Part 1 CODES AND STANDARDS

1.1 All drawings and all sections of the specifications shall apply to and form an integral part of this section.

.1 Comply with and adhere to all applicable, codes, standards and applicable bylaws of the authority having jurisdiction.

.2 Where there is a conflict between the drawings and specifications and applicable codes or standards or requirements of the authority having jurisdiction the more restrictive condition shall apply.

1.2 SCOPE OF WORK

.1 Refer to front end specifications and adhere to all requirements as specified.

.2 Work to include all labour, material and equipment required for installing, testing and commissioning of mechanical systems as detailed in other sections of Divisions 21 to 23.

.3 All mechanical work to be bid as a single complete sub-contract even though work of various mechanical trades has been subdivided.

.4 It is the responsibility of the general mechanical contractor to co-ordinate the work among the various mechanical sub-trades to ensure complete functioning systems.

1.3 EXISTING CONDITIONS – RENOVATION ALLOWANCES

.1 Examine site, existing adjacent buildings and local conditions affecting work under this contract. Examine Structural, Architectural, Mechanical and Electrical and all other Contract drawings to ensure work can be performed without changes to the building as shown on drawings. 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 closing of tenders.

.2 The Contractor is advised that detailed site investigations are to be carried out prior to fabrication and construction of duct and duct components; verify the size, orientation, location and supports required for, duct to equipment transitions and new duct to existing duct connections.

.3 Drawings and equipment specifications are based on the best information available at time of Bid Opportunity and are subject to revision based on reviewed shop drawings received during the project submittals process.

.4 Contractors shall include all necessary allowances in their bid price for minor changes that adjust tie-in locations and duct sizes to meet equipment shop drawing requirements and as-found conditions.

.5 The following allowances shall be considered minor and incidental to the price bid. No claims for extra will be considered by the Contract Administrator for modifications required to accommodate these minor changes,

.1 Duct diameter or duct rectangular dimensions, ± 50 mm.
.2 Tie-in locations to existing ductwork, ± 3.0 m in all directions,

.3 Duct routing, deviation from duct centreline shown, ± 2.0 m in all directions,
.4 Fittings additional to that shown on drawings,
.5 Fittings required to achieve temporary, partial, operation of an air moving system in accordance with the stated phased construction implementation schedule.

.6 The Contractor is advised that detailed site investigations are to be carried out prior to fabrication and construction of plumbing and piping systems and piping components; verify the size, orientation, location and supports required for, pipe to equipment transitions and new pipe to existing pipe connections.

.7 Drawings and equipment specifications are based on the best information available at time of Tender and are subject to revision based on reviewed shop drawings received during the project submittals process.

.8 Contractors shall include all necessary allowances in their bid price for minor changes that adjust tie-in locations and pipe sizes to meet equipment shop drawing requirements and as-found conditions.

.9 The following allowances shall be considered minor and incidental to the price bid. No claims for extra will be considered by the Contract Administrator for modifications required to accommodate these minor changes,

.1 Pipe diameter dimensions, ± 40 mm.
.2 Tie-in locations to existing plumbing and piping, ± 3.0 m in all directions,
.3 Pipe routing, deviation from pipe centreline shown, ± 3.0 m in all directions,
.4 Pipe fittings additional to that shown on drawings,
.5 Fittings required to achieve temporary, partial, operation of any piping system in accordance with the stated phased construction implementation schedule.

.10 The general mechanical Contractor shall take all steps necessary to make any affected sub-trades of the renovation allowances stated above aware of these allowances and shall enforce these allowances; no change orders will be considered for renovation allowances stated above, the decision of the Contract Administrator is final.

1.4 SITE SERVICE INFORMATION

.1 Location, routing and depth of existing mechanical services shown on drawings including sanitary sewers, water mains and other utilities are based on recorded information and are approximate only. Contractor and his sub-trades shall verify exact location at jobsite.

.2 Obtain Contract Administrator approval before commissioning systems and putting into service.

1.5 PERMITS AND REGULATIONS

.1 Obtain all permits and pay all fees for performing the work.

.2 Review drawings with authorities having jurisdiction to ensure compliance with all applicable codes and bylaws.

1.6 EXECUTION OF WORK

.1 Install work in advance of concrete pouring or similar work. Provide and set pipe sleeves and equipment anchors as required.

