REQUEST FOR BIDS

PROJECT: 1703

REHABILITATION OF HISTORIC
GOVERNMENT OF CANADA BUILDINGS
IN WATERTON, ALBERTA

PRIME CONSULTANT:

RKH ARCHITECTURE LTD.
1510A, 31 STREET NORTH
LETHBRIDGE, ALBERTA
T1H 5J8

ENGINEERING CONSULTANT:

ELECTRICAL, MECHANICAL

RAE MCLEAN & ASSOCIATES LTD.
#207, 6036 – 3RD STREET. SW.,
CALGARY, ALBERTA
T2H 0H9

TENDER CLOSING DATE: _____
CLOSING TIME: 2:01 P.M. (MST)

DIVISION 8 – OPENINGS

DIVISION 9 – FINISHES

DIVISION 10 - SPECIALTIES

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DIVISION 23 - HEATING, VENTILATING AND AIR CONDITIONING (HVAC)

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1 General Requirements

1.1. DESCRIPTION

.1 Work under this Contract covers the rehabilitation of Historic Government of Canada Buildings. The work to the buildings will consist of work to the Main Building and the Out-Building as located on drawing A2-1. The work includes: selective demolition and the restoration of internal finishes; the addition of new mechanical equipment; re-plumbing and re-wiring of both buildings.

.2 As these are a historic buildings, care will need to be taken in the removal and refinishing of historic materials and finishes. Significant experience and skill in the restoration of wood floors and wood trims, and plaster walls and ceilings is required.

.3 As the buildings are located in Waterton Park;

.1 The General Contractor will be required to obtain any and all passes, permits, etc. as stipulated by Waterton National Park in the performance of the work of this project.

.2 The General Contractor will be required to attend a mandatory safety/training session provided by Waterton National Park, and to adhere to any required operating conditions, constraints, and regulations specified by Waterton National Park staff.

.3 The General Contractor will have limited use of the full site and unlimited use of the work area until Completion of the Project. On-site material storage and laydown areas will need to be coordinated with the Owner and will be required to be screened from the general public. The entire site must be maintained and presentable at all times.

.4 As this is a heavily used tourist area, the General Contractor will need to coordinate and receive approvals from the Owner, Waterton Parks Staff, and Consultant in advance of performing any work creating unusual noise, smells, or other disturbances.Work included under this contract will consist of the supply of all labour, materials, equipment, supervision, design (where indicated in the contract documents), permits, fees, inspection and testing necessary to provide a first class facility suitable for the intended use.

.5 The successful bidder will enter into a single lump sum contract with the Owner using a standard Government of Canada contract document.

1.2. DRAWING LIST

.a A complete list of drawings is included in Section 00 01 15 – List of Drawing Sheets.

.b Any revised drawings issued prior to closing of tenders shall become part of the List of Drawings.

1.3. PROJECT COORDINATION

.1 Site Examination

.1 Visit the site and compare the drawings and specifications with all existing site conditions including all conditions surrounding the site prior to submitting bid. There is a scheduled pre-bid site meeting. Failure to visit the site in no way relieves the Contractor from the necessity of furnishing any material, or performing any work in accordance with drawings and specifications, without additional cost to the Owner.

.2 Submission of the bid is deemed to be evidence that the Contractor has examined the site and is familiar with conditions under which work will be done.

.2 Co-ordination

.1 Coordinate the progress of the Work, progress schedules, submittals, use of the site, temporary utilities, construction facilities and controls.

.2 Co-ordinate work of all trades and subcontractors to expedite progress and avoid interference. This applies particularly to work of trades which will be installed in close proximity with work of other trades. Requests for extras, as a result of lack of coordination will not be considered.

.3 Notify trades and Subcontractors of readiness for their Work, to allow adequate time for installation without delaying Completion of project.

.4 Examine the drawings and specifications regarding the performance of the Work. Examine existing conditions and report to the Consultant in writing, any defects or deficiencies which may affect the Work. In the absence of any such report, the Contractor and/or trades will be held to have waived all claims for damage to or defects in such Work.

.5 Signing the Contract indicates acceptance by the Contractor of conditions under which Work will be done.

.6 Bring to the attention of the Consultant all discrepancies between drawings, specification and existing and surrounding site conditions. Failure to do so, in no way relieves the Contractor from performing Work as intended, at no additional cost to the Owner.

.7 Supply all items to be built-in including anchors, ties, nailing strips, blocks, bolts, sleeves, etc., as and when required, together with templates, measurements, and shop drawings.

.8 Establish correct location of sleeves, inserts, hangers, holes and chases.

.9 Check and verify dimensions as the Work proceeds.

1.4. BUILDING CODES, SAFETY CODES, LAWS, REGULATIONS

.1 Give all required notices and comply with all laws, ordinances, rules, regulations, codes and orders relating to the work which are or come in force during the performance of the work, for the preservation of the public health and construction safety. If the work

as shown on the drawings is required to be changed, as per the governing authorities, that shall be brought to the attention of the Architect before starting the work.

.2 Obtain and pay for all necessary permits, licenses, certificates, and any other special permits required, except those specified, or which will be obtained and paid for by those subcontractors affected. The Contractor will apply and pay for the Building Permit.

.3 In addition to the Building Safety Codes Inspector, the Owner's Fire Marshal is one of the Authorities Having Jurisdiction on this project.

1.5. SCOPE OF WORK AND LOCATION

.1 The work of this Contract and Location comprises the work shown on the drawings and as stated in the specifications.

.2 The work is to be completed within a Canadian National Park and all work and care must be done in compliance with Parks Canada Regulations.

.3 Include all incidental, casual or relatively subordinate work occurring as a necessary but minor result of the major part of the work if not shown on the drawings or specified, but required to complete the contract as intended.

1.6. INTERPRETATION

.1 No oral interpretations shall be effective to modify the provisions of the Contract Documents. Every request for an interpretation shall be made at once to the Architect.

.2 The Architect will not be responsible for oral instructions.

.3 Any questions on finish or colours are to be answered only by the Architect. Submit questions in ample time before the requested information is required.

.4 Take instructions only from the Architect or his appointed consultant or Inspection Company.

1.7. CHANGE IN THE WORK

.1 Written orders will only be made on official forms as follows:

.1 Contemplated Change Order (CCO) - to determine the value of additional work to the contract.

.2 Change Order (CO) - where the value of contractual obligation has been determined and approved by the owner.

1.8. DIAGRAMMATIC LOCATIONS

.1 Locations 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 Note furring requirements and limitations indicated on drawings. Make allowances for possibility that indications and locations on mechanical and electrical drawings are

diagrammatic.

.4 Where locations of holes in the structure would possibly affect the nature or strength of structure, inform the Consultant before proceeding.

.5 Where the Contractor determines the furring allowances described in 1.3.3 above cannot be obtained, inform the Consultant before concrete forming or installation work is carried out.

.6 Inform Consultant of impending installation of items of Work which are diagrammatically indicated on drawings, and obtain acceptance for actual location.

.7 Submit field drawings to indicate relative position of various services and equipment when required by Consultant.

1.9. WORKING LIMITS

.1 Confine all operations within the designated work area.

1.10. HARASSMENT

.1 For the purpose of this contract, harassment guidelines have been established to prevent conduct defined as harassment, between the Contractor, Subcontractors, Sub-subcontractors, the Owner and the Consultants.

.2 Harassment as defined as unwanted attention, in verbal, written, graphic or physical form. Any such conduct which creates an offensive or intimidating working environment shall be considered as harassment.

.3 For the purpose of these guidelines, all site shacks, offices, and general site will be considered to be “public” spaces. Material, either written or graphic, on view in “public” spaces, deemed to be offensive by the Consultant or Owner shall be removed.

.4 Any conduct considered as harassment will be brought to the attention of the General Contractor. The General Contractor will be responsible to prevent further incidents.

.5 The General Contractor shall ensure that all employees of the General Contractor, Subcontractors and Sub-subcontractors working on the construction site are familiar with and adhere to these guidelines.

1.11. AGREEMENTS WITH THE REGIONAL DISTRICT

.1 The Owner will obtain all necessary agreements (Development Permit) and make arrangements with Parks Canada – Waterton Lakes National Park to facilitate the work of this project.

1.12. RESPONSIBLE PERSONNEL

.1 Throughout the course of Construction, the Contractor, mechanical Subcontractor, electrical Subcontractor and all other such subcontractors as deemed appropriate for the stage of construction, must designate and advise the Owner of a contact person and back-up contact person for working hours and non-working hours in the event of emergencies.

.2 Update this list as construction meetings and provided to the Owner.

1.13. PUBLICITY

.1 All publicity/media requests are to be directed to the Owner Representative.

.2 No mention of the project in advertising or articles in any publication will be permitted unless approved by the Owner.

.3 Publicity or advertising implying endorsement of a product by the Owner of a product will not be permitted.

1.14. PROJECT MEETINGS

.1 Administrative

.1 Schedule and administer project progress meetings throughout the progress of the Work on a bi-weekly basis.

.2 Distribute written notice of each meeting four days in advance of meeting date to the Consultant, the Owner's Representative, Subcontractors and/or other persons whose presence is required.

.3 Provide physical space and make arrangements for meetings.

.4 The Prime Consultant will record the minutes of bi-weekly progress meetings and will include significant proceedings and decisions. Parties requiring action will be identified in right column of minute page. The following items will be indicated:

.a List of persons attending.

.b Decisions taken

.c Instructions required or issued.

.d All matters discussed.

.5 The Project Manager will type, reproduce and distribute copies of minutes within three days after each meeting and Transmit to meeting participants, affected parties not in attendance and the owner.

.6 The entire site, including meeting areas are be designated as "NO SMOKING" zones.

.7 The Contractor shall conduct minuted subtrade meetings on a weekly basis, and distribute minutes to all affected parties, including Consultant and Owner.

1.15. SUBMITTALS

.1 Administrative

.1 Submit to the Consultant submittals listed for review. Submit with reasonable promptness and in an orderly sequence so as not to cause delay in the Work.

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

.3 Review submittals prior to submission to the Consultant. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and coordinated with the requirements of the Work and the Contract Documents.

.4 Verify field measurements and affected adjacent Work are coordinated.

.5 Do all shop drawings and record drawings in imperial units.

.2 Shop Drawings and Product Data

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

.2 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connection, explanatory notes and other information necessary for completion of the Work.

.3 Adjustments made on shop drawings by the Consultant are not intended to change the Contract Price.

.4 Make changes in shop drawings as the Consultant may require.

.5 Submit one electronic copy of shop drawings for each requirement requested in the specification sections and hardcopies as the Consultant may require. Ensure that a copy gets transmitted to the Owner.

.6 Submit one electronic copy of product data sheets or brochures for requirements requested in the specifications sections, and hardcopies as the Consultant may reasonably request where shop drawings will not be prepared due to standardized manufacture of product.

.7 Provide shop drawings for each trade as one complete set. Do not submit shop drawings in a "piece meal" fashion, i.e. Provide miscellaneous metal shop drawings for different handrails at different times.

.8 Do not copy the contract documents for the purpose of shop drawings production, unless directed otherwise by the Consultant.

.9 The consultant will NOT provide CADD disks of Contract Working drawings to aid the Contractor in the production of shop drawings.

.10 Any proposed deviations from the Contract Documents must be boldly indicated as such on the shop drawings. No acceptance shall be inferred or assumed otherwise.

.3 Registered Professional Engineer's Confirmation Letter

.1 For all sections of Work which require the Contractors or Subcontractor to provide professional engineering services, the Contractor's or Subcontractor's Registered Professional Engineer shall design and Engineer components for the project which the Contractor or Subcontractor Registered Professional Engineer is responsible for, and shall sign and seal on shop drawings and supporting documentation. The Contractor's or Subcontractor's Registered Professional Engineer shall review all fabrication and installation of such components. At completion of the Work, each of the Contractor's and/or Subcontractor's Registered Professional Engineer shall provide to the Consultant, a letter confirming that:

.a All Civil, structural, architectural, mechanical, electrical and other components are fabricated and erected in conformance with their design.

.b All components are capable of supporting all loads or capable of performance specified or indicated on the reviewed shop drawings,

.c All changes to the contract documents have been reviewed and are acceptable.

.d All components have been designed, fabricated and installed to substantially comply with the applicable requirements of the Alberta Building Code2014 and the National Building Code of Canada 2015.

.e All components have been designed and installed to conform with the seismic restraint requirements of the Alberta Building Code 2014 and the National Building Code of Canada 2015.

.f The fabrication and installation of such components has been reviewed and accepted by the Contractor's and/or Subcontractor's Registered Professional Engineers.

.g All components are fabricated and erected in accordance with the reviewed shop drawings.

.4 Samples

.1 Submit for review samples as requested in the respective specification sections.

.2 Deliver samples prepaid to Consultant's business address.

.3 Do not undertake any Work until samples have been reviewed and accepted by the Consultant. The accepted Samples will become the minimum standard acceptable.

.5 Operation and Maintenance Manuals

.1 Two weeks prior to Substantial Performance of the Work, submit to the Consultant, three (3) copies of Operation and maintenance manuals.

.2 Bind contents in a three-ring, hard covered, plastic jacketed binder. Organize contents into applicable categories of work, parallel to specification sections. Upgrade to meet mechanical and electrical specification requirements where applicable. Bind data as follows:

.a Bind data in vinyl hard covered, three ring loose-leaf binders for 215 mm x 250 mm size paper.

.b Enclose title sheet, labelled "Operation and Maintenance Manual", project name, date and list of contents.

.c Label binder face and spine with Project title, date, Project locations, manual title and volume number with printed Non-removable labels or silk screened lettering

.d Organize contents into applicable Sections of work to parallel project specification breakdown. Identify each Section by labelled tabs protected by celluloid covers fastened to hard paper dividing sheets.

.e Provide three sets of binders for Divisions 0 to 14, three sets of binders for Divisions 20 to 25 and three sets of binders for Division 26 to 50.

.3 Include in the Architectural manuals the following information, together with the data specified in each Section:

.a Manufacturer's maintenance guides, parts lists and name and address of

nearest vendor of parts and any special tools required for maintenance of building components with movable parts.

.b Copy of installed hardware schedule.

.c List of materials installed giving manufacturer's name and manufacturer's code name for products.

.d Names, addresses and phone numbers of subcontractor's and suppliers.

.e Copy if all guarantees and warranties issued.

.f Copy of all reviewed shop drawings with all data concerning changes made during construction. (Only one set of Reviewed shop drawings required - install in one manual only or in a 4th binder specifically title shop drawings).

.g Where contents of manual included in this installation and delete, or otherwise clearly indicate, all manufacturer's Data with which this installation is not concerned.

.4 Manuals to contain operational information on equipment, cleaning and lubrication schedules, filters, overhaul, and Adjustment schedules and similar maintenance manuals. Provide schematic drawings for all equipment and components.

.5 Where there is a conflict between this Section and Mechanical and Electrical Sections, allow for the more expensive Method.

.6 Provide temporary instruction for any piece of equipment, which is in use during the construction period.

.7 Final payments will not be released prior to receipt of the Operation and Maintenance Manuals.

.6 Record Drawings

.1 After award of the Contract, the Consultant will provide a set of opaque drawings for the purpose of maintaining Record drawings and to be maintained on site. Accurately and neatly record deviations from Contract Documents Caused by site conditions, clarification details or drawings and changes ordered and other forms of written Modification issued by the Consultant. Update on a daily basis.

.2 Record all changes in red using suitable notation and ensure revisions to elevations and location of all concealed components including, foundations, mechanical and electrical services are detailed. Indicate all changes made by Change Order or Supplementary Instruction.

.3 Refer to Division 15 and 16 for specific Mechanical and Electrical requirements regarding preparation and submission of final Project Record Drawings.

.4 Identify drawings as "Project Record Copy". Maintain in new condition and make available at all times for review on site by Consultant.

.5 On completion of Work and prior to final review, submit clearly marked up printed record documents to prime consultants. Also, print one complete set of clearly marked up printed record drawings for the Owner.

.7 Progress Photographs

.1 Provide a competent photographer to take all photographs.

.2 Upon commencement of Work and at weekly intervals thereafter, supply the Consultant with digital copies in JPEG format of three (3) different view photographs of each building elevation, numerous details/finishes photos, interior elevations and the like as required to clearly indicate progress of all parts of the Work.

.3 Label each photo file with the project name, date, and location of exposure.

.4 Submit progress photographs with monthly application for payment.

.5 On completion of work, provide 4 thumbdrives with copies of all the photographs taken during Construction and final completion. Take photographs in colour; minimum 5 mega pixels.

.6 One copy of the submitted photographs disc will be retained by the consultant and one copy forwarded to the Owner, one copy will be forwarded to Parks Canada, and one copy will be sent to Canadian Heritage.

.8 Analysis of Contract Sum

.1 Within two (2) weeks after Contract award, furnish for review by the Consultant a detailed breakdown of the contract Sum, the total aggregating the amount of Bid. When accepted, this analysis will become the basis for contractor's breakdown of application for payment.

.2 This initial breakdown must be more comprehensive than the one used for payment application.

.9 Materials List

.1 Furnish a detailed list of materials and equipment, and names of suppliers within 10 working days of Contract award.

.10 Standard Forms

.1 Standard form 1943 Request for Payment will be used for progress claims. Requests will also require a WCB form and Statutory Declaration to be included.

.11 Mock-ups

.1 Provide mock-ups for items as requested in the individual specification Sections.

.2 Construct sample areas at location designated by the Consultant.

.3 Sample installations must indicate materials, patterns, joints, colours, shades, installation methods and level of workmanship.

.4 Adjust sample installations as required to conform to the referenced standards, the drawings, and this specification, and to gain acceptance by the Consultant, at no additional cost to the Owner.

.5 Accepted sample installations will become the standard for the project and may be incorporated into the Work. Any work which does not match the accepted mock-ups will be rejected and replaced to match accepted mock-ups.

1.16. SCHEDULES

.1 Schedules Required

.1 Provide a construction progress schedule.

.2 Inform the Owner immediately if schedule cannot be met.

.3 Provide a Submittal Schedule for Shop Drawings, Product Data and Samples.

.4 Indicate date of Substantial Performance of the Work as specified in the Stipulated Price Bid Form.

.2 Format

.1 Prepare schedule in form of a horizontal bar chart.

.2 Provide separate bar chart for each trade or operation.

.3 Provide horizontal time scale identifying the first workday of each week.

.4 Format for listings: The chronological order of the start of each item of work.

.5 Identification of listings: by systems description.

.3 Submission

.1 Submit initial schedules within 15 days after award of Contract.

.2 Submit monthly progress claim schedule to the Owner at the time of first progress claim.

.3 Submit one opaque reproduction, plus 2 copies to be retained by the Consultant.

.4 Consultant will review schedule and return reviewed copy within 10 days after receipt.

.5 If the Contractor's schedule indicates a change to the conditions of the Contract, the change(s) will be accepted only after it has been accepted by the Owner in accordance with the General Conditions of the Contract.

.6 Resubmit finalized schedule within 6 days after return of reviewed copy.

.7 Distribute copies of the revised schedule to:

.a Job site office.

.b Subcontractors.

.c Other concerned parties.

1.17. QUALITY CONTROL

.1 Reviews

.1 Provide the Owner and the Consultant with access to the Work.

.2 Give Owner and Consultant minimum 48 hours' notice requesting review of Work is designated for special tests, reviews or acceptances by the Consultant's instructions, or the law of the place of Work.

.3 If the Contractor covers or permits to be covered, Work that has been designated for special tests, reviews or acceptances before such is made, especially mechanical and

electrical work in concealed spaces, uncover such Work, have the reviews or tests satisfactorily completed, and make good such Work.

.2 Codes and Standards

.1 Perform work in accordance with the National Building Code (NBC 2015), Workers' Compensation Board of Alberta, and all other codes and regulations of Parks Canada, Provincial, and/or local application provided that any case of conflict or discrepancy, the more stringent requirement shall apply.

.2 Meet or exceed requirements of specifies standards, codes and documents.

.3 Independent Inspection Agencies – If required

.1 The Owner will engage an Independent Inspection and testing agencies for the purpose of inspecting and testing portions of the Work. Costs of such services will be borne by the Owner.

.2 Equipment required for executing inspection and testing will be provided by appointed agencies.

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

.4 The Contractor will pay for the following testing and inspection services:

.a Inspection and testing required by law, ordinances, rules, regulations or orders of public authorities.

.b Inspection and testing performed exclusively for the Contractor's convenience.

.c Mill tests and certificates of compliance.

.d Test specified to be carried out by the Contractor under the supervision of the Consultant.

.e Testing adjustment and balancing of mechanical and electrical equipment and systems.

.f After rectification, re-testing of work found deficient by previous tests.

.4 Reports

.1 Submit one electronic copy of inspection and test reports, including reports from independent testing agency, promptly to the Consultant.

.2 Provide copies to:

.a Subcontractor of work being inspected or tested.

.b Manufacture or fabricator of material being inspected or tested.

.5 Remedial Work

.1 Perform all remedial work required as a result of deficiencies or work which does not meet the Contract documents, at no cost to the Owner. Additional tests required to ascertain if remedial work complies with contract documents will be borne by the Contractor.

1.18. CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS.

.1 Installation and Removal

.1 Provide construction facilities and temporary controls in order to execute the work expeditiously.

.2 Remove from site all such work after use.

.2 Guard Rails and Barricades

.1 Provide rigid guard railings and barricades as required by authority having jurisdiction.

.2 Neatly assemble and firmly brace.

.3 Maintain as required during construction period.

.4 Remove barriers prior to completion and final acceptance. Patch and repair surfaces to original condition damaged by erection of barriers.

.3 Weather Enclosures

.1 Provide weather tight closures to unfinished door and window openings, top 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 area for temporary heat.

.4 Site Storage and Overloading

.1 Confine the work and the operations of employees to limits indicated by the Contract Documents. Do not unreasonably encumber the premises with Products.

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

.3 Every temporary support shall be as strong as the permanent support.

.4 Do not place loads on concrete floors until they have obtained their permanent set and the Consultant's Authorization has been received.

.5 Public Traffic Flow

.1 Provide and maintain flag persons, traffic signals, barricades and flares/lights/lanterns as required to perform the Work and protect the public.

.2 Maintain access to all portions of the site for fire fighting equipment to the satisfaction of the local Fire Department and the Owner's representative.

.6 Sanitary Facilities

.1 Provide sufficient portable sanitary facilities during the construction period for workers, in accordance with local health authorities.

.2 Maintain in clean condition.

.3 Provide separate facilities, as required, for men and women, appropriately identified.

.7 Equipment/Tool/Materials Storage

.1 Provide and maintain, in a clean and orderly condition, lockable weatherproof sheds suitable for storage of tools, Equipment and materials and to protect from weather or

construction,

.2 Locate Materials required to be stored on site in a manner to cause the least interference with work activities, in an area designated by the Owner and screened from public view.

.8 Fuelled and Gas Welding Machines and Air Compressors

.1 Each respective user of fuelled or gas welding machines or air compressors is responsible for such equipment.

.2 Ensure apparatus is not open to physical damage and extremes of heat and is securely anchored.

.9 Construction Signage

.1 No signs or advertisements, other than warning signs shall be exhibited on site without permission of Owner.

.2 Safety and Instruction Signs and Notices:

.a Signs and Notices for safety and instruction including graphic symbols shall conform to CAN3-Z321.

.b Maintenance and Disposal of Site Signs:

.c Maintain approved signs and notices in good condition for duration of project, and dispose of off-site on completion of project or earlier if directed by Consultant.

.10 Offices

.1 Provide and maintain, in a clean and orderly condition, during progress or Work, adequately lighted, heated and ventilated lockable temporary office shed or trailer. Permit the Consultant and Owner to use these facilities.

.2 Office to be a minimum of 10 m2 in area, equipped with a desk, telephone, 2 chairs, filing cabinet, layout table and plan hanging files.

.3 Provide Contractor's offices with space for filing and layout of Contract Documents and Contractor's normal site office staff. Provide meeting room of adequate size to hold all required meetings.

.4 Provide adequate required first aid facilities as required by the Authority having jurisdiction.

.5 Subcontractors may provide their own offices as necessary. Direct the location of these offices within the hoarded area.

.11 Security

.1 Assume full responsibility for any losses or damages to materials, fixtures or equipment whether due to failure to properly secure the work site or for any other reason whatsoever.

.2 Ensure that access locations in hoarding to the work site are securely locked after working hours and during holidays and that equipment and machinery, within the work site hoarding area, is properly locked or otherwise rendered inoperable to any unauthorized individuals.

.12 Protection

.1 Carefully maintain existing benchmarks, monuments and other survey control references.

.2 Take precautions at all times to protect persons, including the public, Contractor's employees, Subcontractor's and their employees, and property affected in any way by the work. Especially guard against or eliminate hazardous Conditions.

.3 Protect work and materials from damage due to building operation, from action of the elements, from carelessness of contractor's employees or subcontractors and their employees, from vandalism and from any other cause until completion and the Owner's acceptance of the work.

.4 Secure covers for openings into ducts, piping, fixtures and appliances both before and after setting into place to prevent obstruction breakage and disfigurement.

.5 Protect Work against possible damage from:

.a Ground water and rain water

.b Snow, ice and frost. Remove snow, ice and frost where necessary for efficient progress.

.c Climatic and weather conditions.

.d Fire.

.6 Be responsible for damage incurred, and remove and replace with new Work at no extra cost to the Owner.

.7 Protect adjacent roads and private property from damage during construction.

.13 Protection of Building Finishes and Equipment

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

.2 Provide all necessary screens, covers, and hoardings as required.

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

.14 Special Controls

.1 Where the performance of work requires the presence of the Contractor's personnel on government premises, the Contractor shall ensure that its personnel shall comply with the policy of the Government of Canada which prohibits smoking on any government premises.

.2 The entire site, including meeting areas are be designated as "NO SMOKING" zones. "Smoking" includes the use of any forms of tobacco or cannabis, as well as vaping and/or any other e-cigarette type device.

.3 As this is a heavily used tourist area, the General Contractor will need to coordinate and receive approvals from the Owner, Waterton Parks Staff, and Consultant in advance of performing any work creating unusual noise, smells, or other disturbances.

.4 Follow and comply with all requirements and regulations of the National Parks, Parks Canada, and Waterton Nation Park Authorities. Pay special attention to Watercourse

protection, Wildlife interaction, and Vegetation and Soil management.

.15 Project Cleanliness

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

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

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

.4 Store waste materials within the confines of the site hoarding in lidded metal waste bins for commercial use. Waste to be source separated and disposed of as follows:

.a Sorted Materials

.b Cardboard

.c Unsorted Waste

.d Hazardous Waste.

1.19. MATERIALS AND EQUIPMENT

.1 Minimum Standard

.1 Perform work in accordance with the standards set forth in the National Building Code 2015.

.2 Where a material or item is required to conform to standards set out in a standard specification such as a CSA or ASTM or CGSB or NBC and the like, obtain assurance from supplier, in writing, (including trade literature), that its product conforms.

.3 All standard specifications shall be the latest issue, except when a year date is indicated.

.4 Upon request supply the Consultant with satisfactory evidence that material complies with Standard Specification or test requirements.

.2 Product and Material Quality

.1 Products, materials equipment and articles (referred to as Products throughout the Specifications) incorporated in the work will be new, not damaged or defective and of the best quality (compatible with specifications) for the purpose intended. If requested, furnish evidence as to type, source and quality of Products.

.2 Defective Products will be rejected, regardless of previous reviews. Review does not relieve responsibility, but is a precaution against oversight or error. Remove and replace defective Products at own expense and be responsible for delays and expenses caused by rejection.

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

.4 The flame spread rating of floor, wall, and ceiling finishes including glazing shall conform to the Building Code.

.3 Availability of Products

.1 Immediately upon signing of major subcontracts review product and delivery requirements and anticipate foreseeable supply delays for any items. If delays in supply of materials, equipment or articles are foreseeable, notify the Consultant of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance or Work. Submit proof of immediate ordering materials to ensure delivery so as not to delay construction schedule.

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

.4 Substitutions

.1 For products specified only by reference to standards use any product, which meets the standard, made by any manufacturer.

.2 For products specified by naming several products or manufacturers use any product named.

.3 For products specified by naming one product there is no option unless the Consultant has accepted an alternative product in writing 10 working days prior to bid closing.

.4 For acceptance of products other than those specified, submit a request in writing. Clearly define and describe the product for which acceptance is requested. Accompany requests with manufacturer's literature, specifications, drawings, cuts, performance date, or other information necessary to completely describe them. Acceptance by the Consultant will be in the form of written acceptance of the alternative. Clearly indicate the amount of credit, or the additional cost involved, so that adjustment to the contract can be made.

.5 With requests for substitution include:

.a Complete data substantiating compliance of the proposed substitute with contract requirements.

.b For products: product identification, including manufacturer's name and address; manufacturer's literature, including product description, performance and test data, reference standards, and limitations; samples, if appearance is relevant; names and addresses of similar projects where the product has been used.

.c For construction methods: detailed description of the proposed method, and drawings illustrating it.

.d Itemized comparison of proposed substitution with product or method specified.

.e Data relating to changed in schedule.

.f Quotation for change in contract sum is substitution is approved.

.g In making a request for substitution the Contractor represents that he has personally investigated the proposal and determined that it is equal or

superior to the product or method specified; that the same guarantee will be furnished for the substitute as for the original; that he will co-ordinate installation of the accepted substitute into the work, making such changes in the work as may be required to accommodate the change; that he waives all claims for additional compensation for costs which subsequently become apparent arising out of the substitution; and that the quotation is complete and includes all related costs under this contract.

.h Substitutions will not be considered which are implicit in submitted shop drawings or samples rather than formally presented proposals as described above.

.i Substitutions will not be considered which require substantial changes in the Contract Documents.

.6 Proposals will be considered by the Consultant only if products selected from those specified are not available, or if delivery date of products selected from those specified, which are brought to the attention of and considered by the Consultant as equivalent to those specified and will result in a credit to the Contract amount.

.7 Advise the Consultant of all adjustments and changes necessary in the work to accommodate the substitution. The decisions of the Consultant as to whether the substitution proposed is acceptable are final. The proposed substitutions must meet or exceed the specified product.

.8 If no substitution is requested, and if no provisions to the contrary have been made in the Contract, for the item in question, provide the item named in these specifications.

.9 Should the proposed substitution be accepted either in part or in whole, assume the responsibility when the substitution affects the work of any other section of the specifications. Pay for any drawing changes required as a result of the substitution, and all costs for changes to the Work resulting from the substitution.

.10 Any and all credits arising from the use of substitutions will be credited to the contract in such amounts as may be determined by the Consultant and the Contract Price will be adjusted. No substitutions will be permitted without the prior written permission of the Consultant.

.11 All substitution acceptances of products shall include acceptability of the Alberta Building Code, and/or the National Building Code if required.

.5 Storage, Handling and Protection

.1 Handle and store products in a manner to prevent damage, at alteration, 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 seals and labels intact.

.3 Adequately and continuously protect items having high-class factory finish such as baked enamel, porcelain, enamel or polished metal, from scratches or other damage, while in transit, during installation and until completion of the contract.

.4 Schedule deliveries to avoid interference and delays in Work. Provide for continuity of supply to avoid change of supplier or materials during all phases of Work.

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

.6 Manufacturer's Instructions

.1 Unless otherwise indicated in the 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 the manufacturers.

.2 Interpret recommended practices as directives and change the word "should" to "shall".

.3 Notify the Consultant in writing, of conflicts between the specifications and manufactures instructions, so that the consultant may establish the course of action.

.4 Improper installation or erection of Products, due to failure in complying with these requirements, authorizes the Consultant to require removal and re-installation at no increase in Contract Price.

.7 Workmanship

.1 Provide the best quality workmanship, executed by workers experienced and skilled in the respective duties for which they are employed. Immediately notify the Consultant if required Work is such as to make it impractical to produce required results.

.2 Do not employ any unfit person or anyone unskilled in their required duties.

.3 Decisions as to the quality or fitness of workmanship in cases of dispute rest solely with the Consultant, whose decision is final.

.8 Concealment

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

.2 Before installation, inform the Consultant if there is a contradictory situation. Install as directed by the Consultant.

.9 Sleeves, Anchors, Hangers and Supports

.1 Provide and set sleeves where conduits pass through masonry or concrete.

.2 Hanger wires, rods, brackets, bolts, inserts and other connections shall not pierce concrete slabs except as authorized by the Consultant. Methods of fixing shall be submitted to the Consultant for acceptance, prior to commencement of operation.

.3 All system pipe, conduit and equipment anchors, hangers and support systems and connections to building structure are the Contractors' responsibility and shall be designed by a Professional Engineer registered in the Province of Alberta. Make engineering design notes available to the Consultant upon request.

.10 Roughing-In

.1 Be responsible for obtaining manufacturer's literature and for correct roughing-in and hook-up of all equipment, fixtures and appliances as required.

.11 Field Marketing

.1 Do not use wick pen to mark face of products to be installed in the Work. Such pen marks will show through applied paint or vinyl coatings and the like, in due course. The

Subcontractor shall be held responsible and will be required to remedy such defects, classified as “latent defects” regardless of when they occur.

.12 Trademarks and Labels

.1 Trademarks and labels, including applied labels, shall not be visible in the finished Work. Such trademarks or labels shall be removed by grinding if necessary, or painted out where the particular material has been painted.

.2 The exception of this requirement shall be those essential to obtain identification of Mechanical and Electrical equipment, and those required to be visible by authorities having jurisdiction such as ULC labels on doors and frames, and those on plumbing fixtures and trim.

1.20. SAFETY

.1 Fire Fighting Equipment

.1 Provide adequate fire extinguishers on the premises during the course of construction of the types and sizes recommended by the authority having jurisdiction for control of fires resulting from particular work being performed. Instruct workers in their use.

.2 Place all extinguishers in the immediate vicinity of the work being performed ready for instant use.

.3 In the use of especially hazardous types of equipment such as torches and welding equipment, do not commence work or use equipment unless fire extinguishers of an approved type and capacity are placed in working area and are available for immediate use by the workers using the above mentioned equipment.

.4 Observe all regulations of the local fire department and take all necessary precautions to prevent fires.

.5 Maintain all fire extinguishers in good condition. If used, immediately recharge or replace.

.6 During the full time of Construction, maintain free unobstructed access to all parts of the building for Regional fire department equipment and maintain levels of safety and to the satisfaction of the Fire Marshall.

.2 Safety Requirements

.1 Adhere to all Occupational Health and Safety Act regulations for the safety of the public and of workers at all times.

.2 For the purposes of this Act, the Contractor shall be deemed to be the “Prime Contractor” and shall post appropriate notice on the site as required.

.3 Follow any directives from the Workers’ Compensation Board and provide any safeguards required.

.4 Post all necessary danger signs.

.5 Whenever workmen leave the job after using hazardous equipment, make a thorough check to ensure that there is not a possibility of fire resulting from the Work.

.6 Maintain on site five (5) sets of CSA approved construction safety hats, boots and

glasses for use of any authorized visitor to site.

.7 Incorporate the W.H.I.M.I.S (workplace hazardous material information system) and instruct all personnel handling, using and installing hazardous materials, in the proper and safe use of these materials. Hazardous materials are to be handled and used only by personnel trained and knowledgeable in their use and handling.

1.21. PROJECT CLOSEOUT

.1 Inspection and Declaration

.1 Notify Owner and Architect in writing of satisfactory completion of Contractor's Inspection and that corrections have been made for each phase.

.2 Owner and Architect Inspection: Architect and Contractor will perform inspection of Work to identify obvious defects or deficiencies. Contractor to correct Work accordingly for each phase.

.3 Completion: submit written certificate that following have been performed for each phase:

.1 Work has been completed and inspected for compliance with Contract Documents.

.2 Defects have been corrected and deficiencies have been completed.

.3 Equipment and systems have been tested, adjusted and balanced and are fully operational.

.4 Certificates required by Fire Commissioner have been submitted.

.5 Operation of systems have been demonstrated to Owner's personnel.

.6 Work is complete and ready for final inspection.

.4 Final Inspection: when items noted above are completed, request final inspection of Work by Owner and Architect and Contractor. If Work is deemed incomplete by Owner and Architect complete outstanding items and request a reinspection.

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

.6 Final Payment: when Architect considers final deficiencies and defects have been corrected and it appears requirements of Contract have been totally performed, make application for final payment. If Work is deemed incomplete by Owner and Architect, complete outstanding items and request a reinspection.

.2 Adjustment and Clean-Up

.1 The Contractor is responsible for maintaining of discipline and general orderliness.

.2 Continuously daily cleanup equivalent to at least broom-cleaning throughout the performance of Work within the existing building boundaries including manual cleanup of waste products and debris outside the building area or on neighbouring streets. Any mud, debris etc. must be cleaned from the roadway immediately. Materials must be secured at all times and any such items disturbed from the storage location must be retrieved immediately. Materials must not be allowed to enter the public spaces or to

enter the nearby water bodies.

.3 When the Work is Substantially Performed, remove surplus products, tools, constructions machinery and equipment not required for the performance of the remaining Work and leave the Work reasonably clean and acceptable for work of following Sections. Commencement of Work of any trade constitutes acceptance of conditions as being satisfactory for Work of subsequent trade. In cases of dispute, the Owner may remove the rubbish and charge the cost to the Contractor.

.4 Provide collection containers for removal of debris and deposit waste products and debris daily into the collection container. The location of collection container to be specified by the Owner.

.5 Remove waste materials and debris from the site at regularly scheduled times or dispose of as directed by the Owner or Consultant. All waste is to be stored and handled with the National Park Garbage Regulations.

.6 Clean up combustible debris at end of every workday and remove from site.

.7 Burning or burying of rubbish and waste materials within park boundaries, or on-site is strictly prohibited.

.8 Break up all large crates, carton etc., before placing them into the containers, arrange for the removal of all such waste materials placed in the collection containers.

.9 Do not dispose of wastes or volatile materials, such as mineral spirits, oil or paint thinner into waterways, storm or sanitary sewers, ponds or ditches.

.10 Conform with all applicable Parks Canada, environmental laws, regulations and ordinances.

.11 Handle, store and dispose of all hazardous wastes in compliance with authorities having jurisdiction.

.12 Leave the work broom clean before the review process commences.

.13 Restore all existing areas and site work damaged or disturbed due to earthwork or other work of this Contract, back to their original condition and to finish grades indicated on Drawings.

.3 Final Cleaning

.1 Adjust touch-up and repair all operating doors sash, hardware and equipment, leave all in perfect working order, cleaned and polished.

.2 Examine and clean all plumbing and electrical fixtures to produce intended appearance and function.

.3 Wash and dry all glazed walls.

.4 Clean and polish glass mirrors, hardware, stainless steel, chrome, porcelain, enamel, baked enamel, mechanical and electrical fixtures. Replace broken, scratched or disfigured glass at no extra to the Contract sum if the damage occurred during the course of the Construction Contract.

.5 Broom clean and wash exterior walks, steps and surfaces, soiled due to Work of this Contract, including all public areas.

.6 Remove dirt and other disfigurations from exterior surfaces.

.4 Systems Demonstrations

.1 Prior to final review, demonstrate operation of each system to the Owner's maintenance staff.

.2 Instruct personnel in operation, adjustment, and maintenance of equipment and systems, using provided operation and maintenance data as the basis for instruction.

.5 Documents

.1 During the progress of the work, together with the Mechanical and Electrical trades, keep on the site at all times, a complete and separate set of black line prints and note thereon clearly in RED ink, neatly, accurately and promptly, all Architectural, Mechanical and Electrical changes, revisions and additions to the work and deviations from the Contract Documents. Accurate locations, depth, size and type of outside underground utilities are to be included in these record drawings. Drawings are to be presented at each job meeting.

