

HVAC Replacement Assessment

Batoche NHS Admin Building

Parks Canada

Client Project reference: 5P420-17-5371
AECOM Project number: 60554072

January 10, 2019

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Introduction

AECOM has prepared this report on the Heating, Ventilation and Air Conditioning (HVAC) system of the Administration and Maintenance Building for the AECOM project manager.

Background

The Batoche Administration and Maintenance Building rooftop HVAC equipment requires replacement for it is beyond its useful life and components have failed.

Comments from Parks Canada regarding the Batoche Administration and Maintenance Building are as follows:

- One cannot use the make-up air handling unit as the gas heating section does not work, and it will lower the building temperature;
- Air conditioning (condensing unit) is only running one compressor of two and cannot meet cooling demand;
- Office across from coffee (staff) room has too much airflow, which results in convection cooling and is uncomfortable for the employee;
- There is no ductwork to the office in the northeast corner of the building - next to the tractor bay;
- There is no duct work in tractor bay, but it does have a radiant heater;
- One has had to run fan continuously to keep the air handling unit running, otherwise the fan motor goes out on thermal limit, and fan compartment gets too warm before controls energize the fan.

Requirements

Review the existing HVAC design and reference documents. Provide analysis and recommendations for changes to the existing HVAC system.

Climatic Data

2015 National Building Code of Canada

Province and Location	Elev. m	Design Temperature				De- gree- Days Below 18°C	15 Min. Rain, mm	One Day Rain, 1/50, mm	Ann. Rain, mm	Moist. Index	Ann. Tot. Ppn., mm	Driv- ing Rain Wind Pres- sures, Pa, 1/5	Snow Load, kPa, 1/50		Hourly Wind Pressures, kPa	
		January		July 2.5%									S _s	S _r	1/10	1/50
		2.5% °C	1% °C	Dry °C	Wet °C											
Prince Albert	435	-37	-40	28	21	6100	20	81	320	0.51	410	140	1.9	0.1	0.29	0.38

**We used Prince Albert as the reference city because it is the closest geographically.*

Heating

The client has requested AECOM to perform an assessment if the existing equipment which is due for replacement is still adequate for the building which underwent space changes and expansion.

Ventilation

The NBC section 6.3.1.1. Required Ventilation clause (2) states “*Except in storage garages covered by Article 6.3.1.4., the rates at which outdoor air is supplied in buildings by ventilation systems shall be not less than the rates required by ANSI/ASHRAE 62, “Ventilation for Acceptable Indoor Air Quality” (except Addendum n).*”

For spaces identified as a Storage Garage. The NBC section 6.3.1.4. Ventilation of Storage Garages clause (1.c) states “*provide, during operating hours, a continuous supply of outdoor air at a rate of not less than 3.9 L/s for each square metre of floor area.*”

A-6.3.1.4.(1) *Storage Garages.* Areas where motor vehicles are parked with the engine off for extended periods of time, such as car dealership showrooms, are not considered as storage garages.

A-6.3.1.4.(2) *Ventilation of Storage Garages.* Storage garages are ventilated to protect occupants from exposure to carbon monoxide and other vehicular exhaust fumes. In certain cases, such as small two-or three-bay storage garages that are used for occasional vehicle storage, and where occupants are not present, carbon monoxide or nitrogen dioxide monitoring devices may be omitted if the ventilation system is interlocked with a local light switch or other controls to ensure continuous system operation whenever the area is occupied. In any event, the ventilation system capacity must be designed to limit the concentrations of carbon monoxide or nitrogen dioxide at or below the prescribed values.

Assumptions

AECOM has assumed the following:

- Tractor bay vehicles are only used on summertime only and building personnel does not generally occupy the space when a vehicle is operating;
- The maintenance for the vehicles is all done in the mechanic's bay;
- Personnel occupancy density is based on ASHRAE 62.1-2001.

Analysis

Ventilation

Outdoor Air Requirement before modifications

Table 1 summarizes the requirement for outdoor air and also shows which rooms are modified. The original floor plan is also shown in Appendix A.

Room (New)	Room (Old)	O/A Req	
		L/s	CFM
"WAJAX" Storage Shop	Pumper Storage	140	296.69
IT Room	Staff Room	70	148.34
Washroom 1			
Staff Room			
North Vestibule	North Vestibule	50	105.96
Washroom 2	Washroom 2		0.00
Open Office	General Office	140	296.69
Office 1	Supervisor	50	105.96
Office 2	Storage	60	127.15
Mail/Copier			
Carpentry Shop	Workshop	375	794.70
Office 3			
Office 4			
Mechanic's Bay	Equipment Garage	285	603.97
Boardroom	Storage		
South Vestibule			
Tractor Bay	N/A		
Total		1,170	2,479.45

Table 1. Initial Outdoor Air Requirement

Existing Duct

AECOM was informed that the existing duct was not modified after the expansion causing air flow imbalance and different space temperatures as some spaces are not supplied with air while others are oversupplied.

Current Outdoor Air Requirements

AECOM has determined that a reassessment of supplied outdoor air is in order due to the changes in the space classification. Also, most of the space that is modified is from a storage space into an office space where it will need more outdoor air supplied. From Figure 1. We can see the spaces that are modified and the new occupancy of the room.

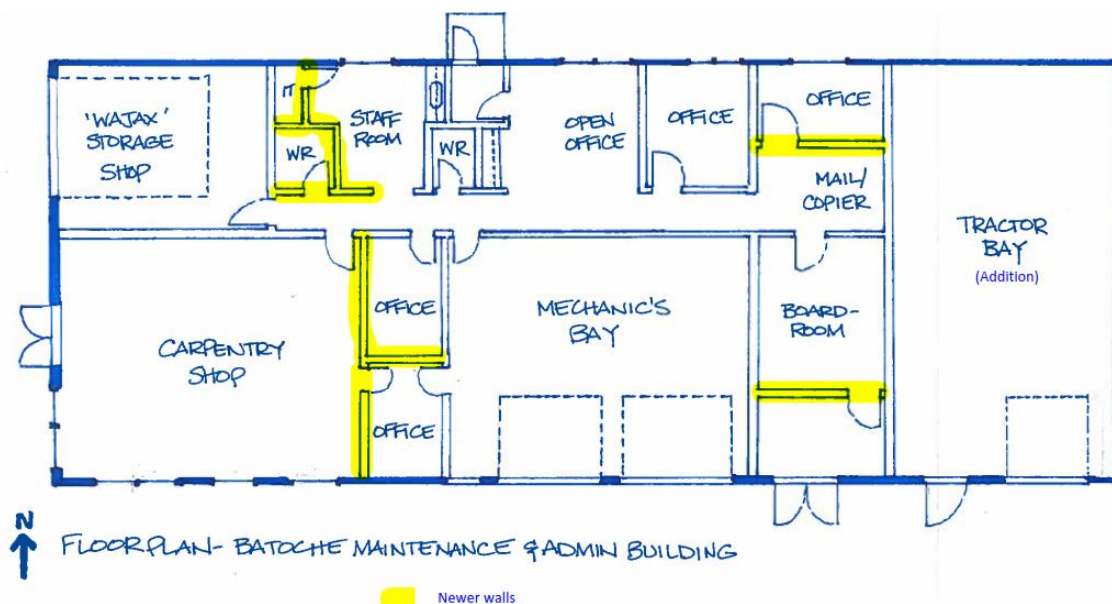


Figure 1 Revised Floor Plan

Rooms that have a new Occupancy Classification

A. Carpentry Shop (formerly Workshop)

AECOM has determined that the conversion of some of this space from a workshop into an office space reduced the Outdoor Air requirement. The new offices need an outdoor air supply.

B. Boardroom and South Vestibule (formerly storage)

AECOM has determined that this modified space will require an air supply because as shown in Appendix A there is no ducts heading into the space.

C. Office and Mail/Copier (formerly storage)

AECOM has determined that the duct supplying this space has to be extended so the office can get fresh air directly, not just transfer air or infiltration.

D. Tractor Bay (Additional room attached to the building)

AECOM has determined that this space has no impact with the capacity of the equipment but additional outdoor AIR needs to be redirected to the space from the existing duct.

Room	Floor Area	Floor Area	Fresh Air Requirement		Occupancy	O/A Req	Remarks
	m ²	ft ²	per person	per area		CFM	L/s
"WAJAX" Storage Shop	33.93	365.26	20	0.18	4	145.75	68.77
IT Room	2.02	21.75	50		1	50.00	23.59
Washroom 1	4	43.06		0		0.00	0.00
Staff Room	19.73	212.39	20		6	120.00	56.63
North Vestibule	3.35	36.06		0.10		3.61	1.70
Washroom 2	3	32.29		0		0.00	0.00
Open Office	25.83	278.06	20	0	2	40.00	18.88
Office 1	12.83	138.11	20	0	2	40.00	18.88
Office 2	10	107.65	20	0	2	40.00	18.88
Mail/Copier	15.56	167.50	20		2	40.00	18.88
Carpentry Shop	69.79	751.29	10	0.18	6	195.23	92.13
Office 3	9.22	99.25	20	0	2	40.00	18.88
Office 4	8.98	96.67	20	0	2	40.00	18.88
Mechanic's Bay	68.91	741.81		1.5		1112.72	525.07
Boardroom	19.61	211.10	20	0	11	220.00	103.81
South Vestibule	10.8	116.26		0.10		11.63	5.49
Tractor Bay	87.73	944.41		0.15		141.66	66.85
Total						2240.59	1057.29

