Pan Am Pool

Universal Change Room

BID OPPORTUNITY 878-2021

City of Winnipeg
25 Poseidon Bay
Winnipeg Manitoba

ISSUED FOR CONSTRUCTION

SPECIFICATION

1x1 architecture inc.

Lavergne Draward & Associates Inc. (Structural)
Epp Siepman Engineering Inc. (Mechanical/Electrical)

April 26, 2022

DIVISIONS	SECTION NO. AND TITLE

DIVISIONS	SECTION NO. AND TITLE

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 City of Winnipeg Bid Opportunity Document

.2 Section 01 14 00 – Work Restrictions

1.2 WORK COVERED BY CONTRACT DOCUMENTS

.1 Work of this Contract comprises of the interior renovation of the Universal Change Room area of the main level of the Pan Am Pool, as described in the contract documents.

.2 Work will be required in the boiler room in the basement below the Universal Change Room area. This area contains mechanical and electrical equipment on the floor and hung from the ceiling that will need to be worked around.

1.3 WORK SEQUENCE

.1 Construct Work to provide for continuous public usage. Provide proper hoarding and signage for alternate routes to maintain public usage of other areas of the facility during construction.

.2 Maintain fire access/control.

1.4 CONTRACTOR USE OF PREMISES

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

.1 The facility will be open to the Public during Construction.

.2 Work by other contractors, if applicable.

.2 Co-ordinate use of premises under direction of Contract Administrator.

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

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

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

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

1.5 EXISTING SERVICES

.1 Notify Contract Administrator and utility companies of intended interruption of services and obtain required permission.

.2 Where Work involves breaking into or connecting to existing services, carry out work at times as directed by governing authorities with minimum disturbance to pedestrian and vehicular traffic.

.3 Provide alternative routes for pedestrian and vehicular traffic.

.4 Provide adequate bridging over trenches that cross sidewalks or roads to permit normal traffic.

.5 Where unknown services are encountered, immediately advise Contract Administrator and confirm findings in writing.

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

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

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

1.6 DOCUMENTS REQUIRED

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

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

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 11 00 – Summary of Work.

1.2 ACCESS AND EGRESS

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

1.3 USE OF SITE AND FACILITIES

.1 Execute work with least possible interference or disturbance to normal use of premises. Make arrangements with Contract Administrator 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 Contract Administrator will assign sanitary facilities for use by Contractor's personnel. Keep facilities clean.

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

.6 Other Contractors may be on site performing work on other contracts. Schedule and cooperate use of facility (loading docks, etc.).

1.4 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 Contract Administrator to facilitate execution of work.

1.5 EXISTING SERVICES

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

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

.3 Provide for pedestrian and vehicular traffic.

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

1.6 SPECIAL REQUIREMENTS

.1 Paint public occupied areas Monday to Friday from 18:00 to 07:00 hours.

.2 Carry out noise generating Work Monday to Friday from 18:00 to 07:00 hours.

.3 Submit construction schedule for distribution to Contract Administrator.

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

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

1.7 BUILDING SMOKING ENVIRONMENT

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

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 11 00 - Summary of Work

.2 Section 01 33 00 – Submittal Procedures

.3 Section 01 77 00 – Closeout Procedures

.4 Section 01 78 00 – Closeout Submittals

1.2 ADMINISTRATIVE

.1 Schedule and administer project meetings throughout the progress of the work at regular two (2) week intervals. Coordinate with Contract Administrator.

.2 Prepare agenda for meetings.

.3 Distribute written notice of each meeting four days in advance of meeting date to Contract Administrator.

.4 Provide physical space and make arrangements for meetings.

.5 Preside at meetings.

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

.7 Reproduce and distribute copies of minutes within three days after meetings and transmit to meeting participants.

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

.2 Contract Administrator, Contractor, major Subcontractors will be in attendance.

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

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

.5 Agenda to include:

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

.2 Presentation of Construction Schedule.

.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 City supplied products or equipment.

.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.

1.4 PROGRESS MEETINGS

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

.2 Contractor, major Subcontractors involved in Work and Contract Administrator are to be in attendance.

.3 Notify parties minimum 5 days prior to meetings.

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

.5 Agenda to include the following:

.1 Review, approval of minutes of previous meeting.

.2 Review of Work progress since previous meeting.

.3 Field observations, problems, conflicts.

.4 Problems which impede construction schedule.

.5 Review of off-site fabrication delivery schedules.

.6 Corrective measures and procedures to regain projected schedule.

.7 Revision to construction schedule.

.8 Progress schedule, during succeeding work period.

.9 Review submittal schedules: expedite as required.

.10 Maintenance of quality standards.

.11 Review proposed changes for 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 SECTION INCLUDES

.1 Shop drawings and product data.

.2 Samples.

.3 Certificates and transcripts.

1.2 RELATED SECTIONS

.1 Section 01 78 00 - Closeout Submittals.

.2 Other sections requesting submittals.

.3 This section describes requirements applicable to all Sections within Divisions 03 to 32.

1.3 ADMINISTRATIVE

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

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

.3 Shop Drawings that require approval of any legally constituted authority having jurisdiction shall be provided to such authority by the Contractor for approval.

.4 Present Shop Drawings, product data, samples and mock-ups in units used on drawings.

.5 Where items or information is not manufactured or produced in units used on drawings, converted values within the metric measurement tolerances are acceptable.

1.4 CO-ORDINATION OF SUBMISSIONS

.1 Review submittals prior to submission to Contract Administrator. 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.

.2 Submittals not stamped, signed, dated, identified as to specific project, and attesting to their being reviewed will be returned without being examined and shall be considered rejected.

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

.4 Contractor's responsibility for errors and omissions in submission is not relieved by Contract Administrator 's review of submittals.

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

.6 Keep one (1) reviewed copy of each submission on Site.

.7 Verify:

.1 Field measurements and dimension shop drawing accordingly.

.2 Affected adjacent Work are coordinated and note on submission.

.3 Catalogue numbers and similar data.

.8 Coordinate submission of interrelated Shop Drawings with the requirements of the Work and the Contract Documents. Individual shop drawings will not be reviewed until all related shop drawings are available to the Contract Administrator.

1.5 SUBMITTALS, SHOP DRAWINGS AND PRODUCT DATA

.1 Where the Contract Administrator is required to review Shop Drawings, method samples, mock-ups, premature requests for Substantial Performance or Completion reviews, and completed “corrections” more than once and/ or enter into extended discussions or preparation of additional details or calculations to facilitate the Contractor’s work or that of the Contractor’s sub-trades, the additional consulting time shall be paid for by the Contractor. Similarly, if deficient workmanship or construction requires additional or unscheduled Site visits by the Contract Administrator, or other inspectors or reviewers, the additional time and disbursements based on the Contract Administrator’s hourly rates, etc. shall be paid by the Contractor.

.2 The Contractor shall review all Shop Drawings before providing them to the Contract Administrator. The Contractor represents by this review that:

.1 The Contractor has determined and verified all applicable field measurements, field construction conditions, Product requirements, catalogue numbers and similar data, or will do so, and

.2 The Contractor has checked and co-ordinated each Shop Drawing with the requirements of the Work and of the Contract Documents.

.3 Allow ten (10) working days for Contract Administrator's review of each submission.

.4 Adjustments made by Contract Administrator on Shop Drawings and Submittals do not relieve the Contractor from compliance with the requirements of the Contract Documents and are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Contract Administrator prior to proceeding with Work.

.5 Make changes in Shop Drawings as Contract Administrator may require, consistent with Contract Documents. When resubmitting, notify Contract Administrator in writing of any revisions other than those requested.

.6 Accompany submissions with duplicate transmittal letter, containing:

.1 Date.

.2 Project title and number.

.3 Contractor's name and address.

.4 Identification, description, and quantity of each shop drawing, product data and sample.

.5 Other pertinent data.

.7 Submissions shall 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 Identify details by reference to sheet and detail numbers shown on the Contract Drawings.

.6 Details of appropriate portions of Work as applicable:

.1 Specification Section number.

.2 Fabrication.

.3 Layout, showing dimensions, including identified field dimensions, and clearances.

.4 Setting or erection details.

.5 Capacities.

.6 Performance characteristics.

.7 Standards.

.8 Operating weight.

.9 Wiring diagrams.

.10 Single line and schematic diagrams.

.11 Relationship to other parts of the Work.

.8 After Contract Administrator's review, distribute copies.

.9 Submit electronic copy of Shop Drawings for each requirement requested in specification Sections and as Contract Administrator may reasonably request.

.10 Submit electronic copy of product data sheets or brochures for requirements requested in specification sections and as requested by Contract Administrator where Shop Drawings will not be prepared due to standardized manufacture of product.

.11 Delete information not applicable to project.

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

.13 If upon review by Contract Administrator, no errors or omissions are discovered or if only minor corrections are made, an electronic copy will be returned and fabrication and installation of Work may proceed. If Shop Drawings are rejected, noted copy will be returned and re-submission of corrected Shop Drawings, through same procedure

indicated above, must be performed before fabrication and installation of Work may proceed.

1.6 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 Contract Administrator's business address.

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

.4 Submit samples in an orderly sequence, so as to cause no delay in the work. Failure to submit samples in ample time is not to be considered sufficient reason for an extension of contract time and no claim for extension by reason of such default will be allowed.

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

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

.7 Make changes in samples which Contract Administrator may require, consistent with Contract Documents.

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

1.7 MOCK-UP

.1 Erect mock-ups to Section 01 45 00 and as outlined in specific Sections.

1.8 PHOTO DOCUMENTATION

.1 The Contractor shall photograph and submit monthly colour pictures in digital format demonstrating the progress of the Work and at all concealed areas prior to being covered.

.2 Submit two sets: one to the Contract Administrator and one to the Design Authority.

.3 Submit 100 mm x 150 mm copies of each, labelled and in protective covers in three-ring binders to the Contract Administrator with the Contract Operation and Maintenance Manuals upon completion of the project.

1.9 CERTIFICATES AND TRANSCRIPTS

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

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

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Inspection and testing, administrative and enforcement requirements.

.2 Tests and mix designs.

.3 Mock-ups.

.4 Written and electronic reports.

.5 Equipment and system adjust and balance.

.6 This section describes requirements applicable to all Sections within Divisions 03 to 32.

1.2 REFERENCES

.1 ISO/IEC 17025:2005 - General Requirements for the Competence of Testing and Calibration Laboratories.

.2 SCC (Standards Council of Canada).

1.3 INSPECTION BY AUTHORITY

.1 Allow Authorities Having Jurisdiction access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.

.2 Give timely notice requesting inspection whenever portions of the Work are designated for special tests, inspections or approvals, either when described in the Contract Documents or when required by law in the Place of the Work.

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

1.4 REVIEW BY CONTRACT ADMINISTRATOR

.1 Allow Contract Administrator access to Work.

.2 Contract administrator may order any part of the Work to be reviewed or inspected if Work is suspected to be not in accordance with Contract Documents.

.3 If, upon review such work is found not in accordance with Contract Documents, correct such Work and pay cost of additional review and correction.

1.5 INDEPENDENT INSPECTION AGENCIES

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

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

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

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

1.6 ACCESS TO WORK

.1 Allow inspection and testing agencies access to Work, off Site manufacturing and fabrication plants.

.2 Cooperate to provide reasonable access and facilities for such access.

1.7 PROCEDURES

.1 Notify appropriate agency and Contract administrator in advance of requirement for tests, in order that attendance arrangements can be made.

.2 Submit samples and materials required for testing, as specifically requested in specifications to the designated testing laboratory directly unless requested otherwise. Submit with reasonable promptness and in an orderly sequence so as not to cause delay in Work.

.3 Provide labour and facilities to:

- .1 Provide access to the work to be inspected and tested.
- .2 Facilitate inspections and tests.
- .3 Make good any work which was disturbed by the inspection and test.
- .4 Provide storage on Site for a testing laboratory's exclusive use to store equipment and cure test samples.

.4 Notify the Testing Agency sufficiently in advance of operations to allow for the assignment of laboratory personnel and for the scheduling of tests.

1.8 REJECTED WORK

.1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Contract administrator as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.

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

.3 If in opinion of Contract administrator it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, City of Winnipeg may deduct from Contract Price the difference in value between Work performed and that called for by Contract Documents, amount of which shall be determined by Contract administrator.

1.9 REPORTS

.1 Submit one (1) electronic copy of signed inspection and test reports to Contract administrator, Subcontractor of work being inspected or tested, and City of Winnipeg.

1.10 MOCK-UP

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

.2 Construct in all locations acceptable to Contract administrator or as specified in specific Section.

.3 Prepare mock-ups for City of Winnipeg's and Contract administrator's review with reasonable promptness and in an orderly sequence, so as not to cause any delay in Work.

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

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

.6 Mock-ups are required by but not limited to the following Sections:

.1 Section 06 20 00 – Finish Carpentry

.2 Refer to A2.2 for flood testing requirements of floor

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

.8 Refer to Mechanical and Electrical Divisions for definitive requirements.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 52 00 - Construction Facilities.

1.2 INSTALLATION AND REMOVAL

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

.2 Remove from site all such work after use.

.3 This section describes requirements applicable to all Sections within Divisions 03 to 32.

1.3 WATER SUPPLY

.1 Provide continuous supply of potable water for construction use.

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

.3 Contractor will pay for utility charges at prevailing rates.

1.4 TEMPORARY HEATING AND VENTILATION

.1 Pay for costs of temporary heat and ventilation used during construction, including costs of installation, fuel, operation, maintenance and removal of equipment. Use of direct-fired heaters discharging waste products into work areas will not be permitted.

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

.1 Facilitate progress of Work.
.2 Protect Work and products against dampness and cold.
.3 Prevent moisture condensation on surfaces.
.4 Provide ambient temperatures and humidity levels for storage, installation and curing of materials.
.5 Provide adequate ventilation to meet health regulations for safe working environment.

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

.4 Ventilating:

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

.4 Ventilate storage spaces containing hazardous or volatile materials.

.5 Ventilate temporary sanitary facilities.

.6 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.

.5 Permanent heating system of building, may be used when available on approval by the City of Winnipeg. Be responsible for damage to heating system if use is permitted.

.6 On completion of Work for which permanent heating system is used, replace filters, and clean inside and outside of all ductwork and equipment.

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

.8 Maintain strict supervision of operation of temporary heating and ventilating equipment to:

.1 Conform with applicable codes and standards.

.2 Enforce safe practices.

.3 Prevent abuse of services.

.4 Prevent damage to finishes.

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

1.5 TEMPORARY POWER AND LIGHT

.1 Contractor will provide a source for, and pay the costs of temporary power during construction for temporary lighting and operating of power tools.

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

1.6 TEMPORARY COMMUNICATION FACILITIES

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

1.7 FIRE PROTECTION

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

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

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 51 00 - Temporary Utilities.

.2 This section describes requirements applicable to all Sections within Divisions 03 to 32.

1.2 INSTALLATION AND REMOVAL

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

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

.3 Indicate use of supplemental or other staging area.

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

.5 Remove from Site all such work after use.

1.3 SCAFFOLDING

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

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

1.4 HOISTING

.1 Provide, operate and maintain hoists cranes required for moving of workers, materials and equipment.

.2 Hoists and cranes shall be operated by qualified operator.

1.5 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.

1.6 CONSTRUCTION PARKING

.1 Parking will be permitted on Site provided it does not disrupt performance of Work.

.2 Provide and maintain adequate access to project Site.

.3 Construction parking areas to be designated by City of Winnipeg.

1.7 OFFICES

.1 General Contractor and Subcontractors may at their discretion provide a Site trailer for use as their own offices. Location to be approved by Contract Administrator and City of Winnipeg.

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

1.8 EQUIPMENT, TOOL AND MATERIALS STORAGE

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

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

.3 Handle and store products in a manner to prevent damage, deterioration and soiling and in accordance with manufacturer's recommendations when applicable.

.4 Store sensitive products in weather tight, climate controlled, enclosures in an environment favourable to Product.

.5 Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

.6 Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

.7 Remove and replace damaged products at own expense and to the satisfaction of the Contract Administrator

1.9 SANITARY FACILITIES

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

1.10 CONSTRUCTION SIGNAGE

.1 No signs or advertising shall be allowed or displayed without the approval of the Contract Administrator and City of Winnipeg.

.2 This project will not be used to advertise or promote systems, construction or assembly methods, tools or equipment used and/or incorporated therein without written approval of the Contract Administrator and City of Winnipeg.

1.11 PROTECTION AND MAINTENANCE OF TRAFFIC

.1 Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of

equipment and work, and erection and maintenance of adequate warning, danger, and direction signs

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

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

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

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

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

.7 Provide snow removal during period of Work.

1.12 CLEAN-UP

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

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

END OF SECTION

Part 1 General

1.1 INSTALLATION AND REMOVAL

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

.2 Remove from Site all such work after use.

1.2 GUARD RAILS AND BARRICADES

.1 Provide secure, rigid guard rails and barricades around deep excavations, open shafts, open stair wells, open edges of floors and roofs.

1.3 WEATHER ENCLOSURES

.1 Provide weather tight closures around any exterior wall and roof penetrations as required.

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

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

1.4 DUST TIGHT SCREENS

.1 Provide dust tight screens 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.

1.5 ACCESS TO SITE

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

1.6 PUBLIC TRAFFIC FLOW

.1 Provide and maintain competent, traffic signals and barricades as required to perform Work and protect public.

1.7 FIRE ROUTES

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

1.8 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

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

.2 Be responsible for damage incurred.

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

END OF SECTION

Part 1 General

1.1 QUALITY

.1 Products, materials, equipment, parts or assemblies, 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 Defective products, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.

.3 Should disputes arise as to quality or fitness of products, decision rests strictly with Contract Administrator.

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

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

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

1.3 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 Contract Administrator.

.9 Arrange storage of Products to permit access for inspection. Periodically inspect to verify Products are undamaged and are maintained in acceptable condition.

.10 Provide equipment and personnel to store Products by methods to prevent soiling, disfigurement, or damage.

1.4 TRANSPORTATION

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

1.5 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 Contract Administrator in writing, of conflicts between specifications and manufacturer's instructions, so that Contract Administrator will establish course of action.

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

1.6 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 Contract Administrator if required Work is such as to make it impractical to produce required results.

.2 Do not employ anyone unskilled in their required duties. Contract Administrator reserves right to require dismissal from Site, workers deemed incompetent or careless.

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

1.7 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.

1.8 CONCEALMENT

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

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

1.9 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.

1.10 LOCATION OF FIXTURES

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

.2 Inform Contract Administrator of conflicting installation. Install as directed.

1.11 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.

1.12 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.

1.13 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 Contract Administrator.

1.14 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 and pedestrian and vehicular traffic.

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

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures

.2 Section 01 61 00 – Common Product Requirements.

.3 Individual Product Specification Sections:

.1 Cutting and patching incidental to work of the section.

.2 Advance notification to other sections of openings required in Work of those sections.

1.2 SUBMITTALS

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

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

.1 Structural integrity of elements of project.

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

.3 Efficiency, maintenance, or safety of operational elements.

.4 Visual qualities of sight-exposed elements.

.5 Work of City of Winnipeg 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 City of Winnipeg or separate contractor.

.7 Written permission of affected separate contractor.

.8 Date and time work will be executed.

1.3 MATERIALS

.1 Required for original installation.

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

1.4 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.

1.5 EXECUTION

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

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

.3 Uncover Work to install ill-timed Work.

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

.5 Remove samples of installed Work for testing when requested.

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

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

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

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

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

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

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

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

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

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Progressive cleaning.

.2 Cleaning prior to acceptance.

1.2 PROJECT CLEANLINESS

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

.2 Remove waste materials from Site at regularly scheduled times or dispose of as directed by Contract administrator. Do not burn waste materials on Site, unless approved by Contract administrator.

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

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

.5 Provide on-Site containers for collection of waste materials and debris.

.6 Dispose of waste materials and debris off Site.

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

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

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

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

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

1.3 FINAL CLEANING

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

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

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

.4 Remove waste products and debris.

.5 Remove waste materials from Site at regularly scheduled times or dispose of as directed by Contract administrator. Do not burn waste materials on Site.

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

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

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

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

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

.11 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 Sweep and wash clean paved areas.

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

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

.18 Remove snow and ice from access to building.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Inspections and declarations.

.2 Closeout submittals

.3 Operation and maintenance manual format.

.4 Contents each volume.

.5 Recording actual Site conditions.

.6 Record documents and samples.

.7 Record documents.

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 45 00 - Quality Control.

.3 Section 01 74 11 - Cleaning

.4 Section 01 79 00 - Demonstration and Training.

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Acceptance of Work Procedures:

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

.1 Notify Contract Administrator in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.

.2 Request Contract Administrator's inspection.

.2 Contract Administrator's Inspection:

.1 Contract Administrator and Contractor to inspect Work and identify defects and deficiencies.

.2 Contractor to correct Work as directed.

.3 Completion Tasks: submit written certificates in English that tasks have been performed as follows:

.1 Work: completed and inspected for compliance with Contract Documents.

.2 Defects: corrected and deficiencies completed.

.3 Equipment and systems: tested, adjusted and balanced and fully operational.

.4 Certificates required by Authorities Having Jurisdiction have been submitted.

.5 Operation of systems: demonstrated to City of Winnipeg's personnel.

.6 Work: complete and ready for final inspection.

.4 Final Inspection:

.1 When completion tasks are done, request final inspection of Work by Contract Administrator, and Contractor.

.2 When Work incomplete according to City of Winnipeg Contract Administrator, complete outstanding items and request re-inspection.

.5 Declaration of Substantial Performance: when Contract Administrator considers deficiencies and defects corrected and requirements of Contract substantially performed, make application for Certificate of Substantial Performance.

.6 Commencement of Lien and Warranty Periods: date of City of Winnipeg's acceptance of submitted declaration of Substantial Performance to be date for commencement for warranty period and commencement of lien period unless required otherwise by lien statute of Place of Work.

.7 Final Payment:

.1 When Contract Administrator considers final deficiencies and defects corrected and requirements of Contract met, make application for final payment.

.2 When Work deemed incomplete by Contract Administrator, complete outstanding items and request re-inspection.

.8 Payment of Holdback: after issuance of Certificate of Substantial Performance of Work, submit application for payment of holdback amount in accordance with contractual agreement.

1.4 FINAL CLEANING

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

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

Part 2 Products

2.1 NOT USED

Part 3 Execution

3.1 NOT USED

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE REQUIREMENTS

.1 Pre-warranty Meeting:

.1 Convene meeting one week prior to contract completion with contractor's representative and Contract Administrator to:

.1 Verify Project requirements.

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

.2 Contract Administrator to establish communication procedures for:

.1 Notifying construction warranty defects.

.2 Determine priorities for type of defects.

.3 Determine reasonable response time.

.3 Contact information for bonded and licensed company for warranty work action: provide name, telephone number and address of company authorized for construction warranty work action.

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

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

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

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

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

1.3 FORMAT

.1 Organize data as instructional manual.

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

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

.1 Identify contents of each binder on spine.

.4 Cover: identify each binder with type or printed title 'Operation and Maintenance Manuals'; list title of project and identify subject matter of contents.

.5 Arrange content by systems and subdivided by MASTERFORMAT division and Section numbers and sequence of Table of Contents.

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

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

.8 Drawings: provide with reinforced punched binder tab.

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

.9 Provide 1:1 scaled CAD files in dxf and dwg format on DVD.

1.4 CONTENTS - PROJECT RECORD DOCUMENTS

.1 Table of Contents for Each Volume: provide title of project;

.1 Date of submission; names.

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

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

.2 For each product or system:

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

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

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

.5 Typewritten Text: as required to supplement product data.

.1 Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00 - Quality Control.

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

1.5 AS -BUILT DOCUMENTS AND SAMPLES

.1 Maintain, in addition to requirements in General Conditions, at Site for Contract Administrator one record copy of:

.1 Contract Drawings.

.2 Specifications.

.3 Addenda.

.4 Change Orders and other modifications to Contract.

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

.6 Field test records.

.7 Inspection certificates.

.8 Manufacturer's certificates.

.2 Store record documents and samples in field office apart from documents used for construction.

.1 Provide files, racks, and secure storage.

.3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual.

.1 Label each document "RECORD DOCUMENTS" in neat, large, printed letters.

.4 Maintain record documents in clean, dry and legible condition.

.1 Do not use record documents for construction purposes.

.5 Keep record documents and samples available for inspection by Contract Administrator.

1.6 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS

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

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

.3 Record information concurrently with construction progress.

.1 Do not conceal Work until required information is recorded.

.4 Contract Drawings and shop drawings: mark each item to record actual construction, including:

.1 Measured depths of elements of foundation in relation to finish first floor datum.

.2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.

.3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.

.4 Field changes of dimension and detail.

.5 Changes made by change orders.

.6 Details not on original Contract Drawings.

.7 References to related shop drawings and modifications.

.5 Specifications: mark each item to record actual construction, including:

.1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.

.2 Changes made by Addenda and change orders.

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

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

1.7 EQUIPMENT AND SYSTEMS

.1 For each item of equipment and each system include description of unit or system, and component parts.

.1 Give function, normal operation characteristics and limiting conditions.

.2 Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.

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

.3 Include installed colour coded wiring diagrams.

.4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences.

.1 Include regulation, control, stopping, shut-down, and emergency instructions.

.2 Include summer, winter, and any special operating instructions.

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

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

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

.8 Include sequence of operation by controls manufacturer.

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

.10 Provide installed control diagrams by controls manufacturer.

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

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

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

.14 Building products, applied materials, and finishes: include product data, with catalogue number, size, composition, and colour and texture designations.

.1 Provide information for re-ordering custom manufactured products.

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

.16 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.

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

1.8 MAINTENANCE MATERIALS

.1 Extra Stock Materials:

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

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

.3 Deliver to Site; place and store.

.4 Receive and catalogue items.

.1 Submit inventory listing to Contract Administrator.

.2 Include approved listings in Maintenance Manual.

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

.2 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 location as directed; place and store.

.4 Receive and catalogue items.

.1 Submit inventory listing to Contract Administrator.

.2 Include approved listings in Maintenance Manual.

1.9 DELIVERY, STORAGE AND HANDLING

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

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

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

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

.5 Remove and replace damaged products at own expense and for review by Contract Administrator.

1.10 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 Contract Administrator approval.

.3 Warranty management plan to include required actions and documents to assure that Contract Administrator 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 Contract Administrator for approval prior to each monthly pay estimate.

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

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

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

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

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

.5 Co-execute submittals when required.

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

.7 Except for items put into use with City of Winnipeg's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.

.8 Conduct joint warranty inspection, measured from time of acceptance, by Contract Administrator.

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

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

.2 Listing and status of delivery of Certificates of Warranty for extended warranty items, to include roofs, HVAC balancing, pumps, motors, transformers, and commissioned systems such as fire protection, alarm systems, sprinkler systems, lightning protection systems.

.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 warranty inspection (prior to 12 month warranty expiration), post-construction.

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

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

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

.11 Written verification to follow oral instructions.

.1 Failure to respond will be cause for the Contract Administrator to proceed with action against Contractor.

1.11 WARRANTY TAGS

.1 Tag, at time of installation, each warranted item. Provide durable, oil and water resistant tag approved by Contract Administrator.

.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 01 78 00 - Closeout Submittals.

.2 Section 01 45 00 - 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 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 Contractor to Receive and catalogue all items.

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 Contractor to receive and catalogue all items.

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 Contractor to receive and catalogue all items.

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 Contract Administrator.

END OF SECTION

□

Part 1 General

1.1 SECTION INCLUDES

.1 Procedures for demonstration and instruction of Products, equipment and systems to City of Winnipeg's personnel.

.2 Seminars and demonstrations.

1.2 RELATED SECTIONS

.1 Section 01 78 00 – Closeout Submittals.

.2 Section 01 78 40 - Maintenance Requirements.

.3 This section describes requirements applicable to all Sections within Divisions 03 to 32.

1.3 DESCRIPTION

.1 Demonstrate operation and maintenance of equipment, building envelope, and systems to City of Winnipeg's personnel two (2) weeks prior to date of substantial performance.

.2 City of Winnipeg will provide list of personnel to receive instructions or training, and will coordinate their attendance at agreed-upon times.

1.4 COMPONENT DEMONSTRATION

.1 Manufacturer to provide authorized representative to demonstrate operation of equipment and systems.

.2 Instruct City of Winnipeg's personnel, and provide written report that demonstration and instructions have been completed.

1.5 SUBMITTALS

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

.2 Submit reports within one (1) week after completion of demonstration, that demonstration and instructions have been satisfactorily completed.

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

1.6 CONDITIONS FOR DEMONSTRATIONS

.1 Equipment has been inspected and put into operation in accordance with all applicable Sections of this Specification.

.2 Mechanical and Electrical testing, adjusting, and balancing have been performed in accordance with Mechanical and Electrical Divisions, and equipment and systems are fully operational.

.3 Testing, adjusting, and balancing have been performed in accordance with specifications and equipment and systems are fully operational.

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

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 PREPARATION

.1 Verify that suitable conditions for demonstration and instructions are available.

.2 Verify that designated personnel are present.

.3 Prepare agendas and outlines.

.4 Establish seminar organization.

.5 Explain component design and operational philosophy and strategy.

.6 Develop equipment presentations.

.7 Present system demonstrations.

.8 Accept and respond to seminar and demonstration questions with appropriate answers.

3.2 PREPARATION OF AGENDAS AND OUTLINES

.1 Prepare agendas and outlines including the following:

.1 Equipment and systems to be included in seminar presentations.
.2 Name of companies and representatives presenting at seminars.
.3 Outline of each seminar's content.
.4 Time and date allocated to each system and item of equipment.
.5 Provide separate agenda for each system

3.3 SEMINAR ORGANIZATION

.1 Coordinate content and presentations for seminars.

.2 Coordinate individual presentations and ensure representatives scheduled to present at seminars are in attendance.

.3 Arrange for presentation leaders familiar with the design, operation, maintenance and troubleshooting of the equipment and systems. Where a single person is not familiar with all aspects of the equipment or system, arrange for specialists familiar with each aspect.

.4 Coordinate proposed dates for seminars with City of Winnipeg and select mutually agreeable dates.

3.4 EXPLANATION OF DESIGN STRATEGY

.1 Explain each system. Include following information:

.1 An overview of how system is intended to operate.

.2 Description of design parameters, constraints and operational requirements.

.3 Description of system operation strategies.

.4 Information to help in identifying and troubleshooting system problems.

3.5 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 all phases of operation and maintenance using operation and maintenance manuals as the basis of instruction. Video record all sessions and place video on DVD in suitable format for City of Winnipeg's use.

.3 Instruct personnel on control and maintenance of sensory equipment and operational equipment associated with maintaining energy efficiency and longevity of service.

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

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

.6 In addition to start-up supervision, instruct the City of Winnipeg's personnel in the operation and maintenance of all equipment and systems prior to Substantial Completion inspection.

.7 Following site instruction, review all information with the City of Winnipeg's representative to ensure a thorough understanding of the equipment and its operations.

.8 Confirm in writing to the Contract Administrator, the date and personnel in attendance. Document on Contract Administration Summary.

3.6 TIME ALLOCATED FOR INSTRUCTION

.1 Ensure time required for instruction of each item of equipment or system is adequate for all systems, some of which are noted below:

.1 Plumbing System.

.2 Heating System.

.3 Cooling System.

.4 Ventilation System.

.5 Control System.

.6 Electrical System.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 CSA International

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

1.2 SITE CONDITIONS

.1 If material resembling spray or trowel-applied asbestos or other designated substance be encountered, stop work, take preventative measures, and notify Contract Administrator immediately.

.1 Proceed only after receipt of written instructions have been received from Contract Administrator.

.2 Notify Contract Administrator before disrupting building access or services.

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 EXAMINATION

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

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

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

.4 Disconnect, cap, plug or divert, as required, existing public utilities within the property where they interfere with the execution of the work, in conformity with the requirements of the authorities having jurisdiction. Mark the location of these and previously capped or plugged services on the site and indicate location (horizontal and vertical) on the record drawings. Support, shore up and maintain pipes and conduits encountered.

.1 Immediately notify Building Manager & Contract Administrator and utility company concerned in case of damage to any utility or service, designated to remain in place.

.2 Immediately notify the Building Manager & Contract Administrator should uncharted utility or service be encountered, and await instruction in writing regarding remedial action.

3.2 PREPARATION

.1 Protection of In-Place Conditions:

- .1 Prevent movement, settlement, or damage to adjacent structures, utilities and parts of building to remain in place. Provide bracing and shoring required.
- .2 Keep noise, dust, and inconvenience to occupants to minimum.
- .3 Protect building systems, services and equipment.
- .4 Provide temporary dust screens, covers, railings, supports and other protection as required.

.2 Demolition/Removal:

- .1 Remove items as indicated. Take care to ensure no damage occurs to existing finishes during removal process.
- .2 Remove parts of existing building to permit new construction.
- .3 Trim edges of partially demolished building elements to tolerances as defined by Contract Administrator to suit future use.
- .4 Return items indicated on drawings as Return to City to City. General Contractor to move items to location in building as indicated by Contract Administrator.

3.3 CLEANING

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

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

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

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

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 ASTM International

.1 ASTM A 53/A 53M-12, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.

.2 ASTM A269M-15a, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.

.3 ASTM A307-14, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.2 CSA Group

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

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

.3 CSA S16-14, Design of Steel Structures.

.4 CSA W48-14, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).

.5 CSA W59-13, Welded Steel Construction (Metal Arc Welding).

.3 The Master Painters Institute (MPI)

.1 Architectural Painting Specification Manual.

.4 ULC Standards

.1 UL 2768-2011, Architectural Surface Coatings.

.2 UL 2760-2011, Surface Coatings - Recycled Water-borne.

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

.3 Shop Drawings:

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

.2 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

1.3 QUALITY ASSURANCE

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

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

1.4 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, off ground, indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Replace defective or damaged materials with new.

Part 2 Products

2.1 MATERIALS - STEEL

.1 Steel sections and plates: to G40.21, Grade 350W.

.2 Angles, Channels and Plates: to G40.21, Grade 300W.

.3 Steel Tubing: to G40.21-350W CLASS C or ASTM A500, Grade C.

.4 Welding materials: to CSA W59.

.5 Bolts and anchor bolts: to ASTM A307. Galvanized to ASTM A153 for galvanized components.

.6 Grout: non-shrink, non-metallic, flowable, 15 MPa at 24 hours.

2.2 FABRICATION

.1 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.

.2 Use self-tapping shake-proof flat headed screws on items requiring assembly by screws or as indicated.

.3 Where possible, fit and shop assemble work, ready for erection.

.4 Exposed welds continuous for length of each joint. File or grind exposed welds smooth and flush.

.5 Exposed mechanical fastenings: Flush countersunk screws or bolts; unobtrusively located; consisten with design of component, except where specifically noted otherwise.

.6 Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.3 FINISHES

.1 Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

.2 Galvanizing: hot dipped galvanizing with zinc coating 600 g/$m^2$to CAN/CSA-G164.

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

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

2.4 ISOLATION COATING

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

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

.2 Concrete, mortar and masonry.

.3 Wood.

Part 3 Execution

3.1 EXAMINATION

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

.1 Visually inspect substrate in presence of Contract Administrater

.2 Inform Contract Administrater of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions remedied.

3.2 ERECTION - GENERAL

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

.2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.

.3 Provide suitable means of anchorage acceptable to Contract Administrator such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.

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

.5 Supply components for work by other trades in accordance with shop drawings and schedule.

.6 Make field connections with bolts to CSA S16, or weld field connection.

.7 Deliver items over for casting into concrete and building into masonry together with setting templates to appropriate location and construction personnel.

.8 Touch-up rivets, field welds, bolts and burnt or scratched surfaces with primer after completion.

.9 Touch-up galvanized surfaces with zinc rich primer where burned by field welding.

3.3 CLEANING

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

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

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

3.4 PROTECTION

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

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

3.5 SCHEDULES

.1 The following schedule is a list of principal items only. Refer to drawing details for items not specifically scheduled.

.2 MATERIAL – WASHROOM VANITY STEEL CHANNEL SUPPORT FRAME

.1 Provide vanity support structure as detailed on drawings.

.2 Paint white. Refer to Section 09 91 99.

.3 STAINLESS STEEL MIRROR

.1 12 gauge 304 grade Stainless steel with # 8 mirror finish

.2 Refer to drawings for sizes and locations

.4 BENCH BRACKETS IN ROOM 131

.1 Provide stainless steel bench support brackets to support wood benches as detailed on drawings

.2 Paint white. Refer to Section 09 91 99.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Blocking in wall and roof openings.

.2 Wood furring and grounds.

.3 Telephone and electrical panel back boards.

.4 Concealed wood blocking for support of toilet and bath accessories, wall cabinets, wood trim and all other wall mounted equipment or furnishings shown on Drawings or Schedules.

.5 Preservative treatment of wood.

1.2 RELATED SECTIONS

.1 Section 06 20 00 – Finish Carpentry.

.2 Section 08 11 00 - Metal Doors and Frames.

.3 Section 09 22 16 – Non-Structural Metal Stud Framing.

.4 Section 10 28 14 – Toilet and Bath Accessories.

.5 Structural, Mechanical and Electrical Specifications.

1.3 REFERENCES

.1 CSA-O80 Series-08 - Wood Preservation.

.2 CSA-O121-08 - Douglas Fir Plywood

.3 CAN/CSA-O141-05 (R2009) - Softwood Lumber.

.4 CSA-O151-09 - Canadian Softwood Plywood.

.5 CSA-O153-M1980 (R2008) - Poplar Plywood.

.6 CSA-O437-93 (R2006) - OSB and Waferboard.

.7 NPA A208.1-2009 - Particleboard.

.8 APA (American Plywood Association) - Grades and Specifications.

.9 CANPLY (Canadian Plywood Association) - Canadian Plywood Handbook.

.10 National Lumber Grades Authority (NLGA) - Standard Grading Rules for Canadian Lumber, 2007 Edition.

1.4 QUALITY ASSURANCE

.1 Lumber Products: Graded and stamped to NLGA requirements.

.2 Plywood Products: Certified and graded to CANPLY requirements.

Part 2 Products

2.1 MATERIALS

.1 Lumber: NLGA (Standard Grading Rules for Canadian Lumber).

.1 CAN/CSA-O141, softwood, SPF species, Select grade.

.2 19% maximum moisture content, pressure preservative treat.

.2 Plywood: CSA-O121 (DFP).

.3 Particleboard: NPA A208.1; sanded.

.4 Mat-Formed Panelboards: CSA-O437, OSB.

2.2 ACCESSORIES

.1 Fasteners and Anchors:

.1 Fasteners: Hot dipped galvanized steel for high humidity and treated wood locations, unfinished steel elsewhere.

.2 Anchors: Toggle bolt type for anchorage to hollow masonry, expansion shield and lag bolt type for anchorage to solid masonry or concrete, and bolt or ballistic fastener for anchorages to steel, as required.

2.3 FACTORY WOOD TREATMENT

.1 Wood Preservative (Pressure Treatment): CSA-O80 Series using water borne preservative with 0.25% retainage.

.2 Wood Preservative (Surface Application): Clear type.

Part 3 Execution

3.1 FRAMING

.1 Set members level and plumb, in correct position.

.2 Place horizontal members, crown side up.

.3 Construct curb members of single pieces.

.4 Space framing as indicated on Drawings.

.5 Curb roof openings except where prefabricated curbs are provided. Form corners by alternating lapping side members.

.6 Coordinate curb installation with installation of decking and support of deck openings and roofing vapour retardant.

3.2 SHEATHING

.1 Secure sheathing to framing members with ends over firm bearing and staggered.

.2 Install telephone and electrical panel back boards with plywood sheathing material where required. Size the back board as indicated on Electrical Drawings and specifications.

3.3 SITE APPLIED WOOD TREATMENT

.1 Apply preservative treatment in accordance with manufacturer's written instructions.

.2 Brush apply two (2) coats of preservative treatment on wood in contact with cementitious materials or roofing and related metal flashings. Treat Site-sawn cuts.

.3 Allow preservative to dry prior to erecting members.

3.4 DOOR FRAME INSTALLATION

.1 Install door frames in rough openings square and level.

3.5 SURFACE-APPLIED WOOD PRESERVATIVE

.1 Before installation, treat surfaces of material with wood preservative. Apply preservative after materials have been cut and fit to size.

.2 Apply preservative by dipping, brush, or spray to completely saturate and maintain a wet film on the surface for a minimum of 3 minutes.

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

.4 Touch-up all material as follows:

.1 All exterior wood blocking, backing, curbs, nailers, or sleepers.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Finish carpentry items.

.2 Installation of interior ceiling panels.

.3 Hardware and attachment accessories.

1.2 RELATED SECTIONS

.1 Section 01 45 00 – Quality Control

.2 Section 05 50 00 - Metal Fabrications.

.3 Section 06 10 13 - Wood Blocking and Curbing.

.4 Section 06 41 11 - Architectural Woodwork.

.5 Section 09 91 99 – Painting for Minor Works.

1.3 REFERENCES

.1 AHA A135.4-2004 – Basic Hardboard.

.2 ASTM E84-09c - Test Method for Surface Burning Characteristics of Building Materials.

.3 BHMA A156.9-2003 - Cabinet Hardware.

.4 CAN/CGSB-11.3-M87 - Hardboard.

.5 CSA-O80 Series-08 - Wood Preservation.

.6 CSA-O121-08 - Douglas Fir Plywood

.7 CSA-O141-05 - Softwood Lumber.

.8 CSA-O151-09 - Canadian Softwood Plywood.

.9 CSA-O153-M1980 (R2008) - Poplar Plywood.

.10 NPA A208.1-2009 - Particleboard.

.11 NPA A208.2-2009 - Medium Density Fibreboard (MDF) for Interior Applications.

.12 AWS (AWMAC Architectural Woodwork Standards) – 1st Edition, 2009.

.13 CHPVA (Canadian Hardwood Plywood and Veneer Association) - Official Grading Rules for Canadian Hardwood Plywood.

.14 NEMA (National Electric Manufacturers Association) LD3-2000 - High Pressure Decorative Laminates.

.15 NLGA (National Lumber Grades Authority) - Standard Grading Rules for Canadian Lumber, 2007 Edition.

.16 NHLA (National Hardwood Lumber Association).

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Coordination:

.1 Coordinate with other work having a direct bearing on work of this section.

.2 Coordinate the work with mechanical and electrical rough-in, installation of associated and adjacent components.

1.5 SCOPE OF WORK

.1 Installation of wood wall as detailed on drawings.

.2 Ensure that blocking has been provided by Section 06 10 13.

.3 Countersink all nail fasteners and fill ready for specified finish.

.4 Exposed fasteners: Refer to Drawings.

.5 Finish hardware to be supplied by others unless specified in this Section.

1.6 SUBMITTALS FOR REVIEW

.1 Section 01 33 00: Submission procedures.

.2 Product Data: Provide data on fire retardant treatment materials and application instructions.

.3 Shop Drawings:

.1 Indicate materials, component profiles, fastening methods, jointing details, and accessories.

.2 Provide instructions for attachment hardware and finish hardware.

1.7 SUBMITTALS FOR INFORMATION

.1 Section 01 33 00: Submission procedures.

.2 Installation Data: Provide application instructions.

1.8 QUALITY ASSURANCE

.1 Perform work to AWMAC Premium quality.

.2 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three (3) years experience.

.3 Installer Qualifications: Company specializing in performing the work of this section with minimum three (3) years.

1.9 REGULATORY REQUIREMENTS

.1 Conform to applicable code for fire retardant requirements.

1.10 DELIVERY, STORAGE, AND PROTECTION

.1 Section 01 61 00: Transport, handle, store, and protect products.

.2 Protect work from moisture damage.

1.11 ENVIRONMENTAL REQUIREMENTS

.1 Do not install paneling when temperature or humidity conditions may have a detrimental effect on paneling.

1.12 MOCKUPS

.1 Refer to Section 01 45 00.

.2 Wood Wall in Room 115:

.1 Provide site mock-up of wood wall panel.

.2 Mock-up area to be no less than 2 boards high x 48" and shall include wall boards, trims and fasteners, including any back-up materials as indicated on Drawings.

.3 Approved mock-up may remain as part of the Work if acceptable to Contract Administrator.

.4 If not accepted, make necessary changes for Contract Administrator to review.

Part 2 Products

2.1 SHEET MATERIALS

.1 Softwood Plywood: CSA-O121; Graded to AWMAC Economy installation; veneer lumber core; Douglas Fir face species, square cut.

2.2 WOOD WALL ROOM 115:

.1 Standard of Acceptance:

.1 Grade: Select Aspen, Edge Grain Fir, S4S

.2 Size: ¾" thick x 3 ½" wide

.3 Fasteners: Oval head stainless steel screw fasteners. Refer to Drawings for spacings.

.4 Finish: Natural penetrating stain (by Section 09 91 23).

2.3 WOOD BENCHES IN ROOMS 131

.1 Standard of Acceptance:

.1 Grade: Select Aspen, Edge Grain Fir, S4S

.2 Size: 1 ½" thick x width as required per Drawings.

.3 Fasteners: As detailed on Drawings.

.4 Finish: Natural penetrating stain (by Section 09 91 23).

2.4 ADHESIVE

.1 Adhesive: Type recommended by AWMAC to suit application.

2.5 FASTENERS

.1 Fasteners: Of size and type to suit application; zinc finish in concealed locations and stainless steel in exposed locations, unless noted otherwise.

.2 Concealed Joint Fasteners: Threaded steel.

2.6 ACCESSORIES

.1 Lumber for Shimming, Blocking: Softwood lumber of SPF species.

2.7 FABRICATION

.1 Fabricate to AWMAC Premium standards.

.2 Shop assemble work for delivery to Site, permitting passage through building openings.

.3 When necessary to cut and fit on Site, provide materials with ample allowance for cutting.

2.8 SHOP FINISHING

.1 Sand work smooth and set exposed nails or screws – refer to Drawings.

.2 Apply wood filler in exposed nail and screw indentations.

.3 On items to receive transparent finishes, use wood filler which matches surrounding surfaces and of types recommended for applied finishes.

.4 Seal stain and varnish clear exposed to view surfaces.

Part 3 Execution

3.1 EXAMINATION

.1 Section 01 71 00: Verify existing conditions before starting work.

.2 Verify that field measurements are as indicated on Shop Drawings.

.3 Verify adequacy of backing and support framing.

.4 Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

3.2 INSTALLATION

.1 Install work to AWMAC Premium Quality Standard.

.2 Set and secure materials and components in place, plumb and level.

.3 Carefully scribe work abutting other components, with maximum gaps of 1 mm (1/32 inch). Do not use additional overlay trim to conceal larger gaps.

.4 Install components with nails or screws as detailed.

.5 Install components with wall adhesive by gun application where adhesive is indicated.

3.3 ERECTION TOLERANCES

.1 Maximum Variation from True Position: 1.5 mm (1/16 inch).

.2 Maximum Offset from True Alignment with Abutting Materials: 1 mm (1/32 inch).

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 06 40 00 - Architectural Woodworking

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Detailed specification of construction and fabrication.

.2 Manufacturer’s installation instructions.

.3 Manufacturer’s detailed recommendations for handling, storage, installation,

.4 protection, and maintenance.

.3 Shop Drawings:

.1 Indicate materials, colours, patterns and finishes, sizes and dimensions, profiles, edge details, installation details including location and layout of each type of fabrication and accessory.

1.3 MOCK-UPS

.1 Refer to Section 06 40 00 – Architectural Woodwork.

1.4 CLOSEOUT SUBMITTALS

.1 Provide closeout submittals in accordance with Section 01 78 00 - Closeout Submittals.

.2 Provide manufacturer’s care and maintenance information for incorporation in operation and maintenance manual.

.3 Provide one maintenance kit with instructions.

1.5 QUALITY ASSURANCE

.1 Fabricator Qualifications: certified by solid surface manufacturer.

.2 Installer Qualifications: firm experienced in installation or application of systems similar in complexity to those required for project, including specific requirements indicated. Acceptable to or licensed by solid surface material manufacturer.

.3 Source Limitations: obtain materials and products from single source.

1.6 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:

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

.2 Maintain indoor temperature and humidity within range recommended by the AWMAC Quality Standards for location of the project.

.3 Store and protect laminate, adhesive, and core materials from nicks, scratches, and blemishes.

.4 Replace defective or damaged materials with new.

Part 2 Products

2.1 SOLID SURFACING MATERIAL

.1 Solid surfacing countertops: homogenous sheet material composed of acrylic resins, fire-retardant filler materials, and coloring agents.

.1 Acceptable material: Corian or approved equal.

.2 Nominal sheet thickness: ½" thick.

.3 Pattern/Colour: Pebble Terrazo.

.4 Finish: Matte.

.5 Warranty: 10 year limited product warranty.

.6 Environmental: Greenguard indoor air quality certified, NSF Certified.

.2 Integrated solid surface sink: Corian or approved equal.

.1 Colour: Designer White

.2 Standard of acceptance: 820P by Corian with overflow. Coordinate faucet and piping with mechanical.

2.2 ACCESSORIES

.1 Joint adhesive: manufacturer's standard adhesive to create inconspicuous, nonporous joints, with a chemical bond (WA8215).

.2 Sealant: mildew resistant silicone as specified in Section 07 92 00 - Joint Sealing.

.3 Sink/bowl mounting hardware: bowl clips, brass inserts and fasteners for attachment of under mount sinks/bowls, of type recommended by manufacturer.

2.3 FABRICATION

.1 Fabricate components in shop to greatest extent practical to size and shape indicated, in accordance with reviewed shop drawings and manufacturer's published requirements.

.2 Form joints between components using manufacture's standard joint adhesive. Make joints inconspicuous in appearance and without voids. Attach 100 mm wide reinforcing strip under joints.

.3 Provide holes and cutouts for plumbing, bath accessories, and other components.

.4 Rout and finish component edges to a smooth, uniform finish. Rout cutouts and sand edges smooth. Repair or reject defective or inaccurate work.

.5 Finish surfaces to uniform finish.

.6 Thermoforming:

.1 Comply with forming data from manufacturer.

.2 Construct matching molds to form components shape.

.3 Form pieces to shape prior to seaming and joining.

.4 Cut pieces larger than finished dimensions, sand edges, remove nicks and scratches.

.5 Heat entire component uniformly between 280°−325°F during forming. Prevent blistering, whitening or cracking of material during forming.

Part 3 Execution

3.1 EXAMINATION

.1 Examine substrates to receive solid surfacing. Identify conditions detrimental to proper or timely installation and provide written report to Contractor. Do not commence installation until conditions have been corrected.

3.2 PREPARATION

.1 Precondition solid surfacing in accordance with manufacturer's printed installation instructions.

3.3 INSTALLATION

.1 Install components plumb and level, in accordance with reviewed shop drawings, project installation details and manufacturer's printed instructions.

.2 Form joints using approved adhesive, with joints inconspicuous in finished work.

.3 Adhere under mount sinks/bowls to countertop using manufacturer's recommended joint adhesive.

.4 Adhere top mount sinks/bowls to countertop using manufacturer's recommended adhesive/silicone sealant.

.5 Remove excessive adhesive and sealants.

.6 Coordinate plumbing installation with plumbing Subcontractor.

3.4 INSTALLATION OF VANITIES

.1 Install plumb, level, true and straight. Shim as necessary using concealed shims.

.2 Attach top securely to base unit or support brackets in accordance with manufacturer's printed instructions.

.3 Seal between wall and component with silicone sealant.

3.5 3.5 PROTECTION

.1 Protect Protect surfaces from damage until date of Substantial Performance of the Work. Repair or replace damaged components that cannot be repaired to Contract Administrator's satisfaction.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 semi rigid acoustic insulation where indicated on Drawings.

1.2 REFERENCES

.1 ASTM C208-08a - Cellulosic Fibre, Insulating Board.

.2 ASTM C552-07 - Cellular Glass Thermal Insulation.

.3 ASTM C578-09e1 - Rigid, Cellular Polystyrene Thermal Insulation.

.4 ASTM C591-09 - Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation.

.5 ASTM C612-09 - Mineral Fibre Block and Board Thermal Insulation.

.6 ASTM C1126-04 - Faced or Unfaced Rigid Cellular Phenolic Thermal Insulation.

.7 ASTM C1289-08e1 - Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.

.8 ASTM E84-09c - Test Method for Surface Burning Characteristics of Building Materials.

.9 ASTM E96/E96M-05 - Test Methods for Water Vapor Transmission of Materials.

.10 ASTM D 1621 - Standard Test Method for Compressive Properties Of Rigid Cellular Plastics.

.11 CAN/ULC-S102-07 - Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

.12 CAN/ULC-S701-05 - Thermal Insulation, Polystyrene, Boards and Pipe Covering.

.13 CAN/ULC-S702-09 - Thermal Insulation, Mineral Fibre, for Buildings.

.14 CAN/ULC-S703-09 - Cellulose Fibre Insulation (CFI) for Buildings.

.15 CAN/ULC-S704-03 - Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.

.16 CAN/ULC-S706-09 - Wood Fibre Thermal Insulation for Buildings.

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Coordination:

.1 Coordinate with other work having a direct bearing on work of this section.

.2 Coordinate the work with Section 04 22 00 for installation of vapour retarder.

.3 Coordinate the work with Section 07 52 00 for the installation of Modified Bitumen Membrane Roofing.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

.3 Manufacturer's Instructions:

.1 Submit manufacturer's installation instructions.

1.5 DELIVERY, STORAGE AND HANDLING

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

.2 Store and protect materials from nicks, scratches, and blemishes .

.3 Replace defective or damaged materials with new.

1.6 CLOSEOUT SUBMITTALS

.1 Section 01 78 00: Closeout Procedures.

1.7 ENVIRONMENTAL REQUIREMENTS

.1 Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

Part 2 Products

2.1 INSULATION MATERIALS

.1 Acoustical Sound Insulation **(interior walls)**: Semi-rigid, non-combustible mineral fibre batt insulation, type 1 compliant.

.1 Acoustical Performance: NRC 0.7

.2 Thickness: As shown on Drawings.

.3 Standard of Acceptance:

.1 Rockwool AFB or approved equal

2.2 ADHESIVE MATERIALS

.1 Adhesive Type 1: Type recommended by insulation manufacturer for application.

2.3 ACCESSORIES

.1 Sheet Vapour Retarder:

.2 Tape: Polyethylene self-adhering type, mesh reinforced, 50 mm (2 inch) wide.

.3 Insulation Fasteners: Impaling clip of galvanized steel with washer retainer, to be mechanically fastened to surface to receive board insulation, length to suit insulation thickness and substrate, capable of securely and rigidly fastening insulation in place.

Part 3 Execution

3.1 EXAMINATION

.1 Verify that substrate, adjacent materials, and insulation boards are dry and ready to receive insulation and adhesive.

.2 Verify substrate surface is flat, free of honeycomb, fins, irregularities and materials or substances that may impede adhesive bond.

3.2 INSTALLATION – ACOUSTIC INSULATION

.1 Refer to Drawings.

3.3 PROTECTION OF FINISHED WORK

.1 Do not permit work to be damaged prior to covering insulation.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Fireproof firestopping and fire-safing materials and accessories.

1.2 RELATED SECTIONS

.1 Section 06 10 13 - Wood Blocking and Curbing

.2 Section 09 21 16 – Gypsum Board Assemblies

.3 Structural Specifications.

.4 Mechanical Divisions – Heating, Ventilating, and Air-Conditioning (HVAC): Mechanical work requiring firestopping.

.5 Electrical Divisions: Electrical work requiring firestopping.

1.3 REFERENCES

.1 ASTM E84-09c - Test Method for Surface Burning Characteristics of Building Materials.

.2 ASTM E119-09c - Method for Fire Tests of Building Construction and Materials.

.3 ASTM E814-09 - Test Method of Fire Tests of Through-Penetration Fire Stops.

.4 ASTM E1966-07 - Test Method for Fire-Resistive Joint Systems.

.5 CAN/ULC-S101-07 - Fire Endurance Tests of Building Construction and Materials.