.2 Upon completion of work: The contractor shall obtain and pay for a computer disk(s) containing all PDF files of drawings and specifications which are to clearly indicate in RED all changes and deviations made during the work, as recorded on the record drawings.

.6 Materials and Finishes

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

.7 Warranties and Bonds

Assemble maintenance and warranty information in binder and submit upon acceptance of work. 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 Owner's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.

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

i. Name of item.

ii. Model and serial numbers.

iii. Location where installed.

iv. Name and phone numbers of manufacturers or suppliers.

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

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

vii. Cross-reference to warranty certificates as applicable.

viii. Starting point and duration of warranty period.

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

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

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

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

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

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

.11 Written verification will follow oral instructions. Failure to respond will be cause for the Owner and Architect to proceed with action against Contractor.

END OF SECTION

SUMMARY OF WORK

1.1. INTERPRETATION

.1 Give descriptions given in this section the widest of possible interpretations with regard to what is included in the Contract, to the extent that the work in question is required by the Contract Documents, and the narrowest of possible interpretations with regard to what is excluded from the contract.

.2 Do not construe inclusion of specific items in the Work as limiting the generality of other statements of what is included.

.3 Do not construe exclusion of specific items from the Work as implying the exclusion of other items not specifically mentioned.

1.2. WORK COVERED BY THIS CONTRACT

.1 DESCRIPTION:

.1 Work under this Contract covers the rehabilitation of Historic Government of Canada Buildings. The work to the buildings will consist of work to the Main Building and the Out-Building as located on drawing A2-1. The work includes: selective demolition and the restoration of internal finishes; the addition of new mechanical equipment; re-plumbing and re-wiring of both buildings.

.2 As these are a historic buildings, care will need to be taken in the removal and refinishing of historic materials and finishes. Significant experience and skill in the restoration of wood floors and wood trims, and plaster walls and ceilings is required.

1.3. CONTRACT TIME

.1 Time and all time limits stated in the Contract documents are of essence to the Contract. Perform all work expeditiously and with adequate forces to achieve total completion of work within contract time. A schedule will be required to be prepared and submitted to the Owner for acceptance.

.2 Completion of Work is assumed to mean completion of all deficiencies, all exterior work complete all hard and soft landscaping complete, removal of Contractor's temporary facilities and equipment. The owner intends to secure the building upon completion of the Work, and will not permit work deficiency correction to be carried out after occupancy.

1.4. REGULATORY REQUIREMENTS

.1 Comply with codes, ordinances, rules, regulations, order, and other legal requirements of public authorities which bear on the performance of the work. The contract documents do not create any release from compliance with the same.

1.5. NOTICES, LICENCES, AND CERTIFICATES

.1 Promptly submit written notice to the Consultant of observed variance of contract documents from legal requirements of the authorities having jurisdiction over site of operation and notices which relate to the Work, to the preservation of public health, and to construction safety. Make appropriate modifications to contract documents as required.

.2 The contractor shall obtain and pay for licences, certificates and approvals required by authorities having jurisdiction and the contract documents.

1.6. CONTRACTOR'S DUTIES

.1 Unless specifically noted otherwise in the specifications or the drawings, provide and pay for:
- .1 Labour, Materials and equipments.
- .2 Tools, construction equipment and machinery.
- .3 Water, heat, and utilities required for construction that are not agreed to and provided by existing services at the site.
- .4 Other facilities and services necessary for the proper execution of the completion of the work.
- .5 Provide a copy of all current insurance required, as specified in Section 00 21 13 Item 19.

.2 Pay legally required GST, Sales consumer and use taxes.

.3 Secure and pay for the following as necessary to ensure the proper execution and completion of the work.

- .1 Permits (except Development Permit and Building Permit).
- .2 Government Fees.
- .3 Licenses.
  - .a Any person, business, or corporation doing work in Waterton Lakes National Park must obtain a business license.

    For More information contact:
    Municipal Officer,
    Realty Services for Waterton Lakes National Park
    Phone: 403-859-5117
    Email: waterton.info@pc.gc.ca

.4 Obtain all "Certificates of Occupancy" and "Development Completion Certificate" or "Certificate of Approval" such as may be issued by the building, plumbing, electrical, or zoning etc. departments or by any other inspection authorities having jurisdiction over the site.

.5 Give required notices.

.6 Coordinate the whole of the Contract work to provide a complete project.

.7 Keep on the job during working hours as large a force of labour as can be used with efficiency and with due regard to both speed in completion of the work and economy in the execution

thereof.

.8 Enforce strict discipline and good order among employees. Do not employ on the work anyone not skilled in the work assigned to him. On order of the Consultant, the Contractor shall discharge from the work any person or Persons who may appear in the opinion of the Consultant to be incompetent or act in an improper manner.

1.7. CONTRACTOR'S USE OF PREMISES

.1 The General Contractor will have limited use of the full site and unlimited use of the work area until Completion of the Project. On-site material storage and laydown areas will need to be coordinated with the Owner and will be required to be screened from the general public. The entire site must be maintained and presentable at all times.

.2 As this is a heavily used tourist area, the General Contractor will need to coordinate and receive approvals from the Owner, Waterton Parks Staff, and Consultant in advance of performing any work creating unusual noise, smells, or other disturbances.

.3 The Contractor shall assume full care, custody and control of premises assigned to him for performance of the Work, including responsibility for making good any damage to existing property attributable to performance of the Work.

.4 Assume full responsibility for protection and safekeeping of products under this Contract.

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

1.8. OWNER FURNISHED ITEMS (OWNER RESPONSIBILITIES)

.1 Arrange for delivery of shop drawings, product data, samples, manufacturer's instructions, and certificates to Contractor.

.2 Deliver suppliers bill of materials to the contractor.

.3 Arrange and pay for delivery to site in accordance with Progress schedule.

.4 Inspect deliveries jointly with Contractor.

.5 Submit claims for transportation damage.

.6 Arrange for replacement of damaged, defective, or missing items.

.7 Arrange for manufacturer's field services; arrange for and deliver manufacturer's warranties and bonds to Contractor.

1.9. OWNER FURNISHED ITEMS (CONTRACTOR RESPONSIBILITIES)

.1 Designate submittals and delivery date for each product in progress schedule.

.2 Review shop drawings, product data, samples and other submittals. Submit to Consultant notification of any observed discrepancies or problems anticipated due to non-conformance with Contract Documents.

.3 Receive and unload products at site.

.4 Inspect deliveries jointly with Owner, record shortages, and damaged or defective items.

.5 Handle products at site, including uncrating and storage.

.6 Protect products from damage, and from exposure to elements.

.7 Assemble, install, connect, adjust, and finish products.

.8 Provide installation inspections required by public authorities.

.9 Repair or replace items damaged by Contractor or Subcontractor on site (under his control).

END OF SECTION

1. ALTERNATIVE MATERIALS AND PROCEDURES

1. If, for any reason, the Bidder should propose to use different materials, equipment or methods which, in the Bidder's opinion, would improve the operation of the installation specified, the Bidder shall:

    (a) base the Bid on the exact requirements of the Bid Documents; and

    (b) submit with the Bid a proposal, in the prescribed following form;

        i. Person and Company the request is from, with contact information,

        ii. Date of Request,

        iii. Project Name,

        iv. Relevant Specification Section Number and Name,

        v. Description in full detail the different materials, equipment or methods which the Bidder is proposing,

        vi. The Bidder's reasons for such deviation from the requirements of the Bid Documents,

        vii. A comparison between the specified materials, equipment or methods and the proposed materials, equipment or methods listing all major differences,

        viii. Any increase or decrease applicable to the Bidder's price or completion time resulting from the alternative proposal,

        ix. A listing of 5 projects where the bidder has successfully utilized the different materials, equipment or methods, with contact information for each project. Projects referenced shall be of similar nature and scope to the project where the alternative materials, equipment or methods is being requested.

2. The Bidder agrees that the use of alternatives will not affect the Bidder's base bid amount and that the Bidder will be responsible for any cost charges relating thereto, as all alternatives may be deemed inappropriate, but that the Owner may consider the Bidder's alternative proposal and indicate at the time of the acceptance of a Bid, whether or not the alternative proposal is acceptable to the Owner.

3. The Owner reserves the right, in its sole discretion, to accept or reject any or all substitutions and alternatives.

4. Documentation requested in (1b) may be sent to the Architect no later than 10 business days prior to Tender Close for review. An addendum may be issued to include the requested different materials, equipment or methods which the Bidder is proposing, however there is no guarantee that the submission will be reviewed prior to Tender Close and the bidder should submit the documentation requested in (1b) with their bid as directed.

5. A sample submission form is available. Bidders may utilize the sample submission form or submit documentation of their own, so long as all the requested information is present.

END OF SECTION

From:	
Company:	
eMail:	

Date of Request:	
Phone:	
Fax:	

We respectfully ask for you to review this proposed alternative material, equipment, or method for the following project:

Project:	
Specification Section #:	
Section Name:	

Specified material, equipment, or method:

Proposed Alternative:

Reason for request:

Comparison between specified material, equipment, or method and proposed alternative:

Changes to Project: (increase or decrease)

Price:		**Project Time:**	

References:

	Project Name	Contact	eMail	Phone
1.				
2.				
3.				
4.				
5.				

Additional Comments:

Part 1 General

1.1 TOLERANCES FOR INSTALLATION OF WORK

.1 Unless acceptable tolerances are otherwise specified in a Section or a reference standard or are otherwise required for proper functioning of equipment, site services, and mechanical and electrical systems:

.1 "plumb and level" shall mean plumb or level within 3mm in 3048mm (1/8" in 10').

.2 "square" shall mean not in excess of 10 seconds lesser or greater than 90 degrees.

.3 "straight" shall mean within 3mm (1/8") under a 3048mm (10') long straight edge.

1.2 CONSTRUCTION REVIEW

.1 The Consultant and his sub-consultants may carry out construction review during the progress of the work. The Consultant's general review during construction, and inspection and testing by independent inspection and testing companies reporting to the Consultant, are both undertaken to inform the Owner of the Contractor's performance and shall in no way augment the Contractor's quality control or relieve him of contractual responsibility.

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

1.3 QUALITY CONTROL

.1 Bring to the attention of the Consultant any defects in the work or departures from the Contract Documents which may occur during construction. The Consultant will decide upon corrective action and state his recommendations in writing.

.2 The Consultant may appoint and direct inspection and testing companies to review completed work in addition to inspection and testing specified for inclusion in the work under Source and Field Quality Control in other Sections.

1.4 INSPECTION

.1 Allow Architect 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 Architect 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 Architect 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, Owner shall pay cost of examination and replacement.

1.5 **PROCEDURES**

.1 Notify appropriate agency and Architect 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.

.4 Where factual evidence exists that defective workmanship has occurred or that work has been carried out incorporating defective materials, the Consultant may have tests, inspections or surveys performed, analytical calculation of structural strength made, and the like, in order to help determine whether the work must be replaced. Testing, retesting, inspections or surveys carried out under these circumstances will be made at the Contractor's expense, regardless of their results, which may be such that, in the Consultant's opinion, the work may be acceptable.

1.6 **RESPONSIBILITIES OF THE CONTRACTOR**

.1 Inspection and testing performed by firms engaged for Source and Field Quality Control specified in other Sections shall not relieve the Contractor from responsibility of performing his work in accordance with the Contract Documents.

.2 Provide access for inspection and testing personnel to work in progress and to fabricator's operations.

.3 Provide samples of materials to be tested in required quantities at locations testing is performed.

.4 Provide labour and facilities:

.1 To facilitate inspections and tests.

.2 For storing of specimens at required temperature and free from vibration, in conformance with reference standard and inspection and testing company instructions.

.3 For obtaining, handling and transporting of samples at site and plant.

.5 Notify Consultant, and inspection and testing company at least 48 hours before work to be inspected and tested commences.

.6 When it is discovered on inspection that work is proceeding with incorrect materials or methods, ensure that corrections are immediately made and that improperly completed work is replaced.

.7 Inspect all work done by subtrades prior to application of final cover materials i.e. pressure plates, drywall ceilings, concrete slab pours and the like.

1.7 **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 Architect 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 Architect it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Owner 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 Owner and Architect.

1.8 **REPORTS**

.1 Submit 1 electronic copy of inspection and test reports to both the Owner and Architect.

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

1.9 **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 Architect and may be authorized as recoverable.

1.10 **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 acceptable to Architect and as specified in a specific Section of the project manual.

.3 Prepare mock-ups for Architect 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, Architect will assist in preparing schedule-fixing dates for preparation.

.6 Mock-up will remain as part of the Work and when acceptable to Owner and Architect.

END OF SECTION

1. General

1.1 RELATED SECTIONS

.1 Scheduling of work: Division 1.
.2 Submittals: Division 1.
.3 Temporary facilities: Division 1.

1.2 REFERENCE STANDARDS

.1 Unless otherwise specified, carry out demolition work in accordance with CSA S350-M1980, Code of Practice for Safety in Demolition of Structures.

1.3 EXISTING CONDITIONS

.1 Visit and examine the site and note all characteristics and irregularities affecting the work of this Section.

1.4 SUBMITTALS

.1 Where required by authorities having jurisdiction, submit for approval, drawings, diagrams, details and supporting data clearly showing sequence of demolition and removal work of building supporting structures and underpinning. Provide Owner with copy of such drawings.

.2 Drawings for structural elements shall be designed by and bear signature and stamp of qualified professional engineer registered in the Province of Alberta.

1.5 PROTECTION

.1 Prevent movement or settlement of adjacent work. Provide and place bracing or shoring and be responsible for safety and support of such work. Be liable for any such movement or settlement, and any damage or injury caused.

.2 Cease operations and notify Owner if safety of any adjacent work or structure appears to be endangered. Take all precautions to support the structure. Do not resume operations until reviewed with the Owner.

.3 Ensure safe passage of building occupants around area of demolition.

.4 Cease operations and notify Owner immediately for special protective and disposal instructions when any asbestos materials are uncovered during the work of this section.

.5 Prevailing weather conditions and weather forecasts shall be considered. Demolition work shall not proceed when weather conditions constitute a hazard to the workers and site.

.6 Prevent debris from blocking surface drainage inlets and mechanical and electrical systems which remain in operation.

.7 Temporarily suspended work that is without continuous supervision, shall be closed to prevent entrance of unauthorized persons.

1.6 TEMPORARY PARTITIONS

.1 Erect and maintain dustproof partitions, seal off ducts as required to prevent spread of dust and fumes to other parts of the building. On completion, remove partitions and make good surfaces to match adjacent surfaces.

1.7 SALVAGEABLE AND RECYCLABLE MATERIALS

.1 Except where otherwise specified, all materials indicated or specified to be permanently removed from the Place of the Work shall become Contractor's property. Maximize to the fullest extent possible, salvage and recycling of such materials, consistent with proper economy and expeditious performance of the Work.

.2 A current listing of recyclers specializing in specific categories of materials may be obtained from:

Alberta Environment
Recycling Branch
Phone: (403) 427-5838

2. Products

Not Used

3. Execution

3.1 MATERIALS TO BE REUSED

.1 Carefully remove, store and protect wooden features, trim, mouldings, light fixtures, and radiators so as to provide a reference for reconstruction of new items.

3.2 EXISTING SERVICES

.1 Disconnect all electrical and telephone service lines in the areas to be demolished. Post warning signs on all electrical lines and equipment which must remain energized to serve other areas during period of demolition. Disconnect electrical and telephone service lines in demolition areas to the requirements of local authority having jurisdiction.

.2 Disconnect and cap all mechanical services in accordance with requirements of local authority having jurisdiction. Natural gas supply lines shall be removed by the gas company or by a qualified tradesman in accordance with gas company instructions.

.3 Essential Services: Maintain all essential services.

.4 In each case notify the affected utility company in advance and obtain approval where required, before commencing with the work on main services.

3.3 DEMOLITION

.1 Remove from the site all materials indicated to be removed.

.2 Carry out demolition in a manner to minimize inconvenience to adjacent occupied space.

.3 Carry out demolition in an orderly and careful manner.

.4 Demolition by explosives or methods to initiate a "Rapid Progressive Failure" of any portion of a structure will not be permitted.

.5 Before commencing general demolition, separate by hand demolition, attached structures to remain from structure to be demolished.

.6 Sprinkle exterior debris with water to prevent dust. Do not cause flooding, contaminated runoff or icing. Do not allow waste material, rubbish, and windblown debris to reach and contaminate adjacent properties.

.7 Lower waste materials in a controlled manner; do not drop or throw materials from heights.

.8 Burning of materials on site is not permitted.

3.4 RESTORATION

.1 Restore to its original condition any portion of the building demolished unnecessarily, at no expense to the Owner.

.2 Immediately as the work progresses, repair all vibration and excavation damages to existing adjacent properties and active underground services.

.3 Walls of adjoining structures that were not exposed prior to demolition shall be adequately protected from all weather.

3.5 CLEAN-UP

.1 For clean-up during demolition and for final cleaning, comply with requirements of Division 1.

END OF SECTION

1. GENERAL

1.1 DESCRIPTION OF WORK

.1 Masonry Repointing.

1.2 EXISTING CONDITIONS

.1 The Masonry Contractor shall report to the Consultant all additional areas of deteriorated masonry not identified on the drawings which are revealed during the work, and shall await instruction regarding repair or replacement of brick units.

2. PRODUCTS

2.1 WATER

.1 Water shall be potable and free from contamination.

2.2 CEMENT

.1 Cement shall be white or normal Portland cement as required for colour match.

2.3 MORTAR

.1 Type N Mortar is approved. Colour is to match existing.

2.4 PIGMENT

.1 Pigments shall be dry, powered and inorganic pigments. (Approved manufacturer – Northern Pigment Ltd., Toronto or approved equal).

2.5 AGGREGATE

.1 The aggregate shall be well graded, washed sand, free of organic materials or coal soot; matching the texture and range of sizes found in the mortar to be matched.

2.6 ACCESSORIES

.1 Foam Rod: round closed cell foam, extruded polyethelene, Shore A hardness of 20 tensile strength 140 – 200 kPa, outsized 30 – 50%, compatible with sealant and primer, non-adhering to sealant.

3. EXECUTION

3.1 CEMENT GAUGING OF MORTARS

.1 All mortar must be used within two hours of gauging; do not retemper mortars after this time has elapsed. Coloured pointing mortar shall not be retempered.

.2 All batching is to be done with suitable containers of known volume to ensure standardization and conformity of measurement. Shovel measurement of materials is not permitted. Boxes shall be of such a size that a batch sufficient for one mixer load is measured out.

.3 Cement shall be added and mixed for about five minutes in mechanical mixer before use.

.4 The amount of water required shall be recorded and added at the start of mixing for future batches.

.5 All mixing boards and mechanical mixing machines must be cleaned between batches.

3.2 MIX FORMULAE

.1 Mix for very tight joints. Colour – Mortar-fine sand 1:2:3 or as recommended by manufacturer.

.2 Mix for all other joints 1/2/8-9 or as recommended by manufacturer.

.3 Masonry contractor to coordinate exact mix with Architect prior to repointing. Provide samples for approval.

3.3 COLOURING OF MORTARS

.1 A test patty of mortar must be prepared, accurately proportioned to represent the final mix formula and amount of pigment.

.2 The final colour of the test mortar must be determined only when it is dry in a joint.

.3 No more than 10% by volume of pigment shall be added to mortars.

.4 Once proportions are determined, careful control during mixing is vital to ensure quality control. A measuring box should be made to hold the specified amount of pigment for each mortar batch.

3.4 CUTTING-OUT OF DETERIORATED JOINTING

.1 All seriously deteriorated joints are to be cut out to the full height of the joint and to a minimum depth of twice the thickness.

.2 Seriously deteriorated joints are defined as having; loose or missing mortar; excessively soft mortar; powdery or crumbling mortar; cracks that weaken the bond between units; voids; or badly stained pointing.

.3 Metal fittings such as nails, brackets, clips and the like should be removed from wall areas as cutting-out proceeds.

.4 Sound adjacent joints are not to be cut out but left in their present state.

.5 If cutting-out with power saws is necessary, then the saw must be guided on a fixed straight edge and the operation is to be approved by the Consultant.

3.5 METHOD OF CUTTING-OUT

.1 All cutting-out is to be done by skilled craftsman under the direction of a competent mason experienced in this type of work.

.2 All cutting-out of joints is to be done with hammer and chisel, unless otherwise specified herein.

.3 Joints improperly repointed with hard cement mortars may be partially cut out with power saws and grinding wheels under the following conditions:

.1 All work is to be done under the direct supervision of the foreman.

.2 Power equipment may be used only to score one cut in each joint at the center of the joint; the cut is to be no more than one half the width of the joint, and cut to the full depth of the joint required.

.3 Final cutting-out of the joints is to be made with sharp bolsters, to detach the upper and lower fragments remaining. Do not clean out joints with power equipment. All finish work is to be done by hand. It is practically impossible to remove hard portland cement-based mortars from masonry by hand chiseling, but with care a satisfactory result can be achieved with mechanical cutting equipment as an aid.

.4 Great care must be taken so as not to damage masonry unity adjacent to joints.

.5 When cutting-out is completed in each area all joints are to be brushed clean of debris and the joints blown clean with medium-pressure compressed air.

3.6 LOOSE AND REPLACEMENT UNIT

.1 Loose brick units are to be carefully removed and reset in a full bed of mortar.

.2 The unit cavity is to be cleaned out of all loose material and washed with water to remove dust and pre-wet the adjacent material.

.3 Units are to be reset in a solidly and evenly filled bed of mortar.

.4 Units are to be set true and level matching exactly the existing bond pattern and coursing throughout.

.5 Head and bed joints are to be solidly packed with mortar.

.6 Replacement units are to match the original material in size, colour and texture.

3.7 REPOINTING

.1 Immediately before repointing operations commence, the area to be pointed is to be thoroughly flushed with water to remove all dust and to wet the surface well until suction is controlled and the surface stays wet.

.2 Pointing is to be built up in lifts not exceeding 6 mm in depth; each lift must be allowed to set before subsequent layers of mortar are applied.

.3 After the final layer of mortar is thumbprint hard the joint is to be tooled lightly to give the final required form. Do not overwork the face of the joint. Head joints must be tooled first.

.4 All masons are to use identical jointing tools.

.5 Joints are to be tooled behind the face of the masonry units to match the weathered joints.

.6 All excess mortar must be removed from the face of the masonry before it sets, and the jointing neatly finished to match existing.

4. MASONRY REPAIR

.1 Insert continuous foam rod in both sides of wall where possible, at locations noted on drawings. Install to depth suitable for mortar cover.

.2 Tool mortar to depth suitable for gypsum mix finish.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

1. Document, inventory, remove, restore, and reinstall selected decorative metal components as indicated.
   a. Photograph inventory all components prior to removal.
   b. Restoration treatment shall include solvent cleaning, degreasing of metal surfaces, and electroplating of decorative metal surfaces that were originally electroplated.
   c. Restoration treatment shall include solvent cleaning, degreasing/sanding of metal surfaces, and powder coating of decorative metal surfaces.
   d. ALTERNATE: Restoration treatment to include solvent cleaning of metal surfaces and coating with a protective finish (in lieu of electroplating).
2. Remove, restore and reinstall selected decorative metal light fixture components as indicated. Replace with owner supplied units where indicated.
   a. Restoration treatment to include solvent cleaning of metal surfaces and coating with a protective finish.

1.2 REFERENCES

ASTM B322-99 (2009) – Standard Guide for Cleaning Metals Prior to Electroplating/Powder Coating.

1.3 SUBMITTALS

1. Schedule of Decorative Metal: Submit a detailed schedule for all decorative metal components to be treated. Schedule shall identify component types, classify base metal or alloy, document existing conditions, and indicate proposed scope for restoration of each component and/or component part including cleaning processes and materials and methods to be used. Schedule shall also identify specific components or component parts that were originally nickel-plated.
2. Electroplating Procedure: Submit names and qualifications of electroplating subcontractor and submit samples of their work for review. Submit a detailed description of the process to be used for electroplating including preparation of metal surfaces, composition of plating materials, and final thickness of surface plating.
3. Powder Coating Procedure: Submit names and qualifications of powder coating subcontractor and submit samples of their work for review. Submit a detailed description of the process to be used for powder coating including preparation of metal surfaces, composition of coatings, and final thickness of surface powder coating.
4. Product Literature: Submit manufacturer's product literature for all proprietary products specified for decorative metal restoration and cleaning work such as solvents, detergents, etc. Product literature shall include specification data, Material Safety Data Sheets and instructions for storage, handling and use.
5. Samples: Submit samples of all miscellaneous components and component parts required for replacement of missing hardware. Replacement hardware to match existing.

1.4 QUALITY ASSURANCE

The Contractor and subcontractors shall have a minimum of ten years of experience in repair and restoration of decorative metal components. The Contractor shall have successfully completed at least three projects of similar scope within the previous five years.

1.5 MOCK-UPS

1. Specific decorative metal components to be used in mock-ups shall be selected by the Architect.
2. Prepare mock-ups of the following work:
   a. Solvent cleaning and degreasing of decorative metal surfaces.
   b. Electroplating on adequately cleaned and degreased metal surface.
   c. Powder Coating on adequately cleaned and degreased metal surface.
   d. Cleaning of hardware that is not to be electroplated.
   e. Wax coating on cleaned metal surfaces.
3. Mock-ups shall demonstrate the full range of restoration techniques required to complete the project. Identify materials and methods to be used for cleaning, coating and polishing for each type of decorative metal surface and condition.
4. More than one mock-up may be required to be acceptable for approval. Prepare at least three mock-ups of each type, if necessary, without further compensation. Approved mock-ups shall become part of the work and shall serve as the quality standard for all similar work.

1.6 DELIVERY, STORAGE AND HANDLING

1. Deliver restoration materials and proprietary products to the project site in the manufacturer's or distributor's packaging, undamaged, complete with installation instructions. Store fillers, putties and cements within the temperature range recommended by the manufacturer and away from direct sunlight.
2. Remove materials and components to be salvaged for treatment and reinstallation as carefully as possible to avoid damage to adjacent building components, materials, and finished surfaces.
3. Securely store materials to be re-used to prevent theft or damage to historic materials.
4. Label all door hardware components removed from individual frames and doors prior to storage with detailed information including door number and location and hardware type to facilitate reinstallation in proper place.
5. Label all light fixtures to be removed from the site with all necessary information including their room location to ensure reinstallation in the proper place.

1.7 PROJECT / SITE CONDITIONS

1. Coordinate work involving other trades so as not to delay the project schedule.
2. Protect existing adjacent materials during the execution of the work. Provide all necessary protection and work procedures to avoid damage to existing material assemblies not a part of the work of this Section.
3. Dispose of waste materials and other debris associated with the work of this Section in accordance with local, state and federal environmental regulations.

PART 2 - PRODUCTS

2.1 CLEANING MATERIALS

1. Mineral Spirits: Klean-Strip Odorless Mineral Spirits or approved comparable product.
2. Xylene: Klean-Strip Xylene (Xylol) or approved comparable product.
3. Non-ionic detergent: Surfonic JL-80X or approved comparable product.

4. Water: Distilled, free from dissolved minerals and other impurities.
5. Brushes: Natural fiber, non-metallic.
6. Cloths: Clean, soft, lint-free.

2.2 COATING MATERIALS

1. Electro Plating: Match composition and thickness of existing historic finishes.
2. Powder Coating: Match composition, colour, and thickness of existing historic finishes.
3. Microcrystalline wax: Renaissance Micro-Crystalline Wax Polish or approved comparable product.

PART 3 - EXECUTION

3.1 GENERAL

1. Review the extent of the decorative metal restoration work with the Architect on site prior to beginning operations. Notify the Architect of any conditions detrimental to the proper and timely completion of the work. Do not commence work until all unsatisfactory conditions have been adequately corrected and the documentation and inventory have been approved by the Architect.
2. Perform each cleaning, polishing, and coating method in a manner which results in uniform coverage of all surfaces, including corners, mouldings and interstices, and which produces an even effect without streaking or damage to decorative metal surfaces.

3.2 INVENTORY, PHOTOGRAPHIC DOCUMENTATION, AND TEMPORARY REMOVAL

1. Conduct complete inventory of existing decorative metal components to be treated. Some components have multiple component parts and specific orientations. The parts should be keyed to each specific component and their orientations retained. Component parts to be inventoried and treated shall include all associated decorative screws and fasteners.
2. Label each component and component part by type, existing location, etc. in accordance with Schedule of Decorative Metal submittal. Make system of inventory and labelling consistent and keyed to the architectural drawings.
3. Carefully detach components scheduled to be removed from existing construction.
4. Before proceeding with steps to treat the decorative metal components, examine the overall surface condition(s) and appearance of each element to determine the extent of the work required. Partial disassembly of some components may be necessary.
5. Describe the typical condition and photograph the overall element and include detailed photographs of specific areas/items of note.

3.3 SOLVENT CLEANING

1. Clean decorative metal components of accumulated grease, grime, paint spatters and other soiling.
2. Using a clean, soft cloth, wipe the surface with appropriate solvent degreaser, rubbing with the grain of the metal. (Begin using mineral spirits as solvent. Xylene may be substituted for additional strength in secondary applications, if necessary.) Clean surface dirt and grease only, do not abrade the metal.
3. Wipe the surface with clean, soft cloth soaked with a .02% solution of non-ionic detergent and water working a small area at a time.

4. Rinse the cleaned area with an excess of distilled water to remove traces of cleaner and corrosion products which can precipitate soon after cleaning.
5. Dry with a soft cloth.
6. Repeat solvent cleaning process until surfaces of decorative metal components are adequately cleaned to obtain good adhesion of electrodeposited metals.

3.4 ELECTROPLATING

1. Provide recommendation for treatment and sample from qualified subcontractor (see Paragraph 1.4 (2) above).
2. Basis for typical electroplating process:
   a. Electrostrip components and/or component parts to be replated in order to remove previous plating materials and surface oxidation.
   b. Polish surfaces smooth to remove any surface imperfections induced by the stripping process.
   c. Flash plate components and/or component parts with copper.
   d. Replate to a total surface thickness of 3/10,000ths to 5/10,000ths of an inch.

3.5 POWDER COATING

3. Provide recommendation for treatment and sample from qualified subcontractor (see Paragraph 1.4 (3) above).
4. Basis for typical powder coating process:
   a. Strip components and/or component parts to be powder coated in order to remove previous finish coating and surface oxidation.
   b. Sand surfaces to remove any surface imperfections induced by the stripping process.
   c. Coat to a total surface thickness of 3/10,000ths to 5/10,000ths of an inch.

3.6 WAX COATING

1. Make sure that previous treatments have thoroughly dried.
2. Apply paste wax to entire surface in smooth circular motions or in strokes to assure that the entire surface is coated with a thin coat of wax.
3. Allow the wax coating to harden.
4. Buff with soft cloths until the surface is even and shiny.
5. If there are dull spots in the finish that do not become shiny with buffing, additional applications of wax may be necessary.

3.7 REINSTALLATION

1. Reinstall restored decorative metal components in original locations. Replace missing or inappropriate screws and fasteners as required.
2. Photograph all reinstalled decorative metal components and submit with final inventory for project record.

END OF SECTION

1 GENERAL

1.2 REFERENCES

.1 Canadian Standards Association (CSA)
- .1 CSA B111-[1974], Wire Nails, Spikes and Staples.
- .2 CAN/CSA-G164-[M92], Hot Dip Galvanizing of Irregularly Shaped Articles.
- .3 CSA O121-[M1978], Douglas Fir Plywood.
- .4 CAN/CSA-O141-[91], Softwood Lumber.
- .5 CSA O151-[M1978], Canadian Softwood Plywood.
- .6 CAN/CSA-O325.0-[92], Construction Sheathing.

.2 National Lumber Grades Authority (NLGA)
- .1 Standard Grading Rules for Canadian Lumber [1991].

1.3 QUALITY ASSURANCE

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

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

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

2 PRODUCTS

2.1 LUMBER MATERIAL

.1 Lumber: unless specified otherwise, softwood, S4S, moisture content 19% or less in accordance with following standards:
- .1 CAN/CSA-O141.
- .2 NLGA Standard Grading Rules for Canadian Lumber.

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

- .1 Board sizes: "Standard" or better grade.
- .2 Dimension sizes: "Standard" light framing or better grade.

2.2 PANEL MATERIALS

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

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

.3 Plywood, OSB and wood based composite panels: to CAN/CSA-O323.

2.3 ACCESSORIES

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

2.4 FINISHES

.1 Galvanizing: to CAN/CSA-G164, use galvanized fasteners for exterior work, or fire-retardant treated lumber.

3 EXECUTION

3.1 INSTALLATION

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

.2 Install furring and blocking as required to space-out and facings, fascia, soffit, 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 fascia backing, nailers, curbs and other wood supports as required and secure using galvanized steel fasteners.

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

1. General

1.1 RELATED SECTIONS

.1 Drawings and general provisions of the contract.

.2 Submittals: Division 1

.3 Painting and Finishing General Requirements Section 09 03 00

.4 Exterior Painting Section 09 03 61

1.2 WORK INCLUDED

.1 Provide labor, materials and equipment necessary to complete the work of this section including:

.1 Removal of exterior finish at areas of wood restoration.

.2 Application of borate wood preservative.

.3 Application of epoxy consolidants.

.4 Application of epoxy filler.

.5 Restoration of wood profile.

1.3 REFERENCES

.1 Standards and Guidelines for the Conservation of Historic Places in Canada 2nd Ed.

.2 “The Secretary of the Interior’s Standards of Rehabilitation and Guidelines for Rehabilitating & Reconstructing Historic Buildings,” U.S. Dept. of the Interior, National Park Service, Washington, D.C. 1995 Ed.

.3 “Wood-Epoxy Repairs for Exterior Woodwork,” by John Leeke, Preservation Consultant, copyrighted 2007

1.4 DEFINITIONS

.1 Consolidate: To restore and strengthen rotted or deteriorated wood with liquid epoxy which penetrates the deteriorated wood and hardens it.

.2 Consolidant: A liquid compound which consolidates wood.

.3 Wood Replacement Compound: A soft plastic mixture of epoxy resin and hardener that adds and / or rebuilds sections of wood.

.4 Induction Period: The time to wait after mixing an epoxy resin and hardener together before applying the mixture so that the reaction is induced.

.5 Pot Life: The time after mixing epoxy resin and hardener in which it remains workable so that it can be applied.

.6 Curing Time: The total reaction time that continues to completion during and after hardening and optimizes most properties.

1.5 SYSTEM DESCRIPTION

.1 Restored wood shall be capable of being sawn, planed, sanded, nailed with carpentry nails and otherwise worked like wood.

.2 Restored wood shall retain paint and / or stain.

.3 Where wood replacement compound has been applied, the material shall form a permanent seamless bond with the wood.

1.6 SUBMITTALS

.1 Supply submittals in accordance with Section 01 00 01.

.2 Product Data: Submit product brochure, technical data, test results in accordance with Section 2.2, manufacturer's product and application instructions.

.3 Craftsman Information: Submit the name of the craftsman that will be performing this work and the experience level of the craftsman in the use of the product.

.4 Material Safety Data Sheets (MSDS).

.5 Greenguard® certifications.

1.7 QUALITY ASSURANCE

.1 Qualifications

.1 Applicator: The applicator should demonstrate successful application of products at other locations or training in the use of the product.

.2 Manufacturer experience: The manufacturer shall have not less than 10 years experience in providing products applied and technical support capability.

.3 Manufacturer qualifications: Required products shall be manufactured or supplied by a single manufacturer.

.2 Mock-Up/Test Panel: The craftsman shall construct a mock-up or test panel in accordance with the drawings for inspection and approval of the architect.

1.8 PROJECT /SITE CONDITIONS

.1 Products are to be applied to a dry substrate with a moisture content of wood below 20%

.2 Ambient temperature shall be 50° degrees F or higher, unless a supplemental heat source is available.

.3. Weather should be dry. In the event of rain, work is to be protected from contact with water.

2. Products

2.1 MANUFACTURER/SUPPLIER

.1 Abatron, Inc., 5501 95th Ave., Kenosha, WI 53144, www.abatron.com, Tel: 800/445-1754/Fax: 262/653-2019.

.2 A suitable alternative pre-approved by the Architect.

2.2 MATERIALS

.1 Wood Preservative: Bora-Care® boron-based concentrated wood preservative.

.2 Wood Consolidant: LiquidWood® low viscosity, penetrating epoxy compound.

.3 Wood Replacement Compound: WoodEpox® light-weight, thixotropic epoxy adhesive.

.4 Wood and Epoxy Primer: Primkote 8006-1™ penetrating primer for wood and epoxy surfaces.

.5 Suitable alternatives pre-approved by the Architect.

2.3 MIXES

.1 Mix materials in accordance with manufacturer's product labels and instructions.

3. Executions

3.1 INSPECTION

.1 Inspect wooden areas to be restored, as identified by the architect. Report any additions or discrepancies to the architect and the general contractor.

3.2 PREPARATION

.1 Remove paint, dirt wax and debris from work area.

.2 Wire brush loose wooden material from surfaces, or use a vacuum for complete cleanliness as necessary.

.3 Remove hardware in the way of the repair and bag it for later restoration and reuse, identifying the component that it came from. Protect adjacent surfaces from spills with masking tape and plastic sheeting. If deterioration is more than superficial, drill small holes, approximately 1/8 inch in diameter, into areas to be consolidated being careful not to drill completely through the wood. Wear protective clothing, eyewear and gloves as noted in manufacturer's MSDS. Apply a Bora-Care® solution to the decayed wood and allow 48-72 hours to dry. Prior to the application of the epoxy consolidant, test the moisture content of the wood for a moisture content of not more than 20%

3.3 REPAIR/ RESTORATION

.1 Epoxy consolidation:

.1 Mix the two part consolidant according to the manufacturer's instructions allowing 5-10 minutes for an induction period prior to application. Mix only an amount that will be used within 50 minutes.

.2 Apply the consolidant according to the manufacturer's instructions.

.3 Where only the surface of the wood to be restored is rotted or deteriorated, the consolidant can be applied by brush. More than one application is recommended to thoroughly consolidate the wood. The Pot life of the consolidant is approximately 30-50 minutes after which time another batch should be made, if needed.

.4 Where deterioration extends beyond the surface of the wood, pour the consolidant directly into holes drilled into the wood using an applicator such as a plastic bottle with a narrow spout or syringe. Wait for the consolidant to be absorbed into the wood. Follow with additional applications of consolidant until the wood is saturated and no more consolidant is absorbed.

.5 Brush out the excess consolidants on the surface of the wood to insure thorough saturation of the wood surface.

.2 Wood Replacement Compound Application:

.1 Apply mixed compound according to manufacturer's instructions. If pigmentation is desired, then it should be added to the mixture at this time.

.2 Apply compound to areas which have been consolidated. Apply compound when consolidant is tacky and not completely hardened.

.3 On wood that is sound and wood that has been previously consolidated, apply a primer such as Primkote 8006-1™ to the wood and consolidated material prior to the application of the compound.

.4 Apply by pressing into place, troweling, or pressing into a form. The repaired area should be slightly overfilled so that it can be sanded or planed after hardening. Apply more compound if there are voids or depressions after smoothing.

.5 After hardening for 12 hours or longer, the compound can be sanded, or planed and carved to correspond to the contour of the surrounding wood.

.6 After hardening 24 hours, paint or stain as specified by the architect.

3.4 FIELD QUALITY CONTROL

.1 Hardened consolidant and wood replacement compound should be tack-free and firm to the touch.

3.5 PROTECTION

.1 Protect all work from cold temperatures and moisture elements until all epoxy work has cured.

