GUY ARCHITECTS

QANP Operations Garage

Project # PW-21-00963356

Parks Canada Agency
Resolute Bay, NU

Issued For Tender
Specification Package

Submitted: April 14, 2022

1 GENERAL

1.01 NOT USED

2 PRODUCTS

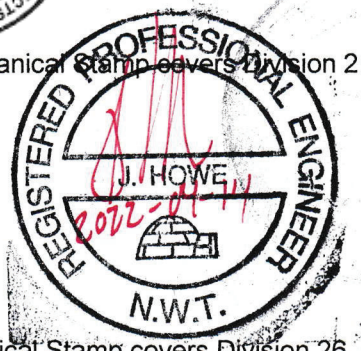
2.01 NOT USED

3 EXECUTION

3.01 SEALS

.1 Architectural Stamp covers Division 00 & Division 01/Division 5 to Division 10

.2 Mechanical Stamp covers Division 21 to 23



.3 Electrical Stamp covers Division 26

.4 Structural/Civil Stamp covers Division 3, Division 31, & Division 33

END OF SECTION

ARCHITECTURAL SPECIFICATION

END OF SECTION

1 ARCHITECTURAL DRAWINGS

- A000 Cover & Code Matrix
- A101 Site Plan
- A102 Ground Floor Plan
- A103 Mezzanine Floor Plan
- A104 Ground Floor Partial Plan
- A105 Reflective Ceiling Plans
- A200 Building Elevations
- A201 Building Elevations
- A300 Building Section
- A301 Building Section
- A302 Building Section
- A303 Stair Details
- A400 Details
- A401 Details
- A402 Details
- A403 Details
- A404 Details
- A405 Details
- A500 Interior Elevations
- A501 Interior Elevations
- A502 Interior Elevations
- A503 Kitchen Elevation
- A504 Millwork Detail - Kitchen
- A600 Door & Window Schedule
- A601 Finish Schedule

2 CIVIL DRAWINGS

- C100 Notes
- C101 Existing Grading Plan
- C102 New Grading Plan

3 STRUCTURAL DRAWINGS

- S100 Notes
- S101 Foundation
- S102 Main Floor Plan
- S103 Mezzanine Plan
- S104 Mezzanine & Stair Plan
- S105 Foundation Details
- S106 Foundation Details
- S107 Framing Details
- S108 Stairway Framing Details
- S109 Stairway Framing Details

4 MECHANICAL DRAWINGS

- **M100 Site Plan**
- **M101 Plumbing DCW/DHW**
- **M102 Plumbing DCW/DHW**
- **M103 Heating**
- **M104 Ventilation**
- **M105 Plumbing Schematic**
- **M106 Heating Schematic**
- **M107 Ventilation Schematic**
- **M108 Ventilation Schematic**

5 ELECTRICAL DRAWINGS

- **E001 Electrical Site Plan**
- **E100 Electrical Specifications and Instructions**
- **E200 Legend & Schematic**
- **E300 Floor Plan Lighting Layout**
- **E301 Floor Plan Electrical Layout**
- **E302 Mezzanine Floor Plan Electrical Layout**
- **E400 Electrical Panel Schedules**
- **E500 Mechanical Load Schedule**
- **E600 Luminaire Schedule**

END OF SECTION

1 GENERAL

1.01 All appendices will be available for viewing at the office of the Parks Canada.

1.02 The requirements of the following documents are to be considered in the implementation of the project.

.1 Appendix A: Topographical Survey

.2 Appendix B: Geotechnical Report

.3 Appendix C: Phase I & Limited Phase II Environmental Site Assessment

.4 Appendix D: Hazardous Building Material Assessments

.5 Appendix E: ENR Guideline for the Management of Waste Asbestos

.6 Appendix F: GNWT Guideline for Hazardous Waste Management

2 PRODUCTS

2.01 The above-noted documents have been appended to this section.

3 EXECUTION

3.01 Review documents prior to submitting bid.

END OF SECTION

1 GENERAL

1.01 WORK COVERED BY CONTRACT DOCUMENTS

.1 Work of this Contract comprises the provision of all submission of building permits, construction, labour and materials, equipment and temporary facilities and all other goods and services required to complete the general construction of the new QANP Operations Garage located in Resolute, NU in conformance with the Contract Documents. The “Garage” is operated by Parks Canada. (PC)

.2 The Work is not limited to work within the limits of the site but includes all work required by the Contract Documents both within and outside the area of work.

.3 Work to include:

1. New piling as per and concrete grade beam with concrete slab as noted.
2. Site Work inclusive of grading, ramps and stairs.
3. New pre-eng building structure with partitions and millwork as noted.
4. New siding, Insulation and roofing as noted.
5. New finishes as noted
6. Install all electrical, mechanical systems as noted in contract documents inclusive of Demonstration, Training and Commissioning.

1.02 GENERAL

.1 Drawings and specifications are complimentary each to the other and what is called for by one shall be binding as if called for by both.

1.03 WORK BY OTHERS

.1 Co-operate with other Contractors in carrying out their respective works and carry out instructions from Departmental Representative.

.2 Co-ordinate work with that of other Contractors: If any part of work under this Contract depends for its proper execution or result upon work of another Contractor, report promptly to Departmental Representative, in writing, any defects which may interfere with proper execution of Work.

1.04 CONTRACTOR USE OF PREMISES

.1 Use of site until Substantial Performance. Use to be coordinated with Parks Canada operations as a portion of the site may be used duration the construction of the new project.

.2 Check means of access to and egress from the site and any rights and interests which may be interfered with in the course of the work. Do not block roadways, entrances or exits. Coordinate vehicle and material access to site with Community Representative.

.3 Contractor shall ensure safety on site and provide own construction facilities.

.4 The boundaries of the site are shown on the Drawings. Should additional areas be required for the storage of materials and/or equipment, the Contractor shall obtain and pay for use of additional storage or work areas needed for operations under this Contract.

.5 Before the commencement of the work, the Contractor shall agree with the Parks Canada on mutually satisfactory location for material storage.

1.05 Parks Canada FURNISHED ITEMS

.1 Parks Canada Responsibilities:
- .1 Provide unincumbered lot
- .2 Make Progress payment as per the terms of the contract.
- .3 Prepare Construction Tender and Contract Documents.
- .4 Provide Project Management during construction. Owner's representative will be the Project Officer which will be identified at the start-up meeting.

.2 Contractor Responsibilities:
- .1 Designate submittals and delivery date for each product in progress schedule.
- .2 Review & stamp shop drawings, verify all site dimension prior to submitting, drawings, product data, samples, and other submittals to Departmental Representative. Submit to Departmental Representative notification of observed discrepancies or problems anticipated due to non-conformance with site conditions and Contract Documents.
- .3 Receive and unload products at site.
- .4 Inspect deliveries, note record shortages and damaged or defective items and arrange for replacement as required.
- .5 Handle products at site, including uncrating and storage as per manufacturer's recommendations.
- .6 Protect products from damage, and from exposure to elements.
- .7 Assemble, install, connect, adjust, and finish products.
- .8 Provide installation inspections required by public authorities.
- .9 Repair or replace items damaged by Contractor or subcontractor on site (under his control).

1.06 DOCUMENTS REQUIRED

.1 Maintain at job site, one copy each document as follows:
- .1 Contract Drawings.
- .2 Specifications.
- .3 Addenda.
- .4 Reviewed Shop Drawings.
- .5 List of Outstanding Shop Drawings.
- .6 Change Orders & Site Instructions
- .7 Other Modifications to Contract.
- .8 Field Test Reports.
- .9 Copy of Approved Work Schedule.
- .10 Health and Safety Plan and Other Safety Related Documents.
- .11 Other documents as specified.
- .12 Contract Documents

.2 All documents at job site to be in SI Metric.

.2 PRODUCTS - NOT USED

.3 EXECUTION - NOT USED

END OF SECTION

1 GENERAL

1.01 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 and harmonize this with the Schedule of Values. Submit updated Schedule of values at each Progress Claim along with update Bar Chart.

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

.4 Submit photographs of all junctures of critical components during installation, this to include: rebar installation, blocking and air barrier connections at all openings.

.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 Parks Canada to enable monitoring of project work in relation to established milestones.

1.02 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 ten (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, Interim Certificate and Final Certificate as defined times of completion are of essence of this contract.

1.03 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit Project Schedule to Parks Canada within seven (7) working days of receipt of acceptance of Master Plan.

.3 Submit progress photographs.

1.04 PROJECT MILESTONES

.1 Project milestones form interim targets for Project Schedule- Documents required.
- .1 Demolition & Site-work (Submit field reports for remediation and removal of existing structure (s))
- .2 Excavation completed as noted on approved construction schedule. (Submit topographical surveys noting grading and new fence location)
- .3 Substructure completed as noted on approved construction schedule.(Submit Survey of Pile cap elevation and locations)
- .4 Superstructure completed as noted on approved construction schedule. (Submit Survey of slab elevation and location relative to setbacks and elevation of finished grades - Geodetic)
- .5 Building closed-in and weatherproofed and insulation completed as noted on approved construction schedule. (Submit thermography completed by a Level 1 Thermographer)
- .6 Interior finishing and fitting, mechanical, and electrical work completed as noted on approved construction schedule.
- .7 Interim Certificate (Substantial Completion) as noted on approved construction schedule.(Provide al O&M materials, Manuals and Training procedures/schedule 2 weeks prior to substantial inspection)

1.05 MASTER PLAN

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

.2 Parks Canada will review and return revised schedules within ten (10) working days.

.3 Revise impractical schedule and resubmit within five (5) working days.

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

1.06 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 Mobilization.
- .3 Demolition
- .4 Shop Drawings, Samples.
- .5 Grading
- .6 Permits.
- .7 Piling and monitoring report.
- .8 Super Structure
- .9 Cladding
- .10 Interior Architecture (Walls, Floors and Ceiling).
- .11 Plumbing and testing.
- .12 Lighting.
- .13 Electrical.
- .14 Piping and testing
- .15 Controls.
- .16 Heating, Ventilating and testing.
- .17 Furniture, Fittings and Fixtures (FF&E)
- .18 Fall Arrest Installation.

1.07 PROJECT SCHEDULE REPORTING

.1 Update Project Schedule on monthly 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.

1.08 PROJECT MEETINGS

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

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

.3 Regarding construction progress meetings, responsibility for hosting scheduling the meeting either virtual or at the site.

1.09 PROGRESS PHOTOGRAPHS

.1 Digital Photography:
- .1 Submit electronic copy of color digital photography in *.jpg format, minimum four (4) megapixel resolution.
- .2 Identification: Name and number of project and date of exposure indicated.
- .3 Number of Viewpoints: Two (2), locations determined by Departmental
- .4 Representative.

Frequency:
- .1 Monthly with progress statement.
- .2 At completion of excavation, all junctures of critical components during installation including rebar installation, blocking, weather and vapor barrier, air/vapor barrier connections at all openings, and as directed by Departmental Representative.

2 PRODUCTS

2.01 NOT USED

.1 Not used.

3 EXECUTION

3.01 NOT USED

.1 Not used.

END OF SECTION

1 GENERAL

1.01 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, Contractor to provided converted values.

.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 coordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.

.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 Consultant'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 Submissions to the Departmental Representative, not directly to the Departmental Representative may be authorized to receive things directly (such as samples or other submittals) on a case-by-case basis. Where Departmental Representative address is:

Guy Architects
P.O. Box 1136, 3528 McDonald Drive
Yellowknife, NT X1A 2N8
Attn: Yaz Medraj
(P): (867) 873-3266

1.02 CONSTRUCTION SCHEDULE

.1 Immediately after the award of Contract, prepare a draft construction schedule for the work of the entire Contract.

.2 Schedule format:

.1 Provide horizontal bar chart for each trade or operation.

.2 Provide horizontal time scale identifying the 1st work day each week.

.3 Indicate progress of each activity to date of schedule submission.

.3 Show in schedule, start and completion times of each item of the Work including mobilization and erection and dismantling and demobilization of temporary facilities.

.4 Distribute draft schedule to subcontractors. Recipients shall respond to the draft schedule to the Contractor in time to allow submission of the schedule by the specified time.

.5 Incorporate commentaries from subcontractors as appropriate and submit three (3) copies for review no later than 14 days after the award of Contract.

.6 Review Consultant's commentary with sub-trades and incorporate comments as appropriate and resubmit within 7 days and until accepted.

.7 Include with schedule, cash flow chart broken down on a monthly basis. Cash flow chart shall indicate the Contractor's anticipated monthly progress billing from commencement of the Work until completion.

.8 At least once per progress claim period, review construction schedule and notify Departmental Representative of any actual or anticipated delays and recommend actions to recover lost time.

.9 In a manner and at times satisfactory to Departmental Representative, update schedule and cash flow chart whenever changes occur.

1.03 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. Contractor to stamp drawings for general conformance prior to submitting drawings for Departmental Representative review. If drawings are not stamped, drawings will be returned.

.2 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.

.3 Allow seven (7) days for Consultant's review of each submission.

.4 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.

.5 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.

.6 Accompany submissions with transmittal letter, in duplicate, containing:
- .1 Date.
- .2 Project title and number.
- .3 Contractor's name and address.
- .4 Identification and quantity of each shop drawing, product data and sample.
- .5 Other pertinent data.

.7 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.

.8 After Consultant's review, distribute copies.

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

.10 Submit pdf electronic 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.

.11 Submit electronic copies of certificates for requirements requested in specification Sections and as requested by Departmental Representative.
- .1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
- .2 Certificates must be dated after award of project contract complete with project name.

.12 Submit PDF electronic copies of manufacturer’s 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.

.13 Submit pdf electronic copies of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Departmental Representative.

.14 Submit electronic copies of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Departmental Representative.

.15 Delete information not applicable to project.

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

.17 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.

1.04 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 Consultant'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 Price. 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.

1.05 PHOTOGRAPHIC DOCUMENTATION

.1 Submit electronic copy of colour digital photography in standard resolution as directed by Departmental Representative.

1.06 CERTIFICATES AND TRANSCRIPTS

.1 Immediately after award of Contract, submit Workers' Compensation Board status.

.2 Submit transcription of insurance immediately after award of Contract.

2 PRODUCTS

2.01 NOT USED

.1 Not Used.

3 EXECUTION

3.01 NOT USED

.1 Not Used.

END OF SECTION

1 GENERAL

1.01 NOT USED

.1 The Contract to keep log of all personnel entering site noting name, phone number and company along with entry and departure time.

.2 Requirements for mandatory isolation, symptom check and reporting as per the Government of Nunavut's most current directives. These can be found at:

https://www.gov.nu.ca/health/information/nunavuts-path

.3 Contractor to factor in NU guideline and restrictions for the scheduling and execution of work by its sub-traces or own forces.

2 PRODUCTS

2.01 NOT USED

.1 Not Used

3 EXECUTION

3.01 NOT USED

.1 Not Used

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 35 43 Environmental Procedures

.2 Section 01 74 00 Cleaning

.3 Section 01 74 19 Waste Management and Disposal

.4 Section 02 41 16.09 Structure Demolition - Short Form

.5 Section 02 82 00.02 Asbestos Abatement - Intermediate Precautions

.6 Section 02 83 11 Lead - Base Paint Abatement – Intermediate Precautions

.7 Section 02 84 00 PCB and Mercury Abatement

.8 ENR Guideline for Management of Waste Asbestos, 2004

.9 GNWT Guideline for Hazardous Waste Management, 2017

1.2 REFERENCE STANDARDS

.1 Northwest Territories

.1 Safety Act, R.S.N.W.T. [2003].

.2 Canada Labour Code, Canada Occupational Safety and Health Regulations, SOR/86–304 [2017].

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit site-specific Health and Safety Plan, within [7] days after date of Notice to Proceed and prior to mobilization to site. Address following items:

.2 Develop checklist for items to be inspected on a daily basis. Document actions taken.

.3 Personnel training requirements including:

.1 Names of personnel and alternates responsible for site safety and health, hazards present on site, and use of personal protective equipment.

.2 Work practices by which personnel can minimize risks from hazards, safe use of engineering controls and equipment on site, medical surveillance requirements, including recognition of symptoms and signs which might indicate overexposure to hazards, and elements of site-specific Health and Safety Plan.

.4 Personal protective equipment (PPE) program addressing:

.1 Donning and doffing procedures.

.2 PPE selection based upon site hazards.

.3 PPE use and limitations of equipment.

.4 Work mission duration, PPE maintenance and storage.

.5 PPE decontamination and disposal.

.6 PPE inspection procedures prior to, during, and after use.

.7 Evaluation of effectiveness of PPE program, and limitations during temperature extremes, and other appropriate medical considerations.

.8 Medical surveillance requirements for personnel assigned to work at site.

.9 Frequency and types of air monitoring, personnel monitoring, and environmental sampling techniques and instrumentation to be used, including methods of maintenance and calibration of monitoring and sampling equipment.

.10 Site control measures employed at site including site map, site work zones, use of 'buddy system', site communications including site security, alerting means for emergencies, standard operating procedures or safe work practices, and identification of nearest medical assistance.

.11 Decontamination procedures for both personnel and equipment.

.12 Emergency response requirements addressing: pre-emergency planning, personnel roles, lines of authority and communication, emergency recognition and prevention, safe distances and places of refuge, site security and control, evacuation routes and procedures, decontamination procedures not covered under decontamination section, emergency medical treatment and first aid, emergency alerting and response procedures, critique of response and follow-up, PPE and emergency equipment, site topography, layout, prevailing weather conditions, and procedures for reporting incidents to local, provincial, or federal agencies.

.13 Written respiratory protection program for project activities.

.14 Procedures dealing with heat and/or cold stress.

.15 Spill containment program if drummed waste material is generated, excavated, stored, or managed on site.

.5 The Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 4-days.

.6 Medical Surveillance: submit certification of medical surveillance for site personnel, within [7] days after date of Notice to Proceed and prior to mobilization to site. Submit additional certifications as personnel are sent to site.

.7 Respirator Fit Testing: submit proof of respirator fit testing for site personnel, within [7] days after date of Notice to Proceed and prior to mobilization to site.

.8 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.

.9 Off-site Contingency and Emergency Response Plan:

.1 Prior to commencing Work involving handling of hazardous materials, develop off-site Contingency and Emergency Response Plan.

.2 Plan must provide immediate response to serious site occurrence such as explosion, fire, or migration of significant quantities of toxic or hazardous material from site.

1.4 REGULATORY REQUIREMENTS

.1 Comply with specified standards and regulations to ensure safe operations at site containing hazardous or toxic materials.

.2 All work is to be conduced in accordance with appropriate WSCC Regulations regarding the disturbance and removal of asbestos, lead based paint, mercury and PCB containing materials.

1.5 SITE CONDITIONS

.1 Work at site will involve contact with:

.1 Asbestos containing materials.

.2 Lead based or containing paint.

.3 PCB containing electrical equipment.

.4 Mercury containing electrical equipment.

.5 Fuel oil storage tank.

1.6 GENERAL REQUIREMENTS

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

.2 Ensure Health and Safety guidelines provide for safe and minimal risk working environment for site personnel and minimize impact of activities involving contact with hazardous materials or hazardous wastes on general public and surrounding environment.

.3 Relief from or substitution for portion or provision of minimum Health and Safety Guidelines specified or reviewed site-specific Health and Safety Plan must submitted to the Departmental Representative and Parks Canada in writing. The Parks Canada and/ or Departmental Representative will respond in writing, either accepting or requesting improvements.

1.7 RESPONSIBILITY

.1 Be responsible for safety of persons and property on site and for protection of persons off 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, and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

1.8 HAZARD COMMUNICATION REQUIREMENTS

.1 Comply with Work Site Hazardous Materials Information System Regulations, R.R.N.W.T.

.2 Communication is via the Parks Canada - INF Project Officer.

.3 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations, Part X - Hazardous Substances.

.4 Provide the Departmental Representative and Parks Canada with Material Safety Data Sheets (MSDS) and documentation on any "hazardous" chemical that Contractor or Contractor Representatives plan to bring onto site.

1.9 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 the INF Project Officer where required to stop or start Work when, at the INF Project Officer's discretion, it is necessary or advisable for reasons of health or safety. The INF Project Officer or Departmental Representative may also stop Work for health and safety considerations.

1.10 UNFORESEEN HAZARDS

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

1.11 PERSONNEL HEALTH, SAFETY, AND HYGIENE

.1 Medical Surveillance:

.1 Conduct medical surveillance of personnel as required by specified regulations.

.2 Training: ensure personnel entering site are trained in accordance with specified personnel training requirements. Training session must be completed by Health and Safety Officer.

.3 Levels of Protection: establish levels of protection for each Work area based on planned activity and location of activity. Minimum PPE required for each level of protection as follows:

.4 Level C/Modified Level C:

.1 Respiratory: halfmask, dual Cartridge - MSA GME-H (GME-P100) and full-face powered respirator, Cartridge - MSA GME-H (GME-P100) as identified through Sections 02 82 00.02, 02 82 00.03 and 02 83 11 as specified and included.

.2 Head, Eye, Ear Protection: ear muffs or plugs, safety glasses with side shields and hard hat.

.3 Hand Protection: Nitril under leather gloves.

.4 Foot Protection: Safety shoes.

.5 Clothing: Tyvek or equivalent coveralls.

.5 Personal Protective Equipment:

.1 Furnish site personnel with appropriate PPE as specified above. Ensure that safety equipment and protective clothing is kept clean and maintained.

.6 Develop protective equipment usage procedures and ensure that procedures are strictly followed by site personnel; include following procedures as minimum:

.1 Ensure prescription eyeglasses worn are safety glasses and do not permit contact lenses on site within work zones.

.2 Ensure footwear is steel-toed safety shoes or when entering or working in potentially contaminated work areas.

.3 Dispose of or decontaminate PPE worn on site at end of each workday.

.4 Decontaminate reusable PPE before reissuing.

.5 Ensure site personnel have passed respirator fit test prior to entering potentially contaminated work areas.

.6 Ensure facial hair does not interfere with proper respirator fit.

.7 Respiratory Protection:

.1 Provide site personnel with extensive training in usage and limitations of, and qualitative fit testing for, air purifying and supplied-air respirators in accordance with specified regulations.

.2 Develop, implement, and maintain respirator program.

.3 Monitor, evaluate, and provide respiratory protection for site personnel.

.4 Ensure levels of protection as listed have been chosen consistent with site-specific potential airborne hazards associated with major contaminants identified on site.

.5 In absence of additional air monitoring information or substance identification, minimum levels of respiratory protection will be required as follows:

.1 Table:

Sustained Total Organic Vapour Concentration Above Background (ppm)	Level of Respirator Protection Required
Intermediate Precautions Lead paint and asbestos containing materials abatement	Half-facepiece air-purifying respirator, Level C

.6 Immediately notify the Departmental Representative and Parks Canada if the level of respiratory protection required increases.

.7 Ensure appropriate respiratory protection during work activities. As minimum requirement, ensure that persons entering potentially contaminated work areas are supplied with and use appropriate respiratory protection.

.8 Assess ability for site personnel to wear respiratory protection.

.9 Ensure site personnel are able to pass respirator fit test prior to entering potentially contaminated work areas.

.8 Heat Stress/Cold Stress: implement cold stress monitoring program as applicable and include in site-specific Health and Safety Plan if applicable.

.9 Personnel Hygiene and Personnel Decontamination Procedures. Provide minimum as follows:

.1 Suitable containers for storage and disposal of used disposable PPE.

.2 Potable water and suitable sanitation facility.

.10 Emergency and First-Aid Equipment:

.1 Locate and maintain emergency and first-aid equipment in appropriate location on site including first-aid kit to accommodate number of site personnel; portable emergency eye wash; two 9 kg ABC type dry chemical fire extinguishers.

.2 Blankets and towels; stretcher; and 1 hand-held emergency siren.

.3 As minimum, provide 1 certified first-aid technician on site at all times when work activities are in progress.

.11 Site Communications:

.1 Post emergency numbers near site telephones.

.2 Ensure personnel use of "buddy" system and develop hand signal system appropriate for site activities.

.3 Provide employee alarm system to notify employees of site emergency situations or to stop Work activities if necessary.

.4 Furnish selected personnel with 2-way radios.

.5 Safety Meetings: conduct mandatory daily safety meetings for personnel, and additionally as required by special or work-related conditions; include refresher training for existing equipment and protocols, review ongoing safety issues and protocols, and examine new site conditions as encountered. Hold additional safety meetings on as-needed basis.

.12 Custodian: employ and assign to Work Custodian to report directly to Health and Safety Officer and who is responsible for keeping safety equipment and facilities clean, properly equipped, and maintained. Custodian may perform other duties for Contractor but Custodian's first priority is maintenance of protective equipment and personnel decontamination area.

1.12 AIR MONITORING

.1 Air Monitoring Program:

.1 The Departmental Representative will develop and air monitoring program meeting specified requirements for this project.

.2 During progress of work activities, air quality in and around the work zones shall be monitored. Monitoring shall be conducted on a regular periodic basis, and additionally as required by special or work-related conditions. Departures from general background levels will determine when operations should be shut down and restarted.

.3 Air Monitoring Reporting: Air monitoring results shall be posted daily by the Departmental Representative or Parks Canada.

1.13 CONTINGENCY AND EMERGENCY RESPONSE

.1 Meet specified requirements.

.2 Arrange and attend co-ordination meeting held with appropriate authorities including City, Fire, Hospital, RCMP, Department of Infrastructure, Department of Health and Social Services, and Community Emergency Co-ordinator; meeting will identify off-site Emergency Response Co-ordinator through whom information and co-ordination will occur in event of incident.

1.14 SITE CONTROL

.1 Meet specified requirements.

.1 Follow the specific requirements as outlined in their specific section for asbestos, lead, PCB, mercury abatement and building demolition work.

.2 Before work involving handling of drums and other containers begins, submit procedures for safe handling of drums and other containers. Implement and enforce drum handling program during activities involving drummed waste characterization including but not limited to handling, opening, sampling, staging, and consolidating.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

1 GENERAL

1.01 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 five (5) days' notice requesting inspection if Work is designated for special tests, inspections or approvals by Parks Canada 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. Submit test results as described in Section 01 33 00.

.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.

1.02 INDEPENDENT INSPECTION AGENCIES

.1 Independent Inspection/Testing Agencies will be engaged by Parks Canada for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by Parks Canada.

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

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

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

1.03 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.

1.04 PROCEDURES

.1 Notify appropriate agency and Parks Canada 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.

1.05 REJECTED WORK

.1 Remove defective Work, whether result of poor workmanship, use of defective products or

damage and whether incorporated in Work or not, which has been rejected by Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.

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

.3 If in opinion of Departmental Representative, it is not expedient to correct defective work or work not performed in accordance with Contract Documents, Departmental Representative will deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which will be determined by Departmental Representative.

1.06 REPORTS

.1 Submit three (3) copies of inspection and test reports to Parks Canada with copy to the

.2 Departmental Representative. Provide copies to subcontractor of work being inspected or tested.

1.07 TESTS AND MIX DESIGNS

.1 Furnish test results and mix designs as requested. This to include concrete cylinders submitted for compression testing as well as slump testing for each batch of concrete.

.2 Cost of tests and mix designs beyond those called for in Contract Documents or beyond those required by law of Place of Work will be appraised by Departmental Representative and may be authorized as recoverable.

1.08 MILL TESTS

.1 Submit mill test certificates as required of specification Sections.

1.09 EQUIPMENT AND SYSTEMS

.1 Submit adjustment and balancing reports for mechanical, electrical and building equipment–systems.

.2 Submit all pressure testing of piping. Submit test to review prior to use.

2 PRODUCTS

2.01 NOT USED

.1 Not Used.

3 EXECUTION

3.01 NOT USED

.1 Not Used.

END OF SECTION

1 GENERAL

1.01 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

1.02 INSTALLATION AND REMOVAL

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

.2 Remove from site all such work after use.

1.03 DEWATERING

.1 Provide temporary drainage and pumping facilities to keep excavations and site free from standing water.

1.04 WATER SUPPLY

.1 Contractor to obtain own supply of portable water for construction use.

1.05 TEMPORARY HEATING AND VENTILATION

.1 Contractor to provide temporary heating required during construction period, including attendance, maintenance and fuel.

.2 Construction heaters used inside building must be vented to outside or be non-flameless type. Solid fuel salamanders are not permitted.

.3 Maintain temperatures of minimum 10 degrees C in areas where construction is in progress.

.4 Ventilating:
- .1 Prevent accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.
- .2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.
- .3 Dispose of exhaust materials in manner that will not result in harmful exposure to persons.
- .4 Ventilate 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.

.5 Permanent heating system of building, to be used when available. Be responsible for damage to heating system if use is permitted.

.6 On completion of Work for which permanent heating system is used, replace any devices used in the filtration system.

.7 Ensure Date of Substantial Performance and Warranties for heating system do not commence until entire system is in as near original condition as possible and is certified by Parks Canada.

.8 Contractor to pay costs for maintaining temporary heat / permanent heating system up to the date

of Substantial Inspection. Heating fuel tanks to be filled at Substantial Inspection at Contractor's cost.

.9 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.
- .5 Vent direct-fired combustion units to outside.

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

1.06 TEMPORARY POWER AND LIGHT

.1 Contractor will provide and pay for temporary power during construction for temporary lighting and operating of power tools.

.2 Arrange for connection with appropriate utility company. Pay costs for installation, maintenance and removal of Temporary Services.

.3 Temporary power for electric cranes and other equipment required for construction is the responsibility of Contractor.

.4 Provide and maintain temporary lighting throughout project. Ensure level of illumination on all floors and stairs is not less than 162 lx.

.5 Connect to existing power supply in accordance with Canadian Electrical Code and provide meters and switching.

.6 Electrical power and lighting systems installed under this Contract may be used for construction requirements only. Make good damage to electrical system caused by use under this Contract.

1.07 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.

2 PRODUCTS

2.01 NOT USED

.1 Not Used.

3 EXECUTION

3.01 NOT USED

.1 Not Used.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

.1 Section 01 11 00 Summary of Work

1.02 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit written request in advance of cutting or alteration which affects:
- .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 Parks Canada 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 Parks Canada or separate contractor.
- .7 Written permission of affected separate contractor.
- .8 Date and time work will be executed.

1.03 MATERIALS

.1 Required for original installation.

.2 Change in Materials: Submit request for substitution in accordance with Section 01 33 00 - Submittal Procedures.

1.04 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.

.5 Provide protection from elements for areas which are to be exposed by uncovering work; maintain excavations free of water.

1.05 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 At penetration of fire rated wall, ceiling, or floor construction, completely seal voids with firestopping material in accordance with Section 07 84 00 - Firestopping full thickness of the construction element.

.13 Refinish surfaces to match adjacent finishes: Refinish continuous surfaces to nearest intersection. Refinish assemblies by refinishing entire unit.

.14 Conceal pipes, ducts and wiring in floor, wall and ceiling construction of finished areas except where indicated otherwise.

1.06 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials as required by Municipality.

2 PRODUCTS

2.01 NOT USED

.1 Not Used.

3 EXECUTION

3.01 NOT USED

.1 Not Used.

END OF SECTION

1 GENERAL

1.01 PROJECT CLEANLINESS

.1 Maintain Work in tidy condition, free from accumulation of waste products and debris, including that caused by other Contractors.

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

.3 Make arrangements with and obtain permits from Authorities Having Jurisdiction for disposal of waste and debris.

.4 Provide on-sitesealable waste containers or such as roll of bins, sea cans or other approved containers for waste materials.

.5 Provide and use marked separate bins for recycling. Refer to Section 01 74 19 – Waste Management and Disposal.

.6 Dispose of waste materials and debris at designated dumping areas off site.

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

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

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

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

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

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

1.02 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 other Contractors.

.5 Remove waste materials from site at regularly scheduled times or dispose of as directed by Consultants or Parks Canada. 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 Vacuum clean and dust building interiors, behind grilles, louvres and screens.

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

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

.13 Remove dirt and other disfiguration from exterior surfaces.

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

.15 Sweep and wash clean paved areas.

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

.17 Clean roofs, downspouts, and drainage systems.

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

.19 Remove snow and ice from access to building.

1.03 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for recycling or reuse in accordance with Section 01 74 19 – Waste Management and Disposal.

2 PRODUCTS

2.01 NOT USED

.1 Not Used.

3 EXECUTION

3.01 NOT USED

.1 Not Used.

END OF SECTION

1 GENERAL

1.01 ADMINISTRATIVE REQUIREMENTS

.1 Acceptance of Work Procedures:
- .1 Contractor's Inspection: Contractor: conduct inspection of work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
  - .1 Notify Parks Canada in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.
  - .2 Request Parks Canada inspection.
- .2 Owner's Inspection:
  - .1 Parks Canada and Contractor to inspect work and identify defects and deficiencies.
  - .2 Contractor to correct work as directed.
- .3 Completion Tasks: submit written certificates in English that tasks have been performed as follows:
  - .1 Work: completed and inspected for compliance with Contract Documents.
  - .2 Defects: corrected and deficiencies completed.
  - .3 Equipment and systems: tested, adjusted and balanced and fully operational.
  - .4 Certificates required by Fire Commissioner and Utility companies: submitted.
  - .5 Operation of systems: demonstrated to Owner's personnel.
  - .6 Work: complete and ready for final inspection.
- .4 Final Inspection:
  - .1 When completion tasks are done, request final inspection of work by Parks Canada and Contractor.
  - .2 When Work incomplete according to Parks Canada complete outstanding items and request re-inspection.
- .5 Declaration of Substantial Performance: when Parks Canada considers deficiencies and defects corrected and requirements of Contract substantially performed, make application for Certificate of Substantial Performance.
- .6 Commencement of Lien and Warranty Periods: date of Owner's acceptance of submitted declaration of Substantial Performance to be date for commencement for warranty period and commencement of lien period unless required otherwise by lien statute of Place of Work.
- .7 Final Payment:
  - .1 When Parks Canada considers final deficiencies and defects corrected and requirements of Contract met, make application for final payment.
  - .2 When Work deemed incomplete by Parks Canada, complete outstanding items and request re-inspection.
- .8 Payment of Holdback: after issuance of Certificate of Substantial Performance of Work,submit application for payment of holdback amount in accordance with contractual agreement.

1.04 FINAL CLEANING

.1 Clean in accordance with Section 01 74 11 - Cleaning.
- .1 Remove surplus materials, excess materials, rubbish, tools and equipment.

2 PRODUCTS

2.01 NOT USED

.1 Not Used.

3 EXECUTION

3.01 NOT USED

.1 Not Used.

END OF SECTION

1 GENERAL

1.01 ADMINISTRATIVE REQUIREMENTS

.1 Pre-warranty Meeting:
- .1 Convene meeting prior to contract completion with contractor's representative and Parks Canada, in accordance with Section 01 32 16 - Project Meetings to:
  - .1 Verify Project requirements.
  - .2 Review manufacturer's installation instructions and warranty requirements.
- .2 Parks Canada to establish communication procedures for:
  - .1 Notifying construction warranty defects.
  - .2 Determine priorities for type of defects.
  - .3 Determine reasonable response time.
- .3 Contact information for bonded and licensed company for warranty work action: provide name, telephone number and address of company authorized for construction warranty work action.
- .4 Ensure contact is located within local service area of warranted construction, is continuously available, and is responsive to inquiries for warranty work action.

1.02 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Two 2 weeks prior to Substantial Performance of the Work, submit to the Parks Canada, four (4) final copies of operating and maintenance manuals in English.

.3 Provide spare parts, maintenance materials and special tools of same quality and manufacture as products provided in Work.

.4 Provide evidence, if requested, for type, source and quality of products supplied.

1.03 FORMAT

.1 Organize data as Operation and Maintenance Manual.

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

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

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

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

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

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

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

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

1.04 CONTENTS - PROJECT RECORD DOCUMENTS

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

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

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

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

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

1.05 AS -BUILT DOCUMENTS AND SAMPLES

.1 Maintain, at site for Parks Canada one record copy of:
- .1 Contract Drawings.
- .2 Specifications.
- .3 Addenda.
- .4 Change Orders and other modifications to Contract.
- .5 Reviewed shop drawings, product data, and samples.
- .6 Field test records.
- .7 Inspection certificates.
- .8 Manufacturer's certificates.

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

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

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

.5 Keep record documents and samples available for inspection by Parks Canada. **1.06**

RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS

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

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

.3 Record information concurrently with construction progress.
- .1 Do not conceal work until required information is recorded.

.4 Contract Drawings and shop drawings: mark each item to record actual construction, including:
- .1 Measured depths of elements of foundation in relation to finish first floor datum.
- .2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
- .3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
- .4 Field changes of dimension and detail.
- .5 Changes made by change orders.
- .6 Details not on original Contract Drawings.
- .7 Referenced Standards to related shop drawings and modifications.

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

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

.7 Provide digital photos, if requested, for site records.

1.07 EQUIPMENT AND SYSTEMS

.1 For each item of equipment and each system include description of unit or system, and component parts.
- .1 Give function, normal operation characteristics and limiting conditions.
- .2 Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.

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

.3 Include installed colour coded wiring diagrams.

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

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

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

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

.8 Include sequence of operation by controls manufacturer.

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

.10 Provide installed control diagrams by controls manufacturer.

.11 Provide Contractor's co-ordination drawings, with installed colour coded piping diagrams.

.12 Provide 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 - Quality Control

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

1.08 MATERIALS AND FINISHES

.1 Building products, applied materials, and finishes: include product data, with catalogue number, size, composition, and colour and texture designations.
- .1 Provide information for re-ordering custom manufactured products.

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

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

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

1.09 MAINTENANCE MATERIALS

.1 Spare Parts:
- .1 Provide spare parts, in quantities specified in individual specification sections.
- .2 Provide items of same manufacture and quality as items in work.
- .3 Deliver to location as directed; place and store.
- .4 Receive and catalogue items.
  - .1 Submit inventory listing to Parks Canada.
  - .2 Include approved listings in Maintenance Manual.
- .5 Obtain receipt for delivered products and submit prior to final payment.

.2 Extra Stock 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 location as directed, place and store.
- .4 Receive and catalogue items.
  - .1 Submit inventory listing to Parks Canada.
  - .2 Include approved listings in Maintenance Manual.
- .5 Obtain receipt for delivered products and submit prior to final payment.

.3 Special Tools:
- .1 Provide special tools, in quantities specified in individual specification section.
- .2 Provide items with tags identifying their associated function and equipment.
- .3 Deliver to location as directed, place and store.
- .4 Receive and catalogue items.
  - .1 Submit inventory listing to Parks Canada.
  - .2 Include approved listings in Maintenance Manual.

1.10 DELIVERY, STORAGE AND HANDLING

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

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

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

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

.5 Remove and replace damaged products at own expense and for review by Parks Canada.

1.11 WARRANTIES AND BONDS

.1 Provide warranties or bond for Contractor and equipment.

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

.3 Provide detailed instruction of the procedures required to serve notice of required action under the warranty.

.4 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work.

.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.

1.12 WARRANTY TAGS

.1 Tag, at time of installation, each warranted item.

.2 Attach tags with copper wire and spray with waterproof silicone coating.

.3 Leave date of acceptance until project is accepted for occupancy.

.4 Indicate following information on tag:
- .1 Type of product/material.
- .2 Model number.
- .3 Serial number.
- .4 Contract number.
- .5 Warranty period.
- .6 Inspector's signature.
- .7 Construction Contractor.

2 PRODUCTS

2.01 NOT USED

.1 Not Used.

3 EXECUTION

3.01 NOT USED

.1 Not Used.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

.1 Sections 22-26

1.02 ADMINISTRATIVE REQUIREMENTS

.1 Demonstrate operation and maintenance of equipment and systems to Owner's personnel two weeks prior to date of substantial performance.

.2 Parks Canada: provide list of personnel to receive instructions, and co-ordinate their attendance at agreed-upon times.

.3 Preparation:
- .1 Verify conditions for demonstration and instructions comply with requirements.
- .2 Verify designated personnel are present.
- .3 Ensure equipment has been inspected and put into operation in accordance with Sections 22 to 26.
- .4 Ensure testing, adjusting, and balancing has been, and equipment and systems are fully operational.

.4 Demonstration and Instructions:
- .1 Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, and maintenance of each item of equipment at agreed upon times, at the equipment’s designated location.
- .2 Instruct personnel in phases of operation and maintenance using operation and maintenance manuals as basis of instruction.
- .3 Review contents of manual in detail to explain aspects of operation and maintenance.
- .4 Prepare and insert additional data in operations and maintenance manuals when needed during instructions.

.5 Time Allocated for Instructions: ensure amount of time required for instruction of each item of equipment or system as follows:
- .1 Division 22 - Plumbing System: 2 hours of instruction.
- .2 Division 26 - Electrical System: 2 hours of instruction.
- .3 Section 08-36-13.2 – Sectional Metal Doors: 2 hours of instruction.

1.03 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit schedule of time and date for demonstration of each item of equipment and each system two weeks prior to designated dates, for Consultant's approval.

.3 Submit reports within one week after completion of demonstration, that demonstration and instructions have been satisfactorily completed.

.4 Give time and date of each demonstration, with list of persons present.

.5 Provide copies of completed operation and maintenance manuals for use in demonstrations and instructions.

1.04 QUALITY ASSURANCE

.1 When specified in individual Sections requiring manufacturer to provide authorized representative to demonstrate operation of equipment and systems:
- .1 Instruct Owner's personnel.
- .2 Provide written report that demonstration and instructions have been completed.

2 PRODUCTS

2.01 NOT USED

.1 Not Used.

3 EXECUTION

3.01 NOT USED

.1 Not Used.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 CSA International
- .1 CSA-A23.1-09/A23.2-[09], Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
- .2 CAN/CSA-A23.3-04(R2010), Design of Concrete Structures.
- .3 CSA-G30.18-[09, Carbon Steel Bars for Concrete Reinforcement.
- .4 CSA-G40.20/G40.21-04(R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .5 CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
- .6 CSA W186-M1990(R2007), Welding of Reinforcing Bars in Reinforced Concrete Construction.