.6 CAN/ULC-S102-07 - Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

.7 CAN/ULC-S115-05 - Fire Tests of Firestop Systems.

.8 FM (Factory Mutual) - FM 4991, Approval of Firestop Contractors.

.9 FCIA (Firestop Contractors International Association) - Manual of Practice.

.10 NFPA 251 - Fire Tests of Building Construction and Materials.

.11 OPL (Omega Point Laboratories).

.12 UL 263 - Fire Tests of Building Construction and Materials (ASTM E119, NFPA 251).

.13 UL 1479 - Fire Tests of Through-Penetration Firestops. (ASTM E814).

.14 UL 1709 - Rapid Rise Fire Tests of Protection Materials for Structural Steel.

.15 UL 2079 - Tests for Fire Resistance of Building Joint Systems.

.16 ULC (Underwriters Laboratories of Canada) - List of Equipment and Materials for:

.1 Building Materials.

.2 Fire Resistance.

.3 Firestop Systems and Components.

.17 WHI (Intertek/Warnock Hershey).

.18 Standard Method of Fire Tests Through Penetration Fire Stops, ULC-S115-M.2005/ CAN4- S115-M.2005 or ASTM E814 Test Requirements.

.19 Underwriters Laboratories of Canada (ULC) CAN4-S115-M.2005 under their designation of ULC-S115-M.2005 and publishes the results in FIRE RESISTANCE RATINGS DIRECTORY.

1.4 DEFINITIONS

.1 Firestopping (Fire-safing): A sealing or stuffing material or assembly placed in spaces between building materials to arrest the movement of smoke, heat, gases, or fire through wall or floor openings.

1.5 SYSTEM DESCRIPTION

.1 Firestopping systems installed to resist spread of fire and passage of smoke and other gases at penetrations through fire resistance rated wall, and floor assemblies, materials and components.

1.6 PERFORMANCE REQUIREMENTS

.1 Materials, accessories and application procedures listed by ULC, cUL, or tested to CAN/ULC-S115 to comply with building code requirements.

.2 Firestopping Materials: CAN/ULC-S101, ASTM E119, ASTM E814 to achieve a fire rating as noted on Drawings.

1.7 ADMINISTRATIVE REQUIREMENTS

.1 Coordination: Coordinate with other work having a direct bearing on work of this section.

1.8 SUBMITTALS FOR REVIEW

.1 Section 01 33 00: Submittal Procedures.

.2 Product Data: Provide data on product characteristics, performance and limitation criteria.

.3 System Design Listings: Submit system design listings, including illustrations from a qualified testing and inspection agency that is applicable for each firestop configuration.

1.9 SUBMITTALS FOR INFORMATION

.1 Section 01 33 00: Submittal procedures.

.2 Installation Data: Manufacturer's special preparation and installation requirements.

.3 Manufacturer's Certificate: Certify that Products meet or exceed specified requirements.

1.10 CLOSEOUT SUBMITTALS

.1 Section 01 78 00: Closeout Submittal.

1.11 QUALITY ASSURANCE

.1 Contractor Qualifications: Company specializing in performing the work of this section and as follows:

.1 FM approved in accordance with FM standard 4991 - Approval of Firestop Contractors.

.2 FCIA Member in good standing.

.3 Licensed by the province or local authority where applicable.

.4 Successfully completed not less than five (5) comparable scale projects.

.2 Single Source Responsibility: Obtain firestop systems for each type of penetration and construction situation from a single primary firestop systems manufacturer.

1.12 REGULATORY REQUIREMENTS

.1 Conform to applicable code for fire resistance ratings and surface burning characteristics.

.2 Provide certificate of compliance from authority having jurisdiction indicating approval of materials used.

1.13 DELIVERY, STORAGE, AND PROTECTION

.1 Section 01 61 00: Transport, handle, store, and protect products.

.2 Deliver firestopping products in original, unopened containers with labels intact and legible, identifying product and manufacturer.

.3 Store and handle firestopping materials to manufacturer's instructions.

1.14 ENVIRONMENTAL REQUIREMENTS

.1 Sequence work to permit installation of firestopping and smoke seal materials to be installed after adjacent work is complete and before closure of spaces.

.2 Do not install firestopping when ambient or substrate temperatures are outside limits permitted by manufacturers or when substrates are wet, due to rain, frost, condensation, or other causes.

.3 Maintain this minimum temperature before, during and for three (3) days after installation of materials.

.4 Ventilate firestopping per manufacturers' instructions by natural means or, where this is inadequate, forced air circulation.

.5 During installation, provide masking and drop sheets to prevent firestopping materials from contaminating any adjacent surfaces.

.6 Do not use materials that contain flammable solvents.

.7 Water based products are unacceptable in wet areas or areas that may be subject to occasional flooding.

1.15 WARRANTY

.1 Manufacturers shall warrant work of this Section against defects and deficiencies in the product material for a period of two (2) years from date of Substantial Performance, in accordance with General Conditions of Contract. Promptly correct any defects or deficiencies, which become apparent within warranty period at no expense to City of Winnipeg.

.2 Fire and smoke stop system Contractor hereby warrants workmanship on material installation for period of two (2) years from date of Substantial Performance, in accordance with General Conditions of Contract. Promptly correct any defects or deficiencies, which become apparent within warranty period at no expense to City of Winnipeg.

Part 2 Products

2.1 MATERIALS

.1 System 1:

.1 Firestopping at joints of floor to wall construction, filling gaps and holes in fire rated assemblies, and filling voids around service penetrations through fire rated assemblies. Install damming material where support for sealant is required.

.2 Materials:

.1 Mineral wool backing insulation: ULC labelled, preformed non combustible or intumescent composite sheet.

.1 Standard of Acceptance:

.1 3M Brand Fire Barrier CS 195 Composite Sheet.

.2 A/D Fire Barrier mineral wool by A/D Fire Protection.

.2 Fire stopping sealant: ULC labelled, single component silicone based or intumescent sealant.

.1 Standard of Acceptance:

.1 3M Brand Fire Barrier Mouldable putty or CP25WB, CP 25N/S or CP 25 S/L caulk

.2 A/D Silicone Firebarrier by A/D Fire Protection.

.3 Fire Stop Sealant by Dow Corning Canada Inc.

.4 Tremco FYRE SIL

.5 Firetemp by Johns Mansville.

.2 System 2:

.1 Firestopping for filling voids around multiple service penetrations through fire rated assemblies. Install damming material to temporarily contain firestopping foam.

.2 Materials:

.1 Firestopping foam: ULC labelled two component silicone foam, foam mortar or intumescent firestopping.

.1 Standard of Acceptance:

.1 3M Brand Fire Barrier FS 195 Wrap/Strip, 7904 Series system or CS 195 Composite sheet with CP 25 S/L elastomer or mouldable putty.

.2 A/D firebarrier mortar or A/D Silicone over A/D firebarrier Mineral Wool Firestopping.

.3 Dow Corning 3 6548 Silicone RTV Foam or Dow Corning Fire Stop Intumescent Wrap Strip over damming material.

.3 System 3:

.1 Firestopping PVC, CPVC and ABS plastic pipe penetration through fire rated assemblies.

.2 Materials:

.1 Intumescent UL classified as a through penetration firestop device when tested in accordance with ASTM E814 (UL 1479). Complete with retainer clip.

.1 Standard of Acceptance:

.1 3M Firebarrier Plastic Pipe Device utilizing FS 195 Wrap/Strip and RC 1 Restricting collar.

.4 Damming material: Provide permanent or removable mineral wool, mineral fibreboard, sheet metal, plywood, particleboard, or calcium silicate board to temporarily support firestopping in accordance with tested assembly being installed and as acceptable to authority having jurisdiction.

.5 Retainers: 24mm (15/16") wide x 24 ga. steel Z formed configuration with bottom dimensions conforming to opening size listed in manufacturer's sizing chart.

.6 Acceptable Manufacturers:

.1 AD Fire Protection Systems Inc.

.2 Hilti Fire Stop Systems.

.3 3M Fire Protection Products.

.4 Tremco, Tremstop, Firestop Systems.

Part 3 Execution

3.1 EXAMINATION

.1 Verify opening configurations, penetrating items, substrates, and other conditions affecting performance of firestopping are ready to receive the work of this section.

.2 Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

.1 Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter that may affect bond of firestopping material.

.2 Remove incompatible materials that may affect bond.

.3 Install backing or damming materials to arrest liquid material leakage.

3.3 APPLICATION

.1 Apply primer and materials to manufacturer's written instructions.

.2 Install material at walls or partition openings that contain penetrating sleeves, piping, ductwork, conduit and other items, requiring firestopping.

.3 Apply firestopping material in sufficient thickness to achieve rating as listed in manufacturer's technical literature and to uniform density and texture. Fire resistance rating of fire stopping material assembly must meet or exceed the fire resistance rating of the floor or wall assembly being penetrated.

.4 Seal holes or voids made by through penetrations, poke through termination devices, and unpenetrated openings or joints to ensure continuity and integrity of fire separation are maintained.

.5 Tool or trowel exposed surfaces to a neat finish where required.

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

3.4 CLEANING

.1 Clean adjacent surfaces of firestopping materials.

.2 Remove equipment, excess materials and debris and clean adjacent surfaces immediately after application. Use methods and cleaning materials approved by manufacturer.

.3 Protect firestopping during and after curing period from contact with contaminating substances. If damage caused by others, the Contractor shall instruct the Firestop Sub-Trade to make appropriate repairs and charge to appropriate trades.

.4 Remove temporary dams after initial set of fire stop and smoke seal materials.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Preparing substrate surfaces.

.2 Sealant and joint backing.

1.2 RELATED SECTIONS

.1 Section 07 84 00 - Firestopping: Sealants required in conjunction with firestopping.

.2 Section 08 11 00 – Metal Doors and Frames.

1.3 REFERENCES

.1 ASTM C509-06 - Elastomeric Cellular Preformed Gasket and Sealing Material.

.2 ASTM C834-10 - Latex Sealants.

.3 ASTM C919-08 - Use of Sealants in Acoustical Applications.

.4 ASTM C920-08 - Elastomeric Joint Sealants.

.5 ASTM C1184-05 - Structural Silicone Sealants.

.6 ASTM C1193-09 - Guide for Use of Joint Sealants.

.7 ASTM C1311-10 - Solvent Release Sealants.

.8 ASTM C1330-02(2007) - Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants.

.9 ASTM C1401-09a - Guide for Structural Sealant Glazing.

.10 ASTM E330-02 - Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference

.11 CGSB-19-GP-5M-1984 - Sealing Compound, One Component, Acrylic Base, Solvent Curing.

.12 CGSB-19-GP-14M-1984 - Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing.

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

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

.15 CAN/CGSB-19.22-M89 - Mildew-Resistant Sealing Compound for Ceramic Tiles.

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

.17 SWRI (Sealant, Waterproofing and Restoration Institute) - Sealant and Caulking Guide Specification.

1.4 SCOPE OF WORK

.1 Caulking shall be provided where required to prevent entry of water into the structure.

.2 Caulking shall be provided between masonry, siding, or other cladding materials and the adjacent door and window frames or trim, including sills unless, such locations are completely protected from the entry of water. Caulking shall also be provided at vertical joints between different cladding materials unless the joint is suitably lapped or flashed to prevent the entry of water.

.3 Caulking shall be provided at all masonry control joints.

.4 Caulk perimeter of all interior pressed steel door and window frames, fire hose cabinets, access door flanges, etc.

1.5 PERFORMANCE REQUIREMENTS

.1 Sealant Design: Design structural sealant to withstand specified loads without breakage, loss, failure of seals, product deterioration, and other defects.

.2 Design installed sealant to withstand:

.1 Dead loads and live loads caused by positive and negative wind loads acting normal to plane of wall as calculated in accordance with the National Building Code.

.2 Movement from ambient temperature range of 49 degrees C (120 degrees F).

.3 Movement and deflection of structural support framing.

.4 Water and air penetration.

1.6 ADMINISTRATIVE REQUIREMENTS

.1 Coordination:

.1 Coordinate with other work having a direct bearing on work of this section.

.2 Coordinate the work with all sections referencing this section.

1.7 SUBMITTALS FOR REVIEW

.1 Section 01 33 00: Submittal Procedures

.2 Product Data: Provide data indicating sealant chemical characteristics, performance criteria, substrate preparation, limitations, colour availability.

.3 Samples: Submit two (2) samples, 300 mm (12 inch) in size illustrating sealant colours for selection.

1.8 SUBMITTALS FOR INFORMATION

.1 Section 01 33 00: Submittal Procedures.

.2 Installation Data: Manufacturer's special installation requirements.

.1 Indicate special procedures, surface preparation, perimeter conditions requiring special attention, field quality control testing.

1.9 QUALITY ASSURANCE

.1 Perform work to sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

.2 Perform structural sealant application work to ASTM C1401.

.3 Perform acoustical sealant application work to ASTM C919.

.4 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three (3) years documented experience.

.5 Applicator Qualifications: Company specializing in performing the work of this section with minimum three (3) years documented experience.

1.10 ENVIRONMENTAL REQUIREMENTS

.1 Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

1.11 WARRANTY

.1 Section 01 78 00: Closeout Submittals.

.2 Warranty: Include coverage for installed sealants and accessories which fail to achieve air tight seal and water tight seal, exhibit loss of adhesion or cohesion, or do not cure.

.3 Provide manufacturer's twenty (20) year material warranty for installed silicone sealant.

.4 Defective work shall include, but not be restricted to joint leakage, cracking, crumbling, melting, running, loss of adhesion, loss of cohesion, or staining of adjoining or adjacent work or surfaces.

Part 2 Products

2.1 MATERIALS

.1 Sealant Colour: to be selected by the Contract Administrator from full range.

.2 Primers: To be type recommended by sealant manufacturer.

.3 Joint backing material: shall be extruded polyolefin foam.

.1 Standard of Acceptance:

.1 Tremco Sof Rod.

.4 Bond Breaker: Where joint configuration does not allow for proper depth/width ration (See Section 3.2.5) - a pressure sensitive plastic tape, such as 3M #266 or #481 shall be placed on the back of the joint which will not bond to the sealant.

.5 Joint Cleaner: Xyol, methylethylketone, or non-corrosive type recommended by sealant manufacturer and compatible with joint forming materials.

2.2 SEALANTS

.1 Type 1: Sealant for all locations except where another type is specified in this section. Multi-component, polyepoxide urethane sealant. To meet specified requirements of CGSB Specification CAN2.19-24-M80.

.1 Standard of Acceptance:

.1 Tremco Dymeric 511
.2 Sonolastic NP-2
.3 Permapol RC-2.
.4 Morton Thiokol
.5 Sikaflex 2CNS/SL
.6 Bostik Chem-Calk 500

.2 Type 2: Sealant for construction joints in lieu of Type 1 where pre-approved by Contract Administrator. One part elastomeric sealants: to meet specified requirements of NSC/CGSB 25-B-N moisture curing hybrid polyurethane.

.1 Standard of Acceptance:

.1 Tremco Dymonic.
.2 Sonolastic 150.
.3 Permapol RC-1.
.4 Morton Thiokol.
.5 Sikaflex 1A.
.6 Bostik Chem-Calk900.

.2 Type 3: Sealant for glass to glass, glass to metal, and metal to metal joints. One part low modulus silicone elastomeric sealant to meet specified requirements of NSC/CGSB Specification CAN2-19.13-M82.

.1 Standard of Acceptance:

.1 Dow Corning 795
.2 Tremco Spectrum 2.
.3 GE Silglaze 2800.
.4 GE Silpruf 2000.

.3 Type 4: Polyurethane sealant for exterior and interior horizontal traffic joints.

.1 Standard of Acceptance:

.1 Tremco THC-900.
.2 Permapol RC-2Sl.
.3 Sonolastic SL2.

.4 Sikaflex 2CSL.

.5 Bostik Chem-Calk 550

.4 Type 6: Use at all perimeter joints and openings in sound rated drywall systems and sealing polyethylene air/vapour barriers. One part acoustical sealant to meet specified requirements of CGSB Specification 19-GP-21M.

.1 Standard of Acceptance:

.1 Tremco Acoustical sealant.

.2 Gibson Homans 2210.

.5 Type 7: Sealant for finishing interior construction joints subject to minimal movement and not otherwise specified in this section. One part paintable latex.

.1 Standard of Acceptance:

.1 Tremco Latex 100.

.2 Bulldog Acrylic Latex

2.3 ACCESSORIES

.1 Primer: Non-staining type, recommended by sealant manufacturer to suit application.

.2 Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.

.3 Joint Backing: ASTM C1330; round, closed cell polyethylene foam rod; oversized 30% to 50% larger than joint width.

.4 Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

.5 Masking tape: Non-staining, non-absorbent type compatible with sealant and adjacent surfaces.

.6 Setting Blocks and Spacers: Compatible with silicone sealant and recommended by sealant manufacturer.

Part 3 Execution

3.1 EXAMINATION

.1 Section 01 71 00: Verify existing conditions before starting work.

.2 Verify that substrate surfaces and joint openings are clean, dry, and free of frost and ready to receive work.

.3 Verify that joint backing and release tapes are compatible with sealant.

.4 Verify at the Site that joints and surfaces have been provided and that joint conditions will not adversely affect execution, performance, or quality of the completed work; and that they can be put into acceptable condition by means of preparation specified in this section.

.5 Ascertain that sealers and coatings applied to sealant substrates are compatible with sealant used and that full bond between sealant and substrate is attained. Request samples of the sealed or coated substrate from their fabricators for testing of compatibility and bond, if necessary.

.6 Verify that specified environmental conditions are ensured before commencing work.

.7 Ensure that releasing agents, coatings or other treatments have either not been applied to joint surfaces or that they are entirely removed.

.8 Defective work resulting from application to unsatisfactory joint conditions will be considered the responsibility of those performing the Work of this Section.

3.2 PREPARATION

.1 Remove loose materials and foreign matter which might impair adhesion of sealant.

.2 Clean and where required prime joints to sealant manufacturer's written instructions.

.3 Perform preparation to sealant manufacturer's written instructions.

.4 Protect elements surrounding the work of this section from damage or disfiguration.

.5 Remove dust, paint, loose mortar, and other foreign matter and dry joint surfaces.

.6 Remove dust silt, scale, and coatings from ferrous metals by wire brush, grinding, or sandblasting.

.7 Remove oil, grease and other coatings from non-ferrous metals with joint cleaner.

.8 Joints to be caulked are to be a minimum of 6mm (1/4 inch) to a maximum of 40mm (1 ½ inch). Examine joint sizes to achieve proper width/depth ratio per manufacturer's recommendations for specified sealant.

.9 Install joint filler or apply bond breaker tape to achieve correct joint depth.

.10 Where necessary to prevent staining, mask adjacent surfaces with tape prior to priming and/or caulking.

.11 Prime sides of joints to sealant manufacturer's instructions immediately prior to caulking.

.12 Before any caulking or sealing is commenced, a test of the material shall be made for indications of staining or poor adhesion.

3.3 INSTALLATION

.1 Install sealant to sealant manufacturer's written instructions.

.2 Measure joint dimensions and size materials to achieve required width/depth ratios.

.3 Install joint backing to achieve a neck dimension no greater than 1/3 of the joint width.

.4 Install bond breaker where joint backing is not used.

.5 Install sealant free of air pockets, foreign embedded matter, ridges, and sags.

.6 Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

.7 Tool joints concave unless detailed otherwise.

3.4 CLEANING

.1 Clean adjacent soiled surfaces.

3.5 PROTECTION OF FINISHED WORK

.1 Remove masking tape and excess sealant.

.2 Protect sealants until cured, remove temporary glass supports.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Hollow metal steel frames.

.2 Pressed steel doors.

1.2 RELATED SECTIONS

.1 Section 07 92 00 – Joint Sealants.

.2 Section 08 71 00 - Door Hardware - General

.3 Section 09 91 99 – Painting for Minor Works.

1.3 REFERENCES

.1 ASTM A653/A653M-09 - Steel Sheet, Zinc-Coated (Galvanized).

.2 ASTM C553-08 - Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.

.3 ASTM C578-09e1 - Rigid, Cellular Polystyrene Thermal Insulation.

.4 ASTM C591-09 - Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation.

.5 ASTM C665-06 - Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.

.6 ASTM C1289-08e1 - Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.

.7 ASTM E90-09 - Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.

.8 ASTM E413-04 - Classification for Rating Sound Insulation

.9 CAN/ULC S104-10 - Standard Method for Fire Tests of Door Assemblies.

.10 CAN/ULC S105-09 - Standard Specification for Fire Door Frames Meeting the Performance Required by CAN/ULC-S104.

.11 CAN/ULC-S704-03 - Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.

.12 CAN/CSA-G40.20-04/G40.21-04 (R2009) - General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.13 CSA-W59-03 (R2008) - Welded Steel Construction (Metal Arc Welding).

.14 CSDMA (Canadian Steel Door Manufacturers Association)

.1 Recommended Dimensional Standards for Commercial Steel Doors and Frames, 2000.

.2 Selection and Usage Guide for Commercial Steel Doors and Frames, 2009.

.15 DHI (Door Hardware Institute) - The Installation of Commercial Steel Doors and Steel Frames, Insulated Steel Doors in Wood Frames and Builder's Hardware.

.16 NFPA 80 - Fire Doors and Fire Windows (2010 Edition).

.17 NFPA 252-2008 - Methods of Fire Tests of Door Assemblies.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Coordination:

.1 Coordinate with other work having a direct bearing on work of this section.

.2 Coordinate the work with frame opening construction, door, and hardware installation.

.2 Sequencing: Sequence installation to ensure wire connections are achieved in an orderly and expeditious manner.

1.5 SUBMITTALS FOR REVIEW

.1 Section 01 33 00: Submittal Procedures.

.2 Product Data: Indicate door and frame configurations and finishes, location of cut-outs for hardware reinforcement.

.3 Shop Drawings:

.1 Indicate frame elevations, reinforcement, anchor types and spacing, location of cut-outs for hardware, and finish.

.2 Indicate door elevations, internal reinforcement, closure method, and cut-outs for glazing, finishes, and hardware.

1.6 CLOSEOUT SUBMITTALS

.1 Section 01 78 00: Closeout Submittals.

1.7 QUALITY ASSURANCE

.1 Products of This Section: Manufactured to ISO 9000 certification requirements.

.2 Conform to requirements of CSDMA. Maintain one (1) copy of document on Site.

.3 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three (3) years documented experience.

1.8 REGULATORY REQUIREMENTS

.1 Fire Rated Door and Frame Construction: Labelled and listed to CAN4-S104 and NFPA 252.

.2 Installed Door and Frame Assembly: Conform to NFPA 80 for fire rated class as scheduled.

1.9 DELIVERY, STORAGE, AND PROTECTION

.1 Refer to Section 01 61 00.

.2 Remove doors and frames from wrappings or coverings upon receipt on Site and inspect for damage.

.3 Store in vertical position, spaced with blocking to permit air circulation between components.

.4 Store materials on planks or dunnage, out of water and covered to protect from damage.

.5 Clean and touch up scratches or disfigurement caused by shipping or handling with zinc-rich primer.

Part 2 Products

2.1 MANUFACTURERS

.1 Allmar.

.2 Other acceptable manufacturers offering functionally and aesthetically equivalent products.

.1 Penner Doors and Hardware.

.3 Substitutions: Refer to City of Winnipeg Bid Opportunity. Approved equals to be in accordance with B7

2.2 MATERIALS

.1 Sheet Steel: Galvanized steel to ASTM A653/A653M, commercial grade (CS), Type B.

.1 Interior Doors and Frames: Coating designation ZF120 (A40).

.2 Reinforcement Channel: To CSA G40.20/G40.21, Type 44W, coating designation to ASTM A653/A653M, coating designation to match door.

2.3 DOOR CORE MATERIALS

.1 Honeycomb Core: Structural small cell 25.4 mm (1 inch) maximum kraft paper honeycomb; weight 36.3 kg (80 lb) per ream minimum, density 16.5 kg/cu m (1.03 pcf) minimum, sanded to required thickness.

.1 Fire Rated Doors: Refer to Drawings and Schedules.

2.4 ADHESIVES

.1 Cores and Steel Components: Heat resistant, structural reinforced epoxy, resin based adhesive.

.2 Lock Seam: Reinforced epoxy resin, high viscosity, thicksotroptic sealant.

2.5 PRIMERS

.1 Rust inhibitive touch-up only.

2.6 ACCESSORIES

.1 Door Silencers: Single stud rubber/neoprene.

.2 Fire labels: metal riveted

.3 Sealant: Refer to 07 92 00 – Joint Sealant

2.7 FABRICATION - DOORS

.1 Interior Doors: Laminated core construction.

.2 Longitudinal Edges: Tack welded, filled and sanded with no visible edge seams.

.3 Mortised, blanked, reinforced, drilled and tapped for templated hardware, in accordance with templates provided by hardware supplier.

.4 Reinforce for surface mounted hardware, anchor hinges, thrust pivots, pivot reinforced hinges, or non-templated hardware.

.5 Top and Bottom Channels: Inverted, recessed, welded steel channels.

.6 Provide factory-applied touch-up primer at areas where zinc coating has been removed during fabrication.

.7 Sound Rated Door after Fabrication: STC of minimum 48, measured to ASTM E413.

2.8 LAMINATED CORE CONSTRUCTION

.1 Interior Doors: Both face sheets 1.2 mm (18 gauge) steel with honeycomb core (refer to Schedule), laminated under pressure to face sheets.

2.9 FABRICATION - FRAMES

.1 Interior Frames: 1.6 mm (14 gauge) thick base metal thickness.

.1 Door Frames and Window Assemblies: Welded type construction.

.2 Fire rated Frames: Refer to Drawings and Schedules.

.2 Mortised, blanked, reinforced, drilled and tapped for templated hardware, in accordance with templates provided by hardware supplier.

.3 Prepare frames for silencers. Provide three (3) single silencers for single doors and mullions of double doors on strike side. Provide two (2) single silencers on frame head at double doors without mullions.

.4 Attach fire rated label to each fire rated door unit.

Part 3 Execution

3.1 EXAMINATION

.1 Section 01 71 00: Verify existing conditions before starting work.

.2 Verify that opening sizes and tolerances are acceptable; check floor area within path of door swing for flatness.

.3 Verify doors and frames are correct size, swing, rating and opening number.

.4 Remove temporary shipping spreaders.

3.2 INSTALLATION

.1 Install doors and frames to CSDMA.

.2 Install fire-rated doors and frames in accordance with NFPA 80, and local authority having jurisdiction.

.3 Coordinate with masonry, gypsum board and concrete wall construction for anchor placement and throat depths.

.4 Coordinate installation of doors and frames with installation of hardware and view holes specified in Section 08 71 00.

.5 Set frames plumb, square, level and at correct elevation.

.6 Secure anchorages and connections to adjacent construction.

.7 Brace frames rigidly in position while building-in. Install wood spreaders at third points of frame rebate height to maintain frame width. Provide vertical support at centre of head for openings exceeding 1 200 mm (48 inches) in width.

.8 Remove wood spreaders after frames have been built-in.

.9 Make allowance for deflection to ensure structural loads are not transmitted to frame product.

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

.11 Adjust operable parts for correct clearances and function.

.12 Install door silencers.

.13 Finish paint as specified in Section 09 91 99.

.14 Install roll formed steel reinforcement channels between two abutting frames. Anchor to structure and floor.

3.3 ERECTION TOLERANCES

.1 Section 01 73 00: Execution Requirements.

.2 Maximum Diagonal Distortion: 1.5 mm (1/16 inch) measured with straight edges, crossed corner to corner.

3.4 SCHEDULE

.1 Refer to Door Schedule Section 08 71 00 and Drawings.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Hardware for hollow metal doors.

1.2 RELATED SECTIONS

.1 Section 08 11 13 –Metal Doors and Frames.

.2 Section 08 71 00 – Door Hardware - Groups

1.3 REFERENCES

.1 CAN4-S104-M80 (R1985) - Method for Fire Tests of Door Assemblies.

.2 CAN/ULC-S132-2007 - Emergency Exit and Emergency Fire Exit Hardware.

.3 CSDMA (Canadian Steel Door Manufacturers Association).

.4 DHI (Door and Hardware Institute Canada) - AHC and EHC certification programs.

.5 DHI (Door Hardware Institute) - A115 series.

.6 DHI (Door Hardware Institute) - WDHS.3 - Hardware Locations for Wood Flush Doors.

.7 BHMA (Builders Hardware Manufacturers Association) - A156 series.

.8 NFPA 80 - Fire Doors, Fire Windows.

.9 NFPA 252 - Fire Tests of Door Assemblies (2008 Edition).

.10 UL 10B - Fire Tests of Door Assemblies.

.11 UL 305 - Panic Hardware.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Coordination: Coordinate with other work having a direct bearing on work of this section.

.1 Coordinate the work with other directly affected sections involving manufacture or fabrication of internal reinforcement for door hardware and recessed items.

.2 Coordinate City of Winnipeg's keying requirements during the course of the Work.

.2 Sequencing: Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

1.5 SUBMITTALS FOR REVIEW

.1 Section 01 33 00: Submittal Procedures.

.2 Shop Drawings:

.1 Indicate locations and mounting heights of each type of hardware, schedules, catalogue cuts, electrical characteristics and connection requirements, including make, model, material, function, finish, and all other pertinent information for each door or pair of doors. Use standard typed hardware list. "Horizontal" list not permitted.

.3 Samples:

.1 Submit one (1) sample of each type hardware specified, when requested by Contract Administrator illustrating style, colour, and finish.

.2 Identify each sample by label indicating applicable specification paragraph number, finish, and hardware package number.

1.6 SUBMITTALS FOR INFORMATION

.1 Section 01 33 00: Submittal Procedures.

.2 Installation Data: Manufacturer's special installation requirements.

1.7 CLOSEOUT SUBMITTALS

.1 Section 01 78 00: Closeout Procedures.

.2 Operation and Maintenance Data: Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.

.3 Provide maintenance data, parts list, and manufacturer's instructions for each type door closers, locksets, door holders, and panic hardware for incorporation into maintenance manual.

.4 Brief maintenance staff regarding proper care of hardware such as lubrication of locksets, adjustments of door closers, cleaning, and general maintenance.

.5 Warranty Documentation: Submit manufacturer warranty and ensure forms have been completed in City of Winnipeg's name and registered with manufacturer.

.6 Record Documentation:

.1 Record actual locations of installed cylinders and their master key code.

.2 Keys: Deliver with identifying tags to City of Winnipeg by security shipment direct from hardware supplier.

1.8 MAINTENANCE MATERIAL SUBMITTALS

.1 Section 01 78 40: Maintenance and extra material requirements.

.2 Tools:

.1 Provide special wrenches and tools applicable to each different or special hardware component.

.2 Provide maintenance tools and accessories supplied by hardware component manufacturer.

1.9 QUALITY ASSURANCE

.1 Products of This Section: Manufactured to ISO 9000 certification requirements.

.2 Perform Work to the following requirements:

.1 BHMA A156 series.
.2 DHI - A115 series.
.3 DHI - WDHS.3.
.4 CSDMA.
.5 NFPA 252.
.6 UL 10B.
.7 UL 305.
.8 ULC S132.
.9 CAN4-S104.

.3 Use ULC listed and labelled hardware for doors in fire separations and exit doors.

.4 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three (3) years experience.

.5 Installer Qualifications: Company specializing in performing the work of this section with minimum three (3) years documented experience.

1.10 REGULATORY REQUIREMENTS

.1 Conform to applicable code for Products requiring electrical connection. Listed and classified by ULC as suitable for the purpose specified and indicated.

1.11 DELIVERY, STORAGE, AND PROTECTION

.1 Section 01 61 00: Transport, handle, store, and protect products.

.2 Package hardware items individually; label and identify each package with door opening code to match hardware schedule.

1.12 WARRANTY

.1 Manufacturer's Warranty:

.1 Closers: Ten years
.2 Locksets & Cylinders: Three years
.3 Hinges: Lifetime
.4 All other Hardware: Two years.

Part 2 Products

2.1 SUPPLIERS

.1 Acceptable Suppliers: As indicated in Hardware Schedule.

2.2 MANUFACTURERS

.1 Acceptable Manufacturers: As indicated in Hardware Schedule.

2.3 KEYING

.1 Contractors to supply, install and make use of construction cylinders in all doors. City of Winnipeg will exchange all construction cylinders at building turnover.

2.4 FINISHES

.1 Finishes: Identified in Schedule at end of section.

Part 3 Execution

3.1 EXAMINATION

.1 Section 01 71 00: Verify existing conditions before starting work.

.2 Verify that doors and frames are ready to receive work and dimensions are as indicated on Shop Drawings.

.3 Verify that electric power is available to power operated devices and is of the correct characteristics.

3.2 INSTALLATION

.1 Install hardware to manufacturer's written instructions.

.2 Use templates provided by hardware item manufacturer.

.3 Mounting heights for hardware from finished floor to centre line of hardware item.

3.3 ADJUSTING

.1 Adjust hardware for smooth operation.

3.4 PROTECTION OF FINISHED WORK

.1 Do not permit adjacent work to damage hardware or finish.

3.5 SCHEDULES

.1 Refer to Door Hardware Schedule.

END OF SECTION

Hardware Sets

Set: 1.0

3	Hinge, Full Mortise	TA2314 NRP 4-1/2" x 4"	US32D	MK
1	Storeroom Lock	9K37D 15D	626	BE
1	Final Best Core	By City		BE
1	Surf Overhead Stop	10-X36	630	RF

Set: 2.0

4	Hinge, Full Mortise	TA2314 4-1/2" x 4"	US32D	MK
1	Storeroom Lock	9K37D 15D	626	BE
1	Final Best Core	By City		BE
1	Electric Strike	5000C-LBM	630	HS
1	Automatic Opener	5710	689	NO
1	Kick Plate	K1050 10"	US32D	RO
1	Wall Stop	406	US32D	RO
1	Distress Alarm	By Electrical Division		OT
1	Washroom Relay Kit	Camden CX-WC11		OT
2	Full Height Actuator	639		NO
1	Power Supply	By Electrical Division		OT

Notes: Outside lever always rigid. Electric strike normally unlocked. Pressing inside "push to lock" button will lock the electric strike, disable the outside actuator and illuminate the "occupied when lit" indicator. Pushing the inside actuator will release the electric strike, power open the door and reset the system. Opening the door manually will also reset the system. Washroom control kit includes push to lock button, occupied when lit indicator, door position switch and relay. Single gang boxes for push to lock button and occupied when lit indicator by others. Latch bolt monitor in electric strike can be used in lieu of the door position switch included in the washroom control kit.

Set: 3.0

3	Hinge, Full Mortise	TA2314 NRP 4-1/2" x 4"	US32D	MK
1	Storeroom Lock	9K37D 15D	626	BE
1	Final Best Core	By City		BE
1	Surface Closer	DA 1431 P9	EN	SA
1	Kick Plate	K1050 10"	US32D	RO

1	Wall Stop	406	US32D	RO
1	Gasketing	S88BL		PE

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 08 11 00 – Metal Doors and Frames

.2 Section 08 44 13- Glazed Aluminum Curtain Walls

.3 Section 08 50 00- Windows

1.2 REFERENCE STANDARDS

.1 ASTM International

.1 ASTM C542-05 , Standard Specification for Lock-Strip Gaskets.

.2 ASTM D790-07e1 , Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.

.3 ASTM D1003-07e1 , Standard Test Method for Haze and Luminous Transmittance of Plastics.

.4 ASTM D1929-96(R2001)e1 , Standard Test Method for Determining Ignition Temperature of Plastics.

.5 ASTM D2240-05 , Standard Test Method for Rubber Property - Durometer Hardness.

.6 ASTM E84-10 , Standard Test Method for Surface Burning Characteristics of Building Materials.

.7 ASTM E330-02 , Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.

.8 ASTM F1233-08 , Standard Test Method for Security Glazing Materials and Systems.

.2 Canadian General Standards Board (CGSB)

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

.2 CAN/CGSB-12.2-M91 , Flat, Clear Sheet Glass.

.3 CAN/CGSB-12.3-M91 , Flat, Clear Float Glass.

.4 CAN/CGSB-12.4-M91 , Heat Absorbing Glass.

.5 CAN/CGSB-12.6-M91 , Transparent (One-Way) Mirrors.

.6 CAN/CGSB-12.8-97 , Insulating Glass Units.

.7 CAN/CGSB-12.8-97 (Amendment), Insulating Glass Units.

.8 CAN/CGSB-12.9-M91 , Spandrel Glass.

.9 CAN/CGSB-12.10-M76 , Glass, Light and Heat Reflecting.

.10 CAN/CGSB-12.11-M90 , Wired Safety Glass.

.11 CAN/CGSB-12.12-M90 , Plastic Safety Glazing Sheets.

.12 CAN/CGSB-12.13-M91 , Patterned Glass.

.3 Glass Association of North American (GANA)

.1 GANA Glazing Manual - 2008 .

.2 GANA Laminated Glazing Reference Manual - 2009 .

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 glass, sealants, and glazing accessories and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

.1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Manitoba, Canada.

.4 Samples:

.1 Submit for review and acceptance of each unit.

.2 Submit duplicate samples of finish and sealant material.

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

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 glazing for incorporation into manual.

1.5 QUALITY ASSURANCE

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

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions and 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 glazing and frames from nicks, scratches, and blemishes.

.3 Protect prefinished aluminum surfaces with strippable coating.

.4 Replace defective or damaged materials with new.

1.7 AMBIENT CONDITIONS

.1 Ambient Requirements:

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

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

Part 2 Products

2.1 MATERIALS

.1 Flat Glass:

.1 Silvered mirror glass: (1/4 inch)

.1 Type 1A-float glass for normal use.

.2 Polish and grind edges.

.3 Accessories:

.1 CRL Satin Anodized Canadian Style ¼" Deep Nose 'J' Channel (or approved equal) around perimeter of mirror.

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

Part 3 Execution

3.1 EXAMINATION

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

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

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

.3 Visually inspect substrate.

.4 Inform Contract Administrator of unacceptable conditions immediately upon discovery.

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

3.2 PREPARATION

.1 Clean contact surfaces with solvent and wipe dry.

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

.3 Prime surfaces scheduled to receive sealant.

3.3 INSTALLATION: INTERIOR - DRY METHOD (TAPE AND TAPE)

.1 Perform work in accordance with GANA Glazing Manual and GANA Laminated Glazing Reference Manual for glazing installation methods.

.2 Cut glazing tape to length and set against permanent stops, projecting 1.6 mm above sight line.

.3 Place setting blocks at 1/3 points, with edge block maximum 150 mm from corners.

.4 Rest glazing on setting blocks and push against tape for full contact at perimeter of light or unit.

.5 Place glazing tape on free perimeter of glazing in same manner described.

.6 Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.

.7 Knife trim protruding tape.

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.

.1 Remove traces of primer, caulking.

.2 Remove glazing materials from finish surfaces.

.3 Remove labels.

.4 Clean glass [and mirrors] using approved non-abrasive cleaner in accordance with manufacturer's instructions.

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

3.5 PROTECTION

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

.2 After installation, mark each light with an "X" by using removable plastic tape or paste.

.1 Do not mark heat absorbing or reflective glass units.

.3 Repair damage to adjacent materials caused by glazing installation.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Gypsum board and joint treatment.

.2 Backer board.

.3 Metal channel ceiling framing.

.4 Acoustical Insulation

1.2 RELATED SECTIONS

.1 Section 06 10 13 - Wood Blocking and Curbing.

.2 Section 07 21 19 – Foamed-in-Place Insulation.

.3 Section 07 84 00 - Firestopping.

.4 Section 09 22 16 – Non-Structural Metal Stud Framing

.5 Section 09 30 10 - Ceramic Floor & Wall Tiling.

1.3 REFERENCES

.1 ANSI A118.9-1999(R2005) - Cementitious Backer Units.

.2 ASTM C553, Type 1 - Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.

.3 ASTM C1104 - Test Method for Determining the Water Vapor Sorption of Unfaced Mineral Fiber Insulation.

.4 ASTM C1338 - Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings.

.5 ASTM E84 - Surface Burning Characteristics of Building Materials.

.6 ASTM C475/C475M-02 (R2007) - Joint Compound and Joint Tape for Finishing Gypsum Board.

.7 ASTM C514-04(2009)e1 - Nails for the Application of Gypsum Board.

.8 ASTM C557-03(2009)e1 - Adhesives for Fastening Gypsum Wallboard to Wood Framing.

.9 ASTM C645-09a - Non-Structural Steel Framing Members.

.10 ASTM C754-09a - Installation of Steel Framing Members to Receive Screw-Attached Gypsum Board.

.11 ASTM C840-08 - Application and Finishing of Gypsum Board.

.12 ASTM C954, 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.

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

.14 ASTM C1047-09 - Accessories for Gypsum Wallboard and Gypsum Veneer Base.

.15 ASTM C1177/C1177M, Specification for Glass Mat Gypsum Substrate for Use as Sheathing.

.16 ASTM C1178/C1178M, Specification for Glass Mat Water Resistant Gypsum Backing Board.

.17 ASTM C1280, Specification for Application of Gypsum Sheathing Board.

.18 ASTM C1278/C1278M-07a - Fiber-Reinforced Gypsum Panel.

.19 ASTM C1325-08b - Non-Asbestos Fiber-Mat Reinforced Cementitious Backer Units.

.20 ASTM C1396/C1396M-09a - Gypsum Board.

.21 ASTM E90-09 - Test Method for Laboratory Measurement of Airborne-Sound Transmission Loss of Building Partitions and Elements.

.22 CAN/CGSB 51.34, Vapour Barrier, Polyethylene Sheet for Use in Building Construction.

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

.24 CAN/ULC-S101-07 - Methods of Fire Endurance Tests of Building Construction and Materials.

.25 CAN/ULC-S102-07 - Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

.26 CAN/ULC-S702-09 - Thermal Insulation Mineral Fibre for Buildings.

.27 GA-214-07 (Gypsum Association) - Recommended Levels of Gypsum Board Finish.

.28 GA-216-07 (Gypsum Association) - Application and Finishing of Gypsum Panel Products.

.29 GA-600-09 (Gypsum Association) - Fire Resistance Design Manual.

.30 GA-801-07 (Gypsum Association) - Handling and Storage of Gypsum Panel Products: A Guide for Distributors, Retailers, and Contractors.

.31 UL - Fire Resistance Directory.

.32 ULC - Fire Resistance Directory.

.33 Association of the Wall and Ceilings Industries International (AWEI)

1.4 SYSTEM DESCRIPTION

.1 Acoustic Attenuation for identified Interior Partitions: STC as indicated on Drawings.

1.5 SUBMITTALS FOR REVIEW

.1 Section 01 33 00: Submittal Procedures.

.2 Product Data:

.1 Provide data on steel stud framing gypsum board, backer board, and joint tape.

.3 Shop Drawings:

.1 Indicate special details associated with acoustic seal for openings.

1.6 QUALITY ASSURANCE

.1 Perform Work in accordance with ASTM C840, GA-214, GA-216, and GA-600. Maintain one (1) copy on Site.

.2 Installer Qualifications: Company specializing in performing the work of this section with minimum three (3) years documented experience.

1.7 DELIVERY, STORAGE, AND PROTECTION

.1 Section 01 61 00: Transport, handle, store, and protect products.

.2 Deliver materials in original packages, containers or bundles bearing manufacturer's brand name and identification.

.3 Store materials inside, level, under cover. Keep dry. Protect from weather, other elements and damage from construction operations and other causes.

.4 Handle gypsum boards to prevent damage to edges, ends or surfaces. Protect metal accessories and trim from being bent or damaged.

1.8 ENVIRONMENTAL REQUIREMENTS

.1 Ambient Conditions:

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

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

.3 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 MANUFACTURERS

.1 Substitutions: Refer to Bid Opportunity.

2.2 FRAMING MATERIALS

.1 Studs and Tracks: Specified in Section 09 22 16.

.2 Furring, Framing, and Accessories: Specified in Section 09 22 16 - Non-Structural Metal Stud Framing.

.3 Fasteners: ASTM C1002.

.4 Anchorage to Substrate: Tie wire, nails, screws, and other metal supports, of type and size to suit application; to rigidly secure materials in place.

.5 Adhesive: CAN/CGSB-71.25, ASTM C557, GA-216.

.6 Contractor has the option of using either a proprietary suspension system or a three-component direct-hung system to suspend gypsum board ceilings.

- .1 Cable suspension system:
  - .1 Standard of Acceptance:
    - .1 CGC Drywall Suspension System - direct hung drywall system.
    - .2 Approved method using steel studs and channels.
- .2 Three Component System:
  - .1 (1 ½ inches x ½ inches x 12') 16 gauge channel suspended by 9 gauge (minimum) hanger wire at a maximum of 48" o.c.
  - .2 Tie the furring bar to the channel at (48 inches) o.c.
  - .3 The perimeter support shall be a (1 ½ inches x 1 ¼ inches) 25 gauge galvanized angle.
  - .4 The gypsum board shall be 16mm (5/8 inches) unless noted otherwise.

2.3 GYPSUM BOARD MATERIALS

.1 Standard Gypsum Board: ASTM C1396/C1396M, paper-faced; 1 220 mm (48 inches) wide, maximum available length in place; tapered edges, ends square cut.

- .1 Fire rated core (Type X), 16 mm (5/8 inch) thick.
  - .1 Location: Jan. Closet (Room 137)
  - .2 Standard of Acceptance:
    - .1 Certainteed Type C Drywall
    - .2 CGC/USG Sheetrock Brand Firecode x Gypsum Board
    - .3 Approved Equal
- .2 Abuse Resistant (Type X), 16 mm (5/8 inch) thick.
  - .1 Location: Circulation Corridor (Room 127)
  - .2 Standard of Acceptance

.1 Certainteed Abuse Resistant

.2 Approved Equal

.3 Moisture and Mold Resistant (Type x) 16mm (5/8 inch) thick for wet locations

.1 Location: All rooms within Universal Changeroom without Tile as finish.

.4 Waterproof Tile Backer Board: ASTM E96, C518 and E84. Manufactured from extruded polystyrene foam, with a cement-free reinforcement layer laminated to both sides, 16mm thick, ends square cut.

.1 Location: All rooms in wet areas (Room 130, 115, 131,132, 133, 134, 135, 136)

.2 Standard of Acceptance:

.1 Kerdi-Board; Manufactured by Schluter

2.4 ACCESSORIES

.1 Fire Rated Insulation: mineral fibre acoustic batts. Rockwool Acoustical Fibre Batt Insulation or equal.

.2 Acoustic Sealant: Non-hardening, non-skinning, for use in conjunction with gypsum board.

.3 Corner Beads: ASTM C1047, GA-216, metal commercial grade sheet steel with G90 Zinc finish perforated and knurled 32mm (1 ¼ inch) flanges; one piece length per location.

.4 Casing Beads: ASTM C1047, GA-216, metal, G90 Zinc finish, perforated flanges; one piece length per location.

.1 Standard of Acceptance:

.1 Product: D-100; Manufactured by Bailey Metal Products Ltd.

.5 Edge Trim: ASTM C1047, GA-216; Type U casing bead.

.6 Resilient Channels: 0.5mm (25ga.) base steel thickness galvanized steel.

.1 Standard of Acceptance:

.1 Product: RC-1 resilient channel; Manufactured by UGC.

.7 Channel Trim: galvanized steel.

.1 Standard of Acceptance:

.1 Product: D-4411; Manufactured by Bailey Metal Products Ltd.

.8 Drywall metal trim: galvanized steel.

.1 Standard of Acceptance:

.1 Product: D-200; Manufactured by Bailey Metal Products Ltd.

.9 Angle Framing Trim: 32 x 38mm (1 ¼ inch x 1 ½ inch) 25 ga.

.1 Standard of Acceptance:

.1 Product: D-700; Manufactured by Bailey Metal Products Ltd.

.10 Flexible Column Trim: 14mm (9/16 inch) flexible PVC trim angle.

.1 Standard of Acceptance:

.1 Product: Flex-Grid Angle; Manufactured by Trim-Tex.

.2 Uniflex®.

.11 Acoustic sealant: to CGSB 19-GP-21M, non-hardening, non-skinning, for use in conjunction with gypsum board.

.1 Standard of Acceptance:

.1 Product: Acoustical Sealant; Manufactured by Tremco.

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

.13 Polyethylene: to CAN 2-52.33-M77, Type 2. Minimum 0.15mm (6mil) thickness.

.14 Insulating strip: rubberized, moisture resistant, 3mm (1/8") thick cork or closed cell neoprene strip, 12mm (1/2") wide, with self-sticking permanent adhesive on one face; lengths as required.

.15 Track sill gasket: 3mm (1/8") thick semi-rigid fiberglass strips or closed cell foam.

.16 Isolation hanger: ARH-1, high tensile rubber 11 gauge interlocked wire, size for 5mm (3/16 inch) deflection with maximum load. Available at Tri-Tec Drywall Services.

.17 Channel Studs: 18ga. channel studs at corners as backing for corner guards.

.18 Joint Materials: ASTM C475, GA-216, compatible with products specified.

.19 Reinforcing tape, adhesive, and water.

.20 Joint compound: Asbestos-free dust-controlled.

.1 Standard of Acceptance:

.1 SHEETROCK® All Purpose Joint Compound.

.2 SHEETROCK® Topping Joint Compound.

.3 DURABOND 90® Compound.

.4 SHEETROCK MC® Ready-to-Use.

.5 SHEETROCK® First Coat Paint primer/sealer.

.21 Protect ready-to-use compounds from freezing and extreme heat. Product that has been frozen is to be discarded.

Part 3 Execution

3.1 EXAMINATION

.1 Section 01 71 00: Verify existing conditions before starting work.

.2 Verify that Site conditions are ready to receive work and opening dimensions are as indicated on shop drawings and as verified by Contractor.

3.2 INSTALLATION

.1 Install in accordance with manufactures instructions.

.2 Components shall be lifted with suitable devices.

.3 Components shall be installed plum and true. Shim where necessary.

.4 Fasten components with self drilling, self tapping bugle head screws through face or back as indicated on shop drawings.

.5 Where components are suspended, use as a minimum 12 gauge galvanized steel wire and the suspension points indicated on the shop drawings.

.6 Framing, hangers etc. as specified for Gypsum Board.

.7 Butt joints are to be adhered together using “Liquid Nail” or equivalent.

.8 Do application and finishing of gypsum board in accordance with ASTM C840 except where specified otherwise.

.9 Do application of gypsum sheathing in accordance with ASTM C1280.

.10 Erect hangers and runner channels for suspended gypsum board ceilings in accordance with ASTM C840 except where specified otherwise.

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

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

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

.14 Install 19 x 64 (3/4 x 2 ½ inch) mm furring channels parallel to, and at exact locations of steel stud partition header track.

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

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

.17 Install wall furring for gypsum board wall finishes in accordance with ASTM C840, except where specified otherwise.

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

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

.20 Erect accessories straight, plumb or level, rigid and at proper plane. Use full length pieces where practical. Make joints tight, accurately aligned and rigidly secured. Mitre and fit

corners accurately, free from rough edges. Secure at 150 mm (6 inches) on centre using contact adhesive for full length.

.21 Install casing beads around perimeter of suspended ceilings.

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

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

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

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

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

.27 Locate control joints where indicated, at changes in substrate construction, at approximate 10 m (30 ft) spacing on long corridor runs and at approximate 15 m (45 ft) spacing on ceilings.

.28 Install control joints straight and true.

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

.30 Install expansion joint straight and true.

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

.32 Fit cornice cap over partition, secure to partition track with two rows of sheet metal screws staggered at 300 mm (12 inches) on centre.

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

.34 Install access doors to electrical and mechanical fixtures specified in respective sections. Rigidly secure frames to furring or framing systems.

.35 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.

.36 Gypsum Board Finish: finish gypsum board walls and ceilings to following levels in accordance with Association of the Wall and Ceiling Industries (AWCI) International Recommended Specification on 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.

.37 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.

.38 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.

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

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

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

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

.43 Apply thin coat to entire surface using trowel or drywall broadknife to fill surface texture differences, variations or tool marks.

.44 Allow skim coat to dry completely.

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

.46 Provide protection that ensures gypsum drywall work will remain without damage or deterioration at time of substantial completion.

3.3 CEILING FRAMING INSTALLATION

.1 Install to ASTM C754 and GA-216.

.2 Coordinate location of hangers with other work.

.3 Install ceiling framing independent of walls, columns, and above ceiling work.

.4 Reinforce openings in ceiling suspension system which interrupt main carrying channels or furring channels, with lateral channel bracing. Extend bracing minimum 600 mm (24 inches) past each end of openings.

.5 Laterally brace entire suspension system.

.6 Contractor has the option of using either a proprietary suspension system or a three-component direct-hung system to suspend gypsum board ceilings.

.1 Cable suspension system: Erect hangers and runner channels or suspended gypsum board ceilings where specifically noted to CSA A82.31M. Approved method using steel studs and channels.

.2 Three Component System:

.1 (1 ½ inches x ½ inches x 12') 16 gauge channel suspended by 9 gauge (minimum) hanger wire at a maximum of 48" o.c.

.2 Tie the furring bar to the channel at (48 inches) o.c.

.3 The perimeter support shall be a (1 ½ inches x 1 ¼ inches) 25 gauge galvanized angle.

.4 The gypsum board shall be 16mm (5/8 inches) unless noted otherwise.

.7 Construct ceilings to a tolerance of 1:1200.

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

.9 Fire and sound rated partitions to be continuous to underside of roof structure above suspended or furred ceiling.

.10 Do not erect ceiling suspension system until anchors, blocking, sound or fire barriers, electrical, and mechanical work above ceiling have been inspected and approved by Contract Administrator.

.11 Ensure suspended system is co-ordinated with location of related components.

.12 Support suspension system main runners with hanger wire secured to the building's structural system. Do not attach suspension system to ductwork or building services. Review mechanical drawings for areas requiring special attention. Completed assembly to support super-imposed loads, such as lighting fixtures, diffusers, and grilles.

.13 Support fluorescent light fixtures with supplemental hangers within 150mm (6 inches) of each corner and at maximum 600mm (24 inches) around perimeter.

.14 Provide isolation hangers where noted.

3.4 ACOUSTIC ACCESSORIES INSTALLATION

.1 Install acoustic sealant within partitions in accordance with manufacturer's written instructions.

.2 Erect accessories straight, plumb or level, rigid, and at proper plane. Use full-length pieces where practical. Make joints tight, accurately aligned, and rigidly secured. Mitre

and fit corners accurately, free from rough edges. Secure at 150mm (6") o.c. or using contact adhesive for full length.

.3 Install casing beads around perimeter of suspended ceilings.

.4 Install channel trim where gypsum board butts against surfaces having no trim and at control joints. Cement and sand to finish.

.5 Install insulating strips continuously at edges of gypsum board or casing beads abutting metal window or exterior doorframes, to provide thermal break.

3.5 GYPSUM BOARD INSTALLATION

.1 Do not apply gypsum board until bucks, anchors, blocking, sound attenuation, electrical and mechanical work are approved.

.2 Apply gypsum board to wood or metal furring or framing using screw fasteners. Maximum spacing of screws 300 mm (12 inches) on centre.

.3 Apply 13 mm (1/2 inch) 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, and in partitions where perimeter sealed with acoustic sealant.

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

.5 Install gypsum board with face side out.

.6 Do not install damaged or damp boards.

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

.8 Erect single layer standard gypsum board horizontal or vertical orientation (whichever results in fewest ends), with ends and edges occurring over firm bearing.

.9 Use screws when fastening gypsum board to wood furring or framing.

.10 Erect exterior gypsum soffit board perpendicular to supports, with staggered end joints over supports.

.11 Treat cut edges and holes in moisture resistant gypsum board with sealant.

.12 Place control joints consistent with lines of building spaces as indicated or required. Confirm all locations with Contract Administrator.

.13 Place corner beads at external corners. Use longest practical length. Place edge trim where gypsum board abuts dissimilar materials.

.14 Install ceramic tile backing board over metal studs, plywood sheet, or gypsum board to manufacturer's written instructions. Refer to Drawings.