.2 Install concealed pipes and ducts neatly, close to building structure so furring is minimum size. Pipes, ducts and equipment installed improperly, to be removed and replaced without cost to Contract Administrator.

.3 Protect and maintain work until building has been completed and accepted. Protect work against damage during installation. Cover with tarpaulins if necessary. Repair all damage to floor and wall surfaces resulting from carrying out work, without expense to the project.

.4 During welding or soldering ensure structure is protected against fire by shielding, using fire-rated sheets or galvanized iron sheets. Contractor shall provide trained persons armed with suitable type extinguishers, to watch for and extinguish sparks, etc.

.5 Comply with MPI's fire watch and hot work policies.

.6 Co-ordinate work with other sections to avoid conflict and ensure proper installation of all equipment. Review all contract drawings.

.7 On completion of work, remove tools, surplus and waste material and leave work in clean, perfect condition.

1.7 WARRANTY

.1 Warranty satisfactory operation of all work and apparatus installed under this contract. Replace, at no expense to Contract Administrator, all items which fail or prove defective within a period of one year after final acceptance of complete contract by Contract Administrator, provided such failure is not due to improper usage by City of Winnipeg. Make good all damage to building incurred as a result of failure or repair of mechanical work.

.2 No certification given, payment made, partial or entire use of equipment by Contract Administrator, shall be construed as acceptance of defective work or acceptance of improper materials. Make good at once, without cost to the Contract Administrator all such defective work or materials and consequence resulting there from, within one year of final acceptance date.

.3 This general guarantee shall not act as a waiver for any specified guarantee and/or warranty of greater length of time noted elsewhere in these documents.

1.8 ENGINEERING INSPECTIONS

.1 Contractor's work will be inspected periodically by Contract Administrator or their representatives, solely for purpose of determining general quality of work, and not for any other purpose. Inspection and directives given to Contractor does not relieve Contractor and his agents and employees of their responsibility to erect and install work in all its parts in a safe and workmanlike manner, and in accordance with plans and specifications, nor impose upon Contract Administrator or their representatives, any responsibility to supervise or oversee erection or installation of any work.

1.9 PIPE WELDING REGULATIONS

.1 Welding to be performed by welder holding current welder's certificate from Provincial Department of Labour.

.2 Pipe fabrication shall conform to the American National Standard, ASME Code for B31.9 – Building Services Piping Code.

.3 Welding procedure qualifications shall be in accordance paragraph 127.1.1 of ANSI B31.1 (refer to Section IX of the ASME Boiler and Pressure Vessel Code).

.4 Pressure and leak tests shall conform to paragraph 137 of ANSI B31.1.

.5 Welding safety requirements shall be in accordance with ANSI Z49.1, Safety in Welding and Cutting.

.6 The testing of welding procedures, welders and welding operators shall conform to the requirements of Section IX of the ASME Boiler and Pressure Vessel Code.

.7 Fabricated piping dimensional tolerances and bends shall conform to the "Pipe Fabrication Institute Standard ES3".

.8 Erected pipelines may have a dimensional tolerance of 15 mm. Greater deviations from drawings are only permissible with written approval from the Contract Administrator.

.9 Piping supports, hangers, spacers, etc. shall be as indicated and in conformance with ANSI B31, Part 5.

1.10 MECHANICAL SHOP DRAWINGS

.1 Submit for review no more than six sets of detailed shop drawings for all mechanical equipment noted in other sections of Divisions 21 to 23.

Alternately the Contractor may elect to submit shop drawings in PDF file format provided all requirements of clause 1.10 are met.

.2 Check shop drawings for conformity to plans and specifications before submission.

.3 Each drawing shall bear Divisions 21 to 23 stamp with Firm's name, date of review and shall be initialled by the responsible officer of Divisions 21 to 23. Include name of project, equipment supplier and clause number equipment is specified under.

.4 Clearly show division of responsibility. No item, equipment or description of work shall be indicated to be supplied or work to be done "by Other's or by Purchaser". Any item, equipment or description of work shown on shop drawings shall form part of the contract, unless specifically noted to contrary.

