SPECIFICATION

INTERIOR RENOVATIONS

Lynne Lake, Manitoba

Tender

TABLE OF CONTENTS

Pages

Division 00 - Procurement and Contracting Requirements

Division 01 - General Requirements

Division 02 - Existing Conditions

Division 07 - Thermal and Moisture Protection

Division 08 - Openings

Division 09 - Finishes

Division 21 - Fire Suppression

Division 22 - Plumbing

Division 23 - Heating, Ventilating and Air Conditioning (HVAC)

Division 25 - Integrated Automation

END OF TABLE

Part 1 General

1.1 WORK COVERED BY CONTRACT DOCUMENTS

.1 Work of this Contract comprises the interior renovations of a Facility Building located at 545 Miner Street, in Lynne Lake, Manitoba. This work includes; labour, materials and shipping of materials, in accordance with the contract documents and as further described herein.

1.2 SCOPE OF WORK

.1 Remove and replace two fan coils, condensers and controls for the facility building ventilation system.

.2 Power clean all ductwork.

.3 Re-balance system after all ductwork has been installed

.4 Install new garage opener and access cards to garage bay No. 2

.5 Remove and replace shower and repair water damaged walls

.6 Check all base board heaters and provide a report to see if they are fully functional.

.7 Remove and replace all lights in the facility building.

1.3 SITE VERIFICATION

.1 Upon award of the contract contractor is to schedule a site trip to site verify all sizes and dimensions. No additional fees will be considered for materials brought onto site of the wrong size.

1.4 WORK SEQUENCE

.1 Buildings will remain occupied during the renovation.

.2 Co-ordinate Progress Schedule with Departmental Representative, Consultant and Local Commander

.3 Maintain fire access/control at all times.

.4 The work on the facility building will be done in phases one phase being completed and certified prior to the second phase being started.

1.5 PROTECTION OF REMAINING FIXTURES AND CABINETRY

.1 The contractor is to document photo the condition of the existing cabinetry and fixtures at takeover of the area of work and supply a digital copy to the consultant.

.2 The contractor is responsible for the protection of all damage caused during the construction process and it will be the responsibility of the contractor to make good to the acceptance of the Project Manager and Consultant.

1.6 CONTRACTOR USE OF PREMISES

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

.1 Owner Occupancy

.2 Work by other Contractors

.3 Public Usage

.2 Keep clear products or equipment which may **interfere** with operation of Building or other contractors.

.3 Assume responsibility for the protection and safekeeping of products under this contract.

.4 Co-ordinate use of premises under direction of Consultant and Departmental Representative.

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

.6 Ensure safe practices and work area to prevent injury or damage to portions of existing work which remain.

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

1.7 OWNER OCCUPANCY

.1 Facility Building will be occupied during construction.

.2 Co-Operate with Owner in scheduling operations to minimize conflict and to facilitate owner usage.

1.8 EXISTING SERVICES

.1 Notify Consultant and utility companies of intended interruption of services and obtain required permission. Pay fees and obtain certificates and permits required.

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

.3 Provide alternative routes for personnel and vehicular traffic (if required).

.4 Establish location and extent of service lines in area of work before starting Work. Notify Consultant of findings.

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

.6 Provide temporary services when directed by Consultant or as required to maintain critical building and tenant systems.

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

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

.9 Protect, relocate or maintain existing active services. When inactive services are encountered, inform consultant and owner prior to capping off in manner approved by authorities having jurisdiction.

.10 Record locations on as-built drawings of maintained, re-routed and abandoned service lines.

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

1.9 DOCUMENTS REQUIRED

.1 Maintain at job site, one copy each document as follows:

.1 Contract Drawings.
.2 Specifications.
.3 Addenda.
.4 Reviewed Shop Drawings.
.5 List of Outstanding Shop Drawings.
.6 Change Orders.
.7 Other Modifications to Contract.
.8 Field Test Reports.
.9 Copy of Approved Work Schedule.
.10 Health and Safety Plan and Other Safety Related Documents.
.11 Other documents as specified.

1.10 CODES AND STANDARDS

.1 Materials shall be new and work shall conform to the minimum applicable standards of the Canadian General Standards board, the Canadian Standards Association, The National Building Code of Canada 2010, and all applicable Territorial and Municipal codes, and all standards listed below. In the case of conflict or discrepancy the most stringent requirement shall apply.

.2 Meet or exceed requirements of contract documents, specified standards, codes and referenced documents.

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 ACCESS AND EGRESS

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

1.2 USE OF SITE AND FACILITIES

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

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

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

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

1.3 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING

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

1.4 EXISTING SERVICES

.1 Notify, utility companies, Consultant, of intended interruption of services and obtain required permission.

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

1.5 SPECIAL REQUIREMENTS

.1 Submit schedule in accordance with Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart.

.2 Ensure that Contractor personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.

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

1.6 SECURITY CLEARANCES

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

1.7 BUILDING SMOKING ENVIRONMENT

.1 Comply with smoking restrictions. Smoking is not allowed on the property.

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 ON-SITE DOCUMENTS

.1 Contract Documents

.2 Specifications

.3 Addenda

.4 Reviewed shop drawings

.5 Change orders

.6 Other modifications in contract

.7 Field test reports

.8 Copy of approved Work Schedule

.9 Manufacturers installation and application instructions

.10 Labour conditions and wage schedules

.11 Project Record Documents (for as-built purposes)

.12 Codes and Standards listed in 01 11 00

1.2 ADMINISTRATIVE

.1 Attend project meetings throughout the progress of the work at the call of Consultant.

.2 Provide physical space and make arrangements for meetings.

.3 Consultant will record the meeting minutes. Include significant proceedings and decisions. Identify actions by parties.

.4 Consultant will reproduce and distribute copies of minutes within three days after meetings and transmit to meeting participants, affected parties not in attendance, Project Manager, and Contractor.

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

1.3 PRECONSTRUCTION MEETING

.1 After award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities. Meeting will be held at the location and time designated by the departmental representative

.2 Departmental Representative, Engineer and Consultant, Contractor, major Subcontractors, will be in attendance. Others may be in attendance at the discretion of the departmental representative or the Contractor. Representatives of the local Building Manager may also be in attendance.

.3 Establish time and location of meeting and notify parties concerned minimum 2 days before meeting.

.4 Agenda to include:

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

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

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

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

.5 Delivery schedule of specified equipment.

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

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

.8 Owner provided products.

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

.10 Maintenance manuals in accordance with Section 01 78 00 - Closeout Submittals

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

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

.13 Appointment of inspection and testing agencies or firms.

.14 Insurances, transcript of policies.

.5 Comply with Departmental Representative’s allocation of mobilization areas of site; for field offices and sheds, for access, traffic and parking facilities.

.6 During construction coordinate use of site and facilities through Departmental Representatives procedures for intra-project communications: submittals, reports and records, schedules, coordination of drawings, recommendations, and resolution of ambiguities and conflicts.

.7 Comply with instruction of consultant for use of Temporary utilities and construction facilities.

.8 Coordinate field engineering and layout work with consultant.

1.4 PROGRESS MEETINGS

.1 During course of Work at the discretion of the Consultant and Departmental Representative.

.2 Representatives of the Contractor, major Subcontractors involved in the work and other as required and decided upon by the Departmental Representative or Contractor are to be in attendance. Contractor to notify all sub-contractors.

.3 Consultant will notify contractor min 5 days prior to meetings

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

.5 Agenda to include the following:

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

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 DEFINITIONS

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

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

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

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

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

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

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

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

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

1.2 REQUIREMENTS

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

.2 Construction Progress Schedule to be Completed in Microsoft Project or Similar Software.

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

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

.5 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Interim Certificate and Final Certificate as defined times of completion are of essence of this contract.

1.3 SUBMITTALS

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

.2 Submit to Consultant within 5 working days of Award of Contract as Master Plan for planning, monitoring and reporting of project progress.

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

1.4 PROJECT MILESTONES

1.5 MASTER PLAN

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

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

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

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

1.6 PROJECT SCHEDULE

.1 Develop detailed Project Schedule derived from Master Plan.

1.7 PROJECT SCHEDULE REPORTING

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

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

1.8 PROJECT MEETINGS

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

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

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE

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

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

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

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

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

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

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

.8 Contractor's responsibility for errors and omissions in submission is not relieved by Engineer's, Consultant's review of submittals.

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

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

1.2 SHOP DRAWINGS AND PRODUCT DATA

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

.2 Submit shop drawings bearing stamp and signature of qualified professional engineer registered or licensed in the Territory of Nunavut, Canada.

.3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.

.4 Allow 14 days for Consultant's review of each submission.

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

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

.7 Accompany submissions with transmittal letter, containing:

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

.8 Submissions include:

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

.9 After Property Manager's, Engineer's, Consultant's review, distribute copies.

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

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

.12 Submit electronic copies of test reports for requirements requested in specification Sections and as requested by Consultant and Engineer.

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

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

.13 Submit electronic copies of certificates for requirements requested in specification Sections and as requested by Consultant and Engineer

.1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.

.2 Certificates must be dated after award of project contract complete with project name.

.14 Submit electronic or 6 copies of manufacturers instructions for requirements requested in specification Sections and as requested by Consultant and Engineer.

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

.15 Submit 6 copies of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Consultant and Engineer.

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

.16 Submit 6 copies of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Consultant and Engineer

.17 Delete information not applicable to project.

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

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

.20 The review of shop drawings by and Consultant is for sole purpose of ascertaining conformance with general concept.

.1 This review shall not mean that Consultant approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or

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

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

1.3 SAMPLES

.1 Submit for review samples in duplicate as requested in respective specification Sections. Label samples with origin and intended use.

.2 Deliver samples prepaid to Consultants business address.

.3 Notify Consultant in writing, at time of submission of deviations in samples from requirements of Contract Documents.

.4 Where colour, pattern or texture is criterion, submit full range of samples.

.5 Adjustments made on samples by Consultant are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Consultant prior to proceeding with Work.

.6 Make changes in samples which Consultant may require, consistent with Contract Documents.

.7 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.4 NOT USED

.1 Not Used.

Part 2 Execution

2.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 REFERENCES

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

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

.1 Material Safety Data Sheets (MSDS).

.3 Northwest Territories & Nunavut

.1 The Workers Compensation Act latest edition.

1.2 SUBMITTALS

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

.2 Submit site-specific Health and Safety Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:

.1 Results of site specific safety hazard assessment.

.2 Results of safety and health risk or hazard analysis for site tasks and operation found in work plan.

.3 Submit copies of Contractor's authorized representative's work site health and safety inspection reports to Consultant or authority having jurisdiction, as required.

.4 Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.

.5 Submit copies of incident and accident reports.

1.3 SAFETY ASSESSMENT

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

1.4 MEETINGS

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

1.5 REGULATORY REQUIREMENTS

.1 Do Work in accordance with Section 01 41 00 - Regulatory Requirements .

1.6 GENERAL REQUIREMENTS

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

.2 Consultant may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns.

1.7 RESPONSIBILITY

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

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

1.8 COMPLIANCE REQUIREMENTS

.1 Comply with The Workers Compensation Act, Workplace Safety Regulation, Northwest Territories and Nunavut WSCC - Workers Safety & Compensation Commission.

.2 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.

1.9 UNFORSEEN HAZARDS

.1 When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of Province having jurisdiction and advise RCMP verbally and in writing.

1.10 POSTING OF DOCUMENTS

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

1.11 CORRECTION OF NON-COMPLIANCE

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

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

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

1.12 WORK STOPPAGE

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

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 REFERENCES AND CODES

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

.2 Meet or exceed requirements of:

.1 Contract documents.

.2 Specified standards, codes and referenced documents.

1.2 HAZARDOUS MATERIAL DISCOVERY

.1 Asbestos: demolition of spray or trowel-applied asbestos is hazardous to health. Stop work immediately when material resembling spray or trowel-applied asbestos is encountered during demolition work. Notify consultant and Project Manager.

.2 PCB: Polychlorinated Biphenyl: stop work immediately when material resembling Polychlorinated Biphenyl is encountered during demolition work. Notify Consultant and Project Manager.

.3 Mould: stop work immediately when material resembling mould is encountered during demolition work. Notify Consultant and Project Manager.

1.3 BUILDING SMOKING ENVIRONMENT

.1 No smoking permitted.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA-A23.1/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

.2 CSA-0121-M1978(R2003), Douglas Fir Plywood.

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

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

1.2 SUBMITTALS

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

1.3 INSTALLATION AND REMOVAL

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

.2 Indicate use of supplemental or other staging area.

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

.4 Remove from site all such work after use.

1.4 SITE STORAGE/LOADING

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

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

1.5 CONSTRUCTION PARKING

.1 Parking will be permitted on site provided it does not disrupt performance of Work or impede the operation of the detachment.

.2 Adequate parking must be maintained for public and building occupant access. This area is already defined and is not to be used for contractor parking.

.3 Provide and maintain adequate access to project site.

1.6 EQUIPMENT, TOOL AND MATERIALS STORAGE

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

.2 Locate materials Required to be stored in weatherproof sheds on site in manner to cause least interference with work activities.

1.7 SANITARY FACILITIES

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

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

1.8 CLEAN-UP

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

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

.3 Remove materials resulting from demolition as soon as possible from site.

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

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian General Standards Board (CGSB)

.1 CGSB 1.59-97, Alkyd Exterior Gloss Enamel.

.2 CAN/CGSB 1.189-00, Exterior Alkyd Primer for Wood.

.2 Canadian Standards Association (CSA International)

.1 CSA-O121-M1978(R2003), Douglas Fir Plywood.

1.2 INSTALLATION AND REMOVAL

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

.2 Remove from site all such work after use.

1.3 DUST TIGHT SCREENS

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

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

1.4 ACCESS TO SITE

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

1.5 FIRE ROUTES

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

1.6 PROTECTION OF BUILDING FINISHES

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

.2 Provide necessary screens, covers, and hoardings.

.3 Confirm with property manager and detachment commander locations and installation schedule 3 days prior to installation.

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

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 REFERENCES

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

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

.3 If there is question as to whether products or systems are in conformance with applicable standards, Project Manager and/or Consultant reserves right to have such products or systems tested to prove or disprove conformance.

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

1.2 QUALITY

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

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

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

.4 Should disputes arise as to quality or fitness of products, decision rests strictly with Project Manager based upon requirements of Contract Documents.

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

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

1.3 AVAILABILITY

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

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

1.4 STORAGE, HANDLING AND PROTECTION

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

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

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

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

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

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

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

.8 Remove and replace damaged products at own expense and to satisfaction of Consultant.

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

1.5 TRANSPORTATION

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

1.6 MANUFACTURER'S INSTRUCTIONS

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

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

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

1.7 QUALITY OF WORK

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

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

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

1.8 CO-ORDINATION

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

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

1.9 CONCEALMENT

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

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

1.10 REMEDIAL WORK

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

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

1.11 LOCATION OF FIXTURES

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

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

1.12 FASTENINGS

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

.2 Prevent electrolytic action between dissimilar metals and materials.

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

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

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

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

1.13 FASTENINGS - EQUIPMENT

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

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

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

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

1.14 PROTECTION OF WORK IN PROGRESS

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

1.15 EXISTING UTILITIES

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

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

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 SUBMITTALS

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

.2 Submit written request in advance of cutting or alteration which affects:

.1 Structural integrity of elements of project.

.2 Integrity of weather-exposed or moisture-resistant elements.

.3 Efficiency, maintenance, or safety of operational elements. Note: Fire panel will alarm when hot cutting is done. Owner and building tenants requires notice when shutting down fire alarm system to do work. When alarm is off, contractor will provide fire watch.

.4 Visual qualities of sight-exposed elements.

.5 Work of Owner or separate contractor.

.3 Include in request:

.1 Identification of project.

.2 Location and description of affected Work.

.3 Statement on necessity for cutting or alteration.

.4 Description of proposed Work, and products to be used.

.5 Alternatives to cutting and patching.

.6 Effect on Work of Owner or separate contractor.

.7 Written permission of affected separate contractor.

.8 Date and time work will be executed.

1.2 MATERIALS

.1 Required for original installation.

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

1.3 PREPARATION

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

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

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

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

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

1.4 EXECUTION

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

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

.3 Uncover Work to install ill-timed Work.

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

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

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

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

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

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

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

.11 At penetration of fire rated wall, ceiling or floor construction, completely seal voids with firestopping material in accordance with Section 07 8400 – Firestopping, full thickness of the construction element

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

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

END OF SECTION

Part 1 General

1.1 PROJECT CLEANLINESS

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

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

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

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

.5 Dispose of waste materials and debris off site.

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

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

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

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

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

1.2 FINAL CLEANING

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

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

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

.4 Remove waste products and debris including that caused by Owner or other Contractors.

.5 Remove waste materials from site at regularly scheduled times or dispose of as directed by Consultant. Do not burn waste materials on site, unless approved by Consultant.

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

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

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

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

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

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

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

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

.14 Remove dirt and other disfiguration from exterior surfaces.

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

.16 Sweep and wash clean paved areas.

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

.18 Clean roofs, downspouts, and drainage systems.

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

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Dispose of waste and separate waste materials for recycling as per requirements of local authorities.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 INSPECTION AND DECLARATION

.1 Contractor's Inspection: Contractor and Subcontractors: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.

.1 Notify Consultant in writing of satisfactory completion of Contractor's Inspection and that corrections have been made.

.2 Request Inspection.

.2 Consultant and Contractor will perform inspection of Work to identify obvious defects or deficiencies. Contractor to correct Work accordingly.

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

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

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

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

.4 Certificates required by Fire Commissioner, Utility companies HRDC Labour Programs-Fire Protection, Engineering Services and Local Authorities 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 Consultant and Contractor. If Work is deemed incomplete by Consultant, complete outstanding items and request reinspection.

1.2 CLEANING

.1 In accordance with Section 01 74 11 – Cleaning.

.2 Remove waste and surplus materials, rubbish and construction facilities from the site in accordance with local authorities.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 Not Used

.1 Not Used.

END OF SECTION

Part 1 General

1.1 SUBMITTALS

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

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

.3 Copy will be returned after final inspection, with Consultant comments.

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

.5 Two weeks prior to Substantial Performance of the Work, submit to the Consultant, four final copies of operating and maintenance manuals in English.

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

.7 Furnish evidence, if requested, for type, source and quality of products provided.

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

.9 Pay costs of transportation.

.10 Supply one electronic and 5 copies of equipment manuals for all new items installed under this project

1.2 FORMAT

.1 Organize data as instructional manual.

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

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

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

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

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

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

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

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

1.3 CONTENTS - EACH VOLUME

.1 Table of Contents: provide title of project;

.1 Date of submission; names.

.2 Addresses, and telephone numbers of Consultant and Contractor with name of responsible parties.

.3 Schedule of products and systems, indexed to content of volume.

.2 For each product or system:

.1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.

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

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

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

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

1.4 AS-BUILTS AND SAMPLES

.1 Maintain, at site for Consultant one record copy of:

.1 Contract Drawings.

.2 Specifications.

.3 Addenda.

.4 Change Orders and other modifications to Contract.

.5 Reviewed shop drawings, product data, and samples.

.6 Field test records.

.7 Inspection certificates.

.8 Manufacturer's certificates.

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

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

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

.5 All copies of the documents must be turned over to consultant, **NO** copies may be maintained by the General Contractor or Trades.

1.5 EQUIPMENT AND SYSTEMS

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

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

.3 Include installed colour coded wiring diagrams.

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

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

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

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

.8 Include sequence of operation by controls manufacturer.

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

.10 Provide installed control diagrams by controls manufacturer.

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

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

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

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

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

1.6 MATERIALS AND FINISHES

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

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

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

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

1.7 SPARE PARTS

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

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

.3 Deliver to site; place and store.

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

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

1.8 SPECIAL TOOLS

.1 Provide special tools, in quantities specified in individual specification sections.

.2 Provide items with tags identifying their associated faction and equipment.

.3 Deliver to site; place and store

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

1.9 MAINTENANCE MATERIALS

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

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

.3 Deliver to site; place and store.

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

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

1.10 SPECIAL TOOLS

.1 Provide special tools, in quantities specified in individual specification section.

.2 Provide items with tags identifying their associated function and equipment.

.3 Deliver to site; place and store.

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

1.11 STORAGE, HANDLING AND PROTECTION

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

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

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

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

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

1.12 WARRANTIES AND BONDS

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

.2 Submit warranty management plan, 30 days before planned pre-warranty conference, to Property Manager and Consultant for approval.

.3 Warranty management plan to include required actions and documents to assure that Property Manager receives warranties to which it is entitled.

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

.5 Submit, warranty information made available during construction phase, to Property Manager for approval prior to each monthly pay estimate.

.6 Assemble approved 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 Include information contained in warranty management plan as follows:

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

.2 Listing and status of delivery of Certificates of Warranty for extended warranty items, to include roofs, HVAC balancing, pumps.

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

.1 Name of item.

.2 Model and serial numbers.

.3 Location where installed.

.4 Name and phone numbers of manufacturers or suppliers.

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

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

.7 Cross-reference to warranty certificates as applicable.

.8 Starting point and duration of warranty period.

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

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

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

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

.4 Contractor's plans for attendance at 10 month post-construction warranty inspections.

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

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

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

.10 Written verification will follow oral instructions. Failure to respond will be cause for the property manager to proceed with action against Contractor.

1.13 PRE-WARRANTY CONFERENCE

.1 Meet with Consultant, to develop understanding of requirements of this section. Schedule meeting prior to contract completion, and at time designated by Consultant.

.2 Consultant will establish communication procedures for:

.1 Notification of construction warranty defects.

.2 Determine priorities for type of defect.

.3 Determine reasonable time for response.

.3 Provide name, telephone number and address of licensed and bonded company that is authorized to initiate and pursue construction warranty work action.

.4 Ensure contact is located within local service area of warranted construction, is continuously available, and is responsive to inquiries for warranty work action.

1.14 WARRANTY TAGS

.1 Tag, at time of installation, each warranted item. Provide durable, oil and water resistant tag approved by Property Manager or Consultant.

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

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

.4 Indicate following information on tag:

.1 Type of product/material.
.2 Model number.
.3 Serial number.
.4 Contract number.
.5 Warranty period.
.6 Inspector's signature.
.7 Construction Contractor.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Equipment and systems.

