

DRAWING LIST

M1	MECHANICAL LEGENDS, NOTES & DETAILS
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M4	SECOND FLOOR PLAN MECHANICAL DEMOLITION
M5	ROOF PLAN MECHANICAL DEMOLITION
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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.
- 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'S 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.
- ALL COLD CONDENSATE DRAINAGE FROM ROOFTOP EQUIPMENT SHALL BE TRAPPED PER MANUFACTURER'S RECOMMENDATIONS & SPILL TO PRECAST 600mmx250mm (24"x10") CONCRETE SPLASH BLOCK.
- DEBRIS SHALL 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
- 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 OWNER'S REPRESENTATIVE BEFORE REMOVAL. REPLACE ANY DAMAGED TILES TO MATCH EXISTING
- WHERE REPLACEMENT EQUIPMENT EXPOSES PREVIOUSLY UNFINISHED SURFACES, FINISH TO MATCH ADJACENT ASSEMBLIES.

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.
- REMOVE ALL UNUSED, ABANDONED OR REDUNDANT DUCTWORK, 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.

PIPING LEGEND	
ITEM	DESCRIPTION
	NEW ITEM
	EXISTING ITEM TO REMAIN
	EXISTING ITEM TO BE REMOVED
	NATURAL GAS
	HOT WATER SUPPLY
	HOT WATER RETURN
	GATE VALVE
	BALL VALVE
	BUTTERFLY VALVE
	GLOBE VALVE
	THERMOSTATIC BALANCING VALVE
	BALANCING VALVE
	? = FLOW RATE
	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
	BACKFLOW PREVENTER
	DOUBLE CHECK VALVE ASSEMBLY
	REDUCED PRESSURE ASSEMBLY
	PUMP
	FLEXIBLE CONNECTION
	REDUCER/INCREASER
	ELBOW TURNED UP
	ELBOW TURNED DOWN
	PIPE CAP
	PIPE SINGLE LINE CUTOFF
	PRESSURE GAUGE
	THERMOMETER
	SENSOR WELL (T-TEMPERATURE)
	SENSOR WELL (P-PRESSURE)
	FLOW SWITCH
	LOW WATER CUT OFF
	ANCHOR
	GUIDE
	FLOOR CLEAN OUT
	WALL CLEAN OUT
	ROOF DRAIN
	HOSE BIB
	FROST PROOF WALL HYDRANT
	FLOOR DRAIN; FFD: FUNNEL FLOOR DRAIN; HD: HUB DRAIN
	FIRE EXTINGUISHER
	NEW CONNECTION TO EXISTING
THIS IS A STANDARD LEGEND. ALL SYMBOLS MAY NOT NECESSARILY BE USED ON DRAWINGS.	

DUCTWORK LEGEND	
SYMBOL	DESCRIPTION
	NEW ITEM
	EXISTING ITEM TO REMAIN
	EXISTING ITEM TO BE REMOVED
	EXISTING ITEM TO BE RELOCATED
	EXISTING ITEM IN RELOCATED POSITION
	EXISTING ITEM TO REMAIN
	OPEN ENDED DUCT
	DUCTWORK SHOWN DOUBLE LINE
	DYNAMIC FIRE DAMPER
	MOTORIZED DAMPER
	BALANCING DAMPER
	BACKDRAFT DAMPER
	OCCUPANCY SENSOR
	CO2 SENSOR (D DENOTES DUCT MOUNTED)
	REVERSE ACTING THERMOSTAT
	THERMOSTAT/TEMPERATURE SENSOR
	NEW CONNECTION TO EXISTING
	TIMECLOCK
	3/4" UNDERCUT
	FLEXIBLE DUCT CONNECTION
	SUPPLY AIR GRILLE
	RETURN AIR GRILLE
	SIDEWALL GRILLE C/W BALANCE DAMPER TYPICAL AT ALL SIDEWALL GRILLES
	INTERNALLY INSULATED DUCT
	EXTERNALLY INSULATED DUCT
	DRAWING NOTE TAG
	DIFFUSER TAG DIFFUSER/GRILLE SIZE (AND NECK SIZE WHERE APPLICABLE) AIR VOLUME (CFM OR l/s AS INDICATED)
	DIFFUSER/GRILLE DESIGNATION (REFER TO SCHEDULE FOR TYPE)
	EQUIPMENT TAG EQUIPMENT TYPE EQUIPMENT NUMBER (REFER TO SCHEDULES FOR INFO)
	NEW DIFFUSER NOTES SQUARE DIFFUSER (ROUND IF SHOWN) DUCT COLLAR CONNECTION SIZE AS PER GRILLE AND DIFFUSER SCHEDULE FLEXIBLE DUCT - MAX. 5'-0" (1.5M) DIFFUSER SUPPLY DUCT - TO BE THE SAME SIZE AS DIFFUSER COLLAR BALANCE DAMPER - TYPICAL AT ALL DIFFUSER SUPPLIES SUPPLY DUCT
THIS IS A STANDARD LEGEND. ALL SYMBOLS MAY NOT NECESSARILY BE USED ON DRAWINGS.	



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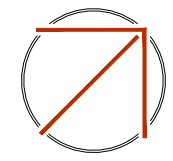
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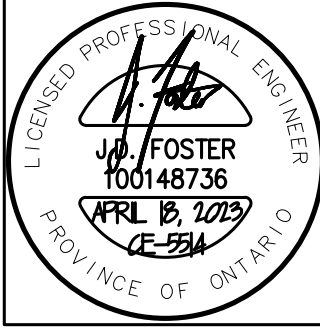
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REVISIONS		
NO.	ISSUED FOR	DATE
00	ISSUED FOR PERMIT/ TENDER	23.04.18

NORTH





DESIGN	NH	DRAWN	NH
CHECKED	JDF	REVIEWED	JDF

PROJECT

UCDSB LINKLATER PS
2023 UPDATES

ADDRESS

300 STONE ST. N.
GANANOQUE, ON

PROJECT NO.

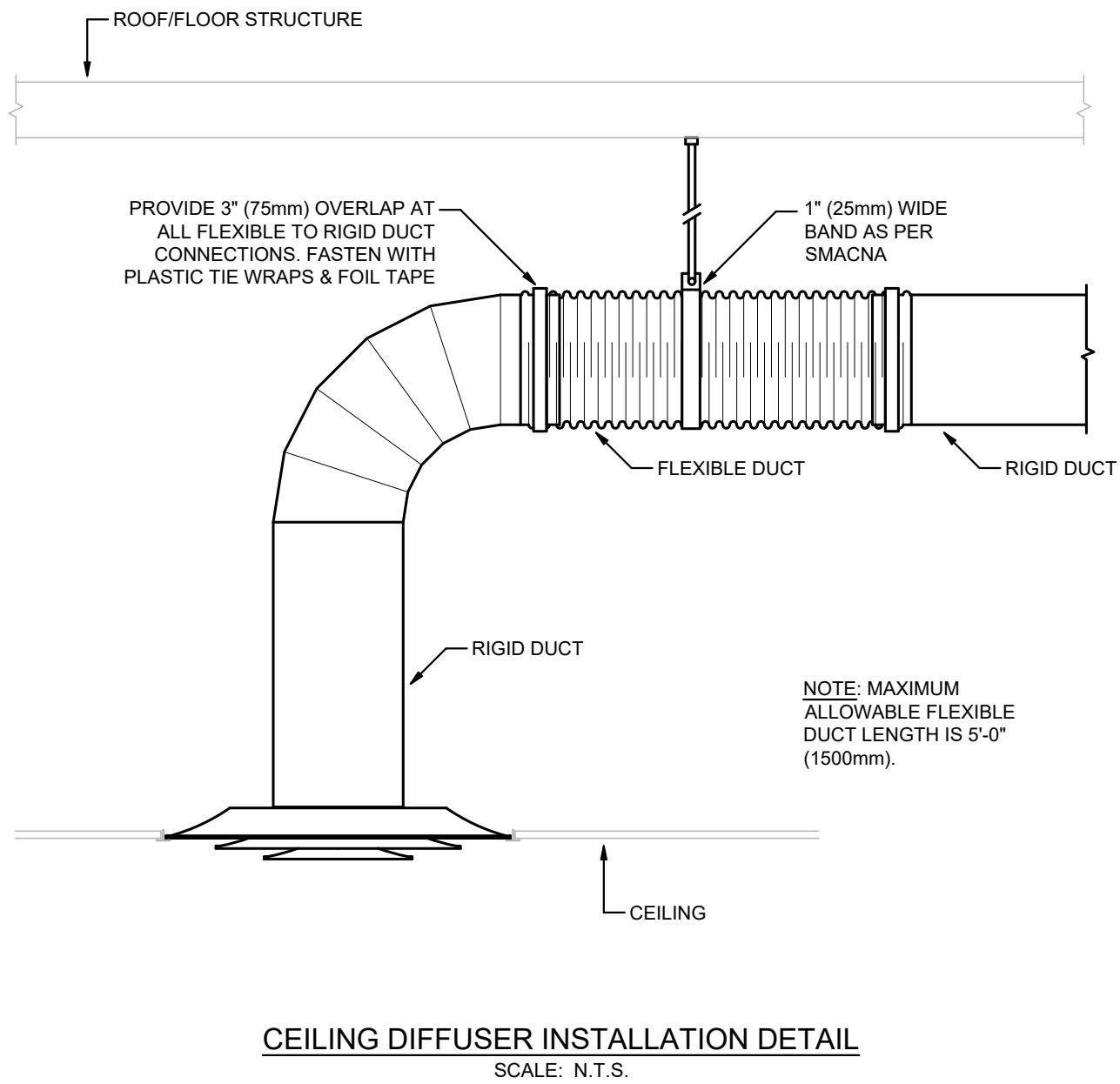
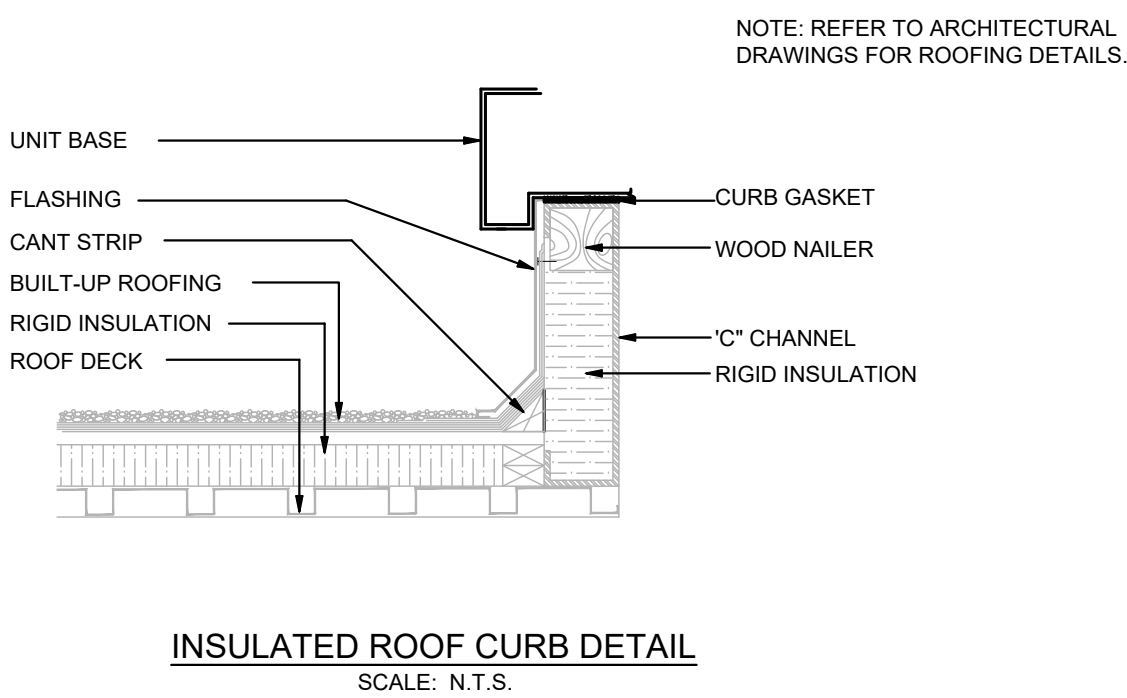
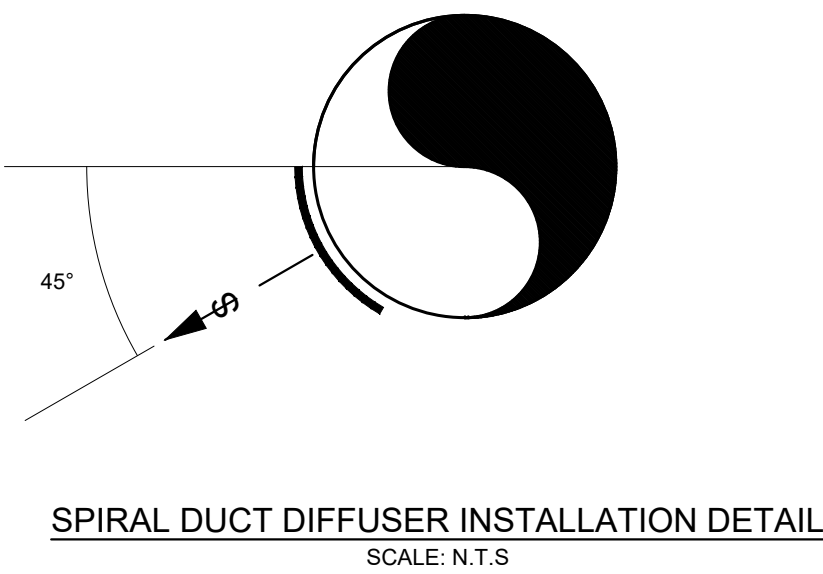
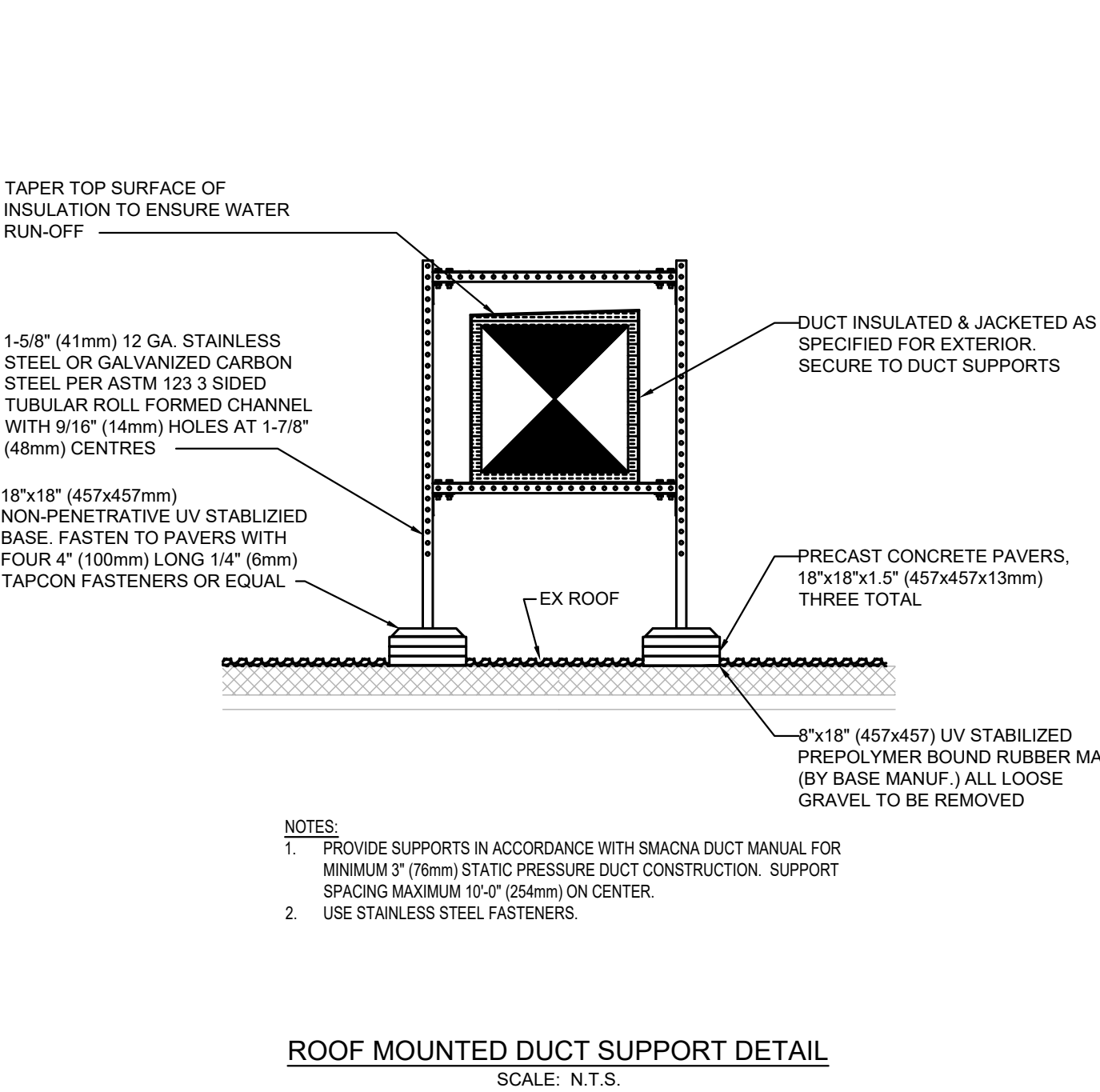
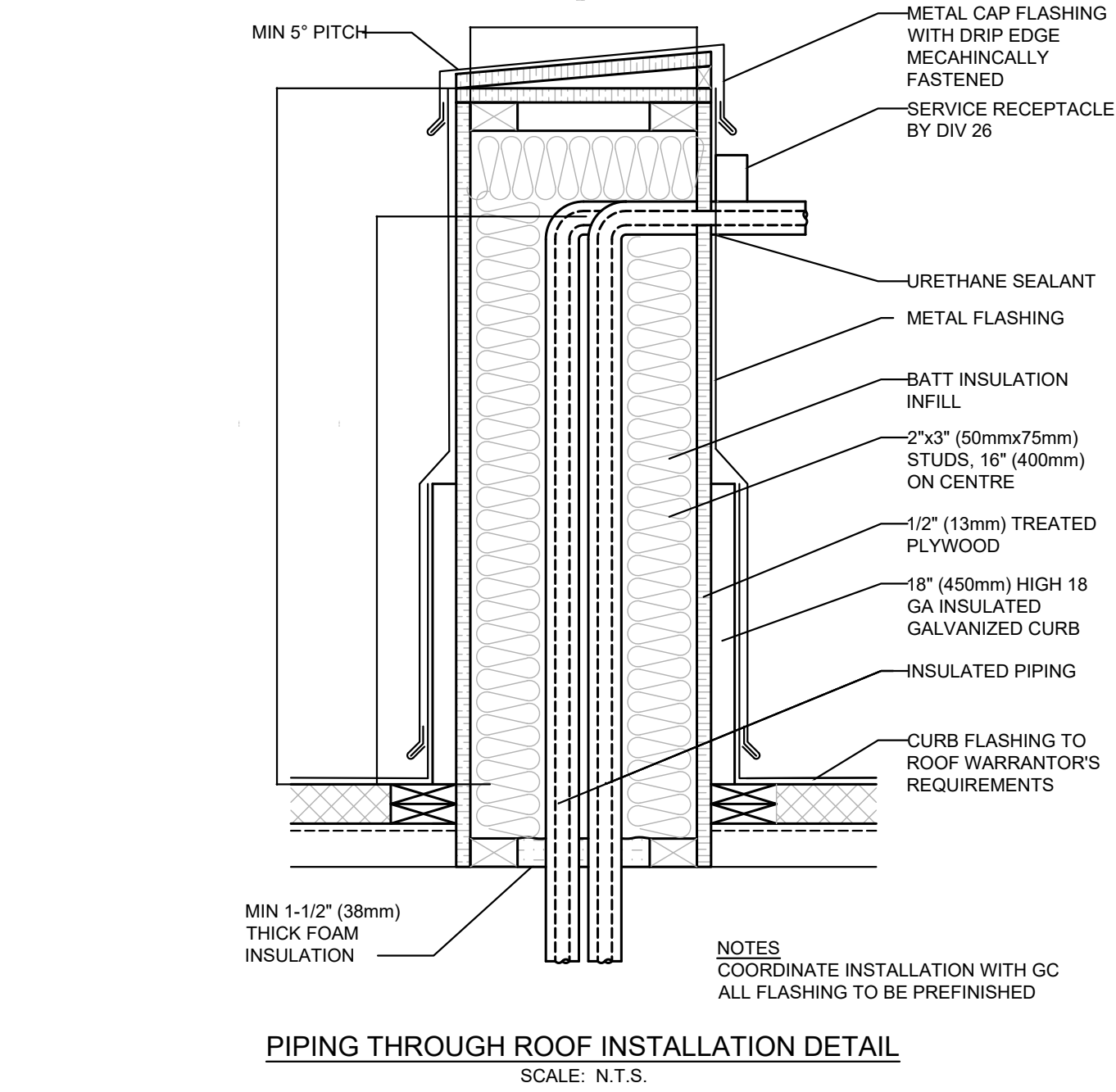
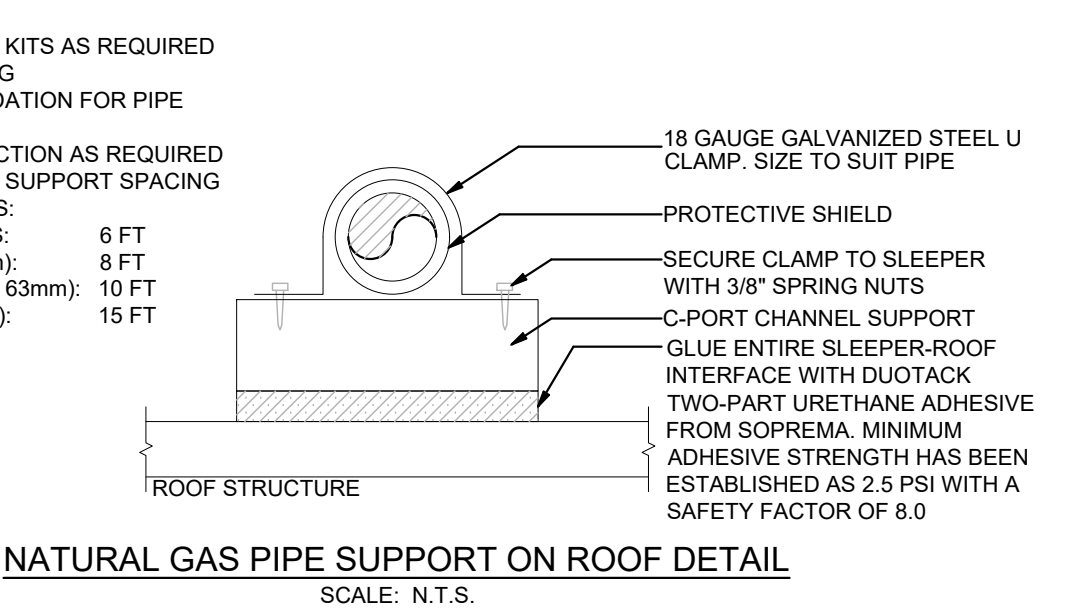
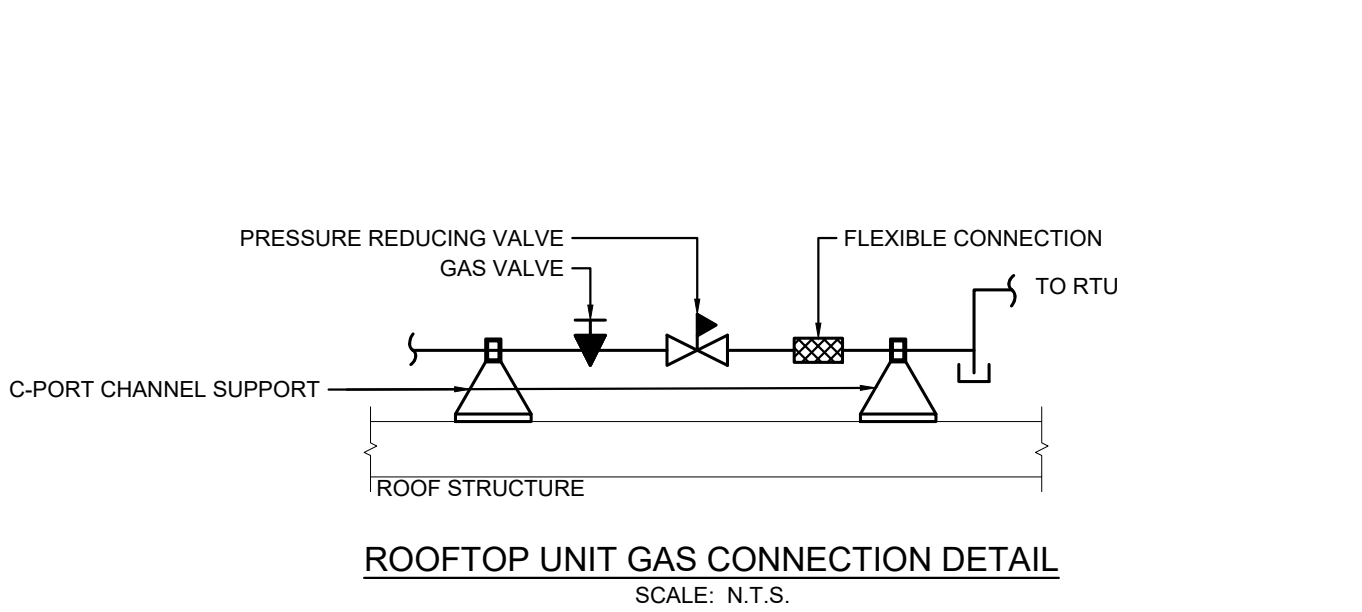
CE-5514

