Specifications

Pukaskwa National Park
Administration Building
Repairs and Upgrades – Phase 2

Project No. 508
(151-06165-06)

March 29, 2017

WSP

ARCHITECTURE | 49

Approved: 2013-06-30

END OF SECTION

Part 1 General

1.1 NOT USED

.1 Not Used

Consultant for Building Code Review: Architecture49 Inc.
Building Code Identification Number (BCIN): n/a

Part 2 Products

2.1 NOT USED

.1 Not Used

Part 3 Execution

3.1 NOT USED

.1 Not Used

Michael Luciw BES, B.Arch, OAA, MRAIC
Principal Architect

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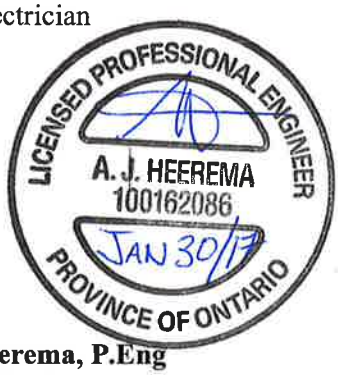

Aaron Heerema, P.Eng
Structural Engineer

END OF SECTION

Part 1 General

1.1 WORK COVERED BY CONTRACT DOCUMENTS

.1 Work of this Contract generally comprises of upgrades and repairs to the exterior of the building including, but not necessarily limited to, the following:

- .1 new wood fibreboard siding and trim;
- .2 insulation upgrades, including new wood expanded polystyrene insulation sheathing;
- .3 new windows and doors;
- .4 membrane roof flashing tie-ins to suit new exterior wall assemblies;
- .5 upgrades to main entrance vestibule finishes;
- .6 mechanical upgrades to the heating and cooling systems and controls;
- .7 building exterior and parking lot lighting upgrades; and
- .8 landscaping upgrades at the main entrance area and walkway.

1.2 CONTRACT METHOD

.1 Construct Work under stipulated price contract.

1.3 WORK BY OTHERS

.1 Co-operate with other Contractors in carrying out their respective works and carry out instructions from PCA Representative or Delegate and/or Consultant.

.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 PCA Representative or Delegate and Consultant in writing, any defects which may interfere with proper execution of Work.

1.4 CONTRACTOR USE OF PREMISES

.1 Limit use of premises for storage, for Work, and for access, to allow:

- .1 Parks Canada Agency (PCA) occupancy.
- .2 Work by other contractors.
- .3 Public usage.

.2 Co-ordinate use of premises under direction of PCA Representative or Delegate.

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

.4 Remove or alter existing work to prevent injury or damage to portions of existing work which remain.

.5 Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as directed by [Consultant].

.6 At completion of operations condition of existing work: equal to or better than that which existed before new work started.

1.5 PARKS CANADA AGENCY (PCA) OCCUPANCY

.1 Parks Canada Agency (PCA) will occupy premises during entire construction period for execution of normal operations.

.2 Co-operate with Parks Canada Agency (PCA) in scheduling operations to minimize conflict and to facilitate Parks Canada Agency (PCA) usage.

.3 Execute Work to cause minimum interference with activities in existing premises and to maintain maximum safety and security to occupants at all times and in accordance with PCA Representative's instructions and/or requirements. All window and door replacements must be executed in a manner that minimizes disruptions to workplace activities, and also provides maximum protection from small mammals and insects from getting into the building. A work plan must be presented to the PCA Representative and Consultant for review and approval prior to commencing any demolition/renovation work.

.4 It is essential that the Contractor co-ordinate and proactively consult with the PCA Representative and the Consultant throughout the duration of the Contract in order to maintain established operational and security protocols as required by authorities having jurisdiction as well as the ongoing functional operation of the existing building.

.5 Provide temporary protection for safe handling of staff and public as well as vehicular traffic including, but not necessarily limited to, hoarding and barricades, covered hoarding at entrances, temporary security fencing, covered hoarding, and the like. The Contractor shall always be mindful of the need to maintain ongoing operations, safety and security for the duration of the Contract.

.6 Co-operate and consult with the PCA Representative, on a continuous basis, in scheduling operations to minimize conflicts, maintain security and to facilitate Parks Canada usage. Co-ordinate Construction Schedule with PCA Representative to suit ongoing and unrestricted occupancy of the existing building during construction.

.7 It is essential that necessary arrangements be made to maintain uninterrupted all services which are necessary for the effective functioning of the existing building program, operations and security levels. This includes delivery of new materials, removal, cutting, reconnecting, reinstalling, rerouting, and reinstatement of material and of services completed. Note that noise and disturbance must be kept to a minimum in areas of the existing building scheduled to remain occupied.

.8 Execute all work as quietly as possible in and around existing building during all times that it is occupied. Schedule dusty and noisy operations to achieve the least disturbance.

.9 Maintain fire access / control throughout all areas of the building including areas to remain occupied during construction / renovations as well as areas subject to new construction / renovations. Provide safety barricades as required.

1.6 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING

.1 Execute work with least possible interference or disturbance to occupants, building operations, public and normal use of premises. Arrange with PCA Representative or Delegate to facilitate execution of work.

1.7 EXISTING SERVICES

.1 Notify PCA Representative or Delegate and utility companies of intended interruption of services and obtain required permission.

.2 Where Work involves breaking into or connecting to existing services, give PCA Representative or Delegate 48 hours notice for necessary interruption of mechanical or electrical service throughout course of work. Minimize duration of interruptions. Carry out work at times as directed by governing authorities with minimum disturbance to pedestrian, vehicular traffic and tenant operations.

.3 Provide alternative routes for personnel, pedestrian and vehicular traffic.

.4 Establish location and extent of service lines in area of work before starting Work. Notify PCA Representative or Delegate of findings.

.5 Submit schedule to and obtain approval from PCA Representative or Delegate for any shut-down or closure of active service or facility including power and communications services. Adhere to approved schedule and provide notice to affected parties.

.6 Provide temporary services when directed by PCA Representative or Delegate to maintain critical building and tenant systems.

.7 Provide adequate bridging over trenches which cross sidewalks or roads to permit normal traffic.

.8 Where unknown services are encountered, immediately advise PCA Representative or Delegate and Consultant and confirm findings in writing.

.9 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction.

.10 Record locations of maintained, re-routed and abandoned service lines.

.11 Construct barriers in accordance with Section 01 56 00- Temporary Barriers and Enclosures.

1.8 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.
- .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.

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 ACCESS AND EGRESS

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

1.2 USE OF SITE AND FACILITIES

.1 Execute work with least possible interference or disturbance to normal use of premises. Make arrangements with PCA Representative or Delegate to facilitate work as stated.

.2 Maintain existing services to building and provide for personnel and vehicle access.

.3 Where security is reduced by work provide temporary means to maintain security.

.4 PCA Representative or Delegate will assign sanitary facilities for use by Contractor's personnel. Keep facilities clean.

.5 Closures: protect work temporarily until permanent enclosures are completed.

1.3 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING

.1 Execute work with least possible interference or disturbance to public, occupants, building operations and normal use of premises. Arrange with PCA Representative or Delegate to facilitate execution of work.

1.4 EXISTING SERVICES

.1 Notify, PCA Representative or Delegate and utility companies of intended interruption of services and obtain required permission.

.2 Where Work involves breaking into or connecting to existing services, give PCA Representative or Delegate 48 hours of notice for necessary interruption of mechanical or electrical service throughout course of work. Keep duration of interruptions minimum. Carry out interruptions after normal working hours of occupants, preferably on weekends.

.3 Provide for pedestrian, personnel, and vehicular traffic.

.4 Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

1.5 SPECIAL REQUIREMENTS

.1 Paint occupied areas Monday to Friday from 18:00to 07:00 hours only and on Saturdays, Sundays, and statutory holidays.

.2 Carry out noise generating Work Monday to Friday from 18:00to 07:00hours and on Saturdays, Sundays, and statutory holidays.

.3 Submit schedule in accordance with Section 01 32 16.07 - Construction Progress Schedule - Bar (GANTT) Chart].

.4 Ensure Contractor's personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.

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

1.6 SECURITY

.1 Where security has been reduced by Work of Contract, provide temporary means to maintain security.

.2 Security clearances:

.1 Personnel employed on this project will be subject to security check. Obtain clearance, as instructed, for each individual who will require to enter premises.

.2 Obtain requisite clearance, as instructed, for each individual required to enter premises.

.3 Personnel will be checked daily at start of work shift and provided with pass which must be worn at all times. Pass must be returned at end of work shift and personnel checked out.

.4 Contractor's personnel will require satisfactory RCMP initiated security screening in order to complete Work in premises and on site.

1.7 BUILDING SMOKING ENVIRONMENT

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

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 CASH ALLOWANCES

.1 Include in Contract Price specified cash allowances.

.2 Cash allowances, unless otherwise specified, cover net cost to Contractor of services, products, construction machinery and equipment, freight, handling, unloading, storage, installation and other authorized expenses incurred in performing Work.

.3 Contract Price, and not cash allowance, includes Contractor's overhead and profit in connection with such cash allowance.

.4 Contract Price will be adjusted by written order to provide for excess or deficit to each cash allowance.

.5 Where costs under a cash allowance exceed amount of allowance, Contractor will be compensated for excess incurred and substantiated plus allowance for overhead and profit as set out in Contract Documents.

.6 Include progress payments on accounts of work authorized under cash allowances in Consultant's monthly certificate for payment.

.7 Prepare schedule jointly with PCA Representative or Delegate, Consultant and Contractor to show when items called for under cash allowances must be authorized by PCA Representative or Delegate for ordering purposes so that progress of Work will not be delayed.

.8 Amount of each allowance, for Work specified in respective specification Sections is as follows:

.1 Provide a Cash Allowance in the sum of Six Thousand and xx/100 Dollars ($6,000.00) to cover the cost of Third Party Inspection and Testing as specified in Section 01 45 00 - Quality Control.

.2 Provide a Cash Allowance in the sum of Fourteen Thousand and xx/100 Dollars ($14,000.00) to cover the cost of **supply only** of all finish hardware in accordance with the requirements of specification Section 08 71 00 - Finish Hardware.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 07 21 13 – Board Insulation

.2 Section 08 51 00 – Fibreglass Windows

1.2 REQUIREMENTS

.1 Referenced specification Sections stipulate pertinent requirements for products and methods to achieve Work stipulated under each Alternative.

.2 Co-ordinate affected related Work and modify surrounding Work to integrate Work under each Alternative.

1.3 AWARD / SELECTION OF ALTERNATIVES

.1 Indicate variation of Bid Price for Alternatives described below and listed in Bid Form Note that this form requests a 'difference' in Bid. Price by adding to or deducting from Bid Price.

.2 Bids will be evaluated on Base Bid price. After determination of lowest Bidder, consideration will be given to Alternatives and Bid Price adjustments.

1.4 ALTERNATIVES

.1 Alternative No. 1:

.1 Base Bid: rigid insulation sheathing (i.e. extruded polystyrene) as specified in Section 07 21 13 – Board Insulation.

.2 Alternative: wood fibreboard sheathing insulation as specified in Section 07 21 13 – Board Insulation.

.2 Alternative No. 2:

.1 Base Bid: low E, argon filled double seal glass units (typical), as specified in Section 08 51 00 – Fiberglass Windows.

.2 Alternative: “Ornilux Bird Protection Glass” as manufactured by Arnold Glas and as specified in Section 08 51 00 – Fiberglass Windows.

.3 Alternative No. 3:

.1 Base Bid: low E, argon filled double seal glass units (typical), as specified in Section 08 51 00 – Fiberglass Windows.

.2 Alternative: “Bird Friendly Glass”” as manufactured by Goldray Glass and as specified in Section 08 51 00 – Fiberglass Windows.

.4 Alternative No. 4:

.1 Base Bid: new landscaping and site finishes scheduled at main entrance and scheduled / detailed on Drawings 0001 & 0002.

.2 Alternative: existing site finishes to remain and/or reinstate as required to suit project scope.

1.5 NOT USED

.1 Not Used.

Part 2 Execution

2.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 Park Canada Agency (PCA) / Contractor Agreement.

1.2 APPLICATIONS FOR PROGRESS PAYMENT

.1 Make applications for payment on account monthly as Work progresses.

.2 Date applications for payment last day of agreed monthly payment period and ensure amount claimed is for value, proportionate to amount of Contract, of Work performed and Products delivered to Place of Work at that date.

.3 Submit to Consultant, at least 14 days before first application for payment. Schedule of values for parts of Work, aggregating total amount of Contract Price, to facilitate evaluation of applications for payment. Once the Consultant has reviewed and approved the quality of the scope of work in subject, all applications for payment by the Contractor shall be submitted to the Parks Canada PCA Representative or Delegate for processing.

1.3 SCHEDULE OF VALUES

.1 Provide schedule of values supported by evidence as Consultant may reasonably direct and when accepted by Consultant, be used as basis for applications for payment.

.2 Include statement based on schedule of values with each application for payment.

.3 Support claims for products delivered to Place of Work but not yet incorporated into Work by such evidence as Consultant may reasonably require to establish value and delivery of products.

1.4 PREPARING SCHEDULE OF UNIT PRICE TABLE ITEMS

.1 Submit separate schedule of unit price items of Work requested in Bid form.

.2 Make form of submittal parallel to Schedule of Values, with each line item identified same as line item in Schedule of Values. Include in unit prices only:

- .1 Cost of material.
- .2 Delivery and unloading at site.
- .3 Sales taxes.
- .4 Installation, overhead and profit.

.3 Ensure unit prices multiplied by quantities given equal material cost of that item in Schedule of Values.

1.5 PROGRESS PAYMENT

.1 Consultant will issue to Parks Canada Agency (PCA), no later than 10 days after receipt of an application for payment, certificate for payment in amount applied for or in such other amount as Consultant determines to be due. If Consultant amends application, Consultant will give notification in writing giving reasons for amendment.

1.6 SUBSTANTIAL PERFORMANCE OF WORK

.1 Prepare and submit to Consultant comprehensive list of items to be completed or corrected and apply for a review by Consultant to establish Substantial Performance of Work or substantial performance of designated portion of Work when Work is substantially performed if permitted by lien legislation applicable to Place of Work designated portion which Parks Canada Agency (PCA) agrees to accept separately is substantially performed. Failure to include items on list does not alter responsibility to complete Contract.

.2 No later than 10 days after receipt of list and application, Consultant will review Work to verify validity of application, and no later than 7days after completing review, will notify Contractor if Work or designated portion of Work is substantially performed.

.3 Consultant: state date of Substantial Performance of Work or designated portion of Work in certificate.

.4 Immediately following issuance of certificate of Substantial Performance of Work, in consultation with Consultant, establish reasonable date for finishing Work.

1.7 PAYMENT OF HOLDBACK UPON SUBSTANTIAL PERFORMANCE OF WORK

.1 After issuance of certificate of Substantial Performance of Work:

.1 Submit application for payment of holdback amount.

.2 Submit sworn statement that accounts for labour, subcontracts, products, construction machinery and equipment, and other indebtedness which may have been incurred in Substantial Performance of Work and for which Parks Canada Agency (PCA) might in be held responsible have been paid in full, except for amounts properly retained as holdback or as identified amount in dispute.

.2 After receipt of application for payment and sworn statement, Consultant will issue certificate for payment of holdback amount.

.3 Where holdback amount has not been placed in a separate holdback account, Parks Canada Agency (PCA) shall, 10 days prior to expiry of holdback period stipulated in lien legislation applicable to Place of Work, place holdback amount in bank account in joint names of Parks Canada Agency (PCA) and Contractor.

.4 Amount authorized by certificate for payment of holdback amount is due and payable on day following expiration of holdback period stipulated in lien legislation applicable to Place of Work. Where lien legislation does not exist or apply, holdback amount is due and payable in accordance with other legislation, industry practice, or provisions which may be agreed to between parties. Parks Canada Agency (PCA) may retain out of holdback amount sums required by law to satisfy liens against Work or, if permitted by lien legislation applicable to Place of Work, other third party monetary claims against Contractor which are enforceable against Parks Canada Agency (PCA).

1.8 PROGRESSIVE RELEASE OF HOLDBACK

.1 Where legislation permits, if Consultant has certified that Work of subcontractor or supplier has been performed prior to Substantial Performance of Work, Parks Canada Agency (PCA) shall pay holdback amount retained for such subcontract Work, or

products supplied by such supplier, on day following expiration of holdback period for such Work stipulated in lien legislation applicable to Place of Work.

.2 In addition to provisions of preceding paragraph, and certificate wording, ensure that such subcontract Work or products is protected pending issuance of final certificate for payment and be responsible for correction of defects or Work not performed regardless of whether or not such was apparent when such certificates were issued.

1.9 FINAL PAYMENT

.1 Submit application for final payment when Work is completed.

.2 Consultant will, no later than 10 days after receipt of application for final payment, review Work to verify validity of application. Consultant will give notification that application is valid or give reasons why it is not valid, no later than 7 days after reviewing Work.

.3 Consultant will issue final certificate for payment when application for final payment is found valid.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Particular requirements for inspection and testing to be carried out by testing laboratory designated by Consultant are provided in individual specification Sections.

1.2 APPOINTMENT AND PAYMENT

.1 PCA Representative or Delegate will appoint and pay for services of testing laboratory except follows:

- .1 Inspection and testing required by laws, ordinances, rules, regulations or orders of public authorities.
- .2 Inspection and testing performed exclusively for Contractor's convenience.
- .3 Testing, adjustment and balancing of conveying systems, mechanical and electrical equipment and systems.
- .4 Mill tests and certificates of compliance.
- .5 Tests specified to be carried out by Contractor under supervision of PCA Representative or Delegate and/or Consultant.

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

1.3 CONTRACTOR'S RESPONSIBILITIES

.1 Provide labour, equipment and facilities to:

- .1 Provide access to Work for inspection and testing.
- .2 Facilitate inspections and tests.
- .3 Make good Work disturbed by inspection and test.
- .4 Provide storage on site for laboratory's exclusive use to store equipment and cure test samples.

.2 Notify 48 PCA Representative or Delegate and Consultant hours minimum sufficiently in advance of operations to allow for assignment of laboratory personnel and scheduling of test.

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

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

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE

.1 Schedule and administer project meetings throughout the progress of the work at the call of PCA Representative or Delegate.

.2 Prepare agenda for meetings.

.3 Distribute written notice of each meeting four days in advance of meeting date to PCA Representative or Delegate and Consultant.

.4 Provide physical space and make arrangements for meetings.

.5 Preside at meetings.

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

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

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

1.2 PRECONSTRUCTION MEETING

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

.2 Consultant, PCA Representative or Delegate, Senior representatives of Contractor, major Subcontractors, field inspectors and supervisors will be in attendance.

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

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

.5 Agenda to include:

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

.2 Schedule of Work: in accordance with Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart.

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

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

.5 Site security in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

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

.7 Parks Canada Agency (PCA) provided products.

.8 Record drawings in accordance with Section 01 33 00 - Submittal Procedures.

.9 Maintenance manuals in accordance with Section 01 7800 - Closeout Submittals.

.10 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00 - Closeout Submittals.

.11 Monthly progress claims, administrative procedures, photographs, hold backs.

.12 Appointment of inspection and testing agencies or firms.

.13 Insurances, transcript of policies.

1.3 PROGRESS MEETINGS

.1 During course of Work and monthly.

.2 Contractor, major Subcontractors involved in Work, PCA Representative or Delegate, Parks Canada Agency (PCA) and Consultant are to be in attendance.

.3 Notify parties minimum 5 days prior to meetings.

.4 Record minutes of meetings and circulate to attending parties and affected parties not in attendance within 5 days after meeting.

.5 Agenda to include the following:

.1 Review, approval of minutes of previous meeting.

.2 Review of Work progress since previous meeting.

.3 Field observations, problems, conflicts.

.4 Problems which impede construction schedule.

.5 Review of off-site fabrication delivery schedules.

.6 Corrective measures and procedures to regain projected schedule.

.7 Revision to construction schedule.

.8 Progress schedule, during succeeding work period.

.9 Review submittal schedules: expedite as required.

.10 Maintenance of quality standards.

.11 Review proposed changes for affect on construction schedule and on completion date.

.12 Other business.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 Section 01 33 00 - Submittal Procedures

1.2 PRECEDENCE

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

1.3 DEFINITIONS

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

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

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

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

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

.6 Milestone: significant event in project, usually completion of major deliverable or phasing of construction due to unrelated scope of work on two different areas.

.7 Hours of Operation: 0800h – 1600h Monday to Friday.

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

1.4 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 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.

1.5 SUBMITTALS

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

.2 Submit to Departmental Representative within 5 working days of Award of Contract Bar (GANTT) Chart as Master Plan for planning, monitoring and reporting of project progress.

1.6 PROJECT SCHEDULE

.1 Develop detailed Project Schedule derived from Master Plan.

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

.1 Award.
.2 Shop Drawings, Samples.
.3 Permits.
.4 Mobilization.
.5 Sitework
.6 Slab on grade.
.7 Interior Architecture (Walls, Floors and Ceiling).
.8 Plumbing.
.9 Lighting.
.10 Electrical.
.11 Millwork.
.12 Fire Systems.
.13 Testing and Commissioning.
.14 Supplied equipment long delivery items.

1.7 PROJECT SCHEDULE REPORTING

.1 Update Project Schedule on weekly basis reflecting activity changes and completions, as well as activities in progress to Departmental Representative.

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

1.8 PROJECT MEETINGS

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

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

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 77 00 – Closeout Procedures

.2 Section 01 78 00 – Closeout Submittals

1.2 ADMINISTRATIVE

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

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

.3 Present shop drawings, product data, samples and mock-ups in SI Metric units.

.4 Where items or information is not produced in SI Metric units converted values are acceptable.

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

.6 Notify PCA Representative or Delegate and Consultant, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.

.7 Verify field measurements and affected adjacent Work are co-ordinated.

.8 Contractor's responsibility for errors and omissions in submission is not relieved by PCA Representative or Delegate's or Consultant's review of submittals.

.9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by PCA Representative or Delegate and Consultant review.

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

1.3 SHOP DRAWINGS AND PRODUCT DATA

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

.2 Submit drawings stamped and signed by professional engineer registered or licensed in Province.

.3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment,

indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.

.4 Allow 10 days for PCA Representative or Delegate's and Consultant's review of each submission.

.5 Adjustments made on shop drawings by PCA Representative or Delegate or Consultant are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Consultant and PCA Representative or Delegate prior to proceeding with Work.

.6 Make changes in shop drawings as PCA Representative or Delegate and Consultant may require, consistent with Contract Documents. When resubmitting, notify Consultant and PCA Representative or Delegate in writing of revisions other than those requested.

.7 Accompany submissions with transmittal letter, 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.

.8 Submissions include:

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

.9 After PCA Representative or Delegate's and Consultant's review, distribute copies.

.10 Submit electronic copies of product data sheets or brochures for requirements requested in specification Sections and as requested by PCA Representative or Delegate and Consultant where shop drawings will not be prepared due to standardized manufacture of product.

.11 Submit electronic copies of test reports for requirements requested in specification Sections and as requested by PCA Representative or Delegate and Consultant.

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

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

.12 Submit electronic copies of certificates for requirements requested in specification Sections and as requested by Consultant and PCA Representative or Delegate.

.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.

.13 Submit electronic copies of manufacturer’s instructions for requirements requested in specification Sections and as requested by Consultant and PCA Representative or Delegate.

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

.14 Submit electronic copies of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Consultant PCA Representative or Delegate.

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

.16 Submit electronic copies of Operation and Maintenance Data for requirements requested in specification Sections and as requested by PCA Representative or Delegate and Consultant.

.17 Delete information not applicable to project.

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

.19 If upon review by Consultant and PCA Representative or Delegate, no errors or omissions are discovered or if only minor corrections are made, electronic 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.

1.4 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 office].

.3 Notify Consultant and PCA Representative or Delegate 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 Consultant are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Consultant and PCA Representative or Delegate prior to proceeding with Work.

.6 Make changes in samples which PCA Representative or Delegate and Consultant 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.

1.5 MOCK-UPS

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

1.6 PHOTOGRAPHIC DOCUMENTATION

.1 Submit electronic digital photography in jpg format, standard resolution monthly with progress statement or as directed by PCA Representative or Delegate and Consultant.

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

.3 Number of viewpoints: 4 locations.

.1 Viewpoints and their location as determined by Consultant and PCA Representative or Delegate.

.4 Frequency of photographic documentation: monthly.

1.7 CERTIFICATES AND TRANSCRIPTS

.1 Immediately after award of Contract, submit Workplace Safety and Insurance Board status.

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

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 14 00 – Work Restrictions

.2 Section 01 33 00 – Submittal Procedures

.3 Section 01 35 43 – Environmental Procedures

.4 Section 02 81 01 – Hazardous Materials

.5 Section 01 74 21 – Construction / Demolition Waste Management and Disposal

.6 Section 02 82 00.01 – Asbestos Abatement - Minimum Precautions

1.2 PRECEDENCE

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

1.3 REFERENCES

.1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations

.2 Health Canada / Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.3 Province of Ontario

.1 Occupational Health and Safety Act, R.S.O. – Latest Edition.

1.4 SUBMITTALS

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

.2 Submit to PCA Representative or Delegate copies of the following documents, including updates issues:

.1 Health and Safety Program as indicated in paragraph 1.12, prior to commencement of work on the work site.

.2 Reports or directions issued by authorities having jurisdiction, immediately upon issuance from that authority.

.3 Accident or Incident Reports, within 24 hours of occurrence.

.4 Copy of all notifications to employees and subcontractors regarding presence of known designated substances prior to start of work.

.3 Submit other data, information and documentation upon request by the PCA Representative or Delegate as stipulated elsewhere in this section.

.4 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 02 81 01 - Hazardous Materials.

1.5 COMPLIANCE REQUIREMENTS

.1 Comply with the latest edition of the Ontario Health and Safety Act, R.S.O and the Regulations made pursuant to the Act.

.2 Observe and enforce construction safety measures required by:

.1 National Building Code of Canada (latest edition).

.2 Provincial Workplace Safety and Insurance Board.

.3 Municipal statutes and ordinances.

.3 In the event of conflict between any provisions of above authorities the most stringent provision shall apply.

.4 Provide to the PCA Representative or Delegate a copy of the Workplace Safety and Insurance Board coverage for all employees for the duration of the contract as per 1.9 Workers Compensation of the General Conditions.

.1 Should the Contractor be a sole proprietor, provide documented proof in a form acceptable to the PCA Representative or Delegate, of an alternative means of personal coverage that meets or exceeds the requirements set out above for Workplace Safety and Insurance Board coverage.

1.6 RESPONSIBILITY

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

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

.3 Should an unforeseen or peculiar safety related hazard or condition become evident during performance of work, immediately take measures to rectify the situation and prevent damage or harm. Advise the PCA Representative or Delegate verbally and in writing of the hazard or conditions.

1.7 SITE CONTROL AND ACCESS

.1 Control all work site access points and work site activities. Delineate and isolate the work site from adjacent and surrounding areas by use of appropriate means to maintain control of all work site access points.

.2 Make provisions for granting permission to access onto work site to all persons who require access. Procedures for granting permission to access are to be in accordance with the Ontario Occupational Health and Safety Act, and the Regulations made pursuant to the Act and the Contractor’s Health and Safety Program.

.3 Ensure persons granted access to the work site are in possession of and wear the minimum personal protective equipment (PPE) designated by the Contractor's Health and Safety Program. Ensure persons granted access to the work site are provided with, trained in the use of, and wear, appropriate PPE that are required above and beyond the designated minimum previously noted and as specifically related to the work site activity that they are involved in. Be responsible for the efficacy of the PPE that is provided above and beyond the designated minimums.

.4 Erect signage at access points and at other strategic locations around the work site clearly identifying the work site area(s) as being "OFF-LIMITS" to non-authorized persons. Signage must be professionally made with well understood graphic symbols and is not to be used as advertizing but for the specific use as related to site safety and key contract information.

.1 Information to be provided on the signage is as follows:

.1 Project Name/Description:

.2 Contractors Company Name:

.3 Project Superintendent's Name/Phone No.:

.4 Departmental Point of Contact Name/Phone No.:

.5 Secure the work site at all times to protect against un-authorized access.

1.8 FILING OF NOTICE

.1 Where required, file Notice of Project and any other required Notices with the Provincial / Territorial Authorities prior to commencement of the work. Provide the PCA Representative or Delegate with a copy of the filed Notice(s) prior to commencement of the work.

1.9 PERMITS

.1 Obtain permits, licenses and compliance certificates at appropriate times and frequencies as required by the authorities having jurisdiction.

.2 Post all permits, licenses and compliance certificates on work site and provide copies to the PCA Representative or Delegate.

1.10 PROJECT / SITE CONDITIONS

.1 The following are the known hazardous substances and/or hazardous conditions at the work site which shall be considered as health or environmental hazards and shall be properly managed should they be encountered as part of the work:

.1 General Construction Hazards.

.2 Refer to Section 01 35 43 Environmental Protection for a list of known hazardous materials.

.3 Contractors are required to be aware of the known hazardous substances and/or hazardous conditions and are to include in their tender price all work associated in working with, in and around the hazards.

.2 The above lists shall not be construed as being complete and inclusive of all safety and health hazards encountered as a result of Contractor's operations during the course of work. Include above items into the hazard assessment program specified herein.

.3 Post on site the "Designated Substance Notice" in location approved by PCA Representative or Delegate.

1.11 MEETINGS

.1 Prior to commencement of work attend a pre-commencement meeting conducted by PCA Representative or Delegate. Ensure minimum attendance by Contractor's site superintendent. PCA Representative or Delegate will advise of time, date and location of the meeting and will be responsible for recording and distributing the minutes.

.2 Conduct site specific occupational health and safety meetings as required by the Ontario Health and Safety Act, and the Regulations made pursuant to the Act.

.3 Record and post minutes of all meetings in plain view on the work site. Make copies available to PCA Representative or Delegate upon request.

1.12 HEALTH AND SAFETY PROGRAM

.1 Contractors are required under Ontario Occupational Health and Safety Act, and the Regulations made pursuant to the Act to have in place a Health and Safety Program. Compliance requirements for the content, detail and implementation of the program resides with the Provincial/Territorial Authority. For the purpose of this Contract the Health and Safety Program shall include a site-specific Health and Safety Plan that acknowledges, assesses and addresses the hazardous substances and/or hazardous conditions known and identified in paragraph 1.10 above, and on-going hazard assessments performed during the progress of work identifying and documenting new or potential health risks and safety hazards not previously known and identified.

.2 Provide one copy of the Health and Safety Program to the PCA Representative or Delegate prior to commencement work on the work site. The coy provided to the PCA Representative or Delegate is for the purpose of review against the contract requirements related to the known hazardous substances and/or hazardous conditions. The review is not to be construed to imply approval by the PCA Representative or Delegate that the program is complete, accurate and legislatively compliant wit Ontario Occupational Health and Safety Act, and the Regulations made pursuant to the Act, and shall not relieve the contractor of their legal obligation under such legislations.

.3 Provide a clearly marked and fully stocked First-Aid Case in a readily available location approved by PCA Representative or Delegate.

1.13 ACCIDENT REPORTING

.1 Investigate and report incidents and accidents as required by Ontario Occupational Health and Safety Act, and the Regulations made pursuant to the Act.

.2 For the purpose of this contract immediately investigate and provide a report to the PCA Representative or Delegate on accidents, incidents and near misses that involve:

.1 A resulting injury that may or may not require medical aid and may or may not involve lost time at work by the injured person(s).

.2 Exposure to toxic chemicals or substances.

.3 Property damage, or potential property damage.

.4 Interruption to adjacent and/or integral infrastructure operations with any potential loss implications.

.3 In the investigation and reporting of incidents and accidents, the Contractor shall report to the PCA Representative or Delegate within one (1) hour.

.4 The Contractor shall provide a complete written report to the PCA Representative or Delegate within 48 hours of the accident and/or incident occurring. The report shall include at minimum:

.1 Date and Time the accident/incident occurred.

.2 Project name and site.

.3 Contractor Company Name and Address.

.4 Name, Occupation and address of injured person(s).

.5 Description of injury or property damage.

.6 Estimate of potential cost impact (lost time (hours), property damage ($)).

.7 Supervisor of injured person.

.8 Witnesses to event, including contact information.

.9 Brief description of event.

.10 Cause of Accident / Incident.

.5 The Contractor shall respond in a timely fashion to correct the action that was deemed to have caused the incident and/or accident and advise in writing on the action taken to prevent a re-occurrence of the incident and/or accident.

1.14 RECORDS ON SITE

.1 Maintain on site a copy of the safety documentation as specified in this section and any other safety related reports and documents issued to or received from the authorities having jurisdiction.

.2 Upon request, make copies available to the PCA Representative or Delegate.

1.15 UNFORESEEN HAZARDS

.1 Should any unforeseen or peculiar safety-related factor, hazard, or condition become evident during performance of Work, and follow procedures in place for Employee's right to Refuse Work in accordance with Acts and Regulations of Province having jurisdiction. Advise PCA Representative or Delegate verbally and in writing.

1.16 POSTING OF DOCUMENTS

.1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Province having jurisdiction, and in consultation with PCA Representative or Delegate.

1.17 CORRECTION OF NON-COMPLIANCE

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

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

.3 PCA Representative or Delegate may stop work if non-compliance of health and safety regulations is not corrected.

1.18 BLASTING

.1 Blasting or other use of explosives is not permitted without prior receipt of written instruction by PCA Representative or Delegate.

1.19 POWDER ACTUATED DEVICES

.1 Use powder actuated devices only after receipt of written permission from PCA Representative or Delegate.

1.20 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.

Part 2 Products

2.1 NOT USED

Part 3 Execution

3.1 NOT USED

END OF SECTION

Part 1 GENERAL

1.1 REFERENCES

.1 Revised Statutes of Canada 1985, Chapter F-14. "*Fisheries Act*" and pursuant regulations

.2 Statutes of Canada 1999 Chapter 33. "*Canadian Environmental Protection Act 1999*" and pursuant regulations.

.3 "*Transportation of Dangerous Goods Act*" and pursuant regulations.

.4 Statutes of Canada 2002, Chapter 29 "*Species at Risk Act"* and pursuant regulations

.5 Revised Statutes of Ontario 1990, Chapter 0.40. "*Ontario Water Resources Act*".

.6 Revised Statues of Ontario 1990, Chapter E.19. "*Environmental Protection Act*".

.1 Revised Regulations of Ontario 1990, Regulation 347 "*General—Waste Management"*.

.7 Statutes of Ontario 2000, Chapter 16. "*Technical Standards and Safety Act, 2000*" and pursuant regulations, codes, and standards.

.8 Ontario Provincial Standard Specification (OPSS) 577 Construction Specification for Temporary Erosion and Sediment Control Measures

.9 Ontario Provincial Standard Specification 518 "Construction Specification for Control of Water from Dewatering Operations".

.10 Ontario Provincial Standard Drawing 220.01 "Barrier for Tree Protection"

.11 Ontario Provincial Standard Specification 182 "General Specification for Environmental Protection for Construction in Waterbodies and on Waterbody Banks".

.12 Municipal Sewer Use By-laws.

.13 Municipal Noise By-laws

.14 4th Can Div Administrative Instructions (AIs)

.1 6.102 Spill Prevention and Response
.2 6.103 Environmental Assessment
.3 6.104 Species at Risk
.4 6.106 Halocarbon Management
.5 6.107 Storage Tank Management
.6 6.108 Solid Waste Diversion
.7 6.111 PCB Management

.15 Garrison Toronto Technical Annex B12 – Environmental Management Program-Hazardous Material Management

1.2 GENERAL

.1 This Section is intended to be a standardized (All encompassing) document. Therefore not all items listed herein will be applicable to every project. Any deliverables or actions

that may be in question should be discussed with the PCA Representative or Delegate prior to assuming they do not apply.

1.3 PRECEDENCE

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

.2 Meet or exceed all federal, provincial, and municipal regulatory requirements, guidelines, and by-laws for environmental protection and natural resource conservation. The more stringent shall apply. Including but not limited to References noted in Sec 1.1.

1.4 INSPECTIONS

.1 The construction work site shall be subject to inspection by the DND Environmental Officer, designate, or PCA Representative or Delegate without prior notice.

1.5 RELATED SECTIONS

.1 Section 01 35 29.06 – Health and Safety Requirements

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

.3 Section 02 81 01 – Hazardous Materials

.4 Section 02 82 00.01 – Asbestos Abatement – Minimum Precautions

1.6 NON-COMPLIANCE PENALTIES

.1 Failure to comply with environmental requirements may result in a PCA Representative or Delegate stop work order and/or an assessment of damages commensurate with repair of damages.

.2 All costs to meet environmental requirements are solely the Contractor's responsibility and are to be carried in the Contractor's bid.

.3 Contractors are responsible to be familiar with this Section and knowledgeable of environmental requirements and related best management and pollution control measures.

1.7 SUBMITTALS

.1 Contractor will be required to submit the following plans for approval when identified in the contract documents:

.1 **Spill Control Plan** outlining measures taken to minimize the impact of accidental discharge such as fuel and procedures for containment and clean-up. Identify equipment and supplies that will be on hand and training of personnel to respond effectively to an accidental spill or discharge. Plan should be developed in accordance with AI 6.102 Spill Prevention and Response.

.2 **Contingency Water Management Plan** should the existing drains become full or obstructed during construction.

.3 **Chemical Usage Plan** to manage chemical use, storage disposal during construction activities to ensure environmental compliance.

.4 **Waste Audits and Waste Reduction Work Plan** In accordance with Ontario Regulation 102/04 "Waste Audits and Waste Reduction Work Plan" before construction work begins at the site, prepare a "waste audit" covering the waste that will be generated in the construction project and a plan to reduce, reuse and recycled waste generated.

.5 **Hazardous Materials Management Plan** as defined in section 1.7

.6 **Sediment and Erosion Control Plan** as needed as per section 1.11.

1.8 HAZARDOUS MATERIALS MANAGEMENT

.1 Submit a hazardous materials management plan to the PCA Representative or Delegate before construction work begins at the site.

.1 Plan is to be written in accordance with Garrison Toronto Technical Annex B12 – Environmental Management Program- Hazardous Material Management is to encompass both hazardous materials used in the course of the work, and hazardous materials waste.

.2 Plan is to comply with best practices and with the requirements of the specifications.

.3 Plan is to include handling, storage, transportation, and emergency response.

.4 Plan is to provide evidence that all proposed transport methods and temporary storage procedures are licensed where applicable.

.1 Include copies of licenses.

.5 Prior to starting work, provide to the PCA Representative or Delegate an inventory of hazardous material to be brought to the site, including volume or mass, and a current Material Safety Data Sheets (MSDS).

.2 All petroleum, oil, lubricants, and other hazardous materials are to be stored within secondary containment and in an appropriate container that is in compliance with applicable legislation.

.3 Incompatible materials are to be stored separately to prevent reaction.

.4 A Limited Pre-Renovation Designated Substance Survey Report prepared by True Grit Consulting Ltd., dated June 8, 2016, (29 pages) was carried out for the Parks Canada Agency (PCA) for guidance in the design and construction of this project. The report is included for information purposes only and can be found in Appendix A.

1. All information shall be reviewed by the Contractor. It shall be understood that such examination shall be for reference only and comments and recommendations contained therein shall not be taken as superseding the requirements of the Contract Documents. Original copies of the reports are on file at the City of Greater Sudbury and may be reviewed upon request;

2. No responsibility is assumed by the PCA Representative or Delegate nor the Consultant for the scope or accuracy of these Report. The Contractor shall review the reports and the existing site and extract his own conclusions and interpretations. The Contractor shall satisfy himself with regards to all matters relating to toxic and hazardous substances and materials affecting the Work.

3. Provide and pay for the services of a qualified subcontractor to direct all work involving material containing asbestos and other hazardous materials including provision of inspection and testing services, as required, to verify clean up completed in accordance with requirements of authorities having jurisdiction. Submit reports to PCA Representative or Delegate and Consultant for review. Take adequate precautions to avoid disturbing friable materials containing asbestos except when being dealt with under the direct supervision and using procedures prescribed by this subcontractor.

4. Lead paint throughout the building. Removal or disturbance of the lead painted surfaces must be conducted in accordance with Ontario Guideline for Lead on Construction Projects.

1.9 FIRES

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

1.10 DISPOSAL OF WASTES

.1 Plan for the proper re-use, recycling or disposal of all waste materials.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal paper, corrugated cardboard packaging material. Divert unused gypsum from landfill to gypsum recycling facility.

.4 Divert unused gypsum from landfill to gypsum recycling facility.

.5 Divert unused metal materials from landfill to metal recycling facility.

.6 Divert unused wood materials from landfill to recycling facility.

.7 Divert unused paint and caulking material from landfill to official hazardous material collections site.

.8 Do not dispose of unused paint, mineral spirits, oil, paint thinner, debris, building materials and caulking materials into storm sewer, sanitary sewer, lakes, streams, onto ground or in other locations where it will pose health or environmental hazard.

.9 Do not burn or bury rubbish and waste materials on site.

.10 Do not dump rubbish and waste materials down storm drains.

1.11 DISPOSAL OF HAZARDOUS MATERIALS WASTE

.1 General

.1 The Contractor is responsible for removal of all Hazardous Materials Waste generated in the course of the Work.

.2 "Hazardous Materials Waste" includes "subject waste" as defined in Ontario Regulation 347 "*General-Waste Management*" made under the "*Ontario Environmental Protection Act*".

.1 Also includes waste oil, which includes:

.1 automotive lubricating oil;

.2 cutting oil;

.3 fuel oil;

.4 gear oil;

.5 hydraulic oil; or,

.6 any other refined petroleum based oil or synthetic oil;

where the oils through use, storage, or handling have become unsuitable for their original purpose due to the presence of impurities or loss of original properties.

.2 Also includes waste pest control substances.

.3 Also includes asbestos waste.

.3 Place materials defined as hazardous or toxic waste, including sealant and adhesive tubes and containers, in containers or areas designated for hazardous waste.

.4 Before work begins on site, submit the following to the PCA Representative or Delegate:

.1 Carriers' Ministry of the Environment licenses to transport Hazardous Materials Waste.

.2 Names, locations, and licenses of Hazardous Materials Waste facilities to be used.

.5 All Hazardous Materials Waste shipments must be accompanied by an approved (signed) and properly completed provincial waste manifest.

.6 Notify PCA Representative or Delegate 10 days prior for removal of all Hazardous Material from DND property.

.7 In Ontario, only Ontario Ministry of the Environment permitted carriers/haulers and receivers (disposal) shall be used for off-site management of wastes unless demonstrated to the PCA Representative or Delegate that it is exempt from the Ontario Environmental Protection Act. The proposed carrier and receiver permits must also allow for the acceptance and handling/management to be generated waste type.

.8 Before sending Hazardous Materials Waste for disposal, the Contractor shall notify the PCA Representative or Delegate for inspection and recording.

.1 The *Transportation of Dangerous Goods Act* and pursuant regulations must be strictly followed when transporting the waste.

.2 If the Contractor is not certified by the Ontario Ministry of the Environment to transport Hazardous Materials Waste, then the services of a certified courier must be procured to do so.

.3 All Hazardous Materials Waste products shall be placed in suitable containers and labeled clearly in accordance with the Transportation of Dangerous Goods Regulation. Any product improperly contained or labeled may not be accepted.

.1 Hazardous Materials Waste products are to be segregated by commodity and placed in separate containers based on class. Do not mix non-compatible hazardous wastes.

.2 Provide copies of all manifests to the PCA Representative or Delegate, and Supply upon inspection of materials.

.1 For asbestos, provide to the PCA Representative or Delegate the receipt from the licensed landfill.

1.12 DRAINAGE

.1 Do not pump water containing suspended materials into waterways, sewer or drainage systems.

.2 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

.3 Any stock piles of soil or fill material shall be stored at least 30 metres from the water bodies and shall be protected by either a heavy duty or light duty sediment barriers or kept covered/tarped.

.4 Ensure all catch basins in vicinity of the work area are covered with geotextile to prevent entry of sediment via surface water into drainage ditches.

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

.1 Comply with Ontario Provincial Standard Specification 517 “Construction Specification for dewatering of Pipeline, Utility and Associated Structure Excavation”.

.1 Disregard references to payment.

.6 Prevent the release of water containing suspended materials into any waterways, storm drains, sanitary sewers or drainage systems.

.1 Comply with Ontario Provincial Standard Specification 518 “Construction Specification for Control of Water from Dewatering Operations”.

.1 Disregard references to payment.

.7 Control disposal and or runoff of water containing suspended materials or other harmful substances in accordance with regulatory requirements.

.8 Comply with the requirements of Ontario Provincial Standard Specification 805 “Construction Specification for Temporary Erosion and Sediment Control Measures” with the exception that berm barriers are not permitted.

.1 Disregard references to payment.

.2 Remove suspended materials from water before release of water into any waterways, storm drains or drainage systems. Acceptable approaches include:

.1 Measures in accordance with Ontario Provincial Standard Specification 517 “Construction Specification for Dewatering of Pipeline, Utility and Associated Structure Excavation” and Ontario Provincial standard Specification 518 “Construction Specification for Control of Water from Dewatering Operations” in both cases disregarding references to payment.

.2 Sediment or silt filter bags.

.9 Additional sediment barrier materials shall be readily available in case they are needed promptly for erosion and sediment control.

.10 Sediment barriers shall not be removed until the terrestrial vegetation has become re-established.

.11 Sediment captured by the barriers must be removed before the barriers are dismantled

.12 Barriers and protection shall be removed and the area restored to original condition at the conclusion of the contract work.

1.13 PROTECTION OF GROUNDWATER MONITORING WELLS

.1 Protect any and all existing groundwater monitoring wells at the site. Make good any damage.

.1 The PCA Representative or Delegate will, upon request, show the Contractor the location of all known monitoring wells.

1.14 PROTECTION OF STORM, SANITARY AND BUILDING DRAINS

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

.1 Establish prior to beginning any work on-site, and maintain until completion of all work.

.2 Acceptable materials include:

.1 Catch Basin Sediment Trap and Geosynthetics.

.2 Storm water management products approved by PCA Representative or Delegate.

.3 Basin Bags

.4 Absorbent socks

.5 Hydrophobic materials

.3 Remove all drain protection materials and devices upon completion of the contract work.

1.15 SITE CLEARING AND PLANT PROTECTION

.1 Protect trees and plants on site and adjacent properties as indicated.

.2 Wrap in burlap, trees and shrubs adjacent to construction work, storage areas and trucking lanes, and encase with protective wood framework from grade level to height of 2m minimum.

.3 Protect trees and plants designated to remain on site and adjacent properties, as per "standard or minimum protective treatment" in Ontario Provincial Standard Drawing 220.01 "Barrier for Tree Protection"

.4 Leave enclosed areas undisturbed; do not use areas for storage, stockpiling or any other purpose. Do not dump or flush any contaminants in areas of tree feeder roots.

.5 Do not attach rigging cables to trees.

.6 Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage. Avoid unnecessary traffic, dumping and storage of materials over root zones.

.7 Minimize stripping of topsoil and vegetation.

.8 Root pruning may be required when working in close proximity to a tree's drip line. The Contractor is responsible for ensuring the PCA Representative or Delegate is aware prior to excavation where the limit of the cut will be in respect to the tree. If it is determined to require root pruning, a certified arboriculture firm in the presence of the PCA Representative or Delegate shall carry it out. Once the limit of the cut has been defined, the Contractor shall not under any circumstances cut the tree roots a second time without the prior approval of the PCA Representative or Delegate

.9 Restrict tree removal to areas indicated or designated by PCA Representative or Delegate.

1.16 WORK ADJACENT TO WATERWAYS

.1 Do not operate construction equipment in waterways.

.2 Do not use waterway beds for borrow material.

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

.4 Design and construct temporary crossings to minimize erosion to waterways.

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

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

.7 Blasting is not permitted.

1.17 POLLUTION CONTROL

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

.2 Control emissions from equipment and plant to local authorities' emission requirements and by complying with operating specifications.

.3 Prevent sandblasting and other extraneous materials from contaminating air and waterways beyond application area.

.1 Provide temporary enclosures where directed by PCA Representative or Delegate.

.4 Minimize the release of dust from gravel, paved areas, and exposed soils using covering measures and wetting techniques. Use chemical dust suppressants only when necessary on problem areas, and only as approved by the PCA Representative or Delegate. Cover or contain loose salvaged materials that have the potential to release airborne particles during their transport.

.5 Secure covers or tarp over waste bins and dumpsters at the end of each work day.

.6 Minimize vehicle traffic on exposed soils and stabilize high traffic areas with clean gravel surface layer or other suitable cover material

.7 Idling time for construction equipment will be minimized, in an effort to decrease the amount of emissions entering the atmosphere. Avoid operating and idling vehicles and gas-powered equipment during smog advisories.

.8 Use of lawn care pesticides are prohibited.

.9 Avoid release of pollutions into drainage systems.

1.18 LIQUID SPILL RESPONSE

.1 "Liquid spills" include fuels, oils, lubricants, anti-freeze, battery acid, refrigerants, chemical products, sewage, and sediment-laden water.

.2 Where the activities on site involve the handling, transferring or disposal of liquids identified above, the contractor shall abide by WSO2-19 Spill Response—and maintain spill control equipment on-site—adequate to control for one hour a liquid spill of 100% of any material brought on to—or handled at—the site.

