THE MERIDIAN RETIREMENT COMMUNITY - FIRE RESTORATION
1 MERIDIAN PLACE, NEPEAN, ON.
MECHANICAL

GENERAL LEGEND

SYMBOL	DESCRIPTION
———	EXISTING PIPING/DUCTWORK/EQUIPMENT
- - - - - - -	EXISTING PIPING/DUCTWORK/EQUIPMENT TO BE REMOVED/RELOCATED
━━━	NEW/RELOCATED PIPING/DUCTWORK/EQUIPMENT
— — — —	EXISTING PIPING/DUCTWORK/EQUIPMENT BELOW SLAB
━ ━ ━ ━	NEW PIPING/DUCTWORK/EQUIPMENT BELOW SLAB
(E)	DENOTES EXISTING EQUIPMENT
(N)	DENOTES NEW EQUIPMENT
(X)	DENOTES EQUIPMENT TO BE REMOVED

DRAWING LIST

SYMBOL	DESCRIPTION
M1	MECHANICAL DRAWING LIST, LEGENDS, & SCHEDULES
M2	MECHANICAL SPECIFICATIONS
M3	MECHANICAL SPECIFICATIONS
M4	MECHANICAL PLUMBING & UTILITIES PLAN
M5	MECHANICAL HVAC PLAN
M6	MECHANICAL ROOF PLAN & DETAILS

CONTROLS LEGEND

SYMBOL	DESCRIPTION
⁀·‿	LOW VOLTAGE CONTROL WIRING
Ⓣ	THERMOSTAT
(SC)	SPEED CONTROLLER

PLUMBING & UTILITIES LEGEND

SYMBOL	DESCRIPTION
— — — —	PIPING BELOW GRADE/SLAB
—— DCW ——	DOMESTIC COLD WATER PIPING
—— DHW ——	DOMESTIC HOT WATER PIPING
—— SAN ——	SANITARY PIPING
—— ST ——	STORM PIPING
—— V ——	VENT PIPING
—— COND ——	CONDENSATE DRAIN
—— NG ——	NATURAL GAS PIPING
⊏ ⊐	GAS SUPPORT
⊜ FD1	FLOOR DRAIN (TYPE)
◎ RD1	ROOF DRAIN (TYPE)
	PIPING OFFSET
	BRANCH PIPING DOWN
	PIPING DOWN
—○	PIPING UP
—▷—	REDUCER
—▶—	FLOW DIRECTION
ʃ	PIPE BREAK
[	CAP
—∪—	RUNNING P–TRAP
	P–TRAP
	DRAIN ASSEMBLY
—ICO	CLEAN OUT
—▯CO	WALL CLEAN OUT
—⊡CO	FLOOR CLEAN OUT
⋈	ISOLATION VALVES
	PRESSURE REDUCING VALVE (PRV)
	CIRCUIT BALANCING VALVE (CBV)
	CHECK VALVE
	FLEXIBLE CONNECTION
ǀǀǀ	UNION
	RELIEF VALVE
	DRAIN VALVE C/W CAP & CHAIN
—+ NFHB	NON–FREEZE HOSE BIBB
	THERMOMETER
PG	PRESSURE GAUGE
	DOMESTIC HOT WATER EXPANSION TANK (ET)

HVAC LEGEND

SYMBOL	DESCRIPTION
	RECTANGULAR DUCTWORK
	ROUND DUCTWORK
	ACOUSTICALLY LINED DUCTWORK (RETURN OR SUPPLY)
	THERMALLY INSULATED DUCTWORK (RETURN OR SUPPLY)
	ROUND DUCTWORK OFFSET
	RECTANGULAR DUCTWORK OFFSET
⊠	DUCTWORK UP
	DUCTWORK DOWN
	RECTANGULAR TO ROUND TRANSITION
	ECCENTRIC RECTANGULAR TO ROUND TRANSITION
	ECCENTRIC TRANSITION
	RECTANGULAR TAKE–OFF C/W BALANCING DAMPER
	RECTANGULAR TAKE–OFF
	ROUND TAKE–OFF C/W BALANCING DAMPER
	ROUND TAKE–OFF
▷]	TAKE–OFF C/W BALANCING DAMPER
▷	TAKE–OFF
⊠	SQUARE SUPPLY DIFFUSER (TYPE)
▦	SUPPLY/RETURN GRILLE
	WALL GRILLE (TYPE)
▭ TO	TRANSFER OPENING (TO)
	ACOUSTICALLY LINED TRANSFER DUCT (TD)
━ · ━ FD	FIRE DAMPER (FD)
——┘ BD	BALANCING DAMPER (BD)
▧	CABINET FAN C/W UNIT MOUNTED GRILLE (TYPE)
SD1 200ø │ 95	DIFFUSER TAG DIFFUSER TYPE AIRFLOW (L/S) SIZE (mm)
SG1 200x200 │ 95	GRILLE TAG GRILLE TYPE AIRFLOW (L/S) DIMENSIONS (mm)

NATURAL GAS DOMESTIC WATER HEATER SCHEDULE

TAG	LOCATION	INPUT (kW)	EFFICIENCY (%)	STORAGE CAPACITY (L)	RECOVERY RATE (L/H) @ 55.6°C	MAX. GAS INLET PRESSURE (kPa)	ELECTRICAL DATA		BASIS OF DESIGN	REMARKS
							AMPS	V/PH/Hz		
DHWT–1	JAN./STOR. 106	35	95	227	523	3.49	–	120/1/60	AO SMITH BTH–120(A)	MOD BURNER 5:1, S/S HX, 160PSI WP, DIRECT VENT SEALED COMBUSTION, ELECTRONIC CONTROLS, DIRECT SPARK IGNITION, T&P RELIEF, VERTICAL CONCENTRIC VENT KIT & NEUTRALIZING KIT.

NOTES: 1. FOR DETAILS REFER TO SPECIFICATIONS.

FIXTURE CONNECTION SCHEDULE

TAG	DOMESTIC COLD WATER (ømm)	DOMESTIC HOT WATER (ømm)	SANITARY (ømm)	TRIM	BASIS OF DESIGN	COMMENTS
L1	13	13	40	DELTA LAVATORY FAUCETS MODEL # B510LF–20	AMERICAN STANDARD WHEELCHAIR USERS LAVATORY	FAUCET HOLES ON 102mm CENTERS
S1	13	13	50	DELTA COMMERCIAL KITCHEN FAUCETS MODEL # 101LF–HDF	NOVANNI DOUBLE SINK MODEL # 2007AEI	
JS1	13	13	75	DELTA WALL MOUNT SERVICE SINK FAUCETS MODEL # 28C9LH	FRANKE MODEL # FSSOR223410/316–1	
WC1	20	–	75	CENTOCO SOLID PLASTIC SEATS ELONGATED 500 SERIES	AMERICAN STANDARD YORKVILLE FLOWISE RIGHT HEIGHT ELONGATED	
WB1	13	13	50	–	WATTS SERIES A2C–M1 INTELLIFLOW AUTOMATIC WATER SHUT OFF VALVE	
FD1	–	–	75	–	WATTS FD–200 FLOOR DRAIN WITH ROUND HEAVY DUTY STRAINER	

NOTES: 1. COORDINATE EXACT PIPING LOCATIONS ON SITE.
2. VENT TO MEET OBC REQUIREMENTS, VENTING THROUGH SLOPED ROOFS NOT PERMITTED.
3. ALL SINKS IDENTIFIED AS BUILT–IN: BASINS BY GENERAL TRADES. ALL OTHER ASSOCIATED ACCESSORIES AND TRIM BY MECHANICAL. ALL PIPEWORK TO BE INSTALLED NEATLY AND COORDINATED WITH ALL OTHER TRADES.
4. MANUFACTURER NAME & MODEL NUMBER REPRESENT ACCEPTABLE QUALITY STANDARD ONLY.
5. MINIMUM UNDERGROUND SANITARY PIPING SIZE TO BE 50ø.
6. INSTALLATION OF SINK TO COMPLY WITH LATEST EDITION OF CSA B651 STANDARD FOR BARRIER–FREE ACCESS. INSULATE DOMESTIC HOT WATER AND DRAIN PIPING UNDER COUNTER. SEE ARCH. DWG FOR DETAILS. ACCEPTABLE MATERIAL: SKALLGUARD WHITE OR MINERAL FIBRE WITH WHITE PVC JACKET.

GRILLE AND DIFFUSER SCHEDULE

UNIT NO.	TYPE	MODULE (mm)	INLET (mm)	MOUNT	FINISH	BASIS OF DESIGN	REMARKS
SG1	SUPPLY AIR GRILLE	AS INDICATED	AS INDICATED	CEILING	B12	EH PRICE 620D	ADJUSTABLE DOUBLE DEFLECTION
SD1	SUPPLY AIR DIFFUSER	300x300	AS INDICATED	CEILING	B12	EH PRICE SCD	
SD2	SUPPLY AIR DIFFUSER	500x500	AS INDICATED	CEILING	B12	EH PRICE SCD	
RG1	RETURN AIR GRILLE	AS INDICATED	AS INDICATED	DRYWALL	B12	EH PRICE 80	
BV1	BRICK VENT	305x197	AS INDICATED	WALL	204–R1	RUSKIN BV100	

NOTES: 1. FOR DETAILS REFER TO SPECIFICATIONS.

FAN SCHEDULE

TAG	LOCATION	FUNCTION	FAN DATA						ELECTRICAL DATA		BASIS OF DESIGN	REMARKS
			TYPE	DRIVE (BELT/DIRECT)	AIR FLOW (L/s)	ESP (Pa)	FAN SPEED (RPM)	SONES	MOTOR SIZE (HP)	V/PH/Hz		
EF–1	WC 103	W/R EXHAUST	CEILING EXHAUST FAN	DIRECT	40	62	870	0.4	0.02	120/1/60	GREENHECK SP–A90	C/W SPEED CONTROLLER
EF–2	JAN/STOR. 106	EXHAUST	INLINE BLOWER	DIRECT	51	62	1010	0.6	0.03	120/1/60	GREENHECK SP–A125	C/W SPEED CONTROLLER

NOTES: 1. FOR DETAILS REFER TO SPECIFICATIONS.
2. DISCONNECT SWITCH BY DIV. 26.
3. SPEED SWITCHES SHALL BE SUPPLIED BY MECHANICAL CONTRACTOR, INSTALLED BY ELECTRICAL CONTRACTOR.

RANGE HOOD SCHEDULE

TAG	LOCATION	MOUNTING LOCATION (WALL / ISLAND / CABINET)	AIR FLOW (L/s)	SIZE (WIDTH x DEPTH)	SONES	ELECTRICAL DATA		BASIS OF DESIGN	REMARKS
						AMPS	V/PH/Hz		
RH–1	KITCHEN 110	WALL	212	750mm x 500mm	8.5	3.3	120/1/60	BROAN B58 SERIES	STAINLESS STEEL C/W LAMPS

NOTES: 1. FOR DETAILS REFER TO SPECIFICATIONS.

ROOFTOP UNIT SCHEDULE

TAG	LOCATION	AREA SERVED	SUPPLY FAN DATA (VSD)					GAS HEATING SECTION					DX COOLING COIL DATA					ELECTRICAL DATA		BASIS OF DESIGN	REMARKS
			FAN TYPE	AIR FLOW (L/s)	EXTERNAL STATIC PRESSURE (Pa)	TOTAL STATIC PRESSURE (Pa)	MOTOR SIZE (HP)	INPUT (kW)	OUTPUT (kW)	E.A.T. (°C)	L.A.T. (°C)	STAGES	TOTAL CAPACITY (kW)	SENSIBLE CAPACITY (kW)	E.A.T. (DB/WB) (°C)	L.A.T. (DB/WB) (°C)	STAGES	FLA/MCA/MOC	V/PH/Hz		
RTU–1	ROOF	GROUND FLOOR	BELT	1982	149	204	2.7	73	60	20	45	2	42.6	29	26.7/19.4	14.6/13.3	2	10.6/65/80	208/3/60	CARRIER 48TCFD14A2A5–6B0G0	C/W PROGRAMMABLE THERMOSTAT SENSOR & PROVIDE 24V WIRING, C/W DEMAND CONTROL VENTILATION

NOTES: 1. FOR DETAILS REFER TO SPECIFICATIONS.
2. MANUFACTURER NAME & MODEL NUMBER REPRESENTS ACCEPTABLE QUALITY STANDARD ONLY. ALTERNATIVE MATERIALS MAY BE APPROVED AFTER REVIEW OF TECHNICAL INFORMATION BY ENGINEER.

EXPANSION TANK SCHEDULE

TAG	LOCATION	FUNCTION	TYPE (DIAPHRAGM/ BLADDER)	OPERATING PRESSURE		OPERATING TEMPERATURE		TANK VOLUME (L)	ACCEPTANCE VOLUME (L)	ORIENTATION (HORIZONTAL/ VERTICAL)	BASIS OF DESIGN	REMARKS
				MIN (kPa)	MAX (kPa)	MIN (°C)	MAX (°C)					
ET–1	JAN./STOR. 106	DOMESTIC HOT WATER	DIAPHRAGM	–	689	–	115	33	9.5	VERTICAL	AMTROL EXTROL MODEL # 60	–

NOTES: 1. FOR DETAILS REFER TO SPECIFICATIONS.
2. PRE–CHARGE PRESSURE TO BE EQUIVALENT TO MINIMUM OPERATING PRESSURE.

Client

DATE	REVISION	REF
2019–03–08	ISSUED FOR TENDER	2
2019–02–11	ISSUED FOR PERMIT/TENDER	1
2019–02–06	ISSUED FOR REVIEW	0

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Nord du projet

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PROVINCE OF ONTARIO

Project/Projet
MERIDIAN RETIREMENT COMMUNITY,
FIRE RESTORATION

Drawing title/Titre du dessin
MECHANICAL DRAWING LIST,
LEGENDS & SCHEDULES

Scale Échelle	AS NOTED	Project no./No. du projet	2019–148
Design by Conçu par	B.BROWN	Drawing/Dessin	M1 OF 6
Drawn by Dessiné par	B.BROWN		
Reviewed by Examiné par	F.BANN		
Date Date	MARCH 2019	Revision no: –	Acad file/Fichier: –

GENERAL NOTES:

1. ALL WORK SHOWN OR IMPLIED ON THESE DRAWINGS SHALL BE CARRIED OUT IN ACCORDANCE WITH:
   A. ALL CODES AND LAWS APPLICABLE (OBC)
   B. INSTRUCTIONS TO BIDDERS
   C. IN ACCORDANCE WITH SMACNA–LATEST EDITION (DUCTWORK)
   D. IN ACCORDANCE WITH ULC STANDARDS
2. PRIOR TO SUBMITTING TENDERS, EACH TRADE SHALL EXAMINE THE SITE TO DETERMINE THE CONDITIONS WHICH MAY AFFECT THE PROPOSED WORK. NO CLAIM FOR EXTRA PAYMENT WILL BE CONSIDERED BECAUSE OF FAILURE TO FULFILL THIS CONDITION. START OF WORK WILL BE DEEMED EVIDENCE OF ACCEPTANCE OF, AND SATISFACTION WITH, EXISTING CONDITIONS.
3. THE DRAWINGS SHALL BE CONSIDERED TO SHOW THE GENERAL CHARACTER AND SCOPE OF THE WORK AND NOT THE EXACT DETAILS OF THE INSTALLATION. THE INSTALLATION SHALL BE COMPLETE WITH ALL ACCESSORIES REQUIRED FOR A COMPLETE AND OPERATIVE INSTALLATION.
4. MECHANICAL CONTRACTOR IS RESPONSIBLE TO FIELD MEASURE LOCATION OF NEW OR RELOCATED EQUIPMENT TO VERIFY CLEARANCES WITH THE MANUFACTURER PRIOR TO ORDERING.
5. THESE MECHANICAL DRAWINGS MUST BE READ IN CONJUNCTION WITH THE ARCHITECTURAL AND ELECTRICAL DRAWINGS AND SPECIFICATIONS.
6. THE WORD "PROVIDE" SHALL DENOTE "SUPPLY AND INSTALL". THE WORD "TAB" SHALL DENOTE "TESTING, ADJUSTING, AND BALANCING".
7. CONTRACTOR SHALL FOLLOW THE BIDDING DOCUMENT PROJECT SCHEDULE. UPON AWARD, CONTRACTOR SHALL SUBMIT WORK SCHEDULE TO PROJECT MANAGER & ENGINEER FOR APPROVAL
8. THE MECHANICAL CONTRACTOR SHALL COORDINATE THE WORK WITH ALL OTHER TRADES AND THE OWNER. THE CONTRACTOR IS RESPONSIBLE FOR COMMUNICATING SAFETY REQUIREMENTS TO ITS EMPLOYEES AND COMPLYING WITH OCCUPATIONAL HEALTH AND SAFETY ACT.
9. CONTRACTOR TO PROVIDE, PRIOR TO COMMENCEMENT OF WORK, ONTARIO MINISTRY OF LABOUR CONTRACTOR REGISTRATION FORM AS WELL AS A CURRENT SIGNED AND DATED CORPORATE HEALTH AND SAFETY POLICY.
10. CONTRACTOR TO PROVIDE FOR THE USE OF HIS WORK FORCE A FIRST AID KIT ACCEPTABLE TO WSIB AND MOL.
11. PAY ALL REQUIRED FEES AND PERMITS.
12. WORKMANSHIP AND MATERIALS SHALL MATCH OR EXCEED THAT OF THE EXISTING AS PRESENTED BY THE PROJECT MANAGER.
13. ALL WORK TO BE CONDUCTED DURING HOURS SPECIFIED BY THE PROJECT MANAGER.
14. ALL CHANGES AND CONNECTIONS TO EXISTING SERVICES, REQUIRING THE SHUTDOWN OF THAT SERVICE SHALL BE DONE AT THE TIME DESIGNATED BY THE PROJECT MANAGER, UNLESS OTHERWISE STATED.
15. THE CONTRACTOR SHALL AT ALL TIMES KEEP PREMISES FREE FROM THE ACCUMULATION OF WASTE MATERIAL TO THE SATISFACTION OF THE PROJECT MANAGER. THE CLEANING OF THE AFFECTED AREA SHALL BE CONTINUOUS. PLACE DUST PROTECTION IN THE FORM OF COVER SHEETS OVER EQUIPMENT AND FURNITURE TO ENSURE NO DUST INFILTRATION.
16. EQUIPMENT REQUIRING CONNECTION TO AN ELECTRICAL POWER SOURCE SHALL BE CSA OR ULC APPROVED FOR USE AT LOCATION OF INSTALLATION.
17. COORDINATE MATERIAL STORAGE WITH THE SITE SUPERINTENDENT AND OTHER TRADES.
18. MANUFACTURER'S INSTRUCTIONS REGARDING THE HANDLING, INSTALLATION AND TESTING OF EQUIPMENT SPECIFIED HEREIN SHALL BE CONSIDERED PART OF THIS SPECIFICATION.
19. SUPPLY TOOLS, EQUIPMENT AND PERSONNEL TO DEMONSTRATE AND INSTRUCT OPERATING AND MAINTENANCE PERSONNEL IN OPERATING, CONTROLLING, ADJUSTING, TROUBLESHOOTING AND SERVICING OF ALL SYSTEMS AND EQUIPMENT DURING REGULAR WORK HOURS, PRIOR TO ACCEPTANCE.
20. MECHANICAL CONTRACTOR SHALL OBTAIN AND PAY FOR HOISTING OF MECHANICAL EQUIPMENT. COORDINATE HOISTING SCHEDULE WITH PROJECT MANAGER. TAKE ALL NECESSARY PRECAUTIONS TO PREVENT DAMAGE TO PUBLIC AND PRIVATE PROPERTY. USE PROPER BARRIERS AND/OR PERSONNEL TO ENSURE HOISTING SAFETY FOR EMPLOYEES AND PUBLIC. CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGE TO EQUIPMENT AND/OR PROPERTY DURING HOISTING. ARRANGE AND PAY FOR ANY REQUIRED PERMITS.
21. INSPECT ALL NEW EQUIPMENT UPON DELIVERY AND NOTIFY PROJECT ENGINEER OF ANY DAMAGE OR DEFICIENCIES.
22. ALL EQUIPMENT, PIPING, DUCTWORK AND WIRING SHALL BE SUSPENDED FROM THE BUILDING STRUCTURE.
23. PROVIDE BLACK WITH WHITE WRITING LAMACOID PLATE ON ALL NEW EQUIPMENT. LABEL UNIT AS SHOWN ON DRAWINGS. LETTERING SIZE TO BE MINIMUM 25MM HIGH. MOUNT NEAR CONTROL SECTION OF THE UNIT.
24. PROVIDE CUTTING, PATCHING AND CORING OF ALL WALLS, CEILING AND OTHER SURFACES AS REQUIRED FOR MECHANICAL WORK. CHECK WITH BUILDING MANAGEMENT PRIOR TO CORE DRILLING AND CUTTING OF FLOOR SLAB REGARDING BUILDING REQUIREMENTS AND POLICIES. PRIOR TO SLAB CUTTING OR CORING, SCAN THE SLAB USING GPR TECHNOLOGY AND COORDINATE DRILLING TO MINIMIZE CUTTING OF THE REINFORCING STEEL AND CONDUIT. FIRE STOP ALL NEW FIRE RATED PENETRATIONS. THE CONTRACTOR IS TO INCLUDE IN TENDER PRICE ALL WORK ASSOCIATED WITH CORE DRILLING AFTER NORMAL WORKING HOURS. OBTAIN WRITTEN VERIFICATION OF LOCATIONS FROM THE STRUCTURAL ENGINEER OF RECORD PRIOR TO DRILLING. CUTTING TORCHES SHALL NOT BE USED FOR MAKING HOLES. PATCH ALL HOLES THROUGH SLAB WITH FIRE–STOP CAULKING (ULC LISTED). PATCHED SURFACES ARE TO BE PRIMED FINISHED, READY FOR FINAL COVERING BY OTHERS (COORDINATE WITH ROOFING CONTRACTOR).
25. PIPING LAYOUT ILLUSTRATED ON DRAWINGS INDICATES GENERAL ROUTING OF PIPE WORK AND DOES NOT SHOW ALL FITTINGS AND OFFSETS REQUIRED FOR COMPLETE INSTALLATION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL PIPING FITTINGS & OFFSETS REQUIRED FOR COORDINATED INSTALLATION WITH OTHER SYSTEMS (DUCTWORK, PIPING, CONDUITS, LIGHTS, ETC.)
26. CONTRACTOR SHALL BE RESPONSIBLE FOR DEACTIVATION, DRAINING AND REFILLING OF DOMESTIC WATER SYSTEMS TO ALLOW PLUMBING FIXTURE REPLACEMENTS.
27. DUCT SIZES INDICATED ON DRAWINGS WHERE ACOUSTICALLY LINED ARE FREE AREA SIZES AND NOT SHEET METAL SIZES.
28. COORDINATE DUCTWORK ROUTING PRIOR TO DUCT FABRICATION; IF MODIFICATIONS ARE REQUIRED, REVISE DUCT SIZE TO MAINTAIN CROSS SECTIONAL AREA.
29. ALLOW FOR 1500 MM OF ADJUSTMENT FOR EXACT LOCATION OF AIR HANDLING UNITS, PUMPS, DUCTS, PIPING, ETC. AT NO EXTRA COST OR CREDIT.
30. ALL MANUFACTURERS AND MANUFACTURER REPRESENTATIVES SHALL SEPARATE PRICING BY MAJOR PIECE OF EQUIPMENT, EQUIPMENT TYPE, AND/OR SERVICE WHEN SUBMITTING TO BIDDING CONTRACTORS. LUMP SUM VALUES ARE NOT TO BE SUBMITTED TO CONTRACTORS. MANUFACTURERS & REPRESENTATIVES PROVIDING ONLY LUMP SUM PRICING WILL BE DISQUALIFIED FROM TENDER.
31. PRIOR TO CLOSING OF CEILINGS, MECHANICAL CONTRACTOR SHALL NOTIFY THE ENGINEER THAT AN INSPECTION IS REQUIRED BEFORE PROCEEDING.
32. CONTRACTOR TO NOTIFY PROJECT MANAGER 3 DAYS BEFORE SCHEDULED SUBSTANTIAL COMPLETION TO ARRANGE INTERIM INSPECTION AND EQUIPMENT COMMISSIONING. NOTIFY PROJECT MANAGER IN WRITING OF ANY CHANGES IN SCHEDULE.
33. WARRANTY PERIOD SHALL BE FOR TWELVE (12) MONTHS AFTER THE DATE OF SUBSTANTIAL COMPLETION AS DETERMINED BY ENGINEER.
34. SUBMITTALS:
   .1 SUBMIT ONE(1) COPY OF SHOP DRAWINGS AND PRODUCT DATA IN ELECTRONIC PDF FORMAT FOR ENGINEER'S REVIEW PRIOR TO PURCHASING AND ORDERING. HARD COPY SHOP DRAWINGS WILL NOT BE ACCEPTED. REVIEWED ELECTRONIC SHOP DRAWINGS WILL BE RE–DISTRIBUTED AS PER PROJECT MANAGER'S INSTRUCTIONS. SHOP DRAWINGS SHALL INCLUDE ALL SPECIFIED EQUIPMENT & SYSTEMS.
   .2 PROVIDE SUBMITTALS IN ACCORDANCE WITH APPLICABLE CODES REQUIRED FOR OCCUPANCY INCLUDING BUT NOT LIMITED TO THE FOLLOWING:
      .3 PLUMBING & UTILITIES:
         .1 SEISMIC CERTIFICATION LETTER SUBMITTED.
      .3 HVAC:
         .1 SEISMIC CERTIFICATION LETTER SUBMITTED.
   .3 MECHANICAL SCOPE OF WORK CONSIDERED COMPLETE WHEN THE FOLLOWING ITEMS HAVE BEEN RECEIVED AND REVIEWED BY ENGINEER:
      .1 ALL SHOP DRAWINGS LISTED IN THIS SPECIFICATION.
      .2 BALANCING REPORT IN ACCORDANCE WITH TAB SECTION IN SPECIFICATIONS.
      .3 AS–BUILT DRAWINGS SHOWING AS–BUILT CONDITIONS COMPLETE WITH RED LINED MARKUPS TO PROJECT MANAGER WITH CONTRACTOR'S SIGNATURE.
      .4 START–UP REPORT FROM MANUFACTURER OF EQUIPMENT.
      .5 THREE (3) COPIES OF OPERATIONS AND MAINTENANCE MANUALS CONTAINING ALL ITEMS PREVIOUSLY REVIEWED BY ENGINEER IN A THREE RING BINDER AND DIVIDERS ORGANIZING ALL SUBMISSIONS BY EACH MECHANICAL TRADE. OPERATIONS MANUAL TO ALSO INCLUDE THE FOLLOWING BUT SHALL NOT BE LIMITED TO:
         .1 LIST OF TRADES INVOLVED AND CONTACT INFORMATION.
         .2 CONTRACTOR'S LETTER OF WARRANTY.
         .3 ALL LETTERS REQUIRED FOR WORKPLACE CONFORMANCE.

MECHANICAL SPECIFICATIONS:

1. SEISMIC RESTRAINT:

.1 PROVIDE COMPLETE SEISMIC RESTRAINT SYSTEM FOR ALL MECHANICAL SYSTEMS AS PER ONTARIO BUILDING CODE LATEST EDITION & NFPA13.
.2 SEISMIC RESTRAINT DESIGN AND SUPERVISION SHALL BE CONDUCTED AND STAMPED BY A PROFESSIONAL SEISMIC ENGINEER. SUBMIT LETTER AND CALCULATION FOR ENGINEER'S REVIEW PRIOR TO SUBSTANTIAL COMPLETION.
.3 THE FINAL CERTIFICATION LETTER SHALL BE FORMATTED TO IDENTIFY THE FOLLOWING WITHIN THE BODY OF THE LETTER:
   .1 THE DATE OF THE FINAL INSPECTION
   .2 A STATEMENT THAT LISTS ALL CONTRACT DOCUMENTS WHICH WERE REVIEWED INCLUDING BUT NOT LIMITED TO THE MECHANICAL DRAWINGS, PROJECT CHANGE ORDERS, SITE INSTRUCTIONS, ETC.
   .3 A STATEMENT WHICH CLEARLY IDENTIFIES ANY EXCLUSIONS OF SCOPE OF SERVICE, AND
   .4 A STATEMENT THAT CERTIFIES THE COMPLETE MECHANICAL SEISMIC INSTALLATION MEETS THE LATEST VERSION OF OBC & APPLICABLE CODES & STANDARDS.

PLUMBING & UTILITIES:

1. INSTALLATION OF PIPEWORK:

.1 CLEARANCES:
   .1 PROVIDE CLEARANCES AROUND SYSTEMS, EQUIPMENT AND COMPONENTS FOR OBSERVATION OF OPERATION, INSPECTION, SERVICING, MAINTENANCE AND AS RECOMMENDED BY MANUFACTURER.
.2 DRAINAGE:
   .1 INSTALL DRAIN VALVE AT LOW POINTS IN PIPING SYSTEMS AND AT THE BASE OF ALL RISERS.
   .2 DRAIN VALVE: NPS 3/4 FULL PORT BALL VALVES UNLESS INDICATED OTHERWISE, WITH HOSE MALE THREAD, CAP AND DRAIN.
.4 AUTOMATIC AIR VENTS:
   .1 INSTALL AUTOMATIC AIR VENTS AT HIGH POINTS OF PIPING SYSTEMS C/W FULL PORT BALL VALVES. AIR VENTS MUST HAVE A MINIMUM CONNECTION OF 13 MM (1/2").
.5 PIPE WORK INSTALLATION:
   .1 SCREWED FITTINGS TO BE JOINTED WITH POLYTETRAFLUOROETHYLENE (PTFE) THREAD SEAL TAPE.
   .2 PROTECT OPENINGS AGAINST ENTRY OF FOREIGN MATERIAL.
   .3 ASSEMBLE PIPING USING FITTINGS MANUFACTURED TO ANSI STANDARDS.
   .4 EXCEPT WHERE INDICATED OTHERWISE, SLOPE PIPING IN DIRECTION OF FLOW FOR POSITIVE DRAINAGE AND VENTING.
   .5 EXCEPT WHERE INDICATED, INSTALL SO AS TO PERMIT SEPARATE THERMAL INSULATION OF EACH PIPE.
   .6 GROUP PIPING WHEREVER POSSIBLE AND AS INDICATED.
   .7 USE ECCENTRIC REDUCERS AT PIPE SIZE CHANGES TO ENSURE POSITIVE DRAINAGE AND VENTING.
   .8 PROVIDE DIELECTRIC COUPLINGS WHERE DISSIMILAR METALS ARE JOINED.
.6 SLEEVES:
   .1 INSTALL WHERE PIPES PASS THROUGH CONCRETE STRUCTURES AND FIRE RATED ASSEMBLIES.
   .2 MATERIAL: SCHEDULE 40 BLACK STEEL PIPE
   .3 PROVIDE SPACE FOR FIRE STOPPING. MAINTAIN FIRE RATING INTEGRITY. ENSURE NO CONTACT BETWEEN COPPER PIPE OR TUBE AND SLEEVE.
.7 FIRE STOPPING:
   .1 SEAL ALL PENETRATIONS OF COPPER/STEEL PIPING THROUGH FIRE SEPARATIONS (I.E. WALL/SLAB) WITH ULC LISTED FIRE STOP CAULKING.
   .2 SEAL ALL PENETRATIONS OF NON–METALLIC PIPING THROUGH FIRE SEPARATIONS (I.E. WALL/SLAB) WITH ULC LISTED FIRE STOP COLLARS.
   .3 ALL FIRE STOPPING SHALL BE INSTALLED IN ACCORDANCE WITH ULC LISTING.

2. DOMESTIC HOT & COLD WATER PIPING:

.1 COPPER TUBE, HARD DRAWN, TYPE "L".
.2 WROUGHT COPPER FITTINGS.
.3 LEAD FREE SOLDER, BRAZE OR SILVER SOLDER (SILFOS 5, 5% SILVER)
.4 BALL VALVES:
   .1 NPS 2" AND UNDER, SCREWED OR SOLDERED:
      .1 CLASS 150.
      .2 BRONZE BODY, STAINLESS STEEL BALL, PTFE TEFLON ADJUSTABLE PACKING, BRASS GLAND AND PTFE TEFLON SEAT, STEEL LEVER HANDLE.
      .3 ACCEPTABLE MATERIAL: CRANE OR EQUAL.

3. DRAINAGE, WASTE & VENT PIPING:

.1 COPPER TYPE DWV ABOVE GRADE; SOLDER: 95:5, 50:50 TO ASTM B32–00EL, TYPE 50A.
.2 FIRE & SMOKE RESISTANT COATED DWV PVC PIPING & FITTINGS, IPEX SYSTEM XFR 15/50 PVC–DWV, ABOVE GRADE.
.3 CAST IRON ABOVE GRADE; MECHANICAL JOINTS: PROVIDE HUBLESS SOIL PIPE COUPLINGS CONSTRUCTED OF EXTRA WIDE 4 TO 6 BAND CORRUGATED TYPE 304 STAINLESS STEEL BANDS, WITH HEAVY DUTY WORM DRIVE CLAMPS.
.4 BELOW GRADE PVC DR28 OR SYSTEM 15.
.5 SLOPE SANITARY DRAIN ACCORDING TO CODE.
.6 INSTALL IN ACCORDANCE WITH CANADIAN PLUMBING CODE, PROVINCIAL PLUMBING CODE AND LOCAL AUTHORITY HAVING JURISDICTION.

4. PIPE TESTING AND CLEANING:

.1 PRESSURE TESTING
   .1 FILL SYSTEM WITH WATER. ENSURE ALL AIR IS REMOVED FROM SYSTEM. BOOST PRESSURE TO TEST PRESSURE USING WATER ONLY. PRESSURIZATION WITH AIR OR NITROGEN IS NOT ALLOWED. TEST TO 1.5 TIMES NORMAL OPERATING PRESSURE TO A MAXIMUM OF THE PIPING SYSTEMS WORKING PRESSURE INCLUDING DEVICES (I.E. VALVES, FITTINGS, ACCESSORIES).
   .2 MINIMUM TEST PRESSURE TO BE:
      .1 862 kPa (125 PSI) FOR COPPER/STEEL PIPING SYSTEMS.
   .3 MAINTAIN SPECIFIED TEST PRESSURE WITHOUT LOSS FOR FOUR (4) HOURS MINIMUM. TEMPERATURE OF SYSTEM TO REMAIN CONSTANT DURING ENTIRE DURATION OF TEST.
   .4 BEAR COSTS FOR REPAIRS OR REPLACEMENT, RETESTING, AND MAKING GOOD. ENGINEER TO DETERMINE WHETHER REPAIR OR REPLACEMENT IS APPROPRIATE.
   .5 INSULATE OR CONCEAL WORK ONLY AFTER REVIEW AND APPROVAL OF TEST RESULTS BY ENGINEER.
.2 FLUSHING AND CLEANING:
   .1 DOMESTIC WATER SYSTEMS:
      .1 FLUSH ENTIRE SYSTEM FOR 8 HOURS. ENSURE OUTLETS FLUSHED FOR 2 HOURS. LET STAND FOR 24 HOURS, THEN DRAW ONE SAMPLE OFF LONGEST RUN. SUBMIT TO TESTING LABORATORY TO VERIFY THAT SYSTEM IS CLEAN. LET SYSTEM FLUSH FOR AN ADDITIONAL 2 HOURS, THEN DRAW OFF ANOTHER SAMPLE FOR TESTING. SUBMIT TEST RESULTS TO ENGINEER.
   .2 CLEANING AND FLUSHING OF NEW PIPING SYSTEMS SHALL BE PERFORMED AFTER PRESSURE TESTING AND PRIOR TO CONNECTION TO EXISTING SYSTEM.

5. CONDENSATE PIPING:

.1 PIPING DESIGNED TO ENSURE COMPLETE REMOVAL OF ALL WATER. DRAIN CONNECTIONS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND DRAIN INTO NEARBY HUB DRAIN STAYING TIGHT TO THE SLAB.
.2 COPPER TUBE, HARD DRAWN, TYPE "L".
.3 WROUGHT COPPER FITTINGS.
.4 LEAD FREE SOLDER, BRAZE OR SILVER SOLDER (SILFOS 5, 5% SILVER)
.5 FIRE & SMOKE RESISTANT COATED DWV PVC PIPING & FITTINGS, IPEX SYSTEM XFR 15/50 PVC–DWV, ABOVE GRADE.