.2 Materials and finishes.

.3 Spare parts.

.4 Maintenance manuals.

.5 Special tools.

.6 Storage, handling and protection.

1.2 RELATED SECTIONS

.1 Section 017800 - Closeout Submittals.

.2 Section 014500 - Quality Control.

1.3 EQUIPMENT AND SYSTEMS

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

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

.3 Include installed colour coded wiring diagrams.

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

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

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

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

.8 Include sequence of operation by controls manufacturer.

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

.10 Provide installed control diagrams by controls manufacturer.

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

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

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

.14 Include test and balancing reports.

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

1.4 MATERIALS AND FINISHES

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

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

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

.4 Building Envelope: include copies of drawings of building envelope components, illustrating the interface with similar or dissimilar items to provide an effective air, vapour and thermal barrier between indoor and outdoor environments. Include an outline of requirements for regular inspections and for regular maintenance to ensure that on-going performance of the building envelope will meet the initial building envelope criteria.

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

1.5 SPARE PARTS

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

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

.3 Deliver to site; place and store.

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

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

1.6 MAINTENANCE MATERIALS

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

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

.3 Deliver to site; place and store.

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

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

1.7 SPECIAL TOOLS

.1 Provide special tools, in quantities specified in individual specification section.

.2 Provide items with tags identifying their associated function and equipment.

.3 Deliver to site; place and store.

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

1.8 STORAGE, HANDLING AND PROTECTION

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

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

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

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

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

END OF SECTION

Part 1 General

1.1 DESCRIPTION

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

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

1.2 QUALITY CONTROL

.1 When specified in individual Sections require manufacturer to provide authorized representative to demonstrate operation of equipment and systems, instruct Owner's personnel, and provide written report that demonstration and instructions have been completed.

1.3 SUBMITTALS

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

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

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

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

1.4 CONDITIONS FOR DEMONSTRATIONS

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

1.5 PREPARATION

.1 Verify that conditions for demonstration and instructions comply with requirements.

.2 Verify that designated personnel are present.

1.6 DEMONSTRATION AND INSTRUCTIONS

.1 Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, and maintenance of each item of equipment at agreed upon times, at the designated location.

.2 Instruct personnel in phases of operation and maintenance using operation and maintenance manuals as basis of instruction.

.3 Review contents of manual in detail to explain aspects of operation and maintenance.

.4 Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instructions.

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 SUMMARY

.1 Section Includes:

.1 This section is limited to portions of the Building Management Manual (BMM) provided to Departmental Representative by Contractor.

.2 Acronyms:

.1 BMM - Building Management Manual.
.2 HVAC - Heating, Ventilation and Air Conditioning.
.3 PI - Product Information.
.4 PV - Performance Verification.
.5 TAB - Testing, Adjusting and Balancing.
.6 WHMIS - Workplace Hazardous Materials Information System.

1.2 GENERAL REQUIREMENTS

.1 Standard letter size paper 216 mm x 279mm.

.2 Binders: vinyl hard covered, 3" "D" ring,(not "O" ring) loose leaf sized, with spine pocket. Identify contents of each binder on spine

.3 Methodology used to facilitate updating.

.4 Drawings, diagrams and schematics to be professionally developed.

.5 Electronic copy of data to be in a format accepted and approved by Property Manger (PDF).

1.3 APPROVALS

.1 Prior to commencement, co-ordinate requirements for preparation, submission and approval with Property Manager.

1.4 GENERAL INFORMATION

.1 Provide Consultant the following for insertion into appropriate Part and Section of BMM:

.1 Complete list of names, addresses, telephone and fax numbers of contractor, sub-contractors that participated in delivery of project - as indicated in Section 1.2 of BMM.

.2 Summary of architectural, structural, fire protection, mechanical and electrical systems installed and commissioned - as indicated in Section 1.4 of BMM.

.1 Including sequence of operation as finalized after commissioning is complete as indicated in Section 2.0 of BMM.

.3 Description of building operation under conditions of heightened security and emergencies as indicated in Section 2.0 of BMM.

.4 System, equipment and components Maintenance Management System (MMS) identification - Section 2.1 of BMM..

.5 Information on operation and maintenance of architectural systems and equipment installed and commissioned - Section 2.0 of BMM.

.6 Information on operation and maintenance of fire protection and life safety systems and equipment installed and commissioned - Section 2.0 of BMM.

.7 Information on operation and maintenance of mechanical systems and equipment installed and commissioned - Section 2.0 of BMM.

.8 Operating and maintenance manual - Section 3.2 of BMM.

.9 Final commissioning plan as actually implemented.

.10 Completed commissioning checklists.

.11 Commissioning test procedures employed.

.12 Completed Product Information (PI) and Performance Verification (PV) report forms, approved and accepted by Property Manager.

.13 Commissioning reports.

1.5 CONTENTS OF OPERATING AND MAINTENANCE MANUAL

.1 For detailed requirements refer to Section 01 78 00 - Closeout Submittals.

.2 Consultant to review and approve format and organization within 2 weeks of award of contract.

.3 Include original manufactures brochures and written information on products and equipment installed on this project.

.4 Record and organize for easy access and retrieval of information contained in BMM.

.5 Include completed PI report forms, data and information from other sources as required.

.6 Inventory directory relating to information on installed systems, equipment and components.

.7 Approved project shop-drawings, product and maintenance data.

.8 Manufacturer's data and recommendations relating: manufacturing process, installation, commissioning, start-up, O&M, shutdown and training materials.

.9 Inventory and location of spare parts, special tools and maintenance materials.

.10 Warranty information.

.11 Inspection certificates with expiration dates, which require on-going re-certification inspections.

.12 Maintenance program supporting information including:

.1 Recommended maintenance procedures and schedule.

.2 Information to removal and replacement of equipment including, required equipment, points of lift and means of entry and egress.

1.6 SUPPORTING DOCUMENTATION FOR INSERTION INTO SUPPORTING APPENDICES

.1 Provide RCMP supporting documentation relating to installed equipment and system, including:

- .1 General:
  - .1 Finalized commissioning plan.
  - .2 WHMIS information manual.
  - .3 Approved "as-built" drawings and specifications.
  - .4 Procedures used during commissioning.
  - .5 Cross-Reference to specification sections.
- .2 Architectural and structural:
  - .1 Inspection certificates, construction permits.
- .3 Fire prevention, suppression and protection:
  - .1 Test reports.
  - .2 Smoke test reports.
  - .3 PV reports.
- .4 Mechanical:
  - .1 Installation permits, inspection certificates.
  - .2 Piping pressure test certificates.
  - .3 Ducting leakage test reports.
  - .4 TAB and PV reports.
  - .5 Copies of posted instructions.
- .5 Electrical:
  - .1 Installation permits, inspection certificates.
  - .2 TAB and PV reports.
  - .3 Electrical work log book.
  - .4 Charts and schedules.
  - .5 Locations of cables and components.
  - .6 Copies of posted instructions.

1.7 LANGUAGE

.1 English and French Language to be in separate binders.

1.8 IDENTIFICATION OF FACILITY

.1 When submitting information to Departmental Representative for incorporation into BMM, use following system for identification of documentation:

- .1 To be supplied to successful contractor.

1.9 USE OF CURRENT TECHNOLOGY

.1 Use current technology for production of documentation. Emphasis on ease of accessibility at all times, maintain in up-to-date state, compatibility with user's requirements.

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA S350-M1980(R1998), Code of Practice for Safety in Demolition of Structures.

1.2 SUBMITTALS

.1 Submit shop drawings in accordance with Sections 01 33 00 - Submittal Procedures 01 00 10 - General Instructions.

1.3 SITE CONDITIONS

.1 Should material resembling spray or trowel-applied asbestos or other designated substance listed as hazardous be encountered, stop work, take preventative measures, and notify Consultant immediately.

.1 Do not proceed until written instructions have been received from Consultant.

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 PREPARATION

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

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

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

3.2 PROTECTION

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

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

.3 Protect building systems, services and equipment.

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

3.3 SALVAGE

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

.2 Items to be stored in weather tight enclosure to ensure that no damaged is caused prior to re-installation

3.4 SITE REMOVALS

.1 Remove items as indicated.

3.5 DEMOLITION

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

.2 Trim edges of partially demolished building elements to tolerances as defined by Consultant to suit future use.

3.6 DISPOSAL

.1 Dispose of removed materials, except where specified otherwise, in accordance with authority having jurisdiction.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 ASTM International

.1 ASTM C919-08, Standard Practice for Use of Sealants in Acoustical Applications.

.2 Canadian General Standards Board (CGSB)

.1 CGSB 19-GP-5M-1984, Sealing Compound, One Component, Acrylic Base, Solvent Curing (Issue of 1976 reaffirmed, incorporating Amendment No. 1).

.2 CAN/CGSB-19.13-M87, Sealing Compound, One-component, Elastomeric, Chemical Curing.

.3 CGSB 19-GP-14M-1984, Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing (Reaffirmation of April 1976).

.4 CAN/CGSB-19.17-M90, One-Component Acrylic Emulsion Base Sealing Compound.

.5 CAN/CGSB-19.24-M90, Multi-component, Chemical Curing Sealing Compound.

.3 General Services Administration (GSA) - Federal Specifications (FS)

.1 FS-SS-S-200-E(2)1993, Sealants, Joint, Two-Component, Jet-Blast-Resistant, Cold Applied, for Portland Cement Concrete Pavement.

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

.1 Material Safety Data Sheets (MSDS).

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

.2 Manufacturer's product to describe:

.1 Caulking compound.

.2 Primers.

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

.3 Samples:

.1 Submit samples of each type of material and colour.

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

.4 Manufacturer's Instructions:

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

1.3 CLOSEOUT SUBMITTALS

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

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

1.4 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:

.1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect joint sealants from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

1.5 SITE CONDITIONS

.1 Ambient Conditions:

.1 Proceed with installation of joint sealants only when:

.1 Ambient and substrate temperature conditions are within limits permitted by joint sealant manufacturer or are above 4.4 degrees C.

.2 Joint substrates are dry.

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

.2 Joint-Width Conditions:

.1 Proceed with installation of joint sealants only where joint widths are more than those allowed by joint sealant manufacturer for applications indicated.

.3 Joint-Substrate Conditions:

.1 Proceed with installation of joint sealants only after contaminants capable of interfering with adhesion are removed from joint substrates.

1.6 ENVIRONMENTAL REQUIREMENTS

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

.2 Conform to manufacturers recommended installation conditions for applications of sealants

.3 Ventilate area of work by use of 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 All sealants to be used in accordance with manufacturers recommended applications

.5 It remains the contractors responsibility to verify compatibility of the sealant with the substrate, primers, backer rods and weather conditions prior to installation.

.1 Bring any discrepancies with the above to the attention of the project manager.

2.2 SEALANT MATERIAL DESIGNATIONS

.1 Exterior joints in horizontal wearing (concrete) surfaces: Polyurethane, semi-self-levelling, moisture curing, non-staining, non-bleeding, colour as selected.

.1 ASTM C920
.2 Single Component
.3 Pourable
.4 Class – Cyclic Movement - 100/50
.5 CAN/CGSB – 19.13-M87
.6 Acceptable Product: Vulkem 45 SSL – Tremco Sealants, or approved equivalent.

.2 General exterior use: Silicone, neutral cure ultra-low modulus, moisture curing, nonstaining, nonbleeding, colour as selected.

.1 ASTM C920
.2 Single Component
.3 Non-Sag
.4 Class – Cyclic Movement - 100/50
.5 Class ‘A’
.6 ASTM C1248, C1382, E84
.7 CAN/CGSB – 19.13-M87
.8 Acceptable Product: Spectrem 1 – Tremco Sealants, or approved equivalent.

.3 Glazing: Silicone, neutral cure, medium modulus, colour as selected.

.1 ASTM C920
.2 Single Component
.3 Non-Sag

.4 Class – Cyclic Movement - 50
.5 Class 'A'
.6 ASTM C1248
.7 CAN/CGSB – 19.13-M87
.8 Acceptable Product: Spectrem 2 – Tremco Sealants, or approved equivalent.

.4 Air-Barrier to Window air-seal sealant: Silyl-terminated polyether polymer (STPe), moisture cure, medium modulus.

.1 Compatible with Air-Barrier system.
.2 ASTM C920
.3 Single Component
.4 Non-Sag
.5 Class – Cyclic Movement - 25
.6 Class 'A'
.7 Acceptable Product: Bakor HE925 BES, or approved equivalent.

.5 General interior use: painted gypsum, painted concrete, painted concrete block: Acrylic latex, colour as selected.

.1 Low VOC.
.2 Single Component
.3 Non-Sag
.2 Class – Cyclic Movement - 12.5
.3 Class 'A'
.4 CAN/CGSB 19-GP-14M
.5 Acceptable Product: Tremflex 834 – Tremco Sealants, or approved equivalent.

.6 Plumbing fixtures and general washroom / kitchen (wet-area) usage: sinks, tubs, urinals, water-closets, vanities: Silicone, acetoxy, moisture curing, with fungicide.

.1 ASTM C920
.2 Single Component
.3 Non-Sag
.4 Class – Cyclic Movement – 25
.5 Class 'A'
.6 CAN/CGSB – 19.13-M87
.7 Acceptable Product: Tremsil 200 – Tremco Sealants, or approved equivalent.

.7 Acoustical Sealant: to ASTM C919: Synthetic rubber, single-component, non-skinning, non-hardening.

.1 Single Component
.2 Non-Sag

.3 Class – Cyclic Movement – N/A

.4 CAN/CGSB 19.21 M87

.5 Acceptable Product: Acoustical Sealant – Tremco Sealants, or approved

.8 Preformed compressible and non-compressible back-up materials:

.1 Polyethylene, urethane, neoprene or vinyl foam:

.1 Extruded open 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 in accordance with sealant manufacturer's written recommendations.

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

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for joint sealants installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate.

.2 Inform Consultant of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied

3.2 SURFACE PREPARATION

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

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

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

.4 Ensure joint surfaces are dry and frost free.

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

3.3 PRIMING

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

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

3.4 BACKUP MATERIAL

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

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

3.5 MIXING

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

3.6 APPLICATION

.1 Sealant:

.1 Apply sealant in accordance with manufacturer's written instructions.

.2 Mask edges of joint where irregular surface or sensitive joint border exists to provide neat joint.

.3 Apply sealant in continuous beads.

.4 Apply sealant using gun with proper size nozzle.

.5 Use sufficient pressure to fill voids and joints solid.

.6 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.

.7 Tool exposed surfaces before skinning begins to give slightly concave shape.

.8 Remove excess compound promptly as work progresses and upon completion.

.2 Curing:

.1 Cure sealants in accordance with sealant manufacturer's instructions.

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

3.7 CLEANING

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

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

.2 Clean adjacent surfaces immediately.

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

.4 Remove masking tape after initial set of sealant.

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

3.8 PROTECTION

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

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

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Aluminum Association (AA)

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

.2 ASTM International

.1 ASTM A1008/A1008M-10, Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.

.2 ASTM D523-08, Standard Test Method for Specular Gloss.

.3 ASTM D822-01(2006), Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings.

.3 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-1.105-M91, Quick-Drying Primer.

.2 CAN/CGSB-1.213-04, Etch Primer (Pretreatment Coating or Tie Coat) for Steel and Aluminum.

.3 CAN/CGSB-1.181-99, Ready-Mixed, Organic Zinc-Rich Coatings.

.4 CSA International

.1 CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.

.5 Environmental Choice Program (ECP)

.1 CCD-016-97(R2005), Thermal Insulation.

.2 CCD-047-98(R2005), Architectural Surface Coatings.

.3 CCD-048-98(R2006), Surface Coatings - Recycled Water-borne.

1.2 ADMINISTRATIVE REQUIREMENTS

.1 Pre-Installation Meetings:

.1 Convene pre-installation meeting 1 week prior to beginning work of this Section, with Consultant in accordance with Section 01 31 19 - Project Meetings to:

.1 Verify project requirements.

.2 Review installation and substrate conditions.

.3 Co-ordination with other construction subtrades.

.4 Review manufacturer's written installation instructions and warranty requirements.

.2 Arrange for site visit with Consultant prior to start of Work to examine existing site conditions adjacent to demolition Work.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

.3 Shop Drawings:

.1 Indicate sizes, service rating, types, materials, operating mechanisms, glazing locations and details, hardware and accessories, required clearances and electrical connections.

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

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

.6 Manufacturers Reports:

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

.1

1.4 CLOSEOUT SUBMITTALS

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

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

1.5 MAINTENANCE MATERIAL SUBMITTALS

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

.2 Spare parts:

.1 Supply spare parts for sectional metal doors as follows:

.1 Door panels: 1.

.2 Door rollers: 2 sets.

.3 Weather-stripping: 2 sets.

.4 Springs and cables: 1 set.

.2 Store where directed. Identify each part and reference to appropriate door.

1.6 QUALITY ASSURANCE

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

1.7 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:

.1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect sectional metal doors, hardware and accessories from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 ELECTRICAL OPERATOR

.1 Electrical jack shaft type operator.

.1 Standard of Acceptance: Dorlec EJH-383

.2 Electrical motors, controller units, remote pushbutton stations, relays and other electrical components: to CSA approval with adjustable timer “TO CLOSE” feature

.3 Power supply: 208 V, 3 phase, 60 Hz.

.1 Motor: ¾ HP high starting torque, class A insulated.

.4 Controller units with integral motor reversing starter, solenoid operated brake 3 heater elements for overload protection, including pushbuttons and control relays as applicable.

.5 Operation: Interior.

.1 Remote pushbutton stations: adjacent to each door. 24V. Flush Mounted, key operated model Square D 9001KY295 complete with emergency stop button, complete with Abloy CY415 cylinder. Abloy Cylinder supplied by hardware supplier .

.6 Exterior Operation

.1 Remote pushbutton station: adjacent to door. 24V Flush mounted key operate model square D 9001KY195, without emergency stop button, complete with Abloy CY415 cylinder. Abloy cylinder to be supplied by the hardware supplier.

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

.1 Safety switch mechanism c/w one set of photo eyes and one reflector.

.8 For jack shaft operators:

.1 Provide floor level disconnect device to allow for manual operation in event of power failure.

.2 Equip Operator with:

.1 Electrical interlock switch to disconnect power to operator when in manual operation.

.2 Built-in chain hoist for manual operation in event of power failure.

.3 Cable fail safe device:

.1 Solenoid brake able to stop door immediately if cable breaks on door free fall Braking Capacity 500 kg

.9 Door speed: 300 mm per second.

.10 Control transformer: for 24 VAC control voltage.

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

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for sectional metal doors installation in accordance with manufacturer's written instructions.

3.2 INSTALLATION

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

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

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

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

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

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

.7 Adjust weatherstripping to form a weather tight seal.

.8 Adjust doors for smooth operation.

3.3 CLEANING

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

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

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

.1 Remove traces of primer; clean doors and frames.

.2 Clean glass and glazing materials with approved non-abrasive cleaner.

3.4 PROTECTION

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

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

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Aluminum Association (AA)

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

.2 ASTM International

.1 ASTM C475-02(2007), Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.

.2 ASTM C514-04(2009e1), Standard Specification for Nails for the Application of Gypsum Board.

.3 ASTM C557-03(2009)e1, Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing.

.4 ASTM C840-08, Standard Specification for Application and Finishing of Gypsum Board.

.5 ASTM C954-07, Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness.

.6 ASTM C1002-07, Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.

.7 ASTM C1047-09, Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.

.8 ASTM C1280-99, Standard Specification for Application of Gypsum Sheathing.

.9 ASTM C1177/C1177M-08, Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.

.10 ASTM C1178/C1178M-08, Standard Specification for Glass Mat Water-Resistant Gypsum Backing Board.

.11 ASTM C1396/C1396M-09a, Standard Specification for Gypsum Wallboard.

.3 Association of the Wall and Ceilings Industries International (AWCI)

.1 AWCI Levels of Gypsum Board Finish-97.

.4 Canada Green Building Council (CaGBC)

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

.2 LEED Canada-CI Version 1.0-2007, LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Guide For Commercial Interiors.

.5 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-51.34-M86(R1988), Vapour Barrier, Polyethylene Sheet for Use in Building Construction.

.2 CAN/CGSB-71.25-M88, Adhesive, for Bonding Drywall to Wood Framing and Metal Studs.

.6 Green Seal Environmental Standards (GS)

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

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

.1 SCAQMD Rule 1113-A2007, Architectural Coatings.

.2 SCAQMD Rule 1168-A2005, Adhesives and Sealants Applications.

.8 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULC-S102-07, Standard Method of Test of Surface Burning Characteristics of Building Materials and Assemblies.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for gypsum board assemblies and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:

.1 Store gypsum board assemblies materials level off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect gypsum board assemblies from nicks, scratches, and blemishes.

.3 Protect from weather, elements and damage from construction operations.

.4 Handle gypsum boards to prevent damage to edges, ends or surfaces.

.5 Protect prefinished aluminum surfaces with wrapping strippable coating. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.

.6 Replace defective or damaged materials with new.

.4 Dispose of waste in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.4 AMBIENT CONDITIONS

.1 Maintain temperature 10 degrees C minimum, 21 degrees C maximum for 48 hours prior to and during application of gypsum boards and joint treatment, and for 48 hours minimum after completion of joint treatment.

.2 Apply board and joint treatment to dry, frost free surfaces.

.3 Ventilation: ventilate building spaces as required to remove excess moisture that would prevent drying of joint treatment material immediately after its application.

Part 2 Products

2.1 MATERIALS

.1 Standard board: to ASTM C1396/C1396M regular, Type X, as per drawings, 1200 mm wide x maximum practical length, ends square cut, edges bevelled.

.2 Gypsum sheathing board: to ASTM C1396/C1396M, regular, Type X, mm thick, 1200 mm wide x maximum practical length.

.1 For use in washrooms, change rooms and exercise room.

.3 Metal furring runners, hangers, tie wires, inserts, anchors: to ASTM C1280.

.4 Drywall furring channels: 0.5 mm core thickness galvanized steel channels for screw attachment of gypsum board.

.5 Resilient clips drywall furring : 0.5 mm base steel thickness galvanized steel for resilient attachment of gypsum board.