.1 Requirement applies to sub-Contractors as well the General Contractor.

.2 In the case of liquid spills, such as sewage and sediment-laden water, the equipment on-site must be adequate to control for one hour a liquid spill of 100% of the likely worst-case scenario.

.3 In the event of a spill, invoke WSO2-19 Spill Response and make notifications as per the Spill Response Report Form provided by the PCA Representative or Delegate. At a minimum and when safe to do so, immediately capture, contain and clean up any spills and leaks. Report spills to the PCA Representative or Delegate who will then advise the Environmental Officer for management as required by Wing Standing Order(WSO) 2-19 Spill Response and WSO 2-18 Hazardous Waste Management.

.4 The contractor shall provide and maintain an inventory of spill control equipment (including drip pans) necessary to control a spill of any POL or hazardous material stored on the project site

1.19 UNANTICIPATED CONTAMINATION (SOIL/AIR/ODOURS)

.1 Should unanticipated contaminated soil and/or odours be discovered during construction:

.1 Stop work and assess the area for safety;

.2 If area has become unsafe due to discovery, evacuate area immediately;

.3 If safe to do so, take immediate steps to control any spread of contamination, in accordance with Contractors' emergency/spill response plan; and

.4 Notify PCA Representative or Delegate and wait for further written instructions.

.5 Collect waybills, analytical results, or bills of landing to verify the approved location for PAH asphalt, fill material and hazardous material waste removed from the site; and

.6 Equipment and vehicle staging areas, material storage, waste storage and work space, will be designated prior to work commencing.

1.20 ACCEPTABLE PRODUCT AND MATERIALS

.1 Use products and materials that are free of possible noxious odours, toxic volatile and particulate emissions containing compounds, especially in interior building environments. Products emitting highly toxic compounds such as benzene, mercury and lead are not permitted on site.

1.21 FUELLING / RE-FUELLING

.1 There will be no fuelling or re-fuelling of vehicles or equipment on Property without prior consent from PCA Representative or Delegate.

.2 When approved, refuelling will be conducted in a designated area away from drainage ditches or catch basins with appropriate spill prevention and spill response measures in place.

1.22 FLUORESCENT LIGHTING TUBES

.1 Fluorescent lighting tubes contain mercury, which must not be released to the environment. Therefore, the tubes must not be broken. Tubes to be disposed of by approved waste contractor.

1.23 PCB BALLAST DISPOSAL

.1 All ballasts are to be removed as required from their fixtures by personnel familiar with the Canadian Environmental Protection Act 1999 (CEPA 1999) PCB Regulations regarding the safe handling and disposal of PCB containing ballasts. Ballasts that are found or suspected to contain PCBs upon removal are to be inventoried by their serial number, and individually packaged in a heat sealed 4 mil plastic bag. Bagged ballasts are then to be placed in an open top PCB Drum provided by Parks Canada Agency (PCA) with at least 150mm (6 in) of absorbent cushioning material in the bottom of the drum by Contractor. Drum is then to be disposed of according to all requirements of this Section pertaining to disposal of Hazardous Materials.

1.24 HALOCARBONS

.1 Comply with all of:

.1 Federal Halocarbon Regulations 2003.

.2 Environmental Code of Practice for Elimination of Fluorocarbon Emissions from Refrigeration and Air Conditioning Systems (The Environment Canada “Refrigeration Code of Practice”) Report EPS 1/RA/2. March 1996.

.2 Installation, servicing, etc., only by, or under the supervision of, a technician licensed by the Province of Ontario as a refrigeration mechanic ALSO in possession of a certificate issued by the Heating, Refrigeration, and Air Conditioning Institute of Canada.

.1 Provide copies of all technicians' certificates to the PCA Representative or Delegate.

.3 The following are the only halocarbons that are acceptable as refrigerants (non-halocarbon refrigerants are also acceptable):

.1 R-410A;

.2 HFC 134A;

.3 HCFC 123

.4 HFC 404A; and,

.4 The contractor will be responsible for the completion of the Refrigeration & Air Conditioning Service Log during the commissioning and decommissioning of equipment, as provided by the PCA Representative or Delegate.

.5 Immediately report all releases of halocarbons to the PCA Representative or Delegate.

.6 After installation, leak-test both factory-charged and non-factory-charged halocarbon-containing equipment in accordance with the Refrigeration Code of Practice.

.1 The PCA Representative or Delegate will <u>not</u> issue the Interim Certificate of Completion until the equipment is documented to be leak-free.

1.25 NOISE

.1 Ensure that noise levels are in accordance with applicable municipal noise by-laws.

1.26 ARCHEOLOGICAL REMAINS / ARTIFACTS

.1 If the Contractor encounters archaeological artefacts (as defined in the General Conditions), or has reasonable grounds to believe that an archeologically sensitive area has been encountered at the site of the work, the Contractor is to take reasonable steps to protect the archaeological resources, contact the PCA Representative or Delegate and cease activities in the area.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Not used.

1.2 REFERENCES AND CODES

.1 Perform Work in accordance with National Building Code of Canada (NBC) including amendments up to tender closing date and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply.

.2 Meet or exceed requirements of:

.1 Contract documents.

.2 Specified standards, codes and referenced documents.

1.3 HAZARDOUS MATERIAL DISCOVERY

.1 Asbestos: demolition of spray or trowel-applied asbestos is hazardous to health. Stop work immediately when material resembling spray or trowel-applied asbestos is encountered during demolition work. Notify Consultant and PCA Representative or Delegate. Refer to Section 02 82 00.01 - Asbestos Abatement - Minimum Precautions.

.2 Mould: stop work immediately when material resembling mould is encountered during demolition work. Notify Consultant and PCA Representative or Delegate.

1.4 BUILDING SMOKING ENVIRONMENT

.1 Comply with smoking restrictions and municipal by-laws.

1.5 NATIONAL PARKS ACT

.1 Perform Work in accordance with National Parks Act when projects are located within boundaries of National Park.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 – Submittals Procedures

1.2 INSPECTION

.1 Allow PCA Representative or Delegate and Consultant access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.

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

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

.4 Consultant and PCA Representative or Delegate 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. If such Work is found in accordance with Contract Documents, PCA Representative or Delegate shall pay cost of examination and replacement.

1.3 INDEPENDENT INSPECTION AGENCIES

.1 Independent Inspection / Testing Agencies will be engaged by PCA Representative or Delegate for purpose of inspecting and/or testing portions of Work.

.2 Allocated costs: to Section 01 21 00 - Allowances.

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

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

.5 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 PCA Representative or Delegate and Consultant at no cost to PCA Representative or Delegate or Consultant. Pay costs for retesting and re-inspection.

1.4 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.

1.5 PROCEDURES

.1 Notify appropriate agency, Consultant and PCA Representative or Delegate 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.

1.6 REJECTED WORK

.1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Consultant or PCA Representative or Delegate 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 PCA Representative or Delegate or Consultant it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Parks Canada Agency (PCA) 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 PCA Representative or Delegate and Consultant.

1.7 REPORTS

.1 Submit 4 copies of inspection and test reports to PCA Representative or Delegate and Consultant.

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

1.8 TESTS AND MIX DESIGNS

.1 Furnish test results and mix designs as requested.

.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 Consultant and PCA Representative or Delegate and may be authorized as recoverable.

1.9 MOCK-UPS

.1 Prepare mock-ups for Work specifically requested in specifications. Include for Work of Sections required to provide mock-ups.

.2 Construct in locations as specified in specific Section acceptable to PCA Representative or Delegate and Consultant.

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

.4 Failure to prepare mock-ups in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.

.5 If requested, Consultant and PCA Representative or Delegate will assist in preparing schedule fixing dates for preparation.

.6 Mock-ups may remain as part of Work.

1.10 MILL TESTS

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

1.11 EQUIPMENT AND SYSTEMS

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

1.12 AIR LEAKAGE TESTING

.1 The contractor shall preform an air leakage test on all new doors per ASHREA 90.1 – 5.4.3.2, conforming to AAMA/WDMA/CSA 101/I.S.2/A440, NFRC or ASTM E283.

.2 Air leakage shall not exceed the limits listed in ASHREA 90.1, which are 1.0 cfm/sq. ft. for glazed swinging doors, and 0.2 cfm/sq. ft. for other doors, when tested at 1.57 psf.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Not used.

1.2 REFERENCE STANDARDS

.1 U.S. Environmental Protection Agency (EPA) / Office of Water

.1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

1.4 INSTALLATION AND REMOVAL

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

.2 Remove from site all such work after use.

1.5 DEWATERING

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

1.6 WATER SUPPLY

.1 PCA Representative or Delegate will provide continuous supply of water for construction use.

.2 Arrange for connection with appropriate utility company and pay costs for installation, maintenance and removal, as required.

.3 PCA Representative or Delegate will pay for utility charges at prevailing rates.

.4 The Contractor shall be responsible for the supply of potable water, as required.

1.7 TEMPORARY HEATING AND VENTILATION

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

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

.3 Provide temporary heat and ventilation in enclosed areas as required to:

.1 Facilitate progress of Work.

.2 Protect Work and products against dampness and cold.

.3 Prevent moisture condensation on surfaces.

.4 Provide ambient temperatures and humidity levels for storage, installation and curing of materials.

.5 Provide adequate ventilation to meet health regulations for safe working environment.

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

.5 Ventilating:

.1 Prevent accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.

.2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.

.3 Dispose of exhaust materials in manner that will not result in harmful exposure to 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.

.6 **Permanent heating system of building not to be used**.

.7 Pay costs for maintaining temporary heat.

.8 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.

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

1.8 TEMPORARY POWER AND LIGHT

.1 PCA Representative or Delegate will pay for temporary power during construction for temporary lighting and operating of power tools, to a maximum supply of 230 volts 30 amps.

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

.3 Temporary power for electric cranes and other equipment requiring in excess of above is 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.

1.9 TEMPORARY COMMUNICATION FACILITIES

.1 Provide and pay for temporary telephone and data hook up, lines, and equipment necessary for own use and use.

1.10 FIRE PROTECTION

.1 Provide and maintain temporary fire protection equipment during performance of Work required by insurance companies having jurisdiction, governing codes, regulations and bylaws.

.2 Burning rubbish and construction waste materials is not permitted on site.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Not used.

1.2 REFERENCE STANDARDS

.1 Canadian Standards Association (CSA International)

.1 CAN/CSA-S269.2-M1987 (R2003), Access Scaffolding for Construction Purposes.

.2 CAN/CSA-Z321-96(R2001), Signs and Symbols for the Occupational Environment.

.2 Public Works Government Services Canada (PSPC) Standard Acquisition Clauses and Conditions (SACC)-ID: R0202D, Title: General Conditions 'C', In Effect as of: May 14, 2004.

.3 U.S. Environmental Protection Agency (EPA) / Office of Water

.1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

1.4 INSTALLATION AND REMOVAL

.1 Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation.

.2 Identify areas which have to be gravelled to prevent tracking of mud.

.3 Indicate use of supplemental or other staging area.

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

.5 Remove from site all such work after use.

1.5 SCAFFOLDING

.1 Scaffolding in accordance with CAN/CSA-S269.2.

.2 Provide and maintain scaffolding, ramps, swing staging, platforms, ladders and temporary stairs.

1.6 HOISTING

.1 Provide, operate and maintain hoists as required for moving of materials and equipment. Make financial arrangements with Subcontractors for their use of hoists.

.2 Hoists to be operated by qualified operator.

1.7 SITE STORAGE / LOADING

.1 Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products.

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

1.8 CONSTRUCTION PARKING

.1 Parking will be permitted on site provided it does not disrupt performance of Work or Parks Canada ongoing operations.

1.9 SECURITY

.1 Provide and pay for responsible security personnel to guard site and contents of site after working hours and during holidays.

1.10 OFFICES

.1 Provide office heated to 22 degrees C, lighted 750 lx and ventilated, of sufficient size to accommodate site meetings and furnished with drawing laydown table.

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

.3 Subcontractors to provide their own offices as necessary. Direct location of these offices.

1.11 EQUIPMENT, TOOL AND MATERIALS STORAGE

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

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

1.12 SANITARY FACILITIES

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

.2 Post notices and take precautions as required by local health authorities. Keep area and

1.13 PROTECTION AND MAINTENANCE OF TRAFFIC

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

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

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

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

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

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

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

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

1.14 CLEAN-UP

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

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

.3 Store materials resulting from demolition activities that are salvageable.

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

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

END OF SECTION

Part 1 General

1.1 INSTALLATION AND REMOVAL

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

.2 Remove from site all such work after use.

1.2 HOARDING

.1 Erect and maintain pedestrian walkways including roof and side covers, complete with signs and electrical lighting as required by law.

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

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

1.3 GUARD RAILS AND BARRICADES

.1 Provide as required by governing authorities.

1.4 WEATHER ENCLOSURES

.1 Provide weather tight closures to unfinished door and window openings, tops of shafts and other openings in floors and roofs.

.2 Close off floor areas where walls are not finished; seal off other openings; enclose building interior work for temporary heat.

.3 Design enclosures to withstand wind pressure and snow loading.

1.5 DUST TIGHT SCREENS

.1 Provide dust tight screens or insulated partitions, as required, to localize dust generating activities, and for protection of workers, finished areas of Work and public.

.2 Maintain and relocate protection until such work is complete.

1.6 ACCESS TO SITE

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

1.7 PUBLIC TRAFFIC FLOW

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

1.8 FIRE ROUTES

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

1.9 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

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

.2 Be responsible for damage incurred.

1.10 PROTECTION OF BUILDING FINISHES

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

.2 Provide necessary screens, covers, and hoardings.

.3 Confirm with PCA Representative or Delegate locations and installation schedule 3 days prior to installation.

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

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

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

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

.3 If there is question as to whether products or systems are in conformance with applicable standards, PCA Representative or Delegate and Consultant reserve right to have such products or systems tested to prove or disprove conformance.

.4 Cost for such testing will be borne by PCA Representative or Delegate in event of conformance with Contract Documents or by Contractor in event of non-conformance.

1.2 QUALITY

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

.2 Procurement policy is to acquire, in cost effective manner, items containing highest percentage of recycled and recovered materials practicable consistent with maintaining satisfactory levels of competition. Make reasonable efforts to use recycled and recovered materials and in otherwise utilizing recycled and recovered materials in execution of work.

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

.4 Should disputes arise as to quality or fitness of products, decision rests strictly with Consultant and PCA Representative or Delegate based upon requirements of Contract Documents.

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

.6 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.3 AVAILABILITY

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

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

1.4 STORAGE, HANDLING AND PROTECTION

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

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

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

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

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

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

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

.8 Remove and replace damaged products at own expense and to satisfaction of PCA Representative or Delegate and Consultant.

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

1.5 TRANSPORTATION

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

.2 Transportation cost of products supplied by Parks Canada Agency (PCA) will be paid for by PCA Representative or Delegate. Unload, handle and store such products.

1.6 MANUFACTURER'S INSTRUCTIONS

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

.2 Notify Consultant and PCA Representative or Delegate in writing, of conflicts between specifications and manufacturer's instructions, so that Consultant and DCC Representative will establish course of action.

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

1.7 QUALITY OF WORK

.1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify PCA Representative or Delegate and Consultant if required Work is such as to make it impractical to produce required results.

.2 Do not employ anyone unskilled in their required duties. PCA Representative or Delegate and Consultant reserve right to require dismissal from site, workers deemed incompetent or careless.

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

1.8 CO-ORDINATION

.1 Ensure co-operation of workers in laying out Work. Maintain efficient and continuous supervision.

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

1.9 CONCEALMENT

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

.2 Before installation inform Consultant and PCA Representative or Delegate if there is interference. Install as directed by Consultant and PCA Representative or Delegate.

1.10 REMEDIAL WORK

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

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

1.11 LOCATION OF FIXTURES

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

.2 Inform Consultant and PCA Representative or Delegate of conflicting installation. Install as directed.

1.12 FASTENINGS

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

.2 Prevent electrolytic action between dissimilar metals and materials.

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

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

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

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

1.13 FASTENINGS - EQUIPMENT

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

.2 Use heavy hexagon heads, semi-finished unless otherwise specified. Use No. 304 stainless steel for exterior areas.

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

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

1.14 PROTECTION OF WORK IN PROGRESS

.1 Prevent overloading of parts of building. Do not cut, drill or sleeve load bearing structural member, unless specifically indicated without written approval of Consultant and PCA Representative or Delegate.

1.15 EXISTING UTILITIES

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

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

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 Parks Canada Agency (PCA)'s identification of existing survey control points and property limits.

1.2 QUALIFICATIONS OF SURVEYOR

.1 Qualified registered land surveyor, licensed to practise in Place of Work, acceptable to Consultant and PCA Representative or Delegate].

1.3 SURVEY REFERENCE POINTS

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

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

.3 Make no changes or relocations without prior written notice to Consultant and PCA Representative or Delegate.

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

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

1.4 SURVEY REQUIREMENTS

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

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

.3 Stake for grading, fill and topsoil placement and landscaping features.

1.5 EXISTING SERVICES

.1 Before commencing work, establish location and extent of service lines in area of Work and notify PCA Representative or Delegate and Consultant]of findings.

.2 Remove abandoned service lines within 2 m of structures. Cap or otherwise seal lines at cut-off points as directed by Consultant and PCA Representative or Delegate.

1.6 LOCATION OF EQUIPMENT AND FIXTURES

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

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

.3 Inform Consultant and PCA Representative or Delegate of impending installation and obtain approval for actual location.

.4 Submit field drawings to indicate relative position of various services and equipment when required by Consultant and PCA Representative or Delegate.

1.7 SUBSURFACE CONDITIONS

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

.2 After prompt investigation, should Consultant determine that conditions do differ materially, instructions will be issued for changes in Work as provided in Changes and Change Orders.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 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 Agency (PCA) 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 Agency (PCA) or separate contractor.
- .7 Written permission of affected separate contractor.
- .8 Date and time work will be executed.

1.2 MATERIALS

.1 Required for original installation.

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

1.3 PREPARATION

.1 Inspect existing conditions, including elements subject to damage or movement during cutting and patching.

.2 After uncovering, inspect conditions affecting performance of Work.

.3 Beginning of cutting or patching means acceptance of existing conditions.

.4 Provide supports to assure structural integrity of surroundings; provide devices and methods to protect other portions of project from damage.

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

1.4 EXECUTION

.1 Execute cutting, fitting, and patching including excavation and fill, to complete Work.

.2 Fit several parts together, to integrate with other Work.

.3 Uncover Work to install ill-timed Work.

.4 Remove and replace defective and non-conforming Work.

.5 Remove samples of installed Work for testing.

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

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

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

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

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

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

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

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

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 PROJECT CLEANLINESS

.1 Maintain Work in tidy condition, free from accumulation of waste products and debris, other than that caused by Parks Canada Agency (PCA) or other Contractors.

.2 Remove waste materials from site at daily regularly scheduled times or dispose of as directed by PCA Representative or Delegate. Do not burn waste materials on site, unless approved by PCA Representative or Delegate.

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

.4 Dispose of waste materials and debris off site.

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

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

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

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

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

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 PRECEDENCE

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

1.2 WASTE MANAGEMENT GOALS

.1 Accomplish maximum control of solid construction waste.

.2 Preserve environment and prevent pollution and environment damage.

1.3 RELATED SECTIONS

.1 Section 01 33 00 – Submittal Procedures

1.4 DEFINITIONS

.1 Class III: non-hazardous waste - construction renovation and demolition waste.

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

.3 Inert Fill: inert waste - exclusively asphalt and concrete.

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

.5 Recyclable: ability of product or material to be recovered at end of its life cycle and re-manufactured into new product for reuse.

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

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

.8 Reuse: repeated use of product in same form but not necessarily for same purpose. Reuse includes:

.1 Salvaging reusable materials from re-modelling projects, before demolition stage, for resale, reuse on current project or for storage for use on future projects.

.2 Returning reusable items including pallets or unused products to vendors.

.9 Salvage: removal of structural and non-structural materials from deconstruction/disassembly projects for purpose of reuse or recycling.

.10 Separate Condition: refers to waste sorted into individual types.

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

.12 Waste Audit (WA): detailed inventory of materials in building. Involves quantifying by volume/weight amounts of materials and wastes generated during construction, demolition, deconstruction, or renovation project. Indicates quantities of reuse, recycling and landfill. Refer to Schedule A.

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

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

1.5 WASTE MANAGEMENT GOALS

.1 Prior to start of Work conduct meeting with DCC Representative to review and discuss Waste Management Plan and Goals.

.2 Provide DCC Representative documentation certifying that waste management, recycling, reuse of recyclable and reusable materials have been extensively practiced.

.3 Accomplish maximum control of solid construction waste.

.4 Preserve environment and prevent pollution and environmental damage.

1.6 DOCUMENTS

.1 Maintain at job site, one copy of following documents:

.1 Waste Audit.
.2 Waste Reduction Workplan.
.3 Material Source Separation Plan.
.4 Schedules A, B & C completed for project.

1.7 SUBMITTALS

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

.2 Prepare and submit prior to project start-up:

.1 Submit 2 copies of completed Waste Audit (WA): Schedule A.
.2 Submit 2 copies of completed Waste Reduction Workplan (WRW): Schedule B.
.3 Submit 2 copies of completed Demolition Waste Audit (DWA): Schedule C.
.4 Submit 2 copies of Materials Source Separation Program (MSSP) description.

.3 Submit before final payment summary of waste materials salvaged for reuse, recycling or disposal by project using deconstruction/disassembly material audit form.

.1 Failure to submit could result in hold back of final payment.

.2 Provide receipts, scale tickets, waybills, and show quantities and types of materials reused, recycled, co-mingled and separated off-site or disposed of.

.3 For each material reused, sold or recycled from project, include amount in tonnes and size of items and the destination.

.4 For each material land filled or incinerated from project, include amount in tonnes of material and identity of landfill, incinerator or transfer station.

1.8 WASTE AUDIT (WA)

.1 Conduct WA prior to project start-up.

.2 Prepare WA: Schedule A.

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

1.9 WASTE REDUCTION WORKPLAN (WRW)

.1 Prepare WRW prior to project start-up.

.2 WRW should include but not limited to:

.1 Destination of materials listed.

.2 Deconstruction/disassembly techniques and sequencing.

.3 Schedule for deconstruction / disassembly.

.4 Location.

.5 Security.

.6 Protection.

.7 Clear labeling of storage areas.

.8 Details on materials handling and removal procedures.

.9 Quantities for materials to be salvaged for reuse or recycled and materials sent to landfill.

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

.4 Describe management of waste.

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

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

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

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

1.10 DEMOLITION WASTE AUDIT (DWA)

.1 Prepare DWA prior to project start-up. Audit (DWA): Schedule C, is included with this Section. Edit to suit project requirements.

.2 Complete DWA: Schedule C.

.3 Provide inventory of quantities of materials to be salvaged for reuse, recycling, or disposal.

1.11 MATERIALS SOURCE SEPARATION PROGRAM (MSSP)

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

.2 Implement MSSP for waste generated on project in compliance with approved methods and as reviewed by DCC Representative.

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

.4 Provide containers to deposit reusable and recyclable materials.

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

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

.7 Collect, handle, store on-site, and transport off-site, salvaged materials in separate condition.

.1 Transport to approved and authorized recycling facility for recycling.

1.12 STORAGE, HANDLING AND PROTECTION

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

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

.3 Protect structural components not removed for demolition from movement or damage.

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

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

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

.7 Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated facilities.

.1 On-site source separation is recommended.

.2 Remove co-mingled materials to off-site processing facility for separation.

.3 Provide waybills for separated materials.

1.13 DISPOSAL OF WASTES

.1 Do not bury rubbish or waste materials.

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

.3 Keep records of construction waste including:

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

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

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

1.14 SCHEDULING

.1 Co-ordinate Work with other activities at site to ensure timely and orderly progress of Work.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 APPLICATION

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

.2 Provide separate disposal bins for each material removed from demolition area, do not mix materials.

3.2 CLEANING

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

.2 Cleanup work area as work progresses.

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

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 – Submittal Procedures

.2 Section 01 78 00 – Closeout Submittals

1.2 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 Consultant and PCA Representative or Delegate in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.

.2 Request PCA Representative or Delegate and Consultant's inspection.

.2 PCA Representative or Delegate and Consultant's Inspection:

.1 Consultant and PCA Representative or Delegate 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, balanced, adjusted and fully operational.

.4 Certificates required by Fire Commissioner, Boiler Inspection Branch, Utility companies: submitted.

.5 Operation of systems: demonstrated to Parks Canada Agency (PCA)'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 Consultant and PCA Representative or Delegate, and Contractor.

.2 When Work incomplete according to PCA Representative or Delegate, Parks Canada Agency (PCA) and Consultant, complete outstanding items and request re-inspection.

1.3 FINAL CLEANING

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

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

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 – Submittal Procedures

.2 Section 01 77 00 – Closeout Procedures

1.2 ADMINISTRATIVE REQUIREMENTS

.1 Pre-warranty Meeting:

.1 Convene meeting one week prior to contract completion with Contractor's representative, PCA Representative or Delegate and Consultant, in accordance with Section 01 31 19 - Project Meetings to:

.1 Verify Project requirements.

.2 Review warranty requirements, manufacturer's installation instructions.

.2 Consultant PCA Representative or Delegate 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.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Two weeks prior to Substantial Performance of the Work, submit to the PCA Representative or Delegate and Consultant, four 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.

1.4 FORMAT

.1 Organize data as instructional manual.

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

.3 When multiple binders are used correlate data into related consistent groupings.

.1 Identify contents of each binder on spine.

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

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

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

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

.8 Drawings: provide with reinforced punched binder tab.

.1 Bind in with text; fold larger drawings to size of text pages.

1.5 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 Consultant 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.

.6 Training: refer to Section 01 79 00 - Demonstration and Training.

1.6 AS-BUILT DOCUMENTS AND SAMPLES

.1 Maintain, in addition to requirements in General Conditions, at site for Consultant, Parks Canada Agency (PCA), PCA Representative or Delegate 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 Consultant and PCA Representative or Delegate.

1.7 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS

.1 Record information on set of blue line opaque drawings, and in copy of Project Manual, provided by PCA Representative or Delegate / Consultant.

.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.

1.8 FINAL SURVEY

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

1.9 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] [Design-Builder'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 Additional requirements: as specified in individual specification sections.

1.10 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.

1.11 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] [site]; place and store.

.4 Receive and catalogue items.

.1 Submit inventory listing to PCA Representative or Delegate.

.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 on site; place and store.

.4 Receive and catalogue items.

.1 Submit inventory listing to PCA Representative or Delegate.

.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 site in location as directed; place and store.

.4 Receive and catalogue items.

.1 Submit inventory listing to PCA Representative or Delegate.

.2 Include approved listings in Maintenance Manual.

1.12 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 Consultant and PCA Representative or Delegate.

1.13 WARRANTIES AND BONDS

.1 Develop warranty management plan to contain information relevant to Warranties.

.2 Submit warranty management plan, 30days before planned pre-warranty conference, to Consultant and PCA Representative or Delegate approval.

.3 Warranty management plan to include required actions and documents to assure that Consultant and PCA Representative or Delegate receives warranties to which it is entitled.

.4 Provide plan in narrative form and contain sufficient detail to make it suitable for use by future maintenance and repair personnel.

.5 Submit, warranty information made available during construction phase, to PCA Representative or Delegate and Consultant for approval prior to each monthly pay estimate.

.6 Assemble approved information in binder, submit upon acceptance of work and organize binder as follows:

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

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

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

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

.5 Co-execute submittals when required.

.6 Retain warranties and bonds until time specified for submittal.

.7 Except for items put into use with Parks Canada Agency (PCA)'s permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.

.8 Conduct joint 4 month and 9 month warranty inspection, measured from time of acceptance, by Consultant and PCA Representative or Delegate.

.9 Include information contained in warranty management plan as follows:

.1 Roles and responsibilities of personnel associated with warranty process, including points of contact and telephone numbers within the organizations of Contractors, subcontractors, manufacturers or suppliers involved.

.2 Listing and status of delivery of Certificates of Warranty for extended warranty items.

.3 Provide list for each warranted equipment, item, feature of construction or system indicating:

.1 Name of item.

.2 Model and serial numbers.

.3 Location where installed.

.4 Name and phone numbers of manufacturers or suppliers.

.5 Names, addresses and telephone numbers of sources of spare parts.

.6 Warranties and terms of warranty: include one-year overall warranty of construction. Indicate items that have extended warranties and show separate warranty expiration dates.

.7 Cross-reference to warranty certificates as applicable.

.8 Starting point and duration of warranty period.

.9 Summary of maintenance procedures required to continue warranty in force.

.10 Cross-Reference to specific pertinent Operation and Maintenance manuals.

.11 Organization, names and phone numbers of persons to call for warranty service.

.12 Typical response time and repair time expected for various warranted equipment.

.4 Contractor's plans for attendance at 4 and 9 month post-construction warranty inspections.

.5 Procedure and status of tagging of equipment covered by extended warranties.

.6 Post copies of instructions near selected pieces of equipment where operation is critical for warranty and/or safety reasons.

.10 Respond in timely manner to oral or written notification of required construction warranty repair work.

.11 Written verification to follow oral instructions.

.1 Failure to respond will be cause for the PCA Representative or Delegate to proceed with action against Contractor.

1.14 WARRANTY TAGS

.1 Tag, at time of installation, each warranted item. Provide durable, oil and water resistant tag approved by PCA Representative or Delegate.

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

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

.4 Indicate following information on tag:

.1 Type of product/material.

.2 Model number.

.3 Serial number.

.4 Contract number.

.5 Warranty period.

.6 Inspector's signature.

.7 Construction Contractor.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 CSA International

.1 CSA S350-M1980(R2003), Code of Practice for Safety in Demolition of Structures.

.2 National Research Council Canada (NRC)

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

.2 National Fire Code of Canada 2015 (NFC).

.3 U.S. Environmental Protection Agency (EPA) / Office of Water

.1 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.2 SITE CONDITIONS

.1 Review "Designated Substance Report" and take precautions to protect environment.

.2 If material resembling spray or trowel-applied asbestos or other designated substance listed as hazardous be encountered, stop work, take preventative measures, and notify Consultant and PCA Representative or Delegate immediately.

.1 Proceed only after receipt of written instructions have been received from Consultant and PCA Representative or Delegate.

.3 Notify PCA Representative or Delegate and Consultant before disrupting building access or services.

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 EXAMINATION

.1 Inspect building and site with PCA Representative or Delegate and Consultant and verify extent and location of items designated for removal, disposal, alternative disposal, recycling, salvage and items to remain.

.2 Locate and protect utilities. Preserve active utilities traversing site in operating condition.

.3 Notify and obtain approval of utility companies before starting demolition.

.4 Disconnect, cap, plug or divert, as required, existing public utilities within the property where they interfere with the execution of the work, in conformity with the requirements

of the authorities having jurisdiction. Mark the location of these and previously capped or plugged services on the site and indicate location (horizontal and vertical) on the record drawings. Support, shore up and maintain pipes and conduits encountered.

.1 Immediately notify Consultant and PCA Representative or Delegate and utility company concerned in case of damage to any utility or service, designated to remain in place.

.2 Immediately notify the PCA Representative or Delegate and Consultant should uncharted utility or service be encountered, and await instruction in writing regarding remedial action.

3.2 PREPARATION

.1 Protection of In-Place Conditions:

.1 Prevent movement, settlement, or damage to adjacent and landscaping features structures, utilities, and parts of building to remain in place. Provide bracing and shoring required.

.2 Keep noise, dust, and inconvenience to occupants to minimum.

.3 Protect building systems, services and equipment.

.4 Provide temporary dust screens, covers, railings, supports and other protection as required.

.5 Do Work in accordance with Section 01 35 29.06 - Health and Safety Requirements.

.2 Demolition/Removal:

.1 Remove items as indicated.

.2 Removal of Pavements, Curbs and Gutters:

.1 Square up adjacent surfaces to remain in place by saw cutting or other method approved by Consultant and PCA Representative or Delegate.

.2 Protect adjacent joints and load transfer devices.

.3 Protect underlying and adjacent granular materials.

.3 Remove parts of existing building to permit new construction.

.4 Trim edges of partially demolished building elements to tolerances as defined by Consultant and PCA Representative or Delegate to suit future use.

3.3 CLEANING

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

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

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

.3 Refer to demolition drawings and specifications for items to be salvaged for reuse.

END OF SECTION

Approved: 2009-12-31

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 02 81 00.01

1.2 REFERENCE STANDARDS

.1 Occupational Health & Safety Act

.1 O.Reg. 278/05: Designated Substance – Asbestos on Construction Projects and in Buildings and Repair Operations.

.2 Canadian Environmental Protection Act, 1999 (CEPA 1999)

.1 Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations (SOR/2005-149).

.3 Department of Justice Canada (Jus)

.1 Transportation of Dangerous Goods Act, 1992 (TDG Act) 1992, (c. 34).

.2 Transportation of Dangerous Goods Regulations (T-19.01-SOR/2001-286).

.4 Green Seal Environmental Standards (GS)

.1 GS-11-2008, 2nd Edition, Paints and Coatings.

.2 GS-36-00, Commercial Adhesives.

.5 Health Canada / Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.6 National Research Council Canada (NRC)

.1 National Fire Code of Canada 2015 (NFC).

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

.1 SCAQMD Rule 1113-A2007, Architectural Coatings.

.2 SCAQMD Rule 1168-A2005, Adhesive and Sealant Applications.

1.3 DEFINITIONS

.1 Dangerous Goods: product, substance, or organism specifically listed or meets hazard criteria established in Transportation of Dangerous Goods Regulations.

.2 Hazardous Material: product, substance, or organism used for its original purpose; and is either dangerous goods or material that will cause adverse impact to environment or adversely affect health of persons, animals, or plant life when released into the environment.

.3 Hazardous Waste: hazardous material no longer used for its original purpose and that is intended for recycling, treatment or disposal.

1.4 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 hazardous materials and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit two copies of WHMIS MSDS in accordance with Section 01 35 43- Environmental Procedures 01 35 29.06- Health and Safety Requirements to PCA representative or delegate for each hazardous material required prior to bringing hazardous material on site.

.3 Submit hazardous materials management plan to PCA representative or delegate that identifies hazardous materials, usage, location, personal protective equipment requirements, and disposal arrangements.

.3 Sustainable Design Submittals:

.1 Construction Waste Management:

.1 Submit project Waste Reduction Workplan Waste Management Plan highlighting recycling and salvage requirements.

.2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 75 50% of construction wastes were recycled or salvaged

.2 Low-Emitting Materials: submit listing of paints and coatings adhesives and sealants used in building, comply with VOC and chemical component limits or restrictions requirements.

1.5 DELIVERY, STORAGE AND HANDLING

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

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

.3 Transport hazardous materials and wastes in accordance with Transportation of Dangerous Goods Act, Transportation of Dangerous Goods Regulations, and applicable provincial regulations.

.1 When exporting hazardous waste to another country, ensure compliance with Export and Import of Hazardous Waste and Hazardous Recyclable Materials Regulations.

.4 Storage and Handling Requirements:

.1 Co-ordinate storage of hazardous materials with PCA representative or delegate and abide by internal requirements for labelling and storage of materials and wastes.

.2 Store and handle hazardous materials and wastes in accordance with applicable federal and provincial laws, regulations, codes, and guidelines.

.3 Store and handle flammable and combustible materials in accordance with National Fire Code of Canada (NFC) requirements.

.4 Keep no more than 45litres of flammable and combustible liquids such as gasoline, kerosene and naphtha for ready use.

.1 Store flammable and combustible liquids in approved safety cans bearing the Underwriters' Laboratory of Canada or Factory Mutual seal of approval.

.2 Storage of quantities of flammable and combustible liquids exceeding 45litres for work purposes requires the written approval of the DCC Representative Consultant Departmental Representative.

.5 Transfer of flammable and combustible liquids is prohibited within buildings.

.6 Transfer flammable and combustible liquids away from open flames or heat-producing devices.

.7 Solvents or cleaning agents must be non-flammable or have flash point above 38 degrees C.

.8 Store flammable and combustible waste liquids for disposal in approved containers located in safe, ventilated area. Keep quantities to minimum.

.9 Observe smoking regulations, smoking is prohibited in areas where hazardous materials are stored, used, or handled.

.10 Storage requirements for quantities of hazardous materials and wastes in excess of 5 kg for solids, and 5 litres for liquids:

.1 Store hazardous materials and wastes in closed and sealed containers.

.2 Label containers of hazardous materials and wastes in accordance with WHMIS.

.3 Store hazardous materials and wastes in containers compatible with that material or waste.

.4 Segregate incompatible materials and wastes.

.5 Ensure that different hazardous materials or hazardous wastes are stored in separate containers.

.6 Store hazardous materials and wastes in secure storage area with controlled access.

.7 Maintain clear egress from storage area.

.8 Store hazardous materials and wastes in location that will prevent them from spilling into environment.

.9 Have appropriate emergency spill response equipment available near storage area, including personal protective equipment.

.10 Maintain inventory of hazardous materials and wastes, including product name, quantity, and date when storage began.

.11 When hazardous waste is generated on site:

.1 Co-ordinate transportation and disposal with PCA representative or delegate.

.2 Comply with applicable federal, provincial and municipal laws and regulations for generators of hazardous waste.

.3 Use licensed carrier authorized by provincial authorities to accept subject material.

.4 Before shipping material obtain written notice from intended hazardous waste treatment or disposal facility it will accept material and it is licensed to accept this material.

.5 Label containers with legible, visible safety marks as prescribed by federal and provincial regulations.

.6 Only trained personnel handle, offer for transport, or transport dangerous goods.

.7 Provide photocopy of shipping documents and waste manifests to PCA representative or delegate.

.8 Track receipt of completed manifest from consignee after shipping dangerous goods. Provide photocopy of completed manifest to PCA representative or delegate.

.9 Report discharge, emission, or escape of hazardous materials immediately to PCA representative or delegate and appropriate provincial authority. Take reasonable measures to control release.

.12 Ensure personnel have been trained in accordance with Workplace Hazardous Materials Information System (WHMIS) requirements.

.13 Report spills or accidents immediately PCA representative or delegate. Submit a written spill report to PCA representative or delegate within 24hours of incident.

.5 Develop Construction Waste Management Plan related to Work of this Section and in accordance with Section.

.6 Packaging Waste Management: remove and return of crates, pallets, packaging materials padding, as specified in Construction Waste Management Plan Waste Reduction Workplan in accordance with Section 01 74 21- Construction/Demolition Waste Management and Disposal.

Part 2 Products

2.1 MATERIALS

.1 Description:

.1 Bring on site only quantities hazardous material required to perform Work.

.2 Maintain MSDS in proximity to where materials are being used. Communicate this location to personnel who may have contact with hazardous materials.

.3 Sustainability Characteristics:

.1 Adhesives and Sealants in accordance with Section 07 92 00 - Joint Sealants.

.1 Adhesives and Sealants: maximum VOC limit 250g/L to SCAQMD Rule 1168 to GS-36

.2 Paints Coatings Primersin accordance with manufacturer's recommendations for surface conditions and Section 09 91 23.01- Interior Re-Painting, 09 91 23- Interior Painting.

.1 Primer: maximum VOC limit 250g/L to GS-11 to SCAQMD Rule 1113.

.2 Paints: maximum VOC limit 50g/L to SCAQMD Rule 1113 to GS-11.

.3 Coatings: maximum VOC limit.to SCAQMD Rule 1113

Part 3 Execution

3.1 CLEANING

.1 Progress Cleaning: clean in accordance with Section01 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 recycling in accordance with Section 01 74 21- Construction/Demolition Waste Management and Disposal.

.1 Dispose of hazardous waste materials in accordance with applicable federal and provincial acts, regulations, and guidelines.

.2 Recycle hazardous wastes for which there is approved, cost effective recycling process available.

.3 Send hazardous wastes to authorized hazardous waste disposal or treatment facilities.

.4 Burning, diluting, or mixing hazardous wastes for purpose of disposal is prohibited.

.5 Disposal of hazardous materials in waterways, storm or sanitary sewers, or in municipal solid waste landfills is prohibited.

.6 Dispose of hazardous wastes in timely fashion in accordance with applicable provincial regulations.

.7 Minimize generation of hazardous waste to maximum extent practicable. Take necessary precautions to avoid mixing clean and contaminated wastes.

.8 Identify and evaluate recycling and reclamation options as alternatives to land disposal, such as:

.1 Hazardous wastes recycled in manner constituting disposal.

.2 Hazardous waste burned for energy recovery.

.3 Lead-acid battery recycling.

.4 Hazardous wastes with economically recoverable precious metals.

END OF SECTION

Approved: 2008-12-31

Part 1 General

1.1 SUMMARY

.1 Comply with requirements of this Section when performing following work:

.1 Removing non-friable asbestos-containing materials, other than ceiling tiles, if the material is installed or removed without being broken, cut, drilled, abraded, ground, sanded or vibrated at locations indicated on drawings.

.2 Break, cut, grind, sand, drill, scrape, vibrate or abrade non-friable asbestos containing materials using non-powered hand-held tools, and the material is wetted to control the spread of dust or fibres.

.3 Removing less than one square metre of drywall in which joint-filling compounds that are asbestos containing materials have been used.

1.2 RELATED REQUIREMENTS

.1 Section 02 81 01

1.3 REFERENCE STANDARDS

.1 Department of Justice Canada (Jus)

.1 Canadian Environmental Protection Act, 1999 (CEPA).

.2 Transport Canada (TC)

.1 Transportation of Dangerous Goods Act, 1992 (TDGA).

.3 Occupational Health & Safety Act.

.1 O. Reg. 278/05: Designated substance - asbestos on construction projects and in buildings and repair operations.

1.4 DEFINITIONS

.1 HEPA vacuum: High Efficiency Particulate Air filtered vacuum equipment with filter system capable of collecting and retaining fibres greater than 0.3 microns in any direction at 99.97% efficiency.

.2 Amended Water: water with nonionic surfactant wetting agent added to reduce water tension to allow thorough wetting of fibres.

.3 Asbestos-Containing Materials (ACMs): materials that contain 0.5 per cent or more asbestos by dry weight and are identified under Existing Conditions including fallen materials and settled dust.

.4 Asbestos Work Area: area where work takes place which will, or may, disturb ACMs.

.5 Authorized Visitors: Engineers, Consultants or PCA representatives or delegates, and representatives of regulatory agencies.

.6 Competent worker person: in relation to specific work, means a worker who:

.1 Is qualified because of knowledge, training and experience to perform the work.

.2 Is familiar with the federal & provincial laws and with the provisions of the regulations that apply to the work.

.3 Has knowledge of all potential or actual danger to health or safety in the work.

.7 Friable material: means material that:

.1 When dry, can be crumbled, pulverized or powdered by hand pressure, or

.2 is crumbled, pulverized or powdered.

.8 Non-Friable Material: material that when dry cannot be crumbled, pulverized or powdered by hand pressure.

.9 Occupied Area: any area of the building or work site that is outside Asbestos Work Area.

.10 Polyethylene: polyethylene sheeting or rip-proof polyethylene sheeting with tape along edges, around penetrating objects, over cuts and tears, and elsewhere as required to provide protection and isolation.

.11 Sprayer: garden reservoir type sprayer or airless spray equipment capable of producing mist or fine spray. Must have appropriate capacity for work.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit proof satisfactory to PCA representative or delegate that suitable arrangements have been made to dispose of asbestos-containing waste in accordance with requirements of authority having jurisdiction.

.3 Submit Provincial/Territorial and/or local requirements for Notice of Project Form.

.4 Submit proof of Contractor's Asbestos Liability Insurance.

.5 Submit to PCA representative or delegate necessary permits for transportation and disposal of asbestos-containing waste and proof that asbestos-containing waste has been received and properly disposed.

.6 Submit proof that all asbestos workers and/or supervisor have received appropriate training and education by a competent person in the hazards of asbestos exposure, good personal hygiene and work practices while working in Asbestos Work Areas, and the use, cleaning and disposal of respirators and protective clothing.

.7 Submit proof satisfactory to PCA representative or delegate that employees have respirator fitting and testing. Workers must be fit tested (irritant smoke test) with respirator that is personally issued.

1.6 QUALITY ASSURANCE

.1 Regulatory Requirements: comply with Federal, Provincial/Territorial, and local requirements pertaining to asbestos, provided that in case of conflict among these requirements or with these specifications, more stringent requirement applies. Comply with regulations in effect at time Work is performed.

.2 Health and Safety:

.1 Perform construction occupational health and safety in accordance with Section 01 35 29.06- Health and Safety Requirements.

.2 Safety Requirements: worker protection.

.1 Protective equipment and clothing to be worn by workers while in Asbestos Work Area include:

.1 Air purifying half-mask respirator with N-100, R-100 or P-100 particulate filter, personally issued to worker and marked as to efficiency and purpose, suitable for protection against asbestos and acceptable to Provincial Authority having jurisdiction. The respirator to be fitted so that there is an effective seal between the respirator and the worker's face, unless the respirator is equipped with a hood or helmet. The respirator to be cleaned, disinfected and inspected after use on each shift, or more often if necessary, when issued for the exclusive use of one worker, or after each use when used by more than one worker. The respirator to have damaged or deteriorated parts replaced prior to being used by a worker; and, when not in use, to be stored in a convenient, clean and sanitary location. The employer to establish written procedures regarding the selection, use and care of respirators, and a copy of the procedures to be provided to and reviewed with each worker who is required to wear a respirator. A worker not to be assigned to an operation requiring the use of a respirator unless he or she is physically able to perform the operation while using the respirator.

.2 Disposable-type protective clothing that does not readily retain or permit penetration of asbestos fibres. Protective clothing to be provided by the employer and worn by every worker who enters the work area, and the protective clothing shall consist of a head covering and full body covering that fits snugly at the ankles, wrists and neck, in order to prevent asbestos fibres from reaching the garments and skin under the protective clothing to include suitable footwear, and to be repaired or replaced if torn.

.2 Eating, drinking, chewing, and smoking are not permitted in Asbestos Work Area.

.3 Before leaving Asbestos Work Area, the worker can decontaminate his or her protective clothing by using a vacuum equipped with a HEPA filter, or by damp wiping, before removing the protective clothing, or, if the protective clothing will not be reused, place it in a container for dust and waste. The container to be dust tight, suitable for asbestos waste, impervious to asbestos, identified as asbestos waste, cleaned with a damp cloth or a vacuum equipped with a HEPA filter immediately before removal from the work area, and removed from the work area frequently and at regular intervals.

.4 Facilities for washing hands and face shall be provided within or close to the Asbestos Work Area.

.5 Ensure workers wash hands and face when leaving Asbestos Work Area. Facilities for washing are located as indicated on drawings.

.6 Ensure that no person required to enter an Asbestos Work Area has facial hair that affects seal between respirator and face.

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials in accordance with Section 01 74 21- Construction/Demolition Waste Management and Disposal.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal in accordance with Waste Management Plan.

.4 Separate for and place in designated containers in accordance with Waste Management Plan.

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

.6 Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Regional and Municipal regulations.

.7 Fold up metal banding, flatten and place in designated area for recycling.

.8 Disposal of asbestos waste generated by removal activities must comply with Federal, Provincial, Territorial and Municipal regulations. Dispose of asbestos waste in sealed double thickness 6 mils bags or leak proof drums. Label containers with appropriate warning labels.

.9 Provide manifests describing and listing waste created. Transport containers by approved means to licensed landfill for burial.

1.8 EXISTING CONDITIONS

.1 Reports and information pertaining to ACMs to be handled, removed, or otherwise disturbed and disposed of during this project are available for inspection at are part of the drawings and bid documents. See the Limited Pre-Renovation Designated Substance Survey prepared by True Grit Consulting Ltd.

.2 Notify PCA representative or delegate of friable material discovered during Work and not apparent from drawings, specifications, or report pertaining to Work. Do not disturb such material pending instructions from PCA representative or delegate.

1.9 SCHEDULING

.1 To be coordinated with a PCA representative or delegate.

1.10 PERSONNEL TRAINING

.1 Before beginning Work, provide PCA representative or delegate satisfactory proof that every worker has had instruction and training in hazards of asbestos exposure, in personal hygiene and work practices, and in use, cleaning, and disposal of respirators and protective clothing.

.2 Instruction and training related to respirators includes, following minimum requirements:

.1 Fitting of equipment.

.2 Inspection and maintenance of equipment.

.3 Disinfecting of equipment.

.4 Limitations of equipment.

.3 Instruction and training must be provided by a competent, qualified person.

Part 2 Products

2.1 MATERIALS

.1 Drop Sheets:

.1 Polyethylene: 0.15 mm thick.

.2 FR polyethylene: 0.15 mm thick woven fibre reinforced fabric bonded both sides with polyethylene.

.2 Wetting Agent: 50% polyoxyethylene ester and 50% polyoxyethylene ether mixed with water in a concentration to provide thorough wetting of asbestos-containing material.

.3 Waste Containers: contain waste in two separate containers.

.1 Inner container: 0.15 mm thick sealable polyethylene waste bag.

.2 Outer container: sealable metal or fibre type where there are sharp objects included in waste material; otherwise outer container may be sealable metal or fibre type or second 0.15 mm thick sealable polyethylene bag.

