PROJECT TITLE **Fort George National Historic Site of Canada, Blockhouse Restoration**
Niagara-on-the -Lake Ontario,
Parks Canada Agency, Southwestern Ontario Field Unit

PROJECT NUMBER PRO001504

PROJECT DATE 2018-07-11

End of Section

PART 1 GENERAL

Dwg. No.	Title	Issue No.	Rev. No.	Issue Date
ARCHITECTURAL				
A1	Overall Site Plan & Drawing List	2	-	07/11/18
A2	Location Map, Plan – Outer Redan and General Notes	2	-	07/11/18
A3	Octagonal Blockhouse Plans and Elevations	2	-	07/11/18
A4	Octagonal Blockhouse New Elevations and Details	2	-	07/11/18
A5	Octagonal Blockhouse Sections and Details	2	-	07/11/18
A6	Blockhouse No. 1 Plans and Elevations	2	-	07/11/18
A7	Blockhouse No. 3 Plans and Elevations	2	-	07/11/18
A8	Blockhouse No. 2 Plans	2	-	07/11/18
A9	Blockhouse No. 2 Elevations	2	-	07/11/18
A10	Blockhouse No. 1, 2 & 3 Roof Plans and Details	2	-	07/11/18
A11	Blockhouse No. 1, 2 & 3 Section and Details	2	-	07/11/18
A12	Blockhouse No. 1, 2 & 3 Details	2	-	07/11/18
A13	Blockhouse No. 1, 2 & 3 Details	2	-	07/11/18
ELECTRICAL				
E1	Overall Site Plan	2	-	07/11/18
E2	Octagonal Blockhouse	2	-	07/11/18
E3	Single Line Diagram, Legend, Schedules and Details	2	-	07/11/18
E4	Blockhouse No. 1 Plans and Elevations	2	-	07/11/18
E5	Blockhouse No. 3 Plans and Elevations	2	-	07/11/18
E6	Blockhouse No. 2 Plans	2	-	07/11/18
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End of Section

PART 1 GENERAL

1.1 Section Includes

.1 Description of the Work
.2 Location of site.
.3 Metric project.
.4 Site access.
.5 Contractor traffic route.
.6 Work sequence.
.7 Contractor use of premises.
.8 Heritage Protection Act
.9 References and codes.
.10 Engineer design.
.11 Hazardous material discovery.
.12 Verification.
.13 Building smoking environment.
.14 Special conditions.
.15 Site security.
.16 Protection of drawings.

1.2 Description of the Work

.1 Work of this Contract comprises project PRO001504 Fort George National Historic Site of Canada Blockhouse Restoration, Niagara on the Lake Ontario for Parks Canada as indicated on the drawings and specifications.

.2 The scope includes the removal and replacement of existing wood cladding, trim, windows and accessories on three rectangular Blockhouses # 1, 2 and 3 and the repair of the existing log structure and installation of new wood cladding, trim and accessories at the Octagonal Blockhouse.

.3 Additional scope includes:
.1 Regrading of site and drainage improvements around the Octagonal Blockhouse.
.2 Installation of a new decorative metal gate and hardware at the Outer Redan.

.4 The work shall include the provision of all labour, material, equipment, machinery and tools required to perform the work.

.5 Fort George National Historic Site of Canada is under the jurisdiction of Parks Canada Agency and overlooks the Niagara River, on the outskirts of Niagara-on-the-Lake. Within the fort palisades is a large grassed area, with paved walkways. Blockhouse 1, 2 and 3 and the Octagonal Blockhouse at Fort George are Recognized Federal Heritage Buildings. The designations are confined to the footprint of the buildings.

.1 Blockhouse 1 is a two-storey, squared log structure with an overhanging second storey, and a hipped roof clad in cedar shakes. Small windows and loopholes give a military appearance to the structure. The exterior log walls are clad in painted clapboard siding. An exterior staircase leads up to an upper floor entrance. The building measures about 60’-6” x 40’-5” at the ground floor with a gross floor area (GFA) of about 479 m^2.

.2 Blockhouse 2 is a two-storey, log structure with an overhanging second storey and a low, hipped-roof clad in cedar shakes. Loopholes and small shutters give a military appearance to the structure. The exterior log walls are clad in painted clapboard siding. An exterior staircase

at each end of the building leads up to an upper floor entrance. The building measures about 120'-6" x 40'-5" at the ground floor with a gross floor area (GFA) of about 947 m^2.

.3 Blockhouse 3 is a two-storey, log structure with an overhanging second storey and a low, hipped-roof clad in cedar shakes. Loopholes and small windows give a military appearance to the structure. The exterior log walls are clad in painted clapboard siding. An exterior staircase leads up to an upper floor entrance. The building measures about 60'-6" x 40'-5" at the ground floor with a gross floor area (GFA) of about 479 m^2.

.4 The Octagonal Blockhouse is a polygonal roofed, eight sided, two-storey structure with a ground floor area of about 13 m2. The building includes a rugged, exposed log exterior that features loopholes and an overhanging second storey. A tunnel affords the only access to the structure. The Octagonal Blockhouse is situated within the palisades of the south redan.

.6 Because the project is on a National Historic Site, it is essential all existing features remain as found. Consequently, standards for environmental protection and for visual aesthetics of final product shall be of a quality standard. Contract limits shall be strictly adhered to and the contractor is to take special care to minimize damage and disruption and protect existing features. The Departmental Representative is to be notified immediately if any historic or natural resources are located during construction.

.7 Buried artifacts, the remains and evidence of ancient persons and peoples, and any objects of historic value and worth, remain the property of the Crown. Any and all such objects shall be protected and immediately brought to the attention of the Departmental Representative.

.1 Archaeologist will be on site to monitor work to ensure no archaeology resources are damaged. Advise Departmental Representative and receive direction regarding protecting such resources should any be discovered by either archaeology or the contractor. The contractor could be directed to stop work on the area and redirect work elsewhere until the issue is resolved to the Departmental Representative's satisfaction.

1.3 Location of Site

.1 The Work of this Contract is located at the Fort George National Historic Site of Canada, Niagara-on-the Lake, Ontario

.2 Address: 51 Queen's Parade, Niagara-on-the-Lake, ON L0S 1J0

1.4 Metric Project

.1 This project is to be based on The International System of Units (SI). Measurements are expressed in metric (SI) units.

1.5 Site Access

.1 Access to the site to be arranged by the Departmental Representative.

1.6 Contractor Traffic Route

.1 Maintain fire department access to the site.

1.7 Work Sequence

.1 Work continuously.

1.8 Precedence of Documents

.1 In the event of conflict within and between the Contract Documents, the order of priority within specifications and drawings are - from highest to lowest:
- .1 Agreement - Between Owner and Contractor,
- .2 Supplementary Conditions (if any),
- .3 General Conditions of the Contract,
- .4 Sections of Division 1 of the specifications,
- .5 Specifications:
  - .1 Sections of Divisions 2 through 33 of the specifications and
  - .2 Specifications specifically indicated on drawings.
- .6 Schedules and keynotes:
  - .1 Schedules within the specifications, then
  - .2 Schedules on drawings.
- .7 Drawings:
  - .1 Drawings of larger scale shall govern over those of smaller scale of the same date, then
  - .2 Dimensions shown on drawings shall govern over dimensions scaled from drawings.
- .8 Later dated documents shall govern over earlier documents of the same type.

.2 In the event of conflict between documents, the decision of the Departmental Representative shall be final.

1.9 Contractor Use of Premises

.1 The Contractor is to arrange his operations, site storage, temporary facilities and services during the construction of work under this Contract to allow Parks Canada Staff free access to the site and maintain normal maintenance of the facility.

.2 Inform Departmental Representative in advance of any deliveries, impending interruption in service or use of utilities that may disrupt Park access, normal traffic flow or normal operation of the Park.

.3 The site will be in use during the progress of this work and Departmental Representative will notify well in advance of any operational requirement that could interfere or hinder project progress.

.4 Do not unreasonably encumber Site with materials and equipment.

.5 Move stored products or equipment which interfere with operations of the Site.

.6 Other contracts may be in progress at the site during the course of this work.

.7 Cooperate with other Contractors in carrying out their respective works and carry out all instructions from the Departmental Representative in this regard.

.8 If any part of the work under this Contract appears that it may be affected by the work of another Contractor, report promptly to the Departmental Representative, in writing or other approved communication method.

.9 Contractor is reminded that the site is of national historic significance and should at all times, treat it as such.

1.10 Canada National Parks Act

.1 The site is a National Historic Site recognized by Canada and must be treated as such. Excavation or storage of material beyond the immediate work area defined by the Departmental Representative is strictly prohibited. Every precaution will be taken to minimize disturbance or damage to the area surrounding or adjacent to the defined work site.

1.11 References and Codes

.1 Perform Work in accordance with the National Building Code, 2015 (NBC), Ontario Building Code, 2012 (OBC), National Fire Code of Canada, 2015 (NFC), the Canadian Electrical Code CSA C22.1-18, Canada Occupational Health & Safety Regulation (Canada Labour Code, Part II), the Ontario Ministry of Labour Occupational Health and Safety Act for Construction Projects, and other codes of federal, provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply.

.2 Meet or exceed requirements of:
.1 Contract documents.
.2 Specified standards, codes and referenced documents.
.3 The Standards and Guidelines for Conservation of Historic Places in Canada (Second Edition).

1.12 Engineer Design

.1 Where specifications require work to be designed by an engineer, engage an engineer licensed in the Province of Ontario to design such work.

1.13 Hazardous Material Discovery

.1 Refer to Designated Substances & Hazardous Materials Survey, Fort George- Four Historic Buildings (Blockhouses) prepared by Ontario Environmental & Safety Network Ltd., Dated June 20, 2018 for known hazardous substances.

.2 Should any other material resembling asbestos or other hazardous substances be encountered in course of demolition work, immediately stop work and notify the Departmental Representative. Refer to Section 01 41 00.

1.14 Verification

.1 All dimensions shall be verified on site, and all necessary modifications and adjustments shall be made as necessary to suit.

1.15 Building Smoking Environment

.1 Smoking is prohibited on the property.

1.16 Special Conditions

.1 Fort George will remain open and in operation throughout the construction period with staff and park visitors around the areas of work.

1.17 Site Security

.1 Take whatever measures are necessary to secure the buildings and site from unauthorized access, theft and vandalism.

1.18 Protection of Drawings

.1 Electronic documents may not be forwarded to others, transmitted, downloaded or reproduced in any format, whether print or electronic, without the express, written permission of the Departmental Representative.

.2 Drawings, specifications and other contract related documents which are posted on Contractor controlled websites for access by sub-trades and suppliers, shall be posted only on password protected and secure websites approved by the Departmental Representative to limit access to those with an expressed interest in the Project.

.3 Provide Departmental Representative with access to such websites as noted above.

PART 2 PRODUCTS

3.1 Not Used

.1 Not used

PART 3 EXECUTION

3.2 Not Used

.1 Not used

End of Section

PART 1 GENERAL

1.1 Definitions

.1 Activity: element of Work performed during course of Project. Activity normally has expected duration, and expected cost and expected resource requirements. Activities can be subdivided into tasks.

.2 Bar Chart (GANTT Chart): graphic display of schedule-related information. In typical bar chart, activities or other Project elements are listed down left side of chart, dates are shown across top, and activity durations are shown as date-placed horizontal bars. Generally Bar Chart should be derived from commercially available computerized project management system.

.3 Baseline: original approved plan (for project, work package, or activity), plus or minus approved scope changes.

.4 Construction Work Week: Monday to Friday, inclusive, will provide five day work week and define schedule calendar working days as part of Bar (GANTT) Chart submission.

.5 Duration: number of work periods (not including holidays or other nonworking periods) required to complete activity or other project element. Usually expressed as workdays or workweeks.

.6 Master Plan: summary-level schedule that identifies major activities and key milestones.

.7 Milestone: significant event in project, usually completion of major deliverable.

.8 Project Schedule: planned dates for performing activities and the planned dates for meeting milestones. Dynamic, detailed record of tasks or activities that must be accomplished to satisfy Project objectives. Monitoring and control process involves using Project Schedule in executing and controlling activities and is used as basis for decision making throughout project life cycle.

.9 Project Planning, Monitoring and Control System: overall system operated by Departmental Representative to enable monitoring of project work in relation to established milestones.

1.2 Requirements

.1 Ensure Master Plan and Detail Schedules are practical and remain within specified Contract duration.

.2 Plan to complete Work in accordance with prescribed milestones and time frame.

.3 Limit activity durations to maximum of approximately 10 working days, to allow for progress reporting.

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

1.3 Submittals

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

.2 Submit to Departmental Representative within 10 working days of Award of Contract Bar (GANTT) Chart as Master Plan for planning, monitoring and reporting of project progress.

.3 Submit Project Schedule to Departmental Representative within 5 working days of receipt of acceptance of Master Plan.

1.4 Master Plan

.1 Structure schedule to allow orderly planning, organizing and execution of Work as Bar Chart (GANTT).

.2 Departmental Representative will review and return revised schedules within 5 working days.

.3 Revise impractical schedule and resubmit within 5 working days.

.4 Accepted revised schedule will become Master Plan and be used as baseline for updates.

1.5 Project Schedule

.1 Develop detailed Project Schedule derived from Master Plan.

.2 Ensure detailed Project Schedule includes as minimum milestone and activity types for each blockhouse where applicable, and as follows:
- .1 Award.
- .2 Mobilization.
- .3 Abatement.
- .4 Material removals.
- .5 Window fabrication.
- .6 Loopholes fabrication
- .7 Log restoration.
- .8 Cladding removals
- .9 Cladding replacement
- .10 Roofing.
- .11 Painting (interior and exterior)
- .12 Electrical work.
- .13 New gate.
- .14 Site grading and drainage.

1.6 Project Schedule Reporting

.1 Update Project Schedule on bi-weekly basis reflecting activity changes and completions, as well as activities in progress.

.2 Include as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays and impact with possible mitigation.

1.7 Project Meetings

.1 Discuss Project Schedule at regular site meetings, identify activities that are behind schedule and provide measures to regain slippage. Activities considered behind schedule are those with projected start or completion dates later than current approved dates shown on baseline schedule.

PART 2 PRODUCTS

2.1 Not Used

.1 Not used

PART 3 EXECUTION

3.1 Not Used

.1 Not used

End of Section

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PART 1 GENERAL

1.1 Section Includes

.1 Administrative.
.2 Shop Drawings and Product Data.
.3 Progress Photographs.
.4 Certificates and Transcripts.

1.2 Administrative

.1 Submit to Departmental Representative submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.

.2 Work affected by submittal shall not proceed until review is complete.

.3 Present submittals in metric units.

.4 Review submittals prior to submission to Departmental Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and coordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.

.5 Notify Departmental Representative in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.

.6 Verify field measurements and affected adjacent work are coordinated.

.7 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative's review.

.8 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative’s review.

.9 Keep one reviewed copy of each submission on site.

1.3 Shop Drawings and Product Data

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

.2 Coordinate each submission with requirements of work and Contract Documents. Individual submissions will not be reviewed until all related information is available.

.3 Submit shop drawings bearing stamp and signature of qualified professional Engineer registered or licensed in the Province of Ontario where required by the individual specification sections. Each submittal and each resubmittal must bear the stamp of the Engineer

.4 Indicate materials, methods of construction, explanatory notes and other information necessary for completion of Work.

.5 Allow ten (10) days for Departmental Representative's review of each submission.

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

.7 Make changes in shop drawings as Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of revisions other than those requested.

.8 Accompany submissions with transmittal letter containing:
- .1 Date.
- .2 Project title and number.
- .3 Contractor's name and address.
- .4 Other pertinent data.

.9 Submissions shall include:
- .1 Date and revision dates.
- .2 Project title and number.
- .3 Name and address of:
  - .1 Subcontractor.
  - .2 Supplier.
  - .3 Manufacturer.
- .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
- .5 Details of appropriate portions of Work as applicable:
  - .1 Layout, showing dimensions, including identified field dimensions, and clearances.
  - .2 Standards.

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

.11 Submit one electronic copy in PDF format of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.

.12 Submit electronic copy in PDF format of product data sheets or brochures for requirements requested in Specification Sections and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.

.13 Delete information not applicable to project.

.14 Supplement standard information to provide details applicable to project.

.15 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.

.16 The review of shop drawings by the Departmental Representative is for sole purpose of ascertaining conformance with general concept.
- .1 This review shall not mean that the Departmental Representative approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in

shop drawings or of responsibility for meeting requirements of construction and Contract Documents.

.2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of sub-trades.

1.4 Progress Photographs

.1 Progress photographs to be electronically formatted and labelled as to location and view.

.2 Submit electronic copy colour digital photography in jpg format, standard resolution monthly with progress statement and as directed by Departmental Representative.

.3 Project identification: name and number of project and date of exposure indicated.

.4 Number of viewpoints: 2 locations.
.1 Viewpoints and their location as determined by Departmental Representative.

.5 Frequency of photographic documentation: monthly.

1.5 Certificates and Transcripts

.1 Immediately after award of Contract, Submit Workplace Safety and Insurance Board Experience Report.

PART 2 PRODUCTS

2.1 Not Used

.1 Not used

PART 3 EXECUTION

3.1 Not Used

.1 Not used

End of Section

PART 1 GENERAL

1.1 References

.1 Canadian Standards Association (CSA)
  .1 CSA S350-M1980 (R2003), Code of Practice for Safety in Demolition of Structures.
.2 .2 National Building Code 2015 (NBC):
  .1 NBC 2015, Division B, Part 8 Safety Measures at Construction and Demolition Sites.
.3 Province of Ontario:
  .1 Occupational Health and Safety Act Revised Statutes of Ontario 1990, Chapter O.1 as amended, and Regulations for Construction Projects, O. Reg. 213/91 as amended.
  .2 O. Reg. 490/09, Designated Substances.
  .3 Workplace Safety and Insurance Act, 1997.
  .4 Municipal statutes and authorities.

1.2 Action and Informational Submittals

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

.2 Submit site-specific Health and Safety Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:
  .1 Results of site specific safety hazard assessment.
  .2 Results of safety and health risk or hazard analysis for site tasks and operation.
  .3 Measures and controls to be implemented to address identified safety hazards and risks.

.3 Provide a Fire Safety Plan, specific to the work location.

.4 Contractor's and Sub-contractors' Safety Communication Plan.

.5 Contingency and Emergency Response Plan addressing standard operating procedures specific to the project site to be implemented during emergency situations.

.6 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 10 days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within 5 days after receipt of comments from Departmental Representative.

.7 Departmental Representative's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.

.8 Submit names of personnel and alternates responsible for site safety and health.

.9 Submit records of Contractor's Health and Safety meetings when requested.

.10 Submit 2 copies of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative weekly.

.11 Submit copies of orders, directions or reports issued by health and safety inspectors of the authorities having jurisdiction.

.12 Submit copies of incident and accident reports.

.13 Submit Material Safety Data Sheets (MSDS).

.14 Submit Workplace Safety and Insurance Board (WSIB) - Experience Rating Report.

1.3 Filing of Notice

.1 File Notice of Project with Provincial authorities prior to commencement of Work.

1.4 Work Permit

.1 Obtain building permits related to project prior to commencement of Work.

1.5 Safety Assessment

.1 Perform site specific safety hazard assessment related to project.

1.6 Meetings

.1 Schedule and administer Health and Safety meeting with Departmental Representative prior to commencement of Work.

1.7 Regulatory Requirements

.1 Comply with the Acts and regulations of the Province of Ontario.

.2 Comply with specified standards and regulations to ensure safe operations at site.

1.8 Project Site Conditions

.1 Work at site will involve contact with:
- .1 Silica in concrete and concrete block.
- .2 Mercury in fluorescent light tubes.
- .3 Asbestos in transite wall and ceiling panels, door insulation
- .4 Lead in paint.
- .5 PCBs in light ballasts.

.2 Fort George has a black powder program where they conduct demonstrations for the visiting public at certain times of the year. They also store small quantities of this material in a ready magazine under lock and key in Blockhouse 3. The program is run in accordance with directive 3.5.7.

1.9 General Requirements

.1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.

.2 Departmental Representative may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns either accepting or requesting improvements.

.3 Relief from or substitution for any portion or provision of minimum Health and Safety standards specified herein or reviewed site-specific Health and Safety Plan shall be submitted to Departmental Representative in writing.

1.10 Compliance Requirements

.1 Comply with Ontario Occupational Health and Safety Act, R.S.O. 1990 Chapter 0.1, as amended.

1.11 Responsibility

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

.2 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

.3 Where applicable the Contractor shall be designated "Constructor", as defined by Occupational Health and Safety Act and Regulations for Construction Projects for the Province of Ontario.

1.12 Unforseen Hazards

.1 Should any unforeseen or peculiar safety-related factor, hazard, or condition become evident during performance of Work, immediately stop work and advise Departmental Representative verbally and in writing.

.2 Follow procedures in place for Employees Right to Refuse Work as specified in the Occupational Health and Safety Act for the Province of Ontario.

1.13 Health and Safety Coordinator

.1 Employ and assign to Work, competent and authorized representative as Health and Safety Coordinator. Health and Safety Coordinator must:
  .1 Have site-related working experience specific to activities associated abatement of lead and asbestos containing materials.
  .2 Have working knowledge of occupational safety and health regulations.
  .3 Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform Work.
  .4 Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan.
  .5 Be on site during execution of Work and report directly to and be under direction of site supervisor.

1.14 Posting of Documents

.1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Province of Ontario, and in consultation with Departmental Representative.
  .1 Contractor's Safety Policy.
  .2 Constructor's Name.
  .3 Notice of Project.
  .4 Name, trade, and employer of Health and Safety Representative or Joint Health and Safety Committee members (if applicable).
  .5 Ministry of Labour Orders and reports.
  .6 Occupational Health and Safety Act and Regulations for Construction Projects for Province of Ontario.

.7 Address and phone number of nearest Ministry of Labour office.
.8 Material Safety Data Sheets.
.9 Written Emergency Response Plan.
.10 Site Specific Safety Plan.
.11 Valid certificate of first aider on duty.
.12 WSIB "In Case of Injury at Work" poster.
.13 Location of toilet and cleanup facilities.

1.15 Correction of Non-Compliance

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

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

.3 Departmental Representative may stop Work if non-compliance of health and safety regulations is not corrected.

1.16 Blasting

.1 Blasting or other use of explosives is not permitted.

1.17 Work Stoppage

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

.2 Assign responsibility and obligation to Health and Safety Coordinator to stop or start Work when, at Health and Safety Coordinator's discretion, it is necessary or advisable for reasons of health or safety. Departmental Representative may also stop Work for health and safety considerations.

PART 2 PRODUCTS

3.1 Not Used

.1 Not used

PART 3 EXECUTION

3.2 Not Used

.1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

.1 Administrative.
.2 Fires.
.3 Disposal of Wastes.
.4 Drainage.
.5 Protection of Water Quality
.6 Pollution Control.
.7 Unanticipated Soil Contamination.

1.2 References

.1 Statutes of Canada 1999 Chapter 33. Canadian Environmental Protection Act 1999.
  .1 SOR/2003-289. Federal Halocarbon Regulations, 2003.
  .2 Transportation of Dangerous Goods Act, 1992 (1992, c. 34)
.2 OPSS 805 Construction Specification for Temporary Erosion and Sediment Control Measures, November, 2015.
.3 U.S. Environmental Protection Agency (EPA)/Office of Water
  .1 EPA 832/R-92-005-92, Storm Water Management for Construction Activities, Chapter 3.
.4 Canadian Council of Ministers of the Environment (CCME), Environment Quality Guidelines.
.5 The Federal Policy on Wetland Conservation.
.6 Any Provincial Standards and Federal requirements.

1.3 Submittals

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

.2 Prior to commencing construction activities or delivery of materials to site, provide Environmental Protection Plan for review by Departmental Representative.
  .1 Ensure Environmental Protection Plan includes comprehensive overview of known or potential environmental issues to be addressed during construction.
  .2 Address topics at level of detail commensurate with environmental issue and required construction tasks.
  .3 Include in Environmental Protection Plan:
    .1 Names of persons responsible for ensuring adherence to Environmental Protection Plan.
    .2 Names and qualification of persons responsible for manifesting hazardous waste to be removed from site, and the name and location of the wastes destination (disposal facility).
    .3 Names and qualifications of persons responsible for training site personnel.
    .4 Descriptions of environmental protection personnel training program.
    .5 Erosion and sediment control plan identifying type and location of erosion and sediment controls to be provided including monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations, EPA 832/R-92-005, Chapter 3 requirements.
    .6 Drawings showing locations of proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on site.
    .7 Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use. Ensure plan includes measures for marking limits of use areas and methods for protection of features to be preserved within authorized work areas.

.8 Spill Control Plan including procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.
.9 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.
.10 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, are contained on project site.
.11 Contaminant Prevention Plan identifying potentially hazardous substances to be used on job site; intended actions to prevent introduction of such materials into air, water, or ground; and detailing provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.
.12 Historical, archaeological, cultural resources biological resources and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands.

1.4 Administrative

.1 Comply with all federal, provincial, and municipal regulatory requirements and guidelines for environmental protection and natural resource conservation, including those referenced above.

.2 The Work Site is subject to inspection by the Departmental Representative, without prior notice.

.3 It is the Contractor's responsibility to be aware of environmental requirements and the best management practices and pollution control measures necessary to meet them.

.4 It is the Contractor's responsibility to obtain and abide by permits, licenses and compliance certificates at appropriate times and frequencies as required by the authorities having jurisdiction.

.5 All hazardous materials are to be stored with secondary containment

1.5 Fires

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

1.6 Disposal of Wastes

.1 Refer to Section 01 74 20.

1.7 Drainage

.1 Provide Erosion and Sediment Control Plan identifying type and location of erosion and sediment controls provided. Ensure plan includes monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations, EPA 832/R-92-005, Chapter 3 requirements.

.2 Provide temporary drainage and pumping as necessary to keep excavations and site free from water.

.3 Do not pump water containing deleterious substances into waterways, sewer or drainage systems.

.4 Protect storm drains against entry by sediment, debris, oil, or chemicals.

.5 Control disposal or runoff of water containing deleterious substances or other harmful substances in accordance with local authority requirements.

1.8 Protection of Water Quality

.1 No waste or surplus organic material including topsoil is to be stored or disposed of within 30 metres of any watercourses. Run-off from excavation piles will not be permitted to drain directly into watercourses. Where this measure is not sufficient or feasible to control sediment entering the watercourses, sedimentation traps or geo-textile coverage will be required.

.2 If de-watering is required, the water shall be pumped into a sedimentation pond or diffused onto vegetated areas a minimum of 30 metres from any watercourses and not pumped directly into the watercourses.

.3 Provide all de-watering and sedimentation control required to properly complete the work of this contract.

.4 Supply, install and maintain silt/sediment control fencing along the edge of the site to intercept construction runoff silt, to the satisfaction of the Departmental Representative.

1.9 Pollution Control

.1 Maintain, inspect, and repair temporary erosion and pollution control features installed under this contract on a weekly basis. Submit inspection logs to the Departmental Representative when requested.

.2 Control emissions from equipment and plant to conform to federal, provincial, and municipal requirements.

.3 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

.4 Have appropriate emergency spill response equipment and rapid clean-up kit on site located adjacent to hazardous materials storage area. Provide personal protective equipment required for clean-up.

.5 Take all measures necessary to prevent material and mud tracking on adjacent roads and streets.

.6 Use mechanical sweepers as often as necessary to keep adjacent roads and streets clean of material and mud that is deposited from this project.

.7 Spills or discharges of pollutants or contaminants under the control of the Contractor, and spills or discharges of pollutants or contaminants that are a result of the Contractor's operations that cause or are likely to cause adverse effects shall forthwith be reported to the Departmental Representative. Such spills or discharges and their adverse effects shall be as defined in the Environmental Protection Act R.S.O. 1999.

.8 All spills or discharges of liquid, other than accumulated rain water, from luminaries, internally illuminated signs, lamps, and liquid type transformers under the control of the Contractor, and all spills or discharges from this equipment that are a result of the Contractor's operations shall, unless otherwise indicated in the Contract, be assumed to contain PCB's and shall forthwith be reported to the Departmental Representative.

.9 This reporting will not relieve the Contractor of his legislated responsibilities regarding such spills or discharges.

1.10 Unanticipated Soil Contamination

.1 Should unanticipated soil contamination be discovered:
  .1 Stop work, and assess the situation for safety.
  .2 If situation does not appear to be safe, evacuate workers from area.
  .3 If safe to do so, take immediate steps to control any spread of contamination, in accordance with Contractor's spill prevention and response plan.
  .4 Immediately contact the Departmental Representative.

PART 2 PRODUCTS

2.1 Not Used

.1 Not used

PART 3 EXECUTION

3.1 Cleaning

.1 Ensure public waterways, storm and sanitary sewers remain free of waste and volatile materials disposal.

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

3.2 Mitigation of Impacts

.1 Potential environmental impacts shall be mitigated as follows: Potential impacts of this project are associated with constructed disturbances. It is reasonable to conclude that with appropriate mitigation in place and good work practices, impact will be of short duration and the potential zone of influence will be confined to the immediate vicinity of the work area.

.2 Ensure that a copy of the environmental requirements will be readily available on site for inspection and reference purposes during the construction phase of the project, and that all contractors and their agents will be made aware of and respect the following requirements where applicable to their direct involvement in the work.

.3 Machinery must be checked for leakage of lubricants or fuel and must be in good working order. Refueling must be done at least 30 m from any water body and on an impermeable surface. Basic petroleum spill clean-up equipment should be on-site. All spills or leaks should be promptly contained, cleaned up and reported to the 24-hour environmental emergencies reporting system.

.4 Fuel level must be inspected on a daily basis to ensure there is no leakage to the surrounding environment.

.5 Schedule Work to avoid periods of heavy precipitation. Erosion control structures are to be used, as appropriate, to prevent erosion and release of sediment and/or sediment laden water during the construction phase. These structures are to be left in place until all exposed soils are stabilized.

.6 Materials used must be clean and non-toxic (i.e., free of fuel, oil, grease and /or any other contaminants).

.7 All construction waste material will be disposed of in a provincially approved manner.

.8 Maintain equipment in proper running order to prevent leaking or spilling of potentially hazardous or toxic products. This includes hydraulic fluid, diesel, gasoline and other petroleum products.

.9 The exposed soil area must be minimized by limiting the area that is exposed at one time and by limiting the time that any one area is exposed. All stockpiled soil must be covered and/or dyked to prevent erosion and release of sediment laden water.

.10 All waste materials will be disposed of according to Provincial Waste Management Regulations so as to mitigate potential effects generated by leachate entering soils.

.11 All other material except those identified as existing potentially hazardous materials can be disposed of at local Construction & Demolition Waste facilities.

.12 Construction equipment must be fitted with standard and well- maintained noise suppression devices. Construction activities must respect appropriate time restriction and use smaller, less disturbing equipment where possible.

.13 Appropriate dust suppression methods are to be employed when required. Determine locations where water is to be applied, the amount of water to be applied, and the times at which it shall be applied. Waste oil is not to be used for dust control under any circumstances.

.14 Engines must not be allowed to idle between work periods.

.15 All machinery must be well muffled. If necessary, trucks may be required to avoid the use of "hammer" braking along specific sections of the route.

.16 Adherence is required to the regulations set out by the Migratory Birds Convention Act and the Species at Risk Act.

.17 Contractors must ensure that food scraps and garbage are not left at the work site.

.18 Construction activities will be carried out during times acceptable to local authorities. Construction will be carried out during daylight hours to avoid disturbance in the area.

.19 All vehicles must be free of external contamination prior to leaving the site.

.20 Care shall be taken to ensure the vehicles are clean of debris and soil. Tracking of debris and mud along the travel ways is not acceptable.

End of Section

PART 1 GENERAL

1.1 Section Includes

.1 Section includes general protection and treatment procedures for designated historic spaces, areas, rooms, and surfaces and the following specific work:
  .1 Temporary protection of historic materials.
  .2 Protection during use of heat generating materials.
  .3 Historic preservation treatment procedures.