.6 Nails: to ASTM C514.

.7 Steel drill screws: to ASTM C1002.

.8 Stud adhesive: to CAN/CGSB-71.25 ASTM C557.

.9 Laminating compound: as recommended by manufacturer, asbestos-free.

.10 Casing beads, corner beads, control joints and edge trim: to ASTM C1047, metal, zinc-coated by hot-dip process, 0.5 mm base thickness, perforated flanges, one piece length per location.

.11 Cornice cap: 12.7 mm deep x partition width, of 1.6 mm base thickness galvanized sheet steel, prime painted. Include splice plates for joints.

.12 Sealants: in accordance with Section 07 92 00 - Joint Sealants.

.13 Polyethylene: to CAN/CGSB-51.34, Type 2.

.14 Insulating strip: rubberized, moisture resistant, 3 mm thick cork closed cell neoprene strip, 12 mm wide, with self-sticking permanent adhesive on one face, lengths as required.

.15 Joint compound: to ASTM C475, asbestos-free.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for gypsum board assemblies installation in accordance with manufacturer's written instructions.

3.2 ERECTION

.1 Do application and finishing of gypsum board to ASTM C840 except where specified otherwise.

.2 Do application of gypsum sheathing to ASTM C1280.

.3 Erect hangers and runner channels for suspended gypsum board ceilings to ASTM C840 except where specified otherwise.

.4 Support light fixtures by providing additional ceiling suspension hangers within 150 mm of each corner and at maximum 600 mm around perimeter of fixture.

.5 Install work level to tolerance of 1:1200.

.6 Frame with furring channels, perimeter of openings for access panels, light fixtures, diffusers, grilles.

.7 Install 19 x 64 mm furring channels parallel to, and at exact locations of steel stud partition header track.

.8 Furr for gypsum board faced vertical bulkheads within and at termination of ceilings.

.9 Furr above suspended ceilings for gypsum board fire and sound stops and to form plenum areas as indicated.

.10 Install wall furring for gypsum board wall finishes to ASTM C840, except where specified otherwise.

.11 Furr openings and around built-in equipment, cabinets, access panels, , on four sides. Extend furring into reveals. Check clearances with equipment suppliers.

.12 Furr duct shafts, beams, columns, pipes and exposed services where indicated.

.13 Erect drywall resilient furring transversely across studs joists between the layers of gypsum board, spaced maximum 600 mm on centre and not more than 150 mm from ceiling/wall juncture. Secure to each support with 38 mm common nail 25 mm drywall screw.

.14 Install 150 mm continuous strip of 12.7 mm gypsum board along base of partitions where resilient furring installed.

3.3 APPLICATION

.1 Apply gypsum board after bucks, anchors, blocking, sound attenuation, electrical and mechanical work have been approved.

.2 Apply single layer gypsum board to wood /metal furring or framing using screw fasteners for first layer, screw fasteners for second layer. Maximum spacing of screws 300 mm on centre.

.1 Single-Layer Application:

.1 Apply gypsum board on ceilings prior to application of walls to ASTM C840.

.2 Apply gypsum board vertically or horizontally, providing sheet lengths that will minimize end joints.

.2 Double-Layer Application:

.1 Install gypsum board for base layer and exposed gypsum board for face layer.

.2 Apply base layer to ceilings prior to base layer application on walls; apply face layers in same sequence. Offset joints between layers at least 250 mm.

.3 Apply base layers at right angles to supports unless otherwise indicated.

.4 Apply base layer on walls and face layers vertically with joints of base layer over supports and face layer joints offset at least 250 mm with base layer joints.

.3 Apply single layer gypsum board to concrete block surfaces, where indicated, using laminating adhesive.

.1 Comply with gypsum board manufacturer's recommendations.

.2 Brace or fasten gypsum board until fastening adhesive has set.

.3 Mechanically fasten gypsum board at top and bottom of each sheet.

.4 Exterior Soffits and Ceilings: install exterior gypsum board perpendicular to supports; stagger end joints over supports. Install with 6 mm gap where boards abut other work.

.5 Apply water-resistant gypsum board where wall tiles coating to be applied adjacent to slop sinks janitors closets. Apply water-resistant sealant to edges, ends, cut-outs which expose gypsum core and to fastener heads. Do not apply joint treatment on areas to receive tile finish.

.6 Apply 12 mm diameter bead of acoustic sealant continuously around periphery of each face of partitioning to seal gypsum board/structure junction where partitions abut fixed building components. Seal full perimeter of cut-outs around electrical boxes, ducts, , in partitions where perimeter sealed with acoustic sealant.

.7 Install ceiling boards in direction that will minimize number of end-butt joints. Stagger end joints at least 250 mm.

.8 Install gypsum board on walls vertically to avoid end-butt joints. At stairwells and similar high walls, install boards horizontally with end joints staggered over studs, except where local codes or fire-rated assemblies require vertical application.

.9 Install gypsum board with face side out.

.10 Do not install damaged or damp boards.

.11 Locate edge or end joints over supports. Stagger vertical joints over different studs on opposite sides of wall.

3.4 ACCOUSTIC ASSEMBLIES

.1 Apply 12mm dia bead of acoustic sealant continuously around periphery of each face of partitioning to seal gypsum board/structure junction where partitions abut fixed building components. Seal full perimeter of cut-outs around electrical boxes and ducts and other penetrations.

.2 Acoustic rated rooms will be tested to ensure a minimum STC 46 Rating is achieved

.3 Any tests indicating the minimum STC 46 rating has not been achieved will be corrected at the contractor's expense.

.4 Retesting of acoustic rated rooms to confirm compliance with the STC rating will be at the contractors' expense.

3.5 INSTALLATION

.1 Erect accessories straight, plumb or level, rigid and at proper plane. Use full length pieces where practical. Make joints tight, accurately aligned and rigidly secured. Mitre and fit corners accurately, free from rough edges. Secure using contact adhesive for full length at 150 mm on centre.

.2 Install casing beads around perimeter of suspended ceilings.

.3 Install casing beads where gypsum board butts against surfaces having no trim concealing junction and where indicated. Seal joints with sealant.

.4 Install insulating strips continuously at edges of gypsum board and casing beads abutting metal window and exterior door frames, to provide thermal break.

.5 Install shadow mould at gypsum board/ceiling juncture as indicated. Minimize joints; use corner pieces and splicers.

.6 Construct control joints of two back-to-back casing beads set in gypsum board facing and supported independently on both sides of joint.

.7 Provide continuous polyethylene dust barrier behind and across control joints.

.8 Locate control joints at changes in substrate construction.

.9 Install control joints straight and true.

.10 Construct expansion joints as detailed, at building expansion and construction joints. Provide continuous dust barrier.

.11 Install expansion joint straight and true.

.12 Install cornice cap where gypsum board partitions do not extend to ceiling.

.13 Fit cornice cap over partition, secure to partition track with two rows of sheet metal screws staggered at 300 mm on centre.

.14 Splice corners and intersections together and secure to each member with 3 screws.

.15 Install access doors to electrical and mechanical fixtures specified in respective sections.

.1 Rigidly secure frames to furring or framing systems.

.16 Finish face panel joints and internal angles with joint system consisting of joint compound, joint tape and taping compound installed according to manufacturer's directions and feathered out onto panel faces.

.17 Gypsum Board Finish: finish gypsum board walls and ceilings to following levels in accordance with AWCI Levels of Gypsum Board Finish:

.1 Levels of finish:

.1 Level 0: no tapping, finishing or accessories required.

.2 Level 1: embed tape for joints and interior angles in joint compound. Surfaces to be free of excess joint compound; tool marks and ridges are acceptable.

.3 Level 2: embed tape for joints and interior angles in joint compound and apply one separate coat of joint compound over joints, angles, fastener heads and accessories; surfaces free of excess joint compound; tool marks and ridges are acceptable.

.4 Level 3: embed tape for joints and interior angles in joint compound and apply two separate coats of joint compound over joints, angles, fastener heads and accessories; surfaces smooth and free of tool marks and ridges.

.5 Level 4: embed tape for joints and interior angles in joint compound and apply three separate coats of joint compound over joints, angles, fastener heads and accessories; surfaces smooth and free of tool marks and ridges.

.6 Level 5: embed tape for joints and interior angles in joint compound and apply three separate coats of joint compound over joints, angles, fastener heads and accessories; apply a thin skim coat of joint compound to entire surface; surfaces smooth and free of tool marks and ridges.

.18 Finish corner beads, control joints and trim as required with two coats of joint compound and one coat of taping compound, feathered out onto panel faces.

.19 Fill screw head depressions with joint and taping compounds to bring flush with adjacent surface of gypsum board so as to be invisible after surface finish is completed.

.20 Sand lightly to remove burred edges and other imperfections. Avoid sanding adjacent surface of board.

.21 Completed installation to be smooth, level or plumb, free from waves and other defects and ready for surface finish.

.22 Apply one coat of white primer sealer over surface to be textured. When dry apply textured finish in accordance with manufacturer's instructions.

.23 Mix joint compound slightly thinner than for joint taping.

.24 Apply thin coat to entire surface using trowel or drywall broad knife to fill surface texture differences, variations or tool marks.

.25 Allow skim coat to dry completely.

.26 Remove ridges by light sanding or wiping with damp cloth.

3.6 CLEANING

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

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

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

.2 Waste Management: separate waste materials for reuse recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

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

3.7 PROTECTION

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

.2 Repair damage to adjacent materials caused by gypsum board assemblies installation.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 ASTM International

.1 ASTM C645-11a, Standard Specification for Non-structural Steel Framing Members.

.2 ASTM C754-11, Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.

.2 Environmental Choice Program (ECP)

.1 CCD-047-98(R2005), Architectural Surface Coatings.

.2 CCD-048-95(R2006), Surface Coatings - Recycled Water-Borne.

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

.1 Material Safety Data Sheets (MSDS).

.4 The Master Painters Institute (MPI)

.1 Architectural Painting Specification Manual - current edition.

.1 MPI #26, Primer, Galvanized Metal, Cementitious.

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

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

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

.3 Samples:

.1 Submit duplicate 300 mm long samples of non-structural metal framing.

1.3 QUALITY ASSURANCE

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

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

1.4 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:

.1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect metal framing from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 MATERIALS

.1 Non-load bearing channel stud framing: to ASTM C645, stud size as indicated on drawings, roll formed from 0.53mm thickness hot dipped galvanized steel sheet, for screw attachment of gypsum board.

.1 Knock-out service holes at 460 mm centres.

.2 Non-Load bearing channel heavy duty stud framing: to ASTM C645, stud size as indicated on drawings, roll formed from 1.43mm thickness hot dipped galvanized steel sheet, for screw attachment of gypsum board.

.1 Knock-out service holes at 460 mm centres.

.2 For installation around Room 103

.3 Floor tracks: to ASTM C645, in widths to suit stud sizes, 32 mm flange height. Ceiling tracks to be 50mm flange heights

.4 Metal channel stiffener: 1.4 mm thick cold rolled steel, coated with rust inhibitive coating.

.5 Acoustical sealant: in accordance with Section 07 92 00 - Joint Sealants.

.6 Insulating strip: rubberized, moisture resistant 3 mm thick cork strip, 12 mm wide, with self-sticking adhesive on one face, lengths as required.

.7 Metal Mesh: ¾”, 10 GA flat expanded steel metal mesh. Base metal thickness 0.120. Metalex KF09 or equal.

.8 Metal washers: 19mm dia steel washers

.9 Security screws: Torx head

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for non-structural metal framing application in accordance with manufacturer's written instructions.

3.2 ERECTION

.1 Align partition tracks at floor and ceiling and secure at 600 mm on centre maximum.

.2 Install damp proof course under stud shoe tracks of partitions on slabs on grade.

.3 Place studs vertically at spacing shown on drawings and not more than 50 mm from abutting walls, and at each side of openings and corners.

.1 Position studs in tracks at floor and ceiling. Cross brace steel studs as required to provide rigid installation to manufacturer's instructions.

.4 Erect metal studding to tolerance of 1:1000.

.5 Attach studs to bottom and ceiling track using screws.

.6 Co-ordinate simultaneous erection of studs with installation of service lines. When erecting studs ensure web openings are aligned.

.7 Co-ordinate erection of studs with installation of door/window frames and special supports or anchorage for work specified in other Sections.

.8 Provide two studs extending from floor to ceiling at each side of openings wider than stud centres specified.

.1 Secure studs together, 50 mm apart using column clips or other approved means of fastening placed alongside frame anchor clips.

.9 Install heavy gauge single jamb studs at openings.

.10 Erect track at head of door/window openings and sills of sidelight/window openings to accommodate intermediate studs.

.1 Secure track to studs at each end, in accordance with manufacturer's instructions.

.2 Install intermediate studs above and below openings in same manner and spacing as wall studs.

.11 Frame openings and around built-in equipment, cabinets, access panels, on four sides. Extend framing into reveals. Check clearances with equipment suppliers.

.12 Provide 40 mm stud or furring channel secured between studs for attachment of fixtures behind lavatory basins, toilet and bathroom accessories, and other fixtures including grab bars and towel rails, attached to steel stud partitions.

.13 Install steel studs or furring channel between studs for attaching electrical and other boxes.

.14 Extend partitions to ceiling height except where noted otherwise on drawings.

.15 Maintain clearance under beams and structural slabs to avoid transmission of structural loads to studs.

.1 Use 50 mm leg ceiling tracks.

.16 Install continuous insulating strips to isolate studs from uninsulated surfaces.

.17 Install two continuous beads of acoustical sealant insulating strip under studs and tracks around perimeter of sound control partitions.

3.3 ACOUSTIC WALLS

.1 Ensure that no back to back electrical boxes, ducts or conduit are installed in the same stud spaces or attached to the same stud.

.2 Install two continuous beads of acoustical sealant under studs and tracks around perimeter of acoustically rated partitions. Ensure tight fit to adjacent substrate. Fill gaps prior to installation of gypsum board.

3.4 CLEANING

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

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

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

.3 Waste Management: separate waste materials for reuse recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal 01 35 21 - LEED Requirements.

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

3.5 PROTECTION

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

.2 Repair damage to adjacent materials caused by non-structural metal framing application.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section .

1.2 REFERENCES

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

.1 ASTM F1303-04, Standard Specification for Sheet Vinyl Floor Covering with Backing.

.2 Canada Green Building Council (CaGBC)

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

.2 LEED Canada-CI Version 1.0-2007, LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Guide For Commercial Interiors.

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

.1 Material Safety Data Sheets (MSDS).

.4 South Coast Air Quality Management District (SCAQMD), California State

.1 SCAQMD Rule 1113-04, Architectural Coatings.

.2 SCAQMD Rule 1168-05, Adhesives and Sealants Applications.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

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

.3 Provide samples in accordance with Section 01 33 00 - Submittal Procedures.

.1 Submit duplicate 300 x 300 mm sample pieces of sheet material, 300 mm long base, nosing, feature strips, treads, edge strips.

.4 Sustainable Design Submittals:

.1 LEED Canada-NC Version 1.0 CI Version 1.0 Submittals: in accordance with Section 01 35 21 - LEED Requirements.

.5 Closeout Submittals:

.1 Provide maintenance data for resilient flooring for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.4 SUSTAINABLE REQUIREMENTS

.1 Materials and products in accordance with Section 01 47 15 - Sustainable Requirements: Construction.

1.5 DELIVERY, STORAGE AND HANDLING

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

.2 Waste Management and Disposal:

.1 Separate waste materials for reuse recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.6 AMBIENT CONDITIONS

.1 Maintain air temperature and structural base temperature at flooring installation area above 20 degrees for 48 hours before, during and 48 hours after installation.

1.7 MAINTENANCE

.1 Extra Materials:

.1 Provide extra materials of resilient sheet flooring and adhesives in accordance with Section 01 78 00 - Closeout Submittals.

.2 Provide m^2 of each colour, pattern and type flooring material required for project for maintenance use.

.3 Extra materials one piece and from same production run as installed materials.

.4 Identify each roll of sheet flooring and each container of adhesive.

.5 Deliver to Departmental Representative DCC Representative Consultant, upon completion of the work of this section.

.6 Store where directed by Departmental Representative DCC Representative Consultant.

Part 2 Products

2.1 MATERIALS

.1 Resilient Sheet Flooring (RSF-1) :Standard of Acceptance: Acceptable material: Altro Aquarius (measurements and product weights given below are approximate): Slip Resistance .88/D 1.03/W

.1 Color from manufacturers standard range.

.2 Complies with requirements for ASTM F 1913 Standard Specification for Vinyl Sheet Floor Covering Without Backing.

.3 iQ construction: no wax, no finish for life of product.

.4 Roll/Sheet Width: 6' 6" (2 m)

.5 Wear layer/Overall thickness: .080" (2.0 mm).

.6 ASTM D 2047, Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring of 0.6 or greater.

.7 ASTM F 970, Standard Test Method for Static Load Limit – 250 PSI.

.8 ASTM E 648, Standard Test method for Critical Radiant Flux of 0.45 watts/cm2 or greater, Class I

.2 Primers and adhesives: of types recommended by resilient flooring manufacturer for specific material on applicable substrate, above, on or below grade.

.3 Sub-floor filler and leveller: white premix latex requiring water only to produce cementitious pasteas recommended by flooring manufacturer for use with their product.

.4 Metal edge strips:

.1 Aluminum extruded, smooth, polished stainless steel with lip to extend under floor finish, shoulder flush with top of adjacent floor finish.

.5 External corner protectors: stainless steel, type recommended by flooring manufacturer.

.6 Edging to floor penetrations: stainless steel , type recommended by flooring manufacturer.

.7 Sealer and wax: type recommended by resilient flooring material manufacturer for material type and location.

.8 Underlayment:

.1 Underlayment plywood 1/4” (As per manufacturers instructions)

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 SITE VERIFICATION OF CONDITIONS

.1 Ensure concrete floors are clean and dry by using test methods recommended by flooring manufacturer.

3.3 PREPARATION

.1 Clean floor and apply filler; trowel and float to leave smooth, flat hard surface. Prohibit traffic until filler cured and dry.

.2 Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes and other defects with sub-floor filler.

.3 Prime and Seal concrete slab to resilient flooring manufacturer's printed instructions.

3.4 APPLICATION: FLOORING

.1 Provide high ventilation rate, with maximum outside air, during installation, and for 48 to 72 hours after installation. If possible, vent directly to outside. Do not let contaminated air recirculate through district or whole building air distribution system. Maintain extra ventilation for at least one month following building occupation.

.2 Apply adhesive uniformly using recommended trowel. Do not spread more adhesive than can be covered by flooring before initial set takes place.

.3 Lay flooring with seams parallel to building lines to produce a minimum number of seams. Border widths minimum 1/3 width of full material.

.4 Run sheets in direction of traffic. Double cut sheet joints and continuously seal heat weld according to manufacturer's printed instructions.

.5 Heat weld seams of linoleum sheet flooring in accordance with manufacturer's printed instructions.

.6 As installation progresses, and after installation roll flooring with 45 kg minimum roller to ensure full adhesion.

.7 Cut flooring around fixed objects.

.8 Install feature strips and floor markings where indicated. Fit joints tightly.

.9 Install flooring in pan type floor access covers. Maintain floor pattern.

.10 Continue flooring over areas which will be under built-in furniture.

.11 Continue flooring through areas to receive movable type partitions without interrupting floor pattern.

.12 Terminate flooring at centreline of door in openings where adjacent floor finish or colour is dissimilar.

.13 Install metal edge strips at unprotected or exposed edges where flooring terminates.

3.5 APPLICATION: BASE

.1 Lay out base to keep number of joints at minimum.

.2 Clean substrate and prime with one coat of adhesive.

.3 Apply adhesive to back of base.

.4 Set base against wall and floor surfaces tightly by using 3 kg hand roller.

.5 Install straight and level to variation of 1:1000.

.6 Scribe and fit to door frames and other obstructions. Use premoulded end pieces at flush door frames.

.7 Cope internal corners. Use premoulded corner units for right angle external corners. Use formed straight base material for external corners of other angles.

.8 Use toeless type base where floor finish will be carpet, coved type elsewhere.

.9 Install toeless type base before installation of carpet on floors.

.10 Heat weld base in accordance with manufacturer's printed instructions.

3.6 FIELD QUALITY CONTROL

.1 Manufacturer's Field Services:

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

3.7 CLEANING

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

.2 Remove excess adhesive from floor, base and wall surfaces without damage.

.3 Clean, seal and wax floor and base surface to flooring manufacturer's printed instructions.

3.8 PROTECTION

.1 Protect new floors from time of final set of adhesive until final inspection.

.2 Prohibit traffic on floor for 48 hours after installation.

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 Master Painters Institute (MPI)

.1 MPI Architectural Painting Specifications Manual, 2004.

.2 MPI - Maintenance Repainting Manual, 1998.

1.2 SUBMITTALS

.1 Submittals in accordance with Section 01 33 00 - Submittal Procedures 01 00 10 - General Instructions.

.2 Product Data:

.1 Submit product data and instructions for each paint and coating product to be used.

.2 Submit product data for the use and application of paint thinner.

.3 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01 33 00 - Submittal Procedures 01 00 10 - General Instructions.

.4 Submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.5 Submit manufacturer's installation and application instructions.

1.3 STORAGE AND HANDLING

.1 Storage and Protection:

.1 Provide and maintain dry, temperature controlled, secure storage.

.2 Store materials and supplies away from heat generating devices.

.3 Store materials and equipment in well ventilated area within temperature as recommended by manufacturer.

.2 Fire Safety Requirements:

.1 Provide one 9 kg Type ABC dry chemical fire extinguisher adjacent to storage area.

.2 Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.

.3 Handle, store, use and dispose of flammable and combustible materials in accordance with National Fire Code of Canada requirements.

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

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

.4 Paint, stain and wood preservative finishes and related materials (thinners, and solvents) are regarded as hazardous products and are subject to regulations for disposal. Information on these controls can be obtained from Provincial Ministries of Environment and Regional levels of Government.

1.5 SITE CONDITIONS

.1 Heating, Ventilation and Lighting:

.1 Ventilate enclosed spaces continuously during and after painting process. Run ventilation system 24 hours per day during installation, and provide continuous ventilation for 7 days after completion of application of paint.

