

PART 1    GENERAL

1.1            GENERAL REQUIREMENTS

- .1            Comply with the requirements of Section 210501, Mechanical General Provisions.
- .2            Comply with the requirements of Section 210504, Basic Materials and Methods.
- .3            Comply with the requirements of Clause B6.

1.2            APPROVED 'SUBSTITUTES' AND 'ALTERNATES'

- .1            Where a Manufacturer's name, make, model, and/or size is specified, it is for the purpose of setting a standard of quality, performance, capacity, appearance and/or serviceability, and is acceptable without qualification. Manufacturers listed as acceptable 'Substitutes' have been deemed by the The Contract Administrator as capable of producing equipment and/or material of comparable quality, performance and approximate dimensions, and can be used in the preparation of the Bid. Where no substitutes are indicated, provide the exact make specified.
- .2            'Substitute' equipment and material is deemed to be interchangeable with that specified, with little or no revisions required to the design intent and/or other items, equipment or connections.
- .3            'Alternate' equipment and material is deemed to be an acceptable 'Substitute' which will require major revisions to the design intent and/or other items, equipment or connections.
- .4            Requests for approval of additional 'Substitutes' or 'Alternates' must be submitted not less than seven days prior to closing date of the Bid, and submissions must bear proof of acceptance by the The Contract Administrator if used in the Bid. Requests shall include all performance, capacity, appearance, weight, connections, power and wiring requirements, etc required for the The Contract Administrator to make a complete evaluation.
- .5            Assume full responsibility for ensuring that, when providing accepted 'Substitutes' and 'Alternates', all space, weight, connections, power and wiring requirements, etc. are considered and adjusted costs are included in the Bid. The Mechanical systems have been designed based on the equipment/materials of the specified manufacturer(s). The onus shall be on the Subcontractor (along with his sub-sub-contractor and the supplier) to ensure that 'Substitute' or 'Alternate' equipment/materials will meet the required performance and electrical characteristics, as well as fit properly into the allotted space, including allowance for required access and servicing. Any additional costs incurred as a result of modifications to the system(s) or the room layout, or modifications required by other trades, shall be borne by the Subcontractor (along with his sub-sub-contractor and the supplier) and shall be deemed to be included in the Bid price.
- .6            Bidders must base their price on specified manufacturers or approved 'Substitutes'. 'Alternates', when allowed, must be listed separately, with the amount to be added or subtracted for each substitution. If in the preparation of the Bid, this Subcontractor neglects to name the manufacturer of an accepted 'Alternate', it will be understood that specified or 'Substitute' equipment will be provided.
- .7            If, in the opinion of the The Contract Administrator, 'Substitute' equipment/material submitted for review as Shop Drawings is not satisfactory, satisfactory equipment/material of the specified or an accepted 'Substitute' manufacturer must be re-submitted.
- .8            If, in the opinion of the The Contract Administrator, 'Alternate' equipment/material submitted for review as Shop Drawings is not satisfactory, satisfactory equipment/material of the specified or an accepted 'Substitute' manufacturer must be re-submitted.

1.3 APPROVED 'SUBSTITUTES'

.1 The following is the list of pre-approved 'Substitutes':

- |     |                                   |   |   |   |
|-----|-----------------------------------|---|---|---|
| .1  | Access Doors:                     | Bauco;  |   |   |
| .2  | Actuators for Valves and Dampers: |   | Belimo                                    |   |
| .3  | Air Compressors and Accessories:  | Comairco;<br>Airtek;  | Sullair;<br>Gardner Denver;               | Hankinson;  |
| .4  | Air Cooled Condensing Units:      | Keeprite;<br>McQuay;  | Carrier;<br>York;                         | Lennox;<br>Engineered Air;  |
| .5  | Air Curtains (Air Doors):         | King;   | Cook;                                     | Mars;   |
| .6  | Air Filters:                      | Farr;   | AAF;                                      | Continental;  |
| .7  | Air Handling Units:               | Trane;<br>Haakon;   | Carrier;<br>McQuay;                       | Engineered Air;<br>Scott-Springfield; York;                               |
| .8  | Air Vents:                        | Armstrong;<br>Maid-O-Mist;                                  | Braukman;<br>Dole;                        | Bell and Gossett;<br>Hamlet and Garneau;                                  |
| .9  | Back Flow Preventors:             | Conbraco;<br>Kunkle;<br>Fisher;<br>Boylston;                | Beeco;<br>Taylor;<br>Singer;<br>Lonergan; | Febco;<br>Consolidated;<br>Crosby-Ashton;<br>Masoneilan;Wilkins<br>Watts; |
| .10 | Boilers (Copper Tube):            | Raypak;<br>Rendamax;  | PK Thermific;<br>Lochinvar;               | Ajax;<br>RBI; Superhot;   |
| .11 | Boilers (Steel Tube):             | Burnham;<br>Superhot;                                       | Unilux;<br>Universal;                     | Cleaver Brooks;<br>Bryan; Ajax;   |
| .12 | Boilers (Cast Iron):              | Burnham;<br>Smith;  | Viessman;<br>Slant-fin;                   | Hydrotherm;<br>DeDeitrich;  |
| .13 | Boilers (Condensing):             | Aerco;  | Viessman;                                 | Fulton;   |
| .14 | Chemical Treatment:               | Bird Archer;<br>Dearborne;                                  | Calgon;<br>Mogul;                         | Drew Chemical;  |
| .15 | Chillers:                         | Carrier;  | McQuay;                                   | Trane; York;  |
| .16 | Chimneys:                         | Metal-Fab;  | Ampco;                                    | Cleaver Brooks;   |
| .17 | Cleanouts:                        | Ancon;  | Smith;                                    | Zurn; Mifab;  |
| .18 | Computer Room AC Units:           | Hiross;   | Liebert;                                  | Airflow; Canatel;   |
| .19 | Controls :                        | Landis and Steafa (Siemens);<br>Mikkelson Coward (Andover); | Johnson;<br>Barber Coleman (Siebbe);      | Honeywell;<br>CSE/Delta;  |
| .20 | Cooling Towers:                   | Evapco;   | BAC;                                      |   |
| .21 | Dehumidifiers:                    | BryAir;   | PoolPak;                                  | Engineered Air;   |

.22	Domestic Water Heaters (Tank type):	Ruud/Rheem; John Woods;	AO Smith; Jetglass/BradfordWhite;	
.23	Domestic Water Heaters: (Tankless):	CEC;		
.24	Duct-free Split AC Units:	Carrier;	Freidrich;	Mr. Slim;
.25	Electric Duct Coils;	Nailor Hart;	PM Wright;	
.26	Expansion Tanks:	Amtrol; Wessels;	Hamlet and Garneau; Armstrong;	
.27	Fabric Duct Diffusers:	FOF;		
.28	Fan Coil Units:	McQuay; York;	First Fan Coil; Engineered Air;	Trane;
.29	Fans (Centrifugal and Axial):	Greenheck; Twin City; Woods;	Penn; Delhi; Cook;	New York Blower; Barry Blower; Northern Blower;
.30	Fans (Downdraft/Ceiling):	Pleasantaire;	Banvil;	Canarm;
.31	Fans (Fume Exhaust Systems):	Plymovent;	Belnor;	
.32	Fans (Washroom and Cabinet):	Greenheck; Broan;	Penn; Delhi;	Reversomatic; Cook;
.33	Filter Gauges:	Dwyer;		
.34	Force Flow Entrance Heaters:	Trane York;	Reznor; McQuay;	Engineered Air; Rosemex;
.35	Fume Detection Systems:	ACME;	CET;	
.36	Furnaces:	Lennox;	Engineered Air;	
.37	Gas Meters:	Equimeter;		
.38	Glycol Feed Systems:	Axiom;	Hamlet and Garneau;	
.39	Grilles and Diffusers:	Carnes; Titus;	Kreuger; Nailor Hart;	EH Price; Hart and Cooley;
.40	Heat Exchangers (Plate Type):	Armstrong;	Bell and Gossett;	
.41	Heat Exchangers (Shell and Tube):	Armstrong;	Bell and Gossett;	
.42	Heat Pumps:	Carrier; Lennox;	McQuay; Keeprite;	Mammoth; Trane; York; AAF;

.43	Heat Recovery Ventilators:	Greenheck; Lifebreath;	Carrier; Keeprite;	Broan; Z-duct;		
.44	Humidifiers:	DriSteem; Armstrong;	Carnes; Nortec;	Rosemex; Herrmidifier;	NEP; York;	Vapac; Pure;
.45	Hydronic Coils:	Carrier; Trane;	Heatcraft; McQuay;	Engineered Air;		
.46	Hydronic System Accessories:	Bell and Gosset;	Taco;	Spirax/Sarco;		
.47	Insulation (General):	Fibreglas;	Manson;	Knauf;		
.48	Insulation (Traps):	TrapWrap (Brocar);	LavGuard (TrueBro);			
.49	Level and Flow Switches:	Magnetrol;				
.50	Louvres:	Westvent; Greenheck;	Airolite; Penn;	Carnes; Ruskin;	Ventex;	
.51	Make-up Air Units:	Carrier;	Engineered Air;	I.C.E.;		
.52	Mechanical Grooved Pipe Joints:	Gruv-Lok;	Victaulic			
.53	Packaged Terminal Air Conditioners and Heat Pumps:	Friedrich; Trane;	McQuay; Mammoth;	Mr Slim;		
.54	Pitless Units:	Baker;	Monitor;			
.55	Plumbing Fixtures, Drains and Brass:					
.1	Acid Dilution Tanks:	Watts;				
.2	Drinking Fountains:	Oasis;	Haws;	Halsey Taylor;	Crane;	
.3	Electronic Faucets:	Chicago; Zurn;	Kohler; Sloan;	DMP Electronics; Cambridge;	Delta;	
.4	Emergency Showers and Eyewashes:	Guardian;	Haws;	Bradley		
.5	Floor Drains, Grease Traps and Fixture Carriers:	Ancon;	Smith;	Zurn;	Mifab;	
.6	Mixing Valves:	Leonard;	Powers/Crane;			
.7	Plumbing Brass:	Delta; Emco; Smith;	Waltec; Sloan; Moen;	Symmons; PricePfister; Cambridge;	Crane; Leonard; Powers;	Zurn; Mifab;
.8	Plumbing Fixtures (General):	Crane;	Kohler;	American Standard;		
.9	Plumbing Fixtures (Specialty):	Fiat;	Bradley;	Metcraft;		

.10	Showers and Tubs:	Hytec;	Fiat;	Venco/Structural Glass;
.11	Stainless Steel Sinks:	Steel Queen;	KIL/Aristaline;	Architectural Metals;
.12	Toilet Seats;	Olsonite;	Centoco;	Bemis;
.56	Pressure Gauges:	Taylor;	Weiss;	Marshalltown;
		Ashcroft;	Duro;	Lunkenheimer;
		Trerice;	Ametek;	Marsh;
				Winters;
.57	Pressure Relief Valves, Pressure Regulating Valves:	Conbraco;	Beeco;	Febco;
		Kunkle;	Taylor;	Consolidated;
		Fisher;	Singer;	Crosby-Ashton;
		Boylston;	Loneragan;	Masoneilan;Wilkins
.58	Pumps (Circulating):	Armstrong;	Grundfos;	Bell and Gossett;
		Darling;	Taco;	
.59	Pumps (Domestic):	Armstrong;	Grundfos;	Bell and Gossett;
.60	Pumps (Domestic Booster):	Armstrong;	Bell and Gossett;	
.61	Pumps (Sump and Sewage):	Armstrong;	Grundfos;	Bell and Gossett;
		Grinder;	Myers;	Hydromatic;Goulds
.62	Pumps (Vertical Turbine):	Armstrong;		
.63	Pumps (Fire):	Armstrong;		
.64	Pumps (Condensate):	Armstrong;	Sterling;	
.65	Pumps (Well):	Myers;	Jacuzzi	
.66	Radiant Ceiling Panels (Hydronic):	Airtex;	TWA (Frenger);	
.67	Radiant Heaters (Gas Fired):	Schwank;	Reznor;Roberts Gordon	
.68	Radiation (Special):	Rosemex;	Hudevaad;	Runtal;
.69	Radiation (Standard):	Rosemex;	Modine;	Rittling;
		Slantfin;	Engineered Air;	
.70	Range Hoods:	Broan;		
.71	Roof Top Units:	Trane;	Carrier;	Engineered Air;
		Keeprite;	Lennox;	McQuay;
				Mammoth;
				York;
.72	Shock Absorbers:	Smith;	Zurn;	
.73	Silencers:	VAW;	Vibro-Acoustics;;	
.74	Sound and Vibration Isolation:	Vibron;	Airmaster;	Amber-Booth;
		Vibro-Acoustics;		SVC Industries;
				Kinetics;
.75	Special Duct Cleaning:	Power-Vac;	Advance Robotic;	
.76	Steam System Accessories:	Watson McDaniels;	Armstrong;	Spirax/Sarco;

