

ASHRAE 62-2001 COMPLIANCE	
ASHRAE APPLICATION TYPE TOTAL OCCUPANCY	: FOOD AND BEVERAGE SERVICE = 10 PERSONS
OUTDOOR AIR RATE, R ₀ OUTDOOR AIR REQUIRED	= 20 CFM/ PERSON = 200 CFM
OUTDOOR AIR SUPPLIED	= 300 CFM

DOMESTIC WATER HEATER SCHEDULE (ELECTRIC)						
TAG	MAKE AND MODEL	CAPACITY [US GAL]	INLET / OUTLET	ELECTRICAL V / PH / HZ	KW	WEIGHT (FULL) [LBS]
DWH-1	AO SMITH DSE-40-9	40	1-3/4" / 1-3/2"	208/1/60	9.0	475
NOTE: CONVERT NON-SIMULTANEOUS TO SIMULTANEOUS ELECTRIC COIL CONFIGURATION. BOTH HEATING ELEMENTS SHALL COME ON SIMULTANEOUSLY.						

GREASE INTERCEPTOR SIZING: GI-1		
FIXTURE	DIMENSIONS [IN]	DRAIN RATE [GPM]
KS-1	18 x 18 x 14	14.7
	18 x 18 x 14	14.7
TOTAL		29.5
GREASE INTERCEPTOR		ENDURA 3925A02LO
GREASE CAPACITY		50 LBS / 25 GPM

GREASE INTERCEPTOR SIZING: GI-2		
FIXTURE	DIMENSIONS [IN]	DRAIN RATE [GPM]
PS-1	26 x 24 x 14	28.4
TOTAL		28.4
GREASE INTERCEPTOR		ENDURA 3925A02LO
GREASE CAPACITY		50 LBS / 25 GPM



FAN COIL / HEAT PUMP SCHEDULE											
TAG	MAKE & MODEL	NOMINAL COIL SIZE	AIR		HEATING		COOLING		ELECTRICAL		WEIGHT [LBS]
			SUPPLY AIR [CFM]	E.S.P. [IN. WC]	RATED CAPACITY (MBH)	ELECTRIC HEAT (KW)	TOTAL COOLING (MBH)	SENSIBLE COOLING (MBH)	V / PH / HZ	MCA /MOP	
FC-1	DAIKIN FBQ24PBJU	2 TON	688	0.8	-	7.0	24.0	18.7	208/1/60	1.8 / 15	80
HP-1	DAIKIN RZQ24TAVJU	2 TON	-	0.5	27.0	-	24.0	18.7	208/1/60	16.5 / 25	172
C/W ACCESSORIES			4) INSULATED HOUSING				7) ACCESS DOOR				
1) FILTERS			5) FLEXIBLE DUCT CONNECTIONS				8) INTEGRATED CONTROL FOR DUCT HEATER				
2) EC MOTOR			6) ADJUST ABLE PULLEY								
3) VIBRATION ISOLATORS											

KITCHEN EXHAUST HOOD								
TAG	MANUFACTURER	TYPE	MAX COOK TEMP	EXHAUST CFM	SUPPLY CFM	LENGTH	HOOD CONSTRUCTION	END TO END HOOD CONFIG.
KEH-1	CAPTIVEAIRE	TYPE I	600°F	2406	200	8'-9"	430 SS WHERE EXPOSED	LEFT
KEH-2	CAPTIVEAIRE	TYPE I	600°F	2406	200	8'-9"	430 SS WHERE EXPOSED	RIGHT

TAG	MANUFACTURER	MODEL	EXHAUST [CFM]	ESP [\"WC]	ELECTRICAL			WEIGHT [LBS]	NOTES
					V / PH / HZ	HP	FLA		
KEF-1	CAPTIVEAIRE	USB124DD-RM	4812	2.0	208/3/60	5	15.8	748	ALL
NOTES									
1. GREASE BOX									
2. INLET SERVICE DUCT CONNECT									
3. DISCHARGE EXTENSION									
4. ROOF CURB RAIL									

MAKE-UP AIR UNIT									
TAG	MAKE	MODEL	SERVICE	SUPPLY AIR		HEATING [MBH]			ELECTRICAL
				CFM	E.S.P.	INPUT	OUTPUT	TEMP RISE	
MAU-1	CAPTIVEAIR	A2-D.250-20D	KEH-1, KEH-2	4,661	0.5	276,549	254,425	55°F	208/3/60
NOTES:									
1. REVERSE INTERLOCK WITH KEF-1									
2. BACK INLET / FRONT DISCHARGE / LEFT HAND ACCESS.									
3. PROVIDE ROOF CURB.									
4. INTAKE HOOD C/W BIRDSCREEN.									
5. PROVE 2" MERV8 FILTERS.									
6. MOTORIZED BACKDRAFT DAMPER									
7. LOW FIRE START									
8. VFD IN VENTED WEATHER PROOF ENCLOSURE C/W SEPARATE 120 V WIRING PACKAGE									

FAN SCHEDULE												
TAG	MAKE	MODEL	LOCATION	CFM	E.S.O. [IN. WC]	WEIGHT [LBS]	SONES	OPTIONS	CONTROL		ELECTRICAL	REMARKS
									CONTROL TYPE	PILOT DEVICE		
EF-1	GREENHECK	CSP-A390-VG	CEILING SPACE	150	0.25	24	0.7	BDD, BS	A	TC	208/1/60	ON TIMECLOCK TO RUN OPERATE DURING OCCUPIED HOURS
EP: EXPLOSION PROOF MOTOR			RC: ROOF CURB		VG: VARGREEN MOTOR			CO	CARBON MONOXIDE		E	E
FIL: FILTERS			IL: INTERLOCKED WITH		BS: BIRD SCREEN			ITL	INTERLOCKED		E	E
MD: MOTORIZED DAMPER			GAS DETECTION SYSTEM					LSC	LIGHT CONTROL SWITCH		E	E
CONTROL TYPE:			ALL FANS TO HAVE:					OS	OCCUPANCY SENSOR		E	E
A- AUTOMATIC			VIBRATION ISOLATION SPRINGS					T	THERMOSTAT - DIRECT		M	M
MA- MANUAL								TC	TIME CLOCK - 7 DAY		E	E
CONTROL WIRING								TPC	THERMOSTAT - 7 DAY PROGRAM		M	M
ALL LINE VOLTAGE CONTROL WIRING BY ELECTRICAL CONTRACTOR								TR	THERMOSTAT - REVERSE ACTING		E	E
ALL LOW VOLTAGE CONTROL WIRING BY MECHANICAL CONTRACTOR								TS	TEMPERATURE SENSOR		M	M
DISCONNECT								WS	WALL SWITCH		E	E
DISCONNECT SHALL BE SUPPLIED AND INSTALLED BY ELECTRICAL CONTRACTOR								WSP	WALL SWITCH W/ PILOT LIGHT		E	E

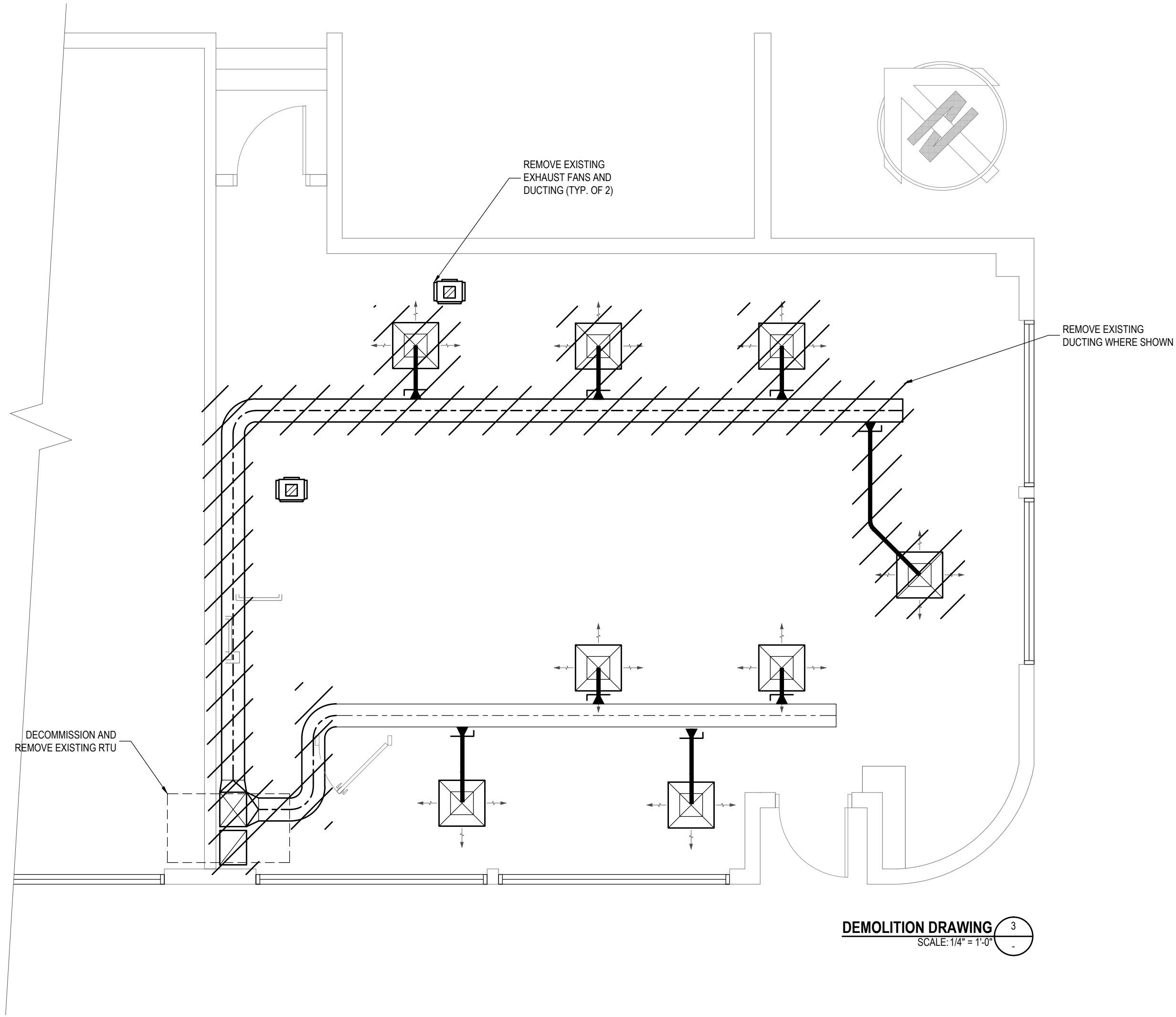
PLUMBING FIXTURE SCHEDULE				
TAG	PRODUCTS		DESCRIPTION	ACCESSORIES
WC-1	WATER CLOSET		AMERICAN STANDARD CADET PRO RIGHT HEIGHT ELONGATED PRESSURE ASSISTED TOILET	C/WITH LOCKING DEVICE FOR TANK COVER AND COMPLETE WITH GRAB BARS, PAPER HOLDER, SHELF, HOOK AND TILTED MIRROR ALL TO 2018 ACCESSIBILITY CODE. *CENTROC #8001TSC0.001, HEAVY DUTY TOILET SEAT, WHITE SOLID PLASTIC, OPEN FRONT. FRANKE COMMERCIAL MIDLAND #CM-16104 TOILET BACK REST. PROVIDE FLOOR FLANGE. (SAME MATERIAL AS THE CONNECTING PIPE DRAIN), WITH ALL BRASS BOLTS AND WITH RUBBER GASKET.*
LAV-1	LAVATORY BASIN		AMERICAN STANDARD DECORUM WALL HUNG LAVATORY9024.001EC AS PER ACCESSIBILITY CODE PIPES TO BE INSULATED.	MOEN #8563 AUTO SENSOR FAUCET C/W BATTERIES LAWLER #TMM-1070, BELOW DECK THERMOSTATIC WATER MIXING VALVE, INTEGRAL CHECKS. MCGUIRE #155WCECO OFFSET OPEN GRID DRAIN. MCGUIRE #LFH1718V, POLISHED BRASS FAUCET SUPPLIES. MCGUIRE #B872C, P-TRAP. MCGUIRE #PROWRAP #PW2000WC SANITARY COVERING *0955.001EC ACRYLIC SHROUD KNEE CONTACT GUARD.
HS-1	HAND SINK		CLIENT SUPPLIED	
PS-1	1 BOWL SINK		CLIENT SUPPLIED	
KS-1	2 BOWL SINK		CLIENT SUPPLIED	
CO	DRAINAGE SPECIALTY		WATTS CO-200-R-1-34G CLEANOUT	
FD	DRAINAGE SPECIALTY		WATTS FD-100-C-7-A5-1 FLOOR DRAIN	WATTS #A5-1.
NOTE: REFER TO ARCHITECTURE AND INTERIOR DESIGN DRAWINGS FOR PLUMBING FIXTURES SPECIFICATIONS.				

DOMESTIC WATER PIPE SIZING BRITISH COLUMBIA PLUMBING CODE 2018		
METHOD USED	AVERAGE PRESSURE LOSS SMALL-COMMERCIAL ENGINEERING DETAILED	
DEVELOPED LENGTH:		
FROM PROPERTY LINE LOCATED OUTSIDE THE BUILDING	0 FT	0 m
FROM WATER SERVICE TO MOST REMOTE OUTLET	116 FT	35 m
TOTAL	116 FT	35 m
MINIMUM STATIC PRESSURE AVAILABLE	60 PSI	413.4 kPa
PRESSURE LOSSES:		
METERS	0 PSI	0 kPa
PRV	5 PSI	34 kPa
RFBP	0 PSI	0 kPa
ELEVATION CHANGE	20 Ft	9 PSI 60 kPa
STEP 1(C):		
413.4 kPa MINIMUM STATIC PRESSURE	- 0 kPa PRESSURE LOSSES TO SERVICE	= 413.4 kPa ADJUSTED PRESSURE AT WATER SERVICE ENTRY TO BUILDING
STEP 1(D):		
413.4 kPa ADJUSTED PRESSURE	+ 34 kPa METER, PRV, RFBP, ET AL	+ 60 kPa LOSSES FOR SYSTEM HEIGHT
= 214 kPa		+ 105 kPa MINIMUM PRESSURE REQUIRED
STEP 1(E):		
214 kPa	/ 53 m	= 4.04 kPa/m
MINIMUM PRESSURE REQUIRED FOR USING AVERAGE PRESSURE LOSS METHOD IS 2.6 kPa/m		
REFERENCE: BCBC 2018 A-2.6.3.1 (2) - A		
NOTE: CONTRACTOR TO ENSURE MINIMUM PRESSURE OF 60 PSI IS AVAILABLE		

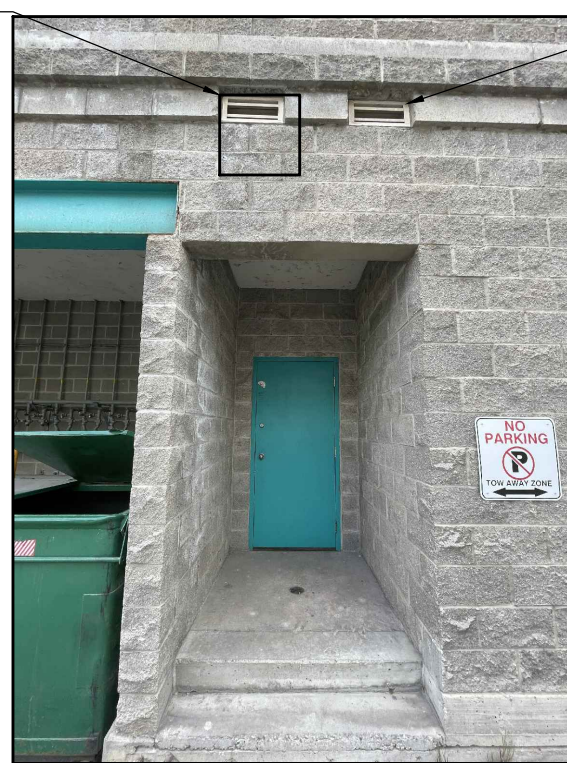
MINIMUM FIXTURE CONNECTION SCHEDULE					
TAG	FIXTURE	DHW	DCW	SAN	VENT
WC	WATER CLOSET (FLUSH TANK)		3/2"	3"	1 1/2"
LAV	LAVATORY	1/2"	1/2"	1 1/2"	1 1/2"
UR	URINAL (METERING, WASHOUT)	-	1/2"	1 1/2"	1 1/2"
SH	SHOWER (PUBLIC)	1/2"	1/2"	1 1/2"	1 1/2"
HS	HAND SINK	1/2"	1/2"	1 1/2"	1 1/2"
KS	KITCHEN SINK	1/2"	1/2"	1 1/2"	1 1/2"
MS	MOP SINK	1/2"	1/2"	1 1/2"	1 1/2"
DW	DISHWASHER	1/2"	-	1 1/2"	1 1/2"
FD	FLOOR DRAIN	-	1/2"	3"	1 1/2"

TABLE A-2.6.3.1.(2)F PIPE SIZES FOR WATER SYSTEMS BASED ON NUMBER OF FIXTURE UNITS SERVED USING THE AVERAGE PRESSURE LOSS METHOD								
Pipe Size (inches)	WATER VELOCITY							
	PEX (Hot & Cold)				Copper (Cold)		Copper (Hot)	
	2.4 gpm (80l/s)				1.5 m/s (5ft/s)		1.2 m/s (4ft/s)	
	FLOW AND FIXTURE UNITS SERVED							
	L/s		Fixture Units		L/s	Fixture Units	L/s	Fixture Units
½	0.46	8	0.38	7	0.23	3.5	0.18	2.5
¾	0.68	13	0.54	11	0.34	6.5	0.27	4.5
1	0.95	21	0.77	17	0.48	9	0.38	7.5
1½	1.62	42	1.26	30	0.81	18	0.63	14
2	2.47	83	1.8	54	1.24	29	0.99	22
2½	3.4	146	2.6	102	1.75	46	1.4	34
3	6.68	337	4.82	285	3.04	120	2.43	81
3½	9.55	662	7.69	500	4.69	245	3.75	170
4	12.53	1018	10.73	750	6.7	400	5.36	295
5	22.94	2450	18.9	1800	11.78	850	9.42	600
6	37	4400	29	3550	18.35	1625	14.68	1125
8	52.1	9600	42	4600	26.38	2875	21.11	2125

FIXTURE UNIT COUNT - PUBLIC USE									
DIV B, PART 2, TABLE 2.6.3.2.A, TABLE 2.4.9.3									
TAG	FIXTURE	#	DHW		DCW		SAN		T. FU
			FU	T. FU	FU	T. FU	FU	T. FU	
WC-1	WATER CLOSET (FLUSH TANK)	1	0.0	0.0	2.2	2.2	4.0	4.0	
LAV-1	LAVATORY	1	2.0	2.0	2.0	2.0	1.0	1.0	
PS-1	POT SINK	1	4.0	4.0	4.0	4.0	2.0	2.0	
HS-1	HAND SINK	2	2.0	4.0	2.0	4.0	1.5	3.0	
KS-1	KITCHEN SINK (DOMESTIC TYPE)	1	4.0	4.0	4.0	4.0	2.0	2.0	
DW-1	COMMERCIAL DISHWASHER (3/4")	1	3.0	3.0	2.0	2.0	3.0	3.0	
FD-1	FLOOR DRAIN (3")	1	0.0	0.0	0.0	0.0	3.0	3.0	
HD-1	HUB DRAIN	2	0.0	0.0	0.0	0.0	3.0	6.0	
TOTAL			17.0		18.2		18.0		
INCOMING WATER LINE (DCW+DHW)					1 1/2" COPPER		19.2 FU		