Table 2. Revised Outdoor Air Requirement

Heating

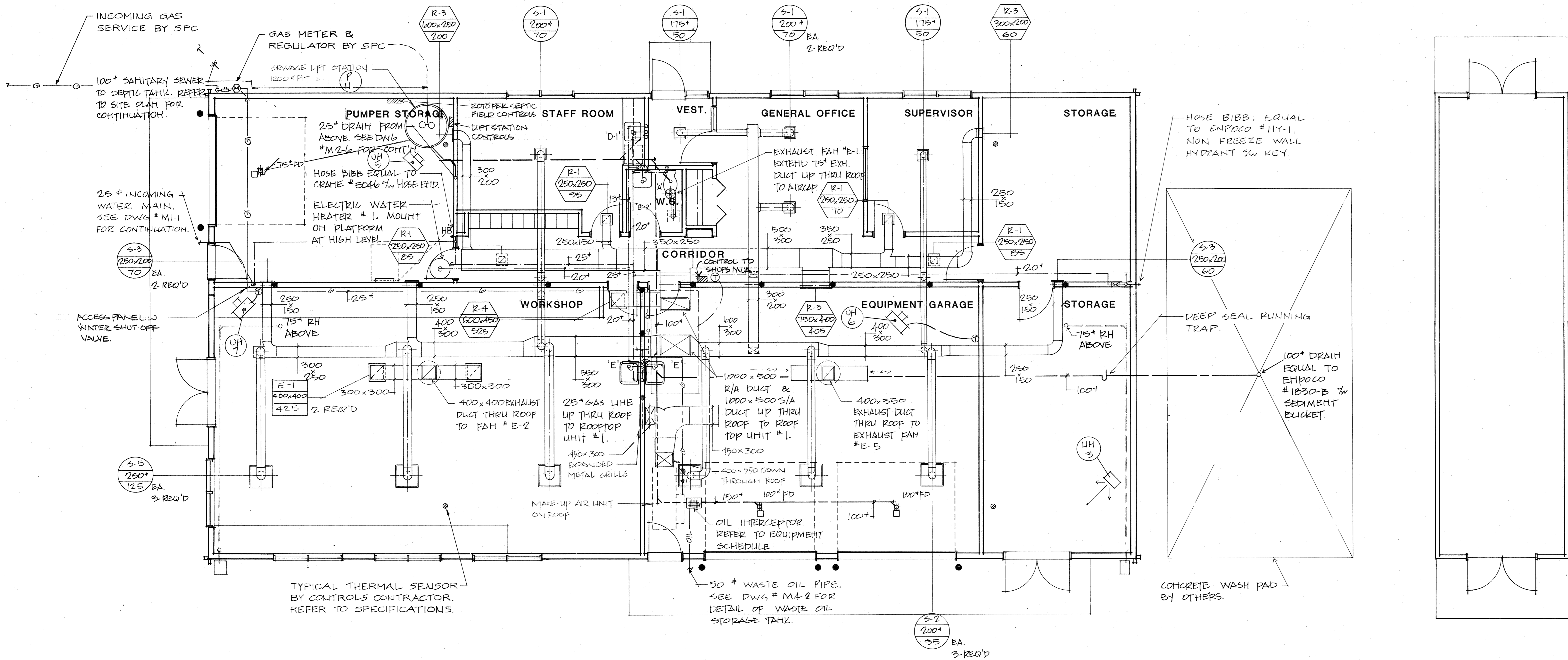
The heating load is lower as the need for outdoor air is lower too. The difference is not significant enough to warrant a change in equipment. Please refer to the attached HAP Report for more details.

Conclusion

It is recommended that the following actions be taken to rectify the HVAC system in the Administration and Maintenance Building.

1. Supply and install both supply and return ductwork to occupied spaces;
2. Demolition existing HVAC rooftop equipment;
3. Supply and install new HVAC rooftop equipment that matches existing performance; except the make-up air unit shall have an indirect gas-fired heat section;
4. Conduct thorough testing, adjusting and balancing of the HVAC systems.
5. Commission the new and existing HVAC systems.

Appendix A - Drawings



1	APR 86	PROJECT RECORD DRAWING	TMI	
no.	date	description	drawn by trace par	app'd by appr. par
revision / révision				

CONSULTANTS

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ARCHITECTS
IKOY FILE - 82-204

Yoneda & Associates Ltd.

CERTIFICATE OF AUTHORIZATION
REFERENCE NUMBER 83-905

Parks
CanadaParcs
Canada

Engineering and Architecture

Génie et architecture

project title / titre du projet

CONTEMPORARY FACILITIES
BATOCHÉ NATIONAL HISTORIC SITE

BATOCHÉ SASKATCHEWAN

drawing title / titre du dessin

MAINTENANCE BUILDING
PLUMBING & VENTILATION

designed by / conception p

DA

drawn by / tracé par

BL

checked by/vérifié

DA 0

project asset number / numéro du projet d'immobilisation

1. *Journal of the American Medical Association*, 2000; 283: 2686-2692.

reference / drawing number / numéro de référence / dessin

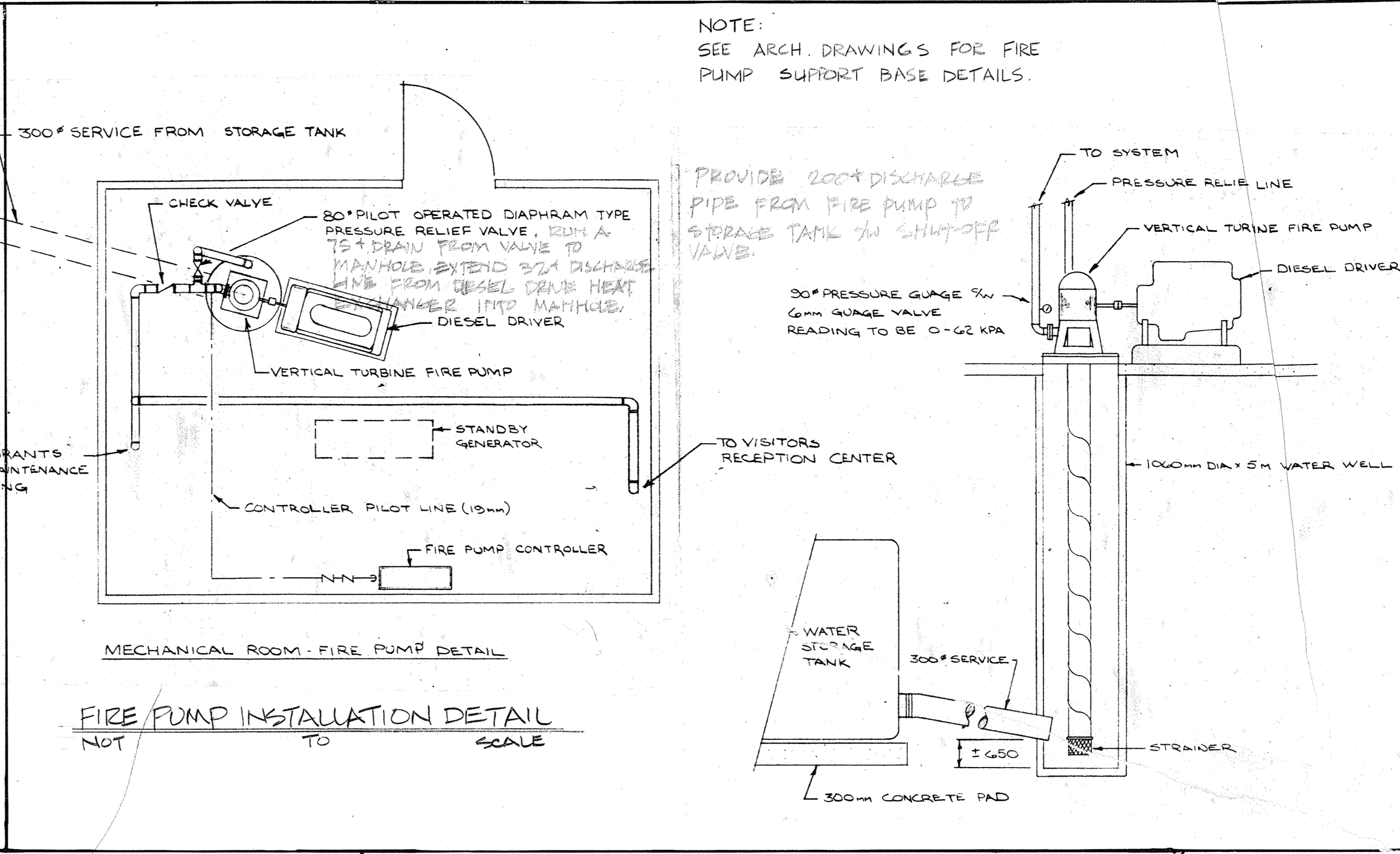
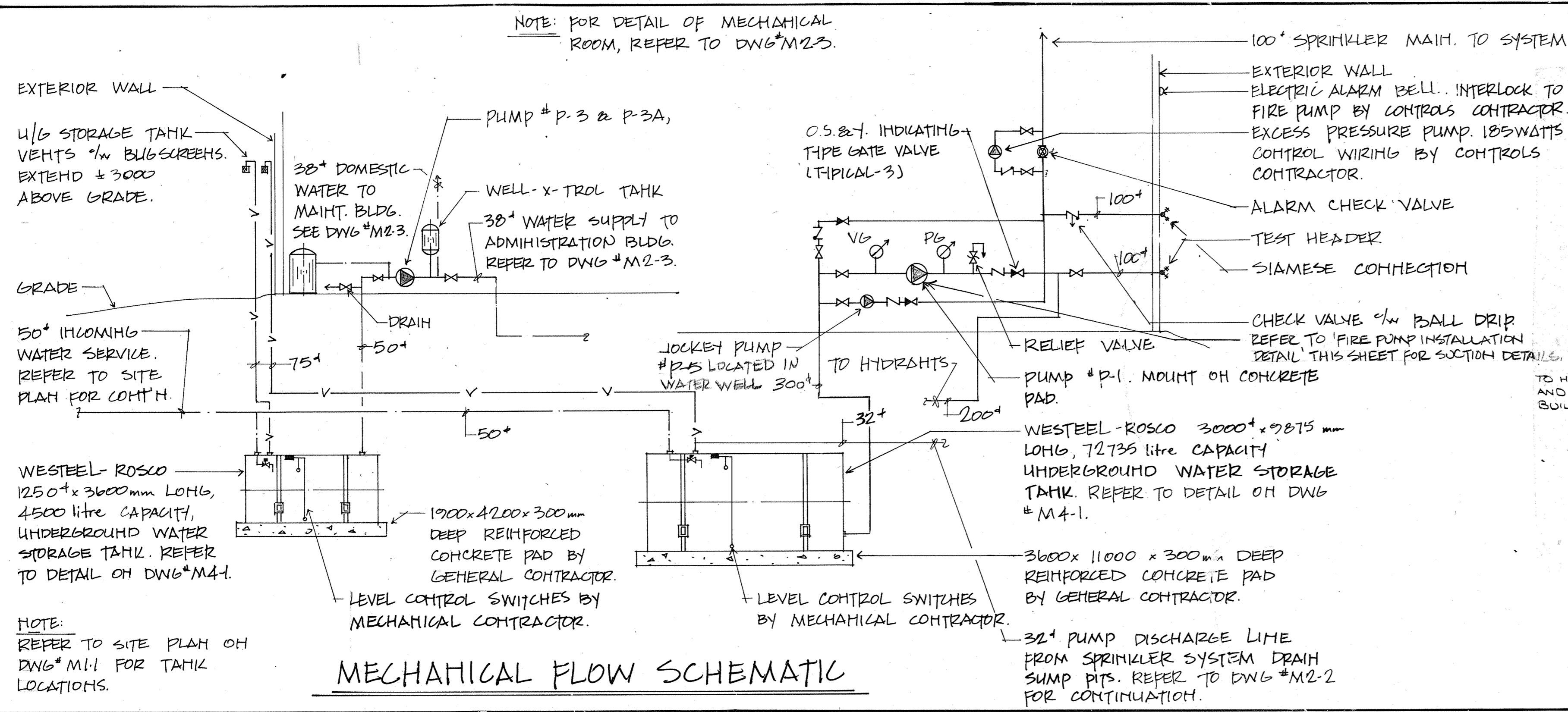
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M2.5

