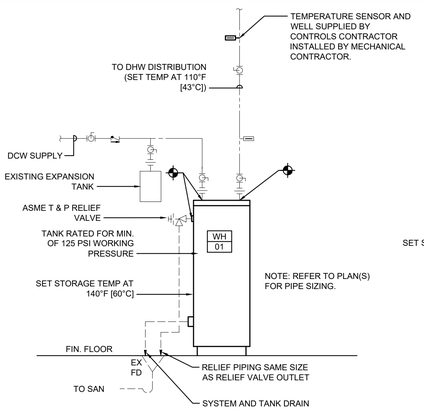
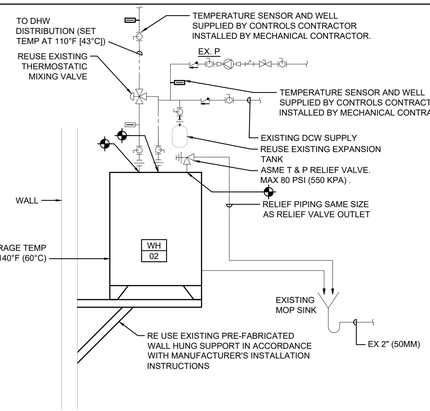


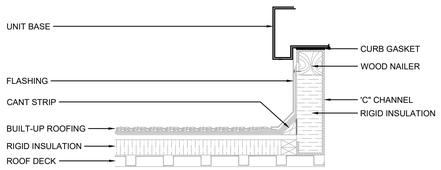
DOMESTIC HOT WATER TANK DETAIL: ELECTRIC, FLOOR MOUNTED

SCALE: N.T.S.



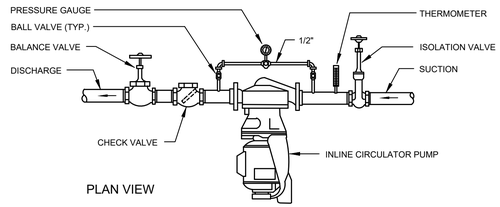
DOMESTIC HOT WATER TANK DETAIL: ELECTRIC, CEILING SPACE MOUNTED

SCALE: N.T.S.



INSULATED ROOF CURB DETAIL

SCALE: N.T.S.

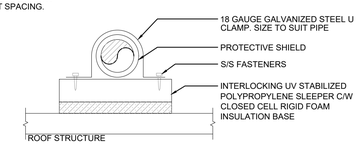


PLAN VIEW

INLINE PUMP / CIRCULATOR DETAIL

SCALE: N.T.S.

NOTES:
1. PROVIDE EXTENSION KITS AS REQUIRED FOR ELEVATED PIPING
2. PROVIDE SUPPORT AT EVERY FITTING
3. PROVIDE ACCOMMODATION FOR PIPE MOVEMENT DUE TO EXPANSION/CONTRACTION AS REQUIRED
4. FOR NATURAL GAS PIPING, COMPLY WITH CSA B149 FOR PIPE SUPPORT SPACING.



PIPE SUPPORT ON ROOF DETAIL

SCALE: N.T.S.

GENERAL NOTES: (APPLICABLE TO ALL DRAWINGS)

- THESE DRAWINGS ARE AN INTEGRAL PART OF THE SPECIFICATIONS WHICH ACCOMPANY THEM.
- ALL MATERIALS AND WORKMANSHIP SHALL BE NEW UNLESS NOTED OTHERWISE, FREE OF DEFECTS, AND COMPLY WITH ALL APPLICABLE STANDARDS.
- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE
- INSTALL DUCTWORK / PIPING TIGHT TO UNDERSIDE OF STRUCTURE UNLESS NOTED OTHERWISE.
- DO NOT SCALE DRAWINGS. OBTAIN ALL DIMENSIONS FROM EXISTING ARCHITECTURAL PLANS, SITE INSPECTIONS, AND MANUFACTURER'S SHOP DRAWINGS.
- REFER TO ARCHITECTURAL DRAWINGS FOR LOCATION OF FIRE RATED ASSEMBLIES.
- ALL MATERIALS WITHIN RETURN AIR PLENUMS SHALL HAVE A FLAME—SPREAD RATING NOT MORE THAN 25 AND A SMOKE DEVELOPED CLASSIFICATION NOT MORE THAN 50.
- OPENINGS IN EXTERIOR WALLS AND ROOF ARE TO BE PROPERLY FLASHED AND MADE WEATHERPROOF.
- ALL ROOF FLASHING FOR CURBS & PENETRATIONS TO COMPLY WITH ROOF WARRANTOR'S REQUIREMENTS.
- ALL NECESSARY CUTTING / PATCHING FOR MECHANICAL WORK SHALL BE PROVIDED BY APPROPRIATE TRADE(S) AT CONTRACTOR'S EXPENSE UNLESS NOTED OTHERWISE.
- MAKE GOOD ALL BUILDING COMPONENTS DAMAGED BY WORK OF THIS TRADE TO THE CONSULTANT SATISFACTION.
- PROVIDE ALL SLEEVES, INSERTS AND HANGERS REQUIRED FOR THE WORK. TREAT ALL SLEEVES OR HOLES PIERCING ACOUSTICAL SEPARATIONS FOR INSTALLATIONS OF THIS DIVISION TO MAINTAIN ACOUSTICAL RATING. ALL GAPS SHALL BE PACKED WITH ACOUSTICAL INSULATION AND SEALED AT BOTH ENDS WITH ACOUSTICAL CAULKING. PATCH ALL OPENINGS AROUND INSTALLATIONS OF THIS DIVISION PIERCING FIRE OR SMOKE SEPARATIONS WITH AN APPROVED WATERTIGHT SMOKE AND FIRE STOP SEALANT.
- INSTALL ALL EQUIPMENT & ASSOCIATED DUCTWORK, PIPING, APPURTENANCES TO PROVIDE MAINTENANCE ACCESS. ALLOW FOR ALL ACCESS DOORS REQUIRED FOR EQUIPMENT INSTALLATIONS & SERVICE. ENSURE PROPER ACCESS DOOR SIZE, TYPE AND FIRE RATING.
- COORDINATE ALL WORK WITH OTHER TRADES AND SUPPLIERS/MANUFACTURERS TO AVOID INTERFERENCES AND CONFLICTS BETWEEN SERVICES. PLAN WORK WELL IN ADVANCE TO ELIMINATE INSTALLATION AND COORDINATE DIFFICULTIES. COOPERATE WITH OTHER TRADES ON SITE TO RESOLVE INTERFERENCES TO SATISFACTORILY COMPLETE THE PROJECT.
- IF NO STRUCTURAL CONSULTANT ENGAGE THE SERVICES OF A STRUCTURAL ENGINEER TO DESIGN REINFORCEMENT OF EXISTING STRUCTURE AS REQUIRED.
- ALL COLD CONDENSATE DRAINAGE FROM ROOFTOP EQUIPMENT SHALL BE TRAPPED PER MANUFACTURER'S RECOMMENDATIONS & SPILL TO PRECAST 600mmx250mm (24"x10") CONCRETE SPLASH BLOCK.
- DEBRIS WILL BE KEPT TO A MINIMUM. ON COMPLETION OF CONSTRUCTION AND PRIOR TO THE FINAL INSPECTION AND ACCEPTANCE BY THE OWNER, SITE SHALL BE CLEANED AND ALL SCRAP MATERIALS RESULTING FROM THE WORK SHALL BE REMOVED.
- PRIOR TO THE FINAL INSPECTION, ALL EQUIPMENT SHALL BE CLEANED. ALL CONSTRUCTION DUST AND DIRT SHALL BE REMOVED FROM INSTALLED EQUIPMENT AT THE END OF THE JOB.
- EXISTING INSTALLATIONS SHOWN FOR GENERAL REFERENCE ONLY. ATTEND SITE TO ASSESS WORK PRIOR TO BID SUBMISSION. INCLUDE ALL COSTS TO MODIFY AND / OR EXTEND NEW WORK AS REQUIRED TO MEET DESIGN INTENT. VERIFY ALL EXISTING DUCT / PIPE SIZES & CLEARANCES ON SITE.
- ALL EXISTING MECHANICAL EQUIPMENT TO REMAIN UNLESS NOTED OTHERWISE
- OPERATION OF EXISTING MECHANICAL EQUIPMENT TO REMAIN SHALL BE VERIFIED. DEFICIENCIES SHALL BE REPORTED TO CONSULTANT.
- SCHEDULE AND PHASE WORK TO REDUCE INTERFERENCE AND DOWNTIME OF EXISTING SYSTEMS. NOTIFY OWNER'S REPRESENTATIVE OF ALL DOWNTIME PRIOR TO PROCEEDING WITH WORK.
- REMOVE EXISTING CEILING TILES AS REQUIRED TO PERFORM WORK. SAFELY STORE TILES FOR REINSTALLATION AFTER WORK & INSPECTIONS ARE COMPLETE. EXISTING DAMAGED TILES MUST BE IDENTIFIED & REPORTED TO OWNERS REPRESENTATIVE BEFORE REMOVAL. REPLACE ANY DAMAGED TILES TO MATCH EXISTING.
- MEASURE & DOCUMENT EXISTING AIRFLOWS AT GRILLES / REGISTERS / DIFFUSERS TO BE REBALANCED. FINAL BALANCING REPORT MUST INCLUDE AS-FOUND AND FINAL AIRFLOW MEASUREMENTS.
- WHERE REPLACEMENT EQUIPMENT EXPOSES PREVIOUSLY UNFINISHED SURFACES, FINISH TO MATCH ADJACENT ASSEMBLIES.
- ALLOW FOR SCOPING OF EXISTING CONCEALED DRAINAGE PIPING TO VERIFY LOCATION & ROUTING.
- DISPOSE OF EXISTING REFRIGERANTS IN ACCORDANCE WITH ALL APPLICABLE ENVIRONMENTAL REGULATIONS.

GENERAL DEMOLITION NOTES: (APPLICABLE TO ALL DRAWINGS)

- ALL EXISTING EQUIPMENT TO REMAIN UNLESS IDENTIFIED OTHERWISE ON THE DRAWINGS, GENERAL NOTES OR SPECIFICATIONS.
- EXTENTS OF DEMOLITION SHOWN ARE APPROXIMATE AND THIS TRADE IS RESPONSIBLE FOR ALL DEMOLITION REQUIRED TO MEET DESIGN INTENT.
- REMOVE ALL UNUSED, ABANDONED OR REDUNDANT PIPING, HANGERS, & ACCESSORIES BACK TO SOURCE & CAP.
- COORDINATE WITH FACILITY MAINTENANCE DEPARTMENT FOR DISPOSAL OF REMOVED DEVICES. DISPOSE OF ALL UNWANTED DEVICES AS REQUIRED AS PER FACILITY STANDARDS.

DUCTWORK LEGEND

SYMBOL	DESCRIPTION
	NEW ITEM
	EXISTING ITEM TO REMAIN
	EXISTING ITEM TO BE REMOVED
REL	EXISTING ITEM TO BE RELOCATED
ER	EXISTING ITEM IN RELOCATED POSITION
EX	EXISTING ITEM TO REMAIN
OED	OPEN ENDED DUCT
	DUCTWORK SHOWN DOUBLE LINE
(S) OC	OCCUPANCY SENSOR
(S) CO2	CO2 SENSOR (-D DENOTES DUCT MOUNTED)
(T)	THERMOSTAT/TEMPERATURE SENSOR
	NEW CONNECTION TO EXISTING
EA	EXHAUST AIR
OA	OUTSIDE AIR
RA	RETURN AIR
SA	SUPPLY AIR
	FLEXIBLE DUCT CONNECTION
	DUCT DOWN - POSITIVE / NEGATIVE PRESSURE
	DUCT UP - POSITIVE / NEGATIVE PRESSURE
	SUPPLY AIR GRILLE
	RETURN AIR GRILLE
?	DRAWING NOTE TAG
??? / ??	EQUIPMENT TAG EQUIPMENT TYPE EQUIPMENT NUMBER (REFER TO SCHEDULES FOR INFO)

THIS IS A STANDARD LEGEND. ALL SYMBOLS MAY NOT NECESSARILY BE USED ON DRAWINGS.

PIPING LEGEND

ITEM	DESCRIPTION
	NEW ITEM
	EXISTING ITEM TO REMAIN
	EXISTING ITEM TO BE REMOVED
	BELOW FLOOR PIPING
	HEAT TRACED PIPING
	POTABLE (DOMESTIC) COLD WATER (DCW)
	POTABLE (DOMESTIC) HOT WATER (DHW)
	POTABLE (DOMESTIC) HOT WATER RETURN (DHWR)
SAN	SANITARY DRAIN
CD	CONDENSATE DRAIN
	NATURAL GAS
RL	REFRIGERANT LIQUID
RS	REFRIGERANT SUCTION
(TW)	HOT WATER SUPPLY
(TWR)	HOT WATER RETURN
	GATE VALVE
	BALL VALVE
	BUTTERFLY VALVE
	GLOBE VALVE
TBV	THERMOSTATIC BALANCING VALVE
	BALANCING VALVE
	? = FLOW RATE
PICV	PRESSURE INDEPENDENT CONTROL VALVE
	UNION
	CIRCUIT SETTER
	PLUG VALVE
	GAS VALVE
	STRAINER
	CHECK VALVE
	TRIPLE DUTY VALVE
	2 WAY CONTROL VALVE
	3 WAY CONTROL VALVE
	PRESSURE RELIEF VALVE
	PRESSURE REDUCING VALVE
AV	AV - MANUAL AIR VENT; AAV - AUTOMATIC AIR VENT
	BACKFLOW PREVENTER
DCVA	DOUBLE CHECK VALVE ASSEMBLY
RP	REDUCED PRESSURE ASSEMBLY
	PUMP
	FLEXIBLE CONNECTION
	REDUCER/INCREASER
	ELBOW TURNED UP
	ELBOW TURNED DOWN
	PIPE CAP
	PIPE SINGLE LINE CUTOFF
	PRESSURE GAUGE
	THERMOMETER
T	SENSOR WELL (T-TEMPERATURE)
P	SENSOR WELL (P-PRESSURE)
FS	FLOW SWITCH
	LOW WATER CUT OFF
	ANCHOR
	GUIDE
FCO	FLOOR CLEAN OUT
WCO	WALL CLEAN OUT
HB	HOSE BIB
	NEW CONNECTION TO EXISTING

THIS IS A STANDARD LEGEND. ALL SYMBOLS MAY NOT NECESSARILY BE USED ON DRAWINGS.

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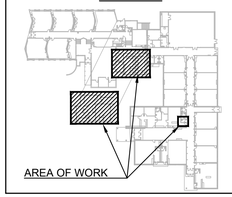
KEYPLAN



AREA OF WORK

REVISIONS

NO.	ISSUED FOR	DATE
00	50% PROGRESS SUBMISSION	26.01.21
01	90% PROGRESS SUBMISSION	26.02.04
02	TENDER SUBMISSION	26.03.03

NORTH

LICENSED PROFESSIONAL ENGINEER
CE-6380
26-03-03
J.J.PEPPER
100114890
PROVINCE OF ONTARIO

DESIGN	ALC	DRAWN	JH
CHECKED	JP	REVIEWED	ALC

PROJECT
ST. ANNE CAMBRIDGE

ADDRESS
127 ELGIN ST. NORTH, CAMBRIDGE, ON

PROJECT NO.
CE-6380

DRAWING TITLE
LEGENDS, NOTES & DETAILS - MECHANICAL

DRAWING NUMBER
M1 OF 9

PACKAGED AIR SOURCE HEAT PUMP ROOFTOP UNIT SCHEDULE

ACCESSORIES:
1. MERV 8 (PRE)FILTERS
2. MERV 14 (FINAL) FILTERS
3. COMPARATIVE ENTHALPY ECON.
4. MOTORIZED OA DAMPER
5. BAROMETRIC RELIEF DAMPER
6. POWER EXHAUST
7. ROOF CURB, 18" HIGH
8. STAINLESS STEEL HEAT EXCHANGER
9. REFRIG. LEAK DETECTION SYSTEM
10. RA SMOKE DETECTOR
11. PROGRAMMABLE THERMOSTAT
12. DISCONNECT SWITCH - FACTORY MOUNTED
13. HOT GAS REHEAT, MODULATING
14. RA CO2 SENSOR
15. DIGITAL SCROLL COMPRESSOR
16. VARIABLE SPEED SUPPLY FAN
17. DDC CONTROLLER, BACNET CERTIFIED
18. HORIZONTAL DISCHARGE / RETURN

DWG REF	MANUF.	MODEL	DESIGN AIRFLOWS			COOLING						HEATING - HEAT PUMP				BACKUP HEATING - NAT. GAS				MOTOR - SUPPLY		ELECTRICAL			ACCESSORIES	OPERATING WEIGHT [lbs.] (kg)	REMARKS
			SUPPLY [CFM] (L/s)	ESP [in. w.c.] (Pa)	OUTDOOR [CFM] (L/s)	TOTAL [MBH] (kW)	SENSIBLE [MBH] (kW)	E.A.T. [°F] (°C)		L.A.T. [°F] (°C)		MIN. IEER (AHRI)	CAP [MBH] (kW)	E.A.T. [°F] (°C)	L.A.T. [°F] (°C)	MIN. COP @17°F (AHRI)	INPUT [MBH] (kW)	OUTPUT [MBH] (kW)	E.A.T. [°F] (°C)	L.A.T. [°F] (°C)	BRAKE HP [HP]	NOM. HP [HP]	VOLT / PH / HZ	MCA	MOCP			
								D.B.	W.B.	D.B.	W.B.			D.B.	D.B.				D.B.	D.B.								
RTU-01	TRANE	DHK102A3SBH	2975 (1404)	1.378 (342.90)	850 (401)	105.68 (31.0)	78.63 (23.0)	80.0 (26.7)	67.0 (19.4)	57.59 (14.2)	56.18 (13.4)	16.4	97.77 (28.7)	70.0 (21.1)	100.33 (38.0)	2.25	200.0 (58.6)	162.0 (47.5)	70.0 (21.1)	119.7 (48.7)	1.367	3.0	208 / 3 / 60	56	70	1,3,4,5,6,7,8,9,11,12,13, 14,16,17	1321.0 (599.2)	PROVIDE NEW ROOF CURB. CONTRACTOR TO CONFIRM EXISTING SILENCERS ARE IN GOOD OPERABLE CONDITION. REPORT TO CONSULTANT EXTRA DEFICIENCIES WITH FIT UP DURING SHOP DRAWING APPROVAL. MOD. GAS HEAT, 10:1 TURNDOWN. REUSE EXISTING S/A AND R/A SMOKE DETECTORS

ALTERNATE MANUFACTURERS:
AAON, AIRWISE, CARRIER, DAIKIN, TRANE, YORK (JCI)

NOTES:
ASHP HEATING LOCKED OUT BELOW 25°F (-4.0°C) (ADJUSTABLE)

PLUMBING FIXTURE SCHEDULE

DWG REF	DESCRIPTION		HOT [in.] (mm)	COLD [in.] (mm)	DRAIN [in.] (mm)
WC	BOWL:	AMERICAN STANDARD 4.8L FLUSH 3451.001.020 'MADERA' FLOOR MOUNTED, VITREOUS CHINA WATER CLOSET WITH ELONGATED BOWL, SYPHON JET BOWL AND 38 MM (1½") TOP SPUD INLET.	--- ---	1-1/2" (38)	3" (76)
	VALVE:	DELTA TECK 81T201HWA EXPOSED POLISHED CHROME PLATED HARD WIRED FLUSH VALVE, INFRARED SENSOR, VACUUM BREAKER, 38MM (1-1/2") CONNECTION. ASME A112.1037 / CSA B125.37 AND ADA / ANSI A117.1 CODE COMPLIANT. ADJUST FOR 4.8L FLUSH.			
	SEAT:	CENTOCO 1500STS FOR ELONGATED BOWL, SOLID WHITE PLASTIC, OPEN FRONT WITH REMOVABLE BUMPERS, CONCEALED CHECK HINGE, AND TYPE 316 STAINLESS STEEL HINGE POSTS AND TRIM.			
UR	URINAL:	AMERICAN STANDARD "WASHBROOK" NO. 6590.001.020 VITREOUS CHINA, WASHDOWN FLUSH ACTION, 19 MM (3/4") TOP SPUD, INTEGRAL FLUSH SPREADER, OPEN TRAP, STAINLESS STEEL REMOVABLE STRAINER AND 50 MM (2") OUTLET CONNECTION.	--- ---	3/4" (19)	2" (51)
	VALVE:	DELTA TECK 81T231HWA EXPOSED POLISHED CHROME PLATED HARD WIRED FLUSH VALVE, INFRARED SENSOR, VACUUM BREAKER, 38MM (1-1/2") CONNECTION. ASME A112.1037 / CSA B125.37 AND ADA / ANSI A117.1 CODE COMPLIANT. ADJUST FOR 0.5L FLUSH.			
	CARRIER:	WATTS CA-311 HEAVY DUTY URINAL CARRIER WITH PIPE UPRIGHTS WELDED TO STEEL BASE PLATES .			
MS	SINK:	STERN-WILLIAMS NO. MTB-2424 WITH MOULDED STONE BASIN, 250 MM (10") HIGH WALLS, INTEGRALLY MOLDED SHELF, CAST BRASS CADMIUM PLATED DRAIN BODY, CAST BRASS LOCKNUT, NEOPRENE GASKET, STAINLESS STEEL COMBINATION DOME STRAINER AND LINT BASKET AND DRAIN BODY FOR 80 MM (3") I.P.S. LEAD CAULKED JOINT. C/W STAINLESS STEEL BACK PANEL.	1/2" (13)	1/2" (13)	3" (76)
	FAUCET:	DELTA TECK 28T2965 WALL MOUNTED SERVICE SINK FAUCET WITH 150 MM (6") BLADE HANDLES, HOSE END SPOUT, PAIL HOOK, BOTTOM BRACE, INTEGRAL STOPS, VACUUM BREAKER AND 1200 MM (48") VINYL HOSE AND HANGER.			
	WASTE:	80 MM (3") CAST IRON "P" TRAP.			
DF		MURDOCK A171 SERIES MODEL A171100F-BF1S BARRIER FREE WALL MOUNTED, DRINKING FOUNTAIN WITH PUSHBUTTON AND BOTTLE FILLER. BUBBLER TO DELIVER 0.3 GPM FLOW, FLEXIBLE GUARD WITH INTEGRALLY DESIGNED NON-SQUIRT FEATURE AND OPERATE ON A WATER PRESSURE RANGE OF 20-105 PSIG. CONSTRUCTED FROM 304 STAINLESS STEEL AND HAVE INTEGRAL DRAIN. GRANITE FINISH COOLER WITH SATIN STAINLESS FINISH BOTTLE FILLER.	--- ---	3/8" (10)	1-1/4" (32)
WF		BRADLEY TERREON TRI-FOUNT WASHFOUNTAIN, MODEL MF2933, CONTINUOUS BOWL, CENTER SHANK, COLOUR SELECTION BY ARCHITECT. AIR ACTIVATION PUSHBUTTON, SEPARATE SLOW-CLOSING SOLENOID VALVE, C/W THERMOSTATIC MIXING VALVE. NO SOAP DISPENSER.	1/2" (13)	1/2" (13)	2" (51)

GAS FIRED MAKEUP AIR UNIT SCHEDULE

DWG REF	MANUF.	MODEL	AIRFLOW [CFM] (L/s)	ESP [in. w.c.] (Pa)	FAN RPM	HEATING INPUT [MBH] (kW)	HEATING OUTPUT [MBH] (kW)	TEMP RISE [°F] (°C)	ELECTRICAL			WEIGHT [lbs.] (kg)	REMARKS
									VOLT/PH/HZ	MCA	MOCP		
MUA-01	REZNOR	RPB-400	4000 (1888)	1.0 (248.84)	900	400 (117.2)	320 (93.8)	62.0 (34.4)	208 / 3 / 60	18.85	30	933.0 (423.2)	REPLACEMENT LIKE FOR LIKE. PROVIDE NEW ROOF CURB. WITH DOWNTURN PLENUM REPORT TO CONSULTANT EXTRA DEFICIENCIES WITH FIT UP DURING SHOP DRAWING APPROVAL STAGE. RA/OA DAMPERS.

