber, configuration and spacing of trusses. Indicate connector types, thicknesses, sizes, locations and design value. Show bearing details. Indicate design load for members.
- .7 Submit stress diagram or print-out of computer design indicating design load for truss members. Indicate allowable load and stress increase.
- .8 Indicate arrangement of webs or other members to accommodate ducts and other specialties.
- .9 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .10 Instructions: submit manufacturer's installation instructions.

1.6 DELIVERY,  
STORAGE AND  
HANDLING

- .1 Deliver, handle, store and protect materials in accordance with Section 01 61 00 - Common Product Requirements.
  - .2 Storage and Protection:
-

1.6 DELIVERY,  
STORAGE AND  
HANDLING  
(Cont'd)

- .2 (Cont'd)
  - .1 Store trusses on job site in accordance with manufacturer's instructions. Provide bearing supports and bracings. Prevent bending, warping and overturning of trusses.
- .3 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 Remove from site and dispose of 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 (WMP).
  - .4 Separate for reuse and recycling and place in designated containers Steel, Metal, Plastic waste in accordance with Waste Management Plan (WMP).
  - .5 Fold up metal and plastic banding, flatten and place in designated area for recycling.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Lumber: species, grade, softwood, S4S, with maximum moisture content of 19% at time of fabrication and to following standards:
  - .1 CAN/CSA-0141.
  - .2 NLGA (National Lumber Grading Association), Standard Grading Rules for Canadian Lumber.
- .2 Fastenings: to CAN/CSA-086.

2.2 FABRICATION

- .1 Fabricate wood trusses in accordance with approved shop drawings.
- .2 Provide for design camber and roof slopes when positioning truss members.
- .3 Connect members using metal connector plates.



2.3 SOURCE QUALITY CONTROL

- .1 Identify lumber by grade stamp of an agency certified by Canadian Lumber Standards Administration Board.

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 datasheet.

3.2 ERECTION

- .1 Erect wood trusses as indicated in accordance with approved shop drawings.
- .2 Handling, installation, erection, bracing and lifting in accordance with manufacturers instructions.
- .3 Make adequate provisions for handling and erection stresses.
- .4 Exercise care to prevent out-of-plane bending of trusses.
- .5 Install temporary horizontal and cross bracing to hold trusses plumb and in safe condition until permanent bracing and decking are installed.
- .6 Install permanent bracing in accordance with approved shop drawings, prior to application of loads to trusses.
- .7 Do not cut or remove any truss material without approval of Departmental Representative.

3.3 FIELD QUALITY CONTROL

- .1 Manufacturer's Field Services:
    - .1 Have manufacturer of products supplied under this Section review work involved in handling, installation/application, protection and cleaning of its products, and submit written reports, in acceptable format, to verify compliance of work with Contract.
-

3.4 CLEANING

- .1 Remove surplus materials, excess materials, rubbish, tools and equipment on completion of installation.

PART 1 - GENERAL

1.1 RELATED  
SECTIONS

- .1 Section 06 10 00 - Rough Carpentry.

1.2 REFERENCES

- .1 American National Standards Institute (ANSI)
    - .1 ANSI A208.1-09, Particleboard.
    - .2 ANSI A208.2-09, Medium Density Fibreboard (MDF).
    - .3 ANSI/HPVA HP-1-2016, Standard for Hardwood and Decorative Plywood.
  - .2 American Society for Testing and Materials International (ASTM)
    - .1 ASTM E 1333-96(2014), Standard Test Method for Determining Formaldehyde Concentrations in Air and Emissions Rates from Wood Products Using a Large Chamber.
  - .3 Architectural Woodwork Manufacturers Association of Canada (AWMAC) and Architectural Woodwork Institute (AWI)
    - .1 Architectural Woodwork Standards Manual (Edition 2).
  - .4 Canadian General Standards Board (CGSB)
    - .1 CAN/CGSB-11.3-M87, Hardboard.
  - .5 Canadian Plywood Association (CanPly)
    - .1 The Plywood Handbook 2012.
  - .6 Canadian Standards Association (CSA International)
    - .1 CSA B111-74(R2003), Wire Nails, Spikes and Staples.
    - .2 CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
    - .3 CSA O121-08(R2013), Douglas Fir Plywood.
    - .4 CAN/CSA O141-05(R2014), Softwood Lumber.
    - .5 CSA O151-09(R2014), Canadian Softwood Plywood.
  - .7 National Lumber Grades Authority (NLGA)
    - .1 Standard Grading Rules for Canadian Lumber 2005.
  - .8 Underwriters Laboratories of Canada (ULC)
-

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- 1.2 REFERENCES (Cont'd)
- .8 (Cont'd)
    - .1 CAN4-S104-80(R1985), Standard Method for Fire Tests of Door Assemblies.
    - .2 CAN4-S105-85(R1992), Standard Specification for Fire Door Frames, meeting the Performance Required by CAN4-S104.
- 1.3 SUBMITTALS
- .1 Submit Submittal submissions: in accordance with Section 01 33 00 - Submittal Procedures.
  - .2 Sustainable Submittals:
    - .1 Co-ordinate submittal requirements and provide submittals required by Section 01 33 00 - Submittal Procedures: Construction.
  - .3 Shop Drawings Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
    - .1 Indicate details of construction, profiles, jointing, fastening and other related details.
    - .2 Indicate materials, thicknesses, finishes and hardware.
- 1.4 QUALITY ASSURANCE
- .1 Lumber by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.
  - .2 Plywood, particleboard, OSB and wood based composite panels in accordance with CSA and ANSI standards.
- 1.5 DELIVERY, STORAGE, AND HANDLING
- .1 Deliver, handle, store and protect materials in accordance with Section 01 61 00 - Common Product Requirements.
    - .1 Protect materials against dampness during and after delivery.
    - .2 Store materials in ventilated areas, protected from extreme changes of temperature or humidity.
  - .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 LUMBER MATERIAL .1 Softwood lumber: unless specified otherwise, S4S, moisture content 19% or less in accordance with following standards:
- .1 CAN/CSA-0141.
  - .2 NLGA Standard Grading Rules for Canadian Lumber.
  - .3 AWMAC premium grade, moisture content as specified.
- 2.2 PANEL MATERIAL .1 Douglas fir plywood (DFP): to CSA 0121, standard construction.
- .1 Forestry Stewardship Council (FSC) certified.
- .2 Canadian softwood plywood (CSP): to CSA 0151, standard construction.
- .1 Forestry Stewardship Council (FSC) certified.
- .3 Hardwood plywood: to ANSI/HPVA HP-1.
- 2.3 ACCESSORIES .1 Nails and staples: to CSA B111; galvanized to CAN/CSA-G164 for exterior work, interior humid areas and for treated lumber; galvanized stainless steel finish elsewhere.
- .2 Wood screws: copper galvanized stainless steel, type and size to suit application.

PART 3 - EXECUTION

- 3.1 INSTALLATION .1 Do finish carpentry to Quality Standards of the Architectural Woodwork Manufacturers Association of Canada (AWMAC), except where specified otherwise.
- .2 Scribe and cut as required, fit to abutting walls, and surfaces, fit properly into recesses and to accommodate piping, columns, fixtures, outlets, or other projecting, intersecting or penetrating objects.
-

3.1 INSTALLATION  
(Cont'd)

- .3 Form joints to conceal shrinkage.

3.2 CONSTRUCTION

- .1 Fastening:  
.1 Position items of finished carpentry work accurately, level, plumb, true and fasten or anchor securely.  
.2 Design and select fasteners to suit size and nature of components being joined. Use proprietary devices as recommended by manufacturer.  
.3 Set finishing nails to receive filler. Where screws are used to secure members, countersink screw in round smooth cut hole and plug with wood plug to match material being secured.  
.4 Replace items of finish carpentry with damage to wood surfaces including hammer and other bruises.
- .2 In so far as practicable assemble the work at the mill and deliver to the site ready for installation.
- .3 Where it will be necessary to cut and fit on the job, fabricate with ample allowance for cutting and fitting.
- .4 Fabricate work according to job measurements.
- .5 Mouldings and trim shall be true to detail and cleanly cut with sharp profiles.
- .6 Machine sand all exposed surfaces to a smooth, even surface and leave ready for finishing.
- .7 Make joints with concealed nailing and screwing where practicable or with mortise, tenons, dowels and glued joints.
- .8 Do all nailing in hardware in predrilled countersunk holes.
- .9 Countersink exposed nails where use is unavoidable, fill the holes neatly.
- .10 Use only water-resistant glue conforming with the applicable CSA Specification.
- .11 Scribe, mitre, join accurately and neatly to conform with details. All joints unless otherwise detailed shall be hairline.
-

3.2 CONSTRUCTION  
(Cont'd)

- .12 Neatly cope intersecting moulding and internal corners (do not mitre).
- .13 Fabrication and installation shall be performed only by craftsmen skilled and experienced in this work.
- .14 Install finished work plumb, true and square as indicated and detailed on the drawings.
- .15 Blind nail finished work to nailing strips, blocking, furring, grounds, etc.

3.3 DOOR HANGING

- .1 Unless otherwise specified elsewhere in the specification, install all metal and wood doors and install all hardware for these doors as supplied under Section 08 71 00 - Door Hardware.
- .2 Co-operate fully with other trades so as not to interrupt schedules and ensure smooth and continuous progress of work.

3.4 SETTING OF DOOR FRAMES

- .1 Install all door frames to exact locations as indicated on the drawings and/or scope of work.
- .2 Co-operate fully with other trades so as not to interrupt schedules and ensure smooth and continuous progress of work.
- .3 Door frames shall be set plumb, square and true, properly braced and complete with bottom spacer and clip angles.
- .4 Ensure that all anchors are in place and adjustable and the work is ready for proper building in.
- .5 Brace frames solidly in position where being built into masonry or drywall. Install temporary horizontal wood spreader at mid-height of frame until adjacent work is completed.

3.5 HARDWARE

- .1 Take delivery of hardware and assume full responsibility for it until building is handed over to the Owner.

3.5 HARDWARE  
(Cont'd)

- .2 Install hardware as specified and according to schedules.
- .3 Install finishing hardware supplied by Section 08 71 00 - Door Hardware and other hardware required for installation and function work of this section. Accurately locate and cut for hardware using tools and jigs recommended by Supplier. Adjust to function as intended.
- .4 Adjust doors and hardware to operate smoothly and without binding. Adjust doors to fit tightly and to remain place at all stages of opening. Lubricate hardware as recommended by supplier.
- .5 Clean hardware, as recommended by supplier, and wood to leave free from finish defects on any exposed surface.
- .6 Do all cutting and fitting required for hardware installation.
- .7 Handle hardware items carefully. Keep free from scratches, dents and other defacements.
- .8 Cover knobs, handles and the like until completion of painting.
- .9 Examine hardware at work completion. Test, oil grease, ease and adjust hardware in perfect condition.



PART 1 - GENERAL

- 1.1 RELATED REQUIREMENTS
- .1 Section 01 33 00 - Submittal Procedures.
  - .2 Section 01 35 29 - Health and Safety Requirements.
  - .3 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- 1.2 REFERENCES
- .1 American Society for Testing and Materials International (ASTM)
    - .1 ASTM C 591-16, Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation.
    - .2 ASTM C 1289-16a, Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
    - .3 ASTM E 96/E 96M-16, Standard Test Methods for Water Vapour Transmission of Materials.
  - .2 Canadian General Standards Board (CGSB)
    - .1 CGSB 71-GP-24M-77(R1983), Adhesive, Flexible, for Bonding Cellular polystyrene Insulation.
  - .3 Underwriters Laboratories of Canada (ULC)
    - .1 CAN/ULC-S704-11, Standard for Thermal Insulation Polyurethane and Polyisocyanurate, Boards, Faced.
  - .4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
    - .1 Material Safety Data Sheets (MSDS).
- 1.3 ACTION AND INFORMATIONAL SUBMITTALS
- .1 Product Data:
    - .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
  - .2 Manufacturer's Instructions:
    - .1 Submit manufacturer's installation instructions.
-

1.4 QUALITY  
ASSURANCE

- .1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
- .2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .3 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29 - Health and Safety Requirements.

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 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal polystyrene, corrugated cardboard packaging material in appropriate on-site for recycling in accordance with Waste Management Plan.

PART 2 - PRODUCTS

2.1 INSULATION

- .1 Extruded polystyrene (XPS): to CAN/ULC-S701.
  - .1 Type: 4.
  - .2 Compressive strength: 210 kPa.
  - .3 Thickness: 38 mm as indicated.
  - .4 Size: 600 mm x 2400 mm.
  - .5 Edges: shiplapped.

2.2 ADHESIVE

- .1 Adhesive (for polystyrene): to CGSB 71-GP-24.
    - .1 Type: 1.
-

PART 3 - EXECUTION

- 3.1 MANUFACTURER'S INSTRUCTIONS
- .1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.
- 3.2 WORKMANSHIP
- .1 Install insulation after building substrate materials are dry.
  - .2 Install insulation to maintain continuity of thermal protection to building elements and spaces.
  - .3 Fit insulation tight around electrical boxes, plumbing and heating pipes and ducts, around exterior doors and windows and other protrusions.
  - .4 Keep insulation minimum 75 mm from heat emitting devices such as recessed light fixtures.
  - .5 Cut and trim insulation neatly to fit spaces. Butt joints tightly, offset vertical joints. Use only insulation boards free from chipped or broken edges. Use largest possible dimensions to reduce number of joints.
  - .6 Offset both vertical and horizontal joints in multiple layer applications.
  - .7 Do not enclose insulation until it has been inspected and approved by Departmental Representative.
- 3.3 EXAMINATION
- .1 Prior to commencement of work ensure:
    - .1 Substrates are firm, straight, smooth, dry, free of snow, ice or frost, and clean of dust and debris.
-

3.4 RIGID  
INSULATION  
INSTALLATION

- .1 Apply Type 1 adhesive to polystyrene insulation board 6mm beads in a grid pattern in accordance with manufacturer's recommendations.
- .2 Imbed insulation boards into vapour barrier type adhesive, applied as specified, prior to skinning of adhesive.
- .3 Leave insulation board joints unbonded over line of expansion and control joints. Bond a continuous 150 mm wide 0.15 mm modified bituminous membrane over expansion and control joints using compatible adhesive and primer before application of insulation.

3.5 PERIMETER  
FOUNDATION  
INSULATION

- .1 Exterior application: extend boards minimum below finish grade as indicated. Install on exterior face of perimeter foundation wall with adhesive.
- .2 Under slab application: extend boards in from perimeter foundation slab as indicated. Lay boards on level compacted fill.

3.6 CLEANING

- .1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

PART 1 - GENERAL

- 1.1 RELATED SECTIONS
- .1 Section - 01 35 29 - Health and Safety.
  - .2 Section 01 33 00 - Submittal Procedures.
  - .3 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- 1.2 REFERENCES
- .1 American Society for Testing and Materials International (ASTM)
    - .1 ASTM C 553-13, Specification for Mineral Fibre Blanket Thermal Insulation for Commercial and Industrial Applications.
    - .2 ASTM C 665-12, Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
    - .3 ASTM C 1320-2010(R2016), Standard Practice for Installation of Mineral Fiber Batt and Blanket Thermal Insulation for Light Frame Construction.
  - .2 Canadian Standards Association (CSA International)
    - .1 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
- 1.3 SUBMITTALS
- .1 Product Data:
    - .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
  - .2 Manufacturer's Instructions:
    - .1 Submit manufacturer's installation instructions.
- 1.4 QUALITY ASSURANCE
- .1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
-

- .2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .3 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29 - Health and Safety Requirements.

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 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard packaging material in appropriate on-site for recycling in accordance with Waste Management Plan.

PART 2 - PRODUCTS

2.1 INSULATION

- .1 Batt and blanket mineral fibre: to ASTM C 553 ASTM C 665 CAN/ULC S702.
  - .1 Fibreglass batt insulation.
  - .2 Thickness: as indicated.

2.2 ACCESSORIES

- .1 Vapour barrier: Shall be (6 mil) polyethylene.
  - .2 3M shipping/packing tape 50 mm wide.
  - .3 Sealant: acoustic sealant to CGSB 19-GP-21.
-

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS .1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.2 INSULATION INSTALLATION .1 Install insulation to maintain continuity of thermal protection to building elements and spaces.  
.2 Fit insulation closely around electrical boxes, pipes, ducts, frames and other objects in or passing through insulation.  
.3 Do not compress insulation to fit into spaces.  
.4 Do not enclose insulation until it has been inspected and approved by Departmental Representative.

3.3 CLEANING .1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

PART 1 - GENERAL

- 1.1 SECTION INCLUDES
- .1 Materials, installation of asphalt shingles and roll roofing.
- 1.2 RELATED SECTIONS
- .1 Section 01 33 00 - Submittal Procedures.
  - .2 Section 01 45 00 - Testing and Quality Control.
  - .3 Section 01 61 00 - Common Product Requirements.
  - .4 Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
  - .5 Section 01 78 00 - Closeout Submittals.
- 1.3 REFERENCES
- .1 Canadian General Standards Board (CGSB).
    - .1 CAN/CGSB-37.4-M89, Fibrated, Cutback Asphalt, Lap Cement for Asphalt Roofing.
    - .2 CAN/CGSB-37.5-M89, Cutback Asphalt Plastic Cement.
    - .3 CAN/CGSB-51.34-M86, Vapour Barrier Polyethylene Sheet, for Use in Building Construction.
  - .2 Canadian Roofing Contractors' Association (CRCA).
    - .1 CRCA Roofing Specification Manual - 1997.
  - .3 Canadian Standards Association (CSA International).
    - .1 A123.5-16, Asphalt Shingles Made From Glass Felt and Surfaced With Mineral Granules.
    - .2 CSA A123.2-03 (R2013), Asphalt-Coated Roofing Sheets.
    - .3 CAN/CSA-A123.3-05(R2015), Asphalt Saturated Organic Roofing Felt.
    - .4 CAN3-A123.51-14, Asphalt Shingle Application on Roof Slopes 1:3 and Steeper.
    - .5 CSA B111-1974 (R1998), Wire Nails, Spikes and Staples.
  - .4 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
    - .1 Material Safety Data Sheets (MSDS).
-



1.4 SUBMITTALS

- .1 Submit proof of manufacturer's CCMC Listing and listing number to Departmental Representative.
- .2 Manufacturer's Instructions: Provide to indicate special handling criteria, installation sequence, cleaning procedures.
- .3 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.
- .4 Submit product data sheets for asphalt shingles. Include:
  - .1 Product characteristics.
  - .2 Performance criteria.
  - .3 Installation instructions.
  - .4 Limitations.
  - .5 Colour and finish.

1.5 SAMPLES

- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit duplicate samples of full size specified shingles.

1.6 DELIVERY,  
STORAGE AND  
HANDLING

- .1 Deliver, handle, store and protect materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Provide and maintain dry, off-ground weatherproof storage.
- .3 Remove only in quantities required for same day use.

1.7 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.
-

1.7 WASTE  
MANAGEMENT AND  
DISPOSAL  
(Cont'd)

- .4 Place materials defined as hazardous or toxic in designated containers.
- .5 Divert unused asphalt shingle materials from landfill to asphalt recycling facility approved by Departmental Representative.
- .6 Dispose of unused asphaltic cement type materials at official hazardous material collections site approved by Departmental Representative.
- .7 Fold up metal banding, flatten and place in designated area for recycling.

1.8 EXTRA MATERIALS

- .1 All unused shingles remain property of owner.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Asphalt shingles: to CSA A123.1/A123.5.
    - .1 15 year warranty.
    - .2 FM 4473 Class 4 impact resistance rating.
    - .3 Type: self-seal.
    - .4 Mass: minimum 95 kg/3m<sup>2</sup> for type 1.
    - .5 Colours: black as selected by Departmental Representative.
  - .2 Ice and water shield: modified bitumen to CSA A123.2, Type M 20 kg.
    - .1 Roll roofing with self-adhesive backing (57 mil) 1.5 mm thickness.
  - .3 Asphaltic Cement:
    - .1 Plastic cement: to CAN/CGSB-37.5.
    - .2 Lap cement: to CAN/CGSB-37.4.
  - .4 PVC drip edge: extruded profile of unplasticized polyvinyl chloride of minimum thickness of 0.8 mm.
  - .5 Nails: to CSA B111, of galvanized steel, sufficient length to penetrate 19 mm into deck.
  - .6 Staples: chisel point galvanized steel 25 mm crown 1.5 mm thick, sufficient length to penetrate 20 mm into deck tubelock nails for soffit substrates.
-

2.1 MATERIALS  
(Cont'd)

- .7 Ridge vent: 250 mm wide ridge cap exhaust vent 18.0 sq in./linear ft.

PART 3 - EXECUTION

3.1 APPLICATION

- .1 Do asphalt shingle work in accordance with CAN3-A123.51 CAN3-A123.52 CRCA Specification except where specified otherwise.
- .2 Install drip edge along eaves, overhanging 12 mm, with minimum 50 mm flange extending onto roof decking. Nail to deck at 400 mm on centre.
- .3 Install ice and water shield over entire roof prior to installation of asphalt shingles.
- .4 Install asphalt shingles on roof slopes 1:3 and steeper in accordance with CAN3-A123.51.
- .5 Install ridge vent and cap with shingles.

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 06 10 00 - Rough Carpentry.
- .4 Section 06 20 00 - Finish Carpentry.
- .5 Section 07 62 00 - Sheet Metal Flashing and Trim.
- .6 Section 07 92 00 - Joint Sealants.
- .7 Section 08 11 00 - Metal Doors and Frames.

1.2 REFERENCES

- .1 American National Standards Institute (ANSI)
    - .1 ANSI A135.6-06, Hardboard Siding Standard.
  - .2 ASTM International
    - .1 ASTM D 5116-10, Standard Guide For Small-Scale Environmental Chamber Determinations of Organic Emissions From Indoor Materials/Products.
  - .3 American National Standards Institute (ANSI)
    - .1 ANSI A135.6, Hardboard Siding Standard.
  - .4 Canadian General Standards Board (CGSB)
    - .1 CAN/CGSB-11.3, Hardboard.
    - .2 CAN/CGSB-11.5, Hardboard, Precoated, Factory Finished, for Exterior Cladding.
    - .3 CAN/CGSB-11.6, Installation of Exterior Hardboard Cladding.
  - .5 Canadian General Standards Board (CGSB)
    - .1 CAN/CGSB-51.32, Sheathing, Membrane, Breather Type.
  - .6 CSA International
    - .1 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
    - .2 CSA O121-08, Douglas Fir Plywood.
    - .3 CSA O151-09, Canadian Softwood Plywood.
-

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- .1 CCD-045-95, Sealants and Caulking Compounds.
  - .8 National Lumber Grading Authority (NLGA)
    - .1 NLGA Standard Grading Rules for Canadian Lumber 2010.
- 
- 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 wood siding and include product characteristics, performance criteria, physical size, finish and limitations.
    - .2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29 - Health and Safety Requirements, 01 35 43 - Environmental Procedures. Indicate VOC's for caulking materials during application.
- 
- 1.4 QUALITY ASSURANCE
- .1 Provide Certificate of Quality Compliance from siding manufacturing upon completion of fabrication.
  - .2 Provide Certificate of Quality Compliance upon satisfactory completion of installation.
- 
- 1.5 WARRANTY
- .1 Warranty Period: 15 years against cracking, peeling, blistering, chalking, loss of coating adhesion, yellowing with age, and no damage caused by rinse cleaning surface dirt. Warranty to commence at date of Substantial Completion.
- 
- 1.6 DELIVERY, STORAGE AND HANDLING
- .1 Deliver, store and handle materials in accordance with Section 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, indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect siding from nicks, scratches, and blemishes.
- .3 Replace defective or damaged materials with new.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- .1 Engineered Wood Siding and Trims: 304.8 wide face with 110 plank Revele lap siding. .
- .2 Strapping: Softwood Lumber, kiln dried treated with brush applied wood preservative, size 38 mm x 89 mm spaced 400 mm o.c.
- .3 Nails: Mechanically galvanized, to securely and rigidly retain the work permanently in position, pre-finished baked on coating to match siding finish. Nails 64 mm long for siding and 83 mm for trims.
- .4 Exterior Sheathing Membrane: CAN/CGSB 51.32M, Spunbonded olefin sheeting, conforming to ASTM D3675, single ply laminated and coated.
- .5 Sealant: Thermoplastic type, color to exactly match siding.
- .6 Concealed Flashings: 0.4 mm thick galvanized steel.
- .7 Trims: Batten trim 114 mm wide supplied by siding manufacturer. Pre-finished.

### 2.2 FINISH

- .1 Pre-finish color: Thermoplastic acrylic latex emulsion, factory coated under controlled environment conditions by a modified vacuum coat method, one prime coat and one finish coat, applied to all board surfaces, minimum 0.15 mm dry film thickness.
  - .1 Standard color or custom color from manufacturer's range of colors.

.2 Touch-up Paint: Thermoplastic acrylic latex emulsion, same type and color as siding.

PART 3 - EXECUTION

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Departmental Representative.
  - .2 Proceed with installation only after unacceptable conditions have been remedied.

3.2 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.3 PREPARATION

- .1 Install metal flashing continuous over window and other openings. Secure in position tight to wall sheathing.
- .2 Install strapping at 400 mm o.c.
- .3 Install pre-fabricated starter strips.
- .4 Apply sealant around window, door and other opening frames.

3.4 INSTALLATION

- .1 Install siding and accessories to manufacturer's instructions.
- .2 Install starter strip.
- .3 Install siding for natural watershed.
- .4 Install siding in straight aligned lengths, set level with plumb ends and corners.

- .5 Install hardboard to CGSB11-GP-6M and manufacturer's instructions.
- .6 Achieve siding joints no less than 800 mm apart in adjoining boards and distribute evenly over wall surface.
- .7 Install corner trims, battens, closures, etc.
- .8 Fasten siding securely to wood batten substrate. Ensure strapping is secured into the structural wood framing members a minimum of 64 mm of per siding manufacturer's specifications.
- .9 Face nail 25 mm from bottom of siding board directly into wood strapping, drive nail head just flush with siding surface; do not indent or penetrate painted coating.
- .10 Install metal drip flashing over door frame.

3.5 INCIDENTAL SITE FINISHING

- .1 Carefully set exposed nails flush with siding coating.
- .2 Touch-up blemished siding materials to match siding color.

3.6 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, disposal and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
    - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.
-



3.7 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by wood siding installation.

PART 1 - GENERAL

1.1 RELATED  
SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 06 10 00 - Rough Carpentry.
- .3 Section 06 20 00 - Finish Carpentry.
- .4 Section 07 31 13 - Asphalt Shingles.
- .5 Section 07 92 10 - Joint Sealing.

1.2 REFERENCES

- .1 The Aluminum Association Inc. (AAI)
  - .1 AAI-Aluminum Sheet Metal Work in Building Construction-2002.
- .2 American Society for Testing and Materials International (ASTM)
  - .1 ASTM A 606-04, Standard Specification for Steel, Sheet and Strip, High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, with Improved Atmospheric Corrosion Resistance.
  - .2 ASTM A 653/A 653M-07, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
  - .3 ASTM A 792/A 792M-06a, Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
- .3 Canadian Roofing Contractors Association (CRCA)
  - .1 Roofing Specifications Manual 1997.
- .4 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-51.32-M77, Sheathing, Membrane, Breather Type.
  - .2 CAN/CGSB-93.1-M85, Sheet Aluminum Alloy, Prefinished, Residential.

1.3 SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
  - .2 Product Data:
-

.1 Submit manufacturer's printed product literature for sheet metal flashing systems materials, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Samples:

.1 Submit duplicate 50 mm x 50 mm samples of each type of sheet metal material, finishes and colours.

1.4 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 SHEET METAL  
MATERIALS

.1 Zinc coated steel sheet: 0.76 mm thickness, commercial quality to ASTM A 653/A 653M, with Z275 designation zinc coating.

2.2 PREFINISHED  
STEEL SHEET

.1 Prefinished steel with factory applied polyvinylidene fluoride.  
.1 Class F1S.  
.2 Colour selected by Consultant from manufacturer's standard range.  
.3 Specular gloss: 30 units +/- in accordance with ASTM D 523.  
.4 Coating thickness: not less than 22 micrometres.  
.5 Resistance to accelerated weathering for chalk rating of 8, colour fade 5 units or less and erosion rate less than 20% to ASTM D 822 as follows:  
.1 Outdoor exposure period 2500 hours.  
.2 Humidity resistance exposure period 5000 hours.

2.3 ACCESSORIES

- .1 Isolation coating: alkali resistant bituminous paint.
- .2 Plastic cement: to CAN/CGSB 37.5.
- .3 Underlay for metal flashing: dry sheathing to CAN/CGSB-51.32 No. 15 perforated asphalt felt to CSA A123.3.
- .4 Sealants: See Section 07 92 10 - Joint Sealing.
- .5 Fasteners: of same material as sheet metal, to CSA B111, ring thread flat head roofing nails of length and thickness suitable for metal flashing application.
- .6 Washers: of same material as sheet metal, 1 mm thick with rubber packings.
- .7 Touch-up paint: as recommended by prefinished material manufacturer.
  - .1 Maximum VOC limit 50 g/L to Standard GS-11.

2.4 FABRICATION

- .1 Fabricate metal flashings and other sheet metal work in accordance with applicable CRCA 'FL' series details.
- .2 Fabricate aluminum flashings and other sheet aluminum work in accordance with AAI-Aluminum Sheet Metal Work in Building Construction.
- .3 Form pieces in 2400 mm maximum lengths.
  - .1 Make allowance for expansion at joints.
- .4 Hem exposed edges on underside 12 mm.
  - .1 Mitre and seal corners with sealant.
- .5 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.
- .6 Apply isolation coating to metal surfaces to be embedded in concrete or mortar.

2.5 METAL FLASHINGS

- .1 Form flashings, copings and fascias to profiles indicated of 0.76 mm thick prefinished steel.
-

PART 3 - EXECUTION

- 3.1 MANUFACTURER'S INSTRUCTIONS .1 Compliance: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.
- 3.2 INSTALLATION .1 Install sheet metal work as detailed.
- .2 Use concealed fastenings except where approved before installation.
- .3 Provide underlay under sheet metal.  
.1 Secure in place and lap joints 100 mm.
- .4 Lock end joints and caulk with sealant.
- .5 Insert metal flashing under drip flashing to form weather tight junction.
- .6 Caulk flashing at cap flashing with sealant.
- 3.3 SCUPPERS .1 Install scuppers as indicated.
- 3.4 CLEANING .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.
- .3 Leave work areas clean, free from grease, finger marks and stains.

PART 1 - GENERAL

- 1.1 RELATED SECTIONS
- .1 Section 01 61 00 - Common Product Requirements.
  - .2 Section 01 45 00 - Quality Control.
  - .3 Section 01 33 00 - Submittal Procedures.
  - .4 Section 31 53 13 - Timber Cribwork.
- 1.2 REFERENCES
- .1 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
    - .1 Material Safety Data Sheets (MSDS).
  - .2 Underwriter's Laboratories of Canada (ULC)
    - .1 ULC-S115-1995, Fire Tests of Fire stop Systems.
- 1.3 DEFINITIONS
- .1 Fire Stop Material: device intended to close off opening or penetration during fire or materials that fill openings in wall or floor assembly where penetration is by cables, cable trays, conduits, ducts and pipes and poke-through termination devices, including electrical outlet boxes along with their means of support through wall or floor openings.
  - .2 Single Component Fire Stop System: fire stop material that has Listed Systems Design and is used individually without use of high temperature insulation or other materials to create fire stop system.
  - .3 Multiple Component Fire Stop System: exact group of fire stop materials that are identified within Listed Systems Design to create on site fire stop system.
  - .4 Tightly Fitted; (ref: NBC Part 3.1.9.1.1 and 9.10.9.6.1): penetrating items that are cast in place in buildings of noncombustible construction or have "0" annular space in buildings of combustible construction.
-

.1 Words "tightly fitted" should ensure that integrity of fire separation is such that it prevents passage of smoke and hot gases to unexposed side of fire separation.

1.4 SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
  - .1 Submit shop drawings to show proposed material and method of installation.
  - .2 Construction details should accurately reflect actual job conditions.
- .4 Samples:
  - .1 Submit samples showing actual fire stop material proposed for project.
- .5 Quality assurance submittals: submit following in accordance with Section 01 45 00 - Quality Control.
  - .1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
  - .2 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures with Section 01 33 00 - Submittal Procedures.

1.5 DELIVERY,  
STORAGE AND HANDLING

- .1 Packing, shipping, handling and unloading:
  - .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
  - .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.3 Deliver materials to the site in undamaged condition and in original unopened containers, marked to indicate manufacturer seals and labels ULC markings.

.2 Storage and Protection:

.1 Store materials indoors in dry location, keep from freezing and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Replace defective or damaged materials with new.

.3 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.

1.6 MEASUREMENT FOR PAYMENT

.1 No measurement for payment to be made under this section. Include cost in unit prices for item in treated timber cribwork.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Fire stopping and smoke seal systems: in accordance with CAN-ULC-S115.
- .1 Asbestos-free materials and systems capable of maintaining effective barrier against flame, smoke and gases in compliance with requirements of CAN- ULC-S115 and not to exceed opening sizes for which they are intended and conforming to specified special requirements described in PART 3.
- .2 Fire stop system rating: 1.5 Hour Rating.
- .2 Service penetration fire stop components: certified by test laboratory to CAN-ULC-S115.
- .3 Fire-resistance rating of installed fire stopping assembly in accordance with NBC.
- .4 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.



- .5 Damming and backup materials, supports and anchoring devices: to manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.
- .6 Sealants for vertical joints: non-sagging.

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 PREPARATION

- .1 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials.
  - .1 Ensure that substrates and surfaces are clean, dry and frost free.
- .2 Prepare surfaces in contact with fire stopping materials and smoke seals to manufacturer's instructions.

3.3 INSTALLATION

- .1 Install fire stopping and smoke seal material and components in accordance with manufacturer's certified tested system listing.
- .2 Seal holes or voids made by through penetrations, poke-through termination devices, and unpenetrated openings or joints to ensure continuity and integrity of fire separation are maintained.
- .3 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.
- .4 Tool or trowel exposed surfaces to neat finish.
- .5 Remove excess compound promptly as work progresses and upon completion.

- 3.4 SEQUENCES OF OPERATION
- .1 Proceed with installation only when submittals have been reviewed by Departmental Representative.
- 3.5 FIELD QUALITY CONTROL
- .1 Inspections: notify Departmental Representative when ready for inspection and prior to concealing or enclosing fire stopping materials and service penetration assemblies.
- .2 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.
- 3.6 CLEANING
- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.
- .3 Remove temporary dams after initial set of fire stopping and smoke seal materials.
- 3.7 SCHEDULE
- .1 Fire stop and smoke seal at:
- .1 Penetrations through fire-resistance rated timber cribwork partitions and walls..

PART 1 - GENERAL

1.1 SECTION  
INCLUDES

- .1 Materials, preparation and application for caulking and sealants.

1.2 RELATED  
SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 45 00 - Quality Control.
- .3 Section 01 61 00 - Common Product Requirements.
- .4 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .5 Section 03 10 00 - Concrete Forming and Accessories.
- .6 Section 03 30 00 - Cast-in-Place Concrete.
- .7 Section 06 10 00 - Rough Carpentry.
- .8 Section 06 20 00 - Finish Carpentry.

1.3 REFERENCES

- .1 Canadian General Standards Board (CGSB)
- .2 CAN/CGSB-19.24-M90, Multi-component, Chemical Curing Sealing Compound.
- .3 Department of Justice Canada (Jus)
  - .1 Canadian Environmental Protection Act, 1999 (CEPA).
- .4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .5 Transport Canada (TC)
  - .1 Transportation of Dangerous Goods Act, 1992 (TDGA).

1.4 SUBMITTALS

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

- .2 Manufacturer's product to describe.
  - .1 Caulking compound.
  - .2 Primers.
  - .3 Sealing compound, each type, including compatibility when different sealants are in contact with each other.
- .3 Submit manufacturer's instructions in accordance with Section 01 33 00 - Submittal Procedures.
  - .1 Instructions to include installation instructions for each product used.

1.5 DELIVERY,  
STORAGE, AND  
HANDLING

- .1 Deliver, handle, store and protect materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Deliver and store materials in original wrappings and containers with manufacturer's seals and labels, intact. Protect from freezing, moisture, water and contact with ground or floor.

1.6 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 Remove from site and dispose of 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 Place materials defined as hazardous or toxic in designated containers.
  - .5 Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Regional and Municipal regulations.
-

- .6 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.
- .7 Divert unused joint sealing material from landfill to official hazardous material collections site approved by Departmental Representative.
- .8 Empty plastic joint sealer containers are not recyclable. Do not dispose of empty containers with plastic materials destined for recycling.
- .9 Fold up metal banding, flatten, and place in designated area for recycling.

1.7 PROJECT  
CONDITIONS

- .1 Environmental Limitations:
  - .1 Do not proceed with installation of joint sealants under following conditions:
    - .1 When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 4.4 degrees C.
    - .2 When joint substrates are wet.
- .2 Joint-Width Conditions:
  - .1 Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.
- .3 Joint-Substrate Conditions:
  - .1 Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

1.8 ENVIRONMENTAL  
REQUIREMENTS

- .1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of Material Safety Data Sheets (MSDS) acceptable to Labour Canada.
-

- .2 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.

1.9 MEASUREMENT FOR PAYMENT

- .1 No measurement for payment to be made under this section. Include costs in unit prices for items in which joint sealing is required.

PART 2 - PRODUCTS

2.1 SEALANT MATERIALS

- .1 Where sealants are qualified with primers use only these primers.

2.2 SEALANT MATERIAL DESIGNATIONS

- .1 Polyurethane Sealant:
  - .1 Self-Leveling to CAN/CGSB-19.13 M87, Classification C-1-25-B-N, Premium Grade, colour to match concrete.
  - .2 Non-Sag to CAN/CGSB-19.24, colour to match concrete.
- .2 Preformed Compressible and Non-Compressible back-up materials.
  - .1 Polyethylene or Neoprene Foam.
    - .1 Extruded closed cell foam backer rod.
    - .2 Size: oversize 30 to 50%.
  - .2 Neoprene or Butyl Rubber.
    - .1 Round solid rod, Shore A hardness 70.
  - .3 High Density Foam.
    - .1 Extruded closed cell polyvinyl chloride (PVC), extruded polyethylene, closed cell, Shore A hardness 20, tensile strength 140 to 200 kPa, extruded polyolefin foam, 32 kg/m<sup>3</sup> density, or neoprene foam backer, size as recommended by manufacturer.
  - .4 Bond Breaker Tape.
    - .1 Polyethylene bond breaker tape which will not bond to sealant.

2.3 SEALANT  
SELECTION

- .1 Expansion and control joints in exterior surfaces of poured-in-place concrete: Sealant type: mono, acrylic terpolymer.
- .2 Control and expansion joints in exterior surfaces of walls: Sealant type: thermo plastic elastomeric sealant.
- .3 Seal interior perimeters of exterior openings as detailed on drawings: Sealant type: acrylic latex sealant.
- .4 Perimeters of interior frames, as detailed and itemized: Sealant type: acrylic terpolymer.

2.4 JOINT CLEANER

- .1 Non-corrosive and non-staining type, compatible with joint forming materials and sealant recommended by sealant manufacturer.
- .2 Primer: as recommended by manufacturer.

PART 3 - EXECUTION

3.1 PROTECTION

- .1 Protect installed Work of other trades from staining or contamination.

3.2 SURFACE  
PREPARATION

- .1 Examine joint sizes and conditions to establish correct depth to width relationship for installation of backup materials and sealants.
  - .2 Clean bonding joint surfaces of harmful matter substances including dust, rust, oil grease, and other matter which may impair Work.
  - .3 Do not apply sealants to joint surfaces treated with sealer, curing compound, water repellent, or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.
  - .4 Ensure joint surfaces are dry and frost free.
-

- .5 Prepare surfaces in accordance with manufacturer's directions.

3.3 PRIMING

- .1 Where necessary to prevent staining, mask adjacent surfaces prior to priming and caulking.
- .2 Prime sides of joints in accordance with sealant manufacturer's instructions immediately prior to caulking.

3.4 BACKUP MATERIAL

- .1 Apply bond breaker tape where required to manufacturer's instructions.
- .2 Install joint filler to achieve correct joint depth and shape, with approximately 30% compression.

3.5 MIXING

- .1 Mix materials in strict accordance with sealant manufacturer's instructions.

3.6 APPLICATION

- .1 Sealant.
    - .1 Apply sealant in accordance with manufacturer's written instructions.
    - .2 Mask edges of joint where irregular surface or sensitive joint border exists to provide neat joint.
    - .3 Apply sealant in continuous beads.
    - .4 Apply sealant using gun with proper size nozzle.
    - .5 Use sufficient pressure to fill voids and joints solid.
    - .6 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.
    - .7 Tool exposed surfaces before skinning begins to give slightly concave shape.
    - .8 Remove excess compound promptly as work progresses and upon completion.
  - .2 Curing.
    - .1 Cure sealants in accordance with sealant manufacturer's instructions.
-



.2 Do not cover up sealants until proper curing has taken place.

.3 Cleanup.

.1 Clean adjacent surfaces immediately and leave Work neat and clean.

.2 Remove excess and droppings, using recommended cleaners as work progresses.

.3 Remove masking tape after initial set of sealant.

PART 1 - GENERAL

1.1 RELATED  
SECTIONS

- .1 Section 01 61 00 - Common Product.
- .2 Section 01 33 00 - Submittal Procedures.
- .3 Section 08 71 00 - Door Hardware.
- .4 Section 09 97 19 - Painting Exterior Metal Surface.

1.2 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
  - .1 ASTM A 653/A 653M-06a, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
  - .2 ASTM B 29-03, Standard Specification for Refined Lead.
  - .3 ASTM B 749-03, Standard Specification for Lead and Lead Alloy Strip, Sheet and Plate Products.
- .2 Canadian Standards Association (CSA International)
  - .1 CSA-G40.20-04/G40.21-04, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
  - .2 CSA W59-03, Welded Steel Construction (Metal Arc Welding).
- .3 Canadian Steel Door Manufacturers' Association (CSDMA)
  - .1 CSDMA, Recommended Specifications for Commercial Steel Doors and Frames, 2000.
  - .2 CSDMA, Selection and Usage Guide for Commercial Steel Doors, 1990.

1.3 SYSTEM  
DESCRIPTION

- .1 Design Requirements:
    - .1 Design exterior frame assembly to accommodate to expansion and contraction when subjected to minimum and maximum surface temperature of -35 degrees C to 35 degrees C.
    - .2 Maximum deflection for exterior steel entrance screens under wind load of 1.2 kPa not to exceed 1/175th of span.
-

1.4 SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Provide product data: in accordance with Section 01 33 00 - Submittal Procedures.
- .3 Provide shop drawings: in accordance with Section 01 33 00 - Submittal Procedures.
  - .1 Indicate each type of door, material, steel core thicknesses, mortises, reinforcements, location of exposed fasteners, openings, glazed louvred, arrangement of hardware and fire rating and finishes.
  - .2 Indicate each type frame material, core thickness, reinforcements, glazing stops, location of anchors and exposed fastenings and reinforcing fire rating finishes.

1.5 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 MATERIALS

- .1 Sheet steel: 1.2 mm and 1.6 mm base thickness, commercial grade steel to ASTM A525M-80 with Z or ZF 001 wiped zinc finish.
  - .2 Door Core: Hollow steel: vertically stiffened with 1.2 mm thick steel ribs. Voids filled with semi-rigid fibrous insulation minimum density 24 kg/m<sup>3</sup>.
  - .3 Primer: for touch up to CGSB 1-GP-181M+Amdt-Mar78.
-

2.2 DOOR CORE  
MATERIALS

- .1 Steel doors as detailed, in accordance with Canadian Steel Door and Frame Manufacturers' Association, "Canadian Manufacturing Specifications for Steel Doors and Frames", 1982 for hollow steel construction except where specified otherwise.
- .2 Use 1.6 mm base thickness steel sheet for Doors; remainder to be 1.2 mm base thickness steel sheet.
- .3 Mortise, reinforce, drill and tap doors and reinforcements to receive hardware using templates provided by finish hardware supplier.
- .4 Touch up doors with primer where galvanized finish damaged during fabrication.

2.3 PRIMER

- .1 Touch-up prime CAN/CGSB-1.181.
  - .1 Maximum VOC limit 50 g/L to GC-03.

2.4 PAINT

- .1 Field paint steel doors and frames in accordance with Sections 09 91 23 - Interior Painting, 09 91 19 - Painting Exterior Metal Surfaces. Protect weatherstrips from paint. Provide final finish free of scratches or other blemishes.
  - .1 Maximum VOC emission level 50 g/L to GS-11 to SCAQMD Rule 1113.

2.5 ACCESSORIES

- .1 Door silencers: single stud rubber/neoprene type.
- .2 Exterior and interior top and bottom caps: rigid polyvinylchloride extrusion conforming to CGSB 41-GP-19Ma steel.
- .3 Door bottom seal:

2.6 FRAMES  
FABRICATION GENERAL

- .1 Fabricate frames in accordance with CSDMA specifications.
  - .2 Fabricate frames to profiles and maximum face sizes as indicated.
-

- .3 Exterior frames: 1.2 mm welded thermally broken type construction.
- .4 Blank, reinforce, drill and tap frames for mortised, templated hardware, using templates provided by finish hardware supplier. Reinforce frames for surface mounted hardware.
- .5 Protect mortised cutouts with steel guard boxes.
- .6 Prepare frame for door silencers, 3 for single.
- .7 Manufacturer's nameplates on frames and screens are not permitted.
- .8 Conceal fastenings except where exposed fastenings are indicated.
- .9 Provide factory-applied touch up primer at areas where zinc coating has been removed during fabrication.
- .10 Insulate exterior frame components with polyurethane insulation.

2.7 FRAME ANCHORAGE

- .1 Provide appropriate anchorage to floor and wall construction.
- .2 Locate each wall anchor immediately above or below each hinge reinforcement on hinge jamb and directly opposite on strike jamb.
- .3 Provide 2 anchors for rebate opening heights up to 1520 mm and 1 additional anchor for each additional 760 mm of height or fraction thereof.
- .4 Locate anchors for frames in existing openings not more than 150 mm from top and bottom of each jambs and intermediate at 660 mm on centre maximum.

2.8 FRAMES: WELDED  
TYPE

- .1 Welding in accordance with CSA W59.
- .2 Accurately mitre or mechanically joint frame product and securely weld on inside of profile.