.77	Strainers:	Armstrong; Streamflo;	Crane; Kitz;	Mueller;	Sarco;	Toyo;
.78	Thermometers:	Taylor; Ashcroft; Tterice;	Weiss; Duro; Ametek;	Marshalltown; Lunkenheimer; Marsh;	Winters;	
.79	Trap Primers:	Mifab;	Smith;	Zurn;		
.80	Unit Heaters (Hydronic):	Modine; McQuay;	Engineered Air; Beacon-Morris;	Reznor; Rosemex;	Trane;	
.81	Unit Heaters (Gas Fired):	Modine;	Reznor;	Sterling;	Beacon-Morris;	
.82	Vacuum Breakers:	Febco;	Watts;	Wilkins;	Spirax/Sarco;	
.83	Vacuum Cleaning Central Systems;	Broan;				
.84	Vacuum Pumps:	SIHI;				
.85	Valves (General):	Crane; Nibco;	Kitz; Toyo;	Apollo; Jenkins;	Newman-Hattersley; American Valve;	Anvil;
.86	Valves (Butterfly):	Kitz; Apollo;	Nibco; Dezurik;	Jenkins; Keystone;	Newman-Hattersley; Crane;	
.87	Valves (Check):	Centerline; Singer;	Hagen; Dezurik;	Mueller; Crane		
.88	Valves (Radiation):	Griswold; Danfoss;	Sarco; Dahl;	Red and White;		
.89	Ventilation Specialties:	Nailor Hart; Carnes;	Greenheck; Titus;	Ruskin; EH Price;		
.90	Water Softeners:	Culligan;	Filter Soft;	USF;		

1.4 APPROVED 'ALTERNATES'

.1 The following is the list of pre-approved 'Alternates':

.1	Access Doors:	Lehage;	Milcor;	Acudor; Mifab;
.2	Insulation (Traps):	SnapTrap (Zestron)		
.3	Water Treatment Systems:	Culligan;	Olympic;	Prairie

END OF SCHEDULE A

PART 1    SPECIFICATIONS

1 GENERAL

- 1.1 Air Handling Units shall be built to the level of quality as herein specified and to the description of the Air Handling Unit Schedule.
- 1.2 Substitution of any product other than that specified, must assure no deviation below the stated capacities, air flow rate, heat transfer rate, filtration efficiency and air mixing quality. Power requirements must not be exceeded, and where specifically defined, sound power levels must not be exceeded. Applications for "equal" or "alternate" must address these factors.
- 1.3 Unless stated otherwise, air handling units are to be shipped to the job in one piece, factory assembled. All equipment shall be factory tested prior to shipment.
- 1.4 The Air Handling Units shall be the product of a Canadian owned firm, built in Canada, with all components made in Canada, where possible. The air handling units and major components shall be products of manufacturers regularly engaged in the production of such equipment and with a minimum of fifteen continuous years of proven production experience. Manufacturer shall have a fully implemented and auditable quality assurance program, equal to the ISO-9002 Quality Standard.
- 1.5 Air Handling Units shall be as manufactured by Engineered Air and be based bid. Alternate products must show savings and clearly indicate all areas where they do not meet specified product.

2 UNIT CONSTRUCTION

- 2.1 Unit casing shall be of minimum 18 (1.3mm) gauge satin coat galvanized sheet metal. Galvanized surfaces shall be cleaned with a degreasing solvent to remove oil and metal oxides and primed with a two part acid based etching primer. Finish coat shall be an electrostatically applied enamel of Knight-Fighter Grey color, to all exposed surfaces. All unprotected metal and welds shall be factory coated.
- 2.2 All walls, roofs and floors shall be of formed construction, with at least two breaks at each joint. Joints shall be secured by sheet metal screws or pop rivets. Wall and floor joints shall be broken in and roof joints broken out (exposed) for rigidity. All joints shall be caulked with a water resistant sealant.
- 2.3 Units shall be provided with access doors to the following components: fans and motors; filters; dampers and operators. Access doors shall be large enough for easy access. Removal of screwed wall panels will not be acceptable. Provide hinged access doors, fully lined, with a minimum of two Camlock fasteners.
- 2.4 Casings shall be supported on formed galvanized steel channel or structural channel supports, designed and welded for low deflections. Integral lifting lugs shall be provided for hoisting.
- 2.5 All units shall be internally insulated with 1" (25mm) thick 1 1/2 lb./cu.ft. (24 kg./cu.m.) density, neoprene coated fibre glass thermal insulation

3 FANS

- 3.1 Centrifugal fans shall be rated in accordance with AMCA Standard Test Code, Bulletin 210. Fan manufacturer shall be a member of AMCA. All fans and fan assemblies shall be dynamically balanced during factory test run. Fan shafts shall be selected for stable operation at least 20% below the first critical RPM. Fan shafts shall be provided with a rust inhibiting coating.
- 3.2 Forward curved fans shall be equipped with greaseable pillow block bearings, supported on a rigid structural steel frame.

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- 3.3 Fixed drives shall be provided. All drives shall be provided with a rust inhibiting coating. The air balancer shall provide for drive changes (if required) during the air balance procedure.
- 3.4 Fan-motor assemblies shall be provided with vibration isolators. Isolators shall be bolted to steel channel welded to unit floor which is welded to the structural frame of the unit. The isolators shall be neoprene-in-shear type. Fans shall be attached to the discharge panel by a heavy glass fabric, neoprene impregnated, with a sealed double locking fabric to metal connection.

4 GAS HEAT SECTION (DJ) - Indirect Fired

- 4.1 Heating units shall have an indirect natural gas fired heating section that is C-ETL approved for both sea level and high altitude areas.
- 4.2 Heat exchanger shall be a primary drum and multi-tube secondary assembly constructed of titanium stainless steel with multi-plane turbulators, and shall be of a floating stress relieved design. Heat exchanger shall be provided with condensate drain connection. The heat exchanger casing shall have 1" (25 mm) of insulation between the outer cabinet and inner liner. Blower assemblies close coupled to duct furnace type heat exchangers are not acceptable.
- 4.3 The burner assembly shall be a blow through positive pressure type with an intermittent pilot ignition system to provide a high seasonal efficiency. Flame surveillance shall be with a solid state programmed flame relay c/w flame rod. The burner and gas train shall be in a cabinet enclosure. Insulation in the burner section shall be covered by a heat reflective galvanized steel liner. Atmospheric burners, or burners requiring power assisted venting are not acceptable.
- 4.4 Unit(s) incorporating discharge air control and wherever specified, shall include 15:1 turndown (HT burner). The high turndown burner minimum input shall be capable of controlling at 6.7% of its rated input without on-off cycling and include built in electronic linearization of fuel and combustion air. Efficiency shall increase from hi to lo fire.
- 4.5 Operating natural gas pressure at unit(s) manifold shall be 7" (1750 Pa) w.c.

5 FILTERS

- 5.1 Filter sections shall be provided with adequately sized access doors to allow easy removal of filters. Filter removal shall be from one side as noted on the drawings.
- 5.2 The filter modules shall be designed to slide out of the unit. Side removal 2" (50mm) filters shall slide into a formed metal track, sealing against metal spacers at each end of the track.
- 5.3 2" (50mm) Replaceable Media Filters: Disposable glass fibre media type enclosed in permanent galvanized metal frames with metal retainers on both sides.
- 5.4 Filter media shall meet U.L. Class 2 standards.

6 DAMPERS

- 6.1 Damper frames shall be u-shaped galvanized metal sections securely screwed or welded to the air handling unit chassis. Pivot rods of 1/2" (13mm) aluminum, shall turn in bronze bushings, fabricated from self-oiling bronze. Rods shall be secured to the blade by means of straps and set screws.
- 6.2 Blades shall be 18 gauge (1.3mm) galvanized metal with two breaks on each edge and three breaks on centreline for rigidity. The pivot rod shall "nest" in the centreline break. Damper edges shall interlock. Maximum length of damper between supports shall be 42 inches (1070mm).



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- 6.3 Damper linkage brackets shall be 16 gauge (1.6mm) cadmium plated steel with bronze bushings, and shall be self aligning to prevent binding.
- 6.4 Dampers construction shall include blade ends sealed with an adhesive backed foamed polyurethane gasketing. Outdoor air dampers also include an all weather PVC seal, fastened with a positive lock grip and pliable overlap edge on entering air side of interlocking edges. Dampers are interlocked from the centre.
- 6.5 Mixing dampers shall be parallel blade type. Belimo actuators supplied by unit manufacturer.

7 COILS

- 7.1 Coils shall be Superfin as manufactured by Engineered Air. Fins constructed of aluminum or copper shall be rippled for maximum heat transfer and shall be mechanically bonded to the tubes by mechanical expansion of the tubes. The coils shall have a galvanized steel casing. All coils shall be factory tested with air at 300 psig (2070 kPa) while immersed in an illuminated water tank.
- 7.2 Coils shall be removable from the unit at the header end, unless shown otherwise on the drawings.
- 7.3 Refrigerant Superfin evaporator type coils shall be equipped with distributors connected to the coil by copper tubes. Where a hot gas bypass is required, the inlet shall be at the refrigerant distributor. Solenoid valves, expansion valves, and related accessories are to be provided and installed by the refrigeration contractor.
- 7.42 Refrigerant coils with multiple compressors shall be alternate tube circuited in order to distribute the cooling effect over the entire coil face at reduced load conditions. Provision for use of thermal expansion valves must be included for variable air volume and/or make-up air applications.

8 PRE-WIRED EQUIPMENT AND FACTORY INSTALLED CONTROLS

- 8.1 Air handling units shall be factory wired and tested, and shall be certified by C.G.A., with C.S.A. approved components.
- 8.2 Wiring shall be in accordance with the Canadian Electrical Code, Part 1, and pertinent sections of Part 2 of the Code pertaining to specific equipment type and purpose.
- 8.3 All electrical circuits shall undergo a dielectric strength test (CSA C22.2-0), and shall be factory tested and checked as to proper function.
- 8.4 Pre-wired air handling units shall bear an approved bilingual label with all the necessary identification marks, electrical data, and any necessary cautions as required by the Canadian Electrical Code, Part 2.
- 8.5 Provide a system of motor control, including all necessary terminal blocks, motor contactors, motor overload protection, grounding lugs, control transformers, auxiliary contactors and terminals for the connection of external control devices or relays. Gas fired units shall also include high limit and combustion air flow switch.
- 8.6 Automatic controls shall be housed in a control panel mounted in or on the air handling unit, which will meet the C.S.A. standard of the specific installation. Discharge air controller, DJM, shall be manufactured by unit supplier to ensure single source responsibility (controllers manufactured by secondary supplier NOT acceptable).
- 8.7 DJ Control  
Electronic DJM (Modulating Fuel w/ Modulating Combustion Air)  
Solid state analyzer complete with proportional and integral control and with a discharge air sensor to maintain set point temperature and provide rapid response to incremental changes in discharge air

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temperature. Combustion air motor speed varies in response to the modulation of gas flow to provide optimum fuel/air mixture and efficiency at all conditions. Combustion efficiency of heat exchangers shall increase 4 – 5% from high fire to low fire on units incorporating 15:1 turndown (HT Burner). Heat exchangers shall provide a minimum of 80% efficiency throughout the entire operating range. Alternate manufacturers units which do not incorporate a variable speed combustion air blower shall have a modulating gas valve and a combustion air damper with a linear linkage connected to an actuator which has a minimum of 100 steps of control.

Controllers for heating units only shall include the following standard features:

- linear gas and combustion air flow obtained via a built in solid state linear algorithm
- -40F (-40C) minimum operating ambient temperature
- four (4) air change pre-purge on units with over 400 MBH (117 kw) input
- post purge
- interrupted pilot
- self check on start-up to make sure air proving and discharge air sensors are operating within design tolerances
- low fire start
- controlled burner start-up and shut down
- diagnostic lights for ease of set-up and service
- blower contactor that starts fan after burner pre-purge
- damper contact that allows fan to start after damper opens, damper to close after fan stops and damper to close on flame failure
- non-recycling auto by-pass low limit that has built-in sensor checking
- built-in alternate blower and damper functions and set back temperatures for unoccupied mode operation using a single room thermostat

8.8 Damper Control – Provide modulating damper operator.

8.9 Low Limit

Provide a discharge air low limit equipped with an automatic by-pass time delay to allow for cold weather start-up. On a heating system failure this device will shut down the fan and close the outdoor air damper. This device shall require resetting by interrupting the electrical circuit.

8.10 Fire alarm circuits (where required) shall be powered from a relay in unit circuitry.

8.11 C-TRAC3 Controller

The controller shall automatically start in heating, economizer, or cooling mode based on continuously monitored ambient temperature and load requirements.

The controller shall include an adjustable low limit set point for freeze protection to cease equipment operation in the event of low discharge temperature. If the discharge air temperature falls below the adjusted set point, the blowers will shut down and the outside air dampers shall close. \_\_\_The low limit bypass timer shall vary automatically depending on the thermal coefficient of the style of heat exchanger.

If the discharge air temperature approaches the low limit set point, the controller shall automatically reduce the economizer minimum fresh air down to half of its original setting to compensate.