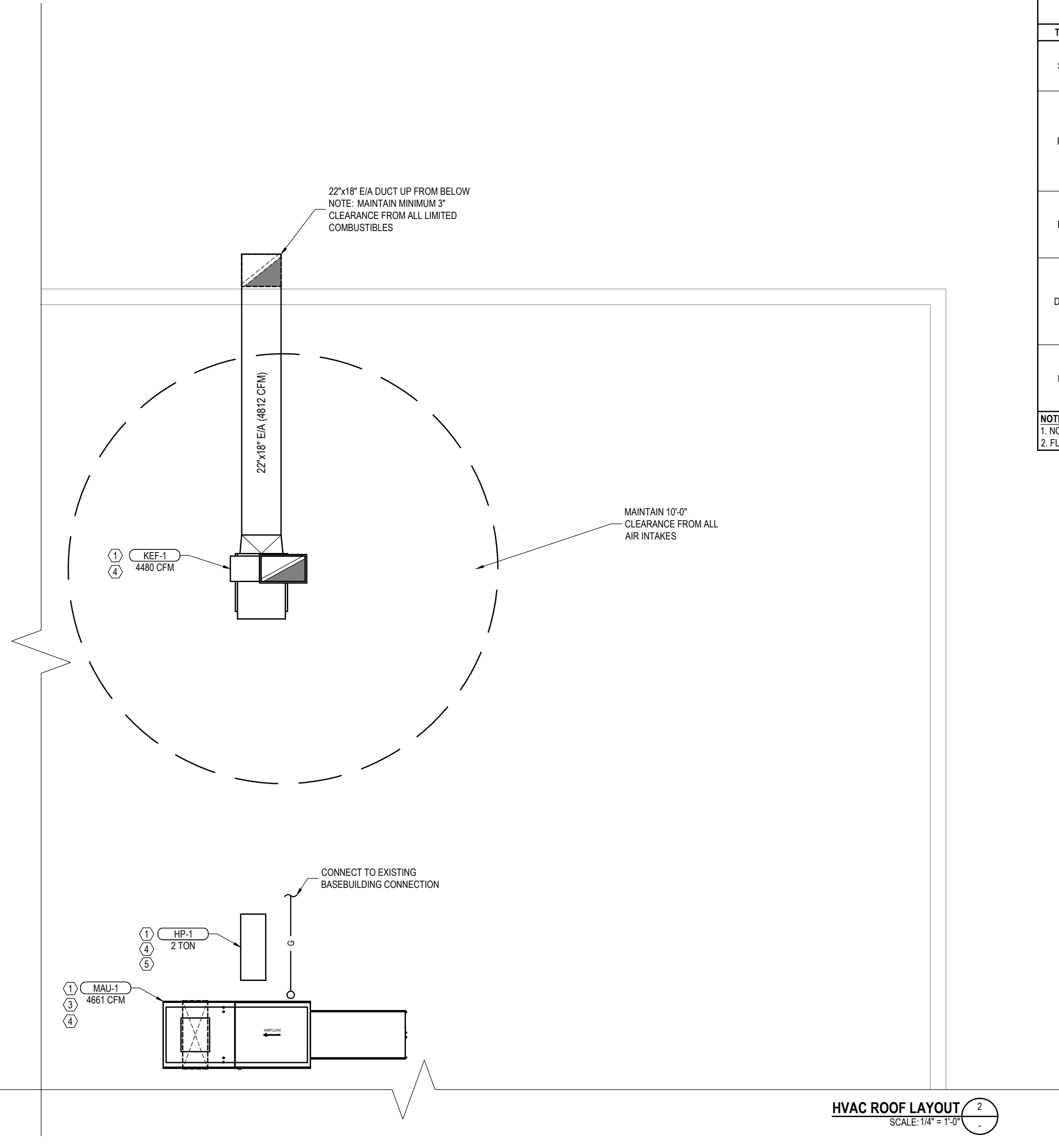
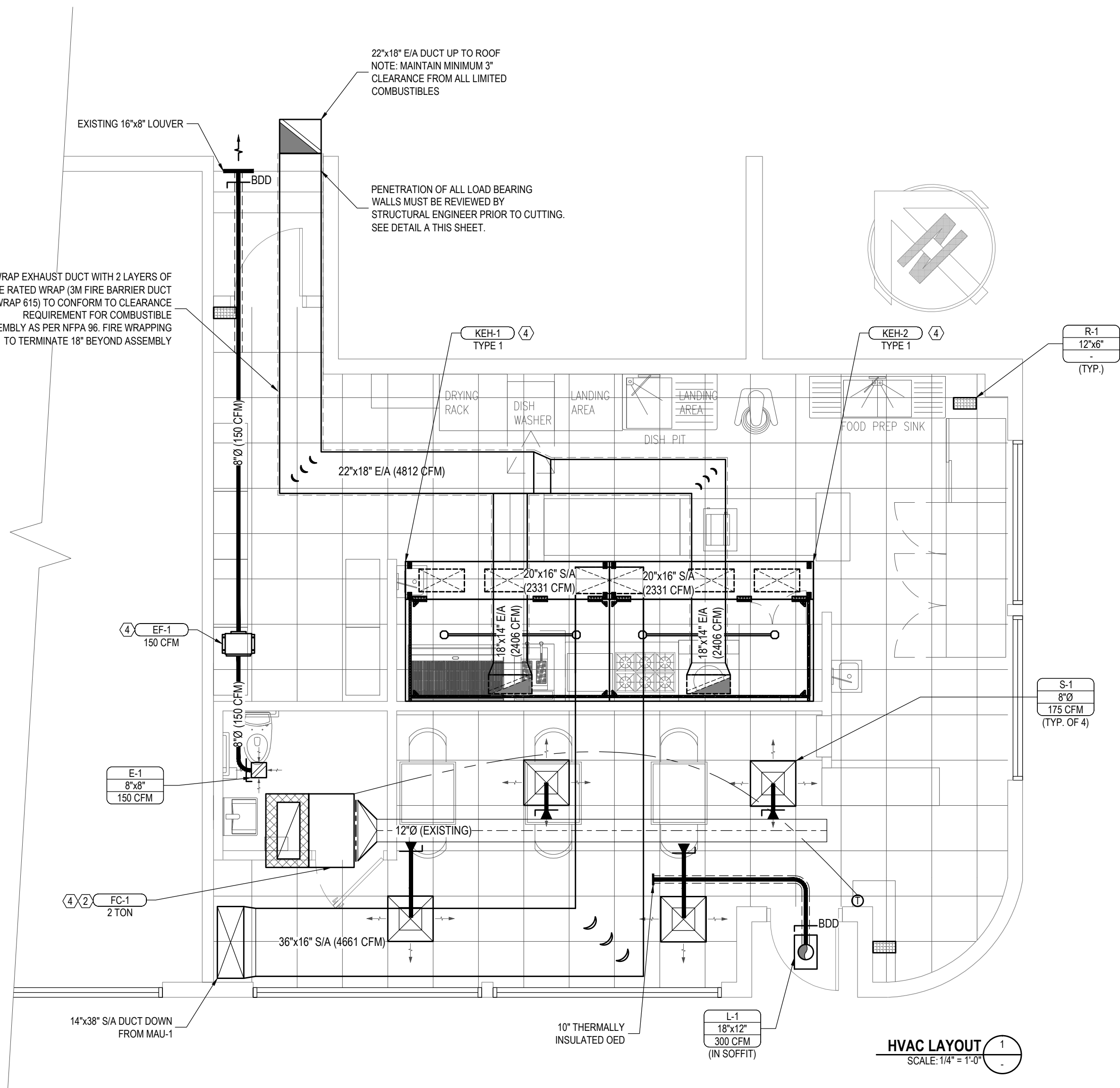
EXISTING 16"x8" LOUVER
TO BE OPENED UP TO
ALLOW FOR PASSAGE OF
22"x18" KEF-1 DUCT



EXISTING 16"x8" LOUVER
TO BE USED FOR EF-1

NOTE: STRUCTURAL REVIEW BY CERTIFIED
PROFESSIONAL REQUIRED BEFORE CUTTING OF
STRUCTURAL WALLS.

EXHAUST LOUVER LAYOUT
SCALE: 1/4" = 1'-0"



HVAC NOTES	
GENERAL EQUIPMENT	
1. MECHANICAL CONTRACTOR TO PROVIDE STRUCTURAL SEISMIC RESTRAINS FOR ALL MECHANICAL AND PLUMBING EQUIPMENT TO THE SATISFACTION OF THE SEISMIC ENGINEER. COORDINATE MOUNTING TO BUILDING STRUCTURE WITH THE BUILDING STRUCTURAL ENGINEER.	
2. PROVIDE GAS LINE REDUCERS AS REQUIRED FOR FINAL CONNECTION TO EQUIPMENT.	
ROOF EQUIPMENT	
1. ALL EXHAUST AIR AND PLUMBING VENTS SHALL BE A MINIMUM OF 10'-0" (3.05M) FROM ALL ROOF OPENINGS AND/OR O/A INTAKES.	
2. COORDINATE WITH GENERAL CONTRACTOR'S ROOFING CONTRACTOR TO PROVIDE 1" (25mm) THICK RIGID INSULATION TO ALL ROOF CURBS.	
3. ROOF EQUIPMENT LAYOUT IS BASED ON SPECIFIED EQUIPMENT. WHERE ALTERNATE EQUIPMENT IS USED, ADHERE TO CLEARANCES REQUIRED BY MANUFACTURER AND ALL APPLICABLE CODES.	
4. ROOF OPENINGS IN DECKING SHALL BE CUT TO THE SIZE OF THE ACTUAL DUCT DROP THROUGH ROOF (NOT THE SIZE OF THE ROOF CURB) AT THE START OF CONSTRUCTION. PROVIDE EXACT DIMENSIONS (BASED ON APPROVED SHOP DRAWINGS) OF REQUIRED ROOF OPENINGS TO GENERAL CONTRACTOR FOR PROPER COORDINATION, TYPICAL FOR ALL MECHANICAL EQUIPMENT ROOF OPENINGS.	
INSULATION	
1. DUCTWORK SHALL BE INSTALLED WITH 10' LONG OF THERMAL INSULATION FROM EXTERIOR WALLS / ROOF OPENINGS.	
2. FIRST 10' OF SUPPLY AND RETURN AIR DUCTWORK SHALL BE LINED ON ALL SURFACES WITH ACOUSTIC INSULATION.	
DUCTWORK, GRILLES, & DIFFUSERS	
1. ALL GOOSENECKS ON ROOF AND LOUVERS ON EXTERNAL WALLS SHALL BE C/W INSECT SCREENS.	
2. PROVIDE BALANCING DAMPERS FOR ALL DIFFUSERS & GRILLES FOR BALANCING, UNLESS OTHERWISE SPECIFIED.	
3. WHEN USING FLEX DUCT, DUCT SIZE SHALL BE INCREASED BY ONE SIZE LIMITED TO A MAX LENGTH OF 5 FEET.	
4. SUPPLY AIR DIFFUSERS IN OPEN AREAS TO BE INSTALLED AT PARTITION WALL HEIGHT.	
5. IF RE-USING EXISTING COMPONENTS, GENERAL CONDITION AND NECK SIZE OF DIFFUSERS MUST BE CONFIRMED.	
6. FIRE-STOPPING SHALL COMPLY WITH CAN4-S115-M STANDARD.	
THERMOSTATS	
1. MOUNT ALL THERMOSTATS AT 5'-0" A.F.F UNLESS NOTED OTHERWISE.	
2. COORDINATE LOCATION OF THERMOSTATS WITH TENANT / OWNER BEFORE BEGINNING THE WORK. THERMOSTATS SHALL NOT BE INSTALLED BEHIND PERMANENT FIXTURES / MILLWORK. MAKE ALLOWANCES FOR RELOCATING THERMOSTATS AS REQUESTED BY OWNER OR OWNER'S REPRESENTATIVE.	
3. PROVIDE INSULATED BACKING FOR ALL THERMOSTATS MOUNTED ON EXTERIOR WALLS OR COLD SURFACES (IF ANY).	

KEY NOTES - HVAC	
① MOUNT ALL ROOF CURBS AS PER MANUFACTURER'S SPECIFICATIONS.	
② CONDENSATE DRAIN C/W TRAP AS PER MANUFACTURER'S REQUIREMENTS.	
③ GAS PRESSURE REGULATOR C/W GAS COCK ABOVE ROOF. EXTEND ALL GAS PRESSURE REGULATOR VENTS TO A MINIMUM OF 10'-0" (3.05m) FROM ALL ROOF OPENINGS / O/A INTAKES WHERE REQUIRED BY GAS AUTHORITY. MAKE FINAL CONNECTION TO UNIT.	
④ PROVIDE SEISMIC RESTRAINTS TO THE SATISFACTION OF THE SEISMIC ENGINEER ON ALL MECHANICAL EQUIPMENT.	
⑤ MAINTAIN CLEARANCES AS PER MANUFACTURER'S INSTALLATION MANUAL.	

DIFFUSERS AND GRILLES SCHEDULE				
TAG	DESCRIPTION	MODEL	SIZE	AIRFLOW
S-1	SQUARE PLAQUE DIFFUSER	EH PRICE 24 x 24 / SPD / B12	8"	150 - 300 CFM
			10"	301 - 400 CFM
			12"	400 - 500 CFM
R-1	RETURN AIR GRILLE (NON DUCTED)	EH PRICE 80 / TB / A / B12 (EGGGRATE)	6" x 6"	UP TO 150 CFM
			12" x 6"	151 - 350 CFM
			12" x 12"	351 - 650 CFM
			24" x 12"	651 - 1,200 CFM
			24" x 24"	1,201-2,500 CFM
			48" x 20"	2,501-4,000 CFM
E-1	EXHAUST AIR GRILLE (DUCTED)	EH PRICE S30 / F / L / A / B12	6" x 6"	UP TO 100 CFM
			8" x 8"	101 - 200 CFM
			12" x 12"	201 - 375 CFM
			14" x 14"	375 - 575 CFM
DG-1	DOOR GRILL	EH PRICE STG1 SERIES	1" DOOR UNDERCUT	UPTO 150 CFM
			24" x 20"	151 - 300 CFM
			26" x 24"	301 - 400 CFM
			USE TRANSFER AIR DUCT	401 AND ABOVE
			12" x 12"	0 - 200 CFM
L-1	LOUVER	EH PRICE DE439 SERIES	18" X12"	201 - 400 CFM
			18" X 18"	401 - 600 CFM
			24" X 18"	601 - 800 CFM
NOTES:				
1. NOISE CRITERIA WILL BE NC 20 OR BELOW.				
2. FLEX DUCT SHALL BE ONE SIZE LARGER DIFFUSER NECK SIZE AND HAVE A MAXIMUM OF 5 FEET.				

No.	DATE	DESCRIPTION
3	July 29 2021	RE-ISSUED FOR BUILDING PERMIT
2	June 23 2021	ISSUED FOR BUILDING PERMIT
1	June 21 2021	ISSUED FOR CLIENT REVIEW ONLY

DESTROY ALL PRINTS DATED PREVIOUS TO FINAL DATE ABOVE.

REVISIONS	
THIS DRAWING SHALL ONLY BE USED WHEN SIGNED FOR THE PURPOSE SPECIFIED BELOW.	

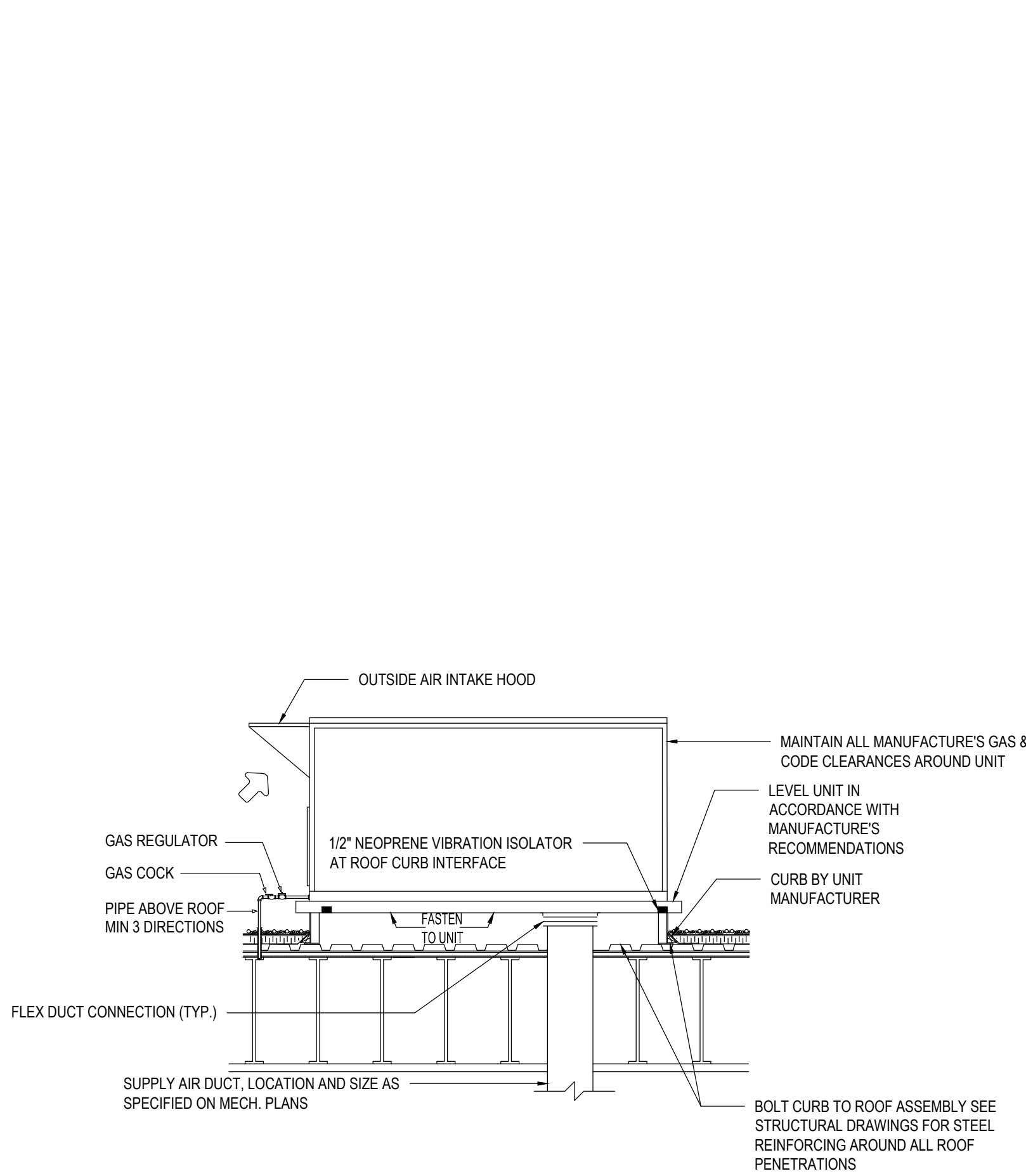
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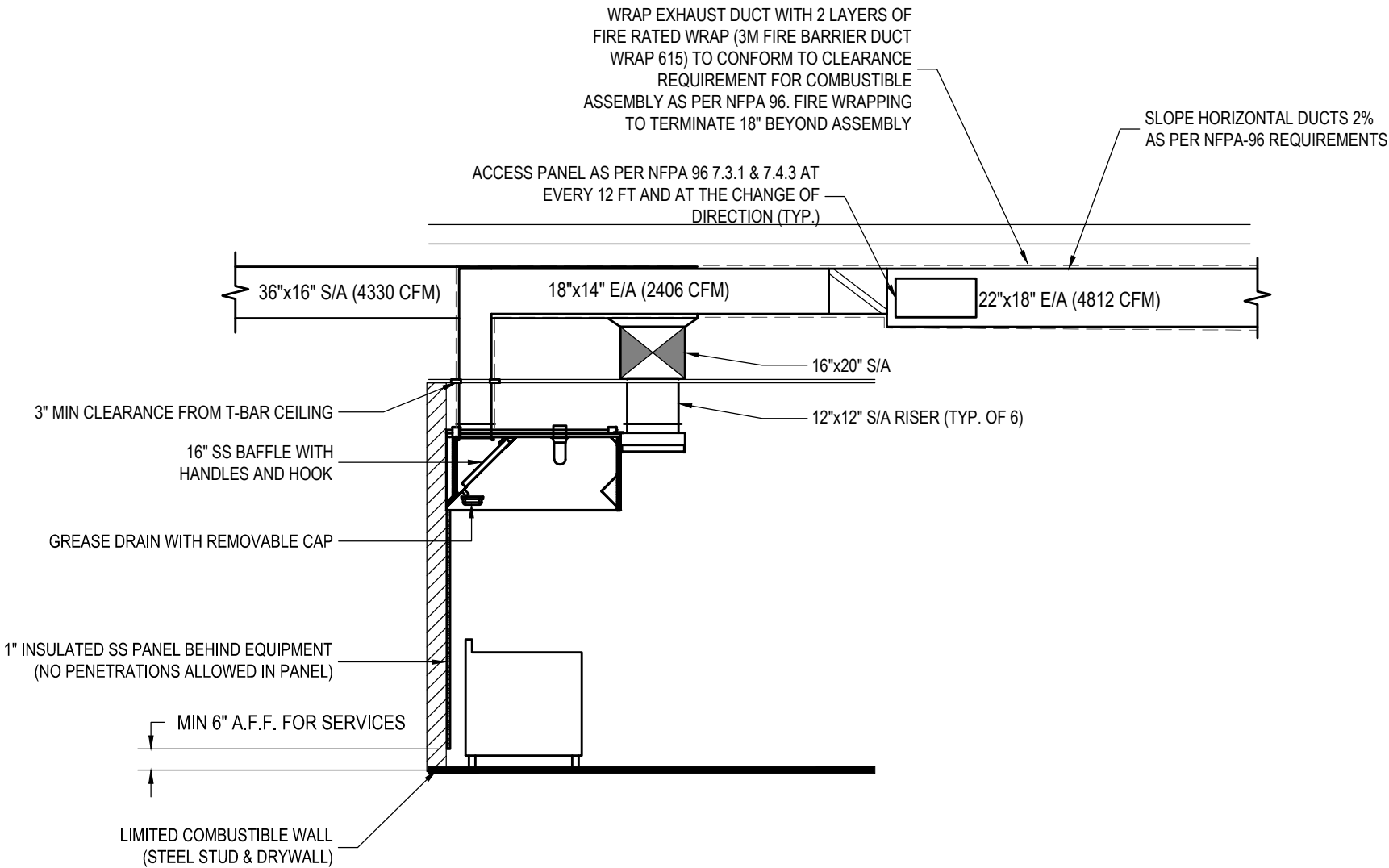
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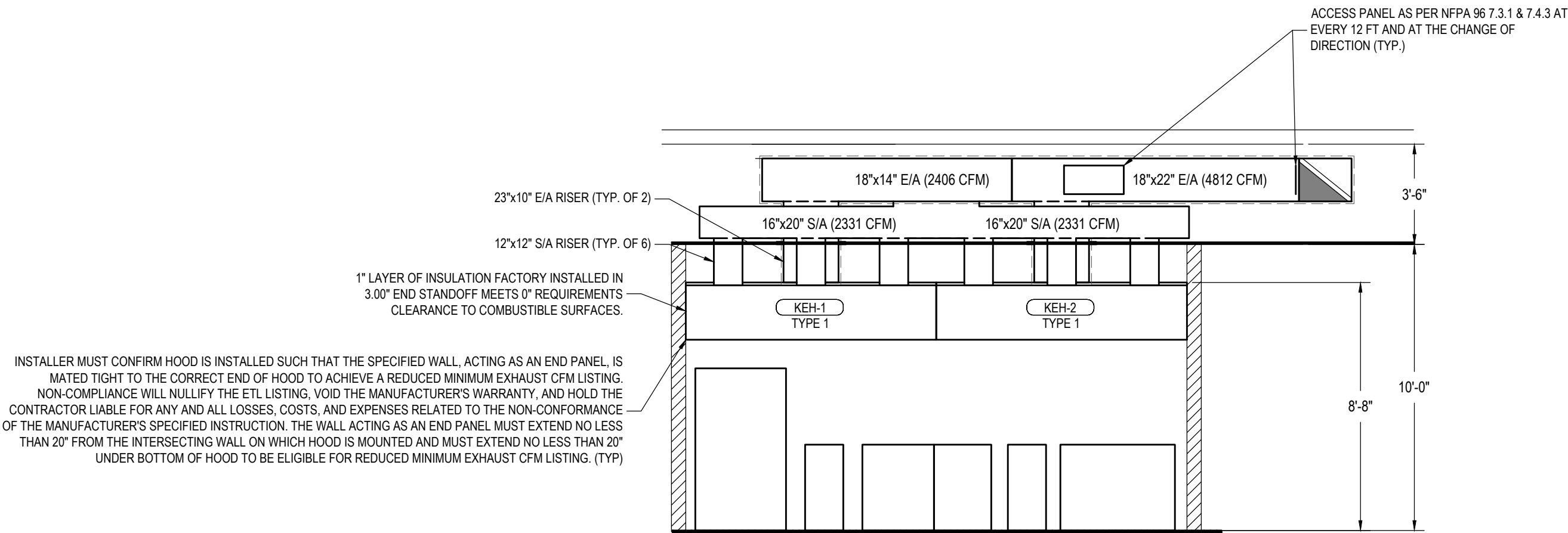
PROJECT		
TRAIL RESTAURANT		
102-1100 BAY AVENUE TRAIL, BC		
TITLE		
HVAC LAYOUT		
DRAWN	CHECKED	PROJECT No.
---	SS	13506
SCALE	DRAWING No.	
AS NOTED	M-2.1	
DATE		
29 Jul, 2021		



