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END OF SECTION

SPECIFICATION APPROVALS

1. APPROVED BY:

BE Hoyle

DATE:

January 19, 2022

2. TENDER BY:

W. Lister

DATE:

January 19, 2022

Drawing No	Title	Date
<u>Electrical</u>		
E1 of 8	Wharf Plan Power	2022-01-19
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<u>Civil</u>		
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1.1 DESCRIPTION OF WORK

- .1 The work covered under this project consists of the furnishing of all labour, and equipment, for electrical remediation to the wharf structure located at Stuart Town Wharf, Deer Island, NB., in strict accordance with Specifications and accompanying drawings and subject to all terms and conditions of the contract.
- .2 The work consists of but is not necessarily limited to the following:
 - .1 Supply and installation of new electrical services on the wharf and floats as indicated on the plans or as directed by the Departmental Representative.
 - .2 Supply and installation of new electrical building.
 - .3 Removal and disposal of all existing electrical equipment including abandoned wire and conduit of all obsolete equipment unless indicated otherwise.
- .3 All materials required for the execution of this Contract must be supplied by the Contractor.

1.2 SITE OF WORK

- .1 Work will be carried out at Stuart Town Wharf, Deer Island, New Brunswick in the location as shown on the accompanying drawings.

1.3 FAMILIARIZATION WITH SITE

- .1 Before submitting a bid, it is recommended that bidders inspect and examine the site of work and satisfy themselves as to the form and nature of the work, materials, the means of access to the site, and the temporary facilities required for completion of the work. Means of access to the site, severity, exposure and uncertainty of weather, soil conditions, any accommodations they may require, and in general shall themselves 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 Obtain prior permission from the Departmental Representative before carrying out such site inspection.
- .3 Contractors, bidders or those they invite to site are to review specification Section 01 35 29.06 – Health and Safety Requirements before visiting site. Take all appropriate safety measures for any visit to site, either before or after acceptance of bid.
- .4 Bidders are required to wear all appropriate personnel protective equipment and take all precautionary measures necessary to ensure their safety during any pre-tender visit.
- .5 Contractor shall make own assessment of the site conditions, and difficulties in carrying out the work as specified

1.4 CODES AND STANDARDS

- .1 Perform work in accordance with the 2018 Canadian Electrical Code, 2015 National Building Code of Canada, FCC Standard 373 - Standard for Piers and Wharves (<http://www.hrsdc.gc.ca/en.lp.lo.fp.standards.373.shtml>), and any other of provincial or local application including all amendments up to project tender 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.

1.5 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 (GANNT) 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. Generally, Bar Charts derived from commercially available computerized project management system are preferred but not mandatory.
- .4 Contractor must ensure that schedule is adhered to meet the requirements without exception.

1.6 ABBREVIATIONS

- .1 Following abbreviations of standard specifications have been used in this specification and on the drawings: CGSB - Canadian Government Specifications Board CSA - Canadian Standards Association 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.

1.7 MEASUREMENT RESPONSIBILITIES

- .1 Notify Departmental Representative at least 72 hours in advance of operations to permit required electrical inspectors to inspect the work done, for payment purposes.

1.8 CONTRACTOR'S USE OF SITE

- .1 Co-operate with users of existing facilities. Maintain access to the wharf structures during fishing season and consult with the local Harbour Authority for the site access limitations.
- .2 Should interference occur, take directions from Departmental Representative.
- .3 Construction operations, including storage of materials for this contract, not to interfere with the fishing activity and/or operations at this harbour.
- .4 Be responsible for arranging the storage of materials on or off site. 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. Obtain and pay for use of additional storage or work areas needed for operations.
- .5 Exercise care so as not to obstruct or damage public or private property in the area.
- .6 Do not unreasonably encumber site with materials or equipment.
- .7 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.
- .8 Comply with all regulations and authorities having jurisdiction over the work, whether on land or on water.

1.9 PROJECT MEETINGS

- .1 Contractor 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 Contractor 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.

1.10 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.

1.11 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.

1.12 EXISTING SERVICES

- .1 Where work involves breaking into or connecting to existing services, carry out work at times directed by governing authorities, with minimum of disturbance to site operations.
- .2 Before commencing work, establish location and extent of service lines in area of work and notify Departmental Representative of findings.
- .3 Submit schedule to and obtain approval from Departmental Representative for any shut-down or closure of active service or facility. Adhere to approved schedule and provide notice to affected parties.
- .4 Provide temporary services when directed by Departmental Representative to maintain critical facility systems.
- .5 Where unknown services are encountered, immediately advise Departmental Representative and confirm findings in writing.
- .6 Protect, relocate or maintain existing active services as required. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction over service. Record locations of maintained, re-routed and abandoned service lines.
- .7 The wharf shall remain in full service to the users during the duration of the construction contract.

1.13 WORK 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 their not being informed of the areas and extent of interface work shall be the sole responsibility to the General Contractor and shall be resolved at no extra cost to Canada.

1.14 WORK COMMENCEMENT

- .1 Prior to mobilization to project site, a Site Specific Safety Plan must be submitted and accepted, unless otherwise agreed by Departmental Representative.
- .2 Project work on site is to commence in accordance with submitted schedule, 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.

1.15 DOCUMENTS

- .1 Maintain at job site, one copy each of the following:
 - .1 Contract Drawings.
 - .2 Specifications.
 - .3 Addenda.
 - .4 Reviewed Shop Drawings.
 - .5 List of outstanding Shop Drawings.
 - .6 Change Orders.
 - .7 Other modifications to Contract.
 - .8 Field Test Reports.
 - .9 Copy of Approved Work Schedule.
 - .10 Health and Safety Plan and other safety related documents.
 - .11 Electrical Lock-out.
 - .12 Fire Safety Hot Work Permit.
 - .13 Permits, Codes and Acts.
 - .14 Waste Management Plan.
 - .15 Other documents as stipulated elsewhere in the Contract Documents, Drawings and these Specifications.

1.16 PERMITS

- .1 In accordance with the General Conditions, obtain and pay for building permit, certificates, licenses and other permit as required by municipal, provincial and federal 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 forms and approval documents received from above referenced authorities.
- .5 Comply with all requirements, recommendations and advice 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.

1.17 NOTICE TO SHIPPING/MARINERS

- .1 Notify the Marine Communications and Traffic Services' Centre, of Fisheries and Oceans Canada, ten (10) days prior to commencement and upon completion of 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.

1.18 FACILITY SMOKING ENVIRONMENT

- .1 Comply with smoking restrictions.

1.19 INTERPRETATION OF DOCUMENTS

- .1 Supplementary to GC1.1 of the General Conditions, the Division 01 sections of the specifications take precedence over technical specifications in other divisions of the specifications.

1.20 CUTTING, FITTING AND PATCHING

- .1 Execute cutting, 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.
- .3 Do not cut, bore, or sleeve load-bearing members without .
- .4 Make cuts with clean, true, smooth edges. Make patches inconspicuous in final assembly.

END OF SECTION

1.1 PROJECT MANAGEMENT

- .1 Contractor to provide a competent project manager or superintendent who shall be continuously on site when all work is being performed.
- .2 The name and credentials of this person to be provided to the Departmental Representative for acceptance.
- .3 The designated person cannot be changed unless agreed to in writing by the Departmental Representative.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Upon acceptance of bid and prior to commencement of work, submit to Departmental Representative the following work management documents:
 - .1 Work Schedule as specified herein.
 - .2 Shop Drawing Submittal Schedule specified in Section 01 33 00 – Submittal Procedures.

1.3 WORK SCHEDULE

- .1 All materials for the project are to be received by the Contractor prior to March 30, 2022 and stored by the Contractor until ready for installation.
- .2 Work on site to start July 11, 2022 after the completion of the spring lobster fishery and be completed by September 30, 2022 prior to the start of the fall lobster fishery.
- .3 Upon acceptance of bid submit:
 - .1 Preliminary work schedule within 7 calendar days of contract award.
 - .2 Detailed work schedule within 21 calendar days of contract award.
- .4 Schedule to indicate all calendar dates from commencement to completion of all work within the time stated in the accepted bid.
- .5 Provide sufficient details in preliminary 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.
- .6 Preliminary work schedule content to include as a minimum the following:
 - .1 Bar (GANTT) Charts, indicating all work activities, tasks and other project elements, their anticipated durations, planned dates for achieving key activities and major project milestones supported with;
 - .2 Written narrative on key elements of work illustrated in bar chart, providing sufficient details to demonstrate a reasonable implementation plan for completion of project within designated time.
 - .3 Generally Bar Charts derived from commercially available computerized project management system are preferred but not mandatory.

- .7 Detailed Work Schedule:
 - .1 Prepare by use of Critical Path Method (CPM) indicating:
 - .1 Complete and detailed sequence of all construction activities. Show projected start and completion dates for each activity.
 - .2 Number of calendar days required to carry out each activity.
 - .3 Critical path items with resulting critical dates, non-critical activities and resulting float time.
 - .4 Actual workdays from non-working days such as weekend and statutory days etc...
 - .5 Projected and actual percentage of work completed for each major work activity.
 - .2 Prepare CPM schedule by use of well recognized and widely used electronic software. Submit copy of schedule in paper format and one electronic version on diskette for each submission.
 - .3 Accompany CPM with written narrative as required and in sufficient detail to fully describe work and demonstrate a reasonable implementation plan for completion of project within designated time.
- .8 Work schedule must take into consideration and reflect the work phasing, required sequence of work, special conditions and operational restrictions as specified below and indicated on drawings.
- .9 Schedule work in cooperation with the Departmental Representative. Incorporate within Detailed Work Schedule, items identified by Departmental Representative during review of preliminary schedule.
- .10 Completed schedule shall be approved by Departmental Representative. When approved, take necessary measures to complete work within scheduled time. Do not change schedule without Departmental Representative's approval.
- .11 Ensure that all subtrades and subcontractors are made aware of the work restraints and operational restrictions specified.
- .12 Schedule Updates:
 - .1 Submit on a monthly basis when requested by Departmental Representative.
 - .2 Provide information and pertinent details explaining reasons for necessary changes to implementation plan.
 - .3 Identify problem areas, anticipated delays, impact on schedule and proposed corrective measures to be taken.
- .13 Departmental Representative will make interim reviews and evaluate progress of work based on approved schedule. Frequency of such reviews will be as decided by Departmental Representative. Address and take corrective measures on items identified by reviews and as directed by Departmental Representative. Update schedule accordingly.

- .14 In every instance, change or deviation from the Work Schedule, no matter how minimal the risk or impact on safety or inconvenience to tenant or public might appear, will be subject to prior review and approval by the Departmental Representative.

1.4 OPERATIONAL RESISTRICTIONS

- .1 The Contractor must recognize that wharf users will be affected by implementation of this contract. The Contractor must perform the work with utmost regard to the safety and convenience of facility occupants and users. All work activities must be planned and scheduled with this in mind. The Contractor will not be permitted to disturb any portion of the wharf without providing temporary facilities as necessary to ensure safe and direct passage through disturbed or otherwise affected areas.

- .2 Contractor to meet with the Departmental Representative on a weekly basis to identify intended work areas, activities and scheduling for the coming week.

.3 Safety Signage:

- .1 Provide onsite, and erect as required during progress of work, proper bilingual signage, mounted on self-supporting stands, warning the public of construction activities in progress and alerting need to exercise caution.
- .2 Signage to be professionally printed and mounted on wooden backing, colored and to express messages as directed by the Departmental Representative.
- .3 Generally maximum size of sign should be in the order of 1.0 square meters. Number of signs required will be dependent on number of areas in facility under renovation at any one time.
- .4 Include costs for the supply and installation of these signs in the bid price.

.4 Dust and Dirt Control:

- .1 See Section 01 74 00 – Cleaning for cleaning requirements.
- .2 Effectively plan and implement dust control measures and cleaning activities as an integral part of all construction activities. Review all measures with the Departmental Representative before undertaking work, especially for major dust generating activities.
- .3 Do not allow demolition debris and construction waste to accumulate on site and contribute to the propagation of dust.
- .4 As work progresses, maintain construction areas in a tidy condition at all times.

1.5 PROJECT MEETINGS

- .1 Schedule and administer project meetings, held as directed by Departmental Representative, for entire duration of work and when deemed necessary due to progress of work or particular situation.
- .2 Prepare agenda for meetings.
- .3 Notify participants in writing 4 days in advance of meeting date.
 - .1 Ensure attendance of all subcontractors.
 - .2 Departmental Representative will provide list of other attendees to be notified.

- .4 Hold meetings at project site or where approved by Departmental Representative.
- .5 Preside at meetings and record minutes.
 - .1 Indicate significant proceedings and decisions. Identify action items by parties.
 - .2 Distribute to participants by mail or by facsimile within 3 calendar days after each meeting.
 - .3 Make revisions as directed by Departmental Representative.
 - .4 Departmental Representative will advise whether submission of minutes by Email is acceptable. Decision will be based on compatibility of software among participants.

1.6 WORK COORDINATION

- .1 The General Contractor is responsible for coordinating the work of the various trades and predetermining where the work of such trades interfaces with each other.
 - .1 Designate one person from own employ having overall responsibility to review contract documents and shop drawings, plan and manage such coordination.
- .2 The General Contractor shall 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.
- .3 Submission of shop drawings and ordering of prefabricated equipment or prebuilt components shall only occur once coordination meeting for such items has taken place between trades and all conditions affecting the work of the interfacing trades has been made known and accounted for.
- .4 Work Cooperation:
 - .1 Ensure cooperation between trades in order to facilitate the general progress of the work and avoid situations of spatial interference.
 - .2 Ensure that each trade provides all other trades reasonable opportunity for the completion of the work and in such a way as to prevent unnecessary delays, cutting, patching and the need to remove and replace completed work.
- .5 No extra costs to the Contract will be considered by the Departmental Representative as a result of Contractor's failure to effectively coordinate all portions of the Work. Disputes between the various trades as a result of their not being informed of the areas and extent of interface work shall be the sole responsibility of the General Contractor to be resolved at own cost.

END OF SECTION

1.1 ADMINISTRATIVE

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

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 have been reviewed by Departmental Representative.
- .4 Present shop drawings, product data, samples and mock-ups in SI Metric units.
- .5 Where items or information is not produced in SI 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 measurement or data have been taken and that each submittal has been checked and coordinated 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.
- .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 coordinated.
- .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 Submittal format: paper originals, or alternatively clear and fully legible photocopies or 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 revisions 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 4 copies which will be retained by the 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 of trade from which 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.
- .4 Supplement manufacturer's standard drawings and literature with additional information to provide details applicable to project.
- .5 Delete information not applicable to project on all submittals.
- .6 Allow 10 calendar days for Departmental Representative's review of each submission.
- .7 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.
- .8 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.
- .9 Accompany each submission with transmittal letter, in duplicate, containing:
 - .1 Date.
 - .2 Project title and project number.
 - .3 Contractor's name and address.
 - .4 Identification and quantity of each shop drawing, product data and sample.
 - .5 Other pertinent data.
- .10 Submissions shall include:
 - .1 Date and revision dates.
 - .2 Project title and project 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.
- .11 After Departmental Representative's review, distribute copies.
- .12 Submit electronic copies of product data sheets or brochures for requirements requested in specification Sections as requests, where shop drawings will not be prepared due to standardized manufacture of product.
- .13 Submit electronic copies of manufacturer's instructions of requirements requested in specifications Sections as requested.
- .14 Submit electronic copies of Operation and Maintenance Data for requirements requested in specification Sections.
- .15 Delete information not applicable to project.
- .16 Supplement standard information to provide details applicable to project.
- .17 The review of shop drawings by the Departmental Representative or by an authorized Consultant or designate is for sole purpose of ascertaining conformance with general concept. This review shall not mean that Canada 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 all 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 SCHEDULES, 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.
 - .4 Immediately after award of Contract, submit Workers' Compensation Board Status.
 - .5 Submit transcription of insurance immediately after award of Contract.

END OF SECTION

- Part 1 General
- 1.1 SECTION INCLUDES
 - .1 Fire and Safety Requirements.
 - .2 Hot Work Permit.
- 1.2 RELATED WORK
 - .1 Section 01 35 29.06 – 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 Construction Operations.
(<http://www.hrsdc.gc.ca/en/lp/lo/fp/Standards/301.shtml>).
 - .2 FCC No. 302-June 1982 Standard for Welding and Cutting.
(<http://www.hrsdc.gc.ca/en/lp/l/fp/Standards/302.shtml>).
 - .3 FCC Standards, may also be viewed at the Regional Fire Protection Service's Office (Previously known as the Fire Commissioner of Canada), located at 99 Wyse Road, 8th Floor, Dartmouth, NS, Tel: (902)426-6053.
- 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.
- 1.5 ACTION AND INFORMATIONAL 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.
 - .2 Submit in accordance with 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 29.06 – Health and Safety Requirements.

- .2 In event of conflict between any provisions of 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;
- .4 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.
- .5 Requirement for individual authorization based on:
 - .1 Nature of phasing or 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 premises.
- .6 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 29.06 – Health and Safety Requirements.
 - .2 Use of 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 superintendant, or other authorized person designated by Contractor, granting permission to worker or subcontractor to proceed with work.
 - .5 Provision of a designated person to carry out a Fire Safety Watch for a minimum of 30 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 29.06 – 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 Worker (s),
 - .2 Authorized person issuing the Hot Work Permit,
 - .3 Fire Safety Watcher,
 - .4 Subcontractors and Contractors.
 - .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 the Departmental Representative's discretion with possible disciplinary measures imposed as specified in Section 01 35 29.06 – 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 Number.
 - .2 Building Name, address and specific room or area where hot work will be performed.
 - .3 Date when permit is 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 his/her 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.
- .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 Superintendant for safe keeping.

1.10 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.

END OF SECTION

1.1 REFERENCES

- .1 New Brunswick Occupational Health and Safety Act (1983).
- .2 Canadian Hazardous Products Act.

1.2 RELATED WORK

- .1 Section 01 35 24 – Special Procedures on Fire and Safety Requirements.

1.3 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 Qualified 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 Knowledgeable about the provisions of occupational health and safety statutes and regulations that apply to the Work and;
- .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.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .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.
 - .2 Departmental Representative will review Health and Safety Plan and provide comments.
 - .3 Revise the Plan as appropriate and resubmit within 10 working 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 and accident reports.
- .8 Submit WHMIS SDS - Safety Data Sheets.
 - .1 Comply with Occupational Health and Safety Act for Province of New Brunswick, and Regulations made pursuant to the Act.
 - .2 OHS is enforced by WorkSafe NB.
 - .3 Comply with Canada Labour Code - Part II (entitled Occupational Health and Safety) and the Canada Occupational Health and Safety Regulations (COSH) as well as any other regulations made pursuant to the Act.
 - .1 The Canada Labour Code can be viewed at:
[www.http://laws.justice.gc.ca/en/L-2/](http://laws.justice.gc.ca/en/L-2/)
 - .2 COSH can be viewed at: [www.http://laws.justice.gc.ca/eng/SOR-86-304/ene.html](http://laws.justice.gc.ca/eng/SOR-86-304/ene.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
 - .4 Provide copies of accident and incident reports.
 - .5 Observe construction safety measures of:
 - .1 Part 8 of National Building Code.
 - .2 Municipal by-laws and ordinances.
 - .6 Submit valid copy of Contractor's WorkSafe NB Coverage prior to commencement of Work.
 - .7 Provide copies of reports or directions issued by Federal, provincial and Municipal health and safety inspectors.
 - .8 Provide Safety Data Sheets (SDS) for controlled products specified by the regulations made under the Hazardous Materials Act.
 - .9 In case of conflict or discrepancy between above specified requirements, the more stringent shall apply.
 - .10 Maintain Workers Compensation Coverage in good standing for duration of Contract. Provide proof of clearance through submission of Letter in Good Standing.
 - .11 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 on site and for protection of persons and environment adjacent to the site to extent that they may be affected by conduct of Work.
- .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. Immediately stop and remove non-authorized persons.
- .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 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 PPE. Supply PPE to inspection authorities who require access to conduct tests or perform inspections.

1.7 PROTECTION

- .1 Provide temporary facilities for protection and safe passage of public pedestrians and vehicular traffic around and adjacent to work site.
- .2 Provide safety barricades, lights and signage of work site as required, providing a safe working environment for workers.
- .3 Carry out work placing emphasis on Health & Safety of the Public, Facility Personnel, Construction Works and Protection of the Environment.
- .4 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 – General Instructions, at Work Site.
- .2 Where a particular permit or compliance certificate cannot be obtained, notify Departmental Representative in writing and obtain approval to proceed before carrying out applicable portion of work.
- .3 Obtain permits, licenses and compliance certificates, at appropriate times and frequency as stipulated by authorities having jurisdiction.