ALTERNATE MANUFACTURERS: BOUSQUET, ICE WESTERN, TRANE

BOILER SCHEDULE

DWG REF	MANUF.	MODEL	INPUT [MBH] (kW)	OUTPUT [MBH] (kW)	FLOW [USGPM] (L/s)	ΔT [°F] (°C)	ΔP [ft. w.c.] (kPa)	FLUID TYPE	ELECTRICAL		REMARKS
									V/PH/HZ	MCA	
B-01, B-02	LOCHINVAR	KBX800N	800.0 (234.5)	776.0 (227.4)	76.0 (4.79)	20.0 (-6.7)	17.0 (50.8)	WATER	120 / 1 / 60	5.4	REPLACE BOILERS LIKE FOR LIKE. CONTRACTOR TO CONFIRM SITE FIT UP TO EXISTING CONDITIONS. REPORT TO CONSULTANT ANY DEFICIENCIES/INTERFERENCES.C/W CONDENSATE NEUTRALIZING KIT, LOW WATER CUTOFF, FLOW SWITCH, AND INLET/OUTLET TEMP SENSORS. INCLUDE LOCHINVAR BACK FLOW DAMPER FOR COMMON VENTING. INCLUDE BACNET CARD

ALTERNATE MANUFACTURERS: HYDROTHERM, LAARS, LOCHINVAR, RIELLO, SMITH, VIESSMAN, WEIL MCLAIN

PG: PROPYLENE GLYCOL EG: ETHYLENE GLYCOL

PUMP SCHEDULE

DWG REF	SERVING	MANUF.	MODEL	FLOW [GPM] (L/s)	HEAD [ft. w.c] (kPa)	FLUID	EFF. [%]	PUMP POWER [BHP]	MOTOR [HP]	RPM	ELECTRICAL [V / Ph / Hz]	REMARKS
P-01, P-02	HEATING SYSTEM	BELL AND GOSSETT	e-80 3x3x7C	220 (13.88)	35 (104.61)	WATER	75.3	2.72	3	1750	208 / 3 / 60	CONTRACTOR TO VERIFY EXISTING VFDS CAN BE RE-USED WITH REPLACEMENT PUMPS.

ALTERNATE MANUFACTURERS:
ARMSTRONG, GRUNDFOS, TACO, WILO

NOTES:
PG = PROPYLENE GLYCOL

ELECTRIC POTABLE (DOMESTIC) WATER HEATER SCHEDULE

DWG REF	MANUF.	MODEL	INPUT [MBH] (kW)	STORAGE CAPACITY [USG] (L)	RECOVERY CAPACITY [USG/h] (L/h)	TEMP RISE [°F] (°C)	ELEMENTS		ELECTRICAL [V / Ø / Hz]	REMARKS
							kW [ea]	QTY.		
WH-01	AO SMITH	DEL-50	17.1 (5.0)	50 (189.3)	20.3 (76.8)	90 (32.2)	5	2	208 / 3 / 60	10kW ELECTRICAL INPUT, ELEMENTS TO RUN SIMULTANEOUS
WH-02	AO SMITH	DEL-50	17.1 (5.0)	50 (189.3)	20.3 (76.8)	90 (32.2)	5	2	208 / 3 / 60	10kW ELECTRICAL INPUT, ELEMENTS TO RUN SIMULTANEOUS

ALTERNATE MANUFACTURERS:
AO SMITH, BRADFORD WHITE, JOHN WOOD, RHEEM

CONTROL NOTES:

1. GENERAL

- ALL SETPOINTS AND SCHEDULES SHALL BE ADJUSTABLE.
- UNOCCUPIED HEATING SETPOINT: 60.0°F (15.6°C) .
- UNOCCUPIED COOLING SETPOINT: 80.0°F (26.6°C).
- OCCUPIED HEATING SETPOINT: 70.0°F (21.1°C).
- OCCUPIED COOLING SETPOINT: 75.0°F (23.8°C).
- CO2 SETPOINT: 800 PPM
- REFER TO DRAWINGS AND SCHEMATICS FOR DEVICE AND EQUIPMENT LOCATIONS.

2. DEFINITIONS

- EQUIPMENT DUTY / STANDBY: WHERE EQUIPMENT IS DESIGNATED DUTY / STANDBY, DUTY EQUIPMENT TO OPERATE. STANDBY EQUIPMENT TO START AUTOMATICALLY IF DUTY EQUIPMENT ENTERS ALARM/FAILURE STATUS MODE. ROLES SHALL ALTERNATE EVERY 700 HOURS (MONTHLY)
- EQUIPMENT LEAD/LAG: WHERE EQUIPMENT IS DESIGNATED LEAD / LAG, LEAD EQUIPMENT TO OPERATE. LAG EQUIPMENT TO START / STOP AUTOMATICALLY PER OPERATING SEQUENCE. ROLES SHALL ALTERNATE EVERY 700 HOURS (MONTHLY)
- OA, OAT : OUTSIDE AIR, OUTSIDE AIR TEMPERATURE
- SA, SAT: SUPPLY AIR, SUPPLY AIR TEMPERATURE
- RA, RAT: RETURN AIR, RETURN AIR TEMPERATURE
- EA, EAT: EXHAUST AIR, EXHAUST AIR TEMPERATURE
- MA, MAT: MIXED AIR, MIXED AIR AIR TEMPERATURE

3. ALARM LEVELS

1 - LIFE SAFETY: LATCHING - TRIGGERED AFTER TRUE FOR 1 SECOND
2 - CRITICAL EQUIPMENT: LATCHING - TRIGGERED AFTER TRUE FOR 10 SECONDS
3 - URGENT: NON-LATCHING - TRIGGERED AFTER TRUE FOR 1 MINUTE
4 - WARNING: NORMAL, NON-LATCHING - TRIGGERED AFTER TRUE FOR 5 MINUTES

LATCHING ALARMS SHALL REQUIRE OPERATOR ACKNOWLEDGEMENT BEFORE RETURNING TO NORMAL

BOILER PLANT :
B-01, B-02, P-01, P-02, P-03, P-04

GENERAL:

- COORDINATE WITH CONTROLS CONTRACTOR. EXISTING CONTROL SEQUENCES TO BE MAINTAINED.
- BOILER MANUFACTURERS REPRESENTATIVE TO START-UP AND TEST BOILERS AND ASSOCIATED CONTROL SYSTEM.
- BAS SHALL ALLOW FOR LEAD/LAG, CASCADING BOILER AND PUMP CONTROL. CONTROLLER SHALL HAVE ADJUSTABLE LEAD/LAG BOILER AND PUMP SCHEDULE.

CONTROL DEVICES:

- OUTDOOR AIR TEMPERATURE SENSOR C/W SUN SHADE SHIELD ON NORTH SIDE OF BUILDING.
- BOILER HIGH LIMIT SWITCH
- BOILER LOW WATER CUT-OFF
- WATER TEMPERATURE SENSOR [TS-1]

SEQUENCE OF OPERATIONS:

- MAINTAIN EXISTING SYSTEM OF OPERATIONS.

ALARMS / SAFETIES:

LEVEL 2 : ON HIGH LIMIT BOILERS SHALL BE DISABLED.
[ON LOW WATER BOILERS SHALL BE DISABLED].

ROOFTOP UNIT : GYM UNIT
MUA-01

GENERAL:

- COORDINATE WITH CONTROLS CONTRACTOR. EXISTING CONTROL SEQUENCES TO BE MAINTAINED.

OPERATING SEQUENCE:

- ENABLE OCCUPIED/UN-OCCUPIED SETTINGS FROM BAS.
- UN-OCCUIPIED PERIOD: ENERGIZE UNIT FAN, HEATING TO MAINTAIN A UNOCCUPIED TEMPERATURE SETPOINTS AS REQUIRED.
- OCCUPIED PERIOD : SUPPLY FAN SHALL RUN CONTINUOUSLY. STAGE HEATING TO MAINTAIN A OCCUPIED SETPOINT .
  - OA CONTROL : OA DAMPER SHALL MODULATE BETWEEN SCHEDULED MIN OA POSTION AND DESIGN OA POSITION TO MAINTAIN CO2 BETWEEN SETPOINT & SETPOINT +200PPM.

PACKAGED ROOFTOP UNIT VVT SYSTEM : OFFICE UNIT
RTU-01

GENERAL:

- COORDINATE WITH CONTROLS CONTRACTOR. EXISTING CONTROL SEQUENCES TO BE MAINTAINED.

EXHAUST FAN : GANG WASHROOMS

OPERATING SEQUENCE:

- ENERGIZE / DE-ENERGIZE FAN ON OFF FROM BAS.

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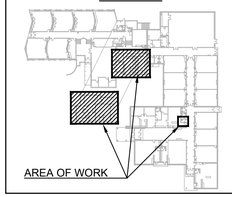
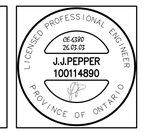
KEYPLAN



REVISIONS

NO.	ISSUED FOR	DATE
00	50% PROGRESS SUBMISSION	26.01.21
01	90% PROGRESS SUBMISSION	26.02.04
02	TENDER SUBMISSION	26.03.03

NORTH



DESIGN	ALC	DRAWN	JH
CHECKED	JP	REVIEWED	ALC

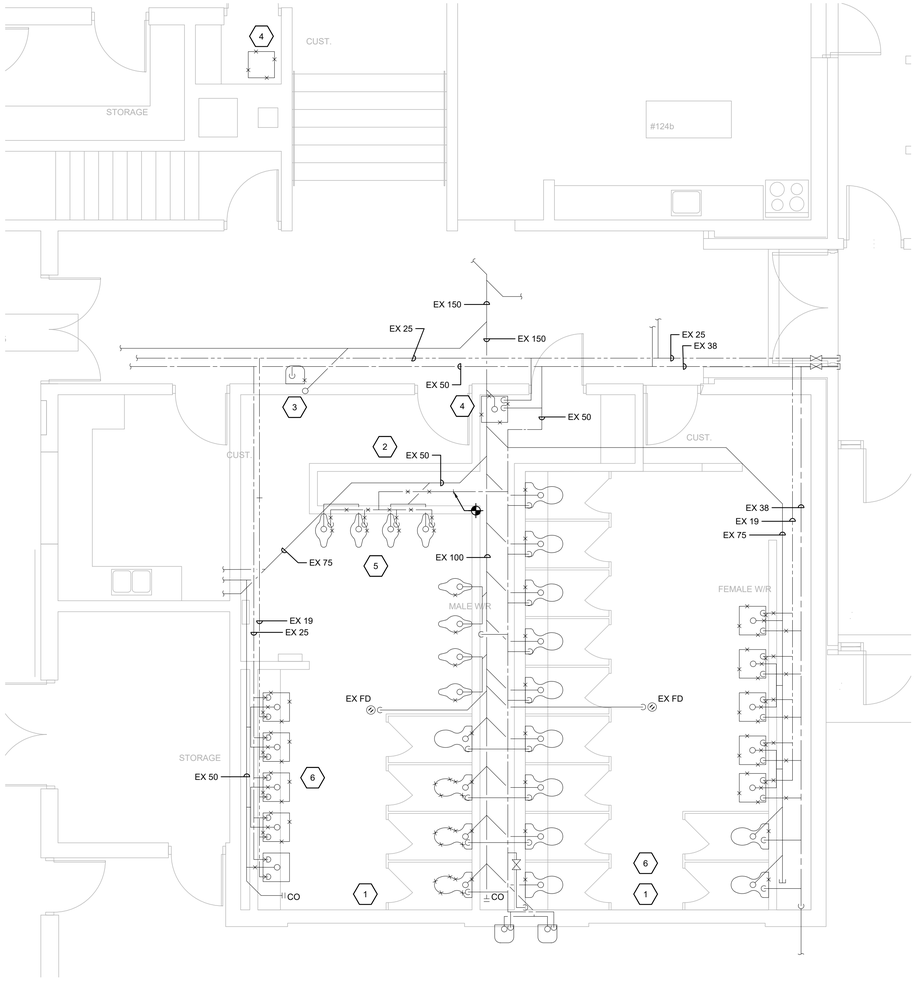
PROJECT
ST. ANNE CAMBRIDGE

ADDRESS
127 ELGIN ST. NORTH, CAMBRIDGE, ON

PROJECT NO.
CE-6380

DRAWING TITLE
SCHEDULES & CONTROL NOTES - MECHANICAL

DRAWING NUMBER
M2 OF 9

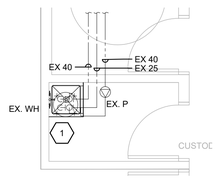


WASHROOM PART PLAN - PLUMBING & DRAINAGE REMOVALS

SCALE: 1:50

DRAWING NOTES (INDICATED WITH HEXAGONS):

1. REMOVE ALL EXISTING WATER CLOSETS WITHIN ROOM. EXISTING CONNECTIONS TO REMAIN FOR NEW FIXTURES.
2. REMOVE EXISTING DOMESTIC TANK SERVING URINALS AND PIPING AFTER TANK.
3. REMOVE EXISTING DRINKING FOUNTAIN. EXISTING CONNECTIONS TO REMAIN FOR NEW FIXTURE.
4. REMOVE EXISTING MOP SINK. EXISTING CONNECTIONS TO REMAIN FOR NEW FIXTURE.
5. REMOVE ALL EXISTING URINALS WITHIN ROOM. EXISTING CONNECTIONS TO REMAIN FOR NEW FIXTURES.
6. REMOVE EXISTING LAV WITHIN ROOM. CAP ASSOCIATED PIPING CONNECTIONS BELOW FLOOR / BEHIND WALL TO ALLOW FOR SURFACE REFINISH BY OTHERS.

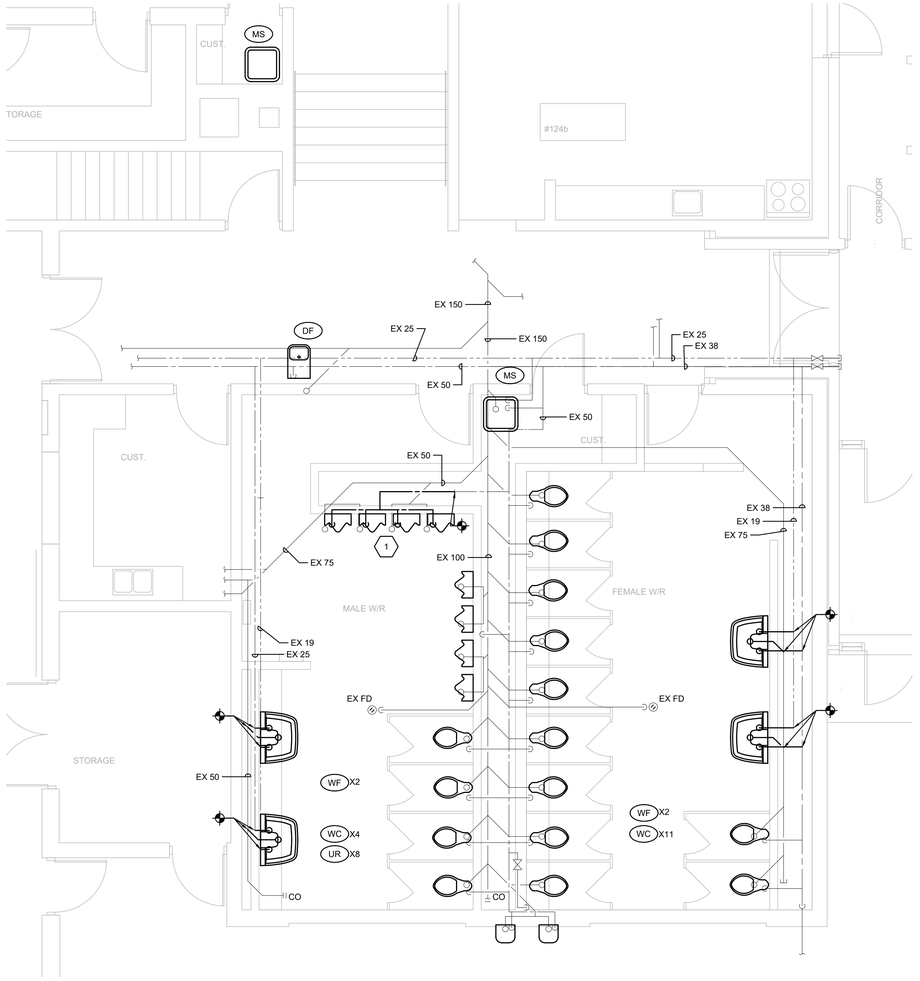


CUSTODIAN PART PLAN - PLUMBING & DRAINAGE REMOVALS

SCALE: 1:50

DRAWING NOTES (INDICATED WITH HEXAGONS):

1. REMOVE EXISTING WATER HEATER . DOMESTIC PIPING TO REMAIN FOR RECONNECTION.



WASHROOM PART PLAN - PLUMBING & DRAINAGE NEW

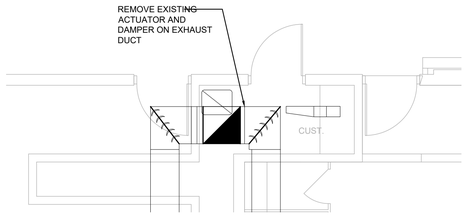
SCALE: 1:50

DRAWING NOTES (INDICATED WITH HEXAGONS):

1. COORDINATE FINISHED URINAL AND FIXTURE LOCATION INSTALLATION HEIGHTS WITH ARCHITECTURAL.

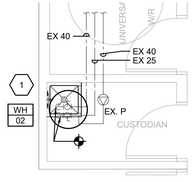
GENERAL NOTES:

- INSTALL PLUMBING AND FIXTURES IN ACCORDANCE WITH OBC 2024.