MAKE-UP AIR UNIT DETAIL
SCALE: N.T.S.



KEH - SIDE VIEW
SCALE: 1/4"=1'-0"



KEH - FRONT VIEW
SCALE: 1/4"=1'-0"

AIR FLOW SUMMARY			
EQUIPMENT TAG	SUPPLY AIR [CFM]	EXHAUST AIR [CFM]	OUTSIDE AIR [CFM]
RELIEF OED	300	-	300
MAU-1	4662	-	4662
EF-1	-	150	-
KEF-1	-	4812	-
TOTAL	4962	4962	4962

- ### COMMERCIAL KITCHEN VENTILATION SYSTEM NOTES
- HVAC NOTES
- DUCTWORK:
 - ALL COMMERCIAL KITCHEN DUCTWORK SHALL COMPLY WITH BCBC 2018 AND NFPA REQUIREMENTS (NFPA 96-2011).
 - TYPE I KITCHEN EXHAUST DUCTS TO BE 16 GA CARBON STEEL ALL WELDED LIQUID/AIR TIGHT.
 - THE PROTECTION AROUND GREASE DUCTS (OR CLEARANCE) SHALL CONTINUE UP THROUGH THE ROOF ASSEMBLY TO 450mm (18") ABOVE THE ROOF.
 - NO DAMPERS ARE TO BE INSTALLED IN THE EXHAUST SYSTEM.
 - MAINTAIN MINIMUM CLEARANCES BETWEEN KITCHEN EXHAUST DUCT / HOOD WITH OTHER BUILDING COMPONENTS: 18" TO COMBUSTIBLE, 3" TO LIMITED COMBUSTIBLE, 0" TO NON-COMBUSTIBLE.
 - ALL NFPA 96 KITCHEN EXHAUST DUCTWORK ELBOWS TO BE FULL RADIUS C/W ACCESS PANELS, GREASE DUCT SERVICE / INSPECTION OPENINGS SHALL BE REQUIRED WITHIN 18" (457mm) OF ANY DAMPER IN THE EXHAUST COLLAR OF A GREASE HOOD.
 - PROVIDE 14"x14" SERVICE INSPECTION OPENINGS, UNLESS OTHERWISE NOTED, EVERY 12 FT. (3.7m) OR CHANGE IN DIRECTION, OR AS INDICATED ON THE DRAWINGS.
 - THE EDGE OF ALL OPENINGS SHALL BE MINIMUM 1-1/2" (38mm) FROM ALL OUTSIDE EDGES OF THE DUCT OR WELDED SEAM.
 - SLOPE ALL KITCHEN EXHAUST DUCTWORK BACK TO HOODS MINIMUM 2% FOR HORIZONTAL DUCTS LESS THAN OR EQUAL TO 75 FT.
 - ALL DUCT WORK TO BE LEAK TESTED. ALL NFPA 96 EXHAUST DUCTS TO BE 100% WATER TIGHT LEAK TESTED C/W LEAK TEST REPORT. PROVIDE COMPLETED SUCCESSFUL TEST REPORT TO CONSULTANT PRIOR TO COMPLETION OF CEILINGS.
 - ACCESS PANELS:
 - NFPA 96 2011 COMPLIANT
 - GREASE TIGHT
 - 40mm [1-1/2"] MINIMUM FROM BOTTOM OF DUCT.
 - IN DUCT SIDES - SAME GAUGE AS DUCT (MINIMUM) AT ALL DIRECTION / SIZE CHANGES
 - 6m [20 FT] MAXIMUM SPACED IN HORIZONTAL RUNS
 - HAVE A GASKET OR SEALANT RATED FOR 1500°F AND SHALL BE GREASE TIGHT.
 - FASTENERS MADE OF CARBON OR STAINLESS STEEL
 - A SIGN SHALL BE PLACED ON ALL CEILING ACCESS PANELS STATING: "ACCESS PANEL - DO NOT OBSTRUCT"
 - GREASE DUCT SERVICES / INSPECTION OPENINGS SHALL BE PROTECTED BY AN APPROVED ACCESS PANELS. OPENINGS SHALL NOT BE REQUIRED IN PORTIONS OF DUCT THAT ARE ACCESSIBLE FROM DUCT ENTRY OR DISCHARGE.
 - SEPARATION DISTANCE: OUTDOOR INTAKE FOR MAKE-UP AIR UNIT AND ROOF TOP UNITS SHALL BE AT LEAST 3000mm (10 FT.) AWAY FROM ANY PLUMBING VENT, EXHAUST DISCHARGE, FLUE & ETC.
 - KITCHEN EXHAUST FAN WIRING TO BE EXTERNAL (WIRING MUST NOT BE INSTALLED IN THE AIRSTREAM)
 - INSTALLATION MUST INCLUDE MEANS FOR INSPECTING, CLEANING, AND SERVICING THE EXHAUST FAN.
 - MAKE UP AIR UNIT TO HAVE AIR VOLUME OF MINIMUM 90% OF THE EXHAUST AIR VOLUME OF THE EXHAUST FAN.
 - GREASE FILTERS SHALL BE UL-C LISTED, THE INSTALLATION SHALL BE TIGHT FITTING AND FIRMLY HELD IN PLACE WITH STAINLESS STEEL BRACKETS.
 - FOR DIRECT GAS-FIRED MAKE-UP AIR UNITS ONLY AIR FLOW SWITCH SHALL BE INSTALLED AT WELDED BRACKET ON EXHAUST DUCT, SUCH THAT THE GAS BURNER OF MAKE-UP AIR UNIT WILL BE ABLE TO FIRE UP ONLY AFTER KITCHEN HOOD EXHAUST FAN HAS STARTED AND AIR FLOW IS CONFIRMED.

SEQUENCE OF OPERATION

THE HOOD CONTROL PANEL IS CAPABLE OF OPERATING IN ONE OR MORE OF THE FOLLOWING STATES AT ANY GIVEN TIME:

-AUTOMATIC: THE SYSTEM OPERATES BASED ON THE DIFFERENTIAL BETWEEN ROOM TEMPERATURE AND THE TEMPERATURE AT THE HOOD CAVITY OR EXHAUST DUCT COLLAR. FANS ACTIVATE AT A CONFIGURABLE TEMPERATURE DIFFERENTIAL THRESHOLD DEPENDING ON THE JOB CONFIGURATION EACH FAN ZONE CAN BE CONFIGURED AS STATIC OR DYNAMIC. THESE TERMS REFER TO WHETHER A VARIABLE MOTOR (SUCH AS EC MOTORS OR VFD DRIVEN MOTORS) MODULATE WITH TEMPERATURE. IF THE PANEL IS EQUIPPED WITH VARIABLE SPEED FANS AND THE ZONE IS DEFINED AS "DYNAMIC", THESE WILL MODULATE WITHIN A USER DEFINED RANGE BASED ON THE TEMPERATURE DIFFERENTIAL. PANELS EQUIPPED WITH VARIABLE SPEED FANS AND A FAN ZONE DEFINED AS "STATIC", FANS WILL RUN AT A SET SPEED CALCULATED FOR THE DRIVE. DEMAND CONTROL VENTILATION SYSTEMS ARE CAPABLE OF MODULATING EXHAUST AND MAKE UP AIR FAN SPEEDS PER THE REQUIREMENTS OUTLINED IN IECC 403.2.8.

-MANUAL: THE SYSTEM OPERATES BASED ON HUMAN INPUT FROM AN HMI.

-SCHEDULE: A WEEKLY SCHEDULE CAN BE SET TO RUN FANS FOR A SPECIFIED PERIOD THROUGHOUT THE DAY. THERE ARE THREE OCCUPIED TIMES PER DAY TO ALLOW FOR THE USER TO SET UP A TIME THAT IS SUITABLE TO THEIR NEEDS. ANY TIME THAT IS WITHIN THE DEFINED OCCUPIED TIME, THE SYSTEM WILL RUN AT MODULATION MODE AND FOLLOW THE FAN PROCEDURE ALGORITHM BASED ON TEMPERATURE DURING THIS TIME. DURING UNOCCUPIED TIME, THE SYSTEM WILL HAVE AN EXTRA OFFSET TO PREVENT UNINTENDED ACTIVATION OF THE SYSTEM DURING A TIME WHERE THE SYSTEM IS NOT BEING OCCUPIED.

-OTHER: THE SYSTEM OPERATES BASED ON THE INPUT FROM AN EXTERNAL SOURCE (DDC, BMS OR HARD-WIRED INTERLOCK).

-FIRE: UPON ACTIVATION OF THE HOOD FIRE SUPPRESSION SYSTEM, THE EXHAUST FAN WILL COME ON OR CONTINUE TO RUN. THE HOOD MAKEUP AIR WILL SHUTDOWN, AND A SIGNAL WILL BE SENT FOR ACTIVATING THE SHUNT TRIP BREAKER PROVIDED BY THE ELECTRICIAN. FUEL GAS WILL SHUT OFF VIA A MECHANICAL/ELECTRICAL GAS VALVE ACTUATED BY THE HOOD FIRE SUPPRESSION SYSTEM.

DEMAND CONTROL VENTILATION HOOD CONTROL PANEL SPECIFICATIONS

-CONTROLS SHALL BE LISTED BY ETL (UL 508A) AND SHALL COMPLY WITH DEMAND VENTILATION SYSTEM TURNDOWN REQUIREMENTS OUTLINED IN IECC 403.2.8 (2015).

-THE CONTROL ENCLOSURE SHALL BE NEMA 1 RATED AND LISTED FOR INSTALLATION INSIDE OF THE EXHAUST HOOD UTILITY CABINET. THE CONTROL ENCLOSURE MAY BE CONSTRUCTED OF STAINLESS STEEL OR PAINTED STEEL.

-TEMPERATURE PROBE(S) LOCATED IN THE EXHAUST DUCT RISER(S) SHALL BE CONSTRUCTED OF STAINLESS STEEL.

-A DIGITAL CONTROLLER SHALL BE PROVIDED TO ACTIVATE THE HOOD EXHAUST FANS DYNAMICALLY BASED ON A FIXED DIFFERENTIAL BETWEEN THE AMBIENT AND DUCT TEMPERATURES SENSORS. THIS FUNCTION SHALL MEET THE REQUIREMENTS OF IMC 507.1.1.

-A DIGITAL CONTROLLER SHALL PROVIDE ADJUSTABLE HYSTERESIS SETTINGS TO PREVENT CYCLING OF THE FANS AFTER THE COOKING APPLIANCES HAVE BEEN TURNED OFF AND/OR THE HEAT IN THE EXHAUST SYSTEM IS REDUCED.

-A DIGITAL CONTROLLER SHALL PROVIDE AN ADJUSTABLE MINIMUM FAN RUN-TIME SETTING TO PREVENT FAN CYCLING.

-VARIABLE FREQUENCY DRIVES (VFDs) SHALL BE PROVIDED FOR FANS AS REQUIRED. THE DIGITAL CONTROLLER SHALL MODULATE THE VFDs BETWEEN A MINIMUM SETPOINT AND A MAXIMUM SETPOINT ON DEMAND. THE DUCT TEMPERATURE SENSOR INPUT(S) TO THE DIGITAL CONTROLLER SHALL BE USED TO CALCULATE THE SPEED REFERENCE SIGNAL.

-THE VFD SPEED RANGE OF OPERATION SHALL BE FROM 0% TO 100% FOR THE SYSTEM, WITH THE ACTUAL MINIMUM SPEED SET AS REQUIRED TO MEET MINIMUM VENTILATION REQUIREMENTS.

-AN INTERNAL ALGORITHM TO THE DIGITAL CONTROLLER SHALL MODULATE SUPPLY FAN VFD SPEED PROPORTIONAL TO ALL EXHAUST FANS THAT ARE LOCATED IN THE SAME FAN GROUP AS THE SUPPLY FAN.

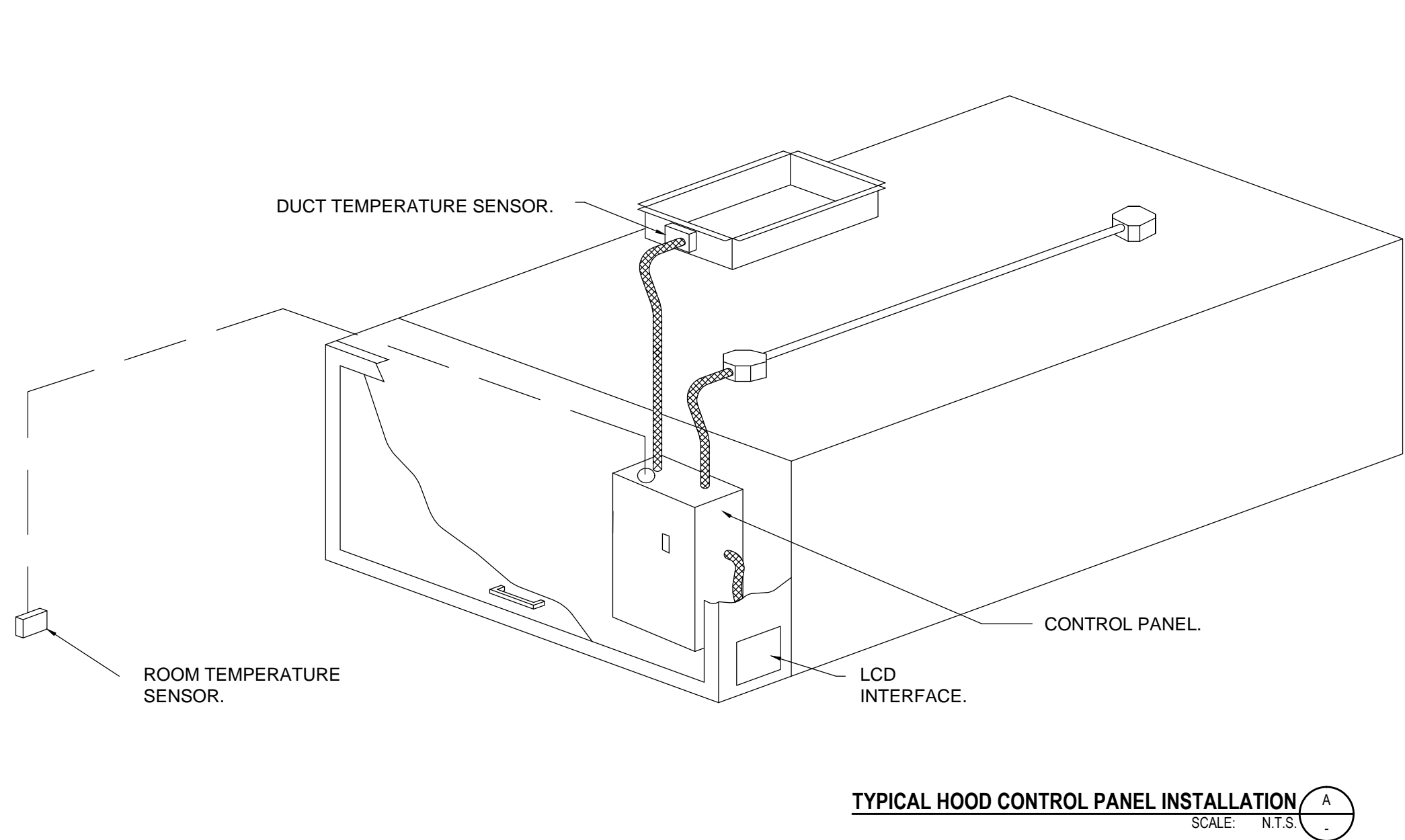
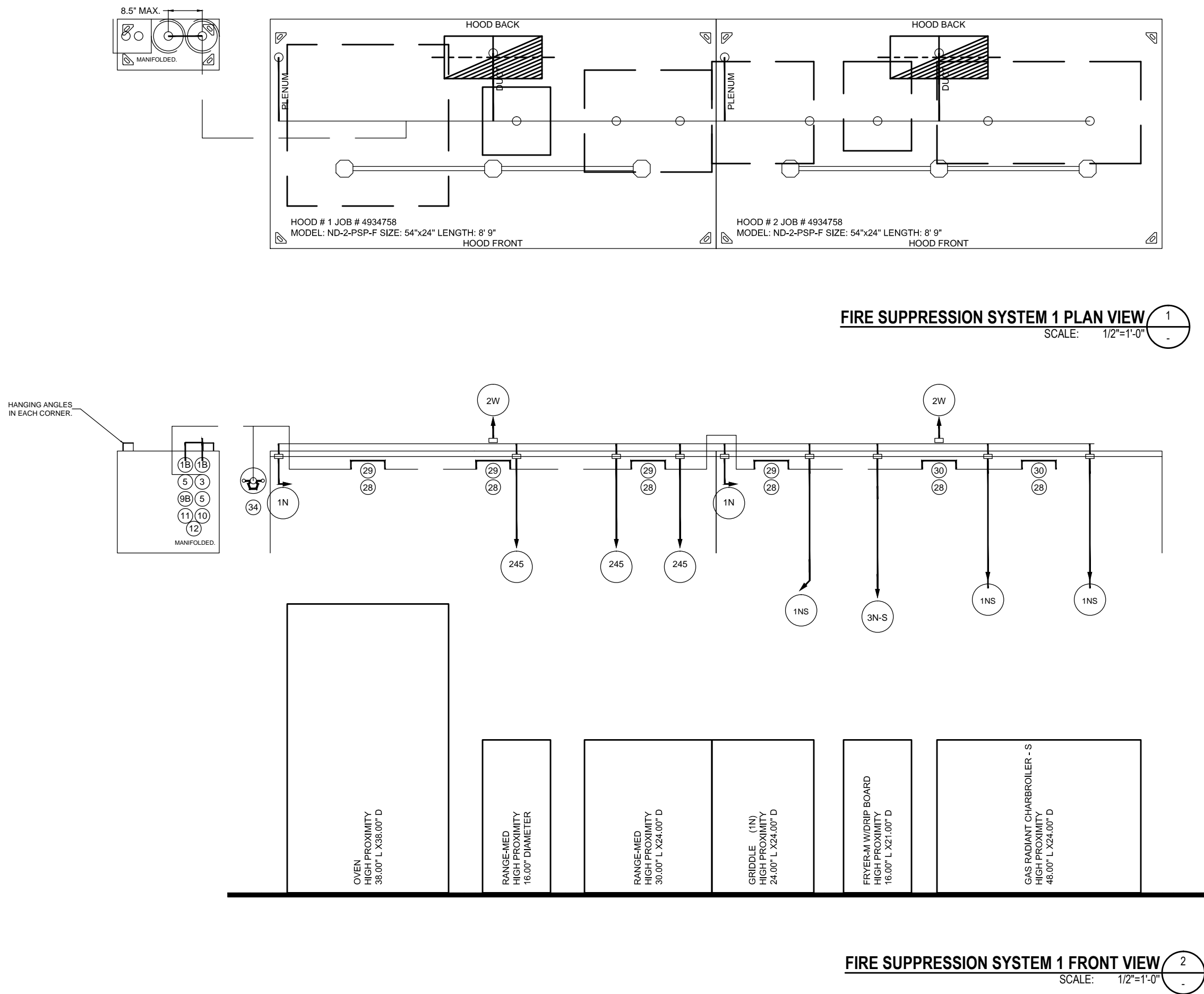
-THE SYSTEM SHALL OPERATE IN PREP MODE DURING LIGHT COOKING LOAD OR COOL DOWN MODE WHEN SUFFICIENT HEAT REMAINS UNDERNEATH THE HOOD SYSTEM AFTER COOKING OPERATIONS HAVE COMPLETED. OPERATION DURING EITHER OF THESE PERIODS WILL DISABLE THE SUPPLY FANS AND PROVIDE AN EXHAUST FAN SPEED THAT IS EQUAL TO THE MINIMUM VENTILATION REQUIREMENT.