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B.O.



MECHANICAL FLOW SCHEMATIC

NOTE: REFER TO SITE PLAN ON DWG#M11 FOR TANK LOCATIONS.

ENGINEERED AIR MODEL PW-3-82-6200 PACKAGED HEAT/COOL ROOFTOP UNIT, 58.6 kW HEATING INPUT, 46.9 kW HEATING OUTPUT, 27.8 kW COOLING CAPACITY AT ARI STANDARD CONDITIONS, 1170 l/s AT 175 Pa S.P., 750 W BLOWER MOTOR, 560 W CONDENSER FAN, TWO COMPRESSORS AT 2.3 kW EACH. UNIT c/w HEAT/COOL T'STAT, STARTER, FILTERS, ROOF MOUNTING FRAME, ECONOMIZER SECTION. WEATHERPROOF DISCONNECT BY ELECTRICAL CONTRACTOR. 240V/1 PHASE. PROVIDE TIME DELAY RELAYS AS REQUIRED SUCH THAT COMPRESSORS WILL START IN SUCCESSION, ONE AT A TIME.

VENTILATION UNIT # 1. (Administration)

LENNOX MODEL QCS9-511-150 HEAT/COOL ROOFTOP UNIT, 44 kW HEATING INPUT, 33 kW HEATING OUTPUT, 14.5 kW COOLING CAPACITY AT ARI STANDARD CONDITIONS, 775 l/s AT 125 Pa S.P., 560 W BLOWER MOTOR, 190 W CONDENSER FAN. UNIT c/w HEAT/COOL T'STAT, STARTER, FILTERS, ROOF MOUNTING FRAME, ECONOMIZER SECTION. WEATHERPROOF DISCONNECT BY ELECTRICAL CONTRACTOR. 240V/1 PHASE. MINIMUM CIRCUIT AMPCITY: 41.0 AMPS.

VENTILATION UNIT # 2. (Administration)

LENNOX MODEL QCS9-651-150 HEAT/COOL ROOFTOP UNIT, 44 kW HEATING INPUT, 33 kW HEATING OUTPUT, 17.4 kW COOLING CAPACITY AT ARI STANDARD CONDITIONS, 945 l/s AT 125 Pa S.P., 560 W BLOWER MOTOR, 190 W CONDENSER FAN. UNIT c/w HEAT/COOL T'STAT, STARTER, FILTERS, ROOF MOUNTING FRAME, ECONOMIZER SECTION. WEATHERPROOF DISCONNECT BY ELECTRICAL CONTRACTOR. 240V/1 PHASE. MINIMUM CIRCUIT AMPCITY: 40.5 AMPS.

VENTILATION UNIT # 3. (Theatre)

ENGINEERED AIR MODEL PW-10-255-3300 PACKAGED HEAT/COOL ROOFTOP UNIT, 176 kW HEATING INPUT, 141 kW HEATING OUTPUT, 87.9 kW COOLING CAPACITY AT ARI STANDARD CONDITIONS, 5170 l/s AT 185 Pa S.P., 5.6 kW BLOWER MOTOR, 3.7 kW RETURN AIR FAN, TWO 1.2 kW CONDENSER MOTORS. UNIT c/w HEAT/COOL T'STAT, STARTER, FILTERS, ECONOMIZER SECTION. WEATHERPROOF DISCONNECT BY ELECTRICAL CONTRACTOR. 240V/1 PHASE. MINIMUM CIRCUIT AMPCITY: 216 AMPS. PROVIDE TIME DELAY RELAYS AS REQUIRED SUCH THAT COMPRESSORS WILL START IN SUCCESSION, ONE AT A TIME.

VENTILATION UNIT # 4 & 4A. (Grand Passage)

ENGINEERED AIR MODEL PW-6-153-S300 PACKAGED HEAT/COOL ROOFTOP UNIT, 87.9 kW HEATING INPUT, 70.3 kW HEATING OUTPUT, 45.7 kW COOLING CAPACITY AT ARI STANDARD CONDITIONS, 2600 l/s AT 125 Pa S.P., 2.3 kW BLOWER MOTOR, 1.5 kW RETURN AIR FAN, TWO 1.2 kW CONDENSER FAN, THREE COMPRESSORS AT 3.7 kW EACH. UNIT c/w HEAT/COOL T'STAT, STARTER, FILTERS, ROOF MOUNTING FRAME, ECONOMIZER SECTION. WEATHERPROOF DISCONNECT BY ELECTRICAL CONTRACTOR. 240V/1 PHASE. PROVIDE TIME DELAY RELAYS AS REQUIRED SUCH THAT COMPRESSORS WILL START IN SUCCESSION, ONE AT A TIME.

VENTILATION UNIT # 5. (Exhibit Hall Display Cases)

LENNOX MODEL GC54-311-90 HEAT/COOL ROOFTOP UNIT, 26.4 kW HEATING INPUT, 19.8 kW HEATING OUTPUT, 9.0 kW COOLING CAPACITY AT ARI STANDARD CONDITIONS, 520 l/s AT 185 Pa S.P., 373 W BLOWER MOTOR, 190 W CONDENSER FAN. UNIT c/w HEAT/COOL T'STAT, STARTER, FILTERS, ROOF MOUNTING FRAME, ECONOMIZER SECTION. WEATHERPROOF DISCONNECT BY ELECTRICAL CONTRACTOR. 240V/1 PHASE. MINIMUM CIRCUIT AMPCITY: 26.6 AMPS.

VENTILATION UNIT # 6. (Exhibit Hall)

ENGINEERED AIR MODEL PW-3-82-S175 PACKAGED HEAT/COOL ROOFTOP UNIT, 51.3 kW HEATING INPUT, 41.0 kW HEATING OUTPUT, 31.1 kW COOLING CAPACITY AT ARI STANDARD CONDITIONS, 1425 l/s AT 175 Pa S.P., 1.2 kW BLOWER MOTOR, 750 W RETURN AIR FAN, 560 W CONDENSER FAN, TWO COMPRESSORS AT 2.3 kW EACH. UNIT c/w HEAT/COOL T'STAT, STARTER, FILTERS, ROOF MOUNTING FRAME, ECONOMIZER SECTION. WEATHERPROOF DISCONNECT BY ELECTRICAL CONTRACTOR. 240V/1 PHASE. PROVIDE TIME DELAY RELAYS AS REQUIRED SUCH THAT COMPRESSORS WILL START IN SUCCESSION, ONE AT A TIME.

NOTE:

1. SUPPLY AND RETURN FAN STOP/START CONTACTS SHALL BE WIRED TO A TERMINAL STRIP.
2. CONTROLS FOR ROOFTOP UNIT ECONOMIZERS SHALL NOT BE ELECTRONIC CONTROL.
3. MOTORIZED DAMPERS AND OPERATORS FOR VENTILATION UNITS SHALL BE PROVIDED BY CONTROLS CONTRACTOR FOR INSTALLATION AT FACTORY.
4. REFER TO SECTION 19950 IN SPECIFICATIONS FOR FURTHER DETAIL.

SUPPLY FAN # S-1. (Mechanical Room)

WOODS MODEL 24GJ AEROPOLL FAN, 3500 l/s AT 125 Pa S.P., 24 DEGREE BLADE PITCH ANGLE, 1.2 kW MOTOR AT 1140 RPM. SUSPEND FAN BY 4 STEEL RODS c/w VIBRATION ISOLATORS. DISCONNECT BY ELECTRICAL CONTRACTOR. 240V/1 PHASE.

HUMIDIFIER # 1. (Vent Unit # 5.)

NORTEC MODEL # ES-300 ELECTRONIC STEAM HUMIDIFIER, 7.7 kg/hr STEAM OUTPUT, 400 mm MANIFOLD LENGTH, 5.8 kW ELECTRICAL INPUT. 240V/1 PHASE.