DRAWING TITLE

MECHANICAL LEGENDS, NOTES
& DETAILS

DRAWING NUMBER

M1 OF 12



- 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).
 - REFER TO DRAWINGS AND SCHEMATICS FOR DEVICE AND EQUIPMENT LOCATIONS.
2. DEFINITIONS
- 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
- DIRECT OUTDOOR AIR SYSTEM - CLASSROOMS
RTU-101, RTU-103, RTU-104
- GENERAL
- COORDINATE OCCUPANCY SCHEDULE WITH OWNER PRIOR TO ADJUSTING TIMECLOCK.
- CONTROL DEVICES:
- PROVIDE SUPPLY AIR TEMPERATURE SENSOR.
 - INSTALL CONTROLLER PROVIDED WITH UNIT. CONTROLLER SHALL HAVE CONTACTS TO ACCEPT A LOW VOLTAGE SIGNAL FROM THE FIRE ALARM PANEL TO SHUTDOWN UNIT.
- OPERATING SEQUENCE:
- DISABLE/ENABLE RTU FROM TIME CLOCK.
 - WHEN DISABLED CYCLE RTU FAN OFF AND INTAKE DAMPER CLOSED.
 - WHEN ENABLED CYCLE RTU FAN ON AND INTAKE DAMPER OPEN. MODULATE HEATING TO MAINTAIN A SUPPLY AIR TEMPERATURE SETPOINT OF 70°F/21.1°C. MODULATE COOLING TO MAINTAIN A SUPPLY AIR TEMPERATURE OF 75°F/23.9°C.
 - MODULATE HEAT RECOVERY WHEEL AS FOLLOWS WHEN SYSTEM ENABLED:
 - COOLING RECOVERY:
 - MODULATE THE HEAT WHEEL SPEED TO MAINTAIN A SETPOINT 2°F LESS THAN THE UNIT SUPPLY AIR TEMPERATURE SETPOINT.
 - HEATING RECOVERY:
 - MODULATE THE HEAT WHEEL SPEED TO MAINTAIN A SETPOINT 2°F GREATER THAN THE UNIT SUPPLY AIR TEMPERATURE SETPOINT.
 - THE HEAT WHEEL SHALL RUN FOR COOLING RECOVERY WHENEVER THE UNIT IS IN COOLING MODE. THE SUPPLY FAN IS ON, AND THE RETURN AIR TEMPERATURE IS 5°F OR MORE BELOW THE OUTSIDE AIR TEMPERATURE.
 - THE HEAT WHEEL SHALL RUN FOR HEATING RECOVERY WHENEVER THE UNIT IS IN HEATING MODE. THE SUPPLY FAN IS ON, AND THE RETURN AIR TEMPERATURE IS 5°F OR MORE ABOVE THE OUTSIDE AIR TEMPERATURE.
 - THE HEAT WHEEL SHALL RUN AT 5% SPEED FOR 20 SECONDS EVERY 4 HOURS THE UNIT RUNS. FOR SELF-CLEANING.
- SAFETIES
- ON SIGNAL FROM FIRE ALARM SYSTEM UNIT SHALL CYCLE OFF.
 - THE HEAT WHEEL SHALL RUN AT 5% SPEED WHENEVER THE OUTSIDE AIR TEMPERATURE DROPS BELOW 15°F OR WHENEVER EXHAUST AIR TEMPERATURE DROPS BELOW 20°F.

- ALARMS
- SEND ALARM SIGNAL TO BAS ON OUTSIDE AIR DAMPER FAILURE.
 - SEND ALARM SIGNAL TO BAS ON SUPPLY FAN FAILURE.
 - SEND ALARM SIGNAL TO BAS ON EXHAUST FAN FAILURE.
 - SEND ALARM SIGNAL TO BAS IF SUPPLY FILTER DIFFERENTIAL PRESSURE EXCEEDS USER DEFINED LIMIT.
 - SEND ALARM SIGNAL TO BAS IF EXHAUST FILTER DIFFERENTIAL PRESSURE EXCEEDS USER DEFINED LIMIT.
 - SEND ALARM SIGNAL TO BAS IF SUPPLY AIR TEMPERATURE EXCEEDS 120°F OR IS LESS THAN 45°F.
 - SEND ALARM SIGNAL TO BAS UPON RECEIVING A FREEZE/STAT STATUS.
 - SEND ALARM SIGNAL TO BAS UPON RECEIVING AN EMERGENCY SHUTDOWN SIGNAL.
 - SEND ALARM SIGNAL TO BAS ON HEAT WHEEL ROTATION FAILURE.

- PACKAGED ROOFTOP UNIT - OFFICES
RTU-102
- GENERAL:
- EXISTING HYDRONIC HEATING TO REMAIN. RTU-102 TO PROVIDE SUPPLEMENTAL HEAT DURING HEATING SEASON AND CONTINUOUS COOLING DURING COOLING SEASON.
- CONTROL DEVICES:
- PROVIDE A ROOM SENSOR WITH LOCAL ADJUSTMENTS AND OVERRIDES.
- OPERATING SEQUENCE:
- ENABLE OCCUPIED/UN-OCCUPIED SETTINGS FROM BAS SCHEDULE.
 - UN-OCCUPIED PERIOD (COOLING): CYCLE UNIT FAN, HEATING AND COOLING TO MAINTAIN AN UNOCCUPIED SETPOINT OF 80°F/26.6°C (ADJUSTABLE).
 - OCCUPIED PERIOD (COOLING): FAN SHALL RUN CONTINUOUS. CYCLE COOLING STAGES TO MAINTAIN A SPACE TEMPERATURE SETPOINT OF 75°F/23.8°C (ADJUSTABLE).
 - ECONOMIZER: CYCLE ON FREE COOLING IF OUTSIDE AIR ENTHALPY IS LESS THAN SETPOINT.
 - OCCUPIED/UNOCCUPIED (HEATING): MAINTAIN EXISTING SEQUENCE OF OPERATIONS TO PROVIDE HEAT FROM EXISTING RADIATORS. IF TEMPERATURE MORE THAN 2°F/1.1°C BELOW SETPOINT, CYCLE FAN AND HEATING ON FROM RTU-102 UNTIL SPACE SETPOINT IS REACHED. CYCLE THROUGH TWO STAGES OF HEATING AS REQUIRED TO MAINTAIN SETPOINT.
- PACKAGED ROOFTOP UNIT - GYMNASIUM
RTU-105
- GENERAL:
- EXISTING HYDRONIC HEATING TO REMAIN. RTU-101 TO PROVIDE SUPPLEMENTAL HEAT DURING HEATING SEASON AND CONTINUOUS COOLING DURING COOLING SEASON.
 - READ OUT ALL POINTS FROM THE UNIT TO THE BUILDING CONTROL SYSTEM THROUGH THE BACNET INTERFACE CARD.
- CONTROL DEVICES:
- PROVIDE A ROOM SENSOR WITH LOCAL ADJUSTMENTS AND OVERRIDES.
 - PROVIDE A CO2 SENSOR TO BE LOCATED IN RA DUCT IN GYMNASIUM.
- OPERATING SEQUENCE:
- ENABLE OCCUPIED/UN-OCCUPIED SETTINGS FROM BAS SCHEDULE.
 - UN-OCCUPIED PERIOD (COOLING): CYCLE UNIT FAN, AND COOLING TO MAINTAIN AN UNOCCUPIED SETPOINT OF 80°F/26.6°C (ADJUSTABLE).
 - OCCUPIED PERIOD (COOLING): FAN SHALL RUN CONTINUOUS. CYCLE COOLING STAGES TO MAINTAIN A SPACE TEMPERATURE SETPOINT OF 75°F/23.8°C (ADJUSTABLE).
 - ECONOMIZER: CYCLE ON FREE COOLING IF OUTSIDE AIR ENTHALPY IS LESS THAN SETPOINT.
 - OCCUPIED/UNOCCUPIED (HEATING): MAINTAIN EXISTING SEQUENCE OF OPERATIONS TO PROVIDE HEAT FROM EXISTING RADIATORS. IF TEMPERATURE DECREASES MORE THAN 2°F/1.1°C BELOW SETPOINT, CYCLE FAN AND HEATING ON FROM RTU-101 UNTIL SPACE SETPOINT IS REACHED. CYCLE THROUGH TWO STAGES OF HEATING AS REQUIRED TO MAINTAIN SETPOINT.
 - DURING OCCUPIED PERIODS, OA DAMPER SHALL OPEN TO PROVIDE MINIMUM OUTSIDE AIRFLOW RATE. IF SENSED CO2 RISES ABOVE 800 PPM (ADJUSTABLE), OA DAMPER SHALL MODULATE BETWEEN MINIMUM & DESIGN OUTDOOR AIRFLOW RATE TO MAINTAIN SENSED CO2 BETWEEN 800 AND 1000 PPM. OA DAMPER TO REMAIN CLOSED DURING UNOCCUPIED PERIODS.
 - ENERGY RECOVERY WHEEL: BUILT IN CONTROLLER TO START/STOP ENERGY RECOVERY WHEEL BASED ON ENTHALPY AND CURRENT MODE OF OPERATION.
- EXHAUST FAN - GYM WASHROOMS, GYM STORAGE
EF-101, EF-102
- GENERAL
- COORDINATE OCCUPANCY SCHEDULE WITH OWNER PRIOR TO PROGRAMMING TIME CLOCK
- CONTROL DEVICES:
- PROGRAMMABLE 7-DAY DIGITAL TIME CLOCK
- OPERATING SEQUENCE:
- ENERGIZE / DE-ENERGIZE FAN ON OFF FROM TIMECLOCK