.3 Labelling requirements: affix pre-printed cautionary asbestos warning in both official languages that is visible when ready for removal to disposal site.

.4 Slow - drying sealer: non-staining, clear, water - dispersible type that remains tacky on surface for at least 8 hours and designed for purpose of trapping residual asbestos fibres.

.5 Tape: fibreglass - reinforced duct tape suitable for sealing polyethylene under both dry conditions and wet conditions using amended water.

Part 3 Execution

3.1 PROCEDURES

.1 Do construction occupational health and safety in accordance with Section 01 35 29.06-Health and Safety Requirements.

.2 Before beginning Work, isolate Asbestos Work Area using, minimum, preprinted cautionary asbestos warning signs in both official languages that are visible at access routes to Asbestos Work Area.

.1 Remove visible dust from surfaces in the work area where dust is likely to be disturbed during course of work.

.2 Use HEPA vacuum or damp cloths where damp cleaning does not create a hazard and is otherwise appropriate.

.3 Do not use compressed air to clean up or remove dust from any surface.

.3 Prevent spread of dust from Asbestos Work Area using measures appropriate to work to be done.

.1 Use FR polyethylene drop sheets over flooring such as carpeting that absorbs dust and over flooring in Asbestos Work Area where dust and contamination cannot otherwise be safely contained. Drop sheets are not to be reused.

.4 Wet materials containing asbestos to be cut, ground, abraded, scraped, drilled, or otherwise disturbed unless wetting creates hazard or causes damage.

.1 Use garden reservoir type low - velocity fine - mist sprayer.

.2 Perform Work to reduce dust creation to lowest levels practicable.

.3 Work will be subject to visual inspection and air monitoring.

.4 Contamination of surrounding areas indicated by visual inspection or air monitoring will require complete enclosure and clean-up of affected areas.

.5 Frequently and at regular intervals during Work and immediately on completion of work:

.1 Dust and waste to be cleaned up and removed using a vacuum equipped with a HEPA filter, or by damp mopping or wet sweeping, and placed in a waste container, and

.2 Drop sheets to be wetted and placed in a waste container as soon as practicable.

.6 Cleanup:

.1 Place dust and asbestos containing waste in sealed dust-tight waste bags. Treat drop sheets and disposable protective clothing as asbestos waste; wet and fold these items to contain dust, and then place in plastic bags.

.2 Clean exterior of each waste-filled bag using damp cloths or HEPA vacuum and place in second clean waste bag immediately prior to removal from Asbestos Work Area.

.3 Seal waste bags and remove from site. Dispose of in accordance with requirements of Provincial/Territorial and Federal Authority having jurisdiction. Supervise dumping and ensure that dump operator is fully aware of hazardous nature of material to be dumped and that the appropriate guidelines and regulations for asbestos disposal are followed.

.4 Perform final thorough clean-up of Work areas and adjacent areas affected by Work using HEPA vacuum.

END OF SECTION

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes: drilled in anchors for concrete.

B. Related Sections:

1. Divison 4 Masonry Sections.

2. Division 5 Metals Sections.

1.02 SUBMITTALS

A. General: Submit in accordance with *Conditions of the Contract* and Division 1 Submittal Procedures Section.

1. Product specifications with recommended design values and physical characteristics for expansion anchors.

2. Quality Assurance Submittals:

a. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.

3. Manufacturer's installation instructions.

B. Closeout Submittals: Submit the following:

1. Record Documents: Project record documents for installed materials in accordance with Division 1 Closeout Submittals Section.

1.03 QUALITY ASSURANCE

A. Installer Qualifications:

1. Drilled-in anchors shall be installed by a **contractor** with at least **three** years of experience performing similar installations.

B. Installer Training: Conduct a thorough training with the manufacturer or the manufacturer's representative for the **contractor** on the project. Training to consist of a review of the complete installation process for drilled-in anchors, to include but not limited to:

1. hole drilling procedure

2. hole preparation & cleaning technique

3. proof loading/torquing

1.04 DELIVERY, STORAGE AND HANDLING

A. General: Comply with Division 1 Section–Product Storage and Handling Requirements.

1. Store anchors in accordance with manufacturer's recommendations.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Fasteners and Anchors:

1. Bolts and Studs: ASTM A307; ASTM A449 where “high strength” is indicated on the Drawings.

2. Carbon and Alloy Steel Nuts: ASTM A563.

3. Carbon Steel Washers: ASTM F436.

4. Carbon Steel Threaded Rod: ASTM A36; or ASTM A193 Grade B7; or ISO 898 Class 5.8.

5. Wedge Anchors: ASTM A510; or ASTM A108.

6. Zinc Plating: ASTM B633.

7. Hot-Dip Galvanizing: ASTM A153.

8. Metric Anchor Bolts, Screws, and Studs: ISO 898 Part 1.

9. Metric Anchor Nuts: EN 24033.

A. Heavy Duty Metric Sleeve Anchors: Torque-controlled, exhibiting follow-up expansion under load, with provision for rotation prevention during installation. Type and size as indicated on Drawings.

1. Exterior Use: Unless otherwise indicated on the Drawings, provide carbon steel anchors manufactured from materials conforming to ISO 898 Part 1, with zinc plating equivalent to ASTM B633, Type III Fe/Zn 5 (5μm min.).

2. Where anchor manufacturer is not indicated, subject to compliance with requirements and acceptance by the Engineer, provide the following:

a. Hilti HSL, HSLG, or HSLB.

b. Hilti HSL-3, HSL-3-G, or HSL-3-B (carbon steel).

PART 3 – EXECUTION

3.01 INSTALLATION

A. Drilled-In Anchors:

1. Drill holes with rotary impact hammer drills **using carbide-tipped bits, hollow drill bit system, or core drills using diamond core bits**. Drill bits shall be of diameters as specified by the anchor manufacturer. Unless otherwise shown on the Drawings, all holes shall be drilled perpendicular to the concrete surface.

a. Cored Holes: Where anchors are permitted to be installed in cored holes, use core bits with matched tolerances as specified by the manufacturer. Properly clean cored hole per manufacturer’s instructions.

b. Embedded Items: Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Exercise care in coring or drilling to avoid

damaging existing reinforcing or embedded items. Notify the Engineer if reinforcing steel or other embedded items are encountered during drilling. Take precautions as necessary to avoid damaging prestressing tendons, electrical and telecommunications conduit, and gas lines.

2. Perform anchor installation in accordance with manufacturer instructions.

3. Heavy-Duty Sleeve Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in part to be fastened. Set anchors to manufacturer's recommended torque, using a torque wrench. Following attainment of 10% of the specified torque, 100% of the specified torque shall be reached within 7 or fewer complete turns of the nut. If the specified torque is not achieved within the required number of turns, the anchor shall be removed and replaced unless otherwise directed by the Engineer.

3.02 REPAIR OF DEFECTIVE WORK

A. Remove and replace misplaced or malfunctioning anchors. Fill empty anchor holes and patch failed anchor locations with high-strength non-shrink, nonmetallic grout. Anchors that fail to meet proof load or installation torque requirements shall be regarded as malfunctioning.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 CSA International

- .1 CSA B111-1974 (R2003), Wire Nails, Spikes and Staples.
- .2 CSA O141-05(R2009), Softwood Lumber.
- .3 CSA O151-09, Canadian Softwood Plywood.
- .4 CSA O325-07, Construction Sheathing.
- .5 CAN/CSA-Z809-08, Sustainable Forest Management.

.2 Health Canada / Workplace Hazardous Materials Information System (WHMIS)

- .1 Material Safety Data Sheets (MSDS).

.3 National Lumber Grades Authority (NLGA)

- .1 Standard Grading Rules for Canadian Lumber 2010.

.4 National Research Council Canada (NRC)

- .1 National Building Code of Canada 2015 (NBC).

1.2 QUALITY ASSURANCE

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

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

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

1.3 DELIVERY, STORAGE, AND HANDLING

.1 When it is required that wood maintain dimensional stability and tolerances, to ensure accurate installation of later work, store and install it only in dry areas and when no further installation of moist materials is contemplated.

.2 Provide dry storage areas for rough carpentry materials. Stack lumber 150 mm (6”) clear of floor.

.3 Cover materials stored on site with tarpaulins or polyethylene sheets to prevent moisture, absorption and impairment of structural and aesthetic-properties.

Part 2 Products

2.1 LUMBER MATERIAL

.1 Lumber: unless specified otherwise, softwood, S4S, SPF Species, moisture content 19% or less in accordance with following standards:

.1 CSA O141.

.2 NLGA Standard Grading Rules for Canadian Lumber.

.2 Furring, blocking, nailing strips, grounds, rough bucks, cants, curbs, fascia backing and sleepers:

.1 Board sizes: "standard" or better grade.

.2 Dimension sizes: "standard" light framing or better grade.

.3 Strapping at mineral fibre reinforced cementitious cladding shall be minimum 1”x4” (3/4”x 3.5” nominal size) SPF and must be fastened to the existing 1/2” plywood sheathing with 5-1/2” #8 wood screws at 12” vertically c/c & 16” horizontally c/c. The screws shall be stainless or plated as required to provide the necessary rust inhibitors.

2.2 PANEL MATERIALS

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

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

2.3 FABRICATION

.1 Design construction details for expansion and contraction of materials.

.2 Machine sand surfaces exposed in the finished work. Hand sand to an even smooth surface free from scratches.

Part 3 Execution

3.1 INSTALLATION

.1 Comply with requirements of National Building Code of Canada (NBC), supplemented by the following paragraphs.

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

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

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

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

.6 Install sleepers as indicated.

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

3.2 ERECTION

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

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

END OF SECTION

Part 1 General

1.1 WORK INCLUDED IN THIS SECTION

.1 Installation of new aluminum and hollow metal and doors.

.2 Installation of finish hardware supplied under Section 08 71 00, Finish Hardware, for aluminum and hollow metal doors.

1.2 PRODUCT DELIVERY, STORAGE AND HANDLING

.1 Accept delivery of doors and finish hardware.

.2 Inspect doors for damage, upon delivery to the site. Hollow metal doors which cannot be readily corrected by sanding, shall be promptly returned to the manufacturer.

.3 Store doors in a dry and clean location. Store in a temperature and humidity controlled area. Stack 6” (150 mm) off the floor.

.4 Be responsible for any damage to doors and hardware from time of delivery until accepted by Parks Canada Agency (PCA) after installation.

1.3 JOBSITE CONTROL AND DISTRIBUTION OF HARDWARE

.1 Provide locked room for the storage of hardware at the job and a person responsible for the control and distribution of hardware.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 INSTALLATION

.1 Finish Hardware:

.1 Set, fit and adjust hardware according to manufacturer's directions. Hardware shall operate freely. After installation, adjust door closers for closing and latching speed and panic devices for proper latching. Protect installed hardware from damage and paint spotting.

.2 Pre-drill kickplates and doors before attachment of plates. Apply with water-resistant adhesive and countersunk stainless steel screws.

.3 Locate hardware in accordance with requirements specified in Section 08 71 00, Finish Hardware.

.4 Install door closers in such a manner that door opening is unaffected, and that maximum swing is permitted.

.5 Electronic Hardware:

.1 Install all electronic barrier free operator components, security components such as magnetic locks, door status switches, card readers, processors, transformers, and other electric devices.

.2 All wiring will be supplied and installed by Electrical Division 16 including conduit, boxes and other electrical appurtenances, including connections and terminations. Be responsible for ensuring that all wiring work is done in accordance with the suppliers wiring diagrams and directions.

.3 Arrange for testing and commissioning of system by the distributor of the system. Submit a copy of reports to the PCA Representative or Delegate.

.4 Note: when installing electric strikes, it is imperative that doors are perfectly aligned to enable the bolt to properly close. Also ensure that rubber silencers do not impair the proper strike action required. Adjust or remove silencers as necessary.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 06 10 00 - Rough Carpentry

.2 Section 07 21 13 - Board Insulation

.3 Section 07 44 56 – Mineral Fiber Reinforced Cementitious Cladding

.4 Section 07 62 00 – Sheet Metal Flashing and Trim

1.2 WORK INCLUDED IN THIS SECTION

.1 Installation of new membrane air barrier to existing exterior plywood wall sheathing and extending minimum 300 mm (12”) onto existing concrete foundation wall.

.2 Installation of new weather-resistant barrier membrane to new wood fibreboard insulation, including tie-in to window and door openings and sealing of all service penetrations.

1.3 AIR / VAPOUR BARRIER REQUIREMENTS - GENERAL

.1 The drawings do not indicate every situation where an air / vapour barrier is required, however it is a requirement in the design of the building to provide an integral monolithic impermeable air / vapour barrier that prevents water leakage and the diffusion of water vapour and air movement under the action of a difference in vapour and air pressure, at the inner face of the insulation.

.2 Exercise extreme care to ensure that a fully continuous air/vapour barrier will be maintained over the entire insulated area and that it extends across all junctions between different materials.

.3 Co-ordinate and co-operate with other trades such as wood fibreboard insulation, fiberglass windows, and hollow metal doors where materials serving purpose of air / vapour barrier abut the materials of this Section of the work. Responsibility for supervising and ensuring continuity of air / vapour barrier system rests with this Section.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

.1 Store packaged materials in their original wrappings or containers with manufacturer's labels and seals intact. Store flammable materials outside the building and protect from weather hazards and open flame. Abide by fire protection regulations imposed by the authorities having jurisdiction, and take precautionary measures to avoid fires.

.2 In cold weather, provide warm storage for materials such that their consistency is suitable for ease of application.

1.5 PROTECTION

.1 Protect all surfaces, and in particular the building cladding, from being marred or contaminated by the materials, by means of protective covers, boards, tapes and other approved means.

.2 Supervise the work of other trades where such work is closely associated with the work of this Section and report any damage.

.3 Protect the work of this Section from damage until the building insulation, cladding, masonry, or other permanent protection is in place.

1.6 JOB CONDITIONS

.1 Apply air / vapour barrier only when substrate and ambient air temperatures are at least 5°C. Do not install during inclement weather conditions.

.2 Surfaces shall be clean and dry, free of deleterious material which could impair adhesion of membrane.

1.7 MOCK-UP

.1 Construct mock-up in accordance with the requirements of specification Section 01 45 00 – Quality Control.

.2 Construct one (1) 1830 mm (6'-0") x 1830 mm" (6'-0) sample of air / vapour barrier installations in locations as directed by Consultant. Do not proceed with installations until mock-up reviewed by Consultant.

Part 2 Products

2.1 AIR BARRIER MEMBRANE

.1 For application over existing exterior wood sheathing substrate, shall be designed to protect the interior of the building envelope in all climatic conditions. Air barrier membrane shall provide high diffusion tightness in cold weather (0.17 Perm; protection against condensation) and maximum diffusion openness in warm weather (13.2 Perm; facilitates rapid drying to the interior).

.2 Membrane shall consist of a vapor-variable polyethylene copolymer with polypropylene cover fleece, including the following performance characteristics:

.1	Weight:	150 g/m2 (0.5 oz/sf)
.2	Thickness:	0.45 mm (18 mils)
.3	Roll Width:	1.50 m (59 1/16")
.4	Perm Rating:	13.20 to 0.17
.5	Tensile Strength:	250 N/50 mm / 170N/50 mm (29 lb/in - 19 lb/in)
.6	Elongation:	60%/60% (longt./transverse)
.7	Tear Resistance:	120 N/ 120N ; 27 lbf / 27 lbf (longt./transverse)
.8	Thermal Conductivity:	0.85 hr.ft2°F/BTU.in (0.17 W/mK)
.9	Long Term: Temperature Resistance	-40 C° to 80 C° (-40 F° to 176 F°)
.11	UV/Weather Exposure:	up to 2 months

.3 Acceptable Materials:

.1 Intesana c/w Tescon Vana Tape for overlaps, Tescon Profil for corner connections, Contega HF to adhere to rough or uneven substrates and concrete connections, Roflex for pipes penetrations, and Kaflex gaskets for wire

penetrations, all as manufactured by ProClima and distributed by 475 High Performance Building Supply (Tel.: 1-800-995-6329) (email: info@foursevenfive.com).

2.2 WEATHER-RESISTANT BARRIER MEMBRANE

.1 For application over new wood fibreboard insulation panels, shall be high vapour permeable, airtight, weather resistant rainscreen barrier membrane.

.2 Membrane shall consist of a monolithic TEEE membrane with a polypropylene microfiber protective cover fleece, including the following performance characteristics:

.1	Weight:	115 ±5 g/m2
.2	Thickness:	0.40 mm ±0.05 mm
.3	Roll Width:	1.50 m (59 1/16”)
.4	Perm Rating:	38 perms per ASTM E96 12572
.5	Tensile Strength:	220 ±15 N/5 cm / 185 ±15 N/5 cm; 25 ±2 lb/in / 21±2 lb/in
.6	Elongation:	60 ±20 % / 70 ±20 %
.7	Nail Tear Resistance:	130 ±30 N / 135 ±30 N; 29 ±7 lbf / 30 ±7 lbf
.8	Thermal Conductivity:	0.85 hr.ft2°F/BTU.in (0.17 W/mK)
.9	Long Term: Temperature Resistance	-40 °C/-40 °F to +100 °C/212 °F
.11	UV/Weather Exposure:	up to 2 months

.3 Acceptable Materials:

.1 Solitex Mento 1000 c/w Tescon Vana Tape for overlaps, Tescon Profil for corner connections, Contega HF to adhere to rough or uneven substrates and concrete connections, Roflex for pipes penetrations, and Kaflex gaskets for wire penetrations, all as manufactured by ProClima and distributed by 475 High Performance Building Supply (Tel.: 1-800-995-6329) (email: info@foursevenfive.com).

Part 3 Execution

3.1 AIR BARRIER MEMBRANE INSTALLATION

.1 Install weather-resistant barrier membrane over existing exterior wood sheathing substrate and laid perpendicular or parallel to the sub-structure with the printed side facing the exterior.

.2 Membrane shall be applied taut and without sags or creases. If long term tensile forces on the taped overlaps are expected by insulation’s weight, the taped overlap can be reinforced with tape applied at right angles to the overlap every 300 mm (12”).

.3 To prevent condensation in cavities, weather-resistant barrier shall be taped and sealed airtight immediately after installation of the fibreboard insulation panels.

.4 Install weather-resistant barrier membrane and accessories in strict accordance with manufacturer’s printed instructions.

.5 Membrane should be applied taut and without sags or creases. The maximum on center spacing of the structure behind SOLITEX MENTO 1000 is 40”/100 cm. After membrane is applied, battens should be installed through the SOLITEX MENTO 1000 into the structure to support the weight of the blown. The battens should be less then 20” on center (50 cm). Above >14° (3:12) the SOLITEX MENTO membrane can be used as temporary roofing, with overlaps taped and sealed. Roof pitches below

3.2 WEATHER-RESISTANT BARRIER MEMBRANE INSTALLATION

.1 Install weather-resistant barrier membrane new wood fibreboard insulation panels and laid perpendicular or parallel to the sub-structure with the printed side facing the exterior.

.2 Membrane shall be wrapped over ends of panels and applied taut and without sags or creases. If long term tensile forces on the taped overlaps are expected by insulation’s weight, the taped overlap can be reinforced with tape applied at right angles to the overlap every 300 mm (12”).

.3 To prevent condensation in cavities, weather-resistant barrier shall be taped and sealed airtight immediately after installation of the fibreboard insulation panels.

.4 Install weather-resistant barrier membrane and accessories in strict accordance with manufacturer’s printed instructions.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 Canadian General Standards Board (CGSB)

.1 CGSB 71-GP-24M-AMEND-77(R1983), Adhesive, Flexible, for Bonding Cellular polystyrene Insulation.

.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.3 Underwriters Laboratories of Canada (ULC)

.1 CAN/ULC-S701-05, Thermal Insulation, Polystyrene Boards and Pipe Covering

.2 CAN/ULC-S704-11, Standard for Thermal Insulation Polyurethane and Polyisocyanurate, Boards, Faced.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for board insulation 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. Indicate VOC's during application and curing.

.3 Certificates:

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

.4 Test Reports:

.1 Submit certified test reports showing compliance with specified performance characteristics and physical properties.

.5 Manufacturer's Instructions:

.1 Submit manufacturer's installation instructions.

1.3 DELIVERY, STORAGE AND HANDLING

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

.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 Replace defective or damaged materials with new.

1.4 COORDINATION OF AIR BARRIER INSTALLATION BY OTHERS

.1 The drawings do not indicate every situation where an air barrier is required, however it is a requirement in the design of the building to provide an integral, monolithic, vapour permeable air barrier that prevents water leakage and air movement under the action of a difference in air pressure, at the inner face of the insulation.

.2 Responsibility for ensuring continuity of air barrier membrane installation rests with others.

.3 Co-ordinate and co-operate with trade supplying and installing the air barrier system and other trades, such as wood fibre insulation and fiberglass windows, where materials serving purpose of air barrier abut the materials of these sections of the work.

1.5 STORAGE

.1 Store packaged materials in their original wrappings or containers with manufacturer's labels and seals intact. Store flammable materials outside the building and protect from weather hazards and open flame. Abide by fire protection regulations imposed by the authorities having jurisdiction, and take precautionary measures to avoid fires.

.2 Do not store insulation in direct contact with the earth, road surface, or floors. Place suitable forms or skids under the insulation upon delivery to protect the insulation from absorbing dampness from the surrounding terrain or floor. Cover material with approved tarpaulins and secure.

1.6 PROTECTION

.1 Protect all surfaces, and in particular the building cladding, from being marred or contaminated by the materials, by means of protective covers, boards, tapes and other approved means.

.2 Protect all surfaces, and in particular the building cladding, from being marred or contaminated by the materials, by means of protective covers, boards, tapes and other approved means.

.3 Protect the work of this Section from damage until the building cladding, or other permanent protection is in place.

1.7 MOCK-UP

.1 Construct mock-up in accordance with the requirements of specification Section 01 45 00 – Quality Control.

.2 Construct mock-up of wood fibreboard insulation panel installation including interface with windows and air / vapour barrier installations. Do not proceed with installations until mock-up reviewed by Consultant.

Part 2 Products

2.1 RIGID INSULATION SHEATHING

.1 For use as interior sheathing at existing exterior wall assemblies walls, in lieu of wood fiberboard insulation, as indicated, shall be closed-cell, extruded polystyrene complying with CAN/ULC-S701, Type 2, and the following minimum requirements:

- .1 Thermal resistance: RSI 0.87 per 25 mm (R 5.0 per 1 inch) thickness
- .2 Compressive strength: 110 kPa (16 p.s.i.)
- .3 Water absorption: less than 0.70% by volume
- .4 Water vapour permeance: 90 ng/Pa s m2 (1.5 perms)
- .5 Flexural strength: 240 kPa (35 p.s.i.)

.2 Provide rigid insulation sheathing with ship-lapped edges in 50.8 mm (2”) thickness.

.3 Acceptable Materials:

- .1 "Styrofoam Cladmate" as manufactured by Dow Chemical of Canada Ltd.
- .2 "Foamular C-200" as manufactured by Owens Corning Canada.
- .3 Alternate approved by Consultant.

2.2 WOOD FIBREBOARD INSULATION – ALTERNATIVE PRICE

.1 Single ply construction, compression-resistant, homogenous, untreated wood fibreboard insulation panels with 4% polyurethane resin additive.

- .1 Nominal Thickness: 4” (100 mm)
- .2 Panel Size: 49-1/4” (1250 mm) x 23-5/8” (600 mm)
- .3 Panel Weight: 10.5 kg / m2
- .4 Thermal Resistance: R-3.7 / in.
- .5 Compressive strength: 70 kPa (10.2 p.s.i.)
- .6 Tensile strength: 10 kPa (15 p.s.i.)
- .7 Water absorption: less than 0.70% by volume
- .8 Water vapour permeance: 90 ng/Pa s m2 (1.5 perms)
- .9 Joint Type: butt

.2 Fasteners: shall be stainless steel as recommended by manufacturer and suitable for mounting of panels to existing and/or new wood strapping.

.3 Acceptable Product: “Thermasafe-md” as manufactured by Gutex and distributed by 475 High Performance Building Supply (Tel.: 1-800-995-6329) (email: info@foursevenfive.com)

2.3 PREFINISHED EXTERIOR FOUNDATION INSULATION

.1 For use at base of exterior wall assemblies for use below grade and where exposed above grade, in locations as indicated shall be closed-cell, expanded, extruded polystyrene complying with CAN/CGSB 51.20, Type 4, complete with a factory applied 9 mm (3/8”) latex-modified concrete facing and the following minimum requirements:

.1 Thermal resistance: RSI 0.87 per 25 mm (R 5.0 per 1 inch) thickness

.2 Compressive strength: 210 kPa (30 p.s.i.)

3 Water absorption: less than 0.70% by volume

.4 Water vapour permeance: 50 ng/Pa s m2 (0.9 perms)

.5 Tensile strength: 350 kPa (50 p.s.i.)

.6 Shear strength: 240 kPa (35 p.s.i.)

.2 Provide insulation in locations and thickness as indicated on drawings.

.3 Acceptable Materials:

.1 "Concrete Faced Insulated Wall Panels" as manufactured by T Clear Corporation

.2 "CFI Concrete Faced Insulated Wall Panels" Tech-Crete Processors Ltd.

.3 Alternate approved by Consultant.

Part 3 Execution

3.1 EXAMINATION

.1 Verify that surfaces and conditions are ready to accept the Work of this section.

3.2 INSTALLATION

.1 Install insulation after building substrate materials are dry.

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

.3 Fit insulation tight around electrical boxes, plumbing and heating pipes and ducts, around exterior doors and windows and other protrusions.

.4 Cut and trim insulation neatly to fit spaces. Butt joints tightly, offset vertical joints. Use only insulation boards free from chipped or broken edges. Use largest possible dimensions to reduce number of joints.

.5 Offset both vertical and horizontal joints in multiple layer applications.

.6 Do not enclose insulation until it has been inspected and approved by Consultant and PCA Representative or Delegate.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 06 10 00 - Rough Carpentry

.2 Section 07 21 13 - Board Insulation

.3 Section 07 62 00 – Sheet Metal Flashing and Trim

.4 Section 07 92 00 – Joint Sealants

1.2 REFERENCE STANDARDS

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

.1 Material Safety Data Sheets (MSDS).

.2 National Research Council Canada (NRC)

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

1.3 QUALITY ASSURANCE

.1 Installer Qualifications: Minimum of 2 years experience with installation of similar products.

1.4 DESIGN CRITERIA

.1 The cement fibreboard siding and trim cladding system, including fasteners and supports, shall be designed in accordance with reference standards specified herein and to the following requirements:

.1 Positive wind load support: 1.915 kPa (40 psf).

.2 Negative wind load support: 1.436 kPa (30 psf).

.3 Deflection: not to exceed 1/180 of the span.

1.5 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:

.1 Store materials in dry location, off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect cementitious panels from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

1.6 PROJECT CONDITIONS

.1 Maintain environmental conditions (i.e. temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.7 ENVIRONMENTAL REQUIREMENTS

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of material safety data sheets (MSDS) acceptable to Labour Canada.

1.8 WARRANTIES

.1 Lap and Panel Siding: provide manufacturers standard, limited, non-pro-rated thirty (30) year product warranty.

.2 Trim Boards: provide manufacturers standard, limited, non-pro-rated fifteen (15) year product warranty.

.3 Finishes: limited product warranty against manufacturing finish defects for a period of fifteen (15) years from the date of installation; when used for its intended purpose, properly installed and maintained according to manufacturer’s published installation instructions, the product finishes will not peel, crack or chip. Finish warranty shall include the cost of labor and material.

.4 Workmanship Warranty: application limited warranty for two (2) years.

Part 2 Products

2.1 MANUFACTURER / CLADDING MATERIALS

.1 Drawings and specifications for Work of this Section are based on a cement fibreboard horizontal lap siding and panel and trim board siding system as manufactured by James Hardie Building Products Inc.

.2 Products of other manufacturers of similar composition and profile, and conforming to the requirements of the drawings and specifications are also acceptable.

.3 Acceptable materials / manufacturers:

.1 “HardieZone HZ5” Series as manufactured by James Hardie Building Products Inc.

.2 Alternate approved by Consultant.

.4 Acceptable materials / profiles:

.1 Horizontal Lap Siding: “HardiePlank Beaded Cedarmill” Series, 5/16” (8 mm) thick x 12’-0” (3660 mm) long x 8-1/4” (210 mm) panel width with 7” (178 mm) exposure.

.2 Siding Panels: “HardiePanel Smooth” Series, 5/16” (8 mm) thick x 4’-0” (1200 mm) wide x panel length to suit exposures and minimize panel joints.

.3 Soffit Panels: "HardieSoffit Non-Vented Smooth" Series, 1/4" (6 mm) thick x 2'-0" (610 mm) wide x panel length to suit exposures and minimize panel joints.

.3 Trim Boards: "HardieTrim Smooth" Series, 3/4" (19 mm) thick x 12'-0" (3660 mm) long x 3-1/2" (89 mm) wide; as detailed.

2.2 FACTORY FINISH

.1 All cement fibreboard siding and trim products shall be provided with a factory applied baked on "ColorPlus Technology" series paint system in colours as selected by Consultant from manufacturer's complete range.

2.3 FURRING AND FRAMING SUPPORT SYSTEM

.1 Refer to the requirements of Section 06 10 53 – Miscellaneous Rough Carpentry.

2.4 FASTENERS

.1 Support System Fasteners: concealed fasteners shall be stainless steel with hex head.

.2 Wood Framing: 10-12 1-1/2 inch long x 0.47 inch HD low profile Torx (T20W) (TW-S- D12-4.8x38)

.3 Face Nailing: Use a powder coated colour-matched stainless steel screw for the face nail areas only. Acceptable material: TW-S 300 series austenitic stainless steel cladding fastener by SFS intec, Inc.

.4 Siding and Trim Fasteners: minimum No. 8, self-drilling, stainless steel, countersunk screws as recommended by cement fibreboard siding and trim manufacturer. **Factory finish to match siding and trim colours selected. Field touch-up as required to suit.**

.5 Existing Wood Strapping: refer to the requirements of Section 06 10 53 – Miscellaneous Rough Carpentry.

2.5 PREFINISHED METAL FLASHINGS AND TRIM MATERIALS

.1 Refer to the requirements of Section 07 62 00 – Sheet Metal Flashing and Trim.

2.6 SEALANTS

.1 Refer to the requirements of Section 07 92 00 – Joint Sealants.

Part 3 Execution

3.1 EXAMINATION

.1 Do not begin installation until substrates have been properly prepared.

.2 If framing preparation is the responsibility of another installer, notify Consultant of unsatisfactory preparation before proceeding.

3.2 PREPARATION

.1 Clean surfaces thoroughly prior to installation.

.2 Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 SIDING AND TRIM INSTALLATION

.1 Install materials in strict accordance with manufacturer's installation instructions. Installation shall be by skilled mechanics, and in strict accordance with system manufacturer's printed directions.

.2 Install a minimum 1/4” (6 mm) thick lath starter strip at the bottom course of the wall. Apply planks horizontally with minimum 1-1/4” (32 mm) wide laps at the top. The bottom edge of the first plank overlaps the starter strip.

.3 Allow minimum vertical clearance between the edge of siding and any other material in strict accordance with the manufacturer’s installation instructions.

.4 Align vertical joints of the planks over framing members.

.5 Maintain clearance between siding and adjacent finished grade.

.6 Locate splices at least one stud cavity away from window and door openings.

.7 Secure to framing members with fasteners recommended by manufacturer and to satisfy engineered design criteria.

.8 Place siding fasteners no closer than 3/8” (9.5 mm) from panel edges and 2” (51 mm) from panel corners.

.9 Place trim fasteners no closer than 3/4" (19 mm) and no further than 2” (51 mm) from side edge of trim board and no closer than 1” (25 mm) from end. Fasten maximum 16” (406 mm) on center.

.10 Allow 1/8” (3 mm) gap between trim and siding as recommended by manufacturer. Seal gap with high quality, paint-able caulk installed in accordance with the requirements of specification Section 07 92 00, Joint Sealants.

.11 Cladding system shall be installed plumb, straight and true to adjacent work. Co-operate with other trades to ensure proper installation and anchorage of this Work.

3.4 PROTECTION

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

.2 Repair damage to adjacent materials caused by mineral fibre reinforced panel installation.

3.5 CLEANING

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

.1 Wash down exposed acrylic exterior surfaces using solution of mild domestic detergent in warm water, applied with soft clean wiping cloths.

.2 Wash down exposed aggregate exterior surfaces using fine water spray.

.3 Remove excess sealant with recommended solvent.

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

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 Canadian General Standards Board (CGSB)

.1 CGSB 37-GP-54M, Roofing and Waterproofing Membrane, Sheet-Applied, Flexible, Polyvinyl Chloride.

.2 CGSB 37-GP-55M, Application of Sheet-Applied, Flexible, Polyvinyl Chloride Roofing Membrane.

1.2 QUALIFICATIONS

.1 Apply roofing flashing membranes employing only skilled workers having experience in the work specified, and having an understanding of the design principles of the materials which they are providing.

.2 Only Contractors accredited in writing by the manufacturer, with a minimum five (5) years experience and who are skilled in PVC sheet membrane roofing work and waterproofing will be acceptable. If requested submit certification from manufacturer as proof of compliance to this requirement.

.3 A representative of the membrane manufacturer shall visit Site on the day the work of this Section is commenced and periodically thereafter, and shall ensure the work is properly performed. Upon completion of the work of this Section, the manufacturer's representative shall inspect the roof and certify, in writing, that all work has been executed in strict accordance with the contract documents and the membrane manufacturer's requirements.

.4 There shall be no deviation made from the contract documents without prior written approval by the Consultant and the membrane manufacturer. Inform the Consultant promptly, in writing, of any problems.

1.3 DESCRIPTION / SCOPE OF MEMBRANE FLASHING WORK

.1 Work of this Section shall include, but not necessarily be limited to, the following:

.1 localized removals / modifications to the existing parapet flashings and installation of new fully adhered PVC membrane flashings at the existing roofing areas, as required, to suit the new cladding system installations as detailed.

.2 Installation of flat stock metal roof flashing material supplied by others.

1.4 DELIVERY, STORAGE AND HANDLING

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

.2 Package and store roofing materials identified with attached labels of the manufacturer, showing brand, contents, weight as applicable, and product and specification numbers.

.3 Handle all materials to prevent damage. Place all materials on pallets and fully protect from moisture.

.4 Membrane rolls shall be stored lying down on pallets and fully protected from the weather with clean canvas tarpaulins. Unvented polyethylene tarpaulins are not accepted due to the accumulation of moisture beneath the tarpaulin in certain weather conditions that may affect the ease of membrane weldability.

.5 All adhesives shall be stored at temperatures between 5º C (40º F) and 27º C (80º F).

.6 All flammable materials shall be stored in a cool, dry area away from sparks and open flames. Follow precautions outlined on containers or supplied by material manufacturer / supplier.

1.5 ENVIRONMENTAL CONDITIONS

.1 Do not apply any part of the roofing flashing system over damp materials, nor during a period of damp weather.

.2 Apply roofing materials only when air and surface temperature are above 4°C, have been so for at least 48 hours, and are not likely to go below 4°C until work is completed.

.3 Proceed with winter work during the months of November to March inclusive, and otherwise when temperatures are below 4°C, only with the mutual documented agreement of Contractor and manufacturer of modified bitumen flashing membrane that with materials and methods used, specified installation under conditions of warranty will be successfully achieved.

1.6 COMPATABILITY

.1 Compatibility between components of roofing system is essential. Materials to be incorporated into the system must be compatible.

.2 PVC membranes are incompatible with asphalt, coal tar, heavy oils, solvents, roofing cements, bituminous materials, creosote and some preservative materials. Such materials shall not remain in contact with PVC membranes. Provide separation strips, as required, between incompatible materials to maintain integrity of air/vapour barrier membranes. Consult membrane manufacturer regarding compatibility, precautions and recommendations.

.3 Provide a written declaration to Consultant stating that the materials and components, as assembled in the roofing system, are compatible with each other as well as adjacent materials.

1.7 EXTENDED WARRANTY

.1 Submit warranties in accordance with Section 01 78 00 - Closeout Submittals covering the repair or replacement of defective work from the expiration of the standard one (1) year warranty included in the Contract as defined in the General Conditions.

.2 Leaking, failure to stay in place, undue expansion, deformation, cracking, and splitting seams will be judged as defective work.

.3 Total workmanship warranty period shall be two (2) years.

.4 Submit ten (10) year manufacturer’s warranty covering the repair or replacement of any portion of the roofing and waterproofing membrane resulting from defects in the manufacture of the membrane materials.

.5 Manufacturer's warranty shall cover labour and materials and include repair and replacement, to extent required, of all work of this Section in event of leaks or other failure if such failure results from defects and deficiencies of membrane and flashings.

Part 2 Products

2.1 MANUFACTURE

.1 Drawings and specifications for work of this Section are based on a single ply, mechanically fastened, PVC sheet membrane roofing system as manufactured by Sarnafil Canada Ltd.

2.2 PVC MEMBRANE ROOF FLASHINGS

Polyvinyl chloride (PVC), non-woven glass fibre reinforced membrane, minimum 48 mil (1.2 mm) thickness, ultraviolet radiation resistant, complete with lacquer based dirt repellent top coating.

.2 Membrane shall conform to the requirements of CGSB 37-GP-54M Standard for Roofing and Waterproofing Membrane, Sheet-Applied, Flexible, Polyvinyl Chloride, Type 2, Class B.

.3 Acceptable Materials: "G410-12 Flashing Membrane" as manufactured by Sarnafil or alternate approved by Consultant.

.4 Membrane Colour: white to match existing.

2.3 SEPARATION SHEET

.1 Solvent-based, reactivating-type adhesive used to attach the flashing membrane to the substrate, either horizontally or vertically. Adhesive shall also be as recommended by manufacturers of materials being adhered and for use under climatic conditions to be encountered.

.2 Acceptable Material: "Sarnacol 2170 Adhesive" as manufactured by Sarnafil or alternate approved by Consultant.

2.4 MEMBRANE ADHESIVE

.1 For interfacing with bituminous materials, air/vapour barriers and other incompatible materials shall be asphalt-resistant, glass fibre reinforced membrane.

.2 Acceptable Material: "G459-15" as manufactured by Sarnafil or alternate approved by Consultant.

2.5 PRIMERS

.1 As recommended by roofing membrane manufacturer, to condition surfaces and promote adhesion of roofing components.

2.6 MECHANICAL FASTENING BARS AND ACCESSORIES

.1 Fastening bars shall be pre-manufactured galvanized steel bar, minimum 14 gauge (2.0 mm) thick , coating designation G90 commercial, with slot holes at 1" (25 mm) o.c.

.2 In general, all fastening bars, fasteners, anchors, nails and straps, sealing tapes shall be zinc or cadmium plated steel, galvanized or stainless steel and as recommended by manufacturer.

.3 Mixing metal types and methods of contact shall be assembled in such a manner as to avoid galvanic corrosion. Fasteners for attachment of metal to masonry shall be expansion type fasteners with stainless steel pins. All concrete fasteners and anchors shall have a minimum embedment of 1-1/4" (32 mm) and shall be approved for such use by the fastener manufacturer. All miscellaneous wood fasteners and anchors used for flashings shall have a minimum embedment of 1" (25 mm) and shall be approved for such use by the fastener manufacturer.

2.7 METAL PARAPET FLASHINGS

.1 Refer to the requirements of Section 07 62 00 – Metal Flashings and Trim.

Part 3 Execution

3.1 EXAMINATION

.1 Verify that surfaces and conditions are ready to accept the Work of this section.

3.2 APPLICATION - GENERAL

.1 Apply roofing materials in accordance with drawings, specifications, material manufacturer's printed directions, and requirements of Jurisdictional Authorities.

.2 Prime sheathing, wood, concrete, masonry or metal surfaces as required and/or recommended by membrane manufacturer.

3.3 MEMBRANE FLASHING APPLICATION

.1 Flashing shall be adhered to compatible, dry, smooth, and solvent-resistant surfaces. Use caution to ensure adhesive fumes are not drawn into the building. All flashings shall be installed concurrently with the roof membrane as the job progresses. Provide temporary flashings, as required, to suit construction sequencing. If any water is allowed to enter under the newly completed roofing, the affected area shall be removed and replaced at the contractor's expense.

.2 Over the properly installed and prepared flashing substrate, adhesive shall be applied in accordance to manufacturer's instructions. The adhesive shall be applied in smooth, even coats with no gaps, globs or similar inconsistencies. Only an area that can be completely covered in the same day's operations shall be flashed. The bonded sheet shall be pressed firmly in place with a hand roller.

.3 No adhesive shall be applied in seam areas that are to be welded. All panels of membrane shall be applied in the same manner, overlapping the edges of the panels as required by welding techniques.

.4 Install fastening bars in accordance with manufacturer's instructions with approved fasteners into the structural deck at the base of parapets, walls and curbs.

.5 All flashing membranes shall be consistently adhered to substrates. All interior and exterior corners and miters shall be cut and hot-air welded into place. No bitumen shall be in contact with the membrane.

3.4 METAL PARAPET FLASHINGS

.1 Install in accordance with the requirements of Section07 62 00 – Metal Flashings and Trim.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 06 10 00 – Miscellaneous Rough Carpentry

.2 Section 07 21 13 - Board Insulation

.3 Section 07 21 13 – PVC Membrane Roof Flashings

.4 Section 07 44 56 – Mineral Fiber Reinforced Cementitious Cladding

.5 Section 07 92 00 – Joint Sealants

1.2 REFERENCE STANDARDS

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

.1 ASTM A446/A446M-91, Specification for Steel Sheet, Zinc Coated (Galvanized) by the Hot Dip Process, Structural, Physical Quality

.2 ASTM A525M-91b, Specification for General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process Metric

1.3 QUALITY ASSURANCE

.1 Metal flashing and trim shall be installed by the manufacturer's construction forces or by an accredited installer approved by the siding manufacturer.

1.4 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 flashing and trim materials and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

.1 Clearly indicate type of metal cladding being supplied, wall elevations, materials, gauges, profiles, trim and closure pieces, flashings, dimensions, layouts, types and locations of fastenings and installation details. Indicate provisions for structural and thermal movement between metal cladding, structural systems and other adjacent materials.

.4 Samples:

.1 Submit duplicate samples of each product specified, complete with two complete sets of color chips representing manufacturer's full range of available colors and patterns.

1.5 DELIVERY, STORAGE AND HANDLING

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

.2 Protect the work of this Section from damage. Protect other work from damage resulting from this work. Damaged work which cannot be satisfactorily repaired shall be replaced at no additional cost to the Parks Canada Agency (PCA).

.3 Store materials on site in a manner to prevent damage thereto, or deterioration of finish. Galvanized surfaces which show evidence of "white rust" will not be accepted.

.4 Stockpile panels tilted to provide water run-off, free from ground contact on firm, level, non-staining supports extending full width of sheet and spaced not more than 18” (450 mm) apart. Cover components with opaque polyethylene sheet to protect from direct sunlight and moisture penetration. Vent to allow air movement.

.5 Conduct transport of materials to the job site storage compound in such a manner to prevent in-transit damage. These measures shall include, but not limited to crating, polyethylene wrapping system, etc.

Part 2 Products

2.1 ACCEPTABLE MANUFACTURER'S UNLESS SPECIFIED OTHERWISE

.1 Products of the following manufacturers conforming to the requirements of the specifications and drawings are acceptable:

.1 Agway Metals Inc.
.2 Canadian Metal Rolling Mills
.3 Flynn Metals
.4 Ideal Roofing
.5 Peerless Enterprises
.6 VicWest Steel
.7 Alternate approved by Consultant

2.2 METAL FLASHINGS AND TRIM - GENERAL

.1 Metal flashings and trim materials shall be formed of structural quality, zinc coated sheet steel, commercial quality conforming to ASTM A446.

.2 Core nominal thickness of bare metal: minimum 26 gauge (0.6 mm).

.3 Zinc coating: to ASTM A525, latest edition, zinc coating designation (both sides) Z275; match Stelco Minimized Spangle Coating.

.4 Isolation coating: alkali resistant bituminous paint. Panel surfaces to be colour coated on exterior face and wipe coat galvanized on interior face to manufacturer's standard.

.5 Flashing Cleats and Starter Strips: minimum 16 gauge (0.06”) (1.6 mm) thick zinc coated steel, minimum 2” (50 mm) wide; starter strips continuous.

2.3 PAINTED FINISHES

.1 Prior to fabrication, all preformed galvanized steel exterior face sheets, soffit sheets and all related trim and accessories shall be cleaned and pre-treated prior to application of an inhibitive primer and shall receive a factory applied paint finish or coating system. Colour shall be selected by Consultant at later date from manufacturer's standard range. Acceptable materials:

.1 Stelcolour 8000 Series

.2 Valspar Perspecta & Weather

.3 Valspar Perspecta & Weather

.4 Alternate approved by Consultant

2.4 FASTENERS

.1 Concealed fasteners shall be stainless steel with hex head. Exposed fasteners shall be stainless steel hex head with neoprene bond washer complete with nylon covered heads in colour to match colour of metal flashings and trim.

2.5 MINERAL FIBER REINFORCED CEMENTITIOUS CLADDING

.1 Refer to the requirements of Section 07 44 56– Mineral Fiber Reinforced Cementitious Cladding.

2.6 PLYWOOD, WOOD FURRING AND STRAPPING

.1 Refer to the requirements of Section 06 10 53 – Miscellaneous Rough Carpentry.

2.7 WOOD FIBREBOARD INSULATION

.1 Refer to the requirements of Section 07 21 13 - Board Insulation.

2.8 PVC MEMBRANE ROOF FLASHINGS

.1 Refer to the requirements of Section 07 54 00 – PVC Membrane Roof Flashings.

2.9 SEALANTS

.1 Refer to the requirements of Section 07 92 00 – Joint Sealants.

Part 3 Execution

3.1 CO-OPERATION AND CO-ORDINATION

.1 Co-operate with all trades to ensure rapid installation of metal panels and flashings as soon as preceding work is ready to receive same.

.2 Give timely instructions and information in writing of the requirements necessary for surfaces, materials or bases prepared and/or supplied by other trades which will affect the work of this Section.

.3 This Contractor shall bear the cost of any cutting, patching or making good required as a result of failure to carry out the provisions of this Clause.

3.2 FABRICATION

.1 Fabricate all sheet metal material for flashings, closures and accessories for panels to the same material, gauge and finish as the exterior panels unless otherwise specified or called for on the drawings. Form bends sharp and true.

.2 Fabricate to conform to reviewed shop drawings, and to allow for structural movement within system.

.3 Fabricate flashings and trim to prevent entry of water into building and from collecting within wall assembly.

3.3 SHEET METAL FLASHINGS, CLOSURES AND TRIM - GENERAL

.1 Fabricate metal flashings and sheet metal work to profiles as indicated or detailed. Sheet metal work shall be watertight under all conditions.

.2 Install sheet metal work with concealed fastenings. Exposed fastenings will be permitted only with approval of Consultant, when concealed fastenings are impossible. If used, install to a weathertight condition, and evenly and neatly locked. Do not use pop rivets.

3.4 PARPAET FLASHINGS

.1 Provide continuous starter strips to present true leading edge. Anchor to backup to provide rigid, secure installation. Conceal fastening.

.2 In general, join sheet metal by "S" seams, to permit thermal movement. Fill all joints with sealant as flashing is being installed. Subsequent to installation clean off all excess visible material. Space joints evenly where exposed, or as otherwise shown on drawings or approved by the Consultant. Lock seam and seal. Make corners by means of raised lock seams. Locate joints at 8’-0” (2440 mm) maximum spacing. Make allowance for expansion at joints.

.3 Make surfaces free from distortions, buckling, warp, wave, dents, oil canning or other defects detrimental to appearance or performance. Make corners square and surfaces straight and in true planes.

.4 Double back exposed edges on underside at least 1/2” (12.7 mm) for appearance and stiffness. Dovetail, mitre, lock joint and seal corners. Apply sealant to all open sheet metal joints and at juncture with other materials.

.5 Provide underlay or isolation coating to sheet metal surfaces that come into contact with masonry, concrete or another kind of metal.

.6 Prepare and touch up all scratches on pre-painted finish with air drying formulation of the coil coating paint. Replace material at no cost to the Parks Canada Agency (PCA), if touching up is not acceptable to the Consultant.

3.5 CLEANING

.1 Upon completion of the installation, clean down all metal flashings and trim and leave all work installed under this section clean.

.2 Use only cleaning agents recommended by the cladding manufacturer.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 ASTM International

.1 ASTM C790-90, Recommended Practices for Use of Latex Sealing Compounds

.2 ASTM C804-83, Standard Practices for Use of Solvent-Release Type Sealant

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-19.13-M87, Sealing Compound, One-Component, Elastomeric, Chemical Curing

.2 CAN/CGSB-19.17-M90, Sealing Compound, One-Component, Acrylic Emulsion Base

.3 CAN/CGSB-2-19.24-M90, Sealing Compound, Multi-Component, Chemical Curing

1.2 QUALITY ASSURANCE

.1 Have work performed by a recognized established caulking and sealing contractor having previous experience and with skilled workers thoroughly trained and competent in the use of caulking and sealing equipment and the specified materials.

1.3 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 the sealants and caulking proposed.

.2 Submit manufacturer's name for each compound which will be used on project before commencing work.

