Project Title Prince Edward Point National Wildlife Area
Visitor’s Experience Improvements

Project Number R.080100.002

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Architect and Consultant for Building Code Review:

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## PART 1 - GENERAL

### 1.1 SECTION INCLUDES

.1 Title and description of Work.

.2 Contract Method.

.3 Work sequence.

.4 Contractor use of premises.

### 1.2 PRECEDENCE

.1 For Federal Government projects, Division 01 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

### 1.3 WORK COVERED BY CONTRACT DOCUMENTS

.1 Work of this Contract comprises general construction of a bird banding station, outhouse, and wayfinding signage, located at 6056 Long Point Road, Milford, Ontario; and further identified as the Prince Edward Point National Wildlife Area.

### 1.4 CONTRACT METHOD

.1 Construct work under lump sum contract.

### 1.5 COST BREAKDOWN

.1 Within 48 hours of notification of acceptance of bid furnish a cost breakdown by Section aggregating contract price.

.2 Show separately cost of equipment purchased exempt from Harmonised Sales Tax under your Harmonised Sales Tax licence number.

.3 Within 48 hours of acceptance of bid submit a list of subcontractors.

### 1.6 CONTRACTOR USE OF PREMISES

.1 Contractor shall limit use of premises for Work, for storage, and for access, to allow;
- .1 Owner use of site.
- .2 Public use of site.

.2 Coordinate use of premises under direction of Departmental Representative.

.3 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.

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 This project requires work to be limited in place and time in order to minimize impact on site operations. Be responsible for efficiently coordinating work to comply with the requirements of this Section. Contractor is to assume all costs related to the inefficiencies and loss of productivity caused by the requirements of this Section.

1.2 Access and Egress

.1 Design, construct and maintain temporary "access to" and "egress from" work areas, including stairs, runways, ramps or ladders and scaffolding, independent of finished surfaces and in accordance with relevant municipal, provincial and other regulations.

1.3 Use of Site and Facilities

.1 The site is a wildlife reserve and a scientific research site. Disturbance of the natural environment beyond the work area indicated is not acceptable. Take measures to protect the environment in accordance with the requirements of Section 01 35 43.
.2 Execute work with least possible interference or disturbance to normal use of premises. Make arrangements with Departmental Representative to facilitate work as stated.
.3 Maintain existing services to building and provide for personnel and vehicle access.
.4 Closures: protect work temporarily until permanent enclosures are completed.

1.4 Existing Services

.1 Notify Departmental Representative and utility companies of intended interruption of services and obtain required permission.
.2 Where Work involves breaking into or connecting to existing services, give Departmental Representative 48 hours of notice for necessary interruption of mechanical or electrical service throughout course of work. Keep duration of interruptions minimum. Carry out interruptions after normal working hours of occupants, preferably on weekends. Provide with the notice, the details of the shutdowns, schedule, locations, and safety procedures, including sequence of work.
.3 Provide for personnel, pedestrian and vehicular traffic.
.4 Construct barriers in accordance with Section 01 56 00.

1.5 Special Requirements

.1 Submit schedule in accordance with Section 01 32 16.
.2 Ensure Contractor's personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.

.3 Keep within limits of work and avenues of ingress and egress.

1.6 Building Smoking Environment

.1 Comply with smoking restrictions. Smoking is not allowed.

PART 2 PRODUCTS

2.1 Not Used

.1 Not Used.

PART 3 EXECUTION

3.1 Not Used

END OF SECTION

## PART 1 - GENERAL

### 1.1 ADMINISTRATIVE

.1 Schedule and administer project meetings throughout the progress of the work at the call of Departmental Representative.

.2 Prepare agenda for meetings.

.3 Distribute written notice of each meeting 4 days in advance of meeting date to Departmental Representative.

.4 Provide physical space and make arrangements for meetings.

.5 Preside at meetings.

.6 Record the meeting minutes. Include significant proceedings and decisions. Identify actions by parties.

.7 Reproduce and distribute copies of minutes within three days after meetings and transmit to Departmental Representative, meeting participants and affected parties not in attendance.

.8 Representative of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.

### 1.2 PRECONSTRUCTION MEETING

.1 Within 15 days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.

.2 Departmental Representative, Contractor, major Subcontractors, field inspectors and supervisors will be in attendance.

.3 Establish time and location of meeting and notify parties concerned minimum 5 days before meeting.

.4 Incorporate mutually agreed variations to Contract Documents into Agreement, prior to signing.

.5 Agenda to include:

.1 Appointment of official representative of participants in the Work.

.2 Schedule of Work: in accordance with Section 01 32 16.

.3 Schedule of submission of shop drawings, samples, mock-ups, colour chips. Submit submittals in accordance with Section 01 33 00.

.4 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences in accordance with Section 01 52 00.

.5 Site security in accordance with Section 01 56 00.

.6 Health and safety in accordance with Section 01 35 29.

.7 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.

.8 Record drawings and specifications in accordance with Sections 01 33 00 and 01 78 00.

.9 Maintenance manuals in accordance with Section 01 78 00.

.10 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00.
.11 Monthly progress claims, administrative procedures, photographs, hold backs.
.12 Appointment of inspection and testing agencies or firms.
.13 Insurances, transcript of policies.

1.3 PROGRESS MEETINGS

.1 During course of Work and 2 weeks prior to project completion, schedule progress meetings bi-weekly.

.2 Contractor, major Subcontractors involved in Work and Departmental Representative are to be in attendance.

.3 Notify parties minimum 5 days prior to meetings.

.4 Record minutes of meetings and circulate to attending parties and affected parties not in attendance within 3 days after meeting.

.5 Agenda to include the following:
.1 Review, approval of minutes of previous meeting.
.2 Review of Work progress since previous meeting.
.3 Field observations, problems, conflicts.
.4 Problems which impede construction schedule.
.5 Review of off-site fabrication delivery schedules.
.6 Corrective measures and procedures to regain projected schedule.
.7 Revision to construction schedule.
.8 Progress schedule, during succeeding work period.
.9 Review submittal schedules: expedite as required.
.10 Maintenance of quality standards.
.11 Review proposed changes for effect on construction schedule and on completion date.
.12 Other business.

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 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 5 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 PROJECT MILESTONES

.1 Project milestones form interim targets for Project Schedule.
.1 Shop drawings for CLTs within 15 working days of Award of Contract date.
.2 Excavation completed within 40 working days of Award of Contract date.
.3 Substructure completed within 50 working days of Award of Contract date.
.4 Superstructure completed within 60 working days of Award of Contract date.
.5 Building closed-in and weatherproofed within 80 working days of Award of Contract date.
.6 Interior finishing and fitting, mechanical, and electrical work completed within 100 working days of Award of Contract date.
.7 Certificate of Completion within 110 working days of Award of Contract date.

1.5 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.

1.6 PROJECT SCHEDULE

.1 Develop detailed Project Schedule derived from Master Plan.

.2 Ensure detailed Project Schedule includes as minimum milestone and activity types as follows:

.1 Award.
.2 Shop Drawings, Samples.
.3 Permits.
.4 Mobilization.
.5 Excavation.
.6 Backfill.
.7 Slab on grade.
.8 Cross Laminated Timber.
.9 Siding and Roofing.
.10 Openings.
.11 Lighting.
.12 Electrical.
.13 Millwork.
.14 Deficiencies
.15 Demobilization

1.7 PROJECT SCHEDULE REPORTING

.1 Update Project Schedule on 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.

1.8 PROJECT MEETINGS

.1 Discuss Project Schedule at regular site meetings specified in Section 01 31 19, 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.

.2 Weather related delays with their remedial measures will be discussed and negotiated.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not used.

END OF SECTION

PART 1 GENERAL

1.1 Administrative

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

1.2 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 by Contractor to illustrate details of a portion of Work.
.2 Where indicated in the respective specification sections, submit shop drawings bearing stamp and signature of qualified professional engineer registered or licensed in Province of Ontario, Canada.
.3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and

other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been coordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.

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

.5 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.

.6 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.

.7 Accompany submissions with transmittal letter. Submissions without transmittal letters will be returned without being examined and shall be considered rejected. Include:

- .1 Date.
- .2 Project title and number.
- .3 Contractor's name and address.
- .4 Identification and quantity of each shop drawing, product data and sample.
- .5 Other pertinent data.

.8 Submissions include:

- .1 Date and revision dates.
- .2 Project title and number.
- .3 Name and address of:
  - .1 Subcontractor.
  - .2 Supplier.
  - .3 Manufacturer.
- .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
- .5 Details of appropriate portions of Work as applicable:
  - .1 Fabrication.
  - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
  - .3 Setting or erection details.
  - .4 Capacities.
  - .5 Performance characteristics.
  - .6 Standards.
  - .7 Operating weight.
  - .8 Wiring diagrams.
  - .9 Single line and schematic diagrams.
  - .10 Relationship to adjacent work.

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

.10 Submit 1 electronic copy of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.

.11 Submit 1 electronic copy and 3 hard copies 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.

.12 Submit electronic copy of test reports for requirements requested in specification Sections and as requested by Departmental Representative.

.1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.

.2 Testing must have been within 3 years of date of contract award for project.

.13 Submit 1 electronic copy of manufacturers' instructions for requirements requested in specification Sections and as requested by Departmental Representative.

.1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.

.14 Submit 3 hard copies and 1 electronic copy of Manufacturers' Field Reports for requirements requested in specification Sections and as requested by Departmental Representative.

.1 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.

.15 Submit 3 hard copies and 1 electronic copy of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Departmental Representative.

.16 Delete information not applicable to project.

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

.18 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.

.19 The review of shop drawings by 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.

1.3 Samples

.1 Submit for review samples in duplicate as requested in respective specification Sections. Label samples with origin and intended use.
.2 Deliver samples prepaid to Departmental Representative's business address.
.3 Notify Departmental Representative in writing, at time of submission of deviations in samples from requirements of Contract Documents.
.4 Where colour, pattern or texture is criterion, submit full range of samples.
.5 Adjustments made on samples by Departmental Representative are not intended to change Contract amount. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.
.6 Make changes in samples which Departmental Representative may require, consistent with Contract Documents.
.7 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.4 Mock-ups

.1 Erect mock-ups in accordance with 01 45 00.

1.5 Fees, Permits and Certificates:

.1 Provide authorities having jurisdiction with information requested.
.2 Pay fees and obtain certificates and permits required.
.3 Furnish certificates and permits.

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): Canada
  .1 CSA S350-M1980(R2003), Code of Practice for Safety in Demolition of Structures.
.2 National Building Code 2015 (NBC):
  .1 NBC 2015, Division B, Part 8 Safety Measures at Construction and Demolition Sites.
.3 National Fire Code 2015 (NFC):
  .1 NFC 2015, Division B, Part 5 Hazardous Processes and Operations, subsection 5.6.1.3 Fire Safety Plan.
.4 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.
.5 Treasury Board of Canada Secretariat (TBS):
  .1 Treasury Board, Fire Protection Standard April 1, 2010 www.tbs-sct.gc.ca/pol/doc-eng.aspx ?id=17316&section=text.

### 1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit 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 found in work plan.
  .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, in accordance with NBC, Division B, Article 8.1.1.1.3 prior to commencement of work. The plan shall be coordinated with, and integrated into, the existing Emergency Procedures and Evacuation Plan in place at the site. Departmental Representative will provide Emergency Procedures and Evacuation Plan. Deliver two copies of the Fire Safety Plan to the Departmental Representative not later than 14 days before commencing work.
.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. Coordinate plan with existing Emergency Response requirements and procedures provided by Departmental Representative.
.6 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 5 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 biweekly.

.11 Submit 2 copies of orders, directions or reports issued by health and safety inspectors of the authorities having jurisdiction.

.12 Submit 2 copies of incident and accident reports.

.13 Submit Material Safety Data Sheets (MSDS).

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

.15 Medical Surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel, in accordance with O. Reg. 490, prior to commencement of Work, and submit additional certifications for any new site personnel to Departmental Representative.

## 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 PROJECT/SITE CONDITIONS

.1 Work at Site will involve contact with:

.1 Ticks

.2 Poison ivy

.3 Wildlife

## 1.8 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.

## 1.9 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 CO-ORDINATOR

.1 Employ and assign to Work, competent and authorized representative as Health and Safety Co-ordinator. Health and Safety Co-ordinator must:

.1 Have working knowledge of occupational safety and health regulations.

.2 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.

.3 Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan.

.4 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 Emeregency 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 POWDER ACTUATED DEVICES

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

1.18 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

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 Definitions

.1 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade environment aesthetically, culturally and/or historically.

.2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction. Control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.

1.2 References

.1 Canada Wildlife Act

.2 Species at Risk Act

.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.

1.3 Action and Informational Submittals

.1 Prior to commencing construction activities or delivery of materials to site, provide Environmental Protection Plan for review and approval by Departmental Representative.

.2 Ensure Environmental Protection Plan includes comprehensive overview of known or potential environmental issues to be addressed during construction.

.3 Address topics at level of detail commensurate with environmental issue and required construction tasks.

.4 Include in Environmental Protection Plan:
.1 Names of persons responsible for ensuring adherence to Environmental Protection Plan.
.2 Names and qualifications of persons responsible for manifesting hazardous waste to be removed from site.
.3 Names and qualifications of persons responsible for training site personnel.
.4 Descriptions of environmental protection personnel training program.
.5 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.

.6 Spill Control Plan including procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.

.7 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.

.8 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, are contained on project site.

.9 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.

.10 Waste Water Management Plan identifying methods and procedures for management and/or discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in flushing of lines.

.11 Historical, archaeological, cultural, and biological resources and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands.

.12 Pesticide treatment plan to be included and updated, as required.

1.4 Fuel Storage

.1 Storage of fuels on the site must comply with applicable Federal, Provincial, and Municipal requirements.

1.5 Pollution Control

.1 Maintain temporary erosion and pollution control features installed under this Contract.

.2 Control emissions from equipment and plant to local authorities' emission requirements.

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

1.6 Notification

.1 Departmental Representative will notify Contractor in writing of observed noncompliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection plan.

.2 Contractor: after receipt of such notice, inform Departmental

Representative of proposed corrective action and take such action for approval by Departmental Representative.

.1 Do not take action until after receipt of written approval by Departmental Representative.

.3 Departmental Representative will issue stop order of work until satisfactory corrective action has been taken.

.4 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

PART 2 - PRODUCTS

2.1 Not Used

.1 Not Used.

PART 3 - EXECUTION

3.1 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11.

.1 Leave Work area clean at end of each day.

.2 Bury rubbish and waste materials on site where directed after receipt of written approval from Departmental Representative.

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

.4 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11.

.5 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.

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

END OF SECTION

# PART 1 - GENERAL

## 1.1 REFERENCES AND CODES

.1 Perform Work in accordance with National Building Code of Canada (NBC) 2015, National Fire Code of Canada (NFC) 2015 and Ontario Building Code (OBC) 2012, including all amendments up to bid closing date and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply as directed by the Departmental Representative.

.2 Meet or exceed requirements of:

.1 Contract documents.

.2 Specified standards, codes and referenced documents.

## 1.2 HAZARDOUS MATERIAL DISCOVERY

.1 Stop work immediately and notify Departmental Representative if materials which may contain designated substances or PCB's are discovered in course of work.

## 1.3 BUILDING SMOKING ENVIRONMENT

.1 Comply with smoking restrictions.

## 1.4 NATIONAL PARKS ACT

.1 Perform Work in accordance with Canada Wildlife Act and the Species at Risk Act.

## 1.5 RELICS AND ANTIQUITIES

.1 Relics and antiquities, and items of historical or scientific interest such as cornerstones and contents, commemorative plaques, inscribed tables, and similar objects found on site shall remain the property of Environment and Climate Change Canada. Protect such articles and request directives from Departmental Representative.

.2 Should historic objects be uncovered during excavating, stop work immediately and notify the Departmental Representative. Do not resume work until directed to by the Departmental Representative.

## 1.6 IAQ - INDOOR AIR QUALITY

.1 Comply with CSA-Z204-94(R1999), Guideline for Managing Indoor Air Quality in Office Buildings and CSA B651-12(R2017).

## 1.7 ACCESSIBLE DESIGN

.1 Comply with CSA B651-12(R20170, Accessible Design for the Built Environment, unless specified otherwise. In any case of conflict or discrepancy between the building codes and CSA B651, the requirements of CSA B651 shall apply.

1.9 TAXES

.1 Pay applicable Federal, Provincial and Municipal taxes.

1.10 EXAMINATION

.1 Examine existing conditions and determine conditions affecting work.

## 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 ABBREVIATIONS AND ACRONYMS

.1 The abbreviations and acronyms are commonly found in the Project Manual and represent the associated organizations or terms.

## 1.2 MATERIALS, EQUIPMENT AND METHODS

.1 A:
- .1 AB: anchor bolt.
- .2 AC: acoustic.
- .3 AC PAN: acoustic panel.
- .4 ACU: acoustic unit ceiling.
- .5 AFF: above finished floor.
- .6 AC PLAS: acoustic plaster.
- .7 ACT: acoustic tile.
- .8 ACR CU LVR: acrylic cube louvre.
- .9 ADH: adhesive.
- .10 ADJ: adjustable.
- .11 A/C: air conditioner.
- .12 AHU: air handling unit.
- .13 AL: aluminum.
- .14 ANOD: anodized.
- .15 APPROX: approximate.
- .16 ARCH: architecture.
- .17 ARCH BLK: architectural block.
- .18 AVB: air vapour barrier.

.2 B:
- .1 B: base.
- .2 BEAST: benthic assessment of sediment.
- .3 BH: bore hole.
- .4 BHP: brake horse power.
- .5 BL: bottom layer.
- .6 BLK: block.
- .7 BLKD: bulkhead.
- .8 BM: beam.
- .9 BOT: bottom.
- .10 BMP: best management practice.
- .11 B PL: base plate.
- .12 BRG: bearing.
- .13 BRK: brick.
- .14 BSMT: basement.
- .15 BTEX: benzene, toluene, ethylbenzene and xylenes.
- .16 BUR: built-up roof.

.3 C:
- .1 CAL: caliper.
- .2 CANTIL: cantilever.
- .3 CB: catch basin.
- .4 CC: centre to centre.

.5 CCN: contemplated change notice.
.6 CDF: controlled density fill.
.7 CEC: Canadian Electical Code.
.8 CF: chair fabric.
.9 CHAN: channel.
.10 CHS: Canadian hydrographic service.
.11 CJ: construction joint.
.12 CL: centreline.
.13 CK: cork.
.14 CLG: ceiling.
.15 CLR: clear.
.16 COL: column.
.17 CONC: concrete.
.18 CONC BLK: concrete block.
.19 CONC BRK: concrete brick.
.20 CONT: continuous.
.21 CONT J: control joint.
.22 COMPL: complete.
.23 CM: centimetre. (Nursery stock).
.24 CP: circulating pump.
.25 CPL: cement plaster.
.26 CPM: critical path method.
.27 CPT: carpet.
.28 CPTT: carpet tile.
.29 CT: ceramic tile.
.30 CTE: connect to existing.
.31 CV: control valve.
.32 CVT: conductive vinyl tile.
.33 C/W: complete with.

.4 D:
.1 D: deep.
.2 dB: decibels.
.3 DB: dry-bulb.
.4 DD: dutch door.
.5 DEG: degree.
.6 DF: drinking fountain.
.7 DIA: diameter.
.8 DIM: dimension.
.9 DL: dead load.
.10 DMNT: demountable.
.11 DP: dampproofing.
.12 DR: door.
.13 DRP: drapery.
.14 DWL: dowel.

.5 E:
.1 EA: each.
.2 EC: epoxy coating.
.3 ECF: engineered containment facility.
.4 EE: each end.
.5 EF: each face (architectural/structural).
.6 EF: exhaust fan (mechanical/electrical).

.7 EL: elevation.
.8 ELEC: electric.
.9 ELEV: elevator.
.10 EM: expanded metal.
.11 ENCL: enclosure.
.12 EQ: equal.
.13 ET: expansion tank.
.14 EXH: exhaust.
.15 EXIST: existing.
.16 EXPJ: expansion joint.
.17 EXP STRUCT: exposed structure.
.18 EXT: exterior.
.19 EW: each way.
.20 EWT: entering water temperature.

.6 F:
.1 FC: fuel contributed.
.2 FD: floor drain.
.3 FDN: foundation.
.4 FEAT W: feature wall.
.5 FEXT: fire extinguisher.
.6 FH: fire hose.
.7 FHC: fire hose cabinet.
.8 FHR: fire hose rack.
.9 FIN: finish.
.10 FIP: federal identity program.
.11 FL: floor.
.12 FLD: field.
.13 FLUOR: fluorescent.
.14 FR: frame.
.15 FRR: fire resistance rating.
.16 FTG: footing.

.7 G:
.1 GALV: galvanized steel.
.2 GB: grab bar.
.3 GBD: gypsum board.
.4 GC: General Conditions.
.5 GF: ground floor.
.6 GFCI: ground fault circuit interrupter.
.7 GL: glass or glazing.
.8 GL BLK: glass block.
.9 GPC: gypsum plaster ceiling.
.10 GPW: gypsum plaster wall.
.11 GT: glass tile.

.8 H:
.1 HB: hose bib.
.2 HC: hollow core.
.3 HCWD: hollow core wood door.
.4 HD: hand dryer.
.5 HDW: hardware.
.6 HDWD: hardwood.

.7 HEX: heat exchanger.
.8 HM: hollow metal.
.9 HOR: horizontal.
.10 HOR EF: horizontal each face.
.11 HP: hydro pole.
.12 HPA: Hamilton Port Authority.
.13 HR: hour.
.14 HRV: heat recovery ventilator.
.15 HT: height.
.16 HTR: heater.
.17 HUM: humidifier.
.18 HWT: hot water tank.
.19 HYD: hydrant.
.20 HZ: Hertz frequency, cycles per second.

.9 I:
.1 ICF: insulated concrete formwork.
.2 ID: inside diameter.
.3 INS: insulation.
.4 INTLK: interlock.

.10 J:
.1 JT: joint.

.11 K:
.1 KPL: kick plate.

.12 L:
.1 LAT: leaving air temperature.
.2 LAV: lavatory.
.3 LDG: landing.
.4 LG: long.
.5 LINO: linoleum.
.6 LL: live load.
.7 LT: light.
.8 LWT: leaving water temperature.

.13 M:
.1 MAS: masonry.
.2 MAS FL: masonry flashing.
.3 MAX: maximum.
.4 MBG: metal bar grating.
.5 MCL: metal cube louvre.
.6 MECH: mechanical.
.7 MET: metal.
.8 MET DK: metal deck.
.9 MET FL: metal flashing.
.10 MET GRID CLG: metal grid ceiling.
.11 MET GRTG: metal grating.
.12 MET LIN CLG: metal linear ceiling.
.13 MET T PTN: metal toilet partition.
.14 MH: maintenance hole.
.15 MIN: minimum.

.16 MLP: metal lath and plaster.
.17 MO: masonry opening.
.18 MR: marble.
.19 MT: metal threshold.
.20 MWP: membrane waterproofing.

.14 N:
.1 NBC: national building code.
.2 NC: normally closed.
.3 NF: near face.
.4 NFC: national fire code.
.5 NIC: not in contract.
.6 NO: number.
.7 NRC: noise reduction coefficient.
.8 NRP: non removable pin.
.9 NTS: not to scale.

.15 O:
.1 OA: outside air.
.2 OBC: Ontario building code.
.3 OC: on centre.
.4 OD: outside diameter.
.5 OPNG: opening.
.6 OPR: operator.
.7 OVHD: overhead.
.8 OWSJ: open web steel joist.

.16 P:
.1 P: prefinished.
.2 PAH: polynuclear aromatic hydrocarbons.
.3 PARG: parging.
.4 PCC: precast concrete.
.5 PCT: porcelain ceramic tile.
.6 PED ACS FLG: pedestal access flooring.
.7 PF: panel fabric.
.8 PH: phase.
.9 PL: plate.
.10 PLAM: plastic laminate.
.11 PLAS: plaster.
.12 PLYWD: plywood.
.13 PR: pair.
.14 PREFAB: prefabricated.
.15 PREFIN: prefinished.
.16 PRESS: pressure.
.17 PRFL: profile.
.18 PRV: pressure regulating valve.
.19 PT: paint.
.20 PTD: paper towel dispenser.
.21 PTN: partition.
.22 PVC: polyvinyl cholide.

.17 Q:
.1 QTB: quarry tile base.

.2 QTF: quarry tile floor.
.3 QTR: quarry tile roof.

.18 R:
.1 R: radius.
.2 RA: return air.
.3 RAD: return air damper.
.4 RB: resilient base.
.5 RC: reinforced concrete.
.6 RCPT: receptacle.
.7 RD: roof drain.
.8 REINF: reinforced/reinforcing.
.9 REQD: required.
.10 REQT: requirement.
.11 RFT: rubber floor tile.
.12 RM: room.
.13 RO: rough opening.
.14 RP: radiant panel.
.15 RRS: recycled rubber sheet.
.16 RRT: recycled rubber tile.
.17 RSD: rolling steel door.
.18 RSF: rubber sheet flooring.
.19 RT: rubber tile.
.20 RTU: roof top unit.
.21 RWL: rain water leader.

.19 S:
.1 SA: supply air.
.2 SAN SEW: sanitary sewer.
.3 SCHED: schedule.
.4 SC: solid core.
.5 SCRN: screen.
.6 SCWD: solid core wood door.
.7 SD: smoke developed.
.8 SDT: static dissipative tile.
.9 SECT: section.
.10 SH: sill height.
.11 SIM: similar.
.12 SL: sliding.
.13 SLR: sealer.
.14 SPEC: specification.
.15 SS: stainless steel.
.16 STD: standard.
.17 STL: steel.
.18 STL BM: steel beam.
.19 STC: sound tranmission class.
.20 STL FL DK: steel floor deck.
.21 STL PL: steel plate.
.22 STN: stone.
.23 STR: structure or structural.
.24 ST SEW: storm sewer.
.25 S&U: stain and urethane.
.26 S&V: stain and varnish.

.27 SVT: solid vinyl tile.

.20 T:
- .1 T: top.
- .2 T&B: top and bottom.
- .3 TCB: turbidity control plan.
- .4 TEL: telephone.
- .5 TER: terrazzo.
- .6 TERT: terrazzo tile.
- .7 THKNS: thickness.
- .8 THR: threshold.
- .9 TMPD: tempered.
- .10 TOPG: topping.
- .11 TRANSV: transverse.
- .12 TYP: typical.

.21 U:
- .1 U: urethane.
- .2 U/C: undercut.
- .3 UGRD: underground.
- .4 UNO: unless noted otherwise.
- .5 UOS: unless otherwise specified.
- .6 U/S: underside.
- .7 UR: urinal.

.22 V:
- .1 V: volt.
- .2 VCF: vinyl coated fabric.
- .3 VCT: vinyl compositition tile.
- .4 VEL: velocity.
- .5 VERT: vertical.
- .6 VERT B: vertical blinds.
- .7 VERT EF: vertical each face.
- .8 VSF: vinyl sheet flooring.
- .9 VPT: vinyl plank flooring.
- .10 VT: vinyl tile.
- .11 VWC: vinyl wall covering.

.23 W:
- .1 WB: wet-bulb.
- .2 WC: water closet.
- .3 W-C: wall connectors.
- .4 WD: wood.
- .5 WDV: wood veneer.
- .6 WG: water gauge.
- .7 WH: wall hydrant.
- .8 WHMIS: workplace hazardous materials information system.
- .9 WP: waterproofing.
- .10 WR: washroom.
- .11 WSIB: workplace safety and insurnace board.
- .12 WT: weight.
- .13 WTP: water treatment plant.

1.3 STANDARDS ORGANIZATIONS

.1 Standards writing organizations:

.1 AA - Aluminum Association.
.2 ACPA - American Concrete Pipe Association.
.3 ANSI - American National Standards Institute.
.4 ASHRAE - American Society of Heating and Refrigerating and Air-Conditioning Engineers.
.5 ASTM - American Society for Testing and Materials.
.6 AWI/AWMAC - Architectural Woodwork Institute/Architectural Woodwork Manufacturers Association of Canada.
.7 AWPA - American Wood Preservers' Association.
.8 AWWA - American Water Works Association.
.9 BHMA - Builders Hardware Manufacturers Association.
.10 CCDC - Canadian Construction Documents Committee.
.11 CCMPA - Canadian Concrete Masonry Producers Association.
.12 CGSB - Canadian General Standards Board.
.13 CNTA - Canadian Nursery Trades Association.
.14 CPCA - Canadian Painting Contractors Association.
.15 CRCA - Canadian Roofing Contractors Association.
.16 CSA - Canadian Standards Association.
.17 CSC - Construction Specifications Canada.
.18 CSDMA - Canadian Steel Door Manufacturers Association.
.19 CSI - Construction Specifications Institute.
.20 CSSBI - Canadian Sheet Steel Building Institute.
.21 CRCA - Canadian Roofing Contractors Association.
.22 DHI - Door and Hardware Insitute.
.23 EEMAC - Electrical and Electronic Manufacturer's Association of Canada.
.24 ESA - Electrical Safety Authority.
.25 FCC - Fire Commissioner of Canada.
.26 FSC - Forest Stewardship Council.
.27 GANA - Glass Association of North America.
.28 HMMA - Hollow Metal Manufacturers Association.
.29 IEEE - Institute of Electrical and Electronics Engineers Inc.
.30 ISO - International Organization for Standardization.
.31 IWFA - International Window Film Association.
.32 LEED - LEED Canada, Leadership in Energy and Environmental Design.
.33 MPI - Master Painters Insitute.
.34 NAAMM - National Association of Architectural Metal Manufacturers.
.35 NCPI - National Clay Pipe Institute.
.36 NEMA - National Electrical Manufacturers Association.
.37 NFPA - National Fire Protection Association.
.38 OPSD - Ontario Provincial Standard Drawings.
.39 OPSS - Ontario Provincial Standard Specifications.
.40 PPI - Plasctics Pipe Institute.
.41 SDI - Steel Door Intitute.
.42 SCAQMD - South Coast Air Quality Management District.
.43 TIA - Telecommunications Industry Association.
.44 TIAC - Thermal Insulation Association of Canada.
.45 TTMAC - Terrazzo Tile and Marble Association of Canada.
.46 UL - Underwriters Laboratories.
.47 ULC - Underwriters Laboratories of Canada.

.48 US EPA - United States Environmental Protection Agency.
.49 WH - Warnock Hersey.

1.4 FEDERAL GOVERNMENT DEPART- MENTS AND AGENGIES

.1 Departments, agencies and crown corporations.
.1 CEAA - Canadian Environmental Assessment Agency.
.2 CSC - Correctional Service Canada.
.3 CRA - Canada Revenue Agency.
.4 DND - Department of National Defence.
.5 ECCC – Environment and Climate Change Canada.
.6 FHBRO - Federal Heritage Buildings Review Office.
.7 HC - Health Canada.
.8 HCD - Heritage Conservation Directorate.
.9 LC - Labour Canada.
.10 PC - Parks Canada.
.11 PSPC - Public Service Procurement Canada.
.12 PWGSC - Public Works and Government Services Canada.
.13 RCMP - Royal Canadian Mounted Police.
.14 TBS - Treasury Board Secretariat.
.15 TC - Transport Canada.

1.5 PROVINCIAL GOVERNMENT DEPART- MENTS AND AGENGIES

.1 MOECC - Ontario Ministry of Environment and Climate Change.

.2 MOL - Ontario Ministry of Labour.

.3 MTO and MOT - Ontario Ministry of Transportation.

.4 TSSA - Technical Standards and Safety Authority.

1.6 INTERNATIONAL GOVERNMENT DEPART- MENTS AND AGENCIES

.1 DOHMH - New York City Department of Health and Mental Hygiene, USA.

.2 GSA - Government Services Administration, USA.

1.7 UNITS OF MEASURE METRIC

.1 The following abbreviations of units of measure are commonly found in the Project Manual:
.1 C: Celsius.
.2 cm: centimetre.
.3 kg: kilogram.
.4 kg/m$^3$: kilogram per cubic metre.
.5 kN: kilonewton.
.6 kPa: kilopascals.
.7 kw: kilowatts.
.8 l/s: litre per second.
.9 m: metre.
.10 m$^3$: cubic metre.
.11 mg/kg: milligrams per kilogram.

.12 mg/L: milligrams per litre.
.13 mm: millimetres.
.14 MPa: megapascal.
.15 NTU: nephelometric turbidity unit.
.16 ppm: parts per million.
.17 ug/L: micrograms per litre.
.18 ug/$m^3$: micrograms per cubic metre.

1.8 UNITS OF MEASURE IMPERIAL

.1 The following abbreviations of units of measure are commonly found in the Project Manual:
.1 BTU: British thermal units.
.2 CFM: cubic feet per minute.
.3 F: Fahrenheit.
.4 ft: foot/feet.
.5 FPI: fins per inch.
.6 FPM: feet per minute.
.7 ga: gauge.
.8 gpm: gallons per minute.
.9 in: inches.
.10 lbs: pounds.
.11 NTU: nephelometric turbidity unit.
.12 psi: pounds-force per square inch.
.13 PSIG: PSI gauge.
.14 ppm: parts per million.
.15 RPM: revolutions per minute.

1.9 LEED TERMS

.1 Acronyms specific to LEED:
.1 CI: commercial interiors.
.2 EQ: environmental quality.
.3 MR: material and resources.
.4 NC: new construction.

## 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 Inspection

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

1.2 Photographic Record

.1 Due to the isolated location of the site, access by the Departmental Representative to review the work will be limited. Compliance with the requirements of the plans and specifications must be demonstrated with thorough photographic documentation of the work in progress. Record each step of construction including details identified in technical sections.
.2 Submit electronic copy of colour digital photography in .jpg format, fine resolution, organized by date, weekly and as directed by Departmental Representative.
  .1 Photograph quality: well-illuminated, proper exposure, sharply focused, free of glare and motion blur. 4500x3000 pixels, 8 MB minimum file size. Mobile phone photographs are not acceptable.
.3 Project identification: name and number of project and date of exposure indicated.
.4 Number of viewpoints: as required to fully document activity.
.5 Frequency of photographic documentation: daily as directed by Departmental Representative.
  .1 Provide a minimum twenty (20) photographs daily of the progress of work.
  .2 Post photos daily on a server hosted by the Departmental Representative
.6 Failure to provide a complete record of construction will require dismantling of completed work to reveal concealed conditions.