.2 Reinforcing Steel Institute of Canada (RSIC)
- .1 RSIC-2004, Reinforcing Steel Manual of Standard Practice.

.3 Good Building Practice for Northern Facilities -4th Ed.

1.02 QUALITY ASSURANCE

.1 Submit in accordance with Section 01 45 00 - Quality Control] and as described in PART 2 - SOURCE QUALITY CONTROL.
- .1 Upon request, submit in writing to Departmental Representative proposed source of reinforcement material to be supplied.

1.03 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 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 in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Replace defective or damaged materials with new.

2 PRODUCTS

2.01 MATERIALS

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

.2 Departmental Representative. CSA G30.12M - GRADE 400 MPA -

.3 10M, 15M, 20M bars

152x152 MW/MW18.7 welded wire mesh: to ASTM A 185/A 185M. .1 Provide in flat sheets only.

2.02 FABRICATION

.1 Fabricate reinforcing steel in accordance with CSA-A23.1/A23.2 and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.

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

2.03 SOURCE QUALITY CONTROL

.1 Upon request, provide Departmental Representative with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis.

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

3 EXECUTION

3.01 PLACING REINFORCEMENT

.1 Place reinforcing steel as indicated on placing drawings and in accordance with CSA-A23.1/A23.2.

.2 Prior to placing concrete, obtain Consultant's approval of reinforcing material and placement.

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

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 CSA International
- .1 CSA-A23.1/A23.2-[2004], Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
- .2 CSA A3000-[08], Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
- .3 CAN/CSA-G30.18-[M92(R2002)], Billet-Steel Bars for Concrete Reinforcement.

.2 Good Building Practice for Northern Facilities -4th Ed.

1.02 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Procedures. Provide testing results for review Departmental Representative.

1.03 DELIVERY, STORAGE AND HANDLING

.1 Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1/A23.2.

2 PRODUCTS

2.01 MATERIALS

.1 Cement: to CSA A3001, Type GU.

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

.3 Welded steel wire fabric: to ASTM A 185.

.4 Other concrete materials: to CSA A23.1/A23.2.

2.02 MIXES

.1 Performance Method for specifying concrete: to meet performance criteria to CSA A23.1/A23.2.
- .1 Provide concrete mix to meet following hard state requirements:

A. Grade beams
- Concrete strength (minimum) - 35 mpa
- Cement type - GU (formerly type 10)
- Exposure class - F-2
- Air content - 5-8%
- Aggregate size (maximum) - 20mm
- Slump 80 +/- 20mm
- Max W/C ratio - 0.55

B. Interior slabs
- Concrete strength (minimum) - 32 mpa
- Cement type - GU (formerly type 10)

Exposure class - N
Air content - N
Aggregate size (maximum) - 20mm
Slump 80 +/- 20mm
Max W/C ratio - 0.50

C. Exterior slabs on grade
Concrete strength (minimum) - 32 mpa
Cement type - GU (formerly type 10)
Exposure class - C-2
Air content - 5-8%
Aggregate size (maximum) - 20mm
Slump 80 +/- 20mm
Max W/C ratio - 0.50

.2 Concrete supplier's certification.

.3 Provide quality management plan to ensure verification of concrete quality to specified performance.

3 EXECUTION

3.01 PREPARATION

.1 Provide The Client 24 hours notice before each concrete pour.

.2 Place concrete reinforcing in accordance with Section 03 20 00 - Concrete Reinforcing.

.3 During concreting operations:
- .1 Development of cold joints not allowed.
- .2 Ensure concrete delivery and handling facilitates placing with minimum of rehandling, and without damage to existing structure or Work.

.4 Protect previous Work from staining.

.5 Clean and remove stains prior to application of concrete finishes.

3.02 INSTALLATION/ APPLICATION

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

.2 Sleeves and inserts:
- .1 Cast in sleeves, ties, slots, anchors, reinforcement, frames, conduit, bolts, waterstops, joint fillers and other inserts required to be built-in.
- .2 Sleeves and openings greater than 100 mm x 100 mm not indicated, must be reviewed by Departmental Representative.

3.03 FINISHES

.1 Interior floor slabs requiring smooth surface: initial finishing operations followed by final finishing comprising mechanical floating and steel troweling as specified in CSA A23.1/A23.2 to produce hard, smooth, dense troweled surface free from blemishes.

3.04 CURING

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

.2 curing temperature 20 degrees celsius or as low as 15 degrees Celsius. Use ACI committee 209 equation to achieve 70% of 28 day strength at 20 degrees Celsius. TYPE GU (10): HYDRATED MIN.7 DAYS.

3.05 FIELD QUALITY CONTROL

.1 Concrete testing: to CSA A23.1/A23.2 by testing laboratory designated and paid for by The Contractor.
.2 Slump.
.3 Compressive strength at 7 and 28 days.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 Canadian Institute of Steel Construction (CISC)/Canadian Paint Manufacturers Association (CPMA).
- .1 Handbook of the Canadian Institute of Steel Construction.
- .2 CISC/CPMA Standard 2-75, Quick-Drying Primer for use on Structural Steel.

.2 Canadian Standards Association (CSA International)
- .1 CSA G40.20/G40.21-[04], General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .2 CAN/CSA-G164-[M92(R2003)], Hot Dip Galvanizing of Irregularly Shaped Articles.
- .3 CAN/CSA-S16-[01(R2007)], Limit States Design of Steel Structures.
- .4 CAN/CSA-S136-[07], North American Specifications for the Design of Cold Formed Steel Structural Members.
- .5 CSA W47.1-[03], Certification of Companies for Fusion Welding of Steel.
- .6 CSA W48-[06], Filler Metals and Allied Materials for Metal Arc Welding.
- .7 CSA W55.3-[1965(R2003)], Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.
- .8 CSA W59-[03], Welded Steel Construction (Metal Arc Welding).

.3 Good Building Practice for Northern Facilities -4th Ed.

1.02 ACTION AND INFORMATIONAL SUBMITTALS

.1 Shop Drawings:
- .1 Submit drawings stamped and signed by professional engineer registered or licensed in NAPEG (Nunavut) Canada.

.2 Erection drawings:
- .1 Submit erection drawings indicating details and information necessary for assembly and erection purposes including:
  - .1 Description of methods.
  - .2 Sequence of erection.
  - .3 Type of equipment used in erection.
  - .4 Temporary bracings.

.3 Fabrication drawings:
- .1 Submit fabrication drawings showing designed assemblies, components and connections are stamped and signed by qualified professional engineer licensed in the NAPEG (Nunavut), Canada.

.4 Fabricator Reports:
- .1 Provide structural steel fabricator's affidavit stating that materials and products used in fabrication conform to applicable material and products standards specified and indicated.

1.03 DELIVERY, STORAGE AND HANDLING

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

.2 Deliver materials in manufacturer's original, undamaged containers with identification labels

intact.

2 PRODUCTS

2.01 DESIGN REQUIREMENTS

.1 Design details and connections in accordance with requirements of CAN/CSA-S16 and CAN/CSA-S136 with CSA-S136.1 to resist forces, moments, shears and allow for movements indicated.

.2 Shear connections:
- .1 Select framed beam shear connections from an industry accepted publication such as "Handbook of the Canadian Institute of Steel Construction" when connection for shear only (standard connection) is required.
- .2 Select or design connections to support reaction from maximum uniformly distributed load that can be safely supported by beam in bending, provided no point loads act on beam, when shears are not indicated.

.3 For composite construction select or design minimum end connection to resist reaction resulting from factored movement resistance as tabulated in the "Handbook of the Canadian Institute of Steel Construction" assuming 100% shear connection with depth of steel deck and/or slab shown on drawings.

.4 Submit sketches and design calculations stamped and signed by qualified professional engineer licensed in NAPEG (Nunavut), Canada for non-standard connections.

.5 Contract to confirm field measurements and verify these on Shop Drawings prior to submitting Shop drawings to Departmental Representative for review.

Contract to confirm field measurements and verify these on Shop Drawings prior to submitting

Shop drawings to Departmental

Representative for review. **2.02**

1. Structural steel is to conform to CSA G40.21.

MATERIALS		
	W Shape beans and columns	350W
	Channels and Angles	350W
	HSS sections, Class C	350W
	Plates	300W
	Structural bolts	ASTM A325
	Piles	A252 GR.3 Steel Pile

2.03 FABRICATION

.1 Fabricate structural steel in accordance with CAN/CSA-S16 and in accordance with approved shop drawings.

.2 Install shear studs in accordance with CSA W59 and CSA-S16.

.3 Continuously seal members by 6mm continuous fillet welds where indicated. (Grind smooth).

.4 . Structural bolts are to conform to ASTM A325. Minimum diameter cadmium plated if exposed to weather.

5. High strength steel bolt field connections except where detailed otherwise.

2.04 SHOP PAINTING

.1 Clean, prepare surfaces and shop prime structural steel in accordance with CAN/CSA-S16.

.2 Clean members, remove loose mill scale, rust, oil, dirt and foreign matter. Prepare surface according to NACE No.3/SSPC-SP-6.

.3 Prepare steel surfaces for painting to SSPC SP3 all steel and apply CISC/CPMA 2-75 over Commercial Blast Cleaning, one or two field coats enamel. 37-50 micrometres (1-2 mils) dry film thickness per coat, minimum system dry film thickness, 75-100 micrometres (3-4 mils).

3 EXECUTION

3.01 APPLICATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.02 GENERAL

.1 Structural steel work: in accordance with CAN/CSA-S16.

.2 Welding: in accordance with CSA W59 and by fabricators certified by Canadian Welding Bureau to the requirements of CSA W47.1 Division 1 or 2.1.

.3 Companies to be certified under Division 1 or 2.1 of CSA W47.1 for fusion welding of steel structures and/or CSA W55.3 for resistance welding of structural components.

3.03 ERECTION

.1 Erect structural steel, as indicated and in accordance with CAN/CSA-S16.

.2 Continuously seal members by continuous welds where indicated. Grind smooth.

3.04 FIELD QUALITY CONTROL

.1 Test shear studs in accordance with CSA W59.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 CSA International
- .1 CSA W47.1-09, Certification of Companies for Fusion Welding of Steel Structures.
- .2 CSA W55.3-08, Certification of Companies for Resistance Welding of Steel and Aluminum.
- .3 CSA W59-[M03(R2008)], Welded Steel Construction (Metal Arc Welding) [Metric].
- .4 CAN/CSA S136-16, North American Specification for the Design of Cold Formed Steel Structural Members.

1.02 ACTION AND INFORMATIONAL SUBMITTALS

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

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

.3 Shop Drawings:
- .1 Submit drawings stamped and signed by professional engineer registered or licensed in NAPEG (Nunavut), Canada.
- .2 Indicate design loads, member sizes, materials, design thickness exclusive of coatings, coating specifications, connection and bracing details, screw sizes and spacing, and anchors.
- .3 Indicate locations, dimensions, openings and requirements of related work.
- .4 Indicate welds by welding symbols as defined in CSA W59.

1.04 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance 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 in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

2 PRODUCTS

2.01 MATERIALS

.1 Steel: Products with a design thicknesses less than or equal to 1.146 mm shall have a minimum yield strength of 230 MPa and products with a design thicknesses equal to or greater than 1.438 mm shall have a minimum yield strength of 345 MPa.

.2 Zinc coated (galvanized) or zinc-iron alloy-coated (galvannealed) by the hot-dip process

.3 Welding materials: to CSA W59 and certified by Canadian Welding Bureau.

.4 Screws: Self-drilling, self-tapping sheet metal screws, corrosion protected with zinc coating.

.5 Anchors: concrete expansion anchors or other suitable drilled type fasteners.

.6 Bolts, nuts, washers: hot dipped galvanized to ASTM A 123/A 123M, zinc coating.

.7 Touch up primer: zinc rich, to CAN/CGSB-1.181.

2.02 METAL FRAMING

.1 Steel studs: to CAN/CSA S136, fabricated from metallic coated steel, depth and thickness as indicated.

.2 Stud tracks: fabricated from same material and finish as steel studs, depth to suit.

.3 Tension straps and accessories: as recommended by manufacturer.

3 EXECUTION

3.01 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for precast concrete installation in accordance with manufacturer's written instructions.
  .1 Inform the Client of unacceptable conditions immediately upon discovery.
  .2 Proceed with installation only after unacceptable conditions have been remedied.

3.02 GENERAL

.1 Weld in accordance with CSA W59.

.2 Certification of companies: to CSA W47.1 for fusion welding and CSA W55.3 for resistance welding.

.3 Do structural metal stud framing work to CSSBI S5.

3.03 ERECTION

.1 Erect components to requirements of reviewed shop drawings.

.2 Touch up welds with coat of zinc rich primer.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 ASTM International
- .1 ASTM A 53/A 53M-07, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
- .2 ASTM A 269-08, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
- .3 ASTM A 307-07b, Standard Specification for Carbon Steel Bolts and Studs, 413 Mpa (60,000 PSI) Tensile Strength.

.2 CSA International
- .1 CSA G40.20/G40.21-04(R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .2 CAN/CSA G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
- .3 CSA S16-09, Design of Steel Structures.
- .4 CSA W48-06, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).
- .5 CSA W59-M03(R2008), Welded Steel Construction (Metal Arc Welding) Metric.

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

.4 The Master Painters Institute (MPI)
- .1 Architectural Painting Specification Manual - current edition.

1.02 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Shop Drawings:
- .1 Submit drawings stamped and signed by professional engineer registered or licensed in Nunavut, Canada.
- .2 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

1.03 FIELD DIMENSIONS

.1 Before work is commenced examine adjoining work on which work is in any way dependent and make necessary adjustments to enable work to fit.

.2 Verify measurements on the job site as required so that the fabricated work fits the job conditions.

.3 Provide concealed blocking as required to suit installation.

1.04 QUALITY ASSURANCE

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

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

1.05 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
- .1 Store materials in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Replace defective or damaged materials with new.

2 PRODUCTS

2.01 MATERIALS

.1 Material generally: new, free from defects impairing strength, durability, and appearance; of best commercial quality for purposes specified. Metals to be full thickness and sizes stated, free of rust, scale, oil and grease.

.2 Steel sections and plates: to CAN/CSA-G40.21, Grade 300W.

.3 Steel bar mill products: Generally merchant block quality mild steel with low carbon content for hot forming, cold bending.

.4 Steel Pipe: To ASTM A53 standard weight black finish.

.5 Welding Materials: To CSA W59.

.6 Welding Electrodes: To CSA W48 series.

.7 Solder: In bar form of an approved brand, 50% pig lead, 50% pure block tin.

.8 Flux: Rosin, cut muriatic acid, or other approved.

.9 Screws: Generally flathead and countersunk unless otherwise described, to match surrounding materials that are exposed to view. To be compatible with materials thus uniformly secured with slot head, socket or Phillips preferred.

.10 Bolts and nuts: to ASTM A307.

.11 Grout: Non-shrink, non-ferrous, flowable, 24-hour strength, Mpa 15, pull-out strength 7.9 Mpa.

.12 Glues and Adhesives: Best quality epoxy type, non-staining and water-proof, unless otherwise noted.

.13 Hot Dipped Galvanizing regular shaped articles to CAN/CSA-G164-(M92)

2.02 FABRICATION

.1 Generally:

.1 All work to be done strictly according to contract drawings, reviewed shop drawings and site measurements. It shall be square, plumb, straight, true, rigid and sound, conforming to best practice and fabrication techniques.

.2 Provide and fix all nuts, bolts, washers, screws, clips, anchors, brackets, plates, bars and racks as required to complete work in this Section and to join the work of others.

.2 Joints: Accurately cut and fitted, neat, tight, reinforced or braced as necessary.

.3 Bolts carefully tied in without deformation: Nick threads to prevent subsequent loosening except in demountable work, or weld in place where noted. Use washers when bolting to wood blocking.

.4 Welding:

.1 Welds to be neat with continuous fillet, free of cavities, shop done where possible. Use no fillers or solders. Grind off surplus material. Concealed or inconspicuous where possible. Type, size and spacing of welds as per reviewed shop drawings. Work to requirements of CSA W47 series, W48 series and W59, as appropriate.

.2 Fabricator to be fully approved by the Canadian Welding Bureau. If the fabricator does not have, or fails to obtain the required certification, the Contractor will be held responsible for the quality of this work.

.5 Rivets: Blind or concealed where possible.

.6 Prime coat for ferrous metal:

.1 To be applied under adequate illumination and ventilation and a minimum of 10C. Do no exterior priming in damp or cold weather. Work after all cutting and filling has been done.

.2 Type of primer: Refer Clause 3.1.1.

.7 Polished or finished work to be smooth, clean and uniform, with even closed joints protected from damage during transit and progress of the work to completion. Produce intended finish to Consultant's satisfaction and to reviewed sample.

2.03 FINISHES

.1 Galvanizing: hot dipped galvanizing with zinc coating 600 g/m to CAN/CSA-G164. for exterior work.

.2 Chromium plating: chrome on steel with plating sequence of 0.009 mm thickness of copper 0.010 mm thickness of nickel and 0.0025 mm thickness of chromium for interior work.

.3 Shop coat primer: to CAN/CGSB-1.40.

.4 Zinc primer: zinc rich, ready mix to CAN/CGSB-1.181.

.5 Bituminous paint: to CAN/CGSB-1.108. for isolation with concrete.

2.04 ISOLATION COATING

.1 Isolate aluminum from following components, by means of bituminous paint:

.1 Dissimilar metals except stainless steel, zinc, or white bronze of small area.

.2 Concrete, mortar and masonry.

.3 Wood.

2.05 SHOP PAINTING

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

.2 Use primer unadulterated, as prepared by manufacturer. Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7 degrees C.

.3 Clean surfaces to be field welded; do not paint.

2.06 STEEL BOLLARDS

.1 152mm diameter x 1200mm steel bollards.

.2 Concrete Filled

.3 Finish: Refer to Drawing: Finish Schedule.

3 EXECUTION

3.01 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for metal fabrications installation in accordance with manufacturer's written instructions.
- .1 Visually inspect substrate in presence of Parks Canada.
- .2 Inform Parks Canada 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 The Parks Canada.

3.02 ERECTION

.1 Obtain Consultant’s permission prior to site cutting or making adjustments, which are not part of scheduled work.

.2 Install items free from distortion or defects detrimental to appearance and performance.

.3 Make provision for erection stresses and temporary bracing. Keep work in alignment at all times.

.4 After installation, touch-up field welds and scratches and damaged prime painted surfaces. Use a primer consistent with that used to provide shop coat and paint as per section 09 91 23 of this specification.

.5 Supply to other trades as appropriate, items required to be cast into concrete or built into masonry, complete with necessary setting templates.

.6 Support brackets to be fastened to the millwork and blocking with #12 screws complete with finishing washers. Screws to be approved by millwork manufacturer.

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

.8 Provide suitable means of anchorage acceptable to Consulatant as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.

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

pass.

3.03 STEEL BOLLARDS

.1 Install bollards as indicated.

.2 Set bollards in concrete. Grout to fill hole. Trowel surface smooth and flush with adjacent surfaces.

3.04 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
.1 Leave Work area clean at end of each day.

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

3.05 PROTECTION

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

.2 Repair damage to adjacent materials caused by metal fabrications installation.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

.1 05 50 00 Metal Fabrications

09 91 23 Interior Painting

1.02 REFERENCE STANDARDS

.1 American National Standards Institute/National Association of Architectural Metal Manufacturers (ANSI/NAAMM)
- .1 ANSI/NAAMM MBG 531-(2017), Metal Bar Grating Manual.

.2 ASTM International
- .1 ASTM A 53/A 53M-(07), Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
- .2 ASTM A 307-(07b), Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- .3 ASTM A 325M-(09), Standard Specification for Structural Bolts, Steel, Heat Treated, 830 MPa Minimum Tensile Strength Metric.

.3 Canada Green Building Council (CaGBC)
- .1 LEED Canada-NC Version 1.0-(2004), LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations (including Addendum (2007)).
- .2 LEED Canada-CI Version 1.0-(2007), LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Guide For Commercial Interiors.

.4 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-1.40-(97), Anti-corrosive Structural Steel Alkyd Primer.
- .2 CAN/CGSB-1.181-(99), Ready-Mixed Organic Zinc-Rich Coating.

.5 CSA International
- .1 CSA G40.20/G40.21-(13(R2018)), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .2 CAN/CSA G164-(M92(R2003)), Hot Dip Galvanizing of Irregularly Shaped Articles.
- .3 CSA W59-(03(R2008)), Welded Steel Construction (Metal Arc Welding).

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

.7 National Association of Architectural Metal Manufactures (NAAMM)
- .1 AMP 510-(92), Metal Stair Manual.

.8 National Research Council Canada (NRC)
- .1 National Building Code of Canada (2015) (NBC).

.9 The Society for Protective Coatings (SSPC)
- .1 Systems and Specifications Manual, Volume 2, 2008 Edition.

1.03 ACTION AND INFORMATIONAL SUBMITTALS

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

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

.3 Shop Drawings:
.1 Submit drawings stamped and signed by professional engineer registered or licensed in NAPEG, NWT, Canada.
.2 Indicate construction details, sizes of steel sections and thickness of steel sheet.

.4 Sustainable Design Submittals:
.1 N/A

1.04 QUALITY ASSURANCE

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

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

1.05 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
.1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect stairs from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

2 PRODUCTS

2.01 SYSTEM DESCRIPTION

.1 Design Requirements:

.2 Design metal stair, balustrade and landing construction and connections to National Building Code of Canada (NBC) vertical and horizontal live load requirements.

.3 Detail and fabricate stairs to NAAMM Metal Stairs Manual.

2.02 MATERIALS

.1 Steel sections: to CSA G40.20/G40.21 Grade 300 W.

.2 Steel plate: to CSA G40.20/G40.21, Grade 260 W, pattern Grip Strut safety grating.

.3 Floor plate: to CSA G40.20/G40.21, Grade 260 W.
.1 Thickness: 12 gauge.

.2 Width: 1219 mm.
.3 Design: Grip Strut safety grating, 5 diamond (298 mm wide), 64 mm deep channel.

.4 Steel pipe: to ASTM A 53/A 53M, standard weight, schedule 40 seamless black.

.5 Steel tubing: to CSA G40.20/G40.21, Grade 260 W, square, 6 mm wall thickness, sizes and dimensions as indicated.

.6 Metal bar grating: to ANSI/NAAMM MBG 531, steel, Type W-19-4, with checkered plate nosings.

.7 Welding materials: to CSA W59.

.8 Bolts: to ASTM A 307.

.9 High strength bolts: to ASTM A 325M.

2.03 FABRICATION

.1 Fabricate in accordance with NAAMM, Metal Stair Manual.

.2 Weld connections where possible, otherwise bolt connections. Countersink exposed fastenings, cut off bolts flush with nuts. Make exposed connections of same material, colour and finish as base material on which they occur.

.3 Accurately form connections with exposed faces flush:
.1 Make mitres and joints tight.
.2 Make risers of equal height.

.4 Grind or file exposed welds and steel sections smooth.

.5 Shop fabricate stairs in sections as large and complete as practicable.

2.04 PLATE/GRATING STAIRS

.1 Treads to be 12 gauge Grip Strut safety grating, and secure to stringers with L 35 x 35 x 5 supports. Form landings from 12 gauge Grip Strut safety grating.

.2 Form steel grating treads and landings from metal bar grating to profile indicated and secure to stringers and supports as indicated. Form landings of steel grating and reinforce as required.

.3 Form stringers from MC 245 x 6.5.

2.05 ANGLE BALUSTRADES

.1 Construct balusters from 64x64x6 mm steel angle.

.2 Weld balusters to knife plates and handrails.

.3 Terminate flush with bottom of stringer.

2.06 HSS RAILINGS

.1 Construct HSS railings as follows:
.1 Top rail: 50x50x6 mm HSS.
.2 Intermediate rail: 25x25x6 mm HSS.

.2 Weld railings to balustrades as indicated.

2.07 FINISHES

.1 Galvanizing: hot dipped galvanizing with zinc coating 600 g/mý to CAN/CSA-G164.

.2 Shop coat primer: to CAN/CGSB-1.40.

.3 Zinc primer: zinc rich, ready mix to CAN/CGSB-1.181.

2.08 SHOP PAINTING

.1 Clean surfaces in accordance with Steel Structures Painting Council Manual Volume 2.

.2 Apply one coat of shop primer except interior surfaces of pans.

.3 Apply two coats of primer of different colours to parts inaccessible after final assembly.

.4 Use primer as prepared by manufacturer without thinning or adding admixtures. Paint on dry surfaces, free from rust, scale, grease, do not paint when temperature is below 7 degrees C.

.5 Do not paint surfaces to be field welded.

3 EXECUTION

3.01 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for metal stairs and ladders installation in accordance with manufacturer's written instructions.
- .1 Visually inspect substrate in presence of Client.
- .2 Inform Client 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 Client.

3.02 INSTALLATION OF STAIRS

.1 Install in accordance with NAAMM, Metal Stair Manual.

.2 Install plumb and true in exact locations, using welded connections wherever possible to provide rigid structure. Provide anchor bolts, bolts and plates for connecting stairs to structure.

.3 Hand items over for casting into concrete or building into masonry to appropriate trades together with setting templates.

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

.5 Touch up shop primer to bolts, welds, and burned or scratched surfaces at completion of erection.

3.03 INSTALLATION OF PLASTIC HANDRAIL

.1 Apply plastic handrails in accordance with manufacturer's printed instructions, using recommended tools.

.2 Make joints and mitres neat, tight and inconspicuous. Remove surplus material from joint. Provide solid return at exposed ends of handrail.

3.04 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  .1 Leave Work area clean at end of each day.

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

.3 Waste Management: separate waste materials for reuse and recycling as applicable.
  .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.05 CLEANING

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

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

3.06 PROTECTION

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

.2 Repair damage to adjacent materials caused by metal stairs and ladders installation.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

.1 Section 06 20 00 Finish Carpentry

Section 06 40 00 Architectural Woodwork

Section 07 72 00 Roof Anchor

Section 10 28 10 Toilet and Bath Accessories

1.02 REFERENCE STANDARDS

.1 American National Standards Institute/National Particleboard Association (ANSI/NPA)
- .1 ANSI/NPA A208.1-(2016), Particleboard.

.2 ASTM International
- .1 ASTM A 123/A 123M-(17), Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- .2 ASTM A 653/A 653M-(09), Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealled) by the Hot-Dip Process.
- .3 ASTM C 578-(11a), Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
- .4 ASTM C 1289-(1), Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
- .5 ASTM C 1396/C 1396M-(11), Standard Specification for Gypsum Board.
- .6 ASTM D 1761-(20), Standard Test Methods for Mechanical Fasteners in Wood.
- .7 ASTM D 5055-(19e1), Standard Specification for Establishing and Monitoring Structural Capacities of Prefabricated Wood I-Joists.
- .8 ASTM D 5456-(21), Standard Specification for Evaluation of Structural Composite Lumber Products.

.3 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-11.3-(M87), Hardboard.
- .2 CAN/CGSB-51.32-(M77), Sheathing, Membrane, Breather Type.
- .3 CAN/CGSB-51.34-(M86), Vapour Barrier, Polyethylene Sheet for Use in Building Construction and amendment.
- .4 CAN/CGSB-71.26-(M88), Adhesive for Field-Gluing Plywood to Lumber Framing for Floor Systems.

.4 CSA International
- .1 CAN/CSA-A123.2-(03(R2013)), Asphalt Coated Roofing Sheets.
- .2 CAN/CSA-A247-(M86(R1996)), Insulating Fiberboard.
- .3 CSA B111-(1974(R2003)), Wire Nails, Spikes and Staples.
- .4 CSA O112.9-(10 (R2014)), Evaluation of Adhesives for Structural Wood Products (Exterior Exposure).
- .5 CSA O121-(17), Douglas Fir Plywood.
- .6 CAN/CSA O122-(06(R2011)), Structural Glued-Laminated Timber.
- .7 CSA O141-(05(R2015)), Softwood Lumber.
- .8 CSA O151-(17), Canadian Softwood Plywood.
- .9 CSA O153-(M1980(R2008)), Poplar Plywood.
- .10 CSA O325-(07(R2012), Construction Sheathing.
- .11 CSA O437 Series-(93(R2011)), Standards on OSB and Waferboard.

.12 CAN/CSA-Z809-(16), Sustainable Forest Management.

.6 Forest Stewardship Council (FSC)
.1 FSC-STD-01-001-(2018), FSC Principle and Criteria for Forest Stewardship.

.7 National Lumber Grades Authority (NLGA)
.1 Standard Grading Rules for Canadian Lumber (2017).

.8 National Research Council Canada (NRC)
.1 National Building Code of Canada (2015) (NBC).

.9 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
.1 SCAQMD Rule 1113-(A2011), Architectural Coatings.
.2 SCAQMD Rule 1168-(A2017), Adhesives and Sealants Applications.

.10 Sustainable Forestry Initiative (SFI)
.1 SFI-(2010-2014) Standard.

.11 The Truss Plate Institute of Canada
.1 Truss Design Procedures and Specifications for Light Metal Plate Connected Wood Trusses (2019).

.12 Underwriters' Laboratories of Canada (ULC)
.1 CAN/ULC-S706-(09), Standard for Wood Fibre Insulating Boards for Buildings.

1.03 ACTION AND INFORMATIONAL SUBMITTALS

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

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

.3 Shop Drawings:
.1 Submit drawings stamped and signed by professional engineer registered or licensed by NAPEG member.

.4 Sustainable Design Submittals:
.1 Low-Emitting Materials:
.1 Submit listing of adhesives, sealants, paints and coatings used in building, showing compliance 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.

1.04 QUALITY ASSURANCE

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

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

.3 Sustainable Standards Certification:

.1 Certified Wood: submit listing of wood products and materials used in accordance with CAN/CSA-Z809 or FSC or SFI.

1.05 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
- .1 Store materials off ground 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.

2 PRODUCTS

2.01 FRAMING STRUCTURAL AND PANEL MATERIALS

.1 Description:
- .1 Sustainability Characteristics:
  - .1 Lumber CAN/CSA-Z809
  - .2 Plywood, Particleboard, OSB urea-formaldehyde free, CAN/CSA-Z809

.2 Lumber: softwood, S4S, moisture content 19% (S-dry) or less in accordance with following standards:
- .1 CSA O141.
- .2 NLGA Standard Grading Rules for Canadian Lumber.

.3 Structural Composite Lumber (SCL) in accordance with ASTM D 5456.

.4 Timber for earthwork to be Pressure Treated in accordance with National Building Code of Canada (NBC).
- .1 203x203mm SPF species

.5 Furring, blocking, nailing strips, grounds, rough bucks, cants curbs, fascia backing and sleepers:
- .1 S2S is acceptable for concealed work.
- .2 Board sizes: "Standard" or better grade.
- .3 Dimension sizes: "Standard" light framing or better grade.
- .4 Post and timbers sizes: "Standard" or better grade.

.6 Plywood, OSB and wood based composite panels: to CSA O325.

.7 Douglas fir plywood (DFP): to CSA O121, standard construction.

.8 Canadian softwood plywood (CSP): to CSA O151, standard construction.

.9 Poplar plywood (PP): to CSA O153, standard construction.

.10 Interior mat-formed wood particleboard: to ANSI/NPA 208.1.

.11 Mat-formed structural panelboards (OSB wafer): to CAN O437.

.12 Isocyanurate Insulation, refer to drawings for size.

.13 Extruded polystyrene insulation board, refer to drawings for size.

.14 Gypsum sheathing: to ASTM C 1396/C 1396M.

2.02 ACCESSORIES

.1 Exterior wall sheathing paper: to CAN/CGSB-51.32 spunbonded olefin

.2 Air seal: closed cell polyurethane or polyethylene.

.3 Sealants: in accordance with Section 07 92 00 - Joint Sealants.
.1 Sealants: VOC limit 250 g/L maximum.

.4 General purpose adhesive: to CSA O112.9.
.1 VOC limit 70 g/L maximum.

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

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

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

.11 Nailing discs: flat caps, minimum 25 mm diameter, minimum 0.4 mm thick, fibre, formed to prevent dishing. Bell or cup shapes not acceptable.

.12 Roof sheathing H-Clips: formed "H" shape, thickness to suit panel material, extruded 6063-T6 aluminum alloy type approved by Parks Canada.

.13 Fastener Finishes:
.1 Galvanizing: to ASTM A 123/A 123M, use galvanized fasteners for exterior work, interior highly humid areas, pressure-preservative, fire-retardant and treated lumber.

.14 Wood Preservative:
.1 Preservative Coating: in accordance with manufacturer's recommendations for surface conditions:
.1 Preservative: VOC limit 350 g/L maximum.
.2 Coatings: VOC limit 350 g/L.

3 EXECUTION

3.01 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for product installation in accordance with manufacturer's written instructions.
.1 Visually inspect substrate in presence of Parks Canada.
.2 Inform Parks Canada 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 Parks Canada.

3.02 PREPARATION

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

.2 Apply preservative by dipping, or by brush to completely saturate and maintain wet film on

surface for minimum 3 minute soak on lumber and one minute soak on plywood.

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

.4 Treat material as follows:
- .1 Wood cants, fascia backing, curbs, nailers, sleepers on roof deck.
- .2 Wood furring for wall-hung FF&E and Misc Hardware on outside surface of walls.
- .3 Wood sleepers supporting wood subflooring over concrete slabs in contact with ground or fill.

3.03 MATERIAL USAGE

.1 Roof sheathing:
- .1 Dens Deck manufactured by Georgia Pacific sheathing grade square edge, 12mm thick, or equivalent to be approved by Departmental Representative.

.2 Exterior wall sheathing:
- .1 Gypsum sheathing, exterior Grade panel, refer to drawings for panel edge profile,16 mm Type X. Manufacturer; as specified by ULC assemblies.

.3 Subflooring:
- .1 Not Used

.4 Underlay:
- .1 Not Used

.5 Combined subfloor and underlay:
- .1 Not Used

.6 Electrical equipment mounting boards:
- .1 Plywood square edge, GIS, 19 mm thick.

3.04 INSTALLATION

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

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

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

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

.5 Install Gypsum board wall sheathing in accordance with manufacturer's printed instructions.

.6 Install Dens Deck roof sheathing in accordance with requirements of National Building Code of Canada (NBC).

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

.8 Install furring to support siding applied vertically where there is no blocking and where sheathing is not suitable for direct nailing.
- .1 Align and plumb faces of furring and blocking to tolerance of 1:600.

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

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

.11 Use dust collectors and high quality respirator masks when cutting or sanding wood panels.

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

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

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

3.05 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
- .1 Leave Work area clean at end of each day.

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

3.06 PROTECTION

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

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

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

.1 Section 06 40 00 Architectural Woodwork

1.02 REFERENCE STANDARDS

.1 American National Standards Institute (ANSI)
- .1 ANSI A208.1-09, Particleboard.
- .2 ANSI A208.2-09, Medium Density Fibreboard (MDF) for Interior Applications.
- .3 ANSI/HPVA HP-1-10, American National Standard for Hardwood and Decorative Plywood.

.2 Architectural Woodwork Manufacturers Association of Canada (AWMAC) and Architectural Woodwork Institute (AWI)
- .1 Architectural Woodwork Quality Standards, 1st edition, 2009.

.3 ASTM International
- .1 ASTM A 123/A 123M-09, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

.4 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-11.3-M87, Hardboard.

.5 CSA International
- .1 CSA B111-74(R2003), Wire Nails, Spikes and Staples.
- .2 CSA O121-08, Douglas Fir Plywood.
- .3 CSA O141-05(R2009), Softwood Lumber.
- .4 CSA O151-09, Canadian Softwood Plywood.
- .5 CSA O153-M1980(R2008), Poplar Plywood.
- .6 CAN/CSA-Z809-08, Sustainable Forest Management.

.6 National Lumber Grades Authority (NLGA)
- .1 Standard Grading Rules for Canadian Lumber 2010.

1.02 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Shop Drawings:
- .1 Submit drawings stamped and signed by professional engineer registered or licensed in Northwest Territories, Canada.
- .2 Indicate details of construction, profiles, jointing, fastening and other related details.
- .3 Indicate materials, thicknesses, finishes and hardware.

.4 Samples:
- .1 Submit for review and acceptance of each unit.
- .2 Submit 300 x 300 mm samples of each type of solid wood or plywood to receive clear finish.

1.03 QUALITY ASSURANCE

.1 Lumber by grade stamp of agency certified by Canadian Lumber Standards Accreditation Board (CLSAB).

.2 Plywood, particleboard, OSB and wood based composite panels to CSA and ANSI standards.

.3 Wood fire rated frames and panels: listed and labelled by an organization accredited by Standards Council of Canada to CAN/ULC-S104 and CAN/ULC-S105.

1.05 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
- .1 Store materials in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect wood products from nicks, scratches, and blemishes.
- .3 Replace defective or damaged materials with new.

2 PRODUCTS

2.01 MATERIALS

.1 Softwood lumber: S4S, moisture content 19% or less in accordance with following standards:
- .1 CSA O141.
- .2 CAN/CSA-Z809 or FSC or SFI certified.
- .3 NLGA Standard Grading Rules for Canadian Lumber.
- .4 AWMAC premium grade, moisture content as specified.
- .5 Machine stress-rated lumber is acceptable.
- .6 Hardwood lumber: moisture content 10% or less in accordance:
  - .1 National Hardwood Lumber Association (NHLA).
  - .2 AWMAC premium grade, moisture content as specified.
  - .3 CAN/CSA-Z809 or FSC or SFI certified.

.2 Panel Material: urea-formaldehyde free
- .1 CAN/CSA-Z809 or FSC or SFI certified.
- .2 Douglas fir plywood (DFP): to CSA O121, standard construction.
- .3 Canadian softwood plywood (CSP): to CSA O151, standard construction.
- .4 Hardwood plywood: to ANSI/HPVA HP-1.
- .5 Poplar plywood (PP): to CSA O153, standard construction.
- .6 Particleboard: to ANSI A208.1.
- .7 Hardboard: to CAN/CGSB-11.3.
- .8 Medium density fibreboard (MDF): to ANSI A208.2, density 640-800 kg/mü.
- .9 Low density fibreboard: to CSA-A247M.

2.02 ACCESSORIES

.1 Nails and staples: to CSA B111; galvanized to ASTM A 123/A 123M for exterior work, interior

humid areas and for treated lumber; plain finish elsewhere.

.2 Self-Tapping metal screws: #10 S/S finishing washer for birch -plywood wainscoting.

.3 Adhesive and Sealants: in accordance with Section 07 92 00 - Joint Sealants.

3 EXECUTION

3.01 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for wood products installation in accordance with manufacturer's written instructions.
- .1 Visually inspect substrate in presence of Parks Canada.
- .2 Inform Parks Canada 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 Parks Canada.

3.02 INSTALLATION

.1 Do finish carpentry to Quality Standards of (AWMAC).

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

.3 Form joints to conceal shrinkage.

3.03 CONSTRUCTION

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

.2 Interior and exterior frames:
- .1 Set frames with plumb sides and level heads and sills and secure.

.3 Workbench
- .1 Secure paneling and perimeter trim using adhesive recommended for purpose by manufacturer. Fill nail holes caused by temporary fixing with filler matching wood in colour.
- .2 Secure paneling and perimeter trim using concealed fasteners.
- .3 Secure paneling and perimeter trim using counter sunk screws plugged with matching wood plugs.

.4 Hardware:
- .1 Install doors and window finish hardware in accordance with the manufacturer's written

instructions and as specified in the related Sections.

.5 Birch Plywood Wainscoting:
  .1 Install panels as detailed. Start paneling at floor and secure at base (below top of baseboard with c/s screw to solid blocking. Panel in horizontal coursing, with splines inserted at location noted on the drawings. Secure spline at 800mmOC with fasteners as noted.

3.04 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  .1 Leave Work area clean at end of each day.
.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

3.05 PROTECTION

.1 Protect installed products and components from damage during construction.
.2 Repair damage to adjacent materials caused by finish carpentry installation.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

.1 Section None.

1.02 REFERENCE STANDARDS

.1 American Society of Mechanical Engineers (ASME)
- .1 ASME B18.6.3-[2011], Machine Screws, Tapping Screws, and Metallic Drive Screws (Inch Series).

.2 ASTM International
- .1 ASTM D 2369-[10e1], Test Method for Volatile Content of Coatings.
- .2 ASTM D 2832-[92(2011)], Standard Guide for Determining Volatile and Nonvolatile Content of Paint and Related Coatings.
- .3 ASTM D 5116-[10], Standard Guide For Small-Scale Environmental Chamber Determinations of Organic Emissions From Indoor Materials/Products.

.3 Canada Green Building Council (CaGBC)
- .1 LEED Canada-NC Version 1.0-[2004], LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations (including Addendum [2007]).
- .2 LEED Canada-CI Version 1.0-[2007], LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Guide For Commercial Interiors.
- .3 LEED Canada 2009 for Design and Construction- [2010], LEED Canada 2009 for Design and Construction Leadership in Energy and Environmental Design Green Building Rating System Reference Guide.
- .4 LEED Canada for Existing Buildings, Operations and Maintenance- [2009], LEED Canada 2009 Leadership In Energy and Environmental Design Green Building Rating System Reference Guide.

.4 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-51.32-[M77], Sheathing, Membrane, Breather Type.
- .2 CAN/CGSB-93.2-[M91], Prefinished Aluminum Siding, Soffits and Fascia, for Residential Use.
- .3 CAN/CGSB-93.3-[M91], Prefinished Galvanized and Aluminum-Zinc Alloy Steel Sheet for Residential Use.
- .4 CAN/CGSB-93.4-[92], Galvanized and Aluminum-Zinc Alloy Coated Steel Siding Soffits and Fascia, Prefinished, Residential.
- .5 CAN/CGSB-93.5-[92], Installation of Metal Residential Siding, Soffits and Fascia.

.5 CSA International
- .1 CSA B111-[1974(R2003)], Wire Nails, Spikes and Staples.

.6 Environmental Choice Program (ECP)
- .1 CCD-045-[95], Sealants and Caulking Compounds.