-A DIGITAL CONTROLLER SHALL DISABLE THE SUPPLY FANS), ACTIVATE THE EXHAUST FAN(S), ACTIVATE THE APPLIANCE SHUNT TRIP, AND DISABLE AN ELECTRIC GAS VALVE AUTOMATICALLY WHEN FIRE CONDITION IS DETECTED ON A COVERED HOOD.

-A DIGITAL CONTROLLER SHALL ALLOW FOR EXTERNAL BMS FAN CONTROL VIA DRY CONTACT (EXTERNAL CONTROL SHALL NOT OVERRIDE FAN OPERATION LOGIC AS REQUIRED BY CODE).

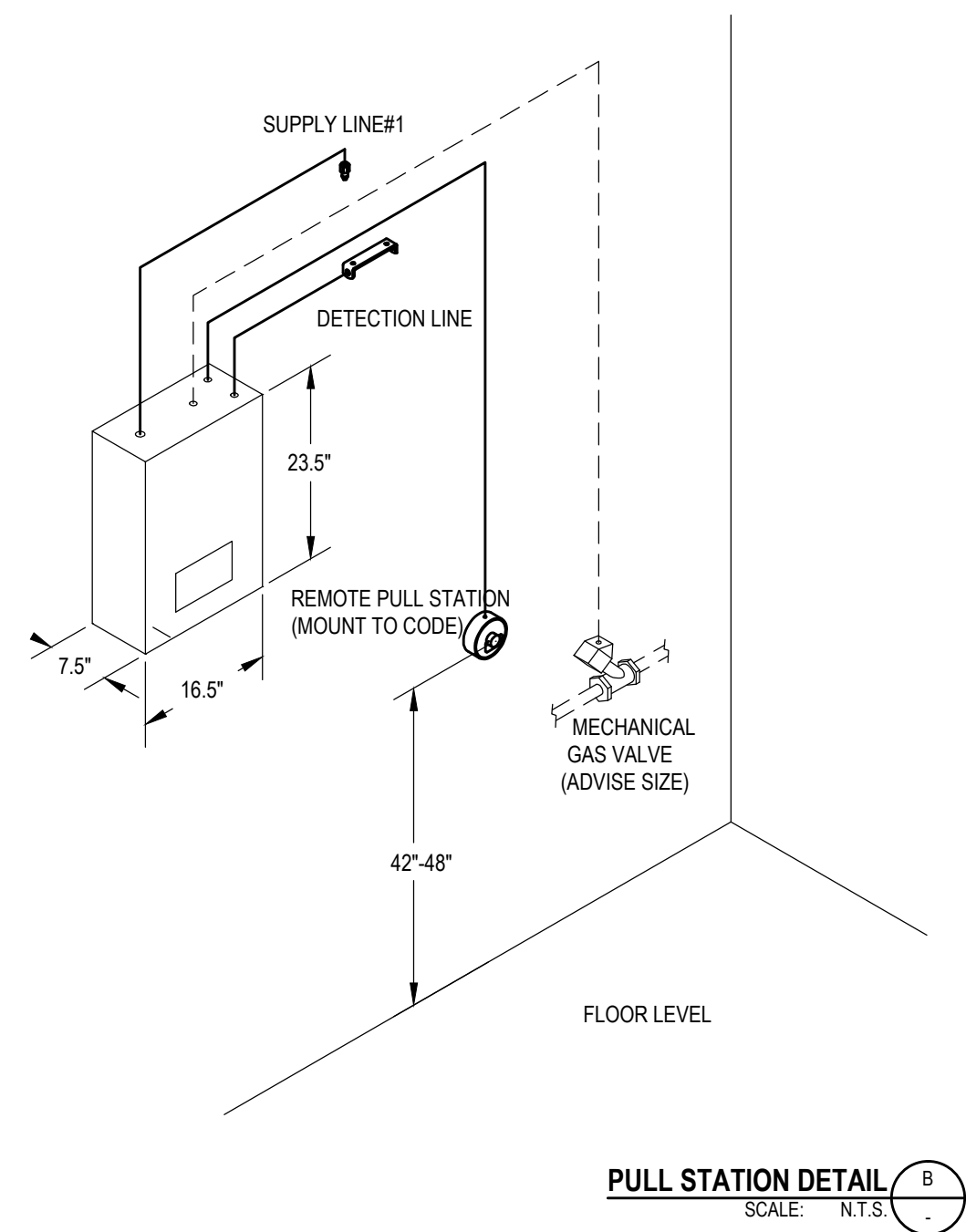
-AN LCD INTERFACE SHALL BE PROVIDED WITH THE FOLLOWING FEATURES:
A. ON/OFF PUSH BUTTON FAN & LIGHT SWITCH ACTIVATION
B. INTEGRATED GAS VALVE RESET FOR ELECTRONIC GAS VALVES (NO RESET RELAY REQUIRED).
C. VFD FAULT DISPLAY WITH AUDIBLE & VISUAL ALARM NOTIFICATION.
D. DUCT TEMPERATURE SENSOR FAILURE DETECTION WITH AUDIBLE & VISUAL ALARM NOTIFICATION.
E. MIS-WIRED DUCT TEMPERATURE SENSOR DETECTION WITH AUDIBLE & VISUAL ALARM NOTIFICATION.
F. A SINGLE LOW VOLTAGE CAT-5 RAS WIRING CONNECTION.
G. AN ENERGY SAVINGS INDICATOR THAT UTILIZES MEASURED KWH FROM THE VFDs.

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102-1100 BAY AVENUE TRAIL, BC		
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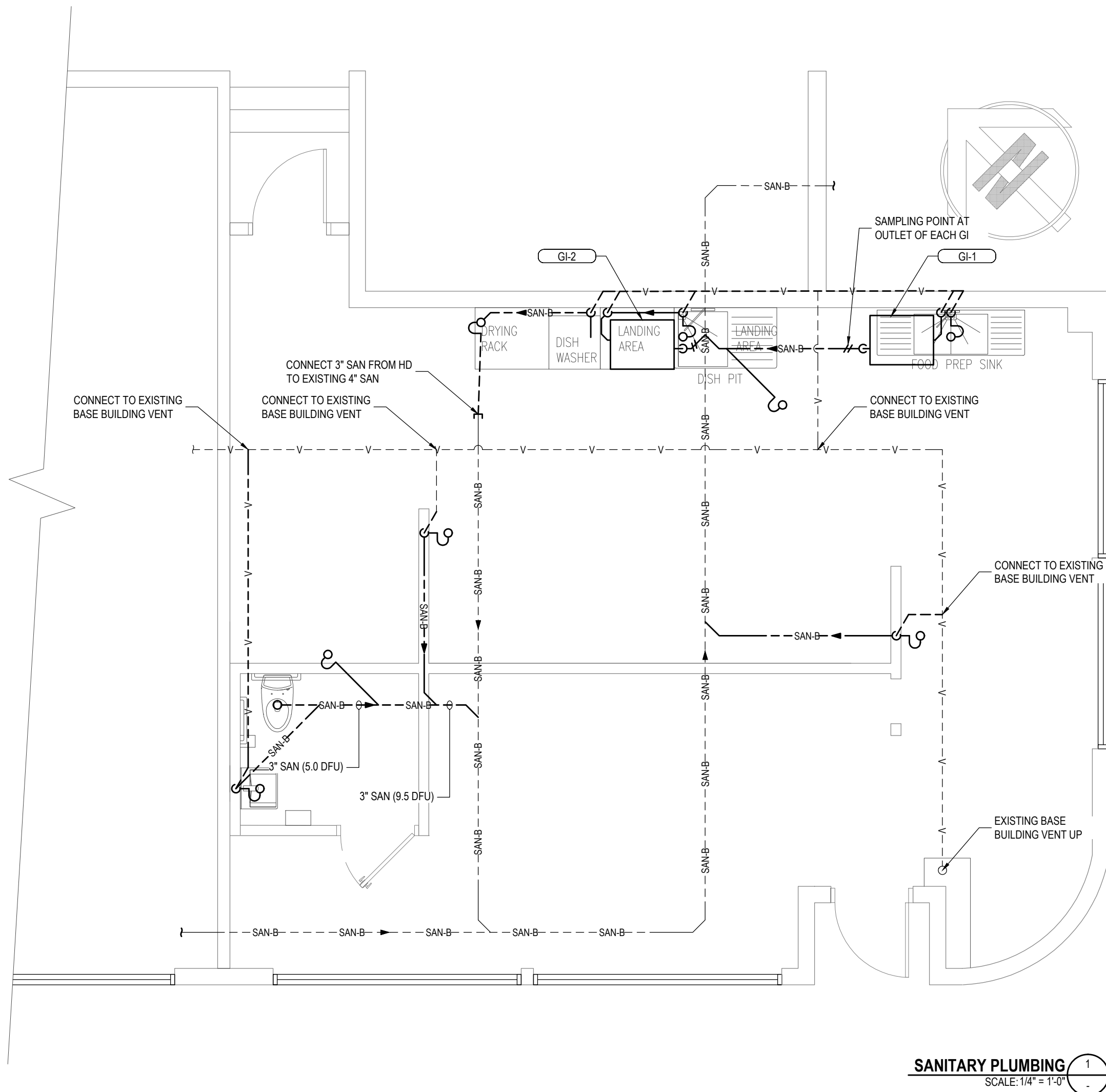
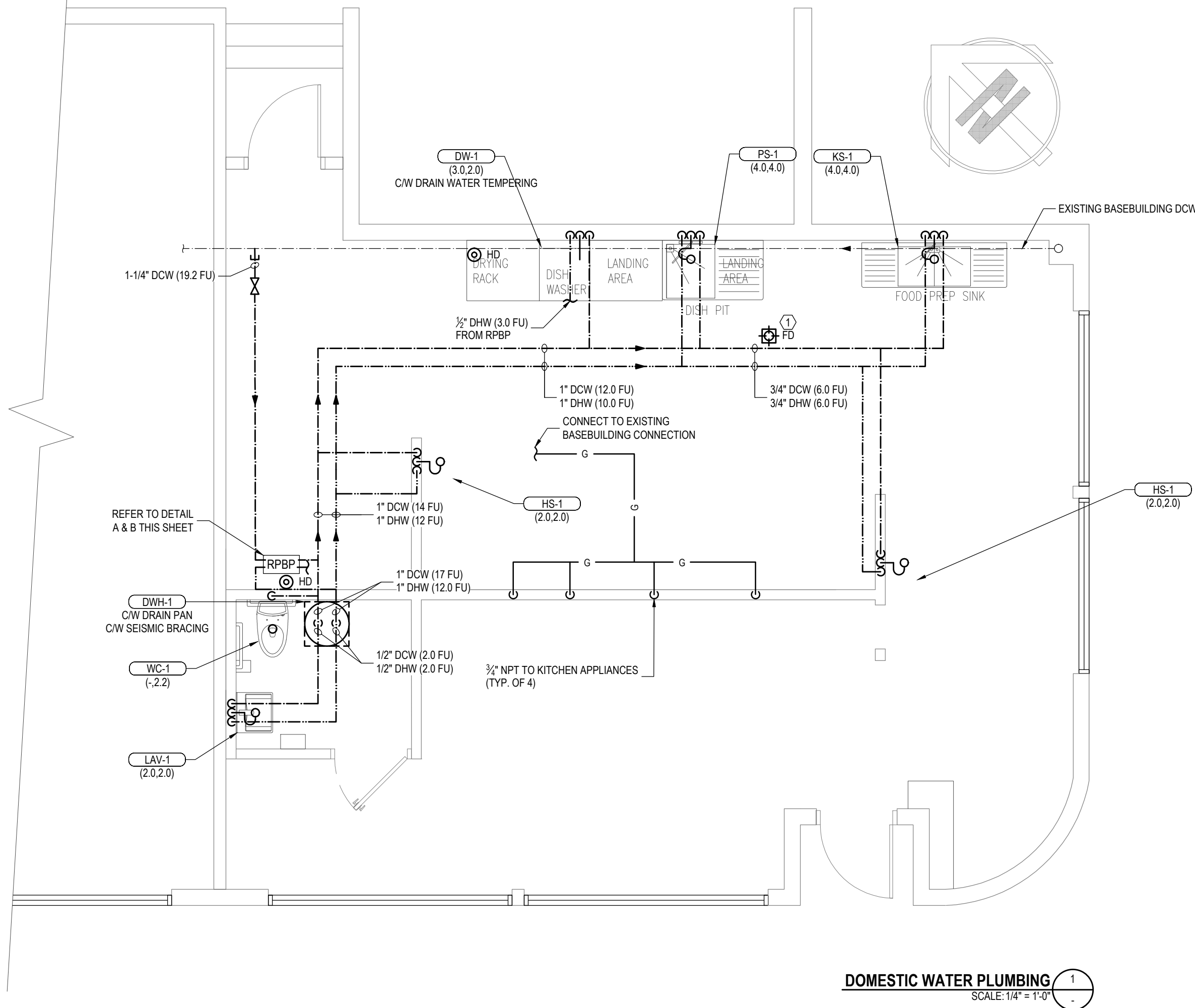


LEGEND - FIRE CABINET ANSUL SYSTEM	
1A	1.5 GALLON TANK
1B	3 GALLON TANK
2	OEM AUTOMAN RELEASE
3	OEM REGULATED RELEASE
4	OEM REGULATED ACTUATOR
5	ANSULEX LIQUID AGENT (1.5 GAL.)
6	ANSULEX LIQUID AGENT (3 GAL.)
7	CARTRIDGE (101-20)
8	CARTRIDGE (101-10)
9	CARTRIDGE (101-30)
9A	CARTRIDGE (L.T-A-101-30)
9B	DOUBLE TANK CARTRIDGE
10	TEST LINK
11	DOUBLE MICROSWITCH
12	HOSE ASSEMBLY
1100	DUCT NOZZLE (430913)
2W	DUCT NOZZLE (419337)
1W	NOZZLE ASSEMBLY (419336)
1F	NOZZLE ASSEMBLY (419333)
1N	NOZZLE ASSEMBLY (419335)
12N	NOZZLE ASSEMBLY (419334)
3N	NOZZLE ASSEMBLY (419338)
245	NOZZLE ASSEMBLY (419340)
230	NOZZLE ASSEMBLY (419339)
2120	NOZZLE ASSEMBLY (419343)
290	NOZZLE ASSEMBLY (419342)
260	NOZZLE ASSEMBLY (419341)
28	DETECTOR BRACKET
29	LOW TEMP FUSIBLE LINK
30	HIGH TEMP FUSIBLE LINK
MGV	MECHANICAL GAS VALVE
EGV	ELECTRICAL GAS VALVE
34	REMOTE MANUAL PULL STATION
S	SWIVEL ADAPTOR

FIRE SUPPRESSION SYSTEM NOTES	
1.	THE INSTALLER OF THE FIRE SUPPRESSION SYSTEM SHALL CERTIFY TO THE CITY BUILDING INSPECTOR THAT THE INSTALLATION COMPLIES WITH: 1.1. UL 300 STANDARDS. 1.2. UL/CORD-C1254-S-1995 1.3. NFPA 96, 2014 EDITION. 1.4. NFPA 17A, 2009 EDITION. 1.5. THE TERMS OF THE EQUIPMENT LISTINGS AND 1.6. THE MANUFACTURER'S INSTRUCTIONS.
2.	WET CHEMICAL FIRE SUPPRESSION SYSTEM SHALL BE BY ANSUL AS NOTED IN THE SCHEDULE.
3.	THE RESTAURANT FIRE SUPPRESSION SYSTEM SHALL BE THE PRE-ENGINEERED TYPE WITH A FIXED NOZZLE AGENT DISTRIBUTION NETWORK. IT SHALL BE LISTED WITH UNDERWRITERS LABORATORIES CANADA, INC. (ULC)
4.	THE SYSTEM SHALL BE CAPABLE OF AUTOMATIC DETECTION AND ACTUATION WITH LOCAL OR REMOTE MANUAL ACTUATION. ACCESSORIES SHALL BE AVAILABLE FOR MECHANICAL OR ELECTRICAL GAS LINE SHUT-OFF APPLICATIONS.
5.	THE EXTINGUISHING AGENT SHALL BE A POTASSIUM CARBONATE, POTASSIUM ACETATE-BASED FORMULATION DESIGNED FOR FLAME KNOCKDOWN AND SECUREMENT OF GREASE RELATED FIRES. IT SHALL BE AVAILABLE IN PLASTIC CONTAINERS WITH INSTRUCTIONS FOR LIQUID AGENT HANDLING AND USAGE.
6.	THE REGULATED RELEASE MECHANISM SHALL BE COMPATIBLE WITH A FUSIBLE LINK DETECTION SYSTEM. THE FUSIBLE LINK SHALL BE SELECTED AND INSTALLED ACCORDING TO THE OPERATING TEMPERATURE IN THE VENTILATING SYSTEM. THE FUSIBLE LINK SHALL BE SUPPORTED BY A DETECTOR BRACKET/LINKAGE ASSEMBLY.
7.	COORDINATE WITH MECHANICAL FOR SEQUENCE OF OPERATION. SEQUENCE OF OPERATION WILL BE DONE AND COORDINATED WITH LOCAL AHJ (BY OTHERS).
8.	REMOTE MANUAL PULL STATION TO ACTIVATE THE FIRE SUPPRESSION SYSTEM SHALL BE INSTALLED AT 48" ABOVE THE FINISHED FLOOR AND INSTALLED IN THE PATH OF EXIT OR EGRESS FROM THE KITCHEN AREA AND CLEARLY IDENTIFY THE HAZARD PROTECTED.
WET CHEMICAL FIRE SUPPRESSION SYSTEM	
SYSTEM 1 SYSTEM SIZE: ANSUL-R102-3.0/3.0 TOTAL FLOW POINTS REQUIRED: 18 INSTALLATION: WALL UTILITY CABINET LEFT	
SEQUENCE OF OPERATION	
REFER TO M-2.2	