3.6 PROPRIETARY BACKER BOARDS

.1 Install proprietary paperless exterior sheathing, wallboards, cement board and tile backer boards in accordance with the manufacturer's technical literature.

3.7 ACCESS DOORS

.1 Install access doors to electrical and mechanical fixtures specified in respective Sections and to the approval of the Contract Administrator for location. Refer to Drawings for locations of ceiling access doors.

.2 Rigidly secure frames to furring or framing systems.

3.8 JOINT TREATMENT

.1 Finish in accordance with ASTM C840 and GA-214, Level 5 for all areas exposed to view and Level 2 for all areas not exposed.

.2 Feather coats on to adjoining surfaces so that camber is maximum 0.8 mm (1/32 inch).

.1 Fill and finish joints and corners of cementitious backing board.

.2 Control Joints:

.1 Construct control joints of preformed units or (2) back-to-back casing beads set in gypsum board facing and supported independently on both sides of joint.

.2 Provide continuous 150mm (6 inches) wide polyethylene dust barrier behind and across control joints.

.3 Locate control joint at approximate 10000mm (30') spacing on long runs, at approximate 15000mm (45') spacing on ceilings or where indicated on drawings. Locate control joints over door openings aligned with corner of doorframe and carry up to top of partition.

.4 Install control joints straight and true.

.5 Install expansion joint covers at Bridge connection in accordance with manufacturer's instructions. Blend into wall.

.3 Taping and Filling:

.1 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.

.2 Finish corner beads, control joints, and trim as required with (2) coats of joint compound and (1) coat of taping compound, feathered out onto panel faces.

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

.4 Tape and fill joints above ceiling line to underside of structure in all walls and to floor line for proper installation of cove base.

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

.6 Completed installation to be smooth, level or plumb, free from waves and other defects, and ready for painting or other finish coatings including fabric or vinyl wall coverings.

.7 Apply a continuous skim coat at all partitions located directly below valence lighting or perpendicular to exterior windows for a length of 10000mm (30') to provide a smooth surface free of joints and imperfections.

.8 Sanding not required behind permanent fixtures and above finished ceilings.

.9 Apply a continuous skim coat of topping joint compound over the FibreBond® panels to provide a smooth and consistent painting surface, or apply SHEETROCK® First Coat paint.

3.9 TOLERANCES

.1 Maximum Variation of Finished Gypsum Board Surface from True Flatness: 3 mm in 3 m (1/8 inch in 10 ft) in any direction.

3.10 SCHEDULES

.1 Level 1: Above finished ceilings concealed from view.

.2 Level 4: Ceilings exposed to view.

.3 Construct Fire separation assemblies where indicted on drawings

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Formed metal framing of studs and furring, at interior locations.

.2 Framing accessories.

.3 Gypsum board and joint treatment.

.4 Light gauge metal stud wall framing.

.5 Metal channel ceiling framing unless otherwise stated on Structural Drawings.

1.2 RELATED SECTIONS

.1 Section 05 50 00 - Metal Fabrications.

.2 Section 06 10 13 - Wood Blocking and Curbing: Rough wood blocking within stud framing.

.3 Section 09 21 16 - Gypsum Board Assemblies: Gypsum board on metal studs for partitioning.

1.3 REFERENCES

.1 ASTM A123/A123M-09 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

.2 ASTM A653/A653M-09 - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.3 ASTM C645-09a - Non-Structural Steel Framing Members.

.4 ASTM C754-04 - Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.

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

.6 CAN/CGSB-1.181-99 - Ready-Mixed, Organic Zinc-Rich Coating.

.7 CAN/CGSB-7.1-98 - Lightweight Steel Wall Framing Components.

.8 SSPC (The Society for Protective Coatings) - Steel Structures Painting Manual.

.9 Association of Wall and Ceiling Contractors (A.W.C.C.) Specification Standards Manual.

.10 CAN/CSA-S136-07 - North American Specification for the Design of Cold-Formed Steel Structural Members.

.11 CSA W47.1-03 (R2008) - Certification of Companies for Fusion Welding of Steel Structures.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Coordination:

.1 Coordinate with other work having a direct bearing on work of this section.

.2 Coordinate the placement of components within the stud framing assembly specified elsewhere.

1.5 QUALITY ASSURANCE

.1 Perform Work to ASTM C754 Association of Wall and Ceiling Contractors (A.W.C.C.) Specification Standards Manual.

.2 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three (3) years experience.

.3 Installer Qualifications: Company specializing in performing the work of this section with minimum three (3) years documented experience.

Part 2 Products

2.1 STUD FRAMING MATERIALS

.1 Studs: ASTM A653/A653M, non-load bearing rolled steel, channel shaped, punched for utility access, as indicated on Drawings.

.1 Thickness: 0.76 mm (20 gauge) unless otherwise noted.

.2 Tracks and Headers: Same material and thickness as studs, bent leg retainer notched to receive studs.

.1 Compression Track: Supply electrogalvanized 0.9mm (20ga.) nominal core thickness steel track with minimum 50mm (2 inch) deep leg and sufficient width to accommodate deflection movement in structure with compressing wall studs.

.3 Ceiling Runners: Interior Steel Studs and Furring of the Association of Wall and Ceiling Contractors (A.W.C.C.) Specification Standards Manual With extended leg retainer.

.1 20ga. 0.88mm (0.035 inch), as detailed with leg length to allow for 50mm (2 inch) movement.

.4 Furring and Bracing Members: Of same material as studs; thickness to suit purpose.

.1 0.5mm (25ga.) core thickness.

.2 22 x 65mm (7/8 inch x 2 ½ inch) hat section, galvanized.

.5 Fasteners: ASTM C1002, self drilling, self tapping screws.

.1 Non-load bearing channel stud framing: to ASTM 645-76. "Non-load Bearing Steel Studs, runners (Track), and Rigid Furring Channels for Screws".

.2 Screws for the application to steel studs, runners and furring channels: to ASTM C646-78a "Steel Drill Screws for the Application of Gypsum Sheet Material to Light Gauge Steel Studs".

.3 Screw penetration beyond joined materials shall not be less than 3 exposed threads.

.4 Thread types and drilling capability shall conform to the manufacturer's recommendations.

.5 Screws covered by sheathing materials shall have low profile heads.

.6 Acoustical Insulating Tape: Interior Steel Studs and Furring of the Association of Wall and Ceiling Contractors (A.W.C.C.) Specification Standards Manual.

.7 Bracing: cross bracing 25mm (1 inch) x 16ga. galvanized metal strapping for diagonal bracing.

.8 Sill Gasket: Neoprene purpose made closed cell sill gasket to be installed under base track of exterior steel studs.

.9 Acoustic Sealant: As specified in Section 09 21 16.

.10 Touch-Up Primer for Galvanized Surfaces: CAN/CGSB-1.181.

2.2 FABRICATION

.1 Fabricate assemblies of framed sections to sizes and profiles required.

.2 Fit, reinforce, and brace framing members to suit design requirements.

.3 Fit and assemble in largest practical sections for delivery to Site, ready for installation.

2.3 FINISHES

.1 Accessories: Same finish as framing members.

Part 3 Execution

3.1 EXAMINATION

.1 Section 01 71 00: Verify existing conditions before starting work.

.2 Verify that rough-in utilities are in proper location.

3.2 ERECTION

.1 Align and secure top and bottom runners at 600 mm (24 inches) on centre.

.2 Place two (2) beads of acoustic sealant between runners and substrate to achieve an acoustic seal.

.3 Place one (1) beads of acoustic sealant between studs and adjacent vertical surfaces to achieve an acoustic seal.

.4 Fit runners under and above openings; secure intermediate studs to same spacing as wall studs.

.5 Install studs vertically at 400 mm (16 inches) on centre, unless otherwise noted on Drawings.

.6 Align stud web openings horizontally.

.7 Secure studs to tracks using fastener method. Do not weld.

.8 Stud Splicing: Not permissible.

.9 Fabricate corners using a minimum of three studs.

.10 Double stud at wall openings, door and window jambs, not more than 50 mm (2 inches) from each side of openings.

.11 Brace stud framing assembly rigid.

.12 Coordinate erection of studs with requirements of door frames and window frames; install supports and attachments.

.13 Coordinate installation of wood bucks, anchors, and wood blocking with electrical and mechanical work to be placed within or behind stud framing.

.14 Blocking: Install blocking for support of plumbing fixtures, toilet partitions, wall cabinets, toilet accessories, hardware, opening frames, and all other wall mounted installations.

.1 Secure wood blocking to studs.

.15 Refer to Drawings for indication of partitions extending to finished ceiling only and for partitions extending through the ceiling to the structure above. Maintain clearance under structural building members to avoid deflection transfer to studs. Provide extended leg ceiling runners.

.16 Coordinate placement of insulation in stud spaces after stud frame erection.

3.3 ACCESS PANELS

.1 Co-ordinate the work and prepare openings for access panels in gypsum wallboard partitions and ceilings. Access panels will be supplied by other trades for access to plumbing, mechanical, and other service points. Installation of the access panel will be by Section 09 21 16 - Gypsum Board Assemblies, unless noted otherwise. This section prepares the opening with metal stud back up.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 07 92 00- Joint Sealing

.2 Section 09 21 16- Gypsum Board Assemblies

.3 Section 10 28 14- Toilet and Bath Accessories

1.2 REFERENCE STANDARDS

.1 American National Standards Institute (ANSI)/Ceramic Tile Institute (CTI)

.1 ANSI A108.1-99 , Specification for the Installation of Ceramic Tile (Includes ANSI A108.1A-C, 108.4-.13, A118.1-.10, ANSI A136.1).

.2 CTI A118.3-92 , Specification for Chemical Resistant, Water Cleanable Tile Setting and Grouting Epoxy and Water Cleanable Tile Setting Epoxy Adhesive (included in ANSI A108.1).

.3 CTI A118.4-92 , Specification for Latex Cement Mortar (included in ANSI A108.1).

.4 CTI A118.5-92 , Specification for Chemical Resistant Furan Resin Mortars and Grouts for Tile Installation (included in ANSI A108.1).

.5 CTI A118.6-92 , Specification for Ceramic Tile Grouts (included in ANSI A108.1).

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

.1 ASTM C144-04, Specification for Aggregate for Masonry Mortar.

.2 ASTM C207-06 , Specification for Hydrated Lime for Masonry Purposes.

.3 ASTM C847-06 , Specification for Metal Lath.

.4 ASTM C979-05 , Specification for Pigments for Integrally Coloured Concrete.

.3 Canadian General Standards Board (CGSB)

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

.2 CGSB 71-GP-22M-78(AMEND.), Adhesive, Organic, for Installation of Ceramic Wall Tile.

.3 CAN/CGSB-75.1-M88 , Tile, Ceramic.

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

.4 CSA Group (CSA)

.1 CSA A123.3-05 , Asphalt Saturated Organic Roofing Felt.

.2 CAN/CSA-A3000-03(R2006) , Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

.5 Terrazzo Tile and Marble Association of Canada (TTMAC)

.1 Tile Specification Guide 09 30 00 2006/2007, Tile Installation Manual.

.2 Tile Maintenance Guide 2000 .

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.

.1 Include manufacturer's information on:

.1 Ceramic tile, marked to show each type, size, and shape required.

.2 Chemical resistant mortar and grout (Epoxy and Furan).

.3 Cementitious backer unit.

.4 Dry-set cement mortar and grout.

.5 Divider strip.

.6 Elastomeric membrane and bond coat.

.7 Reinforcing tape.

.8 Levelling compound.

.9 Latex cement mortar and grout.

.10 Commercial cement grout.

.11 Organic adhesive.

.12 Slip resistant tile.

.13 Waterproofing isolation membrane.

.14 Fasteners.

.3 Provide samples in accordance with Section 01 33 00- Submittal Procedures.

.1 Wall tile: submit 300 x 300 mm sample panels of each colour, texture, size, and pattern of tile.

.2 Trim shapes, bullnose cap and cove including bullnose cap and base pieces at internal and external corners of vertical surfaces, each type, colour, and size.

.3 Adhere tile samples to 13 mm thick plywood and grout joints to represent project installation.

1.4 QUALITY ASSURANCE

.1 Quality Assurance Submittals:

.1 Manufacturer's Instructions: manufacturer's installation instructions.

1.5 MOCK-UP

.1 Section 01 45 00 – Quality Control: Requirements for mock-up.

.2 Ceramic Wall Tiling

.1 Provide 1 m wide x full height of wall mockup, with backer board, finish grout and specified accessories.

.3 Ceramic Floor Tiling:

.1 Provide 3 m (3 feet) long by 1 m (3 feet) wide mock-up, with cleavage membrane, finish grout, and specified accessories.

.4 Locate where directed by Contract Administrator.

.5 Approved mock-up may remain as part of the Work.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Packing, shipping, handling and unloading:

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

1.7 AMBIENT CONDITIONS

.1 Maintain air temperature and structural base temperature at ceramic tile installation area above 12 degrees C for 48 hours before, during, and 48 hours after, installation.

.2 Do not install tiles at temperatures less than 12 degrees C or above 38 degrees C.

.3 Do not apply epoxy mortar and grouts at temperatures below 15 degrees C or above 25 degrees C.

1.8 MAINTENANCE

.1 Extra Materials:

.1 Provide maintenance materials in accordance with Section 01 78 00- Closeout Submittals.

.2 Provide minimum 2% of each type and colour of tile required for project for maintenance use. Store where directed.

.3 Maintenance material same production run as installed material.

Part 2 Products

2.1 WALL TILE (CT-1)

.1 Ceramic tile (CT-1): to CAN/CGSB-75.1, Type 5, Class MR 4, 4” x 4” x ¼” size, smooth surface, as indicated on drawings.

.1 Standard of Acceptance: Olympia Colour & dimensions series, Arctic White, Finish: Bright, size 4” x 4”

.1 Pattern: Horizontal Stacked Bond per interior elevations.

.2 Grout colour to be selected by Contract Administrator from manufacturers range

2.2 WALL TILE (PO-1) – LARGE FORMAT

.1 Porcelain Tile (PO-1): to CAN/CGSB-75.1, Type 5, Class MR 4, 39.375” x 118.11” x .22” size, as indicated on drawings.

.1 Standard of Acceptance: Stone Tile Laminam Calce in colour Grigio

.1 Grout colour to be selected by Contract Administrator from manufacturers range

2.3 FLOOR TILE

.1 Porcelain tile (CT-2): to ANSI A137.1 AND to CAN/CGSB-75.1, 50mm (2”) x (50mm (2”), 305mm x 305mm (12”x12”) mesh, non-slip abrasive surface (unglazed finish), as indicated on drawings and schedule.

.1 Standard of Acceptance: Olympia Tile Quebec Series

.1 Colour: colour to be selected by Contract Administrator from manufacturers range ; Allow for two colour selections

2.4 TILE BACKER BOARD

.1 Refer to Section 09 21 16 - Gypsum Board Assemblies for Waterproof Tile Substrate.

2.5 PATCHING AND LEVELLING COMPOUND

.1 Cement base, polymer compound, manufactured specifically for resurfacing and leveling concrete floors. Products containing gypsum are not acceptable.

.2 Meet ANSI A108.1 and ASTM C109 and C348

.3 Surface preparation: as per manufacturers recommendation

.4 Mixing and Product Application: as per manufacturers recommendation

.5 Curing procedure: as per manufacturers recommendation

.6 Provide expansion and control joint as recommended by manufacturer

.7 Have not less than the following physical properties:

.1 Compressive strength – 20.7 to 27.6 MPa.

.2 Flexural strength -6.48 to 10.3 MPa.

.8 Standard of Acceptance: Mapei Planislope RS

2.6 WATERPROOFING MEMBRANE

.1 Premium latex based waterproofing and crack isolation membrane

.2 Meets ANSI A118.10 and ANSI 118.12

.3 Standard of Acceptance: Mapei Mapelastic AquaDefense

2.7 TILE-SETTING MORTARS

.1 Polymer-modified Thin set mortar that can be used for large and heavy tile and non sag applications

.2 Meet ANSI A118.4 THE, A118.11 and A118.15 HTE

.3 Surface preparation: as per manufacturers recommendation

.4 Mixing and Product Application: as per manufacturers recommendation

.5 Standard of Acceptance: Mapei Ultralite Mortar

2.8 GROUT

.1 Epoxy grout and adhesive (Industrial Grade):

.1 100% solids epoxy grout.

.2 Solvent free, low VOC, two component system.

.3 Comply with ANSI A118.3 requirements and ISO 130007 RG Classification

.4 Job coloured grout are not acceptable.

.5 Standard of Acceptance: Mapei Kerapoxy IEG CQ

.1 Colour: To be selected from manufacturer's standard range for each type of tile.

2.9 FLEXIBLE SEALANT

.1 100% silicone sealant specifically formulated for heavy traffic for expansion/movement joints complying

.2 Comply with ASTM standards; slump (ASTM C639), Tack-Free time (ASTM C679,) shore "A" hardness (ASTM C661), joint movement (ASTM C920), elongation at break (ASTM D412), flexibility (ASTM C734) and passes weatherability (Accelerated Weathering Tester QUV)

.3 Application: as per manufacturers recommendation

.4 Standard of Acceptance: Mapei Mapesil T

.1 Colour: To be selected from manufacturer's standard range

2.10 ACCESSORIES

.1 Reinforcing mesh: 50 x 50 x 1.6 x 1.6 mm galvanized steel wire mesh, welded fabric design, in flat sheets.

.2 Cleavage plane: polyethylene film to CGSB 51-34.

.3 Metal lath: to ASTM C847 galvanized finish, 10 mm rib at 2.17 kg/m^2

.4 Prefabricated Movement Joints: purpose made, having a Shore A Hardness not less than 60 and elasticity of plus or minus 40 percent when used in accordance to TTMAC Detail 301EJ.

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

.1 Sealants: maximum VOC limit 250 g/L to SCAQMD Rule 1168.

.6 Floor sealer and protective coating: to CAN/CGSB-25.20, to tile and grout manufacturers recommendations.

.7 Reducer Strips: purpose made metal extrusion; anodized aluminum type, ball-and-socket hinged profile with sloped, integrated trapezoid-perforated anchoring leg, and integrated grout joint spacer.

.1 Standard of Acceptance:

.1 Schluter®, RENO-U.

.1 Profile with sloped exposed surface: 4mm (5/32 inch) tall leading edge, integrated trapezoid-perforated anchoring leg, and integrated grout joint spacer.

.2 Material and Finish: AE – Satin Anodized Aluminum.

.3 Location: At all Porcelain/Ceramic Tile and Concrete Transitions.

.4 Installation method: To suit selected ceramic tile thickness.

.5 Install as per the recommendations and specifications of the manufacturer.

.8 Finishing and Edge-Protection Profiles for walls: purpose made metal extrusion; anodized aluminum type, profile with square visible surface, integrated trapezoid-perforated anchoring leg, and integrated grout joint spacer.

.1 Standard of Acceptance;

.1 Schluter®, SCHIENE.

.1 Profile: Square visible surface, integrated trapezoid-perforated anchoring leg, and integrated grout joint spacer.

.2 Material and Finish: AE – Satin Anodized Aluminum.

.3 Location: At all Porcelain/Ceramic Tile terminations and exposed edges.

.4 Installation method: To suit selected ceramic tile thickness.

.5 Install as per the recommendations and specifications of the manufacturer.

.2 Schluter®, DILEX-EHK.

.1 Profile: Coved surface, integrated trapezoid-perforated anchoring leg, and integrated grout joint spacer.

.2 Material and Finish: AE – Satin Anodized Aluminum.

.3 Location: At all Ceramic Tile inside corner edges at and wall transitions.

.4 Installation method: To suit selected ceramic tile thickness.

.5 Install as per the recommendations and specifications of the manufacturer.

.3 Schluter®, DILEX-HKA.

.1 Profile: Coved surface, integrated trapezoid-perforated anchoring leg, and integrated grout joint spacer.

.2 Material and Finish: AE – Satin Anodized Aluminum.

.3 Location: At all Porcelian/Ceramic Tile wall to floor transitions.

.4 Installation method: To suit selected porcelain/ceramic tile thickness.

.5 Install as per the recommendations and specifications of the manufacturer.

.4 Schluter®, QUADEC

.1 Profile: Squsre reveal surface, integrated trapezoid-perforated anchoring leg, and integrated grout joint spacer.

.2 Material and Finish: AE – Satin Anodized Aluminum.

.3 Location: At Ceramic Tile outside corner wall to wall transitions.

.4 Installation method: To suit selected porcelain/ceramic tile thickness.

.5 Install as per the recommendations and specifications of the manufacturer.

2.11 MIXES

.1 To suit substrate and wall tile / floor tile

2.12 CLEANING COMPOUNDS

.1 Specifically designed for cleaning masonry and concrete and which will not prevent bond of subsequent tile setting materials including patching and leveling compounds and elastomeric waterproofing membrane and coat.

.2 Materials containing acid or caustic material are not acceptable.

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 WORKMANSHIP

.1 Do tile work in accordance with the latest edition of TTMAC Tile Installation Manual, "Ceramic Tile", except where specified otherwise.

.2 Apply tile or backing coats to clean and sound surfaces.

.3 Fit tile around corners, fitments, fixtures, drains and other built-in objects. Maintain uniform joint appearance. Cut edges smooth and even. Do not split tiles.

.4 Maximum surface tolerance 1:800.

.5 Make joints between tile uniform and approximately 1.5 mm wide, plumb, straight, true, even and flush with adjacent tile. Ensure sheet layout not visible after installation. Align patterns.

.6 Lay out tiles so perimeter tiles are minimum 1/2 size.

.7 Sound tiles after setting and replace hollow-sounding units to obtain full bond.

.8 Use metal trims at all inside and outside corners and at floor to wall transitions.

.9 Use metal trims at termination of wall tile panels.

.10 Allow minimum 24 hours after installation of tiles, before grouting.

.11 Clean installed tile surfaces after installation and grouting cured.

.12 Make expansion joints at 20’-0” max, both directions and where indicated on drawings.

3.3 WALL & FLOOR TILE

.1 Install in accordance with TTMAC details.

.2 Level substrate with smoothing / ramping mortar specified if required prior to tile installation.

.3 Ensure cement board is securely fastened so that no deflection is present.

.4 All mortars to be applied in a unidirectional manner.

.5 Fit tile around corners, fitments, fixtures, drains and other built-in objects. Maintain uniform joint appearance. Cut edges smooth and even. Do not split tiles.

.6 Clean installed tile surfaces after installation and grouting cured.

.7 Install divider strips at junction of tile flooring and dissimilar materials.

3.4 FLOOD TEST

.1 After installation of new sloped mortar base, but prior to ceramic tile installation, conduct a flood test of all areas to ensure positive slopes are achieved to floor drains

.2 Conduct test in the presence of Contract Administrator and City, and proceed with ceramic floor tile installation only after acceptance of floor slopes by Contract Administrator

3.5 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.

3.6 CLEANING

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

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures

.2 Section 01 45 00 - Quality Control.

.3 Section 01 61 00 - Common Product Requirements.

.4 Section 09 21 16 – Gypsum Board Assemblies.

.5 Section 09 22 16 – Non-Structural Metal Stud Framing

1.2 REFERENCES

.1 ASTM International

.1 ASTM C635/C635M-07, Standard Specifications for the Manufacture, Performance and Testing of Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings.

.2 ASTM C636/C636M-08, Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.

.3 ASTM E1477-98a(2008), Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-92.1-M89, Sound Absorptive Prefabricated Acoustical Units.

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

.1 Material Safety Data Sheets (MSDS).

.4 Underwriter's Laboratories of Canada (ULC)

.1 CAN/ULC-S102-2007, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

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 ceiling panels and ceiling suspension system and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit 2 copies of WHMIS MSDS to Contract Administrator.

.3 Shop Drawings:

.1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Manitoba, Canada.

.2 Submit reflected ceiling plans for special grid patterns as indicated.

.3 Indicate lay-out, hanger spacing and fastening details, splicing method for main and cross runners, change in level details, and acoustical unit support at ceiling fixture including lateral bracing and accessories.

.4 Samples:

.1 Submit for review and acceptance of each unit.

.2 Samples will be returned for inclusion into work.

.3 Submit duplicate samples of each type acoustical units.

1.4 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:

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

.2 Store materials inside, level, under cover. Protect from weather, damage from construction operations and other causes, in accordance with manufacturer's printed instructions.

.3 Handle materials to prevent damage to edges or surfaces. Protect metal accessories and trim from being bent or damaged.

.4 Store and protect acoustic ceiling materials from nicks, scratches, and blemishes.

.5 Replace defective or damaged materials with new.

.1 Packaging Waste Management: remove and recycle waste materials to appropriate facilities.

Part 2 Products

2.1 COMPONENTS

.1 Acoustic units for suspended ceiling system: to CAN/CGSB-92.1.

.2 Acoustic Ceiling Tile ‘ACT’ (in Universal Room Areas),

.1 Type: XX (per ASTM E1264)

.2 Form: NA (per ASTM E1264)

.3 Pattern: G (per ASTM E1264)

.4 Finished Surface: CRF vinyl

.5 Finished Surface Color: White

.6 Flame Spread: Class A per ASTM E84

.7 Core Composition: Moisture resistant, fiberglass-reinforced gypsum

.8 Clean Room Classification: Class 5 per ISO 14644-1

.9 Humidity Resistance: Warrantied to withstand relative humidity of up to 95% at 104 deg. F. without sagging, warping or delaminating for 10 years.

.10 Noise Reduction Coefficient (NRC) designation: NA

.11 Light Reflectance (LR) range of 0.78 to ASTM E1477.

.12 Edge type: square.

.13 Size: 610mm x 1220mm x 13mm (2’x4’x 1/2”)

.14 Standard of Acceptance:

.1 Aquarock by CertainTeed

.2 Ceramaguard by Armstrong

.3 Radar Ceramic ClimaPlus by USG

.3 Acoustical Suspension:

.1 Intermediate duty system to ASTM C635.

.2 Basic materials for suspension system: commercial quality cold rolled steel, zinc coated.

.3 Suspension system: non-fire rated, two directional exposed tee bar grid.

.4 Exposed tee bar grid components: shop painted satin sheen, white colour. Components die cut.

.5 Flange Size: 24mm (15/16”)

.6 Colour: White

.7 Main Runners: 3658mm (12’)

.8 Cross Tees: To suit ceiling layout

.9 Edge Molding: Angle

.10 Hanger wire: galvanized soft annealed steel wire, 3.6 mm diameter for access tile ceilings.

.11 Hanger inserts: purpose made.

.12 Carrying channels: of size and gauge to support loads and be constructed of galvanized steel.

.13 Accessories: splices, clips, wire ties, retainers and wall moulding flush or reveal, to complement suspension system components, as recommended by system manufacturer.

.4 Performance/Design Criteria:

.1 Maximum deflection: 1/360th of span to ASTM C635 deflection test.

2.2 ACCESSORIES

.1 Touch-up paint: in accordance with manufacturer's recommendations for surface conditions:

.1 Paint: VOC limit 250 g/L maximum to GS-11.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for product installation in accordance with manufacturer's written instructions prior to acoustical ceiling installation.

.1 Visually inspect substrate in presence of Contract Administrator.

.2 Inform Contract Administrator of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Contract Administrator.

3.2 INSTALLATION

.1 Installation: in accordance with ASTM C636 except where specified otherwise.

.2 Suspension System:

.1 Erect ceiling suspension system after work above ceiling has been inspected by Contract Administrator.

.2 Secure hangers to overhead structure using attachment methods acceptable to Contract Administrator.

.3 Install hangers spaced at maximum 1200 mm centres and within 150 mm from ends of main tees.

.4 Lay out centreline of ceiling both ways, to provide balanced borders at room perimeter as indicated on reflected ceiling plan.

.5 Install wall moulding to provide correct ceiling height.

.6 Completed suspension system to support super-imposed loads, such as lighting fixtures, diffusers, grilles and speakers.

.7 Support at light fixtures and diffusers with additional ceiling suspension hangers within 150 mm of each corner and at maximum 600 mm around perimeter of fixture.

.8 Interlock cross member to main runner to provide rigid assembly.

.9 Ensure finished ceiling system is square with adjoining walls and level within 1:1000.

.10 Control relative humidity and temperature levels in accordance to manufacturer's recommendations prior to ceiling installation.

.3 Acoustic Panels:

.1 Install acoustical panels and tiles in ceiling suspension system.

.2 Co-ordinate ceiling work with work of other sections such as interior lighting, fire protection communication, and intrusion and detection systems.

3.3 CLEANING

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

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

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

3.4 PROTECTION

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

.2 Repair damage to adjacent materials caused by acoustical ceiling installation.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 06 40 00- Architectural Woodwork

.2 Section 08 11 00 – Metal Doors and Frames

.3 Section 09 21 16- Gypsum Board Assemblies

1.2 REFERENCE STANDARDS

.1 Environmental Protection Agency (EPA)

.1 Test Method for Measuring Total Volatile Organic Compound Content of Consumer Products, EPA Method 24 - Surface Coatings.

.2 SW-846, Test Methods for Evaluating Solid Waste: Physical/Chemical Methods.

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

.1 Material Safety Data Sheets (MSDS).

.3 Master Painters Institute (MPI)

.1 The Master Painters Institute (MPI)/Architectural Painting Specification Manual (ASM) - [current edition] .

.2 Standard GPS-1-12 , MPI Green Performance Standard.

.3 Standard GPS-2-12 , MPI Green Performance Standard.

.4 National Research Council Canada (NRC)

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

.5 Society for Protective Coatings (SSPC)

.1 SSPC Painting Manual, Volume Two, 8th Edition, Systems and Specifications Manual.

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Scheduling:

.1 Coordinate painting operations with other trades.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Provide manufacturer's instructions, printed product literature and data sheets for paint and paint products and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Confirm products to be used are in MPI’s approved product list.

.3 Upon completion, provide records of products used. List products in relation to finish system and include the following:

.1 Product name, type and use.

.2 Manufacturer's product number.

.3 Colour numbers.

.4 MPI Environmentally Friendly classification system rating.

.5 Manufacturer's Material Safety Data Sheets (MSDS).

.6 MPI #

.4 Samples:

.1 Submit full range colour sample chips to indicate where colour availability is restricted.

.2 Submit duplicate 12” x 12” (300 x 300 mm) sample panels of each paint and special finish or stain with specified paint or coating in colours, gloss/sheen and textures required to MPI Architectural Painting Specification Manual standards submitted on following substrate materials:

.1 5/8” (16 mm) gypsum board for finishes over gypsum board and other smooth surfaces.

.2 ½” (13 mm) douglas fir plywood for finishes over plywood.

.3 ¾” (19 mm) Arbor Wood Ash 190 Siding for finishes over interior wood siding.

.4 Retain reviewed samples on-site to demonstrate acceptable standard of quality for appropriate on-site surface.

.5 Certificates: Provide certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties. MPI Gateway #.

.6 Manufacturer's Instructions:

.1 Provide manufacturer's installation and application instructions.

1.5 CLOSEOUT SUBMITTALS

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

.2 Operation and Maintenance Data: Provide operation and maintenance data for painting materials for incorporation into manual.

.3 Include:

.1 Product name, type and use.

.2 Manufacturer's product number.

.3 Colour numbers.

.4 MPI Environmentally Friendly classification system rating.

1.6 MAINTENANCE MATERIAL SUBMITTALS

.1 Extra Stock Materials:

.1 Provide maintenance materials in accordance with Section 01 78 00- Closeout Submittals.

.2 Submit one (1) four litre can of each type, colour, and surface finish to City.

.3 Label each container with colour, type, texture, room locations, in addition to the manufacturer's label.

1.7 QUALITY ASSURANCE

.1 Qualifications:

.1 Contractor: to have a minimum of 5 years proven satisfactory experience. When requested, provide list of last 3 comparable jobs including, job name and location, specifying authority, and project manager.

.2 Qualified journeypersons as defined by local jurisdiction to be engaged in painting work.

.3 Apprentices: may be employed provided they work under direct supervision of qualified journeyperson in accordance with trade regulations.

.4 Conform to latest MPI requirements for exterior painting work including preparation and priming.

.5 Materials: in accordance with MPI Painting Specification Manual "Approved Product" listing and from a single manufacturer for each system used.

.6 Retain purchase orders, invoices and documents to prove conformance with noted MPI requirements when requested by Contract Administrator.

.7 Standard of Acceptance:

.1 Walls: no defects visible from a distance of 1000 mm (39 inches) at 90 degrees to surface.

.2 Soffits and Ceilings: no defects visible from floor at 45 degrees to surface when viewed using final lighting source.

.3 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

1.8 DELIVERY, STORAGE AND HANDLING

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

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

.1 Labels: to indicate:

.1 Type of paint or coating.

.2 Compliance with applicable standard.

.3 Colour number in accordance with established colour schedule.

.3 Storage and Handling Requirements:

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

.2 Observe manufacturer's recommendations for storage and handling.

.3 Store materials and supplies away from heat generating devices.

.4 Store materials and equipment in well ventilated area with temperature range 7 degrees C to 30 degrees C.

.5 Keep areas used for storage, cleaning and preparation, clean and orderly.

.6 Remove paint materials from storage only in quantities required for same day use.

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

.8 Fire Safety Requirements:

.1 Provide one 9 kg dry chemical Type ABC 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 the National Fire Code of Canada (NFC).

1.9 SITE CONDITIONS

.1 Ambient Conditions:

.1 Heating, Ventilation and Lighting:

.1 Provide heating facilities to maintain ambient air and substrate temperatures above 10 degrees C for 24 hours before, during and after paint application until paint has cured sufficiently.

.2 Provide continuous ventilation for 7 days after completion of application of paint.

.3 Provide temporary ventilating and heating equipment where permanent facilities are not available or supplemental ventilating and heating equipment if ventilation and heating from existing system is inadequate to meet minimum requirements.

.4 Provide minimum lighting level of 323 Lux on surfaces to be painted.

.5 Temperature, Humidity and Substrate Moisture Content Levels:

.1 Unless pre-approved written approval by product manufacturer, perform no painting when:

.1 Ambient air and substrate temperatures are below 10 degrees C.

.2 Substrate temperature is above 32 degrees C unless paint is specifically formulated for application at high temperatures.

.3 Substrate and ambient air temperatures are not expected to fall within MPI or paint manufacturer's prescribed limits.

.4 The relative humidity is under 85 % or when the dew point is more than 3 degrees C variance between the air/surface temperature. Paint should not be applied if the dew point is less than 3 degrees C below the ambient or surface temperature. Use sling psychrometer to establish the relative humidity before beginning paint work.

.5 Rain or snow are forecast to occur before paint has thoroughly cured or when it is foggy, misty, raining or snowing at site.

.6 Ensure that conditions are within specified limits during drying or curing process, until newly applied coating can itself withstand 'normal' adverse environmental factors.

.2 Perform painting work when maximum moisture content of the substrate is below:

.1 15 % for hard wood.

.2 17 % for soft wood.

.3 12 % for plaster and gypsum board.

.4 Test for moisture using calibrated electronic Moisture Meter. Test concrete floors for moisture using "cover patch test".

.2 Surface and Environmental Conditions:

.1 Apply paint finish in areas where dust is no longer being generated by related construction operations or when wind or ventilation conditions are such that airborne particles will not affect quality of finished surface.

.2 Apply paint to adequately prepared surfaces and to surfaces within moisture limits.

.3 Apply paint when previous coat of paint is dry or adequately cured.

.3 Additional interior application requirements:

.1 Apply paint finishes when temperature at location of installation can be satisfactorily maintained within manufacturer's recommendations.

Part 2 Products

2.1 MATERIALS

.1 Only Paint materials listed in the MPI Approved Products List (APL) are acceptable for use on this project.

.2 Stain and varnish materials to be as specificied.

.3 Provide paint materials for paint systems from single manufacturer.

.4 Conform to latest MPI requirements for interior painting work including preparation and priming.

.5 Coatings: Ready mixed, except field catalyzed coatings. Process pigments to a soft paste consistency, capable of being readily and uniformly dispersed to a homogenous coating; good flow and brushing properties; capable of curing free of streaks or sags.

.6 Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve the finishes specified, of commercial quality.

.7 Patching Materials: Latex filler

.8 Fastener Head Cover Materials: Latex Filler

2.2 COLOURS

.1 Refer to drawings for Room Finish Schedule.

.2 Stain to be polyurethane varnish, clear (no colour), and satin finish (Gloss Level 4).

.3 If selected colours are not available, selection of alternative paint and stain colours will be from manufacturers full range of colours.

.4 Where specific products are available in restricted range of colours, selection based on limited range.

.5 For deep and ultra deep colours; 4 coats may be required.

2.3 MIXING AND TINTING

.1 Perform colour tinting operations prior to delivery of paint to site. Obtain written approval from Contract Administrator for tinting of painting materials.

.2 Mix paste, powder or catalyzed paint mixes in accordance with manufacturer's written instructions.

.3 Use and add thinner in accordance with paint manufacturer's recommendations. Do not use kerosene or similar organic solvents to thin water-based paints.

.4 Thin paint for spraying in accordance with paint manufacturer's instructions.

.5 Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity. Strain as necessary.

2.4 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 herein and as noted on Finish Schedule.

2.5 INTERIOR PAINTING SYSTEMS

.1 All interior painting systems to be MPI Premium Grade

.2 Refer to Finish Schedule for locations where Epoxy paint systems are to be utilized.

.3 Wood Siding, Wood Ceiling, and Wood Benches (Solid Fir):

.1 INT 6.3E - Polyurethane varnish Gloss Level 4 finish (over stain).

.2 INT 6.3K - Polyurethane varnish Gloss Level 4 finish.

.4 Structural steel and metal fabrications: exposed columns, beams and metal fabrications:

.1 INT 5.1E Alkyd – level 5 finish (over alkyd primer).

.5 Galvanized metal: doors, frames, misc. steel, pipes, and exposed ducts.

.1 INT 5.3C - Alkyd Level 5 finish (over cementitious primer).

.6 Plaster and gypsum board: gypsum wallboard, drywall, "sheet rock type material", and textured finishes:

.1 INT 9.2A - Latex Level 2 finish (over latex primer/sealer) for ceilings.

.2 INT 9.2A - Latex Level 4 finish (over latex primer/sealer) for walls.

.3 INT 9.2CC – Alkyd, W.B.

.4 INT 9.2E - Epoxy Finish Premium Grade (Satin) finish.

2.6 SPECIAL FINISHES

.1 Refer to Finish Schedule for locations where Epoxy paint systems are to be utilized.

.2 Vanity steel frame to be spray applied shop painted

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 GENERAL

.1 Perform preparation and operations for interior painting in accordance with MPI Architectural Painting Specifications Manual except where specified otherwise.

.2 Apply paint materials in accordance with paint manufacturer's written application instructions.

3.3 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable to be painted in accordance with manufacturer's written instructions.

.1 Visually inspect substrate.

.2 Inform Contract Administrator of unacceptable conditions immediately upon discovery.

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

.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 Maximum moisture content as follows:

.1 Plaster and gypsum board: 12 %.

.2 Hard Wood: 15 %.

.3 Soft Wood: 17%.

3.4 PREPARATION

.1 Clean and prepare surfaces in accordance with MPI Architectural Painting Specification Manual requirements. Refer to MPI Manual in regard to specific requirements and as follows:

.1 Remove dust, dirt, and other surface debris by vacuuming, wiping with dry, clean cloths or compressed air.

.2 Wash surfaces with a biodegradable detergent and clean warm water using a stiff bristle brush to remove dirt, oil and other surface contaminants.

.3 Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface.

.4 Allow surfaces to drain completely and allow to dry thoroughly.

.5 Prepare surfaces for water-based painting, water-based cleaners should be used in place of organic solvents.

.6 Use trigger operated spray nozzles for water hoses.

.7 Many water-based paints cannot be removed with water once dried. Minimize use of mineral spirits or organic solvents to clean up water-based paints.

.2 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.

.3 Where possible, prime non-exposed surfaces of new wood surfaces before installation. Use same primers as specified for exposed surfaces.

.1 Apply sealer to MPI #36 over knots, pitch, sap and resinous areas.

.2 Apply wood filler to nail holes and cracks.

.3 Tint filler to match stains for stained woodwork.

.4 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.

.5 Carried out during shop priming: clean metal surfaces to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and other foreign substances in accordance with MPI requirements. Remove traces of blast products from surfaces, pockets and corners to be painted by blowing with clean dry compressed air, vacuum cleaning, or brushing with clean brushes.

.6 Touch up of shop primers with primer as specified.

3.5 PROTECTION

.1 Protect building surface and adjacent structures from paint splatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore such surfaces as directed by Contract Administrator.

.2 Protect items that are permanently attached such as Fire Labels on doors and frames.

.3 Protect factory finished products and equipment.

.4 Protect passing pedestrians, building occupants, and general public in and about building.

.5 Remove light fixtures, surface hardware on doors, and other surface mounted equipment, fittings and fastenings prior to undertaking painting operations. Store items and re-install after painting is completed.

.6 Move and cover any furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.

.7 As painting operations progress, place “WET PAINT” signs in pedestrian and vehicle traffic areas.

3.6 APPLICATION

.1 Apply paint to manufacturer's application instructions unless specified otherwise.

.2 Brush and Roller Application:

.1 Apply paint in uniform layer using brush and/or roller type suitable for application.

.2 Work paint into cracks, crevices and corners.

.3 Paint surfaces and corners not accessible to brush using spray, daubers and/or sheepskins. Paint surfaces and corners not accessible to roller using brush, daubers or sheepskins.

.4 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces free of roller tracking and heavy stipple.

.5 Remove runs, sags and brush marks from finished work and repaint.

.3 Spray application:

.1 Provide and maintain equipment that is suitable for intended purpose, capable of atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.

.2 Keep paint ingredients properly mixed in containers during paint application either by continuous mechanical agitation or by intermittent agitation as frequently as necessary.

.3 Apply paint in uniform layer, with overlapping at edges of spray pattern. Back roll first coat application.

.4 Brush out immediately all runs and sags.

.5 Use brushes and rollers to work paint into cracks, crevices and places which are not adequately painted by spray.

.4 Use dipping, sheepskins or daubers only when no other method is practical in places of difficult access.

.5 Apply coats of paint continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.

.6 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.

.7 Sand and dust between coats to remove visible defects.

.8 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as tops of interior cupboards and cabinets and projecting ledges.

.9 Finish top, bottom, edges and cutouts of doors after fitting as specified for door surfaces.

.10 Wood, drywall, plaster, stucco, concrete, concrete masonry units and brick; if sprayed, must be back rolled.

3.7 MECHANICAL/ELECTRICAL EQUIPMENT

.1 Paint finished area exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment with colour and finish to match adjacent surfaces, except as indicated.

.2 Boiler room, mechanical and electrical rooms: paint exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment.

.3 Other unfinished areas: leave exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment in original finish and touch up scratches and marks.

.4 Do not paint over nameplates.

.5 Keep sprinkler heads free of paint.

.6 Paint inside of ductwork where visible behind grilles, registers and diffusers with primer and one coat of matt black paint.

.7 Paint fire protection piping red.

.8 Paint disconnect switches for fire alarm system and exit light systems in red enamel.

.9 Paint natural gas piping yellow.

.10 Paint both sides and edges of backboards for telephone and electrical equipment before installation. Leave equipment in original finish except for touch-up as required, and paint conduits, mounting accessories and other unfinished items.

.11 Do not paint interior transformers and substation equipment.

3.8 SITE TOLERANCES

.1 Walls: no defects visible from a distance of 1000 mm at 90 degrees to surface.

.2 Ceilings: no defects visible from floor at 45 degrees to surface when viewed using final lighting source.

.3 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

3.9 FIELD QUALITY CONTROL

.1 In accordance with Section 01 45 00.

3.10 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00- 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 00 - Cleaning.

3.11 RESTORATION

.1 Clean and re-install hardware items removed before undertaken painting operations.

.2 Remove protective coverings and warning signs as soon as practical after operations cease.

.3 Remove paint splashings on exposed surfaces that were not painted. Remove smears and spatter immediately as operations progress, using compatible solvent.

.4 Protect freshly completed surfaces from paint droppings and dust. Avoid scuffing newly applied paint.

.5 Restore areas used for storage, cleaning, mixing and handling of paint to clean condition as approved by Contract Adminstrator.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 This Section includes the following:

.1 Interior Signage

1.2 SUBMITTALS

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

.2 Submit shop drawings, catalogue sheets and full-size templates.

.3 Indicate materials, thicknesses, sizes, finishes, colours, construction details, mounting methods.

.4 Submit full size templates, drawn-to-scale details for individually fabricated or incised lettering indicating word and letter spacing.

.5 Submit duplicate representative sample of each type sign and mounting method.

1.3 QUALITY ASSURANCE

.1 Installer Qualifications: Workers sufficiently trained to undertake the required installations.

.2 Product Options: Drawings indicate locations of all installations.

.3 Each supplier shall be responsible for adjustments to place equipment to the satisfaction of the Contract Administrator, and the City of Winnipeg. The supplier shall co-operate with other trades concerned in this matter. The manufacturer and supplier assume responsibility for the equipment to meet all applicable regulatory standards for the installation intended.

1.4 PROJECT CONDITIONS

.1 Field Measurements: Indicate measurements on Shop Drawings.

Part 2 Products

2.1 INTERIOR SIGNAGE

.1 2 ply - 3mm thick plastic “limacoid” black engraving sheet with white core. Provide suitable adhesive backing for substrate. Sign graphics to be well defined, arranged for balanced appearance, and properly word and letter spaced per drawings.

.2 Braille; Clear plastic “Raster” type. Braille text to conform with the latest edition of the City of Winnipeg CWADS.

.3 Refer to Drawings for sizes, wording, braille, symbols, and mounting heights.

2.2 FABRICATION

.1 Fabricate signs in accordance with details, specifications and approved shop drawings.

.2 Build units square, true, accurate to size, free from visual or performance defects.

.3 Accurately fit and securely join sections to obtain tight, closed joints.

.4 Allow for thermal movement without distortion of components.

.5 Exposed fasteners permitted only where indicated or approved by Contract Administrator and to be inconspicuous and same finish and colour as base material, or as noted.

.6 Manufacturer's nameplates on sign surface locations visible in completed work not acceptable.

Part 3 Execution

3.1 INSTALLATION

.1 Erect and secure signs plumb and level at elevations indicated on drawings and as directed by Contract Administrator.

.2 Comply with sign manufacturer's installation instructions and approved shop drawings.

3.2 ADJUSTING AND CLEANING

.1 Clean signs in accordance with Section 01 74 11 – Cleaning.

.2 Repair damaged finishes so no evidence remains of corrective work. Use only materials and procedures recommended by manufacturer. Replace units that cannot be restored to their factory-finished appearance.

3.3 SCHEDULE

.1 Refer to Drawings for locations.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 09 21 16- Gypsum Board Assemblies

.2 Section 09 30 13- Ceramic Tiling

.3 Section 10 28 14- Toilet and Bathroom Accessories

1.2 REFERENCE STANDARDS

.1 ASTM International

.1 ASTM A480/A480M -14a , Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting, Sheet, and Strip.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-71.20-M88 , Adhesive, Contact, Brushable.

.3 Forest Stewardship Council (FSC)

.1 FSC-STD-01-001 (V4-0)-2013 , FSC Principle and Criteria for Forest Stewardship.

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

.1 Material Safety Data Sheets (MSDS).

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 plastic toilet compartments and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

.1 Submit drawings that indicate fabrication details, plans, elevations, hardware, and installation details.

.4 Samples:

.1 Submit duplicate 12” x 12” (300 x 300 mm) samples of panel showing finish on both sides, two finished edges and core construction. All samples must be properly identified including: name of supplier and name of manufacturer.

.2 Submit duplicate representative samples of each hardware item, including brackets, fastenings and trim.

1.4 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:

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

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

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 INTERIOR CHANGE ROOM COMPARTMENTS

.1 Material: High Density Polyethylene (HPDE), fabricated from polymer resins compounded under high pressure, forming single thickness panel. Waterproof and non-absorbent, with self-lubricating surface, resistant to marks by pens, pencils, markers, and other writing instruments.

.2 Door and Divising Panel: Extra Privacy Option (72”) for doors and dividing panels and panels between stalls (all panels). Locate doors and dividing panels 100 mm (4”) above finished floor.

.3 Fire Resistance Requirements: Partition materials shall comply with the following requirements, when tested in accordance with the ASTM E 84: Standard Test Method for Surface Burning Characteristics of Building Materials

.1 Class A flame spread/smoke developed rating, tested to ASTM E84

.4 Dimensions of stalls per drawings.

.5 Edge: Shiplap edge for increased privacy.

.6 Continuous edge mounted hinge.

.7 Provide Occupancy indicator

.8 Provide second Door pull on all doors and door stop

.9 Provide swinging doors c/w appropriate hinges where required to meet accessibility code requirements.

.10 Provide door bumper that also functions as coat hook.

.11 Provide heavy duty extruded aluminum door pull, clear anodized suitable for doors.

.12 Provide hidden wall brackets and appropriate rails required for assembly.

.13 Texture: Orange Peel

.14 Colour: White

.15 Wall Brackets: Continous heavy duty extruded aluminum, clear anodized finish, inserted into slotted panels and fastened to panels with estainless stell tamper resisitant screws. Length to be 71 inches

.16 Product: Eclipse 2 Partition, manufactured by Scranton Products, or approved equal.

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 plastic toilet compartments installation in accordance with manufacturer's written instructions.

.1 Inform Consultant of unacceptable conditions immediately upon discovery.

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

3.2 INSTALLATION

.1 Ensure supplementary anchorage, if required, is in place.

3.3 ERECTION

.1 Partition erection:

.1 Install partitions secure, plumb and square.

.2 Anchor mounting brackets to masonry or concrete surfaces using screws and shields: to hollow walls using bolts and toggle type anchors,[to steel supports with bolts in threaded holes.

.3 Attach panel and pilaster to brackets with through type sleeve bolt and nut.

.4 Equip each door with hinges, latch set, and each stall with coat hook mounted on door, mounting heights as indicated. Install door bumper mounted to doors.

.5 Equip outswinging doors with door pulls located in accordance with the Manitoba Building Code

.6 Install hardware grab bars where indicated.

.2 Floor supported and overhead braced partition erection:

.1 Attach pilasters to floor with pilaster supports and level, plumb, and tighten installation with levelling device.

.2 Secure pilaster shoes in position.

.3 Secure headrail to pilaster face with not less than two fasteners per face.

.4 Set tops of doors parallel with overhead brace when doors are in closed position.

.3 Floor supported partition erection:

.1 Secure pilasters to floor with pilaster supports anchored with minimum 50 mm penetration in structural floor.

.2 Level, plumb and tighten installation with levelling device.

.3 Secure pilaster shoes in position.

.4 Set tops of doors level with tops of pilasters when doors are in closed position.

.4 Screen erection:

.1 Provide urinal stall screens consisting of panel, pilaster as indicated.

.2 Anchor screen panels to walls with 2 panel brackets and pilaster complete with floor shoes, anchored to floor.

.3 Secure to supplementary anchorage above ceiling finish to receive screen pilaster.

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.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Toilet and washroom accessories.

.2 Grab bars.

.3 Attachment hardware.

1.2 RELATED SECTIONS

.1 Section 05 50 00 – Metal Fabrications

.2 Section 06 10 13 – Wood Blocking and Curbing.

.3 Section 06 20 00 – Finish Carpentry.

.4 Section 07 92 00 – Joint Sealants.

.5 Section 09 30 13 - Ceramic Tiling.

.6 Section 09 91 13 – Interior Painting

.7 Electrical Divisions and Drawings.

1.3 REFERENCES

.1 ASTM A123/A123M-08 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

.2 ASTM A167-99(2004) - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

.3 ASTM A269-08 - Seamless and Welded Austenitic Stainless Steel Tubing for General Service.

.4 ASTM B456-03 - Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.

.5 CAN/CSA-B651-04 - Accessible Design for the Built Environment.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Section 01 31 00: Project management and coordination procedures.

.2 Coordination:

.1 Coordinate with other work having a direct bearing on work of this section.

.2 Coordinate the work with the placement of internal wall reinforcement to receive anchor attachments.

1.5 SUBMITTALS FOR REVIEW

.1 Section 01 33 00: Submission procedures.

.2 Product Data: Provide data on accessories describing base material, finish, size, finish, details of function, hardware and locks, attachment methods, description of rough-in-frame, and building-in details of anchor for grab bars.

1.6 CLOSEOUT SUBMITTALS

.1 Section 01 78 00: Closeout Submittals.

1.7 REGULATORY REQUIREMENTS

.1 Conform to applicable code and CAN/CSA-B651 for accessibility requirements for the handicapped.

Part 2 Products

2.1 MANUFACTURERS

.1 Substitutions: Refer to Bid Opportunity.

2.2 MATERIALS

.1 Sheet Steel: ASTM A1008/A1008M.

.2 Stainless Steel Sheet: ASTM A167, Type 304.

.3 Stainless steel tubing: Type 304 mm wall thickness: 3/64” (1.2 mm)

.4 Adhesive: Two component epoxy type, waterproof.

.5 Fasteners: concealed screws and bolts hot dip galvanized, exposed fasteners to match face of unit.

.6 Expansion Shields: Fibre, lead, or rubber as recommended by accessory manufacturer for component and substrate.

.7 Primer: Refer to Section 09 91 13.

2.3 FABRICATION

.1 Weld and grind joints of fabricated components, smooth.

.2 Form exposed surfaces from single sheet of stock, free of joints. Form surfaces flat without distortion. Maintain surfaces without scratches or dents.

.3 Shop assemble components and package complete with anchors and fittings.

.4 Provide steel anchor plates, adapters, and anchor components for installation.

2.4 KEYING

.1 Supply two (2) keys for each accessory to City of Winnipeg.

.2 Master key all accessories.

2.5 FINISHES

.1 Shop Primed Ferrous Metals: Pre-treat and clean, spray apply one coat primer and bake.

.2 Stainless Steel: No. 4 satin luster finish.

.3 Back paint components where contact is made with building finishes to prevent electrolysis.

Part 3 Execution

3.1 EXAMINATION

.1 Verify that field measurements are as indicated.

.2 Verify that site conditions are ready to receive work and dimensions are as indicated on shop drawings.

.3 Verify exact location of accessories for installation and that blocking has been provided.

3.2 PREPARATION

.1 Deliver inserts and rough-in frames to site for timely installation.

.2 Provide templates and rough-in measurements as required.

3.3 INSTALLATION

.1 Install accessories to manufacturer instructions and CAN/CSA-B651.

.2 Install plumb and level, securely and rigidly anchored to substrate.

.3 Install and secure accessories rigidly in place as follows:

.1 Stud walls: install steel back-plate to stud prior to plaster or drywall finish. Provide plate with threaded studs or plugs.

.2 Hollow masonry units, existing plaster or drywall: use toggle bolts drilled into cell or wall cavity.

.3 Solid masonry, marble, stone or concrete: use bolt with lead expansion sleeve set into drilled hole.

.4 Toilet and shower compartments: use male to female through bolts.

.4 Install grab bars on built-in anchors provided by bar manufacturer.

.5 Use tamper proof screws/bolts for fasteners.

.6 Fill units with necessary supplies shortly before final acceptance of building.

.7 Install mirrors in accordance with Section 08 80 00- Glazing.

3.4 WASHROOM ACCESSORY MOUNTING HEIGHTS

.1 Install washroom accessories using dimensions shown on Drawings. Confirm all locations with Contract Administrator prior to installation.

3.5 WASHROOM ACCESSORIES

.1 All components to be Bobrick Contoured line commercial grade unless otherwise indicated (or equal by Frost or ASI Watrous). Refer to drawings for quantity and locations.

