1. MECHANICAL GENERAL REQUIREMENTS

1.1 APPLICATION

1.1.1 In addition to the instructions to Bidders, General Conditions of the Contract and Special Requirements, this section applies to and governs each mechanical section.

1.2 WORK EXCLUDED FROM MECHANICAL DIVISION

1.2.1 Painting and Color Coding - to City's approval and as required by applicable codes.

1.2.2 Electrical wiring and connections (including between motors, equipment and controls and motor starting switches and alarm devices) by Electrical Section.

1.2.3 The Mechanical Contractor shall lay out all locations of proposed openings with the Contractor. The Contractor shall perform all cutting and patching required to accommodate mechanical equipment, piping, or ductwork. The Contractor shall confirm the location of existing precast floor reinforcement strands prior to coring openings through the existing floor system. All curbs and counterflashing for mechanical equipment to be provided by the Contractor. All concrete pads (interior and exterior) for mechanical equipment to be provided by the Contractor.

1.3 DOCUMENTS

1. Not Used.

1.4 EXAMINATION

1. Not Used.

1.5 PERMITS, INSPECTION AND TESTING

1.5.1 File all necessary notices and approved layouts and pay for all local authority inspections, approvals and permits applicable to 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.

1.5.2 The Mechanical Contractor shall make the application to the Gas Utility on behalf of the City for the new gas service and meter as located on the drawings.

1.6 DELIVERY AND STORAGE

1.6.1 Check and do not deliver finished equipment to job until weatherproof dry storage is available, location as determined by the Contract Administrator.

1.7 GUARANTEES

1. Not Used.

1.8 FABRICATION AND WORKMANSHIP

1.8.1 Employ skilled mechanics in their respective trades under competent supervision, and where required by provincial or local regulations shall be holders of acceptable qualification certificates.

1.9 INSTALLATION AND ERECTION

1.9.1 The mechanical contractor shall perform all work in accordance with the Manitoba Building Code, 2005, the Manitoba Plumbing Code, 2005, and all authorities having jurisdiction. The mechanical drawings do not show all architectural, structural and electrical features. Take information involving dimensions of building from figured dimensions of architectural drawings and check the same by site measurement.

1.9.2 The drawings show the general location and route to be followed by pipes, ducts, and other services. Make the necessary changes or additions to runs to accommodate structural conditions as built. Locations of pipes and other equipment shall be altered without charge, provided the change is made before installation, and does not necessitate change in quantity of materials.

1.9.3 Assume full responsibility for layout of own work and for any damage caused to property of others through improper location or poor workmanship.

1.9.4 Be familiar with the work required of other sections, and the progress schedule. Cooperate with others whose work adjoins, to minimize delays and avoid conflicts.

1.9.5 Locate all openings in walls, partitions, beams, etc. required for installation of pipes and equipment, etc. specified in this section of the specifications.

1.9.6 The mechanical division shall be responsible for fire stopping with cUL or ULC approved systems for all openings around ducts, pipes, etc. to maintain integrity of fire rated assemblies. Submit with shop drawings the fire stopping systems to be used for each penetration.
The mechanical division shall be responsible for sealing all other duct, pipe, etc. openings in all other assemblies to create airtight installation using non-combustible sealants.

1.10 SHOP DRAWINGS

1.10.1 Within two weeks after award of contract provide and submit shop drawings which are clearly identified with references to recognized design standards used, indicating layouts, quantity, details of equipment, sizes, capacities and roughing in and exact requirements for concrete pits, bases, roof curbs, and other supporting members. Shop drawings shall be approved by the Contract Administrator before equipment is ordered or released for fabrication.

1.10.2 Each shop drawing must be certified by the manufacturer and as such shall indicate that all product engineering has been performed to ensure the project will meet the requirements of the intended installation.

1.10.3 Secure and verify all field dimensions, and where fabrication must proceed before these are available ensure that the field dimensions are followed to suit.