3.6 CLEAN UP

.1 Following all applications of epoxy, leave all areas free and clean of epoxy. Discard unused epoxy, containers, tools and towels in accordance with local, provincial and federal regulations.

END OF SECTION.

1. General

1.1 RELATED SECTIONS

.1 Rough Carpentry: Section 06 10 10.

.2 Painting and Finishing Schedule: Section 09 03 61.

1.2 REFERENCE DOCUMENTS

.1 WM/Series Wood Moulding Patterns published by Wood Moulding and Millwork Producers (WM).

.1 This publication is available from Wood Moulding and Millwork Producers, P.O. Box 25278, Portland, Oregon, 97225, ph. (503) 292-9288.

1.3 SAMPLES

.1 Comply with requirements of Section 01 00 01 - General Requirements.

.2 Submit 300 mm x 300 mm samples of each type of solid wood or plywood to receive stain or natural finish.

1.4 DELIVERY AND STORAGE

.1 Make no delivery until site conditions are adequate to receive the work of this Section. Protect materials from weather while in transit to site.

.2 Adequately protect finish surfaces during delivery, handling and storage.

1.5 ENVIRONMENTAL CONDITIONS

.1 Materials for interior installation shall be installed only in areas with a constant and minimum temperature of 15 C, with interior relative humidity conditions within design values.

1.6 COORDINATION

.1 Coordinate provision of concealed blocking or supports.

.2 Ensure that back-priming of finish carpentry surfaces concealed after installation, has been performed as specified in Section 09 03 00, prior to installation.

2. Products

2.1 MATERIALS

.1 Softwood lumber: average moisture content of 6% and maximum of 9% for interior work, an average of 12% and maximum of 15% for exterior work. Confirm with Architect as to particular species and grade.

.2 Hardwood lumber: average moisture content of 6% and maximum of 9% for interior work. Confirm with Architect as to particular species and grade.

.3 Douglas fir plywood: to CSA O121-M1978, good one side grade.

.4 Fasteners: to suit size and nature of components being fastened.

2.3 SITE FABRICATION

.1 Fabricate items rigid, plumb and square, as detailed, with tight, hairline joints. Sand work smooth, set all nails and screws.

3. Execution

3.1 INSTALLATION

.1 Existing materials

.1 Reinstall existing baseboards and trim in exact location the original material was removed from. Where possible, utilize salvaged materials in lieu of supplying and installing new materials. Install baseboards and trim where none existed and are specified on the drawings.

.2 Follow installation instructions for new materials where practicable.

.2 New Materials

.1 Supply and install baseboards and trim as noted on drawings.

.2 Scribe and cut as required to fit abutting walls, and surfaces, to fit properly into recesses and to accommodate intersecting or penetrating objects.

.3 Install door and window trim in single lengths without splicing.

.4 Fit backs of baseboards and casing snugly to wall surfaces to eliminate cracks at junction of base and casing with walls.

.5 Set and secure materials and components in place, rigid, plumb and square, with tight, hairline joints.

.6 Form joints to conceal shrinkage.

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

.8 Butt and cope internal joints of baseboards to make snug, tight joint. Cut right angle joints of mouldings and external corners of base with mitred joints.

.9 Provide heavy duty fixture attachments for wall mounted cabinets, shelving and handrails.

.10 After installation, adjust operating hardware to ensure correct operation.

END OF SECTION

1. General

1.1 RELATED SECTIONS

.1	Rough Carpentry:	Section 06 10 10.
.2	Painting and Finishing General Requirements	Section 09 03 00.

1.2 WORK

.1 Provide all labor and materials required to restore damaged, worn, or missing sections of wood flooring as noted on the drawings or as directed by the Owner or the Architect.

1.3 QUALITY STANDARDS

.1 Provide experienced, well-trained workers competent to complete the work as specified.
.2 All work shall comply with manufacturer's instructions and governing building codes.

1.4 SAMPLES

.1 Submit 300 mm long samples of each type of solid wood flooring to receive stain or natural finish.

1.5 DELIVERY AND STORAGE

.1 Make no delivery until site conditions are adequate to receive the work of this Section.
.2 Protect materials from weather while in transit to site.
.3 Return any products or materials delivered in a damaged or unsatisfactory condition.
.4 Packaging must be sealed with clear manufacturer and identification markings.
.5 Store wood flooring materials in work area for at least 72 hours prior to installation.
.6 Adequately protect finish surfaces during delivery, handling and storage.
.7 Protect materials from construction damage and occupant traffic.

1.6 ENVIRONMENTAL CONDITIONS

.1 Materials for interior installation shall be installed only in areas with a constant and minimum temperature of 15°C, with interior relative humidity conditions within design values.

2. Products

2.1 MATERIALS

.1 Wood flooring repairs:
Provide wood flooring in sizes, species, grades and configurations as similar as possible to the original flooring.

.2 New wood flooring:
Select grade plain-sawn Red Oak or White Oak, 25/32" thick, 3-¼" face width.
Tongue and grove, end matched.
Install wood nosings at landings and stair treads.
Install underlayments per manufacturer's recommendations.

.3 Nails, screws, other fasteners as per flooring manufacturer's specifications.
Ring-shank flooring nails must be long enough to securely attach the flooring to substrate.
Where possible, nails shall be hidden from view.
When nails cannot be hidden, countersink nails and fill holes with manufacturer's recommended filler.
Nails must not split the flooring.

.4 Install wood baseboard as noted on the drawings or as directed by the Owner.
Unless otherwise noted on the drawings or as directed by the Owner, wood baseboard shall match as closely as possible the architectural characteristics of the original (existing) baseboard.
Newly installed wood baseboard and trim shall be painted or stained to match surrounding woodwork.

.5 Install shoe molding to conceal edges at vertical projections, walls, cabinets, etc.
Newly installed wood shoe shall be painted or stained to match flooring finish.

.6 Metal transition strips (thresholds):
Edge strips shall be no less than 3/4" width, 1/8" thick, butt type, rounded or beveled on the exposed edge with lengths sufficient to minimize joints.
Standard color (i.e. silver or gold) per Owner's selection.
Do not reuse transition strips.

2.3 SITE FABRICATION

.1 Fabricate items rigid, plumb and square, as detailed, with tight, hairline joints. Sand work smooth, set all nails and screws.

3. Execution

3.1 INSTALLATION

.1 Flooring shall be installed per manufacturer's instructions and as specified herein.
Store wood flooring in work area for 72 hours prior to installation.
Reject warped or bent flooring material.

.2 Wood floor layout
- Confirm direction of wood flooring strips, patterns, and borders.
- Confirm the schedule for stripping, sanding and finishing.
- Extend flooring into closets, recesses, toe spaces, doorways, etc.
- Flooring shall be smooth without humps or depressions.
- Butt flooring tightly against vertical surfaces, door jambs, casings, etc.
- Scribe as necessary to fit around objects and at changes in floor finish materials.
- Scribed joints must be cut neatly and square.

.3 Sanding
Sweep newly completed floor clean prior to sanding.

Sand wood strip flooring after installation is complete, with Hummel Belt Sander, edger and hand scraper. Use coarse, medium and fine grades of sandpaper to produce a

uniform, even and smooth surface. Sandpaper must be continuous from the factory and not joined on the jobsite. Do not use Drum sander. Sand to a fine smooth finish, free from scratches and surface irregularities. Do not sand floor in such a way as to burnish the wood. Sand flooring to a smooth and even surface using 3 cut operation with no. 36, 60 and 100 grit sandpapers.

After sanding with belt sander, buff entire floor using 100 grit screenback with a heavy duty buffing machine.

After sanding, sweep and vacuum all wood floor surfaces to remove dust and dirt followed by the use of tack rag before applying the first coat of floor finish. Floor shall be free of all dust, contamination or residual material before commencement of application of floor finishes.

Present a smooth surface without stop marks, gouges, streaks or shiners when finished.

.3 Nailing

- Drive diagonally. Space as required. Nail at ends of each strip. Pre-drill as necessary to prevent splits. Nail type as specified by manufacturer.

.4 Joints

- Construct joints within tolerances required by manufacturer.
- Cut joints: tight, straight, matched, aligned.
- Stagger joints.
- Do not allow end joints to occur side by side; separate by at least two strips.
- Do not damage tongue and grooves before or during installation.
- Use small or varied strips sparingly and never near one another.
- When repairing straight cuts over former openings or previously repaired sections, remove sufficient existing materials to be able to stagger joints and board lengths.
- Provide a minimum of ½" expansion joint space at all walls.

.5 Shoe Mouldings and Baseboards

- Historic Mouldings and Baseboards are to be removed and refinished before reinstallation.
- Existing shoe molding and baseboards maybe reused if material is in good condition, free from damage, and unbroken. Contractor shall take care to prevent damage during removal and reinstallation.
- Finish (stain or paint) shoe molding and baseboard to match surrounding wood work.
- Reinstall wood baseboards tight to wall and floor.
- Fasten baseboards and/or shoe moulding to walls only, not floors, to cover expansion space.
- When existing Mouldings and Baseboards are to be replaced:
  - Miter joints in shoe moldings and baseboard at outside corners, joints, and at ends.
  - Cope joints at inside corners of shoe molding and baseboard.
  - Install shoe mouldings at door trim where door trim does not come flush to finish floors.
  - Install baseboards in adequate lengths to minimize joints.

- Set and fill all nail holes in shoe molding and baseboard.

.6 Door clearance:
If necessary, Contractor shall undercut doors to allow for proper clearance over new flooring. Door shall not drag or scrape on new flooring. Contractor shall take extreme care to not scratch, mar, splinter, or otherwise damage the door or door finish when undercutting.
Provide clearances below doors as necessary to allow for; thresholds, weatherstripping, nosings, etc.

.7 Install wood or metal transition strips only where new flooring meets a dissimilar flooring material.
Transition strips shall be securely installed with screws or nails per manufacturer's instructions.
Transition strips shall be in sufficient lengths to minimize joints.

3.2 FINISHING AND REFINISHING

.1 Finishing of new wood floors:
- Sand new wood flooring consistently smooth, without lumps, depressions, and burns.
- Before applying finish, thoroughly cleanup and vacuum all sanding dust.
- Fill all nail holes with manufacturer's recommended wood filler compound.
- Apply final finish as soon as possible after final sanding is complete.
- Apply final finish as per manufacturer's instructions.
- Allow at least 24 hours, or longer per manufacturer's instructions, drying time between finish coats.

.2 Refinishing of existing wood flooring:
- Remove existing wood flooring finish materials using approved safe methods.
- Remove and dispose of debris using approved safe methods.
- After cleanup is complete, containment measures may be removed and properly disposed.
- Fill all nail holes with manufacturer's recommended wood filler compound.
- Apply final finish as soon as possible after finish removal is complete.
- Apply final finish as per manufacturer's instructions.
- Allow at least twenty-four (24) hours, or longer per manufacturer's instructions, drying time between finish coats.

3.3 INSPECTION, REPAIR, AND TOUCH-UP

.1 Securely protect flooring from damage by construction traffic or further construction work.

.2 Repair or replace any damaged or defective work:
- Chipped
- Scratched
- Marred
- Stained
- Joints that are not tight
- Gaps at walls, jambs, or trim
- The Contractor shall pay all costs for repairing or replacing defective flooring or flooring which has been damaged as a result of Contractor failing to adequately protect flooring.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian General Standards Board (CGSB)

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

1.2 SUBMITTALS

.1 Provide submittals in accordance with Section 01 00 01 – General Requirements.

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet and include:

.1 Product characteristics.

.2 Performance criteria.

.3 Limitations.

.3 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS).

.4 Quality assurance submittals:

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

.2 Instructions: submit manufacturer's installation instructions and comply with written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Waste Management and Disposal:

.1 Separate waste materials in accordance with Section 01 00 01 – General Requirements

Part 2 Products

2.1 SHEET VAPOUR BARRIER

.1 Polyethylene film: to CAN/CGSB-51.34, 0.10 mm thick.

2.2 ACCESSORIES

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

.2 Sealant: compatible with vapour retarder materials, recommended by vapour retarder manufacturer. To Section 07 92 10 - Joint Sealing.

.3 Staples: minimum 6 mm leg.

.4 Moulded box vapour barrier: factory-moulded polyethylene box for use with recessed electric switch and outlet device boxes.

Part 3 Execution

3.1 INSTALLATION

.1 Ensure services are installed and inspected prior to installation of retarder.

.2 Install sheet vapour retarder on warm side of exterior wall and ceiling assemblies prior to installation of gypsum board to form continuous retarder.

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

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

3.2 EXTERIOR SURFACE OPENINGS

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

3.3 PERIMETER SEALS

.1 Seal perimeter of sheet vapour barrier as follows:

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

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

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

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

3.4 LAP JOINT SEALS

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

.1 Attach first sheet to substrate.

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

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

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

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

3.5 ELECTRICAL BOXES

.1 Seal electrical switch and outlet device boxes that penetrate vapour barrier as follows:

.1 Install moulded box vapour barrier.

.2 Apply sealant to seal edges of flange to main vapour barrier and seal wiring penetrations through box cover.

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

.1 The General Conditions of the Contract, Supplementary Conditions, and the General Requirements of Division 1, form part of this section, and must be read in conjunction with the requirements of this section, and all related sections.

1.2 RELATED REQUIREMENTS

.1 Section 07 92 10: Joint Sealant

.2 Section 09 21 16: Gypsum Wallboard

.3 Division 22: Plumbing

.4 Division 23 Heating, Ventilating and Air Conditioning (HVAC)

.5 Division 26: Electrical

.6 Contractor shall be responsible for coordinating this section with all related sections.

1.3 REFERENCES

.1 Underwriters Laboratories of Canada (ULC):

.1 CAN/ULC S115-05, Standard Method of Fire Tests and Firestop Systems

.2 American Society for Testing and Materials (ASTM):

.1 ASTM E814-11a, Standard Test Method for Fire Tests of Penetration Firestop Systems

1.4 SUBMITTALS

.1 Submit submittals in accordance with the General Conditions and Section 01 30 00.

.2 Shop Drawings:

.1 Provide details indicating all reinforcing, anchorages, fastening and proposed method of installation for the various conditions within the project.

.3 Samples:

.1 Submit samples of each type of firestop and smokeseal material and accessory.

1.5 QUALITY ASSURANCE

.1 Applicator shall be licensed by the manufacturer of fireproofing materials.

.2 Conform to flame and temperature ratings established by ULC CAN4-S115-05 and ASTM E814-11a.

.3 Submit manufacturer's certification that materials meet or exceed specified requirements.

.4 Maintain flame and temperature ratings equal to surrounding materials.

1.6 DELIVERY, STORAGE, HANDLING AND PROTECTION

.1 Deliver materials in original, unopened packages bearing name of manufacturer and product identification.

.2 Store materials off ground, under cover, and away from damp surfaces.

1.7 SITE CONDITIONS

.1 Do not apply materials when temperature of substrate material is below 4 deg C and surrounding air temperature is below 4 deg C, for 24 hours prior to application.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Bears UL, ULC or Warnock Hersey label and confirmation of compliance with ASTM E814-11a or CAN4-S115.

.2 Provide fire stopping and smoke sealing systems in accordance with CAN4-S115-M and shall also conform to special requirements in part 3.5 of the Building Code.

.3 Fire-resistant rating of fire stopping material assemblies must meet or exceed the fire-resistance rating of the floor or wall section being penetrated.

.4 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control shall be elastomeric seal type. Do not use a cementitious, or rigid seal at such locations.

.5 Primers shall be to manufacturer's recommendation for specific material, substrate, and end use.

.6 Damming and backup materials, supports and anchoring devices shall be to manufacturer's recommendations, and in strict accordance with tested assembly being installed as acceptable to authorities having jurisdiction.

.7 Sealants for vertical joints, shall be non-sagging type.

PART 3 - EXECUTION

3.1 PROTECTION

.1 Mask adjacent work of other Sections as necessary to avoid spillage onto adjoining surfaces. Remove stains on adjacent surfaces as required.

3.2 PREPARATION

.1 Examine sizes and conditions to establish correct thickness and installation of backup materials. Ensure surfaces are dry and frost free.

.2 Clean bonding surfaces of deleterious substances including dust, paint, rust, oil, grease and other foreign matter which may otherwise impair effective bonding.

.3 Do not apply firestops and smokeseals to surfaces previously painted or 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 Prepare surfaces in accordance with manufacturer's instructions.

.5 Priming and Sealing: Prime surfaces in accordance with manufacturer's instructions.

3.3 APPLICATION

.1 Install materials in accordance with published 'Through-Penetration Firestop Systems' in UL's Fire Resistance Directory or the publication of another approved independent laboratory.

.2 Mix materials in accordance with manufacturers' written instructions.

.3 Apply in strict accordance with ULC certification and manufacturer's recommendations to provide a temperature and flame rated seal equal as a minimum to the rating of the wall or floor surrounding.

.4 Seal all holes or voids made by penetrations to ensure an air and water resistant seal.

.5 Seal all joints to ensure an air and water resistant seal, capable to withstand compression due to thermal, wind or seismic joint movement.

.6 Consult with Mechanical Engineer and project manager prior to installation of UL firestop systems that might hamper the performance of fire dampers as it pertains to duct work.

.7 Apply to mechanical and electrical service through-penetrations, to formed, sleeved, or cored openings in smoke and fire rated masonry, or gypsum wallboard stud walls and structural floors and ceilings.

.8 Apply to head of smoke and fire rated gypsum wallboard stud wall abutting underside of structure (concrete or steel deck).

.9 Apply to control joints in rated stud walls.

.10 Apply to penetrations for passage of duct, cable, cable tray, conduit, piping, electrical busways and raceways through fire rated vertical barriers (walls and partitions), horizontal beams (floor/ceiling assemblies) and vertical service shaft walls and partitions.

.11 Apply to safing slots gaps between edge of floor slabs and curtain walls.

.12 Apply to openings between structurally separate sections of walls and floors.

.13 Apply to gaps between tops of walls and ceiling or roof assemblies.

.14 Apply to expansion joints in fire rated walls and floors.

.15 Apply to openings and penetrations in fire rated partitions or walls containing fire doors.

.16 Apply to openings around structural members which penetrate fire rated floors or walls.

.17 Apply firestop and smokeseal materials in accordance with manufacturer's directions, with sufficient pressure to properly fill and seal openings.

.18 Tool or trowel exposed surfaces.

.19 Remove excess compounds promptly as work of this Section progresses and upon completion of work of this Section.

3.4 CURING

.1 Cure materials in accordance with manufacturer's instructions.

.2 Do not cover up materials until proper curing has taken place.

3.5 IDENTIFICATION

.1 Identify through-penetration firestop systems with pressure-sensitive, self-adhesive, preprinted vinyl labels. Attach labels permanently to surfaces of penetrated construction on both sides of each firestop system installation where labels will be visible to anyone seeking to remove penetrating items or firestop systems. Include the following information on labels:

.1 The words: "Warning: Through-Penetration Firestop System - Do Not Disturb"

.2 Contractor's name, address and telephone number.

.3 Designation of applicable testing and inspection agency.

.4 Date of installation.

.5 Manufacturer's name for firestop materials.

3.6 CLEAN UP AND REPAIRS

.1 Clean adjacent surfaces immediately and leave work neat and clean.

.2 Remove excess materials using recommended procedures, as work progresses.

.3 Remove dams after initial set of firestops and smokeseals as required.

.4 Correct staining and discolouring of adjacent surfaces as directed by Consultant.

.5 Remove all debris and excess materials entirely from the site and leave the work in a neat and tidy condition.

.6 Perform one simulated smoke test for each penetration type once per day. Simulate smoke at a rate of four seconds/100 cubic feet (2.8 cubic metres) and maintain the fog density until inspection is complete.

.7 After inspection is complete, repair all defective firestopping and smokeseals and test again. Continue this procedure until all firestopping and smokeseals passes test.

END OF SECTION

Part 1 GENERAL

1.1 SECTION INCLUDES

.1 Materials, preparation and application for caulking and sealants.

1.2 REFERENCES

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

.1 ASTM C919-02, Standard Practice for Use of Sealants in Acoustical Applications.

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

.1 Material Safety Data Sheets (MSDS).

1.3 SUBMITTALS

.1 Submit product data in accordance with Section 01 00 01 - General Requirements.

.2 Manufacturer's product to describe.

.1 Caulking compound.

.2 Primers.

.3 Sealing compound, each type, including compatibility when different sealants are in contact with each other.

.3 Submit samples in accordance with Section 01 00 01 - General Requirements.

.4 Submit duplicate samples of each type of material and colour.

.5 Cured samples of exposed sealants for each colour where required to match adjacent material.

.6 Submit manufacturer's instructions in accordance with Section 01 00 01 - General Requirements.

.1 Instructions to include installation instructions for each product used.

1.4 QUALITY ASSURANCE/MOCK-UP

.1 Construct mock-up in accordance with Section 01 00 01 - General Requirements.

.2 Construct mock-up to show location, size, shape and depth of joint complete with back-up material, primer, caulking and sealant.

.3 Mock-up will be used:

.1 To judge colour workmanship, substrate preparation, operation of equipment and material application.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, handle, store and protect materials in accordance with Section 01 00 01 - General Requirements.

.2 Deliver and store materials in original wrappings and containers with manufacturer's seals and labels, intact. Protect from freezing, moisture, water and contact with ground or floor.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for recycling in accordance with Section 01 00 01 - General Requirements.

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

.3 Place materials defined as hazardous or toxic in designated containers. Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Regional and Municipal, and Parks Canada regulations.

.4 Unused sealant material must not be disposed of into sewer system, into streams, lakes, onto ground or in other location where it will pose health or environmental hazard.

.5 Empty plastic joint sealer containers are not recyclable. Do not dispose of empty containers with plastic materials destined for recycling.

.6 Fold up metal banding, flatten, and place in designated area for recycling.

1.7 PROJECT CONDITIONS

.1 Environmental Limitations:

.1 Do not proceed with installation of joint sealants under following conditions:

.1 When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 4.4 degrees C.

.2 When joint substrates are wet.

.2 Joint-Width Conditions:

.1 Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.

.3 Joint-Substrate Conditions:

.1 Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

1.8 ENVIRONMENTAL REQUIREMENTS

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of Material Safety Data Sheets (MSDS) acceptable to Labour Canada.

.2 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.

.3 Engineer will arrange for ventilation system to be operated on maximum outdoor air and exhaust during installation of caulking and sealants. Ventilate area of work as directed by Engineer by use of approved portable supply and exhaust fans.

Part 2 PRODUCTS

2.1 SEALANT MATERIALS

.1 Do not use caulking that emits strong odours, contains toxic chemicals or is not certified as mould resistant in air handling units.

.2 When low toxicity caulks are not possible, confine usage to areas which 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 Silicones One Part.

.1 To CAN/CGSB-19.13.

Acceptable material: Dow corning 795 Silicone or equal.

2.2 SEALANT BACKUP MATERIAL

.1 Preformed Compressible and Non-Compressible back-up materials.

.1 Polyethylene, Urethane, Neoprene or Vinyl Foam.

.1 Extruded closed cell foam backer rod.

.2 Size: oversize 30 to 50 %.

.2 Neoprene or Butyl Rubber.

.1 Round solid rod, Shore A hardness 70.

.3 High Density Foam.

.1 Extruded closed cell polyvinyl chloride (PVC), extruded polyethylene, closed cell, Shore A hardness 20, tensile strength 140 to 200 kPa, extruded polyolefin foam, 32 kg/m^3 density, or neoprene foam backer, size as recommended by manufacturer.

.4 Bond Breaker Tape.

.1 Polyethylene bond breaker tape which will not bond to sealant.

2.3 JOINT CLEANER

.1 Non-corrosive and non-staining type, compatible with joint forming materials and sealant recommended by sealant manufacturer.

.2 Primer: as recommended by manufacturer.

Part 3 EXECUTION

3.1 PROTECTION

.1 Protect installed Work of other trades from staining or contamination.

3.2 SURFACE PREPARATION

.1 Examine joint sizes and conditions to establish correct depth to width relationship for installation of backup materials and sealants.

.2 Clean bonding joint surfaces of harmful matter substances including dust, rust, oil grease, and other matter which may impair Work.

.3 Do not apply sealants to joint surfaces treated with sealer, curing compound, water repellent, or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.

.4 Ensure joint surfaces are dry and frost free.

.5 Prepare surfaces in accordance with manufacturer's directions.

3.3 PRIMING

.1 Where necessary to prevent staining, mask adjacent surfaces prior to priming and caulking.

.2 Prime sides of joints in accordance with sealant manufacturer's instructions immediately prior to caulking.

3.4 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 Cleanup.

.1 Clean adjacent surfaces immediately and leave Work neat and clean.

.2 Remove excess and droppings, using recommended cleaners as work progresses.

.3 Remove masking tape after initial set of sealant.

END OF SECTION

1. General

1.1 RELATED SECTIONS

.1 Painting and Finishing: Section 09 03 00.

.2 Painting and Finishing Schedule Section 09 03 61.

1.2 QUALITY ASSURANCE

.1 Manufacture fire door and frame components and assemblies to ULC/ULI/WARNOCK HERSHEY/FACTORY MUTUAL requirements.

.2 Hollow Metal Trades Association - Canadian Manufacturing Standards for Metal Doors and Frames.

1.3 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Division 1.

.2 Clearly indicate each type of frame, material, material thicknesses, mortises, reinforcements, anchors, finish, and special features.

.3 Reference frames to door schedule. Indicate door numbers and construction where applicable.

2. Products

2.1 MATERIALS

.1 Frames: 1.6 mm for exterior doors, commercial quality steel cold rolled to ASTM A653M-96; zinc coated to Z275 coating designation for exterior frames; knock down door frames are not allowed.

.2 Accessories: Glazing stops, floor anchors, channel spreaders, 1.6 mm tee anchors, 1.2 mm wall stud anchors, zinc coated to ASTM A653M-96, coating designation ZF075, corrugate tee anchors for masonry bond, drill stud anchors for wire tie to studs, lag bolts, shields and bushing for existing or concrete openings.

.3 Guard Boxes: 0.50 mm steel, ZF075 coating designation zinc finish to ASTM A653M-96.

.4 Door Bumpers: black neoprene.

.5 Reinforcement for Hardware: carbon steel, prime painted, to the following thicknesses:

Hinge & Pivot reinforcements	30 mm x 250 mm 3.5 mm
Strike reinforcements	1.6 mm
Flush Bolt reinforcements	1.6 mm
Closer reinforcements	2.5 mm
Surface hardware reinforcements	2.5 mm

.6 Door Jamb Reinforcement: 100 mm x 40 mm structural steel channel to CAN3-G40.21-92.

2.2 FABRICATION

.1 Fabricate frames in accordance with details and approved shop drawings. To Underwriters requirements and provide Underwriters labels.

.2 Mortise, reinforce, drill and tap frames and reinforcements to receive hardware using templates

provided. Locate mortising to National Builders Hardware Association Standards.

.3 Install 2 double stud bumpers on strike jamb of frame for each single door and 2 bumpers at head of double door frames.

.4 Protect strike, hinge and overhead concealed door closer reinforcement completely by guard boxes welded to frame.

.5 Attach temporary wood or weld in 50 mm channel spreaders to frame; ensure proper frame alignment.

.6 Where frames terminate at finished floor, provide floor plates for anchorage to floor structure.

.7 Cut mitres accurately and weld or secure bent tabs on inside of frame profile.

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

.9 Fill surface depressions and butted joints with metallic paste filler and sand to a uniform smooth finish.

.10 Touch-up frames by priming areas where galvanizing is damaged.

.11 Reinforce head of frames wider than 1200 mm with 2.5 mm formed steel channel welded in place, flush with top of frame.

.12 Provide three jamb anchors per jamb for frames up to 2130 mm high and one additional for each 600 mm over 2130 mm high.

.13 Minimum depth of stop: 15 mm. Glazing stops miter joints, channel shape 15 mm wide with counter screws.

.14 Cut-off hospital stops at 45 deg. to height same as adjacent base finish; weld, fill, grind smooth and apply primer finish.

.15 Reinforce head section at junction with removable mullion.

.16 Reinforce both jambs where door openings occur in screens. Install reinforcing continuous structure to structure.

3. Execution

3.1 INSTALLATION

.1 Set frames in plumb and square at correct elevation. Limit of acceptable frame distortion - 2 mm out of plumb measured on face of frame, maximum twist corner to corner of 3 mm.

.2 Secure anchorages and connections to adjacent construction. Anchor door jamb reinforcement securely to structure.

.3 Brace frames solidly to maintain in position while being built-in. Erect frames in accordance with fabricator’s instructions.

.4 Install a temporary horizontal wood spreader at mid-height of door opening to maintain frame width until building work completed.

.5 For frames over 1200 mm in width, provide vertical support at the centre of head.

.6 Remove temporary spreaders only after completion of adjacent work.

.7 Co-ordinate grouting of all frames solid to adjacent construction.

.8 Provide formed metal drip section full width of frame opening for exterior doors.

END OF SECTION

1. General

1.1 RELATED WORK SPECIFIED IN OTHER SECTIONS

.1	Hollow Metal Frames:	Section 08 11 14.
.2	Painting and Finishing General Requirements:	Section 09 03 00.
.3	Painting and Finishing Schedule	Section 09 03 61.

1.2 PRODUCT OPTIONS AND SUBSTITUTIONS

.1 Refer to Division 1 for requirements pertaining to product options and substitutions.

1.3 REFERENCE DOCUMENTS

.1 Except as otherwise specified, comply with requirements of Canadian Manufacturing Standards for Steel Doors and Frames published by the Canadian Steel Door and Frame Manufacturers' Association.

1.4 FIRE RATED DOORS

.1 Provide doors produced under label service program of a testing agency acceptable to authorities having jurisdiction.

.2 Doors shall bear testing agency label indicating following:

.1 At standard size openings: fire endurance rating.

.2 At oversized openings: unclassified as to fire rating.

1.5 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Division 1.

.2 Clearly indicate each type of door, material, metal thicknesses, mortises, reinforcements, location of exposed fasteners and special features.

.3 Reference door types to door schedule. Indicate door numbers where applicable.

2. Products

2.1 MATERIALS

.1 Sheet Steel: to ASTM A653M-96 commercial quality steel, cold rolled, zinc coated to ZF075 coating designation.

.2 Honeycomb core material: rigid pre-expanded resin impregnated kraft paper having maximum 25 mm hexagonal shaped cells.

.3 Reinforcement for Hardware: carbon steel, welded in place, prime painted, to the following thicknesses:

.1	Hinge, pivot and panic bar reinforcements:	3.5 mm
.2	Lock face, flush bolts, concealed bolts:	2.5 mm
.3	Concealed or surface closer reinforcements:	2.5 mm
.4	Other surface hardware reinforcements:	2.5 mm

.4 .1 Locks shall in accordance to the requirements of the owner.

2.2 FABRICATION

.1 Hollow metal doors shall be of seamless construction with no visible seams or joints on faces at vertical edges.

.2 Steel face sheet thickness:

.1 Exterior doors: 1.6 mm.

.3 Core Construction shall be one of the following:

.1 Internally steel stiffened with continuous vertical steel stiffeners at 150 mm O.C. spot welded to both face sheets; fill voids with glass fibre insulation.

.2 Composite construction consisting of honeycomb core with steel face sheets pressure laminated to core.

.4 Refer to door drawing for required size and ratings of doors, or other requirements.

.5 Mortise, reinforce, drill and tap doors and reinforcements to receive hardware using templates provided.

.6 Join door faces at intersecting edges with continuous welds, fill and grind smooth. Finish door faces flush without visible joints or distortion.

.7 Close top and bottom edges of door with recessed 1.2 mm steel channel, full width welded. Provide closure channel at top edge of exterior doors. Provide weep holes in exterior door bottom channel.

.8 Make provisions for glass, provide glazing stops. Weld stops to door on security side.

.9 Touch-up doors by priming areas where zinc coating is damaged.

3. Execution

3.1 INSTALLATION

.1 Install doors and hardware in accordance with templates and manufacturer's instructions. Maximum permissible warp of 3 mm measured diagonally across door.

.2 Adjust operable parts for correct function.

.3 Apply hardware to Class 'A' fire rated doors prior to delivery.

END OF SECTION

1 GENERAL

1.1 REFERENCES

.1 CAN/CGSB-12.1[M90] Tempered or Laminated Safety Glass.

.2 Flat Glass Manufacturers Association (FGMA) Glazing Manual.

.3 Laminators Safety Glass Association Standards Manual.

1.2 PERFORMANCE REQUIREMENTS

.1 Provide continuity of building enclosure vapour and air barrier using glass and glazing materials as follows:

.1 Utilize inner light of multiple light sealed units for continuity of air and vapour seal.

.2 Limit glass deflection to 1/200 with full recovery of glazing materials.

1.3 QUALITY ASSURANCE

.1 Perform work in accordance with FGMA Glazing Manual and Laminators Safety Glass Association - Standards Manual for glazing installation methods.

1.4 ENVIRONMENTAL REQUIREMENTS

.1 Install glazing when ambient temperature is 10C minimum. Maintain ventilated environment for 24 hours after application.

.2 Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

2 PRODUCTS

2.1 MATERIALS: FLAT GLASS

.1 Safety glass: to CAN/CGSB-12.1, transparent 12.5 mm thick.

2.2 ACCESSORIES

.1 Setting blocks: Neoprene 80 - 90 Shore A durometer hardness to ASTM D2240, length of 25 mm for each square meter of glazing to suit glazing method, glass light weight and area.

.2 Glazing tape:

.1 Preformed butyl compound with integral resilient tube spacing device,

.2 Closed cell polyvinyl chloride foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume 2%, designed for compression of 25%, to effect an air and vapour seal.

.3 Glazing splines: resilient polyvinyl chloride silicone, extruded shape to suit glazing channel retaining slot, colour as selected.

.4 Glazing clips: manufacturer's standard type.

.5 Lock-strip gaskets: to ASTM C542.

3 EXECUTION

3.1 EXAMINATION

.1 Verify that openings for glazing are correctly sized and within tolerance.

.2 Verify that surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.

3.2 PREPARATION

.1 Clean contact surfaces with solvent and wipe dry.

.2 Seal porous glazing channels or recesses with substrate compatible primer or sealer.

.3 Prime surfaces scheduled to receive sealant.

3.3 CLEANING

.1 Remove glazing materials from finish surfaces.

.2 Remove labels after work is complete.

.3 Clean glass.

END OF SECTION

1. General

1.1 INTENT

.1 This Section specifies general requirements for all painting and finishing work to be performed on site.

.2 Read this Section in conjunction with the following Sections containing more detailed requirements for site painting and finishing:

.1	Painting and Finishing Schedule:	Section 09 03 61.

1.2 RELATED SECTIONS

.1	Finish Carpentry	Section 06 20 00.
.2	Gypsum Board:	Section 09 21 16.

1.3 REFERENCES

.1 The painting and finishing specifications for new, not previously painted or finished, substrates are based on and make reference to the "MASTER PAINTERS INSTITUTE' Architectural Painting Specification Manual", latest edition, including the "MPI Approved Products Lists".

.2 The painting and finishing specifications for previously painted or finished substrates are based on and make reference to the "Maintenance Repainting Specification Manual", latest edition, including the "MPI Approved Products Lists".

1.4 PRODUCT DATA

.1 Comply with requirements of Section 01 00 01 - General Requirements.

.2 Prior to commencement of Work of this Section, submit list of all products proposed for use. Include manufacturer's name, product name, product code and MPI number of each product.

.3 Products identified in submitted products list and approved by Owner shall be used in the applications for which they are scheduled and shall not be changed without Owner's consent.

1.5 FIELD SAMPLES

.1 Finish, with all required coats, one reasonably sized surface of each major substrate and trim piece, and colour scheme, to show selected colours, finish textures, gloss levels, and workmanship.

.2 Obtain Owner's approval before proceeding with remainder of the work. Approved sample area shall serve as the standard to be met or exceeded in the remainder of the work.

1.6 DELIVERY, STORAGE, AND HANDLING

.1 Deliver materials in sealed original labeled containers bearing manufacturer's name, type of material, brand name, colour designation, and where applicable, instructions for mixing and reducing.

.2 Store paint and other materials in a single heated and well ventilated area with a minimum ambient temperature of 7°C.

.3 Take precautionary measures to prevent fire hazards or spontaneous combustion.

1.7 SITE CONDITIONS

.1 Interior:

.1 Temperature: Maintain temperature at minimum 8°C for at least 24 hours before and during application and until coatings have cured.

.2 Ventilation: Adequately ventilate areas where coatings are being applied and maintain a reasonably dust free atmosphere.

.3 Lighting: Maintain bright and uniform levels of lighting in areas where coatings are being applied.

.2 Exterior:

.1 Temperature: Apply coatings only when temperature is above 10°C.

.2 Precipitation: Do not apply coatings during periods of precipitation nor when precipitation is imminent.

.3 Wind: Do not apply coatings under high wind conditions resulting in wind-blown dust and debris.

1.8 COORDINATION

.1 Ensure that site applied paints and finishes are compatible with primers or other finishes applied in the shop or factory.

.2 Notify Owner of any incompatibilities.

1.9 MAINTENANCE MATERIALS

.1 Leave on premises not less than 4 L of unused material of each colour and finish sheen used.

.2 Tightly seal and clearly label containers.

2. Products

2.1 MATERIALS

.1 Paint and Other Finishing Materials:

.1 Use only "top line quality" products. Refer to schedules Sections for product descriptions and product numbers. Product numbers are from the MPI Approved Product Lists, latest edition.

.2 Where a product number is specified in a schedule, use any corresponding MPI approved product from the MPI Approved Product Lists.

.3 Where a product number is followed by an asterisk, use any corresponding environmental choice certified product from the MPI Approved Product Lists. Such products are certified for the EcoLogo under Environment Canada's Environmental Choice Program.

.2 Thinners: Odorless paint thinner, pure and clean with no deleterious material.

.3 Patching compounds: Spackling compound or oil base putty for substrates receiving a paint finish. Oil base putty, coloured to match finish, for substrates receiving a transparent finish.

2.2 MIXING

.1 Except as otherwise specified, paints shall be ready mixed. Materials in paste or powder form, or to be field-catalyzed, shall be field mixed in accordance with manufacturer's directions. Pigments shall be fully ground and shall maintain a soft paste consistency in vehicle during storage that can and shall be dispersed readily and uniformly by paddle to a complete homogeneous mixture.

.2 Thinning of materials will be permitted only where specified herein or upon Owner's approval. Do not use solvent for thinning.

.3 Thoroughly strain all materials prior to each application.

2.3 COLOURS / GLOSS LEVELS

.1 Gloss levels are to be interpreted as those defined in the "MASTER PAINTERS INSTITUTE' Architectural Painting Specification Manual"

.2 Specified Paint Colours and general locations. Refer to room finish schedule for specifics.

.1	Main Floor Walls / Ceiling:	Benjamin Moore – Chantilly Lace (2121-70) – GL5 – Semi-gloss
.2	Upper Floor Walls / Ceiling:	Benjamin Moore – Lemon Chiffon (OC-109) – GL5 – Semi-gloss
.3	Upper Floor Closet Walls, Door, Trim:	Benjamin Moore – Soft Chamois (OC-13) – GL5 – Semi-gloss
.4	Upper Floor Washroom Walls / Ceiling:	Benjamin Moore – Snowfall White (OC-118) – GL6 – Gloss
.5	Main Floor Washroom Door:	Benjamin Moore – Hancock Green (HC-117) – GL4 – Satin
.6	Main Floor Entry Doors:	Benjamin Moore – Richmond Gold (HC-41) – GL4 – Satin
.7	Trim Stain:	Benjamin Moore – Bittersweet Chocolate (2114-10) - STAIN

3. Execution

3.1 VERIFICATION OF CONDITIONS

.1 Prior to commencement of painting and finishing work, thoroughly examine all substrates scheduled to receive coatings.