WASHROOM PART PLAN - HVAC

SCALE: 1:50



CUSTODIAN PART PLAN - PLUMBING & DRAINAGE

SCALE: 1:50

DRAWING NOTES (INDICATED WITH HEXAGONS):

1. INSTALL NEW WATER HEATER AS PER MANUFACTURERS REQUIREMENTS.

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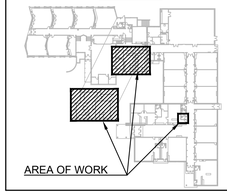

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NORTH

LICENSED PROFESSIONAL ENGINEER
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26.05.03
J.J.PEPPER
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PROVINCE OF ONTARIO

DESIGN	ALC	DRAWN	JH
CHECKED	JP	REVIEWED	ALC

PROJECT

ST. ANNE CAMBRIDGE

ADDRESS

127 ELGIN ST. NORTH,
CAMBRIDGE, ON

PROJECT NO.

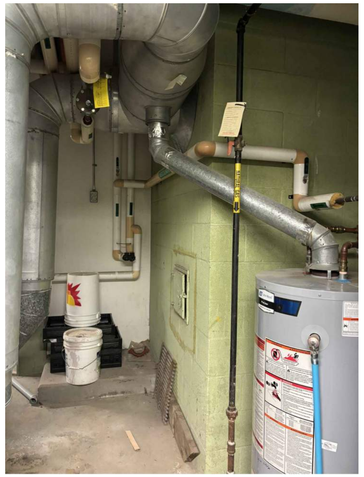
CE-6380

DRAWING TITLE

WASHROOM PART PLANS - PLUMBING, DRAINAGE, & HVAC

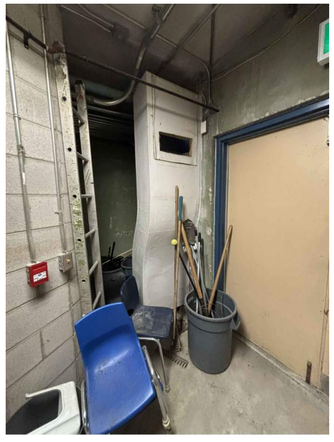
DRAWING NUMBER

M3 OF 9



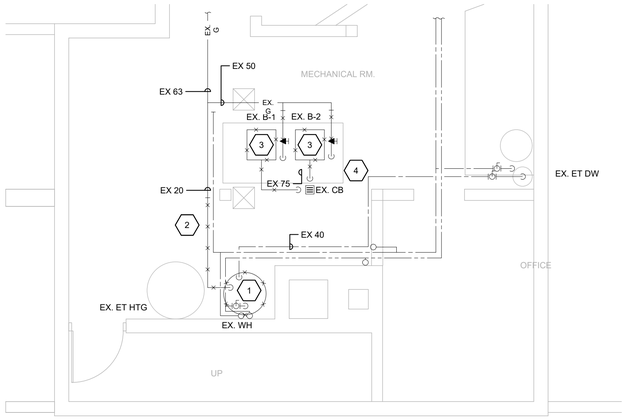
REFERENCE IMAGE - EXISTING CHIMNEY

SCALE: NTS



REFERENCE IMAGE - EXISTING COMBUSTION AIR INTAKE

SCALE: NTS

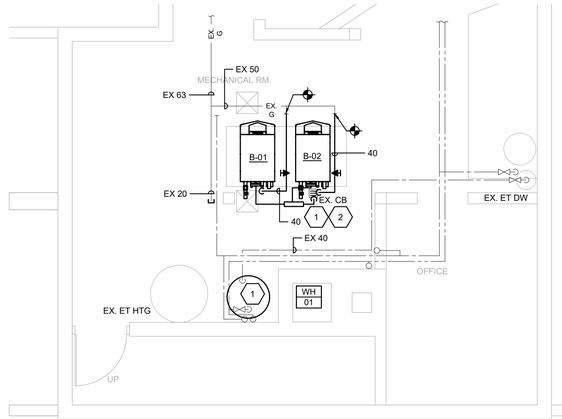


MECHANICAL ROOM PART PLAN - PLUMBING & DRAINAGE REMOVALS

SCALE: 1:50

DRAWING NOTES (INDICATED WITH HEXAGONS):

1. REMOVE EXISTING WATER HEATER. DOMESTIC PIPING TO REMAIN FOR RECONNECTION.
2. REMOVE EXISTING GAS PIPING, HANGERS, VALVES & APPURTENANCES FROM INDICATED POINT TO WATER HEATER.
3. REMOVE EXISTING GAS PIPING, HANGERS, VALVES & APPURTENANCES FROM INDICATED POINT TO FURNACE.
4. REMOVE EXISTING DRAIN PIPING ON FURNACES.

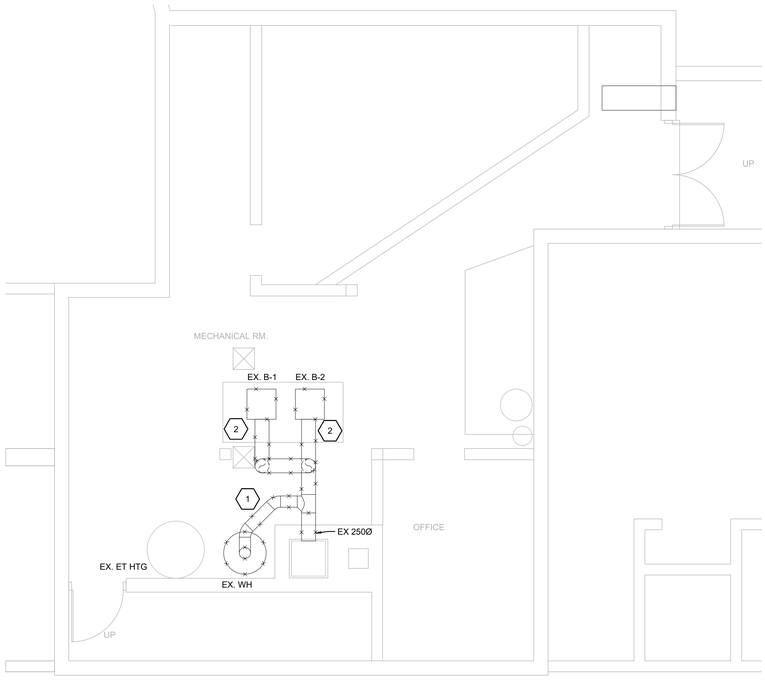


MECHANICAL ROOM PART PLAN - PLUMBING & DRAINAGE NEW

SCALE: 1:50

DRAWING NOTES (INDICATED WITH HEXAGONS):

1. EXTEND CONDENSATE NEUTRALIZER DISCHARGE TO EXISTING CATCH BASIN.
2. COMMISSIONING CONTRACTOR TO CONFIRM EXISTING GAS SERVICE TO BOILERS. PROVIDE PRV FOR EACH BOILER.

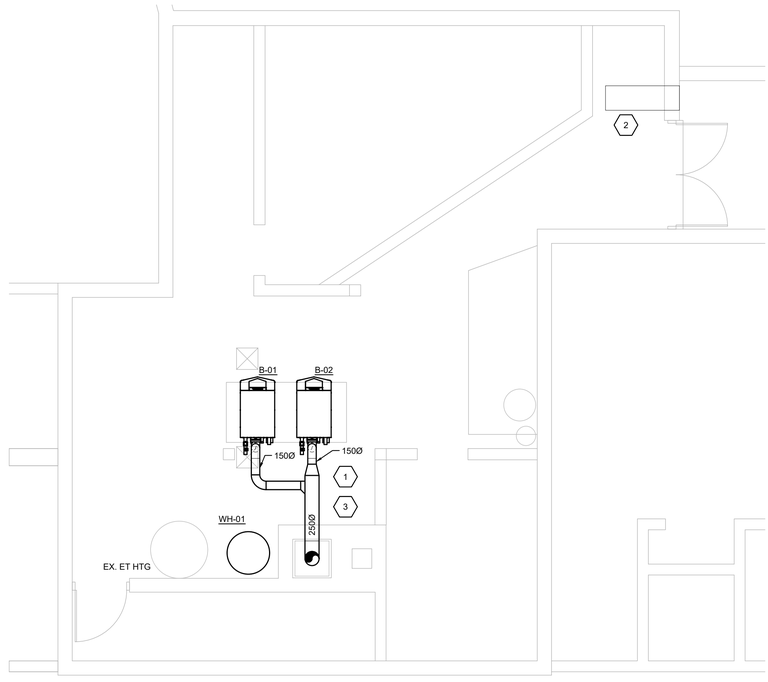


MECHANICAL ROOM PART PLAN - HVAC REMOVALS

SCALE: 1:50

DRAWING NOTES (INDICATED WITH HEXAGONS):

1. REMOVE WATER HEATER VENTING, HANGERS & APPURTENANCES TO THE COMBINED EXHAUST VENT.
2. REMOVE BOILER VENTING, HANGERS & APPURTENANCES FROM BOILERS TO EXISTING CHIMNEY.



MECHANICAL ROOM PART PLAN - HVAC NEW

SCALE: 1:50

DRAWING NOTES (INDICATED WITH HEXAGONS):

1. VENT SIZING SHOWN FOR PRICING ONLY. SUCCESSFUL BIDDER SHALL SUBMIT DETAILED VENT SIZE CALCULATIONS WITH BOILER SHOP DRAWINGS SPECIFIC TO THIS PROJECT.
2. CONTRACTOR TO CONFIRM SIZE AND LOCATION OF COMBUSTION AIR INTAKE MEETS CSAB149 8.3 REQUIREMENTS.
3. INCLUDE NEW ULC S635 LINED CHIMNEY BREACHING SYSTEM AS PER CSA 8.12.2. INSTALL IN ACCORDANCE TO MANUFACTURER'S INSTRUCTIONS.

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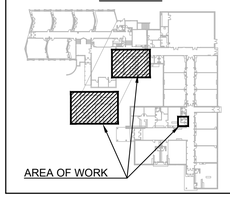

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NORTH

LICENSED PROFESSIONAL ENGINEER
CE-6380 26.03.03
J.J.PEPPER
100114890
PROVINCE OF ONTARIO

DESIGN	ALC	DRAWN	JH
CHECKED	JP	REVIEWED	ALC

PROJECT

ST. ANNE CAMBRIDGE

ADDRESS

127 ELGIN ST. NORTH, CAMBRIDGE, ON

PROJECT NO.

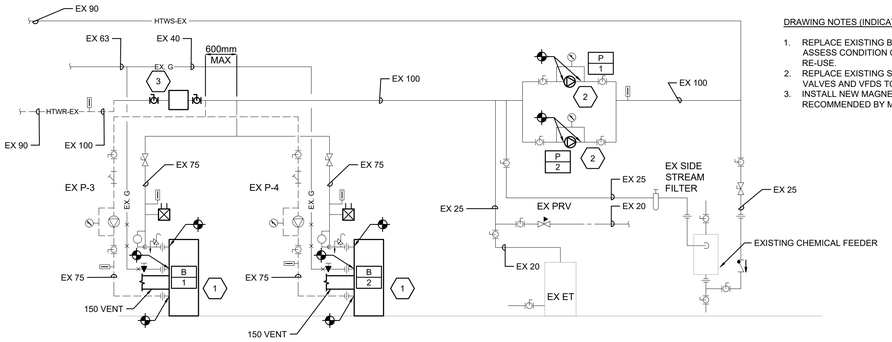
CE-6380

DRAWING TITLE

MECHANICAL ROOM PART PLANS - PLUMBING, DRAINAGE & DUCTWORK

DRAWING NUMBER

M4 OF 9

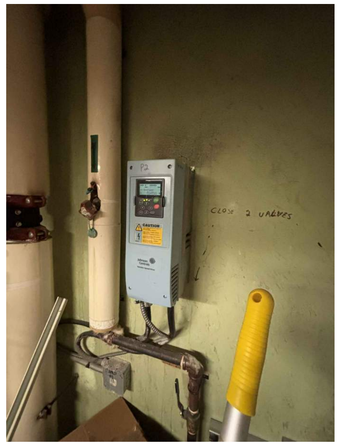


DRAWING NOTES (INDICATED WITH HEXAGONS):

1. REPLACE EXISTING BOILERS. CONTRACTOR TO ASSESS CONDITION OF EXISTING VALVES FOR RE-USE.
2. REPLACE EXISTING SYSTEM PUMP. ASSOCIATED VALVES AND VFDS TO REMAIN FOR RE-USE.
3. INSTALL NEW MAGNETIC SEPARATOR AS RECOMMENDED BY MANUFACTURER.

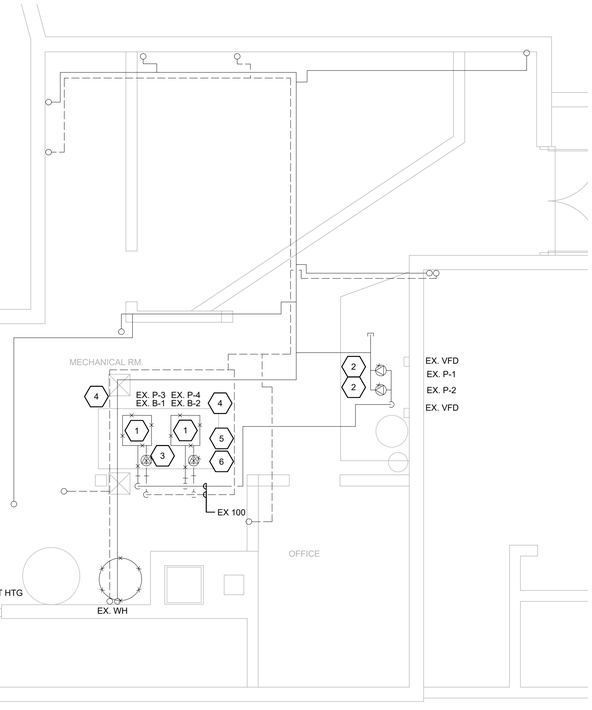
BOILER ROOM SCHEMATIC

SCALE: NTS



REFERENCE IMAGE - PUMP VFD

SCALE: NTS

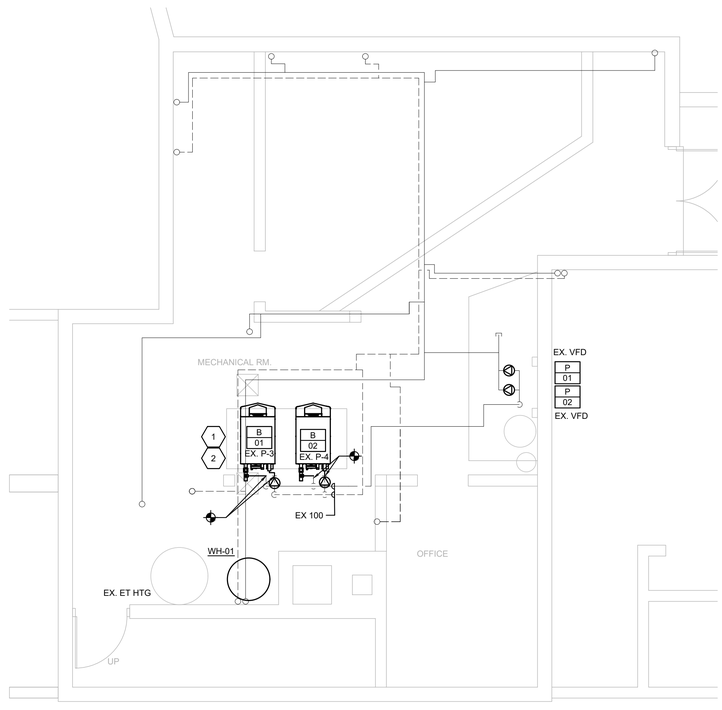


MECHANICAL ROOM PART PLAN - HYDRONIC REMOVALS

SCALE: 1:50

DRAWING NOTES (INDICATED WITH HEXAGONS):

1. REMOVE EXISTING BOILER. COORDINATE WITH CONTROLS CONTRACTOR.
2. REMOVE EXISTING SYSTEM PUMP. ASSOCIATED VALVES AND VFDS TO REMAIN FOR RE-USE. CONTRACTOR TO CONFIRM VERIFY EXISTING ELECTRICAL FOR THE VFD WITH PUMP SHOP DRAWING SUBMISSION.
3. REMOVE PIPING, VALVES, HANGERS, CONTROLS & APPURTENANCES BETWEEN EQUIPMENT & INDICATED POINT-UPSTREAM PIPING TO REMAIN FOR RECONNECTION.
4. REMOVE AND STORE BOILER CIRCULATION PUMPS FOR RE-INSTALLATION.
5. EXISTING HOUSEKEEPING PAD TO REMAIN.
6. CONTROLS CONTRACTOR TO MEASURE AND VERIFY EXISTING SEQUENCE OF OPERATIONS OF THE SYSTEMS.



MECHANICAL ROOM PART PLAN - HYDRONIC NEW

SCALE: 1:50

DRAWING NOTES (INDICATED WITH HEXAGONS):

1. EXTEND EXISTING HOUSEKEEPING PAD AS REQUIRED TO SUIT NEW BOILERS.
2. MANUFACTURER'S RECOMMENDED SERVICE CLEARANCE. INSTALL UNIT, ASSOCIATED PIPING, VENTING AND APPURTENANCES TO ALLOW FOR MAINTENANCE ACCESS TO UNIT.

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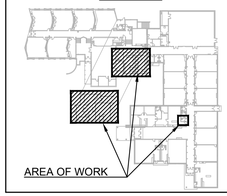

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NORTH

LICENSED PROFESSIONAL ENGINEER
CE-6380
26.03.03
J.J.PEPPER
100114890
PROVINCE OF ONTARIO

DESIGN	ALC	DRAWN	JH
CHECKED	JP	REVIEWED	ALC

PROJECT
ST. ANNE CAMBRIDGE

ADDRESS
127 ELGIN ST. NORTH,
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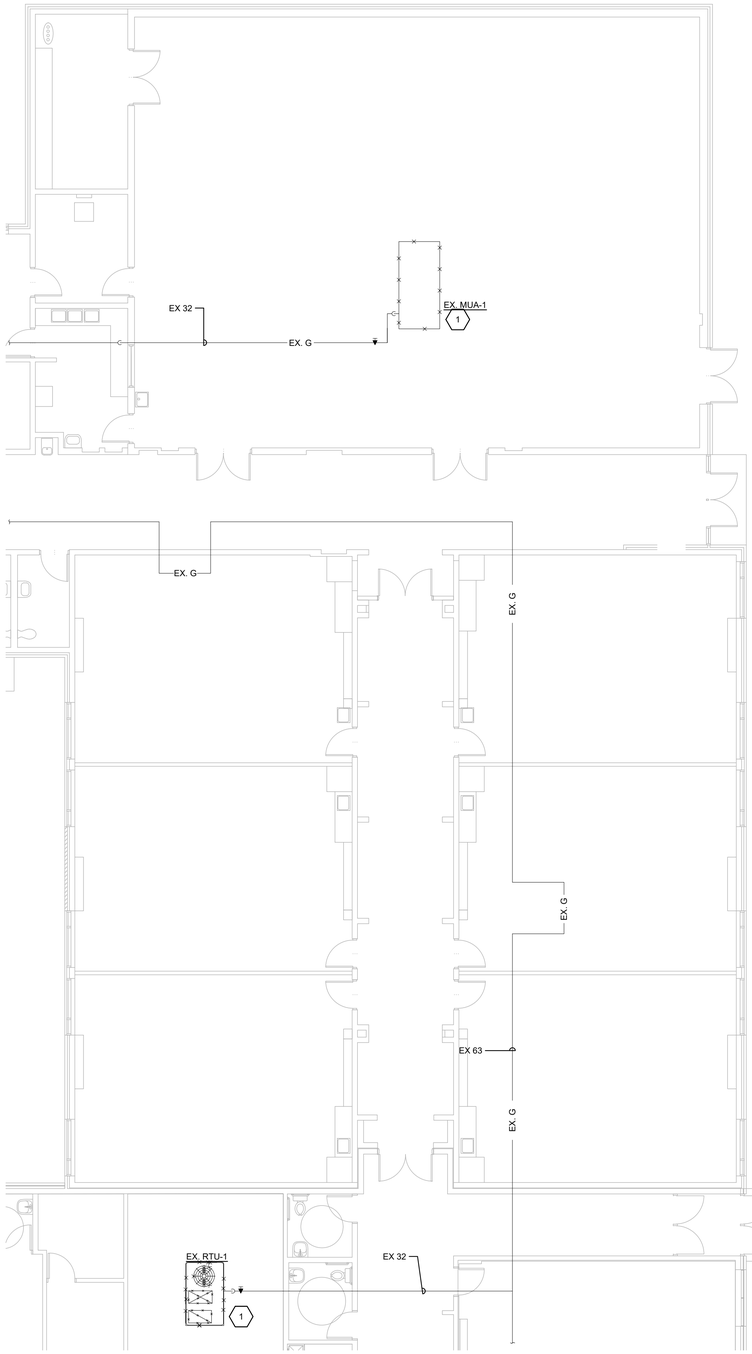
PROJECT NO.
CE-6380