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.
- .5 Implement and carry out a health and safety hazard assessment program as part of the work. Program to include:
 - .1 Initial hazard assessments carried out immediately upon notification of contract award and prior to commencement of work.
 - .2 On-going hazard assessments performed during the progress of work identifying new or potential health risks and safety hazards not previously known. As a minimum, hazard assessments shall be carried out when:
 - .1 New subtrade work, new subcontractor(s) or new workers arrive at the site to commence another portion of the work.
 - .2 The scope of work has been changed by Change Order.
 - .3 Potential hazards or weakness in current health and safety practices are identified by Departmental Representative or by an authorized safety representative.
- .6 Each hazard assessment to be made in writing. Keep copies of all assessments on site for duration of work. Upon request, make available to Departmental Representative for inspection.

1.11 PROJECT/SITE CONDITIONS

- .1 Following are potential health, environmental and safety hazards at the site for which Work may involve contact with:
 - .1 Harbour in use; pedestrians, vehicles or trucks.
 - .2 Working near water courses, and tides.
 - .3 Fire Hazards.

- .4 Overhead utilities.
- .5 Lock Out Procedures required.
- .6 PPE Requirements.
- .7 Heights.
- .8 Possibility of working on barges, unsteady work platform.
- .2 Facility on-going operations:
 - .1 The Contractor will cooperate with users of existing facilities. Maintain access to the existing wharf structures during fishing season and consult with the Departmental Representative for site access limitations.
 - .2 Should interferences occur, take directions from Departmental Representative.
 - .3 Do not unreasonably encumber site with materials.
 - .4 Move stored products or equipment which interfere with operations.
 - .5 Comply with all regulations and authorities having jurisdiction over the work, whether on land or on water.
 - .6 Contractor will note that fishing activity in the harbour includes fishing boats, moorings, etc.

1.12 MEETINGS

- .1 Prior to commencement of work, attend Health and Safety meeting conducted by Departmental Representative. Have Contractor's Site Superintendent in attendance. Departmental Representative will advise of time and location.
- .2 Provide site safety orientation sessions to all workers and other authorized persons prior to granting them access to work site. Brief persons on site conditions and on the minimum site safety rules in force at site.
- .3 Conduct site specific occupational health and safety meetings during the entire work as follows:
 - .1 Formal meetings on a minimum monthly basis.
 - .2 Informal tool box meetings on a regular basis from a predetermined schedule.
 - .3 Keep workers informed of anticipated hazards, on safety practices and procedures to be followed and of other pertinent safety information related to:
 - .1 Progress of Work;
 - .2 New sub-trades arriving on site and;
 - .3 Changes in site and project conditions.
- .4 Record and post minutes of meetings. Make copies available to Departmental Representative upon request.

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.

- .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 Communication 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 This designated Health & Safety Site Representative, in addition to their regular duties, will act as Health and Safety Supervisor and be responsible for implementing, enforcing and monitoring health and safety provisions.
 - .7 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 Name, duties and responsibilities of persons designated as Emergency Warden(s) and deputies.
 - .3 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.
- .4 On-site Communication Plan:
 - .1 Procedures for sharing of work related safety information to workers and subcontractors, including emergency and evacuation measures.
- .5 Address all activities of the Work including those of subcontractors.
- .6 Review Health and Safety Plan regularly during the Work. Update as conditions warrant to address emerging risks and hazards, such as whenever new trade or subcontractor arrive at Work Site.
- .7 Departmental Representative will respond in writing, where deficiencies or concerns are noted and may request re-submission of the Plan with correction of deficiencies or concerns.
- .8 Post copy of the Plan, and updates, prominently on Work Site.

1.14 POSTING OF DOCUMENTS

- .1 Ensure applicable items, articles, notices and orders are posted in conspicuous locations on site in accordance with Acts and Regulations of New Brunswick.

1.15 SAFETY SUPERVISION

- .1 Employ Health & Safety Site Representative responsible for daily supervision of health and safety of the Work.
- .2 Health & Safety Site Representative may be the Superintendent of the Work or other person designated by Contractor and shall be assigned the responsibility and authority to:
 - .1 Implement, monitor and enforce daily compliance with health and safety requirements of the Work.
 - .2 Monitor and enforce Contractor's site-specific Health and Safety Plan.
 - .3 Conduct site safety orientation session to persons granted access to Work Site.
 - .4 Ensure that persons allowed site access are knowledgeable and trained in health and safety pertinent to their activities at the site or are escorted by a competent person while on the Work Site.
 - .5 Stop the Work as deemed necessary for reasons of health and safety.
- .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.

1.16 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 of 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.

1.17 MINIMUM SITE SAFETY RULES

- .1 Notwithstanding 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 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.

1.18 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.

1.19 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.

1.20 HAZARDOUS PRODUCTS

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

1.21 CONFINED SPACES

- .1 Abide by occupational health and safety regulations regarding work in confined spaces.

1.22 SITE RECORDS

- .1 Maintain on Work Site copy of safety related 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.

1.23 POSTING OF DOCUMENTS

- .1 Ensure applicable items, articles, notices and orders are posted in conspicuous locations 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.

END OF SECTION

1.1 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.

1.2 FIRES

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

1.3 DISPOSAL OF WASTES AND HAZARDOUS MATERIALS

- .1 Do not bury rubbish and waste materials on site. Dispose at approved landfill sites as specified in Section 01 74 19 – Waste Management and Disposal.
- .2 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.
- .3 Store, handle and dispose of hazardous materials and hazardous waste in accordance with applicable federal and provincial laws, regulations, codes and guidelines.
- .4 Dispose of construction waste materials and demolition debris, resulting from work, at approved landfill sites only. Carry out such disposal in strict accordance with provincial and municipal rules and regulations. Separate out and prevent improper disposal of items banned from landfills.
- .5 Establish method 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.
- .6 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.

1.4 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.

- .4 Pumped water must meet applicable federal, provincial, and municipal standards before it can be discharged to a surface water body. If regulatory guidelines are not met, 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 lands. Maintain in good order for duration of work.

1.5 PERMITS

- .1 All guidelines and instructions stated on permits must be strictly adhered to.

1.6 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 Avoid indicated spawning beds when constructing temporary crossings of waterways.
- .7 Do not blast under water or 100 m of spawning beds.
- .8 Do not refuel any type of equipment within 100 meters of a water body. Maintain equipment in good working condition with no fluid leaks, loose hoses or fittings.

1.7 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.
- .3 Prevent sandblasting and other extraneous materials from contaminating air beyond application area, by providing temporary enclosures.
- .4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads and around entire construction site.
- .5 Maintain inventory of hazardous materials and hazardous waste stored on site. List items by product name, quantity and date when storage began.

- .6 Have emergency spill response equipment and rapid clean-up kit, appropriate to work, at site. Locate adjacent to work and where hazardous materials are stored. Provide personal protective equipment as required for clean-up.
- .7 Report, to Federal and Provincial Department of Environment, spills of petroleum and other hazardous materials as well as accidents having potential of polluting the environment. Also notify Departmental Representative and submit a written spill report to Departmental Representative within 24 hours of occurrence.

1.8 WILDLIFE PROTECTION

- .1 Should nests of migratory birds in wetlands be encountered during work, immediately notify Departmental Representative for directives to be followed.
 - .1 Do not disturb nest site and neighbouring vegetation until nesting is completed.
 - .2 Minimize work immediately adjacent to such areas until nesting is completed.
 - .3 Protect these areas by following recommendations of Canadian Wildlife Service.

END OF SECTION

Part 1 General

1.1 INSPECTION

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

1.2 INDEPENDENT INSPECTION AGENCIES

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

1.3 ACCESS TO WORK

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

1.4 PROCEDURES

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

1.5 REJECTED WORK

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

1.6 REPORTS

- .1 Submit 4 copies of inspection and test reports to Departmental Representative.
- .2 Provide copies to subcontractor of work being inspected or tested manufacturer or fabricator of material being inspected or tested.

1.7 MOCK-UPS

- .1 Prepare mock-ups for Work specifically requested in specifications. Include for Work all Sections required to provide mock-ups.
- .2 Construct in locations acceptable to Departmental Representative as specified in specific section.
- .3 Prepare mock-ups for Departmental Representative's review with reasonable promptness and in orderly sequence, to not cause delays of 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-ups at conclusion of Work or when acceptable to Departmental Representative.
 - .7 Specification section identifies whether mock-up may remain as part of Work or if it is to be removed and when.
- 1.8 MILL TESTS
- .1 Submit adjustment and balancing reports for electrical equipment systems.
 - .2 Refer to Sections for definitive requirements.

END OF SECTION

- 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 resulting from Contractor's use of road.
- 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 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.
- 1.4 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, underground cables to approval of local power supply authority.
- 1.5 WATER SUPPLY
- .1 Arrange, pay for and maintain temporary water supply in accordance with governing regulations and ordinances.
- 1.6 BARRICADES
- .1 Provide and maintain sufficient barricades, fencing, notices, warning signs, light signals, etc. for the protection of adjoining property and to warn others and workmen engaged on the job of the dangers caused by work.
 - .2 Types and location of barricades, etc. to be in accordance with local regulations and to the satisfaction of Departmental Representative.
 - .3 The presence of such barricades, lights, etc. shall not relieve the Contractor of the responsibility for any damages.

1.7 SECURITY

- .1 Contractor to make own arrangements for security of his equipment, materials, damages resulting from fire and theft.

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 CAN3-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.

END OF SECTION

- Part 1 General
- 1.1 INSTALLATION AND REMOVAL
- .1 Provide temporary controls in order to execute work in expeditious manner.
- .2 Remove from site all such work after use.
- 1.2 BARRICADES
- .1 Provide as required by governing authorities.
- 1.3 ACCESS TO SITE
- .1 Provide and maintain access to adjacent harbour facilities.
- 1.4 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 public.
- 1.5 FIRE ROUTES
- .1 Maintain access to property and adjacent wharves, including overhead clearances for use by emergency response vehicles.
- 1.6 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.
- 1.7 WASTE MANAGEMENT AND DISPOSAL
- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 – Waste Management and Disposal.

END OF SECTION

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 Compliance to specified standards.
 - .5 Manufacturer's installation or application instructions.
 - .6 Evidence of arrangements to procure.
 - .7 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 classification 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.
- .6 Within text of each specification Section, references may be made to reference standards.
- .7 Conform to these reference standards, in whole or in part as specifically requested in specifications.
- .8 If there are any questions to whether products or systems are in conformance with applicable standards, Departmental Representative reserves right to have such products or systems tested to prove or disprove conformance.

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.
- .3 Products, materials, equipment and articles incorporated in Work shall be new, not damaged or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.

- .4 Procurement policy is to acquire, in cost effective manner, items containing highest percentage of recycled and recovered materials practicable consistent with maintaining satisfactory levels of competition. Make reasonable efforts to use recycled and recovered materials and in otherwise utilizing recycled and recovered materials in execution of work.
- .5 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.
- .6 Should disputes arise as to quality or fitness of products, decision rests strictly with Departmental Representative based upon requirements of Contract Documents.
- .7 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.
- .8 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.

1.3 ACCEPTABLE MATERIALS AND ALTERNATIVES

- .1 Where materials are specified by trade names, trademarks or manufacturers, when so listed in the various sections of the Specification or added into the Contract Documents by addendum, select one of the names listed for use on project.
- .2 In accordance with Clause 15 of the General Instructions to Bidders, Document No. R2710T, submission of alternative materials to those trade names or manufacturers listed in the contract documents as acceptable materials, must be done during the bidding period following procedures indicated therein.
- .3 Note that Document R2710T is incorporated by reference into, and forms part of the Bid and Contract Documents.

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 manufacturer's instructions, so that Departmental Representative will designate which document is to be followed.
- .3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Departmental Representative to require removal and re-installation at no increase in Contract Price or Contract Time.

1.5 AVAILABILITY

- .1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, notify Departmental Representative of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.
- .2 Immediately notify Departmental Representative in writing of unforeseen or unanticipated material delivery problems by manufacturer. Provide support documentation as per clause 1.1.2.6 above.
- .3 In event of failure to notify Departmental Representative at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Departmental Representative reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

1.6 WORKMANSHIP

- .1 Ensure quality of work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Departmental Representative if required work is such as to make it impractical to produce required results.
- .2 Do not employ anyone unskilled in their required duties. The Departmental Representative reserves right to require dismissal from site, workers deemed incompetent or careless.
- .3 Decisions as to standard of fitness of quality or work in cases of dispute rest solely with Departmental Representative whose decision is final.
- .4 Remove unsuitable or incompetent workers from site as stipulated in the General Conditions.
- .5 Ensure cooperation of workers in laying out work. Maintain efficient and continuous supervision on site at all times.
- .6 Coordinate work between trades and subcontractors. See Section 01 14 10 – Scheduling and Management of Work in this regard.
- .7 Coordinate placement of openings, sleeves and accessories.

1.7 FASTENINGS – GENERAL

- .1 Keep exposed fastenings to minimum, space evenly and lay out neatly.
- .2 Fastenings which cause spalling or cracking of material to which anchorage is made, are not acceptable.

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 and, use resilient washers with stainless steel.
- .5 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.
- .6 Prevent electrolytic action between dissimilar metals and materials.
- .7 Use non-corrosive hot dip galvanized or 316 stainless steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.
- .8 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.
- .9 Keep exposed fastenings to a minimum, space evenly and install neatly.
- .10 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

1.9 STORAGE, HANDLING AND PROTECTION

- .1 Deliver, handle and store materials in manner to prevent damage, adulteration, 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 Store sheet materials on flat, solid supports and keep clear of ground. Slope to shed moisture.
- .6 Immediately remove damaged or rejected materials from site.
- .7 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.

- .8 Touch-up damaged factory finished surfaces to Departmental Representative's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

1.10 TRANSPORTATION

- .1 Pay costs of transportation of products required in performance of Work.

END OF SECTION

- 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 accumulations of wastes at end of each working day.
 - .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 a tidy 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 performs 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 2 Products
- 2.1 NOT USED
- Part 3 Execution
- 3.1 NOT USED

END OF SECTION

Part 1 General

1.1 DISPOSAL OF WASTE

- .1 Separate and recycle waste materials designated for disposal.
- .2 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard and packaging material in appropriate on-site bins for recycling.
- .3 Place materials defined as hazardous or toxic in designated containers.
- .4 Divert unused metal materials from landfill to metal recycling facility as approved by Departmental Representative.
- .5 Fold up metal banding, flatten and place in designated area for recycling.
- .6 Unused paint or coating material must be disposed of at an official hazardous material collections site as approved by Departmental Representative.
- .7 Do not dispose of unused paint material into sewer system, streams, lakes, onto ground, or in any other location where it will pose a health or environmental hazard.
- .8 Disposal of waste volatile materials, mineral spirits, oil, and paint thinner into waterways, storm, or sanitary sewers is strictly prohibited.
- .9 Dispose of unused material at an official hazardous material collections site. Do not dispose of unused hazardous material into the sewer system, streams, lakes, on ground or in any other location where they will pose a health or environmental hazard.
- .10 Do not dispose of preservative treated wood through incineration.
- .11 Do not dispose of preservative treated wood with other materials destined for recycling or reuse.
- .12 Dispose of treated wood, end pieces, wood scraps and sawdust at a sanitary landfill.
- .13 Dispose of unused preservative material at an official hazardous material collections site. Do not dispose of unused preservative material into the sewer system, streams, and lakes, on ground or in any other location where they will pose a health or environmental hazard.
- .14 Burying of rubbish and waste materials is prohibited.
- .15 All waste material not designated for recycle to be disposed of at an approved waste disposal site in accordance with appropriate environmental guidelines.

1.2 STORAGE AND HANDLING OF WASTE

- .1 Store materials to be reused, recycled and salvaged in locations as directed by Departmental Representative.
- .2 Unless specified otherwise, materials for removal become property of the Contractor.
- .3 Protect, stockpile, store and catalogue salvaged items.
- .4 Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facility.

Part 2 Not Used

Part 3 Execution

3.1 APPLICATION

- .1 Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.

3.2 CLEANING

- .1 Remove tools and waste materials on completion of work and leave work area in clean and orderly condition.
- .2 Clean-up work area as work progresses.
- .3 Source separate materials to be reused or recycled into specific sort areas.

3.3 DIVERSION OF MATERIALS

- .1 Separate materials from general waste and stockpile in separate piles or containers, to approval of Departmental Representative, and consistent with applicable fire regulations. Mark containers or stockpile areas. Provide instruction on disposal practices.
- .2 On-site sale of salvaged, recovered, reusable, or recyclable materials is not permitted.

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE REQUIREMENTS

.1 Acceptance of Work Procedures:

- .1 Contractor's Inspection: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
 - .1 Notify Departmental Representative in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.
 - .2 Request Departmental Representative's inspection.
- .2 Departmental Representative's Inspection:
 - .1 Departmental Representative and Contractor to inspect Work and identify defects and deficiencies.
 - .2 Contractor to correct Work as directed.
- .3 Completion Tasks: submit written certificates in English that tasks have been performed as follows:
 - .1 Work: completed and inspected for compliance with Contract Documents.
 - .2 Defects: corrected and deficiencies completed.
 - .3 Equipment and systems: tested, adjusted, balanced and fully operational.
 - .4 Certificates required by Utility companies: submitted.
 - .5 Operation of systems: demonstrated to Departmental Representative's personnel.
 - .6 Work: complete and ready for final inspection.
- .4 Final Inspection:
 - .1 When completion tasks are done, request final inspection of Work by Departmental Representative.
 - .2 When Work incomplete according to Departmental Representative, complete outstanding items and request re-inspection.
- .5 Declaration of Substantial Performance: when Departmental Representative considers deficiencies and defects corrected and requirements of Contract substantially performed, make application for Certificate of Substantial Performance.
- .6 Final Payment:
 - .1 When Departmental Representative considers final deficiencies and defects corrected and requirements of Contract met, make application for final payment.

1.2 FINAL CLEANING

.1 Clean in accordance with Section 01 74 00 – Cleaning.

.1 Remove surplus materials, excess materials, rubbish, tools and equipment.

.2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 – Waste Management and Disposal.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE REQUIREMENTS

.1 Pre-warranty Meeting:

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

1.2 SUBMITTALS

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

1.3 FORMAT

- .1 Organize data as instructional manual.
- .2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.
- .3 When multiple binders are used correlate data into related consistent groupings.
 - .1 Identify contents of each binder on spine.
- .4 Cover: identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.
- .5 Arrange content by systems, under Section numbers and sequence of Table of Contents.

- .6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
 - .7 Text: manufacturer's printed data, or typewritten data.
 - .8 Drawings: provide with reinforced punched binder tab.
 - .1 Bind in with text; fold larger drawings to size of text pages.
- 1.4 CONTENTS - PROJECT RECORD DOCUMENTS
- .1 Table of Contents for Each Volume: provide title of project;
 - .1 Date of submission; names.
 - .2 Addresses, and telephone numbers of Departmental Representative and Contractor with name of responsible parties.
 - .3 Schedule of products and systems, indexed to content of volume.
 - .2 For each product or system:
 - .1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.
 - .3 Product Data: mark each sheet to identify specific products and component parts, and data applicable to installation; delete inapplicable information.
 - .4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.
 - .5 Warranties and Certificates: for work and systems.
 - .6 Typewritten Text: as required to supplement product data.
 - .1 Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00 – Quality Control.
- 1.5 AS -BUILT DOCUMENTS AND SAMPLES
- .1 Maintain one record copy of:
 - .1 Contract Drawings.
 - .2 Specifications.
 - .3 Addenda.
 - .4 Change Orders and other modifications to Contract.
 - .5 Reviewed shop drawings, product data, and samples.
 - .6 Field test records.
 - .7 Inspection certificates.
 - .8 Manufacturer's certificates.
 - .2 Store record documents and samples in field office apart from documents used for construction.
 - .1 Provide files, racks, and secure storage.