.2 Co-ordinate use of existing ventilation system with Property Manager and ensure its operation during and after application of paint as required.

.3 Provide minimum lighting level of 323 Lux on surfaces to be painted.

.2 Temperature, Humidity and Substrate Moisture Content Levels:

.1 Apply paint finishes when ambient air and substrate temperatures at location of installation can be satisfactorily maintained during application and drying process, within MPI and paint manufacturer's prescribed limits.

.2 Test concrete, masonry and plaster surfaces for alkalinity as required.

.3 Apply paint to adequately prepared surfaces, when moisture content is below paint manufacturer's prescribed limits.

.3 Additional application requirements:

.1 Apply paint finish in areas where dust is no longer being generated by related construction operations or when wind or ventilation conditions are such that airborne particles will not affect quality of finished surface.

.2 Apply paint in occupied facilities during silent hours only. Schedule operations to approval of Property Manager such that painted surfaces will have dried and cured sufficiently before occupants are affected.

Part 2 Products

2.1 MATERIALS

.1 Provide paint materials for paint systems from single manufacturer.

.1 Acceptable Manufacturers: Sherwin Williams, Benjamin Moore, Pittsburgh Paints.

.2 Conform to latest MPI requirements for all painting work including preparation and priming.

.3 Materials (primers, paints, coatings, varnishes, stains, lacquers, fillers, thinners, solvents, etc.) in accordance with MPI - Architectural Painting Specification Manual and MPI - Maintenance Repainting Manual "Approved Product" listing.

.4 Use MPI listed materials having minimum E2 rating where indoor air quality (odour) requirements exist.

2.2 COLOURS

.1 Colour schedule will be based upon selection of 2 base colours and two accent colours.

2.3 MIXING AND TINTING

.1 Perform colour tinting operations prior to delivery of paint to site, in accordance with manufacturer's written instructions. Obtain written approval from Consultant for tinting of painting materials.

.2 Use and add thinner in accordance with paint manufacturer's recommendations. Do not use kerosene or similar organic solvents to thin water-based paints.

.3 Thin paint for spraying in accordance with paint manufacturer's instructions.

.4 Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity.

2.4 GLOSS/SHEEN RATINGS

.1 Paint gloss is defined as sheen rating of applied paint, in accordance with following values:

	Gloss @ 60 degrees	Sheen @ 85 degrees
Gloss Level 1 - Matte Finish (flat)	Max. 5	Max. 10
Gloss Level 2 - Velvet-Like Finish	Max.10	10 to 35
Gloss Level 3 - Eggshell Finish	10 to 25	10 to 35
Gloss Level 4 - Satin-Like Finish	20 to 35	min. 35
Gloss Level 5 - Traditional Semi-Gloss Finish	35 to 70	
Gloss Level 6 - Traditional Gloss	70 to 85	
Gloss Level 7 - High Gloss Finish	More than 85	

.2 Gloss level ratings of painted surfaces as indicated and as noted on Finish Schedule.

2.5 EXTERIOR PAINTING

.1 Concrete Vertical Surfaces: (including horizontal soffits)

.1 EXT 3.1A - Latex semi gloss finish.

.2 Concrete Masonry Units: smooth and split face block and brickEXT 4.2A - Latex semi gloss finish.

.3 Structural Steel and Metal Fabrications: columns, beams, joists and miscellaneous metal.

.1 EXT 5.1D - Alkyd semi gloss finish.

.4 Galvanized Metal: high contact/high traffic areas (doors, frames, railings and handrails, etc.).

.1 EXT 5.3B - Alkyd semi gloss finish.

.5 Dimension Lumber: columns, beams, exposed joists, underside of decking, siding, fencing, etc.

.1 EXT 6.2B - Waterborne solid colour stain finish.

.2 EXT 6.2C - Alkyd semi gloss finish.

.3 EXT 6.2L - Semi-transparent stain finish.

.6 Dressed Lumber: doors, door and window frames, casings, battens, smooth facias, etc.

.1 EXT 6.3B - Alkyd semi gloss finish do not use flat finish on doors.

.2 EXT 6.3C - Solid colour stain finish do not use in high contact areas or on doors.

.3 EXT 6.3D - Semi-transparent stain finish do not use on doors.

2.6 INTERIOR PAINTING

.1 Structural Steel and Metal Fabrications: columns, beams, joists and miscellaneous metal.

.1 INT 5.1E Alkyd - semi gloss finish.

.2 Galvanized Metal: high contact/high traffic areas (doors, frames, railings and handrails, etc.).

.1 INT 5.3C - Alkyd semi gloss finish (over cementitious primer).

.3 Plaster and gypsum board: gypsum wallboard, drywall, "sheet rock" type material, etc.

.1 INT 9.2A - Latex semi gloss finish (over latex sealer).

.2 INT 9.2C - Alkyd semi gloss finish (over latex sealer).

.3 INT 9.2M - Institutional low odour/low VOC semi gloss finish.

Part 3 Execution

3.1 GENERAL

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

.2 Perform preparation and operations for interior painting in accordance with MPI - Architectural Painting Specifications Manual and MPI - Maintenance Repainting Manual except where specified otherwise.

3.2 EXAMINATION

.1 Investigate existing substrates for problems related to proper and complete preparation of surfaces to be painted. Report to RCMP Property Manager and General Contractor damages, defects, unsatisfactory or unfavourable conditions before proceeding with work.

.2 Conduct moisture testing of surfaces to be painted using properly calibrated electronic moisture meter, except test concrete floors for moisture using simple "cover patch test". Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.

3.3 PREPARATION

.1 Protection:

.1 Protect existing building surfaces and adjacent structures from paint spatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore surfaces as directed by RCMP Property Manager or Consultant.

.2 Protect items that are permanently attached such as Fire Labels on doors and frames.

.3 Protect factory finished products and equipment.

.2 Surface Preparation:

.1 Remove electrical cover plates, light fixtures, surface hardware on doors, bath accessories and other surface mounted equipment, fittings and fastenings prior to undertaking painting operations. Identify and store items in secure location and re-installed after painting is completed.

.2 Move and cover furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.

.3 Place "WET PAINT" signs in occupied areas as painting operations progress. Signs to approval of RCMP Property Manager.

.3 Clean and prepare surfaces in accordance with MPI - Architectural Painting Specification Manual and MPI - Maintenance Repainting Manual specific requirements and coating manufacturer's recommendations.

.4 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before prime coat is applied and between applications of remaining coats. Apply primer, paint, or pretreatment as soon as possible after cleaning and before deterioration occurs.

.5 Where possible, prime non-exposed surfaces of new wood surfaces before installation. Use same primers as specified for exposed surfaces.

.1 Apply vinyl sealer to MPI #36 over knots, pitch, sap and resinous areas.

.2 Apply wood filler to nail holes and cracks.

.3 Tint filler to match stains for stained woodwork.

.6 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 1000 mm.

.7 Clean metal surfaces to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and other foreign substances in accordance with MPI requirements.

.8 Touch up of shop primers with primer as specified.

.9 Do not apply paint until prepared surfaces have been accepted by Consultant

3.4 APPLICATION

.1 Method of application to be as approved by Consultant. Conform to manufacturer's application instructions unless specified otherwise.

.2 Apply coats of paint continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.

.3 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.

.4 Sand and dust between coats to remove visible defects.

.5 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as tops of interior cupboards and cabinets and projecting ledges.

3.5 SCHEDULE

.1 Paint all new interior casings with 1 coat primer and 2 coats semi gloss paint. Color to match existing trim color.

.2 Re-Paint as required to repair damage caused by window removal and installation.

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 professional engineer registered or licensed in Alberta, Canada.

.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 In addition to transmittal letter referred to in Section 01 33 00 - Submittal Procedures: use MCAC "Shop Drawing Submittal Title Sheet". Identify section and paragraph number.

.6 Closeout Submittals:

- .1 Provide operation and maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
- .2 Operation and maintenance manual approved by, and final copies deposited with, Departmental Representative 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 Departmental Representative for approval. Submission of individual data will not be accepted unless directed by Departmental Representative.

.2 Make changes as required and re-submit as directed by Departmental Representative.

.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 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 Departmental Representative 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 29.06 - Health and Safety Requirements.

1.3 MAINTENANCE

.1 Furnish spare parts in accordance with Section 01 78 00 - Closeout Submittals as follows:

.1 One set of packing for each pump.

.2 One casing joint gasket for each size pump.

.3 One head gasket set for each heat exchanger.

.4 One glass for each gauge glass.

.5 One filter cartridge or set of filter media for each filter or filter bank in addition to final operating set.

.2 Provide one set of special tools required to service equipment as recommended by manufacturers and in accordance with Section 01 78 00 - Closeout Submittals .

.3 Furnish one commercial quality grease gun, grease and adapters to suit different types of grease and grease fittings.

Part 2 Products

Part 3 Execution

3.1 PAINTING REPAIRS AND RESTORATION

.1 Do painting in accordance with Section 09 19 99 – Painting for Minor works.

.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 Departmental Representative 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 Combi unit.

.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.

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 SECTION INCLUDES

.1 Pipe, pipe fittings, valves, and connections for piping systems.

.1 Sanitary sewer.

.2 Domestic water.

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Administrative Requirements.

.2 Section 01 44 00 - Quality Assurance: Requirements for references and standards.

.3 Section 01 44 00 - Quality Assurance.

.4 Section 01 61 00 - Common Product Requirements.

.5 Section 01 78 10 - Execution Requirements.

.6 Section 08 31 13 - Access Doors And Frames.

.7 Section 09 91 10 - Painting.

.8 Section 23 05 48 - Vibration Isolation.

.9 Section 23 05 53 - Mechanical Identification.

.10 Section 23 07 19 - Piping Insulation.

.11 Section 26 05 80 - Equipment Wiring: Electrical characteristics and wiring connections.

1.3 REFERENCES

.1 AGA Z21.22 - Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems.

.2 ASME B16.1 - Cast Iron Pipe Flanges and Flanged Fittings.

.3 ASME B16.3 - Malleable Iron Threaded Fittings.

.4 ASME B16.4 - Grey Iron Threaded Fittings.

.5 ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.

.6 ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.

.7 ASME B16.23 - Cast Copper Alloy Solder Joint Drainage Fittings - DWV.

.8 ASME B16.26 - Copper Alloy Bronze Fittings for Flared Copper Tubes.

.9 ASME B16.29 - Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings - DWV.

.10 ASME B16.32 - Cast Copper Alloy Solder Joint Fittings for Sovent Drainage Systems.

.11 ASME B31.1 - Power Piping.

.12 ASME B31.2 - Fuel Gas Piping.

.13 ASME B31.9 - Building Services Piping.

.14 ASME SEC IV - Construction of Heating Boilers.

.15 ASME SEC IX - Welding and Brazing Qualifications.

.16 ASTM A47/A47M - Ferritic Malleable Iron Castings.

.17 ASTM A53/A53M - Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

.18 ASTM A74 - Cast Iron Soil Pipe and Fittings.

.19 ASTM A234/A234M - Piping Fittings of Wrought-Carbon Steel and Alloy Steel for Moderate and High Temperature Service.

.20 ASTM B32 - Solder Metal.

.21 ASTM B42 - Seamless Copper Pipe, Standard Sizes.

.22 ASTM B43 - Seamless Red Brass Pipe, Standard Sizes.

.23 ASTM B68 - Seamless Copper Tube, Bright Annealed.

.24 ASTM B75 - Seamless Copper Tube.

.25 ASTM B88 - Seamless Copper Water Tube.

.26 ASTM B251 - General Requirements for Wrought Seamless Copper and Copper-Alloy Tube.

.27 ASTM B280 - Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.

.28 ASTM B302 - Threadless Copper Pipe, Standard Sizes.

.29 ASTM B306 - Copper Drainage Tube (DWV).

.30 ASTM C4 - Clay Drain Tile and Perforated Clay Drain Tile.

.31 ASTM C14/C14M - Concrete Sewer, Storm Drain, and Culvert Pipe.

.32 ASTM C425 - Compression Joints for Vitrified Clay Pipe and Fittings.

.33 ASTM C443 - Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.

.34 ASTM C564 - Rubber Gaskets for Cast Iron Soil Pipe and Fittings.

.35 ASTM C700 - Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated.

.36 ASTM C1053 - Borosilicate Glass Pipe and Fittings for Drain, Waste, and Vent (DWV) Applications.

.37 ASTM D1785 - Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.

.38 ASTM D2235 - Solvent Cement for Acrylonitrile - Butadiene - Styrene (ABS) Plastic Pipe and Fittings.

.39 ASTM D2239 - Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter.

.40 ASTM D2241 - Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).

.41 ASTM D2447 - Polyethylene (PE) Plastic Pipe, Schedules 40 and 80, Based on Outside Diameter.

.42 ASTM D2466 - Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.

.43 ASTM D2513 - Thermoplastic Gas Pressure Pipe, Tubing, and Fittings.

.44 ASTM D2564 - Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems.

.45 ASTM D2609 - Plastic Insert Fittings for Polyethylene (PE) Plastic Pipe.

.46 ASTM D2661 - Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe and Fittings.

.47 ASTM D2662 - Polybutylene (PB) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter.

.48 ASTM D2665 - Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings.

.49 ASTM D2666 - Polybutylene (PB) Plastic Tubing.

.50 ASTM D2683 - Socket-Type Polyethylene Fillings for Outside Diameter-Controlled Polyethylene Pipe and Tubing.

.51 ASTM D2729 - Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

.52 ASTM D2751 - Acrylonitrile-Butadiene-Styrene (ABS) Sewer, Pipe, and Fittings.

.53 ASTM D2846 - Chlorinated Polyvinyl Chloride (CPVC) Pipe, Fittings, Solvent Cements and Adhesives for Potable Hot Water Systems.

.54 ASTM D2855 - Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings.

.55 ASTM D2996 - Filament-Wound 'Fibreglass' (Glass-Fibre-Reinforced Thermosetting-Resin) Pipe.

.56 ASTM D2997 - Centrifugally-Cast 'Fibreglass' (Glass-Fibre-Reinforced Thermosetting-Resin) Pipe.

.57 ASTM D3000 - Polybutylene (PB) Plastic Pipe (SDR-PR) Based on Outside Diameter.

.58 ASTM D3034 - Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

.59 ASTM D3262 - 'Fibreglass' (Glass-Fibre-Reinforced Thermosetting-Resin) Sewer Pipe.

.60 ASTM D3309 - Polybutylene (PB) Plastic Hot- and Cold-Water Distribution System.

.61 ASTM D3517 - 'Fibreglass' (Glass-Fibre-Reinforced Thermosetting-Resin) Pressure Pipe.

.62 ASTM D3754 - 'Fibreglass' (Glass-Fibre-Reinforced Thermosetting-Resin) Sewer and Industrial Pressure Pipe.

.63 ASTM D3840 - 'Fibreglass' (Glass-Fibre-Reinforced Thermosetting-Resin) Pipe Fittings for Non-Pressure Applications.

.64 ASTM E814 - Fire Tests of Through-Penetration Fire Stops.

.65 ASTM F437 - Threaded Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80.

.66 ASTM F438 - Socket-Type Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 40.

.67 ASTM F439 - Socket-Type Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80.

.68 ASTM F441 - Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80.

.69 ASTM F442 - Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe(SDR-PR).

.70 ASTM F477 - Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

.71 ASTM F493 - Solvent Cements for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe and Fittings.

.72 ASTM F628 - Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe with a Cellular Core.

.73 ASTM F679 - Poly(Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings.

.74 ASTM F708 - Design and Installation of Rigid Pipe Hangers.

.75 ASTM F1281 - Crosslinked Polyethylene/Aluminum/Crosslinked Polyethylene (PEX-AL-PEX) Pressure Pipe.

.76 ASTM F1282 - Polyethylene/Aluminum/Polyethylene (PE-AL-PE) Composite Pressure Pipe.

.77 AWS A5.8 - Filler Metals for Brazing and Braze Welding.

.78 AWWA C105 - Polyethylene Encasement for Ductile-Iron Piping Systems.

.79 AWWA C110 - Ductile - Iron and Gray - Iron Fittings, 3 In. - 48 In. (76 mm - 1219 mm), for Water.

.80 AWWA C111 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

.81 AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast, for Water.

.82 AWWA C651 - Disinfecting Water Mains.

.83 AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe (and Fabricated Fittings), 4 inch - 12 inch (100 mm - 300 mm), for Water Distribution.

.84 AWWA C901 - Polyethylene (PE) Pressure Pipe and Tubing, 1/2 inch - 3 inch (13 mm - 76 mm) for Water Service.

.85 AWWA C902 - Polybutylene (PB) Pressure Pipe and Tubing, 1/2 inch - 3 inch (13 mm - 76 mm) for Water.

.86 AWWA C905 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14 inch - 48 inch (350 mm - 1200mm).

.87 AWWA C950 - Fibreglass Pressure Pipe.

.88 CAN-3 B281 - Aluminum Drain, Waste, and Vent Pipe and Components.

.89 CISPI 301 - Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications.

.90 CISPI 310 - Joints with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applictions.

.91 MSS SP58 - Pipe Hangers and Supports - Materials, Design and Manufacturer.

.92 MSS SP-67 - Butterfly Valves.

.93 MSS SP69 - Pipe Hangers and Supports - Selection and Application.

.94 MSS SP-70 - Cast Iron Gate Valves, Flanged and Threaded Ends.

.95 MSS SP-71 - Cast Iron Swing Check Valves, Flanged and Threaded Ends.

.96 MSS SP-78 - Cast Iron Plug Valves, Flanged and Threaded Ends.

.97 MSS SP-80 - Bronze Gate, Globe, Angle and Check Valves.

.98 MSS SP-85 - Cast Iron Globe & Angle Valves, Flanged and Threaded Ends.

.99 MSS SP89 - Pipe Hangers and Supports - Fabrication and Installation Practices.

.100 MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

.101 NCPWB - Procedure Specifications for Pipe Welding.

.102 UL 1479 - Fire Tests of Through-Penetration Firestops.

1.4 SUBMITTALS FOR REVIEW

.1 Section 01 33 00: Procedures for submittals.

.2 Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalogue information. Indicate valve data and ratings.

1.5 SUBMITTALS AT PROJECT CLOSEOUT

.1 Section 01 78 10: Procedures for submittals.

.2 Project Record Documents: Record actual locations of valves.

1.6 QUALITY ASSURANCE

.1 Perform Work to Province of Manitoba standards. Maintain one copy on site.

.2 Valves: Manufacturer's name and pressure rating marked on valve body.

.3 Welding Materials and Procedures: Conform to ASME SEC IX and applicable provincial labour regulations.

.4 Welders Certification: To ASME SEC IX and NCPWB Standard Procedure Specifications.

.5 Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.

1.7 REGULATORY REQUIREMENTS

.1 Perform Work to Province of Manitoba plumbing code.

.2 Conform to applicable code for installation of backflow prevention devices.

1.8 DELIVERY, STORAGE, AND PROTECTION

.1 Section 01 61 00: Transport, handle, store, and protect products.

.2 Accept valves on site in shipping containers with labelling in place. Inspect for damage.

.3 Provide temporary protective coating on cast iron and steel valves.

.4 Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

.5 Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.9 ENVIRONMENTAL REQUIREMENTS

.1 Section 01 61 00: Environmental conditions affecting products on site.

.2 Do not install underground piping when bedding is wet or frozen.

1.10 EXTRA MATERIALS

.1 Section 01 78 10: Operation and maintenance data.

.2 Provide two repacking kits for each size valve.

Part 2 Products

2.1 SANITARY SEWER PIPING, ABOVE GRADE

.1 Cast Iron Pipe: ASTM A74, service weight.

.1 Fittings: Cast iron.

.2 Joints: ASTM C564, neoprene gasket system or lead and oakum.

.2 Cast Iron Pipe: CISPI 301, hubless, service weight.

.1 Fittings: Cast iron.

.2 Joints: CISPI 310, neoprene gaskets and stainless steel clamp-and-shield assemblies.

2.2 WATER PIPING, ABOVE GRADE

.1 Copper Tubing: ASTM B88M, Type L, hard drawn.

.1 Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.

.2 Joints: ASTM B32, solder, Grade 95TA.

2.3 FLANGES, UNIONS, AND COUPLINGS

.1 Pipe Size 80 mm and Under:

.1 Ferrous pipe: Class 150 malleable iron threaded unions.

.2 Copper tube and pipe: Class 150 bronze unions with soldered joints.

.2 Pipe Size Over 25 mm:

.1 Ferrous pipe: Class 150 malleable iron threaded or forged steel slip-on flanges; preformed neoprene gaskets.

.2 Copper tube and pipe: Class 150 slip-on bronze flanges; preformed neoprene gaskets.

.3 Grooved and Shouldered Pipe End Couplings:

.1 Housing: Malleable iron clamps to engage and lock, designed to permit some angular deflection, contraction, and expansion; steel bolts, nuts, and washers; galvanized for galvanized pipe.

.2 Sealing gasket: "C" shape composition sealing gasket.

.4 Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.4 PIPE HANGERS AND SUPPORTS

.1 Plumbing Piping - Drain, Waste, and Vent:

.1 Conform to ASME B31.9 ASTM F708 MSS SP58 MSS SP69 MSS SP89.

.2 Hangers for Pipe Sizes 15 to 40 mm: Carbon steel, adjustable swivel, split ring.

.3 Hangers for Pipe Sizes 40 mm and Over: Carbon steel, adjustable, clevis.

.4 Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.

.5 Wall Support for Pipe Sizes to 80 mm: Cast iron hook.

.6 Wall Support for Pipe Sizes 100 mm and Over: Welded steel bracket and wrought steel clamp.

.7 Vertical Support: Steel riser clamp.

.8 Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

.9 Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

.2 Plumbing Piping - Water:

.1 Conform to ASME B31.9 ASTM F708 MSS SP58 MSS SP69 MSS SP89.

.2 Hangers for Pipe Sizes 15 to 40 mm: Malleable iron Carbon steel, adjustable swivel, split ring.

.3 Hangers for Cold Pipe Sizes 50 mm and Over: Carbon steel, adjustable, clevis.

.4 Hangers for Hot Pipe Sizes 50 to 100 mm: Carbon steel, adjustable, clevis.