DRAWING TITLE
MECHANICAL ROOM PART PLANS - HYDRONIC

DRAWING NUMBER
M5 OF 9

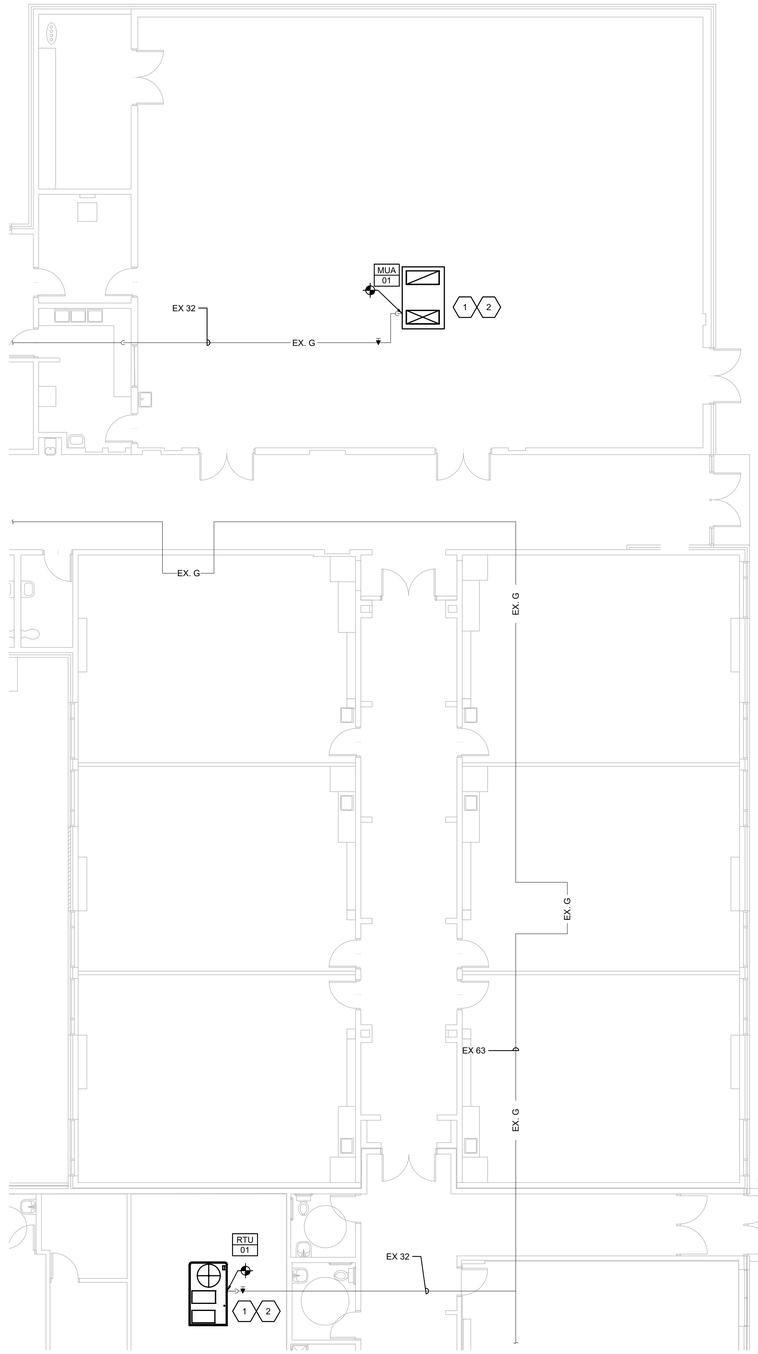


ROOF PLAN - HVAC REMOVALS

SCALE: 1:100

DRAWING NOTES (INDICATED WITH HEXAGONS):

1. REMOVE ROOFTOP EQUIPMENT. EXISTING ROOF PENETRATIONS TO REMAIN FOR REPLACEMENT EQUIPMENT.



ROOF PLAN - HVAC NEW

SCALE: 1:100

DRAWING NOTES (INDICATED WITH HEXAGONS):

1. ENSURE MANUFACTURER'S RECOMMENDED SERVICE CLEARANCES ARE MAINTAINED.
2. CONTRACTOR TO PROVIDE DUCT TRANSMISSIONS FROM EXISTING DUCT WORK TO FIT UP TO NEW RTU OPENINGS. PROVIDE ACOUSTICALLY LINED INTERNAL AND EXTERIOR INSULATION.

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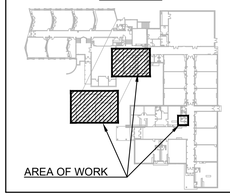

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CE-6380
26.03.03
J.J.PEPPER
100114890
PROVINCE OF ONTARIO

DESIGN	ALC	DRAWN	JH
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PROJECT

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127 ELGIN ST. NORTH,
CAMBRIDGE, ON

PROJECT NO.

CE-6380

DRAWING TITLE

ROOF PLANS - MECHANICAL

DRAWING NUMBER

M6 OF 9

1. MECHANICAL GENERAL REQUIREMENTS:

1.1. GENERAL:

1.1.1. MAKE SITE VISIT(S) AS NECESSARY BEFORE BID CLOSING TO ESTABLISH AND VERIFY ALL EXISTING CONDITIONS. MAKE ALLOWANCE FOR ANY NEW OR EXISTING SERVICE AND EQUIPMENT RELOCATIONS NECESSARY TO COMPLETE THE WORK AND INCLUDE IN THE BID PRICE. EXTRAS WILL NOT BE ALLOWED FOR FAILURE TO PROPERLY EVALUATE EXISTING CONDITIONS.

1.1.2. THE DRAWINGS SHOW THE GENERAL INTENT OF THE WORK, NOT THE DETAILS OF INSTALLATION. CO-ORDINATE THE ROUTING AND INSTALLATION OF ALL MECHANICAL SERVICES WITH ALL EXISTING CONDITIONS, STRUCTURE AND THE WORK OF ALL OTHER TRADES. PROVIDE INSTALLATION DRAWINGS AS REQUIRED.

1.1.3. DO NOT SCALE MECHANICAL DRAWINGS. TAKE FIELD DIMENSIONS PRIOR TO ANY INSTALLATION.

1.2. DESCRIPTION: PROVIDE WORK IN ACCORDANCE WITH FULL INTENT AND MEANING OF DRAWINGS AND SPECIFICATIONS. THE WORD "PROVIDE" WHERE USED IN THE CONTRACT DOCUMENTS, IS TO BE INTERPRETED AS "SUPPLY AND INSTALL" ALONG WITH ALL ASSOCIATED HARDWARE AND CONNECTIONS.

1.3. WORKMANSHIP: PROVIDE ALL NEW MATERIALS AND EQUIPMENT WITH THE APPROPRIATE LISTING (I.E. CSA, ULC, CETL, ETC.) ALL WORKMANSHIP BY THIS TRADE SHALL BE FIRST CLASS, CONFORMING TO INDUSTRY STANDARD PRACTICES FOR SAFETY, ACCESSIBILITY, DURABILITY AND NEATNESS FOR ACCEPTANCE BY THE OWNER'S REPRESENTATIVES.

1.4. SLEEVES, HANGERS, INSERTS: PROVIDE ALL SLEEVES, INSERTS AND HANGERS REQUIRED FOR THE MECHANICAL WORK/ TREAT ALL SLEEVES OR HOLES PIERCING ACOUSTICAL SEPARATIONS FOR INSTALLATIONS OF THE DIVISION TO MAINTAIN ACOUSTICAL RATING. ALL GAPS SHALL BE PACKED WITH ACOUSTICAL INSULATION AND SEALED AT BOTH ENDS WITH ACOUSTICAL CAULKING. PATCH ALL OPENINGS AROUND INSTALLATIONS OF THIS DIVISION PIERCING FIRE OR SMOKE SEPARATIONS WITH AN APPROVED WATERTIGHT SMOKE AND FIRE STOP SEALANT.

1.5. FLASHING:

1.5.1. FOR PLUMBING VENT ROOF PENETRATIONS, USE THALER SJ-38 "STACK JACK" INSULATED FLASHING CONSISTING OF 330 MM (13") HIGH, ONE PIECE SPUN ALUMINUM BASE WITH DECK FLANGE, URETHANE INSULATION LINE AND EPDM BASE SEAL. SIZE SEALS TO SUIT PIPE DIAMETER.

1.6. INTERPRETATION: DIVISION OF THE WORK AMONG SUPPLIERS OR VENDORS AND SUBCONTRACTORS IS SOLELY THE CONTRACTOR'S RESPONSIBILITY. NEITHER THE OWNER NOR CONSULTANT ASSUMES ANY RESPONSIBILITY TO ACT AS AN ARBITER TO ESTABLISH SUBCONTRACT TERMS BETWEEN SECTORS OR DISCIPLINES OF WORK.

1.7. COORDINATION BETWEEN TRADES: CO-ORDINATE THE WORK OF THIS TRADE WITH ALL OTHER TRADES ON THE JOB SO THAT THE WORK MAY PROGRESS WITHOUT ANY DELAY. SCHEDULE AND PHASE DEMOLITION AND NEW WORK TO REDUCE INTERFERENCE AND DOWNTIME OF EXISTING SYSTEMS. NOTIFY OWNER'S REPRESENTATIVE OF ALL DOWNTIME PRIOR TO PROCEEDING WITH WORK.

1.8. DISCREPANCY: IF A DISCREPANCY IS FOUND IN THE SPECIFICATION OR ON THE DRAWINGS, REQUEST CLARIFICATION PRIOR TO THE END OF THE QUESTION PERIOD SO THAT CLARIFICATION CAN BE PROVIDED IN WRITING.

1.9. REGULATORY REQUIREMENTS: CONFORM TO GOVERNING MUNICIPAL AND PROVINCIAL CODES, RULES AND REGULATIONS AND/OR AUTHORITIES HAVING JURISDICTION.

1.10. CODES AND STANDARDS:

1.10.1. ALL WORK SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE ONTARIO BUILDING CODE, THE ONTARIO FIRE CODE AND ANY OTHER LOCAL REGULATIONS HAVING JURISDICTION OVER THE WORK OF THIS TRADE.

1.10.2. WHERE A CODE OR STANDARD IS REFERENCED, THE LATEST VERSION OF THE CODE OR STANDARD REFERENCED IN THE APPLICABLE BUILDING CODE IS TO BE APPLIED.

1.11. SAFETY: COMPLY WITH ALL PROVINCIAL/FEDERAL AND/OR LOCAL SAFETY REGULATIONS, INCLUDING THE OCCUPATIONAL HEALTH AND SAFETY ACT. IN ADDITION, COMPLY WITH ALL OF THE OWNER'S HEALTH AND SAFETY REQUIREMENTS.

1.12. PERMITS AND FEES: OBTAIN ALL PERMITS REQUIRED FOR INSTALLATION OF MECHANICAL TRADES WORK, ARRANGE FOR INSPECTIONS TESTS THEREWITH AND PAY ALL COSTS FOR PERMITS, INSPECTIONS, AND ASSOCIATED FEES. THIS INCLUDES ANY TSSA INSPECTION AND/OR CERTIFICATION. OBTAIN PERMITS IMMEDIATELY AFTER NOTIFICATION OF AWARD OF CONTRACT.

1.13. TAXES: ENSURE THAT PROVINCIAL AND/OR FEDERAL TAXES ARE INCLUDED WHERE REQUIRED.

1.14. WARRANTY: PROVIDE A WRITTEN WARRANTY FOR ALL MATERIALS, EQUIPMENT AND LABOUR FOR A ONE-YEAR PERIOD TO BEGIN AT THE TIME OF SUBSTANTIAL COMPLETION. COMPLETE ALL WARRANTY REGISTRATION DOCUMENTATION ON BEHALF OF THE BUILDING OWNER. INCLUDE COPIES OF COMPLETED DOCUMENTATION IN OPERATIONS AND MAINTENANCE MANUALS.

1.15. CERTIFICATION: PROVIDE MANUFACTURER'S WRITTEN CERTIFICATION OF THE INSTALLATION AND OPERATION OF ALL SYSTEMS AND MAJOR EQUIPMENT.

1.16. EXISTING SERVICE:

1.16.1. DO NOT SHUT DOWN OR MAKE CONNECTIONS TO ANY EXISTING SERVICE WITHOUT WRITTEN PERMISSION OF THE OWNER.

1.16.2. BE RESPONSIBLE FOR DEMOLITION AND REMOVAL OF MECHANICAL EQUIPMENT AND SERVICES DESIGNATED FOR REMOVAL ON DRAWINGS.

1.17. SITE PROTECTION AND CLEANLINESS: PROTECT ALL WORK AND MATERIALS, BEFORE AND AFTER ERECTION, FROM WEATHER AND OTHER HAZARDS, AND KEEP IN A CLEAN AND ORDERLY MANNER. AVOID ACCUMULATION OF DEBRIS AS THE WORK PROGRESSES. ON COMPLETION OF THE CONSTRUCTION AND PRIOR TO THE FINAL INSPECTION AND ACCEPTANCE BY THE OWNER, CLEAN UP AND REMOVE FROM THE SITE ALL SCRAP MATERIALS RESULTING FROM THE WORK OF THIS TRADE.

1.18. ADJUSTMENT AND OPERATION OF SYSTEMS: WHEN WORK IS COMPLETE, ADJUST ALL EQUIPMENT ITEMS, OF VARIOUS SYSTEMS, FOR PROPER OPERATION WITHIN FRAMEWORK OF DESIGN INTENT, AND OPERATING CHARACTERISTICS AS PUBLISHED BY EQUIPMENT MANUFACTURER.

1.19. EQUIPMENT BASES AND PADS: VERIFY SIZE OF BASES INDICATED ON DRAWINGS WITH ACTUAL REQUIREMENTS. CONSTRUCT BASES AND PADS AT LEAST 150 MM (6") HIGH. EXTEND BASES 50 MM (2") BEYOND EQUIPMENT BASE. CHAMFER ALL UPPER PERIMETER EDGES OF BASE. SUPPLY ANCHOR BOLTS AND SLEEVES, TO TRADE SECTION CONSTRUCTING BASES.

1.20. MISCELLANEOUS STEEL: SUPPLY AND INSTALL MISCELLANEOUS STRUCTURAL SUPPORTS, PLATFORMS, AND BRACES, AS REQUIRED TO HANG OR SUPPORT ALL EQUIPMENT, PIPING, DUCTWORK AND SIMILAR ITEMS.

1.21. EQUIPMENT INSTALLATION: INSTALL AND START UP ALL ITEMS OF EQUIPMENT, DEVICES AND SYSTEMS IN ACCORDANCE WITH MOST RECENT MANUFACTURER'S PUBLISHED GUIDELINES AND RECOMMENDATIONS. CONTRACTOR IS RESPONSIBLE FOR ASCERTAINING MANUFACTURERS INSTALLATION GUIDELINES AND RECOMMENDATIONS. TOUCH-UP ALL SHOP PAINTED EQUIPMENT DAMAGED IN TRANSIT OR DURING INSTALLATION TO MATCH ORIGINAL SHOP FINISH.

1.22. CUTTING AND PATCHING: PROVIDE ALL CUTTING AND PATCHING REQUIRED FOR THE WORK OF THIS TRADE. ALL CUTTING AND PATCHING SHALL BE PERFORMED BY TRADE SPECIALIZING IN THE MATERIAL TO BE PATCHED. INCLUDE ALL COSTS FOR CUTTING AND PATCHING RELATED TO THE WORK OF THIS TRADE IN THE BID PRICE. WHERE PIPES AND DUCTS ARE SHOWN PASSING THROUGH EXISTING WALLS, FLOORS, AND ROOF, CUT AND PATCH THE NECESSARY OPENINGS. SHOULD CUTTING, REPAIRING, AND PATCHING OF PREVIOUSLY FINISHED WORK, OF OTHER TRADES, BE REQUIRED TO ALLOW INSTALLATION OF MECHANICAL WORK, PAY ALL COSTS FOR TRADE SECTION CONCERNED TO PERFORM WORK.

1.23. SPARE PARTS / TOOLS TO BE FURNISHED:

1.23.1. SPARE SET OF FILTERS FOR EACH FILTER BANK.

1.23.2. ALL SPECIALITY TOOLS NECESSARY FOR EQUIPMENT INSTALLED IN THIS PROJECT.

1.24. CHANGES IN THE WORK: CHANGES TO THE CONTRACT REQUIRING ADDITIONS TO OR DELETIONS FROM THE WORK OF THIS DIVISION SHALL BE CARRIED OUT UPON WRITTEN REQUEST OF THE CONSULTANT. EXTRAS TO THE CONTRACT OR CREDITS SHALL BE SUBMITTED WITH A COMPLETE COST BREAKDOWN AS FOLLOWS:

- ITEMIZED MATERIAL LIST WITH QUANTITIES AND UNIT COSTS

- ITEMIZED LABOUR COST BREAKDOWN

- COPY OF QUOTATIONS FROM ALL SUPPLIERS FOR ALL EQUIPMENT

- COPY OF QUOTATIONS FROM ALL SUBCONTRACTORS INCLUDING ALL OF THE REQUIREMENTS OF THIS SECTION

- TOTAL MATERIAL COST

- TOTAL HOURS

- HOURLY RATE (REFER TO SUPPLEMENTARY CONDITIONS AND GENERAL CONTRACT)

- TOTAL OVERHEAD AND PROFIT (REFER TO SUPPLEMENTARY CONDITIONS AND GENERAL CONTRACT)

1.25. COMPLETION: PRIOR TO THE FINAL INSPECTION, CLEAN ALL MECHANICAL EQUIPMENT, CLEAN ALL CONSTRUCTION DUST AND DIRT FROM INSTALLED EQUIPMENT AT THE END OF THE JOB. REPAIR ANY DAMAGE BY THE MECHANICAL TRADE TO EXISTING BUILDINGS OR EQUIPMENT, ETC TO THE CONSULTANTS SATISFACTION.

1.26. SUBMITTALS:

1.26.1. SHOP DRAWINGS:

1.26.1.1. SUBMIT SHOP DRAWINGS FOR ALL EQUIPMENT SUPPLIED BY MECHANICAL DIVISION. SUBMIT ELECTRONIC COPIES TO CONSULTANT FOR REVIEW.

1.26.1.2. SUBMIT UNITS OF MEASURE IN EITHER METRIC OR IMPERIAL THAT MATCH THOSE OF THE DRAWINGS.

1.26.1.3. PROVIDE TITLE SHEET INCLUDING PROJECT NAME, SHOP DRAWING NAME (INCLUDING SPECIFICATION CLAUSE REFERENCE).

1.26.1.4. EACH SHOP DRAWING MUST BEAR STAMP AND SIGNATURE OF RESPONSIBLE OFFICIAL IN CONTRACTOR'S AND SUBCONTRACTOR'S ORGANIZATION, FOR EACH SUBMISSION, AS EVIDENCE THAT DRAWING HAS BEEN CHECKED AGAINST REQUIREMENTS AS CALLED FOR IN SPECIFICATIONS AND DRAWINGS.

1.26.2. INTERFERENCE DRAWINGS:

1.26.2.1. IN AREAS WHERE SPACE IS LIMITED AND MULTIPLE TRADES ARE INSTALLING SERVICES, COORDINATE INSTALLATION OF SERVICES. PREPARE INTERFERENCE DRAWINGS PRIOR TO CONSTRUCTION TO ENSURE INSTALLATION OF ALL SERVICES IS COORDINATED.

1.26.3. OPERATION AND MAINTENANCE INSTRUCTION MANUALS:

1.2.3.1. PROVIDE PDF COPIES OF COMPLETE OPERATION AND MAINTENANCE INSTRUCTIONS FOR EQUIPMENT FURNISHED UNDER THIS CONTRACT. MANUAL TO BE ORGANIZED WITH BOOKMARKS IN A FORMAT TO MATCH THE SPECIFICATION SECTIONS. ONCE MANUAL IS REVIEWED AND ACCEPTED, PROVIDE PDF VERSION, 2 HARD COPY VERSIONS IN THREE RING BINDERS, AND USB DRIVE COMPLETE WITH INDEX PAGES, INDEXING TABS AND COVER IDENTIFICATION AT FRONT AND SIDE.

1.2.3.2. MANUALS SHALL INCLUDE THE FOLLOWING INFORMATION:

CONTACT INFORMATION OF CONSULTANTS AND CONTRACTORS

COMPLETE SET OF FINAL PROJECT SHOP DRAWINGS

CONTROL SHOP DRAWINGS AND OPERATING SEQUENCE, INCLUDING WIRING OF COMPONENTS

COPY OF THE VALVE DIRECTORY

OPERATING INSTRUCTIONS, INCLUDING START-UP AND SHUT-DOWN PROCEDURE

MAINTENANCE INSTRUCTIONS, INCLUDING PREVENTIVE MAINTENANCE INSTRUCTIONS FOR COMPONENTS OF EQUIPMENT

LIST OF EQUIPMENT WITH AIR FILTERS: INDICATE SIZES, QUANTITIES AND TYPES FOR EACH PIECE OF EQUIPMENT

FINAL TESTING AND BALANCING REPORT

COPIES OF THE FINAL TSSA CERTIFICATES

MANUFACTURERS' WARRANTIES AND GUARANTEES

AS-BUILTS

1.2.4. AS-BUILT DRAWINGS:

1.2.4.1. PRINT A FULL SCALE SET OF DRAWINGS FOR THE SITE THAT INCLUDE ALL ADDENDUM REVISIONS. MAINTAIN AN ACCURATE RECORD OF DEVIATIONS AND CHANGES FROM CONTRACT DRAWINGS WITH RED LINE MARKINGS ON SITE AS CONSTRUCTION PROGRESSES. TRANSFER AS-BUILT MARK-UPS TO DIGITAL DRAWING FORMAT AT THE COMPLETION OF THE PROJECT. THIS PROCESS SHOULD BE COMPLETED BEFORE TESTING, BALANCING AND/OR COMMISSIONING. SUBMIT TO THE CONSULTANT WITH THE O&M MANUALS AT COMPLETION OF PROJECT.