1.2 References

.1 Parks Canada Standards and Guidelines for the Conservation of Historic Places in Canada.
.2 National Fire Protection Association (NFPA)
  .1 NFPA 51 B Standard for Fire Prevention During Welding, Cutting, and Other Hot Work
  .2 NFPA 241Standard for Safeguarding Construction, Alteration, and Demolition Operations

1.3 Submittals

.1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Construction Schedule for Historic Treatments: Indicate for entire Project the following for each activity to be performed in historic spaces, areas, and rooms, and on historic surfaces:
  .1 Detailed sequence of historic treatment work, with starting and ending dates, coordinated with Departmental Representative's continuing operations and other known work in progress.
  .2 Utility Services: Indicate how long utility services will be interrupted. Coordinate shutoff, capping, and continuation of utility services.
  .3 Coordination of partial occupancy or completed Work.
  .4 Equipment Data: List gross loaded weight, axle-load distribution, and wheel-base dimension data for mobile and heavy equipment proposed for use. Do not use such equipment without Contractor's professional engineer's certification that structures can support the imposed loadings without damage.

.3 Qualification Data: See specific specification sections for requirements of individual subcontractor requirements.

.4 Preconstruction Documentation: Show preexisting conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by Contractor's historic treatment operations.

.5 Historic Treatment Program: Submit before work begins.

.6 Inventory of Salvaged Items: After removal or dismantling work is complete, submit a list of items that have been salvaged.

.7 Fire-Prevention Plan: Prepare a written plan for preventing fires during the Work, including placement of fire extinguishers, fire blankets, rag buckets, and other fire-prevention devices during each phase or process. Coordinate plan with Departmental Representative’s fire-protection equipment and requirements. Include each fire watch's training, duties, and authority to enforce fire safety.

.8 Regulatory Requirements: Comply with notification regulations of authorities having jurisdiction before beginning removal and dismantling work. Comply with hauling and disposal regulations of authorities having jurisdiction.

1.4 Definitions

.1 Consolidate: To strengthen loose or deteriorated materials in place.

.2 Dismantle: To disassemble and detach items by hand from existing construction to the limits indicated, using small hand tools and small one-hand power tools, so as to protect nearby historic surfaces; and legally dispose of dismantled items off-site, unless indicated to be salvaged or reinstalled.

.3 Historic: Spaces, areas, rooms, surfaces, materials, finishes, and overall appearance that are important to the successful rehabilitation as determined by Departmental Representative. Designated historic spaces and surfaces are indicated on Drawings.
.1 Restoration Zones: Areas of greatest architectural importance, integrity, and visibility; to be preserved and restored to the original design and finish as indicated on Drawings.
.2 Renovation Zones: Areas of significant architectural importance, integrity, and visibility; to be preserved and restored consistent with the remaining historic fabric and to the extent indicated on Drawings.
.3 Alteration Zones: Areas of slight architectural importance, integrity, and visibility; to leave any remaining original fabric untouched insofar as is consistent with accommodating modern uses for the building as indicated on Drawings.

.4 Existing to Remain: Existing items that are not to be removed or dismantled.

.5 Match: To blend with adjacent construction and manifest no apparent difference in material type, species, cut, form, detail, color, grain, texture, or finish; as approved by Departmental Representative.

.6 Reconstruct: To remove existing item, replicate damaged or missing components, and reinstall in original position.

.7 Refinish: To remove existing finishes to base material and apply new finish to match original, or as otherwise indicated.

.8 Reinstall: To protect removed or dismantled item, repair and clean it as indicated for reuse, and reinstall it in original position, or where indicated.

.9 Remove: Specifically for historic spaces, areas, rooms, and surfaces, the term means to detach an item from existing construction to the limits indicated, using hand tools and hand-operated power equipment, and legally dispose of it off-site, unless indicated to be salvaged or reinstalled.

.10 Repair: To correct damage and defects, retaining existing materials, features, and finishes while employing as little new material as possible. Includes patching, piecing-in, splicing, consolidating, or otherwise reinforcing or upgrading materials.

.11 Replace: To remove, duplicate, and reinstall entire item with new material. The original item is the pattern for creating duplicates unless otherwise indicated.

.12 Replicate: To reproduce in exact detail, materials, and finish unless otherwise indicated.

.13 Reproduce: To fabricate a new item, accurate in detail to the original, and in either the same or a similar material as the original, unless otherwise indicated.

.14 Restore: To consolidate, replicate, reproduce, repair, and refinish as required to achieve the indicated results.

.15 Retain: To keep existing items that are not to be removed or dismantled.

.16 Reversible: New construction work, treatments, or processes that can be removed or undone in the future without damaging historic materials unless otherwise indicated.

.17 Salvage: To protect removed or dismantled items and deliver them to Departmental Representative ready for reuse.

.18 Stabilize: To provide structural reinforcement of unsafe or deteriorated items while maintaining the essential form as it exists at present; also, to reestablish a weather-resistant enclosure.

.19 Strip: To remove existing finish down to base material unless otherwise indicated.

1.5 Project Meetings for Historic Treatment

.1 Preliminary Historic Treatment Conference: Before starting historic treatment work, conduct a preconstruction conference at Project site.
  .1 Attendees: In addition to representatives of Departmental Representative and Contractor, and installers whose work interfaces with or affects historic treatment shall be represented at the meeting.
  .2 Agenda: Discuss items of significance that could affect progress of historic treatment work, including review of the following:
  .3 Governing regulations.
  .4 Areas where existing construction is to remain and the required protection.
  .5 Sequence of historic treatment work operations.
  .6 Storage, protection, and accounting for salvaged and specially fabricated items.
  .7 Existing conditions, staging, and structural loading limitations of areas where materials are stored.

.2 Reporting: Record conference results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from conference.

1.6 Materials Ownership

.1 Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to Departmental Representative that may be encountered during removal and dismantling work, regardless of whether they were previously documented, remain Departmental Representative's property. Carefully dismantle and salvage each item or object.

1.7 Project Conditions

.1 General Size Limitation in Historic Spaces: Materials, products, and equipment used for performing the Work and for transporting debris, materials, and products shall be of sizes that clear surfaces within historic spaces, areas, rooms, and openings, including temporary protection, by 300 mm or more.

.2 Notify Departmental Representative of discrepancies between existing conditions and Drawings before proceeding with removal and dismantling work.

.3 If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Departmental Representative. Departmental Representative will remove hazardous materials under a separate contract.
  .1 In the case of asbestos, stop work in the area of potential hazard, shut off fans and other air handlers ventilating the area, and rope off area until the questionable material is identified. Re-assign workers to continue work in unaffected areas. Resume work in the area of concern after safe working conditions are verified.

1.8 Coordination

.1 Coordinate historic treatment procedures in this Section with public circulation patterns at Project site. Public circulation patterns cannot be closed off entirely, and in places can be only temporarily redirected around small areas of work. Plan and execute the Work accordingly.

1.9 Storage and Protection of Historic Materials

.1 Salvaged Historic Materials:
  .1 Clean only loose debris from salvaged historic items unless more extensive cleaning is indicated.
  .2 Pack or crate items after cleaning; cushion against damage during handling. Label contents of containers.
  .3 Store items in a secure area until delivery to Departmental Representative.
  .4 Transport items to Departmental Representative's storage area designated by Departmental Representative.
  .5 Protect items from damage during transport and storage.

.2 Historic Materials for Reinstallation:
  .1 Repair and clean historic items as indicated and to functional condition for reuse.
  .2 Pack or crate items after cleaning and repairing; cushion against damage during handling. Label contents of containers.
  .3 Protect items from damage during transport and storage.
  .4 Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment unless otherwise indicated. Provide connections, supports, and miscellaneous materials to make item functional for use indicated.

.3 Existing Historic Materials to Remain: Protect construction indicated to remain against damage and soiling from construction work. Where permitted by Departmental Representative, items may be dismantled and taken to a suitable, protected storage location during construction work and reinstalled in their original locations after historic treatment and construction work in the vicinity is complete.

.4 Storage and Protection: When taken from their existing locations, catalog and store historic items within a weathertight enclosure where they are protected from wetting by rain, snow, condensation, or ground water, and from freezing temperatures.
  .1 Identify each item with a nonpermanent mark to document its original location. Indicate original locations on plans elevations, sections, or photographs by annotating the identifying marks.
  .2 Secure stored materials to protect from theft.

PART 2 PRODUCTS

2.1 Not Used

.1 Not used

PART 3 EXECUTION

3.1 Protection - General

.1 Comply with temporary barrier requirements in Section 01 52 00.

.2 Ensure that supervisory personnel are on-site and on duty when historic treatment work begins and during its progress.

.3 Protect persons, motor vehicles, surrounding surfaces of building, building site, plants, and surrounding buildings from harm resulting from historic treatment procedures. Coordinate with Section 01 52 00, Temporary Facilities.
.1 Use only proven protection methods, appropriate to each area and surface being protected.
.2 Provide barricades, barriers, and temporary directional signage to exclude public from areas where historic treatment work is being performed.
.3 Erect temporary protective covers over walkways and at points of pedestrian and vehicular entrance and exit that must remain in service during course of historic treatment work.
.4 Contain dust and debris generated by removal and dismantling work and prevent it from reaching the public or adjacent surfaces.
.5 Provide shoring, bracing, and supports as necessary. Do not overload structural elements.
.6 Protect floors and other surfaces from damage, wear, and staining.

.4 Temporary Protection of Historic Materials:
.1 Protect existing historic materials with temporary protections and construction. Do not deface or remove existing materials.
.2 Do not attach temporary protection to historic surfaces except as indicated as part of the historic treatment program and approved by Departmental Representative.

.5 Comply with each product manufacturer's written instructions for protections and precautions. Protect against adverse effects of products and procedures on people and adjacent materials, components, and vegetation.

.6 Utility and Communications Services:
.1 Notify Departmental Representative, authorities having jurisdiction, and entities owning or controlling wires, conduits, pipes, and other services affected by the historic treatment work before commencing operations.

.7 Existing Drains:
.1 Prevent solids such as stone or mortar residue from entering the drainage system. Clean out drains and drain lines that become sluggish or blocked by sand or other materials resulting from historic treatment work.
.2 Protect drains from pollutants. Block drains or filter out sediments, allowing only clean water to pass.

3.2 Protection During Application of Chemicals

.1 Record existing work before each procedure, and record progress during the work. Use digital preconstruction documentation photographs. Photographs are to be 3264x2448 pixels minimum.

.2 Perform surveys of Project Site as the Work progresses to detect hazards resulting from historic treatment procedures.

.3 Protect motor vehicles, surrounding surfaces of building being restored, building site, plants, and surrounding buildings from harm or damage resulting from applications of chemical cleaners and paint removers.

.4 Cover adjacent surfaces with protective materials that are proven to resist chemicals selected for Project unless chemicals being used will not damage adjacent surfaces as indicated in historic treatment program. Use covering materials and masking agents that are waterproof, UV resistant, and will not stain or leave residue on surfaces to which they are applied. Apply protective materials according to manufacturer's written instructions. Do not apply liquid masking agents or adhesives to painted or porous surfaces. When no longer needed, promptly remove protective materials staining.

.5 Do not apply chemicals during winds of sufficient force to spread them to unprotected surfaces.

.6 Neutralize and collect alkaline and acid wastes and legally dispose of off-site.

.7 Collect and dispose of runoff from chemical operations by legal means and in a manner that prevents soil contamination, soil erosion, undermining of paving and foundations, damage to landscaping, or water penetration into building interior.

3.3 Fire Protection

.1 General: Follow fire-prevention plan and the following.
  .1 Comply with NFPA 241 requirements unless otherwise indicated. Perform duties entitled "Owner's Responsibility for Fire Protection."
  .2 Remove and keep area free of combustibles including, rubbish, paper, waste, and chemicals, except to the degree necessary for the immediate work.
  .3 Prohibit smoking by all persons within Project work and staging areas.

.2 Heat-Generating Equipment and Combustible Materials: Comply with the following procedures while performing work with heat-generating equipment or highly combustible materials, including welding, torch-cutting, soldering, brazing, paint removal with heat, or other operations where open flames or implements utilizing high heat or combustible solvents and chemicals are anticipated:
  .1 As far as practical, restrict heat-generating equipment to shop areas or outside the building.
  .2 Do not perform work with heat-generating equipment in or near rooms or in areas where flammable liquids or explosive vapors are present or thought to be present. Use a combustible gas indicator test to ensure that the area is safe.
  .3 Use fireproof baffles to prevent flames, sparks, hot gases, or other high-temperature material from reaching surrounding combustible material.
  .4 Prevent the spread of sparks and particles of hot metal through open windows, doors, holes, and cracks in floors, walls, ceilings, roofs, and other openings.
  .5 Fire Watch: Before working with heat-generating equipment or highly combustible materials, station personnel to serve as a fire watch at each location where such work is performed.

Fire-watch personnel shall have the authority to enforce fire safety. Station fire watch according to NFPA 51B, NFPA 241.

.3 Fire Extinguishers, Fire Blankets, and Rag Buckets: Maintain fire extinguishers, fire blankets, and rag buckets for disposal of rags with combustible liquids. Maintain each as suitable for the type of fire risk in each work area. Ensure that nearby personnel and the fire watch personnel are trained in fire-extinguisher and blanket operation.

3.4 General Historic Treatment

.1 Ensure that supervisory personnel are present when historic treatment work begins and during its progress.

.2 Halt the process of deterioration and stabilize conditions unless otherwise indicated. Perform work as indicated on Drawings. Follow the procedures in subparagraphs below and procedures approved in historic treatment program:
- .1 Retain as much existing material as possible; repair and consolidate rather than replace.
- .2 Use additional material or structure to reinforce, strengthen, prop, tie, and support existing material or structure.
- .3 Use reversible processes wherever possible.
- .4 Use historically accurate repair and replacement materials and techniques unless otherwise indicated.
- .5 Record existing work before each procedure (preconstruction) and progress during the work with digital preconstruction documentation photographs or video recordings. Provide one copy of each photograph in JPEG software format and one copy of each video recording in MPEG “Quick Time Player” or equivalent software format on CD.

.3 Notify Departmental Representative of visible changes in the integrity of material or components whether due to environmental causes including biological attack, UV degradation, freezing, or thawing; or due to structural defects including cracks, movement, or distortion.
- .1 Do not proceed with the work in question until directed by Departmental Representative.

.4 Where missing features are indicated to be repaired or replaced, provide features whose designs are based on accurate duplications rather than on conjectural designs, subject to approval of Departmental Representative.

.5 Where Work requires existing features to be removed or dismantled and reinstalled, perform these operations without damage to the material itself, to adjacent materials, or to the substrate.

.6 Identify new and replacement materials and features with permanent marks hidden in the completed work to distinguish them from original materials. Record a legend of identification marks and the locations of the items on record Drawings.

End of Section

PART 1 GENERAL

1.1 Section Includes

.1 References.
.2 Departmental Representative's Regulations.
.3 Hazardous Material Discovery.
.4 Access for Inspection and Testing.
.5 Other Regulatory Requirements.

1.2 References

.1 Perform Work in accordance with the National Building Code of Canada 2015, the Ontario Building Code Act, O. Reg. 332/12, the Ontario Building Code (OBC), 2012 including all Supplements and other codes of provincial or local regulation provided that in case of conflict or discrepancy, more stringent requirements apply.

.2 Complete demolition work in accordance with CSA S350-M1980 (R2003) - Code of Practice for Safety in Demolition of Structures.

.3 Where a material is designated in the Contract Documents for a certain application, unless otherwise specified, that material shall conform to standards designated in the Code. Similarly, unless otherwise specified, installation methods and standards of workmanship shall also conform to standards invoked by the aforementioned Code.

.4 Meet or exceed requirements of:
  .1 Contract documents.
  .2 Specified standards, codes and referenced documents.
  .3 Manufacturer's instructions.

.5 Where requirements of Contract Documents exceed Code requirements provide such additional requirements.

.6 Comply with the requirements of The Standards and Guidelines for Conservation of Historic Places in Canada (Second Edition).

1.3 Hazardous Material Discovery

.1 Stop work immediately when material resembling asbestos, lead paint, PCB's mould or any other designated substance which is not identified in the Designated Substance Report is encountered during the course of the work. Notify Departmental Representative immediately.

.2 The Departmental Representative will arrange for independent testing of suspected designated substances and removal of such substances encountered on the site during the course of the work which are not identified in the Designated Substance Report.

1.4 Access for Inspection and Testing

.1 Cooperate fully with and provide assistance to, all outside authorities including Building Inspectors, utilities, testing agencies and Departmental Representatives, with the inspection of the Work.

1.5 Other Regulatory Requirements

.1 Conform to the requirements of the Ontario Ministry of Transportation, Regional and Local authorities regarding transportation of materials.

.2 Obtain required road occupancy permits and pay any required roadway damage deposits required by the local municipality.

.3 Conform to the requirements of Parks Canada Agency.

.4 Conform to the requirements of the Ontario Ministry of the Environment.

.5 Conform to the requirements of the Ontario Ministry of Labour.

.6 Conform to all applicable local by-laws, regulations and ordinances.

PART 2 PRODUCTS

2.1 Not Used

.1 Not used

PART 3 EXECUTION

3.1 Not Used

.1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

.1 Inspection.
.2 Independent Inspection Agencies.
.3 Access to Work.
.4 Procedures.
.5 Rejected Work.
.6 Reports.
.7 Contractors Responsibilities
.8 Mock-Ups

1.2 References

.1 The Standards and Guidelines for Conservation of Historic Places in Canada (Second Edition).

1.3 Inspection

.1 Allow Departmental Representative access to Work.

.2 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Departmental Representative instructions, or law of Place of Work.

.3 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.

1.4 Independent Inspection Agencies

.1 Independent Inspection/Testing Agencies will be engaged by Departmental Representative.

.2 Provide equipment required for executing inspection and testing by appointed agencies.

.3 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.

.4 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Departmental Representative at no cost to Departmental Representative. Pay costs for retesting and re-inspection.

1.5 Procedures

.1 Notify Departmental Representative 48 hours in advance of requirement for tests, in order that attendance arrangements can be made.

.2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in orderly sequence to not cause delays in Work.

.3 Provide labour and facilities to obtain and handle samples and materials on site.

1.6 Rejected Work

.1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.

.2 Make good other Contractor's work damaged by such removals or replacements promptly.

1.7 Reports

.1 Submit electronic pdf format inspection and test reports to Departmental Representative.

.2 Provide copies to Subcontractor of work being inspected or tested or manufacturer or fabricator of material being inspected or tested.

1.8 Contractors Responsibilities

.1 Contractor is responsible for the execution of the Construction Quality Plan and is to pay all costs for the execution of the Construction Quality Plan. Designate an experienced site representative for carrying out the Construction Quality Plan.

.2 The Contractor is responsible to provide the Departmental Representative with a completed quality product for the Work. Each Contractor shall be responsible for any costs associated with re-testing and reperforming the Work as a result of the Contractor's poor performance or workmanship or other failure to comply with the Contract Documents.

.3 All Work shall be done by persons qualified in their respective trades, and the workmanship shall be first-class in every respect. Each Contractor is responsible for ensuring employees are appropriately trained. All materials and equipment furnished shall be the best of their respective kinds for the intended use and unless otherwise specified, same shall be new and of the latest design.

.4 The Departmental Representative will have the authority to reject Work that does not conform to the Contract Documents or may require special inspection or testing, whether or not such Work is to be then fabricated, installed or completed.

.5 The Departmental Representative shall engage and pay for without cost to the Contractors a testing firm to perform such engineering laboratory services and on-site inspection as deemed necessary by the Departmental Representative, The Departmental Representative will determine compliance with the requirements of the Contract Documents. This Work will not be a service to the Contractors for the performing of tests and checking of materials required of the Contractors.

.6 Copies of test and inspection reports will be furnished to the Contractor. The laboratory and its

representatives will be instructed to promptly call to the attention of the Contractor, any instance of non-compliance with the requirements of the Contract Documents. Failure to so notify the Contractor shall not relieve the Contractor of any of its responsibilities for compliance or making good workmanship or materials which are not in compliance with the requirements of the Contract Documents. The agency shall notify the Departmental Representative and the Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services

.8 Contractor's construction materials, procedures and work shall be subject to specified testing procedures and shall be in conformance with the Contract Documents as verified by Testing Agency.

.9 Cooperate with the testing firm and provide labor to assist with sample preparations where applicable.

.10 Except where specifically indicated to be provided by another entity as identified, inspections, tests, and similar quality control services including those specified to be performed by independent agency are the Contractor's responsibility, and costs thereof are not to be included in contract sum.

.11 Cooperate with independent agencies performing required inspections, tests, and similar services. Provide auxiliary services as reasonably requested, including access to Work, the taking of samples or assistance with the taking of samples, delivery of samples to test laboratories, and security and protection for samples and test equipment at Project site.

.12 Coordination: Contractor and each engaged independent agency performing inspections, tests, and similar services for project are required to coordinate and sequence activities so as to accommodate required services with minimum delay of Work and without the need of removal/replacement of work to accommodate inspections and tests. Scheduling of times for inspections, tests, taking of samples, and similar activities is Contractor's responsibility.

.13 Where sampling and testing is required for Sections of Work listed in the Contract Documents, the tests shall be performed by an independent testing lab and paid for by the Contractor.

.14 Test procedures to be used shall be submitted for approval of the Departmental Representative where other than those specified are recommended by the testing agency.

.15 Testing Agency Duties: The independent Testing Agency engaged to perform inspections, sampling and testing of materials and construction specified in individual Specification Sections shall cooperate with the Departmental Representative and Contractors in performance of its duties, and shall provide qualified personnel to perform required inspections and tests.

.16 Contractor is responsible for scheduling times for inspections, tests, taking samples and similar activities.

1.9 Mock Ups

.1 Prepare mock-ups for Work specifically requested in specifications.

.2 Construct in locations acceptable to Departmental Representative.

.3 Prepare mock-ups for Departmental Representative's review with reasonable promptness and in orderly sequence, to not cause delays in Work.

.4 Failure to prepare mock-ups in ample time is not considered sufficient reason for extension of

Contract Time and no claim for extension by reason of such default will be allowed.

.5 Mock-ups may remain as part of Work unless indicated otherwise.

PART 2 PRODUCTS

2.1 Not Used

.1 Not used

PART 3 EXECUTION

3.1 Not Used

.1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

.1 Installation and Removal.
.2 Dewatering.
.3 Water Supply.
.4 Temporary Heating and Ventilation.
.5 Temporary Power and Light.
.6 Temporary Communication Facilities.

1.2 Installation and Removal

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

.2 Remove from site all such work after use.

1.3 Dewatering

.1 Provide temporary drainage and pumping facilities to keep excavations and site free from standing water. Refer to Section 01 41 00.

1.4 Water Supply

.1 Provide continuous supply of potable water for construction use.

.2 Water shall be potable and shall meet the requirements of the technical sections of the specifications.

1.5 Temporary Heating and Ventilation

.1 Provide temporary heating required during construction period, including attendance, maintenance and fuel.

.2 Construction heaters used inside building must be vented to outside or be flameless type. Solid fuel salamanders are not permitted, unless prior approval is given by the Departmental Representative.

.3 Provide temporary heat and ventilation in enclosed areas as required to:
  .1 Facilitate progress of Work.
  .2 Protect Work against dampness and cold.
  .3 Prevent moisture condensation on surfaces.
  .4 Provide adequate ventilation to meet health regulations for safe working environment.

.4 Ventilating:
  .1 Prevent accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.
  .2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.
  .3 Dispose of exhaust materials in manner that will not result in harmful exposure to persons.
  .4 Ventilate spaces containing hazardous or volatile materials.
  .5 Ventilate temporary sanitary facilities.
  .6 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.

.5 Maintain strict supervision of operation of temporary heating and ventilating equipment to:
.1 Conform to applicable codes and standards.
.2 Enforce safe practices.
.3 Prevent abuse of services.
.4 Vent direct fired combustion units to outside.

.6 Be responsible for damage due to failure in providing adequate heat and protection during construction.

1.6 Temporary Power and Light

.1 Existing sources of electric power can be made available to the Contractor. Conversions or alterations to existing sources of electric power to meet construction requirements are the responsibility of the Contractor.

.2 The points of delivery and limits on amount available will be determined on site by the Owner whose written permission must be obtained before any connection is made.

.3 Electrical power and lighting systems installed under this Contract may be used for construction requirements only with prior approval of Consultant provided that guarantees are not affected.

.4 Provide and maintain temporary lighting throughout project. Lighting levels shall be sufficient to complete work including inspections. Provide minimum lighting levels of 400 lux at work areas. Lighting levels at floors and stairs not within work areas shall be not less than 160 lux at all times during construction activity.

.5 All equipment used shall be CSA approved.

1.7 Temporary Communication Facilities

.1 Provide and pay for temporary telephone, fax, data and equipment necessary for own use.

PART 2 PRODUCTS

2.1 Not Used

.1 Not used

PART 3 EXECUTION

3.1 Not Used

.1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

.1 Construction aids.
.2 Site storage.
.3 Parking.
.4 Construction access.
.5 Offices.
.6 Equipment and material storage.
.7 Sanitary facilities.
.8 Signage.
.9 Shoring.

1.2 References

.1 Canadian Standards Association (CSA International)
  .1 CAN/CSA-Z321-96 (R2006), Signs and Symbols for the Workplace

1.3 Installation and Removal

.1 Provide construction facilities in order to execute work expeditiously.

.2 Remove from site all such work after use.

1.4 Hoisting

.1 Provide, operate and maintain hoists and cranes required for moving of workers, materials and equipment.

.2 Hoists and cranes shall be operated by qualified operator.

1.5 Site Storage/Loading

.1 Do not unreasonably encumber premises with products.

.2 Do not load or permit to load any part of Work with a weight or force that will endanger the Work.

1.6 Construction Parking

.1 Parking will be permitted adjacent to the site at areas designated by the Departmental Representative provided it does not disrupt performance of Work or ongoing Departmental Representatives operations.

.2 Provide and maintain adequate access to project site.

1.7 Construction Access

.1 Coordinate with Departmental Representative.

1.8 Offices

.1 Contractor may provide their own office as necessary and subject to site constraints.

1.9 Equipment, Tool and Material Storage

.1 Provide and maintain, in a clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials.

1.10 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.

1.11 Construction Signage

.1 Signs and notices for safety and instruction shall be in English and French. Graphic symbols shall conform to CAN/CSA-Z321-96 (R2006).

.2 Post "Construction Zone" signage outside barrier and entrance to all work areas.

.3 Maintain approved signs and notices in good condition for duration of project, and dispose of off-site on completion of project.

.4 Install signage to direct site traffic and deliveries to the Construction work areas.

1.12 Shoring

.1 Examine the site to determine the conditions under which work will be performed.

.2 Contractor shall formulate his own conclusions as to the extent of the existing conditions and shoring required.

.3 The method of shoring shall be according to the Contractor's and his Engineer's directions.

.4 All existing loads must be shored prior to commencement of demolition and removal of load bearing elements.

.5 All shoring and frame braces must be supplied with a safe load rating which must not be exceeded. Install in accordance with manufacturer's recommended procedures and safety guidelines. Ensure that the safe load conditions of the shoring are not exceeded by dead, live or construction loads.

.6 Completely remove all shoring after new structure is installed.

.7 Submit shoring drawings and a proposed installation procedure stamped by a professional engineer registered in the Province of Ontario. Procedures shall follow the information provided on these drawings. The shoring design engineer shall be retained and paid for by the Contractor. The shoring engineer shall review all existing conditions on site prior to completing shoring design.

.8 Removal of existing materials without proper engineered shoring is a safety hazard and will not be permitted.

.9 Make good all damage to the existing structure and adjoining structures and bear full responsibility

for failure to provide adequate shoring.

.10 The failure or refusal of the Departmental Representative to suggest the use of shoring, shall not in any way or to any extent relieve the Contractor of any responsibility concerning the condition of the work or of any of their obligations under the Contract, nor impose any liability on the Departmental Representative; nor shall any delay, whether caused by any action or want of action on the part of the Contractor, or by any act of the Departmental Representative relieve the Contractor from necessity of properly and adequately protecting the existing structure from collapse or damage, nor from and of his obligations under the Contract relating to injury to persons or property, nor entitle him to any claims for extra compensation or an extension in schedule.

PART 2 PRODUCTS

2.1 Not Used

Not used

PART 3 EXECUTION

3.1 Not Used

.1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

.1 Barriers and enclosures.

1.2 Installation and Removal

.1 Provide temporary controls in order to execute Work expeditiously and protect the public.

.2 Remove from site all such work after use unless indicated to remain.

1.3 Fencing, Guard Rails and Barricades

.1 Provide as required by governing authorities and Departmental Representative.

.2 Contractor's lay-down area must be secure and there must be no access by unauthorized persons.

.3 Provide temporary fencing around whole work site. Use modular free-standing fencing: galvanized, minimum 1.8m high, chain link or welded steel mesh, pipe rail. Provide one lockable truck entrance gate and at least one pedestrian door as directed. Equip all gates with locks and keys. Maintain fence in good repair.

1.4 Protection for Off Site and Public Property

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

.2 Be responsible for damage incurred

PART 2 PRODUCTS

2.1 Not Used

.1 Not used

PART 3 EXECUTION

3.1 Not Used

.1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

.1 Product quality, availability, storage, handling, protection, and transportation.
.2 Manufacturer's instructions.
.3 Quality of Work, coordination and fastenings.
.4 Existing Utilities

1.2 Quality

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

.2 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.

.3 Should any dispute arise as to quality or fitness of products, decision rests strictly with Consultant based upon requirements of Contract Documents.

.4 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.

.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.

1.3 Availability

.1 Review product delivery requirements and anticipate foreseeable supply delays for any items. If delays in supply of products are foreseeable, notify Consultant of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.

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

1.4 Storage, Handling and Protection

.1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.

.2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.

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

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

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

.6 Store sheet materials 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 Remove and replace damaged products at own expense and to satisfaction of Consultant.

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

1.5 Transportation

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

.2 Transportation cost of products supplied by Owner will be paid for by Owner. Contractor shall be responsible for the unloading, handling and storage of such products.

1.6 Manufacturer’s Instructions

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

.2 Notify Consultant in writing, of conflicts between specifications and manufacturer's instructions, so that Consultant may establish course of action.

.3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Consultant to require removal and re installation at no increase in Contract Price or Contract Time.

1.7 Quality of Work

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

.2 Immediately notify Consultant if required Work is such as to make it impractical to produce required results.

.3 Do not employ anyone unskilled in their required duties. Consultant reserves right to require dismissal from site, workers deemed incompetent or careless.

.4 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Consultant, whose decision is final.

1.8 Coordination

.1 Ensure cooperation of workers in laying out Work. Maintain efficient and continuous supervision.

.2 Be responsible for coordination and placement of openings, sleeves and accessories.

1.9 Concealment

.1 In finished areas, conceal pipes, ducts and wiring in floors, walls and ceilings, except where

indicated otherwise.

.2 Before installation, inform Consultant if there is interference. Install as directed by Consultant.

1.10 Remedial Work

.1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Coordinate adjacent affected Work as required.

.2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

1.11 Location of Fixtures

.1 Consider location of fixtures, outlets, and mechanical and electrical items indicated as approximate.

.2 Inform Consultant of conflicting installation. Install as directed.

1.12 Fastenings

.1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.

.2 Prevent electrolytic action between dissimilar metals and materials.

.3 Use non corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.

.4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.

.5 Keep exposed fastenings to a minimum, space evenly and install neatly.

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

1.13 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. Use No. 304 stainless steel for exterior areas.

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

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

1.14 Protection of Work in Progress

.1 Adequately protect Work completed or in progress. Work damaged or defaced due to failure in providing such protection is to be removed and replaced, or repaired, as directed by Consultant, at

no increase in Contract Price or Contract Time.

.2 Prevent overloading of any part of building. Do not cut, drill or sleeve any load bearing structural member, unless specifically indicated without written approval of Consultant.

1.15 Existing Utilities

.1 When breaking into or connecting to existing services or utilities, execute Work at times directed by local governing authorities, with minimum of disturbance to Work, and/or building occupants and pedestrian and vehicular traffic.

.2 Protect, relocate or maintain existing active services. When services are encountered, cap off in manner approved by authority having jurisdiction. Stake and record location of capped service.

1.16 Hazardous Materials

.1 Report any found or suspected hazardous materials to the Owner.

PART 2 PRODUCTS

2.1 Not Used

.1 Not used

PART 3 EXECUTION

3.1 Not Used

.1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

.1 Field engineering and survey services.

1.2 Survey Reference Points

.1 Locate, confirm and protect control points prior to starting site work. Preserve permanent reference points during construction.

.2 Make no changes or relocations without prior written notice to Departmental Representative.

1.3 Survey Requirements

.1 Establish two permanent bench marks on site, referenced to established bench marks by survey control points. Record locations, with horizontal and vertical data in Project Record Documents.

.2 Establish lines and levels, locate and lay out, by instrumentation.

.3 Stake for grading and fill placement.