.5 Hangers for Hot Pipe Sizes 150 mm and Over: Adjustable steel yoke, cast iron pipe roll, double hanger.

.6 Multiple or Trapeze Hangers: Steel channels with welded supports or spacers and hanger rods.

.7 Multiple or Trapeze Hangers for Hot Pipe Sizes 150 mm and Over: Steel channels with welded supports or spacers and hanger rods, cast iron roll.

.8 Wall Support for Pipe Sizes to 80 mm: Cast iron hook.

.9 Wall Support for Pipe Sizes 100 mm and Over: Welded steel bracket and wrought steel clamp.

.10 Wall Support for Hot Pipe Sizes 150 mm and Over: Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast iron pipe roll.

.11 Vertical Support: Steel riser clamp.

.12 Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

.13 Floor Support for Hot Pipe Sizes to 100 mm: Cast iron adjustable pipe saddle, locknut, nipple, floor flange, and concrete pier or steel support.

.14 Floor Support for Hot Pipe Sizes 150 mm and Over: Adjustable cast iron pipe roll and stand, steel screws, and concrete pier or steel support.

.15 Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

2.5 GATE VALVES

.1 Up To and Including 80 mm:

.1 MSS SP-80, Class 125, bronze body, bronze trim, rising stem, handwheel, inside screw, solid wedge disc, solder or threaded ends.

.2 50 mm and Larger:

.1 MSS SP-70, Class 125, iron body, bronze trim, outside screw and yoke, handwheel, solid wedge disc, flanged ends. Provide chain-wheel operators for valves 150 mm and larger mounted over 2400 mm above floor.

2.6 GLOBE VALVES

.1 Up To and Including 80 mm:

.1 MSS SP-80, Class 125, bronze body, bronze trim, handwheel, teflon disc, solder or threaded ends.

.2 50 mm and Larger:

.1 MSS SP-85, Class 125, iron body, bronze trim, handwheel, outside screw and yoke, renewable bronze plug-type disc, renewable seat, flanged ends. Provide chain-wheel operators for valves 150 mm and larger mounted over 2400 mm above floor.

2.7 BALL VALVES

.1 Construction, 100 mm and Smaller: MSS SP-110, Class 150, 2760 kPa CWP , bronze, two piece body, chrome plated brass ball, regular port, teflon seats and stuffing box ring, blow-out proof stem, lever handle with balancing stops, solder or threaded ends with union.

2.8 PLUG VALVES

.1 Construction 65 mm and Larger: MSS SP-78, 1200 kPa CWP , cast iron body and plug, pressure lubricated, teflon or Buna N packing, flanged or grooved ends. Provide lever operator with set screw.

2.9 FLOW CONTROLS

.1 Construction: Class 150, Brass or bronze body with union on inlet and outlet, temperature and pressure test plug on inlet and outlet, blowdown/backflush drain.

.2 Calibration: Control flow within 5 percent of selected rating, over operating pressure range of 10 times minimum pressure required for control, maximum minimum pressure 24 kPa.

2.10 SWING CHECK VALVES

.1 Up To and Including 80 mm:

.1 MSS SP-80, Class 125, bronze body and cap, bronze swing disc with rubber seat, solder or threaded ends.

.2 50 mm and Larger:

.1 MSS SP-71, Class 125, iron body, bronze swing disc, renewable disc seal and seat, flanged or grooved ends.

2.11 SPRING LOADED CHECK VALVES

.1 Class 125, iron body, bronze trim, stainless steel springs, bronze disc, Buna N seals, wafer style ends.

2.12 WATER PRESSURE REDUCING VALVES

.1 MSS SP-80, bronze body, stainless steel and thermoplastic internal parts, fabric reinforced diaphragm, strainer, threaded double union ends.

.2 Over 50 mm:

.1 MSS SP-85, cast iron body, bronze fitted, elastomeric diaphragm and seat disc, flanged.

2.13 RELIEF VALVES

.1 Pressure Relief:

.1 AGA Z21.22 certified, bronze body, teflon seat, steel stem and springs, automatic, direct pressure actuated.

.2 Temperature and Pressure Relief:

.1 AGA Z21.22 certified, bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, temperature relief maximum 98.9 degrees C, capacity ASME SEC IV certified and labelled.

2.14 STRAINERS

.1 Size 50 mm and Under:

.1 Class 150, threaded bronze body 2070 kPa CWP, Y pattern with 0.8 mm1/32 inch stainless steel perforated screen.

.2 Size 40 mm to 100 mm:

.1 Class 125, flanged iron body, Y pattern with 1.6 mm stainless steel perforated screen.

.3 Size 125 mm and Larger:

.1 Class 125, flanged iron body, basket pattern with 3.2 mm stainless steel perforated screen.

2.15 FIRE STOP SYSTEMS

.1 General Purpose Fire Stopping Sealant:

.1 Water based, non-slumping, premixed sealant with intumescent properties, rated for 3 hours per ASTM E814 and UL 1479.

.2 General Purpose Vibration Resistant Fire Stopping Sealant:

.1 Silicone based, non-slumping, premixed sealant with intumescent properties, vibration and moisture resistant, rated for 3 hours per ASTM E814 and UL 1479.

.3 DWV Plastic Pipe Systems Fire Stopping Sealant:

.1 Silicone based, premixed sealant with intumescent properties, vibration and moisture resistant, rated for 3 hours per ASTM E814 and UL 1479 with metal collars.

Part 3 Execution

3.1 EXAMINATION

.1 Section 01100- Coordination and Meetings: Verification of existing conditions before starting work.

.2 Verify that excavations are to required grade, dry, and not over-excavated.

3.2 PREPARATION

.1 Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

.2 Remove scale and dirt, on inside and outside, before assembly.

.3 Prepare piping connections to equipment with flanges or unions.

3.3 INSTALLATION

.1 Install to manufacturer's instructions.

.2 Provide non-conducting dielectric connections wherever jointing dissimilar metals.

.3 Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.

.4 Install piping to maintain headroom, conserve space, and not interfere with use of space.

.5 Group piping whenever practical at common elevations.

.6 Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Refer to Section 23 05 16.

.7 Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings. Refer to Section 23 07 19.

.8 Provide access where valves and fittings are not exposed. Coordinate size and location of access doors with Section 08 31 13.

.9 Establish elevations of buried piping outside the building to ensure not less than 1.0 m of cover.

.10 Install vent piping penetrating roofed areas to maintain integrity of roof assembly

.11 Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.

.12 Provide support for utility meters to requirements of utility companies.

.13 Prepare exposed, unfinished pipe, fittings, supports, and accessories ready for finish painting. Refer to Section 09 91 10.

.14 Excavate to Sections 31 23 18 and 31 23 23 for work of this Section.

.15 Backfill to Sections 31 23 16 and 31 23 23 for work of this Section.

.16 Install bell and spigot pipe with bell end upstream.

.17 Install valves with stems upright or horizontal, not inverted.

.18 Pipe vents from gas pressure reducing valves to outdoors and terminate in weather proof hood.

.19 Install water piping to ASME B31.9.

.20 Sleeve pipes passing through partitions, walls and floors.

.21 Inserts:

.1 Provide inserts for placement in concrete formwork.

.2 Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.

.3 Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 100 mm.

.4 Where concrete slabs form finished ceiling, locate inserts flush with slab surface.

.5 Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above flush with top of recessed into and grouted flush with slab.

.22 Pipe Hangers and Supports:

.1 Install to ASTM B31.9 ASTM F708 and MSS SP89.

.2 Support horizontal piping as scheduled.

.3 Install hangers to provide minimum 15 mm space between finished covering and adjacent work.

.4 Place hangers within 300 mm of each horizontal elbow.

.5 Use hangers with 40 mm minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.

.6 Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.

.7 Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.

.8 Provide copper plated hangers and supports for copper piping sheet lead packing between hanger or support and piping.

.9 Prime coat exposed steel hangers and supports. Refer to Section 09 91 10. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

.10 Provide hangers adjacent to motor driven equipment with vibration isolation; refer to Section 23 05 48.

.11 Support cast iron drainage piping at every joint.

3.4 APPLICATION

.1 Use grooved mechanical couplings and fasteners only in accessible locations.

.2 Install unions downstream of valves and at equipment or apparatus connections.

.3 Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.

.4 Install gate ball or butterfly valves for shut-off and to isolate equipment, part of systems, or vertical risers.

.5 Install globe ball or butterfly valves for throttling, bypass, or manual flow control services.

.6 Provide lug end butterfly valves adjacent to equipment when provided to isolate equipment.

.7 Provide spring loaded check valves on discharge of water pumps.

.8 Provide flow controls in water recirculating systems where indicated.

3.5 ERECTION TOLERANCES

.1 Section 01 44 00: Tolerances.

.2 Establish invert elevations, slopes for drainage to 2 one percent minimum. Maintain gradients.

.3 Slope water piping minimum 0.25 percent and arrange to drain at low points.

3.6 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

.1 Disinfect water distribution system to Section 22 05 81.

3.7 SERVICE CONNECTIONS

.1 Provide new sanitary sewer services. Before commencing work check invert elevations required for sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage and cover to avoid freezing.

.2 Provide new water service complete with approved double check backflow preventer and water meter with by-pass valves pressure reducing valve,.

.1 Provide sleeve in wall for service main and support at wall with reinforced concrete bridge. Caulk enlarged sleeve and make watertight with pliable material. Anchor service main inside to concrete wall.

3.8 SCHEDULES

.1 Pipe Hanger Schedule:

.1 Metal Piping:

.1 Pipe size: 15 to 32 mm:

.1 Maximum hanger spacing: 2 m.

.2 Hanger rod diameter: 9 mm.

.2 Pipe size: 40 to 50 mm:

.1 Maximum hanger spacing: 3 m.

.2 Hanger rod diameter: 9 mm.

.3 Pipe size: 65 to 75 mm:

.1 Maximum hanger spacing: 3 m.

.2 Hanger rod diameter: 13 mm.

.4 Pipe size: 100 to 150 mm:

.1 Maximum hanger spacing: 3 m.

.2 Hanger rod diameter: 15 mm.

.5 Pipe size: 200 to 300 mm:

.1 Maximum hanger spacing: 4.25 m.

.2 Hanger rod diameter: 22 mm.

.6 Pipe size: 350 mm and Over:

.1 Maximum hanger spacing: 6 m.

.2 Hanger rod diameter: 25 mm.

.2 Plastic Piping:

.1 All Sizes:

.1 Maximum hanger spacing: 1.8 m.

.2 Hanger rod diameter: 9 mm.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Washroom Fixtures

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Administrative Requirements.

.2 Section 01 44 00 - Quality Assurance.

.3 Section 01 61 00 - Common Product Requirements.

.4 Section 01 78 10 - Execution Requirements.

.5 Section 07 92 00 - Joint Sealants: Seal fixtures to walls and floors.

.6 Section 23 05 29 - Supports And Anchors.

.7 Section 22 10 00 - Plumbing Piping.

.8 Section 22 42 01 - Plumbing Specialties.

.9 Section 22 47 00 - Plumbing Equipment.

.10 Section 26 05 80 - Equipment Wiring: Electrical characteristics and wiring connections.

1.3 REFERENCES

.1 ASME A112.6.1 - (Floor Affixed) Supports for Off-the-Floor Plumbing Fixtures for Public Use.

.2 ASME A112.18.1 - Plumbing Fixture Fittings.

.3 ASME A112.19.1 - Enamelled Cast Iron Plumbing Fixtures.

.4 ASME A112.19.2 - Vitreous China Plumbing Fixtures.

.5 ASME A112.19.3 - Stainless Steel Plumbing Fixtures (Designed for Residential Use).

.6 ASME A112.19.4 - Porcelain Enamelled Formed Steel Plumbing Fixtures.

.7 ASME A112.19.5 - Trim for Water-Closet Bowls, Tanks, and Urinals.

.8 NFPA 70 - National Electrical Code.

1.4 SUBMITTALS FOR REVIEW

.1 Section 01 33 00: Procedures for submittals.

.2 Product Data: Provide catalogue illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.

1.5 SUBMITTALS FOR INFORMATION

.1 Section 01 33 00: Procedures for submittals.

.2 Manufacturer's Instructions: Indicate installation methods and procedures.

1.6 SUBMITTALS AT PROJECT CLOSEOUT

.1 Section 01 78 10: Procedures for submittals.

.2 Maintenance Data: Include fixture trim exploded view and replacement parts lists.

.3 Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.7 QUALITY ASSURANCE

.1 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

1.8 REGULATORY REQUIREMENTS

.1 Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., testing firm acceptable to the authority having jurisdiction as suitable for the purpose specified and indicated.

1.9 DELIVERY, STORAGE, AND PROTECTION

.1 Section 01 61 00: Transport, handle, store, and protect products.

.2 Accept fixtures on site in factory packaging. Inspect for damage.

.3 Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

1.10 WARRANTY

.1 Section 01 78 10.

1.11 EXTRA MATERIALS

.1 Section 01 78 10.

.2 Supply two sets of faucet washers, Flush valve service kits, lavatory supply fittings.

Part 2 Products

2.1 HC Shower – (T-1)

.1 Mirolin Modes: Access 66 CSA Compliant

.2 Size : 66”x37 ¼” x 88”

.3 To be complete with:

.1 1 ¼” grab bars

.2 White Dome Light

.3 Curtain Rod

.4 Water Dam

.4 Faucet: American Standard Colony Soft #1662.211.002 Pressure balancing Complete Shower Kit, Polished Chrome finish, Consisting of: 171 mm (6-3/4") x 152 mm (6") oval shaped wall trim faceplate with on/off and volume and temperature control single lever handle. Pressure Balancing shower Rough Valve, cast brass body, 13 mm (1/2") Direct Sweat inlets/outlets, ceramic disc valve cartridges, integral hot water limit stop, screwdriver stops, Back-to-Back Capable. 86 mm (3-3/8") face dia, 5.7 LPM (1.5 GPM) 3-Function Water-Saving Hand shower with pause feature, Easy Clean spray nozzles, check valve and pressure compensating flow control device, complete with 1524 mm

(60") long Hose, In-line Vacuum Breaker and Wall Supply. Hand shower Slide Bar 914 mm (36") high cylindrical bar, adjustable bracket for personal shower, anchors/screws and mounting brackets included.

.5 Floor Drain: Watts #FD-100-C-A Floor Drain, epoxy coated cast iron, 5" (127 mm) adjustable round nickel bronze strainer, reversible clamping collar with primary & secondary weepholes. Provide P-Trap, Same material as the connecting pipe drain.

Part 3 Execution

3.1 EXAMINATION AND PREPARATION

.1 Section 01 70 00: Verification of existing conditions before starting work.

.2 Verify that walls and floor finishes are prepared and ready for installation of fixtures.

.3 Verify that electric power is available and of the correct characteristics.

.4 Confirm that millwork is constructed with adequate provision for the installation of counter top lavatories and sinks.

3.2 PREPARATION

.1 Rough-in fixture piping connections to minimum sizes indicated in fixture rough-in schedule for particular fixtures.

3.3 INSTALLATION

.1 Install each fixture with trap, easily removable for servicing and cleaning.

.2 Provide chrome plated rigid or flexible supplies to fixtures with loose key screwdriver stops, reducers, and escutcheons.

.3 Install components level and plumb.

.4 Install and secure fixtures in place with wall supports wall carriers and bolts.

.5 Seal fixtures to wall and floor surfaces with sealant as specified in Section 07 92 00, colour to match fixture.

.6 Solidly attach water closets to floor with lag screws. Lead flashing is not intended hold fixture in place.

3.4 INTERFACE WITH OTHER PRODUCTS

.1 Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.

3.5 ADJUSTING

.1 Section 01 78 10 - Execution Requirements: Adjusting installed work.

.2 Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

3.6 CLEANING

.1 Section 01 78 10 - Execution Requirements: Cleaning installed work.

.2 Clean plumbing fixtures and equipment.

3.7 PROTECTION OF FINISHED WORK

.1 Section 01 78 10 - Execution Requirements: Protecting installed work.

.2 Do not permit use of fixtures.

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 professional engineer registered or licensed in the Northwest Territories, Canada.

.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 In addition to transmittal letter referred to in Section 01 33 00 - Submittal Procedures: use MCAC "Shop Drawing Submittal Title Sheet". Identify section and paragraph number.

.6 Closeout Submittals:

- .1 Provide operation and maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
- .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 Consultant 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 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 29.06 - Health and Safety Requirements.

1.3 MAINTENANCE

.1 Furnish spare parts in accordance with Section 01 78 00 - Closeout Submittals as follows:

.1 One set of packing for each pump.

.2 One casing joint gasket for each size pump.

.3 One head gasket set for each heat exchanger.

.4 One glass for each gauge glass.

.5 One filter cartridge or set of filter media for each filter or filter bank in addition to final operating set.

.2 Provide one set of special tools required to service equipment as recommended by manufacturers and in accordance with Section 01 78 00 - Closeout Submittals.

.3 Furnish one commercial quality grease gun, grease and adapters to suit different types of grease and grease fittings.

1.4 DELIVERY, STORAGE, AND HANDLING

.1 Waste Management and Disposal:

.1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

Part 2 Execution

2.1 SECURITY FASTENERS

.1 Security screws are required to be used in all secure areas.

2.2 PAINTING REPAIRS AND RESTORATION

.1 Do painting in accordance with Section 09 91 23 - Interior Painting.

.2 Prime and touch up marred finished paintwork to match original.

.3 Restore to new condition, finishes which have been damaged.

2.3 CLEANING

.1 Clean interior and exterior of all systems including strainers. Vacuum interior of ductwork and air handling units.

2.4 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 coils and air conditioning units.

.2 In-floor hydronic system.

.3 Exhaust fans.

.4 Hot water tank and recirculation pump.

.5 LAN room AC unit.

.6 Forced flow heaters.

.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 will record these demonstrations on video tape for future reference.

2.5 PROTECTION

.1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Nameplates.

.2 Tags.

.3 Stencils.

.4 Pipe Markers.

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Administrative Requirements.

.2 Section 01 61 00 - Common Product Requirements.

1.3 REFERENCES

.1 ASME A13.1 - Scheme for the Identification of Piping Systems.

1.4 SUBMITTALS

.1 Section 01 33 00: Procedures for submittals.

.2 Submit list of wording, symbols, letter size, and colour coding for mechanical identification.

.3 Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.

.4 Product Data: Provide manufacturers catalogue literature for each product required.

.5 Samples: Submit two label samples.

.6 Manufacturer's Installation Instructions: Indicate special procedures, and installation.

1.5 PROJECT RECORD DOCUMENTS

.1 Section 01 78 10: Submittals for project closeout.

.2 Record actual locations of tagged valves.

Part 2 Products

2.1 NAMEPLATES

.1 Manufacturers:

.1 Lamacoid.

.2 Substitutions: Refer to Section 01 62 00.

.2 Description: Laminated three-layer plastic with engraved black letters on light contrasting background colour.

2.2 TAGS

.1 Manufacturers:

.1 Lamacoid

.2 Substitutions: Refer to Section 01 62 00.

.2 Chart: Typewritten letter size list in anodized aluminum frame.

2.3 STENCILS

.1 Stencils: With clean cut symbols and letters of following size:

.1 20-30 mm Outside Diameter of Insulation or Pipe: 200 mm long colour field, 15 mm high letters.

.2 40-50 mm Outside Diameter of Insulation or Pipe: 200 mm long colour field, 20 mm high letters.

.3 65-150 mm Outside Diameter of Insulation or Pipe: 300 mm long colour field, 30 mm high letters.

.4 200-250 mm Outside Diameter of Insulation or Pipe: 600 mm long colour field, 65 mm high letters.

.5 Over 250 mm Outside Diameter of Insulation or Pipe: 800 mm long colour field, 90 mm high letters.

.6 Ductwork and Equipment: 65 mm high letters.

.2 Stencil Paint: As specified in Section 09 91 99.

2.4 PIPE MARKERS

.1 Manufacturers:

.1 Brady Canada

.2 Substitutions: Refer to Section 01 62 00.

.2 Colour: Conform to ASME A13.1.

.3 Plastic Pipe Markers: Factory fabricated, flexible, semi- rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.

.4 Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

.5 Underground Plastic Pipe Markers: Bright coloured continuously printed plastic ribbon tape, minimum 150 mm wide by 0.10 mm thick, manufactured for direct burial service.

Part 3 Execution

3.1 PREPARATION

.1 Degrease and clean surfaces to receive adhesive for identification materials.

.2 Prepare surfaces to Section 09 91 99 for stencil painting.

3.2 INSTALLATION

.1 Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.

.2 Install tags with corrosion resistant chain.

.3 Apply stencil painting to Section 09 91 99.

.4 Install plastic pipe markers to manufacturer's instructions.

.5 Install plastic tape pipe markers complete around pipe to manufacturer's instructions.

.6 Install underground plastic pipe markers 150 to 200 mm below finished grade, directly above buried pipe.

.7 Identify air handling units, pumps, heat transfer equipment, tanks, and water treatment devices with plastic nameplates. Small devices, such as in-line pumps, may be identified with tags.

.8 Identify control panels and major control components outside panels with plastic nameplates.

.9 Identify thermostats relating to terminal boxes or valves with nameplates.

.10 Identify valves in main and branch piping with tags.

.11 Identify air terminal units and radiator valves with numbered tags.

.12 Tag automatic controls, instruments, and relays. Key to control schematic.

.13 Identify piping, concealed or exposed, with plastic tape pipe markers. stencilled painting. Use tags on piping 20 mm diameter and smaller. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 6 m on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.

.14 Identify ductwork with stencilled painting. Identify with air handling unit identification number and area served. Locate identification at air handling unit, at each side of penetration of structure or enclosure, and at each obstruction.

.15 Provide ceiling tacks to locate valves or dampers above T-bar type panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Testing, adjustment, and balancing of air systems.

.2 Measurement of final operating condition of HVAC systems.

1.2 RELATED SECTIONS

.1 Section 01 20 13 - Price and Payment Procedures.

.2 Section 01 33 00 - Administrative Requirements.

.3 Section 01 44 00 - Quality Assurance:

.1 Testing laboratory services.
.2 Employment of testing agency and payment for services.
.3 Inspection and testing allowances.

.4 Section 01 61 00 - Common Product Requirements.