.3 Samples:

.1 Prepare sample joints at site of each type of caulking and sealant for each joint condition. Do not proceed with work until each sample joint has been approved by Consultant.

.2 Approved joints shall represent minimum acceptable for work.

1.4 JOB CONDITIONS

.1 Apply materials only to completely dry surfaces, and at air and material temperatures above minimum established by manufacturer's specifications.

.2 The applicator is responsible for ensuring the sealants are applied under acceptable conditions. Substrate temperatures of less than 4°C require special considerations, to ensure a clean, dry substrate and proper sealant wet-out.

.1 The substrate to which sealant is to be applied should be dry. This is particularly crucial where the substrate is porous and subject to water absorption. Although the joint interface may appear to be dry, the substrate below the immediate joint surface may still be moist. This moisture can migrate rapidly to the joint surface thereby contaminating any preparation.

.2 Use a quick flashing solvent such as methyl-ethyl-ketone (MEK) or xylol to clean the substrates. Ensure that the substrates and/or any coatings on the substrate are compatible.

.3 After solvent cleaning, wipe the joint interfaces dry with a second clean rag.

.4 Immediately following cleaning, install the sealant and tool it.

Part 2 Products

2.1 SEALANT MATERIALS - GENERAL

.1 Do not use caulking that emits strong odours, contains toxic chemicals or is not certified as mould resistant in air handling units.

.2 When low toxicity caulks are not possible, confine usage to areas which off gas to exterior, are contained behind air barriers, or are applied several months before occupancy to maximize off gas time.

.3 Where sealants are qualified with primers use only these primers.

.4 Labels indicating conformance to specified reference specifications will be acceptable as verification that contents meet specified requirements. Colour will be selected by Consultant from manufacturer's standard range. Colours shall match surface on which it occurs unless noted otherwise.

.5 Sealants shall be non-bleeding and capable of supporting their own weight. All caulking, sealants, cleaning solvents, fillers and primers shall be compatible with each other.

2.2 SEALANT TYPE A – URETHANE BASED

.1 Exterior, non-traffic bearing, weather side of construction: multi-component modified urethane base chemical curing conforming to CAN/CGSB-19.24-M, Type 2, Class B or one component modified urethane base chemical curing conforming to CAN/CGSB-19.13-M, Class MCG-2-25-B-N, in colours as selected by the Consultant.

.2 Acceptable Materials:

.1 ‘Dymeric 240’ or ‘Dymonic’ as manufactured by Tremco Limited,

.2 ‘Sikaflex 2C NS’ or ‘Sikaflex 1a’ as manufactured by Sika Canada Inc.

.3 ‘540 Single Component Polyurethane’ as manufactured by 3M,

.4 ‘PL S40 Polyurethane’ as manufactured by Loctitie,

.5 Alternate approved by Consultant.

2.3 SEALANT TYPE B – ACRYLIC LATEX BASED

.1 Interior, non-traffic bearing: one (1) component, interior acrylic latex emulsion base, conforming to CAN/CGSB-19.17-M.

.2 Acceptable Materials:

.1 'Alex Plus' as manufactured by DAP

.2 'Parr-crylic' as manufactured by Loctite Canada Inc.

.3 'Tremflex 834' as manufactured by Tremco Limited

.4 Alternate approved by Consultant

2.4 PRIMERS

.1 Specifically designed for use with sealants on surfaces encountered, compatible with joint forming materials and as recommended by sealant manufacturer, to assure adhesion of sealants and to prevent staining of substrate material.

2.5 SEALANT BACKING

.1 Extruded or preformed, compressible, resilient, non-waxing, non-extruding, non-staining strips of closed cell polyethylene or urethane foam rod, diameter 25% wider than joint width. Sizes and shapes to suit various conditions and manufactured especially for caulking purpose.

.2 Backing shall be compatible with sealant, primer and substrate. Ensure that sealant backing is not cut nor punctured during installation.

2.6 BOND BREAKER

.1 Tape of type supplied or recommended by sealant or caulking manufacturer.

2.7 CLEANING MATERIAL

.1 Non-corrosive, non-staining, solvent type, xylol, methyl-ethyl-ketone (MEK), toluol, isopropyl alcohol (IPA) or as recommended by sealant manufacturer and acceptable to material or finish manufacturers for surfaces adjacent to sealed areas.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for joint sealants installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Consultant and/or PCA Representative or Delegate.

.2 Inform Consultant and/or PCA Representative or Delegate 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 Consultant and/or PCA Representative or Delegate.

3.2 SURFACE PREPARATION

.1 Examine joint sizes and conditions to establish correct depth to width relationship for installation of backup materials and sealants.

.2 Clean bonding joint surfaces of harmful matter substances including dust, rust, oil grease, and other matter which may impair Work.

.3 Do not apply sealants to joint surfaces treated with sealer, curing compound, water repellent, or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.

.4 Ensure joint surfaces are dry and frost free.

.5 Prepare surfaces in accordance with manufacturer's directions.

3.3 PRIMING

.1 Where necessary to prevent staining, mask adjacent surfaces prior to priming and caulking.

.2 Prime sides of joints in accordance with sealant manufacturer's instructions immediately prior to caulking.

3.4 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.

3.5 MIXING

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

3.6 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.

3.7 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.

3.8 PROTECTION

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

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

3.9 SCHEDULE

.1 General: use one (1) of the sealants specified for each type in the following locations. Ensure sealant chosen (from several specified under each type under "MATERIALS") for each location is recommended by manufacturer for use for conditions encountered.

.2 Sealant Type A – Urethane Based: install in the following exterior locations:

.1 Joints between exterior hollow metal door frames and adjacent wall assemblies and metal cladding or panels in exterior wall construction.

.2 Joints between cement fibreboard cladding system as detailed, or recommended by cladding manufacturer.

.2 All other exterior locations where sealing is required or noted on Drawings, except where sealing is specified in other Sections.

.3 Sealant Type B - Acrylic Latex Based: install in the following interior locations:

.1 Joints between interior hollow metal door frames and adjacent wall / partition construction.

.2 Joints between fiberglass windows and aluminium entrance framing and adjacent wall construction.

END OF SECTION

Part 1 General

1.1 GENERAL REQUIREMENTS

.1 Division One, General Requirements is part of this Section and shall apply as if repeated here.

1.2 REFERENCED STANDARDS

.1 Canadian Standards Association (CSA).

- .1 CSA A101-M1983, Thermal Insulation, Mineral Fibre, for Buildings.
- .2 CAN/CSA-G40.21-M92, Structural Quality Steels.
- .3 CSA W59-M1989, Welded Steel Construction (Metal Arc Welding).

.2 Canadian General Standards Board (CGSB).

- .1 CAN/CGSB-1.181-92, Ready-Mixed Organic Zinc-Rich Coating.
- .2 CGSB 41-GP-19Ma-84, Rigid Vinyl Extrusions for Windows and Doors.
- .3 CAN/CGSB-51.20-M87, Thermal Insulation, Polystyrene, Boards and Pipe Covering.
- .4 CGSB 51-GP-21M-78, Thermal Insulation, Urethane and Isocyanurate, Unfaced.

.3 American Society for Testing and Materials (ASTM).

- .1 ASTM A653-97 (M-97), Standard Specification for Steel Sheet, Zinc-Coated (Galvanized)or Zinc Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .2 ASTM A924-97 (M-97), Standard Specification for General Requirements for Steel Sheet Metallic-Coated by the Hot-Dip Process.
- .3 ASTM B29-92, Specification for Refined Lead.
- .4 ASTM B117-95, Method of Salt Spray (Fog) Testing
- .5 ASTM B749-85 (91), Specification for Lead and Lead Alloy Strip, Sheet and Plate Products.
- .6 ASTM E 152-81a, Methods for Fire Tests of Door Assemblies.
- .7 ASTM E 163-94a, Methods for Fire Tests of Window Assemblies.

.4 Underwriter's Laboratories of Canada (ULC).

- .1 CAN4-S104M-M80, Fire Tests of Door Assemblies.
- .2 CAN4-S105M-M85, Fire Door Frames.

.5 Canadian Steel Door and Frame Manufacturer's Association.

.1 CSDFMA, Specifications for Commercial Steel Doors and Frames, 1990.
.2 CSDFMA, Recommended Selection and Usage Guide for Commercial Steel Doors, 1990.

.5 National Fire Protection Association (NFPA).

.1 NFPA 80-1992, Fire Doors and Windows.
.2 NFPA 252-1990, Door Assemblies Fire Tests of.

1.3 REQUIREMENTS OF REGULATORY AGENCIES

.1 Steel Fire Rated Doors and Frames: labelled and listed by an organization accredited by Standards Council of Canada in conformance with CAN4 S104M and CAN4 S105M for ratings specified or indicated.

1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

.1 Brace frame units to prevent distortion in shipment, and protect finished surfaces by sturdy protective wrappings.

.2 Store doors in protective wrappings in a secure dry location, to ensure that they are not damaged until hung. Install them only when work has progressed to a stage when no damage will occur to them in place.

1.5 SHOP DRAWINGS

.1 Submit shop drawings in accordance with the requirements of specification Section 01 33 00, Submittal Procedures.

.2 Indicate materials and details in scale full size for head, jamb and sill, profiles of components, interior and exterior trim junction between combination units, elevations of unit, anchorage details, location of isolation coating, description of related components, and exposed finishes, fasteners, and caulking.

1.6 MOCK-UP

.1 Construct mock-up in accordance with the requirements of specification Section 01 45 00 – Quality Control.

.2 Construct mock-up of typical door and frame installation including finish hardware and interface with air / vapour barrier installation. Do not proceed with installations until mock-up reviewed by Consultant.

Part 2 Products

2.1 MATERIALS

.1 Steel: commercial grade, tension levelled steel to ASTM A924-97 (M97), galvanized to ASTM A653-97 (M97), coating designation ZF75 (A25) typical **and Z275 (G90) in exterior locations.**

.2 Doors and Panels:

.1 Facings, rails, stiles: 5/64" (1.2 mm) (18 ga.) base steel thickness.
.2 Interior Stiffeners: 0.914 mm base steel thickness.
.3 Hardware Reinforcement: 1/8" (3 mm) base steel thickness.
.4 Sound Deadening and Insulating Material: semi-rigid fibreglass 24 kg/m3 minimum density, to fill core space. Honeycomb structural core consisting of kraft paper with 3/4" (19 mm) cells x core thickness may be used at interior locations.
.5 Glazing Stops: 1/16" (1.6 mm) base steel thickness, formed, drilled and countersunk for fasteners.

.3 Frames:

.1 Steel: 1/16" (1.6 mm) (16 ga.) base thickness.
.2 Hardware Reinforcement: 1/8" (3 mm) base steel thickness.
.3 Mortar Guards: 0.762 mm base steel thickness.
.4 Rubber Bumpers: Glynn-Johnson GJ64 or approved equivalent.

.4 Anchors:

.1 Frames in Masonry: adjustable "T" strap anchors.
.2 Labelled Frames: to conform to ULC requirements.
.3 Frames in Gypsum Board Partitions: steel anchor clips and floor anchors of suitable design securely welded inside each jamb.
.4 Anchorage to Floor: minimum 1/8" (3 mm) thick clip angles with 2 holes for expansion bolting to floor.

.5 Galvanizing:

.1 Typical interior units: steel sheet galvanized to ASTM A653-97 (M97), coating designation ZF75 (A25), to a total mass coating of 120 g/m2, both sides.
.2 Exterior units, and interior units in unheated areas: steel sheet galvanized to ASTM A653-97 (M97), coating designation Z275 (G90), to a total mass coating of 275 g/m2, both sides. Mill phosphatize to provide for good paint adhesion.

2.2 FABRICATION - GENERALLY

.1 Fit and assemble work in the shop, where possible. Make trial assembly in shop when

not possible.

.2 Fabricate, reinforce and anchor component parts and assemblies to support loads that usage will impose without deflection detrimental to function, appearance or safety. For interior doors either the use of metal stiffeners with the spaces between stiffeners filled with insulation, or honeycomb structural core will be acceptable. For exterior doors the core is to be completely filled with insulation.

.3 Reinforce components to resist in-use stresses imposed by finishing and security hardware.

.4 Prepare frames and doors for finish hardware with mortises and reinforcement. Drill and tap to template information. Reinforce for surface-mounted hardware and for door closer brackets. Provide for concealed door closers where specified. Install mortar guards at cut-outs and reinforcing plates in frame. For cylindrical locks install reinforcing units to lock manufacturer's specification. For mortise locks provide a suitable internal bracket to hold the lock case rigidly in the centre of the door.

.5 Provide for anticipated expansion and contraction of frames and supports.

.6 Fit elements at intersections and joints accurately together in true planes, plumb and level.

.7 Weld frame and door assemblies. Weld continuously at joints exposed to view including door edge seams, or at joints through which air or water could penetrate from the exterior of the building to the interior. Seams shall be welded, filled and sanded flush.

.8 Where welding is impossible, connections may be bolted. Ream drilled holes and leave exposed edges clean and smooth.

.9 Isolate from each other dissimilar metals and metal from concrete or masonry, to prevent electrolysis.

.10 Ensure that exterior doors and frames are tightly fitted, and that entry of water is prevented by drips on head frames of outswinging doors exposed to weather.

.11 Make allowance in frames and doors to receive electrical conduits for security strikes and contactors which may be installed in doors and frames. Provide electrical conduit protection mortar boxes to receive conduit for electric strikes, locks, door closers, and hinges as detailed.

2.3 DOOR AND SCREEN FRAMES

.1 Fabricate frames to details shown on Drawings using welded construction.

.2 Fabricate steel frames in minimum base steel thickness specified. Minimum frame

material thickness applies only to work which does not otherwise require heavier gauges to meet specified fire-rated construction.

.3 Touch up frames in the factory where coating has been removed.

.4 Where members join at corners, cut mitres and weld continuously along inside welding.

.5 Where tubular transoms or mullions meet frame members, joint by butt welding.

.6 Attach two channel spreaders at bottom of door frames to maintain square alignment. Provide removable attachment for spreaders on frames that to not extend below finished floor, and remove them after frames are built in.

.7 Incorporate structural stiffeners for frame members where required to withstand loadings. Securely anchor them at bottom and top. Where they extend above ceiling, anchor them to concrete or structural framing to suit site conditions and in such a way that load from the structure is not transferred to the frames.

.8 Install three rubber bumpers in latch side stops of each interior door frame. Locate lowest bumper 9” (230 mm) above bottom of door.

.9 Backpaint exterior frames and frames to unheated areas where in contact with masonry or concrete or other dissimilar materials.

.10 Fabricate glass stops for non-rated screens the same as specified for glass stops for doors. Fabricate glass stops for fire rated screens 3/4” (19 mm) wide and of 1.35 mm thick sheet steel.

.11 Note all exterior doors on the Door Schedule shall have insulated frames. Fill these frames with fibreglass or foamed in place polyurethane insulation.

2.4 DOORS AND PANELS

.1 Fabricate interior and exterior doors and panels with sheet steel in specified base steel thickness.

.2 Minimum panel thickness applies only to doors not otherwise requiring heavier gauges to meet specified fire-rated construction.

.3 Fabricate doors with faces true and smooth, and with no dimples or welds visible.

.4 Bevel edges of stiles to suit door swing.

.5 Locate hardware to Canadian Steel Door & Frame Manufacturer's Association Standard, unless shown otherwise on Drawings or Door Schedule.

.6 Fill solid all voids within doors and panels with insulation, or honeycomb core. For exterior doors and panels, fill voids with insulation.

.7 Fabricate muntins, removable stops, and glass mouldings of minimum 1.2 mm steel.

.8 Prepare doors to receive glass and grilles. Install grilles. Secure removable stops with countersunk Phillips oval head screws symmetrically spaced on stop lengths.

.9 Close top and bottom edges of exterior doors to make a weathertight seal, and doors to which the tops can be seen from stair landings or other high elevations, so that they are flush with face edges.

2.5 ANCHORS

.1 Provide frames for installation in masonry walls with the following number of anchors:

.1 Frames up to 7’-6” (2300 mm) height, 3 anchors;
.2 Frames 7’-6” (2300 mm) to 8’-0” (2400 mm), 4 anchors;
.3 Frames over 8’-0” (2400 mm), 1 anchor for each 2’-0” (600 mm) or fraction thereof in height over 8’-0” (2400 mm).

.2 Provide frames for installation in stud partitions with the following number of anchors:

.1 Frames up to 7’-6” (2300 mm height, 4 anchors;
.2 Frames 7’-6” (2300 mm) to 8’-0” (2400 mm),, 5 anchors; AND
.3 Frames over 8’-0” (2400 mm),, 5 anchors, plus 1 additional for each 2’-0” (600 mm) or fraction thereof in height over 8’-0” (2400 mm).

.3 Provide frames to be anchored to previously-placed concrete, masonry, or structural steel, with anchors of suitable design, as shown on reviewed shop drawings.

.4 Securely weld adjustable floor anchors to inside of each jamb profile, with two holes provided at each jamb for floor anchorage.

.5 Anchors shall have minimum gauges: "T" strap type, 1/16” (1.6 mm) "L" type, 3/64” (1.2 mm); wire type, 5/32” (3.9 mm) diameter; stirrup type, 1/16” (1.6 mm); stud type,

2.6 FINISHING

.1 Carbon Steel: clean and smooth work at welds which has been ground. Fill if necessary, and prime all areas from which zinc has been removed.

2.7 FIRE RATED HOLLOW METAL DOORS AND FRAMES

.1 Construct fire-rated doors and frames of ratings indicated, in accordance with ULC Section 120 IDO, and as otherwise required by Jurisdictional Authorities. Fire rated

screens containing doors shall be labelled (whole assembly).

.2 Ensure that hardware used meets requirements of ULC 120 ID16, and installed to NFPA 80 requirements.

.3 Doors and frames indicated as labelled shall have attached ULC labels. Attach labels on the inside of the hinge jamb midway between the top hinge and the head of the door frame. Where fire doors are shown in pairs swinging in the same or opposite directions they shall bear a ULC label of a category that does not require astragals.

Part 3 Execution

3.1 INSTALLATION

.1 Installation of the work of this Section is specified in other Sections.

END OF SECTION

Part 1 General

1.1 REFERENCED STANDARDS

.1 CAN/CGSB-12.1-M90 Tempered or Laminated Safety Glass

.2 CAN/CGSB-12.8-97, Insulating Glass Units

.3 CAN/CGSB-1.108-M89, Bituminous Solvent Type Paint

.4 CAN/CGSB 19.24-M90, Multi-component, Chemical-Curing Sealing Compound

.5 NAAMM AMP-501-88, The National Association of Architectural Metal Manufacturers, Finishes for Aluminum

1.2 DESIGN REQUIREMENTS

.1 The drawings and specifications do not intend to identify or solve the requirements of thermal, structural, vapour and air movement, methods of anchorage, and other requirements. The responsibility of performance rests solely with the aluminium door and screen manufacturer.

.2 Comply with the requirements of the National Building Code. Comply with the design and performance requirements specified in the building codes, and as specified in this Section, and design and engineer the work accordingly.

.3 The work shall have a method of attachment to the structure which shall take into account site peculiarities and so that there shall be no possibility of site and air vibrations or normal temperature movements of the building to loosen, weaken, and/or fracture the connection between the units and the structure or between the units themselves.

.4 Thermally break exterior frame members. Provide thermal breaks between exterior and interior components, insulate and isolate assemblies to provide total absence of condensation on interior metal or glass surfaces under maintained design conditions.

.5 All glass shall be tempered and conform to CAN/CGSB-12.1-M89, and CAN/CGSB-12.8-M89.

1.3 QUALITY ASSURANCE

.1 Qualification of Subcontractor: execute work of this Section using a fabricator and erector who has adequate plant, equipment and skilled tradesmen to perform work expeditiously, and is known to have been responsible for previous satisfactory installations. Submit proof of experience upon request of Consultant.

1.4 SHOP DRAWINGS

.1 Submit shop drawings in accordance with the requirements of specification Section 01 33 00, Submittal Procedures.

.2 Indicate materials and details in scale full size for head, jamb and sill, profiles of components, interior and exterior trim junction between combination units, elevations of unit, anchorage details, location of isolation coating, description of related components, and exposed finishes, fasteners, and caulking. Indicate location of manufacturer's nameplates.

.3 Submit catalogue details for each type of door and frame illustrating profiles, dimensions and methods of assembly.

1.5 SHOP DRAWINGS

.1 Submit samples in accordance with the requirements of specification Section 01 33 00, Submittal Procedures.

.2 Submit one 12’ x 12” (300 mm x 300 mm) corner sample of each type door and frame.

.3 Submit sample showing glazing detail, reinforcement, finish and location of manufacturer's nameplates.

.4 Frame sample to show glazing stop, door stop, jointing detail, finish and wall trim.

1.6 MAINTENANCE DATA

.1 Submit maintenance data in accordance with the requirements of specification Section 01 78 00, Closeout Submittals.

.2 Provide operation and maintenance data for cleaning and maintenance of aluminum finishes

1.7 EXTENDED WARRANTY

.1 Submit an extended warranty covering the maintenance, repair or replacement of defective work for a period of four (4) years from the expiration of the standard one (1) year warranty included in the Contract under the General Conditions.

.2 Structural failure, leaking, loosening, fading, discolouration, deforming and failure of glazing units shall be judged as defective work.

.3 Total warranty period shall be five (5) years.

Part 2 Products

2.1 ACCEPTABLE MANUFACTURERS

.1 Products and systems by other the following manufacturers, of similar profile, and conforming to all required design and performance requirements of the drawings and specifications are acceptable:

.2 Acceptable Manufacturers:

.1 Alumicor Limited

.2 Commercial Aluminum

.3 Kawneer Company Canada Limited

.4 Fulton Windows, Division of F.J. Fulton Industries Inc.

.5 A & D Prevost Inc.

.6 Windspec Inc.

.7 Alternate approved by Consultant

.2 All components, except glass products, shall come from a single source.

2.2 ALUMINUM ENTRANCE FRAMING

.1 Drawings and specifications for work of this Section are based on the Flushglaze BF 3400 Series thermally broken aluminum entrance door system, and the Flushglaze 800 Series non-thermally broken frames for interior screens, modified as indicated, as manufactured Alumicor Limited.

2.3 ALUMINUM ENTRANCE DOORS

.1 Drawings and specifications for work of this Section are based on the Insuldoor 600 Series thermally broken exterior entrance doors and Canadiana 600 Series interior vestibule doors, modified as indicated, as manufactured Alumicor Limited.

.2 Construct doors of porthole extrusions with minimum wall thickness of 1/8” (3 mm). Exterior door thickness shall be 2” (50.8 mm). Interior door thickness shall be 1-3/4” (44.5 mm).

.3 Fabricate doors to the following custom profiles and face sizes:

.1 Door Stiles: 5-3/4” (146 mm) wide minimum

.2 Top Rail: 5-5/8” (143 mm) high minimum

.3 Bottom Rail: 7” (178 mm) high minimum

.4 Intermediate Rail: as detailed

.4 Work of this Section shall be performed by the manufacturer and/or by a dealer / installer who is specifically authorized to represent, fabricate, install and provide extended warranties for the products and systems produced and engineered by the manufacturer.

.5 Note that basic and extended warranties are to be issued jointly by the manufacturer and by the dealer/installer on a "joint and several" basis. It shall not be permitted for the manufacturer to sell standard products to the dealer and then expect said dealer to engineer/modify/design/install warrant the entire system.

2.4 MATERIALS - GENERAL

.1 Aluminum Extrusions and Sheet: AA6063-T54 alloy for extrusions; AA alloy 3003-H14 for sheets and plates.

.2 Screws, Bolts, Nuts, Washers, Rivets, and Other Fastening Devices: stainless austenitic grade (300 Series) steel and of sufficient strength for the purpose.

.3 Isolation Coating: alkali resistant, bituminous paint conforming to CAN/CGSB 1.108.

.4 Weatherstrip: replaceable backed wool pile.

.5 Door Bumpers: black neoprene.

.6 Thermal Break: fabricate thermal break members of extruded PVC.

.7 Glazing Gaskets: exterior flexible tubular extruded EPDM, interior extruded polymer with integral spacer shim.

.8 Glazing Tape: 13/64" (5 mm) thick x height required 100% solid polyisobutylene-butyl, reinforced preformed tape with built in spacer.

.9 Setting Blocks and Spacer Shims: neoprene or oil-resistant rubber, as approved by glass manufacturer.

.10 Sealant: refer to Section 07 92 00 – Joint sealants.

2.5 GLAZING

.1 Typical Exterior Door and Screen Glazing:

.1 Hermetically sealed insulating glass conforming to CAN/CGSB-12.1 and CAN/CGSB-12.8 and IGMAC Certification Program. Units to have aluminum spacers, polyisobutylene primary seal and polysulphide or silicone secondary seal with 1/2" (12.7 mm) argon filled air space between inner and outer lites, using spacers of metal and sealant.

.2 Typical exterior glass lite shall be minimum 1/4" (6 mm) clear float glass, conforming to CAN/CGSB-12.1, and inner lite in minimum 1/4" (6 mm) clear float glass conforming to CAN/CGSB-12.1. Provide Low-E soft coating on # 2 surface. Total thickness of unit not less than 25 mm (1").

.3 Design all glass to comply with the requirements of CAN/CGSB-12.20. All glass shall be tempered.

.2 Typical Interior Door and Screen Glazing:

.1 Typical interior glass lite shall be minimum 1/4" (6 mm) clear float glass, conforming to CAN/CGSB-12.1.

.3 Design all glass to comply with the requirements of CAN/CGSB-12.20. All glass shall be tempered.

2.6 FABRICATION

.1 Structural performance shall be based on CSA Standard CAN3-S157 "Strength Design in Aluminum" and a maximum deflection of 1/175 of the span.

.2 Fabricate doors and screens to profiles and maximum face sizes indicated. Provide minimum 7/8" (22 mm) bite for insulating glazed units.

.3 Fit joints tightly and secure mechanically.

.4 Conceal fastenings.

.5 Mortise, reinforce, drill and tap doors, frames and reinforcements to receive hardware using templates provided under Section 08 71 00, Finish Hardware.

.6 Isolate aluminum from direct contact with dissimilar metals, concrete and masonry by means of a heavy application of isolation coating.

2.7 ALUMINUM FINISHES

.1 Finish exposed surfaces of aluminum doors, frames, screens, closures, panels and other exposed components in accordance with Aluminum Association Designation System for Aluminum Finishes.

.2 Factory finish all exposed aluminum surfaces with an anodic oxide treatment to obtain an Architectural Class 1 clear anodized finish in accordance with Aluminum Association Specifications. M12C22A31.

2.8 ISOLATION COATING

.1 Isolate aluminum from following components, by means of a heavy application of isolation coating:

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

.2 concrete, mortar and masonry, and

.3 wood.

2.9 FINISH HARDWARE

.1 Supply of finish hardware for aluminum entrance doors shall be supplied by Section 08 71 00, Finish Hardware, except as noted otherwise herein.

.2 Supply and install weatherstripping and door sweeps, for all exterior doors.

.3 Comply with all requirements of Section 08 71 00, Finish Hardware with respect to instructions, inspections, adjustment and rectification of defects.

.4 **Carefully salvage and re-install existing automatic door operators**.

Part 3 Execution

3.1 PRIOR INSPECTION OF THE STRUCTURE

.1 After lines and grades have been established, and before beginning installation in any area, examine all parts of the structure on which work of this section is to be placed in that area. Should any conditions be found which will prevent the proper execution of work, report such conditions in writing to the Consultant.

.2 Do not proceed with installation work until such conditions are corrected or adjusted to the satisfaction of the Consultant and the installation Contractor.

3.2 WORKMANSHIP

.1 Erect door and entrance framing plumb and true, in proper alignment and relationship to established lines and grades, as shown on reviewed shop drawings. Make the finished work rigid, neat in appearance, free from defects.

.2 Anchor the work to the existing structure by permanent methods, in strict accordance with reviewed shop drawings.

3.3 GLAZING

.1 Accurately measure glass openings and calculate glass size based on manufacturer's installation tables allowing for proper minimum edge engagement, rabbet width, rabbet depth, and expansion.

.2 Before glazing, verify openings to see that they are square, plumb, and in true planes. If found otherwise, do not proceed with glazing until proper corrections are made.

.3 Set insulating glass lites on setting blocks placed at 1/4 points from each corner of glass.

.4 Dry glaze by means of EPDM gaskets on interior and preformed glazing tape with built-in shim on exterior.

3.4 SEALANT AND AIR / VAPOUR SEALING

.1 Seal all joints required for a weatherproof installation and against air / vapour leakage. Use materials in strict accordance with the manufacturer's printed instructions, and apply only by mechanics specially trained or experienced in their use.

.2 Before applying sealants or sprayed-in-place urethane insulation air seal, completely remove all mortar, dirt, dust, moisture and other foreign matter from surfaces it will contact. Mask adjoining surfaces when required, to maintain a clean and neat appearance. Tool sealing compounds to fill the joint and provide a smooth finished surface.

3.5 CAULKING

.1 Apply sealant in accordance with the requirements of specification Section 07 92 00, Joint Sealants. Conceal sealant within units except where exposed use is permitted by Consultant.

3.6 CLEANING AND REPAIRING

.1 Remove damaged, dented, defaced, defectively-finished or tool-marked components and replace with new.

.2 Refinish shop-applied finishes in field only with approval of Consultant.

.3 Clean off dirt resulting from erection on surfaces exposed to view.

.4 Remove, as work progresses, all excess or foreign materials or droppings which would set or become difficult to remove from wall cladding surfaces at time of final cleaning.

.5 Before building is turned over to the Parks Canada Agency (PCA), remove temporary protection, clean and polish exterior and exposed interior surfaces of all work of this Section. Use proper cleaning materials and methods to prevent damage to surfaces, finishes, sealer or work of other trades. Make good such damage to Consultant's satisfaction.

.6 Do not use steel wool, wire brushes or steel scrapers on any finished surfaces.

.7 Upon completion of work of this Section replace or make good all defective, scratched or damaged work to Consultant’s satisfaction at no extra cost to the Parks Canada Agency (PCA).

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-12.1-M90, Tempered or Laminated Safety Glass

.2 CAN/CGSB-12.3-M91, Glass, Polished Plate or Float, Flat, Clear

.3 CAN/CGSB-12.8-M97, Insulating Glass Units

.4 CAN/CGSB-12.20-M89, Structural Design of Glass Buildings

.5 CAN/CGSB 19-GP-24-M90, Multi-component Chemical Curing Sealing Compound.

.6 CAN/CGSB-1.40-97, Anticorrosive Structural Steel Alkyd Primer

.2 Canadian Standards Association (CSA International)

.1 CAN/CSA-A440-M90, Windows

.2 CAN2-12.2-M76, Glass, Sheet, Flat, Clear

.3 CAN/ULC-S705.1-01, Standard for Thermal Insulation - Sprayed- Applied Rigid Polyurethane Foam – Medium Density – Material Specification

.3 Insulating Glass Manufacturer’s Association of Canada (IGMAC)

1.2 SUBMITTALS

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

.2 Provide shop drawings and product data in accordance with Section 01 33 00 - Submittal Procedures.

.1 Indicate materials and details in scale or full size for head, jamb and sill, profiles of components, interior and exterior trim junction between combination units, elevations of unit, anchorage and support details, location of isolation coating, description of related components, and exposed finishes, fasteners, and caulking.

.2 Employ the services of a professional structural engineer, licensed in the Province of Ontario to design support / suspension systems, fastenings, spacing of clips, and like conditions. Shop drawings shall bear the seal and signature of professional engineer.

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

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

.3 Provide samples in accordance with Section 01 33 00 - Submittal Procedures.

.1 Submit one (1) - 610 mm x 750 mm (24” x 30”) representative model of typical window.

.2 Include frame, sash, sill, vision glass, and weatherproofing method, insect screens, surface finish and hardware. Indicate location of manufacturer's nameplates.

.3 Include 150 mm (6") long samples of head, jamb, sill and meeting rail mullions to indicate profile.

.4 Provide test reports in accordance with Section 01 33 00 - Submittal Procedures.

.1 Submit report from an independent testing laboratory, indicating windows meet or exceed performance requirements of CAN/CSA-A440-00 with respect to air infiltration, wind load resistance, water tightness, ease of operation, load tests on screens, forced entry resistance and mullion deflection (for combined and composite windows) as specified herein.

.2 Additionally, submit report from an independent CSA accredited simulation lab indicating that the windows meet the energy efficiency requirements (U-value, SHGC, etc.).

.5 Provide maintenance data in accordance with Section 01 78 00 – Closeout Submittals.

.1 Provide maintenance data for cleaning and maintenance of finishes for incorporation into operating and maintenance manual.

1.3 MOCK-UP

.1 Provide mock-up of typical window unit installation in accordance with Section 01 45 00 – Quality Control.

1.4 DELIVERY, STORAGE AND HANDLING

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

.2 Identify each carton with material name, date of manufacture and lot number.

.3 Store windows and accessories off ground, under cover, protected from weather and construction activities.

1.4 WARRANTY

.1 Warrant work of this Section against defects and deficiencies for period of ten (10) years in accordance with General Conditions of the Contract.

.2 Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of Consultant and at no expense to Parks Canada Agency (PCA).

.3 Defects include but are not limited to failure of seal of enclosed air space, breakage of glass caused by frame distortions and thermal forces, loosening of fastenings and deposits on inner face of insulated glass units that are detrimental to vision.

Part 2 Products

2.1 DESIGN AND PERFORMANCE REQUIREMENTS

.1 Drawings and specifications for work of this Section are based on the "300 Awning" Series fixed and push-out casement type window products as manufactured by Fibertec Windows and Door Mfg. Products manufactured by Inline Fiberglass or alternates approved by Consultant are also acceptable, provided they conform to the requirements of the drawings and specifications.

.2 Window units shall meet or exceed the requirements of CAN/CSA A440-00 Windows and performance criteria indicated as follows:

.1 Air Leakage: A-3

.2 Water Leakage: B-7

.3 Windload Resistance: C-5

.4 Forced Entry Resistance: F-2

.2 All fiberglass extrusions shall be completely filled with polyurethane foam insulation.

.3 All fixed and awning window units shall be supplied in configurations indicated. **Field verify existing rough framing and trim prior to ordering new windows.**

.4 All window units shall be finished on exterior with **custom colour** baked acrylic polyurethane paint finish. The interior of the windows shall be "white".

2.2 GLAZING

.1 Typical glazing for exterior windows shall be argon gas filled double seal glass units, approximately 1" (25.4 mm) thick, with low E coating on the third surface and non-metallic / thermally-broken spacers, as indicated / scheduled, in accordance with the requirements of CAN2-12.8-M90 and IGMAC and as follows.

.1 North and East Elevations:

.1 Low E coating: soft coat

.2 Thermal spacers: non-metallic

.3 U-value: 0.180 Btu/h*ft2*F (1.02 W/m2*K)

.4 Visual transmittance: 0.39

.5 Energy efficiency rating: +31

.2 South and West Elevations:

.1 Low E coating: hard coat

.2 Thermal spacers: warm edge

.3 U-value: 0.220 Btu/h*ft2*F (1.32 W/m2*K)

.4 Visual transmittance: 0.42

.5 Energy efficiency rating: +35

.2 Provide with exterior dry glazed gaskets and co-extruded flexible vinyl seals on the interior.

.3 Design all glass to comply with the requirements of CAN/CGSB-12.20. Temper glass if required to meet size requirements.

2.3 BIRD PROTECTION GLAZING – ALTERNATE PRICE OPTION 1

.1 Alternate glazing for exterior windows shall be argon gas filled double seal glass units, minimum 1" (25.4 mm) thick, with a patterned, collision deterrence, ultra-violet (UV) reflective coating on the fourth surface and low E coating on the third surface complete with non-metallic / thermally-broken spacers, as indicated / scheduled in Paragraph 2.3 above, in accordance with the requirements of CAN2-12.8-M90 and IGMAC.

.2 Provide with exterior dry glazed gaskets and co-extruded flexible vinyl seals on the interior.

.3 Provide with inner pane of 5/16" (8 mm) laminated safety glass conforming to the requirements of CAN/CGSB-12.1-M90, Type 1. Glass shall have a clear PVB interlayer of 0.76 mm (0.03") thickness. Total glass thickness shall be approximately 1" (25 mm). Design all glass to comply with the requirements of CAN/CGSB-12.20. Temper glass if required to meet size requirements.

.4 Acceptable Product: "Ornilux Bird Protection Glass" as manufactured by Arnold Glas and distributed by Clearstream Architectural Products Ltd. (Tel. 1-905-570-3166).

2.4 BIRD PROTECTION GLAZING – ALTERNATE PRICE OPTION 2

.1 Alternate glazing for exterior windows shall be argon gas filled double seal glass units, minimum 1" (25.4 mm) thick, with a durable, pigmented, patterned, collision deterrence, ceramic frit enamel coating on the first surface and non-metallic / thermally-broken spacers, as indicated / scheduled in Paragraph 2.3 above, in accordance with the requirements of CAN2-12.8-M90 and IGMAC.

.2 The ceramic frit pattern shall be separate visual markers no less than 3.2mm (1/8") and spaced in 50 mm(2") vertical and 50mm (2") horizontal pattern (minimum).

.3 Typical glazing for exterior windows shall be argon gas filled double seal glass units, approximately 1" (25.4 mm) thick, with low E coating on the third surface and non-metallic / thermally-broken spacers, as indicated / scheduled, in accordance with the requirements of CAN2-12.8-M90 and IGMAC and as follows.

.4 Provide with exterior dry glazed gaskets and co-extruded flexible vinyl seals on the interior.

.5 Provide with inner pane of 1/4" (6 mm) clear glass conforming to the requirements of CAN/CGSB-12.3-M90. Total glass thickness shall be approximately 1" (25 mm). Design all glass to comply with the requirements of CAN/CGSB-12.20. Temper glass if required to meet size requirements.

.6 Acceptable Product: "Bird Friendly Glass" as manufactured by Goldray Glass (Tel. 1-800-640-3709).

2.5 SCREWS, BOLTS, NUTS, WASHERS, AND OTHER FASTENING DEVICES

.1 Stainless steel with a chromium content of not less than 12%.

.2 Polystyrene and polyurethane cores: heat resistant, epoxy resin based, low viscosity, contact cement.

.3 Lock-seam doors: fire resistant, resin reinforced polychloroprene, high viscosity, sealant / adhesive.

2.6 SUPPORT ANGLES AND CLIPS

.1 Minimum 16 gauge (1/16") (1.6 mm) thick roll formed miscellaneous continuous support angles at sills and fastening clips and/or strap anchors at jambs and head, typical, except where design of window units require heavier members; galvanized to Z275. Members shall be appropriately slotted to minimize through metal conductivity.

2.7 RUST INHIBITING PRIMER

.1 Conforming to CAN/CGSB-1.40-97, Anticorrosive Structural Steel Alkyd Primer.

2.8 BITUMINOUS PAINT

.1 Best quality obtainable.

2.9 ACCESSORIES

.1 **Insect Screens**: heavy duty, anti-glare glass fiber cloth insect screen set in aluminum frame and conforming to CAN/CGSB-79.1 complete with necessary mounting hardware. Finish frame to match window cladding in colour as selected by Consultant from manufacturer's complete range. Mount on interior of window.

.2 **Hardware**: equip venting windows with heavy duty roto gear operator c/w T-handle, concealed hinges and concealed single point locking mechanisms to permit easy operation of units. Hardware to be satin nickel finish.

.3 **Foamed-in-place Insulation Air Seals**: inject around perimeter of window framing, two component polyurethane foam insulation conforming to the requirements of CAN/ULC-S705.1-01. Install in accordance with manufacturer's printed instructions, to suit field conditions and to prevent transfer of stress into framing members.

.4 **Exterior Sealants**: in accordance with the requirements of Section 07 92 00, Joint Sealants.

2.10 FABRICATION - GENERAL

.1 Fabricate frames square and prepare for glazing. Fill frames with insulation as required..

.2 Design and fabricate necessary concealed brackets and anchorage devices so that, when installed, they will compensate for unevenness and dimensional difference in the structure to which they are secured, will allow full expansion and contraction of framing members as a result of such expansion and contraction of framing members and will adequately sustain themselves, the windows and superimposed wind and rain loads and all other stresses.

.3 Take field measurements prior to fabrication.

.4 Jig assemble components in shop and partially disassemble where necessary prior to delivery and installation. Field fabrication will not be permitted.

.5 Accurately form joints and intersections to tight, hairline fit.

.6 Nick threads to prevent loosening of nuts. Make bolted and screwed work as inconspicuous as possible.

.7 Glaze and weatherstrip all units in factory as far as practicable.

.8 Apply two (2) shop coats of rust inhibiting primer to steel components. Over primer and over aluminum coming in contact with masonry apply a shop coat of bituminous paint. Take other necessary measures to prevent future deterioration due to corrosion and electrolysis.

.9 Provide thermal break which will maintain interior surface of frames and glass free from condensation and frosting under conditions of -23 deg C (-10 deg F) outside temperature with 23 deg C (74 deg F) inside temperature and 35% relative humidity.

2.11 FABRICATION – FIXED AND AWNING UNITS

.1 Designed and fabricated so that dirt, snow and ice cannot interfere with the efficiency of movable parts.

.2 Provide a permanent weatherstrip joint at the junction of sills with jamb frame members.

.3 Make sash units operable for ventilation in configurations indicated.

.4 Arrange sash for inside glazing secured with snap-in aluminum glazing beads.

.5 Secure sash stiles permanently to the horizontal rails with coped or mitred joints neatly made.

.6 Provide one (1) or more sash locks for each sash unit, fabricated of stainless steel or white bronze which shall securely lock windows in a closed position.

.7 Jamb weatherstripping shall operate on serrated guides with the horizontal weatherstrip at head, sill and meeting rails engaged in such a manner that when the sash is closed but not locked it will successfully pass the air infiltration requirements specified.

Part 3 Execution

3.1 INSTALLATION

.1 Conceal all fastenings for window components from view.

.2 Securely install frames plumb, true, square and straight in openings and free from distortion.

.3 Install insect screens to cover full height of operable window sash.

.4 Caulk joints between masonry or other adjacent material and frames and between frames, sills and other material. Caulk inside and outside.

.5 Leave final installation water and weather tight.

3.2 ADJUST AND CLEAN

.1 Immediately prior to final cleaning of the glass and before handing over the Building to the Parks Canada Agency (PCA) make good all damage and disfigurement to the work, and remove all protective coatings, stains and foreign matter from all exposed, exterior and interior surfaces of work supplied under this Section, and leave in a uniform colour and in first-class condition to the PCA Representative or Delegate’s satisfaction.

.2 Use soap and water, or water and approved solvents not injurious to vinyl, glass, glazing and sealant compounds. Abrasive shall not be used.

.3 Adjust all operating devices and leave in perfect working order.

END OF SECTION

Part 1 General

1.1 GENERAL REQUIREMENTS

.1 Throughout the specification, type of materials are specified by manufacturer's name and catalogue number in order to establish standards of quality and performance and not for the purpose of limiting competition.

.2 Unless specifically stated otherwise such as locks / locksets, the bidder may use the alternate products specified, except that the burden is upon the bidder to prove such quality. Supply samples if required, to permit a fair evaluation of the proposed substitute with respect to quality, serviceability, warranty and cost.

.3 Supply only of Finish Hardware shall be in accordance with the requirements of specification Section 01 21 00, Allowances.

1.2 WORK INCLUDED IN THIS SECTION

.1 Supply to the site, all finish hardware specified complete with templates and installation instructions, together with all required screws, expansion shields, anchors and other related accessories for satisfactorily attaching or installing all finish hardware.

.2 Package hardware separately for each opening and state clearly on each package the number and description of the opening for which the hardware is intended.

1.3 HARDWARE REPRESENTATIVE

.1 All finish hardware shall be inspected after installation by the hardware supplier who shall certify in writing to the PCA Representative or Delegate, that all hardware has been supplied and installed in accordance with the specifications and Hardware List, and are functioning properly.

.2 At project completion instruct the PCA Representative or Delegate on all aspects of maintenance and adjustments of all finish hardware.

.3 Following award of contract, arrange to meet with PCA Representative or Delegate to finalize the keying schedule.

1.4 CO-ORDINATION OF RELATED WORK

.1 Co-ordinate the hardware with other allied trades such as carpentry, millwork, aluminum door and screens, wood doors, hollow metal doors and frames, electrical and others.

.2 Power for door hardware including all raceways and boxes to wall switches and wiring to alarm system is to be supplied by Electrical Division 16. The automatic door operator supplier to co-ordinate and supply installation of electrical devices only in conjunction with the electric strike if required.

.3 All other electrical work shall be provided at each opening by the electrical contractor as required.

.4 The work of other trades to required to be performed to ensure proper installation and function of the automatic door operators shall be as follows:

.1 Wiring and conduit between control devices and operator. Wiring, conduit and electrical equipment required to interface with door operators/controls and any other electrical control/monitoring systems supplied and installed by others.

.2 Preparation of wall and frame to provide adequate support for operator header.

.3 120 Volt electrical service.

1.5 HANDLING AND STORAGE

.1 Handle and store materials on job site in such a manner that no damage will be done to the materials.

.2 Deliver and store materials undamaged in a dry area.

.3 Wrap all hardware in separate packages complete with all trimming and screws required for each item, distinctly labelled and numbered for each opening to correspond with the final reviewed Finish Hardware Schedule.

1.6 HARDWARE REINFORCEMENT

.1 Provision of hardware reinforcing required to provide a firm support for hardware is under other sections of these specifications, however, it shall be the responsibility of this section to check that all doors, frames and panels are reinforced in a satisfactory manner to provide a firm support. Report any doors, frames or panels that have not been adequately reinforced.

1.7 FIRE AND BUILDING CODES

.1 All hardware shall comply with applicable fire and building codes and requirements of local authority having jurisdiction over hardware. All electrical items must have CSA approval.

.2 For all doors indicated on Door Schedule as requiring a fire-resistance rating, hardware shall have been tested and listed by ULC as meeting requirements for use on labelled fire doors, and shall bear labels or markings attesting to such listing.

1.8 BARRIER FREE REQUIREMENTS

.1 The building is designed to meet the needs of barrier free access. All hardware shall be supplied and installed in accordance with the Ontario Building Code and CAN/CSA-B61-M90.

1.9 SUBMITTALS

.1 Shop Drawings:

.1 It shall be the responsibility of the hardware supplier to examine the plans and schedules to satisfy itself that all hardware listed can be used as specified.

.2 Prepare and submit to the PCA Representative or Delegate for review, five (5) copies of hardware schedule showing all hardware required for each opening.

.3 Fully detail schedule as to actual factory catalogue numbers, quantities, hardware locations, etc. Include catalogue cut sheets of each item of hardware.

.4 Arrange schedule in the same format and numerical sequence as that in the accompanying schedule.

.5 All pages of the schedule shall be printed on 8-1/2" x 11" sized paper.

.6 Within seven (7) days after receiving reviewed hardware schedule, supply two (2) copies of the schedule to the PCA Representative or Delegate. Bind in a hard cover with provision for insertion of additional pages.

.2 Samples:

.1 Submit samples of the complete line of hardware and finishes to the PCA Representative or Delegate in accordance with the requirements of specification Section 01 33 00, Submittal Procedures, if and when requested, to accompany any proposal for substitution. Fully label each sample as to manufacturer, type, size, and location for which its use is proposed.

.2 Remove samples from the PCA Representative or Delegate's office promptly upon request of PCA Representative or Delegate.

.3 Substitute new samples for any samples that are not considered by the PCA Representative or Delegate to be equal to the hardware scheduled. Final approved samples will be retained by the PCA Representative or Delegate until the project is completed.

.4 Do not order hardware from the manufacturers until the samples have been approved by the PCA Representative or Delegate, and the hardware and finishes supplied are identical with the approved samples.

.3 For maintenance use submit the following:

.1 One (1) set wrenches for locksets, exit devices and door closers.

.2 Three (3) sets of manufacturer's installation instructions for locksets.

.3 Three (3) sets of manufacturer's instructions in regard to proper care of hardware including lubrication of locksets, exit devices and door closers.

.4 One (1) complete set of template schedules.

.5 Catalogue cuts of all hardware installed.

1.10 CHANGES

.1 Check all changes to the work of this section, that may be issued and revise the reviewed hardware schedule accordingly. Submit all revisions to the hardware schedule to the PCA Representative or Delegate for review.

1.11 WARRANTY

.1 Submit a warranty in accordance with the requirements of specification Section 01 78 00, Closeout Submittals, covering the repair or replacement of defective work within specified periods.

.2 Provide total warranty of five (5) years for door closers and two (2) years for all other hardware.

.3 State in the warranty that any defective (material and operation) item of hardware shall be replaced immediately upon notification that item is defective at no expense to PCA Representative or Delegate.