Dual sensors shall be used in the discharge air for precise temperature control.

As the ambient temperature falls, the C-TRAC3 controller shall automatically compensate for outside air thermal expansion by proportionally reducing the amount of outside air.

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In Occupied/Unoccupied mode (For Std AC units only) the controller shall be capable of unoccupied heating with adjustable temperature setback with intermittent blower operation.

The heat/economizer/cool function shall be modulating discharge air with 0-10 VDC reset. Minimum discharge air set point reverts to minimum set point if the BMS control fails.

The C-TRAC3 electronic temperature control system shall provide 3 stages of mechanical cooling control to maintain discharge temperature. The minimum run and off time for the compressors shall be variable based on load requirements.

When in heating mode, the C-TRAC3 shall provide a signal to the DJM2 programmed logic heating controller for series DJ gas fired heater.

Mechanical cooling shall be disabled below an adjustable low ambient temperature set point.

The C-TRAC3 shall have indication and troubleshooting LED lights, multi-meter set point and sensor temperature test points, and a common alarm contact in the event of equipment failure. Information can be accessed from a PDA (personal digital assistant) or laptop computer for improved access to control settings using Engineered Air SMC software.

AIR HANDLING UNIT SCHEDULE		
<b>FAN SECTION</b>	AIR HANDLING UNIT TAG	AHU-1
	SERVICE	Gym/Hall
	LOCATION	Mezzanine Mechanical Room 204
	MAKE / MANUFACTURER	DJE40/C / Engineered Air
	MODEL / FAN - SIZE/TYPE	FC/15x15
	TOTAL AIRFLOW RATE CFM (l/s)	4,000 (1,888)
	MINIMUM FRESH AIRFLOW RATE CFM (l/s)	2,200 (1,038)
	EXTERNAL STATIC IN. W.G. (pa)	0.5 (12)
	MOTOR HP (kw)	5 (4)
	FILTER SECTION	PLEATED 30% (MERV 7)
	FILTER NO. & SIZE INCHES (mm)	2 @ 20 x 25 (500 x 625) 2 @ 16 x 25 (400 x 625)
<b>HEATING SECTION</b>	HEATING CAPACITY KW (mbh) INPUT/OUTPUT	118/95 (400/324)
	MEDIUM	Natural Gas
	ENTERING AIR TEMP. °F (°C)	17.3 (-8.2)
	LEAVING AIR TEMP. °F (°C)	92 (33.3)
<b>COOLING SECTION</b>	COOLING COIL NO. & SIZE INCHES (mm)	1 @ 30 x 50 (750 x 1250)
	COOLING CAPACITY TOTAL/SENS MBH (ton)	190 (15.9) / 123 (10.3)
	MEDIUM	R-22
	ENTERING AIR TEMP. DRY/WET °F (°C)	81.6 (27.6) / 68 (20)
	LEAVING AIR TEMP. °F (°C)	53.1 (11.7) / 52.8 (11.6)
	MAX. AIR PRESSURE DROP IN. W.G. (pa)	0.6 (152)
	MAX. FACE VELOCITY FPM (m/min)	500 (152)
<b>ACCESSORIES</b>	UNIT WEIGHT LBS (kg)	2200 (998)
	Vertical Configuration	
	Controls for heating and cooling shall be suitable for control by the DDC system.	

END OF SCHEDULE B

SCHEDULE C

PART 1 SPECIFICATIONS

.1 GENERAL

- .1 Unit shall be ETL and cETL approved, completely assembled for one-piece shipping and rigging, leak pressure and functionally tested at the factory to assure a trouble-free start-up after installation, covered by a 1-year limited parts warranty on the complete unit.
- .2 Unit shall have a steel angle frame to provide the rigid support required for shipping, rigging and years of dependable operation, zinc-coated steel that has been finished by a powder paint process to provide a long-lasting quality appearance, removable panels for easy access to all internal components during maintenance and service.
- .3 The dimensions of each unit shall not exceed those specified in the plans.
- .4 Each compressor shall be mounted on isolators to minimize the transmission of vibration.
- .5 All condenser coils be draw thru design and constructed of copper tubes arranged in staggered rows and mechanically expanded into aluminum fins.
- .6 The condenser fan motor(s) shall be directly connected to the condenser fans, have permanently lubricated ball bearings, have inherent overload protection and be arranged for vertical discharge of the condenser air.

.2 OPTIONS ON YORK MODEL CMB

- .1 Low Ambient Pressure Switch Kit.

.3 GYM CONDENSING UNIT

.1 GENERAL

- .1 Compressors shall be hermetic type, 3600 RPM, set on resilient neoprene mounts and complete with line voltage break internal overload protection, internal pressure relief valve and crankcase heater.
  - .2 Condenser coils shall be copper tube type, mechanically expanded into aluminium fins. Coils shall be factory tested with air at 300 psig (2070 kPa) while immersed in an illuminated water tank. Coils shall be C.S.A. certified.
  - .3 Condenser fans shall be direct driven propeller type arranged for vertical draw through air flow. Motors shall be weather resistant type, with integral overload protection and designed for vertical shaft condenser fan applications. Fan and motor assemblies shall be mounted on a formed orifice plate for optimum efficiency with minimum noise level.
- .2 Split System Condensing Units
- .1 Condensing units shall be C.S.A. approved. Condensing units shall be designed for a minimum of 15 F (8 C) liquid sub cooling. Condensing units shall operate down to 50 F (10 C) as standard. Multiple compressor/condenser circuits shall be separate from each other. Suction and liquid lines shall be extended to the outside of the cabinet. Service ports fitted with Schraeder fittings shall be connected to the suction and discharge lines for charging or pressure gauge readings.
  - .2 Controls for hermetic compressor units shall include compressor and condenser fan motor contactors, control circuit transformer, cooling relays, recycling pumpdown relays, ambient compressor lockout, high pressure controls and automatic reset low pressure controls. Head pressure actuated fan cycling control shall be provided on all dual condenser fan units.

PART 2 STANDARD OF ACCEPTANCE

- .1 Base Bid: As per schedule.

PART 3    SCHEDULE

<b>CONDENSING UNIT SCHEDULE</b>									
<b>NO.</b>	<b>SERVICE</b>	<b>MAKE</b>	<b>MODEL</b>	<b>CAPACITY MBH (ton)</b>	<b>VOLT</b>	<b>PHASE</b>	<b>MCA</b>	<b>MOP Max/Min</b>	<b>REMARKS</b>
CU-1	FC-1	York	CMB060	60 (5)	208	1	32.7	50/35	c/w Low Ambient Kit
CU-2	FC-2	York	CMB048	48 (4.)	208	1	30.3	50/30	c/w Low Ambient Kit
CU-3	FC-3	York	CMB030	30 (2.5)	208	1	15.1	25/15	c/w Low Ambient Kit
CU-4	FC-4	York	CMB018	18 (1.5)	208	1	8.9	15/10	c/w Low Ambient Kit
CU-5	FC-5	York	CMB036	36 (3.)	208	1	18.3	30/20	c/w Low Ambient Kit
CU-6	FC-6	York	CMB018	18 (1.5)	208	1	8.9	15/10	c/w Low Ambient Kit
CU-7	FC-7	York	CMB018	18 (1.5)	208	1	8.9	15/10	c/w Low Ambient Kit
CU-8	FC-8	York	CMB030	30 (2.5)	208	1	15.1	25/15	c/w Low Ambient Kit
CU-9	FC-9	York	CMB030	30 (2.5)	208	1	15.1	25/15	c/w Low Ambient Kit
CU-10	FC-10	York	CMB036	36 (3.)	208	1	18.3	30/20	c/w Low Ambient Kit
CU-11	FC-11	York	CMB048	48 (4.)	208	1	30.3	50/30	c/w Low Ambient Kit
CU-12	AHU-1	EngA	CUA173	190 (15.9)	600	3			17 Tons 3 Circuits
CU-13	HRV-1	York	HA120	120 (10.)	600/3	10.53	20.1	30/30	c/w hot gas bypass

END OF SCHEDULE C

PART 1    SPECIFICATIONS

.1        GENERAL

- .1        Furnish and install Belt Drive Blower Coil Units where indicated on the plans and specifications. Units shall be completely factory assembled and tested and shipped as one piece except where noted.
- .2        All units shall be capable of meeting or exceeding the scheduled capacities for cooling, heating and air delivery. All unit dimensions for each model and size shall be considered maximums.
- .3        All units shall be of "draw-thru" design with coils, fans, motor/ drive and drain pan completely contained within the unit cabinet.
- .4        Electric heat to be in the blow-thru configuration.
- .5        Units shall be cETL listed in compliance with UL/ANSI Std. 1995.
- .6        All unit coils shall meet or exceed the scheduled cooling and heating capacity, selected and rated in accordance with ARI 410.

.2        CONSTRUCTION

- .1        All units shall be fabricated of minimum 18 gauge galvanized steel with a G90 zinc coating, able to withstand a 125 hour salt spray test per ASTM B-117. Panels shall be die-formed "multi-bend" construction for optimum strength and rigidity. All exterior panels shall be (single wall insulated with 1 inch, 4 pound per cubic foot skin, dual density fiberglass insulation) (foil faced-insulated with 1" thick, 1.8 pound per cubic foot density scrim reinforced foil faced insulation), rated for a maximum air velocity of 3600 f.p.m. In addition to using adhesive complying with NFPA 90A, the insulation shall incorporate a secondary mechanical fastener attached to the unit casing wall (weld pin). Adhesive as the only method of fastening the insulation to the casing is not acceptable. Minimum thermal conductivity shall be 0.24. Insulation must meet all requirements of UL 181 and NFPA 90A. All units shall have minimum 1" duct collars on discharge and return.
- .2        All access panels shall be fully insulated and attached with standard fasteners on at least two opposite sides. No single access panel shall be larger than 30" x 36" for safety and ease of handling. No coil or drain piping or electrical connections shall pass through any access panel.
- .3        Each unit shall be furnished with a one-piece heavy gauge IAQ 304 stainless steel drain pan with welded corner construction.
- .4        All units shall be provided with 9/16" diameter hanger rod holes in the top and bottom panels for "through-bolt" type suspension installation. Spring type unit mounting vibration isolators shall be provided by the unit manufacturer.

.3        FAN ASSEMBLY

- .1        All units shall be furnished with standard selection double inlet forward curved centrifugal blowers statically and dynamically balanced for smooth operation. All blower wheels shall have two set screws and shall be mounted on solid steel shafting rotating in ball bearings with a minimum design average life of 100,000 hours. All standard blower assemblies shall have resilient mounted cartridge type permanently lubricated ball bearings.

.4        FAN MOTOR & DRIVE ASSEMBLY

- .1        All fan motors shall be standard NEMA design motors of the horsepower listed in the equipment schedule. All motors shall be 1750 RPM, 60 hertz ODP single speed motors rated for continuous duty. All motors shall be reversible rotation type.
- .2        Three phase motors shall be "across-the-line" start type in 56 Frame size up through two horsepower.
- .3        All motors shall be mounted on an adjustable base.
- .4        All motor wiring is to be terminated in a junction box, external to the unit casing.

SCHEDULE D

- .5 All fan drive assemblies shall include an adjustable pitch motor pulley, a fixed pitch blower pulley and a standard cross section "V-belt". All fan drives shall be selected at a minimum service factor of 1.2.
- .5 COILS
  - .1 All unit coils shall be rated in accordance with ARI 410.
  - .2 All coils shall be 1/2" O.D. seamless copper tubes with collared and corrugated aluminum fins. All tubes shall be mechanically expanded to provide an efficient bond between tube and fin.
  - .3 Direct expansion (DX) coils shall have 0.0055" thick aluminum fins and 0.016" tube wall thickness.
  - .4 DX coils shall be tested to 450 PSIG pressure and factory sealed and charged with a minimum of 5 PSIG nitrogen or refrigerated dry air. DX coils shall be provided with a fixed orifice refrigerant distributor. A field furnished and installed thermal expansion valve (TXV) shall be mounted directly to the refrigerant distributor.
  - .5 Tube wall thickness shall be 0.025" on chilled water, hot water, and direct expansion coils.
- .6 FILTER RACK ASSEMBLY
  - .1 All units shall be furnished with a flat filter rack with hinged access on both sides designed to accept a 2" nominal standard sized filters. All units shall be provided with nominal 2" pleated filters factory installed. One complete set of spare pleated filters shall be provided for each unit.
- .7 DISCHARGE PLENUM SECTION
  - .1 Where shown on the plans, the unit manufacturer shall furnish a fully insulated discharge plenum section complete with a double deflection supply grille (cannot be used with discharge heating coil plenum options).
- .8 ELECTRICAL CONTROL
  - .1 The unit fan motor shall be completely factory wired to an external electrical enclosure. Each unit shall include fan control package with 24 volt control voltage. Each unit shall include motor circuit fusing, contactor, control circuit transformer and terminal strip for connection of field wiring.
  - .2 A main incoming power fused disconnect switch shall be factory furnished and wired by the unit manufacturer for single point power connection.
- .9 ELECTRIC HEAT SECTION
  - .1 Where shown on the plans and in the schedule, the unit manufacturer shall furnish an electric resistance heating assembly with the heating capacity, voltage and stages as shown in the schedule. The heater assembly shall be designed and rated for installation to the blower coil unit in the blow-thru configuration without the use of duct extensions or transitions between the unit and the heater assembly. The heater assembly shall be factory assembled to the air handling unit and completely factory wired. The heater/unit assembly shall be listed for zero clearance meeting all N.E.C. requirements and be cETL listed in compliance with UL/ANSI Std. 1995.
  - .2 All heating elements shall be open coil design using Ni-Chrome wire mounted in ceramic insulators and housed in an insulated heavy gauge galvanized steel housing. All elements shall terminate in a machine staked stainless steel terminal secured with stainless steel hardware. The element support brackets shall be spaced no greater than 3-1/2" on center. All internal wiring shall be rated for 105°C minimum.
  - .3 All heaters shall include over-temperature protection. All heaters shall include a non-adjustable airflow switch.
  - .4 An incoming line power distribution block shall be provided. The power distribution block shall be designed to accept incoming power wiring capable of carrying 125% of the calculated load current.



