Specification
For
Electrical Improvements
Southern Harbour, NL

 # 721642

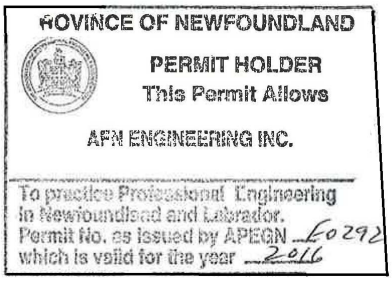
Project File No: FP802-160059

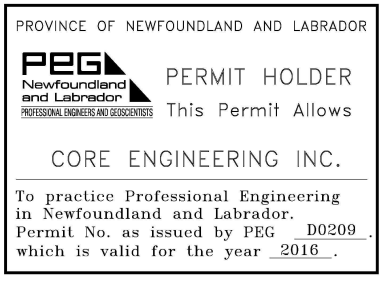
Owner:
Department of Fisheries and Oceans
Corporate Services and Human Resources
John Cabot Building
10 Barter's Hill
P.O. Box 5667
St. John's, NL A1C 5X1

Electrical Consultant:
CORE Engineering Inc.

Civil Consultant:
AFN Engineering Inc.

Date: February 23, 2016





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1.1 SCOPE .1 The work consists of the furnishing of all plant, labour, equipment and material for Electrical Improvements at Southern Harbour, NL, in strict accordance with specifications and accompanying drawings and subject to all terms and conditions of the Contract.

1.2 DESCRIPTION OF WORK .1 In general, work under this contract consist of, but will not necessarily be limited to, the following:

.1 Construction of a new electrical shed complete with concrete foundation.
.2 Relocation of signs, as noted on the drawings.
.3 Supply and installation of electrical pull pits, asphalt and granulars, as noted on the drawings.
.4 Supply and installation of all electrical work for a complete installation, as noted on the drawings. Note that existing items to be re-used in the new work are shown on the drawings.

1.3 SITE OF WORK .1 Work will be carried out at Southern Harbour, NL, in the location as shown on the accompanying drawings.

1.4 DATUM .1 Datum used for this project is Lowest Normal Tides (LNT). Bench marks are shown on the drawings. Confirm with Departmental Representative prior to construction.

.2 Bidders are advised to consult the Tide Tables issued by Fisheries and Oceans in order to make sure of the tidal conditions affecting work.

1.5 FAMILIARIZATION WITH SITE .1 Before submitting a bid, it is recommended that bidders visit the site and its surroundings to review and verify the form, nature and extent of the work, materials needed for the completion of the work, the means of access to the site, severity, exposure and uncertainty of weather, soil conditions, any accommodations they may require, and in general shall obtain all necessary information as to risks, contingencies and other circumstances which may influence or affect their bid or costs to do the work. No allowance shall be made subsequently in this connection on account of error or negligence to properly observe and determine the conditions that will apply.

.2 Contractors, bidders or those they invite to site are to review specification Section 01 35 29 - Health and Safety Requirements before visiting site. Take all appropriate safety measures for any visit to site, either before or after acceptance of bid.

.3 Obtain prior permission from the Departmental Representative before

carrying out such site inspection.

1.6 CODES AND STANDARDS

.1 Perform work in accordance with the latest edition of the National Building Code of Canada, FCC Standard 373 - Standard for Piers and Wharves (http://www.hrsdc.gc.ca/eng/labour/ fire_protection/policies_standards/ commissioner/373/page00.shtml), and any other code of provincial or local application including all amendments up to project bid closing date provided that in any case of conflict or discrepancy, the more stringent requirements shall apply.

.2 Materials and workmanship must meet or exceed requirements of specified standards, codes and referenced documents.

1.7 TERM ENGINEER

.1 Unless specifically stated otherwise, the term Engineer where used in the Specifications and on the Drawings shall mean the Departmental Representative as defined in the General Conditions of the Contract.

1.8 SETTING OUT WORK

.1 Set grades and layout work in detail from control points and grades established by Departmental Representative.

.2 Assume full responsibility for and execute complete layout of work to locations, lines and elevations indicated or as directed by Departmental Representative.

.3 Provide devices needed to layout and construct work.

.4 Supply such devices as straight edges and templates required to facilitate Departmental Representative's inspection of work.

.5 Supply stakes and other survey markers required for laying out work.

1.9 COST BREAKDOWN

.1 Before submitting first progress claim submit breakdown of Contract price in detail as directed by Departmental Representative and aggregating contract price.

.2 Provide cost breakdown in same format as the numerical and subject title system used in this specification project manual and thereafter sub-divided into major work components as directed by Departmental Representative.

.3 Upon approval by Departmental Representative, cost breakdown will be used as basis for progress payment.

1.10 WORK SCHEDULE

.1 Submit within 7 work days of notification of acceptance of bid, a

construction schedule showing commencement and completion of all work within the time stated on the Bid and Acceptance Form and the date stated in the bid acceptance letter.

.2 Provide sufficient details in schedule to clearly illustrate entire implementation plan, depicting efficient coordination of tasks and resources, to achieve completion of work on time and permit effective monitoring of work progress in relation to established milestones.

.3 As a minimum, work schedule to be prepared and submitted in the form of Bar (GANTT) Charts, indicating work activities, tasks and other project elements, their anticipated durations and planned dates for achieving key activities and major project milestones provided in sufficient details and supported by narratives to demonstrate a reasonable plan for completion of project within designated time. Generally Bar Charts derived from commercially available computerized project management system are preferred but not mandatory.

.4 Submit schedule updates on a minimum monthly basis and more often, when requested by Departmental Representative, due to frequent changing project conditions. Provide a narrative explanation of necessary changes and schedule revisions at each update.

.5 The schedule, including all updates, shall be to Departmental Representative's approval. Take necessary measures to complete work within approved time. Do not change schedule without Departmental Representative's approval.

.6 All work on the project will be completed within the time indicated on the Bid and Acceptance Form.

.7 Provide two (2) weeks of advance notice to designated representative before disconnecting power to wharf. Wharf is not to be without power for more than (1) week. Contractor will be assessed $1,000.00 per day penalty for each day that the wharf is without power past the allowed electrical shutdown duration of seven (7) days.

1.11 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
NLGA - National Lumber Grades Authority
ASTM - American Society for Testing and Materials

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

1.12 QUARRY AND EXPLOSIVES	.1	Make own arrangements with Provincial authorities and owners of private properties, for the quarrying and transportation of rock and all materials and machinery necessary for work over their property, roads or streets as case may be.
1.13 SITE OPERATIONS	.1	Arrange for sufficient space adjacent to project site for conduct of operations, storage of materials and so on. Exercise care so as not to obstruct or damage public or private property in area. Do not interfere with normal day-to-day operations in progress at site. All arrangements for space and access will be made by Contractor.
	.2	Remove snow and ice as required to maintain safe access in a manner that does not damage existing structures or interfere with the operations of others.
1.14 PROJECT MEETINGS	.1	Departmental Representative will arrange project meetings and assume responsibility for setting times and recording minutes.
	.2	Project meetings will take place on site of work unless so directed by the Departmental Representative.
	.3	Departmental Representative will assume responsibility for recording minutes of meetings and forwarding copies to all parties present at the meetings.
	.4	Have a responsible member of firm present at all project meetings.
1.15 PROTECTION	.1	Store all materials and equipment to be incorporated into work to prevent damage by any means.
	.2	Repair or replace all materials or equipment damaged in transit or storage to the satisfaction of Departmental Representative and at no cost to Canada.
1.16 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, pedestrian, vehicular traffic and tenant 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. This includes disconnection of electrical power and communication services to tenant's operational areas. 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 Provide adequate bridging over trenches which cross walkways or roads to permit normal traffic.

.6 Where unknown services are encountered, immediately advise Departmental Representative and confirm findings in writing.

.7 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.

1.17 DOCUMENTS REQUIRED

.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 Site specific Health and Safety Plan and other safety related documents
.11 Other documents as stipulated elsewhere in the Contract Documents.

1.18 PERMITS

.1 Obtain and pay for all permits, certificates and licenses as required by Municipal, Provincial, Federal and other Authorities.

.2 Provide appropriate notifications of project to municipal and provincial inspection authorities.

.3 Obtain compliance certificates as prescribed by legislative and regulatory provisions of municipal, provincial and federal authorities as applicable to the performance of work.

.4 Submit to Departmental Representative, copy of application submissions and approval documents received for above referenced authorities.

.5 Submit to Departmental Representative, copy of quarry permit, if

applicable, prior to start of quarry operations.

.6 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.

1.19 CUTTING, FITTING AND PATCHING

.1 Execute cutting, including excavation, fitting and patching required to make work fit properly.

.2 Where new work connects with existing and where existing work is altered, cut, patch and make good to approval of Departmental Representative. This includes patching of openings in existing work resulting from removal of existing services.

.3 Do not cut, bore, or sleeve load-bearing members.

.4 Make cuts with clean, true, smooth edges. Make patches inconspicuous in final assembly.

1.20 EXISTING SUB-SURFACE CONDITIONS

.1 Information pertaining to the existing sub-surface conditions may be available by contacting the Departmental Representative.

.2 Contractors are cautioned that any previous investigations that may be available for review, were intended to provide general site information only. Any interpolation and/or assumptions made relative to any previous investigations is the Contractor's responsibility.

1.21 LOCATION OF EQUIPMENT

.1 Location of work shown or specified shall be considered as approximate. Actual location shall be as required to suit conditions at time of installation and as is reasonable. Obtain approval of Departmental Representative.

.2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space and in accordance with manufacturer's recommendations for safety, access and maintenance.

.3 Inform Departmental Representative when impending installation conflicts with other new or existing components. Follow directives for actual location.

.4 Submit field drawings to indicate relative position of various services and equipment when required by Departmental Representative.

1.22 FISH HABITAT

.1 This work is being conducted in an area where fish habitat may be affected. Perform work to conform with rules and regulations governing fish habitat and in accordance with authorization for work

or undertakings affecting fish habitat.

.2 Contact the local Department of Fisheries and Oceans detachment at least 48 hours in advance of starting any work on site. Submit confirmation to the Departmental Representative that DFO have been contacted.

1.23 NOTICE TO SHIPPING/MARINERS

.1 Notify the Marine Communications and Traffic Services' Centre, of Fisheries and Oceans Canada, at (709) 772-2083, ten (10) days prior to commencement and upon completion of the work, in order to allow for the issuance of Notices to Shipping/Mariners.

.2 During construction any vessels or barges utilized must be marked in accordance with the provisions of the Canada Shipping Act Collision Regulations.

1.24 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.

1.25 WORKS COORDINATION

.1 Responsible for coordinating the work of the various trades, where the work of such trades interfaces with each other.

.2 Convene meetings between trades whose work interfaces and ensure that they are fully aware of the areas and the extent of where interfacing is required. Provide each trade with the plans and specifications of the interfacing trade, as required, to assist them in planning and carrying out their respective work.

.3 Canada will not be responsible for or held accountable for any extra costs incurred as a result of the failure to carry out coordination work. Disputes between the various trades as a result of their not being informed of the areas and extent of interface work shall be the sole responsibility of the General Contractor and shall be resolved at no extra cost to Canada.

1.26 CONTRACTOR'S USE OF SITE

.1 Construction operations, including storage of materials for this contract, not to interfere with the fishing activity and/or operations at this harbour facility.

.2 Responsible for arranging the storage of materials on or off site, and any materials stored at the site which interfere with any of the day to day activities at or near the site will be moved promptly at the Contractor's expense, upon request by Departmental Representative.

.3 Contractor will take adequate precautions to protect existing concrete decks and asphalt when operating tracked equipment.

.4 Exercise care so as not to obstruct or damage public or private property in the area.

.5 At completion of work, restore area to its original condition. Damage to ground and property will be repaired by Contractor. Remove all construction materials, residue, excess, etc., and leave site in a condition acceptable to Departmental Representative.

1.27 WORK COMMENCEMENT

.1 Mobilization to project site is to commence immediately after acceptance of bid and submission of Site Specific Safety Plan and insurance documentation, unless otherwise agreed by Departmental Representative.

.2 Project work on site is to commence as soon as possible, with a continuous reasonable work force, unless otherwise agreed by Departmental Representative.

.3 Weather conditions, short construction season, delivery challenges and the location of the work site may require the use of longer working days and additional work force to complete the project within the specified completion time.

.4 Make every effort to ensure that sufficient material and equipment is delivered to site at the earliest possible date after acceptance of bid and replenished as required.

1.28 FACILITY SMOKING ENVIRONMENT

.1 Comply with smoking restrictions.

1.29 WORKING ADJACENT TO COMMUNITY ROADS

1. The Contractor will be responsible to restore any damage to existing roadways.

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Inspecting and testing by inspecting firms or testing laboratories designated by Departmental Representative.

1.2 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

.1 Particular requirements for inspection and testing to be carried out by testing laboratory designated by Departmental Representative are specified under various sections.

1.3 APPOINTMENT AND PAYMENT

.1 Departmental Representative will appoint and pay for services of testing laboratory except for the following:
.1 Inspection and testing required by laws, ordinances, rules, regulations or orders of public authorities.
.2 Inspection and testing performed exclusively for Contractor's convenience.
.3 Mill tests and certificates of compliance.
.4 Tests specified to be carried out by Contractor under the supervision of Departmental Representative.
.5 Tests requested by Departmental Representative to confirm material specifications when the applicable manufacturer's documentation or test results are unavailable.
.6 Additional tests specified in the following paragraph.

.2 Where tests or inspections by designated testing laboratory reveal Work not in accordance with contract requirements, pay costs for additional tests or inspections as required by Departmental Representative to verify acceptability of corrected work.

1.4 CONTRACTOR'S RESPONSIBILITIES

.1 Provide labour, equipment and facilities to:
.1 Provide access to Work to be inspected and tested.
.2 Facilitate inspections and tests.
.3 Make good Work disturbed by inspection and test.
.4 Provide storage on site for laboratory's exclusive use to store equipment and cure test samples.

.2 Notify Departmental Representative sufficiently in advance of operations to allow for assignment of laboratory personnel and scheduling of test.

.3 Where materials are specified to be tested, deliver representative samples in required quantity to testing laboratory.

.4 Pay costs for uncovering and making good Work that is covered before required inspection or testing is completed and approved by Departmental Representative.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Shop drawings and product data.

.2 Samples.

.3 Certificates.

1.2 SUBMITTAL GENERAL REQUIREMENTS

.1 Submit to Departmental Representative for review submittals listed, including shop drawings, samples, certificates and other data, as specified in other sections of the Specifications.

.2 Submit with reasonable promptness and in orderly sequence so as to allow for Departmental Representative's review and not cause delay in Work. Failure to submit in ample time will not be considered sufficient reason for an extension of Contract time and no claim for extension by reason of such default will be allowed.

.3 Do not proceed with work until relevant submissions are reviewed by Departmental Representative.

.4 Present shop drawings, product data, samples and mock-ups in 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 measurements or data have been taken, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents.
.1 Submittals not stamped, signed, dated and identified as to specific project will be returned unexamined by Departmental Representative and considered rejected.

.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 and coordinate.

.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 of originals. Facsimiles are not acceptable, except in special circumstances pre-approved by Departmental Representative. Poorly printed non-legible photocopies or facsimiles will not be accepted and be returned for resubmission.

.12 Make changes or revision to submissions which Departmental Representative may require, consistent with Contract Documents and resubmit as directed by Departmental Representative. When resubmitting, notify Departmental Representative in writing of any revisions other than those requested.

.13 Keep one reviewed copy of each submittal document on site for duration of Work.

1.3 SHOP DRAWINGS AND PRODUCT DATA

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

.2 Number of Shop Drawings: submit sufficient copies of shop drawings which are required by the General Contractor and sub-contractors plus 2 copies which will be retained by Departmental Representative. Ensure sufficient numbers are submitted to enable one complete set to be included in each of the maintenance manuals specified, if applicable.

.3 Shop Drawings Content and Format:

.1 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where items or equipment attach or connect to other items or equipment, confirm that all interrelated work have been coordinated, regardless of section or trade from which the adjacent work is being supplied and installed.

.2 Shop Drawings Format:

.1 Opaque white prints or photocopies of original drawings or standard drawings modified to clearly illustrate work specific to project requirements. Maximum sheet size to be 1000 x 707 mm.

.2 Product Data from manufacturer's standard catalogue sheets, brochures, literature, performance charts and diagrams, used to illustrate standard manufactured products, to be original full colour brochures, clearly marked indicating applicable data and deleting information not applicable to project.

.3 Non or poorly legible drawings, photocopies or facsimiles will not be accepted and returned not reviewed.

.3 Supplement manufacturer's standard drawings and literature with additional information to provide details applicable to project.

.4 Delete information not applicable to project on all submittals.

.4 Allow 10 calendar days for Departmental Representative's review of each submission.

.5 Adjustments or corrections made on shop drawings by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, advise Departmental Representative in writing prior to proceeding with Work.

.6 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections and comments are made, fabrication and installation may proceed upon receipt of shop drawings. If shop drawings are rejected and noted to be Resubmitted, do not proceed with that portion of work until resubmission and review of corrected shop drawings, through same submission procedures indicated above.

.7 Accompany each submission with transmittal letter, 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.

.8 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.

.9 After Departmental Representative's review, distribute copies.

.10 The review of shop drawings by the Departmental Representative or their delegated representative is for sole purpose of ascertaining conformance with general concept. This review shall not mean that the Departmental Representative 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.

1.1 SECTION INCLUDES

.1 Fire Safety Requirements.

.2 Hot Work Permit.

1.2 RELATED WORK

.1 Section 01 35 25 - Special Procedures on Lockout Requirements.

.2 Section 01 35 29 - Health and Safety Requirements.

1.3 REFERENCES

.1 Fire Protection Standards issued by Fire Protection Services of Human Resources Development Canada as follows:
.1 FCC No. 301-June 1982 Standard for Construction Operations (http://www.hrsdc.gc.ca/eng/labour/fire_protection/policies_standards/commissioner/301/page00.shtml).
.2 FCC No. 302-June 1982 Standard for Welding and Cutting (http://www.hrsdc.gc.ca/eng/labour/fire_protection/policies_standards/commissioner/302/page00.shtml).
.3 FCC standards, may also be viewed at the Regional Fire Protection Services' 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 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 the Submittal General Requirements specified in Section 01 33 00.

1.6 FIRE SAFETY REQUIREMENTS

.1 Implement and follow fire safety measures during Work. Comply with following:
.1 National Fire Code, 2005
.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 28.

.2 In event of conflict between any provisions of above authorities the

most stringent provision will apply. Should a dispute arise in determining the most stringent requirement, Departmental Representative will advise on the course of action to be followed.

1.7 HOT WORK AUTHORIZATION

.1 Obtain Departmental Representative's written "Authorization to Proceed" before conducting any form of Hot work on site.

.2 To obtain authorization submit to Departmental Representative:
.1 Contractor's typewritten Hot Work Procedures to be followed on site as specified below.
.2 Description of the type and frequency of Hot Work required.
.3 Sample Hot Work Permit to be used.

.3 Upon review and confirmation that effective fire safety measures will be implemented during performance of hot work, Departmental Representative will provide authorization to proceed as follows:
.1 Issue one written "Authorization to Proceed" covering the entire project for duration of work or;
.2 Separate work, or segregate certain parts of work, into individual entities. Each entity requiring a separately written "Authorization to Proceed" from Departmental Representative. Follow Departmental Representative's directives in this regard.

.4 Requirement for individual authorization based on:
.1 Nature or phasing of work;
.2 Risk to Facility operations;
.3 Quantity of various trades needing to perform hot work on project or;
.4 Other situation deemed necessary by Departmental Representative to ensure fire safety on premises.

.5 Do not perform any Hot Work until receipt of Departmental Representative's written "Authorization to Proceed" for that portion of work.

.6 In tenant occupied Facility, coordinate performance of Hot Work with Facility Manager through the Departmental Representative. When directed, perform Hot Work only during non-operative hours of Facility. Follow Departmental Representative's directives in this regard.

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.
.2 Use of a Hot Work Permit system for each hot work event.
.3 The step by step process of how to prepare and issue permit.
.4 Permit shall be issued by Contractor's site Superintendent, or other authorized person designated by Contractor, granting permission to worker or subcontractor to proceed with hot work.
.5 Provision of a designated person to carryout a Fire Safety Watch for a minimum of 60 minutes immediately upon completion of the hot work.
.6 Compliance with fire safety codes and standards specified herein and occupational health and safety regulations specified in Section 01 35 29.

.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 Contractor.

.5 Brief all workers and subcontractors on Hot Work Procedures and Permit system established for project. Stringently enforce compliance.
.1 Failure to comply with the established procedures may result in the issuance of a Non-Compliance Notification at Departmental Representative's discretion with possible disciplinary measures imposed as specified in Section 01 35 29.

1.9 HOT WORK PERMIT

.1 Hot Work Permit to include, as a minimum, the following data:
.1 Project name and project number.
.2 Building name, address and specific room or area where hot work will be performed.
.3 Date when permit issued.
.4 Description of hot work type to be performed.
.5 Special precautions required, including type of fire extinguisher needed.
.6 Name and signature of person authorized to issue the permit.
.7 Name of worker (clearly printed) to which the permit is being issued.
.8 Time Duration that permit is valid (not to exceed 8 hours). Indicate start time and date, and completion time and date.
.9 Worker signature with date and time upon hot work termination.
.10 Specified time period requiring safety watch.

.11 Name and signature of designated Fire Safety Watcher, complete with time and date when safety watch terminated, certifying that surrounding area was under continual surveillance and inspection during the full watch time period specified in Permit and commenced immediately upon completion of Hot Work.

.2 Permit to be typewritten form. Industry Standard forms shall only be used if all data specified above is included on form.

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

1.10 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.

1.1 SECTION INCLUDES

.1 Procedures to isolate and lockout electrical facility or other equipment from energy source.

1.2 RELATED WORK

.1 Section 01 35 24 - Fire Safety Requirements.

.2 Section 01 35 29 - Health and Safety Requirements.

1.3 REFERENCES

.1 C22.1-06 - Canadian Electrical Code, Part 1, Safety Standard for Electrical Installations.

.2 CAN/CSA C22.3 No. 1-10 - Overhead Systems.

.3 CAN/CSA C22.3 No. 7-10 - Underground Systems.

.4 COSH, Canada Occupational Health and Safety Regulations made under Part II of the Canada Labour Code.

1.4 DEFINITIONS

.1 Electrical Facility: means any system, equipment, device, apparatus, wiring, conductor, assembly or part thereof that is used for the generation, transformation, transmission, distribution, storage, control, measurement or utilization of electrical energy, and that has an amperage and voltage that is dangerous to persons.

.2 Guarantee of Isolation: means a guarantee by a competent person in control or in charge that a particular facility or equipment is isolated.

.3 De-energize: in the electrical sense, that a piece of equipment is isolated and grounded, e.g. if the equipment is not grounded, it cannot be considered de-energized (DEAD).

.4 Guarded: means that an equipment or facility is covered, shielded, fenced, enclosed, inaccessible by location, or otherwise protected in a manner that, to the extent that is reasonably practicable, will prevent or reduce danger to any person who might touch or go near such item.