1.3 Access to Work

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

1.4 Procedures

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

1.5 Rejected Work

.1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.
.2 If in opinion of Departmental Representative it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Departmental Representative may deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which will be determined by Departmental Representative.

1.6 Reports

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

1.7 Mock-Ups

.1 Prepare mock-ups for Work specifically requested in specifications. Include for Work of all Sections required to provide mock-ups.
.2 Construct in locations acceptable to Departmental Representative unless otherwise specified in the specific section of the specifications.
.3 Prepare mock-ups for Departmental Representative's review with reasonable promptness and in orderly sequence, to not cause delay in Work.
.4 Failure to prepare mock-ups in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
.5 If requested, Departmental Representative will review and comment on schedule dates for preparation.

.6 Specification section identifies whether mock-up may remain as part of Work or if it is to be removed and when.

1.8 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. Immediately notify Departmental Representative if required Work is such as to make it impractical to produce required results.

.2 Departmental Representative retains the right of refusal if proposed individuals do not meet required experience as determined by the Departmental Representative.

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 SUBMITTALS

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

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 FIRE PROTECTION

.1 Provide and maintain temporary fire protection equipment during performance of Work required by insurance companies having jurisdiction and governing codes, regulations and bylaws.
.2 Burning rubbish and construction waste materials is not permitted on site.

1.4 TEMPORARY POWER AND LIGHT

.1 Limited photovoltaic power is available for use during construction for occasional operating of hand power tools and battery charging, however it is insufficient to perform the work. The Contractor shall provide and pay for connection and disconnection at the end of the project. The Departmental Representative will pay for power consumption.
    .1 Provide power beyond that supplied by Departmental Representative. Pay all associated costs
    .2 Provide temporary power distribution and lighting as required.
    .3 Provide temporary power connections to hook up site trailers.

1.5 TEMPORARY HEATING AND VENTILATION

.1 Provide temporary heating required during construction period, including attendance and maintenance.
.2 Construction heaters used inside building must be flameless type.
.3 Provide temporary heat and ventilation in enclosed areas as required to:
    .1 Facilitate progress of Work.
    .2 Protect Work and products against dampness and cold.
    .3 Prevent moisture condensation on surfaces.
    .4 Provide ambient temperatures and humidity levels for storage, installation and curing of materials.
    .5 Provide adequate ventilation to meet health regulations for safe working environment.
.4 Maintain temperatures in areas where construction is in progress as specified.
.5 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 personnel.
.4 Ventilate storage 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.

.6 Maintain strict supervision of operation of temporary heating and ventilating equipment to:
.1 Conform with applicable codes and standards.
.2 Enforce safe practices.
.3 Prevent abuse of services.
.4 Prevent damage to finishes.

.7 Be responsible for damage to Work due to failure in providing specified heat and protection during construction.

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 S269.2-16, Access Scaffolding for Construction Purposes.
  .2 CAN/CSA-Z321-96(R2006), Signs and Symbols for the Occupational Environment.
  .3 CSA 0121-17, Douglas Fir Plywood
  .4 CSA Z797-09(R2014), Code of Practice for Access Scaffold
  .5 CAN/CSA-Z321-96(R2006), Signs and Symbols for the Occupational Environment, withdrawn but still available from CSA, CCOHS and Techstreet
.2 Province of Ontario.
  .1 Occupational Health and Safety Act, 1990 (Last amendment 2016), R.S.O.
  .2 Ontario Regulation 213/91 - Construction Projects (Last amendment O.Reg.142/17), R.S.O.
  .3 Technical Standards and Safety Act, 2000 (TSSA).

1.2 Submittals

.1 Provide submittals in accordance with Section 01 33 00.
.2 Provide design drawings for scaffolding, signed and sealed by qualified professional engineer licensed to practise in the province of Ontario, where prescribed.
.3 Provide shop drawings of construction yard layout, hoarding and fence details for approval of the Departmental Representative.

1.3 Installation and Removal

.1 Provide construction facilities in order to execute work expeditiously.
.2 Remove from site all such work after use.
.3 Provide site plans indicating hoarding and access points for all phases of construction.

1.4 Hoisting

.1 Provide, operate and maintain hoists and equipment required for moving of workers, materials and equipment. Make financial arrangements with Subcontractors for their use of hoists and equipment.
.2 Hoists and cranes to be TSSA certified and operated by qualified operators.
.3 Provide foundations to support hoisting equipment.
.4 Locate equipment at locations approved by Departmental Representative.
.5 Comply with special safety measures listed under Section 01 35 29.

1.5 Site Storage/Loading

.1 Provide on-site storage facility. Locate materials in a manner to cause least interference with site activities. Provide off-site storage in addition to trailer area designated.

.2 Confine work and operations of employees to the areas prescribed by Contract Documents. Do not unreasonably encumber premises with products.

.1 Move stored products or equipment, which interferes with operations of Departmental Representative or other contractors.

.2 Obtain and pay for use of, off site, additional storage or work areas needed for operations.

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

.4 Do not use roofs as storage areas.

1.6 Offices

.1 Departmental Representative will provide furnished office space for scheduled site meetings. It is not available as a permanent site office

.2 Maintain in clean condition.

1.7 Equipment, Tool and Materials Storage

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

.2 Locate materials not required to be stored in weatherproof sheds on site in manner to cause least interference with work activities.

1.8 Sanitary Facilities and First Aid Facilities

.1 Departmental Representative will provide sanitary facilities for work force in existing outbuilding. Maintain in clean condition. Use of facilities in Vancotte Cottage is not permitted.

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

.3 Provide a clearly marked and fully stocked first-aid case in a readily available location.

1.9 Construction Signage

.1 No signs or advertisements, other than warning signs, are permitted on site.

.2 Signs and notices for safety and instruction in both official languages. Graphic symbols to CAN/CSA-Z321. Locate signs at access points and as required by legislation.

.3 Maintain approved signs and notices in good condition for duration of project, and dispose of off site on completion of project or earlier if directed by Departmental Representative. The contractor to hire his own flagman on a permanent basis.

.4 Submit signage, locations for signage, and material composition of signage for review by the Departmental Representative 15 days in advance of work.

.5 Signage shall be supplied and installed to appropriately manage occupants inside buildings, pedestrians on sidewalks, and vehicular traffic. Any changes to previously approved locations of signage and contents must be presented to the Departmental Representative for approval.

1.10 Protection and Maintenance of Traffic

.1 Provide access and temporary relocated roads as necessary to maintain traffic.

.2 Maintain and protect traffic on affected roads during construction period except as otherwise specifically directed by Departmental Representative.

.3 Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs

.4 Protect travelling public from damage to person and property.

.5 Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic. Limit access to areas indicated.

.6 Verify adequacy of existing roads and allowable load limit on these roads. The Contractor is responsible for repair of damage to roads caused by construction operations.

.7 Construct access and haul roads necessary.

.8 Haul roads: constructed with suitable grades and widths; sharp curves, blind corners, and dangerous cross traffic shall be avoided.

.9 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.

.10 Dust control: adequate to ensure safe operation at all times.

.11 Location, grade, width, and alignment of construction and hauling roads: subject to approval by Departmental Representative.

.12 Remove, upon completion of work, haul roads designated by Departmental Representative.

1.11 Clean-Up

.1 Remove construction debris, waste materials, packaging material from work site daily.

.2 Clean dirt or mud tracked onto paved or surfaced roadways.

.3 Stack stored new or salvaged material not in construction facilities.

1.12 Reinstatement

.1 On completion of the Work, remove from the premises all temporary construction facilities, surplus material, dirt and debris.

.2 Make good any damage caused by the Work and restore the site to the condition which existed prior to commencement of Work.

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 Builders Hardware Manufacturers Association (BHMA):

.1 ANSI/BHMA-A156.1-2013, Butts and Hinges.

.2 ANSI/BHMA-A156.3-2014, Exit Devices.

.3 ANSI/BHMA-A156.4-2013, Door Controls - Closers.

.2 Canadian Steel Door and Frame Manufacturing Association (CSDFMA)

.3 Master Painters Institute (MPI):

.1 MPI Architectural Specification Manual, 2014 (referred to herein as "MPI Manual")

.2 MPI Approved Product List, January 2017 (Referred to herein as "MPI APL").

1.2 Installation and Removal

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

.2 Remove from site all such work after use.

1.3 Hoarding

.1 Provide and maintain temporary fencing with accesses as required.

.2 Provide barriers around trees and plants designated to remain. Protect from damage by equipment and construction procedures.

1.4 Access to Site

.1 Provide and maintain access roads, sidewalk crossings, ramps and construction runways as may be required for access to Work.

1.5 Public Traffic Flow

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

1.6 Fire Routes

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

1.7 Protection for Off-Site and Public Property

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

.2 Prevent damage to and protect landscaping features and vegetation including those at site trailers and laydown storage areas.

.3 Be responsible for damage incurred.

1.8 Protection of Building Finishes

.1 Provide protection for finished and partially finished building finishes and equipment during performance of Work, to approval of

Departmental Representative. Take into account additional protection required to prevent damage due to nature of material. Water stained structural timbers must be replaced.

.2 Provide necessary screens, covers, and hoardings and seals to protect existing wall openings. Remove and reinstall as required. Use materials and methods to prevent contact with adjacent masonry, to approval of Departmental Representative.

.3 Confirm with Departmental Representative locations and installation schedule 3 days prior to installation.

.4 Be responsible for damage incurred due to lack of or improper protection.

.5 Unless otherwise indicated protect building openings with 16 mm thickness Douglas Fir plywood sheathing grade on 38 x 89 wood studs.

1.9 Waste Management and Disposal

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20.

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 facilities.

## 1.2 RELATED SECTIONS

.1 Section 01 45 00 - Quality Control.

## 1.3 REFERENCES

.1 Within text of specifications, reference may be made to reference standards.

.2 Conform to these standards, in whole or in part as specifically requested in specifications.

.3 If there is question as to whether any product or system is in conformance with applicable standards, Departmental Representative reserves right to have such products or systems tested to prove or disprove conformance.

.4 The cost for such testing will be born by Departmental Representative in event of conformance with Contract Documents or by Contractor in event of non-conformance.

.5 Conform to latest date of issue of referenced standards in effect on date of submission of Bids, except where specific date or issue is specifically noted.

.6 OPSS Ontario Provincial Standard Specifications and OPSD Ontario Provincial Standard Drawings quoted in these specifications are available online at http://www.raqsb.mto.gov.on.ca/techpubs/ops.nsf/OPSHomepage.

## 1.4 QUALITY

.1 Products, materials, equipment and articles (referred to as products throughout specifications) 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 Departmental Representative 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.

## 1.5 AVAILABILITY

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

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

## 1.6 METRIC SIZED MATERIALS

.1 SI metric units of measurement are used exclusively on the drawings and in the specifications for this project.

.2 The Contractor is required to provide metric products in the sizes called for in the Contract Documents except where a valid claim can be made that a particular product is not available on the Canadian market.

.3 Claims for exemptions from use of metric sized products shall be in writing and fully substantiated with supportive documentation. Promptly submit application to Departmental Representative for consideration and ruling. Non-metric sized products may not be used unless Contractor's application has been approved in writing by the Departmental Representative.

.4 Difficulties caused by the Contractor's lack of planning and effort to obtain modular metric sized products which are available on the Canadian market will not be considered sufficient reasons for claiming that they cannot be provided.

.5 Claims for additional costs due to provision of specified modular metric sized products will not be considered.

## 1.7 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 Departmental Representative.

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

## 1.8 TRANSPORTATION

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

.2 Transportation cost of products supplied by Departmental Representative will be paid for by Departmental Representative. Unload, handle and store such products.

## 1.9 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 Departmental Representative in writing, of conflicts between specifications and manufacturer's instructions, so that Departmental Representative may establish course of action.

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

## 1.10 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. Immediately notify Departmental Representative if required Work is such as to make it impractical to produce required results.

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

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

## 1.11 CO-ORDINATION

.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.

## 1.12 CONCEALMENT

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

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

## 1.13 REMEDIAL WORK

.1 Refer to Section 01 73 00.

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

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

## 1.14 LOCATION OF FIXTURES

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

.2 Inform Departmental Representative of conflicting installation. Install as directed.

## 1.15 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.

## 1.16 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.

## 1.17 PROTECTION OF WORK IN PROGRESS

.1 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 Departmental Representative.

## 1.18 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 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.

# 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 survey services to measure and stake site.

.2 Survey services to establish and confirm inverts for Work.

.3 Recording of subsurface conditions found.

## 1.2 REFERENCES

.1 Departmental Representative’s identification of existing survey control points and property limits.

## 1.3 QUALIFICATIONS OF SURVEYOR

.1 Qualified registered land surveyor, licensed to practise in Place of Work, acceptable to Departmental Representative.

## 1.4 SURVEY REFERENCE POINTS

.1 Existing base horizontal and vertical control points are designated on drawings.

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

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

.4 Report to Departmental Representative when reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.

.5 Require surveyor to replace control points in accordance with original survey control.

## 1.5 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, fill and topsoil placement and landscaping features.

.4 Stake slopes.

.5 Stake batter boards for foundations.

.6 Establish foundation and floor elevations.

.7 Establish lines and levels for mechanical and electrical work.

## 1.6 EXISTING SERVICES

.1 Before commencing work, establish location and extent of service lines in area of Work and notify Departmental Representative of findings.

## 1.7 LOCATION OF EQUIPMENT AND FIXTURES

.1 Location of equipment, fixtures and outlets indicated or specified are to be considered as approximate.

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

.3 Inform Departmental Representative of impending installation and obtain approval for actual location.

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

## 1.8 RECORDS

.1 Maintain a complete, accurate log of control and survey work as it progresses.

## 1.9 SUBMITTALS

.1 Submit name and address of Surveyor to Departmental Representative.

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

.3 Submit certificate signed by surveyor certifying and noting those elevations and locations of completed Work that conform and do not conform with Contract Documents.

## 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 Submittals

.1 Submittals: in accordance with Section 01 33 00.
.2 Submit written request in advance of cutting or alteration which may affect:
  .1 Structural integrity of elements of project.
  .2 Integrity of weather-exposed or moisture-resistant elements.
  .3 Efficiency, maintenance, or safety of operational elements.
  .4 Visual qualities of sight-exposed elements.
  .5 Work of Departmental Representative or separate contractor.
.3 Include in request:
  .1 Identification of project.
  .2 Location and description of affected Work.
  .3 Statement on necessity for cutting or alteration.
  .4 Description of proposed Work, and products to be used.
  .5 Alternatives to cutting and patching.
  .6 Effect on Work of Departmental Representative or separate contractor.
  .7 Written permission of affected separate contractor.
  .8 Date and time work will be executed.
.4 Submit samples of proposed patch materials to Departmental Representative, for review, prior to undertaking work.

1.2 Submittals - Existing Conditions

.1 Submit documents in accordance with Section 01 33 00.
.2 Provide photographs of surrounding properties, objects and structures liable to be damaged or be the subject of subsequent claims.

1.3 Preparation

.1 Inspect existing conditions, including elements subject to damage or movement during cutting and patching.
.2 After uncovering, inspect conditions affecting performance of Work.
.3 Beginning of cutting or patching means acceptance of existing conditions.
.4 Provide supports to assure structural integrity of surroundings; provide devices and methods to protect other portions of project from damage.

1.4 Execution

.1 Execute cutting, fitting, and patching, including excavation and fill, to complete Work.
.2 Fit several parts together, to integrate with other Work.
.3 Uncover Work to install ill-timed Work.
.4 Remove and replace defective and non-conforming Work.
.5 Remove samples of installed Work for testing.

.6 Provide openings in non-structural elements of Work for penetrations of mechanical and electrical Work.

.7 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.

.8 Employ original installer to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight-exposed surfaces.

.9 Cut rigid materials using masonry saw or core drill. Pneumatic or impact tools not allowed on masonry work without prior approval.

.10 Restore work with new products in accordance with requirements of Contract Documents.

.11 Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

.12 Patch and make good surfaces cut, damaged or disturbed, to Departmental Representative's approval. Match existing material, colour, finish, and texture.

1.5 Waste Management and Disposal

.1 Separate waste materials in accordance with Section 01 74 20.

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 The site is frequented by wild animals at all times. Food, food waste, and food packaging must be stored securely and removed from site daily.

.2 Maintain Work in tidy condition, free from accumulation of waste products and debris, other than that caused by Departmental Representative or other Contractors.

.3 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site.

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

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

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

.7 Provide and use clearly marked separate bins for recycling. Refer to Section 01 74 20.

.8 Remove waste material and debris from site and deposit in waste container at end of each working day.

.8 Dispose of waste materials and debris off site.

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

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

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

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

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

## 1.3 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 Remove waste products and debris other than that caused by Departmental Representative or other Contractors.

.5 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site.

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

.7 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.

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

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

.10 HEPA vacuum clean and dust building interiors, behind grilles, louvres and screens.

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

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

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

.14 Remove dirt and other disfiguration from exterior surfaces.

.15 Clean and sweep roofs, gutters, areaways, and sunken wells.

.16 Sweep and wash clean paved areas.

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

.18 Clean roofs, downspouts, and drainage systems.

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

.20 Remove snow and ice from access to building.

## 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 Text, schedules and procedures for systematic Waste Management Program for construction, deconstruction, demolition, and renovation projects, including:
- .1 Diversion of Materials.
- .2 Waste Audit (WA) - Schedule A.
- .3 Waste Reduction Workplan (WRW) - Schedule B.
- .4 Demolition Waste Audit (DWA) - Schedule C.
- .6 Materials Source Separation Program (MSSP).
- .7 Canadian Governmental Responsibility for the Environment Resources - Schedule E.

## 1.2 DEFINITIONS

.1 Cost/Revenue Analysis Workplan (CRAW): Based on information from WRW, and intended as financial tracking tool for determining economic status of waste management practices.

.2 Demolition Waste Audit (DWA): Relates to actual waste generated from project.

.3 Materials Source Separation Program (MSSP): Consists of series of ongoing activities to separate reusable and recyclable waste material into material categories from other types of waste at point of generation.

.4 Recyclable: Ability of product or material to be recovered at end of its life cycle and re-manufactured into new product for reuse by others.

.5 Recycle: Process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.

.6 Recycling: Process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for purpose of using in altered form. Recycling does not include burning, incinerating, or thermally destroying waste.

.7 Reuse: Repeated use of product in same form but not necessarily for same purpose. Reuse includes:
- .1 Salvaging reusable materials from re-modelling projects, before demolition stage, for resale, reuse on current project or for storage for use on future projects.
- .2 Returning reusable items including pallets or unused products to vendors.

.8 Salvage: Removal of structural and non-structural materials from

deconstruction/disassembly projects for purpose of reuse or recycling.

.9 Separate Condition: Refers to waste sorted into individual types.

.10 Source Separation: Acts of keeping different types of waste materials separate beginning from first time they became waste.

.11 Waste Audit (WA): Detailed inventory of materials in building. Involves quantifying by volume/weight amounts of materials and wastes generated during construction, demolition, deconstruction, or renovation project. Indicates quantities of reuse, recycling and landfill. Refer to Schedule A. Target for this project is 95% diversion from landfill.

.12 Waste Management Coordinator (WMC) : Contractor representative responsible for supervising waste management activities as well as coordinating related, required submittal and reporting requirements.

.13 Waste Reduction Workplan (WRW): Written report which addresses opportunities for reduction, reuse, or recycling of materials. Refer to Schedule B. WRW is based on information acquired from WA (Schedule A).

## 1.3 DOCUMENTS

.1 Maintain at job site, one copy of following documents:
.1 Waste Audit.
.2 Waste Reduction Workplan.
.3 Material Source Separation Plan.
.4 Schedules A, B, D, and E completed for project.

## 1.4 SUBMITTALS

.1 Submittals in accordance with Section 01 33 00.

.2 Prepare and submit following prior to project start-up:
.1 Submit 2 copies of completed Waste Audit (WA): Schedule A.
.2 Submit 2 copies of completed Waste Reduction Workplan (WRW): Schedule B.
.5 Submit 2 copies of Materials Source Separation Program (MSSP) description.

.3 Submit before final payment summary of waste materials salvaged for reuse, recycling or disposal by project using deconstruction/disassembly material audit form.
.1 Failure to submit could result in hold back of final payment.
.2 Provide receipts, scale tickets, waybills, and show quantities and types of materials reused, recycled, co-mingled and separated off-site or disposed of.
.3 For each material reused, sold or recycled from project, include

amount in tonnes quantities by number, type and size of items and the destination.
.4 For each material land filled or incinerated from project, include amount in tonnes of material and identity of landfill, incinerator or transfer station.

## 1.6 WASTE AUDIT (WA)

.1 Conduct WA prior to project start-up.

.2 Prepare WA: Schedule A.

.3 Record, on WA - Schedule A, extent to which materials or products used consist of recycled or reused materials or products.

## 1.7 WASTE REDUCTION WORKPLAN (WRW)

.1 Prepare WRW prior to project start-up.

.2 WRW should include but not limited to:
.1 Destination of materials listed.
.2 Deconstruction/disassembly techniques and sequencing.
.3 Schedule for deconstruction/disassembly.
.4 Location.
.5 Security.
.6 Protection.
.7 Clear labelling of storage areas.
.8 Details on materials handling and removal procedures.
.9 Quantities for materials to be salvaged for reuse or recycled and materials sent to landfill.

.3 Structure WRW to prioritize actions and follow 3R's hierarchy, with Reduction as first priority, followed by Reuse, then Recycle.

.4 Describe management of waste.

.5 Identify opportunities for reduction, reuse, and recycling of materials. Based on information acquired from WA.

.6 Post WRW or summary where workers at site are able to review content.

.7 Set realistic goals for waste reduction, recognize existing barriers and develop strategies to overcome these barriers.

.8 Monitor and report on waste reduction by documenting total volume and cost of actual waste removed from project.

## 1.10 MATERIALS SOURCE SEPARATION PROGRAM (MSSP)

.1 Prepare MSSP and have ready for use prior to project start-up.

.2 Implement MSSP for waste generated on project in compliance with

approved methods and as reviewed by Departmental Representative.

.3 Provide on-site facilities for collection, handling, and storage of anticipated quantities of reusable and recyclable materials.

.4 Provide containers to deposit reusable and recyclable materials.

.5 Locate containers in locations, to facilitate deposit of materials without hindering daily operations.

.6 Locate separated materials in areas which minimize material damage.

.7 Collect, handle, store on-site, and transport off-site, salvaged materials in separate condition.
.1 Transport to approved and authorized recycling facility or to users of material for recycling.

.8 Collect, handle, store on-site, and transport off-site, salvaged materials in combined condition.
.1 Ship materials to site operating under Certificate of Approval premises of Departmental Representative.
.2 Materials must be immediately separated into required categories for reuse or recycling.

## 1.11 WASTE PROCESSING SITES

.1 Province of: Ontario.
.1 Name: Ontario Ministry of Environment and Climate Change, 135 St. Clair Avenue West, Toronto, ON, M4V 1PS.
.2 Telephone: 800-565-4923 or 416-325-4000.
.3 Fax: 416-314-6713.

.2 Recycling Council of Ontario: 55 University Avenue, Toronto, ON, M5J 2H7.
.1 Telephone: 888-501-9637.
.2 Email: rco@rco.on.ca.
.3 Internet: http://www.rco.on.ca/.

## 1.12 STORAGE, HANDLING AND PROTECTION

.1 Store, materials to be reused, recycled and salvaged in locations as directed by Departmental Representative.

.2 Unless specified otherwise, materials for removal become Contractor's property.

.3 Protect, stockpile, store and catalogue salvaged items.

.4 Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facility.

.5 Protect structural components not removed for demolition from

movement or damage.

.6 Support affected structures. If safety of building is endangered, cease operations and immediately notify Departmental Representative.

.7 Protect surface drainage, mechanical and electrical from damage and blockage.

.8 Separate and store materials produced during dismantling of structures in designated areas.

.9 Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated facilities.
.1 On-site source separation is recommended.
.2 Remove co-mingled materials to off-site processing facility for separation.
.3 Provide waybills for separated materials.

## 1.13 DISPOSAL OF WASTES

.1 Do not bury rubbish or waste materials.

.2 Do not dispose of waste, volatile materials, mineral spirits, oil, paint thinner, into waterways, storm, or sanitary sewers.

.3 Keep records of construction waste including:
.1 Number and size of bins.
.2 Waste type of each bin.
.3 Total tonnage generated.
.4 Tonnage reused or recycled.
.5 Reused or recycled waste destination.

.4 Remove materials from deconstruction as deconstruction/disassembly Work progresses.

.5 Prepare project summary to verify destination and quantities on a material-by-material basis as identified in pre-demolition material audit.

## 1.14 USE OF SITE AND FACILITIES

.1 Execute work with least possible interference or disturbance to normal use of premises.

## 1.15 SCHEDULING

.1 Coordinate Work with other activities at site to ensure timely and orderly progress of Work.

## PART 2 - PRODUCTS

### 2.1 NOT USED

.1 Not Used.

## PART 3 - EXECUTION

### 3.1 APPLICATION

.1 Do Work in compliance with WRW.

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

### 3.2 CLEANING

.1 Remove tools and waste materials on completion of Work, and leave work area in clean and orderly condition.

.2 Clean-up work area as work progresses.

.3 Source separate materials to be reused/recycled into specified sort areas.

### 3.3 DIVERSION OF MATERIALS

.1 From following list, separate materials from general waste stream and stockpile in separate piles or containers, as reviewed by Departmental Representative, and consistent with applicable fire regulations.
- .1 Mark containers or stockpile areas.
- .2 Provide instruction on disposal practices.

.2 On-site sale of salvaged, recovered, reusable and recyclable materials is not permitted.

.3 Demolition Waste

| Material Type | Recommended Diversion | Actual Diversion % |
|---|---|---|
| Metals | 100 | |
| Rubble | 100 | |
| Wood (uncontaminated) | 100 | |
| Other | | |

.4 Construction Waste

| Material Type | Recommended Diversion | Actual Diversion % |
|---|---|---|
| Cardboard | 100 | |
| Plastic Packaging | 100 | |
| Rubble | 100 | |
| Steel | 100 | |

Wood (uncontaminated) 100
Other

## 3.4 WASTE AUDIT (WA)

.1 The following pertains to Schedule A - Waste Audit (WA). Column-1 refers to the category of waste, and a physical description of the material (eg. off-cuts, clean drywall, etc.). Column-2 refers to the total quantity of materials received by the Contractor. Measurement units must be specified. Column-3 refers to the estimated percentage of material that is waste. Column-4 refers to the total quantity of waste (column-2 x column-3). Column-5 refers to the areas(s) in which the waste was generated. Column-6 refers to the total percentage of recycled material from the specified total quantity of waste (column-4). Column-7 refers to the total percentage of reused material from the specified total quantity of waste (column-4).

.2 Schedule A - Waste Audit (WA)

| 1 Material Category | 2 Material Quantity | 3 Estimated Waste % | 4 Total Quantity Of Waste | 5 Generation Point | 6 % Recycled | 7 %Reused |
|---|---|---|---|---|---|---|
| Wood and Plastics | | | | | | |
| Off-cuts | | | | | | |
| Forms | | | | | | |
| Packaging | | | | | | |
| Pallets | | | | | | |
| Metals | | | | | | |
| Roofing | | | | | | |
| Glass | | | | | | |
| Other | | | | | | |

## 3.5 WASTE REDUCTION WORKPLAN (WRW)

.1 The following pertains to Schedule B - Waste Reduction Workplan (WRW). Column-1 refers to the category and type of waste materials. Column-2 refers to the persons responsible for completing the WRW. Column-3 refers to Column-4 of Schedule A. Column-4 refers to the amount of reused waste predicted and realized. Column-5 refers to the amount of recycled waste predicted and realized. Column-6 refers to the approved recycling facility.

.2 Schedule B

| 1 Material Category | 2 Person Responsible | 3 Total Quantity Of Waste | 4 Reused amount | 5 Recycled Amount | 6 Material Destination |
|---|---|---|---|---|---|
| Wood and Plastics | | | | | |
| Off-cuts | | | | | |
| Forms | | | | | |
| Packaging | | | | | |
| Pallets | | | | | |
| Metals | | | | | |
| Roofing | | | | | |
| Glass | | | | | |
| Other | | | | | |

## 3.8 CANADIAN GOVERNMENTAL DEPARTMENTS CHIEF RESPONSIBILITY FOR THE ENVIRONMENT

.1 Schedule E - Government Chief Responsibility

.1 Ministry of Environment and Climate Change, 135 St. Clair Avenue West, Toronto,ON M4V 1P5. Telephone 1-800-565-4923, 416-325-4000.

## 3.9 CONSTRUCTION & DEMOLITION WASTE

.1 Carefully deconstruct and source separate materials/equipment and

divert from D&C waste destined for landfill to maximum extent possible. Reuse, recycle or sell material off site for reuse except where indicated otherwise. On site sales are not permitted.

.2 For construction and demolition projects, even for those not over 2,000 m2 total floor area, 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 Brick 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 or recycled.

.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.

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 Prepare instructions and data using personnel experienced in maintenance and operation of described products.

.2 Copy will be returned after final inspection, with Departmental Representative's comments.

.3 Revise content of documents as required prior to final submittal.

.4 Two weeks prior to Substantial Performance of the Work, submit to the Departmental Representative, four final copies of maintenance manuals and commissioning documentation in English and French and one electronic copy.

.5 Ensure spare parts, maintenance materials and special tools provided are new, undamaged or defective, and of same quality and manufacture as products provided in Work.

.6 If requested, furnish evidence as to type, source and quality of products provided.

.7 Defective products will be rejected, regardless of previous inspections. Replace products at own expense.

.8 Pay costs of transportation.

## 1.3 FORMAT

.1 Organize data in the form of an 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 systems, process flow, under Section numbers and sequence of Table of Contents.

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

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

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

.9 Provide 1:1 scaled CAD files in dwg format. Forward pdf, NMSEdit Professional spp, MS Word, MS Excel, MS Project and Autocad dwg files on USB compatible with PWGSC encryption requirements or through email or alternate electronic file sharing service such as ftp, as directed by Departmental Representative.

## 1.4 CONTENTS - EACH VOLUME

.1 Table of Contents: provide title of project;
.1 Date of submission; names,
.2 Addresses, and telephone numbers of Contractor with name of responsible parties;
.3 Schedule of products and systems, indexed to content of volume.

.1 For each product or system:
.1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.

.2 Product Data: mark each sheet to clearly identify specific products and component parts, and data applicable to installation; delete inapplicable information.

.3 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.

.4 Typewritten Text: as required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00.

## 1.5 AS-BUILTS AND SAMPLES

.1 Maintain at the site for Departmental Representative one record copy

of:
.1 Contract Drawings.
.2 Specifications.
.3 Amendments and addenda.
.4 Change Orders and other modifications to the Contract.
.5 Reviewed shop drawings, product data, and samples.
.6 Field test records.
.7 Inspection certificates.
.8 Manufacturer's certificates.

.2 Store record documents and samples in field office apart from documents used for construction. Provide files, racks, and secure storage.

.3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual. 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 and samples available for inspection by Departmental Representative.

.6 Turn one set, paper copy and electronic copy, of AS-BUILT drawings and specifications over to Departmental Representative on completion of work. Submit files on USB compatible with PWGSC encryption requirements or through email or alternate electronic file sharing service such as ftp, as directed by Departmental Representative.

.7 If project is completed without significant deviations from Contract drawings and specifications submit to Departmental Representative one set of drawings and specifications marked "AS-BUILT".

## 1.6 RECORDING ACTUAL SITE CONDITIONS

.1 Record information on set of black line opaque drawings, and in copy of Project Manual, provided by Departmental Representative.

.2 Provide felt tip marking pens, maintaining separate colours for each major system, for recording information.

.3 Record information concurrently with construction progress. Do not conceal Work until required information is recorded.

.4 Contract Drawings and shop drawings: legibly mark each item to record actual construction, including:
.1 Measured depths of elements of foundation in relation to finish first floor datum.
.2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
.3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.

.4 Field changes of dimension and detail.
.5 Changes made by change orders.
.6 Details not on original Contract Drawings.
.7 References to related shop drawings and modifications.

.5 Specifications: legibly mark each item to record actual construction, including:
.1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
.2 Changes made by Amendments and change orders.

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

## 1.7 FINAL SURVEY

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

## 1.8 EQUIPMENT AND SYSTEMS

.1 Each Item of Equipment and Each System: include description of unit or system, and component parts. Give function, normal operation characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.

.2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.

.3 Include installed colour coded wiring diagrams.

.4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

.5 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

.6 Provide servicing and lubrication schedule, and list of lubricants required.

.7 Include manufacturer's printed operation and maintenance instructions.

.8 Include sequence of operation by controls manufacturer.

.9 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

.10 Provide installed control diagrams by controls manufacturer.

.11 Provide Contractor's coordination drawings, with installed colour coded piping diagrams.

.12 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

.13 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

.14 Include test and balancing reports as specified in Section 01 45 00.

.15 Additional requirements: As specified in individual specification sections.

## 1.9 MATERIALS AND FINISHES

.1 Building Products, Applied Materials, and Finishes: include product data, with catalogue number, size, composition, and colour and texture designations. Provide information for re-ordering custom manufactured products.

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

.3 Moisture-protection and Weather-exposed Products: include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

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

## 1.10 SPARE PARTS

.1 Provide spare parts, in quantities specified in individual specification sections.

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

.3 Deliver to site; place and store.

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

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

## 1.11 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 Deliver to site; place and store.

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

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

## 1.12 STORAGE, HANDLING AND PROTECTION

.1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.