1.12 DEFINITION OF FINISHES AND SYMBOLS

AL, 689	Aluminum Paint
C, P	Prime Paint
C15, 619	Dull-Nickel Plated
C32D, 630	Dull-Stainless Steel
C28	Satin Finish Aluminum - Anodized
C26D, 626	Dull-Chromium Plated
CA, AL	Aluminum Anodized
STS	Self Tapping Screws
WS/S	Wood Screws and Shield
SB	Sex Bolts
SB & MS	Sex Bolts & Machine Screws
TB Only	Thru Bolt Only
NRP	Non Removable Pin
RH	Right Hand
RHR	Right Hand Reverse
LH	Left Hand
LHR	Left Hand Reverse
SLC	Strike Lip Length to Centre
FMS	Full Machine Screws
AMS	Arm Machine Screws
MS	Machine Screws
TMS	Template Machine Screws
KA	Keyed Alike
KD	Keyed Different
FBB	Template - Ball Bearing
GROMM & MS	Grommet Nuts & Machine Screws

1.13 HARDWARE LOCATION OF DOORS

.1 Standard hardware location dimensions shall be in accordance with Canadian Metric Guide for Steel Doors and Frames (Modular Construction) prepared by Canadian Steel Door and Frame Manufacturer’s Association unless indicated or scheduled otherwise.

Part 2 Products

2.1 FINISH HARDWARE

.1 All hardware shall be supplied by manufacturers approved within the hardware heading specifications to be provided at a later date.

.2 Hardware manufactured by following firms shall be acceptable, subject to approval by PCA Representative or Delegate of samples and list of items proposed:

.1 Hinges: Stanley Hardware

		Hager Hinge Canada Ltd. Mont-Hard (Canada) Inc.
.2	Locks / Latches:	Sargent of Canada Ltd. Yale-Corbin Canada Ltd. Schlage Locks-Ingersoll-Rand Door Hardware Ilco Unican Inc. Dominion Lock Division Best Universal Locks Ltd. Arrow Lock Canada Ltd.
.3	Exit Devices:	Sargent of Canada Ltd. Yale-Corbin Canada Ltd. Von Duprin -Ingersoll-Rand Door Hardware Magnokrom Inc. Arrow Lock Canada Ltd.\ American Device Mfg. Co. (Dorma Door Controls)
.4	Door Closers:	Sargent of Canada Ltd. LCN Closers-Ingersoll-Rand Door Hardware Yale-Corbin Canada Limited Yale-Rixson Firemark (Can) Ltd. (floor type only) Norton Closers-Yale-Corbin Canada Ltd. Dorma Door Controls Ltd.
.5	Door Holders:	Sargent of Canada Ltd. Yale-Rixson Firemark (Can) Ltd. Magnokrom Inc. LCN / Ingersoll-Rand Door Hardware K.M. Thomas Co. Ltd.
.6	Overhead Stops:	Sargent of Canada Ltd. LCN / Ingersoll-Rand Door Hardware Yale-Corbin Canada Limited
.7	Removable Mullions:	Sargent of Canada Ltd. Von Duprin -Ingersoll-Rand Door Hardware Yale-Corbin Canada Limited
.9	Door Stops:	Canadian Builders Hardware Manufacturers Ltd. LCN / Ingersoll-Rand Door Hardware Hager Architectural Hardware General Hardware Standard Metal Hardware Mfg. Ltd. Ives of Canada Ltd.
.10	Pushplates / Door Pulls:	Canadian Builders Hardware Manufacturers Ltd. Hager Architectural Hardware Gallery Specialties Standard Metal Hardware Mfg. Ltd.

		Ives of Canada Ltd.
.11	Surface and Flush Bolts:	Magnokrom Inc. Glynn Johnson / Ingersoll-Rand Door Hardware Gallery Specialties
.12	Kickplates	Gallery Specialties
.13	Thresholds / Weatherstripping:	K.N. Crowder Mfg. Hager Architectural Hardware

2.2 KEYING SYSTEM

.1 Develop new keying system for the new hardware in consultation with PCA Representative or Delegate to suit existing keying system. Keying system shall include keying alike, keying differently, keying in groups, sub-master keying and grand-master keying locks as required.

.2 Prepare and submit keying chart and related explanatory data to PCA Representative or Delegate for approval. Do not commence lock work until written confirmation of keying arrangements is received from PCA Representative or Delegate.

.3 Supply three (3) keys per lockset. Stamp each key DO NOT DUPLICATE on one side and on the other with a key symbol consisting of not more than four letters or numbers.

2.3 TEMPLATES

.1 All hardware applied to metal doors and frames shall be made to template.

.2 Check Hardware Schedule, Drawings and Specifications, and furnish promptly to applicable trades any templates, template information and manufacturer's literature, required for proper preparation for and application of hardware, in ample time to facilitate progress of work.

.3 Templates shall consist of hardcopies of manufacturer’s template literature or, alternatively, electronic links to manufacturer’s website.

Part 3 Execution

3.1 EXAMINATION

.1 Before furnishing any hardware, carefully check all Architectural Drawings of work requiring hardware, verify door swings, door and frame material and operating conditions, and assure that hardware will fit work to which it is to be attached.

.2 Check shop drawings and frame and door lists affecting hardware type and installation, and certify to correctness thereof, or advise PCA Representative or Delegate in writing of required revisions.

3.2 INSTALLATION

.1 In accordance with the requirements of specification Section 06 21 00, Installation of Doors and Finish Hardware.

3.3 HARDWARE HEADINGS

.1 Hardware headings are to be provided by the Consultant at a later date.

.2 Supply only of Finish Hardware shall be in accordance with the requirements of specification Section 01 21 00, Allowances.

END OF SECTION

Part 1 General

1.1 GENERAL REQUIREMENTS

.1 Examine the Specifications and Drawings for the work of other Sections regarding the provisions for prime and finish coats. Paint or finish all materials installed throughout the project which are required to be painted and which are left unfinished or unpainted by other Sections. The only exception to this requirement is where the drawings, specifications, or schedules state positively and explicitly that a surface is not be finish painted.

1.2 REFERENCE STANDARDS

.1 ASTM International

.1 ASTM D523-89, Test Method for Specular Gloss

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-1.100-M89, Interior Latex Type, Flat Paint
.2 CAN/CGSB-1.119-M89, Primer-Sealer, Wall, Interior Latex Type
.3 CAN/CGSB-1.195-M90, Interior Semi-gloss Latex Paint
.4 CAN/CGSB-1.209-93, Low Sheen Latex Interior Paint
.5 CGSB 85-GP-16M, Painting Galvanized Steel
.6 CAN/CGSB-85.100-93, Painting
.7 ECP, Environmental Choice Program
.8 ECP-07-89, Water-borne Surface Coatings
.9 ECP-12-89, Solvent-borne Paints
.10 OPCA, Ontario Painting Contractors Association
.11 ULC, Underwriters' Laboratories of Canada
.12 CAN/ULC-S102-M88, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies

1.3 SUBMITTALS

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

.2 Samples:

.1 Submit samples of every colour required in accordance with the requirements of specification Section 01300, Submittals. Include a complete list of paint and finish materials to be used, showing the name of the manufacturer, the catalogue number, grade and quality of the materials proposed for use.

.2 Colours shall match those specified in the Material and Colour Schedule. Colours selected for work of this Section shall be based on products manufactured by Sherwin Williams.

.3 Apply samples of finishes in a testing area in the building in the presence of the PCA Representative or Delegate. Apply samples with the correct material, number of coats, colour, texture and degree of gloss required. Refinish if required, until approval of the PCA Representative or Delegate is obtained. Location of testing area shall be as approved by the PCA Representative or Delegate.

.4 Leave test areas undisturbed until completion of the work. Approved work in the test area shall serve as a standard for similar work throughout the project. Work which does not match the approved finishes shall be corrected and refinished at no expense to the Parks Canada Agency (PCA).

.5 Submit opaque paint samples in triplicate on 4” x 8” (100 mm x 200 mm) draw down cards on black and white. Submit samples of stains and clear finishes in triplicate on 2" x 4" x 3/8” thick (50 mm x 100 mm x 10mm) piece of wood of same species as scheduled to receive stain or clear finish.

.3 List of Materials:

.1 Submit a list of materials proposed for use on the work, for review at least thirty (30) days before the materials are required. The list shall bear the manufacturer's official certification that the materials listed thereon are the best quality made by the company.

.4 Extra Materials:

.1 supply Parks Canada Agency (PCA) with one (1) clearly identified sealed 4 litre can of each colour and type of paint, stain, and varnish for this work for future maintenance. Take such materials to designated storage area in the building.

1.4 PRODCUT DELIVERY, STROAGE AND HANDLING

.1 Storage and Safety Precautions: store containers of paint, varnish, thinner, and other volatile materials in well-ventilated designated room under lock and key, where they will not be exposed to excessive heat or direct rays of the sun. Keep containers tightly closed when not in actual use. Remove used cloths from building every night, and when not in use. Take precautions against spontaneous combustion by burning, drenching in water, or placing in air-tight covered metal containers. Provide warning signs where toxic materials and explosive solvents are used. Provide CO2 fire extinguisher of 9 kg. capacity in this room while area is used for paint storage.

.2 Ventilation: ventilate, heat and maintain storage area at minimum temperature of 10 deg C (50 deg F) and protected from direct rays of sun.

.3 Protection: Protect the work of other trades from damage. Post signs at freshly-painted surfaces immediately following their completion. Any soiling of concrete pavement attributable to this section due to spillage, mixing of material, or any other cause whatsoever, to be entirely reinstated under this Section at no expense to the Parks Canada Agency (PCA).

1.5 JOB CONDITIONS

.1 Environmental Temperature: do not paint or finish in unclean or improperly ventilated areas. Maintain ambient and substrate temperatures and humidity conditions within acceptable limits as recommended by paint manufacturer. Maintain adequate ventilation at all times to control excessive humidity.

.2 Protection:

.1 Provide metal pans or adequate tarpaulins to protect floors in areas assigned for the storage and mixing of paints.

.2 Use sufficient drop cloths and protective coverings for the full protection of floors, furnishings, and work not being painted. Protect mechanical, electrical, and special equipment hardware, all other components of the building which do not require painting from paint spotting and other soiling during the painting process.

.3 Leave above areas clean and free from evidence of occupancy upon completion of painting.

.4 Protect paint materials from fire and freezing.

.5 Keep waste rags in metal drums containing water, and remove from building at end of each working shift.

Part 2 Products

2.1 PAINT

.1 **Highest grade, first line quality product of the manufacturer**. Painting and finishing materials shall comply with or exceed CAN2-85-100 for Premium Grade Work and complying with the specified generic formula guide in accordance with the manufacturer's recommendations.

.2 Refer to Material and Colour Schedule for colours. Paints are identified as (P). Colours will be selected by the PCA Representative or Delegate form the manufacturers listed and shall be matched by paint supplier. The following manufacturers are acceptable:

.1 Benjamin Moore Paints
.2 Colour Your World
.3 General Paint Ltd.
.4 Dulux Paints
.5 Para Paints Canada Inc.
.6 PPG Canada Inc.
.7 Pratt and Lambert Inc.
.8 Sherwin-Williams Company of Canada Limited
.9 Sico Inc.
.10 Alternate approved by Consultant

.3 The Consultant reserves the right to refuse any paint or finishing material if in his opinion it is incapable of matching specified colours or is not suitable or adequate for the use which it is proposed.

.4 Paint and finishing materials for each procedure listed in Finish Schedule shall be products of single manufacturer.

.5 Paint products shall meet or exceed requirements of ECP-07 Guidelines for water based paints. In addition, paint products shall meet or exceed applicable performance standards issued by CGSB or other such standards approved by accredited standards writing organizations.

.6 Paint shall have excellent flowing and brushing properties. Paint shall cure free of sags, runs, wrinkles to yield desired finish specified.

.7 Sheen shall be as selected by Consultant.

2.2 STAIN

.1 Water based pigmented stain, in colour selected by PCA Representative or Delegate.

2.3 POLYURETHANE VARNISH

.1 Unless specified otherwise interior grade, water based, suitable for use on existing oil based stains / finishes. Sheen shall be as selected by PCA Representative or Delegate

Part 3 Execution

3.1 INSPECTION

.1 Verify moisture content of surfaces with electronic moisture metre. Do not proceed without written directions if moisture reading is higher than 12-15%.

.2 Ensure temperature of surfaces to be finished is between 10 and 20 deg C (50 and 68 deg F). Proceed with work only when surfaces and conditions are satisfactory for production of a first-class job. Report to PCA Representative or Delegate, in writing, any surfaces which are found to be unsatisfactory. Commencement of work shall imply acceptance of substrate surfaces.

.3 Remove dust, grease, rust, and extraneous matter from all surfaces, except that rust occurring on items specified to be primed under other Sections shall be removed and work re-primed under those Sections.

3.2 PREPARATION

.1 Gypsum Board: inspect to ensure joints are completely filled and sanded smooth. Inspect surfaces for "nail popping", screw heads not recessed and taped, breaks in surface or other imperfections and have repaired as required. Fill small nicks or holes with patching compound and sand smooth.

.2 Hardware: remove finish hardware, switch plates and accessories, removable trim, grilles, etc; mask any that are not removable. Re-install these when paint is thoroughly dry and clean them. Do not clean hardware with solvent. Prime-painted hardware items shall be painted to match the surface on which they are installed.

3.3 PROTECTION

.1 Provide scaffolding, staging, platforms and ladders, as required for execution of work. Erect scaffolding to avoid interference with work of other trades. Comply with Occupational Health and Safety Act.

.2 Provide drop cloths or adequate plastic sheets to protect floors in areas assigned for storage and mixing of paints.

.3 Mask and cover all surrounding surfaces to provide neat, clean, true juncture lines, and to keep paint from adjacent surfaces. Upon completion, remove masking and clean adjacent surfaces free of overspray spatters, drips, smears and overspray.

.4 Mask labels and specification plates occurring on equipment to be painted and ULC labels on doors and frames.

.5 Remove finish hardware, electrical switch and outlet covers to protect from paint splatter. Mask items not removable. Use sufficient drop cloths and protective coverings for full protection of floors, furnishings, mechanical, electrical and special equipment, all other components of building which do not require painting or to be removed, from paint spotting and other soiling. Re-install items when paint is dry. Clean any components that are paint spotted or soiled.

.6 Keep waste rags in covered metal drums containing water and remove from building at end of each day.

.7 Prohibit traffic, where possible, from areas where painting is being carried out and until paint is cured. Post “wet paint” or other warning signage during and on completion of work.

3.4 WORKMANSHIP

.1 Apply work using skilled tradesmen working under direction of a capable foreman, and according to manufacturer's specifications; in a workmanlike manner; with suitable clean equipment in good condition; in dust-free and under adequate illumination and suitable conditions for production of best results; evenly, uniform in sheen, colour and texture, free from brush marks, sags, crawls, runs, or other defects detrimental to appearance or performance; and in a manner to prevent spattering or spilling over finished surfaces.

.2 Mix paint on site and use unadulterated, except where specified otherwise in manufacturer's directions.

.3 Use same brand of paint for primer, intermediate, and finish coats.

.4 Do not apply succeeding coats until preceding coat is dry and hard.

.5 Lighten preceding coats 25% white (tint white coats) from the colour called for in the Colour and Material Schedule.

.6 It is generally intended that material be applied by brush or roller. Except as specified otherwise, spray painting will be permitted in areas where advantageous, but PCA Representative or Delegate shall be consulted and shall approve each area before spray painting commences. PCA Representative or Delegate may at any time prohibit the use of spray painting for such reasons during application as carelessness, poor masking, or

protective measures, paint fogs drifting into prepainted surfaces or other finishes, disturbance to other trades, or failure to obtain a dense, even, opaque finish.

.7 Sand lightly between coats with No. 00 sandpaper.

.8 Do not apply last coat of varnish on stained wood surfaces until all gloss varnish applications have been inspected and approved by the PCA Representative or Delegate.

3.5 APPLICATION

.1 Note: In addition to specific notes included in this specification refer to Material and Colour Schedule for additional requirements. Provide finish uniform in sheen, colour and texture, free from streaks, shiners and brush or roller marks or other defects.

.2 Follow manufacturer's preparation and application instructions.

.3 Paint all exposed surfaces where specifically noted on Room, Material and Finish Schedule.

.4 Unless specifically noted, do not paint stainless steel, chrome, baked enamel, plastic laminate, solid phenolic plastic, glass, tile, porcelain enamel, ceramic surfaces, equipment name or specification plates, fire resistance labels, washroom fixtures, manhole and catch basin covers, floors or sprinkler heads. Make good paint finish on items where painted surfaces have become marred or defaced.

.5 Examine the Drawings and Specifications for the work of other sections regarding the provisions for prime and finish coats. Paint or finish all materials installed throughout the project which are required to be painted and which are left unfinished or unpainted by other sections. The only exception to this requirement is where the Drawings, specifications or schedules state positively and explicitly that a surface is not to be finish painted.

.6 In areas where painting is not called for, painting is not required, with the following exceptions, which require paint: plywood backboards, all other exposed wood and hollow metal doors and frames. Colours selected by PCA Representative or Delegate.

.7 In areas where painting is not called for, painting is not required, with the following exceptions, which require paint: plywood backboards, all other exposed wood and hollow metal doors and frames. Colours selected by PCA Representative or Delegate.

.8 Paint glazing rebates and stops of hollow metal sections before glass is installed.

.9 Paint convectors, grilles, conduit, pipes, ducts, hangers, brackets, panels, access panels, exposed steel, concrete inserts, bus ducts, and other articles on or near finished surface shall to match the colour of the surface on which the article appears, except where noted otherwise on Schedules.

.10 Do not paint circuit breakers, switches, and receptacles, or similar electrical components.

.11 For finished interior wood that is to be painted, apply one coat of approved best grade white interior trim primer, reduced with thinners in accordance with manufacturer's printed directions, to ALL surfaces of wood as soon as material is delivered and before it is built in. Use brushes for applying material to interior wood.

.12 Paint entire plane of areas exhibiting incomplete or unsatisfactory coverage and of areas which have been cut and patched. Patching not acceptable.

.13 Do not paint over ULC labels on doors and frames and over identification labels on mechanical and electrical equipment.

3.6 DISPOSAL OF PAINT WASTE

.1 Be responsible for removal and disposal of material and waste generated by this Section.

.2 Remove empty and partly used containers from Site and recycle or disposed of as Hazardous Waste in accordance with local municipal, provincial and federal environmental regulations. Provide proof of such action in form of receipts of tipping fees, disposal fees or bills of lading, as applicable.

.3 Remove from Site peripheral items, such as clean up solvents, paint brushes, rags, and similar items and dispose of where necessary in accordance with local municipal, provincial and federal environmental regulations.

.4 Do not rinse off of latex paints from brushes and rags under running water tap. While work is ongoing, whether using latex or alkyd products, rinse off all brushes and rags in container with appropriate solvent (water or paint thinner). Leave such container in well lit and well ventilated area , away from any flammable conditions. Dispose of emulsion created in accordance with local municipal, provincial and federal environmental regulations.

3.7 INTERIOR FINISH SCHEDULE

.1 The following Formulae are intended to provide completely opaque surfaces, typical unless scheduled otherwise for clear or semi-transparent finishes. If surfaces are not completely opaque, apply additional coats at no additional cost to the Parks Canada Agency (PCA).

.2 Coordinate with PCA Representative or Delegate before painting any surface not included in the formulae as listed.

.3 Painted Masonry or Concrete:
One (1) coat of interior acrylic enamel primer, as required.
Two (2) coats of interior 100% acrylic enamel, eggshell finish.

.4 Painted Gypsum Board or Plaster Wall Surfaces:
One (1) coat of interior acrylic enamel primer - sealer, as required.
Two (2) coats of interior 100% acrylic enamel, eggshell finish.

.5 Exposed Gypsum Board or Plaster Ceilings, Coves and Bulkheads:
One (1) coat of primer - sealer, as required.
Two (2) coats of interior 100% acrylic enamel, flat finish.

.6 Ferrous Metal Surfaces (if not shop primed):
One (1) coat of interior acrylic enamel primer. Acceptable product:
Equivalent to "DevFlex Primer No. 4020" as manufactured by Devoe High Performance Coatings.
Two (2) coats of interior 100% acrylic enamel, semi-gloss finish. Acceptable product:
Equivalent to "DevFlex No. 4216" as manufactured by Devoe High Performance Coatings.

.7 Ferrous Metal Surfaces (if shop primed):
Touch-up only with same paint as that applied in the shop.
Two (2) coats of interior 100% acrylic enamel, semi-gloss finish. Acceptable product: *Equivalent to "DevFlex No. 4216" as manufactured by Devoe High Performance Coatings.*

.8 Woodwork for Painting:
One (1) coat of interior acrylic enamel primer, as required.
Two (2) coats of interior 100% acrylic enamel, semi-gloss finish

.9 Prepare surfaces, as required, by applying proper primers on the surface to which paint is to be applied. For surfaces above ceilings, paint surfaces after all services have been installed and prior to ceiling installation.

3.8 EXTERIOR FINISH SCHEDULE

.1 The following Formulae are intended to provide completely opaque surfaces, typical unless scheduled otherwise for clear or semi-transparent finishes. If surfaces are not completely opaque, apply additional coats at no additional cost to the Parks Canada Agency (PCA).

.2 Coordinate with PCA Representative or Delegate before painting any surface not included in the formulae as listed.

.3 Galvanized Metal Surfaces (if not shop primed)
One (1) coat of rust inhibitive, zinc rich metal primer
Two (2) coats of 100% acrylic enamel, semi-gloss finish, exterior grade. Acceptable product: *Equivalent to "ICI Weatherguard 1550" as manufactured by Devoe High Performance Coatings.*

.4 Galvanized Metal Surfaces (with existing shop coat primer):
Touch-up only with same rust inhibitive, zinc rich metal primer as that applied in the shop
Two (2) coats of 100% acrylic enamel, semi-gloss finish, exterior grade. Acceptable product: *Equivalent to "ICI Weatherguard 1550" as manufactured by Devoe High Performance Coatings.*

.5 Ferrous Metal Surfaces (with existing shop coat primer):
Touch-up only with same rust inhibitive, zinc rich metal primer as that applied in the shop
Two (2) coats of 100% acrylic enamel, semi-gloss finish, exterior grade. Acceptable product: *Equivalent to "ICI Weatherguard 1550" as manufactured by Devoe High Performance Coatings.*

.6 Ferrous Metal Surfaces (if not shop primed):
One (1) coat of rust inhibitive, zinc rich metal primer
Two (2) coats of 100% acrylic enamel, semi-gloss finish, exterior grade. Acceptable product: *Equivalent to "ICI Weatherguard 1550" as manufactured by Devoe High Performance Coatings*

END OF SECTION

Part 1 General

1.1 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:

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

.2 Shop drawings:

.1 Drawings to show:

.1 Mounting arrangements.

.2 Operating and maintenance clearances.

.2 Drawings and product data accompanied by:

.1 Detailed drawings of bases, supports, and anchor bolts.

.2 Acoustical sound power data, where applicable.

.3 Points of operation on performance curves.

.4 Manufacturer to certify current model production.

.5 Certification of compliance to applicable codes.

1.2 CLOSEOUT SUBMITTALS

.1 Operation and Maintenance Data: submit operation and maintenance data for incorporation to manual.

.1 Operation and maintenance manual approved by, and final copies deposited with, owner before final inspection.

.2 Operation data to include:

.1 Control schematics for systems including environmental controls.

.2 Description of systems and their controls.

.3 Description of operation of systems at various loads together with reset schedules and seasonal variances.

.4 Operation instruction for systems and component.

.5 Description of actions to be taken in event of equipment failure.

.6 Valves schedule and flow diagram.

.7 Colour coding chart.

.3 Maintenance data to include:

.1 Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.

.2 Data to include schedules of tasks, frequency, tools required and task time.

.4 Performance data to include:

.1 Equipment manufacturer's performance datasheets with point of operation as left after commissioning is complete.

.2 Equipment performance verification test results.

.3 Special performance data as specified.

.4 Testing, adjusting and balancing reports as specified in Section 23 05 93-Testing, Adjusting and Balancing for HVAC.

.5 Approvals:

.1 Submit copies of draft Operation and Maintenance Manual to consultant for approval.

.2 Make changes as required and re-submit as directed by Consultant.

.6 Additional data:

.1 Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified demonstrations and instructions.

.7 Site records:

.1 Provide sets of white prints as required for each phase of work. Mark changes as work progresses and as changes occur. Include changes to existing mechanical systems, control systems and low voltage control wiring.

.2 Transfer information weekly to reproducibles, revising reproducibles to show work as actually installed.

.3 Use different colour waterproof ink for each service.

.4 Make available for reference purposes and inspection.

.8 As-Built drawings:

.1 Prior to start of Testing, Adjusting and Balancing for HVAC, finalize production of as-built drawings.

.2 Identify each drawing in lower right hand corner in letters at least 12 mm high as follows: "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (Date).

.3 Submit to Consultant for approval and make corrections as directed.

.4 Perform testing, adjusting and balancing for HVAC using as-built drawings.

.5 Submit completed reproducible as-built drawings with Operating and Maintenance Manuals.

.9 Submit copies of as-built drawings for inclusion in final TAB report.

1.3 MAINTENANCE MATERIAL SUBMITTALS

.1 Furnish spare parts as follows:

.1 One set of packing for each pump.

.2 One casing joint gasket for each size pump.

.3 One head gasket set for each heat exchanger.

.4 One glass for each gauge glass.

.5 One filter cartridge or set of filter media for each filter or filter bank in addition to final operating set.

.2 Provide one set of special tools required to service equipment as recommended by manufacturers.

.3 Furnish one commercial quality grease gun, grease and adapters to suit different types of grease and grease fittings.

1.4 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.

Part 2 Execution

2.1 PAINTING REPAIRS AND RESTORATION

.1 Prime and touch up marred finished paintwork to match original.

.2 Restore to new condition, finishes which have been damaged.

2.2 SYSTEM CLEANING

.1 Clean interior and exterior of all systems including strainers. Vacuum interior of air handling units and duct work that has been worked on.

2.3 FIELD QUALITY CONTROL

.1 Manufacturer's Field Services:

.1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.

.2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

2.4 CLEANING

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

2.5 PROTECTION

.1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

END OF SECTION

Approved: 2013-06-30

Part 1 General

1.1 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:

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

.2 Shop Drawings:

.1 Indicate on drawings:

.1 Mounting arrangements.

.2 Operating and maintenance clearances.

.2 Shop drawings and product data accompanied by:

.1 Detailed drawings of bases, supports, and anchor bolts.

.2 Acoustical sound power data, where applicable.

.3 Points of operation on performance curves.

.4 Manufacturer to certify current model production.

.5 Certification of compliance to applicable codes.

1.2 CLOSEOUT SUBMITTALS

.1 Operation and Maintenance Data: submit operation and maintenance data.

.1 Operation and maintenance manual approved by, and final copies deposited with, Parks Canada Agency (PCA) before final inspection.

.2 Operation data to include:

.1 Control schematics for systems including environmental controls.

.2 Description of systems and their controls.

.3 Description of operation of systems at various loads together with reset schedules and seasonal variances.

.4 Operation instruction for systems and component.

.5 Description of actions to be taken in event of equipment failure.

.6 Valves schedule and flow diagram.

.7 Colour coding chart.

.3 Maintenance data to include:

.1 Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.

.2 Data to include schedules of tasks, frequency, tools required and task time.

.4 Performance data to include:

.1 Equipment manufacturer's performance datasheets with point of operation as left after commissioning is complete.

.2 Equipment performance verification test results.

.3 Special performance data as specified.

.4 Testing, adjusting and balancing reports as specified in Section 23 05 93-Testing, Adjusting and Balancing for HVAC.

.5 Approvals:

.1 Submit copies of draft Operation and Maintenance Manual to Consultant for approval.

.2 Make changes as required and re-submit as directed by Consultant.

.6 Additional data:

.1 Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified demonstrations and instructions.

.7 Site records:

.1 Provide sets of white prints as required for each phase of work. Mark changes as work progresses and as changes occur. Transfer information weekly to reproducibles, revising reproducibles to show work as actually installed.

.2 Use different colour waterproof ink for each service.

.3 Make available for reference purposes and inspection.

.8 As-built drawings:

.1 Prior to start of Testing, Adjusting and Balancing for HVAC, finalize production of as-built drawings.

.2 Identify each drawing in lower right hand corner in letters at least 12 mm high as follows: - "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (Date).

.3 Submit to Consultant for approval and make corrections as directed.

.4 Perform testing, adjusting and balancing for HVAC using as-built drawings.

.5 Submit completed reproducible as-built drawings with Operating and Maintenance Manuals.

.9 Submit copies of as-built drawings for inclusion in final TAB report.

1.3 MAINTENANCE MATERIAL SUBMITTALS

.1 Furnish spare parts as follows:

.1 One set of packing for each pump.

.2 One casing joint gasket for each size pump.

.3 One glass for each gauge glass.

.2 Provide one set of special tools required to service equipment as recommended by manufacturers.

1.4 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.

Part 2 Execution

2.1 PAINTING REPAIRS AND RESTORATION

.1 Prime and touch up marred finished paintwork to match original.

.2 Restore to new condition, finishes which have been damaged.

2.2 SYSTEM CLEANING

.1 Clean interior and exterior of all systems including strainers.

2.3 FIELD QUALITY CONTROL

.1 Site Tests: conduct following tests in accordance with Section and submit report as described in PART 1 -ACTION AND INFORMATIONAL SUBMITTALS.

.2 Manufacturer's Field Services:

.1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.

.2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

2.4 CLEANING

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

2.5 PROTECTION

.1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 American Society of Mechanical Engineers International (ASME)

- .1 ANSI/ASME B16.15, Cast Cooper Alloy Threaded Fittings, Classes 125 and 250.
- .2 ANSI/ASME B16.18, Cast Copper Alloy Solder Joint Pressure Fittings.
- .3 ANSI/ASME B16.22, Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
- .4 ANSI/ASME B16.24, Cast Copper Alloy Pipe Flanges and Flanged Fittings: Class 150, 300, 400, 600, 900, 1500 and 2500.
- .5 ASME B16.26, Cast Copper Alloy Fittings for Flared Copper Tubes.
- .6 ASME B31.9, Building Services Piping.
- .7 ASME B36.19M, Stainless Steel Pipe.

.2 ASTM International

- .1 ASTM A182/A 182M, Standard Specification for Forged or Rolled Alloy and Stainless Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service.
- .2 ASTM A269, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
- .3 ASTM A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- .4 ASTM A312/A312M, Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes.
- .5 ASTM A351/A351M, Castings, Austenitic, for Pressure Containing Parts.
- .6 ASTM A403/A403M, Wrought Austenitic Stainless Steel Piping Fittings.
- .7 ASTM A536, Standard Specification for Ductile Iron Castings.
- .8 ASTM B32, Standard Specification for Solder Metal.
- .9 ASTM B42, Seamless Copper Tube, Standard Sizes.
- .10 ASTM B88M, Standard Specification for Seamless Copper Water Tube (Metric).
- .11 ASTM F876, Standard Specification for Crosslinked Polyethylene (PEX) Tubing.
- .12 ASTM F877, Standard Specification for Crosslinked Polyethylene (PEX) Hot and Cold Water Distribution System.
- .13 ASTM F1960-, Standard Specification for Cold Expansion Fittings with PEX Reinforcing Rings for Use with Crosslinked Polyethylene (PEX) Tubing.

.3 American National Standards Institute/American Water Works Association (ANSI)/(AWWA)

- .1 ANSI/AWWA C111/A21.11, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

.2 ANSI/AWWA C151/A21.51, Ductile Iron Pipe, Centrifugally Cast, for Water.

.3 AWWA C904, Crosslinked Polyethylene (PEX) Pressure Pipe, ½ In. (12 mm) through 3 In. (76mm), for Water Service.

.4 CSA Group

.1 CSA B137.5, Crosslinked Polyethylene (PEX) Tubing Systems for Pressure Applications.

.2 CSA B242, Groove and Shoulder Type Mechanical Pipe Couplings.

.5 Underwriters Laboratories of Canada (ULC)

.1 CAN/ULC S101, Fire Endurance Tests of Buildings Construction and Materials.

.2 CAN/ULC S102.2, Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings and Miscellaneous Materials and Assemblies.

.3 CAN/ULC S115, Standard Method of Fire Tests of Firestop.

.6 National Sanitation foundation (NSF)

.1 NSF/ANSI 61, Drinking Water System Components-Health Effects.

.2 NSF 372, Drinking Water System Components - Lead Content.

.7 Manufacturer's Standardization Society of the Valve and Fittings Industry (MSS).

.1 MSS-SP-67, Butterfly Valves.

.2 MSS-SP-70, Grey Iron Gate Valves, Flanged and Threaded Ends.

.3 MSS-SP-71, Grey Iron Swing Check Valves, Flanged and Threaded Ends.

.4 MSS-SP-80, Bronze Gate, Globe, Angle and Check Valves.

.8 National Research Council (NRC)

.1 National Plumbing Code of Canada (NPC) .

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data

.1 Provide manufacturer's printed product literature and datasheets for insulation and adhesives, and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Closeout Submittals:

.1 Provide maintenance data for incorporation into manual.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Store and manage hazardous materials in accordance with requirements.

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

.3 Handle and dispose of hazardous materials in accordance with regulations.

Part 2 Products

2.1 PIPING

.1 Domestic hot, cold and recirculation systems, within building.

.1 Above ground:

.1 Copper tube, hard drawn, type L: to ASTM B88M.

.2 PEX Piping to CSA B137.5.

.3 If PEX piping is used in the plenum it shall be rated for use in a plenum.

2.2 FITTINGS

.1 Bronze pipe flanges and flanged fittings, Class 150: to ANSI/ASME B16.24.

.2 Cast bronze threaded fittings, Class 125: to ANSI/ASME B16.15.

.3 Cast copper, solder type: to ANSI/ASME B16.18.

.4 Wrought copper and copper alloy, solder type: to ANSI/ASME B16.22.

.5 NPS 2 and larger:

.1 ANSI/ASME B16.18 or ANSI/ASME B16.22 roll grooved to CSA B242.

.2 PEX fittings to CSA B137.5 and F1960.

.6 NPS 1 ½ and smaller:

.1 Wrought copper to ANSI/ASME B16.22] or cast copper to ANSI/ASME B16.18; with stainless steel internal components and EPDM seals. Suitable for operating pressure to 1380 kPa.

.2 PEX fittings to CSA B137.5.

2.3 JOINTS

.1 Rubber gaskets, latex-free 1.6 mm thick: to AWWA C111.

.2 Bolts, nuts, hex head and washers: to ASTM A307, heavy series.

.3 Solder: tin copper alloy.

.4 Teflon tape: for threaded joints.

.5 Grooved couplings: designed with angle bolt pads to provide rigid joint, complete with EPDM gasket.

.6 Dielectric connections between dissimilar metals: dielectric fitting, complete with thermoplastic liner.

.7 NPS 1 ½ and smaller: PEX fittings to CSA B137.5.

.8 NPS 2 and larger: PEX fittings to CSA B137.5 and ASTM F1960. Elbows, adapters, couplings, plugs, tees, multi-port tees and valves.

2.4 GATE VALVES

.1 NPS 2 and under, soldered:

.1 Rising stem: to MSS-SP-80, Class 125, 860 kPa, bronze body, screw-in bonnet, solid wedge disc as specified Section 23 05 23.01- Valves - Bronze.

.2 NPS 2 and under, screwed:

.1 Rising stem: to MSS-SP-80, Class 125, 860 kPa, bronze body, screw-in bonnet, solid wedge disc as specified Section 23 05 23.01- Valves - Bronze.

2.5 GLOBE VALVES

.1 NPS2 and under, soldered:

.1 To MSS-SP-80, Class 125, 860 kPa, bronze body, renewable composition disc, screwed over bonnet as specified Section 23 05 23.01- Valves - Bronze.

.2 NPS 2 and under, screwed:

.1 To MSS-SP-80, Class 150, 1 MPa, bronze body, screwed over bonnet, renewable composition disc as specified Section 23 05 23.01- Valves - Bronze.

2.6 SWING CHECK VALVES

.1 NPS 2 and under, soldered:

.1 To MSS-SP-80, Class 125, 860 kPa, bronze body, bronze swing disc, screw in cap, regrindable seat as specified Section 23 05 23.01- Valves - Bronze.

.2 NPS 2 and under, screwed:

.1 To MSS-SP-80, Class 125, 860 kPa, bronze body, bronze swing disc, screw in cap, regrindable seat as specified Section 23 05 23.01- Valves - Bronze.

2.7 BALL VALVES

.1 NPS 2 and under, screwed:

.1 Class 150.

.2 Bronze body, stainless steel or chrome plated brass ball, PTFE adjustable packing, brass gland, steel lever handle as specified Section 23 05 23.01- Valves - Bronze.

.2 NPS 2 and under, soldered:

.1 To ANSI/ASME B16.18, Class 150.

.2 Bronze body, stainless steel or chrome plated brassball, PTFE adjustable packing, brass gland steel lever handle, with NPT to copper adaptors as specified Section 23 05 23.01- Valves - Bronze.

.3 NPS 2 and under, mechanical:

.1 To CSA B137.5 and ASTM F1960.

.2 Lead free brass body.

Part 3 Execution

3.1 PREPARATION

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

3.2 INSTALLATION

.1 Install in accordance with Ontario Building Code

.2 Install pipe work in accordance with Section 23 05 05- Installation of Pipework, supplemented as specified herein.

.3 Assemble piping using fittings manufactured to ANSI and Standard Council of Canada (SCC) standards.

.4 Install CWS piping below and away from HWS and HWC and other hot piping so as to maintain temperature of cold water as low as possible.

.5 Connect to fixtures and equipment in accordance with manufacturer's written instructions unless otherwise indicated.

.6 Valves

.1 Isolate equipment, fixtures and branches with gate valves.

3.3 FIELD QUALITY CONTROL

.1 Pressure Tests

.1 Conform to requirements of Section 21 05 01- Common Work Results for Mechanical.

.2 Test pressure: greater of 1.5 times maximum system operating pressure or 860 kPa.

3.4 FLUSHING AND DISINFECTION

.1 Flush out, disinfect and rinse system to requirements of authority having jurisdiction.

3.5 START-UP

.1 Timing: start up after:

.1 Pressure tests have been completed.

.2 Disinfection procedures have been completed.

.3 Certificate of static completion has been issued.

.4 Water treatment systems operational.

3.6 PERFORMANCE VERIFICATION

.1 Scheduling:

.1 Verify system performance after pressure and leakage tests and disinfection are completed, and Certificate of Completion has been issued by authority having jurisdiction.

.2 Procedures:

.1 Verify that flow rate and pressure meet Design Criteria.

.2 Adjust pressure regulating valves while withdrawal is maximum and inlet pressure is minimum.

.3 Verify performance of temperature controls.

.4 Verify compliance with safety and health requirements.

.5 Confirm water quality consistent with supply standards, and ensure no residuals remain as result of flushing or cleaning.

3.7 OPERATION REQUIREMENTS

.1 Co-ordinate operation and maintenance requirements including, cleaning and maintenance of specified materials and products.

.2 Operational requirements include:

.1 Cleaning materials and schedules.

.2 Repair and maintenance materials and instructions.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 ASTM International Inc.

.1 ASTM D2235, Standard Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings.

.2 ASTM D2564, Standard Specification for Solvent Cements for Poly(Vinyl-Chloride) (PVC) Plastic Piping Systems.

.2 Canadian Standards Association (CSA International)

.1 CAN/CSA-Series B1800, Thermoplastic Nonpressure Pipe Compendium - B1800 Series.

.3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.4 National Research Council Canada (NRC)

.1 National Plumbing Code of Canada (NPC).

1.2 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

.2 Store at temperatures and conditions recommended by manufacturer.

Part 2 Products

2.1 PIPING AND FITTINGS

.1 For above ground DWV piping to:

.1 CAN/CSA B1800.

2.2 JOINTS

.1 Solvent weld for PVC: to ASTM D2564.

.2 Solvent weld for ABS: to ASTM D2235.

Part 3 Execution

3.1 APPLICATION

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

3.2 INSTALLATION

.1 In accordance with Section 23 05 05- Installation of Pipework.

.2 Install in accordance with Ontario Building Code.

3.3 TESTING

.1 Hydraulically test to verify grades and freedom from obstructions.

3.4 PERFORMANCE VERIFICATION

.1 Cleanouts:

.1 Ensure accessible and that access doors are correctly located.

.2 Open, cover with linseed oil and re-seal.

.3 Verify cleanout rods can probe as far as the next cleanout, at least.

.2 Test to ensure traps are fully and permanently primed.

.3 Storm water drainage:

.1 Verify domes are secure.

.2 Ensure weirs are correctly sized and installed correctly.

.3 Verify provisions for movement of roof system.

.4 Ensure fixtures are properly anchored, connected to system and effectively vented.

3.5 CLEANING

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

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 National Air Duct Cleaners Association (NADCA)

.1 ACR Standard, [2006 edition]: Assessment, Cleaning and Restoration of HVAC Systems.

.2 North American Insulation Manufacturers Association (NAIMA)

.1 NAIMA [2005], Cleaning Fibrous Glass Insulated Duct Systems - Recommended Practices.

Part 2 Execution

2.1 PREPARATION

2.2 BASIC DUCT CLEANING

.1 Do duct cleaning in accordance with NADCA ACR Standard.

.2 Isolate and clean duct at least 6ft (2 m) each side of any work done to the ductwork.

.3 Ensure that dirt deposits and debris from zone being cleaned does not pass through another zones which has already been cleaned.

2.3 OPTIONAL FULL DUCT CLEANING

.1 Provide as a separate optional price duct cleaning of the full system.

.2 Do duct cleaning in accordance with NADCA ACR Standard.

.3 All ductwork shall be cleaned.

END OF SECTION

Part 1 General

1.1 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:

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

.2 Shop Drawings:

.1 Indicate on drawings:

.1 Mounting arrangements.

.2 Operating and maintenance clearances.

.2 Shop drawings and product data accompanied by:

.1 Detailed drawings of bases, supports, and anchor bolts.

.2 Acoustical sound power data, where applicable.

.3 Points of operation on performance curves.

.4 Manufacturer to certify current model production.

.5 Certification of compliance to applicable codes.

1.2 CLOSEOUT SUBMITTALS

.1 Operation and Maintenance Data: submit operation and maintenance data

.1 Operation and maintenance manual approved by, and final copies deposited with, Parks Canada Agency (PCA) before final inspection.

.2 Operation data to include:

.1 Control schematics for systems including environmental controls.

.2 Description of systems and their controls.

.3 Description of operation of systems at various loads together with reset schedules and seasonal variances.

.4 Operation instruction for systems and component.

.5 Description of actions to be taken in event of equipment failure.

.6 Valves schedule and flow diagram.

.7 Colour coding chart.

.3 Maintenance data to include:

.1 Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.

.2 Data to include schedules of tasks, frequency, tools required and task time.

.4 Performance data to include:

.1 Equipment manufacturer's performance datasheets with point of operation as left after commissioning is complete.

.2 Equipment performance verification test results.

.3 Special performance data as specified.

.4 Testing, adjusting and balancing reports as specified in Section 23 05 93-Testing, Adjusting and Balancing for HVAC.

.5 Approvals:

.1 Submit copies of draft Operation and Maintenance Manual Consultant for approval.

.2 Make changes as required and re-submit as directed by Consultant.

.6 Additional data:

.1 Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified demonstrations and instructions.

.7 Site records:

.1 Provide sets of white prints as required for each phase of work. Mark changes as work progresses and as changes occur. [Include changes to existing mechanical systems, control systems and low voltage control wiring].

.2 Transfer information weekly to reproducibles, revising reproducibles to show work as actually installed.

.3 Use different colour waterproof ink for each service.

.4 Make available for reference purposes and inspection.

.8 As-built drawings:

.1 Prior to start of Testing, Adjusting and Balancing for HVAC, finalize production of as-built drawings.

.2 Identify each drawing in lower right hand corner in letters at least 12 mm high as follows: - "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (Date).

.3 Submit to Consultant for approval and make corrections as directed.

.4 Perform testing, adjusting and balancing for HVAC using as-built drawings.

.5 Submit completed reproducible as-built drawings with Operating and Maintenance Manuals.

.9 Submit copies of as-built drawings for inclusion in final TAB report.

1.3 MAINTENANCE MATERIAL SUBMITTALS

.1 Furnish spare parts as follows:

.1 One set of packing for each pump.

.2 One casing joint gasket for each size pump.

.3 One head gasket set for each heat exchanger.

.4 One glass for each gauge glass.

.5 One filter cartridge or set of filter media for each filter or filter bank in addition to final operating set.

.2 Provide one set of special tools required to service equipment as recommended by manufacturers.

.3 Furnish one commercial quality grease gun, grease and adapters to suit different types of grease and grease fittings.

1.4 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.

Part 3 Execution

3.1 PAINTING REPAIRS AND RESTORATION

.1 Prime and touch up marred finished paintwork to match original.

.2 Restore to new condition, finishes which have been damaged.

3.2 SYSTEM CLEANING

.1 Clean interior and exterior of all systems including strainers. Vacuum interior of ductwork and air handling units per 23 01 31.

3.3 FIELD QUALITY CONTROL

.1 Manufacturer's Field Services:

.1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.

.2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

3.4 CLEANING

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

3.5 PROTECTION

.1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 Canadian Standards Association (CSA International)

.1 CSA B139, Installation Code for Oil Burning Equipment.

.2 National Research Council Canada (NRC)

.1 National Fire Code of Canada (NFC).

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:

.1 Provide manufacturer's printed product literature, specifications and datasheets for piping and equipment and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacture’s guidelines

.2 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

Part 2 Products

2.1 MATERIAL

.1 Paint: zinc-rich to CAN/CGSB-1.181.

Part 3 Execution

3.1 APPLICATION

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

3.2 CONNECTIONS TO EQUIPMENT

.1 In accordance with manufacturer's instructions unless otherwise indicated.

.2 Use valves and either unions or flanges for isolation and ease of maintenance and assembly.

.3 Use double swing joints when equipment mounted on vibration isolation and when piping subject to movement.

3.3 CLEARANCES

.1 Provide clearance around systems, equipment and components for observation of operation, inspection, servicing, maintenance and as recommended by manufacturer and CSA B139.

.2 Provide space for disassembly, removal of equipment and components as recommended by manufacturer without interrupting operation of other system, equipment, components.

3.4 DRAINS

.1 Install piping with grade in direction of flow except as indicated.

.2 Install drain valve at low points in piping systems, at equipment and at section isolating valves.

.3 Pipe each drain valve discharge separately to above floor drain.

.1 Discharge to be visible.

.4 Drain valves: NPS 3/4 gate or globe valves unless indicated otherwise, with hose end male thread, cap and chain.

3.5 AIR VENTS

.1 Install automatic air vent (as noted) to at high point in piping systems.

.2 Install isolating valve at each automatic air valve.

.3 Install drain piping to approved location and terminate where discharge is visible.

3.6 DIELECTRIC COUPLINGS

.1 General: compatible with system, to suit pressure rating of system.

.2 Locations: where dissimilar metals are joined.

.3 NPS 2 and under: isolating unions or bronze valves.

.4 Over NPS 2: isolating flanges.

3.7 PIPEWORK INSTALLATION

.1 Install oil pipework to CSA B139.

.2 Screwed fittings jointed with Teflon tape.

.3 Protect openings against entry of foreign material.

.4 Install to isolate equipment and allow removal without interrupting operation of other equipment or systems.

.5 Assemble piping using fittings manufactured to ANSI standards.

.6 Saddle type branch fittings may be used on mains if branch line is no larger than half size of main.

.1 Hole saw (or drill) and ream main to maintain full inside diameter of branch line prior to welding saddle.

.7 Install exposed piping, equipment, rectangular cleanouts and similar items parallel or perpendicular to building lines.

.8 Install concealed pipework to minimize furring space, maximize headroom, and conserve space.

.9 Slope piping, except where indicated, in direction of flow for positive drainage and venting.

.10 Install, except where indicated, to permit separate thermal insulation of each pipe.

.11 Group piping wherever possible

.12 Ream pipes, remove scale and other foreign material before assembly.

.13 Use eccentric reducers at pipe size changes to ensure positive drainage and venting.

.14 Provide for thermal expansion as indicated.

.15 Valves:

.1 Install in accessible locations.

.2 Remove interior parts before soldering.

.3 Install with stems above horizontal position unless indicated.

.4 Valves accessible for maintenance without removing adjacent piping.

.5 Install globe valves in bypass around control valves.

.6 Use gate valves at branch take-offs for isolating purposes except where specified.

.16 Check Valves:

.1 Install silent check valves on discharge of pumps and as indicated, or

.2 Install swing check valves in horizontal lines on discharge of pumps.

3.8 ESCUTCHEONS

.1 Install on pipes passing through walls, partitions, floors, and ceilings in finished areas.

.2 Construction: one piece type with set screws.

.1 Chrome or nickel plated brass or type 302 stainless steel..

.3 Sizes: outside diameter to cover opening or sleeve.

.1 Inside diameter to fit around pipe or outside of insulation if so provided.

3.9 FLUSHING OUT OF PIPING SYSTEMS

.1 Before start-up, clean interior and flush of piping systems.

.2 Preparatory to acceptance, clean and refurbish equipment and leave in operating condition, including replacement of filters in piping systems.

3.10 PRESSURE TESTING OF EQUIPMENT AND PIPEWORK

.1 Advise Consultant 48 hour’s minimum prior to performance of pressure tests.

.2 Pipework: test as specified in relevant sections of heating, ventilating and air conditioning work.

.3 Maintain specified test pressure without loss for 4 hours minimum unless specified for longer period of time in relevant mechanical sections.