HUMIDIFIER # 2. (Display Case)

NORTEC MODEL # ES-200 ELECTRONIC STEAM HUMIDIFIER, 4.0 kg/hr STEAM OUTPUT, 3.4 kW ELECTRICAL INPUT. 240V/1 PHASE. 300mm MANIFOLD LENGTH. MOUNT MANIFOLD WITHIN DISPLAY CASE. CO-ORDINATE ON SITE WITH PARKS CANADA PERSONNEL.

HUMIDIFIER # 3. (Vent Unit # 1.)

NORTEC MODEL # ES-300 ELECTRONIC STEAM HUMIDIFIER, 7.7 kg/hr STEAM OUTPUT, 450 mm MANIFOLD LENGTH, 5.8 kW ELECTRICAL INPUT. 240V/1 PHASE.

EXHAUST FAN # E-1. (Maintenance Building)

BROAN MODEL #660 EXHAUST FAN, 30 l/s AT 35 Pa S.P. FAN c/w DELUXE GRILLE, 60 W MOTOR. 120V/1 PHASE.

EXHAUST FAN # E-2. (Work Shop)

GREENHECK MODEL CRB-14-5 ROOF MOUNTED EXHAUST FAN, 850 l/s AT 125 Pa S.P., 373 W MOTOR AT 1230 RPM. UNIT c/w ROOF MOUNTING CURB, BIRDSCREEN AND BACKDRAFT DAMPER. 240V/1 PHASE.

EXHAUST FAN # E-3. (Administration)

PHILLIPS-LAU MODEL DUA-9 DUCT BLOWER, 330 l/s AT 125 Pa S.P., 190 W MOTOR AT 820 RPM. UNIT c/w INSULATED CABINET AND BACKDRAFT DAMPER. SUSPEND FROM JOISTS c/w VIBRATION ISOLATORS. 120V/1 PHASE.

EXHAUST FAN # E-4. (Administration)

PHILLIPS-LAU MODEL DUA-7 DUCT BLOWER, 190 l/s AT 125 Pa S.P., 125 W MOTOR AT 860 RPM. UNIT c/w INSULATED CABINET AND BACKDRAFT DAMPER. SUSPEND FROM JOISTS c/w VIBRATION ISOLATORS. 120V/1 PHASE.

EXHAUST FAN # E-5. (Equipment Garage)

GREENHECK MODEL CHE-14-4 ROOF MOUNTED EXHAUST FAN, 700 l/s AT 125 Pa S.P., 190 W MOTOR AT 1020 RPM. UNIT c/w ROOF MOUNTING CURB, BIRDSCREEN AND BACKDRAFT DAMPER. 120V/1 PHASE.

EXHAUST FAN # E-6. (Concession)

GREENHECK MODEL CSP-60 EXHAUST FAN, 320 l/s AT 94 Pa S.P., 125 W MOTOR AT 1050 RPM. UNIT c/w INSULATED CABINET, GRILLE, BACKDRAFT DAMPER AND SPEED CONTROLLER. WIRING BY ELECTRICAL CONTRACTOR. 120V/1 PHASE.

ELECTRIC WATER HEATER # 1 (Maintenance Building)

JOHN WOOD MODEL JW-309-SE ELECTRIC WATER HEATER, 1.5 kW SINGLE ELEMENT, 113 liter STORAGE CAPACITY. UNIT c/w P&T RELIEF VALVE AND AUTO CONTROLS. WIRING BY ELECTRICAL CONTRACTOR. 120V/1 PHASE.

ELECTRIC WATER HEATER # 2 (Administration)

JOHN WOOD MODEL JW-405-SE ELECTRIC WATER HEATER, 1.5 kW SINGLE ELEMENT, 136 liter STORAGE CAPACITY. UNIT c/w P&T RELIEF VALVE AND AUTO CONTROLS. WIRING BY ELECTRICAL CONTRACTOR. 120V/1 PHASE.

ELECTRIC FORCE-FLD HEATER # FF-1. (Theater Stage)

FEDERAL PIONEER ELECTRIC MODEL TFA27-15 SURFACE MOUNTED ELECTRIC FORCE-FLD HEATER, 1.5 kW. UNIT c/w BUILT-IN T'STAT. SUPPLIED AND INSTALLED BY ELECTRICAL CONTRACTOR. 240V/1 PHASE.

ELECTRIC UNIT HEATER # UH-1. (Mechanical Room)

FEDERAL PIONEER ELECTRIC MODEL UH-27-331 UNIT SUSPENSION ELECTRIC HEATER, 3 kW, 1901/s, 50 W MOTOR AT 1550 RPM. UNIT c/w BUILT-IN T'STAT. SUPPLIED AND INSTALLED BY ELECTRICAL CONTRACTOR. 240/1 PHASE.

ELECTRIC UNIT HEATER # UH-2. (Well Pumphouse)

FEDERAL PIONEER ELECTRIC MODEL UH-27-331 UNIT SUSPENSION ELECTRIC HEATER, 3 kW, 1901/s, 50 W MOTOR AT 1550 RPM. UNIT c/w BUILT-IN T'STAT. SUPPLIED AND INSTALLED BY ELECTRICAL CONTRACTOR. 240/1 PHASE.

ELECTRIC UNIT HEATER # UH-3. (Storage Room)

FEDERAL PIONEER ELECTRIC MODEL UH-27-331 UNIT SUSPENSION ELECTRIC HEATER, 3 kW, 1901/s, 50 W MOTOR AT 1550 RPM. UNIT c/w BUILT-IN T'STAT. SUPPLIED AND INSTALLED BY ELECTRICAL CONTRACTOR. 240/1 PHASE.

ELECTRIC UNIT HEATER # UH-4 & UH-4A. (Sewage Treatment Tank)

FEDERAL PIONEER ELECTRIC MODEL UH-27-331 UNIT SUSPENSION ELECTRIC HEATER, 3 kW, 1901/s, 50 W MOTOR AT 1550 RPM. UNIT c/w BUILT-IN T'STAT. SUPPLIED AND INSTALLED BY ELECTRICAL CONTRACTOR. 240/1 PHASE.

OIL INTERCEPTOR. (Maintenance Building)

BNPOCO MODEL B6300-10 FLUSH MOUNTED OIL INTERCEPTOR WITH SKID-PROOF TOP, 0.75 l/s FLOW RATE. MAKE VENT CONNECTION.

PUMP # P-1. (Fire Pump)

AURORA MODEL 4-481-11C DIESEL DRIVEN FIRE PUMP WITH 60 BHP MODEL B-378-P2 DIESEL ENGINE DRIVER, 31.5 l/s AT 1550 RPM. UNIT c/w CONTROL PANEL, BATTERIES, BATTERY CHARGER AND EXHAUST SILENCER. REVISED BY C.O. TO AURORA #F12L, 1770RPM DIESEL ENGINE WITH #17ACAB RIGHT ANGLE GEAR DRIVE PUMP (#F60). ALL OTHER CHARACTERISTICS APPLY.

PUMP # P-2 & P-2A. (SUMP PUMP)

BARNES MODEL SSB-31 SUBMERSIBLE SUMP PUMP, 3.16 l/s AT 45 kPa HEAD, 250 W MOTOR AT 1750 RPM. UNIT c/w LIQUID FLOAT CONTROL AND HIGH WATER ALARM. WIRING BY ELECTRICAL CONTRACTOR. 120V/1 PHASE.

PUMP # P-3 & P-3A. (Domestic water)

MONARCH SERIES 70 MODEL 702-4X102 PRESSURE BOOSTER PUMP COMPLETE WITH WELL-X-TROL TANK. 0.85 l/s CAPACITY. PUMP c/w PRESSURE SWITCH, ADJUSTABLE FROM 70 kPa TO 350 kPa, 0.37 kW MOTOR. 120V/1 PHASE. INSTALL BRONZE FOOT VALVE AT INTAKE PIPE. PUMP TO BE SELF-PRIMING.

PUMP # P-4, P-4A & P-4B. (SUMP PUMP)

BARNES MODEL SSB-31 SUBMERSIBLE SUMP PUMP, 3.16 l/s AT 45 kPa HEAD, 250 W MOTOR AT 1750 RPM. UNIT c/w LIQUID FLOAT CONTROL AND HIGH WATER ALARM. WIRING BY ELECTRICAL CONTRACTOR. 120V/1 PHASE.

PUMP # P-5. (Jockey Pump)

AURORA MODEL 933 JOCKEY PUMP, 0.16 l/s AT 345 kPa HEAD, 373 W MOTOR AT 3500 RPM. 240V/1 PHASE. SUPPLIED AND INSTALLED BY SPRINKLER SUB-CONTRACTOR.

PUMP # P-6. (Fuel Oil)

VIKING SERIES 180 MODEL PH GEAR PUMP, 0.13 l/s AT 350 kPa HEAD. 185 W MOTOR. 120V/1 PHASE. INTERLOCK WITH LEVEL CONTROLS AT DAY STORAGE TANK.

PUMP # P-7. (Gas Pump)

GILBARCO MODEL 154-1 COMBINATION GASOLINE PUMP AND DISPENSER. PUMP MOTOR TO BE 560 W, 240V/1 PHASE. UNIT c/w 3.5 METER HOSE, AUTOMATIC SHUT-OFF NOZZLE AND ELECTRICAL JUNCTION BOX. WIRING AND WEATHERPROOF DISCONNECT BY ELECTRICAL CONTRACTOR.

PUMP # P-8 & P-8A. (Sewage Treatment Tank)

REFER TO SPECIFICATIONS.

PUMP # P-9. (Well Pump)

MONARCH SERIES 15, 100mm DIA. SUBMERSIBLE WELL PUMP, 28 STAGES, 0.63 l/s AT 1700 kPa HEAD, 2.3 kW MOTOR AT 3450 RPM. PUMP c/w STRAINER, CHECK VALVE, BLEEDER ORIFICE AND POWER CABLE AS REQUIRED.