.5 Take full responsibility for securing and verifying field dimensions. In case where fabrication must proceed prior to field dimensions being available, check all shop drawings and approve for dimensions only. In this case guarantee that dimensions will be worked to and ensure that other sub-trades are aware of these dimensions and shall comply with them.

.6 Review by Contract Administrator shall be mutually understood to refer to general design only. If errors in detailed dimensions or interference with work are noticed, attention of Contractor will be called to such error or interferences, but Contract Administrator's review of drawings will not relieve Contractor from responsibility for said error or interferences, or from necessity of furnishing such work, and materials as may be required for completion of work as called for in Contract Documents.

1.11 MECHANICAL SUB-TRADES

.1 State in tender, names of all sub-trades to be used in mechanical work.

.2 Contractor to have minimum five years experience in field of mechanical contracting and to have successfully performed work of similar nature and approximate size to that indicated in specifications and on drawings. Sub-trades shall employ, on this project, foremen or supervisory personnel who have had similar experience to that required by the Contractor.

1.12 OPERATING AND MAINTENANCE MANUALS

.1 Provide operation and maintenance data for incorporation into O&M manuals.

.2 Draft operation and maintenance manual to be approved by, and final copies deposited with, Contract Administrator before final inspection.

.3 Operation data to include:

.1 Control schematics for each system.
.2 Description of each system and its controls for control systems not provided by the Contract Administrator's control contractor.
.3 Description of operation of each system at various loads together with reset schedules and seasonal variances.
.4 Operation instruction for each system and each component.
.5 Description of actions to be taken in event of equipment failure.

.4 Maintenance data shall include:

.1 Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.
.2 Data to include schedules of tasks, frequency, and tools required and task time.

.5 Performance data to include:

.1 Equipment manufacturer's performance data sheets with point of operation as left after commissioning is complete.
.2 Equipment performance verification test results.
.3 Special performance data as specified elsewhere.

.6 Approvals:

.1 Submit (1) copy of draft Operation and Maintenance Manual to Contract Administrator for approval. Submission of individual data will not be accepted unless so directed by Contract Administrator.
.2 Bind data in 3 ring binder with indexed tabs, table of contents, and contact personnel for repair and maintenance. Make changes as required and resubmit (3) final copies and a compact disc including a PDF file of the bound O&M manual.

1.13 DRAWINGS

.1 Drawings are diagrammatic only and do not show all details. Information involving accurate measurements of building to be taken from Architectural Drawings and/or at the building. Make without additional expense to Contract Administrator, all necessary

changes or additions to runs to accommodate structure conditions. Locations of pipes, ducts and other equipment to be altered without charge to Contract Administrator, provided change is made before installation and does not necessitate additional materials and that Contract Administrator ratifies all such changes and recorded on Record Set of Drawings.

.2 Drawings and specifications to be considered as an integral part of Contract Documents. Neither drawings nor specifications to be used alone. Misinterpretation of requirements of plans or specifications shall not relieve Contractor of responsibility of properly completing work to approval of Contract Administrator.

.3 It is the mechanical general contractor's responsibility to ensure that all subcontractors and suppliers are aware of and conform to all contract requirements indicated on both the drawings and specifications.

.4 As work progresses, and before installing piping, ductwork, fixtures and equipment interfering with interior treatment and use of building, consult Contract Administrator for comments. This applies to all levels and proper grading of piping. If Contractor fails to perform above checking and fails to inform Contract Administrator of such interference, Contractor to bear all subsequent expense to make good the installation.

.5 Drawings indicate general location and route to be followed by pipes and ducts. Where required piping is not shown on plans or 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.

.6 Refer to Architectural Drawings for roof construction details. These shall relate to roof supports, piping penetrating roofs, etc. as indicated on the mechanical drawings.

1.14 MATERIALS – EQUALS AND ALTERNATES

.1 Acceptable manufacturers of specified materials and equipment are named in this specification for the purpose of establishing the standard of materials and workmanship to which Contractor shall adhere. The tender price shall be based on the use of materials and equipment as specified.

.2 Materials of same general type are to be from the same manufacture (eg: all air supply units shall be same manufacturer). The Contractor shall ensure that all sub-trades provide products of same manufacturer.