.1	Baby Change Station (BCS)	Koala Kare Products: KB110-SSWM Horizontal Wall Mounted
.2	Toilet Backrest (BR):	Refer to Mech specification
.3	Grab Bars (GB1,GB2,GB3,GB4)	Frost or Bobrick 32mm (1 ¼")
.4	Hand Dryer (HD-1):	Bobrick 7128 or approved equal
.5	Hair Dryer (HD-2):	World Dryer Model A Push Button Hand Dryer, White Steel or equal
.6	Framed mirror (MI) :	
.1	Adhered to doors	Bobrick B-165 2448
.2	Above sink	Bobrick B 165 2436
.7	Mirror (Above Vanity in room 115)	Refer to 08 80 00 Glass & Glazing
.8	Robe Hooks (RH):	Frost 1150
.9	Liquid Soap Dispenser (SD)	Contura Series, Bobrick B-818615
.10	Shelf (SH)	Bobrick B-295 x 14
.11	Sanitary Napkin Disposal (SND)	Bobrick B-254
.12	Toilet Paper Holder (TP)	Contura Series, Bobrick B-4288
.13	Folding Shower Seat with Legs:	Bobrick B-918116

.14 Shower Rod (Room 132/133/134)

.1 1 ½" dia, 18 gauge stainless steel tubing of required length with satin finished flanges.

.2 Acceptable Product: Bobrick B-6047

.3 Shower rod material and anchorage to withstand downward pull of 0.9 kN

.15 Shower Curtain (Room 132/133/134)

.1 Opaque, matte white vinyl 0.008" thick, containing anti-bacterial and flame retardant agents; length to suit space

.2 Provide white HDPE grommets along top, one every 6". Bottom and sides to be hemmed

.3 Hooks: Provide suitable quantity of stainless steel hooks for shower curtain (Bobrick 204-1)

.4 Acceptable Product: Bobrick B-204-3

.16 Shower Rod and Curtain (Room 136))

.1 Rod:

.1 Ceiling mounted, commercial grade, suitable for wet environment, curved corner where required per Drawings

.2 Provide heavy duty curtain carriers.

.3 Provide required accessories including stoppers.

.4 Ceiling mounted system must suit Acoustical Tile Ceiling system.

.5 Standard of acceptance: SnapCubicle by Drapery Industries, or approved equal

.2 Curtain:

.1 Application: Shower Curtain Fabric

.2 Characteristics: 100% Polyester, water repellant

.3 Width: To suite application

.4 Performance: Meetings NFPA requirements of flame resistance

.5 Maintenance: Machine washable

.6 Standard of acceptance: CS Traditional (Vinyl) Shower Curtains "Shower Shield" in colour: White / Snow, or approved equal

.17 Change Room Bench

.1 High quality, recycled plastic material with stainless steel hardware and fixed floor anchors

.2 Room 115

.1 Standard of Acceptance: Wide Bench #68.1507 by Nordesco Industries Inc. Size: 15.5 wide x 7'-0" long.

.2 Quantity: Two (2)

.3 Room 132, 133, 134

.1 Standard of Acceptance: Wide Bench #68.1503 by Nordesco Industries Inc. Size: 15.5 wide x 3'-0" long.

.2 Quantity: One (1) per room; Three (3) Total

.18 Corner Guard

.1 Refer to drawings for quantities and locations.

.2 Standard of Acceptance: Frost, Model 1117 Corner Guard, 18 gauge, type 304 Stainless Steel, No.4 Brushed finish, Size 2"D x 2" W x 96" H.

.3 Installation method: full length self adhesive backing as per manufacturers recommendations and application methods.

3.6 ELECTRICALLY HEIGHT ADJUSTABLE CHANGE TABLE

.1 Refer to Drawings for location. Coordinate with electrical.

.2 Standard of acceptance: Pressalit SCT 1000 shower change table, electrically height adjustable, Item Number R8593118000

.1 Colour: White

.2 Outer measurements: 29.9" x70.9"

.3 Adjustability: Height adjustable

.4 Adjustment height: 15,76 inch

.5 Product capacity: 331 lbs

.6 Speed up: 0,43 inch/s

.7 Speed down: 0,35 inch/s

.8 Noise level: 50 dB

.9 Foldable including safety rail.

.10 Wired remote control.

3.7 MOTORIZED CEILING MOUNTED LIFT SYSTEM

.1 Refer to Drawings for location. Coordinate with electrical.

.2 Standard of Acceptance: HumanCare Brand, HeliQ 300 model, safe working load of 300 kg / 661 lbs.

.1 Ceiling / Wall mounted H Track and Lift System: reinforced rail system suspended from structure complete with mounting hardware, moving rail, and lifting system. Track to be constructed from high strength extruded aluminum to suit weight requirements.

.2 Rechargeable battery power source

.3 Lifting capacity 661 lbs

.4 90-240 Vac charger, electronic soft-start and soft-stop motor control and current limiter for circuit protection in case of overload.

.5 Lift shall include: two rechargeable batteries, charger, remote and hand control, low battery indicator, swivel adaptor 'H' track system per plans, end stops, emergency stop, emergency lowering device, integral maintenance monitoring system, two-point spreader bar, hygienic slings.

.6 Allow for 2 hygienic slings, one adult and one child size

.7 6 point lifting strap

.8 Charging Unit:

3.8 ADJUSTING

.1 Adjust toilet and bathroom accessories components and systems for correct function and operation in accordance with manufacturer's written instructions.

.2 Lubricate moving parts to operate smoothly and fit accurately.

3.9 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00- 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 00- Cleaning.

3.10 PROTECTION

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

.2 Repair damage to adjacent materials caused by toilet and bathroom accessories installation.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 06 10 13 – Wood Blocking and Curbing

.2 Section 06 20 00 – Finish Carpentry

.3 Section 09 22 16 – Non-Structural Metal Stud Framing

.4 Section 09 21 16 – Gypsum Board Assemblies

.5 Section 09 30 13 - Ceramic Tiling

1.2 REFERENCES

.1 ASTM International (ASTM):
1. ASTM D 638 - Standard Test Method for Tensile Properties of Plastics.
2. ASTM D 790 - Standard Test Method for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
3. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Material.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Provide manufacturer's product literature and data sheets for solid phenolic lockers and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

.1 Dimensioned plans detailing layout of lockers.

a. Elevations sections, numbering, colors, details, and anchorages/ attachments to other work.

.2 Details of anchoring components and methods for project conditions.

.1 Identify components required for installation but not supplied by locker manufacturer.

.3 Indicate on drawings: type and class of locker, thicknesses of material, fabricating and assembly methods, assembled banks of lockers, tops, rods, hooks, shelves, bases, trim, numbering, filler panels, end/back panels, doors, handles, locking method, ventilation method, and finishes.

.4 Samples:

.1 For each finish product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, colour, and finish.

.5 Closeout Submittals: Provide manufacturer's executed warranty and manufacturer's maintenance instructions that include recommendations for periodic cleaning and maintenance of all components.

1.4 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements:

.1 Deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

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

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

.3 Replace defective or damaged materials with new.

1.5 SEQUENCING

.1 Ensure that locating templates and other information required for installation of products of this section are furnished to affected trades in time to prevent interruption of construction progress.

.2 Ensure that products in the section are supplied to affected trades in time to prevent interruption of construction progress.

1.6 PROJECT CONDITIONS

.1 Field Measurements:

.1 Verify dimensions for installation by field measurements prior to fabrication and indicate measurements on Shop Drawings.

.2 If field measurements cannot be made without delaying the Work, establish dimensions and fabricate units without field measurements. Coordinate supports, adjacent construction, and fixture locations to ensure actual dimensions correspond to established dimensions.

.2 Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

Part 2 Products

2.1 MANUFACTURED UNITS

.1 Refer to Drawing Elevations for lockers types and arrangement, complete with Trespa filler panels with matching finish required.

.2 Standard of Acceptance:

.1 Z-Tier Model by Spectrum Lockers, 885 Milner Ave. Toronto, Ontario M1B 5V8, Phone: 1-855-444-0588 Email: info@spectrumlockers.com.

2.2 MATERIALS

.1 Panel Material:

.1 Decorative papers impregnated with the melamine resin on faces with a clear protective overcoat and integrally compression molded within a core consisting of solid phenolic impregnated kraft papers.

.2 Core or panel material shall meet fire resistance per ASTM E84

.2 Doors:

.1 Material: 1/2" (13mm) thick solid phenolic composite material.

.2 Corners: Rounded

.3 Color: As selected from Trespa TopLab's full color range. Refer to elevation drawings for quantities and locations of each colour.

.1 Colour A – K18.0.1 Mystic White

.2 Colour B – K21.1.0 Winter Grey

.4 Edges: Standard profile is straight edge no profile.

.5 Door Fastening: Through Bolted.

.3 Locker Bodies

.1 Exposed edges: Straight profile; eased edges to remove sharpness; machine polished and free from tooling imperfections.

.2 Tops, bottoms, and intermediate shelves: 1/2" (13mm) thick solid phenolic composite material with ventilation holes.

.3 Locker backs: +/- 1/4" (6mm) thick solid composite material.

.4 Locker Sides: 3/8" (10mm) thick solid phenolic composite material.

.5 Made from Trespa Toplab Base, E0-00 White

.4 Ancillary Panels: Finished end panels and closures shall be 1/2" (13mm) thick solid phenolic composite material. Panels shall be Colour A – Mystic White.

.5 Hardware

.1 Hinges:

.1 Material: 304-grade stainless steel.

.2 Quantity: Three (3) for full height doors and two (2) for multi-tier units.

.2 Interior hooks:

.1 Material: Stainless steel.

.2 Top Hook: Two prong: one per opening for 1, 2, and "Z" tiers.

.3 Side Hook: Single prong: two per opening for 1, 2, and "Z" tiers.

.3 Fasteners: Exposed fasteners, where present, shall be 304 stainless steel

.4 Fastener Application: Apply directly into or through the material.

.5 Other Reinforcement: Aluminum or metal profiles for reinforcements shall not be permitted.

.6 Door Identification (identification plates): 1 1/2" stainless steel disk with laser engraved numbering, or visible on integrated hasp handle

.6 Ventilation

.1 Interior Vent: Provide six 3/8” (10mm) diameter ventilation holes on tops, bottoms, and intermediate shelves. Provide three 3/8” (10mm) diameter ventilation holes on “Z” type intermediary shelves.

.7 Base

.1 Base not furnished with Locker: Solid wood face plate, refer to drawings.

.2 Base furnished with locker: Adjustable leg mounted: 3 3/4” adjustable to 5”, ABS plastic mounting-leveling leg.

.8 Size

.1 Overall Height: 71-3/4”

.2 Overall Width: 12”

.3 Overall Depth: 15”

.9 Accessories and Options

.1 Locking System: Stainless Steel Hasp Plate and Bar with Integrated Handle

.2 Locker Top: ½’’ top shall be Flat. Refer to drawings for top cover plate.

.3 Door Identification:

.1 Number Plates: Identification plates to be stainless steel with laser engraved numbers and mounted into machined door pocket with permanent adhesive.

.2 Fonts to be a minimum 1/2” high and up to four alphanumeric characters

.3 Numbering sequence to be provided by Contract Administrator.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates and surfaces to receive metal lockers previously installed under other Sections or Contracts are acceptable for product installation in accordance with manufacturer's instructions prior to metal locker installation.

.2 Inform Contract Administrator of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied have been approved by the Contract Administrator.

3.2 INSTALLATION

.1 Assemble and install lockers in accordance with manufacturer's written instructions.

.2 Securely fasten lockers to grounds and nailing strips.

.3 Install wall trim around recessed locker banks.

.4 Install filler panels (false fronts) where indicated and where obstructions occur.

.5 Install locker numbers and locks.

3.3 ADJUSTING

.1 Adjust lockers for correct function and operation in accordance with manufacturer's written instructions.

.2 Lubricate moving parts to operate smoothly and fit accurately.

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 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 locker installation.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Documents and certain applicable terminology.

.2 Associated requirements.

.3 Work expectations.

.4 Work by other parties.

.5 Words and terms.

.6 Examination

.7 Closeout submittals

.8 Operation and maintenance manual format.

.9 Contents each volume.

.10 Recording actual site conditions.

.11 Record documents.

.12 Warranties and bonds.

.13 Quality Assurance.

.14 Demonstration and Training

.15 Conditions for Demonstrations

.16 Shop drawings and product data.

.17 Samples.

.18 Certificates and transcripts.

.19 Product quality, availability, storage, handling, protection, and transportation.

.20 Product changes and substitutions.

.21 Manufacturer's instructions.

.22 Quality of Work, coordination and fastenings.

.23 Accessibility of Equipment

.24 Coordination, work for other trades, electrical requirements, temporary use of equipment.

.25 Existing facilities.

1.2 RELATED SECTIONS

.1 Applicable sections in Division 01, including:

- .1 Allowances
- .2 Construction Progress Documentation.
- .3 Submittal Procedures.
- .4 Product Exchange Procedures.
- .5 Substitutions
- .6 Closeout Submittals.

.2 This section describes common work applicable to all Sections within project Divisions 21, 22, 23 and 25.

1.3 COMPLEMENTARY DOCUMENTS

.1 Drawings, specifications, and schedules are complementary to each other and what is called for by one will be binding as if called for by all. Should any discrepancy appear between documents which leave doubt as to the intent or meaning, obtain direction from the Contract Administrator.

.2 The drawings for mechanical work are performance drawings. They are generally diagrammatic and are not to scale unless detailed otherwise. They establish scope, material and installation quality and are not detailed installation instructions showing every offset, fitting, valve or every difficulty encountered during execution of work and will not be used as an excuse for deficiencies or omissions. Where required installations are not shown on plans or are only shown diagrammatically, install in such a way as to conserve headroom and interfere as little as possible with free use or space through which they pass, while adequate space is allowed for service, maintenance, repair, or replacement for all equipment.

.3 Drawings indicate general location and route of new and existing pipes & duct systems. Review of exact location and routing of systems prior to bidding is the responsibility of the contractor. Install piping and duct systems not exactly shown in plan or indicated by note, by graphic, or diagrammatically in schematic or riser diagrams to provide an operational assembly or system.

.4 Install components to physically conserve headroom, to minimize furring spaces, to accommodate installed Work, or other obstructions.

.5 Install ceiling mounted or exposed mechanical components such as diffusers, sprinkler heads and grilles in accordance with reflected ceiling drawings or floor plans.

.6 Locate devices with primary regard for convenience of operation and usage.

.7 Examine all discipline drawings, specifications, and schedules and related Work to ensure that Work can be satisfactorily executed. Conflicts or additional Work beyond Work described, to be brought to the attention of the Contract Administrator.

.8 Should any discrepancy appear between the drawings and specifications, which leaves the Contractor in doubt as to the true intent and meaning of the plans, and specifications, the Contractor shall obtain a ruling in writing from the Contract Administrator in writing before submitting the bid. If this is not done it will be assumed that the most expensive alternative has been included in the bid price.

.9 All specification sections of the Project Manual and Drawings are affected by requirements of Division 01 sections.

1.4 DESCRIPTION OF THE WORK

.1 Division of the Work among other contractors, subcontractors, suppliers or vendors is solely the Contractor's responsibility. Neither the City nor Contract Administrator assumes any responsibility to act as an arbiter to establish subcontract terms or disagreements between sectors or disciplines of the Work.

1.5 CONTRACT METHOD

.1 Construct Work under the contract requirements in the applicable Division 00 sections.

.2 Contract Documents were prepared by the Contract Administrator for the City. Any use which a third party makes of the Contract Documents, or any reliance on or decisions to be made based on them, are the responsibility of such third parties. The Contract Administrator accepts no responsibility for any damages suffered by any third party as a result of decisions made or actions based on the Contract Documents.

1.6 PERMITS, INSPECTION AND TESTING

.1 File all necessary notices and approved layouts, obtain and pay for all Local Authority and Fire Underwriters Inspections, approvals and permits applicable to each Mechanical Section. Make changes required to secure Local Authorities approval, without extra cost. Where conflicting requirements occur, comply with most stringent regulation. Note that requirements shown or specified may exceed minimum standards set by Local Authorities.

.2 The Regulations of the A.S.M.E. Code and the Provincial Labour Department shall cover the design, manufacture, installation, welding and tests of piping and other equipment as specified hereafter.

.3 Obtain Registration Certificates for all pressure vessels, with suitable metal-framed glass covers installed where directed. Furnish all certificates required by Local Authorities before acceptance of building by City.

.4 The City may request the Mechanical Section to operate device or material installed for such time as the Contract Administrator may require, as a thorough test, before final acceptance. Such tests shall not be construed as evidence of acceptance, and no claim for cost of such operation for test, or damage due to inadequacy or defect will be recognized.

.5 Note that site reviews by the Contract Administrator are for the purpose of determining in general if the work is proceeding in accordance with the Contract Documents, and to endeavour to guard the City against defects and deficiencies and not to superintend the execution of the work, which is the Mechanical Contractor’s and their Subcontractors’ responsibility.

1.7 WORDS AND TERMS

.1 Conform to the following definitions and their defined meanings in addition to those referenced in Division 01:

.1 **Install:** To remove from site storage, move or transport to intended location, install in position, connect to utilities, repair site caused damage, and make ready for use.

.2 **Supply:** To acquire or purchase, ship or transport to the site, unload, remove packaging to permit inspection for damage, re-package, replace damaged items, and safely store on-site.

.3 **Provide:** Wherever the term "provide" is used in relationship to equipment, piping and other materials specified for the work, it means "supply, install and connect". Wherever the terms “provide” is used in connection with services such as testing, balancing, start-up, preparation of drawings for any part of the work, it means procure, prepare, supervise, take responsibility for, and pay for these services.

.4 **Typical:** A representative characteristic that is standard for all installations whether individually noted or not throughout the documents. “Typical” applies to each individual or combined installation except where specifically noted or otherwise indicated that the application is non-typical.

.5 **Exposed:** Any work not concealed in wall, shaft, or ceiling cavities or spaces. Work behind doors, in closets or cupboards or under counters is considered exposed.

.6 **New:** Produced from new materials.

.7 **Renewed:** Produced or rejuvenated from an existing material to like-new condition to serve a new or existing service.

.8 **Defective:** A condition determined exclusively by the Contract Administrator.

1.8 EXAMINATION

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

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

.3 Examine all contract documents to ensure work can be performed without changes to the Work as shown on plans. No allowance will be made later for necessary changes, unless notification of interferences have been brought to the Contract Administrator's attention in writing, prior to bid closing.

.4 Verify that materials and equipment can be delivered to the place of the work and that sufficient space and access is available to permit installation as shown on the drawings.

.5 Verify the locations and inverts of service lines leaving and entering building to ensure their proper function prior to commencing work.

1.9 CLOSEOUT SUBMITTALS

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

.2 Copy will be returned with the Contract Administrator 's comments.

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

.4 Two (2) weeks prior to Substantial Performance of the Work, submit to the Contract Administrator, three (3) final copies of operating and maintenance manuals in Canadian English.

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

.6 Summary audit documents associated with requirements for LEED classification documentation.

.7 If requested, furnish evidence as to 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.

1.10 OPERATION AND MAINTENANCE MANUAL FORMAT

.1 Refer also to Section 01 78 00 for formats for manuals. Where there is a discrepancy with this section, follow the requirements of 01 78 00.

.2 Organize data in the form of an instructional manual.

.3 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 8.5 x 11 inch (219 x 279 mm) with spine and face pockets.

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

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

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

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

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

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

1.11 CONTENTS - EACH VOLUME

.1 Refer also to Section 01 78 00 for formats for contents. Where there is a discrepancy with this section, follow the requirements of 01 78 00.

.2 Table of Contents: Provide:

.1 Title of project.

.2 Date of submission.

.3 Names, addresses, and telephone numbers of the Contract Administrator and Contractor with name of responsible parties.

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

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

.4 Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation; delete inapplicable information. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00.

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

.6 Certificate of Acceptance: Relevant certificates issued by authorities having jurisdiction, including code compliance certificate, life safety systems performance certificate. pressure vessel acceptance.

.7 Training: Refer to Demonstration and Training in this Section.

1.12 RECORDING ACTUAL SITE CONDITIONS

.1 Record information on a full-sized set of drawings, and within the Project Manual.

.2 Annotate with coloured felt tip marking pens, maintaining separate colours for each major system, for recording changed information.

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

.4 Contract drawings and shop drawings: legibly mark each item to record actual construction, including:

.1 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.

.2 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.

.3 Field changes of dimension and detail.

.4 Changes made by change orders.

.5 Details not on original Contract Drawings.

.6 References to related shop drawings and modifications.

.5 Specifications: legibly mark each item to record actual construction, including:

.1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.

.2 Changes made by Addenda and change orders.

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

1.13 RECORD DOCUMENTS

.1 Prior to Substantial Performance of the Work, electronically transfer the marked-up information from the as-built documents, as follows:

.1 Drawings: AutoCAD or Adobe Acrobat (PDF).

.2 Specifications: Adobe Acrobat (PDF).

.2 Mark revised documents as "RECORD DOCUMENTS". Include all revisions.

.3 Submit completed record documents to the Contract Administrator on a CD, DVD, or by electronic transfer.

1.14 WARRANTIES AND BONDS

.1 Refer also to Section 01 78 00 for Warranties and Bonds.

.2 Provide written guarantee that complete installation including materials, work and operation of all equipment provide under Mechanical Sections are first class in every respect, subject only to improper usage by the City, and make good forthwith when reported all defects which develop within one year from date of acceptance of building by the City at no additional cost to the City.

.3 In addition, guarantee heating and cooling systems through one complete heating or cooling season, as applicable.

.4 Deliver to the City all equipment manufacturer's guarantees specified in excess of one year.

1.15 FABRICATION AND WORKMANSHIP

.1 Employ skilled mechanics in their respective trades, under competent supervision, and where required by Provincial or Local regulations holder of acceptable qualification certificates.

1.16 QUALITY ASSURANCE

.1 Provide testing organization services as specified in subsequent Sections.

.2 Testing organization: Current member in good standing of their respective professional or industry organization and certified to perform specified services.

.3 Comply with applicable procedures and standards of the certification sponsoring association.

.4 Perform services under direction of supervisor qualified under certification requirements of sponsoring association.

.5 Qualifications:

.1 Provide adequate workforce training through meetings and demonstrations.

.2 Provide a designated experienced person on site with de-construction experience throughout the project for consultation and supervision purposes.

1.17 DEMONSTRATION AND TRAINING

.1 Refer also to Section 01 79 00 for Demonstration and Training. Where there is a discrepancy with this section, follow the requirements of 01 79 00.

.2 Instruct the City's designated employees in proper care, operation, use and maintenance of all systems and equipment, and provide general explanatory literature required and start up supervision and instructions.

.3 Provide two (2) weeks prior notice to the City to schedule the training.

.4 The City will provide list of personnel to receive instructions, and will coordinate their attendance at agreed-upon times.

.5 Upon completion of instructions, forward to the Contract Administrator with a copy to the City a letter indicating person instructed and dates that the instruction took place. If in the Contract Administrator's opinion, this is not done satisfactorily, the Contract Administrator may direct such instruction, and charge all costs involved to relevant section.

1.18 CONDITIONS FOR DEMONSTRATIONS

.1 Equipment has been inspected and put into operation in accordance with related sections.

.2 Testing, adjusting, and balancing have been performed and equipment and systems are fully operational.

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

1.19 SHOP DRAWINGS - ADMINISTRATIVE REQUIREMENTS

.1 Shop drawings shall be submitted electronically in PDF format documents to shopdrawings@eppsiepman.com.

.2 Submit to the Contract Administrator submittals listed for review. Submit with reasonable promptness and in orderly sequence so as to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for an extension of Contract Time and no claim for extension by reason of such default will be allowed.

.3 Work affected by submittal shall not proceed until review is complete.

.4 Present Shop Drawings, product data, samples and mock-ups in SI Metric and/or Imperial inch-pound units, to match the units used in the schedules.

.5 Review submittals prior to submission to the Contract Administrator. 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.

.6 Submittals not stamped, signed, dated, identified as to specific project, and attesting to their being reviewed will be returned without being examined and shall be considered rejected.

.7 Notify the Contract Administrator, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.

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

.9 Contractor's responsibility for errors and omissions in submission is not relieved by the Contract Administrator 's review of submittals.

.10 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by the Contract Administrator review.

.11 Keep one (1) reviewed copy of each submission on site.

1.20 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 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been coordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications. Indicate layouts, quantity, details of equipment, control wiring diagrams, sizes, capacities and roughing in and exact requirements for concrete pits, bases and other supporting members.

.3 Each shop drawing must be certified by manufacturer and as such shall indicate that all product engineering has been performed to ensure the product will meet the requirements of the intended installation.

.4 Shop drawings for grilles, registers and diffusers shall be accompanied by an itemized list indicating the unit locations by room number and the unit size.

.5 Allow ten (10) days for the Contract Administrator 's review of each submission.

.6 Adjustments made on Shop Drawings by the Contract Administrator are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to the Contract Administrator prior to proceeding with Work.

.7 Make changes in Shop Drawings as the Contract Administrator may require, consistent with Contract Documents. When resubmitting, notify the Contract Administrator in writing of any revisions other than those requested.

.8 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.

.9 Submissions shall 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 other parts of the Work.

.10 After the Contract Administrator 's review, distribute copies.

.11 Submit one (1) copy of Shop Drawings as a pdf document by email attachment for each requirement requested in specification Sections and as the Contract Administrator may reasonably request. Any electronic copy of shop drawings shall bear all the required marks of certification and approval by the manufacturer and contractor(s) as indicated above. The Contract Administrator will review and mark up one copy of the shop drawing, and return to the contractor by email attachment. The contractor shall then make copies as required for ordering and documentation purposes. Multiple copies of shop drawings will not be returned.

.12 Submit one electronic copy of product data sheets or brochures for requirements requested in specification sections and as requested by the Contract Administrator where Shop Drawings will not be prepared due to standardized manufacture of product. Submittals shall be submitted as a pdf document by email attachment, or delivered as a hard copy. Any electronic copy of shop drawings shall bear all the required marks of certification and approval by the manufacturer and contractor(s) as indicated above.

.13 Delete information not applicable to project.

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

.15 If upon review by the Contract Administrator, no errors or omissions are discovered or if only minor corrections are made, one electronic copy will be returned and fabrication and installation of Work may proceed. If Shop Drawings are rejected, noted copy will be returned and re-submission of corrected Shop Drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may

proceed. The contractor shall then make copies as required for ordering and documentation purposes. Multiple copies of shop drawings will not be returned.

.16 Checking of shop drawings by the Contract Administrator does not constitute acceptance of responsibility. Such checking constitutes assistance only to the Mechanical Division in the proper execution of their work.

1.21 SAMPLES

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

.2 Deliver samples prepaid to the Contract Administrator 's business address unless otherwise instructed.

.3 Notify the Contract Administrator 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 the Contract Administrator are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to the Contract Administrator prior to proceeding with Work.

.6 Make changes in samples which the Contract Administrator 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.

1.22 MOCK-UP

.1 Erect mock-ups to the requirements of Division 01.

1.23 PRODUCT QUALITY

.1 Products, materials, equipment, parts or assemblies (referred to as Products) incorporated in Work: New, not damaged or defective, of best quality (compatible with specification requirements) for purpose intended. If requested, provide evidence as to type, source and quality of Products provided.

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

.3 Should any dispute arise as to quality or fitness of Products, decision rests strictly with the Contract Administrator.

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

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

1.24 AVAILABILITY

.1 Immediately upon signing Contract, review Product delivery requirements and anticipate foreseeable supply delays for any items.

.2 If delays in supply of Products are foreseeable, notify the Contract Administrator of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.

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

1.25 STORAGE AND PROTECTION

.1 Store and protect Products in accordance with manufacturers' written instructions.

.2 Store with seals and labels intact and legible.

.3 Store sensitive Products in weather tight, climate controlled, enclosures in an environment favourable to Product.

.4 For exterior storage of fabricated Products, place on sloped supports above ground.

.5 Cover Products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of Products.

.6 Cover open ends of pipes, fixtures, ductwork, etc. to prevent entry of building rubbish.

.7 Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

.8 Provide equipment and personnel to store Products by methods to prevent soiling, disfigurement, or damage.

.9 Arrange storage of Products to permit access for inspection. Periodically inspect to verify Products are undamaged and are maintained in acceptable condition.

1.26 TRANSPORTATION AND HANDLING

.1 Transport and handle Products in accordance with manufacturer's written instructions.

.2 Promptly inspect shipments to ensure that Products comply with requirements, quantities are correct, and Products are undamaged.

.3 Provide equipment and personnel to handle Products by methods to prevent soiling, disfigurement, or damage.

.4 Protect all finished and unfinished work from soiling or damage, cover floors with tarpaulins or plywood as necessary, and repair any damage resulting from work of Mechanical Section.

.5 Protect finished surfaces to remain exposed, by paper, polyethylene or other satisfactory removable protective covering using paste acceptable to fixture manufacturer to prevent possible damage to finishes, until all reason for construction damage has passed and until acceptance by the City, and make good any such damage.

1.27 SPECIAL CLEANING

.1 Maintain tidiness within work of Mechanical Sections and at completion remove protective paper, labels, etc. and tools and waste materials. Leave clean and in perfect operating condition.

.2 Remove dirt, rubbish, grease, and dust for which this section is responsible from all exposed surfaces and fixtures.

.3 Operate, drain and flush out bearings and refill with new charge of lubricant, before final acceptance.

.4 Thoroughly clean piping, ducts and equipment of dirt, cuttings and other foreign substances within the scope of work area. Disconnect, clean and reconnect whenever necessary for purpose of locating and removing obstructions. Repair work damaged in course of removing obstructions. Refer to 23 31 00 for any additional duct cleaning requirements.

.5 Clean exposed surfaces of mechanical equipment, ductwork, piping, etc., and polish plated work.

.6 Protect bearings and shafts during installation. Grease shafts and sheaves to prevent corrosion. Supply and install extended nipples to outside of bearing enclosures for lubrication purposes.

.7 Remove tools, surplus, and waste material from the building site upon completion of work. Clean grease, dirt, and excess material from walls, floors, ceilings, surfaces, and fixtures for which this Contractor was responsible, and leave the premises suitable for immediate use.

.8 At the end of construction all systems shall be left ready for operation.

.9 This Section shall be responsible for repair work as may be necessary to remove dents and touch-up of factory finishes.

1.28 PRODUCT CHANGES

.1 Change in Product/Products: Submit request for substitution or alternative in accordance with this Section and Division 01 Product Exchange Procedures Division 01 Substitutions Sections.

.1 Any substituted item submitted for consideration must not exceed the available space limitations, and all additional costs for mechanical, electrical, structural and architectural revisions required to incorporate the substituted material shall be the responsibility of the Mechanical Division.

1.29 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 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.

1.30 MANUFACTURER'S WRITTEN INSTRUCTIONS

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

.2 Notify the Contract Administrator in writing, of conflicts between specifications and manufacturer's instructions, so that the Contract Administrator may establish course of action.

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

1.31 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 the Contract Administrator if required Work is such as to make it impractical to produce required results.

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

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

.4 Assume full responsibility for layout of own work and for any damage caused to property of others through improper location or poor workmanship.

1.32 COORDINATION

.1 Ensure cooperation of workers in laying out Work. Maintain efficient and continuous supervision.

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

.3 Check levels shown before commencement to ensure adequate falls for sewers and pipes and report discrepancies immediately. Failure to so check and report does not relieve this section from responsibility for consequent extra expenditures.

.4 Where space is indicated as reserve for future equipment, leave clear and install piping and other work so that connections can be made to future equipment.

.5 Secure approval where necessary to cut holes in either finished or unfinished work, employ section whose work is involved, cut openings no larger than necessary and without damage to adjoining work and carefully repair all damage to match adjacent work. Note the Mechanical Division is responsible for all required cutting and patching relating to this Contract, except as specifically noted otherwise.

.6 Provide and set bolts, templates, sleeves and fixing materials for fixing work under this section securely to work provided under other sections, in advance of other work, where required.

.7 Locate all openings in walls, partitions, beams, etc. required for installation of ducts, pipes and equipment, etc. specified in this section of the specifications and frame all openings as required.

.8 Installation of all equipment shall allow sufficient space to facilitate ease of maintenance. Clearance space shall allow for the removal of all components of equipment without hindrance. Where clearance requirements are not shown on the mechanical plans, manufacturer clearances must be maintained at a minimum.

1.33 WORK FOR OTHER TRADES

.1 The Mechanical Contractor shall rough-in for and/or connect up all equipment requiring mechanical services, as shown on drawings or mentioned elsewhere in the specifications.

.2 Supply other trades with all necessary details, rough-in drawings, wiring diagrams, etc. as required.

1.34 ELECTRICAL REQUIREMENTS

.1 Motors and electrical equipment supplied under Mechanical Division shall comply with Electrical Section and electrical characteristics scheduled or shown.

.2 See "Installation and Wiring Controls" in Electrical Section for equipment supplied under Electrical Section.

.3 The Electrical section shall provide starters for all motors and wire from starters to motors, unless otherwise indicated.

.4 The Electrical section shall wire between starters and switching components such as relays, float switches, and pressure switches.

.5 Supply to Electrical Section within four (4) weeks after contract award, fully detailed diagrams of power and control wiring required for equipment supplied by Sections 21 – 25.

.6 Motors shall be squirrel cage induction type 1800 RPM unless otherwise noted. Where dampness occurs, all motors and electrical apparatus such as float switches, etc. supplied integrally with any piece of apparatus, shall be totally enclosed.

.7 All motors 1 hp and larger shall be high efficiency as defined in CSA C390.

1.35 CONCEALMENT

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

.2 Before installation, inform the Contract Administrator if there is interference. Install as directed by the Contract Administrator.

1.36 ACCESS PANELS

.1 Provide in ample time for installation under relevant sections all necessary access panels in walls and ceilings to allow access to dampers, valves, etc., size 300 mm x 300 mm (12" x 12") min. or as required for proper maintenance with steel panel and frame, similar to Acudor, type to suit application. Instruct relevant section for proper location of access panels. Final locations subject to the Contract Administrator 's approval. ULC approved access panels must be provided where access is through or into a fire partition or assembly. If access doors have been specified by architectural sections the architectural specification shall supersede this section.

1.37 REMEDIAL WORK

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

1.38 ALTERATION WORK

.1 Where work is to be done in existing buildings, accurately survey, provide for avoidance of damage and interference to existing work and rectify any such damage due to work under Mechanical Sections. Accept existing work as it exists at time of tendering.

.2 Carefully dismantle existing mechanical equipment to be removed or relocated. Temporarily disconnect, remove, and reinstall existing equipment, piping, ductwork, conduit, light fixtures, and similar items, which interfere with the new installation after

completion of new work. Store equipment and materials on the premises as directed by the City.

.3 All usable salvaged equipment and materials shall remain the property of the City unless specifically noted otherwise. Such material shall be removed from the building and be safely and neatly stored on the site for removal by the City. The Contractor shall remove all rejected salvage from the site and legally dispose of it off site.

.4 Reuse existing equipment in new work after first repairing and reconditioning any defective items where noted. Safely cap and seal disconnected mechanical services within finished surfaces.

.5 The abandonment of existing equipment and material in place is not acceptable. All redundant services are to be removed back to active mains, which shall then be capped at existing point of connection.

.6 All mechanical equipment conflicting with new equipment being installed shall be moved or disconnected, without damage, by Contractor and shall remain property of the City. Remove ducts and piping not required in revised systems and interfering with new installation. This material shall become property of Contractor.

.7 Disconnect existing equipment indicated, intended to be reused, rough-in in new position, and after replacement connect up ready for use.

.8 Removal and relocation of mechanical equipment by relevant Mechanical Sections.

1.39 LOCATION OF FIXTURES

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

.2 Inform the Contract Administrator of conflicting installation. Install as directed.

1.40 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.

1.41 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 Type 304 or 316 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.

1.42 TEMPORARY USE OF EQUIPMENT

.1 No portion of any mechanical system or equipment provided under Mechanical Sections may be used for temporary heating without the Contract Administrator 's written permission and observance of the following procedure:

.1 Oil and grease motor, fan and pump bearings, etc. check on a regular basis and maintain as recommended by manufacturer.

.2 Maintain and clean when necessary cleanable type filters and clean and oil just prior to take-over of building by the City. Replace throwaway type filters.

.3 Ensure that mechanical air handling equipment is not operated during painting.

.4 Employ equipment manufacturers and subtrades to ensure and certify that all systems and equipment are in proper condition, and guarantee all work used prior to take-over as for new work, from date of acceptance of building by the City.

.5 If permission for temporary use of mechanical equipment is granted, use Canadian Plumbing and Mechanical Contractors Association standard form of agreement as basis of responsibilities. Guarantee on complete installation shall not start until acceptance of building by the City.

.2 All return air grilles/openings shall be equipped with MERV 8 filters to keep return air system clean of dust and dirt if air handling equipment is being used before turnover to the City.

1.43 PROTECTION OF WORK IN PROGRESS

.1 Prevent overloading of any part of the Project.

.2 Do not cut, drill or sleeve any load bearing structural member, unless specifically indicated, without written approval of the Contract Administrator.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Pipe, fittings, valves, and connections for sprinkler, standpipe and fire hose, combination sprinkler and standpipe systems.

.2 Back flow prevention

1.2 RELATED SECTIONS

.1 Submittal Procedures.

.2 Product Requirements.

.3 Closeout Submittals.

.4 Painting: Preparation and painting of fire protection piping systems.

.5 Section 21 13 00 - Sprinklers.

.6 Section 23 05 53 - Mechanical Identification.

.7 Section 23 05 29 - Supports and Anchors.

1.3 REFERENCES

.1 ASME Boiler and Pressure Vessel Code Section IX - Welding and Brazing Qualifications.

.2 ASME B16.1 - Cast Iron Pipe Flanges and Flanged Fittings.

.3 ASME B16.3 - Malleable Iron Threaded Fittings.

.4 ASME B16.4 - Cast Iron Threaded Fittings.

.5 ASME B16.5 - Pipe Flanges and Flanged Fittings.

.6 ASME B16.9 - Factory-made Wrought Steel Buttwelding Fittings.

.7 ASME B16.11 - Forged Fittings Socket Welding and Threaded.

.8 ASME B16.25 - Buttwelding Ends.

.9 ASME B36.10 - Welded and Seamless Wrought Steel Pipe.

.10 ASTM A135 - Electric-Resistance-Welded Steel Pipe.

.11 ASTM A47/A47M - Ferritic Malleable Iron Castings.

.12 ASTM A53/A53M - Pipe, Steel, Black and Hot-Dipped, Zinc-coated Welded and Seamless.

.13 ASTM A234/A234M - Piping Fittings of Wrought-Carbon Steel and Alloy Steel for Moderate and High Temperature Service.

.14 ASTM A795 - Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use.

.15 AWS D10.10 - Recommended Practices for Local Heating of Welds in Piping and Tubing.

.16 AWWA C110 - Ductile-Iron and Gray-Iron Fittings 76 mm through 1219 mm (3 Inch through 48 inch) for Welder.

.17 AWWA C151 - Ductile Iron Pipe, Centrifugally Cast, for Water.

.18 NFPA 13 - Installation of Sprinkler Systems.

.19 UL - Fire Resistance Directory.

.20 Underwriters Laboratories of Canada (ULC)

1.4 SUBMITTALS FOR REVIEW

.1 Section: Procedures for submittals.

.2 Product Data: Provide manufacturers catalogue information. Indicate valve data and ratings.

.3 Shop Drawings:

.1 Indicate pipe materials used, jointing methods, supports, floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.

.2 Indicate hazard levels, and NFPA codes that are applicable to the system.

.4

1.5 SUBMITTALS AT PROJECT CLOSEOUT

.1 Section: Procedures for submittals.

.2 Project Record Documents: Record actual locations of components and tag numbering.

.3 Operation and Maintenance Data: Include installation instructions and spare parts lists.

1.6 QUALITY ASSURANCE

.1 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

.2 All carbon steel pipe and fittings shall be manufactured in Canada or the United States of America. This does not include stainless steel.

.3 Installer Qualifications: Company specializing in performing the work of this section with minimum five years documented experience, licensed in the Province of Manitoba, member in good standing with the Canadian Automatic Sprinkler Association, and approved by manufacturer.

1.7 REGULATORY REQUIREMENTS

.1 Conform to ULC., UL., FM.

.2 Sprinkler Systems: Conform to NFPA 13.

.3 Welding Materials and Procedures: Conform to Manitoba Department of Labour and ASME Code requirements.

.4 Valves: Bear UL/ULC label or marking. Provide manufacturer's name and pressure rating marked on valve body.

.5 Products Requiring Electrical Connection: Listed and classified as suitable for the purpose specified and indicated.

1.8 DELIVERY, STORAGE, AND PROTECTION

.1 Section: Transport, handle, store, and protect products.

.2 Deliver and store valves in shipping containers, with labelling in place.

.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.

1.9 EXTRA MATERIALS

.1 Section: Operation and Maintenance Data.

1.10 INSPECTION AND TESTS

.1 All inspections and tests required by the above mentioned authorities and agencies shall be arranged for and performed by this contractor.

.2 Carry out any necessary flow tests without extra compensation.

.3 All piping and fittings in the standpipe and sprinkler systems shall be hydrostatically tested at a pressure of 1380 kPa (200psi) for 2 hours without evidence of loss or leakage or as per NFPA 13.

Part 2 Products

2.1 ABOVE GROUND PIPING AND FITTINGS

.1 Steel Pipe: ASTM A53; ASTM A135; ASTM A135 UL listed, threadable, light wall; ASTM A795; or ASME B36.10; Schedule 10 black; or ASME B36.10; Schedule 40 black; or ASME B36.10; Schedule 10 galvanized; or ASME B36.10; Schedule 40 galvanized as scheduled below.

.2 All carbon steel pipe and fittings shall be manufactured in Canada or the United States of America.

.1 Steel Fittings: ASME B16.9, wrought steel, buttwelded; ASME B16.25, buttweld ends; ASTM A234, wrought carbon steel and alloy steel; ASME B16.5, steel flanges and fittings; ASME B16.11, forged steel socket welded and threaded.

.2 Cast Iron Fittings: ASME B16.1, flanges and flanged fittings; ASME B16.4, threaded fittings.

.3 Malleable Iron Fittings: ASME B16.3, threaded fittings ASTM A47.

.4 Mechanical Grooved Couplings: Malleable iron housing clamps to engage and lock, "C" shaped elastomeric sealing gasket, steel bolts, nuts, and washers; galvanized for galvanized pipe.

.5 Mechanical Formed Fittings: Carbon steel housing with integral pipe stop and O-ring pocked and O-ring, uniformly compressed into permanent mechanical engagement onto pipe.

.3 Plastic piping systems are not permitted.

.4 CPVC plastic piping systems are permitted where noted on the drawings only.

.5 Pipe 50mm (2”) and smaller shall be joined by threaded connections.

.6 Pipe 64mm (2 ½") and larger may be joined by roll groove mechanical joints. Provide galvanized pipe and fittings for dry and preaction sprinkler systems.

.7 Fittings: ULC approved for use in wet and/or dry pipe sprinkler systems.

.8 Ferrous: screwed, welded, flanged or roll grooved.

.9 Ensure fittings, mechanical couplings, and rubber gaskets are supplied by same manufacturer.

Part 3 Execution

3.1 PREPARATION

.1 Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

.2 Remove scale and foreign material, from inside and outside, before assembly.

.3 Prepare piping connections to equipment with flanges or unions.

3.2 INSTALLATION

.1 Use grooved mechanical couplings and fasteners only in accessible locations.

.2 Install piping to NFPA 13 for sprinkler systems.

.3 Route piping in orderly manner, plumb and parallel to building structure and as instructed on drawings. Maintain gradient.

.4 Install piping to conserve building space, to not interfere with use of space and other work.

.5 Group piping whenever practical at common elevations.

.6 Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

.7 Slope piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level.

.8 Prepare pipe, fittings, supports, and accessories for finish painting. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.

.9 Do not penetrate building structural members unless indicated.

.10 When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

.11 Die cut threaded joints with full cut standard taper pipe threads with red lead and linseed oil or other non-toxic joint compound applied to male threads only.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Wet-pipe sprinkler assembly.

.2 System design, installation, and certification.

1.2 RELATED SECTIONS

.1 Section - Mechanical Identification.

.2 Section - Vibration Isolation.

1.3 REFERENCES

.1 NFPA 13 - Installation of Sprinkler Systems.

.2 FM - Factory Mutual Approval Guide.

.3 UL - Fire Resistance Directory.

.4 UL 199 - Automatic Sprinklers for Fire-Protection Service.

.5 Underwriters Laboratories of Canada (ULC)

1.4 SYSTEM DESCRIPTION

.1 System to provide coverage for building areas noted.

.2 Provide system to NFPA 13 requirements.

1.5 SUBMITTALS FOR REVIEW

.1 Section: Procedures for submittals.

.2 Product Data: Provide data on sprinklers, valves, and specialties, including manufacturers catalogue information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.

.3 Shop Drawings:

.1 Submit preliminary layout of finished ceiling areas indicating only sprinkler locations coordinated with ceiling installation.

.2 Indicate hydraulic calculations, detailed pipe layout, hangers and supports, sprinklers, components and accessories. Indicate system controls.

.4 Submit shop drawings, product data and hydraulic calculations to the Contract Administrator and authority having jurisdiction for approval. Submit proof of approval to the Contract Administrator.

1.6 SUBMITTALS AT PROJECT CLOSEOUT

.1 Section: Procedures for submittals.

.2 Project Record Documents: Record actual locations of sprinklers and deviations of piping from drawings. Indicate drain and test locations.

.3 Manufacturer's Certificate: Certify that system has been tested and meets or exceeds specified requirements and code requirements.

.4 Operation and Maintenance Data: Include components of system, servicing requirements, record drawings, inspection data, replacement part numbers and availability, and location and numbers of service depot.

1.7 QUALITY ASSURANCE

.1 Perform Work to NFPA 13.

.2 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

.3 Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years documented experience.

.4 Design system under direct supervision of a Professional Engineer experienced in design of this Work and licensed at the place where the Project is located.

1.8 REGULATORY REQUIREMENTS

.1 Conform to ULC and FM.

.2 Perform Work to NFPA 13.

.3 Equipment and Components: Bear ULC, UL, FM label or marking.

.4 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: Transport, handle, store, and protect products.

.2 Store products in shipping containers and maintain in place until installation. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

1.10 EXTRA MATERIALS

.1 Section: Operation and maintenance data.

.2 Provide extra sprinklers to NFPA 13.

.3 Provide suitable wrenches for each sprinkler type.

.4 Provide metal storage cabinet located adjacent to alarm valve.

Part 2 Products

2.1 SPRINKLERS

.1 Suspended Ceiling:

.1 Type: Standard pendant type with matching push on escutcheon plate.

.2 Finish: Enamel, colour white.

.3 Escutcheon Plate Finish: To match sprinkler body.

.4 Fusible Link: Glass bulb type temperature rated for specific area hazard unless otherwise noted.

.2 Exposed Area Type:

.1 Type: Standard upright type.

.2 Finish: Brass.

.3 Fusible Link: Glass bulb type temperature rated for specific area hazard unless otherwise noted.

.3 Guards: Finish to match sprinkler finish.

.4 Provide protective guards for all sprinkler heads installed in confined but accessible spaces.

.5 All sprinkler shall be permanently marked so as to identify each sprinkler based on type, orifice size, shape, deflector characteristic, pressure rating and thermal sensitivity.

.6 Provide lead solder fusible link as required to meet specific application requirements and as required by the local authority having jurisdiction.

Part 3 Execution

3.1 INSTALLATION

.1 Install to NFPA 13.

.2 Install equipment to manufacturers written instructions.

.3 Place pipe runs to minimize obstruction to other work.

.4 Place piping in concealed spaces above finished ceilings.

.5 Centre sprinklers in one direction only in ceiling tile with location in other direction at ¼, ½, or ¾ of the ceiling tile length, dependent upon spacing and coordination with ceiling elements. Layout instructions provided on the architectural and mechanical drawings override spacing instruction given above.

.6 Apply masking tape or paper cover to ensure concealed sprinklers, cover plates, and sprinkler escutcheons do not receive field paint finish. Remove after painting. Replace painted sprinklers.

.7 Flush new sections of piping system of foreign matter.

.8 Install guards on sprinklers where indicated and as per NFPA 13.

.9 Hydrostatically test entire system. Test shall be witnessed by authority having jurisdiction.

.10 Before commencement of any work, examine work of other trades and make immediate report to the Contract Administrators of any defect or interference affecting work or guarantee of this work.

.11 If drilling of structural beams or other load bearing members is required by design or by site conditions for passage of piping, obtain the Contract Administrators approval for location and proposed drilling procedure before drilling. Drill only in locations previously approved by the Contract Administrator. Where drilling is required by design or existing site conditions, be responsible for carrying out same to approved procedure.

.12 Allow for expansion and contraction when installing pipe hangers.

.13 Install horizontal valves with stems upright where space allows.

.14 Carefully coordinate work with other trades so that unnecessary offsets and revisions to the approved drawings are avoided. Failure to coordinate does not relieve Contractor from meeting performance standards.

.15 The Project Coordinator shall approve any shutdowns of existing water distribution systems, fire sprinkler systems, domestic water systems or fire alarm systems. Provide advance written notice at least 14 days prior to the shutdown to the Construction Coordinator.

3.2 INTERFACE WITH OTHER PRODUCTS

.1 Ensure required devices are installed and connected as required to fire alarm 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.
.3 Natural gas.

1.2 RELATED SECTIONS

.1 Section 09 21 16 – Gypsum Board Assemblies.

.2 Section 09 91 99 – Painting for Minor Works

.3 Section 23 05 48 - Vibration Isolation.

.4 Section 23 05 53 - Mechanical Identification.

.5 Section 23 07 19 - Piping Insulation.

.6 Section 23 05 16 – Piping Expansion Compensation.

.7 Section 23 05 29 – Supports and Anchors.

1.3 REFERENCES

.1 ASTM E814 - Fire Tests of Through-Penetration Fire Stops.

.2 ASME B31.9 - Building Services Piping.

.3 ASME SEC IV - Construction of Heating Boilers.

.4 ASME SEC IX - Welding and Brazing Qualifications.

.5 ASME B16.3 - Malleable Iron Threaded Fittings.

.6 MSS SP58 - Pipe Hangers and Supports - Materials, Design and Manufacturer.

.7 MSS SP69 - Pipe Hangers and Supports - Selection and Application.

.8 MSS SP-80 - Bronze Gate, Globe, Angle and Check Valves.

.9 MSS SP89 - Pipe Hangers and Supports - Fabrication and Installation Practices.

.10 MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

.11 NCPWB - Procedure Specifications for Pipe Welding.

.12 UL 1479 - Fire Tests of Through-Penetration Firestops.

.13 ASTM F708 - Design and Installation of Rigid Pipe Hangers.

.14 AWS A5.8 - Filler Metals for Brazing and Braze Welding.

.15 ASME B16.22-2001 (R2005) - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.

.16 ASME B16.26 - Copper Alloy Bronze Fittings for Flared Copper Tubes.

.17 ASME B16.4 - Grey Iron Threaded Fittings.

.18 AWWA C651 - Disinfecting Water Mains.

.19 ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.

.20 ASTM B42 - Seamless Copper Pipe, Standard Sizes.

.21 ASTM B43 - Seamless Red Brass Pipe, Standard Sizes.

.22 ASTM B68 - Seamless Copper Tube, Bright Annealed.

.23 ASTM B75 - Seamless Copper Tube.

.24 ASTM B22.18-03 - Seamless Copper Water Tube.

.25 ASTM B251 - General Requirements for Wrought Seamless Copper and Copper-Alloy Tube.

.26 ASTM B302 - Threadless Copper Pipe, Standard Sizes.

.27 ASME B16.1 - Cast Iron Pipe Flanges and Flanged Fittings.

.28 ASME B16.23 - Cast Copper Alloy Solder Joint Drainage Fittings - DWV.

.29 ASME B16.32 - Cast Copper Alloy Solder Joint Fittings for Solvent Drainage Systems.

.30 ASTM A74 - Cast Iron Soil Pipe and Fittings.

.31 ASTM B306 - Copper Drainage Tube (DWV).

.32 ASME B16.29 - Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings - DWV.

.33 ASTM B32-04 - Solder Metal.

.34 CISPI 301 - Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications.

.35 CISPI 310 - Joints with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications.

.36 MSS SP-85 - Cast Iron Globe & Angle Valves, Flanged and Threaded Ends.

.37 MSS SP-70 - Cast Iron Gate Valves, Flanged and Threaded Ends.

.38 MSS SP-71 - Cast Iron Swing Check Valves, Flanged and Threaded Ends.

.39 MSS SP-78 - Cast Iron Plug Valves, Flanged and Threaded Ends.

.40 ASTM D2665 - Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings.

.41 ASTM D2564 - Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems.

.42 ASTM D2855-96 (2002) - Standard Practice for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings.

.43 ASME B31.1 - Power Piping.

.44 CAN/CSA B149.1 – Natural Gas and Propane Installation Code.

.45 ASME B31.2 - Fuel Gas Piping.

.46 ASTM A47/A47M - Ferritic Malleable Iron Castings.

.47 ASTM A53/A53M - Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

.48 ASTM A234/A234M - Piping Fittings of Wrought-Carbon Steel and Alloy Steel for Moderate and High Temperature Service.

1.4 SUBMITTALS FOR REVIEW

.1 Section 21 05 00: Submission procedures.

.2 Product Data: Provide data on all valves larger than 50mm (2”), and all backflow prevention devices and accessories. Provide manufacturers catalogue information. Indicate valve data and ratings.

1.5 CLOSEOUT SUBMITTALS

.1 Section 21 05 00: Submission procedures.

.2 Record Documentation: Record actual locations of valves on record drawings.

1.6 QUALITY ASSURANCE

.1 Perform Work to the standards of the Province and Municipality of Jurisdiction.

.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 Welder's Certification: To Manitoba Department of Labour standards.

.5 Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.

.6 All carbon steel pipe and fittings shall be manufactured in Canada or the United States of America. This does not include stainless steel.

1.7 REGULATORY REQUIREMENTS

.1 Perform Work to the latest version of the Manitoba Plumbing Code and local Municipal requirements.

.2 Conform to applicable code for installation of backflow prevention devices.

.3 Provide certificate of compliance from authority having jurisdiction indicating approval of installation of backflow prevention devices.

1.8 DELIVERY, STORAGE, AND PROTECTION

.1 Refer to specification section Product Requirements: 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 Refer to specification section Environmental Protection: Environmental conditions affecting products on site.

.2 Do not install underground piping when bedding is wet or frozen.

Part 2 Products

2.1 SANITARY SEWER PIPING, ABOVE GRADE

.1 75mm (3”) and over - Cast Iron Pipe: CISPI 301, hubless, service weight. Class 4000

.1 Fittings: Cast iron.

.2 Joints: ASTM C564 and CISPI Standard 310, neoprene gasket system and stainless steel clamp-and-shield assemblies.

.2 Copper Tube: ASTM B306, DWV.

.1 Fittings: ASTM B306 with lead-free soldered cast brass drainage fittings to CSA B158.1 or wrought copper fittings to ANSI B16-29

.2 Joints: ASTM B32, lead-free solder, Grade 50B.

.3 PVC Pipe with FSR25: CSA B181.2

.1 Fittings: PVC.

.2 Joints: ASTM D2855, solvent weld to ASTM D2565.

.4 PVC Pipe with FSR25/SDC50: CSA B181.2. Piping shall be tested and listed in accordance with CAN/ULC-S102.2 and clearly marked with the certification logo indicating a flame spread rating (FSR) not exceeding 25 and a smoke developed classification (SDC) not exceeding 50.

.1 Fittings: PVC.

.2 Joints: ASTM D2855, solvent weld to ASTM D2565.

.3 Manufacturer: IPEX System XFR or equal.

2.2 WATER PIPING, ABOVE GRADE

.1 Copper Tubing 50mm (2") and under: ASTM B88, 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 Copper Tubing over 50mm (2"): ASTM B88, Type L hard drawn.

.1 Fittings: Silver brazed fittings.

2.3 NATURAL GAS PIPING, ABOVE GRADE

.1 Steel Pipe: ASTM A53 Schedule 40 Black.

.1 Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M, forged steel welding type.