.5 Isolate: means that an electrical facility, mechanical equipment or machinery is separated or disconnected from every source of electrical, mechanical, hydraulic, pneumatic or other kind of energy that is capable of making it dangerous.

.6 Live/alive: means that an electrical facility produces, contains, stores or is electrically connected to a source of alternating or direct current of an amperage and voltage that is dangerous or contains any hydraulic, pneumatic or other kind of energy that is capable of making the facility dangerous to persons.

1.5 COMPLIANCE REQUIREMENTS

.1 Perform lockouts in compliance with:
.1 Canadian Electrical Code.
.2 Federal and Provincial Occupational Health and Safety Acts and Regulations as specified in Section 01 35 29.
.3 Regulations and code of practice as applicable to mechanical equipment or other machinery being de-energized.
.4 Procedures specified herein.

.2 In event of conflict between any provisions of above authorities the most stringent provision will apply. Should a dispute arise in determining the most stringent requirement, Departmental Representative will advise on the course of action to be followed.

1.6 SUBMITTALS

.1 Submit copy of proposed Lockout Procedures and sample form of lockout permit or lockout tags for review.

.2 Submit documentation within 7 calendar days of acceptance of bid. Do not proceed with work until submittal has been reviewed by Departmental Representative.

.3 Submit above documents in accordance with the submittal requirements specified in Section 01 33 00.

.4 Resubmit Lockout Procedures with noted revisions as may result from Departmental Representative's review.

1.7 ISOLATION OF EXISTING SERVICES

.1 Obtain Departmental Representative's written authorization prior to conducting work on an existing active, energized service or facility required as part of the work and before proceeding with lockout of such services or facility.

.2 To obtain authorization, submit to Departmental Representative the following documentation:
.1 Written Request for Isolation of the service or facility and;
.2 Copy of Contractor's Lockout Procedures.

.3 Make a Request for Isolation for each event, unless directed otherwise by Departmental Representative, and as follows:
.1 Fill-out standard forms in current use at the Facility when so directed by Departmental Representative or;
.2 Where no form exist at Facility, make request in writing identifying:
.1 Identification of system or equipment to be isolated, including its location;
.2 Time duration, indicating Start time and date, and Completion time and date when isolation will be in effect;
.3 Voltage of service feed to system or equipment being

isolated;

.4 Name of person making the request.

.3 Document to be in typewritten format.

.4 Do not proceed until receipt of written notification from Departmental Representative granting the Isolation Request and authorization to proceed with the isolation of designated equipment or facility. Departmental Representative may designate other individual at the Facility as the person authorized to grant the Isolation Request.

.5 Conduct safe, orderly shut down of equipment or facilities, de-energize and isolate power and other sources of energy and lockout items in accordance with requirement of clause 1.8 below.

.6 Plan and schedule shut down of existing services in consultation with the Departmental Representative and the Facility Manager. Minimize impact and downtime of facility operations.

.7 Determine in advance, as much as possible, in cooperation with the Departmental Representative, the type and frequency of situations which will require a Request for Isolation. Follow Departmental Representative's directives in this regard.

.8 Conduct hazard assessment as part of the planning process of isolating existing equipment and facilities. Hazard Assessments to conform with requirements of Health and Safety Section 01 35 29.

1.8 LOCKOUTS

.1 Isolate and lockout electrical facilities, mechanical equipment and machinery from all potential energy sources prior to starting work on such items.

.2 Develop and implement lockout procedures to be followed on site as an integral part of the Work.

.3 Use energy isolation lockout devices specifically designed and appropriate for type of facility or equipment being locked out.

.4 Use industry standard lockout tags.

.5 Provide appropriate safety grounding and guards as required.

.6 Prepare Lockout Procedures in writing. Describe safe work practices, work functions and sequence of activities to be followed on site to safely isolate all potential energy sources and lockout/tagout facilities and equipment.

.7 Include within procedures a system of worker request and issuance of individual lockout permit by a person, employed by Contractor, designated to be "in-charge" and being responsible for:

.1 Controlling issuance of permits or tags to workers.
.2 Determining permit duration.
.3 Maintaining record of permits and tags issued.
.4 Submitting a Request for Isolation to Departmental Representative when required in accordance with Clause 1.7 above.
.5 Designating a Safety Watcher, when one is required based on type of work.
.6 Ensuring equipment or facility has been properly isolated, providing a Guarantee of Isolation to worker(s) prior to proceeding with work.
.7 Collecting and safekeeping lockout tags, returned by workers, as a record of the event.

.8 Clearly establish, describe and allocate, within procedures, the responsibilities of:
.1 Workers.
.2 Designated person controlling issuance of lockout tags/permits.
.3 Safety Watcher.
.4 Subcontractors and General Contractor.

.9 Procedures shall meet the requirements of Codes and Regulations specified in clause 1.5 above.

.10 Generic procedures, if used, must be edited, supplemented with pertinent information and tailored to reflect specific project conditions. Clearly label as being the procedures applicable to this contract.
.1 Incorporate site specific rules and procedures established by Facility Manager and in force at site. Obtain such procedures through Departmental Representative.

.11 Procedures to be in typewritten format.

.12 Submit copy of Lockout Procedures to Departmental Representative, in accordance with submittal requirements of clause 1.6 herein, prior to commencement of work.

1.9 CONFORMANCE

.1 Ensure that lockout procedures, as established for project on site, are stringently followed. Enforce use and compliance by all workers.

.2 Brief all persons working on electrical facilities, mechanical and other equipment fed by an energy source on requirements of this section.

.3 Failure to perform lockouts in accordance with regulatory requirements or follow procedures specified herein may result in the issuance of a Non-Compliance Notification at Departmental Representative's discretion with possible disciplinary measures

imposed as specified in Section 01 35 29.

1.10 DOCUMENTS ON SITE

.1 Post Lockout Procedures on site in common location for viewing by workers.

.2 Keep copies of Request for Isolation submitted to Departmental Representative and lockout permits or tags issued to workers during the course of work for full project duration.

.3 Upon request, make such data available to Departmental Representative or to authorized safety representative for inspection.

1.1 RELATED WORK

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

.2 Section 01 35 25 - Special Procedures on Lockout Requirements.

1.2 DEFINITIONS

.1 COSH: Canada Occupational Health and Safety Regulations made under Part II of the Canada Labour Code.

.2 Competent Person: means a person who is:

.1 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 Knowledgeable about potential or actual danger to health or safety associated with the Work.

.3 Medical Aid Injury: any minor injury for which medical treatment was provided and the cost of which is covered by Workers' Compensation Board of the province in which the injury was incurred.

.4 PPE: personal protective equipment.

.5 Work Site: where used in this section shall mean areas, located at the premises where Work is undertaken, used by Contractor to perform all of the activities associated with the performance of the Work.

1.3 SUBMITTALS

.1 Make submittals in accordance with Section 01 33 00.

.2 Submit site-specific Health and Safety Plan prior to commencement of Work.

.1 Submit within 10 work days of notification of Bid Acceptance. Provide 3 copies.

.2 Departmental Representative will review Health and Safety Plan and provide comments.

.3 Revise the Plan as appropriate and resubmit within 5 work days after receipt of comments.

.4 Departmental Representative's review and comments made of the Plan shall not be construed as an endorsement, approval or implied warranty of any kind by Canada and does not reduce Contractor's overall responsibility for Occupational Health and Safety of the Work.

.5 Submit revisions and updates made to the Plan during the course of Work.

.3 Submit name of designated Health & Safety Site Representative and support documentation specified in the Safety Plan.

.4 Submit building permit, compliance certificates and other permits obtained.

.5 Submit copy of Letter in Good Standing from Provincial Workers Compensation or other department of labour organization.
.1 Submit update of Letter of Good Standing whenever expiration date occurs during the period of Work.

.6 Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.

.7 Submit copies of incident reports.

.8 Submit WHMIS MSDS - Material Safety Data Sheets.

1.4 COMPLIANCE REQUIREMENTS

.1 Comply with the Occupational Health and Safety Act for the Province of Newfoundland and Labrador, and the Occupational Health and Safety Regulations made pursuant to the Act.

.2 Comply with Canada Labour Code Part II, (entitled Occupational Health and Safety) and the Canada Occupational 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/
.2 COSH can be viewed at:
www.http://laws.justice.gc.ca/eng/SOR-86-304/ne.html.
.3 A copy may be obtained at: Canadian Government Publishing Public Works & Government Services Canada Ottawa, Ontario, K1A 0S9 Tel: (819) 956-4800 (1-800-635-7943) Publication No. L31-85/2000 E or F).

.3 Observe construction safety measures of:
.1 Part 8 of National Building Code.
.2 Municipal by-laws and ordinances.

.4 In case of conflict or discrepancy between any specified requirements, the more stringent shall apply.

.5 Maintain Workers Compensation Coverage in good standing for duration of Contract. Provide proof of clearance through submission of Letter of Good Standing.

.6 Medical Surveillance: Where prescribed by legislation or regulation, obtain and maintain worker medical surveillance documentation.

1.5 RESPONSIBILITY

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

.1 Departmental Representative will provide names of those persons authorized by Departmental Representative to enter onto Work Site and will ensure that such authorized persons have the required knowledge and training on Health and Safety pertinent to their reason for being at the site, however, Contractor remains responsible for the health and safety of authorized persons while at the Work Site.

.2 Isolate Work Site from other areas of the premises by use of appropriate means.

.1 Erect fences, hoarding, barricades and temporary lighting as required to effectively delineate the Work Site, stop non-authorized entry, and to protect pedestrians and vehicular traffic around and adjacent to the Work and create a safe environment.

.2 Post signage at entry points and other strategic locations indicating restricted access and conditions for access.

.3 Use professionally made signs with bilingual message in the 2 official languages or international known graphic symbols.

.3 Provide safety orientation session to persons granted access to Work Site. Advise of hazards and safety rules to be observed while on site.

.4 Ensure persons granted site access wear appropriate PPE. Supply PPE to inspection authorities who require access to conduct tests or perform inspections.

.5 Secure Work Site against entry when inactive or unoccupied and to protect persons against harm. Provide security guard where adequate protection cannot be achieved by other means.

1.7 PROTECTION

.1 Give precedence to safety and health of persons and protection of environment over cost and schedule considerations for Work.

.2 Should unforeseen or peculiar safety related hazard or condition become evident during performance of Work, immediately take

measures to rectify situation and prevent damage or harm. Advise Departmental Representative verbally and in writing.

1.8 FILING OF NOTICE

.1 File Notice of Project with pertinent provincial health and safety authorities prior to beginning of Work.
.1 Departmental Representative will assist in locating address if needed.

1.9 PERMITS

.1 Post permits, licenses and compliance certificates, specified in section 01 10 10, at Work Site.

.2 Where 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.

1.10 HAZARD ASSESSMENTS

.1 Perform site specific health and safety hazard assessment of the Work and its site.

.2 Carryout initial assessment prior to commencement of Work with further assessments as needed during progress of work, including when new trades and subcontractors arrive on site.

.3 Record results and address in Health and Safety Plan.

.4 Keep documentation on site for entire duration of the Work.

1.11 PROJECT/SITE CONDITIONS

.1 The following are known or potential project related safety hazards at site:

- .1 Working in close proximity of water.
- .2 Use of water crafts and floating platforms.
- .3 Wet and slippery conditions.
- .4 Inclement weather.
- .5 Heavy equipment activity.
- .6 Heavy lifting.
- .7 Working at heights.
- .8 Cutting tools and other construction power tools.
- .9 Overhead power/utility lines.
- .10 Risk of electric shock.
- .11 Vehicular and pedestrian traffic.
- .12 Confined spaces.

.2 Above items shall not be construed as being complete and inclusive of potential health, and safety hazards encountered during work.

.3 Include above items into hazard assessment process.

.4 MSDS Data sheets of pertinent hazardous and controlled products

stored on site can be obtained from Departmental Representative.

1.12 MEETINGS

.1 Attend pre-construction health and safety meeting, convened and chaired by Departmental Representative, prior to commencement of Work, at time, date and location determined by Departmental Representative. Ensure attendance of:
.1 Superintendent of Work.
.2 Designated Health & Safety Site Representative.
.3 Subcontractors.

.2 Conduct regularly scheduled tool box and safety meetings during the Work in conformance with Occupational Health and Safety regulations.

.3 Keep documents on site.

1.13 HEALTH AND SAFETY PLAN

.1 Prior to commencement of Work, develop written Health and Safety Plan specific to the work. Implement, maintain, and enforce Plan for entire duration of Work and until final demobilization from site.

.2 Health and Safety Plan shall include the following components:
.1 List of health risks and safety hazards identified by hazard assessment.
.2 Control measures used to mitigate risks and hazards identified.
.3 On-site Contingency and Emergency Response Plan as specified below.
.4 On-site 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 Names, competence and reporting relationship of other supervisory personnel used in the Work for occupational health and safety purposes.

.3 On-site Contingency and Emergency Response Plan shall include:
.1 Operational procedures, evacuation measures and communication process to be implemented in the event of an emergency.
.2 Evacuation Plan: site and floor plan layouts showing escape routes, marshaling areas. Details on alarm notification methods, fire drills, location of fire fighting equipment and other related data.
.3 Name, duties and responsibilities of persons designated as Emergency Warden(s) and deputies.
.4 Emergency Contacts: name and telephone number of officials from:
.1 General Contractor and subcontractors.
.2 Pertinent Federal and Provincial Departments and Authorities having jurisdiction.
.3 Local emergency resource organizations.
.5 Harmonize Plan with Facility's Emergency Response and Evacuation Plan. Departmental Representative will provide pertinent data including

name of DFO and Facility Management contacts.

.4 On-site Communication Plan:
.1 Procedures for sharing of work related safety information to workers and subcontractors, including emergency and evacuation measures.
.2 List of critical work activities to be communicated with Facility Manager which have a risk of endangering health and safety of Facility users.

.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 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.

.2 Conduct Formal Inspections on a minimum monthly basis. Use standardized safety inspection forms. Distribute to subcontractors.

.3 Follow-up and ensure corrective measures are taken.

.6 Cooperate with Facility's Occupational Health and Safety representative should one be designated by Departmental Representative.

.7 Keep inspection reports and supervision related documentation on site.

1.15 TRAINING

.1 Use only skilled workers on Work Site who are effectively trained in occupational health and safety procedures and practices pertinent to their assigned task.

.2 Maintain employee records and evidence of training received. Make data available to Departmental Representative upon request.

.3 When unforeseen or peculiar safety-related hazard, or condition occur during performance 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.

1.16 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.

1.17 COORECTION OF NON-COMPLIANCE

.1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Departmental Representative.

.2 Provide Departmental Representative with written report of action taken to correct non-compliance of health and safety issues identified.

.3 Departmental Representative will stop Work if non-compliance of health and safety regulations is not corrected in a timely manner.

1.18 INCIDENT REPORTING

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

.2 Submit report in writing.

1.19 HAZARDOUS PRODUCTS

.1 Comply with requirements of Workplace Hazardous Materials Information System WHMIS).

.2 Keep MSDS data sheets for all products delivered to site.
- .1 Post on site.
- .2 Submit copy to Departmental Representative.

1.20 BLASTING

.1 Blasting or other use of explosives is not permitted on site without prior receipt of written permission and instructions from Departmental Representative.

.2 Do blasting operations in accordance with local and provincial codes.

1.21 POWDER ACTUATED DEVICES

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

1.22 CONFINED SPACES

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

.2 Obtain an Entry Permit in accordance with Part XI of the Canada Occupational Health and Safety Regulations for entry into an existing identified confined space located at the Facility or premises of Work.
- .1 Obtain permit from Facility Manager
- .2 Keep copy of permit issued.
- .3 Safety for Inspectors:
  - .1 Provide PPE and training to Departmental Representative and other persons who require entry into confined space to perform inspections.

.2 Be responsible for efficacy of equipment and safety of persons during their entry and occupancy in the confined space.

1.23 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.

1.24 POSTING OF DOCUMENTS

.1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on Work Site in accordance with Acts and Regulations of Province having jurisdiction.

.2 Post other documents as specified herein, including:
.1 Site specific Health and Safety Plan.
.2 WHMIS data sheets.

1.25 DIVING OPERATIONS

.1 All diving work to comply fully with the requirements of CSA Z275.2-04, "Occupational Safety Code for Diving Operations", CSA Z275.4-02, "Competency Standards for Diving Operations "and CSA Z180.1-00,"Compressed Breathing Air and Systems."

.2 Dive personnel must meet the minimum competency requirements of the CSA Z275.4-02 (R2008) and all divers must possess a valid Category 1 Diving Certificate or an Unrestricted Surface-supplied Certificate.

.3 Diving in free-swim mode is not permitted at the work site.

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

1.1 RELATED WORK	.1	Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
1.2 DEFINITIONS	.1	Hazardous Material: Product, substance, or organism that is used for its original purpose; and that is either dangerous goods or a material that may cause adverse impact to the environment or adversely affect health of persons, animals, or plant life when released into the environment.
1.3 FIRES	.1	Fires and burning of rubbish on site not permitted.
1.4 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 21.
	.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. Carryout 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 methods and undertake construction practices which will minimize waste and optimize use of construction materials. Separate at source all construction waste materials, demolition debris and product packaging and delivery containers into various waste categories in order to maximize recycling abilities of various materials and avoid disposal of debris at landfill site(s) in a "mixed state". Where recycling firms, specializing in recycling of specific materials exist, transport such materials to the recycling facility and avoid disposal at landfill sites.
	.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.
1.5 DRAINAGE	.1	Provide temporary drainage and pumping as necessary to keep excavations and site free from water.
	.2	Do not pump water containing suspended materials into waterways, sewer or drainage systems.

.3 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with governing regulations and requirements.

.4 Pumped water must meet applicable federal, provincial, and municipal standards before it can be discharged to a surface water body. If regulatory guidelines exceedences are noted, the Departmental Representative has the right to issue stop pumping instructions to the Contractor. Contractor will not be compensated for any delays associated with retrofitting equipment to meet guidelines.

.5 Provide control devices such as filter fabrics, sediment traps and settling ponds to control drainage and prevent erosion of adjacent lands. Maintain in good order for duration of work.

1.6 PERMITS

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

1.7 WORK ADJACENT TO WATERWAYS

.1 Do not operate construction equipment in waterways.

.2 Do not use waterway beds for borrow material.

.3 Do not dump excavated fill, waste material or debris in waterways.

.4 At borrow sites, design and construct temporary crossings to minimize erosion to waterways in strict conformance with provincial and federal environmental regulations.

.5 Do not skid logs or construction materials across waterways.

.6 Avoid indicated spawning beds when constructing temporary crossings of waterways.

.7 Do not blast within 100 m of spawning beds.

.8 Do not refuel any type of equipment within 100 m of a water body. Maintain equipment in good working condition with no fluid leaks, loose hoses or fittings.

1.8 POLLUTION CONTROL

.1 Maintain temporary erosion and pollution control features installed under this contract. Use turbidity curtain if directed by the Regulatory Authorities.

.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 the 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.

.8 Provide a floating debris containment boom whenever any of the Contractors methods of work allow for the potential of floating debris.

1.9 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.

1.1 SECTION INCLUDES

.1 Inspection and testing, administrative and enforcement requirements.

.2 Tests and mix designs.

.3 Mill tests.

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 78 00 - Closeout Submittals.

1.3 INSPECTION

.1 Facilitate Departmental Representative's access to Work. If part of Work is being fabricated at locations other than construction site, make preparations to allow access to such Work whenever it is in progress.

.2 Give timely notice requesting inspection of Work designated for special tests, inspections or approvals by Departmental Representative or by inspection authorities having jurisdiction.

.3 If Contractor covers or permits to be covered Work designated for special tests, inspections or approvals before such is made, uncover Work until particular inspections or tests have been fully and satisfactorily completed and until such time as Departmental Representative gives permission to proceed. Pay costs to uncover and make good such Work.

.4 In accordance with the General Conditions, Departmental Representative may order any part of Work to be examined if Work is suspected to be not in accordance with Contract Documents.

1.4 INDEPENDENT INSPECTION AGENCIES

.1 Departmental Representative may engage and pay for service of Independent Inspection and Testing Agencies for purpose of inspecting and testing portions of Work except for the following which remain part of Contractor's responsibilities:

.1 Inspection and testing required by laws, ordinances, rules, regulations or orders of public authorities.

.2 Inspection and testing performed exclusively for Contractor's convenience.

.3 Testing, adjustment and balancing of conveying systems, mechanical and electrical equipment and systems.

.4 Mill tests and certificates of compliance.

.5 Tests as specified within various sections designated to be carried out by Contractor under the supervision of Departmental Representative.

.6 Additional tests specified in Clause 1.4.2.

.2 Where tests or inspections by designated Testing Agency reveal work not in accordance with contract requirements, Contractor shall pay costs for additional tests or inspections as Departmental Representative may require to verify acceptability of corrected work.

.3 Employment of inspection and testing agencies by Departmental Representative does not relax responsibility to perform Work in accordance with Contract Documents.

1.5 ACCESS TO WORK

.1 Furnish labour and facility to provide access to the work being inspected and tested.

.2 Co-operate to facilitate such inspections and tests.

.3 Make good work disturbed by inspections and tests.

1.6 PROCEDURES

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

.2 Submit representative samples of materials specified to be tested. Deliver in required quantities to Testing Agency. Submit with reasonable promptness and in an orderly sequence so as not to cause delay in Work.

.3 Provide labour and facilities to obtain and handle samples on site. Provide sufficient space on site for Testing Agency's exclusive use to store equipment and cure test samples.

1.7 REJECTED WORK

.1 Remove and replace defective Work, whether result of poor workmanship, use of defective or damaged products and whether incorporated in Work or not, which has been identified by Departmental Representative as failing to conform to Contract Documents.

.2 Make good damages to existing or new work, including work of other Contracts, resulting from removal or replacement of defective work.

1.8 TESTING BY CONTRACTOR

.1 Provide all necessary instruments, equipment and qualified personnel to perform tests designated as Contractor's responsibilities herein or elsewhere in the Contract Documents.

.2 At completion of tests, turn over 2 copies of fully documented test reports to Departmental Representative.

.3 Submit mill test certificates and other certificates as specified in

various sections.

.4 Furnish test results and mix designs as specified in various sections.

1.1 ACCESS

.1 Provide and maintain adequate access to project site.

.2 Maintain access roads for duration of contract and make good damage resulting from Contractors' use of roads.

1.2 CONTRACTOR'S SITE OFFICE

.1 Be responsible for and provide own site office, if required, including electricity, heat, lights and telephone. Locate site office as directed by Departmental Representative.

1.3 DEPARTMENTAL REPRESENTATIVE'S SITE OFFICE

.1 Provide or construct a separate site office for the use of the Departmental Representative and the Site Representative. The building must be in place prior to commencement of work.

.2 Provide heating system to maintain 22°C inside temperature at -20°C outside temperature.

.3 The building will be approximately 2400 mm x 3600 mm. It will have a suitable frame covered with a weatherproof siding and lined with plywood or other approved material. The floor will be of 19 mm thick material. It will be provided with suitable window with at least 1 m² of glass and arranged to provide at least 0.5 m² of screened opening. The door will be fitted with a lockset and 2 keys.