.5 Section 01 78 10 - Execution Requirements:

.1 Starting of Systems.
.2 Testing, Adjusting, and Balancing of Systems.

1.3 ALLOWANCES

.1 Cash Allowance: Section 01 20 13 for the Cash Allowance Sum applicable to this section.

.2 Allowance includes testing, adjusting, and balancing of mechanical systems.

.3 Work is included in this section and is part of the Contract Sum/Price.

1.4 REFERENCES

.1 AABC - National Standards for Total System Balance.

.2 ADC - Test Code for Grilles, Registers, and Diffusers.

.3 ASHRAE 111 - Practices for Measurement, Testing, Adjusting, and Balancing of Building Heating, Ventilation, Air-conditioning, and Refrigeration Systems.

.4 NEBB - Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems.

.5 SMACNA - HVAC Systems Testing, Adjusting, and Balancing.

1.5 SUBMITTALS

.1 Section 01 33 00: Procedures for submittals.

.2 Submit name of adjusting and balancing agency for approval within 30 days after award of Contract.

.3 Section 01 44 00: Procedures for submitting Field Reports.

.4 Field Reports: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.

.5 Prior to commencing work, submit report forms or outlines indicating adjusting, balancing, and equipment data required.

.6 Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Consultant and for inclusion in operating and maintenance manuals.

.7 Provide reports in soft cover, letter size, 3-ring binder manuals, complete with index page and indexing tabs, with cover identification at front and side. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.

.8 Include detailed procedures, agenda, sample report forms and copy of AABC National Project Performance Guaranty prior to commencing system balance.

.9 Test Reports: Indicate data on AABC National Standards for Total System Balance forms. Submit data in S.I. Metric units.

1.6 PROJECT RECORD DOCUMENTS

.1 Section 01 78 10: Submittals for project closeout.

.2 Record actual locations of flow measuring stations and balancing valves and rough setting.

1.7 QUALITY ASSURANCE

.1 Perform total system balance to AABC National Standards for Field Measurement and Instrumentation, Total System Balance.

.2 Maintain one copy of each document on site.

1.8 QUALIFICATIONS

.1 Agency: Company specializing in the testing, adjusting, and balancing of systems specified in this Section with minimum three years documented experience certified by AABC/CAABC.

.2 Perform Work under supervision of CAABC Certified Test and Balance Engineer.

1.9 PRE-BALANCING CONFERENCE

.1 Convene one week prior to commencing work of this section, to Section 01 33 00.

1.10 SEQUENCING

.1 Sequence work to Section 01 10 13.

.2 Sequence work to commence after completion of systems and schedule completion of work before Substantial Completion of Project.

1.11 SCHEDULING

.1 Schedule work to Section 01 33 00.

.2 Schedule and provide assistance in final adjustment and test of life safety and smoke control system with Fire Authority.

Part 2 Products

.1 Not used

Part 3 Execution

3.1 AGENCIES

.1 Testing agency must be AABC/CAABC certified balancing company

.2 Testing by Mechanical contractor will not be accepted unless the contractor is certified by the above agency

3.2 EXAMINATION

.1 Verify that systems are complete and operable before commencing work. Ensure the following conditions:

.1 Systems are started and operating in a safe and normal condition.
.2 Temperature control systems are installed complete and operable.
.3 Proper thermal overload protection is in place for electrical equipment.
.4 Final filters are clean and in place. If required, install temporary media in addition to final filters.
.5 Duct systems are clean of debris.
.6 Fans are rotating correctly.
.7 Fire and volume dampers are in place and open.
.8 Air coil fins are cleaned and combed.
.9 Access doors are closed and duct end caps are in place.
.10 Air outlets are installed and connected.
.11 Duct system leakage is minimized.
.12 Hydronic systems are flushed, filled, and vented.
.13 Pumps are rotating correctly.
.14 Proper strainer baskets are clean and in place.

.15 Service and balance valves are open.

.2 Submit field reports. Report defects and deficiencies noted during performance of services which prevent system balance.

.3 Beginning of work means acceptance of existing conditions.

3.3 PREPARATION

.1 Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to Consultant to facilitate spot checks during testing.

.2 Provide additional balancing devices as required.

3.4 INSTALLATION TOLERANCES

.1 Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.

.2 Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.

.3 Hydronic Systems: Adjust to within plus or minus 10 percent of design.

3.5 ADJUSTING

.1 Ensure recorded data represents actual measured or observed conditions.

.2 Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.

.3 After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.

.4 Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

.5 At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by the Owner.

.6 Check and adjust systems approximately six months after final acceptance and submit report.

3.6 AIR SYSTEM PROCEDURE

.1 Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities [at site altitude].

.2 Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.

.3 Measure air quantities at air inlets and outlets.

.4 Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.

.5 Use volume control devices to regulate air quantities only to extend that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.

.6 Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.

.7 Provide system schematic with required and actual air quantities recorded at each outlet or inlet.

.8 Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.

.9 Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.

.10 Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.

.11 Where modulating dampers are provided, take measurements and balance at extreme conditions. [Balance variable volume systems at maximum air flow rate, full cooling, and at minimum air flow rate, full heating.]

.12 Measure building static pressure and adjust supply, return, and exhaust air systems to provide required relationship between each to maintain approximately 12.5 Pa positive static pressure near the building entries.

.13 Check multi-zone units for motorized damper leakage. Adjust air quantities with mixing dampers set first for cooling, then heating, then modulating.

.14 For variable air volume system powered units set volume controller to air flow setting indicated. Confirm connections properly made and confirm proper operation for automatic variable air volume temperature control.

.15 On fan powered VAV boxes, adjust air flow switches for proper operation.

3.7 WATER SYSTEM PROCEDURE

.1 Adjust water systems to provide required or design quantities.

.2 Use calibrated [Venturi tubes, orifices, or other metered] fittings and pressure gauges to determine flow rates for system balance. Where flow metering devices are not installed, base flow balance on temperature difference across various heat transfer elements in the system.

.3 Adjust systems to provide specified pressure drops and flows through heat transfer elements prior to thermal testing. Perform balancing by measurement of temperature differential in conjunction with air balancing.

.4 Effect system balance with automatic control valves fully open to heat transfer elements.

.5 Effect adjustment of water distribution systems by means of balancing cocks, valves, and fittings. Do not use service or shut-off valves for balancing unless indexed for balance point.

.6 Where available pump capacity is less than total flow requirements or individual system parts, full flow in one part may be simulated by temporary restriction of flow to other parts.

3.8 SCHEDULES

.1 Equipment requiring testing, adjusting and balancing:

- .1 Forced Air Furnaces
- .2 Heat recovery ventilators
- .3 Electric duct heater Coils
- .4 Air Filters
- .5 Air Inlets and Outlets

.2 Report Forms

- .1 Title Page:
  - .1 Name of Testing, Adjusting, and Balancing Agency
  - .2 Address of Testing, Adjusting, and Balancing Agency
  - .3 Telephone number of Testing, Adjusting, and Balancing Agency
  - .4 Project name
  - .5 Project location
  - .6 Project Architect
  - .7 Project Engineer
  - .8 Project Contractor
  - .9 Project altitude
  - .10 Report date
- .2 Summary Comments:
  - .1 Design versus final performance
  - .2 Notable characteristics of system
  - .3 Description of systems operation sequence
  - .4 Summary of outdoor and exhaust flows to indicate amount of building pressurization
  - .5 Nomenclature used throughout report
  - .6 Test conditions
- .3 Instrument List:
  - .1 Instrument
  - .2 Manufacturer
  - .3 Model number
  - .4 Serial number

.5 Range
.6 Calibration date

.4 Electric Motors:
.1 Manufacturer
.2 Model/Frame
.3 HP/BHP
.4 Phase, voltage, amperage; nameplate, actual, no load
.5 RPM
.6 Service factor
.7 Starter size, rating, heater elements
.8 Sheave Make/Size/Bore

.5 V-Belt Drive:
.1 Identification/location
.2 Required driven RPM
.3 Driven sheave, diameter and RPM
.4 Belt, size and quantity
.5 Motor sheave diameter and RPM
.6 Centre to centre distance, maximum, minimum, and actual

.6 Pump Data:
.1 Identification/number
.2 Manufacturer
.3 Size/model
.4 Impeller
.5 Service
.6 Design flow rate, pressure drop, BHP
.7 Actual flow rate, pressure drop, BHP
.8 Discharge pressure
.9 Suction pressure
.10 Total operating head pressure
.11 Shut off, discharge and suction pressures
.12 Shut off, total head pressure

.7 Air Cooled Condenser:
.1 Identification/number
.2 Location
.3 Manufacturer
.4 Model number
.5 Serial number
.6 Entering DB air temperature, design and actual
.7 Leaving DB air temperature, design and actual
.8 Number of compressors

.8 Cooling Coil Data:

.1 Identification/number
.2 Location
.3 Service
.4 Manufacturer
.5 Air flow, design and actual
.6 Entering air DB temperature, design and actual
.7 Entering air WB temperature, design and actual
.8 Leaving air DB temperature, design and actual
.9 Leaving air WB temperature, design and actual
.10 Water flow, design and actual
.11 Water pressure drop, design and actual
.12 Entering water temperature, design and actual
.13 Leaving water temperature, design and actual
.14 Saturated suction temperature, design and actual
.15 Air pressure drop, design and actual

.9 Heating Coil Data:
.1 Identification/number
.2 Location
.3 Service
.4 Manufacturer
.5 Air flow, design and actual
.6 Water flow, design and actual
.7 Water pressure drop, design and actual
.8 Entering water temperature, design and actual
.9 Leaving water temperature, design and actual
.10 Entering air temperature, design and actual
.11 Leaving air temperature, design and actual
.12 Air pressure drop, design and actual

.10 Electric Duct Heater:
.1 Manufacturer
.2 Identification/number
.3 Location
.4 Model number
.5 Design kW
.6 Number of stages
.7 Phase, voltage, amperage
.8 Test voltage (each phase)
.9 Test amperage (each phase)
.10 Air flow, specified and actual
.11 Temperature rise, specified and actual

.11 Air Moving Equipment

.1 Location
.2 Manufacturer
.3 Model number
.4 Serial number
.5 Arrangement/Class/Discharge
.6 Air flow, specified and actual
.7 Return air flow, specified and actual
.8 Outside air flow, specified and actual
.9 Total static pressure (total external), specified and actual
.10 Inlet pressure
.11 Discharge pressure
.12 Sheave Make/Size/Bore
.13 Number of Belts/Make/Size
.14 Fan RPM

.12 Return Air/Outside Air Data:
.1 Identification/location
.2 Design air flow
.3 Actual air flow
.4 Design return air flow
.5 Actual return air flow
.6 Design outside air flow
.7 Actual outside air flow
.8 Return air temperature
.9 Outside air temperature
.10 Required mixed air temperature
.11 Actual mixed air temperature
.12 Design outside/return air ratio
.13 Actual outside/return air ratio

.13 Exhaust Fan Data:
.1 Location
.2 Manufacturer
.3 Model number
.4 Serial number
.5 Air flow, specified and actual
.6 Total static pressure (total external), specified and actual
.7 Inlet pressure
.8 Discharge pressure
.9 Sheave Make/Size/Bore
.10 Number of Belts/Make/Size
.11 Fan RPM

.14 Duct Traverse:

.1 System zone/branch
.2 Duct size
.3 Area
.4 Design velocity
.5 Design air flow
.6 Test velocity
.7 Test air flow
.8 Duct static pressure
.9 Air temperature
.10 Air correction factor

.15 Duct Leak Test:
.1 Description of ductwork under test
.2 Duct design operating pressure
.3 Duct design test static pressure
.4 Duct capacity, air flow
.5 Maximum allowable leakage duct capacity times leak factor
.6 Test apparatus
.1 Blower
.2 Orifice, tube size
.3 Orifice size
.4 Calibrated
.7 Test static pressure
.8 Test orifice differential pressure
.9 Leakage

.16 Air Monitoring Station Data:
.1 Identification/location
.2 System
.3 Size
.4 Area
.5 Design velocity
.6 Design air flow
.7 Test velocity
.8 Test air flow

.17 Flow Measuring Station:
.1 Identification/number
.2 Location
.3 Size
.4 Manufacturer
.5 Model number
.6 Serial number
.7 Design Flow rate

.8 Design pressure drop
.9 Actual/final pressure drop
.10 Actual/final flow rate
.11 Station calibrated setting

.18 Air Distribution Test Sheet:
.1 Air terminal number
.2 Room number/location
.3 Terminal type
.4 Terminal size
.5 Area factor
.6 Design velocity
.7 Design air flow
.8 Test (final) velocity
.9 Test (final) air flow
.10 Percent of design air flow

.19 Sound Level Report:
.1 Location
.2 Octave bands - equipment off
.3 Octave bands - equipment on

.20 Vibration Test:
.1 Location of points:
.1 Fan bearing, drive end
.2 Fan bearing, opposite end
.3 Motor bearing, centre (if applicable)
.4 Motor bearing, drive end
.5 Motor bearing, opposite end
.6 Casing (bottom or top)
.7 Casing (side)
.8 Duct after flexible connection (discharge)
.9 Duct after flexible connection (suction)
.2 Test readings:
.1 Horizontal, velocity and displacement
.2 Vertical, velocity and displacement
.3 Axial, velocity and displacement
.3 Normally acceptable readings, velocity and acceleration
.4 Unusual conditions at time of test
.5 Vibration source (if non-complying)

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Duct work insulation.

.2 Duct Liner.

.3 Insulation jackets.

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Administrative Requirements.

.2 Section 01 44 00 - Quality Assurance.

.3 Section 01 61 00 - Common Product Requirements.

.4 Section 09 91 10 - Painting: Painting insulation jackets.

.5 Section 23 05 53 - Mechanical Identification.

.6 Section 23 31 00 - Duct Work: Glass fibre duct work.

.7 Section 23 31 00 - Duct Work: Duct liner.

1.3 REFERENCES

.1 Section 01 44 00: Requirements for references and standards.

.2 ASTM B209 - Aluminum and Aluminum-Alloy Sheet and Plate.

.3 ASTM C518 - Steady-State Thermal Transmission Properties by Means of the Heat Flow Metre Apparatus.

.4 ASTM C553 - Standard Specification for Mineral Fibre Blanket Thermal Insulation for Commercial and Industrial Applications.

.5 ASTM C612 - Standard Specification for Mineral Fibre Block and Board Thermal Insulation.

.6 ASTM C921 - Properties of Jacketing Materials for Thermal Insulation.

.7 ASTM C1071 - Fibrous Glass Duct Lining Insulation(Thermal Sound Absorbing Material).

.8 ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

.9 ASTM E96 - Water Vapour Transmission of Materials.

.10 ASTM E162 - Standard Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source.

.11 ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

.12 NAIMA National Insulation Standards.

.13 NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials.

.14 SMACNA - HVAC Duct Construction Standards - Metal and Flexible.

.15 UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials.

1.4 SUBMITTALS FOR REVIEW

.1 Section 01 33 00: Procedures for submittals.

.2 Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

1.5 SUBMITTALS FOR INFORMATION

.1 Section 01 33 00: Procedures for submittals.

.2 Manufacturer's Instructions: Indicate installation procedures which ensure acceptable workmanship and installation standards will be achieved.

1.6 QUALITY ASSURANCE

.1 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

.2 Applicator Qualifications: Company specializing in performing the work of this section with minimum three years documented experience.

1.7 REGULATORY REQUIREMENTS

.1 Materials: Flame spread/smoke developed rating of 25/50 to [ASTM E84] [NFPA 255] [UL 723].

1.8 DELIVERY, STORAGE, AND PROTECTION

.1 Section 01 61 00: Transport, handle, store, and protect products.

.2 Accept materials on site in original factory packaging, labelled with manufacturer's identification, including product density and thickness.

.3 Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.9 ENVIRONMENTAL REQUIREMENTS

.1 Section 01 61 00: Environmental conditions affecting products on site.

.2 Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.

.3 Maintain temperature during and after installation for minimum period of 24 hours.

Part 2 Products

2.1 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 deg C mean temperature when tested in accordance with ASTM C 335

.3 TIAC Code C-1; Rigid mineral fibre board to ASTM C 612, with or without factory applied vapour retarder jacket to CBSB 51-GP-52Ma

.4 TIAC Code C-2: Mineral fibre blanket to ASTM C 553 faced with or without factory applied vapour retarder jacket to CGSB 51-GP-52Ma

.1 Mineral Fibre to ASTM c 553

.2 Jacket: to CGSB 51-gp-52MA

.3 Maximum "k" Factor to ASTM C 553

2.2 JACKETS

.1 Canvas:

.1 220 gm/m2 cotton. Plain weave, treated with dilute fire retardant lagging adhesive to ASTM C921

2.3 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 C 449

.4 ULC Listed Canvas Jacket

.5 Tape self-adhesive, aluminum reinforced 75mm wide

.6 Contact adhesive: quick setting

.7 Canvas adhesive: washable

.8 Tie wire: 1.5mm stainless steel

.9 Banding: 12mm wide, 0.5mm thick stainless steel

.10 Facing: 25mm galvanized steel hexagonal wire mesh stitched on one face of insulation

.11 Fasteners: 4mm dia pins with 35mm dia clips, length to suit insulation thickness.

Part 3 Execution

3.1 EXAMINATION

.1 Section 01 70 00 - Examination and Preparation: Verification of existing conditions before starting work.

.2 Verify that duct work has been tested before applying insulation materials.

.3 Verify that surfaces are clean, foreign material removed, and dry.

3.2 INSTALLATION

.1 Section 01 44 00 - Quality Assurance: Manufacturer's instructions.

.2 Install to NAIMA National Insulation Standards.

.3 Insulated duct work conveying air below ambient temperature:

.1 Provide insulation with vapour barrier jackets.

.2 Finish with tape and vapour barrier jacket.

.3 Continue insulation through walls, sleeves, hangers, and other duct penetrations.

.4 Insulate entire system including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.

.4 Insulated duct work conveying air above ambient temperature:

.1 Provide with or without standard vapour barrier jacket.

.2 Insulate fittings and joints. Where service access is required, bevel and seal ends of insulation.

.5 Duct Work Exposed in Mechanical Equipment Rooms or Finished Spaces below 3 metres above finished floor: Finish with canvas jacket sized for finish painting or aluminum jacket.

.6 Exterior Applications: Provide insulation with vapour barrier jacket. Cover with caulked aluminum jacket with seams located on bottom side of horizontal duct section.

.7 External Duct Insulation Application:

.1 Secure insulation with vapour barrier with wires and seal jacket joints with vapour barrier adhesive or tape to match jacket.

.2 Secure insulation without vapour barrier with staples, tape, or wires.

.3 Install without sag on underside of duct work. Use adhesive or mechanical fasteners where necessary to prevent sagging. Lift duct work off trapeze hangers and insert spacers.

.4 Seal vapour barrier penetrations by mechanical fasteners with vapour barrier adhesive.

.5 Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.

.8 Duct and Plenum Liner Application:

.1 Adhere insulation with adhesive for 90 percent coverage.

.2 Secure insulation with mechanical liner fasteners. Refer to SMACNA Standards for spacing.

.3 Seal and smooth joints. Seal and coat transverse joints.

.4 Seal liner surface penetrations with adhesive.

.5 Duct dimensions indicated are net inside dimensions required for air flow. Increase duct size to allow for insulation thickness.

3.3 SCHEDULES

Ducts	**Insulation**
Exhaust Ducts Within 3 m of Exterior Openings	2” foil-faced insulation
Outside Air Intake Ducts and Plenum	2” foil-faced insulation
Supply and Return Ducts and Plenums in Basement	1” foil-faced insulation or to match existing
Supply and Return Ducts and Plenums in Crawlspace	2” foil-faced insulation or to match existing
Supply and Return Ducts and Plenums in Attic space	2” foil-faced insulation
Supply and Return Ducts in Ceiling Space above General offices	Acoustic insulation
Vertical supply and return shafts supplying General offices	Acoustic insulation

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Duct access doors.

.2 Fire dampers.

.3 Flexible duct connections.

.4 Motorized Control dampers.

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Administrative Requirements.

.2 Section 01 61 00 - Common Product Requirements.

.3 Section 01 78 10 - Execution Requirements.

.4 Section 23 05 48 - Vibration Isolation.

.5 Section 23 31 00 - Duct Work.

.6 Section 23 36 00 - Air Terminal Units: Pressure regulating damper assemblies.

.7 Section 26 05 80 - Equipment Wiring: Electrical characteristics and wiring connections.

1.3 REFERENCES

.1 NFPA 90A - Installation of Air Conditioning and Ventilating Systems.

.2 NFPA 92A - Smoke-Control Systems.

.3 SMACNA - HVAC Duct Construction Standards - Metal and Flexible.

.4 UL 33 - Heat Responsive Links for Fire-Protection Service.

.5 UL 555 - Fire Dampers.

.6 UL 555S - Smoke Dampers.

1.4 SUBMITTALS

.1 Section 01 33 00: Procedures for submittals.

.2 Shop Drawings: Indicate for shop fabricated assemblies including volume control dampers duct access doors and duct test holes.

.3 Product Data: Provide for shop fabricated assemblies including volume control dampers duct access doors duct test holes and hardware used. Include electrical characteristics and connection requirements.

.4 Manufacturer's Installation Instructions: Indicate for fire dampers and combination fire and smoke dampers.

1.5 PROJECT RECORD DOCUMENTS

.1 Section 01 78 10: Submittals for project closeout.

.2 Record actual locations of access doors and test holes.

1.6 QUALIFICATIONS

.1 Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

1.7 REGULATORY REQUIREMENTS

.1 Products Requiring Electrical Connection: Listed and classified by CSA as suitable for the purpose specified and indicated.

1.8 DELIVERY, STORAGE, AND HANDLING

.1 Section 01 61 00: Transport, handle, store, and protect products.

.2 Protect dampers from damage to operating linkages and blades.

1.9 EXTRA MATERIALS

.1 Section 01 78 10: Submittals for project closeout.

.2 Provide two of each size and type of fusible link.

Part 2 Products

2.1 DUCT ACCESS DOORS

.1 Manufacturers:

.1 Naylor

.2 Substitutions: Refer to Section 01 62 00.

.2 Fabricate to SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.