.7 Green Seal Environmental Standards (GS)
- .1 GS-36-[11], Standard for Commercial Adhesives.

.8 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards

.1 SCAQMD Rule 1168-[A2005], Adhesives and Sealants Applications.

.9 Underwriters' Laboratories of Canada (ULC)
.1 CAN/ULC-S706-[09], Standard for Wood Fiber Insulating Boards for Buildings.

1.03 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section [01 33 00 - Submittal Procedures].

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for [metal siding] and include product characteristics, performance criteria, physical size, finish and limitations.
.2 Submit [2] copies of WHMIS MSDS in accordance with Section [01 35 29.06 - Health and Safety Requirements] [01 35 43 - Environmental Procedures].
.1 Indicate VOCs for caulking materials during application [and curing].

.3 Shop Drawings:
.1 Submit drawings stamped and signed by professional engineer registered or licensed in Nunavut, Canada.
.2 Indicate dimensions, profiles, attachment methods, schedule of wall elevations, trim and closure pieces, [soffits], [fascia], [metal furring], and related work.

.4 Samples:
.1 Submit duplicate 600mm x 600mm samples of siding material, of colour and profile specified.

1.04 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.

1.05 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements] [and] [with manufacturer's written instructions].

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

.3 Storage and Handling Requirements:
.1 Store materials off ground, [indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect metal siding from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

2 PRODUCTS

2.01 ALUMINUM CLADDING COMPONENTS

.1 Strip siding: to CAN/CGSB-93.2, Type [A] [B] [C], Class [1] [2] [horizontal] [vertical].
- .1 Colour: Departmental Representative to select from Manufacturer's range.
- .2 Gloss: medium].
- .3 Profile: Based on Manufacturer's range deep, preformed interlocking joints, fastener holes pre-punched.
- .4 Pattern: plain
- .5 Thickness: 24GA min. base metal thickness.
- .6 Backing: [RSI 8.8 polyurethane

.2 Soffit: to None

2.02 FASTENERS

.1 Nails: CSA B111. Screws: ASME B18.6.3. Purpose made as recommended by Manufacturer.

2.03 CAULKING

.1 Sealants: in accordance with Section [07 92 00- Joint Sealants].
- .1 Test for acceptable VOC emissions in accordance with ASTM D 2369 and ASTM D 2832.
- .2 Adhesives and sealants: VOC limit 250 g/L maximum to SCAQMD Rule 1168.

2.04 SHEATHING PAPER

.1 Exterior wall sheathing paper: to CAN/CGSB-51.32, spunbond olefin

2.05 ACCESSORIES

.1 Exposed trim: inside corners, outside corners, cap strip, drip cap, under sill trim, starter strip and window/door trim of same material, colour and gloss as cladding, with fastener holes pre-punched.

3 EXECUTIONS

3.01 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable in accordance with manufacturer's written instructions.
- .1 Visually inspect substrate in presence of Departmental Representative.
- .2 Inform Departmental Representative of unacceptable conditions immediately upon
- .3 discovery.

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

3.02 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.

3.03 INSTALLATION

.1 Install cladding in accordance with CGSB 93.5, and manufacturer's written instructions.

.2 Install one-layer exterior wall sheathing paper horizontally by lapping edges 150 mm with higher layer overlapping lower layer.

.3 Install continuous starter strips, inside and outside, corners, edgings, cap, sill and window/door opening flashings as indicated.

.4 Install outside corners, fillers and closure strips with carefully formed and profiled work.

.5 Maintain joints in exterior cladding, true to line, tight fitting, hairline joints.

.6 Attach components in manner not restricting thermal movement.

.7 Caulk junctions with adjoining work with sealant. Do work in accordance with Section 07 92 00 - Joint Sealants.

3.04 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
.1 Leave Work area clean at end of each day.

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

3.05 PROTECTION

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

.2 Repair damage to adjacent materials caused by preformed metal siding installation.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

.1 Section 07 46 19 Steel Siding

.2 Section 07 61 00 Sheet Metal Roofing

1.02 REFERENCE STANDARDS

.1 American Society for Testing and Materials International (ASTM)
- .1 ASTM A 167-(99(2004)), Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
- .2 ASTM A 240/A 240M-(2018), Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
- .3 ASTM A 606-(04), Standard Specification for Steel, Sheet and Strip, High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, with Improved Atmospheric Corrosion Resistance.
- .4 ASTM A 653/A 653M-(08), Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .5 ASTM A 792/A 792M-(06a), Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
- .6 ASTM B 32-(04), Standard Specification for Solder Metal.
- .7 ASTM B 370-(2019), Standard Specification for Copper Sheet and Strip for Building Construction.
- .8 ASTM D 523-(89(1999)), Standard Test Method for Specular Gloss.
- .9 ASTM D 822-(01(2018)), Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings.

.3 Standard GS-36-(2013), Commercial Adhesives.

1.03 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

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

.3 Shop Drawings:
- .1 Shop drawings: Submit drawings stamped and signed by professional engineer registered or licensed in the NWT.

.4 Samples:
- .1 Submit duplicate 600mm long sample with typical profile of each type of sheet metal material, finishes and colours.
- .2 Manufacturer's Field Reports: submit to manufacturer's written reports within 3 days of review, verifying compliance of Work, as described in PART 3, FIELD QUALITY CONTROL.

1.04 QUALITY ASSURANCE

.1 Pre-Installation Meetings: convene pre-installation meeting one week prior to beginning work on-site installation with Departmental Representative in accordance with Section 01 32 16 - Construction Progress

Schedule - Bar (GANTT) Chart.
.1 Verify project requirements.
.2 Review installation and substrate conditions.
.3 Co-ordination with other building subtrades.
.4 Review manufacturer's installation instructions and warranty requirements.

1.05 DELIVERY, STORAGE AND HANDLING

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

2 PRODUCTS

2.01 SHEET METAL MATERIALS

.1 Zinc coated steel sheet: 24 GA thickness, commercial quality to ASTM A 653/A 653M, with Z275 designation zinc coating.

2.02 PREFINISHED STEEL SHEET

.1 Prefinished steel with factory applied Sherwyn & Williams Coil Coating.
.1 Manufacturer: Vic West
.2 Humidity resistance exposure period 1000 hours.

2.03 ACCESSORIES

.1 Isolation coating: alkali resistant bituminous paint.

.2 Fasteners: of same material as sheet metal

.3 Washers: of same material as sheet metal, 1 mm thick with rubber packings.

2.05 FABRICATION

.1 Fabricate metal flashings and other sheet metal work as indicated. Refer to drawings for profile.

.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.

2.06 METAL FLASHINGS

.1 Form flashings, copings and fascias to profiles indicated of 24GA thick galvanized and prefinished as noted. Refer to flashing schedule.

2.07 EAVES TROUGHS AND DOWNPIPES

.1 Galvanized steel eaves troughs & open-faced downspouts by Vic West, refer to drawings for location, minimum 22 gauge.

.2 Sizes and profiles as indicated.

.3 Provide goosenecks, outlets, strainer baskets and necessary fastenings.

.4 Form 600 x 600 mm splash pans from 26 gauge galvanized sheet metal.

.5 Provide gutter extensions at all downspouts. Extension to be minimum 1000 mm away from the building.

3 EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.02 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 Counter flash bituminous flashings at intersections of roof with vertical surfaces and curbs.
- .1 Flash joints using S-lock/ standing seams forming tight fit over hook strips.

.5 Lock end joints and caulk with sealant.

3.03 EAVES TROUGHS AND DOWNPIPES

.1 Install eaves troughs and secure to building at 609mm on centre
- .1 Eaves troughs to be level.
- .2 Seal joints watertight.

.2 Install downpipes and provide goosenecks back to wall.

.3 Install splash pans as indicated.

3.04 SCUPPERS

.1 Scuppers are the extension of eaves trough as indicated.

3.05 FIELD QUALITY CONTROL

.1 Manufacturer's Field Services:
- .1 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

3.06 CLEANING

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

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

.3 Leave work areas clean, free from grease, finger marks and stains.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 ASTM International
- .1 ASTM C 919-08, Standard Practice for Use of Sealants in Acoustical Applications.

.2 Canadian General Standards Board (CGSB)
- .1 CGSB 19-GP-5M-1984, Sealing Compound, One Component, Acrylic Base, Solvent Curing (Issue of 1976 reaffirmed, incorporating Amendment No. 1).
- .2 CAN/CGSB-19.13-M87, Sealing Compound, One-component, Elastomeric, Chemical Curing.
- .3 CGSB 19-GP-14M-1984, Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing (Reaffirmation of April 1976).
- .4 CAN/CGSB-19.17-M90, One-Component Acrylic Emulsion Base Sealing Compound.
- .5 CAN/CGSB-19.24-M90, Multi-component, Chemical Curing Sealing Compound.

.3 General Services Administration (GSA) - Federal Specifications (FS)
- .1 FS-SS-S-200-E(2)1993, Sealants, Joint, Two-Component, Jet-Blast-Resistant, Cold Applied, for Portland Cement Concrete Pavement.

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

1.02 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for joint sealants and include product characteristics, performance criteria, physical size, finish and limitations.
- .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 Manufacturer's Instructions:
- .1 Submit instructions to include installation instructions for each product used.

1.03 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for incorporation into manual.

1.04 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
- .1 Store materials in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect joint sealants from nicks, scratches, and blemishes.
- .3 Replace defective or damaged materials with new.

1.05 SITE CONDITIONS

.1 Ambient Conditions:
- .1 Proceed with installation of joint sealants only when:
  - .1 Ambient and substrate temperature conditions are within limits permitted by joint sealant manufacturer or are above 4.4 degrees C.
  - .2 Joint substrates are dry.
  - .3 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.

.2 Joint-Width Conditions:
- .1 Proceed with installation of joint sealants only where joint widths are more than those allowed by joint sealant manufacturer for applications indicated.

.3 Joint-Substrate Conditions:
- .1 Proceed with installation of joint sealants only after contaminants capable of interfering with adhesion are removed from joint substrates.

1.06 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 Health Canada.

.2 Ventilate area of work as directed by Client.

2 PRODUCTS

2.01 SEALANT MATERIALS

.1 Sealants acceptable for use on this project must be listed on CGSB Qualified Products List issued by CGSB Qualification Board for Joint Sealants. Where sealants are qualified with primers use only these primers.

.2 Sealant Type 2: CAN 2-19-18-M82; Silicone base, solvent curing. Interior use generally.
- .1 Colour: White in Washroom, clear at all other locations. Not to be painted.

.3 Sealant Type 3: CAN\CGSB-19.13-M87; Elastomeric, one compound, chemical curing. Interior use generally on joints which may be painted.
- .1 Colour: White in washroom, clear at all other locations.

.4 Sealant Type 4: CGSB 19-GP-22M-77; Mildew and fungus resistant. Interior use where mildew and fungus resistance is required. ie. Washroom around plumbing fixtures.
- .1 Colour: White in WC, clear at all other locations.

2.02 BACK-UP MATERIALS

.1 Polyethylene, Urethane, Neoprene or Vinyl Foam
- .1 Extruded closed cell foam backer rod.
- .2 Size: oversize 30 to 50%.

.2 High Density Foam: Extruded closed cell polyvinyl chloride (PVC) or neoprene foam backer, size as recommended by manufacturer.

.3 Bond Breaker Tape: Polyethylene bond breaker tape, which will not bond to sealant.

2.03 JOINT CLEANER

.1 Non-corrosive and non-staining type, compatible with joint forming materials and sealant in accordance with sealant manufacturer's written recommendations.

.2 Primer: in accordance with sealant manufacturer's written recommendations.

3 EXECUTION

3.01 EXAMINATION

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

3.02 SURFACE PREPARATION

.1 Examine joint sizes and conditions to establish correct depth to width relationship for installation of backup materials and sealants. Joint depth to half the joint width minimum 3mm to maximum 25mm

.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.

3.03 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.

3.04 BACKUP MATERIAL

.1 Apply bond breaker tape where required to manufacturer's instructions.

.2 Install joint filler to achieve correct joint depth and shape, with approximately 30% compression.

3.05 MIXING

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

3.06 APPLICATION

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

.2 Curing:
- .1 Cure sealants in accordance with sealant manufacturer's instructions.
- .2 Do not cover up sealants until proper curing has taken place.

3.07 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
- .1 Leave Work area clean at end of each day.
- .2 Clean adjacent surfaces immediately.
- .3 Remove excess and droppings, using recommended cleaners as work progresses.
- .4 Remove masking tape after initial set of sealant.

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

3.08 PROTECTION

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

.2 Repair damage to adjacent materials caused by joint sealants installation.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 American Society for Testing and Materials International (ASTM)
- .1 ASTM A 653/A 653M-06a, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .2 ASTM B 29-03, Standard Specification for Refined Lead.
- .3 ASTM B 749-03, Standard Specification for Lead and Lead Alloy Strip, Sheet and Plate Products.

.2 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.
- .2 CGSB 41-GP-19Ma-84, Rigid Vinyl Extrusions for Windows and Doors.

.3 Canadian Standards Association (CSA International)
- .1 CSA-G40.20-04/G40.21-04, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .2 CSA W59-03, Welded Steel Construction (Metal Arc Welding).

.4 Canadian Steel Door Manufacturers' Association (CSDMA)
- .1 CSDMA, Recommended Specifications for Commercial Steel Doors and Frames, 2000.
- .2 CSDMA, Selection and Usage Guide for Commercial Steel Doors, 1990.

.5 National Fire Protection Association (NFPA)
- .1 NFPA 80-99, Standard for Fire Doors and Fire Windows.
- .2 NFPA 252-03, Standard Methods of Fire Tests of Door Assemblies.

.6 Underwriters' Laboratories of Canada (ULC)
- .1 CAN/ULC-S701-01, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.
- .2 CAN/ULC-S702-97, Standard for Thermal Insulation, Mineral Fibre, for Buildings.
- .3 CAN/ULC-S704-03, Standard for Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.
- .4 CAN4-S104-M80, Standard Method for Fire Tests of Door Assemblies.
- .5 CAN4-S105-M85, Standard Specification for Fire Door Frames Meeting the Performance Required by CAN4-S104.

1.02 SYSTEM DESCRIPTION

.1 Design Requirements:
- .1 Design exterior frame assembly to accommodate to expansion and contraction when subjected to minimum and maximum surface temperature of -35 degrees C to 35 degrees C.
- .2 Maximum deflection for exterior steel entrance screens under wind load of 1.2 kPa not to exceed 1/175th of span.
- .3 Steel fire rated doors and frames: labelled and listed by an organization accredited by Standards Council of Canada in conformance with CAN4-S104 NFPA 252 for ratings specified or indicated.
- .4 Provide fire labelled frames for openings requiring fire protection ratings. Test products in conformance with CAN4-S104, and listed by nationally recognized agency having factory inspection services.

1.03 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Provide product data: in accordance with Section 01 33 00 - Submittal Procedures.

.3 Provide shop drawings: in accordance with Section 01 33 00 - Submittal Procedures.
- .1 Submit drawings stamped and signed by professional engineer registered or licensed in Northwest Territories, Canada.
- .2 Indicate each type of door, material, steel core thicknesses, mortises, reinforcements, location of exposed fasteners, openings, glazed, arrangement of hardware and fire rating and finishes.
- .3 Indicate each type frame material, core thickness, reinforcements, glazing stops, location of anchors and exposed fastenings and reinforcing, fire rating finishes.
- .4 Include schedule identifying each unit, with door marks and numbers relating to numbering on drawings and door schedule.
- .5 Submit test and engineering data, and installation instructions.

1.04 DELIVERY, STORAGE AND HANDLING

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

2 PRODUCTS

2.01 MATERIALS

.1 Galvanized steel sheet: commercial quality to ASTM A526, with Zinc Coating Designation ZFO75, locations for interior doors and frames as per ASTM A525.

.2 Doors:
- .1 For interior doors .064" base thickness.
- .2 For exterior doors .064" base thickness.
- .3 Door Core:
  - .1 Interior Doors: structural core consisting of particle board to thickness indicated.
  - .2 Exterior Doors: bonded core consisting of urethane or isocyanurate board insulation to CGSB 51-GP-21M-78, bonded to door skins, with no metal to metal contact except at edges.

.3 Door Frames:
- .1 Steel frames to exterior openings 1.58mm base thickness.
- .2 Steel frames to interior openings 0.79mm base thickness.

.4 Provide other door and frame components in accordance with CSDFMA requirements.

.5 Primer:
- .1 For galvanized steel sheet: CGSB 1-GP-178Ma-Dec-82.

.6 Door Bumpers: Black neoprene

.7 Frame head and jamb reinforcement: 100mm x 38mm structural steel channel to CAN 3-G40.21-M81.

.8 Provide top cap for exterior doors.

.9 Adhesives: Heat resistant structural reinforced adhesive.

2.02 FRAMES FABRICATION GENERAL

.1 Fabricate doors and frames as detailed, to Canadian Steel Door and Frame Manufacturers' Association, (CSDFMA) Canadian Manufacturing Specifications for Steel Doors and Frames, 1982; except where specified otherwise. Reinforce door and frames to suit hardware requirements.

.2 Blank, reinforce, drill and tap doors and frames for mortised hardware. Reinforce doors and frames for surface mounted hardware.

.3 Apply, at factory, touch up primer to doors and frames manufactured from galvanized steel where coating has been removed during fabrication.

2.03 DOORS

.1 Fabricate doors with longitudinal edges seamless, welded, filled and sanded flush.

.2 Fabricate doors with top and bottom channels flush, extending full width of door and welded to both faces.

.3 Construct matching lites in same manner as doors.

.4 Fabricate exterior doors with flush closure channel top and weep holes in bottom channel.

.5 Lites to be located as per door schedule, frame and glazing by door manufacturer to suite rating if applicable.

2.04 FRAMES

.1 Cut mitres and joints accurately and weld continuously on inside of frame profile.

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

.3 Provide adjustable jamb anchors for fixing at floor.

.4 Install 3 bumpers on strike jamb for each single door and 2 bumpers at head for pairs of doors.

.5 Fabricate thermally broken frames for exterior doors using steel core, separating exterior portion of frame from interior portion with polyvinyl thermal breaks.

3 EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

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

3.02 INSTALLATION GENERAL

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

.2 Install doors and frames to CSDMA Installation Guide.

3.03 FRAME INSTALLATION

.1 Set frames plumb, square, level and at correct elevation. Acceptable distortion of 1.58mm out of plumb; max. twist corner 3mm

.2 Secure anchorages and connections to adjacent construction.

.3 Brace frames rigidly in position while building-in. Install temporary horizontal wood spreader at third points of door opening to maintain frame width. Provide vertical support at centre of head for openings over 4' (1200mm) wide. Remove temporary spreaders after frames are built-in.

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

3.04 DOOR INSTALLATION

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

.2 Install in accordance with National fire Codes, Volume 4, produced by National Fire Protection Association (NFPA) 80.

.3 Provide even margins between doors and jambs and doors and finished floor as follows:
- .1 Hinge side: 0.79mm".
- .2 Latch-side and head: 1.58mm
- .3 Finished floor: 12mm (except fire rated doors).

.4 Adjust operable parts for correct function.

3.05 FINISH REPAIRS

.1 Touch up with primer finishes damaged during installation.

3.06 GLAZING

.1 Install glazing for doors in accordance with Section 08 80 50 - Glazing.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

.1 Section 05 50 00 Metal Fabrication.

1.02 REFERENCE STANDARDS

.1 Aluminum Association (AA)
- .1 AA DAF 45-(03(R2009)), Designation System for Aluminum Finishes.

.2 ASTM International
- .1 ASTM A 1008/A 1008M-(21), Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.
- .2 ASTM D 523-(08), Standard Test Method for Specular Gloss.
- .3 ASTM D 822-(13(2018)), Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings.
- .4 ASTM C518

.3 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-1.105-(M91), Quick-Drying Primer.
- .2 CAN/CGSB-1.213-(04), Etch Primer (Pretreatment Coating or Tie Coat) for Steel and Aluminum.
- .3 CAN/CGSB-1.181-(99), Ready-Mixed, Organic Zinc-Rich Coatings.

1.03 ADMINISTRATIVE REQUIREMENTS

.1 Pre-Installation Meetings:
- .1 Convene pre-installation meeting 1 week prior to beginning work of this Section with Departmental Representative.
  - .1 Verify project requirements.
  - .2 Review installation and substrate conditions.
  - .3 Co-ordination with other construction subtrades.
  - .4 Review manufacturer's written installation instructions and warranty requirements.

.2 Arrange for site visit with Parks Canada prior to start of Work to examine existing site conditions.

1.04 ACTION AND INFORMATIONAL SUBMITTALS

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

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

.3 Shop Drawings:
- .1 Submit drawings stamped and signed by professional engineer registered or licensed in Territory.
- .2 Indicate sizes, service rating, types, materials, operating mechanisms, glazing locations and details, hardware and accessories, required clearances and electrical connections.

.4 Certificates: submit product certificates signed by manufacturer certifying materials comply with

specified performance characteristics and criteria and physical requirements.

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

1.05 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for sectional metal doors for incorporation into manual.

1.06 MAINTENANCE MATERIAL SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Spare parts:
- .1 Supply spare parts for sectional metal doors as follows:
  - .1 Door panels: 1.
  - .2 Door rollers: 4
  - .3 Weatherstripping: 1 set.
  - .4 Springs and cables: 0
- .2 Store where directed. Identify each part and reference to appropriate door.

1.07 QUALITY ASSURANCE

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

1.08 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
- .1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect sectional metal doors, hardware and accessories from nicks, scratches, and blemishes.
- .3 Replace defective or damaged materials with new.

2 PRODUCTS

2.01 DESIGN CRITERIA

.1 Design exterior door assembly to withstand wind load of 1 kPa with a maximum horizontal deflection of 1/240 of opening width.

.2 Design door panel assemblies with thermal insulation factor 3.25 RSI.

2.02 MATERIALS

.1 1.6mm Galvanized steel sheet: commercial quality Z275 zinc coating.

.2 Steel sheet: commercial quality to ASTM A 1008/A 1008M exposed (E), with Painted finish (White).

.3 Glazing: 305mm x 610mm dual acrylic thermoset in moulded gasket.- 2 per door, refer to door schedule.

.9 Cable: multi-strand galvanized steel aircraft cable.

2.03 DOORS

.1 Door based on Thermatite ADV200 manufactured by Richard-Wilcox or approved alternate.

.2 Fabricate 50 mm thick polyurethane insulated panel doors of interlocking steel sections, thermally broken, double sealed as indicated.

.3 Fabricate panel frames in a continuous box frame with vertical stiffeners at 600 mm centres.

.4 Install glazing for door section. Sizes and number of lights as indicated.

2.04 HEAVY DUTY INDUSTRIAL HARDWARE

.1 Finish: hot dipped galvanized hardware and torsion assembly mounting brackets 380g/sm to ASTM QA525-9b.

.2 Track: 3.1mm (11ga) standard vertical lift hardware with 86mm overall outside dimension with 400mm radius weather-tight closing galvanized steel track.

.3 Track Hangers: 32mm x 32mm 2mm (14ga) commercial galvanized perforated steel angle.

.4 Rollers: 75mm long stem with 14 - 8mm dia ball bearing. 11mm dia roller axels and both the inner and outer balls facing hardened steel.

.5 Counter-Balance: Helically wound torsion springs manufactured from oil-tempered spring wire, stress relieved minimum of 25,000 cycles.
- .1 Drum: diameter and material as recommended by manufacturer.
- .2 Shaft: diameter and material as recommended by manufacturer.

2.05 ACCESSORIES

.1 Overhead horizontal track and operator supports: galvanized steel, type and size to suit installation.

2.06 ALUMINUM FINISHES

.1 N/A

2.07 PREFINISHED STEEL SHEET

.1 Prefinished steel with factory applied primer modified polyester.
- .1 White colour
- .2 Specular gloss: 30 units +/-5 in accordance with ASTM D 523.
- .3 Coating thickness: not less than 20 micrometres.
- .4 Resistance to accelerated weathering for chalk rating of 8, colour fade 5 units or less and erosion rate less than 20% to ASTM D 822 as follows:
  - .1 Outdoor exposure period 1000 hours.
  - .2 Humidity resistance exposure period 1000 hours.

2.08 OPERATORS

.1 N/A

2.09 ELECTRICAL OPERATOR

.1 Electrical dual trolley type operator based on Model ETBH by Doorlec Corporation

.2 Electrical motors, controller units, remote pushbutton stations, relays, and other electrical components: to CSA approval.

.3 Power supply: 208/120V, 3 phase, 60 Hz.
- .1 Motor: 0.248 kW, (1/3hp) 208 V, 1 phase.

.4 Controller units with integral motor reversing starter, solenoid operated brake, including 3 pushbutton and controls.

.5 Operation:
- .1 Remote pushbutton stations: surface mounted, in 2 locations, with keyed "OPEN-STOP-CLOSE" designations on pushbuttons in English and French,

.6 Safety switch: combination roll rubber with limit switches for full length of bottom rail of bottom section of door, to reverse door to open position when coming in contact with object on closing cycle.

.7 For jack shaft operators:
- .1 Provide floor level disconnect device to allow for manual operation in event of power failure.
- .2 Equip Operator with:
  - .1 Electrical interlock switch to disconnect power to operator when in manual operation.
  - .2 Built-in chain hoist for manual operation in event of power failure.

.8 For trolley operators:
- .1 Attach operator to door with quick release device to disconnect door from operator in event of power failure.

.9 Door speed: 300 mm per second.

.10 Control transformer: for 24 VAC control voltage.

.11 Mounting brackets: galvanized steel, size and gauge to suit conditions.

3 EXECUTION

3.01 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for sectional metal doors installation in accordance with manufacturer's written instructions.
- .1 Visually inspect substrate in presence of Parks Canada.
- .2 Inform Departmental Representative of unacceptable conditions immediately
- .3 upon discovery. Proceed with installation only after unacceptable conditions have been remedied.

3.02 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 doors and hardware in accordance with manufacturer's instructions.

.3 Rigidly support rail and operator and secure to supporting structure.

.4 Touch-up steel doors with primer where galvanized finish damaged during fabrication.

.5 Install operator including electrical motors, controller units, pushbutton stations, relays and other electrical equipment required for door operation.

.6 Lubricate and adjust door operating components to ensure smooth opening and closing of doors.

.7 Adjust weatherstripping to form a weather tight seal.

.8 Adjust doors for smooth operation.

3.03 FIELD QUALITY CONTROL

.1 Manufacturer's Field Services:
- .1 Obtain written reports from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product within 3 days of review.
- .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 testing.
- .4 Schedule site visits to review Work at stages listed:
  - .1 Upon completion of Work, after cleaning is carried out.

3.04 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
- .1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools, and equipment in accordance with Section 01 74 11 - Cleaning.
- .1 Remove traces of primer; clean doors and frames.
- .2 Clean glass and glazing materials with approved non-abrasive cleaner.

3.05 PROTECTION

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

.2 Repair damage to adjacent materials caused by sectional metal door installation.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

.1 Section 05 50 00 Metal Fabrication.

1.02 REFERENCE STANDARDS

.1 Aluminum Association (AA)
- .1 AA DAF 45-(03(R2009)), Designation System for Aluminum Finishes.

.2 ASTM International
- .1 ASTM A 123/A 123M-(12), Standard Specification for Zinc (Hot-Dip galvanized) Coatings on Iron and Steel Products.
- .2 ASTM E 1748-(95(2009)), Standard Test Method for Evaluating the Engagement Between Windows and Insect Screens as an Integral System.

.3 CSA Group
- .1 AAMA/WDMA/CSA 101/I.S.2/A440-(11 (R2016)), NAFS - North American Fenestration Standard for Windows, Doors, and Skylights.
- .2 CSA A440S1-(09), Canadian Supplement to AAMA/WDMA/CSA 101/1.S.2/A440, NAFS - North American Fenestration Standard for Windows, Doors, and Skylights.
- .3 CAN/CSA-A440.4-(07(R2012)), Window, Door, and Skylight Installation
- .4 CAN/CSA-A440.2/A440.3-(09), Fenestration energy performance/User guide to CSA A440.2, Fenestration energy performance.
- .5 CAN/CSA-Z91-(02(R2013)), Health and Safety Code for Suspended Equipment Operations.
- .6 CAN/CSA-Z809-(08(R2013)), Sustainable Forest Management.

.4 Screen Manufacturers Association (SMA)
- .1 SMA 1201R-2002 Specification for Insect Screens for Windows, Sliding Doors and Swinging Doors.

1.03 ACTION AND INFORMATIONAL SUBMITTALS

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

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

.3 Shop Drawings:
- .1 Submit drawings stamped and signed by professional engineer registered or licensed in Territory.
- .2 Indicate materials and details in full size scale for head, jamb and sill, profiles of components, interior and exterior trim, junction between combination units, elevations of unit, anchorage details, location of isolation coating, description of related components fasteners, and caulking. Indicate location of manufacturer's nameplates.

.4 Samples:
- .1 Submit for review and acceptance of each unit.

.5 Test and Evaluation Reports:

.1 Submit test reports from approved independent testing laboratories, certifying compliance with specifications.

.2 All test reports that reference the NAFS must include, on the first page, a summary of the results including, at minimum:
- .1 The product manufacturer.
- .2 The type of product.
- .3 The model number/series number.
- .4 The primary product designation.
- .5 The secondary product designation.
  - .1 Positive design pressure.
  - .2 Negative design pressure.
  - .3 Water penetration resistance test pressure.
  - .4 Canadian air infiltration and exfiltration levels.
- .6 The test completion date.

.3 The report will also contain the following information:
- .1 Test dates.
- .2 Report preparation dates.
- .3 Test information retention period.
- .4 Location of testing facilities.
- .5 Full description of test samples, including:
  - .1 Anodized finish,
  - .2 Condensation resistance.
  - .3 Safety drop - vertical sliding windows only.
  - .4 Block operation - sliding windows only.
  - .5 Sash strength and stiffness - operable casement, projecting.
  - .6 Sash pull-off - vinyl windows.
  - .7 Forced entry resistance.
  - .8 Mullion deflection - combination and composite windows.
- .6 Complete description of amendments, as applicable.
- .7 Conclusion.
- .8 Drawings signed by the testing laboratory, if provided.

1.04 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for windows for incorporation into manual.

1.05 QUALITY ASSURANCE

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

1.06 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
- .1 Store materials off ground, indoors, and 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.

2 PRODUCTS

2.01 MATERIALS

.1 Materials: to AAMA/WDMA/CSA 101/I.S.2/A440 supplemented as follows:

.2 All windows by same manufacturer.

.3 Low windows: Sash and frame to be fiberglass

.4 Clerestory frame: fiberglass

.5 Glass: in accordance with Section 08 80 50 - Glazing.

.6 Screens: to ASTM E 1748 on the ventilating portion of the windows.
- .1 Type: Black nylon
- .2 Insect screening mesh: count 18 x 16.
- .3 Fasteners: tamper proof.
- .4 Screen frames: to match window frames.
- .5 Mount screen frames for interior replacement.

.7 Metal sills of type and size as detailed, complete with anchoring devices.

.8 Isolation coating: alkali resistant bituminous paint.

.9 Sealants:
- .1 VOC limit 250 g/L maximum.

2.02 WINDOW TYPE AND CLASSIFICATION

.1 Product types:
- .1 AP - Awning hopper projected/fixed windows combo unit.
- .2 FW- Fixed window.
- .3 CL - Clerestorey window.

.2 Frames:
- .1 CL to be fiberglass frame with triple glazed pane
- .2 AP/FW frame and sash to be fiberglass.
  - .1 Colour: Silver

2.03 FABRICATION

.1 Fabricate in accordance with AAMA/WDMA/CSA 101/I.S.2/A440 supplemented as follows:

.2 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.

.3 Face dimensions detailed are maximum permissible sizes.

.4 Brace frames to maintain squareness and rigidity during shipment and installation.

.5 Finish steel clips and reinforcement with 380 g/mý zinc coating to ASTM A 123/A 123M.

2.04 ISOLATION COATING

.1 Coatings: in accordance with manufacturer's recommendations for surface conditions.

.1 Coating: VOC limit 275 g/L.

.2 Isolate aluminum from following components, by means of isolation coating:
.1 Dissimilar metals except stainless steel, zinc, or white bronze of small area.
.2 Concrete, mortar, and masonry.
.3 Wood.

2.05 GLAZING

.1 Glaze windows in accordance with AAMA/WDMA/CSA 101/I.S.2/A440.

2.06 HARDWARE

.1 Hardware: Aluminum handles to provide security and permit easy operation of units.

.2 Locks: provide operating sash with cam locking device manually locking in closed position.

2.07 AIR BARRIER AND VAPOUR RETARDER

.1 Equip window frames with site installed air barrier and vapour retarder material for sealing to building air barrier and vapour retarder as follows:
.1 Material: identical to, or compatible with, building air barrier and vapour retarder materials to provide required air tightness and vapour diffusion control throughout exterior envelope assembly.
.2 Material width: adequate to provide required air tightness and vapour diffusion control to building air barrier and vapour retarder from interior.

3 EXECUTION

3.01 EXAMINATION

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

3.02 INSTALLATION

.1 Window installation:
.1 Install in accordance with AAMA/WDMA/CSA 101/I.S.2/A440.
.2 Arrange components to prevent abrupt variation in colour.

.2 Sill installation:
.1 Install metal sills with uniform wash to exterior, level in length, straight in alignment with plumb upstands and faces. Use one piece for sills, jambs and head, refer to Window schedule for dimensions at each location.
.2 Cut sills to fit window opening.
.3 Secure sills in place with anchoring devices located at ends joints of continuous sills and

evenly spaced 600 mm on centre in between.

.4 Fasten expansion joint cover plates and drip deflectors with self-tapping stainless steel screws.

.5 Maintain 9 mm space between butt ends of continuous sills. For sills over 1200 mm in length, maintain 3mm-6 mm space at each end.

.3 Caulking:

.1 Seal joints between windows and windowsills with sealant. Bed sill expansion joint cover plates and drip deflectors in bedding compound. Caulk between sill upstand and window-frame. Caulk butt joints in continuous sills.

.2 Apply sealant in accordance with Section 07 92 00 - Joint Sealants. Conceal sealant within window units except where exposed use is permitted by Departmental Representative.

3.03 CLEANING

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

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

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

3.04 PROTECTION

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

.2 Repair damage to adjacent materials caused by window installation.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 American National Standards Institute (ANSI) / Builders Hardware Manufacturers Association (BHMA)

- .1 ANSI/BHMA A156.1 – Butts and Hinges (1996).
- .2 ANSI/BHMA A156.2 – Bored and Preassembled Locks and Latches (2011).
- .3 ANSI/BHMA A156.3 – Exit Devices (2008).
- .4 ANSI/BHMA A156.4 – Door Controls –Closers (2008)
- .5 ANSI/BHMA A156.5 – Auxiliary Locks and Associated Products (2010)
- .6 ANSI/BHMA A156.6 – Architectural Door Trim (2010)
- .7 ANSI/BHMA A156.7 – Template Hinge Dimensions (2009)
- .8 ANSI/BHMA A156.8 – Door Controls –Overhead Stops and Holders (2010)
- .9 ANSI/BHMA A156.9 – Cabinet Hardware
- .10 ANSI/BHMA A156.10 – Power Operated Pedestrian Doors
- .11 ANSI/BHMA A156.11 – Cabinet Locks
- .12 ANSI/BHMA A156.12 – Interconnected Locks and Latches
- .13 ANSI/BHMA A156.13 – Mortise Locks and Latches Series 1000 (2005)
- .14 ANSI/BHMA A156.14 – Sliding and Folding Door Hardware
- .15 ANSI/BHMA A156.15 – Closer/Holder/Release Devices (2006)
- .16 ANSI/BHMA A156.16 – Auxiliary Hardware (2008)
- .17 ANSI/BHMA A156.17 – Self-closing Hinges and Pivots (2010)
- .18 ANSI/BHMA A156.18 – Materials and Finishes (2006)
- .19 ANSI/BHMA A156.19 – Power Assist and Low Energy Operated Doors (2007)
- .20 ANSI/BHMA A156.20 – Strap and Tee Hinges, Hasps
- .21 ANSI/BHMA A156.21 – Thresholds (2009)
- .22 ANSI/BHMA A156.22 – Door Gasketing and Edge Seal Systems (2005)
- .23 ANSI/BHMA A156.23 – Electromagnetic Locks
- .24 ANSI/BHMA A156.24 – Delayed Egress Locking Systems (2003)
- .25 ANSI/BHMA A156.25 – Electrified Locking Devices (2007)
- .26 ANSI/BHMA A156.26 – Continuous Hinges (2006)
- .27 ANSI/BHMA A156.27 – Power and Manual Operated Manual Revolving Pedestrian Doors
- .28 ANSI/BHMA A156.28 – Master Keying Systems
- .29 ANSI/BHMA A156.29 – Exit Locks and Alarms (2007)
- .30 ANSI/BHMA A156.30 – High Security Cylinders
- .31 ANSI/BHMA A156.31 – Electric Strikes and Frame Mounted Actuators

.2 NFPA

- .1 NFPA 80 – Standard for Fire Doors and Other Opening Protectives 2010 Edition.
- .2 NFPA 101 – Life Safety Code 2006 Edition.
- .3 NFPA 105 – Standard for the Installation of Smoke Door Assemblies and Other Opening Protectives 2007 Edition.
- .4 NFPA 252 – Standard Methods of Fire Tests of Door Assemblies 2012 Edition.

.3 UL

- .1 UL 10B – Fire Tests of Door Assemblies.
- .2 UL 10C – Positive Pressure Fire Tests of Door Assemblies.

1.02 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Schedule:
- .1 Submit six 6 copies of the fully detailed hardware schedule.
- .2 Hardware schedule shall indicates product number, description, manufacturer, size, fasteners, application, and finish of each item required.
- .3 Hardware sets with electrified hardware shall include an operation description, elevation drawing, and a point-to-point drawing.

.3 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: Not Applicable.

.4 Manufacturer's Instructions: submit manufacturer's installation instructions.

1.03 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for door hardware for incorporation into manual.

1.04 MAINTENANCE MATERIALS SUBMITTALS

.1 Extra Stock Materials:

.1 Supply maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.

.2 Tools:
- .1 Supply 2 sets of wrenches for door closers and locksets.

1.05 QUALITY ASSURANCE

.1 Regulatory Requirements:
- .1 Hardware for doors in fire separations and exit doors certified by a Canadian Certification Organization accredited by Standards Council of Canada.

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

1.06 DELIVERY, STORAGE AND HANDLING

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

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

.3 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 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.

1.07 WARRANTY

.1 All materials and installation shall be provided with a minimum of one (1) year warranty against defects and workmanship from the date of substantial completion of the project.

.2 Product warranties in excess of one (1) year shall be provided for the following hardware products:
.1 Door Closers – ten (10) years.
.2 Mortise Locks – ten (10) years.
.3 Exit Devices – five (5) years.
.4 Cylindrical Locks – seven (7) years.
.5 Electrified Hardware – two (2) years.
.6 Floor Closers – ten (10) years.

1.08 MAINTENANCE

.1 Service Contracts

.1 All low energy automatic door operators and low voltage electrified hardware shall be provided with a one (1) year maintenance and service contract provided by the installation company from the date of substantial completion of the project.

.2 Extra Materials
.1 All remaining fasteners and special installation tools shall be turned over to the Parks Canada upon substantial completion of the project.
.2 Clearly mark each item as to its use and applicable piece of hardware.

2 PRODUCTS

2.01 HARDWARE ITEMS

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

2.02 MANUFACTURERS

.1 Refer to attached cut sheets

2.03 KEYING

.1 Doors, padlocks and cabinet locks to be keyed as directed by the Parks Canada. Prepare detailed keying schedule in conjunction with Departmental Representative.

.2 Stamp keying code numbers on keys and cylinders.

.3 Supply construction cores.

.4 Hand over permanent cores and keys to Parks Canada.

3 EXECUTION

3.01 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 CSDFMA Canadian Metric Guide for Steel Doors and Frames.

.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 and locks when directed by Client.
- .1 Install permanent cores and ensure locks operate correctly.

3.02 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.

3.03 CLEANING

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

3.04 DEMONSTRATION

.1 Keying System Setup and Cabinet:
- .1 Set up key control system with file key tags, duplicate key tags, numerical index, alphabetical index and key change index, label shields, control book and key receipt cards.
- .2 Place file keys and duplicate keys in key cabinet on their respective hooks.
- .3 Lock key cabinet and turn over key to Client.

.2 Maintenance Staff Briefing:

.1 Brief maintenance staff regarding:
- .1 Proper care, cleaning, and general maintenance of projects complete hardware.
- .2 Description, use, handling, and storage of keys.
- .3 Use, application and storage of wrenches for door closers and locksets.

.3 Demonstrate operation, operating components, adjustment features, and lubrication requirements.

3.05 PROTECTION

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

.2 Repair damage to adjacent materials caused by door hardware installation.