.2 Do not apply coatings to substrates whose condition will adversely affect execution, permanence, or quality of work and which cannot be put into an acceptable condition through preparatory work specified herein.

.3 Verify compatibility of any previously applied coatings with specified coatings.

.4 Notify Owner of any incompatibilities.

3.2 PROTECTION OF EXISTING SURFACES

.1 Provide sufficient quantity of clean drop cloths and take necessary protective measures to prevent spray, splashing, and droppings from fouling adjacent surfaces.

.2 Remove electrical plates, surface hardware, fittings and fastenings prior to painting and finishing operations. Carefully store and replace these items on completion of work in each area.

.3 Take special care to keep sprinkler heads and smoke detectors free of paint. Replace those which do receive paint.

3.3 CONDITION OF SUBSTRATES

.1 Sound, non-dusting, and free of grease, oil, dirt and other matter detrimental to adhesion and appearance of coatings.

.2 Temperature: Minimum 8°C.

.3 Moisture Content: Maximum 15% for wood, maximum 12% for other substrates. Test for moisture content using electronic moisture meter.

.4 Alkalinity: Test cementitious substrates for alkalinity using litmus paper test.

3.4 PREPARATION OF NEW/UNFINISHED SUBSTRATES

.1 Prepare substrates in accordance with requirements of Chapter 3, Surface Preparation, of the MPI Manual and as specified herein.

.2 All Substrates: Thoroughly broom, vacuum and wipe clean as required to produce acceptable surface. Sand lightly and dust prior to application of each coat. Use proper type and grade of sandpaper to avoid scratching or gouging of surfaces.

.3 Wood Generally: Clean soiled surfaces, sand smooth and dust off. Fill nail holes, splits, scratches, small joints and other minor imperfections with patching compound after paint prime coat or first varnish coat has been applied and dried. Apply putty with putty knife, press firmly in place, and finish off flush with surface.

.4 Wood for Paint Finish: Clean knots, pitch streaks, and sappy sections of residue and seal such areas with shellac before applying prime coat.

.5 Bare Ferrous Metal: Remove rust and scale and wash with solvent.

.6 Previously Primed Metal: Remove loose shop paint and rust; make good shop coat, feather out edges of touch-up.

.7 Zinc Coated Metal: Remove surface contaminants and wash with solvent.

.8 Gypsum Board: Fill minor cracks, holes, and imperfections with tinted patching compound after prime coat has been applied and dried. Allow patching compound to dry, sand smooth and remove dust. Use minimum #150 grit sandpaper.

.9 Alkaline Surfaces: Wash and neutralize using proper type of solution compatible with paint to be used.

3.5 PAINTING AND FINISHING OF EXISTING MATERIALS AND SURFACES

.1 Thoroughly inspect existing conditions to determine degree of deterioration of each previously coated substrate required to be repainted or refinished. Degrees of deterioration shall be as defined in Surface Preparation, of the "Maintenance Repainting Specification (MRS) Manual", i.e. sound, slight to moderately deteriorated, or severely deteriorated.

.2 Prepare substrates using surface preparation procedures, including cleaning and removal systems, specified for the degree of deterioration, Surface Preparation, of the MRS Manual.

.1 Remove, label and store, prior to painting of existing materials and surfaces the following items:
- .1 Door hardware signage and accessories,
- .2 Device plates,
- .3 Lighting fixtures,
- .4 Factory finished work,
- .5 Signage where removable,
- .6 Wall and Door Trim,
- .7 Picture Rails.

.2 Where such items are not removable, provide proper masking and protection prior to commencement of painting:

.3 Clean such items if deemed necessary by the Consultant, before being re-installed following successful completion of the work in each area. Solvents detrimental to lacquer finishes are not to be used for cleaning these items.

3.6 APPLICATION OF COATINGS, GENERALLY

.1 Applied and cured coatings shall be uniform in thickness, sheen, colour, and texture and be free of defects detrimental to appearance and performance. Such defects include brush marks, streaks, runs, laps, heavy stippling, pile up of paints and skipped or missed areas. Edges of paint adjoining other materials shall be clean and sharp with no overlapping.

.2 Use rollers which will produce the least possible stipple effect; maximum 10 mm pile for smooth substrates. Heavier pile rollers may be permitted for use on rough substrates, subject to Owner's approval.

.3 Airless spray application shall be followed with back rolling.

.4 Use a single manufacturer's products for all coats required for each finish system.

.5 Vary slightly the colour of successive coats to differentiate between coats.

.6 Each coat shall be dry and hard before succeeding coats are applied with a minimum of 24 hours between coats, except where manufacturer's instructions state otherwise.

.7 For woodwork to receive a stain finish, apply uniform coats of stain and wipe off if required. Wood shall have a uniform shade. Match stain so that dissimilar woods have uniform finished appearance.

.8 For open grain woods to receive a clear finish, tint wood filler to match wood. Work filler well into grain and before it sets, wipe off excess to provide a clean surface.

3.7 FINISHING OF NEW/UNFINISHED SUBSTRATES

.1 Site paint or finish all work and substrates indicated as requiring site painting or finishing in Schedules, Drawings, or Specifications.

.2 Site apply all prime and finish coats as scheduled, whether or not factory prime coats have been applied.

3.8 BACK-PRIMING INTERIOR WOOD

.1 Except for architectural woodwork having factory applied finishes as specified in Section 06 20 00, backprime following concealed surfaces of interior wood components, prior to their installation:

.1 Surfaces in contact with concrete or masonry.

.2 Surfaces in contact with any floors or floor finishes.

.3 Cut-outs for sinks, drains and other mechanical services.

.4 Underside of front edges of countertops and toe-spaces.

.5 Other surfaces which may be subjected to moisture during normal use or cleaning operations.

.2 Use white alkyd wood primer for components scheduled to receive a paint finish.

.3 Use semi-transparent stain for components scheduled to receive a solid or semi-transparent stain finish.

.4 Use gloss varnish, reduced 25% with thinner, for components scheduled to receive a varnish finish.

3.9 FINISHING NEW/UNFINISHED DOORS AND FRAMES

.1 Finish edges of doors in accordance with specified finish system. For top and bottom edges, final coat may be omitted.

.2 Finish wood doors after doors have been hung and adjusted or refinish tops, bottoms and edges after fitting.

.3 Apply finishes specified for exterior doors to both door faces.

.4 Finish unfinished vertical edges of prefinished wood doors to match door faces.

3.10 FINISHING MISCELLANEOUS SUBSTRATES

.1 Paint substrates behind surface mounted fixtures, wall mounted heating units and unbacked cabinet work with specified finish systems, including specified number of coats.

.2 Finish shelving tops, bottoms and edges with specified finish systems, including specified number of coats.

3.11 PATCHING OF COMPLETED WORK

.1 Repair, touch-up, and refinish damaged finishes and finishes unsatisfactory to Owner.

.2 Refinish entire wall or area where deemed necessary by Owner.

3.12 CLEANING/CLEAN-UP

.1 Place cotton waste, cloths and other material which may constitute a fire hazard in metal containers and remove from site daily.

.2 Upon completion of the work, remove all paint and varnish spots from floors, glass and other surfaces. Remove from the premises all rubbish and accumulated materials of whatever nature, not caused by others, and leave this work in clean, orderly and acceptable conditions.

END OF SECTION

1. GENERAL

.1 SECTION INCLUDES

.1 Interior Primer.

.2 Interior Paint.

.3 Exterior Primer.

.4 Exterior Paint.

.5 Wall Preparation.

.2 RELATED SECTIONS

.1	Finish Carpentry	Section 06 20 00.
.2	Gypsum Board Assemblies:	Section 09 21 16.

.3 REFERENCES

.1 MPI (APL) - Master Painters Institute.

.4 DEFINITIONS

.1 Paints are available in a wide range of sheens or glosses, as measured by a gloss meter from a 60 degree angle from vertical, as a percentage of the amount of light that is reflected. The following terms are used to describe the gloss of the products.

1. Flat - Less than 5 units.
2. Matte - 0 - 10 units.
3. Eggshell - 10 - 25 units.
4. Satin - 20 - 35 units.
5. Semi-Gloss - 35 - 70 units.
6. Gloss - 70 - 85 units.

.5 SUBMITTALS

.1 Submit under provisions of Section 01 00 01 - General Requirements.

.2 Product Data: Provide a complete list of all products to be used, with the following information for each:

- .1 Manufacturer's name, product name and/or catalog number, and general product category.
- .2 Cross-reference to specified paint system(s) that the product is to be used in; include description of each system.

.3 Samples: Submit three paper samples, 5 inches by 7 inches (127mm x 178mm) in size, illustrating selected colors for each color and system selected with specified coats cascaded.

.4 Manufacturer's Instructions: Indicate special surface preparation procedures.

.5 Maintenance Data: Submit data on cleaning, touch-up, and repair of painted and coated surfaces.

.6 QUALITY ASSURANCE

.1 Manufacturer Qualifications: a single manufacturer with a minimum of ten (10) years experience will supply all primary products specified in this section.

.2 Installer Qualifications: All products listed in this section are to be installed by a single installer with a minimum of five (5) years demonstrated experience in installing products of the same type and scope as specified.

.3 Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.

1. Finish areas designated by Architect.
2. Do not proceed with remaining work until Architect approves workmanship, color, and sheen.
3. Refinish mock-up area as required to produce acceptable work.

.7 DELIVERY, STORAGE, AND HANDLING

.1 Store products in manufacturer's unopened packaging until ready for installation.

.2 Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

.3 Disposal:

1. Never pour leftover coating down any sink or drain. Use up material on the job or seal can and store safely for future use.
2. Do not incinerate closed containers.
3. For specific disposal or recycle guidelines, contact the local waste management agency or district. Recycle whenever possible.

.8 PROJECT CONDITIONS

.1 Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

.9 WARRANTY

.1 At project closeout, provide to the Owner or owner's representative an executed copy of the Manufacturer's standard form outlining the terms and conditions of and any exclusions to their Limited Warranty against Manufacturing Defect.

.10 EXTRA MATERIALS

.1 At project closeout, supply the Owner or owner's representative one gallon of each product for touch-up purposes.

.2 At project closeout, provide the color mixture name and code to the Owner or owner's representative for accurate future color matching.

2. PRODUCTS

.1 MANUFACTURERS

.1 Acceptable Manufacturer: Benjamin Moore & Co., which is located at: 101 Paragon Drive, Montvale, NJ 07645; Toll Free Tel: 866-708-9181; Tel: 201-573-9600; Email: info@benjaminmoore.com; Web: www.benjaminmoore.com

.2 Substitutions: Not permitted.

.2 MATERIALS - GENERAL

.1 Volatile Organic Compound (VOC) Content:

1. Provide coatings that comply with the most stringent requirements specified in the following:
2. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
3. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.

.2 Compatibility: Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

.3 MIXING AND TINTING

.1 Except where specifically noted in this section, all paint shall be ready-mixed and pre-tinted. Agitate all paint prior to and during application to ensure uniform color, gloss, and consistency.

.2 Thinner addition shall not exceed manufacturer's printed recommendations. Do not use kerosene or other organic solvents to thin water-based paints.

.3 Where paint is to be sprayed, thin according to manufacturer's current guidelines.

.4 EXTERIOR PRIMERS

1. One (1) Coat of Insl-X – Aqua Lock Plus Wood Primer (AQ-0400)

.5 INTERIOR PRIMERS

1. Gypsum Wall Board

   One (1) Coat of Coronado – Super Kote 3000 Latex Primer (948)

2. Wood Trim

   One (1) Coat of Insl-X – Aqua Lock Plus Wood Primer (AQ-0400)

.6 EXTERIOR FINISH COATS

1. Three (3) Coats of Benjamin Moore – Regal Exterior Paint – Low Lustre (K401)

.7 INTERIOR FINISH COATS

1. Two (2) Coats of Benjamin Moore – Scuff-X Interior Paint

3. EXECUTION

.1 EXAMINATION

.1 Do not begin installation until substrates have been properly prepared.

.2 Ensure that surfaces to receive paint are dry immediately prior to application.

.3 Ensure that moisture-retaining substrates to receive paint have moisture content within tolerances allowed by coating manufacturer. Where exceeding the following values, promptly notify Architect and obtain direction before beginning work.

1. Concrete: 13 percent. Allow new concrete to cure a minimum of 28 days.
2. Exterior Wood: 17 percent.
3. Interior Wood: 15 percent.
4. Interior Finish Detail Woodwork, Including Trim, and Casework: 10 percent.
5. Plaster and Gypsum: 15 percent.
6. Concrete Slab-On-Grade: Perform calcium chloride test over 24 hour period or other acceptable test to manufacturer. Verify acceptable moisture transmission and pH levels.

.4 Examine surfaces to receive coatings for surface imperfections and contaminants that could impair performance or appearance of coatings, including but not limited to, loose primer, rust, scale, oil, grease, mildew, algae, or fungus, stains or marks, cracks, indentations, or abrasions.

.5 Correct conditions that could impair performance or appearance of coatings in accordance with specified surface preparation procedures before proceeding with coating application.

.2 PREPARATION - GENERAL

.1 Clean surfaces thoroughly prior to coating application.

.2 Do not start work until surfaces to be finished are in proper condition to produce finished surfaces of uniform, satisfactory appearance.

.3 Stains and Marks: Remove completely, if possible, using materials and methods recommended by coating manufacturer; cover stains and marks which cannot be completely removed with isolating primer or sealer recommended by coating manufacturer to prevent bleed-through.

.4 Remove Mildew, Algae, and Fungus using materials and methods recommended by coating manufacturer.

.5 Remove dust and loose particulate matter from surfaces to receive coatings immediately prior to coating application.

.6 Remove or protect adjacent hardware, electrical equipment plates, mechanical grilles and louvers, lighting fixture trim, and other items not indicated to receive coatings.

.7 Move or protect equipment and fixtures adjacent to surfaces indicated to receive coatings to allow application of coatings.

.8 Protect adjacent surfaces not indicated to receive coatings.

.9 Prepare surfaces in accordance with manufacturer's instructions for specified coatings and indicated materials, using only methods and materials recommended by coating manufacturer.

.3 SURFACE PREPARATION

.1 Gypsum Board: Repair cracks, holes and other surface defects with joint compound to produce surface flush with adjacent surfaces.

.2 Metals - Ferrous, Unprimed: Remove rust or scale, if present, by wire brush cleaning, power tool cleaning, or sandblast cleaning; remove grease, oil, and other contaminants which could impair coating performance or appearance by solvent cleaning, with phosphoric-acid solution cleaning of welds, bolts and nuts; spot-prime repaired welds with specified primer.

.3 Metals - Ferrous, Shop-Primed: Remove loose primer and rust, if present, by scraping and sanding, feathering edges of cleaned areas to produce uniform flat surface; solvent-clean surfaces and spot-prime bare metal with specified primer, feathering edges to produce uniform flat surface.

.4 Metals - Galvanized Steel (not passivated): Clean with a water-based industrial strength cleaner, apply an adhesion promoter followed by a clean water rinse. Alternately, wipe down surfaces using clean, lint-free cloths saturated with xylene or lacquer thinner; followed by wiping the surface dry using clean, lint-free cloths.

.5 Metals - Galvanized Steel, Passivated: Clean with water-based industrial strength cleaner. After the surface has been prepared, apply recommended primer to a small area. Allow primer to cure for 7 days, and test adhesion using the "cross-hatch adhesion tape test" method in accordance with ASTM D 3359. If the adhesion of the primer is positive, proceed with a recommended coating system for galvanized metal.

.6 Wood:
1. Seal knots, pitch streaks, and sap areas with sealer recommended by coating manufacturer; fill nail recesses and cracks with filler recommended by coating manufacturer; sand surfaces smooth.
2. Apply primer coat to back of wood trim and paneling.

.7 Wood Doors: Seal door tops and bottoms prior to finishing.

.8 Wood Doors - Field-Glazed Frames and Sash: Prime or seal glazing channels prior to glazing.

.4 APPLICATION - GENERAL

.1 Apply each coat to uniform coating thickness in accordance with manufacturer's instructions, not exceeding manufacturer's specified maximum spread rate for indicated surface; thins, brush marks, roller marks, orange-peel, or other application imperfections are not permitted.

.2 Allow manufacturer's specified drying time, and ensure correct coating adhesion, for each coat before applying next coat.

.3 Inspect each coat before applying next coat; touch-up surface imperfections with coating material, feathering, and sanding if required; touch-up areas to achieve flat, uniform surface without surface defects visible from 5 feet (1.5 m).

.4 Remove dust and other foreign materials from substrate immediately prior to applying each coat.

.5 Where paint application abuts other materials or other coating color, terminate coating with a clean sharp termination line without coating overlap.

.6 Where color changes occur between adjoining spaces, through framed openings that are of same color as adjoining surfaces, change color at outside stop corner nearest to face of closed door.

.7 Re-prepare and re-coat unsatisfactory finishes; refinish entire area to corners or other natural terminations.

.5 CLEANING

.1 Clean excess coating materials, and coating materials deposited on surfaces not indicated to receive coatings, as construction activities of this section progress; do not allow to dry.

.2 Re-install hardware, electrical equipment plates, mechanical grilles and louvers, lighting fixture trim, and other items that have been removed to protect from contact with coatings.

.3 Reconnect equipment adjacent to surfaces indicated to receive coatings.

.4 Relocate to original position equipment and fixtures that have been moved to allow application of coatings.

.5 Remove protective materials.

.6 PROTECTION

.1 Protect completed coating applications from damage by subsequent construction activities.

.2 Repair to Architect's acceptance coatings damaged by subsequent construction activities. Where repairs cannot be made to Architect's acceptance, re-apply finish coating to nearest adjacent change of surface plane, in both horizontal and vertical directions.

END OF SECTION

1. General

1.1 SECTION INCLUDES

.1 This Section includes requirements for supply and installation of the following:

.1 Gypsum board on walls.

.2 Related accessories.

1.2 REFERENCE DOCUMENTS

.1 Materials and workmanship shall meet or exceed the following:

.1 ASTM C840-96 - Application and Finishing of Gypsum Board. Provide copy on site.

.2 Materials and installation of fire-rated assemblies shall conform to assemblies that have achieved the specified rating when tested to CAN/ULC-S101-1989, Standard Methods of Fire Endurance Tests of Building Construction and Materials.

1.3 SUBMITTALS

.1 Comply with requirements of Division 1.

2. Products

2.1 GYPSUM BOARD

.1 Standard Gypsum Wallboard:

.1 Conforming to ASTM C1396, ivory paper faced, tapered edges, 1220mm (48") wide sheets of maximum practical lengths to minimize end joints, 1/2" thick unless indicated otherwise on drawings.

.1 Sheetrock Brand Gypsum Panels by CGC Inc.
.2 ProRoc Regular by CertainTeed.
.3 ToughRock Gypsum Wallboard by Georgia-Pacific Canada.

.2 Abuse Resistant Gypsum Board:

.1 Manufactured to produce greater resistance to surface indentation and impact penetration resistance than standard gypsum panels:

.2 Gypsum panels with glass fibre reinforced core, tapered edges, minimum 5/8” thickness, conforming to ASTM C1396M and tested to the performance ratings.

.3 Acceptable Materials:

.1 Sheetrock Abuse Resistant by CGC Inc.
.2 Abuse Resistant by CertainTeed.
.3 ToughRock Abuse Resistant by Georgia Pacific Canada.

.3 Gypsum Ceiling Board:

.1 Sag Resistant Gypsum Board: Meeting requirements of ASTM C1396M, ceiling board manufactured to have more sag resistance than regular type gypsum board with long edges tapered, and as follows:

.2 Location: Ceiling surfaces.

.3 Acceptable Materials:

.1 Sheetrock Interior Ceiling Board by CGC Inc.
.2 Tough Rock CD Ceiling Board by Georgia Pacific Canada.
.3 ProRoc Interior Ceiling Board by CertainTeed.

.4 Water (Moisture) and Mould Resistant Wallboard:

.1 Conforming to ASTM C1396 or ASTM C1278, 1220mm (48") wide panels of maximum practical lengths to minimize end joints, tapered edges, 13mm (1/2") thick, with water (moisture) and mould resistant core. Mould resistant panel score of 10 when tested in accordance with ASTM D3273 and evaluated to ASTM D3274. Less than 5% water absorption by weight after 2-hour immersion, as per ASTM C473.

.2 Acceptable Materials: Paperless, coated fibreglass mat on face, back and long edges, water-resistant treated core gypsum board. Conforming to ASTM C1658:

.1 DensArmour Plus High Performance Interior Panels by Georgia Pacific Canada.
.2 Fiberock Brand Aqua-Tough Interior Panels, by CGC Inc.

2.2 ACCESSORIES

.1 Accessories shall be as specified unless otherwise required for conformance to fire-rated assemblies.

.2 Screws: to ASTM C1002-96a, and modified as required for fastening to 1.22 mm and thicker steel studs.

.4 Adhesive for bonding gypsum board to wood and metal framing: waterproof, organic type, gun applied, to CAN/CGSB - 71.25-M88.

.5 Corner Beads: to ASTM C1047-95, galvanized sheet steel, beaded angle, knurled and perforated, 32 mm wide flanges, for joint compound filling metal and paper flange combination, beaded angle, for installation with joint compound.

.6 Edge Beads: to ASTM C1047-95, galvanized sheet steel to ASTM A653M-96, Z180 zinc coating, beaded edge, knurled and perforated flange 32 mm wide, for joint compound filling.

.7 Joint treatment material, joint tape and topping compound: to ASTM C475-94.

.8 Diamond Steel Mesh: 1½" #9 (10GA), flat, carbon steel, strand width .158" and thickness .110", as manufactured by Dramex Expanded Metal Corporation, Rexdale, ON (416.675.6311), or approved equal.

3. Execution

3.1 APPLICATION OF GYPSUM BOARD

.1 Erect gypsum board vertically for walls, unless horizontal application results in fewer end joints. Locate end joints over framing members.

.2 Cut holes for penetrating items to minimize gaps between items and gypsum board.

.3 Keep end joints away from prominent locations and central portions of ceilings.

.4 Locate vertical joints at least 300 mm from jamb lines of doors, windows and other openings.

.5 Erect ceiling gypsum board perpendicular to framing members.

3.2 APPLICATION OF STEEL MESH.

.1 Use minimum 38mm (1 ½") long wood (not drywall) screws spaced at 300mm O/C. (with appropriate washers) to attach steel protection material to wood joists or studs. Screw heads may be of pan, flat, or countersunk type, with pan head being preferred.

.2 Use minimum 1.5" outer diameter (fender-style) washers to secure mesh.

3.3 TAPING AND FINISHING

.1 Finish face panel joints and internal angles with joint system consisting of joint compound, joint tape and topping compound.

.2 Apply joint system according to manufacturer's directions. Feather out onto panel faces.

.3 Finish corner beads, control joints and trim as required with two coats of joint compound and one coat of topping compound feathered out onto panel faces.

.4 Fill each screw or nail head depression individually with joint and topping compounds to bring flush with adjacent surfaces of gypsum board so as to be invisible after painting is completed.

.5 Install materials in accordance with manufacturer's directions.

.6 Sand lightly to remove burred edges and other imperfections. Avoid sanding adjacent surfaces of boards.

.7 Use minimum #120 grit sandpaper for first and second sandings. Use minimum #150 grit sandpaper for final sanding.

.8 Completed installation shall be smooth, level or plumb, free from waves and other defects, ready for painting.

3.4 CUTTING AND PATCHING

.1 Do all cutting, patching and making good as required to provide a satisfactory finish.

.2 When prime coat has become sufficiently dry, examine surfaces for any final patching that may be required. Use colour tinted patching compound for later visual examination.

END OF SECTION

1 GENERAL

This section will outline the products and procedures for the repair to and re-plastering of walls and ceilings using existing wooden lathes and lime plasters.

2 PRODUCTS

2.1 LATHE MATERIAL

.1 Provide either oak or chestnut riven lathe. A textured surface and exposed grain provides a better key for the plaster.

2.2 PLASTER MATERIAL

.1 Plastering Sand. Pitt sand is preferred.

.2 Slaked Lime Putty (minimum 14 days old) (If hydrated bag lime is used pre-soaking to a putty is necessary to provide the correct volumes)

.3 Cow or Ox hair for reinforcement

2.3 ACCESSORIES

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

3 EXECUTION

.1 Preparation of Ceiling and Removal of Lathe and Plaster.

.2 Repair of Damaged, broken, missing, or deteriorated wooden lathe.

.3 Installation of Lathes

.4 Plastering.

3.1 INSTALLATION

.1 Preparation of Ceiling and Removal of Lathe and Plaster.

.1 REMOVAL of PLASTER

Clean all old plaster from between the lathe. Check all timbers are free from rot, insect activity, and are generally sound. Use a brush to get rid of any residual materials and vacuum to remove dust.

Denail all timbers.

.2 REPAIR of PLASTER

With repair, cut the edges of any existing plaster to halfway of the nearest joist; angle the cut on the old plaster at 45 degrees so the new material is applied over the bevel holding the edge of the original plaster in place. Ensure that all lathe are securely fixed, re-nail where necessary.

Repairs would normally be carried out following the reinstatement of the key to the rest of the ceiling. Reinstatement results in the original ceiling being up to three times stronger than the original ceiling and resistant to affects caused by water leaks.

.2 REPAIR OF LATHES

.1 Remove sections of lathe that are severely cracked or broken, or otherwise would compromise the application of the plaster coating. Review all questionable areas with the Architect. Remove damaged lathe in complete sections back to supporting

members.

.3 INSTALLATION OF LATHES

Thoroughly wet lathe. To remove the absorption from the lathe spray with "Westox RAP primer or similar" thoroughly wetting the lathe top and bottom, also soak the exposed edges of the plaster around the repair with the primer to "kill" the suction. This also helps to remove the problem of warped lathe when the wet plaster is applied.

Soaking lathe makes them easier to cut with a lath hammer, prevents splinters in the fingers during fixing, makes them easier to nail with less splitting and prevents the expansion of lathe following the application of wet plaster which causes key breakage. Lime plasters are badly affected by too much suction so it is important that all suction is controlled.

Fix the lath at every fixing point (joist) using stainless steel fixings, such as nails, cup and screw, screw and washer or stainless steel brad nails. Make sure there is a 6mm – 10mm (3/8”) gap between each lath to ensure the lime mix can squeeze through and hook onto the back of the lathe.

Fix every lath the same way until you come to fix the eighth lath, move this one over one joist, to create a staggered joint, this will help prevent long, continuous cracks from developing.

Once the whole ceiling or wall is lathed it should be dampened about 10minutes prior to the application of the first coat, this gives time for any excess of water to run off and gives you time to knock up the lime mix. There shouldn’t be any droplets of water on the lathe, as this will cause the plaster to slide across the lathe rather than stick to them.

.4 PLASTERING

.1 PREPARATION OF MATERIALS

Roughly mix the sand and lime together at the ratio of 3 parts sand to 1 part lime and 1 part of teased hair. (all parts are by volume and the same part measurement should be used for each component) Mix by placing 1 portion of lime into a mixer with water and the fibers followed by three portions of sand, tip out after turning over 6 or 7 times. Form a pile of the material until enough mortar has been mixed that is required for the render and float coats. Cover the pile with a plastic sheet and leave for a minimum of 14 days before using if the lime has not been previously aged.(All measuring should be with gauging boxes, not shovels)

.2 MORTAR

Take 3 portions of the mixed material (e.g. 3 x 20 litres) this measure will consist of 60 litres of sand and 20 litres of lime (Lime mixes with the sand without increasing the bulk).

.3 LIME SET COAT

The basic components of a lime set coat is a reverse of the scratch and float coats, ie, 3 parts sand 1 part lime mortar (Coarse stuff) to 3 parts lime to 1 part sand, set coat (Fine stuff) adjustment might be required depending on the sand and 5 parts lime to 2 parts sand is often the required mix after good clean pit sand is passed through a 300 micron sieve.

Mix the lime plaster in a clean mixing vessel using clean water, mix to a usable

consistency and apply a scratch coat directly over the lathe at a 45 degree angle to the lathe so the plaster passes through the wire and lathe curling over to form a key on the back of the lathe, apply so approximately 5 to 8mm of the plaster is left on the underside of the lathe, allow for initial set and scratch thoroughly ready for the following float coat. After the material has cured for several days mix fresh mortar and fill the area to be repaired or form screeds around the perimeter of the ceiling at the required finished level, if plastering a large area form box screeds to the perimeter screeds, fill between the screeds and rule and devil float to a flat keyed surface ready for the following set coat.

If a lime set is preferred allow three or 4 days before applying the lime set over the float coat (depending on the drying conditions)

.4 SET COAT

In a suitable mixing vessel, place 3 portions of lime to 1 portion of sand, and mix to a usable consistency. Apply the mix to the float coat in an even coat at the approximate thickness of 3 to 4mm. After the initial application, lay the material flat and scour the surface with water and a wooden float to compact the material and prevent crazing. (If crazing occurs, increase the portion of sand to 1½ or 2 parts). When the material is well compacted, apply a 'laying in' coat tightly over the surface to fill any voids and finish with a steel trowel and water to a smooth even surface and leave ready for painting.

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

.1 The General Conditions of the Contract, Supplementary Conditions, and the General Requirements of Division 1, form part of this section, and must be read in conjunction with the requirements of this section, and all related sections.

1.2 RELATED REQUIREMENTS

.1 Section 06 20 00: Finish Carpentry

.2 Section 07 92 00: Joint Sealants

.3 Section 09 03 00: Painting and Finishing General Requirements

.4 Section 09 21 16: Gypsum Board

.5 Section 09 65 00: Resilient Flooring and Accessories

1.3 SUMMARY

.1 Section Includes: Provide ceramic, porcelain tiling including but not limited to following:

- .1 grouting control joints in floor slab under tile.
- .2 waterproofing membrane.
- .3 levelling bed.
- .4 fast-setting cement leveling bed for interior floors.
- .5 crack isolation membrane for both floors and walls.
- .6 thin-set mortar bond coat.
- .7 fast-setting thin-set mortar bond coat.
- .8 floor tile, base and fittings.
- .9 wall tile.
- .10 caulking tile control joints.
- .11 caulking penetrations through wall and floor tile.
- .12 sealing stone tile.

1.4 REFERENCES

.1 Abbreviations and Acronyms:

- .1 CIM: Crack Isolation Membrane.
- .2 EGP: Exterior Grade Plywood.
- .3 MSDS: Material Safety Data Sheets.
- .4 SCAQMD: South Coast Air Quality Management District; www.aqmd.gov.
- .5 TTMAC: Terrazzo, Tile & Marble Association of Canada; www.ttmac.com.
- .6 VOC: Volatile Organic Compound.
- .7 WHMIS: Workplace Hazardous Materials Information System.

.2 Reference Standards:

.1 American National Standards Institute (ANSI):

.1 ANSI A118.3-09, American National Standard Specifications for Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy and Water Cleanable Tile-Setting Epoxy Adhesive

.2 ANSI A118.4-09, American National Standard Specifications for Latex-Portland Cement Mortar

.3 ANSI A118.7-09, American National Standard Specifications for Polymer Modified Cement Grouts for Tile Installation

.4 ANSI A118.10-09, American National Standard Specifications for Load Bearing,Bonded, Waterproof Membranes for Thin-set Ceramic Tile and Dimension Stone Installation

.5 ANSI A118.11-09, American National Standard Specifications for EGP (Exterior Glue Plywood) Latex-Portland Cement Mortar

.6 ANSI A136.1-09, American National Standard Specifications for Organic Adhesives for Installation of Ceramic Tile

.7 ANSI A137.1-09, Specification for Ceramic Tile

.2 American Society for Testing and Materials (ASTM):

.1 ASTM A185/A185M-07, Specification for Steel Welded Wire Reinforcement, Plain, for Concrete

.2 ASTM C144-11 - Specification for Aggregate for Masonry Mortar

.3 ASTM C207-06(2011), Standard Specification for Hydrated Lime for Masonry Purposes

.4 ASTM C373-14, Standard Test Method for Water Absorption, Bulk Density, Apparent Porosity, and Apparent Specific Gravity of Fired Whiteware Products, Ceramic Tiles and Glass Tiles

.5 ASTM C503/C503M-10, Standard Specification for Marble Dimension Stone

.6 ASTM C648-04(2009), Standard Test Method for Breaking Strength of Ceramic Tile

.7 ASTM C650-04(09), Standard Test Method for Resistance of Ceramic Tile to Chemical Substances

.8 ASTM C847-12, Standard Specification for Metal Lath

.3 Canadian General Standards Board (CGSB):

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

.4 Canadian Standards Association (CSA):

.1 CSA A3000-13, Cementitious Materials Compendium

.2 CSA A123.3-05(R20100), Asphalt Saturated Organic Roofing Felt

.3 CSA A23.1/A23.2-09, Concrete Materials and Methods of Concrete Construction / Test Methods and Standard Practices for Concrete

.5 International Organization for Standardization (ISO):

.1 ISO 13006:1998, International Standard – Ceramic Tiles - Definitions, classification, characteristics and marking

.2 ISO 10545-7:1996, International Standard - Ceramic Tiles – Part 7: Determination of resistance to surface abrasion for glazed tiles

.3 ISO 13007-1:2004, International Standard - Ceramic tiles - Grouts and adhesives – Part 1: Terms, definitions and specifications for adhesives

.4 ISO 13007-3:2004, International Standard - Ceramic tiles - Grouts and adhesives – Part 3: Terms, definitions and specifications for grouts

1.6 SUBMITTALS

.1 Provide submittals in accordance with the General Conditions and Section 01 30 00.

.2 Action Submittals: Provide the following submittals before starting any work of this Section:

.1 Product Data: Submit manufacturer's product data for each type of product specified. Data shall indicate compliance with specification and installation recommendations of manufacturer of products being used.

.2 Shop Drawings: Submit Shop Drawings for work of this Section to Architect of Record. In addition to minimum requirements indicate following:

.1 details of construction.

.2 joint layouts.

.3 dimensions.

.4 patterns.

.5 markings.

.6 lettering.

.3 Samples:

.1 Submit samples to Consultant. Submit individual sample panels of each colour of ceramic tile, set with adhesive, grouting and bonding method as specified, showing quality, colour and finish of material, grout and pattern of tiles. Ensure each panel is minimum 600 mm x 600 mm (24" x 24").

.2 Submit samples of preformed bases, trim and other specialty shapes.

1.7 MAINTENANCE MATERIAL

.1 Provide minimum 2% of each type and colour of tile required for project for maintenance use in accordance with Section 01 00 01 Closeout Submittals.

.2 Maintenance material to be of same production run as installed material.

.3 Provide instructions for the care and maintenance of all tile for this project, for inclusion in Operations and Maintenance Manual.

1.8 QUALITY ASSURANCE

.1 Qualifications:

.1 Installers: Execute work of this Section using a company who is a member in good standing with TTMAC and has minimum 5 years successful experience in application of

Products, systems and assemblies specified. Perform tile work using skilled mechanics trained and experienced in work of this complexity. Install waterproofing system using an applicator approved by system manufacturer.

.2 Mock-Ups:

.1 Construct a minimum 2'x2' mock-up at Project location designated by Consultant for acceptance. Ensure mock-up area is cleaned and properly prepared for tiling using specified setting and grouting materials in accordance with Specifications, Product instructions and discussions. During mock-up installation, ensure participants are present to observe substrate preparation, installation, grouting and cleaning procedures. Caution: When grouting with sanded grout, take special care and caution to prevent scratching, dulling or otherwise damaging tile natural surface appearance.

.2 After mock-up has cured and been inspected, discuss pertinent remarks, observations and recommendations in the presence of participants.

.3 Once accepted, mock-up including recorded remarks and recommendations remains part of finished work and used as a quality reference standard for balance of Project.

.4 It shall be the responsibility of the material manufacturer's representative to visit the site during installation, at intervals agreed upon with the Consultant to ensure proper use of proprietary materials and assist the Contractor as may be required, and shall also submit a report to the Consultant of their findings after each site review to ensure their directions are being adhered to.

1.9 DELIVERY, STORAGE AND HANDLING

.1 Delivery and Acceptance Requirements:

.1 Coordinate deliveries to comply with construction progress schedule and arrange for above ground, under cover storage before materials are delivered to site.

.2 Deliver tile in a manner to avoid chipping, breakage, staining and any other damage.

.3 Deliver packaged materials in their original bags and containers clearly identified.

.2 Storage and Handling Requirements:

.1 Store and handle tile in a manner to avoid chipping, breakage, staining and any other damage.

.2 Store packaged materials in their original bags and containers clearly identified. Keep containers sealed and labels intact unit time of use. Prevent damage or contamination to materials by water, moisture, freezing, excessive heat, foreign matter or other causes. If materials have frozen, do not stir liquids or mix materials until they are completely thawed.

.3 Provide secure heated and dry storage facilities on site. Maintain temperatures in storage area between 15 deg C (59 deg F) and 30 deg C (86 deg F).

1.10 SITE CONDITIONS

.1 Do not perform work of this Section at temperature below 12 deg C (54 deg F) when using portland cement mortars or dry set mortars, latex portland mortars or bond coat. Maintain temperature between 12 deg C (54 deg F) and 32 deg C (90 deg F).

.2 Observe manufacturer's recommended working temperatures for installation of adhesives and grouts.

.3 Close doors and windows and turn off direct forced ventilation systems and apparatus. Turn off radiant floor heating systems and protect work area from direct draft, sun and heat exposure during installation and for at least 72 hours after completion

.4 Do not perform work of this Section when either substrate and/or ambient temperatures are below 10 deg C (50 deg F) or above 35 deg C (95 deg F). Maintain temperature in tiled areas within these temperature limits during installation and for 7 Days after completion of the Work unless otherwise indicated in the Product instructions and/or in ANSI A108 Installation Standard Procedure requirements.

1.11 WARRANTY

.1 Manufacturer Warranty:

.1 Warrant work of this Section for a period of 5 years against defects, excessive wear and loss of adhesion including replacement of defective tiling, materials, labour costs for demolition of defective work, accessories and installation systems. Cracks arising from normal shrinkage and/or expansion of concrete are not considered as structural failure. Hairline cracks in grout joints which result from these causes are considered normal and warranty is not voided as a result of these minor defects.

.2 Warrant waterproofing work of this Section against defects of workmanship and materials and against any actual leakage, for a period of 5 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

.1 Manufacturer List: Products of following manufacturers are acceptable subject to conformance to requirements of Drawings, Schedules and Specifications:

.1 Flextile Ltd.; www.flextile.net

.2 Laticrete International, Inc.; www.laticrete.com

.3 Mapei Corporation; www.mapei.ca

.4 Terratinta; www.stone-tile.com

.2 Use proprietary Products in full compliance with manufacturer's recommendations. As far as possible obtain Product from single manufacturer ensuring compatibility with adjacent components while maintaining quality.

2.3 MATERIALS

.1 Waterproofing Membrane: Provide 1 of following:

.1 Extra heavy duty, seamless, load bearing conforming to ANSI A118.10, for installation of ceramic tile and quarry tile for areas such as bathrooms, plazas, showers, kitchens, fountains and balconies : “Flextile WP-980 Waterproof & Crack Isolation Membrane with Reinforcing Fabric” by Flextile Ltd. or “Latacrete 9235” waterproof membrane system with Latacrete's fiberglass cloth reinforcement by Laticrete International, Inc. or “Mapelastic™ 315” by Mapei Corporation.

.2 A single component self-curing liquid rubber polymer that forms a flexible, seamless waterproofing membrane; provide “Hydro Ban” by Laticrete International, Inc. or “Aqua Defense” by Mapei Corporation.