DIFFUSER SCHEDULE				
DWG REF	MANUF.	MODEL	FINISH	REMARKS
S1	PRICE	SPD	WHITE	SQUARE PLAQUE DIFFUSER, STEEL CONSTRUCTION, EQUALIZING GRID
S2	PRICE	520	ALUMINIUM	DOUBLE DEFLECTION, LOUVERED SUPPLY GRILLE, STEEL CONSTRUCTION, C/W VOLUME DAMPER. BLADES PARALLEL TO LONG DIMENSION. C/W DAMPER.
S3	PRICE	LBP26B	ALUMINIUM	LINEAR BAR GRILLE, EXTRUDED ALUMINUM CONSTRUCTION.
S4	PRICE	SDGE	PRIME	EXTRUDED ALUMINUM SPIRAL DUCT SUPPLY GRILLE. C/W BLADE DAMPER.
R1	PRICE	530	ALUMINIUM	SINGLE DEFLECTION, LOUVERED RETURN GRILLE, STEEL CONSTRUCTION. BLADES PARALLEL TO LONG DIMENSION. C/W DAMPER.
R2	PRICE	96	ALUMINIUM	HEAVY DUTY RETURN GYM GRILLE, STEEL CONSTRUCTION.
R3	PRICE	PDDR	WHITE	PERFORATED RETURN DIFFUSER, STEEL CONSTRUCTION.
E1	PRICE	80	WHITE	EGG CRATE GRILLE, EXTRUDED ALUMINUM CONSTRUCTION. C/W VOLUME DAMPER.
E2	PRICE	530	ALUMINIUM	SINGLE DEFLECTION, LOUVERED RETURN GRILLE. STEEL CONSTRUCTION. BLADES PARALLEL TO LONG DIMENSION. C/W DAMPER
GENERAL NOTE: MOUNTING FRAME TO SUIT CEILING TYPES. SEE ARCHITECTURAL REFLECTED CEILING PLAN DRAWINGS FOR CEILING TYPES. PROVIDE INTEGRAL FIRE STOP FLAPS WHERE FIRE DAMPERS ARE INDICATED ON DRAWINGS.				
<u>ALTERNATE MANUFACTURERS:</u> KREUGER, METALAIRE, NAILOR, TITUS				

LOUVER SCHEDULE							
DWG REF	SERVING.	MANUF.	MODEL	SIZE [WxH in.] (WxH mm)	AIR FLOW [CFM] (L/s)	PRESS. DROP [in. w.c.] (Pa)	REMARKS
LVR-101	EF-101	GREENHECK	ESD-435	18 x 14 (457 x 406)	360 (217.0)	0.10 (24.88)	EXTRUDED ALUMINUM STATIONARY DRAINABLE LOUVER, 4" (102MM) DEPTH, FLANGE FRAME
LVR-102	EF-102	GREENHECK	ESD-435	12 x 12 (305 x 305)	165 (77.8)	0.10 (24.88)	EXTRUDED ALUMINUM STATIONARY DRAINABLE LOUVER, 4" (102MM) DEPTH, FLANGE FRAME
<u>ALTERNATE MANUFACTURERS:</u> E. H. PRICE, GREENHECK, REVERSOMATIC, VENTEX							

EXHAUST FAN SCHEDULE											
<u>ACCESSORIES:</u> 1) HANGER RODS 2) HANGING VIBRATION ISOLATORS 3) BASE ISOLATOR KIT 4) FLEXIBLE CONNECTIONS - INLET AND/OR OUTLET 5) MOTORIZED BACKDRAFT DAMPER COORDINATE OPERATING VOLTAGE W/ DIV. 16 6) ROOF CURB TO BE PROVIDED BY GENERAL CONTRACTOR AS DETAILED ON ARCHITECTURAL DWGS. 7) 18" ROOF CURB BY FAN MANUFACTURER 8) DISCONNECT SWITCH 9) BELTS, DRIVES, AND PULLEYS 10) BIRDSCREEN 11) TRANSFORMER AND RELAY FOR 24V CONTROL 12) WEATHER HOOD 13) SPEED CONTROLLER 14) WALL MOUNT CONTROLLER 15) BELT DRIVE MOTOR COVERS 16) INSULATED HOUSING 17) DRAIN CONNECTION 18) LOUVERED WALL BOX C/W B.D.D. 19) REVERSE ACTING THERMOSTAT 20) ECM MOTOR C/W SPEED ADJUSTMENT											
DWG REF	MANUF.	SERVING	MODEL	AIRFLOW [CFM] (L/s)	ESP [in. w.c.] (Pa)	MOTOR [HP]	RPM	SOUND [SONES]	ELECTRICAL [V / Ph / Hz]	ACCESSORIES	REMARKS
EF-101	PANASONIC	CHANGEROOMS & WRS	FV-40NLF1	360 (170)	0.50 (124.4)	0.15	1080	2.6	120V/160	1, 2, 4, 8, 9, 13	CONTROL WITH SPEED CONTROLLER
EF-102	PANASONIC	STORAGE & JANITOR CLOSET	FV10NLF1E	165 (78)	0.50 (124.4)	FHP	1000	3.8	120V/160	1, 2, 4, 8, 9, 13	CONTROL WITH SPEED CONTROLLER
<u>ALTERNATE MANUFACTURERS:</u> FANTECH											

PACKAGED ROOFTOP UNIT SCHEDULE																		
<div>ACCESSORIES: 1) MERV 13 FILTERS 2) SPARE SET OF FILTERS 3) POWER EXHAUST 4) ECONOMIZER SECTION 5) GRAVITY RELIEF DAMPERS 6) COMPARATIVE ENTHALPHY CONTROLS 7) VVT CONTROL PACKAGE 8) ROOF CURB, 18" HIGH 9) STAINLESS STEEL HEAT EXCHANGER 10) AVERAGING THERMOSTAT 11) PROGRAMMABLE THERMOSTAT 12) DISCONNECT SWITCH 13) HOT GAS REHEAT FOR DE-HUMIDIFICATION 14) HOT GAS BYPASS FOR CAPACITY REDUCTION 15) DIGITAL SCROLL COMPRESSOR</div>																		
DWG REF	MANUF.	MODEL	COOLING ENTERING AIR TEMP	SENS. COOLING	TOTAL COOLING	HEATING INPUT	HEATING OUTPUT	EXTERNAL STATIC PRESSURE	TOTAL AIR FLOW	OUTDOOR AIR FLOW	MOTOR [HP]	SEER	ELECTRICAL			ACCESSORIES	WEIGHT [LBS] (KG)	REMARKS
			[DBWB, °F] (DBWB, °C)	[MBH] (kW)	[MBH] (kW)	[MBH] (kW)	[in.wg] (PA)	[CFM] (L/S)	[CFM] (L/S)	VOLTAGE			MCA [A]	MOCP [A]				
RTU-102	TRANE	YSC036	80.0 / 67.0 (26.7/19.4)	32.8 (9.6)	37.9 (11.1)	80 (23.4)	64.8 (19.0)	0.75 (187)	1400 (661)	220 (104)	0.75	14	208 V / 3Ø	20	30	1, 2, 3, 4, 8, 12, 13	747 (338.8)	15A CONVENIENCE OUTLET
RTU-105	TRANE	MIXED AIR E010	73.6 / 61.7 (23.1/16.5)	97.6 (28.6)	117.7 (34.5)	300 (87.9)	243 (71.2)	0.60 (149)	4000 (1888)	1500 (708)	5	12.6	208 V / 3Ø	69.3	90	1, 2, 3, 4, 8, 9, 12, 13	3740 (1696.4)	C/W ENERGY RECOVERY WHEEL, 15A CONVENIENCE OUTLET & CUSTOM HORIZONTAL DISCHARGE PLENUM ROOF CURB
ALTERNATE MANUFACTURERS: CARRIER, ENGINEERED AIR, LENNOX, YORK (JCI)			NOTE: COOLING CAPACITY BASED ON 95.0 °F AMBIENT.															

DIRECT OUTDOOR AIR UNIT SCHEDULE																					
<div>ACCESSORIES: 1) MERV 13 FILTERS 2) SPARE SET OF FILTERS 3) POWER EXHAUST</div> <div>4) ECONOMIZER SECTION 5) GRAVITY RELIEF DAMPERS 6) COMPARATIVE ENTHALPY CONTROLS</div> <div>7) VVT CONTROL PACKAGE 8) ROOF CURB, 18" HIGH 9) STAINLESS STEEL HEAT EXCHANGER</div> <div>10) AVERAGING THERMOSTAT 11) PROGRAMMABLE THERMOSTAT 12) DISCONNECT SWITCH</div> <div>13) HOT GAS REHEAT FOR DE-HUMIDIFICATION 14) HOT GAS BYPASS FOR CAPACITY REDUCTION 15) DIGITAL SCROLL COMPRESSOR</div>																					
DWG REF	MANUF.	MODEL	SUPPLY FAN				EXHAUST FAN				TOTAL COOLING [MBH] [kW]	SENSIBLE COOLING [MBH] [kW]	HEATING INPUT [MBH] [kW]	HEATING OUTPUT [MBH] [kW]	TEMP. RISE [°F] [°C]	ELECTRICAL			WEIGHT [LBS] [KG]	ACCESSORIES	REMARKS
			AIR FLOW [CFM] [L/S]	ESP [in.wg] [PA]	FAN R.P.M.	MOTOR HP	AIR FLOW [CFM] [L/S]	ESP [in.wg] [PA]	FAN R.P.M.	MOTOR HP						VOLTAGE	MCA [A]	MOCP [A]			
RTU-101	TRANE	MIXED AIR E010	3875 (1829)	0.5 (124)	1618	3	3254 (1536)	0.5 (124)	1460	2	120.3 (35.3)	90.3 (26.5)	300 (87.9)	243 (73.2)	72 (22.2)	208V / 3Ø	67.3	80	3806 (1726.4)	1, 2, 3, 4, 6, 8, 9, 12, 13	C/W ENERGY RECOVERY WHEEL, C/W 100 AMP NON FUSED DISCONNECT & MAINTENANCE RECEPTACLE
RTU-103	TRANE	HORIZON OABD	2375 (1121)	0.5 (124)	2360	1.5	2038 (962)	0.5 (124)	2141	1.5	44.5 (13.0)	40 (11.7)	300 (87.9)	243 (73.2)	20 (-6.7)	208V / 3Ø	33.4	45	2004 (909.0)	1, 2, 3, 4, 6, 8, 9, 12, 13	C/W ENERGY RECOVERY WHEEL, C/W 100 AMP NON FUSED DISCONNECT & MAINTENANCE RECEPTACLE
RTU-104	TRANE	MIXED AIR E010	3475 (1640)	0.5 (124)	2917	5	2919 (1378)	0.5 (124)	2861	3	76.2 (22.3)	63.2 (18.5)	300 (87.9)	243 (73.2)	23 (-5.0)	208V / 3Ø	69.5	90	2074 (940.8)	1, 2, 3, 4, 6, 8, 9, 12, 13	C/W ENERGY RECOVERY WHEEL, C/W 100 AMP NON FUSED DISCONNECT & MAINTENANCE RECEPTACLE
ALTERNATE MANUFACTURERS: CARRIER, ENGINEERED AIR, LENNOX, YORK (JCI)																					



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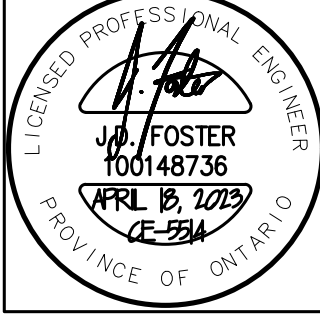
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REVISIONS		
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NORTH



PROFESSIONAL ENGINEER
J.D. FOSTER
100148736
P.E. B. 2015
PROVINCE OF ONTARIO

DESIGN	NH	DRAWN	NH
CHECKED	JDF	REVIEWED	JDF

PROJECT

UCDSB LINKLATER PS
2023 UPGRADES

ADDRESS

300 STONE ST. N.
GANANOQUE, ON

PROJECT NO.

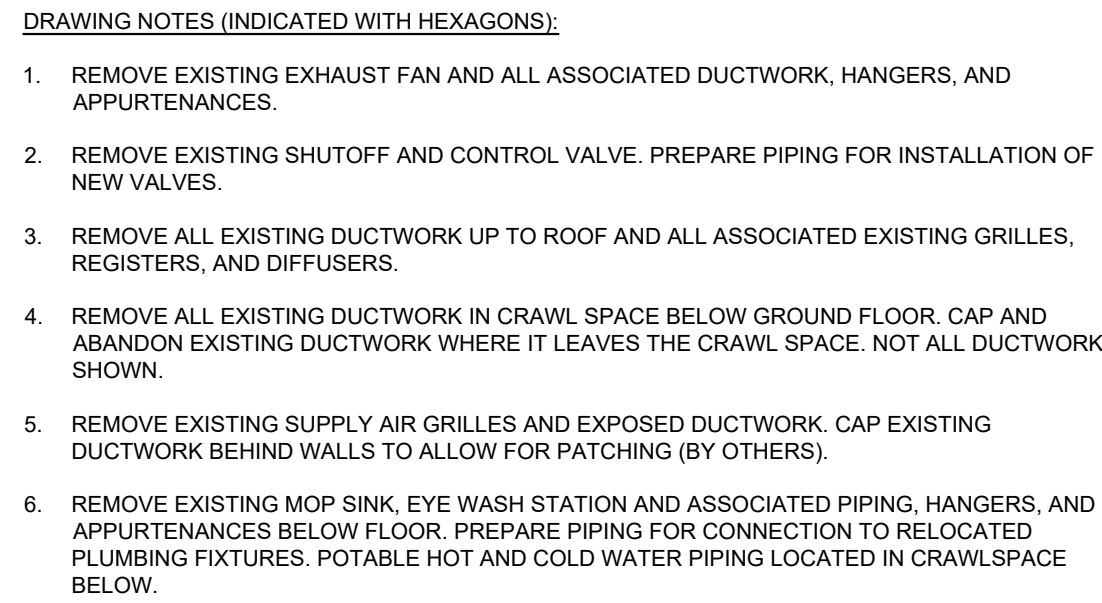
CE-5514

DRAWING TITLE

MECHANICAL SCHEDULES
& CONTROL NOTES

DRAWING NUMBER

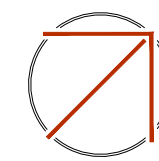
M2 OF 12



SCALE: 1:125

1. REMOVE EXISTING EXHAUST FAN AND ALL ASSOCIATED DUCTWORK, HANGERS, AND APPURTENANCES.
2. REMOVE EXISTING SHUTOFF AND CONTROL VALVE. PREPARE PIPING FOR INSTALLATION OF NEW VALVES.
3. REMOVE ALL EXISTING DUCTWORK UP TO ROOF AND ALL ASSOCIATED EXISTING GRILLES, REGISTERS, AND DIFFUSERS.
4. REMOVE ALL EXISTING DUCTWORK IN CRAWL SPACE BELOW GROUND FLOOR. CAP AND ABANDON EXISTING DUCTWORK WHERE IT LEAVES THE CRAWL SPACE. NOT ALL DUCTWORK SHOWN.
5. REMOVE EXISTING SUPPLY AIR GRILLES AND EXPOSED DUCTWORK. CAP EXISTING DUCTWORK BEHIND WALLS TO ALLOW FOR PATCHING (BY OTHERS).
6. REMOVE EXISTING HOP SINK, EYE WASH STATION AND ASSOCIATED PIPING, HANGERS, AND APPURTENANCES BELOW FLOOR. PREPARE PIPING FOR CONNECTION TO RELOCATED PLUMBING FIXTURES. POTABLE HOT AND COLD WATER PIPING LOCATED IN CRAWLSPACE BELOW.

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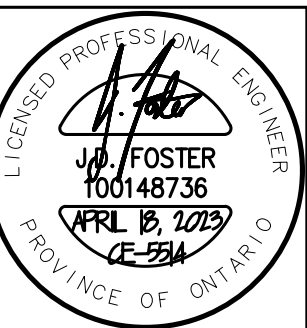
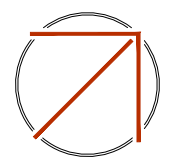
GROUND FLOOR PLAN MECHANICAL DEMOLITION

M3 OF 12

KEYPLAN

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DRAWING TITLE

SECOND FLOOR PLAN MECHANICAL DEMOLITION

DRAWING NUMBER

M4 OF 12



SECOND FLOOR PLAN - DEMOLITION

SCALE: 1:125

DRAWING NOTES (INDICATED WITH HEXAGONS):

1. NOT USED.
2. REMOVE EXISTING SHUTOFF AND CONTROL VALVE. PREPARE PIPING FOR INSTALLATION OF NEW VALVE.
3. REMOVE ALL EXISTING DUCTWORK UP TO ROOF AND ALL ASSOCIATED EXISTING GRILLES, REGISTERS, AND DIFFUSERS.



ROOF PLAN - DEMOLITION

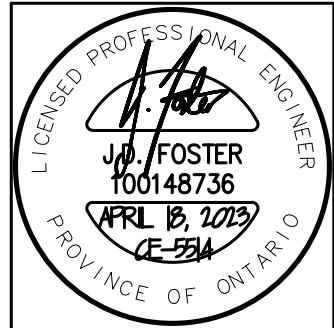
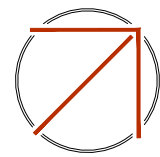
SCALE: 1:125

DRAWING NOTES (INDICATED WITH HEXAGONS):
1. REMOVE ROOFTOP EQUIPMENT AND ASSOCIATED CURB.