1.10.4 Each shop drawing shall include name of job, mechanical subcontractor, equipment supplier and clause under which equipment is specified. Clearly indicate the equipment mark number or symbol corresponding to the drawings and specifications.

1.10.5 Checking of shop drawings by the Contract Administrator does not constitute acceptance of responsibility. Such checking constitutes an assistance only to the Mechanical Division in the proper execution of their work.

1.10.6 Prior to submittal of shop drawings the Mechanical Contractor shall check and verify that all details have been included and then indicate so by signing each drawing to this effect.

1.10.7 Submittal Requirements: in accordance with Section 01330 Submittal Procedures.

1.11 MAINTENANCE AND OPERATING INSTRUCTIONS

1.11.1 Obtain from each Mechanical Section prior to the take-over date two sets of all brochures or literature supplied by manufacturers of each piece of equipment, bind into two sets in hard cover 3-ring binders, and deliver to the City. The information provided should include:
- A complete list of mechanical equipment supplied and installed under each section including description, make, type, size, capacity, serial number and list of repair and replacement parts, with names and addresses of suppliers.
- The correct installation procedure.
- The manufacturer's recommended operating and maintenance instructions.
- A description of the Controls Sequences.

1.11.2 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. 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, complete with the City's signature upon completion. 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.

1.12 PROVISION OF SPARE PARTS TO THE CITY

1.12.1 The mechanical contractor shall supply and deliver to the City upon completion of the project a complete set of spare parts required for maintenance of the mechanical equipment according to the manufacturer’s recommendations.

1.13 AS-BUILT DRAWINGS

1.13.1 An extra set of clean prints will be issued to Mechanical Section. Mark up as the job progresses, and provide to the Contract Administrator a complete and accurate record "As-Built" of all mechanical work.

2. PLUMBING MATERIAL AND METHODS

2.1 SITE SERVICES

2.1.1 All work shall be done in accordance with City of Winnipeg Standards.

2.1.2 Prior to tender close, confirm elevations and locations with the local municipality and include in the tender price, costs of completing the building servicing.

2.1.3 Valve and valve box - Gate valves: to AWWA C500-71, standard iron body, bronze mounted double disc wedge valves with non-rising stems, suitable for 150 psi. Cast iron valve box.

2.1.4 Service Connections - Copper tubing and joints: to CSA HC7.6-1968, type K seamless tube, for 150 psi working pressure.

2.1.5 Sewer pipe material shall be PVC SDR35 to ASTMD-3034 gravity sewer pipe.

2.1.6 Pipe Bedding Materials - Granular material, general: Gradation to be within specified limits when tested to ASTM C136-76 (AASHTO T11-76 and T27-74) and giving a smooth curve without sharp breaks when spotted on a semi log grading chart. Bedding sand: Natural sand or crushed rock screening to following grading requirements:

ASTM Sieve Size	Percent Passing
0.375 inches	100
N0.4 50	100
N0.10 30	90
N0.40 10	50
N0.200 0	10

Liquid limit: ASTM D423-66 (1972) (AASHTO T89-68), maximum 25.
Plasticity index: ASTM D424-59 (1971) (AASHTO T90-70), maximum 6.

2.1.7 CHLORINE - Sodium hypochlorite, calcium hypochlorite, liquid chlorine, to AWWA B300-75, AWWA B301-59 to disinfect water mains.

2.1.8 Piping to be bedded on 4”of sand. Sand shall extend up 4”above top of pipe. Compact to 95% of coorected maximum dry density.

2.1.9 Test as per requirements of local authorities.

2.1.10 Flush and disinfect to AWWA C601-68 requirements.

2.2 INTERIOR PLUMBING

2.2.1 All drainage piping shall be sloped at 1/50 unless otherwise shown.

2.2.2 The top of floor drains shall be located to suit the slope of the floor.

2.2.3 All plumbing piping shall be anchored at maximum 5' (1500 mm) intervals.

2.2.4 Piping shall have adequate clearance through each wall opening to permit unrestricted expansion.

2.2.5 When penetrating a fire separation, the separation must be returned to its original rating with a ULC listed firestop system in compliance with CAN-4S115-M.