.2 Store in original and undamaged condition with manufacturer's seal and labels intact.

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

.4 Store paints and freezable materials in a heated and ventilated room.

.5 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.

## 1.13 WARRANTIES AND BONDS

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

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

.3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of 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 Certificate 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 bonds until time specified for submittal.

## PART 2 - PRODUCTS

### 2.1 NOT USED

.1 Not Used.

## PART 3 - EXECUTION

### 3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 **General**

## *1.1* RELATED SECTIONS

.1 Section 03 20 00 Concrete Reinforcing

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

.3 Section 03 35 05 Concrete Finishing

## *1.2* REFERENCES

.1 Canadian Standards Association (CSA)

- .1 CSA-A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction.
- .2 CSA-O86.1-14, Engineering Design in Wood (Limit States Design).
- .3 CSA O121-17 Douglas Fir Plywood.
- .4 CSA O151-17, Canadian Softwood Plywood.
- .5 CAN3-O188.0-17, Standard Test Methods for Mat-Formed Wood Particleboards and Waferboard.
- .6 CSA O437 Series-93 (R2006), Standards for OSB and Waferboard.
- .7 CSA S269.1-16 Falsework and Formwork.

.2 ULC

- .1 ULC-S701-11 Standard for Thermal Insulation, Polystyrene, Boards, and Pipe Covering

.3 Council of Forest Industries of British Columbia (COFI)

1. COFI Exterior Plywood for Concrete Formwork.

.4 ACI

1. ACI 302.1R.96 Guide for Concrete Floor and Slab Construction.

## *1.3* SHOP DRAWINGS

.1 Submit shop drawings for formwork and falsework in accordance with Division 1.

.2 Indicate method and schedule of construction, shoring, stripping and re-shoring procedures, materials, arrangement of joints, special architectural exposed finishes, ties, liners, water stops, dovetail anchor slots, and locations of temporary embedded parts. Show size of tie hole, plastic plug, and plug recess. Comply with CSA S269.1.

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

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

.5 Each shop drawing submission shall bear stamp and signature of qualified professional Departmental Representative registered or licensed in Province of Ontario, Canada.

.6 Assume full responsibility for complete design and engineering of formwork including shoring and bracing to resist loads due to wet concrete, forms, wind and other forces arising from use of equipment to place concrete.

### *1.4* DELIVERY, STORAGE AND HANDLING

.1 Store materials on site in a manner to prevent damage thereto. Protect from weather. Comply with CSA A23.1/A23.2, Clause 9.

.2 Protect work of this Section from damage. Protect other work from damage resulting from this work. Replace damaged work which cannot be satisfactorily repaired.

## PART 2 Products

### *2.1* MATERIALS

.1 Formwork materials:

1. For concrete without special architectural features, use wood and wood product formwork materials to CSA-O121 and CSA-O86.1.

.2 Form ties:

1. For concrete not designated 'Architectural', use removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25mm dia. in concrete surface.

.3 For Architectural concrete:

1. Form Ties: Threaded internal disconnecting, spreader type, adjustable in length. Ties to have maximum breakback of 40mm from concrete surface. Ensure ties incorporate removable tapered plastic spreader cones, with setback of 40mm. Ensure taper of spreader matches taper of tie hole plugs. Wire ties not permitted.
2. Tie Hole Plugs: Plastic set back plugs, grey to match concrete, 40mm setback, to fit tightly into tie holes. Include for tie hole plug quantity on basis of 762mm each way plug spacing pattern.

.4 Form liner:

1. Plywood: Douglas Fir to CSA O121 T and G.

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

.6 Form stripping agent: colourless mineral oil, non-toxic, biodegradable, low VOC, free of kerosene, with viscosity between 20 to 25mm2 at 40°C, flashpoint minimum 150°C, open cup.

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

.8 Sealant: to Division 7.

.9 Waterstops: Extrusions of plasticized PVC low temperature compound to sizes and shapes indicated on drawings.

.10 Dovetail Anchors and Slots: Minimum 0.6mm overall thickness zinc coating Z275 galvanized steel dovetail anchor slots with fillers to prevent entry of concrete during placing and minimum 1.9mm overall thickness. Zinc coating Z275 galvanized steel dovetail anchors. Anchors shall project to within 19mm of masonry face.

.11 Mechanical Fasteners: Galvanized steel screw and washer with screw of length to secure insulation to formwork without penetrating concrete finish surface.

.12 Formwork Insulation: Extruded, expanded polystyrene, CAN/ULC-S701, Type 4, minimum RSI (R) value of 5.0 per 25mm, compressive strength (min 100psi), and thickness as indicated on Drawings.

## PART 3 **Execution**

### 3.1 **FABRICATION AND ERECTION**

.1 Verify lines, levels and column centres before proceeding with formwork and ensure dimensions agree with drawings. Verify the locations of all inserts, anchor bolts, cast-ins, etc. with structural, architectural, mechanical, electrical, and shop drawings prior to proceeding with formwork. Report any discrepancies to Departmental Representative immediately. Verify levels, location, dimensions and condition of existing work;

.1 Construct forms to produce plumb and level concrete and true to linear building lines. Maximum variations (not accumulative) as follows:

.2 Variation from plumb in concrete surfaces not to exceed 6mm in 3m nor 9mm in 6m or more.

.3 Variation from level or grade indicated on Drawings for tops of walls not to exceed 6mm in 3m nor 9mm in 6m in building length.

.4 Variation of linear building lines from established position in plan and related positions of walls not to exceed 6mm in 3m, 9mm in 1 bay nor 25mm in building length.

.5 Variation of concrete slabs and toppings from dead level or slopes as indicated on Drawings not to exceed 3.2mm in 3m.

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

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

.4 Fabricate and erect falsework in accordance with CSA S269.1 and COFI Exterior Plywood for Concrete Formwork.

.5 Refer to architectural drawings for concrete members requiring architectural exposed finishes.

.6 Do not place shores and mud sills on frozen ground.

.7 Provide site drainage to prevent washout of soil supporting mud sills and shores.

.8 Fabricate and erect formwork in accordance with CSA-S269.3 to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CSA-A23.1/A23.2.

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

.10 Locate horizontal form joints for exposed columns 2.4m above finished floor elevation.

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

.12 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated.

.13 Construct forms for architectural concrete to achieve the following:

2. Water-tight forms at corners, panel joints, recesses, arises and at construction joints.
3. Accurate alignment of concrete surfaces.
4. Surfaces without indentations other than those indicated.
5. Sharp and straight corners (unless other wise indicated.

.14 Build in anchors, sleeves, ties, bolts, nailers, templates, shelf angles and other inserts required to accommodate Work specified in other sections. Assure that all anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.

.15 Clean formwork in accordance with CSA-A23.1/A23.2, before placing concrete.

.16 If slip forming and flying forms are used, submit details of equipment and procedures for Departmental Representative's approval.

.17 Use full size contact form sheeting panels wherever possible. Install contact surfaces of formwork to produce neat and symmetrical joint patterns. Ensure joints are vertical or horizontal and, where possible, stagger to maintain structural continuity. Back vertical joints solidly and nail edges of abutting sheets to same stud. Likewise solidly back horizontal joints. Ensure adjacent form panels fit accurately, tight and flush. Use straightest available lumber.

.18 Align forms to ensure no visible defects appear on finished work.

.19 Locate wall form ties in accordance with reviewed shop drawings; align on a particular member both vertically and horizontally. Arrange reuse of form so tie holes are also reused. Tighten form ties, particularly at corners.

.20 Form slab soffits using full size panels where possible. Keep number of smaller size panels to minimum.

.21 Take particular care in forming corners and openings. Ensure formwork is tight and braced so no movement occurs.

.22 Use templates to secure and align anchor bolts in formwork prior to placement of the concrete. Report any interference with reinforcing or other inserts to Departmental Representative prior to the placement of the concrete. Concrete should not be placed until interference issues are resolved in writing by the Departmental Representative.

.23 For walls and shear walls, leave one side of form open for review of reinforcing steel. Close form only after Departmental Representative has reviewed bar placement.

## 3.2 **REMOVAL AND RESHORING**

.1 Leave formwork in place for following minimum periods of time after placing concrete. Proposed removal times to be approved by Departmental Representative in writing prior to work.

1. 3 days for walls and sides of beams.
2. 3 days for columns.
3. 28 days for beam soffits, slabs, decks and other structural members, or 3 days when replaced immediately with adequate shoring to standard specified for falsework, and when concrete has reached at least 75% of specified 28 day strength.
4. 3 days for footings and abutments.

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

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

.4 Space reshoring in each principal direction at not more than 3m apart.

.5 Re-use formwork and falsework subject to requirements of CSA-A23.1/A23.2.

.6 Strip fibre forms off architectural concrete 2 Days after placing, using power operated saw. To strip form, set power saw blade slightly less than thickness of the form, make 2 vertical cuts and remove form. Then, using broad bladed tool, carefully pry form off with short strokes by pushing handle toward column. Exercise care so not to mar concrete surface. After stripping, replace form halves on column and wire in place to protect column during construction. Leave around columns until after scaffolding and other formwork have been removed at end of construction to ensure column protection.

.7 Be responsible for safety of structure, both before and after removal of forms until concrete has reached its specified 28 Day compressive strength.

.8 Take particular care when removing forms to ensure no damage occurs at corners, arises and the like.

.9 To help avoid colour variations in architectural concrete, ensure length of time between concrete placing and form removal is approximately same for each portion of work.

.10 In hot weather, wood forms remaining in place should not be considered adequate for curing but should be removed or loosened so concrete surfaces may be kept moist or coated with curing agent.

.11 In cold weather, defer removal of formwork or insulate formwork, to avoid thermal shock and consequent cracking of concrete surface.

.12 Install tie hole plugs immediately following removal of spreader cones. Install to a snug fit, maximum setback from concrete surface as specified.

.13 When concrete is dry, install temporary polyethylene rope in reglets to prevent contamination of same.

## 3.3 **CONSTRUCTION JOINTS**

.1 Form construction joints where required and where indicated. Construction joints shall conform to CSA-A23.1/A23.2, Clause 20.

.2 Form 50mm x 100mm beveled shear keys full length on construction joints, unless detailed otherwise.

END OF SECTION

PART 1 **General**

## *1.1* RELATED SECTIONS

.1 Section 03 10 00 Concrete Formwork

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

.3 Section 03 35 05 Concrete Finishing

## *1.2* REFERENCES

.1 American Concrete Institute (ACI)

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

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

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

.3 American Society for Testing and Materials (ASTM) COFI Exterior Plywood for Concrete Formwork.

.1 ASTM A775/A775M-17, Specification for Epoxy-Coated Reinforcing Steel Bars.

.4 Canadian Standards Association (CSA)

.1 CSA A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction.

.2 CSA A23.3-14, Design of Concrete Structures for Buildings.

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

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

.5 CSA G30.15-M1983(R1998), Welded Deformed Steel Wire Fabric for Concrete Reinforcement.

.6 CSA G30.18-09(R2014), Billet-Steel Bars for Concrete Reinforcement.

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

.8 CSA W186-M1990(R2016), Welding of Reinforcing Bars in Reinforced Concrete Construction.

## *1.3* SHOP DRAWINGS

.1 Submit shop drawings including placing of reinforcement in accordance with Division 1.

.2 Indicate on shop drawings, bar bending details, lists, quantities

of reinforcement, sizes, spacings, locations of reinforcement and mechanical splices if approved by Departmental Representative, with identifying code marks to permit correct placement without reference to structural drawings. Indicate sizes, spacings and locations of chairs, spacers and hangers. Prepare reinforcement drawings in accordance with Reinforcing Steel Manual of Standard Practice - by Reinforcing Steel Institute of Canada.

.3 Detail lap lengths and bar development lengths to CSA-A23.3, unless otherwise indicated. Provide type C tension lap splices unless otherwise indicated.

.4 Show walls and beams in full elevation and indicate bar size, spacing, laps, bends, etc.

.5 Show slab reinforcing full length on drawings.

.6 Detail placement of reinforcing where special conditions occur.

### *1.4* DELIVERY, STORAGE AND HANDLING

.1 Store materials on site in a manner to prevent damage thereto. Protect from weather. Comply with CSA A23.1, Clause 9.

.2 Protect work of this Section from damage. Protect other work from damage resulting from this work. Replace damaged work which cannot be satisfactorily repaired.

.3 Handle, transport and install epoxy coated reinforcing steel bars carefully to avoid damage thereto. Conform to OPSS 1442, Clause 1442.07.03.

## PART 2 Products

### *2.1* MATERIALS

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

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

.3 Deformed steel wire for concrete reinforcement: to CSA G30.15.

.4 Welded steel wire fabric: to CSA G30.5. Provide in flat sheets only.

.5 Epoxy coating of non-prestressed reinforcement: to ASTM A775/A775M.

.6 Chairs, bolsters, bar supports, spacers: to CSA-A23.1/A23.2. To be adequate for strength and support of reinforcing construction required. Use chairs with plastic coated feet where slab and beam soffits will be exposed.

.7 Mechanical splices: subject to approval of Departmental Representative not permitted.

.8 Plain round bars: to CAN/CSA-G40.20/G40.21.

## *2.2* FABRICATION

.1 Fabricate reinforcing steel in accordance with CSA-A23.1/A23.2, ANSI/ACI 315, and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada, unless indicated otherwise.

.2 Obtain Departmental Representative's approval for locations of reinforcement splices other than those shown on placing drawings.

.3 Upon approval of Departmental Representative weld reinforcement in accordance with CSA W186.

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

## *2.3* SOURCE QUALITY CONTROL

.1 Provide Departmental Representative with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, minimum 4 weeks prior to commencing reinforcing work.

.2 Inform Departmental Representative of proposed source of material to be supplied.

# PART 3 Products

## *3.3* FIELD BENDING

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

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

.3 Replace bars which develop cracks or splits.

## *3.4* PLACING REINFORCEMENT

.1 Place reinforcement in accordance with reviewed shop drawings and in accordance with CSA A23.1/A23.2. Support with chairs, bolsters, bar supports or spacers in as close spacing as possible to prevent displacement of reinforcement from intended bar position, before and during placing of concrete. Pieces of block, wood, and/or similar items, are not acceptable as chairs and spacers.

Maximum chair spacing:

10M – 600mm

15M – 1200mm

20M – 1600mm

25M – 2000mm

.2 Use plain round bars as slip dowels in concrete. Paint portion of dowel intended to move within hardened concrete with one coat of asphalt paint. When paint is dry, apply a thick even film of mineral lubricating grease.

.3 Prior to placing concrete, obtain Departmental Representative's review of reinforcing material and placement. Provide minimum 24 hours' notice prior to concrete placement for review.

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

.5 Protect epoxy coated portions of bars with covering during transportation and handling. Repair in accordance with ASTM A775/A775M.

.6 Lap wire mesh sections at least 152mm and wire tighter securely; discontinue wire mesh at joints.

.7 Clean reinforcing before placing concrete.

.8 Ensure welded wire fabric is lifted to centre of slab (or where indicated) during concrete placing.

## *3.5* FIELD TOUCH-UP

.1 Touch up damaged and cut ends of epoxy coated reinforcing steel with compatible finish to provide continuous coating.

## *3.6* FIELD QUALITLY CONTROL

.1 Independent inspection and testing company may be appointed and paid for by Departmental Representative to conduct mill tests – physical and chemical analysis of reinforcing steel supplied. Refer to Division 1.

.2 Cooperate with and assist inspection and testing company's personnel during inspection and tests.

.3 defective materials and complete work which fails tests and replace as directed by Departmental Representative.

END OF SECTION

PART 1 General

## *1.1* RELATED SECTIONS

.1 Section 03 10 00 Concrete Formwork

.2 Section 03 20 00 Concrete Reinforcing

.3 Section 03 35 05 Concrete Finishing

## *1.2* REFERENCES

.1 Canadian Standards Association (CSA)

.1 CAN/CSA-A3000-13, Cementitious Materials Compendium

.2 CSA A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction.

.3 CSA A23.3-14, Design of Concrete Structures for Buildings.

.2 American Society for Testing and Materials (ASTM)

.1 ASTM C109/C109M-13, Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 50-mm Cube Specimens).

.2 ASTM C260-10A, Specification for Air-Entraining Admixtures for Concrete.

.3 ASTM C494/C494M-17, Specification for Chemical Admixtures for Concrete.

.3 ULC

.1 ULC-S701-11 Standard for Thermal Insulation, Polystyrene, Boards, and Pipe Covering.

## *1.3* SAMPLES

.1 Submit samples in accordance with Division 1.

.2 At least 4 weeks prior to commencing work, inform Departmental Representative of proposed source of aggregates and provide access for sampling.

## *1.4* CERTIFICATES

.1 Submit certificates in accordance with Division 1.

.2 Minimum 4 weeks prior to starting concrete work submit to Departmental Representative manufacturer's test data and certification by qualified independent inspection and testing laboratory that following materials will meet specified requirements:

.1 Portland cement.

.2 Blended hydraulic cement.

.3 Supplementary cementing materials.

.4 Grout.

.5 Admixtures.

.6 Aggregates.

.7 Water.

.8 Waterstops.

.9 Waterstop joints.

.10 Joint filler.

.11 Bonding agent

.12 Curing compound

.13 Column anchor bolts

.14 Sealant

.15 Specified admixtures

.3 Provide certification that mix proportions selected will produce concrete of quality, yield and strength as specified in concrete mixes, and will comply with CSA A23.1/A23.2.

.4 Provide certification that plant, equipment, and materials to be used in concrete comply with requirements of CSA A23.1/A23.2.

.5 Anchor Bolt Setting Diagrams: Submit detailed drawings for anchor bolt setting.

.6 Records: Keep a written record of concrete pours, showing location, date, cubic yards or metres of concrete including signed trip ticket for each truck, ambient air temperature, and unusual occurrences during placement of each pour. Permit inspection of records by Departmental Representative at any time. At completion of work, submit a summary of such data in 6 copies to Departmental Representative.

## *1.5* QUALITY ASSURANCE

.1 Minimum 4 weeks prior to starting concrete work, submit proposed quality control procedures in accordance with Division 1 for Departmental Representative 's approval for following items:

.1 Falsework erection.

.2 Hot weather concrete.

.3 Cold weather concrete.

.4 Curing.

.5 Finishes.

.6 Formwork removal.

.7 Joints.

## *1.6* DELIVERY, STORAGE AND HANDLING

.1 Store materials on site in a manner to prevent damage thereto. Protect from weather. Comply with CSA A23.1/A23.2, Clause 9.

.2 Protect work of this Section from damage. Protect other work from damage resulting from this work. Replace damaged work which cannot be satisfactorily repaired.

## *1.7* GENERAL

.1 Do not place concrete during or before rain. If rain occurs after

placing and before initial set of concrete, cover with waterproof material until set. Embedded materials used in parking structural slab for floor drains, pipes and other hardware shall be non-metallic; and a low copper aluminum alloy, as designated in CAN3-B79 or an equally corrosion resistant metal, coated on surfaces in contact with concrete to prevent galvanic corrosion with steel reinforcing or protected against corrosive effects of de-icing chemicals by an effective and durable coating.

.2 Do not use calcium chloride or other chemical in mix to reduce freezing point of concrete.

.3 When ready mixed (mixed in transit) concrete is used, complete discharge of concrete within period of 1 hour after mixing water has been added to dry material except when concrete materials are heated, in which case reduce this period to 30 minutes. When concrete is delivered at air temperature below 4°C, ensure temperature at work of not less than 16 °C or more than 32°C.

PART 2 Products

## *2.1* MATERIALS

.1 Portland cement to CAN/CSA3000-13 Type GU.

.2 Blended hydraulic cement: to CSA A23.1/A23.2.

.3 Supplementary cementing materials: to CSA A23.1/A23.2.

.4 Cementitious hydraulic slag: to CSA A23.1/A23.2.

.5 Water: to CSA A23.1/A23.2.

.6 Aggregates: to CSA A23.1/A23.2. Coarse aggregates to be normal density fine aggregates to CSA A23.1/A23.2.

.7 Air entraining admixture: to ASTM C 260/C260M.

.8 Chemical admixtures: to ASTM C494/494M. Departmental Representative to approve accelerating or set retarding admixtures during cold and hot weather placing.

.9 Concrete retarders: to ASTM C494/494M water based, low VOC, solvent free. Do not allow moisture of any kind to come in contact with the retarder film.

.10 Curing compound: to CSA A23.1/A23.2.

.11 Weep hole tubes: plastic.

.12 Water: Conforming to CSA A23.1/A23.2.

.13 Insulation: Extruded, expanded polystyrene, CAN/ULC-S701, Type 4, minimum RSI value of 5.0 per 25mm, compressive strength (min 100psi), and thickness as indicated on Drawings.

## *2.2* MIXES

.1 Proportion normal density concrete in accordance with CSA A23.1/A23.2, to give the following quality for all concrete as indicated.

| LOCATION | 28 DAY STRENGTH | CLASS OF EXPOSURE | SLUMP* |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Slab on grade (Exterior) | 35 MPa | C-1 | 75 |
| Footings | 35 MPa | C-1 | 75 |

* Obtain these slumps with aid of specified water reducing agent.
* Note: All concrete exposed to exterior conditions to have minimum 6% air entrainment.

.2 Ready-mixed concrete and concrete proportions shall be in accordance with CSA A23.1/A23.2 and as follows:

.1 Minimum allowable compressive strength shall be 35MPa at 28 Days of age, unless otherwise noted or shown.

.2 If blended normal Portland cement/cementitious hydraulic slag is used except for floor mixes, slag content shall not be more than 25% of total mass of cement. Total volume of cement in concrete floor mixes shall be 100% Normal Portland Cement.

.3 Provide certification that mix proportions selected will produce concrete of specified quality and yield and that strength will comply with CSA A23.1/A23.2.

.4 Use of calcium chloride not permitted.

.5 Do not change concrete mix without prior approval of Departmental Representative. Should change in material source be proposed, new mix design to be approved by Departmental Representative.

PART 3 Execution

## *3.1* Preparation

.1 Obtain Departmental Representative's approval before placing concrete. Provide 48 hours notice prior to placing of concrete.

.1 For walls and columns leave one side of form open for review of reinforcing. Close furring only after Departmental Representative has reviewed bar placement.

.2 Pumping of concrete is permitted only after approval of equipment and mix in writing by Departmental Representative.

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

.4 Prior to placing of concrete obtain Departmental Representative’s approval of proposed method for protection of concrete during placing and curing.

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

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

.7 Confirm surfaces on which concrete is to be placed are free of

frost, water and debris before placing concrete.

## *3.2* NEW CONCRETE WORK

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

.2 Sleeves and inserts.

.1 No sleeves, ducts, pipes or other openings shall pass through joists, beams, column capitals or columns, except where indicated or approved by Departmental Representative in writing.

.2 Where approved by Departmental Representative in writing, set sleeves, ties, pipe hangers and other inserts and openings as indicated or specified elsewhere. Sleeves and openings greater than 101mm x 101mm not indicated, must be approved by Departmental Representative.

.3 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain approval of modifications from Departmental Representative before placing of concrete.

.4 Check locations and sizes of sleeves and openings shown on drawings.

.5 Set special inserts for strength testing as indicated and as required by non-destructive method of testing concrete.

.3 Anchor bolts.

.1 Set anchor bolts to templates under supervision of appropriate trade prior to placing concrete.

.2 Protect anchor bolt holes from water accumulations, snow and ice build-ups.

.3 Locate anchor bolts used in connection with expansion shoes, rollers and rockers with due regard to ambient temperature at time of erection.

.4 Dovetail anchor slots:

.1 Install continuous vertical anchor slot to forms where masonry abuts concrete wall or columns.

.2 Install continuous vertical anchor slots at 812mm o.c. where concrete walls are masonry faced.

.5 Grout under base plates and machinery using procedures in accordance with manufacturer's recommendations which result in 100 % contact over grouted area.

.6 Finishing.

.1 Finish concrete in accordance with CSA A23.1/A23.2 Section 03 35 05.

.2 Use procedures acceptable to Departmental Representative or those noted in CSA A23.1/A23.2 to remove excess bleed water. Ensure surface is not damaged.

**.3** Use curing compounds compatible with applied finish on concrete surfaces. Provide written declaration that compounds used are compatible.

## *3.3* SITE TOLERANCE

.1 Concrete tolerance in accordance with CSA A23.1/A23.2 straight edge method.

## *3.4* FIELD QUALITLY CONTROL

.1 Inspection and testing of concrete and concrete materials will be carried out by a Testing Laboratory designated by Departmental Representative in accordance with CSA A23.1/A23.2 and Division 1.

.2 Departmental Representative will pay for costs of tests as specified in Division 1.

.3 Contractor will take additional test cylinders during cold and hot weather concreting. Cure cylinders on job site under same conditions as concrete which they represent.

.4 Concrete cylinder test. Three cylinders from each Day's pour for each $75m^3$ of concrete, or for each $30m^3$ of concrete poured in small amounts on successive Days.

.5 Air entrainment test and slump test made from same batch of concrete from which test cylinders are made.

.6 Tests will be made in accordance with CSA A23.1/A23.2.

.7 Inspection Company's reports of tests will be forwarded to Departmental Representative and Contractor with an opinion or reason for any abnormalities noted thereon.

.8 Cooperate with and assist Inspection Company's personnel during inspection and tests.

.9 Remove defective materials and completed work which fails tests and replace as directed by Departmental Representative.

.10 Where work or materials fail to meet strength requirements as indicated by test results, pay costs of additional inspection and testing required for new replacement work or materials.

.11 Non-destructive Methods for Testing Concrete shall be in accordance with CSA A23.1/A23.2.

.12 Inspection or testing by Departmental Representative will not augment or replace Contractor quality control nor relieve him of his contractual responsibility.

.13 Cold Weather Protection

.1 Carry out cold weather concreting, unless otherwise specified, in accordance with CSA A23.1/A23.2.

.14 Hot Weather Protection

.1 Carry out hot weather concreting, unless otherwise specified, in accordance with CSA A23.1/A23.2.

END OF SECTION

PART 1 **General**

***1.1*** **SECTION INCLUDES**

.1 Materials and installation for concrete floor hardeners, slip resistant coatings, and sheet curing materials.

***1.2*** **REFERENCES**

.1 Health Canada - Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

***1.3*** **SUBMITTALS**

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

.2 Include application instructions for concrete hardener curing compound and slip resistant coating.

.3 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 and 01 35 29.

.1 WHMIS MSDS acceptable to Human Resources Development Canada-Labour and Health Canada for concrete floor hardeners.

.2 Indicate VOC content.

PART 2 **Products**

***2.1*** **FLOOR HARDENER**

.1 Non-metallic hardener: premixed, dry shake surface hardener, abrasion resistant.

***2.2*** **SLIP RESISTANT ABRASIVE AGGREGATE**

.1 Emery aggregate: crushed emery, minimum 50% aluminum oxide.

.2 Homogeneous aluminum oxide, minimum 95%.

.3 Ferric oxide, minimum 25%.

.4 Silicon carbide.

PART 3 **Execution**

***3.1*** **EXAMINATION**

.1 Verify that slab surfaces are ready to receive Work.

***3.2*** **HARDENING**

.1 Apply floor hardener aggregate at rate of 1lb per sq. ft. in accordance with manufacturer's written instructions.

***3.3*** **PROTECTION**

.1 Protect finished installation until floor treatment has completely cured.

END OF SECTION

PART 1 **General**

## *1.1* RELATED SECTIONS

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

## *1.2* REFERENCES

.1 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-25.20-95, Surface Sealer for Floors.

.2 Canadian Standards Association (CSA)

.1 CSA A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction.

## *1.3* PERFORMANCE REQUIREMENTS

.1 Product quality and quality of work in accordance with Division 6.

.2 Submit written declaration that components used are compatible and will not adversely affect finished flooring products and their installation adhesives.

## *1.4* PRODUCT DATA

.1 Submit product data in accordance with Division 1.

.2 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 and 01 35 29. WHMIS MSDS acceptable to Labour Canada and Health and Welfare Canada for concrete floor treatment materials. Indicate VOC content.

.3 Include application instructions for concrete floor treatments.

## *1.5* ENVIRONMENTAL REQUIREMENTS

.1 Work area:

.1 Make the work area water tight protected against rain and detrimental weather conditions.

.2 Temperature:

.1 Maintain ambient temperature of not less than 10°C from 7 days before installation to at least 48 hours after completion of work and maintain relative humidity not higher than 40% during same period.

.3 Moisture:

.1 Ensure concrete substrate is within moisture limits prescribed by finish manufacturer.

.4 Safety: Safety

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials.

PART 2 **Products**

***2.1*** **CHEMICAL HARDNERS**

.1 Type 1 - Sodium silicate.

.2 Water: potable.

***2.2*** **SEALING COMPOUNDS**

.1 Surface sealer: to CAN/CGSB-25.20, Type 2 - water based, clear.

.2 Surface sealers may not be manufactured or formulated with aromatic solvents formaldehyde halogenated solvents mercury lead cadmium hexavelant chromium and their compounds.

***2.3*** **CURING COMPOUNDS**

.1 Select low VOC, water-based, organic-solvent free curing compounds.

***2.4*** **CONCRETE STAINS**

.1 Select low VOC, water-based concrete stains.

***2.5*** **MIXES**

.1 Mixing, ratios and application in accordance with manufacturer's instructions.

PART 3 **Execution**

***3.1*** **EXAMINATION**

.1 Verify that all surfaces are ready to receive work and elevations are as indicated on drawings.

***3.2*** **WORKMANSHIP**

.1 Steel trowel concrete slabs architectural floor finishes.

.2 Other concrete slabs to be screeded off to true lines and levels shown and left ready to receive finish. Depress slabs where required.

.3 Where floor drains occur, floors to be level around walls and have a minimum 5mm per metre uniform pitch to drains, unless indicated otherwise.

.4 Co-ordinate with equipment suppliers regarding additional requirements for tolerances on floor level finishes etc.

***3.3*** **PLAIN FLOOR, FINISH (UNEXPOSED)**

.1 Roll or tamp concrete to force coarse aggregate into concrete mix, then screed.

.2 Float surface with wood or metal float or with power finishing machine and bring surface to true elevation.

.3 Steel trowel to smooth and even surface.

.4 Follow with second steel trowelling to produce smooth burnished surface to within 6mm tolerance when measured in any direction using 3m straight edge. Do not overtrowel.

.5 Sprinkling of dry cement or dry cement and sand mixture over concrete surfaces is not acceptable.

.6 Apply curing compound in accordance with manufacturer's instructions. Do not use curing compound when slab is to receive bonded finish. Damp curing or other approved method shall then be employed.

.7 Sawcut crack-control joints in slabs on grade to CAN/CSA-A23.1-00 (maximum 24 hours after placement), as noted on drawings. Seal with joint filler.

.8 After curing and when concrete is dry, seal control joints and joints at junction with vertical surfaces with sealing compound.

## *3.4* FLOOR FINISH (EXPOSED)

.1 Finish concrete floors as per Paragraph 3.2, Clauses .1 to .5, and apply floor hardener, non-metallic aggregate at a rate of 5.0 kg/m2 to manufacturer's instructions.

.2 Apply curing/sealing compound to manufacturer's instructions.

.3 Sawcut crack-control joints in slabs on grade to CAN/CSA-A23.1-00 (maximum 24 hours after placement), as noted on drawings. Seal with joint filler.

.4 After curing/sealing and when concrete is dry, seal control joints and joints at junction with vertical surfaces with sealing compound.

.5 Clean surfaces and apply second coat curing/sealing compound before handing building over to Departmental Representative.

## *3.5* APPLICATION

.1 Curing/Sealing:

.1 Liquid Compound Curing/Sealing: Apply compound after saw cutting operations have been completed, at a rate recommended by compound manufacturer. Clean concrete floor of laitance, tiremarks, oil, grease, etc. to the satisfaction of the Departmental Representative prior to applying sealing compound.

.2 Water Curing: Water cure slabs where required for compatibility of floor finish adhesive. Do not use curing/sealing compound. Water down entire area and cover with polyethylene sheets for a minimum of 7 Days. Sheet coverage to include exposed edges. Provide suitable weights to prevent blow-off or displacement of sheets. Remove cover after minimum 7 consecutive Days. Allow to air dry until concrete has developed design strength.

END OF SECTION

# PART 1 - GENERAL

## 1.1 REFERENCES

.1 CSA International
- .1 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
- .2 CSA O80 Series-15, Wood Preservation.
- .3 CSA O80.27-1.1-15, This Standard covers the fire-retardant treatment of Douglas Fir, hardwood, softwood, and Poplar plywood by pressure processes.
- .4 CSA O121-17, Douglas Fir Plywood.
- .5 CAN/CSA-O141-05(R2014), Softwood Lumber.
- .6 CSA O151-17, Canadian Softwood Plywood.
- .7 CAN/CSA-O325-16, Construction Sheathing.
- .8 CAN/CSA-Z809-16, Sustainable Forest Management.

.2 American Society for Testing and Materials International (ASTM)
- .1 ASTM A123/A123M-17, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

.3 Forest Stewardship Council (FSC)
- .1 FSC-STD-01-001-2015, FSC Principle and Criteria for Forest Stewardship V5-2.
- .2 FSC-STD-20-002-2009, Structure and Content of Forest Stewardship Standards V3-0.
- .3 FSC Accredited Certified Bodies.

.4 Green Seal Environmental Standards (GS)
- .1 GS-11-2015, Edition 3.2, Paints and Coatings.

.5 National Lumber Grades Authority (NLGA)
- .1 Standard Grading Rules for Canadian Lumber GR-2017.

.6 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
- .1 SCAQMD Rule 1113-A2016, Architectural Coatings.

.7 National Building Code of Canada (NBC) 2015.

## 1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for rough carpentry work and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Low-Emitting Materials:
- .1 Submit listing of paints and coatings used in building, comply with VOC and chemical component limits or restriction requirements.

.2 Submit listing of composite wood products used in building, stating that they contain no added urea-formaldehyde resins, and laminate adhesives used in building, stating that they contain no urea-formaldehyde.