.2 Joints: NFPA 54, threaded or welded to ANSI B31.9.

2.4 FLANGES, UNIONS, AND COUPLINGS

.1 Pipe Size 80 mm (3 inches) 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 inch):

.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.

2.5 BALL VALVES

.1 Manufacturers:

.1 MAS

.2 Kitz

.3 Crane.

.4 Substitutions: Refer to Section 21 05 00.

.2 Construction, 100 mm (4 inches) and smaller: MSS SP-110, Class 150, 2760 kPa (400 psi) brass, two piece body, 316 stainless ball and trim, full port, teflon seats and stuffing box ring, blow-out proof stem, lever handle, solder ends.

2.6 PLUG VALVES

.1 Manufacturers:

.1 Nordstrom Valves, Inc. MSS SP-78, Type II.

.2 Substitutions: Refer to Section 21 05 00.

.2 Construction 50 mm (2 inches) and smaller: Figure 114, MSS SP-78, 2700 kPa (400 psi), cast iron body and plug, pressure lubricated, teflon or Buna N packing, flanged or threaded ends. Provide lever operator with set screw.

.3 Construction 65 mm (2-1/2 inches) and larger: MSS SP-78, 1200 kPa (175 psi), cast iron body and plug, pressure lubricated, teflon or Buna N packing, flanged ends. Provide lever operator with set screw.

Part 3 Execution

3.1 EXAMINATION

.1 Section 21 05 00: Verify 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.

.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 written 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 09 21 16.

.9 Establish elevations of buried piping outside the building to ensure not less than 2.4 m (8 ft) 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 Prepare exposed, unfinished pipe, fittings, supports, and accessories ready for finish painting. Refer to Section 09 91 99.

.13 Install valves with stems upright or horizontal, not inverted.

.14 Install water piping to ASME B31.9.

.15 Install fuel oil piping to ASME B31.9 and CSA B139.

.16 Sleeve pipes passing through partitions, walls and floors. Set sleeves in concrete forms for all pipes passing through new concrete walls, beams and slabs.

.17 Pipe sleeves to extend above floor line as follows:

.1 Unfinished areas – 25 mm (1 inches).

.2 Finished areas (copper sleeves) – 7 mm (1/4 inches).

.3 Mechanical rooms, kitchens and washrooms – 100 mm (4 inches).

.18 Caulk sleeves to provide watertight installation.

.19 Where pipes pass through floors and walls in finished areas and where exposed to view, provide Crane #10 B.C. chrome-plated, pressed steel floor plates.

.20 Install galvanized, oversize pipe sleeves on passing through walls or partitions, for building into wall construction, by other trades.

.21 Sleeves and holes for piping on cold water systems shall be large enough to accommodate pipe insulation. Insulation on piping for hot water systems may stop at walls or floors.

.22 Prior to installing sleeves in concrete beams, receive final jobsite approval by Structural Engineer.

3.4 PIPE PRESSURE TESTING

.1 Do not insulate pipe prior to pressure testing. Pressure test in sections if necessary before concealing or insulating pipe.

.2 Do not introduce water for testing where freezing conditions exist or where piping systems being tested are located above sensitive areas or equipment that may be damaged or contaminated by water leakage.

.3 Hydraulically test all pipe. Pneumatic testing not permitted without prior approval from the Contract Administrator and the Authority Having Jurisdiction.

.4 Should leaks develop in any part of the piping system, remove and replace defective sections, fittings and equipment. Pipe dope, caulking, tape, lead wool, dresser couplings, etc. shall not be used to correct deficiencies. The contractor shall be responsible for all cleanup related to leakage during flushing, testing, and chemical treatment of piping, including original building piping if included in the testing.

.5 Subject piping to a hydrostatic pressure of at least that 1-½ times the operating pressure of the system for a period of at least 12 hours. If leaks are detected, such leaks shall be repaired and the test started over. Record results and submit witnessed (by the Contract Administrator or the City's representative) reports to the Contract Administrator.

.6 Cast iron piping systems: water-test each portion of the system for 15 minutes at a head pressure of 10' of water. Test procedure shall be in accordance with CISPI and the manufacturer's recommendations. Compressed air shall not be used for testing.

.7 Register pressures at the highest system point.

.8 Provide at least 48 hours (during working days) notice to the Contract Administrator or the City's Representative prior to testing to allow the tests to be witnessed.

3.5 APPLICATION

.1 Install unions downstream of valves and at equipment or apparatus connections.

.2 Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.

.3 Install ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.

.4 Provide plug valves in natural and propane gas systems for shut-off service.

.5 PVC DWV piping installed in non-combustible buildings shall comply with the restrictions in the following table.

Product	NON-COMBUSTIBLE BUILDING				
	General Usage	Air Plenum[1]	Vertical Services Spaces[2]	High-Rise Building	Underground
Combustible Pipe FSR25: (eg. IPEX System 15)	P	N[3]	N	N	P
Combustible Pipe FSR25/SDC50: (eg. IPEX XFR, CPVC)	P	P	N	P	P
MJ Grey Coupling	P	P	N	P	N

1. Restrictions for air plenums also apply to combustible buildings as well.
2. Certified firestopping devices are required whenever the system penetrates a vertical or horizontal separation, and shall be certified to CAN4-S115 and tested with a pressure differential of 50 Pa.
3. Sizes 20" and 24" are N

3.6 ERECTION TOLERANCES

.1 Establish invert elevations, slopes for drainage to one percent (1/8 inch per foot) minimum, except pipe sized 75 mm (3 inches) or less shall have a slope no less than two percent (1/4 inch per foot). Maintain gradients.

.2 Slope water piping minimum 0.25 percent and arrange to drain at low points.

3.7 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

.1 Prior to starting work, verify system is complete, flushed and clean.

.2 Ensure pH of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).

.3 Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, throughout system to obtain 50 to 80 mg/L residual.

.4 Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.

.5 Maintain disinfectant in system for 24 hours.

.6 If final disinfectant residual tests less than 25 mg/L, repeat treatment.

.7 Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.

.8 Take samples no sooner than 24 hours after flushing, from 5 percent of outlets and from water entry, and analyze to AWWA C651.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Floor Drains

.2 Trap seal primers.

.3 Cleanouts.

.4 Hose Bibs

.5 Water hammer arrestors.

1.2 RELATED SECTIONS

.1 Section 01 11 00 - Summary of Work

.2 Section 22 10 00 - Plumbing Piping.

.3 Section 22 42 02 - Plumbing Fixtures.

1.3 REFERENCES

.1 ASME - SEC 8D - Boilers and Pressure Vessels Code - Rules for Construction of Pressure Vessels.

.2 ASME A112.21.1 - Floor Drains.

.3 ASME A112.26.1 - Water Hammer Arrestors.

.4 NSF/ANSI 61 – Drinking Water System Components – Health Effects

.5 PDI G-101 - Testing and Rating Procedure for Grease Interceptors with Appendix of Sizing and Installation Data.

.6 PDI WH-201 - Water Hammer Arrestors.

.7 CSA B125.3 – Plumbing Fittings

1.4 SUBMITTALS FOR REVIEW

.1 Section 21 05 00: Submission procedures.

.2 Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.

.3 Shop Drawings: Indicate dimensions, weights, and placement of openings and holes.

1.5 CLOSEOUT SUBMITTALS

.1 Section 21 05 00: Submission procedures.

.2 Operation Data: Indicate frequency of treatment required for interceptors.

.3 Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.

.4 Record Documentation: Record actual locations of equipment, cleanouts, backflow preventers, water hammer arrestors, trap seal primers.

1.6 MAINTENANCE MATERIAL SUBMITTALS

.1 Section 01 78 40: Maintenance and extra material requirements.

1.7 QUALITY ASSURANCE

.1 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three (3) years documented experience.

1.8 DELIVERY, STORAGE, AND PROTECTION

.1 Section 21 05 00: Transport, handle, store, and protect products.

.2 Accept specialties on site in original factory packaging. Inspect for damage.

Part 2 Products

2.1 FLOOR DRAINS

.1 Manufacturers:

.1 Mifab
.2 Zurn.
.3 Watts.
.4 Substitutions: Refer to Section 21 05 00.

.1 Floor Drain (FD-1) – Surface Membrane Floors:

.1 ANSI A112.21.1,
.1 Lacquered cast iron once piece body with wide anchor flange,
.2 Weep holes,
.3 Round, adjustable stainless steel strainer, vandal proof
.4 Complete with ½" trap primer connection.

Floor Drain Schedule

Tag	Type	Inlet	Body Material	Vandal Proof	Sediment Bucket	Trap Seal Primer
FD-1	Surface Membrane	Heavy Duty Strainer	Cast Iron	Yes	No	Yes

2.2 TRAP SEAL PRIMER

.1 Manufacturers:

.1 Mifab

.2 Zurn.

.3 Watts.

.4 Precision Plumbing Products.

.5 Substitutions: Refer to Section 21 05 00.

.2 Pressure drop activated brass trap seal primer

.1 Inlet opening of 1/2" (13mm) male N.P.T. and outlet opening of female 1/2" (13mm) N.P.T.

.2 Complete with four view holes and removable filter screen.

.3 Requires no site adjustments and no air pre-charge.

.4 Each trap seal primer shall be installed with brass trap seal primer air gap fitting,

.5 Where multiple floor drains are being served install a trap seal primer distribution unit.

.6 Primers shall be installed with union directly upstream, and shut off valve.

.7 Supply line to primer shall have a reverse bend in it to reduce the change of sediment collecting in primer, refer to manufacturer’s installation instructions.

2.3 CLEANOUT COVERS

.1 Exterior Surfaced Areas:

.1 Manufacturers:

.1 Mifab

.2 Zurn.

.3 Watts.

.4 Substitutions: Refer to Section 21 05 00.

.2 Round cast nickel bronze access frame and non-skid cover.

.2 Exterior Unsurfaced Areas:

.1 Line type with lacquered cast iron body and round epoxy coated gasketed cover.

.3 Interior Finished Floor Areas:

.1 Lacquered cast iron body with anchor flange, reversible clamping collar, threaded top assembly, and round gasketed scored cover in service areas and round gasketed depressed cover to accept floor finish in finished floor areas.

.4 Interior Finished Wall Areas:

.1 Line type with lacquered cast iron body and round epoxy coated gasketed cover, and round stainless steel access cover secured with machine screw.

.5 Interior Unfinished Accessible Areas:

.1 Caulked or threaded type.

.2 Bolted stack cleanouts on vertical rainwater leaders.

2.4 HOSE BIBS

.1 Interior:

.1 Manufacturers:

.1 Mifab

.2 Zurn.

.3 Watts.

.4 Substitutions: Refer to Section 21 05 00.

.2 Exposed-type anti-contamination wall faucet with ¾" (19mm) male hose connection and anti-siphon vacuum breaker.

.3 Exterior finish to be brass, operating handle to be cast-iron, coloured blue or red (for cold or hot), and inlet connection shall be ½" (13mm) F.P.T.

.4 Vacuum breaker to be certified to A.S.S.E. Standard 1011 and listed by I.A.P.M.O.

2.5 WATER HAMMER ARRESTORS

.1 Manufacturers:

.1 Mifab

.2 Zurn.

.3 Watts.

.4 Substitutions: Refer to Section 21 05 00.

.2 ASME A112.26.1,

.1 Stainless steel construction,

.2 Bellows type sized to PDI WH-201,

.3 Pre-charged suitable for operation in temperature range -73 to 149 degrees C (-100 to 300 degrees F) and maximum 1700 kPa (250 psi) working pressure.

Part 3 Execution

3.1 INSTALLATION

.1 Install to manufacturer instructions.

.2 Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.

.3 Install floor cleanouts at elevation to accommodate finished floor.

.4 Install water hammer arrestors complete with accessible isolation valve on hot and cold water supply piping to washing machine outlets, banks of flush valve fixtures (eg. Water closets, urinals).

.5 Install air chambers on hot and cold water supply piping to each fixture or group of fixtures (each washroom). Fabricate same size as supply pipe or 20 mm (3/4 inch) minimum, and minimum 450 mm (18 inches) long.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Water closets.

.2 Lavatories.

.3 Service sinks.

.4 Showers.

1.2 RELATED SECTIONS

.1 Section 21 05 00 – Submittal Procedures.

.2 Section 01 45 00 - Quality Control.

.3 Section 01 61 00 – Common Product Requirements.

.4 Section 01 78 00 - Closeout Submittals.

.5 Section 06 41 11 - Architectural Woodwork:

.1 Preparation of counters for sinks,

.2 Lavatory tops.

.6 Section 07 92 00 - Joint Sealants: Seal fixtures to walls and floors.

.7 Section 23 05 29 - Supports And Anchors.

.8 Section 22 10 00 - Plumbing Piping.

.9 Section 22 42 01 - Plumbing Specialties.

1.3 REFERENCES

.1 CSA B45.1 / ASME A112.19.2 - Ceramic plumbing fixtures

.2 CSA B45.2 / ASME A112.19.1 - Enamelled Cast Iron and Enamelled Steel Plumbing Fixtures

.3 CSA B45.3 - Porcelain-Enamelled Steel Plumbing Fixtures

.4 CSA B125.1 / ASME A112.18.1 - Plumbing Supply Fittings

.5 CSA B125.2 / ASME A112.18.2 – Plumbing Waste Fittings

.6 CSA B125.3 - Plumbing Fittings

.7 CSA B125.6 / ASME A112.18.6 – Flexible Water Connectors

.8 CSA B125.14 / ASME A112.4.14 - Manually operated valves for use in plumbing systems

.9 CSA B125.16/ASSE 1016/ASME A112.1016 - Performance Requirements for Automatic Compensating Valves for Individual Showers and Tub/Shower Combinations

.10 CSA B125.70 / ASSE 1070/ASME A112.1070 - Performance requirements for water temperature limiting devices

.11 CSA B651 – Barrier-free Design.

.12 ASSE 1017 - Performance Requirements for Temperature Actuated Mixing Valves for Hot Water Distribution Systems

.13 ASSE 1069 - Performance Requirements for Automatic Temperature Control Mixing Valves

.14 ASME A112.6.1 - (Floor Affixed) Supports for Off-the-Floor Plumbing Fixtures for Public Use.

.15 ASME A112.19.4 - Porcelain Enamelled Formed Steel Plumbing Fixtures.

.16 ASME A112.19.5 - Trim for Water-Closet Bowls, Tanks, and Urinals.

.17 CSA 22.2 – Canadian Electrical Code

.18 NBCC 2010 - National Building Code of Canada

.19 NPCC 2010 – National Plumbing Code of Canada

.20 NFCC 2010 – National Fire Code of Canada

.21 NSF

.1 NSF 61 - Drinking Water System Components – Health Effects

.2 NSF 372 - Drinking Water System Components – Lead Content

1.4 SUBMITTALS FOR REVIEW

.1 Section 21 05 00: Submission procedures.

.2 Product Data: Provide catalogue illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.

1.5 CLOSEOUT SUBMITTALS

.1 Section 21 05 00: Submission procedures.

.2 Maintenance Data: Include fixture trim exploded view and replacement parts lists.

.3 Warranty Documentation: Submit manufacturer warranty and ensure forms have been completed in the City’s name and registered with manufacturer.

1.6 QUALITY ASSURANCE

.1 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three (3) 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 PROTECTION

.1 Section 21 05 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.

Part 2 Products

2.1 FLUSH VALVE WATER CLOSETS – FLOOR-MOUNTED

.1 WC-1 – Barrier Free Water Closet:

.1 Manufacturer: Kohler Model K-96057.

.2 Other acceptable manufacturers offering equivalent products.

.1 American Standard.

.2 Substitutions: Refer to Section 21 05 00.

.3 ASME A112.19.2 / CSA B45.1:

.1 Floor mounted, vitreous china closet bowl, with elongated rim,

.2 (1-1/2 inch) 38 mm top spud,

.3 China bolt caps.

.4 ADA / CSA B651:

.1 422mm (16-5/8 inch) high bowl.

.2 Exposed Sensor Operated Flush Valve (Hard Wired) – Barrier Free:

.1 Manufacturer: Delta Model 81T201HW.

.1 Substitutions: Refer to Section 21 05 00.

.2 American Standard

.3 Kohler

.2 ASME A112.19.2 / CSA B45.1:

.1 Exposed chrome plated, electronic infrared sensor flush valve

.2 Chloramine resistant diaphragm with forged brass diaphragm retainer and renewable seat.

.3 Distance measurement based on bowl length for activation setting. Field adjustable.

.4 Integral screwdriver stop and vacuum breaker,

.5 Metal non hold open over-ride button, ADA compliant

.6 Pressure loss check angle stop with cap,

.7 Factory set to 4.8lpf (1.28 gal) flush volume. Confirmation of field adjustments by contractor to be provided to Contract Administrator.

.8 Valve outlet tube 610 mm (24 inches) height

.9 Complete with junction box and stainless steel cover plate.

.10 120V to 24V transformer required.

.3 Transformer Schedule:

.1 For up to 10 Electronic Valves Provide:

.1 110 to 24VAC Class II 20VA ()

.2 Manufacturer: Delta Model 060704A

.3 Seat (Barrier Free):

.1 Manufacturer: Kohler K-4650.

.2 Other acceptable manufacturers offering equivalent products.

.1 Bemis 1950SS.

.2 Substitutions: Refer to Section 21 05 00.

.3 Solid white plastic, open front with cover, extended back,

.4 Self-sustaining hinge, brass bolts,

.5 Sized for elongated bowl.

.4 Back Rest:

.1 Manufacturer: Franke CM-16104.

.2 Other acceptable manufacturers offering equivalent products.

.1 Substitutions: Refer to Section 21 05 00.

.3 Stainless steel bar uses #4 gloss with flanges and covers.

.4 Antique white solid core plastic laminate 10”x4” panel back.

.5 Concealed snap flanges and mounting hardware included.

.6 Provide adequate backing in wall for support and comply to local codes for barrier free requirements

2.2 LAVATORIES

.1 LAV- 1: Vitreous China Wall Hung Basin:

.1 Manufacturer: Kohler Model K-1728.

.2 Other acceptable manufacturers offering equivalent products.

.1 American Standard.

.2 Substitutions: Refer to Section 21 05 00.

.3 ASME A112.19.2 / CSA B45.1:

.1 Vitreous china wall hung lavatory,

.2 489 x 438 mm (19-1/4 x 17-1/4 inch),

.3 Ledge back,

.4 Drillings on 100 mm (4 inch) centres,

.5 Rectangular basin and splash lip,

.6 Integral front overflow.

.7 Angle valve screwdriver stop,

.8 Chrome-plated copper supplies.

.4 ADA / CSA B651:

.1 Barrier-free compliant.

.2 LAV-2: Integral Countertop Basin:

.1 Supplied by general contractor as part of counter-top. Provide faucet and trim only.

.3 Lavatory Metered Faucet:

.1 Manufacturer: Delta Model 591T0250

.2 Other acceptable manufacturers offering equivalent products.

.1 American Standard

.2 Kohler

.3 Substitutions: Refer to Section 21 05 00.

.3 ASME A112.18.1/CSA B125.1:

.1 Hands free (touchless) on/off faucet,

.2 H2Optics™ technology, no external adjustments required,

.3 all metal faucet construction,

.4 5 1/4" long rigid spout, no lift rod hole,

.5 vandal resistant 0.5 gpm (1.9 L/min) spray outlet,

.6 Hard Wire (24VAC) infrared electronic handwash(Product supplied with a Converter to convert 24VAC to 6 VDC) 4" (102mm) centers - 2-1/2" x 7" (64 mm x 178 mm) forged coverplate with locking mechanism (anti-rotation), 3 hole installation,

.7 supplied with open grid strainer, chrome finish

.8 Solenoid and Controller in Plastic Surface Mount Housing-NO MIXING VALVE SUPPLIED

.4 Accessories:

.1 Chrome plated 1.3 mm (17 gauge) brass P-trap with clean-out plug and arm with escutcheon.

.2 Offset waste with perforated open strainer.

.3 Angle valve screwdriver stop,

.4 Chrome-plated copper supplies.

.5 Wall Mounted Carrier:

.1 Manufacturer: Mifab Model MC-41

.2 Other acceptable manufacturers offering equivalent products.

.1 Watts

.2 Zurn.

.3 Substitutions: Refer to Section 21 05 00.

.3 ASME A112.6.1:

.1 Cast iron and steel frame with two structural steel legs,

.2 Lugs for floor and wall attachment,

.3 Concealed arm supports,

.4 Bearing plate and studs.

.6 Lavatory Pipe Insulation:

.1 Manufacturer: TrueBro Lav Guard 2 E-Z

.2 Other acceptable manufacturers offering equivalent products.

.1 Substitutions: Refer to Section 21 05 00.

.3 Material:

.1 Molded vinyl Nominal Wall 1/8" constant

.2 UV Protection

.3 Trimming (E-Z Series) "Internal, E-Z Tear-To-Fit trim feature"

.4 Fasteners (E-Z Series) Internal E-Z Grip fasteners (reusable)

.5 Color - China white, Paintable

.6 Burning Characteristics ASTM D-635

.7 "ASTM G21 and G22 - Bacteria/Fungus Resistance

2.3 SHOWERS

.1 Shower Trim:

.1 Manufacturer: Delta Model 13220.

.1 Substitutions: Refer to Section 21 05 00.

.2 ASME A112.18.1 / CSA-B125.1 / ASSE 1016

.1 Pressure-balanced shower valve,

.2 Pressure Balancing Cartridge with integral spool and sleeve assembly;

.3 Adjustable hot water limit stop.

.4 Cartridge shall contain all the movable parts and shall be accessible from the front of the unit.

.5 The escutcheon will have a hot and cold coded index.

.6 The valve shall have a lever handle.

.7 Shower head to be Delta RP46384 1.5 gpm (5.7 lpm) maximum with brass ball.

.2 Shower Trim – Barrier-Free with Hand-Held Shower:

.1 Manufacturer: Delta Model 13220.

.1 Substitutions: Refer to Section 21 05 00.

.2 ASME A112.18.1 / CSA-B125.1 / ASSE 1016

.1 Pressure-balanced shower valve,

.2 Pressure Balancing Cartridge with integral spool and sleeve assembly;

.3 Adjustable hot water limit stop.

.4 Cartridge shall contain all the movable parts and shall be accessible from the front of the unit.

.5 The escutcheon will have a hot and cold coded index.

.6 The valve shall have a lever handle.

.3 Handshower Package

.1 Manufacturer: Delta Model RPW324HDF-1.5.

.1 Substitutions: Refer to Section 21 05 00.

.2 ASME A112.18.1 / CSA-B125.1; ASME A112.18.3

.1 Handshower with Shut-off Button and Integral Backflow Protection,

.2 1.5 U.S.Gpm (5.7 L/min.) Flow Control

.3 1753 mm (69") Long Double Sprial Metal Hose

.4 610mm (24") SS Finish Sliding Handshower Bar w/Vertical Mounting Pin and Screws

.5 CP Brass Swivel Handshower Elbow for Vertical Mounting Pin

.6 Integral ASSE Approved Vacuum Breakers

.3 ADA / CSA B651:

.1 Barrier-free compliant when installed in conjunction with other requirements.

2.4 SERVICE SINKS

.1 Mop Sink:

.1 Manufacturer: Fiat Product MSB-2424 - 24” x 24” x 10” (610 x 610 x 254 mm)

.2 Other acceptable manufacturers offering equivalent products.

.1 Zurn.

.2 American Standard

.3 Configuration:

.1 Size: 600 x 600 x 250 mm (24 x 24 x 10 inch) high,

.2 Floor mounted molded stone mop service basin, with 832 hose and holder, 889 cc. mop hanger, and 600 mm (24”) vinyl bumper guard.

.3 Stainless steel strainer.

.2 Trim:

.1 Manufacturer: Delta Model 28T2383.

.2 ASME A112.18.1

.1 Polished chrome wallmount service faucet with rigid spout, 8” centres, cast brass construction, chrome-plated.

.2 Two handle with integral check stops, polished chrome plated finish, lever-blade handles.

.3 Long rigid spout with pail hook and adjustable top wall brace, pail hook and ¾” hose thread on spout.

.4 Body mounted angle vacuum breaker, garden hose end outlet on spout.

.5 Vacuum breaker, integral stops.

.3 Accessories:

.1 1.5 m (5 feet) of 13 mm (1/2 inch) diameter plain end reinforced rubber hose,

.2 Hose clamp hanger,

.3 Mop hanger.

.1

Part 3 Execution

3.1 EXAMINATION

.1 Section 01 70 00: Verify 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 to manufacturer's instructions.

.2 Install each fixture with trap, easily removable for servicing and cleaning.

.3 Provide chrome plated rigid supplies to fixtures with screwdriver stops, reducers, and escutcheons. Install all exposed piping and valves neatly and close to the wall. Supplies should be run as plumb as possible.

.4 Install components level and plumb.

.5 All mixing valves serving multiple fixtures shall be installed in recessed cabinets.

.6 Install lavatory mixing valves neatly and out of site under millwork unless specified as installed in recessed cabinet. Secure with proper fasteners – galvanized strapping is not acceptable. Where provided on the drawings, refer to mixing valve installation details.

.7 The temperature of water discharging into a bathtub or shower shall be set and tested by the contractor to not exceed 120°F (49°C).

.8 Install and secure fixtures in place with wall supports or wall carriers (as specified in Part 2 Products) and bolt, washer, nut fasteners.

.9 Seal fixtures to wall and floor surfaces with sealant as specified in Section 07 92 00, colour to match fixture.

.10 Seal sinks and lavatories to the millwork. Install gasket where supplied or recommended by sink or lavatory manufacturer.

.11 Solidly attach water closets to floor with lag screws.

.12 Emergency shower / eye-wash stations should be installed so that shower head is at least 82" above floor and 32" from wall or nearest obstruction.

.13 Thermally insulate and jacket all exposed drain pipe extensions, traps, and trap arms below barrier-free wall-hung lavatories.

.14 Transformers serving electronic plumbing fixtures shall be supplied by this section. Coordinate installation with electrical trades. Low voltage wiring by this section. Contractor is responsible for coordinating quantity of transformers required. Transformers shall be installed in nearest fully accessible ceiling space unless noted otherwise on drawings. Coordinate exact location with City of Winnipeg.

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 Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

.2 Adjust stops or valves to comply with specified flow rates.

.3 Adjust sensor ranges to allow consistent operation of fixtures.

3.6 CLEANING

.1 Section 01 74 00: Cleaning installed work.

.2 Clean plumbing fixtures and equipment.

3.7 PROTECTION OF FINISHED WORK

.1 Section 01 78 40: Protecting installed work.

.2 Do not permit use of fixtures.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Single phase electric motors.

.2 Three phase electric motors.

1.2 RELATED SECTIONS

.1 Section 21 05 00 – Submittal Procedures.

.2 Section 01 61 00 – Common Product Requirements.

.3 Section 01 78 00 - Closeout Submittals.

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 IEEE 112 - Test Procedure for Polyphase Induction Motors and Generators.

.4 NEMA MG 1 - Motors and Generators.

1.4 SUBMITTALS

.1 Section 21 05 00: Procedures for submittals.

.2 Product Data: Provide wiring diagrams with electrical characteristics and connection requirements.

.3 Test Reports: Indicate test results verifying nominal efficiency and power factor for three phase motors larger than 15 Kw (20 horsepower).

.4 Manufacturer's Installation Instructions: Indicate setting, mechanical connections, lubrication, and wiring instructions.

1.5 OPERATION AND MAINTENANCE DATA

.1 Section 21 05 00: Submittals for project closeout.

.2 Operation Data: Include instructions for safe operating procedures.

.3 Maintenance Data: Include assembly drawings, bearing data including replacement sizes, and lubrication instructions.

1.6 QUALIFICATIONS

.1 Manufacturer: Company specializing in manufacture of electric motors and their accessories, with minimum three years documented product development, testing, and manufacturing experience.

1.7 REGULATORY REQUIREMENTS

.1 Conform to applicable electrical code.

.2 Products Requiring Electrical Connection: Listed and classified by testing firm acceptable to the authority having jurisdiction as suitable for the purpose specified and indicated.

1.8 DELIVERY, STORAGE, AND HANDLING

.1 Section 21 05 00: Transport, handle, store, and protect products.

.2 Protect motors stored on site from weather and moisture by maintaining factory covers and suitable weather-proof covering. For extended outdoor storage, remove motors from equipment and store separately.

1.9 WARRANTY

.1 Section 21 05 00: Submittals for project closeout.

.2 Provide five year warranty.

.3 Warranty: Include coverage for motors larger than 20 horsepower.

Part 2 Products

2.1 MANUFACTURERS

.1 Baldor.

.2 Toshiba.

.3 WEG

.4 Substitutions: Refer to Section 21 05 00.

2.2 GENERAL CONSTRUCTION AND REQUIREMENTS

.1 Motors less than 250 Watts, for intermittent service: Equipment manufacturer's standard and need not conform to these specifications.

.2 Electrical Service:

.1 The following are required electrical characteristics unless otherwise indicated in the drawings and schedules.

.2 Motors 0.5 kW (3/4 hp) and smaller: 115 volts, single phase, 60 Hz.

.3 Motors Larger than 0.5 kW (3/4 hp): 208 volts, three phase, 60 Hz.

.3 Type:

.1 Open drip-proof except where specifically noted otherwise.

.2 Motors: Design for continuous operation in 40 degrees C environment.

.3 Design for temperature rise to NEMA MG 1 limits for insulation class, service factor, and motor enclosure type.

.4 Motors with frame sizes 254T and larger: Energy Efficient Type.

.4 Visible Nameplate: Indicating motor horsepower, voltage, phase, cycles, RPM, full load amps, locked rotor amps, frame size, manufacturer's name and model number, service factor, power factor, efficiency.

.5 Wiring Terminations:

.1 Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to code, threaded for conduit.

.2 For fractional horsepower motors where connection is made directly, provide conduit connection in end frame.

2.3 SINGLE PHASE POWER - SPLIT PHASE MOTORS

.1 Starting Torque: Less than 150 percent of full load torque.

.2 Starting Current: Up to seven times full load current.

.3 Breakdown Torque: Approximately 200 percent of full load torque.

.4 Drip-proof Enclosure: Class A (50 degrees C temperature rise) insulation, NEMA Service Factor, prelubricated sleeve or ball bearings.

.5 Enclosed Motors: Class A (50 degrees C temperature rise) insulation, 1.0 Service Factor, prelubricated ball bearings.

2.4 SINGLE PHASE POWER - PERMANENT-SPLIT CAPACITOR MOTORS

.1 Starting Torque: Exceeding one fourth of full load torque.

.2 Starting Current: Up to six times full load current.

.3 Multiple Speed: Through tapped windings.

.4 Open Drip-proof or Enclosed Air Over Enclosure: Class A (50 degrees C temperature rise) insulation, minimum 1.0 Service Factor, prelubricated sleeve or ball bearings, automatic reset overload protector.

2.5 SINGLE PHASE POWER - CAPACITOR START MOTORS

.1 Starting Torque: Three times full load torque.

.2 Starting Current: Less than five times full load current.

.3 Pull-up Torque: Up to 350 percent of full load torque.

.4 Breakdown Torque: Approximately 250 percent of full load torque.

.5 Motors: Capacitor in series with starting winding; provide capacitor-start/capacitor-run motors with two capacitors in parallel with run capacitor remaining in circuit at operating speeds.

.6 Drip-proof Enclosure: Class A (50 degrees C temperature rise) insulation, NEMA Service Factor, prelubricated bearings.

.7 Enclosed Motors: Class A (50 degrees C temperature rise) insulation, 1.0 Service Factor, pre-lubricated ball bearings.

2.6 THREE PHASE POWER - SQUIRREL CAGE MOTORS

.1 Starting Torque: Between 1 and 1-1/2 times full load torque.

.2 Starting Current: Six times full load current.

.3 Power Output, Locked Rotor Torque, Breakdown or Pull Out Torque: NEMA Design B characteristics.

.4 Design, Construction, Testing, and Performance: Conform to NEMA MG 1 for Design B motors.

.5 Insulation System: NEMA Class B or better.

.6 Testing Procedure: To IEEE 112. Load test motors to determine free from electrical or mechanical defects in compliance with performance data.

.7 Motor Frames: NEMA Standard T-Frames of steel, aluminum, or cast iron with end brackets of cast iron or aluminum with steel inserts.

.8 Thermistor System (Motor Frame Sizes 254T and Larger): Three PTC thermistors imbedded in motor windings and epoxy encapsulated solid state control relay for wiring into motor starter.

.9 Bearings: Grease lubricated anti-friction ball bearings with housings equipped with plugged provision for relubrication, rated for minimum AFBMA 9, L-10 life of 20,000 hours. Calculate bearing load with NEMA minimum V-belt pulley with belt centre line at end of NEMA standard shaft extension. Stamp bearing sizes on nameplate.

.10 Sound Power Levels: To NEMA MG 1.

.11 Part Winding Start where indicated: Use part of winding to reduce locked rotor starting current to approximately 60 percent of full winding locked rotor current while providing approximately 50 percent of full winding locked rotor torque.

.12 Weatherproof Epoxy Sealed Motors: Epoxy seal windings using vacuum and pressure with rotor and starter surfaces protected with epoxy enamel; bearings double shielded with waterproof non-washing grease.

.13 Nominal Efficiency: As scheduled at full load and rated voltage when tested to IEEE 112.

.14 Nominal Power Factor: As scheduled at full load and rated voltage when tested to IEEE 112.

Part 3 **Execution**

3.1 APPLICATION

.1 Single phase motors for shaft mounted fans, oil burners, centrifugal pumps: Split phase type.

.2 Single phase motors for shaft mounted fans or blowers: Permanent split capacitor type.

.3 Motors located in exterior locations, wet air streams downstream of sprayed coil dehumidifiers, draw through cooling towers, air cooled condensers, humidifiers, direct drive axial fans, roll filters, explosion proof environments, dust collection systems: Totally enclosed type.

3.2 INSTALLATION

.1 Install to manufacturer's written instructions.

.2 Install securely on firm foundation. Mount ball bearing motors with shaft in any position.

.3 Check line voltage and phase and ensure agreement with nameplate.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Flexible pipe connectors.

.2 Expansion joints and compensators.

.3 Pipe loops, offsets, and swing joints.

1.2 RELATED SECTIONS

.1 Section 21 11 00 - Fire Protection Piping.

.2 Section 22 10 00 - Plumbing Piping.

.3 Section 23 21 00 - Hydronic Piping.

1.3 REFERENCES

.1 MIL-E-17814E - Expansion Joints, Pipe, Slip-Type, Packed.

1.4 PERFORMANCE REQUIREMENTS

.1 Provide structural work and equipment required to control expansion and contraction of piping. Verify that anchors, guides, and expansion joints provided, adequately protect system.

.2 Expansion Calculations:

.1 Installation Temperature (hot water heating, domestic hot water): 10 degrees C (50 degrees F).

.2 Hot Water Heating: 99 degrees C (210 degrees F).

.3 Domestic Hot Water: 60 degrees C (140 degrees F).

.4 Installation Temperature (chilled water): 27 degrees C (80 degrees F).

.5 Chilled Water: 7 degrees C (45 degrees F).

.6 Safety Factor: 30 percent.

1.5 SUBMITTALS

.1 Section 21 05 00: Procedures for submittals.

.2 Product Data:

.1 Flexible Pipe Connectors: Indicate maximum temperature and pressure rating, face-to-face length, live length, hose wall thickness, hose convolutions per metre(foot) and per assembly, fundamental frequency of assembly, braid structure, and total number of wires in braid.

.2 Expansion Joints: Indicate maximum temperature and pressure rating, and maximum expansion compensation.

.3 Design Data: Indicate selection calculations.

.4 Manufacturer's Installation Instructions: Indicate special procedures, and external controls.

1.6 PROJECT RECORD DOCUMENTS

.1 Section 21 05 00: Submittals for project closeout.

.2 Record actual locations of flexible pipe connectors, expansion joints, anchors, and guides.

1.7 OPERATION AND MAINTENANCE DATA

.1 Section 21 05 00: Submittals for project closeout.

.2 Maintenance Data: Include adjustment instructions.

1.8 QUALIFICATIONS

.1 Manufacturer: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.9 DELIVERY, STORAGE, AND HANDLING

.1 Section 21 05 00: Transport, handle, store, and protect products.

.2 Accept expansion joints on site in factory packing with shipping bars and positioning devices intact. Inspect for damage.

.3 Protect equipment from exposure by leaving factory coverings, pipe end protection, and packaging in place until installation.

1.10 WARRANTY

.1 Warranty: Include coverage for leak free performance of packed expansion joints.

1.11 EXTRA MATERIALS

.1 Section 21 05 00: Submittals for project closeout.

.2 Provide two 340 gm (12 ounce) containers of packing lubricant and cartridge style grease gun.

Part 2 Products

2.1 FLEXIBLE PIPE CONNECTORS

.1 Steel Piping:

.1 Manufacturers:

.1 HYSPAN.

.2 Substitutions: Refer to Section 21 05 00

.2 Inner Hose: Stainless Steel.

.3 Exterior Sleeve: Double braided stainless steel.

.4 Pressure Rating: 862 kPa (125 psig) WSP and 204 degrees C (400 degrees F).

.5 Joint: As specified for pipe joints.

.6 Size: Use pipe sized units.

.7 Maximum offset: 20 mm (3/4 inch) on each side of installed centre line.

.2 Copper Piping – heating water, chilled water, and condenser water up to and including 50 mm (2”):

.1 Manufacturers:

.1 Hydro Flex.

.2 Substitutions: Refer to Section 21 05 00.

.2 Inner Hose: 300 series stainless steel.

.3 Exterior Sleeve: Braided stainless steel.

.4 Pressure Rating: 862 kPa (125 psig) WSP and 204 degrees C (400 degrees F).

.5 Joint: threaded male ends.

.6 Size: Use pipe sized units

.7 Maximum offset: 20 mm (3/4 inch) on each side of installed centre line.

2.2 ACCESSORIES

.1 Pipe Alignment Guides:

.1 Manufacturers:

.1 Anvil.

.2 HYSPAN.

.3 Substitutions: Refer to Section 21 05 00.

.2 Two piece welded steel with enamel paint, bolted, with spider to fit standard pipe, frame with four mounting holes, clearance for minimum 25 mm (1 inch) thick insulation, minimum 75 mm (3 inch) travel.

Part 3 Execution

3.1 INSTALLATION

.1 Provide support and equipment required to control expansion and contraction of piping. Provide loops, pipe offsets, and swing joints, or expansion joints where required and where indicated on the drawings.

.2 If not otherwise indicated on the drawings 1200 mm x 1200 mm (4' x 4') expansion loops shall be installed on all copper hot water heating piping having a straight run in excess of 12 m (40'). The expansion loop shall be centred in the straight run, with alignment guides on each side of the loop and anchors at the extreme ends of the pipe run. Similar loops shall be installed on straight runs of steel steam, condensate and hot water piping which exceeds 18 m (60') in length.

.3 Follow Manufacturer’s written instructions in regard to proper length, anchoring and guiding, pre-compression, removal of spacers, and testing.

.4 When expansion joints are installed at ambient temperatures higher than minimum system operating temperature, they shall be precompressed prior to installation, to allow for eventual contraction of piping.

.5 Install flexible pipe connectors on pipes connected to equipment supported by vibration isolation. Provide line size flexible connectors.

.6 Install flexible connectors at right angles to displacement. Install one end immediately adjacent to isolated equipment and anchor other end. Install in horizontal plane unless indicated otherwise.

.7 Rigidly anchor pipe to building structure where necessary. Provide pipe guides so movement is directed along axis of pipe only. Erect piping such that strain and weight is not on cast connections or apparatus.

.8 Provide victaulic piping with minimum one joint per 25 mm (1 inch) pipe diameter instead of flexible connector supported by vibration isolation. Victaulic piping need not be anchored.

3.2 MANUFACTURER'S FIELD SERVICES

.1 Provide inspection services by flexible pipe manufacturer's representative for final installing and certify installation is to manufacturer's recommendations and connectors are performing satisfactorily.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Pipe and equipment hangers and supports.

.2 Equipment bases and supports.

.3 Sleeves and seals.

.4 Flashing and sealing equipment and pipe stacks.

1.2 RELATED SECTIONS

.1 Section 07 84 00 - Firestopping: Joint seals for piping and duct penetration of fire rated assemblies.

.2 Section 09 91 99 – Painting for Minor Works.

.3 Section 21 11 00 - Fire Protection Piping.

.4 Section 23 07 19 - Piping Insulation.

.5 Section 22 10 00 - Plumbing Piping.

.6 Section 23 21 00 - Hydronic Piping.

1.3 REFERENCES

.1 ASME B31.1 - Power Piping.

.2 ASME B31.2 - Fuel Gas Piping.

.3 ASME B31.5 - Refrigeration Piping and Heat Transfer Components.

.4 ASME B31.9 - Building Services Piping.

.5 ASTM F708 - Design and Installation of Rigid Pipe Hangers.

.6 MSS SP58 - Pipe Hangers and Supports - Materials, Design and Manufacturer.

.7 MSS SP69 - Pipe Hangers and Supports - Selection and Application.

.8 MSS SP89 - Pipe Hangers and Supports - Fabrication and Installation Practices.

.9 NFPA 13 - Installation of Sprinkler Systems.

.10 NFPA 14 - Installation of Standpipe, Private Hydrants, and Hose Systems.

.11 UL 203 - Pipe Hanger Equipment for Fire protection Service.

1.4 SUBMITTALS

.1 Section 21 05 00: Procedures for submittals.

.2 Shop Drawings: Indicate system layout with location and detail of trapeze hangers.

.3 Product Data: Provide manufacturers catalogue data including load capacity.

.4 Design Data: Indicate load carrying capacity of trapeze, multiple pipe, and riser support hangers.

.5 Manufacturer's Installation Instructions: Indicate special procedures and assembly of components.

1.5 REGULATORY REQUIREMENTS

.1 Conform to applicable code for support of plumbing, hydronic, steam and steam condensate piping.

.2 Supports for Sprinkler Piping: To NFPA 13.

.3 Supports for Standpipes: To NFPA 14.

Part 2 Products

2.1 PIPE HANGERS AND SUPPORTS

.1 Manufacturers:

.1 Anvil.
.2 Grinnel.
.3 Substitutions: Refer to Section 21 05 00.

.2 Fire Protection Piping:

.1 Conform to NFPA 13.
.2 Hangers for Pipe Sizes 13 to 38 mm (1/2 to 1-1/2 inch): Carbon steel, adjustable swivel, split ring.
.3 Hangers for Pipe Sizes 50 mm (2 inches) 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 75 mm (3 inches): Cast iron hook.
.6 Wall Support for Pipe Sizes 100 mm (4 inches) 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.

.3 Plumbing Piping - DWV:

.1 Conform to ASME B31.9.

.2 Cast Iron DWV Piping:

.1 Hangers for Pipe Sizes 13 to 38 mm (1/2 to 1-1/2 inch): Carbon steel, adjustable swivel, split ring.

.2 Hangers for Pipe Sizes 50 mm (2 inches) and over: Carbon steel, adjustable, clevis.

.3 Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.

.4 Wall Support for Pipe Sizes to 75 mm (3 inches): Cast iron hook.

.5 Wall Support for Pipe Sizes 100 mm (4 inches) and over: Welded steel bracket and wrought steel clamp.

.6 Vertical Support: Steel riser clamp.

.7 Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

.8 Clamping for MJ couplings: Socket-pipe clamps with washers, threaded rod, and nuts (Anvil Fig. 594 & 595 or equal).

.3 Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

.4 PVC DWV Pipe Support: to manufacturer's requirements.

.4 Plumbing Piping - Water:

.1 Conform to ASME B31.9.

.2 Perforated strap or wire hangers are not permitted.

.3 Hangers to be adjustable after pipe is in place.

.4 Clevis hangers shall be oversized to suit the outside diameter of insulation and jacket to maintain the integrity of insulation and vapour barrier.

.1 Protection Saddles

.1 On piping 2" and smaller, carry insulation over pipe hangers. On all domestic cold water piping over 1-1/4", use oversized clevis hangers and GSS insulation protection shield to maintain integrity of vapour barrier.

.2 On copper piping over 2", use at each hanger or support Grinnell Fig. 167 protection shield or equal. Shields shall have a minimum length of 12" (305mm) to spread weight. Rectangular solid wood blocks, cut to suit the insulation thickness, shall be installed at hanger locations. Wedges are not permitted.

.5 Hangers for Pipe Sizes 15 to 40 mm (1/2 to 1-1/2 inch): Carbon steel, adjustable swivel, split ring.

.6 Hangers for Cold Pipe Sizes 50 mm (2 inches) and over: Carbon steel, adjustable, clevis.

.7 Hangers for Hot Pipe Sizes 50 to 100 mm (2 to 4 inches): Carbon steel, adjustable, clevis.

.8 Hangers for Hot Pipe Sizes 150 mm (6 inches) and over: Adjustable steel yoke, cast iron pipe roll, double hanger.

.9 Multiple or Trapeze Hangers: Steel channels with welded supports or spacers and hanger rods.

.10 Multiple or Trapeze Hangers for Hot Pipe Sizes 150 mm (6 inches) and over: Steel channels with welded supports or spacers and hanger rods, cast iron roll.

.11 Wall Support for Pipe Sizes to 80 mm (3 inches): Cast iron hook.

.12 Wall Support for Pipe Sizes 100 mm (4 inches) and over: Welded steel bracket and wrought steel clamp.

.13 Wall Support for Hot Pipe Sizes 150 mm (6 inches) and over: Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast iron pipe roll.

.14 Vertical Support: Steel riser clamp.

.15 Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

.16 Floor Support for Hot Pipe Sizes to 100 mm (4 inches): Cast iron adjustable pipe saddle, locknut, nipple, floor flange, and concrete pier or steel support.

.17 Floor Support for Hot Pipe Sizes 150 mm (6 inches) and over: Adjustable cast iron pipe roll and stand, steel screws, and concrete pier or steel support.

.18 Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

.19 Isolation: Copper piping shall be isolated from steel supports by appropriate use of copper plated hangers, plastic coated hangers, tinning pipe at supports, or provision of suitable lead or copper isolators.

.5 Hydronic Piping:

.1 Conform to ASME B31.9.

.2 Perforated strap or wire hangers are not permitted.

.3 Hangers to be adjustable after pipe is in place.

.4 Clevis hangers shall be oversized to suit the outside diameter of insulation and jacket to maintain the integrity of insulation and vapour barrier.

.1 Protection Saddles

.1 On piping 2" and smaller, carry insulation over pipe hangers. On all chilled water piping, and domestic cold water piping over 1-1/4”, use oversized clevis hangers and GSS insulation protection shield to maintain integrity of vapour barrier.

.2 On insulated steel pipe over 2" use at each hanger or support, Grinnell Fig. 160, 161 or 162 to suit pipe size and insulation thickness. Pack space between saddle and pipe with insulation.

.3 On copper piping over 2", use at each hanger or support Grinnell Fig. 167 protection shield or equal. Shields shall have a minimum length of 12" (305mm) to spread weight. Rectangular solid wood blocks, cut to suit the insulation thickness, shall be installed at hanger locations. Wedges are not permitted.

.5 Where pipe expansion in excess of 12mm (1/2") axially occurs or where indicated to be installed on the drawings, provide Grinnell Fig. 171 Adjustable Pipe Roll or Grinnell Fig. 271 Pipe Roll Stand.

.6 Hangers for Pipe Sizes 13 to 38 mm (1/2 to 1-1/2 inch): Carbon steel, adjustable swivel, split ring.

.7 Hangers for Cold Pipe Sizes 50 mm (2 inches) and over: Carbon steel, adjustable, clevis.

.8 Hangers for Hot Pipe Sizes 50 to 100 mm (2 to 4 inches): Carbon steel, adjustable, clevis.

.9 Hangers for Hot Pipe Sizes 150 mm (6 inches) and over: Adjustable steel yoke, cast iron roll, double hanger.

.10 Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.

.11 Multiple or Trapeze Hangers for Hot Pipe Sizes 150 mm (6 inches) and over: Steel channels with welded spacers and hanger rods, cast iron roll.

.12 Wall Support for Pipe Sizes to 76 mm (3 inches): Cast iron hook.

.13 Wall Support for Pipe Sizes 100 mm (4 inches) and over: Welded steel bracket and wrought steel clamp.

.14 Wall Support for Hot Pipe Sizes 150 mm (6 inches) and over: Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast iron roll.

.15 Vertical Support: Steel riser clamp.

.16 Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

.17 Floor Support for Hot Pipe Sizes to 100 mm (4 inches): Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

.18 Floor Support for Hot Pipe Sizes 150 mm (6 inches) and over: Adjustable cast iron roll and stand, steel screws, and concrete pier or steel support.

.19 Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

.20 Isolation: Copper piping shall be isolated from steel supports by appropriate use of copper plated hangers, plastic coated hangers, tinning pipe at supports, or provision of suitable lead or copper isolators.

.21 Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.

.22 Inserts: Malleable iron case of steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

.6 Refrigerant Piping:

.1 Conform to ASME B31.5.

.2 Hangers for Pipe Sizes 13 to 38 mm (1/2 to 1-1/2 inch): Carbon steel, adjustable swivel, split ring.

.3 Hangers for Pipe Sizes 50 mm (2 inches) 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 75 mm (3 inches): Cast iron hook.

.6 Wall Support for Pipe Sizes 100 mm (4 inches) 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.

.7 For roof mounted piping, provide supports equivalent to:

.1 Portable Pipe Hangers model PP 10 strut style with pipe clamp guides, Portable Pipe Hangers Model PSE-2-2 with clevis style hangers, or

supports. Install to Manufacture's specifications. Supports to be aluminium with stainless steel clamps and rollers. Membrane pads to be close-cell extruded polystyrene insulation equal to Dow Chemical Roofmate. Pipe shall be a minimum of 8" above finished roof level.

.2 MIFAB C-Port Series. Minimum 6 1/2" in height, supports to be constructed of recycled rubber, UV resistant and designed to support rooftop equipment. Supports to be selected, sized, and configured to match equipment installation requirements and roof construction, with galvanized steel channel. All metal work including strut or pipe clamps to be stainless steel.

2.2 ACCESSORIES

.1 Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.

2.3 INSERTS

.1 Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

2.4 SLEEVES

.1 Sleeves for Pipes Through Non-fire Rated Floors: 1.2 mm thick (18 gauge) galvanized steel.

.2 Sleeves for Pipes Through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Steel pipe or 1.2mm thick (18 gauge) galvanized steel.

.3 Sleeves for Pipes Through Fire Rated and Fire Resistive Floors and Walls, and Fire Proofing: Prefabricated fire rated sleeves including seals, UL listed refer to Section 07 84 00.

.4 Where pipes pass through floors, walls or ceilings, in finished areas and where exposed to view, supply and install chrome-plated pressed steel floor plates.

.5 Sleeves for Round Ductwork: Galvanized steel.

.6 Sleeves for Rectangular Ductwork: Galvanized steel or wood.

.7 Firestopping Insulation: Glass fibre type, non-combustible; refer to Section 07 84 00.

.8 Sealant: Acrylic; refer to Section 07 92 00.

Part 3 Execution

3.1 INSTALLATION

.1 Install to manufacturer's written instructions.

3.2 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 over100 mm (4 inches).

.4 Where concrete slabs form finished ceiling, locate inserts flush with slab surface.

.5 Install galvanized oversize pipe sleeves on all pipes passing through walls or partitions, for building into wall construction by other trades.

.6 All sleeves are to be large enough to accommodate pipe insulation as specified.

.7 The Mechanical Division shall include in tender price all cost of drilling for sleeves up to 175 mm (7") in precast sections relative to work under Mechanical Division. Prior to drilling all openings/locations must be checked by the Contract Administrator. Drilling shall be done using diamond core drilling machinery.

.8 All sleeves in mechanical rooms, janitors closets and washrooms shall extend 100 mm (4") above the finished floor level to prevent water seeping down.

.9 Caulk the space between pipes and floor sleeves or openings, to prevent water seeping down, with an approved caulking compound. The caulking compound and method of application shall be to the Contract Administrator's approval.

.10 Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut flush with top of slab.

3.3 PIPE HANGERS AND SUPPORTS

.1 Install to manufacturer's written instructions.

.2 Install heating water, glycol, chilled water, condenser water, and engine exhaust piping to ASME B31.9.

.3 Perforated strap or wire hangers will not be permitted.

.4 Support horizontal piping as scheduled.

.5 Hangers in new concrete structural floor systems shall be supported by inserts placed prior to pouring of concrete. Inserts shall be Grinnell cast iron or wrought steel adjustable type.

.6 Where hangers must be installed in existing concrete slabs, approved expansion type inserts shall be used, or if heavy weights must be supported, a hole shall be drilled through the slab and a 50 mm x 50 mm (2" x 2") washer and nut installed above rough slab before the floor finish is poured.

.7 Where the structural system is open web steel joists, piping shall be supported by means of angles spanning the bottom or top chords of adjacent joists. The number of joists to be spanned in this way shall be determined by the incident load of piping.

.8 In no case shall the hanging of piping directly from roof decking be allowed, unless special permission is obtained from the Contract Administrator.

.9 Copper hot water piping in long runs, where expansion may be significant and where hanger rods are less than 600 mm (2") in length may require roller hangers. Any such cases which cannot be avoided shall be referred to the Contract Administrator for a decision. If necessary, roller hangers shall be installed as directed with protection saddles as specified. Expansion and contractions of domestic H.W. piping should not be a problem, as wide fluctuations in temperature are not normal. Piping shall be hung from slabs, rather than from the bottom of beams, in order to keep hanger rods sufficiently long to take up any movement.

.10 Install hangers to provide minimum 13 mm (1/2 inch) space between finished covering and adjacent work.

.11 Place hangers within 300 mm (12 inches) of each horizontal elbow.

.12 Use hangers with 38 mm (1-1/2 inch) minimum vertical adjustment.

.13 Support horizontal cast iron pipe adjacent to each hub, with 1.5 m (5 feet) maximum spacing between hangers.

.14 Support all pipe with MJ couplings on both sides of the joint. At multiple fittings or short lengths, support every 300 mm (12”).

.15 Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.

.16 Support riser piping independently of connected horizontal piping.

.17 Provide copper plated hangers and supports for copper piping.

.18 Design hangers for pipe movement without disengagement of supported pipe.

.19 All hanger rods shall have sufficient threaded length to allow for vertical adjustment of hangers after pipe is in place. Use 2 nuts on each rod, one above the clevis or angle iron and one below.

.20 Where pipes or equipment are supported from floors or walls, structural steel supports shall be fabricated, using welded joints except where provision is made for adjustment. Where details of construction are not indicated, drawings shall be submitted to the Contract Administrator for approval before fabrication.

.21 Clamps should be located immediately below a coupling if possible. Risers up to 50 mm (2") size shall be braced at intervals not over 2100 mm (7').

.22 Vertical piping other than risers through floors shall be provided with suitable supports, sway braces, etc.

.23 Vertical piping shall be supported at the base in an approved manner.

.24 On insulated piping supported by roller supports or trapeze supports (angle iron) provide at each hanger or support a protection saddle of 16 ga. galvanized sheet steel, rolled to

match the outside diameter of the insulation. The saddle shall cover approximately the bottom one third of the circumference of the insulation. The length shall be at least as long as that recommended by the insulation manufacturer as published in their data.

.25 On insulated pipe up to and including 50 mm (2") pipe, clevis hangers shall be sized to suit the O.D. of the pipe. On insulated pipe of 63 mm (2½") and above, the hangers shall be sized to suit the O.D. of the insulation and protection saddles, as described above shall be installed.

.26 Prime coat exposed steel hangers and supports. Refer to Section 09 91 99. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

3.4 EQUIPMENT BASES AND SUPPORTS

.1 Provide templates, anchor bolts, and accessories for mounting and anchoring equipment.

.2 Construct supports of steel members. Brace and fasten with flanges bolted to structure.

.3 Provide rigid anchors for pipes after vibration isolation components are installed.

3.5 SLEEVES

.1 Set sleeves in position in formwork. Provide reinforcing around sleeves.