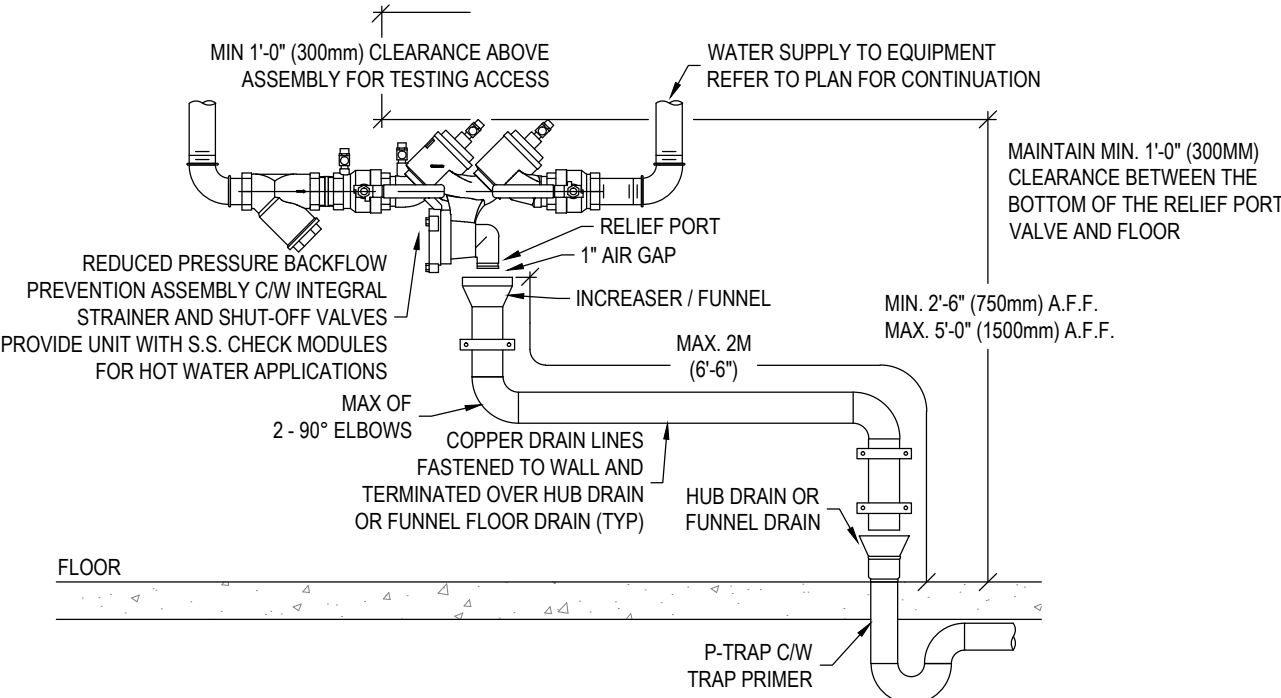
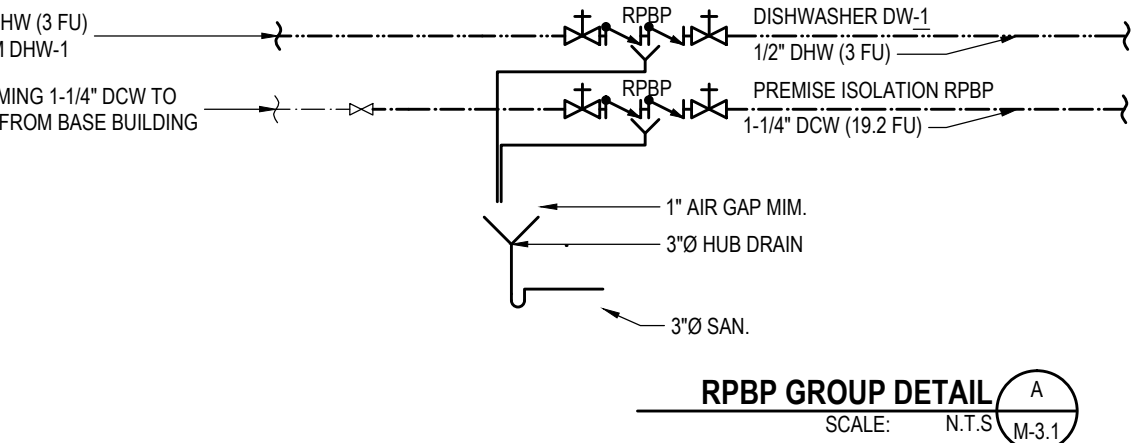
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- PLUMBING NOTES**
1. ALL PIPING MATERIALS SHALL CONFORM TO THE B.C.B.C. 2018 EDITION.
 2. ALL SANITARY PIPING TO BE MINIMUM 2% SLOPE, UNLESS OTHERWISE NOTED.
 3. ALL SANITARY AND DOMESTIC WATER SHOWN AGAINST EXTERIOR AND DEMISING WALLS SHALL BE FURRED IN AND INSTALLED ON WARM SIDE OF INSULATION AND VAPOR BARRIER. WHERE FURRING IS NOT PRESENT, PROVIDE CAVITY WITHIN BATT-INSULATED WALL FORMED FROM RIGID FOAM INSULATION AND SEAL AIRTIGHT AROUND INSULATED PIPE.
 4. PRIOR TO COMMENCING ANY PIPING INSTALLATION WITHIN THE BUILDING, THE MECHANICAL CONTRACTOR MUST CHECK THE SIZES, LOCATION, AND INVERT ELEVATIONS OF ALL CAPPED SERVICES, INCLUDING SANITARY SEWER, STORM SEWER, WATER MAINS, AND GAS MAINS WITH THE CIVIL RECORD DRAWINGS TO ENSURE THAT THESE BUILDING SERVICES CAN BE INSTALLED AS SHOWN.
 5. ALL SANITARY FLOOR DRAINS AND HUB DRAINS SHALL BE UP TO GRADE LEVEL WITH HEAVY DUTY ACCESS COVERS INSTALLED FLUSH WITH FINISHED FLOOR AND BE C/W TRAP PRIMERS.
 6. PROVIDE CLEAN-OUT AT THE BASE OF ALL STACKS AND RWL'S AS REQUIRED BY CODE.
 7. COORDINATE ALL PIPE SLEEVE PLACEMENT WITH GENERAL CONTRACTOR.
 8. FIRE STOP ANY PIPES THAT PENETRATE FIRE SEPARATIONS AND SLAB. FIRESTOPPING SHALL COMPLY WITH CANA-S115-MBS STANDARD. REFER TO MECHANICAL SCHEDULES.
 9. ALL DHW AND DCW FIXTURES AND BRANCH LINES TO BE COMPLETE WITH ISOLATION VALVES.
 10. MECHANICAL CONTRACTOR TO PROVIDE STRUCTURAL SEISMIC RESTRAINTS FOR ALL MECHANICAL AND PLUMBING EQUIPMENT TO THE SATISFACTION OF THE SEISMIC ENGINEER. COORDINATE MOUNTING TO BUILDING STRUCTURE WITH THE BUILDING STRUCTURAL ENGINEER.
 11. HOT WATER TANK DRAIN PAN DISCHARGE TO BE CONNECTED TO NEAREST SINK TAILPIECE
 12. PLUMBING FIXTURES
 - 12.1. LAVATORY C/W THERMOSTATIC MIXING VALVE (OUTLET TEMPERATURE CONTROL LIMITING DISCHARGE TEMPERATURE TO 110 DEGREE F) THERMOSTATIC MIXING VALVE, MAKE: LAWLER MODEL: TMM-1070, TO BE INSTALLED BELOW LAVATORIES.
 - 12.2. LAVATORIES INSTALLED IN A WASHROOM FOR PUBLIC USE SHALL BE EQUIPPED WITH A DEVICE CAPABLE OF AUTOMATICALLY SHUTTING OFF THE FLOW OF WATER WHEN THE LAVATORY IS NOT IN USE.
 - 12.2. LAVATORIES INSTALLED IN A WASHROOM FOR HANDICAP USE SHALL HAVE THE TRAP INSULATED (PRE-FORMED INSULATION KIT) TO PROTECT CONTACT BURN.
 - 12.3. WATER CLOSETS INSTALLED IN A WASHROOM FOR PUBLIC USE SHALL BE OF THE ELONGATED TYPE AND PROVIDED WITH A SEAT OF THE OPEN FRONT TYPE.
 - 12.4. WATER CLOSETS INSTALLED IN A WASHROOM FOR HANDICAP USE SHALL HAVE THE FLUSH CONTROL ON THE SIDE OPPOSITE TO THE GRAB BAR AND HAVE A SECURED LID.

- FIRESTOPPING NOTES**
1. ALL FIRE STOPPING SHALL BE DONE IN ACCORDANCE WITH THE CURRENT BUILDING CODE-BY-LAW TO MAINTAIN FIRE RATINGS OF THE STRUCTURE AND FINISHES. MATERIALS USED FOR FIRE STOPPING SHALL BE TESTED AND APPROVED FOR THE PARTICULAR APPLICATION.
 2. PRIOR TO COMMENCEMENT OF WORK, THE CONTRACTOR IS TO PROVIDE SHOP DRAWINGS TO THE ENGINEER FOR REVIEW. SHOP DRAWINGS SHALL COMPRISE OF COPIES OF THE ULC LISTED DETAILS APPROPRIATE FOR EACH OF THE MECHANICAL SYSTEMS USED AND THE ASSEMBLIES PENETRATED SHOWING THE TESTED METHOD OF FIRESTOPPING.
 3. ALL ROUGH OPENINGS FOR MECHANICAL/PLUMBING SYSTEMS TO BE SIZED AS PER MANUFACTURER'S LISTED DETAILS. MAXIMUM ANNUAL SPACING FOR PIPING TO BE ADHERED TO. REPAIR/REPLACEMENT OF STRUCTURE OR RELOCATION OF MECHANICAL/PLUMBING SYSTEMS DUE TO INCORRECT OPENING SIZE/SHAPE IS THE RESPONSIBILITY OF THIS CONTRACTOR.
 4. ENSURE THAT CONTINUITY OF ALL FIRE SEPARATIONS IS MAINTAINED AT ALL PIPING PENETRATIONS OF FIRE SEPARATIONS.
 5. FOR PARKADE CEILING AND FIRE WALLS THAT REQUIRE AN FT RATING (COORDINATE WITH ARCHITECTURAL DRAWINGS), PROVIDE FIRE-STOPPING IN ACCORDANCE WITH THE MANUFACTURER'S CANULC LISTING. ON CAST IRON PIPING IN PARKADE, INSULATE FIRST FEW FEET OF PIPING AS NECESSARY TO MEET T RATING REQUIREMENT LENGTH AND INSULATION TYPE TO MEET REQUIREMENTS OF APPROVED ASSEMBLY TO BE USED). SUBMIT SHOP DRAWING OF APPROVED ASSEMBLY BEING USED.
 6. REFER TO ARCHITECT'S / INTERIOR DESIGNER'S DRAWINGS FOR IDENTIFICATION OF FIRE SEPARATIONS.
 7. APPROVED FIRESTOP PRODUCT MANUFACTURERS LIMITED TO 3M, HILTI, PFP.
 8. WORK TO BE UNDERTAKEN BY QUALIFIED TRADES PEOPLE ONLY. INSTALLERS SHALL HOLD VERIFIABLE INSTALLER'S CERTIFICATE FROM THE MANUFACTURER.
 9. NOTIFY CONSULTANT (ENGINEER) WHEN READY FOR INSPECTION AND PRIOR TO CONCEALING OR ENCLOSING THE FIRE STOP ASSEMBLIES.
- NOTE:** COORDINATE WITH ARCHITECT / INTERIOR DESIGNER FOR LOCATION OF FIRE RATED WALLS, ROCKS AND OTHER ASSEMBLIES FOR FIRE-STOPPING AND FIRE DAMPERS.

- KEY NOTES - PLUMBING**
- ① 3"Ø FLOOR DRAIN C/W TRAP PRIMER.



REDUCED PRESSURE DEVICE SIZE	FLOOR DRAIN GRATE OPENING AND OUTLET	DRAIN LINE SIZE HUB DRAIN C/W 24" INLET STANDPIPE & FUNNEL	OPEN PIPE TO OUTSIDE C/W 24" OF VERTICAL DROP AT DEVICE PRIOR TO 90° CHANGE OF DIRECTION
1/2"	2"	1 1/2"	2"
3/4"	3"	2"	2"
1"	3"	2"	2"
1 1/2"	4"	3"	3"
1 1/2"	6"	3"	3"
2"	6"	3"	3"
2 1/2"	6"	4"	4"
3"	6"	4"	4"
4"	8"	6"	4"
6"	8"	6"	4"

- NOTES:**
1. THE INSTALLATION FOR ALL THE TESTABLE CROSS CONNECTION DEVICES TO CONFORM WITH THE CAN/CSA-B64.10.01 STANDARD.
 2. ALL THE PIPING ON THE DISCHARGE SIDE OF A TESTABLE CROSS CONNECTION CONTROL DEVICE TO BE LABELED TO CAN/CSA-B64.10.01 STANDARD FOR IDENTIFICATION OF PIPING SYSTEMS.
 3. ALL THE TESTABLE CROSS CONNECTION CONTROL DEVICES REQUIRE THE PERMANENT LAMACOID IDENTIFICATION TAGS (IE. RPB-A-PREMISE ISOLATION, DCWA - LAWN IRRIGATION, ETC).
 4. THE INSTALLATION OF AN INLINE STRAINER SHALL BE REQUIRED WHERE WATER CONTAINS FOREIGN MATERIAL THAT COULD LODGE ON OR ERODE SEATING SURFACES.
 5. PROVIDE C.P. ESCUTCHEONS WHERE PIPING ENTERS EXITS WALL (TYP).