1.4 Existing Services

.1 Before commencing work, establish location and extent of service lines in area of Work and notify Departmental Representative of findings. The Contractor is responsible for coordination of all utility locates.

.2 Where Work involves breaking into or connecting to existing services, carry out work at times directed by authorities having jurisdiction, with minimum of disturbance to building occupants, pedestrian and vehicular traffic.

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

1.5 Records

.1 Record locations of maintained and abandoned service lines.

1.6 Submittals

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

.2 On request of Departmental Representative, submit documentation to verify accuracy of field engineering work.

1.7 Subsurface Conditions

.1 Promptly notify Departmental Representative in writing if subsurface conditions at Place of Work differ materially from those indicated in Contract Documents, or a reasonable assumption of probable conditions based thereon.

.2 After prompt investigation, should Departmental Representative determine that conditions do differ materially, instructions will be issued for changes in the Work.

.3 Buried artifacts, the remains and evidence of ancient persons and peoples, and any objects of historic value and worth, remain the property of the Crown. Any and all such objects shall be protected an immediately brought to the attention of the Departmental Representative.

.1 Archaeologist will be on site to monitor work to ensure no archaeology resources are damaged. Advise Departmental Representative and receive direction regarding protecting such resources should any be discovered by either archaeology or the contractor. The contractor could be directed to stop work on the area and redirect work elsewhere until the issue is resolved to the Departmental Representative's satisfaction.

PART 2 PRODUCTS

2.1 Not Used

.1 Not used

PART 3 EXECUTION

3.1 Not Used

.1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

.1 Progressive Cleaning
.2 Final Cleaning

1.2 Project Cleanliness

.1 Maintain Work in tidy condition, free from accumulation of waste products and debris.

.2 Remove waste materials from site at daily regularly scheduled times or dispose of as directed by the Owner. Do not burn waste materials on site.

.3 Clear snow and ice from access to building, bank/pile snow in designated areas only.

.4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

.5 Provide on-site containers for collection of waste materials and debris.

.6 Provide and use clearly marked separate bins for recycling.

.7 Remove debris daily. The work site must be left clean and tidy upon completion, to the satisfaction of the Consultant.

.8 Clean interior areas prior to start of finishing work, and maintain areas free of dust and other contaminants during finishing operations.

.9 Store volatile waste in covered metal containers, and remove from premises at end of each working day.

.10 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.

.11 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

PART 2 PRODUCTS

2.1 Products

.1 All cleaning materials and products shall be low VOC type. Submit list of cleaning products including MSDS for approval prior to commencement of cleaning operations.

.2 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and recommended by cleaning material manufacturer.

PART 3 EXECUTION

3.1 Final Cleaning

.1 When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.

.2 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.

.3 Prior to final review remove surplus products, tools, construction machinery and equipment.

.4 Clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate, and mechanical and electrical fixtures. Replace broken, scratched or disfigured glass.

.5 Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, furniture fitments, walls, floors and ceilings.

.6 Clean lighting reflectors, lenses, and other lighting surfaces.

.7 Vacuum clean and dust building interiors, behind grilles, louvres and screens.

.8 Wax, seal, shampoo or prepare floor finishes, as recommended by manufacturer.

.9 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.

.10 Clean equipment and fixtures to a sanitary condition; clean or replace filters of mechanical equipment.

.11

.12 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.

.13 Remove dirt and other disfiguration from exterior surfaces.

.14 Clean and sweep roofs. Clear all drains.

.15 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.

.16 Sweep and wash clean paved areas.

.17 Remove snow and ice from access to building.

End of Section

PART 1 GENERAL

1.1 Construction/Demolition Waste

.1 Carefully deconstruct and source separate materials/equipment and divert, from Construction and Demolition waste destined for landfill to maximum extent possible. Target for this project is 60% diversion from landfill. Reuse, recycle, compost, anaerobic digest or sell material for reuse except where indicated otherwise. On site sales are not permitted.

.2 Source separate waste and maintain waste audits in accordance with the Environmental Protection Act, Ontario Regulation 102/94 and Ontario Regulation 103/94.
- .1 Provide facilities for collection, handling and storage of source separated wastes.
- .2 Source separate the following waste:
  - .1 Concrete block and Portland cement concrete.
  - .2 Corrugated cardboard.
  - .3 Wood, not including painted or treated wood or laminated wood.
  - .4 Steel.

.3 Submit a waste reduction workplan indicating the materials and quantities of material that will be recycled and diverted from landfill
- .1 Indicate how material being removed from the site will be reused, recycled, composted or anaerobically digested

.4 Submit proof that all waste is being disposed of at a licensed land fill site or waste transfer site. A copy of the disposal/waste transfer site's license and a letter verifying that said landfill site will accept the waste must be supplied to Departmental Representative prior to removal of waste from the demolition site.

1.2 Waste Processing Sites

.1 Province of Ontario.
- .1 Ministry of Environment and Energy, 135 St. Clair Avenue West, Toronto, ON, M4V 1P5.
- .2 Telephone: 800-565-4923 or 416-323-4321.
- .3 Fax: 416-323-4682.

.2 Recycling Council of Ontario: 215 Spadina Avenue, #225, Toronto, ON, M5T 2C7.
- .1 Telephone: 416-657-2797
- .2 Fax: 416-960-8053
- .3 Email: rco@rco.on.ca.
- .4 Internet: http://www.rco.on.ca/.

PART 2 PRODUCTS

2.1 Not Used

.1 Not used

PART 3 EXECUTION

3.1 Canadian Governmental Departments Chief Responsibility for the Environment

.1 Government Chief Responsibility for the Environment:

Province	Address	General Inquiries	Fax
Ontario	Ministry of Environment and Energy	(416) 323-4321	(416) 323-4682
	135 St. Clair Avenue West Toronto, ON M4V 1P5	9800) 565-4923	
	Environment Canada	(416) 734-4494	
	Toronto, ON		

End of Section

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PART 1 GENERAL

1.1 Section Includes

.1 Administrative procedures preceding preliminary and final inspections of Work.

1.2 Related Work

.1 Section 01 78 00 Closeout Submittals

1.3 Inspection and Declaration

.1 Contractor's Inspection: The Contractor shall conduct an inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents. Submit duplicate copies of the deficiency list to the Departmental Representative and Departmental Representative.
  .1 Notify Departmental Representative in writing of satisfactory completion of Contractor's Inspection and that corrections have been made.
  .2 Request Departmental Representative's review.

.2 Departmental Representative's Review: Departmental Representative and Contractor will perform review of Work to identify obvious defects or deficiencies. Contractor shall correct Work accordingly.

.3 Completion: submit written certificate that following have been performed:
  .1 Work has been completed and inspected for compliance with Contract Documents.
  .2 Defects have been corrected and deficiencies have been completed.
  .3 Work is complete and ready for Final Review by the Departmental Representative.

.4 Final Inspection: when items noted above are completed, request final review of Work by Departmental Representative, and Contractor. If Work is deemed incomplete by the Departmental Representative, complete outstanding items and request re-review.

.5 Declaration of Substantial Performance: when Departmental Representative consider deficiencies and defects have been corrected and it appears requirements of Contract have been substantially performed, make application for certificate of Substantial Performance.

PART 2 PRODUCTS

2.1 Not Used

.1 Not used

PART 3 EXECUTION

3.1 Not Used

.1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

.1 As built, samples, and specifications.
.2 Equipment and systems.
.3 Product data, materials and finishes, and related information.
.4 Operation and maintenance data.
.5 Spare parts, special tools and maintenance materials.
.6 Warranties and bonds.
.7 Final site survey.

1.2 Submission

.1 Work will not be deemed complete unless draft copies of the "As-built" Record Documents have been submitted and reviewed by the Departmental Representative.

.2 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.

.3 Pay costs of transportation.

1.3 Format

.1 Organize data in the form as instructional manual.

.2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.

.3 When multiple binders are used correlate data into related consistent groupings. Identify contents of each binder on spine.

.4 Cover: identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.

.5 Arrange content by Section numbers and sequence of Table of Contents.

.6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.

.7 Text: manufacturer's printed data, or typewritten data.

.8 Drawings: provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

.9 Provide 1:1 scaled CAD files in .dwg format on CD.

1.4 As Builts

.1 Maintain at the site for Departmental Representative one record copy of:
  .1 Contract Drawings.
  .2 Specifications.
  .3 Addenda.

.4 Change Orders and other modifications to Contract.
.5 Field test records.
.6 Inspection certificates.

.2 Store record documents in field office apart from documents used for construction.

.3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual. Label each document "PROJECT RECORD" in neat, large, printed letters.

.4 Maintain record documents in clean, dry and legible condition. Do not use record documents for construction purposes.

.5 Keep record documents available for inspection by Departmental Representative.

1.5 Recording Actual Site Conditions

.1 Record information on set of drawings, provided by Departmental Representative.

.2 Record information concurrently with progress of the Work.

.3 Contract Drawings and shop drawings: mark each item to record actual construction, including:
.1 Field changes of dimension and detail.
.2 Changes made by change orders.
.3 Details not on original Contract Drawings.

.4 Submit following drawings:
.1 Record changes in red. Mark on one set of prints and at completion of project prior to final inspection, produce electronic “as-built” records on disk using latest version of AutoCad. Annotate “AS-BUILT RECORD” in each drawing title block.

.2 All changes shall be shown on a separate drawing layer named "as-built".

.3 At least 2 weeks prior to commencement of scheduled commissioning activities, submit one copy of the DRAFT “As-built” Project Record Documents for Departmental Representatives review and use during the commissioning activities. After the completion of the commissioning activities, the Departmental Representative will return to the Contractor the DRAFT copy, with review comments, for revision. Prior to the Issuance of the Final Certificate of Completion, and within 10 working days after Substantial Performance, submit 2 copies of the FINAL “As-built” Project Record Documents and disk of “as-built” record drawings.

.5 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections

1.6 Materials and Finishes

.1 Building Products, Applied Materials, and Finishes: include product data, with catalogue number, size, composition, and colour and texture designations.

.2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

.3 Moisture-Protection and Weather-Exposed Products: include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and

recommended schedule for cleaning and maintenance.

.4 Additional Requirements: as specified in individual specifications sections.

1.7 Final Survey

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

1.8 Maintenance Materials

.1 Provide maintenance and extra materials, in quantities specified in individual specification sections.

.2 Provide items of same manufacture and quality as items in Work.

.3 Maintenance materials are to be delivered to the Owner prior to the Contractor’s application for Substantial Performance.

.4 Receive and catalogue items. Submit inventory listing to Consultant. Include approved listings in Maintenance Manual.

.5 Obtain receipt for delivered products and submit prior to final payment.

1.9 Warranties and Guarantees

.1 Separate each warranty or guarantee with index tab sheets keyed to Table of Contents listing.

.2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

.3 Obtain warranties and guarantees, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of the applicable item of work.

.4 Except for items put into use with Owner's permission, leave date of beginning of time of warranty until the Date of Substantial Performance is determined.

.5 Verify that documents are in proper form, contain full information, and are notarized.

.6 Co-execute submittals when required.

.7 Retain warranties and guarantees until time specified for submittal.

1.10 Independent Specialty Engineers Sign-Off

.1 Prior to Substantial Performance, provide copies of signed and stamped engineers review and sign-off letters stating that the work has been built in accordance with their drawings and designs. Conditional or vague letters of sign-off will not be accepted. All specialty design engineers for all sub-contractors and suppliers will be required to review the work in progress at appropriate intervals to ensure compliance with their designs and drawings and shall provide final sign-off letters. Provide copies of all field reports issued by specialty engineers. Carry all costs associated with full compliance with this requirement.

PART 2 PRODUCTS

2.1 Not Used

.1 Not used

PART 3 EXECUTION

3.1 Not Used

.1 Not used

End of Section

PART 1 GENERAL

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 06 10 00 Rough Carpentry
.2 Section 07 92 00 Joint Sealants
.3 Section 08 52 00 Wood Windows

1.3 References

.1 CSA Group (CSA)
  .1 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
  .2 CSA O80 Series-15, Wood Preservation.
  .3 CSA O86-14, Engineering Design in Wood.
  .4 CSA O112-M Series 1977 (R2006) Standards for Wood Adhesives.
  .5 CSA Z809-16, Sustainable Forest Management.
.2 The Standards and Guidelines for Conservation of Historic Places in Canada (Second Edition).

1.4 Submittals

.1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product data, installation instructions, and general recommendations from manufacturer for types of repair required including technical data sheets defining performance properties.
  .1 Submit product data for:
    .1 Waterproof wood adhesive.
    .2 Consolidant Materials.
    .3 Preservatives.
    .4 Patching compound materials.
  .2 Include manufacturer's material safety data sheets for the safe handling of the specified materials and products, in accordance with Workplace Hazardous Materials Information Service (WHMIS) requirements.

1.5 Quality Assurance

.1 Restorations Specialist: Work must be performed by a firm having experience in comparable wood restoration work.
  .1 Restoration Specialist firm must be acceptable to, or certified by, manufactured of primary restoration materials.
  .2 Only skilled workers who are thoroughly trained and experienced in wood repairs and restoration work at areas as noted, have the skills required for the work of this section, and are completely familiar with the materials and methods specified shall be used for wood restoration work.
  .3 At least one skilled worker shall be present at all times during the execution of the work and shall personally direct the wood repairs and restoration work

.4 In acceptance or rejection of the wood restoration work, no allowance will be made for lack of skill on the part of the workers.

.2 Field Mock-ups
.1 Construct mock-ups in accordance with Section 01 45 00.
.2 Wood Restoration: perform a mock-up of each type of wood repair system specified to demonstrate materials and methods intended to be used in the finished work.
.1 Perform mock-ups in areas indicated by the Departmental Representative.
.2 Obtain the Departmental Representative's written approval of each mock-up before proceeding with the work of the Section
.3 Protect the approved mock-ups until the completion of all the work
.4 Approved mock-up shall represent the minimum acceptable standard for each type and detail of the restoration work.

.3 Sustainable Standards Certification: Certified Wood: submit listing of wood products and materials used in accordance with CSA Z809 or FSC or SFI.

1.6 Shipping, Handling and Storage

.1 Refer to Section 01 61 00 – Common Product Requirements.

.2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.

.3 Deliver all materials in original unopened containers labeled with the manufacturer's name, brand name, item name and installation instructions.

.4 Store materials in compliance with the manufacturer's requirements for temperature, maximum and minimum, and other conditions. Keep all materials under cover and dry. Protect against exposure to the weather.

1.7 Project Conditions

.1 Coordinate wood repair so that the effected surfaces are exposed for a minimal time to avoid further damage to bare wood.

.2 Weather: Proceed with the work of this section only when existing and foreseen weather conditions permit the work to be performed in accordance with the manufacturer's recommendations for temperature and humidity range, minimum and maximum.

.3 Substrate Conditions: Do not proceed with product applications until substrates have been inspected and are determined to be in satisfactory conditions. Substrate moisture content shall not be in excess of 18% during preparation and application
.1 Remove all decayed wood to a clean, sound, unaffected substrate
.2 Remove all built up paints, and other debris to a clean sound substrate.
.3 Remove all wood sawdust to a clean sound substrate.

.4 Protection:
.1 Use all necessary means to protect interior of building from all damage caused by precipitation and other environmental conditions during the work of this Section
.2 Protect all adjacent building surfaces from damage, staining or deterioration resulting from wood restoration work.

.3 Protect the restoration work in progress to prevent further deterioration exposed wood surfaces. Protect the completed work until the time of final inspection and acceptance by the Departmental Representative.

1.8 Waste Management and Disposal

.1 Refer to Section 01 74 20 – Construction Waste Management and Disposal.

1.9 Warranty

.1 Warrant the work of this Section against defects of workmanship and material, for a period of three (3) years from the date of Certificate of Completion and agree to make good promptly any defects which occur or become apparent within the warranty period.

.2 Repairs of warranted work shall include removal and reinstatement of related finishes and the making good of any other work damaged or disturbed by the warranty work.

PART 2 PRODUCTS

2.1 General

.1 Compatibility: provide products recommended by the manufacturers to be fully compatible with indicated substrate.

2.2 Patching Lumber

.1 Match wood species and grain to adjacent work.

.2 Reuse existing logs or parts thereof, where indicated.

.3 At time of installation, moisture content of wood to be between 10% and 15%.

.4 Use only straight, sawn square and true material.

.5 Panel and concealed framing materials: refer to Section 06 10 00.

2.3 Repair Products

.1 Low viscosity epoxy coupling/bonding agent.

.2 Consolidation materials: 2 component 100% solids epoxy consolidant.
- .1 Liquid Wood by Abatron
- .2 Epoxy Resin 332 by Dow Chemical.
- .3 Epoxy Diluent RD2, by Ciba-Geigy.
- .4 Approved equivalent.

.3 Flexible patching compound materials:
- .1 Structural Adhesive putty, shrink-free epoxy wood filler Greenguard Certified.
  - .1 WoodEpox by Abatron
  - .2 Epoxy Resin 331 (epoxy resin) by Dow Chemical.
  - .3 LP-3 (polysulphide rubber) by Thiokol Chemical
  - .4 Versamid 140 by Versamid Chemical

.5 Approved equivalent.

.4 Fasteners: stainless steel or galvanized nails and screws.

2.4 Clear Penetrating Sealers

.1 50% solids epoxy/polyamide Clear Penetrating Epoxy Sealer.

2.5 Surface Preservatives

.1 Preservative: to CAN/CSA-O80.

2.6 Chinking Materials

.1 Water: Potable, free from contamination and deleterious amounts of acids, alkalines or organic material.

.2 Portland Cement: To CAN/CSA-A5.

.3 Hydrated Lime: To ASTM C207, type S.

.4 Aggregate: Well graded washed sand to CSA A82-56. Aggregate shall be of texture and colour determined by the Consultant to suit site conditions and to match original if necessary, based on analysis of existing.

.5 Oakum: twisted jute fibre or equivalent as approved by departmental representative.

.6 Nails: to CSA B111, galvanized spiral nails 63 mm long or as required.

2.7 Damp Course and Flashing

.1 Peel and stick modified SBS bitumen membrane reinforced with proprietary glass screen, minimum thickness of 1.0 mm.

PART 3 EXECUTION

3.1 Examination

.1 Inspect all wood surfaces in conjunction with the Departmental Representative to determine the extent of restoration and methods to be used.
  .1 The Departmental Representative's decision regarding the extent of required repair, and extent of profile replication work shall be final.
  .2 In wood surfaces where decay is present, determine the methods and treatment of repair.
  .3 Areas that do not attach existing profiles, determine the level of restoration and replication to be achieved.

.2 Joints, Joinery and edges: Check wood members at joints, seams and edges for:
  .1 Any open seams or failed conditions.
  .2 Wood moisture content.
  .3 The presence of wood decay, by probing surfaces.

.3 Sills and Trim
- .1 Inspect wood surfaces for natural defects (knots) cracks and checks.
- .2 Determine wood moisture content.
- .3 Probe for the presence for wood decay.

3.2 Protection

.1 Protect all adjacent areas and adjoining materials against damage.

.2 Provide protection against the spread of dust and residues into the environment at or beyond the work area.

3.3 General Repair

.1 General Overhaul of Woodwork:
- .1 Remove rotted wood from trim, sashes, doors, logs and framing members as directed.
- .2 Scrub all affected surfaces of wood with bleach and detergent mixture in water to remove and kill fungus. Rinse with water. Rinse with bleach mixture. Allow to dry.
  - .1 Bleach and detergent mixture: Mix 1 litre bleach with 50 ml detergent with 200 ml Tri-sodium phosphate and 3 litres of water to create cleaning solution.
  - .2 Bleach mixture: Mix bleach and water 1:1.
- .3 Take apart removable sections of woodwork and reset after repair of individual pieces.
- .4 Brush-apply consolidant mixture to strengthen deteriorated wood, as specified in this Section.
- .5 Insert one-piece wood dutchman into large voids. Set dutchman with grain in same direction as wood piece being repaired.
- .6 Bed dutchman in semi-rigid patching compound. Fill all voids.
- .7 Fill all open edge grain, checks, vanes and knot holes with epoxy-resin semi-rigid patching compound specified in this Section.
- .8 After curing, sand down repairs for refinishing.

.2 Consolidation of Deteriorated Wood:
- .1 Complete all stripping and bleaching before starting consolidation.
- .2 Wood must be below 15% moisture content when consolidant is applied.
- .3 Treat soft, punky, and weathered wood with brush-applied consolidant mixture before filling with semi-rigid patching compound.
- .4 Drill 6 mm diameter holes about 50 mm o.c. at 45^{o} downward from the face plane to allow for full impregnation of the grain. Do not drill through the full thickness of the wood as this would allow resin to escape below.
- .5 Plug holes in the edges of wood that might leak with plastic modelling clay before applying mixed consolidant.
- .6 Mix consolidant in accordance with manufacturer's instructions.
- .7 Inject consolidant into the holes in the wood. Allow consolidant to seep into the wood. Repeat as necessary. The intent is to saturate the grain of the wood as deeply as possible.
- .8 Brush any consolidant standing on the surface of the wood into the grain. When saturated, wipe off surplus consolidant with paper towels. Remove all consolidant standing on the surface. Allow consolidant to cure 24 hours at room temperature. Allow to cure longer at lower temperature.

.3 Flexible Epoxy Patching of Voids in Wood:
- .1 Apply semi-rigid patching compound only after consolidation of woodwork.
- .2 Fill all open edge grin, checks, wanes, knot holes and voids with semi-rigid patching compound.

.3 Work mixed patching compound into the crevices and finish slightly above the surface of the wood. Patching compound can be used as a bedding adhesive for dutchman inserts and as a large-volume filler.
.4 Mix Patching Compound in accordance with manufacturer's instructions.
.5 Mix only enough patching compound that can be used within 20 minutes. Ensure that all preparation is complete before mixing patching compound. Clean up all tools and containers with zylor immediately after use. Ensure that all compound is removed from tools to prevent contamination of next mix.
.6 Allow patching compound to cure overnight at above 10°C, longer at lower temperatures. When properly cured the compound will be a rubbery, semi-rigid material that can be carved, planed, sanded and painted easily.
.7 Shave cured, exposed compound down to the original surface with woodworking tools.

3.4 Preventative Systems

.1 Preservation and Sealing of seams and joints. Repair of wood" checking" due to weathering
.1 Open or failed seams and checks shall be dilated to a width of 4.7 mm and depth of 12.7 mm.
.2 Remove all decayed, soft and weathered wood.
.3 Check the moisture content and hardness of wood at and around the repair, maximum allowable moisture content 18%.
.4 Sand bare wood to remove all loose fibers, paint, compounds.
.5 Remove all sawdust and dirt.
.6 Pre-treat bare and sanded wood thoroughly with low viscosity epoxy coupling/bonding agent
.7 Allow coupling agent to penetrate wood surface for a minimum of 10 minutes and maximum of 30 minutes, or as recommended by the manufacturer. Avoid applying in direct sunlight
.8 Remove any excess bonding agent with absorbing paper
.9 Apply epoxy repair compound over epoxy bonding agent while still tacky.
.10 Epoxy compound shall have optimal contact with wood.
.11 Avoid inclusion of air pockets during application
.12 Fill joints full, even and smooth in one application
.13 Allow full cure time as specified by manufacturer before application of paint.
.14 After curing, sand surface even and smooth. Transitions and irregularities between wood and epoxy shall not be visible after sanding
.15 If required, smooth any remaining irregularities with an additional application of epoxy repair compound. Always sand between coats.

3.5 Curative Systems

.1 Preservation and Repair of Damaged/Decayed Wood:
.1 Remove all paint and other coatings from area to be repaired.
.2 Remove all decayed soft and discoloured wood, to sound bright unaffected material
.3 Check area of removal to determine complete elimination of decayed material.
.1 Remaining wood should be even colour without red-brown and/or gray spots.
.2 No soft wood, existing brittle compound, or other previous repair materials should remain.
.4 Check moisture content and hardness of the wood in and around the repair area
.1 Moisture content of wood to be 18% or less
.5 Sand bare wood to remove all loose fibers, paint, compounds. Remove all sawdust and dirt.
.6 Pre-treat bare and sanded wood thoroughly with low viscosity epoxy coupling/bonding agent. Allow coupling/bonding agent to penetrate wood surface for a minimum of 10 minutes and maximum of 30 minutes, or as recommended by the manufacturer. Avoid applying in direct sunlight. Remove any excess bonding agent with absorbing paper.
.7 Apply epoxy repair compound over the uncured epoxy coupling agent.

.1 Epoxy fill shall have optimal contact with wood.
.2 Avoid inclusion of air pockets during application
.3 Fill joints fill, even and smooth in one application
.4 Allow full cure time as specified by manufacturer before preparing for finishes.

.8 After curing, sand surface even and smooth. Transitions and irregularities between wood and epoxy shall not be visible after sanding.

.9 If required, smooth any remaining irregularities with an additional application of epoxy repair compound. Always sand between coats.

3.6 Surface Preservative

.1 Spray or brush apply wood preservative concentrate to clean and dry wood surfaces where indicated at the rate of 1 litre/ 4.2 m^2 and in accordance with manufacturer's recommendations.

3.7 Log Repair

.1 Cut out all soft and loose material down to sound surfaces.

.2 Surfaces should be free of dust, grease, oil, wax, and any other foreign matter. Use a tack rag to completely remove dust prior to application.

.3 Apply clear penetrating epoxy sealers to sound surfaces in accordance with manufacturer's instructions.

.4 Fill large voids with wood filler.

.5 Install damp course flashing membrane between sill logs and stone foundations.

3.8 Chinking

.1 Remove existing loose and deteriorated chinking where directed.

.2 Pack void between logs with oakum.

.3 Place galvanized nails to support mortar at 600 mm centres.

.4 Replace chinking mortar with new, mixed at rate of 1 part Portland Cement, ½ part masonry lime and 3 parts sand and potable water, or other mix as approved by Departmental Representative.

.5 Tool joints to match existing texture and profile.

3.9 Cleaning

.1 Proceed in accordance with Section 01 74 11 – Cleaning.

.2 Clean any drippage and spills of surplus resins from adjacent surfaces and make good any damage to finishes or materials caused by the work of this Section.

End of Section

PART 1 GENERAL

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 06 01 61 Wood Repairs
.2 Section 06 20 00 Finish Carpentry
.3 Section 07 31 29 Wood Shingles
.4 Section 07 46 23 Wood Siding
.5 Section 07 92 00 Joint Sealants
.6 Section 08 52 00 Wood Windows

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM A123/A123M-13, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
  .2 ASTM A653/A653M-15, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealled) by the Hot-Dip Process.
  .3 ASTM D1761-12, Standard Test Methods for Mechanical Fasteners in Wood.
.2 American Wood Protection Association (AWPA):
  .1 AWPA P5-15, Standard for Waterborne Preservatives.
  .2 AWPA P8-14, Standard for Oil-Borne Preservatives.
.3 CSA Group (CSA)
  .1 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
  .2 CAN/CSA-O80 Series-15, Wood Preservation, Includes Update No. 1 (2008).
  .3 CSA O86-14, Engineering Design in Wood.
  .4 CSA O121-08(R2013), Douglas Fir Plywood.
  .5 CSA O141-05(R2014), Softwood Lumber.
  .6 CSA O151-09(R2014), Canadian Softwood Plywood.
  .7 .CSA Z809-16, Sustainable Forest Management.
.4 Canadian General Standards Board (CGSB)
  .1 CGSB 19-GP-5M (1984), Sealing Compound, One Component, Acrylic Base, Solvent Curing (Incorporating Amendment No. 1).
  .2 CAN/CGSB-51.32-M77, Sheathing, Membrane, Breather Type.
.5 Underwriters Laboratories Canada (ULC)
  .1 CAN/ULC-S102 Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
.6 Forest Stewardship Council (FSC)
  .1 FSC-STD-01-001-2004, FSC Principle and Criteria for Forest Stewardship.
  .2 FSC-STD-20-002-2004, Structure and Content of Forest Stewardship Standards V2-1
  .3 FSC Accredited Certified Bodies.
.7 National Lumber Grading Authority (NGLA)
  .1 Standard Grading Rules for Canadian Lumber, 2014.
.8 Sustainable Forestry Initiative (SFI).

1.4 Submittals

.1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for wood products and accessories and include product characteristics, performance criteria, physical size, finish and limitations.

1.5 Quality Assurance

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

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

.3 Sustainable Standards Certification:
.1 Certified Wood: submit listing of wood products and materials used in accordance with FSC-STD-01-001.

1.1 Shipping, Handling and Storage

.1 Materials shall not be delivered before they are required for proper conduct of the work.

.2 Protect materials, under cover, both in transit and on the site.

.3 Store materials to prevent deterioration or the loss or impairment of their structural and other essential properties. Do not store materials in areas subject to high humidity.

.4 Protect work from damage during storage, handling, installation and until the building is turned over to the Departmental Representative. Make good damage and loss without additional expense to the Departmental Representative.

.5 Store sheathing materials level and flat, in a dry location. Protect panel edges from moisture at all times.

PART 2 PRODUCTS

2.1 Framing, Structural and Panel Materials

.1 Description Sustainability Characteristics:
.1 Lumber, CSA Z809, SFI or Forestry Stewardship Council (FSC) certified.
.2 Plywood, urea-formaldehyde free, CSA Z809, SFI or Forestry Stewardship Council (FSC) certified.

.2 Lumber: softwood, S4S, moisture content S-DRY graded and stamped in accordance with following standards:
.1 CSA O141.
.2 NLGA Standard Grading Rules for Canadian Lumber.

.3 Roof Sheathing Boards: As specified in Section 07 31 29.

.4 Framing and board lumber: in accordance with NBC, except as follows:
.1 Studs: spruce, pine or fir (SPF), 121c. "STUD".
.2 Lintels and plates: spruce, pine or fir (SPF), 124b. "No. 1" Structural, Structural Light Framing and Structural Joists And Planks.

.5 Furring, blocking, nailing strips, strapping, grounds, rough bucks and fascia backing: NLGA spruce,

pine or fir (SPF), 121c. and pine, 113d.
.1 S4S

.6 Douglas fir plywood: to CSA 0121, urea formaldehyde free.
.1 Sheathing: SHG Sheathing Grade. Nominal thickness as indicated, sanded surfaces to Tables E-1 and E-2, square edge.
.2 Soffit and fascia sheathing: G1S Good One Side Grade. Nominal thickness 19 mm, sanded surfaces to Tables E-1 and E-2, square edge.

.7 Preservative treated plywood: Douglas Fir to CSA O121, G1S good one side, pressure treated with CCA to CAN/CSA-O80.9, minimum retention 4.0 kg/mü by assay.
.1 Preservative: chromated copper arsenate (CCA) to AWPA P5 as amended by CAN/CSA-O80-Series.

.8 Field applied wood preservative: copper napthenate to AWPA P8, green colour.

.9 Nails, Spikes and Staples: To CSA B111

.10 Bolts: 12.5 mm diameter unless indicated otherwise, galvanized, complete with nuts and washers.

.11 Proprietary Fasteners: toggle bolts, expansion shields and lag bolts, screws and lead or inorganic fibre plugs, recommended for purpose by manufacturer.

.12 Sealant: in accordance with Section 07 92 00.

.13 Building Paper: to CAN2-51.32-M, 15# asphalt impregnated paper.

PART 3 EXECUTION

3.1 Examination

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for product installation in accordance with manufacturer's written instructions.
.1 Visually inspect substrate in presence of Departmental Representative.
.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 Preparation

.1 Treat surfaces of material with wood preservative, before installation.

.2 Apply preservative by dipping, or by brush to completely saturate and maintain wet film on surface for minimum 3 minute soak on lumber and one minute soak on plywood.

.3 Re-treat surfaces exposed by cutting, trimming or boring with liberal brush application of preservative before installation.

.4 Treat material as indicated.

3.3 Installation

.1 Rough Hardware:
  .1 Work shall include rough hardware such as nails, bolts, nuts, washers, screws, clips, hangers, connectors, strap iron, and operating hardware for temporary enclosures.

.2 Strapping for Siding:
  .1 25 x 89 or as indicated pressure treated stock at 400 mm c/c maximum
  .2 Apply strapping vertically for horizontal cladding.
  .3 Shim as required to suit profile of existing log construction.

.3 Apply dampproof flashing over masonry on which wood framing bears.

.4 Apply wood preservative to wood in contact with foundations.

.5 Treat surfaces of pressure treated wood and plywood which are cut or bored after pressure treatment with field applied wood preservative.

.6 Install members true to line, levels and elevations, square and plumb to a tolerance of 1:600 and rigidly secure in place.

.7 Construct continuous members from` pieces of longest practical length.