MAINTENANCE BUILDING - SHOPS MAJOR UNIT

ENGINEERED AIR MODEL HE-27-967-KW INPUT, 1180W @ 62.5 S.P. 560 W MOTOR 240V/1 1160Hz, 4W FILTERS, CONTROL CABINET, INLET HOOD & BIRDSCREEN. DUAL CAPACITY INTERLOCK TO E-2 & E-5.

ELECTRIC UNIT HEATERS #UH-5, #UH-6 & #UH-7

FEDERAL PIONEER #UH-27-51-2 SUSPENDED ELECTRIC UNIT HEATERS, 5.0 KW EA, 240V/1 1160Hz. UNITS c/w REMOTE THERMOSTATS

PUMP # P-10/P-10A

HYDRAUTIC #E-75 SUBMERSIBLE SEWAGE PUMPS 9.0 FIBREGLASS TANK & COVER, 5.5/5.5 @ 70 KPa HEAD, 1750RPM, 115V/1160Hz, c/w ALTERNATOR & HIGH LEVEL ALARM.

PUMP # P-11/P-11A

SAME AS P-10/10A EXCEPT #SP-50, 2.845 @ 60KPa HEAD

GRILLE AND DIFFUSER SCHEDULE

SUPPLY:	TYPE	THROAT SIZE	AIR VOLUME
S-1	E.H. PRICE MODEL TMSA ADJUSTABLE CEILING DIFFUSER c/w AG-75 DAMPER. MODULE 300x300. STYLE 1 MOUNT. DIFFUSER c/w FIRE STOP FLAP.		
S-2	E.H. PRICE MODEL TMSA ADJUSTABLE CEILING DIFFUSER c/w AG-75 DAMPER. MODULE 600x600. STYLE 3 MOUNT. DIFFUSER c/w FIRE STOP FLAP.		
S-3	E.H. PRICE MODEL CI-272-5-0-A-B15.		
S-4	E.H. PRICE MODEL CTH-2535-4368-C FLOOR DIFFUSER. 0 DEGREE DEFLECTION.		
S-5	E.H. PRICE MODEL TMSA ADJUSTABLE CEILING DIFFUSER c/w AG-75 DAMPER. MODULE 600x600. STYLE 1 MOUNT. DIFFUSER c/w FIRE STOP FLAP.		
S-6	E.H. PRICE MODEL CTH-2535-4368-C FLOOR GRILLE. 30 DEGREE DEFLECTION.		
S-7	E.H. PRICE MODEL CTH-2535-4368-C FLOOR GRILLE. 15 DEGREE DEFLECTION.		
S-8	E.H. PRICE MODEL CTH-2535-4368-C FLOOR DIFFUSER. 0 DEGREE DEFLECTION. BAKED ENAMEL FINISH. COLOR AS SELECTED BY ARCHITECT.		
S-9	E.H. PRICE MODEL CTH-2535-4368-C FLOOR DIFFUSER. 0 DEGREE DEFLECTION. PRIME COATED FOR FIELD PAINTING. COLOR AS SELECTED BY ARCHITECT.		
RETURN:	TYPE	THROAT SIZE	AIR VOLUME
R-1	E.H. PRICE MODEL TCR PERFORATED CEILING GRILLE c/w AG-96 DAMPER. MODULE 300x300. STYLE 1 MOUNT. GRILLE c/w FIRE STOP FLAP.		
R-2	E.H. PRICE MODEL TCR PERFORATED CEILING GRILLE c/w AG-96 DAMPER. MODULE 600x600. STYLE 3 MOUNT. GRILLE c/w FIRE STOP FLAP.		
R-3	E.H. PRICE MODEL CI-3-5-0-A-B15.		
R-4	E.H. PRICE MODEL CI-3-0-G-Q-B15 c/w FILTER.		
R-5	E.H. PRICE MODEL CI-50-5-0-A-B15.		
R-6	E.H. PRICE MODEL CI-3-0-5-A-PC. PRIME COATED FOR FIELD PAINTING. COLOR AS SELECTED BY ARCHITECT.		
R-7	E.H. PRICE MODEL CS-3-0-5-A-PC. PRIME COATED FOR FIELD PAINTING. COLOR AS SELECTED BY ARCHITECT.		
R-8	E.H. PRICE MODEL CTH-2535-4368-C FLOOR DIFFUSER. 0 DEGREE DEFLECTION. PRIME COATED FOR FIELD PAINTING. COLOR AS SELECTED BY ARCHITECT.		
EXHAUST:	TYPE	THROAT SIZE	AIR VOLUME
E-1	E.H. PRICE MODEL CI-3-5-0-A-B15. GRILLE c/w FIRE STOP FLAP.		

CONSULTANTS

1	APR 86	PROJECT RECORD DRWG	TM		
no.	date	description	drawn by	app'd by	
			trace par	app par	
revision / révision					

IKOY ARCHITECTS
IKOY FILE - 82-204
Yoneda & Associates Ltd.
Consulting Professional Engineers
CERTIFICATE OF AUTHORIZATION #6
REFERENCE NUMBER 83-905

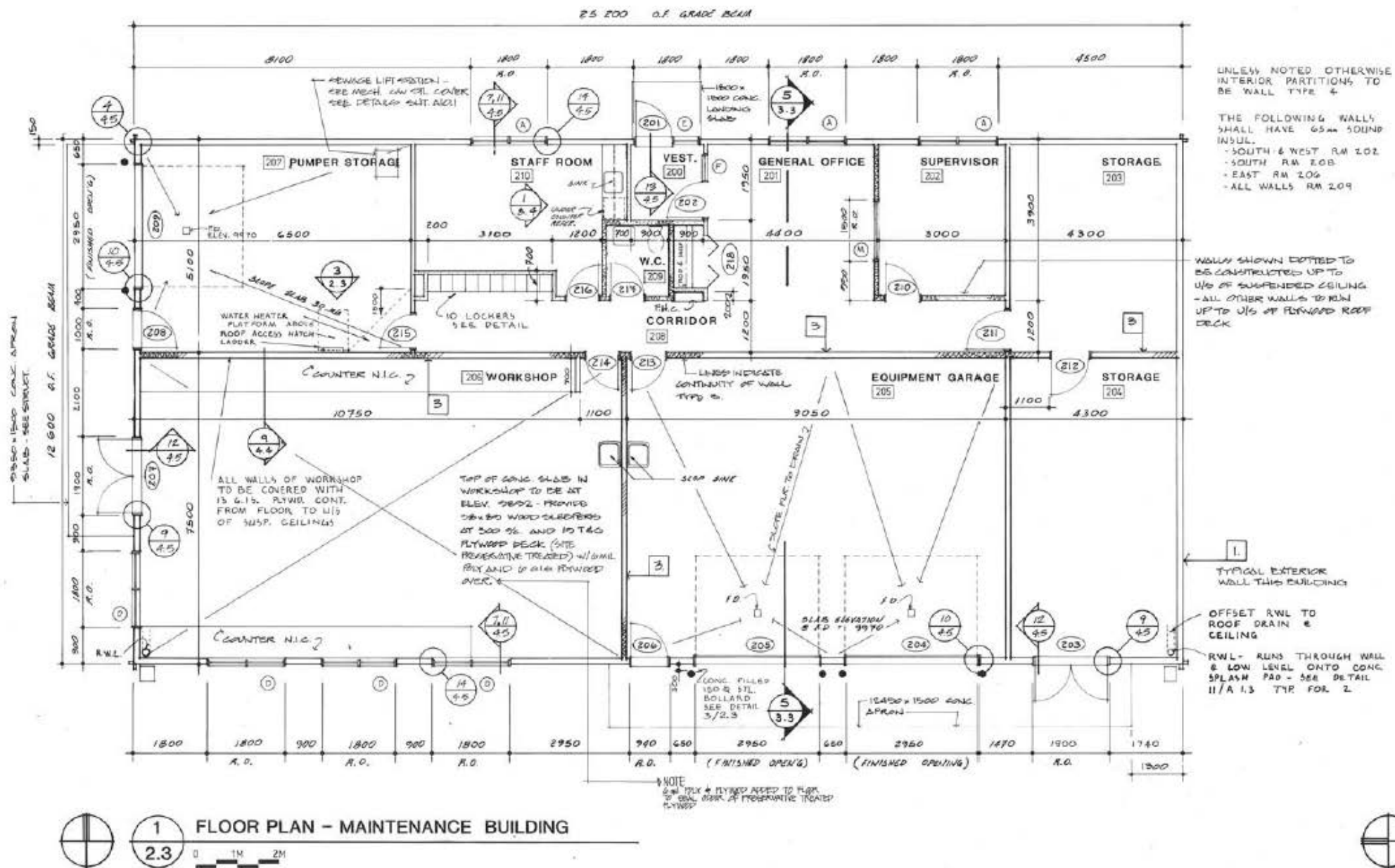
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CONTEMPORARY FACILITIES
BATOCHE NATIONAL HISTORIC SITE
BATOCHE SASKATCHEWAN

MECHANICAL FLOW SCHEMATIC SCHEDULES

designed by / conception par	approved by / approuvé par
DA	DA
drawn by / tracé par	date / date
BL	JUNE 11, 1984
checked by / vérifié par	scale / échelle
DA	NO SCALE
project asset number / numéro du projet d'immobilisation	sheet no. / feuille no.
reference / drawing number / numéro de référence / dessin	M3-1
HPBA 84/R4/E	