.3 Equipment listed as "equal" in specifications or submitted as alternate by Contractor must meet all space requirements, specified capacities and must have equipment characteristics of specified equipment as interpreted by Contract Administrator. Install equipment in strict accordance with manufacturer's published recommendations. Any variations to installation, additional work required or additional equipment required to meet the specified and designed drawing of the "equal" equipment that is not required for the specified product shall be the responsibility of the contractor and/or supplier.

.4 Equipment and material shown on drawings and not specified herein, or specified herein and not shown on drawings, shall be included in this Contract as though both shown and specified

1.15 EQUIPMENT INSTALLATION

.1 Unions or flanges: provide for ease of maintenance and disassembly.

.2 Space for servicing, disassembly and removal of equipment and components: provided as recommended by manufacturer or as indicated.

.3 Equipment drains/Relief Valves: pipe to floor drains, minimum drain size NPS 1 complete with tees and cleanouts for easy cleaning.

.4 Contractor responsible for coordination with Contract Administrator for final equipment locations.

.5 Relocate equipment as indicated on the drawings. Be fully responsible for damage to equipment until accepted by the Contract Administrator at project completion.

1.16 ELECTRIC MOTORS, STARTERS AND WIRING

.1 Provide electric motors for all equipment supplied in this Division. Motors to operate at 1800 rpm, unless noted otherwise. Motor design shall comply with Canadian Electrical Code requirements. All electric motors supplied shall be capable of being serviced locally.

.2 All three phase motors shall have a service factor of 1.15 times nominal rated horsepower of the motor.

.3 Motors 0.75 kw (1 hp) and larger shall be high efficiency motors as defined and tested to CSA C390 or IEEE 112B and Manitoba Hydro Power Smart Standards. Motors 0.37 kw (0.5 hp) and over to be 575 V/3 ph/60 Hz unless specified otherwise. Motors under 0.37 kw to be 120V/1 ph/60 Hz.

.4 Confirm with electrical drawings and specifications, voltage characteristics applying to each individual motor where motor voltages are mentioned in this specifications and prior to ordering motors.

.5 Division 26 – Electrical to provide starters and local disconnects for all motors, except as otherwise noted. Division 26 – Electrical shall wire from starters to motors.

.6 Wiring required under Section 23 09 33 to be performed by Section 23 09 33 except as noted otherwise. Refer to Division 26 for wiring methods and conduit systems required by all wiring performed by Section 23 09 33.

1.17 FIRESTOPPING

.1 Provide fire-stopping material and installation within annular space between pipes, ducts, insulation and adjacent fire separation.

.2 Uninsulated unheated pipes not subject to movement; no special preparation.

.3 Uninsulated heated pipes subject to movement: wrap with non-combustible smooth material to permit pipe to move without damaging firestopping material.

.4 Insulated pipes and ducts: ensure integrity of insulation and vapour barrier at fire separation.

.5 Submit ULc approved assembly shop drawings for any pipe or duct penetrations through walls and ceiling identified to carry a fire-resistive-rating. Assembly drawings shall be

complete and indicate all required preparations for fire stopping and fire stopping systems in accordance with ULc assemblies shown.

.6 Submit shop drawings indicating proposed material, reinforcement, anchorage, fastenings and method of installation. Construction details shall accurately reflect actual job conditions.

.7 Submit manufacturer's product data for materials and prefabricated devices, providing descriptions sufficient for identification at job site. Include manufacturer's printed instructions for installation, and ULC service assembly number.

.8 Perform work in accordance with Specification Section 07 84 00.

1.18 ANCHOR BOLTS AND TEMPLATES

.1 Supply all anchor bolts and templates, mechanical equipment supports for installation by other divisions.

1.19 PROTECTION OF OPENINGS

.1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

1.20 BELT DRIVES

.1 Fit reinforced belts in sheave matched to drive. Multiple belts to be matched sets.

.2 Use cast iron or steel sheaves secured to shafts with removable keys unless otherwise specified.

.3 For motors under 10 hp: standard adjustable pitch drive sheaves, having plus or minus 10% range. Use mid-position of range for specified rpm.

.4 Minimum drive rating: 1.5 times nameplate rating on motor. Keep overhung loads within manufacturer's design requirements on prime mover shafts.

.5 Motor slide rail adjustment plates to allow for centre line adjustment.

1.21 GUARDS

.1 Provide guards for unprotected drives.