6. THERMAL INSULATION FOR PIPING:

.1 GENERAL:
   .1 ALL COMPONENTS OF INSULATION SYSTEM TO HAVE MAXIMUM FLAME SPREAD RATING OF 25 AND MAXIMUM SMOKE DEVELOPED RATING OF 50 IN ACCORDANCE WITH CAN4–S102.
.2 TIAC CODE A–1 FORMED MINERAL FIBRE WITHOUT VAPOUR BARRIER:
   .1 APPLICATION: FOR PIPING, VALVES AND FITTINGS ON:
      .1 DOMESTIC HOT WATER PIPING SYSTEMS.
   .2 MATERIAL:
      .1 MINERAL FIBRE: TO CAN/CGSB–51.9–92.
      .2 MAXIMUM "K" FACTOR: TO CAN/CGSB–51.9–92.
   .3 THICKNESS: 25MM
.3 TIAC CODE A–3 FORMED MINERAL FIBRE WITH FACTORY APPLIED VAPOUR RETARDER JACKET:
   .1 APPLICATION: FOR PIPING, VALVES AND FITTINGS ON:
      .1 DOMESTIC COLD WATER PIPING SYSTEMS.
      .2 CONDENSATE PIPING SYSTEM.
   .2 MATERIAL:
      .1 MINERAL FIBRE: TO CAN/CGSB–51.9–92.
      .2 JACKET: TO CGSB 51–GP–52MA.
      .3 MAXIMUM "K" FACTOR: TO CAN/CGSB–51.9–92.
   .3 THICKNESS: 25MM
.4 FASTENINGS:
   .1 FOR INSULATION SYSTEMS TIAC CODE A–1:
      .1 TAPE: SELF–ADHESIVE, ALUMINUM, REINFORCED, 50MM WIDE MINIMUM.
      .2 CONTACT ADHESIVE: QUICK SETTING.
      .3 CANVAS ADHESIVE: WASHABLE.
      .4 TIE WIRE: 1.5MM DIAMETER STAINLESS STEEL.
      .5 BANDS: STAINLESS STEEL, 19MM WIDE, 0.5MM THICK.
      .6 THERMAL INSULATING AND FINISHING CEMENT: TO CAN/CGSB–51.12–95.
      .7 VAPOUR RETARDER LAP ADHESIVE: WATER BASED, FIRE RETARDANT TYPE, COMPATIBLE WITH INSULATION.
      .8 INDOOR VAPOUR RETARDER FINISH: VINYL EMULSION TYPE ACRYLIC, COMPATIBLE WITH INSULATION.
   .2 FOR INSULATION SYSTEMS TIAC CODE: A–3.
      .1 SECUREMENTS: TAPE AT 300 MM OC.
      .2 SEALS: VR LAP SEAL ADHESIVE, VR LAGGING ADHESIVE.
      .3 INSTALLATION: TIAC CODE: 1501–C.
.5 JACKETS:
   .1 CANVAS:
      .1 220 G/SQ.M. COTTON, PLAIN WEAVE, TREATED WITH DILUTE FIRE RETARDANT LAGGING ADHESIVE TO ASTM C921.
      .2 LAGGING ADHESIVE: COMPATIBLE WITH INSULATION.
      .3 RANDOM SAMPLES TO BE TAKEN DURING INSTALLATION C/W DATE & TIME ON SAMPLE.
   .2 ALUMINUM:
      .1 TO ASTM B209.
      .2 THICKNESS: 0.50 MM SHEET.
      .3 FINISH: EMBOSSED.
      .4 JOINING: LONGITUDINAL AND CIRCUMFERENTIAL SLIP JOINTS WITH 50 MM LAPS.
      .5 FITTINGS: 0.5 MM THICK DIE–SHAPED FITTING COVERS WITH FACTORY–ATTACHED PROTECTIVE LINER.
      .6 METAL JACKET BANDING AND MECHANCIAL SEALS: STAINLESS STEEL, 19 MM WIDE, 0.5 MM THICK AT 300 MM SPACING.
   .3 PVC:
      .1 ONTARIO BUILDING CODE COMPLIANT FOR 25/50 FLAME SPREAD AND SMOKE DEVELOPED.
      .2 MINIMUM THICKNESS 0.015 MIL.
      .3 COLOUR WHITE UNLESS OTHERWISE SPECIFIED.
      .4 NON YELLOWING UV STABILIZED.
      .5 MINIMUM SERVICE TEMPERATURES: –20°C.
      .6 MAXIMUM SERVICE TEMPERATURE: 65°C.
      .7 MOISTURE VAPOUR TRANSMISSION: 0.02 PERM.
      .8 FASTENINGS:
         .1 USE SOLVENT WELD ADHESIVE COMPATIBLE WITH INSULATION TO SEAL LAPS AND JOINTS.
         .2 TACKS.
         .3 PRESSURE SENSITIVE VINYL TAPE OF MATCHING COLOUR.
   .4 APPLICATION:
      .1 EXPOSED INDOORS: CANVAS, EXCEPT GENERATOR EXHAUST SHALL BE ALUMINUM.
      .2 EXPOSED PIPING & FITTINGS IN MECHANICAL ROOMS: PVC.
      .3 EXPOSED EXTERIOR: ALUMINUM.
      .4 CONCEALED, INDOORS: PVC ON VALVES AND FITTINGS ONLY. NO FURTHER FINISH.
      .5 USE VAPOUR RETARDER JACKET ON TIAC CODE A–3 INSULATION COMPATIBLE WITH INSULATION.
      .6 FINISH ATTACHMENTS: STAINLESS STEEL BANDS AT 150 MM O.C. SEALS: WING OR CLOSED.
      .7 INSTALLATION: TO APPROPRIATE TIAC CODE CRF/1 THROUGH CRF/5.

7. HEAT TRACING FOR PIPING:

.1 GENERAL:
   .1 FURNISH AND INSTALL A COMPLETE ULC LISTED AND CSA CERTIFIED SYSTEM OF HEATING CABLES, COMPONENTS, AND CONTROLS TO PREVENT PIPES FROM FREEZING.
.2 PRODUCTS:
   .1 THE SELF–REGULATING HEATING CABLE SHALL CONSIST OF TWO (2) 16 AWG NICKEL–COPPER BUS WIRES EMBEDDED IN A PARALLEL IN A SELF–REGULATING POLYMER CORE THAT VARIES ITS POWER OUTLET TO RESPOND TO TEMPERATURE ALL ALONG ITS LENGTH, ALLOWING THE HEATING CABLE TO BE CUT TO LENGTH IN THE FIELD. THE HEATING CABLE SHALL BE COVERED BY A RADIATION–CROSSLINKED, MODIFIED POLYOLEFIN DIELECTRIC JACKET. TO PROVIDE A GROUND PATH AND TO ENHANCE THE HEATING CABLE'S RUGGEDNESS, THE HEATING CABLE SHALL HAVE A BRAID OF TINNED COPPER AND AN OUTER JACKET OF MODIFIED POLYOLEFIN AS REQUIRED PER SECTION 427–23 OF THE NEC–1996. FOR INSTALLATION OF PLASTIC PIPING, THE HEATING CABLE SHALL BE APPLIED USING ALUMINUM TAPE (AT–180).
   .2 IN ORDER TO CONSERVE ENERGY AND TO PREVENT OVERHEATING, THE HEATING CABLE SHALL HAVE A SELF–REGULATING FACTOR OF AT LEAST 90%. THE SELF–REGULATING FACTOR IS DEFINED AS THE PERCENTAGE REDUCTION, WITHOUT THERMOSTATIC CONTROL, OF THE HEATING CABLE OUTPUT GOING FROM 4.4°C (40°F) PIPE TEMPERATURE OPERATION TO 65.6°C (150°F) PIPE TEMPERATURE OPERATION.
   .3 THE HEATING CABLE SHALL OPERATE ON LINE VOLTAGES OF [120][208] VOLTS WITHOUT THE USE OF TRANSFORMERS.
   .4 THE HEATING CABLE FOR METAL PIPE FREEZE PROTECTION SHALL BE SIZED ACCORDING TO THE TABLE BELOW. THE REQUIRED HEATING CABLE OUTPUT RATING IS IN WATTS PER FOOT AT 10°C (50°F). (HEATING CABLE SELECTION BASED ON 25 MM (1") FIBERGLASS INSULATION ON METAL PIPING.)

PIPE SIZE (NPS):	MINIMUM AMBIENT TEMPERATURE –17°C(0°F)	–29°C(–20°F)
3 OR LESS	5 WATTS	5 WATTS
4	5 WATTS	5 WATTS

   .5 HEATING–CABLE CIRCUIT SHALL BE PROTECTED BY A GROUND–FAULT DEVICE FOR EQUIPMENT PROTECTION. THIS REQUIREMENT IS IN ACCORDANCE WITH SECTION 427–22 OF THE NEC–1996.
.3 COMPONENTS:
   .1 ALL HEATING–CABLE COMPONENTS SHALL BE UL LISTED AND CSA CERTIFIED, FOR USE AS PART OF THE SYSTEM TO PROVIDE PIPE FREEZE PROTECTION. COMPONENT ENCLOSURES SHALL BE RATED NEMA 4X TO PREVENT WATER INGRESS AND CORROSION. INSTALLATION SHALL NOT REQUIRE THE INSTALLATION CONTRACTOR TO CUT INTO THE HEATING–CABLE CORE TO EXPOSE THE BUS WIRES. CONNECTION SYSTEMS THAT REQUIRE THE INSTALLING CONTRACTOR TO STRIP THE BUS WIRES, OR THAT USE CRIMPS OR TERMINAL BLACKS, SHALL NOT BE ACCEPTABLE. ALL COMPONENTS THAT MAKE AN ELECTRICAL CONNECTION SHALL BE RE–ENTERABLE FOR SERVICING. NO COMPONENT SHALL USE SILICONE TO SEAL THE ELECTRICAL CONNECTIONS. AN EXCEPTION WILL BE MADE IN AREAS WHERE A CONDUIT TRANSITION IS REQUIRED.
.4 SYSTEM CONTROL:
   .1 THERMOSTATIC CONTROL – AMBIENT SENSING: THE SYSTEM SHALL BE CONTROLLED BY AN AMBIENT SENSING THERMOSTAT SET AT 4.4°C (40°F) [THROUGH A CONTRACTOR TO RECEIVE AN ON/OFF SIGNAL FROM THE BUILDING AUTOMATION SYSTEM].
.5 POWER CONNECTION, END SEAL, SPLICE, OUTER JACKET REPAIR, AND GUTTER AND ROOF INSULATION CLIP KITS SHALL BY APPLIED IN THE FIELD.
.6 THERMOSTAT:
   .1 THE SYSTEM SHALL BE CONTROLLED BY A THERMOSTAT EITHER DIRECTLY OR THROUGH AN APPROPRIATE CONTRACTOR.
.7 CIRCUIT BREAKER:
   .1 THE SYSTEM SHALL BE PROTECTED BY A GROUND FAULT CIRCUIT BREAKER WITH A 30 MILLIAMP TRIP.
.8 ACCEPTABLE MATERIALS: RAYCHEM XL–TRACE OR APPROVED EQUAL.
.9 INSTALLATION:
   .1 SYSTEM MUST BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS.
   .2 APPLY THE HEATING CABLE LINEARLY ON THE PIPE AFTER PIPING HAS BEEN SUCCESSFULLY PRESSURE–TESTED. SECURE THE HEATING CABLE TO PIPING WITH CABLE TIES OR FIBERGLASS TAPE.
   .3 APPLY "ELECTRICAL TRACED" LABELS TO THE OUTSIDE OF THE THERMAL INSULATION.
   .4 DISTRIBUTE AND FASTEN CABLE EVENLY ON PIPE USING PIPE STRAP OR TAPE AT MAXIMUM SPACING 0.5M. ENSURE THAT HEATING CABLE DO NOT TOUCH OR CROSS EACH OTHER AT ANY POINT. RUN ONLY COLD LEADS IN CONDUIT AND ENSURE SENSING BULB DOES NOT TOUCH CABLE. GROUND SHIELD TO BUILDING GROUND. COORDINATE CABLE INSTALLATION WITH INSULATION APPLICATION. LOOP ADDITIONAL CABLE AT FITTINGS, VALVE AND FLANGES.
   .5 MAKE POWER AND CONTROL CONNECTIONS.
   .6 AFTER INSULATION AND BEFORE AND AFTER INSTALLING THE THERMAL INSULATION, SUBJECT HEATING CABLE TO TESTING USING A 2500 VDC MEGGER. MINIMUM INSULATION RESISTANCE SHALL BE 20 MEGOHMS OR GREATER. WHERE RESISTANCE OF 50 MEGAOHMS OR LESS IS MEASURED, STOP WORK AND ADVISE ENGINEER.

8. VALVES:

.1 BALL VALVES:
   .1 BODY AND CAP: CAST HIGH TENSILE BRONZE TO ASTM B62 OR BRASS TO ASTM B16/B16M C36000.
   .2 STEM: TAMPERPROOF BALL DRIVE.
   .3 STEM PACKING NUT: EXTERNAL TO BODY.
   .4 BALL AND SEAT: REPLACEABLE CHROME PLATED BRASS SOLID FULL PORT BALL AND TEFLON SEATS.
   .5 STEM SEAL: TFE WITH EXTERNAL PACKING NUT.
   .6 OPERATOR: REMOVABLE LEVER HANDLE.
   .7 ACCEPTABLE MATERIAL: CRANE, JENKINS, TOYO, VICTAULIC, KITZ.
.2 CHECK VALVES:
   .1 NPS 2 AND UNDER, BRONZE SWING TYPE, BRONZE DISC:
      .1 STANDARD SPECIFICATION: MSS SP–80.
      .2 CONNECTIONS: WITH HEX. SHOULDERS.
      .3 BODY: Y–PATTERN WITH INTEGRAL SEAT AT 45°, SCREW–IN CAP WITH HEX HEAD.
      .4 DISC AND SEAT: RENEWABLE ROTATING DISC, TWO–PIECE HINGE DISC CONSTRUCTION; SEAT: REGRINDABLE.
      .5 ACCEPTABLE MATERIAL: CRANE, JENKINS, TOYO, VICTAULIC, KITZ.

9. ACCESS DOORS

.1 SUPPLY AND INSTALL AS NECESSARY TO GAIN ACCESS TO ALL CONCEALED MECHANICAL EQUIPMENT FOR OPERATING, INSPECTING, ADJUSTING, SERVICING.
.2 SIZES: EXCEPT AS INDICATED OTHERWISE, TO BE MINIMUM SIZES AS FOLLOWS:
   .1 FOR BODY ENTRY: 600 X 600 MM (24" X 24").
   .2 FOR HAND ENTRY: 300 X 300 MM (12" X 12").
.3 CONSTRUCTION: ROUNDED SAFETY CORNERS, CONCEALED HINGES, SCREWDRIVER LATCH, ANCHOR STRAPS, ABLE TO OPEN 180°.
.4 MATERIALS
   .1 TILED OR MARBLE SURFACES AND OTHER SPECIAL AREAS: STAINLESS STEEL WITH BRUSHED SATIN OR POLISHED FINISH AS DIRECTED BY CONSULTANT.
   .2 ALL OTHER AREAS: PRIME COATED STEEL.
.5 FIRE RATING
   .1 ACCESS DOORS FIRE RATING TO MATCH THAT OF WALL, CEILING OR FLOOR THE ACCESS DOOR IS INSTALLED IN. COORDINATE WITH ARCHITECTURAL DRAWINGS.
.6 LOCATION: ENSURE THAT EQUIPMENT IS CLEARLY WITHIN VIEW AND ACCESSIBLE FOR OPERATING, INSPECTING, ADJUSTING, SERVICING WITHOUT THE NEED FOR SPECIAL TOOLS.

10. BASES, PIPE HANGERS AND SUPPORTS:

.1 GENERAL:
   .1 BASES, HANGERS, SUPPORTS AND SWAY BRACES SHALL BE OF MANUFACTURED TYPE AND ASSEMBLED AS PER MANUFACTURER'S INSTRUCTIONS. ENSURE THAT SUPPORTS, GUIDES AND ANCHORS DO NOT TRANSMIT EXCESSIVE QUANTITIES OF HEAT TO BUILDING STRUCTURE. DESIGN HANGERS AND SUPPORTS TO OPERATE UNDER ALL OPERATING CONDITIONS. ALLOW FOR FREE EXPANSION AND CONTRACTION AND PREVENT THE TRANSMISSION OF EXCESSIVE STRESSES INTO PIPE WORK OR CONNECTED EQUIPMENT. PROVIDE FOR VERTICAL ADJUSTMENT AFTER INSTALLATION. DESIGN SHALL BE IN ACCORDANCE WITH ANSI B31.1 AND MSS–SP58.
   .2 SUPPORT FROM TOP OR BOTTOM OF STRUCTURAL MEMBERS. WHERE STRUCTURAL BEARING DOES NOT EXIST OR INSERTS ARE NOT IN SUITABLE LOCATIONS, PROVIDE SUPPLEMENTARY STRUCTURAL STEEL MEMBERS.
   .3 SUPPORTS MADE FROM WIRE, WOOD, ROPE OR ANY OTHER VULNERABLE MAKE–SHIFT MATERIAL ARE NOT PERMITTED.
   .4 FOR UNINSULATED COPPER PIPE OR TUBING THE CLAMPS AND SUPPORTS SHALL HAVE AN ELECTROPLATED COPPER FINISH.
   .5 PROVIDE ADDITIONAL SUPPORTS AT CHANGES IN PIPE DIRECTION AND FOR CONCENTRATION OF LOADS DUE TO WEIGHT OF VALVES, STRAINERS, ETC.
   .6 PIPE HANGERS AND SUPPORTS SHALL BE PAINTED WITH ZINC RICH PAINT AFTER MANUFACTURE.
   .7 PROVIDE INSULATION PROTECTION SHIELDS AS REQUIRED.
.2 BASE MOUNTED EQUIPMENT:
   .1 PROVIDE A 4" HIGH AND 8" LARGER ALL ROUND THAN EQUIPMENT CONCRETE HOUSE KEEPING PAD C/W CHAMFERED EDGES AND ANCHORED TO THE STRUCTURAL SLAB.
   .2 ALL EQUIPMENT TO BE SUPPORTED BY STRUCTURAL GRADE STEEL C/W NEOPRENE PAD VIBRATION ISOLATION AND ANCHORED TO THE BUILDING STRUCTURE.