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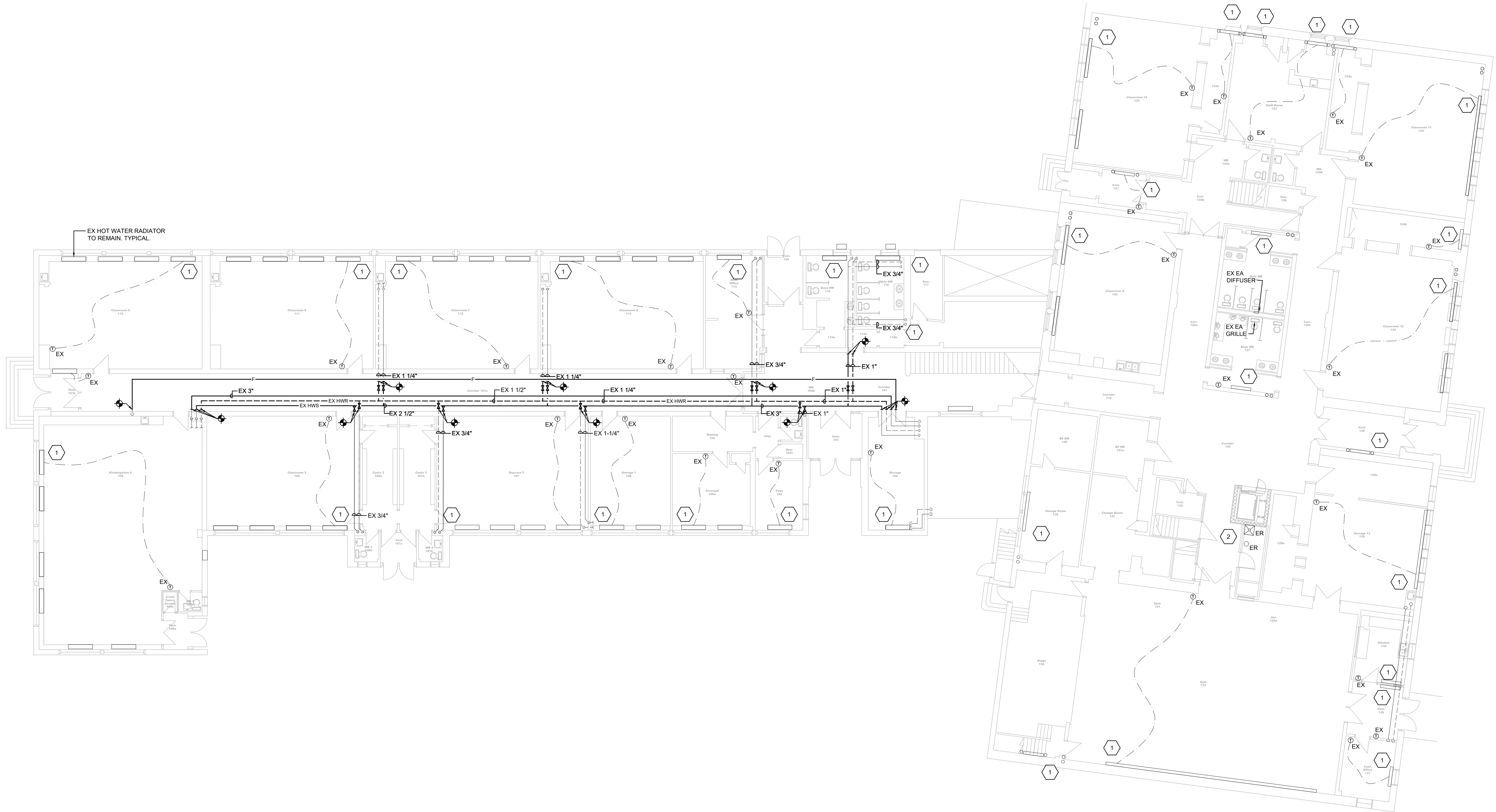
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DRAWING TITLE

ROOF PLAN
MECHANICAL DEMOLITION

DRAWING NUMBER

M5 OF 12



GROUND FLOOR PLAN - PIPING

SCALE: 1:125

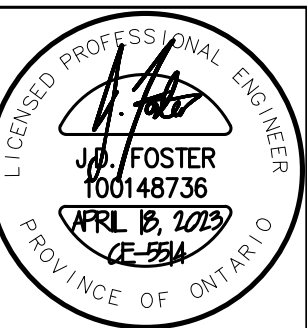
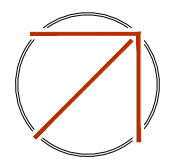
DRAWING NOTES (INDICATED WITH HEXAGONS):

1. PROVIDE NEW CONTROL VALVE AND ISOLATION VALVE. SIZE TO MATCH EXISTING.
2. CONNECT TO EXISTING PIPING AND EXTEND AND CONNECT TO RELOCATED MOP SINK AND EYE WASH.

REVISIONS

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00	ISSUED FOR PERMIT/ TENDER	23.04.18

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PROJECT

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PROJECT NO.

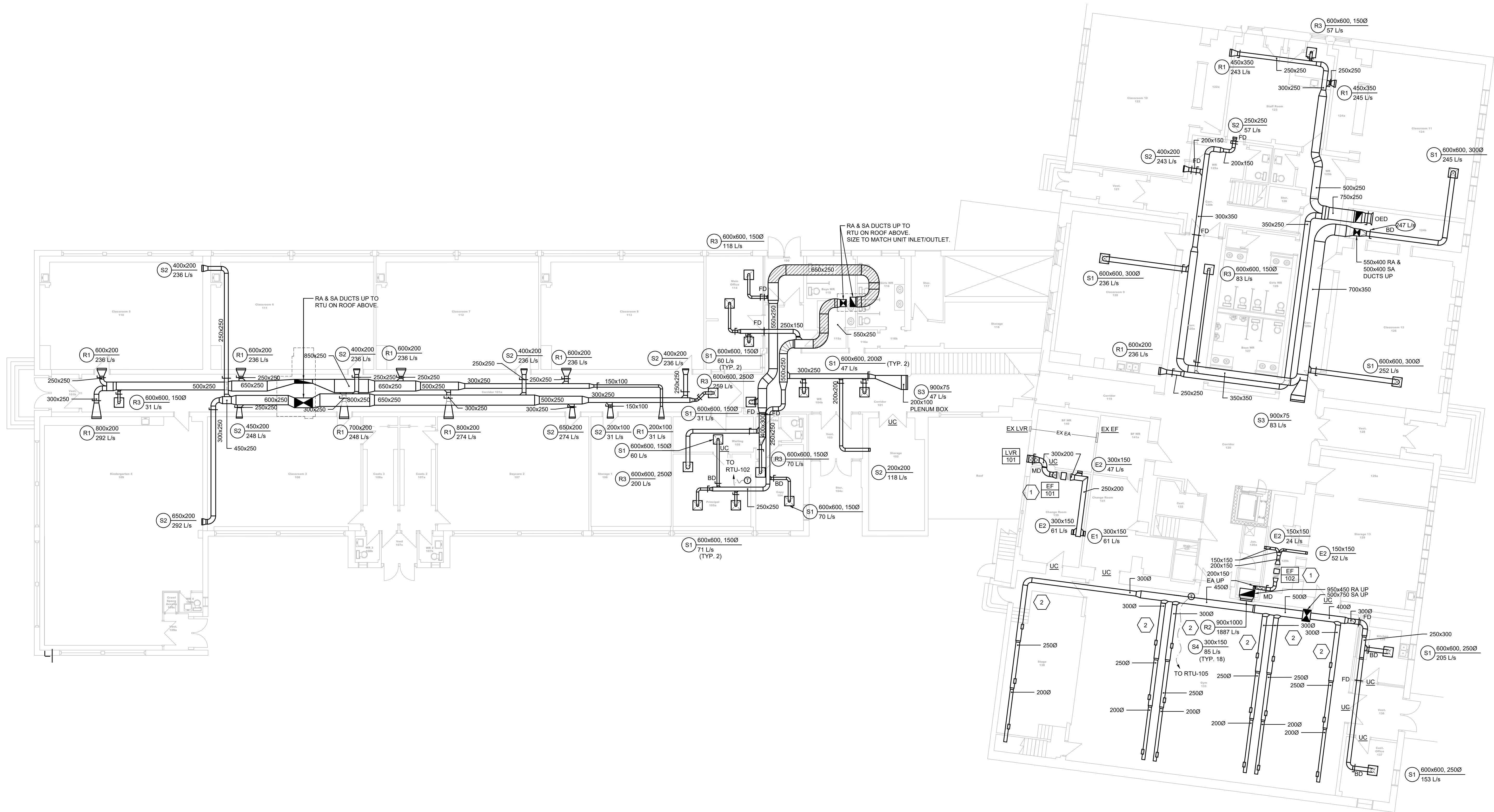
CE-5514

DRAWING TITLE

GROUND FLOOR PLAN
PIPING

DRAWING NUMBER

M6 OF 12



GROUND FLOOR PLAN - AIR DISTRIBUTION

SCALE: 1:125

GENERAL DRAWING NOTES:

- EXTERNALLY INSULATE ALL CONCEALED DUCTWORK.
- INTERNALLY INSULATE FIRST 3m OF SA & RA DUCTWORK FROM RTU.

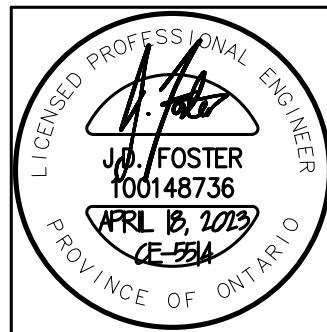
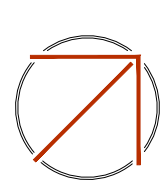
DRAWING NOTES (INDICATED WITH HEXAGONS):

- TRANSITION TO UNIT CONNECTION SIZE & ATTACH WITH FLEXIBLE CONNECTOR.
- DEGREASE & PRIME EXPOSED SPIRAL DUCT - FINAL FINISH BY GC.

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00	ISSUED FOR PERMIT/ TENDER	23.04.18

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PROJECT

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PROJECT NO.

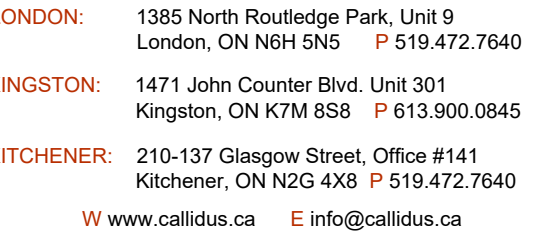
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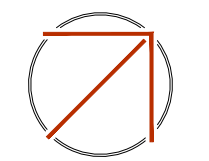
GROUND FLOOR PLAN
AIR DISTRIBUTION

DRAWING NUMBER

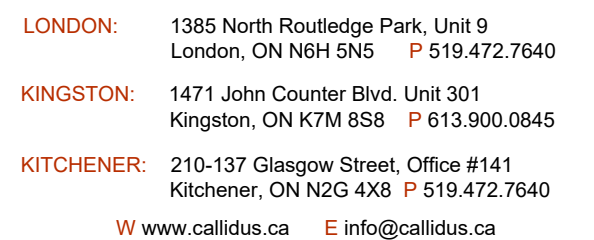
M7 OF 12



SCALE: 1:125

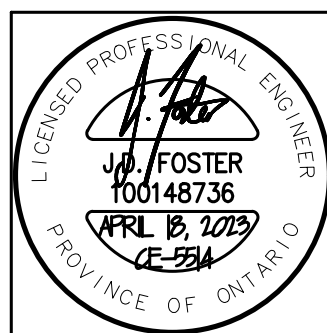
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M8 OF 12



KEYPLAN

REVISIONS

[illegible]

DESIGN	NH	DRAWN	NH
CHECKED	JDF	REVIEWED	JDF

PROJECT

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2023 UPGRADES

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300 STONE ST. N.
GANANOQUE, ON

PROJECT NO.

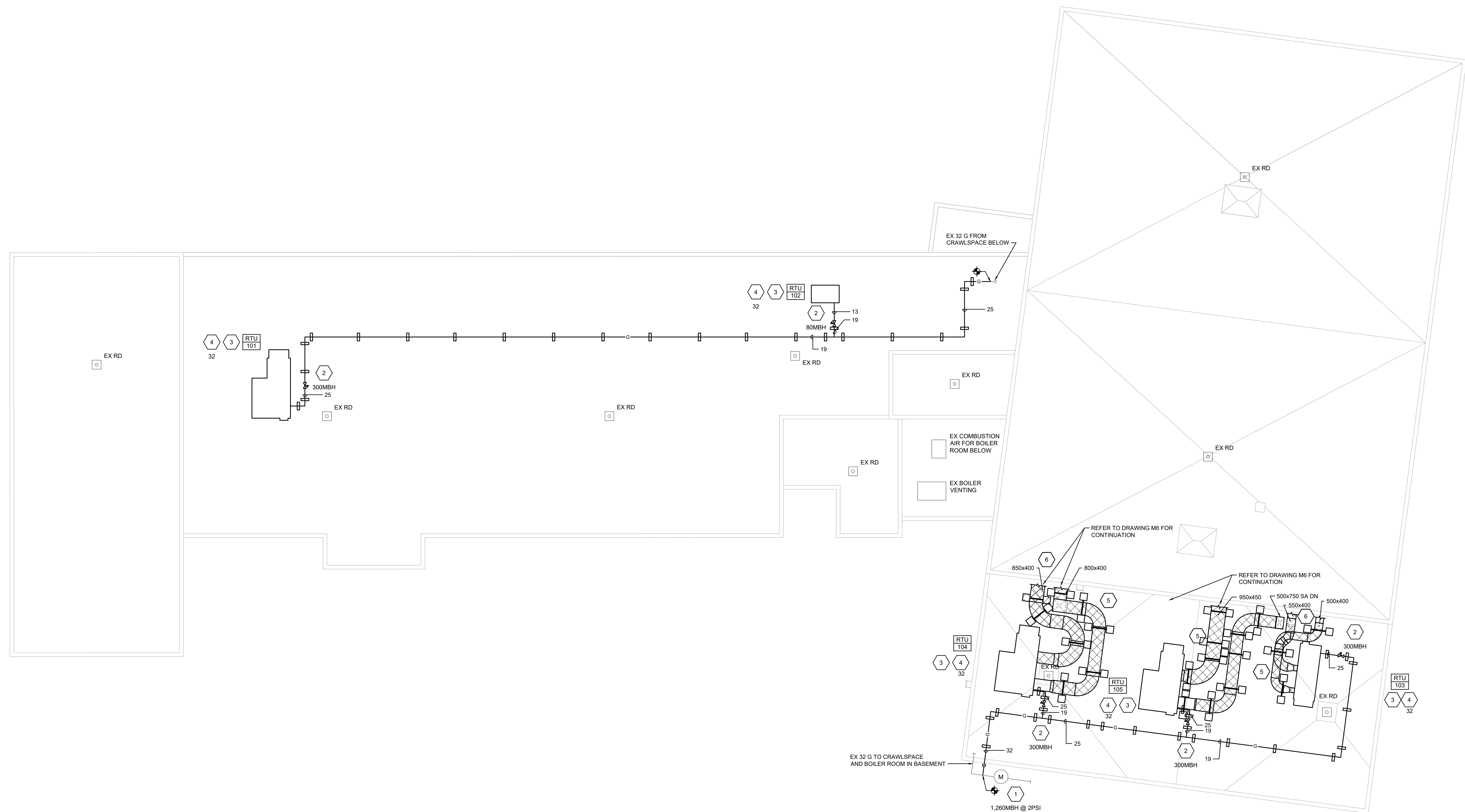
CE-5514

DRAWING TITLE

ROOF PLAN
MECHANICAL

DRAWING NUMBER

M9 OF 12



ROOF PLAN - MECHANICAL

SCALE: 1:125

DRAWING NOTES (INDICATED WITH HEXAGONS):

1. COORDINATE UPGRADE OF METER & REGULATOR BY NATURAL GAS UTILITY AS SPECIFIED FOR NOTED DEMAND & PRESSURE.
2. PROVIDE PRESSURE REDUCING VALVE. INLET PRESSURE: 2PSI; OUTLET PRESSURE: 7-14" WC. DOWNSTREAM CONNECTED GAS LOAD AS NOTED.
3. CONNECT GAS FIRED EQUIPMENT WITH PRESSURE REDUCING VALVE, SHUTOFF VALVE, UNION AND DIRT TRAP. SEE DETAIL ON DRAWING M1.
4. TRAP CONDENSATE PER MANUFACTURER'S REQUIREMENTS & SPILL TO SPLASH BLOCK ON ROOF. SIZE AS NOTED.
5. PROVIDE INTERNAL LINING ON DUCTWORK ON ROOF.
6. DUCTWORK TO RISE TO HIGH LEVEL BEFORE ENTERING SECOND FLOOR CEILING SPACE. SUPPORT VERTICAL DUCTWORK FROM EXTERIOR WALL. DUCTWORK TO AVOID INTERFERENCE WITH EXISTING WINDOWS.

1. MECHANICAL GENERAL REQUIREMENTS:

1. GENERAL:

- MAKE SITE VISIT(S) AS NECESSARY BEFORE BID CLOSING TO ESTABLISH AND VERIFY ALL EXISTING CONDITIONS, MAKE ALLOWANCES FOR ANY EXISTING 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.
- 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.
- DO NOT SCALE MECHANICAL DRAWINGS. TAKE FIELD DIMENSIONS PRIOR TO ANY INSTALLATION.

- 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".
- 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.
- 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.
- REGULATORY REQUIREMENTS:** CONFORM TO GOVERNING MUNICIPAL AND PROVINCIAL CODES, RULES AND REGULATIONS AND/OR AUTHORITIES HAVING JURISDICTION.
- CODES AND STANDARDS:** 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.
- 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.

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

- WARRANTY:** PROVIDE A WRITTEN WARRANTY FOR ALL MATERIALS, EQUIPMENT AND LABOUR FOR A ONE-YEAR PERIOD TO BEGIN AT THE TIME WHEN THE WORK IS DESIGNATED ACCEPTABLE BY THE CONSULTANT.

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

12. EXISTING SERVICE:

- DO NOT SHUT DOWN OR MAKE CONNECTIONS TO ANY EXISTING SERVICE WITHOUT WRITTEN PERMISSION OF THE OWNER.
- BE RESPONSIBLE FOR DEMOLITION AND REMOVAL OF MECHANICAL EQUIPMENT AND SERVICES DESIGNATED FOR REMOVAL ON DRAWINGS.
- PROTECTION:** PROTECT ALL WORK AND MATERIALS, BEFORE AND AFTER ERECTION, FROM WEATHER AND OTHER HAZARDS, AND KEEP IN A CLEAN AND ORDERLY MANNER.

- 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.

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

- 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.

- CUTTING AND PATCHING:** 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.

- SPARE PARTS:** PROVIDE SPARE SET OF FILTERS FOR EACH FILTER BANK. PROVIDE SPARE BELTS FOR ALL EQUIPMENT THAT UTILIZES BELT DRIVES. PROVIDE ALL SPECIALTY TOOLS FOR EQUIPMENT PROVIDED FOR THIS PROJECT.