REDUCED PRESSURE BACKFLOW ASSEMBLY 1
SCALE: NOT TO SCALE M-3.1

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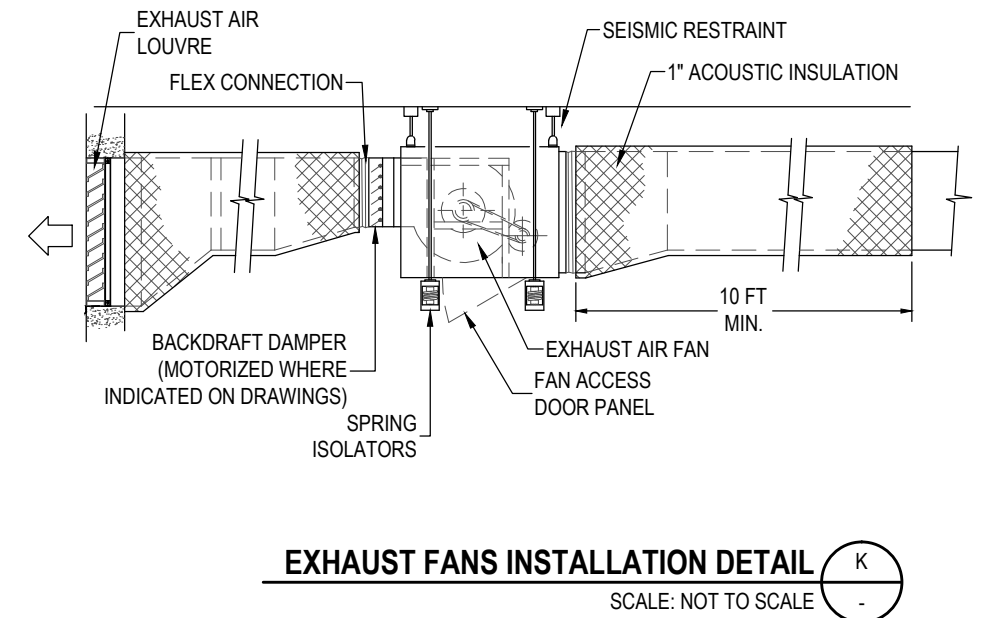
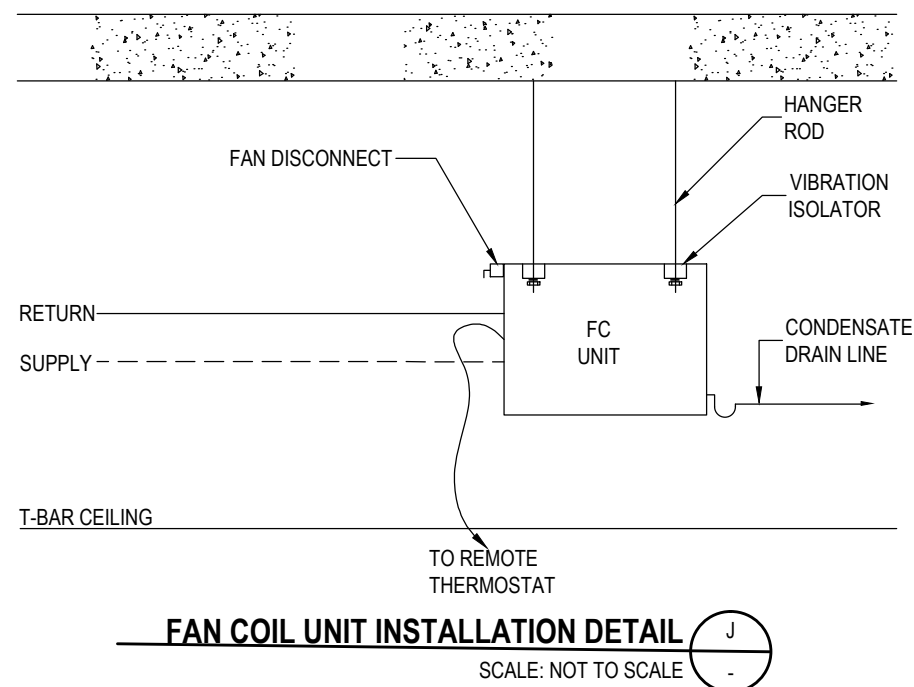
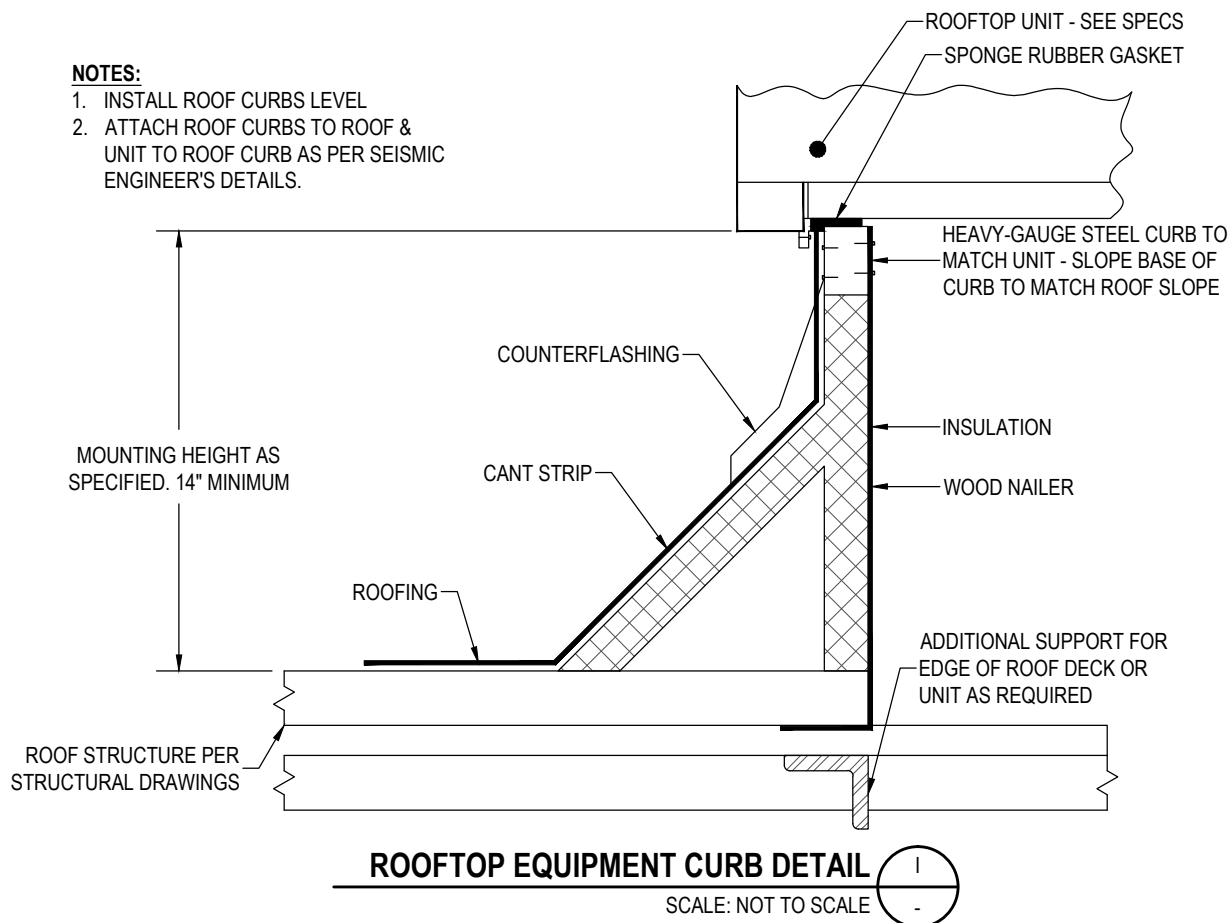
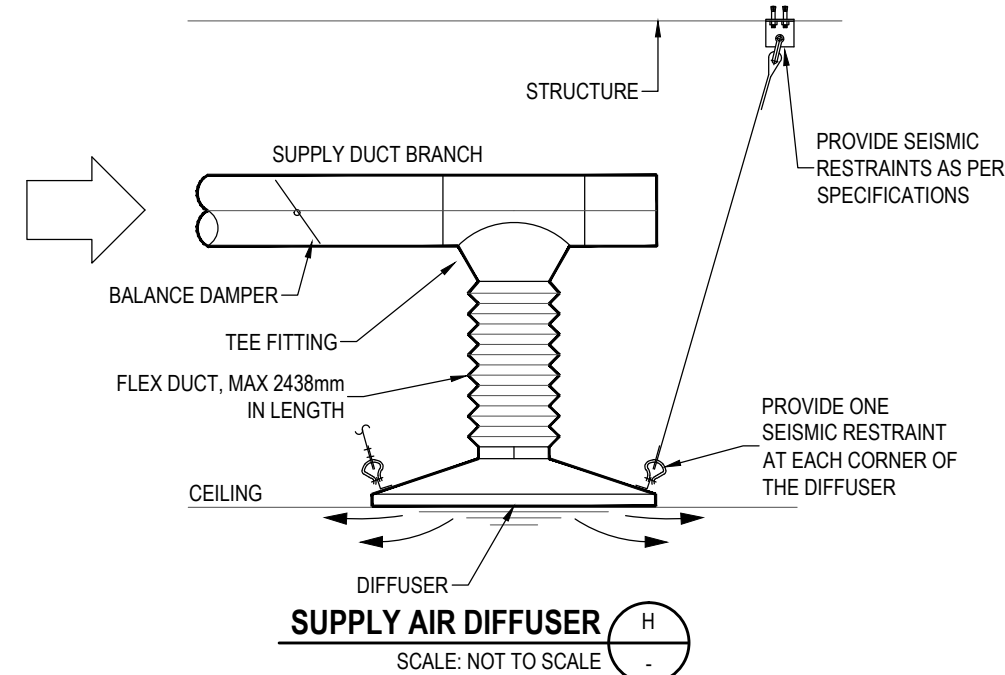
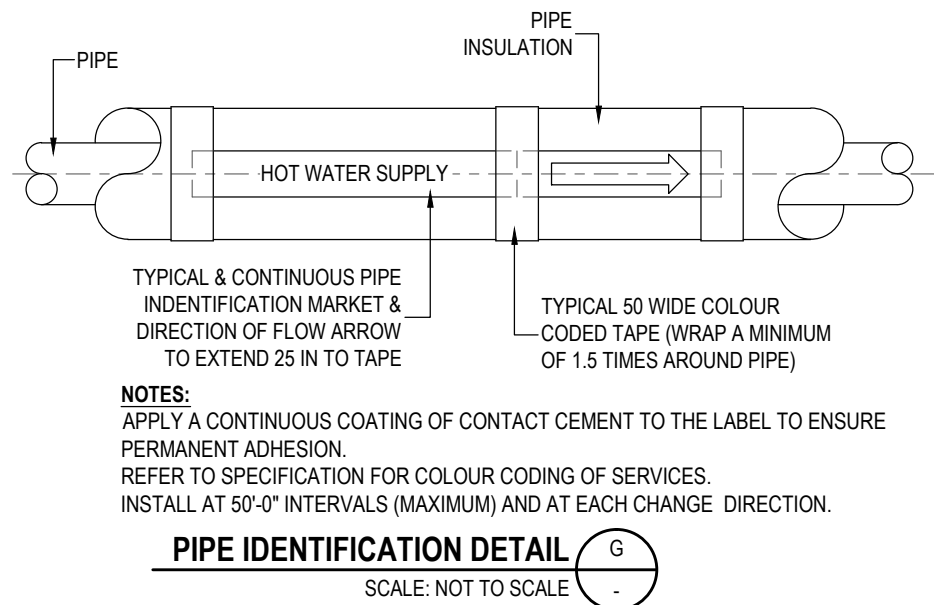
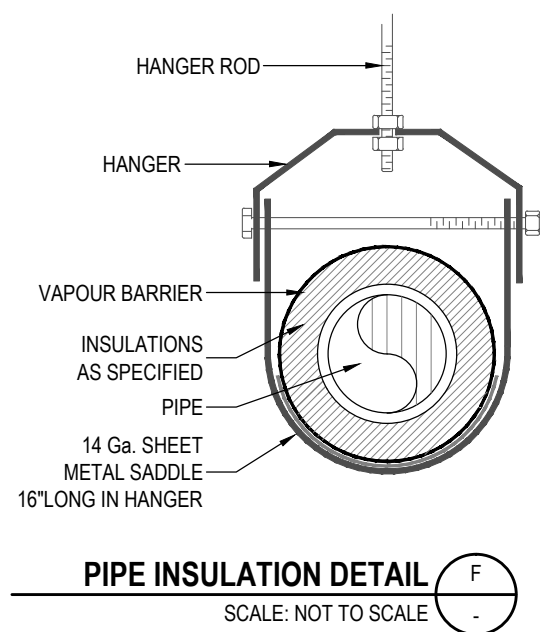
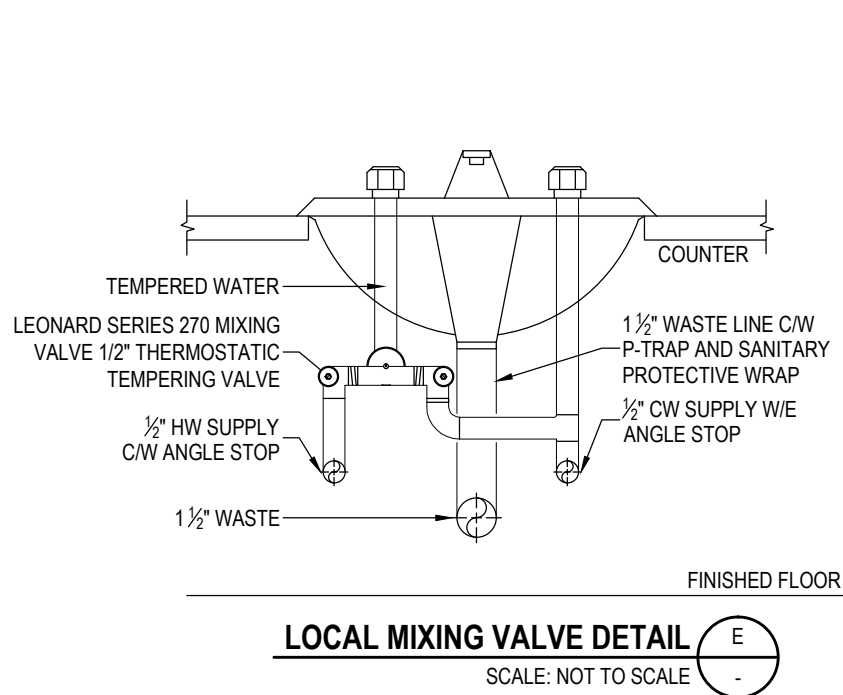
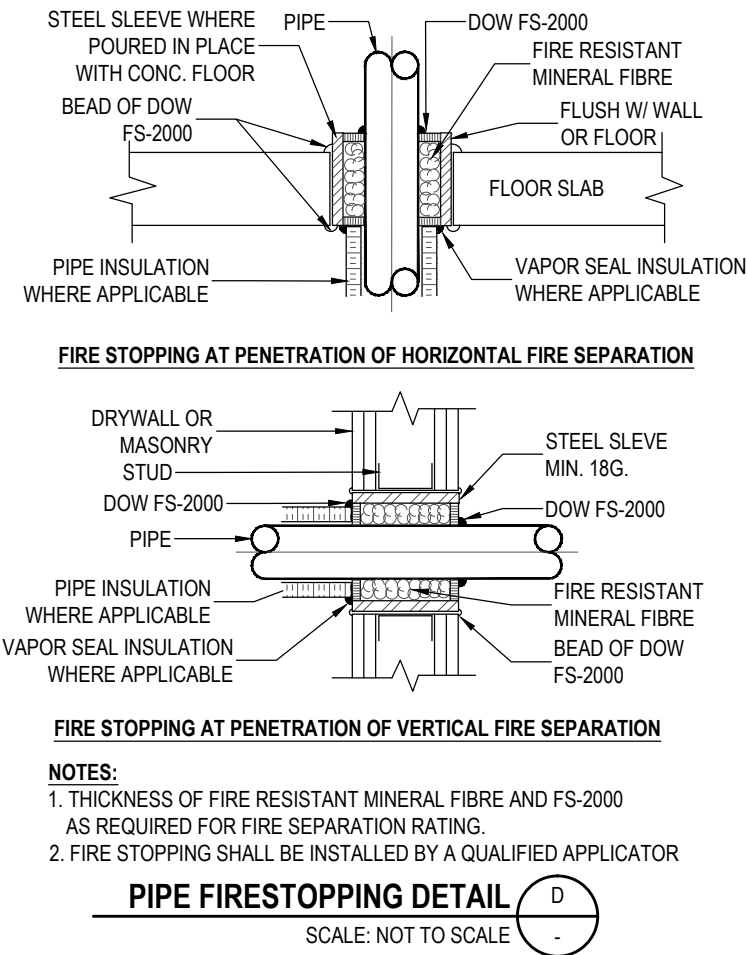
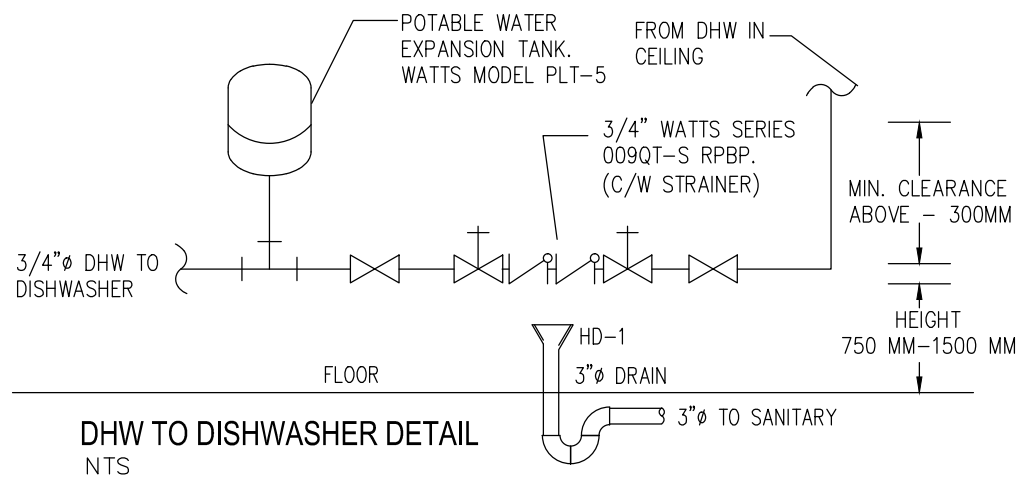
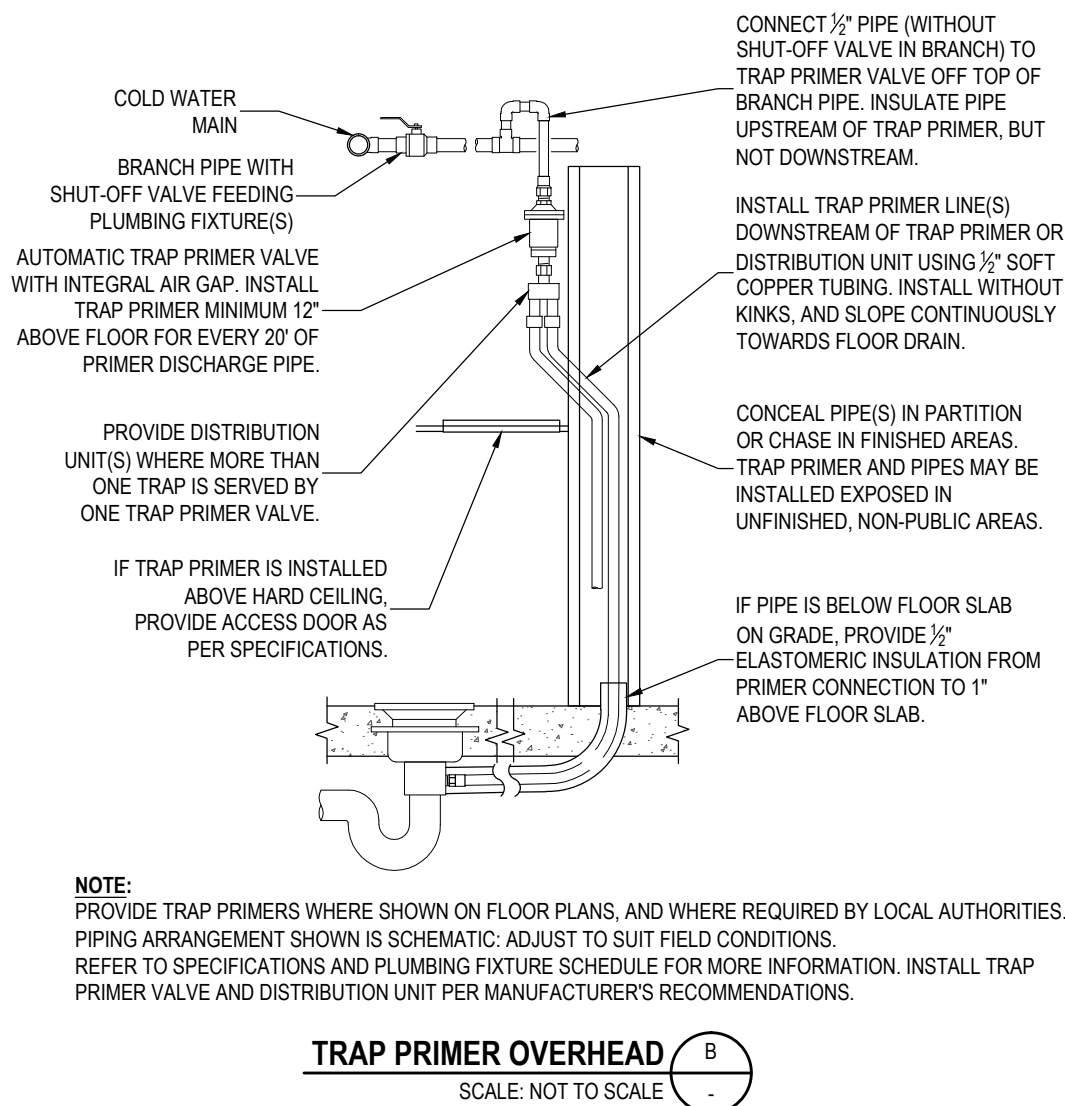
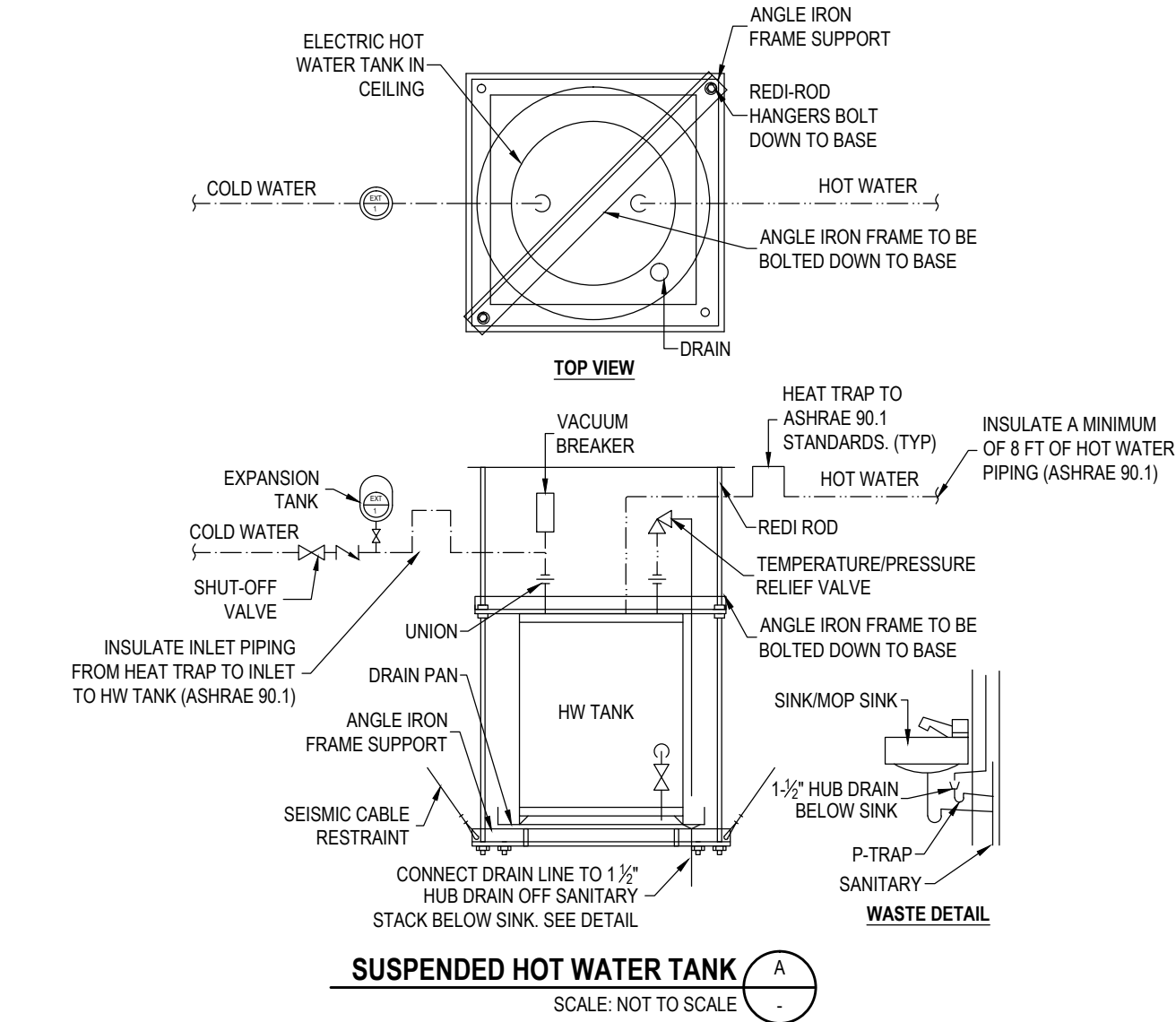
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DESTROY ALL PRINTS DATED PREVIOUS TO FINAL DATE ABOVE.		
REVISIONS		
THIS DRAWING SHALL ONLY BE USED WHEN SIGNED FOR THE PURPOSE SPECIFIED BELOW.		
THE SPECIFICATIONS ARE TO BE CONSIDERED AS AN INTEGRAL PART OF THESE DRAWINGS AND NEITHER THE DRAWINGS NOR THE SPECIFICATIONS SHALL BE USED ALONE. REFER TO ARCHITECTURAL, CIVIL AND STRUCTURAL DRAWINGS FOR DIMENSIONS. DO NOT SCALE. THIS DOCUMENT IS PROVIDED FOR THE SOLE USE OF OUR CLIENT UNDER THE CONDITIONS AND TERMS OF OUR AGREEMENT. PUBLICATION, REPRODUCTION, OR TRANSLATION IN WHOLE OR IN PART, OF THIS DOCUMENT WITHOUT THE PRIOR WRITTEN PERMISSION OF TAG ENGINEERING INC. IS STRICTLY PROHIBITED.		
THESE DRAWINGS ARE THE PROPERTY OF THE ENGINEER AND MUST BE RETURNED AT COMPLETION OF WORK OR UPON REQUEST.		
TAG ENGINEERING INC. #401, 14840 64 Avenue Surrey, BC V3S 1X7 PH: 604.790.0579 www.tagengineering.ca		29 Jul, 2021
PROJECT		
TRAIL RESTAURANT		
102-1100 BAY AVENUE TRAIL, BC		
TITLE		
MECHANICAL DETAILS		
DRAWN	CHECKED	PROJECT No.
---	SS	13506
SCALE	DRAWING No.	
AS NOTED	M-4.1	
DATE		
29 Jul, 2021		