- .3 Cope accurately and securely weld butt joints of mullions, transom bars, centre rails and sills.
- .4 Grind welded joints and corners to a flat plane, fill with metallic paste and sand to uniform smooth finish.
- .5 Securely attach floor anchors to inside of each jamb profile.
- .6 Weld in 2 temporary jamb spreaders per frame to maintain proper alignment during shipment.
- .7 Fabricate frame products for openings.

2.9 DOOR  
FABRICATION GENERAL

- .1 Doors: swing type, flush, as indicated.
- .2 Exterior doors: insulated sheet steel construction.
- .3 Fabricate doors with longitudinal edges locked seamed, welded. Seams: visible grind welded joints to a flat plane, fill with metallic paste filler and sand to a uniform smooth finish.
- .4 Blank, reinforce, drill doors and tap for mortised, templated hardware.
- .5 Factory prepare holes 12.7 mm diameter and larger except mounting and through-bolt holes, on site, at time of hardware installation.
- .6 Provide factory-applied touch-up primer at areas where zinc coating has been removed during fabrication.
- .7 Manufacturer's nameplates on doors are not permitted.

2.10 DOORS:  
HONEYCOMB CORE  
CONSTRUCTION

- .1 Form face sheets for exterior doors from 1.6 1.2 1.0 mm sheet steel with honeycomb polystyrene polyurethane core laminated under pressure to face sheets.

2.11 INSULATED  
STEEL DOOR  
CONSTRUCTION

- .1 Form face sheets for exterior doors from 1.2 mm sheet steel.
- .2 Reinforce doors with vertical stiffeners, securely welded laminated to face sheets at 150 mm on centre maximum.
- .3 Fill voids between stiffeners of exterior doors with insulated core.

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  
GENERAL

- .1 Install doors and frames to CSDMA Installation Guide.

3.3 FRAME  
INSTALLATION

- .1 Set frames plumb, square, level and at correct elevation.
  - .2 Secure anchorages and connections to adjacent construction.
  - .3 Brace frames rigidly in position while building-in. Install temporary horizontal wood spreader at third points of door opening to maintain frame width. Provide vertical support at centre of head for openings over 1200 mm wide. Remove temporary spreaders after frames are built-in.
  - .4 Make allowances for deflection of structure to ensure structural loads are not transmitted to frames.
  - .5 Caulk perimeter of frames between frame and adjacent material.
-

3.4 DOOR  
INSTALLATION

- .1 Install doors and hardware in accordance with hardware templates and manufacturer's instructions and Section 08 71 00 - Door Hardware.
- .2 Provide even margins between doors and jambs and doors and finished floor and thresholds as follows.
  - .1 Hinge side: 1.0 mm.
  - .2 Latchside and head: 1.5 mm.
  - .3 Finished floor, and thresholds: 13 mm.
- .3 Adjust operable parts for correct function.

3.5 FINISH REPAIRS

- .1 Touch up with primer finishes damaged during installation.
- .2 Fill exposed frame anchors and surfaces with imperfections with metallic paste filler and sand to a uniform smooth finish.



PART 1 - GENERAL

1.1 RELATED  
SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 61 00 - Common Product Requirements.
- .3 Section 01 78 00 - Closeout Submittals.
- .4 Section 08 11 00 - Metal Doors and Frames.

1.2 REFERENCES

- .1 Canadian Steel Door and Frame Manufacturers' Association (CSDFMA).
  - .1 CSDFMA Canadian Metric Guide for Steel Doors and Frames (Modular Construction): standard hardware location dimensions.
- .2 Canadian General Standards Board (CGSB).
  - .1 CAN/CGSB-69.17-M86(R1993), Bored and Preassembled Locks and Latches.
  - .2 CAN/CGSB-69.18-M90/ANSI/BHMA A156.1-1981, Butts and Hinges.
  - .3 CAN/CGSB-69.22-M90/ANSI/BHMA A156.6-1986, Architectural Door Trim.
  - .4 CAN/CGSB-69.28-M90/ANSI/BHMA A156.12-1986, Interconnected Locks and Latches.
  - .5 CAN/CGSB-69.29-93/ANSI/BHMA A156.13-1987, Mortise Locks and Latches.
  - .6 CAN/CGSB-69.31-M89/ANSI/BHMA A156.15-1981, Closer/Holder Release Device.

1.3 SUBMITTALS

- .1 Product Data:
  - .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Samples:
  - .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
  - .2 Identify each sample by label indicating applicable specification paragraph number, brand name and number, finish and hardware package number.

- 
- 1.3 SUBMITTALS  
(Cont'd)
- .2 (Cont'd)
    - .3 After approval samples will be returned for incorporation in the Work.
  - .3 Hardware List:
    - .1 Submit contract hardware list in accordance with Section 01 33 00 - Submittal Procedures.
    - .2 Indicate specified hardware, including make, model, material, function, size, finish and other pertinent information.
  - .4 Manufacturer's Instructions:
    - .1 Submit manufacturer's installation instructions.
  - .5 Closeout Submittals
    - .1 Provide operation and maintenance data for door closers, locksets, door holders for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
- 1.4 QUALITY ASSURANCE
- .1 Regulatory Requirements:
  - .2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- 1.5 DELIVERY, STORAGE, AND HANDLING
- .1 Packing, Shipping, Handling and Unloading:
    - .1 Deliver, store, handle and protect materials in accordance with Section 01 61 00 - Common Product Requirements.
    - .2 Package each item of hardware including fastenings, separately or in like groups of hardware, label each package as to item definition and location.
  - .2 Storage and Protection:
    - .1 Store finishing hardware in locked, clean and dry area.
- 1.6 WASTE DISPOSAL AND MANAGEMENT
- .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
-

1.6 WASTE DISPOSAL  
AND MANAGEMENT  
(Cont'd)

- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Dispose of corrugated cardboard polystyrene plastic packaging material in appropriate on-site bin for recycling in accordance with site waste management program.

1.7 MAINTENANCE

- .1 Extra Materials:
  - .1 Provide maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.
  - .2 Supply two sets of wrenches for door closers locksets.

PART 2 - PRODUCTS

2.1 HARDWARE ITEMS

- .1 Use one manufacturer's products only for similar items.

2.2 DOOR HARDWARE

- .1 Locks and latches:
    - .1 Bored and preassembled locks and latches: to CAN/CGSB-69.17, preassembled lock, grade 1, designed for function and keyed as stated in Hardware Schedule.
    - .2 Lever handle: plain design.
    - .3 Escutcheons: round.
    - .4 Normal strikes: box type, lip projection not beyond jamb.
    - .5 Cylinders: key into keying system.
    - .6 Finished to satin.
  - .2 Butts and hinges:
    - .1 Butts and hinges: to CAN/CGSB-69.18, designated by letter A and numeral identifiers, followed by size and finish, listed in Hardware Schedule.
  - .3 Door Closers and Accessories:
    - .1 Door controls (closers): to CAN/CGSB-69.20, designated by letter C and numeral identifiers listed in Hardware Schedule, size in accordance with CAN/CGSB-69.20, table A1, finished to satin.
-

2.2 DOOR HARDWARE  
(Cont'd)

- .3 (Cont'd)
  - .1 (Cont'd)
- .4 Thresholds: 150 mm wide x full width of door opening, stainless steel mill finish, plain surface,, with lip.
- .5 Weatherstripping:
  - .1 Head and jamb seal:
    - .1 Extruded aluminum frame and closed cell neoprene vinyl insert.
    - .2 Adhesive backed neoprene vinyl covered foam material.
  - .2 Door bottom seal:
    - .1 Extruded aluminum frame and closed cell neoprene vinyl sweep, stainless steel finish.

2.3 FASTENINGS

- .1 Use only fasteners provided by manufacturer. Failure to comply may void warranties and applicable licensed labels.
- .2 Supply screws, bolts, expansion shields and other fastening devices required for satisfactory installation and operation of hardware.
- .3 Exposed fastening devices to match finish of hardware.
- .4 Use fasteners compatible with material through which they pass.

2.4 KEYING

- .1 Doors, to be keyed alike great grand master keyed. Prepare detailed keying schedule in conjunction with Departmental Representative.
- .2 Provide keys in duplicate for every lock in this Contract.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.
- .2 Furnish metal door and frame manufacturers with complete instructions and templates for preparation of their work to receive hardware.
- .3 Furnish manufacturers' instructions for proper installation of each hardware component.

3.2 INSTALLATION

- .1 Install hardware to standard hardware location dimensions in accordance with Canadian Metric Guide for Steel Doors and Frames (Modular Construction) prepared by Canadian Steel Door and Frame Manufacturers' Association.
- .2 Where door stop contacts door pulls, mount stop to strike bottom of pull.
- .3 Use only manufacturer's supplied fasteners. Failure to comply may void manufacturer's warranties and applicable licensed labels. Use of "quick" type fasteners, unless specifically supplied by manufacturer, is unacceptable.

3.3 ADJUSTING

- .1 Adjust door hardware, operators, closures and controls for optimum, smooth operating condition, safety and for weather tight closure.
- .2 Lubricate hardware, operating equipment and other moving parts.
- .3 Adjust door hardware to provide tight fit at contact points with frames.

3.4 CLEANING

- .1 Perform cleaning after installation to remove construction and accumulated environmental dirt.
-

3.4 CLEANING  
(Cont'd)

- .2 Clean hardware with damp rag and approved non-abrasive cleaner, and polish hardware in accordance with manufacture's instructions.
- .3 Remove protective material from hardware items where present.
- .4 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

PART 1 - GENERAL

1.1 SUMMARY

- .1 Section Includes:
  - .1 Material and installation of site applied paint finishes to new interior surfaces, including site painting of shop primed surfaces.
- .2 Related Sections:
  - .1 Section 01 33 00 - Submittal Procedures.
  - .2 Section 01 35 29 - Health and Safety Requirements.
  - .3 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
  - .4 Section 01 78 00 - Closeout Submittals.

1.2 REFERENCES

- .1 Department of Justice Canada (Jus)
  - .1 Canadian Environmental Protection Act (CEPA), 1999, c. 33
- .2 Environmental Protection Agency (EPA)
  - .1 EPA Test Method for Measuring Total Volatile Organic Compound Content of Consumer Products, Method 24 - 2010, (for Surface Coatings).
- .3 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .4 Master Painters Institute (MPI)
  - .1 MPI Architectural Painting Specifications Manual, 2004.
- .5 National Fire Code of Canada - 2015

1.3 QUALITY ASSURANCE

- .1 Qualifications:
    - .1 Contractor: minimum of 3 years proven satisfactory experience. Provide list of last three comparable jobs including, job name and location, specifying authority, and project manager.
    - .2 Journeymen: qualified journeymen who have "Tradesman Qualification Certificate of Proficiency" engaged in painting work.
-

1.3 QUALITY  
ASSURANCE  
(Cont'd)

- .1 (Cont'd)
  - .3 Apprentices: working under direct supervision of qualified trades person in accordance with trade regulations.

1.4 SCHEDULING

- .1 Submit work schedule for various stages of painting to Departmental Representative for review. Submit schedule minimum of 48 hours in advance of proposed operations.
- .2 Obtain written authorization from Departmental Representative for changes in work schedule.
- .3 Schedule painting operations to prevent disruption of occupants.

1.5 SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
  - .2 Product Data:
    - .1 Submit product data and instructions for each paint and coating product to be used.
    - .2 Submit product data for the use and application of paint thinner.
  - .3 Samples:
    - .1 Submit full range colour sample chips to indicate where colour availability is restricted.
    - .2 Manufacturer's Instructions:
      - .1 Submit manufacturer's installation and application instructions.
    - .3 Closeout Submittals: submit maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals include following:
      - .1 Product name, type and use.
      - .2 Manufacturer's product number.
      - .3 Colour numbers.
      - .4 MPI Environmentally Friendly classification system rating.
-



1.6 DELIVERY,  
STORAGE AND  
HANDLING

- .1 Packing, Shipping, Handling and Unloading:
    - .1 Pack, ship, handle and unload materials in accordance with Section 01 61 00 - Common Product Requirements and manufacturer's written instructions.
  - .2 Acceptance at Site:
    - .1 Identify products and materials with labels indicating:
      - .1 Manufacturer's name and address.
      - .2 Type of paint or coating.
      - .3 Compliance with applicable standard.
      - .4 Colour number in accordance with established colour schedule.
  - .3 Remove damaged, opened and rejected materials from site.
  - .4 Storage and Protection:
    - .1 Provide and maintain dry, temperature controlled, secure storage.
    - .2 Store materials and supplies away from heat generating devices.
    - .3 Store materials and equipment in well ventilated area with temperature range 7 degrees C to 30 degrees C.
  - .5 Keep areas used for storage, cleaning and preparation clean and orderly. After completion of operations, return areas to clean condition.
  - .6 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 Remove from site and dispose of 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 (WMP).
    - .4 Separate for reuse and recycling and place in designated containers Steel Metal Plastic waste in accordance with Waste Management Plan (WMP).
    - .5 Place materials defined as hazardous or toxic in designated containers.
    - .6 Ensure emptied containers are sealed and stored safely.
-

1.6 DELIVERY,  
STORAGE AND  
HANDLING  
(Cont'd)

- .6 (Cont'd)
- .7 Unused paint coating materials must be disposed of at official hazardous material collections site as approved by Departmental Representative.

1.7 SITE CONDITIONS

- .1 Heating, Ventilation and Lighting:
  - .1 Ventilate enclosed spaces in accordance with Section.
  - .2 Provide heating facilities to maintain ambient air and substrate temperatures above 10 degrees C for 24 hours before, during and after paint application until paint has cured sufficiently.
  - .3 Provide continuous ventilation for seven days after completion of application of paint.
  - .4 Provide minimum lighting level of 323 Lux on surfaces to be painted.
  - .5 Test concrete, masonry and plaster surfaces for alkalinity as required.
- .2 Surface and Environmental Conditions:
  - .1 Apply paint finish in areas where dust is no longer being generated by related construction operations or when wind or ventilation conditions are such that airborne particles will not affect quality of finished surface.
  - .2 Apply paint to adequately prepared surfaces and to surfaces within moisture limits.
  - .3 Apply paint when previous coat of paint is dry or adequately cured.
- .3 Additional interior application requirements:
  - .1 Apply paint finishes when temperature at location of installation can be satisfactorily maintained within manufacturer's recommendations.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Paint materials listed in the MPI Approved Products List (APL) are acceptable for use on this project.
  - .2 Provide paint materials for paint systems from single manufacturer.
  - .3 Conform to latest MPI requirements for interior painting work including preparation and priming.
-

2.1 MATERIALS  
(Cont'd)

- .3 (Cont'd)
- .4 Materials (primers, paints) in accordance with MPI Architectural Painting Specification Manual "Approved Product" listing.
- .5 Paints, coatings, adhesives, solvents, cleaners, lubricants, and other fluids:
  - .1 Water-based Water soluble Water clean-up.
  - .2 non-flammable biodegradable.
  - .3 Manufactured without compounds which contribute to ozone depletion in the upper atmosphere.
  - .4 Manufactured without compounds which contribute to smog in the lower atmosphere.
  - .5 Do not contain methylene chloride, chlorinated hydrocarbons, toxic metal pigments.

2.2 COLOURS

- .1 Submit proposed Colour Schedule to Departmental Representative for review.
- .2 Colour schedule will be based upon selection of 3 base colours.

2.3 INTERIOR  
PAINTING SYSTEMS

- .1 Concrete horizontal surfaces: floors:
  - .1 INT 3.2A - Latex floor enamel low gloss finish.
  - .2 INT 3.2B - Alkyd floor enamel low gloss finish.
- .2 Dressed lumber: including doors, door and window frames, casings, mouldings:
  - .1 INT 6.3A - High performance architectural latex insert gloss level finish.
  - .2 INT 6.3BB - Waterborne alkyd gloss finish interior doors and frames in non-humid locations only.

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 data sheet.
-

3.2 GENERAL

- .1 Perform preparation and operations for interior painting in accordance with MPI Architectural Painting Specifications Manual except where specified otherwise.
- .2 Apply paint materials in accordance with paint manufacturer's written application instructions.

3.3 PREPARATION

- .1 Protection:
    - .1 Protect existing building surfaces and adjacent structures from paint splatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore surfaces as directed by Departmental Representative.
    - .2 Protect items that are permanently attached such as Fire Labels on doors and frames.
    - .3 Protect factory finished products and equipment.
    - .4 Protect passing pedestrians, building occupants and general public in and about the building.
  - .2 Surface Preparation:
    - .1 Remove electrical cover plates, light fixtures, surface hardware on doors, bath accessories and other surface mounted equipment, fittings and fastenings prior to undertaking painting operations. Identify and store items in secure location and re-installed after painting is completed.
    - .2 Move and cover furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.
    - .3 Place "WET PAINT" signs in occupied areas as painting operations progress. Signs to approval of Departmental Representative.
  - .3 Clean and prepare surfaces in accordance with MPI Architectural Painting Specification Manual requirements. Refer to MPI Manual in regard to specific requirements and as follows:
    - .1 Remove dust, dirt, and other surface debris by vacuuming, wiping with dry, clean cloths or compressed air.
    - .2 Wash surfaces with a biodegradable detergent and bleach where applicable and clean warm water using a stiff bristle brush to remove dirt, oil and other surface contaminants.
    - .3 Allow surfaces to drain completely and allow to dry thoroughly.
-

3.3 PREPARATION  
(Cont'd)

- .4 Prepare surfaces for water-based painting, water-based cleaners should be used in place of organic solvents.
- .5 Use trigger operated spray nozzles for water hoses.
- .6 Many water-based paints cannot be removed with water once dried. Minimize use of mineral spirits or organic solvents to clean up water-based paints.
- .4 Where possible, prime non-exposed surfaces of new wood surfaces before installation. Use same primers as specified for exposed surfaces.
  - .1 Apply vinyl sealer to MPI #36 over knots, pitch, sap and resinous areas.
  - .2 Apply wood filler to nail holes and cracks.
  - .3 Tint filler to match stains for stained woodwork.
- .5 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 1000 mm.
- .6 Clean metal surfaces to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and other foreign substances in accordance with MPI requirements. Remove traces of blast products from surfaces, pockets and corners to be painted by brushing with clean brushes blowing with clean dry compressed air or vacuum cleaning.
- .7 Touch up of shop primers with primer as specified.
- .8 Do not apply paint until prepared surfaces have been accepted by Departmental Representative.

3.4 APPLICATION

- .1 Method of application to be as approved by Departmental Representative. Apply paint by brush roller. Conform to manufacturer's application instructions unless specified otherwise.
  - .2 Brush and Roller Application:
    - .1 Apply paint in uniform layer using brush and/or roller type suitable for application.
    - .2 Work paint into cracks, crevices and corners.
    - .3 Paint surfaces and corners not accessible to brush using spray, daubers and/or sheepskins. Paint surfaces and corners not accessible to roller using brush, daubers or sheepskins.
-

3.4 APPLICATION  
(Cont'd)

.4 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces free of roller tracking and heavy stipple.

.5 Remove runs, sags and brush marks from finished work and repaint.

.3 Use dipping, sheepskins or daubers only when no other method is practical in places of difficult access.

.4 Apply coats of paint continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.

.5 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.

.6 Sand and dust between coats to remove visible defects.

.7 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as tops of interior cupboards and cabinets and projecting ledges.

.8 Finish top, bottom, edges and cutouts of doors after fitting as specified for door surfaces.

3.5 FIELD QUALITY CONTROL

.1 Advise Departmental Representative when surfaces and applied coating is ready for inspection. Do not proceed with subsequent coats until previous coat has been approved.

.2 Cooperate with inspection firm and provide access to areas of work.

3.6 RESTORATION

.1 Clean and re-install hardware items removed before undertaken painting operations.

.2 Remove protective coverings and warning signs as soon as practical after operations cease.

---

3.6 RESTORATION  
(Cont'd)

- .3 Remove paint splashings on exposed surfaces that were not painted. Remove smears and spatter immediately as operations progress, using compatible solvent.
- .4 Restore areas used for storage, cleaning, mixing and handling of paint to clean condition as approved by Departmental Representative.

PART 1 - GENERAL

1.1 RELATED  
SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
- .3 Section 01 45 00 - Testing and Quality Control.

1.2 REFERENCES

- .1 American Society for Testing and Materials International, (ASTM).
  - .1 ASTM D 610-01, Test Method for Evaluating Degree of Rusting on Painted Steel Surfaces.

1.3 SUBMITTALS

- .1 Product Data.
  - .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Samples.
  - .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
  - .2 Upon request, Departmental Representative to furnish qualified products list of paints.
- .3 Manufacturer's Instructions:
  - .1 Submit manufacturer's installation instructions.

1.4 QUALITY  
ASSURANCE

- .1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

1.5 WASTE  
MANAGEMENT AND  
DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
  - .2 Divert unused coating materials from landfill through disposal at a special wastes depot.
-



PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Paint.
  - .1 Primer: MPI EXT 5.1C, primer, marine for steel.
    - .1 Primer for second coat: tinted sufficiently off finish colour of first coat to show where second coat is applied.
    - .2 Tinting material: compatible with primer and not detrimental to its service life.
  - .2 Enamel: MPI EXT 5.1G, enamel, alkyd, marine, exterior; first coat grey; second coat grey.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.2 SITE EXAMINATION

- .1 Precaution should be taken when removing loose and rusted existing paint from metal surfaces.

3.3 PREPARATION

- .1 New metal surfaces.
    - .1 Clean surfaces of new metal to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and foreign substances in accordance with the following:
      - .1 Solvent cleaning: SSPC-SP-1.
      - .2 Power tool cleaning: SSPC-SP-3.
  - .2 Do not apply paint until prepared surfaces have been accepted by Departmental Representative.
  - .3 Prior to commencing paint application the degree of cleanliness of surfaces to be in accordance with SSPC-Vis 1.
  - .4 Protection of surfaces.
    - .1 Protect surfaces not to be painted and if damaged, clean and restore such surfaces as directed by Departmental Representative.
-

.2 Apply primer, paint, or pretreatment after surface has been cleaned and before deterioration of surface occurs.

.3 Clean surfaces again if rusting occurs after completion of surface preparation.

.4 Prevent contamination of cleaned surfaces by salts, acids, alkalis, corrosive chemicals, grease, oil and solvents before prime coat is applied and between applications of remaining coats of paint. Remove contaminants from surface and apply paint immediately.

.5 Protect cleaned and freshly painted surfaces from dust to approval of Departmental Representative.

.5 Mixing paint.

.1 Do not dilute or thin paint for brush application; use as received from manufacturer.

.2 Mix ingredients in container before and during use and ensure breaking up of lumps, complete dispersion of settled pigment, and uniform composition.

.3 Do not mix or keep paint in suspension by means of air bubbling through paint.

.6 Number of paint coats.

.1 New metal surfaces.

.1 Shop: one primer coats.

.2 Field: Two alkyd enamel coats to minimum dry film thickness of 25 microns per coat.

3.4 APPLICATION

.1 Apply paint by spraying, brushing, or combination of both. Use sheepskins or daubers when no other method is practical in places of difficult access.

.2 Use dipping or roller coating method of application when specifically authorized by Departmental Representative.

.3 Caulk open seams at contact surfaces of built up members with material approved by Departmental Representative, before second undercoat of primer is applied.

.4 Where surface to be painted is not under cover, do not apply paint when:

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- .1 Air temperature is below 5 degrees C or when temperature is expected to drop to 0 degrees C before paint has dried.
  - .2 Temperature of surface is over 50 degrees C unless paint is specifically formulated for application at high temperatures.
  - .3 Fog or mist occur at site; it is raining or snowing; there is danger of rain or snow; relative humidity is above 85%.
  - .4 Surface to be painted is wet, damp or frosted.
  - .5 Previous coat is not dry.
- .5 Provide cover when paint must be applied in damp or cold weather. Protect, shelter, or heat surface and surrounding air to comply with temperature and humidity conditions. Protect until paint is dry or until weather conditions are suitable.
  - .6 Remove paint from areas which have been exposed to freezing, excess humidity, rain, snow or condensation. Prepare surface again and repaint.
  - .7 Apply each coat of paint as continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.
  - .8 Brush application.
    - .1 Work paint into cracks, crevices and corners and paint surfaces not accessible to brushes by spray, daubers or sheepskins.
    - .2 Brush out runs and sags.
    - .3 Remove runs, sags and brush marks from finished work and repaint.
  - .9 Spray application.
    - .1 Provide and maintain equipment that is suitable for intended purpose, capable of properly atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.
    - .2 Provide traps or separators to remove oil and water from compressed air and drain periodically during operations.
    - .3 Keep paint ingredients properly mixed in spray pots or containers during paint application either by continuous mechanical agitation or by intermittent agitation as frequently as necessary.
    - .4 Apply paint in uniform layer, with overlapping at edges of spray pattern.
    - .5 Brush out immediately runs and sags.
-

- .6 Use brushes to work paint into cracks, crevices and places which are not adequately painted by spray. In areas not accessible to spray gun, use brushes, daubers or sheepskins.
  - .7 Remove runs, sags and brush marks from finished work and repaint.
  
  - .10 Shop painting.
    - .1 Do shop painting after fabrication and before damage to surface occurs from weather or other exposure.
    - .2 Spray paint contact surfaces of field assembled, bolted, friction type joints with primer coat only. Do not brush primer after spraying.
    - .3 Do not paint metal surfaces which are to be embedded in concrete.
    - .4 Paint metal surfaces to be in contact with wood with either full paint coats specified or three shop coats of specified primer.
  
  - .11 Field painting.
    - .1 Paint steel structures as soon as practical after erection.
    - .2 Touch up metal which has been shop coated with same type of paint and to same thickness as shop coat. This touch-up to include cleaning and painting of field connections, welds, rivets, nuts, washers, bolts, and damaged or defective paint and rusted areas.
    - .3 Field paint surfaces (other than joint contact surfaces) which are accessible before erection but which are not to be accessible after erection.
    - .4 Do not apply final coat of paint until concrete work is completed, except as directed by Departmental Representative. If concreting or other operations damage paint, clean and repaint damaged area. Remove concrete spatter and droppings before paint is applied.
    - .5 Where painting does not meet with requirements of specifications, and when so directed by Departmental Representative remove defective paint, thoroughly clean affected surfaces and repaint in accordance with these specifications.
  
  - .12 Handling painted metal.
    - .1 Do not handle painted metal until paint has dried, except for necessary handling for painting or stacking for drying.
-

.2 Scrape off and touch up paint which is damaged in handling, with same number of coats and kinds of paint as were previously applied to metal.

3.5 CLEANING

- .1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

PART 1 - GENERAL

1.1 PRODUCT DATA AND  
SHOP DRAWINGS

- .1 Submit product data and shop drawings in accordance with Division 01.
- .2 Product data to include:
  - 1. Suspension of heating element.
  - 2. Physical size.
  - 3. Thermostat control if integral.
  - 4. Finish
  - 5. KW rating.
  - 6. Cabinet thickness.
  - 7. Cabinet surface temperature.

PART 2 - MATERIALS

2.1 BASEBOARD  
CONVECTORS

- .1 Epoxy/polyester powder paint.
- .2 White in color.
- .3 Rated 240 Volt.
- .4 Cabinet:
  - .1 20 gauge steel connection box.
  - .2 22 gauge steel body.
  - .3 20 gauge steel front panel.
  - .4 Rounded upper corners.
- .5 Linear high limit temperature control with automatic reset.
- .6 Stainless steel tubular heating element with aluminum fins.
- .7 Floating heating element on high temperature nylon bushings.

2.2 CONTROLS

- .1 Wall mounted thermostats: type line voltage. Supplied and installed by Division 26.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Install baseboard convector heaters, blank sections and controls.

- .2 When wireway is used, remove knock-outs and insert insulating bushings between each unit.
- .3 Install grounding wire to maintain ground integrity between heating, blank and auxiliary sections.
- .4 Make power and control connections.

3.2 FIELD QUALITY CONTROL

- .1 Perform tests in accordance with Section 26 05 01 - Common Work Results - Electrical.
- .2 Ensure that heaters and controls operate correctly.

PART 1 - GENERAL

1.1 GENERAL

- .1 This section covers items common to Sections of Division 23, 26 and 33. This section supplements requirements of Division 01.

1.2 CODES AND STANDARDS

- .1 Do complete installation in accordance with CSA C22.1-2015 except where specified otherwise.
- .2 Do overhead and underground systems in accordance with CSA C22.3 No.1-M1987 except where specified otherwise.
- .3 Abbreviations for electrical terms: to CSA Z85- 1983.
- .4 Adhere to DFC Standards, latest editions.
- .5 Adhere to Canadian Electrical Code - current edition.

1.3 CARE, OPERATION AND START-UP

- .1 Instruct Departmental Representative and operating personnel in the operation, care and maintenance of systems, system equipment and components.

1.4 VOLTAGE RATINGS

- .1 Operating voltages: to CAN3-C235-83.
- .2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard. Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

1.5 PERMITS, FEES AND INSPECTION

- .1 Submit to Electrical Inspection Department and Supply Authority necessary number of drawings and specifications for examination and approval prior to commencement of work.



- .2 Pay associated fees.
- .3 Departmental Representative will provide drawings and specifications required by Electrical Inspection Department and Supply Authority at no cost.
- .4 Notify Departmental Representative of changes required by Electrical Inspection Department prior to making changes.
- .5 Furnish Certificates of Acceptance from Electrical Inspection Department and authorities having jurisdiction on completion of work to Departmental Representative.

1.6 MATERIALS AND EQUIPMENT

- .1 Provide materials and equipment in accordance with Division 01.
- .2 Equipment and material to be CSA certified. Where there is no alternative to supplying equipment which is not CSA certified, obtain special approval from Electrical Inspection Department.
- .3 Factory assembles control panels and component assemblies.

1.7 FINISHES

- .1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.
- .2 Clean and touch up surfaces of shop painted equipment scratched or marred during shipment or installation, to match original paint.
- .3 Clean and prime exposed non-galvanized hangers, racks and fastenings to prevent rusting.

1.8 EQUIPMENT IDENTIFICATION

- .1 Identify electrical equipment with nameplates as follows:

.2 Nameplates:

1. Lamicoid 3 mm thick plastic engraving sheet, black face, white core, mechanically attached with self tapping screws.

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

.3 Wordings on nameplates and labels to be approved by Departmental Representative prior to manufacture.

.4 Allow for average of twenty-five (25) letters per nameplate.

.5 Identification to be provided in English.

1.9 TESTING,  
ACCEPTANCE AND  
GUARANTEE

.1 The work of this Contractor shall be tested and installed and any devices not operational shall be remedied immediately. Tests required by local authorities shall be the responsibility of the Contractor. When the work is completed, it shall be tested in its entirety, and shall be in good working order before the Certificate of Acceptance shall be issued.

.2 A written guarantee shall be supplied to Canada by the Contractor covering the prompt making good of any and all defects in material and workmanship for the period of one (1) year from the date of acceptance and the making good of any such defects shall be completely the responsibility of the Contractor.

.3 The Contractor will be responsible for the supply of sufficient power on a temporary basis to allow testing of all equipment and systems. These will be tested in the presence of the Departmental Representative.

1.10 WIRE  
IDENTIFICATION

- .1 Identify wiring with permanent indelible identifying markings, either numbered or 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 code: to CSA C22.1.

1.11 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 20 mm wide auxiliary colour.

	<u>Prime</u>	<u>Auxiliary</u>
up to 250 V	Yellow	
up to 600 V	Yellow	Green
up to 5 kV	Yellow	Blue
up to 15 kV	Yellow	Red

1.12 CONDUCTOR  
TERMINATIONS

- .1 Lugs, terminals, screws used for termination of wiring to be suitable for either copper or aluminum conductors. Corrosion resistant to salt environment.

1.13 MANUFACTURERS  
AND CSA LABELS

- .1 Visible and legible, after equipment is installed.

1.14 WARNING SIGNS

- .1 As specified and to meet requirements of Electrical Inspection Department and Departmental Representative.
- .2 Use decal signs, minimum size 175 x 250 mm.

1.15 MOUNTING HEIGHTS

- .1 If mounting height of equipment is not

indicated, verify before proceeding with installation.

- .2 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise.
- .3 Install electrical equipment at following heights unless indicated otherwise.
  - 1. Pedestal receptacles as indicated on drawing details.
  - 2. Light fixtures on wooden poles as indicated on drawing details.
  - 3. Panelboards: as required by code or as indicated.

1.16 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.

1.17 FIELD QUALITY CONTROL

- .1 All electrical work to be carried out by qualified, licensed electricians or apprentices as per the conditions of the Provincial Act respecting manpower vocational training and qualification. Employees registered in a provincial apprentices program shall be permitted, under the direct supervision of a qualified licensed electrician, to perform specific tasks - the activities permitted shall be determined based on the level of training attained and the demonstration of ability to perform specific duties.
- .2 The work of this division to be carried out by a contractor who holds a valid Master Electrical contractor license as issued by the Province that the work is being constructed.
- .3 Conduct and pay for following tests:
  - 1. Power distribution system including phasing, voltage, grounding and load balancing.

- 
2. Circuits originating from branch distribution panels.
  3. Lighting and its controls.
  4. Motors, heaters and associated control equipment including sequenced operation of systems where applicable.
- .4 Furnish manufacturer's certificate or letter confirming that entire installation as it pertains to each system has been installed to manufacturer's instructions.
  - .5 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.
  - .6 Carry out tests in presence of Departmental Representative.
  - .7 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.
  - .8 Submit test results for Departmental Representative's review.
- 1.18 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES
- .1 Submit shop drawings in accordance with Division 01 - Section 01 33 00 - Submittal Procedures.
  - .2 Show on shop drawings details of construction, dimensions, capacities, weights and electrical performance characteristics of equipment or material.
  - .3 Where applicable, include wiring, single line and schematic diagrams.
  - .4 Include wiring drawings or diagrams showing interconnection with work of other divisions are required.

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- .5 Each shop drawing shall be stamped and signed by the Contractor before submitting, stating that he has checked the drawings against the requirements as called for in the contract documents, and also in the case here the equipment attached to or connects to other equipment, that it has been properly coordinated with this equipment, whether supplied under the Electrical Division or under other Divisions.
  - .6 Each shop drawing for non-catalogue items shall be prepared specifically for this project. If brochures are submitted for catalogue items, the brochures shall be marked definitely indicating the item or items to be supplied.
  - .7 Work shall not be proceeded until final review of shop drawings are received by the Contractor.
  - .8 Shop Drawing Review is for general compliance with contract documents. No responsibility is assumed by the Departmental Representative for correctness of dimensions or details. Corrections or comments made on the shop drawings during the Departmental Representative's review do not relieve the Contractor from compliance with the requirements of the drawings and specifications.
- 1.19 OPERATION AND MAINTENANCE DATA
- .1 Submit operation and maintenance data in accordance with Division 01.
  - .2 Include in manuals information based on following requirements:
    - 1. Operation and maintenance instructions to be sufficiently detailed with respect to design elements, construction features and component function and maintenance requirements, to

permit effective startup. Operation, maintenance, repair, modification, extension and expansion of any portion or feature of installation.

2. Technical data to be in the form of approved shop drawings, project data, supplemented by bulletins, component illustrations, exploded views technical descriptions of items, and parts lists. Advertising of sales literature will not be accepted.

3. Provide wiring and schematic diagrams and performance curves.

4. Include names and addresses of local suppliers for all items included in maintenance manuals.

5. Material to be in English.

1.20 MATERIAL  
SPECIFIED

.1 Where substitutions are to be submitted for materials bearing the clause "or approved equal", approval of the substitute item must be submitted to the Departmental Representative at least TEN DAYS PRIOR to the closing date of the tender. The proposed substitution shall show product name, complete specification and be equal to, or better than the named item. No increase in the tender price shall be made for such a substitution should it be accepted. Accepted equals will be listed in an addendum seven days prior to the Trade closing date.

.2 Where additional manufacturers are named under Articles entitled "Approved Manufacturers", the choice of which of the manufacturers named in reference to a particular article is to be used, shall be the Contractors.

.3 Materials or product specified without the clauses "or approved equal" or "approved manufacturers" shall be supplied as specified and no proposed substitution will be considered.

.4 Where approvals are granted for the use of other equipment any and all changes or

additions required for the installation or operation of the approved equipment will be made by the Contractor at his own expense and no claims will be approved for any such changes, notwithstanding approval of shop drawings. Equipment that is accepted and installed and then does not perform as represented by original submitted data shall be replaced by the Contractor with equipment as specified, at no charge to the Canada.

1.21 QUALIFICATIONS OF WORKERS

.1 Qualified trades people shall be used for all disciplines of the electrical work required for this project.

1.22 EXAMINATION OF OTHER WORK

.1 This Division requires the examination of the material and work of all other Divisions upon which the work of this Section depends for proper completion. Any defect in work, levels, or materials, shall be reported to the Departmental Representative. The work of this Division shall not commence until such defects have been corrected.

1.23 DRAWINGS, CHANGES ACCESSIBILITY

.1 The drawings shall be considered to show the general character and scope of the work and not the exact details of the installation.

.2 The installation shall be completed with all supports and accessories required for a complete operative and satisfactory installation.

.3 The location, arrangement and connection of equipment and material as shown on the drawings represents a close approximation to the intent and requirements of the Contract.

.4 The right is reserved by the Departmental Representative to make reasonable changes required to accommodate conditions arising during the progress of the work. Such changes shall be done at no extra cost to Canada, unless the location, arrangement or connection is more than 1.5 m from that shown.



.5 Actual location of existing services shall be verified in the field where necessary before work is commenced.

.6 Changes and modifications necessary to ensure co-ordination and to avoid interference or conflicts with other trades, or to accommodate existing conditions, shall be made at no extra cost to Canada.

1.24 AS-BUILT  
DRAWINGS

.1 The Departmental Representative will provide the Contractor with two (2) extra sets of white prints on which the Contractor shall clearly mark as the job progresses all changes and deviations from that shown on Contract drawings. On completion, forward to the Departmental Representative two (2) sets of drawings indicating all such changes and deviations.

1.25 CONTRIBUTION  
IN AID

.1 Contractor shall include all contribution in aid expenses incurred by power utility company in contract price. Consult with power company prior to bidding for amount carried.

PART 2 - PRODUCTS

NOT APPLICABLE TO THIS SECTION

PART 3 - EXECUTION

NOT APPLICABLE TO THIS SECTION

PART 1 - GENERAL

1.1 SCOPE OF WORK  
AND GROUNDING

- .1 The Electrical Contract includes all electrical work at the site including but not limited to:
1. Removal of existing wiring, conduit, pedestals, lighting and panelboards, disconnects, etc. as indicated.
  2. Supply and installation of new shore power junction boxes, coverplates, receptacles, labels, power pedestals, etc. as indicated.
  3. Supply and installation of new conduit and fittings for a complete installation.
  4. Supply and installation of new electrical service rated 400 amp (wild leg), 120/240 Volt, three phase, 4 wire.
  5. Supply and installation of electrical devices in new shed as indicated.
  6. Installation of owner supplied light fixtures on wooden poles.
  7. Supply and installation of branch circuit wiring to power pedestals and light poles as indicated.
  8. Coordination with utility company the supply of new electrical service. All associated cost to be included in tender price.
  9. Supply and installation of new wooden light poles as indicated.
  10. Other work as indicated on drawings and in this specification.
  11. The electrical systems in the new Electrical building is to be completed and commissioned prior to the disconnection and removal of the existing electrical equipment and electrical building.
  12. Relocation of electrical systems for the existing finger pier and marginal wharf is to be completed in such a manor to minimize the down time for the existing operational infrastructure.

PART 1 - GENERAL

- 1.1 SECTION INCLUDES .1 Materials and installation for Wire and Box Connectors 0-1000 V.
- 1.2 RELATED SECTIONS .1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

PART 2 - PRODUCTS

- 2.1 MATERIALS .1 Pressure type wire connectors: 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.

PART 3 - EXECUTION

- 3.1 INSTALLATION .1 Remove insulation carefully from ends of conductors and:
  - 1. 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 C22.2 no 65.

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

.2 Section 26 05 20 - Wire and Box Connectors 0 - 1000 V.

1.2 REFERENCES

.1 CSA C22.2 No .0.3-96, Test Methods for Electrical Wires and Cables.

.2 CAN/CSA-C22.2 No. 131-M1989 (R1994), type Teck 90 cable.

1.3 PRODUCT DATA

.1 Submit product data in accordance Division 01.

PART 2 - PRODUCTS

2.1 BUILDING WIRES

.1 Conductors: stranded for 10 AWG and larger. Minimum size: 12 AWG.

.2 Copper conductors: size as indicated, with 600V insulation of chemically cross-linked thermosetting polyethylene material rated RW90 XLPE and RWU90 XLPE as indicated.

.3 All wiring shall be installed in conduit as indicated.

PART 3 - EXECUTION

3.1 INSTALLATION OF BUILDING WIRES

.1 Install wiring as follows:

1. In conduit systems in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.

2. Terminate cables in accordance with Section 26 05 20 - Wire and Box Connectors 0 - 1000 V.

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

.2 Section 26 05 01 - Common Work Results - Electrical.

1.2 REFERENCES

.1 American National Standards Institute (ANSI)/Institute of Electrical and Electronics Engineers (IEEE).

1. ANSI/IEEE 837 [1989(R1996)],  
Qualifying Permanent Connections Used in  
Substation Grounding.

.2 Canadian Standards Association, (CSA  
International

.3 CAN/CSA Z32 [1999], Electrical Safety  
and Essential Electrical Systems in Health  
Care Facilities.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Grounding equipment to: CSA C22.2 No. 41-  
1950 (R1967).

.2 Copper grounding conductors to: ASA G7.1-  
1963.

2.2 EQUIPMENT

.1 Copper conductor to each electrode to be  
bare, stranded, tinned, soft annealed, size as  
indicated.

.2 Rod electrodes, copper clad steel, 19mm  
diameter by 3 m long.

.3 Copper ground conductor to sea bed.

.4 Insulated grounding conductors: as per  
Conductors specification section.

.5 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. Bronze ground plate as indicated.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION GENERAL

.1 Install complete permanent, continuous system and circuit equipment, grounding systems including electrodes, conductors, connectors, accessories, as indicated, to conform to requirements of Departmental Representative and local authority having jurisdiction over installation. Where conduits are used, install a minimum #10 AWG insulated green ground conductor throughout the complete conduit system and connect all outlet boxes, devices, equipment and panel ground bus to this ground conductor.

.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.

.7 Install bonding wire for flexible conduit, connected at one end to grounding bushing, solderless lug, clamp or cup washer and screw. Neatly clean bonding wire to exterior of flexible conduit.

.8 Install separate ground conductor to outdoor lighting standards and receptacles located on power pedestals.

.9 Install copper grounding conductor run in conduit from electrical service to sea bed. Provide 25 meter coil of ground conductor at sea bed. Install as per Canadian Electrical Code.

### 3.2 ELECTRODES

.1 Install rod, plate electrodes and make grounding connections.

.2 Bond separate, multiple electrodes together.

.3 Bronze ground plate as indicated.

### 3.3 TESTS

.1 Perform tests in accordance with Section 26 05 01 - 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.

.3 Perform tests before energizing electrical system.

PART 1 - GENERAL

1.1 RELATED  
DOCUMENTS

.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SHOP DRAWINGS  
AND PRODUCT DATA

.1 Submit shop drawings and product data for cabinets in accordance with Division 01 - Submittal Procedures.

PART 2 - PRODUCTS

2.1 JUNCTION AND  
PULL BOXES

.1 Weatherproof junction and pull boxes as indicated and sized on drawings. To be used for exterior electrical connections on poles for lighting circuits and wharf receptacles.

.2 Enclosures rating EEMAC 4X and threaded hubs. Corrosion resistant to salt environment.

PART 3 - EXECUTION

3.1 JUNCTION & PULL  
BOX INSTALLATIONS

.1 Install junction and pull boxes in locations as indicated on drawings.

.2 Only main junction and pull boxes are indicated. Install pull boxes so as not to exceed 30 m of conduit run between pull boxes.

3.2 IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 01 - Common Work Results - Electrical.

.2 Install size 2 identification labels indicating system name, voltage and phase.



PART 1 - GENERAL

1.1 RELATED  
DOCUMENTS

.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 REFERENCES

.1 CSA C22.1-2015, Canadian Electrical Code, Part 1.

PART 2 - PRODUCTS

2.1 OUTLET AND  
CONDUIT BOXES GENERAL

- .1 Size boxes in accordance with CSA C22.1.
- .2 102 mm square or larger outlet boxes as required for special devices.
- .3 Gang boxes where wiring devices are grouped.
- .4 Blank cover plates for boxes without wiring devices.
- .5 Combination boxes with barriers where outlets for more than one system are grouped.
- .6 See details on drawings for electrical pedestal outlet box types.
- .7 All conduits and boxes in electrical shed shall be rigid PVC.

2.2 CONDUIT BOXES

.1 PVC or fibreglass FS and FD boxes with factory threaded hubs and mounting feet for surface wiring of switches, receptacles and controls. See drawings for details.

2.3 FITTINGS GENERAL

.1 Bushing and connectors with nylon insulated throats.

.2 Knock-out fillers to prevent entry of debris.

.3 Conduit outlet bodies for conduit up to 32 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 Provide correct size of openings in boxes for conduit, mineral insulated and armoured cable connections. Reducing washers are not allowed.

.4 Provide approved coverplates for lighting fixture junction boxes.

PART 1 - GENERAL

1.1 RELATED  
DOCUMENTS

.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 LOCATION OF  
CONDUIT

.1 Drawings show all conduits in their approximate locations only.

1.2 APPROVALS,  
CODES AND PERMITS

.1 All work shall be done in accordance with latest edition of the Canadian Electrical Code C22.1-2015.

.2 Contractor shall present the drawings to the Electrical Inspection Authority for approval and obtain a permit before starting work.

.3 Notify the Departmental Representative of any changes required before proceeding.

PART 2 - PRODUCTS

2.1 CONDUIT

.1 Liquid tight flexible conduit to CSA C22.2 No. 56. To be used for final connection to lighting fixtures.

.2 Rigid PVC conduit: to CSA C22.2 No. 211.2. To be used below grade unless noted otherwise.

.3 Rigid PVC conduit: to CSA C22.2 No. 211.2 to be used on new wooden pole as indicated.

.4 Epoxy coated conduit: to CSA C22.2 No. 45 with zinc coating and corrosion resistant epoxy finish inside and outside. To be used for electrical service. See drawing details.