.2 Setting Bed and Thin-Set Adhesive:

.1 Latex Mortar Bond Coat: ISO 13007-1 performance level (C2ES2P2); ANSI A118.4; ANSI A118.11; for improved (C2) cement adhesive with (E) extended open time (S2) high-deformability (>5 mm) and improved (P2) for adherence to EGP characteristics, conforming to ANSI A118.4 and ANSI A118.11 requirements, supply “Laticrete 4237 with 211 Crete Filler Powder” by Laticrete International, Inc., “Kerabond/Keralastic" by Mapei Corporation or “#51 Floor and Wall Mix Thin-Set Mortar” and “#44 High Solids Latex Thin-Set Mortar Additive” by Flextile Ltd., “Ardex X 5 Thin Set Mortar” by Ardex.

.3 Tile Materials – Upper Washroom

.1 Walls: Shell White, 4” x 4”, by Olympia Tile.

.4 Grout

.1 Floor grout: Sanded, latex-modified Portland cement grout, to ANSI 118.6. Acceptable Colours and products:

.1 #00 White by Mapei Inc.

.2 Other acceptable products:

.1 Laticrete 500/1776, by Laticrete International Inc.

.2 TA-650/869, by Tec Specialty Products Inc.

.3 Polyblend Sanded, by Custom Building Products.

.5 Grout Sealer: Penetrating sealer as recommended by grout manufacturer to suit grout selected. Acceptable products are:

.6 Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers and as follows:

.1 Job Site Cleaner: Phosphoric acid/nitric acid based cleaning solution mixed in accordance with cleaner manufacturers recommendations and as recommended by tile manufacturer.

.2 Maintenance Cleaner: Non-toxic, electrolytic, biodegradable, non-ammonia containing, pH controlled cleaning solution mixed in accordance with manufacturer’s recommendations.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions:

.1 Verify existing conditions and finishes are ready to receive specified tile work. Ensure backings are structurally sound, level, and plumb within required tolerances. Notify Consultant in writing of unacceptable substrate conditions.

.2 Ensure compatibility of adhesives, waterproofing, reinforcing and fillers with adjacent substrate and component coming in contact with these Products.

.3 Ensure waterproofing and adhesive manufacturers; examine substrate conditions, verify conditions are suitable for installation prior to commencement and review application procedures. If requested submit written report.

.2 Evaluation and Assessment:

.1 Before setting, examine tile backs for possible dust or other contaminants. If necessary, use a slightly damp towel and wipe tile backs to remove any such dust or contaminant residue.

.2 Commencement of work implies acceptance of previously completed work.

3.2 PREPARATION

.1 Surface Preparation:

.1 Ensure substrates are structurally sound, solid, stable, level, plumb and true to a tolerance in plane of 6 mm in 3 m (1/4" in 10' - 0") in accordance with ANSI A108 specification requirements. Ensure substrates are clean and free of dust, oil, grease, paint, tar, wax, curing agent, primer, sealer, form release agent or any deleterious substance and debris which may prevent or reduce adhesion.

.2 Mechanically sand, shot blast or scarify substrate as required to completely remove paint, loosely bonded topping, loose particles and contaminants. Surface etching or contaminant removal by chemical means is not permitted. When sanding or scarifying surfaces that may contain silica sand, wear an approved dust mask.

3.3 INSTALLATION

.1 Provide tiling in accordance with TTMAC's "Specification Guide 09 30 00 Tile Installation Manual 2006-2007" unless specified otherwise.

.2 Lay out tile so field or patterns are centered on wall areas, or conform to architectural details so no tile less than 1/2 size occurs. No cut tiles are allowed at finished ceiling level. Align joints in walls, bases and floors, where tile sizes accommodate. Provide uniform joint widths throughout.

.3 Prior to installation ensure back of each tile is free of contaminants. Distribute production run variations evenly, maintaining continuity of appearance. When necessary, wipe the back face of stone or tile with a damp towel or cloth to remove dust and residual contaminants.

.4 Arrange accessories in tile work so they are spaced evenly, centered with joints and set true with proper and adequate projection conforming to manufacturer's recommendations.

.5 Make sure tile has adequate solid backing. Ensure corner and edges are fully supported by bonding material. Avoid slippage. Ensure tile installation has a minimum of 95% bond coverage by backbuttering or other approved technique.

.6 Fit tile units around corners, fitments, fixtures, drains and other built-in-objects to maintain uniform joint appearance. Cut, drill and set anchors, bolts for fastening fixtures and fittings in tile work. Make cut edges smooth, even and free from chipping. Do not split tile.

.7 Grout to match colour of tile unless indicated otherwise. Fill joints.

.8 Ceramic Tile:

.1 Provide setting bed in accordance with manufacturer's printed instructions and as specified herein.

.2 Prepare gypsum board and cement board surfaces, by applying a scratch coat of setting bed material.

.3 Provide setting compound in 1 layer with notched trowel to provide a continuous 3 mm to 6 mm (1/8" to 1/4") bed in unidirectional manner on both substrate and tile back.

.4 Place tiles to achieve uniform:

.1 shading.

.2 colouring.

.3 jointing.

.5 Lay tiles in true lines, conforming to lines of building and arrange symmetrically in accordance with Drawing layouts. Review layout and slopes with Consultant prior to setting of tiles.

.6 Lay tile on freshly notched thin-set mortar, slide tile back and forth at 90 degree to notches. Ensure tiles are set while bond coat is wet and in tacky stage without skin. Provide back buttering by applying thin troweled coat to back side of tile using flat side of trowel immediately before laying to achieve minimum 95% adhesion.

.7 Tile Joints: space tile between 1.5 mm (1/16”) and 3 mm (1/8”) width joints when grouting with unsanded grout and minimum 3 mm (1/8”) width joints when grouting with sanded or epoxy grout. No butt joints are permitted.

.8 Lay out work to produce a symmetrical pattern with minimum amount of cutting. Ensure cut tile at room perimeter is not less than 1/2 full size.

.9 Set wall tile in a true vertical plane with edges of tiles flush with each other.

.10 Provide ceramic tile bases to work of Architectural Woodwork and Modular Casework Sections as indicated.

.11 Replace cracked, discoloured, chipped and damaged tile.

.12 Align joints of wall tiles.

.9 Grouting:

.1 Where tiling or stone tiling is installed with normal setting thin-set mortar, grout no sooner than 24 hours after installation.

.2 Where tiling or stone tiling is installed with fast-setting mortar system, grout no sooner than 3 to 4 hours after installation.

.3 Where tiling or stone tiling is installed with reactive epoxy mortars and adhesives, grout no sooner than 24 hours after installation.

.4 Where tiling or stone tiling is installed with reactive polyurethane adhesive, grout no sooner than 24 hours after installation.

.5 Install epoxy grouts in accordance with Product instructions and ANSI Al08.6.

.6 Install chemical resistant furan resin mortar and grout only for setting and grouting pre-waxed chemical resistant floor tile or paving brick. Proceed in accordance with Product instructions and ANSI A108.8.

.7 Install unsanded cement grout in accordance with Product instructions and ANSI A108.10.

.8 Install sanded cement grout in accordance with Product instructions and ANSI A108.10.

.9 Install fast-setting sanded 'HCT' cement grout in accordance with Product instructions and ANSI A108.10.

3.4 SITE QUALITY CONTROL

.1 Non-Conforming Work: Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of Consultant at no cost to Owner.

3.5 CLEANING

.1 Remove grout and mortar residue immediately while work progresses and before materials harden on tiling surface.

.2 Clean tiling completely leaving no apparent cement laitance on the surface. Do not acid wash especially where pigmented grouts are specified.

.3 Clean adjacent surfaces that have been soiled or otherwise marred, to completely remove evidence of materials causing same.

.4 Upon completion, remove protective coverings and clean down finished work of this Section leaving it in a correct condition according to industry standards. Correct defective jointing and grouting and other non-conformities.

3.6 PROTECTION

.1 Protect other parts of work from spatters, stains or damage.

.2 Remove and replace with new materials, sections of work that have become stained, soiled, broken, chipped or otherwise damaged.

.3 Protect finished work from weather, freezing and complete water immersion for periods of at least 72 hours to 14 Days after completion of the Work depending on setting and grouting materials used. Follow Product instructions for requirements.

.4 Walls: Protect walls from impact, vibration and hammering on adjacent and opposite walls for periods of at least 24 hours to 7 Days after installation depending on setting and grouting materials used. Follow Product instructions for requirements.

.5 Since temperature and humidity conditions during and after installation affect final curing time of cement based and epoxy materials, allow for extended periods of cure and protection when ambient and/or substrate temperatures drop below 15 deg C (60 deg F) and/or when relative humidity is higher than 70%.

.6 Protect finished work from damage by other trades and general abuse until Substantial Completion and acceptance.

3.7 SCHEDULES

.1 Install tiles according to TTMAC's "Specification Guide 09 30 00 Tile Installation Manual 2012-2014".

.2 Wall Tile:

.1 Tile Installed Over Gypsum Board – Thin-Set Method, Dry Areas Only: TTMAC Detail 304W-2012-2014.

.2 Tile Installed on Cementitious Backer Unit (CBU), Thin-Set Method/Walls, Detail A - Interior Wet/Dry Areas and Exterior Use: TTMAC Detail 305W-2012-2014.

.3 Tile Installed on Coated Glass Mat Backer Board, Detail B - Interior Wet/Dry Areas: TTMAC Detail 305W-2012-2014.

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

.1 The General Conditions of the Contract, Supplementary Conditions, and the General Requirements of Division 1, form part of this section, and must be read in conjunction with the requirements of this section, and all related sections.

1.2 SUMMARY

.1 This Section includes, but is not limited to, the following:

.1 Resilient tile materials:

.1 Linoleum floor tile

.2 Resilient sheet materials:

.1 Homogeneous sheet linoleum flooring.

.3 Resilient accessories:

.1 Resilient wall bases
.2 Stainless Steel Cove Cap for cove base
.3 Cove Former for cove base
.4 Resilient accessories for transition strips, area dividers

1.3 RELATED REQUIREMENTS

.1 Section 09 03 00: Painting and Finishing General Requirements

.2 Section 09 21 16: Gypsum Board

1.4 REFERENCES

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

.1 ASTM F1516-08, Standard Practice for Sealing Seams of Resilient Flooring Products by the Heat Weld Method (when Recommended)

.2 ASTM F1859-12, Standard Specification for Rubber Sheet Floor Covering Without Backing

.3 ASTM F1861-08(2012)e1, Standard Specification for Resilient Wall Base

.4 ASTM F1869-11, Standard Test Method for Measuring Moisture Vapour Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride

.5 ASTM F2034-08, Standard Specification for Sheet Linoleum Floor Covering

.6 ASTM F2169-12, Standard Specification for Resilient Stair Treads

.2 Canadian General Standards Board (CGSB):

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

1.5 ADMINISTRATIVE REQUIREMENTS

.1 Coordination: Close spaces to traffic during flooring installation and until time period after installation recommended in writing by manufacturer; install flooring and accessories after other finishing operations, including painting and ceiling construction have been completed.

.2 Pre-Installation Conference: Conduct conference at Project site to verify project requirements, substrate conditions, patterns and layouts, coordination with other Sections affected by work of this Section, manufacturer's installation instructions and manufacturer's warranty requirements.

1.6 SUBMITTALS

.1 Submit submittals in accordance with the General Conditions and Section 01 00 01 Submittals.

.2 Action Submittals:

.1 Product Data: Submit one copy of product data for each type of product specified.

.2 Shop Drawings: Submit shop drawings indicating:

.1 Location of seams and edges
.2 Location of columns, doorways, enclosing partitions, built-in furniture, cabinets, and cut-out locations
.3 Type and style of resilient transition strip used between adjacent flooring types

.3 Samples for Selection: Submit manufacturer's colour charts and samples for initial selection consisting of full range of colours and patterns available for each type of product indicated.

.4 Samples for Verification:

.1 Resilient Flooring: Submit samples of each different specified product for verification of colour and pattern in manufacturer's standard size, but not less than 6" x 6" in size for tile or sheet material, or 6" long for resilient accessories.

.5 Informational Submittals: Provide the following submittals during the course of the work:

.1 Site Quality Control Test Results: Submit results or moisture emission testing of concrete subfloors prior to installation of flooring. Results shall include comparison of manufacturer's recommended moisture content to actual moisture vapour emission rate.

.6 Maintenance Data and Operating Instructions:

.1 Operation and Maintenance Data: Submit manufacturer's written instructions for maintenance and cleaning procedures, include list of manufacturer recommended cleaning and maintenance products, and name of original installer and contact information in accordance with Section 01 00 01 Submittals: Operation and Maintenance Data.

.7 Safety Data Sheets:

.1 Submit WHMIS safety data sheets for incorporation into the Operation and Maintenance Manual. Keep one copy of WHMIS safety data sheets on site for reference by workers.

.8 Maintenance Materials:

.1 Provide 5% of each colour of vinyl composition tile and 30'-0" lineal feet coil stock of each colour of resilient base specified, boxed and labelled.

.2 Store maintenance materials on the premises as directed by the Owner.

1.7 QUALITY ASSURANCE

.1 Contractor executing work of this Section shall have a minimum of five (5) years continuous Canadian experience in successful and installation of work of type and quality shown and specified. Submit proof of experience upon Consultant's request.

.2 Resilient Flooring Installer: Use an installer who is competent in heat welding and have a minimum of five (5) years documented experience in the installation of resilient sheet flooring and seams in accordance with manufacturer's training or certification program:

1.8 DELIVERY, STORAGE, HANDLING AND PROTECTION

.1 Coordinate deliveries to comply with Construction Schedule and arrange ahead for off-the-ground, under cover storage location. Do not load any area beyond the design limits.

.2 Materials shall be carefully checked, unloaded, stored and handled to prevent damage. Protect materials with suitable non-staining waterproof coverings.

.3 Store material in original, undamaged containers or wrappings with manufacturer's seals and labels intact.

.4 Restrict traffic by other trades during installation.

.5 Provide adequate protection of completed tiled surfaces to prevent damage by other trades until final completion of this project. Minimum protection shall consist of kraftpaper.

1.9 ENVIRONMENTAL CONDITIONS

.1 Temperature of room, floor surface and materials shall not be less than 21 deg C for 48 hours before, during and for 48 hours after installation. Concrete floors shall be aged for a minimum of 28 days and shall be dry before application of the resilient floor tile.

.2 Moisture content of floor shall not exceed a maximum of 3 lbs. of water per 1,000 sq. ft. of concrete slab area over a 24 hour period as measured by one of the following methods, as approved by Consultant:

.1 Rubber Manufacturer's Association (RMA) moisture test using anhydrous calcium chloride.

.2 Does not exceed 3% as measured by Calcium Carbide Hygrometer procedure.

.3 Does not exceed 5% as measured by normal Protimeter.

.3 Avoid exposure to high humidity, cold drafts and abrupt temperature changes.

1.10 WARRANTY

.1 Warrant the work of this Section against defects in materials and workmanship in accordance with the General Conditions but for an extended period of five (5) years and agree to repair or replace faulty materials or work which become evident during warranty period without cost to the Owner. Defects shall include, but not limited to, bond failure, and extensive colour fading.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

.1 Basis-of-Design Manufacturers: Manufacturers named in this Section were are approved to provide work specified in this Section. Additional manufacturers offering similar products may be incorporated into the work of this Section provided they meet the performance requirements indicated and provided requests for substitution are provided in accordance with Section 01 23 51 Request for Alternate Materials, a minimum of ten (10) days in advance of Bid Closing.

.2 Approved manufacturers:

.1 Johnsonite

.2 Armstrong Flooring

.3 Forbo Flooring Systems

2.2 SHEET FLOORING MATERIALS

.1 Sheet Linoleum Flooring: Conforming to ASTM F2034 and as follows:

.1 Type: I – Linoleum Sheet with Backing

.2 Thickness: Nominal 3/32" (2.5mm)

.3 Width: Nominal Roll Width

.4 Length: Manufacturers standard roll length

.5 Basis of Design Product: Marmoleum Real by Forbo.

.6 Colour:

.1 Refer to room finish schedules.
.2 Adhesives: Waterproof epoxy type as manufactured or recommended by manufacturer.
.3 Weld rod: By manufacturer with colour to match sheet.

2.3 TILE FLOORING MATERIALS

.1 Linoleum Tile: Conforming to ASTM F2034, Type I, composed of natural ingredients, mixed and placed onto a jute backing, marbleized pattern, 0.100"(2.5mm) thickness:

.1 Critical Radiant Flux: 0.45 watts/cm^2 – Class 1, to ASTM E648.

.2 Smoke: 450 or less to ASTM E662.

.3 Static Load Limit: 250psi(17.6kg/cm^2) to ASTM F970.

.4 Basis of Design Product: Marmoleum Composition Tile by Forbo Flooring Inc.

2.4 RESILIENT ACCESSORIES

.1 Resilient Wall Base for Resilient Flooring: Smooth, buffed exposed face and ribbed or grooved bonding surface supplied in maximum practical length, with pre-moulded end stops and external corners to match base, conforming to ASTM F1861 and as follows:

.1 Type: TV – Thermoplastic Vinyl

.2 Group: 1 – Homogeneous

.3 Style: A – Straight

.4 Height: 4-1/2" (114mm)

.5 Thickness and Length: Manufacturers standard.

.6 Colour:

.1 Refer to room finish schedules.

.7 Basis of Design Manufacturer: Johnsonite, Tightlock Resilient Wall Base

.2 Resilient Wall Base for Carpet: Smooth, buffed exposed face and ribbed or grooved bonding surface supplied in maximum practical length, with pre-moulded end stops and external corners to match base, conforming to ASTM F1861 and as follows:

.1 Type: TP – Thermoplastic Rubber

.2 Group: 1 – Homogeneous

.3 Style: A – Straight

.4 Height: 4-1/2" (114mm)

.5 Thickness and Length: Manufacturers standard.

.6 Colour

.1 Refer to room finish schedules.

.7 Basis of Design Manufacturer: Johnsonite, Tightlock Carpet Wall Base

.3 Cove Base: Cove Former and Stainless Steel Cove Cap to be supplied by resilient flooring manufacturer, in maximum practical lengths.

.4 Resilient Transition and Edge Strips: Extruded vinyl shapes meeting or exceeding ADA Recommendations for change of level transitions for transition between floors finishes having different levels, i.e.: between resilient flooring on underlayment to carpet with no cushion or underlayment; acceptable materials as follows:

.1 The following list is included to indicate the most commonly used transition and edge strip accessories; additional materials may be required where transition heights differ from the products listed and shall be included as a part of the Contract.

.2 Transition Strips:

.1 Carpet to Resilient Flooring Transition: Johnsonite No. CTA-XX-[H].
.2 Carpet to Concrete Slab Transition: Johnsonite No. CTA-XX-[J].
.3 Resilient Flooring to Concrete Slab Transition: Johnsonite SSR-XX-[B]
.4 Ceramic Tile to Resilient Flooring Transition: Johnsonite CTA-XX-[K]

.5 Trowellable Levelling and Patching Compounds: Latex modified, portland cement based formulation provided or approved by resilient product manufacturer for applications indicated; Gypsum based materials will not be accepted for use on this project.

.6 Heat Welding Bead: Solid strand product recommended by flooring manufacturer for heat welding seams, and as follows:

.1 Colour and Pattern: Match colour and pattern of resilient flooring, as approved by the Consultant.Colour: Match field colour of resilient flooring. Colour: As selected by Consultant from manufacturer's full range of colours to contrast with field and accent colour of resilient flooring.]

.7 Fillers and Primers:

.1 Types and brands approved, acceptable to flooring material and resilient base manufacturers for the applicable conditions. Use non-shrinking latex compound.

.8 Resilient Floor Tile and Sheet Adhesive:

.1 Water-based adhesive, 100% solvent free, highly moisture resistant and containing anti-microbial protection.

.1 Basis of Design Product: Sustain 885m by Forbo.

.9 Resilient Floor Tile and Sheet Finishing Accessories:

.1 Sealer and Wax: Coordinated with Owners preferred long term maintenance program, sealer or wax as appropriate to flooring materials specified.

.2 Polyethylene: 6” thickness conforming to CAN/CGSB-51.34.

.3 Tape: Self adhesive 3” wide cloth tape.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Testing and Inspections: Test moisture emission rate of concrete subfloor prior to installing flooring, using the calcium chloride test method in accordance with ASTM F1869.

.2 Examine substrates, areas, and conditions affecting work are in accordance with manufacturer's requirements, and as follows:

.1 Verify that floor surfaces are smooth and flat to plus or minus 1/8” over 10’; notify Consultant in writing where floor tolerances are not within acceptable values.

.2 Verify that concrete slabs exhibit normal alkalinity of between 5 and 9 and that they are free of carbonization or dusting deleterious to flooring installation or adhesive bond.

.3 Verify that subfloors are free of cracks, ridges, depressions, scale, and foreign deposits that could interfere with flooring installation.

3.2 PREPARATION

.1 Comply with resilient flooring manufacturer's written installation instructions for preparing substrates indicated to receive flooring.

.2 Fill cracks, holes, and depressions in substrates using trowellable levelling and patching compounds in accordance with manufacturers written instructions and as follows:

.1 Levelling and patching shall be restricted to correcting minor deviations or imperfections to bring floor surface finish to within flooring manufacturers tolerances for flatness.

.3 Remove coatings from concrete substrates, including curing compounds and other substances that are incompatible with flooring adhesives, and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer; do not use solvents.

.4 Broom and vacuum clean substrates immediately before installing flooring.

3.3 INSTALLATION

.1 Comply with resilient flooring manufacturer's written installation instructions.

.2 Unroll flooring and allow stabilizing before cutting and fitting in accordance with manufacturer's installation instructions.

.3 Apply primer in strict accordance with manufacturer's printed instructions. Permit primer to dry.

.4 Apply adhesive uniformly with an approved notchtooth spreader at the recommended rate. (Mechanical spreader not approved). Do not spread more adhesive than can be covered before initial set takes place. Use waterproof adhesive throughout. Follow manufacturer's instructions.

.5 Layout tile flooring as follows:

.1 Lay tile with joints [parallel] to building lines [or as indicated on drawings] to produce a symmetrical tile pattern. Begin laying tiles at the starting point, ensuring that the tile is laid exactly along the layout lines.

.2 Install tile flooring so that perimeter tile width is minimum 1/2 full size. Plan the sequence of spreading adhesive so that the border tiles can be cut and placed into the adhesive before the adhesive working time has been exceeded.

.3 Use trowel as recommended by flooring manufacturer for specific adhesive. Spread at a rate of approximately 150 ft^2/gallon, as recommended by flooring manufacturer.

.4 Install to pattern and direction indicated on Drawings.

.5 Immediately after installation, roll the tile with a 100 pound roller in both directions and repeat as necessary to ensure adequate transfer of adhesive to the backing.

.6 Adhere resilient flooring to substrate without producing open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, or other surface imperfections in completed installation.

.1 Use adhesive applied to substrate in compliance with flooring manufacturer's recommendations, including those for trowel notching, adhesive mixing, and adhesive open and working times.

.6 Layout sheet flooring as follows:

.1 Maintain uniformity of resilient flooring direction. Cut required length of linoleum flooring from roll, allowing enough material to extend up the wall 100mm to 150mm (4" to 6") at either end.

.2 Do not bridge building expansion joints with sheet flooring.

.3 Arrange for a minimum number of seams, where seams are necessary place them in inconspicuous and low traffic areas, and not less than 150mm (6") away from parallel joints in flooring substrates.

.4 Match edges of flooring for colour shading and pattern at seams in accordance with manufacturer's written recommendations.

.5 Apply adhesive and lay sheet flooring into wet adhesive and roll with a 100 pound roller.

.6 Obtain Consultant's acceptance in writing before installing materials having cross seams; make adjustments to seaming plan as directed by Consultant to minimize or eliminate cross seams.

.7 Weld seams with welding rod where optional with manufacturer in accordance with written instructions for treatment of flooring adjacent to seams:

.1 Route joints of sheet flooring, leaving recommended joint profile for welding rod and permanently weld seams in accordance with ASTM F1516

.8 Install flooring flush with adjoining floor covering surfaces..

.9 Provide cap to top of coved sheet flooring. Top of coved sheet flooring shall be straight and level to variation of plus or minus 1/8" over 10' straight edge.

.10 Roll sheet flooring in both directions in accordance with manufacturer's instructions.

.11 Adhere resilient flooring to substrate without producing open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, or other surface imperfections in completed installation.

.1 Use adhesive applied to substrate in compliance with flooring manufacturer's recommendations, including those for trowel notching, adhesive mixing, and adhesive open and working times.

.7 Layout resilient base as follows:

.1 Fit joints tight and vertical.

.2 Joints along one plane shall be at minimum 23' spacing, at inconspicuous locations.

.3 Mitre internal corners, use pre-moulded sections for external corners and exposed ends.

.4 Install base on solid backing. Adhere tightly to wall and floor surfaces.

.5 Scribe and fit to door frames and other obstructions.

.6 Install outside corners prior to installation of straight sections.

.7 Install straight and level to variation of plus or minus 1/8" over 10' straight edge.

.8 Do not stretch base during installation.

.9 Shave back of base where necessary to produce snug fit to substrate.

.8 Layout resilient accessories as follows:

.1 Install [stair nosing] [stair treads] one piece for full width of tread. Adhere over entire surface and fit accurately.

.2 Install edge strips at unprotected and exposed edges where flooring terminates.

.9 Accurately scribe tile around walls, and other floor conditions.

.10 Each type of material used shall be from one manufacturer throughout the work and material in each area shall be of same production run.

.11 Remove and replace loose, damaged and defective tiles where required and as directed by Consultant.

3.4 CLEANING, SEALING AND FINISHING

.1 Cleaning, sealing and finishing of resilient tile flooring shall be performed using the cleaning, sealing and finishing materials specified of one manufacturer in accordance with the manufacturer's instructions and recommendations. Allow a minimum of four (4) days to elapse after completion of each resilient flooring installation before commencing cleaning, sealing, and finishing operations.

.2 Work shall be handed over to the Owner free of blemishes and in perfect condition.

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

.1 The General Conditions of the Contract, Supplementary Conditions, and the General Requirements of Division 1, form part of this section, and must be read in conjunction with the requirements of this section, and all related sections.

1.2 SUMMARY

.1 Provision of all labour, materials, equipment and incidental services necessary to provide carpet floor finish, including primers, mastics and leveling fillers, adhesives, carpet material, accessories, and protection.

1.3 QUALITY ASSURANCE

.1 Installer shall have a minimum of five (5) years documented experience in the installation of commercial carpet, and be certified by the Manufacturer. Documentation shall be submitted to the Consultant.

1.4 SUBMITTALS

.1 Submit control submittals in accordance with Section 01 00 01.

.2 The General Contractor must provide the following information prior to ordering:

- .1 Requirements: Contractor is responsible for providing the total yardage required.
- .2 Timing of the project.
- .3 Actual time the carpet is to arrive on site.
- .4 Delivery address the carpet is to be shipped to.
- .5 Follow up with written correspondence via fax to carpet manufacturer.
- .6 Payment terms: Carpet manufacturer to be paid for the supply of material net 45 days.

.3 Submit proof that carpet has been tested and passed the Indoor Air Quality (IAQ) Carpet Testing Program requirements of the Carpet and Rug Institute.

.4 Product Data

- .1 Submit product data in accordance with Section 01 00 01.
- .2 Submit product data sheet for each carpet, underlay, adhesive, carpet protection and subfloor filler.
- .3 Submit WHMIS MSDS - Material Safety Data Sheets acceptable to Labour Canada and Health and Welfare Canada for carpet adhesive and seam adhesive. Indicate VOC content.

.5 Samples

- .1 Submit samples in accordance with Section 01 00 01.
- .2 Submit duplicate 12"x12" (300x300mm) pieces of each type of carpet and carpet tile specified, duplicate pieces for each colour selected.

.6 Certificates: Submit proof of performance for each material specified in this Section as follows:

.1 Indoor Air Quality (IAQ): Confirmation of participation in Carpet and Rug Institute's Carpet Testing Program requirements including certificate number including expiration date; or participation certificate indicating participation in ISO 14001 Registration or Scientific Certification System.

.2 Site Quality Control Test Results: Submit results or moisture emission testing of concrete subfloors prior to installation of flooring. Results shall include comparison of manufacturer's recommended moisture content to actual moisture vapour emission rate.

.7 Closeout Submittals

.1 Submit operation and maintenance data for incorporation into manual specified in Section 01 00 01.

.1 Detailed printed instructions for maintenance procedures to ensure maximum life and appearance of floor covering;

.2 Information on recycling of carpeting including manufacturer's reprocessing program; indicate what portions of materials are recyclable.

.2 Include information on recycling of carpet including manufacturer's reprocessing program. Indicate which portions of materials are recyclable.

.8 Extra Materials

.1 Provide extra materials of carpet, carpet base, and adhesives in accordance with Section 01 00 01.

.2 Provide 10% of total carpeted area.

.3 Extra materials to be from same production run as installed materials.

.4 Identify each package of carpet and each container of adhesive.

.5 Deliver and store where directed by Consultant.

1.5 ADMINISTRATIVE REQUIREMENTS

.1 Coordination: Install carpeting before installing items indicated for installation on top of carpet and after other finishing operations, including painting and ceiling construction, has been completed.

.2 Pre-installation Conference: Conduct conference at Project site in accordance with requirements of Section 01 00 01, to verify project requirements, substrate conditions, patterns and layouts, coordination with other Sections affected by work of this Section, manufacturer's installation instructions and manufacturer's warranty requirements.

1.6 REGULATORY REQUIREMENTS

.1 Indoor Air Quality: compliance with CRI Indoor Air Quality Program, CRI -IAQ requirements for maximum total volatile chemicals released into air. Label each carpet product with CRI -IAQ label.

.2 Provide documentation that product meets or exceeds following criteria based on an emission factor measured in mg/m /hr:

.1 Total Volatile Organic Compounds - 0.5.

.2 Formaldehyde - 0.05.

.3 4-phenylcyclohexene - 0.05.

.4 Styrene - 0.4.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Label packaged materials. For tile products indicate nominal dimensions of tile.

.2 Store packaged materials in original containers or wrapping with manufacturer's seals and labels intact.

.3 Store carpeting and accessories in location as directed by Consultant.

.4 Prevent damage to materials during handling and storage. Keep materials under cover and free from dampness.

.5 Maintain temperature of store room at a minimum of 20 deg C, for at least 24 hours immediately before the installation.

1.8 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 00 01, and with Waste Reduction Workplan.

.2 Place materials defined as hazardous or toxic waste in designated containers.

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

.4 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan.

.5 Fold up metal banding, flatten and place in designated area for recycling.

.6 Collect and separate plastic and/or paper packaging for recycling.

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

.8 Close and seal, tightly, all partly used sealant and adhesive containers and store protected in well ventilated, fire-safe area at moderate temperature.

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

.10 Collect, package and store carpet cut-offs and waste material for recycling and return to recycler in accordance with Waste Management Plan.

1.9 PROJECT/SITE ENVIROMENTAL REQUIREMENTS

.1 Moisture: Ensure substrate is within moisture limits prescribed by manufacturer.

.2 Temperature: Maintain ambient temperature of not less than 18 deg C from [72] hours before installation to at least 72 hours after completion of work.

.3 Relative humidity: Maintain relative humidity between 10 and 65% RH for 48 hours before, during and 48 hours after installation.

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

1.10 VENTILATION

.1 Ventilate area of work as directed by Consultant by use of approved portable supply and exhaust fans.

.2 Ventilate enclosed spaces in accordance with Section 01 00 01.

.3 Provide continuous ventilation during and after carpet application. Run ventilation system [24 hours per day] during installation; provide continuous ventilation for [7] days after completion of carpet installation.

1.11 EXTENDED WARRANTIES

.1 System Warranty

.1 Provide manufacturer's certificate warranting the specified carpet products against defects in materials and manufacture including deterioration of backing, delamination, stretching, wrinkling, fading, or other conditions detrimental to appearance or performance, for a minimum period of 10 years from Date of Substantial Performance. Warranty shall cover complete replacement of affected area including carpet, adhesives, and removal/installation costs.

.2 Installation Warranty

.1 Provide a written guarantee stating that carpet installation is guaranteed against defects for two (2) years from Date of Substantial Performance.

PART 2 - PRODUCTS

2.1 CARPET

.1 Provide area carpet for Out Building A-200 and A-203.
Refer to drawing A10-1 for Style and Colour.
.1 Manufacturer: Tarkett/Tandus Centiva.

.1 Provide a carpet runner to protect hallways and stairs in Main Building as noted on plans.
Refer to drawing A10-1 for Style and Colour.

Sides of all runners to be finished.

All stair runners are to be tacked, not glued in place.

Anti-slip backing material to be incorporated into hallway runners.

Stair Rods: ½" Antique brass smooth polished tubular rods.

Stair Brackets: Antique brass regular brackets with finials.

In lieu of shop drawings, provide samples of bars, brackets, and carpet with finished edge for review by Owner and Architect prior to installation.

Include 2 complete extra sets of hardware (bars and brackets).

.1 Manufacturer: Tarkett/Tandus Centiva.

2.2 ACCESSORIES

.1 Seaming tape and adhesive: types recommended by carpet manufacturer for purpose intended.

.2 Adhesive:

.1 Non-release type: two–part polyurethane; Ultrabond G19, by Mapei.

.2 Acrylic release type: recommended by carpet tile manufacturer.

.3 Low VOC content in accordance with CRI requirements.

.3 Carpet protection: non-staining heavy duty kraft paper, or cardboard.

.4 Binder bars: brass of type recommended by carpet manufacturer.

.5 Resilient Accessories: Transition strips, nosings and rubber base as specified in Section 09 65 00, of types indicated on drawings and as required to protect exposed edge of carpet; maximum lengths to minimize running joints.

PART 3 - EXECUTION

3.1 PREPARATION

.1 Remove ridges and bumps.

.2 Apply sub-floor filler/patch to low spots and cracks to achieve floor level to a tolerance as indicated in Section 01 00 01.

.3 Where moisture tests result in values higher than those specified above, apply floor sealer/moisture barrier to concrete floor surface prior to installation. Re-test moisture levels.

.4 Pre-condition carpeting following manufacturer's printed instructions.

.5 Install resilient base before proceeding with carpeting.

3.2 INSTALLATION

.1 Install carpeting using minimum of pieces.

.2 Install in accordance with manufacturer's printed instructions.

.3 Install carpeting after finishing work is completed but before demountable office partitions and telephone and electrical pedestal outlets are installed.

.4 Finish installation to present smooth wearing surface free from conspicuous seams, burring and other faults.

.5 Use material from same dye lot. Ensure colour, pattern and texture match within any one visual area. Maintain constant pile direction.

.6 Hot melt seams and cross-joints.

.7 Fit neatly around architectural, mechanical, electrical and telephone outlets, and furniture fitments, around perimeter of rooms into recesses, and around projections.

3.3 PROTECTION OF FINISHED WORK

.1 Vacuum carpets clean immediately after completion of installation. Protect traffic areas.

.2 Prohibit traffic on carpet until adhesive is cured.

.3 Install carpet protection to satisfaction of Consultant.

.4 Repairs: Replace damaged or defective tile carpeting at no cost to the Owner.

END OF SECTION

1. General

1.1 REFERENCE DOCUMENTS

.1 National Fire Protection Association (NFPA):

.1 NFPA (Fire) 10 Portable Fire Extinguishers, 2013 Edition

.2 Underwriters Laboratories of Canada (ULC):

.1 CAN/ULC-S508-02 (R2013) Standard for the Rating and Fire Testing of Fire Extinguishers, Including Amendments 1 and 2

1.2 PRODUCT OPTIONS AND SUBSTITUTIONS

.1 Refer to Division 01 for requirements pertaining to product options and substitutions.

1.3 SUBMITTALS

.1 Product Data:

.1 Submit manufacturer's printed product literature, specifications and data sheets in accordance with Section 01 33 00 - Submittal Procedures.

.2 Shop Drawings:

.1 Submit shop drawings, clearly indicating fabrication details, plans, elevations, edge details, hardware, and installation details.

.2 Submit large scale details of all anchorages, clearly indicating components, materials, and finishes, and related work.

1.4 CLOSEOUT SUBMITTALS

.1 Operation and Maintenance Data:

.1 Provide data describing maintenance of product for incorporation into Maintenance and Operation Manual.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Waste Management and Disposal:

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

2. Products

2.1 RATING OF PORTABLE FIRE EXTINGUISHERS

.1 Provide hand portable extinguishers rated in accordance with CAN/ULC S508 and bearing ULC label.

2.2 PORTABLE FIRE EXTINGUISHERS

.1 Multi-Purpose Dry Chemical - Pressure Type:

.1 Description: ammonium phosphate, powder type, heavy duty steel cylinder, baked enamel finish, squeeze grip handle with positive on/off valve, hose and nozzle, mounting brackets.

.2 Capacity: 2.2 kg.

.3 Classification: Class A, B, and C fires.

.2 Carbon Dioxide:

.1 Description: carbon dioxide charged heavy duty steel cylinder, baked enamel finish, positive on/off squeeze grip handle, impact resistance discharge horn, mounting bracket.

.2 Capacity: 2.2 kg.

.3 ULC Rating: 2BC.

2.3 FIRE EXTINGUISHER CABINET

.1 Fire Extinguisher Cabinet: cabinet tub formed of 1.6 mm steel. Door and adjustable frame are fabricated of 2.5 mm steel corrosion resistant treated, chrome plate.

.2 Semi-recessed with canopy door

3. Execution

3.1 INSTALLATION

.1 Install fire extinguisher cabinet with top of cabinet 1.5 m above floor.

.2 Provide extinguishers of the type listed for the following areas.

.1 Electrical and telephone rooms: carbon dioxide
.2 File Room: multi-purpose dry chemical
.3 Kitchen: carbon dioxide
.4 Office Areas: multi-purpose dry chemical

.3 Install extinguishers in one of the following:

.1 Fire extinguisher cabinets

.4 Provide extinguishers where indicated on drawings.

.5 Where exact location is not indicated, mount in location as directed by the Consultant.

END OF SECTION

Part 1 General

1.1 SUBMITTALS

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

.2 Shop drawings; submit drawings stamped and signed by the contractor certifying that the shop drawings comply with the contract documents.

.3 Shop drawings to show:

- .1 Mounting arrangements.
- .2 Operating and maintenance clearances.

.4 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.

.5 Closeout Submittals:

- .1 Provide operation and maintenance data for incorporation into manual specified in Section 01 77 00 – Closeout Procedures.
- .2 Operation and maintenance manual approved by, and final copies deposited with, Consultant before final inspection.
- .3 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.
- .4 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.
- .5 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.

.6 Approvals:

.1 Submit 2 copies of draft Operation and Maintenance Manual to Consultant for approval. Submission of individual data will not be accepted unless directed by Consultant.

.2 Make changes as required and re-submit as directed by Consultant.

.7 Additional data:

.1 Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified demonstrations and instructions.

.8 Site records:

.1 Contractor to provide 1 set of reproducible mechanical drawings. 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.

.9 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.

.10 Submit copies of as-built drawings for inclusion in final TAB report.

1.2 QUALITY ASSURANCE

.1 Quality Assurance: in accordance with Section 01 45 00 - Quality Control.

Part 2 Products

2.1 NOT USED

Part 3 Execution

3.1 PAINTING REPAIRS AND RESTORATION

.1 Do painting in accordance with Section 09 91 99 - Painting.

.2 Prime and touch up marred finished paintwork to match original.

.3 Restore to new condition, finishes which have been damaged.

3.2 CLEANING

.1 After Construction and prior to turn-over of the fit-up space, perform cleaning as follows:

.1 Clean interior and exterior of all systems including strainers.