- .3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual.
 - .1 Label each document "PROJECT RECORD" in neat, large, printed letters.
 - .4 Maintain record documents in clean, dry and legible condition.
 - .1 Do not use record documents for construction purposes.
 - .5 Keep record documents and samples available for inspection by Departmental Representative.
- 1.6 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS
- .1 Record information on set of black line opaque drawings provided by Departmental Representative.
 - .2 Use red marking pen for recording information.
 - .3 Record information concurrently with construction progress.
 - .1 Do not conceal Work until required information is recorded.
 - .4 Contract Drawings and shop drawings: mark each item to record actual construction, including:
 - .1 Measured depths of elements of foundation in relation to finish first floor datum.
 - .2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - .3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
 - .4 Field changes of dimension and detail.
 - .5 Changes made by change orders.
 - .6 Details not on original Contract Drawings.
 - .7 References to related shop drawings and modifications.
 - .5 Specifications: mark each item to record actual construction, including:
 - .1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
 - .2 Changes made by Addenda and change orders.
 - .6 Other Documents: maintain manufacturer's certifications, inspection certifications, and field test records, required by individual specifications sections.
 - .7 Provide digital photos, if requested, for site records.
- 1.7 FINAL SURVEY
- .1 Submit final site survey certificate, certifying that elevations and locations of completed Work are in conformance, or non-conformance with Contract Documents.

1.8 EQUIPMENT AND SYSTEMS

- .1 For each item of equipment and each system include description of unit or system, and component parts.
 - .1 Give function, normal operation characteristics and limiting conditions.
 - .2 Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.
- .2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.
- .3 Include installed colour coded wiring diagrams.
- .4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences.
 - .1 Include regulation, control, stopping, shut-down, and emergency instructions.
 - .2 Include summer, winter, and any special operating instructions.
- .5 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- .6 Provide servicing and lubrication schedule, and list of lubricants required.
- .7 Include manufacturer's printed operation and maintenance instructions.
- .8 Include sequence of operation by controls manufacturer.
- .9 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- .10 Provide installed control diagrams by controls manufacturer.
- .11 Provide Contractor's co-ordination drawings, with installed colour coded piping diagrams.
- .12 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- .13 Additional requirements: as specified in individual specification sections.

1.9 MATERIALS AND FINISHES

- .1 Building products, applied materials, and finishes: include product data, with catalogue number, size, composition, and colour and texture designations.
 - .1 Provide information for re-ordering custom manufactured products.
- .2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

- .3 Moisture-protection and weather-exposed products: include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- .4 Additional requirements: as specified in individual specifications sections.

1.10 MAINTENANCE MATERIALS

- .1 Spare Parts:
 - .1 Provide spare parts, in quantities specified in individual specification sections.
 - .2 Provide items of same manufacture and quality as items in Work.
 - .3 Deliver to site; place and store.
 - .4 Receive and catalogue items:
 - .1 Submit inventory listing to Departmental Representative.
 - .2 Include approved listings in Maintenance Manual.
 - .5 Obtain receipt for delivered products and submit prior to final payment.
- .2 Special Tools:
 - .1 Provide special tools, in quantities specified in individual specification section.
 - .2 Provide items with tags identifying their associated function and equipment.
 - .3 Deliver to site; place and store.
 - .4 Receive and catalogue items.
 - .1 Submit inventory listing to Departmental Representative.
 - .2 Include approved listings in Maintenance Manual.

1.11 DELIVERY, STORAGE AND HANDLING

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

1.12 WARRANTIES AND BONDS

- .1 Develop warranty management plan to contain information relevant to Warranties.
- .2 Submit warranty management plan, 30 days before planned pre-warranty conference, to Departmental Representative approval.
- .3 Warranty management plan to include required actions and documents to assure that Departmental Representative receives warranties to which it is entitled.

- .4 Provide plan in narrative form and contain sufficient detail to make it suitable for use by future maintenance and repair personnel.
- .5 Submit, warranty information made available during construction phase, to Departmental Representative for approval prior to each monthly pay estimate.
- .6 Assemble approved information in binder, submit upon acceptance of work and organize binder as follows:
 - .1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.
 - .2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.
 - .3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of applicable item of work.
 - .4 Verify that documents are in proper form, contain full information, and are notarized.
 - .5 Co-execute submittals when required.
 - .6 Retain warranties and bonds until time specified for submittal.
- .7 Except for items put into use with Departmental Representative's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.
- .8 Conduct joint 9 month warranty inspection, measured from time of acceptance, by Departmental Representative.
- .9 Include information contained in warranty management plan as follows:
 - .1 Roles and responsibilities of personnel associated with warranty process, including points of contact and telephone numbers within the organizations of Contractors, subcontractors, manufacturers or suppliers involved.
 - .2 Listing and status of delivery of Certificates of Warranty for extended warranty items, to include roofs, motors, transformers, commissioned systems.
 - .3 Provide list for each warranted equipment, item, feature of construction or system indicating:
 - .1 Name of item.
 - .2 Model and serial numbers.
 - .3 Location where installed.
 - .4 Name and phone numbers of manufacturers or suppliers.
 - .5 Names, addresses and telephone numbers of sources of spare parts.
 - .6 Warranties and terms of warranty: include one-year overall warranty of construction. Indicate items that have extended warranties and show separate warranty expiration dates.
 - .7 Cross-reference to warranty certificates as applicable.
 - .8 Starting point and duration of warranty period.
 - .9 Summary of maintenance procedures required to continue warranty in force.

- .10 Cross-Reference to specific pertinent Operation and Maintenance manuals.
- .11 Organization, names and phone numbers of persons to call for warranty service.
- .12 Typical response time and repair time expected for various warranted equipment.
- .4 Contractor's plans for attendance at 9 month post-construction warranty inspections.
- .5 Procedure and status of tagging of equipment covered by extended warranties.
- .6 Post copies of instructions near selected pieces of equipment where operation is critical for warranty and/or safety reasons.
- .10 Respond in timely manner to oral or written notification of required construction warranty repair work.
- .11 Written verification to follow oral instructions.
 - .1 Failure to respond will be cause for the Departmental Representative to proceed with action against Contractor.
- 1.13 WARRANTY TAGS
 - .1 Tag, at time of installation, each warranted item. Provide durable, oil and water resistant tag approved by Departmental Representative.
 - .2 Attach tags with copper wire and spray with waterproof silicone coating.
 - .3 Leave date of acceptance until project is accepted for occupancy.
 - .4 Indicate following information on tag:
 - .1 Type of product/material.
 - .2 Model number.
 - .3 Serial number.
 - .4 Contract number.
 - .5 Warranty period.
 - .6 Inspector's signature.
 - .7 Construction Contractor.
- Part 2 Products
 - 2.1 NOT USED
 - .1 Not Used.
- Part 3 Execution
 - 3.1 NOT USED
 - .1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 31 23 33 – Excavating, Trenching and Backfilling.

1.2 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM A 185-07, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
 - .2 ASTM D 260-86(2001), Standard Specification for Boiled Linseed Oil.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-19.24-M90, Multicomponent, Chemical-Curing Sealing Compound.
- .3 Canadian Standards Association (CSA International)
 - .1 CSA-A23.1/A23.2-2019, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
 - .2 CAN/CSA-A3000-18, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
 - .3 CSA-A3001-03, Cementitious Materials for Use in Concrete.
 - .4 CAN/CSA-G30.18-09(R2019), Carbon Steel Bars for Concrete Reinforcement.

1.3 DESIGN REQUIREMENTS

- .1 Performance: in accordance with CSA-A23.1/A23.2, and as described in Mixes of PART 2 - PRODUCTS.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit product data in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Concrete hauling time: submit for review deviations exceeding maximum allowable time of 120 minutes for concrete to be delivered to site of Work and discharged after batching.

1.5 QUALITY ASSURANCE

- .1 Submit to Departmental Representative, minimum 4 weeks prior to starting concrete work, valid and recognized certificate from plant delivering concrete.

1.6 MEASUREMENT FOR PAYMENT

- .1 Cast-in-place concrete will be measured by lump sum.

Part 2 Products

2.1 MATERIALS

- .1 Cement: to CAN/CSA-A3001, Type GU.
- .2 Water: to CSA-A23.1/A23.2.
- .3 Reinforcing bars: to CAN/CSA-G30.18, Grade 400.
- .4 Fine aggregate: FA1 as per table 10 of CSA A23.1.
- .5 Course aggregate: 20 to 5 mm maximum nominal size as per table 11 of CSA A23.1.
- .6 Air entraining admixture: in accordance with ASTM C494/C494M.

2.2 MIXES

- .1 Provide concrete mix to meet the following:
 - .1 Cement: Portland Type GU.
 - .2 Class of exposure: N.
 - .3 16 mm nominal size coarse aggregate.
 - .4 Maximum total water/cement ration 0.45.
 - .5 Air content 5 to 8 %.
 - .6 Admixture: air entraining only.
 - .7 Minimum compressive strength at 28 days: 25 MPa.
 - .8 Slump: at time and point of discharge 30 to 60 mm.

Part 3 Execution

3.1 PREPARATION

- .1 Provide Departmental Representative 24 hours notice before each concrete pour.
- .2 Prior to placing concrete:
 - .1 Formwork completed and secured.
 - .2 Ice and free standing water removed.
 - .3 Embedded items installed and held in position.
- .3 During concreting operations:
 - .1 Development of cold joints not allowed.
 - .2 Ensure concrete delivery and handling facilitates placing with minimum of rehandling, and without damage to existing structure or Work.

3.2 CONSTRUCTION

- .1 Perform cast-in-place concrete work in accordance with CSA-A23.1/A23.2.

3.3 INSERTS

- .1 Cast in sleeves, ties, slots, anchors, reinforcement, frames, conduit, bolts, waterstops, joint fillers and other inserts required to be built-in.

3.4 FINISHES

- .1 Screed to plane surfaces and use aluminum floats.
- .2 Trowel smooth to provide lightly brushed finish.

3.5 CURING

- .1 Use curing compounds compatible with applied finish on concrete surfaces free of bonding agents and in accordance with CSA-A23.1/A23.2.

3.6 SITE TOLERANCES

- .1 Concrete finishing tolerance in accordance with CSA-A23.1/A23.2.

3.7 CLEANING

- .1 Use trigger operated spray nozzles for water hoses.
- .2 Designate cleaning area for tools to limit water use and runoff.

3.8 REMOVALS

- .1 Remove all formwork prior to backfilling.

END OF SECTION

- Part 1 General
- 1.1 RELATED SECTIONS
 - .1 Division 01 – General Requirements.
- 1.2 REFERENCES
 - .1 Canadian Standards Association (CSA International)
 - .1 C22.1-18, Canadian Electrical Code (CEC), Part 1 (24th Edition), Safety Standard for Electrical Installations.
 - .2 C22.3 No. 7:20, Underground Systems.
 - .3 C235:19, Preferred Voltage Levels for AC Systems up to 50,000 V.
 - .4 Z462-18, Workplace Electrical Safety.
 - .2 Electrical and Electronic Manufacturer's Association of Canada (EEMAC)
 - .1 EEMAC Y1-2-1979, Performance Specifications for Finishing Systems for Outdoor Electrical Equipment.
 - .2 EEMAC 2Y-1-1958, Light Gray Colour for Indoor Switch Gear.
 - .3 Institute of Electrical and Electronics (IEEE)/National Electrical Safety Code Product Line (NESC)
 - .1 IEEE SP1122-2000, The Authoritative Dictionary of IEEE Standards Terms, 7th Edition.
- 1.3 DEFINITIONS
 - .1 Electrical and electronic terms: unless otherwise specified or indicated, terms used in these specifications, and on drawings, are those defined by IEEE SP1122.
- 1.4 DESIGN REQUIREMENTS
 - .1 Operating voltages: to CAN3-C235.
 - .2 Control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard.
 - .1 Equipment to operate in extreme operating conditions established in above standard without damage to equipment.
 - .3 Language operating requirements: provide identification nameplates and labels for control items in English.
- 1.5 ACTION AND INFORMATIONAL SUBMITTALS
 - .1 Submittals: in accordance with Section 01 33 00 – Submittal Procedures.
 - .2 Product Data: submit WHMIS SDS in accordance with Section 01 35 29 – Health and Safety Requirements.

- .3 Shop drawings:
 - .1 Submit manufacturer shop drawings of all equipment.
 - .2 Part numbers for submitted products and equipment to be clearly highlighted, boxed or arrowed with all required accessories and components identified.
 - .3 Submitted information must be detailed and relevant to the project. Bulk generic information is not acceptable.
 - .4 Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, accessories and other items that must be shown to ensure coordinated installation.
 - .5 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.
 - .6 Indicate on drawings clearances for operation, maintenance, and replacement of operating equipment devices.
 - .7 If changes are required, resubmit corrected drawings.
 - .8 Where the use of electronic shop drawings has been agreed to by the Departmental Representative, the following submittal requirements are to be followed:
 - .1 Shop drawings to be submitted in PDF format, legible and clear.
 - .2 Shop drawings to be grouped by specification section, with one PDF file per specification section. The file name to indicate the section number and name, i.e. "26 50 00 Lighting Rev0.PDF" with resubmissions appended Rev1, Rev2, etc.
 - .3 Supplemental information not previously submitted to be identified as follows: "26 50 00 Lighting Supplement 1.PDF", Supplement 2, etc.
 - .4 A cover sheet is to be incorporated into each PDF submission and indicate the project name and number, specification section number and name, the contractors name, suppliers name, date submitted, contractor's stamp and signature identifying that the contractor has reviewed the information prior to submission for correctness and completeness. Sufficient white space (minimum of ¼ page) is to be left for the Departmental Representative's stamp and comments.
 - .5 Part numbers for submitted products to be clearly highlighted, boxed or arrowed with all required accessories and components indicated.
 - .6 Submitted information must be specific, detailed and relevant to the project. Bulk, generic information is not acceptable.
- .4 Quality Control: in accordance with Section 01 45 00 – Quality Control.
 - .1 Provide CSA certified equipment and material.
 - .2 Where CSA certified equipment and material is not available, submit such equipment and material to inspection authorities for special approval before delivery to site.
 - .3 Submit test results of installed electrical systems and instrumentation.
 - .4 Permits and fees: in accordance with General Conditions of contract.
 - .5 Submit, upon completion of Work, load balance report as described in PART 3 – FIELD QUALITY CONTROL.
- .5 Upon completion of project, submit as-built drawings and maintenance manuals.

1.6 QUALITY ASSURANCE

- .1 Quality Assurance: in accordance with Section 01 45 00 – Quality Control.
- .2 Qualifications: electrical Work to be carried out by qualified, licensed electricians or apprentices in accordance with authorities having jurisdiction as per the conditions of Provincial Act respecting manpower vocational training and qualification.
 - .1 Employees registered in provincial apprentices program: permitted, under direct supervision of qualified licensed electrician, to perform specific tasks.
 - .2 Permitted activities: determined based on training level attained and demonstration of ability to perform specific duties.
- .3 Site Meetings:
 - .1 Site Meetings: as part of Field Services described in Part 3 - FIELD QUALITY CONTROL, schedule site visits, to review Work, at stages listed.
 - .1 After delivery and storage of products, and when preparatory Work is complete but before installation begins.
 - .2 Twice during progress of Work at 25% and 60% complete.
 - .3 Upon completion of Work, after cleaning is carried out.
- .4 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29.06 – Health and Safety Requirements.

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements.
- .2 Separate and recycle waste materials in accordance with Section 01 74 19 – Waste Management and Disposal.
 - .1 Separate waste materials for reuse and recycling.
 - .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

1.8 SYSTEM STARTUP

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

1.9 OPERATING INSTRUCTIONS

- .1 Provide for each system and principal item of equipment as specified in technical sections for use by operation and maintenance personnel.
- .2 Operating instructions to include following:
 - .1 Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.
 - .2 Start up, proper adjustment, operating, lubrication, and shutdown procedures.
 - .3 Safety precautions.
 - .4 Procedures to be followed in event of equipment failure.
 - .5 Other items of instruction as recommended by manufacturer of each system or item of equipment.

- .3 Print or engrave operating instructions and frame under glass or in approved laminated plastic.
 - .4 Post instructions where directed.
 - .5 For operating instructions exposed to weather, provide weather-resistant materials or weatherproof enclosures.
 - .6 Ensure operating instructions will not fade when exposed to sunlight and are secured to prevent easy removal or peeling.
- 1.10 SITE VISIT
- .1 Prior to tender submission, visit the site and become familiar with the job and all conditions which may affect costs. Ignorance of existing conditions will not be considered as basis for extra claims.
- 1.11 MEASUREMENT FOR PAYMENT
- .1 Electrical will be measured by lump sum.
- Part 2 Products
- 2.1 MATERIALS AND EQUIPMENT
- .1 Provide material and equipment in accordance with Section 01 61 00 – Common Product Requirements.
 - .2 Material and equipment to be CSA certified. Where CSA certified material and equipment are not available, obtain special approval from inspection authorities before delivery to site and submit such approval as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.
 - .3 Factory assemble control panels and component assemblies.
- 2.2 ELECTRIC EQUIPMENT AND CONTROLS
- .1 Verify installation and co-ordination responsibilities related to equipment and controls, as indicated. Verify size, location and wiring requirements of all equipment with appropriate trade and reviewed shop drawings prior to rough-in.
 - .2 Provide wiring and conduit.
- 2.3 WARNING SIGNS
- .1 Warning Signs: in accordance with requirements of authority having jurisdiction and Departmental Representative.
 - .2 Decal signs, minimum size 175 x 250 mm.

2.4 WIRING TERMINATIONS

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

2.5 EQUIPMENT IDENTIFICATION

- .1 Identify electrical equipment with nameplates and labels as follows:
 - .1 Nameplates: plastic laminate lamicoïd 3 mm thick plastic engraving sheet, matte white finish face, black core, lettering accurately aligned and engraved into core and mechanically attached with 3M VHB acrylic adhesive type 4941.
 - .2 Sizes as follows:

NAMEPLATE SIZES

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

- .2 Labels: embossed plastic labels with 6 mm high letters unless specified otherwise.
- .3 Wording on nameplates and labels to be approved by Departmental Representative prior to manufacture.
- .4 Allow for minimum of twenty-five (25) letters per nameplate.
- .5 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.
- .6 Lamicoïd nameplate installed on distribution panelboards, meter centers, circuit breaker enclosures and power modules shall indicate the following:
 - .1 Designated name of equipment.
 - .2 Overcurrent protection device rating.
 - .3 Voltages, number of phases and wires.
 - .4 Designation of power source.
 - .5 The following is an example.

PANEL D1 – 400A
120/208V – 3PH – 4W
FED FROM TRANSFORMER: TX1

- .7 Lamicoid nameplates installed on manual starters, control panels, disconnect switches, large junction and pull boxes, service equipment and service modules shall contain the following information:
 - .1 Designated name of equipment.
 - .2 Designated name of power source.
 - .3 Voltage(s), number of phases and wires.
 - .4 Branch circuit breaker number(s) where possible.
- .8 All junction and/or pull boxes (volume less than 8500 cu cm) shall be marked with an indelible ink marker to designate the circuit number of enclosed wiring, the designated panel name and electrical characteristics where applicable.
- .9 Install an additional lamicoid nameplate on all, or any piece of electrical equipment, or apparatus, i.e. panelboards and fusible switches, etc. that may contain overcurrent devices, i.e. circuit breakers and/or fuses, that have been designed for, and incorporate an interrupting capacity sized “larger” than 10 KAIC.

Example:

Minimum interrupting capacity of breakers installed in this panel is to be not less than 14 KAIC	Minimum interrupting capacity of fuses installed in this fusible switch is to be not less than 100 KAIC
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2.6 WIRING IDENTIFICATION

- .1 Identify wiring with permanent indelible identifying markings, indicating panel and circuit number; i.e., D2-31. Normal ground circuits to have ground, neutral and phase wires identified with black on white background tape. Tape to be preprinted vinyl, self-adhesive. Circuits to be identified at both ends and at all pull and junction boxes.
- .2 Use coloured plastic tapes to identify feeders on both ends of phase conductors and at junction and pull boxes if conductor insulation colours are other than red, black, blue, white and green.
- .3 Maintain phase sequence and colour coding throughout.
- .4 Colour coding: to CSA C22.1.
- .5 Use colour coded wires in communication cables, matched throughout system.

2.7 FINISHES

- .1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.
 - .1 Paint distribution enclosures light grey to EEMAC 2Y-1.

Part 3 Execution

3.1 INSTALLATION

- .1 Do complete installation in accordance with CSA C22.1 except where specified otherwise.
- .2 Do underground systems in accordance with CSA C22.3 No.1 except where specified otherwise.