2.2 CONDUIT  
FASTENINGS

.1 One hole PVC straps to secure surface conduits 50 mm and smaller. Two hole PVC straps for conduits larger than 50 mm.

.2 Beam clamps to secure conduits to exposed steel work.

.3 Channel type supports for two or more conduits at 1 m oc.

.4 Threaded rods, 6 mm dia., to support suspended channels.

2.3 CONDUIT FITTINGS

.1 Fittings for raceways: to CSA C22.2 No. 18-M1987.

.2 Factory 90° bends are required for 25 mm and larger conduits.

.3 Fittings manufactured for use with conduit specified, approved for encasement in slab.

2.4 EXPANSION  
FITTINGS FOR RIGID  
CONDUIT

.1 Weatherproof expansion fittings with internal bonding jumper suitable for linear expansion and 19mm deflection in all directions as required.

.2 Watertight expansion fittings with integral bonding jumper suitable for linear expansion and 19mm deflection in all directions as required.

.3 Weatherproof expansion fittings for linear expansion at entry to panel as required.

2.5 FISH CORD

.1 Polypropylene.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Install conduit in centre one-third of concrete slab in location as shown for conduits in deck.

.2 Ensure conduit has a minimum concrete cover of 35 mm all around except where noted otherwise on drawings.

.3 Place conduit between mats of steel and secure in position with tye wire.

.4 Install sleeves where conduits pass through timber.

.5 Install junction boxes for lighting on sides of poles in locations shown. Secure in place and fill with packing to be removed after concrete is placed.

.6 Ensure system is intact and clear after concrete is poured. Remove and replace any blocked conduit.

.7 Install pull rope in empty conduit before pouring concrete.

.8 Swab conduits when system is complete.

.9 Dry conduits out before installing wire.

.10 Install rigid PVC conduit except where noted otherwise on drawings.

.11 Install epoxy coated rigid galvanized steel conduit for electrical service as indicated.

.12 Install surface mounted rigid PVC conduit in shed.

PART 1 - GENERAL

1.1 RELATED  
DOCUMENTS

- .1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- .1 Section Includes:
  - 1. Service Equipment.

PART 2 - PRODUCTS

2.1 EQUIPMENT

- .1 Service entrance rated disconnect as indicated.
- .2 CT cabinet and meter socket as indicated.
- .3 Conduits and wiring as indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Install service equipment.
- .2 Connect to incoming service.
- .3 Connect to outgoing load circuits.
- .4 Make grounding connections in accordance with Section 26 05 28 - Grounding - Secondary.
- .5 Make provision for power supply authority's metering.

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Materials and installation for standard and custom breaker type panelboards.

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 26 28 21 - Moulded Case Circuit Breakers.

.3 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.3 SHOP DRAWINGS

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

.2 Drawings to include electrical detail of panel, branch breaker type, quantity, ampacity and enclosure dimension.

PART 2 - PRODUCTS

2.1 PANELBOARDS

.1 Panelboards: to CSA C22.2 No. 29 and product 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 panelboards: bus and breakers rated for 18,000 A (symmetrical) interrupting capacity or as indicated.

.3 250 V panelboards shall be complete with bolt-on circuit breakers.

.4 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.

.5 Panelboards: mains, number of circuits, and number and size of branch circuit breakers as indicated.

.6 Two keys for each panelboard and key panelboards alike.

.7 Copper bus with neutral of same ampere rating as mains.

.8 Mains: suitable for bolt-on breakers.

.9 Trim with concealed front bolts and hinges.

.10 Trim and door finish: baked grey enamel.

.11 Panel to be complete with main breaker as indicated.

## 2.2 BREAKERS

.1 Breakers: to Section 26 28 21- Moulded Case Circuit Breakers.

.2 Breakers with thermal and magnetic tripping in panelboards except as indicated otherwise.

## 2.3 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 01 - Common Work Results - Electrical.

.2 Nameplate for each panelboard size 4 engraved as indicated. Indicate on nametag the supply distribution panelboard.

.3 Complete circuit directory with typewritten legend showing location and load of each circuit.

## 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 panelboards in enclosure or as indicated.

.3 Mount panelboards to height specified in Section 26 05 01 or as indicated.



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.4 Connect loads to circuits.

.5 Connect neutral conductors to common neutral bus with respective neutral identified.

PART 1 - GENERAL

1.1 RELATED  
DOCUMENTS

.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

.1 Section Includes:  
1. Wiring Devices.

1.3 SHOP DRAWINGS  
AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with Division 01 Specification Sections.

PART 2 - PRODUCTS

2.1 SWITCHES

- .1 15 A, 120 V, single pole, double pole, three-way, four-way switches as indicated to: CSA-C22.2 No.55 and CSA-C22.2 No.111.
- .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 White toggle.
  - .6 Specification grade.
- .3 Toggle operated fully rated for tungsten filament and fluorescent lamps, and up to 80% of rated capacity of motor loads.
- .4 Switches of one manufacturer throughout project.
- .5 Acceptable products:
  - .1 Hubbel HBL 1201 W,

- .2 Leviton 1201-2W,
- .3 Pass and Seymour.

## 2.2 RECEPTACLES

- .1 Receptacles, plugs and similar wiring devices to: CSA C22.2 #42M-1984.
- .2 Duplex receptacles, marine grade, flush mounted CSA type 5-15 R, 125 V, 15 A, U ground, with following features:
  - 1. Yellow urea moulded housing.
  - 2. Suitable for No. 10 AWG for back and side wiring.
  - 3. Break-off links for use as split receptacles.
  - 4. Eight back wired entrances, four side wiring screws.
  - 5. Double wipe contacts and riveted grounding contacts.
- .3 All receptacles shall be marine grade and of one manufacturer throughout project.
- .4 Supply and install other marine grade receptacles as indicated on drawings.

## 2.3 COVERPLATES

- .1 PVC marine grade coverplates for wiring devices unless otherwise indicated on plans.
- .2 Coverplates from one manufacturer throughout project.
- .3 PVC cover plates for wiring devices mounted in surface mounted FS or FD type unless otherwise indicated on plans.
- .4 Weatherproof coverplates as indicated.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- .1 Receptacles:
  - 1. Install receptacles in gang type outlet box when more than one receptacle is required in one location.
  - 2. Mount receptacles at height specified in Section 26 05 01 - Common Work Results -

Electrical or as indicated.

.2 Coverplates:

1. Protect cover plate finish with paper or plastic film until painting and other work is finished.
2. Install suitable common coverplates where wiring devices are grouped.
3. Do not use coverplates meant for flush outlet boxes on surface-mounted boxes.
4. Contractor to run separate neutral for each circuit.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

.1 Section Includes:  
1. Fuses - Low Voltage.

1.3 REFERENCES

.1 Canadian Standard Association (CSA).  
1. CSA C22.2No.248.12-94, Low Voltage Fuses Part 12: Class R (Bi-National Standard with, UL 248-12 (1st Edition).

1.4 SHOP DRAWINGS AND PRODUCT DATA

1. Submit shop drawings and product data in accordance with Division 01 - Submittal Procedures.

1.5 DELIVERY AND STORAGE

1. Ship fuses in original containers.  
2. Do not ship fuses installed in switchboard.  
3. Store fuses in original containers in storage cabinet in a moisture free location.

1.6 MAINTENANCE MATERIALS

1. Provide maintenance materials in accordance with Division 01 - Closeout Submittals.  
2. Six spare fuses of each type and size installed up to and including 600 A.

PART 2 - PRODUCTS

2.1 FUSES GENERAL

1. Fuse type references L1, L2, J1, R1, etc. have been adopted for use in this specification.  
2. Fuses: product of one manufacturer for entire project.

2.2 FUSE TYPES

1. Class J fuses (formerly HRCI- J).

1. Type J1, time delay, capable of carrying 500% of its rated current for 10 s minimum.
2. Type J2, fast acting.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

1. Install fuses in mounting devices immediately before energizing circuit.
2. Ensure correct fuses fitted to physically match mounting devices.
  1. Install Class R rejection clips for HRCI-R fuses.
3. Ensure correct fuses fitted to assigned electrical circuit.
4. Where UL Class RK1 fuses are specified, install warning label "Use only UL Class RK1 fuses for replacement" on equipment.

PART 1      GENERAL

1.1 SECTION INCLUDES

- .1 Equipment and installation for ground fault circuit interrupters (GFCI).

1.2 RELATED SECTIONS

- .1 Section 26 05 01 - Common Work Results - Electrical.

1.3 REFERENCES

- .1 Canadian Standards Association (CSA)
  - .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.

1.4 SUBMITTALS

- .1 Submit product data and shop drawings.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Equipment and components for ground fault circuit interrupters (GFCI): to CAN/CSA-C22.2 No.144.
- .2 Components comprising ground fault protective system to be of same manufacturer.

2.2 BREAKER TYPE GROUND  
FAULT INTERRUPTER

- .1 Single or two pole ground fault circuit interrupter for 15-20 A, 120 V, 1 phase circuit c/w test and reset facilities.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Do not ground neutral on load 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 01 - Common Work Results - Electrical.
- .2 Demonstrate simulated ground fault tests.

END OF SECTION



PART 1 - GENERAL

1.1 RELATED DOCUMENTS

.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

.1 Section Includes:  
1. Moulded Case Circuit Breakers.

1.3 PRODUCT DATA

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

.2 Include time-current characteristic curves for breakers with ampacity of 300 Amp and over with interrupting capacity of 10,000 A symmetrical (rms) and over at system voltage.

PART 2 - PRODUCTS

2.1 BREAKERS GENERAL

.1 Bolt-on moulded case circuit breaker: quick- make, quick-break type, for manual and automatic operation with temperature compensation for 40°C ambient.

.2 Common-trip breakers: with single handle for multi-pole applications.

.3 Magnetic instantaneous trip elements in circuit breakers to operate only when value of current reaches setting. Trip settings on breakers with adjustable trips to range from 3-8 times current rating.

.4 Circuit breakers with interchangeable trips as indicated.

.5 Interrupting capacity to be 18,000 Amps symmetrical (rms).

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.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Install circuit breakers as indicated.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 RELATED SECTIONS

.1 Division 1 Specification Sections.  
.2 Section 26 05 01 - Common Work Results - Electrical.

1.3 PRODUCT DATA

.1 Submit product data in accordance with Division 1 Specification Sections.

PART 2 - PRODUCTS

2.1 DISCONNECT SWITCHES

.1 Fusible and non-fusible disconnect switch, sized as indicated.  
.2 Provision for padlocking in on-off switch position by three locks.  
.3 Mechanically interlocked door to prevent opening when handle in ON position.  
.4 Fuse holders: relocatable and suitable without adaptors, for type and size of fuse indicated.  
.5 Quick-make, quick-break action.  
.6 ON-OFF switch position indication on switch enclosure cover.  
.7 Heavy duty service entrance rated.  
.8 EEMAC 4X for exterior use and EEMAC 2 for interior use.

2.2 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 01 - Common Work Results - Electrical.  
.2 Indicate name of load controlled on size 4 nameplate.

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Fused and Non Fused

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PART 3 - EXECUTION

3.1 INSTALLATION

.1 Install disconnect switches complete with fuses as indicated.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

.1 Section Includes:

1. Lighting.

.2 Related Sections:

1. Division 01 - Submittal Procedures.
2. Division 01 - Quality Requirements

1.3 SCOPE

.1 Light fixtures in new electrical shed shall be supplied and installed by this Contractor. Light fixtures on wooden poles to be supplied by Owner and installed by this Contractor.

1.4 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings in accordance with Division 01 - Submittal Procedures.

.2 Submit shop drawings for ballasts.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Type A fixture:

1. Rated 120 V, 60 Hz, LED, constructed of one piece fibreglass reinforced polyester housing. CSA listed for damp/wet locations and complete with polycarbonate acrylic lens.

2. Type B fixture:

1. Rated 120 V, 60 Hz, LED, constructed of die cast aluminum, CSA listed for wet location.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Locate and install fixtures as indicated on drawings.

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3.2 WIRING

.1 Connect light fixtures to circuits as indicated.

.2 Perform tests in accordance with Section 26 05 01 - Common Work Results - Electrical.

PART 1 - GENERAL

1.1 REFERENCES

- .1 Canadian Standards Association (CSA):
  - 1. CAN/CSA-015-90, Wood Utility Poles and Reinforcing Stubs.
  - 2. American National Standards Institute (ANSI).
  - 3. Excavating, Trenching and Backfilling.
  - 4. Common Work Results - Electrical: Section 26 05 01.

1.2 PRODUCT DATA

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

1.3 SHOP DRAWINGS

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

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Wood preservation: to CAN/CSA080 Series.

2.2 POLES

- .1 Wood utility poles: to CAN/CSA-015, wood species, Class 2, 12.2 meter poles, CCA or ACA pressure treated to 080-M1983. Installation as detailed on civil drawings.
  - 1. 12.2 m long poles for lighting fixtures.
  - 2. Minimum circumference at top - 635 mm.
  - 3. Minimum circumference at 1.8 m from butt - 978 mm.
- .2 Contractor to supply all mounting hardware, wiring, conduit, leg bolts, etc. as required.

2.3 EQUIPMENT IDENTIFICATION

- .1 Rustproof number nails with 50 mm high designated number and data installed.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Wooden light poles in concrete deck installation shall be as outlined on Civil drawings and in Civil specification. Coordinate with General Contractor.
  
- .2 Install owner supplied lights on wooden poles as indicated.



PART 1 - GENERAL

1.1 SCOPE OF WORK

- .1 Testing and commissioning are called for throughout the individual specifications. This does not relieve this trade from providing all testing and commissioning necessary to ensure that systems and equipment operate as required and that they interface with other systems and equipment as required.

1.2 SECTION INCLUDES

- .1 Commissioning of all building electrical systems and component including:
- .1 Testing and adjustment.
  - .2 Demonstrations and Training.
  - .3 Instructions of all procedures for Owner's personnel.
  - .4 Updating as-built data.
  - .5 Co-ordination of Operation and Maintenance material.

1.3 RELATED SECTIONS

- .1 Section 01 78 00 - Closeout Submittals.
- .2 Section 26 05 01 - Common Work Results - Electrical.

1.4 REFERENCES

- .1 CSA (Canadian Standards Association).
- .2 Underwriters Laboratories of Canada.

1.5 QUALITY ASSURANCE

- .1 Provide qualified trades persons, certified testing agencies, factory trained and approved by the Commissioning Team Leader.
- .2 Submit the names of all personnel to be used during the Commissioning activities for Owner Approval.

1.6 COMMISSIONING

- .1 The purpose of the commissioning process is to fully test all

electrical components and operating procedures by challenging these systems to realistic operation conditions.

- .2 The Commissioning activities shall be co-ordinated by the General Contractor.
- .3 Commissioning activities for the electrical systems must have available up to date as-built drawing information and accurate Operations and Maintenance Manuals. These documents shall be a major part of this activity.
- .4 Contractor shall be responsible to update all documentation with information and any changes duly noted during the Commissioning exercise.
- .5 Contractor shall arrange for all outside suppliers, equipment manufacturers, test agencies and others as identified in the commissioning sections of this specification. The cost associated with this requirement shall be included as part of the tender price.

#### 1.7 SUBMITTALS

- .1 As-built drawings and data books must be available two weeks prior to commissioning for review and use by the consultant and Commissioning Team prior to the start of the commissioning activities.

#### 1.8 PREPARATION

- .1 Provide test instruments required for all activities as defined in the commissioning documents.
- .2 Verify all systems are in compliance with the requirements of the commissioning documents prior to the precommissioning check out operation.
- .3 Confirm all scheduled activities have

identified personnel available.

- .4 Where systems or equipment do not operate as required, make the necessary corrections or modifications, re-test and re-commission.

1.9 SYSTEM DESCRIPTION

- .1 Perform all start up operations, control adjustment, trouble shooting, servicing and maintenance of each item of equipment as defined in the commissioning documentation.
- .2 Owner will provide list of personnel to receive instructions and will coordinate their attendance at agreed upon times.
- .3 Prepare and insert additional data in the operations and maintenance manuals and update as-built drawings when need for additional data becomes apparent during the commissioning exercise.
- .4 Where instruction is specified in the commissioning manual, instruct personnel in all phases of operation and maintenance using operation and maintenance manuals as the basis of instruction.
- .5 Conduct presentation on Owner's premises. Owner will provide space.

1.10 FINAL REPORT

- .1 This trade shall assemble all testing data and commissioning reports and submit them to the Owner.
- .2 Each form shall bear signature of recorder, and that of supervisor of reporting organizer.

1.11 SCHEDULE OF ACTIVITIES

- .1 Commissioning activities shall be conducted based on pre-established

schedule with all members of the commissioning team.

- .2 Adhering to the established schedule is very important as the co-ordination and scheduling of the participants will be difficult to alter once this is established. Close co-ordination of this schedule is important.
- .3 In the event project cannot be commissioned in the allotted time slot, the contractor shall pay for all costs associated with assembling the Commissioning Team at a later date. If the contractor has not performed his duties to reach commissioning stage as outlined earlier, he will incur all expenses of other trades and the Commissioning Team due to his non-compliance.

PART 2 - PRODUCTS NOT APPLICABLE TO THIS SECTION

PART 3 - EXECUTION NOT APPLICABLE TO THIS SECTION

PART 1 - GENERAL

1.1 SUMMARY

- .1 This section defines correction to maximum dry density to take into account aggregate particles larger than 19 mm.

1.2 REFERENCES

- .1 American Society for Testing and Materials (ASTM)
- .1 ASTM C127-12, Standard Test Method for Specific Gravity and Absorption of Coarse Aggregate.
  - .2 ASTM D698-1221, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)).
  - .3 ASTM D1557-12, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 kN-m/m<sup>3</sup>)).
  - .4 ASTM D4253-00 (2006), Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.

1.3 DEFINITIONS

- .1 Corrected maximum dry density is defined as:
- .1  $D = (D1 \times D2) / ((F1 \times D2) + (F2 \times D1))$
  - .2  $D = (F1 \times D1) + (0.9 \times D2 \times F2)$
  - .3 Where: D = corrected maximum dry density kg/m<sup>3</sup>.
    - .1 F1 = fraction (decimal) of total field sample passing 19 mm sieve
    - .2 F2 = fraction (decimal) of total field sample retained on 19 mm sieve (equal to 1.00 - F1)
    - .3 D1 = maximum dry density, kg/m<sup>3</sup> of material passing 19 mm sieve determined in accordance with Method A of ASTM D698.
    - .4 D2 = bulk density, kg/m<sup>3</sup>, of material retained on 19 mm sieve, equal to 1000G where G is bulk specific gravity (dry basis) of material when tested to ASTM C127.
  - .4 For free draining aggregates, determine D1 (maximum dry density) to ASTM D4253 dry method when directed by Departmental Representative.

1.4 MEASUREMENT FOR PAYMENT .1 All work covered under this specification is considered to be incidental to the project and will not be measured for payment.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

PART 1 - GENERAL

1.1 RELATED  
SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .3 Section 31 23 33.01 - Excavating, Trenching and Backfilling.

1.2 REFERENCES

- .1 American Society for Testing and Materials (ASTM)  
.1 ASTM D4791-10, 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 Install sampling facilities at discharge end of production conveyor, to allow Departmental Representative to obtain representative samples of items being produced. Stop conveyor belt when requested by Departmental Representative to permit full cross section sampling.
- .5 Pay cost of sampling and testing of aggregates which fail to meet specified requirements.

1.4 WASTE  
MANAGEMENT AND  
DISPOSAL

- .1 Divert unused granular materials from landfill to local quarry facility 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 D4791.
  - .1 Greatest dimension to exceed five times least dimension.
- .3 Fine aggregates satisfying requirements of applicable section to be one, or blend of following:
  - .1 Natural sand.
  - .2 Manufactured sand.
  - .3 Screenings produced in crushing of quarried rock, boulders, gravel or slag.
- .4 Coarse aggregates satisfying requirements of applicable section to be one of or blend of following:
  - .1 Crushed rock.
  - .2 Gravel and crushed gravel composed of naturally formed particles of stone.
  - .3 Light weight aggregate, including slag and expanded shale.

2.2 SOURCE QUALITY CONTROL

- .1 Inform Departmental Representative of proposed source of aggregates and provide access for sampling at least 2 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 Where clearing is required, leave screen of trees between cleared area and roadways as directed.
  - .3 Clear, grub and strip area ahead of quarrying or excavating operation sufficient to prevent contamination of aggregate by deleterious materials.
  - .4 When excavation is completed dress sides of excavation to nominal 1.5:1 slope, and provide drains or ditches as required to prevent surface standing water.
  - .5 Trim off and dress slopes of waste material piles and leave site in neat condition.
- .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 300 mm in depth to prevent contamination of aggregate. Stockpile aggregates on ground but do not incorporate bottom 300 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 hours 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.
-

- .3 For temporary or permanent abandonment of aggregate source, restore source to condition meeting requirements of authority having jurisdiction.

PART 1 - GENERAL

1.1 DESCRIPTION .1 This section specifies supply, placement and compaction of rockfill and common fill as required or as directed by Departmental Representative.

1.2 RELATED REQUIREMENTS .1 Section 31 23 33.01 - Excavating, Trenching and Backfilling.  
.2 Section 31 32 19.01 - Geotextiles.

1.3 REFERENCES .1 ASTM International  
.1 ASTM D 698-07e1, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m<sup>3</sup> ).  
.2 Underwriters' Laboratories of Canada (ULC)

1.4 MEASUREMENT FOR PAYMENT .1 Rock Fill (100 mm minus): Supply, placement and compaction of rock fill will be measured by the cubic metre place measure (CMPM). The volume of material will be determined in place from measurements taken prior to and at completion of the work. Include the cost of all plant, labour, equipment, and materials required to complete the work as specified.  
.2 Rock Fill (75 mm - 150 mm): Supply and placement of rock fill will be measured by the cubic metre place measure (CMPM). The volume of material will be determined in place from measurements taken prior to and at completion of the work. Include the cost of all plant, labour, equipment, and materials required to complete the work as specified.

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- 1.4 MEASUREMENT FOR .3 Rock Fill (150 mm - 300 mm): Supply and placement  
PAYMENT of rock fill will be measured by the cubic metre.  
(Cont'd) The volume of material will be determined in place  
from measurements taken prior to and at completion  
of the work. Include the cost of all plant,  
labour, equipment, and materials required to  
complete the work as specified.

## PART 2 - PRODUCTS

- 2.1 ROCK FILL .1 Rock fill material to following requirements:
- .1 Crushed quarry stone consisting of hard durable particles free from clay lumps, frozen material and other deleterious materials, and free from splits, seams or defects likely to impair its soundness during handling or under action of water.
  - .2 Relative density: to ASTM C127, not less than 2.65.
  - .3 (100 mm minus) Rock size to be 85% - 90% 38 mm - 100 mm and with rock no greater than 150 mm dia.
  - .4 (75 mm - 150 mm) material to following requirements:
    - .1 Rock size to be 80% - 95% 75 mm - 150 mm and with rock no greater than 200 mm dia.
  - .5 (150 mm to 300 mm) Rock size to be 80% - 90% 150 mm - 300 mm and with no rock greater than 300 mm dia.

## PART 3 - EXECUTION

- 3.1 EXAMINATION .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or are acceptable for rough grading installation.
- .1 Visually inspect substrate in presence of Departmental Representative.
  - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
-

3.1 EXAMINATION  
(Cont'd)

- .1 (Cont'd)  
.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of approval to proceed from Departmental Representative.

3.2 PLACING ROCK  
FILL

- .1 Only rock fill material approved by Departmental Representative will be supplied. Material will be placed uniformly across the full cross-section in depths identified on the project drawings but not exceeding 300 mm (loose depth).
- .2 Use suitable earth moving and surface grading equipment to place and spread rock fill in continuous and uniform horizontal lifts.
- .3 Place 100 mm minus rock fill as indicated on the project drawings, but not exceeding a maximum loose depth of 300 mm. Each lift will be graded level prior to compaction as identified but not less than eight (8) passes with a 10 tonne vibratory roller each way. Where accessibility does not allow for use of a 10 tonne vibratory roller, place 100 mm minus rock fill in 200 mm lifts, grade level and compact with 10 passes of a one (1) tonne diesel plate tamper each way.
- .4 Place 75 mm to 150 mm rock fill as indicated on the project drawings following the same requirements identified for the 100 mm minus rock fill noted above.
- .5 Place 150 mm to 300 mm rock fill as indicated on the project drawings, but not exceeding a maximum loose depth of 400 mm. Each lift will be graded level prior to compaction as indicated on the project drawings but not less than twelve (12) passes with a 10 tonne vibratory roller each way.
- .6 Compaction of rock fill material will be restricted to 300 mm above LNT and extending up to the elevation identified for the placement of granular materials.
- .7 All side slopes to be one (1) vertical to one and one half (1.5) horizontal.

3.3 GRADING

- .1 Rough grade to levels, profiles, and contours allowing for surface treatment as indicated.
- .2 Rough grade to following depths below finish grades:
  - .1 50 mm for finished grades of Type 1 material.
- .3 Slope rough grades as indicated on drawings.
- .4 Grade ditches to depth required for maximum run-off as directed.
- .5 Prior to placing fill over existing ground, scarify surface to depth of 150 mm minimum before placing fill over existing ground. Maintain fill and existing surface at approximately same moisture content to facilitate bonding.
- .6 Compact filled and disturbed areas to corrected maximum dry density to ASTM D 698, as follows:
  - .1 95% under roadway and parking areas.

3.4 TESTING

- .1 Inspection and testing of soil compaction will be carried out by testing laboratory designated by ULC. Costs of tests will be paid by Owner Departmental Representative in accordance with Sections 01 29 83 - Payment Procedures for Testing Laboratory Services.

3.5 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 Remove recycling containers and bins from site and dispose of materials at appropriate facility.
-

3.6 PROTECTION

- .1 Protect bench marks, buildings, surface or underground utility lines which are to remain as directed by Departmental Representative. If damaged, restore to original or better condition unless directed otherwise.
  
- .2 Maintain access roads to prevent accumulation of construction related debris on roads.



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 31 22 13 - Rough Grading.
- 1.2 MEASUREMENT PROCEDURES
- .1 Mass Excavation: Measurements for payment to be made under this section will be measured by the cubic metre place measure (CMPM). Include costs in unit prices for item for which excavating and backfilling is required. Include the cost of all plant, labour, equipment required to complete the work as specified.
- 1.3 REFERENCES
- .1 American Society for Testing and Materials (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 C136-05, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
    - .3 ASTM D422-63 (2002), Standard Test Method for Particle-Size Analysis of Soils.
    - .4 ASTM D698-12e, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbs/ft<sup>3</sup>) (600 kN-m/m<sup>3</sup>).
    - .5 ASTM D4318-05, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of 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.
- 1.4 DEFINITIONS
- .1 Excavation classes: two classes of excavation will be recognized; common excavation and rock excavation.
-

1.4 DEFINITIONS  
(Cont'd)

- .1 (Cont'd)
- .1 Rock: any solid material in excess of 0.25 m<sup>3</sup> and which cannot be removed by means of heavy duty mechanical excavating equipment with 0.95 to 1.15m<sup>3</sup> bucket. Frozen material not classified as rock.
- .2 Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation.
- .2 Waste material: excavated material unsuitable for use in Work or surplus to requirements.
- .3 Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of Work.
- .4 Unsuitable materials:
- .1 Weak and compressive materials under excavated areas.
- .2 Frost susceptible materials under excavated areas.
- .3 Frost susceptible materials:
- .1 Fine grained soils with plasticity index less than 10 when tested to ASTM D4318, and gradation within limits specified when tested to ASTM D422 and ASTM C136: Sieve sizes to CAN/CGSB-8.1.
- .2 Table:
- | Sieve Designation | % Passing |
|-------------------|-----------|
| 2.00 mm           | 100       |
| 0.10 mm           | 45 - 100  |
| 0.02 mm           | 10 - 80   |
| 0.005 mm          | 0 - 45    |
- .3 Coarse grained soils containing more than 20% by mass passing 0.075 mm sieve.
- .5 Unshrinkable fill: very weak mixture of Portland cement, concrete aggregates and water that resists settlement when placed in utility trenches, and capable of being readily excavated.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Type 1 fill: to the following requirements:

2.1 MATERIALS  
(Cont'd)

- .1 (Cont'd)
  - .1 Crushed, pit run or screened stone, gravel or sand.
  - .2 Gradations to be within limits specified when tested to ASTM C136. Sieve sizes to CAN/CGSB-8.1.
- .2 Type 2 fill: selected material from excavation or other sources, approved by Departmental Representative for use intended, unfrozen and free from rocks larger than 75 mm, cinders, ashes, sods, refuse or other deleterious materials.

Sieve Designation	% Passing
Type 1	
101.6 mm	100
50 mm	75-100
4.75 mm	25-55
1.2 mm	10-35
0.3 mm	5-20
0.075 mm	0-12

PART 3 - EXECUTION

3.1 SITE PREPARATION

- .1 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.

3.2 EXCAVATION

- .1 Excavate to lines, grades, elevations and dimensions as indicated.
- .2 Mass excavation is to be measured from existing grade down to LNT 0.000.
- .3 Remove all pile wharf and other obstructions encountered during excavation in accordance with Section 02 41 16 - Sitework, Demolition and Removal.
- .4 Excavation must not interfere with bearing capacity of adjacent foundations.
- .5 Do not obstruct flow of surface drainage.

3.2 EXCAVATION  
(Cont'd)

- .6 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.
- .7 Notify Departmental Representative's approval of excavation is reached.
- .8 Obtain Departmental Representative's approval of completed excavation.
- .9 Excavated materials from the project are to be disposed of at an approved provincial landfill only, pending prior approval from the site owner/operator. Disposal of sediments must be done so in accordance with applicable federal/provincial legislation. Sediments are not permitted to be reused or disposed of at any other location other than a provincial landfill unless approved by the Departmental Representative.

3.3 FILL TYPES AND  
COMPACTION

- .1 Use fill of types as indicated.

3.4 BACKFILLING

- .1 Do not proceed with backfilling operations until Departmental Representative has inspected and approved installations.
  - .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 150 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.
  - .5 Backfilling around installations:
    - .1 Place bedding and surround material as specified elsewhere.
    - .2 Do not backfill around or over cast-in-place concrete within 24 hours after placing of concrete.
-

3.4 BACKFILLING  
(Cont'd)

- .5 (Cont'd)  
.3 Place layers simultaneously on both sides of installed Work to equalize loading. Difference not to exceed 1.0 m.

3.5 RESTORATION

- .1 Upon completion of Work, remove waste materials and debris, trim slopes, and correct defects as directed by Departmental Representative.  
.2 Clean and reinstate areas affected by Work as directed by Departmental Representative.  
.3 Restore site to its normal state prior to excavation.

PART 1 - GENERAL

1.1 SECTION  
INCLUDES

- .1 Materials and installation of polymeric geotextiles used in retaining wall structures, filtration, drainage structures and roadbeds, purpose of which is to:
  - .1 Separate and prevent mixing of granular materials of different grading.
  - .2 Act as hydraulic filters permitting passage of water while retaining soil strength of granular structure.

1.2 RELATED WORK

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .3 Section 31 22 13 - Rough Grading.
- .4 Section 31 23 33.01 - Excavating, Trenching and Backfilling.
- .5 Section 31 53 13 - Timber Cribwork.

1.3 REFERENCES

- .1 ASTM Society for Testing and Materials (ASTM)
    - .1 ASTM D4491-99a(2004)e1, Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
    - .2 ASTM D 4595-05, Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method.
    - .3 ASTM D 4716-04, Standard Test Method for Determining the (In-Plane) Flow Rate Per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head.
    - .4 ASTM D 4751-04, Standard Test Method for Determining Apparent Opening Size of a Geotextile.
  - .2 Canadian General Standards Board (CGSB)
    - .1 CAN/CGSB-4.2-M88, Textile Test Methods.
    - .2 CAN/CGSB-148.1, Methods of Testing Geotextiles and Geomembranes.
      - .1 No.2-M85, Mass per Unit Area.
      - .2 No.3-M85, Thickness of Geotextiles.
-

.3 No.7.3-92, Grab Tensile Test for Geotextiles.

.4 No. 6.1-93, Bursting Strength of Geotextiles Under No Compressive Load.

- .3 Canadian Standards Association (CSA)
- .1 CAN/CSA-G40.20-04/G40.21-04, General Requirements for Rolled or Welded Structural Quality Steel.
  - .2 CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.

1.4 SAMPLES

- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit to Departmental Representative the following samples at least 2 weeks prior to commencing work.
  - .1 Minimum length of 1 m of roll width of geotextile.

1.5 MILL CERTIFICATES

- .1 Submit to Departmental Representative a copy of mill test data and certificate at least 2 weeks prior to start of work.

1.6 DELIVERY AND STORAGE

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

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 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 Fold up metal banding, flatten and place in designated area for recycling.

1.8 MEASUREMENT FOR PAYMENT

- .1 No measurement for payment to be made under this section. Include costs in items of work which geotextile is required. Section 31 53 13 - Timber Cribwork and Section 31 22 13 - Rough Grading.

PART 2 - PRODUCTS

2.1 MATERIAL

- .1 Non-woven, mechanically bounded, needle punched polyester membrane, suitable for use in seawater environment.
  - .2 Physical properties:
    - .1 Thickness: to CAN/CGSB-148.1, No.3, minimum 4.7 mm.
    - .2 Mass per unit area: to CAN/CGSB-148.1, No.2, minimum 400 g/m<sup>2</sup>.
    - .3 Tensile strength and elongation (in any principal direction): to ASTM D4595.
      - .1 Tensile strength: minimum 1180 N, wet condition.
      - .2 Elongation at break: 50 to 100 percent.
      - .3 Seam strength: equal to or greater than tensile strength of fabric.
    - .4 Mullen burst strength: to CAN/CGSB-4.2, method 11.1, minimum 3850 kPa.
    - .5 Tear propagation (CAN-12-2) 530 N.
  - .3 Hydraulic properties:
    - .1 Apparent opening size (AOS): to ASTM D4751, 50 to 150 micrometres.
    - .2 Permittivity: to ASTM D4491, 0.25 cm per second.
  - .4 Securing pins and washers: to CAN/CSA-G40.21, Grade 300W, hot-dipped galvanized with minimum zinc coating of 600 g/m<sup>2</sup> to CAN/CSA G164.
-



PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Place one (1) layer of geotextile material as indicated on drawings.
- .2 Place geotextile material by unrolling onto graded surface in orientation, manner and locations indicated and retain in position with securing pins and washers.
- .3 Place geotextile material on sloping surfaces in one continuous length from toe of slope to upper extent of geotextile.
- .4 Place geotextile material smooth and free of tension stress, folds, wrinkles and creases.
- .5 Overlap each successive strip of geotextile 600 mm over previously laid strip.
- .6 Join successive strips of geotextile by sewing.
- .7 Pin successive strips of geotextile with securing pins at 300 mm interval at mid point of lap as indicated.
- .8 Protect installed geotextile material from displacement, damage or deterioration before, during and after placement of material layers.
- .9 After installation, cover with overlying layer within 4 hours of placement.
- .10 Replace damaged or deteriorated geotextile to approval of Departmental Representative.
- .11 Place and compact soil layers in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.

3.2 CLEANING

- .1 Remove construction debris from Project site and dispose of debris in an environmentally responsible and legal manner.
-

3.3 PROTECTION

- .1 Vehicular traffic not permitted directly on geotextile.

PART 1 - GENERAL

1.1 RELATED  
REQUIREMENTS

- .1 Section 31 23 33.01 - Excavating, Trenching and Backfilling.

1.2 PRICE AND  
PAYMENT PROCEDURES

- .1 Rock Mattress Fill (100 mm - 200 mm): Supply, placement, and compaction of rock fill will be measured by the cubic metre. The volume of material will be determine in place from measurements taken prior to and at completion of the work. Include the cost of all plant, labour, equipment, and materials required to complete the work as specified.
- .2 Scour Protection Rock (200 mm - 400 mm): Supply, placement, and compaction of rock fill will be measured by the cubic metre. The volume of material will be determine in place from measurements taken prior to and at completion of the work. Include the cost of all plant, labour, equipment, and materials required to complete the work as specified.

1.3 REFERENCES

- .1 ASTM International
- .1 ASTM C 117-13, Standard Test Method for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.
- .2 ASTM C 127-12, Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate.
- .3 ASTM C 136-13, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

1.4 DELIVERY,  
STORAGE AND  
HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
-

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Mattress material to following requirements:
  - .1 Crushed quarry stone consisting of hard durable particles free from clay lumps, frozen material and other deleterious materials, and free from splits, seams or defects likely to impair its soundness during handling or under action of water.
  - .2 Relative density: to ASTM C 127, not less than 2.65.
  - .3 Rock size to be 85% - 90% 100 mm - 200 mm and with rock no greater than 300 mm dia.
- .2 Rock scour protection (200 mm - 400 mm):
  - .1 Quarried rock: uniformly graded.
  - .2 Quarried rock: to be free from splits, seams or defects likely to impair its soundness during handling or by action or water and to approval of Departmental Representative.
  - .3 Rock, cubical and angular in shape with ratio of maximum to minimum dimensions of less than:.
    - .1 Maximum rock size: 500 mm.
    - .2 Minimum rock size: 100 mm.

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 gabion mattresses installation in accordance with manufacturer's written instructions.
    - .1 Visually inspect substrate in presence of Departmental Representative.
    - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
    - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.
-

- 3.2 PREPARATION .1 Sound area in presence of Departmental Representative before placing rock scour protection material, and record elevation of bottom on which rock to be placed.
- 3.3 PLACEMENT .1 Ensure that no frozen material is used in placing.  
.2 Do not place rock material until bottom area has been reviewed by Departmental Representative.  
.3 Place scour protection materials to dimensions as indicated.  
.4 Prevent segregation in placing of material sizes.  
.5 Do not place material during weather judged unsuitable by Departmental Representative.
- 3.4 SCOUR PROTECTION .1 Place scour protection to details as indicated as soon as practicable after placement of cribs.
- 3.5 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 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

PART 1 - GENERAL

- 1.1 DESCRIPTION .1 This section specifies requirements for supply and installation of treated timber and necessary fastenings for fabrication, placing, and ballasting of timber cribwork.
- 1.2 RELATED SECTIONS .1 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .2 Section 06 05 73 - Wood Treatment.
- .3 Section 31 32 19.01 - Geotextiles.
- 1.3 MEASUREMENT FOR PAYMENT .1 Treated Timber Cribwork-(Supply and Install): to be measured in cubic metres (m<sup>3</sup>) of completed work which include excavation to hard bottom crib seat, ballast stone, gravel, treated timber, blocking, fastenings, and all plant, labour, materials and equipment to perform work.
- .2 Measure timber cribwork in cubic metres determined by product. Use following dimensions measured in place:
- .1 Height: average of measurements taken at each vertical from bottom of lowest timber to top side of uppermost course of timber.
- .2 Width: average of measurements between outside faces of exterior longitudinal timbers, each width measured on top ties of each row of cross ties.
- .3 Length: measured horizontally along centre-line of crib between outside faces of exterior cross ties.
- .3 Cribwork below step will be determined by product of following dimensions measured in place:
- .1 Height: average of measurements taken at each vertical from bottom of lowest timber to top side of uppermost course of timber.
- .2 Width: average of measurements between outside faces of exterior longitudinal timbers, measured at each crosstie at low water elevations.
-

- .3 Length: measured horizontally along centre-line of crib and parallel to level water surface between outside faces of exterior cross ties.
- .4 Cribwork above step will be determined by product of following dimensions measured in place:
  - .1 Heights: average of measurements taken at each vertical from top of step crib to top of top course of timber.
  - .2 Width: average of measurements between outside faces of exterior longitudinal timbers, each width measured on top tier of each row of crossties.
  - .3 Length: measured horizontally along centre-line of crib and parallel to level water surface between outside faces of exterior cross ties.
- .5 Measurements of the vertical lengths, widths and lengths of cribwork, will be taken in the presence of both the Contractor and the Departmental Representative and will be verified and signed by both parties on the site to avoid any disputes.

#### 1.4 SAFETY REQUIREMENTS

- .1 Worker protection:
  - .1 Workers must wear gloves, respirators, dust masks, long sleeved clothing, eye protection, protective clothing when handling, drilling, sawing, cutting or sanding preservative treated wood and applying preservative materials.
  - .2 Workers must not eat, drink or smoke while applying preservative material.
  - .3 Clean up spills of preservative materials immediately with absorbent material. Safely discard of absorbent material to sanitary landfill.

#### 1.5 REFERENCES

- .1 American Society for Testing and Materials (ASTM International)
    - .1 ASTM A307-12, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile.
    - .2 ASTM C136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
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.3 ASTM-A123/A123M-13, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

.4 ASTM F1667-13, Standard Specification for Driven Fasteners, Nails, Spikes, and Staples.

.2 American Wood-Preserver's Association (AWPA)

.1 AWPA M4-11, Standard for the Care of Preservation - Treated Wood Products.

.3 Canadian Standards Association (CSA International)

.1 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.

.2 CAN/CSA-G40.20-13/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Steel.

.3 CAN/CSA-O80 Series-08 (R2012), Wood Preservation.

.4 Canadian Wood Council

.1 Wood Design Manual.

.5 National Lumber Grades Authority (NLGA)

.1 Standard Grading Rules for Canadian Lumber 2014 edition.

#### 1.6 SUBMITTALS

.1 Ballast:

.1 Submit proposed placing method to Departmental Representative for approval, prior to placing of ballast.

#### 1.7 WASTE MANAGEMENT

.1 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.2 Dispose of all corrugated cardboard and polystyrene plastic packaging material in appropriate on-site bin for recycling.

.3 Place materials defined as hazardous or toxic in designated containers.

.4 Ensure emptied containers are sealed and stored safely.

.5 Do not dispose of preservative treated wood through incineration.

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- .6 Do not dispose of preservative treated wood with other materials destined for recycling or reuse.
- .7 Dispose of treated wood, end pieces, wood scraps and sawdust at a sanitary landfill.
- .8 Dispose of unused preservative material at an official hazardous material collections site. Do not dispose of unused preservative material into sewer system, streams, lakes, on ground or in any other location where they will pose a health or environmental hazard.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- .1 Timber: Use timber graded and stamped in accordance with applicable grading rules and standards of associations or agencies approved to grade lumber by Canadian Lumber Standards Accreditation Board of CSA.
  - .2 Species: Douglas Fir, Pacific Coast Hemlock and Eastern Hemlock.
  - .3 Grade: No. 1 Structural.
  - .4 Grading authority: NLGA.
  - .5 Preservative treatment: To CSA O80 for coastal waters and Section 06 05 73 - Wood Treatment. Supply timbers in lengths required. Cut and field treat timbers only as may be necessary to suit site conditions. Contractor will have on site sufficient lengths and thickness of treated timber to permit levelling of cribs after ballasting operations.
  - .6 Miscellaneous steel: Medium structural steel conforming to CSA Specification G40.21 "Structural Quality Steels".
    - .1 Hot dip galvanized: to ASTM-A123/A123M. Minimum weight of zinc coating as stated in this Standard. Fabricator to adhere to recommendations of Standard.
    - .2 Wire nails, spikes, staples: to CSA-B111 or ASTM F1667.
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- .3 Bolts, nuts, washers: to ASTM A307.
- .4 Drift Bolts: to G40.21 from round stock, button head and diamond or wedge point.
- .5 Washers:
  - .1 Round Plate Washers: for 19 mm diameter machine bolts, 79 mm diameter by 7.9 mm thick, with hole diameter of 21 mm. Washers to G40.21.
  - .2 Square washers not permitted to be used.
- .6 All hardware galvanized.
  
- .7 Ballast for filling cribs to following requirements:
  - .1 Stone, consisting of hard durable particles free from clay lumps, organic material and other deleterious materials.
  - .2 Dry density in place: minimum 2600 kg per cubic metre.
  - .3 Ballast stone to be well graded with maximum sizes not exceeding 400 mm on any side and minimum size of not less than 250 mm on any side.
  
- .8 Gravel: Evenly graded pit run or crushed stone, maximum size, 50 mm, with not more than 8% passing the 0.075 mm sieve.

### PART 3 - EXECUTION

#### 3.1 PREPARATION

- .1 Excavate area of crib base to elevation indicated on drawings, hard bottom or bedrock and disposed as directed by Departmental Representative for disposal. Refer to Appendix B - P.E.D. Report and Section 01 74 11 - Construction/Demolition Waste Management and Disposal.
- .2 Cost of excavation for new timber crib from LNT 0.000 down to crib seat elevation is to be included in the price for cribwork. Section 31 53 13 - Timber Cribwork.
- .3 Contractor to confirm with Departmental Representative that excavated cribseat is adequate for cribwork placement.

- .4 Before construction, stockpile sufficient ballast to completely fill cribs. Provide suitable plant and equipment to keep crib in proper position and alignment during sinking operations.
- .5 Take closely spaced accurate soundings and probings, 1500 mm centre to centre or less, precisely located by template, to determine actual configuration of base area of crib. Construct crib bottom to match base configuration. Scribe cribwork to hard bottom or to hard bottom or to bedrock if required.
- .6 Cribs out of alignment or not correctly located to be refloated and replaced in correct position.