1.4 QUALITY ASSURANCE

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

.2 Plywood identification: by grade mark in accordance with applicable CSA standards.

.3 Plywood, OSB and wood based composite panel construction sheathing identification: by grademark in accordance with applicable CSA standards.

.4 Sustainable Standards Certification:
.1 Certified Wood: submit listing of wood products and materials used in accordance with FSC-STD-01-001, CAN/CSA-Z809, SFI or Forestry Stewardship Council (FSC) certified.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 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 wood from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

.4 Develop Waste Reduction Workplan related to Work of this Section.

.5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, banding, and packaging materials as specified in Construction Waste Management Plan Waste Reduction Workplan in accordance with Section 01 74 20.

## PART 2 - PRODUCTS

2.1 MATERIALS

.1 Lumber: unless specified otherwise, softwood, S4S, S-DRY, B and Better Clear, in accordance with following standards:
.1 CAN/CSA-O141.
.2 NLGA Standard Grading Rules for Canadian Lumber.
.3 CAN/CSA-Z809, SFI or Forestry Stewardship Council (FSC)

certified.

.2 Furring, blocking, nailing strips, grounds, rough bucks, cants, curbs, fascia backing and sleepers:
.1 Board sizes: "Standard" or better grade.
.2 Dimension sizes: "Standard" light framing or better grade.
.3 Post and timbers sizes: "Standard" or better grade.

.3 Panel Materials: CAN/CSA-Z809, SFI or Forestry Stewardship Council (FSC) certified.
.1 Douglas fir plywood (DFP): to CSA O121, standard construction. Urea-formaldehyde free.
.2 Canadian softwood plywood (CSP): to CSA O151, standard construction. Urea-formaldehyde free.
.3 Plywood, OSB and wood based composite panels: to CAN/CSA-O325. Urea-formaldehyde free.

## 2.2 ACCESSORIES

.1 Fasteners: to ASTM A123/A123M for exterior work.

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

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

.4 Proprietary fasteners: toggle bolts, expansion shields and lag bolts, screws and lead or inorganic fibre plug, recommended for purpose by manufacturer.

# PART 3 - EXECUTION

## 3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for rough carpentry 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 1 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 as follows:
.1 Wood cants, fascia backing, curbs, nailers, sleepers on roof deck.

## 3.3 INSTALLATION

.1 Comply with requirements of NBC, supplemented by the following paragraphs.

.2 Install furring and blocking as required to space-out and support casework, cabinets, wall and ceiling finishes, facings, fascia, soffit, siding and other work as required.

.3 Align and plumb faces of furring and blocking to tolerance of 1:600.

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

.5 Install wood cants, fascia backing, nailers, curbs and other wood supports as required and secure using galvanized steel fasteners.

.6 Install wood backing, dressed, tapered and recessed slightly below top surface of roof insulation for roof hopper.

.7 Install sleepers as indicated.

.8 Use caution when working with particle board. Use dust collectors and high quality respirator masks.

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

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

## 3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11.
.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.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

## PART 1 - GENERAL

### 1.1 REFERENCES

.1 ASTM International
- .1 ASTM A36/A36M-14, Standard Specification for Carbon Structural Steel.
- .2 ASTM A47/A47M-99(2014), Standard Specification for Ferritic Malleable Iron Castings.
- .3 ASTM A123/A123M-17, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- .4 ASTM A307-14, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- .5 ASTM A653/A653M-17, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .6 ASTM D7247 – 17, Standard Test Method for Evaluating the Shear Strength of Adhesive Bonds in Laminated Wood Products at Elevated Temperatures.

.2 APA – The Engineered Wood Association
- .1 ANSI-APA PRG 320-2018, Standard for Performance-Rated Cross-Laminated Timber.

.3 CSA International
- .1 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
- .2 CSA G40.20-13/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .3 CAN/CSA-O80 Series-15, Wood Preservation.
- .4 CSA O86-14, Engineering Design in Wood.
- .5 CSA O112 Series-M1977(R2006), CSA Standards for Wood Adhesives.
- .6 CAN/CSA-O122-16, Structural Glued-Laminated Timber.
- .7 CSA O177-06(R2015), Qualification Code for Manufacturer's of Structural Glued-Laminated Timber.
- .8 CSA S16-14, Design of Steel Structures.
- .9 CSA W47.1-09(R2014), Certification of Companies for Fusion Welding of Steel Structures.
- .10 CAN/CSA-Z809-16, Sustainable Forest Management.

.4 American Institute of Timber Construction
- .1 AITC 405-2005, Standard for Adhesives for use in Structural Glued Laminated Timber.

.5 Green Seal Environmental Standards (GS)
- .1 GS-11-2015, Edition 3.2, Paints and Coatings.

.6 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
- .1 Material Safety Data Sheets (MSDS).

.7 The Master Painters Institute (MPI)/Architectural Painting

Specification Manual - 2011.
.1 MPI# 79 - Primer, Alkyd, Anti-Corrosive for Metal.

.8 Society of Automotive Engineers International (SAE)
.1 SAE Handbook 2009.

.9 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
.1 SCAQMD Rule 1113-A2016, Architectural Coatings.

## 1.2 ADMINISTRATIVE REQUIREMENTS

.1 Pre-Installation Meetings:
.1 Convene pre-installation meeting 1 week prior to beginning work of this Section and on-site installation, with Contractor's Representative and Departmental Representative in accordance with Section 01 31 19 to:
.1 Verify project requirements.
.2 Review installation and substrate conditions.
.3 Co-ordination with other building subtrades.
.4 Review manufacturer's written installation instructions and warranty requirements.

.3 Ensure key personnel attend.

.4 Departmental Representative will provide written notification of change to meeting schedule established upon contract award 24 hours prior to scheduled meeting.

## 1.3 QUALIFICATIONS of MANUFACTURERS

.1 Manufacture structural glue-laminated members in plant certified by Administrative Board Structural Glue-Laminated Timber Division, to CSA-0177-06 to manufacture Class 1 (interior) members and Class X (exterior) members

.2 Manufacture structural cross-laminated timber panel members in a plant qualified in accordance with ANSI/APA PRG 320-2018 or equivalent certification

.3 At completion of project submit certificate in accordance with CSA-0177-06, Appendix B

.4 Fabricator for welded steel connections to be certified in accordance with CSA-W47.1-09(R2014)

.5 Site Meetings: as part of Manufacturer's Services described in PART 3 - FIELD QUALITY CONTROL, schedule site visits, to review Work.

## 1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for glued-laminated construction and include product characteristics, performance criteria, physical size, finish and limitations.
.2 Submit two copies of WHMIS MSDS.

.3 Shop Drawings:
.1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
.2 Submit erection drawings in accordance with CSA S16 and CSA O86.
.3 Shop drawings for members: indicate stress grade, service grade and appearance grades, shop applied finishes, camber, cuts, ledgers, holes and connection details.

.4 Samples:
.1 Submit for review and acceptance of each unit.
.2 Samples will be returned for inclusion into work.
.3 Submit 2 samples of connector plates.

.5 Certifications: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
.1 Submit manufacturer's plant certification to CSA O177, Appendix B at completion of fabrication.

.6 Test and Evaluation Reports: submit certified test reports for CLT from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.

.7 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures.

.8 Manufacturers Reports:
.1 Manufacturer's Field Reports: submit manufacturer's written reports within 3 days of review, verifying compliance of Work, as described in Part 3 - FIELD QUALITY CONTROL.

.9 Sustainable Design Submittals:

.1 Construction Waste Management:
.1 Submit project Waste Reduction Workplan highlighting recycling and salvage requirements.
.2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 95% of construction wastes were recycled or salvaged.
.2 Recycled Content:
.1 Submit listing of recycled content products used, including details of required percentages or recycled content materials and products, showing their costs and

percentages of post-consumer and post-industrial content, and total cost of materials for project.

.3 Low-Emitting Materials:
.1 Submit listing of adhesives, sealants, and coatings used in building, showing compliance with VOC and chemical component limits or restrictions requirements.
.2 Submit listing of glue-laminated products used in building, stating that they contain no added urea-formaldehyde resins, and laminate adhesives used in building, stating that they contain no urea-formaldehyde.

## 1.5 QUALITY ASSURANCE

.1 Qualifications:
.1 Manufacture structural glued-laminated members in plant certified by CSA as meeting requirements of CSA O177, class X.
.2 Submit certificate in accordance with CSA O177, Appendix B at completion of fabrication.
.3 Fabricator for welded steel connections to be certified to CSA W47.1.
.4 Place authorization labels on glued-laminated members indicating manufactured in CSA certified plant.
.5 Certification of material protective sealer.
.6 Cross-laminated timber panels shall comply with the requirements of APA PRG 320 or equivalent, certified by a professional engineer registered and licensed in the province of the project or by a recognized certification body. CLT of European origin shall be certified with a European Technical Assessment.

## 1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements:
.1 Deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
.2 Apply protective sealer to glued-laminated units before shipping unless specified otherwise.
.3 Wrap members prior to leaving plant with a moisture resistant wrapping.
.4 Use padded, non-marring slings for handling glued-laminated members.
.5 Protect corners with wood blocking.
.6 Make adequate provision for delivery and handling stresses.

.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 Slit underside of membrane covering during storage at site without defacing member.

.3 Store glued-laminated units and protect from weather, block off ground and separate with stripping, so air may circulate around faces of members.

.4 Cover glued-laminated units with opaque moisture resistant membrane if stored outside.

.5 Store and protect glue-laminated products from nicks, scratches, and blemishes.

.6 Replace defective or damaged materials with new.

.4 Develop Waste Reduction Workplan 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 Waste Reduction Workplan in accordance with Section 01 74 20.

.1 Ensure preservative treated wood is disposed of by means other than for recycling or reuse.

.2 Dispose of treated wood, end pieces, wood scraps and sawdust at sanitary landfill approved by Departmental Representative.

.3 Dispose of unused wood preservative material at official hazardous material collections site approved by Departmental Representative.

.4 Divert unused wood materials from landfill to recycling, reuse or composting facility approved by Departmental Representative.

## 1.7 DESIGN

.1 Products – Glulam, CLT panels and wood deck products shall be custom designed to fit the dimensions and loads indicated on the plans.

.2 Retain a Professional Engineer registered in the Province of Ontario to design Glulam and CLT Framing System; to prepare, seal and sign all shop drawings. Shop drawings shall show both design and installation requirements.

.3 The Professional Engineer responsible for the design of the glulam beam and CLT panel connections shall coordinate the requirements of the wood connection with the Structural Steel Design Engineer where these work of the Structural steel Section connects to the glulam or CLT framing.

.4 All wood connections are to be designed by a Professional Engineer registered in the province of Ontario in accordance with CSA-O86 and CSA S16. This includes panel to panel connection, glulam connections and associated steel connection brackets and plates.

## 1.8 GENERAL REQUIREMENTS

.1 Provide all material, equipment and labour required for the completion of the Contract, including:
- .1 Design of all connections, wood-to-wood, wood-to-steel and wood-to- concrete, to the requirements of the relevant building code and standards, taking account of the required fire resistance and acoustic performance;
- .2 Design of alternative equivalent elements;
- .3 Supply and installation of all connectors and steel plates for wood-to-wood connection assemblies;
- .4 Supply and installation of all connectors (screws, dowels, bolts) for wood- to-steel and wood-to-concrete connection assemblies;
- .5 Coordination with related steel and concrete works.

.2 Steel plates, assemblies and anchors for wood-to-concrete and wood-to-steel connections
- .1 All steel plates and assemblies of wood-to-steel connections shall be supplied by the contractor and attached to the steel structure in the steel fabrication workshop;
- .2 All steel base plates, steel assemblies and concrete anchors for wood-to- concrete connections shall be supplied and installed on site by contractor.
- .3 The work of this section includes, but is not necessarily limited to, the following:
  - .1 Glued-laminated wood beams and columns;
  - .2 Cross-laminated timber panels;
  - .3 Connection hardware and connectors.

## PART 2 - PRODUCTS

## 2.1 SUPPLY/FABRICATION

.1 The glue-laminated timber, cross-laminated timber supplier/fabricator carried by the Contractor shall be named in the bid submission, and shall not be changed following award of contract unless approved by the Departmental Representative.

## 2.2 MATERIALS

.1 Laminating stock: Spruce CAN/CSA-Z809, to CAN/CSA-O122.

.2 Adhesive: to CSA O112 Series, to grade of service required in accordance with CAN/CSA-O122.
- .1 Urea-formaldehyde free.

.3 Sealer for glued-laminated members: penetrating type, clear, non-yellowing liquid.
- .1 Coatings: VOC limit 275 g/L maximum to SCAQMD Rule 1113.

.4 CLT Adhesive: to CSA O112 Series, and ASTM D7247.

.5 Fastenings:
- .1 Split ring connections: hot rolled carbon steel, SAE 1010, in accordance with SAE handbook.
- .2 Shear plate connections:
  - .1 Pressed steel type: hot rolled carbon steel, SAE 1010, in accordance with SAE handbook.
  - .2 Malleable iron type: to ASTM A47/A47M, grade 350.
- .3 Lag screws: Proprietary structural connector screws.
- .4 Bolts: to ASTM A307.
- .5 Side plates: to CSA G40.20/G40.21 and ASTM A36/A36M.
- .6 Drift pins: to ASTM A307.
- .7 Glued-laminated rivets: hot dip galvanized to ASTM A36/A36M and A123/A123M.
- .8 Nails and spikes: to CSA B111.
- .9 Truss plates: light gauge galvanized sheet steel to ASTM A653/A653M, grade A, yield point 255 MPa.

.6 Shop coat primer for steel connections: to MPI# 79. Ecologo certified.

.7 Galvanizing: to ASTM A123/A123M, hot dipped, Coating Grade 85, minimum zinc coating of 600 g/m$^2$.

.8 Sealer for untreated glue-laminated members and cut ends of glue laminated and CLT members: Penetrating type, clear, non-yellowing liquid which will protect wood against moisture entry,

.9 Wood Preservatives:
- .1 Alkaline Copper Quaternary (ACQ) or Copper Azole (CA), based preservatives in accordance with CAN/CSA-O80 Series.
- .2 All wood in direct contact with concrete, masonry, or soil are to be protected with preservatives.
- .3 For glulam members where edges are exposed to the weather, treat members in accordance with the American Wood-Preservers' Association (AWPA) with pentachlorophenol in light solvent as required for above grade exposure.
- .4 Coordinate with Section 09 91 99 to avoid preservative, or sealer staining of panels or members exposed to view.

## 2.3 FABRICATION

.1 Lay-up CLT panels with pre-glued CLT panels in alternating directions, leaving voids for services as indicated with all faces of lamella fully glued.

.2 Fabricate members to following classifications:
- .1 Glulam Stress grade: to CSA O86 20f-E bending grade unless noted otherwise on drawings.
- .2 CLT members to SPF 1 or SPF 2 material

.3 For CLT exposed in the finished structure Face layer to be SPF J Grade.
.4 Appearance grade for Glulam: Quality
.5 Stress grade: V2

.3 Mark laminated members for identification during erection. Marks not to be visible in final assembly. Clearly mark top surface of all roof panels

.4 Do not apply sealer to areas which are to receive stained finish or preservative treatment.

.5 Design connections to CSA O86, and CSA S16 unless specifically detailed, to resist shears, moments and forces indicated.
.1 Fabricate in accordance with CSA S16.

.6 Galvanize connections after fabrication.

.7 Cut holes as required for pipes, ducts, and the like in accordance with the following:
.1 Indicate openings on the fabrication and erection drawings.
.2 Holes in glulam beams:
.1 Provide holes as required up to a maximum diameter of 10% of the beam depth.
.2 Locate holes within the middle third of the span and within the middle third of the beam depth.
.3 Space adjacent holes at five times the largest diameter.
.3 Holes in CLT panels:
.1 A single hole up to 200mm round or square is allowable in a standard panel.
.2 Do not locate holes below concentrated loads or near panel edges or corners.
.4 Do not overcut corners on square openings.

.7 Stress classes: as specified on drawings, or equivalent.

.8 Service class: exterior.

.9 Appearance grade of visible surfaces of Glued-laminated timber (GLT) and Cross- laminated timber (CLT): Architectural
.1 Mixture of species is not permitted, except where differences are minimal and acceptable;
.2 All knot holes and voids measuring over 20 mm are filled with a wood-tone filler or clear wood inserts selected for similarity with the grain and color of the adjacent wood;
.3 Unfilled knot holes do not exceed 20 mm when measured in the direction of the lamination length, with the exception that a knot hole may be longer than 20 mm if its area is not greater than 300 $mm^2$;
.4 No loose knots;
.5 Black knots do not exceed 30 mm in diameter;
.6 Excessive knots and clusters of knots are not permitted;

.7 Surface finished smooth with no misses or wanes permitted;
.8 Blue stains and other discolorations not permitted;
.9 Resin pockets maximum 5 x 50 mm, no clusters of pockets;
.10 Insect damage not permitted;
.11 Bark not permitted;
.12 Occasional surface shrinkage cracks (checks) permitted;
.13 For CLT panels:
.1 Maximum width of component boards 100 mm;
.2 Component boards to be side-glued (narrow faces).

.10 Factory-applied sealer: See Materials and Shop Sealing and Painting

.11 Mark or number items so that they can be identified during assembly. Marks should not be visible once the assembly is completed.

.12 Unless otherwise stated, design the steel assembly parts in accordance with CSA O86 and CSA S16, so that they resist the axial forces, shear and bending moments. Manufacture these parts in accordance with the CSA S16.

.13 Galvanize all steel elements, whether intended for interior or exterior locations.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for glue-laminated material 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 Connection to foundations and steel structure
.1 Verify levels, location, dimensions, alignment and condition of previous work by others before commencing installation.
.2 Report discrepancies and potential problem areas to Departmental Representative and Construction Contractor for direction before commencing installation.

.4 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 PRESERVATIVE TREATMENT

.1 Coordinate with Section 09 91 99 to avoid preservative, or sealer staining of CLT panels, or other members that would affect the final uniform color/clear finish exposed to view.

3.3 ERECTION

.1 Protect CLTs from damage before erection.

.1 Erect glued-laminated members and CLT panels in accordance with reviewed erection drawings.

.2 Brace and anchor members until permanently secured by structure.

.3 Make adequate provisions for erection stresses.

.4 Splice and join only at locations as indicated on reviewed erection drawings.

.5 Do not field cut or alter members without Departmental Representative's approval. If approved, preservative treat cut ends.

.6 Make splicing and jointing only at locations shown.

.7 Fit members closely and accurately to other members and other assemblies

.8 Field cutting and alteration of members not permitted without Departmental Representatives’ approval.

.9 Confirm to erection tolerances specified in CSA-S16 Clause 29.3. If the interfacing tolerances are not compatible review and coordinate interfacing tolerances so that various elements come together properly.

.10 Re-tightening Connections:

.1 Connection steel assemblies of glue laminated members shall be inspected at 6 and 12 months after completion of the building and tightened sufficiently to bring the faces of the connected materials into close contact without deformation.

.2 Any paint or other finishes damaged by these operations shall be made good.

.3 The cost of this work shall be included in the contract price

3.4 FIELD QUALITY CONTROL

.1 Manufacturer's Field Services:

.1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, protecting and cleaning of product.

.2 Submit 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 Ensure manufacturer's representative is present before and during critical periods of installation

.4 Schedule site visits:

.1 After delivery and storage of products, and when preparatory Work, or other Work, on which the Work of this Section depends, is complete but before installation begins.

.2 Upon completion of the Work, after cleaning is carried out.

.1 The Contractor shall engage a qualified professional engineer experienced in the design, fabrication and erection of timber structures of comparable complexity and scope and registered and licensed in the province of the project, who shall conduct inspections of the erection and prepare and submit written inspection reports verifying that the Work of this section is in accordance with the Contract Documents and reviewed Shop Drawings.

.2 The Contractor shall record the following items in site logs for perusal by the Departmental Representative and for submission to Departmental Representative at end of installation:

.1 Environmental conditions daily;

.2 Deliveries of material to the site, including verified manifests with notes of damaged or missing materials;

.3 Installation of each element and verification of each connection for quality control;

.4 Equipment used, including drills for screw installation;

.5 Modifications to reviewed shop and erection drawings;

.6 Photographs of representative elements and connections of each type, as well as documentation of important details.

.3 The Contractor shall record the following items in a site log for perusal by the Departmental Representative and for submission to the Departmental Representative at building delivery to the Departmental Representative:

.1 Environmental conditions at the site daily;

.2 Humidity levels in enclosed parts of the building daily;

.3 Equipment and methods used to control humidity levels within the enclosed parts of the building daily;

## 3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11.

.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.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.6 PROTECTION

.1 If timber elements are individually wrapped:
.1 Do not remove wrappings until they no longer serve a useful purpose, including protection from weather, sunlight, soiling, and damage from Work of other trades.
.2 Coordinate wrapping removal with finishing Work. Retain wrapping where it can serve as a painting shield.
.3 Slit underside of wrapping to prevent accumulation of moisture inside the wrapping. Do not deface members.

.2 Within the closed or partially closed building, the Construction Contractor shall control the relative humidity levels to not less than 40%. Direct heaters to avoid direct exposure of wood surfaces to hot dry air currents. Use humidification equipment as required until delivery of the building to the Departmental Representative.

3.5 ERECTION TOLERANCES

.1 Connections used may require tighter tolerances than hereafter specified.
.1 Elevation: 3 mm from specified elevation.
.2 Plan position: 3 mm from specified plan position.

.2 For rectangular areas involving more than one panel, the corner-to-corner diagonal measurements shall not differ by more than 0.25% of the length of the shorter side of the rectangle.

.3 Joints between CLT panels: 3 mm maximum gap.

END OF SECTION

# PART 1 - GENERAL

## 1.1 REFERENCES

.1 ASTM International
.1 ASTM D2832-92(2016), Standard Guide for Determining Volatile and Nonvolatile Content of Paint and Related Coatings.
.2 ASTM D5116-10, Standard Guide For Small-Scale Environmental Chamber Determinations of Organic Emissions From Indoor Materials/Products.
.3 ASTM E1333-14, Standard Test Method for Determining Formaldehyde Concentrations in Air and Emission Rates From Wood Products Using a Large Chamber.

.2 Architectural Woodwork Manufacturers Association of Canada (AWMAC), and Woodwork Institute (WI).
.1 AWMAC/WI NAAWS Edition 3.1-2017.

.3 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-71.20-M88, Adhesive, Contact, Brushable.

.4 CSA International
.1 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
.2 CSA O112.4 SERIES-M1977(R2006), Standards for Wood Adhesives.
.3 CSA O121-17, Douglas Fir Plywood.
.4 CSA O141-05(R2014), Softwood Lumber.
.5 CSA O151-17, Canadian Softwood Plywood.
.6 CSA O153-13(R2017), Poplar Plywood.
.7 CAN/CSA-Z809-16, Sustainable Forest Management.

.5 Forest Stewardship Council (FSC)
.1 FSC-STD-01-001, FSC Principle and Criteria for Forest Stewardship V4-0.
.2 FSC-STD-20-002, Structure and Content of Forest Stewardship Standards V3-0.

.6 Green Seal Environmental Standards (GS)
.1 GS-11-2015, Edition 3.2, Paints and Coatings.
.2 GS-36-2013, Commercial Adhesives.

.7 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
.1 Material Safety Data Sheets (MSDS).

.8 International Organization for Standardization (ISO)
.1 ISO 14040-2006, Environmental Management-Life Cycle Assessment - Principles and Framework.
.2 ISO 14041-98, Environmental Management-Life Cycle Assessment - Goal and Scope Definition and Inventory Analysis.

.9 National Electrical Manufacturers Association (NEMA)
.1 ANSI/NEMA LD-3-05, High-Pressure Decorative Laminates (HPDL).

.10 National Hardwood Lumber Association (NHLA)
.1 Rules for the Measurement and Inspection of Hardwood and Cypress 1998.

.11 National Lumber Grades Authority (NLGA)
.1 Standard Grading Rules for Canadian Lumber GR 2017.

.12 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
.1 SCAQMD Rule 1113-A2016, Architectural Coatings.
.2 SCAQMD Rule 1168-A2017, Adhesives and Sealants Applications.

.13 Sustainable Forestry Initiative (SFI).

## 1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for architectural woodwork and include product characteristics, performance criteria, physical size, finish and limitations.
.2 Submit two copies of WHMIS MSDS.

.3 Shop Drawings:
.1 Indicate details of construction, profiles, jointing, fastening and other related details.
.1 Scales: profiles full size, details half full size.
.2 Indicate materials, thicknesses, finishes and hardware.
.3 Indicate locations of service outlets in casework, typical and special installation conditions, and connections, attachments, anchorage and location of exposed fastenings.

.4 Samples:
.1 Submit for review and acceptance of each unit.
.2 Samples will be returned for inclusion into work.
.3 Submit duplicate samples of plywood: sample size 200 x 200 mm.

.5 Certifications: submit AWMAC/WI GIS certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
.1 Architectural woodwork shall be manufactured and/or installed to the current AWMAC/WI NAAWS and shall be subject to an inspection at the plant and/or site by an appointed AWMAC/WI Certified Inspector.
.2 Inspection costs shall be included in the bid price for this project. Contact your local AWMAC/WI Chapter for details of inspection costs.
.3 Shop drawings shall be submitted to the AWMAC/WI Chapter office for review before work commences.
.4 Work that does not meet the AWMAC/WI NAAWS, as specified, shall be replaced, reworked and/or refinished by the architectural woodwork contractor, to the approval of AWMAC/WI, at no additional cost to the. Departmental Representative.

.5 If the woodwork contractor is an AWMAC/WI Manufacturer member in good standing, a two (2) year AWMAC/WI Guarantee Certificate will be issued.
.6 The AWMAC/WI Guarantee shall cover replacing, reworking and/or refinishing any deficient architectural woodwork due to faulty workmanship or defective materials supplied by the woodwork contractor, which may appear during a two (2) year period following the date of issuance.
.7 If the woodwork contractor is not an AWMAC/WI Manufacturer member they shall provide the Departmental Representative with a two (2) year maintenance bond, in lieu of the AWMAC/WI Guarantee Certificate, to the full value of the architectural woodwork contract.

.6 Sustainable Design Submittals:
.1 Construction Waste Management:
.1 Submit project Waste Reduction Workplan highlighting recycling and salvage requirements.
.2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 95% of construction wastes were recycled or salvaged.
.2 Recycled Content:
.1 Submit listing of recycled content products used, including details of required percentages or recycled content materials and products, showing their costs and percentages of post-consumer and post-industrial content, and total cost of materials for project.
.3 Low-Emitting Materials:
.1 Submit listing of adhesives and sealants and paints and coatings used in building, comply with VOC and chemical component limits or restrictions requirements.
.2 Submit listing of composite wood products used in building, stating that they contain no added urea-formaldehyde resins, and laminate adhesives used in building, stating that they contain no urea-formaldehyde.

## 1.3 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 to CSA and ANSI standards.

.3 Mock-ups:
.1 Construct mock-ups in accordance with Section 01 45 00.
.1 Shop prepare one base cabinet unit, complete with hardware and shop applied finishes, and install where directed by Departmental Representative.
.2 Allow 1 week for inspection of mock-up by Departmental Representative before proceeding with Work.
.3 When accepted, mock-up will demonstrate minimum standard for Work.
.4 Do not proceed with work prior to receipt of written acceptance of mock-up by Departmental Representative.
.5 Mock-up may remain as part of finished work.

## 1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 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.
.1 Protect millwork against dampness and damage during and after delivery.
.2 Store millwork in ventilated areas, protected from extreme changes of temperature or humidity.

.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 architectural woodwork 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 Waste Reduction Workplan in accordance with Section 01 74 20.

# PART 2 - PRODUCTS

## 2.1 MATERIALS

.1 Softwood lumber: unless specified otherwise, S4S, S-DRY, B and Better Clear, in accordance with following standards:
.1 CSA O141.
.2 NLGA Standard Grading Rules for Canadian Lumber.
.3 AWMAC/WI NAAWS premium grade, moisture content as specified.
.4 CAN/CSA-Z809, SFI or Forestry Stewardship Council (FSC) certified.

.2 Machine stress-rated lumber is acceptable for all purposes.

.3 Hardwood lumber: moisture content 12% or less in accordance with following standards:
.1 National Hardwood Lumber Association (NHLA).
.2 AWMAC/WI NAAWS premium grade, moisture content as specified.

.4 Douglas fir plywood (DFP): to CSA O121, standard construction, FSC certified.
.1 Plywood resin to contain no added urea-formaldehyde.

.5 Hardboard:
.1 To CAN/CGSB-11.3, FSC certified.
.2 Hardboard resin to contain no added urea-formaldehyde.

.6 Nails and staples: to CSA B111.

.7 Wood screws: stainless steel, type and size to suit application.

.8 Splines: wood.

2.2 MANUFACTURED UNITS

.1 Casework:
.1 Fabricate caseworks to AWMAC/WI NAAWS premium quality grade.
.2 Furring, blocking, nailing strips, grounds and rough bucks and sleepers.
.1 Board sizes: "standard" or better grade.
.2 Dimension sizes: "standard" light framing or better grade.
.3 Urea-formaldehyde free.
.3 Framing pine species, NLGA C Select grade.
.4 Case bodies (ends, divisions and bottoms).
.1 Softwood plywood:
.1 Thickness: 19 mm.
.2 Number of plies: 5.
.3 Face veneer: fir species, G2S grade, sanded.
.4 Back veneer: fir species, G2S grade, sanded.
.5 Core: veneer.
.6 Bond: Type II.
.7 Sanding: regular sanding.
.8 Grain direction vertical.
.5 Backs:
.1 Hardboard, 6 mm thick.
.6 Shelving and countertops:
.1 Softwood plywood:
.1 Thickness: 19 mm.
.2 Number of plies: 5.
.3 Face veneer: fir species, G2S grade.
.4 Back veneer: fir species, G2S grade.
.5 Core: veneer.
.6 Bond: Type II.
.7 Sanding: regular sanding.
.8 Grain direction longitudinal.

.2 Drawers:
.1 Fabricate drawers to AWMAC/WI NAAWS premium custom grade supplemented as follows:
.2 Sides and Backs.
.1 Solid wood: pine species, C Select grade, 13 mm thick.
.3 Bottoms:
.1 Softwood and poplar plywood square edge, 6 mm thick.
.4 Fronts:
.1 Softwood plywood:
.1 Thickness: 19 mm.
.2 Number of plies: 5.
.3 Face veneer: fir species, G2S grade.
.4 Back veneer: fir species, G2S grade.
.5 Core: veneer.
.6 Bond: Type II.
.7 Sanding: regular sanding.

.8 Grain direction longitudinal.

.3 Casework Doors:

.1 Fabricate doors to AWMAC/WI NAAWS premium grade supplemented as follows:

.2 Medium Density Fibreboard, fir veneer.

2.3 FRAMED PARTITION

.1 Framing for Partition W2

.1 Fabricate partition to AWMAC/WI NAAWS premium custom grade supplemented as follows:

.1 S4S Fir boards

.1 Dressed dimensions as indicated

.2 Fir decking

.1 NLGA Pattern 1(134)

2.4 FABRICATION

.1 Set nails and countersink screws apply stained plain wood filler to indentations, sand smooth and leave ready to receive finish.

.2 Shop install cabinet hardware for doors, shelves and drawers. Recess shelf standards unless noted otherwise.

.3 Shelving to cabinetwork to be adjustable unless otherwise noted.

.4 Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes and other fixtures.

.5 Shop assemble work for delivery to site in size easily handled and to ensure passage through building openings.

.6 Obtain governing dimensions before fabricating items which are to accommodate or abut appliances, equipment and other materials.

2.5 FINISHING

.1 Finish in accordance with Section 09 91 99.

## PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for architectural woodwork installation in accordance with manufacturer's 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 architectural woodwork to AWMAC/WI NAAWS.

.2 Install prefinished millwork at locations shown on drawings.
.1 Position accurately, level, plumb straight.

.3 Fasten and anchor millwork securely.
.1 Supply and install heavy duty fixture attachments for wall mounted cabinets.

.4 Use draw bolts in countertop joints.

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

.6 Apply water resistant building paper bituminous coating over wood framing members in contact with masonry or cementitious construction.

.7 Fit hardware accurately and securely in accordance with manufacturer's written instructions.

## 3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11.
.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.
.1 Clean millwork and cabinet work inside cupboards and drawers and outside surfaces.
.2 Remove excess glue from surfaces.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

## 3.4 PROTECTION

.1 Protect millwork and cabinet work from damage until final inspection.

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

.3 Repair damage to adjacent materials caused by architectural woodwork installation.

END OF SECTION

**PART 1- GENERAL**

1.1 **SUMMARY**

.1 Section Includes: Work includes all labor, materials, and equipment necessary to install all aspects of a portland cement plaster assembly.

**1.2 REFERENCES**

.1 ASTM C150/C150M-18 –Standard Specification for Portland Cement

.2 ASTM C847-14a – Standard Specification for Metal Lath

.3 ASTM C144-17 – Aggregate for Job-Mixed Portland Cement-Based Plaster

.4 ASTM C926-18a – Standard Specification for Application of Portland Cement-Based Plaster

.5 ASTM C1063-18b – Standard Specification for Installation of Lathing and Furring for Portland Cement Based Plaster

.6 PCA (Portland Cement Association) – Plaster (Stucco) Manual

**1.3 ASSEMBLY DESCRIPTION**

.1 General: Portland cement plaster is comprised of a water-resistive barrier, optional sheathing, lath, scratch, brown coats, and a finish coat. Minimum nominal 19mm cement thickness.

.2 Application Methods: The plaster may be applied by hand tools or machine pumps but must have sufficient force to adhere to the substrate.

**1.4 SUBMITTALS**

.1 Product Data: All product data sheets, evaluation reports, details, and warranty information that pertain to the project in accordance with Section 01 30 00.

.2 Samples: Submitted upon request.