- 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:

- MATERIALS, QUANTITIES AND UNIT PRICES FOR ALL EQUIPMENT REQUIRED OR DELETED
- UNIT HOURS
- 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)

20. SUBMITTALS:

1. SHOP DRAWINGS:

- SUBMIT SHOP DRAWINGS FOR ALL EQUIPMENT SUPPLIED BY MECHANICAL DIVISION. SUBMIT ELECTRONIC COPIES TO CONSULTANT FOR REVIEW.
- SUBMIT UNITS OF MEASURE IN EITHER METRIC OR IMPERIAL THAT MATCH THOSE OF THE DRAWINGS.
- PRIOR TO SUBMITTING ANY SHOP DRAWINGS, SUBMIT SHOP DRAWING TRACKING DOCUMENT THAT IDENTIFIES ALL SHOP DRAWINGS TO BE SUBMITTED FOR REVIEW AND APPROVAL. INCLUDE ANTICIPATED DATE OF SUBMISSION. THIS IS TO BE A LIVING DOCUMENT TO BE MAINTAINED THROUGH THE COURSE OF THE PROJECT. ATTACH AN UPDATED COPY WITH EACH SET OF MEETING MINUTES, INCLUDING STATUS OF EACH SUBMISSION.
- PROVIDE TITLE SHEET INCLUDING PROJECT NAME, SHOP DRAWING NAME (INCLUDING SPECIFICATION CLAUSE REFERENCE).
- 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.

2. INTERFERENCE DRAWINGS:

- 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.

3. OPERATION AND MAINTENANCE INSTRUCTION MANUALS:

- 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. SUBMIT TO CONSULTANT FOR REVIEW. ONCE MANUAL IS REVIEWED AND ACCEPTED, PROVIDE A SINGLE HARD COPY VERSION IN THREE RING BINDERS, COMPLETE WITH INDEX PAGES, INDEXING TABS AND COVER IDENTIFICATION AT FRONT AND SIDE.
- 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
 - WIRING DIAGRAM OF CONTROL PANELS
 - COPY OF THE VALVE DIRECTORY
 - OPERATING INSTRUCTIONS, INCLUDING START-UP AND SHUT-DOWN

PROCEDURE

- MAINTENANCE INSTRUCTIONS, INCLUDING PREVENTIVE MAINTENANCE INSTRUCTIONS FOR COMPONENTS OF EQUIPMENT
- A LIST OF EQUIPMENT WITH AIR FILTERS: INDICATE SIZES, QUANTITIES AND TYPES FOR EACH PIECE OF EQUIPMENT
- COMPLETE PARTS LIST OF ASSEMBLIES AND THEIR COMPONENT PARTS, SHOWING MANUFACTURER'S NAME, CATALOGUE NUMBER, AND NEAREST REPLACEMENT SOURCE
- LIST OF RECOMMENDED SPARE PARTS AND QUANTITY OF EACH ITEM TO BE STOCKED
- FINAL TESTING AND BALANCING REPORT
- COPIES OF THE FINAL TSSA CERTIFICATES
- MANUFACTURER'S WARRANTIES AND GUARANTEES

4. AS-BUILT DRAWINGS:

- MAINTAIN AN ACCURATE RECORD OF DEVIATIONS AND CHANGES FROM CONTRACT DRAWINGS WITH RED LINE MARKINGS. TRANSFER AS-BUILT MARK-UPS TO DIGITAL DRAWING FORMAT. THIS PROCESS SHOULD BE COMPLETED BEFORE TESTING, BALANCING AND/OR COMMISSIONING. SUBMIT TO THE CONSULTANT WITH THE O&M MANUALS AT COMPLETION OF PROJECT. MONTHLY DRAWS MAY NOT BE APPROVED IF MARKED UP DRAWINGS ARE NOT KEPT UP TO DATE.
- FORMAT FILES TO MATCH EXACTLY THE LAYERING SYSTEM AND SYMBOLOGY OF THE CONSULTANT. BIND ALL EXTERNAL REFERENCES.
- REMOVE ENGINEER'S STAMP AND INCLUDE CONTRACTORS INFORMATION. INDICATE "AS-BUILT" IN REVISION BLOCK.
- AS-BUILT DRAWINGS WILL BE ASSUMED TO HAVE A VALUE OF \$3,000.00. 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.
- THIS PROJECT UTILIZED THE FOLLOWING DIGITAL FORMAT(S): PDF

- 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.

- ACCESS DOORS:** PROVIDE ACCESS DOOR OF AT LEAST 200 MM x 200 MM (8" X 8") IN SIZE AS REQUIRED IN WALLS AND CEILINGS TO ENSURE THAT ACCESS IS PROVIDED FOR ALL EQUIPMENT, VALVES OR APPURTENANCES. BOTH NEW AND EXISTING. PROVIDE ACCESS DOORS COMPATIBLE WITH ADJACENT FINISHES AND WHERE APPLICABLE, WITH A FIRE RATING EQUAL TO THE SURFACES IN WHICH INSTALLED.

23. FIRESTOPPING AND SMOKE SEAL:

- 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.
- 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

24. MATERIALS AND EQUIPMENT:

1. EQUALS AND ALTERNATES:

- 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.
- 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.
- SUPPLIERS WISHING TO SUBMIT OTHER ITEMS OF EQUIPMENT FOR APPROVAL AS AN EQUAL TO THOSE SPECIFIED MUST APPLY TO THE CONSULTANT AT LEAST 14 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.
- 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.
- AFTER EXECUTION OF THE CONTRACT, SUBSTITUTION OF EQUIPMENT WILL NOT BE CONSIDERED.
- 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.

2. SEISMIC RESTRAINT SYSTEM:

- GENERAL:** PROVIDE CALCULATIONS FOR THE SELECTION OF SEISMIC RESTRAINT SYSTEMS. SEALED BY A QUALIFIED PROFESSIONAL ENGINEER, LICENSED IN THE PROVINCE OF ONTARIO. UPON COMPLETION OF INSTALLATION PROVIDE A CERTIFICATE FROM THE MANUFACTURER OF SEISMIC RESTRAINTS THAT THE SYSTEMS HAVE BEEN INSTALLED PROPERLY AND MEET OR EXCEED DESIGN REQUIREMENTS.
- SEISMIC RESTRAINTS SHALL BE PROVIDED FOR FUNCTIONAL COMPONENTS OF THE BUILDING SERVICES IN ACCORDANCE WITH THE REQUIREMENTS OF THE ONTARIO BUILDING CODE. THE PERFORMANCE OF CABLE RESTRAINTS SYSTEMS, ROD STIFFENER CLAMPS AND SEISMIC ISOLATOR SYSTEMS SHALL BE VERIFIED BY AN INDEPENDENT TESTING LABORATORY.
- ALL SEISMIC RESTRAINT PRODUCTS SHALL BE PROVIDED BY ONE MANUFACTURER/SUPPLIER.
- SYSTEMS REQUIRING SEISMIC RESTRAINT:**
 - PIPE AND DUCTWORK
 - THE FOLLOWING PIPE AND DUCT SIZES, AND LARGER, MUST BE RESTRAINED.
 - 63 MM (3-1/2") DIAMETER PIPE IN GENERAL AREAS
 - 32 MM (2-1/4") DIAMETER PIPE IN MECHANICAL ROOMS
 - 32 MM (2-1/4") DIAMETER PIPE CONTAINING HAZARDOUS MATERIALS AND MEDICAL PIPING (IE - NATURAL GAS, OIL, MEDICAL VACUUM, ETC)
 - 0.56 SQUARE METRES (6 SQUARE FEET) FACE AREA FOR DUCT OR 28" DIAMETER
 - 63 MM (3-1/2") DIAMETER CONDUIT IN GENERAL AREAS
 - 32 MM (2-1/4") DIAMETER CONDUIT IN MECHANICAL ROOMS
 - ANY TRAPEZE WITH A COMPONENT COMBINED WEIGHT THAT EXCEEDS THE ABOVE ITEMS
- SUSPENDED EQUIPMENT:**
 - ALL SUSPENDED EQUIPMENT THAT MEETS ANY OF THE FOLLOWING CONDITIONS REQUIRES ATTACHMENT AND SEISMIC RESTRAINT AS SPECIFIED BY THE SUPPLIER:
 - RIGIDLY ATTACHED TO PIPE OR DUCT THAT IS 34 KG (75 LB) AND GREATER
 - ITEMS HUNG INDEPENDENTLY OR WITH FLEXIBLE CONNECTIONS 9 KG (20 LB) AND GREATER
 - ITEMS CONTAINING HAZARDOUS MATERIAL.
 - WALL MOUNTED EQUIPMENT WEIGHING 9 KG (20 LB) OR LESS DOES NOT REQUIRE SEISMIC RESTRAINT UNLESS IT CONTAINS HAZARDOUS MATERIALS.
 - ROOF MOUNTED EQUIPMENT NEEDS TO BE INSTALLED ON A STRUCTURAL FRAME.

SEISMIC RATED ROOF CURB, OR STRUCTURAL CURB OR FRAME MECHANICALLY CONNECTED TO THE STRUCTURE. ITEMS SHALL NOT BE MOUNTED ONTO SLEEPERS OR PADS THAT ARE NOT MECHANICALLY ATTACHED TO THE STRUCTURE.

7. PIPING AND DUCT SYSTEMS:

- PROVIDE SEISMIC CONTROL MEASURES WITH SPACING AND ANCHORAGE ENGINEERED FOR THE SPECIFIC PROJECT. PROVIDE ROD STIFFENERS WHERE REQUIRED.
 - MAXIMUM RESTRAINT SPACING:
 - PIPING - TRANSVERSE SPACING 12 M (40 FT), LONGITUDINAL SPACING 24 M (80 FT)
 - DUCT - TRANSVERSE SPACING 9 M (30 FT), LONGITUDINAL SPACING 18 M (60 FT)
 - HAZARDOUS MATERIAL AND MEDICAL PIPING - TRANSVERSE SPACING 6 M (20 FT), LONGITUDINAL SPACING 12 M (40 FT)
 - SEISMIC SYSTEMS ARE TO BE COMPATIBLE WITH REQUIREMENTS FOR ANCHORING AND GUIDING OF PIPING SYSTEMS.
 - DRILLED OR POWER DRIVEN ANCHORS OR FASTENERS NOT PERMITTED FOR USE WITH SEISMIC CONTROL MEASURES.
 - OUTDOOR AND ROOF MOUNTED SYSTEMS MUST BE MECHANICALLY ATTACHED TO STRUCTURE. THIS ATTACHMENT MUST ACCOUNT FOR SEISMIC AND WIND LOADING.
 - FRICTION DUE TO GRAVITY DOES NOT CONSTITUTE A SEISMIC ATTACHMENT.
 - DO NOT BRACE EQUIPMENT TO SEPARATE PORTIONS OF THE STRUCTURE THAT MAY ACT DIFFERENTLY IN RESPONSE TO AN EARTHQUAKE. FOR EXAMPLE, DO NOT CONNECT A TRANSVERSE BRACE TO A WALL AND A LONGITUDINAL BRACE TO A FLOOR OR ROOF AT THE SAME BRACE LOCATION.
 - UNLESS NOTED OTHERWISE ON SEISMIC SHOP DRAWINGS, ALL DUCT IS TO BE SCREWED TO THE TRAPEZE (TOP AND BOTTOM) WITH #10 SCREWS AT 305 MM (12") SPACING FOR EVERY TRAPEZE.
 - ALL PIPES MUST BE ATTACHED TO TRAPEZE WITH PIPE CLAMPS.
 - WHERE PIPE OR DUCT SIZE REDUCES BELOW REQUIRED DIMENSIONS NOTED IN SECTION 2.3.1, THE FINAL RESTRAINT SHALL BE INSTALLED AT THE TRANSITION LOCATION.
 - ITEMS MOUNTED INTO T-BAR SUSPENDED CEILING GRIDS REQUIRE:
 - UNDER 9 KG (20 LB) ATTACHED DIRECTLY TO THE CEILING GRID.
 - OVER 9 KG (20 LB) LESS THEN 25 KG (56 LB) ATTACHED DIRECTLY TO THE CEILING GRID AND PROVIDE 2 - 12 GA WIRES FROM THE EQUIPMENT TO THE STRUCTURE ABOVE.
 - OVER 25 KG (56 LB) ARE TO BE HUNG INDEPENDENTLY FROM THE STRUCTURE.
 - SLEEPERS FOR ROOF MOUNTED PIPES, DUCT, AND EQUIPMENT REQUIRE MECHANICAL CONNECTION TO THE BUILDING.
 - SEISMIC RESTRAINT CONNECTIONS ARE NOT TO BE CONNECTED TO THE BOTTOM CHORD OF STEEL JOISTS OR THE BOTTOM FLANGE OF STEEL BEAMS.
 - ROD STIFFENERS ARE REQUIRED WHERE THE HANGER ROD EXCEEDS THE MAXIMUM LENGTH AS SHOWN IN THE SEISMIC CALCULATION SHEETS. THEY ARE ONLY REQUIRED AT RESTRAINT LOCATIONS.
 - STANDARD BEAM CLAMPS CANNOT BE USED TO ATTACH SEISMIC RESTRAINT SYSTEMS.
3. TESTING AND BALANCING:
- PRESSURE TESTS:**
 - PROVIDE PRESSURE TESTS ON ALL PIPING INCLUDED IN THIS CONTRACT. FURNISH ALL PUMPS, COMPRESSORS, GAUGES AND CONNECTORS NECESSARY FOR TESTS.
 - CONDUCT HYDROSTATIC TESTS FOR A MINIMUM PERIOD OF 2 HOURS, DURING THIS TIME THE PRESSURE SHALL REMAIN CONSTANT.
 - FOR PNEUMATIC TESTS, FIRST PRESSURIZE SYSTEM WITH AIR TO APPROXIMATELY ONE-HALF SPECIFIED PRESSURE, BUT NOT TO EXCEED 345 KPA (50 PSIG), AND EXAMINE ALL JOINTS FOR LEAKS WITH A SOAPSUDS SOLUTION. REPAIR ANY LEAKS.
 - CONDUCT FINAL TESTS ON NATURAL OR PROPANE GAS PIPING IN ACCORDANCE WITH REQUIREMENTS OF LOCAL UTILITY OR GOVERNING AUTHORITY.
 - FORWARD COPIES OF ALL FINAL TESTS ON ALL PRESSURE AND DRAINAGE PIPING TO CONSULTANT.
 - AIR AND WATER BALANCING:**
 - ASSUME RESPONSIBILITY FOR TESTING, BALANCING, AND PLACING ALL AIR HANDLING AND LIQUID SYSTEMS IN OPERATION.
 - RETAIN INDEPENDENT BALANCING FIRM TO BALANCE AIR AND WATER HANDLING SYSTEMS.
 - PROVIDE SHEAVES AND PULLEYS AND BELTS AS REQUIRED TO ACHIEVE AIR FLOWS INDICATED. CO-ORDINATE SUPPLY WITH NEW EQUIPMENT MANUFACTURER.
 - ON COMPLETION OF TESTING AND BALANCING OF ALL SYSTEMS, SUBMIT TO CONSULTANT A PDF REPORT OF FINDINGS, INCLUDING COMPLETE DATA OF PUMP AND FAN PERFORMANCE, STATIC PRESSURES, AIR 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.
 - SUBMIT WITH EACH COPY OF REPORT, COMPLETE SETS OF DUCT LAYOUT PRINTS NEATLY MARKED IN RED INK, SHOWING ALL LOCATIONS AT WHICH TEST READINGS WERE TAKEN, AIR VOLUME, VELOCITY AND STATIC PRESSURE IN EACH SUPPLY AND RETURN DUCT, AND FINAL READING AT ALL OUTLETS. OBTAIN DUCT LAYOUT PRINTS FOR MARK-UP PURPOSES FROM CONSULTANT.
 - 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.
 - THE FOLLOWING COMPANIES ARE ACCEPTABLE:
 - AERO DYNAMICS - 613-741-0220
 - DATA AIR TESTING & BALANCING LTD - 613-283-9998, 631-727-9924
 - E.B. BALANCING INC - 613-880-9030
 - HYDRAULIQUE R&O SERVICES INC - 514-739-1921
 - KANATA AIR BALANCING AND ENGINEERING LTD - 613-226-1220
 - MAXIMA TECHNICAL SERVICES INC - 613-824-0756

4. MECHANICAL INSULATION:

- WHERE INSULATION THICKNESS IS NOT IDENTIFIED, COMPLY WITH ASHRAE 90.1 REQUIREMENTS.
- ALL PRODUCTS TO HAVE FLAME SPREAD RATING LESS THAN 25 AND SMOKE DEVELOPED CLASSIFICATION LESS THAN 50 IN COMPLIANCE WITH CANULC-S102.
- PROVIDE A CONTINUOUS VAPOUR BARRIER ON ALL COLD SYSTEMS.
- INSULATION TYPES:**
 - PGF - PREFORMED GLASS FIBRE:** FIBROUS GLASS SPLIT SECTIONAL PIPE INSULATION CONFORMING TO CANULC C-S702, WITH FACTORY APPLIED VAPOUR BARRIER JACKET TO ASTM C921 AND SELF-SEAL LAP JOINT.
 - FGF - FLEXIBLE GLASS FIBRE:** ASTM C553 FLEXIBLE NON-COMBUSTIBLE BLANKET, WITH FACTORY APPLIED VAPOUR BARRIER JACKET TO ASTM E96/E96M, THERMAL CONDUCTIVITY TO ASTM C518.
 - RGF - RIGID GLASS FIBRE:** ASTM C612 RIGID NON-COMBUSTIBLE BLANKET, WITH FACTORY APPLIED VAPOUR BARRIER JACKET TO ASTM E96/E96M, THERMAL CONDUCTIVITY TO ASTM C518.
 - CF - CELLULAR FOAM:** ASTM C534/C534M, FLEXIBLE, CELLULAR ELASTOMERIC, MOULDED OR SHEET WITH ANTIMICROBIAL COATING. USE WATERPROOF VAPOUR BARRIER ADHESIVE. EXPOSED INSULATION TO HAVE WHITE FINISH.
- PIPING:**
 - DO NOT INSULATE FLANGES OR UNIONS AT CONNECTION TO EQUIPMENT.
 - VALVE OPERATORS AND BALANCING VALVE TEST PORTS TO BE ACCESSIBLE WITHOUT REMOVAL OF INSULATION.
 - PIPE INSULATION INSERTS AND SHIELDS:** PROVIDE RIGID INSERTS AND SHIELDS AT ALL HANGING 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 MM (IN)	INSERT LENGTH 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)	560 (22)