2.2.6 Unless otherwise shown, the water supply to every group of fixtures in the same room shall be 3/4" (19mm) with a 1/2" (12mm) water supply and shut off to each fixture.

2.2.7 Where a vent pipe passes through the roof, it shall be insulated according to the insulation schedule, to a distance of 10' into the heated space.

2.2.8 All piping exposed to public view shall be cleaned of all excess joining material. Piping shall be primed and painted to the City's specifications.

2.2.9 All piping within ceiling return-air plenums to conform to the flame and smoke spread requirements of the Manitoba Plumbing Code.

2.2.10 All serviceable items shall be installed in such a manner that they may be serviced as specified by manufacturer. Contractor shall be responsible for the coordination and installation of all access hatches that may be required in order to service items in otherwise inaccessible spaces.

2.3 SCHEDULE OF PIPE AND FITTINGS

2.3.1 Interior drain and vent piping below ground:
- IPEX System 15 PVC DWV pipe in accordance with CSA B181.2, solvent weld, or:
- Bibby-St. Croix class 4000 cast iron mechanical joint or pipe and fittings.

2.3.2 Interior drain and vent piping above ground:
- IPEX System 15 PVC DWV pipe in accordance with CSA B181.1, or IPEX System XFR where necessary to meet the Code requirements for piping in non-combustible construction, or:
- Up to 2½" diameter: Type DWV copper tube with cast solder fittings and joints, drainage pattern, or 2" Bibby-St. Croix class 4000 cast iron M.J.
- 3" diameter and over - Bibby-St. Croix class 4000 cast iron mechanical joint soil pipe and fittings with stainless steel M.J. clamps as required to meet latest CSA B70 specifications in sizes up to and including 10". Bibby-St. Croix class 4000 hub and spigot soil pipe and fittings in 12" and 15" sizes.

2.3.3 Interior water piping (cold and hot):
- Type "L" hard temper copper tube with wrought or cast solder fittings. Solder with type 95-5 solder.

2.3.4 Drain and overflow piping:

- Hot water heater T&P drain - copper type "L".
- DX coil condensate - ½" clear polyethylene hose, or copper type "L" where necessary to meet the Code requirements for piping in non-combustible construction.

2.3.5 Pipe hangers and supports:
- All piping shall be suspended with clevis type hangers with hanger rods as required.

3. INSULATION

3.1 DOMESTIC COLD WATER LINES
- All lines shall be insulated with 1" Fibreglass 455°C (850°F) pipe insulation, 5 lb. per cubic foot density with factory applied ASJ vapour barrier jacket.
Adhesive - Seal longitudinal and circumferential laps with Benjamin Foster 30-36 or Bakelite 120-09 or approved equals.
Exposed - Finish with 6 ounce canvas and two full coats of Benjamin Foster 30-36 or Bakelite 120-09 or approved equal to form a fire retardant jacket.

Requirements - - All cold water piping including fittings and valves shall be installed complete with thermal insulation and a continuous, unbroken moisture and vapour seal. All hangers, supports, anchors, or other projections that are secured to cold surfaces shall be insulated and vapor sealed.

3.2 DOMESTIC HOT WATER AND RECIRCULATION LINES
- Domestic hot water lines that are part of a recirculation system and lines installed downstream of mixing valve shall be insulated with 1" Fibreglass 455°C (850°F) pipe insulation, 5 lb. per cubic foot density with factory applied ASJ vapour barrier jacket.
Adhesive - Seal longitudinal and circumferential laps with Benjamin Foster 30-36 or Bakelite 120-09 or approved equals.
Exposed - Finish with 6 ounce canvas and two full coats of Benjamin Foster 30-36 or Bakelite 120-09 or approved equal to form a fire retardant jacket.

3.3 PLUMBING VENTS and RAIN WATER LEADERS
- Fibreglass type 850 insulation type "R.F.F.R.K." facing, K=0.30, and ASJ. Density 1.15 lb per cu. ft., thickness - 1 ½".