3.2 VAPOUR BARRIER PENETRATIONS

- .1 Outlet and junction boxes installed in walls or ceilings equipped with a vapour barrier are to be surrounded with a moisture resistant barrier or boxes that are specifically designed for vapour barrier penetrations are to be used.
- .2 Penetrations through vapour barriers shall be effectively sealed to maintain the integrity of the vapour barrier.

3.3 CUTTING AND PATCHING

- .1 Provide cutting, coring and drillings as required for installation of electrical services. Hole sizes to be kept to a minimum. Restoration of damaged surfaces to preconstruction condition will be by this contractor.

3.4 NAMEPLATES AND LABELS

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

3.5 CONDUIT AND CABLE INSTALLATION

- .1 Install cables, conduits and fittings embedded in structure as indicated.

3.6 LOCATION OF OUTLETS AND EQUIPMENT

- .1 Locate outlets in accordance with Section 26 05 32 – Outlet Boxes, Conduit Boxes and Fittings.
- .2 Change location of outlets and equipment at no extra cost or credit, providing distance does not exceed 3000 mm, unless indicated otherwise, and information is given before installation.
- .3 Locate light switches on latch side of doors.

3.7 MOUNTING HEIGHTS

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

- .3 Install electrical equipment at the following heights unless indicated otherwise.
 - .1 Local switches: 1200 mm.
 - .2 Wall receptacles: 1000 mm.
 - .3 Thermostats: 1200 mm.
 - .4 Panelboards: 1500 mm or as required by Code
- .4 Refer to all detail drawings and confirm mounting of outlet boxes prior to roughing-in.

- 3.8 COORDINATION OF PROTECTIVE DEVICES
 - .1 Ensure circuit protective devices such as overcurrent trips, relays and fuses are installed to required values and settings.

- 3.9 FIELD QUALITY CONTROL
 - .1 Load Balance:
 - .1 Measure phase current to panelboards with normal loads (lighting) operating at time of acceptance; adjust branch circuit connections as required to obtain best balance of current between phases and record changes.
 - .2 Provide upon completion of work, load balance report as directed in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS: phase and neutral currents on panelboards, operating under normal load, as well as hour and date on which each load was measured, and voltage at time of test.
 - .2 Conduct following tests in accordance with Section 01 45 00 – Quality Control.
 - .1 Power distribution system including phasing, voltage, grounding and load balancing.
 - .2 Circuits originating from branch distribution panels.
 - .3 Lighting and its control.
 - .4 Insulation resistance testing:
 - .1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.
 - .2 Check resistance to ground before energizing.
 - .3 Carry out tests in presence of Departmental Representative.
 - .4 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.

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

END OF SECTION

- Part 1 General
- 1.1 DESCRIPTION OF WORK
- .1 In general, work of this Section consists of the removal and replacement of electrical services on existing wharf as noted.
- .2 Remove all redundant/obsolete/abandoned electrical equipment, wire, cable and conduit. This includes all wire, cable and conduit underneath the wharf.
- 1.2 RELATED SECTIONS
- .1 Section 01 74 19 – Waste Management and Disposal.
- .2 Section 26 05 00 – Common Work Results for Electrical.
- 1.3 SITE SURVEY
- .1 Prior to Tender submission, visit the site and survey and Quantify the extent of the removals/alterations required for this contract and include all costs in the total tendered price.
- 1.4 REFERENCE STANDARDS
- .1 All removal and alteration work of electrical construction to be done in accordance with the safety standards outlined in the Canadian Electrical Code.
- 1.5 PROTECTION
- .1 The contractor is responsible for any damages to existing structure as a result of the work.
- Part 2 Products
- 2.1 Not Applicable
- Part 3 Execution
- 3.1 GENERAL REMOVALS
- .1 Remove existing electrical services as noted
- .2 Schedule all removal work with the Departmental Representative. Arrange work to minimize disruptions to wharf operations.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 26 05 00 – Common Work Results for Electrical.

1.2 WASTE MANAGEMENT AND DISPOSAL

- .1 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- .2 Fold up metal banding, flatten and place in designated area for recycling.
- .3 Do not dispose of preservative treated wood through incineration.
- .4 Do not dispose of preservative treated wood with other materials destined for recycling or reuse. Dispose of treated wood, end pieces, wood scraps and sawdust at sanitary landfill as approved by Departmental Representative.
- .5 Dispose of unused wood preservative material at official hazardous material collections site.
- .6 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 WOOD PRODUCTS

- .1 All wood products shall be cut from live timber and must be free from physical defects such as surface rot, heart rot and loose knots.
- .2 Wood products to be pressure treated in accordance with CAN/CSA-080 Series-08(R2012). Use ACA or CCA treatment only.
- .3 Pressure treatment to be AWWA category 4B with a CCA pcf of 0.60, suitable for marine use.
- .4 Any field cuts to be treated in accordance with AWWA standard M4 with a preservative containing at least 2% copper.
- .5 Rough hardware: bolts, nuts, washers, lags, pin, screws; 316 stainless steel.
- .6 Wood products to be ordered to length to avoid field cuts.

2.2 WOOD UTILITY POLES

- .1 Wood utility poles: to CAN/CSA-O15, wood species Pine, Class 3, preservative treated.
 - .1 9 m long poles for site lighting as indicated.

Part 3 Execution

3.1 INSTALLATION

- .1 Layout and install the work in the locations and arrangement shown on the drawings or as indicated by the Departmental Representative.
- .2 Where indicated replace existing wood pole with new. Remove and reinstall existing or provide new light fixtures, associated wiring and switching.
- .3 Pre-drill all anchor holes to prevent splitting of wood.
- .4 All field cuts, holes and breaks in the preservative treatment shall be given two coats of preservative before assembly.
- .5 Securely fasten new wood products and poles to existing structure.
- .6 Use 316 stainless steel or hot dipped galvanized hardware to fasten wood products and poles in place and for mounting of new or existing equipment to the wood products and poles.

END OF SECTION

- Part 1 General
 - 1.1 RELATED SECTIONS
 - .1 Section 26 05 00 – Common Work Results for Electrical
 - 1.2 ACTION AND INFORMATIONAL SUBMITTALS
 - .1 Submit shop drawings in accordance with Section 01 33 00 – Submittal Procedures.
 - .2 Shop Drawings to include manufacturer’s instructions, printed product literature and data sheets including characteristics, physical size, finish and limitations.
 - .3 Operational and Maintenance Data: submit operation and maintenance data for incorporation into manual specified in Section 01 78 00 – Closeout Submittals
 - 1.3 DELIVERY STORAGE AND HANDLING
 - .1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements.
 - .2 Separate and recycle waste materials in accordance with Section 01 74 19 – Waste Management and Disposal.
 - .1 Separate waste materials for reuse and recycling.
 - .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- Part 2 Products
 - 2.1 POWER PEDESTALS
 - .1 Power pedestals to be a self-contained enclosure housing terminal blocks and receptacles for separately metered marina shore power services and general power as indicated. Pedestals to include:
 - .1 Main housing constructed of 16 gauge 316L stainless steel with a UV resistant white polyurethane finish and be 3R rated. Enclosure to be divided into 2 or 4 separate sections as indicated, each containing copper terminals capable of accepting #10 AWG to #2/0 AWG conductors for single phase 120/240V feed through capacity. Each pedestal to house 2 or 4 L14-30R receptacles and associated breakers. Where indicated 20A 5-20R receptacles to be installed in lieu of 30A receptacles. Pedestal dimensions to be 1333mm H x 282mm W x 282mm D.
 - .2 Pedestal to be c/w polycarbonate mounting base plate to isolate the bottom housing from the dock surface.
 - .3 30A receptacles to be corrosion resistant marine grade, 120/240V, 30A L14-30R c/w lockable cover and 30A, 2P breaker, quantity as indicated.

- .4 20A receptacles to be corrosion resistant marine grade, 120V, type 5-20R c/w lockable cover and 20A, 1P 5mA GFI breaker, quantity as indicated.
- .5 Each 30A receptacle will be fed from a separately metered service located in the service building.
- .6 Each 20A receptacle will be fed from the wharf general services Panel A in the service building.
- .7 Fully assembled pedestals to be CSA certified and labeled.
- .2 Acceptable materials
 - .1 Marina Electrical Equipment Harbor Light SS series c/w receptacles as indicated.

2.2 EQUIPMENT IDENTIFICATION

- .1 Provide equipment identification in accordance with Section 26 05 00 – Common Work Results for Electrical.
- .2 Size 4 lamacoid nameplate for each metered outlet. Example F31 where:
 - .1 F3 – indicates pedestal number.
 - .2 1 – indicates outlet on pedestal.

Part 3 Execution

3.1 INSTALLATION

- .1 Existing floats to be modified as indicated to accept Power Pedestals. Use Wood Products as specified in Section 26 05 10 for additional support. Fasten base plates to float sub-structures as shown in details and as approved by Departmental Representative. Exact locations of pedestals to be reviewed with Departmental Representative prior to installation.
- .2 Feed power cables through float wireways or structure and up into pedestal base.
- .3 Install cable connectors and terminate on appropriate terminal blocks as per manufacturer's installation instructions. Each pedestal will be uniquely labeled and receptacles numbered to match meter in service building as per table.
- .4 Megger all feeders prior to energizing and test each receptacle and ground fault protection.

END OF SECTION

- Part 1 General
- 1.1 RELATED SECTIONS
- .1 Section 26 05 00 – Common Work Results for Electrical.
- 1.2 ACTION AND INFORMATIONAL SUBMITTALS
- .1 Submit shop drawings in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Shop Drawings to include manufacturer’s instructions, printed product literature and data sheets including characteristics, physical size, finish and limitations.
- .3 Operational and Maintenance Data: submit operation and maintenance data for incorporation into manual specified in Section 01 78 00 – Closeout Submittals.
- 1.3 DELIVERY STORAGE AND HANDLING
- .1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements.
- .2 Separate and recycle waste materials in accordance with Section 01 74 19 – Waste Management and Disposal.
- .1 Separate waste materials for reuse and recycling.
- .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- Part 2 Products
- 2.1 SERVICE MODULES
- .1 Fabricate service modules utilizing 9mm thick aluminum plate, Type A82C 5052-H32 as indicated.
- .2 Fabricate using sound, continuous full penetration welds conforming to CSA Specification W59-03.
- .3 After fabrication, all parts shall be cleaned; welds ground smooth.
- 2.2 ANCHORAGE
- .1 16mm diameter 316 stainless steel anchor bolts and stainless steel nuts and washers.
- Part 3 Execution
- 3.1 INSTALLATION
- .1 Install service module and secure in place.
- .2 Install corrosion resistant electrical components as indicated in service module.

END OF SECTION

- Part 1 General
- 1.1 RELATED SECTIONS
- .1 Section 26 05 00 – Common Work Results for Electrical.
- 1.2 REFERENCES
- .1 Canadian Standards Association (CSA International)
- .1 C22.2 No.18.3-12 (R2017), Conduit, Tubing and Cable Fittings (Tri-National Standard with ANCE NMX-J-017 and UL 514B).
- .2 C22.2 No.65-18, Wire Connectors (Tri National Standard with NMX-J-543-ANCE and UL 486A-486B).
- .2 Electrical and Electronic Manufacturers' Association of Canada (EEMAC)
- .1 EEMAC 1Y-2, 1961 Bushing Stud Connectors and Aluminum Adapters (1200 Ampere Maximum Rating).
- .3 National Electrical Manufacturers Association (NEMA)
- 1.3 ACTION AND INFORMATIONAL SUBMITTALS
- .1 Submit shop drawings in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Shop Drawings to include manufacturer's instructions, printed product literature and data sheets including characteristics, physical size, finish and limitations.
- .3 Operational and Maintenance Data: submit operation and maintenance data for incorporation into manual specified in Section 01 78 00 – Closeout Submittals.
- 1.4 DELIVERY STORAGE AND HANDLING
- .1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements.
- .2 Separate and recycle waste materials in accordance with Section 01 74 19 – Waste Management and Disposal.
- .1 Separate waste materials for reuse and recycling.
- .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

Part 2

Products

2.1

MATERIALS

- .1 Crimp style wire connectors, nylon insulated, with current carrying parts of copper alloy, for conductors #16 AWG and smaller.
- .2 Fork tongue, nylon insulated, crimp style terminals for connecting conductors #16 AWG and smaller to screw down terminals.
- .3 Pressure type wire connectors to: CAN/CSA-C22.2 No.65, with current carrying parts of copper alloy sized to fit copper conductors as required. Use twist-on connectors for #14 AWG to #8 AWG wires.
- .4 Crimp style wire connectors, nylon insulated with current carrying parts of copper alloy, for connecting solid to stranded conductors.
- .5 Compression type connectors or terminal blocks in suitable enclosure for connecting #6 AWG conductors and larger, unless indicated otherwise. Compression type connectors to have a temperature rating of 90 deg. C.
- .6 Fixture type splicing connectors to: CAN/CSA-C22.2 No.65, with current carrying parts of copper alloy sized to fit copper conductors 10 AWG or less.
- .7 Bushing stud connectors: to EEMAC 1Y-2 to consist of:
 - .1 Connector body and stud clamp for stranded round copper or aluminum conductors.
 - .2 Clamp for stranded round copper conductors.
 - .3 Stud clamp bolts.
 - .4 Bolts for copper conductors.
 - .5 Sized for conductors as indicated.
- .8 Waterproof gel filled twist-on type wire connectors to: CAN/CSA-C22.2 No.65 and UL486G, with current carrying parts of copper alloy sized to fit copper conductors as required.
 - .1 Suitable for use in damp, wet, raintight and submersible locations.
 - .2 Temperature rating: 105 deg. C.
 - .3 Silicone sealant temperature: -43 deg. C to 204 deg. C.
 - .4 Acceptable materials:
 - .1 King Innovation: Dryconn waterproof connectors.
 - .2 Ideal "Underground" connectors.
- .9 Insulated splicer/ reducer inline or offset connectors:
 - .1 Aluminum construction suitable for copper and aluminum conductors.
 - .2 Captive pressure screws.
 - .3 Watertight touch safe.
 - .4 Removable plugs, plastisol black cover.

- .5 Wire range size to suit.
- .6 Acceptable materials:
 - .1 Ilsco type PBTO.
 - .2 Penn Union Type IPBB.
 - .3 T & B.
- .10 Insulated splicer/ reducer inline terminal blocks:
 - .1 Aluminum construction suitable for copper and aluminum conductors.
 - .2 Captive pressure screws.
 - .3 Touch safe plastic covers.
 - .4 Wire range size to suit.
 - .5 Acceptable materials:
 - .1 Square D type 9080 LBA (#14-2/0).
 - .2 Merson type MPDB miniature (#14-2/0).
 - .3 Ilsco.
- .11 Teck Connectors:
 - .1 Watertight, copper free aluminum approved for TECK cable.
 - .2 Acceptable materials:
 - .1 Thomas & Betts StarTeck.
 - .2 Iberville Tek Series.
- .12 Flexible cord strain-relief connectors:
 - .1 Watertight connector body with grip for strain relief. Approved for use with insulated flexible cord.
 - .2 Aluminum connector body.
 - .3 Stainless steel mesh grip.
 - .4 Grip diameter range to match cable diameter.
- .13 Flexible Cable Insulated Ferrules:
 - .1 Ferrules for terminating flexible wire in screw clamp terminals.
 - .2 Thin-walled copper tube throat construction.
 - .3 Compression fit using manufacturer's recommended tool with colour coded die.
- .14 Cold Weather Tape:
 - .1 Acceptable materials:
 - .1 Scotch Brand '88'.

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 No.65.
 - .2 Install splice/reducer connectors and terminal blocks for cables larger than #6 at field and panel ends terminating with #12 AWG conductors for 15A & 20A circuits and #10 AWG for 30A circuits. For larger amperage circuits use appropriately sized connectors based on equipment amperage.
 - .3 Install gel filled twist-on type connectors for lighting and receptacle circuit splice locations and tighten.
 - .4 Install bushing stud connectors in accordance with EEMAC 1Y-2.
 - .5 Install ferrules on all flexible wire connections in accordance with ferrule manufacturer's recommendations.
 - .6 Wrap connectors in junction boxes with double half lapped layer of cold weather tape.
- .2 Use waterproof silicone filled connectors for splices in damp or wet locations, including but not limited to, connections inside of exterior light fixtures, receptacles and junction boxes.

3.2 RESTRICTIONS

- .1 No splices are allowed in panelboards or in equipment enclosures unless noted otherwise.

END OF SECTION

- Part 1 General
- 1.1 RELATED SECTIONS
- .1 Section 26 05 00 – Common Work Results for Electrical.
 - .2 Section 26 05 20 – Wire and Box Connectors (0 - 1000V).
 - .3 Section 26 05 29 – Hangers and Supports for Electrical Systems.
 - .4 Section 26 05 34 – Conduits, Conduit Fastenings and Conduit Fittings.
- 1.2 REFERENCES
- .1 Canadian Standards Association (CSA International)
 - .1 C22.2 No. 0.3-09 (R2019), Test Methods for Electrical Wires and Cables.
 - .2 C22.2 No. 96-17, Portable Power Cables.
 - .3 C22.2 No. 131-17, Type TECK 90 Cable.
- 1.3 ACTION AND INFORMATIONAL SUBMITTALS
- .1 Submit shop drawings in accordance with Section 01 33 00 – Submittal Procedures.
 - .2 Shop Drawings to include manufacturer’s instructions, printed product literature and data sheets including characteristics, physical size, finish and limitations.
 - .3 Operational and Maintenance Data: submit operation and maintenance data for incorporation into manual specified in Section 01 78 00 – Closeout Submittals.
- 1.4 DELIVERY STORAGE AND HANDLING
- .1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements.
 - .2 Separate and recycle waste materials in accordance with Section 01 74 19 – Waste Management and Disposal.
 - .1 Separate waste materials for reuse and recycling.
 - .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- Part 2 Products
- 2.1 WIRES
- .1 Conductors: stranded for 8 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.

2.2 TECK CABLE

- .1 Cable: to CAN/CSA-C22.2 No. 131.
- .2 Conductors:
 - .1 Grounding conductor: copper.
 - .2 Circuit conductors: copper, size as indicated.
- .3 Insulation:
 - .1 Chemically cross-linked thermosetting polyethylene rated type RW90, 600V.
- .4 Inner jacket: polyvinyl chloride material.
- .5 Armour: flat interlocking aluminum.
- .6 Overall covering: thermoplastic polyvinyl chloride material.
- .7 Fastenings:
 - .1 One hole steel straps to secure surface cables 50 mm and smaller. Two hole steel straps for cables larger than 50 mm.
 - .2 Channel type supports for two or more cables at 1500 mm centers.
 - .3 Threaded rods: 6 mm dia. to support suspended channels.
- .8 Connectors:
 - .1 Watertight approved for TECK cable.

2.3 FLEXIBLE POWER CABLES

- .1 Cable to: C22.2 No. 96-17.
- .2 Conductors:
 - .1 Type G-GC – two or three conductors plus ground, size as indicated, stranded tinned copper.
- .3 Insulation:
 - .1 Ethylene-propylene-rubber (EPR) rated 2kV.
 - .2 Oil and moisture resistant.
 - .3 Insulation rated 90 deg C.
 - .4 Colour coded: red, black, white, green ground.
- .4 Outer jacket:
 - .1 Black heavy duty CPE thermoset compound.

Part 3 Execution

3.1 INSTALLATION OF WIRES

.1 Install wiring as follows:

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

3.2 INSTALLATION OF TECK CABLE 0 -1000 V

- .1 Install cables, fastened in place at 1200 mm intervals and 300 mm from terminations.

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

3.3 INSTALLATION OF FLEXIBLE POWER CABLES

- .1 Install cables in accordance with C22.1-18.

- .2 Terminate cables in accordance with Section 26 05 20 – Wire and Box Connectors (0 - 1000 V); use flexible cord strain relief connectors for all attachments to electrical enclosures.

- .3 Support cables using flexible cord support grips.

3.4 RESTRICTIONS

- .1 Installation of cables must be done in a manner to prevent damage from nor interfere with wharf activities.