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

.9 Install furring to support siding.
  .1 Align and plumb faces of furring and blocking to tolerance of 1:600.
  .2 Shim s as necessary.
  .3 Provide additional furring and strapping at rectangular blockhouses where existing furring or strapping is missing or damaged.

.10 Install rough bucks, nailers and linings to rough openings as required to provide backing for frames and other work.

.11 Install wood backing, nailers and other wood supports as required and secure using galvanized steel or non- ferrous fasteners.

.12 Insert loose insulation in spaces indicated.

3.4 Cleaning

.1 Proceed in accordance with Section 01 74 11 – Cleaning.

3.5 Protection

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by rough carpentry installation.

End of Section

PART 1 GENERAL

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 06 10 00 Rough Carpentry
.2 Section 07 46 23 Wood Siding
.3 Section 07 92 00 Joint Sealants
.4 Section 08 52 00 Wood Windows
.5 Section 09 21 16 Gypsum Board
.6 Section 09 91 13 Painting

1.3 References

.1 ASTM International, (ASTM)
  .1 ASTM E1333-14 Standard Test Method for Determining Formaldehyde Concentrations in Air and Emissions Rates from Wood Products Using a Large Chamber.
  .2 ASTM F1667 - 17 Standard Specification for Driven Fasteners: Nails, Spikes, and Staples
.2 CSA Group (CSA)
  .1 CSA B111-1974 (R2003) Wire Nails, Spikes and Staples.
  .2 CAN/CSA-G164-M92 (R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
  .3 CSA O141-05 (R2014) - Softwood Lumber
  .4 CSA 0151-17 Canadian Softwood Plywood
  .5 CSA Z760-94 (R2001) Life Cycle Assessment
.3 Forest Stewardship Council (FSC)
  .1 FSC-STD-01-001-V4-0 FSC Principle and Criteria for Forest Stewardship.
  .2 FSC-STD-20-002-2004, Structure and Content of Forest Stewardship Standards V2-1
  .3 FSC Accredited Certified Bodies.
.4 National Hardwood Lumber Association (NHLA)
  .1 Rules for the Measurement and Inspection of Hardwood and Cypress 1998.
.5 National Lumber Grades Authority (NLGA)
  .1 Standard Grading Rules for Canadian Lumber 2005.
.6 South Coast Air Quality Management District (SCAQMD), California State (SCAQMD)
  .1 SCAQMD Rule 1168-03, Adhesives and Sealants Applications

1.4 Submittals

.1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Submit shop drawings.
  .1 Indicate details of construction, profiles, jointing, fastening and other related details.
  .2 Site measure each loophole location and provide shop drawings showing details of construction and assembly.

  .3 Indicate materials, thicknesses, finishes and hardware.

.3 Submit duplicate 300 mm long samples of each type of solid wood.

1.5 Quality Assurance

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

.2 Wood materials certified by Forestry Stewardship Council.

1.6 Shipping, Handling and Storage

.1 Refer to Section 01 61 00 – Common Product Requirements.

.2 Protect materials against dampness during and after delivery.

.3 Store materials in ventilated areas, protected from extreme changes of temperature or humidity.

1.7 Waste Management and Disposal

.1 Refer to Section 01 74 20 – Construction Waste Management and Disposal.

PART 2 PRODUCTS

2.1 Lumber Materials

.1 Softwood lumber: unless specified otherwise, S4S, moisture content 19% or less in accordance with following standards:
.1 CSA O141-05 (R2014)
.2 NLGA Standard Grading Rules for Canadian Lumber.

2.2 Accessories

.1 Rough Hardware: Bolts, lag screws, anchors, nails and expansion shields required to secure this portion of work. Rough hardware hot dip galvanized conforming to latest edition of CAN/CSA-G164. All fasteners used in damp or wet areas to be suitable for use in corrosive environment. Use hot dipped galvanized or other material approved by Departmental Representative.

.2 Nails and staples: to ASTM F1667 galvanized.

.3 Wood screws: to CSA B 35.4 plain type and size to suit application.

.4 Stainless Steel hardware: Type 316 Stainless steel for exposed or wet locations, tamper proof.

.5 Splines: wood or metal to suit application.

.6 Weather strip: dual durometer bulb weather strip. Color: Beige.

.7 Adhesive: recommended by manufacturer, waterproof type, maximum VOC limit 30 g/L SCAQMD Rule 1168 - Adhesives and Sealants Applications.

PART 3 EXECUTION

3.1 Construction

.1 Fastening:
.1 Position items of finished carpentry work accurately, level, plumb, true and fasten or anchor securely.
.2 Design and select fasteners to suit size and nature of components being joined. Use proprietary devices as recommended by manufacturer.
.3 Set finishing nails to receive filler. Where screws are used to secure members, countersink screw in round smooth cut hole and plug with wood plug to match material being secured.

.4 Replace items of finish carpentry with damage to wood surfaces including hammer and other bruises.

3.2 Fabrication

.1 General:
.1 Field measure all dimensions.
.2 Fabricate all finish carpentry items to AWMAC premium grade, and in accordance with the reviewed shop drawings.
.3 Set nails and screws, apply plain wood filler to indentations, sand smooth and leave ready to receive finish.
.4 Ease edges of solid lumber components to 1.6 mm radius.

.2 Fabricate interior trim and doors for loopholes as detailed and to match existing. Site verify dimensions at each location and adjust to suit.

.3 Fabricate wood baseboard in maximum practical lengths and to match existing profiles.

.4 Fabricate all other trim, door and window jambs, stops, jambs, sills etc. to match original construction and to suit existing conditions.

3.3 Installation

.1 All fastenings shall be concealed.

.2 Provide heavy duty grounds as necessary for secure installation of finish carpentry work.

.3 All wood surfaces shall be sanded smooth, ready to receive finish.

.4 Scribe and cut as required, fit to abutting walls and surfaces, fit properly into recesses and to accommodate piping, columns, fixtures, outlets or other projecting, intersecting or penetrating objects.

.5 Form joints to conceal shrinkage.

.6 Set and secure materials and components in place, rigid plumb and square.

.7 Design and select fasteners to suit size and nature of components being joined. Use proprietary devices as recommended by manufacturer.

.8 Set finishing nails to receive filler. Where screws are used to secure members, countersink screws in round, cleanly cut hole and plug with wood plug to match material being secured.

.9 Replace items of finish carpentry with damage to wood surfaces including hammer and other bruises.

.10 Remove and reinstall existing elements shown to remain.

.11 Interior door and window trim: to match original.

.12 Bond stools to shims with waterproof adhesive. Tightly butt all joints and bond together with adhesive and concealed splines. Cut to fit tight to all penetrations.

.13 Install wood baseboard in maximum practical lengths. Mitre all corners and joints, and connect to existing baseboard scheduled to remain with tight fitting joints.

3.4 Loopholes:

.1 Coordinate with Section 07 46 23 for exterior elements of loopholes.

.2 Fabricate interior door and trim at loopholes and windows to match original. Reinstall existing hardware.

.3 Install continuous weather stripping at perimeter of loophole doors.

3.5 Cleaning

.1 Proceed in accordance with Section 01 74 11 – Cleaning.

End of Section

PART 1 GENERAL

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 06 10 00 Rough Carpentry
.2 Section 07 25 00 Weather Barriers
.3 Section 07 46 23 Wood Siding
.4 Section 07 92 00 Joint Sealants

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM C518-17 Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
  .2 ASTM C612-14 Standard Specification for Mineral Fiber Block and Board Thermal Insulation
  .3 ASTM E84-17a Standard Test Method for Surface Burning Characteristics of Building Materials
.2 Underwriters Laboratories Canada (ULC)
  .1 CAN/ULC-S702-14, Thermal Insulation Mineral Fibre for Buildings
.3 CSA Group (CSA)
  .1 CSA B111-1974 (R2003) Wire Nails, Spikes and Staples

1.4 Submittals

.1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Submit insulation manufacturer's product literature including specified physical properties for each type of insulation specified.

.3 Submit installation instructions.

.4 Submit certification that product complies with specification requirements and is suitable for the use indicated.

1.5 Quality Assurance

.1 Insulation shall not be produced with, or contain, any of the regulated CFC compounds listed in the Montreal Protocol of the United Nations Environmental Program.

1.6 Shipping, Handling and Storage

.1 Refer to Section 01 61 00 – Common Product Requirements.

.2 Deliver, handle and store materials in accordance with manufacturer’s printed instructions.

.3 Deliver material to the site in the original unbroken packages bearing the name of manufacturer.

.4 Store materials in an approved manner at the site preceding application and protect from damage at all times.

.5 Remove damaged or deteriorated materials from site.

1.7 Waste Management and Disposal

.1 Refer to Section 01 74 20 – Construction Waste Management and Disposal.

1.8 Warranty

.1 Provide written warranty that the actual thermal resistance of the extruded polystyrene foam insulation will not vary by more than 10% from its published thermal resistance.

.2 Warranty period is 15 years after date of Certificate of Completion.

PART 2 PRODUCTS

2.1 Board Insulation

.1 Semi Rigid Mineral Wool Insulation
- .1 Mineral fibre board: to ASTM C612.
- .2 Type: IVB Compliant.
- .3 Density: 70 kg/m3.
- .4 Surfaces: unsurfaced
- .5 Thickness: as indicated.

.2 Adhesives: As recommended by material manufacturer, compatible with insulation and substrate membrane, waterproof.

2.2 Batt Insulation

.1 Fibreglass friction fit batts to CSA A101-M, Type 1 or mineral fibre to CAN/ULC-S702 Type 1 for wall application, width and thickness as shown on details.

2.3 Accessories

.1 Rough Hardware: Nails and staples as required for installation of insulation and membrane materials, galvanized to CSA B111 and B34.

.2 Mechanical Fastening: galvanized screw type fasteners with 25 mm galvanized plate washers. Screws shall be 13 mm longer than the combined thickness of the insulation and sheathing.

PART 3 EXECUTION

3.1 Installation – General

.1 Install insulation of types indicated, or, where not indicated, as appropriate, to provide a continuously un-interrupted building envelope in accordance with the requirements of the reference standards.

.2 Install insulation after building substrate materials are dry.

.3 Install insulation to maintain continuity of thermal protection to building elements and spaces.

.4 Fit insulation tightly around all structural angles, penetrations and other protrusions.

.5 Cut and trim insulation neatly to fit spaces. Butt joints tightly; offset vertical joints. Use only

.6 Insulation board materials free from chipped or broken edges.

.7 Sizes of materials shall be consistent with the module of the system.

.8 Do not enclose or conceal insulation until it has been inspected by the Departmental Representative.

3.2 Batt Insulation

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

.2 Install batt insulation in spaces as shown on drawings.

.3 Pack loose fibreglass insulation in crevices between exterior framing and door, window and loophole frames and about lintels, frames, beams around ducts at holes and other places where shown or required to eliminate air infiltration.

3.3 Cleaning

.1 Proceed in accordance with Section 01 74 11 – Cleaning.

End of Section

PART 1 GENERAL

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 06 10 00 Rough Carpentry
.2 Section 07 21 13 Building Insulation
.3 Section 07 46 23 Wood Siding
.4 Section 08 52 00 Wood Windows

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM E84-17a Standard Test Method for Surface Burning Characteristics of Building Materials
  .2 ASTM E96/E96M-16 Standard Test Methods for Water Vapor Transmission of Materials
  .3 ASTM E331-00(2016) Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
  .4 ASTM E2178-13 Standard Test Method for Air Permeance of Building Materials
  .5 ASTM E2357-17 Standard Test Method for Determining Air Leakage of Air Barrier Assemblies
  .6 ASTM E2273-03(2011) Standard Test Method for Determining the Drainage Efficiency of Exterior Insulation and Finish Systems (EIFS) Clad Wall Assemblies
.2 American Architectural Manufacturers Association (AAMA)
  .1 AAMA 711-13 Voluntary Specification for Self Adhering Flashing Used for Installation of Exterior Wall Fenestration Products
.3 National Fire Protection Association (NFPA)
  .1 NFPA 285 Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components

1.4 Submittals

.1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data: For each type of product.
  .1 For weather barrier, include data on air and water-vapor permeance based on testing in accordance with referenced standards.

.3 Shop Drawings: Show details of weather barrier at terminations, openings, and penetrations. Show details of flexible flashing applications.

.4 Manufacturer's Instructions: For installation of each product specified.

.5 Installer's weather barrier manufacturer-training certificate.

1.5 Quality Assurance

.1 Installer Qualifications: A qualified firm that is certified by weather barrier system manufacturer to install manufacturer's product.

.2 Manufacturer's Field Service: Register project with weather barrier manufacturer prior to installation of weather barrier and comply with weather barrier manufacturer's project registration and observation process.

.3 Preinstallation Conference: Conduct conference at Project site.
- .1 Meet with Departmental Representative, Installer and installers of work that interfaces with or affects weather barrier.
- .2 Review methods and procedures related to weather barrier installation, including manufacturer's written instructions.
- .3 Review and finalize construction, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
- .4 Examine substrate conditions and finishes for compliance with requirements.
- .5 Review flashings, special weather barrier details, weather barrier penetrations, and condition of other construction that affects weather barrier.
- .6 Review temporary protection requirements for weather barrier during and after installation.

1.6 Shipping, Handling and Storage

.1 Refer to Section 01 61 00 – Common Product Requirements.

.2 Deliver, handle and store materials in accordance with manufacturer’s printed instructions.

.3 Do not store near heat source or open flame.

1.7 Waste Management and Disposal

.1 Refer to Section 01 74 20 – Construction Waste Management and Disposal.

1.8 Warranty

.1 Warrant the work of this Section against defects of workmanship and material, for a period of ten (10) years from the date of Certificate of Completion and agree to make good promptly any defects which occur or become apparent within the warranty period.

PART 2 PRODUCTS

2.1 Manufacturer

.1 Source Limitations: Obtain weather barrier assembly components from same manufacturer as weather barrier.

2.2 Performance Requirements

.1 General Performance: Installed weather barrier and accessories shall withstand specified wind pressures, liquid water penetration, and water vapor pressures, without failure due to defective manufacture of products.

2.3 Weather Barrier

.1 Commercial Building Wrap: ASTM E2357 passed, ABAA (Air Barrier Association of America) evaluated air barrier assembly, and assembly water resistance per ASTM E331; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested in accordance with ASTM E84; UV stabilized for nine-month exposure; and acceptable to authorities having jurisdiction.

.1 System Description: Single-layer weather barrier, including flashing and sealing of penetrations and seams.
.2 Air Permeance, Product: Not more than 0.005 L/s x sq. m at 75 Pa when tested in accordance with ASTM E2178.
.3 Water Penetration Resistance, Product: Hydrostatic head resistance greater than 2.35 m in accordance with AATTC 127.
.4 Water-Vapour Permeance: Not less than 1300 ng/Pa x s x sq. m per ASTM E96/E 96M, Desiccant Method (Procedure A) or not less than 1600 ng/Pa x s x sq. m per ASTM E96/E 96M, Water Method (Procedure B).
.5 Allowable UV Exposure Time: Not less than nine months when tested in accordance with ASTM G 155 (Accelerated Weathering).
.6 Flame Propagation Test: Materials and construction shall be as tested in accordance with NFPA 285.
.7 Heat and Visible Smoke Release Rates: Maximum rates in accordance with NFPA 285.
.1 Peak Heat Release: 150 kW/sq. m.
.2 Total Heat Release: 20 MJ/sq. m
.3 Effective Heat of Combustion: 18 MJ/kg
.8 Weather barrier system to have a VOC content of 30 g/L or less.

2.4 Weather Barrier Flashing

.1 Conformable Weather Barrier Flashing: Composite flashing material composed of micro-creped, polyethylene laminate with a 100 percent butyl-based adhesive layer; AAMA 711 Class A (no primer), Level 3 thermal exposure, 80° C for 7 days.
.1 Conformability: Able to create a seamless sill pan extending up the jambs without cuts, patches, or fasteners.
.2 Water Penetration: No leakage at 720 Pa per ASTM E331.
.3 Low Temperature Adhesion: Exceeds minimum value of 0.26N/mm at minus 4° C as Class A (without primer use).
.4 Adhesion after Water Immersion: Exceeds minimum value of 0.26N/mm, after AAMA 800, Sections 2.4.1.3.1/2.4.1.4.3, Test B.

.2 Strip Flashing: Composite flashing material composed of spunbonded polyethylene laminate with 100 percent butyl-based, dual-sided, adhesive layer; AAMA 711, Class A (no primer), Level 3 thermal exposure, 80° C for 7 days.
.1 Water Penetration: No leakage at 15 psf (720 Pa) per ASTM E331.
.2 Low Temperature Adhesion: Exceeds minimum value of 0.26N/mm at minus 4° C as Class A without primer use.
.3 Adhesion after Water Immersion: Exceeds minimum value of 0.26N/mm, after AAMA 800, Sections 2.4.1.3.1/2.4.1.4.3, Test B.

2.5 Weather Barrier Accessories

.1 Building-Wrap Tape: Pressure-sensitive plastic tape recommended by weather barrier manufacturer for sealing joints and penetrations in commercial building wrap.

.2 Fasteners: as recommended by manufacturer.

.3 Primer for Flashings: Synthetic rubber-based product; spray applied..
.1 Peel Adhesion Test: Passes in accordance with ASTM D3330, Test Method F, for the following.
.1 Peel Angles: 0, 25, 72, and 180 degrees.
.2 Chemical Compatibility: Pass; AAMA 713.

.3 Flame Spread Index: 5; ASTM E84.
.4 Smoke Development Index: 0; ASTM E84.

PART 3 EXECUTION

3.1 Examination

.1 Examine substrates, with Installer present, for compliance with requirements.

.2 Verify that substrate and surface conditions are in accordance with commercial weather barrier manufacturer recommendations prior to installation.
.1 Verify that rough sill framing for doors and windows is sloped downwards towards the exterior and is level across width of the opening.

.3 Verify that surfaces to receive weather barrier flashing are clean, dry, and free of frost.

.4 Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 Preparation

.1 Direct water onto an acceptable weather barrier drainage plane with an unobstructed path to exterior of wall.
.1 Provide a drainage path for water intrusion through window and door attachment system that collects at window and door sills and directs water to the exterior or weather barrier.

3.3 Installation

.1 General: Comply with weather barrier manufacturer's written instructions and warranty requirements.

.2 Cover exposed exterior surface of insulation or strappng with weather barrier securely fastened to framing.
.1 Maintain continuity of air and water barrier assemblies.
.2 Start weather barrier installation at a building corner, leaving 300 mm of weather barrier extended beyond corner to overlap.
.3 Install weather barrier horizontally starting at lower portion of wall surface.
.4 Provide minimum 150 mm overlap at horizontal- and vertical-wrap seams in a shingle manner to maintain continuous downward drainage plane and air and water barrier.

.3 Seams: Seal seams with building wrap tape per manufacturer's recommended installation instructions.
.1 Shiplap horizontal seams in weather barrier to facilitate proper drainage.

.4 Fasteners: Use weather barrier manufacturer’s recommended fasteners to secure weather barrier and install fasteners according weather barrier manufacturer’s installation guidelines.
.1 Do not use temporary fasteners to permanently attach weather barrier.

.5 Openings: Completely cover openings with weather barrier, then cut weather barrier membrane to openings according to weather barrier manufacturer's installation guidelines.
.1 Provide head and jamb flaps and seam overlaps to maintain continuous drainage.
.2 Repair damage to weather barrier using method recommended by weather barrier manufacturer.
.3 Install flashing according to weather barrier manufacturer's installation guidelines.

3.4 Flashing Installation

.1 Installation: Remove wrinkles and bubbles, reposition weather barrier as necessary to produce a uniform, smooth surface.
- .1 Ensure that ambient and substrate surface temperatures are acceptable in accordance with manufacturer instructions and recommendations.
- .2 Wipe surfaces to remove moisture, dirt, grease and other debris that could interfere with adhesion.
- .3 Apply weather barrier manufacturer's recommended primer over sheathing substrates to receive weather barrier flashing.
- .4 Lap weather barrier flashing a minimum of 50 mm onto weather barrier.
- .5 Apply pressure over entire surface using roller or firm hand pressure

.2 Rough Openings: Shiplap flashing with weather barrier in a shingle manner to maintain a continuous downward drainage plane and air and water barrier in accordance with manufacturer's written instructions.
- .1 Apply 230-mm wide conformable weather barrier flashing at window sills.
- .2 Ensure that sill flashing does not slope to the interior.
- .3 Install backer rod in joint between frame of opening product and flashed rough opening on the interior.
- .4 Apply sealant or closed-cell polyurethane foam insulation around entire opening/fenestration product to create air seal around interior perimeter of window openings in accordance with weather barrier manufacturer's instructions.
- .5 Around door and window openings, apply butyl-based flashing to flaps of weather barrier.
- .6 Use strip flashing with wrap cap screws to secure head flap of the windows.

.3 Penetrations: Apply weather barrier manufacturer's recommended weather barrier flashing patches. Seal weather barrier around each penetration with weather barrier manufacturer's recommended self-adhered flashing product or sealant. Integrate products with flanges into the weather barrier.

.4 Terminations: Provide minimum 50 mm overlap using strip flashing on base of wall systems to maintain continuous downward drainage plane.
- .1 Secure weather barrier with fasteners and weather-barrier flashing.
- .2 Patch and repair existing weather barriers shown to remain and where damaged to provide a complete weather barrier envelope.

3.5 Protection

.1 Protect installed weather barrier from the following:
- .1 Damage from cladding, structure, or a component of the structure (e.g., window, door, or wall system).
- .2 Contamination from building site chemicals, premature deterioration of building materials, or nonstandard use or application of products.
- .3 Foreign objects or agents, including the use of materials incompatible with weather barrier products.
- .4 UV exposure in excess of products' stated limits.

3.6 Cleaning

.1 Proceed in accordance with Section 01 74 11 – Cleaning.

End of Section

PART 1 GENERAL

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 06 10 00 Rough Carpentry
.2 Section 07 62 00 Sheet Metal Flashing and Trim

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM D226/D226M-17 Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing
  .2 ASTM D5116-17 Standard Guide For Small-Scale Environmental Chamber Determinations of Organic Emissions from Indoor Materials/Products.
.2 CSA Group (CSA)
  .1 CSA A123.3-05(R2013), Asphalt Saturated Organic Roofing Felt.
  .2 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
  .3 CSA O118.1-08 (R2013), Western Red Cedar Shakes and Shingles.
  .4 CAN/CSA-Z809-08(R2013), Sustainable Forest Management.
.3 Canadian General Standards Board (CGSB)
  .1 CAN/CGSB-51.32-M77, Sheathing, Membrane, Breather Type.
.4 Cedar Shake and Shingle Bureau (CSSB)
  .1 CSSB-97, Cedar Shake and Shingle Grading Rules.
  .2 CSSB New Roof Construction Manual for Roof Application Details 2011.
.5 Forest Stewardship Council (FSC)
  .1 FSC-STD-01-001-2004, FSC Principle and Criteria for Forest Stewardship.
.6 National Building Code (NBC) 2015.
.7 Sustainable Forestry Initiative (SFI)
  .1 SFI-010-2014 Standard.
.8 The Standards and Guidelines for Conservation of Historic Places in Canada (Second Edition).

1.4 Submittals

.1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:
  .1 Submit manufacturer's instructions, printed product literature and data sheets for wood shingles and board caps and include product characteristics, performance criteria, physical size, finish and limitations.
  .2 Include information on preservation and restoration of shingles.

.3 Shop Drawings:
  .1 Indicate details of flashing installation.

.4 Samples: Submit duplicate full size shingles, of finish and profile specified.

.5 Wood Certification: submit manufacturer's Chain-of-Custody Certificate number for CAN/CSA-Z809 or FSC or SFI certified wood.

1.5 Definitions

.1 Shingle: tapered slice of wood sawn from block with taper in direction of grain or axial direction.

1.6 Quality Assurance

.1 Mock-ups:
- .1 Construct mock-ups in accordance with Section 01 45 00.
- .2 Construct 1200 mm x 1200 mm mock-up where directed by Departmental Representative.
- .3 Allow 24 hours for inspection of mock-up before proceeding with work.
- .4 When accepted, mock-up will demonstrate minimum standard of quality required for this work.
  - .1 Approved mock-up may remain as part of finished work.

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

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

1.7 Shipping, Handling and Storage

.1 Refer to Section 01 61 00 – Common Product Requirements.

.2 Deliver, handle and store materials in accordance with manufacturer’s printed instructions.

.3 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.4 Storage and Handling Requirements:
- .1 Exercise care to avoid damage during unloading and storing.
- .2 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .3 Store and protect shingles from nicks, scratches, and blemishes.
- .4 Replace defective or damaged materials with new.
- .5 Remove only in quantities required for same day use.

1.8 Unused Materials

.1 Unused shingles remain property of Departmental Representative.

.2 Return unused shingles to Departmental Representative. Retain packaging or rewrap shingles to form complete bundles.

.3 Label packages to identify product, quantity and manufacturer/supplier.

.4 Deliver and store in location designated by Departmental Representative.

1.9 Waste Management and Disposal

.1 Refer to Section 01 74 20 – Construction Waste Management and Disposal.

1.10 Warranty

.1 Warrant the work of this Section against defects of workmanship and material, for a period of two (2) years from the date of Certificate of Completion and agree to make good promptly any defects which occur or become apparent within the warranty period.

PART 2 PRODUCTS

2.1 Materials

.1 Red cedar shingles: to CSA O118.1, 456 mm length, random width, butt thickness 5/2". 6 mm point thickness, No.1 grade western red cedar, Blue Label Certigrade Perfection Series, clear heartwood, 100% edge grain, no defects, sawn both sides. Pressure treated.
   .1 CAN/CSA-Z809 or FSC or SFI certified.
   .2 Ridge caps: Board sawn certified taper ridge boards Premium grade, 16 mm thickness x 152 mm wide.

.2 Roofing felt: to CSA A123.3 or ASTM D226, perforated asphalt felt; No.15 unless otherwise specified.

.3 Nails: to CSA B111 or CSA O118.1, Appendix E.

.4 Pressure preservative treatment: to CSA O118.1, Appendix F.

.5 Roof sheathing boards: Minimum WRCLA Western Red Cedar, rough sawn, C and better clear grade. Thickness, width and grain to match existing adjacent work.

.6 Drip Edge: 100 mm wide prefinished metal drip edge in maximum practical lengths.

PART 3 EXECUTION

3.1 Manufacturer's Instructions

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

3.2 Examination

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable in accordance with manufacturer's written instructions.
   .1 Visually inspect substrate in presence of Departmental Representative.
   .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
   .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.3 Removal of Existing Roofing

.1 Remove existing roofing, flashings and underlay, and expose sheathing of roof.

.2 Withdraw existing shingle and flashing nails, set those which break off. Leave surfaces free from dirt and loose material.

.3 Departmental Representative to inspect roof sheathing. Take up, cut out, remove portion of roofing boards affected by rot, fungal or insect attack as directed on site by Departmental Representative and where indicated on drawings.

.4 Replace cut out portions of sheathing boards with boards of equal sectional dimensions, and specified grade. Seat each end of board on rafter, with 25 mm bearing, and secure to rafter.

3.4 Application

.1 Do wood shingle work in accordance with NBC and CSA O118.1, Appendix C, except where indicated or specified otherwise.

.2 Install shingles over dry substrate.

.3 Install 2-ply No.15 roofing felt system over entire roof.

.4 Install drip edge.

.5 Install shingles with 140 mm weather exposure and having triple thickness of shingle at any given point.

.6 Space shingles from 6 to 10 mm.

.7 Stagger joints minimum of 40 mm in succeeding courses. Ensure that in any 3 courses no two joints are in alignment.

.8 Use two nails per shingle. Space nails 20 mm from edge and 40 mm above butt line of following course.

.9 Drive nails flush but do not crush shingles.

.10 Double shingles at eaves, projecting butts 20 mm from first sheathing board.

.11 Apply strip of sheathing paper minimum 200 mm wide over hips and ridges. Install board caps at ridges.

3.5 Protection

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by wood shingles installation.

3.6 Cleaning

.1 Proceed in accordance with Section 01 74 11 – Cleaning.

End of Section

PART 1 GENERAL

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 06 10 00 Rough Carpentry
.2 Section 07 21 13 Building Insulation
.3 Section 07 25 00 Weather Barriers
.4 Section 07 62 00 Sheet Metal Flashing and Trim
.5 Section 07 92 00 Joint Sealants
.6 Section 08 52 00 Wood Windows
.7 Section 09 91 13 Painting

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM F1667 - 17 Standard Specification for Driven Fasteners: Nails, Spikes, and Staples
.2 CSA Group (CSA)
  .1 CSA O141-05 (R2014) - Softwood Lumber
  .2 CAN/CSA-Z809-08 (R2013) - Sustainable Forest Management
.3 National Lumber Grades Authority (NLGA)
  .1 NLGA Standard Grading Rules for Canadian Lumber.
.4 The Standards and Guidelines for Conservation of Historic Places in Canada (Second Edition).

1.4 Submittals

.1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Submit shop drawings:
  .1 All dimensions must be verified in the field prior to submittal of shop drawings.
  .2 Drawings shall clearly show materials, joints, anchorage system, profiles, fastenings, sealants, edge conditions, closures, expansion joint and other details as may be required for a weather tight installation. Distinguish between factory and field assembled work.
  .3 Indicate details of complete wall assembly including insulation, sub-framing, exterior panel, flashing, trim and accessories.
  .4 Submit shop drawings for loopholes. Indicate each location and site verify all dimensions.

.3 Submit two boards, minimum 610 mm long in profile indicated.

1.5 Shipping, Handling and Storage

.1 Refer to Section 01 61 00 – Common Product Requirements.

1.6 Waste Management and Disposal

.1 Refer to Section 01 74 20 – Construction Waste Management and Disposal.

PART 2 PRODUCTS

2.1 Materials

.1 Lumber siding: to NLGA Standard Grading Rules for Canadian Lumber.

.2 Bevel siding: grading rule 201a, Western Red Cedar, Clear V.G Heart Grade, Kiln-dried factory primed sanded texture. To NLGA Standard Grading Rules and WCLIB Grading Standards.
.1 Bevel size: 14 mm thick butt, 5 mm tip, 200 mm high board with nominal 50 mm lap.

.3 Profile: To match existing, plain bevel siding custom fabricated.

.4 Wood Trim: Similar to siding except for size and profile. Custom sizes and profiles as detailed. Include loopholes, corner boards, fascia, skirting boards, door and window trim etc. fabricate to longest practical lengths.

.5 Nails: ASTM 1667, hot dip galvanized, spiral or ring thread type with flat large head for sheathing paper and flashings and oval head for siding. Nails for siding shall be minimum 65 mm long.

.6 Metal Flashing: as specified in Section 07 62 00.

.7 Sealant: as specified in Section 07 92 00.

.8 Insect Screen: to ASTM E1748. Count 18 x 16.

2.2 Warranty

.1 Warrant the work of this Section against defects of workmanship and material, for a period of two (2) years from the date of Certificate of Completion and agree to make good promptly any defects which occur or become apparent within the warranty period.

PART 3 EXECUTION

3.1 Installation

.1 Do not commence work until weather barriers specified in Section 07 25 00 have been inspected and approved.

.2 Install metal flashings at base of walls, at door and window heads and at other locations shown on drawings; extend flashing up behind weather barrier minimum 100 mm and form a drip at the outside edge; double back exposed edges minimum 13 mm. At joints use flat lock seams, lapped 25 mm.

.3 Install siding to walls with edges square, true to line and tight to openings; use full length boards; accumulation of short lengths not permitted. Fasten siding in straight, aligned lengths to strapping at 400 mm o.c maximum using two fasteners at each location. Evenly space nails Stagger butt joints not less than 900 mm and distribute evenly over all surfaces. Cut butt joints at 45 degree slope to outside. Seal cut surfaces.

.4 Evenly distribute boards with lighter and darker shades for a balanced overall appearance.

.5 Nail each board to each furring member.

.6 Install trim boards in maximum possible lengths. Accumulation of short lengths is not acceptable. Mitre corners where indicated. Skribe fascia boards where indicated below soffits to match profile of existing timber framing extensions.

.7 Fabricate loopholes and trim elements as detailed using material as specified and matching existing. Custom fabricate loopholes at each location to suit existing building opening dimensions. Replace entire loophole assembly unless otherwise shown or directed by Departmental Representative.

.8 Install loophole assemblies level and square with wood levelling shims. Fasten levelling shims to existing log and new timber framings with nails. Install loopholes in accordance with shop drawings. Make all necessary site modifications to suit existing conditions.