1.2.4.2. THE AS-BUILT DRAWINGS SHALL HAVE A VALUE OF $5,000 UNLESS THE MECHANICAL CONTRACT VALUE IS LESS THAN $100,000 WHICH SHALL HAVE A $3,000 VALUE. ONCE AS-BUILT DRAWINGS HAVE BEEN COMPLETED, SUBMITTED AND REVIEWED, PAYMENT WILL BE RELEASED. THIS VALUE IS NOT INCLUDED IN THE AMOUNT REQUIRED BY THE CONSTRUCTION LIEN ACT.

1.3. EQUIPMENT NAMEPLATES: PROVIDE LAMINATED WHITE PHENOLIC PLASTIC NAMEPLATES WITH 10 MM HIGH BLACK LETTERS FOR EQUIPMENT INSTALLED UNDER THIS DIVISION. INCLUDE EQUIPMENT NUMBER AND EQUIPMENT NAME GENERALLY AS LISTED ON DRAWING SCHEDULES. SUBMIT LIST OF NAMEPLATES TO CONSULTANT FOR REVIEW PRIOR TO FABRICATION. IF THE OWNER HAS SPECIFIC STANDARDS, FOLLOW THESE STANDARDS.

1.4. ACCESS DOORS: MINIMUM 200 MM x 200 MM (8" X 8") IN SIZE AS REQUIRED IN WALLS AND CEILINGS FOR ACCESS TO ALL EQUIPMENT, VALVES OR APPURTENANCES. ACCESS DOORS SHALL BE COMPATIBLE WITH ADJACENT FINISHES AND WITH FIRE RATING EQUAL TO THE SURFACES IN WHICH INSTALLED WHERE APPLICABLE. WHERE ACCESS DOOR IS FIRE RATED, DOOR IS TO BE ULC LISTED. MINIMUM 18 GAUGE STEEL. ACCESS DOORS 450 MM X 450 MM (18"X18") OR LARGER SHALL BE HINGED. PROVIDE POSITIVE LATCHING SYSTEM.

1.5. FIRESTOPPING AND SMOKE SEAL:

1.5.1. PROVIDE ULC LISTED FIRESTOP SYSTEM TO SEAL AROUND ALL MECHANICAL SERVICES WHICH PENETRATE PART OF A BUILDING ASSEMBLY REQUIRED TO HAVE A FIRE RESISTANCE RATING.

1.5.2. SUBMIT DETAILED SHOP DRAWINGS TO THE CONSULTANT FOR REVIEW. INCLUDING:

-MANUFACTURER'S TECHNICAL PRODUCT DATA AND INSTALLATION INSTRUCTIONS FOR EACH SPECIFIC TYPE AND LOCATION OF PENETRATION

-CERTIFICATION THAT PROPOSED FIRESTOPPING MATERIALS AND ASSEMBLIES COMPLY WITH CAN4-S115-M

-ULC LISTINGS WITH COPIES OF ULC DATA SHEETS FOR EACH SPECIFIC TYPE AND LOCATION OF PENETRATION

1.6. MATERIALS AND EQUIPMENT:

1.6.1. EQUALS AND ALTERNATES:

1.6.1.1. USE MATERIALS AND EQUIPMENT AS SPECIFIED HEREIN, OR SPECIFIED EQUIVALENT. DESIGN OF MECHANICAL SYSTEMS HAS BEEN BASED ON FIRST LISTED SUPPLIER AND MODEL NUMBER/SIZE STATED IN EQUIPMENT SCHEDULES.

1.6.1.2. SOME ITEMS OF EQUIPMENT, ONE OR MORE ADDITIONAL NAMES OF ACCEPTABLE EQUAL MANUFACTURERS MAY BE LISTED. THE DESIGN, LAYOUT, SPACE ALLOCATION, CONNECTION DETAILS, ETC., ARE BASED ON THE PRODUCTS NAMED FIRST IN THE DESCRIPTION AND/OR SCHEDULES. THE GENERAL APPROVAL INDICATED BY LISTING THE NAMES OF OTHER EQUAL MANUFACTURERS IS TO ESTABLISH THE QUALITY OF MANUFACTURE ONLY AND IS SUBJECT TO FINAL REVIEW OF SHOP DRAWINGS, PERFORMANCE DATA, TEST REPORTS BY CONSULTANT.

1.6.1.3. SUPPLIERS WISHING TO SUBMIT OTHER ITEMS OF EQUIPMENT FOR APPROVAL AS AN EQUAL TO THOSE SPECIFIED MUST APPLY TO THE CONSULTANT AT LEAST 10 CALENDAR DAYS BEFORE BID CLOSING DATE. REQUESTS MUST BE ACCOMPANIED BY COMPLETE DESCRIPTION AND TECHNICAL DATA ON THE ITEMS PROPOSED. DEVIATIONS FROM THE SPECIFICATIONS MUST BE STATED IN WRITING AT TIME OF APPLICATION FOR APPROVAL.

1.6.1.4. ITEMS OF EQUIPMENT BY MANUFACTURERS, NOT NAMED IN THE SPECIFICATIONS, MAY BE OFFERED AS ALTERNATIVES. PROPOSALS MUST BE ACCOMPANIED BY FULL DESCRIPTIVE AND TECHNICAL DATA, TOGETHER WITH THE STATEMENT OF AMOUNT OF ADDITION OR DEDUCTION FROM THE BASE BID.

1.6.1.5. AFTER EXECUTION OF THE CONTRACT, SUBSTITUTION OF EQUIPMENT WILL NOT BE CONSIDERED.

1.6.1.6. WHERE EQUIPMENT OTHER THAN THE EQUIPMENT USED AS A BASIS FOR DESIGN, LAYOUT AND SPACE ALLOCATION IS USED, PRODUCE AND SUBMIT REVISED LAYOUTS OF EQUIPMENT, PIPES, DUCTS, ETC., IN THE AREAS AFFECTED. SUBMIT THESE DRAWINGS WITH THE SHOP DRAWINGS. FAILURE TO PRODUCE THESE DRAWINGS IS AN INDICATION BY THE CONTRACTOR THAT THEY ARE NOT REQUIRED AND THE ORIGINAL SPACE ALLOCATIONS ARE ADEQUATE FOR THE SUBSTITUTED EQUIPMENT.

1.7. MECHANICAL PROJECT COMPLIANCE:

1.7.1. THE FOLLOWING DOCUMENTS AND/OR CONFIRMATION IS REQUIRED TO ALLOW THE CONSULTANT TO ISSUE OUR LETTER OF GENERAL REVIEWS:

- CONFIRMATION THAT FIRESTOPPING IS COMPLETE

2. TESTING AND BALANCING:

2.1. AIR AND WATER BALANCING:

2.1.1. ASSUME RESPONSIBILITY FOR TESTING, BALANCING, AND PLACING ALL LIQUID SYSTEMS IN OPERATION.

2.1.2. RETAIN INDEPENDENT BALANCING FIRM TO BALANCE WATER HANDLING SYSTEMS.

2.1.3. ON COMPLETION OF TESTING AND BALANCING OF ALL SYSTEMS, SUBMIT TO CONSULTANT A PDF REPORT OF FINDINGS, INCLUDING COMPLETE DATA OF PUMP PERFORMANCE AND WATER FLOW RATES, FINAL READINGS AT ALL OUTLETS, AND AMPERE READINGS OF ALL MOTORS, TAKEN AT MOTOR TERMINALS WHEN EQUIPMENT IS OPERATING UNDER FULL LOAD CONDITIONS.

2.1.4. SUBMIT WITH EACH COPY OF REPORT, COMPLETE SETS OF PIPING LAYOUT PRINTS NEATLY MARKED IN RED, SHOWING ALL LOCATIONS AT WHICH TEST READINGS WERE TAKEN, AND FLOW MEASUREMENT. SHOW DIFFERENTIAL PRESSURE ACROSS PUMPS. OBTAIN PIPING LAYOUT PRINTS FROM CONSULTANT.

2.1.5. INSTALLATION TOLERANCES

2.1.5.1. AIR HANDLING SYSTEMS: ±5% OF DESIGN

2.1.5.2. HYDRONIC SYSTEMS: ±5% OF DESIGN

3. MECHANICAL INSULATION:

3.1. ALL PRODUCTS TO HAVE FLAME SPREAD RATING LESS THAN 25 AND SMOKE DEVELOPED CLASSIFICATION LESS THAN 50 IN COMPLIANCE WITH CAN/ULC-S102.

3.2. PROVIDE A CONTINUOUS VAPOUR BARRIER ON ALL COLD SYSTEMS.

3.3. DEFINITIONS:

3.4. INDIRECTLY CONDITIONED SPACE (IND COND SP): ENCLOSED SPACE THAT IS HEATED OR COOLED INDIRECTLY BY BEING CONNECTED TO ADJACENT SPACES INCLUDING RETURN AIR PLENUMS WITH OR WITHOUT EXPOSED ROOFS ABOVE

3.5. UNCONDITIONED SPACE (UNCOND SP): AN ENCLOSED SPACE THAT IS NOT HEATED OR COOLED INCLUDING MECHANICAL CHASES / FURRED-IN SPACES.

3.6. OUTSIDE: EXPOSED TO OUTDOOR AMBIENT TEMPERATURES INCLUDING SOFFITS, PARKING GARAGES, UNHEATED ATTICS / PLENUMS ABOVE INSULATED CEILINGS, AND UNHEATED CRAWL SPACES.

3.7. CONCEALED: INSULATED MECHANICAL SERVICES AND EQUIPMENT ABOVE SUSPENDED CEILINGS, IN CHASES / BULKHEADS AND MECHANICAL / ELECTRICAL SERVICE ROOMS.

3.8. EXPOSED: NOT CONCEALED

3.9. INSULATION TYPES:

3.9.1. PGF - PREFORMED GLASS FIBRE: FIBROUS GLASS SPLIT SECTIONAL PIPE INSULATION CONFORMING TO CAN/ULC S102, WITH FACTORY APPLIED VAPOUR BARRIER JACKET TO CGSB 51-GP-52M AND SELF-SEAL LAP JOINT. THERMAL CONDUCTIVITY TO ASTM C335.

3.9.2. FGF - FLEXIBLE GLASS FIBRE: FLEXIBLE NON-COMBUSTIBLE BLANKET CONFORMING TO CAN/ULC S102, WITH FACTORY APPLIED VAPOUR BARRIER JACKET TO CGSB 51-GP-52M. THERMAL CONDUCTIVITY TO ASTM C177.

3.9.3. RGF - RIGID GLASS FIBRE: RIGID NON-COMBUSTIBLE BLANKET CONFORMING TO CAN/ULC S102, WITH FACTORY APPLIED VAPOUR BARRIER JACKET TO CGSB 51-GP-52M. THERMAL CONDUCTIVITY TO ASTM C177.

3.9.4. CF - CELLULAR FOAM: FLEXIBLE, CELLULAR ELASTOMERIC, TUBE/SHEET/ROLL WITH ANTIMICROBIAL COATING CONFORMING TO CAN/ULC S102. THERMAL CONDUCTIVITY CONFORMING TO ASTM C177/C518. EXPOSED INSULATION TO HAVE WHITE FINISH.

3.10. SURFACE FINISHES / JACKETS:

3.10.1. EXPOSED INTERIOR PIPING: FINISH EXPOSED INSULATED PIPING, VALVES AND FITTINGS WITH PVC JACKETING WITH 25/50 FIRE RATING, BASED ON CAN/ULC-S102-M88 TESTING.

3.10.2. PROTECTIVE JACKETS: EXPOSED INSULATED PIPING IN PUBLIC AREAS & STORAGE / MECHANICAL ROOMS UP TO 2.5M (10FT) AFF: PROVIDE METAL JACKET OF 0.4 MM (0.0016") THICK PLAIN OR STUCCO EMBOSSED ALUMINUM, WITH LONGITUDINAL "SNAP-LOCK", OR LAPPED JOINTS CAULKED WITH SILICONE AND BUTT JOINTS SECURED WITH ALLOY STRAPS AND MECHANICAL FASTENERS. PROVIDE JACKETING COMPLETE WITH FACTORY ATTACHED PROTECTIVE LINER.NOT APPLICABLE FOR REFRIGERANT PIPING.

3.11. PIPING:

3.11.1. DO NOT INSULATE FLANGES OR UNIONS AT CONNECTION TO EQUIPMENT.

3.11.2. VALVE OPERATORS AND BALANCING VALVE TEST PORTS TO BE ACCESSIBLE WITHOUT REMOVAL OF INSULATION.

3.11.3. PIPE INSULATION INSERTS AND SHIELDS: PROVIDE RIGID INSERTS AND SHIELDS AT ALL HANGER SUPPORTS WHERE PIPING IS INSULATED. INSERT THICKNESS TO MATCH INSULATION THICKNESS. INSERT TO BE HYDROUS CALCIUM SILICATE RIGID PIPE INSULATION. INSERT AND SHIELD TO PROTECT BOTTOM HALF OF PIPE. SHIELD TO BE FABRICATED FROM GALVANIZED STEEL. SHIELD COLOUR TO MATCH COLOUR OF INSULATION FINISH. SHIELD AND INSERT LENGTH TO BE AS FOLLOWS:

NOMINAL PIPE SIZE	INSERT LENGTH
MM (IN)	MM (IN)
40-65 (1-1/2 - 2-1/2)	250 (10)
80-150 (3-6)	300 (12)
200-250 (8-10)	400 (14)
>=300 (>=12)	550 (22);

3.12. PIPE INSULATION APPLICATION

3.0.1. POTABLE COLD WATER, NON-METALLIC PIPING, PART 9 BUILDINGS - INSULATION NOT REQUIRED.

3.0.2. COMPLETELY INSULATE ALL OTHER SYSTEMS LISTED BELOW.

SYSTEM / LOCATION	TYPE	THICKNESS, MM (IN)
SANITARY WHERE NOTED / SPEFICIED		
COLD COND. / EQMT DRAIN	PGF (OR CF)	25(1)
POTABLE (DOMESTIC) WATER:		
COLD	PGF (OR CF)	25 (1)
HOT & RECIRC., <=32 MM (1-1/4")	PGF	25 (1)
HOT & RECIRC., >=38 MM (1-1/2")	PGF	38 (1-1/2)
HYDRONIC		
HTW / HTG , <=32mm (1-1/4")	PGF	38 (1-1/2)
HTW / HTG , >=38mm (1-1/2")	PGF	50 (2-1/2)

3.2. DUCTWORK:

SYSTEM / LOCATION	TYPE	THICKNESS, MM (IN)	MIN R-VALUE, K M² / W (H FT² °F / BTU)
SA / RA / EA			
SA IN INDIRECTLY CONDITIONED SP.	FGF	38 (1-1/2)	0.34 (1.9)
UNCONDITIONED SP.	FGF	50 (2)	1.06 (6.0)
OUTSIDE	RGF	75 (3)	2.11 (12.0)
OA & COMBUSTION AIR			
CONCEALED - INDOOR	FGF	50 (2)	1.06 (6.0)
EXPOSED - INDOOR	RGF	38 (1-1/2)	1.06 (6.0)

3.3. EQUIPMENT: INSULATE PUMP BODIES, HEAT EXCHANGERS, STORAGE TANKS, AIR SEPARATORS, EXPANSION TANKS, HYDRAULIC SEPARATORS, STRAINERS UNLESS FACTORY INSULATED.

3.3.1. HOT EQUIPMENT: 50 MM (2") OF FGF INSULATION UNLESS NOTED OTHERWISE.

3.3.2. DO NOT INSULATE OVER TOP OF NAMEPLATES AND ASME STAMPS. WHERE EQUIPMENT REQUIRES SERVICE, PROVIDE EASILY REMOVABLE INSULATION THAT CAN BE REMOVED AND REINSTALLED TO ALLOW FOR REQUIRED SERVICE.

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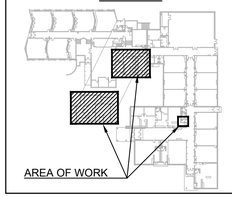
KEYPLAN



REVISIONS

NO.	ISSUED FOR	DATE
00	50% PROGRESS SUBMISSION	26.01.21
01	90% PROGRESS SUBMISSION	26.02.04
02	TENDER SUBMISSION	26.03.03

NORTH

DESIGN	ALC	DRAWN	JH
CHECKED	JP	REVIEWED	ALC

PROJECT

ST. ANNE CAMBRIDGE

ADDRESS

127 ELGIN ST. NORTH, CAMBRIDGE, ON

PROJECT NO.

CE-6380

DRAWING TITLE

MECHANICAL SPECIFICATIONS

DRAWING NUMBER

M7 OF 9

4. PIPING SYSTEMS:

4.1. GENERAL:

4.1.1. EXPANSION AND CONTRACTION: INSTALL ALL PIPING SO AS TO BE FREE FROM STRAIN AND DISTORTION DUE TO EXPANSION AND CONTRACTION AS GOVERNED BY REQUIREMENTS OF ANSI B31.1, EXCEPT AS HEREINAFTER MODIFIED. ALLOW FOR EXPANSION AND CONTRACTION BY OFFSETS. EXPANSION U-BENDS OR LOOPS. DO NOT USE EXPANSION JOINTS OF ANY TYPE UNLESS SPECIFICALLY INDICATED ON DRAWINGS.

4.1.2. PIPING SUBJECT TO FREEZING:

4.1.2.1. WHERE HORIZONTAL OR VERTICAL PIPING IS RUN ALONG AN OUTSIDE BUILDING WALL, AND CONCEALED IN A PIPE SPACE, CIRCULATION OF INTERIOR AIR SHALL BE MAINTAINED IN THE PIPE SPACE BY MEANS OF AN AIR GRILLE(S), LOCATED AT THE TOP AND THE BOTTOM OF THE PIPE SPACE, FACING THE INTERIOR OF THE BUILDING.

4.1.3. LINES, GRADES AND SLOPES:

4.1.3.1. INSTALL LIQUID PIPING FREE OF POCKETS AND PITCH TO DRAIN, AT LOW POINTS IN PIPING, WITH VALVES OR TRAPS INSTALLED AS REQUIRED FOR DRAINAGE OF THE PIPING.

4.1.3.2. INSTALL PIPING TO FOLLOWING SLOPES:

4.1.3.3. DRAINAGE PIPING: 1:50 ON DRAINS OF NPS 3 SIZE AND LESS AND 1:100 ON DRAINS OF NPS 4 AND LARGER.

4.1.3.4. POTABLE (DOMESTIC) WATER PIPING: PITCH TO LOW POINTS SO THAT ALL PIPING MAY BE COMPLETELY DRAINED.

4.1.3.5. HOT WATER HEATING PIPING: SLOPE UP 1:500 IN DIRECTION OF FLOW.

4.1.3.6. NATURAL GAS: SLOPE DOWN 1:1000 IN DIRECTION OF FLOW.

4.1.4. UNIONS OR FLANGES - PROVIDE IN THE FOLLOWING LOCATIONS:

4.1.4.1. FOR BY-PASSES AROUND EQUIPMENT, CONTROL VALVES, DEVICES IN PIPING SYSTEMS, AND ELSEWHERE INDICATED ON DRAWINGS.

4.1.4.2. AT CONNECTIONS TO EQUIPMENT (LOCATE BETWEEN SHUT-OFF VALVE AND EQUIPMENT).

4.1.4.3. PROVIDE DIELECTRIC UNIONS, OR ISOLATING TYPE COMPANION FLANGES, AT ALL CONNECTIONS BETWEEN COPPER TUBING AND FERROUS PIPING.

4.1.5. PIPING CONNECTIONS TO MAINS:

4.1.5.1. MAKE DOWN FEED PIPING CONNECTIONS, TO HORIZONTAL SUPPLY AND RETURN WATER MAINS, ON BOTTOM QUADRANT OF MAINS.

4.1.6. SLEEVES:

4.1.6.1. INSTALL SLEEVES WHERE PIPING PASSES THROUGH FOUNDATIONS, ABOVE GRADE FLOORS, AND WALLS. FABRICATE SLEEVES OF SCHEDULE 40 BLACK STEEL PIPE OR TYPE "K" COPPER TUBING.

4.1.6.2. SLEEVES FOR PIPING PASSING THROUGH ROOFS WILL BE SUPPLIED AND INSTALLED UNDER THIS DIVISION.

4.1.6.3. MAKE SLEEVES LARGE ENOUGH TO PASS FULL THICKNESS OF PIPE COVERING WHERE SAME IS USED, AND WITH SUFFICIENT CLEARANCE BETWEEN PIPE AND SLEEVE TO ALLOW FOR ANY LATERAL MOVEMENT OF PIPING DUE TO EXPANSION AND CONTRACTION.