END OF SECTION

- Part 1 General
 - 1.1 RELATED SECTIONS
 - .1 Section 26 05 00 – Common Work Results for Electrical.
 - .2 Section 26 05 21 – Wires and Cables (0-1000V).
 - 1.2 REFERENCES
 - .1 American National Standards Institute (ANSI)/Institute of Electrical and Electronics Engineers (IEEE)
 - .1 ANSI/IEEE 837-2014, IEEE Standard for Qualifying Permanent Connections Used in Substation Grounding.
 - .2 Canadian Standards Association, (CSA International)
 - .1 C22.2 No.41-13 (R2017), Grounding and Bonding Equipment (Tri-National Standard with NMX-J-590-ANCE and UL 467).
 - 1.3 ACTION AND INFORMATIONAL SUBMITTALS
 - .1 Submit shop drawings in accordance with Section 01 33 00 – Submittal Procedures.
 - .2 Shop drawings to include manufacturer’s instructions, printed product literature and data sheets including characteristics, physical size, finish and limitations.
 - .3 Operational and Maintenance Data: submit operation and maintenance data for incorporation into manual specified in Section 01 78 00 – Closeout Submittals.
 - 1.4 DELIVERY STORAGE AND HANDLING
 - .1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements.
 - .2 Separate and recycle waste materials in accordance with Section 01 74 19 – Waste Management and Disposal.
 - .1 Separate waste materials for reuse and recycling.
 - .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- Part 2 Products
 - 2.1 EQUIPMENT
 - .1 Rod electrodes: copper clad steel 19 mm dia. by 3 m long.
 - .2 Ground plates: steel with minimum 10 mm thickness and 0.36 m² area.

- .3 Grounding conductors: bare stranded copper, tinned, soft annealed, size as indicated.
- .4 Insulated grounding conductors: green, type RW90 minimum size #12AWG.
- .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 Compression type conductor connectors.
 - .5 Bonding jumpers, straps.

Part 3 Execution

3.1 INSTALLATION GENERAL

- .1 Install complete permanent, continuous grounding system including, conductors, connectors, accessories. Install an insulated ground wire in all conduits.
- .2 Install connectors in accordance with manufacturer's instructions.
- .3 Protect exposed grounding conductors from mechanical injury.
- .4 Make connections to rod electrodes using copper welding by thermit process or compression connectors.
- .5 Make connections to ground plates by thermit weld process.
- .6 Use mechanical connectors for grounding connections to equipment provided with lugs.
- .7 Soldered joints not permitted.
- .8 Make grounding connections in radial configuration only, with connections terminating at a single point. Avoid loop connections.

3.2 ELECTRODES

- .1 Install rod electrodes and make grounding connections.
- .2 Where rock is encountered ground plates may be used instead of rods. Plates must be installed on the Harbour bottom at least 2 m below low tide level on the lee side of the wharf.
- .3 Bond separate, multiple electrodes together.
- .4 Use size 1 AWG copper conductors for connections to electrodes.
- .5 Make special provision for installing electrodes that will give acceptable resistance to ground value where rock or sand terrain prevails. Ground as indicated.

3.3 SYSTEM AND CIRCUIT GROUNDING

- .1 Install system and circuit grounding connections to neutral of 240 V systems.

3.4 EQUIPMENT GROUNDING

- .1 Install grounding connections to typical equipment included in, but not necessarily limited to following list: service equipment, distribution panels, outdoor lighting.

3.5 FIELD QUALITY CONTROL

- .1 Perform tests in accordance with Section 26 05 00 – Common Work Results for 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.

END OF SECTION

- Part 1 General
- 1.1 RELATED SECTIONS
- .1 Section 26 05 00 – Common Work Results for Electrical.
- 1.2 ACTION AND INFORMATIONAL SUBMITTALS
- .1 Submit shop drawings in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Shop Drawings to include manufacturer’s instructions, printed product literature and data sheets including characteristics, physical size, finish and limitations.
- .3 Operational and Maintenance Data: submit operation and maintenance data for incorporation into manual specified in Section 01 78 00 – Closeout Submittals.
- 1.3 DELIVERY STORAGE AND HANDLING
- .1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements.
- .2 Separate and recycle waste materials in accordance with Section 01 74 19 – Waste Management and Disposal.
- .1 Separate waste materials for reuse and recycling.
- .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- Part 2 Products
- 2.1 SPECIFIC PURPOSE SUPPORTS
- .1 U-Shaped, 41x41mm, 2.5mm thick 316 stainless steel surface mounted or suspended as required.
- .2 9.5 mm dia 316 stainless steel threaded rods for supporting suspended channel.
- .3 Specific purpose, 316 stainless steel, fasteners to be used to support boxes, conduit and cable from support channel and/or directly from structure.
- .4 Two hole 316 stainless steel straps for cables and conduits.
- 2.2 MOUNTING HARDWARE
- .1 316 Stainless steel corrosion resistant concrete inserts and mounting hardware to be used.

2.3 FLEXIBLE CORD SUPPORT GRIPS

- .1 Heavy duty type.
- .2 Double weave stainless steel mesh grip.
- .3 Grip range to match cable diameter.

Part 3 Execution

3.1 INSTALLATION

- .1 Secure cables directly to underside of structure with expandable inserts or use support channels, surface mounted or suspended.
- .2 Secure surface mounted equipment with stainless steel fasteners.
- .3 Fasten exposed conduit or cables to structures or support systems using two hole stainless steel straps.
- .4 Install fastenings and supports as required for each type of equipment and cable in accordance with manufacturer's installation recommendations.
- .5 Install flexible cord support grips as indicated and in accordance with manufacturer's instructions.

END OF SECTION

- Part 1 General
 - 1.1 RELATED SECTIONS
 - .1 Section 26 05 00 – Common Work Results for Electrical.
 - 1.2 REFERENCES
 - .1 Canadian Standards Association (CSA International)
 - .1 C22.1-18, Canadian Electrical Code, Part 1, 24th Edition.
 - .2 C22.2 No. 40-17, Junction and Pull Boxes.
 - 1.3 ACTION AND INFORMATIONAL SUBMITTALS
 - .1 Submit shop drawings in accordance with Section 01 33 00 – Submittal Procedures.
 - .2 Shop Drawings to include manufacturer’s instructions, printed product literature and data sheets including characteristics, physical size, finish and limitations.
 - .3 Operational and Maintenance Data: submit operation and maintenance data for incorporation into manual specified in Section 01 78 00 – Closeout Submittals.
 - 1.4 DELIVERY STORAGE AND HANDLING
 - .1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements.
 - .2 Separate and recycle waste materials in accordance with Section 01 74 19 – Waste Management and Disposal.
 - .1 Separate waste materials for reuse and recycling.
 - .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- Part 2 Products
 - 2.1 JUNCTION AND PULL BOXES
 - .1 Construction: rigid PVC or 316 stainless steel as noted, CSA 4X rated.
 - .2 Covers Surface Mounted: stainless steel hinged covers complete with neoprene gasket.
 - .3 Mounting feet.
 - .4 Mounting plate.
 - .5 Drilled conduit holes to suit.

.6 Acceptable materials:

- .1 Carlon
- .2 Hoffman
- .3 Hammond
- .4 IPEX
- .5 Rittal

2.2 WIRING TROUGHS

- .1 Construction: 14 gauge plated steel, CSA 3R rated with grey polyester powder paint finish inside and out. Size as indicated.
- .2 Slip on cover.
- .3 Provision for padlocking.
- .4 Mounting plate.
- .5 Drilled conduit holes to suit.
- .6 Acceptable materials:
 - .1 Hoffman.

2.3 DRAIN/BREATHER

- .1 Drain and breather to accommodate pressure changes and allow moisture or condensation to drain from enclosure while maintaining CSA rating.
- .2 Constructed of fibre reinforced nylon with castellated locknuts and inner dust seal to prevent contaminants from entering enclosure.

Part 3 Execution

3.1 JUNCTION AND PULL BOXES INSTALLATION

- .1 Install pull boxes in accessible locations as indicated.
- .2 Size and install junction and pull boxes to CSA C22.1.
- .3 Install breather/drain on all junction and pull boxes

3.2 WIRING TROUGHS

- .1 Install wiring troughs in building as indicated.
- .2 Install terminal blocks and grounding strips sized to accommodate conductors installed.

3.3 IDENTIFICATION

- .1 Equipment Identification: to Section 26 05 00 – Common Work Results for Electrical.
- .2 Identification Labels: size 2 indicating system name voltage and phase or as indicated.

END OF SECTION

- Part 1 General
- 1.1 RELATED SECTIONS
- .1 Section 26 05 00 – Common Work Results for Electrical.
- 1.2 REFERENCES
- .1 Canadian Standards Association (CSA International)
- .1 C22.1-18, Canadian Electrical Code, Part 1, 24th Edition.
- 1.3 ACTION AND INFORMATIONAL SUBMITTALS
- .1 Submit shop drawings in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Shop Drawings to include manufacturer’s instructions, printed product literature and data sheets including characteristics, physical size, finish and limitations.
- .3 Operational and Maintenance Data: submit operation and maintenance data for incorporation into manual specified in Section 01 78 00 – Closeout Submittals.
- 1.4 DELIVERY STORAGE AND HANDLING
- .1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements.
- .2 Separate and recycle waste materials in accordance with Section 01 74 19 – Waste Management and Disposal.
- .1 Separate waste materials for reuse and recycling.
- .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- 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.
- .3 Blank cover plates for boxes without wiring devices.
- 2.2 GALVANIZED STEEL OUTLET BOXES
- .1 One-piece electro-galvanized construction.
- .2 Minimum size 76 x 50 x 38 mm or as indicated. 102 mm square outlet boxes when more than one conduit enters one side with extension and plaster rings as required.

- .3 Utility boxes for outlets connected to surface-mounted EMT conduit, minimum size 102 x 54 x 48 mm.
- .4 102 mm square or octagonal outlet boxes for lighting fixture outlets.

2.3 CONDUIT BOXES

- .1 FD PVC boxes with factory hubs and mounting feet for surface wiring of devices unless noted otherwise.
 - .1 Acceptable manufacturer:
 - .1 Leviton 'Wetguard'
 - .2 Provide gasketed covers for exterior boxes.

2.4 FITTINGS - GENERAL

- .1 Bushings and connectors with nylon insulated throats.
- .2 Knock-out fillers to prevent entry of debris.
- .3 Conduit outlet bodies for conduit up to 35 mm and pull boxes for larger conduits.

Part 3 Execution

3.1 INSTALLATION

- .1 Support boxes independently of connecting conduits.
- .2 Galvanized steel outlet boxes can only be used inside of building.
- .3 Fill boxes with sponges or foam or similar approved material to prevent entry of debris during construction. Remove upon completion of work.
- .4 Provide correct size of openings in boxes for conduit and cable connections. Do not install reducing washers.
- .5 Vacuum clean interior of outlet boxes before installation of wiring devices.
- .6 Identify systems for outlet boxes as required.

END OF SECTION

- Part 1 General
- 1.1 RELATED SECTIONS
- .1 Section 26 05 00 – Common Work Results for Electrical.
- 1.2 REFERENCES
- .1 Canadian Standards Association (CSA International)
- .1 C22.2 No. 18.3-12 (R2017), Conduit, Tubing, and Cable Fittings (Tri-National Standard with ANCE NMX-J-017 and UL 514B).
- .2 C22.2 No. 18.4:15 (R2019), Hardware for the Support of Conduit, Tubing and Cable (Bi-National Standard with UL 2239).
- .3 C22.2 No. 45.1-07 (R2017), Electrical Rigid Metal Conduit- Steel (Tri-National Standard with UL 6 and NMX-J-534-ANCE-2007).
- .4 C22.2 No. 83-M1985 (R2017), Electrical Metallic Tubing.
- .5 C22.2 No. 211.2-06 (R2016), Rigid PVC (Unplasticized) Conduit.
- 1.3 ACTION AND INFORMATIONAL SUBMITTALS
- .1 Submit shop drawings in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Shop Drawings to include manufacturer’s instructions, printed product literature and data sheets including characteristics, physical size, finish and limitations.
- .3 Operational and Maintenance Data: submit operation and maintenance data for incorporation into manual specified in Section 01 78 00 – Closeout Submittals.
- 1.4 DELIVERY STORAGE AND HANDLING
- .1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements.
- .2 Separate and recycle waste materials in accordance with Section 01 74 19 – Waste Management and Disposal.
- .1 Separate waste materials for reuse and recycling.
- .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- 1.5 LOCATION OF CONDUITS
- .1 Drawings do not show all conduits. Those shown are in diagrammatic form only.

- Part 2 Products
- 2.1 CONDUITS
- .1 Electrical metallic tubing (EMT): to CSA C22.2 No. 83, with couplings.
 - .2 Rigid PVC conduit: to CSA C22.2 No. 211.2.
- 2.2 CONDUIT FASTENINGS
- .1 Two hole 316 stainless steel straps to secure surface conduits.
- 2.3 CONDUIT FITTINGS
- .1 Fittings: to CAN/CSA C22.2 No. 18.3, manufactured for use with conduit specified.
 - .2 Ensure factory "ells" where 90 degrees bends are required.
- 2.4 CONDUIT CEMENT
- .1 Conduit cement and primer for PVC conduit.
- 2.5 FISH CORD
- .1 Polypropylene.
- Part 3 Execution
- 3.1 MANUFACTURER'S INSTRUCTIONS
- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.
- 3.2 INSTALLATION
- .1 Install conduits to cause minimum interference in spaces through which they pass.
 - .2 Use EMT inside electrical building.
 - .3 Use rigid PVC conduit underground.
 - .4 Use PVC conduit, fittings and straps for all surface and exposed work to services, devices and equipment where indicated. Install in accordance with manufacturer's recommendations.
 - .5 Use both primer and conduit cement for joining conduits and fittings.
 - .6 Minimum conduit size: 21 mm.
 - .7 Use standard radius elbows for PVC conduit.

- .8 Mechanically bend conduit over 21 mm diameter.
 - .9 Install fish cord in empty conduits.
 - .10 Remove and replace blocked conduit sections.
 - .1 Do not use liquids to clean out conduits.
 - .11 Dry conduits out before installing wire.
- 3.3 SURFACE CONDUITS
- .1 Run parallel or perpendicular to building lines.
 - .2 Group conduits wherever possible on steel channels.
- 3.4 CONDUITS UNDERGROUND
- .1 Slope conduits to provide drainage.
 - .2 Waterproof joints (PVC excepted) with heavy coat of bituminous paint.
- 3.5 CLEANING
- .1 Proceed in accordance with Section 01 74 00 – Cleaning.
 - .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 26 05 00 – Common Work Results for Electrical.
- .2 Section 26 05 21 – Wires and Cables (0-1000V).
- .3 Section 31 23 33 – Excavating, Trenching and Backfilling.

1.2 REFERENCES

- .1 Canadian Standards Association, (CSA International)
- .2 Insulated Cable Engineers Association, Inc. (ICEA)

1.3 DELIVERY STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements.
- .2 Separate and recycle waste materials in accordance with Section 01 74 19 – Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling.
 - .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

Part 2 Products

2.1 CABLE MARKER TAPE

- .1 Metal detectable polyethylene marker tape: 75 mm wide for direct burial.
- .2 Marker sheet red in colour with the following words printed in large black block letters: CAUTION CAUTION CAUTION ELECTRIC LINE BURIED BELOW.

Part 3 Execution

3.1 DIRECT BURIAL OF CABLES

- .1 After sand bed in accordance with Section 31 23 33 – Excavating, Trenching and Backfilling, is in place, lay cables maintaining 75 mm clearance from each side of trench to nearest cable.
 - .1 Do not pull cable into trench.

- .2 Include offsets for thermal action and minor earth movements.
 - .1 Offset cables 150 mm minimum for each 60 m run, maintaining minimum cable separation and bending radius requirements.
- .3 Underground cable splices are not acceptable.
- .4 Minimum permitted radius at cable bends for rubber or plastic covered cables, 8 times diameter of cable or in accordance with manufacturer's written recommendations; for metallic armoured cables, 12 times diameter of cables or in accordance with manufacturer's instructions.
- .5 Cable separation:
 - .1 Maintain 25 mm minimum separation between cables of different circuits.
- .6 After sand protective cover specified in Section 31 23 33 – Excavating, Trenching and Backfilling, is in place, install continuous row of cable warning tape as indicated to cover length of run.

3.2 CABLE INSTALLATION IN DUCTS

- .1 Install cables as indicated in conduits.
 - .1 Do not pull spliced cables inside conduits.
- .2 Install multiple cables in conduits simultaneously.
- .3 Use CSA approved lubricants of type compatible with cable jacket to reduce pulling tension.
- .4 Before pulling cable into conduits and until cables are properly terminated, seal ends of lead covered cables with wiping solder; seal ends of non-leaded cables with moisture seal tape.
- .5 After installation of cables, seal conduit ends with duct sealing compound.

3.3 MARKER TAPE

- .1 Install cable marker tape 300mm below grade, continuous over full length of cable ducts.

3.4 FIELD QUALITY CONTROL

- .1 Perform tests in accordance with Section 26 05 00 – Common Work Results for Electrical.
- .2 Perform tests using qualified personnel. Provide necessary instruments and equipment.
- .3 Check phase rotation and identify each phase conductor of each feeder.
- .4 Check each feeder for continuity, short circuits and grounds. Ensure resistance to ground of circuits is not less than 50 megohms.

- .5 Pre-acceptance tests.
 - .1 After installing cable but before splicing and terminating, perform insulation resistance test with 500V megger on each conductor.
- .6 Provide Departmental Representative with list of test results showing location at which each test was made, circuit tested and result of each test.
- .7 Remove and replace entire length of cable if cable fails to meet any of test criteria.

END OF SECTION

- Part 1 General
- 1.1 RELATED SECTIONS
- .1 Section 26 05 00 – Common Work Results for Electrical.
 - .2 Section 26 05 28 – Grounding – Secondary.
 - .3 Section 26 05 31 – Junction Boxes, Pull Boxes and Wiring Troughs.
 - .4 Section 26 28 13.01 – Fuses – Low Voltage.
 - .5 Section 31 71 73.02 – Underground Electrical Service.
- 1.2 ACTION AND INFORMATIONAL SUBMITTALS
- .1 Submit shop drawings in accordance with Section 01 33 00 – Submittal Procedures.
 - .2 Shop Drawings to include manufacturer’s instructions, printed product literature and data sheets including characteristics, physical size, finish and limitations.
 - .3 Operational and Maintenance Data: submit operation and maintenance data for incorporation into manual specified in Section 01 78 00 – Closeout Submittals.
- 1.3 DELIVERY STORAGE AND HANDLING
- .1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements.
 - .2 Separate and recycle waste materials in accordance with Section 01 74 19 – Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling.
 - .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities
- 1.4 UTILITY COSTS
- .1 Any fees or costs required by the utility for service and each new meter installation to be paid for by contractor as part of the contract price.

- Part 2 Products
- 2.1 SUPPLY DATA
- .1 Service equipment suitable for incoming power supply: 120/240V, 600A, 60Hz, single phase, 3 wire, grounded neutral.
- 2.2 EQUIPMENT
- .1 Fused disconnect switch.
- .2 Multiple meter centres: to utility supply authority requirements.
- 2.3 FUSED DISCONNECT SWITCH
- .1 Heavy duty, fusible, service entrance rated disconnect switch in CSA 1 Enclosure to CSA C22.2 No.4, size as indicated.
- .2 Provision for padlocking in off switch position by three locks.
- .3 Mechanically interlocked door to prevent opening when handle is in ON position.
- .4 Fuses: in accordance with Section 26 28 13.01 - Fuses - Low Voltage.
- .5 Fuseholders: to CSA C22.2 No.39, relocatable and suitable without adaptors, for type and size of fuse indicated.
- .6 Quick-make, quick-break action.
- .7 ON-OFF switch position indication on switch enclosure cover.
- 2.4 MULTIPLE METER CENTRES
- .1 Rated for 600A, 240V, one phase, 3 wire service with the following features:
- .1 Each meter stack to be suitable for 6- 100A 1 phase services or 3- 200A services as indicated.
- .2 Each meter to be complete with a main breaker sized as indicated.
- .3 Tap box, if required, rated for 600A with main lugs suitable for 2 x 350MCM copper conductors per phase and neutral.
- .4 Factory pre-bussing from main lugs to the line side of all positions.
- .5 Interchangeable hubs.
- .6 Top or bottom entry.
- .7 Blank covers for unused sockets.
- 2.5 NAMEPLATES
- .1 Each meter stack suitable for 6-100A 1 phase services to have a size 7 nameplate at the top stating: 'MAXIMUM BREAKER SIZE TO BE INSTALLED IS 60A'.