.4 Prior to tests, isolate equipment and other parts which are not designed to withstand test pressure or media.

.5 Pay costs for repairs or replacement, retesting, and making good.

.6 Insulate or conceal work only after approval and certification of tests.

3.11 EXISTING SYSTEMS

.1 Connect into existing piping systems at times approved by Parks Canada Agency (PCA).

.2 Be responsible for damage to existing plant by this work.

3.12 CLEANING

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

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 Electrical motors, drives and guards for mechanical equipment and systems.

.2 Supplier and installer responsibility indicated in Motor, Control and Equipment Schedule on electrical drawings and related mechanical responsibility is indicated on Mechanical Equipment Schedule on mechanical drawings.

.3 Control wiring and conduit is specified in Division 26 except for conduit, wiring and connections below 50 V which are related to control systems specified in Division 22 and 23. Refer to Division 26 for quality of materials and workmanship.

1.2 REFERENCE STANDARDS

.1 American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE)

.1 ASHRAE 90.1, Energy Standard for Buildings Except Low-Rise Residential Buildings (IESNA cosponsored; ANSI approved; Continuous Maintenance Standard).

.2 Electrical Equipment Manufacturers' Association Council (EEMAC)

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet. Include product characteristics, performance criteria, and limitations.

.2 Quality Control:

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

.3 Closeout Submittals

.1 Provide maintenance data for motors, drives and guards for incorporation into manual.

1.4 QUALITY ASSURANCE

.1 Regulatory Requirements: work to be performed in compliance with applicable Provincial regulations.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Packing, shipping, handling and unloading:

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

Part 2 Products

2.1 GENERAL

.1 Motors: high efficiency, in accordance with local Hydro company standards and to ASHRAE 90.1.

2.2 MOTORS

.1 Provide motors for mechanical equipment as specified.

.2 Motors under 1/2 HP: speed as indicated, continuous duty, built-in overload protection, resilient mount, single phase, 120 V, unless otherwise specified or indicated.

.3 Motors 1/2 HPand larger: EEMAC Class B, squirrel cage induction, speed as indicated, continuous duty, drip proof, ball bearing, maximum temperature rise 40degrees C, 3 phase.

.4 Provide VFD capable motors where indicated.

2.3 BELT DRIVES

.1 Fit reinforced belts in sheave matched to drive. Multiple belts to be matched sets.

.2 Use cast iron or steel sheaves secured to shafts with removable keys unless otherwise indicated.

.3 For motors under 10 HP: standard adjustable pitch drive sheaves, having plus or minus 10% range. Use mid-position of range for specified r/min.

.4 For motors 10 HP and over: sheave with split tapered bushing and keyway having fixed pitch unless specifically required for item concerned. Provide sheave of correct size to suit balancing.

.5 Correct size of sheave determined during commissioning.

.6 Minimum drive rating: 1.5 times nameplate rating on motor. Keep overhung loads within manufacturer's design requirements on prime mover shafts.

.7 Motor slide rail adjustment plates to allow for centre line adjustment.

.8 Supply one set of spare belts for each set installed.

2.4 DRIVE GUARDS

.1 Provide guards for unprotected drives.

.2 Guards for belt drives;

- .1 Expanded metal screen welded to steel frame.
- .2 Minimum 1.2 mm thick sheet metal tops and bottoms.
- .3 38mm dia holes on both shaft centres for insertion of tachometer.
- .4 Removable for servicing.

.3 Provide means to permit lubrication and use of test instruments with guards in place.

.4 Install belt guards to allow movement of motors for adjusting belt tension.

.5 Guard for flexible coupling:

.1 "U" shaped, minimum 1.6 mm thick galvanized mild steel.

.2 Securely fasten in place.

.3 Removable for servicing.

.6 Unprotected fan inlets or outlets:

.1 Wire or expanded metal screen, galvanized, 19 mm mesh.

.2 Net free area of guard: not less than 80% of fan openings.

.3 Securely fasten in place.

.4 Removable for servicing.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

.1 Fasten securely in place.

.2 Make removable for servicing, easily returned into, and positively in position.

3.3 CLEANING

.1 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 Materials and components for metering steam and chilled/hot water including installation.

1.2 REFERENCE STANDARDS

.1 American Society of Mechanical Engineers (ASME)

.1 ASME Fluid Meter's Handbook: Their Theory and Application, Sixth Edition.

.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet, product characteristics, performance criteria, and limitations.

.2 Submittals to include:

.1 Piping configuration and sizing - straight pipe upstream and downstream, distances to first weld, protrusion, thermowell, pressure tap.

.2 Service conditions.

.3 Full details of primary element - standard of design and construction, materials, type serial number, flow rate, differential pressure, irrecoverable head loss (IHL), calculation sheets.

.4 Accuracy statements for each component at specified flow rates and other conditions.

.5 Flow and temperature ranges.

.6 Signal processor calibration data.

.7 Minimum turndown ratio.

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

.3 Closeout Submittals:

.1 Submit maintenance data including monitoring requirements for incorporation into manuals.

1.4 DELIVERY, STORAGE, AND HANDLING

.1 Packing, shipping, handling and unloading:

.1 Deliver, store and handle in accordance with manufacturer's written instructions.

Part 2 Products

2.1 ACCURACY

.1 Gages to be the minimum range that will cover the system temperature and pressure.

.2 Gages to have 2 ½" Dials.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 CLEANING

.1 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 American National Standards Institute (ANSI)/American Society of Mechanical Engineers (ASME)

.1 ANSI/ASME B1.20.1, Pipe Threads, General Purpose (Inch).

.2 ANSI/ASME B16.18, Cast Copper Alloy Solder Joint Pressure Fittings.

.2 ASTM International

.1 ASTM A276, Standard Specification for Stainless Steel Bars and Shapes.

.2 ASTM B62, Standard Specification for Composition Bronze or Ounce Metal Castings.

.3 ASTM B283, Standard Specification for Copper and Copper Alloy Die Forgings (Hot-Pressed).

.4 ASTM B505/B505M, Standard Specification for Copper-Base Alloy Continuous Castings.

.3 Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS)

.1 MSS-SP-25, Standard Marking System for Valves, Fittings, Flanges and Unions.

.2 MSS-SP-80, Bronze Gate Globe, Angle and Check Valves.

.3 MSS-SP-110, Ball Valves, Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:

.1 Provide manufacturer's printed product literature and data sheets for equipment and systems and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 CLOSEOUT SUBMITTALS

.1 Provide maintenance data for incorporation into manual.

1.4 MAINTENANCE MATERIAL SUBMITTALS

.1 Extra Materials/Spare Parts:

.1 Furnish following spare parts:

.1 Valve seats: one for every 10 valves each size, minimum 1.

.2 Discs: one for every 10 valves, each size. Minimum 1.

.3 Stem packing: one for every 10 valves, each size. Minimum 1.

.4 Valve handles: 2 of each size.

.5 Gaskets for flanges: one for every 10 flanged joints. Minimum 1

.2 Tools:

.1 Furnish special tools for maintenance of systems and equipment.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufactures recommendations.

.2 Delivery and Acceptance Requirements:

.1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

Part 2 Products

2.1 MATERIALS

.1 Valves:

.1 Except for specialty valves, to be single manufacturer.

.2 Products to have CRN registration numbers.

.2 End Connections:

.1 Connection into adjacent piping/tubing:

.1 Steel pipe systems: screwed ends to ANSI/ASME B1.20.1.

.2 Copper tube systems: grooved ends to ANSI/ASME B16.18.

.3 Lockshield Keys:

.1 Where lockshield valves are specified, provide 10 keys of each size: malleable iron cadmium plated.

.4 Gate Valves:

.1 Requirements common to gate valves, unless specified otherwise:

.1 Standard specification: MSS SP-80.

.2 Bonnet: union with hexagonal shoulders.

.3 Connections: screwed with hexagonal shoulders.

.4 Inspection and pressure testing: to MSS SP-80. Tests to be hydrostatic.

.5 Packing: non-asbestos.

.6 Handwheel: non-ferrous.

.7 Handwheel Nut: bronze to ASTM B62.

.2 NPS 2 and under, non-rising stem, solid wedge disc, Class 125

.1 Body: with long disc guides, screwed bonnet with stem retaining nut.

.2 Operator: Handwheel.

.3 NPS 2 and under, non-rising stem, solid wedge disc, Class 150:

.1 Body: with long disc guides, screwed bonnet with stem retaining nut.

.2 Operator: handwheel.

.4 NPS 2 and under, rising stem, split wedge disc, Class 125:

.1 Body: with long disc guides, screwed bonnet.

.2 Disc: split wedge, bronze to ASTM B283, loosely secured to stem.

.3 Operator: handwheel.

.5 NPS 2 and under, rising stem, solid wedge disc, Class 125:

.1 Body: with long disc guides, screwed bonnet.

.2 Operator: handwheel.

.6 NPS 2 and under, rising stem, solid wedge disc, Class 150:

.1 Body: with long disc guides, union bonnet.

.2 Operator: handwheel

.5 Globe Valves:

.1 Requirements common to globe valves, unless specified otherwise:

.1 Standard specification: MSS SP-80.

.2 Bonnet: union with hexagonal shoulders.

.3 Connections: screwed with hexagonal shoulders.

.4 Pressure testing: to MSS SP-80. Tests to be hydrostatic.

.5 Stuffing box: threaded to bonnet with gland follower, packing nut, high grade non-asbestos packing.

.6 Handwheel: non-ferrous.

.7 Handwheel Nut: bronze to ASTM B62.

.2 NPS 2 and under, composition disc, Class 125:

.1 Body and bonnet: screwed bonnet.

.2 Disc and seat: renewable rotating disc composition to suit service conditions, regrindable bronze seat, loosely secured to bronze stem to ASTM B505.

.3 Operator: handwheel.

.3 NPS 2 and under, composition disc, Class 150:

.1 Body and bonnet: union bonnet.

.2 Disc and seat: renewable rotating PTFE disc in easily removable disc holder, regrindable bronze seat, loosely secured to bronze stem to ASTM B505.

.3 Operator: handwheel.

.4 NPS 2 and under, plug disc, Class 150, screwed ends:

.1 Body and bonnet: union bonnet.

.2 Disc and seat ring: tapered plug type with disc stem ring of AISI S420 stainless steel to ASTM A276, loosely secured to stem.

.3 Operator: handwheel.

.6 Check Valves:

.1 Requirements common to check valves, unless specified otherwise:

.1 Standard specification: MSS SP-80.

.2 Connections: screwed with hexagonal shoulders.

.2 NPS 2 and under, swing type, bronze disc, Class 125:

.1 Body: Y-pattern with integral seat at 45 degrees, screw-in cap with hex head.

.2 Disc and seat: renewable rotating disc, two-piece hinge disc construction; seat: regrindable.

.3 NPS 2 and under, swing type, bronze disc:

.1 Body: Y-pattern with integral seat at 45 degrees, screw-in cap with hex head.

.2 Disc and seat: renewable rotating disc, two-piece hinge disc construction; seat: regrindable.

.4 NPS 2 and under, swing type, composition disc, Class 200:

.1 Body: Y-pattern with integral seat at 45 degrees, screw-in cap with hex head.

.2 Disc: renewable rotating disc composition to suit service conditions, bronze two-piece hinge disc construction.

.5 NPS 2 and under, horizontal lift type, composition disc, Class 150:

.1 Body: with integral seat, union bonnet ring with hex shoulders, cap.

.2 Disc: renewable disc in disc holder having guides top and bottom, composition to suit service.

.6 NPS 2 and under, vertical lift type, bronze disc, Class 125:

.1 Disc: rotating disc having guides top and bottom, disc guides, retaining rings.

.7 Silent Check Valves:

.1 NPS 2 and under:

.1 Body: cast high tensile bronze to ASTM B62 with integral seat.

.2 Pressure rating: Class 125.

.3 Connections: screwed ends to ANSI B1.20.1 and with hex. shoulders.

.4 Disc and seat: renewable rotating disc.

.5 Stainless steel spring, heavy duty.

.6 Seat: regrindable.

.8 Ball Valves:

.1 NPS 2 and under:

.1 Body and cap: cast high tensile bronze to ASTM B62.

.2 Pressure rating: Class125 2760-kPa CWP.

.3 Connections: screwed ends to ANSI B1.20.1 and with hexagonal shoulders.

.4 Stem: tamperproof ball drive.

.5 Stem packing nut: external to body.

.6 Ball and seat: replaceable stainless steel solid ball and Teflon seats.

.7 Stem seal: TFE with external packing nut.

.8 Operator: removable lever handle.

.9 Butterfly Valves:

.1 NPS 2 1/2 through NPS 6, 2068 kPa with grooved ends.

.1 Body: cast bronze, with copper-tube dimensioned grooved ends.

.2 Disc: elastomer coated ductile iron with integrally cast stem.

.3 Operator: lever.

Part 3 Execution

3.1 INSTALLATION

.1 Install rising stem valves in upright position with stem above horizontal.

.2 Remove internal parts before soldering.

.3 Install valves with unions at each piece of equipment arranged to allow servicing, maintenance, and equipment removal.

3.2 CLEANING

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

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 American Society of Mechanical Engineers (ASME)

.1 ASME B16.1, Cast Iron Pipe Flanges and Flanged Fittings.

.2 ASTM International Inc.

.1 ASTM A49, Standard Specification for Heat-Treated Carbon Steel Joint Bars.

.2 ASTM A126, Standard Specification for Grey Iron Castings for Valves, Flanges, and Pipe Fittings.

.3 ASTM A536, Standard Specification for Ductile Iron Castings.

.4 ASTM B61, Standard Specification for Steam or Valve Bronze Castings.

.5 ASTM B62, Standard Specification for Composition Bronze or Ounce Metal Castings.

.6 ASTM B85/B85M, Standard Specification for Aluminum-Alloy Die Castings.

.7 ASTM B209, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:

.1 Provide manufacturer's printed product literature, specifications and datasheets for valves and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 CLOSEOUT SUBMITTALS

.1 Submit maintenance data for incorporation into manual specified.

1.4 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements:

.1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

1.5 MAINTENANCE MATERIAL SUBMITTALS

.1 Extra Materials/Spare Parts:

.2 Furnish following spare parts:

.1 Valve seats: one for every 10 valves each size, minimum 1.

.2 Discs: one for every 10 valves, each size, minimum 1.

.3 Stem packing: one for every 10 valves, each size, minimum 1.

.4 Valve handles: 2 of each size.

.5 Gaskets for flanges: one for every 10 flanged joints.

Part 2 Products

2.1 MATERIAL

.1 Valves:

.1 Except for specialty valves, to be of single manufacturer.

.2 Standard specifications:

.1 Gate valves: MSS SP-70.

.2 Globe valves: MSS SP-85.

.3 Check valves: MSS SP-71.

.3 Requirements common to valves, unless specified otherwise:

.1 Body, bonnet: ductile iron to ASTM A536 Grade 65-45-12 or cast iron to ASTM B209 Class B.

.2 Connections: flanged ends with 2 mm raised face with serratedto ANSI B16.1.

.3 Inspection and pressure testing: to MSS SP-82.

.4 Bonnet gasket: non-asbestos.

.5 Stem: to have precision-machined Acme or 60 degrees V threads, top screwed for handwheel nut.

.6 Stuffing box: non-galling two-piece ball-jointed packing gland, gland bolts and nuts.

.7 Gland packing: non-asbestos.

.8 Handwheel: die-cast aluminum alloy to ASTM B85/B85M or malleable iron to ASTM A49. Nut of bronze to ASTM B62.

.9 Identification tag: with catalogue number, size, other pertinent data.

.4 All products to have CRN registration numbers.

2.2 GATE VALVES

.1 NPS 2 1/2 - 8, non rising stem, inside screw, bronze trim, solid wedge disc:

.1 Body and multiple-bolted bonnet: with full length disc guides designed to ensure correct re-assembly, Class 125.

.2 Disc: solid offset taper wedge, bronze to ASTM B62.

.3 Seat rings: renewable bronze to ASTM B62, screwed into body.

.4 Stem: bronze to ASTM B62.

.5 Disc: solid offset taper wedge, cast iron to ASTM A126 Class B, secured to wrought steel stem.

.6 Seat: integral with body.

.7 Stem: wrought steel.

.8 Operator: handwheel.

.9 Bypass: complete with union and NPS gate valve as Section 23 05 23.01- Valves - Bronze,

.2 NPS 2 1/2-8, outside screw and yoke (OS&Y), bronze trim, solid wedge disc:

.1 Body and multiple-bolted bonnet: with bosses in body and bonnet for taps and drains, full length disc guides designed to ensure correct re-assembly, yoke, yoke hub, yoke sleeve and nut. Class 125.

.2 Disc: solid offset taper wedge, bronze to ASTM B62 up to NPS 3, cast iron with bronze disc rings on other sizes, secured to stem through integral forged T-head disc-stem connection.

.3 Seat rings: renewable bronze screwed into body.

.4 Stem: manganese-bronze.

.5 Disc: solid offset taper all-cast iron, secured to stem through integral forged T-head disc-stem connection.

.6 Seat rings: integral with body.

.7 Stem: nickel-plated steel.

.8 Pressure-lubricated operating mechanism.

.9 Operator: handwheel

.10 Bypass: complete with union and NPS gate valve as Section 3 05 05- Installation of Pipework

2.3 UNDERWRITERS APPROVED GATE VALVE

.1 NPS 2 1/2 - 14, OS&Y:

.1 Approvals: UL and FM approved for fire service.

.2 UL and FM Label: on valve yoke.

.3 Body, Bonnet: cast iron to ASTM A126 Class B. Wall thicknesses to ANSI B16.1 and ULC C-262 (B) ductile iron to ASTM A536 Grade 65-45-12.

.4 Bonnet bushing, yoke sleeve: bronze, to FM requirements.

.5 Packing gland: bronze.

.6 Stem: manganese bronze. Diameter to ULC C-262 (B). Brass, ASTM B16.

.7 Stuffing box dimensions, gland bolt diameter: to ULC C-262 (B).

.8 Bosses for bypass valve, drain: on NPS 4 and over.

.9 Disc: solid taper wedge. Up to NPS 3: bronze. NPS 4 and over: EPDM coated cast iron with bronze disc rings.

.10 Disc seat ring: self-aligning, Milwood undercut on NPS 3 - 12.

.11 Pressure rating:

.1 NPS 2-1/2 - 12: 1.7 Mpa CWP.

.2 NPS 14-1.2: 1.2 MPa CWP.

.12 Operator: handwheel.

.13 Bypass: complete with union and NPS gate valve as Section 23 05 23.01- Valves - Bronze

2.4 GLOBE VALVES

.1 NPS 2 1/2 - 10, OSY:

.1 Body: with multiple-bolted bonnet.

.2 WP: 860 kPa steam, 1.4 MPa CWP.

.3 Bonnet-yoke gasket: non-asbestos.

.4 Disc: bronze to ASTM B62, fully guided from bottom, securely yet freely connected to stem for swivel action and accurate engagement with disc.

.5 Seat ring: renewable, regrindable, screwed into body.

.6 Stem: bronze to ASTM B62.

.7 Operator: handwheel.

.8 Bypass: complete with union and NPS gate valve as Section 23 05 23.01- Valves - Bronze

2.5 VALVE OPERATORS

.1 Install valve operators as follows:

.1 Handwheel: on valves except as specified.

2.6 CHECK VALVES

.1 Swing check valves, Class 125:

.1 Body and bolted cover: with tapped and plugged opening on each side for hinge pin. Grooved or flanged ends: plain faced with smooth finish.

.1 Up to NPS 16: cast iron to ASTM A126 Class B or ductile iron ASTM A536 Grade 65-45-12.

.2 NPS 18 and over: cast iron to ASTM A126 Class C.

.2 Ratings:

.1 NPS 2 1/2 - 12: 860 kPa steam; 1.4 MPa CWP.

.2 NPS 14 - 16: 860 kPa steam; 1.03 MPa CWP.

.3 NPS 18 and over: 1.03 MPa CWP.

.3 Disc: rotating for extended life.

.1 Up to NPS 6: stainless steel type 316 or bronze to ASTM B62.

.2 NPS 8 and over: bronze-faced cast iron.

.4 Seat rings: renewable bronze to ASTM B62 screwed into body.

.5 Hinge pin, bushings: renewable bronze to ASTM B62 or stainless steel.

.6 Disc: A126 Class B, secured to stem, rotating for extended life.

.7 Seat: cast iron, integral with body.

.8 Hinge pin: exelloy; bushings: malleable iron.

.9 Identification tag: fastened to cover.

.10 Hinge: stainless steel.

.2 Swing check valves, NPS 2 1/2 - 8 Class 250:

.1 Body and bolted cover: cast iron to ASTM A126 Class B with tapped and plugged opening on each side for hinge pin.

.2 Flanged ends: 2 mm raised face with serrated finish.

.3 Rating: 250 psi steam; 500 psi CWP.

.4 Disc: rotating for extended life.

.1 Up to NPS 3: bronze to ASTM B61.

.2 NPS 4 - 8: iron faced with ASTM B61 bronze.

.5 Seat rings: renewable bronze to ASTM B61, screwed into body.

.6 Hinge pin, bushings: renewable, bronze to ASTM B61.

.7 Hinge: galvanized malleable iron.

.8 Identification tag: fastened to cover.

2.7 SILENT CHECK VALVES

.1 Construction:

.1 Body: ductile iron or malleable iron with integral seat.

.2 Pressure rating: Class 125, WP = 860 kPa.

.3 Connections: grooved ends.

.4 Disc: bronze renewable rotating disc.

.5 Seat: renewable, EPDM.

.6 Stainless steel spring, heavy duty.

Part 3 Execution

3.1 INSTALLATION

.1 Install rising stem valves in upright position with stem above horizontal.

3.2 CLEANING

.1 Clean installed products in accordance to manufacturer's recommendation.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 American Society of Mechanical Engineers (ASME)

.1 ASME B31.1, Power Piping.

.2 ASTM International

.1 ASTM A125, Standard Specification for Steel Springs, Helical, Heat-Treated.

.2 ASTM A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.3 ASTM A563, Standard Specification for Carbon and Alloy Steel Nuts.

.3 Factory Mutual (FM)

.4 Manufacturer's Standardization Society of the Valves and Fittings Industry (MSS)

.1 MSS SP58-, Pipe Hangers and Supports - Materials, Design and Manufacture.

.2 MSS SP69-, Pipe Hangers and Supports - Selection and Application.

.3 MSS SP89-, Pipe Hangers and Supports - Fabrication and Installation Practices.

.5 National Research Council Canada (NRC)

.1 National Plumbing Code of Canada (NPC).

.6 Underwriter's Laboratories of Canada (ULC)

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:

.1 Provide manufacturer's printed product literature and data sheets for hangers and supports and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance

.2 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

Part 2 Products

2.1 SYSTEM DESCRIPTION

.1 Design Requirements:

.1 Construct pipe hanger and support to manufacturer's recommendations utilizing manufacturer's regular production components, parts and assemblies.

.2 Base maximum load ratings on allowable stresses prescribed by ASME B31.1 or MSS SP58.

.3 Ensure that supports, guides, anchors do not transmit excessive quantities of heat to building structure.

.4 Design hangers and supports to support systems under conditions of operation, allow free expansion and contraction, prevent excessive stresses from being introduced into pipework or connected equipment.

.5 Provide for vertical adjustments after erection and during commissioning. Amount of adjustment in accordance with MSS SP58.

2.2 GENERAL

.1 Fabricate hangers, supports and sway braces in accordance with MSS SP58. ANSI B31.1 and

.2 Use components for intended design purpose only. Do not use for rigging or erection purposes.

2.3 PIPE HANGERS

.1 Finishes:

.1 Pipe hangers and supports: galvanized after manufacture.

.2 Ensure steel hangers in contact with copper piping are epoxy coated.

.2 Upper attachment structural: suspension from lower flange of I-Beam:

.1 Cold piping NPS 2 maximum: malleable iron C-clamp with hardened steel cup point setscrew, locknut carbon steel retaining clip.

.1 Rod: 9 mm UL listed.

.2 Cold piping NPS 2 1/2 or greater, hot piping: malleable iron beam clamp, eye rod, jaws and extension with carbon steel retaining clip, tie rod, nuts and washers, UL listed to MSS-SP58 or MSS-SP69.

.3 Upper attachment structural: suspension from upper flange of I-Beam:

.1 Cold piping NPS 2 maximum: ductile iron top-of-beam C-clamp with hardened steel cup point setscrew, locknut and carbon steel retaining clip, UL listed.

.2 Cold piping NPS 2 1/2 or greater, hot piping: malleable iron top-of-beam jaw-clamp with hooked rod, spring washer, plain washer and nut UL listed

.4 Upper attachment to concrete:

.1 Ceiling: carbon steel welded eye rod, clevis plate, clevis pin and cotters with weldless forged steel eye nut. Ensure eye 6 mm minimum greater than rod diameter.

.2 Concrete inserts: wedge shaped body with knockout protector plate UL listed to MSS SP69.

.5 Hanger rods: threaded rod material to MSS SP58:

.1 Ensure that hanger rods are subject to tensile loading only.

.2 Provide linkages where lateral or axial movement of pipework is anticipated.

.6 Pipe attachments: material to MSS SP58:

.1 Attachments for steel piping: carbon steel galvanized.

.2 Attachments for copper piping: copper plated black steel.

.3 Use insulation shields for hot pipework.

.4 Oversize pipe hangers and supports.

.7 Adjustable clevis: material to MSS SP69 UL listed, clevis bolt with nipple spacer and vertical adjustment nuts above and below clevis.

.8 Yoke style pipe roll: carbon steel yoke, rod and nuts with cast iron roll, to MSS SP69.

.9 U-bolts: carbon steel to MSS SP69 with 2 nuts at each end to ASTM A563.

.1 Finishes for steel pipework: galvanized.

.2 Finishes for copper, glass, brass or aluminum pipework: epoxy coated, with formed portion plastic coated].

.10 Pipe rollers: cast iron roll and roll stand with carbon steel rod to MSS SP69.

2.4 RISER CLAMPS

.1 Steel or cast iron pipe: galvanized carbon steel to MSS SP58, type 42, UL listed.

.2 Copper pipe: carbon steel copper plated to MSS SP58, type 42.

.3 Bolts: to ASTM A307.

.4 Nuts: to ASTM A563.

2.5 INSULATION PROTECTION SHIELDS

.1 Insulated hot piping:

.1 Curved plate 300 mm long, with edges turned up, welded-in centre plate for pipe sizes NPS 12 and over, carbon steel to comply with MSS SP69.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

.1 Install in accordance with:

.1 Manufacturer's instructions and recommendations.

.2 Clamps on riser piping:

.1 Support independent of connected horizontal pipework using riser clamps and riser clamp lugs welded to riser.

.2 Bolt-tightening torques to industry standards.

.3 Steel pipes: install below coupling or shear lugs welded to pipe.

.4 Cast iron pipes: install below joint.

.3 Clevis plates:

.1 Attach to concrete with 4 minimum concrete inserts, one at each corner.

.4 Provide supplementary structural steelwork where structural bearings do not exist or where concrete inserts are not in correct locations.

3.3 HANGER SPACING

.1 Plumbing piping: to Ontario Plumbing code

.2 Fire protection: to applicable fire code.

.3 Gas and fuel oil piping: up to NPS 1/2: every 1.8 m.

.4 Copper piping: up to NPS 1/2: every 1.5 m.

.5 Flexible joint roll groove pipe: in accordance with table below for steel, but not less than one hanger at joints. Table listings for straight runs without concentrated loads and where full linear movement is not required.

.6 Within 300 mm of each elbow.

Maximum Pipe Size : NPS	Maximum Spacing Steel	Maximum Spacing Copper
up to 1-1/4	2.4 m	1.8 m
1-1/2	3.0 m	2.4 m
2	3.0 m	2.4 m
2-1/2	3.7 m	3.0 m
3	3.7 m	3.0 m
3-1/2	3.7 m	3.3 m
4	3.7 m	3.6 m

3.4 HANGER INSTALLATION

.1 Install hanger so that rod is vertical under operating conditions.

.2 Adjust hangers to equalize load.

.3 Support from structural members. Where structural bearing does not exist or inserts are not in suitable locations, provide supplementary structural steel members.

3.5 HORIZONTAL MOVEMENT

.1 Angularity of rod hanger resulting from horizontal movement of pipework from cold to hot position not to exceed 4 degrees from vertical.

.2 Where horizontal pipe movement is less than 13 mm, offset pipe hanger and support so that rod hanger is vertical in the hot position.

3.6 FINAL ADJUSTMENT

.1 Adjust hangers and supports:

.1 Ensure that rod is vertical under operating conditions.

.2 Equalize loads.

.2 Adjustable clevis:

.1 Tighten hanger load nut securely to ensure proper hanger performance.

.2 Tighten upper nut after adjustment.

.3 C-clamps:

.1 Follow manufacturer's recommended written instructions and torque values when tightening C-clamps to bottom flange of beam.

.4 Beam clamps:

.1 Hammer jaw firmly against underside of beam.

3.7 CLEANING

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

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 Materials and requirements for the identification of piping systems, duct work, valves and controllers, including the installation and location of identification systems.

1.2 REFERENCE STANDARDS

.1 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-1.60, Interior Alkyd Gloss Enamel.

.2 CAN/CGSB-24.3, Identification of Piping Systems.

Part 2 Products

2.1 MANUFACTURER'S EQUIPMENT NAMEPLATES

.1 Metal or plastic laminate nameplate mechanically fastened to each piece of equipment by manufacturer.

.2 Lettering and numbers raised or recessed.

.3 Information to include, as appropriate:

.1 Equipment: manufacturer's name, model, size, serial number, capacity.

.2 Motor: voltage, Hz, phase, power factor, duty, frame size.

2.2 IDENTIFICATION OF PIPING SYSTEMS

.1 Identify contents by background colour marking, pictogram (as necessary), legend; direction of flow by arrows. To CAN/CGSB 24.3 except where specified otherwise.

.2 Legend:

.1 Block capitals to sizes and colours listed in CAN/CGSB 24.3.

.3 Arrows showing direction of flow:

.1 Outside diameter of pipe or insulation less than 75 mm: 100 mm long x 50 mm high.

.2 Outside diameter of pipe or insulation 75 mm and greater: 150 mm long x 50 mm high.

.3 Use double-headed arrows where flow is reversible.

.4 Extent of background colour marking:

.1 To full circumference of pipe or insulation.

.2 Length to accommodate pictogram, full length of legend and arrows.

.5 Materials for background colour marking, legend, arrows:

.1 Pipes and tubing 20 mm and smaller: waterproof and heat-resistant pressure sensitive plastic marker tags.

.2 Other pipes: pressure sensitive vinyl with protective overcoating, waterproof contact adhesive undercoating, suitable for ambient of 100% RH and continuous operating temperature of 150 degrees C and intermittent temperature of 200 degrees C.

.6 Colours and Legends:

.1 Colours for legends, arrows: to following table:

Background colour:	Legend, arrows:
Yellow	BLACK
Green	WHITE
Red	WHITE

.2 Background colour marking and legends for piping systems:

Contents	Background colour marking	Legend
Hot water heating supply	Yellow	HEATING SUPPLY
Hot water heating return	Yellow	HEATING RETURN
Potable Water	Green	CH. DRINK WTR
Oil	Yellow	OIL

2.3 CONTROLS COMPONENTS IDENTIFICATION

.1 Identify all systems, equipment, components, controls, sensors with system nameplates specified in this section.

.2 Inscriptions to include function and (where appropriate) fail-safe position.

2.4 LANGUAGE

.1 Identification in English.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 NAMEPLATES

.1 Locations:

.1 In conspicuous location to facilitate easy reading and identification from operating floor.

.2 Standoffs:

.1 Provide for nameplates on hot and/or insulated surfaces.

.3 Protection:

.1 Do not paint, insulate or cover.

3.3 LOCATION OF IDENTIFICATION ON PIPING AND DUCTWORK SYSTEMS

.1 On long straight runs in open areas in boiler rooms, equipment rooms, galleries, tunnels: at not more than 17 m intervals and more frequently if required to ensure that at least one is visible from any one viewpoint in operating areas and walking aisles.

.2 Adjacent to each change in direction.

.3 At least once in each small room through which piping or ductwork passes.

.4 On both sides of visual obstruction or where run is difficult to follow.

.5 On both sides of separations such as walls, floors, partitions.

.6 Where system is installed in pipe chases, ceiling spaces, galleries, confined spaces, at entry and exit points, and at access openings.

.7 At beginning and end points of each run and at each piece of equipment in run.

.8 At point immediately upstream of major manually operated or automatically controlled valves, and dampers. Where this is not possible, place identification as close as possible, preferably on upstream side.

.9 Identification easily and accurately readable from usual operating areas and from access points.

.1 Position of identification approximately at right angles to most convenient line of sight, considering operating positions, lighting conditions, risk of physical damage or injury and reduced visibility over time due to dust and dirt.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 TAB is used throughout this Section to describe the process, methods and requirements of testing, adjusting and balancing for HVAC.

.2 TAB means to test, adjust and balance to perform in accordance with requirements of Contract Documents and to do other work as specified in this section.

1.2 QUALIFICATIONS OF TAB PERSONNEL

.1 Submit names of personnel to perform TAB to Consultant prior to proceeding.

.2 Provide documentation confirming qualifications, successful experience.

.3 TAB: performed in accordance with the requirements of standard under which TAB Firm's qualifications are approved:

.1 Associated Air Balance Council, (AABC) National Standards for Total System Balance, MN-1.

.2 National Environmental Balancing Bureau (NEBB) TABES, Procedural Standards for Testing, Adjusting, Balancing of Environmental Systems.

.3 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA), HVAC TAB HVAC Systems - Testing, Adjusting and Balancing.

.4 Recommendations and suggested practices contained in the TAB Standard are mandatory.

.5 Use TAB Standard provisions, including checklists, and report forms to satisfy Contract requirements.

.6 Use TAB Standard for TAB, including qualifications for TAB Firm and Specialist and calibration of TAB instruments.

.7 Where instrument manufacturer calibration recommendations are more stringent than those listed in TAB Standard, use manufacturer's recommendations.

.8 TAB Standard quality assurance provisions such as performance guarantees form part of this contract.

.1 For systems or system components not covered in TAB Standard, use TAB procedures developed by TAB Specialist.

.2 Where new procedures, and requirements, are applicable to Contract requirements have been published or adopted by body responsible for TAB Standard used (AABC, NEBB, or TABB), requirements and recommendations contained in these procedures and requirements are mandatory.

1.3 PURPOSE OF TAB

.1 Test to verify proper and safe operation, determine actual point of performance, evaluate qualitative and quantitative performance of equipment, systems and controls at design, average and low loads using actual or simulated loads

.2 Adjust and regulate equipment and systems to meet specified performance requirements and to achieve specified interaction with other related systems under normal and emergency loads and operating conditions.

.3 Balance systems and equipment to regulate flow rates to match load requirements over full operating ranges.

1.4 EXCEPTIONS

.1 TAB of systems and equipment regulated by codes, standards to satisfaction of authority having jurisdiction.

1.5 CO-ORDINATION

.1 Schedule time required for TAB (including repairs, re-testing) into project construction and completion schedule to ensure completion before acceptance of project.

.2 Do TAB of each system independently and subsequently, where interlocked with other systems, in unison with those systems.

1.6 PRE-TAB REVIEW

.1 Review Contract Documents before project construction is started confirm in writing to Consultant adequacy of provisions for TAB and other aspects of design and installation pertinent to success of TAB.

.2 Review specified standards and report to Consultant in writing proposed procedures which vary from standard.

.3 During construction, co-ordinate location and installation of TAB devices, equipment, accessories, measurement ports and fittings.

1.7 START-UP

.1 Follow start-up procedures as recommended by equipment manufacturer unless specified otherwise.

.2 Follow special start-up procedures specified elsewhere in Division 23.

1.8 START OF TAB

.1 Notify Consultant 2 days prior to start of TAB.

.2 Start TAB when building is essentially completed, including:

.3 Installation of ceilings, doors, windows, other construction affecting TAB.

.4 Application of weatherstripping, sealing, and caulking.

.5 Pressure, leakage, other tests specified elsewhere Division 23.

.6 Provisions for TAB installed and operational.

.7 Start-up, verification for proper, normal and safe operation of mechanical and associated electrical and control systems affecting TAB including but not limited to:

.1 Proper thermal overload protection in place for electrical equipment.

.2 Air systems:

.1 Filters in place, clean.

.2 Duct systems clean.

.3 Ducts, air shafts, ceiling plenums are airtight to within specified tolerances.

.4 Correct fan rotation.

.5 Fire, smoke, volume control dampers installed and open.

.6 Coil fins combed, clean.

.7 Access doors, installed, closed.

.8 Outlets installed, volume control dampers open.

.3 Liquid systems:

.1 Flushed, filled, vented.

.2 Correct pump rotation.

.3 Strainers in place, baskets clean.

.4 Isolating and balancing valves installed, open.

.5 Calibrated balancing valves installed, at factory settings.

.6 Chemical treatment systems complete, operational.

1.9 APPLICATION TOLERANCES

.1 Do TAB to following tolerances of design values:

.1 HVAC systems: plus 5%, minus 5%.

.2 Hydronic systems: plus or minus 10%.

1.10 ACCURACY TOLERANCES

.1 Measured values accurate to within plus or minus 2% of actual values.

1.11 INSTRUMENTS

.1 Calibrate in accordance with requirements of most stringent of referenced standard for either applicable system or HVAC system.

.2 Calibrate within 3 months of TAB.

1.12 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit, prior to commencement of TAB:

.2 Proposed methodology and procedures for performing TAB if different from referenced standard.

1.13 PRELIMINARY TAB REPORT

.1 Submit for checking and approval of Consultant, prior to submission of formal TAB report, sample of rough TAB sheets. Include:

.1 Details of instruments used.

.2 Details of TAB procedures employed.

.3 Calculations procedures.

.4 Summaries.

1.14 TAB REPORT

.1 TAB report to show results in SI units and to include:

.1 Project record drawings.

.2 System schematics.

.2 Submit 6 copies of TAB Report to Consultant for verification and approval, in units per the drawings in D-ring binders, complete with index tabs.

1.15 SETTINGS

.1 After TAB is completed to satisfaction of Consultant, replace drive guards, close access doors, lock devices in set positions, ensure sensors are at required settings.

.2 Permanently mark settings to allow restoration at any time during life of facility. Do not eradicate or cover markings.

1.16 COMPLETION OF TAB

.1 TAB considered complete when final TAB Report received and approved by Consultant.

1.17 AIR SYSTEMS

.1 Do TAB of complete HVAC and Hydronic System

.2 Quality assurance: perform TAB under direction of supervisor qualified to standards of NEBB or AABC

.3 Measurements: to include as appropriate for systems, equipment, components, controls: air velocity, static pressure, flow rate, pressure drop (or loss), temperatures (dry bulb, wet bulb, dewpoint), duct cross-sectional area, RPM, electrical power, voltage, noise, vibration.

.4 Locations of equipment measurements: to include as appropriate:

.1 Inlet and outlet of dampers, filter, coil, humidifier, fan, other equipment causing changes in conditions.

.2 At controllers, controlled device.

.5 Locations of systems measurements to include as appropriate: main ducts, main branch, sub-branch, run-out (or grille, register or diffuser).

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 Materials and methods for pressure testing ducts over 5m in length, forming part of a supply, return or exhaust ductwork system directly or indirectly connected to air handling equipment.

.2 This shall be provided as a separate price from the base bid.

1.2 REFERENCE STANDARDS

.1 Sheet Metal and Air Conditioning Contractor's National Association (SMACNA)

.1 SMACNA HVAC Air Duct Leakage Test Manual.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Test Reports: Include pressure test information and results as follows:

.1 Prepare report of results and submit to Consultant within 3 days of completion of tests. Include:

.1 Schematic of entire system.

.2 Schematic of section under test showing test site.

.3 Required and achieved static pressures.

.4 Orifice differential pressure at test sites.

.5 Permissible and actual leakage flow rate (L/s) for test sites.

.6 Witnessed certification of results.

.2 Include test reports in final TAB report.

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

Part 2 Products

2.1 TEST INSTRUMENTS

.1 Test apparatus to include:

.1 Fan capable of producing required static pressure.

.2 Duct section with calibrated orifice plate mounted and accurately located pressure taps.

.3 Flow measuring instrument compatible with the orifice plate.

.4 Calibration curves for orifice plates used.

.5 Flexible duct for connecting to ductwork under test.

.6 Smoke bombs for visual inspections.

.2 Test apparatus: accurate to within +/- 3% of flow rate and pressure.

.3 Submit details of test instruments to be used to Consultant.

.4 Test instruments: to be calibrated.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 TEST PROCEDURES

.1 Maximum lengths of ducts to be tested consistent with capacity of test equipment.

.2 Section of duct to be tested to include:

.1 Fittings, branch ducts, tap-ins.

.3 Repeat tests until specified pressures are attained. Bear costs for repairs and repetition to tests.

.4 Base partial system leakage calculations on SMACNA HVAC Air Duct Leakage Test Manual.

.5 Seal leaks that can be heard or felt, regardless of their contribution to total leakage.

3.3 SITE TOLERANCES

.1 System leakage tolerances specified are stated as percentage of total flow rate handled by system. Pro-rate specified system leakage tolerances. Leakage for sections of duct systems: not to exceed total allowable leakage.

.2 Leakage tests on following systems not to exceed specified leakage rates.

.1 Small duct systems up to 250 Pa: leakage 2%.

.2 Large low pressure duct systems up to 500 Pa: leakage 2%.

.3 For tests of a partial system, the allowable 2% shall be prorated for the entire system. Ie the portion modified and tested, shall have its leakage per m assumed for the remaining ductwork and the total leakage should be below the above.

.3 Evaluation of test results to use surface area of duct and pressure in duct as basic parameters.

3.4 TESTING

.1 Test ducts before installation of insulation or other forms of concealment.

.2 Test after seals have cured.

.3 Test when ambient temperature will not affect effectiveness of seals, and gaskets.

.4 Flexible connections to VAV boxes.

3.5 FIELD QUALITY CONTROL

.1 Performance Verification:

.1 To be certified by same TAB agency approved to undertake TAB on this project.

3.6 CLEANING

.1 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)

.1 ANSI/ASHRAE/IESNA 90.1, SI; Energy Standard for Buildings Except Low-Rise Residential Buildings.

.2 ASTM International Inc.

.1 ASTM B209M, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric).

.2 ASTM C335, Standard Test Method for Steady State Heat Transfer Properties of Pipe Insulation.

.3 ASTM C411, Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.

.4 ASTM C449/C449M, Standard Specification for Mineral Fiber-Hydraulic-Setting Thermal Insulating and Finishing Cement.

.5 ASTM C547, Standard Specification for Mineral Fiber Pipe Insulation.

.6 ASTM C553, Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.

.7 ASTM C612, Standard Specification for Mineral Fiber Block and Board Thermal Insulation.

.8 ASTM C795, Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.

.9 ASTM C921-, Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.

.3 Thermal Insulation Association of Canada (TIAC): National Insulation Standards (2005).

.4 Underwriters Laboratories of Canada (ULC)

.1 CAN/ULC-S102, Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

.2 CAN/ULC-S701, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.

1.2 DEFINITIONS

.1 For purposes of this section:

.1 "CONCEALED" - insulated mechanical services and equipment in suspended ceilings and non-accessible chases and furred-in spaces.

.2 "EXPOSED" - means "not concealed" as previouslydefined.

.3 Insulation systems - insulation material, fasteners, jackets, and other accessories.

1.3 QUALITY ASSURANCE

.1 Qualifications:

Part 2 Products

2.1 FIRE AND SMOKE RATING

.1 To CAN/ULC-S102:

.1 Maximum flame spread rating: 25.

.2 Maximum smoke developed rating: 50.

2.2 INSULATION

.1 Mineral fibre: as specified includes glass fibre, rock wool, slag wool.

.2 Thermal conductivity ("k" factor) not to exceed specified values at 24 degrees C mean temperature when tested in accordance with ASTM C335.

.3 TIAC Code C-2: Mineral fibre blanket to ASTM C553 faced to CGSB 51-GP-52Ma (as scheduled in PART 3 of this section).

.1 Mineral fibre: to ASTM C553.

.2 Jacket: to CGSB 51-GP-52Ma.

.3 Maximum "k" factor: to ASTM C553.

.4 Thickness to match existing

2.3 JACKETS

.1 Aluminum:

.1 To ASTM B209 without moisture barrier as scheduled in PART 3 of this section.

.2 Thickness: 0.50 mm sheet.

.3 Finish: Smooth

.4 Jacket banding and mechanical seals: 12 mm wide, 0.5 mm thick stainless steel.

.1 Stainless steel:

.5 Type: 304

.6 Thickness: 0.50 mm sheet.

.7 Finish: Smooth

.8 Jacket banding and mechanical seals: 12 mm wide, 0.5 mm thick stainless steel.

2.4 ACCESSORIES

.1 Insulating Cement: hydraulic setting on mineral wool, to ASTM C449.

.2 ULC Listed Canvas Jacket:

.1 220gm/m2cotton, plain weave

.3 Tape: self-adhesive, aluminum, reinforced 50 mm wide minimum.

.4 Contact adhesive: quick-setting

.5 Canvas adhesive: washable.

.6 Banding: 12mm wide, 0.5 mm thick stainless steel.

Part 3 Execution

3.1 APPLICATION

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

3.2 PRE-INSTALLATION REQUIREMENTS

.1 Pressure test ductwork systems complete, witness and certify.

.2 Ensure surfaces are clean, dry, free from foreign material.

3.3 INSTALLATION

.1 Install in accordance with TIAC National Standards.

.2 Apply materials in accordance with manufacturers instructions and as indicated.

.3 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.

.1 Ensure hangers, and supports are outside vapour retarder jacket.

.4 Hangers and supports in accordance with Section 23 05 29- Hangers and Supports for HVAC Piping and Equipment.

.1 Apply high compressive strength insulation where insulation may be compressed by weight of ductwork.

.5 Fasteners: install at 300 mm on centre in horizontal and vertical directions, minimum 2 rows each side.

3.4 CLEANING

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

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 Thermal insulation for piping and piping accessories in commercial type applications.

1.2 REFERENCE STANDARDS

.1 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)

.1 ASHRAE Standard 90.1, Energy Standard for Buildings Except Low-Rise Residential Buildings (IESNA co-sponsored; ANSI approved; Continuous Maintenance Standard).

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

.1 ASTM B209M, Standard Specification for Aluminum and Aluminum Alloy Sheet and Plate Metric.

.2 ASTM C335, Standard Test Method for Steady State Heat Transfer Properties of Horizontal Pipe Insulation.

.3 ASTM C411, Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.

.4 ASTM C449/C449M, Standard Specification for Mineral Fiber-Hydraulic-Setting Thermal Insulating and Finishing Cement.

.5 ASTM C533, Calcium Silicate Block and Pipe Thermal Insulation.

.6 ASTM C547, Mineral Fiber Pipe Insulation.

.7 ASTM C795, Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.

.8 ASTM C921, Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.

.3 Manufacturer's Trade Associations

.1 Thermal Insulation Association of Canada (TIAC): National Insulation Standards (Revised 2004).

.4 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULC-S102, Surface Burning Characteristics of Building Materials and Assemblies.

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

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

.4 CAN/ULC-S702.2, Thermal Insulation, Mineral Fibre, for Buildings, Part 2: Application Guidelines.

1.3 DEFINITIONS

.1 For purposes of this section:

.1 "CONCEALED" - insulated mechanical services in suspended ceilings and non-accessible chases and furred-in spaces.

.2 "EXPOSED" - will mean "not concealed" as specified.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:

.1 Submit manufacturer's printed product literature, specifications. Include product characteristics, performance criteria, and limitations.

.2 Quality assurance submittals: submit following

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

1.5 QUALITY ASSURANCE

.1 Qualifications:

.1 Installer: specialist in performing work of this Section, and have at least 3 years successful experience in this size and type of project.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Packing, shipping, handling and unloading:

.1 Deliver, store and handle in accordance with manufacturer's written instructions

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

.3 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

Part 2 Products

2.1 FIRE AND SMOKE RATING

.1 In accordance with CAN/ULC-S102.

.1 Maximum flame spread rating: 25.

.2 Maximum smoke developed rating: 50.

2.2 INSULATION

.1 Mineral fibre specified includes glass fibre, rock wool, slag wool.

.2 Thermal conductivity ("k" factor) not to exceed specified values at 24 degrees C mean temperature when tested in accordance with ASTM C335.

.3 TIAC Code A-1: rigid moulded mineral fibre without factory applied vapour retarder jacket.

.1 Mineral fibre: to CAN/ULC-S702

.2 Maximum "k" factor: to CAN/ULC-S702.

.4 TIAC Code A-3: rigid moulded mineral fibre with factory applied vapour retarder jacket.

.1 Mineral fibre: to CAN/ULC-S702

.2 Jacket: to CGSB 51-GP-52Ma.

.3 Maximum "k" factor: to CAN/ULC-S702

2.3 INSULATION SECUREMENT

.1 Tape: self-adhesive, aluminum, reinforced 50 mm wide minimum.

.2 Contact adhesive: quick setting.

.3 Canvas adhesive: washable.

.4 Bands: stainless steel, 19mm wide, 0.5 mm thick.