SCHEDULE D

- .5 In addition to the above, electric heaters shall include the following options:
- .1 Main incoming power disconnect fused.
  - .2 Magnetic contactors wired for disconnecting operation
  - .3 Fan control package with heater interlock contacts.
  - .4 Minimum two stages of heating control

**PART 2 STANDARD OF ACCEPTANCE**

- .1 Base Bid: All selections are based on Johnson Controls Model AHI Horizontal.

**PART 3 SCHEDULE**

<b>FAN COIL UNIT SCHEDULE</b>														
NO.	SERVICE	LOCATION	MAKE	MODEL	AIR CFM (l/s) 70°F	E.S.P IN. H2O (pa)	MOTOR HP (kw)	COOLING EAT (°F) DB/WB	COOLING		HEATING		Total Amps (amps)	
									MBH (tons)		EAT (°F)			KW (mbh)
									TOTAL	SENS	DB	SENS		
FC-1	Multi-Purpose	150	JCI	AHI-16	1,400 (661)	0.3 (75)	3/4 (0.4)	80 / 67 (27 / 20)	63.3 (5.3)	41.9 (3.5)	70 (21.1)	6 (20)		
FC-2	Multi-Purpose	150	JCI	AHI-12	1,300 (613)	0.3 (75)	1 (0.7)	80 / 67 (27 / 20)	56.1 (4.7)	37.7 (3.2)	70 (21.1)	5 (17)		
FC-3	Games	102	JCI	AHI-8	700 (330)	0.3 (75)	1/2 (0.3)	80 / 67 (27 / 20)	33.5 (2.8)	21.8 (1.9)	70 (21.1)	4 (14)		
FC-4	Meeting	103	JCI	AHI-8	500 (236)	0.3 (75)	1/3 (0.2)	80 / 67 (27 / 20)	22.2 (1.9)	14.6 (1.3)	70 (21.1)	3 (10)		
FC-5	GNSC Office	107-111	JCI	AHI-8	875 (413)	0.3 (75)	3/4 (0.4)	80 / 67 (27 / 20)	39.3 (3.3)	26.1 (2.2)	70 (21.1)	5 (17)		
FC-6	BPCC Office	106 & 115-117	JCI	AHI-8	300 (142)	0.3 (75)	1/3 (0.2)	80 / 67 (27 / 20)	13.1 (1.1)	8.6 (0.8)	70 (21.1)	3 (10)		
FC-7	Wellness/ GNSC Mtg	112 & 114	JCI	AHI-8	345 (163)	0.3 (75)	1/3 (0.2)	80 / 67 (27 / 20)	16.9 (1.5)	10.9 (1.0)	70 (21.1)	3 (10)		
FC-8	Computer Lab	125	JCI	AHI-8	700 (330)	0.3 (75)	1/2 (0.3)	80 / 67 (27 / 20)	33.5 (2.8)	21.8 (1.9)	70 (21.1)	3 (10)		
FC-9	Creative Arts	123-124	JCI	AHI-8	590 (278)	0.3 (75)	1/3 (0.2)	80 / 67 (27 / 20)	29.4 (2.5)	19.0 (1.6)	70 (21.1)	3 (10)		
FC-10	Home Impove	121-122	JCI	AHI-8	880 (415)	0.3 (75)	3/4 (0.4)	80 / 67 (27 / 20)	39.5 (3.3)	26.2 (2.2)	70 (21.1)	8 (27)		
FC-11	Lounge	101	JCI	AHI-12	1,200 (566)	0.3 (75)	3/4 (0.6)	80 / 67 (27 / 20)	53.2 (4.5)	35.4 (3.0)	70 (21.1)	8 (27)		

END OF SCHEDULE D

SCHEDULE E

PART 1 SPECIFICATIONS

- .1 Weatherproof, seamless, heavy gauge, spun aluminum housing, easily removed for service access
- .2 Roof mounted, downflow or upflow configuration as noted
- .3 Recessed base suitable for mounting on roof curb and acting as counterflashing
- .4 Centrifugal, non-overloading, backward inclined, aluminum fan wheel (non-sparking construction)
- .5 Heavy duty ball bearings with minimum life of 200,000 hours
- .6 Belt driven with adjustable pulleys
- .7 Motor to be mounted out of the airstream, with positive cooling ventilation air
- .8 Electrical conduit chase to be provided through the unit, with UL safety disconnect switch, and wiring between the switch and the motor
- .9 hinged sub-base and gravity backdraft damper
- .10 Aluminum birdscreen
- .11 Factory fabricated roof curb or field fabricated roof curb at the Sub-contractor's option

PART 3 SCHEDULE

<b>FAN SCHEDULE</b>										
NO.	SERVICE	MAKE	MODEL	AIR CFM (l/s) 70°F	E.S.P IN. H2O (pa)	RPM	MOTOR HP (kw)	VOLTS	PHASE	REMARKS
EF-1	Kitchen 148	Cook	VCR-HP 165VH6B	1,600 (755)	1 (250)	1331	3/4 (0.6)	208	3	1
EF-2	Zamboni 131	Cook	ACE-B 120C	800 (377)	0.5 (125)	1200	1/4 (0.2)	120	1	2
EF-3	Electrical 202	Cook	ACE-B 180C	3,000 (1415)	0.5 (125)	1065	1 (0.7)	208	3	3
Table Notes: 1. Upblast fan. Furnish with disconnect switch, prefabricated ventilated restaurant roof curb, curb hinge kit, and grease trough kit. Fan to be ULC listed for grease extraction and compliant with NFPA 96. Coordinate power supply with Division 26. 2. Downblast fan. Furnish with disconnect switch, prefabricated roof curb and normally closed motorized damper wired to open when fan "runs". 3. Downblast fan with two speed motor. Furnish with disconnect switch, prefabricated roof curb and normally closed motorized damper wired to open when fan "runs".										

END OF SCHEDULE E

PART 1    SPECIFICATIONS

1.1    HEAT RECOVERY VENTILATOR HRV-1

- .1    Packaged Heat Recovery Ventilator
- .2    Belt Driven, Centrifugal type Supply and Exhaust Blowers, each with internal vibration isolation and sealed ball bearings.
- .3    Integral Defrost and Speed Controls, including Motorized Dampers, sensors, 24V transformer, and Integral Micro-processor circuit board with power and control interlocks and contacts.
- .4    motors shall be continuous duty, permanently lubricated.
- .5    Single point power supply for 208V / 3 phase
- .6    Insulated motorized Outside Air Damper
- .7    Insulated Gravity Backdraft Exhaust Air Damper
- .8    Indoor Units:
  - .1    Double wall construction fully insulated with 1" high density Styrofoam. Inner wall constructed of 24 Ga G90 galvanized steel. Outer wall constructed of 20 Ga G90 Galvanized steel and sealed access doors
  - .2    4 ducted connections
  - .3    Flat Plate Polypropylene heat recovery core.
  - .4    Sealed Fan Bearings
  - .5    Washable Foam Filters in Exhaust and Supply Air Streams

PART 3    SCHEDULE

<b><u>HEAT RECOVERY UNIT SCHEDULE</u></b>		
<b>FAN SECTION</b>	HRV TAG	HRV - 1
	SERVICE	Building
	LOCATION	Mech Room
	MAKE / MANUFACTURER	Nu-Air NU2035
	MODEL / FAN - SIZE/TYPE	FC, DWDI
	TOTAL SUPPLY AIRFLOW RATE CFM (l/s)	3,770      (1,778)
	TOTAL EXHAUST AIRFLOW RATE CFM (l/s)	2,430      (1145)
	EXTERNAL STATIC IN. W.G. (pa)	1.2      (300)
	MOTOR HP/voltage/phase (kw/voltage/phase)	2.0/208/3      (1.5/208/3)
	FILTER SECTION	PLEATED 30% (MERV 7)
<b>ACCESSORIES</b>	POLYPROPYLENE CORE WITH A MINIMUM OF 62% SENSIBLE EFFECTIVENESS	
	FACE AND BYPASS DEFROST	
	PAINTED EXTERIOR FINISH	
	DISCONNECT SWITCH	

END OF SCHEDULE F

PART 1    SPECIFICATIONS

- .1        The direct fired make up air unit shall be design certified by CSA International and CAN ETL.
  
- .2        CONSTRUCTION FEATURES
  - .1        Housing constructed of heavy duty G90 galvanized steel
  - .2        Forward curved centrifugal blower wheel
  - .3        Vibration isolation
  - .4        Adjustable drive assemblies
  - .5        Adjustable motor mount
  - .6        Ball bearing motors
  - .7        Heavy duty, pre-lubricated bearings rated for 200,000 hours of operation
  - .8        Static resistant belts
  - .9        Service doors on both sides
  - .10       down discharge
  - .11       Spring loaded profile plates automatically adjust for any airflow
  - .12       Weatherproof safety disconnect switch
  - .13       Fully insulated casing
  - .14       ETL listed
  
- .3        BLOWER
  - .1        10" forward curved, centrifugal blower.
  - .2        Permanently lubricated ball bearings.
  - .3        Galvanized finish.
  - .4        3/4" Shaft.
  - .5        0-4000 CFM.
  - .6        2500 max. RPM.
  - .7        Used in heated and non-heated supply fans.
  
- .4        TEMP CONTROL
  - .1        Maxitrol 14
  - .2        40-80°F Discharge Temp Control
  
- .5        INTAKE
  - .1        Sloped Foam Filtered Intake for Size #1 Modular Heater.
  - .2        21.813" Wide x 44.375" Long x 23.375" High.
  - .3        Includes 2" Foam EZ Kleen Metal Mesh Filters.
  
- .6        FILTERS
  - .1        3 - EZ Kleen Non-Woven Polyester Metal Mesh Filter.
  - .2        20"x 25"x 2" Used for heater and supply fan intakes.
  - .3        23 layers of expanded aluminum and one layer of non-woven polyester.

<b>MAKE UP AIR UNIT SCHEDULE</b>		
<b>FAN SECTION</b>	<b>MAKE UP AIR UNIT</b>	MAU-1
	<b>SERVICE</b>	Direct Fired Kitchen Make Up Air
	<b>LOCATION</b>	Roof
	<b>MAKE / MANUFACTURER</b>	CaptiveAire A1-D.250-G10
	<b>MODEL / FAN - SIZE/TYPE</b>	10" FC
	<b>TOTAL AIRFLOW RATE CFM (l/s)</b>	1,600 (755)
	<b>EXTERNAL STATIC IN. W.G. (pa)</b>	1 (250)
	<b>MOTOR HP (kw)</b>	1 (1)
	<b>FILTER SECTION</b>	2" EZ Keen Non-Woven Polyester Metal Mesh
	<b>FILTER NO. &amp; SIZE INCHES (mm)</b>	1 @ 20 x 25 (500 x 625)
<b>HEAT ING</b>	<b>HEATING CAPACITY KW (MBH)</b>	55.7 (190)
	<b>MEDIUM</b>	Gas
	<b>TEMP RISE °F ( °C)</b>	110 (61)
<b>ACCESSORIES</b>	<b>UNIT WEIGHT LBS (kg)</b>	552 (250)
	<b>PACKAGED C/W ALL CONTROLS</b>	

END OF SCHEDULE G

<b><u>GRILLE &amp; DIFFUSER SCHEDULE</u></b>										
TYPE	MAKE	MODEL	SERVICE	BORDER	CORE	BLADE	FRAME	FASTEN	FINISH	REMARKS
S1	EH PRICE	SCD	SUPPLY	-	3C	-	3P	-	NOTE 1	NOTE 2
S2	EH PRICE	SCD	SUPPLY	-	3C	-	3P	-	NOTE 1	NOTE 2
S3	EH PRICE	SCD	SUPPLY	-	3C	-	3P	-	NOTE 1	NOTE 2
S4	EH PRICE	SDGE	SUPPLY	-	-	-	-	A	NOTE 1	NOTE 3
S5	EH PRICE	520	SUPPLY	F	520D	L	-	A	NOTE 1	-
S6	EH PRICE	520	SUPPLY	F	520D	L	-	A	NOTE 1	-
S7	EH PRICE	SPD	SUPPLY	-	-	-	3P	-	NOTE 1	NOTE 2
R1	EH PRICE	80	RETURN	CH	80	-	-	-	NOTE 1	-
R2	EH PRICE	90	RETURN	-	90	L	-	A	NOTE 1	-
R3	EH PRICE	10A	RETURN	F	10A	-	-	A	NOTE 1	-
E1	EH PRICE	80	EXHAUST	F	80	-	-	A	NOTE 1	-
E2	EH PRICE	90	EXHAUST	-	90	L	-	A	NOTE 1	-
L1	AIROLITE	K609	LOUVER						NOTE 1	
TABLE NOTES: NOTE 1 FINISH AS SELECTED BY THE CONTRACT ADMINISTRATOR NOTE 2 600mm(24")x600mm(24") MODULE AND DIFFUSER FACE SIZE. NOTE 3 COMPLETE WITH OPPOSED BLADE DAMPER.										