4.1.6.4. FILL SLEEVES FOR FUTURE USE WITH LIME MORTAR.

4.1.7. ESCUTCHEON PLATES: PROVIDE ESCUTCHEON PLATES ON BARE PIPING PASSING THROUGH FINISHED WALLS OR FLOORS.

4.1.8. VALVES: PROVIDE DRAIN VALVES WITH HOSE THREAD OUTLET CONNECTION, OR VALVE WITH LONG NIPPLE ON OUTLET, AT ALL LOW POINTS OF EACH WATER SYSTEM, AND ABOVE ALL RISER OR BRANCH STOP VALVES, FOR PROPER DRAINAGE OF PIPING.

4.1.9. VALVE TAGS AND INDEXES: UPON COMPLETION OF WORK, FURNISH AND INSTALL 25 MM (1") DIA. BRASS TAG AT EACH VALVE BEARING AN INDEX NUMBER DESIGNATING VALVE. PROVIDE DIGITAL AND HARDCOPY DIRECTORY MOUNTED IN GLAZED HARDWOOD FRAME FOR EACH SYSTEM, GIVING THE VALVE INDEX NUMBER, SIZE, MAKE AND CATALOGUE NO. AND "SERVICE" OF EACH VALVE AND LOCATION OF VALVE. INCLUDE SCHEMATIC SHOWING EACH VALVE ALONG WITH INDEX NUMBER FOR CROSS-REFERENCE.

4.1.10. PIPE IDENTIFICATION:

4.1.10.1. LABEL PIPING INSTALLED UNDER THIS DIVISION TO INDICATE CONTENT AND DIRECTION OF FLOW. INCLUDE OPERATING PRESSURE OR VACUUM, AS APPLICABLE.

4.1.10.2. ALL LABELS SHALL BE OF SUFFICIENT WIDTH TO OVERLAP ITSELF.

4.1.10.3. PROVIDE LABELS OF PLASTIC COATED TAPE, WITH SELF-ADHESIVE BACKING SURFACE. FOR INSTALLATION ON INSULATED PIPE, PROVIDE ADHESIVE SUITABLE FOR THIS APPLICATION. CONFORM WITH CAN/CGSB-24.3 AND/OR OWNER STANDARDS FOR PRIMARY LABEL COLOUR, AND WITH LEGEND AND DIRECTION ARROWS IN BLACK. PRINT LEGEND IN FULL WHEREVER FEASIBLE, OR A RECOGNIZED ABBREVIATION OF SERVICE INVOLVED.

4.1.10.4. LOCATE LABELS AS FOLLOWS: AT EVERY END OF EVERY PIPE RUN, ADJACENT TO VALVE OR ITEM OF EQUIPMENT SERVICES. ON EACH EXPOSED PIPE PASSING THROUGH WALL, PARTITION OR FLOOR AT INTERVALS OF 15 M (50'-0") ALONG EVERY EXPOSED PIPE RUN EXCEEDING 15 M (50'-0") IN LENGTH. AT EVERY ACCESS POINT ON CONCEALED PIPING.

4.1.10.5. NATURAL GAS / PROPANE: ALL PIPING / TUBING SHALL BE IDENTIFIED COMPLIANT WITH CSA B149

4.2. HANGERS AND SUPPORTS:

4.2.1. GENERAL:

4.2.1.1. PIPE HANGERS & SUPPORTS TO CSA B214 & MSS SP-58.

4.2.1.2. SUPPORT OR SUSPEND ALL PIPING WITH NECESSARY HANGERS, STRUCTURAL SUPPORTS AND/OR BRACKETS AS REQUIRED, TO PREVENT SAGGING, WARPING AND VIBRATION.

4.2.1.3. DO NOT ALLOW LOADS, OF ANY NATURE, TO BE TRANSMITTED THROUGH PIPING CONNECTIONS TO EQUIPMENT.

4.2.1.4. PROVIDE SUITABLY DAMPENED SPRING HANGERS FOR FIRST THREE SUPPORTS FROM EQUIPMENT CONNECTION ON PIPING SUBJECT TO EXCESSIVE MOVEMENT.

4.2.1.5. DO NOT HANG ANY PIPE, FROM OTHER MECHANICAL SERVICES OR FROM ROOF DECK, UNLESS SPECIFICALLY INDICATED ON DRAWINGS.

4.2.1.6. PROVIDE DIELECTRIC SEPARATION AS REQUIRED.

4.2.2. HANGERS:

4.2.2.1. FOR ALL INSULATED PIPING UP TO NPS 4, CARRYING LIQUIDS AT TEMPERATURES 10.5°C (51°F) AND HIGHER, USE STANDARD WEIGHT CLEVIS HANGERS.

4.2.2.2. FOR INSULATED PIPING OF NPS 4 DIA. AND LARGER, CARRYING LIQUIDS AT TEMPERATURES 10.5°C (51°F) OR HIGHER, USE ADJUSTABLE ROLLER TYPE HANGERS WITH LOCKNUTS. SUPPORT ROLLERS AT BOTH ENDS WITH 2 ADJUSTABLE RODS WITH LOCKNUTS.

4.2.2.3. FOR INSULATED PIPING CARRYING LIQUIDS AT A TEMPERATURE OF 10°C (50°F) OR LESS, USE ELONGATED CLEVIS TYPE HANGERS.

4.2.2.4. PROVIDE INSULATION PROTECTION BEARING PLATES AT ALL HANGERS AND SUPPORTS FOR ALL INSULATED PIPING.

4.2.2.5. FOR NON-INSULATED PIPING USE CLEVIS TYPE OF WROUGHT STEEL CONSTRUCTION.

4.2.2.6. FOR COPPER TUBING PROVIDE COPPER COATED HANGERS.

4.2.2.7. ATTACH HANGER RODS, TO BUILDING STRUCTURE, BY MEANS OF MALLEABLE IRON BEAM CLAMPS OR CONCRETE INSERTS

4.2.3. HANGER SPACING:

4.2.3.1. FOR HORIZONTAL RUNS OF PLUMBING AND DRAINAGE PIPING COMPLY WITH HANGER SPACING REQUIREMENTS OF BUILDING CODE.

4.2.3.2. FOR HORIZONTAL RUNS OF BLACK OR GALVANIZED STEEL PIPE, OTHER THAN FOR PLUMBING SERVICE, COMPLY WITH MSS SP-58 TABLES 3 & 4.

4.2.3.3. FOR HORIZONTAL RUNS OF COPPER TUBING FOR SERVICES OTHER THAN PLUMBING, DO NOT EXCEED 1.8 M (6') BETWEEN HANGERS UNLESS SPECIFICALLY NOTED.

4.2.3.4. FOR HORIZONTAL RUNS OF PIPING FABRICATED OF PVC FOR SERVICES OTHER THAN PLUMBING, DO NOT EXCEED 1.22 M (48")

4.2.3.5. IN A HORIZONTAL RUN, PEX TUBING SHALL BE SUPPORTED AT INTERVALS NOT EXCEEDING 800 MM (32"), UNLESS OTHERWISE SPECIFIED BY THE MANUFACTURER.

4.2.4. VERTICAL PIPING SUPPORTS:

4.2.4.1. SUPPORT VERTICAL PLUMBING AND DRAINAGE PIPING AS REQUIRED BY THE BUILDING CODE, UNLESS MORE STRINGENT REQUIREMENTS ARE SPECIFIED HEREIN.

4.2.4.2. PROVIDE LATERAL STABILITY, OF VERTICAL PIPING, BY FABRICATED BRACKETS OR MALLEABLE IRON EXTENSION TYPE SPLIT HANGERS. RUN VERTICAL PIPING AT COLUMNS IN THE COLUMN WEBS, ON EITHER OR BOTH SIDES OF THE COLUMN, UNLESS OTHERWISE DIRECTED BY THE CONSULTANT.

4.2.4.3. SUPPORT VERTICAL PEX PLUMBING RISER PIPING BY APPLYING RISER CLAMPS AT THE BASE OF EVERY FLOOR AND THE TOP OF EVERY OTHER FLOOR UNLESS OTHERWISE REQUIRED BY THE MANUFACTURER.

4.2.5. ROOF PIPING:

4.2.5.1. PROVIDE ECOBLOK PIPE SUPPORT. UV SATBILIZED RECYCLED RUBBER. MAKE PROVISIONS FOR EXPANSION AND CONTRACTION.

4.2.5.2. PROVIDE GALVANIZED STRUT AND HORSESHOE CLAMPS OF SUFFICIENT HEIGHT TO SECURE PIPING TO SUPPORT BLOCKS. PROVIDE EXTENSION KITS AS REQUIRED.

4.3. MATERIALS OF CONSTRUCTION:

4.3.1. SANITARY AND INDIRECT DRAIN (INCLUDING VENTING):

4.3.1.1. REFERENCE STANDARDS:

4.3.1.1.1. CAST IRON: TO CSA B70. MECHANICAL FITTINGS TO CSA B602.

4.3.1.1.2. COPPER, DWV: HARD DRAWN COPPER DRAINAGE TUBE CONFORMING TO ASTM B 306 WITH WROUGHT COPPER OR CAST BRASS SOLDER JOINT DRAINAGE FITTINGS TO ASME B16.29 OR ASME B16-29.

4.3.1.1.3. ABS, DWV: TO CAN/CSA-B181.1. SOLVENT JOINTS TO ASTM D2335.

4.3.1.1.4. PVC, BUILDING SEWER AND DRAIN PIPE: TO CAN/CSA-B182.1 OR B182.2. RUBBER RING GASKETS INTEGRAL WITH BELL OR SOLVENT WELD TO ASTM D2564.

4.3.1.1.5. PVC, DWV: TO CAN/CSA B181.2. FLAME SPREAD RATING & SMOKE DEVELOPED CLASSIFICATION PER CAN/ULC 102.2 WITH CERTIFICATION LABEL.

4.3.1.1.6. POLYETHELYNE: TO CAN/CSA B137.1. BUTT FUSION FITTINGS TO ASTM D3261.

4.3.1.2. APPLICATION:

4.3.1.2.1. NO PLASTIC PIPING IS PERMITTED TO BE INSTALLED IN VERTICAL SERVICE SPACE.

4.3.1.2.2. PIPING CAST INTO CONCRETE RAFT SLAB SHALL BE PVC, DWV WITH FLAME-SPREAD RATING NOT MORE THAN 25.

4.3.1.2.3. BURIED SECTIONS WITHIN BUILDING AREA AND TO 1.5M (5'-0") OUTSIDE BUILDING: CAST IRON OR PVC, BUILDING SEWER AND DRAIN PIPE

4.3.1.2.4. ABOVE GRADE:

4.3.1.2.4.1. PIPING 75 MM (3") AND SMALLER: COPPER, DWV

4.3.1.2.4.2. PIPING 150 MM (6") AND SMALLER: PVC, DWV OR ABS, DWV

4.3.2. POTABLE (DOMESTIC) HOT AND COLD WATER:

4.3.2.1. REFERENCE STANDARDS:

4.3.2.1.1. ALL MATERIALS TO BE NSF/ANSI 61 & 372 CERTIFIED.

4.3.2.1.2. COPPER:

4.3.2.1.2.1. PIPING: SEAMLESS WATER TUBE TO ASTM B88

4.3.2.1.2.2. FITTINGS:

4.3.2.1.2.3. SOLDER JOINT FITTINGS TO ASME B16.18 (CAST) OR B16.22 (WROUGHT) OR

4.3.2.1.2.4. COLD PRESS FITTINGS WITH EPDM SEALING ELEMENT TO ASME B16.18 OR ASME B16.22. INSTALLED USING PROPER TOOL, ACTUATOR, JAWS, AND RINGS AS INSTRUCTED BY THE PRESS FITTING MANUFACTURER.

4.3.2.1.3. PEX-A:

4.3.2.1.3.1. CROSSLINKED POLYETHYLENE PIPING TO CAN/CSA-B137.5. PRESSURE AND TEMPERATURE RATINGS: 93°C (200°F) AT 80 PSI (551 KPA), 82°C (180°F) AT 100 PSI (689 KPA).

4.3.2.1.3.2. 50 MM (2") AND SMALLER: CAN/ULC-S102.2 LISTED TO A MAXIMUM OF 25 FLAME SPREAD / 50 SMOKE DEVELOPED WITH NO LIMITATIONS ON SPACING.

4.3.2.1.3.3. SEAL PENETRATIONS AT FIRE SEPARATIONS PER CAN/ULC-S115.

4.3.2.1.3.4. PIPING WITHIN A FIRE SEPARATION PER CAN/ULC-S101.

4.3.2.1.3.5. ALL FITTINGS BY TUBING MANUFACTURER.

4.3.2.1.3.6. 25 YEAR CSA SYSTEM WARRANTY (INCLUDING CONSEQUENTIAL) FROM INSTALLATION DATE.

4.3.2.2. APPLICATION:

4.3.2.2.1. ABOVE GROUND PIPING 75 MM (3") AND SMALLER:

4.3.2.2.1.1. TYPE "L" HARD DRAWN COPPER TUBING. PROVIDE SOLDER TO THREADED ADAPTERS AT SCREWED VALVES OR EQUIPMENT.

4.3.2.2.1.2. PEX-A FOR 38 MM (1-1/2") AND SMALLER (ON COMPLETION OF INSTALLATION THE SYSTEM SHALL BE CHARGED WITH POTABLE WATER TO A PRESSURE WHICH MEETS LOCAL PLUMBING CODES. THE SYSTEM SHALL REMAIN AT THIS PRESSURE FOR A MINIMUM OF 24 HOURS TO ENSURE SYSTEM INTEGRITY). PROVIDE COPPER STUB-OUT ELBOWS AT EACH FIXTURE CONNECTION. STUB-OUT TO BE MANUFACTURED FROM SEAMLESS COPPER TUBING WITH A MACHINED ASTM F-1807 PEX BARB CONNECTION AND SPIN SEALED OUTLET. FOLLOW MANUFACTURERS INSTRUCTIONS FOR INSTALLATION.

4.3.3. NATURAL GAS UP TO 860 KPA (125 PSI) :

4.3.3.1. REFERENCE STANDARDS

4.3.3.1.1. STEEL PIPING: SCHED. 40 ERW OR CW BLACK CARBON STEEL PIPE TO ASTM A53/53M OR ASTM 106/106M. FITTINGS / JOINTS - WELDED: CLASS 2000 FORGED STEEL SOCKET WELD FITTINGS CONFORMING TO ASTM A 105/A105M. FITTINGS / JOINTS - THREADED: CLASS 150 BLACK MALLEABLE IRON SCREWED FITTINGS CONFORMING TO ASTM A 197/A197M AND ASME B16.3. FITTINGS / JOINTS - COLD PRESS CONNECT: TO ASTM B16.3 MATERIAL REQMTS, ANSI LC-4/CSA 6.32 PERFORMANCE REQMTS, ANSI HBNR SEALING ELEMENTS.

4.3.3.2. APPLICATIONS

4.3.3.2.1. ABOVE GRADE PIPING - EXPOSED, 50MM (2") OR LESS:

4.3.3.2.1.1. STEEL PIPE, THREADED OR COLD-PRESS FITTINGS / JOINTS.

4.3.3.2.1.2. COPPER TUBE WITH FLARED, BRAZED OR PRESS-CONNECT FITTINGS / JOINTS.

4.3.3.2.1.3. CORRUGATED STAINLESS STEEL TUBING (CSST) & JOINTS / FITTINGS. REVISE PIPE SIZING SHOWN ON PLANS PER MANUFACTURER'S GUIDELINES & DOCUMENT ON AS-BUILT DRAWINGS.

4.3.3.2.1.4. FITTINGS & JOINTS THAT WILL BE CONCEALED SHALL BE INSPECTED & TESTED PRIOR TO CONCEALMENT.

4.3.4. HYDRONIC (HEATING):

4.3.4.1. REFERENCE STANDARDS:

4.3.4.1.1. PIPING:

4.3.4.1.1.1. COPPER: SEAMLESS WATER TUBE TO ASTM B88 / B88M.

4.3.4.1.1.2. STEEL: CONTINUOUS WELD OR ELECTRIC RESISTANCE WELDED BLACK CARBON STEEL CONFORMING TO ASTM A 53/A53M GRADE B.

4.3.4.1.1.3. PVC: TO CSA B137.3. SOLVENT WELD JOINTS TO ASTM D2855.

4.3.4.1.1.4. PEX-A: CROSSLINKED POLYETHYLENE PIPING TO CAN/CSA-B137.5.

50 MM (2") AND SMALLER: CAN/ULC-S102.2 LISTED TO A MAXIMUM OF 25 FLAME SPREAD / 50 SMOKE DEVELOPED.

65 MM (2-1/2") AND LARGER: CAN/ULC-S102.2 LISTED TO A MAXIMUM OF 25 FLAME SPREAD / 50 SMOKE DEVELOPED WITH RATED FIBERGLASS INSULATION. PRESSURE AND TEMPERATURE RATINGS: 93°C (200°F) AT 80 PSI (551 KPA), 82°C (180°F) AT 100 PSI (689 KPA).

SEAL PENETRATIONS AT FIRE SEPARATIONS PER CAN/ULC-S115.

PIPING WITHIN A FIRE SEPARATION PER CAN/ULC-S101.

ALL FITTINGS BY TUBING MANUFACTURER.

25 YEAR WARRANTY FROM INSTALLATION DATE.

4.3.4.1.2. END FITTINGS & JOINTS:

4.3.4.1.2.1. SOLDERED COPPER: TO ASME B16.18 CAST BRASS OR ASME B16.22. SOLDER - WROUGHT COPPER WITH LEAD FREE SOLDER TO ASTM B32.

4.3.4.1.2.2. THREADED: TO ASME B1.20.1.

4.3.4.1.2.3. SOLDER: TO ASTM B16.18.

4.3.4.1.2.4. COLD PRESS: TO ASME B16.3 WITH FACTORY INSTALLED EPDM, INSTALLED USING PROPER TOOL, ACTUATOR, JAWS, AND RINGS AS INSTRUCTED BY THE PRESS FITTING MANUFACTURER.

4.3.4.1.2.5. SOCKET WELD: TO ASTM A105/A-105M & ASME B16.1.

4.3.4.1.2.6. GROOVED: CSA B242 TO ASTM A-356 WITH GRADE 'E' EPDM GASKETS RATED FOR -34°C TO 120°C (-30°F TO 250°F)

4.3.4.1.2.7. FLANGED: TO ASTM B16.1.

4.3.4.1.2.8. COUPLINGS: HINGED, TWO PIECE FLANGES, SHOULDERED OR KEYED CAST DUCTILE IRON CONFORMING TO ASTM A-536 GRADE 65-45-12 AND LOCK BOLT. FLANGE BOLTING - ZINC PLATED HEX HEAD MACHINE BOLTS AND HEX NUTS CONFORMING TO ASTM A 307-97 CLASS A.

4.3.4.1.2.9. FLANGED: CLASS 150 FORGED STEEL SLIP-ON OR WELDNECK RAISED FACE TYPE CONFORMING TO ASTM A 181/A181M-95B GRADE 1 AND ASME B16.5. 1.6 MM (1/16") EPDM GASKETS FOR ANSI CLASS 150 . SEMI-FINISHED HEX HEAD MACHINE BOLTS AND SEMI-FINISHED HEX NUTS, BOTH OF CARBON STEEL CONFORMING TO ASTM A 307-97 CLASS A.

4.3.4.1.2.10. PEX: TO ASTM F1807-8 PEX F1960 BARB ENDS.

4.3.4.1.2.11. PEX-A FITTINGS COMPRESSION: 25 MM (1") THROUGH 100 MM (4") NOMINAL PIPE SIZE: SDR9 FITTING CONSISTING OF A DOUBLE O-RING INSERT WITH A COMPRESSION SLEEVE TIGHTENED AROUND THE PIPE AND INSERT.

4.3.4.1.2.12. ALL PEX ELBOWS, ADAPTERS, COUPLINGS, PLUGS, TEES: BRASS ASTM 1960 COLD-EXPANSION BY PIPE MANUFACTURER UTILIZING ING COLD-EXPANSION PEX-A REINFORCING RINGS. PEX TO METAL TRANSITIONS BY PIPE MANUFACTURER. TO ASTM F876.0.

4.3.4.2. APPLICATION:

4.3.4.2.1. ABOVE FLOOR PIPING 50 MM (2") AND SMALLER:

4.3.4.2.1.1. COPPER: TYPE "L" HARD DRAWN COPPER TUBING. TYPE "L" SOFT ANNEALED COPPER TUBING MAY BE USED WITHIN CONVECTOR ENCLOSURES. FITTINGS: WROUGHT COPPER SOLDER JOINT PRESSURE TYPE, WITH IPS TO COPPER ADAPTERS AT SCREWED CONNECTIONS.