.2 Guards for belt drives:

.1 Expanded metal screen welded to steel frame.
.2 Minimum 1.2 mm thick sheet metal tops and bottoms.
.3 38 mm diameter holes on both shaft centres for insertion of tachometer.
.4 Install belt guards to allow movement of motors for adjusting belt tension.
.5 Guard for flexible coupling:
  .1 "U" shaped, minimum 1.6 mm thick galvanized mild steel.
  .2 Securely fasten in place.
  .3 Removable for servicing.
.6 Unprotected fan inlets or outlets:
  .1 Wire or expanded metal screen, galvanized, 19 mm mesh.

.2 Net free area of guard: not less than 80% of fan openings.

.3 Securely fasten in place.

.4 Removable for servicing.

1.22 SAMPLES

.1 Submit for Contract Administrators review such standard manufacturer's samples as the Contract Administrator may reasonably require.

.2 Submit samples as for procedures describing shop drawings, with reasonable promptness and in an orderly sequence, so as to cause no delay in the work.

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

.4 Submit samples in sizes and quantities requested.

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

.6 Construct field samples at locations acceptable to Contract Administrator.

.7 Reviewed samples will become standards of workmanship and material against which, installed work will be checked on project.

1.23 EQUIPMENT SUPPORTS

.1 Equipment supports supplied by equipment manufacturer: specified elsewhere in Division 23.

.2 Equipment supports not supplied by equipment manufacturer: Fabricate from structural grade steel.

.3 Mount base mounted equipment on chamfered edge housekeeping pads, minimum of 10 mm high and 100 mm larger than equipment dimensions all around. Form concrete around existing housekeeping pad to meet requirements listed.

.4 Provide any necessary, anchor bolts, anchor sleeves, fire-stop sleeves, etc not supplied by equipment suppliers as necessary for a complete installation.

1.24 SLEEVES

.1 Pipe sleeves: at points where pipes pass through masonry, concrete or fire rated assemblies and as indicated.

.2 Schedule 40 steel pipe, galvanized.

.3 Sleeves with annular fin continuously welded at midpoint:

.1 Through foundation walls.
.2 Where sleeve extends above finished floor.

.4 Sizes: minimum 6 mm clearance all around, between sleeve and uninsulated pipe or between sleeve and insulation.

.5 Terminate sleeves flush with surface of concrete and masonry walls, concrete floors on grade and 25 mm above other floors.

.6 Fill voids around pipes;

.1 Caulk between sleeve an pipe in foundation walls and below grade floors with waterproof fire retardant non-hardening mastic.
.2 Where sleeves pass through walls or floors, provide space for firestopping. Where pipes/ducts pass through fire rated walls, floors and partitions, maintain fire rating integrity.
.3 Ensure no contact between copper tube or pipe and ferrous sleeve.
.4 Fill future-use sleeves with lime plaster or other easily removable filler.
.5 Coat exposed exterior surfaces of ferrous sleeves with heavy application of zinc rich paint to CGSB 1-GP-181M+Amdt-Mar-78.

1.25 ESCUTCHEONS

.1 On pipes passing through walls, partitions, floors and ceilings in finished areas.

.2 Chrome or nickel plated brass or Type 302 stainless steel, one piece type with set screws.

.3 Outside diameter to cover opening or sleeve.

.4 Inside diameter to fit around finished pipe.

1.26 ROOF PENETRATIONS

.1 Submit shop drawings indicating proposed material, reinforcement, anchorage, fastenings and method of installation. Construction details shall accurately reflect actual job conditions.

.2 Submit manufacturer's product data for materials and prefabricated devices, providing descriptions sufficient for identification at job site. Include manufacturer's printed instructions for installation, including section or other type details.

.3 Perform work in accordance with Specification Section 07 72 00.

1.27 TESTS

.1 Give 24 hours written notice of date for tests.

.2 Insulate or conceal work only after testing and approval by Contract Administrator.

.3 Conduct tests in presence of Contract Administrator.

.4 Bear costs including retesting and making good.

.5 Piping:

.1 General: maintain test pressure, 448 kPa [65 psi], without loss for 4 hours unless otherwise specified.
.2 Test natural gas system to CAN1-B149.1 and requirements of authorities having jurisdiction.
.3 Test drainage, waste and vent piping to National Building Code and authorities having jurisdiction.
.4 Test fire systems in accordance with authorities having jurisdiction and as specified elsewhere.