.4 The office will be equipped with a drafting chair and a 900 mm x 1500 mm table having a hinged, smooth wooden top suitable for drafting.

.5 Install electrical lighting system to provide minimum 750 lux using surface mounted, shielded commercial fixtures with 10% upward light component.

.6 Maintain office in clean condition.

.7 Arrange and pay for telephone and facsimile machine in the Departmental Representative's Office for Site Representative's exclusive use. Long distance calls or faxes placed on this phone by the Departmental Representative or the Site Representative, as part of normal monitoring activities will be paid by the Contractor.

.8 Contractor may, on approval of Departmental Representative, provide cellular or mobile phone. If approval to use cellular or mobile phone is granted, be responsible for all services, airtime, license and network access fees, and all other fees or charges required to utilize the phone as intended by the manufacturer.

1.4 SANITARY FACILITIES

.1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.

.2 Post notices and take such precautions as required by local health authorities. Keep area and premises in sanitary condition.

1.5 POWER

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

.2 Supply and install all temporary facilities for power such as pole lines and underground cables to approval of local power supply authority.

1.6 WATER SUPPLY

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

1.7 SCAFFOLDING

.1 Design, construct and maintain scaffolding in rigid, secure and safe manner in accordance with CSA797-09.

.2 Erect scaffolding independent of walls. Remove when no longer required.

1.8 CONSTRUCTION SIGN AND NOTICES

.1 Contractor or subcontractor advertisement signboards are not permitted on site.

.2 Only notices of safety or instructions are permitted on site.

.3 Safety and Instruction Signs and Notices:
.1 Signs and notices for safety and instruction shall be in both official languages.

.4 Maintenance and Disposal of Site Signs:
.1 Maintain approved signs and notices in good condition for duration of project and dispose of off site on completion of project or earlier if directed by Departmental Representative.

1.9 REMOVAL OF TEMPORARY FACILITIES

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

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Barriers.

.2 Traffic Controls.

1.2 INSTALLATION AND REMOVAL

.1 Provide temporary controls in order to execute work expeditiously.

.2 Remove from site all such work after use.

1.3 HOARDING

.1 Erect temporary site enclosure using new 1.2 m high snow fence wired to rolled steel "T" bar fence posts spaced at 2.4 m centres. Provide one lockable truck gate. Maintain fence in good repair.

1.4 GUARD RAILS AND BARRICADES

.1 Provide secure, rigid guard rails and barricades around open excavations.

.2 Provide barricades along wharf structure when wheelguard is removed.

.3 Provide as required by governing authorities.

1.5 ACCESS TO SITE

.1 Provide and maintain access to adjacent harbour facilities.

1.6 PUBLIC TRAFFIC FLOW

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

1.7 FIRE ROUTES

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

1.8 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

.1 Protect surrounding private and public property from damage during performance of work.

.2 Be responsible for damage incurred.

1.1 GENERAL

.1 Use new material and equipment unless otherwise specified.

.2 Within 7 days of written request by Departmental Representative, submit following information for any materials and products proposed for supply:

.1 name and address of manufacturer;
.2 trade name, model and catalogue number;
.3 performance, descriptive and test data;
.4 manufacturer's installation or application instructions;
.5 evidence of arrangements to procure.
.6 evidence of manufacturer delivery problems or unforseen 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.

1.2 PRODUCT QUALITY AND REFERENCED STANDARDS

.1 Contractor shall be solely responsible for submitting relevant technical data and independent test reports to confirm whether a product or system proposed for use meets contract requirements and specified standards.

.2 Final decision as to whether a product or system meets contract requirements rest solely with the Departmental Representative in accordance with the General Conditions.

1.3 ACCEPTABLE MATERIALS AND ALTERNATIVES

.1 Acceptable Materials: When materials specified include trade names or trade marks or manufacturer's or supplier's name as part of the material description, select and only use one of the names listed for incorporation into the Work.

.2 Alternative Materials: Submission of alternative materials to trade names or manufacturer's names specified must be done during the bidding period following procedures indicated in the Instructions to Bidders.

.3 Substitutions: After acceptance of bid, substitution of a specified material will be dealt with as a change to the Work in accordance with the General Conditions of the Contract.

1.4 MANUFACTURERS INSTRUCTIONS

.1 Unless otherwise specified, comply with manufacturer's latest printed instructions for materials and installation methods to be used. Do not rely on labels or enclosure provided with products. Obtain written instructions directly from manufacturers.

.2 Notify Departmental representative in writing of any conflict between these specifications and manufacturers instructions, so that Departmental Representative will designate which document is to be followed.

1.5 AVAILABILITY

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

1.6 WORKMANSHIP

.1 Ensure quality of work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed.

.2 Remove unsuitable or incompetent workers from site as stipulated in General Conditions.

.3 Ensure cooperation of workers in laying out work. Maintain efficient and continuous supervision on site at all times.

.4 Coordinate work between trades and subcontractors.

.5 Coordinate placement of openings, sleeves and accessories.

1.7 FASTENINGS - GENERAL

.1 Provide metal fastenings and accessories in same texture, colour and finish as base metal in which they occur. Prevent electrolytic action between dissimilar metals. Use non-corrosive fasteners, anchors and spacers for securing exterior work and in humid areas.

.2 Space anchors within limits of load bearing or shear capacity and ensure that they provide positive permanent anchorage. Wood or organic material plugs not acceptable.

.3 Keep exposed fastenings to minimum, space evenly and lay out neatly.

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

.5 Do not use explosive actuated fastening devices unless approved by

Departmental Representative. See Section 01 35 29 on Health and Safety in this regard.

1.8 FASTENINGS - EQUIPMENT

.1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.

.2 Use heavy hexagon heads, semi-finished unless otherwise specified.

.3 Bolts may not project more than one diameter beyond nuts.

.4 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur and, use resilient washers with stainless steel.

1.9 STORAGE, HANDLING AND PROTECTION

.1 Deliver, handle and store materials in manner to prevent deterioration and soiling and in accordance with manufacturer's instructions when applicable.

.2 Store packaged or bundled materials in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work. Provide additional cover where manufacturer's packaging is insufficient to provide adequate protection.

.3 Store products subject to damage from weather in weatherproof enclosures.

.4 Store cementitious products clear of earth or concrete floors, and away from walls.

.5 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.

.6 Store sheet materials and lumber on flat, solid supports and keep clear of ground. Slope to shed moisture.

.7 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.

.8 Immediately remove damaged or rejected materials from site.

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

1.10 CONSTRUCTION

.1 On request, prove to the satisfaction of Departmental Representative

EQUIPMENT AND PLANT

that the construction equipment and plant are adequate to manufacture, transport, place and finish work to quality and production rates specified. If inadequate, replace or provide additional equipment or plant as directed.

.2 Maintain construction equipment and plant in good operating order. Prevent oil and other contaminant leaks. Should any contaminant leak onto ground or into the water, take immediate and appropriate measures to contain, cleanup and dispose in an environmentally responsible manner.

PART 1 - GENERAL

1.1 GENERAL	.1	Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.
	.2	Store volatile waste in covered metal containers, and remove from premises at end of each working day.
	.3	Prevent accumulation of wastes which create hazardous conditions. 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. Remove waste materials and debris from site on a daily basis.
1.4 FINAL CLEANING	.1	In preparation for acceptance of the Work perform final cleaning.
	.2	Inspect finishes, fitments and equipment. Ensure specified workmanship and operation.
	.3	Broom clean exterior paved and concrete surfaces; rake clean other surfaces of grounds.

1.1 RELATED SECTIONS

.1 Section 01 35 43 - Environment Procedures.

1.2 WASTE MANAGEMENT PLAN

.1 Prior to commencement of work, prepare waste Management Workplan.

.2 Workplan to include:
.1 Waste audit.
.2 Waste reduction practices.
.3 Material source separation process.
.4 Procedures for sending recyclables to recycling facilities.
.5 Procedures for sending non-salvageable items and waste to approved waste processing facility or landfill site.
.6 Training and supervising workforce on waste management at site.

.3 Workplan to incorporate waste management requirements specified herein and in other sections of the Specifications.

.4 Develop Workplan in collaboration with all subcontractors to ensure all waste management issues and opportunities are addressed.

.5 Submit copy of Workplan to Departmental Representative for review and approval.
.1 Make revisions to Plan as directed by Departmental Representative.

.6 Implement and manage all aspects of Waste Management Workplan for duration of work.

.7 Revise Plan as work progresses addressing new opportunities for diversion of waste from landfill.

1.3 WASTE AUDIT

.1 At project start-up, conduct waste audit of:
.1 Site conditions identifying salvageable and non-salvageable items and waste resulting from demolition and removal work.
.2 Projected waste resulting from product packaging and from material leftover after installation work.

.2 Develop written list. Record type, composition and quantity of various salvageable items and waste anticipated, reasons for waste generation and operational factors which contribute to waste.

1.4 WASTE REDUCTION

.1 Based on waste audit, develop waste reduction program.

.2 Structure program to prioritize actions, with waste reduction as first priority, followed by salvage and recycling effort, then disposal as solid waste.

.3 Identify materials and equipment to be:
.1 Protected and turned over to Departmental Representative when indicated.
.2 Salvaged for resale by Contractor.
.3 Sent to recycling facility.
.4 Sent to waste processing/landfill site for their recycling effort.
.5 Disposed of in approved landfill site.

.4 Reduce construction waste during installation work. Undertake practices which will minimize waste and optimize full use of new materials on site, such as:
.1 Use of a central cutting area to allow for easy access to off-cuts;
.2 Use of off-cuts for blocking and bridging elsewhere.
.3 Use of effective and strategically placed facilities on site for storage and staging of left-over or partially cut materials to allow for easy incorporation into work whenever possible avoiding unnecessary waste.

.5 Develop other strategies and innovative procedures to reduce waste such as minimizing the extent of packaging used for delivery of materials to site, etc.

1.5 MATERIAL SOURCE SEPARATION PROCESS

.1 Develop and implement material source separation process at commencement of work as part of mobilization and waste management at site.

.2 Provide on-site facilities to collect, handle and store anticipated quantities of reusable, salvageable and recyclable materials.
.1 Use suitable containers for individual collection of items based on intended purpose.
.2 Locate to facilitate deposit but without hindering daily operations of existing building tenants.
.3 Clearly mark containers and stockpiles as to purpose and use.

.3 Perform demolition and removal of existing structure components and equipment following a systematic deconstruction process.
.1 Separate materials and equipment at source, carefully dismantling, labelling and stockpiling alike items for the following purposes:
.1 Reinstallation into the work where indicated.
.2 Salvaging reusable items not needed in project which Contractor may sell to other parties. Sale of such items not permitted on site.
.3 Sending as many items as possible to locally available recycling facility.
.4 Segregating remaining waste and debris into various

individual waste categories for disposal in a "non-mixed state" as recommended by waste processing/landfill sites.

.4 Isolate product packaging and delivery containers from general waste stream. Send to recycling facility or return to supplier/manufacturer.

.5 Send leftover material resulting from installation work for recycling whenever possible.

.6 Establish methods whereby hazardous and toxic waste materials, and their containers, encountered or used in the course work are properly isolated, stored on site and disposed in accordance with applicable laws and regulations from authorities having jurisdiction.

.7 Isolate and store existing materials and equipment identified for re-incorporation into the Work. Protect against damage.

1.6 WORKER TRAINING AND SUPERVISION

.1 Provide adequate training to workforce, through meetings and demonstrations, to emphasize purpose and worker responsibilities in carrying out the Waste Management Plan.

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

.3 Post a copy of Plan in a prominent location on site for review by workers.

1.7 CERTIFICATION OF MATERIAL DIVERSION

.1 Submit to Departmental Representative, copies of certified weigh bills from authorized waste processing sites and sale receipts from recycling/reuse facilities confirming receipt of building materials and quantity of waste diverted from landfill.

.2 Submit data at pre-determined project milestones as determined by Departmental Representative.

.3 Compare actual quantities diverted from landfill with projections made during waste audit.

1.8 DISPOSAL REQUIREMENTS

.1 Burying or burning of rubbish and waste materials is prohibited.

.2 Disposal of waste, volatile materials, mineral spirits, oil, paint, paint thinner or unused preservative material into waterways, storm, or

sanitary sewers is prohibited.

.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.

.5 Dispose of treated wood, end pieces, wood scraps and sawdust at a sanitary landfill.

.6 Dispose of waste only at approved waste processing facility or landfill sites approved by authority having jurisdiction.

.7 Contact the authority having jurisdiction prior to commencement of work, to determine what, if any, demolition and construction waste materials have been banned from disposal in landfills and at transfer stations. Take appropriate action to isolate such banned materials at site of work and dispose in strict accordance with provincial and municipal regulations.

.8 Transport waste intended for landfill in separated condition, following rules and recommendations of Landfill Operator in support of their effort to divert, recycle and reduce amount of solid waste placed in landfill.

.9 Collect, bundle and transport salvaged materials to be recycled in separated categories and condition as directed by recycling facility. Ship materials only to approved recycling facilities.

.10 Sale of salvaged items by Contractor to other parties not permitted on site.

1.1 SECTION INCLUDES

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

1.2 PROJECT RECORD DOCUMENTS

.1 Departmental Representative will provide two white print sets of contract drawings and two copies of Specifications Manual specifically for "as-built" purposes.

.2 Maintain at site one set of the contract drawings and specifications to record actual as-built site conditions.

.3 Maintain up-to-date, real time as-built drawings and specifications in good condition and make available for inspection by the Departmental Representative at any time during construction.

.4 As-Built Drawings:
.1 Record changes in red ink on the prints. Mark only on one set of prints and at completion of project and prior to final inspection, neatly transfer notations to second set (also by use of red ink). Submit both sets to Departmental Representative. All drawings of both sets shall be stamped "As-Built Drawings" and be signed and dated by Contractor.
.2 Show all modifications, substitutions and deviations from what is shown on the contract drawings or in specifications.
.3 Record following information:
.1 Horizontal and vertical location of various elements in relation to Geodetic Datum.
.2 Field changes of dimension and detail.
.3 All design elevations, sections, and details dimensioned and marked-up to consistently report finished installation conditions.
.4 Any details produced in the course of the contract by the Departmental Representative to supplement or to change existing design drawings must also be marked-up and dimensioned to reflect final as-built conditions and appended to the as-built drawing document.
.5 All change orders issued over the course of the contract must be documented on the finished as-built documents, accurately and consistently depicting the changed condition as it applies to all affected drawing details.

.5 As-built Specifications: legibly mark in red each item to record actual construction, including:
.1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly items substituted from that specified.
.2 Changes made by Addenda and Change Orders.

.3 Mark up both copies of specifications; stamp "as-built", sign and date similarly to drawings as per above clause.

.6 Maintain As-built documents current as the contract progresses. Departmental Representative will conduct reviews and inspections of the documents on a regular basis. Frequency of reviews will be subject to Departmental Representative's discretion. Failure to maintain as-builts current and complete to satisfaction of the Departmental Representative shall be subject to financial penalties in the form of progress payment reductions and holdback assessments.

1.3 REVIEWED SHOP DRAWINGS

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

PART 1 GENERAL

1.1 RELATED SECTIONS

.1 Section 03 20 00 - Concrete Reinforcing.

.2 Section 03 30 00 - Cast-in-Place Concrete.

.3 Section 07 92 10 - Joint Sealing

1.2 REFERENCES

.1 Canadian Standards Association (CSA)

- .1 CAN/CSA-A23.1-04, Concrete Materials and Methods of Concrete Construction.
- .2 CAN/CSA-O86-01 (R2006), Engineering Design in Wood (Limit States Design).
- .3 CSA O121-M1978 (R2003), Douglas Fir Plywood.
- .4 CSA O151-04, Canadian Softwood Plywood.
- .5 CSA O153-M1980 (R2003), Poplar Plywood.
- .6 CAN3-O188.0-M78, Standard Test Methods for Mat-Formed Wood Particleboards and Waferboard.
- .7 CSA O437 Series-93 (R2001), Standards for OSB and Waferboard.
- .8 CSA S269.1-1975 (R2003), Falsework for Construction Purposes.
- .9 CAN/CSA-S269.3-M92 (R2003), Concrete Formwork.

1.3 SHOP DRAWINGS

.1 Submit shop drawings for formwork and falsework for Departmental Representative review.

.2 Indicate method and schedule of construction, shoring, stripping and re-shoring procedures, materials, arrangement of joints, special architectural exposed finishes, ties, liners, and locations of temporary embedded parts. Comply with CSA S269.1, for falsework drawings Comply with CAN/CSA-S269.3 for formwork drawings.

.3 Indicate formwork design data, such as permissible rate of concrete placement, and temperature of concrete, in forms.

.4 Indicate sequence of erection and removal of formwork/falsework as directed by Departmental Representative.

PART 2 PRODUCTS

2.1 MATERIALS

.1 Formwork materials:

.1 Use formwork materials to CAN/CSA-A23.1.

.2 Form ties:

.1 Removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25 mm diameter in concrete surface.

.3 Form release agent: non-toxic, chemically active release agents containing compounds that react with free lime present in concrete to provide water insoluble soaps, preventing set of film of concrete in contact with form.

.4 Falsework materials: to CSA-S269.1.

.1 Materials required to bear grade marks, or be accompanied with certificates, test reports or other proof of conformity.

PART 3 EXECUTION

3.1 FABRICATION AND ERECTION

.1 Verify lines, levels and centres before proceeding with formwork/falsework and ensure dimensions agree with drawings.

.2 Obtain Departmental Representative's approval for use of earth forms framing openings not indicated on drawings.

.3 Hand trim sides and bottoms and remove loose earth from earth forms before placing concrete.

.4 Fabricate and erect falsework in accordance with CSA S269.1.

.5 Fabricate and erect formwork in accordance with CAN/CSA-S269.3 to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CAN/CSA-A23.1.

.6 Align form joints and make watertight. Keep form joints to minimum.

.7 Use 25 mm chamfer strips on external corners and/or 25 mm fillets at interior corners, joints, unless specified otherwise.

.8 Build in anchors, sleeves, and other inserts required to accommodate Work where applicable. Assure that all anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.

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

3.2 REMOVAL AND RESHORING

.1 Leave formwork in place for following minimum periods of time after placing concrete.

.1 5 days for slabs and other structural members, or 3 days when replaced immediately with adequate shoring to standard specified for falsework.

.2 Remove formwork when concrete has reached 75% of its design strength or minimum period noted above, whichever comes later, and replace immediately with adequate reshoring.

.3 Provide all necessary reshoring of members where early removal of forms may be required or where members may be subjected to additional loads during construction as required.

.4 Re-use formwork and falsework subject to requirements of CAN/CSA-A23.1.

END OF SECTION

PART 1 GENERAL

1.1 RELATED SECTIONS

.1 Section 03 10 00 - Concrete Forming and Accessories.

.2 Section 03 30 00 - Cast-in-Place Concrete.

1.2 REFERENCES

.1 American Concrete Institute (ACI)

.1 ACI 315R-80, Manual of Engineering and Placing Drawings for Reinforced Concrete Structure.

.2 American National Standards Institute/American Concrete Institute (ANSI/ACI)

.1 ANSI/ACI 315-80, Details and Detailing of Concrete Reinforcement.

.3 Canadian Standards Association (CSA)

.1 CAN/CSA-A23.1-04, Concrete Materials and Methods of Concrete Construction.

.2 CSA-A23.3-04, Design of Concrete Structures for Buildings.

.3 CSA G30.3-M1983(R1998), Cold Drawn Steel Wire for Concrete Reinforcement.

.4 CSA G30.5-M1983(R1998), Welded Steel Wire Fabric for Concrete Reinforcement.

.5 CSA G30.14-M1983(R1998), Deformed Steel Wire for Concrete Reinforcement.

.6 CSA G30.15-M1983(R1991), Welded Deformed Steel Wire Fabric for Concrete Reinforcement.

.7 CAN/CSA-G30.18-M92(R2007), Billet-Steel Bars for Concrete Reinforcement.

.8 CAN/CSA-G40.21-04, Structural Quality Steels.

.9 CAN/CSA-G164-M92 (R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.

.10 CSA W186-M1990 (R2007), Welding of Reinforcing Bars in Reinforced Concrete Construction.

1.3 SHOP DRAWINGS

.1 Submit shop drawings including placing of reinforcement for Departmental Representative review.

.2 Indicate on shop drawings, bar bending details, lists, quantities of reinforcement, sizes, spacings, locations of reinforcement and mechanical splices if approved by Departmental Representative, with identifying code marks to permit correct placement without reference to structural drawings. Indicate sizes, spacings and locations of chairs, spacers

and hangers. Prepare reinforcement drawings in accordance with Reinforcing Steel Manual of Standard Practice - by Reinforcing Steel Institute of Canada. ANSI/ACI 315 and ACI 315R, Manual of Engineering and Placing Drawings for Reinforced Concrete Structure.

PART 2 PRODUCTS

2.1 MATERIALS

.1 Substitute different size bars only if permitted in writing by Departmental Representative.

.2 Reinforcing steel: billet steel, grade 400, deformed bars to CAN/CSA-G30.18, unless indicated otherwise.

.3 Reinforcing steel: weldable low alloy steel deformed bars to CAN/CSA-30.18.

.4 Cold-drawn annealed steel wire ties: to CSA G30.3.

.5 Chairs, bolsters, bar supports, spacers: to CAN/CSA-A23.1.

.6 Mechanical splices: subject to approval of Departmental Representative.

2.2 FABRICATION

.1 Fabricate reinforcing steel in accordance with CAN/CSA-A23.1, ANSI/ACI 315, and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada. ACI 315R, Manual of Engineering and Placing Drawings for Reinforced Concrete Structures unless indicated otherwise.

.2 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.

2.3 SOURCE QUALITY CONTROL

.1 Provide Departmental Representative with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, minimum 2 weeks prior to commencing reinforcing work.

.2 Upon request inform Departmental Representative of proposed source of material to be supplied.

PART 3 EXECUTION

3.1 FIELD BENDING

.1 Do not field bend or field weld reinforcement except where indicated or authorized by Departmental Representative.

.2 When field bending is authorized, bend without heat, applying a slow and steady pressure.

.3 Replace bars which develop cracks or splits.

3.2 PLACING REINFORCEMENT

.1 Place reinforcing steel as indicated on reviewed placing drawings and in accordance with CAN/CSA-A23.1.

.2 Use approved type chairs to locate the reinforcing steel at the proper grade.

.3 Tie reinforcement where spacing in each direction is:

.1 Less than 300 mm: tie at alternate intersections.

.2 300 mm or more: tie at each intersection.

.4 Prior to placing concrete, obtain Departmental Representative's approval of reinforcing material and placement.

.5 Ensure cover to reinforcement is maintained during concrete pour.

3.3 CLEANING

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

END OF SECTION

PART 1 GENERAL

1.1 DESCRIPTION

.1 This section specifies requirements for supply, placing, finishing, protecting and curing cast-in-place concrete for slab on grade and reinforced concrete foundation/wall associated with the new electrical shed. Note that the manhole/electrical pull pit is to be pre-cast concrete, as noted on the drawings.

1.2 RELATED SECTIONS

.1 Section 03 10 00 - Concrete Forming and Accessories.