.2 Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.

.3 Extend sleeves through floors 25mm (1 inch) above finished floor level. Caulk sleeves.

.4 All sleeves in mechanical rooms, janitors closets and washrooms shall extend 100 mm (4") above the finished floor level to prevent water seeping down.

.5 Install galvanized oversize pipe sleeves on all pipes passing through walls or partitions, for building into wall construction by other trades.

.6 All sleeves are to be large enough to accommodate pipe insulation as specified.

.7 The Mechanical Division shall include in tender price all cost of drilling for sleeves up to 175 mm (7") in precast sections relative to work under Mechanical Division. Prior to drilling all openings/locations must be checked by the Contract Administrator. Drilling shall be done using diamond core drilling machinery.

.8 Where piping or ductwork penetrates floor, ceiling, or wall, close off space between pipe or duct and adjacent work with insulation and caulk, air tight. Provide close fitting metal collar or escutcheon covers at both sides of penetration.

.9 Install stainless steel escutcheons at finished surfaces.

3.6 SCHEDULES

.1 Maximum spacing between pipe supports:

.1 Hangers shall be installed not more than 12” (300mm) from each change in direction of pipes.

.2 Where there are concentrations of valves and fittings, closer spacing will be necessary.

.3 Steel Pipe:

.1	Up to 50mm (2")	2.4m (8 ft.)
.2	65mm (2½”) to 150mm (6”)	3.6m (12 ft.)
.3	200mm (8”) to 300mm (12”)	5.4m (18 ft.)
.4	350mm (14”) to 450mm (18”)	7.2m (24 ft.)
.5	500mm (20”) to 600mm (24”)	9.0m (30 ft.)

.4 Copper Tubing (Hard):

.1	Up to 25mm (1")	1.8m (6 ft.)
.2	32mm (1½”) to 50mm (2”)	2.4m (8 ft.)
.3	63mm (2 ½”) to 75mm (3”)	3.0m (10 ft.)
.4	100mm (4”) to 150mm (6”)	3.6m (12 ft.)
.5	200mm (8”) to 300mm (12”)	4.8m (16 ft.)

.5 Cast Iron Pipe

.1 Maximum spacing – maximum 5 ft. (1.5m)

.2 Support M.J. pipe on both sides of joint. Provide with sway braces and anchors to the Contract Administrator’s approval. At multiple fittings, or short lengths, support every 300mm (12”).

.6 Plastic (PVC, CPVC, PEX)

.1 As recommended by manufacturer for corresponding sizes and materials.

.2 All sizes – do not exceed 1.2m (4 ft).

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Vibration isolation.

1.2 RELATED SECTIONS

.1 Section 23 05 16 - Piping Expansion Compensation.

.2 Section 23 05 29 - Supports And Anchors.

1.3 PERFORMANCE REQUIREMENTS

.1 Provide vibration isolation on motor driven equipment over 0.35 kW (0.5 hp), plus connected piping and ductwork.

.2 All outdoor mounted equipment shall be restrained for the highest wind speed as specified by the project's structural engineer, the governing building code(s) or the authority having jurisdiction.

.3 Provide minimum static deflection of isolators for equipment as indicated.

- .1 Basement, Under 15 kW (20 hp)
  - .1 Under 400 rpm: 63 mm (2.5 inch)
  - .2 400 - 600 rpm: 25 mm (1 inch)
  - .3 600 - 800 rpm: 12 mm (0.5 inch)
  - .4 800 - 900 rpm: 5 mm (0.2 inch)
  - .5 1100 - 1500 rpm: 4 mm (0.14 inch)
  - .6 Over 1500 rpm: 3 mm (0.1 inch)
- .2 Basement, Over 15 kW (20 hp)
  - .1 Under 400 rpm: 63 mm (2.5 inch)
  - .2 400 - 600 rpm: 50 mm (2 inch)
  - .3 600 - 800 rpm: 25 mm (1 inch)
  - .4 800 - 900 rpm: 12 mm (0.5 inch)
  - .5 1100 - 1500 rpm: 5 mm (0.2 inch)
  - .6 Over 1500 rpm: 4 mm (0.15 inch)
- .3 Upper Floors, Normal
  - .1 Under 400 rpm: 90 mm (3.5 inch)
  - .2 400 - 600 rpm: 90 mm (3.5 inch)
  - .3 600 - 800 rpm: 50 mm (2 inch)
  - .4 800 - 900 rpm: 25 mm (1 inch)
  - .5 1100 - 1500 rpm: 12 mm (0.5 inch)
  - .6 Over 1500 rpm: 5 mm (0.2 inch)
- .4 Upper Floors, Critical
  - .1 400 - 600 rpm: 90 mm (3.5 inch)

.2 600 - 800 rpm: 90 mm (3.5 inch)

.3 800 - 900 rpm: 50 mm (2 inch)

.4 1100 - 1500 rpm: 25 mm (1 inch)

.5 Over 1500 rpm: 12 mm (0.5 inch)

.4 Consider upper floor locations critical unless otherwise indicated.

1.4 SUBMITTALS

.1 Section 21 05 00: Procedures for submittals.

.2 Product Data: Provide schedule of vibration isolator type with location and load on each.

.3 Manufacturer's Installation Instructions: Indicate special procedures and setting dimensions.

.4 Manufacturer's Certificate: Certify that isolators are properly installed and adjusted to meet or exceed specified requirements.

1.5 PROJECT RECORD DOCUMENTS

.1 Section 21 05 00: Submittals for project closeout.

.2 Record actual locations of hangers including attachment points.

Part 2 Products

2.1 MANUFACTURERS

.1 Vibro-Acoustics.

.2 Amber/Booth.

.3 Substitutions: Refer to Section 21 05 00.

2.2 VIBRATION ISOLATORS

.1 Open Spring Isolators:

.1 Spring Isolators:

.1 For Exterior and Humid Areas: Provide hot dipped galvanized housings and neoprene coated springs.

.2 Code: Colour code springs for load carrying capacity.

.2 Springs: Minimum horizontal stiffness equal to 75 percent vertical stiffness, with working deflection between 0.3 and 0.6 of maximum deflection.

.3 Spring Mounts: Provide with levelling devices, minimum 6 mm (0.25 inch) thick neoprene sound pads, and zinc chromate plated hardware.

.4 Sound Pads: Size for minimum deflection of 1.2 mm (0.05 inch); meet requirements for neoprene pad isolators.

.2 Restrained Spring Isolators:

.1 Spring Isolators:

.1 For Exterior and Humid Areas: Provide hot dipped galvanized housings and neoprene coated springs.

.2 Code: Colour code springs for load carrying capacity.

.2 Springs: Minimum horizontal stiffness equal to 75 percent vertical stiffness, with working deflection between 0.3 and 0.6 of maximum deflection.

.3 Spring Mounts: Provide with levelling devices, minimum 6 mm (0.25 inch) thick neoprene sound pads, and zinc chromate plated hardware.

.4 Sound Pads: Size for minimum deflection of 1.2 mm (0.05 inch); meet requirements for neoprene pad isolators.

.5 Restraint: Provide heavy mounting frame and limit stops.

.3 Closed Spring Isolators:

.1 Spring Isolators:

.1 For Exterior and Humid Areas: Provide hot dipped galvanized housings and neoprene coated springs.

.2 Code: Colour code springs for load carrying capacity.

.2 Type : Closed spring mount with top and bottom housing separated with neoprene rubber stabilizers.

.3 Springs: Minimum horizontal stiffness equal to 75 percent vertical stiffness, with working deflection between 0.3 and 0.6 of maximum deflection.

.4 Housings: Incorporate neoprene isolation pad meeting requirements for neoprene pad isolators, and neoprene side stabilizers with minimum 7 mm (0.25 inch) clearance.

.4 Restrained Closed Spring Isolators:

.1 Spring Isolators:

.1 For Exterior and Humid Areas: Provide hot dipped galvanized housings and neoprene coated springs.

.2 Code: Colour code springs for load carrying capacity.

.2 Type : Closed spring mount with top and bottom housing separated with neoprene rubber stabilizers.

.3 Springs: Minimum horizontal stiffness equal to 75 percent vertical stiffness, with working deflection between 0.3 and 0.6 of maximum deflection.

.4 Housings: Incorporate neoprene isolation pad meeting requirements for neoprene pad isolators, and neoprene side stabilizers with minimum 7 mm (0.25 inch) clearance and limit stops.

.5 Spring Hanger:

.1 Spring Isolators:

.1 For Exterior and Humid Areas: Provide hot dipped galvanized housings and neoprene coated springs.

.2 Code: Colour code springs for load carrying capacity.

.2 Springs: Minimum horizontal stiffness equal to 75 percent vertical stiffness, with working deflection between 0.3 and 0.6 of maximum deflection.

.3 Housings: Incorporate [neoprene isolation pad meeting requirements for neoprene pad isolators] [rubber hanger with threaded insert].

.4 Misalignment: Capable of 20 degree hanger rod misalignment.

.6 Neoprene Pad Isolators:

.1 Rubber or neoprene waffle pads.

.1 30 durometer.

.2 Minimum 13 mm (1/2 inch) thick.

.3 Maximum loading 275 kPa (40 psi).

.4 Height of ribs: maximum 0.7 times width.

.2 Configuration: 13 mm (1/2 inch) thick waffle pads bonded each side of 6 mm (1/4 inch) thick galvanized steel plate.

.7 Rubber Mount or Hanger: Moulded rubber designed for 13 mm (0.5 inches) deflection with threaded insert.

.8 Glass Fibre Pads: Neoprene jacketed pre-compressed moulded glass fibre.

Part 3 Execution

3.1 INSTALLATION

.1 Install to manufacturer's written instructions.

.2 Install isolation for motor driven equipment.

.3 Where recommended by the manufacturer, isolator base plates shall be bolted to the structure or foundation. Bolting shall incorporate neoprene bushings and washers.

.4 Isolator hangers shall be installed with the housing a minimum of 1/4" (6 mm) below but as close to the structure as possible. Where isolator hangers would be concealed by non-accessible acoustical sub ceiling, install the hangers immediately below the sub ceiling for access.

.5 Install spring hangers without binding.

.6 On closed spring isolators, adjust so side stabilizers are clear under normal operating conditions.

.7 Prior to making piping connections to equipment with operating weights substantially different from installed weights, block up equipment with temporary shims to final height. When full load is applied, adjust isolators to load to allow shim removal.

.8 Provide pairs of horizontal limit springs on fans with more than 1.5 kPa (6.0 inch) static pressure, and on hanger supported, horizontally mounted axial fans.

.9 Support piping connections to isolated equipment resiliently as follows or according to the schedule.

.1 Up to 100 mm (4 inch) Diameter: First three points of support.

.2 125 to 200 mm (5 to 8 inch) Diameter: First four points of support.

.3 250 mm (10 inch) Diameter and Over: First six points of support.

.4 Select three hangers closest to vibration source for minimum 25 mm (1.0 inch) static deflection or static deflection of isolated equipment. Select remaining isolators for minimum 25 mm (1.0 inch) static deflection or 1/2 static deflection of isolated equipment.

.10 Connect wiring to isolated equipment with flexible hanging loop.

.11 All piping and ductwork shall freely pass through walls and floors without rigid connections. Penetration points shall be sleeved or otherwise formed to allow passage of piping or ductwork, and maintain a minimum of ¾" and maximum of 1¼" clearance around the outside surfaces. This clearance space shall be tightly packed with 1.58 P.C.F. glass fiber and shall be caulked airtight after installation of the piping or ductwork. Penetrations through fire rated walls and floors shall be sealed to maintain the rating.

.12 All outdoor equipment, piping and ductwork shall be restrained to resist wind forces per the applicable building code(s) as a minimum. Restraint attachments shall be made by bolts, welds or a positive fastening method. Friction shall not be considered. All attachments shall be proven capable of accepting the required wind load by calculations.

.13 Install wind restraint devices per the restraint manufacturer’s submittals. Any deviation from the manufacturer’s instructions shall be reviewed and approved by the manufacturer.

3.2 MANUFACTURER'S FIELD SERVICES

.1 Inspect isolated equipment after installation and submit report. Include static deflections.

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 09 91 99 – Painting for Minor Works.

1.3 REFERENCES

.1 ASME A13.1 - Scheme for the Identification of Piping Systems.

1.4 SUBMITTALS

.1 Section 21 05 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 Manufacturer's Installation Instructions: Indicate special procedures, and installation.

1.5 PROJECT RECORD DOCUMENTS

.1 Section 21 05 00: Submittals for project closeout.

.2 Record actual locations of tagged valves.

Part 2 Products

2.1 NAMEPLATES

.1 Description: Laminated three-layer plastic with engraved black letters on light contrasting background colour.

2.2 TAGS

.1 Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background colour. Tag size minimum 40 mm (1-1/2 inch) diameter.

.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 (3/4 to 1-1/4 inch) Outside Diameter of Insulation or Pipe: 200 mm (8 inch) long colour field, 15 mm (1/2 inch) high letters.

.2 40-50 mm (1-1/2 to 2 inch) Outside Diameter of Insulation or Pipe: 200 mm (8 inch) long colour field, 20 mm (3/4 inch) high letters.

.3 65-150 mm (2-1/2 to 6 inch) Outside Diameter of Insulation or Pipe: 300 mm (12 inch) long colour field, 30 mm (1-1/4 inch) high letters.

.4 200-250 mm (8 to 10 inch) Outside Diameter of Insulation or Pipe: 600 mm (24 inch) long colour field, 65 mm (2-1/2 inch) high letters.

.5 Over 250 mm (10 inch) Outside Diameter of Insulation or Pipe: 800 mm (32 inch) long colour field, 90 mm (3-1/2 inch) high letters.

.6 Ductwork and Equipment: 65 mm (2-1/2 inch) high letters.

.2 Stencil Paint: As specified in Section 09 91 99, semi - Painting.1.

2.4 PIPE MARKERS

.1 Colour: Conform to ASME A13.1.

.2 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.

.3 Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

.4 Underground Plastic Pipe Markers: Bright coloured continuously printed plastic ribbon tape, minimum 150 mm (6 inches) wide by 0.10 mm (4 mil) thick, manufactured for direct burial service.

2.5 CEILING TACKS

.1 Description: Steel with 20 mm (3/4 inch) diameter colour coded head.

.2 Colour code as follows:

.1 Yellow - HVAC equipment

.2 Red - Fire dampers/smoke dampers

.3 Green - Plumbing valves

.4 Blue - Heating/cooling valves

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 written instructions.

.5 Install plastic tape pipe markers complete around pipe to manufacturer's written instructions.

.6 Install underground plastic pipe markers 150 to 200 mm (6 to 8 inches) 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 pipe markers. Use tags on piping 20 mm (3/4 inch) 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 (20 feet) 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 Testing, adjustment, and balancing of hydronic systems.

.3 Measurement of final operating condition of HVAC systems.

1.2 RELATED SECTIONS

.1 Section 01 45 00 - Quality Assurance:

- .1 Testing laboratory services.
- .2 Employment of testing agency and payment for services.
- .3 Inspection and testing allowances.

.2 Section 21 05 00 - Closeout Submittals:

- .1 Starting of Systems.
- .2 Testing, Adjusting, and Balancing of Systems.

.3 Section 23 31 00 - Duct Work

.4 Section 23 33 00 - Duct Work Accessories

1.3 ALLOWANCES

.1 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 CSA B149.1 - Natural gas and propane installation code

.5 NEBB - Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems.

.6 SMACNA - HVAC Systems Testing, Adjusting, and Balancing.

1.5 SUBMITTALS

.1 Section 21 05 00: Procedures for submittals.

.2 Submit name of adjusting and balancing agency for approval within 30 days after award of Contract.

.3 Submit draft copies of report for review prior to final acceptance of Project. Draft copies shall be submitted in electronic format (Adobe Acrobat PDF file). Provide final copies for the Contract Administrator and for inclusion in operating and maintenance manuals.

.4 Provide final reports in letter size, soft cover or 3-ring binder manuals, complete with index page and indexing tabs, with cover identification at front and side. Also submit an electronic copy (PDF file) of the same. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.

.5 Test Reports: Indicate data on AABC National Standards for Total System Balance forms. Submit data in either S.I. Metric or IP units to match the primary units used on the drawings and schedules.

1.6 PROJECT RECORD DOCUMENTS

.1 Section 21 05 00: Submittals for project closeout.

.2 Record actual locations of flow measuring stations, balancing valves, balancing dampers, and fire dampers.

1.7 QUALITY ASSURANCE

.1 Perform total system balance to AABC National Standards for Field Measurement and Instrumentation, Total System Balance.

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, and certified by AABC.

.2 Perform Work under supervision of AABC Certified Test and Balance Supervisor.

1.9 PRE-BALANCING CONFERENCE

.1 Convene one week prior to commencing work of this section, to Section 21 05 00.

1.10 SEQUENCING

.1 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 21 05 00.

.2 Schedule and provide assistance in final adjustment and test of life safety, smoke evacuation, and/or smoke control system with Fire Authority.

1.12 PROJECT CLOSE-OUT

.1 The Testing, Adjusting and Balancing agency as part of its contract shall act as authorized inspection agency, responsible to list all items that are installed incorrectly, require correction or have not been installed in accordance with contract drawings and/or specifications, pertaining to the air distribution, cooling and heating systems. The Mechanical Contractor shall make good these items.

.2 Final payment on the building will not be issued until the final air balance report has been submitted to the Contract Administrator and has been approved by the Contract Administrator.

Part 2 Products

.1 Not used

Part 3 Execution

3.1 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 Air coil fins are cleaned and combed.
.8 Access doors are closed and duct end caps are in place.
.9 Air outlets are installed and connected.
.10 Duct system leakage is minimized.
.11 Hydronic systems are flushed, filled, and vented.
.12 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.

3.2 PREPARATION

.1 Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to the Contract Administrator to facilitate spot checks during testing.

.2 Provide additional balancing devices as required.

3.3 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.

3.4 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 Make any changes in pulleys and belts, and add any manual dampers as required for correct balance, at no additional cost to the City.

.4 After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.

.5 Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

3.5 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 Test and record motor full load amperes.

.3 Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.

.4 Measure air quantities at air inlets and outlets.

.5 Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.

.6 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.

.7 All outlets shall be adjusted to provide proper throw and directional distribution in accordance with the requirements on the drawings and/or schedules.

.8 Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.

.9 Provide system schematic with required and actual air quantities recorded at each outlet or inlet. Each grille, diffuser and register shall be identified as to location and area.

.10 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.

.11 Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions. Any re-adjustments of controls as deemed necessary, shall be made in co-operation with the Control Subcontractor.

.12 Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.

.1 Test and record entering air temperatures (D.B. heating and cooling).

.2 Test and record entering air temperatures (W.B. cooling).

.3 Test and record leaving air temperatures (D.B. heating and cooling).

.4 Test and record leaving air temperatures (W.B. cooling).

.13 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. Refer to the maximum and minimum rates on the drawings and schedules.

.14 All pitot-tube openings shall have plastic plugs of proper size in uninsulated or internally insulated ductwork. Insulated ductwork shall be provided with rubber plugs that extend to the face of the insulation. Cover the plugs on insulated ductwork with strip of grey tape.

.15 After completion of final balance, the Balance Contractor shall permanently fix the damper operator with a strip of contact tape and spray the quadrant with bright paint to permanently mark its balanced position.

3.6 WATER SYSTEM PROCEDURE

.1 Adjust water systems to provide required or design quantities.

.2 Use calibrated 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 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.

3.7 SCHEDULES

.1 Equipment requiring testing, adjusting and balancing:

.1 Air Cooled Refrigerant Condensers

.2 Unit Air Conditioners

.3 Computer Room Air Conditioning Units

.4 Air Coils
.5 Terminal Heat Transfer Units
.6 Air Handling Units
.7 Fans
.8 Air Filters
.9 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 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

.7 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

.8 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

.9 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

.10 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

.11 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

.12 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

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 09 91 99 – Painting for Minor Works.

.2 Section 23 05 53 - Mechanical Identification.

.3 Section 23 31 00 - Duct Work: Glass fibre duct work.

.4 Section 23 31 00 - Duct Work: Duct liner.

1.3 REFERENCES

.1 ASTM B209 - Aluminum and Aluminum-Alloy Sheet and Plate.

.2 ASTM C518 - Steady-State Thermal Transmission Properties by Means of the Heat Flow Metre Apparatus.

.3 ASTM C553 - Standard Specification for Mineral Fibre Blanket Thermal Insulation for Commercial and Industrial Applications.

.4 ASTM C612 - Standard Specification for Mineral Fibre Block and Board Thermal Insulation.

.5 ASTM C921 - Properties of Jacketing Materials for Thermal Insulation.

.6 ASTM C1071 - Fibrous Glass Duct Lining Insulation(Thermal Sound Absorbing Material).

.7 ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

.8 ASTM E96 - Water Vapour Transmission of Materials.

.9 ASTM E162 - Standard Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source.

.10 ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

.11 NAIMA National Insulation Standards.

.12 NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials.

.13 SMACNA - HVAC Duct Construction Standards - Metal and Flexible.

.14 UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials.

1.4 SUBMITTALS FOR REVIEW

.1 Section 21 05 00: Procedures for submittals.

.2 Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

1.5 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 minimum three years documented experience.

1.6 REGULATORY REQUIREMENTS

.1 Materials: Flame spread/smoke developed rating of 25/50 to NFPA 255 / UL 723.

1.7 DELIVERY, STORAGE, AND PROTECTION

.1 Section 21 05 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.

1.8 ENVIRONMENTAL REQUIREMENTS

.1 Section 21 05 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 VAPOUR BARRIER EXTERNAL DUCT WRAP, GLASS FIBRE, FLEXIBLE

.1 Manufacturers:

.1 Johns Manville Microlite XG

.2 Owens Corning SoftR Duct Wrap.

.3 Other acceptable manufacturers offering equivalent products.

.1 Knauf.

.2 Insulation: ASTM C553; flexible, noncombustible blanket.

.1 'ksi' ('K') value: ASTM C518, 0.045 at 24 degrees C (0.31 at 75 degrees F).

.2 Maximum service temperature: 121 degrees C (250 degrees F).

.3 Maximum moisture absorption: 0.20 percent by volume.

.4 Density 72 kg/cu. meter (4.5 lb/cu. Foot).

.3 Vapour Barrier Jacket:

.1 Kraft paper with glass fibre yarn and bonded to aluminized film (FRK).

.2 Moisture vapour transmission: ASTM E96; 0.02 perm.

.3 Secure with pressure sensitive tape.

.4 Vapour Barrier Tape:

.1 Kraft paper reinforced with glass fibre yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.

.5 Outdoor Vapour Barrier Mastic:

.1 Vinyl emulsion type acrylic or mastic, compatible with insulation, black colour.

.6 Tie Wire: Annealed steel, 1.5 mm (16 gauge).

2.2 JACKETS

.1 Canvas Jacket: UL listed.

.1 Fabric: ASTM C921, 220 g/sq m (6 oz/sq yd), plain weave cotton treated with dilute fire retardant lagging adhesive.

.2 Lagging Adhesive:

.1 Compatible with insulation.

.2 Mineral Fibre (Outdoor) Jacket: Asphalt impregnated and coated sheet, 2.45 kg/sq m (50 lb/square ft).

.3 Aluminum Jacket: ASTM B209M.

.1 Thickness: 0.40 mm (0.016 inch) sheet.

.2 Finish: Smooth.

.3 Joining: Longitudinal slip joints and 50 mm (2 inch) laps.

.4 Fittings: 0.4mm (0.016 inch) thick die shaped fitting covers with factory attached protective liner.

.5 Metal Jacket Bands: 10 mm (3/8 inch) wide; 0.015 mm thick aluminum.

2.3 GLASS FIBRE DUCT LINER, RIGID

.1 Manufacturers:

.1 Johns Manville Linacoustic R-300

.2 Owens Corning QuietR Duct Liner Board

.3 Other acceptable manufacturers offering equivalent products.

.1 Knauf.

.2 Insulation: ASTM C612; rigid, noncombustible board with acrylic polymer meeting ASTM G21 impregnated surface and edge coat.

.1 'ksi ('K') value : ASTM C518, maximum 0.27 at at 24 degrees C (75 degrees F).

.2 Maximum service temperature: 121 degrees C (250 degrees F).

.3 Maximum Velocity on Coated Air Side: 24.5 m/s (5,000 fpm).

.4 Minimum Noise Reduction Criteria: ASTM C1071 0.55 for 25 mm (1 inch) thickness; 0.75 for 40 mm (1-1/2 inches) thickness; 0.90 for 50 mm (2 inch) thickness.

.5 Minimum 20% Certified Recycled Content.

.3 Adhesive:

.1 Waterproof , ASTM E162 fire-retardant type.

.4 Liner Fasteners: Galvanized steel, with press-on head.

2.4 ELASTOMERIC CELLULAR THERMAL DUCT LINER

.1 Manufacturers:

.1 Armacell AP Armaflex Sheets

.2 Other acceptable manufacturers offering equivalent products.

.2 Insulation: Flexible, closed-cell elastomeric insulation in sheet form meeting ASTM C 534,

.1 'ksi' ('K') value : ASTM C177, 0.039 at 24 degrees C (0.27 at 75 degrees F).

.2 Maximum service temperature: 105 degrees C (220 degrees F).

.3 Maximum Velocity on Coated Air Side: 30.5 m/s (6,000 fpm).

.4 Minimum Noise Reduction Criteria: ASTM C423,

.1 0.35 for 32 mm (1-1/4 inches) thickness

.3 Elastomeric Foam Adhesive

.1 Manufacturers:

.1 Armstrong 520 adhesive.

.2 Air dried, contact adhesive, compatible with insulation.

Part 3 Execution

3.1 EXAMINATION

.1 Verify that duct work has been tested before applying insulation materials.

.2 Verify that surfaces are clean, foreign material removed, and dry.

3.2 INSTALLATION

.1 Section 01 45 00 - Quality Assurance: Manufacturer's written instructions.

.2 Install to NAIMA National Insulation Standards.

.3 All duct sizes on the drawings refer to inside duct dimensions. On all acoustically lined ductwork, the external duct dimensions shall be increased by the thickness of the lining.

.4 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.

.5 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.

.6 Where ducts are acoustically lined to the equivalent R-value, no exterior duct insulation is required, except where exposed to outside temperature and weather.

.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.

.9 Install Elastomeric Cellular Thermal Duct Liner as per manufacturer’s recommendations.

.10 External Fire Wrap Duct Insulation Application:

- .1 Install in accordance to manufactures published installation manual.

3.3 SCHEDULES

.1 Duct insulation shall follow the Schedules below as a minimum requirement. These requirements shall apply regardless of whether or not duct insulation is shown on the drawings.

.2 Where duct insulation is shown on the drawings (either with the hatching convention or by means of a key note) and exceeds the requirements of the schedules below, the additional insulation requirements shall be met.

3.4 EXTERNAL DUCT WRAP, GLASS FIBRE, FLEXIBLE

DUCT SERVICE	DUCT SIZE <Inch><mm>	THICKNESS <mm><Inch>
All conditioned air supply ductwork in return plenums or un-conditioned space	=< 400 mm (16”) per side, or round duct	29mm (1 1/8") Installed 38mm (1 ½”) Nominal
Round exhaust ducts, relief ducts from external wall or roof back for length of 3000mm (10 feet) or to insulated damper, whichever is greater	All	57mm (2 1/4") Installed 75mm (3") Nominal
Round outdoor air ducts located in conditioned space to the air handler or mixed air plenum.	All	95mm (3 3/4") Installed 125mm (5") Nominal

3.5 GLASS FIBRE DUCT LINER, RIGID

DUCT SERVICE	DUCT SIZE <Inch><mm>	THICKNESS <mm><Inch>
Rectangular air supply and return air ductwork where indicated on drawings by acoustic hatching symbol.	All	25mm (1")

3.6 ELASTOMERIC CELLULAR THERMAL DUCT LINER

DUCT SERVICE	DUCT SIZE <Inch><mm>	THICKNESS <mm><Inch>
Rectangular air supply and return air ductwork where indicated on drawings by acoustic hatching symbol.	All	32mm (1 1/4")
Rooftop goosenecks - exhaust	All	50mm (2")

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Piping insulation.

.2 Jackets and accessories.

1.2 RELATED SECTIONS

.1 Section 09 91 99 – Painting for Minor Works

.2 Section 22 10 00 - Plumbing Piping: Placement of hangers and hanger inserts.

.3 ection 23 21 00 - Hydronic Piping: Placement of hangers and hanger inserts.

1.3 REFERENCES

.1 ASTM B209 - Aluminum and Aluminum-Alloy Sheet and Plate.

.2 ASTM C177 - Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.

.3 ASTM C195 - Mineral Fibre Thermal Insulating Cement.

.4 ASTM C335 - Steady-State Heat Transfer Properties of Horizontal Pipe Insulation.

.5 ASTM C449/C449M - Mineral Fibre Hydraulic-setting Thermal Insulating and Finishing Cement.

.6 ASTM C518 - Steady-State Thermal Transmission Properties by Means of the Heat Flow Metre Apparatus.

.7 ASTM C533 - Calcium Silicate Block and Pipe Thermal Insulation.

.8 ASTM C534 - Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.

.9 ASTM C547 - Mineral Fibre Pipe Insulation.

.10 ASTM C552 - Cellular Glass Thermal Insulation.

.11 ASTM C578 - Rigid, Cellular Polystyrene Thermal Insulation.

.12 ASTM C585 - Inner and Outer Diameters of Rigid Thermal Insulation for Nominal Sizes of Pipe and Tubing (NPS System).

.13 ASTM C591 - Unfaced Preformed Cellular Polyisocyanurate Thermal Insulation.

.14 ASTM C610 - Moulded Expanded Perlite Block and Pipe Thermal Insulation.

.15 ASTM C921 - Properties of Jacketing Materials for Thermal Insulation.

.16 ASTM D1056 - Flexible Cellular Materials - Sponge or Expanded Rubber.

.17 ASTM D1667 - Flexible Cellular Materials - Vinyl Chloride Polymers and Copolymers (Closed Cell Foam).

.18 ASTM D2842 - Water Absorption of Rigid Cellular Plastics.

.19 ASTM E84 - Surface Burning Characteristics of Building Materials.

.20 ASTM E96 - Water Vapour Transmission of Materials.

.21 CAN/ULC-S102-M88 - Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

.22 NFPA 255 - Surface Burning Characteristics of Building Materials.

.23 UL 723 - Surface Burning Characteristics of Building Materials.

1.4 QUALITY ASSURANCE

.1 Materials: Flame spread/smoke developed rating of 25/50 or less to ASTM E84: NFPA 255; UL 723.

1.5 QUALIFICATIONS

.1 Applicator: Company specializing in performing the work of this section with minimum three years documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

.1 Section 21 05 00: Transport, handle, store, and protect products.

.2 Deliver materials to site in original factory packaging, labelled with manufacturer's identification, including product density and thickness.

.3 Store insulation in original wrapping and protect from weather and construction traffic.

.4 Protect insulation against dirt, water, chemical, and mechanical damage.

1.7 ENVIRONMENTAL REQUIREMENTS

.1 Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.

.2 Maintain temperature during and after installation for minimum period of 24 hours.

Part 2 Products

2.1 GLASS FIBRE PRE-FORMED PIPE INSULATION WITH ALL-SERVICE JACKET

.1 Manufacturers:

.1 Johns Manville Micro-Lok.

.2 Knauf Earthwool 1000.

.3 Owens Corning FIBREGLAS.

.4 Substitutions: Refer to Section 21 05 00.

.2 Insulation: ASTM C547; rigid moulded, non-combustible.

.1 'ksi' ('K') value : ASTM C335, 0.035 at 24 degrees C (0.24 at 75 degrees F).

.2 Minimum Service Temperature: -28.9 degrees C (-20 degrees F).

.3 Maximum Service Temperature: 454 degrees C (850 degrees F).

.4 Maximum Moisture Absorption: 0.2 percent by volume.

.3 Vapour Barrier Jacket

.1 ASTM C921, White kraft paper reinforced with glass fibre yarn and bonded to aluminized film.

.2 Moisture Vapour Transmission: ASTM E96; 0.03 ng/(Pa s sq m) (0.02 perm inches).

.3 Secure with self sealing longitudinal laps and butt strips.

.4 Secure with outward clinch expanding staples and vapour barrier mastic.

.4 Tie Wire: 1.3 mm (18 gauge) stainless steel with twisted ends on maximum 300 mm (12 inch) centres.

.5 Vapour Barrier Lap Adhesive

.1 Compatible with insulation.

2.2 CELLULAR FOAM

.1 Manufacturers:

.1 Armacell AP Armaflex.

.2 Substitutions: Refer to Section 21 05 00.

.2 Insulation: ASTM C534; flexible, cellular elastomeric, moulded or sheet.

.1 'ksi' ('K') Value: ASTM C177 or C518; 0.04 at 24 degrees C (0.27 at 75 degrees F).

.2 Minimum Service Temperature: -40 degrees C (-40 degrees F).

.3 Maximum Service Temperature: 104 degrees C (220 degrees F).

.4 Maximum Moisture Absorption: ASTM D1056; 1.0 percent (pipe) by volume, 1.0 percent (sheet) by volume.

.5 Moisture Vapour Transmission: ASTM E96; 0.20 perm inches.

.6 Maximum Flame Spread: ASTM E84; 25.

.7 Maximum Smoke Developed: ASTM E84; 50.

.8 Connection: Waterproof vapour barrier adhesive.

.3 Elastomeric Foam Adhesive

.1 Manufacturers:

.1 Armstrong 520 adhesive.

.2 Air dried, contact adhesive, compatible with insulation.

.3 Outdoor insulation shall be covered with Armstrong Armaflex finish.

2.3 JACKETS

.1 PVC Plastic

.1 Jacket: ASTM C921, One piece moulded type fitting covers and sheet material, off white colour.

.1 Minimum Service Temperature: -40 degrees C (-40 degrees F).

.2 Maximum Service Temperature: 66 degrees C (150 degrees F).

.3 Moisture Vapour Transmission: ASTM E96; 0.002 perm inches.

.4 Maximum Flame Spread: ASTM E84; 25.

.5 Maximum Smoke Developed: ASTM E84; 50.

.6 Connections: installed in accordance with manufacturer's recommendations using PVC adhesive to seal joints, and tape or butt strips where joined to adjacent pipe covering. Use staples and insulation coating as specified at circumferential joints.

.2 Covering Adhesive Mastic

.1 Compatible with insulation.

.2 Canvas Jacket: UL listed

.1 Fabric: ASTM C921, 220 g/sq m (6 oz/sq yd), plain weave cotton treated with dilute fire retardant lagging adhesive.

.2 Lagging Adhesive

.1 Bakelite 120-18 white fire retardant lagging adhesive.

.3 Coating

.1 Finish with two full brush coats of Bakelite 120-09 white fire retardant paint.

.3 Aluminum Jacket: ASTM B209.

.1 Thickness: 0.40 mm (0.016 inch) sheet.

.2 Finish: Embossed.

.3 Joining: Longitudinal slip joints and 50 mm (2 inch) laps.

.4 Fittings: 0.4 mm (0.016 inch) thick die shaped fitting covers with factory attached protective liner.

.5 Metal Jacket Bands: 10 mm (3/8 inch) wide; 0.38 mm (0.015 inch) thick aluminum.

Part 3 Execution

3.1 EXAMINATION

.1 Verify that piping has been tested before applying insulation materials.

.2 Verify that surfaces are clean, foreign material removed, and dry.

3.2 INSTALLATION

.1 Install materials to manufacturer's written instructions.

.2 On exposed piping, locate insulation and cover seams in least visible locations.

.3 Insulated dual temperature pipes or cold pipes conveying fluids below ambient temperature:

.1 Provide vapour barrier jackets, factory applied or field applied.

.2 Insulate fittings, joints, and valves with moulded insulation of like material and thickness as adjacent pipe.

.3 Finish with glass cloth and vapour barrier adhesive.

.4 PVC fitting covers may be used.

.5 Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations.

.6 Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.

.4 For insulated pipes conveying fluids above ambient temperature:

.1 Provide standard jackets, with or without vapour barrier, factory applied or field applied.

.2 Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe.

.3 Finish with glass cloth and adhesive.

.4 PVC fitting covers may be used, except on steam and condensate piping systems.

.5 For hot piping conveying fluids 60 degrees C (140 degrees F) or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.

.6 For hot piping conveying fluids over 60 degrees C (140 degrees F), insulate flanges and unions at equipment.

.5 Inserts and Shields:

.1 Application: Piping 40 mm (1-1/2 inches) diameter or larger.

.2 Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.

.3 Insert Location: Between support shield and piping and under the finish jacket.

.4 Insert Configuration: Minimum 150 mm (6 inches) long, of same thickness and contour as adjoining insulation; may be factory fabricated.

.5 Insert Material: hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.

.6 Finish insulation at supports, protrusions, and interruptions.

.7 Pipe supports:

.1 All piping shall be supported in such a manner that neither the insulation nor the vapor/weather barrier is compromised by the hanger or the effects of the hanger. In all cases, hanger spacing shall be such that the circumferential joint may be made outside the hanger. On cold systems, vapor barrier shall be continuous, including material covered by the hanger saddle.

.2 Piping systems 3" (75 mm) in diameter or less may be supported by placing saddles of the proper length and spacing under the insulation as designated by the insulation manufacturer.

.3 Where pipe shoes and roller supports are required, insulation shall be inserted in the pipe shoe to minimize pipe heat loss. Where possible, the pipe shoe shall be sized to be flush with the outer pipe insulation diameter.

.4 On vertical runs, insulation support rings shall be used as required.

.8 For all pipe in exposed in occupied areas, finish with PVC jacket.

.9 For exterior piping applications, provide vapour barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapour barrier cement. Cover with aluminum jacket with seams located on bottom side of horizontal piping.

.10 On outdoor chilled water and refrigerant lines, the insulation system shall be completely vapor sealed before the weather-resistant jacket is applied. The outer jacket shall not compromise the vapor barrier by penetration of fasteners, etc. Vapor stops at butt joints shall be applied at every fourth pipe section joint and at each fitting to provide isolation of water incursion. Piping 38mm (1-1/2 inches) and less shall have UV resistant PVC jacket. Pipes larger than 38mm (1-1/2 inches) shall have aluminium jacket.

.11 Fittings and Valves

.1 Shall be insulated with pre-formed fiberglass fittings, fabricated sections of fibreglass pipe insulation. Thickness shall be equal to adjacent pipe insulation. Finish shall be with pre-formed PVC fitting covers or as otherwise specified on contract drawings.

.2 Flanges, couplings and valve bonnets shall be covered with an oversized pipe insulation section sized to provide the same insulation thickness as on the main pipe section. An oversized insulation section shall be used to form a collar between the two insulation sections with low-density blanket insulation being used to fill gaps. Jacketing shall match that used on straight pipe sections. Rough cut ends shall be coated with suitable weather or vapor resistant mastic as dictated by the system location and service. On hot systems where fittings are to be left exposed, insulation ends should be beveled away from bolts for easy access.

.3 On cold systems, particular care must be given to vapor sealing the fitting cover or finish to the pipe insulation vapor barrier. All valve stems shall be sealed with caulking to allow free movement of the stem but provide a seal against moisture incursion. Valve handle extensions are recommended.

.12 Accessory Materials

.1 All accessory materials shall be installed in accordance with project drawings and specifications, manufacturer's instructions, and/or in conformance with the current edition of the Midwest Insulation Contractors Association (MICA) "Commercial & Industrial Insulation Standards."

3.3 TOLERANCE

.1 Substituted insulation materials: Thermal resistance within 10 percent at normal conditions, as materials indicated.

3.4 FIBROUS GLASS INSULATION SCHEDULE

	PIPING SYSTEMS	PIPE SIZE <Inch><mm>	THICKNESS <Inch><mm>
Plumbing Systems			
	Domestic Hot Water Supply & Domestic Hot Water Recirc	=< 2" (50mm)	1" (25mm)
	Domestic Cold Water, medical gas piping	=< 2" (50mm)	1" (25mm)
	Vent piping and medical and/or lab vacuum exhaust piping for developed length of 3000 mm (10 ft) from all roof and/or wall terminals.	all	2" (50mm)
	Plumbing Vents Within 10 Feet (3 Metres) of the Exterior	all	2" (50mm)
Heating Systems			
	Heating water & glycol supply and return, low pressure steam, steam condensate	=< 2" (50mm)	1" (25mm)
Cooling Systems			
	Chilled water & glycol	all	1" (25mm)
	Cold Condensate Drains	all	1" (25mm)
	Condensate Drains from Cooling Coils	all	1" (25mm)
	Refrigerant Suction	all	3/4" (19mm)
	Refrigerant Hot Gas	all	3/4" (19mm)

3.5 CELLULAR FOAM PIPE INSULATION SCHEDULE

	PIPING SYSTEMS	PIPE SIZE <Inch><mm>	THICKNESS <Inch><mm>
	Refrigerant Suction	all	3/4" (19mm)
	Refrigerant Hot Gas	all	3/4" (19mm)

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Metal duct work.

.2 Nonmetal duct work.

.3 Duct cleaning.

1.2 RELATED SECTIONS

.1 Section 01 11 00 - Summary of Work

.2 Section 09 91 99 – Painting for Minor Works.

.3 Section 23 05 29 - Supports And Anchors: Sleeves.

.4 Section 23 07 13 - Duct Insulation: External insulation and duct liner.

.5 Section 23 33 00 - Duct Work Accessories.

.6 Section 23 37 00 - Air Outlets And Inlets.

.7 Section 23 05 93 - Testing, Adjusting, And Balancing.

1.3 REFERENCES

.1 ASTM A36/A36M - Carbon Structural Steel.

.2 ASTM A90/A90M - Weight (Mass) of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings.

.3 ASTM A167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

.4 ASTM A480/A480M - General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip.

.5 ASTM A568/A568M - General Requirements for Steel Sheet, Carbon, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled.

.6 ASTM A653/A653M - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.7 ASTM A1008/A1008M - Steel, Sheet, Cold-Rolled Carbon, Structural, High-Strength Low-Alloy and High Strength Low-Alloy with Improved Formability.

.8 ASTM A1011/A1011M - Standard Specification for Steel, Sheet, and Strip Hot-Rolled, Carbon, Structural, High-Strength, Low-Alloy with Improved Formability.

.9 ASTM B209 - Aluminum and Aluminum-Alloy Sheet and Plate.

.10 AWS D9.1 - Sheet Metal Welding Code.

.11 NBS PS 15 - Voluntary Product Standard for Custom Contact-Moulded Reinforced-Polyestor Chemical Resistant Process Equipment.

.12 NFPA 90A - Installation of Air Conditioning and Ventilating Systems.

.13 NFPA 90B - Installation of Warm Air Heating and Air-Conditioning Systems.

.14 NFPA 91 - Exhaust Systems for Air Conveying of Vapours, Gases, Mists, and Noncombustible Particulate Solids.

.15 NFPA 96 - Ventilation Control and Fire Protection of Commercial Cooking Operations.

.16 SMACNA - HVAC Air Duct Leakage Test Manual.

.17 SMACNA - HVAC Duct Construction Standards - Metal and Flexible.

.18 UL 181 - Factory-Made Air Ducts and Connectors.

1.4 PERFORMANCE REQUIREMENTS

.1 No variation of duct configuration or sizes permitted except by written permission. Size round ducts installed in place of rectangular ducts to ASHRAE table of equivalent rectangular and round ducts.

1.5 PROJECT RECORD DOCUMENTS

.1 Section 21 05 00: Submittals for project closeout.

.2 Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.

1.6 QUALITY ASSURANCE

.1 Perform Work to SMACNA - HVAC Duct Construction Standards - Metal and Flexible.

.2 Maintain one copy of document on site.

1.7 QUALIFICATIONS

.1 Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years' experience.

.2 Installer: Company specializing in performing the work of this section with minimum three years documented experience.

1.8 REGULATORY REQUIREMENTS

.1 Construct commercial kitchen exhaust duct work to NFPA 96 standards.

1.9 ENVIRONMENTAL REQUIREMENTS

.1 Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.

.2 Maintain temperatures during and after installation of duct sealants.

Part 2 Products

2.1 MATERIALS

.1 Galvanized Steel Ducts: ASTM A653 galvanized steel sheet, lock-forming quality, having G60 zinc coating of to ASTM A90.

.2 Insulated Flexible Ducts:

.1 Manufacturers:

.1 Thermaflex G-KM

.2 Substitutions: Refer to Section 21 05 00.

.2 Thermally insulated flexible duct with acoustically rated black CPE core permanently bonded to a coated spring steel wire helix, with fibreglass insulation over fibreglass scrim and polyethelyne vapour barrier. Pressure rating of 6" W.G. (positive) for 4" – 20" I.D. Temperature range -20 ºF to 200 ºF continuous, R-value R-4.2.

.3 The ductwork shall meet NFPA Pamphlet 90A paragraph 113 (a) for flame spread and smoke rating and to meet Underwriter's Laboratories of Canada requirements.

.4 Flexible air ducts shall conform to UL-181 Standard and NFPA 90A. Flexible air ducts shall have a fire rating of at least one-half hour as measured by UL-181 Standard, paragraph No. 7, Flame Penetration Test.

.3 Fasteners: Rivets, bolts, or sheet metal screws.

.4 Sealant:

.1 Manufacturers:

.1 Duro-Dyne

.2 Substitutions: Refer to Section 21 05 00.

.2 Non-hardening, water resistant, fire resistive, compatible with mating materials; liquid used alone or with tape, or heavy mastic.

.5 Hanger Rod: ASTM A36; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.

2.2 DUCT WORK FABRICATION

.1 Fabricate and support to SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated. Unless otherwise indicated fabrication shall conform to standards for duct pressure class rating of +2" w.g. Provide duct material, gauges, reinforcing, and sealing for operating pressures indicated.

.2 Construct T's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centreline. Where not possible and where rectangular elbows are used, provide air-foil turning vanes. Where acoustical lining is indicated, provide turning vanes of perforated metal with glass fibre insulation.

.3 Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.

.4 Provide standard 45 degree lateral wye takeoffs unless otherwise indicated where 90 degree conical tee connections may be used.

.5 All rectangular ducts shall be constructed by breaking the corners and grooving the longitudinal seams using Pittsburgh seam or other approved airtight seam.

.6 All elbows and transformation pieces shall be constructed using Pittsburgh corner seams or double seam corners. All transverse joints shall be constructed using S-slips, Bar Slips, Drive Slips, etc. where recommended in ASHRAE guide. All slips shall be not less than one gauge heavier than duct material. Open corners will not be accepted.

2.3 MANUFACTURED DUCT WORK AND FITTINGS

.1 Manufacture to SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated. Provide duct material, gauges, reinforcing, and sealing for operating pressures indicated.

Part 3 Execution

3.1 INSTALLATION

.1 Install to manufacturer's written instructions.

.2 Install and seal ducts to SMACNA HVAC Duct Construction Standards - Metal and Flexible.

.3 Duct sizes are inside clear dimensions. For lined ducts, maintain sizes inside lining.

.4 No variation of duct sizes will be permitted except by written permission of the Contract Administrator. In the event that additional offsets and changes in direction are required in the duct system, these changes shall be made by the Sheet Metal Trade without additional cost to the City. All ductwork shall be to the recommended practices as laid down by the Sheet Metal and Air Conditioning Contractors National Association (SMACNA).

.5 Where the width of the duct exceeds 450 mm (18") in its largest dimension such ductwork shall be suitably stiffened by breaking the sheets diagonally.

.6 If ductwork is insulated, cross breaking may be omitted providing the ducts are 2 gauges heavier than shown on the above schedule.

.7 All laps shall be in the direction of air flow. Rivets and bolts shall be used throughout. All edges and slips shall be hammered down to leave a smooth interior duct.

.8 Where low pressure ductwork conflicts with mechanical and electrical piping and it is not possible to divert the ductwork or piping to stay within allowable space limitation, provide duct easements.

.9 Easements are not required on pipes 100 mm (4") and smaller outside dimension, unless this exceeds 20% of the duct area. Any irregular or flat shaped intrusions require a duct easement. Hangers and straps in the ductwork shall be parallel to air flow. If this is not possible, provide an easement. If the easement exceeds 25% of the duct area, the duct shall be split into two ducts with the original duct area being maintained. All easements shall be approved by the Contract Administrator before installation.

.10 Provide openings in duct work where required to accommodate thermometers and controllers. Provide pilot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage. Where openings are provided in insulated duct work, install insulation material inside a metal ring.

.11 Locate pitot tube test openings in ductwork at supply fan discharges, on intake of exhaust/and return air fans, in major duct branches and everywhere pitot tube openings are required for proper balancing of air conditioning, ventilation and exhaust systems. Do not place closer than 1829mm (72 inches) to elbows. Space every 150mm (6 inches) across air stream at each location. Refer to drawings for additional opening requirements.

.12 Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

.13 Use crimp joints with or without bead for joining round duct sizes 200 mm (8 inch) and smaller with crimp in direction of air flow.

.14 Use only threaded rod for duct support in exposed areas. Strapping not allowed.

.15 Use double nuts and lock washers on threaded rod supports.

.16 Slope underground ducts to plenums or low pump out points at l:500. Provide access doors for inspection.

.17 Connect fan powered terminal units to supply ducts with 300 mm (one foot) maximum length of flexible duct. Do not use flexible duct to change direction.

.18 Connect diffusers or light troffer boots to low pressure ducts with 0.6 m (2 feet) maximum length of flexible duct held in place with strap or clamp.

.19 Connect flexible ducts to metal ducts with adhesive plus sheet metal screws.

.20 Where interior of duct is visible through grilles, registers or diffusers, paint interior of duct with flat black Tremco paint formulated for galvanized surfaces.

.21 During construction provide temporary closures of metal or taped polyethylene on open duct work to prevent construction dust from entering duct work system.

.22 Seal ductwork so that it is sufficiently airtight to ensure economical and quiet performance of the system. All ductwork, except where otherwise indicated, shall have seams and joints sealed with Duro-Dyne S-2 duct sealer. Apply duct sealer and duct tape

in strict accordance with manufacturer's recommendations, to joints and seams to provide an airtight, watertight installation. Prior to application, ductwork to be dry and free of grease, etc. Use 6mm bead of material along joints. Material, when dry, to have 3.2mm depth extending 25mm on each side of joint or seam.

.23 All ductwork located outdoors shall have seams and joints sealed with grey TREMCO 555 acrylic sealant applied with gun and levelled with putty knife. Use material in accordance with manufacturer's printed recommendations.

.24 Stainless steel ductwork exposed in finished rooms shall not have duct tape application.

.25 Install ductwork free from pulsation, chatter, vibration or objectionable noises.

.26 Should any of these defects appear after the system is in operation, correct problems by removing, replacing, or reinforcing the work as directed by the Contract Administrator.

3.2 CLEANING

.1 Clean duct system and force air at high velocity through duct to remove accumulated dust. To obtain sufficient air, clean half the system at a time. Protect equipment which may be harmed by excessive dirt with temporary filters, or bypass during cleaning.

3.3 SCHEDULES

3.4 DUCT WORK MATERIAL SCHEDULE

	AIR SYSTEM	MATERIAL
	Low Pressure Supply (Heating Systems)	Steel
	Low Pressure Supply (System with Cooling Coils)	Steel
	Return and Relief	Steel
	General Exhaust	Steel
	Outside Air Intake	Steel

3.5 DUCT WORK PRESSURE CLASS SCHEDULE

	AIR SYSTEM	PRESSURE CLASS
	Supply (System with Cooling Coils)	500 Pa (2 inch)
	Return and Relief	250 Pa (1 inch)
	General Exhaust	125 Pa (1/2 inch)
	Outside Air Intake	125 Pa (1/2 inch)
	Intake and Exhaust	250 Pa (1 inch)

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Air turning devices/extractors.

.2 Backdraft dampers.

.3 Duct access doors.

.4 Duct test holes.

.5 Flexible duct connections.

.6 Volume control dampers.

1.2 RELATED SECTIONS

.1 Section 23 05 48 - Vibration Isolation.

.2 Section 23 31 00 - Duct Work.

.3 Section 25 30 00 – Instrument and Control Elements

1.3 REFERENCES

.1 NFPA 90A - Installation of Air Conditioning and Ventilating Systems.

.2 NFPA 92A - Smoke-Control Systems.

.3 NFPA 96 - Ventilation Control and Fire Protection of Commercial Cooking Operations.

.4 SMACNA - HVAC Duct Construction Standards - Metal and Flexible.

.5 CAN/ULC-S112 Standard Method of Fire Test of Fire-Damper Assemblies

1.4 SUBMITTALS

.1 Section 21 05 00: Procedures for submittals.

.2 Manufacturer's Installation Instructions: Indicate for fire dampers and combination fire and smoke dampers.

1.5 PROJECT RECORD DOCUMENTS

.1 Section 21 05 00: Submittals for project closeout.

.2 Record actual locations of access doors.

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 Underwriters' Laboratories Inc., and testing firm acceptable to the authority having jurisdiction as suitable for the purpose specified and indicated.

1.8 DELIVERY, STORAGE, AND HANDLING

.1 Section 21 05 00: Transport, handle, store, and protect products.

.2 Protect dampers from damage to operating linkages and blades.

Part 2 Products

2.1 AIR TURNING DEVICES/EXTRACTORS

.1 Multi-blade device with radius blades attached to pivoting frame and bracket, steel construction, with push-pull operator strap.

2.2 BACKDRAFT DAMPERS.

.1 Gravity Backdraft Dampers, Size 450 x 450 mm (18 x 18 inches) or smaller, provided with Air Moving Equipment: Air moving equipment manufacturers standard construction.

.2 Multi-Blade, Parallel Action Gravity Balanced Backdraft Dampers: 1.5 mm (16 gauge) thick galvanized steel, with centre pivoted blades of maximum 150 mm (6 inch) width, with felt or flexible vinyl sealed edges, linked together in rattle-free manner with 90 degree stop, steel ball bearings, and plated steel pivot pin; adjustment device to permit setting for varying differential static pressure.

2.3 DUCT ACCESS DOORS

.1 Fabricate to SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.

.2 Fabrication: Rigid and close-fitting of galvanized steel with sealing gaskets and quick fastening locking devices. For insulated duct work, install minimum 25 mm (one inch) thick insulation with sheet metal cover.

- .1 Less than 300 mm (12 inches) Square: Secure with sash locks.
- .2 Up to 450 mm (18 inches) Square: Provide two hinges and two sash locks.
- .3 Up to 600 x 1200 mm (24 x 48 inches): Three hinges and two compression latches.
- .4 Larger Sizes: Provide an additional hinge.

.3 Access doors with sheet metal screw fasteners are not acceptable.

.4 Doors in insulated ductwork to be double panel construction with a 25mm (1") insulating filler.

.5 In certain locations where it is inconvenient to swing access doors, removable doors with 4 cam locks will be accepted. However, all such locations shall be approved by the Contract Administrator prior to installation.

2.4 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 Permanent Test Holes: Factory fabricated, air tight flanged fittings with screw cap. Provide extended neck fittings to clear insulation;

2.5 FLEXIBLE DUCT CONNECTIONS

.1 Manufacturers:

.1 Duro-Dyne.

.2 Substitutions: Refer to Section 21 05 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 (30 oz per sq yd).

.2 Net Fabric Width: Approximately 75mm (3 inches) wide.

.3 Metal: 75 mm (3 inch) wide, 0.6 mm thick (24 gauge) galvanized steel.

2.6 VOLUME CONTROL DAMPERS.

.1 Fabricate to SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.

.2 Single Blade Dampers: Fabricate for duct sizes up to 150 x 760 mm (6 x 30 inch).

.3 End Bearings: Except in round duct work 300 mm (12 inches) and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon or sintered bronze bearings.

.4 Quadrants:

.1 Provide locking, indicating quadrant regulators on single and multi-blade dampers.

.2 On insulated ducts mount quadrant regulators on stand-off mounting brackets, bases, or adapters.

.3 Where rod lengths exceed 750 mm (30 inches) provide regulator at both ends.