3. ROOF MOUNTED PIPE SUPPORTS:
   .1 SUPPORT TYPE 1 (S1): FREE–STANDING, ONE PIECE INJECTED MOULDED UV RESISTANT POLYPROPYLENE SHELL AND CLOSED CELL EXTRUDED POLYSTYRENE BASE WITH 300 MM HIGH U–SHAPED MOUNTING CHANNEL AND 13 MMØ STEEL RODS, NUTS & WASHERS. SHALL BE SEISMICALLY RESTRAINED IN ACCORDANCE WITH THE LATEST EDITION OF OBC, AND IN ACCORDANCE WITH THIS SPECIFICATION.
      .1 ACCEPTABLE MATERIALS: A BETTER IDEA INC. MODEL EKP–S040 & EKP–S080, MIRO INDUSTRIES, PPH.

.4 INSULATED PIPE SADDLES:
   .1 INSULATED SADDLES SHALL BE INSTALLED BY THE MECHANICAL CONTRACTOR WHEN SETTING PIPE ELEVATION AT ALL PIPE SUPPORT LOCATIONS ON INSULATED SYSTEMS OPERATING BETWEEN –290°F AND 250°F, INCLUDING:
      .1 DOMESTIC COLD WATER, CHILLED WATER, CONDENSER WATER, CONDENSATE, DOMESTIC HOT WATER, HEATING WATER, AND LOW PRESSURE STEAM.
   .2 COMPOSITION INCLUDES:
      .1 RIGID PHENOLIC FOAM INSULATION THAT MEETS ASTM E–84 (25/50 FLAME SPREAD / SMOKE DEVELOPED REQUIREMENT) WITH DENSITY OF:
         .1 3.75 PCF (0.17 BTU–IN/HR–SQ.FT–°F) @ 75°F MEAN FOR PIPE SIZES UP TO 10" IPS.
         .2 5 PCF (0.20 BTU–IN/HR–SQ.FT–°F) @ 75°F MEAN FOR PIPING 11" IPS TO 30" IPS
      .2 ZERO PERM RATED (ASTM E–96), ABUSE–RESISTANT VAPOUR BARRIER JACKET WITH 1–1/2" WIDE LONGITUDINAL SELF–SEALING ACRYLIC TAPE CLOSURE SYSTEM.
      .3 PIPE INSULATION PROTECTION SHIELD, MANUFACTURED FROM CARBON STEEL WITH A G90 GALVANIZED FINISH, CENTRED AND ADHERED TO BOTTOM WITH AMINIMUM OF 1–1/2" JACKETED INSULATION EXTENDING FROM EACH SIDE TO ALLOW PROPER CIRCUMFERENTIAL CLOSURE AT BUTT JOINTS WITH 3" WIDE ZERO PERM TAPE. SHIELDS SHALL BE 20 GAUGE THICK UP TO 3–1/2" PIPING, 18 GAUGE FOR PIPING FROM 4" TO 10" DIAMETER.
   .3 ACCEPTABLE MATERIAL: BUCKAROOS COOLDRY, MULTIGLASS M–SADDLE, OR EQUIVALENT.
.5 HANGER SPACING:
   .1 COPPER PIPING UP TO NPS 1/2" EVERY 5FT.
   .2 HANGERS SHALL BE WITHIN 12" OF EACH ELBOW.
   .3 HANGERS SHALL BE SPACED IN ACCORDANCE WITH THE MOST STRINGENT REQUIREMENTS OF MANUFACTURER'S RECOMMENDATIONS, CANADIAN PLUMBING CODE, OBC, AURHORITY HAVING JURISDICTION, AND AS FOLLOWS:

MAXIMUM PIPE SIZE (NPS):	MAXIMUM STEEL PIPE SPACING	MAXIMUM COPPER PIPE SPACING:
UP TO 1–1/4	2.5M	2.5M
1–1/2	2.5M	3.0M
2	2.5M	3.0M
2–1/2	2.5M	3.0M
3	2.5M	3.0M
4	2.5M	3.0M

11. PIPE IDENTIFICATION:

.1 PVC MARKERS, CONTINUOUS OPERATING TEMPERATURE OF 212F, 2" HIGH LETTERING FOR PIPING 3" OR LARGER, 3/4" HIGH LETTERING FOR 2 1/2" OR SMALLER. MATCH EXISTING BASE BUILDING STANDARD OR AS FOLLOWS:

CONTENTS:	BACKGROUND:	LABEL:
DOMESTIC HOT WATER SUPPLY	GREEN	DOM. HW SUPPLY
DOMESTIC COLD WATER SUPPLY	GREEN	DOM. CWS
SANITARY	GREEN	SAN.
PLUMBING VENT	GREEN	SAN. VENT

12. PLUMBING SPECIALTIES AND ACCESSORIES:

.1 FLOOR DRAINS:
   .1 FD1: GENERAL DUTY; CAST IRON BODY, ROUND, 5"ø, ADJUSTABLE HEAD, SEDIMENT BASKET, STAINLESS STEEL, TRAP PRIMING CONNECTION, INTEGRAL SEEPAGE PAN, CLAMPING COLLAR AND SEDIMENT BUCKET.
   ACCEPTABLE MATERIAL: WATTS FD–200 OR EQUIVALENT MIFAB, ZURN & J.R. SMITH.
.2 ROOF DRAINS:
   .1 RD1: STANDARD ROOF DRAIN WITH CAST IRON BODY WITH CAST IRON DOME, UNDER–DECK CLAMP TO SUIT ROOF CONSTRUCTION, FLASHING CLAMP RING WITH INTEGRAL GRAVEL STOP.
   ACCEPTABLE MATERIAL: WATTS, MIFAB, J.R. SMITH & ZURN ZA–121–E–DP.
.3 TRAP SEAL PRIMERS:
   .1 TYPE 1: FOR USE ON URINAL OR WATER CLOSET COLD WATER LINE.
      .1 PRESSURE DROP ACTIVATED TYPE, ALL BRASS CONSTRUCTION WITH "O" RING SEALS, 12 MM (NPT ½) MALE INLET & 12 MM (NPT ½) FEMALE OUTLET DRIP LINE CONNECTION WITH VIEWING HOLES, AND REMOVABLE FITTER SCREEN. TRAP PRIMER SHALL HAVE NO ADJUSTMENT. OPERATING RANGE SHALL BE 138 KPA (20 PSI) TO 861 KPA (125 PSI). OPERATES ON PRESSURE DROP OF MINIMUM 20 KPA (3 PSI). ONE (1) TO SIX (6) DRAIN TAPS PER UNIT.
      .2 IDENTIFY ON AS–BUILT DRAWINGS THE LOCATION OF EACH TRAP SEAL PRIMER.
      .3 ENSURE ALL TRAP SEAL PRIMERS ARE ACCESSIBLE FOR MAINTENANCE PURPOSES AND ARE CONNECTED TO URINAL OR WATER CLOSET COLD WATER LINE. TRAP LINE SHALL BE FROM TOP OF COLD WATER LINE AND INCLUDE A SERVICE VALVE. ALL TO BE SERVICEABLE FROM ACCESS DOORS.
      .4 ACCEPTABLE MATERIALS: MIFAB M–500, WATTS, ZURN.
   .2 TYPE 2: FOR USE ON LAVATORY COLD WATER LINE.
      .1 BRASS TRAP SEAL PRIMER WITH REMOVABLE POPPET, INTEGRAL VACUUM BREAKER, GASKETTED ACCESS COVER 13 NPT (½") THREADED INLET AND OUTLET CONNECTIONS, COMPLETE WITH 13 NPT (½") SWEAT CONNECTION ADAPTERS AND 13 NPT (½") DRIP LINE CONNECTION.
      .2 TRAP SEAL PRIMERS ARE LISTED WITH I.A.P.M.O. AND CSA AND ARE TESTED AND CERTIFIED TO THE ASSE 1018.
      .3 TRAP SEAL PRIMERS SHALL BE INSTALLED MINIMUM 305 MM (12") ABOVE THE GRID OF A FLOOR DRAIN OR FLOOD LEVEL RIM OF EQUIPMENT SERVED.
      .4 OPERATING RANGE FOR TRAP SEAL PRIMERS IS 138 KPA (20 PSI) TO 861 KPA (125 PSI).
      .5 ACCEPTABLE MATERIALS: PPP PRIME–PRO, MIFAB MI–TSP–3, ZURN.
   .3 PROVIDE AN AIR GAP FITTING SERVING EACH TRAP SEAL PRIMER IF TRAP SEAL PRIMER DOES NOT INCLUDE INTEGRAL AIR GAP OR AIR SPACE TYPE VACUUM BREAKER IN ACCORDANCE WITH CSA–B64.10.
.4 CLEANOUTS:
   .1 CLEANOUT PLUGS: HEAVY CAST IRON MALE FERRULE WITH BRASS SCREWS AND THREADED BRASS OR BRONZE PLUG. SEALING–CAULKED LEAD SEAT OR NEOPRENE GASKET.
      .1 ACCEPTABLE MATERIAL: ANCON, ENPOCO, J.R. SMITH & ZURN.
   .2 ACCESS COVERS:
      .1 WALL ACCESS: FACE OR WALL TYPE, POLISHED NICKEL BRONZE SQUARE OR ROUND COVER WITH FLUSH HEAD SECURING SCREWS, BEVELLED EDGE FRAME COMPLETE WITH ANCHORING LUGS.
      .2 FLOOR ACCESS: ROUND CAST IRON BODY AND FRAME WITH ADJUSTABLE SECURED NICKEL BRONZE TOP AND:
         .1 PLUGS: BOLTED BRONZE WITH NEOPRENE GASKET.
         .2 COVER FOR UNFINISHED CONCRETE FLOORS: NICKEL BRONZE ROUND, GASKET, VANDAL–PROOF SCREWS.
         .3 COVER FOR TILE AND LINOLEUM FLOORS: POLISHED NICKEL BRONZE WITH RECESSED COVER FOR LINOLEUM OR TILE INFILL, COMPLETE WITH VANDAL–PROOF LOCKING SCREWS.
         .4 COVER FOR CARPETED FLOORS: POLISHED NICKEL BRONZE WITH DEEP FLANGE COVER FOR CARPET INFILL, COMPLETE WITH CARPET RETAINER VANDAL–PROOF LOCKING SCREWS.
.5 EXPANSION TANK
   .1 HORIZONTAL OR VERTICAL STEEL PRESSURIZED REMOVABLE BLADDER AND/OR DIAPHRAGM TYPE EXPANSION TANK AS PER SCHEDULE.
   .2 BLADDER IN HEAVY DUTY BUTYL.
   .3 DIAPHRAGM SEALED IN HEAVY DUTY BUTYL MATERIAL.
   .4 POLYPROLYENE LINER MATERIAL FOR DIAPHRAGM TYPE EXPANSION TANKS.
   .5 WORKING PRESSURE: 1035 KPA (150 PSI) WITH ASME STAMP AND CERTIFICATION INCLUDING CANADIAN REGISTRATION NUMBER (CRN).
   .6 MAXIMUM OPERATING TEMPERATURE: 93°C (200°F).
   .7 STAINLESS STEEL SYSTEM CONNECTIONS.
   .8 AIR PRECHARGED TO INITIAL FILL PRESSURE OF SYSTEM AS PER SCHEDULE.
   .9 BASE MOUNT FOR VERTICAL INSTALLATION.
   .10 SUPPORTS: PROVIDE SUPPORTS WITH HOLD DOWN BOLTS AND INSTALLATION TEMPLATES INCORPORATING SEISMIC RESTRAINT SYSTEMS.
   .11 NSF/ANSI 61 COMPLIANT.
   .12 CAPACITY: AS PER SCHEDULE.
   .13 ACCEPTABLE MATERIALS: AMTROL ST–C, EXPANFLEX.

13. PLUMBING FIXTURE AND TRIM:

.1 FIXTURE PIPING:
   .1 HOT AND COLD WATER SUPPLIES TO EACH FIXTURE:
      .1 STOPS SUPPLIES SHALL BE ALL BRASS WITH FULL TURN BRASS SEAMS AND REPLACEABLE WASHER ATTACHMENT SHALL BE IPS INLET x COMPRESSION OD OUTLET TO FIXTURE. ALL FIXTURE STOP VALVES SHALL BE SCREW DRIVER TYPE.
      .2 CHROME PLATED IN ALL EXPOSED PLACES.
   .2 WASTE:
      .1 CAST BRASS ADJUSTABLE STYLE P–TRAP WITH CLEANOUT ON EACH FIXTURE NOT HAVING INTEGRAL TRAP.
      .2 CHROME PLATED IN ALL EXPOSED PLACES.
      .3 SINK AND LAVATORY HEAVY GAUGE P–TRAPS SHALL BE CAST BRASS ADJUSTABLE STYLE WITH 17 GA. SEAMLESS BRASS WALL BEND. ATTACHMENT NUTS SHALL BE BRASS, NO ZINC ALLOWED. P–TRAPS TO BE REMOVABLE/UNION TYPE OR TO INCLUDE CLEANOUT.
      .4 LAVATORY STRAINERS SHALL BE CHROME PLATED CAST BRASS WITH 17 GA. SEAMLESS BRASS TAILPIECE.
      .5 ALL BARRIER–FREE LAVATORIES AND SINKS SHALL HAVE CHROME PLATED OFFSET TAIL PIECE IN ADDITION TO P–TRAP WITH CLEANOUT. INSULATE P–TRAP AND HOT & COLD WATER PIPES WITH PRE–FORMED & FINISHED SURFACE INSULATION. ARMAFLEX INSULATION AND TAPE NOT ACCEPTABLE.
      .6 URINAL WASTE PIPE & FITTINGS SHALL BE DWV PVC EQUIVALENT TO IPEX SYSTEM 15. EXTEND PLASTIC PIPING UP TO COMBINED WASTE FROM ADJACENT LAVATORY OR OTHER PLUMBING FIXTURES ALLOWING DILUTION OF WASTE.
.2 FIXTURES:
   .1 MANUFACTURE IN ACCORDANCE WITH CSA B45.
   .2 ALL PRODUCTS, WHERE APPLICABLE, SHALL BE MARKED WITH MANUFACTURER'S NAME OR PRODUCT #.
.3 TRIM, FITTINGS: MANUFACTURE IN ACCORDANCE WITH CSA B125.
.4 NUMBER, LOCATIONS: ARCHITECTURAL DRAWINGS TO GOVERN.
.5 FIXTURES IN ANY ONE LOCATION TO BE PRODUCT OF ONE MANUFACTURER AND OF SAME TYPE.
.6 TRIM IN ANY ONE LOCATION TO BE PRODUCT OF ONE MANUFACTURER AND OF SAME TYPE UNLESS OTHERWISE INDICATED.
.7 CARRIERS: PROVIDE FOR ALL WALL MOUNTED PLUMBING FIXTURES.
.8 ROUGHING–IN OF FIXTURES: ROUGH–IN FOR EQUIPMENT SUPPLIED BY OTHER TO BE COMPLETE WITH VALVED SUPPLIES, WASTES AND VENTS, CAPPED AND ASSOCIATED FITTING PIPING & REDUCERS.
.9 CONTRACTOR IS RESPONSIBLE TO ENSURE INSTALLATION OF FIXTURES MEETS CSA–B651 WHERE BARRIER FREE IS REQUIRED.
.10 CONTRACTOR IS RESPONSIBLE TO ENSURE PROPER OPERATION OF FIXTURES UP TO 80 PSI (550 KPA).
.11 PLUMBING FIXTURES: REFERENCE FIXTURE SCHEDULE ON DRAWINGS.

14. DOMESTIC WATER HEATER:

.1 DHWT1:
   .1 HIGH EFFICIENCY GAS FIRED COMMERCIAL LAB WATER HEATER SUBMERGED COMBUSTION CHAMBER WITH HELICAL HEAT EXCHANGER COIL
   .2 DIRECT SPARK IGNITION
   .3 SPIRAL HEAT EXCHANGER KEEPS HOT BURNER GASES SWIRLING, USES CENTRIFUGAL FORCE TO MAXIMIZE EFFICIENCY OF HEAT TRANSFER TO WATER IN TANK
   .4 PROVIDES LONG–LASTING TANK PROTECTION IN VARYING WATER CONDITIONS. POWERED ANODES ARE NON–SACRIFICIAL. AUTOMATICALLY ADJUSTS OUTPUT NEEDED TO PROPERLY PROTECT THE TANK
   .5 GLASS COATING IS APPLIED USING A LIQUID SLUSH COATING TECHNIQUE TO ENSURE UNIFORM COATING. HEAT EXCHANGER COIL IS GLASSED BOTH EXTERNALLY AND INTERNALLY FOR OPTIMUM PROTECTION.
   .6 MECHANICAL VENTING PIPE FOR INTAKE AND EXHAUST
   .7 HIGH EFFICIENCY MODULATING PRE–MIX POWERED BURNER
   .8 3–YEAR LIMITED TANK / 1–YEAR LIMITED PARTS WARRANTY. FOR COMPLETE WARRANTY INFORMATION, CONSULT WRITTEN WARRANTY OR GO TO HOTWATER.COM
   .9 ACCEPTABLE MATERIAL: AO SMITH, CYCLONE OR EQUAL
.2 WATER HEATER PAN:
   .1 28 GA. ALUMINUM, 65MM (2–1/2") HIGH, 25MM (1") CPVC DRAIN CONNECTION
   .2 SELECT DIAMETER SUCH THAT PAN EXTENDS MINIMUM 50MM (2") BEYOND WATER HEATER ON ALL SIDES.
   .3 ACCEPTABLE MATERIAL: OATEY SERIES 34170, OR EQUAL.
.3 WATER SAFETY VALVE:
   .1 RESETTABLE, TESTABLE, FULL PORT WATER ISOLATION VALVE C/W ACTUATOR, WATER SENSOR, & CONTROL MODULE. SHUTS OFF WATER WHEN A LEAK IS DETECTED BY WATER IN THE PAN. MODULE INCLUDES TWO COLOUR LED LIGHT AND AUDIBLE ALARM TO INDICATE STATUS. OPERABLE BY BATTERY POWER OR 120V PLUG. SUITABLE FOR USE WITH POTABLE WATER FROM 0.6°C (33°F) TO 104°C (220°F). MAX SHUT OFF PRESSURE 862 kPa (125 PSI).
   .2 ACCEPTABLE MATERIAL: TACO LEAKBREAKER.
.4 BRV: COMBINATION BALL RELIEF VALVE:
   .1 LEAD FREE
   .2 RELIEF SETTING 515 kPa (75 PSI)
   .3 ACCEPTABLE MATERIAL: WATTS LFBRV, OR EQUAL
.5 THERMOSTATIC MIXING VALVE:
   .1 ASSE STANDARD 1070 & IAPMO CUPC LISTED
   .2 UNDER COUNTER, LEAD FREE BRASS, 4 PORT, "H" PATTERN BODY
   .3 INTEGRAL CHECK VALVES, INTEGRAL SCREENS, ADJUSTMENT NUT WITH LOCKING FEATURE
   .4 10mm (3/8") MALE COMPRESSION OR QUICK–CONNECT FITTINGS
   .5 ACCEPTABLE MATERIAL: WATTS SERIES LFUSG–B
.6 MASTER THERMOSTATIC MIXING VALVE:
   .1 ASSE 1017 & IAPMO UPC LISTED.
   .2 LEAD FREE BRASS BODY WITH AVANCED THERMAL ACTUATOR TO ACCOMMODATE LOW FLOW.
   .3 INTEGRAL CHECK VALVES, INTEGRAL SCREENS, ADJUSTMENT NUT WITH LOCKING FEATURE.
   .4 20 MM (3/4") FEMALE NPT, SWEAT, OR QUICK CONNECT TO SUIT.
   .5 ACCEPTABLE MATERIAL: POWERS LFLM490.