4. PIPE INSULATION TYPE AND THICKNESS:

1. PLUMBING:

- POTABLE (DOMESTIC) COLD WATER AND CITY WATER (PGF):** 25 MM (1")

2. POTABLE (DOMESTIC) HOT WATER (PGF):

- <= 32 MM (1-1/4") - 25 MM (1")
- >= 40 MM (1-1/2") - 40 MM (1-1/2")
- STORM AND SANITARY DRAIN (PGF):** 25 MM (1")

2. HOT WATER HEATING (PGF):

- <= 32 MM (1-1/4") - 40 MM (1-1/2")
- >= 40 MM (1-1/2") - 50 MM (2")

5. APPLICATION:

1. COMPLETELY INSULATE THE FOLLOWING SYSTEMS:

- POTABLE (DOMESTIC) COLD WATER
- POTABLE (DOMESTIC) HOT WATER
- POTABLE (DOMESTIC) HOT WATER RECIRCULATION
- CONDENSATE DRAINS
- HOT WATER HEATING

6. SHEET METAL:

- EXTERNALLY INSULATE ALL DUCTWORK EXCEPT FOR EXPOSED DUCTWORK, DUCTWORK IN A RETURN AIR PLENUM OR DUCTWORK WITH ACOUSTIC DUCT INSULATION. EXTERNALLY INSULATE ALL HIGH OR MEDIUM PRESSURE DUCTWORK. EXTERNALLY INSULATE DUCTWORK IDENTIFIED ON DRAWINGS. EXTERNALLY INSULATE 1,500 MM (5') OF OUTSIDE AIR AND EXHAUST AIR DUCTWORK WHERE DUCTWORK ENTERS/LEAVES THE BUILDING.
- EXPOSED RECTANGULAR DUCTWORK:** RIGID BOARD CONFORMING TO CAN/CGSB-51.10 OF 48 KG/M3 (3 LBCU/FT.) DENSITY, MINIMUM 38 MM (1-1/2") THICKNESS, MINIMUM R-VALUE OF R-4, AND REINFORCED FOIL FLAME RESISTANT KRAFT FACING. INSULATION INSTALLATION TO PREVENT WATER PONDING.
- CONCEALED RECTANGULAR DUCTWORK/CONCEALED AND EXPOSED ROUND DUCTWORK:** FLEXIBLE DUCT INSULATION OF 12 KG/M3 (3/4 LBCU/FT.) DENSITY, MINIMUM 38 MM (1-1/2") THICKNESS, MINIMUM R-VALUE OF R-3.5 WITH REINFORCED FOIL FLAME RESISTANT KRAFT FACING.

7. SURFACE FINISHES:

1. PIPING:

- EXPOSED INTERIOR PIPING:** FINISH EXPOSED INSULATED PIPING, VALVES AND FITTINGS WITH PVC JACKETING. PVC MUST HAVE ATTAINED 2550 FIRE RATINGS, BASED ON CANULC-S102-M88 TESTING.
- DUCTWORK:**
 - FINISH EXPOSED INSULATED DUCTWORK, INSTALLED OUTDOORS, WITH:
 - FIELD INSTALLED SHEET METAL DUCTWORK, FABRICATED AND INSTALLED IN CONFORMANCE WITH SMACNA STANDARDS. FABRICATE DUCTWORK FROM ALUMINUM SHEET METAL. SILICONE SEAL ALL JOINTS AND MAKE WEATHER TIGHT CONNECTIONS. THIN WALL JACKETING MATERIALS WILL BE REJECTED.
 - ZERO PERMEABILITY, SELF-ADHESIVE LAMINATE EXTERIOR INSULATION CLADDING, MINIMUM 5 PLY, 11 KG (25 LB) PUNCTURE RATING, SERVICE TEMPERATURE RATINGS -70°C TO 145° (94°F TO 300°F).



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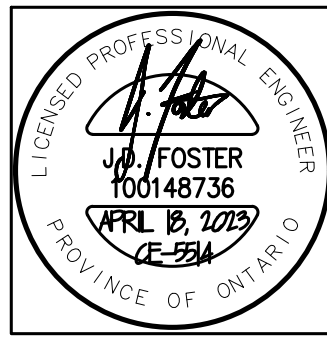
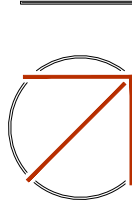
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REVISIONS

NO.	ISSUED FOR	DATE
00	ISSUED FOR PERMIT/ TENDER	23.04.18

NORTH



DESIGN	NH	DRAWN	NH
CHECKED	JDF	REVIEWED	JDF

PROJECT

UCDSB LINKLATER PS
2023 UPGRADES

ADDRESS

300 STONE ST. N.
GANANOQUE, ON

PROJECT NO.

CE-5514

DRAWING TITLE

MECHANICAL SPECIFICATIONS

DRAWING NUMBER

M10 OF 12

5. **PIPING SYSTEMS:**

1. **GENERAL:**

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.

2. **PIPING SUBJECT TO FREEZING:**

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.
2. WHERE HORIZONTAL PIPING IS RUN IN A CEILING SPACE UNDER UNINSULATED ROOF, THE INSULATED PIPE SHALL BE ENCASED IN SLAB INSULATION ON BOTH SIDES AND TOP AND CIRCULATION OF INTERIOR AIR SHALL BE MAINTAINED IN THE ENCASEMENT BY MEANS OF AIR GRILLES, LOCATED IN THE CEILING BELOW, FACING DOWN INTO THE INTERIOR OF THE BUILDING. THE SPACING OF GRILLES SHALL NOT BE LESS THAN 300 MM (12") O.C.

3. **LINES, GRADES AND SLOPES:**

1. INSTALL LIQUID AND AIR 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.
2. INSTALL PIPING TO FOLLOWING SLOPES:
- DRAINAGE PIPING: 1:50 ON DRAINS OF NPS 3 SIZE AND LESS AND 1:100 ON DRAINS OF NPS 4 AND LARGER.
 - POTABLE (DOMESTIC) WATER PIPING: PITCH TO LOW POINTS SO THAT ALL PIPING MAY BE COMPLETELY DRAINED.
 - HOT WATER HEATING PIPING: SLOPE UP 1:500 IN DIRECTION OF FLOW.
 - NATURAL GAS: SLOPE DOWN 1:1000 IN DIRECTION OF FLOW.

4. **UNIONS OR FLANGES – PROVIDE IN THE FOLLOWING LOCATIONS:**

1. FOR BY-PASSES AROUND EQUIPMENT, CONTROL VALVES, DEVICES IN PIPING SYSTEMS, AND ELSEWHERE INDICATED ON DRAWINGS.
2. AT CONNECTIONS TO EQUIPMENT (LOCATE BETWEEN SHUT-OFF VALVE AND EQUIPMENT).

5. **PIPING CONNECTIONS TO MAINS:**

1. MAKE BRANCH CONNECTIONS OF STEAM, GAS, AND COMPRESSED AIR PIPING, TO RESPECTIVE HORIZONTAL PIPING OF LARGER DIAMETER, TO UPPER QUADRANT OF LARGER PIPE.
2. MAKE DOWN FEED PIPING CONNECTIONS, TO HORIZONTAL SUPPLY AND RETURN WATER MAINS, ON BOTTOM QUADRANT OF MAINS.

6. **SLEEVES:**

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.
2. SLEEVES FOR PIPING PASSING THROUGH ROOFS WILL BE SUPPLIED AND INSTALLED UNDER THIS DIVISION.
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. FILL SLEEVES FOR FUTURE USE WITH LIME MORTAR.

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

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.

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.

10. **PIPE IDENTIFICATION:**

1. LABEL PIPING INSTALLED UNDER THIS DIVISION TO INDICATE CONTENT AND DIRECTION OF FLOW, INCLUDE OPERATING PRESSURE OR VACUUM, AS APPLICABLE.
2. ALL LABELS SHALL BE OF SUFFICIENT WIDTH TO OVERLAP ITSELF.
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. 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.

2. **HANGERS AND SUPPORTS:**

1. **GENERAL:**

1. PIPE HANGERS & SUPPORTS TO CSA B214 & MSS SP-58.
2. SUPPORT OR SUSPEND ALL PIPING WITH NECESSARY HANGERS, STRUCTURAL SUPPORTS AND/AND BRACKETS AS REQUIRED, TO PREVENT SAGGING, WARPING AND VIBRATION.
3. DO NOT ALLOW LOADS, OF ANY NATURE, TO BE TRANSMITTED THROUGH PIPING CONNECTIONS TO EQUIPMENT.
4. PROVIDE SUITABLY DAMPENED SPRING HANGERS FOR FIRST THREE SUPPORTS FROM EQUIPMENT CONNECTION ON PIPING SUBJECT TO EXCESSIVE MOVEMENT.
5. DO NOT HANG ANY PIPE, FROM ANOTHER PIPE OR FROM ROOF DECK, UNLESS SPECIFICALLY INDICATED ON DRAWINGS.
6. PROVIDE DIELECTRIC SEPARATION AS REQUIRED.

2. **HANGERS:**

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.
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.
3. FOR INSULATED PIPING CARRYING LIQUIDS AT A TEMPERATURE OF 10°C (50°F) OR LESS, USE ELONGATED CLEVIS TYPE HANGERS.
4. PROVIDE INSULATION PROTECTION BEARING PLATES AT ALL HANGERS AND SUPPORTS FOR ALL INSULATED PIPING.
5. FOR NON-INSULATED PIPING USE CLEVIS TYPE OF WROUGHT STEEL CONSTRUCTION.
6. FOR COPPER TUBING PROVIDE COPPER COATED HANGERS.
7. ATTACH HANGER RODS, TO BUILDING STRUCTURE, BY MEANS OF MALLEABLE IRON BEAM CLAMPS OR CONCRETE INSERTS

3. **HANGER SPACING:**

1. FOR HORIZONTAL RUNS OF PLUMBING AND DRAINAGE PIPING COMPLY WITH HANGER SPACING REQUIREMENTS OF BUILDING CODE.
2. FOR HORIZONTAL RUNS OF BLACK OR GALVANIZED STEEL PIPE, OTHER THAN FOR PLUMBING SERVICE, DO NOT EXCEED MAXIMUM DISTANCES BETWEEN SUPPORTS AND WITH MINIMUM DIAMETER RODS AS FOLLOWS:
- 9 MM (1/2") THROUGH 75 MM (3"); 3.66 M (12') SPACING, 12 MM (1/2") ROD DIA.

- 100 MM (4") THROUGH 200 MM (8"); 5.8 M (19') SPACING, 22 MM (7/8") ROD DIA.

4. **ROOF PIPING:**

1. PROVIDE ECBOCK PIPE SUPPORT. UV SATILIZED RECYCLED RUBBER. MAKE PROVISIONS FOR EXPANSION AND CONTRACTION.
2. PROVIDE GALVANIZED STRUT AND HORSESHOE CLAMPS OF SUFFICIENT HEIGHT TO SECURE PIPING TO SUPPORT BLOCKS. PROVIDE EXTENSION KITS AS REQUIRED.

3. **MATERIALS OF CONSTRUCTION:**

1. **SANITARY AND INDIRECT DRAIN (INCLUDING VENTING):**

1. **REFERENCE STANDARDS:**

1. **COPPER, DWV, HARD DRAWN COPPER DRAINAGE TUBE** CONFORMING TO ASTM B 308 WITH WROUGHT COPPER OR CAST BRASS SOLDER JOINT DRAINAGE FITTINGS TO ASME B16.29 OR ASME B16-28.

2. **APPLICATION:**

1. **ABOVE GRADE:**

1. **PIPING 75 MM (3") AND SMALLER:** DWV COPPER

2. **POTABLE (DOMESTIC) HOT AND COLD WATER:**

1. **REFERENCE STANDARDS:**

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

2. **COPPER:**

1. PIPING - SEAMLESS WATER TUBE TO ASTM B88

2. **FITTINGS:**

1. SOLDER JOINT FITTINGS TO ASME B16.18 (CAST) OR B16.22 (WROUGHT)
2. 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.

3. **PEX-A:**

1. CROSSLINKED POLYETHYLENE PIPING TO CAN/CSA-B137.5.
1. 50 MM (2") AND SMALLER - CANULC-S102.2 LISTED TO A MAXIMUM OF 25 FLAME SPREAD / 50 SMOKE DEVELOPED.
2. 65 MM (2-1/2") AND LARGER - CANULC-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).
2. SEAL PENETRATIONS AT FIRE SEPARATIONS PER CANULC-S115.
3. PIPING WITHIN A FIRE SEPARATION PER CANULC-S101.
4. ALL FITTINGS BY TUBING MANUFACTURER.
5. 25 YEAR WARRANTY FROM INSTALLATION DATE.

2. **APPLICATION:**

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

1. TYPE "L" HARD DRAWN COPPER TUBING. PROVIDE SOLDER TO THREADED ADAPTERS AT SCREWED VALVES OR EQUIPMENT.
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.)
3. CPVC: BUILDINGS OF NON-COMBUSTIBLE CONSTRUCTION, HIGH-RISE BUILDINGS AND IN RETURN AIR PLENUMS. FIRESTOPPING SYSTEMS SHALL BE LISTED UNDER CANULC S115 AND TESTED WITH A PRESSURE DIFFERENTIAL OF 50 PA.

3. **NATURAL GAS:**

1. PIPING 50 MM (2") AND SMALLER ABOVE GRADE PIPING (EXPOSED); SCHEDULE 40 ERW OR CW BLACK CARBON STEEL PIPE CONFORMING TO ASTM A 53/A53M-99B GRADE B, WITH THREADED ENDS. FITTINGS: CLASS 150 BLACK MALLEABLE IRON SCREWED FITTINGS CONFORMING TO ASTM A 197/A197M-98 AND ASME B16.3-1998.

4. **HYDRONIC (HEATING):**

1. **REFERENCE STANDARDS:**

1. **PIPING:**

1. **COPPER:** SEAMLESS WATER TUBE TO ASTM B88 / B88M.
2. **STEEL:** CONTINUOUS WELD OR ELECTRIC RESISTANCE WELDED BLACK CARBON STEEL CONFORMING TO ASTM A 53/A53M GRADE B.
2. **END FITTINGS & JOINTS:**
1. **SOLDERED COPPER:** TO ASME B16.18 CAST BRASS OR ASME B16.22. SOLDER – WROUGHT COPPER WITH LEAD FREE SOLDER TO ASTM B32.
2. **THREADED:** TO ASME B1.20.1.
3. **SOLDER:** TO ASME B16.18.
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.
5. **SOCKET WELD:** TO ASTM A105/A-105M & ASME B16.1
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)
7. **FLANGED:** TO ASME B16.1.
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.
9. **FLANGED:** CLASS 150 FORGED STEEL, SLIP-ON OR WELONECK 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.

2. **APPLICATION:**

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

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.
2. STEEL - SCHEDULE 40 WITH ASME B16.3 CLASS 150 THREADED OR COLD PRESS FITTINGS.
3. PEX-A - WITH F1960 COLD-EXPANSION FITTINGS
4. PVC (CONDENSER WATER ONLY) - SCHEDULE 40

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

1. STEEL - SCHEDULE 40 WITH RAISED FACE FLANGE OR GROOVED FITTINGS.
2. PEX-A - WITH COMPRESSION FITTINGS UP TO 100 MM (4").
3. PVC (CONDENSER WATER ONLY) - SCHEDULE 40

3. **CLEANING:**

1. CLEAN ALL NEW HYDRONIC PIPING.
2. FLUSH SYSTEMS TO REMOVE LOOSE DIRT.
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. DRAIN SYSTEMS, REFILL WITH FRESH WATER AND CIRCULATE FOR MINIMUM OF 4 HOURS TO FLUSH OUT REMAINING CHEMICAL SOLUTION.
5. REFILL SYSTEMS WITH CLEAN WATER AND INHIBITOR AS REQUIRED.

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.

5. **FIRE PROTECTION:**

1. STANDARD BLACK STEEL PIPE WITH SCREWED OR FLANGED CAST IRON SPRINKLER FITTINGS SUITABLE FOR 1,200 KPA (175 PSIG) PRESSURE, COLD WATER, NON-SHOCK, USE SCREWED OR FLANGED TYPE JOINTS BETWEEN PIPE AND FITTINGS OR VALVES. FOR PIPE SIZES 32 MM (1-1/4") AND LARGER, MECHANICAL TYPE COUPLINGS, CANADIAN UNDERWRITER'S LISTED AND IAO APPROVED, MAY BE USED. ENSURE WALL THICKNESS OF PIPE IS IN ACCORDANCE WITH NFPA 13 AND 14 FOR THE TYPE OF CONNECTIONS USED. USE HOT-DIPPED ZINC COATED (GALVANIZED) WELDED AND SEAMLESS PIPE TO ANSI/ASTM A53 FOR DRY PIPE SYSTEMS OR WHERE OTHERWISE INDICATED.

4. **TESTING:**

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

6. **PLUMBING SYSTEM:**

1. **REFERENCES STANDARDS:**

1. CONFORM TO ALL APPLICABLE CODES INCLUDING, BUT NOT LIMITED TO, THE FOLLOWING:
1. **CSA-B149.1:** NATURAL GAS AND PROPANE INSTALLATION CODE
2. **VENTING:** PLUMBING VENTING MAY NOT BE SHOWN ON DRAWINGS. PROVIDE A COMPLETE PLUMBING VENTING SYSTEM FOR ALL PLUMBING FIXTURES SHOWN, IN ACCORDANCE WITH OBC SECTION 7.5.
3. **STERILIZATION OF POTABLE (DOMESTIC) WATER SYSTEMS:**
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.
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.
4. **CONNECTIONS SERVICES:**
1. **NATURAL GAS SERVICE:** MAKE ARRANGEMENTS WITH LOCAL GAS UTILITY FOR UPGRADE OF UNDERGROUND GAS SERVICE, GAS METER, MAIN PRESSURE REDUCING STATION, AND CONNECTION THERETO AT LOCATION INDICATED. PAY FOR COSTS LEVIED BY GAS UTILITY FOR PROVISION, INSTALLATION AND CONNECTION OF THIS SERVICE.