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 written 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 for cleaning kitchen exhaust duct work to NFPA 96. Provide minimum 300 x 300 mm (12 x 12 inch) size for all fire dampers. Enlarge duct if necessary to accommodate properly sized access door.

.4 Provide duct test holes where indicated and required for testing and balancing purposes.

.5 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 (5.0 inches wg) and over, cover connections with leaded vinyl sheet, held in place with metal straps.

.6 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.

.7 Do not locate single blade volume dampers immediately behind diffusers and grilles. This application does not allow uniform airflow across the outlet face.

.8 To minimize generated duct noise, locate volume dampers at least two duct diameters from a fitting and as far away as possible from the outlet or inlet.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Diffusers.

.2 Registers/grilles.

1.2 RELATED SECTIONS

.1 Section 09 91 99 – Painting for Minor Works.

1.3 REFERENCES

.1 ADC 1062 - Air Distribution and Control Device Test Code.

.2 AMCA 500 - Method of Testing Louvers for Ratings.

.3 AMCA 511 – Certified Ratings Program

.4 AMCA 5000 - Method of Testing Dampers for Ratings.

.5 ARI 650 - Air Outlets and Inlets.

.6 ASHRAE 70 - Method of Testing for Rating the Performance of Outlets and Inlets.

.7 SMACNA - HVAC Duct Construction Standard - Metal and Flexible.

.8 NFPA 90A - Installation of Air Conditioning and Ventilating Systems.

1.4 SUBMITTALS

.1 Section 21 05 00: Procedures for submittals.

.2 Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.

1.5 PROJECT RECORD DOCUMENTS

.1 Section 21 05 00: Submittals for project closeout.

.2 Record actual locations of air outlets and inlets.

1.6 QUALITY ASSURANCE

.1 Test and rate air outlet and inlet performance to ADC Equipment Test Code 1062 and ASHRAE 70.

.2 Test and rate louver performance to AMCA 500

.3 Certified AMCA 511 – Certified Ratings Program

1.7 QUALIFICATIONS

.1 Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

Part 2 Products

2.1 MANUFACTURERS

.1 Unless otherwise listed:

.1 Price Industries.
.2 Nailor Industries
.3 Titus
.4 Ventex.

.2 Substitutions: Refer to Section 21 05 00.

2.2 ROUND CEILING DIFFUSERS

.1 Type: Round, stamped or spun, multi-core diffuser to discharge air in 360 degree pattern.

.2 Refer to the schedule for frame, materials of fabrication, finishes, and accessories.

2.3 SQUARE CEILING DIFFUSERS

.1 Type: Square, stamped diffuser to discharge air in 360 degree pattern.

.2 Refer to the schedule for frame, materials of fabrication, finishes, and accessories.

2.4 CEILING GRID CORE EXHAUST AND RETURN REGISTERS/GRILLES

.1 Type: Fixed grilles of 13 x 13 x 13 mm (1/2 x 1/2 x 1/2 inch) louvers.

.2 Refer to the schedule for frame, materials of fabrication, finishes, and accessories.

2.5 WALL SUPPLY REGISTERS/GRILLES

.1 Type: Streamlined and individually adjustable blades, 19 mm (3/4 inch) minimum depth, 19 mm (3/4 inch) maximum spacing with spring or other device to set blades.

.2 Refer to the schedule for frame, materials of fabrication, finishes, and accessories.

2.6 LOUVERS

.1 150 mm (6 inch) Fixed Blade Louver:

.1 Type: 150 mm (6 inch) deep with blades on 45 degree slope with centre baffle and return bend, heavy channel frame, aluminum birdscreen with 13 mm (1/2 inch) square mesh for exhaust and 19 mm (3/4 inch) for intake.
.2 Fabrication: 2.0 mm (0.81 inch) extruded aluminum, welded assembly, with factory baked enamel finish - custom colour to be selected by the architect.
.3 Mounting: Exterior.

Part 3 Execution

3.1 INSTALLATION

.1 Install to manufacturer's written instructions.

.2 Check location of outlets and inlets and make necessary adjustments in position to conform with architectural features, symmetry, and lighting arrangement.

.3 Install diffusers to duct work with air tight connection.

.4 All diffusers, grilles and registers shall be free of fluttering, chattering and vibration. A felt or sponge rubber gasket shall be provided behind each outlet or inlet and adequate fastenings provided to prevent leakage between the outlet and duct, wall or ceiling.

.5 Provide balancing dampers on duct take-off to diffusers, and grilles and registers, despite whether dampers are specified as part of the diffuser, or grille and register assembly.

.6 Paint ductwork visible behind air outlets and inlets matte black.

.7 Care should be taken to install diffusers as per the reflected ceiling plans where available so that the diffusers will fit properly in the ceiling suspension system. The sheet metal subcontractor shall co-ordinate this work with the Contractor, the suspended ceiling subtrade and electrical subtrade.

.8 Should there be any conflict in the location of grilles, registers and diffusers with lights, etc. the matter shall be referred to the Contract Administrator for directive. If requested by the Contract Administrator, the subcontractor shall relocate grilles, diffusers and registers and ductwork attached, within two feet of locations as indicated on the drawings, without extra cost to the City.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Condensing unit package.

.2 Charge of refrigerant and oil.

.3 Controls and control connections.

.4 Refrigerant piping connections.

.5 Motor starters.

.6 Electrical power connections.

1.2 RELATED SECTIONS

.1 Section 23 05 13 - Motors.

.2 Section 23 05 48 - Vibration Isolation: Placement of vibration isolators.

.3 Section 23 23 00 - Refrigerant Piping And Specialties.

.4 Section 23 82 00 – Terminal Heat Transfer Units

.5 Section 25 90 00 - Sequence Of Operation.

.6 Section 26 05 80 - Equipment Wiring: Electrical characteristics and wiring connections.

1.3 REFERENCES

.1 ARI 270 - Sound Rating of Outdoor Unitary Equipment.

.2 ARI 365 - Commercial and Industrial Unitary Air-Conditioning Condensing Units.

.3 ASHRAE 14 - Methods of Testing for Rating Positive Displacement Condensing Units.

.4 ASHRAE 15 - Safety Standard for Refrigeration Systems.

.5 ASHRAE 90A - Energy Conservation in new Building Design.

.6 NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

.7 UL 207 - Refrigerant-Containing Components and Accessories, Non-electrical.

.8 UL 303 - Refrigeration and Air-Conditioning Condensing, and Air-Source Heat Pump Equipment.

1.4 SUBMITTALS FOR REVIEW

.1 Section 21 05 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. Refer to Section fans, 23 73 23.

1.5 SUBMITTALS FOR INFORMATION

.1 Section 21 05 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 21 05 00: 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 testing firm acceptable to the authority having jurisdiction as suitable for the purpose specified and indicated.

1.8 DELIVERY, STORAGE, AND PROTECTION

.1 Section 21 05 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 21 05 00: Submittals for project closeout.

.2 Provide a five year warranty to include coverage for refrigerant compressors.

1.10 EXTRA MATERIALS

.1 Section 21 05 00: Submittals for project closeout.

Part 2 Products

2.1 AIR COOLING CONDENSING UNITS – 1.5 TO 5 TONS

.1 MANUFACTURERS

.1 Carrier
.2 AAON
.3 Lennox
.4 Trane
.5 York
.6 Daikin
.7 Substitutions: Refer to Section 21 05 00.

.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. Testing to ASHRAE.
.3 Performance Ratings: Energy Efficiency Rating (EER) not less than prescribed by ASHRAE 90A.
.4 Refrigerant charge: 410a

.3 CASING

.1 Unit cabinet, including louvered coil guard, will be constructed of galvanized steel, bonderized, and coated with a powder coat paint.

.4 CONDENSER COILS

.1 Coils: Aluminum fins mechanically bonded to seamless copper tubing.
.2 Coil Guard: Louvred

.5 FANS AND MOTORS

.1 Vertical discharge direct driven propeller type condenser fans with fan guard on discharge.
.2 Condenser fan motors will be totally enclosed, 1—phase type with class B insulation and permanently lubricated..
.3 Fan blades will be statically and dynamically balanced.
.4 Condenser fan openings will be equipped with coated steel wire safety guards.

.6 COMPRESSORS

.1 Compressor: Hermetic scroll type.
.2 Mounting: Statically and dynamically balance rotating parts and mount on rubber-in-shear vibration isolators.
.3 Capacity Reduction Equipment: two-step scroll compressors for load matching cooling and heating and improved part load efficiency
.4 Compressor will be covered with a sound absorbing blanket.

.7 REFRIGERANT CIRCUIT

.1 Provide each unit with one refrigerant circuit, or two independent refrigerant circuits, where shown on the drawings factory supplied and piped.
.2 For each refrigerant circuit, provide:
.1 liquid—line back seating shutoff valve with sweat connections,
.2 vapor--line back seating shutoff valve with sweat connections,

.3 system charge of R-410A refrigerant,

.4 POE compressor oil, accumulator, and, reversing valve.

.5 High pressure switch, loss of charge switch, filter drier

.6 Thermostatic Expansion Valve (TXV) Bi—Flow

.7 Snow Stand

.8 Liquid--Line Solenoid Valve (LLS)

.9 Crankcase heater

.10 Compressor Hard Start capacitor and relay

.8 CONTROLS

.1 Control signal to come from associate system with evaporator coil.

.9 ELECTRICAL CHARACTERISTICS AND COMPONENTS

.1 Electrical Characteristics:

.1 Refer to Section 26 05 80.

.2 Motor: Refer to Section 23 05 13.

Part 3 Execution

3.1 INSTALLATION

.1 Install to manufacturer's installation written instructions.

.2 Complete structural, mechanical, and electrical connections to manufacturer's installation instructions.

.3 Provide for connection to electrical service.

.4 Install units on concrete base

.5 Provide connection to refrigeration piping system and evaporators. Refer to Section 23 23 00. Comply with ASHRAE 15.

.6 Provide charge of refrigerant and oil.

3.2 DEMONSTRATION AND INSTRUCTIONS

.1 Section 21 05 00: Demonstrating installed work.

.2 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 for start-up and shut down during first year of operation.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Fan-coil units.

1.2 RELATED SECTIONS

.1 Section 23 05 13 - Motors.

.2 Section 23 21 00 - Hydronic Piping.

1.3 SUBMITTALS FOR REVIEW

.1 Section 21 05 00: Procedures for submittals.

.2 Product Data: Provide typical catalogue of information including arrangements.

.3 Shop Drawings:

.1 Indicate cross sections of cabinets, grilles, bracing and reinforcing, and typical elevations.

.2 Submit schedules of equipment and enclosures typically indicating length and number of pieces of element and enclosure, corner pieces, end caps, cap strips, access doors, pilaster covers, and comparison of specified heat required to actual heat output provided.

.3 Indicate mechanical and electrical service locations and requirements.,

1.4 SUBMITTALS FOR INFORMATION

.1 Section 21 05 00: Submittals for information.

.2 Manufacturer's Instructions: Indicate installation instructions and recommendations.

1.5 SUBMITTALS AT PROJECT CLOSEOUT

.1 Section 21 05 00: Submittals for project closeout.

.2 Project Record Documents: Record actual locations of components and locations of access doors in radiation cabinets required for access or valving.

.3 Operation and Maintenance Data: Include manufacturers descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listings.

.4 Warranty: Submit manufacturer warranty and ensure forms have been completed in the City’s name and registered with manufacturer.

1.6 QUALITY ASSURANCE

.1 Manufacturer Qualifications: 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 Underwriters Laboratories Inc., and testing firm acceptable to the authority having jurisdiction as suitable for the purpose specified and indicated.

1.8 WARRANTY

.1 Section 21 05 00: Submittals for project closeout.

.2 Provide five year manufacturers warranty for fan-coil unit.

.3 Provide one year manufacturer's warranty for fin-tube radiation.

.4 Provide two year manufacturer's warranty for unit heaters.

1.9 EXTRA MATERIALS

.1 Section 21 05 00: Submittals for project closeout.

Part 2 Products

2.1 FAN/BLOWER-COIL UNITS – VERTICAL

.1 Manufacturer: Engineered Air Model LE.

.2 Other acceptable manufacturers offering equivalent products.

.1 Trane

.2 Substitutions: Refer to Section 21 05 00.

.3 Style: Vertical fan coil with DX coil

.4 Coils:

.1 Direct expansion fins shall have full drawn collars to provide a continuous surface cover over the entire tube for maximum heat transfer. Seamless copper tubes shall be mechanically expanded into the fins to provide a continuous primary-to-secondary compression bond over the entire finned length for maximum heat transfer rates.

.2 Bare copper tubes shall not be visible between fins.

.3 Coil casing shall be constructed of stainless steel.

.4 Direct Expansion coils shall be provided with a distributor. The return coil connection shall be a sweat connection with size to be determined by manufacturer based upon the most efficient coil circuiting.

.5 Unit shall include a stainless steel primary and secondary drain pan. The primary

.6 drain pan to be positively sloped in every plane. Primary and secondary drain pans to be insulated with anti-microbial closed-cell insulation. The drain pan shall be designed to ensure no pooling of condensate water per ASHRAE 62.2.

.7 Coils shall have stub-outs off of the headers extending through the unit panneling.

.8 Coils shall have stub-outs off the headers that end within the internal cabinet.

.5 Cabinet:

.1 Unit will be supplied with 1-inch, double-wall panels. The cabinet is to be thermally isolated through injected foam insulation inside each cabinet.

.2 Single wall cabinets with fiberglass insulation exposed in the airstream are not acceptable.

.3 Frame channels which allow heat conductance between the inside and outside of the cabinet are not acceptable. Base rails used for unit mounting/hanging are acceptable.

.4 Panel shall have a minimum thermal insulation of R6. Foam injected insulation conforms to:

.1 a. ASTM C1071 (including C665)

.2 b. UL 181 for erosion

.3 c. 25/50 rating for flame spread/smoke developed per ASTM E-84, UL 723 and NFPA 90A

.6 Finish: Factory apply baked colour on visible surfaces of enclosure or cabinet.

.7 Fans:

.1 Supply fans shall be a DWDI forward-curved type. Fan assemblies shall be balance tested dynamically by the manufacturer. Manufacturer must ensure maximum fan RPM is below the first critical speed.

.2 The complete fan assembly, including motor and main drain pan shall be easily removable.

.3 Fan motor(s) assembly shall be direct-drive style and not include belts, pulleys, or sheaves.

.4 Fan motor(s) shall be of Direct Current Brushless type or minimum motor efficiency of 85 percent when rated in accordance of NEMA Standard MG 1-2016 at full load conditions.

.5 Manufacturer’s supply fan motor must have means to adjust motor speed for field balancing.

.6 Units shall be certified in accordance with the Central Station Air Handler certification program that is based on AHRI Standard 430.

.7 Supply fan must be capable of delivering 1.5" w.g. external static pressure and 3.0" w.g. total static pressure at nominal cabinet CFM.

.8 Motor: Tap wound electronically commutative with sleeve bearings, resiliently mounted.

.9 Control: factory wired, located in cabinet.

.10 Filter: Easily removed 50 mm(2 inch) thick glass fibre throw-away type, on the return plenum.

.11 Capacity: As Scheduled

Part 3 Execution

3.1 INSTALLATION

.1 Install to manufacturer's written instructions.

.2 Install equipment exposed to finished areas after walls and ceiling are finished and painted. Avoid damage.

.3 Protection: Provide finished cabinet units with protective covers during balance of construction.

.4 Fan-Coil Units: Install as indicated. Coordinate to assure correct recess size for recessed units.

3.2 CLEANING

.1 After construction is completed, including painting, clean exposed surfaces of units. Vacuum clean coils and inside of cabinets.

.2 Touch-up marred or scratched surfaces of factory-finished cabinets, using finish materials provided by manufacturer.

.3 Install new filters.

3.3 SCHEDULES

.1 Refer to schedules on drawings.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Thermostats.

.2 Carbon Dioxide Detection

1.2 RELATED SECTIONS

.1 Section 23 05 48 - Vibration Isolation.

.2 Section 23 21 00 - Hydronic Piping: Installation of control valves, flow switches, temperature sensor sockets, gauge taps.

.3 Section 23 33 00 - Duct Work Accessories: Installation of automatic dampers.

.4 Section 26 27 26 - Wiring Devices: Elevation of exposed components.

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 21 05 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 21 05 00: Submittals for information.

.2 Manufacturer's Instructions: Provide for all manufactured components.

1.6 SUBMITTALS AT PROJECT CLOSEOUT

.1 Section 21 05 00: 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 manufacturer’s warranty and ensure forms have been filled out in the City’s name and registered with manufacturer.

1.7 QUALITY ASSURANCE

.1 The Installer shall have an established working relationship with the Control System Manufacturer, and be the authorized representative of the Manufacturer at bid time.

.2 The Installer shall have successfully completed Control System Manufacturer's classes on the control system. The Installer shall present for review the certification of completed training, including the hours of instruction and course outlines upon request.

.3 All products used in this installation shall be new, currently under manufacture, and shall be applied in standard off-the-shelf products. This installation shall not be used as a test site for any new products unless explicitly approved by the Contract Administrator in writing. Spare parts shall be available for at least 5 years after completion of this contract.

1.8 REGULATORY REQUIREMENTS

.1 All work, materials, and equipment shall comply with the rules and regulations of all codes and ordinances of the local, provincial, and national authorities. Such codes, when more restrictive, shall take precedence over these plans and specifications. As a minimum, the installation shall comply with the current editions in effect 30 days prior to receipt of bids of the following codes:

- .1 Canadian Electric Code (CEC)
- .2 National Building Code (NBC)
- .3 ASHRAE 135
- .4 Underwriters Laboratories UL916

1.9 WARRANTY

.1 Section 21 05 00: Submittals for project closeout.

.2 Labor and materials for the control system specified shall be warranted free from defects for a period of 12 months after final completion and acceptance. Control system failures during the warranty period shall be adjusted, repaired, or replaced at no additional cost or

reduction in service to the City. The Contractor shall respond to the City's request for warranty service within 24 hours during normal business hours.

.3 All work shall have a single warranty date, even when the City has received beneficial use due to an early system start-up. If the work specified is split into multiple contracts or a multi-phase contract, then each contract or phase shall have a separate warranty start date and period

.4 Exception: The Contractor shall not be required to warrant reused devices, except for those that have been rebuilt and/or repaired. The Contractor shall warrant all installation labour and materials, however, and shall demonstrate that all reused devices are in operable condition at the time of Contract Administrator review.

1.10 MAINTENANCE SERVICE

.1 Section 21 05 00: Submittals for project closeout.

.2 Provide service and maintenance of control system from Date of Substantial Completion.

.3 Provide complete service of controls systems, including call backs. Make minimum of two complete normal inspections of approximately four (4) hours duration in addition to normal service calls to inspect, calibrate, and adjust controls, and submit written reports.

Part 2 Products

2.1 CARBON DIOXIDE SENSOR

.1 Acceptable manufacturers.

.1 DCS Airsense

.2 Substitutions: Refer to Section 21 05 00.

.2 Non-dispersive infrared (NDIR), Diffusion with a Measurement Range 0-2000 ppm

.1 Repeatability ± 20 ppm CO2 Measurement Accuracy ± 30 ppm ± 2% of reading,

.2 Power Requirements 18 - 30 VDC or 18 - 28 Vrms AC

.3 Operating Temperature Range 0 - 50 0C

.4 Operating Humidity Range 0 - 99% RH, non-condensing

.5 Voltage Output (linear) 0 - 10 VDC full-scale standard

.6 Optional Current Output (linear) 4-20 mA RLOOP < 600 Ω

.7 Dimensions 4.5 x 2.8 x 0.9 inches

.3 Model 308 – Wall or Duct Mount – No display

.4 Model 350 – Wall or Duct Mount – With display

2.2 CONTROLLERS (Stand-alone)

.1 Manufacturer: Honeywell Model T775 series 2000.

.1 Substitutions: Refer to Section 21 05 00.

.2 Graphical Interface Operating programming, includes a keypad lockout.

.3 Internal Time Clock Scheduler:

.4 Independent Modulating Outputs: 0-10 Vdc, 2-10 Vdc, 4-20 mA or Series 90

.5 Modulating High Or Low Limit Control

.6 Configurable Integral And Derivative Times (PID)

.7 Configurable Minimum Off Time

.8 Sensor Calibration

.9 Options

.1 NEMA 4X Enclosure
.2 Room Temperature Sensors
.3 Humidity sensors
.4 Pressure Sensors
.5 Economizer

2.3 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.

2.4 THERMOSTATS (Stand Alone)

.1 Electric Room Thermostats (Commercial Full Digital Display):

.1 Manufacturer: Honeywell Model TB8220.
.1 Substitutions: Refer to Section 21 05 00.
.2 Type: , 24 volts, with setback/setup temperature control.
.3 7 Day Programmable
.1 Conventional Service: Cooling and heating, two step cooling and two step heating.
.2 Heat pumps; Cooling and heating, two step cooling and three step heating
.3 Auto Fan On/OFF, Optional Fan On based on schedule.
.4 Covers: Locking with set point adjustment, with thermometer

Part 3 Execution

3.1 EXAMINATION

.1 Section 21 05 00: 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 are 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 written instructions.

.2 Check and verify location of thermostats, CO2 Detectors, and other exposed control sensors with plans and room details before installation. Locate 1 500 mm(60 inches) above floor. Align with lighting switches.

.3 Provide guards or password protection on thermostats in entrances and other public areas.

.4 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.

.5 Install "hand/off/auto" selector switches to override automatic interlock controls when switch is in "hand" position.

.6 Provide conduit and electrical wiring to Section 26 05 19 and 26 05 33. Electrical material and installation to appropriate requirements of Division 26.

.7 After installation of gas detection, test and calibrate equipment to demonstrate operation of functions described above under sequence of operation by manufactures certified service technician or authorized agent complete with commissioning reports

3.3 MANUFACTURER'S FIELD SERVICES

.1 Section 21 05 00: Prepare and start systems.

.2 Start and commission systems. Allow sufficient time for start-up and commissioning prior to placing control systems in permanent operation.

3.4 DEMONSTRATION AND INSTRUCTIONS

.1 Section 21 05 00: Demonstrating installed work.

.2 Demonstrate complete and operating system to the City.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Electrical demolition.

1.2 RELATED SECTIONS

.1 Section 02 41 99 – Demolition for Minor Works.

Part 2 Products

2.1 MATERIALS AND EQUIPMENT

.1 Materials and equipment for patching and extending work: As specified in individual Sections.

Part 3 Execution

3.1 EXAMINATION

.1 Verify existing conditions before starting work.

.2 Verify field measurements and circuiting arrangements are as shown on Drawings.

.3 Verify that abandoned wiring and equipment serve only abandoned facilities.

.4 Electrical drawings are based on existing record documents and/or casual field observations. Coordinate full extent of demolition work with all disciplines. Coordinate on site with all trades prior to commencement of demolition.

.5 Report discrepancies to the City and the Contract Administrator before disturbing existing installation.

.6 Beginning of demolition means installer accepts existing conditions.

3.2 PREPARATION

.1 Disconnect electrical systems in walls, floors, and ceilings scheduled for removal.

.2 Reroute/extend/re-feed existing electrical as required to maintain existing systems not indicated to be removed.

.3 Existing Electrical Service: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switch overs and connections. Obtain permission from the City and at least twenty-four (24) hours before partially or completely disabling system. Minimize outage duration.

.4 Existing Fire Alarm System: Disable existing system only to make switch overs and modifications. Notify the City and local fire service and at least twenty-four (24) hours before partially or completely disabling system. Minimize outage duration and make all arrangements for fire watch during outage. Where existing devices are covered to

minimize dust infiltration during construction, ensure all dust caps are removed during non-construction periods.

.5 Existing Intercom System: Disable system only to make switch overs and connections. Notify the City at least twenty-four (24) hours before partially or completely disabling system. Minimize outage duration. Make temporary connections to maintain service in areas adjacent to work area.

.6 Where existing luminaires, equipment or devices are to be temporarily relocated, and are to remain in service, provide an apparatus suitable to support the equipment.

3.3 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

.1 The construction documents indicate major items of equipment that exist and may not indicate every item or supporting wiring and conduit to be removed and/or relocated.

.2 Carefully examine the site and construction documents to verify the extent of work defined in the construction documents. Be responsible for determining which existing equipment and/or devices are to be removed and/or relocated.

.3 Remove, relocate, and extend existing installations to accommodate new construction including all existing equipment and/or devices indicated within the construction documents.

.4 Where existing equipment and/or devices are to be temporarily relocated, coordinate the required structure to support the equipment

.5 Remove abandoned wiring to source of supply.

.6 Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.

.7 Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets which are not removed.

.8 Disconnect and remove abandoned panelboards and distribution equipment.

.9 Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.

.10 Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories.

.11 Repair adjacent construction and finishes damaged during demolition and extension work.

.12 Maintain access to existing electrical installations which remain active. Modify installation or provide access panel as appropriate.

.13 Extend existing installations using materials and methods compatible with existing electrical installations, or as specified.

3.4 CLEANING AND REPAIR

.1 Clean and repair existing materials and equipment which remain or are to be reused.

.2 Luminaires: Remove existing luminaires for cleaning. Use mild detergent to clean all exterior and interior surfaces; rinse with clean water and wipe dry. Replace broken electrical parts.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Division 0 – Bidding & Contract Requirements

.2 General Requirements

.3 All Electrical Drawings and Division 25, 26, 27, 28 Series Specification Sections.

1.2 REFERENCES

.1 CSA-C22.1-15 - Canadian Electrical Code, Part I (23rd Edition), Safety Standard for Electrical Installations.

.2 CSA-CAN3-C235-83 (R2010).

.3 CSA (Canadian Standards Association).

.4 UL (Underwriters Laboratories Inc.).

.5 ASTM E-814, - Fire Tests of Penetration Fire Stops.

.6 ANSI/ UL1479 - Fire Tests of Through Penetration Firestops

1.3 REGULATORY REQUIREMENTS

.1 Conform to CSA-C22.1-15.

.2 Comply with all CSA Electrical Bulletins in force at time of tender submission.

.3 Comply with all City of Winnipeg by-laws, ordinances, codes, rulings, and other requirements.

.4 Comply with requirements of the electrical supply authority and the local inspection authority.

.5 Products: Listed and classified by CSA, or ULc and as suitable for the purpose specified and indicated. Where there is no alternative to supplying equipment which is not CSA certified, obtain special approval from the appropriate Inspection Departments.

1.4 DEFINITIONS

.1 The following are definitions of terms and expressions used in the specification:

.1 **Contract Administrator:** Electrical Engineering Consultant: Epp Siepman Engineering Inc.

.2 **Inspection Authority:** agent of any authority having jurisdiction over construction standards associated with any part of electrical work on site.

.3 **Supply Authority:** electrical power utility company responsible for delivery of electrical power to project.

.4 **Electrical Code:** Canadian Electrical Code or Local Code in effect at project location.

.5 **Indicated:** as shown on contract drawings or noted in Contract Documents.

.6 **Install:** To remove from site storage, move or transport to intended location, install in position, connect to utilities, repair site caused damage, and make ready for use.

.7 **Supply:** To acquire or purchase, ship or transport to the site, unload, remove packaging to permit inspection for damage, re-package, replace damaged items, and safely store on-site.

.8 **Provide:** Wherever the term "provide" is used in relationship to equipment, conduit and other materials specified for the work, it means "supply, install, connect and leave in working order all materials and necessary wiring, supports, access panels, etc., as necessary for equipment indicated." Wherever the terms "provide" is used in connection with services such as testing, load balancing, start-up, preparation of drawings for any part of the work, it means procure, prepare, supervise, take responsibility for, and pay for these services.

.9 **Typical:** A representative characteristic that is standard for all installations whether individually noted or not throughout the documents. "Typical" applies to each individual or combined installation except where specifically noted or otherwise indicated that the application is non-typical.

.10 **Exposed:** Any work not concealed in wall, shaft, or ceiling cavities or spaces. Work behind doors, in closets or cupboards or under counters is considered exposed.

.11 **New:** Produced from new materials.

.12 **Renewed:** Produced or rejuvenated from an existing material to like-new condition to serve a new or existing service.

.13 **Defective:** A condition determined exclusively by the Contract Administrator

1.5 PERMITS & FEES

.1 Submit all quantities of drawings and specifications necessary for examination and approval to Electrical Permit Department and Electrical Supply Authority prior to commencement of work.

.2 Obtain and pay for all permits necessary for the electrical installation.

1.6 INSPECTION

.1 Furnish a Certificate of Acceptance from the Inspection Authorities on completion of work. Copies of Certificate shall be included in Maintenance Manuals.

.2 Certificate of Inspection and Approval shall be submitted before final payment may be considered to be due.

.3 During the course of the project construction, the Contract Administrator will carry out periodic site reviews and prepare a deficiency list for remedial action by the Electrical Subcontractor. When requested, the Electrical Contractor shall respond in writing to the Contract Administrator, stating corrective action and completion date for each item listed as deficient. This response shall be in the hands of the Contract Administrator within three working days of receipt of the Site Review Report.

1.7 SUBMITTALS FOR REVIEW

.1 Section 01 33 00: Submission procedures.

.2 Submit shop drawings and product data for review by the Contract Administrator. All drawings shall be in English and metric dimensions or in imperial where indicated. Manufacture of equipment shall not commence until shop drawings have been reviewed.

.3 Shop drawings shall be submitted electronically in PDF format documents to shopdrawings@eppsiepman.com.

.4 Shop drawings shall be reviewed by the electrical contractor, contractor, and where applicable the Utility prior to submittal to Contract Administrator, confirming that they meet all the design requirements.

.5 Indicate details of construction, dimensions, capacities, weights and electrical performance characteristics of equipment or material.

.6 Where applicable, include wiring, single line and schematic diagrams.

.7 Include wiring drawings or diagrams showing inter-connection with work of other sections.

.8 Provide scaled drawings showing layout of all electrical equipment and coordination of same with mechanical equipment in all electrical, electrical/mechanical and voice data rooms.

.9 Submit samples in accordance with General Conditions. Samples shall be forwarded to the Contract Administrator's office and returned. Approved samples will be retained until after tender closing, then all samples will be returned except for the sample submitted by the Manufacturer who has been listed by the successful Contractor in the tender documents. This sample will be used for comparison with the actual production run of successful manufacturer.

.10 Submit shop drawings of service entrance equipment to utilities.

.11 Material submitted for review shall be marked up bear the Contractor's and where applicable the and Utility's reviewed stamp.

1.8 CLOSEOUT SUBMITTALS

.1 Section 01 78 00: Submission procedures.

.2 Maintenance Data:

.1 Provide operation and maintenance data for incorporation into Maintenance Manuals.

.2 Include details of design elements, construction features, component function and maintenance requirements, to permit effective start-up, operation, maintenance, repair, modification, extension and expansion of any portion or feature of installation.

.3 Include technical data, product data, supplemented by bulletins, component illustrations, exploded views, technical descriptions of items, and parts lists. Advertising or sales literature not acceptable.

.4 Include wiring and schematic diagrams and performance curves.

.5 Include names and addresses of local suppliers for items included in Maintenance Manuals.

.6 Include system certifications where applicable.

.7 Certificate of Acceptance from the Inspection Authorities.

.8 Include a list of maintenance materials provided in each related section.

.9 Include all warranty information.

.10 Submit Maintenance Manuals to the Contract Administrator for review. Manuals that are incomplete shall be returned to the Electrical Sub-Contractor for completion. Completed manuals shall be submitted, to the satisfaction of the Contract Administrator, before final payment may be considered to be due.

.3 Maintenance Materials:

.1 Provide maintenance materials as specified. Include a list of the maintenance materials in each related section of the operation and maintenance data.

.2 Turn materials over to the City in an orderly fashion upon completion of installation.

.4 Record Documentation:

.1 Project record documents shall be submitted to the Contract Administrator in AutoCAD file format. Electrical contractor shall be responsible for the production of the record documents. Electronic copies of the design AutoCAD files will be available to the electrical contractor for a nominal fee.

.2 Project record documents shall comprise a complete and accurate record of the actual electrical installation. Record drawings that are inaccurate or incomplete shall be returned to the contractor for correction and completion.

.3 Record drawings shall contain a stamp bearing the words “Record Drawing” or “As-Built Drawing”, the electrical contractor’s company name, date, and the contractor’s signature.

.4 The Contract Administrators will recommend a suitable deficiency holdback until accurate and complete record drawings have been submitted in acceptable form.

.5 Indicate on record drawings, location of all buried services. This information is to be certified correct by Contract Administrator before backfilling commences.

.6 Record actual size and location of all cables including depth of cables where buried.

.7 Contractor to take all schedules/details from specification and put onto additional drawing sheets for Record Drawings.

1.9 EXAMINATION OF SITE CONSTRUCTION DRAWINGS

.1 Prior to submitting a tender, examine the site and local conditions which will affect the work. Refer to the Architectural, Mechanical and Structural drawings, schedules and specifications for construction details to be certain that the electrical work can be satisfactorily carried out as specified. Claims for extra payments resulting from conditions which could reasonably be foreseen during an examination of the documents and/or site, will not be recognized.

.2 Ensure that all equipment designated as “Existing to Remain” or “Existing to be Relocated” is suitable for its intended re-use, including panelboards and circuits. Report any discrepancies to the Contract Administrator before tender close.

.3 Refer to General Conditions for instructions regarding a prearranged site visit during the tender period.

.4 Notify Contract Administrator of any discrepancies, omissions, etc., prior to the awarding of the contract, otherwise the Electrical Contractor shall perform the work as directed at no additional cost to the City.

Part 2 Products

2.1 MATERIALS AND EQUIPMENT

.1 Provide labour, materials, transportation, equipment and facilities, etc., required for the complete electrical installation as indicated or implied on the drawings and specifications.

.2 Electrical equipment shall be new and of type and quality specified.

.3 Request for approval of material, as equal, shall conform to the specification.

.4 Equivalent materials and equipment

.1 Bidders shall submit a tender based on the specified materials and equipment only.

.2 Bidders may submit a tender based on equivalent materials and equipment only if such items have been approved as equals in accordance with B7 by the Contract Administrator.

.3 Bidders may submit, with their tender, an alternate price based on alternate materials and equipment only if such items have been approved as alternates by the Contract Administrator.

.4 Submissions for equals or alternates shall be received by the Contract Administrator, ten (10) working days prior to tender closing. Submissions shall include sufficient manufacturer's data to clearly show equivalency, as well as an itemized list of equal or alternate items, the items for which they were submitted and a space for the Contract Administrator to indicate "approved equal", "approved alternate", or "not approved". Submittal list will be returned or may be picked up at the Contract Administrator's office. Where submissions are not returned by the Contract Administrator before tender closing or are not received by the Contract Administrator ten (10) working days before close of tender, they are considered not approved.

.5 All submissions shall include the following phrase "We have reviewed all contract documents, contract drawings and specifications relating to the equipment presented herein" and shall bear the name and signature of the manufacturer or their agent.

2.2 VOLTAGE RATINGS

.1 Operating voltages: to CAN3-C235-83(R2010).

.2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard. Equipment shall operate in extreme operating conditions established in above standard without damage to equipment.

2.3 FINISHES

.1 Finish outdoor electrical equipment such as parking lot panels, to match light standards.

.2 Paint indoor switchgear and distribution enclosures light grey to EEMAC-2Y-1.

.3 Paint outdoor electrical equipment enclosures with two (2) coats of U.V. resistant Urethane Enamel to minimum 1.5 mil dry coat thickness. Colour shall be "equipment green" to EEMAC 2Y-1.

.4 Clean and touch up surfaces of shop-painted equipment, scratched or marred during shipment or installation, to match original paint.

.5 Clean, prime and paint exposed hangers, racks, fastenings to prevent rusting.

2.4 LABELS AND WARNING SIGNS

.1 Manufacturer's nameplates and CSA labels shall be visible and legible after equipment is installed.

.2 Provide warning signs on equipment, as required, to meet the requirements of the Inspection Authorities, including indication of multiple power sources.

.3 Provide quantity as required of buried cable signs reading "Buried Cable" and "Buried High Voltage Cable". Signs shall be installed at building structure/equipment, at locations as directed on site and as per Canadian Electrical Code.

2.5 PROTECTION

.1 Guards

.1 Provide guards for all electrical equipment and devices in gymnasium and other areas subject to damage.

.2 Sprinkler Proof Equipment

.1 All surface mounted electrical equipment located in sprinklered areas shall be sprinkler proof and shall be provided with suitable hoods and shields.

.2 Entrance of conduits into the top of surface mount electrical panels/cabinets/distributions and motor control centers shall utilize O-rings and watertight connectors.

.3 Construction

.1 Protect exposed live equipment during construction for personnel safety.

.2 Shield and mark live part "LIVE ( ) VOLTS", with appropriate voltage.

.3 Arrange for installation of temporary doors for rooms containing electrical distribution equipment. Keep these doors locked except when under direct supervision.

2.6 SPARE PARTS

.1 Assemble spare parts as specified.

.2 Include the following:

.1 Part number.

.2 Identification of equipment or system for which parts are applicable.

.3 Installation instructions as applicable.

.3 Provide a written list complete with the City's signature assuring that spare parts have been received by the City.

2.7 ACCESSIBILITY OF EQUIPMENT

.1 All new and existing equipment must be accessible, as defined as follows:

.1 Ceiling mounted equipment shall only be considered accessible if a tradesman can place both hands on the equipment component which requires services.

.2 The component must be in clear view, and access must be gained from an 8 or 10 foot step ladder.

.3 Access panels provided in drywall shall be sized and placed in such a manner that a trades person can place two hands on the equipment components as stated above.

.4 Equipment located above acoustic tile ceiling shall be positioned in such a manner that equipment and its components can be accessed through a full tile which does not contain any devices such as light fixtures, speakers, smoke detectors or sprinkler heads.

.5 If this is not possible, it should be reviewed by the Contract Administrator/City before deemed acceptable.

.6 Conduit, pipe, ducting and support racking or any other obstruction to accessibility shall be relocated at the contractor's expense, by the contractor's forces.

2.8 ACCESS DOORS

.1 Access doors shall be minimum #12 gauge prime coat painted bonderized steel. Each shall be complete with a heavy flush frame and anchor, concealed hinges, positive locking screwdriver lock, and mounting and finishing provisions to suit the finish material for which they are supplied. Access doors in fire rated ceilings, walls, partitions, structures, etc. shall be ULc. listed and labeled and of a rating to maintain the fire separation integrity.

.2 Where access doors are located in surfaces where special finishes are required, they shall be of a recessed door type capable of accepting the finish in which they are to be installed so as to maintain the final building surface appearance throughout.

.3 Supply access doors in inaccessible construction shall give access to all concealed junction boxes, pullboxes, conductor joints and other similar electrical work which may need maintenance or repair.

.4 Before commencing installation of electrical work, submit to the Architect for approval, a list of required access doors showing the exact sizes and locations of such access doors. Locate access doors in walls and partitions to the Architect's approval, and arrange electrical work to suit. Access doors shall be, wherever possible, of a standard size for all applications. Confirm exact dimensions with the Architect, prior to ordering.

.5 Access doors will be installed by the Division responsible for the particular type of construction in which access doors are required. Supply the access doors to the Division installing same at the proper time to avoid construction delays.

Part 3 Execution

3.1 COORDINATION WITH OTHER TRADES

.1 Refer to Mechanical, Structural, Architectural and Interior Design drawings and specifications for additional electrical work in connection with other Divisions. Where such work is included in other sections of the specifications, provide equipment, conduit, wiring, etc. (in accordance with the approved manufacturer's shop drawings), as required, for operation of the specified equipment.

.2 Schedule execution of electrical work with associated work specified in other Divisions.

.3 Coordinate electrical work with work of other trades to avoid conflicts with pipes, air ducts or other equipment. Provide additional supports, wiring, etc., to relocate electrical equipment, as required, where structural members, air ducts, piping or other equipment interferes with the electrical installation.

.4 Prior to installation provide scaled drawings of all mechanical/electrical rooms and communication rooms showing layout of all equipment (mechanical and electrical) for Contract Administrator review.

3.2 QUALITY ASSURANCE

.1 Do complete installations in accordance with CSA C22.1-15.

.2 While not identified and specified by number in this Division, comply with CSA Electrical bulletins in force at time of tender submission. Comply with the requirements of all Provincial and local laws, rules, ordinances and codes.

.3 Electrical installations shall comply with all requirements of the electrical supply authority and the inspection authority.

.4 Electrical installation shall be in accordance with the applicable versions of the Canadian Electrical Code, Provincial and other codes, rules and regulations. Supply material and labour required to meet the requirements of these codes, rules and regulations even though the work in not shown on the drawings or mentioned in the specifications. Where the electrical installation calls for better quality materials or construction than the minimum requirements of these codes, rules and regulations, the electrical installation shall be as shown on the drawings and as specified.

3.3 WORKMANSHIP

.1 Install equipment, conduit and cables in a workmanlike manner to present a neat appearance to the satisfaction of the Contract Administrator. Install conduit and cable runs parallel and perpendicular to building lines in chases, behind furring or above ceilings, where such concealment is possible. In areas where systems are to be exposed, install neatly and group in a tidy appearance.

.2 Install equipment/junction boxes and apparatus requiring maintenance, adjustment or eventual replacement, with adequate clearances and accessibility for same.

.3 Provide for all requirements shown on shop drawings or manufacturer's installation instructions.

.4 Work deemed by the Contract Administrator to be unsatisfactory shall be replaced at no additional cost.

3.4 DELIVERY STORAGE AND HANDLING

.1 Deliver all materials to site in an orderly fashion.

.2 Store all materials in a clean and dry place, secure from vandalism or theft. All materials shall be left in shipping containers until required for use.

.3 Provide additional protection such as tarps, padding, wood skids, etc., as required to ensure protection of equipment and as directed by the Architect.

3.5 CONDUIT SLEEVES AND HOLES

.1 Install conduit, and sleeves, prior to pouring of concrete. Sleeves through concrete shall be sized for free passage of conduit.

.2 Holes through exterior walls and roof shall be flashed and made weatherproof.

.3 Make necessary arrangements for cutting of chases, drilling of holes and other structural work required to install electrical conduits, cables, pullboxes and outlet boxes.

.4 Install cables, conduits, and fittings to be embedded or plastered over, neatly and close to building structure so furring can be kept to minimum.

.5 Provide a minimum of two (2) separate conduit sleeves embedded in each concrete lighting fixture base. At least one (1) unused conduit shall be for possible future extension of wiring.

.6 All conduits and cables shall be entered into the building above grade unless otherwise noted.

.7 All coring in buildings with electrical in the slab shall be scanned at contractor’s expense to prevent damage.

3.6 CUTTING AND PATCHING

.1 Pay the costs of all cutting and patching required for the installation of electrical work. Payment for cutting and patching shall be made through the Contractor.

.2 Cutting and patching required for the installation of electrical work shall be done by the particular trade whose work is involved. No cutting or patching shall be carried out by the tradesman employed on the electrical work.

.3 Obtain the approval of the Architect before arranging for any cutting. Patching shall restore the affected area to the original condition; materials and methods used for patching shall be in accordance with the requirements of the corresponding Divisions of the specification.

3.7 DEVICE INSTALLATION

.1 Device Location

.1 Locate devices as indicated.

.2 Do not install devices back-to-back in wall.

.3 Drawings are schematic only and do not indicate all architectural or structural elements.

.4 Change location of devices at no extra cost or credit, providing distance does not exceed 10'-0" (3 m) and information is provided before installation.

.5 Locate light switches on latch side of doors.

.6 Vertically align devices of different systems when shown in close proximity to each other and occurring at different mounting heights.

.7 Coordinate mounting heights and location of all equipment with Architectural, Mechanical and Structural Drawings prior to installation of rough-in boxes.

.2 Mounting Heights

.1 Mounting height of equipment is from finished floor to centre line of equipment unless specified or indicated otherwise.

.2 If mounting height of equipment is not indicated, verify with Architect before proceeding with installation.

.3 Install electrical equipment at the following heights unless indicated or directed otherwise:

Device / Equipment	Mounting Height	
Devices above counters	150mm	6”****
Receptacles: - General - Exterior	 400mm 1000mm	 16” 39”
Switches, Dimmers, push buttons, Luxo bracket - General	 1200mm	 47”
Clocks	2150mm	84”
Automatic Door Operator Pushbuttons	900mm	36”
Occupancy Sensors	Per manufacturers recommendations	
Fire Alarm Visual, Audible, & Combination Devices	2350mm* or 150mm**	92”* or 6”**
Fire Alarm Manual Pullstations	1200mm	47”
Fire Fighter Handsets	1500mm	59”
Thermostats - General	 1200mm	 47”
Intercom Stations	1200mm	47”
Communication Outlets	400mm	16”
Hand Dryers	1200mm	47”
Branch Circuit Panelboards, Control Panels, Annunciators. Install panels taller than 1800mm (72”) with bottom no more than 100mm (4”) above floor.	2000mm*	78”*
Enclosed circuit breakers	1600mm***	60”***

*Measured to top of device/equipment

**Measured from Ceiling to top edge of device where mounting height would be lower than required specification.

***Measured to operating handle of device.

****Coordinate counter backsplash heights with architectural drawings prior to rough-in. Maintain minimum 1" clearance above backsplash height.

.1 Coordinate all mounting heights with Architectural elevations.

.2 Where installed in block or brick, mounting heights shall be as above or at bottom of nearest course.

.4 Panelboards and other equipment which are to be surface mounted shall be installed on minimum 19mm (3/4") good one side, fir plywood mounting backboards. Treat backboards with wood preservative prior to installation and paint with primer and two (2) coats gray enamel before any equipment is mounted. Provide plywood mounted boards unless specified otherwise in other sections.

.5 Panelboards mounted on exterior concrete/block walls shall have minimum 3/4" air gap behind enclosure (to minimize condensation).

.6 All transformers, motor control centers and floor-mounted distribution panels shall be mounted on 100mm (4") concrete housekeeping pads. The Electrical Contractors shall be responsible for provision of these pads.

3.8 FIREPROOFING

.1 Where cables or conduits pass through block or concrete walls and floors and any fire-rated assembly, seal openings with firestopping systems that have been tested for specific fire-resistance-rated construction conditions conforming to the construction assembly type, penetrating item type, annular space requirements, and fire-rating involved in each instance.

.2 Provide products that upon curing, do not re-emulsify, dissolve, leach, breakdown or otherwise deteriorate over time from exposure to atmospheric moisture, sweating pipes, ponding water or other forms of moisture characteristic during and after construction.

.3 Openings within walls and floors designed to accommodate cabling systems subjected to frequent cable changes shall be provided with re-enterable products.

.4 Fire proofing of electrical cables, conduits, trays, etc, passing through fire barriers shall conform to local codes and inspection authorities.

.5 Fire stop materials shall be asbestos free and have been tested in accordance with ASTM E-814, and ULC 1479.

.6 Fire stop and smoke seals shall be done in accordance with Section 07 84 13.

.7 Approved manufacturers:

.1 Nelson Firestop Products

.2 Specified Technologies

.3 Hilti Firestop

3.9 LOAD BALANCE

.1 Measure phase current to panelboards with normal loads operating at time of measurement. Adjust branch circuit connections as required to obtain best balance of current between phases and record changes.

.2 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.

.3 Submit, at completion of work, a report listing phase and neutral currents on panelboards, transformers and motor control centres, operating under normal load. State hour and date on which each load was measured, and voltage at time of test.

.4 Include load balance test results in maintenance manuals.

3.10 TESTING

.1 Conduct and pay for tests including, but not limited to, the following systems:

- .1 Circuits originating from branch distribution panels.
- .2 Lighting and its control.
- .3 Motors, heaters and associated control equipment including sequenced operation of systems where applicable.
- .4 Systems:
  - .1 Fire Alarm
  - .2 Public Address
  - .3 Communication cabling systems.
- .5 Grounding systems.

.2 Insulation Resistance Testing

- .1 Hi-pot all H.V. cable and equipment over 600 volts, to manufacturer's specifications.
- .2 Megger circuits, feeders and equipment up to 350V with a 500V instrument.
- .3 Megger 350-600V circuits, feeders and equipment with a 1000V instrument.
- .4 Check resistance to ground before energizing.

.3 Furnish Manufacturer's Certificate or letter confirming that entire installation, as it pertains to each system, has been installed to manufacturer's instructions. Submit letter in accordance with this section.

.4 Carry out tests in presence of Contract Administrator where directed.

.5 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.

.6 Submit test results in Maintenance Manuals.

3.11 CARE, OPERATION AND START-UP

.1 Instruct the City's operating personnel in the operation, care and maintenance of equipment. Arrangement of such instructional sessions shall be done at a time convenient to the City.

.2 Arrange and pay for services of Manufacturer's factory service engineer to supervise start-up of installation, check, adjust, balance and calibrate components.

.3 Provide these services for such a period, and for as many visits as necessary to put equipment into operation, and ensure that operating personnel are conversant with all aspects of its care and operation.

3.12 CLEANING

.1 Final cleaning shall be done in accordance with the specification.

.2 Final cleaning shall include, but not be limited to, all lighting reflectors, lenses, and other lighting surfaces that have been exposed to dust and dirt throughout the course of construction.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Building wire and cable.

.2 Non-metallic sheathed cable.

.3 Direct burial cable.

.4 Service entrance cable.

.5 Armoured cable.

.6 Metal clad cable.

.7 Wiring connectors and connections.

1.2 RELATED SECTIONS

.1 Section 26 05 53 - Electrical Identification.

1.3 REFERENCES

.1 CSA-C22.1-15 - Canadian Electrical Code, Part I (23rd Edition), Safety Standard for Electrical Installations.

.2 CSA C22.2 No. 0.3 - Test Methods for Electrical Wires and Cables.

.3 CSA C22.2 No. 48-M90 (R2000) - Non-metallic Sheathed Cable.

.4 CSA C22.2 No. 51 Armoured Cables.

.5 CSA C22.2 No. 52-96 (R2000) - Underground Service-Entrance Cables.

.6 CAN/CSA C22.2 No. 65-03 (CSA/UL/ANCE) – Wire Connectors.

.7 CSA C22.2 No. 75-03 (CSA/UL/ANCE) - Thermoplastic-Insulated Wires and Cables.

.8 CSA C22.2 No. 123 Aluminum Sheathed Cables.

.9 CSA C22.2 No. 131 Type TECK 90 Cable.

.10 CSA C22.2 No. 208-03 - Fire Alarm and Signal Cable.

.11 NECA (National Electrical Contractors Association) - Standard of Installation.

.12 NETA (International Electrical Testing Association) - ATS-2003 - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

.13 CSA (Canadian Standards Association).

.14 UL (Underwriters Laboratories Inc.).

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Coordination:

.1 Coordinate with other work having a direct bearing on work of this section.

.2 Where wire and cable destination is indicated and routing is not shown, determine exact routing and lengths required.

1.5 SUBMITTALS FOR INFORMATION

.1 Section 01 33 00: Submission procedures.

.2 Design Data: Indicate voltage drop and ampacity calculations for aluminum conductors substituted for copper conductors.

.3 Installation Data: Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements.

1.6 CLOSEOUT SUBMITTALS

.1 Section 01 78 00: Submission procedures.

.2 Record Documentation: Record actual locations of components and circuits.

1.7 QUALITY ASSURANCE

.1 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum five (5) years documented experience.

1.8 REGULATORY REQUIREMENTS

.1 Conform to CSA-C22.1.

.2 Provide products listed and classified by CSA or ULC and as suitable for the purpose specified and indicated.

1.9 PROJECT CONDITIONS

.1 Conductor sizes are based on copper unless indicated as aluminum or "AL".

Part 2 Products

2.1 BUILDING WIRE

.1 Description: Single conductor insulated wire.

.2 Conductor: Copper unless otherwise noted.

.3 Insulation Voltage Rating: 600 volts.

.4 Insulation: Thermoplastic material rated 90 degrees C.

2.2 ARMOURED CABLE

.1 Description: Type ACWU90 and AC90.

.2 Conductor: Copper unless otherwise noted.

.3 Insulation Voltage Rating: 600 volts.

.4 Insulation Temperature Rating: 90 degrees C.

.5 Insulation Material: Thermoplastic.

2.3 METAL CLAD CABLE

.1 Description: Type TECK90.

.2 Conductor: Copper unless otherwise noted.

.3 Insulation Voltage Rating: 600 volts.

.4 Insulation Temperature Rating: 90 degrees C.

.5 Insulation Material: Cross-Linked Polyethylene RW90.

.6 Armour Material: Aluminum.

.7 Armour Design: Interlocked metal tape.

.8 Jacket: PVC.

.9 Rating: Hazardous Location, CSA FT4

2.4 CONNECTORS

.1 Pressure type connectors, fixture type splicing connectors, cable clamps and lugs, as required.

Part 3 Execution

3.1 EXAMINATION

.1 Verify that field measurements are as indicated.

.2 Verify that interior of building has been protected from weather.

.3 Verify that mechanical work likely to damage wire and cable has been completed.

.4 Verify that raceway installation is complete and supported.

3.2 PREPARATION

.1 Completely and thoroughly swab raceway before installing wire.

3.3 WIRING METHODS

.1 Concealed Dry Interior Locations: Use only armoured cable and building wire in raceway.

.2 Exposed Dry Interior Locations: Use only building wire in raceway.

.3 Above Accessible Ceilings: Use only armoured cable, metal clad cable, and building wire in raceway.

.4 Wet or Damp Interior Locations: Use only metal clad cable, armoured cable with jacket, and building wire in raceway.

.5 Exterior Locations: Use only building wire Type RWU90 insulation in raceway, metal clad cable, and armoured cable with jacket.

.6 Underground Installations: Use only direct burial cable, armoured cable with jacket, and metal clad cable.

3.4 INSTALLATION

.1 Route wire and cable as required to meet project conditions.

.2 Install cable to the CSA-C22.1.

.3 Use solid conductor for feeders and branch circuits 10 AWG and smaller.

.4 Use stranded conductors for control circuits.

.5 Use conductor not smaller than 12 AWG for power and lighting circuits.

.6 Use conductor not smaller than 16 AWG for control circuits.

.7 User conductors sized to accommodate a maximum 3% voltage drop for the length of the circuit as per the following table:

Maximum Conductor Length for 120V Branch Circuits

Breaker Size[A]	Conductor	
	Size [AWG]	Max Length [m]
15A	#12	20
	#10	35
	#8	55
	#6	90
20A	#12	15
	#10	25
	#8	40
	#6	65
	#4	110
30A	#10	15
	#8	25
	#6	45
	#4	70

.8 Pull all conductors into raceway at same time.

.9 Use suitable wire pulling lubricant for building wire 4 AWG and larger.

.10 Protect exposed cable from damage.

.11 Include the following three paragraphs if cable is specified.

.12 Armoured cable shall be used for connections from conduit systems to recessed luminaires in accessible ceilings. Cable shall be of sufficient length to allow the lighting fixture to be relocated to any location within an 1800mm (6') radius. Cable shall be clamped before entering the lighting fixture and shall be clipped before entering the conduit system junction box.

.13 Armoured cable may be used for connections from conduit systems to wiring devices in steel stud partitions and for interconnection of wiring devices within steel stud partitions. Cables shall be clipped before entering junction or outlet boxes.

.14 Use suitable cable fittings and connectors.

.15 Neatly train and lace wiring inside boxes, equipment, and panelboards.

.16 Clean conductor surfaces before installing lugs and connectors.

.17 Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.

.18 Use split bolt connectors for copper conductor splices and taps, 6 AWG and larger. Tape uninsulated conductors and connector with electrical tape to 150 percent of insulation rating of conductor.

.19 Use solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.

.20 Use insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.

.21 Identify wire and cable to Section 26 05 53. Identify each conductor with its circuit number or other designation indicated.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Bonding.

1.2 REFERENCES

.1 CSA-C22.1-15 - Canadian Electrical Code, Part I (23rd Edition), Safety Standard for Electrical Installations.

.2 IEEE 81-2012 IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System.

1.3 SYSTEM DESCRIPTION

.1 Existing grounding system.