.2 Vacuum interior of ducts. Submit photos of cleaned ducts.

3.3 DEMONSTRATION

.1 Consultant will use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.

.2 Trial usage to apply to following equipment and systems:

.1 Fan Coil System

.2 Exhaust system

.3 Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.

.4 Use operation and maintenance manual and as-built drawings as part of instruction materials.

.5 Instruction duration time requirements as specified in appropriate sections.

3.4 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 SUBMITTALS

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

.2 Shop drawings; submit drawings stamped and signed by the contractor certifying that the submitted material complies with the contract documents.

.3 Shop drawings to show:

- .1 Mounting arrangements.
- .2 Operating and maintenance clearances.

.4 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.

.5 Closeout Submittals:

- .1 Provide operation and maintenance data for incorporation into manual specified in Section 01 77 00 – Contract Closeout.
- .2 Operation and maintenance manual approved by, and final copies deposited with, Consultant before final inspection.
- .3 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.
- .4 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.
- .5 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.

.6 Approvals:

.1 Submit 2 copies of draft Operation and Maintenance Manual to Consultant for approval. Submission of individual data will not be accepted unless directed by Consultant

.2 Make changes as required and re-submit as directed by Consultant.

.7 Additional data:

.1 Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified demonstrations and instructions.

.8 Site records:

.1 The contractor is to provide 1 set of reproducible mechanical drawings. 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.

.9 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.

.10 Submit copies of as-built drawings for inclusion in final TAB report.

1.2 QUALITY ASSURANCE

.1 Quality Assurance: in accordance with Section 01 45 00 - Quality Control.

.2 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29- Health and Safety Requirements.

Part 2 Products

2.1 MATERIALS

.1 Not Used

Part 3 Execution

3.1 PAINTING REPAIRS AND RESTORATION

.1 Do painting in accordance with Section 09 91 99 - Painting.

.2 Prime and touch up marred finished paintwork to match original.

.3 Restore to new condition, finishes which have been damaged.

3.2 CLEANING

.1 Clean interior and exterior of all systems including strainers. Vacuum interior of ductwork and air handling units.

3.3 DEMONSTRATION

.1 Consultant will use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.

.2 Trial usage to apply to following equipment and systems:

.1 All new plumbing equipment and piping.

.3 Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.

3.4 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 REFERENCES

.1 American National Standards Institute (ANSI)/American Society of Mechanical Engineers International (ASME)

- .1 ANSI/ASME B16.15:2013, Cast Bronze Threaded Fittings, Classes 125 and 250.
- .2 ANSI/ASME B16.18:2012, Cast Copper Alloy Solder Joint Pressure Fittings.
- .3 ANSI/ASME B16.22:2013, Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
- .4 ANSI/ASME B16.24:2016, Cast Copper Alloy Pipe Flanges, Flanged Fittings, And Valves: Classes 150, 300, 600, 900, 1500 and 2500.
- .5 ASME B16.26-13, Cast Copper Alloy Fittings for Flared Copper Tubes.
- .6 ASME B31.9-14, Building Services Piping.

.2 ASTM International Inc.

- .1 ASTM A307-14e1, Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 PSI Tensile Strength.
- .2 ASTM A536-84(2014)e1, Standard Specification for Ductile Iron Castings.
- .3 ASTM B88M-16, Standard Specification for Seamless Copper Water Tube (Metric).
- .4 ASTM A536-84 (2014), Standard Specification for Ductile Iron Castings.
- .5 ASTM B32-08 (2014), Standard Specification for Solder Metal.
- .6 ASTM B42-15a, Seamless Copper Tube, Standard Sizes.
- .7 ASTM B88M-14, Standard Specification for Seamless Copper Water Tube (Metric).
- .8 ASTM F876-15, Standard Specification for Crosslinked Polyethylene (PEX) Tubing.
- .9 ASTM F877-11, Standard Specification for Crosslinked Polyethylene (PEX) Hot and Cold Water Distribution System.

.3 American National Standards Institute/American Water Works Association (ANSI)/(AWWA)

- .1 ANSI/AWWA C111/A21.11-17, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
- .2 ANSI/AWWA C151/A21.51-09, Ductile Iron Pipe, Centrifugally Cast, for Water.
- .3 AWWA C904-[06], Crosslinked Polyethylene (PEX) Pressure Pipe, ½ In. (12 mm) through 3 In. (76mm), for Water Service.

.4 Canadian Standards Association (CSA International)

- .1 CSA B242-05 (R2016), Groove and Shoulder Type Mechanical Pipe Couplings.
- .2 CSA B137.5-[13], Crosslinked Polyethylene (PEX) Tubing Systems for Pressure Applications.

.5 Underwriters Laboratories of Canada (ULC)

.1 CAN/ULC S101-07, Fire Endurance Tests of Buildings Construction and Materials.

.2 CAN/ULC S102.2-10, Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings and Miscellaneous Materials and Assemblies.

.3 CAN/ULC S115-11, Standard Method of Fire Tests of Firestop.

.6 Department of Justice Canada (Jus)

.1 Canadian Environmental Protection Act, 1999, c. 33 (CEPA).

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

.1 Material Safety Data Sheets (MSDS).

.8 Manufacturer's Standardization Society of the Valve and Fittings Industry (MSS).

.1 MSS-SP-67-02a, Butterfly Valves.

.2 MSS-SP-70-06, Grey Iron Gate Valves, Flanged and Threaded Ends.

.3 MSS-SP-71-05, Grey Iron Swing Check Valves, Flanged and Threaded Ends.

.4 MSS-SP-80-03, Bronze Gate, Globe, Angle and Check Valves.

.9 National Research Council (NRC)

.1 National Plumbing Code of Canada (NPC) 2015.

.10 Transport Canada (TC)

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

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 and datasheets for insulation and adhesives, and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Closeout Submittals:

.1 Provide maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.3 DELIVERY, STORAGE AND HANDLING

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

.1 Handle and dispose of hazardous materials in accordance with Regional and Municipal regulations.

.2 Waste Management: separate waste material for reuse and recycling in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal

Part 2 Products

2.1 PIPING

.1 Domestic hot, cold and recirculation systems, within building.

.1 Above ground: copper tube, hard drawn, type L: to ASTM B88M.

.2 PEX Piping to CSA B137.5.

.2 Buried or embedded:

.1 Copper tube, soft annealed, type K: to ASTM B88M, in long lengths and with no buried joints.

.2 PEX Piping to CSA B137.5.

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: ANSI/ASME B16.18 or ANSI/ASME B16.22 roll grooved to CSA B242.

.6 NPS 1 1/2 and smaller :

.1 Wrought copper to ANSI/ASME B16.22, cast copper to ANSI/ASME B16.18; with 301 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 95/5.

.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 BALL VALVES

.1 NPS 2 and under, screwed:

.1 Class 150.

.2 Bronze or Forged Brass body, chrome plated brass or stainless steel ball, PTFE adjustable packing, brass gland and PTFE Bunan or TFE seat, 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, chrome plated brass or stainless steel ball, PTFE adjustable packing, brass gland and PTFE or Bunan seat, steel lever handle, with NPT to copper adaptors as specified Section 23 05 23.01 - Valves - Bronze.

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 Install in accordance with National Plumbing Code and local authority having jurisdiction rules.

.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.

3.3 VALVES

.1 Isolate equipment, fixtures and branches with ball valves.

3.4 PRESSURE TESTS

.1 Conform to requirements of Section 21 05 01 - Common Work Results for Mechanical.

.2 Test pressure: greater of 1 times maximum system operating pressure or 860 kPa.

3.5 FLUSHING AND CLEANING

.1 Flush entire system for 8 h. Ensure outlets flushed for 2 hours. Let stand for 24 hours, then draw one sample off longest run. Submit to testing laboratory to verify that system is clean copper to Provincial or Federal potable water guidelines. Let system flush for additional 2 hours, then draw off another sample for testing.

3.6 PRE-START-UP INSPECTIONS

.1 Systems to be complete, prior to flushing, testing and start-up.

.2 Verify that system can be completely drained.

.3 Ensure that pressure booster systems are operating properly.

.4 Ensure that air chambers, expansion compensators are installed properly.

3.7 DISINFECTION

.1 Flush out, disinfect and rinse system to requirements of authority having jurisdiction.

.2 Upon completion, provide laboratory test reports on water quality for Departmental Representative approval.

3.8 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.

.2 Provide continuous supervision during start-up.

.3 Start-up procedures:

.1 Establish circulation and ensure that air is eliminated.
.2 Check pressurization to ensure proper operation and to prevent water hammer, flashing and/or cavitation.
.3 Bring HWS storage tanks up to design temperature slowly.
.4 Monitor piping HWS and HWC piping systems for freedom of movement, pipe expansion as designed.
.5 Check control, limit, safety devices for normal and safe operation.

.4 Rectify start-up deficiencies.

3.9 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 TAB HWC in accordance with Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.

.3 Adjust pressure regulating valves while withdrawal is maximum and inlet pressure is minimum.

.4 Sterilize HWS and HWC systems for Legionella control.

.5 Verify performance of temperature controls.

.6 Verify compliance with safety and health requirements.

.7 Check for proper operation of water hammer arrestors. Run one outlet for 10 seconds, then shut of water immediately. If water hammer occurs, replace water hammer arrestor or re-charge air chambers. Repeat for outlets and flush valves.

.8 Confirm water quality consistent with supply standards, and ensure no residuals remain as result of flushing or cleaning.

.3 Reports:

.1 In accordance with Section 01 91 13 - General Commissioning (Cx) Requirements: Reports, using report forms as specified in Section 01 91 13 - General Commissioning (Cx) Requirements: Report Forms and Schematics.

.2 Include certificate of water flow and pressure tests conducted on incoming water service, demonstrating adequacy of flow and pressure.

3.10 OPERATION REQUIREMENTS

.1 Co-ordinate operation and maintenance requirements including, cleaning and maintenance of specified materials and products with Section 23 05 05 - Installation of Pipework.

3.11 CLEANING

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

.2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 – Construction /Demolition Waste Management and Disposal.

3.12 PLUMBING INSPECTION

.1 Contractor to contact local plumbing inspection authority and have system signed off by authority having jurisdiction.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 ASTM International (ASTM)

- .1 ASTM B32-08, Standard Specification for Solder Metal.
- .2 ASTM B306-02, Standard Specification for Copper Drainage Tube (DWV).
- .3 ASTM C564-03a, Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.

.2 CSA Group (CSA)

- .1 CSA B67-1972 (R1996), Lead Service Pipe, Waste Pipe, Traps, Bends and Accessories.
- .2 CAN/CSA-B70-06, Cast Iron Soil Pipe, Fittings and Means of Joining.
- .3 CAN/CSA-B125.3-05, Plumbing Fittings.

.3 Green Seal Environmental Standards (GSES)

- .1 Standard GS-36-[00], Commercial Adhesives.

.4 National Research Council Canada (NRC)

- .1 National Plumbing Code of Canada 2015 (NPC).

.5 South Coast Air Quality Management District (SCAQMD), California State

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

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 and datasheets for adhesives, and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle 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.

Part 2 Products

2.1 COPPER TUBE AND FITTINGS

.1 Above ground sanitary and vent Type DWV to: ASTM B306.

.1 Fittings.

.1 Cast brass: to CAN/CSA-B125.3.

.2 Wrought copper: to CAN/CSA-B125.3.

.2 Solder: lead free,

2.2 CAST IRON PIPING AND FITTINGS

.1 Above ground sanitary and vent: to CAN/CSA-B70.

.1 Joints:

.1 Hub and spigot:

.1 Caulking lead: to CSA B67.

.2 Mechanical joints:

.1 Neoprene or butyl rubber compression gaskets with stainless steel clamps.

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 15 - Common installation requirements for HVAC pipework.

.2 Install in accordance with National Plumbing Code

3.3 TESTING

.1 Pressure test buried systems before backfilling.

.2 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 that cleanout rods can probe as far as the next cleanout, at least.

.2 Test to ensure traps are fully and permanently primed.

.3 Ensure that fixtures are properly anchored, connected to system and effectively vented.

3.5 CLEANING

.1 Clean in accordance with Section 01 74 00 - Cleaning.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 ASTM International Inc.

.1 ASTM B32-08(2014), Standard Specification for Solder Metal.

.2 ASTM B306-13, Standard Specification for Copper Drainage Tube (DWV).

.3 ASTM C564-14, Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.

.2 Canadian Standards Association (CSA International).

.1 CSA B67-1972(R1996), Lead Service Pipe, Waste Pipe, Traps, Bends and Accessories.

.2 CAN/CSA-B70:2012, Cast Iron Soil Pipe, Fittings and Means of Joining.

.3 CAN/CSA-B125.3-05, Plumbing Fittings.

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 and datasheets for adhesives, and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

Part 2 Products

2.1 COPPER TUBE AND FITTINGS

.1 Above ground sanitary and vent Type DWV to: ASTM B306.

.1 Fittings.

.1 Cast brass: to CAN/CSA-B125.3.

.2 Wrought copper: to CAN/CSA-B125.3.

.2 Solder: lead free, tin-95:5, type TA , to ASTM B32.

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 Install in accordance with National Plumbing Code and local authority having jurisdiction.

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 that cleanout rods can probe as far as the next cleanout, at least.

.2 Test to ensure traps are fully and permanently primed.

.3 Ensure that fixtures are properly anchored, connected to system and effectively vented.

.4 Affix applicable label (, sanitary, vent, etc.) c/w directional arrows every floor or 4.5 m (whichever is less).

3.5 CLEANING

.1 Clean in accordance with Section 01 74 23 – Final Cleaning.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 American National Standards Institute/CSA Group (ANSI/CSA)

.1 ANSI Z21.10.1-2004 /CSA 4.1-2004, Gas Water Heaters - Volume I, Storage Water Heaters With Input Ratings of 75,000 Btu Per Hour or Less.

.2 ANSI Z21.10.1A-2006 /CSA 4.1A-[2006], Addenda 1 to ANSI Z21.10.1-2004/CSA 4.1-2004, Gas Water Heaters Volume I, Storage Water Heaters With Input Ratings of 75,000 Btu Per Hour or Less.

.3 ANSI Z21.10.1b-2006 /CSA 4.1b-2006, Addenda 2 to ANSI Z21.10.1-2004/CSA 4.1-2004, Gas Water Heaters - Volume I, Storage Water Heaters With Input Ratings of 75,000 Btu Per Hour or Less.

.4 ANSI Z21.10.3A-[2007] /CSA 4.3-2007, Gas Water Heaters - Volume III - Storage Water Heaters, with Input Ratings Above 75,000 Btu Per Hour, Circulating and Instantaneous.

.2 CSA Group (CSA)

.1 CSA B51-03 (R2007), Boiler, Pressure Vessel, and Pressure Piping Code.

.2 CAN/CSA-B149.1-[05], Natural Gas and Propane Installation Code.

.3 CAN/CSA-C309-M90 (R2003), Performance Requirements for Glass-Lined Storage Tanks for Household Hot Water Service.

.3 National Research Council Canada (NRC)

.1 National Plumbing Code of Canada [2015] (NPC).

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 and datasheets for domestic water heater, and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

.1 Indicate:

.1 Equipment, including connections, fittings, control assemblies and ancillaries, identifying factory and field assembled.

1.3 CLOSEOUT SUBMITTALS

.1 Provide maintenance and engineering data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle 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.

1.5 WARRANTY

.1 Contractor hereby warrants domestic water heaters in accordance with CCDC2, but for number of years specified for each product.

Part 2 Products

2.1 GAS DIRECT VENT WATER HEATER

.1 To ANSI Z21.10.3/CSA 1-4.3 with a recovery rate of 439L/h based on 56 degrees C rise and 29.3kW input. Thermal efficiency of 96% efficient condensing design.

.2 Tank: 189 L, blue diamond glass lined steel.

.3 Enhanced Ultra-low NOx burner complies with SCAQMD Rule 1146.2 and other Air Quality Management Districts with similar requirements for NOx emissions of less than 14 ng/J or 20 ppm.

2.2 TRIM AND INSTRUMENTATION

.1 Drain valve: NPS 1 with hose end.

.2 ASME rated temperature and pressure relief valve sized for full capacity of heater, having discharge terminating over floor drain and visible to operators.

.3 Magnesium anodes adequate for 20 years of operation and located for easy replacement.

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 Install in accordance with manufacturer's recommendations authority having jurisdiction.

.2 Provide structural steel support for mounting above floor as indicated on drawings.

.3 Provide insulation between tank and supports.

.4 Provide acid neutralization on condensate drain.

.5 Install natural gas fired domestic water heaters in accordance with CAN/CSA-B149.1.

3.3 CLEANING

.1 Clean in accordance with Section 01 74 00 - Cleaning.

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

END OF SECTION

Part 1 General

1.1 REFERENCES

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

.1 ASTM A126-04(2014), Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings.

.2 ASTM B62-17, Specification for Composition Bronze or Ounce Metal Castings.

.2 Canadian Standards Association (CSA International).

.1 CSA-B64 Series-11, Backflow Preventers and Vacuum Breakers.

.2 CSA-B79-08(R2013), Floor, Area and Shower Drains, and Cleanouts for Residential Construction.

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

.1 Material Safety Data Sheets (MSDS).

.4 Plumbing and Drainage Institute (PDI).

.1 PDI-WH201-92, Water Hammer Arresters Standard.

1.2 SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet for fixtures and equipment.

.2 Indicate dimensions, construction details and materials for specified items.

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

.4 Instructions: submit manufacturer's installation instructions.

.5 Manufacturers' Field Reports: manufacturers' field reports specified.

Part 2 Products

2.1 CLEANOUTS

.1 Cleanout Plugs: heavy cast iron male ferrule with brass screws and threaded brass or bronze plug. Sealing-caulked lead seat or neoprene gasket.

.2 Access Covers:

.1 Wall Access: face or wall type, polished nickel bronze or stainless steel square cover with flush head securing screws, bevelled edge frame complete with anchoring lugs.

.2 Floor Access: rectangular cast iron body and frame with adjustable secured nickel bronze top and:

.1 Plugs: bolted bronze with neoprene gasket.

.2 Cover for Unfinished Concrete Floors: nickel bronze round or square, gasket, vandal-proof screws.

.3 Cover for Terrazzo Finish: polished nickel bronze or brass with recessed cover for filling with terrazzo, vandal-proof locking screws.

.4 Cover for Tile and Linoleum Floors: polished nickel bronze with recessed cover for linoleum or tile infill, complete with vandal-proof locking screws.

.5 Cover for Carpeted Floors: polished nickel bronze with deep flange cover for carpet infill, complete with carpet retainer vandal-proof locking screws.

2.2 WATER HAMMER ARRESTORS

.1 Stainless steel or Copper construction, type: to PDI-WH201.

2.3 BACK FLOW PREVENTERS

.1 Preventers: to CSA-B64 Series, application. As required.

2.4 VACUUM BREAKERS

.1 Breakers: to CSA-B64 Series, vacuum breaker as required by the authority having jurisdiction

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 data sheet.

3.2 INSTALLATION

.1 Install in accordance with National Plumbing Code of Canada and local authority having jurisdiction.

.2 Install in accordance with manufacturer's instructions and as specified.

3.3 CLEANOUTS

.1 Install cleanouts at base of soil and waste stacks, and rainwater leaders, at locations required by code, and as indicated.

.2 Bring cleanouts to wall or finished floor unless serviceable from below floor.

.3 Building drain cleanout and stack base cleanouts: line size to maximum NPS4.

3.4 WATER HAMMER ARRESTORS

.1 Install on branch supplies to fixtures or group of fixtures .

3.5 START-UP

.1 General:

.1 In accordance with Section 01 91 13 - General Commissioning (Cx) Requirements: General Requirements, supplemented as specified herein.

.2 Timing: start-up only after:

.1 Pressure tests have been completed.

.3 Provide continuous supervision during start-up.

3.6 TESTING AND ADJUSTING

.1 General:

.1 In accordance with Section 01 91 13- General Commissioning (Cx) Requirements : General Requirements, supplemented as specified.

.2 Timing:

.1 After start-up deficiencies rectified.

.2 After certificate of completion has been issued by authority having jurisdiction.

.3 Application tolerances:

.1 Pressure at fixtures: +/- 70kPa.

.2 Flow rate at fixtures: +/- 20%.

.4 Adjustments:

.1 Verify that flow rate and pressure meet design criteria.

.2 Make adjustments while flow rate or withdrawal is (1) maximum and (2) 25% of maximum and while pressure is (1) maximum and (2) minimum.

.5 Access doors:

.1 Verify size and location relative to items to be accessed.

.6 Cleanouts:

.1 Verify covers are gas-tight, secure, yet readily removable.

.7 Water hammer arrestors:

.1 Verify proper installation of correct type of water hammer arrester.

.8 Commissioning Reports:

.1 In accordance with Section 01 91 13 - General Commissioning (Cx) Requirements: Reports, supplemented as specified.

.9 Training:

.1 In accordance with Section 01 91 13 - General Commissioning (Cx) Requirements: Training of O&M Personnel, supplemented as specified.

.2 Demonstrate full compliance with Design Criteria.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CAN/CSA-B45 Series-02(R2008), Plumbing Fixtures.

.2 CAN/CSA-B125.3-05, Plumbing Fittings.

.3 CAN/CSA-B651-04, Accessible Design for the Built Environment.

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 and datasheets for washroom fixtures, and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Indicate fixtures and trim:

.1 Dimensions, construction details, roughing-in dimensions.

.2 Factory-set water consumption per flush at recommended pressure.

.3 (For water closets, urinals): minimum pressure required for flushing.

.4 Shop Drawings:

.1 Provide drawings stamped and signed by the contractor certifying that the submitted material complies with the contract documents.

1.3 CLOSEOUT SUBMITTALS

.1 Include:

.1 Description of fixtures and trim, giving manufacturer's name, type, model, year, capacity.

.2 Details of operation, servicing, maintenance.

.3 List of recommended spare parts.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

Part 2 Products

2.1 MANUFACTURED UNITS

.1 Fixtures: manufacture in accordance with CAN/CSA-B45 series.

.2 Trim, fittings: manufacture in accordance with CAN/CSA-B125.3.

.3 Exposed plumbing brass to be chrome plated.

.4 Number, locations: as indicated on the drawings.

.5 Fixtures in any one location to be product of one manufacturer and of same type.

.6 Trim in any one location to be product of one manufacturer and of same type.

.7 Water closets:

.1 WC -1: floor-mounted, flush tank.

.1 Bowl: vitreous china, syphon jet, elongated rim, close-coupled combination, bowl and bolt caps.

.2 Closet tank: vitreous china with tank liner, flapper type flush valve assembly for ultra low flush cycle: adjustable from 3.8 - 17 litres/flush, factory set to 5.7 litres/flush.

.8 Water Closet Seats.

.1 Seat: white, elongated, open front, moulded solid plastic, with cover, stainless steel check hinges, stainless steel or solid brass insert post, slow close colour to match water closet.

.9 Washroom Lavatories:

.1 L-1: Wall-hung, integral back:

.1 Vitreous china, with splash lip, soap depressions, supply openings on 100 mm centres, overflow.

.2 L-2: counter top:

.1 Porcelain-on-steel, self-rimming, with front overflow, soap depressions, gasket, swivel clamps, semi-oval or rectangular bowl, supply openings

.10 Washroom Lavatory Trim:

.1 Chrome plated brass, combination supply and waste fittings, mixing spout, washerless, pop-up waste, aerator, metal indexed handles.

.1 Provide accessories to limit maximum flow rate to 8.35 l/minute at 413Kpa.

.2 Waste fitting: pop-up.

.2 Chrome plated brass, single handed mixing faucet, mixing spout, washerless, aerator, handle.

.1 Provide accessories to limit maximum flow rate to 8.35 l/minute at 413 kPa.

.2 Waste fitting: plug and chain.

.11 Fixture piping:

.1 Hot and cold water supplies to fixtures:

.1 Chrome plated flexible supply pipes with screwdriver stop, reducers, escutcheon. insulated feed on barrier free.

.2 Waste:

.1 Brass P trap with clean out on fixtures not having integral trap.

.2 Chrome plated in exposed places. Insulate and offset waste on barrier free.

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 Mounting heights:

.1 Standard: see millwork details and meet barrier free requirements

.2 Barrier free: to most stringent NBCC CAN/CSA B651.

3.3 ADJUSTING

.1 Conform to water conservation requirements specified this section.

.2 Adjustments:

.1 Adjust water flow rate to design flow rates.

.2 Adjust pressure to fixtures to ensure no splashing at maximum pressures.

.3 Checks:

.1 Water closets: flushing action.

.2 Aerators: operation, cleanliness.

.3 Vacuum breakers, backflow preventers: operation under all conditions.

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 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CAN/CSA-B45 Series-02(R2013), Plumbing Fixtures.

.2 CAN/CSA-B125.3-12, Plumbing Fittings.

.3 CAN/CSA-B651-12, Accessible Design for the Built Environment.

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 and datasheets for fixtures, and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

Part 2 Products

2.1 MANUFACTURED UNITS

.1 Fixtures: manufacture in accordance with CAN/CSA-B45 series.

.2 Trim, fittings: manufacture in accordance with CAN/CSA-B125.

.3 Exposed plumbing brass to be chrome plated.

.4 Number, locations: architectural drawings to govern.

.5 Fixtures to be product of one manufacturer.

.6 Trim to be product of one manufacturer.

.7 Ground Floor Kitchen Sink – Main Detachment Building

.1 New stainless steel kitchen sink on main floor to be supplied and installed in new millwork

.2 Sink: 27 ¼” x 20 9/16” drop-in double compartment sink, self-rimming with undercoating, 90mm basket strainer, 20 guage, 18-8 stainless steel, ‘Kindred’ Model: CCLA2027R/8S/3 c/w 3-hole drillings on ledgeback. Sink compartment to be different sizes.

.3 Chrome plated heavy duty brass combination supply fitting with CER-TECK ceramic structures, aerator, lever blade metal handles, "Delta" 26C3133 faucet c/w chrome plated supply with swing spout. Complete with chrome feeds and shutoffs.

.8 Upper Floor Kitchen Sink – Garage Building

.1 New stainless steel kitchen sink on upper floor to be supplied and installed in new millwork

.2 Sink: 31 ¼" x 20 ½" x 8" deep drop-in double compartment sink, self-rimming with undercoating, 90mm basket strainer, 20 guage, 18-8 stainless steel, 'Franke' Model: LBD6408-1/3 c/w 3-hole drillings on ledgeback. Bowls to be equal size 14" x 16"

.3 Chrome plated heavy duty brass combination supply fitting with CER-TECK ceramic structures, aerator, lever blade metal handles, "Delta" 26C3133 faucet c/w chrome plated supply with swing spout. Complete with chrome feeds and shutoffs.

.9 Fixture piping:

.2 Hot and cold water supplies to each fixture:

.1 Chrome plated flexible supply pipes each with screwdriver stop, reducers, escutcheon. Insulated feed.

.3 Waste:

.1 Brass P trap with clean out on each fixture not having integral trap.

.2 Chrome plated in all exposed places. Offset and insulated waste.

.3 Provide under the counter sanitary pump Meyers EB33 to pump sink waste.

.10 Barrier Free

.1 Fixtures and installation to comply to CSA B651.Execution

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 Mounting heights:

.1 Standard: to comply with millwork drawings unless otherwise indicated or specified.

.2 Physically handicapped: to comply with most stringent of either NBCC or CAN/CSA-B651.

3.3 ADJUSTING

.1 Conform to water conservation requirements specified this section.

.2 Adjustments:

.1 Adjust water flow rate to design flow rates.

.2 Adjust pressure to fixtures to ensure no splashing at maximum pressures.

.3 Checks:

.1 Aerators: operation, cleanliness.

.2 Vacuum breakers, backflow preventers: operation under all conditions.

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 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CAN/CSA-B45 Series-02(R2008), Plumbing Fixtures.

.2 CAN/CSA-B125.3-05, Plumbing Fittings.

.3 CAN/CSA-B651-04, Accessible Design for the Built Environment.

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 and datasheets for fixtures, and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

Part 2 Products

2.1 MANUFACTURED UNITS

.1 Trim, fittings: manufacture in accordance with CAN/CSA-B125.3.

.2 Exposed plumbing brass to be chrome plated.

.3 Number, locations: architectural drawings to govern.

.4 Fixtures in any one location to be product of one manufacturer and of same type.

.5 Trim in any one location to be product of one manufacturer and of same type.

.6 Baths:

.1 BT-1 : existing tub.

.2 Existing tub to be relocated as shown on architectural drawings and re-piped to existing piping.

.3 New tub shower fitting as shown on architectural drawings.

.4 Waste: concealed pop-up waste and overflow fitting with lever-operated mechanism.

.7 Showers

.1 New acrylic shower and door supplied and installed where indicated on architectural drawings paying special attention to drain location due to existing wood joist.

.2 Showerhead.

.1 Shower system with secondary integral volume control

.2 Pressure Balancing valve

.3 Adjustable stop screw to limit handle turn

.4 Standard of acceptance: Symmons Model S-9601-P with flow restricted head.

.8 Fixture piping:

.1 Hot and cold water supplies to each fixture.

.2 Waste:

.1 Brass P trap with cleanout on each fixture not having integral trap.

.2 Chrome plated in all exposed places.

.3 Brass or chrome strainer on all showers

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 Mounting heights:

.1 Standard: to comply with architectural drawings.

3.3 ADJUSTING

.1 Conform to water conservation requirements specified this section.

.2 Adjustments:

.1 Adjust water flow rate to design flow rates.

.2 Adjust pressure to fixtures to ensure no splashing at maximum pressures.

.3 Checks:

.1 Aerators: operation, cleanliness.

.2 Vacuum breakers: operation under all conditions.

.4 Thermostatic controls:

.1 Verify temperature settings, operation of control, limit and safety controls.

3.4 CLEANING

.1 Clean in accordance with Section 01 74 23 - Final Cleaning.

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

END OF SECTION

Part 1 General

1.1 SUBMITTALS

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

.2 Shop drawings; submit drawings stamped and signed by the contractor certifying the submitted material complies with the contract documents.

.3 Shop drawings to show:

.1 Mounting arrangements.

.2 Operating and maintenance clearances.

.4 Shop drawings and product data accompanied by:

.1 Manufacturer to certify current model production.

.2 Certification of compliance to applicable codes.

.5 Closeout Submittals:

.1 Provide operation and maintenance data for incorporation into manual specified in Section 01 77 00 – Closeout Procedures

.2 Operation and maintenance manual approved by, and final copies deposited with, Consultant before final inspection.

.3 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.

.4 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.

.5 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.

.6 Approvals:

.1 Submit 2 copies of draft Operation and Maintenance Manual to Consultant for approval. Submission of individual data will not be accepted unless directed by Consultant

.2 Make changes as required and re-submit as directed by Consultant.

.7 Additional data:

.1 Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified demonstrations and instructions.

.8 Site records:

.1 The contractor will provide 1 set of reproducible mechanical drawings. 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.

.9 As-built drawings:

.1 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).

.2 Submit to Consultant for approval and make corrections as directed.

.3 Submit completed reproducible as-built drawings with Operating and Maintenance Manuals.

Part 2 Products

2.1 Not used

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 DEMONSTRATION

.1 Consultant will use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.

.2 Trial usage to apply to following equipment and systems:

.1 New and revised mechanical systems

.3 Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.

.4 Use operation and maintenance manual, as-built drawings, and audio visual aids as part of instruction materials.

.5 Instruction duration time requirements as specified in appropriate sections.

.6 Consultant may record these demonstrations on video tape for future reference.

3.3 CLEANING

.1 Clean interior and exterior of all systems including strainers. Vacuum interior of ductwork and air handling units.

3.4 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 USE OF SYSTEMS

.1 Use of renovated HVAC systems is permitted only under following conditions:

- .1 Entire system is complete, pressure tested and cleaned.
- .2 There is no possibility of damage..
- .3 Systems will be:
  - .1 Operated as per manufacturer's recommendations and instructions.
  - .2 Monitored continuously by the Building maintenance personnel.
- .4 Warranties and guarantees are not relaxed.
- .5 Regular preventive and other manufacturers recommended maintenance routines are being performed.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.

.2 National Fire Code of Canada (2015)

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

1.3 DELIVERY, STORAGE AND HANDLING

.1 Delivery and Acceptance Requirements:

.1 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.

.1 Primers Paints in accordance with manufacturer's recommendations for surface conditions.

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

.3 Paints: maximum VOC limit 150 g/L to Standard GS-11 to SCAQMD Rule 1113.

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 National Fire Code of Canada and CSA B139.

.2 Provide space for disassembly, removal of equipment and components as recommended by manufacturer and CSA B139 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 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.

3.6 PIPEWORK INSTALLATION

.1 Install 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, conserve space.

.9 Install, except where indicated, to permit separate thermal insulation of each pipe.

.10 Group piping wherever possible.

.11 Ream pipes, remove scale and other foreign material before assembly.

.12 Provide for thermal expansion.

3.7 SLEEVES

.1 General: install where pipes pass through masonry, concrete structures, fire rated assemblies, and as indicated.

.2 Material: schedule 40 black steel pipe.

.3 Construction: use annular fins continuously welded at mid-point at foundation walls and where sleeves extend above finished floors.

.4 Sizes: 6 mm minimum clearance between sleeve and uninsulated pipe or between sleeve and insulation.

.5 Installation:

.1 Concrete, masonry walls, concrete floors on grade: terminate flush with finished surface.

.2 Other floors: terminate 25 mm above finished floor.

.3 Before installation, paint exposed exterior surfaces with heavy application of zinc-rich paint to CAN/CGSB-1.181.

.6 Sealing:

.1 Foundation walls and below grade floors: fire retardant, waterproof non-hardening mastic.

.2 Elsewhere:

.1 Provide space for firestopping.

.2 Maintain fire rating integrity.

.3 Sleeves installed for future use: fill with lime plaster or other easily removable filler.

.4 Ensure no contact between copper pipe or tube and sleeve.

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 PREPARATION FOR FIRE STOPPING

.1 Install firestopping within annular space between pipes, ducts, insulation and adjacent fire separation in accordance with Section 07 84 00 - Fire Stopping.

.2 Material to permit pipe movement without damaging fires topping material or installation.

.3 Insulated pipes and ducts: ensure integrity of insulation and vapour barriers.

.4 Uninsulated pipes and ducts: ensure support members do not interfere with fire stopping.

3.10 PRESSURE TESTING OF EQUIPMENT AND PIPEWORK

.1 Advise Consultant 48 hours minimum prior to performance of pressure tests.

.2 Pipework: test all new piping at twice operating pressure.

.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 Conduct tests in presence of Consultant.

.6 Pay costs for repairs or replacement, retesting, and making good. Consultant to determine whether repair or replacement is appropriate.

.7 Insulate or conceal work only after approval and certification of tests by Consultant.

3.11 EXISTING SYSTEMS

.1 Connect into existing piping systems at times approved by Building Owner.

.2 Request written approval Building Owner 10 days minimum, prior to commencement of work.

.3 Be responsible for damage to existing systems by this work.

3.12 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 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 REFERENCES

.1 American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE)

.1 ASHRAE 90.1-16, Energy Standard for Buildings Except Low-Rise Residential Buildings (IESNA cosponsored; ANSI approved; Continuous Maintenance Standard).

.2 Electrical Equipment Manufacturers' Association Council (EEMAC)

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

.1 Material Safety Data Sheets (MSDS).

1.3 SUBMITTALS

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

.2 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.

.1 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01 33 00 - Submittal Procedures.

.3 Quality Control: in accordance with Section 01 45 00 - Quality Control.

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

.2 Instructions: submit manufacturer's installation instructions.

.1 Contractor will make available 1 copy of systems supplier's installation instructions.

.4 Closeout Submittals

.1 Provide maintenance data for motors, drives and guards for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.4 QUALITY ASSURANCE

.1 Regulatory Requirements: work to be performed in compliance with CEPA, CEAA, TDGA, and applicable Provincial /Territorial regulations.

.2 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29 - 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 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 373 W : speed as indicated, continuous duty, built-in overload protection, resilient mount, single phase, 120 V, unless otherwise specified or indicated.

.3 Motors 373 W and larger: EEMAC Class B, squirrel cage induction, speed as indicated, continuous duty, drip proof, ball bearing, maximum temperature rise 40 degrees C, 3 phase, 600 V, unless otherwise 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 7.5 kW : standard adjustable pitch drive sheaves, having plus or minus 10% range. Use mid-position of range for specified r/min.

.4 For motors 7.5 kW 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 in accordance with Section 01 78 00 - Closeout Submittals.

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 38 mm 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 FIELD QUALITY CONTROL

.1 Site Tests: conduct following tests in accordance with Section 01 45 00 - Quality Control and submit report as described in PART 1 - SUBMITTALS.

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 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 within 90 days of award of contract.

.2 Provide documentation confirming qualifications, successful experience, and previous experience with projects of similar size and complexity.

.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-1-2002.

.2 National Environmental Balancing Bureau (NEBB) TABES, Procedural Standards for Testing, Adjusting, Balancing of Environmental Systems-1998.

.3 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA), HVAC TAB HVAC Systems - Testing, Adjusting and Balancing-2002.

.4 Recommendations and suggested practices contained in the TAB Standard: 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 and 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 OPERATION OF SYSTEMS DURING TAB

.1 Operate systems for length of time required for TAB and as required by Consultant for verification of TAB reports.

1.9 START OF TAB

.1 Notify Consultant 7 days prior to start of TAB.

.2 Start TAB when tenant renovation is essentially completed, including:

.3 Installation of ceilings, doors, windows, other construction affecting TAB.

.4 Application of weather stripping, 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 and sealed.

.3 Ducts, air shafts, ceiling plenums are airtight to within specified tolerances.

.4 Correct fan rotation.

.5 Access doors, installed, closed.

.6 Outlets installed, volume control dampers open.

1.10 APPLICATION TOLERANCES

.1 Do TAB to following tolerances of design values:

.1 HVAC systems: plus 5%, minus 5%.

1.11 ACCURACY TOLERANCES

.1 Measured values accurate to within plus or minus 2 % of actual values.

1.12 INSTRUMENTS

.1 Prior to TAB, submit to Consultant list of instruments used together with serial numbers.

.2 Calibrate in accordance with requirements of most stringent of referenced standard for either applicable system or HVAC system.

.3 Calibrate within 3 months of TAB. Provide certificate of calibration to Consultant.

1.13 SUBMITTALS

.1 Submit, prior to commencement of TAB:

.2 Proposed methodology and procedures for performing TAB if different from referenced standard.

1.14 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.

1.15 TAB REPORT

.1 Format in accordance with referenced standard.

.2 TAB report to show results in SI units and to include:

.1 Project record drawings.

.2 System schematics.

.3 Submit 6 copies of TAB Report to Consultant for verification and approval, in English in D-ring binders, complete with index tabs. Provide also in Electronic (CD) format.

1.16 VERIFICATION

.1 Reported results subject to verification by Consultant

.2 Provide personnel and instrumentation to verify up to 100% of reported results.

.3 Number and location of verified results as directed by Consultant.

.4 Pay costs to repeat TAB as required to satisfaction of Consultant.

1.17 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.

1.18 COMPLETION OF TAB

.1 TAB considered complete when final TAB Report received and approved by Consultant.

1.19 AIR SYSTEMS

.1 Standard: TAB to most stringent of this section or TAB standards of AABC, NEBB SMACNA or ASHRAE..

.2 Do TAB of systems, equipment, components, controls specified Division 23 following systems, equipment, components, controls:

.1 All existing, new and revised mechanical systems.

.2 Note: all diffusers in the space require balancing.

.3 Qualifications: personnel performing TAB qualified to standards of AABC or NEBB.

.4 Quality assurance: perform TAB under direction of supervisor qualified to standards of AABC or NEBB.