Part 3 Execution

3.1 INSTALLATION

- .1 Install service equipment.
- .2 Connect to incoming service.
- .3 Connect to outgoing services.
- .4 Make grounding connections in accordance with Section 26 05 28 – Grounding – Secondary and utility requirements.
- .5 Make provision for power supply utility's metering to meet their requirements.

END OF SECTION

- Part 1 General
 - 1.1 RELATED SECTIONS
 - .1 Section 26 05 00 – Common Work Results for Electrical.
 - .2 Section 26 28 16.02 – Molded Case Circuit Breakers.
 - 1.2 REFERENCES
 - .1 Canadian Standards Association (CSA International)
 - .1 C22.2 No.29-15 (R2019), Panelboards and Enclosed Panelboards.
 - 1.3 ACTION AND INFORMATIONAL SUBMITTALS
 - .1 Submit shop drawings in accordance with Section 01 33 00 – Submittal Procedures.
 - .2 Shop Drawings to include manufacturer’s instructions, printed product literature and data sheets including characteristics, physical size, finish and limitations.
 - .3 Operational and Maintenance Data: submit operation and maintenance data for incorporation into manual specified in Section 01 78 00 – Closeout Submittals.
 - 1.4 DELIVERY STORAGE AND HANDLING
 - .1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements.
 - .2 Separate and recycle waste materials in accordance with Section 01 74 19 – Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling.
 - .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- 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.
 - .2 250 V panelboards: bus and breakers rated for 10kA (symmetrical) interrupting capacity or as indicated.
 - .3 Sequence phase bussing with odd numbered breakers on left and even on right, with each breaker identified by permanent number identification as to circuit number and phase.

- .4 Panelboards: mains, number of circuits, and number and size of branch circuit breakers as indicated.
- .5 Four keys for each panelboard and key panelboards alike.
- .6 Copper bus with neutral of same ampere rating as mains.
- .7 Mains: suitable for bolt-on breakers.
- .8 Trim with concealed front bolts and hinges.
- .9 Trim and door finish: baked grey enamel.
- .10 Minimum of 33% spare space unless indicated otherwise.

2.2 LOADCENTRES

- .1 250V loadcentre: 70A, single phase, with bus and breakers rated for 10 kA (symmetrical) interrupting capacity. CSA 1 enclosure.
- .2 Space for two 25mm or four 12mm plug in breakers.
- .3 Loadcentres to be c/w 30A, 2P 30mA GFI breakers to feed metered service receptacles on wharf.

2.3 BREAKERS

- .1 Breakers: to Section 26 28 16.02 – Molded Case Circuit Breakers.
- .2 Breakers with thermal and magnetic tripping in panelboards except as indicated otherwise.
- .3 Breakers with 30 mA ground fault trip where indicated.

2.4 EQUIPMENT IDENTIFICATION

- .1 Provide equipment identification in accordance with Section 26 05 00 – Common Work Results for Electrical.
- .2 Nameplate for each panelboard and loadcentre size 4 engraved as indicated.
- .3 Complete circuit directory with typewritten legend showing location and load of each circuit.
- .4 Arc flash hazard label installed on panel door.

Part 3 Execution

3.1 INSTALLATION

- .1 Locate panelboards and loadcentres as indicated and mount securely, plumb, true and square, to adjoining surfaces.
- .2 Mount panelboards to height specified in Section 26 05 00 – Common Work Results for Electrical or as indicated.
- .3 Connect loads to circuits.
- .4 Connect neutral conductors to common neutral bus with respective neutral identified.

END OF SECTION

- Part 1 General
 - 1.1 RELATED SECTIONS
 - .1 Section 26 05 00 – Common Work Results for Electrical.
 - 1.2 REFERENCES
 - .1 Canadian Standards Association (CSA International)
 - .1 C22.2 No.42-10(R2020), General Use Receptacles, Attachment Plugs and Similar Devices.
 - .2 C22.2 No.42.1:13 (R2017), Cover Plates for Flush-Mounted Wiring Devices (Bi-National standard with UL 514D).
 - .3 C22.2 No. 55:15 (R2020), Special Use Switches.
 - 1.3 ACTION AND INFORMATIONAL SUBMITTALS
 - .1 Submit shop drawings in accordance with Section 01 33 00 – Submittal Procedures.
 - .2 Shop Drawings to include manufacturer’s instructions, printed product literature and data sheets including characteristics, physical size, finish and limitations.
 - .3 Operational and Maintenance Data: submit operation and maintenance data for incorporation into manual specified in Section 01 78 00 – Closeout Submittals.
 - 1.4 DELIVERY STORAGE AND HANDLING
 - .1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements.
 - .2 Separate and recycle waste materials in accordance with Section 01 74 19 – Waste Management and Disposal.
 - .1 Separate waste materials for reuse and recycling.
 - .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- Part 2 Products
 - 2.1 SWITCHES
 - .1 15A, 120V, single pole switches to: CSA-C22.2 No.55 and CSA-C22.2 No.111.
 - .2 Manually-operated heavy duty specification grade 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 Brown toggle.
- .3 Toggle operated locking fully rated for LED lighting, and up to 80% of rated capacity of motor loads.
- .4 Switches of one manufacturer throughout project.

2.2 RECEPTACLES

- .1 Duplex receptacles for indoor use, heavy duty specification grade, type 5-20R, 125V, 15/20A, U ground, to: CSA-C22.2 No.42 with following features:
 - .1 Brown urea moulded housing.
 - .2 Suitable for No. 10 AWG for back and side wiring.
 - .3 Break-off links for use as split receptacles.
 - .4 Double wipe contacts and riveted grounding contacts.
- .2 Single receptacles, CSA type L14-30R, 125/250V, 30A, grounded, to: CSA-C22.2 No. 42 with following features:
 - .1 Corrosion resistant, marine grade, CSA 4X enclosure complete with weatherproof cover. Mounted in corrosion resistant PVC outlet box suitable for separately mounted devices.
 - .2 Suitable for No. 10 AWG back and side wiring.
 - .3 Triple wipe contacts and riveted grounding contacts.
 - .4 Acceptable materials for outlets:
 - .1 Box: Leviton single gang FDBX1-Y.
 - .2 Receptacle c/w cover: Leviton #99W74-S.
- .3 Single receptacles, CSA type 5-20R, 125V, 20A, grounded, to: CSA-C22.2 No.42 with following features:
 - .1 Corrosion resistant, marine grade, CSA 4X enclosure complete with weatherproof cover. Mounted in corrosion resistant PVC outlet box suitable for separately mounted devices.
 - .2 Suitable for No. 10 AWG back and side wiring.
 - .3 Triple wipe contacts and riveted grounding contacts.
 - .4 Acceptable materials for outlets:
 - .1 Box: Leviton FDBX2-Y.
 - .2 Receptacle c/w cover : Leviton #99W33-S.

2.3 GFI MODULE

- .1 GFI Module rated 20A, 120VAC, 60 Hz with the following features:
 - .1 Corrosion resistant, marine grade, CSA 3R enclosure complete with weatherproof cover. Mounted in corrosion resistant PVC outlet box.
 - .2 Suitable for No. 10 AWG back wiring.
 - .3 Manual Reset

- .4 Acceptable materials for modules:
 - .1 GFI Module: Hubbell #GFMST20.
 - .2 Box: Leviton FDBX2-Y (where protecting duplex receptacle outlet).
 - .3 Cover: Killark #FCL-GF.

2.4 WELDER RECEPTACLE

- .1 Welder receptacle, CSA 6-50R, 240V, 50A grounded.
 - .1 Brass double wipe contacts and riveted grounding contacts.
 - .2 Suitable for # 8 to #4 AWG wiring.
 - .3 Acceptable materials:
 - .1 Leviton 5374 c/w 788-CR cover.
 - .2 Hubbell HBL9367 c/w HBL9420 cover.

Part 3 Execution

3.1 INSTALLATION

- .1 Switches:
 - .1 Install single throw switches with handle in "UP" position when switch closed.
 - .2 Mount toggle switches at height in accordance with Section 26 05 00 – Common Work Results for Electrical as indicated.
- .2 Receptacles:
 - .1 Install receptacles in outlet boxes c/w weatherproof covers where indicated.
 - .2 Mount receptacles and outlets at heights indicated.
- .3 Do not install coverplates meant for flush outlet boxes on surface mounted boxes.
- .4 Do not use back entrances for connecting wiring devices to circuits. Wrap conductors around screw terminals and tighten.
- .5 GFI modules:
 - .1 Install GFI modules in single or two gang tandem outlet box as indicated.
- .6 Welder receptacle:
 - .1 Install receptacle as indicated.
 - .2 Install lamacoid plate indicating “FOR WELDER USE ONLY”.
- .7 Identification:
 - .1 Provide identification indicating circuit and panel number at all wiring devices using lamacoid plates.

END OF SECTION

- Part 1 General
 - 1.1 RELATED SECTIONS
 - .1 Section 26 05 00 – Common Work Results for Electrical.
 - .2 Section 26 24 01 – Service Equipment.
 - 1.2 ACTION AND INFORMATIONAL SUBMITTALS
 - .1 Submit shop drawings in accordance with Section 01 33 00 – Submittal Procedures.
 - .2 Shop Drawings to include manufacturer’s instructions, printed product literature and data sheets including characteristics, physical size, finish and limitations.
 - .3 Operational and Maintenance Data: submit operation and maintenance data for incorporation into manual specified in Section 01 78 00 – Closeout Submittals.
 - 1.3 DELIVERY, STORAGE AND HANDLING
 - .1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements.
 - .2 Separate and recycle waste materials in accordance with Section 01 74 19 – Waste Management and Disposal.
 - .1 Separate waste materials for reuse and recycling.
 - .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
 - 1.4 MAINTENANCE MATERIALS
 - .1 Provide maintenance materials in accordance with Section 01 78 00 – Closeout Submittals.
 - .2 Two spare fuses of each type and size installed up to and including 600A.
- Part 2 Products
 - 2.1 FUSES - GENERAL
 - .1 Fuses: product of one manufacturer.
 - 2.2 FUSE TYPES
 - .1 Class R fuses.
 - .1 Type RK1, fast acting.

- .2 Class T fuses.
 - .1 Type A3T, 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 matched mounting devices.
- .3 Ensure correct fuse is fitted to assigned electrical circuit.

END OF SECTION

- Part 1 General
 - 1.1 RELATED SECTIONS
 - .1 Section 26 05 00 – Common Work Results for Electrical.
 - .2 Section 26 24 16.01 – Panelboards Breaker Type.
 - 1.2 REFERENCES
 - .1 Canadian Standards Association (CSA International).
 - .1 C22.2 No. 5-16, Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures (Tri-National Standard with UL 489 and NMX-J-266-ANCE-2016).
 - 1.3 ACTION AND INFORMATIONAL SUBMITTALS
 - .1 Submit shop drawings in accordance with Section 01 33 00 – Submittal Procedures.
 - .2 Shop drawings to include manufacturer’s instructions, printed product literature and data sheets including characteristics, physical size, finish and limitations.
 - .3 Operational and Maintenance Data: submit operation and maintenance data for incorporation into manual specified in Section 01 78 00 – Closeout Submittals.
 - 1.4 DELIVERY STORAGE AND HANDLING
 - .1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements.
 - .2 Separate and recycle waste materials in accordance with Section 01 74 19 – Waste Management and Disposal.
 - .1 Separate waste materials for reuse and recycling.
 - .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- Part 2 Products
 - 2.1 BREAKERS GENERAL
 - .1 Molded-case circuit breakers, to CSA C22.2 No. 5.
 - .2 Bolt-on molded case circuit breaker: quick- make, quick-break type, for manual and automatic operation with temperature compensation for 40 degrees C ambient.
 - .3 Common-trip breakers: with single handle for multi-pole applications.

- .4 Magnetic instantaneous trip elements in circuit breakers to operate only when value of current reaches setting.
- .5 Circuit breakers to have minimum 10KA symmetrical rms interrupting capacity rating, unless indicated otherwise.
- .6 Circuit breakers being installed in panelboards to be by the same manufacturer as the panelboard.
- .7 Breakers must be new, complete with original factory warranty and supplied from an authorized manufacturer's distributor.

2.2 THERMAL MAGNETIC BREAKERS

- .1 Molded case circuit breaker to operate automatically by means of thermal and magnetic tripping devices to provide inverse time current tripping and instantaneous tripping for short circuit protection.

2.3 OPTIONAL FEATURES

- .1 Include ground fault interrupting capability (30mA maximum) where indicated.

Part 3 Execution

3.1 INSTALLATION

- .1 Install circuit breakers as indicated.
- .2 All feeders on the wharf must be protected with 30mA ground fault trip breakers.

END OF SECTION

- Part 1 General
 - 1.1 RELATED SECTIONS
 - .1 Section 26 05 00 – Common Work Results for Electrical.
 - .2 Section 26 28 13.01 – Fuses – Low Voltage.
 - 1.2 REFERENCES
 - .1 Canadian Standards Association (CSA International).
 - .1 CAN/CSA C22.2 No.4-16, Enclosed and Dead Front Switches (Tri-National Standard with NMX-J-162-ANCE-2016 and UL 98).
 - .2 C22.2 No.39-13 (R2017), Fuseholder Assemblies.
 - 1.3 ACTION AND INFORMATIONAL SUBMITTALS
 - .1 Submit shop drawings in accordance with Section 01 33 00 – Submittal Procedures.
 - .2 Shop Drawings to include manufacturer’s instructions, printed product literature and data sheets including characteristics, physical size, finish and limitations.
 - .3 Operational and Maintenance Data: submit operation and maintenance data for incorporation into manual specified in Section 01 78 00 – Closeout Submittals.
 - 1.4 DELIVERY STORAGE AND HANDLING
 - .1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements.
 - .2 Separate and recycle waste materials in accordance with Section 01 74 19 – Waste Management and Disposal.
 - .1 Separate waste materials for reuse and recycling.
 - .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- Part 2 Products
 - 2.1 DISCONNECT SWITCHES – NON-FUSED
 - .1 Heavy duty, horsepower rated disconnect switch, to CAN/CSA C22.2 No.4 size as indicated. Mount in CSA 1 enclosure when installed indoors and in CSA 4 stainless steel enclosure when mounted outdoors.
 - .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 Quick-make, quick-break action.
- .5 ON-OFF switch position indication on switch enclosure cover.
- .6 Approved for service entrance use, where required.

2.2 EQUIPMENT IDENTIFICATION

- .1 Provide equipment identification in accordance with Section 26 05 00 – Common Work Results for Electrical.
- .2 Indicate name of load controlled on size 4 nameplate.

Part 3 Execution

3.1 INSTALLATION

- .1 Install disconnect switches as indicated.

END OF SECTION

- Part 1 General
- 1.1 RELATED SECTIONS
 - .1 Section 26 05 00 – Common Work Results for Electrical.
- 1.2 REFERENCES
 - .1 Canadian Standards Association (CSA International)
 - .1 CAN/CSA-C22.2 No. 60947-4-1:14 (R2019), Low-voltage Switchgear and Controlgear – Part 4-1: Contactors and Motor-starters – Electromechanical Contactors and Motor-starters (Bi-National Standard, with UL 60947-4-1).
- 1.3 ACTION AND INFORMATIONAL SUBMITTALS
 - .1 Submit shop drawings in accordance with Section 01 33 00 – Submittal Procedures.
 - .2 Shop Drawings to include manufacturer’s instructions, printed product literature and data sheets including characteristics, physical size, finish and limitations.
 - .3 Operational and Maintenance Data: submit operation and maintenance data for incorporation into manual specified in Section 01 78 00 – Closeout Submittals.
- 1.4 DELIVERY STORAGE AND HANDLING
 - .1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements.
 - .2 Separate and recycle waste materials in accordance with Section 01 74 19 – Waste Management and Disposal.
 - .1 Separate waste materials for reuse and recycling.
 - .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- 1.5 EXTRA MATERIALS
 - .1 Provide maintenance materials in accordance with Section 01 78 00 – Closeout Submittals.
- 1.6 DELIVERY STORAGE AND HANDLING
 - .1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements.
 - .2 Separate and recycle waste materials in accordance with Section 01 74 19 – Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling.
 - .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

- Part 2 Products
- 2.1 MANUAL MOTOR STARTERS
- .1 Single, three phase manual motor starters of size, type, rating, and enclosure type as indicated, with components as follows:
- .1 Switching mechanism, quick make and break.
- .2 One/three overload heaters, manual reset, trip indicating handle.
- .2 Accessories:
- .1 Toggle heavy duty labelled as indicated.
- .2 Indicating light: LED, red, heavy duty type.
- .3 Locking tab to permit padlocking in “ON” or “OFF” position.
- 2.2 FINISHES
- .1 Apply finishes to enclosure in accordance with Section 26 05 00 – Common Work Results for Electrical.
- 2.3 EQUIPMENT IDENTIFICATION
- .1 Provide equipment identification in accordance with Section 26 05 00 – Common Work Results for Electrical.
- .2 Manual switch designation label, white plate, black letters, size 1, engraved as indicated.
- Part 3 Execution
- 3.1 INSTALLATION
- .1 Install starters, connect power and control as indicated.
- .2 Ensure overload device elements installed.
- 3.2 FIELD QUALITY CONTROL
- .1 Perform tests in accordance with Section 26 05 00 – Common Work Results for Electrical and manufacturer's instructions.
- .2 Operate switches to verify correct functioning.
- .3 Check that sequence controls, interlocking with other separate related starters, equipment, control devices, operate as indicated.

END OF SECTION

- Part 1 General
 - 1.1 RELATED SECTIONS
 - .1 Section 26 05 00 – Common Work Results for Electrical.
 - 1.2 RESPONSIBILITY
 - .1 Work and materials for this section are the responsibility of the electrical Contractor.
 - 1.3 REFERENCE STANDARDS
 - .1 Canadian Standards Association (CSA International)
 - .1 C22.2 No.46-13 (R2018), Electric Air-Heaters.
 - .2 National Electrical Manufacturers Association (NEMA)
 - .1 NEMA 250-2018, Enclosures for Electrical Equipment (1000 V Maximum).
 - 1.4 ACTION AND INFORMATIONAL SUBMITTALS
 - .1 Submit shop drawings in accordance with Section 01 33 00 – Submittal Procedures.
 - .2 Shop Drawings to include manufacturer’s instructions, printed product literature and data sheets including characteristics, physical size, finish and limitations.
 - .3 Operational and Maintenance Data: submit operation and maintenance data for incorporation into manual specified in Section 01 78 00 – Closeout Submittals.
 - 1.5 DELIVERY, STORAGE AND HANDLING
 - .1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements.
 - .2 Separate and recycle waste materials in accordance with Section 01 74 19 – Waste Management and Disposal.
 - .1 Separate waste materials for reuse and recycling.
 - .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- Part 2 Products
 - 2.1 FORCED AIR WALL MOUNTED HEATERS
 - .1 Forced air heaters, wall mounted, commercial type as follows:
 - .1 Enclosure:
 - .1 Steel, 1.2 mm thick.
 - .2 Knockouts for 16 mm diameter conduit left, right, bottom and rear.
 - .3 Grill and frame finished almond.

- .2 Elements and Fan:
 - .1 Tubular heating element with fins.
 - .2 Mineral insulated, nickel chromium alloy.
 - .3 Motor: totally enclosed, shaded pole, impedance protected motor.
 - .4 Fan delay switch.
 - .5 Voltage: as indicated.
 - .2 Controls:
 - .1 Built-in accessible controls. 'On-Off-Fan Only' selector switch and temperature control knob.
 - .3 Accessories:
 - .1 Surface mounting backbox.
- Part 3 Execution
- 3.1 INSTALLATION
 - .1 Install heaters in accordance with manufacturer's instructions.
 - .2 Make power and control connections.
 - 3.2 FIELD QUALITY CONTROL
 - .1 Perform tests in accordance with Section 26 05 00 – Common Work Results for Electrical.