3.2 CRIB  
CONSTRUCTION

- .1 Construct timber cribwork to 400 mm above LNT prior to sinking in final position in work.
  - .2 Levelling Pieces:
    - .1 Place treated timber levelling pieces beneath bottom timbers to conform to shape of base area.
    - .2 Place levelling pieces horizontally.
    - .3 Secure succeeding pieces at intersections of bottom timbers and vertical posts, and other levelling pieces with machine bolts.
  - .3 Bottom timbers:
    - .1 Place bottom timbers lengthwise, and crosswise to form bottom three courses of cribs.
    - .2 Crosswise bottom timbers to be of one piece.
    - .3 Lengthwise bottom timbers to be of one piece.
    - .4 Secure three courses of bottom timbers together with machine bolts at every intersection with each other and with vertical posts.
  - .4 Ballast floor:
    - .1 Place ballast floor on pockets on bottom or middle course of bottom timbers.
    - .2 Ballast floor timber to be spaced evenly with no space greater than 100 mm.
    - .3 Secure each ballast floor timber to bottom timbers with drift bolts securing adjacent ballast floor timbers to same bottom timber.
  - .5 Longitudinals:
    - .1 Longitudinals one length for individual cribs below LNT.
-

- .2 Longitudinals minimum 6100 mm long above LNT.
  - .3 Where cribs are married together, longitudinals of sufficient length to span a minimum of a half a bay of one crib and one and a half bays of the adjacent crib.
  - .4 Butt join exterior and interior longitudinals a minimum distance of 600 mm from crosstie with joint in centre of a 1200 mm long joiner block.
  - .5 Secure block to lower timber with drift bolt at centre and secure longitudinals and splice at ends to block with drift bolts.
  - .6 Stagger joints in longitudinal timbers. Do not join in same bay or on same vertical post.
  - .7 Secure longitudinals to intersection of cross ties with drift bolt and to intersection of vertical posts with machine bolt every third course of longitudinals, along with the top course.
  - .8 Countersink machine bolts on exterior face above LNT.
- .6 Cross ties: one length across cribs.
- .1 Secure cross ties to intersection of longitudinals with drift bolt and to intersection of vertical posts with machine bolt every third course of cross tie, along with the top course.
  - .2 One row of crossties and verticals may be eliminated from one crib where cribs marry together above +400 mm LNT.
- .7 Vertical posts: one length from bottom of cribwork to top of cribwork. Locate one vertical post at corner of each crib and at intersection of crossties with longitudinals.
- .8 Blocking: install treated timber filler blocking as indicated on drawings.
- .1 Cut blocking exact length to completely fill spaces and such that the total thickness of crossties and longitudinals carrying the bearing weight of the deck be a minimum of 600 mm if cribwork ends on a crosstie.
  - .2 If cribwork ends on a longitudinal one additional tier of blocking is required.
  - .3 Blocking of same size and material as crossties or longitudinals and fastened with 2 drift bolts into timber immediately below it.
-

- .9 Levelling: treated timber required for levelling of cribwork after ballasting, must be full width continuous over entire length to be levelled.
- .10 Bolt Sizing and Holing:
  - .1 Drift Bolts: length of drift bolts equal to thickness of timbers fastened less 50 mm, unless otherwise specified. Bore holes for drift bolts 2 mm smaller diameter than bolt and for full length of bolt.
  - .2 Machine Bolts: length of machine bolts equal to thickness of timbers fastened plus thickness of washers plus 40 m. Where bolts are countersunk, the length, as noted above, less depth of countersink. Thread machine bolts for 64 mm. Bore holes for machine bolts to same diameter as bolts.

3.3 HANDLING  
TREATED TIMBER

- .1 Handle treated material without damaging original treatment.
  - .1 Replace treated timber with major damage to original treatment, as instructed by Departmental Representative.
- .2 Field treatment: to CAN/CSA-080. Apply and saturate cuts, minor surface damage, abrasions, and nail and spike holes with preservative.
- .3 Ripping of treated timber not permitted without prior approval of Departmental Representative.

3.4 BALLAST

- .1 Place ballast to avoid damage to timber cribwork.
- .2 Place ballast so that differential height of fill between adjacent cells, at any time, will be less than 1 m.
- .3 Pockets of cribs ballasted within 100 mm of top of crib timbers.

3.5 GRAVEL

- .1 Install a 150 mm layer of gravel over the top of ballast to form a base for the reinforced concrete deck.

- .2 Hand place final items of ballast stone to fill voids and depressions to hold gravel in place.
- .3 Install gravel to grade required and compact in preparation for concrete deck work.
- .4 Clean any loose gravel off timber surface prior to placement of deck.

3.6 TOLERANCES

- .1 1 in 300 in overall dimensions.
- .2 Locate cribs within 100 mm of location as indicated. Horizontal misalignment within 100 mm along the outside faces.
- .3 Space between ballasted cribs within 200 mm. No payment for this space will be made above or below LNT.

3.7 PROTECTION

- .1 Protect work from damage resulting from work on other sections and from damage resulting from environmental conditions.
- .2 Repair or replace portion or entire crib at no additional cost if damaged by work.

PART 1 - GENERAL

- 1.1 DESCRIPTION
- .1 This section specifies requirements for supply and installation of structural timber as follows:
    - .1 Supply and installation of treated dimension timber wheelguard, wheelguard blocking, coping, and associated painting.
    - .2 Supply and installation of untreated dimension hardwood timber fenders.
    - .3 Supply and installation of untreated timber hardwood ladders, ladder handgrips, and associated hardware and painting.
- 1.2 RELATED WORK
- .1 Section 02 41 16 - Sitework, Demolition and Removal.
  - .2 Section 03 30 00 - Cast-in-Place Concrete.
  - .3 Section 06 05 73 - Wood Treatment.
  - .4 Section 31 53 13 - Timber Cribwork.
- 1.3 REFERENCES
- .1 American Society for Testing and Materials (ASTM International)
    - .1 ASTM A307-12, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile.
  - .2 ASTM-A123/A123M, Standard Specification for Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products.
  - .3 ASTM F1667-13, Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.
  - .4 American Wood-Preserver's Association (AWPA)
    - .1 AWPA M4-11, Standard for the Care of Preservation - Treated Wood Products.
  - .5 Canadian Standards Association (CSA International)
    - .1 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
    - .2 CAN/CSA-G40.21-04, General Requirements for Rolled or Welded Structural Quality Steel/Structural Steel.
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.3 CAN/CSA-080 Series-08 (R2012), Wood Preservation.

.6 Canadian Wood Council  
.1 Wood Design Manual.

.7 National Lumber Grades Authority (NLGA)  
.1 Standard Grading Rules for Canadian Lumber 2014 edition.

1.4 DIMENSIONS

.1 Check existing site dimensions and report discrepancies to Departmental Representative before commencing work.

1.5 PROTECTION

- .1 Avoid dropping, bruising or breaking of wood fibres.
- .2 Avoid breaking surfaces of treated timber.
- .3 Do not damage surfaces of treated timber by boring holes or driving nails or spikes into them to support temporary material or staging.
- .4 Treat cuts, breaks or abrasions on surfaces of treated timber with 3 brush coats of preservative to CSA 080.
- .5 Treat bolt holes, cutoffs and field cuts in accordance with CSA 080.

1.6 DELIVERY AND STORAGE

- .1 Store timber horizontally, evenly supported and open piled permit circulation when stored for prolonged period.
  - .2 When handling long timber, provide support at sufficient number of points, properly located to prevent damage due to excessive bending.
  - .3 Handle treated timber with hemp, manila or sisal rope slings or other approved means of support that will not damage surface.
-



- .4 Do not use sharp pointed tools to handle treated timber. Any timber so handled will be rejected and be replaced at Contractor's expense.

1.7 MEASUREMENT  
FOR PAYMENT

- .1 Structural Timber (Supply and Install):
  - .1 Treated Dimension Timber: The supply and installation of treated dimension timber for wheelguard, wheelguard blocking and coping will be measured by the cubic metre (m<sup>3</sup>) of timber secured in place, including all timber, fastenings, plant, material, equipment, labour, wheelguard bolt hole levelling sealant, painting of wheelguard and wheelguard blocking.
  - .2 Untreated Dimension Hardwood Timber: The supply and installation of untreated dimension hardwood timber for vertical hardwood fenders, and horizontal fenders as specified will be measured by the cubic metre (m<sup>3</sup>) of timber secured in place including all timber, fastenings, plant, material, equipment, and labour.
  - .3 Ladders - (Untreated): The supply and installation of untreated ladders will be measured by the unit secured in place. Contractor will provide all timber, fastenings, plant, material, equipment, and labour, including untreated timber hardwood ladder uprights, ladder rungs, ladder handgrips, and painting of ladder uprights.

PART 2 - PRODUCTS

2.1 TIMBER  
MATERIALS

- .1 Timber: Use timber graded and stamped in accordance with applicable grading rules and standards of associations or agencies approved to grade lumber by Canadian Lumber Standards Administration Board of CSA.
- .2 Species
  - .1 Wheelguard, wheelguard blocks, coping, : Hemlock or Douglas Fir (CCA or ACA treated).
  - .2 Hardwood fenders, and ladder uprights: Birch or Maple untreated).
- .3 Grade: No. 1 Structural Grade
- .4 Grading Authority: NLGA

- .5 Preservative Treatment: Treat to CSA 080, for coastal waters and Section 06 05 73 - Wood Treatment. Timbers will be treated in the lengths required. Unnecessary field cutting will not be permitted.
- .6 Primer: Alkyd undercoat, exterior oil wood primer, similar to Pittsburgh 6-9 or approved equal.
- .7 Paint: Alkyd/Oil Resin paint similar to Pittsburgh Paints "Safety Yellow" Product ID 7-808C or approved equal. Paint to conform to CAN/CGSB-1.61-2004.

2.2 MISCELLANEOUS  
STEEL AND  
FASTENINGS

- .1 Miscellaneous Steel: All steel and fastenings to be CSA G40.21, Grade 300 W, galvanized.
- .2 Nails and Spikes: to CSA B111 or ASTM F1667.
- .3 Machine Bolts and Nuts: to ASTM A307. All machine bolts and nuts to be galvanized.
- .4 Drift Bolts: to G40.21 from round stock button head and diamond or wedge point. All drift bolts to be galvanized.
- .5 Washers:
  - .1 Round Plate Washers: for 16 mm machine bolts will be 76 mm diameter by 6.4 mm thick, for 19 mm machine bolts will be 79 mm diameter by 7.9 mm thick and have a hole diameter of 18 mm and 21 mm diameter respectively. Washers to conform to G40.21. All washers to be galvanized.
  - .2 Plain Washers: to CSA B19.1, Class 2. All washers to be galvanized.
  - .3 Square washers are not permitted.
- .6 Galvanizing: will conform to ASTM/A123/A123M. Unless otherwise specified, minimum weight of zinc coating will be as stated in this Standard. Fabricator is to adhere to recommendations of Standard.
- .7 Ladder Rungs and Hand Grips: to CSA G40.21, galvanized.

- .8 Lag Screws: to CSA B34, galvanized lag screw washers will conform to CSA B19.1
- .9 Welding in accordance with CSA Standards. The welders will be qualified to the appropriate classification as stated in CSA W47.1 "Certification of Companies for Fusion Welding of Steel Structures." Conform welding to all appropriate requirements and recommendations of CSA Standard W59 "Welded Steel Construction" (metal arc welding).

2.3 ANCHOR BOLTING SYSTEM

- .1 Anchor bolts, where required, for anchoring coping and/or wheelguard to existing concrete deck will be 19 mm diameter resin cartridge anchors.
- .2 Submit shop drawings and manufacturer's specification for anchor bolts for approval.
- .3 Anchor bolts to be installed with strict adherence to manufacture specifications.

PART 3 - EXECUTION

3.1 PREPARATION

- .1 Install structural timbers to details shown on drawings or as specified.

3.2 WHEELGUARD AND WHEELGUARD BLOCKING

- .1 Wheelguard timbers to be 200 mm x 200 mm and will be in minimum lengths of 6100 mm or as specially required with butt joints made over wheelguard blocking. Wheelguard timbers to be chamfered on top, 25 mm on each horizontal and vertical surface.
  - .2 Wheelguard blocks will be installed at 1500 mm on centre or as required to support the wheelguard.
  - .3 Wheelguard will be secured through wheelguard blocking, coping and two (2) crib timbers below with two (2) 25 mm diameter drift bolts as shown on detail drawings.
-

- .4 The installation of wheelguard and wheelguard blocking as per detail.

### 3.3 COPING

- .1 Install 200 mm x 250 mm treated timber coping in minimum length of 7620 mm around perimeter of wharf as directed.
- .2 Secure coping to timber below with 19 mm diameter drift bolts spaced at 1500 mm on centre and to concrete deck with 19 mm diameter by 600 mm long machine bolts spaced at 1500 mm on centre. The machine bolts will be countersunk on the exterior face; the nut installed on the outside and each bolt equipped with 2 washers.
- .3 Secure coping to concrete deck using coping anchor bolts where approved by Departmental Representative. Secure coping 1500 mm on centre. All bolts to be countersunk on the exterior face. All countersinking to be drilled.

### 3.4 FENDERS

- .1 Horizontal Fenders:
    - .1 Install hardwood timber fenders in minimum length of 4880 mm along top perimeter of wharf. Stagger joints in coping from joints in horizontal fender.
    - .2 Top horizontal fender to be chamfered 25 mm on top seaward face.
    - .3 Secure horizontal fender to coping with 16 mm diameter lag screws, minimum of four (4) each lag screws per fender, spaced at 1500 mm on centre. All lag screws to be countersunk on the exterior face.
  - .2 Vertical Fenders:
    - .1 Install hardwood timber fenders spaced at 300 mm on centre along face of wharf.
    - .2 Secure each fender with four (4) each 16 mm diameter lag screws evenly spaced from LNT to underside of horizontal fender. All lag screws to be countersunk.
    - .3 All fenders to extend from underside of horizontal fender to 300 mm below LNT.
-

.4 Do not notch or cut fenders to provide straight wharf face. Continuous blocking will be installed behind fenders and chocks to provide straight face.

3.5 LADDERS

- .1 Install ladders on face of wharf in locations shown on drawings or designated by Departmental Representative.
- .2 Ladder uprights to be 2-150 mm x 200 mm installed from 900 mm below LNT to wheelguard elevation. Uprights to be bevelled at 45° on top and painted as specified.
- .3 Construction details and steel handgrips as per detail.
- .4 Secure each upright with four (4) each evenly spaced 19 mm diameter galvanized lag screws. All lag screws to be countersunk.

3.6 PAINTING

- .1 Paint four (4) sides and exposed ends of wheelguard, exposed sides of wheelguard blocking, tops of fenders, and complete ladder uprights as directed by the Departmental Representative.
- .2 Use one (1) coat of exterior oil wood primer and two (2) coats of alkyd/oil resin paint as specified. Paint materials for each coat to be product of a single manufacturer as specified. Ensure previous coat of primer or paint is dry before second coat is applied.

3.7 BOLT SIZING

- .1 Drift Bolts: Drift bolts used in the work will have a length equal to thickness of timbers being fastened less 50 mm unless otherwise specified. Holes for drift bolts will be bored 2 mm smaller diameter than size of steel used and for full length of bolts.
-

- .2 Machine Bolts: Machine bolts used in work will have a length equal to thickness of timbers being fastened plus thickness of washers plus 40 mm. Where bolts are countersunk, the length will be as above less depth of countersinking. Machine bolts will be threaded for 64 mm. Holes will be drilled same diameter as bolt.
- .3 Lag Screws: All lag screws used in the work will have a length equal to thickness of timbers being fastened less 50 mm and depth of countersinking. Holes for lag screws to be drilled same diameter as shank portion of screw and to inside thread diameter for threaded portion of screw and for full length. All lag screws will be countersunk, screwed, not driven in place, and will have one (1) standard washer under the head.
- .4 Countersink drift bolts and/or lag screws in hardwood fenders, chocks, ladders, and slipway runners to the extent that the minimum distance from face of timber to head of bolt is 12 mm.
- .5 Bolting of timbers without properly drilled bolt holes will not be accepted.

### 3.8 INFILLING

- .1 Install treated structural timber full length sections in areas as indicated on drawings or as indicated by Departmental Representative.
- .2 Cut and remove damaged, split, rotten, loose timber as indicated on drawings or as indicated by Departmental Representative.
- .3 Secure treated structural timber infill with drift bolts, lag screws, and spikes as required, shown on drawings or as indicated by Departmental Representative.
- .4 All splicing, leveling, and infilling to be approved by Departmental Representative prior to installation of new fendering.

PART 1 - GENERAL

- 1.1 RELATED SECTIONS
- .1 Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
  - .2 Section 31 05 17 - Aggregate Materials.
  - .3 Section 32 12 16 - Asphalt Paving.
- 1.2 MEASUREMENT PROCEDURES
- .1 Type 1 Granular Base: will be measured in cubic meters (m<sup>3</sup>) Supply, placement and compaction of Type 1 granular base, including the cost of all plant, labour, equipment and materials required to complete the work as specified.
  - .2 Type 2 Granular Sub Base: will be measured in cubic meters (m<sup>3</sup>). Supply, placement and compaction of Type 2 granular sub base including the cost of all plant, labour, equipment and materials required to complete the work as specified.
- 1.3 REFERENCES
- .1 American Society for Testing and Materials (ASTM)
    - .1 ASTM C117-95, Standard Test Method for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.
    - .2 ASTM D136, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
    - .3 ASTM D136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregate.
    - .4 ASTM D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft<sup>3</sup>) (600kN-m/m<sup>3</sup>).
    - .5 ASTM D1557, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft-lbf/ft<sup>3</sup>) (2,700kN-m/m<sup>3</sup>).
    - .6 ASTM D1883, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soil.
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.7 ASTM D4318, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of 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.

1.4 DELIVERY,  
STORAGE AND  
HANDLING

- .1 Deliver and stockpile aggregates in accordance with Section 31 05 17 - Aggregate Materials. Stockpile minimum 50% of total aggregate required prior to beginning operation.
- .2 Divert unused granular material from landfill to local facility as approved by Departmental Representative.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Type 1 Granular Base: Material to the following requirements:
  - .1 Granulations to be within following limits when tested to ASTM C136-84a and ASTM C117-87. The gradings shall not show marked fluctuations from opposite extremes of the limiting sizes, and giving a smooth curve without sharp breaks when plotted on a semi-log grading chart to ASTM

<u>ASTM Sieve Designation</u>	<u>% Passing</u>
19.0 mm	100
12.5 mm	70-100
9.5 mm	-
4.75 mm	40-70
2.00 mm	23-50
0.425 mm	7-25
0.180 mm	-
0.075 mm	3-8

- .2 Type 2 Granular Sub-Base Material to the following requirements:



.1 Gradation to be within following limits when tested to ASTM C136-82 and ASTM C117-80. The gradings shall not show marked fluctuations from opposite extremes of the limiting sizes, having a smooth curve without sharp breaks when plotted on a semi-log grading chart to ASTM E11-87.

<u>ASTM Sieve Designation</u>	<u>%Passing</u>
50.8 mm	75-100
15.9 mm	45-80
4.76 mm	25-55
1.20 mm	12-35
0.300 mm	7-20
0.075 mm	3-6 (Pit Source) 3-8 (Rock Source)

- .2 Other properties as follows:
- .1 Liquid Limit: to ASTM D423-66, (1972) maximum 25.
  - .2 Plasticity Index: to ASTM D424-59 (1971) maximum 0.
  - .3 Los Angeles Abrasion: to ASTM C131-81. Maximum % loss by weight: 35.
  - .4 Crushed Fragments: 50%. The percent of crushed particles will be determined by examining the fraction retained on the 4.76mm sieve and dividing the weight of the crushed particles by the total weight retained on the 4.76mm sieve.
  - .5 CBR:AASHTO T193-72 Min 100 when compacted to 100% of AASTO T180-75 Method D.

### PART 3 - EXECUTION

#### 3.1 SEQUENCE OF OPERATIONS

- .1 Construct granular base to depth and grade in areas indicated.
- .2 Ensure no frozen material is placed.
- .3 Place material only on clean unfrozen surface, free from snow and ice.
- .4 Place material to full width in uniform layers not exceeding 150mm compacted thickness. Department Representative may authorize thicker lifts (layers) if specified compaction can be achieved.
- .5 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.

.6 Remove and replace that portion of layer in which material becomes segregated during spreading.

.1 Compaction Equipment

.1 Compaction equipment to be capable of obtaining required material densities.

.2 Compacting

.1 Compact to density not less than 100% corrected maximum dry density ASTM D698.

.2 Shape and roll alternately to obtain smooth, even and uniformly compacted base.

.3 Apply water as necessary during compacting to obtain specified density.

.4 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by Department Representative.

3.2 SITE TOLERANCES

.1 Finished base surface to be within plus or minus 10 mm of established grade and cross section but not uniformly high or low.

3.3 PROTECTION

.1 Maintain finished base in condition conforming to this Section until succeeding material is applied or until acceptance by Departmental Representative.

PART 1 - GENERAL

- 1.1 SUMMARY .1 This method covers measurement of loss of Marshall Stability resulting from action of water on compacted asphalt paving mixtures containing penetration grade asphalt cement.
- .2 Numerical index of retained stability is obtained by comparing stability of specimens determined in accordance with usual Marshall procedures with stability of specimens that have been immersed in water for prescribed period.
- 1.2 RELATED SECTIONS .1 Section 32 12 16 - Asphalt Paving.
- 1.3 REFERENCES .1 American Association of State Highway and Transportation Officials (AASHTO)  
.1 AASHTO T245-97 (2001), Resistance to Plastic flow of Bituminous Mixtures Using Marshall Apparatus.

PART 2 - PRODUCTS

- 2.1 MATERIALS .1 Representative samples of each asphalt paving mixture proposed for use on Project.
- 2.2 EQUIPMENT .1 One or more water baths with automatic controls for immersing specimens. Baths normally used for Marshall test are suitable for test.
- .2 Scale and water bath with suitable accessory equipment for weighing test specimens in air and in water to determine their densities.
-

- .3 Flat transfer plates of glass or metal. Keep one plate under each specimen during immersion period and during subsequent handling, except when weighing and testing, to prevent breakage or distortion of specimens.
- .4 Apparatus required to conduct Marshall test.

### PART 3 - EXECUTION

#### 3.1 PREPARATION OF TEST SPECIMENS

- .1 Prepare at least 8 specimens for each test with hand-operated hammer, in accordance with AASHTO T245, except where specified otherwise.

#### 3.2 TEST PROCEDURES

- .1 Do Marshall testing in accordance with AASHTO T245, except where specified otherwise.
- .2 Weigh each specimen in air and in water. Weigh in water as rapidly as possible to minimize absorption.
- .3 Calculate specific gravity of each specimen as follows:
  - .1 Specific Gravity =  $A / (A-B)$
  - .2 Where A = weight of specimen in air in grams
  - .3 B = weight of specimen in water in grams
- .4 Sort each set of 8 specimens into 2 groups of 4 specimens each so that average specific gravity of specimens in group 1 is essentially same as that of group 2.
- .5 Test group 1 specimens for Marshall stability. Calculate S1 = Marshall stability of group 1 (average).
- .6 Immerse group 2 specimens in water for 24h at 60°C, then test immediately for Marshall stability. Calculate S2 = Marshall stability of group 2 (average).

#### 3.3 Test Report

- .1 Report test results to Departmental Representative.
-

- .2 Report numerical index of retained stability as resistance of asphaltic paving mixtures to detrimental effect of water, expressed as percentage of original stability retained after immersion period.
- .3 Calculate index as follows:
  - .1 Index of Retained Stability =  $S_2 / S_1 \times 100$

PART 1 - GENERAL

- 1.1 SECTION INCLUDES
- .1 Materials and installation for asphalt concrete paving.
- 1.2 RELATED SECTIONS
- .1 Section 01 29 83 - Payment Procedures for Testing Laboratory Services.
  - .2 Section 01 33 00 - Submittal Procedures.
  - .3 Section 01 35 29 - Health and Safety Requirements.
  - .4 Section 31 05 17 - Aggregate Materials.
  - .5 Section 32 12 10 - Marshall Immersion Test for Bitumen.
  - .6 Section 32 11 23 - Aggregate Base Courses.
- 1.3 REFERENCES
- .1 American Association of State Highway and Transportation Officials (AASHTO)
    - .1 AASHTO M320-02, Standard Specification for Performance Graded Asphalt Binder.
    - .2 AASHTO R29-02, Standard Specification for Grading or Verifying the Performance Graded of an Asphalt Binder.
    - .3 AASHTO T245-97(2001), Resistance to Plastic flow of Bituminous Mixtures Using Marshall Apparatus.
  - .2 Asphalt Institute (AI)
    - .1 AI MS2-1994 Sixth Edition, Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types.
  - .3 American Society for Testing and Materials International, (ASTM)
    - .1 ASTM C88-05, Standard Test Method for Soundness of Aggregates by Use of Sodium Sulphate or Magnesium Sulphate.
    - .2 ASTM C117-04, Standard Test Method for Material Finer Than 0.075mm (No.200) Sieve in Mineral Aggregates by Washing.
    - .3 ASTM C123-04, Standard Test Method for Lightweight Particles in Aggregate.
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- .4 ASTM C127-07, Standard Test Method for Specific Gravity and Absorption of Coarse Aggregate.
- .5 ASTM C128-07a, Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate.
- .6 ASTM C131-06, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
- .7 ASTM C136-06, Standard Method for Sieve Analysis of Fine and Coarse Aggregates.
- .8 ASTM C207-06, Standard Specification for Hydrated Lime for Masonry Purposes.
- .9 ASTM D995-95b(2002), Standard Specification for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures.
- .10 ASTM D2419-02, Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
- .11 ASTM D3203-05, Standard Test Method for Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures.
- .12 ASTM D4791-05e1, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.

- .4 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-8.1-M88, Sieves Testing, Woven Wire, Metric.
  - .2 CAN/CGSB-16.3-M90, Asphalt Cements for Road Purposes.

1.4 PRODUCT DATA

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit viscosity-temperature chart for asphalt cement to be supplied showing either Saybolt Furol viscosity in seconds or Kinematic Viscosity in centistokes, temperature range 105 to 175 degrees C at least 2 weeks prior to beginning Work.
- .3 Submit manufacturer's test data and certification that asphalt cement meets requirements of this Section.
- .4 Submit asphalt concrete mix design and trial mix test results to Departmental Representative for review at least 2 weeks prior to beginning Work.

1.5 SAMPLES

- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Inform Departmental Representative of proposed source of aggregates and provide access for sampling at least 2 weeks prior to beginning Work.
- .3 Submit samples of following materials proposed for use at least 2 weeks prior to beginning Work.
  - .1 One 5 L container of asphalt cement.
- .4 If materials have been tested by an independent testing laboratory within previous 6 months and have successfully passed tests equal to requirements of this specification, disregard above instructions and submit test certificates from testing laboratory showing suitability of materials for this project.

1.6 DELIVERY,  
STORAGE AND  
HANDLING

- .1 Deliver and stockpile aggregates in accordance with Section 31 05 17 - Aggregate Materials. Stockpile minimum 50% of total amount of aggregate required before beginning asphalt mixing operation.
- .2 When necessary to blend aggregates from one or more sources to produce required gradation, do not blend in stockpiles.
- .3 Stockpile fine aggregate separately from coarse aggregate, although separate stockpiles for more than two mix components are permitted.
- .4 Provide approved storage, heating tanks and pumping facilities for asphalt cement.

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 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
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- .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 aggregate materials from landfill to quarry facility for reuse as approved by Departmental Representative.
- .5 Divert unused asphalt from landfill to facility capable of recycling materials.
- .6 Fold up metal banding, flatten and place in designated area for recycling.

1.8 MEASUREMENT FOR PAYMENT

- .1 Asphalt Paving: (65mm Surface Course), will be measured by the square metre (m<sup>2</sup>) of compacted surface coarse asphalt installed in the work within the limits indicated on the drawings.
- .2 No separate payment will be made for any other ingredient or feature of the work and all factors, including asphalt bituminous tack coat, milling, compaction, cold weather, asphalt, aggregates, saw cutting, and all plant, labour and materials is inclusive in the above price.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Performance graded asphalt cement: to AASHTO M320, grade PG 58 - 28 when tested to AASHTO R29.
- .2 Aggregates: in accordance with Section 31 05 17 - Aggregate Materials: General and following requirements:
  - .1 Crushed stone or gravel.
  - .2 Gradations: within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.2.
  - .3 Table

Sieve Designation	% Passing	
	Lower Course	Surface Course
200 mm	-	-
75 mm	-	-
50 mm	-	-
38.1 mm	-	-
25 mm	100	-
19 mm	-	-
12.5 mm	70-85	100
9.5 mm	-	-
4.75 mm	40-65	55-75
2.00 mm	30-50	35-55
0.425 mm	15-30	15-30
0.180 mm	5-20	5-20
0.075 mm	3-8	3-8

.4 Coarse aggregate: aggregate retained on 4.75 mm sieve and fine aggregate is aggregate passing 4.75 mm sieve when tested to ASTM C136.

.5 When dryer drum plant or plant without hot screening is used, process fine aggregate through 4.75 mm sieve and stockpile separately from coarse aggregate.

.6 Do not use aggregates having known polishing characteristics in mixes for surface courses.

.7 Sand equivalent: ASTM D2419. Min: 50.

.8 Magnesium Sulphate soundness: to ASTM C88.

Max % loss by mass:

.1 Coarse aggregate surface course: 12%.

.2 Coarse aggregate lower course: 12%.

.3 Fine aggregate, surface course: 16%.

.4 Fine aggregate, lower course: 16%.

.9 Los Angeles degradation: Grading B, to ASTM C131. Max % loss by mass:

.1 Coarse aggregate, surface course: 25%.

.2 Coarse aggregate, lower course: 35%.

.10 Absorption: to ASTM C127. Max % by mass:

.1 Coarse aggregate, surface course: 1.75%.

.2 Coarse aggregate, lower course: 2.00%.

.11 Loss by washing: to ASTM C117. Max % passing 0.075 mm sieve:

.1 Coarse aggregate, surface course: 1.5%.

.2 Coarse aggregate, lower course: 2.0%.

.12 Lightweight particles: to ASTM C123. Max % by mass less than 1.95 relative density:

.1 Surface course: 1.5%.

.2 Lower course: 3.0%.

.13 Flat and elongated particles: to ASTM D4791, (with length to thickness ratio greater than 5):

Max % by mass:

.1 Coarse aggregate, surface course: 15%.

.2 Coarse aggregate, lower course: 15%..

.14 Crushed fragments: at least 60% of particles by mass within each of following sieve designation ranges, to have at least 1 freshly fractured face. Material to be divided into ranges, using methods of ASTM C136.

Passing		Retained on
25 mm	to	12.5 mm
12.5 mm	to	4.75 mm

.15 Regardless of compliance with specified physical requirements, fine aggregates may be accepted or rejected on basis of past field performance.

.3 Mineral filler:

.1 Finely ground particles of limestone, hydrated lime, Portland cement or other approved non-plastic mineral matter, thoroughly dry and free from lumps.

.2 Add mineral filler when necessary to meet job mix aggregate gradation or as directed to improve mix properties.

.3 Mineral filler to be dry and free flowing when added to aggregate.

## 2.2 EQUIPMENT

.1 Pavers: mechanical grade controlled self-powered pavers capable of spreading mix within specified tolerances, true to line, grade and crown indicated.

.2 Rollers: sufficient number of type and weight to obtain specified density of compacted mix.

.3 Vibratory rollers:

.1 Minimum drum diameter: 1200 mm.

.2 Maximum amplitude of vibration (machine setting): 0.5 mm for lifts less than 40 mm thick.

- .4 Haul trucks: sufficient number and of adequate size, speed and condition to ensure orderly and continuous operation and as follows:
  - .1 Boxes with tight metal bottoms.
  - .2 Covers of sufficient size and weight to completely cover and protect asphalt mix when truck fully loaded.
  - .3 In cool weather or for long hauls, insulate entire contact area of each truck box.
  
- .5 Hand tools:
  - .1 Lutes or rakes with covered teeth for spreading and finishing operations.
  - .2 Tamping irons having mass not less than 12 kg and bearing area not exceeding 310 cm<sup>2</sup> for compacting material along curbs, gutters and other structures inaccessible to roller. Mechanical compaction equipment, when approved by Departmental Representative, may be used instead of tamping irons.
  - .3 Straight edges, 4.5 m in length, to test finished surface.

2.3 MIX DESIGN

- .1 Mix design to be provided approved by Departmental Representative.
  
- .2 Mix design to be developed by testing laboratory approved by Departmental Representative.
  
- .3 Design of mix: by Marshall method to requirements below.
  - .1 Compaction blows on each face of test specimens: 75.
  - .2 Mix physical requirements:

<u>Property</u>	<u>Roads</u>
Marshall Stability	5.5 surface course
at 60°C kN min	4.5 lower course
Flow Value mm	2-4
Air Voids in	3-5 surface course
Mixture, %	2-6 lower course
Voids in Mineral	15 surface course
Aggregate, % min	13 lower course
Index of Retained	75
Stability % minimum	

- .3 Measure physical requirements as follows:
  - .1 Marshall load and flow value: to AASHTO T245.
  - .2 Compute void properties on basis of bulk specific gravity of aggregate to ASTM C127 and ASTM C128. Make allowance for volume of asphalt absorbed into pores of aggregate.
  - .3 Air voids: to ASTM D3203.
  - .4 Voids in mineral aggregates: to AI MS2, chapter 4.
  - .5 Index of Retained Stability: measure in accordance with Section 32 12 10 - Marshall Immersion Test for Bitumen.
- .4 Do not change job-mix without prior approval of Departmental Representative. When change in material source proposed, new job-mix formula will be provided to be approved to be reviewed by Departmental Representative.
- .5 Return plant dust collected during processing to mix in quantities acceptable to Departmental Representative.

### PART 3 - EXECUTION

#### 3.1 PLANT AND MIXING REQUIREMENTS

- .1 Batch and continuous mixing plants:
  - .1 To ASTM D995.
  - .2 Feed aggregates from individual stockpiles through separate bins to cold elevator feeders. Do not load frozen materials into bins.
  - .3 Feed cold aggregates to plant in proportions to ensure continuous operations.
  - .4 Calibrate bin gate openings and conveyor speeds to ensure mix proportions are achieved.
  - .5 Before mixing, dry aggregates to moisture content not greater than 1% by mass or to lesser moisture content if required to meet mix design requirements.
  - .6 Immediately after drying, screen aggregates into hot storage bins in sizes to permit recombining into gradation meeting job-mix requirements.
  - .7 Store hot screened aggregates in manner to minimize segregation and temperature loss.

.8 Heat asphalt cement and aggregate to mixing temperature directed by Departmental Representative. Do not heat asphalt cement above maximum temperature indicated on temperature-viscosity chart

.9 Make available current asphalt cement viscosity data at plant. With information relative to viscosity of asphalt being used, Departmental Representative to approve review temperature of completed mix at plant and at paver after considering hauling and placing conditions.

.10 Maintain temperature of materials within 5 degrees C of specified mix temperature during mixing.

.11 Mixing time:

.1 In batch plants, both dry and wet mixing times as directed by Departmental Representative. Continue wet mixing as long as necessary to obtain thoroughly blended mix but not less than 30s or more than 75s.

.2 In continuous mixing plants, mixing time as directed by Departmental Representative but not less than 45s.

.3 Do not alter mixing time unless directed by Departmental Representative.

.2 Dryer drum mixing plant:

.1 To ASTM D995.

.2 Load aggregates from individual stockpiles to separate cold feed bins. Do not load frozen materials into bins.

.3 Feed aggregates to burner end of dryer drum by means of multi-bin cold feed unit and blend to meet job-mix requirements by adjustments of variable speed feed belts and gates on each bin.

.4 Meter total flow of aggregate by an electronic weigh belt system with indicator that can be monitored by plant operator and which is interlocked with asphalt pump so that proportions of aggregate ,RAP and asphalt entering mixer remain constant.

.5 Provide for easy calibration of weighing systems for aggregates without having material enter mixer.

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- .6 Calibrate bin gate openings and conveyor speeds to ensure mix proportions are achieved. Calibrate weigh bridge on charging conveyor by weighing amount of aggregate passing over weigh bridge in set amount of time. Difference between this value and amount shown by plant computer system to differ by not more than plus or minus 2%.
- .7 Make provision for conveniently sampling full flow of materials from cold feed.
- .8 Provide screens or other suitable devices to reject oversize particles or lumps of aggregate from cold feed prior to entering drum.
- .9 Provide system interlock stop on feed components if either asphalt or aggregate from bin stops flowing.
- .10 Accomplish heating and mixing of asphalt mix in approved parallel flow dryer-mixer in which aggregate enters drum at burner end and travels parallel to flame and exhaust gas stream. Control heating to prevent fracture of aggregate or excessive oxidation of asphalt. Equip system with automatic burner controls and provide for continuous temperature sensing of asphalt mixture at discharge, with printing recorder that can be monitored by plant operator. Submit printed record of mix temperatures at end of each day.
- .11 Mixing period and temperature to produce uniform mixture in which particles are thoroughly coated, and moisture content of material as it leaves mixer to be less than 2%.
- .3 Temporary storage of hot mix:
- .1 Provide mix storage of sufficient capacity to permit continuous operation and designed to prevent segregation.
- .2 Do not store asphalt mix in storage bins in excess of 3 hours.
- .4 Mixing tolerances:
- .1 Permissible variation in aggregate gradation from job mix (percent of total mass).
- |                          |     |
|--------------------------|-----|
| 4.75 mm sieve and larger | 5.0 |
| 2.00 mm sieve            | 4.0 |
| 0.425 mm sieve           | 3.0 |
| 0.180 mm sieve           | 2.0 |
| 0.075 mm sieve           | 1.0 |

.2 Permissible variation of asphalt cement from job mix: 0.25%.

.3 Permissible variation of mix temperature at discharge from plant: 5 degrees C.

3.2 PREPARATION

.1 Preparation of granular base, prior to paving, shall be carried out in accordance with Section 32 11 23 - Aggregate Base Courses.

.2 Prior to laying mix, clean surfaces of loose and foreign material.

3.3 TRANSPORTATION OF MIX

.1 Transport mix to job site in vehicles cleaned of foreign material.

.2 Paint or spray truck beds with limewater, soap or detergent solution, or non petroleum based commercial product, at least daily or as required. Elevate truck bed and thoroughly drain. No excess solution to remain in truck bed.

.3 Schedule delivery of material for placing in daylight, unless Departmental Representative approves artificial light.

.4 Deposit mix from surge or storage silo to trucks in multiple drops to reduce segregation. Do not dribble mix into trucks.

.5 Deliver material to paver at uniform rate and in an amount within capacity of paving and compacting equipment.

.6 Deliver loads continuously in covered vehicles and immediately spread and compact. Deliver and place mixes at temperature within range as directed by Departmental Representative, but not less than 135 degrees C.

3.4 PLACING

.1 Obtain Departmental Representative's approval of existing concrete deck surface prior to placing asphalt butuminous tack coat.



- .2 Place asphalt concrete to thicknesses, grades and lines as indicated. Bevel all perimeter edges of asphalt as indicated on drawings.
- .3 Placing conditions:
  - .1 Place asphalt mixtures only when air temperature is above 5 degrees C.
  - .2 When temperature of surface on which material is to be placed falls below 10 degrees C, provide extra rollers as necessary to obtain required compaction before cooling.
  - .3 Do not place hot-mix asphalt when pools of standing water exist on surface to be paved, during rain, or when surface is damp.
- .4 Place asphalt concrete in compacted lifts of thickness as indicated.
  - .1 Lower course in 1 layer of 50 mm.
  - .2 Surface course in 1 layer of maximum 50 mm.
- .5 Where possible do tapering and levelling where required in lower lifts. Overlap joints by not less than 300 mm.
- .6 Spread and strike off mixture with self propelled mechanical finisher.
  - .1 Construct longitudinal joints and edges true to line markings. Departmental Representative to establish lines for paver to follow parallel to centerline of proposed pavement. Position and operate paver to follow established line closely.
  - .2 When using pavers in echelon, have first paver follow marks or lines, and second paver follow edge of material placed by first paver. Work pavers as close together as possible and in no case permit them to be more than 30 m apart.
  - .3 Maintain constant head of mix in auger chamber of paver during placing.
  - .4 If segregation occurs, immediately suspend spreading operation until cause is determined and corrected.
  - .5 Correct irregularities in alignment left by paver by trimming directly behind machine.
  - .6 Correct irregularities in surface of pavement course directly behind paver. Remove by shovel or lute excess material forming high spots. Fill and smooth indented areas with hot mix. Do not broadcast material over such areas.
  - .7 Do not throw surplus material on freshly screeded surfaces.

- .7 When hand spreading is used:
  - .1 Distribute material uniformly. Do not broadcast material.
  - .2 During spreading operation, thoroughly loosen and uniformly distribute material by lutes or covered rakes. Reject material that has formed into lumps and does not break down readily.
  - .3 After placing and before rolling, check surface with templates and straightedges and correct irregularities.
  - .4 Provide heating equipment to keep hand tools free from asphalt. Control temperature to avoid burning material. Do not use tools at higher temperature than temperature of mix being placed.

### 3.5 COMPACTING

- .1 Do not change rolling pattern unless mix changes or lift thickness changes. Change rolling pattern only as directed by Departmental Representative.
  - .2 Roll asphalt continuously to density not less than 98% of blow Marshall density to AASHTO T245.
  - .3 General:
    - .1 Provide at least two rollers and as many additional rollers as necessary to achieve specified pavement density. When more than two rollers are required, one roller must be pneumatic tired type.
    - .2 Start rolling operations as soon as placed mix can bear weight of roller without excess displacement of material or cracking of surface.
    - .3 Operate roller slowly initially to avoid displacement of material. Do not exceed 5 km/h for breakdown and intermediate rolling for static steel-wheeled and pneumatic tired rollers. Do not exceed 9 km/h for finish rolling.
    - .4 For lifts 50 mm thick and greater, adjust speed and vibration frequency of vibratory rollers to produce minimum of 25 impacts per metre of travel. For lifts less than 50 mm thick, impact spacing not to exceed compacted lift thickness.
    - .5 Overlap successive passes of roller by minimum of 200 mm and vary pass lengths.
    - .6 Keep wheels of roller slightly moistened with water to prevent pick-up of material but do not over-water.
-

- .7 Do not stop vibratory rollers on pavement that is being compacted with vibratory mechanism operating.
  - .8 Do not permit heavy equipment or rollers to stand on finished surface before it has been compacted and has thoroughly cooled.
  - .9 After traverse and longitudinal joints and outside edge have been compacted, start rolling longitudinally at low side and progress to high side. Ensure that all points across width of pavement receive essentially equal numbers of passes of compactors.
  - .10 When paving in echelon, leave unrolled 50 to 75 mm of edge which second paver is following and roll when joint between lanes is rolled.
  - .11 Where rolling causes displacement of material, loosen affected areas at once with lutes or shovels and restore to original grade of loose material before re-rolling.
- .4 Breakdown rolling:
- .1 Begin breakdown rolling with static steel wheeled roller vibratory roller immediately following rolling of transverse and longitudinal joint and edges.
  - .2 Operate rollers as close to paver as necessary to obtain adequate density without causing undue displacement.
  - .3 Operate breakdown roller with drive roll or wheel nearest finishing machine. When working on steep slopes or super-elevated sections use operation approved by Departmental Representative.
  - .4 Use only experienced roller operators.
- .5 Intermediate rolling:
- .1 Use pneumatic-tired, steel wheel or vibratory rollers and follow breakdown rolling as closely as possible and while paving mix temperature allows maximum density from this operation.
  - .2 Rolling to be continuous after initial rolling until mix placed has been thoroughly compacted.
- .6 Finish rolling:
- .1 Accomplish finish rolling with two-axle or three-axle tandem steel wheeled rollers while material is still warm enough for removal of roller marks. If necessary to obtain desired surface finish, use pneumatic-tired rollers as directed by Departmental Representative.
-

.2 Conduct rolling operations in close sequence.

3.6 JOINTS

- .1 General:
  - .1 Remove surplus material from surface of previously laid strip. Do not deposit on surface of freshly laid strip.
  - .2 Paint contact surfaces of existing structures such as Portland cement concrete deck, manholes, curbs or gutters with bituminous material prior to placing adjacent pavement.
- .2 Transverse joints:
  - .1 Offset transverse joint in succeeding lifts by at least 600 mm.
  - .2 Cut back to full depth vertical face and tack face with thin coat of hot asphalt prior to continuing paving.
  - .3 Compact transverse joints to provide smooth riding surface. Use methods to prevent rounding of compacted surface at joints.
- .3 Longitudinal joints:
  - .1 Offset longitudinal joints in succeeding lifts by at least 150 mm.
  - .2 Cold joint is defined as joint where asphalt mix is placed, compacted and left to cool below 100 degrees C prior to paving of adjacent lane.
    - .1 If cold joint can not be avoided, cut back by saw cutting previously laid lane, by at least 150 mm, to full depth vertical face, and tack face with thin coat of hot asphalt of adjacent lane.
  - .3 Overlap previously laid strip with spreader by 25 to 50 mm.
  - .4 Before rolling, carefully remove and discard coarse aggregate in material overlapping joint with lute or rake.
  - .5 Roll longitudinal joints directly behind paving operation.
  - .6 When rolling with static or vibratory rollers, have most of drum width ride on newly placed lane with remaining 150 mm extending onto previously placed and compacted lane.

- .4 Construct bevel joints so that thinner portion of joint contains fine graded material obtained by changed mix design or by raking out coarse aggregate in mix. Place and compact joint so that joint is smooth and without visible breaks in grade.
- .5 Construct butt joints as directed by Departmental Representative.

3.7 FINISH  
TOLERANCES

- .1 Finished asphalt surface to be within 5 mm of design elevation but not uniformly high or low.
- .2 Finished asphalt surface not to have irregularities exceeding 5 mm when checked with 4.5 m straight edge placed in any direction.

3.8 DEFECTIVE WORK

- .1 Correct irregularities which develop before completion of rolling by loosening surface mix and removing or adding material as required. If irregularities or defects remain after final compaction, remove surface course promptly and lay new material to form true and even surface and compact immediately to specified density.
- .2 Repair areas showing checking, rippling, or segregation.
- .3 Adjust roller operation and screed settings on paver to prevent further defects such as rippling and checking of pavement.

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .3 Section 26 05 01 - Common Work Results - Electrical.

1.2 REFERENCES

- .1 CSA C22.1-2015, Canadian Electrical Code, Part 1.
  - .1 CSA C22.2 No. 211.1, Rigid Types EBI and DB2/ES2 PVC Conduit.
  - .2 CSA C22.2 No. 211.3, Reinforced Thermosetting Resin Conduit RTRC and Fittings (Bi-national standard, with UL 1684).

1.3 SUBMITTALS

- .1 Submit WHMIS MSDS - Material Safety Data Sheets acceptable to Labour Canada, and Health and Welfare Canada for solvent cement. Indicate VOC content.
- .2 Submit manufacturer's data and certification at least 2 weeks prior to commencing work.
- .3 Submit manufacturer's information data sheets and instructions.

1.4 DELIVERY,  
STORAGE AND  
HANDLING

- .1 Deliver, store and Handle materials in accordance with Section 01 61 00 - Common Product Requirements.

1.5 RECORD DRAWINGS

- .1 Provide record drawings, including details of pipe and cable duct materials, maintenance and operating instructions.