.3 Fabrication: Rigid and close-fitting of galvanized steel with sealing gaskets and quick fastening locking devices. For insulated duct work, install minimum 25 mm thick insulation with sheet metal cover.

.1 Less Than 300 mm Square: Secure with sash locks.

.2 Up to 450 mm Square: Provide two hinges and two sash locks.

.3 Up to 600 x 1200 mm: Three hinges and two compression latches with outside and inside handles.

.4 Larger Sizes: Provide an additional hinge.

.4 Access doors with sheet metal screw fasteners are not acceptable.

2.2 DUCT TEST HOLES

.1 Temporary Test Holes: Cut or drill in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.

2.3 FIRE DAMPERS

.1 Manufacturers:

.1 Naylor Model Type A or B

.2 Substitutions: Refer to Section 01 62 00.

.2 Fabricate to NFPA 90A and UL 555, and as indicated.

.3 Dynamic Fire dampers as per UL 555.

.4 Ceiling Dampers: Galvanized steel, 0.76 mm frame and 1.5 mm flap, two layers 3.2 mm ceramic fibre on top side , and one layer on bottom side for round flaps, with locking clip.

.5 Horizontal Dampers: Galvanized steel, 0.76 mm frame, stainless steel closure spring, and lightweight, heat retardant non-asbestos fabric blanket.

.6 Curtain Type Dampers: Galvanized steel with interlocking blades. Provide stainless steel closure springs and latches for horizontal installations closure under air flow conditions. Configure with blades out of air stream except for 250 Pa pressure class ducts up to 300 mm in height.

.7 Multiple Blade Dampers: 1.5 mm galvanized steel frame and blades, oil-impregnated bronze or stainless steel sleeve bearings and plated steel axles, 3.2 x 12.7 mm plated steel concealed linkage, stainless steel closure spring, blade stops, and lock.

.8 Fusible Links: UL 33, separate at 71 degrees C with adjustable link straps for combination fire/balancing dampers.

2.4 FLEXIBLE DUCT CONNECTIONS

.1 Manufacturers:

.1 Flexmaster

.2 Substitutions: Refer to Section 01 62 00.

.2 Fabricate to SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.

.3 Connector: Fabric crimped into metal edging strip.

.1 Fabric: UL listed fire-retardant neoprene coated woven glass fibre fabric to NFPA 90A, minimum density 1.0 kg/sq m.

.2 Net Fabric Width: Approximately 50 75 150 mm wide.

.3 Metal: 75 mm wide, 0.6 mm thick galvanized steel .

.4 Leaded Vinyl Sheet: Minimum 14 mm thick, 4.2 kg/sq m, 10 dB attenuation in 10 to 10,000 Hz range.

2.5 MOTORIZED CONTROL DAMPERS

.1 Manufacturers:

.1 Tamco Series 1000/Belimo

.2 Substitutions: Refer to Section 01 62 00.

.2 Aluminum air foil control damper.

.3 Flanged to duct.

.4 With Belimo actuator, NFBUP/NFXUP sized to match damper.

.5 Sized to match internal dimensions of duct.

Part 3 Execution

3.1 PREPARATION

.1 Verify that electric power is available and of the correct characteristics.

3.2 INSTALLATION

.1 Install accessories to manufacturer's instructions, NFPA 90A, and follow SMACNA HVAC Duct Construction Standards - Metal and Flexible. Refer to Section 23 31 00 for duct construction and pressure class.

.2 Provide backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.

.3 Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire dampers, combination fire and smoke dampers, and elsewhere as indicated. Provide minimum 200 x 200 mm size for hand access, 450 x 450 mm size for shoulder access, and as indicated. Provide 100 x 100 mm for balancing dampers only. Review locations prior to fabrication.

.4 Provide duct test holes where indicated and required for testing and balancing purposes.

.5 Provide fire dampers , combination fire and smoke dampers and smoke dampers at locations indicated, where ducts and outlets pass through fire rated components , and where required by authorities having jurisdiction. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.

.6 Install smoke dampers and combination smoke and fire dampers to NFPA 92A.

.7 Demonstrate re-setting of fire dampers to Owner's representative.

.8 Provide flexible connections immediately adjacent to equipment in ducts associated with fans and motorized equipment , and supported by vibration isolators. Refer to Section 23 05 48. For fans developing static pressures of 1250 Pa and over, cover connections with leaded vinyl sheet, held in place with metal straps.

.9 Use splitter dampers only where indicated.

.10 Provide balancing dampers on high velocity systems where indicated. Refer to Section 23 36 00.

.11 Provide balancing dampers on duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Direct Drive Centrifugal fans.

.2 Fan Accessories.

1.2 RELATED WORK

.1 Section 01 33 00 - Administrative Requirements.

.2 Section 01 61 00 - Common Product Requirements.

.3 Section 01 78 10 - Execution Requirements.

.4 Section 23 05 13 - Motors.

.5 Section 23 05 48 - Vibration Isolation.

.6 Section 23 07 13 - Duct Insulation.

.7 Section 23 31 00 - Duct Work.

.8 Section 23 33 00 - Duct Work Accessories: Backdraft dampers.

.9 Section 23 73 23 - Air Handling Units.

.10 Section 26 05 80 - Equipment Wiring: Electrical characteristics and wiring connections.

1.3 REFERENCES

.1 AFBMA 9 - Load Ratings and Fatigue Life for Ball Bearings.

.2 AFBMA 11 - Load Ratings and Fatigue Life for Roller Bearings.

.3 AMCA 99 - Standards Handbook.

.4 AMCA 210 - Laboratory Methods of Testing Fans for Aerodynamic Performance Rating.

.5 AMCA 300 - Reverberant Room Method for Sound Testing of Fans.

.6 AMCA 301 - Method of Calculating Fan Sound Ratings from Laboratory Test Data.

.7 SMACNA - HVAC Duct Construction Standards - Metal and Flexible.

1.4 SUBMITTALS

.1 Section 01 33 00: Procedures for submittals.

.2 Shop Drawings: Indicate assembly of centrifugal fans and accessories including fan curves with specified operating point clearly plotted, sound power levels for both fan inlet and outlet at rated capacity, and electrical characteristics and connection requirements.

.3 Product Data: Provide data on centrifugal fans and accessories including fan curves with specified operating point clearly plotted, sound power levels for both fan inlet and outlet at rated capacity, and electrical characteristics and connection requirements.

.4 Manufacturer's Installation Instructions.

1.5 OPERATION AND MAINTENANCE DATA

.1 Section 01 78 10: Submittals for project closeout.

.2 Maintenance Data: Include instructions for lubrication, motor and drive replacement, spare parts list, and wiring diagrams.

1.6 DELIVERY, STORAGE, AND HANDLING

.1 Section 01 61 00: Transport, handle, store, and protect products.

.2 .Protect motors, shafts, and bearings from weather and construction dust.

1.7 ENVIRONMENTAL REQUIREMENTS

.1 Do not operate fans for any purpose until ductwork is clean, filters in place, bearings lubricated, and fan has been test run under observation.

1.8 EXTRA MATERIALS

.1 Section 01 78 10: Submittals for project closeout.

.2 Provide two sets of belts for each fan.

Part 2 Products

2.1 MANUFACTURERS

.1 Greenheck Product See schedule

.2 Substitutions: [Refer to Section 01 61 00.]

2.2 GENERAL

.1 Performance Ratings: Conform to AMCA 210.

.2 Sound Ratings: AMCA 301, tested to AMCA 300.

.3 Fabrication: Conform to AMCA 99.

.4 Performance Base: Sea level conditions.

.5 Temperature Limit: Maximum 50 degrees C.

.6 Static and Dynamic Balance: Eliminate vibration or noise transmission to occupied areas.

.7 Performance

.1 See Schedule.

2.3 ACCESSORIES

.1 Fixed Inlet Vanes: Steel construction with fixed cantilevered inlet guide vanes welded to inlet bell.

.2 Adjustable Inlet Vanes: Steel construction with blades [supported at both ends] [cantilevered] with two permanently lubricated bearings, variable mechanism [out of air stream] terminating in single control lever with control shaft for double width fans [and locking quadrant].

.3 Discharge Dampers: [Parallel] [Opposed] blade heavy duty steel damper assembly with blades constructed of two plates formed around and welded to shaft, channel frame, sealed ball bearings, with blades linked out of air stream to single control lever.

.4 Inlet/Outlet Screens: Galvanized steel welded grid.

.5 Access Doors: Shaped to conform to scroll, with quick opening latches and gaskets.

.6 Scroll Drain: <13 mm><<1/2 inch>> steel pipe coupling welded to low point of fan scroll.

Part 3 Execution

3.1 INSTALLATION

.1 Install to manufacturer's instructions.

.2 Install fans as specified, with resilient mountings and flexible electrical leads. Refer to Section 23 05 48.

.3 Install flexible connections specified in Section 23 33 00 between fan inlet and discharge ductwork. Ensure metal bands of connectors are parallel with minimum one inch flex between ductwork and fan while running.

.4 Install fan restraining snubbers as required. Refer to Section 23 05 48. Adjust snubbers to prevent tension in flexible connectors when fan is operating.

.5 Provide sheaves required for final air balance.

.6 Provide safety screen where inlet or outlet is exposed.

.7 Pipe scroll drains to nearest floor drain.

.8 Provide backdraft dampers on discharge of exhaust fans and as indicated. [Refer to Section 23 33 00.]

3.2 CENTRIFUGAL FAN SCHEDULE

	Drawing Code	**F-1**	**F-2**
	Manufacturer	Greenheck	Greenheck
	Model	SQ-120-VG	SQ-140-VG
	Fan Type	Inline	Inline
	Wheel Type	Centrifugal	Centrifugal
	Air Flow Capacity	1300cfm	2300cfm
	Static Pressure	0.5”WC	0.5”WC
	Drive	DIRECT	DIRECT
	Motor hp	½ HP	¾ HP
	Electrical	115/1/60	115/1/60

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Condensing unit package.

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Administrative Requirements.

.2 Section 01 44 00 - Quality Assurance.

.3 Section 01 61 00 - Common Product Requirements.

.4 Section 01 78 10 - Execution Requirements.

.5 Section 03 30 00 - Cast-in-place Concrete: Concrete bases.

.6 Section 23 05 13 - Motors.

.7 Section 23 05 48 - Vibration Isolation: Placement of vibration isolators.

.8 Section 23 23 00 - Refrigerant Piping And Specialties.

.9 Section 23 54 10 - Forced Air Furnaces.

.10 Section 23 73 23 - Air Handling Units.

.11 Section 23 82 16 - Air Coils.

.12 Section 23 82 00 - Terminal Heat Transfer Units: Fan-coil units.

.13 Section 25 90 00 - Sequence Of Operation.

.14 Section 26 05 80 - Equipment Wiring: Electrical characteristics and wiring connections.

1.3 REFERENCES

.1 ARI 210/240 - Unitary Air-Conditioning and Air-Source Heat Pump Equipment.

.2 ARI 270 - Sound Rating of Outdoor Unitary Equipment.

.3 ARI 365 - Commercial and Industrial Unitary Air-Conditioning Condensing Units.

.4 ASHRAE 14 - Methods of Testing for Rating Positive Displacement Condensing Units.

.5 ASHRAE 15 - Safety Standard for Refrigeration Systems.

.6 ASHRAE 90A - Energy Conservation in new Building Design.

.7 NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

.8 UL 207 - Refrigerant-Containing Components and Accessories, Non-electrical.

.9 UL 303 - Refrigeration and Air-Conditioning Condensing, and Air-Source Heat Pump Equipment.

1.4 SUBMITTALS FOR REVIEW

.1 Section 01 33 00: Procedures for submittals.

.2 Shop Drawings: Indicate components, assembly, dimensions, weights and loadings, required clearances, and location and size of field connections. Include schematic layouts showing condensing units, cooling coils, refrigerant piping, and accessories required for complete system.

.3 Product Data: Provide rated capacities, weights specialties and accessories, electrical nameplate data, and wiring diagrams. Make submission with coils, refer to Section 23 73 23.

1.5 SUBMITTALS FOR INFORMATION

.1 Section 01 33 00: Submittals for information.

.2 Design Data: Indicate pipe and equipment sizing.

.3 Submit manufacturer's installation instructions.

1.6 SUBMITTALS AT PROJECT CLOSEOUT

.1 Section 01 78 10: Submittals for project closeout.

.2 Operation and Maintenance Data: Include start-up instructions, maintenance instructions, parts lists, controls, and accessories.

1.7 REGULATORY REQUIREMENTS

.1 Products Requiring Electrical Connection: Listed and classified by CSA as suitable for the purpose specified and indicated.

1.8 DELIVERY, STORAGE, AND PROTECTION

.1 Section 01 61 00: Transport, handle, store, and protect products.

.2 Comply with manufacturer's installation instructions for rigging, unloading, and transporting units.

.3 Protect units on site from physical damage. Protect coils.

1.9 WARRANTY

.1 Section 01 78 10: Submittals for project closeout.

.2 Provide a five year warranty to include coverage for refrigerant compressors.

1.10 EXTRA MATERIALS

.1 Section 01 78 10: Submittals for project closeout.

.2 Provide two of complete change of lubricating oil.

Part 2 Products

2.1 MANUFACTURERS

.1 Carrier

.2 Other Acceptable Manufacturers:

.3 Substitutions: [Refer to Section 01 62 00.]

2.2 MANUFACTURED UNITS

.1 Units: Self-contained, packaged, factory assembled and pre-wired units suitable for outdoor use consisting of cabinet, compressors, condensing coil and fans, integral sub-cooling coil, controls, liquid receiver, and screens.

.2 Construction and Ratings: To [ARI 210/240] [ARI 365] [and UL 207 and UL 303]. Testing to ASHRAE 14.

.3 Performance Ratings: Energy Efficiency Rating (EER) [and Coefficient of Performance (COP)] not less than prescribed by ASHRAE 90A.

2.3 CASING

.1 House components ingalvanized steel panels with weather resistant, baked enamel finish.

2.4 CONDENSER COILS

.1 Coils: Aluminum fins mechanically bonded to seamless copper tubing. Provide sub-cooling circuits. Air test under water to <2900 kPa><<425 psig>>, and [vacuum] dehydrate. Seal [with holding charge of [nitrogen] [refrigerant]].

.2 Coil Guard: [Expanded metal] [Louvred] [PVC coat steel wire] [with lint screens].

2.5 CONTROLS

.1 On unit, mount weatherproof steel control panel, NEMA 250, containing power and control wiring, factory wired with single point power connection.

.2 For each compressor, provide starter, non-recycling compressor overload, starter relay, and control power transformer or terminal for controls power. Provide manual reset current overload protection. For each condenser fan, provide across-the-line starter with starter relay.

.3 Provide safety controls arranged so any one will shut down machine:

.1 High discharge pressure switch (manual reset) for each compressor.

.2 Low suction pressure switch (automatic reset) for each compressor.

.3 Oil Pressure switch (manual reset).

2.6 PERFORMANCE

.1 See schedule.

2.7 ELECTRICAL CHARACTERISTICS AND COMPONENTS

.1 See schedule.

Part 3 Execution

3.1 INSTALLATION

.1 Install to manufacturer's installation instructions.

.2 Complete structural, mechanical, and electrical connections to manufacturer's installation instructions.

.3 Provide for connection to electrical service. Refer to Section 26 05 80.

.4 Install units on vibration isolation. Refer to Section 23 05 48.

.5 Install units on concrete base as indicated. Refer to Section 03 30 00.

.6 Provide connection to refrigeration piping system and evaporators. Refer to Section 23 23 00. Comply with ASHRAE 15.

.7 Provide charge of refrigerant and oil.

3.2 DEMONSTRATION AND INSTRUCTIONS

.1 Section 01 78 10: Demonstrating installed work.

.2 Supply initial charge of refrigerant and oil for each refrigeration system. Replace losses of oil or refrigerant prior to end of correction period.

.3 Charge system with refrigerant and test entire system for leaks after completion of installation. Repair leaks, put system into operation, and test equipment performance.

.4 Shut-down system if initial start-up and testing takes place in winter and machines are to remain inoperative. Repeat start-up and testing operation at beginning of first cooling season.

.5 Provide cooling season start-up, and winter season shut-down for first year of operation.

.6 Inspect and test for refrigerant leaks every 3months during first year of operation.

3.3 SCHEDULES

	Drawing Code	**CU-1**	**CU-2**
	Manufacturer		

	Drawing Code	**CU-1**	**CU-2**
	Model Number	38AUZA07A0A5	24ANB642A003
	Cooling		
	Capacity	6TONS	3.5 TONS
	Power	208/3/60	208/1/60

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Packaged air handling units.

.2 Filter sections.

.3 Cooling coils.

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Administrative Requirements.

.2 Section 01 44 00 - Quality Assurance.

.3 Section 01 61 00 - Common Product Requirements.

.4 Section 01 78 10 - Execution Requirements.

.5 Section 22 10 00 - Plumbing Piping: Equipment drains.

.6 Section 23 05 13 - Motors.

.7 Section 23 05 16 - Piping Expansion Compensation.

.8 Section 23 05 48 - Vibration Isolation.

.9 Section 23 07 13 - Duct Insulation.

.10 Section 23 31 00 - Duct Work.

.11 Section 23 33 00 - Duct Work Accessories: Flexible duct connections.

.12 Section 23 34 13 - Axial Fans.

.13 Section 23 34 16 - Centrifugal Fans.

.14 Section 23 82 16 - Air Coils.

.15 Section 26 05 80 - Equipment Wiring: Electrical characteristics and wiring connections.

1.3 REFERENCES

.1 AFBMA 9 - Load Ratings and Fatigue Life for Ball Bearings.

.2 AFBMA 11 - Load Ratings and Fatigue Life for Roller Bearings.

.3 AMCA 99 - Standards Handbook.

.4 AMCA 210 - Laboratory Methods of Testing Fans for Aerodynamic Performance Rating.

.5 AMCA 300 - Reverberant Room Method for Sound Testing of Fans.

.6 AMCA 301 - Method of Publishing Sound Ratings for Air Moving Devices.

.7 AMCA 500 - Method of Testing Louvres for Ratings.

.8 AMCA 5000 - Method of Testing Dampers for Ratings.

.9 ARI 410 - Forced-Circulation Air-Cooling and Air-Heating Coils.

.10 ARI 430 - Fabrication of Central Station Air Handling Units.

.11 ARI 435 - Application of Central-Station Air-Handling Units.

.12 ARI 610 - Central System Humidifiers for Residential Applications.

.13 SMACNA - HVAC Duct Construction Standards - Metal and Flexible.

.14 UL 900 - Air Filter Units.

1.4 SUBMITTALS

.1 Section 01 33 00: Procedures for submittals.

.2 Shop Drawings: Indicate assembly, unit dimensions, weight loading, required clearances, construction details, field connection details, and electrical characteristics and connection requirements.

.3 Product Data:

.1 Provide literature which indicates dimensions, weights, capacities, ratings, fan performance, gauges and finishes of materials, and electrical characteristics and connection requirements.

.2 Provide data of filter media, filter performance data, filter assembly, and filter frames.

.3 Provide fan curves with specified operating point clearly plotted.

.4 Submit sound power level data for both fan outlet and casing radiation at rated capacity.

.5 Submit electrical requirements for power supply wiring including wiring diagrams for interlock and control wiring, clearly indicating factory-installed and field-installed wiring.

.4 Manufacturer's Installation Instructions.

1.5 OPERATION AND MAINTENANCE DATA

.1 Section 01 78 10: Submittals for project closeout.

.2 Maintenance Data: Include instructions for lubrication, filter replacement, motor and drive replacement, spare parts lists, and wiring diagrams.

1.6 QUALIFICATIONS

.1 Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience, who issues complete catalogue data on total product.

1.7 DELIVERY, STORAGE, AND HANDLING

.1 Section 01 61 00: Transport, handle, store, and protect products.

.2 Accept products on site in factory-fabricated protective containers, with factory-installed shipping skids and lifting lugs. Inspect for damage.

.3 Store in clean dry place and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures, and finish.

1.8 ENVIRONMENTAL REQUIREMENTS

.1 Do not operate units for any purpose, temporary or permanent, until ductwork is clean, filters are in place, bearings lubricated, and fan has been test run under observation.

1.9 EXTRA MATERIALS

.1 Section 01 78 10: Submittals for project closeout.

.2 Provide one set for each unit of fan belts, filters.

Part 2 Products

2.1 MANUFACTURERS

.1 Carrier Product 40RUA.

.2 Substitutions: [Refer to Section 01 62 00.]

2.2 GENERAL DESCRIPTION

.1 Configuration: Fabricate with fan and coil section plus accessories, including:

.1 Filter section.
.2 Cooling coil section.

.2 Performance Base: Sea level conditions.

.3 Fabrication: Conform to AMCA 99 and ARI 430.

.4 Performance

.1 Air Flow: 2300cfm at 0.8in wg external static pressure.
.2 Motor: 1 hp, 208volt, three phase, 60 Hz.

2.3 ELECTRICAL CHARACTERISTICS AND COMPONENTS

.1 Electrical Characteristics:

.1 [____] volts, [single] [three] phase, 60 Hz.

.2 Refer to Section 26 05 80.

.2 Motor: [TEFC] [Refer to Section 23 05 13.]

.3 Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated.

2.4 COILS

.1 Casing: Provide access to both sides of coils. Enclose coils with headers and return bends [exposed outside] [fully contained within] casing. Slide coils into casing through removable end panel [with blank off sheets and sealing collars at connection penetrations].

.2 Drain Pans: [<600 mm><<24 inch>> downstream of coil] and down spouts for cooling coil banks more than one coil high.

2.5 FILTERS

.1 Filter Box: Section with filter guides, access doors from both sides, for side loading.

.2 Filter Media: UL 900 listed, Class I or Class II, approved by [local] [____] authorities.

.3 [Flat] [Angle] [High Capacity]: Arrangement with <50 mm><<2 inch>> deep [washable permanent panel filters.] [disposable panel filters.] [disposable, extended area panel filters.] [Refer to Section 23 40 00.]

.4 Filter Gauges: 3-1/2 inch diameter diaphragm actuated dial in metal case, with static pressure tips.