3.06 HARDWARE SETS

Set: 1.0
Doors:D3, (Exterior Doors)
Description:

3	Hinge, Full Mortise, Hvy Wt	TA386 NRP 4-1/2" x 4-1/2"	US26D	MK
1	Storeroom/Closet Lock	21 8204 LNL Doors D4	US26D	SA
1	Surface Closer	351 CPS	EN	SA
1	Threshold	254x5AFG		PE
1	Gasketing	312CR		PE
1	Sweep	18062CNB		PE
1	Astragal	357SS 84"		PE
1	Stop Strip	184AT		PE
1	Institutional Lock	21 8217 LNL Door D5	US26D	SA
1	Fire Department Lock Box			

Set: 2.0
Doors: D4 (Kitchen)
Description:

3	Hinge, Full Mortise, Hvy Wt	TA386 4-1/2" x 4-1/2"	US26D	MK
1	Passage Latch	8215 LNL	US26D	SA
1	Surface Closer	351 UO	EN	SA
1	Kickplate	K1050 10" x 2" LDW	630	RO
1	Door Stop	441H	US26D	RO
1	Threshold	171A		PE
1	Gasketing	312CR		PE
1	Sweep	18062CNB		PE

Set: 3.0
Doors: D4 (WC)
Description:

3	Hinge, Full Mortise, Hvy Wt	TA386 4-1/2" x 4-1/2"	US26D	MK
1	Privacy Lock	8265 LNL	US26D	SA
1	Door Stop	441H	US26D	RO

Set: 4.0
Doors: D5 (Mech/Elec Room)
Description:

3	Hinge, Full Mortise, Hvy Wt	TA386 4-1/2" x 4-1/2"	US26D	MK
1	Classroom Lock	21 8237 LNL	US26D	SA
1	Surface Closer	351 CPS	EN	SA
1	Kickplate	K1050 10" x 2" LDW	630	RO

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

.1 08 50 00 Windows

08 11 00 Metal Doors and Frames

1.02 REFERENCE STANDARDS

.1 ASTM International
- .1 ASTM C 542-(05), Standard Specification for Lock-Strip Gaskets.
- .2 ASTM D 790-(17), Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
- .3 ASTM D 1003-(07e1), Standard Test Method for Haze and Luminous Transmittance of Plastics.
- .4 ASTM D 1929-(96(R2001)e1), Standard Test Method for Determining Ignition Temperature of Plastics.
- .5 ASTM D 2240-(05), Standard Test Method for Rubber Property - Durometer Hardness.
- .6 ASTM E 84-(20), Standard Test Method for Surface Burning Characteristics of Building Materials.
- .7 ASTM E 330-(02), Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
- .8 ASTM F 1233-(21), Standard Test Method for Security Glazing Materials and Systems.

.2 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-12.1-(2017), Tempered or Laminated Safety Glass.
- .2 CAN/CGSB-12.2-(M91 (R2017)), Flat, Clear Sheet Glass.
- .3 CAN/CGSB-12.3-(M91 (R (2017)), Flat, Clear Float Glass.
- .4 CAN/CGSB-12.4-(M91, (R2017)), Heat Absorbing Glass.
- .5 CAN/CGSB-12.6-(M9), Transparent (One-Way) Mirrors.
- .6 CAN/CGSB-12.8-(97 (R2022)), Insulating Glass Units.
- .7 CAN/CGSB-12.8-(97 (R2022)), Insulating Glass Units.
- .8 CAN/CGSB-12.9-(M91), Spandrel Glass.
- .9 CAN/CGSB-12.10-(M76), Glass, Light and Heat Reflecting.
- .10 CAN/CGSB-12.11-(M90), Wired Safety Glass.
- .11 CAN/CGSB-12.12-(M90), Plastic Safety Glazing Sheets.
- .12 CAN/CGSB-12.13-(M91), Patterned Glass.

1.03 ADMINISTRATIVE REQUIREMENTS

.1 Pre-Installation Meetings:
- .1 Convene pre-installation meeting 1week prior to beginning work on-site installation, with Parks Canada.
  - .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.

.2 Arrange for site visit with Parks Canada prior to start of Work to examine existing site

.3 conditions. Hold project meetings every month.

.4 Ensure site supervisor, Parks Canada and subcontractor representatives attend.

.5 Parks Canada will submit written notification of change to meeting schedule established upon contract award 72 hours prior to scheduled meeting.

1.04 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for [glass, sealants, and glazing accessories] and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:
- .1 Submit drawings stamped and signed by professional engineer registered or licensed in Territory.

.4 Samples:
- .1 Submit for review and acceptance of each unit.
- .2 Samples will be returned for inclusion into work.
- .3 Submit 150cmm size samples of sealant material.

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

.6 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
- .1 Submit shop inspection and testing for glass.

1.05 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for glazing for incorporation into manual.

1.06 QUALITY ASSURANCE

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

.2 Mock-ups:
- .1 Construct mock-up to include glass and plastic glazing and perimeter air barrier and vapour retarder seal.
- .3 Mock-up will be used:
  - .1 To judge quality of work, substrate preparation, operation of equipment and material application.
- .4 Locate where indicated on drawings.
- .5 Allow 72 Submit shop and testing for glass and 1 week for inspection of mock-up by Departmental Representative 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.

1.07 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
- .1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect glazing and frames from nicks, scratches, and blemishes.
- .3 Protect prefinished surfaces with wrapping and strippable coating.
- .4 Replace defective or damaged materials with new.

1.08 AMBIENT CONDITIONS

.1 Ambient Requirements:
- .1 Install glazing 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.

2 PRODUCTS

2.01 MATERIALS

.1 Design Criteria:
- .1 Ensure continuity of building enclosure vapour and air barrier using glass and glazing materials as follow:
  - .1 Utilize inner light of multiple light sealed units for continuity of air and vapour seal.
- .2 Size glass to withstand wind loads, dead loads and positive and negative live loads acting normal to plane of glass to design pressure to ASTM E330.
- .3 Limit glass deflection to flexural limit of glass with full recovery of glazing materials.

.2 Flat Glass- Clearstorey:
- .3 Transparent translucent
  - .1 Horizontal tempering.
  - .2 Class B-float.
  - .3 6mm for each of the three panes

.3 Insulating Glass Units:
- .1 Insulating glass units: to CAN/CGSB-12.8, triple unit, mm overall thickness.
  - .1 Glass thickness: 6mm each light, 6mm inner light and 6mm middle light 6mm outer light.
  - .2 Inter-cavity space: Cardinal s/s insulated spaces
  - .3 Glass coating: surface number 2 and 5 low "E coating by Manufacturer
  - .4 Inert gas fill: argon krypton.
  - .5 Manufacturer (Duxton Windows) to provide glass

.4 Sealant: in accordance with Section 07 92 00 - Joint Sealants.
- .1 VOC limit [250] g/L maximum to [SCAQMD Rule 1168].
  - .1 VOC limit: 5 % maximum by weight to [CCD-045].

.2 Ensure sealant does not contain chemical restrictions to CCD-045.

2.02 ACCESSORIES

.1 Setting blocks & Space Shims: as per manufacturer's Shop Drawings

.2 6mm mirror attachment accessories:
.1 Stainless steel clips.

3 EXECUTION

3.01 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 in presence of Parks Canada.
.4 Inform Departmental Representative of unacceptable conditions immediately upon
.5 discovery.
Proceed with installation only after unacceptable conditions have been remedied.

3.02 PREPARATION

.1 Clean contact surfaces with solvent and wipe dry.

.2 Seal porous glazing channels or recesses with substrate compatible primer or sealer.

.3 Prime surfaces scheduled to receive sealant.

3.03 INSTALLATION: EXTERIOR - DRY METHOD (PREFORMED GLAZING)

.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 Manufacture's glazing installation methods.

.3 Cut glazing spline to length.

.4 Place setting blocks at 1/5 points, with edge block maximum 150 mm from corners.

.5 Rest glazing on setting blocks and push against fixed stop with sufficient pressure to attain full contact.

3.04 INSTALLATION: MIRRORS

.1 Set mirrors with clips . Anchor rigidly to wall construction.

.2 Place plumb and level.

3.05 CLEANING

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

3.06 PROTECTION

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

.2 After installation, mark each light with an "X" by using removable plastic tape or paste.
.1 Do not mark heat absorbing or reflective glass units.

.3 Repair damage to adjacent materials caused by glazing installation.

3.07 SCHEDULE

.1 Refer to Drawings

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 Aluminum Association (AA)
- .1 AA DAF 45-03(R2009), Designation System for Aluminum Finishes.

.2 ASTM International
- .1 ASTM C 475-02 (2007), Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
- .2 ASTM C 514-04 (2009e1), Standard Specification for Nails for the Application of Gypsum Board.
- .3 ASTM C 557-03 (2009) e1, Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing.
- .4 ASTM C 840-08, Standard Specification for Application and Finishing of Gypsum Board.
- .5 ASTM C 954-07, Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.84mm to 2.84mm in Thickness.
- .6 ASTM C 1002-07, Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
- .7 ASTM C 1047-09, Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
- .8 ASTM C 1280-99, Standard Specification for Application of Gypsum Sheathing.
- .9 ASTM C 1177/C 1177M-08, Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
- .10 ASTM C 1178/C 1178M-08, Standard Specification for Glass Mat Water-Resistant Gypsum Backing Board.
- .11 ASTM C1396/C1396M-09a, Standard Specification for Gypsum Wallboard.
- .12 ASTM D3273-16, Standard Test Method for Resistant to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.

.3 Association of the Wall and Ceilings Industries International (AWCI)
- .1 AWCI Levels of Gypsum Board Finish-97.

.4 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-51.34-M86(R1988), Vapour Barrier, Polyethylene Sheet for Use in Building Construction.
- .2 CAN/CGSB-71.25-M88, Adhesive, for Bonding Drywall to Wood Framing and Metal Studs.

.5 Underwriters' Laboratories of Canada (ULC)
- .1 CAN/ULC-S102-07, Standard Method of Test of Surface Burning Characteristics of Building Materials and Assemblies.
- .2 CAN/ULC-S101-07, Standard Methods of Fire Endurance Tests of Building Construction Materials

1.02 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for gypsum board assemblies and include product characteristics, performance criteria, physical size, finish and limitations.

1.03 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
- .1 Store gypsum board assemblies materials in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect gypsum board assemblies from nicks, scratches, and blemishes.
- .3 Protect from weather, elements and damage from construction operations.
- .4 Handle gypsum boards to prevent damage to edges, ends or surfaces.
- .5 Replace defective or damaged materials with new.

1.04 AMBIENT CONDITIONS

.1 Maintain temperature 10 degrees C minimum, 21 degrees C maximum for 48 hours prior to and during application of gypsum boards and joint treatment, and for 48 hours minimum after completion of joint treatment.

.2 Apply board and joint treatment to dry, frost free surfaces.

.3 Ventilation: ventilate building spaces as required to remove excess moisture that would prevent drying of joint treatment material immediately after its application.

2 PRODUCTS

2.01 MATERIALS

.1 Standard board: to ASTM C1396/C1396M regular, 12mm thick and Type X, 16mm thick, 1200 mm wide x maximum practical length, ends square cut, edges beveled.

.2 Water-resistant board: to ASTM C1396/C1396M regular, 12mm thick and 1200mm wide x maximum practical length.

.3 Metal furring runners, hangers, tie wires, inserts, anchors.

.4 Nails: to ASTM C 514.

.5 Steel drill screws: to ASTM C 1002.

.6 Stud adhesive: to ASTM C 557.

.7 Laminating compound: as recommended by manufacturer, asbestos-free.

.8 Casing beads, corner beads, control joints and edge trim: to ASTM C 1047, zinc-coated by hot-dip process, 0.5mm base thickness, perforated flanges, one piece length per location.

.9 Sealants: in accordance with Section 07 92 00 - Joint Sealants.
- .1 VOC limit 250 g/L maximum to SCAQMD Rule 1168.
- .2 Acoustic sealant: in accordance with Section 07 92 00 - Joint Sealants.

.10 Insulating strip: rubberized, moisture resistant, 3 mm thick closed cell neoprene strip, 12 mm wide, with self-sticking permanent adhesive on one face, lengths as required.

.11 Joint compound: to ASTM C 475, asbestos-free.

.12 Joint tape (refer to plan for locations):
- .1 Joint tape for use on non-rated walls: to ASTM C475-02.
- .2 Joint tape for use on walls with Fire Resistance Ratings: to CAN/ULC-S101-07.
  - .1 Ensure minimum rating of tape to match ULC assembly.
- .3 Joint tape for use in area requiring water & mold resistance: to ASTM D3273-16.

2.02 FINISHES

.1 Smooth finish.

3 EXECUTION

3.01 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for gypsum board assemblies installation in accordance with manufacturer's written instructions.
- .1 Inform Client of unacceptable conditions immediately upon discovery.
- .2 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Client.

3.02 ERECTION

.1 Do application and finishing of gypsum board to ASTM C 840 except where specified otherwise.

.2 Do application of gypsum sheathing to ASTM C 1280.

.4 Support light fixtures by providing additional ceiling suspension hangers within 150 mm of each corner and at maximum 600 mm around perimeter of fixture.

.5 Install work level to tolerance of 1:1200.

.6 Frame with furring channels, perimeter of openings for access panels, light fixtures, diffusers, grilles.

.7 Install wall furring for gypsum board wall finishes to ASTM C 840, except where specified otherwise.

.8 Furr openings and around built-in equipment, cabinets, access panels, on four sides. Extend furring into reveals. Check clearances with equipment suppliers.

.9 Furr duct shafts, beams, columns, pipes and exposed services where indicated.

.10 Erect drywall resilient furring transversely across studs spaced maximum 600 mm on centre and not more than 150 mm from ceiling/wall juncture. Secure to each support with 25mm drywall screw.

.11 Install 150mm continuous strip of 12.7mm gypsum board along base of partitions where resilient furring installed.

3.03 APPLICATION

.1 Apply gypsum board after bucks, anchors, blocking, sound attenuation, electrical and mechanical work have been approved.

.2 Apply layer gypsum board to metal furring or framing using screw or laminating adhesive and screw fasteners for second layer. Maximum spacing of screws 300 mm on center. Refer to wall types.

- .1 Single-Layer Application:
  - .1 Apply gypsum board on ceilings prior to application of walls to ASTM C 840.
  - .2 Apply gypsum board vertically or horizontally, providing sheet lengths that will minimize end joints.
- .2 Double-Layer Application:
  - .1 Install gypsum board for base layer and exposed gypsum board for face layer.
  - .2 Apply base layer to ceilings prior to base layer application on walls; apply face layers in same sequence. Offset joints between layers at least 250mm.
  - .3 Apply base layers at right angles to supports unless otherwise indicated.
  - .4 Apply base layer on walls and face layers vertically with joints of base layer over supports and face layer joints offset at least 250mm with base layer joints.
- .3 Triple-Layer Application
  - .1 To ULC Design assemblies as indicated on the drawings.

.3 Apply single, double or triple layer gypsum board to concrete surfaces, where indicated, using laminating adhesive, as per drawings.

- .1 Comply with gypsum board manufacturer's recommendations.
- .2 Brace or fasten gypsum board until fastening adhesive has set.
- .3 Mechanically fasten gypsum board at top and bottom of each sheet.

.4 Apply water-resistant gypsum board where noted on drawings. Do not apply joint treatment on areas to receive panel finish (backsplash).

.5 Apply 12mm diameter bead of acoustic sealant continuously around periphery of each face of partitioning to seal gypsum board/structure junction where partitions abut fixed building components. Seal full perimeter of cut-outs around electrical boxes, ducts, in partitions where perimeter sealed with acoustic sealant.

.6 Apply board using stud adhesive on furring or framing, laminating adhesive on base layer of gypsum board.

.7 Install gypsum board with face side out.

.8 Do not install damaged or damp boards.

.9 Locate edge or end joints over supports. Stagger vertical joints over different studs on opposite sides of wall.

3.04 INSTALLATION

.1 Erect accessories straight, plumb or level, rigid and at proper plane. Use full length pieces where practical. Make joints tight, accurately aligned and rigidly secured. Mitre and fit corners accurately, free from rough edges. Secure at 150 mm on center, using contact adhesive for full length.

.2 Install casing beads around perimeter of suspended ceilings.

.3 Install casing beads where gypsum board butts against surfaces having no trim concealing junction and where indicated. Seal joints with sealant.

.4 Install insulating strips continuously at edges of gypsum board and casing beads abutting metal window and exterior door frames, to provide thermal break.

.5 Install cornice cap where gypsum board partitions do not extend to ceiling.

.6 Fit cornice cap over partition, secure to partition track with two rows of sheet metal screws staggered at 300 mm on center.

.7 Splice corners and intersections together and secure to each member with 3 screws.

.8 Install access doors to electrical and mechanical fixtures specified in respective sections.
.1 Rigidly secure frames to furring or framing systems.

.9 Finish face panel joints and internal angles with joint system consisting of joint compound, joint tape and taping compound installed according to manufacturer's directions and feathered out onto panel faces.

.10 Gypsum Board Finish: finish gypsum board walls and ceilings to following levels in accordance with AWCI Levels of Gypsum Board Finish:
.1 Levels of finish:
.1 Level 5: embed tape for joints and interior angles in joint compound and apply three separate coats of joint compound over joints, angles, fastener heads and accessories; apply a thin skim coat of joint compound to entire surface; surfaces smooth and free of tool marks and ridges.

.11 Finish corner beads, control joints and trim as required with two coats of joint compound and one coat of taping compound, feathered out onto panel faces.

.12 Fill screw head depressions with joint and taping compounds to bring flush with adjacent surface of gypsum board so as to be invisible after surface finish is completed.

.13 Sand lightly to remove burred edges and other imperfections. Avoid sanding adjacent surface of board.

.14 Completed installation to be smooth, level or plumb, free from waves and other defects and ready for surface finish.

.15 Apply one coat of white primer sealer over surface to be textured. When dry apply textured finish in accordance with manufacturer's instructions.

.16 Mix joint compound slightly thinner than for joint taping.

.17 Apply thin coat to entire surface using trowel or drywall broad knife to fill surface texture differences, variations or tool marks.

.18 Allow skim coat to dry completely.

.19 Remove ridges by light sanding or wiping with damp cloth.

3.05 CLEANING

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

.1 Leave Work area clean at end of each day.
.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

3.06 PROTECTION

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

.2 Repair damage to adjacent materials caused by gypsum board assemblies installation.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 ASTM International
- .1 ASTM C 645-11a, Standard Specification for Nonstructural Steel Framing Members.
- .2 ASTM C 754-11, Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.

.2 The Master Painters Institute (MPI)
- .1 Architectural Painting Specification Manual - current edition.
  - .1 MPI #26, Primer, Galvanized Metal, Cementitious.

1.02 ACTION AND INFORMATIONAL SUBMITTALS

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

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

.3 Samples: Not Applicable.

1.03 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
- .1 Store materials in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect metal framing from nicks, scratches, and blemishes.
- .3 Replace defective or damaged materials with new.

2 PRODUCTS

2.01 MATERIALS

.1 Non-load bearing channel stud framing: to ASTM C 645, 92mm and 152mm stud size, roll formed from 0.91mm thickness hot dipped galvanized steel sheet, for screw attachment of gypsum board. Knock out service holes at 460mm centres.

.2 Floor and ceiling tracks: to ASTM C 645, in widths to suit stud sizes:
- .1 Base runner: bottom track with 33 mm flange height.
- .2 Track for fire separations:
  - .1 Deflection track: to ULC system as indicated on the drawings.
  - .2 Regular track: top track with 33 mm flange height.
- .3 Deflection track: slotted track, sized to accommodate minimum deflection of 51 mm.

.3 Non-load bearing truss stud framing system: to consist of:
- .1 Studs: 152mm size; truss-type bent rod web with double rod chords 12 x 6 mm x 1.2 mm channel chords; welded together at contact points. Make rod of minimum 4.5 mm diameter cold drawn steel wire having tensile strength of 620 MPa. Design studs for clip attachment of wire tying of metal lath.
- .2 Floor track: snap-in type formed to hold studs securely in place at 50 mm intervals; fabricated from 0.5 mm thick steel sheet; size to suit studs.
- .3 Ceiling track: channel shaped track for use with stud shoes and 1.2 mm diameter double wire ties; size to suit studs.
- .4 After fabrication apply one shop coat of CAN/CGSB-1.40 primer to steel surfaces. Descale and clean surfaces before painting.

.4 Metal channel stiffener: 31 x 92mm size and 31 x 152mm, 1.4 mm thick cold rolled steel, coated with rust inhibitive coating.

.5 Acoustical sealant: to CAN/CGSB-19.21.

.6 Insulating strip: rubberized, moisture resistant 3 mm thick ethatfoam sill gasket with self-sticking adhesive on one face, width of track and lengths as required.

.7 Metal furring hat channel: 22 mm deep, minimum 25 gauge, coated with rust inhibitive coating.

3 EXECUTION

3.01 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for non-structural metal framing application in accordance with manufacturer's written instructions.
- .1 Inform Client of unacceptable conditions immediately upon discovery.
- .2 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Client.

3.02 ERECTION

.1 Align partition tracks at floor and ceiling and secure at 600mm o.c. maximum.

.2 Install damp proof course under stud shoe tracks of partitions on slabs on grade.

.3 Place studs vertically at 400 mm oc and not more than 50 mm from abutting walls, and at each side of openings and corners. Position studs in tracks at floor and ceiling. Cross brace steel studs as required to provide rigid installation to manufacturer's instructions.

.4 Erect metal studding to tolerance of 1:1000.

.5 Attach studs to bottom using screws or pop rivets.

.6 Co-ordinate simultaneous erection of studs with installation of service lines. When erecting studs ensure web openings are aligned.

.7 Co-ordinate erection of studs with installation of door/window frames and special supports or anchorage for work specified in other Sections.

.8 Provide two studs extending from floor to ceiling at each side of openings wider than stud centres specified. Secure studs together, 50mm apart using column clips or other approved means of fastening placed alongside frame anchor clips.

.9 Install heavy gauge single jamb studs at openings.

.10 Erect track at head of door/window openings and sills of sidelight/window openings to accommodate intermediate studs. Secure track to studs at each end, in accordance with manufacturer's instructions. Install intermediate studs above and below openings in same manner and spacing as wall studs.

.11 Frame openings and around built-in equipment, cabinets, access panels, on four sides. Extend framing into reveals. Check clearances with equipment suppliers.

.12 Provide 40 mm stud or furring channel secured between studs for attachment of fixtures behind lavatory basins, toilet and bathroom accessories, and other fixtures including grab bars and towel rails, attached to steel stud partitions.

.13 Install steel studs or furring channel between studs for attaching electrical and other boxes.

.14 Extend partitions to ceiling height except where noted otherwise on drawings.

.15 Maintain clearance under beams and structural slabs to avoid transmission of structural loads to studs. And accommodate Deflection Use double track slip joint.

.16 Install continuous insulating strips to isolate studs from uninsulated surfaces.

.17 Install two continuous beads of acoustical sealant under studs and tracks of all partitions.

3.03 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  .1 Leave Work area clean at end of each day.

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

3.04 PROTECTION

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

.2 Repair damage to adjacent materials caused by non-structural metal framing application.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

.1 Section 09 21 16.

1.02 REFERENCE STANDARDS

.1 Environmental Protection Agency (EPA)
- .1 Test Method for Measuring Total Volatile Organic Compound Content of Consumer Products, EPA Method 24 - Surface Coatings.
- .2 SW-846, Test Methods for Evaluating Solid Waste: Physical/Chemical Methods.

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

.3 Master Painters Institute (MPI)
- .1 The Master Painters Institute (MPI)/Architectural Painting Specification Manual (ASM) - current edition.
- .2 Standard GPS-1-12, MPI Green Performance Standard.
- .3 Standard GPS-2-12, MPI Green Performance Standard.

.4 National Research Council Canada (NRC)
- .1 National Fire Code of Canada 2015 (NFC).

.5 Society for Protective Coatings (SSPC)
- .1 SSPC Painting Manual, Volume Two, 8th Edition, Systems and Specifications Manual.

1.03 ADMINISTRATIVE REQUIREMENTS

.1 Scheduling:
- .1 Submit work schedule for various stages of painting to Parks Canada for review. Provide schedule minimum of 48 hours in advance of proposed operations.

1.04 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:
- .1 Provide manufacturer's instructions, printed product literature and data sheets for paint and paint products and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Confirm products to be used are in MPI's approved product list.

.3 Upon completion, provide records of products used. List products in relation to finish system and include the following:
- .1 Product name, type and use.
- .2 Manufacturer's product number.
- .3 Colour numbers.
- .4 MPI Environmentally Friendly classification system rating.
- .5 Manufacturer's Material Safety Data Sheets (MSDS).

.4 Samples:
.1 Submit full range colour sample chips to indicate where colour availability is restricted.

.5 Certificates: Provide certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties. MPI Gateway #.

.6 Manufacturer's Instructions:
.1 Provide manufacturer's installation and application instructions.

1.05 CLOSEOUT SUBMITTALS

.1 Provide in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: Provide operation and maintenance data for painting materials for incorporation into manual.

.3 Include:
.1 Product name, type and use.
.2 Manufacturer's product number.
.3 Colour numbers.
.4 MPI Environmentally Friendly classification system rating.

1.06 MAINTENANCE MATERIAL SUBMITTALS

.1 Extra Stock Materials:
.1 Provide maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.
.2 Submit one four-litre can of each type and colour of primer and finish coating. Identify colour and paint type in relation to established colour schedule and finish system.

1.07 QUALITY ASSURANCE

.1 Qualifications:
.1 Contractor: to have a minimum of 5 years proven satisfactory experience. When requested, provide list of last 3 comparable jobs including, job name and location, specifying authority, and project manager.
.2 Qualified journeypersons as defined by local jurisdiction to be engaged in painting work.
.3 Apprentices: may be employed provided they work under direct supervision of qualified journeyperson in accordance with trade regulations.
.4 Conform to latest MPI requirements for exterior painting work including preparation and priming.
.5 Materials: in accordance with MPI Painting Specification Manual "Approved Product" listing and from a single manufacturer for each system used.
.6 Retain purchase orders, invoices and documents to prove conformance with noted MPI requirements when requested by Client.
.7 Standard of Acceptance:
.1 Walls: no defects visible from a distance of 1000mm at 90 degrees to surface.
.2 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

1.08 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer’s written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .1 Labels: to indicate:
  - .1 Type of paint or coating.
  - .2 Compliance with applicable standard.
  - .3 Colour number in accordance with established colour schedule.

.3 Storage and Handling Requirements:
- .1 Store materials in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Observe manufacturer's recommendations for storage and handling.
- .3 Store materials and supplies away from heat generating devices.
- .4 Store materials and equipment in well ventilated area with temperature range 7 degrees C to 30 degrees C.
- .5 Keep areas used for storage, cleaning and preparation, clean and orderly to approval of Client. After completion of operations, return areas to clean condition to approval of Client.
- .6 Remove paint materials from storage only in quantities required for same day use.
- .7 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling storage, and disposal of hazardous materials.
- .8 Fire Safety Requirements:
  - .1 Provide one 9 kg Type ABC dry chemical fire extinguisher adjacent to storage area.
  - .2 Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site daily.
  - .3 Handle, store, use and dispose of flammable and combustible materials in accordance with the National Fire Code of Canada (NFC).

1.09 SITE CONDITIONS

.1 Ambient Conditions:
- .1 Heating, Ventilation and Lighting:
  - .1 Ventilate enclosed spaces in accordance with Division 23.
  - .2 Provide heating facilities to maintain ambient air and substrate temperatures above 10 degrees C for 24 hours before, during and after paint application until paint has cured sufficiently.
  - .3 Provide continuous ventilation for 7 days after completion of application of paint.
  - .4 Co-ordinate use of existing ventilation system with Client and ensure its operation during and after application of paint as required.
  - .5 Provide temporary ventilating and heating equipment where permanent facilities are not available or supplemental ventilating and heating equipment if ventilation and heating from existing system is inadequate to meet minimum requirements.
  - .6 Provide minimum lighting level of 323 Lux on surfaces to be painted.
  - .7 Temperature, Humidity and Substrate Moisture Content Levels:
    - .1 Unless pre-approved written approval by product manufacturer, perform no painting when:
      - .1 Ambient air and substrate temperatures are below 10 degrees C.
      - .2 Substrate temperature is above 32 degrees C unless paint is specifically formulated for application at high temperatures.
      - .3 Substrate and ambient air temperatures are not expected to fall within MPI or paint manufacturer's prescribed limits.
      - .4 The relative humidity is under 85% or when the dew point is more than 3 degrees C variance between the air/surface

temperature. Paint should not be applied if the dew point is less than 3 degrees C below the ambient or surface temperature. Use sling psychrometer to establish the relative humidity before beginning paint work.

.5 Rain or snow are forecast to occur before paint has thoroughly cured or when it is foggy, misty, raining or snowing at site.

.6 Ensure that conditions are within specified limits during drying or curing process, until newly applied coating can itself withstand 'normal' adverse environmental factors.

.2 Perform painting work when maximum moisture content of the substrate is below:

.1 12% for plaster and gypsum board.

.8 Surface and Environmental Conditions:

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

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

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

.9 Additional interior application requirements:

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

.2 Apply paint in occupied facilities during silent hours only. Schedule operations to approval of Client such that painted surfaces will have dried and cured sufficiently before occupants are affected.

2 PRODUCTS

2.01 MATERIALS

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

.2 Provide paint materials for paint systems from single manufacturer.

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

.7 Paints, coatings, adhesives, solvents, cleaners, lubricants, and other fluids to be:

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

.2 Be non-flammable.

.3 Be manufactured without compounds which contribute to ozone depletion in the upper atmosphere.

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

2.02 COLOURS

.1 Refer to Finish Schedule:

.2 Second coat in three coat system to be tinted slightly lighter colour than top coat to show visible difference between coats, if requested by Departmental Representative

.3 For deep and ultra-deep colours; 4 coats may be required.

2.03 MIXING AND TINTING

.1 Perform colour tinting operations prior to delivery of paint to site. Obtain written approval from Client for tinting of painting materials.

.2 Mix paste, powder or catalyzed paint mixes in accordance with manufacturer's written instructions.

.3 Use and add thinner in accordance with paint manufacturer's recommendations. Do not use kerosene or similar organic solvents to thin water-based paints.

.4 Thin paint for spraying in accordance with paint manufacturer's instructions.

.5 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. Strain as necessary.

2.04 GLOSS/SHEEN RATINGS

.1 Paint gloss is defined as sheen rating of applied paint, in accordance with following values:

	Gloss @ 60 degrees	Sheen @ 85 degrees
Gloss Level 1 - Matte Finish (flat)	Max. 5	Max. 10
Gloss Level 2 - Velvet-Like Finish	Max.10	10 to 35
Gloss Level 3 - Eggshell Finish	10 to 25	10 to 35
Gloss Level 4 - Satin-Like Finish	20 to 35	min. 35
Gloss Level 5 - Traditional Semi-Gloss Finish	35 to 70	
Gloss Level 6 - Traditional Gloss	70 to 85	
Gloss Level 7 - High Gloss Finish	More than 85	

.2 Gloss level ratings of painted surfaces as noted on Finish Schedule.

2.05 INTERIOR PAINTING SYSTEMS

.1 Galvanized metal: doors, frames, railings, misc. steel, pipes, structural Steel Joists, overhead decking, and ducts.
- .1 INT 5.3A - Latex insert gloss over cementitious primer finish.
- .2 INT 5.3C – W.B semi-gloss finish over cementitious primer.

.2 Drywall Ceilings
.1 INT 9.1A - Latex flat finish spray application only.

.3 Plaster and gypsum board: gypsum wallboard, drywall, "sheet rock type material", and textured finishes:
.1 INT 9.2C - Alkyd eggshell finish (over latex primer/sealer).
.2 INT 9.2CC - Alkyd, W.B. semi-gloss finish for wet locations.

.4 Wainscoting clear water based shellac, 3 coats with light sanding between-semi-gloss finish.

3 EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and data sheet.

3.02 GENERAL

.1 Perform preparation and operations for interior painting in accordance with MPI Architectural Painting Specifications Manual except where specified otherwise.

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

3.03 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable to be painted in accordance with manufacturer's written instructions.
.1 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
.2 Proceed with installation only after unacceptable conditions have been remedied.

3.04 PREPARATION

.1 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 Client.

.2 Clean and prepare surfaces in accordance with MPI Architectural Painting Specification Manual requirements. Refer to MPI Manual regarding specific requirements and as follows:
.1 Remove dust, dirt, and other surface debris by vacuuming, wiping with dry, clean cloths or compressed air.
.2 Wash surfaces with a biodegradable detergent and bleach where applicable and clean warm water using a stiff bristle brush to remove dirt, oil and other surface contaminants.
.3 Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface.
.4 Allow surfaces to drain completely and allow to dry thoroughly.
.5 Prepare surfaces for water-based painting, water-based cleaners should be used in place of organic solvents.

.6 Use trigger operated spray nozzles for water hoses.
.7 Many water-based paints cannot be removed with water once dried. Minimize use of mineral spirits or organic solvents to clean up water-based paints.

.4 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.

.5 Where possible, prime non-exposed surfaces of new wood surfaces before installation. Use same primers as specified for exposed surfaces.
.1 Apply sealer to MPI #36 over knots, pitch, sap and resinous areas.
.2 Apply wood filler to nail holes and cracks.
.3 Tint filler to match stains for stained woodwork.

.6 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 1000 mm.

.7 Carried out during shop priming: clean metal surfaces to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and other foreign substances in accordance with MPI requirements. Remove traces of blast products from surfaces, pockets and corners to be painted by brushing with clean brushes, blowing with clean dry compressed air or vacuum cleaning.

.8 Touch up of shop primers with primer as specified.

3.05 EXISTING CONDITIONS

.1 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" and report findings to Client. Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.

.2 Maximum moisture content as follows:
.1 Concrete: 12%.
.2 Hard Wood: 15%.
.3 Soft Wood: 17%.

3.06 APPLICATION

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

.2 Brush and Roller Application:
.1 Apply paint in uniform layer using brush and/or roller type suitable for application.
.2 Work paint into cracks, crevices and corners.
.3 Paint surfaces and corners not accessible to brush using spray, daubers and/or sheepskins. Paint surfaces and corners not accessible to roller using brush, daubers or sheepskins.
.4 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces free of roller tracking and heavy stipple.
.5 Remove runs, sags and brush marks from finished work and repaint.

.3 Spray application:
.1 Provide and maintain equipment that is suitable for intended purpose, capable of

atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.

.2 Keep paint ingredients properly mixed in containers during paint application either by continuous mechanical agitation or by intermittent agitation as frequently as necessary.

.3 Apply paint in uniform layer, with overlapping at edges of spray pattern. Back roll first coat application.

.4 Brush out immediately all runs and sags.

.5 Use brushes and rollers to work paint into cracks, crevices and places which are not adequately painted by spray.

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

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

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

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

.8 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.

.9 Finish inside of cupboards and cabinets as specified for outside surfaces.

.10 Finish closets and alcoves as specified for adjoining rooms.

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

.12 Wood, drywall, plaster, stucco, concrete, concrete masonry units and brick; if sprayed, must be back rolled.

3.07 MECHANICAL/ ELECTRICAL EQUIPMENT

.1 Paint finished area exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment with colour and finish to match adjacent surfaces, except as indicated.

.2 Boiler room, mechanical and electrical rooms: paint exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment.

.3 Other unfinished areas: leave exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment in original finish and touch up scratches and marks.

.4 Do not paint over nameplates.

.5 Keep sprinkler heads free of paint.

.6 Paint inside of ductwork where visible behind grilles, registers and diffusers with primer and one coat of matt black paint.

.7 Paint fire protection piping red.

.8 Paint disconnect switches for fire alarm system and exit light systems in red enamel.

.9 Paint natural gas piping yellow.

.10 Paint both sides and edges of backboards for telephone and electrical equipment before installation. Leave equipment in original finish except for touch-up as required, and paint conduits, mounting accessories and other unfinished items.

.11 Do not paint interior transformers and substation equipment.

3.08 SITE TOLERANCES

.1 Walls: no defects visible from a distance of 1000 mm at 90 degrees to surface.

.2 Ceilings: no defects visible from floor at 45 degrees to surface when viewed using final lighting source.

.3 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

3.09 FIELD QUALITY CONTROL

.1 Standard of Acceptance:
- .1 Walls: no defects visible from a distance of 1000 mm at 90 degrees to surface.
- .2 Ceilings: no defects visible from floor at 45 degrees to surface when viewed using final lighting source.
- .3 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

.2 Retain purchase orders, invoices and other documents to prove conformance with noted MPI requirements when requested by Client.

3.10 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
- .1 Leave Work area clean at end of each day.

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

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.11 RESTORATION

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

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

.3 Remove paint splashes on exposed surfaces that were not painted. Remove smears and spatter immediately as operations progress, using compatible solvent.

.4 Protect freshly completed surfaces from paint droppings and dust to approval of Client. Avoid scuffing newly applied paint.

.5 Restore areas used for storage, cleaning, mixing and handling of paint to clean condition as approved by Client.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

.1 Section 08 11 00 Metal Doors and Frames

1.02 REFERENCE STANDARDS

.1 Aluminum Association (AA)
- .1 AA DAF 45-(03(R2009)), Designation System for Aluminum Finishes.

.2 ASTM International
- .1 ASTM A 123/A 123M-(13), Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- .2 ASTM A 653/A 653M-(13), Standard Specification for Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by Hot-Dip Process.
- .3 ASTM B 32-(20), Standard Specification for Solder Metal.
- .4 ASTM B 456-(11e1), Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.

.3 Canada Green Building Council (CaGBC)
- .1 LEED Canada-NC Version 1.0-(2004), LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations (including Addendum (2007)).
- .2 LEED Canada-CI Version 1.0-(2007), LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Guide For Commercial Interiors.
- .3 LEED Canada 2009 for Design and Construction-(2010), LEED Canada 2009 for Design and Construction Leadership in Energy and Environmental Design Green Building Rating System Reference Guide.
- .4 LEED Canada for Existing Buildings, Operations and Maintenance-(2009), LEED Canada 2009 Leadership In Energy and Environmental Design Green Building Rating System Reference Guide.

.4 Canadian General Standards Board (CGSB)
- .1 CGSB 31-GP-107Ma-(90), Non-Inhibited Phosphoric Acid Base Metal Conditioner and Rust Remover.
- .2 CGSB 41-GP-6M-(1983), Sheets, Thermosetting Polyester Plastics, Glass Fibre Reinforced.

.5 CSA Group
- .1 CSA W47.2-(11 (R2020)), Certification of Companies for Fusion Welding of Aluminum.
- .2 CSA W59-(18), Welded Steel Construction (Metal Arc Welding).
- .3 CSA W59.2-(M1991(R2018)), Welded Aluminum Construction.

1.03 ACTION AND INFORMATIONAL SUBMITTALS

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

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

.3 Shop Drawings:

.1 Submit drawings stamped and signed by professional engineer registered or licensed in Territory.
.2 Submit catalogue sheets and full size templates.
.3 Indicate materials, thicknesses, sizes, finishes, colours, construction details, removable and interchangeable components, electrical components specifications and power loads, wiring terminal box locations, lamp centres and overlaps, access panels, mounting methods, schedule of signs.
.4 Submit full size templates, drawn-to-scale details for individually fabricated.

.4 Samples:
.1 Submit representative sample of each type sign, sign image and mounting method including, but not limited to: graphics, cast letters, sign box installation method, channel

1.04 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for incorporation into manual.

1.05 QUALITY ASSURANCE

.1 Welding Certification in accordance with CSA W47.2.

1.06 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
.1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect specified materials from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

2 PRODUCTS

2.01 MATERIALS

.1 Engraving sheet: lamicoid 3.2 mm thick plastic sheet, red core for doors as noted on the drawing. Size 610mm wide by 305mm high. 45 degree beveled edges. Use Icon for Unisex Washroom.

.2 For Mechanical and Electrical components: CSA approved
.1 Width: to suit sign sizes.

2.02 SIGN GRAPHICS

.1 Sign graphics: well defined, arranged for balanced appearance, and properly word and letter spaced.

.2 Cut and spray process: mask surfaces, accurately cut-out image, spray apply uniform coating to obtain opaque finish to match sample.

.3 Engraving: apply sign images using pantograph mechanical engraving machine to obtain incised as detailed or specified.

2.03 CUT-OUT LETTERS

.1 Not Used

2.04 CAST LETTERS

.1 Not Used

2.05 ILLUMINATED SIGN BOXES

.1 Not Used

2.06 NON- ILLUMINATED SIGN BOXES

.1 Not Used

2.07 CHANNEL LETTER SIGNS

.1 Not Used

2.08 WALL PLATES

.1 Plastic wall plates:
- .1 Fabricate from colour acrylic sheet 3.2 mm thick. Sizes as indicated.
- .2 Sign graphics: engraving.

.2 Adhesive mounting:
- .1 Prepare wall plates for fixing by self-stick foam tape.
- .2 Include back-up plates for fixing to uneven surfaces where required.

2.09 DOOR PLATES

.1 Fabricate sign faces of colour acrylic sheet
- .1 Size: 610mm x 305mm x 3.2mm thick.

.2 Sign graphics: apply by engraving

.3 Interchangeable mounting:
- .1 Supply door plates with approved type.
- .2 Exposed fasteners not permitted.

.4 Fixed mounting: use self-stick foam tape.

.5 Mounting on transparent surfaces: use self-stick foam tape. Include blank back-up plate for opposite side.

.6 Washroom pictographs: cut-out figures without backgrounds.

2.10 FABRICATION

.1 Fabricate signs in accordance with details, specifications and shop drawings.

.2 Build units square, true, accurate to size, free from visual or performance defects.

.3 Fit and securely join sections to obtain tight, closed joints.

.4 Allow for thermal movement without distortion of components.

.5 No exposed fasteners.

.6 Polish exposed edges of plastic to smooth, 45 Degree-beveled profile.

.7 Manufacturer's nameplates on sign surface not permitted.

3 EXECUTION

3.01 EXAMINATION

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

3.02 INSTALLATION

.1 Manufacturer's Instructions: compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and data sheets.

.2 Erect and secure signs plumb and level at elevations as indicated.

.3 Comply with sign manufacturer's installation instructions and approved shop drawings.

.4 Adhesive attachment:
- .1 Use self-stick adhesive foam tape to manufacturer's instructions to fix sign and prevent "rocking".
- .2 Keep tape maximum 1.6 mm from edges.

3.03 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
- .1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .1 Leave signs clean.
- .2 Remove debris from interior of sign boxes.
- .3 Touch up damaged finishes.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 ASTM International
- .1 ASTM A 167-99(2009), Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
- .2 ASTM B 456-03, Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.
- .3 ASTM A 653/A 653M-09, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .4 ASTM A 924/A 924M-09, Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

.2 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-1.81-M90, Air Drying and Baking Alkyd Primer for Vehicles and Equipment.
- .2 CAN/CGSB-1.88-92, Gloss Alkyd Enamel, Air Drying and Baking.
- .3 CGSB 31-GP-107MA-90, Non-inhibited Phosphoric Acid Base Metal Conditioner and Rust Remover.