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PART 2 - PRODUCTS

2.1 PVC DUCTS AND FITTINGS

- .1 Rigid PVC duct: to CSA C22.2 No. 211.1, type rigid PVC for direct burial with minimum wall thickness at any point of 2.8 mm. Nominal length: 3.0 m plus or minus 12 mm. Type DB2 (thinwall) PVC conduits unacceptable.
- .2 Rigid PVC split ducts as required.
- .3 Rigid PVC bends, couplings, reducers, bell end fittings, plugs, caps, adaptors same product material as duct, to make complete installation.
- .4 Rigid PVC 90° and 45° bends as required.
- .5 Rigid PVC 5° angle couplings as required.
- .6 Expansion joints as required.
- .7 Preformed, interlocking intermediate duct spacers for duct size as indicated.
- .8 Use epoxy coated galvanized steel conduit for sections extending above finished grade as indicated.

2.2 SOLVENT WELD COMPOUND

- .1 Solvent cement for PVC duct joints.

2.3 CABLE PULLING EQUIPMENT

- .1 Use 6 mm stranded nylon pull rope tensile strength 5 kN.

2.4 MARKERS

- .1 150 mm wide, 4 mil, polyethylene marker tape in all trenches. Use red colored tape. Install at depth as per drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Install duct in accordance with manufacturer's instructions.
- .2 Clean inside of ducts before laying.
- .3 Ensure full, even support every 1.5 m throughout duct length.
- .4 Slope ducts with 1 to 400 minimum slope.
- .5 During construction, cap ends of ducts to prevent entrance of foreign materials.
- .6 Pull through each duct wooden mandrel not less than 300 mm long and of diameter 6 mm less than internal diameter of duct, followed by stiff bristle brush to remove sand, earth and other foreign matter. Pull stiff bristle brush through each duct immediately before pulling-in cables.
- .7 In each duct install pull rope continuous throughout each duct run with 3 m spare rope at each end.
- .8 Install markers as required.



PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .3 Section 26 05 01 - Common Work Results - Electrical.
- .4 Section 26 05 21 - Wire and Cables 0-1000 V.
- .5 Section 26 05 28 - Grounding - Secondary.
- .6 Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.

1.2 REFERENCES

- .1 Canadian Standards Association (CSA)
  - .1 CAN/CSA-C83, Communication and Power Line Hardware.

1.3 REGULATORY REQUIREMENTS

- .1 Co-ordinate and meet requirements of power supply authority. Ensure availability of power when required. All costs associated with contribution-in-aid of construction to Utility authority for provision of permanent power supply is the responsibility of this contractor. Include cost in tender price.

PART 2 - PRODUCTS

2.1 MATERIAL

- .1 Service mast: epoxy coated, rigid, galvanized steel conduit, suitable for attachment of support clamps, insulator rack, weatherhead, service drop fittings.
- .2 Service mast support devices: as indicated.

- .3 Insulator rack: to CAN/CSA-C83, one, two, three or four wire, heavy duty, as indicated.
- .4 Weatherhead: epoxy coated, rigid galvanized steel conduit to approval of supply authority.
- .5 Epoxy coated, rigid galvanized steel conduit, fittings: in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.
- .6 Service drop conductors and supporting cable: in accordance with Section 26 05 21 - Wires and Cables (0-1000 V), copper, type RW90 XLPE, size and number of conductors as indicated.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- .1 Install service mast, insulator rack, weatherhead.
- .2 Install meter socket and conduit.
- .3 Install service drop conductors allowing sufficient conductor length for connection to service equipment.
- .4 Allow sufficient conductor length for connection to supply by power supply authority.
- .5 Allow sufficient conductor length for drip loops.
- .6 Make grounding connections in accordance with Section 26 05 28 - Grounding - Secondary.

#### 3.2 FIELD QUALITY CONTROL

- .1 Perform tests in accordance with Section

26 05 01 - Common Work Results -  
Electrical.

- .2 Perform additional tests as required by authority having jurisdiction.

PART 1 - GENERAL

1.1 RELATED  
SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

1.2 REFERENCES

- .1 American Society for Testing and Materials (ASTM)
  - .1 ASTM C117-13, Standard Test Method for Material Finer than 0.075 mm Sieve in Mineral Aggregates by Washing.
  - .2 ASTM C136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire.
  - .2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

1.3 SUBMITTALS

- .1 Submit to Departmental Representative for approval, 4 weeks before blasting, details of proposed blasting operations showing types and quantities of explosives, loading charges and patterns, type of blasting caps, blasting techniques, blast protection measures, time of blasting and other pertinent details. Submit subsequent changes to Departmental Representative before proceeding.
  - .2 Samples
    - .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
    - .2 Inform Departmental Representative of proposed source of materials and provide access for sampling at least 2 weeks prior to commencing Work.
    - .3 Submit samples representative of quarry, minimum 2 weeks prior to beginning Work.
    - .4 Ship samples prepaid to Departmental Representative for approval.
-

- .3 Submit for approval of review by Departmental Representative proposed method of handling armour stone. Submission to cover phases of handling, from removal from form to final position.

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 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 Divert unused geotextiles from landfill to plastic recycling facility as approved by Departmental Representative.
- .4 Divert unused metal materials from landfill to metal recycling facility as approved by Departmental Representative.
- .5 Divert unused concrete materials from landfill to local quarry facility as approved by Departmental Representative.
- .6 Fold up metal banding, flatten and place in designated area for recycling.

1.5 INTERFERENCE TO  
NAVIGATION

- .1 Be familiar with vessel movements and fishery activities in area affected by construction operations.
  - .2 Plan and execute work, in a manner that will not impede navigation, including movement of vessels at the facility.
  - .3 Plan and execute work, in a manner that will not interfere with fishing operations or access to marine structures by land and water.
  - .4 Departmental Representative will not be responsible for loss of time, equipment, material or any other charges related to interference with moored vessels in the harbour or other Contractor's operations.
-

- .5 Keep the Marine Communications and Traffic Services' Centre, Fisheries and Oceans Canada, informed of construction operations, in order that necessary Notices to Mariners may be issued.

1.6 REGULATORY REQUIREMENTS

- .1 Comply with municipal, provincial and national codes and regulations relating to project.

1.7 MEASUREMENT FOR PAYMENT

- .1 Rip Rap (500 - 750 kg): measured in cubic metres (m<sup>3</sup>) of material and supplied and placed in this work within the limits specified on drawings.
- .2 There will be no payment made for any material or stone placed beyond limits indicated on the drawings. The final contract grade must be within 200 mm of the specific elevation. Quantities will be based on a as-built survey. Any material placed outside the lines and grades as shown on the drawings will not be measured.
- .3 There will be no additional payment for delays resulting from fishing operations.
- .4 There will be no additional payment for downtime.
- .5 Mobilization/demobilization of equipment to be lump sum will not be measured for payment included in the above pay items.
- .6 Construction and maintenance of haul roads will not be measured for payment.

PART 2 - PRODUCTS

2.1 ROCK MATERIAL

- .1 Hard, angular rock free from cracks, seams and other defects which may impair durability.
  - .2 Relative density, 2.65 minimum.
  - .3 Absorption, 1.5 to 2.0% maximum as determined by ASTM C127 test procedure.
-

- .4 Durability, less than 35% abrasion Wear, ASTM C535 test procedure.
- .5 Sulphate Soundness Determination maximum 12% by ASTM C88.

2.2 RIP-RAP

- .1 Hard, dense with relative density (formally specific gravity) not less than 2.65, durable quarry stone, free from seams, cracks or other structural defects, to meet following size distribution for use intended.
- .2 Rip-rap stone to be well graded with maximum sizes not exceeding 800 mm on any side and minimum size of not less than 500 mm on any side.
- .3 Supply rock spalls to fill open joints.
- .4 Field stones of appropriate sizes are acceptable for hand placed rip-rap.

PART 3 - EXECUTION

3.1 GENERAL

- .1 Contractors will not be permitted to work the existing wharf deck. No equipment allowed on or operate from the structure.

3.2 PREPARATION

- .1 Haul roads: construct and maintain haul roads.

3.3 PLACING

- .1 Place rip-rap as directed to thickness and details indicated or as designated by Departmental Representative.
  - .2 Where rip-rap is to be placed on slopes, excavate trench at toe of slope to dimensions as indicated.
  - .3 All side slopes to be one (1) vertical to one and one half (1.5) horizontal.
-

- .4 Fine grade area to be rip-rapped to uniform, even surface. Fill depressions with suitable material and compact to provide firm bed.
- .5 Place stones in manner approved by Departmental Representative.

3.4 ROCK MATERIAL  
WASHED OUT OF WORK

- .1 Should during the progress of the Work, any rock material be washed out of the Work, or through neglect or carelessness of the Contractor or their employees or from any other cause, be dumped into the water near the Work or anywhere within the harbour or channel so as to interfere in the opinion of the Departmental Representative with actual depths of water and/or impede navigation, it will be removed by the Contractor when ordered to do so by the Departmental Representative. Any material washed out of the Work or displaced beyond the contract limits will be replaced by the Contractor at no cost to Canada.

3.5 TOLERANCES

- .1 Note: These tolerances are not to be considered pay limits but are specified to ensure contractor keeps within acceptable lines and grades.
- .2 Completed component layers to be within the following tolerances of lines and grades as indicated:
  - .1 Rip rap +/-300 mm.



PART 1 - GENERAL

- 1.1 DESCRIPTION .1 This section specifies the requirements for supply and installation of mooring devices as follows:  
.1 Supply and installation of Type "A", Type "B1" mooring cleats and mooring rings.
- 1.2 RELATED WORK .1 Section 02 41 16 - Sitework, Demolition, and Removal.  
.2 Section 03 10 00 - Concrete, Forming and Accessories.  
.3 Section 03 20 00 - Concrete Reinforcing.  
.4 Section 03 30 00 - Cast-in-Place Concrete.
- 1.3 MEASUREMENT FOR PAYMENT .1 Mooring Cleats - Type "A": The supply and installation of Type "A" mooring cleats, including reinforced concrete block and pedestal, will be measured by the unit secured in place. Contractor to provide all concrete, reinforcing steel, anchor bolts, nuts, washers, steel anchor plates, welding, grout, fastenings, paint, plant, equipment, and labour.  
.2 Mooring Cleats - Type "B1": The supply and installation of Type "B1" mooring cleats, including reinforced concrete block and pedestal, will be measured by the unit secured in place. Contractor to provide all concrete, reinforcing steel, anchor bolts, nuts, washers, steel anchor plates, welding, grout, fastenings, paint, plant, equipment and labour.  
.3 Mooring Rings: The supply and placement will be measured by unit secured in place. Contractor to provide all fastenings, equipment and labour.
-

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Mooring Devices:
  - .1 Mooring Cleats Type "A": galvanized cast iron cleats, 225 kg weight as dimensioned on the attached drawing.
  - .2 Mooring Cleats Type "B1": galvanized cast iron cleats, 36.2 kg weight as dimensioned on the attached drawing.
  - .3 Mooring rings galvanized cast iron dimensioned on drawings.
  - .4 Anchor Bolts and Nuts: Anchor bolts/rods manufactured from round bar stock produced to CSA G40.21 Grade 300 W conforming to ASTM A307. Zinc galvanized hex nuts to be ASTM A307 rated, 25 mm dia. having a 3 mm thread pitch, zinc galvanized protective coated.
  - .5 Non-Shrink Grout: pre-mixed compound of non-metallic aggregate and plasticizing agents, capable of developing minimum compressive strength of 50 MPa at 28 days.
  - .6 Welding: to CSA W59.
  - .7 Sealer: to Section 07 92 10 Joint Sealer.
  - .8 Concrete: to Section 03 30 00 Cast-in-Place Concrete.
  - .9 Concrete Reinforcement: to CSA G30.12M, Grade 400.
  - .10 Primer: Alkyd undercoat, exterior oil ferrous metal primer, similar to Pittsburgh 6-208.
  - .11 Paint: Alkyd/Oil Resin paint similar to Pittsburgh Paints "Brilliant Red (Safety Red)" Product ID 7-801C. Paint to conform to CAN/CGSB-1.61-2004.

2.2 SHOP DRAWINGS

- .1 Submit fabricator's shop drawings on cleats in accordance with Section 01 33 00 - Submittal Procedures.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Mooring Cleats - Type "A":
    - .1 Install concrete cleat block and pedestal for Type "A" mooring cleat as per attached drawing.
-

- .2 Install concrete cleat blocks monolithically with deck.
- .3 Secure cleats with 25 mm diameter anchor bolts of lengths required complete with associated nuts and washers.
- .4 After cleat installation is complete, bolt holes in cleats to be filled with approved waterproofing compound.

.2 Mooring Cleats - Type "B1":

- .1 Install Type "B1" cleats as indicated.
- .2 Secure cleats with anchor bolts of lengths required complete with associated nuts and washers as indicated.
- .3 After cleat installation is complete, bolt holes in cleats to be filled with approved waterproofing compound.
- .4 Do not paint.

.3 Mooring Rings:

- .1 Install mooring rings as per attached drawings.

3.2 GROUT

- .1 Set all mooring cleats at locations and elevations indicated or as directed by the Departmental Representative. Grout under base of cleat using a non-shrink, non-metallic type of grout after tightening of anchor bolts or positioning wedges. Grout must be approved by Departmental Representative. Fill anchor bolt holes with approved sealer. Ensure that temperatures of foundation, air, base and grout are within range specified by grout manufacturers.
- .2 Do not grout until approval given by Departmental Representative.

3.3 PAINTING

- .1 Paint ferrous metal portion of "A" mooring cleat.
- .2 Use one (1) coat of exterior oil ferrous metal primer and two (2) coats of alkyd/oil resin paint as specified. Paint materials for each coat to be product of a single manufacturer as specified. Ensure previous coat of primer or paint is dry before second coat is applied.

## **Appendix A**

**Geotechnical Factual Report, Codroy, NL  
by FracFlow Consultants Ltd.**

# GEOTECHNICAL FACTUAL REPORT CODROY, NL

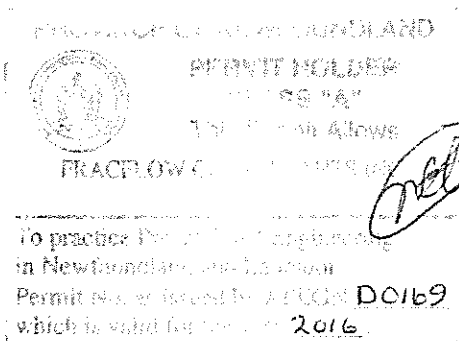
(FFC File: 3091)

Prepared by:

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June 2016



## **Preface**

Department of Fisheries and Oceans (DFO) retained Fracflow Consultants Inc. to undertake a marine geotechnical site investigation at Codroy, NL under Contract F6140-165006 dated May 19, 2016.

The proposed scope of work for the Codroy project consisted of drilling and sampling four (4) geotechnical boreholes, two (2) boreholes through the existing concrete wharf, and two (2) boreholes over the edge of the existing wharf. The scope of work also included collection of marine sediment samples at the borehole locations. The field work was conducted between June 20 and 25, 2016.

The field work for these investigations utilized a Foremost Mobile B-47 geotechnical drill rig at the approximate locations specified by the project engineer. Split-spoon sampling and Standard Penetration Tests (SPTs) were conducted using a NW/NQ diamond drill string in each borehole at the standard 1.5 m interval. Marine sediment sampling was conducted using a grab sampler and a HW/HQ diamond drill string and a 76 mm diameter split spoon.

A visual inspection of the subsurface soil conditions encountered, based on the split-spoon samples that were recovered during the field program, was used to describe the soil conditions at the site. The end of hole elevations of the four (4) boreholes ranged from -7.71 m LNT in BH2 to -18.30 m LNT in BH3.

The overburden, based on the four (4) boreholes that were completed as part of this geotechnical investigation, can be summarized as a layer of varying amounts of sand and gravel with trace to some silt/clay from ocean bottom to the end of hole in borehole BH1, BH2, and BH4. Overburden in BH3 can be summarized as a layer of varying amounts of sand and gravel with trace to some silt/clay, with intervening boulders and or broken rock from ocean bottom to approximately 13.6 m below LNT. From 13.6 m to 14.2 m below LNT, a layer of highly compacted till was encountered. The three split spoon samples collected from 14.2 m below LNT to the end of the hole (18.3 m below LNT) were conducted in up-coning sand and encountered sand with trace silt/clay.

Bedrock was not encountered in any of the boreholes. Broken rock consisting of a grey fine-grained sandstone was encountered in BH1, BH2, and BH4.

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## **1.0 INTRODUCTION**

Department of Fisheries and Oceans (DFO) retained Fracflow Consultants Inc. to undertake a marine geotechnical site investigation at Codroy, NL under Contract F6140-165006 dated May 19, 2016.

The proposed scope of work for the Codroy project consisted of drilling and sampling four (4) geotechnical boreholes, two (2) boreholes through the existing concrete wharf, and two (2) boreholes over the edge of the existing wharf. The two (2) boreholes over the edge of the wharf were moved approximately 1.0 m inside the edge of the wharf, as there was not room to drill over the wharf. The scope of work also included collection of marine sediment samples at the borehole locations. The field work was conducted between June 20 and 25, 2016.

The borehole and marine sediment sampling locations are shown on the site plan in **Figure 1.1**. A summary of the geotechnical field work conducted is shown in **Table 1.1**. A summary of the marine sediment sampling is shown in **Table 1.2**. All sediment samples were delivered to AGAT Laboratories in St. John's on behalf of DFO.

This report contains a factual presentation and full disclosure of all findings of the subsurface investigation. The following sections provide: (1) a description of the site and the general geology of the area; (2) a summary of the investigative procedures used; and (3) a detailed description of the subsurface soil and rock conditions. Appended to this report are the detailed geotechnical logs for each borehole and grain size analysis reports and related laboratory data.

Table 1.1 Summary of geotechnical investigations at Codroy, NL.

Borehole ID	Overburden Drilled (m)	Bedrock Drilled (m)	Total Depth Drilled (m)	SPT & Split-spoon Samples Attempted	Split-spoon Samples Tested
BH1	9.67	0.00	9.67	7	2
BH2	10.63	0.00	10.63	5	2
BH3	17.12	0.00	17.12	12	6
BH4	15.13	0.00	15.13	9	4
<b>Total</b>	<b>52.55</b>	<b>0.00</b>	<b>52.55</b>	<b>33</b>	<b>14</b>

Table 1.2 Summary of marine sediment sampling at Codroy, NL.

Borehole No.	Depth to Harbour Bottom Relative to LNT (m)	Final sample/hole Depth Relative to LNT (m)	Split-spoon Samples Attempted	Sample ID's	Samples Submitted for Analysis
BH1	0.01	0.77	1	BH1-MS1-0-0.76z	1
BH2	-2.92 (ground surface)	2.69	1	BH2-MS1-0-0.23z	1
BH3	1.18	1.44	1	BH3-MS1-0-0.71z	1
BH4	-0.02	0.51	1	BH4-MS1-0-0.23z	1

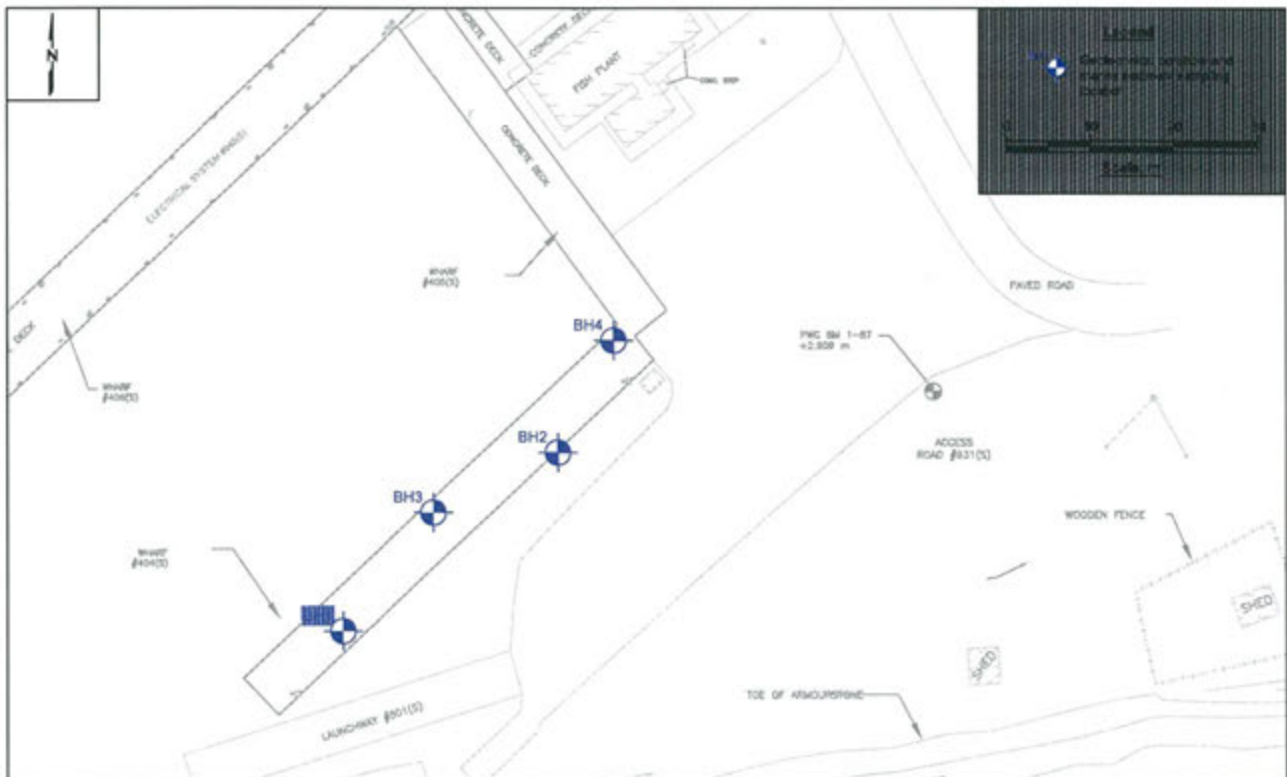



Figure 1.1 Geotechnical borehole and marine sediment sampling location map.

Project No. 3091	Document Reference FFC-NL-3091	
Location Codroy, NL	Date June 2016	

## **2.0 SITE DESCRIPTION AND GENERAL GEOLOGY**

The community of Codroy is located in western Newfoundland on St. George's Bay approximately 38 km north-west of Port aux Basque. Overburden in the area is characterized by marine sediments, "clay, silt, gravel and diamicton", and glacial tills (Kirby, 2009). Bedrock in the area consists of "grey sandstone, pebbly sandstone, siltstone, mudstone, black shale, conglomerate, minor dolomitic limestone" of the Anguille Group (Water Resources Division, 1986).

### **3.0 INVESTIGATIVE PROCEDURES**

At the Codroy site, the project consisted of drilling and sampling four (4) boreholes and collecting marine sediment samples at those borehole locations. The field work for these investigations utilized a Foremost Mobile B-47 at the locations shown in **Figure 1.1**. The field work was conducted between June 20 and 25, 2016.

Overburden material was drilled using ‘NW’ (OD 88.9 mm, ID 76.2 mm) flush joint casing and ‘NQ’ (OD 69.9 mm, ID 60.3 mm) diamond drill string. Soil samples were collected using a 51 mm OD, 610 mm long, split-spoon sampler. In conjunction with this split-spoon soil sampling, Standard Penetration Tests (SPTs) were performed to estimate relative soil densities. The standard procedure is to drive each split-spoon into the ground using a 63.5 kg weight falling a distance of 760 mm. The number of blows is recorded for each 150 mm the split-spoon is advanced. After the first 150 mm advance, a N-value is calculated as the sum of the blow counts required to drive the spoon an additional 300 mm (i.e., the sum of the second and third set of blow counts). The calculated N-value is a direct reflection of the relative density of the soil strata as defined in the Canadian Foundation Engineering Manual (Canadian Geotechnical Society, 1992).

Marine sediment samples for environmental analysis were collected at each borehole location. Marine sediment samples at ocean bottom were collected using a grab sampler. Sediment samples were collected from ocean bottom to 1.0 m below ocean bottom or where the sampler encountered refusal, using a 76 mm diameter split spoon. Collection of the environmental samples followed the procedures that had been established by Public Works and Government Services Canada (PWGSC). Samples were stored on ice before being submitted to AGAT Laboratories in St. John’s for analysis.

Both the soil samples and rock cores were logged and labelled in the field immediately after collection. Soil samples were stored in moisture proof containers and rock cores were stored in wooden core boxes in the field. All soil and rock samples were returned to Fracflow’s office and select soil samples collected during the investigation were tested. Soil testing in the laboratory consisted of standard mechanical sieve analyses and water content determinations that were performed according to ASTM standards as required. The soil and rock core samples are stored by Fracflow for a two-year period.

## **4.0 SUBSURFACE CONDITIONS AND CHARACTERIZATION**

Subsurface characterization is based on the field data collected from the four (4) vertical boreholes that were completed at this site. Data collection included split-spoon sampling while drilling in conjunction with the SPTs. A description of the soil profiles is provided below using both terminologies defined in the Unified Soil Classification System (USCS) and in the Canadian Foundation Engineering Manual (CFEM) (CGS, 1992). Photographs of the core recoveries from each borehole are provided in **Figure 4.1** and **Figure 4.2**. Detailed logs of the geological conditions at each borehole location are provided in **Appendix A**. **Appendix B** contains the grain size analysis information for each soil sample tested.

### **4.1 Soil Description**

Fourteen (14) soil samples were analysed in the lab using mechanical grain size analysis. Three (3) of those samples were also analysed using hydrometer analysis. Overburden in BH1 and BH2 can be described as varying amounts of Gravel and Sand with trace to some Silt/Clay, including frequent cobbles/boulders/broken rock, from ocean bottom to approximately 5.0 m to 6.0 m below LNT, where broken rock was encountered.

Overburden in BH3 can be described as varying amounts of Gravel and Sand with trace to some Silt/Clay, including frequent cobbles/boulders/broken rock, from ocean bottom to approximately 13.6 m below LNT. From 13.6 m to 14.2 m below LNT, a layer of highly compacted till was encountered that was classified as Silty/Clayey Sand with some Gravel. The three (3) split spoon samples collected from 14.2 m below LNT to the end of the hole (18.3 m below LNT) were conducted in up-coning sand and were classified as Sand with trace Silt/Clay.

Overburden in BH4 can be described as varying amounts of Gravel and Sand with trace to some Silt/Clay, including frequent cobbles/boulders/broken rock, from ocean bottom to the end of hole (15.1 m below LNT). Split spoons SS7, SS8, and SS9 were conducted continuously in collapsed material, and tested together near the bottom of the hole where casing had not been advanced.

### **4.2 Bedrock Description**

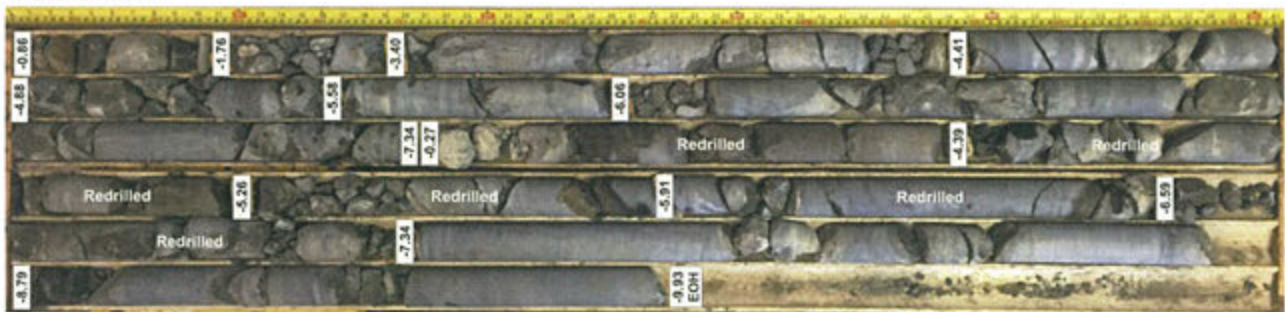
The general description of bedrock in the area consists of “grey sandstone, pebbly sandstone, siltstone, mudstone, black shale, conglomerate, minor dolomitic limestone” of the Anguille Group (Water Resources Division, 1986).

Bedrock was not encountered in any of the four (4) boreholes. Broken rock consisting of a grey fine-grained sandstone was encountered in boreholes BH1, BH2, and BH4. This broken rock had

recoveries ranging from 52% to 100% and Rock Quality Designation (RQD) values ranging from 0% to 84%.



Hole ID: BH1



Hole ID: BH2



Figure 4.1 Photographs of core recovered during drilling from boreholes BH1 and BH2 (elevations shown in m LNT).

Hole ID: BH3



Hole ID: BH4



Figure 4.2 Photographs of core recovered during drilling from boreholes BH3 and BH4 (elevations shown in m LNT).

## **5.0 REFERENCES**

Canadian Geotechnical Society (CGS), 1992, *Canadian Foundation Engineering Manual, 3<sup>rd</sup> Edition*, Technical Committee on Foundations, 512 p.

Water Resources Division, 1986. *Hydrogeology of the St. George's Bay Area*, Water Resources Report 2-8, Water Resources Division, Newfoundland Department of Environment.

Kirby, F.T., Ricketts, R.J., Vanderveer, D.G., 2009, *Surficial Geology of the Codroy map sheet (NTS 110/14)*, Geological Survey, Department of Natural Resources, Government of Newfoundland and Labrador.

*APPENDIX A*

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*Borehole Logs*

Project: Marine Geotechnical Investigation

## Log of Borehole: BH1

Client: DFO

Project No: 3091

Location: Codroy, NL

Date: June 21 - 22, 2016

SUBSURFACE PROFILE				SAMPLE					Standard Penetration Test "N" Value per 300 mm			
Depth below Top of Wharf	Symbol	Geologic Description	Elevation (m)	Sample Type	Sample No.	"N" Value	Recovery (%)	RQD (%)	20	40	60	80
0		Top of Wharf	3.21									
1												
2												
3	1											
4												
5												
6												
7	2											
8												
9												
10	3											
11		Harbour bottom (-0.25 m LNT).	-0.252									
12		SPT: 4 / 6 / 7 / 11. Gravel.		SS	1	13	17					
13	4		-0.861									
14		Overburden: gravel.	-1	OB	--		18	0				
15		SPT: 3 / 3 / 1 / 1. Sand.		SS	2	4	3					
16			-1.76									
17	5											
18		Overburden: gravel.		OB	--		20	0				
19			-2.86									



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Drilling Method: NW casing / NQ coring

Driller: Formation Drilling Ltd.

Datum: LNT

Sheet: 1 of 3

Project: Marine Geotechnical Investigation

## Log of Borehole: BH1

Client: DFO

Project No: 3091

Location: Codroy, NL

Date: June 21 - 22, 2016

SUBSURFACE PROFILE				SAMPLE				Standard Penetration Test "N" Value per 300 mm
Depth below Top of Wharf	Symbol	Geologic Description	Elevation (m)	Sample Type	Sample No.	"N" Value	Recovery (%)	
20		SPT: 10 / 10 / 7 / 52 for 0.09 m, bouncing (refusal). CFEM: Gravel and Sand, trace Silt/Clay.	-3.4	OB	-	-	20	0
21				SS	3	17	28	
22								
23	7	Broken rock.		RC	--		68	35
24								
25			-4.39					
26	8	SS4: "N" Value = 52; Recovery = 0% SPT: 52 for 0.01 m, bouncing (refusal). No sample recovery		RC	--		72	0
27								
28		Broken rock.		RC	--		55	0
29								
30	9		-5.9	RC	--		98	0
31		SPT: 52 / 52 for 0.0 m, bouncing (refusal). CFEM: Gravel and Sand, some Silt/Clay.	-6.06	SS	5	52	100	
32								
33	10	Broken rock.		RC	--		91	38
34								
35			-7.31					
36	11	SS6: "N" Value = 62; Recovery = 0%. SPT: 52 for 0.01 m, bouncing (refusal). No sample recovery.		RC	--		75	61
37		Broken rock.						
38								
39			-8.68	SS	7	52	25	



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Driller: Formation Drilling Ltd.

Datum: LNT

Sheet: 2 of 3

Project: Marine Geotechnical Investigation

## Log of Borehole: BH1

Client: DFO

Project No: 3091

Location: Codroy, NL

Date: June 21 - 22, 2016

SUBSURFACE PROFILE				SAMPLE					Standard Penetration Test "N" Value per 300 mm			
Depth below Top of Wharf	Symbol	Geologic Description	Elevation (m)	Sample Type	Sample No.	"N" Value	Recovery (%)	RQD (%)	20	40	60	80
40		SPT: 52 for 0.10 m, bouncing (refusal). Gravel.										
41		Broken rock.		RC	-		69	42				
42												
43	13		-9.93									
44		End of Borehole										
45												
46	14											
47												
48												
49	15											
50												
51												
52	16											
53												
54												
55												
56	17											
57												
58												
59												



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Driller: Formation Drilling Ltd.

Datum: LNT

Sheet: 3 of 3

Project: Marine Geotechnical Investigation

## Log of Borehole: BH2

Client: DFO

Project No: 3091

Location: Codroy, NL

Date: June 20 - 21, 2016

SUBSURFACE PROFILE				SAMPLE					Standard Penetration Test "N" Value per 300 mm			
Depth below Top of Wharf	Symbol	Geologic Description	Elevation (m)	Sample Type	Sample No.	"N" Value	Recovery (%)	RQD (%)	20	40	60	80
0		Top of Wharf	2.93									
1		SPT: 12 / 10 / 14 / 4. CFEM: Gravelly Sand, some Silt, trace Clay.	2.29	SS	1	24	37					
2		Overburden: gravel.	1.42	OB	-		28	0				
3		SPT: 3 / 3 / 4 / 5. Gravel.	0.794	SS	2	7	10					
4		Overburden: recovery not recorded.	-0.095	OB	-		9	0				
5		SPT: 12 / 13 / 22 / 30. Gravel, some sand.	-0.705	SS	3	35	17					
6		Overburden: gravel and boulders.	-1.61	OB	-		73	0				
7		SPT: 29 / 52 for 0.03 m, bouncing (refusal). Gravel, some sand.	-1.78	SS	4	52	57					
8				RC	-		90	37				
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												



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Drilling Method: NW casing / NQ coring

Driller: Formation Drilling Ltd.

Datum: LNT

Sheet: 1 of 2



Project: Marine Geotechnical Investigation

## Log of Borehole: BH2

Client: DFO

Project No: 3091

Location: Codroy, NL

Date: June 20 - 21, 2016

SUBSURFACE PROFILE				SAMPLE					Standard Penetration Test "N" Value per 300 mm			
Depth below Top of Wharf	Symbol	Geologic Description	Elevation (m)	Sample Type	Sample No.	"N" Value	Recovery (%)	RQD (%)	20	40	60	80
20				RC	-		95	77				
21												
22		Broken rock.										
23	7			RC	-		52	9				
24												
25			-4.63									
25		SPT: 52 / 52 for 0.0 m, bouncing (refusal). CFEM: Sandy Gravel, some Silt/Clay.		SS	5	52	50					
26	8											
27												
28				RC	-		100	84				
29												
30	9											
31		Broken rock.										
32												
33	10			RC	-		100	81				
34												
35			-7.71									
35		End of Borehole										
36	11											
37												
38												
39												



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Driller: Formation Drilling Ltd.

Datum: LNT

Sheet: 2 of 2

Project: Marine Geotechnical Investigation

### Log of Borehole: BH3

Client: DFO

Project No: 3091

Location: Codroy, NL

Date: June 22 - 23, 2016

SUBSURFACE PROFILE				SAMPLE					Standard Penetration Test "N" Value per 300 mm			
Depth below Top of Wharf	Symbol	Geologic Description	Elevation (m)	Sample Type	Sample No.	"N" Value	Recovery (%)	RQD (%)	20	40	60	80
0		Top of Wharf	3.17									
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14		Harbour bottom (-1.18 m LNT).	-1.18									
15		SPT: 10 / 52 for 0.09 m, bouncing (refusal). Gravelly sand.	-1.42	SS	1	52	32					
16												
17		Overburden: gravel.		OB	--		34	0				
18												
19			-2.93									



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Drilling Method: NW casing / NQ coring

Driller: Formation Drilling Ltd.

Datum: LNT

Sheet: 1 of 4

Project: Marine Geotechnical Investigation

## Log of Borehole: BH3

Client: DFO

Project No: 3091

Location: Codroy, NL

Date: June 22 - 23, 2016

SUBSURFACE PROFILE				SAMPLE				Standard Penetration Test "N" Value per 300 mm
Depth below Top of Wharf	Symbol	Geologic Description	Elevation (m)	Sample Type	Sample No.	"N" Value	Recovery (%)	
20				OB	-		34	0
21		SPT: 7 / 32 / 23 / 52 for 0.05 m, bouncing (refusal). CFEM: Sand and Gravel, trace Silt/Clay.	-3.44	SS	2	55	28	
22								
23	7	Overburden: boulders.		OB	--		36	0
24								
25			-4.43					
25		SS3: "N" Value = 52; Recovery = 0%. SPT: 52 for 0.06 m, bouncing (refusal). No sample recovery.		SS	3	52	0	
26	8							
27		Overburden: gravel, boulders.		OB	--		54	21
28								
29			-5.92					
30	9	SPT: 17 / 8 / 1 / 4. Sand and gravel.		SS	4	9	13	
31			-6.53					
32								
33	10	Overburden: broken rock.		OB	--		48	0
34								
35			-7.51					
36	11	SPT: 42 / 33 / 41 / 52 for 0.04 m, bouncing (refusal). CFEM: Gravel and Sand, some Silt, trace Clay.		SS	5	74	61	
37			-8					
38		Overburden: gravel.					75	
39								



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Fax: (709) 753-5101

Drilling Method: NW casing / NQ coring

Driller: Formation Drilling Ltd.

Datum: LNT

Sheet: 2 of 4

Project: Marine Geotechnical Investigation

## Log of Borehole: BH3

Client: DFO

Project No: 3091

Location: Codroy, NL

Date: June 22 - 23, 2016

SUBSURFACE PROFILE				SAMPLE				Standard Penetration Test "N" Value per 300 mm
Depth below Top of Wharf	Symbol	Geologic Description	Elevation (m)	Sample Type	Sample No.	"N" Value	Recovery (%)	
40			-9.02	OB	--		75	13
		SPT: 18 / 52 for 0.14 m, bouncing (refusal). CFEM: Sandy Gravel, some Silt/Clay.	-9.31	SS	6	52	57	
41								
42								
43	13	Overburden: broken rock.		OB	--		51	0
44								
45			-10.6					
46	14	SPT: 8 / 35 / 15 / 13. CFEM: Sand and Gravel, some Silt/Clay.	-11.2	SS	7	50	23	
47								
48		Overburden: broken rock.		OB	--		43	0
49	15							
50			-12.1					
51		SPT: 52 for 0.13 m, bouncing (refusal). Gravel.		SS	8	52	70	
52								
53	16	Overburden: gravel and boulders.		OB	--		28	13
54								
55			-13.6					
56	17	SPT: 31 / 52 for 0.14 m, bouncing (refusal). CFEM: Silty/Clayey Sand, some Gravel.	-13.9	SS	9	52	39	
57		Overburden: highly compacted till.	-14.2	OB	--		23	0
58		Split spoon conducted in up-coning sand. SPT: 8 / 12 / 18 / 22. Sand.	-14.8	SS	10	30	62	
59								



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Drilling Method: NW casing / NQ coring

Driller: Formation Drilling Ltd.

Datum: LNT

Sheet: 3 of 4

Project: Marine Geotechnical Investigation

### Log of Borehole: BH3

Client: DFO

Project No: 3091

Location: Codroy, NL

Date: June 22 - 23, 2016

SUBSURFACE PROFILE				SAMPLE					Standard Penetration Test "N" Value per 300 mm			
Depth below Top of Wharf	Symbol	Geologic Description	Elevation (m)	Sample Type	Sample No.	"N" Value	Recovery (%)	RQD (%)	20	40	60	80
60		Overburden: gravel.		OB	-		6	0				
61												
62	19											
63			-16.2									
64		Split spoon conducted in up-coning sand. SPT: 28 / 52 for 0.13 m, bouncing (refusal). Sand.	-16.5	SS	11	52	100					
65												
66	20	No recovery.		OB	-		0	0				
67												
68			-17.7									
69	21	Split spoon conducted in up-coning sand. SPT: 8 / 12 / 12 / 52 for 0.10 m, bouncing (refusal). CFEM: Sand, trace Silt/Clay.	-18.3	SS	12	24	64					
70												
71		End of Borehole										
72	22											
73												
74												
75	23											
76												
77												
78												



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Drilling Method: NW casing / NQ coring

Driller: Formation Drilling Ltd.

Datum: LNT

Sheet: 4 of 4

Project: Marine Geotechnical Investigation

## Log of Borehole: BH4

Client: DFO

Project No: 3091

Location: Codroy, NL

Date: June 23 - 24, 2016

SUBSURFACE PROFILE				SAMPLE					Standard Penetration Test "N" Value per 300 mm			
Depth below Top of Wharf	Symbol	Geologic Description	Elevation (m)	Sample Type	Sample No.	"N" Value	Recovery (%)	RQD (%)	20	40	60	80
0		Top of Wharf	3.14									
1												
2												
3												
4												
5												
6												
7												
8												
9		Harbour bottom (0.23 m LNT).	0.231									
10		Split spoon sank 0.20 m into soft sediment under own weight before SPT.	0.034									
11		SPT: 1 / 7 / 12 / 23. CFEM: Sand and Gravel, trace Silt/Clay.	-0.576	SS	1	19	33					
12												
13		Overburden: gravel.		OB	--		83	10				
14			-1.33									
15		SPT: 41 / 52 for 0.13 m, bouncing (refusal). CFEM: Sandy Gravel, trace Silt/Clay.	-1.6	SS	2	52	64					
16												
17				OB	--		81	0				
18		Overburden: broken rock.										
19			-2.93	OB	--		100	46				



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Drilling Method: NW casing / NQ coring

Driller: Formation Drilling Ltd.

Datum: LNT

Sheet: 1 of 4

Project: Marine Geotechnical Investigation

## Log of Borehole: BH4

Client: DFO

Project No: 3091

Location: Codroy, NL

Date: June 23 - 24, 2016

SUBSURFACE PROFILE				SAMPLE					Standard Penetration Test "N" Value per 300 mm
Depth below Top of Wharf	Symbol	Geologic Description	Elevation (m)	Sample Type	Sample No.	"N" Value	Recovery (%)	RQD (%)	
20		SS3: "N" Value = 52, Recovery = 67%. SPT: 52 for 0.04 m, bouncing (refusal). Sand.		SS	3	52	67	46	
21				OB	--		38	0	
22									
23	7	Overburden: broken rock.		OB	--		87	24	
24									
25			-4.46						
26	8	SPT: 52 for 0.13 m, bouncing (refusal). Gravel, some sand.		SS	4	52	40		
27									
28		Overburden: broken rock.		OB	--		39	9	
29									
30	9		-5.97						
31		SPT: 21 / 27 / 52 for 0.14 m / 52 for 0.0 m, bouncing (refusal). CFEM: Sandy Gravel, some Silt, trace Clay.		SS	5	79	29		
32									
33	10	Overburden: broken rock.		OB	--		42	0	
34									
35			-7.42						
36	11	SPT: 25 / 22 / 52 / 52 for 0.0 m, bouncing (refusal). Sand, some gravel.		SS	6	74	14		
37									
38							100		
39									



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Drilling Method: NW casing / NQ coring

Driller: Formation Drilling Ltd.

Datum: LNT

Sheet: 2 of 4

Project: Marine Geotechnical Investigation

## Log of Borehole: BH4

Client: DFO

Project No: 3091

Location: Codroy, NL

Date: June 23 - 24, 2016

SUBSURFACE PROFILE				SAMPLE					Standard Penetration Test "N" Value per 300 mm			
Depth below Top of Wharf	Symbol	Geologic Description	Elevation (m)	Sample Type	Sample No.	"N" Value	Recovery (%)	RQD (%)	20	40	60	80
40				OB	-		100	84				
41												
42				OB	-		65	44				
43	13											
44												
45		Overburden: broken rock.										
46	14											
47				OB	-		42	21				
48												
49	15											
50				OB	--		68	27				
51			-12.5									
52	16	Split spoon SS7, SS8, and SS9 conducted continuously in collapsed material. SPT: 5 / 1 / 1 / 1.	-13.1	SS	7	2	--					
53												
54		SPT: 3 / 1 / 1 / 1 for 0.29 m (sank).		SS	8	2	--					
55												
56	17		-13.9									
57		Split spoon sank 0.55 m into soft sediment under own weight before SPT.										
58			-14.5									
59		SPT: 11 / 17 / 17 / 30. CFEM (SS7, SS8 and SS9): Gravelly Sand, trace Silt/Clay.					50					



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Drilling Method: NW casing / NQ coring

Driller: Formation Drilling Ltd.

Datum: LNT

Sheet: 3 of 4



Project: Marine Geotechnical Investigation

## Log of Borehole: BH4

Client: DFO

Project No: 3091

Location: Codroy, NL

Date: June 23 - 24, 2016

SUBSURFACE PROFILE					SAMPLE				Standard Penetration Test "N" Value per 300 mm			
Depth below Top of Wharf	Symbol	Geologic Description	Elevation (m)	Sample Type	Sample No.	"N" Value	Recovery (%)	RQD (%)	20	40	60	80
			-15.1	SS	9	34	50					
60		End of Borehole										
61												
62	19											
63												
64												
65												
66	20											
67												
68												
69	21											
70												
71												
72	22											
73												
74												
75	23											
76												
77												
78												



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Drilling Method: NW casing / NQ coring

Driller: Formation Drilling Ltd.