15. NATURAL GAS PIPING:

.1 STEEL PIPE: TO ANSI/ASME A120.1 OR ASTM A53/A53M, SCHEDULE 40, SEAMLESS AS FOLLOWS:
   .1 NPS ½ TO 2, SCREWED.
   .2 NPS 2½ AND OVER, WELDED.
.2 JOINTING:
   .1 SCREWED FITTINGS: PULVERIZED LEAD PASTE.
   .2 WELDED FITTINGS: TO CSA W47.1.
   .3 FLANGE GASKETS: TO ANSI/ASME B16.21 OR ANSI/ASME B16.20.
.3 FITTINGS
   .1 STEEL PIPE FITTINGS, SCREWED, FLANGED OR WELDED:
      .1 MALLEABLE IRON: SCREWED, BANDED, CLASS 150.
      .2 STEEL PIPE FLANGES AND FLANGED FITTINGS: TO ANSI/ASME B16.5.
      .3 STEEL BUTT–WELDING FITTINGS.
         .4 UNIONS: MALLEABLE IRON, BRASS TO IRON, GROUND SEAT, TO ASTM A47/A47M.
         .5 BOLTS AND NUTS: TO ANSI/ASME B18.2.1.
         .6 NIPPLES: SCHEDULE 40, TO ASTM A53/ A53M.
.4 VALVES
   .1 PROVINCIAL CODE APPROVED, LUBRICATED PLUG OR BALL TYPE.
.5 PRESSURE
   .1 (PRV): PROVIDE GAS SERVICE REGULATOR SELF–CONTAINED TO REDUCE PRESSURE TO DESIGN CAPACITY C/W BUILT–IN OR REMOTE RELIEF VALVE. REFER TO DRAWING SCHEDULE FOR CAPACITIES.
   .2 EXTEND SAFETY RELIEF VALVE TO ATMOSPHERE; TERMINATE IN SAFE LOCATION.
   .3 REFERENCE EQUIPMENT SCHEDULES FOR GAS FLOWS.
   .4 ACCEPTABLE MATERIAL: FISHER SERIES 66,SCHLUMBERGER, OR EQUAL.
.6 EMERGENCY
   .1 PROVIDE RECESSED STAINLESS STEEL VALVE CABINET 18 GAUGE CONSTRUCTION C/W STAINLESS STEEL DOOR, LATCHING, WITH PIANO HINGES. SIZED TO FIT VALVE IDENTIFY AS "EMERGENCY GAS SHUT–OFF VALVE".
.7 SEISMIC GAS
   .1 HORIZONTAL OR VERTICAL EARTHQUAKE SENSITIVE GAS SHUT–OFF VALVE CONSISTING OF SWING CHECK VALVE ARRANGEMENT, WITH AN ACCELERATION SENSITIVE TRIGGERING MECHANISM. THE TRIP MECHANISM CONSISTING OF A STEEL BALL VALVE RESTING ON A TAPERED CUP–SHAPED SUPPORT SOFFIT SEAT CONSTRUCTION FOR POSITIVE SEAL. TRIP MECHANISM TO BE FACTORY SET & SEALED. SIGHT GLASS TO INDICATE OPEN OR CLOSED POSITION. SENSITIVE TO WIDE AMPLITUDE "G" WAVE.
   .2 413 KPA (60 PSI) RATE PRESSURE.
   .3 SUITABLE TO NATURAL GAS FLUID WITH AMBIENT TEMPERATURE RANGE OF –40°C TO 65°C (–40°F TO 150°F).
   .4 FLANGED CONNECTIONS.
   .5 SIZE: LINE SIZE AS INDICATED.
.8 IDENTIFICATION: TO CSA B149.1
.9 INSTALLATION: TO CSA B149.1

HVAC:

1. DUCTWORK:

.1 GENERAL:
   .1 DETAILS, CONSTRUCTION AND MATERIALS HEREIN SHALL BE AS PER SMACNA STANDARDS.
   .2 ALL MATERIALS SHALL CONFORM TO SMOKE AND FLAME SPREAD RATING LIMITATIONS STIPULATED IN THE PROVINCIAL BUILDING CODE OR AS SPECIFIED HEREIN.
   .3 ALL GALVANIZED DUCTWORK INDICATED TO BE FABRICATE FROM 0.2% COPPER CONTENT GALVANIZED SHEET STEEL WITH 1–1/4 CLASS ZINC COATING.
   .4 RECTANGULAR AND FITTINGS: GALVANIZED SHEET STEEL NOT LESS THAN THE FOLLOWING THICKNESS: 24 GA. – 750MM (30") WIDE SMALLER.
   .5 ROUND & OVAL DUCT AND FITTINGS SHALL BE SPIRAL GALVANIZED STEEL MEETING THE ASTM A–527–71 & NOT LESS THAN THE FOLLOWING THICKNESS: 26 GA. – 75MM TO 350MM (3" TO 14")DIA. 24 GA. – 350MM (14") DIA. & LARGER.
   .6 SEAL CLASSIFICATION: SMACNA SEAL CLASS A.
   .7 FLEXIBLE DUCTWORK SHALL BE ALUMINUM WITH TRIPLE LOCK MECHANICAL JOINTS WITH CIRCUMFERENTIAL CORRUGATIONS WITH FACTORY APPLIED, 25mm (1") THICK FLEXIBLE GLASS FIBRE THERMAL INSULATION WITH VAPOUR BARRIER AND VINYL JACKET. MATERIAL SHALL MEET NFPA BULLETIN 90A, PARAGRAPH 113 AND UL–181 CLASS–1. DUCT SHALL WITHSTAND A PRESSURE OF 10" W.C. MAXIMUM LENGTH OF FLEXIBLE DUCTWORK SHALL BE 1.5M (5') FROM DIFFUSER.
      .1 ACCEPTABLE MATERIAL: FLEXMASTER T/–T.

2. THERMAL INSULATION FOR DUCTING:

.1 FLAME AND SMOKE:
   .1 IN ACCORDANCE WITH CAN/ULC S102:
      .1 MAXIMUM FLAME SPREAD RATING: 25.
      .2 MAXIMUM SMOKE DEVELOPED RATING: 50.
.2 INSULATION:
   .1 MINERAL FIBRE AS SPECIFIED HEREIN INCLUDES GLASS FIBRE, ROCK WOOL, SLAG WOOL.
   .2 THERMAL CONDUCTIVITY ("K" FACTOR) NOT TO EXCEED SPECIFIED VALUES AT 24°C MEAN TEMPERATURE WHEN TESTED IN ACCORDANCE WITH ASTM C335/C335M.
   .3 RIGID MINERAL FIBRE BOARD TO CAN/CGSB–51.10, WITH FACTORY APPLIED VAPOUR RETARDER JACKET TO CGSB 51–GP–52MA.
   .4 MINERAL FIBRE BLANKET TO CAN/CGSB–51.11 FACED WITH

Client

2019–03–08	ISSUED FOR TENDER	2
2019–02–11	ISSUED FOR PERMIT/TENDER	1
2019–02–06	ISSUED FOR REVIEW	0
DATE	REVISION	REF

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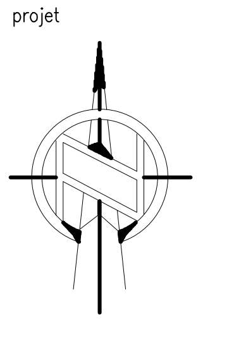
Nord du projet



Seal/Sceau

LICENSED PROFESSIONAL ENGINEER
F.W.A. BANN
90395575
MAR 8/2019
PROVINCE OF ONTARIO

Project/Projet

MERIDIAN RETIREMENT COMMUNITY, FIRE RESTORATION

Drawing title/Titre du dessin

MECHANICAL SPECIFICATIONS

Scale / Échelle: AS NOTED
Project no./No. du projet: 2019–148
Design by / Conçu par: B.BROWN
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FACTORY APPLIED VAPOUR RETARDER JACKET TO CGSB 51-GP-52MA.
- .1 MINERAL FIBRE: TO CAN/CGSB-51.11.
- .2 JACKET: TO CGSB 51-GP-52MA.
- .3 MAXIMUM "K" FACTOR: TO CAN/CGSB-51.11.
- .4 DENSITY: 24 KG/M3.

.3 JACKETS:
- .1 FOR INSULATED EXPOSED DUCTWORK INDOORS:
  - .1 CANVAS: 220 GM/M2 COTTON, PLAIN WEAVE, TREATED WITH DILUTE FIRE RETARDANT LAGGING ADHESIVE TO ASTM C921.
  - .2 LAGGING ADHESIVE: COMPATIBLE WITH INSULATION.
  - .3 ACRYLIC ADHESIVE:
    - .1 THICKNESS: 0.18MM.
    - .2 FINISH: WHITE.
    - .3 PEEL ADHESION: 18N/25MM (65OZ./IN.)
    - .4 PUNCTURE: 130N (30LBS.).
    - .5 UL 723 LISTED (10/20 FLAME/SMOKE RATING).
    - .6 ACCEPTABLE MATERIAL: VENTURECLAD 1577CW.
- .2 FOR ALL EXPOSED DUCTWORK OUTDOORS:
  - .1 ALUMINUM:
    - .1 TO ASTM B209 WITH MOISTURE BARRIER.
    - .2 THICKNESS: 0.50 MM SHEET.
    - .3 FINISH: STUCCO EMBOSSED.
    - .4 JACKET BANDING AND MECHANICAL SEALS:
      - .1 19 MM (3/4") WIDE, 0.5 MM THICK STAINLESS STEEL.

.4 ACCESSORIES:
- .1 VAPOUR RETARDER LAP ADHESIVE: WATER BASED, FIRE RETARDANT TYPE, COMPATIBLE WITH INSULATION.
- .2 INDOOR VAPOUR RETARDER FINISH: VINYL EMULSION TYPE ACRYLIC, COMPATIBLE WITH INSULATION.
- .3 INSULATING CEMENT: HYDRAULIC SETTING ON MINERAL WOOL, TO ASTM C449.
- .4 OUTDOOR VAPOUR RETARDER MASTIC:
  - .1 VINYL EMULSION TYPE ACRYLIC, COMPATIBLE WITH INSULATION.
  - .2 REINFORCING FABRIC: FIBROUS GLASS, UNTREATED 305 G/M2.
- .5 TAPE: SELF-ADHESIVE, ALUMINUM, REINFORCED, 75 MM (3") WIDE MINIMUM.
- .6 CONTACT ADHESIVE: QUICK-SETTING
- .7 CANVAS ADHESIVE: WASHABLE.
- .8 TIE WIRE: 1.5 MM STAINLESS STEEL.
- .9 BANDING: 19 MM (3/4") WIDE, 0.5 MM THICK STAINLESS STEEL.
- .10 FACING: 25 MM (1") GALVANIZED STEEL HEXAGONAL WIRE MESH STITCHED ON ONE FACE OF INSULATION.
- .11 FASTENERS: 2 MM DIAMETER PINS WITH 38 MM (1½") DIAMETER CLIPS, LENGTH TO SUIT THICKNESS OF INSULATION.

.5 DUCTWORK INSULATION SCHEDULE:
- .1 INSULATION TYPES AND THICKNESSES: CONFORM TO FOLLOWING TABLE:

DUCT TYPE:	THICKNESS:
SUPPLY AIR	25 (1")
OUTSIDE AIR TO MIXING PLENUM	50 (2")
EXHAUST AIR WITHIN 3M FROM OUTSIDE	50 (2")
DUCTWORK OUTSIDE	50 (2")
ACOUSTICALLY LINED	NONE

3. ACOUSTIC LINING:

.1 GENERAL:
- .1 FIBROUS GLASS OR "TEXTILE" FIBROUS GLASS DUCT LINER: AIR STREAM SIDE FACED WITH MAT FACING.
- .2 FLAME SPREAD RATING SHALL NOT EXCEED 25. SMOKE DEVELOPMENT RATING SHALL NOT EXCEED 50 WHEN TESTED IN ACCORDANCE WITH CAN/ULC S102.

.2 FLEXIBLE:
- .1 USE ON FLAT SURFACES WHERE INDICATED.
- .2 25 MM (1") THICK, TO CAN/CGSB-51.10, FIBROUS GLASS DUCT LINER.
- .3 DENSITY: 36 KG/M3 MINIMUM.
- .4 THERMAL RESISTANCE TO BE MINIMUM 0.76 M2.°C/W FOR 25 MM THICKNESS WHEN TESTED IN ACCORDANCE WITH ASTM C177, AT 24°C MEAN TEMPERATURE.

.3 FASTENERS:
- .1 WELD PINS 2.0 MM DIAMETER, LENGTH TO SUIT THICKNESS OF INSULATION. METAL RETAINING CLIPS, 32 MM SQUARE.

.4 JOINT TAPE:
- .1 POLY-VINYL TREATED OPEN WEAVE FIBERGLASS MEMBRANE 50 MM WIDE.

.5 SEALER:
- .1 MEET REQUIREMENTS OF NFPA (FIRE) 90A AND NFPA (FIRE) 90B.
- .2 FLAME SPREAD RATING SHALL NOT EXCEED 25. SMOKE DEVELOPMENT RATING SHALL NOT EXCEED 50. TEMPERATURE RANGE MINUS 68°C TO PLUS 93°C.

.6 EDGES:
- .1 PROTECT LEADING AND TRAILING EDGES OF EACH DUCT SECTIONS WITH SHEET METAL NOSING TO 25MM OVERLAP AND FASTENED TO DUCT.

4. DAMPERS – BALANCING:

.1 INSTALLATION:
- .1 DAMPERS ARE TO BE LOCATED IN EACH SUPPLY AIR BRANCH DUCT.
- .2 EACH GRILLE, REGISTER AND DIFFUSER CONNECTION TO HAVE BALANCING DAMPER LOCATED AS CLOSE AS POSSIBLE TO MAIN DUCTS.

.2 SINGLE BLADE DAMPERS:
- .1 OF SAME MATERIAL AS DUCT, BUT ONE SHEET METAL THICKNESS HEAVIER. V-GROOVE STIFFENED.
- .2 SIZE AND CONFIGURATION TO RECOMMENDATIONS OF SMACNA, EXCEPT MAXIMUM HEIGHT 100MM.
- .3 LOCKING WITH SHAFT EXTENSION TO ACCOMMODATE INSULATION THICKNESS.
- .4 INSIDE AND OUTSIDE NYLON OR BRONZE END BEARINGS.
- .5 CHANNEL FRAME OF SAME MATERIAL AS ADJACENT DUCT, COMPLETE WITH ANGLE STOP.

5. DUCT ACCESSORIES:

.1 FLEXIBLE CONNECTIONS:
- .1 FRAME: ALUMINUM METAL FRAME 24 GAUGE THICK WITH FABRIC CLENCHED BY MEANS OF DOUBLE LOCKED SEAMS.
- .2 MATERIAL:
  - .1 FIRE RESISTANT, SELF EXTINGUISHING, NEOPRENE COATED GLASS FABRIC, TEMPERATURE RATED AT -40°F TO 200°F, DENSITY OF 0.25 PSF.
- .3 APPLICATION: ON INLET AND OUTLET OF ALL FANS, AND ANYWHERE ELSE INDICATED ON DRAWINGS.

.2 ACCESS DOORS:
- .1 SUPPLY & INSTALL AS NECESSARY TO GAIN ACCESS TO ALL CONCEALED MECHANICAL EQUIPMENT.
- .2 SIZES: FOR BODY ENTRY 24"x24", FOR HAND ENTRY 12"x12"
- .3 ROUNDED SAFETY CORNERS, CONCEALED HINGES, SCREWDRIVER LATCH, ANCHOR STRAPS, ABLE TO OPEN 180 DEGREES.
- .4 MATERIAL SHALL BE PRIME COATED STEEL UNLESS OTHERWISE NOTED.

6. IDENTIFICATION DUCTWORK SYSTEMS:

- .1 2" HIGH STENCILLED LETTERS AND DIRECTIONAL ARROWS 6" LONG X 2" HIGH.
- .2 COLOURS: BLACK, OR CO-ORDINATED WITH BASE COLOUR TO ENSURE STRONG CONTRAST.

7. BACKDRAFT DAMPER:

- .1 MULTI-LEAF,PARALLEL BLADE TYPE.
- .2 EXTRUDED ALUMINUM INTERLOCKING BLADES, VIBRATION FREE
- .3 ACCEPTABLE MATERIAL: TAMCO, NAILOR OR EQUAL

8. FIRE DAMPERS:

- .1 FIRE DAMPERS: ARRANGEMENT TYPE B OR C, LISTED AND BEAR LABEL OF ULC, MEET REQUIREMENTS OF NFPA (FIRE) 90A AUTHORITIES HAVING JURISDICTION. FIRE DAMPER ASSEMBLIES TO BE FIRE TESTED IN ACCORDANCE WITH CAN/ULC S112.
- .2 MILD STEEL, FACTORY FABRICATED FOR FIRE RATING REQUIREMENT TO MAINTAIN INTEGRITY OF FIRE WALL AND/OR FIRE SEPARATION.
- .3 TOP HINGED: OFFSET SINGLE DAMPER, ROUND OR SQUARE; INTERLOCKING TYPE; SIZED TO MAINTAIN FULL DUCT CROSS SECTION AS INDICATED.
- .4 [USE FOR SYSTEMS WHERE AHUs ARE NOT SHUT-OFF BY FIRE ALARM SYSTEM OR FOR HORZONTAL DAMPERS] FUSIBLE LINK ACTUATED HAVING NEGATOR-SPRING- CLOSING OPERATOR.
- .5 [USE FOR SYSTEMS WHERE AHUs ARE SHUT-OFF BY FIRE ALARM AND DAMPERS ARE VERTICAL] FUSIBLE LINK ACTUATED, WEIGHTED TO CLOSE AND LOCK IN CLOSED POSITION WHEN RELEASED.
- .6 40 X 40 X 3 MM RETAINING ANGLE IRON FRAME, ON FULL PERIMETER OF FIRE DAMPER, ON BOTH SIDES OF FIRE SEPARATION BEING PIERCED.
- .7 RATING: 1½ HR.
- .8 ACCEPTABLE MATERIAL: AMI, E.H. PRICE, GREENHECK, NCA, NAILOR, RUSKIN, VENTEX/ALUMAVENT.
- .9 PROVIDE ACCESS DOOR ADJACENT TO EACH FIRE DAMPER.