.3 CSA International
- .1 CAN/CSA-B651-04, Accessible Design for the Built Environment.
- .2 CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.

1.02 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.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 stamped and signed by professional engineer registered or licensed in Northwest, Territories of Canada.
- .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.

.4 Samples: Not Required.

1.03 CLOSEOUT SUBMITTALS

.1 Provide maintenance data for toilet and bath accessories for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.04 MAINTENANCE MATERIAL SUBMITTALS

.1 Tools:
- .1 Provide special tools required for assembly, disassembly or removal for toilet and bath accessories in accordance with requirements specified in Section 01 78 00 - Closeout Submittals.
- .2 Deliver special tools to Client.

1.06 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
- .1 Store materials 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.

2 PRODUCTS

2.01 SOAP DISPENSER

.1 Surface-Mounted Vertical Soap Dispensers:
1. Basis of Design: Bobrick B-4112

2.02 SANITARY NAPKIN DISPOSAL UNITS

1. Surface-Mounted Sanitary Napkin Disposal Units:
1. Basis of Design: Bobrick Classic Series Model B-254.

2.03 TOILET TISSUE DISPENSER

1. Surface-Mounted Toilet Tissue Dispensers:
1. Basis of Design: Bobrick Classic Series Model B-2888

2.04 HOOKS

1. Heavy-Duty Clothes Hooks:
1. Basis of Design: Bobrick Model B-670
.1 Mounting: Exposed Fasteners
2. Hook and Flange: Stainless Steel

2.05 PAPER TOWEL DISPENSER AND WASTE RECEPTICAL

1. B-39003 Recessed

2.06 CUSTODIAL/JANITORIAL ACCESSORIES

1. Mop and Broom Holders:
1. Basis of Design: Bobrick Model B-223 x 24.
a. Length: 24 inches (610mm) with 3 mop/broom holders.
2. Mounting Base: 18-8, Type 304, 22 gauge (0.8 mm) stainless steel with satin finish on exposed surfaces.
3. Mop and Broom Holders: Replaceable, spring-loaded rubber cams with anti-slip coating; accommodates handles from 7/8 inch to 1-1/4 inch (20 mm to 30 mm) in diameter; with powder coated steel retainers.

3 EXECUTION

3.01 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 Parks Canada upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied.

3.02 INSTALLATION

.1 Install products in strict compliance with manufacturer’s written instructions and recommendations, including the following:

1. Verify blocking has been installed properly.
2. Verify location does not interfere with door swings or use of fixtures.
3. Comply with manufacturer’s recommendations for backing and proper support.
4. Use fasteners and anchors suitable for substrate and project conditions
5. Install units rigid, straight, plumb, and level, in accordance with manufacturer’s installation instructions and approved shop drawings.
6. Conceal evidence of drilling, cutting, and fitting to room finish.
7. Test for proper operation.

3.03 ADJUSTING

.1 Adjust toilet and bathroom accessories components and systems for correct function and operation in accordance with manufacturer's written instructions.

.2 Lubricate moving parts to operate smoothly and fit accurately.

3.04 CLEANING

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

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

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

3.05 PROTECTION

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

.2 Repair damage to adjacent materials caused by toilet and bathroom accessories installation.

3.06 SCHEDULE

.1 Locate accessories where and the heights indicated.

END OF SECTION

1 GENERAL

1.1 Contract Conditions

.1 The General Conditions of the Contract and Division 1, General Requirements shall be read in conjunction with Division 10, all of which shall be considered an integral part of this Contract.

1.2 Work Included

.1 Provision of new Portable Fire Extinguishers:

.1 as required by Code.

1.3 Standards

.1 NFC Section 6.2, “Portable Extinguishers”

.2 NFPA 10, “Portable Extinguishers”

2 PRODUCTS

2.1 Fire Extinguishers - Multipurpose

.1 Multi-purpose dry chemical extinguishers, 4.5 kg, ULC labeled for A, B, and C fires.

.2 Rating = 4A:80B:C

.3 Provide manufacturer’s wall brackets for surface mounted units, and durable service tags.

.4 FLAG ABC-10H or equivalent.

2.2 Accessories

.1 Where indicated, provide semi-recessed extinguisher cabinet in lieu of mounting bracket.

.2 National Model CE-950-1 extinguisher cabinet or equivalent.

2.3 Installation

.1 Mount Extinguishers with manufacturers approved brackets or in cabinets at approved height in locations shown.

3 EXECUTION

3.1 Installation

.1 Install all extinguishers as listed and as required by Code.

.2 Locate with due regard for ease of access and removal, and as directed by the Departmental Representative.

END OF Section 10 44 20

1 GENERAL

1.1 Contract Conditions

.1 The General Conditions of the Contract and Division 01 shall be read in conjunction with this Division, all of which shall be considered an integral part of this Contract.

1.2 Work Included

.1 Insulation and (where applicable) jacketing of the following interior building service piping:

.2 Hot Water/Glycol Heating Supply and Return;

.3 Domestic Hot Water Supply;

.4 Vent Piping (to 1500mm within building);

1.3 Related Work

.1 Common Works – Mech. Section 23 05 01

1.4 Standards

.1 NFPA 90A

2 PRODUCTS

2.1 General

.1 All insulation products shall have maximum flame spread rating 25, maximum smoke developed rating 50 (NFPA 90A).

2.2 Hot Service (To 120°C)

.1 Fibreglass with splash-proof all-service jacket.

.2 Minimum thickness:

.1 Line sizes to 32Ø: 25 mm,

.2 Line sizes to 38Ø: 38 mm,

.3 Line sizes 50Ø and above: 50 mm,

.3 Knauf ASJ.

2.3 Cold Service

.1 Fibreglass with continuous vapour barrier, all service foil-backed jacket

.2 Minimum thickness:

.1 Line sizes to 32Ø: 25 mm,

.2 Line sizes to 38Ø: 38 mm,

.3 Line sizes 50Ø and above: 50 mm.

.3 Knauf ASJ.

2.4 Accessories

.1 Fitting Covers

.1 One-piece pre-moulded high impact PVC w/ fibre glass inserts and accessories.

.2 Standard of Acceptance: Proto PVC

.1 Lavatory p-traps

.1 Moulded closed cell vinyl

.2 No seams or fasteners

.3 Colour: mfr.

.4 McGuire Manufacturing Co. ProWrap

.2 Outdoor Jacketing

.1 Outdoor grade PVC, thickness not less than 0.5 mm.

.2 Proto PVC Jacketing w/ compatible solvent type PVC sealer.

3 EXECUTION

3.1 General

.1 Work shall be performed by qualified insulation journeymen.

.2 Insulation is not required on Domestic Cold Water piping

3.2 Application

.1 Leave all joints exposed until completion and approval of hydrostatic and all other required testing.

.2 Strap insulation securely at 900mm maximum spacing, and with no less than three straps on each section or fitting.

.3 Ensure integrity and continuity of vapour barrier.

.4 Finish with canvas jacket in exposed locations only.

.5 Insulation is not required for:

.1 Control valves, flanges and unions;

.2 Exposed chrome plated DCW/DHW service pipe and fittings.

END OF Section 21 07 20

1 GENERAL

1.1 Contract Conditions

.1 The General Conditions of the Contract and Section 01005, General Requirements (Division 1), shall be read in conjunction with Division 22, all of which shall be considered an integral part of this Contract.

1.2 Work Included

.1 DW Pressure Pump

1.3 Related Work

.1	Domestic Water Piping	Section 22 11 18
.2	Drainage Waste and Vent Piping	Section 22 13 18

1.4 Standards

2 PRODUCTS

2.1 DW Pressure Pump P9

.1 Grundfos Scala2, 115/60/1 motor.

3 EXECUTION

3.1 General

.1 Refer to and apply manufacturers' detailed instructions for all aspects of pump installations.

.2 If debris is noted in piping during construction, the Departmental Representative may direct that removable strainers be placed upstream of pumps prior to startup.

3.2 Circulator

.1 Provide isolating valves and unions or flanges to facilitate removal of circulator.

.2 Install pump between properly aligned and firmly supported pipe connections, with no piping forces imparted on the pump casing

END OF Section 22 10 10

1 GENERAL

1.1 Contract Conditions

.1 The General Conditions of the Contract and Division 01 shall be read in conjunction with this Division, all of which shall be considered an integral part of this Contract.

1.2 Work Included

.1 Domestic Cold and Domestic Hot Water supply piping within building;

1.3 Related Work

.1	Drainage Waste and Vent Piping	Section 22 13 18
.2	Plumbing Specialties and Accessories	Section 22 42 01
.3	Plumbing Fixtures	Section 22 42 02
.4	Plumbing Pumps	Section 22 10 10
.5	Domestic Water Heaters	Section 22 30 05

1.4 Standards

.1 National Plumbing Code.

.2 ASTM

.3 CAN/CSA B137.5-M89

2 PRODUCTS

2.1 Piping

.1 Pipe

.1 Copper tube, hard drawn, Type L (ASTM B88M-83).

.2 PEX-a tubing, CSA B137.5, CAN/ULC-S101, 689 kPa @ 82 ºC. Wirsbo AQUAPEX.

2.2 Valves

.1 Brass construction ball valve, Teflon seat, 2-piece body, screwed ends, blowout-proof stem, memory stop: Red-White Fig. 5044A

3 EXECUTION

3.1 Installation

.1 General

.1 Cut tube ends square and de-burr, clean tube ends and sockets thoroughly before soldering.

.2 Group exposed piping and run parallel to building lines.

.3 Install piping close to building structure to conserve space and minimize furring.

.4 Grade down to low points in direction of flow, at a minimum grade of 0.2%.

.5 Provide hose-end faucets to drain all low points.

.6 Isolate all branches and equipment with gate valves.

.7 Use unions to facilitate removal of equipment.

.8 Use dielectric fittings for connection of dissimilar metal.

.9 Provide one-piece escutcheons on exposed pipe passing through floors and walls.

.10 Where passing through floor or ceiling joists, follow specific recommendations on permissible size and positioning of cutouts.

.11 All penetrations of structural members subject to Consultant's approval.

3.2 Testing

.1 Hydrostatically test domestic water piping systems on pure water at a pressure of 860 kPa sustained over a 4-hour period without measurable loss.

3.3 Cleaning

.1 On completion of tests, fill entire system with water, flush with clean water, and remove sediment from all traps and strainers.

END OF Section 22 11 18

1 GENERAL

1.1 Contract Conditions

.1 The General Conditions of the Contract and Division 01 shall be read in conjunction with this Division, all of which shall be considered an integral part of this Contract.

1.2 Work Included

.1 Interior building drain and vent piping;

.2 Drainage accessories

1.3 Related Work

.1	Domestic Water Supply Piping	Section 22 11 18
.2	Plumbing Specialties and Accessories	Section 22 42 01
.3	Plumbing Fixtures	Section 22 42 02

1.4 Standards

.1 National Plumbing Code.

2 PRODUCTS

2.1 Piping & Fittings - Interior

.1 PVC to CSA B181.2 (gravity), socket fittings, solvent welding;

.2 ASTM B306-81 copper tube, wrought copper fittings to ANSI B16.29-1973, 95/5 solder;

.3 Cast iron (75mm minimum) to CSA B70, mechanical joints to ASTM C564-70;

2.2 Piping & Fittings – Interior

.1 Preinsulated with hydronic heat trace

.2 Urecon Preinsulated Cast Iron pipe w/ hydronic heat trace

3 EXECUTION

3.1 Installation

.1 Install piping parallel and close to walls, to minimum grades per Code.

.2 Use reducing fittings to change pipe size, with eccentric reducers on horizontal runs to ensure drainage and venting - do not use reducing bushings.

.3 Provide one-piece escutcheons on exposed pipe passing through floors and walls.

.4 Where passing through floor or ceiling joists, refer to the Departmental Representative for specific rulings on permissible size and positioning of cutouts.

.5 All penetrations of structural members subject to Consultant's approval.

3.2 Plastic

.1 Use only manufacturer's approved solvents and apply strictly in accordance with manufacturer's published recommendations.

.2 Cut pipe ends square and de-burr, and clean using approved primer immediately before solvent welding.

3.3 Copper

.1 Cut tube ends square and de-burr, clean tube ends and sockets thoroughly before soldering.

.2 Protect from point loading, replace if kinked or damaged.

.3 Prevent contact with dissimilar metals (e.g. hangers).

3.4 Cast Iron

.1 Cut ends square and de-burr using tools intended for the purpose, and taking care not to damage interior or exterior coatings;

.2 Use only manufacturers' approved adaptors for transition between different types and size of pipe.

.3 Align ends before connecting MJ clamps - do not use MJ couplings to correct misalignment.

.4 Prevent contact with dissimilar metals (e.g. hangers).

END OF Section 22 13 18

1 GENERAL

1.1 Contract Conditions

.1 The General Conditions of the Contract (Division 1) shall be read in conjunction with Division 22, all of which shall be considered an integral part of this Contract.

1.2 Work Included

.1 Domestic Water Heater

1.3 Related Work

.1	Domestic Water Piping	Section 22 11 18
.2	Plumbing Specialties	Section 22 42 01

1.4 Standards

.1 National Plumbing Code 2015.

2 PRODUCTS

2.1 Water Heater

.1 Indirect fired storage water heater

.2 Temp/pressure relief valve.

.3 Standard of acceptance: Weil-Mclain Aqua Pro Model 30.

2.2 Check Valve

.1 Bronze body, horizontal swing type Y-pattern, screwed cap. Teflon disc, “Federal Specification” check valve, Toyo Fig.236T.

2.3 Potable Water Expansion Tanks

.1 Potable water expansion tank, 16 ga steel w/ butyl diaphragm and plastic liner.

.2 Tank volume = 18 l

.3 Standard of Acceptance: Flexcon Industries Model PH-12.

2.4 Water Heater Pan

.1 Aluminum w/ 25 mm cpvc fitting.

.2 Nom diameter = 762 mm

.3 Standard of Acceptance: Oatey Model 34175.

3 EXECUTION

3.1 General

.1 Meet the requirements of the National Plumbing Code for service water heaters.

3.2 Installation

.1 Provide pressure/temperature relief, and pipe to floor drain.

.2 Install water heater on drain pan, pipe pan drain to floor drain.

3.3 Testing

.1 Hydrostatically test and clean separate from but to the same standards as the connected piping systems.

END OF Section 22 30 05

1 GENERAL

1.1 Contract Conditions

.1 The General Conditions Division 01 shall be read in conjunction with this Division, all of which shall be considered an integral part of this Contract.

1.2 Work Included

.1 Miscellaneous accessories to Domestic Water and Sewage piping systems

1.3 Related Work

.1	Domestic Water Supply Piping	Section 22 11 18
.2	Drainage Waste and Vent Piping	Section 22 13 18
.3	Electrical	Division 26

1.4 Standards

.1 National Plumbing Code.

2 PRODUCTS

2.1 Domestic Water Storage Tank

.1 1435 l polyethylene upright

.2 Standard of Acceptance: Equinox Industries E325@S

2.2 Sewage Tank

.1 Low Profile Fiberglass, nom height 600 mm

.2 2270 l

.3 External insulation and hydronic heat trace, suitable for outdoor semi-buried installation.

.4 Standard of Acceptance: Equinox Industries NWT500

2.3 Isolating Valves

.1 Brass construction ball valve, Teflon seat, 2-piece body, screwed ends, blowout-proof stem, memory stop: Red-White Fig. 5044A.

2.4 Water Hammer Arrestors

.1 Sealed diaphragm type: Amtrol Mini-Trol 500 or Diatrol 536.

2.5 Hose Bibbs

.1 Bronze construction, male threaded spout, composition disc, chrome plated where exposed, Emco 3741.

2.6 Cleanouts

.1 Threaded brass or bronze plugs in heavy cast iron ferrule with brass screws and neoprene gasket, Wade W8000.

2.7 Floor Drains

.1 Standard of Acceptance: Enpoco.

.2 Washroom floor drains to be provided with trap primers fed from nearest suitable DCW source.

.3 Standard of Acceptance: Zurn Z-1002-A.

3 EXECUTION

3.1 General

.1 Install components where specified or where required by Code, in accordance with manufacturer's instructions.

.2 All cleanouts to be accessible through access plates in finished floors or walls.

.3 Install water hammer arrestors for fixtures or groups of fixtures to Plumbing and Drainage Institute Standard PDI-WH201.

.4 Install interior hose bibbs at low point(s) of water piping to drain system(s) and at locations indicated on the drawings.

END OF Section 22 42 01

1.0 GENERAL

1.1 Contract Conditions

.1 The General Conditions of the Contract and Division 1, General Requirements shall be read in conjunction with Division 22, all of which shall be considered an integral part of this Contract.

1.2 Work Included

.1 Water closet

.2 Lavatory

.3 Kitchen Sink

.4 Mop Sink

1.3 Related Work

.1 Domestic Water Piping Section 22 11 18

.2 Drainage Waste and Vent Piping Section 22 13 18

1.4 Standards

.1 National Plumbing Code - 2015.

2.0 PRODUCTS

2.1 General

.1 All fixtures to be CSA certified.

.2 All fixtures are to be white in colour, with manufacturer's standard matching accessories.

.3 Fixture selections are subject to coordination by the Departmental Representative.

2.2 Lavatory Supplies

.1 Chrome plated finish, heavy pattern cast body, removable burnished aluminum handle, lockshield structure, 3/8" IPS brass supply nipple, 3/8" X 305 mm long flexible braided stainless steel riser

.2 Cambridge Brass 47T512.

2.3 Water Closet

.1 2-piece combination toilet.

.2 Elongated, 305 mm Rough-In, vitreous china, polished chrome trip lever.

.3 Toilet shall be 4.8 l/flush. with 368 mm high bowl, 50 mm dia glazed trapway.

.4 Standard of Acceptance: Kohler Model K-3575.

2.4 Toilet seat

.1 Solid polypropylene plastic, elongated open front.

.2 With check hinge, without cover.

.3 Colour = Black

.4 Kohler Stronghold K-4731-C-7

2.5 Wall-mount Lavatory

.1 Wall-mount, drilled for concealed arm carrier.

.2 Single hole faucet drilling

.3 Standard of Acceptance: Kohler Model K-2031.

2.6 Lavatory Faucet

.1 Deck mount faucet, single hole, single handle.

.2 Standard of Acceptance: Symmons Model SLS-6710-0.5.

2.7 Janitor Sink

.1 600x600 molded stone

.2 Standard of Acceptance: Stern Williams HL-1800

2.8 Janitor Sink Faucet

.1 Wall-mount service faucet.

.2 With integral checks

.3 Standard of Acceptance: Symmons Model S-2490-CHKS

2.9 Sink

.1 Self rimming with faucet ledge.

.2 Single hole faucet drilling

.3 Standard of Acceptance: Refer to Arch

2.10 Sink Faucet

.1 Single handle with pull-down head.

.2 Standard of Acceptance: Symmons Model S-6710-PD-1.5

3.0 EXECUTION

3.1 Fixture Installation

.1 All connections (except WC drains) are to be from wall and complete with manufactured escutcheons.

.2 Hot water faucets shall be placed on left hand side.

.3 Provide shock arrestor for each fixture.

.4 Mounting Heights

.1 Refer to Arch.

.5 Barrier Free

.1 Not used

END OF Section 22 42 02

1 GENERAL

1.1 Contract Conditions

.1 The General Conditions of the Contract and Section 01005, General Requirements (Division 1), shall be read in conjunction with Divisions 22 and 23, all of which shall be considered an integral part of this Contract.

1.2 Work Included

.1 Provision of complete operating mechanical systems in the QANP Garage, including, but not limited to:

.1 Plumbing and Drainage;

.2 Hydronic heating:

.3 Ventilation;

.4 Fuel supply and piping:.

.5 Controls and related systems.

1.3 Related Work

.1 Painting Section 09 91 23

.2 Electrical General Provisions Section 26 05 01

1.4 Reference Standards

.1 Except as otherwise stated, the National Building Code of Canada 2015, the National Plumbing Code 2015, the National Fire Code of Canada 2015, and references contained therein shall govern all work under this Division.

2 PRODUCTS

2.1 General

.1 All products shall be new, of grade and type specified or equivalents approved by the Departmental Representative in writing. Use products of one manufacturer for equipment and material of the same type unless otherwise specified.

2.2 Substitutions

.1

Listing of products is intended to define the standard of acceptance, and not to imply exclusion of unlisted manufacturers and models. Proposals for

substitution must include statements of respective costs of items originally specified and proposed substitutions. All direct and indirect costs of substitution including design and drawing changes, shall be the responsibility of the proponent.

2.3 Submittals

.1 Submit shop drawings to the Departmental Representative in accordance with the requirements of Section 01 78 05. Shop drawings must be checked and approved by the Contractor prior to submission.

.2 Operation and Maintenance literature and record drawings as required by Sections (01 77 00) and (01 78 00) must be submitted prior to Interim inspection.

2.4 Spare Parts

.1 One spare pump for each model of pump installed.

.2 One set of air filters for MUA1

.3 Two sets of air filters for Heat Recovery Ventilators

3 EXECUTION

3.1 Interpretation

.1 Only the general location and routing of piping, and equipment is shown.

.2 Review Plans prior to commencing installation and report to Departmental Representative any obstructions not shown on Plans.

.3 Installation shall be made neatly, conserving space, and with all due regard for maintenance accessibility.

3.2 Regulations & Permits

.1 Serve all notices, obtain all permits, and pay all fees required for the specified work to be carried out.

.2 Furnish all Certificates requested by authorities having jurisdiction as evidence the work conforms to regulations.

3.3 Workmanship

.1 All work shall be performed by qualified tradesmen using proper tools and equipment, under the

supervision of a Mechanical foreman satisfactory to the Departmental Representative.

3.4 Cutting and Patching

.1 All holes required through structures, including supply and setting of sleeves and escutcheons, shall be provided under Division 01.

3.5 Identification

.1 Not used.

3.6 Operations Seminar

.1 Provide Personnel to instruct maintenance personnel in operation of the building systems as per specification section 01 77 00.

3.7 O & M Manuals

.1 Provide O & M Manuals for use at seminar as per Specification section (01 78 00).

3.8 Record Drawings

.1 Provide record drawings as per specification section (01 77 00).

END OF Section 23 05 01

1 GENERAL

1.1 Contract Conditions

.1 The General Conditions of Division 01 shall be read in conjunction with this Division, all of which shall be considered an integral part of this Contract.

1.2 Work Included

.1 Insulation and jacketing of the following ductwork::

.1 Exhausts (outside wall to Fan outlet);

.2 Outside air intakes (outside wall to Fan inlet);

.3 Combustion Air duct

1.3 Related Work

.1 Metal Ducts - Low Pressure Section 23 31 14

1.4 Standards

.1 ACNBC (“Measures for Energy Conservation in New Buildings”);

.2 NFPA 90A.

2 PRODUCTS

2.1 General

.1 Fire resistance to NFPA 90A - maximum flame spread rating 25, maximum smoke developed rating 50.

2.2 Insulation

.1 25 mm fibreglass ductwrap, 16kg/m^3 density, with ULC listed aluminum foil vapour barrier jacket (service temperature -45°C to 65°C)

.2 Fibreglas Rigid-Wrap

2.3 Rigid Duct

.1 Knauf Insulation board

2.4 Fastening

.1 Weld pins, 2mm dia. with 32 mm square nylon retainers

.2 Joint tape, self adhesive 100mm wide

.3 Contact adhesive, quick setting, specifically listed for adhesion of mineral fibre insulation to galvanized ducts

.4 Lap seal adhesive, quick setting, Foster 85-75 Drion

.5 Canvas adhesive, washable, Foster 30-36 Sealfas

2.5 Acoustic Lining

.1 Refer to Metal Ducts - Low Pressure Section 23 31 14.

3 EXECUTION

3.1 General

.1 Work shall be performed by qualified insulation journeymen.

3.2 Application

.1 Apply weld pins at 200mm centres on underside of duct.

.2 Cut ductwrap to ducting in place, and secure all edges with staples, lap seal and tape.

.3 Leave joints exposed until completion and approval of leakage testing.

.4 Ensure continuity of insulation and vapour barrier at all hangers, pipe chases and penetrations in the building structure.

.2 Provide PVC covers or canvas for insulation in exposed locations.

.3 Use metal cladding for insulation installed in outdoor locations.

.4 Apply adhesive to entire surface area of internal duct insulation.

3.3 Jacket

.1 Coat canvas with dilute lagging adhesive for priming, and provide fire-retardent coating acceptable to Fire Marshal.

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1 GENERAL

1.1 Contract Conditions

.1 The General Conditions of the Contract and Division 1, General Requirements shall be read in conjunction with Division 23, all of which shall be considered an integral part of this Contract.

1.2 Work Included

.1 Electric controls for space temperature control

.2 Controllers for air systems;

.3 Control valves for heating coil;

.4 Zone valves for heating zones;

.5 Building low temperature alarm.

.6 Boiler controls;

.7 Water/Sewage tank level switches

.8 Ancillary wiring and devices.

1.3 Related Work

.1	Section 23 05 01	Common Works Mechanical
.2	Section 23 52 00	Heating Boilers
.3	Section 23 34 00	HVAC Fans
.4	Section 26 05 01	Electrical General Provisions

1.4 Standards

.1 CSA Certification.

2 PRODUCTS

2.1 Controls

.1 Except as otherwise specified, all control devices and incidental items shall be of Honeywell manufacture.

.2 Heating Coil Valve Duct Temperature Controller

.1 Temperature Controllers, heating coil valve, 24VAC, 2-10 V output,

.3 Heat Trace Temperature Controller

.1 Temperature Controllers, heating coil valve, 24VAC, relay output,

.2 Honeywell Model T775R2027.Honeywell Model T775R2027.

.4 Boiler Controller

.1 Supplied with Boiler

.5 Boiler Low Water Cutoff

.1 McDonnell & Miller Model 64

.2 TC-4 Test & Check valves

.6 Room Thermostats

.1 Line Voltage SPDT

.2 Honeywell T6051A1016

.7 Thermostat – Building Alarm

.1 Line voltage SPDT

.2 Setpoint range 0ºC to 30ºC

.3 Honeywell Model T631A1154/U.

.8 Zone Valves

.1 Two way valves, normally closed.

.2 Line Voltage

.3 With end switch

.4 Belimo B212B-LF120-S-US.

.9 Heating Coil Valves

.1 24 VAC

.2 3-way valve

.3 2-10 VDC input

.4 Belimo B320+LF24-MFT-S-US

.10 HRV Controllers

.1 Nu-Air Ventilation Model Win-1, 24 VAC

.2 Nu-Air Ventilation Win-20 20 minute timer, 24 VAC

.11 Damper Operators

.1 O/A Damper Actuator

.1 Belimo LF120-S 2-position spring return, 24VAC, direct coupled actuator w/ K4-1 universal jackshaft clamp & ZDB-AF2 Angle of Rotation Limiter.

.2 HRV Motorized Wallcaps

.1 24 VAC

.2 Hoyme Model MOH-0810-S-PO

2.2 Instruments

.1 Provide pressure gauges with needle valves for pump suction and discharge connections for each heating pump, installed at pump flanges.

.2 Provide dial type HWH temperature indicators to monitor the following parameters:

.1 HWH supply and return at each heating coil and boiler.

3 EXECUTION

3.1 General

.1 Automatic control systems and components provided or referenced under this Section are to be installed and adjusted in accordance with the manufacturer's published instructions, and approved Shop Drawings and logic diagrams.

.2 Provide connections to piping and equipment, and calibration of all controls.

.3 Provide glazed, framed system schematic mounted on wall adjacent to fan system.

3.2 Adjustment

.1 On completion of installation, all controls and incidental items are to be adjusted to achieve satisfactory comfort levels throughout the occupied space.

.2 Coordinate commissioning of control systems with equipment manufacturers' representatives.

	.3	Submit report advising of any items beyond the scope of the Contract that may adversely affect system performance.

END OF Section 23 09 33

1 **GENERAL**

1.1 Contract Conditions

.1 The General Conditions of the Contract and Section 01005, General Requirements (Division 1), shall be read in conjunction with Division 23, all of which shall be considered an integral part of this Contract.

1.2 Work Included

.1 Oil storage tank;

.2 Day tank

.3 Ancillary items.

1.3 Standards

.1 CAN/CSA-B139-09;

.2 ULC S601;

.3 NFPA 30, Flammable and Combustible Liquids.

.4 ANSI B31.1, Pressure Piping

2 **PRODUCTS**

1.1 Oil tank

.1 DOUBLE WALL.

.2 ULC listed

.3 2270 l.

.4 Skid base, step package, anti-syphon spill box w/ overfilll preventer @ fill point

.5 Standard of Acceptance: Westeel HFV-2200.

2.1 Piping

.1 External fill piping 50Ø diameter Schedule 40 seamless steel to ASTM A120 Gr. B, malleable fittings.

.2 Vent piping 38Ø.

.3 Connections to burners by Type K hard drawn copper tubing with SAE flared fittings.

2.2 Fusible Link Valve/Filter

.1 Tiger Loop E710

2.3 Flexible Connector

.1 600 mm nominal length, all stainless steel for flammable liquids service.

.1 Unit shall be ULC listed for above and under ground installations.

.2 Dover Corp Flex-Pression FP-2.0-xx

.3 Swing joint may be used instead of flex connector where indicated.

2.4 Accessories

.1 Tank valve, NPT connections, 2 piece ball type, brass body, Teflon seat: Red & White 5044A.

.2 Float operated level indicator, General GFUL-100

.3 Hinged fill cap, lock type, 50Ø male threaded, Firomatic HC-200.

.4 Whistle vent, General GFUL-2125.

.5 Vent cap, aluminum, General GF-125Z

3 EXECUTION

3.1 Installation

.1 Install piping in accordance with reference standards and with burner manufacturers recommendations.

.2 Seal threads with approved compound-do not use TFE tape.

.3 Use dielectric fittings between dissimilar metals.

.4 Make tubing bends and flares with proper tools, and install square and parallel to equipment.

END OF Section 23 13 23

1 GENERAL

1.1 Contract Conditions

.1 The General Conditions of the Contract and Division 01 shall be read in conjunction with this Division, all of which shall be considered an integral part of this Contract.

1.2 Work Included

.1 Boiler Plant and Heating Piping ancillaries.

1.3 Related Work

.1	Heating Boilers	Section 23 52 00
.2	Hydronic Systems	Section 23 21 16
.3	Hydronic Pumps	Section 23 21 23
.4	Electric and Electronic Control	Section 23 09 33

1.4 Standards

.1 CSA B139.15

2 PRODUCTS

2.1 Glycol

.1 Low toxicity inhibited propylene glycol for use in cuprous, ferric, and plastic piping systems, 163°C rated.

.2 Dowfrost HD. No substitutes.

.3 Provide premixed, suitable for use to -45ºC.

2.2 Glycol Tank

.1 Packaged pump, tank, PRV system.

.2 Axiom Industries Model DMF150.

2.3 Balancing Valves

.1 Line Balancers

.1 Globe style, Vernier-type calibrated handwheel with tamper-proof setting, copper alloy solder or threaded end, or flanged iron body over 50mm nominal size, drain and metering connections with integral stops.

.2 Armstrong CBV Series.

.2 Convector Balancers

.1 Divertor type, bronze construction, compression stem packing, solder end:

.2 Amtrol BR-1 or BR-2.

2.4 Isolating Valves

.1 Brass construction ball valve, Teflon seat, 2-piece body, screwed ends, blowout-proof stem, memory stop: Red-White Fig. 5044A.

2.5 Pump Check Valves

.1 Horizontal to 50mm nominal diameter, 860 kPa bronze body, screwed or solder ends, bronze swing disc, Red-White Fig. 236/237.

2.6 Drain Valves

.1 Bronze construction, male threaded spout, composition disc, chrome plated where exposed: Emco 3741.

2.7 Air Vents

.1 Automatic, thermoplastic construction with built-in brass shutoff: Honeywell Braukmann EA122A.

.2 Manual, coin operated satin brass body, Conbraco No. 27-301-01.

2.8 Strainers

.1 Y-type, ASTM B62 bronze body: Spirax Sarco Type BT.

.2 Supply complete with full-bore ball-type blowdown valve.

2.9 Expansion Tank

.1 Diaphragm type, butyl rubber certified for use with propylene glycol.

.2 Amtrol SX-90V, 165 L tank volume, 34 L acceptance volume.

2.10 Air Eliminator

.1 Spirovent Model VDR125FTM air/dirt separator with magnet

2.11 Sidestream Filter

.1 Assembly to include isolation valves, drain valve and sight flow indicator.

.2 304 stainless steel housing, in-line brass head.

.3 10 micron (25 micron) dirt/rust filter.

.4 SAI Aqua Pure AP1610 (19mm) or AP1650 (13mm).

2.12 Sight Flow Indicator

.1 Double window, bronze body, with internal spring and indicator ball.

.2 Operating limit 861kPa @ 93C.

.3 W.E.Anderson Series 200, or similar.

3 EXECUTION

3.1 Installation

.1 Install components where specified or where required by Code, in accordance with manufacturers' instructions.

.2 Install air vents at all high points of all piping systems, with automatic vents in Mechanical Room only.

.3 Install drain valves at low points.

END OF Section 23 21 14

1 GENERAL

1.1 Contract Conditions

.1 The General Conditions of the Contract and Division 01 shall be read in conjunction with this Division, all of which shall be considered an integral part of this Contract.

1.2 Work Included

.1 Hot Water Heating (HWH) piping system;

1.3 Related Work

.1	Thermal Insulation for Piping	Section 10 07 20
.2	Heating Boilers	Section 23 52 00
.3	Hydronic Specialties	Section 23 21 14
.4	Finned Tube Radiation Heaters	Section 23 82 36

1.4 Standards

.1 ASHRAE

.2 ASME

.3 ASTM

2 PRODUCTS

2.1 HWH Piping

.1 Steel Pipe

.1 Black, seamless or ERW (ASTM A-53 Gr. B)

.2 Copper Tube

.1 Type L hard drawn (ASTM B88M-83.

.3 Polyethylene Tube

.1 Cross-linked polyethylene w/ oxygen diffusion barrier (ASTM F-876), rated at 689 kPa @ 82º C.

.2 Standard of Acceptance: Wirsbo-hePEX.

2.2 Fittings

.1 Materials for fittings shall match the characteristics of connecting pipe for pressure, temperature and corrosion.

.2 Fittings to 50 mm nominal diameter may be Class 150 threaded malleable iron, threaded brass or bronze (ANSI B16.5-1978), or wrought copper (ANSI B16.22-1980) for 95-5 solder.

.3 Fittings greater than 50 mm in diameter shall, unless otherwise specified, be butt-welded steel or 95-5 soldered copper.

.4 Provide dielectric unions or insulating flanges to separate dissimilar metals.

.5 Polyethylene tubing:

.1 Wirsbo R/A compression fittings,

.2 Wirsbo Transition fittings,

.3 Do not use Wirsbo Quick & Easy® fittings with hePEX tubing.

.4 Do not install tubing in direct contact with copper tube or fittings.

3 EXECUTION

3.1 Installation

.1 Piping

.1 Cut pipe accurately to measurements taken in place, ream and de-burr.

.2 Align close to building structure to minimize furring.

.3 Slope up to high points and down to low points in direction of flow, at a minimum grade of 0.2%.

.4 All penetrations of structural members subject to Consultant's approval.

.2 Tubing

.1.1 Protect tubing at all expansion joints

.3 Joining

.1 Abrasively clean mating surfaces on copper piping and apply paste flux immediately before soldering.

.2 Apply TFE tape to threaded joints, except that TFE compound shall be used where substantial movement is anticipated (e.g., swing joints).

3.2 Testing & Balancing

.1 Hydrostatically test all piping on pure water at 150% of maximum operating pressure over a 12-hour period without measurable loss.

.2 On completion of testing drain system, fill with a 3% solution of non-foaming phosphate-free detergent, circulate for 8 hours; drain and flush with clean water for 4 hours; drain, clean all strainers and refill, and circulate for further two hours; check strainers, and repeat flushing until debris is clear.

.3 Fill total system with new, premixed, inhibited aqueous propylene glycol (ref. Section 23 21 14), and start up system.

.4 Perform circuit balancing check using installed metering valves and valve manufacturer's rating curve, to demonstrate even and proper distribution throughout the system.

.5 Where flow controls are provided, adjust to specified flows, record, and lock in position.

.6 Submit certified test results to the Departmental Representative.

END OF Section 23 21 16

1 GENERAL

1.1 Contract Conditions

.1 The General Conditions of the Contract and Division 01 shall be read in conjunction with this Division, all of which shall be considered an integral part of this Contract.

1.2 Work Included

.1 Heating circulating pumps.

.2 Glycol Pump.

1.3 Related Work

.1	Heating Boilers	Section 23 52 00
.2	Hydronic Systems	Section 23 21 16
.3	Hydronic Specialities	Section 23 21 14

1.4 Standards

.1 ASHRAE.

2 PRODUCTS

2.1 Circulators

.1 Horizontal-shaft in-line centrifugal single stage pump with the capacities and characteristics as shown.

.2 Pump volute or casing shall be cast iron, stainless steel fitted, drilled and tapped for gauge ports at both the suction and discharge flanges and for drain ports at the bottom of the casing.

.3 The pump shall be close coupled to a thermally protected “canned rotor” motor, with stainless steel shaft and seal ring.

.4 Field replaceable overload protection relay.

2.2 Heating Pumps P1, P4, P8

.1 Grundfos Alpha2 Model 26-99FC, 1.89 L/s @ 5.8 m head, 0.37 kW 115/1Ph/60Hz motor.

2.3 Glycol Pump P3

.1 Included with Glycol tank. Refer to Section 23 21 14.

3 EXECUTION

3.1 General

.1 Refer to and apply manufacturers' detailed instructions for all aspects of pump installations.

.2 If debris is noted in piping during construction, the Departmental Representative may direct that removable strainers be placed upstream of pumps prior to startup.

3.2 Circulators

.1 Install pump between properly aligned and firmly supported pipe connections, with no piping forces imparted on the pump casing.

.2 Do not use flanges to correct piping misalignments.

END OF Section 23 21 23

1 GENERAL

1.1 Contract Conditions

.1 The General Conditions of the Contract and Division 01 shall be read in conjunction with this Division, all of which shall be considered an integral part of this Contract.

1.2 Work Included

.1 Outside air , Supply air and Exhaust air ducts

1.3 Related Work

.1	Thermal Insulation for Ducting	Section 23 07 13
.2	Dampers - Balancing	Section 23 33 14
.3	Dampers - Fire and Smoke	Section 23 33 16
.4	Diffusers, Registers & Grilles	Section 23 37 13

1.4 Standards

.1 SMACNA

.2 ASHRAE

2 PRODUCTS

2.1 Sheet Metal

.1 Galvanized steel with G90 zinc coating to ASTM A525M-80.

.2 Lock forming quality.

.3 Gauge in accordance with ASHRAE recommendations for 1.5 times maximum working static pressure (<0.5 kPa).

1.1 Spiral Duct

.1 Duct and matching fittings of galvanized steel

.2 External 4-ply pressure-tight lockseam construction

.3 Outer wall:

.1 <300Ø: 28 ga

.2 300Ø and larger: 26 ga

.4 Standard of Acceptance:

.1 Ecco Type P.

2.2 Fabrication

.1 Construction as required by SMACNA Low Pressure Duct Construction Standards.

.2 Provide small arc airfoil hollow vanes in curved fittings with throat radius less than duct width, or as indicated

2.3 Joint Adhesive

.1 Polymeric rubber, UL Classified.

.2 United Duct Sealer.

2.4 Supports

.1 Configuration of straps, hangers, rods and angles as per SMACNA details.

.2 Provide lock nuts on all hangers

2.5 Flexible Connections

.1 Canvas, 0-68kkg/m2 density, wire reinforced, impervious neoprene core.

.2 Adjustable stainless steel or nylon straps for attachment to duct and equipment, and compatible sealants.

.3 Duro-Dyne “Durolon”.

2.6 Duct Silencers

.1 Not used

2.7 Acoustic Lining

.1 Not used

.2

2.8 Weld pins

.1 Not used.

3 EXECUTION

3.1 Installation

.1 Install steel duct in accordance with SMACNA manual, generally as indicated on the Drawings.

.2 Ductwork shall be made air tight (no audible leaks under 0.5 kPa pressure) - duct tape will not be permitted for sealing of ductwork.

.3 Duct transitions not to exceed 15 degrees, unless space restrictions deem otherwise.

.4 Provide small arc air foil hollow vanes in duct elbows where centreline radius is less than 1-1/4 times the turning radius of duct or as indicated.

.5 Provide balancing dampers in locations indicated on the drawings- single pin will not be accepted.

.6 Provide backdraft dampers on exhaust system where indicated.

.7 Provide access doors each side of fire dampers.

.8 Provide spiral duct for all duct in exposed locations.

3.2 Testing and Balancing

.1 Following completion of installation, all ductwork shall be thoroughly cleaned of dust, dirt and debris, and all filter elements cleaned or replaced as applicable.

.2 Check status of all components, perform tests and adjustments, and balance the air systems by traverse method in accordance with ANSI/ASHRAE Standard 111-1988.

.3 Air Balancing to be to AABC Standards

.4 Submit certified test results to the Departmental Representative before commencement of Start-Up Service.

.5 Tests to be witnessed by Consultant’s designated representative.

END OF Section 23 31 14

1 GENERAL

1.1 Contract Conditions

.1 The General Conditions of the Contract and Division 01 shall be read in conjunction with this Division, all of which shall be considered an integral part of this Contract.

1.2 Work Included

.1 Control dampers for air system.

.2 Balancing Dampers.

1.3 Related Work

.1 Metal Ducts - Low Pressure to 500 Pa Section 23 31 14

.2 Dampers - Fire and Smoke Section 23 33 16

.3 HVAC Fans Section 23 34 00

1.4 Standards

.1 ASHRAE, SMACNA, AMCA.