1.4 SUBMITTALS FOR REVIEW

.1 Section 01 33 00: Submission procedures.

.2 Product Data: Provide for grounding electrodes and connections.

1.5 SUBMITTALS FOR INFORMATION

.1 Section 01 33 00: Submission procedures.

.2 Test Reports: Indicate overall resistance to ground.

1.6 CLOSEOUT SUBMITTALS

.1 Section 01 78 00: Submission procedures.

.2 Record Documentation: Record actual locations of components and grounding electrodes.

.3 Certificate of Compliance: Indicate approval of installation by authority having jurisdiction.

1.7 QUALITY ASSURANCE

.1 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three (3) years experience.

1.8 REGULATORY REQUIREMENTS

.1 Products: Listed and classified by ULC and/or CSA as suitable for the purpose specified and indicated.

Part 2 Products

2.1 MECHANICAL CONNECTORS

.1 Material: Bronze.

2.2 WIRE

.1 Material: Stranded copper.

.2 Grounding Electrode Conductor: Size to meet CSA-C22.1 requirements.

Part 3 Execution

3.1 EXAMINATION

.1 Verify that final backfill and compaction has been completed before driving rod electrodes.

3.2 INSTALLATION

.1 Provide bonding to meet Regulatory Requirements.

.2 Exposed conductors shall be protected from mechanical injury.

.3 Mechanical connections shall be used for bonding connections to equipment. Soldered joints shall not be permitted.

.4 Buried connections of grounding and bonding conductors shall be made using exothermic welding process.

.5 Provide bonding wire connected to both ends of flexible conduit. Neatly attach to exterior of flexible conduit.

.6 Provide separate ground conductors for all exterior pole mounted luminaires.

.7 Interface with site grounding system.

.8 Bonding connections shall be made using a star configuration. Loop connections shall be avoided.

.9 Single conductor cables with metallic armour shall be bonded at the supply end only. Provide non-metallic entry plates for load end terminations. Provide a separate bonding conductor.

.10 Provide separate bonding conductor in all non-metallic raceways.

.11 Equipment Grounding Conductor: Provide separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.

3.3 SYSTEM GROUNDING

.1 Install system and circuit grounding connection to neutral points of 600V and 208V systems.

.2 Grounding conductors shall be routed in or adjacent to primary conduits or cables.

3.4 EQUIPMENT BONDING

.1 Install bonding connections to typical equipment included in, but not necessarily limited to:

.1 Distribution Panels

.2 Motor Frames

.3 Control Panels

.4 Outdoor lighting

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Conduit and equipment supports.

.2 Anchors and fasteners.

1.2 REFERENCES

.1 CSA-C22.1-15 - Canadian Electrical Code, Part I (23rd Edition), Safety Standard for Electrical Installations.

.2 CECA - Canadian Electrical Contractors Association.

.3 CSA (Canadian Standards Association).

.4 ULC (Underwriters Laboratories Canada Inc.).

1.3 SUBMITTALS FOR REVIEW

.1 Section 01 33 00: Submission procedures.

.2 Product Data: Provide manufacturer's catalogue data for fastening systems.

1.4 REGULATORY REQUIREMENTS

.1 Provide products listed and classified by CSA and as suitable for purpose specified and shown.

Part 2 Products

2.1 PRODUCT REQUIREMENTS

.1 Materials and Finishes: Provide adequate corrosion resistance.

.2 Provide materials, sizes, and types of anchors, fasteners and supports to carry the loads of equipment and conduit. Consider weight of wire in conduit when selecting products.

.3 Anchors and Fasteners:

.1 Concrete Structural Elements: Use expansion anchors.

.2 Steel Structural Elements: Use beam clamps and spring steel clips.

.3 Concrete Surfaces: Use expansion anchors.

.4 Hollow Masonry, Plaster, and Gypsum Board Partitions: Use toggle bolts and hollow wall fasteners.

.5 Solid Masonry Walls: Use expansion anchors.

.6 Sheet Metal: Use sheet metal screws.

.7 Wood Elements: Use wood screws.

2.2 STEEL CHANNEL

.1 U-shape, galvanized steel, size 1.6" x 1.6" (40 x 40 mm), 0.1" (2.5 mm) thick, surface-mounted, suspended or set in poured concrete walls and ceilings as required.

Part 3 Execution

3.1 INSTALLATION

.1 Install products to manufacturer's written instructions.

.2 Provide anchors, fasteners, and supports to CSA-C22.1.

.3 Do not fasten supports to pipes, ducts, mechanical equipment, and conduit.

.4 Do not use powder-actuated anchors.

.5 Obtain permission from the Contract Administrator before using powder-actuated anchors.

.6 Do not drill or cut structural members.

.7 Obtain permission from the Contract Administrator before drilling or cutting structural members.

.8 Do not use plastic cable ties.

.9 Fabricate supports from structural steel or steel channel. Rigidly weld members or use hexagon head bolts to present neat appearance with adequate strength and rigidity. Use spring lock washers under all nuts.

.10 Install surface-mounted cabinets and panelboards with minimum of four anchors.

.11 In wet and damp locations use steel channel supports to stand cabinets and panelboards 25 mm (1 inch) off wall.

.12 Use sheet metal channel to bridge studs above and below cabinets and panelboards recessed in hollow partitions.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Metal conduit.

.2 Flexible metal conduit.

.3 Liquid tight flexible metal conduit.

.4 Electrical metallic tubing.

.5 Nonmetal conduit.

1.2 RELATED SECTIONS

.1 Section 07 84 00 - Firestopping.

.2 Section 26 05 00 – Common Work Results for Electrical.

.3 Section 26 05 34 - Boxes.

.4 Section 26 05 26 - Grounding And Bonding.

.5 Section 26 05 29 - Electrical Supporting Devices.

.6 Section 26 05 53 - Electrical Identification.

1.3 REFERENCES

.1 CSA-C22.1-15 - Canadian Electrical Code, Part I (23rd Edition), Safety Standard for Electrical Installations.

.2 CAN/CSA-C22.2 No. 18.1-04 (R2009) - Metallic Outlet Boxes.

.3 CSA C22.2 No.45 - Rigid Metal Conduit.

.4 CAN/CSA-C22.2 No. 45.1-07 - Electrical Rigid Metal Conduit - Steel.

.5 CSA-C22.2 No. 56-04 - Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.

.6 CSA-C22.2 No. 83.1-07 - Electrical Metallic Tubing - Steel.

.7 CSA-C22.2 No. 211.1-06 - Rigid Types EB1 and DB2/ES2 PVC Conduit.

.8 CSA C22.2 No.211.2 - Rigid PVC (Unplasticized) Conduit.

.9 CSA-C22.2 No. 2420-09 - Belowground reinforced thermosetting resin conduit (RTRC) and fittings.

.10 CSA-C22.2 No. 227.1-06 - Electrical Nonmetallic Tubing.

.11 CSA-C22.2 No. 227.2.1-04 - Liquid-Tight Flexible Nonmetallic Conduit.

.12 CSA (Canadian Standards Association).

.13 UL (Underwriters Laboratories Inc.).

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Section 01 33 00: Project management and coordination procedures.

.2 Coordination:

.1 Coordinate with other work having a direct bearing on work of this section.

1.5 CLOSEOUT SUBMITTALS

.1 Section 01 78 00: Submission procedures.

.2 Record Documentation: Accurately record actual routing of conduits equal to or larger than 53mm(2”).

1.6 REGULATORY REQUIREMENTS

.1 Design conduit size to CSA-C22.1.

.2 Provide products listed and classified by CSA or ULC as suitable for purpose specified and shown.

1.7 DELIVERY, STORAGE, AND PROTECTION

.1 Accept conduit on site. Inspect for damage.

.2 Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

.3 Protect PVC conduit from sunlight.

Part 2 Products

2.1 CONDUIT REQUIREMENTS

.1 Minimum Size: 21mm(3/4 inch) unless otherwise specified.

.2 Underground Installations:

.1 More than 1525 mm(5 ft) from Foundation Wall: Use thick wall non-metallic conduit.

.2 Within 1525 mm(5 ft) from Foundation Wall: Use rigid steel conduit.

.3 In or Under Slab on Grade: Use thick wall non-metallic conduit.

.4 Minimum Size: 27 mm(1 inch).

.5 Provide a separate ground wire in all below-grade conduits.

.6 Provide an exterior trace wire for all conduits containing non-current carrying cabling.

.7 Use waterproof fittings.

.3 Outdoor Locations, Above Grade: Use rigid steel conduit.

.4 Wet and Damp Locations: Use non-metallic conduit.

.5 Dry Locations:

.1 Concealed: Use electrical metallic tubing.

.2 Exposed: Use electrical metallic tubing.

.6 Hazardous Areas: Use rigid steel conduit or teck cable complete with conduit seal fittings and compound.

2.2 METAL CONDUIT

.1 Rigid Steel Conduit: C22.2 No. 45.1.

.2 Fittings and Conduit Bodies: All steel fittings.

2.3 FLEXIBLE METAL CONDUIT

.1 Description: Interlocked steel construction.

.2 Fittings: CSA C22.2 No. 56.

.3 Provide a separate ground wire in all flexible metal conduit.

2.4 LIQUID TIGHT FLEXIBLE METAL CONDUIT

.1 Description: Interlocked steel construction with PVC jacket.

.2 Fittings: CSA C22.2 No. 56.

.3 Provide a separate ground wire in all liquid tight flexible metal conduit.

2.5 ELECTRICAL METALLIC TUBING (EMT)

.1 Description: CSA C22.2 N0. 83.1; galvanized tubing.

.2 Fittings and Conduit Bodies: CSA C22.2 No. 83.1; steel, set screw type.

.3 Refer to Section 26 05 53 for colour requirements.

2.6 NON-METALLIC CONDUIT

.1 Description: CSA C22.2 No. 211.2; PVC.

.2 Fittings and Conduit Bodies: CSA C22.2 No. 211.2.

.3 Provide a separate ground wire in all non-metallic conduit

2.7 ELECTRICAL NON-METALLIC TUBING

.1 Description: CSA 227.1.

.2 Fittings and Conduit Bodies: CSA 227.1.

.3 Provide a separate ground wire in all electrical non-metallic tubing.

2.8 FITTINGS

.1 Fittings shall be manufactured for use with conduit specified.

.2 Insulated throat liners on connectors.

.3 Steel raintight connector fittings complete with O-rings, for use on weatherproof or sprinklerproof enclosures. Steel raintight couplings shall be used for surface conduit installation exposed to moisture or sprinkler heads. Steel raintight connectors shall be used for all top entries to panels, contactors and motor control centres.

.4 Expansion fittings

.1 Outdoor locations - Weatherproof expansion fittings with internal bonding assembly, suitable for 100mm(4") or 200mm(8") linear expansion.

.2 Wet and Damp Locations - Watertight expansion fittings with integral bonding jumper suitable for linear expansion, and 21mm(3/4") deflection in all directions, as required.

.3 Panel Entry - Weatherproof expansion fittings for linear expansion as required.

.4 PVC Conduit - O-ring type expansion fittings.

.5 Flexible watertight conduit between junction boxes with integral bonding jumper suitable for linear and lateral movement greater than 19mm(3/4”).

Part 3 Execution

3.1 EXAMINATION

.1 Verify existing conditions before starting work.

.2 Verify that field measurements are as shown on Drawings.

.3 Verify routing and termination locations of conduit prior to rough-in.

.4 Conduit routing is shown on Drawings in approximate locations unless dimensioned. Route as required to complete wiring system.

.5 Drawings do not contain all conduits. Provide all conduit as required for a complete system.

.6 All conduit sizes indicated on drawings are minimum sizes unless otherwise noted. Where larger conduit sizes are required to meet Canadian Electrical Code requirements, contractor shall provide larger size at no additional cost. Increase conduit size at no extra costs where required to accommodate length of run and voltage drop requirements in accordance with Canadian Electrical Code requirements.

3.2 INSTALLATION

.1 Install conduit to CSA C22.1.

.2 Arrange supports to prevent misalignment during wiring installation.

.3 Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.

.4 Group related conduits; support using conduit rack.

.5 Construct rack using steel channel. Provide space on each for 25% additional conduits.

.6 Fasten conduit supports to building structure and surfaces to Section 26 05 29.

.7 Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports.

.8 Do not attach conduit to ceiling support wires.

.9 Arrange conduit to maintain headroom and present neat appearance.

.10 Provide flexible metal conduit for all connections to motors, recessed lighting, suspended lighting, transformers, and equipment subject to movement or vibration.

.11 Conduit Routing:

.1 All conduit shall be concealed except in mechanical and electrical rooms or as otherwise noted.

.2 Where surface conduit is installed:

.1 Locate more than 2000mm(78 inches) from infrared or gas-fired heaters.

.2 Group conduits on suspended or surface rack support.

.3 Route conduit parallel and perpendicular to walls.

.4 Route conduit installed above accessible ceilings parallel and perpendicular to walls.

.5 Route conduit through roof openings for piping and ductwork or through suitable roof jack with pitch pocket.

.6 Route conduit in and under slab from point-to-point.

.7 Do not route conduits through structural members unless otherwise indicated.

.8 Do not route conduit through terrazzo or concrete toppings unless otherwise indicated.

.9 Do not route conduit horizontally in masonry walls unless otherwise indicated.

.12 All conduit below grade shall be sloped to provide drainage away from the building.

.13 Maintain adequate clearance between conduit and piping.

.14 Maintain 300mm(12 inch) clearance between conduit and surfaces with temperatures exceeding 40 degrees C(104 degrees F).

.15 Cut conduit square using saw or pipe cutter; de-burr cut ends.

.16 Bring conduit to shoulder of fittings; fasten securely.

.17 Where threaded connections are used, threads shall be of sufficient length to ensure a tight connection.

.18 Where conduit becomes blocked, remove and replaced blocked sections.

.19 Join non-metallic conduit using cement as recommended by manufacturer.

.1 Wipe non-metallic conduit dry and clean before joining.

.2 Apply full even coat of cement to entire area inserted in fitting.

.3 Allow joint to cure for 20 minutes, minimum.

.20 Use conduit hubs to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes.

.21 Install no more than equivalent of three 90-degree bends between boxes.

.1 Use conduit bodies to make sharp changes in direction, as around beams.

.2 Use hydraulic one-shot bender to fabricate and factory elbows for bends in metal conduit larger than 53mm(2 inch) size.

.3 All metallic conduit shall be bent cold. Replace sections where conduit is kinked or flattened by more than 10% of its original diameter.

.22 Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.

.23 Ensure conduit systems are dry prior to installation of wiring.

.24 Provide suitable fittings to accommodate expansion and deflection where conduit crosses seismic and control expansion joints, and where conduit transitions from below to above grade.

.25 Provide polypropylene pull string in each empty conduit except sleeves and nipples.

.26 Use suitable caps to protect installed conduit against entrance of dirt and moisture.

.27 Ground and bond conduit to Section 26 05 26.

.28 Identify conduit to Section 26 05 53.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Wall and ceiling outlet boxes.

.2 Pull and junction boxes.

1.2 RELATED SECTIONS

.1 Section 07 84 00 - Firestopping.

.2 Section 09 21 16 – Gypsum Board Assemblies.

.3 Section 26 27 26 - Wiring Devices: Wall plates in finished areas.

1.3 REFERENCES

.1 CAN/CSA-C22.2 No. 18.1-04 (R2009) - Metallic Outlet Boxes.

.2 CSA-C22.1-15 - Canadian Electrical Code, Part I (23rd Edition), Safety Standard for Electrical Installations.

.3 CAN/CSA-C22.2 No. 18.1-04 (R2009) - Metallic Outlet Boxes.

.4 CSA-C22.2 No. 40-1989 (R2004) - Cutout, Junction and Pull Boxes.

.5 CAN/CSA-C22.2 No. 85-M89 (R2010) - Rigid PVC Boxes and Fittings.

.6 CSA (Canadian Standards Association).

.7 UL (Underwriters Laboratories Inc.).

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Coordination:

.1 Coordinate with other work having a direct bearing on work of this section.

1.5 CLOSEOUT SUBMITTALS

.1 Section 01 78 00: Submission procedures.

.2 Record Documentation: Record actual locations and mounting heights of outlet, pull, and junction boxes on project record documents.

1.6 REGULATORY REQUIREMENTS

.1 Provide products listed and classified by UL, testing firm acceptable to the authority having jurisdiction, CSA and as suitable for the purpose specified and indicated.

Part 2 Products

2.1 OUTLET BOXES

.1 Sheet Metal Outlet Boxes: CSA-C22.2 No. 18, galvanized steel.

.1 Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; include 13 mm(1/2 inch) male fixture studs where required.

.2 Concrete Ceiling Boxes: Concrete type.

.2 Non-metallic Outlet Boxes: CSA-C22.2 No. 18.

.3 Cast Boxes: CSA-C22.2 No. 18, Type FD, cast ferric alloy. Provide gasketed cover by box manufacturer. Provide threaded hubs.

.4 In-wall Boxes: 18 gauge white powder coated steel complete with trim ring, will accept standard single gang outlet boxes, wiring devices and cover plates, complete with screw-on steel cover with cable exit.

.5 Wall Plates for Finished Areas: As specified in Section 26 27 26.

2.2 PULL AND JUNCTION BOXES

.1 Sheet Metal Boxes: CSA-C22.2 No. 18, galvanized steel.

.2 Hinged Enclosures: As specified in Section 26 27 16.

.3 Surface Mounted Cast Metal Box: CSA-C22.2 No. 18, Type [4] [6] and; flat-flanged, surface mounted junction box:

.1 Cover: Provide with ground flange, neoprene gasket, and stainless steel cover screws.

Part 3 Execution

3.1 EXAMINATION

.1 Verify existing conditions before starting work.

3.2 INSTALLATION

.1 Install boxes to CSA-C22.1.

.2 Install in locations as shown on drawings, and as required for splices, taps, wire pulling, equipment connections and compliance with regulatory requirements.

.3 Set wall mounted boxes at elevations to accommodate mounting heights specified in section for outlet device and as indicated.

.4 Electrical boxes are shown on drawings in approximate locations unless dimensioned. Adjust box location up to 3 m(10 ft) if required to accommodate intended purpose.

.5 Orient boxes to accommodate wiring devices oriented as specified in Section 26 27 26.

.6 Maintain headroom and present neat mechanical appearance.

.7 Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.

.8 Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 150 mm(6 inches) from ceiling access panel or from removable recessed luminaire.

.9 Install boxes to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.

.10 Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes.

.11 Locate outlet boxes to allow luminaires positioned as shown on reflected ceiling plan.

.12 Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.

.13 Use flush mounting outlet box in finished areas.

.14 Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.

.15 Do not install flush mounting box back-to-back in walls; provide minimum 150 mm(6 inches) separation. Provide minimum 600 mm(24 inches) separation in acoustic rated walls.

.16 Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.

.17 Use stamped steel bridges to fasten flush mounting outlet box between studs.

.18 Install flush mounting box without damaging wall insulation or reducing its effectiveness.

.19 Use in-wall boxes for wall mounted television and smart board power and communications applications.

.20 Do not install in-wall box back-to-back in walls; provide minimum 150 mm(6 inches) separation. Provide minimum 600 mm(24 inches) separation in acoustic rated walls.

.21 Secure in-wall box to interior wall and partition studs. Accurately position to allow for surface finish thickness.

.22 Use stamped steel bridges to fasten in-wall outlet box between studs.

.23 Install in-wall mounting box without damaging wall insulation or reducing its effectiveness.

.24 Use adjustable steel channel fasteners for hung ceiling outlet box.

.25 Do not fasten boxes to ceiling support wires.

.26 Support boxes independently of conduit.

.27 Use gang box where more than one device is mounted together. Do not use sectional box.

.28 Use gang box with plaster ring for single device outlets.

.29 Use cast outlet box in exterior locations [exposed to the weather] and wet locations.

.30 Large Pull Boxes: Use hinged enclosure in interior dry locations, surface-mounted cast metal box in other locations.

3.3 ADJUSTING

.1 Adjust flush-mounting outlets to make front flush with finished wall material.

.2 Install knockout closures in unused box openings.

3.4 CLEANING

.1 Section 01 74 11: Cleaning installed work.

.2 Clean interior of boxes to remove dust, debris, and other material.

.3 Clean exposed surfaces and restore finish.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Nameplates and labels.

.2 Wire markers.

.3 Conduit markers.

1.2 RELATED SECTIONS

.1 Section 09 91 99 – Painting for Minor Works.

1.3 REFERENCES

.1 CSA (Canadian Standards Association).

.2 ULC (Underwriters Laboratories of Canada).

1.4 SUBMITTALS FOR REVIEW

.1 Section 01 33 00: Submission procedures.

.2 Product Data: Provide catalogue data for nameplates, labels, and markers.

.3 Installation Data: Provide list of all equipment requiring nameplates complete with associated nameplate configuration for review.

1.5 REGULATORY REQUIREMENTS

.1 Provide products listed and classified by CSA or ULC and as suitable for purpose specified and shown.

1.6 LANGUAGE

.1 All identification shall be in English.

Part 2 Products

2.1 NAMEPLATES AND LABELS

.1 Nameplates: Engraved three-layer laminated plastic, white letters on blue background for normal power and systems, white letters on red background for life safety power and systems, and white letters on orange background for standby power and systems.

.1 Locations:

.1 Electrical distribution, motor control centres, disconnect switches, panelboards and control equipment enclosures.

.1 Nameplate shall include:

.1 Distribution Name

.2 Distribution Voltage, Phase, Wires, Amperage

.3 Room Location

.4 Fed From:

.1 Panel Name

.2 Supplying Breaker Size/Poles

.3 Room Location

.2 Mechanical equipment disconnect switches:

.1 Nameplate shall include:

.1 Mechanical Equipment Mark

.2 Panel Name & Circuit number

.2 Letter Size:

.1 Use 6 mm(1/4 inch) letters for identifying equipment mark designations and system types.

.2 Use 3 mm(1/8 inch) letters for identifying supporting information.

.3 Use 6 mm(1/4 inch) letters for identifying grouped equipment and loads.

.3 Nameplates on exterior equipment shall be UV & weather resistant.

.4 Wording on nameplates shall be approved prior to manufacture. Submit schedule of nameplates and wording.

.2 Labels: Plastic self-adhesive non-smear labels with 5 mm(3/16 inch) black letters on white background.

.1 Locations:

.1 Wiring devices, including lighting control devices and receptacles.

.1 Label shall include:

.1 Indicate associated panel and circuit number.

.2 E.g. “A-32” (A is for Panel-A, and 32 is the circuit number)

.3 Lighting controls to include brief description of lighting being controlled.

.4 E.g. “Pendants”

.2 Voice/Data Outlets

.1 Label shall include:

.1 Indicate associated rack or cabinet name

.2 Indicate associated patch panel and drop number

.3 E.g. “IDC-A-13” (IDC is for rack name, patch panel A, drop number 13)

.3 Voice/Data Patch Panels

.1 Label shall include:

.1 Indicate associated rack or cabinet name

.2 Indicate patch panel name.

.3 E.g. “IDC-A” (IDC is for rack name, patch panel A)

2.2 WIRE MARKERS

.1 Description: Tape type wire markers.

.2 Locations:

.1 Each conductor at panelboard gutters, pull boxes, outlet and junction boxes and each load connection.

.1 Legend:

.1 Power and Lighting Circuits: Branch circuit or feeder number indicated on drawings.

.2 Control Circuits: Control wire number indicated on Shop Drawings.

.2 Voice/Data drops including both ends of cable.

.1 Label shall include:

.1 Indicate associated rack or cabinet name

.2 Indicate associated patch panel and drop number

.3 E.g. “IDC-A-13” (IDC is for rack name, patch panel A, drop number 13)

2.3 CONDUIT MARKERS

.1 Manufacturers:

.1 Brady; Product: BMP71 Indoor/Outdoor Vinyl Labels.

.2 Substitutions: Refer to Section 26 05 00.

.2 Description: Vinyl label.

.3 Location: Provide markers for each conduit longer than 4.7 m(10 ft).

.4 Spacing: 6 m(20 ft) on centre.

.5 Colour:

.1 Normal Power System: Blue

.2 Life-Safety Power System: Red

.3 Standby Power System: Orange

.4 Fire Alarm System: Red.

.5 Communication System: Yellow

.6 Security Systems: Black

.7 Nursecall Systems: Pink

.8 Controls System: White

.6 Legend:

.1 600 Volt System: 600V.

.2 120/208 Volt System: 120/208V.

.3 Fire Alarm System: FIRE ALARM.

.4 Communication System:

.1 VOICE

.2 DATA

.3 VOICE/DATA

.5 Public Address System: PA
.6 CCTV System: CCTV
.7 Access Control System: ACCESS CONTROL
.8 Intrusion System: INTRUSION
.9 Nursecall System: NURSECALL
.10 Controls System: CONTROLS

Part 3 Execution

3.1 PREPARATION

.1 Degrease and clean surfaces to receive nameplates and labels.

3.2 APPLICATION

.1 Install nameplate and label parallel to equipment lines.

.2 Secure nameplate to equipment front using rivets or screws.

.3 Paint coloured band on each conduit longer than 2 m(6 ft).

.4 Paint bands 6 m(20 ft) on centre.

.5 Colour:

.1 600 Volt System: Orange
.2 208 Volt System: Blue
.3 Fire Alarm System: Red.
.4 Communication System: Yellow
.5 Security Systems: Black
.6 Nursecall Systems: Purple
.7 Controls System: White

.6 Identify underground conduits using underground warning tape. Install one tape per trench at 75 mm(3 inches) below finished grade.

.7 Provide identification on all junction box covers indicating associated system, panel and circuit numbering using permanent marker.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Distribution panelboards.

.2 Branch circuit panelboards.

.3 Load centres.

1.2 RELATED SECTIONS

.1 Section 26 05 26 - Grounding and Bonding.

.2 Section 26 05 53 - Electrical Identification.

1.3 REFERENCES

.1 CSA-C22.1-15 - Canadian Electrical Code, Part I (23rd Edition), Safety Standard for Electrical Installations.

.2 CSA-C22.2 No. 29-11 - Panelboards and Enclosed Panelboards.

.3 NEMA ICS 2-2000 (R2005) - Industrial Control and Systems: Controllers, Contactors, and Overload Relays Rated 600 Volts.

.4 NEMA KS 1-2001 (R2006) - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).

.5 NETA ATS 2007 - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

.6 CSA (Canadian Standards Association).

.7 UL (Underwriters Laboratories Inc.).

1.4 SUBMITTALS FOR INFORMATION

.1 Section 01 33 00: Submission procedures.

.2 Installation Data: Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.5 MAINTENANCE MATERIAL SUBMITTALS

.1 Section 01 78 40: Maintenance and extra material requirements.

.2 Extra Stock Materials: Provide two (2) of each panelboard key.

1.6 QUALITY ASSURANCE

.1 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum five (5) years documented experience.

1.7 REGULATORY REQUIREMENTS

.1 Products: Listed and classified by CSA and as suitable for the purpose specified and indicated.

Part 2 Products

2.1 DISTRIBUTION PANELBOARDS

.1 Manufacturers:

.1 Eaton

.2 Schneider

.3 Siemens

.4 GE

.5 Substitutions: Refer to Section 26 05 00.

.2 Description: CSA-C22.2 No.29, circuit breaker type.

.3 Panelboard Bus: Copper and ratings as indicated. Provide copper ground bus in each panelboard.

.4 Minimum integrated short circuit rating: 10,000 amperes rms symmetrical for 250 volt panelboards; 18,000 amperes rms symmetrical for 600 volt panelboards or as indicated.

.5 Moulded Case Circuit Breakers: CSA-C22.2 No. 5, circuit breakers with integral thermal and instantaneous magnetic trip in each pole. Provide circuit breakers UL listed as Type HACR for air conditioning equipment branch circuits.

.6 Circuit Breaker Accessories: Trip units and auxiliary switches as indicated.

.1 Enclosure: CSA-C22.2 No. 5, Type 1 Sprinklerproof or Type 4 for exterior use or as indicated.

.2 Cabinet Front: Surface type, fastened with hinge and latch and concealed trim clamps, hinged door with flush lock, metal directory frame and finished in manufacturer's standard gray enamel.

2.2 BRANCH CIRCUIT PANELBOARDS

.1 Manufacturers:

.1 Eaton

.2 Schneider

.3 Siemens

.4 Substitutions by approved equal in accordance with B7.

.2 Description: CSA-C22.2 No.29, circuit breaker type, lighting and appliance branch circuit panelboard.

.3 Panelboard Bus: Copper and ratings as indicated. Provide copper ground bus in each panelboard.

.4 Minimum Integrated Short Circuit Rating: 10,000 amperes rms symmetrical for 250 volt panelboards; 18,000 amperes rms symmetrical for 600 volt panelboards or as indicated.

.5 Moulded Case Circuit Breakers: CSA-C22.2 No. 5, plug-on or bolt-on and type thermal magnetic trip circuit breakers, with common trip handle for all poles, listed as Type SWD for lighting circuits, Type HACR for air conditioning equipment circuits, Class A ground fault interrupter circuit breakers where scheduled. Do not use tandem circuit breakers unless indicated.

.6 Enclosure: CSA-C22.2 No. 5, Type 1 Sprinklerproof or Type 4 for exterior use or as indicated.

.7 Cabinet Box: 153 mm(6 inches) deep, 508 mm(20 inches) wide.

.8 Cabinet Front: Surface and Flush cabinet front with concealed trim clamps, concealed hinge, metal directory frame, and flush lock all keyed alike. Finish in manufacturer's standard gray enamel.

2.3 LOAD CENTRES

.1 Manufacturers:

.1 Eaton

.2 Schneider

.3 Siemens

.4 Substitutions: Refer to Section 26 05 00.

.2 Description: Circuit breaker load centre, with bus ratings as indicated.

.3 Minimum Integrated Short Circuit Rating: 10,000 amperes rms symmetrical.

.4 Moulded Case Circuit Breakers: CSA-C22.2 No. 5, plug-on type thermal magnetic trip circuit breakers, with common trip handle for all poles, listed as Type SWD for lighting circuits, Class A ground fault interrupter circuit breakers where indicated. Arc Fault Interrupting circuit breakers as per CSA C22.1.

.5 Enclosure: General Purpose.

.6 Box: Flush type with door. Finish in manufacturer's standard gray enamel.

Part 3 Execution

3.1 INSTALLATION

.1 Install panelboards to CSA-C22.1 and to manufacturer's written instructions.

.2 Install panelboards plumb. Install recessed panelboards flush with wall finishes.

.3 Provide filler plates for unused spaces in panelboards.

.4 Provide typed circuit directory for each branch circuit panelboard. Revise directory to reflect circuiting changes required to balance phase loads.

.5 Provide engraved plastic nameplates under the provisions of Section 26 05 53.

.6 Provide spare conduits out of each recessed panelboard to an accessible location below floor and above ceiling where applicable. Minimum spare conduits: three (3) empty 35mm (1-1/4”) up and two (2) 35mm (1-1/4”) down. Identify each as spare.

.7 Ground and bond panelboard enclosure according to Section 26 05 26.

3.2 ADJUSTING

.1 Measure steady state load currents at each panelboard feeder; rearrange circuits in the panelboard to balance the phase loads to within 20% of each other.

.2 Maintain proper phasing for multi-wire branch circuits.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Wall switches.

.2 Wall dimmers.

.3 Receptacles.

.4 Device plates and decorative box covers.

1.2 RELATED SECTIONS

.1 Section 26 05 34 - Boxes.

1.3 REFERENCES

.1 CSA-C22.1-15 - Canadian Electrical Code, Part I (23rd Edition), Safety Standard for Electrical Installations.

.2 CSAC22.2 No.42 - General Use Receptacles, Attachment Plugs and Similar Devices.

.3 CSAC22.2 No.42.1 - Cover Plates for Flush-Mounted Wiring Devices (Bi-national standard, with UL 514D).

.4 CSAC22.2 No.55 - Special Use Switches.

.5 CSAC22.2 No.111 - General-Use Snap Switches (Bi-national standard, with UL 20, twelfth edition).

.6 CSA-C22.2 No. 184-M1988 (R2009) - Solid State Lighting Controls.

.7 CSA-C22.2 No. 184-M1988 (R2009) - Solid-State Lighting Controls.

.8 CSA (Canadian Standards Association).

.9 UL (Underwriters Laboratories Inc.).

1.4 SUBMITTALS FOR REVIEW

.1 Section 01 33 00: Submission procedures.

.2 Product Data: Provide manufacturer's catalogue information showing dimensions, colours, and configurations.

1.5 SUBMITTALS FOR INFORMATION

.1 Section 01 33 00: Submission procedures.

.2 Installation Data: Submit manufacturer's installation instructions.

1.6 REGULATORY REQUIREMENTS

.1 Provide products listed and classified by CSA and as suitable for the purpose specified and indicated.

Part 2 Products

2.1 WALL SWITCHES

.1 Manufacturers:

.1 Leviton
.2 Hubbell
.3 Cooper
.4 Legrand
.5 Substitutions: Refer to Section 26 05 00.

.1 General-use snap switch:

.1 Grade: Commercial Specification Grade CSA-C22.2 No. 111
.2 Style: Standard toggle
.3 Device Body: white nylon toggle.
.4 Ratings: Match branch circuit and load characteristics. Amperage rating shall be marked on body of switch.

.2 Body and Handle: White with nylon toggle and handle.

2.2 WALL DIMMERS

.1 Manufacturers:

.1 Lutron
.2 Substitutions: Refer to Section 26 05 00

.2 Description: Wall dimmer complete with slide to off control and surge protection.

.3 Body and Handle: white with linear slide control.

.4 Voltage: 120 volts.

.5 Power Rating: Match load as required for circuits controlled.

.6 Products:

.1 Incandescent or Halogen: NT series
.2 Magnetic Low Voltage: NTLV series
.3 Electronic Low Voltage: NTELV series
.4 Fluorescent or LED 3-wire: NTF series
.5 Fluorescent 2-wire: NTFTU series
.6 Fluorescent or LED 0-10VDC: NTSTV-DV

2.3 RECEPTACLES

.1 Manufacturers:

.1 Leviton
.2 Hubbell
.3 Cooper
.4 Legrand

.5 Substitutions: Refer to Section 26 05 00.

General-duty duplex convenience receptacle:

.6 Grade: Commercial Specification Grade Nema WD-6 Compliant, CSA-C22.2 No.42.

.7 Style: Standard

.8 Device Body: Smooth white nylon face and base.

.9 CSA Configuration: Type as specified and indicated.

.10 Tamper resistant as indicated or as per Electrical Code.

.2 GFCI Receptacle: Duplex receptacle with integral ground fault circuit interrupter to meet regulatory requirements complete with steady-on “Green-Power-On” and steady-on “Red-Power-Tripped Off” LED indicator lights

.3 Suitable for No. 10 AWG for back and side wiring.

.4 Break-off links for use as split receptacles.

.5 Double wipe contacts and riveted grounding contacts.

.6 Receptacles shall be of one manufacturer throughout the project.

2.4 WALL PLATES

.1 Standard Stainless Steel Cover Plate: 430 type stainless steel cover plate complete with protective plastic film. Combination or multi-gang covers as required or indicated. Jumbo or standard size as indicated or specified.

Part 3 Execution

3.1 EXAMINATION

.1 Verify that outlet boxes are installed at proper height.

.2 Verify that wall openings are neatly cut and will be completely covered by wall plates.

.3 Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

3.2 PREPARATION

.1 Provide extension rings to bring outlet boxes flush with finished surface.

.2 Clean debris from outlet boxes.

3.3 INSTALLATION

.1 Install devices plumb and level.

.2 Install switches with OFF position down.

.3 Install wall dimmers to achieve full rating specified and indicated after de-rating for ganging as instructed by manufacturer.

.4 Do not share neutral conductor on load side of dimmers.

.5 Install receptacles with grounding pole on bottom.

.6 Install tamper resistant receptacles in classrooms, corridors and offices.

.7 Use exterior use receptacles for exterior applications unless noted otherwise.

.8 Connect wiring device grounding terminal to branch circuit equipment grounding conductor and outlet box.

.9 Install decorative plates on switch, receptacle, and blank outlets in finished areas.

.10 Connect wiring devices by wrapping conductor around screw terminal.

.11 Use jumbo size plates for outlets installed in masonry walls.

.12 Stainless steel protective coverings shall be maintained until project completion and turn-over to the City.

.13 Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.

3.4 CONTROLLED RECEPTACLES

.1 Controlled receptacles shall be zoned on a per room basis.

.2 Interconnect controlled receptacles with lighting controls in associated rooms such that controlled receptacles turn off on vacancy condition.

3.5 INTERFACE WITH OTHER PRODUCTS

.1 Coordinate locations of outlet boxes provided under Section 26 05 34 to obtain mounting heights indicated on drawings.

3.6 FIELD QUALITY CONTROL

.1 Section 01 45 00: Field inspection and testing

.2 Inspect each wiring device for defects.

.3 Operate each wall switch with circuit energized and verify proper operation.

.4 Verify that each receptacle device is energized.

.5 Test each receptacle device for proper polarity.

.6 Test each GFCI receptacle device for proper operation.

3.7 ADJUSTING

.1 Adjust devices and wall plates to be flush and level.

3.8 CLEANING

.1 Section 01 74 11: Cleaning installed work.

.2 Clean exposed surfaces to remove splatters and restore finish.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Interior luminaires and accessories.

.2 Emergency lighting units.

.3 Emergency remote fixtures

.4 Exit signs.

.5 Ballasts.

.6 LED luminaires and drivers,

.7 Lamps.

.8 Luminaire accessories.

1.2 REFERENCES

.1 ANSI/NEMA C78.379-2006 - American National Standard for Electric Lamps - Classification of the Beam Patterns of Reflector Lamps.

.2 CSA-C22.1-15 - Canadian Electrical Code, Part I (23rd Edition), Safety Standard for Electrical Installations.

.3 CSA-C22.2 No. 9.0-96 (R2006) - General Requirements for Luminaires.

.4 CSA-C22.2 No. 250.0-08 - Luminaires.

.5 CSA-C22.2 No. 141-10 - Emergency lighting equipment.

.6 CAN/CSA-E920-98 (R2007) - Ballasts for Tubular Fluorescent Lamps - General and Safety Requirements.

.7 CAN/CSA-E928-98 (R2007) - Auxiliaries for Lamps - A.C. Supplied Electronic Ballasts for Tubular Fluorescent Lamps - General and Safety Requirements.

.8 CAN/CSA-E61347-2-3-03 (R2008) - Lamp Controlgear - Part 2-3: Particular Requirements for A.C. Supplied Electronic Ballasts for Fluorescent Lamps.

.9 NEMA WD 6-2002 (R2008) - Wiring Devices - Dimensional Requirements.

.10 CSA (Canadian Standards Association).

.11 UL (Underwriters Laboratories Inc.).

1.3 SUBMITTALS FOR REVIEW

.1 Section 01 33 00: Submission procedures.

.2 Shop Drawings: Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.

.3 Product Data: Provide dimensions, ratings, and performance data.

1.4 SUBMITTALS FOR INFORMATION

.1 Section 01 33 00: Submission procedures.

.2 Installation Data: Submit data indicating application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.5 CLOSEOUT SUBMITTALS

.1 Section 01 78 00: Submission procedures.

.2 Operation and Maintenance Data: Submit manufacturer's operation and maintenance instructions for each product.

1.6 MAINTENANCE MATERIAL SUBMITTALS

.1 Section 01 78 40: Maintenance and extra material requirements.

.2 Extra Stock Materials:

.1 Provide two (2) of each plastic lens type.

.2 Provide ten (10) replacement lamps for each lamp type.

.3 Provide two (2) of each ballast type.

1.7 QUALITY ASSURANCE

.1 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum five (5) years documented experience.

.2 Conform to requirements of CSA C22.1, and to the Manitoba Hydro Power Smart Commercial Lighting Program.

.3 Products: Listed and classified by CSA, and as suitable for the purpose specified and indicated.

Part 2 Products

2.1 LUMINAIRES

.1 Manufacturers:

.1 Refer to Luminaire Schedule on drawings.

.2 Substitutions by approved equal in accordance with B7.

2.2 EMERGENCY LIGHTING UNITS

.1 Description: Self-contained LED emergency lighting unit.

.2 Battery: 12 volt, lead acid type, with minimum 1/2 hour capacity.

.3 Battery Charger: Solid state pulse type charger, current limited, temperature compensated, short circuit proof, and reverse polarity protected.

.4 Lamps: LED, 5W minimum, 340 lumens minimum.

.5 Housing: Factory white, corrosion resistant steel cabinet.

.6 Indicators: Lamps to indicate AC ON and RECHARGING.

.7 TEST Switch: Transfers unit from external power supply to integral battery supply.

.8 Electrical Connection: 1800 mm cord with plug cap, NEMA WD 6, Type 5-15 configuration.

.9 Input Voltage: Universal 120-347V.

.10 Accessories:

.1 4 voltage sensing relays integral to battery bank unit.

.2 AC/DC terminal blocks

.3 Auto test function

.4 Mounting shelf (200W and over)

.5 NexusRF

.6 Voltage sensing relay panel as indicated

.11 Manufacturers:

.1 Refer to Emergency Lighting Schedule on drawings.

.2 Substitutions by approved equal in accordance with B7.

2.3 EMERGENCY REMOTE FIXTURES

.1 Compact Mini Remote Heads

.1 Lamps: LED, 5W minimum, 340 lumens minimum or as indicated. Quantity of 2 or as indicated.

.2 Housing: injection molded, impact resistant, thermoplastic.

.3 Voltage: To match emergency light

.4 Tool less adjusting.

.2 Decorative Remote Heads

.1 Lamps: LED, 5W minimum, 340 lumens minimum or as indicated. Quantity of 2 or as indicated.

.2 Housing: Powder coated die cast aluminum.

.3 Manufacturers:

.1 Refer to Emergency Lighting Schedule on drawings.

.2 Substitutions by approved equal in accordance with B7.

2.4 EXIT SIGNS

.1 Housing: Extruded aluminum

.2 Face: Aluminum face with red letters on white background.

.3 Directional Arrows: Universal type for field adjustment

.4 Mounting: Universal, for field selection and as indicated

.5 Lamps: LED

.6 Input Voltage: Universal 120-347VAC, 6-24VDC.

.7 Manufacturers:

.1 Refer to Emergency Lighting Schedule on drawings.

.2 Substitutions by approved equal in accordance with B7.

2.5 FLUORESCENT BALLASTS

.1 Manufacturers:

.1 Advance

.2 Standard

.3 Osram Sylvania

.4 GE

.5 Lutron

.6 Substitutions by approved equal in accordance with B7.

.2 Description: High power factor type electromagnetic ballast.

.3 Voltage: Match luminaire voltage.

2.6 FLUORESCENT DIMMING BALLASTS AND CONTROLS

.1 Manufacturers:

.1 Lutron

.2 Substitutions by approved equal in accordance with B7.

.2 Control Unit: Refer to Section 26 27 26

.3 Ballast: Selected by dimming system manufacturer as suitable for operation with control unit.

.4 Lamps: As specified for luminaire.

2.7 LED LUMINAIRES AND DRIVERS

.1 All Luminaires

.1 Comply with IES LM-79-08 Approved Method for measuring lumen maintenance of LED light sources.

.2 Comply with IES LM-80-08 Approved Method for electrical and photometric measurement of SSL product.

.3 LED's shall be Restriction of Hazardous Substances Directive (RoHS) compliant.

.4 LED arrays shall be sealed, high performance, long life type; minimum 70% rated output at 50,000 hours.

.5 LED luminaires shall deliver a minimum of 60 lumens per watt.

.1 LED's shall be "Bin No. 1" quality.

.6 Drivers shall be solid state and accept 120 through 277 VAC at 60 Hz input.

.7 The LED light source shall be fully dimmable with use of compatible dimmers switch designated for low voltage loads.

.8 LED color temperatures: CRI 85, 2700K as noted +/- 145K.

.9 LED color temperatures: CRI 85, 4000K as noted +/- 275K.

.10 LED color temperatures: CRI 85, 5000K as noted +/-283K.

.11 Luminaires shall have internal thermal protection.

.12 Luminaires shall not draw power in the off state. Luminaires with integral occupancy, motion, photo-controls, or individually addressable luminaires with external control and intelligence are exempt from this requirement. The power draw for such luminaires shall not exceed 0.5 watts when in the off state.

.13 Color spatial uniformity shall be within .004 of CIE 1976 diagram.

.14 Color maintenance over rated life shall be within .007 of CIE 1976.

.15 Indoor luminaires shall have a minimum CRI of 85.

.16 Luminaire manufacturers shall adhere to device manufacturer guidelines, certification programs, and test procedures for thermal management

.17 LED package(s)/module(s)/array(s) used in qualified luminaires shall deliver a minimum 70% of initial lumens, when installed in-situ, for a minimum of 50,000 hours.

.18 Luminaires shall be fully accessible from below ceiling plane for changing drivers, power supplies and arrays.

.2 Power Supplies and Drivers

.1 MB Hydro Powersmart approved.

.2 Power Factor: 0.90 or higher

.3 Maximum driver case temperature not to exceed driver manufacturer recommended in-situ operation.

.4 Output operating frequency: 60Hz.

.5 Interference: EMI and RFI compliant with FCC 47 CFR Part 15.

.6 Total Harmonic Distortion Rating: 20% Maximum.

.7 Meet electrical and thermal conditions as described in LM-80 Section 5.0.

.8 Primary Current: Confirm primary current with Drawings.

.9 Secondary Current: Confirm secondary current specified by individual luminaire manufacturers.

.10 Compatibility: Certified by manufacturer for use with individually specified luminaire and individually specified control components.

.11 Solid-state control components to be integral or external per each specified luminaire. Remote control gear to be enclosed in Class 1, Class 2, or NEMA 3R enclosures as required.

.3 Controller and Control System

.1 System electronics driver / controller to use coordinated communication protocols: DMX512, 0-10V, DALI, or proprietary as required.

.2 The Contractor to ensure that external control equipment is compatible with LED control requirements

.3 Provide connector types and wiring as appropriate for un-interrupted communication between devices, considering distance maximums, field obstructions, and accessibility. Ensure that connection points are optically isolated for system noise reduction.

.4 Compatibility: Certified by manufacturer for use with individually specified luminaire and individually specified power supplies and/or drivers

2.8 LAMPS

.1 Fluorescent Lamp Manufacturers:

.1 Philips

.2 Standard

.3 Osram Sylvania

.4 GE

.5 Substitution by approved equal in accordance with B7.

.2 Lamp Types: As specified for luminaire. Less than 1.7mg of mercury.

2.9 ACCESSORIES

.1 Description: Standard down light reflector shall be semi-specular unless noted otherwise.

.2 Joiner Fittings: As specified for linear lighting systems, or as required for end to end continuous row mounting as indicated on drawings. Fittings to match style and finish of luminaire specified.

.3 End Caps: As specified for linear lighting systems, or as required for end of row or stand-alone luminaire installations as indicated on drawings. End caps to match style and finish of luminaire specified.

.4 Wireguard: As specified for luminaire, or as indicated on the drawings.

.1 Gauge: Minimum 8 gauge unless noted otherwise.

.2 Color: Custom color to be confirmed by architect at time of shop drawing review.

2.10 SOURCE QUALITY CONTROL

.1 Section 01 45 00: Manufacturer quality control.

.2 Certify fluorescent ballast design and construction by Certified Ballast Manufacturers, Inc.

Part 3 Execution

3.1 INSTALLATION

.1 Support luminaires larger than 600 x 1200 mm(24 x 48 inch) size independent of ceiling framing.

.2 Locate recessed ceiling luminaires as indicated on reflected ceiling plan.

.3 Install surface mounted luminaires, emergency lighting, and exit signs plumb and adjust to align with building lines and with each other. Secure to prevent movement.

.4 Exposed Grid Ceilings: Fasten surface mounted luminaires to ceiling grid members using bolts, screws, or suitable clips.

.5 Install recessed luminaires to permit removal from below.

.6 Install recessed luminaires using accessories and firestopping materials to meet regulatory requirements for fire rating.

.7 Install clips to secure recessed grid-supported luminaires in place.

.8 Install wall mounted luminaires, emergency lighting units, and exit signs at height as indicated.

.9 Install end to end, or continuous rows of luminaires with appropriate joiner fittings to match the luminaire manufacturer and finish.

.10 Install linear lighting with appropriate end caps where practicable.

.11 Install accessories provided with each luminaire.

.12 Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.

.13 Bond products and metal accessories to branch circuit equipment grounding conductor.

.14 Install specified lamps in each luminaire, emergency lighting unit and exit sign.

3.2 FIELD QUALITY CONTROL

.1 Operate each luminaire after installation and connection. Inspect for proper connection and operation.

3.3 ADJUSTING

.1 Aim and adjust luminaires as directed.

.2 Position exit sign directional arrows as indicated.

3.4 CLEANING

.1 Section 01 74 11: Cleaning installed work.

.2 Clean electrical parts to remove conductive and deleterious materials.

.3 Remove dirt and debris from enclosures.

.4 Clean photometric control surfaces as recommended by manufacturer.

.5 Clean finishes and touch up damage.

3.5 CLOSEOUT ACTIVITIES

.1 Demonstration: Demonstrate luminaire operation for minimum of one (1) hours.

3.6 PROTECTION OF FINISHED WORK

.1 Re-lamp luminaires that have failed lamps and at Substantial Completion.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Fire alarm control panels.

.2 Fire alarm initiating and signaling devices.

.3 Auxiliary fire alarm equipment and wiring.

1.2 RELATED SECTIONS

.1 Section 08 71 00 - Door Hardware - General: Door closers, electric locks, electric releases.

.2 Section 21 13 00 - Sprinklers.

.3 Section 26 05 00 - Common Work Results for Electrical

.4 Section 26 05 19 - Building Wire and Cable.

1.3 REFERENCES

.1 The latest version of the following including all amendments:

.1 CAN/ULC S524 - Standard for the Installation of Fire Alarm Systems.

.2 CAN/ULC S524 - Standard for the Installation of Fire Alarm Systems.

.3 CAN/ULC S525 - Audible Signal Devices for Fire Alarm Systems, Including Accessories.

.4 CAN/ULC S526 - Visible Signal Devices for Fire Alarm Systems.

.5 CAN/ULC S527 - Control Units for Fire Alarm Systems

.6 CAN/ULC S528 - Manual Pull Stations for Fire Alarm Systems.

.7 CAN/ULC S529 - Smoke Detectors for Fire Alarm Systems.

.8 CAN/ULC S530 - Heat Actuated Fire Detectors for Fire Alarm Systems.

.9 CAN/ULC S536 - Inspection and Testing of Fire Alarm Systems.

.10 CAN/ULC S541 - Speakers for Fire Alarm Systems, Including Accessories.

.11 ULC ORD-C386-1990 - Flame Detectors.

1.4 SYSTEM DESCRIPTION

.1 Fire Alarm System: Existing Simplex Grinnel 4100U.

.2 The Fire Alarm System shall consist of all necessary hardware equipment and software programming to perform the following functions:

.1 Fire alarm system detection and notification operations.

.2 Control and monitoring of elevators, door hold-open devices, and other equipment as indicated in the drawings and specifications.

1.5 SUBMITTALS FOR REVIEW

.1 Section 01 33 00: Submission procedures.

.2 Product Data: Provide electrical characteristics and connection requirements.

.3 Shop Drawings: Provide annunciator layout and system wiring diagram showing each device and wiring connection required.

1.6 SUBMITTALS FOR INFORMATION

.1 Section 01 33 00: Submission procedures.

.2 Test Reports: Indicate satisfactory completion of required tests and inspections.

.3 Installation Data: Manufacturer's special installation requirements.

.1 Indicate application conditions and limitations of use stipulated by Product testing agency.

.2 Include instructions for storage, handling, protection, examination, preparation, installation, and starting of products.

1.7 CLOSEOUT SUBMITTALS

.1 Section 01 78 00: Submission procedures.

.2 Maintenance Contracts: Provide service and maintenance of fire alarm system for one (1) year from Date of Substantial Completion.

.3 Operation Data: Operating instructions.

.4 Maintenance Data: Maintenance and repair procedures.

.5 Record Documentation: Record actual locations of initiating devices, signaling appliances, and end-of-line devices.

1.8 MAINTENANCE MATERIAL SUBMITTALS

.1 Section 01 78 40: Maintenance and extra material requirements.

1.9 QUALITY ASSURANCE

.1 Design and install fire alarm system to CAN/ULC S524.

1.10 REGULATORY REQUIREMENTS

.1 Products Requiring Electrical Connection: Listed and classified by ULC and as suitable for the purpose specified and indicated.

Part 2 Products

2.1 MANUFACTURERS

.1 Simplex Grinnell.

.2 Substitutions: None.

2.2 FIRE ALARM AND SMOKE DETECTION CONTROL PANEL

.1 Control Panel: Existing Simplex 4100U

2.3 INITIATING DEVICES

.1 Manual Station: Match existing.

.2 Heat Detector: Match existing.

.3 Ceiling Mounted Smoke Detector: Match existing.

.4 Ceiling Mounted Combination Smoke Detector and Fixed Temperature Heat Detector: Match existing.

.5 Duct Mounted Photoelectric Smoke Detector: Match existing.

.6 Multi-Criteria Fire/CO Detector: Match existing.

.7 Stand-Alone CO Detector: Match existing.

2.4 SIGNALING APPLIANCES

.1 Alarm Horns and Strobes: Match existing.

.2 Interior Remote Annunciator: Match existing.

2.5 FIRE ALARM WIRE AND CABLE

.1 Fire Alarm Power Branch Circuits: Building wire as specified in Section 26 05 19.

.2 Initiating Device and Indicating Appliance Circuits: Power limited fire-protective signaling cable classified for fire and smoke characteristics, copper conductor, 300 volts insulation rated 105 degrees C, suitable for use in air handling ducts, hollow spaces used as ducts, and plenums

.3 Wiring shall be as per manufacturer’s recommendations. All wiring shall be in conduit unless noted otherwise. [All wiring shall be wire in conduit unless noted otherwise.]

Part 3 Execution

3.1 INSTALLATION

.1 Install products to manufacturer's written instructions and CAN/ULC S524, local and national codes, as indicated, and as recommended by the manufacturer.

.2 All initiating and signalling devices, control panels and remote annunciators shall be flush mounted unless indicated otherwise.

.3 Install devices at heights indicated in Section 26 05 00.

.4 Mount end-of-line devices in separate box adjacent to last device in circuit.

.5 Mount outlet box for electric door holder to withstand 36 kg (80 lbs) pulling force.

.6 Make conduit and wiring connections to duct smoke detectors, sprinkler valve tamper and flow switches, fire suppression system control panels, door release devices, smoke control fans and equipment.

.7 Circuiting for fire alarm devices shall be as follows:

.1 Provide Class “A” addressable initiating/alarm circuits throughout unless indicated otherwise.

.2 Provide Class “B” audible/visual signal circuits for signal circuits throughout unless indicated otherwise.

.3 Provide Class “A” audible/visual signal circuits for residential dwelling unit signal circuits only.

.4 Circuits shall have a minimum 15% spare capacity for future system expansion.

.5 All SLC, signal and power riser wiring shall be supervised, including internal wiring between modules.

.8 Where wiring is required to be surface mounted within finished areas, wiring shall be installed in a single piece metal raceway unless noted otherwise. Color of raceway shall be white unless noted otherwise.

.9 Where devices are surface mounted in finished areas, provide a surface mounted metal raceway device box. Color of box shall match the device.

3.2 FIELD QUALITY CONTROL

.1 Section 01 45 00: Field inspection and testing.

.2 Test to CAN/ULC S536 and local inspection authority requirements.

.3 Include services to re-test system one (1) month prior to

3.3 MANUFACTURER'S FIELD SERVICES

.1 Include services of certified technician to supervise installation, adjustments, final connections, and system testing.

3.4 FIRE ALARM WIRE AND CABLE COLOUR CODE

.1 Match existing.

3.5 CLOSEOUT ACTIVITIES

.1 Demonstration: Demonstrate normal and abnormal modes of operation, and required responses to each.

END OF SECTION