5. **VALVES:**

1. SUBMIT SHOP DRAWINGS FOR ALL VALVES.

2. **NATURAL GAS ISOLATION:**

1. UP TO 50 MM (2"), 1,034 KPA (150PSIG) / 600WOG RATING, BRASS OR BRONZE BODY, FULL PORT, BALL VALVE, PTFE SEATS, DOUBLE O-RING DESIGN OR PTFE PACKING, CHROME PLATED SOLID BRONZE BALL, LEVER HANDLE. CSA/CGA 125 /3,16 APPROVED.

7. **HYDRONICS (HEATING WATER) SYSTEM:**

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

2. **VALVES:**

1. **REFERENCE STANDARDS:**

1. **BRONZE:** TO ASTM B62.
2. **BRASS:** TO ASTM B283.
3. **CAST IRON:** TO ASTM A126
4. **STAINLESS STEEL:** TO ASTM A351.

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

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

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.

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

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.
2. **CHECK, WAFER, CAST IRON BODY, STAINLESS STEEL TRIM & SEAT, VITON A SEAT RING, CLASS 125, 200 WOG RATING.**
3. **CHECK AT PUMP DISCHARGE, SILENT, CAST IRON BODY, STAINLESS STEEL TRIM & SEAT, SPRING LOAD CENTRE GUIDED DISC, CLASS 125, 200 WOG RATINGS.**

5. **BALANCING VALVES:**

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.
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.

8. **MECHANICAL EQUIPMENT:**

1. **ROOFTOP UNIT:**

1. **DESCRIPTION:** OUTDOOR, CONSTANT VOLUME, PACKAGED ROOFTOP UNIT WITH GAS HEATING AND DIRECT EXPANSION (DX) COOLING, OF SIZE AND PERFORMANCE AS INDICATED IN SCHEDULES ON DRAWINGS. PROVIDE COMPLETE FACTORY ASSEMBLED UNIT PRE-WIRED AND PIPED WITH FACTORY INSTALLED CONTROLS.
2. **UNIT CONSTRUCTION:** CASINGS SHALL BE FABRICATED OF WEATHER-TIGHT GALVANIZED STEEL PANELS COATED WITH BAKED ENAMEL FINISH AND INSULATED WITH 25MM (1") INSULATION. UNIT SHALL HAVE HINGED AND GASKETTED PANELS FOR EASY ACCESS TO ALL INTERNAL PARTS FOR SERVICING OR REPLACEMENT.
3. **FANS:** THE INDOOR FAN SHALL BE CENTRIFUGAL, FORWARD-CURVED, BELT-DRIVEN FAN WITH STATICALLY AND DYNAMICALLY BALANCED ROTOR, MOUNT FAN AND MOTOR ON VIBRATION ISOLATION BASE(S) AND SEPARATED FROM CASING WITH FLEXIBLE CONNECTION. THE OUTDOOR FAN SHALL BE DIRECT DRIVEN TYPE, WITH COATED STEEL WIRE GUARD AND DISCHARGE AIR VERTICALLY.
4. **COMPRESSOR:** COMPRESSOR SHALL BE SEMI-HERMETIC (HERMETIC) TYPE FACTORY MOUNTED ON SPRING VIBRATION ISOLATORS AND FLEXIBLE SUCTION AND DISCHARGE CONNECTIONS, OIL SIGHT GLASS, COMPRESSOR DISCHARGE VALVES, LIQUID LINE SERVICE VALVES, THERMAL EXPANSION VALVES, OIL PRESSURE SWITCH, CRANKCASE HEATER, AND AUTOMATIC PUMP DOWN SYSTEM WITH CONTROL TO LIQUID LINE SOLENOID VALVE.
5. PROVIDE HOT GAS BYPASS FOR CAPACITY REDUCTION. CYLINDER UNLOADING. PROVIDE HEAD PRESSURE CONTROLS CAPABLE OF OPERATION TO -30°C OUTDOOR AIR TEMPERATURE.
6. **GAS HEATING:** INDUCED DRAFT COMBUSTION WITH INTERMITTENT SPARK IGNITION AND REDUNDANT GAS VALVE. HEAT EXCHANGER SHALL BE MADE OF A MINIMUM 20 GAUGE ALUMINUM SILICON ALLOY COATED STEEL.
7. **ECONOMIZER:** ECONOMIZER SHALL BE FACTORY INSTALLED TYPE AS SCHEDULED CAPABLE OF SIMULTANEOUS ECONOMIZER AND COMPRESSOR OPERATION.
8. **ROOF CURB:** PROVIDE FACTORY FABRICATED 16 GAUGE GALVANIZED STEEL CURB

WITH WOOD NAILER STRIP SUITABLE FOR UNIT DIMENSIONS.

9. **CONTROLS:** PROVIDE ELECTRO MECHANICAL CONTROLS.

10. PROVIDE CONDENSATE DRAIN PER MANUFACTURER'S REQUIREMENTS.

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

2. **DIRECT OUTDOOR AIR UNIT:**

1. **DESCRIPTION:** OUTDOOR, PACKAGED DIRECT OUTDOOR AIR UNIT WITH GAS HEATING AND DIRECT EXPANSION (DX) COOLING OF SIZE AND PERFORMANCE AS INDICATED IN DRAWING SCHEDULES, ASHRAE 90.1 COMPLIANT AND LABELLED, COMPLETE FACTORY ASSEMBLED UNIT PRE-WIRED WITH FACTORY INSTALLED CONTROLS.
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.
3. **FILTERS:** REMOVABLE 50 MM (2 INCHES) THICK GLASS FIBRE DISPOSABLE MERV 8 FILTERS IN METAL FRAMES.
4. **OUTSIDE AIR DAMPER:** LOW LEAK INSULATED (MAX. 10 CFM / FT²) MOTORIZED WITH MECHANICALLY LOCKED BLADE EDGE SEALS
5. RETURN AIR DAMPER, MOTORIZED: FACTORY INSTALLED TO PERMIT 100% RECIRCULATION. CONTROLLED BY TIME CLOCK
6. **FANS, MOTOR(S) & DRIVES:**

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.

2. **MOTOR:** CONTINUOUS DUTY, THERMALLY PROTECTED, PERMANENTLY LUBRICATED, BALL BEARING WITH A 1.15 SERVICE FACTOR, EFFICIENCY TO MM4H 88-10 REQUIREMENTS.

7. **HEATING:**

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.
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.
3. NONCONDENSING MINIMUM THERMAL EFFICIENCY OF 81%. THE THERMAL EFFICIENCY SHALL NOT FALL BELOW 80% THROUGH THE MODULATED OPERATIONAL RANGE.
4. PROVIDE ALL SAFETY CONTROLS FOR THE GAS HEATING INCLUDING ALL INTERLOCKS AND AIR FLOW PROVING SWITCHES TO MEET CGA AND CSA REQUIREMENTS.

8. **COOLING:**

1. COMPRESSOR SHALL BE SEMI-HERMETIC (HERMETIC) TYPE FACTORY MOUNTED ON SPRING VIBRATION ISOLATORS AND FLEXIBLE SUCTION AND DISCHARGE CONNECTIONS, OIL SIGHT GLASS, COMPRESSOR DISCHARGE VALVES, LIQUID LINE SERVICE VALVES, THERMAL EXPANSION VALVES, OIL PRESSURE SWITCH, CRANKCASE HEATER, AND AUTOMATIC PUMP DOWN SYSTEM WITH CONTROL TO LIQUID LINE SOLENOID VALVE.
2. CONDENSER FAN(S) SHALL BE DIRECT DRIVE, TYPE FAN, COATED STEEL WIRE GUARD AND DISCHARGING AIR VERTICALLY.
3. CONDENSATE DRAIN PAN OF STAINLESS STEEL OR POLYMER, SLOPED IN TWO DIRECTIONS, SEALED DISCHARGE THROUGH CABINET.
4. PROVIDE FACTORY INSTALLED HOT GAS BYPASS REHEAT FOR CAPACITY REDUCTION COMPLIANT WITH ASHRAE 90.1
9. PROVIDE CONDENSATE DRAIN PER MANUFACTURER'S REQUIREMENTS. PROVIDE CONDENSATE NEUTRALIZER.
10. **CURB:** MANUFACTURER SUPPLIED 2.8 MM (12 GAUGE) ZINC COATED STEEL WITH A 51 MM X 152 MM (2" X 6") NAILER.
11. **CONTROLS:** PROVIDE REMOTE CONTROL PANEL INCLUDING: ON-OFF AUTO SWITCH, HEAT-OFF-COOL SWITCH INDICATING LIGHTS FOR SUPPLY FAN, EXHAUST FAN PILOT OPERATION, BURNER OPERATION, CLOGGED FILTER INDICATION AND LOCKOUT INDICATION, FIELD WIRING BETWEEN UNIT & CONTROL PANEL BY MECHANICAL CONTRACTOR. REFER TO CONTROL NOTES FOR SEQUENCE OF OPERATION.
3. **INLINE CENTRIFUGAL FAN CABINET:** BELT-DRIVEN, CENTRIFUGAL DUCT FAN UNITS, CONFIGURED FOR HORIZONTAL FLOW FOR HVAC APPLICATIONS. HEAVY-GAUGE GALVANIZED STEEL HOUSING WITH REMOVABLE SIDE PANELS FOR MAINTENANCE, UNIVERSAL MOUNTING BRACKETS TO ALLOW SUSPENSION OF UNIT FROM TOP OR BOTTOM CONNECTIONS, 25 MM (1") FIBERGLASS INSULATION LINER IN FAN HOUSING, PERMANENTLY LUBRICATED SELF-ALIGNING BALL BEARINGS, GALVANIZED STEEL, FORWARD-CURVED, DOUBLE-WIDTH, DOUBLE-INLET, STATICALLY AND DYNAMICALLY BALANCED FAN WHEEL, CONSTRUCTED OF GALVANIZED STEEL.



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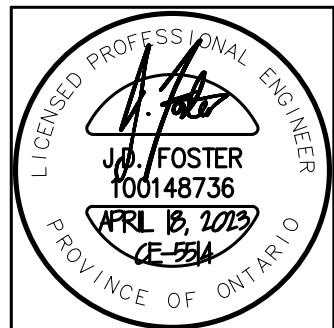
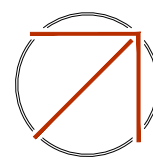
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REVISIONS

NO.	ISSUED FOR	DATE
00	ISSUED FOR PERMIT/ TENDER	23.04.18

NORTH



DESIGN	NH	DRAWN	NH
CHECKED	JDF	REVIEWED	JDF

9. AIR DISTRIBUTION SYSTEM:

1. DUCTWORK:

1. GENERAL:

1. PROVIDE DUCTWORK CONSTRUCTED TO SMACNA 250 FA (1" W.G.) PRESSURE CLASSIFICATION & SEAL CLASS A. FOLLOW ALL OF THE LATEST SMACNA REQUIREMENTS.
2. SEAL ALL DUCT JOINTS AND CONNECTIONS TO DIFFUSERS AND EQUIPMENT WITH HIGH VELOCITY WATER BASED DUCT SEALER.
3. PROVIDE DUCTS OF SIZES INDICATED ON DRAWINGS. WHERE DUCTS ARE TO BE FURNISHED WITH ACOUSTIC DUCT INSULATION, ADJUST DUCT SIZE TO ACCOMMODATE THICKNESS, WITH CLEAR INSIDE DIMENSIONS AS INDICATED ON DRAWINGS.
4. CONTINUOUSLY SOLDER OR SEAL JOINTS IN EXTERIOR AIR INTAKE DUCTS AND PLENUMS TO PREVENT DRIPPING OF MOISTURE.
5. PROVIDE DUCTWORK OF GALVANIZED STEEL SHEET UNLESS INDICATED OTHERWISE.
6. 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.

2. RECTANGULAR DUCTWORK:

1. FOR LONGITUDINAL JOINTS ON RECTANGULAR DUCTWORK, FURNISH PITTSBURGH LOCK JOINTS TIGHTLY CLOSED ALONG FULL LENGTH OF SEAM.
2. CROSS-BREAK FLAT SURFACES BETWEEN JOINTS, OR BETWEEN JOINTS AND INTERMEDIATE REINFORCEMENTS, TO PREVENT VIBRATION OR BUCKLING.
3. WHERE ELBOWS ARE INDICATED AS SQUARE TYPE, PROVIDE AIR TURNING VANES OF DOUBLE BLADE CONSTRUCTION.

3. ROUND DUCTWORK:

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

4. FLEXIBLE TYPE ROUND DUCTWORK:

1. FURNISH FLEXIBLE TYPE ROUND DUCTWORK BETWEEN TRUNK SUPPLY DUCT AND CEILING DIFFUSERS AND WHERE INDICATED ON DRAWINGS (MAXIMUM 1,500 MM (5') LENGTH). REFER TO DETAIL ON DRAWING.
2. PROVIDE FLEXIBLE DUCT OF POLYMERIC LINER BONDED TO WIRE SPIRAL, WHERE INSTALLED IN CEILING SPACE USED AS A RETURN PLENUM, DUCTS SHALL MEET BUILDING CODE FLAME SPREAD AND SMOKE DEVELOPMENT REQUIREMENTS.
3. FLEXIBLE TYPE ROUND DUCTWORK EXPOSED TO VIEW IS NOT ACCEPTABLE.

5. ACOUSTIC DUCT INSULATION: FURNISH RIGID COATED DUCT LINER CONFORMING TO ANSINFFPA 90A AND 90B, OF 25 MM (1") THICKNESS AND 72 KG/M3 (4.5 LB/CU FT) DENSITY. FASTEN DUCT LINER WITH PLATE TYPE IMPALING PINS AND SELF-LOCKING WASHERS. SEAL EXPOSED ENDS OF LINER WITH AN EDGE TREATMENT OR DUCT SEAL TO PREVENT LIFTING. IN HIGH VELOCITY DUCTWORK FURNISH PERFORATED OR EXPANDED METAL INNER LINER OVER ACOUSTIC INSULATION.

6. SUPPORTS AND HANGERS:

1. GENERAL:

1. DUCTWORK SHALL NOT BE SUPPORTED FROM ROOF DECK
2. ALL DUCTWORK SHALL BE SUPPORTED FROM BUILDING STRUCTURE.

2. RECTANGULAR DUCTWORK:

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
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).

3. ROUND DUCTWORK:

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.

4. ROOFTOP DUCT:

1. ADJUSTABLE DUCT SUPPORT COMPLETE WITH 425MM Ø (17") INJECTION MOLDED POLYPROPYLENE SUPPORT BASE SUITABLE FOR ROOF CONSTRUCTION, 41MM X 41 MM (1-5/8" X 1-5/8") 12GA VERTICAL CHANNEL & TOP AND BOTTOM MEMBERS IN GALVANIZED ZINC COATING.
2. PROVIDE ALL NECESSARY HARDWARE INCLUDING CORNER BRACKETS, BOLTS & NUTS, AND DUCT STRUT CLAMPS. ALL HARDWARE TO BE STAINLESS STEEL.
3. ECOFOOT QUICK FRAME, ADVANCED SUPPORT PRODUCTS SS2000D, OR EQUAL.

2. DIFFUSERS, REGISTERS AND GRILLES:

1. REFER TO SCHEDULE AND TAGS ON DRAWINGS FOR ACCESSORIES, NECK SIZE, DIMENSIONS AND CAPACITY.
2. COORDINATE PLACEMENT OF DIFFUSERS, REGISTERS AND GRILLES IN CEILINGS WITH ELECTRICAL AND CEILING INSTALLATION TRADES AND EXACT LOCATION TO FINAL APPROVAL OF CONSULTANT.
3. PROVIDE FRAME ACCESSORIES AS REQUIRED TO SUIT CEILING AND WALL CONSTRUCTION. COORDINATE WITH ARCHITECTURAL DRAWINGS.

3. SHEET METAL SPECIALTIES:

1. BALANCING DAMPERS:

1. LOCKING QUADRANT BALANCING DAMPERS, MANUALLY OPERATED OPPOSED BLADE TYPE, OR BUTTERFLY BLADE TYPE FABRICATED FROM GALVANIZED STEEL SHEET. PROVIDE WHERE INDICATED ON DRAWINGS AND AS REQUIRED TO ALLOW FOR SYSTEM BALANCING.

2. FIRE DAMPERS: DYNAMIC FIRE DAMPERS OF HINGED, FUSIBLE LINK TYPE, CHANNEL FRAMES, BLADES AND HOUSING, ULC LABELED AND CONFORMING TO ANSINFFPA 90A, FURNISH "TYPE B" FIRE DAMPERS FOR RECTANGULAR OR SQUARE DUCTWORK AND "TYPE C" FIRE DAMPERS FOR ROUND DUCTWORK. FIRE DAMPERS SHALL BE RATED FOR OPERATION. PROVIDE WHERE INDICATED ON DRAWINGS.

3. COMBINATION FIRE/SMOKE DAMPERS: FABRICATED TO CANULC S112 & CANULC S112.1, AND TESTED TO AMCA 511, UL 555 FIRE RATING OF 1.5 HOURS. FACTORY SLEEVE AND COLLAR FOR EACH DAMPER IN A THROUGH-WALL CONFIGURATION. PROVIDE FIELD FABRICATED SLEEVE WITH FLANGE FOR SUPPLY GRILLE AT SHAFT CONFIGURATION. FABRICATED WITH GALVANIZED STEEL FRAME AND BLADES, OIL-IMPREGNATED BRONZE OR STAINLESS STEEL SLEEVE BEARINGS AND PLATED STEEL AXLES, STAINLESS STEEL JAMB SEALS, PLATED STEEL CONCEALED LINKAGE, STAINLESS STEEL CLOSURE SPRING, BLADE STOPS, LOCK AND ACTUATOR SHAFT. OPERATORS LISTED / LABELLED SPRING RETURN, ELECTRIC TYPE, 120V / 1Ø. LOCATE DAMPER OPERATOR ON DUCT EXTERIOR, LINKED TO DAMPER OPERATING SHAFT. WHERE DUCT EXTERIOR IS ACCESSIBLE, OTHERWISE LOCATE DAMPER OPERATOR ON INTERIOR OF DUCT.