.3 Samples of the finish coat shall be of an adequate size as required to represent each color and texture to be utilized on the project and produced using the same techniques and tools required to complete the project. No sample shall be less than 300 x 300mm.

.4 Retain approved samples at the construction site throughout the application process.

**1.5 QUALITY ASSURANCE**

.1 Prior to commencement of work, provide an on- site mock-up.

.2 Mock-up shall represent construction using the same quality/techniques to be utilized on the project.

.3 Retain approved mock-up at job site throughout the application process.

.4 Contractor shall acknowledge the SMA technical Bulletins and agree to follow same

.5 Submit letter at completion that the lath and plaster is installed per SMA recommendations.

**1.6 DELIVERY, STORAGE, AND HANDLING**

.1 Delivery: Deliver all materials to the construction site in their original, unopened packaging with labels intact.

.2 Inspection: Inspect the materials upon delivery to assure that specified products have been received. Report defects or discrepancies to the responsible party according to the construction documents; do not use reported material for application.

.3 Storage: Store all products per manufacturer’s recommendations. Generally, store materials in a cool, dry location; away from direct contact with the ground and/or concrete; out of direct sunlight; and protect from weather and other damage.

**1.7 PROJECT CONDITIONS**

.1 Environmental Requirements: Follow product manufacturer's recommendations for environmental conditions and surface preparation.

.2 Temperatures: Before, during and following the application of the Portland cement plaster, the ambient and surface temperatures must remain above 4 C for a minimum period of 24 hours. Protect stucco from uneven and excessive evaporation, especially during hot, dry and/or windy weather. Protect the Portland cement plaster from freezing for a period of not less than 24-hours after set has occurred.

.3 Substrates: Prior to installation, inspect the wall for surface contamination or other defects that may adversely affect the performance of the materials, and shall be free of residual moisture. Do not apply the Portland cement plaster to substrates whose temperature are less than 4 C or contain frost or ice.

.4 All wood based products covered shall be dry and have a moisture content below 19% . DO NOT COVER WET FRAMING.

.5 Inclement Weather: Protect applied material from deleterious effects until cured or dry.

.6 Existing Conditions:

Inspect the project prior to starting work and notify the Departmental Representative of any deficiencies that will negatively impact the plaster assembly. Do NOT proceed until remedied.

**1.8 SEQUENCING AND SCHEDULING**

.1 Sequencing: Coordinate the installation of the lath and Portland cement plaster with all other construction trades. To reduce stucco cracking,

apply plaster only after the building is 90 percent dead loaded and the interior gypsum has been installed.

.2 Plastering contractor shall request and attend a pre-installation meeting with general contractor and Departmental Representative prior to the framing being completed. Plastering contractor shall advise Departmental Representative of control/expansion joint layout concerns. There shall be no cost to the Departmental Representative for moving one-piece control joints prior and up to this meeting date, additional lineal footage of control joints from plans shall warrant a change order.

.3 Staffing: Provide sufficient manpower and proper supervision to ensure continuous operation, free of cold joints, scaffolding lines, curing, variations in texture, etc.

**1.9 WARRANTY**

.1 Warranty: Submit documentation on all products. At completion of work, contractor shall provide a written warranty documentation for the assembly and products used.

.2 Warranty Length: Shall start at the time of substantial completion.

**PART 2 - PRODUCTS**

**2.1 SCRATCH AND BROWN COAT (BASECOAT)**

.1 Cement: A Portland cement complying with ASTM C150/C150M.

.2 Sand:

.1 Field mixes shall comply with ASTM C926 and must have sand that is clean and free from deleterious amounts of loam, clay, silt, soluble salts and organic matter. Sampling and testing shall comply with ASTM C144.

.3 Water: Clean and potable without foreign matter.

**2.2 LATH**

.1 Welded Wire: 1.65mm, 50x50mm opening to ASTM C847.

**2.3 ACCESSORIES**

.1 Fasteners: Nails, staples, or screws used to rigidly secure lath and associated accessories shall be corrosion-resistant and meet the minimum requirements of ASTM C1063.

.2 Zinc and Zinc-Coated (Galvanized) Accessories: The following accessories shall be fabricated from zinc-coated (galvanized) steel

.3 Strip Mesh: Metal Lath, 1.5kg/$m^2$ expanded metal; 150mm wide x 400mm long.

.4 Vent Screed: Minimum 1.6mm thick; thickness governed by plaster thickness; minimum 102 mm width, double “V” profile, with perforated expanse between “V’s” of longest possible lengths.

.5 Casing Bead: Minimum 1.6mm thick; thickness governed by plaster thickness; maximum possible lengths; expanded metal flanges, with square edges.

**2.4 FINISHES**

.1 Portland cement-based blended stucco finish: see SMA list

.2 Color and Texture: Color and finish texture shall be as selected by the Departmental Representative.

**2.5 MIXES**

.1 Portland Cement Plaster Basecoats:

.1 Prescriptive Method: Ratios and Mix Design shall be per ASTM C926. Contractor shall select one of the following mixes (sand is per combined volume of cements):

.1 Portland Cement: 1 part, Masonry Cement: 1 part, Sand: 3 ½ to 4 ½ parts per Cement, Fibers: Maximum 85g per batch

.2 Portland Cement: 1 part; Lime (type S): ¼ to ½ part; Sand: 3 to 4 parts per cement & Lime; Fibers: Maximum 85g per batch

.2 Engineered Method: Pre-mix blends or silos per SMA manufacturer.

.2 Finish Coats: Mixing and tinting instructions are contained in the appropriate product data sheets by the SMA Manufacturer.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

.1 Prior to the application of the portland cement plaster basecoat the plastering contractor shall ensure that:

.1 Surface and site conditions are ready to receive work.

.2 Grounds and Blocking: Verify that the items within the walls for other sections of work have been installed.

.3 Notify Departmental Representative of any defects that may impact the finished assembly. Proceed as directed.

.2 Substrates:

1. Acceptable substrates must be sound, secure and suitable for lath and plaster.

2. Substrates and adjacent materials must be dry and clean. Substrate surface must be flat, free of protrusions or planar irregularities greater than 6mm in 3m.

.3 Flashings: All flashing around windows, at deck attachments, utility penetrations, roof lines, etc. and all kick-out flashing must be properly installed prior to application of portland cement plaster. Notify Departmental Representative if flashings are missing, proceed as directed.

.4 Unsatisfactory conditions or concerns shall be reported to the general contractor and/or builder and/or Departmental Representative and/or Departmental Representative. Do not proceed until directed in writing by Departmental Representative.

**3.2 PREPARATION**

.1 Substrate/Framing: inspect all work prior to starting lath and plastering. Notify Departmental Representative of any issues impacting performance, proceed as directed.

.2 Surrounding Areas: Protect surfaces near the work of this section from damage, disfiguration, and overspray. Mask off all dissimilar materials.

**3.3 INSTALLATION, GENERAL**

.1 General Installation: Refer to Ontario Building Code, ASTM C926, ASTM C1063, and/or the appropriate manufacturer's product data sheet for additional installation requirements and recommendations of the SMA.

**3.4 INSTALLING LATH/TRIMS**

.1 General: Installed per ASTM C1063 or per Departmental Representative's direction. Trims shall be full length and installed plumb/level to within 3mm in 2400mm.

.2 Weep screed shall be installed at the base of all framed walls.

.3 Trims shall be attached per the trim manufacturers instructions; however do not exceed 24 inches on center spacing.

.4 Apply lath per manufacturers recommendations. Laps shall occur at horizontal and vertical joints. Attach lath 150mm on center on CLT wall. Fastener shall penetrate wood by a minimum 19mm, penetration of wood based sheathing shall count as 50% of dimensional lumber. Metal framing by a minimum of three (3) full threads and engage the lath.

.5 Lath shall lap the flange of accessories by more than 50%.

.6 Control Joints: Installed per Departmental Representative's direction. Single-piece control joint may be installed over continuous lath if approved by Departmental Representative. If lath is discontinuous, framing shall support lath terminations. Notify Departmental Representative of issues or changes.

.7 Do not mix lath products on same wall.

.8 Avoid excessive laps with expanded metal lath

.9 Do not use rib lath on walls

.10 Use wire nose corner for cement finish, PVC nose for acrylic finish

.11 Lath shall cover more than 75% of solid flanges.

**3.5 INSTALLING PORTLAND CEMENT PLASTER**

.1 Per ASTM C926, apply Portland cement plaster by hand-troweling to a nominal thickness of 9.5mm for scratch coat. Then apply a second coat to a nominal thickness of 9.5 mm brown coat. Total basecoat shall be a nominal 19mm thickness.

.2 Scratch coat shall substantially cover the lath and be applied with sufficient pressure to encase the lath in cement. Slickers to apply cement plaster are prohibited. Score in a horizontal pattern.

.3 Allow to cure 48 hours, or until sufficiently rigid to accept a brown coat.

.4 Apply brown coat to fill and complete basecoat. Nominal 19mm thickness. Rod to a flat plane. Do not apply to frozen or soft scratch coat. When excess moisture leaves brown coat, hard float to provide densification per ATSM.

.5 Moist Curing: Provide sufficient moisture by fog or moist curing to permit proper hydration of the cementitious materials. The length of time and most effective procedure for curing will depend on climatic and job conditions. Refer to SMA curing guidelines.

**3.6 INSTALLING FINISH COAT**

.1 General: Mix and apply per manufacturer’s product data sheet.

.2 Do not apply to soft, contaminated or frozen basecoat.

.3 Avoid applying to excessively hot walls.

.4 Verification: Verify the desired color, material and texture to match the approved sample and/or mock-up prior to installation.

.5 Avoid scaffold lines and cold joints

.6 Fog coat (cement finish only) as needed to blend color variations

.7 Finish coat shall be free of eye catching imperfections.

**3.7 CLEANING/PATCHING/TOLERANCE**

.1 Cleaning: Remove any and all materials used, overspray from adjacent surfaces, and all protective masking.

.2 Patch and repair as needed, including but not limited to fog coating, imperfections and blisters.

.3 Cracks shall be repaired per the most current SMA Crack Policy (Technical Bulletin 4)

.4 The basecoat of plaster shall be in tolerance:

.1 Not to exceed 6mm in 3m.

.5 Eye catching variations in color or texture pattern will not be accepted.

**3.8 PROTECTION**

.1 Protection: Protect applied material from inclement weather until dry and prevent it from freezing for a minimum of 24-hours after set and/or

until dry. Refer to manufacturer’s product data sheet for additional requirements.

END OF SECTION

# PART 1 - GENERAL

## 1.1 RELATED SECTIONS

.1 Section 06 18 00: Glued-Laminated Construction.

## 1.2 DESIGN CRITERIA

.1 Fastener type and spacing to design wind loads and shear values to NBC 2015, Division B.
.2 Design wall system to accommodate specified erection tolerances of structure.

## 1.3 REFERENCES

.1 CSA International
  .1 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
  .2 CAN/CSA-Z809-16, Sustainable Forest Management.

.2 Forest Stewardship Council (FSC)
  .1 FSC-STD-01-001-(Version 4-0), FSC Principle and Criteria for Forest Stewardship.

.3 National Lumber Grading Authority (NLGA)
  .1 NLGA Standard Grading Rules for Canadian Lumber GR-2017.

.4 Sustainable Forestry Initiative (SFI)
  .1 SFI-2015-2019 Standards and Rules

# PART 2 - PRODUCTS

## 2.1 MATERIALS

.1 Siding:
  .1 Custom dressed, square edge Eastern White Cedar, “C and Better” finish, to paragraph 101c, NLGA “Standard Grading Rules for Canadian Lumber.”
  .2 Include premium for hand selected lumber
  .3 Moisture content: 15% or less
  .4 Vertical grain
  .5 Minimum lengths: 2440 mm

.2 Building paper: heavy-duty asphalt impregnated kraft paper. 2 layers, lapped minimum 400 mm.

.3 Fasteners: stainless steel.

.4 Galvanized steel sheet: commercial grade 1.2 mm thick with zinc-aluminum coating to ASTM A792/A792M, 25 microns in thickness.

.5 Black glass-fibre insect screen cloth.

.6 19 x 38 mm preservative-treated wood strapping.

.7 Self-adhesive waterproof membrane
- .1 Self-adhesive membrane composed of SBS modified buitumen and tri-laminated polyethylene.
- .2 Thickness: 1.5mm.
- .3 Underface: Silicone release film.
- .4 Top face: Tri-laminate woven polyethylene.
- .5 Tensile strength: 15.4 kN/m.
- .6 Ultimate elongation: 25%.
- .7 Tear resistance: 400N.
- .8 Lap adhesion: 2000N/m.
- .9 Water absorption: 0.1% max.
- .10 Peel resistance: 3500 N/m.
- .11 Water vapour permeanceL 0.49 ng/Pa*s*m2.
- .12 Crack cycling at -32, 100 cycles: Unaffected.
- .13 Resistance to hydraulic head: 114 m min.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

.1 Install lapped siding with grain oriented to shed water, as indicated. Cut off splits from board ends before installing. Randomly stagger vertical joints, minimum 400 mm offset.

.2 Provide digital photographs of cladding system installation complying with the requirements of Section 01 33 00.
- .1 Photograph each step of the installation to demonstrate, at a minimum:
  - .1 Substrate prior to installation.
  - .2 Lapping of building paper layers.
  - .3 Lapping of building paper over membrane flashing.
  - .4 Installation of strapping.
  - .5 Orientation of grain in board siding.
- .2 Failure to provide photographs will require disassembly of cladding to review concealed construction.

.3 Install sheet metal drip cap over horizontal surfaces as indicated.

.4 Install siding and accessories in accordance with National Building Code of Canada 2015, Division B, Section 9.27.

.5 Install level, plumb and straight to a tolerance of 1:500.

.6 Stagger adjoining laps minimum 1000 mm.

.7 Siding minimum 500 mm long.

.8 Wrap wood trim and plywood facing with sheet metal.

.9 Machine form aluminum trim to arch curvature and cut siding ends to fit tight to arch curvature.

.10 Apply sealant where detailed, at junction with other materials and around door and window perimeters.

END OF SECTION

# PART 1 - GENERAL

## 1.1 SECTION INCLUDES

.1 Materials and installation for sheet metal roofing.

## 1.2 RELATED SECTIONS

.1 Section 07 92 10 - Joint Sealing.

## 1.3 REFERENCES

.1 American Society for Testing and Materials International, (ASTM).
  .1 ASTM A167-99(2009), Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
  .2 ASTM A240/A240M-17, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
  .3 ASTM A792/A792M-10(2015), Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot Dip Process.
  .4 ASTM B32-08(2014), Standard Specification for Solder Metal.

.2 Canadian General Standards Board (CGSB).
  .1 CAN/CGSB-37.5-M89, Cutback Asphalt Plastic Cement.(Withdrawn)
  .2 CAN/CGSB-37.29-M89, Rubber-Asphalt Sealing Compound.(Withdrawn)
  .3 CAN/CGSB-51.32-M77, Sheathing, Membrane, Breather Type.

.3 Canadian Standards Association (CSA International).
  .1 CSA A123.3-05(R2015), Asphalt Saturated Organic Roofing Felt.

.4 Department of Justice Canada (Jus).
  .1 Canadian Environmental Protection Act (CEPA), 1999.

.5 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
  .1 Material Safety Data Sheets (MSDS).

.6 National Research Council Canada (NRC)/Institute for Research in Construction (IRC) - Canadian Construction Materials Centre (CCMC).
  .1 CCMC-2002, Registry of Product Evaluations.

.7 Transport Canada (TC).
  .1 Transportation of Dangerous Goods Act (TDGA), 1992.

## 1.4 SUBMITTALS

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

.2 Submit product data in accordance with Section 01 33 00.

.3 Submit WHMIS MSDS - Material Safety Data Sheets. WHMIS acceptable to Labour Canada, and Health and Welfare Canada.

.4 Submit product data sheets for bitumen roofing felts insulation. Include:
.1 Product characteristics.
.2 Performance criteria.
.3 Limitations.

.5 Submit shop drawings in accordance with Section 01 33 00.

.6 Indicate arrangements of sheets and joints, types and locations of fasteners and special shapes and relationship of panels to structural frame.

.7 Submit samples in accordance with Section 01 33 00.

.8 Submit 300 x 300 mm samples of each sheet metal material.

1.5 QUALITY ASSURANCE

.1 Submit mock-ups in accordance with Section 01 45 00.

.2 Fabricate 600 x 600 mm sample roofing panel using identical project materials and methods to include typical seam.

.3 Mock-up will be used:
.1 To judge workmanship, substrate preparation, operation of equipment and material application.

.4 Locate where directed.

.5 Allow 24 hours for inspection of mock-up by Departmental Representative before proceeding with sheet metal flashing work.

.6 When accepted, mock-up will demonstrate minimum standard of quality required for this Work. Approved mock-up may not remain as part of finished Work. Remove mock-up and dispose of materials when no longer required and when directed by Departmental Representative.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20.

## PART 2 - PRODUCTS

2.1 SHEET METAL MATERIALS

.1 Plain stainless steel sheet: to ASTM A167, Type 316L with, 0.4 mm minimum thickness

2.5 ACCESSORIES

.1 Isolation coating: alkali resistant bituminous paint.

.2 Plastic cement: to CAN/CGSB-37.5.

.3 Underlay:
- .1 2 layers self-adhesive membrane composed of SBS modified bitumen and tri-laminated polyethylene.
- .2 Thickness: 1.5mm.
- .3 Underface: Silicone release film.
- .4 Top face: Tri-laminate woven polyethylene.
- .5 Tensile strength: 15.4 kN/m.
- .6 Ultimate elongation: 25%.
- .7 Tear resistance: 400N.
- .8 Lap adhesion: 2000N/m.
- .9 Water absorption: 0.1% max.
- .10 Peel resistance: 3500 N/m.
- .11 Water vapour permeanceL 0.49 ng/Pa*s*m2.
- .12 Crack cycling at -32, 100 cycles: Unaffected.
- .13 Resistance to hydraulic head: 114 m min.

.4 Slip sheet: reinforced sisal paper or a heavy felt kraft paper.

.5 Sealant: Asbestos-free sealant, compatible with systems materials, recommended by system manufacturer.

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

.7 Fasteners: concealed.

.8 Washers: of same material as sheet metal, 1 mm thick with rubber packings.

.9 Solder: to ASTM B32.

.10 Flux: rosin, cut muriatic acid, or commercial preparation suitable for materials to be soldered.

## 2.6 FABRICATION

.1 Form individual pans in 3000 mm maximum lengths x 500 wide. Make allowances for expansion at joints.

.2 Hem exposed edges on underside 12 mm, mitre and seal.

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

.4 Apply minimum 0.2 mm dry film thickness coat of plastic cement to both faces of dissimilar metals in contact.

.5 Protect metals against oxidization by back painting with isolation coating where indicated.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

.1 Use concealed fastenings except where approved by Departmental Representative before installation.

.2 Provide underlay under sheet metal roofing. Secure in place and lap joints 100 mm minimum.

.3 Apply slip sheet over underlay to prevent bonding between sheet metal and underlayment. Secure with minimum anchorage and lap joints 50 mm minimum in direction of water flow.

.4 Install sheet metal roof panels using cleats spaced at 600 mm on centre.

.5 Secure cleats with two fasteners each and cover with cleat tabs.

.6 Stagger transverse seams in adjacent panels.

.7 Flash roof penetrations with material matching roof panels, and make watertight.

.8 Form seams in direction of water-flow and make watertight.

.9 Perform soldering with well heated coppers, heat seam thoroughly and sweat solder through its full width.

.10 Clean and flux metals before soldering.

.11 Follow sheet metal manufacturer's recommendations for soldering procedures.

.12 As work progresses, neutralize excess flux with 5% to 10% washing soda solution, and thoroughly rinse. Leave work clean and free of stains.

### 3.3 STANDING SEAM ROOFING

.1 Use .3 mm thick 600 mm wide by 2400 mm long sheets to make roofing with standing seams mm on centre without straight run of standing seam exceeding 10 m.

.2 Fold lower end of each pan under 20 mm.
.1 Slit fold 25 mm away from corner to form tab where pan turns up to make standing seam.
.2 Fold upper end of each pan over 50 mm.
.3 Hook 20 mm fold on lower end of upper pan into 50 mm fold on upper end of underlying pan.

.3 Apply sheet metal roofing beginning at eaves. Loose lock pans to edge strips at eaves.

.4 Finish standing seams 25 mm high on flat surfaces. Bend up one side edge

40 mm and other 45 mm.

.1 Make first fold 6 mm wide single fold and second fold 12 mm wide, providing locked portion of standing seam with 5 plies in thickness.

.2 Fold lower ends of seams at eaves over at 45 degrees angle.

.3 Terminate standing seams at ridge and hips by turning down in tapered fold.

END OF SECTION

# PART 1 - GENERAL

## 1.1 REFERENCES

.1 American Society for Testing and Materials International (ASTM)
  .1 ASTM A167-99(2009), Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
  .2 ASTM A240/A240M-17, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
  .3 ASTM B32-08(2014), Standard Specification for Solder Metal.

.2 Canadian Roofing Contractors Association (CRCA)
  .1 Roofing Specifications Manual 2012.

.3 Canadian Standards Association (CSA International)
  .1 AAMA/WDMA/CSA 101/I.S.2/A440-11(R2016), Standard/Specification for Windows, Doors, and Unit Skylights.
  .2 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.

.4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  .1 Material Safety Data Sheets (MSDS).

## 1.2 SUBMITTALS

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

.2 Product Data:
  .1 Submit manufacturer's printed product literature for sheet metal flashing systems materials, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
  .2 Submit two copies WHMIS MSDS - Material Safety Data Sheets.

.3 Shop Drawings:
  .1 Shop drawings: submit drawings indicating proposed installation methods.

.4 Quality assurance submittals: submit following in accordance with Section 01 45 00.
  .1 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, and installation sequence.

## 1.3 QUALITY ASSURANCE

.1 Pre-Installation Meetings: convene pre-installation meeting one week prior to beginning work of this Section and on-site installation, with contractor's representative and Departmental Representative in accordance with Section 01 32 16 to:
  .1 Verify project requirements.
  .2 Review installation and substrate conditions.

.3 Co-ordination with other building sub-trades.
.4 Review manufacturer's installation instructions and warranty requirements.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00.

.2 Waste Management and Disposal:
.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20.

## PART 2 - PRODUCTS

2.1 SHEET METAL MATERIALS

.1 Plain stainless steel sheet: to ASTM A240/A240M, Type 316L, 0.4 mm minimum thickness.

2.2 ACCESSORIES

.1 Underlay for metal flashing:
.1 2 layers self-adhesive membrane composed of SBS modified bitumen and tri-laminated polyethylene.
.2 Thickness: 1.5mm.
.3 Underface: Silicone release film.
.4 Top face: Tri-laminate woven polyethylene.
.5 Tensile strength: 15.4 kN/m.
.6 Ultimate elongation: 25%.
.7 Tear resistance: 400N.
.8 Lap adhesion: 2000N/m.
.9 Water absorption: 0.1% max.
.10 Peel resistance: 3500 N/m.
.11 Water vapour permeanceL 0.49 ng/Pa*s*m2.
.12 Crack cycling at -32, 100 cycles: Unaffected.
.13 Resistance to hydraulic head: 114 m min.

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

.3 Fasteners: of same material as sheet metal, to CSA B111, flat head roofing nails of length and thickness suitable for metal flashing application.

.4 Washers: of same material as sheet metal, 1 mm thick with rubber packings.

.5 Solder: to ASTM B32.

.6 Flux: rosin, cut hydrochloric acid, or commercial preparation suitable for materials to be soldered.

2.3 FABRICATION

.1 Fabricate metal flashings and other sheet metal work as indicated.

.2 Form pieces in 2400 mm maximum lengths.
.1 Make allowance for expansion at joints.

.3 Hem exposed edges on underside 12 mm.
.1 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 to metal surfaces to be embedded in concrete or mortar.

### 2.4 METAL FLASHINGS

.1 Form flashings, copings and fascias to profiles indicated of .3 mm thick stainless steel sheet.

## PART 3 - EXECUTION

### 3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

### 3.2 INSTALLATION

.1 Install sheet metal work as detailed.

.2 Use concealed fastenings except where approved before installation.

.3 Provide underlay under sheet metal.
.1 Secure in place and lap joints 100 mm.

.4 Lock end joints and solder.

.5 Turn top edge of flashing into recessed reglet or mortar joint minimum of 25 mm. Lead wedge flashing securely into joint.

.6 Install pans around items projecting through roof membrane, solder joints to provide water-tight connections.

### 3.3 CLEANING

.1 Proceed in accordance with Section 01 74 11.

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

.3 Leave work areas clean, free from grease, finger marks and stains.

END OF SECTION

## PART 1 - GENERAL

### 1.1 SECTION INCLUDES

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

.2 Text to complete other various Sections containing sealant or caulking specifications.

### 1.2 REFERENCES

.1 American Society for Testing and Materials International, (ASTM)
.1 ASTM C920-18, Standard Specification for Elastomeric Joint Sealants.

.2 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-19.13-M87, Sealing Compound, One-component, Elastomeric, Chemical Curing.
.2 CAN/CGSB-19.17-M90, One-Component Acrylic Emulsion Base Sealing Compound.

.3 Department of Justice Canada (Jus)
.1 Canadian Environmental Protection Act, 1999 (CEPA).

.4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
.1 Material Safety Data Sheets (MSDS).

.5 Transport Canada (TC)
.1 Transportation of Dangerous Goods Act, 1992 (TDGA).

### 1.3 SUBMITTALS

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

.2 Manufacturer's product to describe.
.1 Caulking compound.
.2 Primers.
.3 Sealing compound, each type, including compatibility when different sealants are in contact with each other.

.3 Submit samples in accordance with Section 01 33 00.

.4 Submit duplicate samples of each type of material and colour.

.5 Cured samples of exposed sealants for each color where required to match adjacent material.

.6 Submit manufacturer's instructions in accordance with Section 01 33 00.
.1 Instructions to include installation instructions for each

product used.

## 1.4 QUALITY ASSURANCE/MOCK-UP

.1 Construct mock-up in accordance with Section 01 45 00.

.2 Construct mock-up to show location, size, shape and depth of joints complete with back-up material, primer, caulking and sealant.

.3 Mock-up will be used:
.1 To judge workmanship, substrate preparation, operation of equipment and material application.

.4 Locate where directed.

.5 Allow 24 hours for inspection of mock-up by Departmental Representative before proceeding with sealant work.

.6 When accepted, mock-up will demonstrate minimum standard of quality required for this Work. Approved mock-up may remain as part of finished Work. Remove mock-up and dispose of materials when no longer required and when directed by Departmental Representative.

## 1.5 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, handle, store and protect materials in accordance with Section 01 61 00.

.2 Deliver and store materials in original wrappings and containers with manufacturer's seals and labels, intact. Protect from freezing, moisture, water and contact with ground or floor.

## 1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20.

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

.3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

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

.5 Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Regional and Municipal regulations.

.6 Unused sealant material must not be disposed of into sewer system, into streams, lakes, onto ground or in other location where it will pose health or environmental hazard.

.7 Divert unused joint sealing material from landfill to official hazardous material collections site approved by Departmental Representative.

.8 Empty plastic joint sealer containers are not recyclable. Do not dispose of empty containers with plastic materials destined for recycling.

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

## 1.7 PROJECT CONDITIONS

.1 Environmental Limitations:
.1 Do not proceed with installation of joint sealants under following conditions:
.1 When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 4.4°C.
.2 When joint substrates are wet.

.2 Joint-Width Conditions:
.1 Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.

.3 Joint-Substrate Conditions:
.1 Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

## 1.8 ENVIRONMENTAL REQUIREMENTS

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

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

# PART 2 - PRODUCTS

## 2.1 SEALANT MATERIALS

.1 Do not use caulking that emits strong odours, contains toxic chemicals or is not certified as mould resistant in air handling units.

.2 When low toxicity caulks are not possible, confine usage to areas

which offgas to exterior, are contained behind air barriers, or are applied several months before occupancy to maximize offgas time.

.3 Where sealants are qualified with primers use only these primers.

## 2.2 SEALANT MATERIAL DESIGNATIONS

.1 Type 1: Silicones One Part.
.1 To CAN/CGSB-19.13 or ASTM C920, primerless, Type S, Grade NS, Class 25 50 100, SWRI validated.

.2 Type 2: Acrylic Latex One Part.
.1 To CAN/CGSB-19.17.

## 2.3 SEALANT SELECTION

.1 Wood windows: Sealant type: 1.

.2 Concrete formwork: Sealant type: 2.

## 2.4 JOINT CLEANER

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

.2 Primer: as recommended by manufacturer.

# PART 3 - EXECUTION

## 3.1 PROTECTION

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

## 3.2 SURFACE PREPARATION

.1 Examine joint sizes and conditions to establish correct depth to width relationship for installation of backup materials and sealants.

.2 Clean bonding joint surfaces of harmful matter substances including dust, rust, oil grease, and other matter which may impair Work.

.3 Do not apply sealants to joint surfaces treated with sealer, curing compound, water repellent, or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.

.4 Ensure joint surfaces are dry and frost free.

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

## 3.3 PRIMING

.1 Where necessary to prevent staining, mask adjacent surfaces prior to priming and caulking.

.2 Prime sides of joints in accordance with sealant manufacturer's instructions immediately prior to caulking.

## 3.4 APPLICATION

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

.2 Curing.
.1 Cure sealants in accordance with sealant manufacturer's instructions.
.2 Do not cover up sealants until proper curing has taken place.

.3 Cleanup.
.1 Clean adjacent surfaces immediately and leave Work neat and clean.
.2 Remove excess and droppings, using recommended cleaners as work progresses.
.3 Remove masking tape after initial set of sealant.

END OF SECTION

**PART 1 - GENERAL**

1.1 Related Requirements

.1 Section 08 03 52 – Wood Doors and Windows

1.2 References

.1 Deutsches Institut für Normung, (DIN)
- .1 DIN 18542:2009, Sealing of outside wall joints with impregnated sealing tapes made of cellular plastics - Impregnated sealing tapes - Requirements and testing
- .2 DIN EN 12667:2001 Thermal Performance of Building Materials and Products - Determination of Thermal Resistance by Means of Guarded Hot Plate and Heat Flow Meter Methods - Products of High and Medium Thermal Resistance; English Version Of DIN 12667
- .3 DIN 4102-1: 1998 Fire behaviour of building materials and building components - Part 1: Building materials; concepts, requirements and tests

.2 American Society for Testing and Materials (ASTM)
- .1 ASTM E330/E330M-14: Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference
- .2 ASTM E331-00(2016) Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference

.3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
- .1 Material Safety Data Sheets (MSDS).

1.3 Action and Informational Submittals

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

.2 Manufacturer's product data to describe:
- .1 Physical properties and performance characteristics
- .2 Dimensions

.3 Submit samples in accordance with Section 01 33 00.

.4 Submit duplicate samples of each type of material and colour.

.5 Submit manufacturer's instructions in accordance with Section 01 33 00.
- .1 Instructions to include installation instructions for each product used.

1.4 Quality Assurance/Mock-Ups

.1 Construct mock-up in accordance with Section 01 45 00.

.2 Construct mock-up to show location, size, shape, depth and adhesion of joints complete with back-up material, primer, caulking and sealant. Allow for four mock-ups on different substrates.

.3 Mock-up will be used:
.1 To judge workmanship, substrate preparation, operation of equipment and material application.

.4 Locate where directed.

.5 Allow 24 hours for inspection of mock-up by Departmental Representative before proceeding with sealant work.

.6 When accepted, mock-up will demonstrate minimum standard of quality required for this Work. Approved mock-up may remain as part of finished Work.

1.5 Delivery, Storage, and Handling

.1 Deliver, handle, store and protect materials in accordance with Section 01 61 00.

.2 Deliver and store materials in original wrappings and containers with manufacturer's seals and labels, intact. Protect from freezing, moisture, water and contact with ground or floor.

1.6 Waste Management and Disposal

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20.

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

.3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

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

.5 Unused material must not be disposed of into sewer system, into streams, lakes, onto ground or in other location where it will pose health or environmental hazard.

.6 Divert unused material from landfill to official hazardous material collections site approved by Departmental Representative.

1.7 Site Conditions

.1 Environmental Limitations:
.1 Do not proceed with installation of compressible foam tape when ambient and substrate temperature conditions are outside limits

permitted by tape manufacturer.

.2 Joint-Width Conditions:
.1 Do not proceed with installation of compressible foam tape where joint widths are greater or less than those allowed by tape manufacturer for applications indicated.

.3 Joint-Substrate Conditions:
.1 Do not proceed with installation of compressible foam tape until contaminants capable of interfering with adhesion are removed from joint substrates.

1.8 Environmental Requirements

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

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

**PART 2 - PRODUCTS**

2.1 Sealant Materials

.1 Pre-compressed, self-expanding joint sealing tape based on polyurethane soft foam with acrylate dispersion impregnation, accessory agents and filling agents with the following properties:
.1 Resistance to wind loading: 3.6 kN/m² uniform load deflection and 9kN/ m² uniform load structural in accordance with ASTM E330/E330M-14.
.2 Air tightness: 0.00004 $m^3$s at .075 kN/m² and 0.00015 $m^3$s at 0.3 kN/m².
.3 Resistance to water penetration: ≥1050 Pa when tested in accordance with ASTM E331-00.
.4 Compatibility with adjoining materials: No corrosion, staining or discolouration when tested in accordance with DIN 18542
.5 Thermal conductance: $\lambda = 0.0412$ W/mK when tested in accordance with DIN 12667.

**PART 3 - EXECUTION**

3.1 Protection

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

3.2 Surface Preparation

.1 Examine joint sizes and conditions to establish correct depth to width relationship for installation of tape.

.2 Ensure joint surfaces are dry and frost free.

.3 Prepare surfaces in accordance with manufacturer's directions.

3.3 Application

.1 Install in accordance with manufacturer’s written instructions.

END OF SECTION

## PART 1 GENERAL

1.1 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA O141-05, Softwood Lumber.