9. ROOFTOP UNIT:

.1 GENERAL:
- .1 ALL UNITS SHALL BE FACTORY ASSEMBLED, INTERNALLY WIRED, FULLY CHARGED WITH R-410A, AND 100 PERCENT RUN TESTED TO CHECK COOLING OPERATION, FAN AND BLOWER ROTATION, AND CONTROL SEQUENCE BEFORE LEAVING THE FACTORY. WIRING INTERNAL TO THE UNIT SHALL BE COLOURED AND NUMBERED FOR SIMPLIFIED IDENTIFICATION. UNITS SHALL BE ULC LISTED AND LABELED, CLASSIFIED FOR CENTRAL COOLING AIR CONDITIONERS.
- .2 ROOFTOP UNIT SHALL MEET OR EXCEED ASHRAE 90.1 COMPLIANCE REQUIREMENTS.

.2 CASING:
- .1 UNIT CASING SHALL BE CONSTRUCTED OF ZINC COATED, HEAVY GAUGE, GALVANIZED STEEL. EXTERIOR SURFACES SHALL BE CLEANED, PHOSPHATIZED, AND FINISHED WITH A WEATHER-RESISTANT BAKED ENAMEL FINISH. UNIT'S SURFACE SHALL BE TESTED IN A SALT SPRAY TEST IN COMPLIANCE WITH ASTM B117. CABINET CONSTRUCTION SHALL ALLOW FOR ALL MAINTENANCE ON ONE SIDE OF THE UNIT. SERVICE PANELS SHALL HAVE HINGED PANELS WHILE PROVIDING A WATER AND AIR TIGHT SEAL. ALL EXPOSED VERTICAL PANELS AND TOP COVERS IN THE INDOOR AIR SECTION SHALL BE INSULATED WITH A CLEANABLE, FOIL-FACED, FIRE-RETARDANT, PERMANENT, ODOURLESS, GLASS FIBRE MATERIAL. THE BASE OF THE UNIT SHALL BE INSULATED WITH 1/8 INCH, FOIL-FACED, CLOSED-CELL INSULATION. ALL INSULATION EDGES SHALL BE EITHER CAPTURED OR SEALED. THE UNIT'S BASE PAN SHALL HAVE NO PENETRATIONS WITHIN THE PERIMETER OF THE CURB OTHER THAN THE RAISED DOWNFLOW SUPPLY/RETURN OPENINGS TO PROVIDE AN ADDED WATER INTEGRITY PRECAUTION, IF THE CONDENSATE DRAIN BACKS UP.

.3 UNIT TOP:
- .1 THE TOP COVER SHALL BE ONE PIECE CONSTRUCTION OR, WHERE SEAMS EXIST, IT SHALL BE DOUBLE-HEMMED AND GASKET-SEALED. THE RIBBED TOP ADDS EXTRA STRENGTH AND ENHANCES WATER REMOVAL FROM UNIT TOP.

.4 COMPRESSORS:
- .1 ALL UNITS SHALL HAVE DIRECT-DRIVE, HERMETIC, SCROLL TYPE COMPRESSORS WITH CENTRIFUGAL TYPE OIL PUMPS. MOTOR SHALL BE SUCTION GAS-COOLED AND SHALL HAVE A VOLTAGE UTILIZATION RANGE OF PLUS OR MINUS 10 PERCENT OF UNIT NAMEPLATE VOLTAGE. INTERNAL OVERLOADS SHALL BE PROVIDED WITH THE SCROLL COMPRESSORS.

.5 CRANKCASE HEATERS SHALL BE INCLUDED ON 6-10 TON UNITS.

.6 INDOOR FAN:
- .1 THE UNITS SHALL BE EQUIPPED WITH A DIRECT DRIVE PLENUM FAN DESIGN. PLENUM FAN DESIGN SHALL INCLUDE A BACKWARD-CURVED FAN WHEEL ALONG WITH AN EXTERNAL ROTOR DIRECT DRIVE VARIABLE SPEED INDOOR MOTOR. ALL PLENUM FAN DESIGNS WILL HAVE A VARIABLE SPEED ADJUSTMENT POTENTIOMETER LOCATED IN THE CONTROL BOX. ALL UNITS (STANDARD EFFICIENCY) SHALL HAVE BELT DRIVE MOTORS WITH AN ADJUSTABLE IDLER-ARM ASSEMBLY FOR QUICK-ADJUSTMENT TO FAN BELTS AND MOTOR SHEAVES. ALL MOTORS SHALL BE THERMALLY PROTECTED. ALL 10 TONS AND 7½-8½ (HIGH EFFICIENCY) SHALL HAVE VARIABLE SPEED DIRECT DRIVE MOTORS. ALL INDOOR FAN MOTORS SHALL MEET ASHRAE 90.1.

.7 OUTDOOR FANS:
- .1 THE OUTDOOR FAN SHALL BE DIRECT-DRIVE, STATICALLY AND DYNAMICALLY BALANCED, DRAW-THROUGH IN THE VERTICAL DISCHARGE POSITION. THE FAN MOTOR SHALL BE PERMANENTLY LUBRICATED AND SHALL HAVE BUILT-IN THERMAL OVERLOAD PROTECTION.

.8 EVAPORATOR AND CONDENSER COILS:
- .1 INTERNALLY FINNED, COPPER TUBES MECHANICALLY BONDED TO A CONFIGURED ALUMINUM PLATE FIN SHALL BE STANDARD. COILS SHALL BE LEAK TESTED AT THE FACTORY TO ENSURE THEIR PRESSURE INTEGRITY. THE EVAPORATOR COIL AND CONDENSER COIL SHALL BE LEAK TESTED. THE ASSEMBLED UNIT SHALL BE LEAK TESTED. A REMOVABLE, REVERSIBLE, DOUBLE-SLOPED CONDENSATE DRAIN PAN WITH THROUGH THE BASE CONDENSATE DRAIN SHALL BE PIPED EXTERNALLY.

.9 CONTROLS:
- .1 UNIT SHALL BE COMPLETELY FACTORY-WIRED WITH NECESSARY CONTROLS AND CONTACTOR PRESSURE LUGS OR TERMINAL BLOCK FOR POWER WIRING. UNIT SHALL PROVIDE AN EXTERNAL LOCATION FOR MOUNTING A FUSED DISCONNECT DEVICE. MICROPROCESSOR CONTROLS PROVIDE FOR ALL 24V CONTROL FUNCTIONS. THE RESIDENT CONTROL ALGORITHMS SHALL MAKE ALL HEATING, COOLING, AND/OR VENTILATING DECISIONS IN RESPONSE TO ELECTRONIC SIGNALS FROM SENSORS MEASURING INDOOR AND OUTDOOR TEMPERATURES. THE CONTROL ALGORITHM MAINTAINS ACCURATE TEMPERATURE CONTROL, MINIMIZES DRIFT FROM SETPOINT, AND PROVIDES BETTER BUILDING COMFORT. A CENTRALIZED MICROPROCESSOR SHALL PROVIDE ANTI-SHORT CYCLE TIMING AND TIME DELAY BETWEEN COMPRESSORS TO PROVIDE A HIGHER LEVEL OF MACHINE PROTECTION. 24-VOLT ELECTROMECHANICAL CONTROL CIRCUIT SHALL INCLUDE CONTROL TRANSFORMER AND CONTACTOR. INCORPORATE TRANE COMMUNICATION INTERFACE FOR BUILDING MANAGEMENT SYSTEM CONNECTIVITY.

.10 HIGH PRESSURE CONTROL:
- .1 ALL UNITS SHALL INCLUDE HIGH PRESSURE CUT-OUT AS STANDARD.

.11 PHASE MONITOR:
- .1 PHASE MONITOR SHALL PROVIDE 100% PROTECTION FOR MOTORS AND COMPRESSORS AGAINST PROBLEMS CAUSED BY PHASE LOSS, PHASE IMBALANCE, AND PHASE REVERSAL. PHASE MONITOR IS EQUIPPED WITH AN LED THAT PROVIDES AN ON OR FAULT INDICATOR. THERE ARE NO FIELD ADJUSTMENTS. THE MODULE WILL AUTOMATICALLY RESET FROM A FAULT CONDITION.

.12 GAS HEATING SECTION:
- .1 THE HEATING SECTION SHALL HAVE A PROGRESSIVE TUBULAR HEAT EXCHANGER DESIGN USING STAINLESS STEEL BURNERS AND CORROSION RESISTANT STEEL THROUGHOUT. AN INDUCED DRAFT COMBUSTION BLOWER SHALL BE USED TO PULL THE COMBUSTION PRODUCTS THROUGH THE FIRING TUBES. THE HEATER SHALL USE A DIRECT SPARK IGNITION (DSI) SYSTEM.

.13 CONVENIENCE OUTLET:
- .1 GFCI, 120V /15AMP, 2 PLUG, CONVENIENCE OUTLET. THE CONVENIENCE OUTLET IS POWERED FROM THE LINE SIDE OF THE DISCONNECT OR CIRCUIT BREAKER.

.14 ECONOMIZER:
- .1 THE ASSEMBLY INCLUDES FULLY MODULATING 0-100 PERCENT MOTOR AND DAMPERS, MINIMUM POSITION SETTING, PRESET LINKAGE, WIRING HARNESS WITH PLUG, SPRING RETURN ACTUATOR AND FIXED DRY BULB CONTROL. THE BAROMETRIC RELIEF SHALL PROVIDE A PRESSURE OPERATED DAMPER THAT SHALL BE GRAVITY CLOSING AND SHALL PROHIBIT ENTRANCE OF OUTSIDE AIR DURING THE EQUIPMENT OFF CYCLE.

.15 THROUGH THE BASE ELECTRICAL WITH DISCONNECT SWITCH:
- .1 AN ELECTRICAL SERVICE ENTRANCE SHALL BE PROVIDED ALLOWING ELECTRICAL ACCESS FOR BOTH CONTROL AND MAIN POWER CONNECTIONS INSIDE THE CURB AND THROUGH THE BASE OF THE UNIT. OPTION SHALL ALLOW FOR FIELD INSTALLATION OF LIQUID-TIGHT CONDUIT AND AN EXTERNAL FIELD-INSTALLED DISCONNECT SWITCH.
- .2 THIS 3-POLE, MOLDED CASE, DISCONNECT SWITCH WITH PROVISIONS FOR THROUGH THE BASE ELECTRICAL CONNECTIONS. THE DISCONNECT SWITCH SHALL BE INSTALLED IN THE UNIT IN A WATER TIGHT ENCLOSURE WITH ACCESS THROUGH A SWINGING DOOR. WIRING SHALL BE PROVIDED FROM THE SWITCH TO THE UNIT HIGH VOLTAGE TERMINAL BLOCK. THE SWITCH SHALL BE UL/CSA AGENCY RECOGNIZED.

.16 POWERED EXHAUST:
- .1 THE POWERED EXHAUST SHALL PROVIDE EXHAUST OF RETURN AIR, WHEN USING AN ECONOMIZER, TO MAINTAIN BETTER BUILDING PRESSURIZATION.

.17 CURB: INSLUATED, 600MM HIGH, SEISMICALLY RESTRAINED CURB.

.18 ACCEPTABLE MATERIAL: TRANE, CARRIER, YORK, LENNOX, AAON, DAIKIN MCQUAY

10. GRILLES, REGISTERS AND DIFFUSER:

.1 GENERAL:
- .1 TO MEET CAPACITY, PRESSURE DROP, TERMINAL VELOCITY, NOISE LEVEL, NECK VELOCITY AS INDICATED.
- .2 FRAMES:
  - .1 FULL PERIMETER GASKETS.
  - .2 PLASTER FRAMES WHERE SET INTO PLASTER OR GYPSUM BOARD AND AS SPECIFIED.
  - .3 CONCEALED FASTENERS
- .3 CONCEALED OPERATORS
- .4 ACCEPTABLE MANUFACTURER: E.H. PRICE, NAILOR, TITUS, KRUEGER, METALAIRE.

.2 SUPPLY DIFFUSERS:
- .1 TYPE SD1: STEEL, SQUARE DIFFUSER WITH FIXED PATTERN 300 MM X 300 MM, DRYWALL MOUNTING AS INDICATED, OFF-WHITE. ACCEPTABLE MATERIAL: E.H. PRICE MODEL SCD OR EQUAL.
- .2 TYPE SD2: STEEL, SQUARE DIFFUSER WITH FIXED PATTERN 500 MM X 500 MM, DRYWALL MOUNTING AS INDICATED, OFF-WHITE. ACCEPTABLE MATERIAL: E.H. PRICE MODEL SCD OR EQUAL.

.3 GRILLES:
- .1 TYPE RG1: ALUMINUM, 13 MM X 13 MM EGG CRATE TYPE FACE BARS, BAKED WHITE ENAMEL FINISH, DUCTED WHERE INDICATED, DRYWALL MOUNTED. SIZE 600 MM X 150 MM UNLESS OTHERWISE INDICATED.
  ACCEPTABLE MATERIAL: E.H. PRICE MODEL 80 OR EQUAL
- .2 TYPE SG1: STEEL CONSTRUCTION, DOUBLE DEFLECTION, HORIZONTAL FACE BARS, OFF-WHITE BAKED ENAMEL FINISH. COMPLETE WITH BALANCING DAMPER SIZE: 250 X 150.
  ACCEPTABLE MATERIAL: E.H. PRICE MODEL 620D OR EQUAL.

11. FANS:

.1 GENERAL:
- .1 STANDARD OF RATING:
  - .1 AMCA 201 FOR FAN APPLICATION.
  - .2 AMCA 302 FOR APPLICATION OF SONE LOUDNESS RATINGS FOR NON-DUCTED AIR MOVING DEVICES.
  - .3 AMCA 303 FOR APPLICATION OF SOUND POWER RATINGS FOR DUCTED AIR MOVING DEVICES.
  - .4 PERFORMANCE: TO ANSI/AMCA 210 AND ANSI/ASHRAE 51. UNIT TO BEAR AMCA CERTIFIED SEAL.
- .2 PWL SOUND RATINGS TO COMPLY WITH AMCA 303, TESTED TO ANSI/AMCA 300 UNIT TO BEAR AMCA CERTIFIED SOUND RATING SEAL.
- .3 ANGLE MOUNTING BRACKETS CAN BE ADJUSTED TO ANY TYPICAL CEILING MATERIAL THICKNESS.
- .4 ALL DIRECT DRIVE FANS SHALL BE SUPPLIED WITH VARIABLE SPEED CONTROLLER FOR INSTALLATION AND WIRING BY DIV. 26.
- .5 PERFORMANCE: AS INDICATED ON DRAWING SCHEDULE
- .6 ACCEPTABLE MATERIAL: GREENHECK, PENN, LOREN COOK, TWIN CITY FAN.

.2 IN-LINE CABINET FAN:
- .1 FAN HOUSING CONSTRUCTION OF CORROSION RESISTANT GALVANIZED STEEL C/W SOUND ABSORBING LINED INSULATION.
- .2 REMOVABLE BOTTOM HOUSING PANEL ALLOWS EASY ACCESS TO THE POWER ASSEMBLY FOR INSPECTION OR SERVICE.
- .3 OUTLET DUCT CONNECTION WITH INTEGRAL BACKDRAFT DAMPER CAN BE CONVERTED FROM HORIZONTAL TO VERTICAL DISCHARGE.
- .4 FAN SCROLL IS CONSTRUCTED OF GALVANIZED STEEL.
- .5 FAN WHEELS ARE DOUBLE WIDTH FORWARD CURVED CENTRIFUGAL TYPE. ALL WHEELS ARE DYNAMICALLY BALANCED FOR VIBRATION FREE OPERATION.
- .6 MOTORS 115/60/1. ALL MOTORS ARE SIZED TO MATCH FAN LOADS, HAVE THERMAL OVERLOAD PROTECTION AND ARE MOUNTED ON VIBRATION ISOLATORS. POWER ASSEMBLIES CAN BE EASILY UNPLUGGED AND REMOVED FOR INSPECTION OR SERVICE.

.3 UPBLAST ROOF EXHAUSTER:
- .1 SPUN ALUMINUM, EXHAUST FANS SHALL BE BELT DRIVE OR DIRECT TYPE AS PER EQUIPMENT SCHEDULE. THE FAN WHEEL SHALL BE CENTRIFUGAL BACKWARD INCLINED, CONSTRUCTED OF ALUMINUM AND SHALL INCLUDE A WHEEL CONE CAREFULLY MATCHED TO THE INLET CONE FOR PRECISE RUNNING TOLERANCES. WHEELS SHALL BE STATICALLY AND DYNAMICALLY BALANCED. THE FAN HOUSING SHALL BE CONSTRUCTED OF HEAVY GAUGE ALUMINUM WITH A RIGID INTERNAL SUPPORT STRUCTURE AND A BIRDSCREEN.
- .2 MOTORS AND DRIVES SHALL BE MOUNTED ON VIBRATION ISOLATORS, OUT OF THE AIRSTREAM.
- .3 A DISCONNECT SWITCH SHALL BE FACTORY INSTALLED AND WIRED FROM THE FAN MOTOR TO A JUNCTION BOX INSTALLED WITHIN THE MOTOR COMPARTMENT.
- .4 ALL FANS SHALL COME WITH PREFABRICATED, INSULATED, 600MM HIGH, SEISMICALLY RESTRAINED ROOF CURB AND BACKDRAFT DAMPER.
- .5 ALL FANS SHALL BEAR THE AMCA CERTIFIED RATINGS SEAL FOR SOUND AND AIR PERFORMANCE.
- .6 ACCEPTABLE MATERIAL: GREENHECK, PENN, LOREN COOK, TWIN CITY FAN.