END OF SCHEDULE H

<b>PLUMBING FIXTURE &amp; EQUIPMENT SCHEDULE</b>	
<b>FIXTURE/EQUIPMENT TAG:</b>	<b>FIXTURE/EQUIPMENT DESCRIPTION</b>
<b>WC-1</b> General use	<p><b><u>TOILET - FLOOR MOUNTED EXPOSED FLUSH VALVE (DUAL FLUSH FLUSH VALVE)</u></b></p> <p>American Standard #3451.160 'MADERA ELONGATED' 'Low Consumption' Toilet, floor mounted, vitreous china, EverClean™ antimicrobial surface which inhibits the growth of stain and odor causing bacteria, mold and mildew, elongated syphon jet flush action bowl, 2-1/8" (54mm) fully glazed internal trapway, 10" x 12" (254mm x 305mm) large water surface, 6L (1.6 gal.) per flush, 1-1/2" (38mm) top spud with condensate channel and bolt caps, for use with flush valve. Provide Floor Flange, flange bolts and gasket. Sloan #WES 111-YO 'UPPERCUT' Water Saving Dual Flush Flushometer, C.P. low consumption, factory set flow, quiet action diaphragm type with non-hold open feature, vacuum breaker and extended seat bumper on back-check angle stop and anti-microbial green lever handle, down 6 LPF / up 4.2 LPF consumption. Centoco #AM500STSCC Toilet Seat, elongated heavy duty solid plastic with Anti-Microbial Compound (to inhibit the growth of bacteria), open front less cover, with reinforced stainless steel check hinge, posts, washers and nuts.</p>
<b>WC-2</b> Handi cap	<p><b><u>TOILET - FLOOR MOUNTED EXPOSED FLUSH VALVE (BARRIER FREE DESIGN) (DUAL FLUSH FLUSH VALVE)</u></b></p> <p>American Standard #3461.160 'MADERA ELONGATED 16-1/2" (419mm) HIGH' Low Consumption Toilet, floor mounted, vitreous china, EverClean™ antimicrobial surface which inhibits the growth of stain and odor causing bacteria, mold and mildew, elongated syphon jet flush action bowl, 2-1/8" (54mm) fully glazed internal trapway, 10" x 12" (254mm x 305mm) large water surface, 6L (1.6 gal.) per flush, 1-1/2" (38mm) top spud with condensate channel and bolt caps, for use with Flush Valve. Provide Floor Flange, flange bolts and gasket. Sloan #WES 111-YG 'UPPERCUT' Water Saving Dual Flush Flushometer, C.P. low consumption, factory set flow, quiet action diaphragm type with non-hold open feature, vacuum breaker and extended seat bumper on back-check angle stop and anti-microbial green lever handle, down 6 LPF / up 4.2 LPF consumption. Centoco #AM820STS Toilet Seat, elongated heavy duty solid plastic with Anti-Microbial Compound (to inhibit the growth of bacteria), open front with cover, reinforced stainless steel check hinge, posts, washers and nuts.</p>
<b>UR-1</b> General Use	<p><b><u>URINAL - WALL HUNG - EXPOSED FLUSH VALVE</u></b></p> <p>American Standard #6501.010 'WASHBROOK' Low Consumption Urinal, wall hung, vitreous china, washdown flush action 3.8L (1.0 Gal.) flush, extended sides for privacy, integral flush spreader, outlet connection, less strainer, 3/4" (19mm) top spud, wall hangers, open trap, for use with flush valve. American Standard #047068-0070A Strainer, removable stainless steel, 2" (50mm) outlet, connecting flange with gasket and bolts. Sloan #186-1-XL REGAL Flush Valve, C.P. low consumption, 3.8 LPF (1.0 GPF) factory set flow, quiet action diaphragm type with non hold open feature, vacuum breaker and back-check angle stop. Jay R. Smith #SQ4-1819 Urinal Wall Access Cleanout, with round stainless steel face and V.P. screw. Jay R. Smith #0637 Urinal Carrier, with steel pipe legs, block base feet supports and bearing plates.</p>



<b>PLUMBING FIXTURE &amp; EQUIPMENT SCHEDULE</b>	
<b>FIXTURE/EQUIPMENT TAG:</b>	<b>FIXTURE/EQUIPMENT DESCRIPTION</b>
<b>LAV-1 General Use</b>	<b><u>BASIN - COUNTER MOUNTED (STAINLESS STEEL)</u></b> Franke 'WASHROOM SYSTEMS' #OV1821-5-1 Basin, centre hole, 21" x 18" x 5" (530mm x 460mm x 127mm) deep, counter mounted, grade 18-10 type 304 stainless steel, front overflow, mirror finished rim, satin finished bowl, self-rimming. Chicago Faucets #333-V-665-MT Metering Single Tempered Water Faucet, C.P. single hole C.C., solid cast brass lead-free body, 'SLO-KLOSE' cartridge with vandal resistant 1 L/cycle (0.25 gpc) per push flow spray spout, easy-tip lever handle and mixing tee with inlet check tails. McGuire #155A-X Basin Drain, C.P., cast brass 1 pc. top, open grid with 17ga. (1.5mm), 1-1/4" (32mm) tailpiece with double gasket. McGuire #H170BV Basin Supplies, C.P., polished brass, rigid horizontal integral copper sweat tube nipple, 1/2" (12mm) I.D. x 5" (127mm) long, all brass 1/4 turn ball valves angle stops with combination V.P. loose key and handle, escutcheons and flexible copper risers. McGuire #8872C-17T 'p' Trap, C.P. brass adjustable body, 17 gauge (1.5mm), 1-1/4" (32mm) and escutcheon.
<b>LAV-2 Handi Cap</b>	<b><u>BASIN - WALL HUNG (BARRIER FREE DESIGN) LARGE FLAT SLAB DESIGN</u></b> American Standard #9141.011 'WHEELCHAIR BASIN', 4" (102mm) centres, 27" x 20" x 3 - 7-1/2" (686mm x 508mm x 76 - 191mm) deep, wall hung, vitreous china, flat slab, low front lip for wheelchair access, front overflow, for concealed arm carrier. Chicago Faucets #802-V-317-XK Faucet, C.P. 4" (102mm) C.C., solid cast brass lead-free body, 1/4 turn ceramic disc valve cartridges, with vandal resistant 7.6 LPM (2.0 GPM) flow aerator outlet and cast brass 4" (102mm) blade handles. McGuire #155WC Basin Drain, C.P., cast brass 1pc. top, offset open grid with 17ga. (1.5mm), 1-1/4" (32mm) tailpiece. McGuire #H165LKN3RB Basin Supplies, C.P., polished brass, rigid horizontal nipple 3/8" (9.5mm) x 3" (75mm) long I.P.S., heavy all brass angle stops, with V.P. loose key, escutcheons and S.S. braided flexible risers. McGuire #8872C 'p' Trap, C.P., polished, cast brass adjustable body, 1-1/4" (32mm) with cleanout plug, seamless brass wall bend and escutcheon. Jay R. Smith #0700-Z-27 Basin Carrier, with steel pipe legs, block base feet support, narrow sleeve and base for extended concealed arms. McGuire #PW2000WC 'PROWRAP' Sanitary Covering, of PVC, vandal-resistant flexible seamless construction, anti-microbial, to exposed piping (to protect against heat/contusions) as per local codes.
<b>LAV-3 General Use (Wellness)</b>	<b><u>BASIN - WALL HUNG (BARRIER FREE DESIGN &amp; GENERAL USE) FOR TIGHT SPACE AREAS</u></b> American Standard #0954.000 'MURRO' Basin, 4" (102mm) centres, 22" x 21" x 5 - 7-1/2" (559mm x 533mm x 127-191mm) deep, wall hung, vitreous china, integral back splash, self draining deck area, sloped front lip, rear overflow, for concealed arm carrier. Chicago Faucets #802-V-665 Metering Faucet, C.P. 4" (102mm) C.C., solid cast brass lead-free body, 'SLO-KLOSE' cartridges, with vandal resistant 1L/cycle (0.25 GPC) per push flow spray, flow aerator outlet and cast brass push handles (5# (2.2 kg) push faucet - check local codes for usage). McGuire #155A Basin Drain, C.P., cast brass 1 pc. top, open grid with 17ga. (1.5mm), 1-1/4" (32mm) tailpiece. McGuire #H165LKN3RB Basin Supplies, C.P., polished brass, rigid horizontal nipple 3/8" (9.5mm) x 3" (75mm) long I.P.S., heavy all brass angle stops, with V.P. loose key, escutcheons and S.S. braided flexible risers. McGuire #8872C 'p' Trap, C.P., polished, cast brass adjustable body, 1-1/4" (32mm) with cleanout plug, seamless brass wall bend and escutcheon. Jay R. Smith #0700-Z Basin Carrier, with steel pipe legs, block base feet support and concealed arms. (For narrow wall installation provide 'Z' type sleeve for arms). American Standard #0059.020 Semi-China Pedestal, to exposed piping (to protect against heat/contusions) as per local codes.

<b>PLUMBING FIXTURE &amp; EQUIPMENT SCHEDULE</b>	
<b>FIXTURE/EQUIPMENT TAG:</b>	<b>FIXTURE/EQUIPMENT DESCRIPTION</b>
<b>LAV-4</b> <b>General Use</b> <b>(Dressing Rooms)</b>	<p><b><u>BASIN - WALL HUNG (BARRIER FREE DESIGN &amp; GENERAL USE) FOR TIGHT SPACE AREAS</u></b>                      American Standard #0954.000 'MURRO' Basin, 4" (102mm) centres, 22" x 21"x 5 - 7-1/2" (559mm x 533mm x 127-191mm) deep, wall hung, vitreous china, integral back splash, self draining deck area, sloped front lip, rear overflow, for concealed arm carrier. Chicago Faucets #802-V-XK Faucet, C.P. 4" (102mm) C.C., solid cast brass lead-free body, 1/4 turn ceramic disc valve cartridges, with vandal resistant 7.6 LPM (2.0 GPM) flow aerator outlet and cast brass lever handles. McGuire #155A Basin Drain, C.P., cast brass 1 pc. top, open grid with 17ga. (1.5mm), 1-1/4" (32mm) tailpiece. McGuire #H170BVRB Basin Supplies, C.P., polished brass, rigid short horizontal integral copper sweat tube nipples, 1/2" (12mm) I.D. x 5" (127mm) long, all brass 1/4 turn ball valve angle stops with combination V.P. loose key and handles, escutcheons and S.S. braided flexible risers. McGuire #8872C-17T 'p' Trap, C.P. brass adjustable body, 17 gauge (1.5mm), 1-1/4" (32mm) and escutcheon. Jay R. Smith #0700-Z Basin Carrier, with steel pipe legs, block base feet support and concealed arms. (For narrow wall installation provide 'Z' type sleeve for arms). American Standard #0059.020 Semi-China Pedestal, to exposed piping (to protect against heat/contusions) as per local codes.</p>
<b>LAV-5</b> <b>General Use</b> <b>(Barrier Free)</b>	<p><b><u>BASIN - COUNTER MOUNTED (BARRIER FREE DESIGN)</u></b>                      American Standard #9494.001 'CADET UNIVERSAL ACCESS' Basin, 4" (102mm) centres, 21" x 17-1/2" x 5-1/4 - 6-7/8" (533mm x 445mm x 133-175mm) deep, counter mounted, vitreous china, rear overflow. Provide basin rim sealant. Chicago Faucets #802-V-317-XK Faucet, C.P. 4" (102mm) C.C., solid cast brass lead-free body, 1/4 turn ceramic disc valve cartridges, with vandal resistant 7.6 LPM (2.0 GPM) flow aerator outlet and cast brass 4" (102mm) blade handles. McGuire #155WC Basin Drain, C.P., cast brass 1pc. top, offset open grid with 17ga. (1.5mm), 1-1/4" (32mm) tailpiece. McGuire #H165LKN3RB Basin Supplies, C.P., polished brass, rigid horizontal nipple 3/8" (9.5mm) x 3" (75mm) long I.P.S., heavy all brass angle stops, with V.P. loose key, escutcheons and S.S. braided flexible risers. McGuire #8872C 'p' Trap, C.P., polished, cast brass adjustable body, 1-1/4" (32mm) with cleanout plug, seamless brass wall bend and escutcheon. ATS SPEC #BF-1 'Sanitary Safti-Covers' of PVC, vandal-resistant flexible seamless construction, anti-microbial, to exposed piping (to protect against heat/contusions) as per local codes.</p>
<b>SH-1</b> <b>General Use</b>	<p><b><u>SHOWER - PRESSURE BALANCING VALVE</u></b>                      Symmons #4-5000-X 'SAFETYMIX' Shower Valve, C.P. heavy duty pressure balancing controller, all brass and stainless steel body design, maximum temperature limit stop, service stops, metal escutcheon plate, heavy duty spindle with single control metal lever handle. Symmons #4-150 'SENIOR' Institutional Head, C.P. cast brass, one piece, with 7.6 LPM (2.0 GPM) flow and secured with vandal-resistant screws. Bobrick #B207 Curtain Rod, S.S. 1" (25mm) dia. 20 GA. (1.0mm). Bobrick #B204-2/B204-1 White Vinyl Curtain, 42" x 72" (1065mm x 1830mm) with S.S. hooks. Jay R. Smith #2005A Floor Drain, with water proofing flange and nickel bronze strainer. Provide 'p' Trap.</p>