.6 Equipment: test as specified in relevant sections.

.7 Prior to tests isolate all equipment or other parts, which are not designed to withstand test pressures or test medium.

1.28 SPECIAL TOOLS

.1 Provide one set of special tools required to service equipment as recommended by manufacturers.

.2 .1 Furnish one commercial quality grease gun, grease and adapters to suit different types of grease and grease fittings.

1.29 ACCESS DOORS FOR MECHANICAL CHASE

.1 Supply access doors to concealed mechanical equipment for operating, inspecting, adjusting and servicing.

.2 Flush mounted 300 x 300 mm for hand entry unless otherwise noted. Doors to open 180 degrees, have rounded safety corners, concealed hinges, screwdriver latches and anchor straps.

.3 Material:

.1 Special areas such as tiled or marble surfaces: use stainless steel with brushed satin or polished finish as directed by Contract Administrator.
.2 Remaining areas: use prime coated steel, or galvanized steel to match adjacent area.

.4 Installation:

.1 Locate so that concealed items are accessible.
.2 Locate so that hand or body entry (as applicable) is achieved.
.3 Installation is specified in applicable sections.

.5 Acceptable material: Zurn, Roto-Tech Smith, Milcor.

1.30 DIELECTRIC UNIONS

.1 General:

.1 To be compatible with and to suit pressure rating of piping system.
.2 Where pipes of dissimilar metals are joined.

.2 Pipes NPS 2. and under: isolating unions, no dielectric couplings.

.3 Pipes NPS 2-1/2 dia. and over: isolating flanges.

1.31 DRAIN VALVES

.1 Locate at low points and at section isolating valves unless otherwise specified.

.2 Minimum NPS ¾ unless otherwise specified: bronze, with hose end male thread and complete with cap and chain.

1.32 AIR VENTS

.1 Install manual air vents and automatic air vents at high points in piping systems.

.2 Install isolating valve at each automatic air valve.

.3 Install drain piping to approved location and terminate where discharge is visible.

1.33 TRIAL USAGE

.1 Contract Administrator reserves the right to use any piece of mechanical equipment, device or material installed under this contract, for such reasonable lengths of time and at such times as Contract Administrator may require, to make complete and thorough test of same, before final completion and acceptance of any part of contract. It is agreed and understood, that no claim for damage will be made for any injury or breakage to any parts of the above due to aforementioned tests, whether caused by weakness or inaccuracy of parts, or by defective materials or workmanship of any kind whatsoever. Supply all labour and equipment for such tests.

1.34 SAFETY DEVICE TESTING

.1 Make complete inspection of all safety devices to ensure:

.1 That safety devices are complete in accordance with specifications and manufacturer's recommendations.

.2 That the safety devices are connected and operating according to all local regulations.

1.35 TEMPORARY USE OF EQUIPMENT

.1 Permanent systems and/or equipment is not to be used during construction period without Contract Administrator's written permission.

.2 Equipment used during construction period to be thoroughly cleaned and overhauled. Replace work or damaged parts so equipment is in perfect condition, to entire satisfaction of Contract Administrator.

.3 Provide proper care, attention and maintenance for equipment while it is being used. If in opinion of Contract Administrator, sufficient care and maintenance is not being given to equipment and systems, Contract Administrator reserves the right to forbid further use of said equipment and systems.

.4 Temporary use of equipment shall in no way relieve Contractor of providing twelve month guarantee period to commence as of date of final acceptance of building as interpreted by Contract Administrator.

.5 All air filters and pipe strainers are to be replaced prior to turning systems over to the Contract Administrator.

1.36 INSTRUCTIONS TO OWNER'S PERSONNEL

.1 Contractor to schedule and co-ordinate start-up supervision and instruction of Contract Administrator's personnel required of individual equipment suppliers as noted in other sections of Divisions 21 to 23. Contractor's construction supervision is also required to instruct Contract Administrator's personnel in operation and maintenance of all equipment and systems to satisfaction of Contract Administrator.