12. RANGE HOOD (DOMESTIC):

.1 COMPLETE SYSTEM INCLUDING:
- .1 750 mm HOOD
- .2 LIFETIME WASHABLE ALUMINUM FILTER
- .3 LIGHT UNIT WITH BULB 120 V – 60 W
- .4 LIGHT SWITCHES
- .5 REMOTE EXHAUST FAN ON/OFF SWITCH INTEGRAL TO HOOD 120V, 15 AMP RATED SWITCH

.2 FINISH: BAKED WHITE ENAMEL

.3 INSTALL HOODS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS

.4 ACCEPTABLE MATERIAL: NUTON, BROAN, OR EQUAL

13. ELECTRIC AND ELECTRONIC CONTROLS:

- .1 ALL 24VDC (LOW VOLTAGE) CONTROLS BY MECHANICAL CONTRACTOR.
- .2 PROVIDE EMT CONDUIT C/W STEEL COUPLINGS AND FITTINGS FOR CONTROL WIRING IN EXPOSED OR EXTERIOR LOCATIONS. REFER TO ELECTRICAL SPECIFICATIONS FOR INSTALLATION DETAILS.
- .3 PROVIDE FT-6 FIRE RATED CABLE FOR CONTROL WIRING IN CONCEALED AREAS.
- .4 THERMOSTAT (LOW VOLTAGE)
  - .1 WALL MOUNTED SUPPLIED WITH RTU
  - .2 FOR USE ON 24V CIRCUIT AT 1.5A CAPACITY.

14. TESTING, ADJUSTING AND BALANCING (TAB):

.1 GENERAL:
- .1 TAB MEANS TO TEST, ADJUST AND BALANCE TO PERFORM IN ACCORDANCE WITH REQUIREMENTS OF CONTRACT DOCUMENTS AND TO DO ALL OTHER WORK AS SPECIFIED IN THIS SECTION.

.2 TOLERANCES:
- .1 DO TAB TO FOLLOWING TOLERANCES OF DESIGN VALUES:
  - .1 HVAC SYSTEMS: PLUS OR MINUS 5%.
  - .2 HYDRONIC SYSTEMS: PLUS OR MINUS 10%.
- .2 ADJUST OR REPLACE SHEAVES AS REQUIRED TO MEET DESIGN PERFORMANCE.
- .3 DO TAB OF COMPLETE MECHANICAL SYSTEMS OVER ENTIRE OPERATING RANGE IN ACCORDANCE WITH MOST STRINGENT CONDITIONS OF AABC (ASSOCIATED AIR BALANCE COUNCIL) & NABC (NATIONAL AIR BALANCE COUNCIL).

.3 TAB REPORT:
- .1 FORMAT TO BE IN ACCORDANCE WITH ASSOCIATED AIR BALANCING COUNCIL (AABC/CAABC).

.4 SYSTEMS:
- .1 AIR SYSTEMS:
  - .1 INCLUDE BOTH SPECIFIED AND MEASURED DATA:
    - .1 MINIMUM & MAXIMUM PRIMARY & SECONDARY AIRFLOWS
    - .2 OPERATING PRESSURES
    - .3 DUCT SIZE & TRANSVERSE READINGS
    - .4 MOTOR VOLTS, AMPS & POWER
  - .2 FOR THE FOLLOWING EQUIPMENT:
    - .1 RTU'S & FANS
    - .2 SUPPLY DUCTWORK
    - .3 DIFFUSERS/GRILLES
- .2 HYDRONIC SYSTEMS:
  - .1 INCLUDE BOTH SPECIFIED AND MEASURED DATA:
    - .1 INLET & OUTLET TEMPERATURES
    - .2 INLET & OUTLET PRESSURES
    - .3 MOTOR VOLTS, AMPS & POWER
    - .4 FLUID FLOW RATES
  - .2 FOR THE FOLLOWING SYSTEMS:
    - .1 DOMESTIC WATER

.5 VERIFICATION:
- .1 ALL REPORTED RESULTS SUBJECT TO VERIFICATION BY ENGINEER.
- .2 PROVIDE MANPOWER AND INSTRUMENTATION TO VERIFY UP TO 30% OF ALL REPORTED RESULTS.
- .3 NUMBER AND LOCATION OF VERIFIED RESULTS TO BE AT DISCRETION OF ENGINEER.
- .4 BEAR COSTS TO REPEAT TAB AS REQUIRED TO SATISFACTION OF ENGINEER.
- .5 PRODUCE "AS-BUILT" FULL SYSTEM SCHEMATICS. USE AS-BUILT DRAWINGS FOR REFERENCE.
- .6 TAB TO BE CONSIDERED COMPLETE ONLY WHEN FINAL TAB REPORT RECEIVED AND APPROVED BY ENGINEER.

15. COMMISSIONING:

.1 GENERAL:
- .1 THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE FUNCTIONAL PERFORMANCE TESTS. THESE TESTS ENSURE THAT ALL EQUIPMENT AND SYSTEMS OPERATE IN ACCORDANCE WITH DESIGN INTENT. THE TESTS ARE DYNAMIC TESTS, AND TEST THE SYSTEMS THROUGH ALL POSSIBLE MODES OF OPERATION.
- .2 IN THE FUNCTIONAL PERFORMANCE TESTS, ALL HVAC MECHANICAL SYSTEMS (INCLUDING CONTROL SYSTEMS) AND ELECTRICAL SYSTEMS SHALL BE CHECKED FOR THE FOLLOWING:
  - .1 VERIFY THAT EACH SYSTEM AND SUB-SYSTEM IS OPERATING.
  - .2 COMPLIES WITH CONTRACT SPECIFICATIONS AND THE DESIGN INTENT DOCUMENT THROUGH THE ENTIRE RANGE OF OPERATING CONDITIONS.
  - .3 RE-TESTING OF CORRECTED ITEMS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
  - .4 DEFICIENCIES IN SYSTEM, SUB-SYSTEM, OR ELEMENT PERFORMANCE WILL BE BROUGHT TO THE ATTENTION OF THE CONSTRUCTION MANAGER AND ENGINEER. DEFICIENCIES WILL BE RESOLVED ON A CASE-BY-CASE BASIS.

.2 FUNCTIONAL PERFORMANCE TEST:
- .1 THE CONTRACTOR SHALL PERFORM FUNCTIONAL PERFORMANCE TESTING. THE CONTRACTOR SHALL MAINTAIN AN EQUIPMENT AND SYSTEM CHECKLIST TO TRACK PROGRESS SO IT CAN BE USED TO SCHEDULE START-UPS AND TESTING.
  - .1 EQUIPMENT CHECKLIST & SYSTEM CHECKLIST:
    - .1 CONTROLS/BUILDING AUTOMATION

.3 DEFICIENCY RESOLUTION FOR SYSTEM COMMISSIONING:
- .1 IF ACCEPTABLE PERFORMANCE CANNOT BE ACHIEVED, THEN THE NECESSARY CORRECTIVE MEASURES SHALL BE CARRIED OUT. THE ENGINEER AND/OR CONTRACTOR WILL ISSUE APPROPRIATE DIRECTIONS IN THIS REGARD.
- .2 THE ALLOCATION OF COST OF DEFICIENCY RESOLUTION SHALL BE DETERMINED BY THE CONSTRUCTION MANAGER AND ENGINEER, ON A CASE-BY-CASE BASIS.

Client

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2019-02-11	ISSUED FOR PERMIT/TENDER	1
2019-02-06	ISSUED FOR REVIEW	0

THE ENGINEER WAIVES ANY AND ALL RESPONSIBILITY AND LIABILITY FOR PROBLEMS WHICH ARISE FROM FAILURE TO FOLLOW THESE PLANS, SPECIFICATIONS AND THE DESIGN INTENT THEY CONVEY, OR FOR PROBLEMS WHICH ARISE FROM OTHER FAILURE TO OBTAIN AND / OR FOLLOW THE ENGINEER'S GUIDANCE WITH RESPECT TO ANY ERRORS, OMISSIONS, INCONSISTENCIES, AMBIGUITIES OR CONFLICTS WHICH ARE ALLEGED.

DO NOT SCALE DRAWINGS

L'INGÉNIEUR DÉCLINE TOUTE RESPONSABILITÉ DÉCOULANT DE PROBLÈMES FAISANT SUITE AU NON RESPECT DES PLANS, DEVIS ET DE L'INTENTION DU CONCEPT QU'ILS INDIQUENT OU DE TOUS LES PROBLÈMES POUVANT RESULTER DU DÉFAUT D'OBTENIR ET / OU DE SUIVRE LES CONSEILS DE L'INGÉNIEUR EN CE QUI CONCERNE LES ERREURS, OMISSIONS, INCONSISTANCES, AMBIGUITÉS OU CONFLITS ALLÈGUÉS.

NE PAS MESURER LES DESSINS A L'ÉCHELLE

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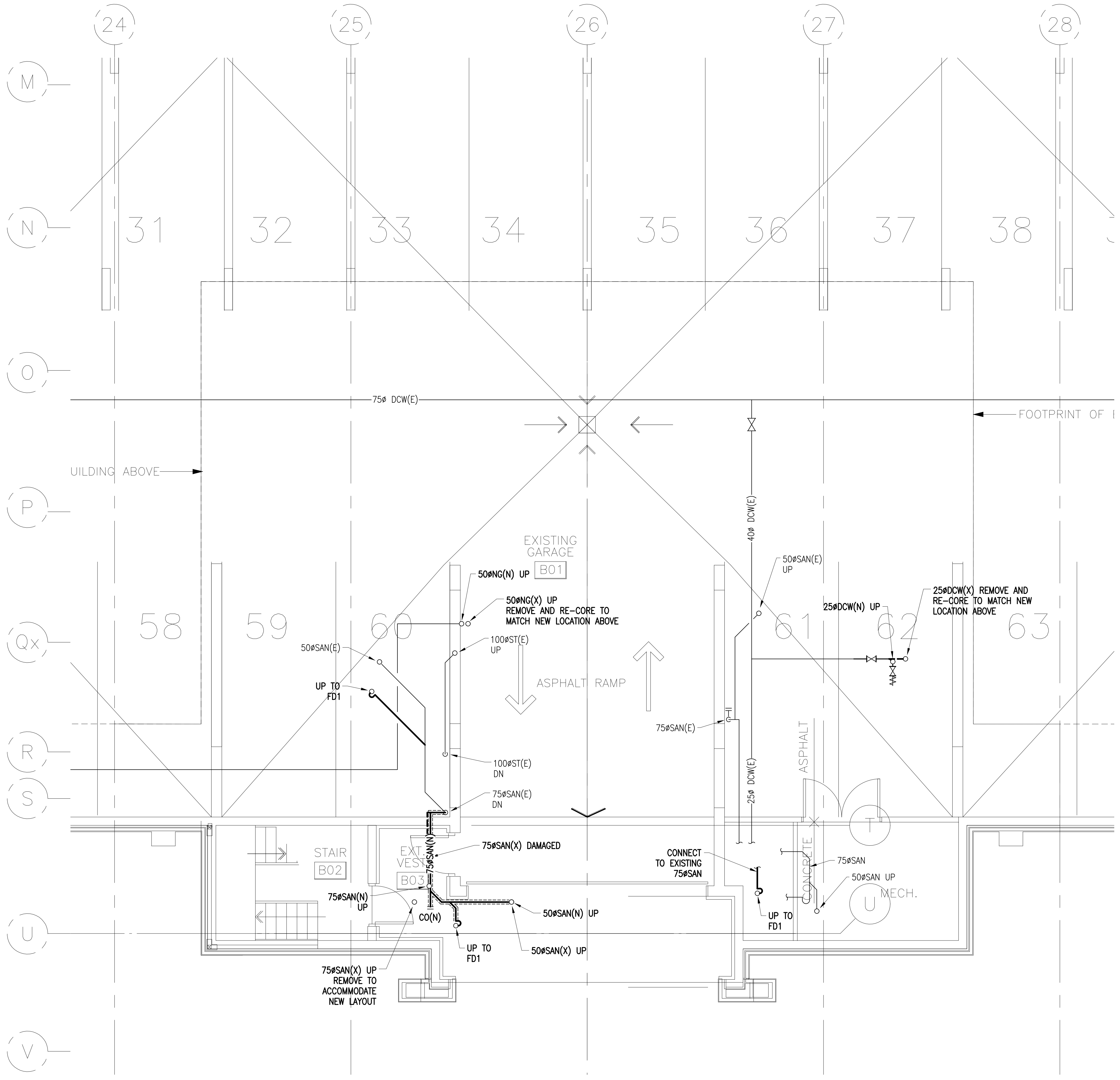
Nord du projet

Seal/Sceau
F.W.A. BANN
90395575
MAR 8/2019

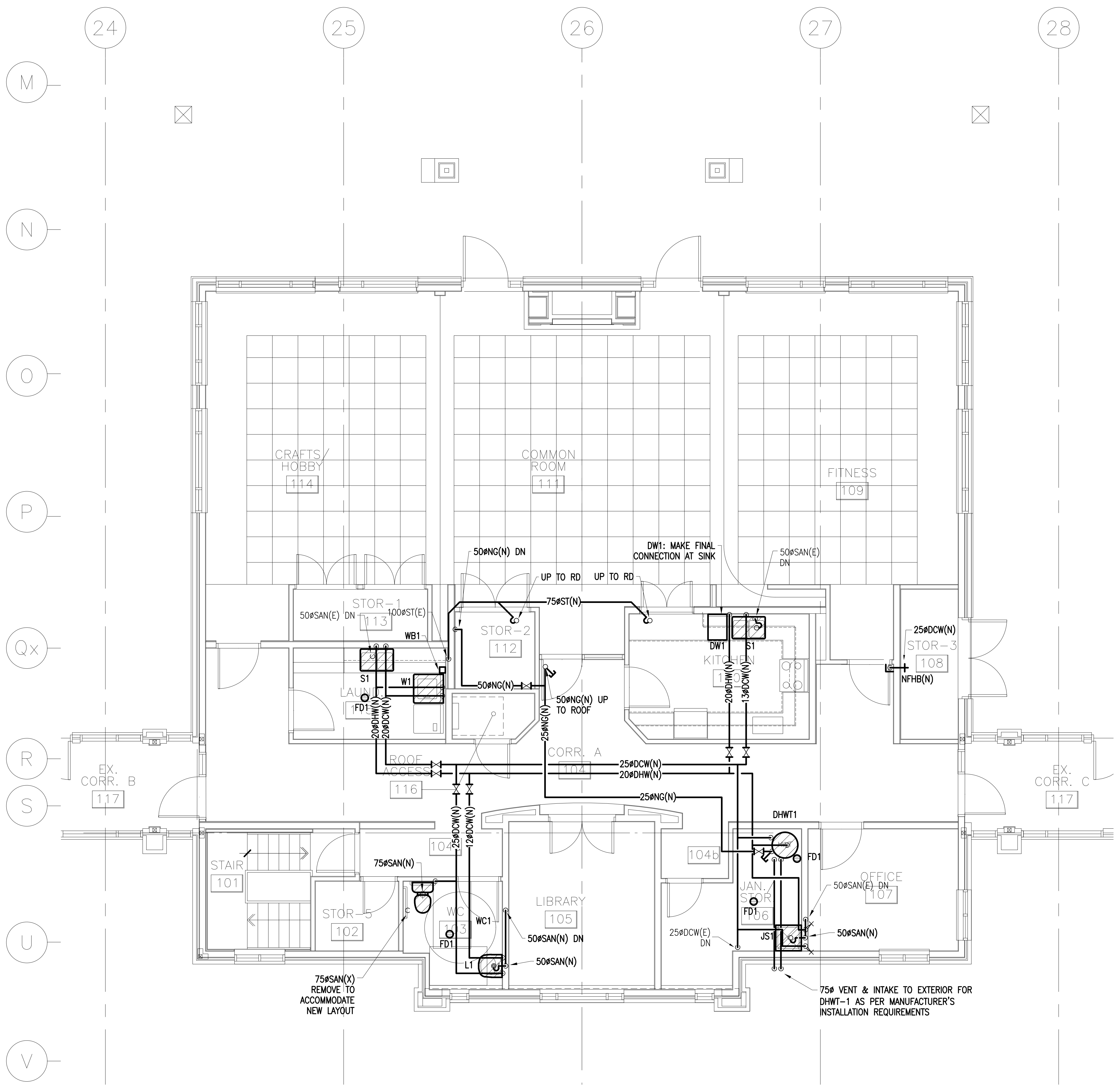
Project/Projet
MERIDIAN RETIREMENT COMMUNITY, FIRE RESTORATION

Drawing title/Titre du dessin
MECHANICAL SPECIFICATIONS

Scale / Échelle	AS NOTED	Project no./No. du projet	2019-148
Design by / Conçu par	B.BROWN	Drawing/Dessin	M3 OF 6
Drawn by / Dessiné par	B.BROWN		
Reviewed by / Examiné par	F.BANN		
Date / Date	MARCH 2019	Revision no: –	Acad file/Fichier: –