.5 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.

.6 Locations of equipment measurements: to include as appropriate:

.1 Inlet and outlet of dampers, fan, other equipment causing changes in conditions.

.2 At controllers, controlled device.

.7 Locations of systems measurements to include as appropriate: main ducts, main branch, sub-branch, run-out (or grille, register or diffuser).

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)

.1 ANSI/ASHRAE/IESNA 90.1-16, SI; Energy Standard for Buildings Except Low-Rise Residential Buildings.

.2 American Society for Testing and Materials International, (ASTM)

.1 ASTM B209M-14, Specification for Aluminum and Aluminum Alloy Sheet and Plate (Metric).

.2 ASTM C335-10e1, Test Method for Steady State Heat Transfer Properties of Horizontal Pipe Insulation.

.3 ASTM C411-11, Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.

.4 ASTM C449/C449M-07(2013), Standard Specification for Mineral Fiber-Hydraulic-Setting Thermal Insulating and Finishing Cement.

.5 ASTM C547-15, Specification for Mineral Fiber Pipe Insulation.

.6 ASTM C553-13, Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.

.7 ASTM C612-14, Specification for Mineral Fiber Block and Board Thermal Insulation.

.8 ASTM C795-08(2013), Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.

.9 ASTM C921-10(2015), Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation

.3 Canadian General Standards Board (CGSB)

.1 CGSB 51-GP-52Ma-89, Vapour Barrier, Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.

.4 Thermal Insulation Association of Canada (TIAC): National Insulation Standards (R1999).

.5 Underwriters Laboratories of Canada (ULC)

.1 CAN/ULC-S102-M88(R2000), Surface Burning Characteristics of Building Materials and Assemblies.

.2 CAN/ULC-S701-01, Thermal Insulation Polyotrene, 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" - will mean "not concealed" as defined herein.

□

.3 Insulation systems - insulation material, fasteners, jackets, and other accessories.

.2 TIAC Codes:

.1 CRD: Code Round Ductwork,

.2 CRF: Code Rectangular Finish.

1.3 SHOP DRAWINGS

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

.2 Submit for approval manufacturer's catalogue literature related to installation, fabrication for duct jointing recommendations.

1.4 SAMPLES

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

.2 Submit for approval: complete assembly of each type of insulation system, insulation, coating, and adhesive proposed. Mount sample on 12 mm plywood board. Affix typewritten label beneath sample indicating service.

1.5 MANUFACTURERS' INSTRUCTIONS

.1 Submit manufacturer's installation instructions in accordance with Section 01 33 00 - Submittal Procedures.

.2 Installation instructions to include procedures used, and installation standards achieved.

1.6 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, qualified to standards TIAC.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

.2 Protect from weather and construction traffic.

.3 Protect against damage from any source.

.4 Store at temperatures and conditions recommended by manufacturer.

1.8 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle 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 paper plastic corrugated cardboard packaging material in appropriate on-site for recycling in accordance with Waste Management Plan.

.4 Divert unused metal materials from landfill to metal recycling facility approved by Consultant.

.5 Divert unused adhesive material from landfill to official hazardous material collections site approved by Consultant.

.6 Do not dispose of unused adhesive materials into sewer systems, into lakes, streams, onto ground or in other locations where it will pose health or environmental hazard.

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: as specified includes glass fibre, rock wool, slag wool.

.2 Thermal conductivity ("k" factor) not to exceed specified values at 24°C mean temperature when tested in accordance with ASTM C335.

.3 TIAC Code C-1: Rigid mineral fibre board to ASTM C612, with factory applied vapour retarder jacket to CGSB 51-GP-52Ma (as scheduled in PART 3 of this Section).

.4 TIAC Code C-2: Mineral fibre blanket to ASTM C553 faced with factory applied vapour retarder jacket 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.

2.3 JACKETS

.1 Aluminum:

.1 To ASTM B209 with 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: 12mm wide, 0.5 mm thick stainless steel.

.1 Stainless steel:

□

.5 Type: 304 or 316.

.6 Thickness: 0.25 or 0.50 mm sheet.

.7 Finish: Smooth.

.8 Jacket banding and mechanical seals: 12 or 19 mm wide, 0.5 mm thick stainless steel.

2.4 ACCESSORIES

.1 Vapour retarder lap adhesive:

.1 Water based, fire retardant type, compatible with insulation.

.2 Indoor Vapour Retarder Finish:

.1 Vinyl emulsion type acrylic, compatible with insulation.

.3 Insulating Cement: hydraulic setting on mineral wool, to ASTM C449.

.4 Outdoor Vapour Retarder Mastic:

.1 Vinyl emulsion type acrylic, compatible with insulation.

.2 Reinforcing fabric: Fibrous glass, untreated 305 g/m^2.

.5 Tape: self-adhesive, aluminum, reinforced, 75 mm wide minimum.

.6 Contact adhesive: quick-setting

.7 Canvas adhesive: washable.

.8 Tie wire: 1.5 mm stainless steel.

.9 Banding: 12 mm wide, 0.5 mm thick stainless steel.

.10 Facing: 25 mm stainless or galvanized steel hexagonal wire mesh stitched on both faces of insulation.

.11 Fasteners: 4 mm diameter pins with 35 mm diameter or square clips, length to suit thickness of insulation.

Part 3 Execution

3.1 PRE-INSTALLATION REQUIREMENTS

.1 Pressure testing of ductwork systems complete, witnessed and certified.

.2 Surfaces clean, dry, free from foreign material.

3.2 INSTALLATION

.1 Install in accordance with TIAC National Standards.

□

.2 Apply materials in accordance with manufacturer's instructions and as indicated.

.3 Use two layers with staggered joints when required nominal thickness exceeds 75 mm.

.4 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.

.1 Hangers, supports to be outside vapour retarder jacket.

.5 Supports, Hangers in accordance with SMACNA.

.1 Apply high compressive strength insulation where insulation may be compressed by weight of ductwork.

.6 Fasteners: At 300 mm oc in horizontal and vertical directions, minimum two rows each side.

3.3 DUCTWORK INSULATION SCHEDULE

.1 Insulation types and thicknesses: Conform to following table:

	TIAC Code	Vapour Retarder	Thickness (mm)
Rectangular cold and dual temperature supply air ducts	C-1	yes	50
Round cold and dual temperatire supply air ducts	C-2	yes	50
Supply, return and exhaust ducts exposed in space being served			[none]
Exhaust duct between dampers and louvres	C-1	no	25

END OF SECTION

□

Part 1 General

1.1 REFERENCES

.1 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)

.1 ASHRAE Standard 90.1-16, 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 C335-10e1, Standard Test Method for Steady State Heat Transfer Properties of Horizontal Pipe Insulation.

.2 ASTM C449/C449M-07, Standard Specification for Mineral Fiber-Hydraulic-Setting Thermal Insulating and Finishing Cement.

.3 ASTM C547-2015, Mineral Fiber Pipe Insulation.

.4 ASTM C921-10(2015), Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.

.3 Canadian General Standards Board (CGSB)

.1 CGSB 51-GP-52Ma-89, Vapour Barrier, Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.

.2 CAN/CGSB-51.53-95, Poly (Vinyl Chloride) Jacketting Sheet, for Insulated Pipes, Vessels and Round Ducts

.4 Department of Justice Canada (Jus)

.1 Canadian Environmental Assessment Act (CEAA), 1995, c. 37.

.2 Canadian Environmental Protection Act (CEPA), 1999, c. 33.

.3 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.

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

.1 Material Safety Data Sheets (MSDS).

.6 Manufacturer's Trade Associations

.1 Thermal Insulation Association of Canada (TIAC): National Insulation Standards (Revised 2004).

.7 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULC-S102-10, Surface Burning Characteristics of Building Materials and Assemblies.

.2 CAN/ULC-S701-17, Thermal Insulation, Polystyrene, Boards and Pipe Covering.

.3 CAN/ULC-S702-2014, Thermal Insulation, Mineral Fibre, for Buildings

.4 CAN/ULC-S702.2-15, Thermal Insulation, Mineral Fibre, for Buildings, Part 2: Application Guidelines.

1.2 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.

.2 TIAC ss:

.1 CRF: Code Rectangular Finish.

.2 CPF: Code Piping Finish.

1.3 SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section01 33 00 - Submittal Procedures. Include product characteristics, performance criteria, and limitations.

.3 Shop Drawings:

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

.1 Shop drawings: submit drawings stamped and signed by contractor, certifying that the submitted information complies with the contract documents.

1.4 QUALITY ASSURANCE

.1 Qualifications:

.2 Installer: specialist in performing work of this Section, and have at least 3 years successful experience in this size and type of project, qualified to standards of TIAC.

1.5 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.

.2 Storage and Protection:

.1 Protect from weather, construction traffic.

.2 Protect against damage.

.3 Store at temperatures and conditions required by manufacturer.

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.

2.3 INSULATION SECUREMENT

.1 Tape: self-adhesive, aluminum, reinforced, 50 mm wide minimum.

.2 Contact adhesive: quick setting.

.3 Bands: stainless steel, 19 mm wide, 0.5 mm thick.

2.4 CEMENT

.1 Thermal insulating and finishing cement:

.1 Hydraulic setting or Air drying on mineral wool, to ASTM C449/C449M.

2.5 JACKETS

.1 Aluminum:

.1 To ASTM B209.

.2 Thickness: 0.50 mm sheet.

.3 Finish: stucco embossed.

.4 Joining: longitudinal and circumferential slip joints with 50 mm laps.

.5 Fittings: 0.5 mm thick die-shaped fitting covers with factory-attached protective liner.

.6 Metal jacket banding and mechanical seals: stainless steel, 19 mm wide, 0.5 mm thick at 300 mm spacing.

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 REMOVABLE, PRE-FABRICATED, INSULATION AND ENCLOSURES

.1 Application: at expansion joints, valves, primary flow measuring elements flanges and unions at equipment.

.2 Design: to permit movement of expansion joint and to permit periodic removal and replacement without damage to adjacent insulation.

.3 Insulation:

.1 Insulation, fastenings and finishes: same as system.

.2 Jacket: aluminum.

3.5 INSTALLATION OF ELASTOMERIC INSULATION

.1 Insulation to remain dry. Overlaps to manufacturers instructions. Ensure tight joints.

.2 Provide vapour retarder as recommended by manufacturer.

3.6 PIPING INSULATION SCHEDULES

.1 Includes valves, valve bonnets, strainers, flanges and fittings unless otherwise specified.

.2 TIAC Code: A-1 .

.1 Securements: SS bands 300 mm on centre.

.2 Seals: lap seal adhesive, lagging adhesive.

.3 Installation: TIAC Code 1501-H.

.3 TIAC Code C-2 with vapor retarder jacket.

.1 Insulation securements: SS bands at 300 mm on centre.

.2 Seals: lap seal adhesive, 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
Domestic hot Water	59	A-1	25	25	25	25	25	25
Domestic Cold Water	10	C-2	25	25	25	25	25	25

.5 Finishes:

.1 Indoors: canvas covered

.2 Outdoors: water-proof aluminum jacket.

.3 Finish attachments: SS screws or bands, at 150 mm on centre.

.4 Installation: to appropriate TIAC code CRF/1 through CPF/5.

3.7 CLEANING

.1 Proceed in accordance with Section 01 74 23 – Final 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 SUMMARY

.1 Section Includes:

.1 Materials and installation procedures for electric heating and cooling controls.

1.2 REFERENCES

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

.1 Material Safety Data Sheets (MSDS).

1.3 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.

1.4 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

.1

2.2 THERMOSTAT (FAN COIL)

.1 Thermostat supplied with fan coil complete with fan switch:

2.3 THERMOSTAT GUARDS

.1 Thermostat guards: lockable, clear. Slots for air circulation to thermostat.

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 control devices.

.2 Install remote sensing device and capillary tube in metallic conduit. Conduit enclosing capillary tube must not touch heater or heating cable.

3.3 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 SUMMARY

.1 Section Includes.

.1 Materials and installation for steel piping, valves and fittings for hydronic systems in building services piping.

.2 Related Sections.

.1 Section 01 33 00 - Submittal Procedures.
.2 Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
.3 Section 01 35 29.06 - Health and Safety Requirements.
.4 Section 01 78 00 - Closeout Submittals.
.5 Section 21 05 01 - Common Work Results for Mechanical.
.6 Section 23 08 02 - Cleaning and Start-up of Mechanical Piping Systems.
.7 Section 23 05 01 - Installation of Pipework.
.8 Section 23 05 23.01 - Valves - Bronze.
.9 Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.

1.2 REFERENCES

.1 American Society of Mechanical Engineers (ASME).

.1 ASME B16.3-98Malleable Iron Threaded Fittings.

.2 American Society for Testing and Materials International, (ASTM).

.1 ASTM A47/A47M-99, Standard Specification for Ferritic Malleable Iron Castings.
.2 ASTM A53/A53M-02, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated Welded and Seamless.
.3 ASTM A536-84(1999)e1, Standard Specification for Ductile Iron Castings.

.3 American Water Works Association (AWWA).

.1 AWWA C111-00, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

.4 Canadian Standards Association (CSA International).

.1 CSA B242-M1980(R1998), Groove and Shoulder Type Mechanical Pipe Couplings.

.5 Manufacturer's Standardization of the Valve and Fittings Industry (MSS).

.1 MSS-SP-70-98, Cast Iron Gate Valves, Flanged and Threaded Ends.
.2 MSS-SP-71-97, Cast Iron Swing Check Valves Flanged and Threaded Ends.
.3 MSS-SP-80-03, Bronze Gate, Globe, Angle and Check Valves.
.4 MSS-SP-85-02, Cast Iron Globe and Angle Valves, Flanged and Threaded Ends.

1.3 SUBMITTALS

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

.2 Closeout Submittals.

.1 Provide maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals and include following:

.1 Special servicing requirements.

1.4 QUALITY ASSURANCE

1.5 MAINTENANCE

.1 Extra Materials.

.1 Provide 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.

Part 2 Products

2.1 PIPE

.1 Steel pipe: to ASTM A53/A53M, Grade B:

2.2 PIPE JOINTS

.1 NPS2 and under:] screwed fittings with PTFE tape.

2.3 FITTINGS

.1 Screwed fittings: malleable iron, to ASME B16.3, Class 150.

2.4 VALVES

.1 Connections:

.1 NPS2 and smaller: screwed ends.

.2 Gate valves: to MSS-SP-70 [Application: Isolating equipment, control valves, pipeline:

.1 NPS2 and under:

.1 Mechanical Rooms : Class 125, rising stem, split wedge disc, as specified Section 23 05 23.01 - Valves - Bronze.

.3 Drain valves: Gate, Class 125, non-rising stem, solid wedge disc, as specified Section 23 05 23.01 - Valves - Bronze.

.4 Swing check valves: to MSS-SP-71.

.1 NPS2 and under:

.1 Class 125, swing, with composition disc, as specified Section 23 05 23.01 - Valves - Bronze.

.5 Ball valves:

.1 NPS2 and under: as specified Section 23 05 23.01 - Valves - Bronze.

Part 3 Execution

3.1 PIPING INSTALLATION

.1 Install pipework in accordance with Section 23 05 01 - Installation of Pipe Work.

3.2 CLEANING, FLUSHING AND START-UP

.1 In accordance with Section 23 08 02 - Cleaning and Start-Up of Mechanical Piping Systems.

3.3 TESTING

.1 Test system in accordance with Section 21 05 01 - Common Work Results for Mechanical.

3.4 BALANCING

.1 Balance water systems to within plus or minus 5 % of design output.

.2 Refer to Section 23 05 93 - Testing, Adjusting and Balancing for HVAC for applicable procedures.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 Materials and installation for copper tubing and fittings for refrigerant.

.2 Related Sections:

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 78 00 - Closeout Submittals.

.3 Section 23 05 05 - Installation of Pipework.

1.2 REFERENCES

.1 American Society of Mechanical Engineers (ASME)

.1 ASME B16.22-01, Wrought Copper and Copper Alloy Solder - Joint Pressure Fittings.

.2 ASME B16.24-02, Cast Copper Pipe Flanges and Flanged Fittings: Class 150, 300, 400, 600, 900, 1500 and 2500.

.3 ASME B16.26-88, Cast Copper Alloy Fittings for Flared Copper Tubes.

.4 ASME B31.5-01, Refrigeration Piping and Heat Transfer Components.

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

.1 ASTM A307-04, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.2 ASTM B280-03, Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.

.3 Canadian Standards Association (CSA International)

.1 CSA B52-99, Mechanical Refrigeration Code.

.4 Environment Canada (EC)

.1 EPS 1/RA/1-96, Environmental Code of Practice for the Elimination of Fluorocarbon Emissions from Refrigeration and Air Conditioning Systems.

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

.1 Material Safety Data Sheets (MSDS).

1.3 SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet for piping, fittings and equipment.

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

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

.5 Instructions: submit manufacturer's installation instructions.

.6 Closeout submittals: submit maintenance and engineering data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

Part 2 Products

2.1 TUBING

.1 Processed for refrigeration installations, deoxidized, dehydrated and sealed.

.1 Hard copper: to ASTM B280, type ACR B.

.2 Annealed copper: to ASTM B280, with minimum wall thickness as per CSA B52 and ASME B31.5.

2.2 FITTINGS

.1 Service: design pressure 2070 kPa and temperature 121 degrees C.

.2 Brazed:

.1 Fittings: wrought copper to ASME B16.22.

.2 Joints: silver solder, 15% Ag-80% Cu-5%P or copper-phosphorous, 95% Cu-5%P and non-corrosive flux.

.3 Flanged:

.1 Bronze or brass, to ASME B16.24, Class 150 and Class 300.

.2 Gaskets: suitable for service.

.3 Bolts, nuts and washers: to ASTM A307, heavy series.

.4 Flared:

.1 Bronze or brass, for refrigeration, to ASME B16.26.

2.3 PIPE SLEEVES

.1 Hard copper or steel, sized to provide 6 mm clearance around between sleeve and uninsulated pipe or between sleeve and insulation.

2.4 VALVES

.1 22 mm and under: Class 500, 3.5 Mpa, globe or angle non-directional type, diaphragm, packless type, with forged brass body and bonnet, moisture proof seal for below freezing applications, brazed connections.

.2 Over 22 mm: Class 375, 2.5 Mpa, globe or angle type, diaphragm, packless type, back-seating, cap seal, with cast bronze body and bonnet, moisture proof seal for below freezing applications, brazed connections.

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 GENERAL

.1 Install in accordance with CSA B52, EPS1/RA/1 and ASME B31.5 Section 23 05 05 - Installation of Pipework.

3.3 BRAZING PROCEDURES

.1 Bleed inert gas into pipe during brazing.

.2 Remove valve internal parts, solenoid valve coils, sight glass.

.3 Do not apply heat near expansion valve and bulb.

3.4 PIPING INSTALLATION

.1 General:

.1 Soft annealed copper tubing: bend without crimping or constriction

.2 Hot gas lines:

.1 Pitch at least 1:240 down in direction of flow to prevent oil return to compressor during operation.

.2 Provide trap at base of risers greater than 2400 mm high and at each 7600 mm thereafter.

.3 Provide inverted deep trap at top of risers.

.4 Provide double risers for compressors having capacity modulation.

.1 Large riser: install traps as specified.

.2 Small riser: size for 5.1 m/s at minimum load. Connect upstream of traps on large riser.

3.5 PRESSURE AND LEAK TESTING

.1 Close valves on factory charged equipment and other equipment not designed for test pressures.

.2 Leak test to CSA B52 before evacuation to 2MPa and 1MPa on high and low sides respectively.

.3 Test Procedure: build pressure up to 35 kPa with refrigerant gas on high and low sides. Supplement with nitrogen to required test pressure. Test for leaks with electronic or halide detector. Repair leaks and repeat tests.

3.6 FIELD QUALITY CONTROL

.1 Site Tests/Inspection:

.1 Close service valves on factory charged equipment.

.2 Ambient temperatures to be at least 13 degrees C for at least 12 hours before and during dehydration.

.3 Use copper lines of largest practical size to reduce evacuation time.

.4 Use two-stage vacuum pump with gas ballast on 2nd stage capable of pulling 5Pa absolute and filled with dehydrated oil.

.5 Measure system pressure with vacuum gauge. Take readings with valve between vacuum pump and system closed.

.6 Triple evacuate system components containing gases other than correct refrigerant or having lost holding charge as follows:

.1 Twice to 14 Pa absolute and hold for 4 h.

.2 Break vacuum with refrigerant to 14 kPa.

.3 Final to 5 Pa absolute and hold for at least 12 h.

.4 Isolate pump from system, record vacuum and time readings until stabilization of vacuum.

.5 Submit test results to Engineer.

.7 Charging:

.1 Charge system through filter-drier and charging valve on high side. Low side charging not permitted.

.2 With compressors off, charge only amount necessary for proper operation of system. If system pressures equalize before system is fully charged, close charging valve and start up. With unit operating, add remainder of charge to system.

.3 Re-purge charging line if refrigerant container is changed during charging process.

.8 Checks:

.1 Make checks and measurements as per manufacturer's operation and maintenance instructions.

3.7 DEMONSTRATION

.1 Instructions:

.1 Post instructions in frame with glass cover in accordance with Section 01 78 00 - Closeout Submittals and CSA B52.

3.8 CLEANING

.1 Perform cleaning operations as specified in accordance with manufacturer's recommendations.

.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 REFERENCES

.1 American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE).

.2 American Society for Testing and Materials International, (ASTM).

.1 ASTM A480/A480M-16b, Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet and Strip.

.2 ASTM A635/A635M-15, Standard Specification for Steel, Sheet and Strip, Heavy-Thickness Coils, Carbon, Hot Rolled.

.3 ASTM A653/A653M-15e1, Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.

.3 National Fire Protection Association (NFPA).

.1 NFPA 90A-15, Standard for the Installation of Air-Conditioning and Ventilating Systems.

.4 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA).

.1 SMACNA HVAC Duct Construction Standards - Metal and Flexible, 3rd Edition 2005.

.2 SMACNA HVAC Air Duct Leakage Test Manual, 2012, 2nd Edition.

1.2 DELIVERY, STORAGE AND HANDLING

.1 Protect on site stored or installed absorptive material from moisture damage.

Part 2 Products

2.1 SEAL CLASSIFICATION

.1 Classification as follows:

Maximum Pressure Pa	SMACNA Seal Class
500	A
250	A
125	A
125	A

.2 Seal classification:

.1 Class A: longitudinal seams, transverse joints, duct wall penetrations and connections made airtight with sealant and tape.

2.2 SEALANT

.1 Sealant: oil resistant, water borne, polymer type flame resistant duct sealant. Temperature range of minus 30 degrees C to plus 93 degrees C. Duct tape as sealing method not acceptable

2.3 TAPE

.1 Tape: polyvinyl treated, open weave fiberglass tape, 50 mm wide.

2.4 DUCT LEAKAGE

.1 In accordance with SMACNA HVAC Air Duct Leakage Test Manual.

2.5 FITTINGS

.1 Fabrication: to SMACNA.

.2 Mitred elbows, rectangular:

.1 To 400 mm: with single thickness turning vanes.

2.6 GALVANIZED STEEL

.1 Lock forming quality: to ASTM A653/A653M, Z90 zinc coating.

.2 Thickness, fabrication and reinforcement: to ASHRAE and SMACNA.

.3 Joints: to ASHRAE and SMACNA.

2.7 HANGERS AND SUPPORTS

.1 Hangers and Supports:

.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 ASHRAE and SMACNA.

.3 Hangers: galvanized steel angle with galvanized steel rods to ASHRAE and SMACNA following table:

Duct Size (mm)	Angle Size (mm)	Rod Size (mm)
up to 750	25 x 25 x 3	6
751 to 1050	40 x 40 x 3	6
1051 to 1500	40 x 40 x 3	10
1501 to 2100	50 x 50 x 3	10
2101 to 2400	50 x 50 x 5	10
2401 and over	50 x 50 x 6	10

.4 Upper hanger attachments:

.1 For concrete: manufactured concrete inserts. NOTE: This is a post-tension building. Follow Maple Lead Property Management requirements for all concrete inserts.

.2 For steel joist: manufactured joist clamp.

.3 For steel beams: manufactured beam clamps:

Part 3 Execution

3.1 GENERAL

.1 Do work in accordance with ASHRAE and SMACNA.

.2 Support risers in accordance with ASHRAE and SMACNA.

.3 Manufacture duct in lengths and diameter to accommodate installation of acoustic duct lining.

3.2 HANGERS

.1 Strap hangers: install in accordance with SMACNA.

.2 Angle hangers: complete with locking nuts and washers.

.3 Hanger spacing: in accordance with ASHRAE and SMACNA as follows:

Duct Size (mm)	Spacing (mm)
to 1500	3000
1501 and over	2500

3.3 SEALING AND TAPING

.1 Apply sealant to outside of joint to manufacturer's recommendations.

.2 Bed tape in sealant and recoat with minimum of one coat of sealant to manufacturers recommendations.

.3 Do not insulate any section of the ductwork until it has been inspected.

END OF SECTION

Part 1 General

1.1 REFERENCES

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

.1 Material Safety Data Sheets (MSDS).

.2 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA).

.1 SMACNA - HVAC Duct Construction Standards - Metal and Flexible, 2005.

1.2 SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and data sheet. Indicate the following:

.1 Flexible connections.

.2 Duct access doors.

.3 Turning vanes.

.4 Instrument test ports.

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

.1 Certification of ratings: catalogue or published ratings to be those obtained from tests carried out by manufacturer or independent testing agency signifying adherence to codes and standards.

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

.5 Instructions: submit manufacturer's installation instructions.

.6 Manufacturer's Field Reports: manufacturer's field reports specified.

1.3 QUALITY ASSURANCE

.1 Pre-Installation Meetings:

.1 Convene pre-installation meeting one week prior to beginning work of this Section in accordance with Section [1 32 16.06 - Construction Progress Schedule - Critical Path Method (CPM

.1 Verify project requirements.

.2 Review installation conditions.

.3 Co-ordination with other building subtrades.

.4 Review manufacturer's installation instructions and warranty requirements.

.2 Health and Safety:

.1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

Part 2 Products

2.1 GENERAL

.1 Manufacture in accordance with SMACNA - HVAC Duct Construction Standards.

2.2 FLEXIBLE CONNECTIONS

.1 Frame: galvanized sheet metal frame with fabric clenched by means of double locked seams.

.2 Material:

.1 Fire resistant, self extinguishing, neoprene coated glass fabric, temperature rated at minus 40 degrees C to plus 90 degrees C, density of 1.3 kg/m^2.

2.3 ACCESS DOORS IN DUCTS

.1 Non-Insulated Ducts: sandwich construction of same material as duct, one sheet metal thickness heavier, minimum 0.6 mm thick complete with sheet metal angle frame.

.2 Insulated Ducts: sandwich construction of same material as duct, one sheet metal thickness heavier, minimum 0.6 mm thick complete with sheet metal angle frame and 25 mm thick rigid glass fibre insulation.

.3 Gaskets: required.

.4 Hardware:

.1 Up to 300 x 300 mm: two sash locks.

.2 301 to 450 mm: four sash locks

2.4 INSTRUMENT TEST

.1 1.6 mm thick steel zinc plated after manufacture.

.2 Cam lock handles with neoprene expansion plug and handle chain.

.3 28 mm minimum inside diameter. Length to suit insulation thickness.

.4 Neoprene mounting gasket.

2.5 FIRE DAMPERS

.1 Fire dampers: bear label of ULC or UL, meet requirements of provincial fire authority, Fire Commissioner of Canada (FCC), ANSI/NFPA 90A, and authorities having jurisdiction. Fire damper assemblies fire tested in accordance with CAN4-S112.

.2 Mild steel, factory fabricated for fire rating requirement to maintain integrity of fire wall and/or fire separation.

.1 Fire dampers: 1-1/2 hour fire rated unless otherwise indicated.

.2 Fire dampers: automatic operating type and have dynamic rating suitable for maximum air velocity and pressure differential to which it will be subjected.

.3 Top hinged: round or square; multi-blade hinged or interlocking type; sized to maintain full duct cross section.

.4 Fusible link actuated, weighted to close and lock in closed position when released or having negator-spring-closing operator for multi-leaf type or roll door type in horizontal position with vertical air flow.

.5 40 x 40 x 3 mm retaining angle iron frame, on full perimeter of fire damper, on both sides of fire separation being pierced.

.6 Equip fire dampers with steel sleeve or frame installed disruption ductwork or impair damper operation.

.7 Equip sleeves or frames with perimeter mounting angles attached on both sides of wall or floor opening. Construct ductwork in fire-rated floor-ceiling or roof-ceiling assembly systems with air ducts that pierce ceiling to conform with ULC.

.8 Design and construct dampers to not reduce duct or air transfer opening cross-sectional area.

.9 Dampers shall be installed so that the centerline of the damper depth or thickness is located in the centerline of the wall, partition of floor slab depth or thickness.

.10 Unless otherwise indicated, the installation details given in SMACNA Install Fire Damp HVAC and in manufacturer's instructions for fire dampers shall be followed.

2.6 SPIN-IN COLLARS

.1 Conical galvanized sheet metal spin-in collars with lockable butterfly damper.

.2 Sheet metal thickness to co-responding round duct standards.

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 data sheet.

3.2 INSTALLATION

.1 Flexible Connections:

.1 Install in following locations:

.1 Inlets and outlets to supply air units and fans.

.2 Inlets and outlets of exhaust and return air fans.

.3 As indicated.

.2 Length of connection: 100mm.

.3 Minimum distance between metal parts when system in operation: 75 mm.

.4 Install in accordance with recommendations of SMACNA.

.5 When fan is running:

.1 Ducting on sides of flexible connection to be in alignment.

.2 Access Doors and Viewing Panels:

.1 Size:

.1 300 x 300 mm for servicing entry.

.2 As indicated.

.2 Locations:

.1 Fire and smoke dampers.

.2 Control dampers.

.3 Devices requiring maintenance.

.4 Required by code.

.5 Elsewhere as indicated.

.3 Instrument Test Ports:

.1 General:

.1 Install in accordance with recommendations of SMACNA and in accordance with manufacturer's instructions.

.2 Locate to permit easy manipulation of instruments.

.3 Install insulation port extensions as required.

.4 Locations:

.1 For traverse readings:

.1 Ducted inlets to roof and wall exhausters.

.2 Inlets and outlets of other fan systems.

.3 Main and sub-main ducts.

.4 And as indicated.

.2 For temperature readings:

.1 At outside air intakes.

.2 At inlet and outlet of coils.

.3 Downstream of junctions of two converging air streams of different temperatures.

.4 And as indicated.

.4 Fire Dampers:

.1 Install in accordance with ANSI/NFPA 90A and in accordance with conditions of ULC listing.

.2 Maintain integrity of fire separation.

.3 After completion and prior to concealment obtain approvals of complete installation from authority having jurisdiction.

.4 Install access door adjacent to each damper.

.5 Co-ordinate with installer of fire-stopping.

.6 Ensure access doors/panels, fusible links, damper operators are easily observed and accessible.

.7 Install break-away joints of approved design on each side of fire separation.

3.3 CLEANING

.1 Perform cleaning operations as specified in Section 01 74 11 and in accordance with manufacturer's recommendations.

.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 REFERENCES

.1 Sheet Metal and Air Conditioning National Association (SMACNA)

.1 SMACNA HVAC Duct Construction Standards, Metal and Flexible-2005.

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

.1 Material Safety Data Sheets (MSDS).

1.2 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.

.1 Submit 2 copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01 33 00 - Submittal Procedures.

.2 Quality assurance submittals: submit following in accordance with Section 01 33 00 - Submittal Procedures.

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

.2 Instructions: submit manufacturer's installation instructions.

1.3 DELIVERY, STORAGE, AND HANDLING

.1 Packing, shipping, handling and unloading:

.1 Deliver, store and handle in accordance with manufacturers recommendations.

Part 2 Products

2.1 GENERAL

.1 Manufacture to SMACNA standards.

2.2 SINGLE BLADE DAMPERS

.1 Fabricate from same material as duct, but one sheet metal thickness heavier. V-groove stiffened.

.2 Size and configuration to recommendations of SMACNA, except maximum height 10mm.

.3 Locking quadrant with shaft extension to accommodate insulation thickness.

.4 Inside and outside nylon or bronze end bearings.

.5 Channel frame of same material as adjacent duct, complete with angle stop.

2.3 MULTI-BLADED DAMPERS

.1 Factory manufactured of material compatible with duct.

.2 Opposed blade: configuration, metal thickness and construction to recommendations of SMACNA.

.3 Maximum blade height: 100mm.

.4 Bearings: self-lubricating nylon.

.5 Linkage: shaft extension with locking quadrant.

.6 Channel frame of same material as adjacent duct, complete with angle stop.

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 where indicated.

.2 Install in accordance with recommendations of SMACNA and in accordance with manufacturer's instructions.

.3 Locate balancing dampers in each branch duct, for supply, return and exhaust systems.

.4 Runouts to registers and diffusers: install single blade damper located as close as possible to main ducts.

.5 Dampers: vibration free.

.6 Ensure damper operators are observable and accessible.

.7 Corrections and adjustments conducted by Consultant.

3.3 FIELD QUALITY CONTROL

.1 Tests:

.1 Tests to cover period of not less than 3 days and demonstrate that system is functioning as specified.

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 REFERENCES

.1 American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE).

.2 Department of Justice Canada (Jus).

- .1 Canadian Environmental Protection Act (CEPA), 1999, c. 33.
- .2 Transportation of Dangerous Goods Act, 1992 (TDGA), c. 34.

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

- .1 Material Safety Data Sheets (MSDS).

.4 National Fire Protection Association (NFPA).

- .1 NFPA 90A-15, Standard for the Installation of Air-Conditioning and Ventilating Systems.
- .2 NFPA 90B-15, Standard for Installation of Warm Air Heating and Air-Conditioning Systems.

.5 Sheet Metal and Air-Conditioning Contractors' National Association (SMACNA).

- .1 SMACNA HVAC Duct Construction Standards - Metal and Flexible, 2005
- .2 SMACNA IAQ Guideline for Occupied Buildings under Construction, 2nd Edition 2007.

.6 Underwriters' Laboratories Inc. (UL).

- .1 UL 181-13, Standard for Factory-Made Air Ducts and Air Connectors.

.7 Underwriters' Laboratories of Canada (ULC).

- .1 CAN/ULC-S110-2007, Fire Tests for Air Ducts.

1.2 SUBMITTALS

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

.2 Product Data: Construction for the following:

- .1 Thermal properties.
- .2 Friction loss.
- .3 Acoustical loss.
- .4 Leakage.
- .5 Fire rating.

.3 Samples: submit samples with product data of different types of flexible duct being used in accordance with Section 01 33 00 - Submittal Procedures.

1.3 QUALITY ASSURANCE

.1 Certification of Ratings:

.1 Catalogue or published ratings to be those obtained from tests carried out by manufacturer or independent testing agency signifying adherence to codes and standards.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Protect on site stored or installed absorptive material from moisture damage.

Part 2 Products

2.1 GENERAL

.1 Factory fabricated to CAN/ULC-S110.

.2 Pressure drop coefficients listed below are based on relative sheet metal duct pressure drop coefficient of 1.00.

.3 Flame spread rating not to exceed 25. Smoke developed rating not to exceed 50.

2.2 METALLIC - UNINSULATED

.1 Type 1 : spiral wound flexible aluminum or stainless steel.

.2 Performance:

.1 Factory tested to 2.5 kPa without leakage.

.2 Maximum relative pressure drop coefficient: 3.

Part 3 Execution

3.1 DUCT INSTALLATION

.1 Install in accordance with: CAN/ULC-S110, UL-181 NFPA 90A, NFPA 90B and SMACNA.

3.2 CHANGE IN DIRECTION

.1 Flexible ducts may not be used for changes in direction of duct – use rigid sheet metal elbows.

END OF SECTION

Part 1 General

1.1 REFERENCES

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

.1 ASTM C423-17, Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.

.2 ASTM C916-14, Standard Specification for Adhesives for Duct Thermal Insulation.

.3 ASTM C1071-12, Standard specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material).

.4 ASTM C1338-14, Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings.

.5 ASTM G21-15, Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

.2 Department of Justice Canada (Jus).

.1 Canadian Environmental Protection Act (CEPA), 1999, c. 33.

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

.1 Material Safety Data Sheets (MSDS).

.4 National Fire Protection Association (NFPA).

.1 NFPA 90A-15, Standard for the Installation of Air Conditioning and Ventilating Systems.

.2 NFPA 90B-15, Standard for the Installation of Warm Air Heating and Air Conditioning Systems.

.5 North American Insulation Manufacturers Association (NAIMA).

.1 NAIMA AH116-5th Edition, Fibrous Glass Duct Construction Standards.

.6 Sheet Metal and Air Conditioning Contractor's National Association (SMACNA).

.1 SMACNA, HVAC DCS, HVAC, Duct Construction Standards, Metal and Flexible-2005.

.2 SMACNA IAQ Guideline for Occupied Buildings 2007.

.7 Transport Canada (TC).

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

.8 Underwriter's Laboratories of Canada (ULC).

.1 CAN/ULC-S102-10-EN, Methods of Test for Surface Burning Characteristics of Building Materials and Assemblies.

1.2 SUBMITTALS

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

1.3 HEALTH AND SAFETY

.1 Do construction occupational health and safety in accordance with Section 01 35 29 – Health and Safety Requirements.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Protect on site stored or installed absorptive material from moisture damage.

Part 2 Products

2.1 DUCT LINER

.1 General:

.1 Mineral Fibre duct liner: air surface coated

.2 Flame spread rating shall not exceed 25. Smoke development rating shall not exceed 50 when tested in accordance with CAN/ULC-S102 and NFPA 90A and NFPA 90B.

.3 Fungi resistance: to ASTM C1338 and ASTM G21.

.2 Rigid:

.1 Use on flat surfaces

.2 25 mm thick, to ASTM C1071, Type 2, fibrous glass rigid board duct liner.

.3 Density: 48 kg/m^3minimum.

.4 Thermal resistance to be minimum 0.76 (m^2. degrees C)/W for 25 mm thickness 1.15 (m^2.degrees C)/W for 38 mm thickness, 1.53 (m^2.degrees C)/W for 50 mm thickness when tested in accordance with ASTM C177, at 24 degrees C mean temperature.

.5 Maximum velocity on faced air side: 20.3 m/sec.

.6 Minimum NRC of 0.70 at 25 mm thickness based on Type A mounting to ASTM C423.

2.2 ADHESIVE

.1 Adhesive: to NFPA 90A and NFPA 90B and ASTM C916.

.2 Flame spread rating shall not exceed 25. Smoke development rating shall not exceed 50. Temperature range minus 29°C to plus 93 °C.

.3 Water-based fire retardant type.

2.3 FASTENERS

.1 Weld pins 2.0 mm diameter, length to suit thickness of insulation. Metal retaining clips, 32 mm square.

2.4 JOINT TAPE

.1 Poly-Vinyl treated open weave fiberglass membrane 50 mm wide.

2.5 SEALER

.1 Meet requirements of NFPA 90A and NFPA 90B.

.2 Flame spread rating shall not exceed 25. Smoke development rating shall not exceed 50. Temperature range minus 68 degrees C to plus 93 degrees C.

Part 3 Execution

3.1 GENERAL

.1 Do work in accordance with SMACNA HVAC DCS.

.2 Line inside of ducts where indicated.

.3 Duct dimensions, as indicated, are clear inside duct lining.

3.2 DUCT LINER

.1 Install in accordance with manufacturer's recommendations, and as follows:

.1 Fasten to interior sheet metal surface with 100 % coverage of adhesive to ASTM C916

.1 Exposed leading edges and transverse joints to be factory coated or coated with adhesive during fabrication.