.2 Section 03 20 00 - Concrete Reinforcing.

1.3 REFERENCES

.1 American Society for Testing and Materials (ASTM)

.1 ASTM C109/C109M-05, Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 in. or 50 mm Cube Specimens).

.2 ASTM C260-06, Specification for Air-Entraining Admixtures for Concrete.

.3 ASTM C494/C494M-05a, Specification for Chemical Admixtures for Concrete.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-51.34-M86, Vapour Barrier, Polyethylene Sheet for Use in Building Construction.

.3 Canadian Standards Association (CSA)

.1 CAN/CSA-A23.1-04, Concrete Materials and Methods of Concrete Construction.

.2 CAN/CSA-A23.2-04, Methods of Test for Concrete.

.3 CSA-A283-06, Qualification Code for Concrete Testing Laboratories.

.4 CAN/CSA-A3000-03 (R2006), Cementitious Materials Compendium (consists of A3001, A3002, A3003, A3004 and A3005).

.1 CSA-A3001-03, Cementitious Materials for Use in Concrete.

1.4 CERTIFICATES

.1 Submit certificates for review by the Departmental Representative.

.2 Minimum 2 weeks prior to starting concrete work submit to Departmental Representative manufacturer's test data and certification by qualified independent inspection and testing laboratory that following materials will meet specified requirements:

.1 Portland cement.

.2 Blended hydraulic cement.
.3 Supplementary cementing materials.
.4 Grout.
.5 Admixtures.
.6 Aggregates.
.7 Water.

.3 Provide certification that mix proportions selected will produce concrete of quality, yield and strength as specified in concrete mixes, and will comply with CAN/CSA-A23.1.

.4 Provide certification that plant, equipment, and materials to be used in concrete comply with requirements of CAN/CSA-A23.1.

1.5 STORAGE OF MATERIALS

.1 Store materials to prevent contamination or deterioration.

.2 Provide adequate storage facilities for materials to ensure a continuous supply of these materials during batching operations.

.3 Store cement in weathertight facility.

1.6 QUALITY ASSURANCE

.1 Minimum 2 weeks prior to starting concrete work, submit proposed quality control procedures to Departmental Representative for the following items:

.1 Cold weather concrete.
.2 Curing.
.3 Finishes.
.4 Formwork removal.
.5 Joints.

PART 2 PRODUCTS

2.1 MATERIALS

.1 Cement: TerC-3 blended hydraulic cement.

.2 Supplementary cementing materials: to CAN/CSA-A3001.

.3 Cementitious hydraulic slag: to CAN/CSA-A3001.

.4 Water: to CAN/CSA-A23.1.

.5 Aggregates: to CAN/CSA-A23.1. Coarse aggregates to be normal density.

.6 Air entraining admixture: to ASTM C260.

.7 Chemical admixtures: to ASTM C494/C494M. Departmental Representative to approve accelerating or set retarding admixtures during cold and hot weather placing.

.8 Concrete retarders: to ASTM C494/C494M. Do not allow moisture of any kind to come in contact with the retarder film.

.9 Curing compound: curing compounds are not to be used.

2.2 MIXES

.1 Proportion concrete in accordance with CAN/CSA-A23.1, Clause 4.3.

.2 Proportion concrete to comply with Alternate 1, Table 2 in CAN/CSA-A23.1 and following requirements:

.1 Cement:

.1 TerC-3 blended hydraulic cement.

.2 Minimum compressive strength: 35 MPa at 28 days.

.3 Class of exposure: C1.

.4 Minimum cement content: 385 kg/m³ of concrete.

.5 20 mm nominal size coarse aggregate.

.6 Air content 5% to 8%.

.7 Density of air-dry concrete in range of 2240 kg/m³ to 2400 kg/m³.

.8 Slump at time and point of discharge 50 mm to 100 mm.

.3 When the Contractor wishes to purchase concrete from a ready mix concrete supplier, submit a letter from the supplier certifying the following:

.1 That plant and equipment is certified and all materials to be used in the concrete comply with the requirements of CAN/CSA-A23.1.

.2 That the mix proportions selected will produce concrete of the specified quality and yield. Indicate mix

.3 That the strengths will comply with the strengths specified herein.

.4 When the Contractor wishes to mix concrete on site, identify the source of aggregates and submit samples of fine and coarse aggregates to a testing laboratory for testing and trial mixes in order to determine a suitable mix design. The testing laboratory, at Contractor's cost, will test the trial mix for slump, air content, density and strength. The results of these tests will be submitted to the Departmental Representative to be reviewed for compliance with the specification. This review must be completed before permission to place concrete is given.

.1 The sand, gravel, water and air entraining agent should be mixed prior to the addition of cement and water reducer.

.5 Weigh aggregates, cement, water and admixture when batching. No alternative methods of measuring will be permitted.

.6 Do not use calcium chloride.

PART 3 EXECUTION

3.1 PREPARATION

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

.2 Pumping of concrete is permitted only after approval of equipment and mix.

.3 Ensure reinforcement and inserts are not disturbed during concrete placement.

.4 Prior to placing of concrete obtain Departmental Representative's approval of proposed method for protection of concrete during placing and curing in adverse weather.

.5 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.

.6 Do not place load upon new concrete until authorized by Departmental Representative.

.7 Insert anchor bolts into foundation wall prior to concrete pour. Anchor bolts to be minimum 300mm long with 150mm long hook into concrete. Anchor bolts to be 13mm in diameter, spaced at 600mm C.C. around perimeter of building. Extend bolt into wall cavity, through bottom sill plate as directed by Departmental Representative.

3.2 CONSTRUCTION

.1 Comply with additional requirements of CAN/CSA-A23.1, Clause 4.1.1.5, for concrete exposed to seawater environments.

.2 Minimum concrete cover over reinforcing steel bars to be 75 mm.

.3 Place concrete in hot weather to CAN/CSA-A23.1.

.4 Place concrete in cold weather to CAN/CSA-A23.1.

.5 Keep concrete surfaces moist continually during protection stage.

.6 Place, consolidate, finish, cure and protect concrete to CAN/CSA-A23.1.

.7 Do not commence placing concrete until Departmental Representative has inspected and approved forms, foundations, reinforcing steel, joints, conveying, spreading, consolidation and finishing equipment and curing and protective methods.

3.3 FORMWORK

.1 Install and strip formwork to CAN/CSA-A23.1.

3.4 INSERTS

.1 Position and secure anchor bolts in formwork to maintain line and grades.

3.5 PLACING CONCRETE

.1 Place, consolidate and finish concrete to CAN/CSA-A23.1.

.2 Do not place concrete on or against frozen material.

.3 Place concrete continuously from joint to joint.

.4 Place concrete in a uniform heading, normal to the centreline. Limit rate of placing to that which can be finished before beginning of initial set.

3.6 PROTECTION AND CURING

.1 Cure to CAN/CSA-A23.1.

.2 Cure concrete by protecting it against loss of moisture, rapid temperature change and mechanical injury for at least 7 days after placement. After finishing operations have been completed, the entire surface of the newly placed concrete shall be covered by whatever curing medium is applicable to local conditions and approved by the Departmental Representative. The edges of concrete slabs exposed by removal of forms shall be protected with continuous curing treatment equal to the method selected for curing the slab and curb surfaces. Cure to CAN/CSA-A23.1. Have the equipment needed for adequate curing at hand and ready to install before actual concrete placement begins.

.3 When air temperature is at or below 5°C or when there is a probability of its falling to that limit within 24 hours of placing (as forecast by the nearest official meteorological office) cold weather protection as per CAN/CSA-A23.1 will be provided and the following:

.1 Housing - Protect concrete by a windproof shelter of canvas or other material to allow free circulation of inside air around fresh touch formwork and provide sufficient space for removal of formwork for finishing. Supply approved heating equipment capable of keeping inside air at a constant temperature sufficiently high to maintain concrete at following curing temperatures.

.1 For initial 3 days at a temperature of not less than 15°C nor more than 27°C at surface.

.2 Maintain concrete at 10°C for an extra 4 days plus the initial 3 days.

.3 In addition to the protective housing, the concrete must be cured as outlined in Clause 3.9.2 above.

3.7 TESTING

.1 Departmental Representative will appoint a concrete testing company to test all work under this section of specification as per CAN/CSA-A23.1.

.2 Cost of compressive strength tests shall be paid for by the Departmental Representative.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCES

.1 All codes and standards referenced in this section refers to the latest edition thereof.

.2 Canadian Standards Association (CSA)

- .1 CSA B111, Wire Nails, Spikes and Staples.
- .2 CSA O121, Douglas Fir Plywood.
- .3 CAN/CSA-O141, Softwood Lumber.
- .4 CAN/CSA-O325.0, Construction Sheathing.

.3 National Lumber Grades Authority (NLGA)

- .1 Standard Grading Rules for Canadian Lumber.

1.2 QUALITY ASSURANCE

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

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

PART 2 PRODUCTS

2.1 FRAMING AND LUMBER MATERIALS - BUILDING

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

- .1 CAN/CSA-O141.
- .2 NLGA Standard Grading Rules for Canadian Lumber.

.2 Framing and board lumber: in accordance with NBC.

.3 Furring, blocking, nailing strips, grounds, rough bucks, fascia backing and sleepers:

- .1 Board sizes: "Standard" or better grade.
- .2 Dimension sizes: "Standard" light framing or better grade.
- .3 Canadian softwood plywood (CSP): to CSA O151, standard construction.

2.2 ACCESSORIES - BUILDING

.1 Sill Gasket: closed cell polyurethane or polyethylene.

.2 General purpose adhesive: to CSA O112 Series.

.3 Nails, spikes and staples: to CSA B111.

.4 Anchor bolts: 13 mm diameter unless indicated otherwise, complete with nuts and washers.

.5 Proprietary fasteners: toggle bolts, expansion shields and lag bolts, screws and lead or inorganic fibre plugs, explosive actuated fastening devices, recommended for purpose by manufacturer.

.6 Roof sheathing H-Clips: formed "H" shape, thickness to suit panel material, type approved by Departmental Representative.

2.3 FASTENER FINISHES

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

PART 3 EXECUTION - BUILDING

3.1 INSTALLATION

.1 Comply with requirements of National Building Code of Canada (NBCC), latest edition, Part 9, supplemented by following paragraphs.

.2 Install members true to line, levels and elevations, square and plumb.

.3 Construct continuous members from pieces of longest practical length.

.4 Install spanning members with "crown-edge" up.

.5 Select exposed framing for appearance. Install lumber and panel materials so that grade marks and other defacing marks are concealed or are removed by sanding where materials are left exposed.

.6 Install roof sheathing in accordance with requirements of NBCC.

.7 Install furring to support siding applied vertically where there is no blocking and where sheathing is not suitable for direct nailing.

3.2 ERECTION

.1 Frame, anchor, fasten, tie and brace members to provide necessary strength and rigidity.

.2 Countersink bolts where necessary to provide clearance for other work.

.3 Use nailing disks for soft sheathing as recommended by sheathing manufacturer.

3.3 SCHEDULES

.1 Roof sheathing:

.1 Plywood, DFP or CSP sheathing grade (SHG), T&G edge, 16 mm thick, unless otherwise indicated.

.2 Exterior wall sheathing:

.1 Plywood, DFP or CSP sheathing grade (SHG), T&G edge, 13 mm thick, unless otherwise indicated.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CAN/CSA-O80 Series-97(R2002), Wood Preservation.

.2 CAN/CSA-O86.1, Engineering Design in Wood.

.3 CAN/CSA-O141-91(R1999), Softwood Lumber.

.4 CSA S307-M1980(R2001), Load Test Procedure for Wood Roof Trusses for Houses and Small Buildings.

.5 CSA S347-99(R2004), Method of Test for Evaluation of Truss Plates Used in Lumber Joints.

.6 CSA W47.1-03, Certification of Companies for Fusion Welding of Steel.

.2 National Lumber Grades Authority (NLGA)

.1 NLGA-03, Standard Grading Rules for Canadian Lumber.

.3 Truss Plate Institute of Canada (TPIC)

.1 TPIC-1996 (R2001), Truss Design Procedures and Specifications for Light Metal Plate Connected Trusses (Limit States Design)

1.2 DESIGN REQUIREMENTS

.1 Design light metal plate connected wood trusses in accordance with TPIC truss design procedures for wood truss chords and webs in accordance with engineering properties in CAN/CSA-O86.

.2 Design light metal plate connected wood trusses in accordance with TPIC truss design procedures for truss joint designs to test engineering properties in accordance with CSA S347 and listed in CCMC Registry of Product Evaluations.

.3 Design trusses, bracing, bridging in accordance with CAN/CSA-O86.1 for building locality as ascertained by NBC, Climatic information for Building Design in Canada and minimum uniform and minimum concentrated loadings stipulated in NBC commentary.

.4 Limit live load deflections to 1/360th of span where gypsum board ceilings are hung directly from trusses.

.5 Limit live load deflections to 1/180th of span unless otherwise specified or indicated.

1.3 QUALITY ASSURANCE

.1 Qualifications

.1 Fabricator for trusses to show evidence of quality control program such as provided by regional wood truss associations, or equivalent.

1.4 SUBMITTALS

.1 Shop Drawings:

.1 Each shop drawing submission to show connection details to be signed and stamped by professional engineer registered or licensed in province of Newfoundland and Labrador, Canada.

.2 Indicate TPIC Truss Design Procedure and CSA O86 Engineering Design in Wood and specific CCMC Product Registry number of the truss plates

.3 Indicate species, sizes, and stress grades of lumber used as truss members. Show pitch, span, camber, configuration and spacing of trusses. Indicate connector types, thicknesses, sizes, locations and design value. Show bearing details. Indicate design load for members.

.4 Submit stress diagram or print-out of computer design indicating design load for truss members. Indicate allowable load and stress increase.

.5 Show location of lateral bracing for compression members.

.6 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

1.5 DELIVERY AND STORAGE

.1 Storage and Protection:

.1 Store trusses on job site in accordance with manufacturer's instructions. Provide bearing supports and bracings. Prevent bending, warping and overturning of trusses.

PART 2 PRODUCTS

2.1 MATERIALS

.1 Lumber: Spruce (S-P-F) species, No. 1 grade, softwood, S4S, with maximum moisture content of 19% at time of fabrication and to following standards:

.1 CAN/CSA-O141.

.2 NLGA (National Lumber Grading Association), Standard Grading Rules for Canadian Lumber.

.2 Fastenings: to CAN/CSA-O86.

2.2 FABRICATION

.1 Fabricate wood trusses in accordance with reviewed shop drawings.

.2 Provide for design camber and roof slopes when positioning truss members.

.3 Connect members using metal connector plates.

2.3 SOURCE QUALITY CONTROL

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

PART 3 EXECUTION

3.1 ERECTION

.1 Erect wood trusses in accordance with reviewed erection drawings.

.2 Handling, installation, erection, bracing and lifting in accordance with manufacturer's instructions.

.3 Make adequate provisions for handling and erection stresses.

.4 Exercise care to prevent out-of-plane bending of trusses.

.5 Install temporary horizontal and cross bracing to hold trusses plumb and in safe condition until permanent bracing and decking are installed.

.6 Install permanent bracing in accordance with reviewed shop drawings, prior to application of loads to trusses.

.7 Do not cut or remove any truss material without approval of Departmental Representative.

.8 Remove chemical and other surface deposits on treated wood, in preparation for applied finishes.

3.2 CLEANING

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

END OF SECTION

PART 1 GENERAL

1.1 REFERENCES

.1 Codes and standards referenced in this section refer to the latest edition thereof.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-51.34, Vapour Barrier, Polyethylene Sheet, for Use in Building Construction.

1.2 PRODUCT DATA

.1 Submit product data sheets for:

.1 Product characteristics.

.2 Performance criteria.

.3 Limitations.

PART 2 PRODUCTS

2.1 VAPOUR BARRIER

.1 Polyethylene film: to CAN/CGSB-51.34, thicknesses as indicated on drawings.

2.2 ACCESSORIES

.1 Joint sealing tape: air resistant pressure sensitive adhesive tape, type as recommended by vapour barrier manufacturer, 50 mm wide for lap joints and perimeter seals, 25 mm wide elsewhere.

.2 Staples: minimum 6 mm leg.

PART 3 EXECUTION

3.1 INSTALLATION

.1 Install sheet vapour retarder on “warm side” of exterior wall and ceiling space assemblies, including unheated spaces, prior to installation of finish wall to form continuous barrier.

.2 Install sheet vapour retarder under concrete floor system as indicated on drawings to form continuous barrier.

.3 Use sheets of largest practical size to minimize joints.

.4 Inspect for continuity. Repair punctures and tears with sealing tape before work is concealed.

3.2 EXTERIOR SURFACE OPENINGS

.1 Cut sheet vapour retarder to form openings and ensure material is lapped and sealed to frame.

3.3 PERIMETER SEALS

.1 Seal perimeter of sheet vapour barrier as follows:

.1 Apply continuous bead of sealant to substrate at perimeter of sheets.

.2 Lap sheet over sealant and press into sealant bead.

.3 Install staples through lapped sheets at sealant bead into wood substrate.

.4 Ensure that no gaps exist in sealant bead. Smooth out folds and ripples occurring in sheet over sealant.

3.4 LAP JOINT SEALS

.1 Seal lap joints of sheet vapour barrier as follows:

.1 Attach first sheet to substrate.

.2 Apply continuous bead of sealant over solid backing at joint.

.3 Lap adjoining sheet minimum 150 mm and press into sealant bead.

.4 Install staples through lapped sheets at sealant bead into wood substrate.

.5 Ensure that no gaps exist in sealant bead. Smooth out folds and ripples occurring in sheet over sealant.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCES

.1 American Society for Testing and Materials International (ASTM)

.1 ASTM C665-01e1, Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.

.2 ASTM C1320-05, Standard Practice for Installation of Mineral Fiber Batt and Blanket Thermal Insulation for Light Frame Construction.

.2 Canadian Standards Association (CSA International)

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

.3 Underwriters Laboratories of Canada (ULC)

.1 CAN/ULC-S702-1997, Standard for Mineral Fibre Insulation.

1.2 SUBMITTALS

.1 Product Data:

.1 Submit manufacturer's printed product literature, specifications and data sheets.

.2 Manufacturer's Instructions:

.1 Submit manufacturer's installation instructions.

1.3 QUALITY ASSURANCE

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

.2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

PART 2 PRODUCTS

2.1 INSULATION

.1 Batt and blanket mineral fibre: to ASTM C665 and CAN/ULC S702.

.1 Type: 1.

.2 Thickness: as indicated.

PART 3 EXECUTION

3.1 MANUFACTURER INSTRUCTIONS

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

3.2 INSULATION INSTALLATION

.1 Install insulation to maintain continuity of thermal protection to building elements and spaces and to ASTM C1320.

.2 Fit insulation closely around electrical boxes, pipes, ducts, frames and other objects in or passing through insulation.

.3 Do not compress insulation to fit into spaces.

.4 Keep insulation minimum 75 mm from heat emitting devices such as recessed light fixtures, and minimum 50 mm from sidewalls of CAN/ULC-S604 Type A chimneys and CAN/CGA-B149.1 and CAN/CGA-B149.2 Type B and L vents.

.5 Do not enclose insulation until it has been inspected and approved by Departmental Representative.

3.3 CLEANING

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

END OF SECTION

PART 1 GENERAL

1.1 REFERENCES

.1 Codes and standards referenced in this section refer to the latest edition thereof.

.2 Canadian General Standards Board (CGSB).

.1 CAN/CGSB-37.4, Fibrated, Cutback Asphalt, Lap Cement for Asphalt Roofing.

.2 CAN/CGSB-37.5, Cutback Asphalt Plastic Cement.

.3 Canadian Roofing Contractors' Association (CRCA).

.1 CRCA Roofing Specification Manual.

.4 Canadian Standards Association (CSA International).

.1 CAN/CSA-A123.1/A123.5, Asphalt Shingles Made From Organic Felt and Surfaced With Mineral Granules/Asphalt Shingles Made From Glass Felt and Surfaced With Mineral Granules.

.2 CSA A123.2, Asphalt-Coated Roofing Sheets.

.3 CAN/CSA-A123.3, Asphalt Saturated Organic Roofing Felt.

.4 CAN3-A123.51, Asphalt Shingle Application on Roof Slopes 1:3 and Greater.

.5 CAN3-A123.52, Asphalt Shingle Application on Roof Slopes 1:6 to Less Than 1:3.

.6 CSA B111, Wire Nails, Spikes and Staples.

.5 National Research Council Canada (NRC)/Institute for Research in Construction (IRC) - Canadian Construction Materials Centre (CCMC).

.1 CCMC, Registry of Product Evaluations.

1.2 SAMPLES

.1 Submit samples if directed by Departmental Representative.

.2 Submit duplicate samples of full size specified shingles.

1.3 EXTRA MATERIALS

.1 Provide 2 unopened bundles of shingles. Store as directed by Departmental Representative.

1.4 SUBMITTALS

.1 Submit product data as directed by Departmental Representative.

.2 Manufacturer's Instructions: Provide to indicate special handling criteria, installation sequence, cleaning procedures.

.3 Submit product data sheets for asphalt shingles. Include:

.1 Product characteristics.

.2 Performance criteria.

.3 Installation instructions.

.4 Limitations.

.5 Colour and finish.

1.5 DELIVERY, STORANGE AND HANDLING

.1 Provide and maintain dry, off-ground weatherproof storage.

.2 Remove only in quantities required for same day use.

1.6 WASTE MANAGEMENT AND DISPOSAL

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

.2 Ensure emptied containers are sealed and stored safely for disposal away from children.

.3 Use the least toxic sealants, and adhesives necessary to comply with requirements of this section.

.4 Close and seal tightly. Remove from site and dispose of all packaging materials at appropriate recycling facilities.

.5 Place used hazardous sealant tubes and adhesive containers in areas designated for hazardous materials.

1.7 WARRANTY

.1 Shingles: 25 year manufacturer's warranty.

PART 2 PRODUCTS

2.1 MATERIALS

.1 Asphalt shingles: to CSA A123.1/A123.5.

.1 Type: self-seal, standard, pattern rectangular.

.2 Mass: minimum 33 kg/3m².

.3 Colors: as selected by Departmental Representative.

.2 Roofing underlay: self-adhesive, non-woven glass fibre matt coated with SBS modified bitumen, minimum thickness 1.8 mm, bottom surface release film, top surface sanded.

.3 Plastic Cement: to CAN/CGSB-37.5.

PART 3 EXECUTION

3.1 APPLICATION

.1 Do asphalt shingle work in accordance with CAN3-A123.51 CAN3-A123.52, NBC/CRCA Specification, except where otherwise specified.

.2 Install layer of self-adhesive roof underlay over entire roof area.

.3 Install drip edge along eaves, overhanging 12 mm, with minimum 50 mm flange extending onto roof decking. Nail to deck at 400 mm oc.

.4 Install bottom step flashing (soaker base flashing) interleafed between shingles at vertical junctions.

.5 Install asphalt shingles on roof slopes 1:3 and steeper in accordance with CAN3-A123.51.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCES

.1 Codes and standards referenced in this section refer to the latest edition thereof.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-11.3, Hardboard.