GENERAL REQUIREMENTS

1.1 GENERAL REQUIREMENTS

- For the purpose of this specification, the following terms shall be understood to mean:
 - "Consultant" - the person(s) representing the Mechanical Consulting Engineering firm and TAG ENGINEERING INC.
 - "Contractor" - the company awarded the contract to execute the work as defined herein reflected on the drawings.
- Should any conflicts occur between layouts shown on drawings and applicable codes, the code requirements shall be adhered to. Should the Contractor have any doubts or queries regarding the interpretation or requirements of the design, such queries shall be addressed to the Consultant promptly in writing to obtain a resolution.
- These specifications and drawings shall be read in conjunction with the terms and conditions of the General Contract Documents.
- Contact documents are diagrammatic only. They are to establish scope, material and quality. They are not detailed installation drawings. Minor details usually not shown or specified and any incidental accessories required for proper installation of the system are to be included in the work.
- All work and materials shall conform to the requirements as set out in the Base Building Tenant/Landlord agreement.
- The Contractor shall visit the site prior to tender and shall become thoroughly familiar with site conditions. Problems arising from a failure to do so shall not constitute a contract change.
- All controls shall be done by Base Building Controls Contractor.
- Air & water balancing shall be performed by an independent Air testing and balance agency which specializes in testing and balancing of heating, ventilating and cooling systems.

1.2 QUERIES

- Tenders finding discrepancies, ambiguities or omissions in the drawings and/or specification documents or being uncertain of the intent, meaning or description of work or systems or interpretation thereof, should address their queries to the Consultant in writing prior to close of tender. If such a request is not made, tenders will be deemed to be based upon the interpretation that may be subsequently given by the Consultant after award of contract.
- All queries should be addressed to:
TAG ENGINEERING INC.
Bus: (604) 790.0579
Email: info@tagengineering.ca

1.3 REGULATIONS

- All work shall be installed in accordance with but not be limited to approved editions of:
British Columbia Building Code & Plumbing Code (latest edition)
City of Vancouver Building By-law (For Buildings in Vancouver)
Canadian Standard Association (CSA)
Canadian Gas Association (CGA)
Workers' Compensation Board
Factory Mutual Fire Insurance Companies, NFPA
Base Building Construction Guidelines
ASHRAE 90.1 (latest edition)

1.4 INTENT

- The intent of this specification and drawings is to provide a complete and fully operating mechanical systems in accordance with applicable codes. The Contractor shall make provisions for labor, material and equipment necessary to complete the mechanical work.
- Conform to manufacturer's instructions, details and procedures for equipment installations.
- Install equipment in locations and routes shown, close to building structure with minimum interference with other services or free space. Remove and replace improperly installed equipment.
- Equipment shall match or exceed quality of the base building equipment.

1.5 INSURANCE

- The Contractor shall provide and show proof of, at his expense, Comprehensive General Liability Insurance of not less than \$5,000,000.00 including non-owned car coverage, contractual liability and containing a cross liability clause. Coverage shall include loss or damage the Contractor may cause to any works, building, equipment, structural, on the Owner's property. The insurance may or may not contain a deductible clause but not to exceed \$500.00.
- The Contractor shall carry full employee's liability insurance for the whole of the work in accordance with the Workers' Compensation Act.

1.6 LIABILITY

- Assume responsibility for laying out work and for damage caused by improper execution of work.
- Protect finished and unfinished work from damage.
- Take responsibility for condition of materials and equipment supplied and protect until work is completed and accepted.
- Existing elevations, dimensions and existing features shall be verified before laying out the work. Starting the work shall be held to imply that the Contractor has verified them to be correct. Any additional costs arising out of any rectifications shall be borne by the Contractor.

1.7 COORDINATION AND COOPERATION

- The Contractor shall co-ordinate the work of all Subcontractors with efficient and continuous supervision.
- Each Sub-Contractor shall identify in writing to the Contractor any existing services deemed to be unacceptable or defective prior to commencement of their work.
- The installation of systems specified in Division 15 and 16, including the inter-related operation and functioning between components of a system and between systems shall be coordinated between the contractors performing the work of Division 15 and 16.
- Install all equipment, piping and ductwork to obtain ceiling heights specified or shown on the architectural drawings. In case of conflict, notify the Engineer before fabricating and installing any item referred to above. Carry out any required adjustment.

1.8 PERMITS & FEES

- Give notices, obtain permits and pay fees so work specified may be carried out. Furnish certificates if requested, as evidence that work conforms with laws and regulations of authorities having jurisdiction.

1.9 INTERRUPTION OF SERVICES

- While work is in progress, continuity of services shall be maintained to all existing systems. Interruptions shall be coordinated with the Owner as to time and duration. The Contractor shall be responsible for any interruptions to services and shall repair any damages to the existing systems caused by his operation.
- Shutdown of existing base building systems shall be coordinated with the Owner or his representative.
- The Contractor shall include in the price any costs for Premium Time outside of normal working hours to complete the work on schedule and to maintain all mechanical systems in operation.

1.10 CUTTING & PATCHING

The Mechanical Contractor shall make provision and be responsible for:

- Identifying all openings and holes required for the passage of mechanical services through structures and dividing walls. Such identification shall be via marked up drawings showing opening locations, sizes, and levels - 2 copies of the drawing to be submitted to the Consultant's office for review prior to any cutting commencing. If required, the Contractor is to clearly mark on site the intended openings for cutting.
- The Contractor shall wherever possible review existing base building structural drawings to avoid requesting openings through post-tension cabling or structural slabs.
- Unless builders work is excluded from his scope of work, the Mechanical Contractor shall include and be responsible for the cutting, patching and making good for all openings required for the installation of his services including costs involved with x-raying and provision of protective coverings.
- The Mechanical Contractor shall supply in good time all sleeves required to be built in for the routing of mechanical services. .
- All coring, drilling, x-raying and other noisy work shall occur before or after designated business hours of 6 am to 6 pm, Monday through Friday and 7 am to 1 pm on Saturdays. This includes the use of Rammer, Hilti or other explosive type fastening devices during designated business hours as outlined above.
- If the slab is post tensioned. Penetration up to 3/2" in the slab is permitted. Any penetration in the slab over 3/2" must be x-rayed with the x-ray signed off by the structural consultant and the construction manager before coring.

1.11 STANDARDS OF MATERIALS, EQUIPMENT AND INSTALLATION

- Equipment used shall not exceed space limitations in any dimension. Replace any equipment or apparatus which does not meet this specification at no cost. Assume full responsibility for the expense of redesign and adjustment to other parts of the building when proposing the use of approved equal or alternate equipment.
- Provide equipment from the specified manufacturers. All mechanical equipment shall have the approved manufacturers name permanently affixed to it.
- Equipment on alternate & approved manufacturers list must be equal in quality and performance to the model specified. Equipment which is not equal will be replaced with the specified equipment at no cost to the owner.
- The equipment manufacturer shall ensure that the strength and anchorage of the internal components of the equipment exceeds the force level used to restrain and anchor the equipment unit itself to the supporting structure.
- Materials shall be new and of uniform pattern throughout.
- Acceptable Products/Suppliers/Manufacturers:

ITEM	ACCEPTABLE PRODUCTS/SUPPLIERS/MANUFACTURERS
Grilles, Diffusers And Registers	E.H. Price, Tinslor Hart
Insulation - Duct/Piping	Fiberglas, Kraus, Johns-Manville, Armstrong, Amalflex, Manson
Jacketing Material	Chillers, Fiberglas, Johns-Manville
Pipe Fittings And Flanges	Crane, Grinnell, Jinnels, Victaulic
Pipe Supporting And Hangers	Crane, Unistrut, Myatt, L.E. Taylor, Grinnell, Sarco
Testing & Balancing And Vibration Control Equipment	Must use Base Building Balancing Contractor Vibro-Acoustics, Lo-Rez, Vibron, Korlund, Mason

1.12 GUARANTEE

- Provide the Client with a written guarantee warranting apparatus furnished to remain in serviceable condition for a period of one (1) year from date of Substantial Completion.

1.13 STANDARD OF WORKMANSHIP

- Only employ tradesmen properly licensed for work.

1.14 SHOP DRAWINGS, ALTERNATIVE MATERIALS & EQUIPMENT

- Contract documents are based on materials and equipment specified. Approval by Consultant of equipment submitted as equal to that specified does not relieve the Contractor of any responsibility.
- Shop drawings shall be submitted to the consultant in electronic (pdf) format, as coordinated after award of contract. Where submittals are derived from digital originals, do not print and re-scan documents; submittals made as such will be immediately rejected.
- Submit a schedule of shop drawings within one week after award of contract. Group submittals by specification division as appropriate.
- Submit material safety data sheet (MSDS) for all applicable products.
- Proposals for alternatives shall include details of any revisions necessary to accommodate same. No increase in the contract price shall be considered.
- Submit shop drawings to Consultant on all equipment specified for review. Do not order equipment or materials until Consultant has reviewed and approved shop drawings.

1.15 RECORD DRAWINGS

- Maintain an updated set of white prints of drawings and specifications on site, complete with red-line record of all changes and deviations dated. At end of construction, all of the above changes shall be transferred by the Consultant at the Contractor's cost to a set of "AutoCAD" system disks containing the mechanical drawings, and revised accordingly. These disks shall then be used to provide two sets of white prints. Prints shall all be handed over by the Sub-Contractor to the Owner. The Contractor undertake "AutoCAD" work as follows:
 - The cost per drawing sheet for transferring information to the record drawings by the Consultant shall be \$400.00 per drawing. Should the Contractor reversioned major re-rundings of services where the original layout is appropriate or should major changes in the scope of work occur, additional charges may apply. Costs for printing are not included.
 - The as-built daily marked-up prints shall conform to the standards of the contract drawings and shall include all details from revision drawings, supplementary drawings, change orders, addenda and site revisions, etc. Each white print drawing sheet shall be marked:
"We hereby certify that these drawings represent the building, as-built"
with signatures immediately below of authorized personnel of this Sub-Contractor.

1.6	SUBSTANTIAL PERFORMANCE INSPECTION
1.	Prior to the contractor requesting an inspection for substantial performance all the following items must be provided to permit beneficial use by the owner.
2.	Comply with requirements in general contract conditions.
3.	As-built drawings submitted. 3 Balancing reports (Air).
4.	All systems shall be certified in writing by the contractor as complete and fully operational.
5.	A complete list of items which the contractor has not finished, or are deficient shall be provided. If, in the opinion of the consultant, this list indicates the project is excessively incomplete, a substantial completion inspection will not be performed.
6.	Sprinkler contractor to submit material and test certificates and schedule 'C' from the sprinkler design engineer.
1.16	O & M MANUALS
1.	Instruct the building operators in the operation and preventative maintenance of each piece of equipment and system supplied and installed. Complete and turn over documentation prior to substantial performance.
2.	Submit 2 sets O & M MANUALS in 3-ring binders and shall include the following:
2.1.	Description of operation of all mechanical systems
2.2.	Shop drawing of all equipment and list of tagged valves
2.3.	Extended warranties AND Contractor's warranty certificate
2.4.	Maintenance and operation instructions
2.5.	List of manufacturers source and trade names
2.6.	Balancing report of air & water systems
2.7.	Copies of record drawings
2.8.	List of inspection and test certificates
2.9.	Seismic engineer's letters of assurance (schedules)
2.10.	Fire protection engineer's letters of assurance (schedules)
2.11.	Final gas inspection acceptance certificate
1.18	COORDINATION WITH DIVISION 23 (16) - ELECTRICAL
1.	Contractor shall review all equipment requiring electrical hook-up with Electrical Contractor and electrical drawings prior to ordering equipment. Ensure proper electrical characteristics are determined for all affected and related work.
2.	Contractor to provide NEC (National Electrical Code) horizontal and vertical clearances for all installed equipment. Offset mechanical work to comply with this requirement.
	PERFORMANCE VERIFICATION
1.1	PERFORMANCE VERIFICATION OF INSTALLED EQUIPMENT
1.	The contractor shall conduct acceptance tests to demonstrate that the equipment and systems meet the specified requirements.
2.	Installed mechanical equipment whose performance is questioned by the consultant, may be subject to performance verification as specified herein.
3.	When performance verification is requested, equipment shall be tested to determine compliance with specified performance requirements.
4.	The consultant will determine by whom testing shall be carried out. When requested, the contractor shall arrange for services of an independent testing agency.
5.	Test equipment and materials where specified or required by authorities having jurisdiction to demonstrate proper and safe operation. Provide notice to Consultant before tests.
6.	Test procedures shall be in accordance with applicable portions of ASME, ASHRAE, SMACNA, NFPA, CSA and other recognized test codes as far as field conditions permit.
1.2	AIR AND WATER BALANCING & TESTING
1.	Air and water balancing and testing shall be undertaken by an independent testing agency and form part of the tenant's work and at the tenant's expense.
2.	The Contractor is responsible for the inspection of the complete HVAC systems, to see that they are in accordance with the intent of the plans and specifications.
3.	During the inspection:
3.1.	Adjust fan drives to get required and rated CFM and specified RPM.
3.2.	Adjust temperature and fan control sequence.
3.3.	Adjust the entire installation as to minimize noise and vibration from fans, compressors, starters and relays.
3.4.	Eliminate any duct pulsation by use of stiffeners or additional supports as required.
3.5.	Correct any equipment or component which is generating objectionable noise in the opinion - of the Owner or by local authorities. Ensure there are no air leaks.
3.6.	Ensure the ductwork is properly supported.
3.7.	Ensure all duct connections are securely fastened to their respective collars or other fittings so they will not come off under maximum system pressure.
3.8.	Diffusers and grilles shall be balanced to +/- 10% of quantities noted on the drawings.
3.9.	Perimeter air systems shall be re-balanced if any HVAC renovations are carried out.
4.	Provide four (4) copies of balancing report to include the following:
4.1.	Fan Data Sheets (supply, return, and exhaust) make, model, serial number motor HP, voltage, rated amp, running amp, fan pulley size - motor pulley size and number and size of belts.
4.2.	Air Outlet Sheet outlet number, outlet make, model area factor, required velocity, required CFM, actual velocity, actual CFM.
4.3.	Single line schematic with outlets numbered corresponding to air outlet sheets.
4.4.	The Balancing Contractor shall make necessary adjustments, replace motor and fan sheaves and belts upon balancing of existing and new air systems.
	SITE INSPECTIONS
1.	Prior to re-installation of the ceiling, boarding of walls, backfill of underground piping, notify the Consultant and arrange for a review of the work.
2.	The contractor shall notify the consultant in writing for the following minimum, but not limited to, inspections: (required to provide a schedule 'C' for occupancy)
2.1.	All below grade piping prior to backfilling.
2.2.	All HVAC & Plumbing rough-in prior to wall and ceiling finish.
2.3.	Fire stopping of all openings.
2.4.	Drop test all fire dampers and demonstrate access.
2.5.	Final occupancy inspection and verification of all equipment being fully operational.
3.	All work shall be approved by any other regulatory body having jurisdiction where required.
4.	The contractor is to provide copies of all permits, inspection reports and certificates to the consultant.
5.	The contractor is to provide the consultant reasonable notice (minimum of 2 days for local sites) prior to calling an inspection.
6.	Final Review: For undertaking final review, the following shall be completed:
6.1.	All systems to be fully operational
6.2.	As-built drawings supplied
6.3.	Operating & Maintenance Manuals submitted.
6.4.	Two (2) days notification (in writing) is required to be given to the consultants prior to reviews being undertaken.
7.	All deficiencies shall be completed within two (2) weeks of an agreed period of time after final review and a letter shall be submitted to the Consultant within that time advising of such. Failure to complete work may result in work being done by the Owner and the costs deducted from final payment.
	SEISMIC RESTRAINTS
1.1	GENERAL REQUIREMENTS
1.	Seismic restraints for all equipment, ductwork, and piping covered by division 22 and 23. Attachment to structural members in accordance with the following:
1.1.	2018 B.C. Building Code (latest edition) or Vancouver Building By-Law (latest edition), whichever is applicable.
1.2.	N.F.P.A. 13 & 14, N.F.P.A. 20
1.3.	SMACNA "Guidelines For Seismic Restraints Of Mechanical Systems And Plumbing Piping Systems".
2.	Contractor to provide professional certification from specialist seismic items trade prior to report for completion or occupancy inspection, whichever is the earlier.
1.2	SEISMIC REQUIREMENTS
1.	Provide and install seismic restraints for all equipment, ductwork and piping in accordance with all current applicable building codes.
2.	The installation of seismic restraints shall not compromise vibration isolation capabilities.
3.	Prior to construction commencement, contractor shall organize a meeting with the general contractor, mechanical contractor, structural consultants and other appropriate parties. At that meeting, the contractor shall present in general the approaches/details used to provide seismic bracing for equipment, ductwork and piping highlighting attachments to structure and trade coordination.
4.	Contractor to provide professional certification for all items installed by this division, including the roof curb.
5.	Seismic engineer is to provide letter of assurance schedule 'C' for all seismic components prior to building occupancy.
6.	Engage the services of a seismic restraint engineer to provide details, field reviews and letter of assurance and compliance for mechanical related equipment and connected services. Letter of assurance and compliance to be provided prior to occupancy and substantial completion. Also, refer to specifications.
	FIRE PROTECTION
1.	Provide complete sprinkler piping system renovations where specified to NFPA No. 13 2013, and local municipal by-laws and requirements. In addition, comply with Owner's insurance authority requirements. All material shall be listed by UL or approved for sprinkler/standpipe use. Pipe sizing by hydraulic calculations.
2.	If required by the City, Drawings and hydraulic calculations shall be signed and sealed by professional engineer registered in BC. Contractor to obtain approval from authority having jurisdiction and provide engineer's letters of assurances as required.
3.	Sprinkler head location shall be subject to approval by the architect. Follow head locations shown on reflected ceiling plan. Provide heads under obstruction to meet code.
4.	Pipe runs when shown on drawings are to be adhered to as closely as possible.
5.	Contractor is responsible for obtaining water supply information and preparing hydraulic calculations accordingly. Allow 10% safety margin (or minimum 10 psi) on pressure at base of riser. Contractor to confirm incoming water line size required by hydraulic calculation before water connection application and installation of any on site plumbing.
6.	Contractor to perform testing in presence of the consultant and submit NFPA Testing contractor's Certificate.
7.	Run all pipe concealed. Piping subject to freezing to be insulated and heat traced.
8.	Provide sprinkler head assembly to protect glass areas as required by the local municipality. In the absence of specific requirements, provide heads at 6 ft (1.8 meter) on center over glass window/wall in rated separations. Use copper pipes when exposed.
9.	In dry sprinkler system, provide necessary drain points to maintain the required headroom under safety margin on pressure at base of risers (or a minimum of 10 PSI). Contractor to confirm incoming piping, provide accelerator, exhaustor, and check valve to meet time limit requirements of NFPA.
10.	Fire Protection piping to be Schedule 40 to NFPA Standard Piping with Screwed or Mechanical Joint Fittings or CPVC "Blazemaster" Piping with Solvent Weld Fittings.