.9 Apply sealant at concealed locations shown on drawings and in accordance with sealant manufacturer's recommendations.

.10 Install insect screen at top of exterior walls at underside of roof eaves where indicated to maintain ventilation of attic spaces.

3.2 Cleaning

.1 Proceed in accordance with Section 01 74 11 – Cleaning.

End of Section

PART 1 GENERAL

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 06 10 00 Rough Carpentry
.2 Section 07 31 29 Wood Shingles
.3 Section 07 46 23 Wood Siding
.4 Section 07 92 00 Joint Sealants
.5 Section 08 52 00 Wood Windows

1.3 References

.1 Canadian Roofing Contractors Association (CRCA) Roofing Specifications Manual.
.2 ASTM International (ASTM)
  .1 ASTM A653/A653M-15e1 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
  .2 ASTM D523-14 Standard Test Method for Specular Gloss
.3 CSA Group (CSA)
  .1 CSA B111, Wire Nails, Spikes and Staples.
.4 Canadian General Services Board (CGSB):
  .1 CAN/CGSB 1.108-M, Bituminous Solvent Type Paint.
  .2 CAN/CGSB-37.5, Cutback Asphalt Plastic Cement.
  .3 CAN/CGSB-51.32, Sheathing, Membrane, Breather Type.

1.4 Submittals

.1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.

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

.3 Submit duplicate 300 x 300 mm samples of each type of sheet metal material, colour and finish when requested by the Departmental Representative.

.4 Submit WHMIS Material Safety Data Sheets for all products intended to be used, including adhesives and sealants.

1.5 Design and Performance Requirements

.1 Appearance: neatly and evenly lay out and install components. Exposed fastening devices not permitted.

.2 Effects of Wind: resist positive and negative wind pressures without detrimental effects.

.3 Water Control: prevent passage of water.

.4 Thermal Movement: accommodate expansion and contraction of component parts without buckling, failure of joints, undue stress on fasteners and other detrimental effects.

.5 Compatibility: components shall be compatible with dissimilar metals and materials with which they are in contact or fastened to so as to prevent corrosion, staining and other detrimental effects. If required, treat or separate contact surfaces with inert and non-staining insulation material to achieve compatibility.

1.6 Quality Assurance

.1 Work of this Section shall be performed by a qualified sheet metal contractor with an accepable level of experience in the type of work required and specified. Submit proof of experience where requested by the Departmental Representative.

1.7 Shipping, Handling and Storage

.1 Refer to Section 01 61 00 – Common Product Requirements.

.2 Materials shall be handled and stored on the job in such a manner that no damage shall be done to the material or the structures.

.3 Materials showing evidence of improper handling and storage shall be rejected and removed from the site at no additional expense to the Departmental Representative.

1.8 Waste Management and Disposal

.1 Refer to Section 01 74 20 – Construction Waste Management and Disposal.

1.9 Warranty

.1 Warrant the work of this Section against defects of workmanship and material, for a period of five (5) years from the date of Certificate of Completion and agree to make good promptly any defects which occur or become apparent within the warranty period.

.2 Submit manufacturer's warrantee that pre-finished materials will not lose film integrity for 25 years and will not chalk or fade for 20 years following date of Certificate of Completion.

PART 2 PRODUCTS

2.1 General

.1 Ensure compatibility of all materials in contact with roof membrane.

2.2 Materials

.1 Sheet Metal: 24 gauge (0.61 mm) thick galvanized sheet steel, commercial quality to ASTM A653 Grade 'A' with a minimum yield stress of 230 MPA, and a working stress of 144 MPA, to CSA 136. Material shall have Z275 designation zinc coating.

.2 Prefinished material shall be colour coated with manufacturer's standard finish system utilizing silicone modified polyester resin, minimum dry film thickness of 1.0 ± 0.1 mils when tested to ASTM D1005.

.1 Colour for all sheet metal flashing and trim shall be as selected by the Departmental Representative from full range of manufacturer's standard colours.

.2 Up to three colours may be selected.

.3 Continuous hook on strips and metal bellows: 22 gauge (0.65 mm) galvanized sheet steel, zinc coating designation ZF275.

.4 Isolation Coating: Alkali resistant exterior bituminous paint to CAN/CGSB 1.108-M.

.5 Plastic Cement: To CAN/CGSB 37.5.

.6 Nails, Bolts, Screws and Other Fastenings: same metal finish as sheet metal being used to CSA B111. The size of fastenings shall suit the applicable conditions.

.7 Underlay: No. 15 perforated asphalt felt to CSA A123.3-M or dry sheathing, breather type, to CAN/CGSB-51.32

.8 Cleats: Of same material, and temper as sheet metal, minimum 50 mm wide. Thickness same as sheet metal being secured.

PART 3 EXECUTION

3.1 General

.1 Install sheet metal work in accordance with CRCA specifications and as detailed.

.2 Use concealed fastenings except where approved before installation.

3.2 Fabrication

.1 Fabricate metal flashings and other sheet metal work in accordance with applicable CRCA specifications and as indicated.

.2 Form pieces in 2440 mm maximum lengths.

.3 Hem exposed edges on underside 13 mm. Mitre and seal corners with sealant.

.4 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.

.5 Apply isolation coating (two coats) to metal surfaces to be in contact with concrete, stone or mortar or dissimilar metals.

.6 Install underlay under sheet metal in accordance with CRCA "FL" series details. Lap joints 100 mm.

.7 All seams shall be of the "slip lock type" that permit adequate movement without resulting in deformation or loosening of metal flashings. Lapped joints or exposed raw edges will not be accepted. Exposed edges shall be "double back" at least 13 mm. At eaves and parapets, metal shall be hooked over continuous starter strips minimum 1 gauge thicker than the metal used for flashing. Secure starter strips at 300 mm on centre or closer as required.

.8 Where metal terminates under fascia boards, secure metal at 610 mm centres using specified fasteners. At curbs to openings or at sleepers, provide locked or standing seams at corners. Solder mitred corners, pop rivet or form standing seams.

.9 Secure metal flashings in reglets at 610 mm centres and further secure metal to vertical surfaces at locks as required.

.10 All flashings shall be installed in perfectly straight lines. Irregular or badly fitted work will not be accepted. Exposed fastenings will only be permitted where concealed fastening is not possible. Provide neoprene washers for exposed fasteners.

.11 Imperfections in metal flashing work such as holes, dents, creases, or oil-canning will not be accepted.

3.3 Caulking of Flashings

.1 Sealants shall be as specified in Section 07 92 00 - Joint Sealants.

.2 Caulk all joints in flashing.

.3 Dissimilar metals in contact, or metals in contact with adjacent surfaces shall be separated from one another to prevent corrosion, staining, or electrolysis by use of approved methods and materials.

.4 Do caulking between metal flashing and concrete.

.5 Caulking compound shall be applied in strict accordance with the manufacturer's application instructions. Use proper surface primers where necessary.

.6 Colour of caulking compound shall be the integral colour of the abutting material.

3.4 Cleaning

.1 Proceed in accordance with Section 01 74 11 – Cleaning.

End of Section

PART 1 GENERAL

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 07 46 23 Wood Siding
.2 Section 07 62 00 Sheet Metal Flashing and Trim
.3 Section 08 52 00 Wood Windows

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM C834-17 Standard Specification for Latex Sealants
  .2 ASTM C920-14a Standard Specification for Elastomeric Joint Sealants
  .3 ASTM C1193-16 Standard Guide for Use of Joint Sealants
  .4 ASTM C1311-14 Standard Specification for Solvent Release Sealants
.2 Canadian General Standards Board (CGSB)
  .1 CGSB 19-GP-5M-1984, Sealing compound, one component, acrylic base, solvent curing.
  .2 CGSB 19.13-M87, Sealing compound, one component, elastomeric chemical curing.
  .3 CGSB 19-GP-14M-1984 Sealing compound, one component, butyl-polyisobutylene, polymer base, solvent curing.
  .4 CAN/CGSB-19.17-M90, One-Component Acrylic Emulsion Base Sealing Compound.
  .5 CAN/CGSB-19.24-M90, Multi component, chemical curing sealing compound.
.3 Department of Justice Canada (Jus)
  .1 Canadian Environmental Protection Act, 1999 (CEPA).
.4 South Coast Air Quality Management District (SCAQMD) California State
  .1 SCAQMD Rule 1168-03: Adhesives and Sealants.

1.4 Submittals

.1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
.2 Submit product data for all sealant materials and accessories.

.3 Submit MSDS Data Sheets for review and acceptance by the Departmental Representative prior to delivery to the project site. Obtain written approval from the Departmental Representative and do not deliver any materials to the sitey, prior to receipt of such approval.

1.5 Quality Assurance

.1 Installation of caulking shall be performed only by workmen thoroughly skilled and specially trained in the techniques of caulking.

.2 Caulking work shall be carried out in strict accordance with manufacturer's printed directions.

1.6 Shipping, Handling and Storage

.1 Refer to Section 01 61 00 – Common Product Requirements.

.2 Deliver, handle and store materials in accordance with manufacturer’s printed instructions.

.3 Use all means necessary to protect caulking materials before, during and after installation and to protect the installed work and materials of all other trades.

.4 In the event of damage, immediately make all repairs and replacements necessary to the approval of the Departmental Representative and at no additional cost to the Departmental Representative.

.5 Store all caulking materials and equipment under conditions recommended by its manufacturer.

.6 Do not use materials stored for a period exceeding the maximum recommended shelf-life of the material.

.7 Materials shall be delivered to the job in their original containers or wrapping with the manufacturer's seal and labels intact.

1.7 Environmental Considerations

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials, and regarding labelling and provision of material safety data sheets.

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

.3 Ventilate area of work by use of approved portable supply and exhaust fans.

1.8 Waste Management and Disposal

.1 Refer to Section 01 74 20 – Construction Waste Management and Disposal.

1.9 Warranty

.1 Warrant the work of this Section against defects of workmanship and material, for a period of three (3) years from the date of Certificate of Completion and agree to make good promptly any defects which occur or become apparent within the warranty period.

PART 2 PRODUCTS

2.1 Materials

.1 Primers: Type recommended by sealant manufacturer. Low VOC type

.2 Joint Fillers:
  .1 General: Compatible with primers and sealants, outsized 30 to 50%.
  .2 Vertical Joints: Polyethylene, Urethane, Neoprene or Vinyl:
    .1 Extruded closed cell foam, Shore A hardness 20, tensile strength 140 to 200 kPa.
  .3 Horizontal Joints: Neoprene or Butyl Rubber (Horizontal Joints): Round solid rod, Shore A hardness 70.

.3 Sealants:
  .1 All sealants shall be Low VOC Type.
  .2 Colour of sealants to be selected by Departmental Representative.
  .3 For Exterior Locations: To ASTM C920-14a, two component LP polysulphide base sealant Type 2 where subjected to foot traffic and Type 1 where not subjected to foot traffic (20-35

Shore A) Class B, bearing seal of approval of Thiokol Chemical Corporation:

.4 For Interior Locations:
  .1 Moving joints:
    .1 Low modulus, high performance, one-component, polyurethane-based, non-sag elastomeric sealant.
      .1 Sikaflex 15LM
  .2 Non-moving Joints
    .1 To CAN3-11.13-M, one component polysulphide base sealant bearing seal of approval of Thiokol Chemical Corporation.
      .1 Vulkem 116 – Tremco
      .2 Mono 555
  .3 Acrylic Latex: Siliconized acrylic latex to ASTM C834.
      .1 Tremflex 834 - Tremco
  .4 Mildew Resistant Sealant: Silicone to ASTM C920.

.5 Where sealants are qualified with primers use only these primers.

.4 Bond Breaker Tape: Polyethylene bond breaker tape which will not bond to sealant.

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

PART 3 EXECUTION

3.1 Inspection

.1 Inspect conditions and substrates upon which work of this Section is dependent. Report to Departmental Representative in writing any defects that may jeopardize the performance of this work.

.2 Commencement of work implies acceptance of conditions.

3.2 Preparation

.1 Remove dust, paint, loose mortar and other foreign matter. Ensure joint surfaces are dry and free of frost.

.2 Remove rust, mill scale and coatings from ferrous metals by wire brush, grinding or sandblasting.

.3 Remove oil, grease and other coatings from non-ferrous metals with joint cleaner.

.4 Do not apply sealants to joint surfaces treated with sealer, curing compound, water repellent, or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.

.5 Examine joint sizes and conditions to achieve correct depth ratio ½ of joint width with minimum width and depth of 6 mm, maximum width 25 mm.

.6 Install joint filler to achieve correct joint depth.

.7 Where necessary to prevent staining, mask adjacent surface prior to priming and caulking.

.8 Apply bond breaker tape where required to ensure performance of sealant.

.9 Prime sides of joints when required and as recommended by sealant manufacturer to ensure performance of sealant immediately prior to caulking.

3.3 Application

.1 Apply sealants in accordance with manufacturer's instructions, in continuous beads, to provide watertight joint. Apply sealant using gun with proper size nozzle. Use sufficient pressure to fill voids and joints solid. Superficial pointing with skin bead is not acceptable.

.2 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities. Neatly tool surface to a slight concave joint.

.3 Clean adjacent surfaces immediately and leave work neat and clean. Remove excess sealant and droppings using recommended cleaners as work progresses. Remove masking after tooling of joints.

.4 Apply sealant to joints between window or door frames to adjacent building components, around perimeter of every external opening.

.5 Caulk joints in surfaces to be painted before surfaces are painted. Where surfaces to be caulked are primed in shop before caulking, check to make sure prime paint and caulking are compatible. If they are incompatible, inform Departmental Representative and change caulking to compatible type approved by Departmental Representative.

3.4 Schedule

.1 Provide sealants at the following locations
- .1 Where required to protect interior from exterior air and water infiltration.
- .2 Joints between all dissimilar materials.
- .3 Joints between window stools and adjacent surfaces.
- .4 Window and shutter frames (inside and outside).
- .5 Door frames (inside and outside).
- .6 Other locations where caulking or sealant is required to provide a neat clean junction

3.5 Cleaning

.1 Proceed in accordance with Section 01 74 11 – Cleaning.

End of Section

PART 1 GENERAL

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 06 10 00 Rough Carpentry
.2 Section 07 92 00 Joint Sealants
.3 Section 09 91 13 Painting

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM E283-04(2012) Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
  .2 ASTM E330 / E330M - 14 Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference
  .3 ASTM E547-00(2016) Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Cyclic Static Air Pressure Difference
  .4 ASTM C1036-16 Standard Specification for Flat Glass
.2 American Architectural Manufactures Association / Window and Door Manufactures Association (AAMA / WDMA): ANSI / AAMA / NWWDA 101 / I.S.2-97 Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors; 101 / I.S.2 / NAFS-02 Voluntary Performance Specification for Windows, Skylights and Glass Doors;
.3 AAMA/WDMA/CSA 101/I.S.2/A440-05 Standard/Specification for Windows, Doors, and Unit Skylights; AAMA/WDMA/CSA 101/I.S.2/A440-08 NAFS – North American Fenestration Standard/Specification for Windows, Doors, and Skylights
.4 National Fenestration Rating Council (NFRC): 101: Procedure for Determining Fenestration Product Thermal Properties.
.5 CSA Group (CSA)
  .1 CAN/CSA A-440 I-M, and CAN/CSA-A440-M, ANSI/NWWDA I.S.2 Industry Standard for Wood Windows.
.6 American National Standards Institute:
  .1 ANSI/NWWDA I.S.4 Industry Standard for Water Repellent Preservative Treatment for Millwork.
.7 Sealed Insulating Glass Manufacturers Association/Insulating Glass Certification Council (SIGMA/IGCC) and Insulating Glass Manufacturers Association of Canada (IGMAC).
.8 Canadian General Standards Board (CGSB).
  .1 CAN/CGSB-12.3-M91, Flat, Clear Float Glass.
  .2 CAN/CGSB-12.8-2017, Insulating Glass Units.
.9 The Standards and Guidelines for Conservation of Historic Places in Canada (Second Edition).

1.4 Submittals

.1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Shop Drawings:
  .1 Indicate materials and details in full size scale for head, jamb and sill, profiles of components, interior and exterior trim, junction between combination units, elevations of unit, anchorage details, location of isolation coating, description of related components and exposed finishes,

fasteners, and caulking. Indicat6e that all existing opening dimensions have been verified by site measurements.

.3 Samples:
.1 Submit corner section.
.2 Include glazing system, quality of construction, and specified finish.

.4 Quality Control Submittals: Submit manufacture's certifications indicating compliance with specified performance and design requirements.

1.5 System Description

.1 Design and Performance Requirements:
.1 Window units shall be designed to comply with ANSI/NWWDA I.S.2-87 Grade 40 or ANSI/NWWDA I.S.2-93 DP30 and CSA A440.
.2 Air leakage shall not exceed the following when tested at 1.57 psf according to ASTM E 283: .30 cfm per square foot of frame.
.3 No water penetration when tested at the following pressure according to ASTM E547: Grade 40-4.43 psf; DP30-4.5 psf and CSA A440-B3.
.4 Assembly shall withstand the following positive or negative uniform static air pressure difference without damage when tested according to ASTM E330: Grade 40-40 psf; DP30-45 psf and CSA A440 - C2.
.5 All windows to conform to CAN/CSA-A440-M for forced entry performance requirements.

1.6 Quality Assurance

.1 Provide mock-up for field testing unit performance requirements and to determine acceptability of unit installation methods.

.2 Approved mock-up will represent minimum quality for the Work.

.3 Approved mock-up can be used within the Work.

1.7 Shipping, Handling and Storage

.1 Refer to Section 01 61 00 – Common Product Requirements.

.2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.

.3 Deliver in original packaging and protect from weather.

.4 Prime or seal wood surfaces, including surface to be concealed by wall construction, if more than thirty (30) days will expire between delivery and installation.

.5 Store window units in an upright position in a clean and dry storage area above ground and protect from weather.

1.8 Warranty

.1 Warrant the work of this Section against defects of manufacturing, workmanship and materials, for a period of ten (10) years from the date of Certificate of Completion and agree to make good promptly any defects which occur or become apparent within the warranty period.

.2 Insulating glass shall be warranted against visible obstruction through the glass caused by a failure of the insulating glass air seal for a period of twenty (20) years from the date of original purchase.

PART 2 PRODUCTS

2.1 Manufactured Units

.1 Windows at Blockhouse 1 will be supplied by the Departmental Representative for installation under this Section. Supply all necessary hardware, trim and accessories to provide a complete installation.

.2 Fabricate, supply and install custom fabricated wood casement units (Blockhouse 2) or fixed storm units (Blockhouse 3) to match existing profile and sizing at the site.

2.2 Frame Description

.1 Clear pine. Profile and grain to match existing. Finger jointed material is not permitted.
- .1 Kiln dried to a moisture content no greater than twelve (12) percent at the time of fabrication.
- .2 Water repellent preservative treated in accordance with WDMA I.S.4.

.2 Frame thickness: 17 mm head and side jambs, 37 mm at sill.

.3 Frame width: 116 mm.

2.3 Sash Description

.1 Clear pine. Profile and grain to match existing. Finger jointed material is not permitted.
- .1 Kiln dried to a moisture content no greater than twelve (12) percent at the time of fabrication.
- .2 Water repellent preservative treated in accordance with WDMA I.S.4.

.2 Sash thickness: 41 mm.

.3 Removable glazing stops.

2.4 Glazing

.1 Select quality complying with ASTM C 1036. Insulating glass SIGMA / IGCC certified to performance level CBA when tested in accordance with ASTM E 774.

.2 Clear glass to CAN/CGSB-12.3:
- .1 Transparent, flat, clear float glass: glazing quality, 3 mm thick minimum.

.3 Insulating Glass Units: To CAN/CGSB-12.8-M, sealed units, not less than 25 mm thick or as required to meet code requirements. Minimum 12.7 mm air space.
- .1 Exterior Units::
  - .1 Outboard Lite: 6 mm clear with low-e coating on second surface.
  - .2 12.7 mm air space, argon filled.
  - .3 Inboard Lite: 6mm clear
  - .4 Performance: All performance data shall be calculated according to ASHRAE standard procedures and verified using the LBL “Window 4.1” program:
    - .1 Winter nighttime U value: 0.24
    - .2 Summer Daytime U value: 0.22
    - .3 Shading Coefficient: 0.33

.4 Solar Heat Gain Coefficient: 0.29
.5 Relative Heat Gain: 68.7
.6 LSG: 1.86
.7 Visible Light transmittance: 54%
.8 Ultraviolet transmittance: 11%

.4 Confirm with Departmental Representative any special requirements for glazing.

.5 Glazing Seal: Silicone bedding.

2.5 Finish

.1 Interior / Exterior: Treated bare wood; Latex prime coat, white.

2.6 Hardware

.1 Provide hardware to match existing. Include the flowing as a minimum:
.1 Balance system: Coil spring block and tackle with nylon cord and fiber filled nylon clutch.
.2 Jamb carrier: Vinyl extrusion with wood inserts. Colour: White
.3 Lock: High pressure zinc die-cast cam lock and keeper.

2.7 Weather Strip

.1 Continuous leaf weather strip at head jamb parting stop; dual durometer bulb weather strip at check rail; foam bulb type dual durometer weather strip on vertical sash edge; dual durometer bulb weather strip at bottom rail. Colour: White.

2.8 Jamb Extension

.1 Factory installed jamb extension for wall thickness indicated or required.

.2 Finish: Finish: Match interior frame finish.

2.9 Head/Seat Board

.1 Factory installed head board / seat board for wall thickness indicated or required.

.2 Finish: Match interior finish.

2.10 Authentic Divided Lites

.1 22 mm single glaze muntin; 43 mm insulating glass muntin.

.2 Pattern: Rectangular; Custom lite layout to match existing.

.3 Finish: Match sash finish.

2.11 Accessories and Trim

.1 Installations and Hardware Accessories:
.1 Installation brackets 162 mm
.2 Sash lifts: High pressure zinc die-cast. Colour: Brass.

2.12 Fabrication

.1 Coordinate dimensions with actual measurements of existing window openings and adjacent construction to match in kind.

.2 Fabricate components to match originals in kind.

.3 Join moldings to match construction of original sash exactly.

.4 Machine sash elements to receive glazing panels. Machine sash elements of movable sash to receive weatherstripping, if appropriate, and hardware.

.5 Glaze units prior top delivery to site.

PART 3 EXECUTION

3.1 Examination

.1 Verification of Conditions: Before Installation, verify openings are plumb, square, and of proper dimension as required in Section 01 71 00. Report frame defects or unsuitable conditions to the General Contractor before proceeding.

.2 Acceptance of Conditions: Beginning of installation confirms acceptance of existing conditions.

3.2 Installation

.1 Assemble and install window units including existing units supplied by the Departmental Representative according to manufacturer's instructions and reviewed shop drawings.

.2 Install sealant and related backing materials at perimeter of unit or assembly in accordance with Section 07 92 00 Joint Sealants. Do not use expansive foam sealant.

.3 Install accessory items as required.

.4 Use finish nails to apply wood trim and mouldings.

3.3 Protection

.1 Protect windows from damage by chemicals, solvents, paint, or other construction operations that may cause damage.

3.4 Cleaning

.1 Proceed in accordance with Section 01 74 11 – Cleaning.

.2 Remove visible labels and adhesive residue according to manufacturer's instructions.

.3 Leave windows and glass in a clean condition.

End of Section

PART 1 GENERAL

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 06 10 00 Rough Carpentry
.2 Section 07 92 00 Joint Sealants
.3 Section 09 91 13 Painting

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM C475/C475M-17 Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
  .2 ASTM C514-04(2014) Standard Specification for Nails for the Application of Gypsum Board
  .3 ASTM C840-17a Standard Specification for Application and Finishing of Gypsum Board
  .4 ASTM C1002-16 Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs
  .5 ASTM C1047-14a Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base
  .6 ASTM C1396/C1396M - 17 Standard Specification for Gypsum Board

1.4 Submittals

.1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Submit WHMIS Material Data Safety Sheets (MSDS) for all products, prior to delivery of products to the site.

1.5 Quality Assurance

.1 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.

1.6 Shipping, Handling and Storage

.1 Refer to Section 01 61 00 – Common Product Requirements.

.2 Deliver, handle and store materials in accordance with manufacturer’s printed instructions.

.3 Use all means necessary to protect gypsum board materials before, during and after installation and to protect the installed work and materials of other trades affected by this work. Store materials in a dry area inside the building. Do not remove wrapping until ready for use. Prevent damage to all edges and surfaces.

1.7 Environmental Requirements

.1 Maintain temperature minimum 10˚C, maximum 21°C for 48 hours prior to and during application of gypsum boards and joint treatment, and for at least 48 hours after completion of joint treatment.

.2 Apply board and joint treatment to dry, frost free surfaces.

.3 Ventilation: Ventilate building spaces as required to remove excess moisture that would prevent drying of joint treatment material immediately after its application.

1.8 Waste Management and Disposal

.1 Refer to Section 01 74 20 – Construction Waste Management and Disposal.

PART 2 PRODUCTS

2.1 Gypsum Board

.1 To CSA A82.27-M and ASTM C1396/C1396M. Standard for non-rated applications, 1220 mm wide x maximum practical length, ends square cut, edges tapered with round edge, 12.7 mm thick or to thickness indicated on drawings.

2.2 Fastening and Adhesives

.1 Drywall Screws: To ASTM C1002 self-drilling, self-tapping, case hardened, length to suit board thickness and provide minimum 12 mm penetration into support.

.2 Joint Tape: To ASTM C475, 50 mm perforated paper tape with preformed seam, mould and mildew resistant.

.3 Joint Filler and Topping: To ASTM C475 vinyl or latex base, slow setting. Asbestos free.

2.3 Accessories

.1 Casing beads, corner beads, control joints and edge trim: to ASTM C1047, zinc-coated by hot-dip process 0.5 mm base thickness, perforated flanges, one piece length per location.

.2 Insulating Strip: Rubberized, moisture resistant, 3.0 mm thick, 12 mm wide closed cell neoprene strip, with self-sticking permanent adhesive on one face; lengths as required.

.3 Sealants: as specified in Section 07 92 00 - Joint Sealants.

PART 3 EXECUTION

3.1 Gypsum Board Application

.1 Do application and finishing of gypsum board in accordance with ASTM C840 except where specified otherwise.

.2 Do not apply gypsum board until bucks, anchors, blocking and electrical work are approved.

.3 Apply gypsum board at right angles to framing members or furring using screw fasteners. Maximum spacing of screws 300 mm o.c.

.4 Carry gypsum board from floor to underside of ceiling or bulkhead above. Furr out and carry gypsum board around any structural members as may be required.

3.2 Accessories

.1 Erect accessories straight, plumb or level, rigid and at proper plane. Use full length pieces where practical. Make joints tight, accurately aligned and rigidly secured. Mitre and fit corners accurately, free from rough edges.

.2 Install casing beads where gypsum board butts against surfaces having no trim concealing junction and where indicated.

.3 Provide control joints in gypsum board facing. Control joints shall be supported with studs or furring channels on both sides of the joint. Control joints shall be provided:
.1 At abutting structural elements.
.2 At maximum 6.0 metre spacings on long partition and bulkhead runs;

3.3 Taping and Filling

.1 Finish face panel joints and internal angles with joint system consisting of joint compound, joint tape and taping compound installed according to manufacturer's directions and feathered out onto panel faces.

.2 Finish corner beads, control joints and trims as required with two coats of joint compound and one coat of taping compound, feathered out onto panel faces.

.3 Fill screw head depressions with joint and taping compounds to bring flush with adjacent surface of gypsum board so as to be invisible after painting is completed.

.4 Sand lightly to remove burred edges and other imperfections. Avoid sanding adjacent surface of board.

.5 Completed installation to be smooth, level or plumb, free from waves and other defects and ready for painting.

3.4 Cleaning

.1 Proceed in accordance with Section 01 74 11 – Cleaning.

End of Section

PART 1 GENERAL

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 06 20 00 Finish Carpentry
.2 Section 07 46 23 Wood Siding
.3 Section 08 52 00 Wood Windows
.4 Section 09 21 16 Gypsum Board
.5 Section 32 31 19 Decorative Metal Gate

1.3 References

.1 Environmental Protection Agency (EPA)
  .1 Test Method for Measuring Total Volatile Organic Compound Content of Consumer Products, Method 24 (for Surface Coatings).
.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  .1 Material Safety Data Sheets (MSDS).
.3 Master Painters Institute (MPI)
  .1 MPI Architectural Painting Specifications Manual, 2004.
  .2 Standard GPS-1-05, MPI Green Performance Standard for Painting and Coatings.
.4 National Fire Code of Canada.
.5 Society for Protective Coatings (SSPC)
  .1 Systems and Specifications, SSPC Painting Manual 2005.
.6 Underwriters Laboratories of Canada (ULC)
  .1 CAN/ULC-S102-10, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies
.7 South Coast Air Quality Management District, California State (SCAQMD)
  .1 SCAQMD Rule 1113-96, Architectural Coatings.
.8 Green Seal GS-11 Green Seal Environmental Standard for Paints and Coatings, January 1997.
.9 The Standards and Guidelines for Conservation of Historic Places in Canada (Second Edition).

1.4 Submittals

.1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:
  .1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
  .2 Submit WHMIS MSDS - Material Safety Data Sheets for all materials.

.3 Samples:
  .1 Submit full range colour sample chips to indicate where colour availability is restricted.
  .2 Submit duplicate 200 x 300 mm sample panels of each paint, stain, clear coating and special finish with specified paint or coating in colours, gloss/sheen and textures required to MPI Architectural Painting Specification Manual standards.
  .3 Retain reviewed samples on-site to demonstrate acceptable standard of quality for appropriate on-site surface.

.4 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties and SCAQMD Rule 1113-96.

.5 Closeout Submittals: submit maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals include following:
.1 Product name, number, type and use.
.2 Colour numbers.
.3 MPI Environmentally Friendly classification system rating.

1.5 Quality Control

.1 Provide mock-up in accordance with Section 01 45 00 - Quality Control.

.2 Mock-Ups:
.1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control.
.2 Prepare and paint designated surface, area, room or item (in each colour scheme) to specified requirements, with specified paint or coating showing selected colours, gloss/sheen and textures. Locate where directed.
.3 Mock-up will be used to judge workmanship, substrate preparation, operation of equipment and material application and workmanship to MPI Architectural Painting Specification Manual standards.
.4 Allow 24 hours for inspection of mock-up before proceeding with work.
.5 When accepted, mock-up will demonstrate minimum standard of quality required for this work. Approved mock-up may remain as part of finished work.

1.6 Quality Assurance

.1 Qualifications:
.1 Contractor: to have a proven level experience and knowledge. When requested, provide list of last three comparable jobs including, job name and location, specifying authority, and project manager.
.2 Qualified journeypersons as defined by local jurisdiction to be engaged in painting work.
.3 Apprentices: may be employed provided they work under direct supervision of qualified journeyperson in accordance with trade regulations.

.2 Conform to latest MPI requirements for painting work including preparation and priming.

.3 Materials: in accordance with MPI Painting Specification Manual "Approved Product" listing and from a single manufacturer for each system used.

.4 Paint materials such as linseed oil, shellac, and turpentine to be highest quality product of an approved manufacturer listed in MPI Painting Specification Manual and to be compatible with other coating materials as required.

.5 Retain purchase orders, invoices and documents to prove conformance with noted MPI requirements when requested by Departmental Representative.

.6 Standard of Acceptance:
.1 Walls: No defects visible from a distance of 1000 mm at 90 degrees to surface.
.2 Soffits: No defects visible from floor at 45 degrees to surface when viewed using final lighting source.
.3 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

1.7 Performance Requirements

.1 Environmental Performance Requirements:
.1 .Provide paint products meeting MPI "Environmentally Friendly" E2 or E3 ratings based on VOC (EPA Method 24) content levels.

.2 Green Performance in accordance with MPI Standard GPS-1.

1.8 Shipping, Handling and Storage

.1 Refer to Section 01 61 00 – Common Product Requirements.

.2 Deliver and store materials in original containers, sealed, with labels intact. Labels to indicate:
.1 Manufacturer's name and address.
.2 Type of paint or coating.
.3 Compliance with applicable standard.
.4 Colour number in accordance with established colour schedule.

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

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

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

.6 Store materials and supplies away from heat generating devices.

.7 Store materials and equipment in well-ventilated area with temperature range 7^0 C to 30^0 C.

.8 Store temperature sensitive products above minimum temperature as recommended by manufacturer.

.9 Keep areas used for storage, cleaning and preparation, clean and orderly to approval of Departmental Representative. After completion of operations, return areas to clean condition to approval of Departmental Representative.