.2 CAN/CGSB-11.5, Hardboard, Precoated, Factory Finished, for Exterior Cladding.

.3 CAN/CGSB-11.6, Installation of Exterior Hardboard Cladding.

.4 CAN/CGSB-51.32, Sheathing, Membrane, Breather Type.

.3 Canadian Standards Association (CSA)

.1 CSA B111, Wire Nails, Spikes and Staples.

.2 CSA O121, Douglas Fir Plywood.

.3 CSA O151, Canadian Softwood Plywood.

.4 NLGA Standard Grading Rules for Canadian Lumber.

1.2 SAMPLES

.1 Submit samples as directed by Departmental Representative.

.2 Submit duplicate 300 mm long sample of profile specified.

1.3 SHOP DRAWING

.1 Submit product information, color options for selection by Departmental Representative, and installation instructions. Incorporate approved shop drawings in Operation and Maintenance Manual.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver siding suitably packaged to avoid damage to finished surface.

.2 Store in an unheated structure or under cover until application. Siding may be temporarily stored outside if at least 4 inches off the ground and on a flat, well drained surface protected from moisture with a shed pack or waterproof cover.

1.5 QUALITY ASSURANCE

.1 If requested, provide Certificate of Quality Compliance from siding manufacturer upon completion of fabrication.

.2 If requested, provide Certificate of Quality Compliance upon satisfactory completion of installation.

1.6 WARRANTY

.1 Warranty Period: 15 years against cracking, peeling, blistering, chalking, loss of coating adhesion, yellowing with age, and no damage caused by rinse cleaning surface dirt. Warranty to extend from date of Substantial Completion.

PART 2 PRODUCTS

2.1 MATERIALS

.1 Clapboard Siding: Cape Cod or approved equal.

.2 Moldings and trim: Western Lodgepole Pine or Eastern Spruce, No. 1 select or better grade, factory finished same as siding, as indicated on drawings.

.3 Strapping: Softwood Lumber, kiln dried, pressure treated.

.4 Nails: Mechanically galvanized, to securely and rigidly retain the work permanently in position, pre-finished baked-on coating to match siding finish.

.5 Exterior Sheathing Membrane: CAN/CGSB 51.32m, Spun bonded olefin sheeting, conforming to ASTM D3575, single ply laminated and coated.

.6 Sealant: thermoplastic, color to exactly match siding.

2.2 FINISH

.1 Pre-finish color: thermoplastic acrylic latex emulsion, factory coated under controlled environment conditions by a modified vacuum coat method, one prime coat and one finish coat, applied to all board surfaces, minimum 6 mil (0.15mm) dry film thickness.

.1 Standard color or custom color from manufacturer's range of colors.

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

PART 3 EXECUTION

3.1 EXAMINATION

.1 Verify that substrate surfaces and wall openings are ready to receive work.

3.2 PREPARATION

.1 Install one layer of sheathing membrane horizontally on sheathed walls, weather lap edges and ends minimum 6 inches (150mm). Stagger vertical laps. Tape all edges.

.2 Install strapping at 406 mm o.c., or as indicated on drawings.

.3 Apply sealant around door and other opening frames.

3.3 INSTALLATION

.1 Install siding and accessories to manufacturer's printed instructions.

.2 Install screen at bottom of base trim.

.3 Install siding for natural watershed.

.4 Install siding in straight aligned lengths, set level with plumb ends and corners.

.5 Achieve siding joints no less than 32 inches (812 mm) apart in adjoining boards and distribute evenly over wall surface.

.6 Miter external and internal corners: Install corner strips, closures, frieze boards skirt boards and trim.

.7 Fasten siding securely to wood batten substrate.

.8 Face nail 1 inch (25mm) from bottom of siding board directly into wood strapping, drive nail head just flush with siding surface; do not indent or penetrate painted coating.

3.4 INCIDENTAL SITE FINISHING

.1 Carefully set exposed nails flush with siding coating.

.2 Touch-up blemished siding materials to match siding color.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCES

.1 Codes and Standards referenced in this section refer to the latest edition thereof.

.2 American Society for Testing and Materials (ASTM)

.1 ASTM A653/A653M, Specification for Steel Sheet Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanized) by the Hot Dip Process.

.3 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-1.181, Ready-Mixed Organic Zinc-Rich Coating.

.4 Canadian Standards Association (CSA International)

.1 G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.2 CSA W59, Welded Steel Construction (Metal Arc Welding).

.5 Canadian Steel Door Manufacturers' Association, (CSDMA).

.1 CSDMA, Specifications for Commercial Steel Doors and Frames.

.2 CSDMA, Recommended Selection and Usage Guide for Commercial Steel Doors.

.6 National Fire Protection Association (NFPA)

.1 NFPA 80, Standard for Fire Doors and Fire Windows.

.2 NFPA 252, Standard Methods of Fire Tests of Door Assemblies.

.7 Underwriters' Laboratories of Canada (ULC)

.1 CAN4-S104M, Fire Tests of Door Assemblies.

.2 CAN4-S105M, Fire Door Frames Meeting the Performance Required by CAN4-S104.

.8 CAN/ULC-S701, Thermal Insulation, Polystyrene, Boards and Pipe Covering.

.9 CAN/ULC-S702, Thermal Insulation, Mineral Fibre, for Buildings.

1.2 DESIGN REQUIREMENTS

.1 Design door assembly to withstand minimum 1,000,000 swing cycles in accordance with ANSI A151.1, with no failure of any design features of the door.

.2 Design exterior frame assembly to accommodate expansion and contraction when subjected to minimum and maximum surface temperature of -35°C to +35°C.

1.3 SHOP DRAWINGS

.1 Indicate each type of door, material, steel core thicknesses, mortises, reinforcements, location of exposed fasteners, openings, glazed, louvers, arrangement of hardware and fire rating and finishes.

.2 Indicate each type frame material, core thickness, reinforcements, glazing stops, location of anchors and exposed fastenings and reinforcing, fire-rating and finishes.

.3 Include schedule identifying each unit, with door marks and numbers relating to numbering on drawings and door schedule.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, handle and store doors and frames at the job site in such a manner as to prevent damage.

.2 Store doors and frames under cover with doors stored in a vertical position on blocking, clear of floor and with blocking between doors to permit air circulation.

1.5 WARRANTY

.1 Provide a written warranty for work of this section from manufacturer for failure due to defective materials for ten (10) years.

1.6 REQUIREMENTS

.1 Steel fire rated doors and frames: labeled and listed by an organization accredited by Standards Council of Canada in conformance with CAN4-S104M NFPA 252 for ratings specified or indicated.

.2 Provide fire labeled frame products for those openings requiring fire protection ratings, as scheduled. Test products in strict conformance with CAN4-S104, ASTM E152 or NFPA 252 and list by nationally recognized agency having factory inspection service and construct as detailed in Follow-Up Service Procedures/Factory Inspection Manuals issued by listing agency to individual manufacturers.

PART 2 PRODUCTS

2.1 MATERIALS

.1 Hot dipped galvanized steel sheet: to ASTM A653M, ZF75, minimum base steel thickness in accordance with CSDMA Table 1 - Thickness for Component Parts.

.2 Reinforcement channel: to CSA G40.20/G40.21, Type 44W, coating designation to ASTM A653M, ZF75.

2.2 DOOR CORE MATERIALS

.1 Stiffened: face sheets welded insulated core.

.1 Expanded polystyrene: CAN/ULC-S701, density 16 to 32 kg/m^3.

.2 Temperature rise rated (TR): core composition to limit temperature rise on unexposed side of door to 250°C at 60 minutes. Core to be tested as part of a complete door assembly, in accordance with CAN4-S104, ASTM E152 or NFPA 252, covering Standard Method of Tests of Door Assemblies and listed by nationally recognized testing agency having factory inspection service.

.3 Thermal Insulation material must:

.1 Not require being labeled as poisonous, corrosive, flammable or explosive under the Consumer Chemical and Container Regulations of the Hazardous Products Act.

.2 Be manufactured using a process that uses chemical compounds with the minimum ozone depletion potential (ODP) available.

2.3 ADHESIVES

.1 Polystyrene cores: heat resistant, epoxy resin based, low viscosity, contact cement.

2.4 PRIMER

.1 Touch-up primer to CAN/CGSB-1.181.

2.5 ACCESSORIES

.1 Door silencers: single stud rubber/neoprene type.

.2 Exterior top and bottom caps steel.

.3 Fabricate glazing stops as formed channel, minimum 16 mm height, accurately fitted, butted at corners and fastened to frame sections with counter-sunk oval head sheet metal screws.

.4 Fire labels: metal riveted.

.5 Foam Insulation: one-component minimal-expanding, flexible polyurethane foam to ASTM D6464.

2.6 FRAMES AND FABRICATION GENERAL

.1 Fabricate frames in accordance with CSDMA specifications. Frames to maintain fore rating of door as recommended by manufacturer.

2.7 FRAME ANCHORAGE

.1 Provide appropriate anchorage to floor and wall construction.

2.8 FRAMES: WELDED TYPE

.1 Welding in accordance with CSA W59.

.2 Accurately mitre or mechanically joint frame product and securely weld on inside of profile.

.3 Cope accurately and securely weld butt joints of mullions, transom bars, centre rails and sills.

.4 Grind welded joints and corners to a flat plane, fill with metallic paste and sand to uniform smooth finish.

.5 Securely attach floor anchors to inside of each jamb profile.

.6 Weld in 2 temporary jamb spreaders per frame to maintain proper alignment during shipment.

2.9 DOOR FABRICATION GENERAL

.1 Doors: swing type to approval of Departmental Representative.

.2 Doors: manufacturers' proprietary construction, tested and/or engineered as part of a fully operable assembly, including door, frame, gasketing and hardware in accordance with ASTM E330.

.3 Provide factory-applied touch-up primer at areas where zinc coating has been removed during fabrication.

.4 Provide fire labeled doors for those openings requiring fire protection ratings, as scheduled. Test such products in strict conformance with CAN4-S104 ASTM E152 NFPA 252 and list by nationally recognized agency having factory inspection service and construct as detailed in Follow-Up Service Procedures/Factory Inspection Manuals issued by listing agency to individual manufacturers.

.5 Manufacturer's nameplates on doors are not permitted.

PART 3 EXECUTION

3.1 INSTALLATION GENERAL

.1 Install labeled steel fire-rated doors and frames to NFPA 80 except where specified otherwise.

.2 Install doors and frames to CSDMA Installation Guide.

3.2 FRAME INSTALLATION

.1 Set frames plumb, square, level and at correct elevation.

.2 Secure anchorages and connections to adjacent construction.

.3 Brace frames rigidly in position while building-in. Install temporary horizontal wood spreader at third points of door opening to maintain frame width. Provide vertical support at centre of head for openings over 1200 mm wide. Remove temporary spreaders after frames are built-in.

.4 Make allowances for deflection of structure to ensure structural loads are not transmitted to frames.

.5 Seal around all frames with foam insulation.

.6 Caulk perimeters of frames between frame and adjacent material.

.7 Maintain continuity of air barrier and vapour retarder.

3.3 DOOR INSTALLATION

.1 Install doors and hardware in accordance with hardware templates and manufacturer's instructions.

.2 Adjust operable parts for correct function.

3.4 FINISH REPAIRS

.1 Touch up with primer finishes damaged during installation.

.2 Fill exposed frame anchors and surfaces with imperfections with metallic paste filler and sand to a uniform smooth finish.

3.5 COMMISSIONING

.1 Instruct maintenance personnel in operation and maintenance of doors and hardware.

.2 Confirm operation and function for all doors and hardware.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCES

.1 Codes and standards referenced in this section refer to the latest edition thereof.

.2 Canadian Steel Door and Frame Manufacturers' Association (CSDFMA).

.3 Canadian General Standards Board (CGSB).

.1 CAN/CGSB-69.17, Bored and Preassembled Locks and Latches.

.2 CAN/CGSB-69.18 /ANSI/BHMA A156.1, Butts and Hinges.

.3 CAN/CGSB-69.19/ANSI/BHMA A156.3, Exit Devices.

.4 CAN/CGSB-69.20/ANSI/BHMA A156.4, Door Controls (Closers).

.5 CAN/CGSB-69.21/ANSI/BHMA A156.5, Auxiliary Locks and Associated Products.

.6 CAN/CGSB-69.29/ANSI/BHMA A156.13, Mortise Locks and Latches.

.7 CAN/CGSB-69.31/ANSI/BHMA A156.15, Closer/Holder Release Device.

.8 CAN/CGSB-69.32-M90/ANSI/BHMA A156.16-1981, Auxiliary Hardware.

.9 CAN/CGSB-69.33/ANSI/BHMA A156.17, Self-Closing Hinges and Pivots.

.10 CAN/CGSB-69.34/ANSI/BHMA A156.18, Materials and Finishes.

1.2 SUBMITTALS

.1 Product Data:

.1 Submit manufacturer's printed product literature.

.2 Hardware List:

.1 Submit contract hardware list.

.2 Indicate specified hardware, including make, model, material, function, size, finish and other pertinent information.

.3 Manufacturer's Instructions:

.1 Submit manufacturer's installation instructions.

1.3 WARRANTY

.1 Provide a written manufacturer’s warranty for work of this Section for failure due to defective materials for ten (10) years, dated from final completion certificate.

1.4 QUALITY ASSURANCE

.1 Only recognized contract hardware distributors will be considered for the work of this section. The distributor shall have on staff a qualified Architectural Hardware Consultant recognized by the Door and Hardware Institute or a person with equivalent qualifications to assist installers and direct detailing, processing and delivery of material, and certify installation acceptance.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Store hardware in locked, clean and dry area.

.2 Package each item of hardware, including fastenings, separately or in like groups of hardware; label each package as to item definition and location.

PART 2 PRODUCTS

2.1 HARDWARE ITEMS

.1 Only door locksets and latches listed on ANSI/BHMA Standards list are acceptable for use on this project.

.2 Use one manufacturer's products only for similar items.

2.2 DOOR HARDWARE

.1 As noted on the drawings.

2.3 FASTENINGS

.1 Use only fasteners provided by manufacturer. Failure to comply may void warranties and applicable licensed labels.

.2 Supply screws, bolts, expansion shields and other fastening devices required for satisfactory installation and operation of hardware.

.3 Exposed fastening devices to match finish of hardware.

.4 Use fasteners compatible with material through which they pass.

2.4 KEYING

.1 Doors to be master keyed as directed. Prepare detailed keying schedule in conjunction with Departmental Representative.

.2 Provide keys in triplicate for every lock in this Contract.

.3 Provide three master keys.

.4 Stamp keying code numbers on keys and cylinders.

2.5 FINISHES

.1 Following finishes are indicated in hardware groups:

BHMA	CAN MATERIAL	FINISH
626	C26D Brass/Bronze	Satin Chrome
628	C28 Aluminum	Satin Alum, Anodized

630	C32D Stainless Steel	Satin Stainless Steel
652	C26D Steel	Plated Satin Chrome
689	Al All	Painted Aluminum
	Alum Aluminum	Mill Finish
	TMDFF (to match door and frame finish)	

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

.2 Furnish metal door and frame manufacturers with complete instructions and templates for preparation of their work to receive hardware.

.3 Furnish manufacturers' instructions for proper installation of each hardware component.

3.2 INSTALLATION

.1 Install hardware to standard hardware location dimensions in accordance with Canadian Metric Guide for Steel Doors and Frames (Modular Construction) prepared by Canadian Steel Door and Frame Manufacturers' Association.

3.3 EXAMINATION

.1 Visit site prior to start of installation of hardware.

.2 Visit will include examination of openings, site conditions and materials for conditions that prevent proper application of finish hardware.

.3 Installation will imply conditions for installation acceptable; hardware contractor to accept responsibility.

3.4 ADJUSTING

.1 Adjust door hardware, operators, closures and controls for optimum, smooth operating condition, safety and for weather tight closure.

.2 Lubricate hardware, operating equipment and other moving parts.

.3 Adjust door hardware to provide tight fit at contact points with frames.

.4 Where hardware is found defective, repair or replace or correct as desired by inspection reports.

3.5 CLEANING

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

.2 Clean hardware with damp rag and approved non-abrasive cleaner, and polish hardware in accordance with manufacturer's instructions.

.3 Remove protective material from hardware items.

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

3.6 PROTECTION

.1 All hardware shall be protected against damage from paint, plaster or other defacing materials. Whenever possible, manufacturer’s protective covering shall not be removed until final project cleaning takes place. Material not protected by manufacture shall be covered or removed from door during painting or any other adjustments that can cause damage to hardware.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCES

.1 Codes and standards referenced in this section refer to the latest edition thereof.

.2 Architectural Painting Specifications Manual, Master Painters Institute (MPI).

.3 Systems and Specifications Manual, SSPC Painting Manual, Volume Two, Society for Protective Coatings (SSPC).

.4 Test Method for Measuring Total Volatile Organic Compound Content of Consumer Products, Method 24 (for Surface Coatings) of the Environmental Protection Agency National Fire Code of Canada.

1.2 QUALITY ASSURANCE

.1 Conform to latest MPI requirements for interior painting work, including preparation and priming.

1.3 ENVIRONMENTAL PERFORMANCE REQUIREMENTS

.1 Provide paint products meeting MPI "Environmentally Friendly" E1, E2 and E3 ratings based on VOC (EPA Method 24) content levels.

1.4 SUBMITTALS

.1 Submit product data and manufacturer's installation/application instructions for each paint and coating product to be used. Submit WHMIS, Material Safety Data Sheets (MSDS).

1.5 SAMPLES

.1 Submit full range color sample chips. Indicate where color availability is restricted.

1.6 DELIVERY, HANDLING AND STORAGE

.1 Deliver and store materials in original containers, sealed, with labels intact.

.2 Labels shall clearly indicate:

- .1 Manufacturer's name and address.
- .2 Type of paint or coating.
- .3 Compliance with applicable standard.
- .4 Color number in accordance with established color schedule.

.3 Remove damaged, opened and rejected materials from site.

.4 Provide and maintain dry, temperature controlled, secure storage.

.5 Observe manufacturer's recommendations for storage and handling.

1.7 SITE REQUIREMENTS

.1 Heating, Ventilation and Lighting:

.1 Ventilate enclosed spaces.

.2 Perform no painting work unless adequate and continuous ventilation and sufficient heating facilities are in place to maintain ambient air and substrate temperatures above 10°C for 24 hours before, during, and after paint application, until paint has cured sufficiently.

.3 Where required, provide continuous ventilation for seven days after completion of application of paint.

.4 Perform no painting work unless a minimum lighting level of 323 Lux is provided on surfaces to be painted.

.2 Temperature, Humidity and Substrate Moisture Content Levels:

.1 Unless specifically pre-approved, perform no painting work when:

.1 Ambient air and substrate temperatures are below 10°C.

.2 Substrate temperature is over 32°C, unless paint is specifically formulated for application at high temperatures.

.3 Substrate and ambient air temperatures are expected to fall outside MPI or paint manufacturer’s prescribed limits.

.4 The relative humidity is above 60%, or when the dew point is less than 3°C variance between the air/surface temperature.

.2 Perform no painting work when the maximum moisture content of the substrate exceeds:

.1 12% for concrete and masonry (clay and concrete brick/block).

.2 15% for wood.

.3 Conduct moisture tests using a properly calibrated electronic Moisture Meter, except test concrete floors for moisture using a simple "cover patch test".

.4 Test concrete, masonry and plaster surfaces for alkalinity, as required.

.3 Surface and Environmental Conditions:

.1 Apply paint finish only in areas where dust is no longer being generated by related construction operations or when wind or ventilation conditions are such that airborne particles will not affect quality of finished surface.

.2 Apply paint only to adequately prepared surfaces and to surfaces within moisture limits noted herein.

.3 Apply paint only when previous coat of paint is dry or adequately cured.

.4 Additional Interior Application Requirements:

.1 Apply paint finishes only when temperature at location of installation can be satisfactorily maintained within manufacturer's recommendations.

PART 2 PRODUCTS

2.1 MATERIALS FOR INTERIOR PAINT

.1 Paint materials listed in the MPI Approved Products List (APL) are acceptable for use on this project.

.2 Paint materials for paint systems shall be products of a single manufacturer.

.3 Whenever possible, select products exhibiting low odor characteristics. If two products are otherwise equivalent, select the product with the lowest odor. Only qualified products with MPI E2 or E3 ”Environmentally Friendly” rating are acceptable for use on this project.

.4 Interior paints, coatings, adhesives, solvents, cleaners, lubricants, and other fluids, shall:

.1 Be water-based, water soluble, water clean-up.

.2 Be non-flammable.

.3 Do not contain methylene chloride, chlorinated hydrocarbons, toxic metal pigments.

.5 Water-borne surface coatings must be manufactured and transported in a manner that steps of process, including disposal of waste products arising there-from will meet requirements of applicable governmental acts, by-laws and regulations including, for facilities located in Canada, Fisheries Act and Canadian Environmental Protection Act (CEPA).

.6 Water-borne surface coatings must not be formulated or manufactured with aromatic solvents, formaldehyde, halogenated solvents, mercury, lead, cadmium, hexavelant chromium or their compounds.

.7 Water-borne surface coatings must have a flash point of 61.0°C or greater.

.8 Water-borne paints and stains, and water borne varnishes must meet a minimum "Environmentally Friendly" E2 rating.

2.2 COLOURS

.1 Departmental Representative will provide Color Schedule after contract award.

.2 Selection of colors will be from manufacturers full range of colors.

.3 Where specific products are available in a restricted range of colors, selection will be based on the limited range.

.4 Second coat in a three coat system to be tinted a slightly lighter color than top coat to show visible difference between coats.

2.3 PAINTING SYSTEMS

.1 Exterior Siding: Cape Cod - shop painted.

.2 Galvanized Metal: doors, frames, etc.

.1 MPI INT 5.3A Latex G5 finish.

.3 Dimension Lumber:

.1 MPI INT 6.2D Latex G5 finish (over latex primer).

.4 Dressed Lumber:

.1 MPI INT 6.3T Latex G5 finish (over latex primer).

PART 3 EXECUTION

3.1 GENERAL

.1 Exterior siding to be Cape Cod and shop painted. Perform preparation and operations for interior painting in accordance with MPI Painting Specifications Manual, except where specified otherwise.

.2 Apply all paint materials in accordance with paint manufacturer's written application instructions.

3.2 EXISTING CONDITIONS

.1 Conduct moisture testing of surfaces to be painted using a properly calibrated electronic moisture meter and report findings to Departmental Representative. Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.

.2 Maximum moisture content as follows:

.1 Wallboard: 12%

.2 Wood: 15%

3.3 CLEANING AND PREPARATION

.1 Clean and prepare surfaces in accordance with MPI Painting Specification Manual requirements. Refer to MPI Manual in regard to specific requirements.

.2 Do not apply paint until prepared surfaces have been accepted by Departmental Representative.

3.4 APPLICATION

.1 Method of application to be approved by Departmental Representative. Apply paint by brush, roller, air sprayer, airless sprayer. Conform to manufacturer's application instructions unless specified otherwise.

END OF SECTION

PART 1 GENERAL

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.3 Section 01 78 00 - Closeout Submittals.