.2 CAN/CSA-Z809-16, Sustainable Forest Management.

.2 National Lumber Grading Authority (NLGA)

.1 NLGA Standard Grading Rules for Canadian Lumber GR-2007.

.3 Architectural Woodwork Manufacturers Association of Canada (AWMAC), Woodwork Institute (WI).

.1 AWMAC/WI North American Architectural Woodwork Standards, NAAWS Edition 3-2017.

.4 .Forest Stewardship Council (FSC)

.1 FSC-STD-01-001-2015, FSC Principle and Criteria for Forest Stewardship V5-2.

.2 FSC-STD-20-002-2009, Structure and Content of Forest Stewardship Standards V3-0.

### 1.2 DEFINITIONS

.1 Bead: a small, linear moulding with a round cross-section that ranges from quarter round to three quarter round.

.2 Run through: the tenon is allowed to run through the mortised member for wedging.

.3 Wedged: a wood wedge used in a dovetail-shaped mortise to secure a tenon.

.4 Draw-bore pin: a tapered wood peg used to fasten a mortise and tenon joint.

.5 Blind mortise: a mortise joint in which the tenon is entirely surrounded by wood.

.6 Dowelled sash: a wood sash with rails and stiles fastened with dowels rather than tenons.

.7 Tongued: a projecting portion of a member, such as a tenon.

.8 Half-lapped: a lap joint in which a rectangular notch in the end of one wood member overlaps a corresponding rectangular notch in the end of another wood member.

.9 Stop chamfered: a corner chamfer that does not extend to the end of the timber or moulding; typically terminated with a small, triangular plane surface.

### 1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Shop drawings:

.1 Submit drawings.

.1 Indicate materials and details, including assemblies, in large-scale for each replicated sash type, full-size profiles of components, elevations of unit, description of related components and exposed finishes, weatherstripping, and fasteners.

.2 Prior to preparation of shop drawings, take field measurements as material is removed to confirm dimensions and details.

.3 Samples:

.1 Submit for review and acceptance of each unit.

.2 Samples will be returned for inclusion into work.

.3 Include glazing, weatherstripping, surface finish and hardware.

**1.4 CLOSEOUT SUBMITTALS**

.1 Submit in accordance with Section 01 78 00.

.2 Operation and Maintenance Data: submit operation and maintenance data for windows for incorporation into manual.

**1.5 QUALITY ASSURANCE**

.1 Arrange for Departmental Representative to inspect period wood door and window fabrication shop during the Work.

.2 Qualifications:

.1 Carry out window fabrication work using skilled tradesperson trained and experienced in fabrication and installation of wood windows.

**1.6 DELIVERY, STORAGE AND HANDLING**

.1 Deliver, store and handle materials in accordance with Section 01 61 00 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 windows from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

.4 Packaging Waste Management: remove for reuse and return of pallets, crates, padding, and packaging materials in accordance with Section 01 74 20.

### 1.7 WARRANTY

.1 The warranty period to be as follows:

.1 New wood sashes and related accessories: 2 years.

.1 Workmanship, including warping, fit and operation: 2 years.

## 2 PRODUCTS

### 2.1 MATERIALS

.1 Lumber, in accordance with the following standards:

.1 CAN/CSA-O141 and National Lumber Grades Authority (NLGA) requirements for Clear Window Stock (Clr-WS), with maximum moisture content of 12%.

.2 National Hardwood Lumber Association (NHLA) requirements, moisture content of maximum 12%.

.3 CAN/CSA-Z809, Sustainable Forest Management.

.4 FSC-STD-01-001, FSC Principle and Criteria for Forest Stewardship V5-2.

.5 FSC-STD-20-002-2009, Structure and Content of Forest Stewardship Standards V3-0.

.2 Glazing: in accordance with Section 08 03 80.

.3 Finishes: in accordance with Section 09 91 99.

### 2.2 FABRICATION

.1 Stiles and rails to be one piece solid stock.

.1 Grade: Clear.

.2 Material: stiles and rails to be made from Douglas fir, quarter sawn, with edge grain to the weather. Moisture content of components not to exceed 10 percent at time of fabrication to be from six to twelve percent. Pegs and wedges to be oak 10 mm square or slightly diamond shaped.

.2 Construction:

.1 Mortise and Tenon:

.1 Top rail and stile single through mortise and tenon wedged draw-bore pegged.

.2 Meeting rail and stile single dovetailed through mortise and tenon and draw-bore pegged.

.3 Bottom rail and stile single through mortise and tenon run through wedged draw-bore pegged.

.3 Dry fit and assemble window components before completing fabrication.

.4 Fabricate units square and true with maximum tolerance of plus or minus 1.5 mm for units with a diagonal measurement of 1800 mm or less and plus or minus 3 mm for units with a diagonal measurement over 1800 mm.

.5 Once stiles and rails are ready for assembly prime end grain and inside mortice and tenons with linseed oil before assembly in accordance with Section 09 91 99.

## 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.

.1 Visually inspect substrate.

.1 The outside faces of frames, top and sides, to be finished in accordance with Section 09 91 99 before sash installation.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied.

### 3.2 INSTALLATION

.1 Install weatherstripping, sashes, related wood window components and hardware as indicated.

### 3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11.

.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.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.

### 3.4 PROTECTION

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

.2 Repair damage to adjacent materials caused by door and window installation.

**END OF SECTION**

## PART 1 GENERAL

### 1.1 REFERENCES

.1 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-12.1-2017, Tempered or Laminated Safety Glass.

### 1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Product Data:

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

.3 Samples:

.1 Submit for review and acceptance of each unit.

.2 Submit 150 x 150 mm size samples of glass including bird deterrent film.

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

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

### 1.3 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00.

.2 Operation and Maintenance Data: submit operation and maintenance data for glazing for incorporation into manual.

### 1.4 QUALITY ASSURANCE

.1 Mock-Ups:

.1 Construct mock-ups in accordance with Section 01 45 00.

.2 Construct mock-up to include glass setting for each glazing type, and putty installation.

.3 Mock-up will be used:

.1 To judge quality of work, substrate preparation, operation of equipment and material application.

.4 Locate where directed.

.5 Allow 72 hours for inspection of mock-up before proceeding with work.

.6 When accepted, mock-up will demonstrate minimum standard of quality required for this work. Approved mock-up may remain as part of finished work.

1.5 **DELIVERY, STORAGE AND HANDLING**

.1 Deliver, store and handle materials in accordance with Section 01 61 00 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 glazing materials off ground and glazing compounds indoors between 18 degrees C and 23 degrees C and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect glazing and accessories from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

.4 Packaging Waste Management: remove for reuse and return of pallets, crates, padding, and packaging materials in accordance with Section 01 74 20.

1.6 **AMBIENT CONDITIONS**

.1 Ambient Requirements:

.1 Install glazing compounds when ambient temperature is 10 degrees C minimum. Maintain ventilated environment for 24 hours after application.

.2 Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

## PART 2 PRODUCTS

2.1 **MATERIALS**

.1 Flat Glass:

.1 Tempered glass, to CAN/CGSB-12.1-M90, clear, 6mm thick.

2.2 **JALOUSIES**

.1 Slats: 100 mm wide, 3mm thick, frosted float glass, 90˚ opening.

.2 Extruded aluminum frame, clear anodized, A41 finish.

.3 Single lift handle per opening.

.4 Insect screen.

2.3 **ACCESSORIES**

.1 Setting blocks: Eastern white pine, minimum 40 mm x width of glazing x 2-3 mm height.

.2 Interior glazing tape: adhesive and elastic, cross-linked butyl preformed tape with a continuous integral EPDM shim.

.3 Exterior glazing tape: 100% solid Polyisobutylene cross-linked butyl, preformed sealant.

.4 Bird deterrent film: clear self-adhesive film with dot pattern, recognized by FLAP Canada as an effective bird deterrent. Provide for 100% of glass area.

## PART 3 EXECUTION

### 3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for glazing installation in accordance with manufacturer's written instructions.

.1 Verify that openings for glazing are correctly sized and within tolerance.

.2 Verify that surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.

.3 Visually inspect substrate.

.4 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.5 Proceed with installation only after unacceptable conditions have been remedied.

### 3.2 INSTALLATION

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

.2 Perform work in accordance with GANA Glazing Manual for glazing installation methods.

.3 Apply patterned film on exterior of all glass.

.4 Cut glazing tape to length; install on glazing light. Seal corners by butting tape and sealing junctions with sealant.

.5 Place setting blocks at 1/4 points, with edge block maximum 150 mm from corners.

.6 Rest glazing on setting blocks and push against fixed stop with sufficient pressure to attain full contact.

.7 Install removable stops without displacing glazing tape. Exert pressure for full continuous contact.

.8 Trim protruding tape edge.

### 3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11.

.1 Leave Work area clean at end of each day.

.1 Remove traces of primer, caulking.

.2 Remove glazing materials from finish surfaces.

.3 Remove labels.

.4 Clean glass using approved non-abrasive cleaner in accordance with manufacturer's instructions.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.

3.4 **PROTECTION**

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

.2 Repair damage to adjacent materials caused by glazing installation.

**END OF SECTION**

**PART 1 - GENERAL**

1.1 REFERENCES

.1 American Society for Testing and Materials International (ASTM)
.1 ASTM A653/A653M-17, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.2 Canadian Standards Association (CSA International)
.1 CSA-G40.20-13/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
.2 CSA W59-2018, Welded Steel Construction (Metal Arc Welding).

.3 Canadian Steel Door Manufacturers' Association (CSDMA)
.1 CSDMA, Recommended Specifications for Commercial Steel Doors and Frames, 2006.
.2 CSDMA, Selection and Usage Guide for Commercial Steel Doors, 2009.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Provide product data: in accordance with Section 01 33 00.

.3 Provide shop drawings: in accordance with Section 01 33 00.
.1 Indicate each type of door, material, steel core thicknesses, mortises, reinforcements, location of exposed fasteners, openings, glazing, arrangement of hardware and fire rating.
.2 Indicate each type frame material, core thickness, reinforcements, glazing stops, location of anchors and exposed fastenings and fire rating.
.3 Include schedule identifying each unit, with door marks and numbers relating to numbering on drawings and door schedule.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00.

.2 Waste Management and Disposal:
.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20.

**PART 2 - PRODUCTS**

2.1 MATERIALS

.1 Hot dipped galvanized steel sheet: to ASTM A653/A653M, minimum base steel thickness in accordance with CSDMA Table 1 - Thickness for Component Parts.

2.2 ADHESIVES

.1 Honeycomb cores and steel components: heat resistant, spray grade, resin reinforced neoprene/rubber (polychloroprene) based, low viscosity, contact cement.
.1 Adhesive: maximum VOC content 50 g/L to SCAQMD Rule 1168.

2.3 PRIMER

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

2.4 PAINT

.1 Field paint steel doors in accordance with Section 09 91 99. Protect weatherstrips from paint. Provide final finish free of scratches or other blemishes.
.1 Maximum VOC emission level 50 g/L to SCAQMD Rule 1113.

2.5 ACCESSORIES

.1 Exterior and interior top and bottom caps: steel.

.2 Metallic paste filler: to manufacturer's standard.

2.6 DOOR FABRICATION GENERAL

.1 Doors: suspended pivot operation, flush, with provision for glass and/or louvre openings as indicated.
.2 Fabricate doors with longitudinal edges welded. Seams: visible.
.3 Blank, reinforce, drill doors and tap for mortised, templated hardware to suit design.

.5 Factory prepare holes 12.7 mm diameter and larger except mounting and through-bolt holes, on site, at time of hardware installation.

.6 Reinforce doors where required, for surface mounted hardware. Provide flush steel top caps to exterior doors.

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

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

2.7 HOLLOW STEEL CONSTRUCTION

.1 Form face sheets for exterior doors from 1.6 mm sheet steel.

.2 Form face sheets for interior doors from 1.6 sheet steel.

.3 Reinforce doors with vertical stiffeners, securely welded to face sheets at 150 mm on centre maximum.

.4 Fill voids between stiffeners with polystyrene core.

**PART 3 - EXECUTION**

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 PAINTING

.1 Paint in accordance with the requirements of Section 09 91 99.

3.3 DOOR INSTALLATION

.1 Install doors and hardware in accordance with hardware templates and manufacturer's instructions and Section 08 71 10.

.2 Provide even margins between doors and jambs and doors and finished floor and thresholds as follows.
.1 Hinge side: 1.0 mm.
.2 Finished floor: 13 mm.
.3 Latch side and head: 1.5mm.

.3 Adjust operable parts for correct function.

3.4 FINISH REPAIRS

.1 Touch up with primer finishes damaged during installation.

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

END OF SECTION

# PART 1 - GENERAL

## 1.1 REFERENCES

.1 ASTM
.1 ASTM B209-14 Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate

.2 CSA International
.1 AAMA/WDMA/CSA-101/I.S.2/A440-11(R2016), NAFS - North American Fenestration Standard/ Specification for Windows, Doors and Skylights.
.2 AAMA/WDMA/CSA-101/I.S.2/A440S1-17, Canadian Supplement to AAMA/WDMA/CSA-101/I.S.2/A440-11, NAFS - North American Fenestration Standard/Specification for Windows, Doors and Skylights.
.3 CAN/CSA-A440.4-07(R2016), Window, Door, and Skylight Installation.

.3 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
.1 SCAQMD Rule 1168-A2017, Adhesives and Sealants Applications.

## 1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for skylight, frame, fasteners, and caulking and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:
.1 Indicate size and description of components, materials, attachment devices, description of frame and finish, and construction details.

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

.5 Manufacturers Reports:
.1 Manufacturer's Field Reports: submit manufacturer's written reports within 3 days of review, verifying compliance of Work, as described in Part 3 - FIELD QUALITY CONTROL.

.6 Manufacturer's Instructions: submit manufacturer's installation instructions.

.7 Sustainable Design Submittals:
.1 Construction Waste Management:
.1 Submit project Waste Reduction Workplan highlighting recycling and salvage requirements.
.2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 75% of

construction wastes were recycled or salvaged.

.2 Recycled Content:

.1 Submit listing of recycled content products used, including details of required percentages or recycled content materials and products, showing their costs and percentages of post-consumer and post-industrial content, and total cost of materials for project.

.3 Low-Emitting Materials:

.1 Submit listing of adhesives and sealants and paints and coatings used in building, showing compliance with VOC and chemical component limits or restrictions requirements.

1.3 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00.

.2 Operation and Maintenance Data: submit operation and maintenance data for skylights for incorporation into manual.

1.4 QUALITY ASSURANCE

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

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 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 skylights and frames from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

.4 Develop Waste Reduction Workplan related to Work of this Section and in accordance with Section 01 74 20.

.5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding and packaging materials as specified in Waste Reduction Workplan in accordance with Section 01 74 20.

## PART 2 - PRODUCTS

2.1 Fixed Curb Mounted (FCM) Unit Skylights

.1 System Description: Fixed curb mounted unit skylight with a roll-formed aluminum frame counter-flashing joined by corner keys, an interior condensation drainage gasket, an insulated glass unit, structural sealant, mounting fasteners, flashing and accessories, as required to meet installation and performance requirements indicated. FCM skylights shall be suitable for installation on roof curbs ranging from 0 degrees up to 60 degrees from horizontal.

.2 Aluminum Frame Counter-flashing: Maintenance-free, roll-formed aluminum, 1.5 mm thick with neutral grey polyvinylidene fluoride resin finish. Counter-flashing frames joined with neutral grey corner keys constructed from injection molded Acrylonitrile Styrene Acrylate.

.1 Unit Sizes: as indicated on Drawings.

.3 Condensation Drainage Gasket: Factory applied black thermoplastic rubber gasket mounted around the entire interior aluminum frame assembly providing a thermal break weather seal and drainage for interior condensation.

.4 Insulated Glass Unit: Factory assembled with low emissivity exterior pane and clear interior pane separated by a stainless steel spacer sealing the space between panes with 95% argon gas.

.1 Exterior Pane: 4mm thick tempered glass with interior surface coated with three layers of low emissivity silver coatings.

.2 Interior Pane:

a. Tempered, Clear 3mm tempered glass

.5 Structural Sealant: Factory applied silicone sealant, black color, bonding the glass pane to the aluminum frame and suitable for external exposure.

a. Head flashing 0.57 mm thick aluminum with polyester lacquer finish.

b. Sill flashing 0.65 mm thick aluminum with polyester lacquer finish.

c. Step pieces 0.57 mm thick aluminum with polyester lacquer finish.

d. Adhesive underlayment: 229 mm wide x 6.4 m length x 0.8 mm thick, SBS modified bitumen with white polyethylene backing sheet.

2.2 Flashings

.1 Step Flashing: Roll formed aluminum, neutral grey finish, factory engineered and fabricated seams, consisting of head flashing, sill flashing, step flashing pieces and adhesive underlayment suitable for use with 100 mm curbs on flat roofs.

.1 Size: As required for skylight sizes indicated.

.2 Material:

a. Head flashing 0.57 mm thick aluminum with polyester lacquer finish.

b. Sill flashing 0.65 mm thick aluminum with Kynar 500 finish.

c. Step pieces 0.57 mm thick aluminum with polyester lacquer finish.

d. Adhesive underlayment: 229 mm wide x 6.4 m length x 0.03 inch 0.8 mm thick, SBS modified bitumen with white polyethylene backing sheet.

2.3 PERFORMANCE REQUIREMENTS

.1 Unit Skylight Standard, AAMA/WDMA/CSA 101/I.S.2/A440-17
.1 Water Test Pressure: 0.72 kPa with no leakage at 5 gallons per minute spray rate.
.2 Canadian Air Infiltration/Exfiltration Rating: Fixed. 0.2 L/s/$m^2$ maximum

2.4 MATERIALS

.1 Aluminum Sheet: Flat sheet complying with ASTM B209.

2.5 FINISHES
.1 Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
.2 Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
.2 Proceed with unit skylight installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

.1 Install unit skylights in accordance with manufacturer's written instructions and approved shop drawings. Coordinate installation of units with installation of substrates, air and vapor retarders, roof insulation, roofing membrane, and flashing as required to ensure that each element of the Work performs properly and that finished installation is weather tight.
.1 Anchor unit skylights securely to supporting substrates.
.2 Install unit skylights on curbs specified in another section with tops of curbs parallel to finished roof slope.
.2 Where metal surfaces of unit skylights will contact incompatible metal or corrosive substrates, including preservative-treated wood, apply

bituminous coating on concealed metal surfaces, or provide other permanent separation recommended in writing by unit skylight manufacturer.

.3 Install unit skylight curb counter-flashing to produce weatherproof seal with curb and overlap with roofing system termination at top of curb.

3.3 CLEANING AND PROTECTION

.1 Clean exposed unit skylight surfaces according to manufacturer's written instructions. Touch up damaged metal coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

.1 Replace glazing that has been damaged during construction period.

.2 Protect unit skylight surfaces from contact with contaminating substances resulting from construction operations.

END OF SECTION

# PART 1 - GENERAL

## 1.1 REFERENCES

.1 American National Standards Institute (ANSI)/ Builders Hardware Manufacturers Association (BHMA)
- .1 ANSI/BHMA A156.9-2015, Cabinet Hardware.
- .2 ANSI/BHMA A156.11-2014, Cabinet Locks.
- .3 ANSI/BHMA A156.16-2013, Auxiliary Hardware.
- .4 ANSI/BHMA A156.18-2016, Materials and Finishes.
- .5 ANSI/BHMA A156.20-2006(R2012), Strap and Tee Hinges and Hasps.

## 1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for cabinet hardware and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Hardware List:
- .1 Submit contract hardware list.
- .2 Indicate specified hardware, including make, model, material, function, finish and other pertinent information.

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

.5 Manufacturer's Instructions: submit manufacturer's installation instructions.

## 1.3 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00.

.2 Operation and Maintenance Data: submit operation and maintenance data for cabinet hardware for incorporation into manual.

## 1.4 QUALITY ASSURANCE

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

## 1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 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 Package items of hardware including fastenings, separately or in like groups of hardware, label each package as to item definition and location.

.4 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 cabinet hardware from nicks, scratches, and blemishes.
.3 Protect prefinished surfaces with wrapping strippable coating.
.4 Replace defective or damaged materials with new.

.5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding and packaging materials as specified in Waste Reduction Workplan in accordance with Section 01 74 20.

## PART 2 - PRODUCTS

### 2.1 HARDWARE ITEMS

.1 Use one manufacturer's product for all similar items.

### 2.2 CABINET HARDWARE

.1 Cabinet hardware: to ANSI/BHMA A156.9, designated by letter B and numeral identifiers as listed below.
.1 Hinges: frameless concealed hinges, type B01602.
.2 Shelf brackets: Installed in holes drilled to receive, type B04013.
.3 Drawer slides: side mounted drawer slides, type B05051.
.4 Back mounter pulls: Wire D-pulls, type B52011

### 2.3 MISCELLANEOUS HARDWARE

.1 Auxiliary hardware: to ANSI/BHMA A156.16, as listed below.
.1 Bird bag hook rail: formed from 13 diameter stainless steel as indicated.
.2 Bird bag hooks: “S” shaped, 100mm long, stainless steel. Quantity 100.
.3 Bumpers: clear polyurethane self-adhesive bumpers for all doors and drawers

### 2.4 WINDOW HARDWARE

.1 Casement hardware
.1 Casement latch to ANSI/BHMA 156.16
.2 Hinges to ANSI/BHMA 156.9
.3 Pull to ANSI/BHMA 156.9

### 2.5 FASTENINGS

.1 Supply screws, bolts, expansion shields and other fastening devices required

for satisfactory installation and operation of hardware.

.2 Exposed fastening devices to match finish of hardware.

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

## PART 3 - EXECUTION

### 3.1 INSTALLATION

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

.2 Install hardware to standard hardware location dimensions in accordance with manufacturer's recommendations and to project design requirements.

### 3.2 ADJUSTING

.1 Adjust cabinet hardware for optimum, smooth operating condition.

.2 Lubricate hardware and other moving parts.

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

### 3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11.
.1 Leave Work area clean at end of each day.
.2 Clean hardware with damp rag and approved non-abrasive cleaner, and polish hardware in accordance with manufacturer's instructions.
.3 Remove protective material from hardware items where present.
.4 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11.

.2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.
.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 cabinet and miscellaneous hardware installation.

### 3.5 SCHEDULE

.1 Cabinet drawers:
.1 1 set drawer slides B05051.
.2 1 wire D-pull B52011 626.

.2 Lower cabinet swinging doors:
.1 2 hinges B01602 626.

.3 Full height cabinet swinging doors
.1 4 hinges B01602 626.

.4 Shelf brackets
.1 Pairs of brackets to suit shelving as indicated B04013.

.5 Casement windows
.1 2 hinges, B0241
.2 1 casement latch, L0501
.3 1 surface mounted knob pull, B0241

END OF SECTION

# PART 1 - GENERAL

## 1.1 REFERENCES

.1 American National Standards Institute (ANSI) / Builders Hardware Manufacturers Association (BHMA)
- .1 ANSI/BHMA A156.1-2016, American National Standard for Butts and Hinges.
- .2 ANSI/BHMA A156.2-2017, Bored and Preassembled Locks and Latches.
- .3 ANSI/BHMA A156.5-2014, Auxiliary Locks and Associated Products.
- .4 ANSI/BHMA A156.6-2015, Architectural Door Trim.
- .5 ANSI/BHMA A156.16-2013, Auxiliary Hardware.
- .6 ANSI/BHMA A156.18-2016, Materials and Finishes.
- .7 ANSI/BHMA A156.21-2014, Thresholds.

.2 Canadian Steel Door Manufacturers' Association (CSDMA)
- .1 CSDMA Recommended Dimensional Standards for Commercial Steel Doors and Frames - 2009.

## 1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for door hardware and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Samples:
- .1 Submit for review and acceptance of each unit.
- .2 Samples will be returned for inclusion into work.
- .3 Identify each sample by label indicating applicable specification paragraph number, brand name and number, finish and hardware package number.
- .4 After approval samples will be returned for incorporation in Work.

.4 Hardware List:
- .1 Submit contract hardware list.
- .2 Indicate specified hardware, including make, model, material, function, size, finish and other pertinent information.

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

.6 Manufacturer's Instructions: submit manufacturer's installation instructions.

## 1.3 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00.

.2 Operation and Maintenance Data: submit operation and maintenance data for door hardware for incorporation into manual.

## 1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 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 Package items of hardware including fastenings, separately or in like groups of hardware, label each package as to item definition and location.

.4 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 door hardware from nicks, scratches, and blemishes.
- .3 Protect prefinished surfaces with wrapping strippable coating.
- .4 Replace defective or damaged materials with new.

.5 Develop Waste Reduction Workplan related to Work of this Section.

.6 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding and packaging materials as specified in Waste Reduction Workplan in accordance with Section 01 74 20.

# PART 2 - PRODUCTS

## 2.1 HARDWARE ITEMS

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

## 2.2 DOOR HARDWARE

.1 Locks and latches:
- .1 Bored and preassembled locks and latches: to ANSI/BHMA A156.2, series 4000 preassembled lock, grade 1, designed for function as stated in Hardware Schedule.
- .2 Lever handles: plain design.
- .3 Roses: round.
- .4 Normal strikes: box type, lip projection not beyond jamb.
- .5 Cylinders: key into keying system as directed.
- .6 Finished to 626.

.2 Butts and hinges:
- .1 Butts and hinges: to ANSI/BHMA A156.1.Type A5111 114 X 101mm
- .2 Finished to 626

.3 Auxiliary locks and associated products: to ANSI/BHMA A156.5, designated by letter E and numeral identifiers as listed below.
- .1 Dead bolt, type E0151. Key into keying system as directed.
- .2 Finished to 626.

.4 Operable wall hardware:
.1 Extruded aluminum track, 6061T6 alloy.
.2 Trucks: Heavy duty centre pivoting type with steel tire wheels on ball bearings and thrust bearings. Load capacity 113 kg per leaf
.3 Recessed flush bolts, stainless steel, complete with strikes set into concrete slab, type L04081
.4 Recessed stainless steel pulls: type J403, finish to 626
.5 Offset pivot hinges: type A1711, finish to 626.

.5 Door bottom seal: heavy duty, door seal of extruded aluminum frame and hollow closed cell neoprene weather seal, recessed in door bottom, closed ends, adjustable automatic retract mechanism when door is open, clear anodized finish.

.6 Thresholds: 150 mm wide x full width of door opening, extruded aluminum, clear anodized finish with lip and vinyl door seal insert.

.7 Weatherstripping:
.1 Head and jamb seal:
.1 Hollow compressible bulb seal let into kerf in frames.

2.4 FASTENINGS

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

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

.3 Exposed fastening devices to match finish of hardware.

.4 Where pull is scheduled on one side of door and push plate on other side, supply fastening devices, and install so pull can be secured through door from reverse side. Install push plate to cover fasteners.

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

2.5 KEYING

.1 Doors to be keyed alike.

.2 Supply keys in duplicate for every lock in this Contract.

.5 Supply construction cores.

.6 Hand over permanent cores and keys to Departmental Representative.

## PART 3 - EXECUTION

3.1 INSTALLATION

.1 Manufacturer's Instructions: comply with manufacturer's written

recommendations, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

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

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

.4 Install hardware to standard hardware location dimensions in accordance with CSDMA Canadian Metric Guide for Steel Doors and Frames (Modular Construction).

.5 Where door stop contacts door pulls, mount stop to strike bottom of pull.

.6 Install key control cabinet.

.7 Use only manufacturer's supplied fasteners.
.1 Use of "quick" type fasteners, unless specifically supplied by manufacturer, is unacceptable.

.8 Remove construction cores when directed by Departmental Representative.
.1 Install permanent cores and ensure locks operate correctly.

## 3.2 ADJUSTING

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

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

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

## 3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11.
.1 Leave Work area clean at end of each day.
.2 Clean hardware with damp rag and approved non-abrasive cleaner, and polish hardware in accordance with manufacturer's instructions.
.3 Remove protective material from hardware items where present.
.4 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11.

.2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.
.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 door hardware installation.

3.5 SCHEDULE

.1 Door 101:
- .1 3 pairs hinges A5111, NRP, 114 x 101 mm 626.
- .2 1 deadlock E0151, 626.
- .3 1 passage set F75 626
- .4 1 threshold.
- .5 1 door bottom seals.
- .6 Head and jamb seals
- .7 1 Recessed flush bolt, stainless steel, complete with strikes, type L04081

.2 Door 102:
- .1 3 pairs hinges A5111, NRP, 114 x 101 mm 626.
- .2 1 deadlock E0151, 626.
- .3 1 passage set F75 626
- .4 1 threshold.
- .5 1 door bottom seals.
- .6 Head and jamb seals

.2 Door 103:
- .1 18 prs offset pivots A1711, 114 x 101 mm 626.
- .2 6 recessed flush pulls type J403, finish to 626
- .3 Extruded aluminum track, 6061T6 alloy.
- .4 Trucks: Heavy duty centre pivoting type with steel tire wheels on ball bearings and thrust bearings. Load capacity 113 kg per leaf
- .5 6 Recessed flush bolts, stainless steel, complete with strikes set into concrete slab, type L04081

END OF SECTION

# PART 1 - GENERAL

## 1.1 REFERENCES

.1 Green Seal Environmental Standards (GS)
  .1 GS-11-2015, Paints and Coatings.

.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  .1 Material Safety Data Sheets (MSDS).

.3 The Master Painters Institute (MPI)
  .1 Architectural Painting Specification Manual - current edition.
  .2 Maintenance Repainting Manual - current edition.

.4 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
  .1 SCAQMD Rule 1113-A2016, Architectural Coatings.

## 1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Product Data:
  .1 Submit manufacturer's instructions, printed product literature and data sheets for paint and coating products and include product characteristics, performance criteria, physical size, finish and limitations.
  .2 Submit 2 copies of WHMIS MSDS.

.3 Samples:
  .1 Submit for review and acceptance of each unit.
  .2 Samples will be returned for inclusion into work.
  .3 Submit duplicate 200 x 300 mm sample panels of each paint with specified paint or coating in colours, gloss/sheen and textures required to MPI Painting Specification Manual standards.

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

.5 Sustainable Design Submittals:

  .2 Construction Waste Management:
    .1 Submit project Waste Reduction Workplan highlighting recycling and salvage requirements.
    .2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 95% of construction wastes were recycled or salvaged.
  .4 Low-Emitting Materials:
    .1 Submit listing of paints and coatings used in building, comply with VOC and chemical component limits or restriction requirements.

## 1.3 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 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 Provide and maintain dry, temperature controlled, secure storage.
.2 Store painting materials and supplies away from heat generating devices.
.3 Store materials and equipment in well ventilated area within temperature as recommended by manufacturer.

.4 Fire Safety Requirements:
.1 Supply 1 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 National Fire Code of Canada requirements.

.5 Develop Waste Reduction Workplan related to Work of this Section and in accordance with Section 01 74 20.

.6 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding and packaging materials as specified in Waste Reduction Workplan in accordance with Section 01 74 20.

## 1.4 SITE CONDITIONS

.1 Heating, Ventilation and Lighting:
.1 Ventilate enclosed spaces in accordance with Section 01 51 00.
.2 Co-ordinate use of existing ventilation system with Departmental Representative and ensure its operation during and after application of paint as required.
.3 Provide minimum lighting level of 323 Lux on surfaces to be painted.

.2 Temperature, Humidity and Substrate Moisture Content Levels:
.1 Apply paint finishes when ambient air and substrate temperatures at location of installation can be satisfactorily maintained during application and drying process, within MPI and paint manufacturer's prescribed limits.
.3 Apply paint to adequately prepared surfaces, when moisture content is below paint manufacturer's prescribed limits.

.3 Additional application requirements:
.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 in occupied facilities during silent hours only. Schedule

operations to approval of Departmental Representative such that painted surfaces will have dried and cured sufficiently before occupants are affected.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

.1 Supply paint materials for paint systems from single manufacturer.

.2 Conform to latest MPI requirements for painting work including preparation and priming.

.3 Materials in accordance with MPI - Architectural Painting Specification Manual and MPI - Maintenance Repainting Manual "Approved Product" listing.
.1 Primer: VOC limit 100 g/L maximum to GS-11 or SCAQMD Rule 1113.
.2 Paint: VOC limit 100 g/L maximum to GS-11 or SCAQMD Rule 1113.

.4 Colours:
.1 Submit proposed Colour Schedule to Departmental Representative for review.
.2 Base colour schedule on selection of 2 base colours.

.5 Mixing and tinting:
.1 Perform colour tinting operations prior to delivery of paint to site, in accordance with manufacturer's written recommendations. Obtain written approval from Departmental Representative for tinting of painting materials.
.2 Use and add thinner in accordance with paint manufacturer's recommendations.
.1 Do not use kerosene or similar organic solvents to thin water-based paints.
.3 Thin paint for spraying in accordance with paint manufacturer's written recommendations.
.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.

.6 Wood window and door varnish:
.1 Linseed oil yacht varnish, consisting of pure resin modified through high temperature curing, linseed oil, tung oil, vegetable driers and thinners. Does not contain petroleum based solvents.

.7 CLT Panels coating:
.1 Boiled organic linseed oil.

.8 Steel doors:
.1 EXT 5.1L, Polyurethane, Pigmented over high build epoxy.
.1 Colour: Custom colour to match sample provided by Departmental Representative
.2 Gloss: level 6

.9 Casework

.1 INT 6.4J Polyurethane.
.2 Gloss Level 3.

## PART 3 - EXECUTION

### 3.1 GENERAL

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and data sheets.

.2 Perform preparation and operations for interior painting in accordance with MPI - Architectural Painting Specifications Manual and MPI - Maintenance Repainting Manual except where specified otherwise.

### 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.

.2 Conduct moisture testing of surfaces to be painted using properly calibrated electronic moisture meter, except test concrete floors for moisture using simple "cover patch test". Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.

### 3.3 PREPARATION

.1 Protection of in-place conditions:
.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 surfaces as directed by Departmental Representative.
.2 Protect items that are permanently attached such as Fire Labels on doors and frames.
.3 Protect factory finished products and equipment.