2.4 CEMENT

.1 Thermal insulating and finishing cement:

.1 Air drying on mineral wool, to ASTM C449/C449M.

2.5 JACKETS

.1 Polyvinyl Chloride (PVC):

.1 One-piece moulded type and sheet to CAN/CGSB-51.53 with pre-formed shapes as required.

.2 Colours: to match adjacent finish paint

.3 Minimum service temperatures: -20 degrees C.

.4 Maximum service temperature: 65 degrees C.

.5 Moisture vapour transmission: 0.02 perm.

.6 Fastenings:

.1 Use solvent weld adhesive compatible with insulation to seal laps and joints.

.2 Tacks.

.3 Pressure sensitive vinyl tape of matching colour.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 PRE-INSTALLATION REQUIREMENT

.1 Pressure testing of piping systems and adjacent equipment to be complete, witnessed and certified.

.2 Surfaces clean, dry, free from foreign material.

3.3 INSTALLATION

.1 Install in accordance with TIAC National Standards.

.2 Apply materials in accordance with manufacturers instructions and this specification.

.3 Use two layers with staggered joints when required nominal wall thickness exceeds 75 mm.

.4 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.

.1 Install hangers, supports outside vapour retarder jacket.

.5 Supports, Hangers:

.1 Apply high compressive strength insulation, suitable for service, at oversized saddles and shoes where insulation saddles have not been provided.

3.4 PIPING INSULATION SCHEDULES

.1 Includes valves, valve bonnets, strainers, flanges and fittings unless otherwise specified.

.2 TIAC Code: A-1.

.1 Securements: Tape or SS bands at 300 mm on centre.

.2 Seals: lap seal adhesive, lagging adhesive.

.3 Installation: TIAC Code 1501-H.

.3 TIAC Code: A-3.

.1 Securements: Tape or SS bands at 300 mm on centre.

.2 Seals: VR lap seal adhesive, VR lagging adhesive.

.3 Installation: TIAC Code: 1501-C.

.4 Thickness of insulation as listed in following table.

.1 Run-outs to individual units and equipment not exceeding 4000 mm long.

.2 Do not insulate exposed runouts to plumbing fixtures, chrome plated piping, valves, fittings.

Application	Temp degrees C	TIAC code	Pipe sizes (NPS) and insulation thickness (mm)		
Run out	to 1	1 1/4 to 2	2 1/2 to 4	5 to 6	8 & over
Hot Water Heating	60 - 94	A-1	25	38	38
Hot Water Heating	up to 59	A-1	25	25	25
Domestic CWS	A-3	25	25	25	25

.5 Finishes:

.1 Exposed in mechanical rooms: canvas.

.2 Concealed, indoors: canvas on valves, fittings. No further finish.

.3 Finish attachments: SS bands

.4 Installation: to appropriate TIAC code CRF/1 through CPF/5.

3.5 CLEANING

.1 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

Part 1 General

1.1 HYDRONIC SYSTEMS - PERFORMANCE VERIFICATION (PV)

.1 Perform hydronic systems performance verification after cleaning is completed and system is in full operation.

.2 When systems are operational, perform following tests:

.1 Conduct full scale tests at maximum design flow rates, temperatures and pressures for continuous consecutive period of 48 hours to demonstrate compliance with design criteria.

.2 Verify performance of hydronic system circulating pumps as specified, recording system pressures, temperatures, fluctuations by simulating maximum design conditions and varying.

.1 Pump operation.

.2 Boiler and operation.

1.2 HYDRONIC SYSTEM CAPACITY TEST

.1 Perform hydronic system capacity tests after:

.1 TAB has been completed

.2 Verification of operating, limit, safety controls.

.3 Verification of primary and secondary pump flow rates.

.4 Verification of accuracy of temperature and pressure sensors and gauges.

.2 Calculate system capacity at test conditions.

.3 Using manufacturer's published data and calculated capacity at test conditions, extrapolate system capacity at design conditions.

.4 When capacity test is completed, return controls and equipment status to normal operating conditions.

.5 Submit sample of system water to approved testing agency to determine if chemical treatment is correct. Include cost.

.6 Heating system capacity test:

.1 Perform capacity test when ambient temperature is within 10% of design conditions. Simulate design conditions by:

.1 Increasing OA flow rates through heating coils (in this case, monitor heating coil discharge temperatures to ensure that coils are not subjected to freezing conditions) or

.2 Reducing space temperature by turning of heating system for sufficient period of time before starting testing.

.2 Test procedures:

.1 Open fully heat exchanger, heating coil and radiation control valves.

.2 With boilers on full firing and hot water heating supply temperature stabilized, record flow rates and supply and return temperatures simultaneously.

.3 Conduct flue gas analysis test on boilers at full load and at low fire conditions.

1.3 FUEL OIL SYSTEMS

.1 Fuel oil pumps:

.1 Check strainers on pump inlet, relief valve on pump outlet with discharge to oil return piping, pressure gauge on strainer inlet, pump inlet and pump discharge.

.2 Verify pump performance.

.2 Operational Tests:

.1 Timing: perform at same time as 100% and 105% boiler PV tests.

.2 Charge system and verify operation.

.3 Verify adequacy of flow rates and pressure from storage facilities to burners.

.4 Verify accurate metering of fuel to burners.

.5 For further details refer to relevant sections of Division 23.

.3 Notify authorities having jurisdiction to enable witnessing of tests as required.

1.4 Lab Sink and Accessibility Washroom

.1 Ensure:

.1 Accessibility sink work with no leaks.

.2 That the lab sink has no water quality issues.

1.5 SANITARY AND STORM DRAINAGE SYSTEMS

.1 Buried systems: perform tests prior to back-filling. Perform hydraulic tests to verify grades and freedom from obstructions.

.2 Ensure that traps are fully and permanently primed.

.3 Ensure that fixtures are properly anchored, connected to system.

.4 Operate flush valves, tank and operate each fixture to verify drainage and no leakage.

1.6 TRAINING

.1 Training shall be provided to Parks Canada Personnel to understand and operate the boiler control system, and the air temperature control system.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 Procedures and cleaning solutions for cleaning mechanical piping systems.

1.2 REFERENCE STANDARDS

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

.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

Part 2 Products

2.1 CLEANING SOLUTIONS

.1 Tri-sodium phosphate: 0.40 kg per 100 L water in system.

.2 Sodium carbonate: 0.40 kg per 100 L water in system.

.3 Low-foaming detergent: 0.01 kg per 100 L water in system.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 CLEANING HYDRONIC AND STEAM SYSTEMS

.1 Timing: systems operational, hydrostatically tested and with safety devices functional, before cleaning is carried out.

.2 Cleaning Agency:

.1 Retain qualified water treatment specialist to perform system cleaning.

.3 Install instrumentation such as flow meters, orifice plates, pitot tubes, flow metering valves only after cleaning is certified as complete.

.4 Cleaning procedures:

.1 Provide detailed report outlining proposed cleaning procedures at least 4 weeks prior to proposed starting date. Report to include:

.1 Cleaning procedures, flow rates, elapsed time.

.2 Chemicals and concentrations used.

.3 Inhibitors and concentrations.

.4 Specific requirements for completion of work.

.5 Special precautions for protecting piping system materials and components.

.6 Complete analysis of water used to ensure water will not damage systems or equipment.

.5 Conditions at time of cleaning of systems:

.1 Systems: free from construction debris, dirt and other foreign material.

.2 Control valves: operational, fully open to ensure that terminal units can be cleaned properly.

.3 Strainers: clean prior to initial fill.

.4 Install temporary filters on pumps not equipped with permanent filters.

.5 Install pressure gauges on strainers to detect plugging.

.6 Report on Completion of Cleaning:

.1 When cleaning is completed, submit report, complete with certificate of compliance with specifications of cleaning component supplier.

.7 Hydronic Systems:

.1 Fill system with water, ensure air is vented from system.

.2 Fill expansion tanks 1/3 to 1/2 full, charge system with compressed air to at least 35 kPa (does not apply to diaphragm type expansion tanks).

.3 Use water metre to record volume of water in system to +/- 0.5%.

.4 Add chemicals under direct supervision of chemical treatment supplier.

.5 Closed loop systems: circulate system cleaner at 60 degrees C for at least 36 h. Drain as quickly as possible. Refill with water and inhibitors. Test concentrations and adjust to recommended levels.

.6 Flush velocity in system mains and branches to ensure removal of debris. System pumps may be used for circulating cleaning solution provided that velocities are adequate.

.7 Add chemical solution to system.

.8 Establish circulation, raise temperature slowly to maximum design. Circulate for 12 h, ensuring flow in all circuits. Remove heat, continue to circulate until temperature is below 38 degrees C. Drain as quickly as possible. Refill with clean water. Circulate for 6 hours at design temperature. Drain and repeat procedures specified above. Flush through low point drains in system. Refill with clean water adding to sodium sulphite (test for residual sulphite).

3.3 START-UP OF HYDRONIC SYSTEMS

.1 After cleaning is completed and system is filled:

.1 Establish circulation and expansion tank level, set pressure controls.

.2 Ensure air is removed.

.3 Check pumps to be free from air, debris, possibility of cavitation when system is at design temperature.

.4 Dismantle system pumps used for cleaning, inspect, replace worn parts, install new gaskets and new set of seals.

.5 Clean out strainers repeatedly until system is clean.

.6 Check water level in expansion tank with cold water with circulating pumps OFF and again with pumps ON.

.7 Repeat with water at design temperature.

.8 Check pressurization to ensure proper operation and to prevent water hammer, flashing, cavitation. Eliminate water hammer and other noises.

.9 Bring system up to design temperature and pressure.

.10 Perform TAB as specified in Section 23 05 93- Testing, Adjusting and Balancing for HVAC.

.11 Adjust pipe supports, hangers, springs as necessary.

.12 Monitor pipe movement, performance of expansion joints, loops, guides, anchors.

.13 Re-tighten bolts using torque wrench, to compensate for heat-caused relaxation. Repeat several times during commissioning.

.14 Check operation of drain valves.

.15 Adjust valve stem packings as systems settle down.

.16 Fully open balancing valves (except those that are factory-set).

.17 Check operation of over-temperature protection devices on circulating pumps.

.18 Adjust alignment of piping at pumps to ensure flexibility, adequacy of pipe movement, absence of noise or vibration transmission.

3.4 CLEANING

.1 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for electric and electronic control system for HVAC and include product characteristics, performance criteria, physical size, finish and limitations.

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

1.3 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.

Part 2 Products

2.1 THERMOSTAT (LOW VOLTAGE)

.1 Low voltage wall thermostat:

.1 For use on 24 V circuit at 1.5 A capacity.

.2 Temperature setting range: 10 degrees C to 25 degrees C.

.3 Thermostat to be programmable

2.2 THERMOSTAT GUARDS

.1 Thermostat guards: lockable and clear. Slots for air circulation to thermostat.

.2 Guards to be installed on thermostats located in public places.

2.3 CO SENSOR

.1 Provide CO sensor to control to operate exhaust fans in the mechanics shop.

2.4 AIR TEMPERATURE SENSOR

.1 Provide air temperature sensor to control air temperature.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for electric and electronic control systems installation in accordance with manufacturer's written instructions.

.1 Inform Consultant of unacceptable conditions immediately upon discovery.

.2 Proceed with installation only after unacceptable conditions have been remedied

3.2 INSTALLATION

.1 Install control devices.

.2 On outside wall, mount thermostats on bracket or insulated pad 25mm from exterior wall.

.3 Install remote sensing device in metallic conduit.

3.3 CLEANING

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 American Society of Mechanical Engineers (ASME)

- .1 ASME-B16.3, Malleable-Iron Threaded Fittings: Classes 150 and 300.
- .2 ASME-B16.9, Factory-Made Wrought Steel Buttwelding Fittings.

.2 ASTM International

- .1 ASTM A47/A47M, Standard Specification for Ferritic Malleable Iron Castings.
- .2 ASTM A53/A53M, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless.
- .3 ASTM B61, Standard Specification for Steam or Valve Bronze Castings.
- .4 ASTM B75M, Standard Specification for Seamless Copper Tube Metric.

.3 CSA International

- .1 CSA-B139, Installation Code for Oil Burning Equipment.
- .2 CSA-B140.0, Oil Burning Equipment: General Requirements.
- .3 CSA-C282 Emergency Electrical Power Supply for Buildings.

.4 Manufacturers Standardization Society of the Valve and Fitting Industry (MSS)

- .1 MSS-SP-80, Bronze Gate, Globe, Angle and Check Valves.

.5 Underwriter's Laboratories of Canada (ULC)

- .1 CAN/ULC S603.1, External Corrosion Protection Systems for Steel Underground Tanks for Flammable and Combustible Liquids.
- .2 ULC ORD-C107.12, Line Leak Detection Devices for Flammable Liquid Piping.

1.2 ADMINISTRATIVE REQUIREMENTS

.1 Pre-Installation Meeting:

- .1 Convene pre-installation meeting one week prior to beginning.
  - .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.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:

- .1 Provide manufacturer's printed product literature, specifications and datasheets for piping, fittings and equipment and include product characteristics, performance criteria, physical size, finish and limitations

.2 Indicate on manufacturer's catalogue literature the following: valves.

.2 Certificates:

.1 Submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.3 Manufacturers' Instructions: provide manufacturer's installation instructions.

1.4 DELIVERY, STORAGE AND HANDLING

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

.2 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

Part 2 Products

2.1 FILL VENT AND CARRIER PIPE

.1 Materials as per CSA-B139

.2 Steel: to ASTM A53/A53M, Schedule 40, continuous weld or electric resistance welded, screwed.

.3 Copper: type L, soft copper tubing, to ASTM B75M, in long lengths.

2.2 STEEL PIPE COATING

.1 Bituminous paint: in accordance with manufacturer's recommendations.

.2 Coating: in accordance with manufacturer's recommendations for surface conditions.

2.3 JOINTING MATERIAL

.1 Screwed fittings: Teflon tape.

.2 Brazed fittings: 85/15.

2.4 FITTINGS

.1 Steel:

.1 Malleable iron: screwed, banded, Class 150 to ASME-B16.3.

.2 Welding: butt-welding to ASME-B16.9.

.3 Unions: malleable iron, brass to iron, ground seat, screwed, to ASTM A47/A47M.

.4 Nipples: Schedule 40, to ASTM A53/A53M.

.2 Copper:

.1 Piping: brazed type.

.2 Connections to equipment: compression.

2.5 GATE VALVES

.1 NPS 2 and under, screwed bonnet: rising stem: to MSS-SP-80, Class 125, 860 kPa, bronze body, solid wedge disc as specified under Section 23 05 23.01- Valves - Bronze.

2.6 GLOBE VALVES

.1 NPS 2 and under, screwed: to MSS-SP-80, Class 125, 860 kPa, bronze body, screwed over bonnet, renewable composition disc suitable for oil service bronze discas specified under Section 23 05 23.01- Valves - Bronze.

.1 Lockshield handles: as indicated.

2.7 BALL VALVES

.1 NPS 2 and under: bronze body, screwed ends, TFE seal, hard chrome ball, 4 MPa, WOG as specified under Section 23 05 23.01- Valves - Bronze.

2.8 SWING CHECK VALVES

.1 NPS 2 and under, screwed: to MSS-SP-80, Class 125, 860 kPa, bronze body, bronze swing disc, renewable composition disc suitable for oil service, screw in cap, regrindable seat as specified under Section 23 05 23.01- Valves - Bronze.

2.9 LUBRICATED PLUG COCKS

.1 NPS 2 and under, screwed: to ASTM B61, Class 150, 1 MPa, bronze body.

Part 3 Execution

3.1 APPLICATION

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

3.2 PIPING

.1 Install piping in accordance with Section 23 05 05- Installation of Pipework, supplemented as specified.

.2 Install oil piping system in accordance with CSA-B139.

.3 Slope piping down in direction of storage tank unless otherwise indicated.

.4 Above ground piping to be protected from physical impact due to impact.

.5 Piping inside building:

.1 Use flare joint to CSA-B139 for copper piping.

.2 Install filter, gate valve, and fire valve at burners.

.6 Piping at tanks:

.1 Suction: terminate 150 mm from bottom of tank with foot valve and strainer.

.7 Clearly label piping runs in legible form indicating;

.1 Piping product content.

.2 Direction of flow.

.3 Identify transfer points in piping systems to CPPI Colour-Symbol System to Mark Equipment and Vehicles for Product Identification

3.3 VALVES

.1 Install valves with stems upright or horizontal unless approved otherwise by Consultant

.2 Install gate valves at branch take-offs, to isolate pieces of equipment and as indicated.

.3 Install globe valves for balancing and in by-pass around control valves.

.4 Install swing check valves on discharge of pumps and as indicated.

.5 Install plug cocks as indicated.

3.4 FIELD QUALITY CONTROL

.1 Performance Verification:

.1 Refer to Section 23 08 01- Performance Verification Mechanical Piping System.

3.5 CLEANING

.1 Clean in accordance with Section manufacturer's written recommendations

.1 Flush after pressure test for a minimum of two hours. Clean strainers and filters.

.2 Dispose of fuel oil used for flushing out in accordance with requirements of authority having jurisdiction.

.3 Ensure vents from regulators, control valves are terminated in approved location and are protected against blockage and damage.

.4 Ensure entire installation is approved by authority having jurisdiction.

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

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 American National Standards Institute (ANSI)/American Welding Society (AWS)

.1 ANSI/AWS A5.8/A5.8M, AMD1 Specification Filler Metals for Brazing and Braze Welding.

.2 ASME

.1 ANSI/ASME B16.4, Gray-Iron Threaded Fittings Classes 125 and 250.

.2 ANSI/ASME B16.15, Cast Copper Alloy Threaded Fittings Classes 125 and 250.

.3 ANSI B16.18, Cast Copper Alloy, Solder Joint Pressure Fittings.

.4 ANSI/ASME B16.22, Wrought Copper and Copper-Alloy Solder Joint Pressure Fittings.

.3 ASTM International

.1 ASTM B32, Standard Specification for Solder Metal.

.2 ASTM B61, Standard Specification for Steam or Valve Bronze Castings.

.3 ASTM B62, Standard Specification for Composition Bronze or Ounce Metal Castings.

.4 ASTM B88M, Standard Specification for Seamless Copper Water Tube Metric.

.5 ASTM E202, Standard Test Methods for Analysis of Ethylene Glycols and Propylene Glycols.

.4 Manufacturers Standardization Society (MSS)

.1 MSS SP67, Butterfly Valves.

.2 MSS SP70, Cast Iron Gate Valves, Flanged and Threaded Ends.

.3 MSS SP71, Grey Iron Swing Check Valves, Flanged and Threaded Ends.

.4 MSS SP80, Bronze Gate, Globe, Angle and Check Valves.

.5 MSS SP85, Cast Iron Globe and Angle Valves, Flanged and Threaded Ends.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:

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

.2 Shop Drawings:

.1 Indicate on manufacturers catalogue literature the following: valves.

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

1.3 CLOSEOUT SUBMITTALS

.1 Operation and Maintenance Data: submit operation and maintenance data for hydronic systems for incorporation into manual.

1.4 MAINTENANCE MATERIAL SUBMITTALS

.1 Extra Materials:

.1 Furnish following spare parts:

.1 Valve seats: one for every ten valves, each size. Minimum one.

.2 Discs: one for every ten valves, each size. Minimum one.

.3 Stem packing: one for every ten valves, each size. Minimum one.

.4 Valve handles: two of each size.

.5 Gaskets for flanges: one for every ten flanges.

1.5 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.

Part 2 Products

2.1 TUBING

.1 Hard drawn copper tubing: to ASTM B88M.

2.2 FITTINGS

.1 Cast bronze threaded fittings: to ANSI/ASME B16.15.

.2 Wrought copper and copper alloy solder joint pressure fittings: to ANSI/ASME B16.22.

.3 Cast iron threaded fittings: to ANSI/ASME B16.4.

.4 Cast copper alloy solder joint pressure fittings: to ANSI B16.18.

2.3 FLANGES

.1 Brass or bronze: threaded.

.2 Cast iron: threaded.

.3 Orifice flanges: slip-on, raised face, 2100 kPa.

2.4 JOINTS

.1 Solder, tin-antimony, 95:5: to ASTM B32.

.2 Silver solder BCUP: to ANSI/AWS A5.8.

.3 Brazing: as indicated.

2.5 VALVES

.1 Connections:

.1 NPS 2 and smaller: ends for soldering.

.2 NPS 2 1/2 and larger: flangedends.

.2 Gate Valves: application: isolating equipment, control valves, pipelines:

.1 NPS 2 and under:

.1 Class 125, rising stem split wedge disc, as specified Section 23 05 23.01- Valves - Bronze.

.2 NPS 2 1/2 and over:

.1 Rising stem, split wedge disc, bronze trim, as specified Section 23 05 23.02- Valves - Cast Iron.

.3 Globe valves:

.1 NPS 2 and under:

.1 Mechanical Rooms: as specified Section 23 05 23.01- Valves - Bronze.

.2 Elsewhere: globe, with composition disc, as specified Section 23 05 23.01- Valves - Bronze.

.4 Balancing, for TAB:

.1 Sizes: calibrated balancing valves, as specified.

.2 NPS 2 and under:

.1 Mechanical rooms: globe, with plug disc as specified Section 23 05 23.01- Valves - Bronze.

.2 Elsewhere: globe, with plug disc as specified Section 23 05 23.01- Valves - Bronze.

.5 Drain valves: gate, Class 125 as specified as 23 05 23.01- Valves - Bronze.

.6 Swing check valves:

.1 NPS 2 and under:

.1 Class 125, swing, with composition disc, as specified Section 23 05 23.01- Valves - Bronze.

.2 NPS 2 1/2 and over:

.1 Flanged ends: as specified Section 23 05 23.02- Valves - Cast Iron.

.7 Silent check valves:

.1 NPS 2 and under:

.1 As specified Section 23 05 23.01- Valves - Bronze.

.2 NPS 2 1/2 and over:

.1 Flanged ends: as specified Section 23 05 23.02- Valves - Cast Iron.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for hydronic systems installation in accordance with manufacturer's written instructions.

.1 Inform Consultant of unacceptable conditions immediately upon discovery.

.2 Proceed with installation only after unacceptable conditions have been remedied

3.2 MANUFACTURER'S INSTRUCTIONS

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

3.3 PIPING INSTALLATION

.1 Connect to equipment in accordance with manufacturer's instruction unless otherwise indicated.

.2 Install concealed pipes close to building structure to keep furring space to minimum. Install to conserve headroom and space. Run exposed piping parallel to walls. Group piping where ever practical.

.3 Slope piping in direction of drainage and for positive venting.

.4 Use eccentric reducers at pipe size change installed to provide positive drainage or positive venting.

.5 Provide clearance for installation of insulation and access for maintenance of equipment, valves and fittings.

.6 Assemble piping using fittings manufactured to ANSI standards.

3.4 VALVE INSTALLATION

.1 Install rising stem valves in upright position with stem above horizontal.

.2 Install gate valves at branch take-offs and to isolate each piece of equipment, and as indicated.

.3 Install silent check valves on discharge of pumps in vertical pipes with downward flow or install swing check valves in horizontal lines on discharge of pumps and as indicated.

3.5 CIRCUIT BALANCING VALVES

.1 Install flow measuring stations and flow balancing valves as indicated.

.2 Remove handwheel after installation and TAB is complete.

3.6 FLUSHING AND CLEANING

.1 Flush after pressure test for a minimum of 4 hours.

.2 Fill with solution of water and non-foaming, phosphate-free detergent 3% solution by weight. Circulate for minimum of 8 hours.

.3 Refill system with clean water. Circulate for at least 4 hours. Clean out strainer screens/baskets regularly. Then drain.

.4 Refill system with clean water. Circulate for at least 2 hours. Clean out strainer screens/baskets regularly. Then drain.

.5 Drainage to include drain valves, dirt pockets, strainers, low points in system.

.6 Re-install strainer screens/baskets.

3.7 FILLING OF SYSTEM

.1 Refill system with clean water adding water treatment as required.

3.8 CLEANING

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 American National Standards Institute/American Water Works Association (ANSI/AWWA)

- .1 ANSI/AWWA C111/A21.11, Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

.2 American Society of Mechanical Engineers (ASME)

- .1 ASME B16.1, Grey Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.
- .2 ASME B16.3, Malleable Iron Threaded Fittings: Classes 150 and 300.
- .3 ASME B16.5, Pipe Flanges and Flanged Fittings: NPS ½ through NPS 24 Metric/Inch Standard.
- .4 ASME B16.9, Factory-Made Wrought Buttwelding Fittings.
- .5 ASME B18.2.1, Square Hex, Heavy Hex and Askew Head Bolts and Hex, Heavy Hex, Hex Flange. Loded Head and Lag Screws (Inch Series).
- .6 ASME B18.2.2, Nuts for General Applications: Machine Screw Nuts, Hex, Square, Hex Flange, and Coupling Nuts (Inch Series).

.3 ASTM International

- .1 ASTM A47/A47M, Standard Specification for Ferritic Malleable Iron Castings.
- .2 ASTM A53/A53M, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated Welded and Seamless.
- .3 ASTM A536, Standard Specification for Ductile Iron Castings.
- .4 ASTM B61, Standard Specification for Steam or Valve Bronze Castings.
- .5 ASTM B62, Standard Specification for Composition Bronze or Ounce Metal Castings.
- .6 ASTM E202, Standard Test Method for Analysis of Ethylene Glycols and Propylene Glycols.

.4 CSA International

- .1 CSA B242, Groove and Shoulder Type Mechanical Pipe Couplings.
- .2 CSA W48, Filler Metals and Allied Materials for Metal Arc Welding.

.5 Manufacturer's Standardization of the Valve and Fittings Industry (MSS)

- .1 MSS-SP-67, Butterfly Valves.
- .2 MSS-SP-70, Grey Iron Gate Valves, Flanged and Threaded Ends.
- .3 MSS-SP-71, Grey Iron Swing Check Valves Flanged and Threaded Ends.
- .4 MSS-SP-80, Bronze Gate, Globe, Angle and Check Valves.
- .5 MSS-SP-85, Grey Iron Globe and Angle Valves, Flanged and Threaded Ends.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:

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

.2 Shop Drawings:

.1 Indicate on drawings:

.1 Components and accessories.

1.3 CLOSEOUT SUBMITTALS

.1 Operation and Maintenance Data: submit operation and maintenance data for hydronic systems for incorporation into manual.

.1 Include special servicing requirements.

1.4 EXTRA STOCK MATERIALS

.1 Supply spare parts as follows:

.1 Valve seats: 1 minimum for every ten valves, each size. Minimum one.

.2 Discs: 1 minimum for every ten valves, each size. Minimum one.

.3 Stem packing: 1 minimum for every ten valves, each size. Minimum one.

.4 Valve handles: 2 minimum of each size.

.5 Gaskets for flanges: 1 minimum for every ten flanges.

1.5 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.

Part 2 Products

2.1 PIPE

.1 Steel pipe: to ASTM A53/A53M, Grade B, as follows:

.1 To NPS 6: Schedule 40.

2.2 PIPE JOINTS

.1 NPS 2 and under:screwed fittings with PTFE tape.

.2 NPS 2-1/2 and over: welding fittings and flanges to CSA W48.

.3 Flanges: raised face to ANSI/AWWA C111/ A21.11 weld neck.

.4 Orifice flanges: slip-on raised face, 2100 kPa.

.5 Flange gaskets: to ANSI/AWWA C111/ A21.11.

.6 Pipe thread: taper.

.7 Bolts and nuts: to ASME B18.2.1 or ASME B18.2.2.

2.3 FITTINGS

.1 Screwed fittings: malleable iron, to ASME B16.3, Class 150.

.2 Pipe flanges and flanged fittings:

.1 Cast iron: to ASME B16.1, Class 125.

.2 Steel: to ASME B16.5.

.3 Butt-welding fittings: steel, to ASME B16.9.

.4 Unions: malleable iron, to ASTM A47/A47M, ASME B16.3.

2.4 VALVES

.1 Connections:

.1 NPS 2 and smaller: screwed ends.

.2 NPS 2-1/2 and larger: flanged ends.

.2 Gate valves: application: isolating equipment, control valves, pipelines to MSS-SP-70, MSS-SP-80:

.1 NPS 2 and under:

.1 Mechanical Rooms: Class 125, rising stem, splitwedge disc, as specified Section 23 05 23.01- Valves - Bronze.

.2 NPS 2-1/2 and over:

.1 Mechanical Rooms: rising stem, split]wedge disc, bronze trim, as specified Section 23 05 23.02- Valves - Cast Iron.

.3 Globe valves:

.1 NPS 2 and under:

.1 Mechanical Rooms:withPTFEdisc, as specified Section 23 05 23.01- Valves - Bronze.

.2 Elsewhere: globe, with composition disc, as specified Section 23 05 23.01- Valves - Bronze.

.2 NPS 2-1/2 and over:

.1 With bronze composition disc, bronze trim, as specified Section 23 05 23.02- Valves - Cast Iron.

.4 Balancing, for TAB:

.1 Sizes: calibrated balancing valves, as specified this section.

.2 NPS 2 and under:

.1 Mechanical Rooms: globe, with plug disc as specified Section 23 05 23.01- Valves - Bronze.

.5 Drain valves: Gate, Class 125, non-rising stem, solid wedge disc, as specified Section 23 05 23.01- Valves - Bronze.

.6 Bypass valves on gate valves NPS 8 and larger: NPS 3/4, Globe, with PTFE disc as specified Section 23 05 23.01- Valves - Bronze.

.7 Swing check valves: to MSS-SP-71.

.1 NPS 2 and under:

.1 Class 125, swing, with disc, as specified Section 23 05 23.01- Valves - Bronze.

.2 NPS 2-1/2 and over:

.1 Flanged ends: as specified Section 23 05 23.02- Valves - Cast Iron.

.8 Silent check valves:

.1 NPS 2 and under:

.1 As specified Section 23 05 23.01- Valves - Bronze.

.2 NPS 2-1/2 and over:

.1 Flanged ends: as specified Section 23 05 23.02- Valves - Cast Iron.

.9 Ball valves:

.1 NPS 2 and under: as specified Section 23 05 23.01- Valves - Bronze.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for hydronic systems installation in accordance with manufacturer's written instructions.

.1 Inform Consultant of unacceptable conditions immediately upon discovery.

.2 Proceed with installation only after unacceptable conditions have been remedied.

3.2 CIRCUIT BALANCING VALVES

.1 Install flow measuring stations and flow balancing valves as indicated.

.2 Remove handwheel after installation and when TAB is complete.

.3 Tape joints in prefabricated insulation on valves installed in chilled water mains.

3.3 CLEANING, FLUSHING AND START-UP

.1 In accordance with Section 23 08 02- Cleaning and Start-Up of Mechanical Piping Systems.

3.4 TESTING

.1 Test system in accordance with Section 21 05 01- Common Work Results for Mechanical.

3.5 BALANCING

.1 Balance water systems to within plus or minus 5% of design output.

.2 In accordance with Section 23 05 93- Testing, Adjusting and Balancing for HVAC for applicable procedures.

3.6 CLEANING

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment

3.7 PROTECTION

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

.2 Repair damage to adjacent materials caused by hydronic systems installation.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 ASME

.1 ASME Boiler and Pressure Vessel Code (BPVC), Section VII-2015

.2 ASTM International

.1 ASTM A47/A47M, Standard Specification for Ferritic Malleable Iron Castings.

.2 ASTM A278/A278M], Standard Specification for Grey Iron Castings for Pressure-Containing Parts for Temperatures up to 650 degrees F (350 degrees C).

.3 ASTM A516/A516M, Standard Specification for Pressure Vessel Plates, Carbon Steel, for Moderate - and Lower - Temperature Service.

.4 ASTM A536, Standard Specification for Ductile Iron Castings.

.5 ASTM B62, Standard Specification for Composition Bronze or Ounce Metal Castings.

.3 CSA Group

.1 CSA B51, Boiler, Pressure Vessel, and Pressure Piping Code.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for expansion tanks, air vents, separators, valves, and strainers and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 CLOSEOUT SUBMITTALS

.1 Operation and Maintenance Data: submit operation and maintenance data for hydronic specialties for incorporation into manual.

1.4 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.

Part 2 Products

2.1 AUTOMATIC AIR VENT

.1 See drawings for specification. Equipment to meet spec or be equivalent with agreement of the engineer that the equipment is an equivalent.

2.2 PIPE LINE STRAINER

.1 NPS 1/2 to 2: bronze body to ASTM B62, screwed connections, Y pattern.

.2 NPS 2 1/2 to 12: flanged cast steel body to ASTM A278/A278M, , or cast iron body to ASTM A278/A278M, connections.

.3 Screen: brass with 1.19 mm perforations.

.4 Working pressure: 860 kPa.

2.3 Dirt Separator

.1 See drawings for specification. Equipment to meet spec or be equivalent with agreement of the engineer that the equipment is an equivalent.

2.4 Chemical Feeder Pots

.1 See drawings for specification. Equipment to meet spec or be equivalent with agreement of the engineer that the equipment is an equivalent.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for hydronic specialties installation in accordance with manufacturer's written instructions.

.1 Inform Consultant of unacceptable conditions immediately upon discovery.

.2 Proceed with installation only after unacceptable conditions have been remedied.

3.2 APPLICATION

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

3.3 GENERAL

.1 Run drain lines and blow off connections to terminate above nearest drain.

.2 Maintain adequate clearance to permit service and maintenance.

.3 Should deviations beyond allowable clearances arise, request and follow Consultant's directive.

.4 Check shop drawings for conformance of tappings for ancillaries and for equipment operating weights.

3.4 STRAINERS

.1 Ensure clearance for removal of basket.

.2 Install ahead of each pump.

3.5 AIR VENTS

.1 Install at high points of systems.

.2 Install gate valve on automatic air vent inlet. Run discharge to nearest drain.

3.6 EXPANSION TANKS

.1 Adjust expansion tank pressure if required.

.2 Reuse existing expansion tank.

3.7 PRESSURE SAFETY RELIEF VALVES

.1 Run discharge pipe to terminate above nearest drain.

3.8 CLEANING

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 American Society of Heating Refrigeration and Air-Conditioning Engineers (ASHRAE)

.1 ANSI/ASHRAE/IES Standard 90.1, Energy Standard for Buildings Except Low-Rise Residential Buildings.

.2 CSA Group

.1 CAN/CSA-B214, Installation Code for Hydronic Heating Systems.

.3 Electrical Equipment Manufacturers Association of Canada (EEMAC)

.4 National Electrical Manufacturers' Association (NEMA)

.1 NEMA MG 1, Motors and Generators.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit to engineer for approval

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for pump, and include product characteristics, performance criteria, physical size, finish and limitations indicate point of operation, and final location in field assembly.

.3 Shop Drawings:

.1 Submit manufacturer's detailed composite wiring diagrams for control systems showing factory installed wiring and equipment on packaged equipment or required for controlling devices or ancillaries, accessories and controllers.

1.3 CLOSEOUT SUBMITTALS

.1 Operation and Maintenance Data: submit operation and maintenance data for hydronic pumps for incorporation into manual.

1.4 DELIVERY, STORAGE AND HANDLING

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

.2 Storage and Handling Requirements:

.1 Store materials in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect hydronic pumps from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 EQUIPMENT

.1 See drawings for sample specification and equipment requirements.

2.2 IN-LINE CIRCULATORS

.1 See drawings for sample specification. Pump to be of the listed specification or equivalent (approved by Engineer)

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for hydronic pump installation in accordance with manufacturer's written instructions.

- .1 Inform Consultant of unacceptable conditions immediately upon discovery.
- .2 Proceed with installation only after unacceptable conditions have been remedied.

3.2 APPLICATION

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

3.3 INSTALLATION

.1 Install hydronic pumps to: CAN/CSA-B214.

.2 In line circulators: install as indicated by flow arrows.

- .1 Support at inlet and outlet flanges or unions.
- .2 Install with bearing lubrication points accessible.

.3 Base mounted type: supply templates for anchor bolt placement.

- .1 Include anchor bolts with sleeves. Place level, shim unit and grout.
- .2 Align coupling in accordance with manufacturer's recommended tolerance.
- .3 Check oil level and lubricate.

.4 Ensure that pump body does not support piping or equipment.

- .1 Provide stanchions or hangers for this purpose.
- .2 Refer to manufacturer's installation instructions for details.

.5 Pipe drain tapping to floor drain.

.6 Install volute venting pet cock in accessible location.

.7 Check rotation prior to start-up.

.8 Install pressure gauge test cocks.

3.4 START-UP

.1 General:

.1 In accordance with manufacturer's recommendations.

.2 Procedures:

.1 Before starting pump, check that cooling water system over-temperature and other protective devices are installed and operative.

.2 After starting pump, check for proper, safe operation.

.3 Check installation, operation of mechanical seals, packing gland type seals. Adjust as necessary.

.4 Check base for free-floating, no obstructions under base.

.5 Run-in pumps for 12 continuous hours minimum.

.6 Verify operation of over-temperature and other protective devices under low- and no-flow condition.

.7 Eliminate air from scroll casing.

.8 Adjust water flow rate through water-cooled bearings.

.9 Adjust flow rate from pump shaft stuffing boxes to manufacturer's recommendation.

.10 Adjust alignment of piping and conduit to ensure true flexibility.

.11 Eliminate cavitation, flashing and air entrainment.

.12 Adjust pump shaft seals, stuffing boxes, glands.

.13 Measure pressure drop across strainer when clean and with flow rates as finally set.

.14 Replace seals if pump used to degrease system or if pump used for temporary heat.

.15 Verify lubricating oil levels.

3.5 PERFORMANCE VERIFICATION (PV)

.1 Verify that manufacturer's performance curves are accurate.

.2 Ensure valves on pump suction and discharge provide tight shut-off.

.3 Net Positive Suction Head (NPSH):

.1 Application: measure NPSH for pumps which operate on open systems and with water at elevated temperatures.

.4 Multiple Pump Installations - Series and Parallel:

.1 Repeat PV procedures specified above for pump performance and pump BHP for combinations of pump operations.

.5 Mark points of design and actual performance at design conditions as finally set upon completion of TAB.

.6 Reports to include:

.1 Record of points of actual performance at maximum and minimum conditions and for single and parallel operation as finally set at completion of commissioning on pump curves.

.2 Pump performance curves (family of curves).

3.6 CLEANING

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)

.2 ASTM International

.1 ASTM A480/A480M, Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet and Strip.

.2 ASTM A635/A635M, Standard Specification for Steel, Sheet and Strip, Heavy-Thickness Coils, Hot-Rolled, Alloy, Carbon, Structural, High-Strength Low-Alloy, and High-Strength Low-Alloy with Improved Formability, General Requirements for.

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

.3 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)

.1 SMACNA HVAC Duct Construction Standards - Metal and Flexible.

.2 SMACNA HVAC Air Duct Leakage Test Manual.

.3 IAQ Guideline for Occupied Buildings Under Construction.

1.2 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.

Part 2 Products

2.1 SEAL CLASSIFICATION

.1 Classification as follows:

Maximum Pressure Pa	SMACNA Seal Class
500	C
250	C
125	C

.2 Seal classification:

.1 Class C: transverse joints and connections made air tight with tape. Longitudinal seams unsealed.

.2 Unsealed seams and joints.

2.2 TAPE

.1 Tape: polyvinyl treated, open weave fiberglass tape, 50mm wide.

2.3 DUCT LEAKAGE

.1 In accordance with SMACNA HVAC Air Duct Leakage Test Manual.

2.4 FITTINGS

.1 Fabrication: to SMACNA.

.2 Radiused elbows:

.1 Round: smooth radius five piece, centreline radius: 1.5times diameter.

.3 Branches:

.1 Round main and branch: enter main duct at 45 degrees with conical connection.

.2 Provide volume control damper in branch duct near connection to main duct.

.4 Transitions:

.1 Diverging: 20 degrees maximum included angle.

.2 Converging: 30 degrees maximum included angle.

2.5 GALVANIZED STEEL

.1 Lock forming quality: to ASTM A653/A653M, Z90 zinc coating.

.2 Thickness, fabrication and reinforcement: to SMACNA.

.3 Joints: to SMACNA

2.6 HANGERS AND SUPPORTS

.1 Hangers and Supports: In accordance with Section 23 05 29- Hangers and Supports for HVAC Piping and Equipment]

.1 Strap hangers: of same material as duct but next sheet metal thickness heavier than duct.

.1 Maximum size duct supported by strap hanger: 500.

.2 Hanger configuration: to SMACNA.

.3 Hangers: galvanized angle with galvanized steel rods to SMACNA]:

Duct Size	Angle Size	Rod Size
(mm)	(mm)	(mm)
up to 750	25 x 25 x 3	6
751 to 1050	40 x 40 x 3	6

.4 Upper hanger attachments:

.1 For concrete: manufactured concrete inserts.

.2 For steel joist:manufactured joist clamp.

.3 For steel beams: manufactured beam clamps:

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for metal duct installation in accordance with manufacturer's written instructions.

.1 Inform Consultant of unacceptable conditions immediately upon discovery.

.2 Proceed with installation only after unacceptable conditions have been remedied.

3.2 GENERAL

.1 Do work as indicated.

.2 Do not break continuity of insulation vapour barrier with hangers or rods.

3.3 HANGERS

.1 Strap hangers: install in accordance with SMACNA.

.2 Angle hangers: complete with locking nuts and washers.

3.4 SEALING AND TAPING

.1 Apply sealant in accordance with to manufacturer's recommendations or SMACNA.

.2 Bed tape in sealant and recoat with minimum of 1 coat of sealant to manufacturers recommendations.

3.5 LEAKAGE TESTS

.1 Refer to Section 23 05 94- Pressure Testing of Ducted Air Systems.

.2 In accordance with SMACNA HVAC Duct Leakage Test Manual.

.3 Make trial leakage tests as instructed to demonstrate workmanship.

.4 Complete test before performance insulation or concealment Work.

3.6 CLEANING

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 American National Standards Institute/Air Movement and Control Association (ANSI/AMCA)

- .1 ANSI/AMCA Standard 99, Standards Handbook.
- .2 ANSI/AMCA Standard 210/(ANSI/ASHRAE 51-07), Laboratory Methods of Testing Fans for Aerodynamic Performance Rating.
- .3 ANSI/AMCA Standard 300, Reverberant Room Method for Sound Testing of Fans.
- .4 ANSI/AMCA Standard 301, Methods for Calculating Fan Sound Ratings from Laboratory Test Data.

.2 The Master Painters Institute (MPI)

- .1 Architectural Painting Specification Manual.
  - .1 MPI #18, Primer, Zinc Rich, Organic.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:

- .1 Submit manufacturer's instructions, printed product literature and data sheets for HVAC fans and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Shop Drawings:

- .1 Provide:
  - .1 Fan performance curves showing point of operation, kW and efficiency.
  - .2 Sound rating data at point of operation.
- .2 Indicate:
  - .1 Motors, sheaves, bearings, shaft details
  - .2 Minimum performance achievable

1.3 MAINTENANCE MATERIAL SUBMITTALS

.1 Extra Materials:

- .1 Provide:
  - .1 Matched sets of belts.
  - .2 Furnish list of individual manufacturer's recommended spare parts for equipment, include:
    - .1 Bearings and seals.

1.4 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.

Part 2 Products

2.1 SYSTEM DESCRIPTION

.1 Performance Requirements:

.1 Catalogued or published ratings for manufactured items: obtained from tests carried out by manufacturer or those ordered by manufacturer from independent testing agency signifying adherence to codes and standards in force.

.2 Capacity: flow rate, static pressure, W, efficiency, revolutions per minute, power, model, size, sound power data and as indicated on schedule.

.3 Fans: statically and dynamically balanced, constructed in conformity with ANSI/AMCA Standard 99.

.4 Sound ratings: comply with ANSI/AMCA Standard 301, tested to ANSI/AMCA Standard 300.

.5 Performance ratings: based on tests performed in accordance with ANSI/AMCA Standard 210.

2.2 FANS GENERAL

.1 Motors:

.1 In accordance with Section 23 05 13- Common Motors Requirements for HVAC Equipment supplemented as specified herein.

.2 Accessories and hardware: matched sets of V-belt drives, adjustable slide rail motor bases, belt guards, safety screens as indicated and as specified in Section 23 05 13- Common Motor Requirements for HVAC Equipment.

.3 Factory primed before assembly in colour standard to manufacturer.

.4 Bearing lubrication systems plus extension lubrication tubes where bearings are not easily accessible.

2.3 PROPELLER FANS

.1 Fabricate multibladed propellers of aluminum or sheet steel within bell mouth entrance on integral mounts, with grease lubricated ball bearings, with extended lubrication fittings, suited for operating in any position, belt or direct driven, complete with motor as indicated.

.2 Provide blade guards.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for HVAC fans installation in accordance with manufacturer's written instructions.

.1 Inform Consultant of unacceptable conditions immediately upon discovery.

.2 Proceed with installation only after unacceptable conditions have been remedied.

3.2 FAN INSTALLATION

.1 Install fans as indicated, complete with resilient mountings specified in Section, flexible electrical leads and flexible connections.

.2 Provide sheaves and belts required for final air balance.

.3 Bearings and extension tubes to be easily accessible.

3.3 CLEANING

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 Institute of Boiler and Radiator Manufacturers (IBR)

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for finned tube radiation heaters and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Shop Drawings:

.1 Indicate on drawings:

.1 Equipment, capacity, piping, and connections.

.2 Dimensions, internal and external construction details, recommended method of installation with proposed structural steel support, sizes and location of mounting bolt holes.

1.3 Inspect and Replace

.1 All radiators should be inspected for damage and replaced if simple combing and cleaning is not sufficient. Additionally inspect all joints to ensure their integrity.

1.4 CLOSEOUT SUBMITTALS

.1 Operation and Maintenance Data: submit operation and maintenance data for finned tube radiation heaters for incorporation into manual.

1.5 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.

Part 2 Products

2.1 NEW BASEBOARD RADIATION

.1 Heating elements: NPS ¾ copper tubing mechanically expanded into flanged collars of evenly spaced aluminum fins, one tube end belled.

.2 Enclosure: minimum 1.0mm thick steel surface mounted with 1.0 mm thick back and top of one piece construction Style to be similar to existing

.3 Element brackets: 1.2mm thick galvanized steel to support front panel and element cradle. Space brackets 900 mm centres maximum.

.4 Provide for noiseless expansion of components.

2.2 REPLACED FINNED TUBE

.1 Replace with finned tube of equal capacity

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for finned tube radiation convector heater installation in accordance with manufacturer's written instructions.

.1 Inform Consultant of unacceptable conditions immediately upon discovery.

.2 Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSTALLATION

.1 Install in accordance with manufacturer's instructions.

.2 Install in accordance with piping layout and approved shop drawings.

.3 Provide for pipe movement during normal operation.

.4 Maintain sufficient clearance to permit performance of service maintenance.

.5 Valves:

.1 Install valves with stems upright or horizontal unless approved otherwise.

.2 Install isolating [gate]valves on inlet and lockshield [globe]balancing valves on outlet of each unit.

.6 Venting:

.1 Install screwdriver vent on cabinet convector, terminating flush with surface of cabinet.

.2 Install standard air vent with cock on continuous finned tube radiation.

.7 Clean finned tubes and comb straight.

.8 Install flexible expansion compensators as indicated.

3.3 CLEANING

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 CSA Group

.1 CSA C22.1, Canadian Electrical Code, Part 1, Ontario Amendments to the code, Safety Standard for Electrical Installations.

.2 CAN3-C235, Preferred Voltage Levels for AC Systems, 0 to 50,000 V.

.2 Institute of Electrical and Electronics / National Electrical Safety Code Product Line

.1 IEEE SP1122, the Authoritative Dictionary of IEEE Standards Terms.

1.2 DEFINITIONS

.1 Electrical and electronic terms: unless otherwise specified or indicated, terms used in these specifications, and on drawings, are those defined by IEEE SP1122.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for all specified equipment and material.

.3 Shop drawings:

.1 Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure co-ordinated installation.

.2 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.

.3 Indicate of drawings clearances for operation, maintenance, and replacement of operating equipment devices.

.4 If changes are required, notify Consultant of these changes before they are made.

.4 Certificates:

.1 Provide CSA certified material /equipment.

.2 Submit test results of installed electrical systems and instrumentation.

.3 Permits and fees: in accordance with General Conditions of contract.

.4 Submit certificate of acceptance from authority having jurisdiction upon completion of Work to Consultant.

1.4 CLOSEOUT SUBMITTALS

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

.2 Operation and Maintenance Data: submit operation and maintenance data for all systems and equipment within scope of work.

.1 Provide for each system and principal item of equipment as specified in technical sections for use by operation and maintenance personnel.

.2 Operating instructions to include following:

.1 Manufacture installation manual

.2 Manufacture operation and maintenance manual.

.3 Other items of instruction as recommended by manufacturer of each system or item of equipment.

1.5 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging.

.3 Storage and Handling Requirements:

.1 Store materials indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Replace defective or damaged materials with new.

Part 2 Products

2.1 DESIGN REQUIREMENTS

.1 Operating voltages: to CAN3-C235.

.2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard.

.1 Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

.3 Language operating requirements: provide identification nameplates for control items in English.

2.2 MATERIALS AND EQUIPMENT

.1 Provide equipment / material in accordance with Section 01 61 00- Common Product Requirements.

.2 Material / equipment to be CSA certified.