Datum: LNT

Sheet: 4 of 4

***APPENDIX B***

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***Grain Size Analysis Reports***

## GRAIN SIZE ANALYSIS

Project : 3091 - Codroy, NL

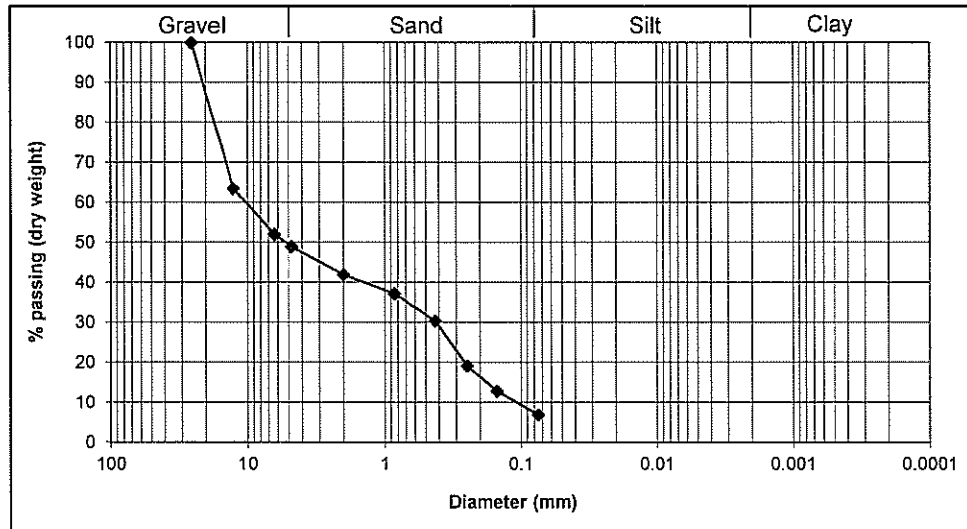
Sample No. : BH1-SS3

Depth below LNT : 2.86 m - 3.40 m

Sieve Analysis

Dry weight of sample (g) = 313.57

Sieve	Opening (mm)	Retained (g)	% Retained	Cumulative % Ret.	% Passing
2	50.8	0.00			
1	25.4	0.00	0.00	0.00	100.00
1/2"	12.7	114.47	36.51	36.51	63.49
1/4"	6.35	35.91	11.45	47.96	52.04
4	4.76	9.86	3.14	51.10	48.90
10	2.00	21.87	6.97	58.08	41.92
20	0.85	14.96	4.77	62.85	37.15
40	0.425	21.61	6.89	69.74	30.26
60	0.25	35.07	11.18	80.92	19.08
100	0.15	19.96	6.37	87.29	12.71
200	0.075	18.58	5.93	93.21	6.79
pan	---	21.28	6.79	100.00	---
		313.57			



$D_{10} = 0.109$

$D_{30} = 0.423$

$D_{60} = 10.25$

$C_u = 94.04$

$C_c = 0.16$

**USCS:** GP-GM (Poorly graded gravel with silt and sand)

$R_{200} = 93.21$

$R_4 = 51.10$

$R_4/R_{200} = 0.55$

SF = 42.11

GF = 51.10

% Gravel = 51.10

% Sand = 42.11

% Silt & Clay = 6.79

% Clay = NA

**CFEM:** Gravel and Sand, trace Silt/Clay

**Moisture Content (%):** 25.46

## GRAIN SIZE ANALYSIS

Project : 3091 - Codroy, NL

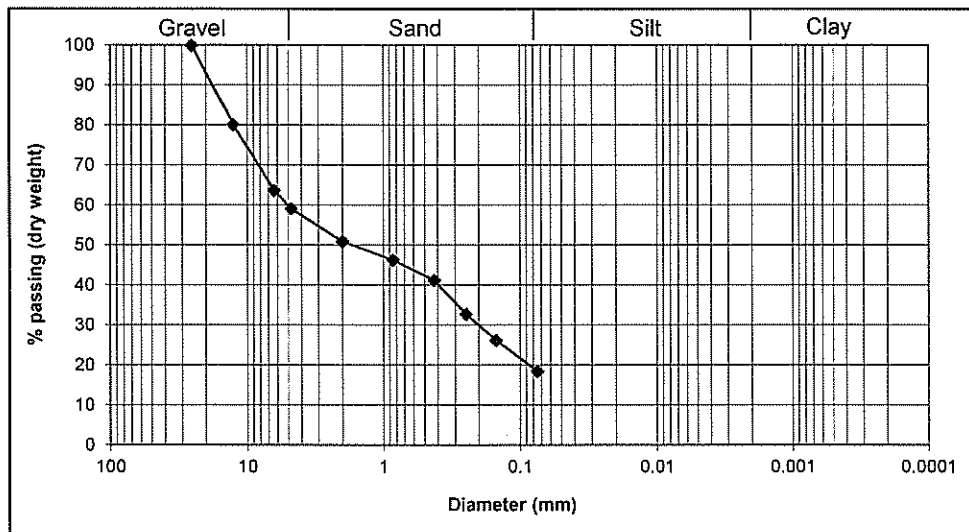
Sample No. : BH1-SS5

Depth below LNT : 5.90 m - 6.06 m

Sieve Analysis

Dry weight of sample (g) = 244.06

Sieve	Opening (mm)	Retained (g)	% Retained	Cumulative % Ret.	% Passing
2	50.8	0.00			
1	25.4	0.00	0.00	0.00	100.00
1/2"	12.7	48.61	19.92	19.92	80.08
1/4"	6.35	40.10	16.43	36.35	63.65
4	4.76	11.11	4.55	40.90	59.10
10	2.00	20.16	8.26	49.16	50.84
20	0.85	11.23	4.60	53.76	46.24
40	0.425	12.34	5.06	58.82	41.18
60	0.25	20.71	8.49	67.30	32.70
100	0.15	16.09	6.59	73.90	26.10
200	0.075	18.84	7.72	81.62	18.38
pan	---	44.87	18.38	100.00	---
		244.06			



D<sub>10</sub> = NA

D<sub>30</sub> = 0.205

D<sub>60</sub> = 5.1

C<sub>u</sub> = NA

C<sub>c</sub> = NA

**USCS:** SM (Silty sand with gravel).

R<sub>200</sub> = 81.62

R<sub>4</sub> = 40.90

R<sub>4</sub>/R<sub>200</sub> = 0.50

SF = 40.72

GF = 40.90

% Gravel = 40.90

% Sand = 40.72

% Silt & Clay = 18.38

% Clay = NA

**CFEM:** Gravel and Sand, some Silt/Clay.

**Moisture Content (%):** 29.59

## GRAIN SIZE ANALYSIS

Project : 3091 - Codroy, NL

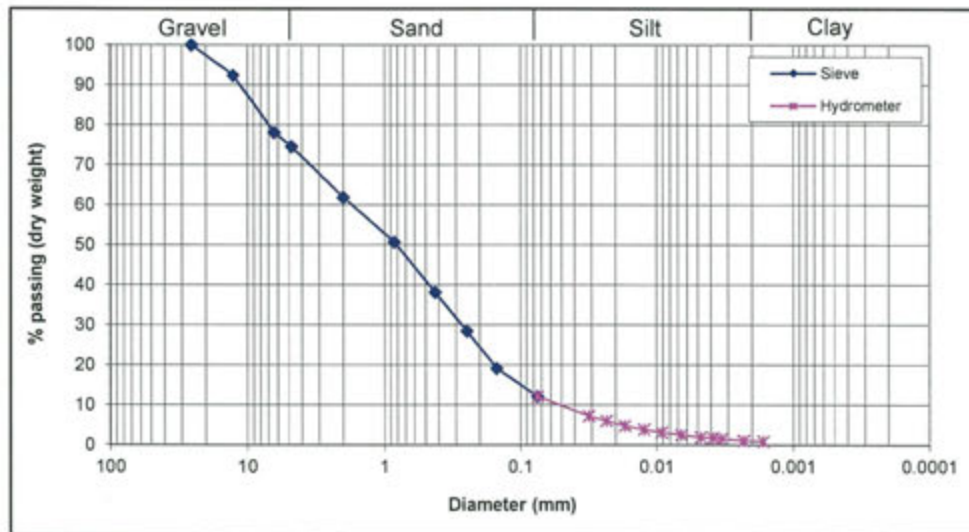
Sample No. : BH2-SS1

Depth below LNT : -2.92 m to -2.29 m

Sieve Analysis

Dry weight of sample (g) = 483.88

Sieve	Opening (mm)	Retained (g)	% Retained	Cumulative % Ret.	% Passing
2	50.8	0.00			
1	25.4	0.00	0.00	0.00	100.00
1/2"	12.7	37.17	7.68	7.68	92.32
1/4"	6.35	69.20	14.30	21.98	78.02
4	4.76	16.87	3.49	25.47	74.53
10	2.00	61.48	12.71	38.17	61.83
20	0.85	53.93	11.15	49.32	50.68
40	0.425	60.68	12.54	61.86	38.14
60	0.25	46.88	9.69	71.55	28.45
100	0.15	44.95	9.29	80.84	19.16
200	0.075	34.18	7.06	87.90	12.10
pan	---	58.54	12.10	100.00	---
		483.88			



$D_{10} = 0.051$

$D_{30} = 0.271$

$D_{60} = 1.73$

$C_u = 33.92$

$C_c = 0.83$

**USCS:** SM (Silty sand with gravel).

$R_{200} = 87.90$

$R_4 = 25.47$

$R_4/R_{200} = 0.29$

SF = 62.43

GF = 25.47

% Gravel = 25.47

% Sand = 62.43

% Silt = 11.00

% Clay = 1.10

**CFEM:** Gravelly Sand, some Silt, trace Clay.

**Moisture Content (%):** 3.79



## GRAIN SIZE ANALYSIS

Project : 3091 - Codroy, NL

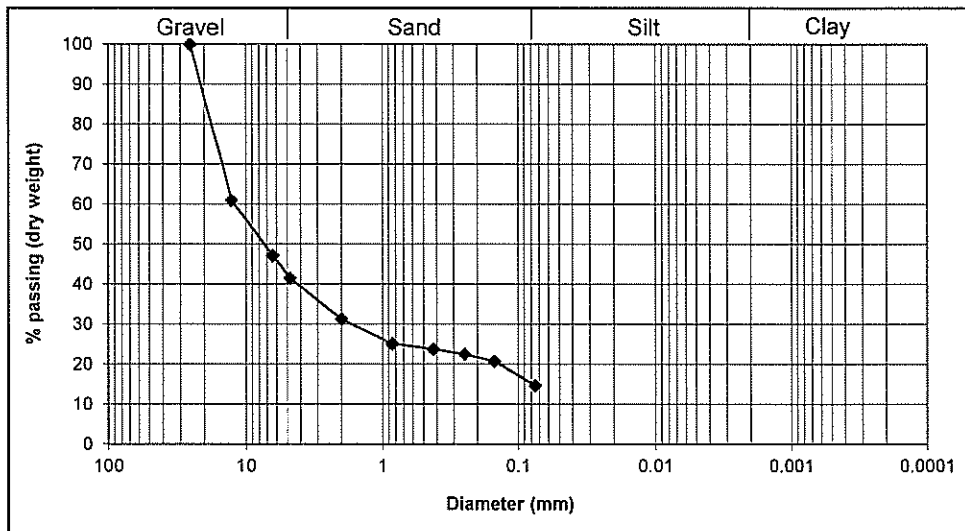
Sample No. : BH2-SS5

Depth below LNT : 4.64 m - 4.79 m

Sieve Analysis

Dry weight of sample (g) = 201.39

Sieve	Opening (mm)	Retained (g)	% Retained	Cumulative % Ret.	% Passing
2	50.8	0.00			
1	25.4	0.00	0.00	0.00	100.00
1/2"	12.7	78.49	38.97	38.97	61.03
1/4"	6.35	27.87	13.84	52.81	47.19
4	4.76	11.34	5.63	58.44	41.56
10	2.00	20.60	10.23	68.67	31.33
20	0.85	12.55	6.23	74.90	25.10
40	0.425	2.76	1.37	76.27	23.73
60	0.25	2.41	1.20	77.47	22.53
100	0.15	3.62	1.80	79.27	20.73
200	0.075	12.22	6.07	85.34	14.66
pan	---	29.53	14.66	100.00	---
		201.39			



D<sub>10</sub> = NA

D<sub>30</sub> = 1.625

D<sub>60</sub> = 11.9

C<sub>u</sub> = NA

C<sub>c</sub> = NA

**USCS:** GM (Silty gravel with sand).

R<sub>200</sub> = 85.34

R<sub>4</sub> = 58.44

R<sub>4</sub>/R<sub>200</sub> = 0.68

SF = 26.89

GF = 58.44

% Gravel = 58.44

% Sand = 26.89

% Silt & Clay = 14.66

% Clay = NA

**CFEM:** Sandy Gravel, some Silt/Clay.

**Moisture Content (%):** 10.70

## GRAIN SIZE ANALYSIS

Project : 3091 - Codroy, NL

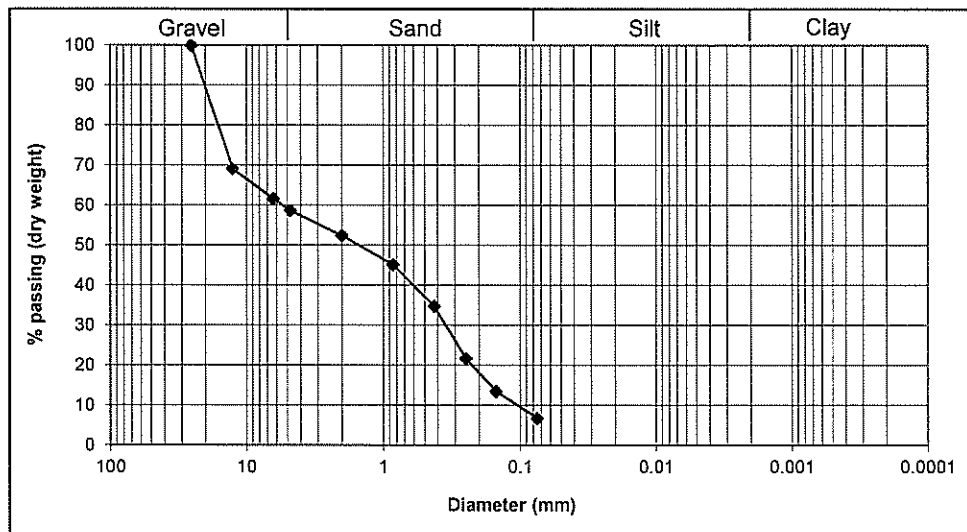
Sample No. : BH3-SS2

Depth below LNT : 2.93 m - 3.44 m

Sieve Analysis

Dry weight of sample (g) = 424.37

Sieve	Opening (mm)	Retained (g)	% Retained	Cumulative % Ret.	% Passing
2	50.8	0.00			
1	25.4	0.00	0.00	0.00	100.00
1/2"	12.7	130.74	30.81	30.81	69.19
1/4"	6.35	32.08	7.56	38.37	61.63
4	4.76	12.30	2.90	41.27	58.73
10	2.00	26.49	6.24	47.51	52.49
20	0.85	31.19	7.35	54.86	45.14
40	0.425	44.17	10.41	65.27	34.73
60	0.25	55.42	13.06	78.33	21.67
100	0.15	34.93	8.23	86.56	13.44
200	0.075	28.62	6.74	93.30	6.70
pan	---	28.43	6.70	100.00	---
		424.37			



$D_{10} = 0.105$

$D_{30} = 0.353$

$D_{60} = 5.5$

$C_u = 52.38$

$C_c = 0.22$

**USCS:** SP-SM (Poorly graded sand with silt and gravel)

$R_{200} = 93.30$

$R_4 = 41.27$

$R_4/R_{200} = 0.44$

SF = 52.03

GF = 41.27

% Gravel = 41.27

% Sand = 52.03

% Silt & Clay = 6.70

% Clay = NA

**CFEM:** Sand and Gravel, trace Silt/Clay

**Moisture Content (%):** 16.72



## GRAIN SIZE ANALYSIS

Project : 3091 - Codroy, NL

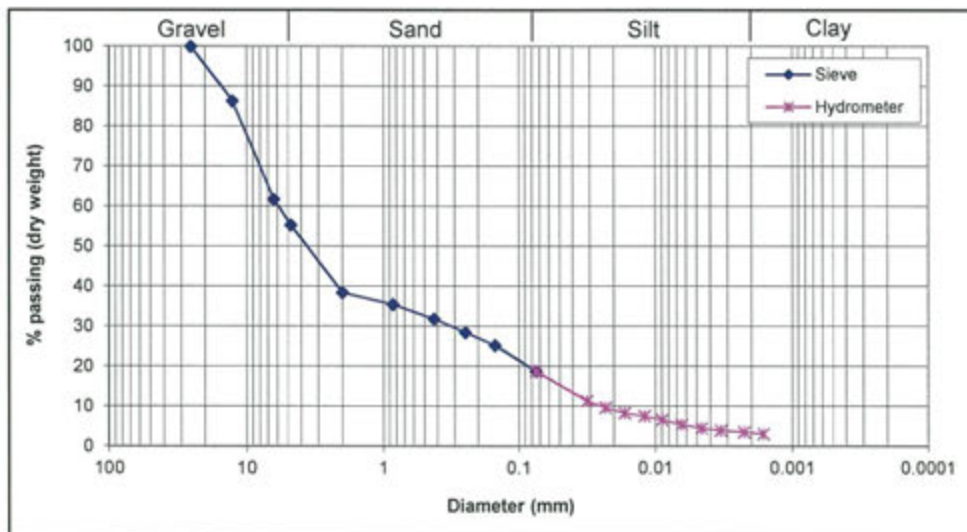
Sample No. : BH3-SS5

Depth below LNT : 7.51 m - 8.00 m

### Sieve Analysis

Dry weight of sample (g) = 422.43

Sieve	Opening (mm)	Retained (g)	% Retained	Cumulative % Ret.	% Passing
2	50.8	0.00			
1	25.4	0.00	0.00	0.00	100.00
1/2"	12.7	57.71	13.66	13.66	86.34
1/4"	6.35	104.12	24.65	38.31	61.69
4	4.76	26.81	6.35	44.66	55.34
10	2.00	71.62	16.95	61.61	38.39
20	0.85	12.88	3.05	64.66	35.34
40	0.425	15.04	3.56	68.22	31.78
60	0.25	14.25	3.37	71.59	28.41
100	0.15	13.72	3.25	74.84	25.16
200	0.075	27.33	6.47	81.31	18.69
pan	---	78.95	18.69	100.00	---
		422.43			



$D_{10} = 0.025$

$D_{30} = 0.326$

$D_{60} = 5.845$

$C_u = 233.80$

$C_c = 0.73$

**USCS:** GM (Silty gravel with sand).

$R_{200} = 81.31$

$R_4 = 44.66$

$R_4/R_{200} = 0.55$

SF = 36.65

GF = 44.66

% Gravel = 44.66

% Sand = 36.65

% Silt = 15.29

% Clay = 3.40

**CFEM:** Gravel and Sand, some Silt, trace Clay.

**Moisture Content (%):** 12.75



## GRAIN SIZE ANALYSIS

Project : 3091 - Codroy, NL

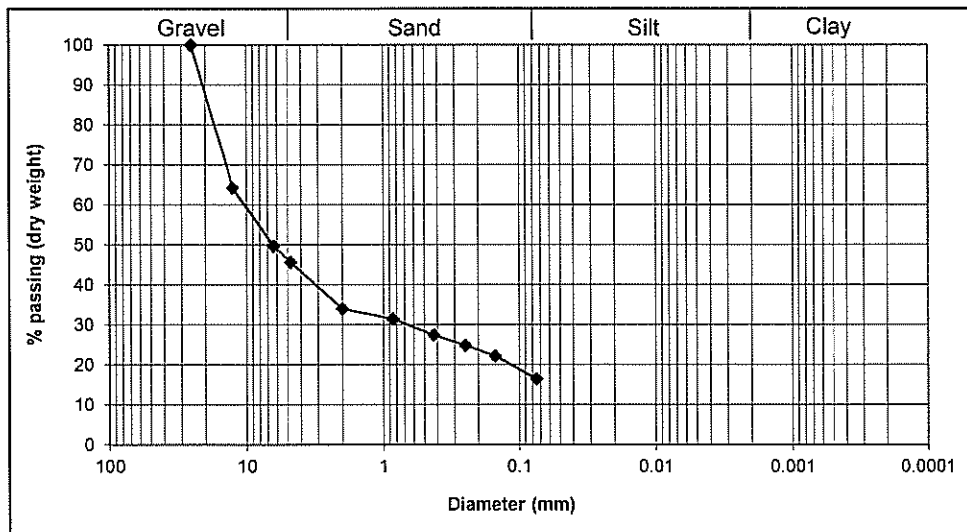
Sample No. : BH3-SS6

Depth below LNT : 9.02 m - 9.31 m

Sieve Analysis

Dry weight of sample (g) = 365.59

Sieve	Opening (mm)	Retained (g)	% Retained	Cumulative % Ret.	% Passing
2	50.8	0.00			
1	25.4	0.00	0.00	0.00	100.00
1/2"	12.7	130.59	35.72	35.72	64.28
1/4"	6.35	53.26	14.57	50.29	49.71
4	4.76	15.01	4.11	54.39	45.61
10	2.00	42.35	11.58	65.98	34.02
20	0.85	9.49	2.60	68.57	31.43
40	0.425	14.46	3.96	72.53	27.47
60	0.25	9.58	2.62	75.15	24.85
100	0.15	9.73	2.66	77.81	22.19
200	0.075	20.93	5.72	83.54	16.46
pan	---	60.19	16.46	100.00	---
		365.59			



$D_{10} = \text{NA}$

$D_{30} = 0.66$

$D_{60} = 10.3$

$C_u = \text{NA}$

$C_c = \text{NA}$

**USCS:** GM (Silty gravel with sand)

$R_{200} = 83.54$

$R_4 = 54.39$

$R_4/R_{200} = 0.65$

SF = 29.14

GF = 54.39

% Gravel = 54.39

% Sand = 29.14

% Silt & Clay = 16.46

% Clay = NA

**CFEM:** Sandy Gravel, some Silt/Clay

**Moisture Content (%): 13.75**

## GRAIN SIZE ANALYSIS

Project : 3091 - Codroy, NL

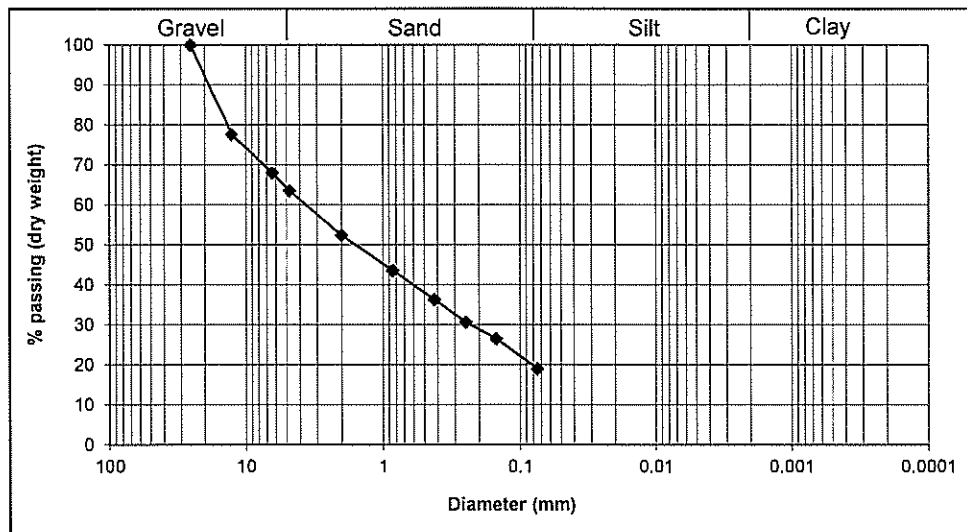
Sample No. : BH3-SS7

Depth below LNT : 10.55 m - 11.16 m

Sieve Analysis

Dry weight of sample (g) = 318.88

Sieve	Opening (mm)	Retained (g)	% Retained	Cumulative % Ret.	% Passing
2	50.8	0.00			
1	25.4	0.00	0.00	0.00	100.00
1/2"	12.7	71.32	22.37	22.37	77.63
1/4"	6.35	30.56	9.58	31.95	68.05
4	4.76	14.01	4.39	36.34	63.66
10	2.00	35.65	11.18	47.52	52.48
20	0.85	28.17	8.83	56.36	43.64
40	0.425	23.28	7.30	63.66	36.34
60	0.25	17.97	5.64	69.29	30.71
100	0.15	13.31	4.17	73.47	26.53
200	0.075	24.16	7.58	81.04	18.96
pan	---	60.45	18.96	100.00	---
		318.88			



D<sub>10</sub> = NA

D<sub>30</sub> = 0.23

D<sub>60</sub> = 3.55

C<sub>u</sub> = NA

C<sub>c</sub> = NA

**USCS:** SM (Silty sand with gravel)

R<sub>200</sub> = 81.04

R<sub>4</sub> = 36.34

R<sub>4</sub>/R<sub>200</sub> = 0.45

SF = 44.70

GF = 36.34

% Gravel = 36.34

% Sand = 44.70

% Silt & Clay = 18.96

% Clay = NA

**CFEM:** Sand and Gravel, some Silt/Clay

**Moisture Content (%):** 33.03

## GRAIN SIZE ANALYSIS

Project : 3091 - Codroy, NL

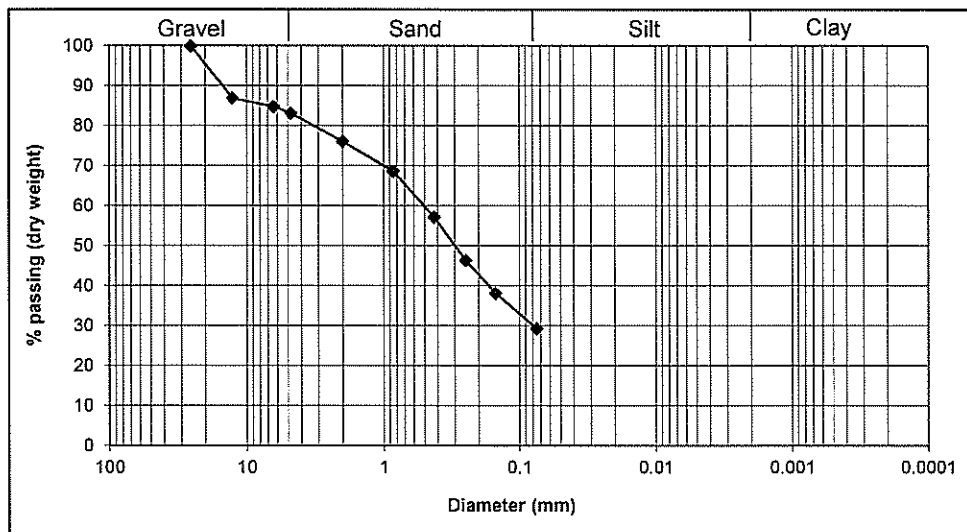
Sample No. : BH3-SS9

Depth below LNT : 13.58 m - 13.87 m

Sieve Analysis

Dry weight of sample (g) = 424.15

Sieve	Opening (mm)	Retained (g)	% Retained	Cumulative % Ret.	% Passing
2	50.8	0.00			
1	25.4	0.00	0.00	0.00	100.00
1/2"	12.7	55.47	13.08	13.08	86.92
1/4"	6.35	9.07	2.14	15.22	84.78
4	4.76	6.82	1.61	16.82	83.18
10	2.00	29.86	7.04	23.86	76.14
20	0.85	31.96	7.54	31.40	68.60
40	0.425	48.57	11.45	42.85	57.15
60	0.25	45.86	10.81	53.66	46.34
100	0.15	35.17	8.29	61.95	38.05
200	0.075	37.51	8.84	70.80	29.20
pan	---	123.86	29.20	100.00	---
		424.15			



D<sub>10</sub> = NA

D<sub>30</sub> = 0.08

D<sub>60</sub> = 0.5

C<sub>u</sub> = NA

C<sub>c</sub> = NA

**USCS:** SM (Silty sand with gravel)

R<sub>200</sub> = 70.80

R<sub>4</sub> = 16.82

R<sub>4</sub>/R<sub>200</sub> = 0.24

SF = 53.97

GF = 16.82

% Gravel = 16.82

% Sand = 53.97

% Silt & Clay = 29.20

% Clay = NA

**CFEM:** Silty/Clayey Sand, some Gravel

**Moisture Content (%):** 8.90

## GRAIN SIZE ANALYSIS

Project : 3091 - Codroy, NL

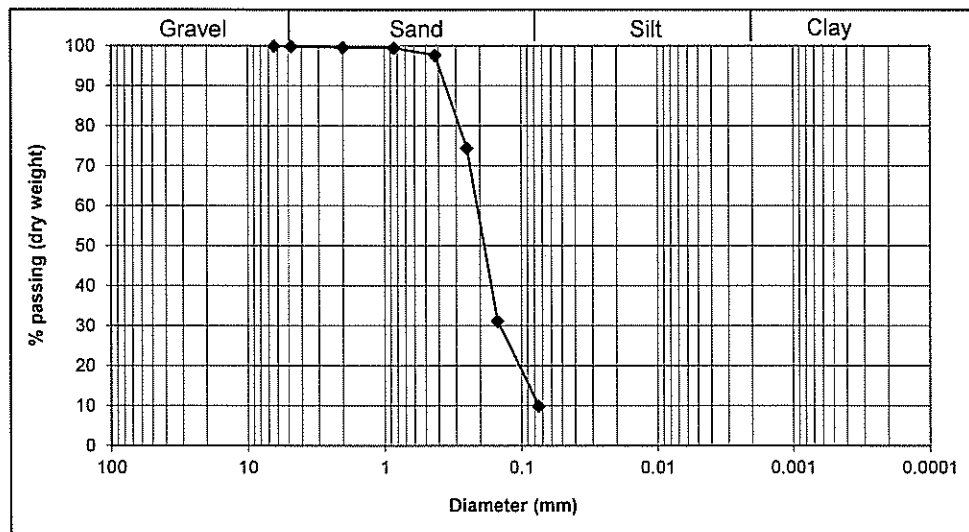
Sample No. : BH3-SS12

Depth below LNT : 17.74 m - 18.30 m

Sieve Analysis

Dry weight of sample (g) = 229.89

Sieve	Opening (mm)	Retained (g)	% Retained	Cumulative % Ret.	% Passing
2	50.8	0.00			
1	25.4	0.00			
1/2"	12.7	0.00			
1/4"	6.35	0.00	0.00	0.00	100.00
4	4.76	0.33	0.14	0.14	99.86
10	2.00	0.55	0.24	0.38	99.62
20	0.85	0.48	0.21	0.59	99.41
40	0.425	4.00	1.74	2.33	97.67
60	0.25	53.67	23.35	25.68	74.32
100	0.15	99.35	43.22	68.89	31.11
200	0.075	48.76	21.21	90.10	9.90
pan	---	22.75	9.90	100.00	---
		229.89			



$D_{10} = 0.075$

$D_{30} = 0.144$

$D_{60} = 0.21$

$C_u = 2.80$

$C_c = 1.32$

**USCS:** SP-SM (Poorly graded sand with silt)

$R_{200} = 90.10$

$R_4 = 0.14$

$R_4/R_{200} = 0.00$

SF = 89.96

GF = 0.14

% Gravel = 0.14

% Sand = 89.96

% Silt & Clay = 9.90

% Clay = NA

**CFEM:** Sand, trace Silt/Clay

**Moisture Content (%):** 19.42

## GRAIN SIZE ANALYSIS

Project : 3091 - Codroy, NL

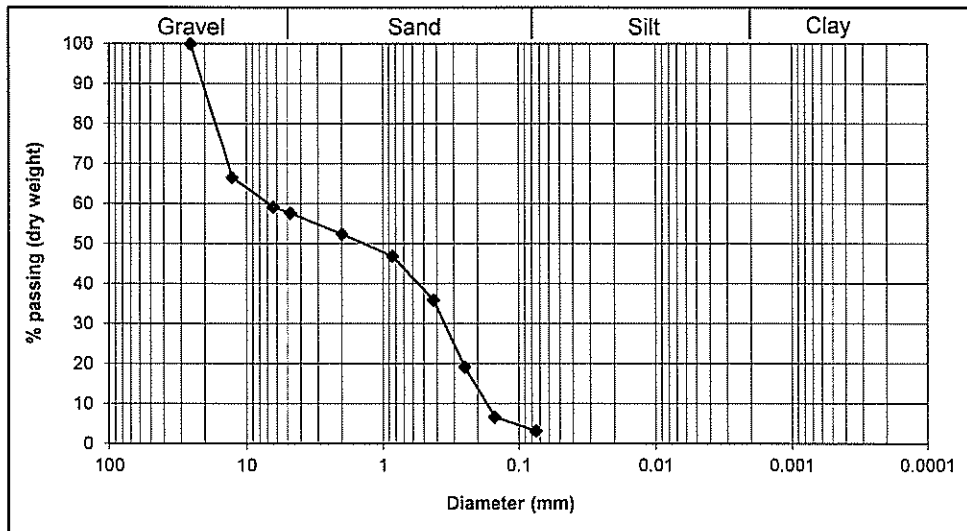
Sample No. : BH4-SS1

Depth below LNT : -0.03 m - 0.58 m

Sieve Analysis

Dry weight of sample (g) = 524.76

Sieve	Opening (mm)	Retained (g)	% Retained	Cumulative % Ret.	% Passing
2	50.8	0.00			
1	25.4	0.00	0.00	0.00	100.00
1/2"	12.7	175.40	33.42	33.42	66.58
1/4"	6.35	38.77	7.39	40.81	59.19
4	4.76	8.14	1.55	42.36	57.64
10	2.00	27.60	5.26	47.62	52.38
20	0.85	28.95	5.52	53.14	46.86
40	0.425	57.56	10.97	64.11	35.89
60	0.25	88.01	16.77	80.88	19.12
100	0.15	65.33	12.45	93.33	6.67
200	0.075	18.11	3.45	96.78	3.22
pan	---	16.89	3.22	100.00	---
		524.76			



$D_{10} = 0.172$

$D_{30} = 0.354$

$D_{60} = 6.9$

$C_u = 40.12$

$C_c = 0.11$

**USCS:** SP (Poorly graded sand with gravel)

$R_{200} = 96.78$

$R_4 = 42.36$

$R_4/R_{200} = 0.44$

SF = 54.42

GF = 42.36

% Gravel = 42.36

% Sand = 54.42

% Silt & Clay = 3.22

% Clay = NA

**CFEM:** Sand and Gravel, trace Silt/Clay

**Moisture Content (%):** 18.23

## GRAIN SIZE ANALYSIS

Project : 3091 - Codroy, NL

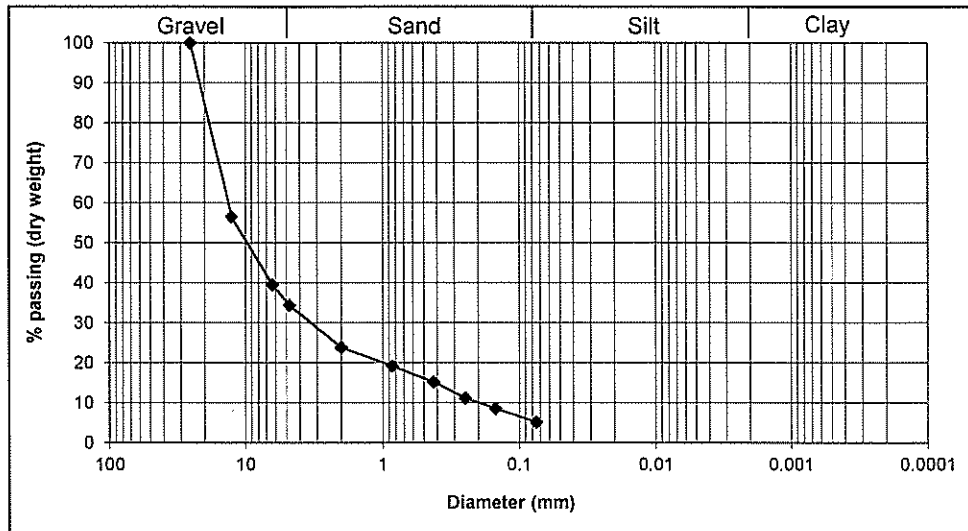
Sample No. : BH4-SS2

Depth below LNT : 1.33 m - 1.60 m

Sieve Analysis

Dry weight of sample (g) = 471.49

Sieve	Opening (mm)	Retained (g)	% Retained	Cumulative % Ret.	% Passing
2	50.8	0.00			
1	25.4	0.00	0.00	0.00	100.00
1/2"	12.7	204.78	43.43	43.43	56.57
1/4"	6.35	80.17	17.00	60.44	39.56
4	4.76	24.44	5.18	65.62	34.38
10	2.00	49.72	10.55	76.16	23.84
20	0.85	21.75	4.61	80.78	19.22
40	0.425	18.87	4.00	84.78	15.22
60	0.25	18.82	3.99	88.77	11.23
100	0.15	12.58	2.67	91.44	8.56
200	0.075	15.79	3.35	94.79	5.21
pan	---	24.57	5.21	100.00	---
		471.49			



$D_{10} = 0.194$

$D_{30} = 3.3$

$D_{60} = 13.45$

$C_u = 69.33$

$C_c = 4.17$

**USCS:** GP-GM (Poorly graded gravel with silt and sand)

$R_{200} = 94.79$

$R_4 = 65.62$

$R_4/R_{200} = 0.69$

SF = 29.17

GF = 65.62

% Gravel = 65.62

% Sand = 29.17

% Silt & Clay = 5.21

% Clay = NA

**CFEM:** Sandy Gravel, trace Silt/Clay

**Moisture Content (%):** 13.86



## GRAIN SIZE ANALYSIS

Project : 3091 - Codroy, NL

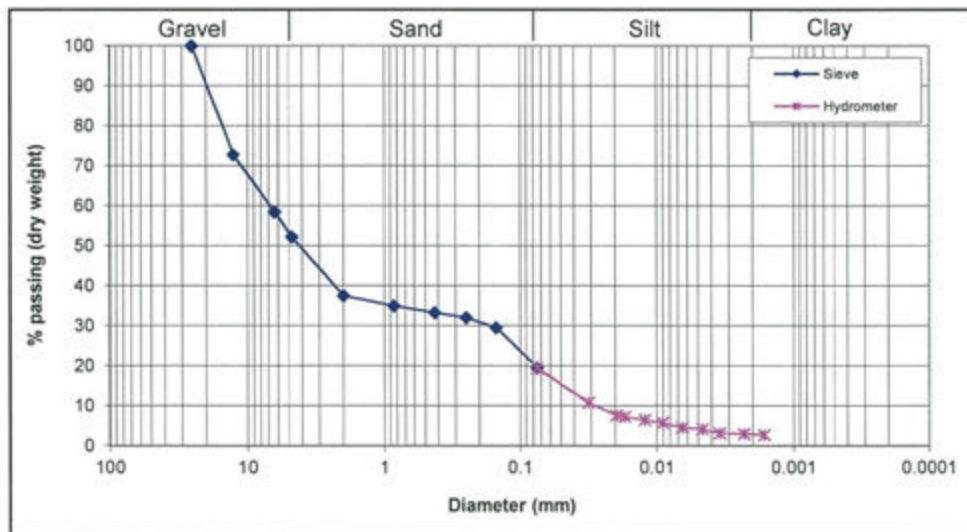
Sample No. : BH4-SS5

Depth below LNT : 5.97 m - 6.42 m

Sieve Analysis

Dry weight of sample (g) = 353.41

Sieve	Opening (mm)	Retained (g)	% Retained	Cumulative % Ret.	% Passing
2	50.8	0.00			
1	25.4	0.00	0.00	0.00	100.00
1/2"	12.7	96.04	27.18	27.18	72.82
1/4"	6.35	50.70	14.35	41.52	58.48
4	4.76	22.17	6.27	47.79	52.21
10	2.00	51.85	14.67	62.47	37.53
20	0.85	9.10	2.57	65.04	34.96
40	0.425	5.83	1.65	66.69	33.31
60	0.25	4.28	1.21	67.90	32.10
100	0.15	9.15	2.59	70.49	29.51
200	0.075	35.69	10.10	80.59	19.41
pan	---	68.60	19.41	100.00	---
		353.41			



$D_{10} = 0.028$

$D_{30} = 0.165$

$D_{60} = 6.77$

$C_u = 241.79$

$C_c = 0.14$

**USCS:** GM (Silty gravel with sand)

$R_{200} = 80.59$

$R_4 = 47.79$

$R_4/R_{200} = 0.59$

SF = 32.79

GF = 47.79

% Gravel = 47.79

% Sand = 32.79

% Silt = 16.61

% Clay = 2.80

**CFEM:** Sandy Gravel, some Silt, trace Clay.

**Moisture Content (%):** 14.92



## GRAIN SIZE ANALYSIS

Project : 3091 - Codroy, NL

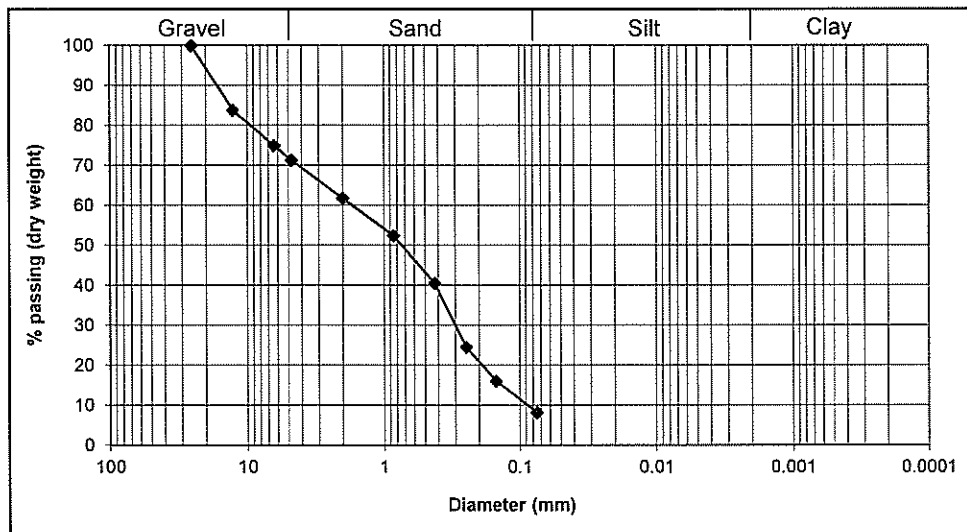
Sample No. : BH4-SS7-8-9

Depth below LNT : 12.46 m - 15.09 m

Sieve Analysis

Dry weight of sample (g) = 780.18

Sieve	Opening (mm)	Retained (g)	% Retained	Cumulative % Ret.	% Passing
2	50.8	0.00			
1	25.4	0.00	0.00	0.00	100.00
1/2"	12.7	126.36	16.20	16.20	83.80
1/4"	6.35	68.92	8.83	25.03	74.97
4	4.76	28.19	3.61	28.64	71.36
10	2.00	74.54	9.55	38.20	61.80
20	0.85	73.21	9.38	47.58	52.42
40	0.425	93.18	11.94	59.52	40.48
60	0.25	124.85	16.00	75.53	24.47
100	0.15	66.52	8.53	84.05	15.95
200	0.075	60.98	7.82	91.87	8.13
pan	---	63.43	8.13	100.00	---
		780.18			



$D_{10} = 0.089$

$D_{30} = 0.3$

$D_{60} = 1.665$

$C_u = 18.71$

$C_c = 0.61$

**USCS:** SP-SM (Poorly graded sand with silt and gravel).

$R_{200} = 91.87$

$R_4 = 28.64$

$R_4/R_{200} = 0.31$

SF = 63.23

GF = 28.64

% Gravel = 28.64

% Sand = 63.23

% Silt & Clay = 8.13

% Clay = NA

**CFEM:** Gravelly Sand, trace Silt/Clay.

**Moisture Content (%):** 13.72

## **Appendix B**

### **Project Effects Determination Report**

**FISHERIES AND OCEANS  
CANADIAN ENVIRONMENTAL ASSESSMENT ACT (CEAA) 2012  
PROJECT EFFECTS DETERMINATION REPORT**

**GENERAL INFORMATION**

1. <b>Project Title:</b> Wharf reconstruction, Codroy, NL	
2. <b>Proponent:</b> Fisheries and Oceans Canada, Small Craft Harbours (DFO SCH)	
3. <b>Other Contacts</b> (Other Proponent, Consultant or Contractor): Public Services and Procurement Canada (PSPC)	4. <b>Role:</b> OGD Consultant
5. <b>Source of Project Information:</b> William French, DFO SCH	
6. <b>Project Review Start Date:</b> September 21, 2016	
7. <b>DFO File No.:</b> 16-HNFL-00384	8. <b>PWGSC File No:</b>
9. <b>TC File No.:</b> 2016-200101 / NEATS: 43563	

**BACKGROUND**

10. **Background about Proposed Development (including a description of the proposed development):**

The proposed development (the Project) involves the reconstruction and replacement of an existing marginal wharf located in Codroy, Newfoundland and Labrador (Appendix A). The work involves the replacement of an existing timber pile structure with a new, slightly shorter, timber crib structure. The new wharf will tie into the existing marginal pile wharf located at the northern edge of the water lot. The Project also includes the relocation of an existing waste oil tank to a newly constructed concrete pad within the Project site, the permanent removal of an existing trailer and concrete slab, and the removal and replacement of the existing electrical shed and its components. The existing asphalt parking area will also be refurbished as part of the Project. This land is under the jurisdiction of DFO-SCH, and Project activities are occurring on federally owned property.

**PROJECT REVIEW**

11. **DFO's rationale for the Project review:**

Project is on federal land  and;

DFO is the proponent

DFO to issue *Fisheries Act* Authorization or *Species at Risk Act* Permit

DFO to provide financial assistance to another party to enable the Project to proceed

DFO to lease or sell federal land to enable the Project to proceed

Other

12. **Fisheries Act Sections (if applicable):** N/A

<p><b>13. Other Authorities</b>  Transport Canada, Navigation Protection Program and Environmental Affairs and Aboriginal Consultation Unit</p>	<p><b>14. Other Authorities rationale for involvement:</b>  <i>Navigation Protection Act</i></p>
<p><b>15. Other Jurisdiction:</b>  Service NL  NL Department of Environment and Conservation, Water Resources</p>	
<p><b>16. Other Expert Departments Providing Advice:</b>  Fisheries and Oceans Canada, Fisheries Protection Program</p>	<p><b>17. Areas of Interest of Expert Departments:</b>  <i>Fisheries Act</i></p>
<p><b>18. Other Contacts and Responses</b>  N/A</p>	

## **19. Scope of Project (details of the Project subject to review):**

### **Project Description**

#### **Construction / Installation:**

The existing wharf structure (6.15 m wide by 61.6 m long) will be demolished in its entirety and replaced with a slightly smaller (6.1 m wide by 54.9 m long) marginal treated-timber wharf within the existing footprint. This includes the replacement of fenders, wheelguards, concrete deck, and the existing timber cribs. The new wharf will consist of 7 cribs, measuring 6.1 m long by 6.1 m wide, which will be directly seated to the harbour bottom. Some dredging or excavation activities may need to be conducted to secure the cribs to the bottom or install a rock mattress. The new wharf will tie into the existing marginal pile wharf located on the northern edge of the water lot. See Site Plans in Appendix B.