<b>PLUMBING FIXTURE &amp; EQUIPMENT SCHEDULE</b>	
<b>FIXTURE/EQUIPMENT TAG:</b>	<b>FIXTURE/EQUIPMENT DESCRIPTION</b>
<b>SH-2</b> Handi Cap	<b><u>SHOWER - PRESSURE BALANCING VALVE (BARRIER FREE DESIGN) (HAND SHOWER SPRAY)</u></b> Symmons #1-250-X-FSB30-V 'SAFETYMIX' Shower Valve, C.P. heavy duty pressure balancing controller, all brass and stainless steel body design, maximum temperature limit stop, service stops, metal escutcheon plate, heavy duty spindle with single control metal lever handle, with 7.6 LPM (2.0 GPM) flow adjustable hand shower spray, 30" (762mm) offset slide bar, 59" (1500mm) flexible metal hose, supply elbow, with flange and inline vacuum breaker. Bobrick #B207 Curtain Rod, S.S. 1" (25mm) dia. 20 GA. (1.0mm). Bobrick #B204-3/B204-1 White Vinyl Curtain, 70" x 72" (1778mm x 1830mm) with S.S. hooks. Symmons #QD C.P. Snap-On / Off Quick Disconnect, for removal of hand shower and hose assembly. Jay R. Smith #2005A Floor Drain, with water proofing flange and nickel bronze strainer. Provide 'p' Trap.
<b>SK-1</b> General Use (Office)	<b><u>SINGLE BOWL SINK - STAINLESS STEEL - BACK LEDGE</u></b> Franke 'WASHROOM SYSTEMS' #LBS6808-1-4 S.S. Sink, 4 hole, 20-1/2" x 20" x 8" (521mm x 508mm x 203mm) deep, counter mounted, back ledge, grade 18-8 type 302 stainless steel, single compartment, satin finished rim and bowl, self rimming, with crumb cup strainer, sound deadening and mounting kit. Extra hole (specify). Chicago Faucets #2301-V-8 'MARATHON' Faucet, C.P. 8" (203mm) C.C., deck mounted, solid cast brass lead-free body, washerless, ceramic drip-free disc valve cartridge, cast brass swing spout with vandal resistant 7.6 LPM (2.0 GPM) flow aerator outlet, removable deck plate, if required, for two hole application, hose and spray unit, single control metal lever handle, 3/8" (10mm) supply tubes. McGuire #H170BV-LR Sink Supplies, C.P., polished, rigid horizontal integral copper sweat tube nipples, 1/2" (12mm) I.D. x 5" (127mm) long, all brass 1/4 turn ball valves angle stops with combination V.P. loose key and handles, escutcheons less flexible copper risers. McGuire #8912C 'p' Trap, C.P. polished cast brass adjustable body, 1-1/2" (38mm) with cleanout plug, seamless brass wall bend and escutcheon.
<b>SK-2</b> General Use (Creative Arts/Canteen)	<b><u>SINGLE BOWL SINK - STAINLESS STEEL - BACK LEDGE</u></b> Franke 'WASHROOM SYSTEMS' ALBS6805-1-3 S.S. Sink, 3 hole, 8" (203mm) centres, 20-9/16" x 20-1/8" x 5" (522mm x 511mm x 127mm) deep, counter mounted, back ledge, grade 18-8 type 302 stainless steel, single compartment, satin finished rim and bowl, self rimming, with crumb cup strainer, sound deadening and mounting kit. Chicago Faucets #1100-V-L9-XK Faucet, C.P. 8" (203mm) C.C., deck mounted, solid cast brass lead-free body, 1/4 turn ceramic disc valve cartridges, swing spout with vandal-resistant 7.6 LPM (2.0 GPM) flow aerator outlet and cast brass hooded lever handles. Provide Sink Supplies with metal angle stops, adaptors, escutcheons and flexible metal risers. Provide 'p' Trap, cast brass 1-1/2" (38mm) with cleanout, union and escutcheon.

<b>PLUMBING FIXTURE &amp; EQUIPMENT SCHEDULE</b>	
<b>FIXTURE/EQUIPMENT TAG:</b>	<b>FIXTURE/EQUIPMENT DESCRIPTION</b>
<b>SK-3</b> <b>General Use</b> <b>(Creative Arts)</b>	<b><u>DOUBLE BOWL SINK - STAINLESS STEEL - BACK LEDGE</u></b> Franke 'WASHROOM SYSTEMS' ALBD6405-1-3 Sink, 3 hole, 8" (203mm) centres, 20-1/2" x 31-1/4" x 5" (521mm x 794mm x 127mm) deep, counter mounted, back ledge, grade 18-8 type 302 stainless steel, double compartment, satin finished rim and bowl, with spillway, self rimming, with crumb cup strainers, sound deadening and mounting kit. Chicago Faucets #786-V-GN8A-390-XK Faucet, C.P. 8" (203mm) C.C., below deck mounted, cast brass lead-free body, 1/4 turn ceramic disc valve cartridges, with vandal-resistant swivel gooseneck spout with 8" (203mm) inlet to outlet projection, 7.6 LPM (2.0 GPM) flow aerator outlet and 2-1/2" (64mm) cast brass lever handles. Symmons #5-210-CK 'MAXLINE' Thermostatic Mixing Valve, extruded brass body, brass and stainless steel control components, vandal-resistant cap, with in-line strainers and checks. Mixer installed in H & CW supplies to provide tempered water to hot side of faucet - as per local codes. Temperature range 85° F (30° C) to 160° F (71° C). Set valve temperature at 120° F (49° C). (Provide tee, adaptors and flex. copper tubing to suit.) McGuire #H165N5-LR Sink Supplies, C.P. Polished Brass Sink Supplies, rigid horizontal nipples 3/8" (10mm) x 5" (127mm) long, I.P.S. heavy all brass angle stops with wheel handle stops and escutcheons, less flexible copper risers. McGuire #8912C 'p' Trap, C.P. polished cast brass adjustable body, 1-1/2" (38mm) with cleanout plug, seamless brass wall bend and escutcheon.
<b>SK-4</b> <b>General Use</b> <b>(Janitors Room)</b>	<b><u>JANITOR MOP SINK - PRECAST TERRAZZO FLOOR MOUNTED - CRESCENT CORNER</u></b> Stern Williams #CRS 2200 Mop Sink, 28" x 28" x 12" (711mm x 711mm x 305mm) deep, floor mounted, corner precast terrazzo with stainless steel cast integral cap on front drop and Integral Drain with strainer. Chicago Faucets #305VB-R-XK-Hose Faucet, C.P. 8" (203mm) C.C., wall mounted, solid cast brass lead-free body, 1/4 turn ceramic disc valve cartridges, cast brass lever handles, body mounted vacuum breaker, integral stops, 36" (915mm) hose and hanger. Provide 'p' Trap, 3" (75mm). Stern Williams #T-40 S.S. Mop Hanger, triple. Stern Williams #BP S.S. Back Splash Panels, on two sides.
<b>SK-5</b>	<b><u>SINGLE BOWL SINK - STAINLESS STEEL - BACK LEDGE</u></b> Franke 'WASHROOM SYSTEMS' #LBS6807-1-3 S.S. Sink, 3 hole, 8" (203mm) centres, 20-1/2" x 20" x 7" (521mm x 508mm x 178mm) deep, counter mounted, back ledge, grade 18-8 type 302 stainless steel, single compartment, satin finished rim and bowl, self rimming, with crumb cup strainer, sound deadening and mounting kit. Chicago Faucets #786-FC-XK Faucet, C.P. 8" (203mm) C.C., below deck mounted, cast brass lead-free body, 1/4 turn ceramic disc valve cartridges, gooseneck spout with integral 7.6 LPM (2.0 GPM) flow laminar (non aerating) outlet, plain spout end and cast brass 4" (102mm) blade handles. Symmons #5-210-CK 'MAXLINE' Thermostatic Mixing Valve, extruded brass body, brass and stainless steel control components, vandal-resistant cap, with in-line strainers and checks. Mixer installed in H & CW supplies to provide tempered water to hot side of faucet - as per local codes. Temperature range 85° F (30° C) to 160° F (71° C). Set valve temperature at 120° F (49° C). (Provide tee, adaptors and flex. copper tubing to suit.) McGuire #H165N5-LR Sink Supplies, C.P. Polished Brass Sink Supplies, rigid horizontal nipples 3/8" (10mm) x 5" (127mm) long, I.P.S. heavy all brass angle stops with wheel handle stops and escutcheons, less flexible copper risers. McGuire #8912C 'p' Trap, C.P. polished cast brass adjustable body, 1-1/2" (38mm) with cleanout plug, seamless brass wall bend and escutcheon.
<b>SK-6</b>	

<b>PLUMBING FIXTURE &amp; EQUIPMENT SCHEDULE</b>	
<b>FIXTURE/EQUIPMENT TAG:</b>	<b>FIXTURE/EQUIPMENT DESCRIPTION</b>
<b>SK-7</b>	
<b>DF-1 HAWS COOLER</b>	<p><b><u>HI-LO DUAL DRINKING FOUNTAIN - STAINLESS STEEL WALL HUNG</u></b>                      Haws #1011HI-LO Fountains, wall mounted, stainless steel, 18 gauge (1.2mm) with #4 satin finish, 14" dia. (356mm) receptors, lead free, 'Soft Touch Valve' control bubblers, self-closing, automatic volume regulators, open grid strainers. Haws #6700.4 Mounting Plate, 36" (914mm) x 12" (305mm) x 3/16" (5mm) steel mounting plate that is predrilled and furnished with all thread studs, nuts and washers. McGuire #HST11BV Fountain Supplies, C.P. polished brass straight 1/4 turn all brass ball valve stops with loose key handles. McGuire #8872C-17T 'p' Trap, C.P., 17 gauge (1.5mm), brass adjustable body, 1-1/4" (32mm) and escutcheon (Trap is concealed in wall - provide access to meet local codes). Jay R. Smith #0823-2 Fountain Carrier, with plate and block base feet support.</p> <p><b><u>REMOTE WATER CHILLER</u></b>                      Haws #HCR8 Remote Chiller, to serve remote outlets as indicated, lead-free, capacity of 8GPH (30L/h), compressor, with 0.5 gal. (2.25L) stainless steel reserve storage tank, louvre air cooled with fan, hermetically sealed reciprocating type, 1/5 H.P. 120 V. single phase A.C. with insulated power cable and 3-prong moulded plug. Provide receptacle with ground fault interrupter. Housed in a galvanized steel cabinet.</p>
<b>DF-2 General Use</b>	<p><b><u>SEMI-RECESSED DRINKING FOUNTAIN - STAINLESS STEEL WALL HUNG</u></b>                      Filtrine #102-STV Fountain, wall mounted, semi recessed, heavy duty, stainless steel, 16 gauge, (1.6mm) with #4 satin finish seamless rounded inside corner one piece receptor, lead-free, 'Soft Touch Valve' cast brass control bubbler, self closing valve and automatic volume regulator and vandal resistant open grid strainer, tailpiece. Provide Fountain Supply, C.P. with metal straight stop. Provide 'p' Trap, cast brass 1-1/4" (32mm) with unions (Trap is concealed in wall - provide access to meet local codes).</p>
<b>EW-1 (H/C)</b>	<p><b><u>EMERGENCY EYE / FACE WASH S.S. RECEPTOR WALL HUNG (BARRIER FREE DESIGN) C/W MIXING VALVE</u></b>                      Haws #7360BTWC Emergency Eye/face wash, wall hung, stainless steel receptor, dual aeration spray heads with flip-top dust covers, min. 11.4 LPM (3.0 GPM) flow, in-line brass strainer, volume regulator, S.S. push handle operating ball valve with S.S. trim, offset open grid strainer, all factory assembled, wall hanger and emergency sign McGuire #8872C-17T 'p' Trap, C.P., 17 gauge (1.5mm), brass adjustable body, 1-1/4" (32mm) and escutcheon. If piping length to unit is more than 50'-0" (19.7m) provide 3/4" (19mm) CW supply to unit, 1/2" (12.7mm) connection, escutcheon. Provide adequate support in wall for eye wash mounting.</p> <p><b><u>EMERGENCY EYE / FACE WASH TEMPERED WATER MIXER (SINGLE STATION)</u></b>                      Haws #9201EW Supply Fixture, thermostatic temperature control valve, all brass and stainless steel design, with liquid filled motor, check stops, safety shut-off should cold water supply fail, hot water failure will allow cold water flow through both the fixed and variable by-pass, outlet temperature gauge, 1/2" (12mm) supplies. Tempered water factory set at 80 deg. F (26C) (Model #9201EW provides up to 7 GPM (120L) at 30psi (246kPa) drop through valve.</p>
<b>Cleanout</b>	<p><b><u>CLEANOUTS - FLOOR CLEANOUT - HEAVY TRAFFIC FINISHED AREAS</u></b>                      Jay R. Smith Series 4100 'Twis-To-Floor' Floor Cleanout, duco coated cast iron body and removable positive gasket seal closure plug and heavy duty 6" (150mm) with extra heavy nickel bronze cover and frame, secured with stainless steel screws, C.O. cast in cover. (For water-proofed areas provide 'FC' flange with flashing clamp).</p>