.4 Section 26 05 00 – Common Work Results – Electrical.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA C22.2 No.46, Electric Air-Heaters.

.2 Underwriters' Laboratories (UL) Inc.

.1 UL 1042, Electric Baseboard Heating Equipment.

1.3 PRODUCT DATA

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

.2 Submit product data sheets for heaters. Include:

.1 Product characteristics.
.2 Performance criteria.
.3 Mounting methods.
.4 Physical size.
.5 kW rating, voltage, phase.
.6 Cabinet material thicknesses.
.7 Limitations.
.8 Colour and finish.

.3 Manufacturer's Instructions: Provide to indicate special handling criteria, installation sequence and cleaning procedures.

1.4 CLOSEOUT SUBMITTALS

.1 Submit operation and maintenance data for heaters in accordance with Section 01 78 00 - Submittal Procedures.

1.5 WASTE MANAGEMENT AND DISPOSAL

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

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

.3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

.4 Divert unused metal and wiring materials from landfill to metal recycling facility approved by Departmental Representative.

.5 Collect, package and store existing unit heaters for, either reuse or recycling and return to recycler in accordance with Waste Management Plan.

PART 2 PRODUCTS

2.1 MANUFACTURERS

.1 Acceptable Product:

.1 Ouellet
.2 Dimplex
.3 Chromalox
.4 Stelpro.

2.2 CONVECTORS

.1 Residential duty baseboard heater:

.1 Steel construction (20ga front; 22ga chassis), surface mounted on wall with front inlet, front outlet.
.2 **White** epoxy powder paint finish.
.3 Tubular finned element.
.4 Capacity and voltage: as indicated.

2.3 CONTROLS

.1 Wall mounted, line voltage thermostat.

PART 3 EXECUTION

3.1 INSTALLATION

.1 Attach heaters to walls in accordance with manufacturer's instructions.

.2 Install line voltage thermostat and connect.

.3 Make power and control connections.

3.2 COMMISSIONING

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

.2 Ensure that heaters and controls operate correctly.

END OF SECTION

PART 1 GENERAL

1.1 GENERAL

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

1.2 REFERENCES

.1 Canadian Standards Association (CSA)

.1 CSA C22.1-15, Canadian Electrical Code, Part 1, Safety Standard for Electrical Installations.

.2 CAN3-C235, Preferred Voltage Levels for AC Systems, 0 to 50,000 V.

1.3 CARE, OPERATION AND START-UP

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

.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 Arrange and pay for services of manufacturer's factory service departmental representative to supervise start-up of installation, check, adjust, balance and calibrate components and instruct operating personnel.

.4 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with all aspects of its care and operation.

1.4 DESIGN REQUIREMENTS

.1 Operating voltages: to CAN3-C235

.2 Equipment and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard. Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

1.5 SUBMITTALS

.1 Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure coordinated installation.

.2 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.

.3 Indicate of drawings clearances for operation, maintenance, and replacement of operating equipment devices.

.4 Quality Control: in accordance with Section 01 45 00 – Testing and Quality Control.

.1 Provide CSA certified equipment and material. Where CSA certified equipment and material is not available, submit such equipment and material to authority having jurisdiction for approval before delivery to site.

.2 Submit test results of installed electrical systems and instrumentation.

.3 Submit certificate of acceptance from authority having jurisdiction upon completion of Work to Departmental Representative.

.5 Manufacturer's Field Reports: submit to Departmental Representative within 7 days of review, verifying compliance of Work and electrical system and instrumentation testing, as described in PART 3 - FIELD QUALITY CONTROL.

1.6 PERMITS, FEES AND INSPECTION

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

.2 Pay associated fees.

.3 Departmental Representative will provide drawings and specifications required by Electrical Inspection Division and Supply Authority at no cost.

.4 Notify Departmental Representative of changes required by Electrical Inspection Division prior to making changes.

.5 Furnish Certificates of Acceptance from Electrical Inspection Division or authorities having jurisdiction on completion of work to Departmental Representative.

1.7 COORDINATION

.1 Coordinate work with work of other divisions to avoid conflict.

.2 Locate distribution systems, equipment, and materials to provide minimum interference and maximum usable space.

.3 Locate all existing underground services and make all parties aware of their existence and location.

.4 Where interference occurs, Departmental Representative must approve relocation of equipment and materials regardless of installation order.

.5 Notwithstanding the review of shop drawings, this division may be required to relocate electrical equipment which interferes with the equipment of other trades, due to lack of coordination by this Division. The cost of this relocation shall be the responsibility of this Division. The Departmental Representative shall decide the extent of relocation required.

1.8 CUTTING AND PATCHING

.1 This contractor is responsible for all cutting and patching associated with installation of electrical equipment.

1.9 PROTECTION

.1 Protect exposed live equipment during construction for personnel safety.

.2 Shield and mark all live parts “LIVE 240 VOLTS”, or with appropriate voltage in English.

.3 Arrange for installation of temporary doors for rooms containing electrical distribution equipment. Keep these doors locked except when under direct supervision of electrician.

1.10 RECORD DRAWINGS

.1 Obtain and pay for three sets of white prints. As the job progresses, mark these prints to accurately indicate installed work. Have the white prints available for inspection at the site at all times and present for scrutiny at each job meeting.

.2 Show on the record drawings the installed inverts of all services entering and leaving the building. Dimension underground services at key points of every run in relation to the structure and building.

.3 Submit record drawings within 30 days prior to start of commissioning.

1.11 INSPECTION OF WORK

.1 The Departmental Representative will make periodic visits to the site during construction to ascertain reasonable conformity to plans and specifications but will not execute quality control. The Contractor shall be responsible for the execution of his work in conformity with the construction documents and with the requirements of the inspection authority.

1.12 SCHEDULING OF WORK

.1 Work shall be scheduled in phases as per other divisions of the specifications.

.2 Become familiar with the phasing requirements for the work and comply with these conditions.

.3 No additional monies will be paid for contractor's requirement to comply with work phasing conditions.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

.1 Provide materials and equipment in accordance with Section 01 61 00 - Common Product Requirements.

.2 Equipment and material to be CSA certified. Where there is no alternative to supplying equipment which is not CSA certified, obtain special approval from Electrical Inspection Division.

.3 Factory assemble control panels and component assemblies.

2.2 WARNING SIGNS

.1 As specified and to meet requirements of Electrical Inspection Department and Departmental Representative.

.2 Porcelain enamel decal signs, minimum size 175 x 250 mm.

2.3 WIRING TERMINATIONS

.1 Lugs, terminals, screws used for termination of wiring to be suitable for either copper or aluminum conductors.

2.4 EQUIPMENT IDENTIFICATION

.1 Identify electrical equipment with nameplates and labels as follows:

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

.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

NAMEPLATE SIZES

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:

.1 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 average of twenty-five (25) letters per nameplate and label.

.5 Identification to be English.

.6 Panels: voltage, phase, ampacity.

2.5 WIRING IDENTIFICATION

.1 Identify wiring with permanent indelible identifying markings (coloured plastic tapes) on both ends of phase conductors at panel and disconnect switch.

.2 Identify wiring with permanent indelible identifying (numbered tapes) on both ends of branch circuit wiring at splitter terminal blocks, at metering cabinets and at panel.

.3 Maintain phase sequence and colour coding throughout.

.4 Colour code: to CSA C22.1-15, Canadian Electrical Code.

.5 Use colour coded wires in communication cables, matched throughout system.

PART 3 EXECUTION

3.1 NAMEPLATES AND LABELS

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

3.2 LOCATION OF OUTLETS

.1 Locate outlets in accordance with Section 26 27 26 – Wiring Devices.

.2 Change location of outlets at no extra cost or credit, providing distance does not exceed 3000 mm, and information is given before installation.

.3 Locate light switches on latch side of doors.

3.3 MOUNTING HEIGHTS

.1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise.

.2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.

.3 Install electrical at following heights unless indicated otherwise.

.1 Local switches: 1200 mm.

.2 Wall receptacles: 450 mm.

3.4 COORDINATION OF PROTECTIVE DEVICES

.1 Ensure circuit protective devices such as overcurrent trips, relays and fuses are installed to required values and settings.

3.5 FIELD QUALITY CONTROL

.1 All electrical work to be carried out by qualified, licensed electricians or apprentices as per the conditions of the Provincial Act respecting manpower vocational training and qualification. Employees registered in a provincial apprentices program shall be permitted, under the direct supervision of a qualified licensed electrician, to perform specific tasks – the activities permitted shall be determined based on the level of training attained and the demonstration of ability to perform specific duties.

.2 The work of this division to be carried out by a contractor who holds a valid Code 1 Electrical Contractor License as issued by the Province.

.3 Conduct and pay for following tests:

.1 Power distribution system including phasing, voltage, grounding.

.2 Circuits originating from branch distribution panels.

.3 Lighting and its control.

.4 Heaters and associated control equipment.

.5 Systems: metering systems.

.4 Furnish manufacturer’s certificate or letter confirming that entire installation as it pertains to each system has been installed to manufacturer’s instructions.

.5 Insulation resistance testing.

.1 Megger and record circuits, feeders and equipment up to 350 V with a 500 V instrument.

.2 Check resistance to ground before energizing and record value.

.6 Carry out tests in presence of Departmental Representative.

.7 Provide instruments, meters, equipment and personnel required to conduct tests during and conclusion of project.

3.6 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 SECTION INCLUDES

.1 Materials and installation for wire and box connectors.

1.2 RELATED SECTIONS

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

1.3 REFERENCES

.1 Canadian Standards Association (CSA)

.1 CAN/CSA-C22.2 No.18, Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware.

.2 CSA C22.2 No.65, Wire Connectors.

.2 National Electrical Manufacturers Association (NEMA)

PART 2 PRODUCTS

2.1 MATERIALS

.1 Pressure type wire connectors to: CSA C22.2 No.65, with current carrying parts of copper sized to fit copper conductors as required.

.2 Connectors in underground pull pits to be silicon filled.

PART 3 EXECUTION

3.1 INSTALLATION

.1 Remove insulation carefully from ends of conductors, position conductors and install connectors in accordance with manufacturer’s instructions.

END OF SECTION

PART 1 GENERAL

1.1 RELATED SECTIONS

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

1.2 REFERENCES

.1 Canadian Standards Association (CSA)

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

PART 2 PRODUCTS

2.1 BUILDING WIRES

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

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

.3 Copper conductors: size as indicated, with thermoplastic insulation type TW rated at 600V, typically used for insulated ground wires.

2.2 NON-METALLIC SHEATHED CABLE

.1 Non-metallic sheathed copper cable type: NMD90 nylon, size as indicated.

PART 3 EXECUTION

3.1 FIELD QUALITY CONTROL

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

.2 Perform tests using method appropriate to site conditions and to approval of Departmental Representative and local authority having jurisdiction over installation.

.3 Perform tests before energizing electrical system.

3.2 INSTALLATION OF BUILDING WIRES

.1 Install wiring as follows:

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

.2 In underground ducts in accordance with Section 26 05 43.01- Installation of Cables in Ducts.

3.3 INSTALLATION OF NON-METALLIC SHEATHED CABLE

.1 Install cables.

.2 Install straps and box connectors to cables as required.

.3 Use permitted in wood stud construction only.

END OF SECTION

PART 1 GENERAL

1.1 RELATED SECTIONS

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

PART 2 PRODUCTS

2.1 EQUIPMENT

.1 Rod electrodes: copper clad steel 21mm dia by 3.0m long.

.2 Grounding conductors: bare stranded copper, soft annealed, size as indicated.

.3 Insulated bonding conductors: green, type TW.

.4 Ground bus: existing copper ground bus and insulator supports to be relocated to new electrical shed.

.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, as required by local authority having jurisdiction.
- .4 Thermit welded type conductor connectors, as indicated.
- .5 Bonding jumpers, straps.
- .6 Pressure wire connectors.
- .7 Compression connectors.

PART 3 EXECUTION

3.1 INSTALLATION GENERAL

.1 Install complete permanent, continuous grounding system including, electrodes, conductors, connectors, accessories. Install a dedicated bonding conductor in all conduit.

.2 Install connectors in accordance with manufacturer's instructions.

.3 Remove existing ground bus from existing electrical room and reinstall in new electrical shed.

.4 Protect exposed grounding conductors from mechanical injury.

.5 Make buried connections, and connections using copper welding by thermit process or with compression connectors.

.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 single grounding point. Avoid loop connections.

3.2 ELECTRODES

.1 Install rod electrodes and make grounding connections.

.2 Bond separate, multiple electrodes together.

.3 Use copper conductors for connections to electrodes as indicated.

.4 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 EQUIPMENT GROUNDING

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

3.4 FIELD QUALITY CONTROL

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

.2 Perform ground continuity and resistance tests using method appropriate to site conditions and to approval of Departmental Representative and local authority having jurisdiction over installation.

.3 Perform tests before energizing electrical system.

END OF SECTION

PART 1 GENERAL

1.1 REALTED SECTIONS

.1 Section 01 33 00 – Submittal Procedures.

.2 Section 26 05 00 – Common Work Results – Electrical.

PART 2 PRODUCTS

2.1 SPLITTERS

.1 Sheet metal enclosure, welded corners and formed hinged cover suitable for locking in closed position.

.2 Terminal blocks for termination of all exterior branch circuit conductors and conductors to branch circuit panels via metering cabinets. All wiring to be labelled at terminal blocks.

PART 3 EXECUTION

3.1 JUNCTION AND PULL BOX INSTALLATION

.1 Install splitter where indicated.

.2 Install terminal blocks and mounting hardware.

.3 Install labelling.

END OF SECTION

PART 1 GENERAL

1.1 RELATED SECTIONS

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

1.2 REFERENCES

.1 Canadian Standards Association (CSA)

.1 CSA C22.1-15, Canadian Electrical Code, Part 1.

PART 2 PRODUCTS

2.1 OUTLET AND CONDUIT BOXES GENERAL

.1 Size boxes in accordance with CSA C22.1.

.2 102 mm square or larger outlet boxes as required for special devices.

2.2 OUTLET BOXES FOR NON-METALLIC SHEATHED CABLE

.1 Electro-galvanized, sectional, screw ganging steel boxes, minimum size 76 x 50 x 63 mm with two double clamps to take non-metallic sheathed cables. For use in wood stud construction only.

PART 3 EXECUTION

3.1 INSTALLATION

.1 Vacuum clean interior of outlet boxes before installation of wiring devices.

.2 Identify systems for outlet boxes as required.

.3 For flush installations mount outlets flush with finished wall using plaster rings to permit wall finish to come within 6 mm of opening.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCES

.1 Canadian Standards Association (CSA)

.1 CAN/CSA C22.2 No. 18, Outlet Boxes, Conduit Boxes, and Fittings and Associated Hardware, a National Standard of Canada.

.2 CSA C22.2 No. 45, Rigid Metal Conduit.

.3 CSA C22.2 No. 211.2, Rigid PVC (Unplasticized) Conduit.

1.2 SUBMITTALS

.1 Product data: submit manufacturer's printed product literature, specifications and datasheets.

.1 Submit cable manufacturing data.

.2 Quality assurance submittals:

.1 Test reports: submit certified test reports.

.2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.3 Instructions: submit manufacturer's installation instructions.

PART 2 PRODUCTS

2.1 CONDUITS

.1 Rigid metal conduit: to CSA C22.2 No. 45, hot dipped galvanized steel threaded.

.2 Rigid PVC conduit: to CSA C22.2 No. 211.2.

2.2 CONDUIT FASTENINGS

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

2.3 CONDUIT FITTINGS

.1 Fittings: manufactured for use with conduit specified. Coating: same as conduit.

.2 Factory "ells" where 90^{o}, 45^{o} or 22.5^{o} bends are required for 25 mm and larger conduits.

.3 Ensure conduit bends other than factory “ells” are made with an approved bender. Making offsets and other bends by cutting and rejoining 90 degree bends are not permitted.

2.4 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 all conduit, conduit fittings and accessories in accordance with the latest edition of the Canadian Electrical Code in a manner that does not alter, change or violate any part of the installed system components or the CSA/UL certification of these components.

.2 Use rigid PVC conduit underground.

.3 Use RGS conduit for service masts.

.4 Use rigid PVC conduit for wiring within electrical shed (exposed).

.5 Minimum conduit size for lighting and power circuits: 21 mm.

.6 Bend conduit cold. Replace conduit if kinked or flattened more than 1/10th of its original diameter.

.7 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.

.8 Install fish cord in empty conduits.

.9 Remove and replace blocked conduit sections. Do not use liquids to clean out conduits.

.10 Dry conduits out before installing wire.

3.3 SURFACE CONDUITS

.1 Run parallel or perpendicular to building lines.

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 11 – 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 01 74 21 - Construction/Demolition Waste Management and Disposal.

.2 Section 26 05 00 - Common Work Results - Electrical.

.3 Section 31 23 10 - Excavating, Trenching and Backfilling.

1.2 REFERENCES

.1 Canadian Standards Association, (CSA)

.2 Insulated Cable Departmental representatives Association, Inc. (ICEA)

PART 2 PRODUCTS

PART 3 EXECUTION

3.1 CABLE INSTALLATION IN DUCTS

.1 Install cables as indicated in ducts.

.1 Do not pull spliced cables inside ducts.

.2 Install multiple cables in duct simultaneously.

.3 Use CSA approved lubricants of type compatible with cable jacket to reduce pulling tension.

.4 To facilitate matching of colour coded multiconductor control cables reel off in same direction during installation.

.5 Before pulling cable into ducts and until cables are properly terminated, seal ends of lead covered cables with wiping solder; seal ends of non-leaded cables with moisture seal tape.

.6 After installation of cables, seal duct ends with duct sealing compound.

3.2 FIELD QUALITY CONTROL

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

.2 Perform tests using qualified personnel. Provide necessary instruments and equipment.

.3 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 1000 V megger on each phase conductor.

.2 Check insulation resistance after each splice and/or termination to ensure that cable system is ready for acceptance testing.

.6 Acceptance Tests

.1 Ensure that terminations and accessory equipment are disconnected.

.2 Ground shields, ground wires, metallic armour and conductors not under test.

.3 Leakage Current Testing.

.1 Raise voltage in steps from zero to maximum values as specified by manufacturer for type of cable being tested.

.2 Hold maximum voltage for specified time period by manufacturer.

.3 Record leakage current at each step.

.7 Provide Departmental Representative with list of test results showing location at which each test was made, circuit tested and result of each test. Include results in Commissioning Manual.

.8 Remove and replace entire length of cable if cable fails to meet any of test criteria.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

.1 Materials, components, cabinets, instruments and installation for metering of branch circuits.

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

.3 Section 26 05 00 - Common Work Results - Electrical.

1.3 REFERENCES

.1 American National Standards Institute (ANSI)

.1 ANSI C39.1, Requirements, Electrical Analog Indicating Instruments.

.2 Canadian Standards Association, (CSA)

.1 CAN3-C17-M84, Alternating - Current Electricity Metering.

1.4 PRODUCT DATA

.1 Indicate meter, and instrument, outline dimensions, panel drilling dimensions and include cutout template.

PART 2 PRODUCTS

2.1 METER

.1 Combination energy and demand meter: to CAN3-C17- AC Electricity Metering.

.2 Accuracy: ±1 %.

.4 Ratings: as indicated.

2.2 TEST TERMINAL BLOCKS

.1 Test terminal blocks: as required.

2.3 INDICATING INSTRUMENTS

.1 Digital indicating instruments: to ANSI C39.1.

.2 Meter to display energy consumption (kwh), maximum and current energy demand (kva) for each branch circuit metered. Display to scroll through circuits connected. Each circuit to be able to be reset from pushbutton on panel face.

PART 3 EXECUTION

3.1 METERING INSTALLATION

.1 Install meters and instruments in location free from vibration and shock.

.2 Make connections in accordance with diagrams.

.3 Locate metering equipment adjacent to branch panel board. Use separate conduit for each set of current transformer connections, exclusive for metering.

3.2 FIELD QUALITY CONTROL

.1 Conduct tests in accordance with Section 26 05 00- Common Work Results – Electrical and in accordance with manufacturer's recommendations.

.2 Perform simulated operation tests with metering, instruments disconnected from permanent signal and other electrical sources.

.3 Verify correctness of connections, polarities of meters, instruments, potential and current transformers, transducers, signal sources and electrical supplies.

.4 Perform tests to obtain correct calibration.

.5 Do not dismantle meters and instruments.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

.1 Service equipment and installation.

1.2 RELATED SECTIONS

.1 Section 26 05 28 - Grounding - Secondary.

PART 2 PRODUCTS

2.1 EQUIPMENT

.1 Fused disconnect switch: existing disconnect switch to be relocated to new shed.

.2 Panel board breaker type: existing panel board to be relocated to new shed. New branch circuit breakers to be added to panel as indicated for new loads.

.3 Cabinet type 'A' for utility revenue metering: existing CT cabinet c/w CTs to be relocated to new shed.

.4 Utility meter socket: existing exterior meter base to be relocated to new shed.

PART 3 EXECUTION

3.1 INSTALLATION

.1 Relocated existing electrical service entrance and distribution equipment to new shed as indicated.

.2 Coordinate disconnection of existing service with Utility Co prior to relocating equipment. Coordinate connection of service to new shed with Utility Co.

.3 Make all connections to service entrance and distribution equipment.

.4 Connect to outgoing load circuits.

.5 Make grounding connections in accordance with Section 26 05 28 - Grounding – Secondary.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

.1 Switches, receptacles, cover plates and their installation.

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 26 05 00 - Common Work Results - Electrical.

1.3 REFERENCES

.1 Canadian Standards Association (CSA)

.1 CSA-C22.2 No.42, General Use Receptacles, Attachment Plugs and Similar Devices.

.2 CSA-C22.2 No.42.1, Cover Plates for Flush-Mounted Wiring Devices (Bi-national standard, with UL 514D).

.3 CSA-C22.2 No.55, Special Use Switches.

.4 CSA-C22.2 No.111, General-Use Snap Switches (Bi-national standard, with UL 20, twelfth edition).

PART 2 PRODUCTS

2.1 SWITCHES

.1 15A, 125V, single pole switches as indicated to: CSA-C22.2 No.55 and CSA-C22.2 No.111.

.2 Manually-operated general purpose ac switches with following features:

.1 Terminal holes approved for No. 10 AWG wire.

.2 Silver alloy contacts.

.3 Urea or melamine moulding for parts subject to carbon tracking.

.4 Suitable for back and side wiring.

.5 Ivory toggle.

.6 Specification grade.

.3 Toggle operated fully rated for tungsten filament and fluorescent lamps, and up to 80% of rated capacity of motor loads.

.4 Switches of one manufacturer throughout project.

.5 Standard of acceptance: Hubbell HBL1201I.

.6 Alternate manufacturers: Pass and Seymour, Leviton, Cooper.

2.2 RECEPTACLES

.1 Duplex receptacles, CSA type 5-15R, 125V, 15A, U ground, to: CSA-C22.2 No.42 with following features (for use in electrical shed only):

.1 Ivory thermoplastic moulded housing.
.2 Suitable for No. 10 AWG for back and side wiring.
.3 Break-off links for use as split receptacles.
.4 Eight back wired entrances, four side wiring screws.
.5 Triple wipe contacts and rivetted grounding contacts.
.6 Specification grade.
.7 Standard of Acceptance: Hubbell HBL5262I.
.8 Alternative Manufacturers: Bryant, Pass and Seymour, Cooper, Leviton.