To facilitate the installation of the new cribs, approximately 450 cubic metres of sediment will be excavated from the footprint of the new wharf. As part of this process, representative sediment samples were collected from the waterlot on August 25, 2016 and submitted for chemical analysis. Several of the samples exceeded CCME industrial soil quality guidelines for arsenic (Appendix C). Analysis of the existing timber cribs was also conducted. As such, the excavated sediments and timber cribs will be transported to a provincially approved landfill for disposal (see approvals in Appendix D).

The Project will also include the levelling and refurbishing of the asphalt parking and servicing area behind the existing wharf, and the relocation of an existing waste oil tank to a newly constructed concrete pad behind the existing wharf. An existing concrete slab and trailer located behind the existing wharf will be permanently removed.

The existing electrical shed and its components will be removed and replaced with new infrastructure to support similar functions.

Standard wharf demolition / reconstruction methods and equipment will be used. The existing wharf will be demolished and removed by heavy equipment operating from the existing wharf deck or possibly a floating barge. The new treated cribwork will be assembled on-site using a combination of heavy equipment and manual labour and floated into position. Ballast stone will then be added to the cribbing to sink it into place. Heavy equipment will operate from the existing wharf deck, the new wharf cribbing, and possibly a floating barge, if required. Dredging of harbour material will be needed to seat the new cribs to the hard bottom and / or install a rock mattress.

The Project involves replacing existing works in the same footprint and it is not anticipated that obstructions will result from this process outside the proposed work area.

#### **Operation**

The existing Environmental Management System (EMS), with an integrated Environmental Management Plan (EMP), for the Harbour Authority of Codroy will cover operational aspects of environmental management and is the mitigation measure for the environmentally responsible aspects of harbour operation (e.g., fuelling, waste disposal, activities on the property and water).

#### **Decommissioning**

This facility is not presently planned to be decommissioned. At the time of decommissioning, DFO-SCH will develop a site-specific re-use or reclamation plan that is appropriate for the applicable environmental legislation and DFO policies.

#### **Scheduling**

Subject to regulatory approval and DFO-SCH operational priorities and funding, this Project may commence during the late Fall 2016 – early Winter 2017 time period.

## 20. Location of Project:

The Project is located in the community of Codroy, on the southwest coast of the Island of Newfoundland. It is approximately 40 km northwest of the town of Channel – Port aux Basques, and the coordinates are 47° 52' 46" N, 59° 23' 55" W. The community is accessible via Route 406.

The Project is located within a commercially active harbour owned by DFO-SCH.

## 21. Environment Description:

### Physical Environment

The project site consists of several treated timber cribwork and pile structure wharves, paved and unpaved service areas, a concrete launchway, several fishing sheds and an active fish plant. There are also several residential homes near the project site. The shoreline surrounding the general area consists primarily of pebble-cobble material and exposed limestone bedrock. The uplands area is characterized by low-lying grass and shrubs with forest cover further inland. The water depth at the Project site is between 0.4 m and 4 m

The Project is located within the Southwestern Newfoundland Ecoregion, more specifically, within the Codroy subregion of the Western Newfoundland Forest. This ecoregion covers the west coast of Newfoundland, south of the Northern Peninsula and west of the barrens of the southern Long Range Mountains and the Buchans Plateau. It is marked by cool summers and snowy cold winters, with a mean annual temperature of approximately 4°C. The mean summer temperature is 12°C and the mean winter temperature is -3.5°C. Annual precipitation ranges between approximately 1,000 and 1,200 mm. The steeply sloping highlands are crystalline palaeozoic and precambrian rocks and are part of the old Appalachian Peneplain Region. The upper surface of the Long Range Mountains provides the ecoregion with protection from northeasterly winds, resulting in the most favourable growing season on the island.

### Biological Environment

According to DFO's Traditional Ecological Knowledge Maps, the general area may provide habitat for capelin spawning, eel, piping plover, salmon migration and staging and shorebirds/waterfowl/seabird nesting and staging.

Moose, black bear, caribou, marten, red fox, and lynx are typical terrestrial wildlife that may be found in the area. Small mammals include little brown bat, eastern chipmunk, and red squirrel. A wide range of birdlife can be found in this ecoregion, including various species of warbler, thrush, woodpecker, vireo, flycatcher, and waterfowl. The Ruby Throated Hummingbird nests in this ecoregion, making it one of few areas where it can be found in the Province.

The ecoregion is dominated by closed stands of balsam fir, black spruce, tamarack, and evergreen shrubs that occur in poorly drained areas. Yellow birch, white pine, red maple, and trembling aspen are also common tree species found in the area. Within the Province, two types of alder swamps (golden rod / alder and bracken / fern alder) are found only in this ecoregion. Mayflower, showy lady's slipper, and Carolina spring beauty are flowering plants that, for the most part, are found only within this ecoregion of the Province.

### Species at Risk (Aquatic and Terrestrial)

A search of the Atlantic Canada Conservation Data Centre (AC CDC) database was conducted; this produced a list of rare / unique species (i.e., plants and animals) as defined by the AC CDC within a 5 km buffer zone (standard AC CDC procedure) of the site of the proposed work. All species were cross-referenced with Schedule 1 of the *Species At Risk Act* (SARA) and none were found to be listed as extirpated, endangered and threatened or of special concern.

While two Important Bird Areas exist within both the Codroy Valley and the Codroy Estuary, the project site does not fall within either of these boundaries.



**22. Scope of Effects Considered (sections 5(1) and 5(2)):**

**Table 1: Potential Project / Environment Interactions Matrix**

Project Phase / Physical Work/Activity	As per Section 5(1)			Section 5(1c)				Section 5(2)			Due Diligence			
	Fish (Fisheries Act)	Aquatic Species (SARA)	Birds (MBCA)	Health and Socio economic	Physical and cultural heritage	Land use	*HAPA Significance	Health and Socio economic	Physical and cultural heritage	*HAPA Significance	Water (ground, surface, drainage, etc)	Terrestrial / Aquatic Species	Soil	Air Quality
<b>Construction/Installation</b>														
Wharf demolition, disposal and reconstruction	P	-	-	-	-	-	-	P	-	-	P	P	-	P
Dredging/disposal	P	-	-	-	-	-	-	P	-	-	P	P	P	P
Operation / Maintenance	P	-	-	-	-	-	-	-	-	-	P	-	-	-
Decommissioning / Abandonment	-	-	-	-	-	-	-	-	-	-	-	-	-	-

\*structure, site or thing that is of historical, archaeological, paleontological or architectural significance.

Legend: P = Potential Effect of Project on Environment; '-' = No Interaction

### **23. Environmental Effects of Project:**

Potential Project-environment interactions and effects are outlined below:

#### **Fish / Fish Habitat:**

- Sedimentation as a result of timber crib wall removal / wharf reconstruction has potential to affect fish and quality of fish habitat.
- Accidental discharge of heavy machinery fuel / fluids or concrete that may enter the marine environment have potential to affect fish and fish habitat.

#### **Health and Socio economic:**

- Potential for safety hazards to workers during demolition and construction activities.

#### **Water:**

- Sedimentation as a result of timber crib wall removal / wharf reconstruction has the potential to change water quality immediately around the Project site.
- As a result of Project-related activities, construction-related refuse may accidentally be deposited in water-body, potentially changing marine water quality in the vicinity of the Project site.
- Accidental discharge of heavy machinery fuel / fluids or concrete may result in a change in marine water quality in the vicinity of the Project site.
- Improperly disposed of dredge spoils and treated timber wastes may result in contamination of surface and ground water.

#### **Aquatic species:**

- Sedimentation as a result of timber crib wall removal / wharf reconstruction may negatively impact aquatic species present at the immediate project site.
- Accidental discharge of heavy machinery fuel/fluids or hazardous substances (e.g. concrete washwater) could negatively affect aquatic species present at the immediate project site.
- Improperly disposed dredge spoils and treated timber wastes have the potential to impact aquatic species.

#### **Soils & Sediments:**

- Equipment malfunctions resulting in hydrocarbon release have potential to cause soil or sediment contamination.
- Construction activities at site or natural events (e.g., rainfalls) have potential to result in erosion / sedimentation events.
- Improperly disposed of dredge spoils and treated timber wastes may result in contamination of surrounding soils.

#### **Navigation Consideration:**

- Environmental effects of the project on navigation are taken into consideration as part of the Project Effects Determination (PED) only when the effects are indirect, i.e. resulting from a change in the environment affecting navigation. Direct effects on navigation are not considered in the PED, but any measures necessary to mitigate direct effects will be included as terms and conditions associated with the work approved or permitted pursuant to the *Navigation Protection Act*.

#### 24. Mitigation Measures for Project (including Habitat Compensation):

- The proposed activities must be carried out in such a manner that sediment, and/or other construction-related materials do not enter the marine environment. Sediment and erosion control measures will be established around the site before Project activities begin, and inspected regularly to confirm that they are functioning properly.
- Activities planned near water will be conducted in a manner such that materials including paint, primers, solvents, degreasers, concrete, hydrocarbons, or other chemicals do not enter a watercourse / water body.
- Concrete used to fill the void and scouring from the existing wharf will be confined to the area to be replaced.
- Vehicles and equipment will be in good repair, free of mud, fuel and oil, or other harmful substances that could potentially change water quality. Vehicles and equipment will be maintained to reduce air emissions.
- Cast-in-place concrete, grout, and mortar will be isolated from precipitation and the marine environment for a minimum 48-hour period or until substantially cured, to allow for the pH to reach neutral levels.
- Materials and equipment used for the Project will be operated and stored in a manner that prevents deleterious substances (e.g., petroleum products, lubricants, silt) from entering the marine environment.
- Cribbing ballast will be, to the extent possible, free of fine-grained materials to reduce sedimentation and must not be obtained from below the high-water mark.
- Shoreline or streambank disturbance will be restricted to within the immediate work area. Disturbed shorelines or streambanks should be stabilized.
- Project activities will avoid periods of heavy wind or precipitation, to reduce the potential for sedimentation or runoff, and to reduce the potential for accidental events such as a release of deleterious substances.
- To the extent possible, the Project activities will be carried out during low tide and low wind-wave conditions to reduce turbidity and to localize the area that might be affected by turbidity. The potential exists for a floating barge to be used during Project-related activities. Barge activity will be conducted in calm conditions to reduce the potential for environmental effects.
- Oil spill response equipment, such as absorbents and open-ended barrels, will be available on-site in case of a spill or leak. Spills or leaks will be promptly contained, cleaned up, and reported to the 24-hour environmental emergencies report system (1-800-563-2444).
- The contractor is responsible for having an established oil spill response plan in place prior to commencing Project activities, which is compliant with applicable federal and provincial legislation. This oil spill response plan must be reviewed and approved by DFO-SCH prior to commencing Project-related activities.
- If using a barge, vessels should be compliant with all *Canada Shipping Act, 2001*, requirements for inspection, which includes certification of the vessel and adequate training and appropriate certificate of competency for the operators. Proponents must also ensure that all vessels have procedures in place to ensure safeguards against marine pollution, including; awareness training

of all employees, means of retention of waste oil on board and discharge to shore based reception facilities, capacity of responding to and clean-up of accidental spills caused by vessels.

- Waste materials will be disposed of in an environmentally responsible manner, and in accordance with federal and provincial legislation.
- Even small spills of oil can have effects on migratory birds and fish and fish habitat. Therefore, a reasonable effort will be taken to reduce the chances of an oil spill occurring in the area. Refuelling and maintenance activities will be undertaken on level terrain, at least 30 m from surface water (including shorelines), on a prepared impermeable surface with a collection system to reduce the possibility of oil, gasoline, and hydraulic fluids from entering surface waters. Waste oil will be disposed of in an approved manner that complies with federal and provincial legislation.
- Project activities will comply with relevant federal and provincial occupational health and safety legislation. Workers will be required to wear the appropriate personal protective equipment while undertaking Project activities.
- Upon completion of construction activities, Project-related non-biodegradable erosion and sediment control materials will be removed, along with construction materials and equipment.
- The existing EMS for the harbor authority of Codroy will cover aspects of environmental management during operations of the wharf.
- The existing waste-oil tank will be relocated at a distance that complies with applicable legislated buffers for the location of fuel / hydrocarbon storage tanks.
- The waste-oil storage tank will comply with all relevant federal and provincial regulations for the storage of hydrocarbons, including secondary containment.
- Timber wastes produced from the demolition of the existing wharf piles are permitted for disposal at the Norris Arm Regional Waste Disposal Facility only, pending prior approval from the site owner operator (Norris Arm WMF (709) 653-2900) (Appendix C). The re-use and/or disposal of treated timber wastes at any other location other than the Norris Arm waste disposal site is not permitted.
- Representative sediment samples were collected from the waterlot on August 25, 2016 and submitted for chemical analysis. Several of the samples exceeded CCME industrial soil quality guidelines for arsenic (Appendix C). As such, dredge sediments are not permitted to be re-used on-site or disposed of on private property or crown lands. Dredged sediments are suitable for disposal at a provincially approved landfill only, pending prior approval from Service NL (approval pending at the time of writing of this report) and the site owner/operator.

#### **25. Significance of Adverse Environmental Effects of Project:**

Taking into account the mitigation measures outlined above, the Project is unlikely to result in significant adverse environmental effects on the environment.

#### **26. Other Considerations (Public Consultation, Aboriginal Consultation, Follow-up)**

##### **Public Consultation**

The Project will provide safer and more secure access for vessels using this facility. No negative public concern is expected as a result of this Project. As such, public consultation was not deemed necessary as part of this determination.

##### **Aboriginal Consultation**

Aboriginal fishers are not known to use the Codroy SCH facility, nor are there Aboriginal groups known to use the general Project area. As such, Aboriginal consultation was not deemed necessary as part of this determination.

**Government Consultation**

Federal and provincial authorities likely to have an interest in the project were consulted by Public Works & Government Services Canada, Environmental Services, during the course of this assessment. A project description was distributed to the following authorities:

- Fisheries and Oceans Canada – Fisheries Protection Program (DFO FPP)
- Transport Canada – Navigation Protection Program (TC NPP)
- Newfoundland and Labrador Department of Environment and Climate Change, Pollution Prevention Division (NLDOEC PPD)
- Service Newfoundland and Labrador (SNL)

Mitigations prescribed by DFO FPP have been incorporated into this report and may also be found in Appendix C. It is the proponents' responsibility to ensure that appropriate mitigation measures are adhered to.

TC NPP determined that an approval would be required under the *Navigation Protection Act*.

The NLDOEC indicated the treated timber wastes produced from the demolition of the existing wharf piles are permitted for disposal at the Norris Arm Regional Waste Disposal Facility only, pending prior approval from the site owner operator (Norris Arm WMF (709) 653-2900) (Appendix C). The re-use and/or disposal of treated timber wastes at any other location other than the Norris Arm waste disposal site is not permitted.

SNL is responsible for issuing permits for the disposal of dredged/excavated materials. An application for disposal was submitted on October 18, 2016. At the time of writing of this report a response has not been obtained. Based on the results of sediment samples collected from the site, it is anticipated that the material will be approved for disposal at the nearest provincially approved landfill.

This project is also covered under a blanket provincial Permit to Alter a Body of Water, Permit # ALT5054. All conditions outlined in the permit must be adhered to.

All expert advice/specialist information provided by the above noted departments has been incorporated into this document.

**Accuracy and Compliance Monitoring**

A follow-up program (as defined in S. 2(1) and as applicable to non-designated projects on federal lands) is a program for determining the effectiveness of mitigation measures. Site monitoring (accuracy and compliance monitoring) may be conducted to verify whether required mitigation measures were implemented. The contractor must provide site access to Responsible Authority officials and/or its agents upon request.

**27. Other Monitoring and Compliance Requirements (e.g. *Fisheries Act* or *Species at Risk Act* requirements)**

N/A

## CONCLUSION

### 28. Conclusion on Significance of Adverse Environmental Effects:

The Federal Authorities have evaluated the project in accordance with Section 67 of *Canadian Environmental Assessment Act (CEAA), 2012*. On the basis of this evaluation, the departments have determined that the project is not likely to cause significant adverse environmental effects with mitigation and therefore can proceed using mitigative measures as outlined.

29. Prepared by:



30. Date: October 18, 2016

31. Name:

Mark McNeil

32. Title:

Environmental Specialist, PSPC-ES

## DECISION

### 33. Decision Taken

- DFO may exercise its power, duty or function, i.e. may issue the authorization - where the project is not likely to cause significant adverse environmental effects. Confirm below the specific power, duty or function that may be exercised.
- DFO to issue *Fisheries Act* Authorization or *Species at Risk Act* Permit
  - DFO to proceed with project (as proponent)
  - DFO to provide financial assistance for project to proceed
  - DFO to provide federal land for project to proceed
- DFO has decided not to exercise its power, duty or function because the project is likely to cause significant adverse environmental effects.
- DFO to ask the Governor in Council to determine if the significant adverse environmental effects are justified in the circumstances

34. Approved by:



35. Date:

Dec 9/16

36. Name:

Paul Curran


37. Title:

Regional Engineer, DFO-SCH, NL

38. References:

n/a

**39. TRANSPORT CANADA RECOMMENDATION**

<b>Project Title:</b>	Wharf reconstruction, Codroy, NL	
<b>TC File No.:</b>	NEATS: 43563	
<b>NPP File No.:</b>	NPP# 2016-200101	
<b>Environmental Review Decision:</b>	Taking into account the implementation of any mitigation measures that Transport Canada considers appropriate, the project <b>is not likely</b> to cause significant adverse environmental effects and, as such, Transport Canada may exercise any power or perform any duty or function that would permit the project to be carried out in whole or in part.	
<b>Reviewed by:</b>	<b>Melissa Ginn</b> Environmental Officer Environmental Affairs and Aboriginal Consultation Unit	
<b>Signature:</b>		<b>Date:</b>
<b>Mailing Address:</b>	10 Barter's Hill, St. John', NL	
<b>Tel:</b>	709-772-3088	
<b>Fax:</b>	709-772-3072	
<b>Email:</b>	melissa.ginn@tc.gc.ca	
<b>Recommended by:</b>	<b>J. Jason Flanagan</b> Senior Environmental Assessment Officer Environmental Affairs and Aboriginal Consultation Unit	
<b>Signature:</b>		<b>Date:</b>
<b>Approved by:</b>	<b>Kevin LeBlanc</b> Regional Manager Environmental Affairs and Aboriginal Consultation Unit	
<b>Signature:</b>		<b>Date:</b>

- Appendix A - Topographic Map and Aerial Photographs
- Appendix B: Site Plans
- Appendix C: Regulatory approvals/responses
- Appendix D: Timber and Sediment analytical results



**Appendix A**  
**Topographic Map and Aerial Photos**



Figure 1. Topographic map indicating location of proposed project

Scale: 1:50,000





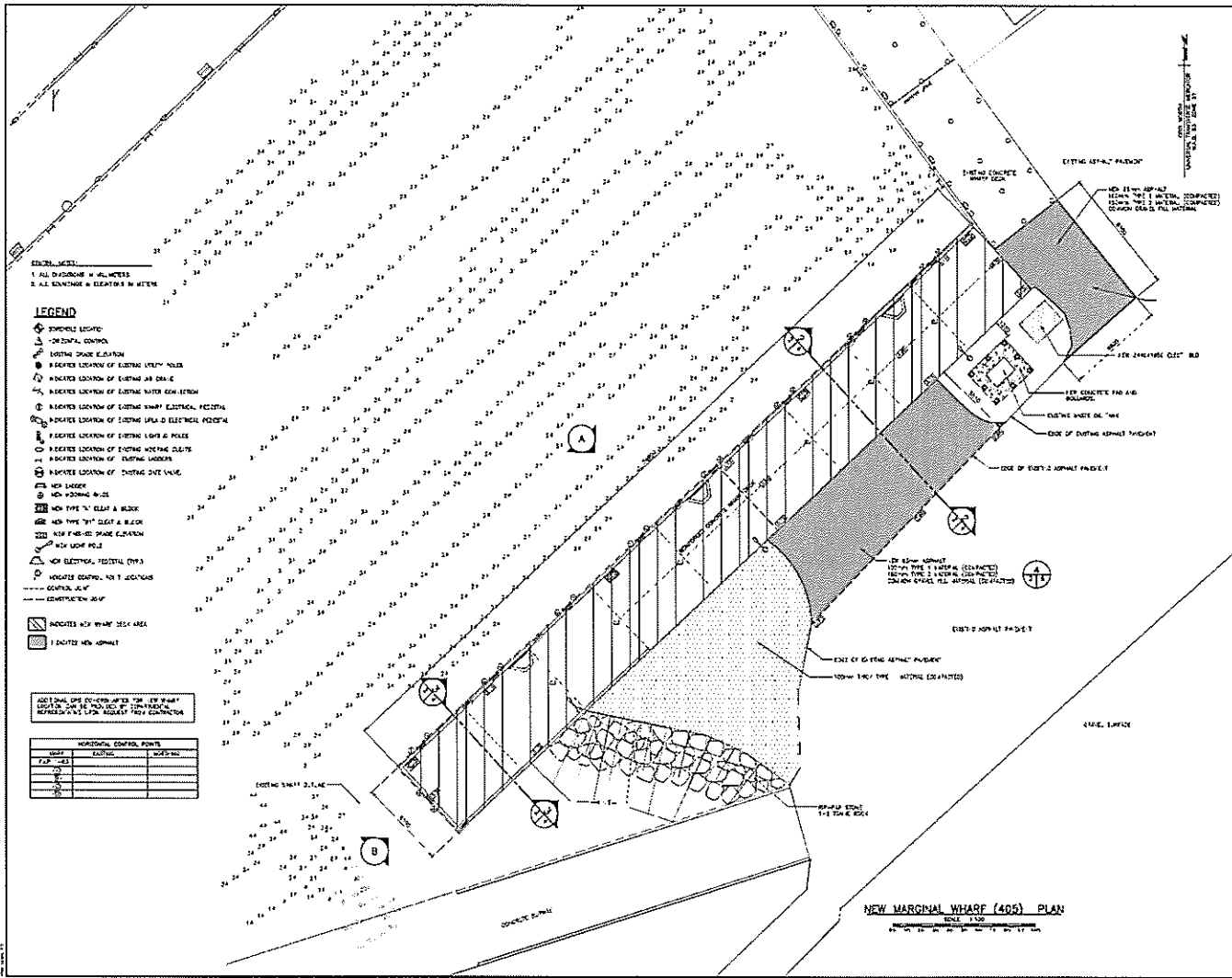
Figure 2: Aerial overview of Codroy SCH.



Figure 3. Section of wharf to be reconstructed (red).

**Appendix B**  
**Site plans of existing conditions and proposed reconstruction**





SCALE: 1:50  
 1. ALL DIMENSIONS IN METERS  
 2. ALL DIMENSIONS IN FEET AND INCHES

**LEGEND**

- GENERAL LIGHT
- △ CONCRETE COLUMN
- EXISTING SHAPE ELEVATION
- INDICATES LOCATION OF EXISTING UTILITY HOLES
- INDICATES LOCATION OF EXISTING AIR DUCTS
- INDICATES LOCATION OF EXISTING WATER CONDUITS
- INDICATES LOCATION OF EXISTING WHARF ELECTRICAL PANELS
- INDICATES LOCATION OF EXISTING WELD ELECTRICAL PANELS
- INDICATES LOCATION OF EXISTING LIGHT FIXTURES
- INDICATES LOCATION OF EXISTING AIRING DECKS
- INDICATES LOCATION OF EXISTING LADDERS
- INDICATES LOCATION OF EXISTING DATE VALVE
- NEW LADDER
- NEW WOODING WALK
- NEW PIPE 1" CLEAR & BLOCK
- NEW PIPE 2" CLEAR & BLOCK
- NEW FIBERGLASS PANE ELEVATION
- NEW WOOD PILE
- NEW ELECTRICAL FEEDLINE (TYPE 1)
- NEW ELECTRICAL FEEDLINE (TYPE 2)
- CONDUIT JOINT
- CONSTRUCTION JOINT
- INDICATES NEW WHARF TEST AREA
- INDICATES NEW ASPHALT

ALL DIMENSIONS AND COORDINATES FROM THE WHARF LEGION CAN BE TAKEN FROM THE CONSTRUCTION REFERENCE POINTS. VERIFY THESE COORDINATES.

NORTHING CONTROL POINTS		
POINT	EASTING	NORTHING
1		
2		
3		
4		
5		

**SMALL CRAFT HARBOURS**

**WHARF #404 RECONSTRUCTION COBBOY, NL**

**NEW SITE PLAN**

DATE	7/10/19
SCALE	1:50
DRAWN BY	704074
CHECKED BY	
APPROVED BY	

2 of 6

SMALL CRAFT HARBOURS



1. THIS IS A REVISION TO THE ORIGINAL DRAWING. ALL CHANGES ARE INDICATED BY CIRCLES AND DASHES.

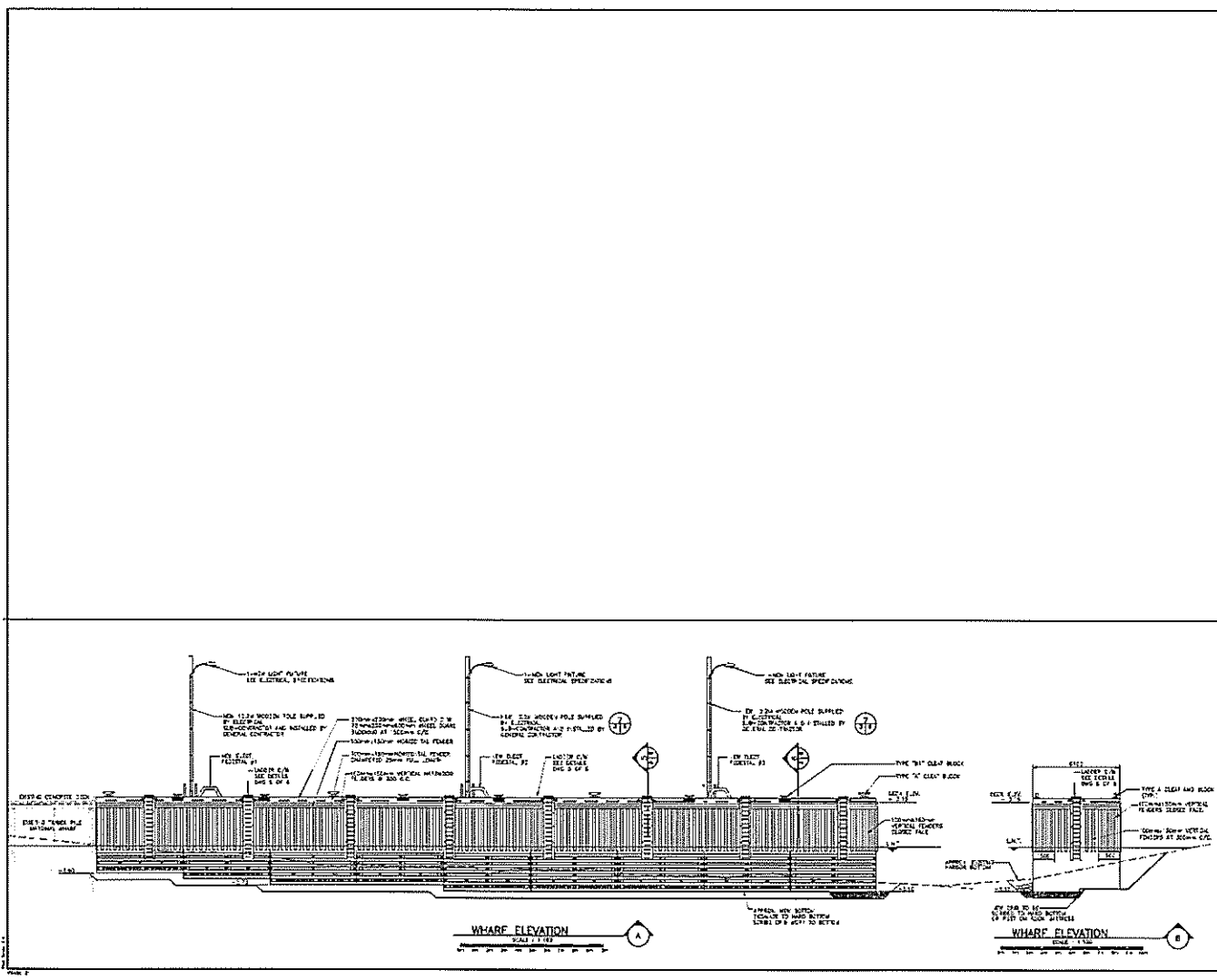


NO.	DATE	BY	CHKD.
A	REVISED PER REVIEW	AWK	

WHARF #404 RECONSTRUCTION CUDROY, FL.

WHARF CRIB PLAN, WHARF ELEVATIONS

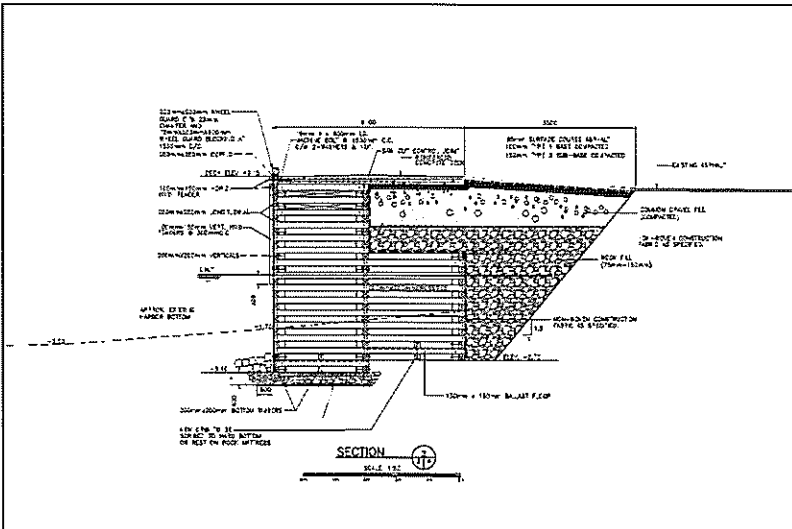
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DATE	10/11/2014
SCALE	AS SHOWN
DESIGNER	AWK
CHECKER	AWK
DATE PLOTTED	10/11/2014
SCALE	AS SHOWN
PROJECT NO.	704074
DATE	10/11/2014



WHARF ELEVATION A

WHARF ELEVATION B

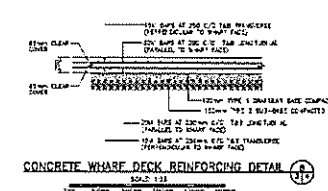
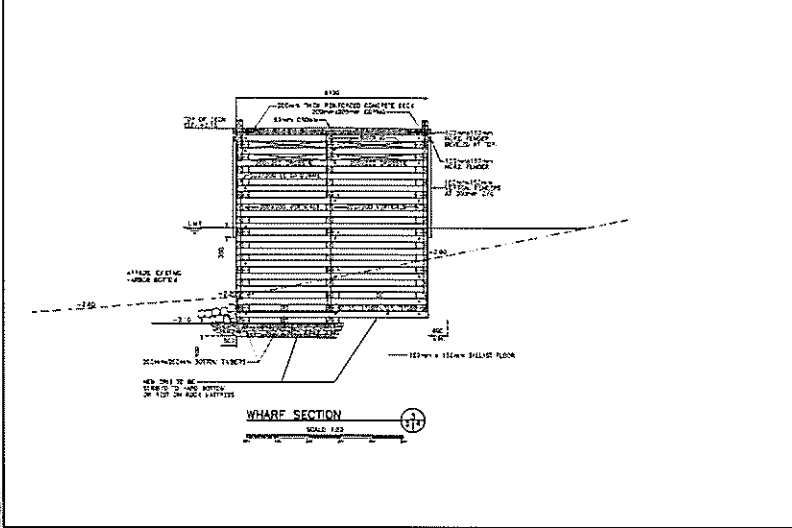




- NOTES:**
1. ALL DIMENSIONS TO FACE UNLESS NOTED OTHERWISE
  2. ALL CONCRETE STRENGTH IS 28 DAY COMPRESSIVE STRENGTH
  3. ALL REINFORCING STEEL SHALL BE SUPPLIED TO THE CONTRACTOR TO BE LAPPED AND WELDED TO THE DESIGNER'S REQUIREMENTS
  4. ALL REINFORCING STEEL SHALL BE LAPPED AND WELDED TO THE DESIGNER'S REQUIREMENTS
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**SMALL CRAFT HARBOURS**

DEPARTMENT OF MARINE AND FISHERIES  
NEW BRUNSWICK



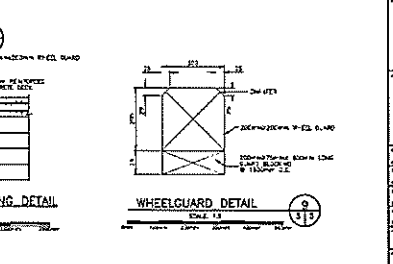
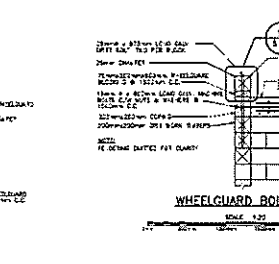
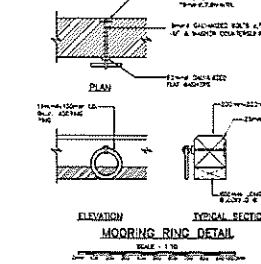
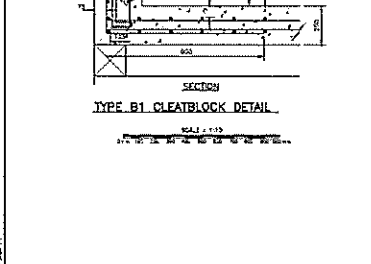
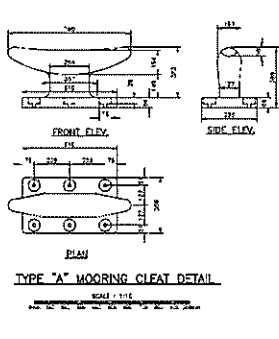
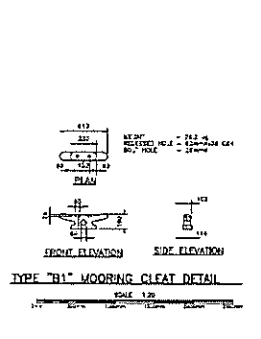
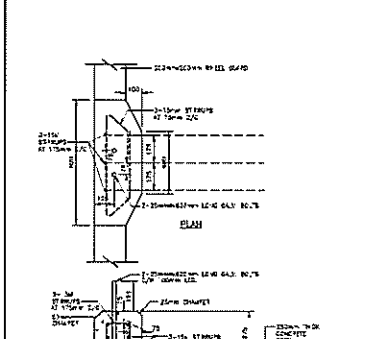
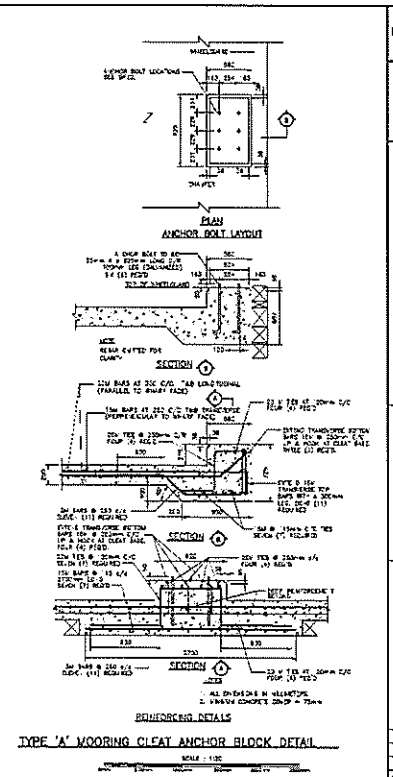
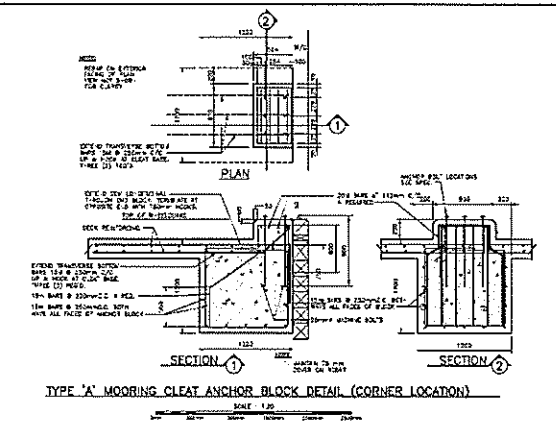
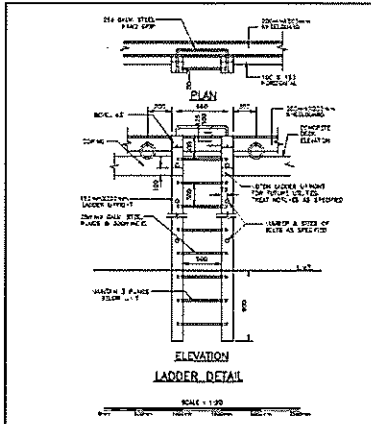
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2	ISSUED FOR REVIEW	10/1/2019
3	ISSUED FOR REVIEW	10/1/2019
4	ISSUED FOR REVIEW	10/1/2019

**WHARF #404 RECONSTRUCTION COBROV, NL**

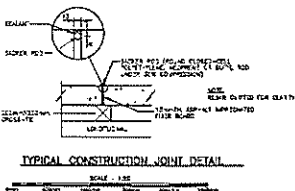
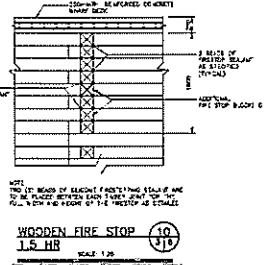
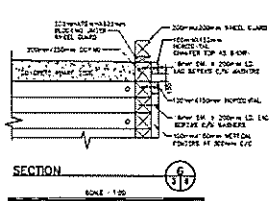
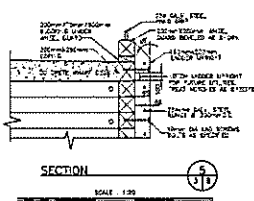
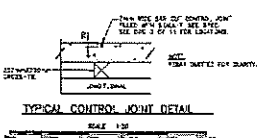
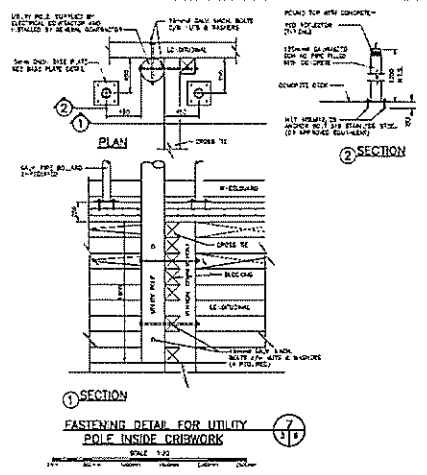
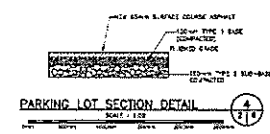
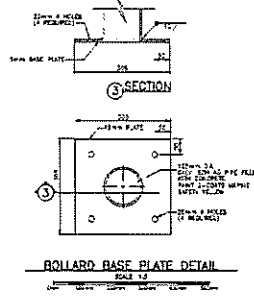
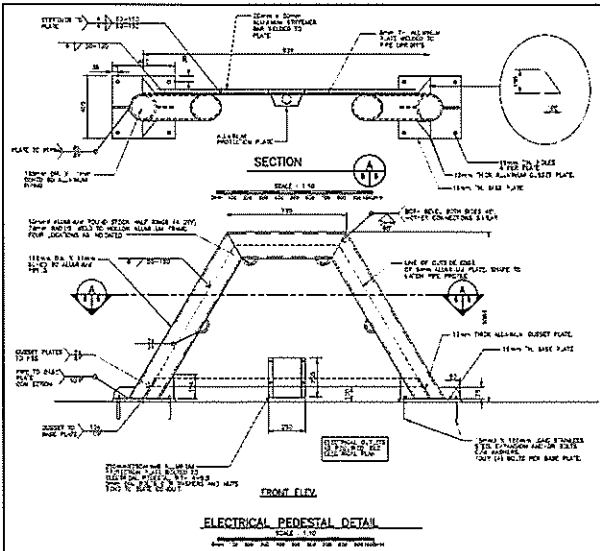
**WHARF SECTIONS**

NO. 704074

4 of 6



SMALL CRAFT HARBOURS	
<p>OFFICE OF SUPERVISOR OF PORTS AND HARBOURS NEW YORK AND NEW JERSEY</p>	
NO.	REVISION FOR WORK
DATE	BY
<p><b>WHARF #404 RECONSTRUCTION COBDOY, N.J.</b></p>	
<p>MISC DETAILS</p>	
<p>DESIGNED BY: [Name]</p>	<p>CHECKED BY: [Name]</p>
<p>DATE: [Date]</p>	<p>SCALE: [Scale]</p>
<p>704074</p>	
<p>5 of 6</p>	



SMALL CRAFT HARBOURS	
WHARF #404 RECONSTRUCTION COBROY, IL.	
MISC DETAILS	
SHEET NO. 704074	OF 5

**Appendix C**  
**Regulatory approvals/responses**



Fisheries and Oceans Canada Pêches et Océans Canada

P.O. Box 5667  
St. John's, NL A1C 5X1

SEP 06 2016

Your file      Votre référence

Our file      Notre référence  
16-HNFL-00384

Mr. Paul Curran  
SCH – DFO  
10 Barter's Hill  
P.O. Box 5667  
St. John's, NL A1C 5X1

Dear Mr. Curran:

**Subject: Implementation of mitigation measures to avoid and mitigate serious harm to fish – Wharf Replacement, Codroy, NL**

The Fisheries Protection Program (the Program) of Fisheries and Oceans Canada received your proposal on August 25, 2016.

Your proposal has been reviewed to determine whether it is likely to result in serious harm to fish which is prohibited under subsection 35(1) of the *Fisheries Act*.

The proposal has also been reviewed to determine whether it will adversely impact listed aquatic species at risk and contravene sections 32, 33 and 58 of the *Species at Risk Act*.

Our review consisted of:

- Application for Review

We understand that you propose to:

- Replace an existing marginal wharf with a smaller, timber pile structure

To avoid the potential of serious harm to fish and their habitat, we are recommending that the attached mitigation measures be included into your plans.

Provided that these mitigation measures are incorporated into your plans, the Program is of the view that your proposal will not result in serious harm to fish. The Program is also of the view that your proposal will not contravene sections 32, 33 or 58 of the *Species at Risk Act*. No formal approval is required from the Program under the *Fisheries Act* or the *Species at Risk Act* in order to proceed with your proposal.

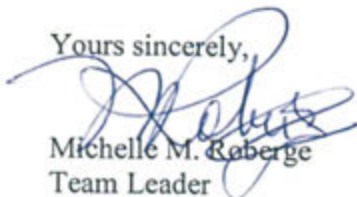
If your plans have changed or if the description of your proposal is incomplete, or changes in the future, you should consult our website (<http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html>) or consult with a qualified environmental consultant to determine if further review is required by the Program.

A copy of this letter should be kept on site while the work is in progress.

It remains your responsibility to meet the other requirements of federal, provincial and municipal agencies.

If you have any questions, please contact Triage and Planning at our St. John's office at (709)-772-4140, by fax at (709)-772-5562, or by email at [FPP-NL@dfo-mpo.gc.ca](mailto:FPP-NL@dfo-mpo.gc.ca). Please refer to the file number referenced above when corresponding with the Program.

Yours sincerely,



Michelle M. Roberge  
Team Leader  
Triage and Planning

Attch (1)

## Mark McNeil

---

**From:** Hann, Joan <joanhann@gov.nl.ca>  
**Sent:** September-22-16 2:55 PM  
**To:** Mark McNeil  
**Cc:** Simms, Tanya J.; Ryan, Marie  
**Subject:** FW: Service NL Referral for Treated Timber Disposal - DFO SCH Western Area - Codroy, NL

Hello Mark

Based upon the results this material shall be disposed at Norris Arm Regional Waste Disposal Facility . Please contact the operator prior to disposal .

A copy of a bill of lading/or an equivalent form ( completed by WDS operator) confirming the waste material was received at the site shall be emailed to my attention.

### Contact Information for Norris Arm WMF

Phone: 709 653-2900  
Fax: 709 653-2920  
E-Mail: [info@cnwmc.com](mailto:info@cnwmc.com)  
Web: [www.cnwmc.com](http://www.cnwmc.com)

Regards

---

**From:** Mark McNeil [mailto:Mark.McNeil@pwgsc-tpsgc.gc.ca]  
**Sent:** Wednesday, September 21, 2016 3:28 PM  
**To:** Hann, Joan  
**Cc:** Simms, Tanya J.  
**Subject:** Service NL Referral for Treated Timber Disposal - DFO SCH Western Area - Codroy, NL

Good afternoon Joan,

Please find attached an application for approval to dispose of creosote treated timber from the reconstruction of an existing wharf located at the DFO SCH site in Codroy, NL.

If you need anything else just let me know.

Thanks,  
Mark

**Mark McNeil, M.Sc.**

Environmental Services | *Services écologiques*  
Public Services and Procurement Canada | *Services Publics et Approvisionnement Canada*  
Suite 204, 1 Regent Square, Corner Brook, NL A2H 7K6 | *Pièce 204, 1 Place Regent, Corner Brook, TN A2H 7K6*

[mark.mcneil@pwgsc-tpsgc.gc.ca](mailto:mark.mcneil@pwgsc-tpsgc.gc.ca)

Tel: (709) 637-4481 | *facsimile/télécopieur (709) 637-4566*  
Mobile: (709) 632-8516 | *cellulaire (709) 632-8516*  
Government of Canada | *Gouvernement du Canada*

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“This email and any attached files are intended for the sole use of the primary and copied addressee(s) and may contain privileged and/or confidential information. Any distribution, use or copying by any means of this

## PERMIT TO ALTER A BODY OF WATER

---

Pursuant to the *Water Resources Act*, SNL 2002 cW-4.01, Section(s) 48

Date: **JANUARY 13, 2010**

File No: **532-02**  
Permit No: **ALT5054**

Proponent: **Department of Fisheries and Oceans  
Small Craft Harbours Branch  
1144 Topsail Road  
Mount Pearl NL A1N 5E8**

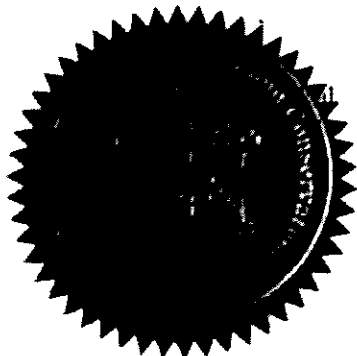
Attention: **William Goulding**

Re: **Minor DFO Dredging Projects (2010 - 2015)**

---

Permission is hereby given for: routine dredging or beach grading of 2000 cubic metres or less of primarily sand, gravel, cobble, and boulder material in order to provide safe navigation at various harbour facilities around the Province, with reference to January 6, 2010 request to extend Permit ALT 2120.