.3 Factory assemble control panels and component assemblies.

2.3 ELECTRIC MOTORS, EQUIPMENT AND CONTROLS

.1 Verify installation and co-ordination responsibilities related to motors, equipment and controls, as indicated.

.2 Control wiring and conduit: in accordance with Section 26 29 03- Control Devices except for conduit, wiring and connections below 50 V which are related to control systems as mechanically shown and specified.

2.4 WARNING SIGNS

.1 Warning Signs: in accordance with requirements of authority having jurisdiction.

.2 Decal signs, minimum size 175 x 250 mm.

2.5 WIRING TERMINATIONS

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

2.6 EQUIPMENT IDENTIFICATION

.1 Identify electrical equipment with nameplates as follows:

.1 Nameplates: lamicoid

.2 Sizes as shown unless specified otherwise.

NAMEPLATE SIZE			
Size 1	25 x 100 mm	1 line	12 mm high letters

.2 Labels: embossed plastic labels with 12 mm high letters unless specified otherwise.

.3 Wording on nameplates/ labels to be approved by Consultant prior to manufacture.

.4 Allow for minimum of twenty-five (25) letters per label.

.5 Disconnects, starters and contactors: indicate equipment being controlled and voltage.

2.7 WIRING IDENTIFICATION

.1 Identify wiring with permanent indelible identifying markings, numbered, on both ends of phase conductors of feeders and branch circuit wiring.

.2 Maintain phase sequence and colour coding throughout.

.3 Colour coding: to CSA C22.1.

.4 Use colour coded wires in communication cables, matched throughout system.

Part 3 Execution

3.1 INSTALLATION

.1 Do complete installation in accordance with CSA C22.1.

.2 Do overhead and underground systems in accordance with CAN/CSA-C22.3 No.1.

3.2 NAMEPLATES AND LABELS

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

3.3 LOCATION OF OUTLETS

.1 Locate outlets in accordance with Section 26 05 32- Outlet Boxes, Conduit Boxes and Fittings.

.2 Do not install outlets back-to-back in wall; allow minimum 150mm horizontal clearance between boxes.

.3 Change location of outlets at no extra cost or credit, providing distance does not exceed 3000mm, and information is given before installation.

3.4 MOUNTING HEIGHTS

.1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise.

.2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.

.3 Install electrical equipment to match existing mounting heights unless code violation. Which then equipment to be installed at code compliant mounting heights.

3.5 CO-ORDINATION OF PROTECTIVE DEVICES

.1 Ensure circuit protective devices such as overcurrent trips, relays and fuses are installed to required values and settings.

3.6 FIELD QUALITY CONTROL

.1 Conduct following tests in accordance with Section 01 45 00- Quality Control.

- .1 Circuits originating from branch circuits.
- .2 Lighting and its control.
- .3 Motors, heaters and associated control equipment including sequenced operation of systems where applicable.
- .4 Systems: fire alarm, building automation, lighting control, communications.
- .5 Insulation resistance testing:
  - .1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.
  - .2 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.
  - .3 Check resistance to ground before energizing.

.2 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.

3.7 SYSTEM STARTUP

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

.2 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with aspects of its care and operation.

3.8 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 / 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.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 CSA International

.1 CAN/CSA-C22.2 No.18 Outlet Boxes, Conduit Boxes and Fittings.

.2 CAN/CSA-C22.2 No.65 Wire Connectors (Tri-National Standard with UL 486A-486B and NMX-J-543-ANCE-03).

.2 Electrical and Electronic Manufacturers' Association of Canada (EEMAC)

.1 EEMAC 1Y-2 Bushing Stud Connectors and Aluminum Adapters (1200 Ampere Maximum Rating).

.3 National Electrical Manufacturers Association (NEMA)

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for wire and box connectors and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 CLOSEOUT SUBMITTALS

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

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

1.4 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labels.

.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.

Part 2 Products

2.1 MATERIALS

.1 Pressure type wire connectors to: CAN/CSA-C22.2 No.65, with current carrying parts of copper sized to fit copper conductors as required.

.2 Clamps or connectors for TECK cable flexible conduit, aluminum sheathed cable, non-metallic sheathed cable armoured cable, as required to: CAN/CSA-C22.2 No.18.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for wire and box connectors installation in accordance with manufacturer's written instructions.

3.2 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.

END OF SECTION

Part 1 General

1.1 PRODUCT DATA

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

Part 2 Products

2.1 BUILDING WIRES

.1 Conductors: stranded for 10AWG and larger. Minimum size: 12AWG.

.2 T90/R90/RW90/RWU90 as required.

2.2 TECK 90 CABLE

.1 Cable: in accordance with Section 26 05 00- Common Work Results for Electrical.

.2 Conductors:

- .1 Grounding conductor: copper ONLY.
- .2 Circuit conductors: copper ONLY.

.3 Insulation:

- .1 Ethylene propylene rubber EP.
- .2 Cross-linked polyethylene XLPE.
- .3 Rating: 600VAC

.4 Inner jacket: polyvinyl chloride material.

.5 Armour: interlocking

.6 Overall covering: thermoplastic polyvinyl chloride, [compliant to applicable Building Code classification for this project].

.7 Fastenings:

- .1 One hole aluminum to secure surface cables 50 mm and smaller. Two hole steel straps for cables larger than 50 mm.
- .2 Channel type supports for two or more cables.

.8 Connectors:

- .1 Watertight approved for TECK cable.

2.3 ARMOURED CABLES

.1 Conductors: insulated, copper, size as indicated.

.2 Type: AC90.

.3 Armour: interlocking type fabricated from aluminum strip.

.4 Connectors: anti short connectors.

2.4 CONTROL CABLES

.1 Type: LVT: 2 soft annealed copper conductors, sized as indicated:

.1 Insulation: thermoplastic.

.2 Sheath: thermoplastic jacket cotton braid

.2 Type: low energy 300 V control cable: solid annealed copper conductors sized as indicated LVT: 2soft annealed copper conductors, sized as indicated:

2.5 NON-METALLIC SHEATHED CABLE

.1 Not to be used.

Part 3 Execution

3.1 FIELD QUALITY CONTROL

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

.2 Perform tests before energizing electrical system.

3.2 GENERAL CABLE INSTALLATION

.1 Install cable in trenches in accordance with Section 33 71 73.02- Underground Electrical Service.

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

.3 Lace or clip groups of feeder cables at distribution centres, pull boxes, and termination points.

.4 Wiring in walls: typically drop or loop vertically from above to better facilitate future renovations. Generally wiring from below and horizontal wiring in walls to be avoided unless indicated.

.5 Provide numbered wire collars for control wiring. Numbers to correspond to control shop drawing legend. Obtain wiring diagram for control wiring.

3.3 INSTALLATION OF BUILDING WIRES

.1 Install wiring as follows:

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

3.4 INSTALLATION OF TECK90 CABLE (0 -1000 V)

.1 Group cables wherever possible on channels.

.2 Install cable securely supported by straps.

3.5 INSTALLATION OF ARMOURED CABLES

.1 Group cables wherever possible on channels.

3.6 INSTALLATION OF ALUMINUM SHEATHED CABLE

.1 Group cables wherever possible on channels.

3.7 INSTALLATION OF CONTROL CABLES

.1 Ground control cable shield.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 CSA Group

.1 CSA C22.2 No.41, Grounding and Bonding Equipment (Tri-National Standard, with NMX-J-590ANCE and UL 467).

.2 CSA C22.2 No.65, Wire connectors (Tri-National Standard, with UL 486A-486B NMX-J-543-ANCE).

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

1.3 CLOSEOUT SUBMITTALS

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

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

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section01 61 00- Common Product Requirements.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging.

.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.

Part 2 Products

Part 3 Execution

3.1 INSTALLATION

.1 Bond and ground as required to CSA C22.2No.41.

3.2 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.

END OF SECTION

Part 1 General

1.1 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

1.2 DELIVERY, STORAGE AND HANDLING

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

.2 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.

Part 2 Products

2.1 SUPPORT CHANNELS

.1 U shape, size 41 x 41mm, 2.5mm thick, surface mounted.

Part 3 Execution

3.1 INSTALLATION

.1 Secure equipment to hollow / solid masonry, tile and plaster surfaces with anchors/

.2 Secure equipment to poured concrete with expandable inserts.

.3 Secure equipment to hollow masonry walls or suspended ceilings with toggle bolts.

.4 Secure surface mounted equipment with twist clip fasteners to inverted T bar ceilings. Ensure that T bars are adequately supported to carry weight of equipment specified before installation.

.5 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.

.6 Fasten exposed conduit or cables to building construction or support system using straps.

.1 One-hole straps to secure surface conduits and cables 50 mm and smaller.

.2 Two-hole steel straps for conduits and cables larger than 50 mm.

.3 Beam clamps to secure conduit to exposed steel work.

.7 Suspended support systems.

.1 Support individual cable or conduit runs with 6 mm diameter threaded rods and spring clips.

.2 Support 2 or more cables or conduits on channels supported by 6 mm diameter threaded rod hangers where direct fastening to building construction is impractical.

.8 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.

.9 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.

.10 Do not use wire lashing or perforated strap to support or secure raceways or cables.

.11 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.

3.2 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.

END OF SECTION

Part 1 General

1.1 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, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Provide shop drawings: in accordance with Section 01 33 00- Submittal Procedures.

Part 2 Products

2.1 JUNCTION AND PULL BOXES

.1 Construction: welded steel enclosure.

.2 Covers Flush Mounted: 25 mm minimum extension all around.

.3 Covers Surface Mounted: screw-on flat covers.

2.2 CABINETS

.1 As specified.

Part 3 Execution

3.1 JUNCTION, PULL BOXES AND CABINETS INSTALLATION

.1 Install pull boxes in inconspicuous but accessible locations.

.2 Mount cabinets with top not higher than 2 m above finished floor except where indicated otherwise.

3.2 IDENTIFICATION

.1 Equipment Identification: to Section 26 05 00- Common Work Results for Electrical.

.2 Identification Labels: indicating system name, voltage and phase.

END OF SECTION

Part 1 General

1.1 ACTION AND INFORMATIONAL SUBMITTALS

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

1.2 DELIVERY, STORAGE AND HANDLING

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

Part 2 Products

2.1 OUTLET AND CONDUIT BOXES GENERAL

.1 Size boxes in accordance with codes and standards.

.2 102mm square or larger outlet boxes as required.

.3 Gang boxes where wiring devices are grouped.

.4 Blank cover plates for boxes without wiring devices.

.5 Combination boxes with barriers where outlets for more than one system are grouped.

2.2 GALVANIZED STEEL OUTLET BOXES

.1 One-piece electro-galvanized construction.

.2 Single and multigang flush device boxes for flush installation, minimum size 76 x 50 x 38mm or as indicated. 102 mm square outlet boxes when more than one conduit enters one side with extension and plaster rings as required.

.3 Utility boxes for outlets connected to surface-mounted EMT conduit, minimum size 102 x 54 x 48mm.

.4 102mm square or octagonal outlet boxes for lighting fixture outlets.

.5 Extension and plaster rings for flush mounting devices in finished tile / plaster walls.

2.3 CONDUIT BOXES

.1 As specified.

2.4 FITTINGS - GENERAL

.1 Bushing and connectors with nylon insulated throats.

.2 Knock-out fillers to prevent entry of debris.

.3 Conduit outlet bodies for conduit up to 35mm and pull boxes for larger conduits.

.4 Double locknuts and insulated bushings on sheet metal boxes.

Part 3 Execution

3.1 INSTALLATION

.1 Support boxes independently of connecting conduits.

.2 Fill boxes with paper, sponges or foam or similar approved material to prevent entry of debris during construction. Remove upon completion of work.

.3 For flush installations mount outlets flush with finished wall using plaster rings to permit wall finish to come within 6 mm of opening.

.4 Provide correct size of openings in boxes for conduit, mineral insulated and armoured cable connections. Do not install reducing washers.

.5 Vacuum clean interior of outlet boxes before installation of wiring devices.

.6 Identify systems for outlet boxes as required.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 Canadian Standards Association (CSA International)

.1 CAN/CSA-C22.2 No. 62 Surface Raceway Systems.

1.2 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, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Indicate types of raceways with terminology similar to that used in this Section.

Part 2 Products

2.1 SURFACE RACEWAY SYSTEM (WIRING PULLED IN)

.1 One piece steel, free of sharp edges to CAN/CSA-C22.2 No. 62.

.2 Corners, pull boxes, elbows, tees, two piece assembly to facilitate site wiring.

.3 Finish: As specified, paint to match existing.

.4 Switch, receptacle, extension boxes, adapters and fittings required for complete installation.

2.2 SURFACE RACEWAY SYSTEM (WIRING LAID IN)

.1 Two piece steel assembly CAN/CSA-C22.2 No. 62.

.1 Finish: As specified, paint to match existing.

.2 Switch, receptacle, extension boxes, adapters and fittings required for complete installation.

2.3 FITTINGS

.1 Elbows, tees, supports, connectors couplings and fittings: to CAN/CSA-C22.2 No. 62.

Part 3 Execution

3.1 INSTALLATION

.1 Install raceway systems as indicated and in accordance with manufacturer's instructions.

.2 Install supports, elbows, tees, connectors, fittings, bushings, adaptors as required.

.3 Keep number of elbows, offsets and connections to minimum.

.4 Use wiring with mechanical protection in channel raceways.

.5 Install barriers in raceways for different services where required by code.

.6 Install wiring after installation of raceway system is complete.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 Canadian Standards Association (CSA International)

- .1 CAN/CSA C22.2 No. 18 Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware, a National Standard of Canada.
- .2 CSA C22.2 No. 45 Rigid Metal Conduit.
- .3 CSA C22.2 No. 56, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
- .4 CSA C22.2 No. 83Electrical Metallic Tubing.
- .5 CSA C22.2 No. 211.2Rigid PVC (Unplasticized) Conduit.
- .6 CAN/CSA C22.2 No. 227.3, Non-metallic Mechanical Protection Tubing (NMPT), A National Standard of Canada

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product data: submit manufacturer's printed product literature, specifications and datasheets.

Part 2 Products

2.1 CABLES AND REELS

.1 Provide cables on reels or coils.

- .1 Mark or tag each cable and outside of each reel or coil, to indicate cable length, voltage rating, conductor size, and manufacturer's lot number and reel number.

.2 Each coil or reel of cable to contain only one continuous cable without splices.

.3 Identify cables for exclusively dc applications.

CONDUITS

.4 Rigid metal conduit: to CSA C22.2 No. 45, galvanized steel

.5 Epoxy coated conduit: to CSA C22.2 No. 45, with zinc coating and corrosion resistant epoxy finish inside and outside.

.6 Electrical metallic tubing (EMT): to CSA C22.2 No. 83, with couplings

.7 Rigid PVC conduit: to CSA C22.2 No. 211.2.

.8 Flexible metal conduit: to CSA C22.2 No. 56, liquid-tight flexible metal aluminum

.9 Flexible PVC conduit: to CAN/CSA-C22.2 No. 227.3

2.2 CONDUIT FITTINGS

.1 Fittings: to CAN/CSA C22.2 No. 18, manufactured for use with conduit specified. Coating: same as conduit.

.2 Set-screws are not acceptable.

2.3 FISH CORD

.1 Polypropylene.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

.1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.

.2 Conceal conduits as specified.

.3 Surface mount conduits as specified.

.4 Use electrical metallic tubing (EMT)

.5 Use flexible metal conduit for work in connection to motors in dry areas.

.6 Use liquid tight flexible metal conduit for connection to motors or vibrating equipment in damp, wet or corrosive locations.

.7 Minimum conduit size for lighting and power circuits: 19 mm.

.8 Bend conduit cold:

.1 Replace conduit if kinked or flattened more than 1/10th of its original diameter.

.9 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.

.10 Install fish cord in empty conduits.

.11 Dry conduits out before installing wire.

3.3 SURFACE CONDUITS

.1 Run parallel or perpendicular to building lines.

.2 Locate conduits behind infrared or gas fired heaters with 1.5 m clearance.

.3 Run conduits in flanged portion of structural steel.

.4 Group conduits wherever possible on surface channels.

.5 Do not pass conduits through structural members.

.6 Do not locate conduits less than 75 mm parallel to steam or hot water lines with minimum of 25 mm at crossovers.

3.4 CONCEALED CONDUITS

.1 Run parallel or perpendicular to building lines.

3.5 CLEANING

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

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

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 CSA International

.1 CAN/CSA-Z809, Sustainable Forest Management.

.2 Forest Stewardship Council (FSC)

.1 FSC-STD-01-001-2004 FSC Principle and Criteria for Forest Stewardship.

.3 Insulated Cable Engineers Association, Inc. (ICEA)

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

1.3 DELIVERY, STORAGE AND HANDLING

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

.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.

Part 2 Products

2.1 CABLE PROTECTION

.1 As specified.

Part 3 Execution

3.1 DIRECT BURIAL OF CABLES

.1 After sand bed in accordance with Section 31 23 33.01- Excavating, Trenching and Backfilling, is in place, lay cables maintaining 50 mm clearance from each side of trench to nearest cable.

.1 Do not pull cable into trench.

.2 Include offsets for thermal action and minor earth movements.

.1 Offset cables 150 mm minimum for each 60m run, maintaining minimum cable separation and bending radius requirements.

.3 Minimum permitted radius at cable bends for rubber, plastic or lead covered cables, 12 times diameter of cable or in accordance with manufacturer's written recommendations; for metallic armoured cables, 12 times diameter of cables or in accordance with manufacturer's instructions.

.4 Cable separation:

.1 Maintain 75mm minimum separation between cables of different circuits.

.2 Maintain 300mm minimum horizontal separation between low and high voltage cables.

.3 When low voltage cables cross high voltage cables maintain 300mm vertical separation with low voltage cables in upper position.

.4 At crossover, maintain 75mm minimum vertical separation between low voltage cables and 150mm between high voltage cables.

3.2 CABLE INSTALLATION IN DUCTS

.1 Install cables as indicated in ducts.

.2 Do not pull spliced cables inside ducts.

.3 Install multiple cables in duct simultaneously.

.4 Use CSA approved lubricants of type compatible with cable jacket to reduce pulling tension.

.5 To facilitate matching of colour coded multiconductor control cables reel off in same direction during installation.

.6 Before pulling cable into ducts and until cables are properly terminated, seal ends of lead covered cables with wiping solder; seal ends of non-leaded cables with moisture seal tape.

.7 After installation of cables, seal duct ends with duct sealing compound.

3.3 FIELD QUALITY CONTROL

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

.2 Perform tests using qualified personnel.

.1 Include necessary instruments and equipment.

.3 Check phase rotation and identify each phase conductor of each feeder.

.4 Check each feeder for continuity, short circuits and grounds.

.1 Ensure resistance to ground of circuits is not less than 50 megohms.

.5 Pre-acceptance tests:

.1 After installing cable but before splicing and terminating, perform insulation resistance test with 500V megger on each phase conductor.

.2 Check insulation resistance after each splice and/or termination to ensure that cable system is ready for acceptance testing.

3.4 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.

3.5 PROTECTION

.1 Repair damage to adjacent materials caused by cables installation.

END OF SECTION

Approved: 2006-09-30

Part 1 General

1.1 REFERENCE STANDARDS

.1 Canadian Standards Association (CSA International)

.1 CSA C22.2 No. 100, Motors and Generators.

.2 Electrical and Electronic Manufacturers' Association of Canada (EEMAC)

.1 EEMAC M1-7, Standard for Motors and Generators.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data: submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 47 15- Sustainable Requirements: Construction and include: product characteristics, performance criteria, physical size, horsepower, watt rating, limitations and finish.

.3 Shop drawings:

.1 Indicate dimensions, recommended installation procedure, wiring diagrams, sizes and location of mounting bolt holes and recommended support method.

.4 Quality Assurance Submittals:

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

.2 Manufacturer's Instructions: submit manufacturer's installation instructions.

.5 Closeout Submittals:

.1 Provide maintenance data for fractional horsepower motors for incorporation into manual specified in Section 01 78 00- Closeout Submittals.

Part 2 Products

2.1 FRACTIONAL HORSEPOWER MOTOR

.1 Non-hazardous locations: to CSA C22.2 No. 100 EEMAC M1-7.

.2 Motor with inherent overheating protectors.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

.1 Install wiring, flexible connections and grounding.

.2 Check rotation before coupling to driven equipment.

3.3 CLEANING

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

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

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 Canadian Standards Association (CSA International)

.1 CSA C22.2 No. 100, Motors and Generators.

.2 CSA C22.2 No. 145, Motors and Generators for Use in Hazardous Locations.

.2 Electrical and Electronic Manufacturers' Association of Canada (EEMAC)

.1 EEMAC M1-7, Standard for Motors and Generators.

.2 EEMAC M2-1, Standard for Lead Marking and Connections for Single-Phase and Polyphase Induction Motors.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 .

.3 Shop drawings:

.1 Indicate:

.1 Overall dimensions of motor.

.2 Shaft centreline to base dimension.

.3 Shaft extension diameter and keyway, coupling dimensions and details.

.4 Fixing support dimensions.

.5 Dimensioned position of ventilation openings. Details of ventilation duct attachments.

.6 Terminal box location and size of terminals.

.7 Arrangement and dimensions of accessories.

.8 Diagram of connections.

.9 Starting current and relative data necessary for use in design of motor starting equipment.

.10 Speed/torque characteristic.

.11 Weight.

.12 Installation data.

.4 Closeout Submittals:

.1 Provide maintenance data for motors for incorporation into manual specified in Section 01 78 00- Closeout Submittals.

.2 Data necessary for maintenance of motors.

.3 Manufacturers recommended list of spare parts. To be supplied.

DELIVERY, STORAGE AND HANDLING

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

.6 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.7 Handle motors with suitable lifting equipment.

.8 Store motors in heated, dry, weather-protected enclosure.

1.3 EXTRA MATERIALS

.1 Provide maintenance materials and spare parts in accordance with Section 01 78 00-Closeout Submittals.

Part 2 Products

2.1 MATERIALS

.1 Motors:

.1 Non-hazardous locations: to CSA C22.2 No. 100/EEMAC M1-7.

.2 Lead markings: to EEMAC M2-1.

2.2 CORROSION PREVENTION AND FINISH PAINTING

.1 Provide equipment resistant to corrosion from severe moisture conditions.

2.3 RATING

.1 As Specified

2.4 MOTOR TYPE

.1 As Specified

2.5 DESIGN LETTERS

.1 As Specified

2.6 ENCLOSURE

.1 As Specified

2.7 APPLICATION

.1 Motor suitable for As Specified

2.8 DIRECTION OF ROTATION

.1 Direction of rotation, As Specified

2.9 BEARINGS

.1 Antifriction type bearings, fitted with readily accessible facilities for lubrication while motor running or stationary.

2.10 MOTOR MOUNTING AND TERMINAL HOUSING

.1 As specified.

2.11 STARTING METHOD

.1 Terminate winding connection necessary for appropriate starting method and identify in motor terminal box.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

.1 Dry out motor if dampness present in accordance with manufacturer's instructions.

.2 Make wiring connections.

.1 Use liquid tight PVC jacketed flexible conduit between rigid conduit and motor.

.3 Make flexible conduit long enough to permit movement of motor over entire length of slide rails.

.4 Check for correct direction of rotation, with motor uncoupled from driven equipment.

.5 Align and couple motor to driven machinery to manufacturer's instructions, using only correct parts such as couplings, belts, sheaves, as provided by manufacturer.

3.3 FIELD QUALITY CONTROL

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

3.4 CLEANING

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

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

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 CSA International

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

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

1.3 DELIVERY, STORAGE AND HANDLING

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

.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.

Part 2 Products

2.1 PHOTOELECTRIC LIGHTING CONTROL

.1 Photoelectric Lighting Controls: to CSA C22.1.

.2 As specified.

2.2 CONTACTOR

.1 Contactor: to CSA C22.1.

.2 As specified.

Part 3 Execution

3.1 INSTALLATION

.1 Install photoelectric controls in accordance with manufacturer's written instructions and to CSA C22.1.

3.2 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.

3.3 PROTECTION

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

.2 Repair damage to adjacent materials caused by lighting control devices installation.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 Materials and installation for low voltage control system designed to provide remote switching of lighting loads by use of:

.1 Exterior Lighting Control System as specified. .

1.2 REFERENCE STANDARDS

.1 As specified.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00- Submittal Procedures. Include product characteristics, performance criteria, and limitations.

.2 Shop Drawings:

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

.3 Closeout Submittals:

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

1.4 QUALITY ASSURANCE

.1 Health and Safety:

.1 Do construction occupational health and safety in accordance with Section 01 35 29.06- Health and Safety Requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Packing, shipping, handling and unloading:

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

.2 Waste Management and Disposal:

.1 Construction/Demolition Waste Management and Disposal: separate waste materials in accordance with Section 01 74 21- Construction/Demolition Waste Management and Disposal.

Part 2 Products

2.1 MATERIALS

.1 Control system: As specified..

2.2 REMOTE CONTROL SWITCHES

.1 As specified

2.3 LOW VOLTAGE RELAYS

As specified.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

.1 Locate and install equipment in accordance with manufacturer's recommendations and as indicated.

3.3 FIELD QUALITY CONTROL

.1 Site Tests:

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

3.4 CLEANING

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

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

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 CSA International

.1 CSA C22.2 No.29-11, Panel boards and Enclosed Panel boards.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

.3 Shop Drawings:

.1 Include on drawings:

.1 Electrical detail of panel, branch breaker type, quantity, ampacity and enclosure dimension.

1.3 CLOSEOUT SUBMITTALS

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

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

1.4 DELIVERY, STORAGE AND HANDLING

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

.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.

Part 2 Products

2.1 PANELBOARDS

.1 Panel boards: to CSA C22.2 No.29 and product of one manufacturer.

.1 Install circuit breakers in panel boards before shipment.

.2 In addition to CSA requirements manufacturer's nameplate must show fault current that panel including breakers has been built to withstand.

.2 250V panelboards: bus and breakers rated for as specified

.3 Sequence phase bussing with odd numbered breakers on left and even on right, with each breaker identified by permanent number identification as to circuit number and phase.

.4 Panel boards: mains, number of circuits, and number and size of branch circuit breakers as indicated.

.5 Minimum of 2 flush locks for each panel board.

.6 As specified on drawings.

2.2 BREAKERS

.1 Breakers: to Section 26 28 16.02- Moulded case Circuit Breakers.

.2 Breakers with thermal and magnetic tripping in panelboards except as indicated otherwise.

2.3 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 00- Common Work Results for Electrical.

.2 Install outdoor rated name plate complete with all Equipment Tag, Voltage, Ampacity, and Feeder Circuit.

.3 Complete circuit directory with typewritten legend showing location and load of each circuit, mounted in plastic envelope at inside of panel door.

Part 3 Execution

3.1 INSTALLATION

.1 Locate panelboards as indicated and mount securely, plumb, and true and square, to adjoining surfaces.

.2 Mount panelboards to height specified in Section 26 05 00- Common Work Results for Electrical.

3.2 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.

3.3 PROTECTION

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

.2 Repair damage to adjacent materials caused by panelboards installation.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 CSA International

.1 CAN/CSA C22.2 No.94.1, Enclosures for Electrical Equipment, Non Environment Considerations.

.2 National Electrical Manufacturers Association (NEMA)

.1 NEMA 250, Enclosures for Electrical Equipment (1000 Volts Maximum).

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for electrical cabinets and enclosures and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 CLOSEOUT SUBMITTALS

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

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

1.4 DELIVERY, STORAGE AND HANDLING

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

.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.

Part 2 Products

2.1 MATERIALS

.1 Enclosure constructed as specified.

.2 Entire enclosure to be capable of withstanding maximum impact force of 86MN/m2area without rupture of material.

.3 Removable enclosure panels with formed edges, galvanized steel external fasteners removable only from inside enclosure.

.4 Cover: As specified.

.5 Door: As specified.

Part 3 Execution

3.1 INSTALLATION

.1 Assemble enclosure in accordance with manufacturer's instructions and securely mount on building structure with channels, supports and fastenings.

.2 Mount equipment in enclosure.

.3 Label electrical cabinets and enclosure to Section 26 05 00- Common Work Results for Electrical.

3.2 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.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 CSA International

.1 As specified.

.2 CSA C22.2 No.42, General Use Receptacles, Attachment Plugs and Similar Devices.

.3 CAN/CSA C22.2 No.42.1Cover Plates for Flush-Mounted Wiring Devices (Bi-national standard, with UL 514D).

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

1.3 CLOSEOUT SUBMITTALS

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

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

1.4 DELIVERY, STORAGE AND HANDLING

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

.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.

Part 2 Products

2.1 SWITCHES

.1 A specified

.2 Switches of one manufacturer throughout project.

2.2 RECEPTACLES

.1 As specified

.2 Receptacles of one manufacturer throughout project.

2.3 COVER PLATES

.1 Cover plates for wiring devices to: CSA C22.2 No.42.1.

.2 Sheet steel utility box cover for wiring devices installed in surface-mounted utility boxes.

.3 As specified.

.4 Stainless steel cover plates for wiring devices mounted in surface-mounted FS or FD type conduit boxes.

.5 Weatherproof cover plates: As specified.

2.4 SOURCE QUALITY CONTROL

.1 Cover plates from one manufacturer throughout project.

Part 3 Execution

3.1 INSTALLATION

.1 Switches:

.1 Install single throw switches with handle in "UP" position when switch closed.

.2 Install switches in gang type outlet box when more than one switch is required in one location.

.3 Mount toggle switches at height in accordance with Section 26 05 00- Common Work Results for Electrical.

.2 Receptacles:

.1 Install receptacles in gang type outlet box when more than one receptacle is required in one location.

.2 Mount receptacles at height in accordance with Section 26 05 00- Common Work Results for Electrical.

.3 Install GFI type receptacles as indicated.

.3 Cover plates:

.1 Install suitable common cover plates where wiring devices are grouped.

.2 Do not use cover plates meant for flush outlet boxes on surface-mounted boxes.

3.2 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.

3.3 PROTECTION

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

.2 Protect stainless steel cover plate finish with paper or plastic film until painting and other work is finished.

.3 Repair damage to adjacent materials caused by wiring device installation.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 CSA International

.1 CSA C22.2 No. 5, Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures (Tri-national standard with UL 489, and NMX-J-266-ANCE-2010).

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

.2 <u>MAINTAIN FAULT CURRENT RATING OF NEW BREAKERS WITH THOSE OF EXISTING ELECTRICAL PANEL.</u>

1.3 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section01 61 00- Common Product Requirements.

.2 Storage and Handling Requirements:

.1 Store circuit breakers in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Replace defective or damaged materials with new.

Part 2 Products

2.1 BREAKERS GENERAL

.1 All Breakers to CSA C22.2 No. 5

.2 Bolt-on moulded case circuit breaker: quick- make, quick-break type, for manual and automatic operation.

.3 Plug-in moulded case circuit breakers: quick- make, quick-break type, for manual and automatic operation.

.4 Common-trip breakers: with single handle for multi-pole applications.

.5 Circuit breakers to have minimum 10kA unless specified otherwise.

2.2 THERMAL MAGNETIC BREAKERS DESIGN A

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

2.3 MAGNETIC BREAKERS (DESIGN B)

.1 Moulded case circuit breaker to operate automatically by means of magnetic tripping devices to provide instantaneous tripping for short circuit protection.

Part 3 Execution

3.1 INSTALLATION

.1 Install circuit breakers as indicated.

3.2 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.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 CSA International

.1 CAN/CSA C22.2 No.144Ground Fault Circuit Interrupters.

.2 National Electrical Manufacturers Association (NEMA)

.1 NEMA PG 2.2, Application Guide for Ground Fault Protection Devices for Equipment.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for ground fault circuit interrupters and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 CLOSEOUT SUBMITTALS

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

.2 Operation and Maintenance Data: submit operation and maintenance data for ground fault circuit interrupter for incorporation into manual.

1.4 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.

Part 2 Products

2.1 MATERIALS

.1 Equipment and components for ground fault circuit interrupters (GFCI): to CAN/CSA C22.2 No.144

.2 Components comprising ground fault protective system to be of same manufacturer.

2.2 BREAKER TYPE GROUND FAULT INTERRUPTER

.1 As specified.

2.3 GROUND FAULT LIFE PROTECTOR

.1 As specified.

2.4 GROUND FAULT PROTECTOR UNIT

.1 As specified.

Part 3 Execution

3.1 INSTALLATION

.1 Do not ground neutral on load side of ground fault relay.

.2 Pass phase conductors including neutral through zero sequence transformers.

.3 Connect supply and load wiring to equipment in accordance with manufacturer's recommendations.

3.2 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00- Common Work Results for Electrical and co-ordinate with Section 01 45 00- Quality Control

CLEANING

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

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

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

END OF SECTION

Part 1 General

.1 CSA Group

.1 CAN/CSA-C22.2 No.4 Enclosed and Dead-Front Switches (Tri-National Standard, with ANCE NMX-J-162-2004 and UL 98).

.2 CSA C22.2 No.39-[13], Fuse holder Assemblies.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for disconnect switches - fused and non-fused and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 DELIVERY, STORAGE AND HANDLING

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

.2 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.

Part 2 Products

2.1 DISCONNECT SWITCHES

.1 As specified.

.2 Provision for padlocking in off switch position.

.3 Mechanically interlocked door to prevent opening when handle in ON position.

.4 Fuses: size as indicated, in accordance with Section 26 28 13.01- Fuses - Low Voltage.

.5 Fuse holders: to CSA C22.2 No.39

.6 Quick-make, quick-break action.

.7 ON-OFF switch position indication on switch enclosure cover.

2.2 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 00- Common Work Results for Electrical.

.2 Indicate name of load controlled on nameplate.

Part 3 Execution

3.1 INSTALLATION

.1 Install disconnect switches complete with fuses if applicable.

3.2 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.

END OF SECTION

Part 1 General

.1 CSA International

.1 CSA C22.2 No.14-10, Industrial Control Equipment.

.2 National Electrical Manufacturers Association (NEMA)

.1 NEMA ICS 2 Controllers, Contactors and Overload Relays Rated 600 V.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

1.3 CLOSEOUT SUBMITTALS

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

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

.3 Include operating information required for start-up, synchronizing and shut-down of generating units.

1.4 DELIVERY, STORAGE AND HANDLING

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

.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.

Part 2 Products

2.1 CONTACTORS

.1 Contactors: to CSA C22.2 No.14.

.2 As specified.

.3 Include following options in cover:

.1 Power indicator lights per circuit on both line and load side

.1 Line Side (RED)

.2 Load Side (GREEN)

.2 Control signal indicator light (GREEN)

2.2 EQUIPMENT IDENTIFICATION

.1 Identify equipment in accordance with Section 26 05 00- Common Work Results for Electrical.

Nameplate indicating

.1 Voltage

.2 Feeder Circuits

.3 Equipment Tag

Part 3 Execution

3.1 INSTALLATION

.1 Install contactors and connect power wires and auxiliary control devices.

.2 Identify contactors with nameplates or labels indicating panel and circuit number.

.3 Test contactors in accordance with 26 05 00- Common Work Results for Electrical.

3.2 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.

3.3 PROTECTION

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

.2 Repair damage to adjacent materials caused by contactor installation.

END OF SECTION

Part 1 General

.1 CSA International

.1 CSA C22.2 No.14, Industrial Control Equipment.

.2 National Electrical Manufacturers Association (NEMA)

.1 NEMA ICS 1Industrial Control and Systems: General Requirements.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

.3 Shop Drawings:

.1 Include schematic, wiring, interconnection diagrams.

1.3 QUALITY ASSURANCE

.1 Conduct tests in accordance with Section 26 05 00- Common Work Results for Electrical.

1.4 CLOSEOUT SUBMITTALS

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

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

1.5 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.

Part 2 Products

2.1 AC CONTROL RELAYS

.1 Control Relays: to CSA C22.2 No.14.

.2 Sealed contact type: As specified.

.3 Universal pole type: As specified.

.4 Fixed contact type: As specified.

2.2 RELAY ACCESSORIES

.1 Standard contact cartridges: normally-open - convertible to normally-closed in field.

.2 As specified.

2.3 SOLID STATE TIMING RELAYS

.1 Construction: AC operated electronic timing relay with solid-state timing circuit to operate output contact.

.2 As specified.

2.4 OPERATOR CONTROL STATIONS

.1 Enclosure: CSA Type 1 / 4, flush / surface mounting: As specified.

2.5 PUSHBUTTONS

.1 As specified.

2.6 SELECTOR SWITCHES

.1 As specified.

2.7 INDICATING LIGHTS

.1 As specified.

2.8 CONTROL AND RELAY PANELS

.1 As specified.

Part 3 Execution

3.1 FIELD QUALITY CONTROL

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

.2 Depending upon magnitude and complexity, divide control system into convenient sections, energize one section at time and check out operation of section.

.3 Upon completion of sectional test, undertake group testing. Check out complete system for operational sequencing.

3.2 CLEANING

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

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 American National Standards Institute (ANSI)

.1 ANSI C82.1, Lamp Ballasts-Line Frequency Fluorescent Lamp Ballast.

.2 ANSI C82.4, Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps Multi Supply Type.

.2 Canadian Standards Association (CSA International)

.3 ICES-005, Radio Frequency Lighting Devices.

.4 Underwriters' Laboratories of Canada (ULC)

1.2 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, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 QUALITY ASSURANCE

.1 Provide mock-ups in accordance with Section 01 45 00- Quality Control.

1.4 DELIVERY, STORAGE AND HANDLING

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

.2 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

.3 Divert unused metal materials from landfill to metal recycling facility.

.4 Disposal and recycling of fluorescent lamps as per local regulations.

.5 Disposal of old PCB filled ballasts.

Part 2 Products

2.1 LAMPS

.1 Fluorescent lamps to be - T8, 32 Watt, medium bi-pin, rapid-start, 4100 K, 30,000 hour lamp life, 2950 initial lumens, CRI 80; or as indicated.

.2 Metal halide lamps to be - clear, BT37, 400 Watt, mogul base, horizontal burn, 4100 K, 15,000 hour lamp life, 36,000 initial lumens, CRI[70], open or enclosed type to suit the luminaire; or as indicated /match existing.

2.2 BALLASTS

.1 Fluorescent ballast: CBM and CSA certified, energy efficient type, IC electronic

.1 Match existing.

2.3 FINISHES

.1 Light fixture finish and construction to meet ULC listing and CSA certification related to intended installation.

2.4 OPTICAL CONTROL DEVICES

.1 As indicated in luminaire schedule.

2.5 LUMINAIRES

.1 As indicated in luminaire schedule.

Part 3 Execution

3.1 INSTALLATION

.1 Locate and install luminaires as indicated.

.2 Provide adequate support to suit ceiling system.

3.2 WIRING

.1 Connect luminaires to lighting circuits:

.1 Install cable / conduit for luminaires as indicated.

3.3 LUMINAIRE ALIGNMENT

.1 Align luminaires mounted in continuous rows to form straight uninterrupted line.

.2 Align luminaires mounted individually parallel or perpendicular to building grid lines.

3.4 CLEANING

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

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

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 CSA Group

.1 CSA C22.2 No.206, Lighting Poles.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

1.3 DELIVERY, STORAGE AND HANDLING

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

.2 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.

Part 2 Products

2.1 STEEL POLES

.1 Steel poles: to CSA C22.2 No.206 designed for underground wiring and:

.1 As specified

.2 Access handhold

.3 Size: As specified.

.4 Anchor bolts: As required

.5 Finish: As specified

.6 Grounding lug.

2.2 LUMINAIRE MOUNTING BRACKETS

.1 Mounting brackets for specified luminaires:

.1 As specified.

2.3 LUMINAIRES

.1 As specified.

Part 3 Execution

3.1 INSTALLATION

.1 Install poles true and plumb, complete with brackets in accordance with manufacturer's instructions.

.2 Install luminaires on pole and install luminaire.

.3 Check luminaire orientation, level and tilt.

.4 Connect luminaire to lighting circuit.

.5 Perform tests in accordance with Section 26 05 00- Common Work Results for Electrical.

3.2 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.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 National Research Council Canada (NRC)

.1 National Building Code of Canada

.2 Treasury Board of Canada Secretariat (TBS), Occupational Safety and Health (OSH)

.1 Fire Protection Standard 10.

.3 Underwriter's Laboratories of Canada (ULC)

.1 CAN/ULC-S524, Standard for the Installation of Fire Alarm Systems.

.2 CAN/ULC-S526, Visible Signal Devices for Fire Alarm Systems, Including Accessories.

.3 CAN/ULC-S527, Standard for Control Units for Fire Alarm Systems.

.4 CAN/ULC-S528, Manual Stations for Fire Alarm Systems, Including Accessories.

.5 CAN/ULC-S529, Smoke Detectors for Fire Alarm Systems.

.6 CAN/ULC-S530 Heat Actuated Fire Detectors for Fire Alarm Systems.

.7 CAN/ULC-S531 Standard for Smoke Alarms.

.8 CAN/ULC-S537 Standard for the Verification of Fire Alarm Systems.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for multiplex fire alarm system and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

.1 Indicate on shop drawings:

.1 Overall system riser

.2 Details for devices.

.3 Details and performance specifications for control, annunciation and peripherals with item by item cross reference to specification for compliance.

1.3 CLOSEOUT SUBMITTALS

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

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

.3 Include:

.1 Instructions for complete fire alarm system to permit effective operation and maintenance.

.2 Technical data - illustrated parts lists with parts catalogue numbers.

.3 Copy of approved shop drawings with corrections completed and marks removed except review stamps.

.4 List of recommended spare parts for system.

.5 System verification report.

1.4 MAINTENANCE MATERIAL SUBMITTALS

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

1.5 DELIVERY, STORAGE AND HANDLING

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

.2 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.

Part 2 Products

2.1 DESCRIPTION

.1 Refer to drawing for scope of work.

.2 System to carry out fire alarm and protection functions; including receiving alarm signals; initiating general alarm; supervising components and wiring; actuating annunciators and auxiliary functions; initiating trouble signals and signalling to[monitoring agency / fire department.

.3 System to include:

.1 Central Control Unit in separate enclosure with power supply, stand-by batteries, central processor with microprocessor and logic interface, main system memory, input-output interfaces for alarm receiving, annunciation/display, and program control/signalling.

.2 Power supplies.

.3 Initiating/input circuits.

.4 Output circuits.

.5 Auxiliary circuits.

.6 Wiring.

.7 Manual and automatic initiating devices.

.8 Audible and visual signalling devices.

.9 End-of-line resistors.

.4 Equipment and devices: ULC listed and labelled and supplied by single manufacturer.

.5 Power supply: to CAN/ULC-S524.

.6 Audible signal devices: to CAN/ULC-S524.

.7 Visual signal devices: to CAN/ULC-S526.

.8 Control unit: to CAN/ULC-S527.

.9 Manual pull stations: to CAN/ULC-S528.

.10 Thermal detectors: to CAN/ULC-S530.

.11 Smoke detectors: to CAN/ULC-S529.

.12 Smoke alarms: to CAN/ULC-S531.

.13 Regulatory Requirements:

.1 To TBS Fire Protection Standard.

.2 Subject to Fire Commissioner of Canada (FC) approval.

.3 Subject to FC inspection for final acceptance.

.4 To Canadian Forces Fire Marshal approval.

.5 System components: listed by ULC and comply with applicable provisions of Provincial Building Code, and meet requirements of local authority having jurisdiction.

2.2 INITIATING/INPUT CIRCUITS

.1 Receiving circuits for alarm initiating devices such as manual pull stations, smoke detectors, heat detectors and water flow switches, wired as existing.

.2 Alarm receiving circuits active and spare: compatible with smoke detectors and open contact devices.

.3 Receiving circuits for supervisory, N/O devices. Devices: wired as existing.

2.3 ALARM OUTPUT CIRCUITS

.1 Alarm output circuit: connected to signals, wired as per existing.

2.4 WIRING

.1 Twisted copper conductors: rated 300V

.2 To initiating circuits: 16AWG minimum, and in accordance with manufacturer's requirements.

.3 To signal circuits: 14AWG minimum, and in accordance with manufacturer's requirements.

.4 To control circuits: 14AWG minimum, and in accordance with manufacturer's requirements.

2.5 MANUAL ALARM STATIONS

.1 Manual alarm stations: As specified.

2.6 AUTOMATIC ALARM INITIATING DEVICES

.1 As specified.

2.7 AUDIBLE SIGNAL DEVICES

.1 As specified.

2.8 VISUAL ALARM SIGNAL DEVICES

.1 As specified.

Part 3 Execution

3.1 INSTALLATION

.1 Refer to drawings for scope of work.

3.2 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00- Common Work Results for Electrical and CAN/ULC-S537.

.2 Fire alarm system:

.1 Perform complete verification of system.

3.3 CLEANING

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

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

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

.1 .

3.4 PROTECTION

.1 Protect installed products and components from damage during construction. Repair damage to adjacent materials caused by fire alarm system installation.

3.5 CLOSEOUT ACTIVITIES

.1 Provide on-site lectures and demonstration by fire alarm verification / contractor to train operational personnel in use and maintenance of fire alarm system.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

- .1 Materials and installation for fire alarm systems.
- .2 Trouble signal devices.
- .3 Manual alarm stations.
- .4 Automatic alarm initiating devices.
- .5 Audible signal devices.
- .6 End-of-line devices.
- .7 Visual alarm signal devices.
- .8 Ancillary devices.
- .9 Sustainable requirements for construction and verification.

1.2 REFERENCE STANDARDS

.1 National Fire Protection Agency

- .1 NFPA 72 National Fire Alarm Code.

.2 National Research Council Canada (NRC)

- .1 National Building Code of Canada

.3 Underwriter's Laboratories of Canada (ULC)

- .1 CAN/ULC-S524 Standard for the Installation of Fire Alarm Systems.
- .2 CAN/ULC-S525 Audible Signal Device for Fire Alarm Systems.
- .3 CAN/ULC-S526 Visual Signal Devices for Fire Alarm Systems.
- .4 CAN/ULC-S527 Control Units.
- .5 CAN/ULC-S528 Manual Pull Stations for Fire Alarm Systems.
- .6 CAN/ULC-S529 Smoke Detectors for Fire Alarm Systems.
- .7 CAN/ULC-S530 Heat Actuated Fire Detectors for Fire Alarm Systems.
- .8 CAN/ULC-S531 Standard for Smoke Alarms.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:

- .1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00- Submittal Procedures.

.2 Shop Drawings:

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

.3 Closeout Submittals:

.1 Submit maintenance and engineering data for incorporation into manual specified in Section 01 78 00- Closeout Submittals in accordance with ANSI/NFPA 20.

.2 Authority of Jurisdiction will delegate authority for review and approval of submittals required by this Section.

.3 Submit following:

.1 Manufacturer's Data for:

.1 Manual pull stations.

.2 Heat detectors.

.3 Open-area smoke detectors.

.4 Alarm bells.

.5 Alarm horns.

.6 Visible appliances.

.7 Wiring.

.8 Outlet boxes.

.9 Fittings for conduit and outlet boxes.

1.4 QUALITY ASSURANCE

.1 Qualifications:

.1 As specified.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Packing, shipping, handling and unloading:

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

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

Part 2 Products

2.1 MATERIALS

.1 Equipment and devices: ULC listed and labelled and supplied by single manufacturer.

.2 Audible signal devices: to CAN/ULC-S525.

.3 Visual signal devices: to CAN/ULC-S526.

.4 Manual pull stations: to CAN/ULC-S528.

.5 Thermal detectors: to CAN/ULC-S530.

.6 Smoke detectors: to CAN/ULC-S529.

.7 Smoke alarms: to CAN/ULC-S531.

2.2 SYSTEM OPERATION

.1 Provide separate circuits from control panel to each zone of initiating devices. Transmission of signals from more than one zone over common circuit to control panel is prohibited.

.2 Single stage operation. Operation to actuation following:

.1 Manual station.

.2 Heat detector.

.3 Smoke detector.

.4 Automatic fire sprinkler system.

.5 Fire extinguishing system.

.6 Fire standpipe system.

2.3 MANUAL ALARM STATIONS

.1 As specified.

.2 Provide non-coded action type with mechanical reset features.

.1 Non-coded single pole normally open contact for single stage.

.3 Stations: semi-flush mounted and interior type as indicated.

.4 Station colour: red.

2.4 AUTOMATIC ALARM INITIATING DEVICES

.1 As specified.

2.5 AUDIBLE SIGNAL DEVICES

.1 As specified.

2.6 END-OF-LINE DEVICES

.1 As required.

2.7 VISUAL ALARM SIGNAL DEVICES

.1 As specified.

.2 Door holders: not require battery backup power.

2.8 OFF-PREMISES FIRE ALARM

.1 Provide auxiliary connection to base fire alarm system in accordance with NFPA 72.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

.1 As specified, refer to drawing package.

.2 Install systems in accordance with CAN/ULC-S524 and TB OSH Chapter 3-04.

3.3 FIELD QUALITY CONTROL

.1 Site Tests:

.1 Perform tests in accordance with Section 26 05 00- Common Work Results for Electrical and CAN/ULC-S537.

3.4 TRAINING

.1 Arrange and pay for on-site lectures and demonstrations by fire alarm equipment supplier / verifier to train operational personnel in use and maintenance of fire alarm system.

3.5 CLEANING

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

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

END OF SECTION