.2 Receptacles of one manufacturer throughout project.

2.3 COVER PLATES

.1 Cover plates for wiring devices to: CSA-C22.2 No.42.1.

.2 Cover plates from one manufacturer throughout project.

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 - Electrical.

.2 Receptacles:

.1 Mount receptacles at height in accordance with Section 26 05 00 – Common Work Results - Electrical.
.2 Mount receptacles at pedestals as indicated.

END OF SECTION

PART 1 GENERAL

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 26 05 00 - Common Work Results – Electrical.

PART 2 PRODUCTS

2.1 BREAKERS GENERAL

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

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

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

.4 Circuit breakers to have minimum symmetrical rms interrupting capacity rating as indicated.

.5 Circuit breakers and mounting hardware to suit existing panels.

2.2 THERMAL MAGNETIC BREAKERS

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

PART 3 EXECUTION

3.1 INSTALLATION

.1 Install circuit breakers and mounting hardware.

.2 Complete type-written directory.

.3 Install lock on devices as indicated.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCES

.1 American National Standards Institute (ANSI)

.1 ANSI C82.1, Electric Lamp Ballasts-Line Frequency Fluorescent Lamp Ballast.

.2 ANSI C82.4, Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps.

.2 American National Standards Institute/Institute of Electrical and Electronics Departmental representatives (ANSI/IEEE)

.1 ANSI/IEEE C62.41, Surge Voltages in Low-Voltage AC Power Circuits.

.3 American Society for Testing and Materials (ASTM)

.1 ASTM F1137, Specification for Phosphate/Oil and Phosphate/Organic Corrosion Protective Coatings for Fasteners.

.4 United States of America, Federal Communications Commission (FCC)

.1 FCC (CFR47) EM and RF Interference Suppression.

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 45 00 - Testing and Quality Control.

1.3 SUBMITTALS

.1 Provide manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 DELIVERY, STORAGE AND HANDLING

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

.2 Deliver materials to site in original factory packaging, labeled with manufacturer's name, address.

.3 Divert unused metal materials from landfill to metal recycling facility.

1.5 ACCEPTABLE PRODUCTS

.1 Luminaires described on the drawings identify quality, performance criteria and other parameters, as indicated for this project. Named fixtures are acceptable with modifications and accessories, as indicated.

.2 Fixtures from other manufacturers may be acceptable provided:

.1 Appearance and lighting performance are similar.

.2 Quality is equal or better.

.3 Lamp and ballast criteria remain the same.

.4 The fixture is provided with modifications and accessories to provide a complete product in keeping with the intent of the project.

.5 Approval in writing is obtained from the Departmental Representative to the supplier/manufacturer 5 days prior to tender closing date.

PART 2 PRODUCTS

2.1 LAMPS

.1 T8 fluorescent lamps: 32W, medium bi-pin, instant start, 3500 K, 30000 hour lamp life, 2950 initial lumens, CRI 80 minimum.

2.2 BALLASTS

.1 T8 fluorescent ballast: CBM and CSA certified, energy efficient type, IC electronic.

.1 Rating: voltage as indicated, 60 Hz, as indicated, for use with 2-32W, T8 octron imperial lamps.

.2 RFI/EMI suppression circuit to: FCC (CFR47) Part 18, sub-part C, Class A and Part 15, sub-part B, Class B.

.3 Totally encased and designed for 40 °C ambient temperature.

.4 Power factor: minimum 98 % with 98% of rated lamp lumens.

.5 Crest factor: 1.5 maximum.

.6 Capacitor: thermally protected.

.7 Thermal protection: non-resettable on coil.

.8 Harmonics: 10 % maximum THD.

.9 Operating frequency of electronic ballast: 40 khz minimum.

.10 Total Circuit Power: 62 Watts.

.11 Ballast Factor: greater than 0.88.

.12 Sound rated: Class A.

.13 Mounting: integral with luminaire.

.14 Be warranted by manufacturer for five years.

2.3 FINISHES

.1 Light fixture finish and construction to meet ULC listings and CSA certifications related to intended installation.

2.4 LUMINAIRES

.1 As indicated on drawings. Provide 10% spare lamps of each type used (minimum of two).

2.5 OPTICAL CONTROL DEVICES

.1 As indicated in luminaire schedule on drawings.

PART 3 EXECUTION

3.1 INSTALLATION

.1 Locate and install luminaires as indicated. Install lamps in all fixtures. Connect to branch circuit.

3.2 LUMINAIRE ALIGNMENT

.1 Align luminaires mounted individually parallel or perpendicular to building grid lines.

3.3 FIELD QUALITY CONTROL

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

END OF SECTION

PART 1 GENERAL

1.1 SCOPE OF WORK

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

1.2 SECTION INCLUDES

.1 Commissioning of all building electrical systems and component including:

.1 Testing and adjustment.
.2 Demonstrations and Training.
.3 Instructions of all procedures for Departmental personnel.
.4 Updating as-built data.
.5 Coordination of Operation and Maintenance material.

1.3 RELATED SECTION

.1 Section 01 77 00 - Closeout Procedures.

.2 Section 26 05 00 - Common Work Results - Electrical.

1.4 REFERENCES

.1 CSA (Canadian Standards Association).

.2 Underwriters Laboratories of Canada.

1.5 QUALITY ASSURANCE

.1 Provide qualified trades persons, certified testing agencies, factory trained and approved by the Departmental Representative.

.2 Submit the names of all personnel to be used during the Commissioning activities for Departmental Representative's Approval.

1.6 COMMISSIONING

.1 The purpose of the commissioning process is to fully test all building systems including architectural, mechanical and electrical components and operating procedures by challenging these systems to realistic operation conditions.

.2 The Commissioning activities shall be coordinated by the General Contractor.

.3 Commissioning activities for the electrical systems must have available up to date as-built drawing information and accurate Operations and Maintenance Manuals. These documents shall be a major part of this activity.

.4 Contractor shall be responsible to update all documentation with information and any changes duly noted during the Commissioning exercise.

.5 Contractor shall arrange for all outside suppliers, equipment manufacturers, test agencies and others as identified in the commissioning sections of this specification. The cost associated with this requirement shall be included as part of the tender price.

1.7 SUBMITTALS

.1 A commissioning document shall be prepared by the Departmental Representative prior to conducting these activities for use by the Commissioning Team.

.2 The electrical sub-contractor shall be responsible for ensuring all activities are properly documented in this manual and coordinated through the General Contractor.

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

1.8 PREPARATION

.1 Provide test instruments required for all activities as defined in the commissioning documents.

.2 Verify all systems are in compliance with the requirements of the commissioning documents prior to the pre-commissioning check out operation.

.3 Confirm all scheduled activities have identified personnel available.

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

1.9 SYSTEM DESCRIPTION

.1 Perform all start up operations, control adjustment, trouble shooting, servicing and maintenance of each item of equipment as defined in the commissioning documentation.

.2 Departmental Representative will provide list of personnel to receive instructions and will coordinate their attendance at agreed upon times.

.3 Prepare and insert additional data in the operations and maintenance manuals and update as-built drawings when need for additional data becomes apparent during the commissioning exercise.

.4 Where instruction is specified in the commissioning manual, instruct personnel in all phases of operation and maintenance using operation and maintenance manuals as the basis of instruction.

.5 Conduct presentation on premises. Departmental Representative will provide space.

1.10 FINAL REPORT

.1 This trade shall assemble all testing data and commissioning reports and submit them to the Departmental Representative.

.2 Each form shall bear signature of recorder, and that of supervisor of reporting organizer.

1.11 SCHEDULE OF ACTIVITIES

.1 Commissioning activities shall be conducted based on pre-established schedule with all members of the commissioning team.

.2 In addition, there will be two meetings held through the contract duration to introduce the parties of the commissioning team, establish the schedules and deadlines for the various activities and review the Commissioning Manual.

.3 Adhering to the established schedule is very important as the coordination and scheduling of the participants will be difficult to alter once this is established. Close coordination of this schedule is important.

.4 In the event project cannot be commissioned in the allotted time slot, the contractor shall pay for all costs associated with assembling the Commissioning Team at a later date. If the contractor has not performed his duties to reach commissioning stage as outlined earlier, he will incur all expenses of other trades and the Commissioning Team due to his non-compliance.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.3 Section 32 12 16 - Asphalt Paving.

1.2 REFERENCES

.1 American Society for Testing and Materials (ASTM)
.1 ASTM D4791-05, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.

1.3 SAMPLES

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

.2 Allow continual sampling by Departmental Representative during production.

.3 Provide Departmental Representative with access to source and processed material for sampling.

.4 Install sampling facilities at discharge end of production conveyor, to allow Departmental Representative to obtain representative samples of items being produced. Stop conveyor belt when requested by Departmental Representative to permit full cross section sampling.

.5 Pay cost of sampling and testing of aggregates which fail to meet specified requirements.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Divert unused granular materials from landfill to local quarry facility as approved by Departmental Representative.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Aggregate quality: sound, hard, durable material free from soft, thin, elongated or laminated particles, organic material, clay lumps or minerals, or other substances that would act in deleterious manner for use intended.

.2 Flat and elongated particles of coarse aggregate: to ASTM D4791.

.1 Greatest dimension to exceed five times least dimension.

.3 Fine aggregates satisfying requirements of applicable section to be one, or blend of following:
.1 Natural sand.
.2 Manufactured sand.
.3 Screenings produced in crushing of quarried rock, boulders, gravel or slag.

.4 Coarse aggregates satisfying requirements of applicable section to be one of or blend of following:
.1 Crushed rock.
.2 Gravel and crushed gravel composed of naturally formed particles of stone.
.3 Light weight aggregate, including slag and expanded shale.

2.2 SOURCE QUALITY CONTROL

.1 Inform Departmental Representative of proposed source of aggregates and provide access for sampling at least 2 weeks prior to commencing production.

.2 If, in opinion of Departmental Representative, materials from proposed source do not meet, or cannot reasonably be processed to meet, specified requirements, locate an alternative source or demonstrate that material from source in question can be processed to meet specified requirements.

.3 Advise Departmental Representative 2 weeks in advance of proposed change of material source.

.4 Acceptance of material at source does not preclude future rejection if it fails to conform to requirements specified, lacks uniformity, or if its field performance is found to be unsatisfactory.

PART 3 - EXECUTION

3.1 PREPARATION

.1 Aggregate source preparation
.1 Prior to excavating materials for aggregate production, clear and grub area to be worked, and strip unsuitable surface materials. Dispose of cleared, grubbed and unsuitable materials as directed by Departmental Representative.
.2 Where clearing is required, leave screen of trees between cleared area and roadways as directed.
.3 Clear, grub and strip area ahead of quarrying or excavating operation sufficient to prevent contamination of aggregate by deleterious materials.

.4 When excavation is completed dress sides of excavation to nominal 1.5:1 slope, and provide drains or ditches as required to prevent surface standing water.

.5 Trim off and dress slopes of waste material piles and leave site in neat condition.

.2 Processing

.1 Process aggregate uniformly using methods that prevent contamination, segregation and degradation.

.2 Blend aggregates, if required, to obtain gradation requirements, percentage of crushed particles, or particle shapes, as specified. Use methods and equipment approved by Departmental Representative.

.3 Wash aggregates, if required to meet specifications. Use only equipment approved by Departmental Representative.

.4 When operating in stratified deposits use excavation equipment and methods that produce uniform, homogeneous aggregate.

.3 Handling

.1 Handle and transport aggregates to avoid segregation, contamination and degradation.

.4 Stockpiling

.1 Stockpile aggregates on site in locations as indicated unless directed otherwise by Departmental Representative. Do not stockpile on completed pavement surfaces.

.2 Stockpile aggregates in sufficient quantities to meet Project schedules.

.3 Stockpiling sites to be level, well drained, and of adequate bearing capacity and stability to support stockpiled materials and handling equipment.

.4 Except where stockpiled on acceptably stabilized areas, provide compacted sand base not less than 300 mm in depth to prevent contamination of aggregate. Stockpile aggregates on ground but do not incorporate bottom 300 mm of pile into Work.

.5 Separate different aggregates by strong, full depth bulkheads, or stockpile far enough apart to prevent intermixing.

.6 Do not use intermixed or contaminated materials. Remove and dispose of rejected materials as directed by Departmental Representative within 48 hours of rejection.

.7 Stockpile materials in uniform layers of thickness as follows:

.1 Max 1.5 m for coarse aggregate and base course materials.

.2 Max 1.5 m for fine aggregate and sub-base materials.

.3 Max 1.5 m for other materials.

.8 Uniformly spot-dump aggregates delivered to stockpile in trucks and build up stockpile as specified.

.9 Do not cone piles or spill material over edges of piles.

.10 Do not use conveying stackers.

.11 During winter operations, prevent ice and snow from becoming mixed into stockpile or in material being removed from stockpile.

3.2 CLEANING

.1 Leave aggregate stockpile site in tidy, well drained condition, free of standing surface water.

.2 Leave any unused aggregates in neat compact stockpiles as directed by Departmental Representative.

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

PART 1 - GENERAL

1.1 DESCRIPTION

.1 This section specifies the requirements for the supplying, producing and placing crushed gravel for quarried stone as a granular base course to lines, grades and typical cross sections indicated, or as directed by Departmental Representative.

1.2 REFERENCES

.1 ASTM C 117-04, Test method for material finer than 0.075 mm sieve in mineral aggregates by washing.

.2 ASTM C 131-06. Test method for resistance to degradation of small size coarse aggregate by abrasion and impact in the Los Angeles machine.

.3 ASTM C 136-6, Method for sieve analysis of fine and coarse aggregates, CAN/CGSB-8.2-M88, Sieves testing, woven wire, metric.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Deliver and stockpile aggregates as directed by Departmental Representative.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Granular base fill (Class “A”) will consist of clean, hard, durable crushed gravel or stone, free from shale, clay, friable materials, organic matter and other deleterious substances and graded within the following limits when tested to ASTM C136 and ASTM C117 and giving a smooth curve without sharp breaks when plotted on a semi-chart.

ASTM Sieve Designation	% Passing
19.0 mm	100
9.51 mm	50-80
4.76 mm	35-60
1.20 mm	15-35
300 um	7-20
75 um	3-6 (Pit Source)
	3-8 (Rock Source)

.2 Physical Requirements for Class “A”:

.1 Liquid Limit ASTM D4318: Maximum 25

.2 Plasticity Index ASTM D4318: Maximum 0

.3 Los Angeles Abrasion ASTM C131-81 Maximum % loss by weight: 35

.4 Crushed Fragments: 50%. The percent of crushed particles will be determined by examining the fraction retained on the 4.76mm sieve and dividing the weight of the crushed particles by the total weight retained on the 4.76 mm sieve.

.5 CBR: ASSHTO T193-72 Min 100 when compacted to 100% of AASHTO T180-74 Method D.

.3 Granular base fill (Class "B") will consist of clean, hard, durable crushed gravel or stone, free from shale, clay, friable materials, organic matter and other deleterious substances and graded within the following limits when tested to ASTM C136 and ASTM C117 and giving a smooth curve without sharp breaks when plotted on a semi-chart.

ASTM Sieve Designation	% Passing
50.8 mm	100
25.4 mm	50 - 100
4.76 mm	20 - 55
1.20 mm	10 - 35
300 um	5 - 20
75 um	2 - 6 (Pit Source) 2 - 8 (Rock Source)

.4 Physical Requirements for Class “B”:

.1 Liquid Limit ASTM D4318: Maximum 25

.2 Plasticity Index ASTM D4318: Maximum 0

.3 Los Angeles Abrasion ASTM C131-81 Maximum % loss by weight: 35

.4 Crushed Fragments: 50%. The percent of crushed particles will be determined by examining the fraction retained on the 4.76 mm sieve and dividing the weight of the crushed particles by the total weight retained on the 4.76 mm sieve.

.5 CBR: ASSHTO T193-72 Min 100 when compacted to 100% of AASHTO T180-74 Method D.

.5 Materials from deposits acceptable as to the quality of the particles, but deficient in sizes to provide the required gradation, may be accepted if the contractor furnishes and satisfactorily incorporates into the product supplementary

sizes from other sources to produce the required grading. If the deficiencies occur in Class “A” or Class "B" materials, corrections may be attempted by crushing to a smaller maximum particle size. In that event, the Departmental Representative will furnish special grading limits on the actual maximum particle size.

.6 Material shall be considered unsuitable even though particle sizes are within the specified gradation limits if particle shape or any other characteristic precludes satisfactory compaction or fails to provide a roadway suitable for traffic. If, in the opinion of the Departmental Representative, an improved particle shape can be achieved by using a different crushing unit for that proposed by the contractor, then the Contractor shall supply and use a crushing unit of the type directed by the Departmental Representative.

.7 Class “A” and Class "B" shall be processed by crushing and, when necessary, to eliminate surplus fines passing the 4.76 mm sieve, shall be screened and washed.

PART 3 - EXECUTION

3.1 INSTALLATION

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

.2 Placing:

.1 Construct granular base to depth and grade in area indicated.

.2 Ensure no frozen material is placed.

.3 Place material only on clean unfrozen surface, free from snow and ice.

.4 The contractor shall place all granular bases in such a manner as to prevent contamination by other materials and to prevent segregation. If, in the opinion of the Departmental Representative, the methods and techniques used by the Contractor cannot overcome contamination or segregation, then the Departmental Representative may direct a modification in these methods which may require the use of an approved spreader box or other acceptable device.

.5 All granular bases shall be placed in uniform layers such that the thickness of the compacted layer does not exceed 50 mm.

.6 Prior to closing down operations for each working

day, all granular materials shall be bladed and compacted to the specified density.

.7 The materials shall be sprayed with water when and as directed by the Departmental Representative, either to aid compaction or reduce dust nuisance or both. When water is added to aid compaction, it shall be applied immediately ahead of the compacting unit

.8 Each layer of granular base shall be bladed shaped and compacted as necessary to produce the required profile and cross-section. The finished surface shall not deviate at any place on a 3 m straight edge by more than 10mm for Class “A” and Class "B". The upper layer shall be maintained to these tolerances and to the specified density until compaction of the contract. This may require keeping the moisture content at the appropriate value during periods of dry weather in addition to regarding and re-compacting as frequently as may be deemed necessary by the Departmental Representative.

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

.4 Compaction Equipment:

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

.5 Compacting:

.1 All Class “A” and Class "B" materials shall be compacted to not less than 100% of the maximum Standard Proctor Dry Density ASTM D698-07e1 Method D.

.2 Compaction operations shall be carried out as closely as possible behind the placing and spreading operation. At the end of each working day, all materials placed shall have been compacted to the specified density.

.3 Each layer of material shall be graded and compacted as specified before the next layer is placed.

.4 Where necessary to obtain the required compaction, the contractor shall apply sufficient water by means of an approved distributor.

3.2 INSTALLATION

.1 Testing of materials and compaction will be carried out by testing

laboratory designated by the Departmental Representative.

.2 Contractor will pay costs for inspection and testing.

.3 Sieve Analysis: proposed granular material will be tested to confirm suitability for intended use and conformity with specifications.

.4 Frequency of Tests: to be determined by the Departmental Representative.

3.3 TOLERANCES

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

3.4 PROTECTION

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

PART 1 - GENERAL

1.1 SUMMARY

.1 This method covers measurement of loss of Marshall Stability resulting from action of water on compacted asphalt paving mixtures containing penetration grade asphalt cement.

.2 Numerical index of retained stability is obtained by comparing stability of specimens determined in accordance with usual Marshall procedures with stability of specimens that have been immersed in water for prescribed period.

1.2 RELATED SECTIONS

.1 Section 32 12 16 - Asphalt Paving.

1.3 REFERENCES

.1 American Association of State Highway and Transportation Officials (AASTHO)

.1 AASHTO T245-97(2001), Resistance to Plastic flow of Bituminous Mixtures Using Marshall Apparatus.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Representative samples of each asphalt paving mixture proposed for use on Project.

2.2 EQUIPMENT

.1 One or more water baths with automatic controls for immersing specimens. Baths normally used for Marshall test are suitable for test.

.2 Scale and water bath with suitable accessory equipment for weighing test specimens in air and in water to determine their densities.

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

.4 Apparatus required to conduct Marshall test.

PART 3 - EXECUTION

3.1 PREPARATION OF TEST SPECIMENS

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

3.2 TEST PROCEDURE

.1 Do Marshall testing in accordance with AASHTO T245, except where specified otherwise.

.2 Weigh each specimen in air and in water. Weigh in water as rapidly as possible to minimize absorption.

.3 Calculate specific gravity of each specimen as follows:
- .1 Specific Gravity = A / (A-B)
- .2 Where A = weight of specimen in air in grams
- .3 B = weight of specimen in water in grams

.4 Sort each set of 8 specimens into 2 groups of 4 specimens each so that average specific gravity of specimens in group 1 is essentially same as that of group 2.

.5 Test group 1 specimens for Marshall stability. Calculate S1 = Marshall stability of group 1 (average).

.6 Immerse group 2 specimens in water for 24 h at 60°C, then test immediately for Marshall stability. Calculate S2 = Marshall stability of group 2 (average).

3.3 TEST REPORT

.1 Report test results to Departmental Representative.

.2 Report numerical index of retained stability as resistance of asphaltic paving mixtures to detrimental effect of water, expressed as percentage of original stability retained after immersion period.

.3 Calculate index as follows:
- .1 Index of Retained Stability = S2 / S1 x 100.

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Materials and installation for asphalt concrete paving.

1.2 RELATED SECTIONS

.1 Section 01 29 83 - Payment Procedures for Testing Laboratory Services.

.2 Section 01 33 00 - Submittal Procedures.

.3 Section 01 35 29 - Health and Safety Requirements

.4 Section 31 05 17 - Aggregate Materials.

.5 Section 32 12 10 - Marshall Immersion Test for Bitumen.

1.3 REFERENCES

.1 American Association of State Highway and Transportation Officials (AASHTO)
.1 AASHTO M320-02, Standard Specification for Performance Graded Asphalt Binder.
.2 AASHTO R29-02, Standard Specification for Grading or Verifying the Performance Graded of an Asphalt Binder.
.3 AASHTO T245-97(2001), Resistance to Plastic flow of Bituminous Mixtures Using Marshall Apparatus.

.2 Asphalt Institute (AI)
.1 AI MS2-1994 Sixth Edition, Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types.

.3 American Society for Testing and Materials International, (ASTM)
.1 ASTM C88-05, Standard Test Method for Soundness of Aggregates by Use of Sodium Sulphate or Magnesium Sulphate.
.2 ASTM C117-04, Standard Test Method for Material Finer Than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.
.3 ASTM C123-04, Standard Test Method for Lightweight Particles in Aggregate.
.4 ASTM C127-07, Standard Test Method for Specific Gravity and Absorption of Coarse Aggregate.
.5 ASTM C128-07a, Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate.
.6 ASTM C131-06, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
.7 ASTM C136-06, Standard Method for Sieve Analysis of Fine and Coarse Aggregates.
.8 ASTM C207-06, Standard Specification for Hydrated Lime for Masonry Purposes.