Requirements - All vent piping in attic space and within 10'-0" developed length from roof openings.

3.4 SHEET METAL

Type 1 External insulation fibreglass all service flexible vapour seal type "R.F.F.R.K." foil faced K=0.035 at 75°F mean temperature. Density 1.15 lb per cu. ft. thickness - 1 ½".
Type 2 External - Fibreglass rigid vapour seal duct insulation, type R.F.F.R.K. foil faced, with a K-factor of .035 (.24) at 23.889°C (75°F) mean temperature. Density 4.5 lb. per cubic foot, thickness 2", c/w factory applied U.L. approved aluminum foil. Where this insulation is installed outdoors and is exposed to the weather, cover with two coats of bituminous waterproofing to a 3 mm (1/8") thickness applied over a layer of fibreglass cloth. Application to be made carefully to endure a good weather seal.

Type 3 External insulation fiberglass flexible type "R.F.F.R.K." foil faced with vapour permeance of .03 perm. Density 1.15 lb per cu. ft. thickness - 1". With factory applied aluminum vapour barrier.

Requirements:

Type 1 All exhaust air ducts from louver outlet to 10'-0" inside building.
Type 1 Combustion air duct/pipe.
Type 1 All HRV fresh air, tempered supply air, and exhaust air ducts.

Type 2 All supply and return air ductwork exposed to outdoor temperatures, including attics.
Type 3 All conditioned air supply ductwork within unconditioned spaces.
Note: All insulation to be extended through exterior walls to face of sheathing.

4. SHEET METAL - VENTILATION

4.1 All ductwork shall be fabricated and installed to the requirements of SMACNA.

4.2 All ducts shall be minimum of 26 gauge.

4.3 Provide flexible duct connection at outlet of exhaust fans.

4.4 Provide cradles with stand-offs at support points for externally insulated ducts. Stand-offs equal to duct thickness.

4.5 Provide double wall "B" vent and chimneys for appliances. Size and install as per Department of Labour requirements and CAN/CGA B149.1 - latest edition.

4.6 Install balance dampers on each branch duct.

4.7 All duct sizes on the drawings refer to inside duct dimensions. Where acoustically lined, the external duct dimensions shall be increased by the thickness of the lining.

4.8 Air balance report for all H.V.A.C systems to be conducted by AABC certified testing company. Testing shall include fire damper verification. Provide (1) one copy of the report to the Contract Administrator for review.

4.9 All serviceable items, including but not limited to balancing dampers and HVAC equipment, shall be installed in such a manner that they may be serviced as specified by the manufacturer. Mechanical contractor shall be responsible for the coordination and installation of all access hatches that may be required in order to service items in otherwise inaccessible spaces.

5. CONTROLS

5.1 GENERAL

5.1.1. Div. 15 shall supply all necessary control components (i.e. operators, switches, timers, relays, transformers, dampers, valves, etc.) for the complete system.

5.1.2 Div. 15 shall supply the control and wiring shop drawings to the Consultant and Div. 16 for review.

5.1.3 Div. 16 shall provide all necessary control wiring (including low voltage) for control systems. Wiring materials and installation to conform to local electrical code. All wiring and conduit to meet the requirements of the Electrical Code and the Div. 16 specifications.

5.2 MATERIALS

- See HVAC & PLUMBING EQUIPMENT

5.3 SEQUENCE OF OPERATION:

5.3.1 FU-1: Re-use existing single stage heating thermostat.

5.3.2 HRV-1: Control with 24 hr/7-day time clock to operate during all occupied periods. During non-heating season operate the HRV in defrost mode so that only the exhaust fan is operating.

5.3.3 DH-1: Control with duct thermostat and air-proving switch. DH-1 set point shall be 70 F.

5.3.4 PU-1, PU-2: Control each pump with a dedicate PIL switch. High alarm to be a separate PIL switch, with audible alarm and visible alarm signal. Locate alarm signal panel in public area of the pavilion as indicated on drawings.