.2 In addition to adhesive, install weld pins not less than 2 rows per surface and not more than 425 mm on centres impact driven mechanical fasteners to compress duct liner sufficiently to hold it firmly in place.

.1 Spacing of mechanical fasteners in accordance with SMAC HVAC DCS NAIMA AH116.

.2 In systems, where air velocities exceeds 20.3 m/sec, install galvanized sheet metal noising to leading edges of duct liner.

3.3 JOINTS

.1 Seal butt joints, exposed edges, weld pin and clip penetrations and damaged areas of liner with joint tape and sealer. Install joint tape in accordance with manufacturer's written recommendations, and as follows:

.1 Bed tape in sealer.

.2 Apply two coats of sealer over tape.

.2 Replace damaged areas of liner at discretion of Consultant..

.3 Protect leading and trailing edges of duct sections with sheet metal nosing having 15 mm overlap and fastened to duct.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 Fans, motors, accessories and hardware for commercial use.

1.2 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, total static pressure, bhp 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 AMCA 99.

.4 Sound ratings: comply with AMCA 301, tested to AMCA 300. Supply unit with AMCA certified sound rating seal.

.5 Performance ratings: based on tests performed in accordance with ANSI/AMCA 210. Supply unit with AMCA certified rating seal, except for propeller fans smaller than 300 mm diameter.

1.3 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 and product data in accordance with Section 01 33 00 - Submittal Procedures.

.3 Provide :

.1 Fan performance curves showing point of operation, BHP and efficiency.

.2 Sound rating data at point of operation.

.4 Indicate:

.1 Motors, sheaves, bearings, shaft details.

.5 Closeout Submittals:

.1 Provide operation and maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.4 MAINTENANCE

.1 Extra Materials:

.1 Provide maintenance materials in accordance with Section [01 78 00 - Closeout Submittals.

.1 Spare parts to include:

.1 Matched sets of belts.

.2 Furnish list of individual manufacturer's recommended spare parts for equipment, include:

.1 Bearings and seals.

.2 Addresses of suppliers.

.3 List of specialized tools necessary for adjusting, repairing or replacing.

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 PROPELLER FANS

.1 Fabricate multibladed propellers of sheet steel or aluminum within bell mouth entrance on integral mounts, with grease lubricated ball bearings, with extended lubrication fittings, suited for operating in any position, direct or belt driven, complete with motor as indicated.

.2 Provide blade guards, bird screen and automatic back draft dampers on discharge, with gasketted edges.

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 FAN INSTALLATION

.1 Provide sheaves and belts required for final air balance.

.2 Bearings and extension tubes to be easily accessible.

.3 Access doors and access panels to be easily accessible.

3.3 ANCHOR BOLTS AND TEMPLATES

.1 Size anchor bolts to withstand seismic acceleration and velocity forces as specified.

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 SUMMARY

.1 Section Includes:

.1 Fans, window ventilators, exterior, wall and ceiling mounted discharge fans for domestic use.

1.2 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.

1.3 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 Provide maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.4 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 WALL AND CEILING DISCHARGE FANS

.1 [Centrifugal direct drive, with plug-in type electric motor suitable for ceiling installation, zinc coated rectangular metal housing.

.2 Sizes and capacity: as indicated on drawings.

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 manufacturer's recommendations.

3.3 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 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.

1.2 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 Indicate following:

.1 Capacity.

.2 Throw and terminal velocity.

.3 Noise criteria.

.4 Pressure drop.

.5 Neck velocity.

1.3 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 To meet capacity, pressure drop, terminal velocity, throw, noise level, neck velocity.

.2 Frames:

.1 Full perimeter gaskets.

.2 Plaster frames where set into plaster or gypsum board or as specified.

.3 Concealed fasteners.

.3 Concealed manual volume control damper operators.

.4 Colour: as directed by architect.

2.2 MANUFACTURED UNITS

.1 Grilles, registers and diffusers of same generic type, products of one manufacturer.

2.3 DIFFUSERS FOR CEILING

.1 Provide square ceiling diffusers to match existing standard of acceptance E.H. Price SCD.

.2 Square Cone ceiling diffusers to have noise level <NC25.

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 manufacturers instructions.

.2 Install with flat head screws in countersunk holes where fastenings are visible.

3.3 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 SUMMARY

.1 Section Includes:

.1 Mechanical louvers; intakes; vents; and reinforcement and bracing for air vents, intakes and gooseneck hoods.

1.2 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.

1.3 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 Indicate following:

.1 Pressure drop.

.2 Face area.

.3 Free area.

.2 Quality assurance submittals: submit following in accordance with Section 01 33 00 - Submittal Procedures.

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

.3 Test Reports:

.1 Submit certified data from independent laboratory substantiating acoustic and aerodynamic performance to ASTM E90.

1.4 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 GOOSENECK HOODS

.1 Thickness: to ASHRAE and SMACNA.

.2 Fabrication: to ASHRAE and SMACNA.

.3 Joints: to ASHRAE and SMACNA and or[proprietary manufactured duct joint. Proprietary manufactured flanged duct joint considered class A seal.

.4 Supports: as indicated.

.5 Complete with integral birdscreen of 2.7 mm diameter aluminum wire. Use 12 mm mesh on exhaust 19 mm mesh on intake.

.6 Horizontal backdraft dampers.

2.2 FIXED LOUVRES - ALUMINUM

.1 Construction: welded with exposed joints ground flush and smooth.

.2 Material: extruded aluminum alloy 6063-T5.

.3 Blade: stormproof pattern with centre watershed in blade, reinforcing bosses and maximum blade length of 1500 mm.

.4 Frame, head, sill and jamb:100 mm deep one piece extruded aluminum, minimum 3 mm thick with approved caulking slot, integral to unit.

.5 Mullions: at 1500 mm maximum centres.

.6 Fastenings: stainless steel SAE-194-8F with SAE-194-SFB nuts and resilient neoprene washers between aluminum and head of bolt, or between nut, ss washer and aluminum body.

.7 Screen: 12 mm exhaust 19 mm intake mesh, 2 mm diameter wire aluminum birdscreen on inside face of louvres in formed U-frame.

.8 Finish: factory applied enamel, Colour: to Architect’s approval.

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 In accordance with manufacturer's and SMACNA recommendations.

.2 Reinforce and brace as indicated.

.3 Anchor securely into opening. Seal with caulking to ensure weather tightness.

3.3 CLEANING

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

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 Heating boiler units:

.1 Fire tube.

.2 Installation.

.3 Commissioning.

1.2 REFERENCES

.1 American Boiler Manufacturer's Association (ABMA)

.2 American National Standards Institute (ANSI)

.1 ANSI Z21.13-2004/CSA 4.9-2004, Gas-Fired Low-Pressure Steam and Hot Water Boilers.

.3 American National Standards Institute (ANSI)/ American Society of Mechanical Engineers (ASME)

.1 ANSI/ASME Boiler and Pressure Vessel Code, Section IV, 2004.

.4 Canadian Gas Association (CGA)

.1 CAN1-3.1-77(R2001), Industrial and Commercial Gas-Fired Package Boilers.

.2 CAN/CSA-B149.1-05, Natural Gas and Propane Installation Code.

.5 Canadian Standards Association (CSA International)

.1 CSA B51-03, Boiler, Pressure Vessel, and Pressure Piping Code.

.2 CSA B139-04, Installation Code for Oil Burning Equipment.

.3 CSA B140.7-05, Oil Burning Equipment: Steam and Hot-Water Boilers.

.6 Electrical and Electronic Manufacturer's Association of Canada (EEMAC)

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

.1 Material Safety Data Sheets (MSDS).

1.3 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.

.2 Indicate the following:
- .1 General arrangement showing terminal points, instrumentation test connections.
- .2 Clearances for operation, maintenance, servicing, tube cleaning, tube replacement.
- .3 Foundations with loadings, anchor bolt arrangements.
- .4 Piping hook-ups.
- .5 Equipment electrical drawings.
- .6 Burners and controls.
- .7 All miscellaneous equipment.
- .8 Flame safety control system.

.3 Engineering data to include:
- .1 Boiler efficiency at 25%, 50%, 75%, 100%, of design capacity.
- .2 Radiant heat loss at 100% design capacity.

.3 Quality assurance submittals: submit following in accordance with Section 01 33 00 - Submittal Procedures.

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

.4 Closeout Submittals:

.1 Submit operation and maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.4 DELIVERY, STORAGE, AND HANDLING

.1 Packing, shipping, handling and unloading:

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

Part 2 Products

2.1 GENERAL

.1 Packaged boiler:

- .1 Certified to ANSI Z21.13 / CSA 4.9 Gas-fired Boiler Standard
- .2 ASME “H” stamped boiler, designed and constructed in compliance with the ASME Boiler and Pressure Vessel Code Section IV
- .3 SA240-S43932 Stainless Steel Heat Exchanger maximum operating pressure 80 psi
- .4 Modulating burner, 10:1 turndown direct Spark Ignition
- .5 Wall (standard) or floor mounting (w/ opt. kit, NTI part # 84630)
- .6 Zero clearance to combustibles (clearances required for service)Provide high efficiency condensing hot water boiler suitable for forced draft with insulated jacket, heat exchanger, natural gas burning system, controls and boiler trim.

.2 Boiler Components:

.1 The heat engine shall be a vertical firetube down-fired design. The combustion chamber, firetubes, tubesheets and shell shall be constructed of Type 439 (ASME SA240, UNS S43932) stainless steel.

.2 The heat engine shall be accessible for inspection and cleaning via a removable burner access cover. The cover shall include a flame observation port.

.3 The heat engine shall be provided with an automatic air vent (field installed).

.4 A factory-supplied field-installed anti-siphon trap shall be connected to the combustion chamber for collection and removal of condensate. The trap shall be translucent to permit visual inspection and shall be easily disassembled for cleaning.

3. Gas Train and Combustion System

.1 The combustion system shall be fully modulating with a 10:1 turndown ratio.

.2 The combustion system shall contain:

.1 Adjustable air/gas ratio valve with integral regulator

.2 Mixing venturi

.3 Variable speed blower utilizing pulse width modulation

.4 Stainless steel cylindrical premix burner with woven stainless steel mesh covering

.5 Dual-electrode spark igniter

.6 Independent flame sensing electrode

4. Controls

.1 The boiler control system shall operate on 24VAC provided by an internal 40VA transformer.

.2 The integrated microprocessor-based controller shall incorporate all operational and safety control functions, including:

.1 Burner spark ignition, flame detection and supervision, burner firing rate modulation, and high temperature limit (UL353 rated),

.2 The controller shall incorporate a proportional-integral-derivative (PID) algorithm for three (3) separate temperature controls: two (2) for space heating with independent setpoints; one (1) for domestic hot water.

.3 The controller shall permit field selection of the boiler control response to a high temperature limit excursion to either Lockout or Recycle and Delay. The factory set response shall be Recycle and Delay.

.3 The controller shall provide:

.1 Operation of up to three (3) pumps: Boiler, Central Heating and Indirect Domestic Hot Water

.3 Domestic hot water prioritization with a field-adjustable priority time

.3 Field-adjustable outdoor reset to automatically set system water temperature based on outdoor air temperature. An outdoor sensor shall be factory-supplied for field installation

.4 Manual firing rate control, adjustable between minimum and maximum firing rate

.5 Warm weather shutdown to disable heating, with field adjustable setpoint

.6 Pump exercise for 10 seconds at 24 hour intervals

.7 Freeze protection to operate the boiler and central heat pumps when outlet water temperature falls below 7.2°C, and fire the burner at minimum modulation when the outlet temperature falls below 3.3°C

.4 Accessories: Condensate treatment kit; one per boiler.

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 ANSI/ASME Boiler and Pressure Vessels Code Section IV, regulations of Province having jurisdiction, except where specified otherwise, and manufacturers recommendations.

.2 Make required piping connections to inlets and outlets recommended by boiler manufacturer.

.3 Maintain clearances as indicated or if not indicated, as recommended by manufacturer for operation, servicing and maintenance without disruption of operation of any other equipment/system.

.4 Pipe hot water relief valves full size to nearest drain.

.5 Natural gas fired installations - in accordance with CAN/CSA-B149.1.

3.3 MOUNTINGS AND ACCESSORIES

.1 Safety valves and relief valves:

.1 Run separate discharge from each valve.

.2 Terminate discharge pipe as indicated.

.3 Run drain pipe from each valve outlet and drip pan elbow to above nearest drain.

.2 Blowdown valves:

.1 Run discharge to terminate as indicated.

3.4 FIELD QUALITY CONTROL

.1 Commissioning:

.1 Manufacturer to:

.1 Certify installation.

.2 Start up and commission installation.

.3 Carry out on-site performance verification tests.

.4 Demonstrate operation and maintenance.

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

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

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

.3 Section 23 23 00 - Copper Tubing and Fittings Refrigerant.

1.2 REFERENCES

.1 Air-Conditioning and Refrigeration Institute (ARI)

.1 ARI 210/240-1994, Standard for Unitary Air Conditioning and Air-Source Heat Pump Equipment.

.2 ARI 325-98, Standard for Ground Water - Source Heat Pumps.

.2 American National Standards Institute/Air-Conditioning and Refrigeration Institute (ANSI/ARI)

.1 ANSI/ARI 320-1993, Standard for Water-Source Heat Pumps.

.3 American National Standards Institute/National Fire Protection Association (ANSI/NFPA)

.1 ANSI/NFPA 90A-1999, Installation of Air Conditioning and Ventilating Systems.

.4 American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE)

.1 ASHRAE Standard 15-2001, Safety Standard for Refrigeration Systems.

.5 Canadian Standards Association (CSA International)

.1 CAN/CSA-C273.3-M91(R2001), Performance Standard for Split-System Central Air-Conditioners and Heat Pumps.

.2 CAN/CSA-C446-M90, Performance of Ground and Water Source Heat Pumps.

.3 CAN/CSA-C655-M91, Performance Standard for Internal Water-Loop Heat Pumps.

.4 CAN/CSA-C656-M92(R1998), Performance Standard for Single Package Central Air Conditioners and Heat Pumps.

.6 Environment Canada, (EC)/Environmental Protection Services (EPS)

.1 EPS 1/RA/2-1996, Code of Practice for Elimination of Fluorocarbons Emissions from Refrigeration and Air Conditioning Systems.

.2 Environment Canada-1994, Ozone-Depleting Substances Alternatives and Suppliers List.

1.3 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings in accordance with Sections 01 33 00 - Submittal Procedures.

.2 Indicate:

.1 Capacities.

.2 ARI Ratings.

.3 Sound Power levels.

.4 Installation instructions.

.5 Start-up Instructions.

.6 O&M, Instructions.

1.4 WARRANTY

.1 For heat pumps, the 12 months warranty period prescribed in subsection GC 32.1 of General Conditions "C" is extended to 5 years.

.2 Contractor hereby warrants heat pumps in accordance with GC 24, but for 5 years.

Part 2 Products

2.1 GENERAL

.1 Heat pumps: EPS 1/RA/2, CSA approved and carry ARI or CSA certification seal.

2.2 REFRIGERANTS

.1 Type of Refrigerant: R410.

2.3 DRAIN PANS

.1 Design and construct condensate drain pans under indoor coils so that no water can accumulate and install to allow for easy cleaning.

2.4 PACKAGED AIR SOURCE HEAT PUMP

.1 General:

.1 To consist of air-to-air outdoor unit and DX fan coil indoor unit, for use with R410.

.2 Outdoor unit:

.1 Semi- hermetic compressor with crankcase heater, oil pump, internal and external current sensitive overload and over-temperature protection.

.2 Outdoor air fan: propeller type with vertical discharge, direct-driven from permanently lubricated motor.

.3 Coil: aluminum plate fins mechanically bonded to copper tubing with joints brazed.

.4 Mounted legs to elevate unit.

.5 Finish: primer and corrosion restraint coatings.

.3 Refrigeration piping:

.1 Between compressor, outdoor coil and indoor coil, complete with refrigerant metering devices and valves.

.4 Controls and protective devices to include:

.1 High pressure stat, loss-of-charge pressure stat.

.2 Crankcase heater.

.3 Suction line accumulator.

.4 Pressure relief device.

.5 Short-cycle protection of compressor.

Part 3 Execution

3.1 INSTALLATION

.1 Install where indicated and in accordance with manufacturer's instructions.

.2 Install outdoor units at ground level on RC housekeeping pad.

.3 Secure with hold-down bolts.

.4 Make piping connections.

.5 Nothing to obstruct ready access to components or to prevent removal of components for servicing.

3.2 START-UP AND COMMISSIONING

.1 Submit written report to Engineer.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 Materials and installation for fan coil units.

1.2 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.

.1 Product data to include:

.1 Filters, fan accessibility.

.2 Physical size.

.3 Thermostat, transformer, controls where integral.

.4 Finish.

.5 kW rating, voltage, phase.

.6 Cabinet material thicknesses.

.2 Shop Drawings:

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

.3 Quality assurance submittals: submit following in accordance with Section 01 33 00 - Submittal Procedures.

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

Part 2 Products

2.1 FAN COIL UNITS

.1 Vertical type, as indicated, having air tight modular components, consisting of casing, fan section with motor and drive, filter section, cooling coil.

2.2 CASINGS

.1 Phosphate treated steel thickness as indicated reinforced and braced for rigidity.

.1 Removable panels provide access for maintenance of internal parts.

.2 Paint steel parts, where not galvanized, with corrosion resistant paint to CAN/CGSB 1.181] [MPI-INT 5.3A.

.3 Finish units, inside and out, with rust resistant enamel.

2.3 ACOUSTIC LINER

.1 Ensure that expanded polystyrene and polyurethane insulation materials were not produced with ozone depleting substances.

.2 Insulate internal surface of panels with 25mm neoprene coated rigid duct liner.

2.4 DRAIN PANS

.1 Construction: stainless steel. Rounded corners.

.2 Drain connection: in bottom at low point.

.3 Installation: slope without sag minimum 1% to ensure no standing water at any time or at any point.

2.5 FANS

.1 Cabinet hung AMCA-rated for sound and performance centrifugal fans , selected to operate in stable part of performance curve at times and heavy duty hours..

2.6 COILS

.1 Capacity: as indicated on drawings.

.2 Ratings: ARI certified.

.3 Construction:

.1 Casings: 1.5 mm thick galvanized sheet steel.

.1 Supports of galvanized steel channel double angle frames.

.2 Blank-off plates. Insulated sandwich construction.

.2 Direct expansion refrigerant coils:

.1 Serpentine type,or Straight tube type arranged to prevent trapping of oil.

.1 Liquid distributors to ensure even distribution of liquid refrigerant to all circuits.

.2 Silver solder or braze joints in refrigerant tubing.

.3 Evacuate and charge coil with nitrogen and seal before sending to site.

.2 Tubes: copper.

.3 Fins: aluminum.

.4 Headers: copper.

.5 Pressure tests: to Canadian Refrigeration Code. Dehydrated. Sealed with nitrogen charge.

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 Mount units on stands as shown on mechanical drawings.

.2 Make power and control connections.

3.3 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 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA C22.1-15, Canadian Electrical Code, Part 1 (23rd Edition), Safety Standard for Electrical Installations.

.2 CAN3-C235-83(R2015), Preferred Voltage Levels for AC Systems, 0 to 50,000 V.

.2 Electrical and Electronic Manufacturer's Association of Canada (EEMAC)

.1 EEMAC 2Y-1-1958, Light Gray Colour for Indoor Switch Gear.

.3 Institute of Electrical and Electronics (IEEE)/National Electrical Safety Code Product Line (NESC)

.1 IEEE SP1122-2000, The Authoritative Dictionary of IEEE Standards Terms, 7th Edition.

1.2 DEFINITIONS

.1 Electrical and electronic terms: unless otherwise specified or indicated, terms used in these specifications, and on drawings, are those defined by IEEE SP1122.

1.3 DESIGN REQUIREMENTS

.1 Operating voltages: to CAN3-C235.

.2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard.

.1 Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

.3 Language operating requirements: provide identification nameplates and labels for control items in English.

1.4 SUBMITTALS

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

.2 Quality Control: in accordance with Section 01 45 00 - Quality Control.

.1 Provide CSA certified equipment and material.

.2 Permits and fees: in accordance with General Conditions of contract.

.3 Submit certificate of acceptance from authority having jurisdiction upon completion of Work to Consultant.

1.5 QUALITY ASSURANCE

.1 Quality Assurance: in accordance with Section 01 45 00 - Quality Control.

.2 Qualifications: electrical work to be carried out by qualified, licensed electricians who hold valid Master Electrical Contractor license or apprentices in accordance with authorities having jurisdiction.

.3 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Material Delivery Schedule: provide Consultant with schedule within weeks after award of Contract.

Part 2 Products

2.1 MATERIALS AND EQUIPMENT

.1 Provide material and equipment in accordance with Section 01 61 00 - Common Product Requirements.

.2 Material and equipment to be CSA certified. Where CSA certified material and equipment is not available, obtain special approval from authority having jurisdiction before delivery to site and submit such approval as described in PART 1 - SUBMITTALS.

2.2 WIRING TERMINATIONS

.1 Ensure lugs, terminals, screws used for termination of wiring are suitable for copper.

2.3 WIRING IDENTIFICATION

.1 Identify wiring with permanent indelible identifying markings, numbered plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.

.2 Maintain phase sequence and colour coding throughout.

.3 Colour coding: to CSA C22.1.

.4 Use colour coded wires in communication cables, matched throughout system.

2.4 CONDUIT AND CABLE IDENTIFICATION

.1 Colour code conduits, boxes and metallic sheathed cables.

.2 Code with plastic tape or paint at points where conduit or cable enters wall, ceiling, or floor, and at 15m intervals.

.3 Colours: 25mm wide prime colour and 20mm wide auxiliary colour.

	Prime	Auxiliary
up to 250 V	Yellow	
up to 600 V	Yellow	Green
up to 5 kV	Yellow	Blue
up to 15 kV	Yellow	Red
Telephone	Green	
Other Communication Systems	Green	Blue
Fire Alarm	Red	
Emergency Voice	Red	Blue
Other Security Systems	Red	Yellow

Part 3 Execution

3.1 INSTALLATION

.1 Do complete installation in accordance with CSA C22.1 except where specified otherwise.

.2 Mark the circuit number feeding all devices on the device.

3.2 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 minimum150 mm horizontal clearance between boxes.

.3 Change location of outlets at no extra cost or credit, providing distance does not exceed 3000 mm, and information is given before installation.

.4 Locate light switches on latch side of doors.

.1 Locate disconnect devices in mechanical and elevator machine rooms on latch side of floor.

3.3 MOUNTING HEIGHTS

.1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise.

.2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.

.3 Install electrical equipment at following heights unless indicated otherwise.

.1 Local switches: 1200 mm.
.2 Wall receptacles:
.1 General: 400 mm.
.2 Above top of continuous baseboard heater: 200 mm.
.3 Above top of counters or counter splash backs: 175 mm.
.3 Panelboards: as required by Code or as indicated.
.4 Telephone and interphone outlets: 400 mm.
.5 Wall mounted telephone and interphone outlets: 1200 mm.
.6 Fire alarm stations: 1200 mm.
.7 Fire alarm bells: 2100mm.
.8 Wall mounted speakers: 2100mm.
.9 Door bell pushbuttons: 1200mm

3.4 CLEANING

.1 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.

Clean and prime exposed non-galvanized hangers, racks and fastenings to prevent rusting.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Materials and installation for wire and box connectors.

1.2 RELATED SECTIONS

.1 Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

1.3 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CAN/CSA-C22.2No.18.2-06(R2016), Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware.

.2 CSA C22.2No.65-13, Wire Connectors.

.2 Electrical and Electronic Manufacturers' Association of Canada (EEMAC)

.1 EEMAC 1Y-2, 1961 Bushing Stud Connectors and Aluminum Adapters (1200 Ampere Maximum Rating).

.3 National Electrical Manufacturers Association (NEMA)

Part 2 Products

2.1 MATERIALS

.1 Fixture type splicing connectors to: CSA C22.2No.65, with current carrying parts of copper sized to fit copper conductors 10 AWG or less.

.2 Bushing stud connectors: to EEMAC 1Y-2 to consist of:

.1 Connector body and stud clamp for round copper conductors.

.2 Clamp for round copper conductors.

.3 Stud clamp bolts.

.4 Bolts for copper conductors.

.5 Sized for conductors as indicated.

.3 Clamps or connectors for flexible conduit, non-metallic sheathed cable as required to: CAN/CSA-C22.2No.18.

.4 Boxes to be hot dip galvanized to ASTM a 924(M) designation Ainc coating Z180(G60).

Part 3 Execution

3.1 INSTALLATION

.1 Remove insulation carefully from ends of conductors and:

.1 Install mechanical pressure type connectors and tighten screws with appropriate compression tool recommended by manufacturer. Installation shall meet secureness tests in accordance with CSA C22.2No.65.

.2 Install fixture type connectors and tighten. Replace insulating cap.

.3 Install bushing stud connectors in accordance with EEMAC 1Y-2.

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 10 AWG and larger. Minimum size: 12 AWG.

.2 Copper conductors: size as indicated, with 600V insulation of cross-linked thermosetting polyethylene material rated RW90 XLPE, Jacketed.

.3 Neutral supported cable: 3 phase insulated conductors of Copper and one neutral conductor of Copper steel reinforced, size as indicated. Type: NS90 Insulation: Type NS-1 rated 300 V Type NSF-2 flame retardant rated 600 V.

2.2 ARMOURED CABLES

.1 Conductors: insulated, copper, size as indicated.

.2 Type: AC90 - lead sheath over cable assembly and under armour.

.3 Armour: interlocking type fabricated from aluminumstrip.

.4 Connectors: anti short connectors.

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 3 tests using method appropriate to site conditions and to approval of Departmental Representative and local authority having jurisdiction over installation.

.3 Perform tests before energizing electrical system.

3.2 INSTALLATION OF BUILDING WIRES

.1 Install wiring as follows:

.1 In conduit systems in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

Part 2 Products

2.1 SUPPORT CHANNELS

.1 U shape, size 41 x 41 mm, 2.5 mm thick, suspended.

Part 3 Execution

3.1 INSTALLATION

.1 Secure equipment to solid masonry, tile and plaster surfaces with lead 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 malleable iron 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 dia threaded rods and spring clips.

.2 Support 2 or more cables or conduits on channels supported by 6 mm dia threaded rod hangers where direct fastening to building construction is impractical.

.8 For surface mounting of two or more conduits use channels at 3 m on centre spacing.

.9 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.

.10 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.

.11 Do not use wire lashing or perforated strap to support or secure raceways or cables.

.12 Do not use supports or equipment installed for other trades for conduit or cable support except with permission of other trade and approval of Consultant.

.13 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.

.14 “The Harry Hays Building is a post-tensioned structure. Perform concrete x-ray prior to any coring and scan prior to any penetration to the slab.”

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA C22.1-15, Canadian Electrical Code, Part 1, 23rd Edition.

1.2 SUBMITTALS

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

Part 2 Products

2.1 OUTLET AND CONDUIT BOXES GENERAL

.1 Size boxes in accordance with CSA C22.1.

.2 Boxes to be hot dipped galvanized to ASTM 924(M) designation Zinc coating Z180 (G60).

.3 Blank cover plates for boxes without wiring devices.

2.2 GALVANIZED STEEL OUTLET BOXES

.1 One-piece electro-galvanized construction.

.2 Utility boxes for outlets connected to surface-mounted EMT conduit, minimum size 102 x 54 x 48 mm.

2.3 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 35 mm 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 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CAN/CSA C22.2 No. 18-06(R2016), Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware,

.2 C22.2 No. 45.1-07 (R2012), Rigid Metal Conduit.

.3 CSA C22.2 No. 56-13, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.

.4 CSA C22.2 No. 83-M1985(R2013), Electrical Metallic Tubing.

1.2 SUBMITTALS

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

.2 Product data: submit manufacturer's printed product literature, specifications and datasheets.

.1 Submit cable manufacturing data.

.3 Quality assurance submittals:

.1 Test reports: submit certified test reports.

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

.3 Instructions: submit manufacturer's installation instructions.

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.2 Place materials defined as hazardous or toxic waste in designated containers.

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

Part 2 Products

2.1 CONDUITS

.1 Rigid metal conduit: to CSA C22.2 No. 45, galvanized steel.

.2 Electrical metallic tubing (EMT): to CSA C22.2 No. 83, with.

.3 Flexible metal conduit: to CSA C22.2 No. 56, aluminum.

2.2 CONDUIT FASTENINGS

.1 One hole steel straps to secure surface conduits 50 mm and smaller.

.1 Two hole steel straps for conduits larger than 50 mm.

.2 Beam clamps to secure conduits to exposed steel work.

.3 Channel type supports for two or more conduits.

.4 Threaded rods, 6 mm diameter, to support suspended channels.

2.3 CONDUIT FITTINGS

.1 Fittings: to CAN/CSA C22.2 No. 18, manufactured for use with conduit specified. Coating: same as conduit.

2.4 FISH CORD

.1 Polypropylene.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

.1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.

.2 Conceal conduits except in mechanical and electrical service rooms and in unfinished areas.

.3 Use electrical metallic tubing (EMT).

.4 Use flexible metal conduit for connection to motors in dry areas connection to recessed incandescent fixtures without prewired outlet box connection to surface or recessed fluorescent fixtures.

.5 Minimum EMT size for lighting and power circuits: 19 mm.

.6 Minimum EMT size for communication outlets: 25 mm.

.7 Install fish cord in empty conduits.

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 suspended channels.

.5 Do not pass conduits through structural members except as indicated.

.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.

.2 Do not install horizontal runs in masonry walls.

.3 Do not install conduits in terrazzo or concrete toppings.

3.5 CLEANING

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

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

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Materials and installation for standard and custom breaker type panel boards.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA C22.2No.29--15, Panelboards and enclosed Panelboards.

1.3 SHOP DRAWINGS

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

.2 Drawings to include electrical detail of panel, branch breaker type, quantity, ampacity and enclosure dimension.

Part 2 Products

2.1 PANELBOARDS

.1 Panelboards: to CSA C22.2No.29 and product of one manufacturer.

.1 Install circuit breakers in panelboards before shipment.

.2 In addition to CSA requirements manufacturer's nameplate must show fault current that panel including breakers has been built to withstand.

.2 250 V panelboard: bus and breakers rated for 10000 A (symmetrical) interrupting capacity or as indicated.

.3 Sequence phase bussing with odd numbered breakers on left and even on right, with each breaker identified by permanent number identification as to circuit number and phase.

.4 Panelboards: mains, number of circuits, and number and size of branch circuit breakers as indicated.

.5 Two keys for each panelboard and key panelboards alike.

.6 Copper bus with neutral of same ampere rating as mains.

.7 Mains: suitable for bolt-on breakers.

.8 Trim with concealed front bolts and hinges.

.9 Trim and door finish: baked grey enamel.

2.2 BREAKERS

.1 Breakers: to Section 26 28 16 - Moulded Case Circuit Breakers

.2 Breakers with thermal and magnetic tripping in panelboards except as indicated otherwise.

.3 Main breaker: separately mounted on top or bottom of panel to suit cable entry. When mounted vertically, down position should open breaker.

2.3 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 00 - Common Work Results - Electrical

.2 Complete circuit directory with typewritten legend showing location and load of each circuit.

Part 3 Execution

3.1 INSTALLATION

.1 Locate panelboards as indicated and mount securely, plumb, true and square, to adjoining surfaces.

.2 Install surface mounted panelboards on plywood backboards in accordance with Section 06 10 00 - Rough Carpentry. Where practical, group panelboards on common backboard.

.3 Mount panelboards to height specified in Section 26 05 00 - Common Work Results - Electrical or as indicated.

.4 Connect loads to circuits.

.5 Connect neutral conductors to common neutral bus

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Switches, receptacles, wiring devices, cover plates and their installation.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

- .1 CSA-C22.2 No.42-10 (R2015), General Use Receptacles, Attachment Plugs and Similar Devices.
- .2 CSA-C22.2 No.42.1-13, Cover Plates for Flush-Mounted Wiring Devices (Bi-national standard, with UL 514D).
- .3 CSA-C22.2 No.111-10 (R2015), General-Use Snap Switches (Bi-national standard, with UL 20, twelfth edition).

1.3 SHOP DRAWINGS AND PRODUCT DATA

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

Part 2 Products

2.1 SWITCHES

.1 15 A, 347 V, single pole, switches to: CSA-C22.2 No.55 and CSA-C22.2 No.111.

.2 Manually-operated general purpose ac switches with following features:

- .1 Terminal holes approved for No. 10 AWG wire.
- .2 Silver alloy contacts.
- .3 Urea or melamine moulding for parts subject to carbon tracking.
- .4 Suitable for back and side wiring.
- .5 Ivory toggle.

.3 Switches of one manufacturer throughout project.

2.2 RECEPTACLES

.1 Duplex receptacles, CSA type 5-15 R, 125 V, 15 A, U ground, to: CSA-C22.2 No.42 with following features:

- .1 Ivory urea moulded housing.
- .2 Suitable for No. 10 AWG for back and side wiring.
- .3 Eight back wired entrances, four side wiring screws.
- .4 Triple wipe contacts and riveted grounding contacts.
- .5 GFR where indicated on drawings

.2 Single receptacles CSA type 5-15 R, 125 V, 15 A, U ground with following features:

.1 Ivory urea moulded housing.

.2 Suitable for No. 10 AWG for back and side wiring.

.3 Four back wired entrances, 2 side wiring screws.

.3 Receptacles of one manufacturer throughout project.

2.3 COVER PLATES

.1 Cover plates for wiring devices to: CSA-C22.2 No.42.1.

.2 Cover plates from one manufacturer throughout project.

.3 Stainless steel, 1 mm thick cover plates cover plates, thickness 2.5 mm for wiring devices mounted in flush-mounted outlet box.

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.

.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 400mm.

.3 Cover plates:

.1 Protect stainless steel cover plate finish with paper or plastic film until painting and other work is finished.

.2 Install suitable common cover plates where wiring devices are grouped.

.3 The circuit number(s) of all duplexes must be shown on a printed lable on the cover plate.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Materials for circuit breakers.

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

1.3 REFERENCES

.1 Canadian Standards Association (CSA International).

.1 CSA-C22.2 No. 5-16, Moulded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures (Tri-national standard with UL 489, tenth edition, and the second edition of NMX-J-266-ANCE).

1.4 SUBMITTALS

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

Part 2 Products

2.1 BREAKERS GENERAL

.1 Circuit breakers to CSA C22.2 No. 5

.2 Plug-in moulded case circuit breakers: to match existing.

.3 Circuit breakers to have minimum 10,000 symmetrical rms interrupting capacity rating.

.4 Circuit breakers to match existing manufacturer.

Part 3 Execution

3.1 INSTALLATION

.1 Install circuit breakers in existing panels.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA-C22.2 No. 214-17, Communications Cables Bi-National standard with UL 444.

.2 Telecommunications Industry Association (TIA)/Electronic Industries Alliance (EIA)

.1 TIA/EIA-568-B.1-(2001), Commercial Building Telecommunications Cabling Standard, Part 1: General Requirements.

.2 TIA/EIA-568-B.2-(2001), Commercial Building Telecommunications Cabling Standard, Part 2: Balanced Twisted-Pair Cabling Components.

.3 TIA/EIA-568-B.3-(2000), Optical Fiber Cabling Components Standard.

.4 TIA/EIA-606-A-(2002), Administration Standard for the Commercial Telecommunications Infrastructure.

.5 TIA TSB-140-2004, Telecommunications Systems Bulletin - Additional Guidelines for Field-Testing Length, Loss and Polarity of Optical Fiber Cabling Systems.

.6 TIA-598-C-(2005), Optical Fiber Cable Color Coding.

1.2 DEFINITIONS

.1 Refer to TIA/EIA-598-C, Annex A for definitions of terms: optical-fiber interconnect, distribution, and breakout cables.

1.3 SYSTEM DESCRIPTION

.1 Structured telecommunications wiring system consist of unshielded-twisted-pair and optical fiber cables, terminations, connectors, cross-connection hardware and related equipment installed inside building for occupant's telecommunications systems, including voice (telephone), data, and image.

.2 Installed in physical star configuration with separate horizontal and backbone sub-systems.

1.4 SUBMITTALS

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

.2 As-built Records and Drawings:

.1 Provide two (2) bound complete hard-copy sets of as-built records to the Engineer.

.1 Provide and place one hard copy of as-built records for each telecommunications room in plan holder in each telecommunications room.

Part 2 Products

2.1 FOUR-PAIR 100 Ω BALANCED TWISTED PAIR CABLE

.1 Four-pair, 100 ohm balanced unshielded-twisted-pair (UTP) cable, flame test classification FT6 or MPP or CMP to: CSA-C22.2 No. 214, Category 6 (Cat 6 to: TIA/EIA-568-B.2.

2.2 WORK AREA UTP 4-PAIR MODULAR JACK

.1 Eight-position modular jack ("RJ-45"), type T568B Category 6 to: TIA/EIA-568-B.2:

.1 Mounted in compatible double gang faceplate, flush entry, 2 jack positions per faceplate.

2.3 UTP CROSS-CONNECT WIRE

.1 Category 6, 4 pairs to: TIA/EIA-568-B.2.

2.4 UTP PATCH CORDS

.1 2 metres long, with factory-installed male plug at one end to mate with "RJ-45" jack and with factory-installed male plug at other end to mate with "RJ-45" jack Category 6, 4 pairs Category 3 pair to: TIA/EIA-568-B.2.

2.5 UTP EQUIPMENT CABLE

.1 4 pair "pigtail", 1 metres long, with factory-installed male plug on one end to mate with "RJ-45" jack and other end equipped with factory-installed male plug to mate with "RJ-45" jack: Category 6 to: TIA/EIA-568-B.2.

2.6 UTP WORK AREA CORDS

.1 3 metres long, each end equipped with "RJ-45" plug Category 6 to: TIA/EIA-568-B.2.

Part 3 Execution

3.1 INSTALLATION OF TERMINATION AND CROSS-CONNECT HARDWARE

.1 Install termination and cross-connect hardware in rack in cabinet as indicated and according to manufacturers' instructions. Identify and label as indicated to: TIA/EIA-606-A.

.2 Install consolidation points, as indicated according to manufacturer's instructions. Identify and label as indicated to: TIA/EIA-606-A.

3.2 INSTALLATION OF HORIZONTAL DISTRIBUTION CABLES

.1 Install horizontal cables as indicated in conduits hooks from telecommunication rooms to individual work-area jacks. Identify and label as indicated to: TIA/EIA-606-A.

.2 Support horizontal cables at intervals not exceeding 2 metres.

.3 Harness slack cable in cabinets, racks, and wall-mounted termination and cross-connection hardware.

3.3 INSTALLATION OF EQUIPMENT CABLES

.1 Install equipment cables from equipment patch panel as indicated.

.1 Identify and label as indicated to: TIA/EIA-606-A.

3.4 IMPLEMENT CROSS-CONNECTIONS

.1 Implement cross-connections using patch cords as specified.

3.5 FIELD QUALITY CONTROL

.1 Test horizontal UTP cables as specified below and correct deficiencies provide record of results as hard copy.

.1 Perform tests for Permanent Link on installed cables, including spares:

.1 Category 6 using certified level III tester to: TIA/EIA-568-B.2.

.2 Provide record of results as hard copy to: TIA/TSB-140.

END OF SECTION

1. GENERAL

.1 Not Used.

2. PRODUCTS

.1 Not Used.

3. EXECUTION

.1 RESTORATION, GENERALLY

.1 Restore all existing areas and site work damaged or disturbed due to earthwork or other work of this Contract, back to their original condition.

END OF SECTION