1
M4
MECHANICAL - BASEMENT PLUMBING & UTILITIES PLAN
1:75



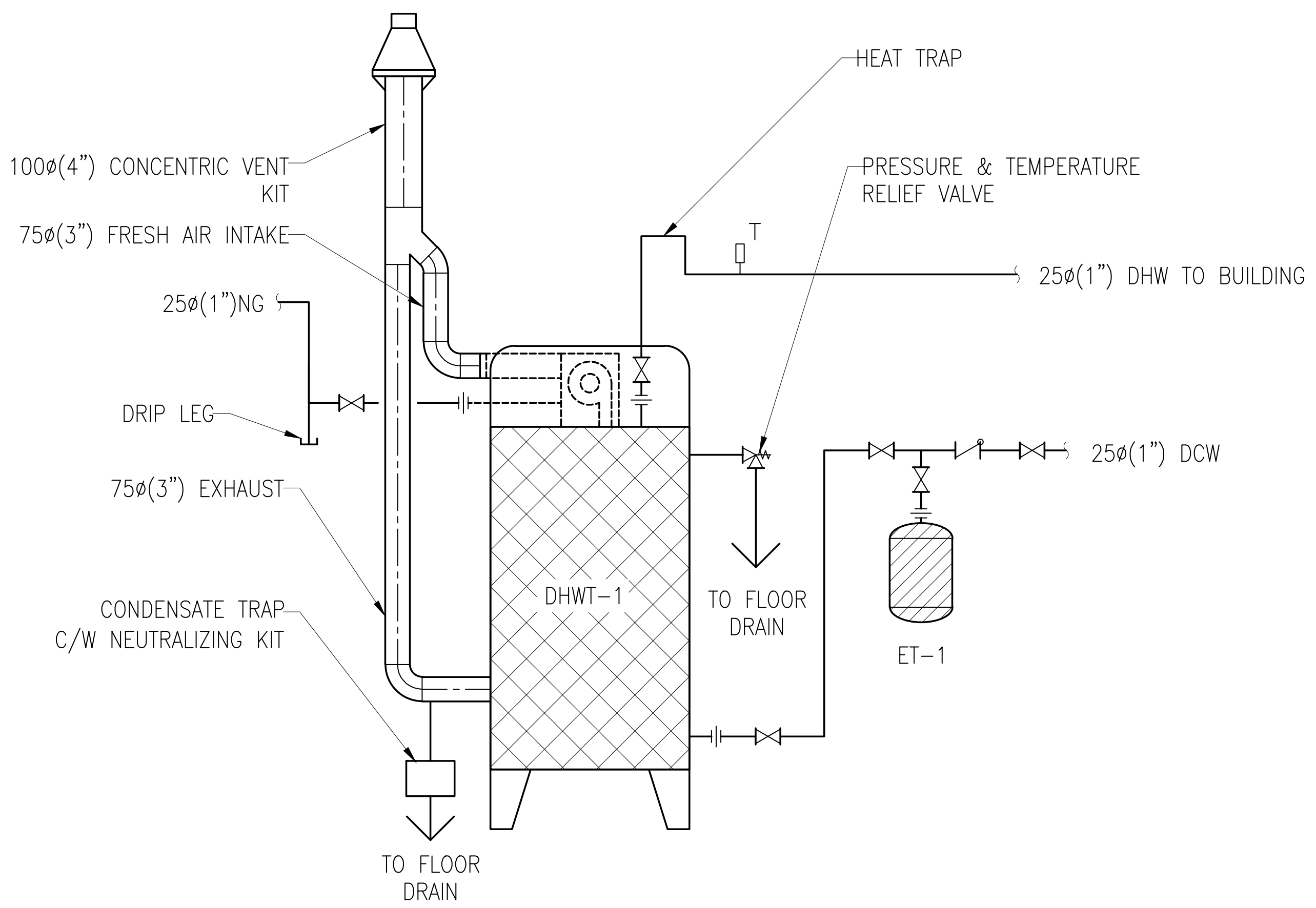
2
M4
MECHANICAL - GROUND FLOOR PLUMBING & UTILITIES PLAN
1:75

PLUMBING & UTILITIES – DEMOLITION

1. REMOVE DAMAGED AND ABANDONED SANITARY PIPING WHERE INDICATED. CLOSE AND SEAL SLAB OPENINGS WHERE NO LONGER NEEDED.

PLUMBING & UTILITIES – NEW WORK

1. PROVIDE NEW SANITARY PIPING AND CONNECTIONS FOR NEW FIXTURES. COORDINATE SLEEVE LOCATIONS WITH STRUCTURAL.
2. HEAT TRACE SANITARY PIPING LOCATION OUTDOORS
3. PROVIDE DHWT-1 AND ACCESSORIES, SEE DETAIL 3/M4.
4. PROVIDE NATURAL GAS PIPING TO DHWT-1 AND RTU-1 ON ROOF.



3
M4
DOMESTIC HOT WATER TANK DETAIL
NTS

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COMMUNITY,
FIRE RESTORATION

Drawing title/Titre du dessin
MECHANICAL PLUMBING
& UTILITIES PLAN

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Design by Conçu par	B.BROWN	Drawing/Dessin	M4 OF 6
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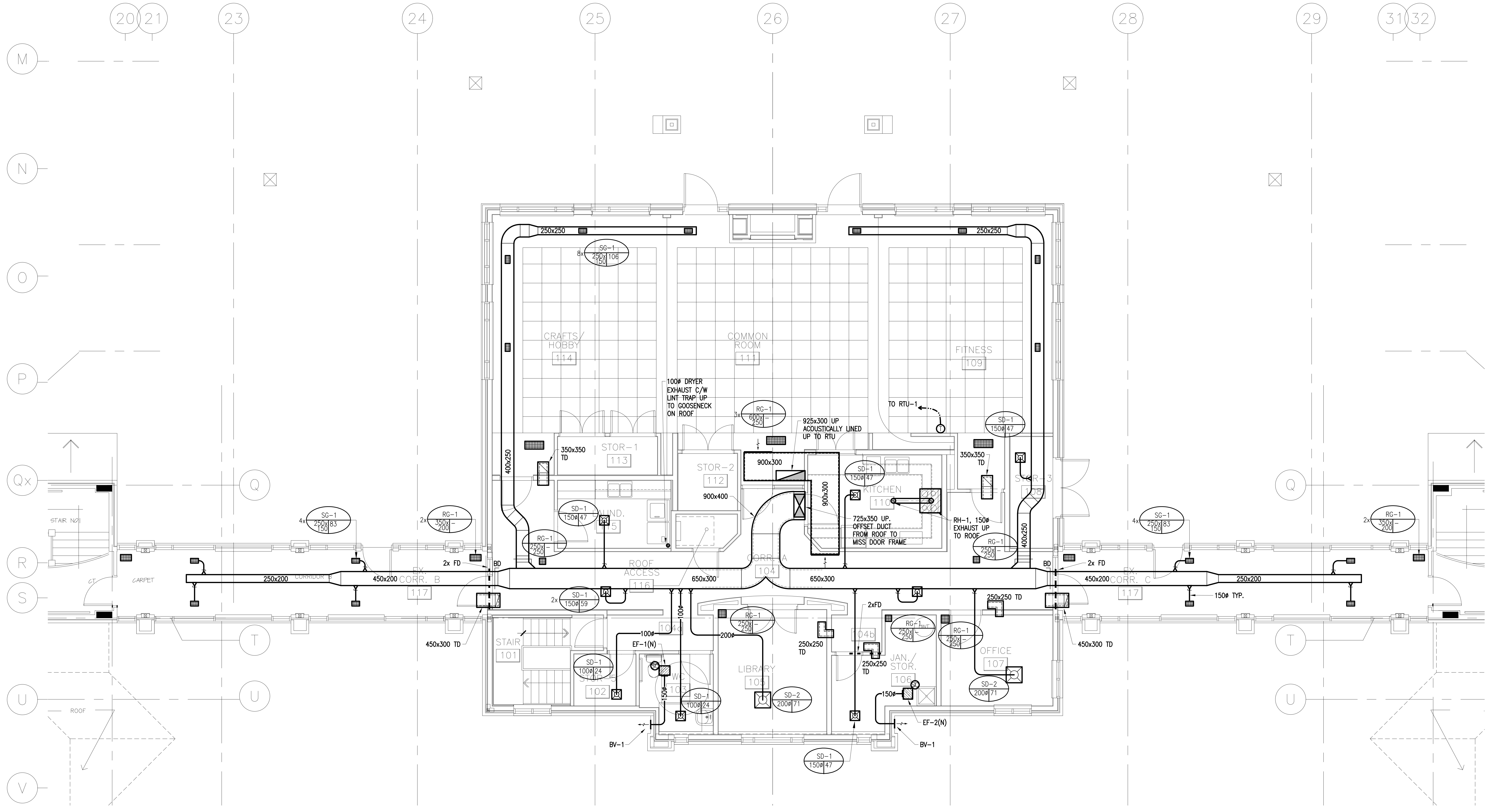

1 M5 MECHANICAL - GROUND FLOOR HVAC PLAN

1:75

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MECHANICAL
GROUND FLOOR
HVAC PLAN

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Drawn by Dessiné par	B.BROWN	M5	
Reviewed by Examiné par	F.BANN	OF	6
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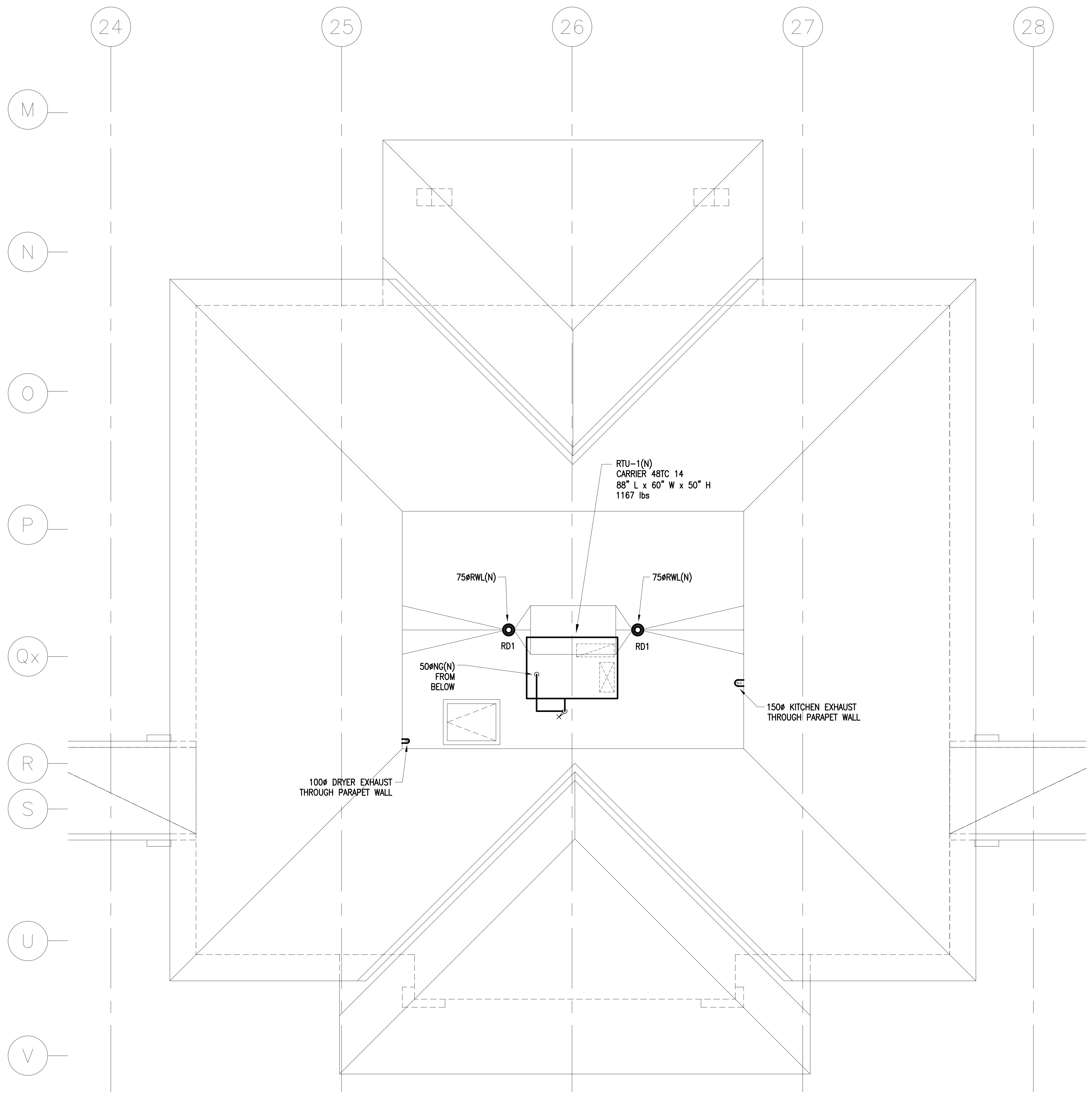
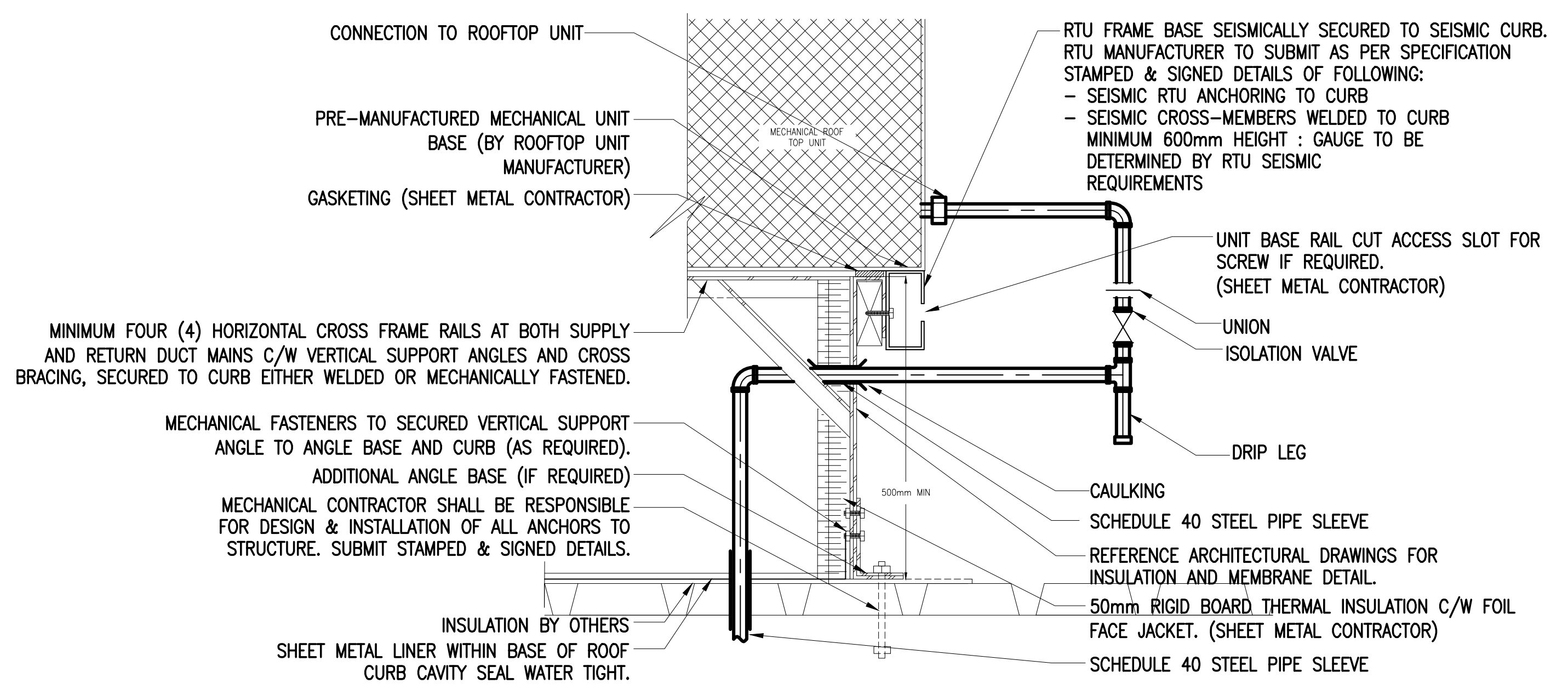


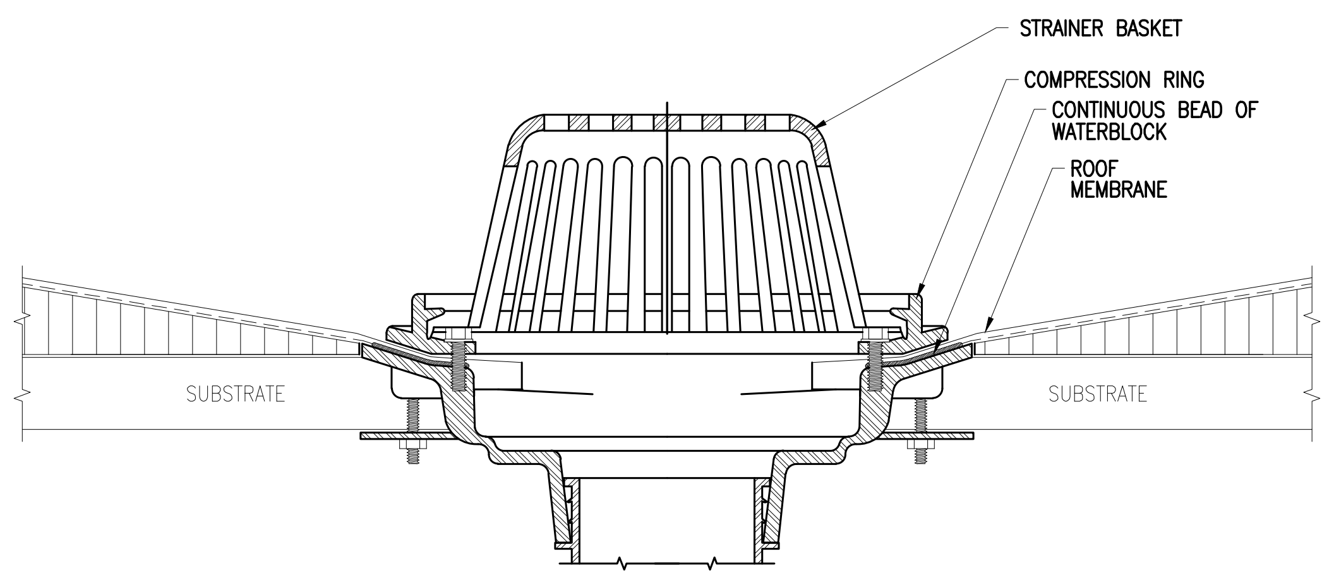
1 / M6 MECHANICAL - ROOF PLAN

1:75



2 / M6 RTU SEISMIC CURB AND GAS PENETRATION DETAIL

NTS



3 / M6 ROOF DRAIN DETAIL

NTS

<u>GENERAL NOTES:</u>

1. COORDINATE WITH ALL OTHER TRADES.
2. COORDINATE DUCT ROUTING WITH STRUCTURAL AND OTHER SYSTEMS AND TRADES.
3. MAINTAIN VENTING CLEARANCES TO INTAKES ON ROOF AS PER OBC.
4. COORDINATE INTERFERENCE DRAWINGS WITH ALL OTHER TRADES. ENSURE ALL MECHANICAL EQUIPMENT MAINTAINS MANUFACTURE'S REQUIRED CLEARANCES.
5. PROVIDE ROOFTOP UNIT (RTU-1) C/W SEISMIC ROOF CURBS BY MECHANICAL. COORDINATE SLEEVING WITH OTHER TRADES. COORDINATE SUPPLY AND RETURN AIR DUCT TRANSITION WITH UNIT CONFIGURATION. REFER TO EQUIPMENT SCHEDULE AND DETAIL. SEISMICALLY SECURE EQUIPMENT TO STRUCTURE.

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MERIDIAN RETIREMENT
COMMUNITY,
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MECHANICAL ROOF
PLAN AND DETAILS

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