.10 Remove paint materials from storage only in quantities required for same day use.

.11 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling storage, and disposal of hazardous materials.

1.9 Fire Safety Requirements

.1 Provide one 9 kg Type ABC dry chemical fire extinguisher adjacent to storage area.

.2 Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.

.3 Handle, store, use and dispose of flammable and combustible materials in accordance with the National Fire Code of Canada.

1.10 Waste Management and Disposal

.1 Refer to Section 01 74 20 – Construction Waste Management and Disposal.

.2 Paint, stain and wood preservative finishes and related materials (thinners, solvents, etc.) are regarded as hazardous products and are subject to regulations for disposal. Information on these controls can be obtained from Provincial Ministry of Environment and Regional levels of Government.

.3 Material which cannot be reused must be treated as hazardous waste and disposed of in an appropriate manner.

Place materials defined as hazardous or toxic waste, including used sealant and adhesive tubes and containers, in containers or areas designated for hazardous waste.

.4 To reduce the amount of contaminants entering waterways, sanitary/storm drain systems or into the ground the following procedures shall be strictly adhered to:
- .1 Retain cleaning water for water-based materials to allow sediments to be filtered out.
- .2 Retain cleaners, thinners, solvents and excess paint and place in designated containers and ensure proper disposal.
- .3 Return solvent and oil soaked rags used during painting operations for contaminant recovery, proper disposal, or appropriate cleaning and laundering.
- .4 Dispose of contaminants in an approved legal manner in accordance with hazardous waste regulations.
- .5 Empty paint cans are to be dry prior to disposal or recycling (where available).
- .6 Where paint recycling is available, collect waste paint by type and provide for delivery to recycling or collection facility.
- .7 Set aside and protect surplus and uncontaminated finish materials: Deliver to or arrange collection by employees, individuals, or organizations for verifiable re-use or re-manufacturing.
- .8 Close and seal tightly partly used sealant and adhesive containers and store protected in well ventilated fire-safe area at moderate temperature.

1.11 Maintenance

.1 Extra Materials:
- .1 Submit maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.

.2 Extra Materials:
- .1 Deliver to extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels. Comply with Section 01 78 00 - Closeout Submittals.
- .2 Quantity: provide one four litre can of each type and colour of primer stain finish coating. Identify colour and paint type in relation to established colour schedule and finish system.
- .3 Delivery, storage and protection: comply with Departmental Representative's requirements for delivery and storage of extra materials.

1.12 Ambient Conditions

.1 Heating, Ventilation and Lighting:
- .1 Ventilate enclosed spaces in accordance with Section 01 51 00 – Temporary Utilities.
- .2 Do not perform painting work unless adequate and continuous ventilation and sufficient heating facilities are in place to maintain ambient air and substrate temperatures above 10^0 C for 24 hours before, during and after paint application until paint has cured sufficiently.
- .3 Provide continuous ventilation for seven days after completion of application of paint
- .4 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 by specifying body, Paint Inspection Agency and, applied product manufacturer, 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 Relative humidity is above 85 % or when dew point is less than 3° C variance between air/surface temperature.

.5 Rain or snow are forecast to occur before paint has thoroughly cured or when it is foggy, misty, raining or snowing at site.

.2 Perform no painting work when maximum moisture content of substrate exceeds 12%.

.3 Conduct moisture tests using a properly calibrated electronic Moisture Meter.

.3 Surface and Environmental Conditions:

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

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

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

.4 Apply paint finishes when conditions forecast for entire period of application fall within manufacturer's recommendations.

.5 Do not apply paint when:

.1 Temperature is expected to drop below 10° C before paint has thoroughly cured.

.2 Substrate and ambient air temperatures are expected to fall outside MPI or paint manufacturer's limits.

.3 Surface to be painted is wet, damp or frosted.

.6 Provide and maintain cover when paint must be applied in damp or cold weather. Heat substrates and surrounding air to comply with temperature and humidity conditions specified by manufacturer. Protect until paint is dry or until weather conditions are suitable.

.7 Schedule painting operations such that surfaces exposed to direct, intense sunlight are scheduled for completion during early morning.

.8 Remove paint from areas which have been exposed to freezing, excess humidity, rain, snow or condensation. Prepare surface again and repaint.

PART 2 PRODUCTS

2.1 Materials

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

.2 Paint materials for paint systems: to be products of single manufacturer.

.3 Only qualified products with E2 or E3 "Environmentally Friendly" ratings are acceptable for use on this project.

.4 Use only MPI listed ‘L’ rated materials.

.5 Paints, coatings, adhesives, solvents, cleaners, lubricants, and other fluids, to be as follows:

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

.2 Be non-flammable biodegradable.

.3 Be manufactured without compounds which contribute to ozone depletion in upper atmosphere.

.4 Be manufactured without compounds which contribute to smog in the lower atmosphere.

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

.6 Water-borne surface coatings must be manufactured and transported in a manner that steps of processes, including disposal of waste products arising therefrom, will meet requirements of applicable governmental acts, by-laws and regulations including Fisheries Act and Canadian Environmental Protection Act (CEPA).

.7 Water-borne surface coatings must not be formulated or manufactured with aromatic solvents,

formaldehyde, halogenated solvents, mercury, lead, cadmium, hexavelant chromium or their compounds.

.8 Water-borne surface coatings and recycled water-borne surface coatings must have flash point of 61° C or greater.

.9 Both water-borne surface coatings and recycled water-borne surface coatings must be made by a process that does not release:
- .1 Matter in undiluted production plant effluent generating a 'Biochemical Oxygen Demand' (BOD) in excess of 15 mg/L to a natural watercourse or a sewage treatment facility lacking secondary treatment.
- .2 Total Suspended Solids (TSS) in undiluted production plant effluent in excess of 15 mg/L to a natural watercourse or a sewage treatment facility lacking secondary treatment.

.10 Water-borne paints and stains, recycled water-borne surface coatings and water borne varnishes must meet a minimum "Environmentally Friendly" E2 or E3 rating.

.11 Recycled water-borne surface coatings must contain 50 % post-consumer material by volume.

.12 Recycled water-borne surface coatings must not contain:
- .1 Lead in excess of 600.0 ppm weight/weight total solids.
- .2 Mercury in excess of 50.0 ppm weight/weight total product.
- .3 Cadmium in excess of 1.0 ppm weight/weight total product.
- .4 Hexavelant chromium in excess of 3.0 ppm weight/weight total product.
- .5 Organochlorines or polychlorinated biphenyls (PCBS) in excess of 1.0 ppm weight/weight total product.

.13 The following must be performed on each batch of consolidated post-consumer material before surface coating is reformulated and canned. These tests must be performed at a laboratory or facility which has been accredited by the Standards Council of Canada.
- .1 Lead, cadmium and chromium are to be determined using ICP-AES (Inductively Coupled Plasma - Atomic Emission Spectroscopy) technique no. 6010 as defined in EPA SW-846.
- .2 Mercury is to be determined by Cold Vapour Atomic Absorption Spectroscopy using Technique no. 7471 as defined in EPA SW-846.
- .3 Organochlorines and PCBs are to be determined by Gas Chromatography using Technique no. 8081 as defined in EPA SW-846.

2.2 Colours

Departmental Representative will provide Colour Schedule. Colour schedule will be based upon selection of three base colours and two deep tint accent colours.

.1 Selection of colours will be from manufacturer’s full range of colours.

.2 Where specific products are available in restricted range of colours, selection will be based on limited range.

.3 Second coat in three coat system to be tinted slightly lighter colour than top coat to show visible difference between coats.

2.3 Mixing and Tinting

.1 Perform colour tinting operations prior to delivery of paint to site.

.2 Mix paste, powder or catalyzed paint mixes in accordance with manufacturer's written instructions.

.3 Add thinner to paint manufacturer's recommendations. Do not use kerosene or organic solvents to thin water-based paints.

.4 Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity.

2.4 Gloss/Sheen Ratings

.1 Paint gloss: defined as sheen rating of applied paint, in accordance with following values:

Gloss Level Category/	Units @ 60 Degrees	Units @ 85 Degrees
G1 – matte finish	0 to 5	Max. 10
G2 – velvet finish	0 to 10	10 to 35
G3 – eggshell finish	10 to 25	10 to 35
G4 – satin finish	20 to 35	Min. 35
G5 – semi-gloss finish	35 to 70	
G6 – gloss finish	70 to 85	
G7 – high gloss finish	> 85	

.2 Gloss level ratings of painted surfaces as specified.

2.5 Painting Systems

.1 Wood Cladding, Soffits, Fascia and Trim:
.1 EXT 6.2A Latex velvet finish (over alkyd/oil primer). Exterior Latex Velvet, colour for exterior cladding and trim to be “Fort George Gray” to match sample provided by Departmental Representative.

.2 Interior Dressed Lumber (Exterior windows and doors):
.1 EXT 6.3A Latex G6 Gloss Finish.

.3 Interior Dressed Lumber (Wood Trim at interior of unheated Octagonal Blockhouse):
.1 EXT 6.2A Latex velvet finish (over alkyd/oil primer). Exterior Semi-Gloss.

.4 Interior Dressed Lumber: (Interior of loophole doors and trim, door and window frames, baseboard casings, etc.):
.1 INT 6.3A High performance architectural latex G5 semi-gloss finish.

.5 Gypsum Board:
.1 INT 9.2B High performance architectural latex G3 eggshell finish.

.6 Exterior Metal Gate Assembly:
.1 EXT 5.1G Polyurethane, pigmented finish (over epoxy zinc rich primer and high build epoxy).

PART 3 EXECUTION

3.1 General

.1 Perform preparation and operations for painting in accordance with MPI Architectural Painting Specifications Manual except where specified otherwise.

.2 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and application instructions, and data sheets.

3.2 Examination

.1 Investigate existing substrates for problems related to proper and complete preparation of surfaces to be painted. Report to Departmental Representative damages, defects, unsatisfactory or unfavourable conditions before proceeding with work.

3.3 Preparation

.1 Perform preparation and operations for painting in accordance with MPI Maintenance Repainting Manual except where specified otherwise.

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

.3 Clean and prepare surfaces to be repainted in accordance with MPI Maintenance Repainting Manual requirements. Refer to the MPI Manual in regard to specific requirements and as follows:
- .1 Remove dust, dirt, and surface debris by vacuuming, wiping with dry, clean cloths or compressed air.
- .2 Wash surfaces with a biodegradable detergent and bleach where applicable and clean warm water using a stiff bristle brush to remove dirt, oil and other surface contaminants.
- .3 Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface.
- .4 Allow surfaces to drain completely and allow to dry thoroughly. Allow sufficient drying time and test surfaces using electronic moisture meter before commencing work.
- .5 Use water-based cleaners in place of organic solvents where surfaces will be repainted using water based paints.
- .6 Many water-based paints cannot be removed with water once dried. Minimize use of kerosene or such organic solvents to clean up water-based paints.

.4 Clean metal surfaces to be repainted by removing rust, dirt, oil, grease and foreign substances in accordance with MPI requirements and SSPC-SP 6. Remove such contaminates from surfaces, pockets and corners to be repainted by brushing with clean brushes, blowing with clean dry compressed air, or brushing/vacuum cleaning as required.

.5 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before priming and between applications of remaining coats. Touch-up, spot prime, and apply primer, paint, or pretreatment as soon as possible after cleaning and before deterioration occurs.

.6 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 1000 mm.

3.4 Protection

.1 Protect existing building surfaces and adjacent structures from paint spatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore such surfaces.

.2 Protect items that are permanently attached such as Fire Labels on doors and frames.

.3 Remove light fixtures, surface hardware on doors, and other surface mounted equipment, fittings and fastenings prior to undertaking painting operations. Store items and re-install after painting is completed.

.4 Protect factory finished products and equipment.

.5 As painting operations progress, place bilingual "WET PAINT/ PEINTURE FRAÎCHE" signs in pedestrian and vehicle traffic areas to approval of Departmental Representative.

3.5 Application

.1 Conform to manufacturer's application instructions unless specified otherwise.

.2 Brush and Roller Application:
- .1 Apply paint in a uniform layer using brush and/or roller of types suitable for application.
- .2 Work paint into cracks, crevices and corners.
- .3 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces shall be free of roller tracking and heavy stipple unless approved by Departmental Representative.
- .4 Remove runs, sags and brush marks from finished work and repaint.

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

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

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

.6 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as projecting ledges.

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

3.6 Field Quality Control

.1 Inspection:
- .1 Field inspection of painting operations to be carried out by Departmental Representative.
- .2 Advise Departmental Representative when each surface and applied coating is ready for inspection. Do not proceed with subsequent coats until previous coat has been approved.

3.7 Cleaning

.1 Proceed in accordance with Section 01 74 11 – Cleaning.

.2 Remove paint where spilled, splashed, splattered or sprayed as work progresses using means and materials that are not detrimental to affected surfaces.

3.8 Restoration

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

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

.3 Remove paint splashings on exposed surfaces that were not painted. Remove smears and spatter immediately as operations progress, using compatible solvent.

.4 Protect freshly completed surfaces from paint droppings and dust to approval of Departmental Representative. Avoid scuffing newly applied paint.

.5 Restore areas used for storage, cleaning, mixing and handling of paint to clean condition as approved by Departmental Representative.

End of Section

PART 1 - GENERAL

1.1 REFERENCE STANDARDS

.1 CSA Group
.1 CSA C22.1-12, Canadian Electrical Code, Part 1 (23rd Edition), Safety Standard for Electrical Installations.
.2 CSA C22.2 No..
.3 CAN3-C235-83(R2010), Preferred Voltage Levels for AC Systems, 0 to 50,000 V.

.2 Institute of Electrical and Electronics (IEEE)/National Electrical Safety Code Product Line (NESC)
.1 IEEE SP1122-2000, The Authoritative Dictionary of IEEE Standards Terms, 7th Edition.

1.2 DEFINITIONS

.1 Electrical and electronic terms: unless otherwise specified or indicated, terms used in these specifications, and on drawings, are those defined by IEEE SP1122.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for panelboard, weatherproof toggle switches, weatherproof junction boxes and security system equipment and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop drawings:
.1 Submit drawings stamped and signed by professional engineer registered or licensed in Ontario, Canada.
.2 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 co-ordinated installation.
.3 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.
.4 Indicate on drawings clearances for operation, maintenance, and replacement of operating equipment devices.

.5 Submit 6 number of copies of 600 x 600 mm minimum size drawings and product data to authority having jurisdiction.
.6 If changes are required, notify Departmental Representative of these changes before they are made.

.4 Certificates:
.1 Provide CSA certified equipment and material.
.2 Where CSA certified equipment and material is not available, submit such equipment and material to inspection authorities for special approval before delivery to site.
.3 Submit test results of installed electrical systems and instrumentation.
.4 Permits and fees: in accordance with General Conditions of contract.
.5 Submit, upon completion of Work, load balance report as described in PART 3 - LOAD BALANCE.
.6 Submit certificate of acceptance from authority having jurisdiction upon completion of Work to Departmental Representative .

.5 Manufacturer's Field Reports: submit to Departmental Representative manufacturer's written report, within 3 days of review, verifying compliance of Work and electrical system and instrumentation testing, as described in PART 3 - FIELD QUALITY CONTROL.

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for panelboard, switches and security system equipment for incorporation into manual.
.1 Provide for each system and principal item of equipment as specified in technical sections for use by operation and maintenance personnel.
.2 Operating instructions to include following:
.1 Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.
.2 Start up, proper adjustment, operating, lubrication, and shutdown procedures.
.3 Safety precautions.
.4 Procedures to be followed in event of equipment failure.
.5 Other items of instruction as recommended by manufacturer of each system or item of equipment.
.3 Print or engrave operating instructions and frame under glass or in approved laminated plastic.

.4 Post instructions where directed.
.5 For operating instructions exposed to weather, provide weather-resistant materials or weatherproof enclosures.
.6 Ensure operating instructions will not fade when exposed to sunlight and are secured to prevent easy removal or peeling.

1.5 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
.1 Store materials off ground, indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect panelboard, switches and security systemequipment from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

.4 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 20 - Waste Management and Disposal.

PART 2 - PRODUCTS

2.1 DESIGN REQUIREMENTS

.1 Operating voltages: to CAN3-C235.

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

.3 Language operating requirements: provide identification nameplates and labels for control items in English.

2.2 MATERIALS AND EQUIPMENT

.1 Provide material and equipment in accordance with Section 01 61 00 - Common Product Requirements.

.2 Materialandequipment to be CSA certified. Where CSA certified material and equipment is are not available, obtain special approval from inspection authorities before delivery to site and submit such approval as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.

.3 Factory assemble control panels and component assemblies.

2.3 WARNING SIGNS

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

.2 decal signs, minimum size 175 x 250 mm.

2.4 WIRING TERMINATIONS

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

2.5 EQUIPMENT IDENTIFICATION

.1 Identify electrical equipment with nameplates and labels as follows:

.1 Nameplates: plastic laminate 3 mm thick plastic engraving sheet , black face, black white core, lettering accurately aligned and engraved into 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
Size 4	20 x 90 mm	1 line	8 mm high letters
Size 5	20 x 90 mm	2 lines	5 mm high letters
Size 6	25 x 100 mm	1 line	12 mm high letters
Size 7	25 x 100 mm	2 lines	6 mm high letters

.2 Labels: embossed plastic labels with 6 mm high letters unless specified otherwise.

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

.4 Allow for minimum of twenty-five (25) letters per nameplate and label.

.5 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.

.6 Disconnects, starters and contactors: indicate equipment being controlled and voltage.

.7 Terminal cabinets and pull boxes: indicate system and voltage.

.8 Transformers: indicate capacity, primary and secondary voltages.

2.6 WIRING IDENTIFICATION

.1 Identify wiring with permanent indelible identifying markings, numbered coloured plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.

.2 Maintain phase sequence and colour coding throughout.

.3 Colour coding: to CSA C22.1.

.4 Use colour coded wires in communication cables, matched throughout system.

2.7 CONDUIT AND CABLE IDENTIFICATION

.1 Colour code conduits, boxes and metallic sheathed cables.

.2 Code with plastic tape or paint at points where conduit or cable enters wall, ceiling, or floor, and at 15 m intervals.

.3 Colours: 25 mm wide prime colour and 20 mm wide auxiliary colour.

Type	Prime	Auxiliary
up to 250 V	Yellow	
up to 600 V	Yellow	Green
up to 5 kV	Yellow	Blue
up to 15 kV	Yellow	Red

Telephone	Green	
Other Communication Systems	Green	Blue
Fire Alarm	Red	
Emergency Voice	Red	Blue
Other Security Systems	Red	Yellow

2.8 FINISHES

.1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.
.1 Paint outdoor electrical equipment light grey.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for light fixture reinstallation in accordance with manufacturer's written instructions.
.1 Visually inspect substrate in presence of Departmental Representative .
.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION

.1 Do complete installation in accordance with CSA C22.1 except where specified otherwise.

.2 Do overhead and underground systems in accordance with CAN/CSA-C22.3 No.1 except where specified otherwise.

3.3 NAMEPLATES AND LABELS

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

3.4 CONDUIT AND CABLE INSTALLATION

.1 Install conduit and sleeves prior to pouring of concrete.
.1 Sleeves through concrete: schedule 40 steel pipe , sized for free passage of conduit, and protruding 50 mm.

.2 If plastic sleeves are used in fire rated walls or floors, remove before conduit installation.

.3 Install cables, conduits and fittings embedded or plastered over, close to building structure so furring can be kept to minimum.

3.5 LOCATION OF OUTLETS

.1 Do not install outlets back-to-back in wall; allow minimum 150 mm horizontal clearance between boxes.

.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.

3.6 MOUNTING HEIGHTS

.1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise.

.2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.

.3 Install electrical equipment at following heights unless indicated otherwise.
.1 Local switches: 1000 mm.
.2 Panelboards: as required by Code or as indicated.

3.7 CO-ORDINATION OF PROTECTIVE DEVICES

.1 Ensure circuit protective devices such as overcurrent trips, relays and fuses are installed to required values and settings.

3.8 FIELD QUALITY CONTROL

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

.2 Conduct following tests in accordance with Section 01 45 00 - Quality Control.
.1 Power distribution system including phasing, voltage, grounding and load balancing.
.2 Circuits originating from branch distribution panels.
.3 Lighting and its control.
.4 Systems: communications and security.
.5 Insulation resistance testing:
.1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.
.2 Check resistance to ground before energizing.

.3 Carry out tests in presence of Departmental Representative.

.4 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.

.5 Manufacturer's Field Services:
.1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.
.2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

3.9 SYSTEM STARTUP

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

.2 Arrange and pay for services of manufacturer's factory service engineer to supervise start-up of installation, check, adjust, balance and calibrate components and instruct operating personnel.

.3 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 aspects of its care and operation.

3.10 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  .1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20 - Waste Management and Disposal .
  .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

.1 This Section includes requirements for selective demolition and removal of electrical components including removal of conduit, junction boxes, and panels, lighting, low voltage wiring and incidentals required to complete work described in this Section ready for new construction.

1.2 REFERENCE STANDARDS

.1 Canadian Standards Association (CSA)
.1 CSA S350 M1980 (R2003), Code of Practice for Safety in Demolition of Structures.

1.3 DEFINITIONS

.1 Demolish: Detach items from existing construction and legally dispose of items off site, unless indicated as removed and salvaged, or removed and reinstalled.

.2 Remove: Planned deconstruction and disassembly of electrical items from existing construction including removal of conduit, junction boxes , cabling and wiring from electrical component to panel taking care not to damage adjacent assemblies designated to remain; legally dispose of items off site, unless indicated as removed and salvaged, or removed and reinstalled.

.3 Remove and Salvage: Detach items from existing construction and deliver them to Representative ready for reuse.

.4 Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.

.5 Existing to Remain: Existing items of construction that are not removed and that are not otherwise indicated as being removed and salvaged, or removed and reinstalled.

.6 Hazardous Substances: Dangerous substances, dangerous goods, hazardous commodities and hazardous products may include asbestos, mercury and lead, PCB's, poisons, corrosive agents, flammable substances, radioactive substances, or other material that can endanger human health or wellbeing or environment if handled improperly as defined by Federal Hazardous Products Act (RSC 1985) including latest amendments.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Action Submittals: Provide in accordance with Section 01 33 00 - Submittal Procedures before starting work of this Section:
.1 Construction Waste Management Plan (CWM Plan): Submit plan addressing opportunities for reduction, reuse, or recycling of materials prepared in accordance with Section 01 74 20 - Construction Waste Management and Disposal.
.2 Landfill Records: Indicate receipt and acceptance of selective demolition waste and hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.5 ADMINISTRATIVE REQUIREMENTS

.1 Coordination: Coordinate work of this Section to avoid interference with work by other Sections.

.2 Scheduling: Account for Representative's continued occupancy requirements during selective demolition with schedule staged occupancy and worksite activities as a defined Critical Path Activity item in accordance with Section 01 32 16 - Construction Progress Schedule.

1.6 QUALITY ASSURANCE

.1 Regulatory Requirements: Perform work of this Section in accordance with:
.1 Federal Workers' Compensation Service
Provincial/Territorial Workers' Compensation Boards/Commissions
.2 Government of Canada, Labour Program: Workplace Safety
Provincial/Territorial Occupational Health and Safety Standards and Programs

1.7 SITE CONDITIONS

.1 Existing Conditions: Condition of materials identified as being salvaged or demolished are based on their observed condition on date that tender is accepted .

.2 Existing Hazardous Substances: Representative performed a hazardous substances assessment and it is not expected that hazardous substances will be encountered in Work.
.1 Hazardous substances will be removed by a hazardous abatement specialist engaged by Representative Owner before start of Work.

.3 Existing Hazardous Substances: Representative Owner has performed a hazardous substances assessment and identified materials requiring abatement as follows:
.1 Hazardous substances are as defined in Hazardous Products Act.
.2 Hazardous substances will be removed by Contractor as a part of Contract before starting Work in accordance with work results described in Related Requirements listed above.

.4 Discovery of Hazardous Substances: It is not expected that Hazardous Substances will be encountered in Work; immediately notify Representative Consultant if materials suspected of containing hazardous substances are encountered and perform following activities:
.1 Refer to Section 01 41 00 - Regulatory Requirements for directives associated with specific material types.
.2 Hazardous substances will be as defined in Hazardous Products Act.
.3 Stop work in area of suspected hazardous substances.
.4 Take preventative measures to limit users' and workers' exposure, provide barriers and other safety devices and do not disturb.
.5 Hazardous substances will be removed by Representative Owner under a separate contract or as a change to Work.
.6 Proceed only after written instructions have been received from Representative Owner Consultant.

PART 2 - PRODUCTS

2.1 NOT USED REPAIR MATERIALS

.1 Electrical Repair Materials: Use only new materials, CSA or ULC labelled as appropriate and matching components remaining after work associated with components identified for removal or demolition are completed.

.2 Firestopping Repair Materials: Use firestopping materials compatible with existing firestopping systems where removal or demolition work affects rated assemblies, restore to match existing fire rated performance.

2.2 SALVAGE AND DEBRIS MATERIALS

.1 Material Ownership: Demolished materials become Contractor's property and will be removed from Project site; except for items indicated as being reused, salvaged, reinstalled, or otherwise indicated to remain Representative's property.

.2 Salvaged Materials: Carefully remove materials designated for salvage and store in a manner to prevent damage or devaluation of materials.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Existing Conditions: Visit site, thoroughly examine and become familiar with conditions that may affect work of this Section before tendering Bid; Representative will not consider claims for extras for work or materials necessary for proper execution and completion of contract that could have been determined by a site visit.

3.2 PREPARATION

.1 Protection of Existing Systems to Remain: Protect systems and components indicated to remain in place during selective demolition operations and as follows:
.1 Prevent movement and install bracing to prevent settlement or damage of adjacent services and parts of existing buildings scheduled to remain.
.2 Notify Representative and cease operations where safety of buildings being demolished, adjacent structures or services appears to be endangered and await additional instructions before resuming demolition work specified in this Section.
.3 Prevent debris from blocking drainage inlets.
.4 Protect mechanical systems that will remain in operation.

.2 Protection of Building Occupants: Sequence demolition work so that interference with use of the building by Representative and users is minimized and as follows:
.1 Prevent debris from endangering safe access to and egress from occupied buildings.
.2 Notify Representative and cease operations where safety of occupants appears to be endangered and await additional instructions before resuming demolition work specified in this Section.

3.3 EXECUTION

.1 Demolition and Removal: Coordinate requirements of this Section as follows:

.1 Disconnect electrical circuits and panel feeders; maintain electrical service and main distribution panel as is, ready for subsequent Work.
.2 Remove existing luminaires, electrical devices and equipment including associated conduits, boxes, wiring, and similar items unless specifically noted otherwise.
.3 Perform demolition work in a neat and workmanlike manner:
.1 Remove tools or equipment after completion of work, and leave site clean and ready for subsequent renovation work.
.2 Repair and restore damages caused as a result of work of this Section to match existing materials and finishes.
.4 Disconnect panel feeders back to main distribution panel and re label respective circuit breaker as "SPARE".
.5 Place weatherproof blank cover plates on exterior outlet boxes remaining after demolition and removal activities.
.6 Remove existing conduits, boxes, cabling and wiring associated with removed luminaires, electrical devices and equipment.
.7 Grind off conduits and make flush with surface of concrete where conduits are cast into concrete; seal open ends of conduit with silicone sealant and leave in place.
.8 Seal open ends of conduit with silicone sealant and leave in place where they are inaccessible or cannot be removed without damaging adjacent construction.

3.4 CLOSEOUT ACTIVITIES

.1 Demolition Waste Disposal: Arrange for legal disposal and remove demolished materials to accredited provincial landfill site or alternative disposal site (recycle centre) except where explicitly noted otherwise for materials being salvaged for re use in new construction.

.2 Hazardous Substances Disposal: Arrange for disposal of hazardous substances.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCE STANDARDS

.1 CSA International
.1 CAN/CSA-C22.2 No.18-98(R2003), Outlet Boxes, Conduit Boxes and Fittings.
.2 CAN/CSA-C22.2 No.65-03(R2008), Wire Connectors (Tri-National Standard with UL 486A-486B and NMX-J-543-ANCE-03).

.2 Electrical and Electronic Manufacturers' Association of Canada (EEMAC)
.1 EEMAC 1Y-2-1961, Bushing Stud Connectors and Aluminum Adapters (1200 Ampere Maximum Rating).

.3 National Electrical Manufacturers Association (NEMA)

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for wire and box connectors and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Sustainable Design Submittals:
.1 Construction Waste Management:
.1 Submit project Waste Management Plan Waste Reduction Workplan highlighting recycling and salvage requirements.

1.3 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for wire and box connectors for incorporation into manual.

1.4 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
.1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect wire and box connectors from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan related to Work of this Section.

.5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials as specified in Construction Waste Management Plan.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Pressure type wire connectors to: CAN/CSA-C22.2 No.65, with current carrying parts of copper sized to fit copper conductors as required.

.2 Fixture type splicing connectors to: CAN/CSA-C22.2 No.65, with current carrying parts of copper sized to fit copper conductors 10 AWG or less.

.3 Bushing stud connectors: to EEMAC 1Y-2 NEMA to consist of:
.1 Connector body and stud clamp for stranded round copper conductors.
.2 Clamp for stranded copper conductors.
.3 Stud clamp bolts.
.4 Bolts for copper conductors .
.5 Sized for conductors as indicated.

.4 Clamps or connectors for armoured cable, TECK cable aluminum sheathed cable, mineral insulated cable, flexible conduit, non-metallic sheathed cable as required to: CAN/CSA-C22.2 No.18.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for wire and box connectors installation in accordance with manufacturer's written instructions.
.1 Visually inspect substrate in presence of Departmental Representative .
.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative .

3.2 INSTALLATION

.1 Remove insulation carefully from ends of conductors and cables and:
.1 Apply coat of zinc joint compound on aluminum conductors prior to installation of connectors.
.2 Install mechanical pressure type connectors and tighten screws with appropriate compression tool recommended by manufacturer. Installation shall meet secureness tests in accordance with CAN/CSA-C22.2 No.65.
.3 Install fixture type connectors and tighten to CAN/CSA-C22.2 No.65. Replace insulating cap.
.4 Install bushing stud connectors in accordance with EEMAC 1Y-2 NEMA.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20 - Waste Management and Disposal .

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

END OF SECTION

PART 1 - GENERAL

1.1 PRODUCT DATA

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

1.2 DELIVERY, STORAGE AND HANDLING

.1 Packaging Waste Management: remove for reuse and return by manufacturer of pallets crates padding and packaging materials in accordance with Section 01 74 20 - Waste Management and Disposal.

PART 2 - PRODUCTS

2.1 BUILDING WIRES

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

.2 Copperconductors: size as indicated, with 600 V insulation of cross-linked thermosetting polyethylene material rated RWU90 XLPE, Non Jacketted.

2.2 TECK 90 CABLE

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

.2 Conductors:
- .1 Grounding conductor: copper as indicated.
- .2 Circuit conductors: copper as indicated, size as indicated.

.3 Insulation:
- .1 Ethylene propylene rubber EP.
- .2 Cross-linked polyethylene XLPE.
- .3 Rating:, 600 V.

.4 Inner jacket: polyvinyl chloridematerial.

.5 Armour: flat, interlocking aluminum.

.6 Overall covering: thermoplastic polyvinyl chloride, compliant to applicable Building Code classification for this project.

.7 Fastenings:
.1 One hole steel straps to secure surface cables 50 mm and smaller. Two hole steel straps for cables larger than 50 mm.
.2 Channel type supports for two or more cables at 1000mm centers.
.3 Threaded rods: 6 mm diameter to support suspended channels.

.8 Connectors:
.1 Watertight, approved for TECK cable.

2.3 ARMOURED CABLES

.1 Conductors: insulated, copper , size as indicated.

.2 Armour: interlocking type fabricated from aluminum strip.

.3 Type: ACWU90 PVC flame retardant jacket over thermoplastic armour and compliant to applicable Building Code classification for this project wet locations.

.4 Connectors: anti short connectors.

2.4 CONTROL CABLES

.1 Type: Dimming Cables:
.1 20 AWG minimum, shielded twisted pair, UV resistant, outdoor cable.
.2 Follow iZSystems GEN3 Installation Guide and use cable approved by manufacturer of existing lighting system.

.2 Type: 24V DC Power Cables:
.1 16 AWG minimum 4 conductors, UV resistant outdoor cable.
.2 Follow iZSystems GEN3 Installation Guide and use cable approved my manufacturer of existing lighting system.