2.6 CONTROLS

.1 Provide electric solid state microcomputer based room thermostat, located as indicated.

.1 Incorporate:

.1 Automatic switching from heating to cooling.

.2 Preferential rate control to minimize overshoot and deviation from set point.

.3 Set-up for four separate temperatures per day.

.4 Instant override of setpoint for continuous or timed period from one hour to 31 days.

.5 Short cycle protection.

.6 Programming based on weekdays, Saturday and Sunday.

.7 Switch selection features including imperial or metric display, 12 or 24 hour clock, keyboard disable, remote sensor, fan on-auto.

.2 Display:

.1 Time of Day.

.2 Actual room temperature.
.3 Programmed temperature.
.4 Programmed time.
.5 Duration of timed override.
.6 Day of week.
.7 System mode indication: Heating, cooling, auto, off, fan auto, fan on.
.8 Stage (heating or cooling) operation.

Part 3 Execution

3.1 INSTALLATION

.1 Install to manufacturer's instructions.

.2 Install to ARI 435.

.3 Assemble high pressure units by bolting sections together. [Isolate fan section with flexible duct connections.]

.4 Install assembled unit on vibration isolators. Refer to Section 23 05 48.

3.2 AIR HANDLING UNIT SCHEDULE

	Drawing Code	**FC-1**	**FC-2**
	Manufacturer	Carrier	Carrier
	Model	40RUAA07T1A5	FV4CNB006L00
	Fan		
	Capacity	2300CFM, two speed	1250cfm
	Static Pressure	0.6”WC	0.6”WC
	Motor	1 HP	¾ HP
	Cooling Coil		
	Capacity	6 TONS	3.5 TONS
	Electrical	208V/3phase/60Hz	208V/1phase/60Hz
	Accessories		
	Thermostat	33CS2PP2S	33CS2PP2S
	Filter rack	Standard, side access	standard, side access

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Air supply system

.2 Thermostats.

.3 Humidistats.

.4 Control valves.

.5 Automatic dampers.

.6 Damper operators.

.7 Time clocks.

.8 Miscellaneous accessories.

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Administrative Requirements.

.2 Section 01 61 00 - Common Product Requirements.

.3 Section 01 78 10 - Execution Requirements.

.4 Section 23 05 19 - Gages And Meters: Thermometer sockets, gauge taps.

.5 Section 23 05 48 - Vibration Isolation.

.6 Section 23 21 00 - Hydronic Piping: Installation of control valves, flow switches, temperature sensor sockets, gauge taps.

.7 Section 23 22 00 - Steam And Steam Condensate Piping: Installation of control valves, flow switches, temperature sensor sockets, gauge taps.

.8 Section 23 33 00 - Duct Work Accessories: Installation of automatic dampers.

.9 Section 25 50 01 - Analog Control Equipment.

.10 Section 25 50 02 - Digital Control Equipment.

.11 Section 25 90 00 - Sequence Of Operation.

.12 Section 26 27 26 - Wiring Devices: Elevation of exposed components.

.13 Section 26 05 80 - Equipment Wiring: Electrical characteristics and wiring connections.

1.3 REFERENCES

.1 AMCA 500 - Test Methods for Louvres, Dampers and Shutters.

.2 ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.

.3 ASTM B32 - Solder Metal.

.4 ASTM B280 - Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.

.5 ASTM D1693 - Environmental Stress - Cracking of Ethylene Plastics.

.6 NEMA DC 3 - Residential Controls - Electric Wall-Mounted Room Thermostats.

.7 NFPA 90A - Installation of Air Conditioning and Ventilation Systems.

1.4 SUBMITTALS FOR REVIEW

.1 Section 01 33 00: Procedures for submittals.

.2 Product Data: Provide description and engineering data for each control system component. Include sizing as requested. Provide data for each system component and software module.

.3 Shop Drawings: Indicate complete operating data, system drawings, wiring diagrams, and written detailed operational description of sequences. Submit schedule of valves indicating size, flow, and pressure drop for each valve. For automatic dampers indicate arrangement, velocities, and static pressure drops for each system.

1.5 SUBMITTALS FOR INFORMATION

.1 Section 01 33 00: Submittals for information.

.2 Manufacturer's Instructions: Provide for all manufactured components.

1.6 SUBMITTALS AT PROJECT CLOSEOUT

.1 Section 01 78 10: Submittals for project closeout.

.2 Project Record Documents: Record actual locations of control components, including panels, thermostats, and sensors. Accurately record actual location of control components, including panels, thermostats, and sensors.

.3 Revise shop drawings to reflect actual installation and operating sequences.

.4 Operation and Maintenance Data: Include inspection period, cleaning methods, recommended cleaning materials, and calibration tolerances.

.5 Warranty: Submit manufacturers warranty and ensure forms have been filled out in Owners name and registered with manufacturer.

1.7 QUALITY ASSURANCE

.1 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

.2 Installer Qualifications: Company specializing in performing the work of this section with minimum five years documented experience.

.3 Design system under direct supervision of a Professional Engineer experienced in design of this Work and licensed in the Province of Manitoba.

1.8 REGULATORY REQUIREMENTS

.1 Products Requiring Electrical Connection: Listed and classified by CSA as suitable for the purpose specified and indicated.

1.9 PREINSTALLATION MEETING

.1 Section 01 33 00: Preinstallation meeting.

.2 Convene one week before starting work of this section.

1.10 WARRANTY

.1 Section 01 78 10: Submittals for project closeout.

.2 Correct defective Work within a five year period after Substantial Completion.

.3 Provide five year manufacturers warranty for ??.

1.11 MAINTENANCE SERVICE

.1 Section 01 78 10: Submittals for project closeout.

.2 Provide service and maintenance of control system for one year from Date of Substantial Completion.

.3 Provide complete service of controls systems, including call backs. Make minimum of two complete normal inspections of approximately 3 hours duration in addition to normal service calls to inspect, calibrate, and adjust controls, and submit written reports.

1.12 EXTRA MATERIALS

.1 Section 01 78 10: Submittals for project closeout.

.2 Provide two of each type of thermostat, exposed sensor.

Part 2 Products

2.1 MANUFACTURERS

.1 [_____] Model [_____].

.2 Other Acceptable Manufacturers:

.1 [_____].

.2 [_____].

.3 [_____].

.3 Substitutions: [Refer to Section 01 62 00.] [Not permitted.]

2.2 CONTROL PANELS

.1 Unitized cabinet type for each system under automatic control with relays and controls mounted in cabinet and temperature indicators, pressure gauges, pilot lights, push buttons and switches flush on cabinet panel face.

.2 NEMA 250, general purpose utility enclosures with enamelled finished face panel.

.3 Provide common keying for all panels.

2.3 INPUT/OUTPUT SENSORS

.1 Temperature:

.1 Manufacturer: [_____] Model [_____].

.2 Other acceptable manufacturers offering equivalent products.

.1 [_____].

.2 [_____].

.3 [_____].

.4 Substitutions: [Refer to Section 01 62 00.] [Not permitted.]

.3 Resistance temperature detectors with resistance tolerance of plus or minus 0.1 percent at <21 degrees C><<70 degrees F>>, interchangeability less than plus or minus 0.2 percent, time constant of 13 seconds maximum for fluids and 200 seconds maximum for air.

.4 Measuring current maximum 5 mA with maximum self-heat of <0.017 degrees C/mW><<0.031 degrees F/mW>> in fluids and <0.008 degrees C/mW><<0.014 degrees F/mW>> in air.

.5 Provide 3 lead wires and shield for input bridge circuit.

.6 Use insertion elements in ducts not affected by temperature stratification or smaller than one square metre. Use averaging elements where larger or prone to stratification sensor length <2.5 m><<8 feet>> or <5 m><<16 feet>> as required.

.7 Insertion elements for liquids: with brass socket, minimum insertion length of<60 mm><<2-1/2 inches>>.

.8 Room sensors: Locking cover [matching the pneumatic thermostats used].

.9 Outside air sensors: Watertight inlet fitting, shielded from direct rays of sun.

.10 Room security sensors: Stainless steel cover plate with insulated back and security screws.

.2 Static Pressure Sensors:

.1 Manufacturer: [_____] Model [_____].

.2 Other acceptable manufacturers offering equivalent products.

.1 [_____].

.2 [_____].

.3 [_____].

.4 Substitutions: [Refer to Section 01 62 00.] [Not permitted.]

.3 Unidirectional with ranges not exceeding 150 percent of maximum expected input.

.4 Temperature compensate with typical thermal error or 0.06 percent of full scale in temperature range of <5 to 40 degrees C><<40 to 100 degrees F>>.

.5 Accuracy: One percent of full scale with repeatability 0.3 percent.

.6 Output: 0 - 5 vdc with power at 12 to 28 vdc.

.3 Equipment Operation Sensors:

.1 Manufacturer: [_____] Model [_____].

.2 Other acceptable manufacturers offering equivalent products.

.1 [_____].

.2 [_____].

.3 [_____].

.4 Substitutions: [Refer to Section 01 62 00.] [Not permitted.]

.3 Status Inputs for Fans: Differential pressure switch with adjustable range of <0 to 1250 Pa><<0 to 5 inches wg>>.

.4 Status Inputs for Pumps: Differential pressure switch piped across pump with adjustable pressure differential range of <50 to 400 kPa><<8 to 60 psi>>.

.5 Status Inputs for Electric Motors: Current sensing relay with current transformers, adjustable and set to 175 percent of rated motor current.

2.4 THERMOSTATS

.1 Electric Room Thermostats:

.1 Manufacturer: [_____] Model [_____].

.2 Other acceptable manufacturers offering equivalent products.

.1 [_____].

.2 [_____].

.3 [_____].

.4 Substitutions: [Refer to Section 01 62 00.] [Not permitted.]

.3 Type: NEMA DC 3, 24 volts[, with setback/setup temperature control].

.4 Service: [cooling only] [heating only] [cooling and heating] [[one] [two] step cooling and [one] [two] step heating].

.5 Covers: Locking with [set point adjustment] [set point indication] [concealed set point], [with thermometer] [without thermometer].

.2 Line Voltage Thermostats:

.1 Manufacturer: [_____] Model [_____].

.2 Other acceptable manufacturers offering equivalent products.

.1 [_____].

.2 [_____].

.3 [_____].

.4 Substitutions: [Refer to Section 01 62 00.] [Not permitted.]

.3 Integral manual On/Off/Auto selector switch, single or two pole as required.

.4 Dead band: Maximum <1 degree C><<2 degrees F>>.

.5 Cover: Locking with [set point adjustment] [set point indication] [concealed set point], [with thermometer] [without thermometer].

.6 Rating: [Motor] load.

.3 Room Thermostat Accessories:

.1 Thermostat Covers: [Brushed aluminum] [_____].

.2 Insulating Bases: For thermostats located on exterior walls.

.3 Thermostat Guards: [Metal] [Locking transparent plastic] [_____] mounted on separate base.

.4 Adjusting Key: As required for device.

.5 Aspirating Boxes: Where indicated for thermostats requiring flush installation.

.4 Outdoor Reset Thermostat:

.1 Manufacturer: [_____] Model [_____].

.2 Other acceptable manufacturers offering equivalent products.

.1 [_____].

.2 [_____].

.3 [_____].

.4 Substitutions: [Refer to Section 01 62 00.] [Not permitted.]

.3 Remote bulb or bimetal rod and tube type, proportioning action with adjustable throttling range, adjustable set point.

.4 Scale range: [<2 to 35 degrees C><<-10 to 70 degrees F>>] [_____].

.5 Airstream Thermostats:

.1 Manufacturer: [_____] Model [_____].

.2 Other acceptable manufacturers offering equivalent products.

.1 [_____].

.2 [_____].

.3 [_____].

.4 Substitutions: [Refer to Section 01 62 00.] [Not permitted.]

.3 Remote bulb or bimetallic rod and tube type, proportional action with adjustable set-point in middle of range and adjustable throttling range.

.4 Averaging service remote bulb element: [<2.3 m><<7.5 feet>>] [<6 m><<20 feet>>].

.6 Electric Low Limit Duct Thermostat:

.1 Manufacturer: [_____] Model [_____].

.2 Other acceptable manufacturers offering equivalent products.

.1 [_____].

.2 [_____].

.3 [_____].

.4 Substitutions: [Refer to Section 01 62 00.] [Not permitted.]

.3 Snap acting, single pole, single throw, [manual] [automatic] reset switch which trips if temperature sensed across any <300 mm><<12 inches>> of bulb length is equal to or below set point,

.4 Bulb length: Minimum <[6] [____] m><<[20] [____] feet>>.

.5 Provide one thermostat for every <1.86 sq m><<20 sq ft>> of coil surface.

.7 Electric High Limit Duct Thermostat:

.1 Manufacturer: [_____] Model [_____].

.2 Other acceptable manufacturers offering equivalent products.

.1 [_____].

.2 [_____].

.3 [_____].

.4 Substitutions: [Refer to Section 01 62 00.] [Not permitted.]

.3 Snap acting, single pole, single throw, [manual] [automatic] reset switch which trips if temperature sensed across any <300 mm><<12 inches>> of bulb length is equal to or above set point,

.4 Bulb length: Minimum [<6 m><<20 feet>>] [_____].

.5 Provide one thermostat for every <1.86 sq m><<20 sq ft>> of coil surface.

.8 Fire Thermostats:

.1 UL labeled, factory set to NFPA 90A.

.2 Normally closed contacts, manual reset.

2.5 TRANSMITTERS

.1 Building Static Pressure Transmitter:

.1 Manufacturer: [_____] Model [_____].

.2 Other acceptable manufacturers offering equivalent products.

.1 [_____].

.2 [_____].

.3 [_____].

.4 Substitutions: [Refer to Section 01 62 00.] [Not permitted.]

.3 One pipe, [direct acting, double bell] [differential type with temperature compensation, scale range <2.5 to 1500 kPa><<0.01 to 6.0 inch wg>> positive or negative, and sensitivity of <0.125 kPa><<0.0005 inch wg>>. Transmit [electronic] [pneumatic] signal to receiver with matching scale range.

.2 Temperature Transmitters:

.1 Manufacturer: [_____] Model [_____].

.2 Other acceptable manufacturers offering equivalent products.

.1 [_____].

.2 [_____].

.3 [_____].

.4 Substitutions: [Refer to Section 01 62 00.] [Not permitted.]

.3 One pipe, directly proportional output signal to measured variable, linearity within plus or minus 1/2 percent of range for <93 degrees C><<200 degree F>> span and plus or minus 1 percent for <10 degrees C><<50 degree F>> span, with [<10 degree C><<50 degrees F>>] [<38 degree C><<100 degrees F>>] [<93 degree C><<200 degrees F>>] temperature range, compensated

bulb, averaging capillary, or rod and tube operation on <138 kPa><<20 psig>> input pressure and <20 to 100 kPa><<3 to 15 psig>> output.

Part 3 Execution

3.1 EXAMINATION

.1 Section 01 78 10: Verification of existing conditions before starting work.

.2 Verify that systems are ready to receive work.

.3 Beginning of installation means installer accepts existing conditions.

.4 Sequence work to ensure installation of components is complementary to installation of similar components in other systems.

.5 Coordinate installation of system components with installation of mechanical systems equipment such as air handling units and air terminal units.

.6 Ensure installation components is complementary to installation of similar components.

.7 Coordinate installation of system components with installation of mechanical systems equipment such as air handling units and air terminal units.

3.2 INSTALLATION

.1 Install to manufacturers instructions.

.2 Check and verify location of thermostats [humidistats] and other exposed control sensors with plans and room details before installation. Locate [<1 500 mm><<60 inches>>] [<1 200 mm><<48 inches>>] [<1 050 mm><<42 inches>>] above floor. Align with lighting switches [and humidistats].

.3 Mount freeze protection thermostats using flanges and element holders.

.4 Mount outdoor reset thermostats and outdoor sensors indoors, with sensing elements outdoors [with sun shield].

.5 Provide thermostats in aspirating boxes in front entrances [handball courts] [gymnasiums] [high security areas] [and] [_____] [and where indicated].

.6 Provide guards on thermostats in entrances [and other public areas] [and where indicated].

.7 Provide mixing dampers of [opposed] [or] [parallel] blade construction arranged to mix streams. Provide pilot positioners on mixed air damper motors. [Provide separate minimum outside air damper section adjacent to return air dampers with separate damper motor.]

.8 Provide isolation (two position) dampers of parallel blade construction.

.9 Install damper motors on outside of duct in warm areas. Do not install motors in locations at outdoor temperatures.

.10 Mount control panels adjacent to associated equipment on vibration free walls or free standing angle iron supports. One cabinet may accommodate more than one system in same equipment room. Provide engraved plastic nameplates for instruments and controls inside cabinet and engraved plastic nameplates on cabinet face.

.11 Install "hand/off/auto" selector switches to override automatic interlock controls when switch is in "hand" position.

.12 Provide conduit and electrical wiring to Section 26 05 80. Electrical material and installation to appropriate requirements of Division 16.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Sequence of operation:

.1 Fan coil.
.2 Return fans
.3 Heating coils
.4 Outside air dampers
.5 Condensing units

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Administrative Requirements.

.2 Section 01 44 00 - Quality Assurance.

.3 Section 01 61 00 - Common Product Requirements.

.4 Section 01 78 10 - Execution Requirements.

.5 Section 25 30 00 - Instruments And Control Elements.

.6 Section 25 50 01 - Analog Control Equipment.

.7 Section 25 50 02 - Digital Control Equipment.

.8 Section 26 05 80 - Equipment Wiring: Electrical characteristics and wiring connections.

1.3 SYSTEM DESCRIPTION

.1 This section defines the manner and method by which controls function.

.2 Requirements for each type of control system operation are specified.

.3 Equipment, devices, and system components required for control systems are specified in other Sections.

1.4 SUBMITTALS FOR REVIEW

.1 Section 01 33 00: Procedures for submittals.

.2 Shop Drawings: Indicate mechanical system controlled and control system components.

.1 Label with settings, adjustable range of control and limits. Include written description of control sequence.
.2 Include flow diagrams for each control system, graphically depicting control logic.
.3 Include draft copies of graphic displays indicating mechanical system components, control system components, and controlled function status and value.

1.5 SUBMITTALS AT PROJECT CLOSEOUT

.1 Section 01 78 10: Submittals for project closeout.

.2 Project Record Documents: Record actual locations of components and set points of controls, including changes to sequences made after submission of shop drawings.

Part 2 Products

2.1 Not Used

.1 Not Used

Part 3 Execution

3.1 FAN COILS

.1 The fan coils provides heating during heating season, and cooling during cooling season.

.2 During heating season, a programmable room thermostat maintains a constant room temperature by staging electric heater coils.

.3 During cooling season a programmable room thermostat maintains a constant room temperature by cycling the cooling coil and condensing unit.

.4 The electric coil shall have an air flow and hi limit safety controls.

.5 The fan coils will be shut down upon fire alarm.

.6 Further controls are outlined in 3.6 SYSTEM CONTROLS.

3.2 RETURN FANS

.1 The return fans for each fan coil operate continuously during occupied mode.

.2 The return fans are shut down during unoccupied mode, or in case of cold temperature trips at the fan coil. See 3.6 SYSTEM CONTROLS.

3.3 HEATING COILS

.1 There are electric heating coils in the ductwork for each fan coil. These are controlled by the thermostat and the HVAC control system. When the system is in heating mode, the coils operate in stages to maintain room temperature at the thermostats. When the system is in cooling mode or in unoccupied mode, the electric coils are disabled.

3.4 MOTORIZED DAMPERS

.1 ADMINISTRATIVE SIDE

.1 The motorized dampers in the HVAC system for the administrative side (FC-1) consist of the following 1) an outside air damper 2) an exhaust air damper and 3) a

mixed air damper. These dampers are modulated to keep the building pressure slightly positive and to maintain a mixed air temperature as specified at the thermostat. The outside air damper shall have a minimum setting (TBD) such that it doesn't completely close during occupied mode.

.2 The outside air damper and the exhaust damper shall close when the HVAC system is in unoccupied mode.

.2 SECURE SIDE

.1 The motorized dampers in the HVAC system for the secure side (FC-2) consist of the following 1) an outside air damper 2) an exhaust air damper and 3) a mixed air damper. These dampers are modulated to keep the building pressure slightly positive and to maintain a mixed air temperature as specified at the thermostat. The outside air damper shall have a minimum setting (TBD) such that it doesn't completely close during occupied mode.

.2 The outside air damper and the exhaust damper shall close when the HVAC system is in unoccupied mode.

3.5 CONDENSERS

.1 The condensers shall operate when the HVAC systems are in cooling mode.

.2 During cooling season a programmable room thermostat maintains a constant room temperature by cycling the cooling coil and condensing unit as required.

3.6 SYSTEM CONTROLS

.1 The following control sequence applies separately to both HVAC systems 1) administrative and 2) secure.

.2 During occupied mode, the supply fan will operate continuously. The outside air damper will modulate between a minimum position (TBD) and a maximum position (determined by the mixed air controller and enthalpy sensor).

.3 The exhaust air damper will open fully during occupied mode, and will close (and the exhaust fan will shut off) during unoccupied mode, and if a low temperature alarm causes the outside air damper to close.

.4 During occupied mode, the mixed air damper will open to a minimum setting. It will open further if the enthalpy sensor indicates free cooling is available.

.5 Provide electric solid state microcomputer-based room thermostat, located as indicated.

.1 Incorporate:

.1 Occupied and unoccupied modes.

.2 Automatic switching from heating to cooling.

.3 Preferential rate control to minimize overshoot and deviation from set point.

.4 Set-up for four separate temperatures per day.

.5 Instant override of setpoint for continuous or timed period from one hour to 31 days.

.6 Short cycle protection.

.7 Programming for each of 7 days per week.

.8 Switch selection features including imperial or metric display, 12 or 24 hour clock, keyboard disable, remote sensor.

.2 Provide controls to permit cooling down to 10 degrees C ambient temperature.

.3 Display:

.1 Time of Day.

.2 Actual room temperature.

.3 Programmed temperature.

.4 Programmed time.

.5 Duration of timed override.

.6 Day of week.

.7 System mode indication: Heating, cooling, fan off, fan on.

.8 Stage (heating or cooling) operation.

END OF SECTION