5.3.5 IR-1, IR-2: Control by low-voltage thermostat. Locations shown on drawings.

5.3.6 PU-3: Control with 24 hr timer to operate during public hours only.

6. PLUMBING FIXTURES AND EQUIPMENT

6.1 Lavatories
- LAV-1: Basin supplied by others. FAUCET: Delta 2000TS110, wall mounting electronic wall-mounted faucet, solid metal spout with wall flange, 24V infrared sensing system field adjustable range, slow close solenoid valve, complete with class II transformer and 10” Stainless steel recessed box, less thermostatic mixing valve.
- LAV-2 – American Standard Lucerne, 4" centers, wall-mounted vitreous china, self rimming, concealed arm carrier. FAUCET: Delta 591T0260, electronic deck-mount faucet, 4” centers, chrome finish, washerless, open grid strainer, vandal resistant aerator, solenold valve.

6.2 Water Closets
- WC-1 - American Standard Madera Elongated, model AF-2234.015, vitreous china, floor mounted, 1 ½” top spud, 6 L flush, exposed trapway with siphon flush action, colour coordinated bolt caps. FLUSH VALVE: Delta 81T201HW, electronic, infrared sensor, polished

chrome finish, 1 ½" top spud, exposed, vandal resistant cover screw, metal "non hold down" ADA compliant handle, vacuum breaker, renewable seat, spud flange and concealed spud nut, pressure loss check angle stop with cap, field adjustable 6L flush. SEAT: Olsonite 10 CC/SS seat, open front with cover for elongated bowl, self-sustaining concealed check hinge, heavy duty high impact plastics, white.
- WC-2 - American Standard 16" Madera Elongated Aqua-Lite, model AF-2305.100F, vitreous china, floor mounted, 1 ½" top spud, 6 L flush, exposed trapway with siphon flush action, colour coordinated bolt caps. FLUSH VALVE: Delta 81T201HW, electronic, infrared sensor, polished chrome finish, 1 ½" top spud, exposed, vacuum breaker, renewable seat, spud flange and concealed spud nut, pressure loss check angle stop with cap, field adjustable 6L flush. SEAT: Olsonite 10 CC/SS seat, open front with cover for elongated bowl, self-sustaining concealed check hinge, heavy duty high impact plastics, white.

6.3 Water Closets - Transformers
- Supply two (2) transformers to serve all electronic fixtures – Delta Model 30393, 20VA hard wired transformer.

6.4 Urinal
- UR-1 - American Standard AF 6501.010 Washbrook top inlet, vitreous china syphon jet action urinal 18-mm (3/4") spud, low consumption 3.8 Lpf, elongated front rim, washout flush action, white, and integral flush spreader. Flush Valve: Delta commercial Model 81T231HW, electronic, infrared sensor, exposed valves 3/4" top inlet, external flush adjustments, polished chrome plate finish, vacuum breaker, and 1" copper sweat inlet adaptor.

6.5 Drinking Fountain
- Halsey-Taylor OVL – II –EBP –stainless steel. Or equivalent substitute.

6.6 Janitor sinks
- MS-1 - Fiat MSB 24 x 24 x 10" (610 x 610 x 254 mm) molded stone mop service basin, with 832 hose and holder, 889 cc. mop hanger, and E-77-AA vinyl bumper guard.
Faucet: Delta Model 28T9 rough chrome wall mount service faucet with rigid spout, 8" centres, cast brass construction, chrome-plated. Two handle with integral check stops, chrome plated finish. Long rigid spout with pail hook, pail hook and ¾" hose thread on spout. Body mounted angle vacuum breaker, garden hose end outlet on spout. Vacuum breaker, integral stops.

6.7 Floor Drains
- FD-1 - 3" outlet Zurn ZXN-415-A cast iron body drain with bottom outlet, combination invertible membrane clamp and adjustable collar with 5" "Type A" heavy-duty polished nickel bronze strainer.