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

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

.2 Perform tests using method appropriate to site conditions and to approval of Departmental Representative and local authority having jurisdiction over installation.

.3 Perform tests before energizing electrical system.

3.2 GENERAL CABLE INSTALLATION

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

.2 Cable Colour Coding: to Section 26 05 00 - Common Work Results for Electrical.

.3 Conductor length for parallel feeders to be identical.

.4 Lace or clip groups of feeder cables at distribution centres, pull boxes, and termination points.

.5 Wiring in walls: typically drop or loop vertically from above to better facilitate future renovations. Generally wiring from below and horizontal wiring in walls to be avoided unless indicated.

.6 Provide numbered wire collars for control wiring. Numbers to correspond to control shop drawing legend. Obtain wiring diagram for control wiring.

3.3 INSTALLATION OF BUILDING WIRES

.1 Install wiring as follows:
.1 In conduit systems in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.
.2 In underground ducts in accordance with Section 33.

3.4 INSTALLATION OF TECK90 CABLE (0 -1000 V)

.1 Group cables wherever possible on channels.

.2 Install cable exposed , securely supported by straps.

3.5 INSTALLATION OF ARMOURED CABLES

.1 Group cables wherever possible on channels.

3.6 INSTALLATION OF CONTROL CABLES

.1 Install control cables in similar configuration to existing cable installation that is being removed and re-installed.

.2 Ground control cable shield.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCE STANDARDS

.1 CSA Group (CSA)
.1 CAN/CSA C22.2 No. 18-98(R2003), Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware, A National Standard of Canada.
.2 CSA C22.2 No. 45-M1981(R2003), Rigid Metal Conduit.
.3 CSA C22.2 No. 56-04, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
.4 CSA C22.2 No. 83-M1985(R2003), Electrical Metallic Tubing.
.5 CSA C22.2 No. 211.2-M1984(R2003), Rigid PVC (Unplasticized) Conduit.
.6 CAN/CSA C22.2 No. 227.3-05, Nonmetallic Mechanical Protection Tubing (NMPT), A National Standard of Canada (February 2006).

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product data: submit manufacturer's printed product literature, specifications and datasheets.
.1 Submit cable manufacturing data.

.3 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.

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20 - Waste Management and Disposal.

.2 Place materials defined as hazardous or toxic waste in designated containers.

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

PART 2 - PRODUCTS

2.1 CABLES AND REELS

.1 Provide cables on reels or coils.
  .1 Mark or tag each cable and outside of each reel or coil, to indicate cable length, voltage rating, conductor size, and manufacturer's lot number and reel number.

.2 Each coil or reel of cable to contain only one continuous cable without splices.

.3 Identify cables for exclusively dc applications.

.4 Reel and mark shielded cables rated 2,001 volts and above.

2.2 CONDUITS

.1 Rigid metal conduit: to CSA C22.2 No. 45, galvanized steel aluminum threaded.

.2 Epoxy coated conduit: to CSA C22.2 No. 45, with zinc coating and corrosion resistant epoxy finish inside and outside.

.3 Electrical metallic tubing (EMT): to CSA C22.2 No. 83, with couplings with expanded ends.

.4 Rigid pvc conduit: to CSA C22.2 No. 211.2.

.5 Flexible metal conduit: to CSA C22.2 No. 56, steel aluminum liquid-tight flexible metal.

.6 Flexible pvc conduit: to CAN/CSA-C22.2 No. 227.3.

2.3 CONDUIT FASTENINGS

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

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

.3 Channel type supports for two or more conduits at m on centre.

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

2.4 CONDUIT FITTINGS

.1 Fittings: to CAN/CSA C22.2 No. 18, manufactured for use with conduit specified. Coating: same as conduit.

.2 Ensure factory "ells" where 90 degrees bends for NPS 1 25 mm and larger conduits.

.3 Watertight connectors and couplings for EMT.
.1 Set-screws are not acceptable.

2.5 EXPANSION FITTINGS FOR RIGID CONDUIT

.1 Weatherproof expansion fittings with internal bonding assembly suitable for 100 mm linear expansion.

.2 Watertight expansion fittings with integral bonding jumper suitable for linear expansion and 19 mm deflection.

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

2.6 FISH CORD

.1 Polypropylene.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

.1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.

.2 Conceal conduits except in mechanical and electrical service rooms in unfinished areas.

.3 Surface mount conduits except.

.4 Use rigid galvanized steel hot dipped galvanized steel aluminum threaded conduit except where specified otherwise.

.5 Use epoxy coated conduit underground in corrosive areas.

.6 Use electrical metallic tubing (EMT) except in cast concrete above 2.4 m not subject to mechanical injury.

.7 Use rigid pvc conduit underground in corrosive areas.

.8 Use flexible metal conduit for connection to motors in dry areas connection to recessed incandescent fixtures without prewired outlet box connection to surface or recessed fluorescent fixtures work in movable metal partitions.

.9 Use liquid tight flexible metal conduit for connection to motors or vibrating equipment in damp, wet or corrosive locations.

.10 Install conduit sealing fittings in hazardous areas.
.1 Fill with compound.

.11 Minimum conduit size for lighting and power circuits: NPS 3/4 19 mm.

.12 Bend conduit cold:
.1 Replace conduit if kinked or flattened more than 1/10th of its original diameter.

.13 Mechanically bend steel conduit over 19 mm diameter.

.14 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.

.15 Install fish cord in empty conduits.

.16 Remove and replace blocked conduit sections.
.1 Do not use liquids to clean out conduits.

.17 Dry conduits out before installing wire.

3.3 SURFACE CONDUITS

.1 Run parallel or perpendicular to building lines.

.2 Run conduits in flanged portion of structural steel.

.3 Group conduits wherever possible on suspended surface channels.

.4 Do not pass conduits through structural members except as indicated.

3.4 CONCEALED CONDUITS

.1 Run parallel or perpendicular to building lines.

.2 Do not install horizontal runs in masonry walls.

.3 Do not install conduits in terrazzo or concrete toppings.

3.5 CONDUITS IN CAST-IN-PLACE CONCRETE

.1 Locate to suit reinforcing steel.
.1 Install in centre one third of slab.

.2 Protect conduits from damage where they stub out of concrete.

.3 Install sleeves where conduits pass through slab or wall.

.4 Provide oversized sleeve for conduits passing through waterproof membrane, before membrane is installed.
.1 Use cold mastic between sleeve and conduit.

.5 Conduits in slabs: minimum slab thickness 4 times conduit diameter.

.6 Encase conduits completely in concrete with minimum 25 mm concrete cover.

.7 Organize conduits in slab to minimize cross-overs.

3.6 CONDUITS IN CAST-IN-PLACE SLABS ON GRADE

.1 Run conduits 25 mm and larger below slab and encase in 75 mm concrete envelope.
.1 Provide 50 mm of sand over concrete envelope below floor slab.

3.7 CONDUITS UNDERGROUND

.1 Slope conduits to provide drainage.

.2 Waterproof joints (pvc excepted) with heavy coat of bituminous paint.

3.8 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 REFERENCE STANDARDS

.1 American National Standards Institute /Institute of Electrical and Electronics Engineers (ANSI/IEEE)
.1 ANSI/IEEE 837-02, IEEE Standard for Qualifying Permanent Connections Used in Substation Grounding.

.2 CSA International
.1 CSA Z32-09, Electrical Safety and Essential Electrical Systems in Health Care Facilities.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for grounding equipment and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for grounding equipment for incorporation into manual.

1.4 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect grounding equipment from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan related to Work of this Section.

.5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 20 - Waste Management and Disposal.

PART 2 - PRODUCTS

2.1 EQUIPMENT

.1 Clamps for grounding of conductor: size as indicated as required to electrically conductive underground water pipe.

.2 Copper conductor: minimum 6 m long for each concrete encased electrode, bare, stranded, tinned, soft annealed, size as indicated as required.

.3 Rod electrodes: copper clad steel 19 mm diameter by minimum 3 m long.

.4 Grounding conductors: bare stranded copper, tinned, soft annealed, size as indicated.

.5 Insulated grounding conductors: green, copper conductors, size as indicated.

.6 Ground bus: copper, size as indicated, complete with insulated supports, fastenings, connectors.

.7 Non-corroding accessories necessary for grounding system, type, size, material as indicated, including but not necessarily limited to:
.1 Grounding and bonding bushings.
.2 Protective type clamps.
.3 Bolted type conductor connectors.
.4 Thermit welded type conductor connectors.
.5 Bonding jumpers, straps.
.6 Pressure wire connectors.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for grounding equipment installation in accordance with manufacturer's written instructions.
.1 Visually inspect substrate in presence of Departmental Representative .
.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative .

3.2 INSTALLATION GENERAL

.1 Install complete permanent, continuous grounding system including, electrodes, conductors, connectors, accessories. Where EMT is used, run ground wire in conduit.

.2 Install connectors in accordance with manufacturer's instructions.

.3 Protect exposed grounding conductors from mechanical injury.

.4 Make buried connections, and connections to conductive water main, electrodes, using copper welding by thermit process permanent mechanical connectors or inspectable wrought copper compression connectors to ANSI/IEEE 837.

.5 Use mechanical connectors for grounding connections to equipment provided with lugs.

.6 Soldered joints not permitted.

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

.8 Install flexible ground straps for bus duct enclosure joints, where such bonding is not inherently provided with equipment.

.9 Make grounding connections in radial configuration only, with connections terminating at single grounding point street side of water pipe. Avoid loop connections.

.10 Bond single conductor, metallic armoured cables to cabinet at supply end, and provide non-metallic entry plate at load end and load end.

3.3 MAINTENANCE HOLES

.1 Install conveniently located grounding stud, electrode, size as indicated stranded copper conductor in each maintenance hole.

.2 Install ground rod in each maintenance hole so that top projects through bottom of maintenance hole. Provide with lug to which grounding connection can be made. Confirm ground resistance meets or exceeds Canadian Electrical Code minimum requirements.

3.4 ELECTRODES

.1 Make ground connections to continuously conductive underground water pipe on street side of water meter.

.2 Install water metre shunt.

.3 Install concrete encased electrodes in building foundation footings, with terminal connected to grounding network.

.4 Install rod, electrodes and make grounding connections as indicated.

.5 Bond separate, multiple electrodes together.

.6 Use size 2/0 AWG copper conductors for connections to electrodes.

.7 Make special provision for installing electrodes that will give acceptable resistance to ground value where rock or sand terrain prevails. Ground as indicated.

3.5 SYSTEM AND CIRCUIT GROUNDING

.1 Install system and circuit grounding connections to neutral of secondary 120/208 V system.

3.6 EQUIPMENT GROUNDING

.1 Install grounding connections to typical equipment included in, but not necessarily limited to following list. Service equipment, transformers, switchgear, duct systems, control panels, distribution panels, outdoor lighting, cable trays.

3.7 COMMUNICATION SYSTEMS

.1 Install grounding connections for security systems, and communication systems as follows:
.1 Security systems and communication systems as indicated.

3.8 FIELD QUALITY CONTROL

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

.2 Perform ground continuity and resistance tests using method appropriate to site conditions and to approval of Departmental Representative and local authority having jurisdiction over installation.

.3 Perform tests before energizing electrical system.

.4 Disconnect ground fault indicator during tests.

3.9 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20 - Waste Management and Disposal .
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

PART 1 - GENERAL

1.1 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for hangers and supports and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Sustainable Design Submittals:
.1 Construction Waste Management:
.1 Submit project Waste Management Plan Waste Reduction Workplan highlighting recycling and salvage requirements.

1.2 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
.1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect hangers and supports from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan related to Work of this Section.

.5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 20 - Waste Management and Disposal.

PART 2 - PRODUCTS

2.1 SUPPORT CHANNELS

.1 U shape, size 41 x 41 mm, 2.5 mm thick, surface mounted suspended set in poured concrete walls and ceilings.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for hangers and supports installation in accordance with manufacturer's written instructions.
.1 Visually inspect substrate in presence of Departmental Representative .
.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative .

3.2 INSTALLATION

.1 Secure equipment to hollow solid masonry, tile and plaster surfaces with lead anchors or nylon shields.

.2 Secure equipment to poured concrete with expandable inserts.

.3 Secure equipment to hollow masonry walls or suspended ceilings with toggle bolts.

.4 Secure surface mounted equipment with twist clip fasteners to inverted T bar ceilings. Ensure that T bars are adequately supported to carry weight of equipment specified before installation.

.5 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.

.6 Fasten exposed conduit or cables to building construction or support system using straps.
.1 One-hole steel straps to secure surface conduits and cables 50 mm and smaller.

.2 Two-hole steel straps for conduits and cables larger than 50 mm.
.3 Beam clamps to secure conduit to exposed steel work.

.7 Suspended support systems.
.1 Support individual cable or conduit runs with 6 mm diameter threaded rods and spring clips.
.2 Support 2 or more cables or conduits on channels supported by 6 mm diameter threaded rod hangers where direct fastening to building construction is impractical.

.8 For surface mounting of two or more conduits use channels at 1.0 m on centre spacing.

.9 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.

.10 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.

.11 Do not use wire lashing or perforated strap to support or secure raceways or cables.

.12 Do not use supports or equipment installed for other trades for conduit or cable support except with permission of other trade and approval of Departmental Representative .

.13 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20 - Waste Management and Disposal .
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCE STANDARDS

.1 CSA Group (CSA)
.1 CSA C22.1-06, Canadian Electrical Code, Part 1, 20th Edition.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

1.3 DELIVERY, STORAGE AND HANDLING

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

.2 Waste Management and Disposal:
.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20 - Waste Management and Disposal.

PART 2 - PRODUCTS

2.1 OUTLET AND CONDUIT BOXES GENERAL

.1 Size boxes in accordance with CSA C22.1.

.2 102 mm square or larger outlet boxes as required.

.3 Gang boxes where wiring devices are grouped.

.4 Blank cover plates for boxes without wiring devices.

.5 Combination boxes with barriers where outlets for more than one system are grouped.

2.2 GALVANIZED STEEL OUTLET BOXES

.1 One-piece electro-galvanized construction.

.2 Single and multi gang flush device boxes for flush installation, minimum size 76 x 50 x 38 mm or as indicated. 102 mm square outlet boxes when more than one conduit enters one side with extension and plaster rings as required.

.3 Utility boxes for outlets connected to surface-mounted EMT conduit, minimum size 102 x 54 x 48 mm.

.4 102 mm square or octagonal outlet boxes for lighting fixture outlets.

.5 Extension and plaster rings for flush mounting devices in finished plaster tile walls.

2.3 MASONRY BOXES

.1 Electro-galvanized steel masonry single and multi gang boxes for devices flush mounted in exposed block walls.

2.4 CONCRETE BOXES

.1 Electro-galvanized sheet steel concrete type boxes for flush mount in concrete with matching extension and plaster rings as required.

2.5 CONDUIT BOXES

.1 Cast FS or FD aluminum boxes with factory-threaded hubs and mounting feet for surface wiring of devices.

2.6 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.

2.7 FITTINGS - GENERAL

.1 Bushing and connectors with nylon insulated throats.

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

.3 Conduit outlet bodies for conduit up to 35mm and pull boxes for larger conduits.

.4 Double locknuts and insulated bushings on sheet metal boxes.

2.8 SERVICE FITTINGS

.1 'High tension' receptacle fitting made of 2 piece stainless steel die-cast aluminum with brushed aluminum satin aluminum housing finish for 1 single 1 duplex two duplex receptacles. Bottom plate with two knockouts for centered or offset installation. 12 x 102 mm extension piece as indicated.

.2 Pedestal type 'low tension' fitting made of 2 piece stainless steel die cast aluminum with brushed aluminum satin aluminum housing finish to accommodate one two amphenol jack connectors.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Support boxes independently of connecting conduits.

.2 Fill boxes with paper, sponges or foam or similar approved material to prevent entry of debris during construction. Remove upon completion of work.

.3 For flush installations mount outlets flush with finished wall using plaster rings to permit wall finish to come within 6 mm of opening.

.4 Provide correct size of openings in boxes for conduit, mineral insulated and armoured cable connections. Do not install reducing washers.

.5 Vacuum clean interior of outlet boxes before installation of wiring devices.

.6 Identify systems for outlet boxes as required.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCE STANDARDS

.1 Insulated Cable Engineers Association, Inc. (ICEA)

.2 Sustainable Forestry Initiative (SFI)
.1 SFI-2010-2014 Standard.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for cables and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Sustainable Design Submittals:
.1 Construction Waste Management:
.1 Submit project Waste Management Plan highlighting recycling and salvage requirements.

1.3 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
.1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect cables from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan related to Work of this Section.

.5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials as specified inConstruction Waste Management Plan Waste Reduction Workplan in accordance with Section 01 74 20 - Waste Management and Disposal.

PART 2 - PRODUCTS

2.1 CABLE PROTECTION

.1 38 x 140 mm planks pressure treated with clear coloured, or copper naphthenate or 5% pentachlorophenol solution, water repellent preservative.

2.2 MARKERS

.1 Concrete type cable markers: 600 x 600 x 100 mm with words: cable, joint or conduit impressed in top surface, with arrows to indicate change in direction of cable and duct runs.

.2 Cedar post type markers: to CAN/CSA-Z809 or FSC or SFI 89 x 89 mm, 1.5 m long, pressure treated with clear coloured, or copper napthenate or 5% pentachlorophenol solution, water repellent preservative, with nameplate fastened near post top, on side facing cable or conduit to indicate depth and direction of duct and cable runs.

.1 Nameplate: aluminum anodized 89 x 125 mm, 1.5 mm thick mounted on cedar post with mylar label 0.125 mm thick with words Cable, Joint or Conduit with arrows to indicate change in direction.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for cable installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative .

3.2 DIRECT BURIAL OF CABLES

.1 After sand bed in accordance with Section 31 23 10 - Excavating, Trenching and Backfilling, is in place, lay cables maintaining 75 mm clearance from each side of trench to nearest cable.
.1 Do not pull cable into trench.

.2 Include offsets for thermal action and minor earth movements.
.1 Offset cables 150 mm minimum for each 60 m run, maintaining minimum cable separation and bending radius requirements.

.3 Make termination and splice only as indicated leaving 0.6 m minimum of surplus cable in each direction.
.1 Make splices and terminations in accordance with manufacturer's written recommendations using approved splicing kits.

.4 Underground cable splices not acceptable.

.5 Minimum permitted radius at cable bends for rubber, plastic or lead covered cables, 8 times diameter of cable or in accordance with manufacturer's written recommendations; for metallic armoured cables, 12 times diameter of cables or in accordance with manufacturer's instructions.

.6 Cable separation:
.1 Maintain 75 mm minimum separation between cables of different circuits.
.2 Maintain 300 mm minimum horizontal separation between low and high voltage cables.
.3 When low voltage cables cross high voltage cables maintain 300 mm vertical separation with low voltage cables in upper position.
.4 At crossover, maintain 75 mm minimum vertical separation between low voltage cables and 150 mm between high voltage cables.
.5 Maintain 300 mm minimum lateral and vertical separation for fire alarm and control cables when crossing other cables, with fire alarm and control cables in upper position.
.6 Install treated planks on lower cables 0.6 m minimum in each direction at crossings.

.7 After sand protective cover specified in Section 31 23 10 - Excavating, Trenching and Backfilling, is in place, install continuous row of overlapping 38 x 140 mm pressure treated planks interlocking cable blocks as indicated to cover length of run.

3.3 CABLE INSTALLATION IN DUCTS

.1 Install cables as indicated in ducts.

.2 Do not pull spliced cables inside ducts.

.3 Install multiple cables in duct simultaneously.

.4 Use CSA approved lubricants of type compatible with cable jacket to reduce pulling tension.

.5 To facilitate matching of colour coded multiconductor control cables reel off in same direction during installation.

.6 Before pulling cable into ducts and until cables are properly terminated, seal ends of lead covered cables with wiping solder; seal ends of non-leaded cables with moisture seal tape.

.7 After installation of cables, seal duct ends with duct sealing compound.

3.4 MARKERS

.1 Mark cable every 150 m along cable duct runs and changes in direction.

.2 Mark underground splices.

.3 Where markers are removed to permit installation of additional cables, reinstall existing markers.

.4 Install concrete cable markers within 180 m from each side of runway centreline; 45 m from each side of taxi way centreline; 50 m from edge of taxi ramps or aprons.

.5 Install cedar post type markers.

.6 Lay concrete markers flat and centred over cable with top flush with finish grade.

3.5 FIELD QUALITY CONTROL

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

.2 Perform tests using qualified personnel.
.1 Include 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.
.1 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 High Potential (Hipot) Testing.
.1 Conduct hipot testing at 100% of original factory test voltage in accordance with manufacturer's ICEA recommendations.

.7 Provide Departmental Representative with list of test results showing location at which each test was made, circuit tested and result of each test.

.8 Remove and replace entire length of cable if cable fails to meet any of test criteria.

3.6 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20 - Waste Management and Disposal .

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

3.7 PROTECTION

.1 Repair damage to adjacent materials caused by cables installation.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCE STANDARDS

.1 CSA International
.1 CSA C22.2 No.29-11, Panelboards and Enclosed Panelboards.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for panelboards and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:
.1 Submit drawings stamped and signed by professional engineer registered or licensed in Province Territory, Canada.
.2 Include on drawings:
.1 Electrical detail of panel, branch breaker type, quantity, ampacity and enclosure dimension.

.4 Sustainable Design Submittals:
.1 Construction Waste Management:
.1 Submit project Waste Management Plan highlighting recycling and salvage requirements.

1.3 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for panelboards for incorporation into manual.

1.4 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
.1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect panelboards from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan related to Work of this Section .

.5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 20 - Waste Management and Disposal.

PART 2 - PRODUCTS

2.1 PANELBOARDS

.1 Panelboards: to CSA C22.2 No.29 and product of one manufacturer.
.1 Install circuit breakers in panelboards before shipment.
.2 In addition to CSA requirements manufacturer's nameplate must show fault current that panel including breakers has been built to withstand.

.2 250V panelboards: bus and breakers rated for 10,000 A (symmetrical) interrupting capacity or as indicated.

.3 Sequence phase bussing with odd numbered breakers on left and even on right, with each breaker identified by permanent number identification as to circuit number and phase.

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

.5 Minimum of 2 flush locks for each panel board.

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

.7 Copperbus with neutral of same ampere rating of mains.

.8 Mains: suitable for bolt-on breakers.

.9 Trim with concealed front bolts and hinges.

.10 Trim and door finish: baked enamel as per colour schedule.

2.2 BREAKERS

.1 Breakers: to Section 26 28 16.02 - Moulded Case Circuit Breakers.

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

.3 Main breaker: separately mounted on top or bottom of panel to suit cable entry. When mounted vertically, down position should open breaker.

2.3 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Nameplate for each panelboard size 4 engraved as indicated.

.3 Nameplate for each circuit in distribution panelboards size 2 engraved as indicated.

.4 Complete circuit directory with typewritten legend showing location and load of each circuit, mounted in plastic envelope at inside of panel door.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for panelboards installation in accordance with manufacturer's written instructions.
.1 Visually inspect substrate in presence of Departmental Representative .
.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative .

3.2 INSTALLATION

.1 Locate panelboards as indicated and mount securely, plumb, true and square, to adjoining surfaces.

.2 Install surface mounted panelboards on plywood backboards. Where practical, group panelboards on common backboard.

.3 Mount panelboards to height specified in Section 26 05 00 - Common Work Results for Electrical or as indicated.

.4 Connect loads to circuits.

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

.6 Where panels of different systems (i.e. Standard and Vital Power) supply a common patient care area, ground busses in panels to be interconnect with a minimum #6 AWG ground conductor.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20 Waste Management and Disposal .
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.4 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by panelboards installation.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCE STANDARDS

.1 CSA International
.1 CSA C22.2 No.42-10, General Use Receptacles, Attachment Plugs and Similar Devices.
.2 CAN/CSA C22.2 No.42.1-00(R2009), Cover Plates for Flush-Mounted Wiring Devices (Bi-national standard, with UL 514D).
.3 CSA C22.2 No.55-M1986(R2008), Special Use Switches.
.4 CSA C22.2 No.111-10, General-Use Snap Switches (Bi-national standard, with UL 20).

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for wiring devices and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:
.1 Submit drawings stamped and signed by professional engineer registered or licensed in Ontario of, Canada.

.4 Sustainable Design Submittals:
.1 Construction Waste Management:
.1 Submit project Waste Management Plan highlighting recycling and salvage requirements.

1.3 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for wiring devices for incorporation into manual.

1.4 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
.1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect wiring devices from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan related to Work of this Section .

.5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 20 - Waste Management and Disposal.

PART 2 - PRODUCTS

2.1 SWITCHES

.1 Weatherproof 20 A, 120 V , single pole, , three-way, switches 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 Ivorytoggle.

.3 Toggle operatedlocking fully rated for tungsten filament and fluorescent lamps, and up to 80% of rated capacity of motor loads and or heating loads.

.4 Switches of one manufacturer throughout project.

2.2 COVER PLATES

.1 Cover plates for wiring devices to: CSA C22.2 No.42.1.

.2 Sheet metalCast cover plates for wiring devices mounted in surface-mounted FS or FD type conduit boxes.

2.3 SOURCE QUALITY CONTROL

.1 Cover plates from one manufacturer throughout project.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for wiring devices installation in accordance with manufacturer's written instructions.
.1 Visually inspect substrate in presence of Departmental Representative .
.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative .

3.2 INSTALLATION

.1 Switches:
.1 Install single throw switches with handle in "UP" position when switch closed.
.2 Install switches in gang type outlet box when more than one switch is required in one location.
.3 Mount toggle switches at height in accordance with Section 26 05 00 - Common Work Results for Electrical as indicated.

.2 Receptacles:
.1 Install receptacles in gang type outlet box when more than one receptacle is required in one location.
.2 Mount receptacles at height in accordance with Section 26 05 00 - Common Work Results for Electrical as indicated.
.3 Where split receptacle has one portion switched, mount vertically and switch upper portion.
.4 Install GFI type receptacles as indicated.

.3 Cover plates:
.1 Install suitable common cover plates where wiring devices are grouped.
.2 Do not use cover plates meant for flush outlet boxes on surface-mounted boxes.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20 - Waste Management and Disposal .
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.4 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Protect stainless steel cover plate finish with paper or plastic film until painting and other work is finished.

.3 Repair damage to adjacent materials caused by wiring device installation.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCE STANDARDS

.1 CSA International
.1 CSA C22.2 No. 5-09, Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures (Tri-national standard with UL 489, and NMX-J-266-ANCE-2010).

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for circuit breakers and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Certificates:
.1 Prior to installation of circuit breakers in either new or existing installation, Contractor must submit 3 copies of a production certificate of origin from the manufacturer. Production certificate of origin must be duly signed by factory and local manufacturer's representative certifying that circuit breakers come from this manufacturer and are new and meet standards and regulations.
.1 Production certificate of origin must be submitted to Departmental Representative for approval.
.2 Delay in submitting production of certificate of origin will not justify any extension of contract and additional compensation.
.3 Any work of manufacturing, assembly or installation to begin only after acceptance of production certificate of origin by Departmental Representative . Unless complying with this requirement, Departmental Representative reserves the right to mandate manufacturer listed on circuit breakers to authenticate new circuit breakers under the contract, and to Contractor's expense.
.4 Production certificate of origin must contain:
.1 Manufacturer's name and address and person responsible for authentication. Person responsible must sign and date certificate.
.2 Licensed dealer's name and address and person of distributor responsible for Contractor's account.
.3 Contractor's name and address and person responsible for project.

.4 Local manufacturer's representative name and address. Local manufacturer's representative must sign and date certificate.
.5 Name and address of building where circuit breakers will be installed:
.1 Project title:.
.2 End user's reference number:.
.3 List of circuit breakers:.

.4 Sustainable Design Submittals:
.1 Construction Waste Management:
.1 Submit project Waste Management Plan highlighting recycling and salvage requirements.

1.3 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
.1 Store circuit breakers off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect circuit breakers from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan related to Work of this Section.

.5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 20 - Waste Management and Disposal.

PART 2 - PRODUCTS

2.1 BREAKERS GENERAL

.1 Moulded-case circuit breakers,Circuit breakers,andground-fault circuit-interrupters,: to CSA C22.2 No. 5

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

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

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

.5 Circuit breakers with interchangeable trips as indicated.

.6 Circuit breakers to have minimum 10,000 symmetrical rms interrupting capacity rating.

2.2 THERMAL MAGNETIC BREAKERS DESIGN A

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

2.3 MAGNETIC BREAKERS (DESIGN B)

.1 Moulded case circuit breaker to operate automatically by means of magnetic tripping devices to provide instantaneous tripping for short circuit protection.

2.4 OPTIONAL FEATURES

.1 Include:
.1 Shunt trip.
.2 Auxiliary switch.
.3 Motor-operated mechanism c/w time delay unit.
.4 Under-voltage release.
.5 On-off locking device.
.6 Handle mechanism.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

.1 Install circuit breakers as indicated.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20 - Waste Management and Disposal .
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

PART 1 GENERAL

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 32 14 40 Stone Paving
.2 Section 32 92 23 Sodding
.3 Section 33 46 13 Foundation Drainage

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM D698-12e2 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft3 (600 kN-m/m3))
  .2 ASTM D1557-12e1 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3))
.2 Ontario Ministry of Transportation
  .1 Ontario Provincial Standard Specifications (OPSS)
    .1 OPSS 805 (2015) Construction Specification for Temporary Erosion and Sediment Control Measures.
    .2 OPSS 180 (2011) General Specification for the Management Of Excess Materials
    .3 OPSS 206 (2009) Construction Specification for Grading
    .4 OPSS 1010 (2013) Material Specification for Aggregates - Base, Subbase, Select Subgrade, and Backfill Material
  .2 Ontario Provincial Standard Details (OPSD)
    .1 OPSD 219.130 (2006) Heavy Duty Silt Fence Barrier
    .2 OPSD 805 (2015) Temporary Erosion and Sediment Control Measures

1.4 Submittals

.1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Submit shop drawings of shoring and bracing required in connection with excavation. Drawings to show clearly procedural sequence to be followed.

.3 Erosion and Sedimentation Control: submit erosion and sedimentation control plan in accordance with authorities having jurisdiction.

1.5 Historic Procedures

.1 The site is a National Historic Site recognized by Canada and must be treated as such. Excavation or storage of material beyond the immediate work area defined by the Departmental Representative is strictly prohibited. Every precaution will be taken to minimize disturbance or damage to the area surrounding or adjacent to the defined work site.

.2 Buried artifacts, the remains and evidence of ancient persons and peoples, and any objects of historic value and worth, remain the property of the Crown. Any and all such objects shall be protected and immediately brought to the attention of the Departmental Representative.
  .1 Archaeologist will be on site to monitor work to ensure no archaeology resources are damaged. Advise Departmental Representative and receive direction regarding protecting such resources should any be discovered by either archaeology or the contractor. The contractor

could be directed to stop work on the area and redirect work elsewhere until the issue is resolved to the Departmental Representative's satisfaction.

1.6 Setting Out Work

.1 Be responsible to construct the work according to levels and locations shown on the drawings. Report any errors or discrepancies to the Departmental Representative before commencing work.

.2 Commencement of any part of the work shall constitute acceptance of drawings as being correct.

.3 Employ a competent instrument man and provide all lines and levels, limit lines and boundary stakes for the execution of the work as required. All bench marks shall be carefully protected.

.4 Provide all Subcontractors with, and be responsible for, all lines, levels and dimensions which such trades require to relate their work to the work of the Contractor or other trades. All trades shall be notified that all such levels and dimensions must be obtained from the Contractor.

1.7 Quality Assurance

.1 Conform to the applicable requirements of the Ontario Provincial Standard Specifications (OPSS).

1.8 Inspection and Testing

.1 Provide proper and sufficient samples, ample opportunity and access at all times for the Departmental Representative or Testing Agency to inspect materials, operations and completed works carried out under this Section.

.2 Sample and test excavated material prior to shipping to landfill off the site. Samples shall be tested for compliance of acceptable material for landfill. Furnish to the Departmental Representative the results of all testing and location of landfill site used. This testing will not be undertaken by the Departmental Representative's Inspection and Testing Agency.

.3 Provide 24 hours notice to inspection laboratory and request tests as follows:
- .1 Sieve Analysis: Proposed fill materials will be tested to confirm stability for intended use and conformity with specifications.
- .2 Density Test: Tests will be conducted on compacted fill, to ASTM D698.
- .3 Frequency Test: Excavated Surfaces: When existing compacted fill surface is being prepared, make a series of three tests of surface for each 500 m^2 area.