4.3.4.2.1.2. STEEL: SCHEDULE 40 WITH ASME B16.3 CLASS 150 THREADED OR COLD PRESS FITTINGS.

4.3.4.2.2. ABOVE FLOOR PIPING, 63 MM (2-1/2") AND LARGER:

4.3.4.2.2.1. STEEL: SCHEDULE 40 WITH RAISED FACE FLANGE OR GROOVED FITTINGS.

4.3.4.2.3. EQUIPMENT DRAINS & OVERFLOWS:

4.3.4.2.3.1. COPPER: TYPE L & DWV HARD DRAWN WITH CAST BRASS OR SOLDER WROUGHT FITTINGS.

4.3.4.2.3.2. PVC: SCHEDULE 40 WITH SOLVENT WELD JOINTS.

4.3.4.3. CLEANING:

4.3.4.3.1. CLEAN ALL NEW HYDRONIC PIPING.

4.3.4.3.2. FLUSH SYSTEMS TO REMOVE LOOSE DIRT.

4.3.4.3.3. PROVIDE CLEANER TO ADEQUATELY CLEAN NEW SYSTEM PIPING. MIX CONCENTRATION IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS AND CIRCULATE FOR 24 TO 72 HOURS AT A TEMPERATURE BETWEEN 21-60°C (70-140°F).

4.3.4.3.4. DRAIN SYSTEMS, REFILL WITH FRESH WATER AND CIRCULATE FOR MINIMUM OF 4 HOURS TO FLUSH OUT REMAINING CHEMICAL SOLUTION.

4.3.4.3.5. REFILL SYSTEMS WITH CLEAN WATER AND INHIBITOR AS REQUIRED.

4.3.4.3.6. INCLUDE SUPPLIER OF WATER TREATMENT SYSTEMS SUPERVISION AND ASSISTANCE DURING INSTALLATION FOR CLEAN OUT AND STARTUP PROCEDURES. PROVIDE ELECTRONIC VERSION OF WRITTEN REPORT TO CONSULTANT.

4.3.5. FLUE GAS VENT (DIRECT VENTS):

4.3.5.1. MATERIAL TYPE AND/OR TEMPERATURE RATING SHALL BE INCLUDED ON THE PIPE PRINT LINE & MANDATORY ORANGE AND BLACK WARNING LABEL APPLIED TO EACH FITTING AS REQUIRED BY ULC S636 TO DISTINGUISH A CERTIFIED GAS VENTING SYSTEM FROM NON-CERTIFIED PLUMBING PIPE. DO NOT MIX PIPE, FITTINGS, SOLVENTS, OR JOINING METHODS FROM DIFFERENT BH VENT MANUFACTURERS; EXCHANGING COMPONENTS FROM VARIOUS MANUFACTURERS VIOLATES THE CONDITIONS OF CERTIFICATION IN THE ULC S636 STANDARD AND VOIDS THE PRODUCT WARRANTY. VENT PIPING PASSING THROUGH AIR PLENUMS, SHALL BE TESTED AND LISTED IN ACCORDANCE WITH CAN/ULC S102.2 AND CLEARLY MARKED WITH THE CERTIFICATION LOGO INDICATING A FLAME-SPREAD RATING NOT MORE THAN 25 AND A SMOKE-DEVELOPED CLASSIFICATION NOT EXCEEDING 50.

4.3.5.2. PVC: SYSTEM S636 PVC VENT PIPING AND FITINGS, ULC S636 CLASS IIA CERTIFIED, FOR USE UP TO AND INCLUDING 65°C (149°F). SYSTEM S636 PVC CEMENT AND PRIMER IS TO BE USED FOR INSTALLATION.

4.3.5.3. CPVC: SYSTEM S636 CPVC VENT PIPING AND FITINGS, ULC S636 CLASS IIB CERTIFIED, FOR USE UP TO AND INCLUDING 90°C (194°F). SYSTEM S636 CPVC CEMENT AND PRIMER IS TO BE USED FOR INSTALLATION.

4.3.5.4. POLYPROPYLENE: SYSTEM S636 POLYPROPYLENE VENT PIPING AND FITINGS, ULC S636 CLASS IIB CERTIFIED, FOR USE UP TO AND INCLUDING 110°C (230°F).

4.3.5.5. DOUBLE WALL STAINLESS STEEL: FOR CAT I, II, IIII, OR IV CONDENSING OR NON-CONDENSING. 441 SS OUTER WALL, AL29-4C INNER WALL. MINIMUM POSITIVE PRESSURE RATING 6 inH20, TESTED TO 35 inH20. MAXIMUM FLUE GAS TEMPERATURE 480°F [249°C]. .

4.3.5.6. SUBMIT VENT & SIZING CALCULATIONS WITH ASSOCIATED EQUIPMENT.

4.4. TESTING:

4.4.1. NATURAL GAS: CONDUCT FINAL TESTS ON NATURAL GAS PIPING IN ACCORDANCE WITH ONTARIO GAS UTILIZATION CODE AND WITH REQUIREMENTS OF LOCAL GAS COMPANY OR GOVERNING AUTHORITY.

4.4.2. WATER: HYDROSTATICALLY TEST WATER PIPING AT 862 KPA (125 PSIG) PRESSURE TO DETECT EXCESSIVE WATER LOSSES.

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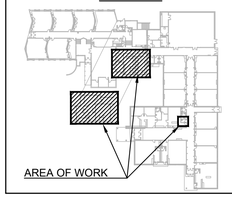
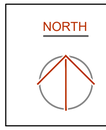
KEYPLAN



REVISIONS

NO.	ISSUED FOR	DATE
00	50% PROGRESS SUBMISSION	26.01.21
01	90% PROGRESS SUBMISSION	26.02.04
02	TENDER SUBMISSION	26.03.03

NORTH



LICENSED PROFESSIONAL ENGINEER
CE-6380
26.03.03
J.J.PEPPER
100114890
PROVINCE OF ONTARIO

DESIGN	ALC	DRAWN	JH
CHECKED	JP	REVIEWED	ALC

PROJECT
ST. ANNE CAMBRIDGE

ADDRESS
127 ELGIN ST. NORTH,
CAMBRIDGE, ON

PROJECT NO.
CE-6380

DRAWING TITLE
MECHANICAL SPECIFICATIONS

DRAWING NUMBER
M8 OF 9

5. PLUMBING SYSTEM:

5.1. REFERENCES STANDARDS:

5.1.1. CONFORM TO ALL APPLICABLE CODES INCLUDING, BUT NOT LIMITED TO, THE FOLLOWING:

5.1.1.1. CSA-B149.1: NATURAL GAS INSTALLATION CODE

5.1.2. ALL PIPING, ACCESSORIES AND EQUIPMENT TO CONFORM TO THE REQUIREMENTS OF NSF/ANSI 61-G & NSF/ANSI 372.

5.2. VENTING: PLUMBING VENTING MAY OR MAY NOT BE SHOWN ON DRAWINGS. PROVIDE A COMPLETE PLUMBING VENTING SYSTEM FOR ALL PLUMBING FIXTURES SHOWN, IN ACCORDANCE WITH THE ONTARIO BUILDING CODE. CARRY VENT, WASTE AND SOIL STACKS THROUGH THE ROOF WHERE SHOWN ON DRAWINGS OR WHERE REQUIRED. SUPPLY ALL FLASHING MATERIALS. USE MATERIALS AS SPECIFIED IN MECHANICAL GENERAL REQUIREMENTS.

5.3. STERILIZATION OF POTABLE (DOMESTIC) WATER SYSTEMS:

5.3.1. FLUSH EACH SYSTEM, AFTER COMPLETION, BY ALLOWING FULL FLOW OF WATER THROUGH SYSTEM FOR A PERIOD OF FIFTEEN MINUTES, OR LONGER WHEN DIRECTED BY CONSULTANT.

5.3.2. AFTER FLUSHING OF THE SYSTEM IS COMPLETED, PROVIDE A 24 HOUR CONTACT STERILIZATION TREATMENT BY TREATING THE WATER WITH 50 PPM OF CHLORINE AS RECOMMENDED IN AWWA SPECIFICATION C-651. AFTER STERILIZATION PERIOD HAS ELAPSED, FLUSH SYSTEM TO REDUCE CHLORINE CONTENT TO AN ACCEPTABLE LEVEL.

5.4. PLUMBING FIXTURES:

5.4.1. PROVIDE CSA COMPLIANT PLUMBING FIXTURES.

5.4.2. PROVIDE PLUMBING FIXTURES AS INDICATED IN SCHEDULE ON DRAWINGS.

5.4.3. CAULK ALL AROUND BASES OF MOP SERVICE SINKS, BUILT-IN BATHTUBS, AND OTHER BUILT-IN FIXTURES.

5.5. VALVES:

5.5.1. SUBMIT SHOP DRAWINGS FOR ALL VALVES.

5.5.2. POTABLE (DOMESTIC) WATER:

5.5.2.1. REFERENCE STANDARDS:

5.5.2.1.1. LEAD FREE, 0.25% CONTENT PER NSF-61/372

5.5.2.1.2. BRONZE TO ASTM C89530

5.5.2.1.3. BRASS TO ASTM C46750

5.5.2.1.4. CAST IRON TO ASTM A126

5.5.2.1.5. STAINLESS STEEL TO ASTM A351

5.5.2.1.6. CPVC RATED TO 1,600 KPA (232 PSI) AT 23°C (73°F)

5.5.2.1.7. ALL PRESSURE RATINGS, SIZES TO MSS SP-25

5.5.2.2. BALL VALVE (UP TO AND INCLUDING 75MM (3")): 600 CWP, BRONZE BODY, FULL PORT, STAINLESS VENTED BALL, PTFE SEATS, BLOW-OUT PROOF STEM, LOCKING LEVER HANDLE WITH INSULATION STEM EXTENSION. SOLDERED, THREADED OR PEX CONNECTIONS. MANUFACTURED TO MSS SP-110. PROVIDE 3-PIECE VALVE FOR CRITICAL SERVICE. PROVIDE 2-PIECE VALVE FOR NON-CRITICAL SERVICE.

5.5.2.3. CHECK (UP TO AND INCLUDING 50MM (2")): Y-PATTERN SWING TYPE, SOLDER OR THREADED, LF BRONZE BODY / TRIM AND INTEGRAL SEAT. 200 CWP RATING TO MSS SP-80.

5.5.2.4. STRAINER (UP TO AND INCLUDING 50MM (2"): WYE-PATTERN LEAD FREE CAST BRONZE, THREADED OR SOLDER CONNECTIONS TO SUIT APPLICATION AND SIZE, SOLID RETAINER CAP WITH GASKET, MINIMUM 300 CWP, 302 STAINLESS STEEL #20 MESH SCREEN.

5.5.2.5. THERMOSTATIC BALANCING VALVE (TBV):

5.5.2.5.1. SIZE TBV TO MATCH LINE SIZE OF ASSOCIATED BRANCH PIPING.

5.5.2.5.2. TBV SHALL BE SELF-CONTAINED AND FULLY AUTOMATIC AND REGULATE THE FLOW OF RECIRCULATED POTABLE (DOMESTIC) HOT WATER BASED ON WATER TEMPERATURE ENTERING THE VALVE REGARDLESS OF SYSTEM OPERATING PRESSURE.

5.5.2.5.3. TBV SHALL BE FACTORY SET. TEMPERATURE SETPOINTS RANGE FROM 27 °C (80 °F) TO 77 °C (170 °F). DEFAULT SETPOINT OF 49 °C (120 °F). CONFIRM WITH CONSULTANT PRIOR TO ORDERING.

5.5.2.5.4. TBV BODY AND ALL INTERNAL COMPONENTS SHALL BE CONSTRUCTED OF STAINLESS STEEL WITH MAJOR COMPONENTS CONSTRUCTED OF TYPE 300 STAINLESS STEEL, RATED TO 1380 KPA (200 PSIG) MAXIMUM WORKING PRESSURE AND 121 °C (250 °F) MAXIMUM WORKING TEMPERATURE.

5.5.2.6. MAKE-UP WATER VALVES:

5.5.2.6.1. PROVIDE WATER FEEDER VALVES IN POTABLE (DOMESTIC) WATER PIPING TO HEATING, COOLING SYSTEMS WHERE INDICATED ON DRAWINGS. VALVES SHALL BE LINE SIZE AND COMPLETE WITH RELIEF VALVE AND STRAINER.

5.5.2.6.2. SET REDUCING VALVE TO HOLD AN EXCESS PRESSURE OF 35 KPA (5 PSI) ABOVE HIGHEST PRESSURE IN SYSTEM.

5.5.2.6.3. PROVIDE SUITABLY SIZED RELIEF VALVE AND PIPE TO DRAIN. SET RELIEF VALVE 210 KPA (30 PSI) HIGHER THAN REDUCING VALVE.

5.5.2.7. WATER PRESSURE REDUCING VALVES:

5.5.2.7.1. PROVIDE PRESSURE REDUCING VALVES IN POTABLE (DOMESTIC) WATER PIPING WHERE SHOWN ON DRAWINGS.

5.5.2.7.2. PROVIDE INTEGRAL STRAINER, LEAD FREE BRASS BODY, STAINLESS STEEL AND THERMOPLASTIC INTERNAL PARTS, REINFORCED EPDM DIAPHRAGM, SOLDER OR THREADED WITH SINGLE UNION ENDS.

5.5.2.7.3. PROVIDE SUITABLY SIZED RELIEF VALVE AND PIPE TO DRAIN.

5.5.2.8. RELIEF VALVES: CSA AND ASME CERTIFIED AND LISTED, BRONZE BODY, AUTOMATIC, DIRECT PRESSURE ACTUATED, TEMPERATURE RELIEF MAXIMUM 99 C (210 F). SIZED PER MANUFACTURER REQUIREMENTS TO SUIT SIZE OF THE ASSOCIATED EQUIPMENT.

5.5.3. NATURAL GAS ISOLATION:

5.5.3.1. UP TO 50 MM (2"): 1,034 KPA (150PSIG) / 600WOG RATING . BRASS OR BRONZE BODY, FULL PORT, BALL VALVE. PFTE SEATS, DOUBLE O-RING DESIGN OR PTFE PACKING. CHROME PLATED SOLID BRONZE BALL. LEVER HANDLE. CSA/CGA 125 /3.16 APPROVED.

5.5.4. WATER HAMMER ARRESTORS: PROVIDE IN ACCORDANCE WITH THE PLUMBING AND DRAINAGE INSTITUTE STANDARD PDI-WH-201. ARRESTORS SHALL BE COPPER CONSTRUCTION WITH BELLOWS SIZED TO PDI WH-201 AND PRE-CHARGED FOR OPERATION IN TEMPERATURE RANGE -0.5C TO 82C (33F TO 180F) AND A MAXIMUM 10.6 BAR (150 PSI) WORKING PRESSURE.

5.5.5. STRAINERS:

5.5.5.1. PROVIDE LINE SIZE STRAINERS:

5.5.5.2. -NPS 50 MM (2") AND UNDER: "Y" PATTERN, 125# (862 KPA) BRONZE BODY, SCREWED ENDS AND SCREWED CLEANOUT.

5.5.5.3. SCREEN MATERIAL FOR STRAINERS: 20 MESH STAINLESS STEEL UNLESS OTHERWISE NOTED.

5.5.6. THERMOMETERS:

5.5.6.1. TUBULAR GLASS TYPE, WITH 230 MM (9") SCALE, RED APPEARING MERCURY IN LENS FRONT TUBE, CAST ALUMINUM CASE, BRASS STEM COMPLETE WITH SEPARABLE SOCKET, ADJUSTABLE ANGLE HINGE ASSEMBLY AND COMBINATION FAHRENHEIT/CELSIUS SCALE WITH GRADUATIONS OF 2 F AND 1 C.

5.5.6.2. PROVIDE WITH STEMS AND STAINLESS STEEL SEPARABLE SOCKETS OF SUFFICIENT LENGTH TO PROVIDE FOR PROPER INSERTION IN PIPING OR EQUIPMENT IN WHICH THEY ARE INSTALLED, AND AS REQUIRED TO ENSURE CORRECT TEMPERATURE READINGS.

5.5.7. PRESSURE GAUGES:

5.5.7.1. CAST ALUMINUM CASE AND BLACK FINISH, PHOSPHOR BRONZE BUSHED ROTARY MOVEMENT, BRONZE BOURDON TUBE, 114 MM (4½") DIAL WITH COMBINED KILOPASCAL AND PSI SCALE, SAFETY BLOWOUT BACK AND OVERLOAD STOPS TO PREVENT DAMAGE TO CASE DUE TO EXCESSIVE PRESSURE.

5.5.7.2. PROVIDE PRESSURE GAUGES WITH DIAL RANGE INDICATING OPERATING PRESSURE AT APPROXIMATELY MID-POINT ON DIAL, WITH 1% ACCURACY AND GRADUATED FOR DIRECT READING TO 7 KPA (1 PSI).

5.6. POTABLE (DOMESTIC) WATER HEATERS:

5.6.1. PROVIDE CSA APPROVED HEATERS OF CAPACITY, SIZE, AND ELECTRICAL CHARACTERISTICS INDICATED IN SCHEDULE ON DRAWINGS. LININGS AND COATINGS OF WATER TANKS SHALL BE CERTIFIED TO NSF/ANSI 61 STANDARDS.

5.6.2. ELECTRIC: COMPLETE WITH ELECTRIC HEATER FACTORY INSULATED, WIRED AND COMPLETELY ASSEMBLED, ENAMELED STEEL OUTER CASING, GLASS LINING, IMMERSION TYPE HEATING ELEMENTS, MAGNESIUM ANODE ROD, AUTOMATIC TEMPERATURE CONTROLS WITH ADJUSTABLE (FLIP-FLOP) THERMOSTAT, HIGH LIMIT CONTROL AND ASME RATED T&P RELIEF VALVE.

6. HYDRONICS (HEATING) SYSTEM:

6.1. THE SYSTEMS SHALL CONFORM TO ALL APPLICABLE CODES INCLUDING, BUT NOT LIMITED TO, CSA-B214.

6.2. VALVES:

6.2.1. REFERENCE STANDARDS:

6.2.1.1. BRONZE: TO ASTM B62.

6.2.1.2. BRASS: TO ASTM B283.

6.2.1.3. CAST IRON: TO ASTM A126

6.2.1.4. STAINLESS STEEL: TO ASTM A351.

6.2.2. GENERAL: PROVIDE SAME MANUFACTURER THROUGHOUT WITH PRESSURE RATING MARKED PER MSS-SP-25. ALL VALVES TO HAVE VALID CRN REGISTRATION NO. ISSUED BY RESPECTIVE PROVINCE. SUBMIT SHOP DRAWINGS FOR ALL VALVES.

6.2.3. VALVES, 50 MM (2") AND SMALLER:

6.2.3.1. ISOLATION: 2 PIECE BRASS OR BRONZE BODY, 1,034 KPA (150 PSI) 60 WOG RATING, FULL PORT, STAINLESS STEEL BALL, LOCKING LEVER HANDLE WITH INSULATION STEM EXTENSION. SOLDERED, THREADED OR PEX CONNECTIONS. MANUFACTURED TO MSS SP-110 STANDARD.

6.2.3.2. CHECK: Y PATTERN SWING TYPE, BRONZE BODY / TRIM. 860 KPA(125 PSI) 200 WOG RATING

6.2.4. VALVES, 63MM (2-1/2") AND LARGER:

6.2.4.1. ISOLATION: LUG STYLE CAST OR DUCTILE IRON BODY, 1,380 KPA (150 PSI) 200 WOG RATING, ALUMINUM BRONZE DISC, EPDM, STAINLESS STEEL STEM, LOCKING LEVER HANDLE WITH INSULATION STEM EXTENSION UP TO 150 MM (6"). MANUAL GEAR OPERATOR WITH INSULATION STEM EXTENSION 200MM (8") AND LARGER. DEAD END SERVICE - BUBBLE TIGHT SHUT-OFF TO 200 PSI.

6.2.4.2. CHECK: WAFER, CAST IRON BODY, STAINLESS STEEL TRIM & SEAT, VITON A SEAT RING. CLASS 125, 200 WOG RATING.

6.2.4.3. CHECK AT PUMP DISCHARGE: SILENT, CAST IRON BODY, STAINLESS STEEL TRIM & SEAT, SPRING LOAD CENTRE GUIDED DISC. CLASS 125, 200 WOG RATING.

6.2.5. BALANCING VALVES:

6.2.5.1. FOR SIZES 50 MM (2") AND UNDER: USE VALVE WITH ADJUSTABLE HIDDEN MEMORY FOR TAMPER PROOF BALANCING, CAST COPPER ALLOY BODY COMPLETE EPOXY RESIN COATING , SELF SEALING TEST POINTS FOR PRESSURE, TEMPERATURE SENSING PROBES, PROTECTIVE CAP AND END CONNECTIONS TO SUIT PIPING SYSTEM.

6.2.5.2. FOR SIZES 65 MM (2½") AND OVER, VALVE WITH ADJUSTABLE HIDDEN MEMORY FOR TAMPER PROOF BALANCING, CAST COPPER ALLOY BODY COMPLETE EPOXY RESIN COATING , SELF SEALING TEST POINTS FOR PRESSURE, TEMPERATURE SENSING PROBES, PROTECTIVE CAP AND END CONNECTIONS TO SUIT PIPING SYSTEM.

6.2.6. DRAIN VALVE: PROVIDE 13 MM (1/2") BRASS SEDIMENT FAUCETS WITH HOSE THREAD OUTLETS AT LOW POINTS OF WATER AIR PIPING SYSTEMS.