END OF SECTION

- Part 1 General
- 1.1 RELATED SECTIONS
- .1 Section 26 05 00 – Common Work Results for Electrical.
- 1.2 ACTION AND INFORMATIONAL SUBMITTALS
- .1 Submit shop drawings in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Shop Drawings to include manufacturer’s instructions, printed product literature and data sheets including characteristics, physical size, finish and limitations.
- .3 Operational and Maintenance Data: submit operation and maintenance data for incorporation into manual specified in Section 01 78 00 – Closeout Submittals.
- 1.3 DELIVERY STORAGE AND HANDLING
- .1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements.
- .2 Separate and recycle water materials in accordance with Section 01 74 19 – Waste Management and Disposal.
- .1 Separate waste materials for reuse and recycling.
- .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- Part 2 Products
- 2.2 LINE VOLTAGE REVERSE ACTING THERMOSTATS
- .1 For use on 120V circuit at 9.8A capacity.
- .2 SPDT snap action.
- .3 Temperature range: 10 deg. C to 30 deg. C.
- .4 Beige colour.
- .5 Built-in thermometer.
- .6 Acceptable materials:
- .1 Honeywell #T651A3026.

Part 3 Execution

3.1 INSTALLATION

- .1 Install and wire control devices as indicated.
- .2 Install reverse acting thermostat on exhaust fan. Set at 75 deg. C.

END OF SECTION

- Part 1 General
- 1.1 RELATED SECTIONS
- .1 Section 26 05 00 – Common Work Results for Electrical.
- 1.2 REFERENCES
- .1 ASTM International Inc.
- .1 ASTM A1008/A1008M-20, Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.
- .2 ASTM F1137-11, Standard Specification for Phosphate/Oil and Phosphate/Organic Corrosion Protective Coatings for Fasteners.
- .2 Canadian Standards Association (CSA International)
- .1 CAN/CSA C22.2 No. 250.0-18, Luminaires (Tri-National Standard, with UL 1598 and NMX-J-307/1-ANCE).
- .2 CAN/CSA C22.2 No. 250.13:20, Light Emitting Diode (LED) Equipment for Lighting Applications.
- .3 CSA C866-17, Performance of LED Luminaires.
- .3 Design Lights Consortium (DLC)
- .4 Illuminating Engineering Society of North America (IESNA)
- .1 IES LM-79-19, Approved Method: Optical and Electrical Measurements of Solid-State Lighting Products (LED and OLED).
- .2 IES LM-80-20, Approved Method: Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays and Modules.
- .3 IES TM-21-19, Projecting Long Term Lumen, Photon, and Radiant Flux Maintenance of LED Light Sources.
- .4 IES, The Lighting Handbook, 10th Edition, Reference and Application.
- .5 Industry Canada
- .1 ICES-005-15, Lighting Equipment.
- .6 Institute of Electrical and Electronics Engineers (IEEE)
- .1 IEEE C62.41.1-02 (R2008), IEEE Guide on the Surge Environment in Low-Voltage (1000 V and less) AC Power Circuits.
- .7 Underwriter’s Laboratories of Canada (ULC)
- .8 Underwriter’s Laboratories (UL)
- .1 UL 94-2013 (R2020), Standard for Tests for Flammability of Plastic Materials for Parts in Devices and Appliances.
- .2 UL 508-1999 (R2018), Standard for Industrial Control Equipment.

- .3 UL 8750-2015 (R2020), Standard for Light Emitting Diode (LED) Equipment for Use in Lighting Products.

1.3 SYSTEM DESCRIPTION

- .1 Lighting system consists of light fixtures specified in the section, including all associated frames, supports, hangers, spacers, stems, aligner canopies, junction boxes and other hardware required for a complete and proper installation.
- .2 Surface luminaires to have frames that are compatible with the ceiling systems for which they are intended.
- .3 Luminaire voltage to match the voltage of the circuit serving the same.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Shop Drawings to include manufacturer's instructions, printed product literature and data sheets including characteristics, physical size, finish and limitations.
- .3 Product Data:
 - .1 Provide manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Provide complete photometric data prepared by independent testing laboratory for luminaires where specified, for review by Departmental Representative.
 - .3 Photometric data to include: VCP Table where applicable, spacing criterion, electronic IES files.
- .4 Operational and Maintenance Data: submit operation and maintenance data for incorporation into manual specified in Section 01 78 00 – Closeout Submittals.

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 Separate and recycle waste materials in accordance with Section 01 74 19 – Waste Management and Disposal.
 - .1 Separate waste materials for reuse and recycling.
 - .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

Part 2 Products

2.1 LED LUMINAIRES

- .1 Luminaires and all components (LEDs, driver, housing, etc.) to have a complete 5-year manufacturer warranty.
- .2 LED luminaire performance to be in accordance with CSA C866.
- .3 Luminaires to be DLC Standard version 4.4 listed.
- .4 Luminaire efficacy: in accordance with DLC requirements.
- .5 Surge protection to: IEEE C.62.41 and UL8750.
- .6 In situ temperature measurement test (ISTMT) provided by an OSHA or UL testing laboratory.
- .7 LEDs
 - .1 LED lifetime projections to: IES TM-21.
 - .2 Performance measurement to: IES LM-79.
 - .3 Lumen maintenance testing to: IES LM-80.
 - .4 Minimum 50,000 hours.
 - .5 Colour bin size to: ANSI C78 377A.
 - .6 Minimum colour rendering index (CRI): 80.
 - .7 Colour temperature 3500K or as indicated.
 - .8 IES L70 minimum 50,000 hours at 25 degrees Celsius.
- .8 LED array to be field replaceable.
- .9 LED Drivers
 - .1 Voltage as indicated.
 - .2 Solid-state electronic.
 - .3 Power factor: minimum 90% lagging or leading.
 - .4 Harmonics: 20 % maximum THD.
 - .5 Short circuit and overload protection.
 - .6 0-10V dimming standard.
- .10 Luminaires to be Restriction of Hazardous Substance Directive (RoHS) compliant.
- .11 Compatibility: manufacturer to submit in writing compatible external control components for each luminaire used.
- .12 Luminaire manufacturer shall be a company with a minimum of 5 years of success manufacturing LED light fixtures for the Canadian market. The agency representing the manufacturer shall be an established company that has had and currently maintains a locally run and operated business in New Brunswick for at least five years. A listing of five (5) projects shall be provided (if requested) where the manufacturer's similar products have been used in Canada, including location, contact person and telephone number.

2.2 FINISHES

- .1 Light fixture finish and construction to meet ULC listings and CSA certifications related to intended installation.
- .2 Baked enamel finish:
 - .1 Conditioning for metal before painting:
 - .1 For corrosion resistance, conversion coating to ASTM F1137.
 - .2 For paint base, conversion coating to ASTM F1137.
 - .2 Metal surfaces of luminaire housing and reflectors finished with high gloss baked enamel to give smooth, uniform appearance, free from pinholes or defects.
 - .3 Reflector and other inside surfaces finished as follows:
 - .1 White: minimum reflection factor 85%.
 - .2 Colour fastness: yellowness factor not above 0.02 and after 250 hour exposure in Atlas fadeometer not to exceed 0.05.
 - .3 Film thickness: not less than 0.3 mm average and in no areas less than 0.025 mm.
 - .4 Gloss: not less than 80 units as measured with Gardner 60 degree glossmeter.
 - .5 Flexibility: withstand bending over 12 mm mandrel without showing signs of cracking or flaking under 10 times magnification.
 - .6 Adhesion: 24 mm square lattice made of 3 mm squares cut through film to metal with sharp razor blade. Adhesive cellulose tape applied over lattice and pulled. Adhesion satisfactory if no coating removed.

Part 3 Execution

3.1 INSTALLATION

- .1 Locate and install luminaires as indicated.
- .2 Provide adequate support to suit ceiling system.
- .3 Supply and install all materials and accessories as required for proper mounting of all luminaires.

3.2 WIRING

- .1 Connect luminaires to lighting circuits:
 - .1 Install junction boxes and wire luminaires and switches from junction boxes.

3.3 CLEANING

- .2 Clean in accordance with Section 01 74 00 – Cleaning.
 - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.
- .3 Clean luminaires, lenses and reflectors in accordance with manufacturer's cleaning instructions and procedures.

END OF SECTION

- Part 1 General
- 1.1 DESCRIPTION OF WORK
 - .1 Work under this Section includes all plant, materials and labour required to excavate, backfill, stockpile, dispose of materials and restore surfaces as indicated on the drawings, specified herein or as directed by the Departmental Representative.
- 1.2 RELATED SECTIONS
 - .1 Section 03 30 00 – Cast-in-Place Concrete.
 - .2 Section 26 05 00 – Common Work Results for Electrical.
 - .3 Section 26 05 43.01 – Installation of Cables in Trenches and Ducts.
- 1.3 EXISTING CONDITIONS
 - .1 Solid rock underlies portion of the zone of excavation required to install foundations and building services. An estimate of the existing bedrock level is provided in the herein referenced geotechnical investigation. Groundwater may be encountered in any excavation.
- 1.4 MEASUREMENT PROCEDURES
 - .1 Work performed under this Section shall form part of the lump sum contract. No additional compensation will be made.
- 1.5 REFERENCE STANDARDS
 - .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM C 117-95, Standard Test Method for Material Finer than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.
 - .2 ASTM C 136-96a, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .3 ASTM D 698-00a, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³) (600 kN-m/m³).
 - .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-8.1-88, Sieves, Testing Woven Wire, Inch Series.
 - .2 New Brunswick Department of Transportation Standard Specifications (January 2019).
 - .3 New Brunswick Department of Transportation Acid Rock Protocol

1.6 ACCESS

- .1 Access to the wharf must not be impeded during excavation and backfill and when excavations are open.
- .2 Provide steel plates where required to allow vehicle access.

1.7 DEFINITIONS

- .1 Excavation classes: one class of excavation will be recognized; common excavation.

- .1 Common excavation: excavation of materials of whatever nature, which includes solid rock.

- .2 Unsuitable materials:

- .1 Weak and compressible 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 D 4318, and gradation within limits specified when tested to ASTM C 136. Sieve sizes to CAN/CGSB-8.1.

- .2 Table:

Sieve Size, mm	% Passing
2.00	100
0.10	45 - 100
0.02	10 - 80
0.005	0 - 45

- .3 Coarse grained soils containing more than 20% by mass passing 0.075 mm sieve.

- .4 Any material deemed unsuitable by the Departmental Representative.

1.8 INSPECTION AND TESTING

- .1 Testing of materials and compaction will be carried out by the testing laboratory designated by the Departmental Representative.

- .2 The Owner will pay for inspection of testing.

- .3 Compaction densities are percentages of Standard Proctor as determined by ASTM D-698-00a.

1.9 PROTECTION OF EXISTING FEATURES

- .1 Protect existing features and services in accordance with applicable local regulations.
- .2 Conduct, with the Departmental Representative, condition survey of trees and other plants, fencing, service poles, wires, pavement, survey bench marks and monuments which maybe affected by Work.
- .3 Take all necessary precautions to protect existing or newly constructed works, but if undermining should occur, it shall be corrected by breaking out and repairing the existing structure and/or replacing the disturbed foundation material with fill concrete, grout, sand, etc., as may be directed by the Departmental Representative. All of the protective and corrective work is to be at the expense of the Contractor.
- .4 The above shall also apply to all electrical cables, poles, sewers, water mains, gas lines and other appurtenances already constructed in the area whether above ground or underground or which appear within the trench. Should damage of any kind, including settlement or lateral movement of adjacent structures, utilities or surface features occur as a result of the work, such conditions and any resultant damage shall be immediately rectified at the Contractor's expense and to the satisfaction of the Departmental Representative.

1.10 SAFETY AND TRAFFIC PLAN

- .1 All signage, barricades, etc. required are the responsibility of the Contractor.

Part 2 Products

2.1 MATERIALS

- .1 Engineered Fill: Properties to the following requirements:
 - .1 Crushed quarried rock.
 - .2 Gradations to be within limits specified when tested to ASTM C-136 and ASTM C-117. Sieve sizes to CAN/CGSB-8.1.
 - .3 Maximum abrasion loss of 30% when tested to MTO LS 618.
 - .4 Maximum Freeze Thaw loss of 20% when tested to MTO LS 614.
 - .5 Plasticity Index to a maximum of three (3) when tested to D4318-05.

.6 Table:

Sieve Size, mm	% Passing
75	95 - 100
50	73 - 95
37.5	58 - 87
25	--
19	35 - 69
12.5	--
9.5	25 - 54
4.75	17 - 43
2.36	12 - 35
1.18	8 - 28
0.30	4 - 16
0.075	0 - 7

.2 Granular Base:

.1 See Section 32 11 23.

.3 Granular Subbase:

.1 See Section 32 11 19

.4 Bedding and Backfill:

.1 Aggregate shall be composed of clean, hard, sound, durable, uncoated particles that do not contain friable, soluble or reactive minerals or other deleterious materials or conditions that would make the aggregate prone to decomposition or disintegration when exposed to the natural elements after placement in the Work.

.2 Gradations to be within limits specified when tested to ASTM C-136 and ASTM C-117. Sieve sizes to CAN/CGSB-8.1.

.3 Maximum abrasion loss of 30% when tested to MTO LS 619.

.4 Maximum Freeze Thaw loss of 20% when tested to MTO LS 614.

.5 Plasticity Index to a maximum of three (3) when tested to D4318-05.

.6 Table: Type 1 (Sand Bedding)

Sieve Size, mm	% Passing
40	100
25	95 - 100
19	90 - 100
9.5	60 - 100
4.75	35 - 80
2.36	15 - 60
0.30	0 - 30
0.075	0 - 10

.7 Table: Type 2 (Clean Stone Bedding)

Sieve Size, mm	% Passing
28	100
20	90 - 100
10	25 - 60
5	0 - 10
2.5	0 - 5

.5 Levelling Course:

- .1 Aggregate shall be composed of clean, hard, sound, durable, uncoated particles that do not contain friable, soluble or reactive minerals or other deleterious materials or conditions that would make the aggregate prone to decomposition or disintegration when exposed to the natural elements after placement in the Work.
- .2 Gradations to be within limits specified when tested to ASTM C-136 and ASTM C-117. Sieve sizes to CAN/CGSB-8.1.
- .3 Maximum abrasion loss of 30% when tested to MTO LS 619.
- .4 Maximum Freeze Thaw loss of 20% when tested to MTO LS 614.
- .5 Plasticity Index to a maximum of three (3) when tested to D4318-05.
- .6 Table:

Sieve Size, mm	% Passing
10	100
5	80 - 90
2.5	60 - 75
1.25	35 - 50
0.63	15 - 30
0.16	0 - 8
0.075	0 - 3

.6 20 mm Clear Stone:

- .1 Aggregate shall be composed of clean, hard, sound, durable, uncoated particles that do not contain friable, soluble or reactive minerals or other deleterious materials or conditions that would make the aggregate prone to decomposition or disintegration when exposed to the natural elements after placement in the Work.
- .2 Gradations to be within limits specified when tested to ASTM C-136 and ASTM C-117. Sieve sizes to CAN/CGSB-8.1.
- .3 Maximum abrasion loss of 30% when tested to MTO LS 618.
- .4 Maximum Freeze Thaw loss of 20% when tested to MTO LS 614.
- .5 Plasticity Index to a maximum of three (3) when tested to D4318-05.

.6 Table:

Sieve Size, mm	% Passing
28	100
19	90 - 100
9.5	25 - 60
4.75	0 - 10
2.36	0 - 5
0.075	0 - 1

.7 Borrow:

.1 All borrow material shall be supplied by the Contractor in accordance with NBDOT Item 121.

.8 6.3 mm minus Course:

.1 Aggregate shall be composed of clean, hard, sound, durable, uncoated particles that do not contain friable, soluble or reactive minerals or other deleterious materials or conditions that would make the aggregate prone to decomposition or disintegration when exposed to the natural elements after placement in the Work.

.2 Gradations to be within limits specified when tested to ASTM C-136 and ASTM C-117. Sieve sizes to CAN/CGSB-8.1.

.3 Maximum abrasion loss of 30% when tested to MTO LS 619.

.4 Maximum Freeze Thaw loss of 20% when tested to MTO LS 614.

.5 Plasticity Index to a maximum of three (3) when tested to D4318-05.

.6 Table:

Sieve Size, mm	% Passing
0.63	100
0.075	8 - 14

.9 Pit Run Gravel :

.1 Aggregate shall be composed of clean, hard, sound, durable, uncoated particles that do not contain friable, soluble or reactive minerals or other deleterious materials or conditions that would make the aggregate prone to decomposition or disintegration when exposed to the natural elements after placement in the Work.

.2 Gradations to be within limits specified when tested to ASTM C-136 and ASTM C-117. Sieve sizes to CAN/CGSB-8.1.

.3 Maximum abrasion loss of 30% when tested to MTO LS 619.

.4 Maximum Freeze Thaw loss of 20% when tested to MTO LS 614.

.5 Plasticity Index to a maximum of five (5) when tested to D4318-05.

.6 Table:

Sieve Size, mm	% Passing
125	100
100	95-100
75	82-100
50	62-100
37.5	52-100
19	30-90
9.5	22-79
4.75	16-66
2.36	12-55
1.18	9-44
.300	4-25
.075	0-7

Part 3 Execution

3.1 GENERAL

- .1 The Contractor will be required to excavate through existing granular materials, native materials and solid rock through the execution of this contract. Suitable excavated granular materials so meeting the appropriate gradations and physical requirements may be re-incorporated into the Work. Unsuitable excavated materials will comprise frozen, saturated, or deleterious materials whatever their origin and shall also include excavated bedrock. All unsuitable excavated materials shall become the property of the Contractor and shall be disposed of off site. All exposed subgrade surfaces shall be inspected by the Departmental Representative prior to the placement of fill or concrete. Existing or constructed engineered fill may be proof rolled at the discretion of the Departmental Representative.
 Groundwater may be encountered at or near the bedrock surface or in the vicinity of existing services. Appropriate de-watering measures will be required by the Contractor.
- .2 The Contractor shall advise the Departmental Representative two weeks in advance of his intended use of any materials to allow sufficient time for sampling and testing. The Contractor shall submit samples of granular materials to be used in the Works if so requested by the Departmental Representative. Approval of a sample does not mean acceptance of the whole source. Each load of material received at the job site shall be subject to all the requirements of that material.
- .3 The costs of any additional testing of backfill, as deemed necessary by the Departmental Representative, to determine the acceptability or degree of compaction shall be paid by the Contractor.
- .4 Operations on earthwork shall be suspended at any time when satisfactory results cannot be obtained due to rain, freezing weather or other conditions of the field. At all times, the Contractor shall drag, blade or slope the fill to provide proper surface drainage.

- .5 Materials which shall be compacted shall be placed in layers no thicker than 300 mm, loose depth, and of the proper moisture content before compacting to facilitate obtaining the prescribed compaction shown on the drawings or specified herein.
- .6 Final grades shall be within 12 mm of the levels shown on the drawings. All areas shall be sloped to avoid puddles.
- .7 It shall be the responsibility of the Contractor to repair all damage and correct all deficiencies which may result from the settlement of backfill areas.

3.2 SITE PREPARATION

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

3.3 STOCKPILING AND DISPOSAL

- .1 Protect fill materials from contamination.
- .2 Excess material unsuitable for backfill shall become the property of the Contractor and be disposed of off site. It will be the Contractor's responsibility to acquire permission and all permits for the disposal site. A copy of all obtained permits are to be submitted to the Departmental Representative.
- .3 In case of a dispute, the Departmental Representative shall be the sole judge as to which material is unsuitable and shall be hauled away.

3.4 DEWATERING AND HEAVE PREVENTION

- .1 Keep excavations free of water while Work is in progress.
- .2 Protect open excavations against flooding and damage due to surface run-off.
- .3 All excavations and trenches shall be kept free from water. Dams, dykes or other work necessary for dewatering including duplicate pumps of sufficient capacity for the purpose, shall be placed at the Contractor's expense.
- .4 The discharge of water from any dewatering operation shall be in accordance with all applicable municipal, provincial, and federal regulations.

3.5 EXCAVATION

- .1 Excavate to lines, grades, elevations and dimensions as indicated.
- .2 Excavation shall include the removal of all water, ice, snow and material of any nature which interferes with construction work.