1.9 Standards

.1 Carry out all work in accordance with the applicable OPSS, OPSD and site drawings. The applicable Ontario Provincial Standard Specifications are listed hereafter.

.2 The following shall apply:
- .1 OPS 180 Management and Disposal of Excess Material
- .2 OPS 206 Grading, Nov. 2005
- .3 OPS 805 Temporary Erosion and Sediment Control Measures

1.10 Protection of Existing Services

.1 Before starting the work, verify the location of all known underground services and utilities occurring in the work site area.

.2 Notify the Departmental Representative, Public Utility or Municipal authorities in advance of planned excavations adjacent to their services.

.3 Take care not to damage or displace encountered known and unknown services.

.4 When such services are encountered during the execution of work, immediately notify the Departmental Representative and protect, brace and support active services. Where repairs to these services become necessary use the following procedure:
.1 Known services, repair at no expense to the Departmental Representative.
.2 Unknown services, forward to the Departmental Representative a complete breakdown of the estimated cost of such work. Proceed only upon written authorization.

.5 In the case of damage to, or cutting off of an essential service, notify Departmental Representative, and Public Utility or Municipal authorities immediately and repair the service under the Departmental Representative's direction.

1.11 Shoring and Bracing

.1 Shoring and trench timbering shall be carried out in accordance with the requirements of The Occupational Health and Safety Act, "November 1992 Ontario Regulation 213/91" and Regulations for Construction Projects by Ontario Ministry of Labour and to Construction Safety Association brochure "Trenching Safety April 1994".

.2 Erect necessary shoring for excavations in such a manner that:
.1 Whenever a trench or excavated face is necessary, shore and brace to prevent failure. Engage a registered Professional Engineer fully qualified in this line of work to design, stamp shop drawings and assume responsibility for the shoring and bracing. Submit shop drawings to the Departmental Representative.
.2 It will properly retain the banks of the excavations and prevent caving-in or displacement or damage to surrounding or adjacent buildings or other property.
.3 It will be entirely free of footings, foundation walls or other such work so that it may be removed entirely or in sections when it is no longer required or when directed, without causing any damage or injury to the structural work that has been completed.

1.12 Sedimentation Control

.1 Maintain and/or repair sedimentation control at all watercourses and catch basins to prevent contamination by excavated fill. Sedimentation control shall be in accordance with the Ontario Provincial Standard Specifications, OPSS 805 and local authorities.

.2 Install sedimentation control as required and obtain Departmental Representative’s approval prior to commencement of site works.

1.13 Dewatering

.1 Keep excavations and backfill dry at all times.

PART 2 PRODUCTS

2.1 Materials

.1 Granular A, B Type II to OPSS.PROV 1010.
.1 Granular A, maximum size 13.2 mm.

.2 Granular B, Type II, maximum size 4.75 mm.

.2 Crushed Stone: Crushed stone shall be composed of clean, hard, durable course gravel, or crushed rock fragments such that 100% of the particles pass the 18 mm sieve and not more than 10% of the particles pass the No. 4 sieve. No clay or other objectionable materials shall be present.

.3 Sand: clean, washed, minimum 100% passing 4.75 mm sieve, maximum 5% passing 0.075 mm sieve to OPSS.PROV 1004.05.07.

.4 Drainage material: As specified in Section 33 46 13.

.5 Topsoil: As specified in Section 32 92 23.

.6 Site excavated material: as backfill only when permitted and approved by the Departmental Representative and below all sodded areas up to underside of topsoil.

.7 Silt fence shall be prefabricated heavy duty geotextile with the following physical properties:

Property	Test Method	Units	Minimum Average Roll Values
Grab Tensile Strength (machine direction)*	ASTM D 4632	N (lbs)	550
Grab Tensile Strength (cross-machine direction)*	ASTM D 4632	N (lbs)	550
Grab Tensile Elongation	ASTM D 4632	%	15/15
Mullen Burst Strength	ASTM D 3786	kPa	2060
Trapezoid Tear Strength	ASTM D 4533	N	290
Permittivity	ASTM D 4491	sec	0.10
Water Flow Rate	ASTM D 4491	l/min/m2	405
Ultraviolet Stability	ASTM D 4355	%	70

.1 Silt fence shall be prefabricated with 3.2 cm nominal square hardwood posts, minimum 1200 mm long at 2.5 metre spacing.

PART 3 EXECUTION

3.1 Examination

.1 Before commencing work establish locations of buried services on and adjacent to site.

.2 Evaluation and Assessment:
.1 Arrange with appropriate authority for relocation of buried services that interfere with execution of work. Pay costs of relocating services.
.2 Testing of materials and compaction of backfill and fill will be carried out by testing laboratory designated by Departmental Representative.

.3 Not later than 48 hours before backfilling or filling with approved material, notify Departmental Representative so that compaction tests can be carried out by designated testing agency.

.4 Before commencing work, conduct, with Departmental Representative, condition survey of existing structures, trees and plants, lawns, fencing, service poles, wires, rail tracks and paving, survey bench marks and monuments which may be affected by work.

3.2 Preparation

.1 Lines and Levels: Refer to Section 01 71 00 - Examination and Preparation.

.2 Install silt fencing in accordance with reference standards.

3.3 Excavation

.1 Shore and brace excavations, protect slopes and banks and perform work in accordance with Provincial and Municipal regulations.

.2 Topsoil stripping:
- .1 Do not handle topsoil while in wet or frozen condition or in any manner in which soil structure is adversely affected.
- .2 Strip topsoil to depths [as indicated] [as directed by Departmental Representative]. Avoid mixing topsoil with subsoil.
- .3 Strip topsoil over areas to be covered by new construction, over areas where grade changes are required, and so that excavated material may be stockpiled without covering topsoil.
- .4 Stockpile in locations as directed by Departmental Representative.

.3 Excavate as required to carry out work, in all materials met.
- .1 Do not disturb soil or rock below bearingsurfaces. Notify Departmental Representative when excavations are complete.
- .2 If bearings are unsatisfactory, additional excavation will be authorized in writing and paid for as additional work.
- .3 Fill excavation taken below depths shown without Departmental Representative's written authorization with concrete of same strength as for footings.

.4 Excavate trenches to provide uniform continuous bearing and support for 150 mm thickness of pipe bedding material on solid and undisturbed ground. Trench widths below point 150 mm above pipe not to exceed diameter of pipe plus 600 mm.

.5 Excavate for slabs to subgrade levels.
- .1 Remove topsoil, organic matter, debris and other loose and harmful matter encountered at subgrade level

3.4 Site Quality Control

.1 Fill material and spaces to be filled to be inspected and approved by Departmental Representative.

3.5 Backfilling

.1 Start backfilling only after inspection and receipt of written approval of fill material and spaces to be filled from Departmental Representative.

.2 Remove snow, ice, construction debris, organic soil and standing water from spaces to be filled.

.3 Lateral support: maintain even levels of backfill around structures as work progresses, to equalize earth pressures.

.4 Compaction of subgrade: compact existing subgrade under walks, paving, and slabs on grade, to same compaction as specified for fill. Fill excavated areas with selected subgrade material compacted as specified for fill.

.5 Placing:
- .1 Place backfill, fill and basecourse material in 150 mm lifts. Add water as required to achieve specified density.

.6 Compaction: compact each layer of material to following densities for material to ASTM D698:
  .1 To underside of basecourses: 95%.
  .2 Basecourses: 100%.
  .3 Elsewhere: 90%.

.7 In trenches:
  .1 Up to 300 mm above pipe or conduit: sand placed by hand.
  .2 Over 300 mm above pipe or conduit: native material approved by Departmental Representative.

.8 Under sodded areas: use site excavated material to bottom of topsoil except in trenches and within 600 mm of foundations.

.9 Against foundations (except as applicable to trenches and under slabs): excavated material or imported material with no stones larger than 200 mm diameter within 600 mm of structures.

3.6 Rough Grading

.1 Grade to ensure that water will drain away from buildings, walls and paved areas, to catch basins and other disposal areas approved by Departmental Representative. Grade to be gradual between finished spot elevations as indicated.

3.7 Water on Prepared Surfaces

.1 Promptly remove, by approved methods, water rising from seeping of the soil or resulting from rainfall wherever such water is on the surface of sub-grade soil and compacted fill.

.2 Where proper drainage and pumping is not carried out as specified herein, and any prepared sub-grade soil for under structural work, and any compacted fill for under concrete slabs, is softened or disturbed by water due to improper drainage and pumping, the Contractor shall remove the unsatisfactory soil and fill, and bear all incidental costs in connection with additional excavation and placing and compacting of granular fill under floor slabs.

3.8 Cleaning

.1 Proceed in accordance with Section 01 74 11 – Cleaning.

.2 As excavation proceeds, keep roads and aisles clean of dirt and excavated material.

.3 Clean up and wash down to remove all dirt and excavated materials caused by the work of this section daily.

End of Section

PART 1 GENERAL

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 31 23 10 Excavating, Trenching and Backfilling

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM C97/C97M-15 Standard Test Methods for Absorption and Bulk Specific Gravity of Dimension Stone
  .2 ASTM C119-16 Standard Terminology Relating to Dimension Stone
  .3 ASTM C170/C170M-17 Standard Test Method for Compressive Strength of Dimension Stone
  .4 ASTM C270-14a Standard Specification for Mortar for Unit Masonry
  .5 ASTM C615/C615M-11 Standard Specification for Granite Dimension Stone
  .6 ASTM C880/C880M-15 Standard Test Method for Flexural Strength of Dimension Stone
.2 Ontario Provincial Standard Specifications (OPSS)
  .1 OPSS1001 (2013) Material Specification for Aggregates - General
  .2 OPSS 1004(2012) Material Specification for Aggregates - Miscellaneous
  .3 OPSS 1010 (2013) Material Specification for Aggregates - Base, Subbase, Select Subgrade, and Backfill Material

1.4 Submittals

.1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data: For each stone type and each manufactured product shown on Drawings or specified.
  .1 For each stone variety used on Project, include physical property data.

.3 Samples: Submit samples for each stone type required, exhibiting the full range of colour characteristics expected.
  .1 Submit a minimum of 2 each, 300 x 300 mm in size, in each colour and finish specified.
  .2 In the case of more variegated stones, colour photos shall be submitted in addition to the number of samples to show the full range of colour and markings to be expected.

.4 Preliminary Test Reports: Submit test reports for proposed stones prior to final stone selection. Preliminary test reports shall be indicative of the stone to be proposed for the project.
  .1 Testing of production stone is required in addition to preliminary test reports.

1.5 Definitions

.1 Definitions contained in ASTM C119 apply to this Section.

1.6 Shipping, Handling and Storage

.1 Refer to Section 01 61 00 – Common Product Requirements.

.2 Store and handle materials to prevent deterioration or damage.

.1 Stone shall be carefully packed and loaded for shipment using reasonable care and customary precautions against damage in transit. Material, which may cause staining or discolouration shall not be used for blocking or packing.
.2 The stone shall be stacked on timber or platforms at least 100 mm above the ground. Care shall be taken to prevent staining or discolouration during storage.
.3 If storage is to be for a prolonged period, polyethylene or other suitable plastic film shall be placed between wood and finished surfaces of completely dry stone.

.3 Properly store cementitious materials. Do not use damp cementitious materials.

1.7 Project Conditions

.1 Cold-Weather Requirements for Exterior Stone Paving: ACI 530.1/ASCE 6/TMS 602.

.2 Hot-Weather Requirements for Exterior Stone Paving: ACI 530.1/ASCE 6/TMS 602:

1.8 Waste Management and Disposal

.1 Refer to Section 01 74 20 – Construction Waste Management and Disposal.

1.9 Warranty

.1 Warrant the work of this Section against defects of workmanship and material, for a period of two (2) years from the date of Certificate of Completion and agree to make good promptly any defects which occur or become apparent within the warranty period.

PART 2 PRODUCTS

2.1 Granite Material

.1 Granite: ASTM C615.

.2 Cut stone from one block or contiguous, matched blocks in which natural markings occur.

.3 Granite type and colour selected by Departmental Representative from full range of manufacturer's standards.

.4 Finish: Textured

.5 Nominal Thickness: Not less than 40 mm.

2.2 Bedding Materials

.1 Base Courses:
.1 Setting bed - Clean well graded sand, free of organics and deleterious soluble salts or other contaminants likely to cause efflorescence. Limestone screening or stone dust shall not be used. Sand shall be as hard as practically available, where concrete pavers are subject to vehicular traffic.
.2 Grading of sand samples for bedding shall be done according to CSA-A23.2A. The bedding sand shall conform to the grading requirements of CSA A23.1-M as shown on the following table.

	Sieve Size	Percent Passing
.2	10 mm	100
.3	5 mm	95 to 100

.4	2.5 mm	80 to 100
.5	1.25 mm	50 to 90
.6	630 µm	25 to 65
.7	315 µm	10 to 35
.8	160 µm	2 to 10

.2 Sand Filler:
- .1 Sharp normal weight sand, to CSA A82.56-M.
- .2 The joint sand shall conform to the grading requirement of CSA A82.56M as shown in the following table:

.1	Sieve Size	Percent Passing
.2	5 mm	100
.3	2.5 mm	95 to 100
.4	1.25 mm	60 to 90
.5	600 µm	35 to 80
.6	305 µm	15 to 20
.7	150 µm	2 to 15

2.3 Accessories

.1 Cleavage Membrane:
- .1 Polyethylene sheeting, ASTM D4397, 0.1 mm thick.

2.4 Stone Fabrication

.1 Select stone for intended use to prevent fabricated units from containing cracks, seams, and starts that could impair structural integrity or function.

.2 Fabricate stone to comply with requirements indicated and with the following references:
- .1 Granite: NBGQA's "Specifications for Architectural Granite."

.3 Cut stone to produce pieces of thickness, size, and shape indicated.
- .1 Pattern: As indicated on Drawings.

.4 Carefully inspect finished stone units at fabrication plant for compliance with requirements. Replace defective units. Clean backs of stones to remove rust stains and iron particles.

PART 3 EXECUTION

3.1 Examination

.1 Examine surfaces indicated to receive stone. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 Preparation

.1 Sweep concrete substrates to remove dirt, dust, debris, and loose particles.

3.3 Bedding Course

.1 Place setting bed to minimum 50 mm compacted thickness.

.2 Spread sand evenly over the base course and screed to a nominal thickness of 50 mm. The screened sand should not be disturbed. Place sufficient sand to stay ahead of the laid pavers. Do not use bedding sand to fill depressions in base course.

.3 Place cleavage membrane over substrates, lapped at least 100 mm at joints

3.4 Installation

.1 Do necessary field cutting as stone is set. Cut lines straight and true and finish field-cut edges to match shop-cut edges. Use power saws with diamond blades to cut stone.

.2 Scribe and field-cut stone as necessary to fit at obstructions. Produce neat joints of size specified or indicated.

.3 Fill joints between stones with sand filler.

3.5 Installation Tolerances

.1 Variation in Line: Do not exceed 3 mm in 2400 mm, 6 mm in 6 m, or 10 mm maximum.

.2 Variation in Surface Plane: Do not exceed 3 mm in 3 m, 6 mm in 6 m, or 10 mm maximum from level or slope indicated.

.3 Variation in Plane between Adjacent Units (Lipping): Do not exceed 0.8-mm difference between planes of adjacent units.

3.6 Adjusting

.1 Remove and replace stone not complying with requirements. Replacement stone shall show no evidence of replacement.

.2 Patching: Minor patching in small areas may be acceptable if the repair does not distract from the overall appearance of the finished project.

3.7 Cleaning

.1 Proceed in accordance with Section 01 74 11 – Cleaning.

End of Section

PART 1 GENERAL

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 09 91 13 Painting

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM A47/A47M-99(2014) Standard Specification for Ferritic Malleable Iron Castings
  .2 ASTM A48/A48M-03(2016) Standard Specification for Gray Iron Castings
  .3 ASTM A153/A153M-16a Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
  .4 ASTM A242/A242M-13(2018) Standard Specification for High-Strength Low-Alloy Structural Steel
  .5 ASTM A500/A500M-18 Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
  .6 ASTM A510/A510M-18 Standard Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel, and Alloy Steel
  .7 ASTM A588/A588M-15 Standard Specification for High-Strength Low-Alloy Structural Steel, up to 50 ksi [345 MPa] Minimum Yield Point, with Atmospheric Corrosion Resistance
  .8 ASTM A1011/A1011M-17a Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength
  .9 ASTM F626-14 Standard Specification for Fence Fittings
  .10 ASTM F900-11(2017) Standard Specification for Industrial and Commercial Steel Swing Gates
.2 American Welding Society (AWS).
  .1 D1.1, Structural Welding Code – Steel.
.3 Building Hardware Manufacturer's Association
  .1 ANSI/BHMA A156.3-2014, Exit Devices
.4 CSA Group (CSA)
  .1 CSA C22.1 The Canadian Electrical Code.
.5 National Ornamental and Miscellaneous Metals Association
.6 The Society of Protective Coatings (SSPC)
  .1 SSPC-Paint 20, Zinc Rich Coating (Type I- Inorganic, and Type II – Organic).

1.4 Submittals

.1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:
  .1 Submit manufacturers' product data of manufactured items and for miscellaneous hardware items associated with decorative metalwork.

.3 Drawings:
  .1 Submit shop drawings detailing installation procedures, including layout, dimensions, anchorage, reinforcement, connections, supports and support placement.
  .2 Indicate hardware and fittings.
  .3 Shop drawings shall be stamped and signed by a Professional Engineer registered in the

Province of Ontario. Each submission of the shop drawings shall bear the seal of the Engineer.

.4 Samples:
.1 Submit selection and verification samples for finishes, colours and textures.

.5 Quality Assurance:
.1 Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
.2 Manufacturer's Instructions: Manufacturer's installation instructions.

.6 Closeout Submittals: Submit the following:
.1 Warranty: Warranty documents specified herein.
.2 Maintenance Data and Operation Data: Include methods for maintaining installed products and precautions against cleaning materials and methods detrimental to finishes and performance.

1.5 Quality Assurance

.1 Qualifications:
.1 Fabricator Qualifications: Fabrication performed in quality controlled manufacturing environment by experienced fabricators with references indicating multiple satisfactory experiences fabricating perforated metals as required for this project.

.2 Work Quality:
.1 Shop and field work shall be performed by mechanics, crafts persons, artisans, and workers skilled and experienced in the fabrication and installation of the decorative metalwork involved.

.3 Mock-Up: Provide a mock-up for evaluation of application workmanship.
.1 Finish areas designated by Consultant.
.2 Do not proceed with remaining work until workmanship and materials are approved by Consultant.
.3 Refinish mock-up area as required to produce acceptable work.

1.6 Shipping, Handling and Storage

.1 Refer to Section 01 61 00 – Common Product Requirements.

.2 Deliver materials and products in labeled packages. Store and handle in strict accordance with manufacturer's instructions.

.3 Upon receipt at jobsite, check materials to ensure no damage occurred during shipping or handling.

1.7 Project Conditions

.1 Field verify all dimensions prior to fabrication of gate.

1.8 Waste Management and Disposal

.1 Refer to Section 01 74 20 – Construction Waste Management and Disposal.

1.9 Warranty

.1 Warrant the work of this Section against defects of workmanship and material, for a period of two (2) years from the date of Certificate of Completion and agree to make good promptly any defects which occur or become apparent within the warranty period.

PART 2 PRODUCTS

2.1 Material

.1 Architectural and Miscellaneous Mild Steel: CSA G40.20-13/G40.21-13, Grade 300W or ASTM A588/A242.

.2 Machine Bolts and Nuts: ASTM Standard A307-10 low carbon steel externally and internally threaded standard fasteners. Dimensions, sizes, thread, strength, quality and type of items shall be designed for the work intended. Exposed fasteners and anchors shall be same material, colour and finish as the metal to which they are applied.

.3 Sheet Steel: (Commercial Quality) ASTM A1008/A1008M-12, stretcher leveled or temper rolled.

.4 Wire Mesh: Carbon Steel GAW 6 x 6 mm" .064 mm wire gauge, welded.

.5 Welding Materials: CSA W59.

.6 Welding Electrodes: CSA W48 Series

.7 Castings: Either gray or malleable iron unless otherwise indicated. Gray Iron per ASTM A48/A48M, Class 30. Malleable Iron per ASTM A47/A47M.

.8 Design: Design of gate shall be as indicated on drawings. Provide complete gate assembly including the following features:
  .1 Decorative metal security gate as detailed complete with flat plate horizontal and vertical plates, perimeter bar assembly, riveted connections and top spikes.
  .2 HSS gate posts with cap plates, set in concrete foundations.
  .3 Gate shall be designed with provisions for security contact device as specified on electrical drawings. Coordinate with electrical.
  .1 Gate shall be equipped with custom fabricated heavy duty strap hinges sized to support a 275 kg load applied at mid-span and all applied torque without permanent deformation
  .2 Provide paddle type exit hardware with black matte finish which complies with the requirements of the National Building Code of Canada and ANSI/BHMA A156.3-2014, Exit Devices. Locate exit device and fabricate gate to prevent access to exit device from exterior side.
  .3 Protect exit device against unauthorized entry with wire mesh as detailed.

.2 Primer; two component polyamine cured zinc rich epoxy coating. High solids, very high zinc dust containing product, conforming to the compositional requirements of SSPC Paint 20,

2.2 Accessories

.1 Anchors, Fasteners, and Accessories: Provide all required anchors, fasteners, miscellaneous components, and accessories as required for complete and finished decorative metal installations.

2.3 Fabrication

.1 Decorative metalwork shall be fabricated by firms or shops experienced and skilled in the custom fabrication of architectural decorative metalwork. Form and fabricate the work as indicated and as required to meet installation conditions.

.2 Decorative metalwork shall be prefabricated and preassembled in the factory or shop as far as practicable.

PART 3 EXECUTION

3.1 Examination

.1 Site Verification of Conditions:
  .1 Verify substrate conditions are acceptable for product installation in accordance with manufacturer's instructions.
  .2 Examine area to receive architectural metalwork for compliance with installation clearances.

3.2 Installation

.1 Erect metalwork square, plumb, straight and true.

.2 Provide suitable means of anchorage as recommended by manufacturer.

.3 Match exposed fastening devices to attached metalwork.

.4 Provide components and setting templates to appropriate trades for placement in concrete or masonry.

.5 Install decorative metalwork as indicated and in accordance with the reviewed Shop Drawings, using workers skilled and experienced in the installation of the type of work involved.

.6 Install decorative metalwork true and horizontal, perpendicular, or at the required angle, as the case may be, level and square, with angles and edges parallel with related lines of the building or structure.

.7 Field welding, where required, shall conform to requirements specified herein for shop welding. All welds shall be ground smooth to match adjacent finish surfaces.

.8 Set posts in concrete foundations as indicated.

.9 Gates:
  .1 Install gates according to Manufacturer's written instructions, level, plumb, and secure for full opening without interference.
    .1 Attach hardware using tamper-resistant or concealed means.
    .2 Install ground-set items in concrete for anchorage
    .3 Adjust hardware for smooth operation and lubricate where necessary.
    .4 Provide rigid, weatherproof joints.
    .5 Assure correctly aligned level and plumb.
    .6 Fully conceal anchor bolts in finished installation.

3.3 Field Quality Control

.1 Field Tolerances:
- .1 Post to post spacing: +/-13 mm
- .2 Plumbness of Posts: +/-3 mm
- .3 Visual Alignment of Posts and Rails: Fencing which is visibly misaligned will not be accepted, and shall be corrected.
- .4 Consistency of plate spacing and alignment: +/-3.0 mm

3.4 Adjusting

.1 Adjust gates to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range.

.2 Confirm that latches and locks engage accurately and securely without forcing or binding.

3.5 Cleaning

.1 Proceed in accordance with Section 01 74 11 – Cleaning.

End of Section

PART 1 GENERAL

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 31 23 10 Excavating, Trenching and Backfilling

1.3 References

.1 Nursery Sod Growers Association of Ontario (NSGA).

1.4 Submittals

.1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Submit name and address of sod farm.

.3 Submit grass seed mix.

1.5 Quality Assurance

.1 Topsoil from each source, native and imported, shall be tested for N.P.K., altrazine, minor elements, as well as clay and organic matter contents and acidity (pH) range. Topsoil shall be tested, written test report submitted and approved by Departmental Representative, prior to delivery to site.

1.6 Shipping, Handling and Storage

.1 Refer to Section 01 61 00 – Common Product Requirements.

.2 Protect sod during transportation, for delivery to the site in a fresh and healthy condition.

.3 Install sod immediately, no later than 48 hours after arrival on site. Keep moist and fresh until installation.

.4 Handle sod carefully to prevent breaking or tearing. Immediately remove damaged and dried-out sod from the site.

1.7 Warranty

.1 Guarantee and provide maintenance as specified for sodded areas, for one year from date of Certificate of Completion.

PART 2 PRODUCTS

2.1 Topsoil

.1 Clean topsoil, imported material approved by the Departmental Representative, and free from admixtures of subsoil, clay lumps, stones or roots over 25 mm diameter, free of toxic substances or any other foreign matter which would inhibit growth. Minimum 150 mm thickness.

2.2 Sod

.1 Sod shall be a Certified No. 1 sod, grown and sold in accordance with the latest specifications of the Nursery Sod Growers Association of Ontario (NSGA), composition of 50% Kentucky Blue Grass and 50% Merion Blue Grass.

.2 At the time of delivery, sod shall have a strong, fibrous root system, be free of disease, stones, burned or bare spots, with a healthy green colour and containing not more than 1% twitch grass and other weeds.

.3 Sod shall be cut and rolled in sections of max. 1.0 m² in area and approximately 3 mm thick as specified by the NSGA.

2.3 Wooden Pegs

.1 Hardwood pegs, 25 x 25 mm square and at least 250 mm long, or longer as required for satisfactory anchorage of sod.

2.4 Fertilizer

.1 Commercial type having a 10-10-10 ratio and shall be applied such that actual nitrogen is 9.0 kg/10 m².

PART 3 EXECUTION

3.1 Preparation

.1 Adjust subgrade to allow the placing of topsoil to minimum depths specified.

.2 Scarify subgrade to at least 75 mm deep and remove debris and all stones 50 mm in diameter and larger.

.3 Arrange for inspection of finished subgrade by Departmental Representative.

.4 Spread and grade topsoil evenly over approved subgrade. Provide minimum 200 mm thick topsoil. No less will be accepted.

.5 Finished sodded area top surface shall be uniform and evenly graded between elevations indicated, free of bumps, ridges and depressions. Remove all stones and lumps over 25 mm in diameter and foreign materials.

.6 Unless recommended otherwise on soil analysis report, apply a 10-10-10 fertilizer at the rate of 9.0 kg/10 m².

.7 Work fertilizer well and uniformly into the topsoil within 48 hours before laying sod.

.8 Fine grade, rake and roll surface until smooth and firm against foot prints, and free of depressions, lumps and irregularities.

3.2 Installation

.1 Place sod closely knit together, so that no open joints are visible and pieces are not overlapping.

.2 Install sod to blend tightly and uniformly with adjoining grass areas.

.3 On slopes of 3:1 and steeper, place sod perpendicularly to the slope and stake every row with wooden pegs at maximum 600 mm intervals. Drive pegs flush with sod.

.4 Immediately after installation, water with sufficient amount to saturate sod and underlying topsoil.

.5 As soon as sod has dried sufficiently to prevent damage, roll with roller to ensure a good bond between sod and topsoil and to remove minor depressions and irregularities.

3.3 Maintenance

.1 Maintain all sodded areas, from date of installation and until one full growing season is complete (minimum 6 months). Obtain Departmental Representative's approval at end of maintenance.

.2 Maintenance shall include all necessary measures to establish and maintain grass in a healthy, vigorous growing condition, for one full growing season.

.3 Maintenance shall include, but not be limited to the following work:
- .1 Mow grass areas at regular intervals as required to maintain grass height between 50 mm and 60 mm. Not more than ⅓ of grass blade shall be cut during one mowing. Hand clip where necessary and keep edges neatly trimmed. Remove heavy clippings immediately after mowing and trimming.
- .2 Control weeds by cutting. Use of chemicals is strictly prohibited.
- .3 Fertilize not less than once per season (Spring, Summer, Fall).
- .4 Water when necessary, with sufficient quantities of water to prevent sod and underlying soil from drying out.
- .5 Roll all sodded areas to remove minor depressions and irregularities.
- .6 Repair all erosion damage resulting from faulty workmanship and/or maintenance.
- .7 Replace all grass which has deteriorated or which shows bare spots.
- .8 Protect all grass areas against damage, including erosion and trespassing, by providing and maintaining proper safeguards. Remove safeguards at end of maintenance period.

3.4 Cleaning

.1 Proceed in accordance with Section 01 74 11 – Cleaning.

.2 Clean up all areas and remove debris

End of Section

PART 1 GENERAL

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 31 23 10 Excavating, Trenching and Backfilling

1.3 References

.1 CSA Group (CSA)
  .1 CAN/CSA-A23.1-14 Concrete Materials and Methods of Concrete Construction.
  .2 CAN/CSA-B182.1- 02 Plastic Drain and Sewer Pipe and Pipe Fittings.
.2 Ontario Building Code, Part 7 - Plumbing.
.3 Ontario Provincial Standard Specifications (OPSS)
  .1 OPSS.PROV 1004-November 2012, Material Specification for Aggregates-Miscellaneous.
  .2 OPSS 1840 Material Specification for Non-Pressure Polyethylene (PE) Plastic Pipe Products

1.4 Shipping, Handling and Storage

.1 Refer to Section 01 61 00 – Common Product Requirements.

.2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.

1.5 Waste Management and Disposal

.1 Refer to Section 01 74 20 – Construction Waste Management and Disposal.

PART 2 PRODUCTS

2.1 Materials

.1 Perforated plastic pipe and fittings: to CSA 182.1. Nominal pipe size 100 mm diameter. Drainage tubing manufactured from high density polyethylene resin which meets or exceeds the requirements of Type III, Category 4 or 5, Grade P33 or P34, Class C as per ASTM D1248.

.2 Joining System: snap, insert or split coupler

.3 Filter Sock: Woven polyester.

.4 Drainage material: 19 mm crushed stone or 19 to 63 mm clean gravel to OPSS.PROV 1004.05.02.

.5 Fine filter aggregate: to CAN/CSA-A23.1, Table 1.

PART 3 EXECUTION

3.1 Layout

.1 Establish grades and inverts from appropriate bench marks. Lay out lines as shown on Drawings.

.2 Slope drainage pipes at least 1%. Pipe grade shall not vary more than 10% of internal diameter of pipe withing a given run. Such deviation shall be gradual and over a distance of not less than 9.0 m.

.3 Lay pipe in straight lines; turn corners using 45 degree bends.

3.2 Installation

.1 Coordinate work of this Section with that of other related Sections.

.2 Do not place pipe in direct contact with rigid materials such as rock, brick, or wood. Do not use grade stakes, stones, masonry or concrete fragments or any type of shim under pipe.

.3 Join pipe sections by means of couplings. Provide end plugs on open ends of pipe runs at high points. Provide fittings such as elbows, bends, tees, adapters, reducers, as required to form a complete drainage system. Carefully tap tapered fittings into pipe; do not overdrive.

.4 Install perforated pipe with holes and coupling slots facing down.

.5 Aggregate materials shall be damp when placed. If necessary, spray with water using fog nozzle to assist hydraulic consolidation.

.6 Place aggregate materials by hand around and above pipe in successive 150 mm lifts.

.7 Consolidate each lift by tamping moderately; prevent damage to pipes.

.8 Do not cover pipes until inspected and approved by Departmental Representative.

3.3 Perimeter Drainage

.1 Provide perimeter drainage at outside of external foundation walls of the Octagonal Blockhouse.

.2 Place filter fabric into prepared excavation. Size filter fabric to completely wrap drainage course, lapping at joints minimum 300 mm.

.3 Place minimum 150 mm coarse filter aggregate on top of filter fabric and consolidate.

.4 Lay drainage pipe to layout shown. Unless other size is indicated, provide 100 mm diameter perforated pipe. Connect to existing outfall as indicated and directed by Departmental Representative.

.5 Provide minimum 150 mm thick coarse filter aggregate at sides and top of drainage pipe.

.6 Close filter fabric over top of drainage course and secure lap in place.

.7 Cover filter fabric with 300 mm fine filter aggregate.

3.4 Inspection

.1 Arrange for inspection of foundation drainage systems by Departmental Representative prior to placing backfill.

3.5 Cleaning

.1 Proceed in accordance with Section 01 74 11 – Cleaning.

End of Section