WALL CONSTRUCTION SCHEDULE

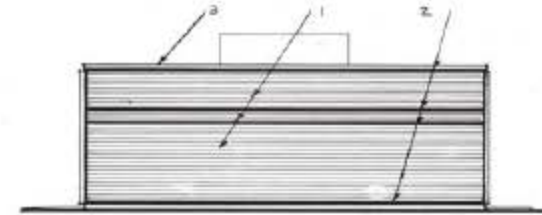
- EXTERIOR WALL
 - CORRUGATED ALUM. SIDING
 - 19mm Z BARS VERTICAL
 - BUILDING PAPER
 - 13 PLYWOOD SHEATHING
 - 38 x 140 WOOD STUDS (SEE STRUCT.)
 - RS1 3.5 BATT INSULATION
 - V.B.
 - 13 G.W.B.
- INTERIOR PARTITION - SOUND RATED
 - 2 LAYERS 13 G.W.B.
 - 38 x 90 WOOD STUDS @ 400 o/c
 - 65 SOUND INSULATION BATTS
 - 19 SOUND BARS @ 400 o/c
 - 2 LAYERS 13 G.W.B.
 - SOUND RATING - S.T.C. 52-DR 72-159
 - EXCEEDS REQUIRED 3/4 HOUR FIRE RATED FROM SUPPLEMENT NO. 2, 1980 N.B.C.
 - WALL TYPE 6 CONSTRUCTED CONTINUOUS FLOOR TO U/S OF ROOF SHEATHING
 - SOUND CAULK TOP AND BOTTOM PLATES
- AS ABOVE EXCEPT REPLACE WOOD STUDS AND BATT INSULATION WITH:
 - 38 x 185 WOOD STUDS (SEE STRUCT.)
 - RS1 4.9 BATT INSULATION
 - 3/4 HR. FIRE RATED FROM SUPPLEMENT NO. 2 1980 N.B.C.
- CURTAIN WALL
 - 92mm DEEP BACK SECTION - NATURAL ANODIZED ALUMINUM
 - 63mm DEEP CAP - POLISHED/BRIGHT DIPPED ANODIZED FINISH
 - H.S.D.G. GLAZING - OUTBOARD LITE SOLEX, INBOARD LITE CLEAR
- 1 HOUR FIRE-RATED PARTITION
 - 16 TYPE 'X' G.W.B.
 - PROVIDE 65mm SOUND INSULATION WHERE NOTED ON PLANS
 - 1 HOUR FIRE RATED U.L.C. W-303
- TYPICAL INTERIOR PARTITION
 - 13 G.W.B.
 - 38 x 90 WOOD STUDS @ 400 o/c
 - 13 G.W.B.
 - USE 38 x 140 WOOD STUDS WHERE DIMENSIONED ON PLANS
 - PROVIDE 65 SOUND INSULATION BATTS WHERE NOTED ON PLANS
- STORAGE BUILDING EXTERIOR WALL
 - CORRUGATED ALUM. SIDING ON 19mm Z BARS
 - BUILDING PAPER
 - 13 PLYWOOD SHEATHING
 - 38 x 90 WOOD STUDS @ 400 o/c

NOTES TO WALL SCHEDULE

- ON ALL EXTERIOR WOOD STUD WALLS, BOTTOM PLATE SHALL BE PRESERVATIVE TREATED.
- PROVIDE DOUBLE CONTINUOUS BEAD OF ACOUSTIC CAULKING BETWEEN BOTTOM PLATE AND CONCRETE ON ALL EXTERIOR WOOD STUD WALLS.



1 NORTH ELEVATION - BLDG. #2



2 EAST ELEVATION - BLDG. #2

KEYNOTES - SHEET A3.3 ONLY

1. NATURAL ANODIZED ALUM. SIDING
2. EXTRUDED ALUM. WALL TRIMS
3. EXTRUDED ALUM. FASCIA
4. CONC. APRON - SEE SHT. A2.3
5. NATURAL ANODIZED ALUM. ROOFING PANELS
6. ROOF DRAIN THRU GRADE BEAM
7. ASBESTOS BOARD GRADE BEAM INSULATION COVER



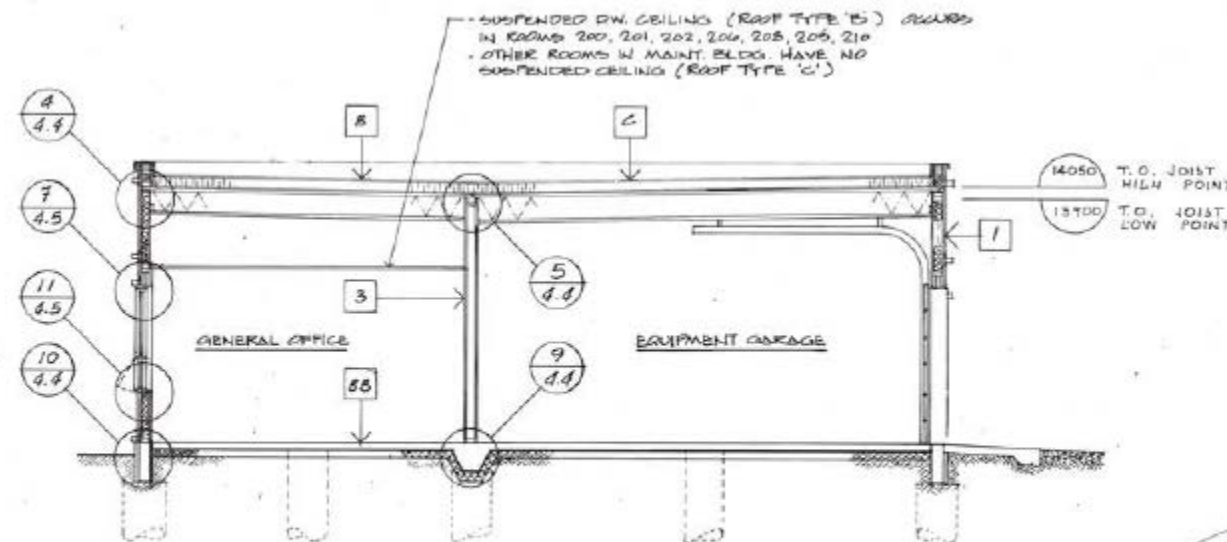
3 SOUTH ELEVATION - BLDG. #2

SEE A/A/C1 FOR ROOF PATTERN
LAYOUT ON MAINT. BUILDINGS

SEE B/A/G FOR DETAILS
OF JOINTS AND EXPANSION
OF EXTRUDED ALUM. WALL TRIMS



4 WEST ELEVATION - BLDG. #2



5 SECTION - BLDG. #2

ROOF CONSTRUCTION SCHEDULE

- | | |
|--|---|
| <p>A. - 200 RIGID INSUL (RSI 7.0) w/ INTEGRAL CONCRETE BALLAST</p> <p>- 4 PLY BUILT-UP ROOFING</p> <p>- 16 T & G PLYWOOD SHEATHING</p> <p>- TRUSSES - SEE STRUCTURAL</p> <p>- 2 LAYERS 13 TYPE 'X' G.W.B. ON METAL SUSPENSION SYSTEM</p> <p>- 50 MIN. FIRE RATED BASED ON MEMBRANE PROTECTION FROM 1980 N.B.C.</p> | <p>F. - 150 RIGID INSUL (RSI 5.25) w/ INTEGRAL CONCRETE BALLAST</p> <p>- 4 PLY BUILT-UP ROOFING</p> <p>- 16 T & G PLYWOOD SHEATHING</p> <p>- NO JOISTS - SEE STRUCTURAL</p> <p>- 97 x 38 WD FIRRING @ 400 o/c</p> <p>- 16 TYPE 'X' G.W.B.</p> <p>- 50 MIN. FIRE RATED FROM SUPPLEMENT #2 TO 1980 N.B.C.</p> |
| <p>B. - As 'A' EXCEPT REPLACE 2 LAYERS OF 13 TYPE 'X' G.W.B. WITH 1 LAYER 13 G.W.B.</p> | <p>F1. - As 'F' EXCEPT REVISE ROOF INSUL. TO 200 RIGID INSUL.</p> |
| <p>C. - AS 'A' EXCEPT DELETE SUSPENDED DRYWALL CEILING</p> | <p>G. - CORRUGATED ALUM. ROOFING PANELS</p> <p>- BUILDING PAPER</p> <p>- 13 PLYWOOD SHEATHING</p> <p>- WOOD TRUSSES</p> |
| <p>D. - CORRUGATED ALUM. ROOFING PANELS</p> <p>- 13 PLYWOOD SHEATHING</p> <p>- 150 RIGID INSUL (RSI 5.25) WITH 2 GIRTS AS DETAILED</p> <p>- V.B.</p> <p>- 13 G.W.B.</p> <p>- 38 METAL DECK - SEE STRUCTURAL</p> <p>- H.S.S. PURLINS - SEE STRUCTURAL</p> <p>- H.S.S. RIGID FRAMES - SEE STRUCTURAL</p> | |
| <p>E. - 150 RIGID INSUL (RSI 5.25) w/ INTEGRAL CONCRETE BALLAST</p> <p>- 4 PLY BUILT-UP ROOFING</p> <p>- CONCRETE TOPPING (MAX. 70 THICK TO MIN. 20 @ ROOF DRAINS)</p> <p>- 6 MIL POLY</p> <p>- 38 METAL DECK</p> <p>- H.S.S. FRAMING</p> | |

3.