HEATING, VENTILATION & AIR CONDITIONING

1.1 GENERAL REQUIREMENTS

1. The construction and installation of ductwork shall be in accordance with the following referenced SMACNA manuals and ASHRAE handbooks.

- 1.1. SMACNA - HVAC duct construction standards, 1985.
- 1.2. SMACNA - HVAC air duct leakage test manual, 1985.
- 1.3. ASHRAE - Handbook - equipment volume.

The project drawings are diagrammatic and although efforts have been made to provide information regarding the number of offsets and transitions, not all are necessarily shown. Changes may be required in duct routings, elevation and duct shape to eliminate interference with structure and other services. All required adjustments shall be established when coordinating and field measuring the work prior to fabrication and must be provided as part of the contract and all associated costs must be considered and included.

3. Ductwork shall meet the requirements of NFPA 90A and 91 and conform to applicable codes.

1.2 INSTALLATION

1. Provide access doors for all concealed serviceable equipment. Access doors shall maintain all fire ratings.
2. Ensure that the integrity of all fire separations is maintained where piping and ductwork systems penetrate rated structures. Contractor to seal tight around all piping with approved caulking material and provide fire damper or fire flap for ductwork with required fire protection rating of closure.
3. Provide isolating valves in branch lines to each piece of equipment.
4. Install pipes with allowance for expansion. Contractor and setting, heating hot water pipes shall have expansion joints, loops or offsets as shown on the drawings and/or at least every 100 feet of straight run. Provide pipe anchors between expansion elements.
5. Coordinate with General Contractor, locations and sizes of required HVAC chases and any additional bracing between studs for wall-hung equipment. Prior to fabrication of ductwork, check all ceiling spaces and heights and conflicts with other trades.
6. Coordinate with General Contractor, any required cutting of structure to facilitate passage for pipes and duct.
7. Thermostats and wall-mounted sensors/equipment shall be located generally as shown, but their exact location shall be field coordinated to avoid interference with wall-mounted items and excessive radiant or other heat sources.

1.3 DUCTWORK

1. Ductwork shall be galvanized steel, lock formed 2" W.G. SMACNA standard for low velocity and medium velocity ductwork quality. Fabricated in accordance with SMACNA Duct Manuals and ASHRAE Handbooks.
2. All ductwork shall be delivered to site in a clean condition and remain clean. During installation all open ends of ductwork shall be capped and kept clean.
3. Provide minimum 300 x 300 mm (12" x 12") access panels to manual dampers, equipment, fire dampers and valves. Refer to interior designer for access panel details.
4. Provide conical take-offs on all right angle take-offs in supply air ductwork. Limit flex ducting to only small diameter ducting (8" or less) and limit the length to no more than 5ft.
5. All ducts associated with fans, and other machinery shall be installed with canvas flexible connections on the inlet and outlet openings.
6. All ductwork penetrating floor slabs above and below or fire separations shall be complete with fire dampers.
7. Provide return air openings and/or insulated sound traps where indicated.
8. Identify ductwork as per base building standards. Confirm prior to submitting tender.
9. Provide seismic supports and cabling for grilles and diffusers.
10. Use of adjustable elbows and flex duct for elbows will not be permitted.
11. All square elbows shall have turning vanes. Provide acoustical seal around ducts and sound traps at penetrations through sound baffles. Seal all openings around ducts and pipes.
12. Paint all visible ductwork through supply, return or exhaust grilles matte black. Coordinate on site with General Contractor.
13. Size round ducts, installed in place of rectangular ducts, from ASHRAE table of equivalent rectangular and round ducts. No variation of duct configuration or sizes permitted except by permission from Consultant.

1.4 INSULATION

1. All insulation work shall be in strict accordance with B.C.I.C.A. Standards, 2018 BC Building Code, and ASHRAE 90.1 2016 and be carried out by an experienced firm with an established reputation in this field, and to the satisfaction of the engineer.
2. Adhesives, sealants, coverings, jackets, etc. shall have composite flame spread and smoke development ratings not exceeding 25 and 50 respectively.
3. All ductwork shall be fiberglass type with vapor barrier.
4. First ten feet of supply and return air duct shall be lined on all surfaces with one inch neoprene faced fiberglass acoustic insulation.
5. Acoustic Insulation:
 - 5.1. Material: flexible or rigid mineral fibre acoustical insulation.
 - 5.2. Acoustic properties: minimum NRC of 0.75 for 25 mm thickness.
 - 5.3. "K" value maximum 0.035 W/(m²·K) at 24C mean temperature. Service temperature: -40C to 65C.
 - 5.4. Surface Finish: Air stream side coated to prevent fire erosion. surface roughness not exceeding 0.58 mm.
6. Exhaust duct passing through unheated place shall be insulated with 1" thermal insulation with vapor barrier.
7. All exhaust ducts shall be insulated 5 feet back from exterior wall termination with 1" thick thermal insulation with vapor barrier.
8. All supply ductwork in unconditioned spaces shall be insulated with 25mm (1") foil wrap insulation.

1.5 FLEXIBLE DUCTS:

1. Flexible duct is shown as single line.
2. When flexible duct is used, it shall be Flexmaster FAN 4T UL approved class 1 duct and insulated with 1" fiberglass insulation and vinyl jacketed.
3. Flexible duct to be installed such that the connection will not come off with a minimum 25 lb force. Flexible metal duct is not acceptable.

1.6 BALANCING DAMPERS

1. Provide balancing dampers where indicated on drawings, at all points on low pressure supply, at each supply/exhaust diffuser, return and exhaust ducts where branches are taken from larger ducts AND at the request of the balancing agent to facilitate balancing

1.7 VIBRATION ISOLATION:

1. All fans and air conditioning units shall be mounted with vibration isolation and seismic supports and cabling.
2. Select isolation equipment in accordance with the manufacturer's instructions for the appropriate loads.

1.8 DRIER VENTS:

1. All drier vents shall pitch continuously to the outside lower.
2. All drier vents shall be taped and sealed. Do NOT screen the exhaust end of the vent system, and do not use screws or rivets to assemble ductwork.

1.9 FIRE DAMPERS

1. Provide UL approved fire dampers made of galvanized steel or prime coated black steel weighted to close and lock in closed position when released by fusible link. Fire dampers in low-pressure ductwork may be multi blade or curtain type. Install fire dampers as per NFPA/CUA 90A.
2. Fabricate combination fire and balancing dampers with linkage readily adjustable in open position.
3. Fire dampers in medium and high-pressure ductwork shall be curtain type and dynamic. Curtain fire dampers shall have blades retained in a recess so free area of connecting ductwork is not reduced.
4. Rate Fire Dampers to match the rating of the separation wall/floor/roof. Provide only UL labeled dampers rated for static or dynamic as stated.
5. Standard of approval: Controlled Air Type B, Canadian Vantage Air or Ruskin Maxam.
6. Fusible links shall be set for 72°C.

CONTROLS

1.1 WORK INCLUDED

1. Provide wiring between thermostats, switches, fans, motorized dampers et al.
2. Provide wiring, piping, raceways, and conduits as required.
3. Provide calibrations, adjustments and checkouts for all ventilation equipment.
4. Provide Instructions for owners.

1.2 GENERAL NOTES

1. The location of all devices shall be reviewed with the Consultant prior to installation.
2. Permanently identify each wire, cable, and conduit pipe.
3. Provide all control components, wiring devices, and labor necessary to assemble a complete control system in accordance with the control manufacturer's recommendations.

1.3 PRODUCTS

Conduits, wiring and cabling:

1. All work shall be installed in accordance with the Canadian Electrical Code and the British Columbia Building Code.
2. The Contractor is responsible for all new control wiring and connections (120 volts and less) including those between line voltage temperature controls, safety, limiting, and other devices directly to starters, holding coils, auxiliary controllers, interlocks, relays, etc., as required for the performance of the control system and the sequence of operations as specified.
3. All wiring is to be in conduit. Do not use exposed conduit or wiring in public areas of the building. Any conduit installed exposed in service areas shall be painted to match the surroundings. Exposed conduit in mechanical rooms need not be painted.
4. 110-volt circuits shall be, at a minimum, of #14 RX 90 copper. For runs over 150 feet in length, use #12 AWG EX 90 copper.

FIRESTOPPING

1. All fire stopping shall be done in accordance with the current building code/by-law to maintain fire ratings of the structure and finishes. Materials used for fire stopping shall be tested and approved for the particular application.
2. Prior to commencement of work, the Contractor is to provide shop drawings to the Consultant for review. Shop drawings shall comprise of copies of the UL listed details appropriate for each of the mechanical systems used and the assemblies penetrated through the tested method of firestopping.
3. All rough openings for mechanical/plumbing systems to be sized as per manufacturer's listed details. Maximum annular spacing for piping to be adhered to. Repair/replacement of structure or relocation of mechanical/plumbing systems due to incorrect opening size/shape is the responsibility of this Contractor.
4. Ensure that continuity of all fire separations is maintained at all piping penetrations.
5. For parake ceiling and fire walls that require an F-T rating (coordinate with architectural drawings), provide fire-stopping in accordance with the manufacturer's CAN/ULC listing. On cast steel piping in parkade, insulate first few feet of piping as necessary to meet T rating requirement (length and insulation type to meet requirements of approved assembly to be used). Submit shop drawing of approved assembly being used.
6. Refer to architect's / interior designer's drawings for identification of fire separations.
7. Approved firestop product manufacturers limited to 3M, Hilti, PFP.
8. Work to be undertaken by qualified trades people only. Installers shall hold verifiable installer's certificate from the manufacturer.
9. Notify Consultant (engineer) when ready for inspection and prior to concealing or enclosing the fire stop assemblies.

Note: Coordinate with architect / interior designer for location of fire rated walls, roofs and other assemblies for fire-stopping and fire dampers.

PLUMBING

1.1. GENERAL REQUIREMENTS

1. All plumbing shall conform to the B.C. Plumbing Code (latest edition) or Vancouver Building By-Law (latest edition) and total approval of local authorities having jurisdiction.

2. Gas piping system to be installed in accordance with CAN/CSA B-149.1-00 and BC Gas Safety Code/Amendments.

3. All materials and equipment shall have prior approval for the application by the authorities having jurisdiction, e.g. Canadian Standards Association (CSA), Canadian Gas Association (CGA), etc.

4. Provide a complete sanitary drainage system, complete from all plumbing fixtures and floor drains to 3 feet outside building and/or as indicated on the mechanical drawings.

5. Provide a complete domestic water distribution system including hot, cold and re-circulation water lines, pressure reducing station, water meter and water heaters as indicated. Connect to site water service at 3 feet outside building and/or as indicated on the mechanical drawings.

6. If there are existing service connections, the General Contractor shall locate and confirm the location and invert elevation of existing connections at line prior to work commencing.

7. If the connections are found to be unsuitable (insufficient size or unacceptable invert), the General Contractor shall inform the Consultant. Be responsible for any corrective action required due to failure to verify or report the unsuitability in a timely manner.

1.2. PIPING MATERIAL

The following piping material shall be used unless specified on the drawing or approved by the Consultant.

1. Sanitary and storm drainage above grade inside building:

1.1. Cast iron with mechanical joints to CAN/CSA-B70-M

1.2. Copper DWV grade to ASTM B306

2. Sanitary and storm drainage below grade:

2.1. Cast iron with mechanical joints to CAN/CSA-B70-M

2.2. PVC Drain Waste and Vent Pipe and Pipe Fittings conforming to CSA B181.2

2.3. ABS Drain Waste and Vent Pipe and Pipe Fittings conforming to CSA B181.1-M85

3. Footing drainage below grade outside building:

3.1. PVC Perforated Building Sewer Pipe and Pipe Fittings conforming to CSA B182.1

3.2. Series 100 PVC 1120 Perforated Pipe and Pipe Fittings conforming to CSA B137.3

4. Domestic hot and cold water above grade inside building:

4.1. All domestic water distribution piping below 4" shall be:

4.3.1. X-Linked Polyethylene (PEX) CAN/CSA B137.5 (Wirsbo/Rehau PEX tubing up to 1" CAN/CSA B137.5)

4.3.2. Type L hard drawn copper with solder joints to ASTM B88 at PRV station only (as specified)

4.4. All domestic water distribution piping above 4" shall be:

4.4.1. Epoxy lined ductile iron with flanged or 1" to victaulic joints to ANSI/AWWA C151/A21.51.

4.5. Polypropylene piping is not approved.

5. Domestic hot and cold water branch lines below grade:

5.1. All joints/fittings installed below grade to be protected by polyken tape.

5.2. All domestic water distribution piping below 4" shall be:

5.2.1. PVC Ringlight Piping with Grooved Mechanical Joints

5.2.2. Wirsbo/Rehau PEX tubing up to 1-1/2" to CAN/CSA B137.5. No joints/fittings below grade.

5.2.3. Type L seamless soft copper tubing to ASTM B88 or copper pipe to ASTM B42 with cast brass or wrought copper fittings and silver soldered joints all encased in a polyethylene piping system.

5.3. All domestic water distribution piping above 4" shall be:

5.3.1. Cement Lined Cast Iron Pipe with Rubber Ring Type Joints for 200 psi working pressure

6. Condensate drains for air conditioning equipment shall be copper DWV grade to ASTM B306. CPVC piping is not approved.

7. No alteration or change to materials specified is acceptable without prior written approval of the consultant.

8. Pressure Reducing Valves

8.1. Clayton Series 90-B or 90-BKT or approved equal pressure reducing valves (pilot operated) with iron body, bronze & resilient trim. For smaller than 30mm (1-1/4") use CRD-KT 1725 (250 psi)

8.2. Install pressure reducing valve assemblies complete with 3 valve by-pass strainer and outlet pressure gauge connection.

9. Backflow Preventers

9.1. Carbonated Beverage Machines & Tea/Coffee Machine: Watts Model SD-2 dual check with atmospheric port.

9.2. All other applications: Watts Series 0707T, certified to CSA Standard B64.

9.3. Install backflow preventers at domestic water connections to all heating, cooling and refrigeration equipment and where specified in the Contract Documents or as required by local jurisdiction.

10. Plumbing Fixtures and Trim:

10.1. Provide new CSA approved fixtures, free from defects with clear, smooth and bright finishes as per fixture schedules. If no fixture schedule is provided, contractor is still required to submit shop drawings of the fixtures to be installed.

10.2. Plumbing fixtures shall meet requirements of the local jurisdictions

1.3. INSTALLATION

1. Provide water hammer arresters on all hot and cold water lines, at groups of plumbing fixtures, dishwashers, clothes washers and where quick opening devices are used.

2. Provide chrome-plated escutcheon plates wherever plumbing lines penetrate a finished wall.

3. Provide shut-off valves and accessories in accessible locations to each appliance, piece of equipment, fixture group or fixture. Provide valves in accordance with codes and where shown on the drawings.

4. Install balancing valves where shown on the drawings or as required and adjust the valves for balanced flow on the re-circulation system. Approved product: Tour and Anderson model STA-5.

5. Identify each piping system with stick-on decals to indicate service and direction of flow.

6. Do not run water pipes in outside walls without the Consultant's approval.

7. General Contractor to provide pipe guards to protect all pipes subject to damage in traffic areas.

8. Provide d-e-lec-tric coupling between two dissimilar pipe materials.

9. HANGERS:

9.1. Support piping on adjustable malleable iron or wrought steel hangers. Grinnel no. 97, 101, 260, 269 or approved equal.

9.2. Installation and spacing shall be as required by code.

9.3. Pipe strapping used in place of approved pipe hangers will not be accepted.

10. EXPANSION & SETTLEMENT

10.1. Install pipes with allowance for expansion, contraction and settling.

10.2. Domestic hot water pipes shall have expansion joints. Loops or offsets, are shown on the drawings at least every 100 ft of straight run. Provide pipe anchors between expansion elements.

10.3. Provide clearance where pipes penetrate structures to allow for pipe movement.

10.4. Provide horizontal offsets at branches from hot and cold water risers with at least 2 elbows prior to a fixture take-off.

10.5. Allow for expansion/contraction of copper pipe as follows:

10.5.1. Domestic hot water at 180°F max. - 1.6"/100 ft or 0.13%

10.5.2. Domestic hot water at 140°F max. - 1.2"/100 ft or 0.1%

10.5.3. Domestic cold water at 50°F max. - 0.4"/100 ft or 0.033%

11. SLEEVES

11.1. Use schedule 40 steel pipe sleeves through concrete structural members, floor slabs. For sleeves through other construction (drywall, tiles, masonry, etc.) use minimum 22 gauge galvanized steel construction.

11.2. Provide sleeves for insulated pipe large enough to permit free movement of pipe without crushing the insulation.

12. HEAT TRACING FOR PLUMBING PIPING

12.1. Self-regulating cable complete with thermostatic and moisture sensing controls.

12.2. Outer jacket: fluoropolymer.

12.3. Submit detailed shop drawings including lengths and locations.

12.4. Manufacturer: Raychem, or approved equal.

13. VIBRATION ISOLATION

13.1. Provide spring with elasticmeric washer hangers for ceiling suspended equipment, and accessories.

14. IDENTIFICATION FOR PLUMBING SYSTEMS

14.1. Identify all equipment with lamacoid nameplates, secured in place with rivets.

14.1. Identify piping in accordance with applicable standards.

15. FACILITY DRAINAGE PIPING LAYOUTS

15.1. Cleanout finished areas - JAY R. SMITH 4000 NB, equal by PRECISION PLUMBING PRODUCTS, or equal by ZURN.

1.4. INSULATION

1. All insulation work shall be in strict accordance with TIA4 standards, the BC Building Code (latest edition and amendments), and ASHRAE 90.1 2016 edition, and be carried out by an experienced firm with an established reputation in this field, and to the satisfaction of the Engineer.

2. Insulation to be as manufactured by Manson Insulation or Knauf Industries. One-piece molded insulation with self-sealing adhesive. All fittings to be complete with one-piece pre-molded high impact PVC fitting covers.

3. All sanitary p-traps in areas subject to freezing shall be insulated with minimum 1" insulation complete with vapor barrier.

4. All exposed handicap lavatory wastes shall be insulated with min. 1/2" insulation complete with vapor barrier.

5. Provide vapor barrier for all cold pipes, rain water leaders, and other cold surface materials in warm areas.

6. All exposed piping to be complete with PF-3 economy finish. No finish required on concealed piping.

7. Where refrigerant lines are exposed to outside, all insulation shall be covered with PVC jacking.

8. THERMAL INSULATION FOR PIPES

SERVICE	FLUID T°	<1"	1-1/4" - 2"	2-1/2" - 4"	>5"
COLD WATER	40°F	1"	1"	1"	1"
HOT & REIRC WATER	105°F - 200°F	1"	1-1/2"	1-1/2"	1-1/2"
ALL REFRIGERANTS	ALL	1"	1-1/2"	1-1/2"	1-1/2"
CHILLED WATER	40°F - 80°F	1"	1"	1"	2"
HEATING WATER	105°F - 200°F	1-1/2"	1-1/2"	2"	2"
CONDENSATE WATER	UP TO 100°F	1"	1-1/2"	2"	2"

3	July 29 2021	RE-ISSUED FOR BUILDING PERMIT
2	June 23 2021	ISSUED FOR BUILDING PERMIT
1	June 21 2021	ISSUED FOR CLIENT REVIEW ONLY
No.	DATE	DESCRIPTION
DESTROY ALL PRINTS DATED PREVIOUS TO FINAL DATE ABOVE.		
REVISIONS		
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PROJECT		
TRAIL RESTAURANT		
102-1100 BAY AVENUE TRAIL, BC		
TITLE		
SPECIFICATIONS		
DRAWN	---	CHECKED SS PROJECT No. 13506
SCALE	AS NOTED	DRAWING No.
DATE	29 Jul, 2021	M-5.1