<b>PLUMBING FIXTURE &amp; EQUIPMENT SCHEDULE</b>	
<b>FIXTURE/EQUIPMENT TAG:</b>	<b>FIXTURE/EQUIPMENT DESCRIPTION</b>
<b>FD-1 (Finished Floor)</b>	<b><u>FLOOR DRAINS - FINISHED AREAS</u></b> Jay R. Smith Series 2005AHD Floor Drain, all duco coated cast iron body, reversible flashing clamp with seepage openings and adjustable 5" (127mm) diameter nickel bronze 1/2" (12.5mm) thick strainer, secured with S.S. screws, 4" (100mm) throat on strainer.
<b>FD-2 (Mechanical Room)</b>	<b><u>FLOOR DRAINS WITH COMBINATION FUNNEL - MECHANICAL ROOMS</u></b> Jay R. Smith Series 2320-3591 Funnel Floor Drain, all duco coated cast iron body, flashing clamp with seepage openings and adjustable 8 1/2" (216mm) diameter C.I. grate with 4" x 9" (101.6mm x 228.6mm) oval funnel.
<b>GT-1 (Kitchen)</b>	<b><u>INTERCEPTORS - GREASE INTERCEPTOR</u></b> Jay R. Smith Series 8450E Grease Interceptor, all duco coated inside & outside C.R. steel enzyme type, removable baffles, gasketed cover with lock and lift ring, integral flow control device, deep seal trap with cleanout and bottom debris trapping leg. Flow rating of 75 GPM (285LPM) and grease capacity for 150 pounds (67.9KG). For flush with floor installation provide extension 'E' as required to meet invert of pipe.
<b>HB-1</b>	<b><u>HOSE BIBB - INTERIOR - WASHDOWN</u></b> Acorn Series 8121CP Hose Valve, C.P. heavy duty polished cast brass body with integral cast flange, vandal-resistant lock shield bonnet with removable wheel handle, 3/4" (19mm) NPT female inlet and hose end vacuum breaker.
<b>RD-1 General Use (Control Flow)</b>	<b><u>ROOF DRAINS - FLOW CONTROL</u></b> Jay R. Smith Series 1083-CAN-ERCCID 'RAINTROL' Flow Control Roof Drain, all duco coated 15-1/4" (387mm) diameter cast iron body, with under deck clamp, solid extension and sump receiver, flashing clamp with seepage openings and, 11" (280mm) diameter secured cast iron dome with 6" (150mm) high flow rate control weir. (Solid extension height to suit roof construction).
<b>Trap Primers</b>	<b><u>TRAP SEAL PRIMERS - MECHANICAL</u></b> SMS INC. Series PR-500 Automatic Trap Seal Primer Valve serving 1 to 4 drains, cast brass body, serving individual or remote area drains (primer automatically activated when there is a pressure drop in the system) with 1/2" (12.7mm) NPT (MtoF) connections with strainer and integral back flow preventer & vacuum breaker. (For 2, 3 or 4 drains provide primer unit with distribution unit assembly #DU-U)
<b>Urinal Cleanouts</b>	<b><u>CLEANOUTS - URINAL CLEANOUT</u></b> Jay R. Smith Series SQ4-1819 Urinal Wall Access Cleanout, with S.S. bolt and wing nut, complete with 4" (102mm) diameter polished S.S. access cover and secured with V.P. screw.
<b>Wall Cleanout</b>	<b><u>CLEANOUTS - LINE CLEANOUT</u></b> Jay R. Smith Series 4420 Line Cleanout, in cast iron ferrule with cast bronze tapered thread plug, with full size pipe opening. Where cleanouts are concealed behind finished walls access shall be made by Smith 4422 round stainless steel plate and slotted flat head stainless steel screw.

<b>PLUMBING FIXTURE &amp; EQUIPMENT SCHEDULE</b>	
<b>FIXTURE/EQUIPMENT TAG:</b>	<b>FIXTURE/EQUIPMENT DESCRIPTION</b>
<b>Water Hammer</b>	<p><b><u>WATER HAMMER ARRESTORS</u></b>            SMS INC. Series SC Series 'Water Hammer Arrestors' with brass piston in a type 'K' copper casing size according to manufacturer's recommendations chart below to eliminate water hammer and shock from piping system. Provide Water Hammer Arrestors on hot and cold water supplies to all quick valves, solenoids, and plumbing fixtures, and locate in an upright position between the last two fixtures on a line, or horizontally at the end of line closest to supply source. On projects exceeding five stories in height, provide water hammer arrestors on domestic water risers as follows. Locate arrestors at the end of riser opposite supply source. Arrestor shall be two pipe sizes larger than the riser is at the connection point, not exceeding the largest pipe size diameter in the riser.</p>
<b>WH-1</b>	<p><b><u>NON FREEZE WALL HYDRANT - BOX - EXTERIOR</u></b>            Jay R. Smith Series 5509QT Box Type Wall Hydrant, 1/4 turn non-drip, ceramic cartridge, 3/4" (19mm) non freeze wall type with bronze face and stainless steel with full 180 deg. cover opening box, adjustable wall-flange operating key and self-draining integral vacuum breaker. Length to suit wall thickness.</p>
<b>DWH-1,2,3,4</b>	<p><b><u>DOMESTIC WATER HEATER</u></b>            Domestic water heater shall be Bradford White model EF-100T-300E-3N(A) with a rated storage capacity of not less than 379 liters (100 usgallons), a minimum gas input of 300,000 BTU/hr (88 kw), a minimum recovery of 1,268 LPH (335 USGPH/) at 56°C (100°F) temperature rise, and a Thermal Efficiency Rating of 93%. It shall be design certified by CSA International for 82°C (180°F) application, either with or without a separate storage tank. The tank shall be lined with Vitraglas vitreous enamel and shall have a bolted hand hole cleanout. The tank shall have four extruded magnesium anode rods installed in separate head couplings. This water heater shall be equipped with stainless steel cold water inlet and Hydrojet Sediment Reduction System. The heater shall be insulated with Non-CFC foam to meet ASHRAE 90.1b standard. This water heater shall be equipped with an electronic ignition system, an ASME rated T&amp;P relief valve and a premix closed combustion system for direct venting using either 76mm (3") or 102mm (4") plastic vent pipe that has been certified to ULC S636. The water heater shall be factory assembled and tested. The water heater shall be approved for zero inch clearance to combustibles. The control shall be an adjustable electronic thermostat to any temperature up to 82°C (180°F). A recycling Energy Cut Off (E.C.O.) shall shut off all gas in the event of an overheat condition. Provide complete with Manitoba Department of Labour approved concentric vent kit. The entire installation shall be made in compliance with all local codes and the requirements of the Authorities Having Jurisdiction.</p>

## PLUMBING FIXTURE & EQUIPMENT SCHEDULE

FIXTURE/EQUIPMENT TAG:	FIXTURE/EQUIPMENT DESCRIPTION
ST-1	<p><b><u>DOMESTIC HOT WATER STORAGE TANK</u></b> Domestic Hot Water Storage tank to be Bradford White Model No. NV310J-5A with a storage capacity of 1,174 liters (310 usgallons) and overall dimensions of 2,185mm (86") high x 1016mm (40") diameter. The tank shall be constructed to achieve hot water delivery of 80% of tank capacity without a drop in outlet temperature utilizing the HydroJet HC device. The tank shall have high density foam insulation, 50mm (2") thick to meet ASHRAE 90.1b standard. The tank shall be built in accordance with ASME construction and so labeled, with a working pressure of 861.6 kPa (125 PSIG). The tank lining shall be Vitraglas with a five year warranty against tank failure. The tank shall have the following standard tapping sizes: 1) Hot Water Supply 75mm (3") 2) Heater Loop 75mm (3") 3) Relief Valve Tapping 32mm (1-1/4") 4) Tank Thermostat 20mm (3/4")</p>

END OF SCHEDULE I



PART 1    SPECIFICATIONS

- .1     The boiler shall be design certified by CSA International and shall meet the requirements of ANSI Z21.13 and CSA 4.9. The boiler shall bear the ASME "H" stamp and shall be national board listed.
  
- .2     **COMBUSTION CHAMBER:**
  - .1     The Stainless Steel combustion chamber shall be designed to drain condensation to the bottom of the heat exchanger assembly. The combustion chamber shall be sealed and completely enclosed, independent of the outer jacket assembly. A build-in trap shall allow condensation to drain from the heat exchanger assembly.
  
- .3     **BURNER:**
  - .1     The burner shall be a premix design and constructed of high temperature Stainless Steel with knitted metal fiber outer covering to provide modulating firing rates. The burner shall provide equal distribution of heat through the entire heat exchanger. A window view port shall be provided for visual inspection of the boiler during firing.
  
- .4     **HEAT EXCHANGER:**
  - .1     The heat exchanger shall be inspected and tested to A.S.M.E. Section IV requirements. The A.S.M.E. Section IV seal of approval will not be provided as standard for jurisdictions not requiring the A.S.M.E Section IV seal of approval. The heat exchanger shall be a two-pass heat exchanger with maximum working pressure of 160 PSI (1100 kPa). The heat exchanger shall be gasket-less. A suitable pressure relief shall be furnished with the heater.
  
- .5     **CONTROLS:**
  - .1     The control system shall have an electronic display for boiler set up, boiler status, and boiler diagnostics. All components shall be accessible from the front of the jacket. The boiler shall be equipped with; a temperature/pressure gauge; A flow switch shall be provided loose.
  
- .6     **VENTING OPTIONS**
  - .1     The boiler shall be vented as a Category IV condensing appliance using CPVC material approved for use on condensing application under standard ULC S636 or equivalent. The following venting options shall be utilized: 1. Horizontal & Vertical Outside Air. 2. Through-Wall Venting. 3. Outdoor Venting. 4. Direct Venting.
  
- .7     **GAS TRAIN:**
  - .1     The gas train shall consist of a gas valve with a pressure regulating electro-hydraulic actuator to provide slow opening, fast closing, safety shutoff and air/gas ratio control. Ignition Module: The ignition module shall employ a direct spark ignition with 3 tries for ignition followed by lockout. Trial for ignition shall proceed with 15 seconds between retrials.
  
- .8     **EXTERNAL JACKET AND FASTENERS:**
  - .1     The external jacket shall be of stainless steel mirror finish panels and heavy gauge painted steel assembled utilizing interference fit locks and minimal non-strip self tap screws..

PART 3    SCHEDULE

<b>BOILER SCHEDULE</b>					
TAG	MANUFACTURER MODEL NO	MINIMUM GAS INPUT KW (MBH)	MAXIMUM GAS INPUT KW (MBH)	MAXIMUM OUTPUT KW (MBH)	REMARKS
B-1	CAMUS DYNAMAX MODEL 0150	8.9 (30)	44 (150)	41 (140)	Natural gas fired boiler with modulating control down to 20% of max. fire rate. Provide complete with all trim and appurtenances required by the local authorities having jurisdiction.
B-2	CAMUS DYNAMAX MODEL 0150	8.9 (30)	44 (150)	41 (140)	Natural gas fired boiler with modulating control down to 20% of max. fire rate. Provide complete with all trim and appurtenances required by the local authorities having jurisdiction.