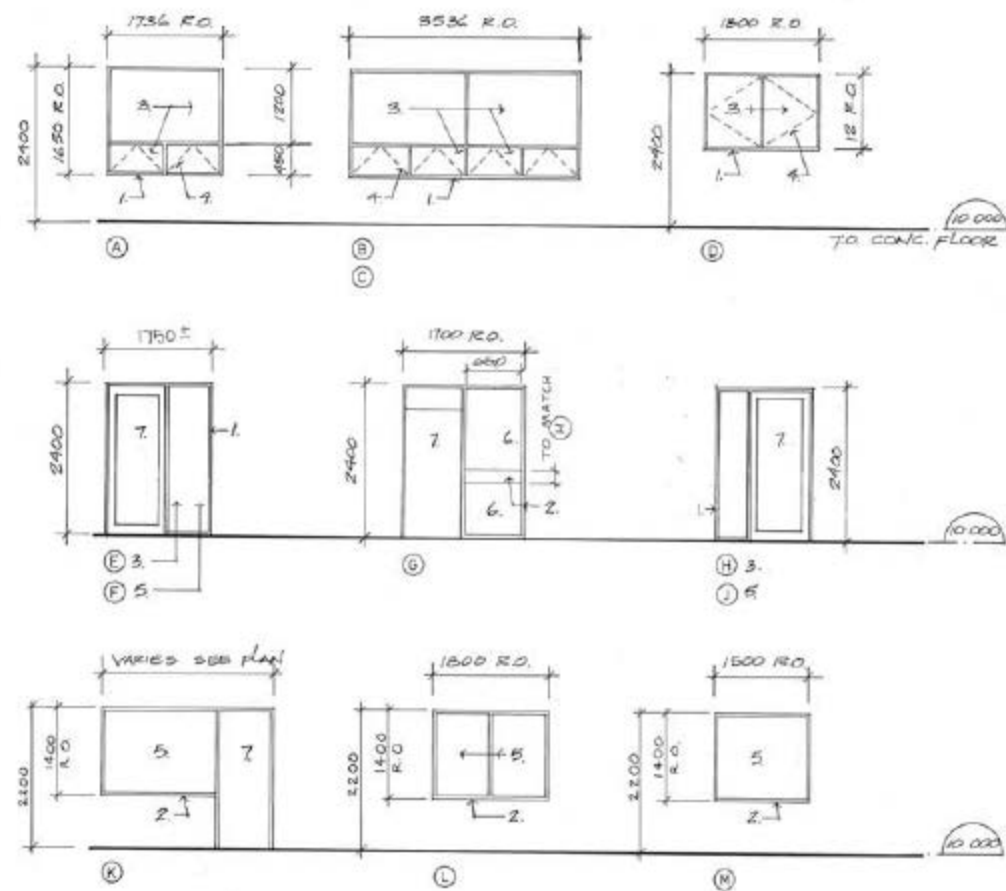
4.

5

8

1

2



2 WINDOW SCHEDULE

2.4 0 1M 2M

SEE SHEET A.9.6 FOR
CONCESSION WDN. INFO.

KEYNOTES TO WINDOW SCHEDULE

1. NATURAL ANODIZED ALUM. THERMALLY BROKEN WINDOW FRAME.
2. PRESSED STEEL FRAME - THROU' TO MATCH WALL THICKNESS.
3. H.S.D.G. OUTBOARD LITE - SOLEX
INBOARD LITE - CLEAR
4. AWNING OR CASEMENT OPENERS AS SHOWN C/W SCREENS.
5. SINGLE GLAZED CLEAR.
6. SINGLE GLAZED WIRED GLASS.
7. DOOR - SEE DOOR SCHEDULE.

Appendix B - Pictures

12/07/05

Eng A ENGINEERED AIR

AIR DELIVERY SPECIFICATIONS
CARACTÉRISTIQUES DE L'AIR PASSAGE

UNIT MODEL/MOÈLE DE L'APPAREIL	F-3-82/S-200-0		
SERIAL/MATRICULE	10524-1		
BLOWER MODEL/MOÈLE DE SOUFFLEUR	12/12		
SUPPLY/ALIMENTATION	7	CAPACITY/CAPACITÉ	2480
RETURN/RETOUR	2	EXTERNAL S.P./P.S. EXTERNE	0.7" WC
TEMP. RISE/ÉLEVATION DE TEMP	2	BLOWER SPEED/VITESSE DE SOUFFLEUR	1210
MOTOR PULLEY/POULIE DU MOTEUR	171 40		
BLOWER PULLEY/POULIE DU SOUFFLEUR	171 40		
BLOWER MOTOR/MOTEUR DE SOUFFLEUR	1.5	BELTS/COURROIES	B-42
240 VOLTS.	1	PHASE, 60 HZ.	900 AMPS

CAUTION — ATTENTION

WHEN AIR DUCTS ARE USED, THE EXTERNAL STATIC PRESSURE SHALL NOT EXCEED THE VALUE SHOWN ON THE NAMEPLATE.

LORSQUE DES CONDUITS D'AIR SONT UTILISÉS, LA PRESSION STATIQUE EXTERNE NE DOIT PAS DÉPASSER LA VALEUR INDIQUÉE SUR LA PLAQUE SIGNALÉTIQUE.


B-34

Fig. 1. Fan Compartment Nameplate

09/01/06

Eng A ENGINEERED AIR

DIVISION OF AIRTEX INDUSTRIES LTD.
1401 HASTINGS CRESCENT S.E., CALGARY, ALBERTA
1175 TWINNEY CRESCENT, NEWMARKET, ONTARIO



DIRECT FIRED MAKE-UP AIR HEATER

Direct Fired Unit		Combination Unit	
°F Outdoor Min. Ambient Temp. 40		For Outdoor Installation	
Model F-3-82/S-200-0	Serial Number 10524-1		
C.F.M. 1400 / 2500	E.S.P. 0.75"	W.C. Temp Rise 100	°F
Supply Fan Size 12/12	RPM 700	Blower Pulley 171 40	
Supply Motor Pulley 171 40	Belts B-42		

UNIT ELECTRICAL SPECIFICATIONS

Voltage 240	Phase 1	60 Hz
Unit May be Equipped With More Than One Main Feeder Circuit		
CKT #1 Feeder Amps 11.49	Max. Fuse 15	Amps (Dual Element)
	Circuit Breaker 15	Amps
CKT #2 Feeder Amps	Max. Fuse	Amps (Dual Element)
	Circuit Breaker	Amps
Supply Fan Motor 7.50	FLA 1.01	HP
Return Air Motor	FLA	LRA
Compressor Motor	FLA	LRA
Condenser Fan Motor	FLA	HP

DIRECT FIRED SECTION

Max. Discharge Temperature 12	°F
Fuel NATURAL GAS	Calorific Value 1000
Max. Firing Rate 550,000	BTUH Min. Firing Rate 17,000
Inlet Pressure 7.0	Manifold Pressure 1.2
Max. Burner Velocity 3200 FPM	Min. Burner Velocity 2500 FPM

DIRECT FIRED MINIMUM CLEARANCE COMBUSTIBLES AND SERVICE CLEARANCE

TOP 1"	BOTTOM 0"	SIDE 1"	CONTROL SIDE 24"
--------	-----------	---------	------------------

HEAT SECTION
See Heat Label When Applicable

COOLING SECTION

Mechanical Cooling	System Charge R	Chilled Water Cooling
Evaporative Cooling		

B-108

Fig. 2. Burner Compartment Nameplate



Fig. 3. RTU Side View



Fig. 4. RTU Front View

Appendix C - Calculations

Air System Sizing Summary for Makeup Air Unit

Project Name: Batoche Maintenance and Admin Building
Prepared by: AECOM

09/13/2018
04:33PM

Air System Information

Air System Name **Makeup Air Unit**
Equipment Class **UNDEF**
Air System Type **SZCAV**

Number of zones **1**
Floor Area **398.2** m²
Location **Prince Albert, Saskatchewan**

Sizing Calculation Information

Calculation Months **Jan to Dec**
Sizing Data **Calculated**

Zone L/s Sizing **Sum of space airflow rates**
Space L/s Sizing **Individual peak space loads**

Central Cooling Coil Sizing Data

Total coil load **11.6** kW
Sensible coil load **11.6** kW
Coil L/s at Aug 1500 **1642** L/s
Max block L/s **1642** L/s
Sum of peak zone L/s **1642** L/s
Sensible heat ratio **1.000**
L/(s kW) **141.1**
m²/kW **34.2**
W/m² **29.2**
Water flow @ 5.6 K rise **0.50** L/s

Load occurs at **Aug 1500**
OA DB / WB **28.9 / 18.3** °C
Entering DB / WB **27.4 / 18.0** °C
Leaving DB / WB **21.2 / 15.9** °C
Coil ADP **20.5** °C
Bypass Factor **0.100**
Resulting RH **52** %
Design supply temp. **14.4** °C
Zone T-stat Check **1 of 1** OK
Max zone temperature deviation **0.0** K

Central Heating Coil Sizing Data

Max coil load **89.2** kW
Coil L/s at Des Htg **1642** L/s
Max coil L/s **1642** L/s
Water flow @ 11.1 K drop **1.92** L/s

Load occurs at **Des Htg**
W/m² **223.9**
Ent. DB / Lvg DB **-18.8 / 28.5** °C

Supply Fan Sizing Data

Actual max L/s **1642** L/s
Standard L/s **1560** L/s
Actual max L/(s·m²) **4.12** L/(s·m²)

Fan motor BHP **0.00** BHP
Fan motor kW **0.00** kW
Fan static **0** Pa

Outdoor Ventilation Air Data

Design airflow L/s **1130** L/s
L/(s·m²) **2.84** L/(s·m²)

L/s/person **40.37** L/s/person

Zone Sizing Summary for Makeup Air Unit

Project Name: Batoche Maintenance and Admin Building
Prepared by: AECOM

09/13/2018
04:33PM

Air System Information

Air System Name **Makeup Air Unit**
Equipment Class **UNDEF**
Air System Type **SZCAV**

Number of zones **1**
Floor Area **398.2** m²
Location **Prince Albert, Saskatchewan**

Sizing Calculation Information

Calculation Months **Jan to Dec**
Sizing Data **Calculated**

Zone L/s Sizing **Sum of space airflow rates**
Space L/s Sizing **Individual peak space loads**

Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m ²)	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11.1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11.1 K	Mixing Box Fan Airflow (L/s)
Zone 1	1642	1642	4.12	0.0	0.00	0.0	0.00	0

Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m ²)
Zone 1	5.8	Jul 1600	15.3	398.2

Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m ²)	Space L/(s·m ²)
Zone 1							
01 - WAJAX Storage Shop	1	0.1	Jul 1900	254	1.2	33.9	7.50
02 - IT Room	1	0.0	Jul 2000	5	0.1	2.0	2.27
03 - Staff Room	1	0.6	Jul 1600	60	0.9	19.7	3.05
04 - North Vestibule	1	0.2	Jul 1500	51	0.8	3.4	14.86
05 - Open Office	1	0.4	Jul 1600	62	1.0	25.8	2.39
06 - Office 1	1	0.3	Jul 1600	51	0.8	12.8	4.01
07 - Office 2	1	0.3	Jul 1600	51	0.8	10.0	5.15
08 - Mail/Copier	1	0.0	Jul 1900	6	0.1	15.6	0.37
09 - Carpentry Shop	1	2.7	Aug 1600	251	3.7	69.8	3.60
10 - Office 3	1	0.1	Jul 1600	20	0.1	9.2	2.17
11 - Office 4	1	0.3	Jul 1600	46	0.7	9.0	5.11
12 - Mechanic's Bay	1	0.2	Jul 1700	517	1.7	68.9	7.50
13 - Boardroom	1	0.4	Jul 1600	60	0.1	19.6	3.06
14 - South Vestibule	1	0.1	Jul 1600	41	0.7	10.8	3.81
15 - Tractor Bay	1	0.3	Jul 1700	168	2.7	87.7	1.91

Air System Design Load Summary for Makeup Air Unit

Project Name: Batoche Maintenance and Admin Building
Prepared by: AECOM

09/13/2018
04:33PM

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Aug 1500 COOLING OA DB / WB 28.9 °C / 18.3 °C			HEATING DATA AT DES HTG HEATING OA DB / WB -36.7 °C / -36.8 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	27 m²	2878	-	27 m²	-	-
Wall Transmission	189 m²	268	-	189 m²	2547	-
Roof Transmission	398 m²	358	-	398 m²	2319	-
Window Transmission	27 m²	251	-	27 m²	5127	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	42 m²	128	-	42 m²	2618	-
Floor Transmission	398 m²	0	-	398 m²	2714	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	0 W	0	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	28	1632	2122	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	5516	2122	-	15325	0
Zone Conditioning	-	5326	2122	-	14890	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Return Fan Load	1642 L/s	0	-	1642 L/s	0	-
Ventilation Load	1130 L/s	6306	-2122	1130 L/s	74273	0
Supply Fan Load	1642 L/s	0	-	1642 L/s	0	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
>> Total System Loads	-	11632	0	-	89162	0
Central Cooling Coil	-	11632	0	-	0	0
Central Heating Coil	-	0	-	-	89162	-
>> Total Conditioning	-	11632	0	-	89162	0
Key:	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

System Psychrometrics for Makeup Air Unit

Project Name: Batoche Maintenance and Admin Building
Prepared by: AECOM

09/13/2018
04:33PM

August DESIGN COOLING DAY, 1500

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Ventilation Air	Inlet	28.9	0.00952	1130	400	6306	-2122
Vent - Return Mixing	Outlet	27.4	0.00973	1642	453	-	-
Central Cooling Coil	Outlet	21.2	0.00973	1642	453	11632	0
Central Heating Coil	Outlet	21.2	0.00973	1642	453	0	-
Supply Fan	Outlet	21.2	0.00973	1642	453	0	-
Cold Supply Duct	Outlet	21.2	0.00973	1642	453	-	-
Zone Air	-	24.0	0.01019	1642	571	5326	2122
Return Plenum	Outlet	24.0	0.01019	1642	571	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1.207; At site altitude = 1.147 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947.6; At site altitude = 2801.0 W/(L/s)

Site Altitude = 427.9 m

TABLE 2: ZONE DATA

Zone Name	Zone Sensible Load (W)	T-stat Mode	Zone Cond (W)	Zone Temp (°C)	Zone Airflow (L/s)	CO2 Level (ppm)	Terminal Heating Coil (W)	Zone Heating Unit (W)
Zone 1	5516	Cooling	5326	24.0	1642	571	0	0

System Psychrometrics for Makeup Air Unit

Project Name: Batoche Maintenance and Admin Building
Prepared by: AECOM

09/13/2018
04:33PM

WINTER DESIGN HEATING

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Ventilation Air	Inlet	-36.7	0.00006	1130	400	-74273	0
Vent - Return Mixing	Outlet	-18.8	0.00006	1642	404	-	-
Central Cooling Coil	Outlet	-18.8	0.00006	1642	404	0	0
Central Heating Coil	Outlet	28.5	0.00006	1642	404	89162	-
Supply Fan	Outlet	28.5	0.00006	1642	404	0	-
Cold Supply Duct	Outlet	28.5	0.00006	1642	404	-	-
Zone Air	-	20.6	0.00006	1642	412	-14890	0
Return Plenum	Outlet	20.6	0.00006	1642	412	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1.207; At site altitude = 1.147 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947.6; At site altitude = 2801.0 W/(L/s)

Site Altitude = 427.9 m

TABLE 2: ZONE DATA

Zone Name	Zone Sensible Load (W)	T-stat Mode	Zone Cond (W)	Zone Temp (°C)	Zone Airflow (L/s)	CO2 Level (ppm)	Terminal Heating Coil (W)	Zone Heating Unit (W)
Zone 1	-15325	Heating	-14890	20.6	1642	412	0	0

System Psychrometrics for Makeup Air Unit

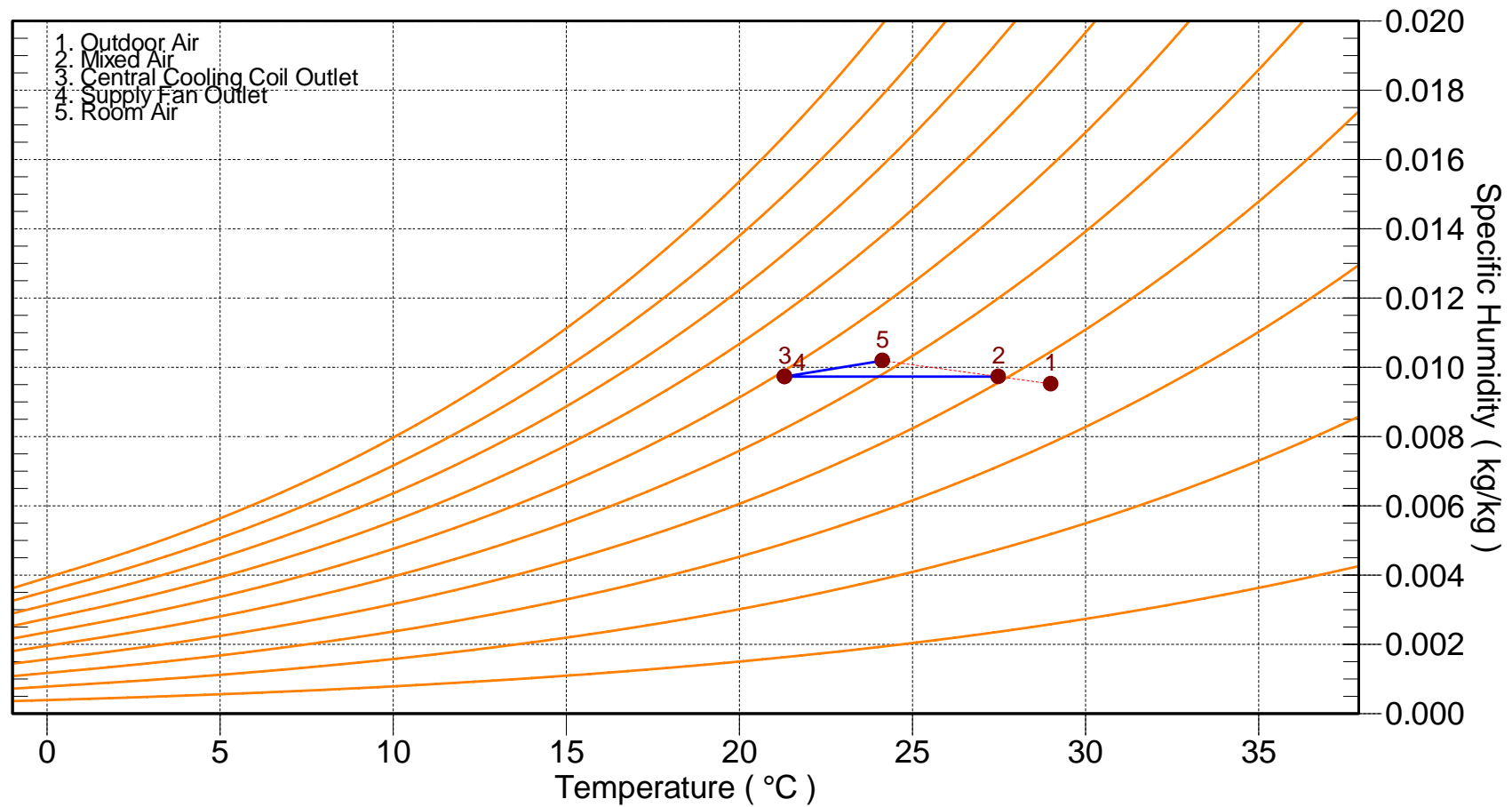
Project Name: Batoche Maintenance and Admin Building
Prepared by: AECOM

09/13/2018
04:33PM

Location: Prince Albert, Saskatchewan

Altitude: 427.9 m.

Data for: August DESIGN COOLING DAY, 1500



System Psychrometrics for Makeup Air Unit

Project Name: Batoche Maintenance and Admin Building
Prepared by: AECOM

09/13/2018
04:33PM

Location: Prince Albert, Saskatchewan
Altitude: 427.9 m.
Data for: WINTER DESIGN HEATING