2 PRODUCTS

2.1 O/A and E/A Dampers

.1 Damper blades 12 ga. extruded aluminum, insulated with 22mm PU foam, thermally broken, incorporating extruded synthetic low-temperature flexible seals, interlocking when closed.

.2 Mounting frame 12ga. 100mm deep aluminum extrusion, insulated with PS foam on three sides.

.3 Jamb sections to incorporate extruded synthetic low-temperature flexible seals.

.4 Self-lubricating Celcon/polycarbonate bearings, aluminum and plated steel control shafts, with cup-point trunnion screws to prevent slippage.

.5 Parallel blade design.

.6 Leakage at 1.0 kPa static pressure not to exceed 25 l/s per m^2 as verified by test results from an independent laboratory.

.7 Dampers shall be suitable for an operating temperature range of minus 40ºC to 73ºC

.8 Tamco Series 9000 PB Severe Cold Option.

.9 Provide “flanged to duct “ type for dampers at wall hoods.

2.2 Balancing Dampers

.1 CFM International Iris Damper

2.3 Access Doors

.1 Cam-lock secured gasketted access doors with safety wire.

.2 Nailor-Hart Series 0800.

3 EXECUTION

3.1 Installation

.1 Mount dampers in finished ductwork at locations indicated on the drawings, accessible for maintenance and adjustment, and verify unrestricted operation of linkage.

.2 Provide access doors for all duct mounted motorized dampers.

END OF Section 23 33 15

1 GENERAL

1.1 Work Included

.1 Heat Recovery Ventilator

.2 Garage Ventilation

1.2 Related Work

.1	Metal Ducts - Low Pressure to 500 Pa	Section 23 31 14
.2	Metal Ducts - High Pressure to 2500 Pa	Section 23 31 15
.3	Louvres, Intakes & Vents	Section 23 37 20

1.3 Standards

.1 ASHRAE, AMCA.

2 PRODUCTS

2.1 Heat Recovery Ventilation Unit HRV1

.1 Rated capacity 95 L/s @ 75 Pa external static pressure

.2 22ga galvanized steel cabinet insulated with 26mm foil-faced fiberglass insulation

.3 Polypropylene heat exchange core, MERV 8 filters.

.4 DWDI direct-drive supply and exhaust blowers, 0.19 kw 120/1/60 PSC motors

.5 Variable control of supply and exhaust fans, independently adjustable

.6 Recirculation defrost

.7 Energy recovery certified to AHRI Standard 1060

.8 Nu-Air NU305HRV.

2.2 Garage Makeup Air Unit MUA1

.1 Energy Savings Products ESP Lov LV140

2.3 Garage Exhaust EF1

.1 Energy Savings Products ESP Lov LV140 BU (Blower unit only)

2.4 Flexible Connections

.1 Duro Dyne “Durolon” canvas wire reinforced impervious neoprene cored connections with adjustable stainless steel or

nylon straps for attachment to duct and equipment. Provide compatible sealants.

.2 Flexible connections to be provided at inlet and outlet of all new fans provided except where noted.

3 EXECUTION

3.1 Location

.1 Install fans where indicated.

.2 Check for conflict with Electrical.

.3 Provide rubber vibration isolators at mounting points.

END OF Section 23 34 00

1 GENERAL

1.1 Work Included

.1 Supply and exhaust air grilles;

1.2 Related Work

.1 Metal Duct - Low Pressure to 500 Pa Section 23 31 14

.2 HVAC Fans Section 23 34 00

1.3 Standards

.1 ASHRAE, ADC.

2 PRODUCTS

2.1 Supply & Exhaust Grilles (HRV1)

.1 Polymer resin construction, three-element, adjustable for flow in supply or exhaust application

.2 Friction fit in standard commercial round duct, 100Ø to 200Ø nominal

.3 Select in accordance with sizing of connecting duct.

.4 Primex WGX Series

3 EXECUTION

3.1 Installation

.1 Install in locations indicated on drawings to manufacturer's recommendations.

END OF Section 23 37 13

1 **GENERAL**

1.1 Contract Conditions

.1 The General Conditions of the Contract and Division 01 shall be read in conjunction with this Division, all of which shall be considered an integral part of this Contract.

1.2 Work Included

.1 Power vent (in lieu of chimney)

.2 Barometric damper.

.3 Breeching connections.

1.3 Related Work

.1 Heating boilers Section 23 52 00

1.4 Standards

.1 CSA B139, ULC S-604

.2 SMACNA, ASHRAE

2 **PRODUCTS**

2.1 Chimney

.1 Sectional prefabricated piping system, ULC listed Type A double wall construction with 25mm mineral insulation, type 304 stainless steel liner and stainless steel outer jacket.

.2 Industrial Chimney Company Inc. Excel 2100-2 for atmospheric draft applications, sized as per drawings.

.3 Provide manufacturer's recommended accessories including (but not limited to) plate support assemblies, firestops, adjustable roof flashing with storm collars, radiation shield, locking bands and/or roof braces, and round tops with deflector skirt.

.4 Provide one chimney for each oil-fired appliance.

2.2 Breeching

.1 Prefabricated mild steel, with sweep bends from boiler outlets.

2.3 Barometric Damper

.1 Regulator for natural draft oil-fired appliances, size same as chimney. Field Type RC.

3 EXECUTION

3.1 General

.1 Use only manufacturer's recommended accessories for installation of prefabricated chimney.

.2 Follow manufacturer's recommendations and SMACNA standards for assembly and support.

.3 Apply approved joint sealant to all sections for complete, leak-proof assembly.

3.2 Chimney

.1 Assemble the chimneys to form continuous stacks from boiler connections to roof penetrations.

.2 Install roof supports and storm-resistant flashings to manufacturer's recommendations.

.3 Install tee in accessible location at the base of the stack, with bolted, gasketted cap for inspection and cleanout purposes.

.4 Install exposed exterior chimney sections in accordance with manufacturer's recommendations with locking bands and roof braces for lateral support (placement subject to approval of Departmental Representative).

3.3 Breeching

.1 Suspend breeching at 1500 mm centres using half rings and hangers, with adjustable lengths between chimney and boilers.

.2 Install bolted, gasketted tee caps on breeching for inspection and cleanout purposes.

END OF Section 23 51 00

1.0 GENERAL

1.1 Contract Conditions

.1 The General Conditions of the Contract and Division 01 shall be read in conjunction with this Division, all of which shall be considered an integral part of this Contract.

1.2 Work Included

.1 Baseboard heating

.2 Unit heaters

1.3 Design Parameters

.1 Space temperatures 22°C nominal inside (at -45°C outside);

.2 Hot water supply 82°C.

1.4 Related Work

.1 Hydronic Systems Section 23 21 16

.2 Hydronic Specialties Section 23 21 14

.3 Electric and Electronic Control System for HVAC Section 23 09 33

1.5 Standards

.1 ASHRAE.

2.0 PRODUCTS

2.1 General

.1 Heating capacities quoted on the Drawings and in these Specifications are down-rated to compensate for the effects of aqueous propylene glycol heating medium.

1.1 Baseboard Radiation

.1 Type A – Engineered Air Model WF-1a enclosure, 457 mm high.

.2 19 mm copper tube, 102 mm x 102 mm fin @ 164 fins/m.

		.3	Single row mounting bracket. Where return line is inside enclosure, provide double row bracket.
1.2	Radiant panels		
		.1	Not used.
1.3	Unit heaterUH1, UH2		
		.1	Engineered Air H7, 115/60/1.
2.0	**EXECUTION**		
2.1	General		
		.1	Install terminal heating units where indicated on the Drawings and in accordance with manufacturers' instructions.

END OF Section 23 82 36

Division 26 – Electrical - Contents

1 General

1.1 GENERAL

1.1.1 This section covers items common to all Divisions 26 and is intended only to supplement the requirements of Division 1.

1.1.2 The plans and specifications are set out for convenience of grouping the work and are not intended to delineate the division of the work among various trades.

1.1.3 Provide all labour, co-ordination, supervision, tools, materials and equipment, as well as the application of a competent knowledge of construction whether or not directly specified or shown on the plans, required for the installation, testing and putting into operation each electrical system and product specified, except where it is specifically mentioned that certain materials and/or labour are not part of the contract.

1.1.4 Execute all work in a professional manner so as to present a neat and finished appearance when completed. Keep competent foremen and necessary journeymen and apprentices on the job during the progress of the work. Endeavor to maintain the same foreman for the duration of the work.

1.1.5 Become familiar with the construction drawings and when laying out the work arrange the equipment with due regard to architectural, structural, and mechanical features. Where locations of outlets and conduit runs are dependent upon equipment being installed by other trades or by the Parks Canada, confirm the location of such outlet and conduit stub-up with no additional charge or expense, and make any necessary changes or additions to the routing of electrical raceways, etc., to accommodate the structural, mechanical and architectural conditions.

1.1.6 Where equipment supplied by the electrical trade must be built into the work of other trades, such as masonry, plastering, finishing, etc., the electrical trade shall supply the equipment to be built in, or measurements to allow the necessary opening to be left, by the trade concerned.

1.1.7 Before submission of tenders, each trade shall examine the plans and specifications of the other trades to ascertain requirements called for therein, and allow for these accordingly.

1.2 WORK INCLUDED

1.2.1 It is the intention of these specifications and drawings to provide for a complete and fully operating electrical system with facilities and services to meet the Parks Canada's requirements described herein, and in complete accord with applicable codes and ordinances.

1.2.2 In general, the work includes the supply and installation of the following:

1.2.2.1 Service, metering
1.2.2.2 Branch circuit panelboards, outlets and wiring.
1.2.2.3 Wiring for mechanical trades.
1.2.2.4 Lighting fixtures and lamps.
1.2.2.5 Emergency lighting system.
1.2.2.6 Exterior car receptacles and wiring.

1.2.2.7 Work done under cash allowances carried by Divisions 26 and others.

1.3 EXAMINATION OF DRAWINGS AND SITE

1.3.1 Before submitting tender, examine the site and allow for all existing conditions affecting the work under contract. Investigate and allow for costs of all services to be provided under this contract, and become satisfied that these can be supplied and installed without any additional charges after award of the contract.

1.3.2 Before submitting tender, examine the architectural and mechanical drawings and allow for running power to and connecting up all electrical apparatus shown thereon, including the supply and installation of any additional lighting shown thereon, whether or not these are called for on the electrical drawings or specifications.

1.4 DISCLAIMER

1.4.1 Notice is hereby given that the drawings and specifications have been prepared by Plan-Eng Consulting Inc. pursuant to its contract of professional retainer with its client. These drawings and specifications may contain limitations or errors which may not be evident. Their accuracy is not warranted.

1.4.2 Any person, other than our client, using or relying on these drawings or specifications may do so only upon condition that their rights to make any claim whatsoever, which may arise from the use of these drawings or specifications, are limited solely to the contractual rights which they may have against the person who provided the drawings and specifications to it pursuant to their contract. They further agree that they have no rights whatsoever to claim damages from Plan-Eng Consulting Inc resulting from the use of these drawings and specifications.

1.5 CHANGE ORDERS

1.5.1 Where the Contractor is requested to submit a price for a notice of proposed change to the work, he shall provide within fourteen (14) days of request, a detailed breakdown of his price, stating:

1.5.1.1 Quantity, unit amount and total amount of actual material or equipment cost or credit,
1.5.1.2 Number of hours of labour, hourly rate, and total actual labour cost or credit, and,
1.5.1.3 For changes involving an increase in the contract price, the approved overhead and profit margins listed in Division 0 under "Supplementary Conditions".

1.5.2 Refer to "Definitions" below.

1.6 CONTRACT BREAKDOWN

1.6.1 Within thirty days of the award of the contract, forward to the Departmental Representative a breakdown of the tendered electrical price into the divisions of work. This breakdown shall be in the form of a lump sum figure for each division, broken down into material costs and labour costs, with the aggregate of these division prices totaling to the tendered price.

1.7 DEFINITIONS

1.7.1 Refer to CSA C22.1 - 18 for "Definitions and General Requirements". These shall be applicable except as elsewhere defined in the specifications or on the drawings.

1.7.2 "Contractor" shall be defined, depending upon context, as the General Contractor, Subcontractor, or Sub-subcontractor that actually performs the work defined in the contract documents. Trade definitions shall be as per "General" paragraph above.

1.7.3 "Actual cost of materials" shall be deemed to be cost of material or equipment to the Contractor. All discounts, other than prompt payment discounts, shall be credited to the Parks Canada.

1.7.4 "Actual cost of labour" shall be deemed to include both direct and indirect labour costs.

1.7.5 "Direct labour costs" shall be defined as the actual base wage rates payable to the Contractor and shall not exceed the base wage rates established by collective agreements.

1.7.6 "Indirect labour costs" shall be defined as the Contractor's actual related costs and payroll burden additional to direct labour costs, and shall not exceed the rates established by collective agreements. Indirect labour costs shall include, but not be limited to: vacation pay, Unemployment Insurance Commission contributions, Canada Pension Plan contributions, Worker's Compensation contributions, company pension costs, training funds, health and welfare costs, association dues, field supervision, small tools and equipment costs. Indirect costs shall not exceed 25% of direct labour costs.

1.7.7 "Overhead" shall be deemed to include all costs, dues and fees that are incurred in achieving the completion of the work or in support of the Contractor's overall program. Overhead shall include, but shall not be limited to, clean-up, hoisting, supervision, additional bonding, and photocopying.

1.7.8 "Inspection Authority" shall mean the agent of any authority having jurisdiction over construction standards associated with any part of electrical work on the site.

1.7.9 "Supply Authority" means the company or commission responsible for the delivery of electrical power to the project.

1.7.10 "Telecommunication Authority" means the company or commission responsible for the delivery of telephone or television services to the project.

1.7.11 "Electrical Code" or "C.E. Code" or "C.E.C." shall mean the current edition of the Canadian Electrical Code C22.1 - 18, Part I as adopted and modified by the Inspection Authority having jurisdiction.

1.7.12 Where the term "provide" refers to the Contractor, it shall mean to supply and install. Where the term "provide" refers to the Parks Canada or his agent it means the Parks Canada or his agent will deliver to the site for installation by the Contractor.

1.7.13 "Indicated" means as shown on contract drawings or noted in contract documents.

1.7.14 "Packaged Equipment" means prewired factory-packaged equipment, provided by others, which is in a completely electrically operable state after one final connection.

1.8 VOLTAGE RATINGS

1.8.1 Operating voltages: to CAN3-C235-83 (R2015).

1.8.2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard. Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

1.9 MATERIALS AND EQUIPMENT

1.9.1 Equipment and material to be certified, manufactured and installed to applicable standards as set out by Canadian Standards Association (CSA) or other accredited agency. Underwriters Laboratories of Canada (ULC) standards shall also be met.

1.9.2 Where there is no alternative to supplying equipment which is not CSA certified, obtain special approval from Inspection Authority or CSA Special Inspection as required, and from the Deparmental Representative.

1.9.3 Existing equipment which is to be reconnected shall bear CSA approval, or special approval as per Sentence 2 above.

1.9.4 Factory assembled control panels and component assemblies.

1.9.5 Where products or materials are specified by the technical description only without reference to manufacturer or trade name, these shall be supplied by a Canadian manufacturer who has been continuously engaged in business for at least five (5) years.

1.9.6 Where products or materials are specified by manufacturer or trade name, this is for the purpose of establishing a standard of quality of products and workmanship to which the Contractor shall adhere, and contractors quoting on products other than those specified or approved for substitution do at their own risk.

1.9.7 Where any products or materials are specified by both technical description and manufacturer's designation, the requirements of the technical description shall take precedence and the manufacturer's designation is given only as a standard of quality for fabrication and general design which shall be modified by the manufacturer to provide the particular features specified.

1.9.8 Any materials or products installed without prior approval shall, if so directed, be removed and replaced at the Contractor's expense with approved materials or products selected by the Parks Canada or their representative.

1.9.9 Acceptable manufacturers and products listed in this specification and on the contract drawings does not imply exclusion of unlisted manufacturers and products, however application for approval to use same shall be submitted as per "Substitutions" paragraph below.

1.10 SUBSTITUTIONS

1.10.1 Substitution of material or equipment from the specified may only be made providing written approval is obtained before the close of tenders. Make application for substitutions in duplicate at least five (5) days before electrical tenders close, giving a complete technical description and illustrations of the equipment it is proposed to substitute and an itemization of the points of deviation from the specified equipment. Where alternate equipment requires installation or connection in addition to those required by the equipment specified, such costs shall be allowed for in the tender.

1.10.2 Within thirty (30) days of the award of the contract, ascertain the delivery dates of all equipment and apply for substitutions on those items which cannot be delivered in time for completion of the project on schedule. If such application for substitution has not been made, it will be assumed that delivery dates have been verified and delivery of materials or equipment will not delay completion of the project on schedule.

1.10.3 In the event materials specified do not bear appropriate approval or meet the Inspection Authority requirements, then this shall be made known in writing and application made for substitution of alternate material within thirty (30) days of the award of the contract. After this period, assume full responsibility for obtaining the approval of the local Inspection Authority and pay all charges levied, and make any modifications required.

1.11 CODES AND STANDARDS

1.11.1 Do complete installation in accordance with Canadian Electrical Code C22.1 – 21, 25th Edition 2021 except where specified otherwise.

1.11.2 Comply with CSA Certification Standards and Electrical Bulletins in force at time of tender submission.

1.11.3 Abbreviations for electrical terms: to CSA Z85-1983.

1.11.4 Comply with codes and standards referenced in individual Sections of the specifications.

1.11.5 National Building Code of Canada NBC 2015

1.11.6 Nunavut Good Building Practices Guidelines, 3rd Edition, 2020

1.12 PERMITS, FEES

1.12.1 Submit to following authorities necessary number of drawings and specifications for examination and approval prior to commencement of work:

1.12.1.1 Electrical Inspection Authority.
1.12.1.2 Building Inspection Authority.
1.12.1.3 Fire Prevention Authority.

1.12.2 Pay associated fees.

1.13 EQUIPMENT IDENTIFICATION

1.13.1 Nameplates: Lamacoid 3 mm thick plastic engraving sheet, black face, white core, mechanically attached unless specified otherwise. Sizes as follows:

1.13.1.1 Size 1: 12 mm high with 5 mm high letters.
1.13.1.2 Size 2: 20 mm high with 8 mm high letters.
1.13.1.3 Size 3: 25 mm high with 12 mm high letters.

1.13.2 Labels: Embossed plastic self adhesive labels (Dymo-Tape) is not allowable unless specified otherwise.

1.13.3 Coordinate names of equipment and systems with Division 15 to ensure that identical names are used.

1.13.4 Identify applicable equipment according to following schedule:

Equipment	Nameplate Identification		Size
Main distribution	-	Building name, consulting engineer, contractor, date, voltage, amperage	3
	-	Main breaker or disconnect	2
	-	Metering cabinet	2
	-	Instrument transformer enclosure including CT ratios	2
Distribution centres	-	Name, voltage, amperage	2
	-	Loads controlled	1
	-	Where fed from	1
Panelboards	-	Name	2
	-	Where fed from	1
Motor control centres	-	Name, voltage, amperage	2
	-	Where fed from	1
	-	Loads controlled	1
Disconnect switches	-	Load controlled and tag	1
	-	Where fed from	1
Starters, contactors	-	Load controlled and tag	2
	-	Where fed from	1
Emergency equipment	-	Name, capacity, voltage (red nameplate)	2
Line voltage cabinets	-	Name, voltage	2
Low voltage cabinets	-	System name	2

1.14 WIRING IDENTIFICATION

1.14.1 Identify 4 AWG wiring and smaller by continuous insulation colour.

1.14.2 Identify wiring larger than 4 AWG by continuous insulation colour or by colour banding tape applied at each end and at splices.

1.14.3 Identify individual circuits or zones by use of blank or pre-numbered wrap-on strips or heat-shrink sleeves at each termination or splice.

1.14.4 Maintain phase sequence and colour coding throughout each system.

1.14.5 Colour code:

1.14.5.1 120/240 V system:
1.14.5.1.1 Phase A - Red.
1.14.5.1.2 Phase B - Black.
1.14.5.2 Grounding conductors - Green.
1.14.5.3 Neutral conductors - White.

1.14.6 Use colour coded wires in communication cables, matched throughout system.

1.15 CONDUIT AND EQUIPMENT COLOUR CODING

1.15.1 Colour code all conduits in accordance with schedule below.

1.15.2 Code with plastic tape or paint at points where conduit enters wall, ceiling, or floor, and at 15 m intervals.

1.15.3 All pull boxes, junction boxes, covers, and conduit banding shall be finished in the following colours:

120/240V	Grey
Low Voltage Control for Lighting	Black

NOTE: All cover markings are to be in black lettering.

1.15.4 All electrical equipment not included in article .3 above is to be color coded as follows:

120/240 V	Grey
Annunciator Cabinets	Red

Telephone Backboards	Grey
Computer and Data Systems Cabinets	Green

All exterior of Motor Housings to match Voltage colour (Brush Only).

1.16 FINISHES

1.16.1 Shop finish metal enclosure surfaces by removal of rust and scale, cleaning, application of rust resistant primer inside and outside, and at least two coats of finish enamel.

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

1.17 PROTECTION

1.17.1 Protect exposed live equipment during construction for personnel safety.

1.17.2 Provide warning signs, as specified and/or to meet requirements of Inspection Authority and Departmental Repesentative.

1.17.3 Shield and mark live parts "LIVE 120 VOLTS", or with appropriate voltage.

1.17.4 Arrange for installation of temporary doors for rooms containing electrical distribution equipment. Keep these doors locked except when under direct supervision of electrician.

1.18 MANUFACTURERS' AND CSA LABELS

1.18.1 Visible and legible after equipment is installed.

1.19 FIRESTOPPING

1.19.1 Where cables or conduits pass through fire separations, fire seal with approved caulking compound in accordance with CSA standards and Alberta Building Code.

1.20 ACCESS DOORS

1.20.1 Supply access doors to concealed electrical equipment for operating, inspecting and servicing. Installation as specified in Division 9.

1.20.2 Access doors: flush mounted 14 gauge 600 x 600 mm for body entry and 300 x 300 mm for hand entry unless otherwise noted. Doors to open 180 degrees, have rounded safety corners, concealed hinges, screwdriver latches and anchor straps.

1.20.2.1 General: prime coated steel.
1.20.2.2 Special areas such as tiled surfaces: stainless steel.

1.20.3 Provide ULC rated access doors in fire separations.

1.21 KEYS

1.21.1 For all electrical equipment specified to come with locks and keys such as fire-alarm cabinet, panelboards, low-voltage cabinets, and etc, contractor to master all keys so that one key opens all. Provide 10 sets of keys.

1.22 TRIAL USAGE

1.22.1 Temporary or trial usage by the Parks Canada or his representative of any electrical apparatus, equipment, work or materials before final completion and written acceptance by the Parks Canada shall not be construed as evidence of an acceptance by the Parks Canada.

1.22.2 The Parks Canada shall have the privilege of temporary usage as soon as the Contractor deems the work to be sufficiently advanced for such usage.

1.23 CARE, OPERATION AND START-UP

1.23.1 Instruct operating personnel in the operation, care and maintenance of equipment as specified in Section 16025.

1.23.2 Arrange and pay for services of the Departmental Representative to supervise start-up of installation, check, adjust, balance and calibrate components.

1.24 CLEANING

1.24.1 Do final cleaning in accordance with Division 1 requirements.

1.24.2 At time of final cleaning, lighting reflectors, lenses, and other lighting surfaces that have been exposed to construction dust and dirt shall be cleaned using soft cloths and approved cleansers.

1.24.3 Vacuum out all panelboard, cabinet and enclosure tubs and clean all equipment surfaces so they are free of construction dirt and paint.

END OF SECTION

1.1 RELATED WORK

1.1.1 Submittals: Division 1.

1.2 RECORD DRAWINGS

1.2.1 Obtain an extra set of white prints and as the work progresses, clearly and accurately record on this set of prints, in red ink, all conduit runs, wire counts and equipment locations as actually installed. Submit record drawings to the Departmental Representative within thirty (30) days of the date of acceptance of the project.

1.2.2 Record drawings shall be kept current on a day to day basis and shall be kept in the Contractor's field office and shall be accessible to the Owner's representative at all times.

1.2.3 The Departmental Representative will provide reproducible (and electronic format) record drawings and submit to the Parks Canada for their records.

1.3 SHOP DRAWINGS

1.3.1 Within thirty (30) days of the award of contract, prepare or obtain equipment shop drawings as required in individual sections of this specification. The drawings shall show construction and fabrication details, weights, outline dimensions, performance characteristics, ratings, schematic and connection diagrams of equipment being purchased. Review and verify all dimensions and ratings and where necessary, alter these shop drawings in order to have the equipment comply with the intent of the specifications and drawings. Where applicable, include wiring, single line and schematic diagrams. Wiring drawings showing interconnection with work of other divisions are required.

1.3.2 Include manufacturer's catalogue cuts and photometric data for lighting fixtures.

1.3.3 All shop drawings shall be delivered complete with a cover sheet indicating project name, date, contractor, name(s) of shop drawings enclosed, applicable specification section, number of pages attached, and space for review stamps and comments. A sample cover sheet is attached at the end of this section.

1.3.4 The review of shop drawings and technical data will be for general design only and will not relieve the contractor from responsibility for their accuracy. Inadvertent approval of shop drawings or technical data which are incomplete in detail or which contain original errors in technical data or sizes of equipment that does not fit the space available shall not be construed as approving departure from requirements of the drawings or specifications.

1.4 OPERATING AND MAINTENANCE MANUALS

1.4.1 Not less than thirty (30) days prior to acceptance of the project furnish, for review by the Departmental Representative, electrical system operating and maintenance manuals as further defined herein.

1.4.2 Each system and piece of equipment requiring adjustment or maintenance or whose operation is not readily apparent to unskilled users and each system requested by the Owner's representative shall be fully described in the manual. Identification numbers shall be used for each piece of equipment; these shall be identical to those used on the shop drawings and specifications.

1.4.3 Each section of the manuals to be complete with the following:

1.4.3.1 Name of system or equipment and manufacturer.
1.4.3.2 Name, address and phone number of nearest service and parts supplier.
1.4.3.3 Functional description of the system or equipment.
1.4.3.4 Operating instructions.
1.4.3.5 Maintenance instructions.
1.4.3.6 Trouble shooting guide.
1.4.3.7 Replacement parts list.
1.4.3.8 Illustrations - showing sizes, options, modifications.
1.4.3.9 Schematic and connection diagrams (these may be in a separate plan pocket or binder).
1.4.3.10 Assembly and parts drawings (these may be in a separate plan pocket or binder).

1.4.4 Provide three (3) electronic O&M Manuals PDF on Flash Drive as well as three (3) 215 x 280 mm extension type, three post catalogue binders bound with vinyl, orange in colour, hot stamped in gold lettering front and spine. Title as follows:

OPERATING AND MAINTENANCE MANUALS
FOR
(PROJECT NAME AND LOCATION)
ELECTRICAL SYSTEM
(PRIME DEPARTMENTAL
REPRESENTATIVE)
(ELECTRICAL
DEPARTMENTAL
REPRESENTATIVE)
(ELECTRICAL CONTRACTOR)
(DATE)

1.4.5 Index each binder according to the following indexing system:

1.4.5.1 Electrical Systems:
1.4.5.1.1 Provide table of contents page with clear plastic cover.
1.4.5.1.2 Certificates on the following:
- Contractor's warranty certificate.
- Inspection Authority inspection reports.
- Structured cabling certificate.

1.4.5.2 List of Electrical Drawings:
1.4.5.2.1 Index of electrical drawings.
1.4.5.2.2 Provide one copy of each as-built drawing under separate cover.

1.4.5.3 Description of Systems:
1.4.5.3.1 Provide complete description of each system.
1.4.5.3.2 Include detailed system description and components comprising that system, explanation of how each component operates, location of each device, and settings

of components requiring adjustment.

1.4.5.4 Maintenance Materials and Spare Parts:
1.4.5.4.1 Provide an itemized list of all maintenance materials and spare parts turned over to Parks Canada, complete with authorized signatures verifying receipt from the Contractor. 1.4.5.5 Systems Demonstration:
1.4.5.5.1 Provide a list indicating dates and attendees of all systems demonstrations given, including signatures.
1.4.5.6 Lighting:
1.4.5.6.1 Shop drawings.
1.4.5.6.2 Fixture type designation.
1.4.5.6.3 Name of manufacturer.
1.4.5.6.4 Catalogue number of fixture.
1.4.5.6.5 Catalogue number of lamps for replacement and where they may be obtained.
1.4.5.6.6 Catalogue number of replacement plastic diffusers or glassware.
1.4.5.6.7 Catalogue number of ballasts for fixtures having these.
1.4.5.6.8 Name, address and phone number of distributor and parts supplier.
1.4.5.6.9 A manufacturer's illustration of the fixture.
1.4.5.6.10 A list of the rooms where the fixture has been installed.
1.4.5.7 Wiring Devices:
1.4.5.7.1 Shop drawings.
1.4.5.10.2 Switches: manufacturer, types.
1.4.5.10.3 Receptacles: manufacturer, types.
1.4.5.10.4 Coverplates: manufacturer, types.
1.4.5.10.5 Specialty devices: manufacturer, description of operation and required maintenance.
1.4.5.8 Emergency Lighting System:
1.4.5.11.1 Shop drawings.
1.4.5.11.2 List of component parts.
1.4.5.11.3 Systems description, operation, required maintenance and manufacturer.
1.4.5.11.4 Results of tests conducted as per Section 26 01 35.
1.4.5.12 Communications Systems:
1.4.5.12.1 Shop drawings for each system.
1.4.5.12.2 List of component parts for each system.
1.4.5.12.3 Systems description, operation, required maintenance and manufacturer for each system.

1.4.5.12.4 Results of tests conducted as per Section 26 01 35.

1.4.5.13 Lighting Control Systems:

1.4.5.13.1 Shop drawings.

1.4.5.13.2 Systems description, operation, maintenance and manufacturer.

1.4.5.13.3 Results of tests conducted as per Section 26 01 35.

1.5 MAINTENANCE MATERIALS

1.5.1 Provide maintenance materials and spare parts as specified in individual Sections of the specifications.

1.5.2 Provide all special tools required for normal maintenance.

1.5.3 Provide a complete inventory of electrical spare parts, tools and maintenance materials as specified.

1.5.4 At completion of project, turn over maintenance materials to the Owner's representative and have them sign and date the inventory list. Provide a copy of the signed inventory list to the Departmental Represnetative.

1.6 BILL OF MATERIALS AND PRICING

1.6.1 Supply to Departmental Representative's office prior to closing of tenders a bill of materials and associated costs. These costs shall be based upon prices submitted to wholesalers or distributors, not including distributor's mark ups.

1.6.2 All manufacturers' agents and representatives, including those specified, shall comply with the above. The Departmental Representative reserves the right to substitute other manufacturer's products if the above conditions are not met.

1.7 ELECTRICAL PRODUCTS OPTION LIST

1.7.1 Identify equipment, systems and subtrades proposed to be used from among those approved for the project. Deliver the completed list to the Departmental Representative not later than twenty-four (24) hours after the close of electrical tenders. Failure to comply with these requirements shall mean the Contractor loses the option of choosing equipment, systems and subtrades and shall use those as may be directed by the Departmental Representative. This list shall give the name of the manufacturer (and subtrade **where applicable**) for each type of material, equipment or system proposed and be set out as follows:

Division Of Work		Manufacturer / Subtrade
.1	Distribution Equipment	----------
.2	Motor Controls	----------
.3	Fire Alarm System	----------
.4	Clock System	----------
.5	Sound/Program/Media Retrieval System	----------

.6 Security System ----------

.7 Wiring Devices ----------

.8 Television System ----------

.9 Emergency Lighting ----------

.10 Exit Lighting ----------

.11 Low-Voltage Switching System ----------

.12 Structured Cabling System ----------

.13 Lamps (All Types) ----------

.14 Lighting Fixtures (Attach complete list indicating manufacturer catalogue number for each fixture type.)

Submitted by:_____

Date:_____20_____ Per: _____

1.8 SHOP DRAWING TRANSMITTAL

1.8.1 The following form is provided as a sample of an acceptable shop drawing transmittal.

PROJECT NAME:

DATE:

ELECTRICAL CONTRACTOR:

SHOP DRAWINGS ENCLOSED:

SPECIFICATION SECTION:

NUMBER OF PAGES:

REVIEW STAMPS AND/OR COMMENTS:

END OF SECTION

1 General

1.1 INTENT

1.1.1 Provide demonstration and instruction sessions to familiarize the Owner's operation and maintenance personnel with electrical systems and their operation and maintenance, prior to takeover by the Parks Canada.

1.2 MANUFACTURER'S SITE SERVICES

1.2.1 Arrange and pay for appropriately qualified manufacturer's representatives to provide or assist electrical equipment and systems demonstration and instruction as specified herein.

1.3 CONTRACTOR / Parks Canada COORDINATION

1.3.1 Establish agendas and attendees for demonstration and instruction sessions in conjunction with Owner's representative. Coordinate scheduling of sessions with Owner's representative.

2 Products

2.1 MATERIALS

2.1.1 Provide copies of completed operation and maintenance manuals, prepared in accordance with Section 26 01 20, for use in demonstrations and instructions.

2.1.2 Provide all spare parts, tools and equipment in order to carry out demonstrations and instructions.

3 Execution

3.1 SYSTEMS DEMONSTRATIONS

3.1.1 Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing and required maintenance for each of the following systems:

- 3.1.1.1 Emergency Lighting System:
  - 3.1.1.1.1 Testing and maintenance of batteries.
  - 3.1.1.1.2 Unit starting in Test position.
  - 3.1.1.1.3 Simulation of power failure and automatic unit start-up.
- 3.1.1.2 Emergency Shut-Off Sub-Panel
- 3.1.1.3 Mechanical Equipment Connections
- 3.1.1.4 Lighting Control Systems:
  - 3.1.1.4.1 Master control unit.
  - 3.1.1.4.2 Remote station operation.

3.1.1.4.3 Exterior lighting control.
3.1.1.4.4 Future Extension Locations:
3.1.1.4.5 Conduit stub-ups.

END OF SECTION

1.1 WORK INCLUDED

1.1.1 Test and check all portions of each electrical system for satisfactory operation. All tests to be done in the presence of the Departmental Representative or his delegate, suitably logged, tabulated, signed and incorporated into the Operating and Maintenance Manuals.

1.1.2 Perform tests using qualified personnel. Provide necessary material and instruments.

1.1.3 Testing and commissioning to be carried out under this contract at no extra cost to the Parks Canada.

1.1.4 Procedures and tests outlined below are electrical tests required in addition to normal visual and mechanical inspections which must be carried out prior to placing equipment in service.

1.1.5 Provide records of all production tests required by EEMAC or CSA for all power distribution equipment to be provided.

1.1.6 Insert a copy of all test results into the operating and maintenance manuals. All test sheets submitted shall be typewritten.

1.1.7 Refer below and to other Sections for additional tests required.

1.2 MAIN SWITCHBOARD

1.2.1 Test reports are required on:

1.2.1.1 Calibration of all instruments and meters.
1.2.1.2 Overcurrent protective device co-ordination.
1.2.1.3 Load test.
1.2.1.4 Fault level verification.
1.2.1.5 Protective relaying calibration.

1.3 AUXILIARY SYSTEMS

1.3.1 Manufacturer's test reports are required for the following systems:

1.3.1.1 Communication cables between outlets and patch panel (printout).

1.4 LOAD BALANCE

1.4.1 Perform load tests when as many loads as possible are operable, prior to turnover to Parks Canada.

1.4.2 Test load balance on all feeders at distribution centres, motor control centres and panelboards with all loads energized.

1.4.3 If load imbalance exceeds 15%, reconnect circuits to balance loads.

1.4.4 Measure and record full load ammeter readings of all panelboard, motor control centre and motor feeders.

1.4.5 Complete a motor survey sheet for each motor and insert into maintenance manuals. Indicate all nameplate data plus current draw at full load and overload selected.

1.5 GROUND RESISTANCE – Not Required

1.6 VOLTAGE TESTING AND ADJUSTING

1.6.1 Measure and record voltage at main service and all panelboards.

1.7 WIRING DEVICES

1.7.1 Test all wiring devices for correct operation, polarity and circuitry.

1.7.2 Check that bonding conductor connects both outlet box bonding screw and receptacle ground terminal.

1.8 COMMUNICATION CABLES

1.8.1 Test all communication cables between Ethernet outlets and Patch Panel

1.8.2 Submit Cable Test Printout

1.8.3 Check that bonding of the communication equipment to system ground.

END OF SECTION

1.1 SITE REVIEW BY DEPARTMENTAL REPRESENTATIVE

1.1.1 Progressive site review reports on the project will be prepared by the Departmental Representative or his delegate.

1.1.2 These site reviews shall not imply acceptance of the work completed to that time. Unsatisfactory work or materials may be rejected at any time regardless of previous reviews. The Departmental Representative reserves the right to note additional deficiencies as they become apparent.

1.1.3 The Contractor shall arrange for the electrical foreman to accompany the Departmental Representative or his delegate and remove panel or outlet box covers, fixture diffusers, or provide other services as requested to facilitate review of the installation.

1.1.4 The Contractor is to ensure that each item is completed by the next scheduled site review, whenever possible.

1.1.5 Provide a minimum of three (3) working days' notice for any requested site visit not regularly scheduled.

1.2 SUBSTANTIAL COMPLETION

1.2.1 Contractor is to check and verify in writing that the following items are complete prior to requesting a site review to obtain substantial completion of the project:

1.2.1.1 Record drawings are up to date.
1.2.1.2 Addenda, progress site review reports, requested changes and previously listed deficiencies have been completed.
1.2.1.3 Maintenance manuals have been submitted.
1.2.1.4 All equipment and devices are installed and operating as indicated.
1.2.1.5 All testing as called for under Section 26 01 35 is complete and reports issued.
1.2.1.6 Systems demonstration as called for under Section 26 01 30 has been carried out.
1.2.1.7 Maintenance materials as specified have been turned over to the Parks Canada.

1.2.2 Any items not able to be completed in time shall be listed in writing and sent in with the request for site review above.

1.2.3 If the project is not complete and deficiencies are not identified prior to the site review, such review shall become null and void. The Contractor shall pay all costs for such trip which includes:

1.2.3.1 Traveling time.
1.2.3.2 Departmental Representative's time.
1.2.3.3 Sundry expenses.

1.3 FINAL COMPLETION

1.3.1 All deficiencies detailed on the substantial completion site review are to be completed and verified before a final review is carried out.

1.3.2 Further site reviews required due to non-completion of deficiencies shall be borne by the Contractor as per subsection 1.2.3 above.

END OF SECTION

1 General

1.1 REFERENCES

1.1.1 CSA C22.2 No. 0.3-92, Test Methods for Electrical Wires and Cables.

1.2 SHOP DRAWINGS

1.2.1 Submit shop drawings in accordance with Section 26 01 20.

2 Products

2.1 BUILDING WIRES

2.1.1 Conductors: stranded for 8 AWG and larger.

2.1.2 Conductors indoors: 98% conductivity copper, size as indicated, with insulation of chemically cross-linked thermosetting polyethylene material rated RW90, or nylon jacketed thermoplastic insulation type T90 Nylon, rated at 600 V.

2.1.3 Grounding conductors: 98% conductivity copper, size as indicated, with thermoplastic insulation type TW75, rated at 600 V.

2.2 ARMOURED CABLE

2.2.1 Conductors: insulated, copper, size as indicated.

2.2.2 Type: AC90.

2.2.3 Armour: interlocking type fabricated from steel strip.

2.3 CONTROL AND LOW VOLTAGE SIGNAL CABLES

2.3.1 Type LVT: 2 soft annealed copper conductors, shielded, minimum 24 AWG, with thermoplastic insulation, outer covering of thermoplastic jacket, and armour of closely wound aluminum wire.

2.3.2 Type ELC cable (bell wire) is not acceptable.

2.4 COMMUNICATIONS SYSTEMS CABLES

2.4.1 Communication system cables: to Section 27 10 00.

2.5 FLEXIBLE CORD

2.5.1 Flexible cord: 98% conductivity copper, 3 or 4 conductor and size as indicated, with 600 V insulation rated for extra-hard usage suitable for use in wet, damp and dry locations, rated SOW.

2.5.2 Flame retardant flexible cord: 98% conductivity copper, 3 or 4 conductor and size as indicated, with 600 V Exane insulation rated RW90, with flame retardant FT-4 rated neoprene jacket.

2.5.2.1 Acceptable material: Delta Suprenant Wire & Cable DAC1048C.

3 Execution

3.1 INSTALLATION OF BUILDING WIRES

3.1.1 Install wiring as follows:

3.1.1.1 In conduit systems in accordance with Section 26 05 33.

3.1.2 All wiring shall be installed in conduit or raceways only. Exposed wiring is not allowed.

3.1.3 NMD90 cable shall not be used on this project.

3.1.4 Use CSA approved lubricants of type compatible with wire/cable jacket to reduce pulling tension.

3.2 INSTALLATION OF ARMOURED CABLES

3.2.1 Minimum wire size shall be No. 12 AWG.

3.2.2 Terminate cables in accordance with Canadian Electrical Code.

3.2.3 Armoured cable may only be used for:

3.2.3.1 Final connections to luminaires (recessed in T-bar) in lengths not exceeding 1.5 m.

3.2.3.2 Connection of wiring devices installed in millwork.

3.3 INSTALLATION OF CONTROL CABLES

3.3.1 Install cable in conduit.

3.3.2 Ground control cable shield.

3.4 INSTALLATION OF COMMUNICATION CABLES

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3.4.1 Installation of communication cables shall be in conduit.

4

4.1 WIRE SIZE SCHEDULE

4.1.1 Lighting and power circuits: No. 12 AWG minimum, except as follows:

4.1.1.1 No. 10 AWG for 15 A, 120 V home runs longer than 23 m.
4.1.1.2 No. 8 AWG for 15 A, 120 V home runs longer than 36 m.