END OF SCHEDULE J

PART 1 SPECIFICATIONS

- .1 The following are general specifications. Refer to the Individual Pump Specifications in the schedule for operating characteristics, specific requirements, and any deviations.
  - .1 Vertical In Line Centrifugal Pumps:
    - .1 Radially split casing
    - .2 Bronze fitted construction
    - .3 1200 kPa (175 psi) pressure rating
    - .4 Mechanical seal with flushing line
    - .5 Drip proof motor at 1800 rpm, unless noted otherwise
    - .6 Stainless steel shaft
    - .7 All Pump Motors shall be 208 V / 3 phase, unless noted otherwise
    - .8 All Duplex Pumps run concurrently, unless noted otherwise.
    - .9 Duplex Pumps running concurrently (Both pumps operating at the same time) are sized at 50% capacity each when both pumps are running.
      - .1 Pumps shall be selected so that the motors are non-overloading when only one pump is operating.
      - .2 Pumps shall be selected so that they are running on a usable point of their pump curve when only one pump is operating.
    - .10 Duplex Pumps running individually (one pump running, the other 100% standby) are sized for 100% individual capacity

PART 2 STANDARD OF ACCEPTANCE

- .1 All selections are based on Armstrong

<b>INFLOOR HEATING SYSTEM PUMP SCHEDULE</b>							
TAG	LOCATION & SERVICE	MFG. & MODEL & SIZE	FLUID	FLOW L/S (USGPM)	HEAD kPa (feet)	MOTOR KW/V/Φ (HP/V/Φ)	NOTES
IFP-1A	Infloor Heating Duplex Pump 50% Standby	Armstrong 4380 1.5x1.5x8	Water	1.14 (18)	167.2 (56)	1.2/208/3 (1.5/208/3)	Bronze Fitted Construction, 1800 rpm, Op Temp = 120°F
IFP-1B	Infloor Heating Duplex Pump 50% Standby	Armstrong 4380 1.5x1.5x8	Water	1.14 (18)	167.2 (56)	1.2/208/3 (1.5/208/3)	Bronze Fitted Construction, 1800 rpm, Op Temp = 120°F

END OF SCHEDULE N

PART 1 SPECIFICATIONS

- .1 The following are general specifications. Refer to the Individual Electric Coil Specifications in the schedule for operating characteristics, specific requirements, and any deviations.
- .2 Frame shall be galvanized steel with either flanged duct connections or suitable for insertion into the side or bottom of a duct, as scheduled. Mounting flanges shall be independent of the terminal box so as to allow installation without opening the box or drilling into it.
- .3 Resistance heating elements shall be of high grade nickel-chrome alloy and shall be insulated by floating ceramic bushings from the galvanized steel frame. Coil terminal pins shall be stainless steel insulated by means of non-rotating ceramic bushings.
- .4 Duct heaters shall be non-sensitive to air flow direction and interchangeable for horizontal or vertical ducts. Heater shall be CSA approved for zero clearance in horizontal ducts.
- .5 Refer to the Individual Electric Coil Specifications in the schedule for heating outputs and staging. In general, heating and reheat coils up to 5 kw shall be single stage on/off, heating and reheat coils 5 kw and over shall be two stage on/off, and pre-heat coils shall be single stage with SCR control.
- .6 Physical size shall conform to the duct size, but shall not result in air velocity less than 140 m/min (450 fpm) nor a watt density higher than 4.5 watts/cm<sup>2</sup> (30 watts/in<sup>2</sup>).
- .7 Heater shall be c/w an integral control cabinet with a hinged door, to enclose the required terminal strips, lugs, and control components. All controls shall be pre-wired.
- .8 Standard power and control components shall include:
  - .1 Single point power supply
  - .2 Control transformer as required, c/w individual fuse or breaker
  - .3 Power and control terminals
  - .4 Magnetic contactors
  - .5 Automatic reset over heat protection
  - .6 Manual reset over heat protection
  - .7 Air pressure differential switch for auto-shut-off on low air flow
- .9 Optional power and control components to be included, shall include:
  - .1 Disconnect switch
  - .2 SCR (modulating) controller
  - .3 Integral discharge temperature sensor/controller
- .10 Maximum Air Pressure Drop: 56 kPa (0.25" H<sub>2</sub>O)

PART 2 STANDARD OF ACCEPTANCE

- .1 Products as manufactured by Caloritec, Thermolec and Chromalox are acceptable.

PART 3    SCHEDULE

<b>ELECTRIC HEATING COIL SCHEDULE: (BASED ON THERMOLEC)</b>									
TAG	LOCATION	SERVING	TYPE	DUCT SIZE mm (INCHES)	POWER		AIR FLOW L/S (CFM)	TEMP RISE (F)	OPTIONS
					KW	(V/PH)			
EHC- HRV--1	MECH. MEZZ. RM 203	HRV-1	OPEN COIL	800x400 (32"x16")	100	575/3	1415 (3000)	105	1-2-3
<p>NOTES:            STANDARD BUILT-IN CONTROLS: ALL DUCT HEATERS SHALL BE COMPLETE WITH THE FOLLOWING BUILT-IN CONTROLS: HIGH LIMIT CUT-OUTS, MAGNETIC CONTACTORS AS REQUIRED, CONTROL TRANSFORMER, AND AIR FLOW SENSOR. ALL HEATER CONTROL PANELS SHALL BE CAPABLE OF BEING INSTALLED IN A HORIZONTAL PLAIN. REFER TO ELECTRICAL DRAWING FOR VOLTAGE AND PHASE INFORMATION.</p> <p>OPTIONS:        1) BUILT-IN DISCONNECT SWITCH.                              2) SCR PROPORTIONAL CONTROLLER                              3) SCREENS BOTH SIDES</p>									

END OF SCHEDULE L

PART 1 SPECIFICATIONS

- .1 GAS-FIRED, SEPARATED COMBUSTION UNIT HEATERS
  - .1 Provide CSA certified 82%-83% high-efficiency, separated-combustion, power vented, gas-fired unit heaters. The unit shall be designed for use in a building with negative pressures up to 0.15" W.C.
- .2 FUEL
  - .1 Unit heater shall be equipped for use with natural gas. Gas connection shall be external to the cabinet.
- .3 HEAT EXCHANGER
  - .1 The heater shall be equipped with a multi-cell, 4 pass serpentine style steel heat exchanger. Heat exchanger tubes shall be press fabricated of titanium stabilized, corrosion resistant aluminized steel. All heat exchangers shall be fabricated with no welding or brazing, only tool pressed mechanical joints. All heat exchanger cells shall be designed with an aerodynamic cross section to provide maximum airflow.
- .4 BURNER
  - .1 The units shall incorporate a single, one piece burner assembly with a single orifice. The burner shall have a continuous wound close pressed stainless steel ribbon separating the flame from the burner interior. All units shall have a single venturi tube and orifice supplying fuel to a one-piece burner housing. Each heat exchanger cell shall use balanced draft induction to maintain optimum flame control.
- .5 CONTROLS
  - .1 Controls shall include a two-stage gas valve; direct spark multi-try ignition with electronic flame supervision with 100% lockout integrally controlled via a printed circuit control board. The control board shall also incorporate diagnostic lights, DIP switches for fan overrun settings, and a relay for fan only operation. All units shall be equipped with a safety limit switch.
  - .2 All controls shall be enclosed in the sealed control compartment to protect them from accidental damage, dust, and atmospheric corrosion.
- .6 COMBUSTION AIR AND VENTING
  - .1 The unit shall have a factory-installed power venter device to draw combustion air from outside of the building. The outside air shall enter the unit through a factory-installed round inlet air terminal on the rear of the heater. The control compartment shall be sealed and the access door shall be gasketed to prevent dirt, lint, dust, or other contaminants present in the heated space from entering the unit. The control compartment door shall be equipped with a safety interlock switch to prevent operation when the door is open.
  - .2 The combustion air supply pipe and flue exhaust pipe shall be run in parallel from the heater to a factory supplied concentric adapter assembly, which allows for a single wall or roof penetration, to the vertical air inlet and vent terminal.
  - .3 The combustion air/venting system shall include a vibration isolated power venter motor and wheel assembly and a combustion air pressure switch and a flame rollout switch.
- .7 ELECTRICAL
  - .1 Operation shall be controlled by an integrated circuit board that includes LED diagnostic indicator lights. Supply voltage connections shall be made in a sealed junction box. 24-volt control connections shall be made on an externally mounted terminal strip with connections (W1, W2, R, and G). All internal wiring, both line and control voltages, shall be terminated by insulated terminal connectors to minimize shock hazard during service.

- .8 CABINET
  - .1 Each unit shall be equipped for use with 115/1 volt power supply.
  - .2 All units will be equipped with a built-in disconnect switch.
  - .3 The cabinet shall be low profile with a pre-coat or powdercoat RAL 1001 white paint finish. Finish shall be a minimum 80 gloss on G30 galvanized steel.
  - .4 The unit shall be designed for ceiling suspension.
  - .5 The cabinet shall be equipped with RAL 3005 burgundy painted, roll-formed horizontal louvers with Downturn nozzle.
  - .6 The cabinet shall be equipped with a full safety fan guard. The enclosed motor and fan assembly shall be resiliently mounted to the cabinet to reduce vibration and noise.
  - .7 The unit shall be designed with a full opening service access panel complete with screw closure attachment and lifting handle for removal. Service panel shall be fully gasketed and equipped with a safety interlock switch. All components in the gas train, all standard electrical controls, and the power venter shall be within the sealed service compartment.

PART 3    SCHEDULE

<b>GAS FIRED UNIT HEATER SCHEDULE</b>							
TAG	MAKE	MODEL	AIR CFM (l/s)	INPUT MBH (kw)	OUTPUT MBH (kw)	MOTOR HP (kw)	REMARKS
GUH-1	Reznor	UDAS 100	1345 (635)	105.0 (30.8)	87.2 (25.5)	0.25 (0.2)	Two stage separated combustion air unit heater with vertical concentric combustion air/vent roof termination kit, TEFC motor, two stage thermostat, thermostat guard, and adjustable downturn nozzle

END OF SCHEDULE M

**PART 1 SPECIFICATIONS**

- .1 GENERAL
  - .1 Contractor shall furnish and install Direct Expansion coils, manufactured by York to meet the performance requirements set forth in the schedule. Coils shall be available for R-22.
- .2 CERTIFICATION
  - .1 All coils shall have performance certified in accordance with ARI Standard 410.
- .3 TUBES
  - .1 All coils shall have 5/8" OD seamless copper tube arranged in a staggered pattern perpendicular to the air flow. The copper tubes shall be firmly bonded to the fins by mechanical expansion.
- .4 HEADER AND DISTRIBUTORS
  - .1 All headers shall be of heavy seamless copper tubing or brass, as dictated by the schedule, and shall be silver brazed to the tubes. The refrigerant distributor shall be of the venturi type for even distribution of refrigerant and low-pressure drop, sized for the required duty and silver brazed to the distributor tubes. All piping connections shall be of 1/4" or 5/16" round seamless copper sized for the required duty and of equal length for maximum distributor efficiency.
- .5 FINS
  - .1 Aluminum fins shall be available in either 0.010" thickness and copper fins shall be available in 0.006" thickness. All shall have a die-formed corrugation with guide channels to create a turbulent wiping action behind the tubes and minimize moisture carry-over. Fins shall have fully drawn collars for accurate spacing and to maximize fin tube contact. Fins shall be firmly bonded by mechanical expansion to increase heat transfer and ensure reliable. Fins shall be continuous across entire width of the coil up to 48-1/4".
- .6 CASING
  - .1 The casing shall be a full channel, die formed, mill galvanized steel and provide ample shipping and stacking support for the fin bundle. Tube sheets shall have extruded collars for tube support and to prevent damage due to expansion and contraction of the fin bundle. Intermediate coil casing channel supports shall be provided on coils with a fin length greater than 62"; two supports above 100". Casing channels shall be free draining, without depressions to prevent moisture and contaminants collection.
- .7 FACE SPLITS
  - .1 Face splits shall be available when single coil total MBH exceeds 500 MBH or for multiple compressors applications. The minimum split section shall never be less than 6 tubes high. Coil face splits should be of equal number of tubes to provide equal refrigerant load splits.
- .8 ROW CONTROL
  - .1 Row control shall be available by selecting two or more coils positioned in series.
- .9 TESTING AND WORKING PRESSURE
  - .1 All coils, including headers, return bends, and distributors, shall be designed to conform to the ANSI B9.1 (Safety Code for Mechanical Refrigeration) when operating with a refrigerant pressure not exceeding 325 PSIG and shall be tested with 325 PSIG compressed air under water.

**PART 2 STANDARD OF ACCEPTANCE**

- .1 Base Bid: All selections are based on York Cooling Coils.

**CONDENSING UNIT SCHEDULE**

NO.	SERVICE	MAKE	MODEL	EAT (F) DB/WB	TOTAL CAP (MBH) TOTAL/SENS	COIL SIZE (IN) H X W	AIR FLOW (CFM)	REF.	REMARKS
DX-HRV-1	HRV	York	DX Coil	90 / 73	130 / 83	32 X 34	3,770	R-22	1

Table Notes:

- 1. Stainless steel drain pan supplied and installed by contractor.