6.8 Cleanout Covers
- Zurn ZANB-1460-13 in unfinished areas.
- Zurn ZN-1602-5 adjustable in areas where sheet flooring (1/4" - 3/8") utilized. Refer to Architectural Finish Schedule.

6.9 Hot Water Tank

- HWT-1 – Rheem Model Fury RR30-30FV, 30 gallon, 30,000BTU natural gas burner, 28gpm recovery, temperature and pressure relief valve included, brass drain valve, high density anode, glass-lined, insulated.

6.10 Wall Hydrant
- WH-1 - Zurn ZN-1300 Encased Ecolotrol "anti-siphon" automatic draining wall hydrant for flush installation. Complete with non-freeze type integral backflow preventer, bronze casing, all bronze interior parts, non-turning operating rod with free-floating compression closure valve, replaceable bronze seat and seat washer, and combination ¾" (19 mm) female or 1" (25 mm) male straight IP inlet. Nickel bronze box and hinged cover with operating key lock.

6.11 Mixing Valve
- MV-1– Symmons Tempcontrol Model 5-102, minimum flow rate of 0.5gpm, maximum flow rate of 6gpm at 20psi pressure differential.

6.12 PU-3: Recirculation Pump - Shall be bronze body recirculating pump, Bell & Gossett Model NBF-8S/LW, ½" sweat connections, 39W, pump shall run continuously during occupied hours, control by 24 hour timer.

6.13 PU-1, PU-2:
- Goulds 3WD51D1HA, ¾ hp, 230 V 1 ph dual seal sewage pump, 80 gpm @ 20' head per pump, 3" discharge, 2" solids, c/w dual seal sensor.
- D10020BDJ NEMA4 duplex control panel, c/w alternator, high level alarm, flashing light, remote contacts, seal sensor circuit, lighting arrestor, 50' long panel switches.
- Goulds float switch mounting bracket
- Two disconnect rail systems, c/w 3/16" x 20' stainless steel cable. Contractor to provide 1-1/4" stainless steel guide rails (not included in Goulds package). Size rails to match pit depth.
- 3" check valve for each pump.

6.14 Sewage Pit:
- 200 gal. concrete sewage pit for sewage lift station. Pit shall have minimum 36" diameter access way with lockable steel cover plate, built-in ladder rungs.

7. HVAC EQUIPMENT

7.1 IR-1
- Roberts Gordon Modulating infra-red heater, Model CTH2-80-30, 80 MBH natural gas input, min. 4.6" W.C. inlet pressure, 30' long, 4" dia. 16 ga. tubing, c/w reflectors, protective grille, mounting brackets, thimbles where shown for roof exhaust termination.
- Vent termination for all vertical vented units shall be manufacturer approved vent cap.

7.2 HRV-1
- Lifebreath Model 1200FD, 1200 cfm @ 0.3" E.S.P., 1/4 hp motors, 120V/1/60, direct drive forward curved fans, c/w 1" washable filters, exhaust-only defrost. Supply c/w 24 hr/7-day timer, intake and exhaust louvers.

7.3 DH-1
- Thermolec 16 kW duct heater, 240 V 1 phase, c/w SCR control, duct thermostat, air proving switch. Size to fit 20" x 8" duct.

7.4 Diffusers & Grille Schedule (Based on E.H. Price)
- SG-1: 12"X12"/SCD/31/3C/B12. Neck size as indicated on the drawing.
- SG-2: 16"X8" 520D/F/L/A c/w OBD balance damper.
- RG-1: 24"x12"/530/F/A/B12
- RG-2: 8"x8"/80/F/A/B12
- RG-3: 12"x12"/80/F/A/B12
- DG-1: 10"x14"/STG1/BF/B15

7.5 Louvers
- Price Airolite Model K638X Architectural Blade Louvers, 4" deep, storm-proof blade with rain check, aluminum construction, nominal 50% free area, baked enamel finish (colour to match existing louvers).

Schedule
- L-1: 30"X24" @ 600FPM
- L-2: 24"X20" @ 1000FPM

END OF SECTION