4. 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.

5. 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.

10. CONTROL SYSTEM:

1. SUPPLY AND INSTALL STANDALONE DIRECT DIGITAL CONTROL SYSTEM COMPLETE WITH SENSORS, ACTUATORS, DIRECT DIGITAL CONTROLLERS, OPERATOR WORKSTATION/NETWORK INTERFACE, ELECTRICAL CONTROL WIRING RESULTING IN COMPLETE AND OPERATING CONTROL SYSTEM CAPABLE OF PROVIDING FUNCTIONS SPECIFIED AND PERFORMING ASPECTS OF SEQUENCE OF OPERATIONS.
2. INSTALL CONTROLS SUPPLIED WITH EQUIPMENT UNLESS NOTED OTHERWISE.
3. REFER TO DRAWINGS AND SCHEMATICS FOR DEVICE AND EQUIPMENT LOCATIONS.

4. ELECTRICAL:

1. PROVIDE POWER BOTH HIGH > 120V AND LOW <120 VOLTAGE REQUIRED FOR THIS SECTION.
2. ELECTRICAL INTERLOCK WIRING OF EQUIPMENT SPECIFIED UNDER OTHER SECTIONS OF THIS DIVISION IS THE RESPONSIBILITY OF TRADE SECTION INSTALLING THAT EQUIPMENT, UNLESS INDICATED OTHERWISE.
3. SUPPLY AND INSTALL ELECTRICAL WIRING INCLUDING RACEWAYS FOR COMPONENTS FURNISHED UNDER THIS SECTION. INSTALL WIRING IN ACCORDANCE WITH GOVERNING ELECTRICAL CODE.
5. QUALIFICATIONS:
 1. MINIMUM OF 5 YEARS EXPERIENCE INSTALLING SIMILAR SYSTEMS INVOLVING COMPUTER BASED CONTROL SYSTEMS AND BE LICENSED REPRESENTATIVE, AFFILIATE, OR OPERATING DIVISION OF CONTROLS MANUFACTURER, WHOLESALERS OR FRANCHISED DEALER/REPRESENTATIVES ARE NOT ACCEPTABLE. USE INSTALLATION PERSONNEL THAT ARE TRAINED AND CERTIFIED AS QUALIFIED BY CONTROLS MANUFACTURER.
 2. UPON COMPLETION OF INSTALLATION, VERIFY BY TEST AND WRITTEN REPORT, THAT SYSTEM IS FULLY FUNCTIONAL, INSTALLED IN ACCORDANCE WITH PLANS AND SPECIFICATIONS AND CALIBRATED WITHIN OPERATIONAL LIMITS SPECIFIED.
 6. WARRANTY: PROVIDE LABOUR, MATERIAL, AND EQUIPMENT NECESSARY TO MAINTAIN BENEFICIAL PERFORMANCE OF ENTIRE BUILDING AUTOMATION SYSTEM FOR PERIOD OF 2 YEARS AFTER ACCEPTANCE OF SYSTEM, OR PARTS THEREOF.
 7. SEQUENCE OF OPERATIONS: PROVIDE NECESSARY CONTROL DEVICES AND APPLICATION SOFTWARE TO CARRY OUT DESCRIBED SEQUENCES OF OPERATION. SEE DRAWINGS FOR SPECIFIED SEQUENCE OF OPERATIONS.
 8. SHOP DRAWINGS:
 1. PREPARE AND SUBMIT SHOP DRAWINGS FOR EQUIPMENT AND SYSTEMS COVERED BY THIS SECTION. AS MINIMUM INCLUDE FOLLOWING:
 1. COMPLETE CATALOGUE DATA AND INSTALLATION INSTRUCTIONS FOR EACH CONTROL COMPONENT.
 2. GENERAL SYSTEM ARCHITECTURE SCHEMATICS AND RISER DIAGRAMS.
 3. VALVE SCHEDULE WITH PIPE SIZES, FLOW RATES, DESIGN AND ACTUAL PRESSURE DROPS.
 4. DAMPER ACTUATOR SCHEDULE WITH SIZE, FLOW AND PRESSURE DROPS.
 5. SEQUENCE OF OPERATION DIAGRAMS AND DESCRIPTIVE PROSE.
 6. DETAILED SOFTWARE DESCRIPTION OF CONTROL AND MONITORING ROUTINES FURNISHED WITH SYSTEM.
 7. PROJECT TEST PLAN, INDICATING HOW SYSTEM WILL BE TESTED AND FOUND TO BE OPERATING IN ACCORDANCE WITH PLANS AND SPECIFICATION.
 2. PROVIDE COMPLETE AND APPROVED AS-BUILT SHOP DRAWINGS DETAILING EQUIPMENT AND INSTALLATION.

9. TRAINING:
 1. PROVIDE OWNER'S SYSTEM OPERATORS COMPLETE INSTRUCTIONS FOR PROPER CONTROL OF SYSTEM UNDER MODES OF OPERATION INCLUDING BUT NOT LIMITED TO SUMMER/WINTER, OCCUPIED/UNOCCUPIED, ENERGY MANAGEMENT AND ALARM EVENT SEQUENCES.
 2. CONDUCT INSTRUCTION DURING NORMAL WORKING HOURS, MONDAY THROUGH FRIDAY AT SITE. PROVIDE ON-SITE TRAINING CONSISTING OF BOTH CLASSROOM AND HANDS-ON TRAINING.
 3. ADDRESS FOLLOWING OPERATOR FUNCTIONS:
 1. SENSOR/ACTUATOR OPERATION
 2. SYSTEM ARCHITECTURE AND BASIC THEORY OF OPERATION
 3. OPERATOR LEVEL (PASSWORD LEVEL 1) INTERFACE TO SYSTEM FOR PASSWORD ACCESS, ALARM HANDLING, POINT ADDRESSING, MANUAL COMMANDS AND DISPLAY OF STATISTICAL DATA
 4. PROGRAM LEVEL (PASSWORD LEVEL 2) OPERATION FOR COMMAND CONTROL AND DEFINITION OF ENERGY MANAGEMENT PARAMETERS
 5. CONFIGURATION LEVEL (PASSWORD LEVEL 3) FOR DATABASE ENTRY AND MODIFICATION
 6. USER DEFINED PROGRAMMING
 7. SUPERVISORY COMPUTER AND OTHER PERIPHERALS OPERATION

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 6. USER DEFINED PROGRAMMING
 7. SUPERVISORY COMPUTER AND OTHER PERIPHERALS OPERATION

10. EQUIPMENT:

1. IDENTIFICATION OF EQUIPMENT:

1. IDENTIFY EACH PIECE OF EQUIPMENT WITH NAMEPLATE IDENTIFYING EQUIPMENT AND FUNCTIONS WITH LETTER AND NUMBER DESIGNATION.
2. USE LAMINATED PLASTIC NAMEPLATES OF AT LEAST 75 MM X 25 MM X 3 MM (3" X 1" X 1/8") WITH BLACK FACE AND WHITE CENTRE AND 6 MM (1/4") HIGH ENGRAVED LETTERING. SECURELY ATTACH TO EQUIPMENT.

2. PANELS: MOUNT RELAYS, TRANSDUCERS, GAUGES AND SIMILAR DEVICES IN CONTROL PANELS.

3. AUTOMATIC CONTROL VALVES:

1. CHARACTERISTICS OF CONTROL VALVES SHALL BE SUITED TO REQUIRED APPLICATION, SIZE AND SELECT VALVES.
2. MAXIMUM ALLOWABLE PRESSURE DROPS:
 - CHILLED WATER COIL VALVES – 21 KPA (3 PSIG)
 - HOT WATER COIL VALVES – 21 KPA (3 PSIG)
 - STEAM COIL VALVES - CRITICAL PRESSURE
 - HOT WATER CONVECTORS – 7 KPA (1 PSIG)
3. VALVE TYPE:
 - VALVES 13 MM (1/2") THROUGH 32 MM (1-1/4") - FEMALE NPT INLET AND MALE NPT UNION OUTLET
 - VALVES 38 MM (1-1/2") THROUGH 51 MM (2") - SCREWED BODIES
 - VALVES 2-1/2" AND LARGER - FLANGED BODIES

4. LIST OF OTHER EQUIPMENT:

- AUTOMATIC DAMPERS AND ACTUATORS
- TEMPERATURE SENSORS
- THERMOSTATS
- CURRENT SENSING RELAYS
- RELAYS

11. THE FOLLOWING CONTROL SYSTEMS COMPANIES ARE ACCEPTABLE:

1. AINSWORTH
2. HONEYWELL
3. AIRON
4. REGULVAR
5. TRANE
6. B. LUNDY MECHANICAL

1. COMMISSIONING:

1. GENERAL: CARRY COSTS TO ASSIST IN THE COMMISSIONING PROCESS FOR ACHIEVING, VERIFYING, AND DOCUMENTING THAT THE FACILITY AND ITS SYSTEMS ARE PLANNED, DESIGNED, INSTALLED, AND TESTED TO MEET THE ORIGINAL PROJECT REQUIREMENTS ESTABLISHED BY THE OWNER.

2. COMMISSIONING TEAM:

1. OWNER'S REPRESENTATIVE - REPRESENTATIVE OF THE OWNER, AS DEFINED IN THE AGREEMENT.
2. CONSULTANT - CONSULTANT, AS DEFINED IN THE AGREEMENT.
3. COMMISSIONING AUTHORITY - PARTY ENGAGED BY THE OWNER TO LEAD COMMISSIONING ACTIVITIES AND COORDINATE OTHER TEAM MEMBERS.

4. CONTRACTOR REPRESENTATIVES - REPRESENTATIVES OF THE CONTRACTOR, INCLUDING ANY SUB-CONTRACTORS WHOSE SCOPE OF WORK INCLUDES ITEMS REQUIRING COMMISSIONING.
5. TESTING AGENCY - SPECIALTY AGENCY ENGAGED BY THE GENERAL CONTRACTOR TO PERFORM TESTS ON COMPONENTS OR SYSTEMS TO VERIFY CONFORMANCE TO OWNER'S REQUIREMENTS OR SPECIFIED REQUIREMENTS.

3. TEAM MEMBER RESPONSIBILITIES:

1. THE COMMISSIONING AUTHORITY WILL PROVIDE THE FOLLOWING:
 1. COMMISSIONING PLAN, INCLUDING BUT NOT LIMITED TO, THE MANAGEMENT OF COMMISSIONING MEETINGS AS REQUIRED AND THE MANAGEMENT OF PROJECT-SPECIFIC COMMISSIONING DOCUMENTS.
 2. ASSEMBLY OF PROJECT REQUIREMENTS, INCLUDING DESIGN CRITERIA & PERFORMANCE GOALS FROM THE CONSTRUCTION DOCUMENTS.
 3. SUPPORT THE SCHEDULING OF THE COMMISSIONING VERIFICATION MEETINGS BETWEEN TEAM MEMBERS.
 4. DEVELOPMENT OF FUNCTIONAL PERFORMANCE CHECKLISTS FOR INDIVIDUAL EQUIPMENT
 5. PREPARE A COMMISSIONING REPORT AND ASSEMBLY OF TESTING AND BALANCING REPORTS, START-UP REPORTS, AND TESTING REPORTS.
 6. AUDIT PROCEDURE, TO BE PERFORMED IN THE EVENT OF DISPUTE OR FAILURE.

2. CONTRACTOR REPRESENTATIVES SHALL:

1. ALLOW COMMISSIONING TEAM MEMBERS TO WITNESS STARTING, TESTING, ADJUSTING AND BALANCING PROCEDURES AND ALLOW COMMISSIONING AUTHORITY FREE ACCESS TO THE SITE.
2. PAY COSTS ASSOCIATED WITH STARTING, TESTING, ADJUSTING AND BALANCING AND RELEVANT INSTRUMENTS AND SUPPLIES REQUIRED TO PERFORM THOSE DUTIES.
3. EMPLOY EXPERIENCED PERSONNEL FOR EQUIPMENT STARTUP AND COMMISSIONING, WHO ARE ABLE TO INTERPRET RESULTS OF READINGS AND TESTS, AND REPORT THE SYSTEM STATUS IN A CLEAR AND CONCISE MANNER.
4. PROVIDE ALL EQUIPMENT REQUIRED TO PERFORM TESTING, BALANCING, AND COMMISSIONING OF SYSTEMS. CALIBRATE INSTRUMENTS USED IN START UP AS ACCURATE. PROVIDE CALIBRATION CERTIFICATES IF REQUESTED BY THE COMMISSIONING AUTHORITY.
5. UTILIZE EQUIPMENT CHECKLIST AND OTHER COMMISSIONING DOCUMENTS REQUIRED BY THE COMMISSIONING AUTHORITY.
6. VERIFY THAT EQUIPMENT IS INSTALLED IN ACCORDANCE WITH CONTRACT DOCUMENTS AND REVIEWED SHOP DRAWINGS.

4. COMMISSION TESTING & VERIFICATION PREREQUISITES:

1. PROVIDE COPIES TO THE COMMISSIONING AUTHORITY, OF COMPONENT AND ASSEMBLY CONTRACT DOCUMENT COMPLIANCE:
 - EQUIPMENT OPERATING CERTIFICATES
 - INSPECTION CERTIFICATES FROM AUTHORITIES HAVING JURISDICTION
 - REQUIRED COPIES OF SHOP DRAWINGS
 - OPERATION AND MAINTENANCE MANUAL (INCLUDING ALL MAJOR EQUIPMENT)
 - ENSURE ALL SYSTEMS HAVE BEEN STARTED, ADJUSTED TO DESIGN CRITERIA, AND ARE FUNCTIONALLY OPERATIONAL, READY FOR INDEPENDENT TESTING
 - COOPERATE WITH THE COMMISSIONING AUTHORITY IN ADVANCE OF ACTIVATING OPERATING SYSTEMS
 - COMPLETE ALL DEFICIENCIES IDENTIFIED IN THE DEFICIENCIES LOG TO MEET THE PROJECT REQUIREMENTS. CARRY ANY ADDITIONAL COSTS REQUIRED FOR RE-VERIFICATION IF REQUIRED BY THE COMMISSIONING AUTHORITY.

5. COMMISSION TESTING & VERIFICATION:

1. ALLOW FOR WORK EFFORT AND ASSOCIATED COSTS NECESSARY TO ASSIST AN OWNER APPOINTED AND REMUNERATED COMMISSIONING AUTHORITY, FOR FULFILLMENT OF A COMMISSION TESTING PROCESS OF THE FACILITY AND WORK.
2. COORDINATE, COOPERATE AND HARMONIZE EFFORTS WITH THE COMMISSIONING AUTHORITY.
3. COMMISSION TESTING WILL INCLUDE A RANDOM TESTING AND EVALUATION PROCESS AS DETERMINED BY THE COMMISSIONING AUTHORITY.
4. COMMISSIONING REPORT SHALL BE SUITABLY LOGGED, TABULATED, SIGNED, AND INCORPORATED INTO PROJECT OPERATING AND MAINTENANCE MANUALS.
5. THE COMMISSIONING PROCESS WILL NOT:
 1. PRECLUDE THE DUTIES AND RESPONSIBILITIES DESCRIBED IN THE CONTRACT DOCUMENTS NOR THE REQUIREMENTS AND OBLIGATIONS OF THE CONTRACT.
 2. CIRCUMVENT ANY REQUIRED WARRANTIES.
 3. RELIEVE THE CONTRACTOR FROM WARRANTY REQUIREMENTS, RESPONSIBILITIES, OR OBLIGATIONS.

6. THE FOLLOWING COMMISSIONING COMPANIES ARE ACCEPTABLE:

1. A CFMS CONSULTING INC – 905-787-9449 x 202. CONTACT – WENDY COLLINS.
2. C.E.S. ENGINEERING LTD – 416-226-4224 x 111. CONTACT – BOBAN RATKOVICH
3. ISOTHERM COMMISSIONING OTTAWA LTD – 613-423-5182. CONTACT – MARC LALONDE.
4. MORRISON HERSHFIELD LTD – 416-495-4294. CONTACT – RINO ZAN.
5. NOVA COMMISSIONING SERVICES LTD – 613-830-6656. CONTACT MATTER VAN GURP OR JEREMIAH POINT.
6. PACT ENGINEERING – 905-773-2442 x 301. CONTACT – REZA ILKHANI
7. WSP CANADA INC – 61-690-3861. CONTACT – SANDY FRAZEE



LONDON: 1385 North Routledge Park, Unit 9
London, ON N6H 5N5 P 519.472.7640

KINGSTON: 1471 John Counter Blvd. Unit 301
Kingston, ON K7M 8S8 P 613.900.0845

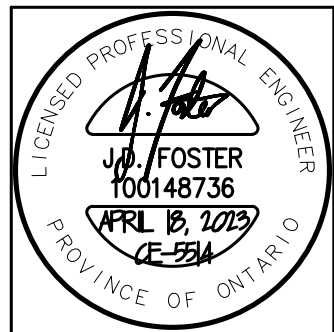
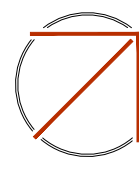
KITCHENER: 210-137 Glasgow Street, Office #141
Kitchener, ON N2G 4X8 P 519.472.7640

W www.callidus.ca E info@callidus.ca

REVISIONS

NO.	ISSUED FOR	DATE
00	ISSUED FOR PERMIT/ TENDER	23.04.18

NORTH



DESIGN	NH	DRAWN	NH
CHECKED	JDF	REVIEWED	JDF

PROJECT

UCDSB LINKLATER PS
2023 UPGRADES

ADDRESS

300 STONE ST. N.
GANANOQUE, ON

PROJECT NO.

CE-5514

DRAWING TITLE

MECHANICAL SPECIFICATIONS
CONT'D

DRAWING NUMBER

M12 OF 12