.2 Surface Preparation:
.1 Remove electrical cover plates, light fixtures, surface hardware on doors, bath accessories and other surface mounted equipment, fittings and fastenings prior to undertaking painting operations. Identify and store items in secure location and re-installed after painting is completed.
.2 Move and cover furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.
.3 Place "WET PAINT" signs in occupied areas as painting operations progress. Signs to approval of Departmental Representative.
.4 Clean and prepare surfaces in accordance with MPI - Architectural Painting Specification Manual and MPI - Maintenance Repainting Manual specific requirements and coating manufacturer's recommendations.
.5 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before prime coat is applied and between applications of remaining coats. Apply primer, paint,

or pretreatment as soon as possible after cleaning and before deterioration occurs.
.7 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.
.8 Clean metal surfaces to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and other foreign substances in accordance with MPI requirements.
.9 Touch up of shop primers with primer as specified.

## 3.4 APPLICATION

.1 Paint only after prepared surfaces have been accepted by Departmental Representative.

.2 Use method of application approved by Departmental Representative.
.1 Conform to manufacturer's application recommendations.
.2 Varnish for wood doors, windows, and frames: apply 4 coats
.3 Linseed oil for interior CLT walls: apply 2 coats

.3 Apply coats of paint in continuous film of uniform thickness.
.1 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 tops of interior cupboards and cabinets and projecting ledges.

.7 Finish inside of cupboards and cabinets as specified for outside surfaces.

.8 Finish closets and alcoves as specified for adjoining rooms.

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

## 3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11.
.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.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

.4 Place materials defined as hazardous or toxic waste, including tubes and containers, in containers or areas designated for hazardous waste.

END OF SECTION

# PART 1 - GENERAL

## 1.1 REFERENCES

.1 ASTM International
.1 ASTM A653/A653M-17, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
.2 ASTM A924/A924M-17a, Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

.2 CSA International
.1 CSA O121-17, Douglas Fir Plywood.
.2 CAN/CSA-Z809-16, Sustainable Forest Management.

.3 UL
.1 UL 2762 Edition 1, 2011, Sustainability for Adhesives.

.4 Green Seal Environmental Standards (GS)
.1 GS-11-15, Standard for Paints and Coatings.
.2 GS-36-13, Standard for Adhesives for Commercial Use.

.5 Porcelain Enamel Institute (PEI)
.1 PEI 501 Properties of Porcelain Enamel.

.6 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
.1 SCAQMD Rule 1168-A2017, Adhesives and Sealants Applications.

## 1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for chalkboards and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Installation Drawings:
.1 Submit installation drawings.
.2 Indicate location, type, size, panel arrangement, backing, hardware, anchor or mounting details, frame or trim and accessories.

.4 Sustainable Design Submittals:
.1 Construction Waste Management:
.1 Submit project Waste Reduction Workplan highlighting recycling and salvage requirements.
.2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 50 75% of construction wastes were recycled or salvaged.

.2 Recycled Content:
.1 Submit listing of recycled content products used, including details of required percentages or recycled content materials and products, showing their costs and percentages of post-consumer and post-industrial content, and total cost of materials for project.

.3 Low-Emitting Materials:
.1 Submit listing of adhesives and sealants and paints and coatings used in building, comply with VOC and chemical component limits or restriction requirements.

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

## 1.3 QUALITY ASSURANCE

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

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

## 1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 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 chalkboards from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

.4 Develop Waste Reduction Workplan 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 Waste Reduction Workplan in accordance with Section 01 74 20.

# PART 2 - PRODUCTS

## 2.1 MATERIALS

.1 Laminating adhesive: to manufacturer's standard.

.2 Adhesives: VOC limit 30 g/L maximum to UL 2762.

.3 Joint reinforcement: concealed mechanical jointing system to provide straight, rigid, continuously supported, tight butt, flush joints at surface.

.4 Anchor clips, brackets and fasteners: concealed type selected by Departmental Representative for fixed mounting.

.5 Facings:
.1 Steel sheet: 1 mm thickness, commercial quality, pre-cleaned and treated to ensure maximum adhesion of an acid resistant type B (for Chalk) porcelain enamel.

.6 Core:
.1 Plywood: 19mm thick, to CSA O151 Grade: G2S.
.2 CAN/CSA-Z809 or FSC or SFI certified.

.7 Backing:
.1 .4 mm tempered aluminum foil for fixed wall mounted panels.

## 2.2 FABRICATION

.1 Fabricate chalkboard panels to sizes indicated. Field measure finished openings for chalkboards prior to fabrication.

.2 Factory laminate chalkboards, consisting of facing sheet, with plywood core and aluminum backing sheet. Adhesive in accordance with manufacturers recommendations.

.3 Make finished panels flat and rigid and fit with joint reinforcement.

.4 Fit joints between abutting chalkboard panels with joint reinforcement except where covering trim is required.

.6 Use concealed brackets to reinforce and hold joints tight and flush.
.1 No exposed fasteners permitted.

.7 Do not install trim or frames.
.1 Ensure facing and core are identical in size.

.8 Factory fit assemblies too large for shipment to site in one piece, disassemble for delivery and site assembly.

## 2.3 FINISHES

.1 Chalkboard writing surfaces:
.1 Porcelain enamel: to Porcelain Enamel Institute Standard PEI 501 regards durability, smoothness of texture, colour continuity. Gloss factor of 6-8 as measured by 45 degree glossmeter:
.1 Surface finish for chalk: black colour selected by

Departmental Representative.

## 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 chalkboard 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 MANUFACTURER'S INSTRUCTIONS

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

### 3.3 INSTALLATION

.1 Install chalkboards in accordance with manufacturer's instructions, parallel to floor with uniform vertical surface, plumb and level, to provide rigid, secure writing surface.
.1 Tolerance: 3mm for fit between chalkboard and available finished opening.

.2 Mechanical attachment:
.1 To wood: use screws and concealed clips or construction adhesive.

### 3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11.
.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.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

## 3.5 PROTECTION

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

.2 Repair damage to adjacent materials caused by chalkboard installation.

END OF SECTION

## PART 1 - GENERAL

### 1.1 REFERENCES

.1 ASTM:
.1 ASTM F2034-08(2013), Standard Specification for Linoleum Sheet Flooring.

.2 Underwriters' Laboratories(UL)
.1 UL 2762 Edition 1, 2011, Sustainability for Adhesives.

.3 Green Seal Environmental Standards (GS)
.1 GS-36-11, Standard for Adhesives for Commercial Use.

.4 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
.1 SCAQMD Rule 1168-A2017, Adhesives and Sealants Applications.

.5 Underwriters' Laboratories of Canada (ULC)
.1 CAN/ULC-S102-2017, Standard Method of Test for Surfaces Burning Characteristics of Building Materials and Assemblies.

### 1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for tackboards and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Installation Drawings:
.1 Submit installation drawings.
.2 Indicate location, type, size, panel arrangement, backing, hardware, anchor or mounting details, frame or trim and accessories.

.4 Samples:
.1 Submit duplicate 300 x 300 mm sample of each type of tackboard.

.5 Sustainable Design Submittals:
.1 Construction Waste Management:
.1 Submit project Waste Reduction Workplan highlighting recycling and salvage requirements.
.2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 75% of construction wastes were recycled or salvaged.
.2 Recycled Content:
.1 Submit listing of recycled content products used, including details of required percentages or recycled content materials and products, showing their costs and percentages of post-consumer and post-industrial content, and total cost

of materials for project.

.3 Low-Emitting Materials:
.1 Submit listing of adhesives and sealants and paints and coatings used in building, comply with VOC and chemical component limits or restriction requirements.

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

## 1.3 QUALITY ASSURANCE

.1 Regulatory Requirements:
.1 Surface burning characteristics of materials: listed and labelled by an organization accredited by Standards Council of Canada.

.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.

## 1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 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 tackboards 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 Waste Reduction Workplan in accordance with Section 01 74 20.

# PART 2 - PRODUCTS

## 2.1 MATERIALS

.1 Mounting adhesive: to manufacturer's standard.

.2 6mm thick composition cork tackboards: resilient smooth surface, uniform density bulletin board consisting of oxidized linseed oil,

rosin, and finely ground cork with integral colour selected by Departmental Representative.
.1 Backing: Jute
.2 Surface burning characteristics in accordance with CAN/ULC-S102, flame spread 54, smoke developed 316.

.3 Recycled content: post-consumer 43% minimum.

## 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 tackboard 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 MANUFACTURER'S INSTRUCTIONS

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

### 3.3 INSTALLATION

.1 Install tackboard material in accordance with manufacturer's instructions.

.2 Trim to suit available space as indicated. Butt tightly to adjacent finishes to create frameless installation. Maximum permitted gaps at edges: 2mm

### 3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11.
.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.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

## 3.5 PROTECTION

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

.2 Repair damage to adjacent materials caused by tackboard installation.

# PART 1 - GENERAL

## 1.1 REFERENCES

.1 ASTM
- .1 ASTM A242/A242M-13(2018), Standard Specification for High-Strength Low-Alloy Structural Steel
- .2 ASTM A895-89(2017), Standard Specification for Free-Machining Stainless Steel Plate, Sheet, and Strip

.2 Canadian Standards Association (CSA)
- .1 CSA W59-18, Welded Steel Construction (Metal Arc Welding) (Imperial Version).
- .2 CAN/CSA-O141-05 (R2014), Softwood Lumber
- .3 CAN/CSA-Z809-16, Sustainable Forest Management.

.3 The Master Painters Institute (MPI)
- .1 Architectural Painting Specification Manual - 2014.

.4 Society for Protective Coatings
- .1 SP 6/NACE No. 3, Commercial Blast Cleaning

.5 National Lumber Grading Authority (NLGA)
- .1 Standard Grading Rules for Canadian Lumber GR-2017

.6 Architectural Woodwork Manufacturers Association of Canada (AWMAC), Woodwork Institute (WI).
- .1 AWMAC/WI North American Architectural Woodwork Standards, NAAWS Edition 3-2017.

## 1.2 SHOP DRAWINGS

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

.2 Submit shop drawings stamped by a structural engineer licensed to practice in the Province of Ontario.

.3 Indicate materials, thicknesses, sizes, finishes, colours, construction details, removable and interchangeable components, mounting methods, schedule of signs.

.4 Submit full size templates for individually incised lettering indicating word and letter spacing.

.5 Digital files for artwork and text will be provided by the Departmental Representative.

## 1.3 SAMPLES

.1 Submit samples in accordance with Section 01 33 00.

.2 Submit representative sample of each type of sign, sign image and mounting method.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 20.

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

.3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, packaging material in appropriate on-site bins for recycling in accordance with Waste Reduction Work Plan.

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

.5 Divert unused metal and wiring materials from landfill to metal recycling facility as approved by Departmental Representative.

.6 Unused paint or coating material must be disposed of at an official hazardous material collections site as approved by Departmental Representative.

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

.8 Do not dispose of unused paint material into sewer system, into streams, lakes, onto ground or in any other location where it will pose health or environmental hazard.

## PART 2 - PRODUCTS

2.1 MATERIALS

.1 Weathering steel plate, to ASTM A242/A242M, Type 1.

.2 Stainless steel, to ASTM A895, Type 304, mill finish.

.3 Flexible cast vinyl overlaminate:
- .1 Non-shrinking
- .2 Clear, luster finish
- .3 Suitable for exterior application
- .4 Service temperature: -54°C to +107°C
- .5 Compatible with direct-to-media printing

.4 Dressed lumber: Douglas fir, S4S, S-DRY graded and stamped in accordance with the following standards:
- .1 CSA 0141
- .2 NLGA Standard Grading Rules for Canadian Lumber
- .3 AWMAC/WI NAAWS Premium Grade, Moisture content as specified
- .4 CAN/CSA-Z809, SFI or Forest Stewardship Council (FSC) Certified

.5 Below-grade waterproof membrane:
- .1 1 layer self-adhesive membrane composed of SBS modified bitumen and tri-laminated polyethylene.
- .2 Thickness: 1.5mm.
- .3 Underface: Silicone release film.
- .4 Top face: Tri-laminate woven polyethylene.
- .5 Tensile strength: 15.4 kN/m.
- .6 Ultimate elongation: 25%.
- .7 Tear resistance: 400N.
- .8 Lap adhesion: 2000N/m.
- .9 Water absorption: 0.1% max.
- .10 Peel resistance: 3500 N/m.
- .11 Water vapour permeance 0.49 ng/Pa*s*m2.
- .12 Crack cycling at -32, 100 cycles: Unaffected.
- .13 Resistance to hydraulic head: 114 m min.

.6 Polyurethane paint: to MPI EXT 5.6B.

.7 Bench varnish:
- .1 Linseed oil yacht varnish, consisting of pure resin modified through high temperature curing, linseed oil, tung oil, vegetable driers and thinners. Does not contain petroleum based solvents.

## 2.2 SIGN GRAPHICS

.1 Direct-to-media printing on painted metal panels.

.2 Self-stick vinyl film: individual letters die cut from 0.1 mm thick white integral colour, matte finish, Avenir Next typeface, upper and lower case, exterior grade PVC film, with self-stick adhesive backing.

.3 Cast vinyl overlaminate

## 2.3 CUT-OUT LETTERS

.1 Cut letters and graphics from weathering and stainless steel plate.

.2 Avenir Next typeface, upper and lower case; sizes and thicknesses as indicated. Make corners square cut.

## 2.4 FABRICATION

.1 Fabricate components in accordance with details, specifications and shop drawings.

.2 Build units square, true, accurate to size, free from visual or performance defects.

.3 Accurately fit and securely join sections to obtain tight, closed joints.

.4 Allow for thermal movement without distortion of components.

.5 Exposed fasteners permitted only where indicated. Anchor painted sign panel to support structures by welded stainless steel studs on reverse side of panel, and stainless steel nuts. Spacing and size of anchors to suit design loads. Isolate sign panel from support panel with rubber-impregnated fabric washers.

.6 Anchor timber bench seating surfaces to weathered steel bases with exposed, recessed, stainless steel carriage bolts

.7 Do steel welding to CSA W59. Finish exposed welds flush and smooth. Ease edges of steel plates to remove sharp corners.

.8 Manufacturer's nameplates on sign surface locations visible in completed work not acceptable.

2.5 FINISHES

.1 Sandblast stainless steel to SSPC SP 6.

.2 Spray apply paint to stainless steel sign panels in accordance MPI System EXT 5.6B.

.3 Apply waterproof membrane to weathering steel below grade.

.4 Apply overlaminate to entire face of sign panels.

## PART 3 - EXECUTION

3.1 INSTALLATION

.1 Erect and secure signs and benches plumb and level at elevations indicated and at locations as directed by Departmental Representative.

.2 Apply waterproof membrane to steel below grade.

.3 Comply with sign manufacturer's installation instructions and approved shop drawings.

.4 Mechanical attachment:
.1 To concrete or stone use epoxy anchored threaded rods as indicated, as appropriate for stresses involved.

.5 Self-adhesive application.
.1 Apply vinyl lettering in accordance with manufacturer’s instructions as indicated.

3.2 CLEANING

.1 Leave signs clean. Remove debris from interior of sign boxes.

.2 Touch up any damaged finishes.

END OF SECTION

# PART 1 - GENERAL

## 1.1 REFERENCES

.1 ASTM International
.1 ASTM A480/A480M-17 Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip

## 1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
.1 Provide manufacturer's printed product literature and data sheets and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:
.1 Submit drawings.
.2 Indicate size and description of components, base material, surface finish inside and out, hardware and locks, attachment devices, description of rough-in-frame, building-in details of anchors for grab bars.

## 1.3 CLOSEOUT SUBMITTALS

.1 Provide maintenance data for toilet and bath accessories for incorporation into manual specified in Section 01 78 00.

## 1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 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 toilet and bathroom accessories 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 in

accordance with Section 01 74 20.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

.1 Stainless steel tubing: Type 308 commercial grade, seamless welded, 1.2 mm wall thickness, minimum 75% recycled content.

.2 Fasteners: concealed screws and bolts hot dip galvanized, exposed fasteners to match face of unit. Expansion shields fibre, lead or rubber as recommended by accessory manufacturer for component and its intended use.

### 2.2 COMPONENTS

.1 Toilet tissue dispenser: double roll type, surface mounted, stainless steel frame, capacity of 500 double ply roll, roll under spring tension for controlled delivery.

.2 Grab bars: 38 mm diameter x 1.6 mm wall tubing of stainless steel, 76 mm diameter wall flanges, exposed screw attachment, flanges welded to tubular bar, provided with steel back plates and all accessories. Knurl bar at area of hand grips. Grab bar material and anchorage to withstand downward pull of 2.2 kN.

.3 Waste receptacle: Surface mount, size 420 mm x 320 mm x 585 mm high, stainless steel to ASTM A480/A480M.

### 2.3 FABRICATION

.1 Weld and grind joints of fabricated components flush and smooth. Use mechanical fasteners only where approved.

.2 Wherever possible form exposed surfaces from one sheet of stock, free of joints.

.3 Brake form sheet metal work with 1.5 mm radius bends.

.4 Form surfaces flat without distortion. Maintain flat surfaces without scratches or dents.

.5 Back paint components where contact is made with building finishes to prevent electrolysis.

.6 Shop assemble components and package complete with anchors and fittings.

.7 Deliver inserts and rough-in frames to job site at appropriate time for building-in. Provide templates, details and instructions for building in anchors and inserts.

.8 Provide steel anchor plates and components for installation on studding and building framing.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrates and surfaces to receive toilet and bathroom accessories previously installed under other Sections or Contracts are acceptable for product installation in accordance with manufacturer's instructions prior to toilet and bathroom accessories installation.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied.

### 3.2 INSTALLATION

.1 Install and secure accessories rigidly in place as follows:
.1 Stud walls: install steel back-plate to stud. Provide plate with threaded studs or plugs.

.2 Install grab bars on built-in anchors provided by bar manufacturer to NBC.

.3 Use tamper proof screws/bolts for fasteners.

.4 Fill units with necessary supplies shortly before final acceptance of building.

### 3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11.
.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.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.
.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 toilet and bathroom accessories installation.

END OF SECTION

## PART 1 - GENERAL

### 1.1 SAMPLE

.1 Submit for Departmental Representative's review duplicate 400 mm square sample of fabric in selected colour and pattern.

### 1.2 MAINTENANCE DATA

.1 Provide parts list and fabric cleaning method for incorporation into maintenance manual specified in Section 01 33 00 and 01 78 00.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

.1 Fabric:
- .1 Width: as indicated.
- .2 Composition: 100% plain woven natural cotton duck fabric.
- .3 Weight: No.10, 500 g/m2.

.2 Track: 1.29 mm extruded aluminium inverted channel with end stops.

.3 Draw: none.

.4 Carrier: steel, roller with sew on hooks.

.5 Brackets: compatible with and finished to match track.

.6 Fasteners: wood screws.

### 2.2 FABRICATION

.1 Fullness: equal to opening width.

.2 Double headings 100 mm; hems 75 mm; sides 25 mm; and lock or blind stitch.

.3 Install necessary weights in hems.

.4 Sew on hooks to conceal track when closed.

.5 Press out creases.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

.1 Mount brackets 600 mm o.c., to ensure no loosening of parts.

.2 Gather fabric into uniform pleats and tape top, bottom and centre for 24 hours.

.3 30 days after installation drapes shall hang between 19 and 32 mm from floor.

# PART 1 - GENERAL

## 1.1 REFERENCES

.1 ASTM International
.1 ASTM D751-06(2011), Standard Test Methods for Coated Fabrics.

.2 U.S. Environmental Protection Agency (EPA)/Office of Water
.1 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.
.2 EPA 833-R-06-004, May 2007, Developing Your Stormwater Pollution Prevention Plan - A Guide for Construction Sites.

## 1.2 ADMINISTRATIVE REQUIREMENTS

.1 Examine soil report, Geotechnical Investigation Proposed Bird Banding Station Building Prince Edward Point National Wildlife Area Prince Edward County, Ontario.

## 1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Site Quality Control Submittals: submit in accordance with Section 01 45 00.
.1 Submit condition survey of existing conditions as described in EXISTING CONDITIONS article.

.3 Erosion and Sedimentation Control: submit erosion and sedimentation control plan in accordance with EPA 832/R92-005.
.4 Construction Waste Management:
.1 Submit project Waste Management Plan highlighting recycling and salvage requirements.
.2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 95% of construction wastes were recycled or salvaged.

# PART 2 - PRODUCTS

## 2.1 MATERIALS

.1 Geotextile: non-woven synthetic fibre fabric, supplied in rolls.
.1 Width: 1m minimum.
.2 Length: 300 m minimum.
.3 Composed of: polypropylene with inhibitors added to base plastic to resist deterioration by ultra-violet and heat exposure for 60 days.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

.1 Evaluation and Assessment:
.1 Examine soil report included in Appendix.

### 3.2 PREPARATION

.1 Temporary erosion and sedimentation control:
.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways. Provide erosion control plan, specific to site, that complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.
.2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

.2 Protection of in-place conditions:
.1 Protect excavations from freezing.
.2 Keep excavations clean, free of standing water, and loose soil.
.3 Where soil is subject to significant volume change due to change in moisture content, cover and protect to Departmental Representative's approval.
.4 Protect natural and man-made features required to remain undisturbed. Unless otherwise indicated or located in an area to be occupied by new construction, protect existing trees from damage.
.5 Protect buried services that are required to remain undisturbed.

.3 Removal:
.1 Remove trees, stumps, logs, brush, shrubs, bushes, vines, undergrowth, rotten wood, dead plant material, exposed boulders and debris within areas designated on drawings. Clean all organic material from exposed bedrock.
.2 Remove stumps and tree roots below footings, slabs, and paving, and to 600 mm below finished grade elsewhere.

### 3.3 EXCAVATION

.1 Protect slopes and banks and perform work in accordance with Provincial and Municipal regulations whichever is more stringent.

.2 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.

.1 Stockpile topsoil on site for later use.

.3 Excavate as required to carry out work.
.1 Do not disturb soil or rock below bearing surfaces.
.2 Notify Departmental Representative when excavations are complete.
.3 If bearings are unsatisfactory, additional excavation will be authorized in writing and paid for as additional work.
.4 Excavation taken below depths shown without Departmental Representative's written authorization to be filled with concrete of same strength as for footings at Contractor's expense.

.4 Excavate for slabs and paving to subgrade levels.
.1 In addition, remove all topsoil, organic matter, debris and other loose and harmful matter encountered at subgrade level.

## 3.4 FIELD QUALITY CONTROL

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

.2 Not later than 1 week minimum before backfilling or filling, submit to designated testing agency, samples of backfill as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.

.3 Do not begin backfilling or filling operations until material has been approved for use by Departmental Representative.

.4 Not later than 48 hours before backfilling or filling with approved material, notify Departmental Representative to allow compaction tests to be carried out by designated testing agency.

## 3.5 BACKFILLING

.1 Inspection: do not commence backfilling until fill material and spaces to be filled have been inspected and approved by Departmental Representative.

.2 Remove snow, ice, construction debris, organic soil and standing water from spaces to be filled.

.3 Placing:
.1 Place backfill in 150 mm lifts: add water as required to achieve specified density.

.4 Restore surface of excavation with material and finish to match existing adjoining surfaces.

## 3.6 GRADING

.1 Grade so that water will drain away from buildings, walls and paved areas, to catch basins and other disposal areas approved by Departmental Representative.
  .1 Grade to be gradual between finished spot elevations shown on drawings.

.2 Strip topsoil as specified in 3.3.2 above 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. Stockpile topsoil on site for later use.

.3 Fill and grade site to achieve elevations indicated.

.4 Place excavated material in 300 mm lifts.

.5 Compact to 80% Standard Proctor Density.

.6 Grade to a uniform slope with a tolerance of 1:120.

## 3.7 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11.
  .1 Leave Work area clean at end of each day.
  .2 Dispose of cleared and grubbed material off site daily.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11.

## PART 1 - GENERAL

### 1.1 SUMMARY

.1 Section Includes:
.1 Materials and installation for preserving root systems of plants affected by excavation.

### 1.2 REFERENCES

.1 Canadian Standards Association (CSA International).
.1 CSA G30.5-M1983(R1998), Welded Steel Wire Fabric for Concrete Reinforcement.

.2 Department of Justice Canada (Jus).
.1 Canadian Environmental Protection Act (CEPA), 1999, c. 33.

.3 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
.1 Material Safety Data Sheets (MSDS).

### 1.4 SUBMITTALS

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

.2 Submit monthly written reports on maintenance during warranty period, to Departmental Representative identifying:
.1 Maintenance work carried out.
.2 Development and condition of plant material.
.3 Preventative or corrective measures required which are outside Contractor's responsibility.

.3 Submit WHMIS MSDS.

### 1.6 DELIVERY, STORAGE AND HANDLING

.1 Store and manage hazardous materials in accordance with Section 01 35 43.

.2 Waste Management and Disposal:

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20.
.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
.3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
.4 Separate for reuse and recycling and place in designated containers for Steel Metal Plastic waste in accordance with Waste Management Plan.
.5 Divert unused metal and wiring materials from landfill to metal recycling facility as approved by Departmental Representative.
.6 Divert unused wood materials from landfill by alternative disposal approved by Departmental Representative.

.7 Divert unused stone and aggregate materials from landfill to local facility approved by Departmental Representative.
.8 Divert unused plastic materials from landfill to local recycling facility approved by Departmental Representative.
.9 Place materials defined as hazardous or toxic in designated containers.
.10 Handle and dispose of hazardous materials in accordance with CEPA, TDGA, Regional and Municipal regulations.
.11 Ensure emptied containers are sealed and stored safely.
.12 Fold up metal banding, flatten and place in designated area for recycling.

## 1.7 SCHEDULING

.1 Obtain approval from Departmental Representative of schedule indicating beginning of Work.

# PART 2 - PRODUCTS

## 2.1 MATERIALS

.1 Fill:
.1 Excavated pervious soil, free from roots, rocks larger than 75 mm, building debris, and toxic ingredients (salt, oil, etc). Excavated material shall be approved by Departmental Representative before use as fill.

.2 Filter Cloth:
.1 Type 1: 100% non-woven needle punched polyester, 2.75 mm thick, 240 g/m2 mass.
.2 Type 2: biodegradable burlap.

.3 Wood posts: 38 x 89 x 2400 mm length, untreated wood.

.4 Welded wire fabric (WWF): 100 x 100, to CSA G30.5.

# PART 3 - EXECUTION

## 3.1 IDENTIFICATION AND PROTECTION

.1 Do construction occupational health and safety in accordance with Section 01 35 29.

.2 Identify plants and limits of root systems to be preserved as approved by Departmental Representative.

.3 Protect plant and root systems from damage, compaction and contamination resulting from construction as approved by Departmental Representative.

.4 Ensure no pruning is done inside drip line. If pruning inside drip line is required consult an aborist or Canadian Certified Horticultural Technician (CCHT) as approved by Departmental Representative.

## 3.2 ROOT CURTAIN SYSTEM

.1 Identify limits for required construction excavation as approved by Departmental Representative.

.2 Prior to construction excavation, hand dig trench minimum 500 mm wide x 1500 mm deep, along perimeter of excavation limits.

.3 Prune exposed roots cleanly at side of trench nearest plants to be preserved. Pruned ends to point obliquely downwards.

.4 Install wooden posts and welded wire fabric against construction edge of trench.

.5 Securely attach Type 2 filter fabric on plant side of wire mesh.

.6 Backfill with native material between curtain wall and plants to be preserved in layers not exceeding 150 mm in depth. Compact each layer to 85% Standard Proctor Density.

.7 Protect root curtain from damage during construction operations.

.8 Water plants and root curtain sufficiently during construction to maintain optimum soil moisture condition until backfill operations are complete.

.9 Protect root curtain before during backfill operations. Ensure root curtain is cut down to 300 mm below finished grade and remove cut material.

END OF SECTION

SNC·LAVALIN

# Geotechnical Investigation
# Proposed Bird Banding Station Building

# Prince Edward Point National Wildlife Area Prince Edward County, Ontario

Final Report

Corporate Services and Finance Branch
Environment and Climate Change Canada (ECCC)
Government of Canada

INFRASTRUCTURE

**August | 23 | 2018**

Internal ref. 656493

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# Geotechnical Investigation
# Proposed Bird Banding Station Building

## Prince Edward Point National Wildlife Area, Prince Edward County, Ontario

### Final Report

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August 23, 2018

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# NOTICE TO READER

This document contains the professional opinion *of* ***SNC-Lavalin GEM Ontario Inc.*** *(SNCL),* as to the matters set out herein, based on professional judgment and reasonable care. It is to be read in the context of the agreement (the "Agreement") between *SNCL* and **Environment and Climate Change Canada** (herein after referred to as the "Client"), the methodology, procedures and techniques used *SNCL*'s assumptions, and the circumstances and constraints under which its mandate was performed. This document is written solely for the purpose stated in the Agreement, and for the sole and exclusive benefit of the Client, whose remedies are limited to those set out in the Agreement. This document is meant to be read as a whole, and sections or parts thereof should thus not be read or relied upon out of context.

*SNCL* has, in preparing the geotechnical parameters and recommendations, followed accepted methodology and procedures, and exercised due care consistent with the intended level of accuracy, using its professional judgment and reasonable care, and is thus of the opinion that there is a high probability that actual site geotechnical conditions will fall within the predicted range. However, no warranty should be implied as to the accuracy of estimates. Unless expressly stated otherwise, assumptions, data and information supplied by, or gathered from other sources (including the Client, other consultants, testing laboratories and equipment suppliers, etc.) upon which *SNCL*'s opinions as set out herein are based, have not been verified by *SNCL*; *SNCL* makes no representation as to their accuracy and disclaims all liability with respect thereto.

*SNCL* disclaims any liability to third parties in respect of the publication, reference, quotation, or distribution of this report or any of its contents to and reliance thereon by any third party.

# 1 Introduction

SNCL was retained by the Client to conduct a geotechnical investigation for a proposed bird banding station building to be located in the Prince Edwards Point National Wildlife Area in Prince Edward County (the "Site"). The proposed structure will be approximately 11 m x 9 m in plan, partially open to the surroundings. Our understanding of the building location at the Site is based on the "PROPOSED BUILDING LOCATION" drawing (A00, Project: 1801, Watson MacEwen Teramura Architects, dated April 12, 2018), provided by the Client.

The purpose of this geotechnical investigation was to obtain information on the subsurface conditions, especially the bedrock depth, at the Site by means of a limited number of boreholes and in-situ tests. Based on SNCL's interpretation of the obtained field information, recommendations are provided on the geotechnical aspects of the proposed development.

The field work for this investigation consisted of advancing a total of two (2) boreholes and was carried out on May 29, 2018. The boreholes were advanced under the full-time supervision of experienced geotechnical personnel from SNCL. The work for this investigation was completed in accordance with SNCL's approved proposal (Ref. No. 18-00957, dated May 1, 2018).

This report contains the findings of SNCL's geotechnical investigation, together with recommendations and comments. These recommendations and comments are based on factual information and are intended only for the use of the design engineers. The recommendations and opinions in this report are applicable only to the proposed project as described in this Section. The report limitations are an integral part of this report.

It needs to be noted that no environmental aspects of site soils or groundwater were being investigated as a part of this scope of work (which was limited to geotechnical recommendations). Environmental related studies and issues, if any, shall be addressed. It is noteworthy that relevant environmental guidelines and regulations may have significant impact on project costs. Environmental guidelines and regulations are subject to change and shall be verified and taken into account when designing and preparing the project.

# 2 Method of Investigation

## 2.1 Fieldwork

The Site Location Plan (Drawing 1) and Borehole Location Plan (Drawing 2) are presented in Appendix 1 of this report. A summary of the borehole locations and final borehole depths is presented in the following table:

**Table 1: Summary of Borehole Depths**

| Borehole ID | Depth (m) | Comments |
|---|---|---|
| BH1 | 0.2 | end of borehole by refusal to split spoon sampler |
| BH2 | 0.2 | end of borehole by refusal to split spoon sampler |

Considering restrictions on using drilling rigs and excavators at the Site, as well as the expectation of a thin overburden soil layer at the Site, SNCL conducted Standard Penetration Testing (SPT) and associated split spoon soil sampling manually at two borehole locations, identified as BH1 and BH2, within the proposed building footprint.

The boreholes were advanced under the full-time supervision of experienced geotechnical personnel from SNCL.

Soil samples were taken while performing the Standard Penetration Test (SPT) in accordance with ASTM D1586. This consisted of freely dropping a manual-lift 31.75 kg (70 lb.) hammer for a vertical distance of 0.76 m (30 inches) to drive a 51 mm (2 inch) outer diameter (O.D.) split-barrel (split spoon) sampler into the ground. The number of blows of the hammer, required to drive the sampler into the relatively undisturbed ground by a vertical distance of 0.30 m (12 inches), is recorded as the SPT 'N' value of the soil which indicates the relative density of non-cohesive soils encountered at a site. At the site, refusal to SPT sampler was observed at both borehole locations in BH1/SS1 and BH2/SS1, probably due to underlying inferred bedrock.

No freestanding water was encountered in any borehole at the completion of sampling. Upon completion of sampling, the soil samples were transported to our soil laboratory for further examination.

## 2.2 Borehole Location Surveying

SNCL recorded borehole locations and coordinates upon completion of the field work. Approximate UTM coordinates and ground surface elevations were recorded using a hand-held GPS. The coordinates and elevations are presented on borehole logs and are summarized in the following Table:

**Table 2: Borehole Locations and Ground Surface Elevations**

| Borehole ID | Approximate Elevation (m AMSL) (1) | Borehole Northing (UTM Zone 18) | Borehole Easting (UTM Zone 18) |
|---|---|---|---|
| BH1 | 77.4 | 4866825.4 | 350646.1 |
| BH2 | 77.6 | 4866833.6 | 350637.0 |

(1) m AMSL: m above mean sea level

It should be noted that the above coordinates and elevations are provided to establish relative differences between borehole locations, and should not be used for construction purposes.