4.1.2 Motor circuits: No. 12 AWG minimum, except as otherwise indicated on drawings or schedules.

4.1.3 Feeder circuits: as indicated on drawings or schedules.

4.1.4 Fire alarm system circuits: to Section 28 3100.

4.1.5 Grounding conductors: as indicated on drawings or schedules, as required by C.E.C., and in accordance with Section 26

4.2 FIELD QUALITY CONTROL

4.2.1 Perform tests in accordance with Section 26 01 35

4.2.2 Perform tests using qualified personnel. Provide necessary instruments and equipment.

4.2.3 Check phase rotation and identify each phase conductor of each feeder.

4.2.4 Check each feeder for continuity, short circuits and grounds. Ensure resistance to ground of circuits is not less than 50 megohms.

4.2.5 Acceptance tests:

4.2.5.1 After installing cable but before splicing and terminating, perform insulation resistance test with 1000 V megger on each phase conductor.

4.2.5.2 Check insulation resistance after each splice and/or termination to ensure that cable system is ready for acceptance testing.

4.2.6 Provide Departmental Representative with list of test results showing location at which each test was made, circuit tested and result of each test and insert into operating and maintenance manuals.

4.2.7 Remove and replace entire length of cable if cable fails to meet any of the test criteria.

END OF SECTION

1 General

1.1 COORDINATION

1.1.1 Concrete work specified in Division 3.

1.1.2 Suspended ceiling work specified in Division 9.

1.1.3 Mechanical work specified in Division 15.

2 Products

2.1 SUPPORT CHANNELS

2.1.1 U shape, size 42 x 42 mm, 2.5 mm thick, suspended (trapeze style), set in poured concrete walls and ceilings as required.

3 Execution

3.1 INSTALLATION

3.1.1 Secure equipment to masonry, tile and plaster surfaces with lead anchors or nylon shields.

3.1.2 Secure equipment to poured concrete with expandable inserts.

3.1.3 Secure equipment to hollow masonry walls or suspended ceilings with toggle bolts.

3.1.4 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.

3.1.5 Fasten exposed conduit or cables to building construction or support system using straps.

3.1.5.1 One-hole steel straps to secure surface conduits and cables 50 mm and smaller.
3.1.5.2 Two-hole steel straps for conduits and cables larger than 50 mm.
3.1.5.3 Beam clamps to secure conduit to exposed steel work.

3.1.6 Suspended support systems.

3.1.6.1 Support individual cable or conduit runs with 6 mm dia threaded rods and spring clips.
3.1.6.2 Support 2 or more cables or conduits on channels supported by 6 mm dia threaded rod hangers where direct fastening to building construction is impractical.

3.1.7 For surface mounting of two or more parallel conduits use channels at 1.5 m oc spacing. Size conduit racks to provide 25% spare capacity.

3.1.8 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support equipment, conduit and cable runs.

3.1.9 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.

3.1.10 Do not use wire lashing or perforated strap to support or secure raceways or cables.

3.1.11 Do not use supports or equipment installed for other trades for conduit or cable support except with permission of other trade and approval of Departmental Representative.

3.1.12 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.

3.1.13 Install surface mounted panelboards on painted G1S plywood backboards. Where practical, group panelboards on common backboard.

3.1.14 Bridge studs top and bottom with channels to support flush mounted cabinets and panelboards in stud walls.

3.1.15 Where wall is inadequate to support wall mounted equipment, mount equipment independently of wall or strengthen wall to suit.

3.1.16 All floor mounted equipment, such as distribution centres shall be mounted on a 100 mm high concrete housekeeping pad.

3.1.17 Combustible materials, such as wood blocking, are not permitted in ceiling spaces to support equipment.

END OF SECTION

1 General

1.1 REFERENCES

1.1.1 CAN/CSA C22.2 No.18-92, Outlet Boxes, Conduit Boxes, and Fittings.

1.1.2 CSA C22.2 No.45-M1981 (R2008), Rigid Metal Conduit.

1.1.3 CSA C22.2 No.56-1977 (R2003), Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.

1.1.4 CSA C22.2 No.83-M1985 (R2017), Electrical Metallic Tubing.

1.1.5 CSA C22.2 No.211.2-M1984 (R2003), Rigid PVC (Unplasticized) Conduit.

1.1.6 CAN/CSA C22.2 No.227.3-M91 (R2003), Flexible Nonmetallic Tubing.

1.2 LOCATION OF CONDUIT

1.2.1 Drawings do not show all conduits. Those shown are in diagrammatic form only.

2 Products

2.1 CONDUITS

2.1.1 Rigid galvanized steel threaded conduit: Schedule 40 thickness, size as indicated.

2.1.2 Electrical metallic tubing (EMT): with couplings, size as indicated.

2.1.3 Rigid PVC conduit: Schedule 40 thickness, FT-6 flame spread rated, size as indicated. Type DB2 PVC conduit.

2.1.4 Flexible metal conduit and liquid-tight flexible metal conduit: size as indicated.

2.1.5 Electrical non-metallic flexible tubing (ENT): size as indicated.

2.2 CONDUIT FASTENINGS

2.2.1 To Section 26 05 29

2.3 CONDUIT FITTINGS

2.3.1 Fittings: manufactured for use with conduit specified. Coating: same as conduit.

2.3.2 Material: EMT fittings shall be steel material. Set-screw type fittings for EMT conduit are acceptable for interior work in dry areas only; use watertight connectors and couplings where indicated or required in exterior applications or areas exposed to moisture or dust.

2.3.3 Factory 'bends' where 45 or 90¤ bends are required for 78 mm and larger conduits.

2.4 FISH CORD

2.4.1 Polypropylene size as required.

3 Execution

3.1 CONDUIT INSTALLATION SCHEDULE

3.1.1 Install conduit according to following schedule:

Conduit Type	Application
Galvanized rigid steel	- Service entrance elbows. - Exposed stub-ups in concrete floors. - Hazardous areas. - Areas exposed to mechanical abuse.
Rigid PVC type DB2	- Underground service entrances.
Rigid PVC unplasticized	- Exterior underground runs. - Under concrete slabs. - In cast-in-place concrete.
Flexible metal	-Connections to T-bar ceiling mounted equipment and devices.
Liquid-tight flexible	-Connections to vibration producing equipment, including: - motor-driven equipment. - Connections to equipment in damp locations. - Connections to kitchen equipment.
ENT	- In cast-in-place concrete slabs.
Surface raceway	- Exposed work in public areas.
EMT	- All other applications.

3.2 INSTALLATION GENERAL

3.2.1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.

3.2.2 Conceal conduits except in mechanical and electrical service rooms.

3.2.3 Seal conduits with approved duct sealing compound where conduit passes from heated to unheated areas. Penetration in wall or roof assembly must also be properly sealed to prevent condensation or air passage.

3.2.4 Bend conduit cold. Replace conduit if kinked or flattened more than 1/10th of its original diameter.

3.2.5 Provide factory made bends, or mechanically bend steel conduit over 35 mm trade size.

3.2.6 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.

3.2.7 Install fish cord in all empty conduits.

3.2.8 Run two 27 mm spare conduits up to ceiling space from each flush panelboard. Terminate these conduits in 150 x 150 x 100 mm junction boxes in ceiling space, and label boxes appropriately.

3.2.9 Where conduits become blocked, remove and replace blocked section.

3.2.10 Cap all stubbed out conduits with tape or other approved material to prevent entry of construction material.

3.2.11 Dry and clean conduits out before installing wire.

3.3 SURFACE CONDUITS

3.3.1 Run parallel or perpendicular to building lines only.

3.3.2 Locate conduits behind heating equipment with 1.5 m clearance. Do not locate conduits less than 75 mm parallel to heating lines with a minimum of 25 mm at crossovers.- Not applicable

3.3.3 Run conduits in flanged portion of structural steel.

3.3.4 Group conduits wherever possible on channels.

3.3.5 Do not drill or cut through structural members without written permission.

3.3.6 Do not run ENT conduit exposed on surface. PVC conduit may be run on surface of walls, from floor penetration to panelboards.

3.3.7 Do not install non-metallic conduit in ceiling spaces or through fire separations.

3.4 CONCEALED CONDUITS

3.4.1 Do not install ENT conduit inside walls more than 1.5 m in length, above slab penetration.

3.4.2 Do not install conduits in concrete toppings.

3.4.3 Do not install non-metallic conduit in insulated cavities.

3.5 CONDUITS IN CAST-IN-PLACE CONCRETE

3.5.1 Locate to suit reinforcing steel. Install in centre one third of slab.

3.5.2 Protect conduits from damage where they stub out of concrete.

3.5.3 Install schedule 40 steel sleeves where conduits pass through slab or wall. Plastic sleeves may not be used in fire separations.

3.5.4 Where conduits pass through waterproof membrane provide oversized sleeve before membrane is installed. Use cold mastic between sleeve and conduit.

3.5.5 Do not place conduits in slabs where slab thickness is less than 4 times conduit diameter.

3.5.6 Encase conduits completely in concrete, with minimum 25 mm cover.

3.5.7 Organize conduits is slab to minimize crossovers.

3.6 CONDUITS IN CAST-IN-PLACE SLABS ON GRADE

3.6.1 Run conduits 27 mm and larger below slab. Ensure backfill material will not damage conduit, otherwise provide sand as backfill material.

3.6.2 Where surface mounted conduit penetrates a floor slab, install a 100 mm high concrete curb around the conduit.

3.7 CONDUITS UNDERGROUND

3.7.1 Slope conduits away from building to provide drainage.

END OF SECTION

1 General

1.1 REFERENCE STANDARD

1.1.1 CSA C22.2 No. 18-1981.

2 Products

2.1 OUTLET AND CONDUIT BOXES GENERAL

2.1.1 Size boxes in accordance with C.E.C.

2.1.2 102 mm square or larger outlet boxes as required for special devices.

2.1.3 Gang boxes where wiring devices are grouped.

2.1.4 Blank cover plates for boxes without wiring devices.

2.1.5 Combination boxes with barriers where outlets for more than one system are grouped.

2.2 SHEET STEEL OUTLET BOXES

2.2.1 Electro-galvanized steel single and multi gang flush device boxes for flush installation, minimum size 76 x 50 x 38 mm or as indicated. 102 mm square outlet boxes when more than one conduit enters one, side with extension and plaster rings as required.

2.2.2 102 mm square or octagonal outlet boxes for lighting fixture outlets.

2.2.3 102 mm square outlet boxes with extension and plaster rings for flush mounting devices in finished drywall and tile walls.

2.3 MASONRY BOXES

2.3.1 Electro-galvanized steel masonry single and multi gang boxes for devices flush mounted in exposed block walls.

2.4 FLOOR BOXES

2.4.1 High capacity floor boxes, concrete-tight as required, with adjustable finishing plate to suit floor finish. Device mounting plates to accommodate number of duplex receptacles and structured cabling jacks as indicated.

2.4.1.1 Acceptable manufacturers: Canadian Electrical Raceways, H.H. Robertson.

2.5 CONDUIT BOXES

2.5.1 Cast FS boxes with factory-threaded hubs and mounting feet for surface wiring of car heaters receptacles.

2.6 FITTINGS GENERAL

2.6.1 Bushing and connectors with nylon insulated throats.

2.6.2 Knock-out fillers to prevent entry of foreign materials.

2.6.3 Conduit outlet bodies for conduit up to 30 mm and pull boxes for larger conduits.

2.6.4 Double locknuts and insulated bushings on sheet metal boxes.

3 Execution

3.1 INSTALLATION

3.1.1 Support boxes independently of connecting conduits.

3.1.2 Fill boxes with paper, sponges, foam or similar approved material to prevent entry of construction material. Remove upon completion of work.

3.1.3 For flush installations mount outlets flush with finished wall using plaster rings to permit wall finish to come within 6 mm of opening.

3.1.4 Provide correct size of openings in boxes for conduit. Reducing washers not allowed.

3.1.5 Exposed outlet boxes in public areas shall be surface raceway boxes only. Exposed sheet steel outlet boxes may be installed in service and unfinished areas only.

3.1.6 Install vapour hats on all boxes located on walls and ceilings where the building air/vapour barrier is penetrated.

3.1.7 Loose fill insulation shall not come in contact with outlet boxes.

3.1.8 Do not install outlets back-to-back in wall; allow minimum 300 mm horizontal clearance between boxes.

3.1.9 Change location of outlets at no extra cost or credit, providing distance does not exceed 3 m, and information is given before installation.

3.1.10 Locate light switches on latch side of doors. Locate disconnect devices in mechanical and elevator machine rooms on latch side of door.

3.1.11 Because of drafting limitations, outlet locations shall be considered as being symbolic rather than the exact physical location for devices. Locate devices on the wall with prime regard for convenience of operation and the best usage of the wall space for this and other purposes. The latch side and swing of doors shall be determined from the architectural drawings and not from the electrical drawings.

3.1.12 Examine the drawings and the work of all other trades to establish the optimum location for electrical outlets and equipment for best utilization of the space.

3.1.13 The Contractor shall, prior to roughing-in any electrical outlets within each room, review the architectural elevations and fitment plans with the Departmental Representative and mark final locations and mounting heights on the field set of drawings, to be approved and signed. Failure to comply may result in outlets being moved at the Departmental Representative's discretion and at the Contractor's expense.

3.2 MOUNTING HEIGHTS

3.2.1 Mounting height of equipment is from finished floor or grade level to centreline of outlet unless specified or indicated otherwise.

3.2.2 If mounting height of equipment is not indicated verify before proceeding with installation.

3.2.3 Install outlet boxes at the following heights unless indicated otherwise:

- 3.2.3.1 Local switches: 1070 mm.
- 3.2.3.2 Receptacles:
  - 3.2.3.2.1 General: 350 mm
  - 3.2.3.2.2 Vehicle Maintenance and Workshop 450mm.
  - 3.2.3.2.3 Above top of continuous baseboard heater: 200 mm.
  - 3.2.3.2.4 Above top of counters or splash back: 175 mm.
  - 3.2.3.2.5 In mechanical and utility rooms: 1200 mm.
  - 3.2.3.2.6 For emergency battery packs: 2400 mm.
- 3.2.3.3 Telephone outlets: 350 mm.
- 3.2.3.4 Wall mounted telephone, 1070 mm.
- 3.2.3.5 Control stations: 1070 mm.
- 3.2.3.6 Thermostats 1220 mm.
- 3.2.3.7 Exit lights 2400 mm.
- 3.2.3.8 Emergency lights and battery packs 2400 mm, 3000 mm on high walls.
- 3.2.3.9 Wall mounted lighting fixtures:
  - 3.2.3.15.1 Interior: 2400 mm.
  - 3.2.3.15.2.Exterior: 1500 mm below top of exterior wall or as per architectural elevation and instruction

END OF SECTION

1 General

1.1 GENERAL REQUIREMENTS

1.1.1 Provide connection to all motors and special equipment as indicated on the drawings, specifications and schedules.

1.1.2 Examine the drawings and specifications of other trades and allow for connection of all equipment requiring electrical hook-up.

1.1.3 Confirm all electrical connections, loads and exact locations with supplier and installer prior to rough-in.

2 Products

2.1 MATERIAL

2.1.1 Provide all necessary materials and equipment to hook up equipment complete, in accordance with manufacturer's recommendations.

3 Execution

3.1 MECHANICAL EQUIPMENT

3.1.1 Install wiring, flexible connections, grounding, as indicated. Use liquid-tight flexible conduit connections to all motor-driven and vibration producing equipment.

3.1.2 Division 16 shall wire up all controls where controls switch power lines directly.

3.1.3 Check phase rotation before energizing.

3.1.4 Connect up all motorized dampers and backdraft dampers as indicated on mechanical drawings or specified in mechanical specifications.

3.1.5 Provide relays/contactors as required, operated by built-in motor thermal protection devices (thermistors), for motors incorporating this type of overload protection.

3.1.6 Provide disconnects for boiler modules (one disconnect per module), and wire up low water cutoffs.

3.1.7 Provide control power supply outlets as required by Division 15 for operation of control panels and similar equipment. Allow for a separate circuit for each control panel unless otherwise indicated.

3.1.8 Provide power to each sump pump control panel. From duplex controller, run two sets of conductors to each group of two sump pumps. Installation to meet requirements of C.E.C. Section 22 and Inspection Authority.

3.1.9 Provide 120 V connection to urinal solenoid controls.

3.1.10 Coordinate requirements for the foregoing with the mechanical trade.

END OF SECTION

1 General

1.1 SHOP DRAWINGS

1.1.1 Submit shop drawings in accordance with Section 26 01 20

1.2 MAINTENANCE MATERIALS

1.2.1 Provide maintenance materials in accordance with Section 26 0110.

2 Products

2.1 COMPONENTS

1.1.1 15 and 20 A, 120V, single pole, double pole, three-way, four-way quiet type switches as indicated.

2.2 MANUFACTURERS

2.2.1 Acceptable manufacturers: Thomas & Betts, Leviton

3 Execution

3.1 SWITCH INSTALLATION

3.1.1 Install low voltage switches complete with mounting brackets and plates.

3.1.2 Mount one, two or three switches in single gang box, four switches in two gang box, with box mounted horizontally. Provide flush mounted cabinet when housing more than four switches or as indicated. Mounting height to be in accordance with Section 26 05 34

3.2 PHOTOCONTROL INSTALLATION – Not applicable

3.2.1 Photocell shall be integrated in Exterior Lighting Fixtures

3.3 WIRING

3.3.1 Low voltage switch wiring to be minimum 18 AWG, type LVT, colour coded, installed in conduit. Band multiple groups of wiring together.

3.3.2 Line voltage wiring: to Section 26 05 13.

3.3.3 Leads for line and low voltage wiring to be 250 mm minimum.

3.3.4 Strap or clip wiring into position.

3.4 IDENTIFICATION

3.4.1 Switches shall be individually labelled indicating load controlled in multi-switch applications, using Size 1 nameplate.

3.4.2 Relays shall be labelled indicating circuit controlled.

END OF SECTION

1 General

1.1 RELATED WORK

1.1.1 Mounting: Section 26 05 29 - Fastenings and Supports.

1.2 SHOP DRAWINGS

1.2.1 Submit shop drawings in accordance with Section 26 01 20 - Submittals.

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

1.3 PLANT ASSEMBLY

1.3.1 Install circuit breakers in panelboards before shipment.

1.3.2 In addition to CSA requirements manufacturer's nameplate must show fault current that panel including breakers has been built to withstand.

2 Products

2.1 PANELBOARDS

2.1.1 Panelboards: product of one manufacturer.

2.1.2 250 V panelboards: bus and breakers rated for 22 kA (symmetrical) interrupting capacity or as indicated.

2.1.3 Sequence phase bussing with odd numbered breakers on left and even on right, with each breaker identified by permanent identification as to circuit number and phase.

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

2.1.5 The mounting pan on which panel interior is mounted shall be of rigid construction, reinforced by flanging of the back pan with formed angle iron sides. Non-reinforced back pans of ordinary flat sheet steel are not acceptable.

2.1.6 Lockable door with keying mastered per Section 26 01 10

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

2.1.8 Mains: suitable for bolt-on breakers.

2.1.9 Enclosure: CSA 1 with drip hoods.

2.1.10 Trim and door finish: as per colour schedule.

2.1.11 Trim with concealed front bolts and hinges.

2.1.12 Single tub design for panelboards of 72 circuits and less, double tub design for panelboards of 84 circuits.

2.2 BREAKERS

2.2.1 Breakers: to Section 26 28 20 - Moulded Case Circuit Breakers.

2.3 MANUFACTURERS

2.3.1 Acceptable manufacturers: Cutler-Hammer Canada, Schneider Canada, Siemens.

3 Execution

3.1 INSTALLATION

3.1.1 Locate panelboards as indicated and mount securely, plumb, true and square, to adjoining surfaces.

3.1.2 Install surface mounted panelboards on plywood backboards. Where practical, group panelboards on common backboard.

3.1.3 Mount at 1800 mm to top of panelboard from finished floor level, as required by Code, or as indicated.

3.1.4 Connect loads to circuits.

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

3.1.6 Install filler pieces in unused circuit positions.

3.2 EQUIPMENT IDENTIFICATION

3.2.1 Provide equipment identification in accordance with Section 16010 - Electrical General Provisions.

3.2.2 Nameplate for each panelboard size 2 engraved with panel name, voltage and where fed from. Mount inside door for flush panelboards.

3.2.3 Nameplate for each circuit in distribution panelboards size 2 engraved as indicated.

3.2.4 Nameplate on each panelboard indicating required interrupting capacity rating for replacement circuit breakers.

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

END OF SECTION

1 General

1.1 SHOP DRAWINGS

1.1.1 Submit shop drawings in accordance with Section 26 01 20

2 Products

2.1 JUNCTION AND PULL BOXES

2.1.1 Welded steel construction with screw-on flat covers for surface mounting, CSA Enclosure type 1 / 3 as required.

2.1.2 Covers with 25 mm minimum extension all around, for flush-mounted pull and junction boxes.

2.2 CABINETS

2.2.1 Type D: sheet steel, formed construction with screw-on flat covers for surface mounting.

2.2.2 Type E: sheet steel, hinged door and return flange overlapping sides, handle, lock and catch, for surface mounting as required.

2.2.3 Type T: sheet steel cabinet, with hinged door, latch, lock, 2 keys, containing 19 mm G1S painted plywood backboard for flush mounting as required.

2.2.4 Switch and control cabinets: prime coated sheet stainless steel tub and door complete with concealed hinge, flush mounted cam lock, for flush mounting.

3 Execution

3.1 JUNCTION, PULL BOXES AND CABINETS INSTALLATION

3.1.1 Use Type D cabinets for pull boxes.

3.1.2 Install pull boxes in inconspicuous but accessible locations.

3.1.3 Mount cabinets with top not higher than 2 m above finished floor.

3.1.4 Install terminal block as indicated in Type T cabinets.

3.1.5 Only main junction and pull boxes are indicated. Install pull boxes in conduit runs exceeding 30 m or with more than three 90 degree bends.

3.1.6 Cabinets to be keyed alike, and provide one key per cabinet.

3.2 IDENTIFICATION

3.2.1 Provide equipment identification in accordance with Section 26 01 10

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

END OF SECTION

1 General

1.1 SHOP DRAWINGS

1.1.1 Submit shop drawings in accordance with Section 26 01 20.

1.1.2 Indicate type of multi-outlet assemblies with similar terminology to these documents.

2 Products

2.1 SURFACE RACEWAY FOR WIRING DEVICES

2.1.1 Two piece steel assembly manufactured for mounting wiring devices and associated wiring, with barriers to separate different systems.

2.1.2 Nominal cross-section dimensions:

2.1.2.1 Double compartment raceway: 110 mm high x 40 mm deep.

2.1.3 Finish: custom factory finish.

2.2 WIRING DEVICES

2.2.1 Receptacles: U-ground duplex receptacles, to Section 26 27 26 - Wiring Devices.

2.2.2 Low voltage outlets: RJ45 data jacks, to Section 27 10 00.

2.3 GROUNDING

2.3.1 Ground system through separate insulated grounding conductor.

2.4 FITTINGS

2.4.1 Elbows, tees, couplings, connectors and miscellaneous fittings manufactured as accessories to product line supplied to provide complete and finished installation.

2.5 MANUFACTURERS

2.5.1 Acceptable material:

2.5.1.1 Double compartment steel raceway: Canadian Electrical Raceways SR475B.

3 Execution

3.1 FITTINGS

3.1.1 Install supports, elbows, tees, connectors, and miscellaneous fittings.

3.1.2 Keep number of elbows, offsets and connections to minimum.

3.1.3 Install barriers where required.

3.2 WIRING DEVICES

3.2.1 Install wiring devices and associated wiring as indicated.

END OF SECTION

1 General

1.1 SHOP DRAWINGS

1.1.1 Submit shop drawings in accordance with Section 26 01 20

2 Products

2.1 SWITCHES

2.1.1 15 and 20 A, 120V, single pole, double pole, three-way, four-way quiet type switches as indicated.

2.1.2 Manually-operated general purpose ac switches as indicated and with following features:

2.1.2.1 Terminals approved for No. 10 AWG wire.
2.1.2.2 Silver alloy contacts.
2.1.2.3 Urea or phenolic moulding for parts subject to carbon tracking.
2.1.2.4 Suitable for back and side wiring.
2.1.2.5 Ivory toggle.

2.1.3 Toggle operated fully rated for LED, and up to 80% of rated capacity of motor loads.

2.1.4 Switches of one manufacturer throughout project.

2.1.5 Acceptable materials (120 V 15 A SPST): Arrow Hart No. 1891, Bryant No. 4801, Hubbell No. 1201, Leviton No. 53501, Pass & Seymour No. 15AC1.

3.2 OCCUPANCY AND MOTION SENSORS

3.2.1 Wall – mounted Occupancy Sensors – CSA Standard

3.2.2 Ceiling – suspended Motion Sensors – CSA Standard

3.3 RECEPTACLES

3.3.1 Duplex receptacles, CSA type 5-15R, 125 V, 15 A, U ground, with following features:

3.3.1.1 Ivory high impact housing.
3.3.1.2 Suitable for No. 10 AWG for back and side wiring.
3.3.1.3 Break-off links for use as split receptacles.
3.3.1.4 Minimum four back wired entrances, four side wiring screws.
3.3.1.5 Triple wipe heavy phosphor bronze contacts and rivetted or one piece grounding contacts.

3.3.2 Receptacles of one manufacturer throughout project.

3.3.3 Acceptable materials: Arrow Hart No. 5252, Bryant No. 5262, Hubbell No. 5252, Leviton No. 5096 or 5262, Pass & Seymour No. 5262-CAN.

3.3.4 Majority of receptacles will be wall-mounted.

3.4 SPECIAL WIRING DEVICES

3.4.1 GFCI receptacles: Class "A" ground fault circuit interrupting, 15 A, 125 V, 3 wire, with provision for test and reset, suitable for installation in flush mounted outlet box, 5 mA ground fault trip level.

3.5 COVER PLATES - GENERAL

3.5.1 Cover plates from one manufacturer throughout project.

3.5.2 Sheet galvanized steel utility box cover for wiring devices installed in surface-mounted utility boxes.

3.5.3 Stainless steel, chrome finish, 1 mm thick cover plates for wiring devices mounted in flush-mounted outlet box.

3.5.4 Cast cover plates for wiring devices mounted in surface-mounted FS type conduit boxes.

3.5.5 Weatherproof single lift spring-loaded cast aluminum cover plates, complete with gaskets for duplex receptacles as indicated.- Not applicable.

3.6 COVER PLATES - COMBINATION OUTLETS

3.6.1 Wherever a wall mounted computer network cable outlet is shown on drawings, it shall be combined with a duplex receptacle in a two-gang barriered outlet box.

3.6.2 A 16 gauge zinc coated steel back plate shall provide solid support for communication devices.

4 Execution

4.2 INSTALLATION

4.2.1 Switches, as applicable:

4.2.1.1 Install single throw switches with handle in "UP" position when switch closed.
4.2.1.2 Install three-way switches with both handles in same position when circuit is off.
4.2.1.3 Install switches in gang type outlet box when more than one switch is required in one location.
4.2.1.4 Mount toggle switches at height specified in Section 26 05 34 or as indicated.
4.2.1.5 Install locking switches in all public areas.

4.2.2 Receptacles:

4.2.2.1 Install receptacles as follows:
4.2.2.1.1 Vertically mounted general purpose receptacles with

ground down.

4.2.2.1.2 Horizontally mounted general purpose receptacles with ground right.

4.2.2.2 Install receptacles in gang type outlet box when more than one receptacle is required in one location.

4.2.2.3 Mount receptacles at height specified in Section 26 05 34 or as indicated.

4.2.2.4 Where split receptacle has one portion switched, mount vertically and switch upper portion.

4.2.3 Cover Plates:

4.2.3.1 Protect stainless steel cover plate finish with paper or plastic film until painting and other work is finished.

4.2.3.2 Install suitable common cover plates where wiring devices are grouped.

4.2.3.3 Do not use cover plates meant for flush outlet boxes on surface-mounted boxes.

4.2.3.4 Provide identification on all coverplates with circuit and panel number by a lamicoid label riveted onto the coverplate.

4.2.4 Replace any wiring devices broken or damaged during construction prior to takeover by Parks Canada.

FIELD QUALITY CONTROL

4.2.5 Refer to Section 26 01 35 for required tests of wiring devices.

END OF SECTION

1. General

1. SHOP DRAWINGS

1.1 Submit shop drawings in accordance with Section 26 01 20 - Submittals.

2. Products

2.1 DISCONNECT SWITCHES

2.2.1 Non-fusible disconnect switches less than 30 A rating, to Section 26 27 26 - Wiring Devices.

2.2.2 Fusible and non-fusible disconnect switch in CSA Enclosure 1 for indoor use and 3 for outdoor use, or as required for application.

2.2.3 Provision for padlocking in on-off switch position by three locks.

2.2.4 Mechanically interlocked door to prevent opening when handle in ON position.

2.2.5 Quick-make, quick-break action.

2.2.6 On-off switch position indication on switch enclosure cover.

2.2.7 Provide full capacity solid neutral except for 3-wire motor disconnect switches.

2.2.8 As component part of combination starter: to Section 16811 - Motor Starters to 600 V.

2.2.9 Fuses: HRC type, size as indicated.

2.2.10 Fuseholders: suitable without adaptors, for type and size of fuse indicated.

2.2 EQUIPMENT IDENTIFICATION

2.2.1 Provide equipment identification in accordance with Section 26 01 10 - Electrical General Provisions.

2.2.2 Indicate name of load controlled on size 2 nameplate.

3. MANUFACTURERS

1. Acceptable manufacturers: Cutler-Hammer Canada, Schneider Canada.

3. Execution

1. INSTALLATION

1. Install disconnect switches as indicated and as required by C.E.C.

1. Install correct size and type of fuse in fusible disconnects.

END OF SECTION

1 General

1.1 SHOP DRAWINGS

1.1.1 Submit shop drawings in accordance with Section 26 01 20.

1.1.2 Include time-current characteristic curves for breakers with ampacity of 100 A and over or with interrupting capacity of 22,000 A symmetrical (rms) and over at system voltage.

2 Products

2.1 BREAKERS GENERAL

2.2.1 Bolt-on moulded case circuit breaker: quick-make, quick-break type, for manual and automatic operation with interrupting capacity of 10 kA (rms symmetrical), and with temperature compensation for 40C ambient.

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

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

2.2.4 Wafer or duplex type breakers will not be accepted.

2.2.5 Width of breakers shall be minimum 25 mm per pole.

2.3 CLASS "A" GROUND FAULT CIRCUIT INTERRUPTING BREAKERS

2.3.1 Moulded case thermal magnetic circuit breaker with ground fault circuit interrupter complete with zero sequence transformer, trip on 5 mA leakage current, and with provision for testing and reset.

3. Execution

3.1 INSTALLATION

3.1.1 Install circuit breakers in factory in quantities and types indicated.

END OF SECTION

1. General

1.1 SHOP DRAWINGS

1.1.1 Submit shop drawings in accordance with Section 26 01 20.

1.1.2 Indicate:

1.1.2.1 Mounting method and dimensions.
1.1.2.2 Starter size and type.
1.1.2.3 Layout of identified internal and front panel components.
1.1.2.4 Enclosure types.
1.1.2.5 Wiring diagram for each type of starter.
1.1.2.6 Interconnection diagrams.

1.2 OPERATION AND MAINTENANCE DATA

1.2.1 Provide data for incorporation into maintenance manual specified in Section 26 01 20.

1.2.2 Include operation and maintenance data for each type and style of starter.

1.3 MAINTENANCE MATERIALS

1.3.1 Provide maintenance materials in accordance with Section 26 01 20.

1.3.2 Provide listed spare parts for each different size and type of starter:

1.3.2.1 1 control transformers.
1.3.2.2 1 operating coil.
1.3.2.3 2 control fuses.
1.3.2.4 1 indicating lamp.

2. Products

2.1 MATERIALS

2.1.1 Starters: to IEC 292 standards.

2.1.1.1 Interrupting capacity: 10 kA (rms symmetrical) or as indicated.

2.2 MANUAL MOTOR STARTERS

2.2.1 Single phase manual motor starters of size, type, rating, and enclosure type as indicated, with components as follows:

2.2.1.1 Switching mechanism, quick make and break.
2.2.1.2 One overload heater, manual reset, trip indicating handle.

2.2.2 Accessories

2.2.2.1 Key switch: standard duty labelled as indicated.
2.2.2.2 Indicating light: standard duty neon type.
2.2.2.3 Locking tab to permit padlocking in "ON" or "OFF" position.
2.2.2.4

2.2.3

2.3 FULL VOLTAGE MAGNETIC STARTERS

2.3.1 Magnetic and combination magnetic starters of size, type, rating and enclosure type as indicated with components as follows:

2.3.1.1 Contactor solenoid operated, rapid action type.
2.3.1.2 Motor overload protective device in each phase, manually reset from outside enclosure.
2.3.1.3 Power and control terminals.
2.3.1.4 Wiring and schematic diagram inside starter enclosure in visible location.
2.3.1.5 Identify each wire and terminal for external connections, within starter, with permanent number marking identical to diagram.

2.3.2 Combination type starters to include motor circuit interrupter with operating lever on outside of enclosure to control motor circuit interrupter, and provision for:

2.3.2.1 Locking in "OFF" position with up to 3 padlocks.
2.3.2.2 Locking in "ON" position.
2.3.2.3 Independent locking of enclosure door.
2.3.2.4 Provision for preventing switching to "ON" position while enclosure door open except for starters installed in motor control centres.

2.3.3 Accessories:

2.3.3.1 Selector switches: standard duty labelled as indicated.
2.3.3.2 Indicating lights: standard duty type and color as indicated.
2.3.3.3 2-N/O and 2-N/O spare auxiliary contacts unless otherwise indicated.

2.4 CONTROL TRANSFORMER

2.4.1 Single phase, dry type, control transformer with primary voltage as indicated and 120 V secondary, complete with primary and secondary fuses for all ungrounded conductors, installed with the starter.
2.4.2 Size control transformer for control circuit load plus 20% spare capacity.

2.5 ENCLOSURE

2.5.1 Provide CSA Type 1 enclosure, or as required.
2.5.2 Apply finishes to enclosure in accordance with Section 26 01 10.

2.6 EQUIPMENT IDENTIFICATION

2.6.1 Provide equipment identification in accordance with Section 26 01 10.
2.6.2 Manual starter designation label, size 1, engraved as indicated.
2.6.3 Magnetic starter designation label, size 2 engraved as indicated.

2.7 MANUFACTURERS

2.7.1 Acceptable manufacturers: Allen-Bradley, Cutler-Hammer, Furnas, Klockner-Moeller, Schneider Square D Co., Westinghouse Canada.

3. Execution

3.1 INSTALLATION

3.1.1 Install starters, connect power and control as indicated.
3.1.2 Ensure correct fuses and overload devices installed, record sizes installed and insert data into maintenance manuals.
3.1.3 Provide one HOA selector switch and one red run indicating light with each starter unless otherwise indicated. Indicating light shall provide a true status of motor running condition.
3.1.4 All motors shall be wired for low voltage release using an HOA selector switch, unless automatic restarting of the motor would cause a hazard, in which case the motor shall be wired for low voltage protection using a start/stop selector pushbutton.

3.2 FIELD QUALITY CONTROL

3.2.1 Perform tests in accordance with Section 26 01 35 and manufacturer's instructions.

3.2.2 Take full load current readings of each motor and insert data into maintenance manuals.
3.2.3 Operate switches, contactors to verify correct functioning.
3.2.4 Perform starting and stopping sequences of contactors and relays.
3.2.5 Check that sequence controls, interlocking with other separate related starters, equipment, control devices, operate as indicated.

END OF SECTION

1 General

1.1 REFERENCE STANDARDS

1.1.1 All lighting fixtures shall bear appropriate CSA factory or CSA Special Inspection approval, all costs of which must be borne by the manufacturer and included in their pricing.

1.2 PRICING SUBMISSION

1.2.1 Pricing submission shall be based on all fixtures being new.

1.3 SHOP DRAWINGS

1.3.1 Submit shop drawings in accordance with Section 26 01 20

1.4 MAINTENANCE MATERIALS

1.4.1 MAINTENANCE MATERIALS
Provide maintenance materials in accordance with Section 26 0110

1.5 FIXTURE SPECIFICATION –
1.5.1 Provide fixture manufacturer's specification including temperature ratings which for cold spaces shall be -40C.

2.0 Products – New Lighting Fixtures required – Page 2

2.1 LUMINAIRES

2.1.1 Energy efficient lighting programme of the project shall be followed, with the use of energy efficient Light Emitting Diode (LED) lamp, all fixtures,high power factor 90% or better, low harmonic distortion less than 20%,instant electronic drivers, light emitting diode exterior fixtures, occupancy sensors, day light saving sensor- mounted fixtures, photocell control, etc

2.1.2 Motion-sensor controlled lumnaires shall be provided in specified area.

2.1.3 The electrical contractor shall supply and install light fixtures as noted on the drawing complete with lamps, seismic – restraint hangers and miscellaneous equipment necessary for a complete and operational installation.

2.1.4 Where recessed fixtures are utilized in insulated ceilings, electrical contractor to confirm with general contractor that fixture will be boxed in with drywall as per code. No extras will be allowed for failure to do so.

2.1.5 Fixtures shall be recessed, or drywall surface-mount, or chain-suspended.

2.1.6 Exterior lighting shall be Cooper Lumark Crosstour 5A with integral photocell

2.1.7 Fixtures shall be left clean upon completion of the project and all lamps operational.

2.1.8 Provide wireguards for all -40C fixtures.

2.2 Provide in corridors, utility rooms, and paths of egress, self-contained emergency

lighting unit battery-packs shall conform to CSA C22.2 No. 141 and provide at full load minimum 30 minutes illumination.

2.3 Emergency Lighting Fixtures shall be rated -40Cin cold temperature areas.

3 Execution

3.1 INSTALLATION

3.1.1 Locate and install luminaires as indicated.

3.1.2 Install recessed fixtures to allow removal from below, to gain access to outlet or pre-wired junction box.

3.1.1 Coordinate entire installation with other trades on site to avoid conflicts. During installation, locate ductwork and any other items that may cause interference in the ceiling space with light fixtures. Notify Departmental Representative promptly of such conditions.

3.2 WIRING

3.2.1 Connect luminaires to lighting circuits:

3.2.1.1 Directly for exterior, and wall mounted luminaires, and for luminaires mounted directly to ceiling structure.
3.2.1.2 Through flexible cable for exposed flexible connections.
3.2.1.3 Through type AC cable for all other luminaires.

3.2.2 All wiring shall be minimum 90 deg.C rated.

3.3 LUMINAIRE SUPPORTS

3.3.1 Fixtures surface mounted on Drywall ceiling shall be supported by manufacturer’s recommended material

3.3.2 Fixtures suspended from the roof soffit by means of chains shall be with material and accessories provided by the manufacturer.

3.3.3 Combustible materials, such as wood blocking, may not be used in ceiling spaces to support fixtures.

3.4 LUMINAIRE CLEANING

3.4.1 Thoroughly clean all fixtures, including reflectors, lamps, diffusers, louvers and lenses, in accordance with Section 26 01 10

3.4.2 Adjust lenses, frames and trims to eliminate light leaks.

END OF SECTION

1 General

1.1 REFERENCE STANDARDS

1.1.1 CSA C22.2 No. 141-M1985(R1999).

1.1.2 CSA Bulletin 1123A.

1.1.3 Canadian Electrical Code C22.1 - 18, Part I, Section 46.

1.2 SHOP DRAWINGS

1.2.1 Submit shop drawings in accordance with Section 26 01 20.

1.2.2 Data to indicate system components, mounting method, source of power and special attachments.

1.3 DELIVERY

1.3.1 Deliver batteries in dry state unless hermetically sealed.

1.3.2 Provide electrolyte in hazard-proof container.

1.4 GUARANTEE

1.4.1 Provide a written guarantee, stating that the battery for emergency lighting is guaranteed against defects in material and workmanship for a period of ten years, with a no-charge replacement during the first year and a pro-rata charge on the remainder, from the date of substantial completion.

2 Products

2.1 UNIT EQUIPMENT

2.1.1 Supply voltage: 120 V ac.

2.1.2 Output voltage: 12 V dc.

2.1.3 Operating time: 60 min at full load.

2.1.4 Capacity: full connected load as indicated on drawings, plus minimum 20% spare capacity.

2.1.5 Auto-Test Feature

2.1.6 Battery: hermetically sealed lead acid, maintenance free, 10 year life.

2.1.7 Charger: solid state, three stage multi-rate with power boost, voltage/current regulated, inverse temperature compensated, short circuit protected, modular construction.

2.1.8 Solid state transfer, operates on either brownout or blackout conditions.

2.1.9 Low voltage disconnect: solid state, modular, operates at 80% battery output voltage.

2.1.10 Signal lights: solid state, life expectancy 100,000 h minimum, for 'AC Power ON' and 'High Charge'.

2.1.11 Cabinet: suitable for direct or shelf mounting to wall, with knockouts for conduit, finished in white.

2.1.12 Standard equipment to include:

2.1.12.1 Test switch.
2.1.12.2 Battery disconnect cord.
2.1.12.3 dc output terminal blocks inside cabinet.
2.1.12.4 Cord and plug connection for ac.

2.1.13 Additional equipment to include:

2.1.13.1 Ammeter.
2.1.13.2 Voltmeter.
2.1.13.3 Time delay relay, 10 minute delay.
2.1.13.4 Mounting bracket.
2.1.13.5 RFI suppressors.
2.1.13.6 Remote test system, capable of activating emergency lights by use of a remotely operated hand-held controller.
2.1.13.7 Multi-circuit fused distribution panel.