.9 ASTM D995-95b(2002), Standard Specification for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures.
.10 ASTM D2419-02, Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
.11 ASTM D3203-05, Standard Test Method for Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures.
.12 ASTM D4791-05e1, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.

.4 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-8.2-M88, Sieves Testing, Woven Wire, Metric.
.2 CAN/CGSB-16.3-M90, Asphalt Cements for Road Purposes.

1.4 PRODUCT DATA

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

.2 Submit viscosity-temperature chart for asphalt cement to be supplied showing either Saybolt Furol viscosity in seconds or Kinematic Viscosity in centistokes, temperature range 105 to 175 degrees C at least 2 weeks prior to beginning Work.

.3 Submit manufacturer's test data and certification that asphalt cement meets requirements of this Section.

.4 Submit asphalt concrete mix design and trial mix test results to Departmental Representative for review at least 2 weeks prior to beginning Work.

1.5 SAMPLES

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

.2 Inform Departmental Representative of proposed source of aggregates and provide access for sampling at least 2 weeks prior to beginning Work.

.3 Submit samples of following materials proposed for use at least 2 weeks prior to beginning Work.
.1 One 5 L container of asphalt cement.

.4 If materials have been tested by an independent testing laboratory within previous 6 months and have successfully passed tests equal to requirements of this specification, disregard above instructions and submit test certificates from testing laboratory showing suitability of materials for this project.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver and stockpile aggregates in accordance with Section 31 05 17 - Aggregate Materials. Stockpile minimum 50% of total amount of aggregate required before beginning asphalt mixing operation.

.2 When necessary to blend aggregates from one or more sources to produce required gradation, do not blend in stockpiles.

.3 Stockpile fine aggregate separately from coarse aggregate, although separate stockpiles for more than two mix components are permitted.

.4 Provide approved storage, heating tanks and pumping facilities for asphalt cement.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Performance graded asphalt cement: to AASHTO M320, grade PG 58 - 28 when tested to AASHTO R29.

.2 Aggregates: in accordance with Section 31 05 17 - Aggregate Materials: General and following requirements:

.1 Crushed stone or gravel.

.2 Gradations: within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.2.

.3 Table

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

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

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

.6 Do not use aggregates having known polishing characteristics in mixes for surface courses.

.7 Sand equivalent: ASTM D2419. Min: 50.

.8 Magnesium Sulphate soundness: to ASTM C88. Max% loss

by mass:

.1 Coarse aggregate surface course: 12%.
.2 Coarse aggregate lower course: 12%.
.3 Fine aggregate, surface course: 16%.
.4 Fine aggregate, lower course: 16%.

.9 Los Angeles degradation: Grading B, to ASTM C131. Max % loss by mass:

.1 Coarse aggregate, surface course: 25%.
.2 Coarse aggregate, lower course: 35%.

.10 Absorption: to ASTM C127. Max % by mass:

.1 Coarse aggregate, surface course: 1.75%.
.2 Coarse aggregate, lower course: 2.00%.

.11 Loss by washing: to ASTM C117. Max % passing 0.075 mm sieve:

.1 Coarse aggregate, surface course: 1.5%.
.2 Coarse aggregate, lower course: 2.0%.

.12 Lightweight particles: to ASTM C123. Max % by mass less than 1.95 relative density:

.1 Surface course: 1.5%.
.2 Lower course: 3.0%.

.13 Flat and elongated particles: to ASTM D4791, (with length to thickness ratio greater than 5): Max % by mass:

.1 Coarse aggregate, surface course: 15%.
.2 Coarse aggregate, lower course: 15%.

.14 Crushed fragments: at least 60 % of particles by mass within each of following sieve designation ranges, to have at least 1 freshly fractured face. Material to be divided into ranges, using methods of ASTM C136.

Passing		Retained on
25 mm	to	12.5 mm
12.5 mm	to	4.75 mm

.15 Regardless of compliance with specified physical requirements, fine aggregates may be accepted or rejected on basis of past field performance.

.3 Mineral filler:

.1 Finely ground particles of limestone, hydrated lime, Portland cement or other approved non-plastic mineral matter, thoroughly dry and free from lumps.
.2 Add mineral filler when necessary to meet job mix aggregate gradation or as directed to improve mix properties.
.3 Mineral filler to be dry and free flowing when added to aggregate.

2.2 EQUIPMENT

.1 Pavers: mechanical grade controlled self-powered pavers capable of spreading mix within specified tolerances, true to line, grade and

crown indicated.

.2 Rollers: sufficient number of type and weight to obtain specified density of compacted mix.

.3 Vibratory rollers:
.1 Minimum drum diameter: 1200 mm.
.2 Maximum amplitude of vibration (machine setting): 0.5 mm for lifts less than 50 mm thick.

.4 Haul trucks: sufficient number and of adequate size, speed and condition to ensure orderly and continuous operation and as follows:
.1 Boxes with tight metal bottoms.
.2 Covers of sufficient size and weight to completely cover and protect asphalt mix when truck fully loaded.
.3 In cool weather or for long hauls, insulate entire contact area of each truck box.

.5 Hand tools:
.1 Lutes or rakes with covered teeth for spreading and finishing operations.
.2 Tamping irons having mass not less than 12 kg and bearing area not exceeding 310 cm² for compacting material along curbs, gutters and other structures inaccessible to roller. Mechanical compaction equipment, when approved by Departmental Representative, may be used instead of tamping irons.
.3 Straight edges, 4.5 m in length, to test finished surface.

2.3 MIX DESIGN

.1 Mix design to be approved by Departmental Representative.
.2 Mix design to be developed by testing laboratory approved by Departmental Representative.

.3 Design of mix: by Marshall method to requirements below.
.1 Compaction blows on each face of test specimens: 75.

.2 Mix physical requirements:

Property	Roads
Marshall Stability at 60°C kN min	5.5 surface course 4.5 lower course
Flow Value mm	2-4
Air Voids in Mixture, %	3-5 surface course 2-6 lower course
Voids in Mineral Aggregate, % min	15 surface course 13 lower course

Index of Retained Stability % minimum	75

.3 Measure physical requirements as follows:

.1 Marshall load and flow value: to AASHTO T245.

.2 Compute void properties on basis of bulk specific gravity of aggregate to ASTM C127 and ASTM C128. Make allowance for volume of asphalt absorbed into pores of aggregate.

.3 Air voids: to ASTM D3203.

.4 Voids in mineral aggregates: to AI MS2, chapter 4.

.5 Index of Retained Stability: measure in accordance with Section 32 12 10 - Marshall Immersion Test for Bitumen.

.4 Do not change job-mix without prior approval of Departmental Representative. When change in material source proposed, new job-mix formula will be provided to be approved to be reviewed by Departmental Representative.

.5 Return plant dust collected during processing to mix in quantities acceptable to Departmental Representative.

PART 3 - EXECUTION

3.1 PLANT AND MIXING REQUIREMENTS

.1 Batch and continuous mixing plants:

.1 To ASTM D995.

.2 Feed aggregates from individual stockpiles through separate bins to cold elevator feeders. Do not load frozen materials into bins.

.3 Feed cold aggregates to plant in proportions to ensure continuous operations.

.4 Calibrate bin gate openings and conveyor speeds to ensure mix proportions are achieved.

.5 Before mixing, dry aggregates to moisture content not greater than 1% by mass or to lesser moisture content if required to meet mix design requirements.

.6 Immediately after drying, screen aggregates into hot storage bins in sizes to permit recombining into gradation meeting job-mix requirements.

.7 Store hot screened aggregates in manner to minimize segregation and temperature loss.

.8 Heat asphalt cement and aggregate to mixing temperature directed by Departmental Representative. Do not heat asphalt cement above maximum temperature indicated on temperature-viscosity chart.

.9 Make available current asphalt cement viscosity data at plant. With information relative to viscosity of asphalt being used, Departmental Representative to review temperature of completed mix at plant and at paver after considering hauling and placing conditions.

.10 Maintain temperature of materials within 5 degrees C of

specified mix temperature during mixing.

.11 Mixing time:

.1 In batch plants, both dry and wet mixing times as directed by Departmental Representative. Continue wet mixing as long as necessary to obtain thoroughly blended mix but not less than 30s or more than 75s.

.2 In continuous mixing plants, mixing time as directed by Departmental Representative but not less than 45s.

.3 Do not alter mixing time unless directed by Departmental Representative.

.2 Dryer drum mixing plant:

.1 To ASTM D995.

.2 Load aggregates from individual stockpiles to separate cold feed bins. Do not load frozen materials into bins.

.3 Feed aggregates to burner end of dryer drum by means of multi-bin cold feed unit and blend to meet job-mix requirements by adjustments of variable speed feed belts and gates on each bin.

.4 Meter total flow of aggregate by an electronic weigh belt system with indicator that can be monitored by plant operator and which is interlocked with asphalt pump so that proportions of aggregate and asphalt entering mixer remain constant.

.5 Provide for easy calibration of weighing systems for aggregates without having material enter mixer.

.6 Calibrate bin gate openings and conveyor speeds to ensure mix proportions are achieved. Calibrate weigh bridge on charging conveyor by weighing amount of aggregate passing over weigh bridge in set amount of time. Difference between this value and amount shown by plant computer system to differ by not more than plus or minus 2%.

.7 Make provision for conveniently sampling full flow of materials from cold feed.

.8 Provide screens or other suitable devices to reject oversize particles or lumps of aggregate from cold feed prior to entering drum.

.9 Provide system interlock stop on feed components if either asphalt or aggregate from bin stops flowing.

.10 Accomplish heating and mixing of asphalt mix in approved parallel flow dryer-mixer in which aggregate enters drum at burner end and travels parallel to flame and exhaust gas stream. Control heating to prevent fracture of aggregate or excessive oxidation of asphalt. Equip system with automatic burner controls and provide for continuous temperature sensing of asphalt mixture at discharge, with printing recorder that can be monitored by plant operator. Submit printed record of mix temperatures at end of each day.

.11 Mixing period and temperature to produce uniform mixture in which particles are thoroughly coated, and moisture content of material as it leaves mixer to be less than 2%.

.3 Temporary storage of hot mix:

.1 Provide mix storage of sufficient capacity to permit continuous operation and designed to prevent segregation.
.2 Do not store asphalt mix in storage bins in excess of 3 hours.

.4 Mixing tolerances:
.1 Permissible variation in aggregate gradation from job mix (percent of total mass).

4.75 mm sieve and larger	5.0
2.00 mm sieve	4.0
0.425 mm sieve	3.0
0.180 mm sieve	2.0
0.075 mm sieve	1.0

.2 Permissible variation of asphalt cement from job mix: 0.25%.
.3 Permissible variation of mix temperature at discharge from plant: 5 degrees C.

3.2 PREPARATION

.1 Remove existing asphalt and/or concrete slab on grade as noted on the drawings or as otherwise directed by Departmental Representative.

3.3 TRANSPORTATION OF MIX

.1 Transport mix to job site in vehicles cleaned of foreign material.

.2 Paint or spray truck beds with limewater, soap or detergent solution, or non petroleum based commercial product, at least daily or as required. Elevate truck bed and thoroughly drain. No excess solution to remain in truck bed.

.3 Schedule delivery of material for placing in daylight, unless Departmental Representative approves artificial light.

.4 Deposit mix from surge or storage silo to trucks in multiple drops to reduce segregation. Do not dribble mix into trucks.

.5 Deliver material to paver at uniform rate and in an amount within capacity of paving and compacting equipment.

.6 Deliver loads continuously in covered vehicles and immediately spread and compact. Deliver and place mixes at temperature within range as directed by Departmental Representative, but not less than 135 degrees C.

3.4 PLACING

.1 Obtain Departmental Representative's approval of subgrade material prior to placing asphalt.

.2 Apply asphalt bituminous tack coat as directed by Departmental Representative, prior to asphalt placement.

.3 Place asphalt concrete to thicknesses, grades and lines as indicated.

Bevel all perimeter edges of asphalt as directed by the Departmental Representative.

.4 Placing conditions:
.1 Place asphalt mixtures only when air temperature is above 5 degrees C.
.2 When temperature of surface on which material is to be placed falls below 10 degrees C, provide extra rollers as necessary to obtain required compaction before cooling.
.3 Do not place hot-mix asphalt when pools of standing water exist on surface to be paved, during rain, or when surface is damp.

.5 Place asphalt concrete in compacted lifts of thickness as indicated.
.1 Lower course in 1 layer of 40 mm.
.2 Surface course in 1 layer of maximum 40 mm.

.6 Where possible do tapering and leveling where required in lower lifts. Overlap joints by not less than 300 mm.

.7 Spread and strike off mixture with self propelled mechanical finisher.
.1 Construct longitudinal joints and edges true to line markings. Departmental Representative to establish lines for paver to follow parallel to centerline of proposed pavement. Position and operate paver to follow established line closely.
.2 When using pavers in echelon, have first paver follow marks or lines, and second paver follow edge of material placed by first paver. Work pavers as close together as possible and in no case permit them to be more than 30 m apart.
.3 Maintain constant head of mix in auger chamber of paver during placing.
.4 If segregation occurs, immediately suspend spreading operation until cause is determined and corrected.
.5 Correct irregularities in alignment left by paver by trimming directly behind machine.
.6 Correct irregularities in surface of pavement course directly behind paver. Remove by shovel or lute excess material forming high spots. Fill and smooth indented areas with hot mix. Do not broadcast material over such areas.
.7 Do not throw surplus material on freshly screeded surfaces.

.8 When hand spreading is used:
.1 Distribute material uniformly. Do not broadcast material.
.2 During spreading operation, thoroughly loosen and uniformly distribute material by lutes or covered rakes. Reject material that has formed into lumps and does not break down readily.
.3 After placing and before rolling, check surface with templates and straightedges and correct irregularities.
.4 Provide heating equipment to keep hand tools free from asphalt. Control temperature to avoid burning material. Do not use

tools at higher temperature than temperature of mix being placed.

3.5 COMPACTING

.1 Do not change rolling pattern unless mix changes or lift thickness changes. Change rolling pattern only as directed by Departmental Representative.

.2 Roll asphalt continuously to density not less than 98% of blow Marshall density to AASHTO T245

.3 General:

.1 Provide at least two rollers and as many additional rollers as necessary to achieve specified pavement density. When more than two rollers are required, one roller must be pneumatic tired type.

.2 Start rolling operations as soon as placed mix can bear weight of roller without excess displacement of material or cracking of surface.

.3 Operate roller slowly initially to avoid displacement of material. Do not exceed 5 km/h for breakdown and intermediate rolling for static steel-wheeled and pneumatic tired rollers. Do not exceed 9 km/h for finish rolling.

.4 For lifts 50 mm thick and greater, adjust speed and vibration frequency of vibratory rollers to produce minimum of 25 impacts per metre of travel. For lifts less than 50 mm thick, impact spacing not to exceed compacted lift thickness.

.5 Overlap successive passes of roller by minimum of 200 mm and vary pass lengths.

.6 Keep wheels of roller slightly moistened with water to prevent pick-up of material but do not over-water.

.7 Do not stop vibratory rollers on pavement that is being compacted with vibratory mechanism operating.

.8 Do not permit heavy equipment or rollers to stand on finished surface before it has been compacted and has thoroughly cooled.

.9 After traverse and longitudinal joints and outside edge have been compacted, start rolling longitudinally at low side and progress to high side. Ensure that all points across width of pavement receive essentially equal numbers of passes of compactors.

.10 When paving in echelon, leave unrolled 50 to 75 mm of edge which second paver is following and roll when joint between lanes is rolled.

.11 Where rolling causes displacement of material, loosen affected areas at once with lutes or shovels and restore to original grade of loose material before re-rolling.

.4 Breakdown rolling:

.1 Begin breakdown rolling with static steel wheeled roller vibratory roller immediately following rolling of transverse and longitudinal joint and edges.

.2 Operate rollers as close to paver as necessary to obtain adequate density without causing undue displacement.

.3 Operate breakdown roller with drive roll or wheel nearest finishing machine. When working on steep slopes or super-elevated sections use operation approved by Departmental Representative.
.4 Use only experienced roller operators.

.5 Intermediate rolling:
.1 Use pneumatic-tired, steel wheel or vibratory rollers and follow breakdown rolling as closely as possible and while paving mix temperature allows maximum density from this operation.
.2 Rolling to be continuous after initial rolling until mix placed has been thoroughly compacted.

.6 Finish rolling:
.1 Accomplish finish rolling with two-axle or three-axle tandem steel wheeled rollers while material is still warm enough for removal of roller marks. If necessary to obtain desired surface finish, use pneumatic-tired rollers as directed by Departmental Representative.
.2 Conduct rolling operations in close sequence.

3.6 JOINTS

.1 General:
.1 Remove surplus material from surface of previously laid strip. Do not deposit on surface of freshly laid strip.
.2 Paint contact surfaces of existing structures such as Portland cement concrete deck, manholes, curbs or gutters with bituminous material prior to placing adjacent pavement.

.2 Transverse joints:
.1 Offset transverse joint in succeeding lifts by at least 600 mm.
.2 Cut back to full depth vertical face and tack face with thin coat of hot asphalt prior to continuing paving.
.3 Compact transverse joints to provide smooth riding surface. Use methods to prevent rounding of compacted surface at joints.

.3 Longitudinal joints:
.1 Offset longitudinal joints in succeeding lifts by at least 150 mm.
.2 Cold joint is defined as joint where asphalt mix is placed, compacted and left to cool below 100 degrees C prior to paving of adjacent lane.
.1 If cold joint can not be avoided, cut back by saw cutting previously laid lane, by at least 150 mm, to full depth vertical face, and tack face with thin coat of hot asphalt of adjacent lane.
.3 Overlap previously laid strip with spreader by 25 to 50 mm.
.4 Before rolling, carefully remove and discard coarse aggregate in material overlapping joint with lute or rake.
.5 Roll longitudinal joints directly behind paving operation.
.6 When rolling with static or vibratory rollers, have most of drum width ride on newly placed lane with remaining 150 mm

extending onto previously placed and compacted lane.

.4 Construct bevel joints so that thinner portion of joint contains fine graded material obtained by changed mix design or by raking out coarse aggregate in mix. Place and compact joint so that joint is smooth and without visible breaks in grade.

.5 Construct butt joints as directed by Departmental Representative.

3.7 FINISH TOLERANCES

.1 Finished asphalt surface to be within 5 mm of design elevation but not uniformly high or low.

.2 Finished asphalt surface not to have irregularities exceeding 5 mm when checked with 4.5 m straight edge placed in any direction.

3.8 DEFECTIVE WORK

.1 Correct irregularities which develop before completion of rolling by loosening surface mix and removing or adding material as required. If irregularities or defects remain after final compaction, remove surface course promptly and lay new material to form true and even surface and compact immediately to specified density.

.2 Repair areas showing checking, rippling, or segregation. Adjust roller operation and screed settings on paver to prevent further defects such as rippling and checking of pavement.

PART 1 GENERAL

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

.3 Section 26 05 00 – Common Work Results - Electrical.

.4 Section 31 23 10 – Excavating, Trenching and Backfilling.

1.2 REFERENCES

.1 Canadian Standards Association (CSA)

.1 CSA C22.2 No. 211.1, Rigid Types EBI and DB2/ES2 PVC Conduit.

1.3 SUBMITTALS

.1 Submit WHMIS MSDS - Material Safety Data Sheets acceptable to Labour Canada, and Health and Welfare Canada for solvent cement. Indicate VOC content.

.2 Submit manufacturer's information data sheets and instructions.

1.4 DELIVERY, STORAGE AND HANDLING

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

1.5 RECORD DRAWINGS

.1 Provide record drawings, including details of pipe and cable duct materials, maintenance and operating instructions.

PART 2 PRODUCTS

2.1 PVC DUCTS AND FITTINGS

.1 Rigid PVC duct: to CSA C22.2 No. 211.1, type rigid PVC for direct burial with minimum wall thickness at any point of 2.8 mm. Nominal length: 3.0 m plus or minus 12 mm. Type DB2 (thinwall) PVC conduits unacceptable.

.2 Rigid PVC split ducts as required.

.3 Rigid PVC bends, couplings, reducers, bell end fittings, plugs, caps, adaptors same product material as duct, to make complete installation.

.4 Rigid PVC 90° and 45° bends as required.

.5 Rigid PVC 5° angle couplings as required.

.6 Preformed, interlocking intermediate duct spacers for duct size as indicated.

2.2 SOLVENT WELD COMPOUND

.1 Solvent cement for PVC duct joints.

2.3 CABLE PULLING EQUIPMENT

.1 Use 6 mm stranded nylon pull rope tensile strength 5 kN.

2.4 MARKING TAPE

.1 150 mm wide, 4 mil, polyethylene marker tape in all trenches. Use red colored tape. Install at depth as per drawings.

PART 3 EXECUTION

3.1 INSTALLATION

.1 Install duct in accordance with manufacturer's instructions.

.2 Clean inside of ducts before laying.

.3 Ensure full, even support every 1.5 m throughout duct length.

.4 Slope ducts with 1 to 400 minimum slope.

.5 During construction, cap ends of ducts to prevent entrance of foreign materials.

.6 Pull through each duct wooden mandrel not less than 300 mm long and of diameter 6 mm less than internal diameter of duct, followed by stiff bristle brush to remove sand, earth and other foreign matter. Pull stiff bristle brush through each duct immediately before pulling-in cables.

.7 In each duct install pull rope continuous throughout each duct run with 3 m spare rope at each end.

.8 Install marking tape as indicated.

END OF SECTION

PART 1 GENERAL

1.1 RELATED SECTIONS

.1 Section 01 33 00 – Submittal Procedures.

.2 Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

.3 Section 26 05 00 - Common Work Results - Electrical.

.4 Section 26 05 21 - Wire and Cables 0-1000 V.

.5 Section 26 05 28 - Grounding - Secondary.

.6 Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.

1.2 REGULATORY REQUIREMENTS

.1 Coordinate and meet requirements of power supply authority. Ensure availability of power when required.

PART 2 PRODUCTS

2.1 MATERIAL

.1 Service mast: rigid galvanized steel conduit, suitable for attachment of support clamps, insulator rack, weatherhead, service drop fittings.

.2 Service mast support devices: as required by inspection authority.

.3 Weatherhead: galvanized steel to approval of supply authority.

.4 Service drop conductors: to Section 26 05 21 - Wires and Cables (0-1000 V), copper, type RW90 XLPE, size and number of conductors as indicated. Black insulation with minimum 25% carbon black for all conductors. Identify neutral conductor with white tape.

PART 3 EXECUTION

3.1 INSTALLATION

.1 Install service mast, insulator rack, weatherhead.

.2 Install service drop conductors allowing sufficient conductor length for connection to service equipment.

.3 Allow sufficient conductor length for connection to supply by power supply authority.

.4 Allow sufficient conductor length for drip loops.

.5 Make grounding connections in accordance with Section 26 05 28 - Grounding - Secondary.

.6 Install cables in mast.

.7 Provide support as required to secure mast

.8 Provide a drain hole in bottom of exterior LB and pack LB where entering building.

3.2 FIELD QUALITY CONTROL

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

.2 Perform additional tests as required by authority having jurisdiction.

END OF SECTION