# 3 Subsoil Conditions

The soil descriptions given in this report and the borehole logs are based on current geotechnical practice, as per the Canadian Foundation Engineering Manual, 4th Edition. The various terms describing the soils are given at the beginning of Appendix 2.

Details of the subsurface conditions encountered are presented on the individual borehole logs attached to this report as Appendix 2. It is emphasized, however, that the soil types, thickness and physical properties as well as inferred bedrock elevations may vary between test locations. The encountered subsurface conditions are summarized as follows:

## 3.1 Topsoil

A surficial covering of dark brown silty sand topsoil with some gravel and abundant rootlets, approximately 0.2 m in thickness, was encountered at both borehole locations:

- BH1 from 0 to 0.2 m below ground surface (bgs) (end of borehole by sampler refusal on inferred bedrock); and
- BH2 from 0 to 0.2 m bgs (end of borehole by sampler refusal on inferred bedrock).

The recovered samples of this stratum were visually described to be in a moist condition. Moisture content measurements obtained on two extracted samples, BH1/SS1 and BH/SS1, were found out to be 12% and 29% by weight, respectively (the higher moisture content of sample BH2/SS1 is due to its higher organic content).

## 3.2 Inferred Bedrock

Bedrock was inferred at both borehole locations at 0.2 m bgs from refusal to SPT sampler. It needs to be noted that rock coring was not a part of this scope of work.

According to “Bedrock Geology of Ontario, Map 2544, southern sheet, Ministry of Northern Development and Mines”, the bedrock in the area is described as limestone, dolostone, shale, arkose, and sandstone. Based on the previous environmental assessment conducted in the Prince Edward Point National Wildlife Area (Phase II and Phase III Environmental Site Assessment report, No. 1666645, dated March 2017, by Golder Associates), the bedrock in the vicinity of the site is described as fresh to slightly weathered grey limestone.

# 4 Groundwater Conditions

Detailed groundwater study was not a part of this scope of work and no piezometer was installed at the Site. However, groundwater observations were made in the boreholes as sampling proceeded and upon completion of sampling.

No freestanding water was encountered in any borehole at the completion of sampling. Water levels in the bedrock cannot be accurately measured or estimated without installing and purging a piezometer. In general, groundwater level should be expected to fluctuate seasonally and can be expected to be higher in response to major weather events. In general, if rock excavation is carried out, it is possible that groundwater discharge from rock fractures may be encountered during excavation.

No long-term groundwater monitoring provisions were made in this investigation program.

# 5 Discussion and Recommendations

## 5.1 General

Based on the findings of the field investigation, it is recommended that the foundations for the proposed building consist of shallow spread, strip, pad footings, conventional concrete slab, or a raft foundation founded on the sound bedrock subgrade. It is noteworthy that bedrock was encountered at a shallow depth of 0.2 m bgs.

## 5.2 Site Preparation

### 5.2.1 Building Footprint

In building footprint, excavations should extend to expose a sufficiently sound bedrock subgrade. Bedrock subgrades should be cleaned of any weathered/loose slabs and brushed and/or air blown clean prior to inspection. Any localized weak areas which are identified should be subexcavated and replaced with suitable fill soils or mass concrete as directed by geotechnical personnel. All subgrades should be inspected by qualified geotechnical personnel prior to placement of foundations and/or Engineered Fill.

Bedrock was not cored at any borehole location; therefore, localized zones of increased weathering may be expected and therefore some rock removals are expected. If decided to construct a basement, excavation of bedrock will be required in building footprint and it may be prudent to obtain further information by coring the bedrock.

We also recommend that to avoid unpleasant surprises, the overburden be stripped prior to finalizing the design of the building using mechanical equipment and, if this is not possible, by hand digging at strategic locations to verify the presence of the bedrock and to inspect the bedrock surface.

## 5.3 Excavation

### 5.3.1 Open Cut

Overburden soil is found to be approximately 0.2 m thick at the site, so no sloping and/or bracing is required for excavation in the overburden soil.

If excavations into bedrock are necessary, the use of appropriate rock removal equipment will be required (i.e. hoe ram etc.). Since weathered bedrock may be encountered at the site, some sloping of the upper weathered zone is required – a slope of 1 horizontal to 2 vertical can be considered for planning purposes. Below the weathered zone, the bedrock should be able to remain stable for short term excavations at near vertical.

## 5.4 Dewatering

Although no groundwater was observed in any borehole during the investigation, some amount of groundwater may be encountered near the bedrock interface, which is not an uncommon occurrence. It is believed that water seepage from the overburden materials can be handled by means of gravity drainage and pumping from open sumps.

Surface grades should be sloped away from open excavations where possible in order to reduce the influx of surface runoff into excavations.

## 5.5 Foundations

### 5.5.1 Shallow Foundations

Within the presumed building footprint, bedrock was inferred at 0.2 m bgs at both borehole locations. Therefore, it is recommended that the foundations for the proposed building consist of shallow spread, strip, pad footings, or conventional concrete slab founded on the sufficiently sound limestone bedrock.

Within the presumed building footprint, rock excavation would likely be required to provide the minimum footing depths and frost protection unless the grade around the building can be raised or thermal insulation is being considered (see Section 5.5.3).

The final subgrade surface of the bedrock around the foundation footprint should be carefully examined by qualified geotechnical personnel at the time of construction and any loose slabs or weathered bedrock should be removed from bedrock subgrades.

Foundations constructed on sufficiently sound bedrock at the Site could be designed considering a bearing resistance of 300 kPa under factored Ultimate Limit States conditions. There would be no corresponding SLS bearing resistance, as settlements for foundations constructed on sufficiently sound bedrock would be considered to be negligible.

**Table 3: Recommended Highest Bearing Elevations – Shallow Foundations**

| Borehole ID | Highest Bearing Elevations – 300 kPa ULS (m/m bgs) |
|---|---|
| BH1 | 0.2/ 77.2 |
| BH2 | 0.2 / 77.4 |

Higher bearing resistances are feasible but not believed to be necessary for the project. Further site investigation, including rock coring, could be conducted to possibly provide higher resistances.

Foundations should be constructed such that they do not exceed a slope of 2 horizontal in 1 vertical over their length. For bedrock subgrades, if uneven surfaces are encountered, lean concrete mix (minimum compressive strength ($f'_c$) of 4 MPa) may be used in order to provide a level working surface (or alternatively to raise the subgrade elevation).

Excavations for sump pits, utility trenches or similar should not intersect a zone which would extend downward at an angle of 1 horizontal to 1 vertical on a bedrock subgrade.

### 5.5.2 Raft Foundations

The proposed building may also be supported on a raft foundation constructed on a sufficiently sound bedrock. The final subgrade surface of the bedrock in the vicinity of the raft foundation (i.e. at least 0.3 m beyond the building footprint) should be carefully examined by qualified geotechnical personnel at the time of construction and any loose slabs or weathered bedrock should be removed from bedrock subgrades.

The ULS factored bearing resistance that may be used for design of the raft foundation is 300 kPa. Since settlements for foundations constructed on sufficiently sound bedrock would be considered to be negligible, there would be no corresponding SLS bearing resistance. If thermal insulation is placed beneath the raft foundation, since the stiffness of rigid insulation is smaller than that of the limestone bedrock, some settlement may be expected. However, considering the strength and rigidity of typical rigid insulations, the anticipated settlement would be still relatively small. However, the information can be obtained from the supplier.

For structural analyses, a modulus of subgrade reaction of 20 MN/m$^3$ (approximately 75 pci) can be used for raft foundation constructed on an inspected and approved bedrock subgrade.

If granular engineered fill is used to raise the subgrade elevation, then bearing resistances of 150 kPa under SLS conditions and 230 kPa under ULS conditions are recommended. The engineered fill must extend at least 1.4 m beyond the outer edge of the footings.

### 5.5.3 Design for Earthquakes

Building foundations are required to be structurally designed to resist a minimum earthquake force, as defined in the National Building Code of Canada, 2010 (NBCC) and Ontario Building Code, 2012 (OBC).

Based on the average penetration resistance of encountered soils and assuming that the bedrock remains continuous to a depth of 30 m below the base of foundations, a site classification for seismic site response of ‘C’ could be considered for design purposes, per these assumptions.

### 5.5.4 Frost Protection

A permanent soil cover of 1.4 m, an equivalent in thermal insulation, or a combination of both soil cover and thermal insulation is required for frost protection of all foundations at the site. If thermal insulation is being considered, appropriate products and placement instructions are best obtained from individual manufacturers. In any case, insulation sheets (such as a layer of rigid polystyrene insulation with a minimum thickness of 100 mm) should be placed with a minimum soil covers of 300 mm and extend at least 1.4 m out from the building. Insulation sheets should also be placed over the exterior face of the foundation/slab, extending vertically to the building wall insulation level. The design of insulation also depends on whether the building will be heated and if so to what extent. If the building is not going to be heated, an underfloor insulation would also be necessary.

Adequate measures must also be taken to avoid damage to the slab insulation—both during construction and over the expected service life of the structure— minimum earth cover of 300 mm should be maintained over the insulation beyond the building perimeter. The soil cover should be of low permeability material and should be positively sloped away from the slab.

A properly prepared and inspected bedrock subgrade at this Site, which should be free of weathered rock, would not be considered as frost susceptible. However, the final subgrade surface of the bedrock under and around the foundation footprint should be carefully examined by qualified geotechnical personnel to ensure that any joints, cracks, crevices etc. in which water could penetrate are properly sealed in the vicinity of the footing or slab-on-grade (i.e. at least 0.3 m beyond the footing or slab-on-grade perimeter). If and where unsuitable, the subgrade can be further lowered to more intact bedrock.

In any event, the exterior foundation walls should be protected from an adfreeze condition by placing a frictionless barrier.

## 5.6 Drainage

Perimeter drainage systems should be installed as per the requirements of (but not necessarily limited to) OBC and local municipal standards. Any drainage systems installed should discharge to a protected and frost-resistant sump. Typical sections of perimeter drains in accordance with the latest edition of the Canadian Foundation Engineering Manual have been presented in Appendix 3 of this report. It should be noted that the uppermost backfill should be impermeable soil.

In addition, an underfloor drainage system may need to be considered depending on the final elevation of floor slabs (provided all floor slabs are constructed a minimum of 0.2 m above final exterior grades, under floor drains are not expected to be required at this Site).

Underfloor and perimeter drainage systems should not be connected, in order to prevent surcharging either system.

It is also recommended that the ground surface around the perimeter of the building slope downward and away from the building walls.

Dampproofing should be applied to exterior foundation walls in order to prevent moisture infiltration from the backfill materials. Moreover, waterproofing membranes could be considered as an additional precaution.

### 5.6.1 Drainage for the Proposed Raft Construction Option

Considering that the proposed raft (325 to 350 mm thick) is proposed to be placed on 100 mm thick layer of insulation and 50 mm thick layer of leveling concrete (both extending 1.4 m out from the building footprint) on an inspected and approved bedrock, and that the final elevation of floor are at least 50 mm above final exterior grades, underfloor drains are not expected to be required at this Site.

It would, however, be prudent to provide a perimeter drainage system to take the surface water away from the vicinity of the building and to reduce the risk of deterioration of insulation material. This latter aspect (i.e. possible deterioration of insulation material) can be checked with the supplier of the insulation material (i.e. high-density extruded polystyrene). The drainage system must be connected (drained) to a municipal storm pipe (rain) or to a frost-free sump. If, however, the perimeter drainage system is considered too expensive (say due to lack of a nearby municipal storm sewer pipe and/or the expense of the construction of a frost-free sump) and if some minor risk is acceptable, then it too can be omitted. Nevertheless, a flooding condition should be prevented. If any required rock excavation for the foundation work at the site can cause any water accumulation, a proper drainage system must be provided.

## 5.7 Slab-on-Grade Construction

For slabs on grade constructed on an inspected and approved bedrock subgrade, a modulus of subgrade reaction of 20 MN/m$^3$ (approximately 75 pci) can be used for design purposes.

Underneath slabs (if any), a minimum 200 mm thick base layer consisting of OPSS Granular ‘A’ should be placed and compacted to 100% of its SPMDD. As well, provisions need to be made to intercept and remove any surface water from below slabs.

The existing topsoil should be completely removed prior to placement of slab-on-grade.

## 5.8 Engineered Fill

Depending on the final design, Engineered Fill application may be required in this project in order to raise subgrade elevations under slab on grade or pavement areas.

For any fill operation to be considered Engineered Fill, the following criteria must be satisfied:

- Engineered Fill should consist of a uniform, homogeneous material. The fill material should also be free of organics, deleterious materials (i.e. building debris such as bricks, metal etc.). Materials meeting Ontario Provincial Standard Specifications (OPSS) Granular 'B' Type I or II or Granular 'A' specifications would be considered as a suitable Engineered Fill material;
- Prior to the placement of Engineered Fill, it must be evaluated for suitability in the Geotechnical Laboratory. Samples should be provided to the Geotechnical Engineer and submitted for Standard Proctor and grain size analysis;
- Engineered Fill must be compactable, and of a suitable moisture content such that it is within +/- 2.0% of its optimum moisture content, as determined through laboratory testing;
- Engineered Fill must be placed under the continuous supervision of a Geotechnical Engineer or their designate;
- Each layer of material should be placed in maximum 0.2 m lifts, and uniformly compacted with compaction equipment suitable for the type of fill used, to 100% of the material's Standard Proctor Maximum Dry Density (SPMDD);
- Field density tests must be taken on each lift of Engineered Fill. Any Engineered Fill which is tested and found to be out of specification shall either be removed, reworked or retested; and
- Engineered Fill placed underneath foundations must extend laterally a minimum of 1 m from the outside edge of footings, and extend downward at an angle of 1 horizontal to 1 vertical to the base of the excavation.

# 6 Closure

The recommendations provided in this report are based on subsoil data obtained at the borehole locations. Experience indicates that the subsoil and groundwater conditions can vary significantly between and beyond the borehole locations. For this reason, the recommendations given in this report are subject to a field verification of the subsoil conditions at the time of construction.

Should any site condition encountered differ from those at the tested locations or any changes in the project, we request that SNCL be notified immediately in order to permit reassessment of the recommendations.

# 7 General Conditions and Limitations

## A. Use of the Report

A.1 The work performed in this report was carried out in accordance with the terms and conditions made part of our proposal and/or contract pursuant to which the report was issued. The conclusions presented in the report are based solely upon the scope of services, governed by the time and budgetary considerations to which this work is subject.

A.2 The factual data, interpretations and recommendations contained in this report pertain to a specific project as described in the report and are not applicable to any other project or site location. If the project is modified in concept, location or elevation or if the project is not initiated within twelve months of the date of the report, SNC should be given an opportunity to confirm that the recommendations are still valid.

A.3 The comments given in this report are intended only for the guidance of the design engineer. Contractors bidding on, or undertaking the work, should rely on their own investigations, as well as their own interpretations of the factual test hole data, as to how subsurface conditions may affect their work.

A.4 The reader should be advised that geotechnical opinions, presented in this report, are subject to inherent uncertainties due to sampling limitations.

A.5 The report must be read as a whole, as sections taken out of context may be misleading. Drafts and working copies of study reports and other deliverables, whether or not marked "draft" and/or "for discussion purposes", do not necessarily reflect SNCL's final opinion following consideration of all matters which are the subject of the study giving rise thereto; they are issued for comment and information purposes only, and are subject to change. The reader should not rely on such documents for any purpose.

## B. Follow-up

B.1 All details of the design and proposed construction may not be known at the time of submission of *SNCL*'s report. It is recommended that *SNCL* be retained during the final design stage to review the design drawings and specifications related to foundations, earthworks, retaining systems and drainage, to determine that they are consistent with the intent of *SNCL*'s report.

B.2 Retention of *SNC* during construction is recommended to confirm and document that the subsurface conditions throughout the site do not materially differ from those given in *SNCL*'s

report and to confirm and document that construction activities did not adversely affect the design intent of *SNCL*'s recommendations.

## C. Soil and Rock Conditions

C.1 Soils and/or rock descriptions in this report are based on commonly accepted methods of classification and identification employed in professional geotechnical practice. Classification and identification of soil and rock involves judgment and *SNCL* does not guarantee descriptions as exact, but infers accuracy only to the extent that is common in current geotechnical practice.

C.2 The soils and rock conditions described in this report are those observed at the time of the study. Unless otherwise noted, those conditions form the basis of the recommendations in the report. The condition of the soil and rock may be significantly altered by construction activities (traffic, excavation, etc.) on the site or on adjacent sites. Excavation may expose the soils to changes due to wetting or drying. Unless otherwise indicated the soil and rock must be protected from these changes or disturbances during construction.

## D. Logs of Test Holes and Subsurface Interpretations

D.1 The test hole logs indicate the approximate subsurface stratigraphy and conditions only at the locations of the test holes. Soil and rock formations are variable to a greater or lesser extent. Boundaries between zones on the logs are often not distinct, but rather are transitional and have been interpreted. The precision with which subsurface stratigraphy and conditions are indicated depends on the method of boring, the frequency of sampling, the method of sampling and the uniformity of subsurface stratigraphy and conditions.

D.2 Subsurface stratigraphy and conditions between test holes are inferred and may vary significantly from stratigraphy and conditions encountered at the test holes.

D.3 Groundwater elevations and conditions described in this report refer only to those observed at the place and time of observation noted in the report. These elevations and conditions may vary seasonally or as a consequence of construction activities on the site or adjacent sites.

## E. Changed Conditions

E.1 Where conditions encountered at the site differ significantly from those described or anticipated in this report, either due to natural variability of subsurface conditions or construction activities, it is a condition of the use or reliance by the client on this report that *SNCL* is notified of the changes and provided with an opportunity to review the recommendations of this report. Recognition of changed soil and rock conditions requires experience and it is recommended that

an experienced geotechnical engineer be employed to visit the site with sufficient frequency to detect if conditions have changed significantly.

## F. Drainage

F.1 Drainage of subsurface water is commonly required either for temporary or permanent installations for the project. Improper design or construction of drainage can have serious consequences. *SNCL* can take no responsibility for the effects of drainage unless *SNCL* is specifically involved in the detailed design and follow-up site services during construction of the system.

**END OF DOCUMENT**

# Appendix 1

Site Location Plan and Borehole Location Plan


## LEGEND

- Approximate site location

## NOTES

1. All site features are approximate.

2. Drawing should be viewed in conjunction with report No.: 656493.

| NO. | DESCRIPTION | DATE |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

CLIENT: Environment and Climate Change Canada

PROJECT: Proposed Bird Banding Station Building

LOCATION: Prince Edward, Prince Edward County, Ontario

TITLE: Site Location Plan

SCALE: NTS

| DATE: | FILE: | DIV. | DRAWING: |
|---|---|---|---|
| June 2018 | 656493 | 00 | 1 |


## LEGEND

BH1 - Approximate borehole location

- Approximate building location

## NOTES

1. All site features are approximate.

2. Drawing should be viewed in conjunction with report No.: 656493.

| NO. | DESCRIPTION | DATE |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

CLIENT: Environment and Climate Change Canada

PROJECT: Proposed Bird Banding Station Building

LOCATION: Prince Edward, Prince Edward County, Ontario

TITLE: Borehole Location Plan

SCALE: NTS

| DATE: | FILE: | DIV. | DRAWING: |
|---|---|---|---|
| June 2018 | 656493 | 00 | - |

# Appendix 2

Record of Boreholes

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# NOTES TO RECORD OF BOREHOLES

*DRILLING DATA*

Method:

| | | |
|---|---|---|
| SolSt Auguring | - | Solid Stem Auguring |
| HolSt Auguring | - | Hollow Stem Auguring |
| WB | - | Washed Boring |

*SAMPLES TYPE*

| | | |
|---|---|---|
| SS | - | Split Spoon |
| AS | - | Auger Sample |
| TW | - | Thin wall Open |
| TP | - | Thin wall Piston |
| WS | - | Washed Sample |
| BS | - | Block Sample |
| RC | - | Rock Core |
| PH | - | Sample Advanced Hydraulically |
| PM | - | Sample Advanced Manually |

*LABORATORY DATA*

| | | |
|---|---|---|
| $W_P$ | - | Plastic Limit |
| W | - | Water Content (%) |
| $W_L$ | - | Liquid Limit |
| $\gamma$ | - | Natural Unit Weight (kN/m$^3$) |
| UNDR STRNG or $c_u$ | - | Undrained Shear Strength (kPa) Field Vane: St-sensitivity |
| pp | - | Pocket Penetrometer |
| UC | - | Unconfined Compression |
| UU | - | Unconsolidated Undrained at Overburden Pressure |
| CU | - | Consolidated Undrained |
| CD | - | Consolidated Drained |
| TOV | - | Total Organic Vapors |

Standard Penetration Test, 'N'- Values: The Standard Penetration Test (SPT) 'N'-values are the number of blows required to cause a standard 51 millimeters o.d. split barrel sampler to penetrate 0.3 meter into undisturbed ground in a borehole when driven by a hammer with a mass of 63.5 kilograms falling freely a distance of a 0.76 meter. For penetrations of less than 0.3 meter, N-values are indicated as the number of blows for the penetration achieved (e.g. 50/25: 50 blows for 25 centimeters penetration).

Dynamic Cone Penetration Test: Continuous penetration of a conical steel point (51 millimeters o.d. 60$^o$ cone angle) driven by 475 J impact energy on a size drill rods. The resistance to cone penetration is measured as the number of blows for each 0.3 meter advance of the conical point into the undisturbed ground.

## Soils are described by their composition and consistency or relative density

**CONSISTENCY:** Cohesive soils are described on the basis of their undrained shear strength ($c_u$) or 'N'-values as follows:

| $c_u$ (kPa) | 0 - 12 | 12 - 25 | 25 - 50 | 50 - 100 | 100 - 200 | >200 |
|---|---|---|---|---|---|---|
| | *VERY SOFT* | *SOFT* | *FIRM* | *STIFF* | *VERY STIFF* | *HARD* |
| N (blows/0.3 meter) | 0 - 2 | 2 - 4 | 4 - 8 | 8 - 15 | 15 - 30 | >30 |

**COMPACTNESS CONDITION:** Cohesionless soils are described on the basis of compactness condition as indicated by 'N'–values as follows:

| N (blows/0.3 meters) | 0 - 4 | 4 - 10 | 10 - 30 | 30 - 50 | >50 |
|---|---|---|---|---|---|
| | *VERY LOOSE* | *LOOSE* | *COMPACT* | *DENSE* | *VERY DENSE* |

## Rocks are described by their composition and structural features and/or strength

**RECOVERY:** Sum of all recovered rock core pieces from a coring run expressed as a percent of the total length of the coring run.

**ROCK QUALITY DESIGNATION (RQD):** Sum of those intact core pieces, 100 millimeters in length expressed as a percent of the length of the coring run. Classification of a rock based on the RQD value as follows:

| RQD (%) | 0 - 25 | 25 - 50 | 50 - 75 | 75 - 90 | 90 - 100 |
|---|---|---|---|---|---|
| | *VERY POOR* | *POOR* | *FAIR* | *GOOD* | *EXCELLENT* |

**JOINTING AND BEDDING:**

| SPACING | 50 mm | 50 - 300 mm | 0.3 - 1.0 m | 1.0 - 3.0 m | >3.0 m |
|---|---|---|---|---|---|
| JOINTING | *VERY CLOSE* | *CLOSE* | *MOD. CLOSE* | *WIDE* | *VERY WIDE* |
| BEDDING | *VERY THIN* | *THIN* | *MEDIUM* | *THICK* | *VERY THICK* |

# RECORD OF BH1 Co-Ord. N 18 4866825.4 350646.1

Environment and Climate Change Canada

| | | | | | |
|---|---|---|---|---|---|
| Project Number: | 656493 | Drilling Location: | BH1 | Logged by: | MM |
| Project Client: | Environment and Climate Change Canada | Drilling Method: | Manually | Compiled by: | RG |
| Project Name: | Proposed Bird Banding Station Building | Drilling Machine: | Split Spoon Soil Sampling | Reviewed by: | RG |
| Project Location: | Prince Edward Point National Wildlife Area, Ontario | Date Started: | May 29, 18 | Date Completed: May 29, 18 | Revision No.: 0 |

| LITHOLOGY PROFILE | | SOIL SAMPLING | | | | | | FIELD TESTING | LAB TESTING | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lithology Plot | DESCRIPTION<br>Local Ground Surface Elevation: 77.4 m | Sample Type | Sample Number | Recovery (%) | SPT 'N' Value | DEPTH (m) | ELEVATION (m) | Penetration Testing: ○ SPT ● DCPT; MTO Vane* △ Intact ▲ Remould; Nilcon Vane* ◇ Intact ◆ Remould; * Undrained Shear Strength (kPa) 20 40 60 80 | ★ Rinse pH Values 2 4 6 8 10 12; Soil Vapour Reading △ parts per million (ppm) 100 200 300 400; ▲ Lower Explosive Limit (LEL) $W_P$ W $W_L$ Plastic Liquid 20 40 60 80 | INSTRUMENTATION INSTALLATION | COMMENTS |
| | dark brown<br>topsoil - silty sand with some gravel laden with rootlets<br>moist<br>77.2<br>0.2<br>End of borehole. | SS | 1 | 57 | R | | | | ○ 12 | | Note: R denotes refusal to SPT sampler. |


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▽ No freestanding groundwater measured in open borehole on completion of drilling.

# RECORD OF BH2 Co-Ord. N 18 4866833.6 350637.0

Environment and Climate Change Canada

| | | | | | |
|---|---|---|---|---|---|
| Project Number: | 656493 | Drilling Location: | BH2 | Logged by: | MM |
| Project Client: | Environment and Climate Change Canada | Drilling Method: | Manually | Compiled by: | RG |
| Project Name: | Proposed Bird Banding Station Building | Drilling Machine: | Split Spoon Soil Sampling | Reviewed by: | RG |
| Project Location: | Prince Edward Point National Wildlife Area, Ontario | Date Started: | May 29, 18 | Date Completed: May 29, 18 | Revision No.: 0 |

| LITHOLOGY PROFILE | | SOIL SAMPLING | | | | | | FIELD TESTING | LAB TESTING | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lithology Plot | DESCRIPTION<br>Local Ground Surface Elevation: 77.6 m | Sample Type | Sample Number | Recovery (%) | SPT 'N' Value | DEPTH (m) | ELEVATION (m) | Penetration Testing: ○ SPT ● DCPT; MTO Vane* △ Intact ▲ Remould; Nilcon Vane* ◇ Intact ◆ Remould; * Undrained Shear Strength (kPa) 20 40 60 80 | ★ Rinse pH Values 2 4 6 8 10 12; Soil Vapour Reading △ parts per million (ppm) 100 200 300 400; ▲ Lower Explosive Limit (LEL) $W_P$ W $W_L$ Plastic Liquid 20 40 60 80 | INSTRUMENTATION INSTALLATION | COMMENTS |
| | dark brown<br>topsoil - silty sand with some gravel laden with rootlets<br>moist<br>77.4<br>0.2<br>end of borehole | SS | 1 | 65 | R | | | | ○ 29 | | Note: R denotes refusal to SPT sampler. |


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▽ No freestanding groundwater measured in open borehole on completion of drilling.



Scale: 1 : 26

# Appendix 3

Permanent Drainage Details

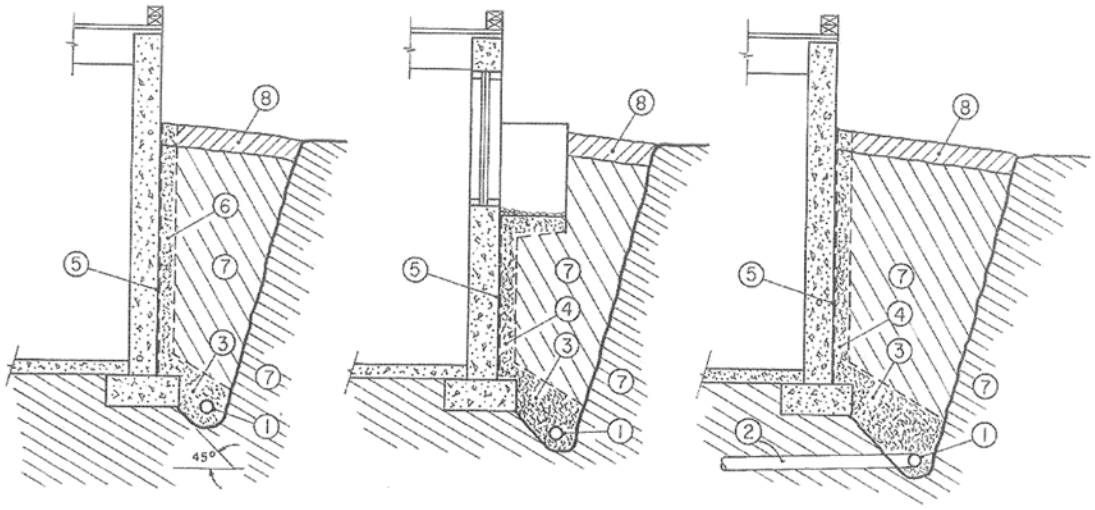


**FIGURE 12.1** *Typical Sections Showing Arrangement of Subsurface Perimeter Drains around Shallow Foundations*

(1) perforated or slotted pipe placed about 300 mm below the upper level of the basement floor slab;
(2) unperforated drain pipe connected to appropriate trap and backwater valve before connecting to a sewer. The trap shall have provisions for inspection and cleaning;
(3) filter material that is compatible with the grain size characteristics of the fine-grained foundation and backfill soils, as well as with the perforations of the pipe;
(4) filter material continuously or intermittently placed next to the foundation wall to intercept water from window wells and from low areas near the building (see also 6);
(5) damp-proofing on wall - optional depending on the quality of the concrete wall;
(6) optional use of sheet drain, or synthetic filter blanket, next to the foundation wall to replace the soil filter according to (4);
(7) foundation and backfill soils, which may contain fine-grained and erodible materials; and
(8) "topping-off" material sloping outward to lead off the surface water. It is usually desirable to use low permeability soil to reduce the risk of overloading the pipe.

*Refer to* : Canadian Foundation Engineering Manual (2006), 4th Edition, Canadian Geotechnical Society, p. 184

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PART 1 – GENERAL

1.1 EXECUTION

1. Stabilize soil and other material storage piles against wind/rainfall erosion
2. Minimize excessive dust (no chemical based dust suppressant – use only water)
3. Avoid idling vehicles/machinery/equipment
4. Any grading required will need to be completed following the project specifications and kept to a minimum in sensitive areas
5. Reduce soil compaction by restricting large machinery to the designated staging area
6. A project-specific Erosion and Sediment Control Plan must be developed and implemented based on specifications contained in contracting documents by the contractor to minimize the potential for loss of site soils to adjacent waterways. The plan must be approved by the Departmental Representative.
7. Spill response kit is kept to be on-site. Immediately contain and clean up any spills. Report spill to the Ontario Spills Action Centre (1-800-268-6060) and Environment and Climate Change Canada
8. Ensure hazardous substances (including fuel) are handled and applied in a manner to prevent release to the environment. All deleterious substances should be stored, mixed, and transferred on impermeable pads within a defined staging area to prevent water/soil contamination at least 30 m from water bodies
9. The operating, refueling, and maintenance of machinery/equipment and the handling and storage of toxic materials (i.e. oils, lubricants, fuels, and paints) will be carried out in such a way as to avoid contamination of soils and water
10. All compounds used for this project shall be utilized and stored according to the manufacturers' Product Technical Data Sheets
11. Recyclable materials and all waste debris shall be removed from the work area and disposed of off-site, in accordance with all federal, municipal, and provincial regulations to appropriate disposal facilities licensed to receive them. Waste will be removed at a minimum weekly from the site.
12. Environment and Climate Change Canada staff and contractors will be diligent in monitoring for SAR/wildlife prior to, during, and after any work activities. Pre-work surveys will check for turtles and their nest and snake activity
13. Contractors are to be briefed on the appearance and potential presence of these SARA species.
14. If individuals are encountered during project activities, stop work, and allow the individuals to flee the area before commencing work.

15. Stockpiled or exposed soils must be closed off from the ground up to prevent turtle access (and possible nesting). Closure structures must be inspected regularly by the contractor.
16. If individuals and/or nests of turtles are encountered, work must halt while Environment and Climate Change Canada is consulted as to how to address the nest
17. Equipment left overnight or on-site for long periods of time must be checked before startup for any snakes that may have found their way into the equipment.
18. When possible, wildlife will be given the opportunity to escape the work site to the surrounding forest or elsewhere to seek new shelter. If any wildlife is discovered that cannot escape quickly enough, then all work in the immediate areas will cease until Environment and Climate Change Canada staff is consulted.
19. All machinery/equipment will be clean prior to use, in order to avoid the introduction of invasive, alien species into the park
20. Any vegetation species targeted for protection (outside of construction area so that it can be avoided), or removal (within area to be destroyed) will be marked using pink flagging tape
21. Workers will stay in the work areas as much as possible while conducting the decommissioning and construction to reduce overall damage to the surrounding vegetation, trampling, and ground compaction (stay in footprint)
22. Contractor will access work areas via established pathways (i.e., concrete, pavement, or gravel surfaces). If established pathways are not present, construction equipment will travel and work on established landscaped areas only and not disturb natural areas.
23. If any vegetation must be removed, Environment and Climate Change Canada must be contacted prior to removal to ensure there is no harm to migratory birds.
24. Trees and vegetation removal will be minimized to the extent necessary.
25. Protect existing trees by excluding any earth work within tree drip lines.
26. All work sites are to be restored to original or better conditions according to landscaping design.
27. If archaeological resources are uncovered during the project, then Environment and Climate Change Canada staff will be immediately notified and work will halt until further direction.
28. All work will abide by conditions set forth in the Canada Wildlife Act permit issued by Environment and Climate Change Canada.
29. All work will be done in accordance with applicable by-laws regarding noise.
30. Concrete curing water will not be directly released to the aquatic environment.
31. Concrete curing water will not be allowed to migrate to the aquatic environment.