2.1.14 Acceptable material: Lumacell RGS series, AimLite Deluge Emergi-Lite, Ready-Lite LDX12 series, Lithonia.

2.2 LIGHTING HEADS

2.2.1 Swivel type head.

2.2.2 Integral on unit and remote mounted as indicated.

2.2.3 Finish: white.

2.2.4 Lamp type: 6 W LED.

2.2.5 Acceptable material:

2.2.5.1 6 W LED: Lumacell RGS series, AimLite Deluge Emergi-Lite, Ready-Lite LDX12 series, Lithonia

2.3 WIRING OF REMOTE HEADS AND EXIT LIGHTS

2.3.1 Conduit: type EMT, to Section 26 05 33.

2.3.2 Conductors: RW90 type to Section 26 05 13, sized as indicated in accordance with manufacturer's recommendations to maintain current flow with maximum 5% voltage drop.

3 Execution

3.1 INSTALLATION

3.1.1 Install unit equipment for emergency lighting in accordance with reference standards listed in 1.1 above.

3.1.2 Install unit equipment and remote mounted fixtures as indicated.

3.1.3 Cut and re-cap cord to remove surplus. Plug into receptacle connected to circuit feeding no other loads.

3.1.4 Direct heads as indicated.

END OF SECTION

1 General

1.1 SHOP DRAWINGS

1.1.1 Submit shop drawings in accordance with Section 26 01 20.

2 Products

2.1 FABRICATION

2.1.1 Housing: extruded aluminum frame, white finish, thin profile.

2.1.2 Lamps: high intensity, non-protruding LEDs, less than 2 W power consumption.

2.1.3 Designed for 25 years of continuous operation without replacement.

2.1.4 Power supplies:

2.1.4.1 Normal power: 120 Vac.
2.1.4.2 Emergency power: 12 Vdc, refer to Section 26 52 01.

2.1.5 Pictogram Greenman Running: evenly illuminated fibreglass on die-cast face plate Pictogram Greenman Running

2.1.6 Exit Sign Fixtures shall be self-powered for 30-minutes and shall be rated -40C in cold temperature areas.

2.2 DESIGN

2.2.1 Wall mounting.

2.2.2 Single or double face as indicated.

2.2.3 Directional arrows: as indicated. Knock-out style arrows aracceptable.

2.3 MANUFACTURERS

2.3.1 Acceptable manufacturers: Dual-Lite Excalibur series, Lumacell LER-400 series, Lithonia.

3 Execution

3.1 INSTALLATION

3.1.1 Install exit lights wall mounted and ceiling mounted only when not practical or possible to wall mount.

3.1.2 Connect fixtures to exit light circuits as indicated. Exit light circuits shall be used for no other loads.

3.1.3 Ensure that exit light circuit breaker is locked in on position.

END OF SECTION

1. General

1.1 REFERENCES

1.1.1 CSA T527-94 (ANSI/EIA/TIA 607), Grounding and Bonding for Telecommunications in Commercial Buildings
1.1.2 CAN/CSA T528-93(R1997) (ANSI/EIA/TIA 606), Design Guidelines for Administration of Telecommunications Infrastructure in Commercial Buildings
1.1.3 CSA T529-95 (ANSI/EIA/TIA 568B), Design Guidelines for Telecommunications Wiring Systems in Commercial Buildings
1.1.4 CAN/CSA T530-M90(R1997) (ANSI/EIA/TIA 569), Building Facilities Design Guidelines for Telecommunications
1.1.5 CSA C22.1, Canadian Electrical Code, Part I
1.1.6 CAN/CSA C22.2 No.182.4-M90(R1996), Plugs, Receptacles, and Connectors for Communication Systems
1.1.7 CSA C22.2 No.214-94, Communication Cables
1.1.8 ANSI/EIA/TIA TSB 67, Transmission Performance Specifications for Field Testing of Unshielded Twisted Pair Cabling Systems
1.1.9 ANSI/EIA/TIA TSB 72, Centralized Optical Fiber Cabling Guidelines
1.1.10 ANSI/EIA/TIA TSB 75, Additional Horizontal Cabling Practices for Open Offices
1.1.11 Building Industry Consulting International (BICSI) TDM Manual

1.2 CONTRACTOR QUALIFICATIONS

1.2.1 All structured cabling work shall be performed by a Telecommunications Contractor whose normal business is the installation of voice, data, and image cabling systems, and to perform associated testing.
1.2.2 The Telecommunications Contractor shall have a contractual relationship with the manufacturer of the equipment installed on the project. Both the manufacturer and Telecommunications Contractor are responsible for the final warranty and certification of the application assurance.
1.2.3 All work shall be performed and supervised by technicians who are fully trained and qualified by the manufacturer to install and test their products. Training shall be ISO 9002 quality approved standard courses. The Telecommunication Contractor shall employ the services of a Registered Communication Distribution Designer, who has current RCDD membership with BICSI, for this project.
1.2.4 In the event that subcontractors are used for any portion of the work or technical support, the Telecommunications Contractor shall bear complete responsibility for the installation, and any corrective action required, for

work performed by subcontractors.

1.3 SYSTEM CERTIFICATION

1.3.1 All cabling, termination hardware, and patch cables shall be ISO 9001 certified and ensure end-to-end transmission requirements for 100 BaseT Category 5 operation, as well as 1000 Mbps Gigabit Ethernet, Twisted Pair Physical Media Dependent (TP-PMD), 155.5 Mbps ATM, 622 Mbps ATM, and video (both baseband and broadband) applications.

1.3.2 Acceptable systems shall be covered by a two-part certification program provided by the manufacturer and his certified vendor. The manufacturer shall administer a follow on program through the Telecommunications Contractor to provide support and service to the Parks Canada. The two parts of the certification program consist of:

1.3.2.1 An assurance program which provides that the certified system will support the applications for which it is designed, for the lifetime of the certified system.

1.3.2.2 A certification program which provides for a fifteen (15) year warranty on all products within the certified system.

1.3.2.3 In the event that the certified system ceases to support the certified application(s), whether at the time of cutover, during normal use, or when upgrading, both the manufacturer and the Telecommunications Contractor shall commit to prompt implementation of corrective action.

1.3.2.4 Documentation proving the cabling system's compliance to the End to End Link Performance recommendations, as listed in Annex E of ANSI/EIA/TIA 568B, shall be provided prior to the structured cabling system being installed.

1.4 SHOP DRAWINGS

1.4.1 Submit shop drawings in accordance with Section 26 01 20.

1.4.2 Include:

1.4.2.1 Manufacturer's technical documentation on all devices used in structured cabling system.

1.5 OPERATING AND MAINTENANCE MANUALS

1.5.1 Provide documentation for inclusion in operating and maintenance manuals specified in Section 26 01 20.

1.5.2 Include:

1.5.2.1 Manufacturer supplied end user's manual, describing the essential system elements and end user's responsibility for maintaining the integrity of the cabling system. This manual shall include as a minimum:

1.5.2.1.1 Guidelines for system expansion and modification.

1.5.2.1.2 Labelling.

1.5.2.1.3 Record keeping.

1.5.2.2 Manufacturer supplied application guidelines for required applications.

1.5.2.3 Test results.

1.5.2.4 System certification documentation.

1.6 RECORD DRAWINGS

1.6 .1 Submit record drawings, in accordance with Section 26 01 20, to Departmental Representative at completion of project.

1.6.2 Record on one set of white prints, all of the structured cable drops, all changes during construction, and other pertinent details. Indicate label name for each outlet, using numbering system employed on the project.

1.7 DESCRIPTION OF WORK

1.7.1 Contractor shall supply and install a complete telecommunications structured cabling system that is based on a physical star wiring topology and shall be designed in accordance with, and supported by, a manufacturer's backed warranty certification as specified above.

1.7.2 The structured cabling system shall conform to the standards listed in 1.1 above, and composed of the following interdependent sub-systems:

1.7.2.1 MC: Main Cross-connect system

1.7.2.2 IC: Intermediate Cross-connect system

1.7.2.3 WA: Work Area - telecommunications outlet/connector, associated cords and adapters

1.7.2.4 HC: Horizontal Cross-connect system - located in the telecommunications closets (TC)

1.7.2.5 A: Backbone cables between MC and HC

1.7.2.6 B: Backbone cables between IC and HC

1.7.2.7 C: Backbone cables between MC and IC

1.7.2.8 D: Horizontal cables between HC and WA

1.7.3 Physical spaces which house structured cabling components comprise the following:

1.7.3.1 TC: Telecommunication Closet - primary function for termination of HC system, but may contain IC or MC systems

1.7.3.2 ER: Equipment Room - functions as a TC with additional capability of housing network trunk/auxiliary terminations
1.7.3.3 EF: Entrance Facility - consists of cables, connecting hardware and protection devices to connect to outside service facilities

1.8 DISTANCE LIMITATIONS

1.8.1 Structured cabling shall conform to CSA T529 standards for distance limitation. Telecommunications Contractor shall examine the drawings and ensure that distance limitations are not exceeded, taking into account length of patch cables and service loops. Advise the Departmental Repesentative during time of tender of any runs that may exceed distance limitations.
1.8.2 Cabling system distances shall not exceed the following:

	Sub-system Listed Above			
	A	B	C	D
UTP Copper Voice	800m	500m	300m	90m
UTP Copper Data	90m*	90m*	90m*	90m
Multimode Fiber	2000m	500m	1500m	90m
Single Mode Fiber	3000m	500m	2500m	90m

(*) Asterisk indicates distance between active devices for applications whose spectral bandwidth exceeds 5 MHz.

1.8.3 Total length of patch cables and cross connect jumpers shall not exceed 10 m.
1.8.4 Patch cables or cross connect jumpers at the horizontal cross connect (HC) shall not exceed 6 m.
1.8.5 A 3 m allowance is assumed for patch cables which connect equipment at the work area (WA). This may be exceeded only where the total length of patch cables and cross connect jumpers does not exceed 10 m.

2. Products

2.1 VOICE AND DATA HORIZONTAL CABLING

2.1.1 UTP: to CSA T529 for Category 5 enhanced operation, with the following physical and transmission characteristics:

2.1.1.1 Physical characteristics:
2.1.1.1.1 Conductors: four pair, No. 24 AWG, thermoplastic insulated solid copper wire.

2.1.1.1.2 Twists: pairs variably twisted relative to one another, with a minimum of 29 twists per m per pair.
2.1.1.1.3 Cable size: maximum outside diameter of 6.4 mm.
2.1.1.1.4 Breaking strength: 40 kg at -20EC, without insulation or jacket cracking.
2.1.1.1.5 Colour coding of pairs: tracer coloured white paired with each of blue, orange, green, and brown.
2.1.1.1.6 Colour coding of jacket: use two colours for voice, data.
2.1.1.1.7 Fire rating: plenum rated overall jacket, FT-4 compliant.

2.1.2 Transmission characteristics:

2.1.2.1 DC resistance: less than 94 ohms/km, with an unbalance between conductors in a pair of 5% maximum.
2.1.2.2 Mutual capacitance of any one pair: maximum of 46 pF/m at 1 MHz.
2.1.2.3 Characteristic impedance: 100 ohms +/- 15%.
2.1.2.4 Maximum attenuation worst pair: equal to or less than 75 dB/1000 m at 16 MHz, 220 dB/1000 m at 100 MHz.
2.1.2.5 NEXT coupling loss between pairs: equal to or greater than 144 dB/1000 m at 16 MHz, 105 dB/1000 m at 100 MHz.

2.2 PATCH CABLES

2.2.1 All patch cables shall match installed cables physical and transmission characteristics, and as follows:

2.2.1.1 UTP type:

2.2.1.1.1 Utilize stranded, not solid, conductors.

2.2.1.1.2 Terminated with 110 and/or modular 8-pin modular connectors.

2.2.1.1.3 Built in exclusion features to prevent accidental polarity reversals and split pairs.

2.2.2 Patch cables shall be pre-manufactured and pre-tested, utilizing a snagless design. Generic patch cables are not acceptable.

2.2.3 Provide patch cables for cross connecting between patch panels and from patch panels to hubs. The quantity of patch cables for the cross connect between the panels shall be at least the same as the number of ports on horizontal patch panels. The quantity of patch cables for connection between hubs and the patch panel shall be at least the same as the number of slots available on the hubs.

2.2.4 Provide one patch cable for every second workstation outlet and each corresponding patch panel outlet.

2.2.5 Provide patch cables according to the following schedule:

2.2.5.1 Cross connect patch cables in closets: 2 m in length.

2.2.5.2 Patch cables at workstations:

2.2.5.2.1 50% shall be 2 m in length.
2.2.5.2.2 30% shall be 3 m in length.
2.2.5.2.3 10% shall be 4 m in length.
2.2.5.2.4 10% shall be 5 m in length.

2.3 TERMINAL CONNECTIONS - UTP

2.3.1 Communication outlet connectors, UTP:

2.3.1.1 Copper-based inserts: to CSA T529.

2.3.1.2 Termination via fixed or removable gas-tight insulation displacement connector (IDC), with hinged or separate buffer cap.

2.3.1.3 Connection of removable IDCs via 8-position edge connector plated with minimum 40 microns of nickel, capable of minimum 250 insertion/withdrawal cycles.

2.3.1.4 Connection of removable IDCs via 8-pin header connector, pins minimum

2.3.1.5 1.4 mm square, maximum 8.9 N engagement force and minimum 2.25 N disengagement force.

2.3.1.6 8-position connector, with copper-based staggered contacts with 50 to 100 microns of nickel overlay and uniformly coated with 50 microns of gold overlay, capable of minimum of 200 insertion and withdrawal cycles.

2.3.1.7 Minimum contact force 1.1 N per contact. Minimum plug retention force 76 N.

2.3.1.8 Conductors separated and aligned internally by comb structure.

2.3.1.9 Compatible with 100 ohm UTP cable, rated for same data transmission speed as cable used.

2.3.1.10 Maximum attenuation worst pair: equal to or less than 0.2 dB at 16 MHz, 0.4 dB at 100 MHz.

2.3.1.11 NEXT coupling loss between pairs: equal to or greater than 56 dB at 16 MHz, 40 dB at 100 MHz.

2.3.1.12 Connector and faceplate to be constructed of high-impact fire retardant thermoplastic, colour to match colour of receptacles specified in Section 16141, CAN/CSA T528 compliant. Outlet shall provide sufficient density to support up to 6 connectors per single gang outlet, and 9 connectors per two gang outlet.

2.3.2 Modular connectors, UTP:

2.3.2.1 Matching types and minimum specifications as for outlet connectors specified above.

2.3.2.2 Long body type.

2.3.2.3 Suitable for No. 24 AWG solid or stranded conductor as required.

2.3.2.4 Tool-stuffed with IDC contacts and plier latched cap.

2.4 PATCH PANELS

2.4.1 Floor mounted rack:

2.4.1.1 Free-standing 4-leg style, open body fabricated of 2.5 mm minimum painted steel.

2.4.1.2 Equipment mounting rails fabricated of 2.0 mm minimum steel, drilled and tapped both sides for No. 12 screws.

2.4.1.3 Grounding lug.
2.4.1.4 Designed to accommodate standard EIA standard 483 mm wide panels.
2.4.1.5 Receptacle bar with 3 m power cord, minimum 10 outlets, complete with surge suppression protection.

2.4.2 Patch panels - UTP:
2.4.2.1 483 mm wide panels, mounted in rack type specified above, for cross connection of horizontal and backbone cabling, with outlets having similar specifications to terminal connection hardware specified above.
2.4.2.2 Wiring blocks shall be constructed of fire retardant moulded plastic blocks consisting of horizontal index strips for termination of 25 pairs of conductors each, accommodating No. 24 AWG conductors without untwisting of pairs or more than 75 mm of unsheathing. A series of fanning blocks shall be located on each side of the block for dressing the cable pairs on the adjacent index strips.
2.4.2.3 Termination blocks shall accommodate over 500 repeated insertions without incurring permanent deformation, suitable for voice, data, and building service applications.
2.4.2.4 Patch panels to have the same number of ports as the total horizontal outlets, plus 10% additional for future.

2.5 MANUFACTURERS

2.5.1 All cables utilized on project shall be from the same manufacturer.

2.5.2 All termination hardware and patch panels utilized on project shall be from the same manufacturer.

2.5.3 Cables and termination hardware may be of different manufacture, provided manufacturer of termination hardware has a contractual agreement with cable manufacturer to provide and end-to-end certified solution.

2.5.4 Acceptable manufacturers:

2.5.4.1 UTP cable: Alcatel, AMP of Canada, Belden, Avaya (Lucent Technologies), NORDX/CDT.
2.5.4.2 Termination hardware: AMP of Canada, Hubbell, Krone, Avaya (Lucent Technologies), NORDX/CDT.

3. Execution

3.1 CABLE INSTALLATION

3.1.1 Install structured cabling in conduit, cable trays, wireways, and surface raceways as indicated on drawings, and as further specified.

3.1.2 Horizontal cabling may not be run open in free air. All cabling shall be completely installed in conduit, raceways or cable tray.

3.1.3 Do not exceed manufacturer's maximum pulling force recommendations.

3.1.4 Maintain not less than minimum bend radius for all cables.

3.1.5 Ensure cables are not squeezed, flattened, or crimped at any point along entire run.

3.1.6 Tie wrap cables neatly into logical bundles in cable-trays, at 600 mm intervals. Ensure tie wraps do not crimp or otherwise damage cables.

3.1.7 No splices or intermediate terminations in UTP cable runs are allowed. Cables shall terminate in cross connect patch panels or workstation outlets only.

3.1.8 Allow 1 m of slack cable on each run at workstation end, and 3 m of slack cable on each run at the patch panel end.

3.1.9 Install cables in slotted PVC raceway in communication rooms, and fan individual cables to applicable patch panels in neat, logical manner. Slotted PVC raceway to conform to FT-4 flame spread requirements, have adhesive backing, be multi-channel capable, and have a minimum 25 mm bend radius on corner fittings.

3.1.10 Provide all necessary wire management accessories for installing all cables inside the management panels. Install cable management panels, cable storage/trough/shelf between every two patch panels to facilitate the installation of patch cables.

3.1.11 After all cabling is installed, provide appropriate fire stopping in openings through fire rated walls. Fire stop material shall be of a type that permits installation of additional cabling in the future, with fire stop material being readily reinstalled. Fire stop material to conform to requirements indicated in Section 16010.

3.2 CONNECTORS

3.2.1 Use tooling specific to connector types and cable in use.

3.2.2 Ensure that connector's strain relief provisions are used. Strip jackets only amount required.

3.2.3 Maintain pair twists. The amount of untwisting to facilitate installation of connector or termination shall not exceed 10 mm.

3.2.4 Pairs within a cable shall not be split, and all pairs must be terminated.

3.2.5 UTP connection configuration shall be in accordance with T568A pinout for data terminations.

3.2.6 UTP connection configuration shall be in accordance with USOC pinout for voice terminations.

3.2.7 Insert blank snap-in cover in all unused outlets to prevent introduction of dust.

3.3 PATCH PANELS

3.3.1 Install rack in telecommunication room, and mount securely to floor

3.3.2 Install patch panels into racks, with as many screws as there are mounting holes or slots in panels.

3.3.3 Attach horizontal wiring in an ordered fashion following sequential numbering of outlets.

3.3.4 Provide necessary strain relief and cable support brackets, and install cables utilizing such devices.

3.4 GROUNDING

3.4.1 Perform all grounding in accordance with CSA T527, C.E.C., Section 26, and the requirements of the manufacturer.

3.4.2 Provide minimum insulated No. 6 AWG grounding wire in each TC, ER, and EF. Maximum resistance to ground shall be 5 ohms.

3.4.3 Ground all racks. Use grounding bushing, solderless lug, clamp, or cup washer and screw.

3.4.4 Install ground conductors such that neither they nor structured cabling interferes with one another in regards to future servicing of patch panel rear end connections.

3.4.5 Protect grounding conductors from injury.

3.5 IDENTIFICATION

3.5.1 Label each end of each cable and each cable termination in accordance with CAN/CSA T528 standards and Section 26 01 10 using prenumbered self-adhesive labels and colour-coded inserts. Coordinate numbering and colour coding systems with Parks Canada.

3.6 FIELD QUALITY CONTROL

3.6.1 Perform testing in accordance with Section 26 01 35

3.6.2 Final testing shall be carried out after substantial completion of project, testing all runs, including patch cables with the modular interface components (plug and jack connectors) in a mated state.

3.6.3 Copper media:

3.6.3.1 Test for the following, in accordance with EIA/TIA TSB 67:
- 3.6.3.1.1 Continuity.
- 3.6.3.1.2 Pair placement and polarity.
- 3.6.3.1.3 DC resistance.

3.6.3.1.4 Structural return loss.
3.6.3.1.5 Characteristics at 100 MHz 155 MHz:
- attenuation
- mutual capacitance
- NEXT
- Powersum NEXT.

3.6.3.1.6 Run length.

3.6.3.2 Prior to recording results, compare readings to predicted values based on cable specification and run length, using connector and patch cable losses as part of predicted value. Retest runs with:
3.6.3.2.1 Resistance and capacitance readings more than 10% above or below predicted values.
3.6.3.2.2 NEXT values 5 dB lower than predicted values.
3.6.3.2.3 Attenuation values 2 dB higher than predicted values.

3.6.3.3 Reconnect or reinstall and retest as necessary to correct excessive variations.
3.6.3.4 Test equipment shall be a Level II bi-directional Category 5 tester, from one of the following:
3.6.3.4.1 Fluke.
3.6.3.4.2 MicroTest Penta.
3.6.3.4.3 Wavetek.

3.6.4 Verify labelling of all conductors at all termination points. Verify labelling of all termination hardware.

3.6.5 Submit one copy of test report to Departmental Representative, and three copies to Parks Canada. Report shall consist of one cable run test per page, be printed on standard 215 mm x 280 paper, and also provided electronically in form requested by Parks Canada.

3.6.6 Provide written documentation confirming that transmission performance testing and inspection have been completed and that all cable runs have passed. Document that all failures have been corrected, and retested successfully.

END OF SECTION

1. General

1.1 REFERENCES

1.1.1 CSA T527-94 (ANSI/EIA/TIA 607), Grounding and Bonding for Telecommunications in Commercial Buildings
1.1.2 CAN/CSA T528-93(R1997) (ANSI/EIA/TIA 606), Design Guidelines for Administration of Telecommunications Infrastructure in Commercial Buildings
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1.2 CONTRACTOR QUALIFICATIONS

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1.2.2 The Telecommunications Contractor shall have a contractual relationship with the manufacturer of the equipment installed on the project. Both the manufacturer and Telecommunications Contractor are responsible for the final warranty and certification of the application assurance.
1.2.3 All work shall be performed and supervised by technicians who are fully trained and qualified by the manufacturer to install and test their products. Training shall be ISO 9002 quality approved standard courses. The Telecommunication Contractor shall employ the services of a Registered Communication Distribution Designer, who has current RCDD membership with BICSI, for this project.
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1.3.2.4 Documentation proving the cabling system's compliance to the End to End Link Performance recommendations, as listed in Annex E of ANSI/EIA/TIA 568B, shall be provided prior to the structured cabling system being installed.

1.4 SHOP DRAWINGS

1.4.1 Submit shop drawings in accordance with Section 26 01 20.

1.4.2 Include:

1.4.2.1 Manufacturer's technical documentation on all devices used in structured cabling system.

1.5 OPERATING AND MAINTENANCE MANUALS

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1.5.2.1.1 Guidelines for system expansion and modification.

1.5.2.1.2 Labelling.

1.5.2.1.3 Record keeping.

1.5.2.2 Manufacturer supplied application guidelines for required applications.

1.5.2.3 Test results.

1.5.2.4 System certification documentation.

1.6 RECORD DRAWINGS

1.6 .1 Submit record drawings, in accordance with Section 26 01 20, to Departmental Representative at completion of project.

1.6.2 Record connection and termination details, cable runs, and changes.

Record connection and termination details, cable runs, and for each outlet, using numbering system employed on the project.

1.7 DESCRIPTION OF WORK

1.7.1 Contractor shall supply and install a complete telecommunications structured cabling system that is based on a physical star wiring topology and shall be designed in accordance with, and supported by, a manufacturer's backed warranty certification as specified above.

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1.7.2.5 A: Backbone cables between MC and HC

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1.7.2.7 C: Backbone cables between MC and IC

1.7.2.8 D: Horizontal cables between HC and WA

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1.7.3.1 TC: Telecommunication Closet - primary function for termination of HC system, but may contain IC or MC systems

1.7.3.2 ER: Equipment Room - functions as a TC with additional capability of housing network trunk/auxiliary terminations
1.7.3.3 EF: Entrance Facility - consists of cables, connecting hardware and protection devices to connect to outside service facilities

1.8 DISTANCE LIMITATIONS

1.8.1 Structured cabling shall conform to CSA T529 standards for distance limitation. Telecommunications Contractor shall examine the drawings and ensure that distance limitations are not exceeded, taking into account length of patch cables and service loops. Advise the Departmental Representative during time of tender of any runs that may exceed distance limitations.
1.8.2 Cabling system distances shall not exceed the following:

	Sub-system Listed Above			
	A	B	C	D
UTP Copper Voice	800m	500m	300m	90m
UTP Copper Data	90m*	90m*	90m*	90m
Multimode Fiber	2000m	500m	1500m	90m
Single Mode Fiber	3000m	500m	2500m	90m

(*) Asterisk indicates distance between active devices for applications whose spectral bandwidth exceeds 5 MHz.

1.8.3 Total length of patch cables and cross connect jumpers shall not exceed 10 m.
1.8.4 Patch cables or cross connect jumpers at the horizontal cross connect (HC) shall not exceed 6 m.
1.8.5 A 3 m allowance is assumed for patch cables which connect equipment at the work area (WA). This may be exceeded only where the total length of patch cables and cross connect jumpers does not exceed 10 m.

2. Products

2.1 VOICE AND DATA HORIZONTAL CABLING

2.1.1 UTP: to CSA T529 for Category 5 enhanced operation, with the following physical and transmission characteristics:

2.1.1.1 Physical characteristics:
2.1.1.1.1 Conductors: four pair, No. 24 AWG, thermoplastic insulated solid copper wire.

2.1.1.1.2 Twists: pairs variably twisted relative to one another, with a minimum of 29 twists per m per pair.
2.1.1.1.3 Cable size: maximum outside diameter of 6.4 mm.
2.1.1.1.4 Breaking strength: 40 kg at -20EC, without insulation or jacket cracking.
2.1.1.1.5 Colour coding of pairs: tracer coloured white paired with each of blue, orange, green, and brown.
2.1.1.1.6 Colour coding of jacket: use two colours for voice, data.
2.1.1.1.7 Fire rating: plenum rated overall jacket, FT-4 compliant.

2.1.2 Transmission characteristics:

2.1.2.1 DC resistance: less than 94 ohms/km, with an unbalance between conductors in a pair of 5% maximum.
2.1.2.2 Mutual capacitance of any one pair: maximum of 46 pF/m at 1 MHz.
2.1.2.3 Characteristic impedance: 100 ohms +/- 15%.
2.1.2.4 Maximum attenuation worst pair: equal to or less than 75 dB/1000 m at 16 MHz, 220 dB/1000 m at 100 MHz.
2.1.2.5 NEXT coupling loss between pairs: equal to or greater than 144 dB/1000 m at 16 MHz, 105 dB/1000 m at 100 MHz.

2.2 PATCH CABLES

2.2.1 All patch cables shall match installed cables physical and transmission characteristics, and as follows:

2.2.1.1 UTP type:

2.2.1.1.1 Utilize stranded, not solid, conductors.

2.2.1.1.2 Terminated with 110 and/or modular 8-pin modular connectors.

2.2.1.1.3 Built in exclusion features to prevent accidental polarity reversals and split pairs.

2.2.2 Patch cables shall be pre-manufactured and pre-tested, utilizing a snagless design. Generic patch cables are not acceptable.
2.2.3 Provide patch cables for cross connecting between patch panels and from patch panels to hubs. The quantity of patch cables for the cross connect between the panels shall be at least the same as the number of ports on horizontal patch panels. The quantity of patch cables for connection between hubs and the patch panel shall be at least the same as the number of slots available on the hubs.
2.2.4 Provide one patch cable for every second workstation outlet and each corresponding patch panel outlet.
2.2.5 Provide patch cables according to the following schedule:
2.2.5.1 Cross connect patch cables in closets: 2 m in length.
2.2.5.2 Patch cables at workstations:
2.2.5.2.1 50% shall be 2 m in length.
2.2.5.2.2 30% shall be 3 m in length.
2.2.5.2.3 10% shall be 4 m in length.
2.2.5.2.4 10% shall be 5 m in length.

2.3 TERMINAL CONNECTIONS - UTP

2.3.1 Communication outlet connectors, UTP:

2.3.1.1 Copper-based inserts: to CSA T529.

2.3.1.2 Termination via fixed or removable gas-tight insulation displacement connector (IDC), with hinged or separate buffer cap.

2.3.1.3 Connection of removable IDCs via 8-position edge connector plated with minimum 40 microns of nickel, capable of minimum 250 insertion/withdrawal cycles.

2.3.1.4 Connection of removable IDCs via 8-pin header connector, pins minimum

2.3.1.5 1.4 mm square, maximum 8.9 N engagement force and minimum 2.25 N disengagement force.

2.3.1.6 8-position connector, with copper-based staggered contacts with 50 to 100 microns of nickel overlay and uniformly coated with 50 microns of gold overlay, capable of minimum of 200 insertion and withdrawal cycles.

2.3.1.7 Minimum contact force 1.1 N per contact. Minimum plug retention force 76 N.

2.3.1.8 Conductors separated and aligned internally by comb structure.

2.3.1.9 Compatible with 100 ohm UTP cable, rated for same data transmission speed as cable used.

2.3.1.10 Maximum attenuation worst pair: equal to or less than 0.2 dB at 16 MHz, 0.4 dB at 100 MHz.

2.3.1.11 NEXT coupling loss between pairs: equal to or greater than 56 dB at 16 MHz, 40 dB at 100 MHz.

2.3.1.12 Connector and faceplate to be constructed of high-impact fire retardant thermoplastic, colour to match colour of receptacles specified in Section 16141, CAN/CSA T528 compliant. Outlet shall provide sufficient density to support up to 6 connectors per single gang outlet, and 9 connectors per two gang outlet.

2.3.2 Modular connectors, UTP:

2.3.2.1 Matching types and minimum specifications as for outlet connectors specified above.

2.3.2.2 Long body type.

2.3.2.3 Suitable for No. 24 AWG solid or stranded conductor as required.

2.3.2.4 Tool-stuffed with IDC contacts and plier latched cap.

2.4 PATCH PANELS

2.4.1 Floor mounted rack:

2.4.1.1 Free-standing 4-leg style, open body fabricated of 2.5 mm minimum painted steel.

2.4.1.2 Equipment mounting rails fabricated of 2.0 mm minimum steel, drilled and tapped both sides for No. 12 screws.

2.4.1.3 Grounding lug.
2.4.1.4 Designed to accommodate standard EIA standard 483 mm wide panels.
2.4.1.5 Receptacle bar with 3 m power cord, minimum 10 outlets, complete with surge suppression protection.

2.4.2 Patch panels - UTP:
2.4.2.1 483 mm wide panels, mounted in rack type specified above, for cross connection of horizontal and backbone cabling, with outlets having similar specifications to terminal connection hardware specified above.
2.4.2.2 Wiring blocks shall be constructed of fire retardant moulded plastic blocks consisting of horizontal index strips for termination of 25 pairs of conductors each, accommodating No. 24 AWG conductors without untwisting of pairs or more than 75 mm of unsheathing. A series of fanning blocks shall be located on each side of the block for dressing the cable pairs on the adjacent index strips.
2.4.2.3 Termination blocks shall accommodate over 500 repeated insertions without incurring permanent deformation, suitable for voice, data, and building service applications.
2.4.2.4 Patch panels to have the same number of ports as the total horizontal outlets, plus 10% additional for future.

2.5 MANUFACTURERS

2.5.1 All cables utilized on project shall be from the same manufacturer.

2.5.2 All termination hardware and patch panels utilized on project shall be from the same manufacturer.

2.5.3 Cables and termination hardware may be of different manufacture, provided manufacturer of termination hardware has a contractual agreement with cable manufacturer to provide and end-to-end certified solution.

2.5.4 Acceptable manufacturers:

2.5.4.1 UTP cable: Alcatel, AMP of Canada, Belden, Avaya (Lucent Technologies), NORDX/CDT.
2.5.4.2 Termination hardware: AMP of Canada, Hubbell, Krone, Avaya (Lucent Technologies), NORDX/CDT.

3. Execution

3.1 CABLE INSTALLATION

3.1.1 Install structured cabling in conduit, cable trays, wireways, and surface raceways as indicated on drawings, and as further specified.

3.1.2 Horizontal cabling may not be run open in free air. All cabling shall be completely installed in conduit, raceways or cable tray.

3.1.3 Do not exceed manufacturer's maximum pulling force recommendations.

3.1.4 Maintain not less than minimum bend radius for all cables.

3.1.5 Ensure cables are not squeezed, flattened, or crimped at any point along entire run.

3.1.6 Tie wrap cables neatly into logical bundles in cable-trays, at 600 mm intervals. Ensure tie wraps do not crimp or otherwise damage cables.

3.1.7 No splices or intermediate terminations in UTP cable runs are allowed. Cables shall terminate in cross connect patch panels or workstation outlets only.

3.1.8 Allow 1 m of slack cable on each run at workstation end, and 3 m of slack cable on each run at the patch panel end.

3.1.9 Install cables in slotted PVC raceway in communication rooms, and fan individual cables to applicable patch panels in neat, logical manner. Slotted PVC raceway to conform to FT-4 flame spread requirements, have adhesive backing, be multi-channel capable, and have a minimum 25 mm bend radius on corner fittings.

3.1.10 Provide all necessary wire management accessories for installing all cables inside the management panels. Install cable management panels, cable storage/trough/shelf between every two patch panels to facilitate the installation of patch cables.

3.1.11 After all cabling is installed, provide appropriate fire stopping in openings through fire rated walls. Fire stop material shall be of a type that permits installation of additional cabling in the future, with fire stop material being readily reinstalled. Fire stop material to conform to requirements indicated in Section 16010.

3.2 CONNECTORS

3.2.1 Use tooling specific to connector types and cable in use.

3.2.2 Ensure that connector's strain relief provisions are used. Strip jackets only amount required.

3.2.3 Maintain pair twists. The amount of untwisting to facilitate installation of connector or termination shall not exceed 10 mm.

3.2.4 Pairs within a cable shall not be split, and all pairs must be terminated.

3.2.5 UTP connection configuration shall be in accordance with T568A pinout for data terminations.

3.2.6 UTP connection configuration shall be in accordance with USOC pinout for voice terminations.

3.2.7 Insert blank snap-in cover in all unused outlets to prevent introduction of dust.

3.3 PATCH PANELS

3.3.1 Install rack in telecommunication room, and mount securely to floor

3.3.2 Install patch panels into racks, with as many screws as there are mounting holes or slots in panels.

3.3.3 Attach horizontal wiring in an ordered fashion following sequential numbering of outlets.

3.3.4 Provide necessary strain relief and cable support brackets, and install cables utilizing such devices.

3.4 GROUNDING

3.4.1 Perform all grounding in accordance with CSA T527, C.E.C., Section 26, and the requirements of the manufacturer.

3.4.2 Provide minimum insulated No. 6 AWG grounding wire in each TC, ER, and EF. Maximum resistance to ground shall be 5 ohms.

3.4.3 Ground all racks. Use grounding bushing, solderless lug, clamp, or cup washer and screw.

3.4.4 Install ground conductors such that neither they nor structured cabling interferes with one another in regards to future servicing of patch panel rear end connections.

3.4.5 Protect grounding conductors from injury.

3.5 IDENTIFICATION

3.5.1 Label each end of each cable and each cable termination in accordance with CAN/CSA T528 standards and Section 26 01 10 using prenumbered self-adhesive labels and colour-coded inserts. Coordinate numbering and colour coding systems with Parks Canada.

3.6 FIELD QUALITY CONTROL

3.6.1 Perform testing in accordance with Section 26 01 35

3.6.2 Final testing shall be carried out after substantial completion of project, testing all runs, including patch cables with the modular interface components (plug and jack connectors) in a mated state.

3.6.3 Copper media:

3.6.3.1 Test for the following, in accordance with EIA/TIA TSB 67:
- 3.6.3.1.1 Continuity.
- 3.6.3.1.2 Pair placement and polarity.
- 3.6.3.1.3 DC resistance.

3.6.3.1.4 Structural return loss.
3.6.3.1.5 Characteristics at 100 MHz 155 MHz:
- attenuation
- mutual capacitance
- NEXT
- Powersum NEXT.

3.6.3.1.6 Run length.

3.6.3.2 Prior to recording results, compare readings to predicted values based on cable specification and run length, using connector and patch cable losses as part of predicted value. Retest runs with:
3.6.3.2.1 Resistance and capacitance readings more than 10% above or below predicted values.
3.6.3.2.2 NEXT values 5 dB lower than predicted values.
3.6.3.2.3 Attenuation values 2 dB higher than predicted values.

3.6.3.3 Reconnect or reinstall and retest as necessary to correct excessive variations.
3.6.3.4 Test equipment shall be a Level II bi-directional Category 5 tester, from one of the following:
3.6.3.4.1 Fluke.
3.6.3.4.2 MicroTest Penta.
3.6.3.4.3 Wavetek.

3.6.4 Verify labelling of all conductors at all termination points. Verify labelling of all termination hardware.

3.6.5 Submit one copy of test report to Departmental Representative, and three copies to Parks Canada. Report consist of one cable run test per page, be printed on standard 215 mm x 280 paper, and also provided electronically in form requested by Parks Canada.

3.6.6 Provide written documentation confirming that transmission performance testing and inspection have been completed and that all cable runs have passed. Document that all failures have been corrected, and retested successfully.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

.1 Refer to the Geotechnical report prepared by Adaptive Baseline Geotechnical Ltd. dated November 24, 2021, File no: RES-G2102 for Site and existing grade specifications.

1.02 REFERENCE STANDARDS

.1 National Building Code (2015)

.2 Good Building Practice for Northern Facilities -4th Ed.

1.03 ADMINISTRATIVE REQUIREMENTS

.1 Co-ordination: arrange with authority having jurisdiction for relocation of buried services that interfere with execution of work.

2 PRODUCTS

2.01 MATERIALS

.1 Recommended Gradation for Type 1, Type 2 and Select Subgrade Materials: The gravel base course should be compacted to a uniform dry Density of 100 percent of SPMDD within ± 2% of the OMC. A recommended typical gradation for stable granular material, for backfill.

Property	ASTM Test Method	Type 2 (Sub-Base)	Type 1 (Base)	Select Subgrade
Gradation (sieve/% passing)	-	-	-	-
150 mm	C136	-	-	100
75.0 mm	C136	100	-	-
37.5 mm	C136	-	-	-
25.0 mm	C136	50-100	100	50-100
19.0 mm	C136	-	75-100	-
9.5 mm	C136	-	50-85	-
4.75 mm	C136	20- 55	35-65	20-100
2.0 mm	C136	-	25-50	-
0.425 mm	C136	5-35	15-30	-
0.300 mm	C136	-	-	5-95
0.150 mm	C136	-	-	2-65
0.075 mm	C117	0-8	5-8	0-25

.2 Crushed Stone for Parking area top layer CCDG 14.02.

3 EXECUTION

3.01 PREPARATION

.1 Protection of in-place conditions:
- .1 Protect excavations from freezing.
- .2 Keep excavations clean, free of standing water, and loose soil.
- .3 Protect buried services that are required to remain undisturbed.

.2 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.

3.02 EXCAVATION

.1 Shore and brace excavations, protect slopes and banks and perform work in accordance with Provincial regulations.

3.03 BACKFILLING

.1 Remove snow, ice, construction debris, organic soil and standing water from spaces to be filled.

.2 Lateral support: maintain even levels of backfill around structures as work progresses, to equalize earth pressures.

.3 Compaction of subgrade: compact existing subgrade under walks, paving, and slabs on grade, to same compaction as fill.
- .1 Fill excavated areas with selected subgrade material compacted as specified for fill.

.4 Placing:
- .1 Place backfill, fill and base course material in 150 mm lifts: add water as required to achieve specified density.

.5 Compaction: compact each layer of material to following densities for material as indicated.

.6 Contractor shall place inspection record after backfilling done, by sending photo for before and after and shall schedule inspection by contact geotechnical personnel be onsite throughout engineered fill pad, parking, driveway area preparation to ensure the native subgrade preparation and material placement/ compaction meets project requirements.

3.04 GRADING

.1 Refer to Geotechnical report prepared by Adaptive Baseline Geotechnical Ltd. dated November 24, 2021, File no: RES-G2102 for grading and drainage requirements.

.2 Grade as per indicated on the Grading plan so that water will drain away from buildings, walls and paved areas to disposal area at existing ditch as per indicated.
- .1 Grade to be gradual between finished spot elevations shown on drawings.
- .2 Contractor shall make sure that a dry density of 100% as required in specification document by placing Geotechnical report for the new condition for the grade.
- .3 Contractor shall order “Density testing” to confirm each lift receives an adequate level of compaction prior to subsequent lifts.
- .4 Test results to be reviewed by the Geotechnical engineer and Guy Architect.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

.1 Refer to the Geotechnical report prepared by Adaptive Baseline Geotechnical Ltd. dated November 24, 2021, File no: RES-G2102 for rock socket pile requirements, installation method, monitoring and other required information.

2 PRODUCTS

2.01 MATERIALS

.1 A252 GR.3 Steel Pile

.2 Min 141mm ø dia. piles with min 6.4mm thickness

3 EXECUTION

3.02 INSTALLATION

.1 The embedment depth of the pile into bedrock to be min 1.5m.

.2 Refer to Geotechnical report for all installation instructions and requirements for construction monitoring of the procedure.

.3 Installation of each pile will be subject to approval of a qualified Geotechnical engineered in behalf of The Parks Canada. (refer to Geotechnical report for recommendation)

.4 Construction to be carried out by suitably qualified contractors experienced in earthworks and foundation construction in the north.

END OF SECTION