- This permit does not release the proponent from the obligation to obtain appropriate approvals from other concerned provincial, federal and municipal agencies.
- This permit is subject to the terms and conditions indicated in Appendix A (attached).
- It should be noted that prior to any significant changes in the design or installation of the proposed works, or in event of changes in ownership or management of the project, an amendment to this permit must be obtained from the Department of Environment and Conservation under Section 49 of the *Water Resources Act*.
- Failure to comply with the terms and conditions will render this permit null and void, place the proponent and their agent(s) in violation of the *Water Resources Act* and make the proponent responsible for taking any remedial measures as may be prescribed by this Department.



  
MINISTER



**APPENDIX A**  
**Terms and Conditions for Environmental Permit**

---

Minor DFO Dredging Projects (2010 - 2015)

**Dredging**

1. Dredging activity must only be carried out during periods when wind, wave and tide conditions minimize the dispersion of silt and sediment from the work site.
2. For each minor dredging project requiring the removal of more than 200 cubic metres of material, the proponent must notify this Department by e-mail or fax using the attached project notification for at least two (2) working days prior to the start date.

**General Alterations**

3. All operations must be carried out in a manner that prevents damage to land, vegetation, and watercourses, and which prevents pollution of bodies of water.
4. The use of heavy equipment in streams or bodies of water is not permitted. The operation of heavy equipment must be confined to dry stable areas.
5. All vehicles and equipment must be clean and in good repair, free of mud and oil, or other harmful substances that could impair water quality.
6. All areas affected by this project must be restored to a state that resembles local natural conditions. Further remedial measures to mitigate environmental impacts on water resources can and will be specified, if considered necessary in the opinion of the Department.
7. All dredged materials resulting from this project must be disposed of at a site approved by the regional Government Services Centre of the Department of Government Services. Depending on test results, dredged materials may in some cases be redeposited and levelled along nearby shorelines.
8. This Permit is valid for five (5) years from the date of issue. An application for renewal or for amendments to this permit may be submitted prior to the expiry date.

**Special Conditions**

9. All work must take place within the proponents legal boundary or with the approval of the upland owner. All work must comply with all other terms and conditions of the Crown Lands grant, lease or license for occupancy.

**Water Quality**

10. This Department reserves the right to require that the proponent sample, analyze, and submit results of water quality tests, for the purpose of ensuring that water quality is maintained within acceptable guidelines.

- cc: Mr. Bob Whitten, Director  
Department of Government Services  
PO Box 8700  
St. John's NL A1B 4J6
- cc: Mr. Calvin Adams (Avalon)  
Regional Manager, Department of Government Services  
Regional Government Service Centre  
PO Box 512  
Harbour Grace NL A0A 2M0
- cc: Mr. Carl Hann (Western)  
Department of Government Services  
PO Box 2006  
Corner Brook NL A2H 6J8
- cc: Mr. Ken Russell (Labrador)  
Manager of Operations  
Department of Government Services  
PO Box 3014, Stn. B  
Happy Valley-Goose Bay NL A0P 1E0
- cc: Mr. Robert Groves (Clarenville Area)  
Regional Government Services Centre  
Department of Government Services  
2 Masonic Terrace  
PO Box 1148  
Clarenville NL A5A 1N2
- cc: Mr. Robert Turner (Eastern Central)  
Manager of Operations  
Department of Government Services  
PO Box 2222  
Gander NL A1V 2N9
- cc: Ms Tanya Simms (Western)  
Manager of Operations  
Department of Government Services  
PO Box 2006  
Corner Brook NL A2H 6J8
- cc: Ms. Donna Folks (Western Central)  
Manger of Operations, Department of Government Services  
3 Cromer Ave.  
Grand Falls-Winsor NL A2A 1W9
- cc: Mr. Darrin Sooley (W)  
Area Habitat Co-ordinator  
Department of Fisheries and Oceans  
1 Regent Square, Suite 201  
Corner Brook NL A2H 7K6
- cc: Mr. Jack O'Rourke (S)  
Area Habitat Biologist - Southern  
Department of Fisheries and Oceans  
1144 Topail Road  
St. John's NL A1N 5E8
- cc: Mr. Leon W. King (C)  
Area Habitat Biologist - Central

Department of Fisheries and Oceans  
4A Bayley Street, Suite 200  
Grand Falls-Windsor NL A2A 2T5

- cc: Mr. Terry Fleet (E)  
Area Habitat Biologist - Eastern  
Department of Fisheries and Oceans  
1144 Topsail Road  
St. John's NL A1N 5E8
- cc: Ms. Kathleen Simms (L)  
Area Habitat Biologist - Labrador  
Department of Fisheries and Oceans  
Bldg. 397, CFB Goose Bay  
PO Box 7003, Station A  
Happy Valley - Goose Bay, NL A0P 1S0
- cc: Ms. Ellen Pickett  
NWPA  
Transport Canada  
John Cabot Building  
PO Box 1300  
St. John's NL A1C 6H8
- cc: Mr. A. W. Pitcher  
Environmental Services  
Department of Public Works and Government Services Canada  
Suite 204, 1 Regent Square  
Corner Brook NL A2H 7K6



## Timber Cribwork

## Fisheries and Oceans Canada

Measures to Avoid Causing Harm to Fish and Fish Habitat

On November 25, 2013 the Fisheries Protection Provisions of the *Fisheries Act* came into force. The *Fisheries Act* requires that projects avoid causing *serious harm to fish* unless authorized by the Minister of Fisheries and Oceans. This applies to work being conducted in or near waterbodies that support fish that are part of or that support a commercial, recreational or Aboriginal fishery.

If you are conducting a project near water, it is your responsibility to ensure you avoid causing serious harm to fish in compliance with the *Fisheries Act*. The following advice will help you avoid causing harm and comply with the *Act*.

- a. *Material used to fill a timber crib structure should be free of fines or sediment; suitable material may include clean blasted rock or boulders.*
- b. *Material should never be removed directly from any watercourse, streambank or shoreline area for use as ballast.*
- c. *Shoreline or streambank disturbance should be restricted to the immediate work area. Disturbed shorelines or streambanks should be stabilized.*
- d. *Untreated wood or pressure treated wood is required for use in or near freshwater environments. Freshly treated preserved wood is to be avoided. The appropriate regulatory agencies (e.g., Environment Canada) should be contacted regarding the use of wood treatment products, weathering and the location of treatment sites for manually applied preservatives.*
- e. *Equipment should be mechanically sound to avoid leaks of oil, gas, and/or hydraulic fluids. Equipment use should be confined to dry stable areas.*
- f. *Conduct work in a manner that prevents the release of debris (e.g., cribbing, ballast, etc.) or sediments into the water.*
- g. *If dredging is required to seat cribs, work should be carried out during low tide or low flow conditions; minimize the amount of dredged material removed by only dredging the area and depth required; use site isolation measures (e.g., silt boom or silt curtain) for containing suspended sediment where in-water work is required.*
- h. *When works are completed, the stream channel, banks and approaches should be restored to original condition.*



Figure 1: Infill material for timber cribs should be blocky, angular and free of fines or sediment.

Additional measures that may be required to protect fish and fish habitat can be found on the DFO national website (<http://www.dfo-mpo.gc.ca/pnw-pppe/index-eng.html>) and in the *Guidelines for the Protection of Freshwater Fish Habitat in Newfoundland & Labrador* (<http://www.dfo-mpo.gc.ca/Library/240270.pdf>)

Should your plans change please contact the Fisheries Protection Program-Regulatory Review:

Fisheries Protection Program  
Fisheries and Ocean Canada  
80 East White Hills Road  
St. John's NL A1C 5X1  
Telephone: (709) 772-4140  
Fax: (709) 772-5562  
Email: FPP-NL@dfo-mpo.gc.ca

ote: This advice is only applicable to the project specified on the accompanying DFO letter.

information is strictly prohibited. If you received this email in error, please delete it immediately and notify the sender.”

January 6, 2017

Mr. Mark McNeil  
Environmental Services  
Public Works and Government Services Canada  
1 Regent Square, Suite 204  
Corner Brook, NL A2H 7K6

**RE: Dredge Disposal – Wharf Reconstruction, Codroy, NL**

Dear Mr. McNeil:


Service NL has reviewed your request submitted on October 18, 2016 regarding the disposal of dredged materials from the wharf reconstruction at Codroy, NL

Based on data results contained in the report, Service NL has approved your request to dispose of 425m<sup>3</sup> of dredged material at an approved waste disposal site subject to the following stipulations:

1. Dredged materials are to be disposed of at the local waste disposal site only. Approval is to be obtained from the owner/operator of the site prior to disposal.
2. Dredged materials are to be stockpiled on site for a minimum of 24 hours before transportation to allow for the drainage of water. The stockpile area is to be located as close as possible to the high water mark. Care is to be taken in choosing this site to limit the negative effect of odors emitting from the stockpile.
3. Dredged materials are to be transported in water tight trucks or containers to prevent leakage.
4. The re-use of dredged materials for other purposes is not permitted under this approval.
5. It is the responsibility of the proponent to obtain any other necessary permits or approvals from federal, provincial, or municipal authorities.
6. The Department reserves the right to cancel this approval at any time for non-compliance with any of the above conditions or for another reason that the Department deems to warrant such action.

If you have any questions, please call (709) 637-2678.

Sincerely,

  
Deborah Goosney  
Environmental Protection Officer  
Service NL



File No. 532-02

## PROJECT NOTIFICATION

Pursuant to the *Water Resources Act* SNL 2002 cW-4.01, Section(s) 48

Date: \_\_\_\_\_

Permit No: ALT 5054

Proponent: Department of Fisheries and Oceans  
Small Craft Harbours Branch  
PO Box 5667, John Cabot Bldg.  
St. John's, NL A1C 5X1

Attention: William Goulding

Re: Minor DFO Dredging Projects (2010 – 2015)

---

This Permit is valid for: Routine dredging or beach grading of 2000 cubic metres or less of primarily sand, gravel, cobble, and boulder material in order to provide safe navigation at various harbour facilities around the Province, with reference to January 6, 2010 request to extend Permit ALT 2120.

### DETAILS:

Waterbody: \_\_\_\_\_ Region: \_\_\_\_\_ Location: \_\_\_\_\_  
UTM: N: \_\_\_\_\_ E: \_\_\_\_\_ Zone: \_\_\_\_\_ NAD: \_\_\_\_\_

Contact Person: \_\_\_\_\_ Project Schedule: From \_\_\_\_\_ to \_\_\_\_\_  
Contact Tel #: \_\_\_\_\_

Work Description: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

This NOTIFICATION must be completed and forwarded as noted below to Department of Environment and Conservation a minimum of **TWO WORKING DAYS** prior to the start of construction. By FAX: (709) 729-0320 or by email: [clydemclean@gov.nl.ca](mailto:clydemclean@gov.nl.ca)





**Appendix D**  
**Timber and sediment analytical results**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICE  
JOHN CABOT BLDG, 10 BARTERS HILL, BOX 4600  
ST. JOHNS, NL A1C5T2  
(709) 772-5396

ATTENTION TO: Karen Foote-Young

PROJECT: AGAT16-21 700359793/R.049540.020

AGAT WORK ORDER: 16X132849

SOIL ANALYSIS REVIEWED BY: Laura Baker, Inorganics Data Reporter

TRACE ORGANICS REVIEWED BY: Jennifer Patterson, Organics Supervisor

DATE REPORTED: Oct 11, 2016

PAGES (INCLUDING COVER): 16

VERSION\*: 2

Should you require any information regarding this analysis please contact your client services representative at (902) 468-8718

**\*NOTES**

VERSION 2: Version 2.0 supersedes Version 1.0, additional analysis, issued, October 11, 2016.

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.



# Certificate of Analysis

AGAT WORK ORDER: 16X132849  
 PROJECT: AGAT16-21 700359793/R.049540.020

11 Morris Drive, Unit 122  
 Dartmouth, Nova Scotia  
 CANADA B3B 1M2  
 TEL (902)468-8718  
 FAX (902)468-8924  
 http://www.agatlabs.com

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICE  
 SAMPLING SITE: Codroy, NL

ATTENTION TO: Karen Foote-Young  
 SAMPLED BY:

## In-House Leachable Metals

DATE RECEIVED: 2016-08-31

DATE REPORTED: 2016-10-11

Parameter	Unit	SAMPLE DESCRIPTION: Codroy SED 1    Codroy SED 2			
		SAMPLE TYPE: Soil		Soil	
		DATE SAMPLED: 8/25/2016	8/25/2016	8/25/2016	8/25/2016
		G / S	RDL	7814960	7814970
Aluminum Leachate	mg/L		0.02	0.02	<0.02
Antimony Leachate	mg/L		0.02	<0.02	<0.02
Arsenic Leachate	mg/L		0.02	<0.02	<0.02
Barium Leachate	mg/L		0.02	0.34	0.16
Beryllium Leachate	mg/L		0.05	<0.05	<0.05
Bismuth Leachate	mg/L		0.02	<0.02	<0.02
Boron Leachate	mg/L		0.05	0.41	0.60
Cadmium Leachate	mg/L		0.003	<0.003	<0.003
Chromium Leachate	mg/L		0.02	<0.02	<0.02
Cobalt Leachate	mg/L		0.01	<0.01	<0.01
Copper Leachate	mg/L		0.02	0.06	0.07
Iron Leachate	mg/L		0.2	<0.2	<0.2
Lead Leachate	mg/L		0.005	<0.005	<0.005
Lithium Leachate	mg/L		0.02	<0.02	<0.02
Manganese Leachate	mg/L		0.02	7.56	7.19
Molybdenum Leachate	mg/L		0.02	<0.02	<0.02
Nickel Leachate	mg/L		0.02	<0.02	<0.02
Selenium Leachate	mg/L		0.02	<0.02	<0.02
Silver Leachate	mg/L		0.005	<0.005	<0.005
Strontium Leachate	mg/L		0.02	1.63	2.91
Thallium Leachate	mg/L		0.001	<0.001	<0.001
Tin Leachate	mg/L		0.02	<0.02	<0.02
Uranium Leachate	mg/L		0.001	<0.001	0.002
Vanadium Leachate	mg/L		0.02	<0.02	<0.02
Zinc Leachate	mg/L		0.02	0.08	0.27
% Moisture	%			30	31

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By: \_\_\_\_\_



**AGAT** Laboratories

### Certificate of Analysis

AGAT WORK ORDER: 16X132849  
PROJECT: AGAT16-21 700359793/R.049540.020

11 Morris Drive, Unit 122  
Dartmouth, Nova Scotia  
CANADA B3B 1M2  
TEL (902)468-8718  
FAX (902)468-8924  
http://www.agatlabs.com

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICE  
SAMPLING SITE: Codroy, NL

ATTENTION TO: Karen Foote-Young  
SAMPLED BY:

**PWGSC NL - Marine Sediment Package - Inorganics**

DATE RECEIVED: 2016-08-31

DATE REPORTED: 2016-10-11

Parameter	Unit	SAMPLE DESCRIPTION: Codroy SED 1    Codroy SED 2    Codroy SED 3				
		G / S	SAMPLE TYPE: Soil			8/25/2016
			RDL	8/25/2016	8/25/2016	
			7814960	7814970	7814971	
Aluminum	mg/kg	10	3060	4360	4970	
Antimony	mg/kg	1	<1	<1	<1	
Arsenic	mg/kg	1	39	15	12	
Barium	mg/kg	5	73	48	50	
Beryllium	mg/kg	2	<2	<2	<2	
Boron	mg/kg	2	15	19	20	
Cadmium	mg/kg	0.3	<0.3	<0.3	<0.3	
Chromium	mg/kg	2	16	21	29	
Cobalt	mg/kg	1	3	4	5	
Copper	mg/kg	2	12	18	49	
Iron	mg/kg	50	46800	16200	24700	
Lead	mg/kg	0.5	11.1	15.1	21.1	
Manganese	mg/kg	2	449	583	424	
Molybdenum	mg/kg	2	<2	<2	3	
Nickel	mg/kg	2	13	17	24	
Selenium	mg/kg	1	<1	<1	<1	
Silver	mg/kg	0.5	<0.5	<0.5	<0.5	
Strontium	mg/kg	5	57	65	69	
Thallium	mg/kg	0.1	<0.1	<0.1	<0.1	
Tin	mg/kg	2	4	4	4	
Uranium	mg/kg	0.1	0.3	0.5	0.6	
Vanadium	mg/kg	2	16	17	17	
Zinc	mg/kg	5	54	57	58	
Mercury	mg/kg	0.05	<0.05	<0.05	<0.05	
Cyanide	µg/g	0.040	<0.040	<0.040	<0.040	
pH			7.54	8.01	8.15	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard  
7814960-7814971 Results are based on the dry weight of the sample.

Cyanide analysed at AGAT Mississauga.

Certified By: \_\_\_\_\_

*Laura Palm*



## Certificate of Analysis

AGAT WORK ORDER: 16X132849  
PROJECT: AGAT16-21 700359793/R.049540.020

11 Morris Drive, Unit 122  
Dartmouth, Nova Scotia  
CANADA B3B 1M2  
TEL (902)468-8718  
FAX (902)468-8924  
<http://www.agatlabs.com>

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICE

ATTENTION TO: Karen Foote-Young

SAMPLING SITE: Codroy, NL

SAMPLED BY:

### AGAT HALIFAX- PWGSC NL - Timber Package B (TCLP BNA)

DATE RECEIVED: 2016-08-31

DATE REPORTED: 2016-10-11

Parameter	Unit	Codroy Timber					
		G / S	RDL	1	2	RDL	3
SAMPLE DESCRIPTION:				Codroy Timber		Codroy Timber	
SAMPLE TYPE:				Timber		Timber	
DATE SAMPLED:		8/25/2016		8/25/2016		8/25/2016	
		7814976		7815075		7815078	
Cresols	mg/L	0.120	<0.120	<0.120	12.0	<12.0	
Ortho-Cresol	mg/L	0.040	<0.040	<0.040	4.00	<4.00	
Meta & Para-Cresol	mg/L	0.080	<0.080	<0.080	8.00	<8.00	
Benzo(a)pyrene	mg/L	0.010	0.39	2.2	1.00	1.7	
Pentachlorophenol	mg/L	0.050	<0.050	<0.050	5.00	<5.00	
Surrogate	Unit	Acceptable Limits					
Chrysene-d12	%	50-130	114	107		60	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

7814976-7815078 Analysis was performed on the leachate.

Due to the nature of the sample extract was diluted and the reporting detection limit has been raised.

Certified By: \_\_\_\_\_

*J. Patterson*



**AGAT** Laboratories

## Certificate of Analysis

AGAT WORK ORDER: 16X132849  
PROJECT: AGAT16-21 700359793/R.049540.020

11 Morris Drive, Unit 122  
Dartmouth, Nova Scotia  
CANADA B3B 1M2  
TEL (902)468-8718  
FAX (902)468-8924  
http://www.agatlabs.com

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICE  
SAMPLING SITE: Codroy, NL

ATTENTION TO: Karen Foote-Young  
SAMPLED BY:

### PWGSC NL - Marine Sediment Package - Atlantic RBCA Tier 1 Hydrocarbons in Soil

DATE RECEIVED: 2016-08-31

DATE REPORTED: 2016-10-11

Parameter	Unit	SAMPLE DESCRIPTION: Codroy SED 1    Codroy SED 2    Codroy SED 3					
		G / S: A		G / S: B		RDL	
		0.030	0.0068	0.03	<0.03[<A]	<0.03[<A]	<0.03[<A]
Benzene	mg/kg	0.37	0.08	0.04	<0.04[<B]	<0.04[<B]	<0.04[<B]
Toluene	mg/kg	0.082	0.018	0.03	<0.03[<A]	<0.03[<A]	<0.03[<A]
Ethylbenzene	mg/kg	11	2.4	0.05	<0.05[<B]	<0.05[<B]	<0.05[<B]
Xylene (Total)	mg/kg			3	<3	<3	<3
C6-C10 (less BTEX)	mg/kg			15	<15	<15	<15
>C10-C16 Hydrocarbons	mg/kg			15	<15	21	<15
>C16-C21 Hydrocarbons	mg/kg			15	113	154	91
>C21-C32 Hydrocarbons	mg/kg			20	113	175	91
Modified TPH (Tier 1)	mg/kg				LR	FR, LR	LR
Resemblance Comment					Y	Y	Y
Return to Baseline at C32					30	31	32
% Moisture	%						
Surrogate	Unit	Acceptable Limits					
Isobutylbenzene - EPH	%	60-140		118	115	79	
Isobutylbenzene - VPH	%	60-140		125	122	121	
n-Dodecacontane - EPH	%	60-140		109	102	86	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard; A Refers to CCME Industrial Guidelines for Soil, Coarse, B Refers to CCME Industrial Guidelines for Soil, Fine  
7814960-7814971 Results are based on the dry weight of the soil.

Resemblance Comment Key:  
GF - Gasoline Fraction  
WGF - Weathered Gasoline Fraction  
GR - Product in Gasoline Range  
FOF - Fuel Oil Fraction  
WFOF - Weathered Fuel Oil Fraction  
FR - Product in Fuel Oil Range  
LOF - Lube Oil Fraction  
LR - Lube Range  
UC - Unidentified Compounds  
NR - No Resemblance  
NA - Not Applicable

Certified By:

*J. Patterson*



**AGAT** Laboratories

## Certificate of Analysis

AGAT WORK ORDER: 16X132849  
PROJECT: AGAT16-21 700359793/R.049540.020

11 Morris Drive, Unit 122  
Dartmouth, Nova Scotia  
CANADA B3B 1M2  
TEL (902)468-8718  
FAX (902)468-8924  
http://www.agatlabs.com

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICE  
SAMPLING SITE: Codroy, NL

ATTENTION TO: Karen Foote-Young  
SAMPLED BY:

### PWGSC NL - Marine Sediment Package - PAH in Sediment

DATE RECEIVED: 2016-08-31

DATE REPORTED: 2016-10-11

Parameter	Unit	SAMPLE DESCRIPTION: Codroy SED 1    Codroy SED 2    Codroy SED 3					
		SAMPLE TYPE:		Soil		Soil	
		DATE SAMPLED:		8/25/2016		8/25/2016	
		G / S: A	G / S: B	RDL	7814960	7814970	7814971
1-Methylnaphthalene	mg/kg			0.05	<0.05	<0.05	<0.05
2-Methylnaphthalene	mg/kg			0.02	<0.02	<0.02	<0.02
Acenaphthene	mg/kg	Factsheet	Factsheet	0.00671	0.0236	0.2652	0.0624
Acenaphthylene	mg/kg	Factsheet	Factsheet	0.005	0.098	0.109	0.069
Anthracene	mg/kg	Factsheet	Factsheet	0.03	0.31	<0.03	0.34
Benzo(a)anthracene	mg/kg	Factsheet	Factsheet	0.01	0.99	1.37	1.37
Benzo(a)pyrene	mg/kg	Factsheet	Factsheet	0.01	0.56	0.69	0.42
Benzo(b)fluoranthene	mg/kg	Factsheet	Factsheet	0.05	0.96	1.03	0.65
Benzo(j,k)fluoranthene	mg/kg			0.05	0.96	0.97	0.66
Benzo(ghi)perylene	mg/kg			0.01	0.23	0.26	0.15
Chrysene	mg/kg	Factsheet	Factsheet	0.01	0.98	1.22	1.53
Dibenzo(a,h)anthracene	mg/kg	Factsheet	Factsheet	0.008	0.054	0.061	0.048
Fluoranthene	mg/kg	Factsheet	Factsheet	0.05	2.18	3.76	2.94
Fluorene	mg/kg	Factsheet	Factsheet	0.01	0.06	0.19	0.15
Indeno(1,2,3)pyrene	mg/kg	Factsheet	Factsheet	0.01	0.31	0.33	0.20
Naphthalene	mg/kg	Factsheet	Factsheet	0.01	0.01	0.04	0.03
Perylene	mg/kg			0.05	0.17	0.21	0.13
Phenanthrene	mg/kg	Factsheet	Factsheet	0.03	0.51	1.17	1.05
Pyrene	mg/kg	Factsheet	Factsheet	0.05	1.17	1.98	2.81
% Moisture	%				30	31	32
Surrogate	Unit	Acceptable Limits					
Nitrobenzene-d5	%		50-140		100	100	98
2-Fluorobiphenyl	%		50-140		98	96	95
Terphenyl-d14	%		50-140		101	101	101

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard; A Refers to CCME Industrial Guidelines for Soil, Coarse, B Refers to CCME Industrial Guidelines for Soil, Fine  
7814960-7814971 Results are based on the dry weight of the soil.

Certified By:

*J. Patterson*



**AGAT** Laboratories

### Certificate of Analysis

AGAT WORK ORDER: 16X132849  
PROJECT: AGAT16-21 700359793/R.049540.020

11 Morris Drive, Unit 122  
Dartmouth, Nova Scotia  
CANADA B3B 1M2  
TEL (902)468-8718  
FAX (902)468-8924  
<http://www.agatlabs.com>

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICE  
SAMPLING SITE: Codroy, NL

ATTENTION TO: Karen Foote-Young  
SAMPLED BY:

**PWGSC NL - Marine Sediment Package - PCB in Sediment**

DATE RECEIVED: 2016-08-31

DATE REPORTED: 2016-10-11

Parameter	Unit	SAMPLE DESCRIPTION: Codroy SED 1    Codroy SED 2    Codroy SED 3					
		G / S: A	G / S: B	RDL	Codroy SED 1	Codroy SED 2	Codroy SED 3
SAMPLE TYPE:		Soil		Soil		Soil	
DATE SAMPLED:		8/25/2016		8/25/2016		8/25/2016	
RDL		7814960		7814970		7814971	
Total Polychlorinated Biphenyls	mg/kg	33	33	0.02	<0.02[<A]	<0.02[<A]	<0.02[<A]
% Moisture	%			30	31	32	
Surrogate	Unit	Acceptable Limits					
Decachlorobiphenyl	%	50-130		92	118	92	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: A Refers to CCME Industrial Guidelines for Soil, Coarse, B Refers to CCME Industrial Guidelines for Soil, Fine  
7814960-7814971 Results are based on the dry weight of the soil.

Certified By: \_\_\_\_\_

*J. Patterson*





## Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICE  
 PROJECT: AGAT16-21 700359793/R.049540.020  
 SAMPLING SITE: Codroy, NL

AGAT WORK ORDER: 16X132849  
 ATTENTION TO: Karen Foote-Young  
 SAMPLED BY:

### Soil Analysis

RPT Date: Oct 11, 2016			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
PWGSC NL - Marine Sediment Package - Inorganics															
Aluminum	9072016		5060	4840	4.4%	< 10	89%	80%	120%	89%	80%	120%	130%	70%	130%
Antimony	9072016		< 1	< 1	0.0%	< 1	88%	80%	120%	88%	80%	120%	NA	70%	130%
Arsenic	9072016		3	3	0.0%	< 1	95%	80%	120%	97%	80%	120%	78%	70%	130%
Barium	9072016		37	34	8.5%	< 5	93%	80%	120%	93%	80%	120%	108%	70%	130%
Beryllium	9072016		< 2	< 2	0.0%	< 2	108%	80%	120%	109%	80%	120%	90%	70%	130%
Boron	9072016		8	8	0.0%	< 2	112%	80%	120%	110%	80%	120%	92%	70%	130%
Cadmium	9072016		< 0.3	< 0.3	0.0%	< 0.3	102%	80%	120%	102%	80%	120%	87%	70%	130%
Chromium	9072016		11	11	0.0%	< 2	107%	80%	120%	114%	80%	120%	85%	70%	130%
Cobalt	9072016		5	5	0.0%	< 1	106%	80%	120%	106%	80%	120%	85%	70%	130%
Copper	9072016		5	5	0.0%	< 2	105%	80%	120%	105%	80%	120%	83%	70%	130%
Iron	9072016		11500	12100	5.1%	< 50	107%	80%	120%	105%	80%	120%	101%	70%	130%
Lead	9072016		8.4	8.8	4.7%	< 0.5	106%	80%	120%	106%	80%	120%	96%	70%	130%
Manganese	9072016		309	322	4.1%	< 2	111%	80%	120%	110%	80%	120%	101%	70%	130%
Molybdenum	9072016		< 2	< 2	0.0%	< 2	105%	80%	120%	105%	80%	120%	87%	70%	130%
Nickel	9072016		10	11	9.5%	< 2	104%	80%	120%	105%	80%	120%	87%	70%	130%
Selenium	9072016		< 1	< 1	0.0%	< 1	94%	80%	120%	91%	80%	120%	72%	70%	130%
Silver	9072016		< 0.5	< 0.5	0.0%	< 0.5	103%	80%	120%	103%	80%	120%	85%	70%	130%
Strontium	9072016		16	16	0.0%	< 5	96%	80%	120%	96%	80%	120%	86%	70%	130%
Thallium	9072016		< 0.1	< 0.1	0.0%	< 0.1	103%	80%	120%	100%	80%	120%	NA	70%	130%
Tin	9072016		3	2	NA	< 2	97%	80%	120%	96%	80%	120%	83%	70%	130%
Uranium	9072016		0.4	0.4	0.0%	< 0.1	110%	80%	120%	109%	80%	120%	101%	70%	130%
Vanadium	9072016		14	13	7.4%	< 2	106%	80%	120%	110%	80%	120%	111%	70%	130%
Zinc	9072016		28	27	3.6%	< 5	105%	80%	120%	108%	80%	120%	83%	70%	130%
Mercury	1		< 0.05	< 0.05	0.0%	< 0.05	85%	70%	130%		70%	130%	74%	70%	130%
Cyanide	7822255		< 0.040	< 0.040	NA	< 0.040	104%	90%	110%	91%	90%	110%	95%	70%	130%
pH	1	7812730	7.02	7.00	0.3%	<	103%	80%	120%		80%	120%		80%	120%
In-House Leachable Metals															
Aluminum Leachate			1.30	0.98	NA	< 0.02	120%	80%	120%	120%	80%	120%	87%	70%	130%
Antimony Leachate			< 0.02	< 0.02	0.0%	< 0.02	80%	80%	120%	103%	80%	120%	98%	70%	130%
Arsenic Leachate			< 0.02	< 0.02	0.0%	< 0.02	106%	80%	120%	89%	80%	120%	112%	70%	130%
Barium Leachate			0.17	0.17	0.0%	< 0.02	109%	80%	120%	101%	80%	120%	99%	70%	130%
Beryllium Leachate			< 0.05	< 0.05	0.0%	< 0.05	107%	80%	120%	110%	80%	120%	106%	70%	130%
Bismuth Leachate			< 0.02	< 0.02	0.0%	< 0.02	97%	80%	120%	102%	80%	120%	88%	70%	130%
Boron Leachate			0.984	1.02	3.6%	< 0.05	118%	80%	120%	117%	80%	120%	115%	70%	130%
Cadmium Leachate			0.005	0.005	0.0%	< 0.003	102%	80%	120%	101%	80%	120%	94%	70%	130%
Chromium Leachate			< 0.02	< 0.02	0.0%	< 0.02	93%	80%	120%	98%	80%	120%	120%	70%	130%
Cobalt Leachate			0.01	0.01	0.0%	< 0.01	106%	80%	120%	95%	80%	120%	104%	70%	130%
Copper Leachate			0.25	0.26	3.9%	< 0.02	80%	80%	120%	98%	80%	120%	86%	70%	130%



## Quality Assurance

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 PROJECT: AGAT16-21 700359793/R.049540.020  
 SAMPLING SITE: Codroy, NL

AGAT WORK ORDER: 16X132849  
 ATTENTION TO: Karen Foote-Young  
 SAMPLED BY:

### Soil Analysis (Continued)

RPT Date: Oct 11, 2016			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Iron Leachate			0.8	0.9	11.8%	< 0.2	102%	80%	120%	99%	80%	120%	92%	70%	130%
Lead Leachate			0.120	0.122	1.7%	< 0.005	108%	80%	120%	104%	80%	120%	94%	70%	130%
Lithium Leachate			0.02	0.02	0.0%	< 0.02	107%	80%	120%	101%	80%	120%	106%	70%	130%
Manganese Leachate			1.92	2.00	4.1%	< 0.02	89%	80%	120%	94%	80%	120%	95%	70%	130%
Molybdenum Leachate			< 0.02	< 0.02	0.0%	< 0.02	102%	80%	120%	100%	80%	120%	103%	70%	130%
Nickel Leachate			< 0.02	< 0.02	0.0%	< 0.02	97%	80%	120%	96%	80%	120%	105%	70%	130%
Selenium Leachate			< 0.02	< 0.02	0.0%	< 0.02	103%	80%	120%	89%	80%	120%	73%	70%	130%
Silver Leachate			< 0.005	< 0.005	0.0%	< 0.005	103%	80%	120%	98%	80%	120%	87%	70%	130%
Strontium Leachate			1.46	1.49	2.0%	< 0.02	108%	80%	120%	102%	80%	120%	96%	70%	130%
Thallium Leachate			< 0.001	< 0.001	0.0%	< 0.001	106%	80%	120%	104%	80%	120%	97%	70%	130%
Tin Leachate			< 0.02	< 0.02	0.0%	< 0.02	101%	80%	120%	99%	80%	120%	103%	70%	130%
Uranium Leachate			< 0.001	< 0.001	0.0%	< 0.001	103%	80%	120%	102%	80%	120%	103%	70%	130%
Vanadium Leachate			< 0.02	< 0.02	0.0%	< 0.02	120%	80%	120%	89%	80%	120%	103%	70%	130%
Zinc Leachate			2.19	2.22	1.4%	< 0.02	116%	80%	120%	93%	80%	120%	101%	70%	130%

Certified By: \_\_\_\_\_

*Laura Balm*

## Quality Assurance

 CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICE  
 PROJECT: AGAT16-21 700359793/R.049540.020  
 SAMPLING SITE: Codroy, NL

 AGAT WORK ORDER: 16X132849  
 ATTENTION TO: Karen Foote-Young  
 SAMPLED BY:

Trace Organics Analysis																
RPT Date: Oct 11, 2016			DUPLICATE				Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Measured Value		Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits		
								Lower	Upper		Lower	Upper		Lower	Upper	

**PWGSC NL - Marine Sediment Package - Atlantic RBCA Tier 1 Hydrocarbons in Soil**

Benzene	1	7820359	< 0.03	< 0.03	0.0%	< 0.03	84%	60%	140%	83%	60%	140%			
Toluene	1	7820359	< 0.04	< 0.04	0.0%	< 0.04	84%	60%	140%	81%	60%	140%			
Ethylbenzene	1	7820359	< 0.03	< 0.03	0.0%	< 0.03	88%	60%	140%	85%	60%	140%			
Xylene (Total)	1	7820359	< 0.05	< 0.05	0.0%	< 0.05	84%	60%	140%	83%	60%	140%			
C6-C10 (less BTEX)	1	7820359	< 3	< 3	0.0%	< 3	88%	60%	140%	98%	60%	140%	107%	30%	130%

Comments: If RPD value is NA, the results of the duplicates are less than 5x the RDL and the RPD will not be calculated.

**PWGSC NL - Marine Sediment Package - PAH in Sediment**

1-Methylnaphthalene	1	7813716	< 0.05	< 0.05	0.0%	< 0.05	95%	50%	140%	100%	50%	140%	98%	50%	140%
2-Methylnaphthalene	1	7813716	< 0.02	< 0.02	0.0%	< 0.02	95%	50%	140%	101%	50%	140%	100%	50%	140%
Acenaphthene	1	7813716	< 0.00671	< 0.00671	0.0%	< 0.00671	94%	50%	140%	99%	50%	140%	97%	50%	140%
Acenaphthylene	1	7813716	< 0.005	< 0.005	0.0%	< 0.005	92%	50%	140%	96%	50%	140%	94%	50%	140%
Anthracene	1	7813716	< 0.03	< 0.03	0.0%	< 0.03	92%	50%	140%	94%	50%	140%	99%	50%	140%
Benzo(a)anthracene	1	7813716	< 0.01	< 0.01	0.0%	< 0.01	92%	50%	140%	94%	50%	140%	93%	50%	140%
Benzo(a)pyrene	1	7813716	< 0.01	< 0.01	0.0%	< 0.01	86%	50%	140%	86%	50%	140%	89%	50%	140%
Benzo(b)fluoranthene	1	7813716	< 0.05	< 0.05	0.0%	< 0.05	86%	50%	140%	82%	50%	140%	85%	50%	140%
Benzo(ghi)perylene	1	7813716	< 0.01	< 0.01	0.0%	< 0.01	92%	50%	140%	90%	50%	140%	88%	50%	140%
Chrysene	1	7813716	< 0.01	< 0.01	0.0%	< 0.01	93%	50%	140%	95%	50%	140%	93%	50%	140%
Dibenzo(a,h)anthracene	1	7813716	< 0.006	< 0.006	0.0%	< 0.006	81%	50%	140%	80%	50%	140%	85%	50%	140%
Fluoranthene	1	7813716	< 0.05	< 0.05	0.0%	< 0.05	93%	50%	140%	95%	50%	140%	96%	50%	140%
Fluorene	1	7813716	< 0.01	< 0.01	0.0%	< 0.01	91%	50%	140%	96%	50%	140%	97%	50%	140%
Indeno(1,2,3)pyrene	1	7813716	< 0.01	< 0.01	0.0%	< 0.01	72%	50%	140%	73%	50%	140%	80%	50%	140%
Naphthalene	1	7813716	< 0.01	< 0.01	0.0%	< 0.01	94%	50%	140%	99%	50%	140%	97%	50%	140%
Perylene	1	7813716	< 0.05	< 0.05	0.0%	< 0.05	89%	50%	140%	87%	50%	140%	92%	50%	140%
Phenanthrene	1	7813716	< 0.03	< 0.03	0.0%	< 0.03	94%	50%	140%	97%	50%	140%	95%	50%	140%
Pyrene	1	7813716	< 0.05	< 0.05	0.0%	< 0.05	93%	50%	140%	95%	50%	140%	97%	50%	140%

**PWGSC NL - Marine Sediment Package - PCB in Sediment**

Total Polychlorinated Biphenyls	1	7814970	< 0.02	< 0.02	0.0%	< 0.02	71%	60%	130%	95%	60%	130%	110%	60%	130%
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**PWGSC NL - Marine Sediment Package - Atlantic RBCA Tier 1 Hydrocarbons in Soil**

>C10-C16 Hydrocarbons	1	7814970	< 15	< 15	0.0%	< 15	93%	60%	140%	98%	60%	140%	NA	30%	130%
>C16-C21 Hydrocarbons	1	7814970	21	25	17.0%	< 15	95%	60%	140%	98%	60%	140%	NA	30%	130%
>C21-C32 Hydrocarbons	1	7814970	154	186	18.8%	< 15	86%	60%	140%	98%	60%	140%	NA	30%	130%

 Comments: If RPD value is NA, the results of the duplicates are less than 5x the RDL and the RPD will not be calculated.  
 Matrix spike not available (NA) due to matrix interference.

**AGAT HALIFAX- PWGSC NL - Timber Package B (TCLP BNA)**

Cresols	7781586	< 0.012	< 0.012	NA	< 0.012	90%	60%	130%	105%	35%	110%	NA	30%	130%
Ortho-Cresol	7781586	< 0.004	< 0.004	NA	< 0.004	85%	50%	130%	79%	50%	130%	NA	50%	130%
Meta & Para-Cresol	7781586	< 0.008	< 0.008	NA	< 0.008	102%	50%	130%	94%	50%	130%	NA	50%	130%
Benzo(a)pyrene	7781586	< 0.001	< 0.001	NA	< 0.001	88%	60%	130%	75%	60%	130%	NA	60%	130%

**AGAT QUALITY ASSURANCE REPORT (V2)**

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 AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from [www.cala.ca](http://www.cala.ca) and/or [www.scc.ca](http://www.scc.ca). The tests in this report may not necessarily be included in the scope of accreditation.

Results relate only to the items tested and to all the items tested



## Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICE  
 PROJECT: AGAT16-21 700359793/R.049540.020  
 SAMPLING SITE: Codroy, NL

AGAT WORK ORDER: 16X132849  
 ATTENTION TO: Karen Foote-Young  
 SAMPLED BY:

### Trace Organics Analysis (Continued)

RPT Date: Oct 11, 2016			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Pentachlorophenol	7781586		< 0.0005	< 0.0005	NA	< 0.005	86%	60%	130%	83%	60%	130%	NA	60%	130%

Comments: When the average of the sample and duplicate results is less than 5x the RDL, the Relative Percent Difference (RPD) will be indicated as Not Applicable (NA).

Certified By: \_\_\_\_\_

*J. Patterson*



## Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICE

AGAT WORK ORDER: 16X132849

PROJECT: AGAT16-21 700359793/R.049540.020

ATTENTION TO: Karen Foote-Young

SAMPLING SITE: Codroy, NL

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Aluminum Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Antimony Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Arsenic Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Barium Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Beryllium Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Bismuth Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Boron Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Cadmium Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Chromium Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Cobalt Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Copper Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Iron Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Lead Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Lithium Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Manganese Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Molybdenum Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Nickel Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Selenium Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Silver Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Strontium Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Thallium Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Tin Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Uranium Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Vanadium Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Zinc Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
% Moisture			GRAVIMETRIC
Aluminum	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Antimony	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS



## Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICE  
 PROJECT: AGAT16-21 700359793/R.049540.020  
 SAMPLING SITE: Codroy, NL

AGAT WORK ORDER: 16X132849  
 ATTENTION TO: Karen Foote-Young  
 SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Arsenic	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Barium	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Beryllium	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Boron	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Cadmium	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Chromium	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Cobalt	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Copper	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Iron	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Lead	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP-MS
Manganese	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Molybdenum	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Nickel	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Selenium	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Silver	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Strontium	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Thallium	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Tin	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Uranium	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Vanadium	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Zinc	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Mercury	MET-121-6101 & MET-121-6107	EPA 245.5	CVAAS
Cyanide	INOR-93-6052	MOE CN-3015 & E 3009 A; SM 4500 CN	TECHNICON AUTO ANALYZER
pH	INOR-121-6001	modified from Canadian Society of Soil Science p15	

## Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICE

AGAT WORK ORDER: 16X132849

PROJECT: AGAT16-21 700359793/R.049540.020

ATTENTION TO: Karen Foote-Young

SAMPLING SITE: Codroy, NL

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Cresols	ORG-91-5114	EPA SW846 3510C & 8270	GC/MS
Ortho-Cresol	ORG-91-5114	EPA SW846 3510C & 8270	GC/MS
Meta & Para-Cresol	ORG-91-5114	EPA SW846 3510C & 8270	GC/MS
Benzo(a)pyrene	ORG-91-5114	EPA SW846 3510C & 8270	GC/MS
Pentachlorophenol	ORG-91-5114	EPA SW846 3510C & 8270	GC/MS
Chrysene-d12	ORG-91-5114	EPA SW846 3510C & 8270	GC/MS
Benzene	VOL-120-5013	Atlantic RBCA Guidelines for Laboratories Tier 1	GC/MS
Toluene	VOL-120-5013	Atlantic RBCA Guidelines for Laboratories Tier 1	GC/MS
Ethylbenzene	VOL-120-5013	Atlantic RBCA Guidelines for Laboratories Tier 1	GC/MS
Xylene (Total)	VOL-120-5013	Atlantic RBCA Guidelines for Laboratories Tier 1	GC/MS
C6-C10 (less BTEX)	VOL-120-5013	Atlantic RBCA Guidelines for Laboratories Tier 1	GC/MS/FID
>C10-C16 Hydrocarbons	VOL-120-5007	Atlantic RBCA Guidelines for Laboratories Tier 1	GC/FID
>C16-C21 Hydrocarbons	VOL-120-5007	Atlantic RBCA Guidelines for Laboratories Tier 1	GC/FID
>C21-C32 Hydrocarbons	VOL-120-5007	Atlantic RBCA Guidelines for Laboratories Tier 1	GC/FID
Modified TPH (Tier 1)	VOL-120-5007	Atlantic RBCA Guidelines for Laboratories Tier 1	GC/MS/FID
Resemblance Comment	ORG-120-5007	Atlantic RBCA Guidelines for Laboratories Tier 1	GC/MS/FID
Return to Baseline at C32	VOL-120-5007	Atlantic RBCA Guidelines for Laboratories Tier 1	GC/FID
% Moisture		Calculation	GRAVIMETRIC
Isobutylbenzene - EPH	VOL-120-5007	Atlantic RBCA Guidelines for Laboratories Tier 1	GC/FID
Isobutylbenzene - VPH	VOL-120-5013	Atlantic RBCA Guidelines for Laboratories Tier 1	GC/MS
n-Dotriacontane - EPH	VOL-120-5007	Atlantic RBCA Guidelines for Laboratories Tier 1	GC/FID
1-Methylnaphthalene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
2-Methylnaphthalene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Acenaphthene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Acenaphthylene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Anthracene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Benzo(a)anthracene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Benzo(a)pyrene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Benzo(b)fluoranthene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Benzo(j,k)fluoranthene	ORG-120-5104	CALCULATION	GC/MS
Benzo(ghi)perylene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Chrysene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Dibenzo(a,h)anthracene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Fluoranthene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Fluorene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Indeno(1,2,3)pyrene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Naphthalene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Perylene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS

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SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Phenanthrene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Pyrene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Nitrobenzene-d5	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
2-Fluorobiphenyl	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Terphenyl-d14	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Total Polychlorinated Biphenyls	ORG-120-5106	EPA SW846/8081/8080	GC/ECD
% Moisture			GRAVIMETRIC
Decachlorobiphenyl	ORG-120-5106	EAP SW846 3510C/8080/8010	GC/ECD