.2 Provide Contract Administrator with three copies of O&M manuals incorporating following:

.1 Service instructions – including lists of spare and replacement parts and names and addresses of suppliers.
.2 Maintenance & Operating instructions.
.3 Revised shop drawings.

.3 Provide Contract Administrator with one set of Record Drawings.

.4 Forward manuals and drawings to Contract Administrator prior to final acceptance. Final payment will not be made until all required manuals have been received.

.5 Review instructions with Contract Administrator's representative to ensure a thorough understanding of equipment and its operation.

1.37 TEMPORARY HEATING

.1 Written permission to be obtained from Contract Administrator to use permanent heating system for temporary heat. Systems to be operated in strict accordance with Contract Administrator's recommendations.

1.38 TEMPORARY VENTILATION

.1 Where the execution of mechanical works results in the off-gassing of noxious or hazardous odours or gasses or pollutants employ all necessary temporary ventilation measures to source capture these gasses.

.2 Route these gasses through a contractor supplied exhaust ventilation system to the outdoors or through an approved filtration system intended for the pollutants encountered.

.3 The Contractor is reminded that the City of Winnipeg will be occupying the building throughout the renovation and all efforts shall be made to ensure that construction generated pollutants are contained and controlled to the satisfaction of the Contract Administrator.

1.39 RECORD DRAWINGS

.1 Provide one set of Record Drawings, marked clearly in red pencil, with all changes and deviations from piping and ductwork, etc. shown on Contract Drawings, including all Work Order Changes.

.2 "Record" drawings to be maintained on a weekly basis to ensure they are up-to-date and accurate.

.3 Provide Contract Administrator with one set of drawing prints with all "Record" changes noted. Eradicate piping and/or ductwork, etc. shown on original drawings that has been affected by the changes.

1.40 PAINTING

.1 Apply at least one coat of corrosion resistant primer paint and finish coat to ferrous supports and site fabricated work.

.2 Prime and touch up marred finished paintwork to match original.

.3 Restore to new condition, finishes which have been damaged too extensively to be merely primed and touched up.

.4 For any required painting of mechanical equipment or appurtenances, confirm colour with Contract Administrator before painting.

1.41 CLEANING AND FLUSHING OF PIPING SYSTEMS

.1 On completion, each piping system shall be flushed out before installation of equipment, fixtures, etc. in order to remove any foreign material in piping.

.2 Flush with water, unless noted otherwise in individual mechanical sections of specifications.

.3 All equipment shall be thoroughly cleaned and left in first class operating condition.

1.42 CUTTING AND PATCHING

.1 General.

.1 The equipment and piping installation work specified in this contract includes the installation by the contractor of equipment, piping and materials supplied by the Contractor. Cutting and patching of the existing structure is required to implement this work. Providing the necessary cutting and patching and related architectural and civil works shall be co-ordinated by and provided by the Contractor using trade persons skilled and regularly involved in the work being carried out. These works may be simply detailed/described on the drawings or specifications; it is the responsibility of the Contractor to fully investigate and provide the services and materials necessary to execute these works.

.2 Contractor to obtain and pay for x-ray analysis prior to any penetrations through structural concrete members required for the mechanical works.

1.43 EQUIPMENT WARRANTIES AND ACCEPTANCE

.1 Quality Warranty

.1 Manufacturer warrants that equipment furnished shall conform to description and specifications contained herein and shall be free from all defective materials and workmanship and all defects due to design. Upon Contract Administrator's request, manufacturer shall, at its sole expense, promptly repair or replace, all or any part of said equipment which is defective in any respects, within 1 year from the date of acceptance after all tests have been complete to satisfaction of Contract Administrator. This does not apply to failure of equipment due to improper usage.

1.44 TAKE OVER PROCEDURES

.1 Prior to application for Certificate of Substantial Performance, the Contractor shall carefully inspect the minor construction deficiencies are complete and/or corrected and that the building is clean and in condition for occupancy. Notify the Contract Administrator in writing, of satisfactory completion of inspection and request an inspection.

.2 During the Contract Administrators inspection, a list of deficiencies will be tabulated and signed by the Contract Administrator. Correct all deficiencies.

.3 When the Contract Administrator considers that all deficiencies have been corrected and that it appears the requirements of the Contract have been performed including delivery of operation and maintenance manuals, make application for Certificate of Substantial Performance.

END OF SECTION