6.3. HYDRONIC SPECIALTIES:

6.3.1. POT FEEDER: FOR EACH SYSTEM, FURNISH A BYPASS FEEDER WITH HEAVY CAST IRON BODY WITH A WORKING PRESSURE OF 1,390 KPA (200 PSIG) AND CAPACITY AS SCHEDULED, FOR ADDING CHEMICALS TO THE SYSTEM. FEEDER SHALL INCLUDE INLET / OUTLET ISOLATING VALVES AND 20 MM (3/4") DRAIN VALVE.

6.3.2. STRAINERS: "Y" TYPE, CLASS 125 CAST IRON BODY STRAINER WITH REMOVABLE MONET SCREEN C/W CLEANOUT. MAXIMUM PRESSURE DROP KPA (0.9 PSIG).

6.3.3. THERMOMETERS:

6.3.3.1. STEM TYPE THERMOMETERS: 230 MM (9") SCALE, ADJUSTABLE ANGLE TYPE, WITH RED APPEARING MERCURY LENS FRONT TUBE, AND CAST ALUMINUM CASE. COMBINED CELSIUS AND FARENHEIT SCALE.

6.3.3.2. DIAL TYPE THERMOMETERS: 114 MM (4-1/2") DIAL SIZE, UNIVERSAL ANGLE TYPE, WITH LINEAR SCALE, BLACK CAST ALUMINUM CASE, CHROME PLATED RING, BRONZE BUSHED BRASS MOVEMENT WITH ADJUSTABLE POINTER. COMBINED CELSIUS AND FARENHEIT SCALE.

6.3.3.3. PROVIDE SENSING BULBS SUITABLE FOR LIQUID MEDIUM BEING MEASURED. FURNISH BULBS IN PIPING OR EQUIPMENT WITH STAINLESS STEEL SEPARABLE WELLS.

6.3.4. PRESSURE GAUGES: CAST ALUMINUM CASE, AND BLACK FINISH, PHOSPHOR BRONZE BUSHED ROTARY TYPE MOVEMENT, BRONZE BOURDON TUBE, 114 MM (4-1/2") DIAL WITH COMBINED PSI AND KILOPASCAL SCALE.

6.3.5. AIR VENTS: PROVIDE AUTOMATIC AIR VENTS, COMPLETE WITH DRIP TRAYS, AT HIGH POINTS OF WATER PIPING SYSTEMS AND ALSO IN ANY OTHER LOCATION NOTED ON DRAWINGS.

6.3.6. AIR SEPARATORS: FURNISH AIR SEPARATORS IN WATER AND GLYCOL/WATER PIPING SYSTEMS OF SIZE AND CAPACITY INDICATED ON DRAWINGS.

6.3.7. FLEXIBLE PIPING CONNECTIONS: FURNISH FLEXIBLE METAL HOSES ON PIPING CONNECTIONS TO HEATING AND COOLING COILS, ON SUCTION AND DISCHARGE CONNECTIONS TO PUMPS, AND IN PIPING SYSTEMS WHERE INDICATED ON DRAWINGS.

6.4. PUMPS:

6.4.1. SEE SCHEDULE ON DRAWINGS FOR SERIES, CAPACITIES, AND DETAILS.

6.4.2. STARTERS AND ELECTRICAL WIRING BY ELECTRICAL TRADE.

6.4.3. INLINE:

6.4.3.1. CLOSE-COUPLED, SINGLE STAGE, CENTRIFUGAL PUMPS DESIGNED FOR INSTALLATION IN A VERTICAL OR HORIZONTAL POSITION, OPERATING TO 1207 KPA (175 PSIG) MAXIMUM WORKING PRESSURE AND 225°F (107°C) MAXIMUM OPERATING TEMPERATURE.

6.4.3.2. PUMP VOLUTE SHALL BE CAST IRON AND IMPELLER SHALL BE BRONZE/BRASS.

6.4.3.3. PROVIDE FACTORY SUPPLIED THERMAL INSULATION SHELL WITH PUMP.

7. MECHANICAL EQUIPMENT:

7.1. BOILER (CONDENSING):

7.1.1. CSA LISTED MODULATING NATURAL GAS BOILERS AS SCHEDULED.

7.1.2. HEAT EXCHANGER: CORROSION RESISTANT FOR FULL CONDENSING OPERATION. ASME RATED UP TO 1103 KPA (160 PSIG).

7.1.3. VENTING: CATEGORY IV.

7.1.4. CONTROLS: TOUCH SCREEN CONTROLLER WITH: PASSWORD SUPPORT, OUTDOOR RESET, PUMP DELAY WITH FREEZE PROTECTION, DHW PRIORITIZATION, LEAD/LAG SCHEDULING, DATA LOGGING, NIGHT SETBACK, AND ABILITY TO CONTROL SYSTEM PUMP(S), MULTIPLE BOILER PUMPS.

7.1.4.1. BACNET COMMUNICATION GATEWAY

7.1.5. ACCESSORIES: HIGH LIMIT WITH MANUAL RESET, LOW WATER CUT OFF WITH MANUAL RESET, INLET/OUTLET TEMP SENSORS, T&P GAUGE, RELIEF VALVE AND CONDENSATE NEUTRALIZE.

7.2. PACKAGED ROOFTOP UNIT:

7.2.1. DESCRIPTION: OUTDOOR PACKAGED ROOFTOP UNIT WITH HEATING (TYPE AS SCHEDULED) AND DIRECT EXPANSION (DX) COOLING / HEATING, OF SIZE AND PERFORMANCE AS INDICATED IN SCHEDULES ON DRAWINGS. COMPLETE FACTORY ASSEMBLED UNIT PRE-WIRED AND PIPED WITH FACTORY INSTALLED CONTROLS.

7.2.2. UNIT CONSTRUCTION: DOUBLE WALL CASING GALVANIZED STEEL PANELS, THERMALLY BROKEN WITH FACTORY FINISH AND INSULATED WITH 50MM (2") RIGID R-13 INSULATION,. UNIT SHALL HAVE HINGED AND GASKETTED PANELS HAVING LOCKABKLE HANDLES FOR ACCESS TO ALL INTERNAL PARTS FOR SERVICING OR REPLACEMENT.

7.2.3. FANS: SUPPLY FAN SHALL BE DIRECT DRIVE PLNUM FAN WITH STATICALLY AND DYNAMICALLY BALANCED ROTOR. MOUNT FAN AND MOTOR ON VIBRATION ISOLATION BASE(S) AND SEPARATED FROM CASING WITH FLEXIBLE CONNECTION. CONDENSER FAN(S) SHALL BE DIRECT DRIVEN TYPE, WITH COATED STEEL WIRE GUARD AND DISCHARGE AIR VERTICALLY. VARIABLE SPEED DRIVES FACTORY MOUNTED INSIDE UNIT CABINET.

7.2.4. EVAPORATOR COIL: COPPER TUBE ALUMINUM FIN COIL ASSEMBLY WITH GALVANIZED DRAIN PAN AND CONNECTION. ALL COILS SHALL BE FACTORY LEAK TESTED WITH HIGH PRESSURE AIR UNDER WATER. COILS SHALL HAVE INTERLACED CIRCUITRY.

7.2.5. COMPRESSOR: SCROLL TYPE FACTORY MOUNTED RESILIENTLY MOUNTED WITH POSITIVE LUBRICATION, CRANKCASE HEATER, HIGH AND LOW PRESSURE SAFETY CONTROLS, MOTOR /64.

7.2.6. PROVIDE HOT GAS BYPASS FOR CAPACITY REDUCTION CYLINDER UNLOADING. PROVIDE HEAD PRESSURE CONTROLS CAPABLE OF OPERATION TO -30 C OUTDOOR AIR TEMPERATURE

7.2.7. GAS HEATING: MODULATED, INDUCED DRAFT COMBUSTION WITH ITH ADJUSTABLE COMBUSTION AIR SUPPLY, PRESSURE REGULATOR, GAS VALVES, MANUAL SHUT-OFF, INTERMITTENT SPARK OR GLOW COIL IGNITION, FLAME SENSING DEVICE. INTEGRAL SAFETIES..

7.2.8. ECONOMIZER: ECONOMIZER SHALL BE FACTORY INSTALLED TYPE AS SCHEDULED CAPABLE OF SIMULTANEOUS ECONOMIZER AND COMPRESSOR OPERATION.

7.2.9. ROOF CURB: PROVIDE FACTORY FABRICATED 16 GAUGE GALVANIZED STEEL CURB WITH WOOD NAILER STRIP SUITABLE FOR UNIT DIMENSIONS.

7.2.10. FACTORY INSTALLED CONTROLS:

7.2.10.1. TERMINAL WIRING STRIP FOR CONNECTION OF CONTROLS BY OTHERS. INCLUDE SUPPLY FAN START / STOP; TWO STAGES HEAT; TWO STAGES COOLING.

7.2.10.2. DDC CONTROLLER WITH BACnet COMMUNICATION PROTOCOL

7.2.10.3. REFRIGERANT DETECTION SYSTEM WITH SENSOR(S) TO INITIATE MITIGATION ON SENSED LEAK.

7.2.11. STAINLESS STEEL CONDENSATE DRAIN PAN WITH OVERFLOW SAFETY SWITCH & CONNECTION.

7.3. MAKE-UP AIR UNIT:

7.3.1. DESCRIPTION: OUTDOOR PACKAGED MAKE-UP AIR UNIT WITH GAS HEATING OF SIZE AND PERFORMANCE AS INDICATED IN DRAWING SCHEDULES, ASHRAE 90.1 COMPLIANT AND LABELLED. COMPLETE FACTORY ASSEMBLED UNIT.

7.3.2. UNIT CONSTRUCTION: CASING SHALL BE FABRICATED OF WEATHER-TIGHT FOAM INSULATED TO ASTM E84 PANELS WITH FACTORY FINISH. UNIT SHALL HAVE HINGED AND GASKETTED PANELS FOR ACCESS TO ALL INTERNAL PARTS FOR SERVICING OR REPLACEMENT.

7.3.3. FILTERS: REMOVABLE 50 MM (2 INCHES) THICK GLASS FIBRE DISPOSABLE MERV [8] FILTERS IN METAL FRAMES.

7.3.4. OUTSIDE AIR DAMPER: LOW LEAK INSULATED (MAX. 10 CFM / FT²) MOTORIZED WITH MECHANICALLY LOCKED BLADE EDGE SEALS

7.3.5. RETURN AIR DAMPER, MOTORIZED: FACTORY INSTALLED TO PERMIT 100% RECIRCULATION. CONTROLLED BY BAS EXTERNAL 2-10 VDC

7.3.6. FANS, MOTOR(S) & DRIVES:

7.3.6.1. SUPPLY FAN: CENTRIFUGAL FORWARD-CURVED, DIRECT OR BELT-DRIVEN WITH ADJUSTABLE PITCH SHEAVE DRIVE ASSEMBLY, FAN WITH STATICALLY AND DYNAMICALLY BALANCED ROTOR IN ACCORDANCE WITH THE LATEST ARI GUIDELINE AND ANSI 2.19. FAN SYSTEM SHALL BE FULLY VIBRATION ISOLATED USING SPRINGS AND FLEXIBLE CONNECTORS.

7.3.6.2. MOTOR: CONTINUOUS DUTY, THERMALLY PROTECTED, PERMANENTLY LUBRICATED, BALL BEARING WITH A 1.15 SERVICE FACTOR. EFFICIENCY TO MMAH SB-10 REQUIREMENTS.

7.3.6.3. FACTORY INSTALLED VARIABLE FREQUENCY DRIVE WITH LINE REACTOR, ECM FILTER AND ALL NECESSARY WIRING PER UL STANDARD. THE DRIVE SHALL HAVE BUILT IN MENU DRIVE DISPLAY WITH TEST, START-UP, MAINTENANCE AND DIAGNOSTIC ASSISTANT. THE DRIVE SHALL BE FACTORY PROGRAMMED FOR 30 SECOND SOFT START. THE DRIVE SHALL HAVE THE FOLLOWING PROTECTION AND ALARMS: SINGLE PHASE, OVERVOLTAGE TRIP LIMIT, UNDER VOLTAGE TRIP LIMIT, OVER TEMPERATURE, MICROPROCESSOR FAULT, MOTOR STALL PROTECTION, MOTOR OVER TEMPERATURE.

7.3.7. HEATING:

7.3.7.1. NATURAL GAS HEATING SYSTEM CONSISTING OF 409 STAINLESS STEEL HEAT EXCHANGER, VENTER FAN, SPARK IGNITION SYSTEM, CONTROL VALVES AND ALL NECESSARY SAFETIES TO PROVIDE A FULLY OPERATIONAL HEATING SYSTEM READY FOR OPERATION FROM FACTORY. HEAT EXCHANGER SHALL PROPERLY DRAIN CONDENSATE OR OTHER WATER DURING THE HEATING AND COOLING SEASON. SYSTEM SHALL MODULATE BOTH THE GAS AND COMBUSTION AIR TO MAINTAIN TEMPERATURE SETPOINT(S) AND THERMAL EFFICIENCY. CERTIFIED TO CSA 2.6.

7.3.7.2. GAS BURNER, CAPABLE OF MODULATING TURN DOWN AS SCHEDULED, ELECTRIC MODULATING MAIN GAS VALVE, MOTORIZED SHUT DOWN VALVE, MAIN AND PILOT GAS REGULATORS, PILOT ELECTRIC GAS VALVE, MANUAL SHUT-OFF VALVE AND PILOT ADJUSTMENT VALVE.

7.3.7.3. NONCONDENSING MINIMUM THERMAL EFFICIENCY OF 81%. THE THERMAL EFFICIENCY SHALL NOT FALL BELOW 80% THROUGH THE MODULATED OPERATIONAL RANGE.

7.3.7.4. PROVIDE ALL SAFETY CONTROLS FOR THE GAS HEATING INCLUDING ALI INTERLOCKS AND AIR FLOW PROVING SWITCHES TO MEET CGA AND CSA REQUIREMENTS.

7.3.8. PROVIDE CONDENSATE DRAIN PER MANUFACTURER'S REQUIREMENTS.

7.3.9. CURB: MANUFACTURER SUPPLIED 2.8 MM (12 GAUGE) ZINC COATED STEEL WITH A 51 MM X 152 MM (2" X 6") NAILER.

7.3.10. CONTROLS: CONTROLS CONTRACTOR TO INTEGRATE UNIT INTO EXISTING BAS. REFER TO CONTROL NOTES FOR SEQUENCE OF OPERATION.

8. AIR DISTRIBUTION SYSTEM:

8.1. DUCTWORK:

8.1.1. GENERAL:

8.1.1.1. PROVIDE DUCTWORK CONSTRUCTED TO SMACNA 250 PA (1" W.G.) PRESSURE CLASSIFICATION & SEAL CLASS A. FOLLOW ALL OF THE LATEST SMACNA REQUIREMENTS.

8.1.1.2. CONTINUOUSLY SOLDER OR SEAL JOINTS IN EXTERIOR AIR INTAKE DUCTS AND PLENUMS TO PREVENT DRIPPING OF MOISTURE.

8.1.1.3. PROVIDE DUCTWORK OF GALVANIZED STEEL SHEET UNLESS INDICATED OTHERWISE.

8.1.1.4. DUCTWORK ASPECT RATIOS CAN BE ADJUSTED TO A MAXIMUM OF 4:1 WHILE KEEPING AT LEAST THE SAME CROSS SECTIONAL AREA, TO AVOID INTERFERENCES, AS REQUIRED.

8.1.2. RECTANGULAR DUCTWORK:

8.1.2.1. FOR LONGITUDINAL JOINTS ON RECTANGULAR DUCTWORK, FURNISH PITTSBURGH LOCK JOINTS TIGHTLY CLOSED ALONG FULL LENGTH OF SEAM.

8.1.2.2. CROSS-BREAK FLAT SURFACES BETWEEN JOINTS, OR BETWEEN JOINTS AND INTERMEDIATE REINFORCEMENTS, TO PREVENT VIBRATION OR BUCKLING.

8.1.2.3. WHERE ELBOWS ARE INDICATED AS SQUARE TYPE, PROVIDE AIR TURNING VANES OF DOUBLE BLADE CONSTRUCTION.

8.1.3. ROUND DUCTWORK:

8.1.3.1. FURNISH NINETY DEGREE ELBOWS WITH SMOOTH CENTRE LINE RADIUS OF 1.5 TIMES DUCT DIAMETER. ALTERNATIVELY FURNISH ELBOWS OF 5 PIECE CONSTRUCTION, SUBJECT TO APPROVAL BY CONSULTANT.

8.1.3.2. DUCTWORK SHALL USE SPIRAL LOCK SEAM TYPE DUCT. SLIP JOINTS IN DIRECTION OF FLOW, IN ACCORDANCE WITH SMACNA STANDARDS.

8.1.4. SUPPORTS AND HANGERS:

8.1.4.1. DO NOT HANG ANY DUCTWORK FROM OTHER MECHANICAL EQUIPMENT OR FROM ROOF DECK, UNLESS SPECIFICALLY INDICATED ON DRAWINGS.

8.1.4.2. RECTANGULAR DUCTWORK:

8.1.4.2.1. FOR DUCTS UP TO 760 MM (30") WIDE: FURNISH STRAP HANGERS OF GALVANIZED SHEET STOCK WITH EDGES FOLDED OVER. BEND STRAP HANGER AROUND BOTTOM OF DUCT FOR MINIMUM OF 38 MM (1-1/2") AND ATTACH TO SIDES AND BOTTOM OF DUCT.

8.1.4.2.2. FOR DUCTS OVER 760 MM (30") WIDE: FURNISH MILD STEEL ROD HANGERS OF MINIMUM 10 MM (3/8") DIA SIZE AND FURNISH 38 MM X 38 MM X 3 MM (1-1/2" X 1-1/2" X 1/8") STEEL ANGLE ACROSS BOTTOM OF DUCT. ATTACH HANGER TO ANGLE (NOT DUCT).

8.1.4.3. ROUND DUCTWORK:

8.1.4.3.1. FOR DUCTS UP TO 900 MM (36") DIAMETER: FURNISH STRAP BAND AND HANGER OF 25 MM (1") X 20 GA. GALVANIZED SHEET STOCK WITH EDGES FOLDED OVER. BAND IS TO FIT TIGHT TO DUCT ALL AROUND AND CONNECT TO HANGER STRAP WITH LOAD RATED FASTENER.

8.2. SHEET METAL SPECIALTIES:

8.2.1. ACCESS DOORS: PROVIDE ACCESS DOORS IN DUCTWORK AND PLENUMS TO ALLOW SERVICING, MAINTENANCE AND INSPECTION OF CONTROL DAMPERS, FIRE DETECTORS, BOTH SIDES OF FIRE AND FIRE/SMOKE DAMPERS, CONTROL ELEMENTS, BEARINGS AND AS INDICATED ON DRAWINGS. FURNISH ACCESS DOORS AT LEAST 300 MM X 150 MM (12" X 6") UNLESS DUCT DIMENSIONS PREVENT.

8.2.2. FLEXIBLE DUCT CONNECTIONS: 75 MM (3") WIDE LISTED FIRE RETARDENT NEOPRENE COATED WOVEN GLASS FIBRE FABRIC TO NFPA 701, CRIMPED INTO 75 MM (3") 24 GA. (0.6MM) GALVANIZED STEEL EDGING STRIPS. MANUFACTURED TO SMACNA STANDARDS.

8.3. VENTING:

8.3.1. PROVIDE VENTING FOR GAS FIRED EQUIPMENT. COMPLY WITH THE REQUIREMENTS OF CSA B149.1, MANUFACTURERS REQUIREMENTS AND AUTHORITY HAVING JURISDICTION.

2. CONTROL SYSTEM:

2.1. FACILITY BUILDING AUTOMATION SYSTEM: MECHANICAL SYSTEMS TO HAVE DIRECT DIGITAL EQUIPMENT CONTROLLERS COMMUNICATING OVER A DEDICATED NETWORK UTILIZING BACnet COMMUNICATIONS PROTOCOL, ACCESSIBLE THROUGH AN OPERATOR INTERFACE OR SECURE IP ADDRESS. COORDINATE WORK WITH FACILITY CONTROLS CONTRACTOR: ACCUTEMP SYSTEMS - 519-896-7027 - SCOTT WARD.

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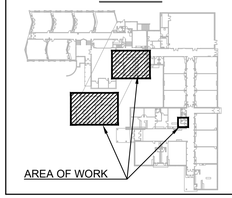
KEYPLAN



REVISIONS

NO.	ISSUED FOR	DATE
00	50% PROGRESS SUBMISSION	26.01.21
01	90% PROGRESS SUBMISSION	26.02.04
02	TENDER SUBMISSION	26.03.03

NORTH

LICENSED PROFESSIONAL ENGINEER
CE-6380
26.03.03
J.J.PEPPER
100114890
PROVINCE OF ONTARIO

DESIGN	ALC	DRAWN	JH
CHECKED	JP	REVIEWED	ALC

PROJECT
ST. ANNE CAMBRIDGE

ADDRESS
127 ELGIN ST. NORTH,
CAMBRIDGE, ON

PROJECT NO.
CE-6380

DRAWING TITLE
MECHANICAL SPECIFICATIONS

DRAWING NUMBER
M9 OF 9