- .3 Where the bearing value of the sub-grade is determined by the Departmental Representative to be unsuitable, or where unknown interfering objects are encountered the Contractor shall sub-excavate to the depth directed by the Departmental Representative.
- .4 Excavation must not interfere with bearing capacity of adjacent foundations.
- .5 For trench excavation, unless otherwise authorized by Departmental Representative in writing, do not excavate more than 30 metres of trench in advance of installation operations.
- .6 All earth banks created by excavating shall be sloped at sufficient angle to prevent sliding or caving in and if they are not adequately sloped, then shoring and/or trench boxes must be used.
- .7 Earth bottoms of excavations to be undisturbed soil or rock, level, free from loose, soft or organic matter.
- .8 Notify Departmental Representative when bottom of excavation is reached.
- .9 Obtain Departmental Representative approval of completed excavation.
- .10 Remove unsuitable material from trench bottom to extent and depth as directed by Departmental Representative.
- .11 Hand trim, make firm and remove loose material and debris from excavations. Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil.
- .12 Make all excavations in such a manner and to such a width as will give adequate clearance for structures connections thereto, for bracing and supporting, pumping, draining and for removing from the excavation any material which the Departmental Representative may deem unsuitable for foundations, including any material which may slough off the sides of the excavation.
- .13 Where excavation carried out by the Contractor exceeds the limits authorized by the Departmental Representative, the costs of such unauthorized excavation shall be borne by the Contractor as shall all necessary fill required to fill the void.

3.6 FILL TYPES AND COMPACTION

- .1 Under foundations: Use 300 mm of engineered fill compacted to 97%.
- .2 Exterior of perimeter concrete slab: Use subbase material compacted to 95%.
- .3 Under slabs: Use materials as indicated on drawings or as specified by Departmental Representative compacted to 95%.
- .4 Under roadways, walkways, curbs and gutters use subbase and base materials as specified in the drawings compacted to 95%.

- .5 Under landscaped areas compacted to 95%.
- .6 Borrow A1 or suitable excavated material to be used below subbase material compacted to 95%.
- .7 Crushed masonry debris. Crushed masonry construction debris should have a maximum particle size not exceeding 200 mm, this material will have both thickness and breadth greater to or equal to one-third of its length. Crushed masonry debris shall consist of clean, hard, sound, free of organic or other deleterious materials. To be used in areas as directed by the Departmental Representative compacted to 95%.

3.7 BEDDING AND SURROUND OF UNDERGROUND SERVICES

- .1 Place bedding and surround of underground services as indicated on the drawings or as directed by the Departmental Representative.
- .2 Place sand bedding in trenches where ducts and cables are direct buried.
- .3 Place bedding and surround material in unfrozen and unsaturated condition.

3.8 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 300 mm loose depth and compacted up to grades indicated. Compact each layer before placing succeeding layer.
- .5 Backfilling around installations:
 - .1 Do not backfill around or over cast-in-place concrete within 24 hours after placing of concrete.

3.9 RESTORATION

- .1 Restore asphalt, concrete and grass where trenching has disrupted existing. Match existing.
- .2 Where grass surfaces are encountered provide topsoil and hydroseed to match existing grading, drainage, and erosion control.
- .3 Where existing asphaltic pavement is encountered during excavations, remove all asphaltic debris from site and after cable duct installation and backfilling are completed, provide new base coarse and asphaltic pavement to match existing.

- .4 Where existing concrete pavement is encountered during excavation, remove all concrete debris from site and after cable duct installation and backfilling are completed, provide new concrete surface to match existing.
- .5 Remove rocks, gravel, and other construction debris from finished asphalt and concrete surfaces

3.10 REPAIRS DURING WARRANTY PERIOD

- .1 During the specified guarantee period, make good, any damage to walks, roads, etc., due to settlement of backfilled areas. All such repairs shall be made at the Contractor's expense upon notification by the Departmental Representative.
- .2 Should the Contractor fail to carry out the necessary maintenance within 5 days after receiving written instruction from the Departmental Representative, the Owner will carry out the work and deduct the cost incurred from the money owing the Contractor.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

- .1 American Society for Testing and Materials International, (ASTM)
 - .1 ASTM D 4491-99a, Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
 - .2 ASTM D 4595-86(2001), Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method.
 - .3 ASTM D 4751-99a, Standard Test Method for Determining Apparent Opening Size of a Geotextile.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-4.2 No. 11.2-M89 (April 1997), Textile Test Methods - Bursting Strength - Ball Burst Test (Extension of September 1989).
 - .2 CAN/CGSB-148.1, Methods of Testing Geotextiles and Complete Geomembranes.
- .3 NBDOT Standard Specifications (January 2019), Division 600, Item 601.

1.2 SUBMITTALS

- .1 Submit to the Departmental Representative following samples at least 2 weeks prior to beginning Work.
 - .1 Minimum length of 2 metres of roll width of geotextile.

1.3 DELIVERY, STORAGE AND HANDLING

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

Part 2 Products

2.1 MATERIALS

- .1 Physical properties as indicated in Table 601-1 (NBDOT Standard Specifications, Jan 2011) for woven (W2) geotextile materials.
- .2 Geotextile: woven or non-woven synthetic fibre fabric, supplied in rolls.
 - .1 Width: 3.5 metres minimum
 - .2 Length: 79 metres minimum
 - .3 Composed of: minimum 85% by mass of polypropylene and/or polyester, with inhibitors added to base plastic to resist deterioration by ultra-violet and heat exposure for 30 days.

- .3 Securing pins and washers: to CAN/CSA-G40.21, Grade 300W, hot-dipped galvanized with minimum zinc coating of 600 g/m² to CAN/CSA G164.
- .4 Thread for sewn seams: equal or better resistance to chemical and biological degradation than geotextile.

Part 3 Execution

3.1 INSTALLATION

- .1 Place geotextile material, as indicated on drawings and as directed by the Departmental Representative, by unrolling onto graded surface and retain in position with securing pins or fill.
- .2 Place geotextile material smooth and free of tension stress, folds, wrinkles and creases.
- .3 Place geotextile material on sloping surfaces in one continuous length from toe of slope to upper extent of geotextile.
- .4 Overlap each successive strip of geotextile 300 mm over previously laid strip.
- .5 Protect installed geotextile material from displacement, damage or deterioration before, during and after placement of material layers.
- .6 After installation, cover with overlying layer within 4 hours of placement.
- .7 Replace damaged or deteriorated geotextile to approval of the Departmental Representative.
- .8 Place and compact soil layers in accordance with Section 31 23 10 - Excavating Trenching and Backfilling and 31 24 13 - Roadway Excavation Embankment and Compaction.

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.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

- .1 NBDOT Standard Specifications (January 2019), Division 600, Item 608.

Part 2 Products

2.1 GENERAL

- .1 All materials to be supplied by the contractor in quantities as indicated and specified.

2.2 STONE

- .1 Hard, durable, angular quarry stone, free from seams, cracks or other structural defects, to meet the size distribution for use intended, as shown in Table 608-1 (NBDOT Specifications) for R-25 & R-5 riprap.

2.3 GEOTEXTILE FILTER

- .1 Geotextile: as indicated in drawings and in accordance with Section 31 32 21 - Geotextiles.

Part 3 Execution

3.1 PLACING

- .1 Where riprap is to be placed on slopes excavate trench at toe of slope as indicated.
- .2 Fine grade area to be riprapped to uniform, even surface. Fill depressions with suitable material and compact to provide firm bed.
- .3 Place geotextile on prepared surface in accordance with Section 31 32 21 - Geotextiles and as indicated. Avoid puncturing geotextile. Vehicular traffic over geotextile is not permitted.
- .4 Place riprap to thickness as per NBDOT Standard Specifications (2011), Item 608 and details as indicated.
- .5 Place stones in manner approved by the Departmental Representative to secure surface and create a stable mass. Place larger stones at bottom of slopes.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

- .1 ASTM C117, Test Method for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.
- .2 ASTM C131, Test Method for Resistance to Degradation of Small Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
- .3 ASTM C136, Method for Sieve Analysis of Fine and Coarse Aggregates.
- .4 ASTM D698, Test Methods for Moisture Density Relations of Soils and Soil Aggregate Mixtures Using 2.49 kg Rammer and 304.8 mm Drop.
- .5 CAN/CGSB-8.1, Sieves Testing, Woven Wire.
- .6 CAN/CGSB-8.2, Sieves Testing, Woven Wire, Metric.
- .7 ASTM D1557, Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 4.54 kg Rammer and 457 mm Drop.
- .8 ASTM D1883, Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.
- .9 ASTM D4318, Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
- .10 ASTM D422, Method for Particle-Size Analysis of Soils
- .11 NB Department of Transportation Standard Specifications (January 2019).

Part 2 Products

2.1 SUBBASE COURSE

- .1 Aggregate shall be composed of clean, hard, sound, durable, uncoated particles that do not contain friable, soluble or reactive minerals or other deleterious materials or conditions that would make the aggregate prone to decomposition or disintegration when exposed to the natural elements after placement in the work.
- .2 Gradations to be within limits specified when tested to ASTM C-136 and ASTM C-117. Sieve sizes to CAN/CGSB-8.1.
- .3 Maximum abrasion loss of 30% when tested to MTO LS 618.
- .4 Maximum Freeze Thaw loss of 20% when tested to MTO LS 614.

.5 Plasticity Index to a maximum of three (3) when tested to D4318-05.

.6 Table:

Sieve Size, mm	% Passing
90	100
75	95 - 100
63	85 - 100
50	73 - 95
37.5	58 - 87
19	35 - 69
9.5	25 - 54
4.75	17 - 43
2.36	12 - 35
1.18	8 - 28
0.3	4 - 16
0.075	0 - 9

Part 3 Execution

3.1 INSPECTION OF EXISTING SUBGRADE SURFACE

.1 Place granular subbase after subgrade is inspected and approved by the Departmental Representative.

3.2 PLACING

.1 Construct granular subbase 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 or ice.

.4 Place granular subbase materials using methods which do not lead to segregation or degradation.

.5 Place material to full width in uniform layers not exceeding 300 mm compacted thickness.

.6 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.

.7 Remove and replace portion of layer in which material has become segregated during spreading.

3.3 COMPACTION EQUIPMENT

- .1 Compaction equipment must be capable of obtaining required densities in materials on project.

3.4 COMPACTING

- .1 Compact to density of not less than 95% maximum dry density in accordance with ASTM D698.
- .2 Granular subbase should be placed and compacted in lifts no greater than 300 mm in thickness.
- .3 Shape and roll alternately to obtain smooth, even and uniformly compacted subbase.
- .4 Apply water as necessary during compaction to obtain specified density.
- .5 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by the Departmental Representative.

3.5 FINISH TOLERANCES

- .1 Finished subbase surface to be within plus or minus 10 mm of established grade and cross section but not uniformly high or low.
- .2 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

3.6 MAINTENANCE

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

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

- .1 ASTM C117, Test Method for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.
- .2 ASTM C131, Test Method for Resistance to Degradation of Small Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
- .3 ASTM C136, Method for Sieve Analysis of Fine and Coarse Aggregates.
- .4 ASTM D698, Test Methods for Moisture Density Relations of Soils and Soil Aggregate Mixtures Using 2.49 kg Rammer and 304.8 mm Drop.
- .5 CAN/CGSB-8.1, Sieves Testing, Woven Wire.
- .6 CAN/CGSB-8.2, Sieves Testing, Woven Wire, Metric.
- .7 ASTM D1557, Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 4.54 kg Rammer and 457 mm Drop.
- .8 ASTM D1883, Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.
- .9 NB Department of Transportation Standard Specifications (January 2019).

Part 2 Products

2.1 BASE COURSE

- .1 Crushed quarried rock composed of clean, hard, sound, durable, uncoated particles that do not contain friable, soluble or reactive minerals or other deleterious materials or conditions that would make the aggregate prone to decomposition or disintegration when exposed to the natural elements after placement in the work.
- .2 Gradations to be within limits specified when tested to ASTM C-136 and ASTM C-117. Sieve sizes to CAN/CGSB-8.1.
- .3 Maximum abrasion loss of 30% when tested to MTO LS 618.
- .4 Maximum Freeze Thaw loss of 20% when tested to MTO LS 614.
- .5 Plasticity Index to a maximum of three (3) when tested to D4318-05.

.6 Table:

Sieve Size, mm	% Passing
37.5	100
31.5	95 - 100
25	81 - 100
19	66 - 90
12.5	50 - 77
9.5	41 - 70
4.75	27 - 54
2.36	17 - 43
1.18	11 - 32
0.30	4 - 19
0.075	0 - 8

Part 3 Execution

3.1 CONSTRUCTION METHODS

- .1 Base course material must be approved by the Departmental Representative before it is incorporated into the work.
- .2 Place base material to the lines and grades indicated on the drawings and as specified herein.
- .3 Prior to placing of granular base course, properly shape and compact subbase or subgrade so as to be firm and able to support the construction equipment without displacement. Correct soft or yielding subbase and make suitable before base construction proceeds.
- .4 Spread and compact the granular base in layers having a depth not greater than 150 mm. Compact with a steel-drummed or wobble-wheel machine to 95% of modified maximum density (ASTM D1557).
- .5 Shape the surface following compaction to the required line, grade and cross Section. Make surface smooth, dense and free from ridges or loose material conforming to the finished surface cross Section as detailed on the drawings.
- .6 Base construction on wet, muddy, or rutted subbase or subgrade is not permitted.
- .7 Loaded gravel trailers are not permitted to travel directly on the subbase layer at any time before or after compaction.
- .8 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
- .9 Remove and replace that portion of layer in which material becomes segregated during spreading.

3.2 FINISH TOLERANCES

- .1 Finished subbase surface to be within plus or minus 10 mm of established grade and cross section but not uniformly high or low.
- .2 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

END OF SECTION

- Part 1 General
- 1.1 RELATED SECTIONS
- .1 Section 26 05 00 – Common Work Results for Electrical.
 - .2 Section 26 05 43.01 – Installation of Cables in Trenches and in Ducts.
- 1.2 REFERENCE STANDARDS
- .1 CSA International
 - .1 C22.2 No. 211.06 (R2016), Rigid PVC (Unplasticized) Conduit.
- 1.3 DEFINITIONS
- .1 In this section duct means rigid PVC conduit.
- 1.4 ACTION AND INFORMATIONAL SUBMITTALS
- .1 Submit in accordance with Section 01 33 00 – Submittal Procedures.
 - .2 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
- 1.5 QUALITY ASSURANCE
- .1 Quality assurance submittals: submit following in accordance with Section 01 45 00 – Quality Control.
 - .1 Certificates: signed by manufacturer certifying materials comply with specified performance characteristics and physical properties.
 - .2 Manufacturer's Instructions: for installation and special handling criteria, installation sequence and cleaning procedures.
- 1.6 DELIVERY, STORAGE AND HANDLING
- .1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements and with manufacturer's written instructions.
 - .2 Separate and recycle waste materials in accordance with Section 01 74 19 – Waste Management and Disposal.
 - .1 Separate waste materials for reuse and recycling.
 - .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

- 1.7 MEASUREMENT PROCEDURES
 - .1 No measurement for payment will be made under this section. Include cost in lump sum payment.

- Part 2 Products

- 2.1 PVC DUCTS AND FITTINGS
 - .1 Rigid PVC duct: size as indicated, with expanded flange ends, for direct burial.
 - .1 Nominal length: 3 m as required, plus or minus 12 mm.
 - .2 Rigid PVC bends, couplings, reducers, end fittings, plugs, caps, adaptors same product material as duct, to make a complete installation.
 - .3 Rigid PVC 90 degree and 45 degree bends as required.
 - .4 Expansion joints as required.

- 2.2 SOLVENT WELD COMPOUND
 - .1 Solvent cement and cleaner for PVC duct joints.

- 2.3 CABLE PULLING EQUIPMENT
 - .1 6 mm stranded nylon/polyester pull rope tensile strength 5 kN.

- 2.4 WARNING TAPE
 - .1 Standard 4-mil polyethylene 76 mm wide tape, red with black letters, imprinted with "CAUTION BURIED ELECTRIC CABLE BELOW ".

- Part 3 Execution

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

- 3.2 INSTALLATION
 - .1 Install ducts in accordance with manufacturer's instructions and at elevations as indicated.
 - .2 Apply cleaning and solvent compounds in accordance with manufacturer's instructions.
 - .3 Clean inside of ducts before laying.
 - .4 Slope ducts with 1 to 400 minimum slope.

- .5 Install plugs and cap both ends of ducts to prevent entrance of foreign materials during and after construction.
- .6 Pull through each duct a 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 material.
 - .1 Pull stiff bristle brush through each duct immediately before pulling-in cables.
- .7 Install a pull rope continuous throughout each duct run with 3 m spare rope at each end.
- .8 Place continuous strip of warning tape 300 mm below final grade above duct and as indicated.
- .9 Notify Departmental Representative for field review upon completion of direct buried ducts and obtain acceptance prior to backfill.

3.3 CLEANING

- .1 Clean in accordance with Section 01 74 00 – Cleaning.
 - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.
- .2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 – Waste Management and Disposal.

END OF SECTION

- Part 1 General
- 1.1 RELATED SECTIONS
- .1 Section 26 05 00 – Common Work Results for Electrical.
 - .2 Section 26 05 21 – Wires and Cables (0 – 1000 V).
 - .3 Section 26 05 28 – Grounding – Secondary.
 - .4 Section 26 05 34 – Conduits, Conduit Fastenings and Conduit Fittings.
 - .5 Section 26 05 43.01 – Installation of Cables in Trenches and in Ducts.
 - .6 Section 26 24 01 – Service Equipment.
 - .7 Section 31 23 33.01 – Excavating, Trenching and Backfilling.
 - .8 Section 33 65 76 – Direct Buried Underground Cable Ducts.
- 1.2 ACTION AND INFORMATIONAL SUBMITTALS
- .1 Submit shop drawings in accordance with Section 01 33 00 – Submittal Procedures.
 - .2 Shop Drawings to include manufacturer’s instructions, printed product literature and data sheets including characteristics, physical size, finish and limitations.
 - .3 Operational and Maintenance Data: Submit operational and maintenance data for incorporation into manual specified in Section 01 78 00 – Closeout Submittals.
- 1.3 DELIVERY STORAGE AND HANDLING
- .1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements.
 - .2 Separate and recycle waste materials in accordance with Section 01 74 19 – Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling.
 - .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- 1.4 QUALITY ASSURANCE
- .1 Regulatory Requirements:
 - .1 Perform Work to comply with applicable Provincial/Territorial regulations.
 - .2 Coordinate and meet requirements of power supply authority.
 - .1 Ensure availability of power when required.

- 1.5 COORDINATION WITH POWER SUPPLY AUTHORITY
 - .1 Coordinate and meet requirements of local Utility. Ensure availability of power when required.
 - .2 Arrange for primary line extensions, utility installation, connections and energization of new and disconnection, removal of existing services made redundant.
- 1.6 UTILITY COSTS
 - .1 Any fees or costs required by the utility to provide new services and removal of existing is to be paid for by the contractor, as part of the contract price. This is to include energization fees for each new metered service.
- 1.7 MEASUREMENT PROCEDURES
 - .1 No measurement for payment will be made under this Section. Include cost in lump sum payment.
- Part 2 Products
- 2.1 MATERIALS
 - .1 Underground ducts: to Section 33 65 76 – Direct Buried Underground Cable Ducts.
 - .2 PVC coated rigid galvanized steel conduit: to Section 26 05 34 – Conduits, Conduit Fastenings and Conduit Fittings.
 - .3 Conductors: copper, type RW90, to Section 26 05 21 – Wires and Cables (0 – 1000 V), size and number of conductors as indicated.
 - .4 Backfill: clean and free of debris, to Section 31 23 33.01 – Excavating, Trenching and Backfilling.
- Part 3 Execution
- 3.1 MANUFACTURER'S INSTRUCTIONS
 - .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.
- 3.2 INSTALLATION
 - .1 Terminate ducts at service pole in accordance with NB Power Standard Construction Practices.
 - .2 Install direct buried underground cable ducts as indicated.
 - .3 Terminate at main switch.

- .4 Install cables in ducts and conduit in accordance with Section 26 05 43.01 – Installation of Cables in Trenches and in Ducts.
- .5 Allow adequate conductor length for connection to supply by power supply authority.
- .6 Allow adequate conductor length for connection to service equipment.
- .7 Make grounding connections in accordance with Section 26 05 28 – Grounding – Secondary.
- .8 Seal ducts and conduits at service entrance after installation of cable.

3.3 FIELD QUALITY CONTROL

- .1 Site Tests:
 - .1 Perform tests in accordance with Section 26 05 00 – Common Work Results for Electrical.
 - .2 Perform additional tests if required by authority having jurisdiction.
- .2 Submit written test results to Departmental Representative for review.

3.4 CLEANING

- .1 Proceed in accordance with Section 01 74 00 – Cleaning.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION