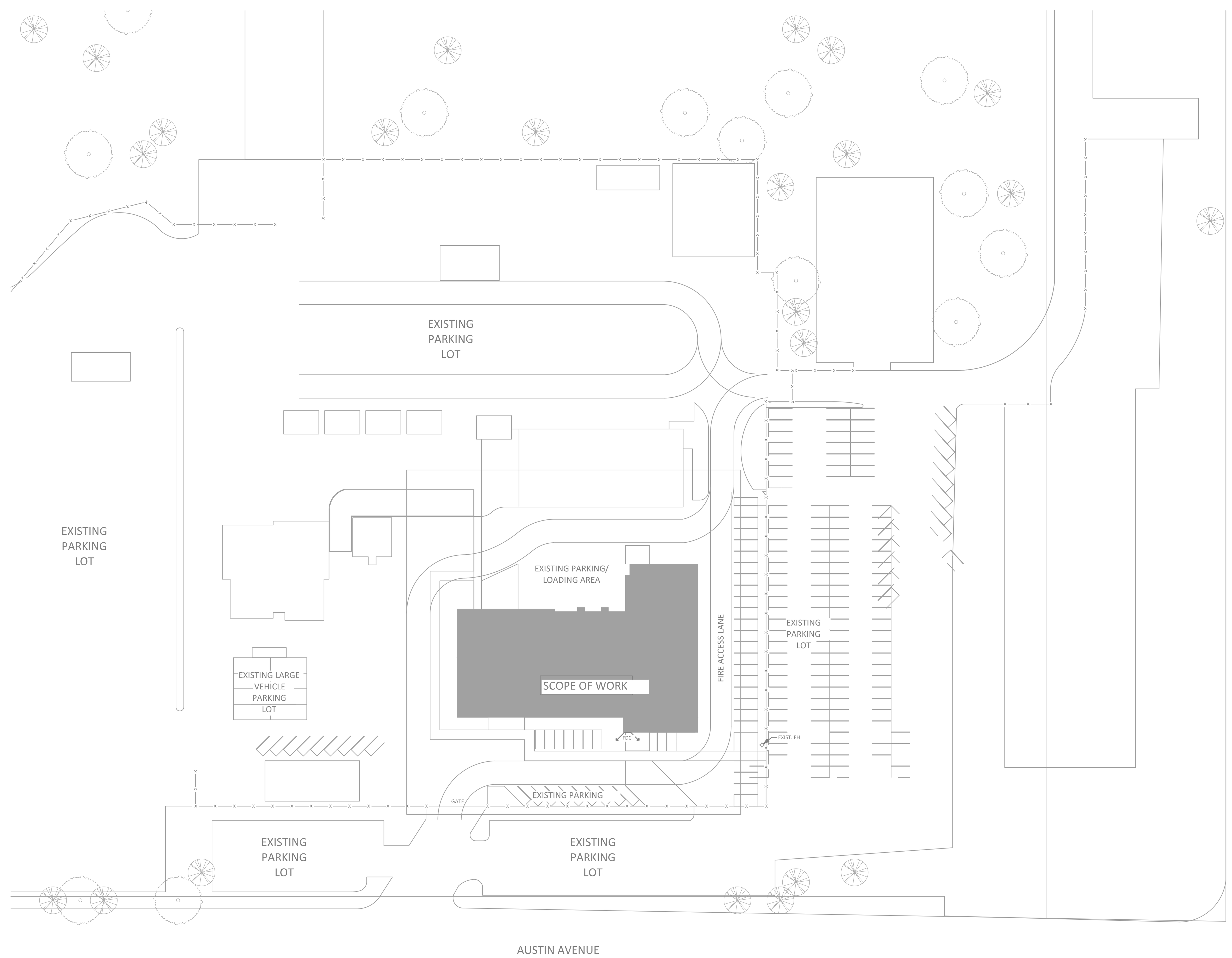
CITY OF COQUITLAM AUSTIN WORKS YARD
51104 FMB REPURPOSE - HVAC UPGRADE



1 M1.0 MECHANICAL SITE PLAN
SCALE : N.T.S

CIVIC ADDRESS

AUSTIN WORKS YARD 500 MARINER WAY, COQUITLAM, BC V3K7B6

DRAWING LIST:

#	SHEET #	DESCRIPTION:	SCALE
1	M1.0	MECHANICAL SITE PLAN & COVER SHEET	N.T.S
2	M2.0	LEVEL 1 FLOOR PLAN – MECHANICAL DEMO	1:100
3	M2.1	LEVEL 2 FLOOR PLAN – MECHANICAL DEMO	1:100
4	M2.2	ROOF PLAN – MECHANICAL DEMO	1:100
5	M3.0	LEVEL 1 FLOOR PLAN – MECHANICAL NEW	1:100
6	M3.1	ROOF PLAN – MECHANICAL NEW	1:100
7	M4.0	MECHANICAL DETAILS & SCHEDULES	N.T.S.
8	M5.0	MECHANICAL SPECIFICATIONS	N.T.S.
9	M5.1	MECHANICAL SPECIFICATIONS	N.T.S.

LEGEND

SYMBOL	DESCRIPTION
	SUPPLY OR OUTDOOR AIR DUCT UP/DOWN
	RETURN AIR DUCT UP/DOWN
	EXHAUST AIR DUCT UP/DOWN
	ROUND DUCT – UP/ELBOW DOWN/TEE DOWN
	EXTERNAL (THERMAL) INSULATION
	INTERNAL (ACOUSTIC) INSULATION
	EXISTING DUCTWORK
	NEW DUCTWORK
	BALANCING DAMPER
	VERTICAL FIRE DAMPER
	HORIZONTAL FIRE DAMPER
BDD	BACK DRAFT DAMPER
	MOTORIZED DAMPER
	RETURN AIR GRILLE
	EXHAUST AIR GRILLE
	SUPPLY AIR DIFFUSER – ROUND/SQUARE
	DUCT OR PIPE CAP–OFF
	EXISTING DOMESTIC COLD WATER
	EXISTING DOMESTIC HOT WATER
	EXISTING DOMESTIC HOT WATER RECIRC.
G	EXISTING GAS
SAN	EXISTING SANITARY SEWER
SAN	EXISTING SANITARY SEWER BELOW SLAB
ST	EXISTING STORM DRAIN
V	EXISTING VENT PIPE
	NEW DOMESTIC COLD WATER
	NEW DOMESTIC HOT WATER
CA	NEW COMPRESSED AIR PIPE
C	NEW CONDENSATE DRAIN PIPE
G	NEW GAS
RS	NEW REFRIGERANT SUCTION PIPING
RL	NEW REFRIGERANT LIQUID PIPING
SAN	NEW SANITARY SEWER
SAN	NEW SANITARY SEWER BELOW SLAB
V	NEW VENT PIPE
	PIPE CLEAN–OUT
	PIPE CLEAN–OUT TO GRADE
	DIRECTION OF FLOW
	PIPE DROP
	PIPE RISE
	PIPE TEE DOWN
	P – TRAP
	SHUT OFF VALVE – NORMALLY OPEN
	PRESSURE REDUCING VALVE
	CHECK VALVE
	BALANCE VALVE C/W TEST PORTS
	CONTROL VALVE –TWO WAY
	BACKFLOW PREVENTION CHECK VALVE
RPBA	REDUCED PRESSURE BACKFLOW ASSEMBLY
C.T.E.	CONNECT TO EXISTING
$	WALL MOUNTED SWITCH
T	WALL MOUNTED THERMOSTAT
S	WALL MOUNTED DDC TEMPERATURE SENSOR
CO	CARBON DIOXIDE SENSOR
	GRILLE TYPE NECK / GRILLE SIZE OR SLOT DIFFUSER LENGTH/ INLET SIZE AIR VOLUME (L/S)
	EQUIPMENT / FIXTURE TYPE
M-	DETAIL NUMBER DRAWING NUMBER

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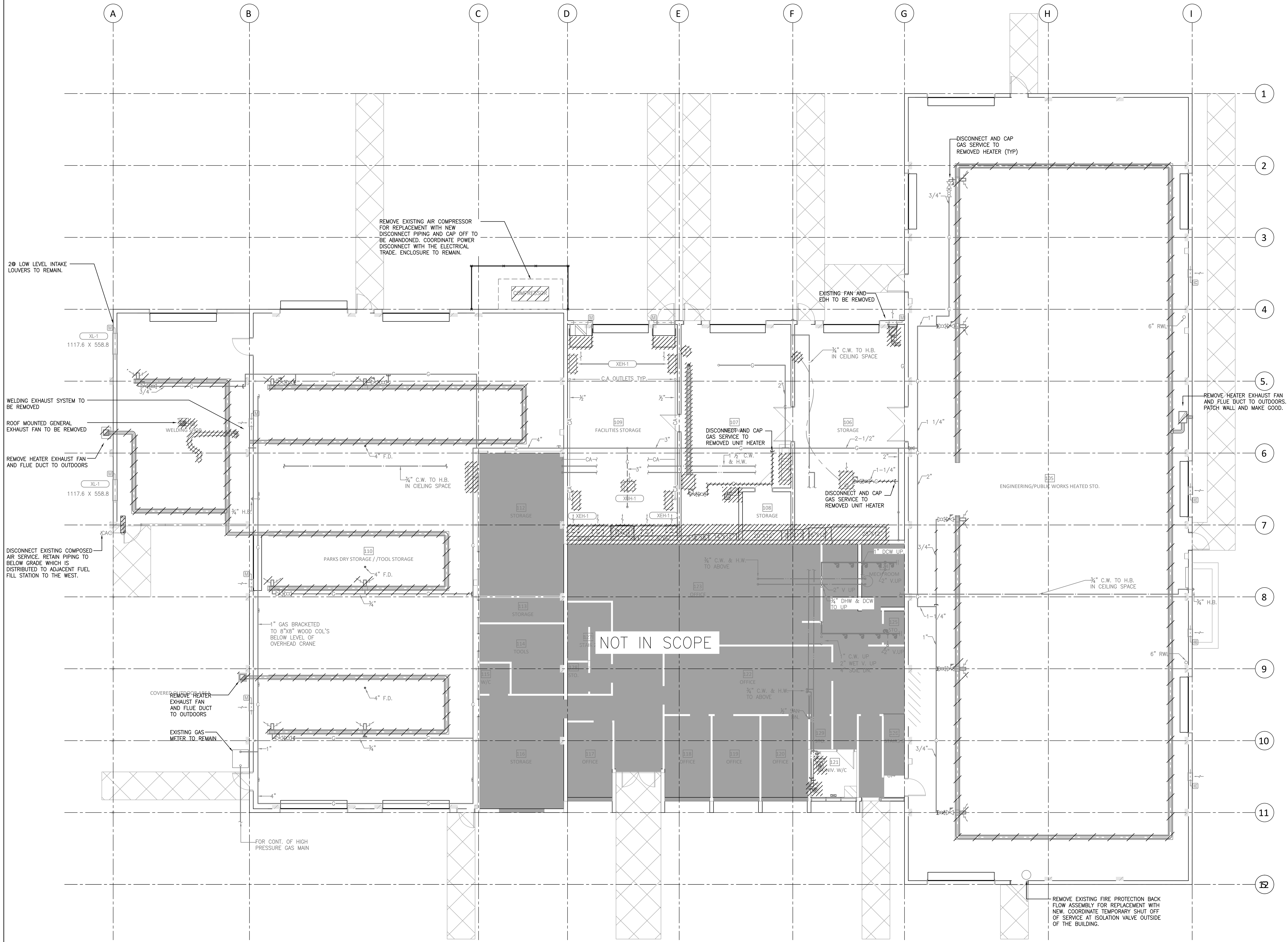
CITY OF COQUITLAM AUSTIN WORKS YARD
51104 FMB REPURPOSE - HVAC UPGRADE
500 MARINER WAY, COQUITLAM, BC V3K7B6

Project Number
24590-M

Drawing
MECHANICAL SITE PLAN & COVER SHEET

Sheet Number
M1.0

Plot Date: 2024-10-09 Scale: N.T.S.



1 LEVEL 1 FLOOR PLAN - MECHANICAL DEMO
M2.0 SCALE :1:100

GENERAL NOTES

1. REMOVE ALL INDICATED EXISTING HVAC EQUIPMENT, DUCTWORK AND ASSOCIATED HANGERS, WIRING, ETC.
2. REMOVE AIR COMPRESSOR AND CONNECTED PIPING. PIPE DISTRIBUTION AND OUTLETS THROUGHOUT THE BUILDING ARE TO REMAIN ABANDONED IN PLACE.
3. ALL REDUNDANT PIPING, HANGER, TIGHTENER, WIRING AND CONDUIT WHICH IS NO LONGER IN USE TO BE REMOVED.
4. PATCH & MAKE GOOD ANY WALL/ROOF OPENING AS A RESULT OF DELETED/REMOVED EXISTING VENTS/PIPING/MECHANICAL EQUIPMENT.
5. REMOVE AND CLEAN UP ALL SYSTEMS, COMPONENTS PER CLIENT'S REQUIREMENT. CAP OFF ALL UNUSED OPENINGS.

SPACE 105 NOTES

1. REMOVE EXISTING GAS FIRED RADIANT HEATING TUBES.
2. REMOVE EXISTING FIRE PROTECTION BACK FLOW ASSEMBLY FOR REPLACEMENT WITH NEW. COORDINATE TEMPORARY SHUT OFF VALVE OF SERVICE AT ISOLATION VALVE OUTSIDE OF THE BUILDING.

SPACE 106 NOTES

1. REMOVE EXISTING DIRECT FIRED UNIT HEATER AND THERMOSTAT. REPLACE WITH NEW UNIT HEATER.
2. REMOVE THE AIR INTAKE FAN AND DUCT HEATER. CAP OFF LOUVER OPENING INSIDE.

SPACE 107 NOTES

1. REMOVE EXISTING GAS FIRED RADIANT HEATER.
2. REMOVE EXISTING AIR OPENING TO ROOF AND MOTORIZED DAMPER. CAP OFF OPENING ON CEILING AND REPAIR ROOF.
3. REMOVE EXISTING SINK AND MILLWORK. CAP OFF WATER SUPPLY AND DRAINAGE PIPING ON WALL/FLOOR

SPACE 109 NOTES

1. REMOVE ALL EXISTING ELECTRIC HEATERS AND THERMOSTAT.
2. REMOVE AIR SUPPLY DUCTWORK, GRILLES AND CAP OFF MAKEUP AIR UNIT SUPPLY DUCT ON CEILING.
3. REMOVE 2 EXHAUST FANS AND DUCTWORKS. CAP OFF TWO 30"ø ROUND LOUVERS ON WALL.
4. REMOVE EXISTING ELECTRIC UNIT HEATER.

SPACE 110 NOTES

1. REMOVE ALL EXISTING GAS FIRED RADIANT HEATERS.
2. ALL EXISTING ENGINE EXHAUST SYSTEMS, WELDING EXHAUST SYSTEMS AND ALL DUCTWORKS, PIPING SUPPORTS TO REMOVE. ALL ROOF AND EXTERIOR WALL OPENINGS ASSOCIATED WITH THE SYSTEMS TO REMAIN.
3. REMOVE EXISTING SINK. CAPOFF WATER SUPPLY AND DRAINAGE CONNECTION ON WALL/FLOOR.
4. EXISTING COMPRESED AIR SYSTEMS, HOSES AND RELATED COMPONENTS TO REMAIN.
5. PROPELLER FAN ON WEST WALL TO REMAIN.

SPACE 111 NOTES

1. REMOVE EXISTING GAS FIRED RADIANT HEATER.
2. REMOVE EXISTING WELDING EXHAUST HOSE ARM AND ASSOCIATED EXHAUST SYSTEMS.

SPACE 121 NOTES

1. REMOVE EXISTING LAV, FAUCET, WATER CLOSET. RETAIN WATER SUPPLY, DRAINAGE AND VENT SERVICES FOR FUTURE RECONNECTION.

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CITY OF COQUITLAM AUSTIN WORKS YARD 51104 FMB REPURPOSE - HVAC UPGRADE
500 MARINER WAY, COQUITLAM, BC V3K7B6

Project Number
24590-M

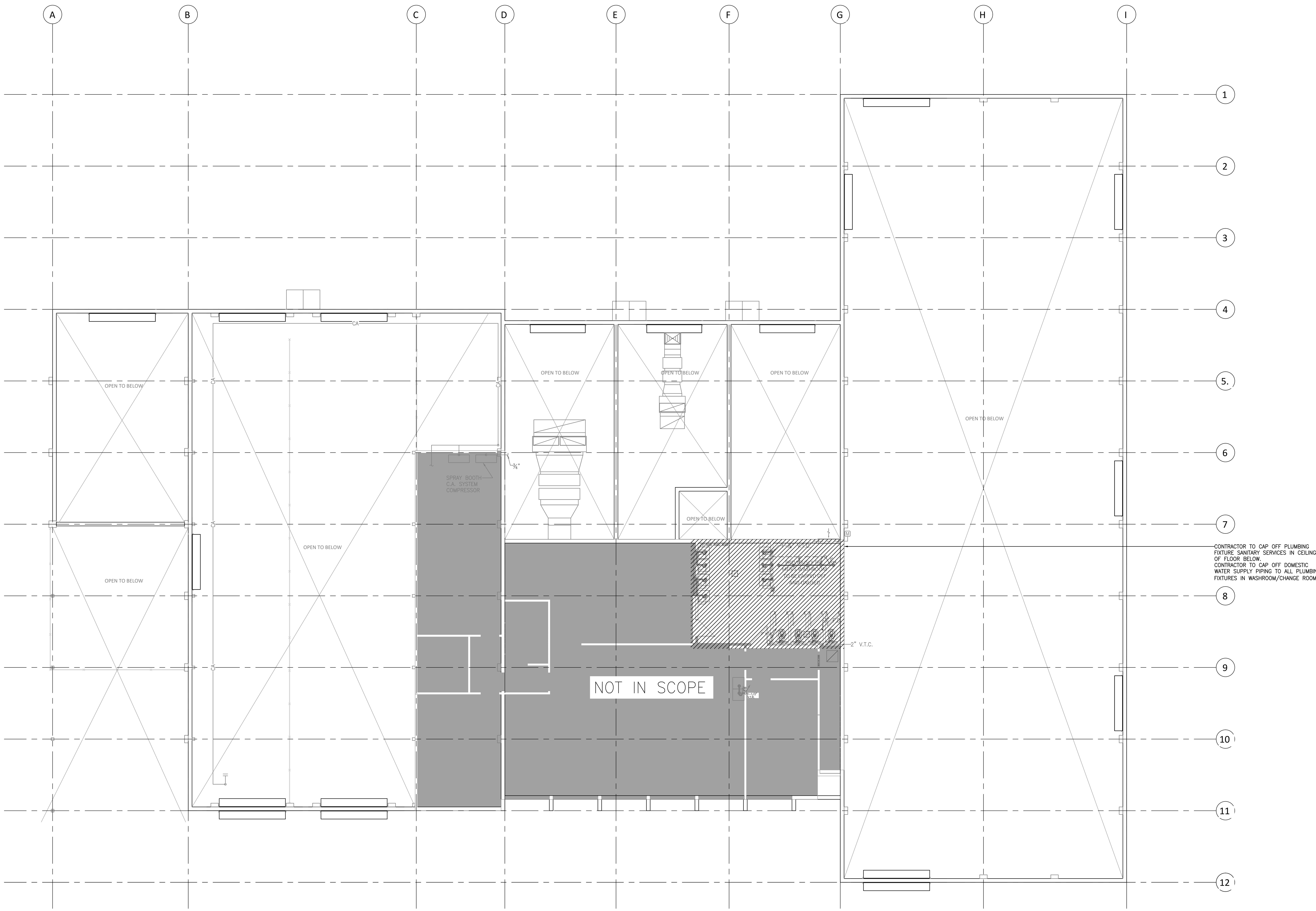
Drawing
LEVEL 1 FLOOR PLAN - MECHANICAL DEMO

Sheet Number
M2.0

Plot Date: 2024-10-09 Scale: 1:100

CHANGING ROOM NOTES

1. EXISTING PLUMBING FIXTURES TO REMAIN IN PLACE.
2. CAP OFF PLUMBING FIXTURE SANITARY PIPING IN FLOOR BELOW.
3. CAP–OFF/ ISOLATE DOMESTIC COLD WATER AND DOMESTIC HOT WATER PIPING TO CHANGE ROOM PLUMBING FIXTURES IN THE FLOOR BELOW.



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OPEN TO BELOW
CA
SPRAY BOOTH C.A. SYSTEM COMPRESSOR
3/4"
NOT IN SCOPE
PREVIOUSLY THE MEN'S WASHROOM TO BE CAPPED OFF AND UNUSED
2" V.T.C.
1-1/2" V.T.R.
CONTRACTOR TO CAP OFF PLUMBING FIXTURE SANITARY SERVICES IN CEILING OF FLOOR BELOW.
CONTRACTOR TO CAP OFF DOMESTIC WATER SUPPLY PIPING TO ALL PLUMBING FIXTURES IN WASHROOM/CHANGE ROOM.

1 M2.1 LEVEL 2 FLOOR PLAN - MECHANICAL DEMO
SCALE :1:100

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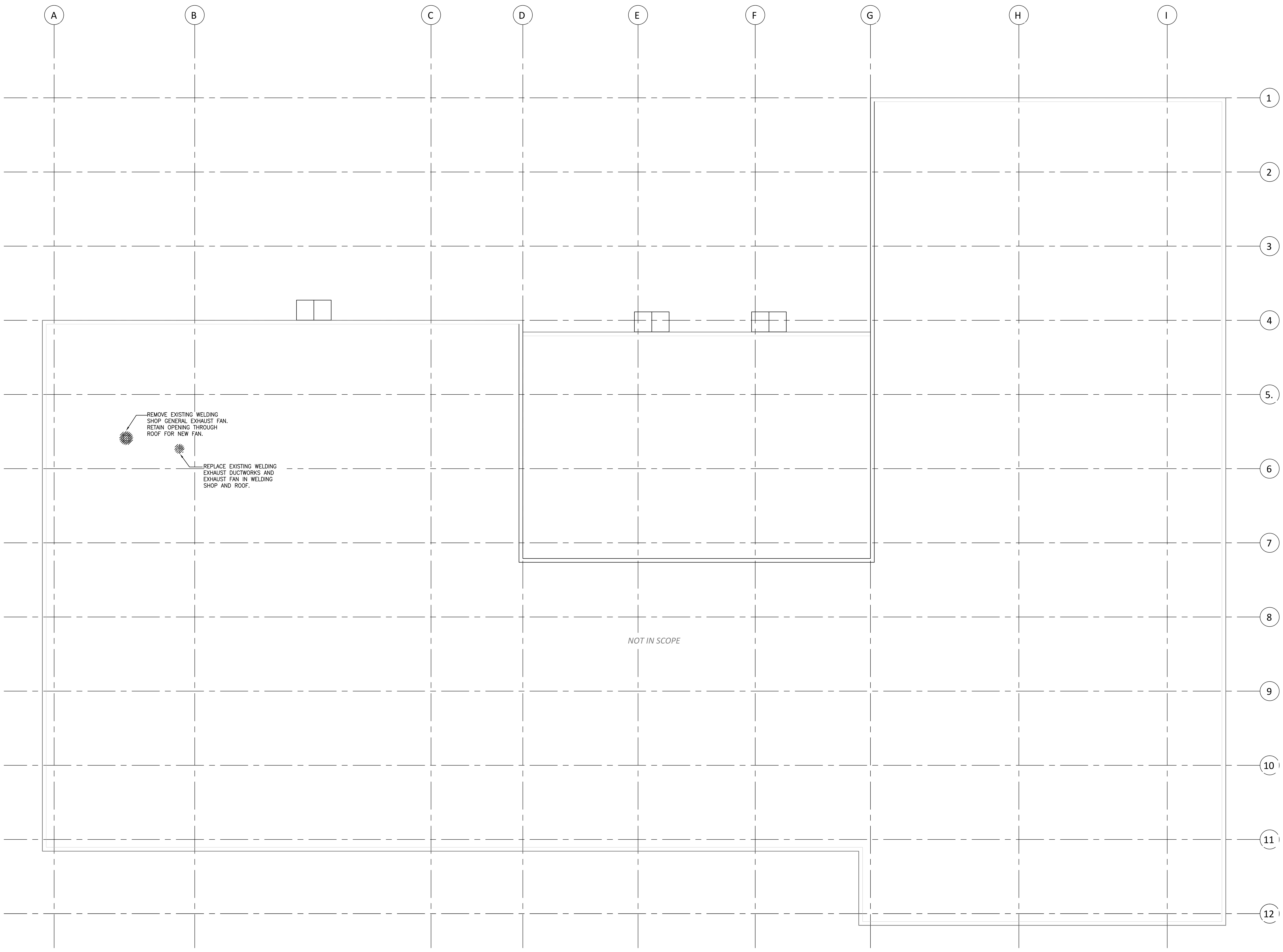
Drawing
LEVEL 2 FLOOR PLAN - MECHANICAL DEMO

Project Number
24590-M

Sheet Number
M2.1

Plot Date: 2024-10-09 Scale: 1:100



1 M2.2 ROOF PLAN - MECHANICAL DEMO
SCALE :1:100

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51104 FMB REPURPOSE - HVAC UPGRADE
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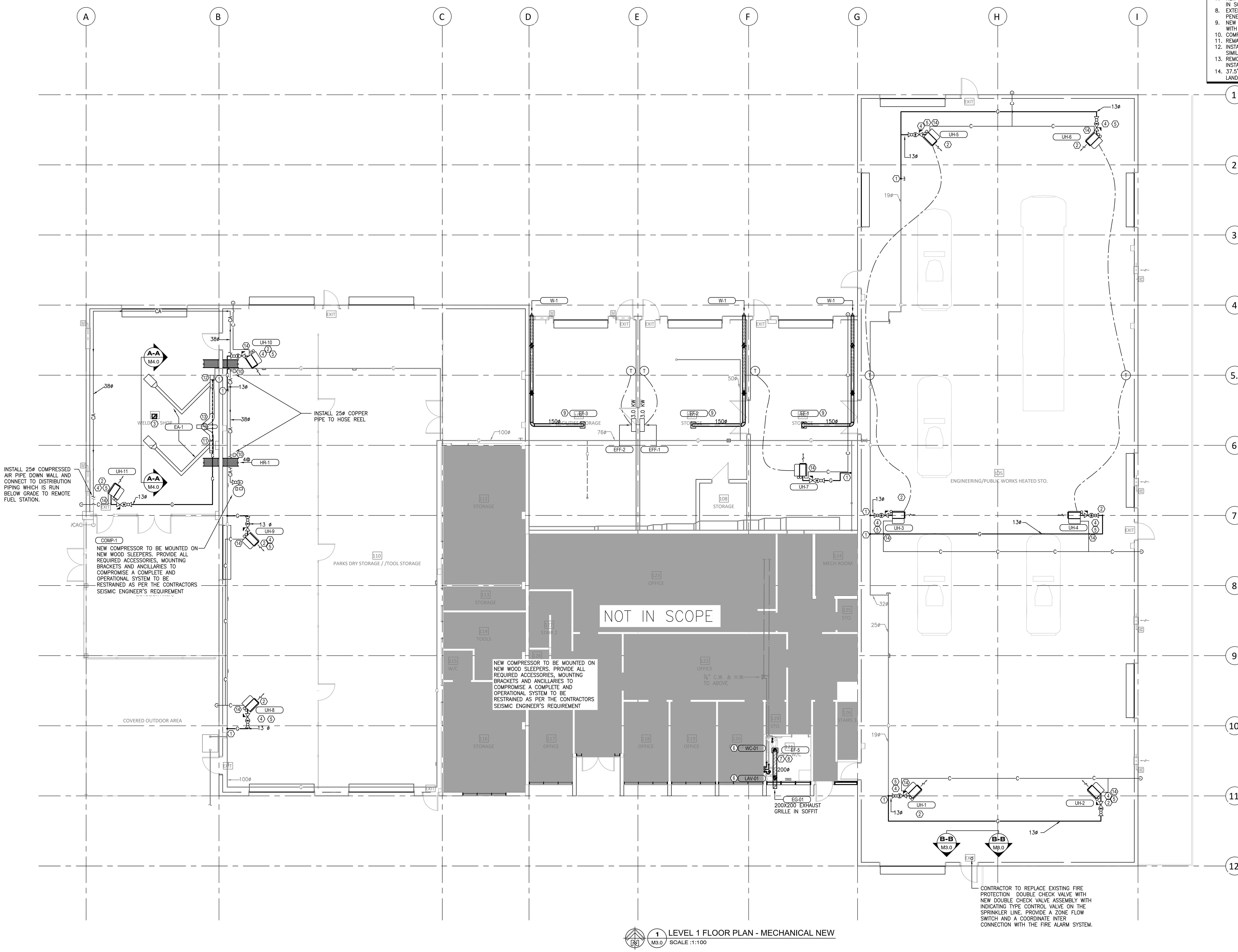
Sheet Number
M2.2

Drawing
ROOF PLAN - MECHANICAL DEMO

Plot Date: 2024-10-09 Scale: 1:100

DRAWING NOTES

1. CONNECT NEW GAS PIPING TO THE EXISTING GAS SYSTEM.
2. PROVIDE NEW GAS POWERED UNIT HEATER
3. EXHAUST AIR UP THROUGH ROOF TO EXHAUST FAN COMPLETE WITH BACK DRAFT DAMPER ON OPENING FOR NEW FAN.
4. UNIT HEATER COMBUSTION AIR AND FLUE DUCT UP THROUGH ROOF. INSTALL PER MANUFACTURER AND GAS CODE REQUIREMENTS COORDINATE ROOFING WORK WITH THE GENERAL CONTRACTOR.
5. PROVIDE ALL REQUIRED MOUNTING ACCESSORIES, HANGERS AND VIBRATION ISOLATORS FOR SUSPENDED UNIT HEATERS.
6. REPLACE EXISTING PLUMBING FIXTURE WITH NEW. RECONNECT TO EXISTING PLUMBING SERVICES.
7. NEW WASHROOM EXHAUST FAN DUCTWORK THROUGH EXTERIOR WALL EXHAUST GRILLE IN SOFFIT. COORDINATE WITH THE GENERAL CONTRACTOR.
8. EXTERNALLY INSULATE WASHROOM EXHAUST DUCT MINIMUM 3 M FROM WALL PENETRATION.
9. NEW EXHAUST FAN DUCTED THROUGH EXTERIOR WALL TO WALL CAP. COORDINATE WITH THE GENERAL CONTRACTOR.
10. COMPRESSED AIR PIPING DOWN TO 2@ HOSE REELS.
11. REMAIN EXISTING WELDING EXHAUST ARM. REPLACE EXHAUST HOSE.
12. INSTALL NEW ARTICULATING WELDING EXHAUST ARM SUPPORTED FROM WALL BRACKETS SIMILAR TO EXISTING ARM.
13. REMOVE EXISTING EXHAUST DUCTWORK AND EXHAUST ON ROOF EXHAUST FAN. INSTALL NEW DUCTWORK AND EXHAUST FAN FOR THE WELDING EXHAUST SYSTEM.
14. 37.5"ø @ 2% CONDENSATE PIPING THROUGH EXTERIOR WALL. TERMINATE TO OUTDOOR LANDSCAPE AREA.



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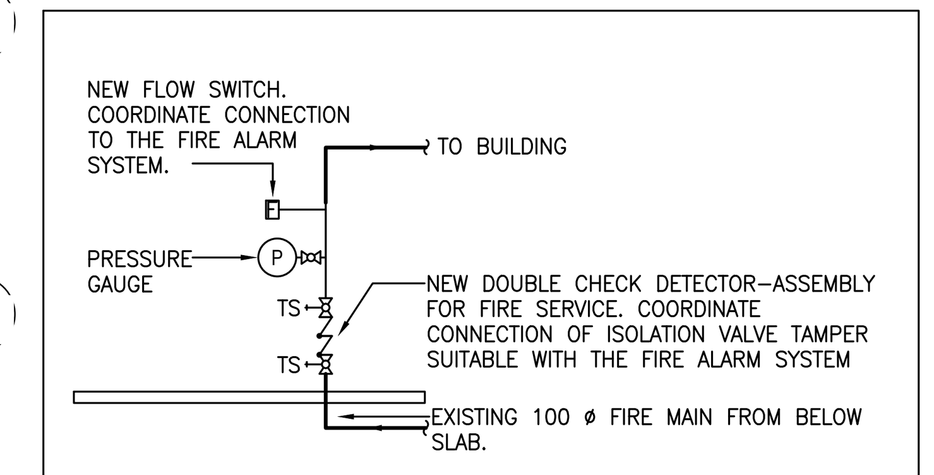
INSTALL 25ø COPPER PIPE TO HOSE REEL
INSTALL 25ø COMPRESSED AIR PIPE DOWN WALL AND CONNECT TO DISTRIBUTION PIPING WHICH IS RUN BELOW GRADE TO REMOTE FUEL STATION.
COMP-1
NEW COMPRESSOR TO BE MOUNTED ON NEW WOOD SLEEPERS. PROVIDE ALL REQUIRED ACCESSORIES, MOUNTING BRACKETS AND ANCILLARIES TO COMPROMISE A COMPLETE AND OPERATIONAL SYSTEM TO BE RESTRAINED AS PER THE CONTRACTORS SEISMIC ENGINEER'S REQUIREMENT
WELDING SHOP
EA-1
HR-1
UH-1
UH-2
UH-3
UH-4
UH-5
UH-6
UH-7
UH-8
UH-9
UH-10
UH-11
W-1
EF-1
EF-2
EF-3
EF-5
EFF-1
EFF-2
WC-01
LAV-01
EG-01
200X200 EXHAUST GRILLE IN SOFFIT
PARKS DRY STORAGE / /TOOL STORAGE
COVERED OUTDOOR AREA
ENGINEERING/PUBLIC WORKS HEATED STO.
NOT IN SCOPE
NEW COMPRESSOR TO BE MOUNTED ON NEW WOOD SLEEPERS. PROVIDE ALL REQUIRED ACCESSORIES, MOUNTING BRACKETS AND ANCILLARIES TO COMPROMISE A COMPLETE AND OPERATIONAL SYSTEM TO BE RESTRAINED AS PER THE CONTRACTORS SEISMIC ENGINEER'S REQUIREMENT
¾" C.W. & H.W. TO ABOVE
CONTRACTOR TO REPLACE EXISTING FIRE PROTECTION DOUBLE CHECK VALVE WITH NEW DOUBLE CHECK VALVE ASSEMBLY WITH INDICATING TYPE CONTROL VALVE ON THE SPRINKLER LINE. PROVIDE A ZONE FLOW SWITCH AND A COORDINATE INTER CONNECTION WITH THE FIRE ALARM SYSTEM.

1 M3.0 LEVEL 1 FLOOR PLAN - MECHANICAL NEW
SCALE :1:100



NEW FLOW SWITCH. COORDINATE CONNECTION TO THE FIRE ALARM SYSTEM.
TO BUILDING
PRESSURE GAUGE
NEW DOUBLE CHECK DETECTOR–ASSEMBLY FOR FIRE SERVICE. COORDINATE CONNECTION OF ISOLATION VALVE TAMPER SUITABLE WITH THE FIRE ALARM SYSTEM
EXISTING 100 ø FIRE MAIN FROM BELOW SLAB.

B-B M3.0 FIRE PROTECTION DETAIL
SCALE :N.T.S.

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Project Number
24590-M

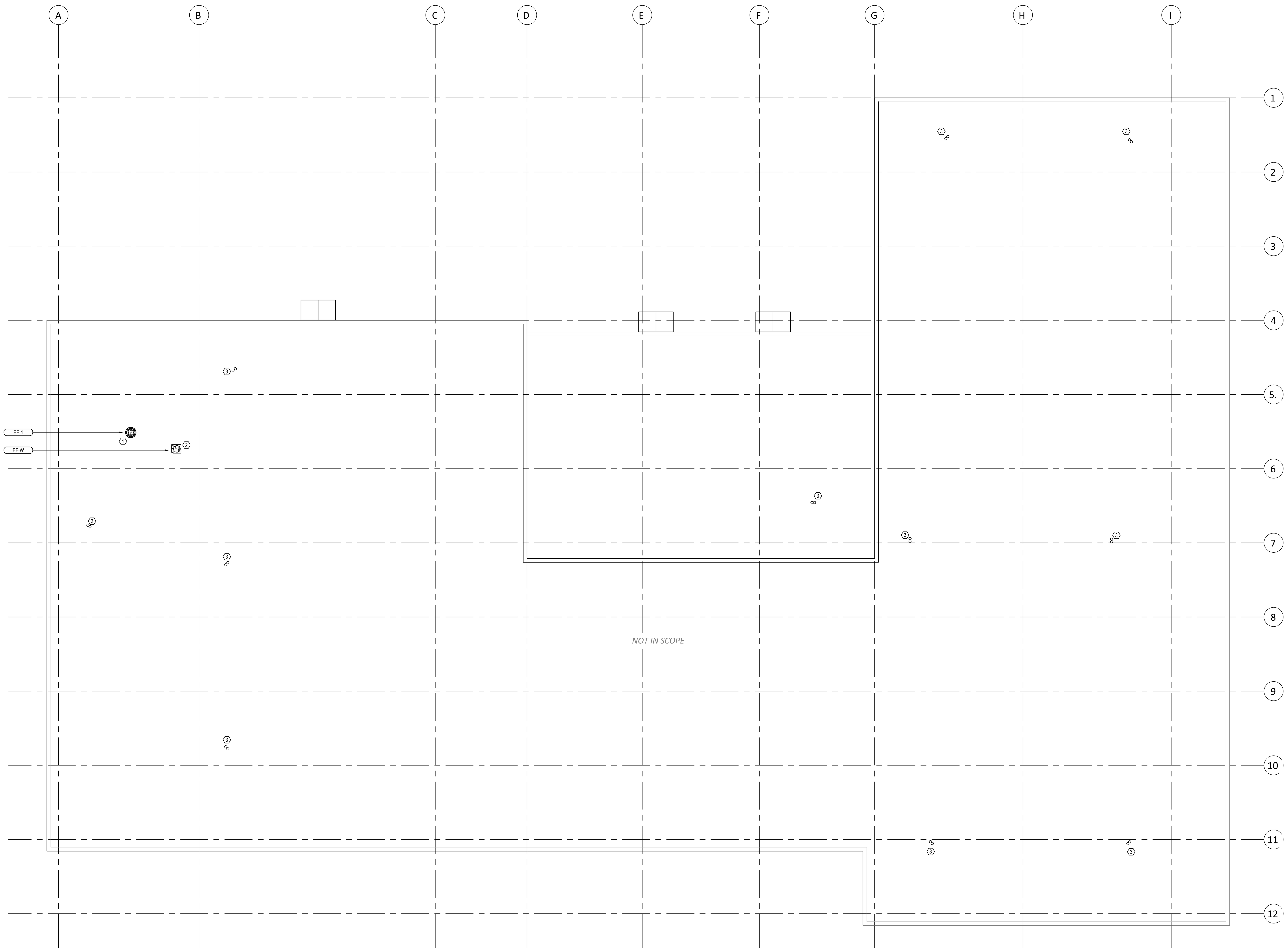
Drawing
LEVEL 1 FLOOR PLAN - MECHANICAL NEW

Sheet Number
M3.0

Plot Date: 2024-10-09 Scale: 1:100

DRAWING NOTES

1. NEW WELDING SHOP GENERAL EXHAUST FAN, COMPLETE WITH CURB. ENLARGE EXISTING ROOF OPENING AS REQUIRED. COORDINATE ROOFING WORK WITH THE GENERAL CONTRACTOR.
2. WELDING EXHAUST DUCT UP THROUGH ROOF FROM BELOW TO EXHAUST FAN. PROVIDE CURB AT DUCT PENETRATION. COORDINATE ROOFING REQUIREMENTS WITH THE GENERAL CONTRACTOR.
3. COMBUSTION AIR AND FLUE VENTS UP FROM UNIT HEATER BELOW. PROVIDE COMPLETE WITH MANUFACTURE APPROVED TERMINATION KITS. SPACE INTAKE AND THE DUCTS AS PER GAS CODE AND MANUFACTURE REQUIREMENTS. COORDINATE ROOF PENETRATION REQUIREMENTS WITH THE GENERAL CONTRACTOR.



1 ROOF PLAN - MECHANICAL NEW
M3.1 SCALE :1:100

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Sheet Number
M3.1

Drawing
ROOF PLAN - MECHANICAL NEW

Plot Date: 2024-10-09 Scale: 1:100

ELECTRICAL MOTOR LIST

TAG	UNIT DESCRIPTION	UNIT LOCATION	HP / W	AMPS	MCA	MOCP	VOLTS	PH	STARTER S	STARTER I	STARTER W	DISCONNECT S	DISCONNECT I	DISCONNECT W	PILOT DEVICE	EMERG POWER	REMARKS
EFF-1	ELECTRIC FORCE FLOW HEATER	ROOM 107	3000 W	-	-	-	208	1	M	M	M	E	E	E	T	N	
EFF-2	ELECTRIC FORCE FLOW HEATER	ROOM109	3000 W	-	-	-	208	1	M	M	M	E	E	E	T	N	
				-	-	-											
UH-1	UNIT HEATER	ROOM 105	180 W	-	-	-	208	1	M	M	M	E	E	E	T	N	
UH-2	UNIT HEATER	ROOM 105	180 W	-	-	-	208	1	M	M	M	E	E	E	T	N	
UH-3	UNIT HEATER	ROOM 105	180 W	-	-	-	208	1	M	M	M	E	E	E	T	N	
UH-4	UNIT HEATER	ROOM 105	180 W	-	-	-	208	1	M	M	M	E	E	E	T	N	
UH-5	UNIT HEATER	ROOM 105	180 W	-	-	-	208	1	M	M	M	E	E	E	T	N	
UH-6	UNIT HEATER	ROOM 105	180 W	-	-	-	208	1	M	M	M	E	E	E	T	N	
UH-7	UNIT HEATER	ROOM 106	180 W	-	-	-	208	1	M	M	M	E	E	E	T	N	
UH-8	UNIT HEATER	ROOM 110	180 W	-	-	-	208	1	M	M	M	E	E	E	T	N	
UH-9	UNIT HEATER	ROOM 110	180 W	-	-	-	208	1	M	M	M	E	E	E	T	N	
UH-10	UNIT HEATER	ROOM 110	180 W	-	-	-	208	1	M	M	M	E	E	E	T	N	
UH-11	UNIT HEATER	ROOM 111	180 W	-	-	-	208	1	M	M	M	E	E	E	T	N	
EF-1	CEILING EXHAUST FAN	ROOM 106	18.5 W	-	-	-	115	1	M	M	M	E	E	E	WS	N	
EF-2	CEILING EXHAUST FAN	ROOM 107	18.5 W	-	-	-	115	1	M	M	M	E	E	E	WS	N	
EF-3	CEILING EXHAUST FAN	ROOM 109	18.5 W	-	-	-	115	1	M	M	M	E	E	E	WS	N	
EF-4	ROOF EXHAUST FAN	ROOM 111	1/10 HP	-	-	-	120	1	M	M	M	E	E	E	WS	N	
EF-5	WASHROOM CEILING EXHAUST FA	WASHROOM 121	16.4 W	-	-	-	115	1	M	M	M	E	E	E	WS	N	
EF-W	WELDING EXHAUST	WELDING STATION 111	1.5 HP	-	-	-	230	1	M	M	M	E	E	E	WS	N	

NATURAL GAS UNIT HEATER SCHEDULE

TAG	MANUFACTURE	MODEL	LOCATION	INPUT HEATING	OUTPUT HEATING	THERMAL EFFICIENCY	MAX AIRFLOW	V/PH/HZ	DIMENSION (LXWXH)	WEIGHT	REMARKS
UH-1	REZNOR	UEZ	CEILING SPACE	16.1KW	15 KW	93%	967 CFM	208/1/60	28.25"X24.25"X17.62"	85 LB	ALL LISTED
UH-2	REZNOR	UEZ	CEILING SPACE	16.1KW	15 KW	93%	967 CFM	208/1/60	28.25"X24.25"X17.62"	85 LB	ALL LISTED
UH-3	REZNOR	UEZ	CEILING SPACE	16.1KW	15 KW	93%	967 CFM	208/1/60	28.25"X24.25"X17.62"	85 LB	ALL LISTED
UH-4	REZNOR	UEZ	CEILING SPACE	16.1KW	15 KW	93%	967 CFM	208/1/60	28.25"X24.25"X17.62"	85 LB	ALL LISTED
UH-5	REZNOR	UEZ	CEILING SPACE	16.1KW	15 KW	93%	967 CFM	208/1/60	28.25"X24.25"X17.62"	85 LB	ALL LISTED
UH-6	REZNOR	UEZ	CEILING SPACE	16.1KW	15 KW	93%	967 CFM	208/1/60	28.25"X24.25"X17.62"	85 LB	ALL LISTED
UH-7	REZNOR	UEZ	CEILING SPACE	16.1KW	15 KW	93%	967 CFM	208/1/60	28.25"X24.25"X17.62"	85 LB	ALL LISTED
UH-8	REZNOR	UEZ	CEILING SPACE	16.1KW	15 KW	93%	967 CFM	208/1/60	28.25"X24.25"X17.62"	85 LB	ALL LISTED
UH-9	REZNOR	UEZ	CEILING SPACE	16.1KW	15 KW	93%	967 CFM	208/1/60	28.25"X24.25"X17.62"	85 LB	ALL LISTED
UH-10	REZNOR	UEZ	CEILING SPACE	16.1KW	15 KW	93%	967 CFM	208/1/60	28.25"X24.25"X17.62"	85 LB	ALL LISTED
UH-11	REZNOR	UEZ	CEILING SPACE	16.1KW	15 KW	93%	967 CFM	208/1/60	28.25"X24.25"X17.62"	85 LB	ALL LISTED

REMARKS:

1. HANGAR SUPPORT.
2. REMOTE WALL MOUNTED THERMOSTAT.
3. HORIZONTAL INTAKE/DISCHARGE
4. DISCHARGE AIR PATTERN CONTROLLERS
5. SAFETY SWITCHES
6. HANGER SUPPORT VIBRATION ISOLATORS
7. FLUE AND COMBUSTION INTAKE TERMINATION KITS

ELECTRIC FORCE FLOW HEATER SCHEDULE

TAG	MANUFACTURER	LOCATION	SERVICE	MODEL	EFFICIENCY	ELECTRICAL V/PH/HZ	INPUT KW	REMARKS
EFF-1	REZNOR	ROOM107	ROOM107	EMC	100 %	208/1/60	3	1, 2, 3, 4
EFF-2	REZNOR	ROOM 109	ROOM 109	EMC	100 %	208/1/60	3	1, 2, 3, 4

REMARKS:
1. FAN DELAY SWITCH. 2. THERMAL CUTOUT. 3. C/W DISCONNECT. 4. WALL MOUNTED THERMOSTAT WITH LOCKABLE COVER

FAN SCHEDULE

EQ. TAG	LOCATION	SERVICE	MAKE	MODEL	ELECTRICAL	FAN FLA	FAN RPM	HP	AIR FLOW (L/S)	E.S.P. (PA)	NOTES
EF-1	CEILING 106	STORAGE 106	GREENHECK	SP-A110	115/1/60	–	960	–	52	62.3	3,4,5,6
EF-2	CEILING 107	STORAGE 107	GREENHECK	SP-A110	115/1/60	–	960	–	52	62.3	3,4,5,6
EF-3	CEILING 109	STORAGE 109	GREENHECK	SP-A110	115/1/60	–	960	–	52	62.3	3,4,5,6
EF-4	ROOF 111	WELDING SHOP 111	GREENHECK	G-090-E	120/1/60	–	1050	1/10	138	62.3	1,2,3,5
EF-5	CEILING 121	WASHROOM 121	GREENHECK	SP-A200	115/1/60	–	1000	–	94	62.3	3,4,5,6
EF-W	ROOF 111	WELDING STATION	SOURCETEC	SBC-10	230/3/60	–	3500	1.5HP	566	558	3,4,5

NOTES:
1. ROOF CURB 2. C/W MOTORIZED DAMPER AND END SWITCH. 3. VIBRATION ISOLATORS. 4. DISCONNECT SWITCH. 5. WALL SWITCH CONTROL. 6. BACK DRAFT DAMPER

AIR COMPRESSOR

AIR COMPRESSOR COMP-01
INGRESOLL RAND 2340L5-V TWO STAGE CAST IRON AIR COMPRESSOR, 5HP, 230/1/60, 14.3 A CFM @ 175 PSIG. DIMENSION OF 32"X21"X69" AND WEIGHT OF 400 POUNDS. CONTRACTOR TO PROVIDE ALL OTHER ASSEMBLIES TO COMPLETE THE COMPRESSED AIR SYSTEM AS PER MECHANICAL DRAWINGS, DETAILS, AND SPECIFICATIONS. AIR COMPRESSOR INSTALLATION SHALL C/W SUFFICIENT MAINTENANCE CLEARANCE AS PER MANUFACTURER REQUIREMENTS.

PLUMBING FIXTURES:

WC-01 (BARRIER FREE)

FLOOR MOUNTED WITH FLOOR OUTLETAMERICAN STANDARD 215AA165.020 TOILET – CADET® PRO™, TANK TYPE TOILET, FLOOR MOUNTED WITH FLOOR OUTLET, HIGH EFFICIENCY HET 4.8 LPF (1.28 GPF), VITREOUS CHINA, WHITE FINISH, EVERCLEAN® ANTIMICROBIAL SURFACE, ELONGATED BOWL. PROVIDE COMPLETE WITH LOCKING LID. CONTRACTOR TO CONFIRM TRIP LEVER SIDE, WHICH IS TO BE ON THE TRANSFER SIDE OF THE FIXTURE.
CENTOCO 820STSFE-001 SEAT – FAST-N-LOCK, FOR ELONGATED BOWL, OPEN FRONT, POLYPROPYLENE, TOILET SEAT, AND STAINLESS STEEL COMMERCIAL CHECK HINGES, WHITE FINISH, FAST-N-LOCK MOUNTING SYSTEM. THE BOLT AND NUT MATERIAL SHALL BE STAINLESS STEEL.
MCGUIRE LFBV2-3X53 SUPPLY – CONVERTIBLE™ II TOILET SUPPLY STOP VALVE, CONSISTING OF (1) STOP VALVE, LEAD FREE BRASS BODY, CHROME-PLATED FINISH, CONVERTIBLE LOOSE KEY HANDLE, ANGLE STOP, 13 MM (1/2") PEX INLET X 10 MM (3/8") O.D. OUTLET.

LAV-01 (BARRIER FREE)

LAVATORY –AMERICAN STANDARD 9140047.020 BASIN – WALL-HUNG LAVATORY, VITREOUS CHINA, WHITE FINISH.
CHICAGO FAUCETS 116.101.AB.1 FAUCET – HYTRONIC®, AUTOMATIC NO-TOUCH, HARDWIRED, LAVATORY FAUCET.
CHICAGO FAUCETS 131-FMAB MIXING VALVE – POINT OF USE, THERMOSTATIC MIXING VALVE.
AMERICAN STANDARD 2411015.002 FIXTURE DRAIN – OPEN GRID DRAIN, FOR SINKS, BRASS CONSTRUCTION, CHROME FINISH, 6-3/8" (162 MM) HEIGHT, WITH OVERFLOW HOLES
MCGUIRE LFBV170 SUPPLY – CONVERTIBLE™ COMMERCIAL FAUCET SUPPLY KIT, CONSISTING OF (2) STOP VALVES, (2) RISERS, (2) FLANGES (STANDARD), LEAD FREE BRASS BODY, CHROME-PLATED FINISH, CONVERTIBLE LOOSE KEY/TRIANGLE HANDLE, ANGLE STOP, 305 MM (12") C.P. LAVATORY FLEXIBLE COPPER RISER TUBES (STANDARD), 13 MM (1/2") SWEAT INLET X 10 MM (3/8") O.D. OUTLET.
MCGUIRE PW2125WC P-TRAP – MOLDED CLOSED CELL VINYL (ANTI-MICROBIAL) WRAPPED CAST BRASS, GLOSSY WHITE, WITH CLEANOUT
WATTS CA-462 CARRIER – HORIZONTAL, WALL MOUNTED CONCEALED ARM LAVATORY CARRIER WITH BACK PLATE, FOR CONCEALED ARM CARRIER.
CHICAGO FAUCETS 243.260.00.1/242.340.00.1 FAUCET POWER KIT – HARDWIRED AC TRANSFORMER, TRANSFORMER AND WIRE

HR-1

REELCRAFT MODEL 82100 OLP WALL MOUNTED HEAVY DUTY SPRING RETRACTABLE COMPRESSED AIR HOSE REEL. 13"ø HOSE, 100 FT LENGTH, GUIDE ARM, WALL MOUNTING ACCESSORIES, RATED FOR 500 PSI @ 70.

W-1

THE BROAN-NUTONE 641 ALUMINUM 150MM ROUND DUCT WALL CAP FOR EXHAUST FAN FEATURES BOTH BACK DRAFT DAMPER AND WELDED BIRD SCREEN.

EXHAUST ARM SPECIFICATION

EA-1

SOURCETEC SAR-3010 SERIES FUME ARM EXTERNALLY SUPPORTED WITH TUBULAR STEEL ROUNDED CORNER SECTION WITH BUILT IN COMPENSATED FRICTION MECHANISM. INTAKE HOOD SHALL BE MADE HEAVY DUTY AL.STEEL MATERIAL FITTED WITH FRICTION LOCKING DAMPER. ARM MAX LENGTH OF 8 M WITH HOSE DIA OF 150.

PIPE AND PIPE FITTING MATERIALS

Service	Pipe Material	Fitting Material	Joints
Compressed Air	Schedule 40 Black Steel	Malleable Iron	Threaded
Fire Protection Systems	Schedule 40 Black Steel (to NFPA Requirements)	Malleable Iron (to NFPA Requirements)	Threaded, Grooved Mechanical (to NFPA Requirements)
Natural Gas	Schedule 40 Steel	Malleable Iron	Threaded (2" and smaller) , Welded (2-1/2" and larger)

INSULATION - HOT PIPE

System	Class	Finish (Exposed Piping)	Insulation Material	Operating Temperature	Insulation Thickness: Run-Outs (13ft Max)	Less Than 1"	1" to 1-1/4"	1-1/2" to 3"	4" to 8"	Greater than 8"
Sanitary Traps (Barrier Free Lavatories)	A2	PF5 PVC	Closed Cell Vinyl	-	-	-	1/2"	1/2"	-	-
Notes:	All concealed piping shall utilize All Service Jacket, unless noted otherwise									
	Insulation thicknesses based on ASHRAE 90.1-2016 Zone 5 (Southern BC)									

GRILLES & DIFFUSER SCHEDULE

TAG	MANUFACTURE	MODEL	SERVICE	NOMINAL SIZE	FINISH	REMARKS
EG-01	EH PRICE	500	EXHAUST	SEE DWG	B12	4

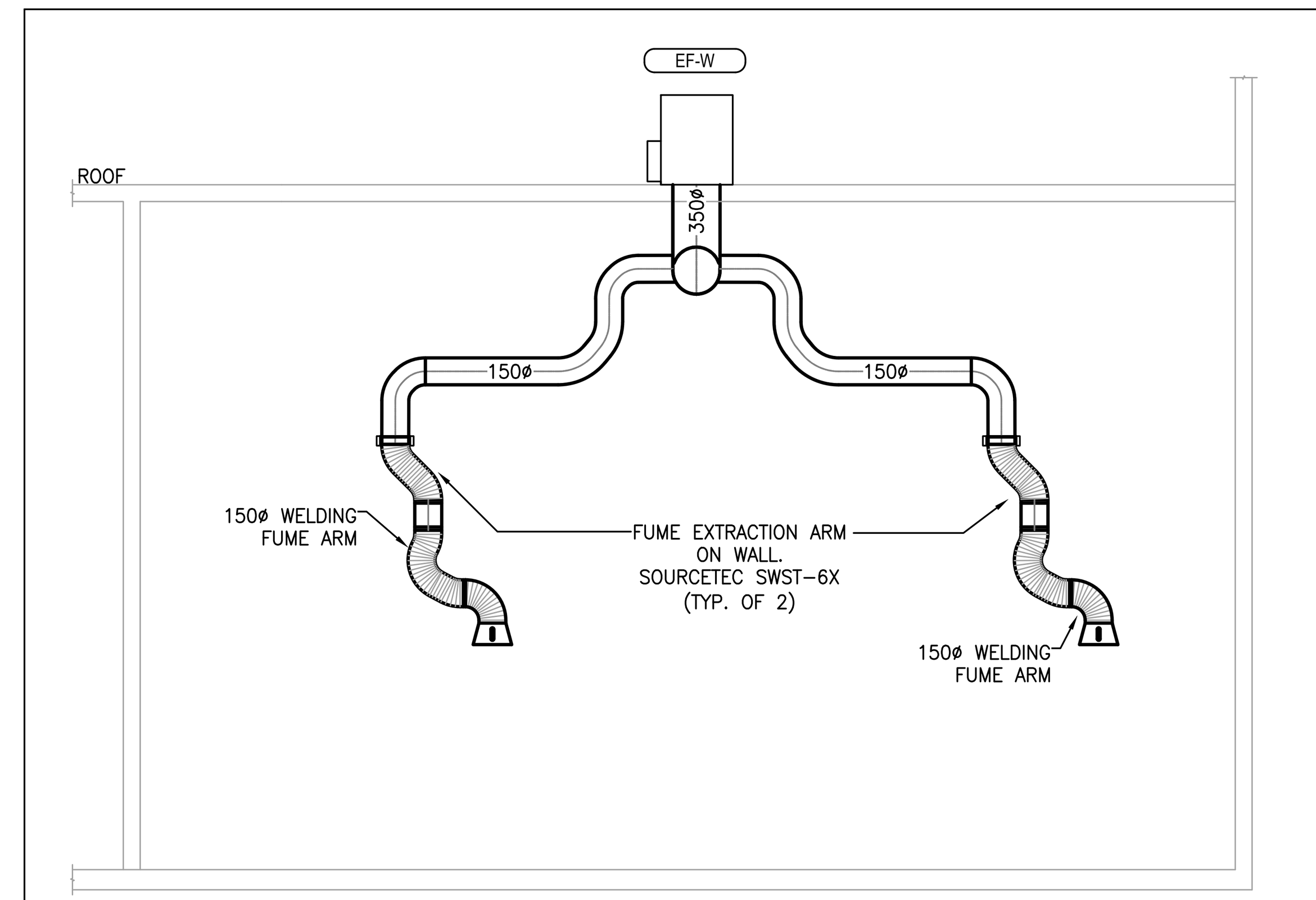
REMARKS:
1. C/W BIRD SCREEN.
2. REFER TO ARCHITECT FOR COLOR.
3. ALUMINUM CONSTRUCTION
4. STEEL CONSTRUCTION
5. C/W INTEGRAL BALANCE DAMPER

DUCTWORK INSULATION

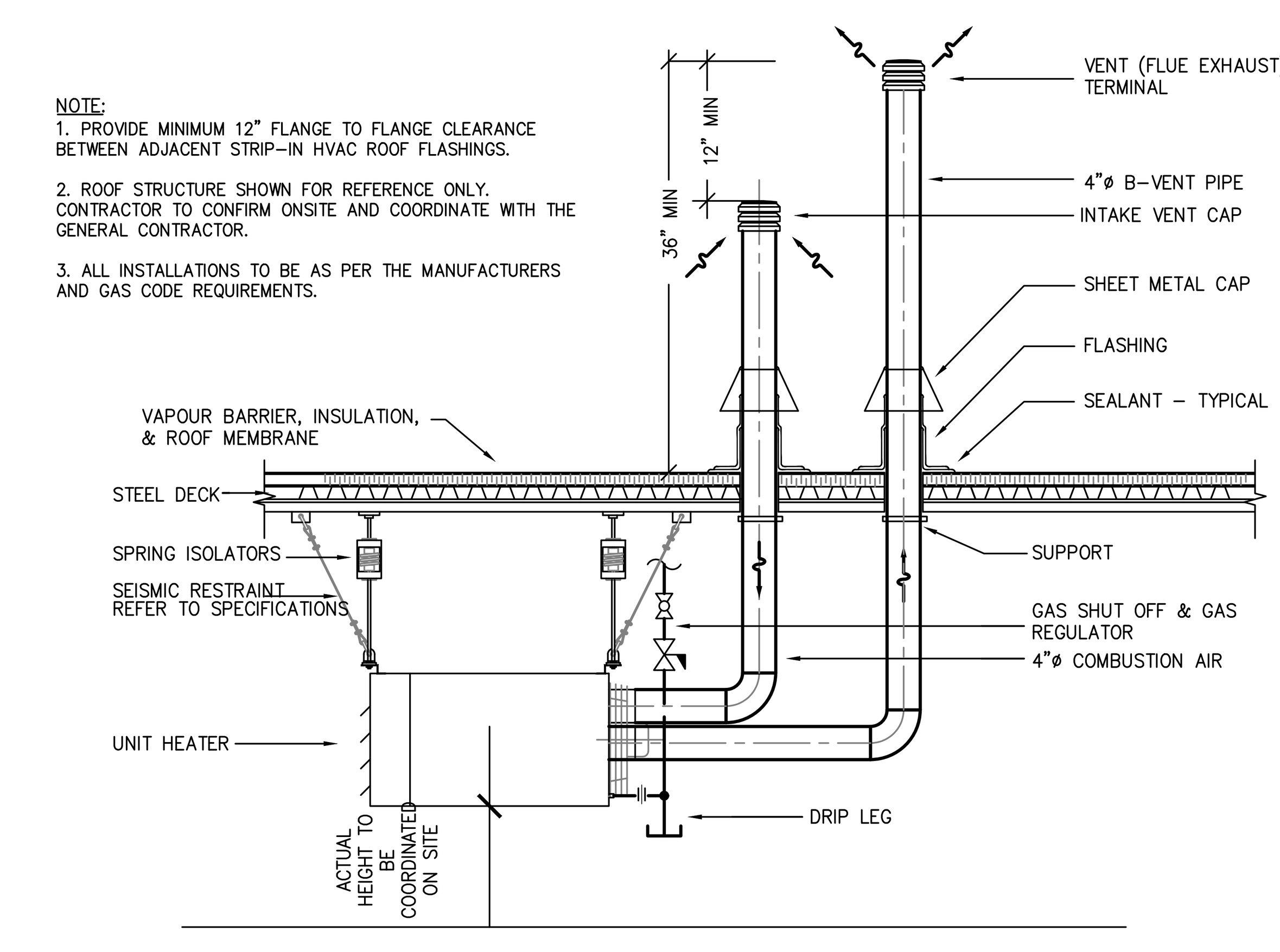
Ductwork Type	Class	Insulation Material	Building Exterior	Unconditioned Space	Exposed	Concealed/Plenum	Buried
Other Systems							
Generator Exhaust	A3	Calcium Silicate	2-1/2" - PF4 Metal	2-1/2" - PF4 Metal	2-1/2" - PF4 Metal	2-1/2" - PF4 Metal	-
Notes:	Insulation thicknesses based on ASHRAE 90.1-2016 Zone 5 (Southern BC)						

ALTERNATES LIST

Product	Approved Manufacturer	Shop Drawings Required
Access Doors	Acudor, E.H. Price, Maxam, Milcor, Mifab, Enpoco	
Air Compressors	DV Systems Inc., Atlas Copco Compressors Canada, CompAir Kellog	Y
Ductwork – Flexible	Thermaflex, Wiremold, Flexmaster, Canaflex	
Ductwork – Round and Oval Spiral	Spiro-Lock, Ecco	
Electric Terminal Heating Units	Chromalox, Q-Mark, Thermolec, Caloritech, Reznor	Y
Fans – Cabinet	Greenheck, Cook, Delhi, Twin City	Y
Fans – Ceiling Mounted	Loren Cook Co., Greenheck Fan Corp., CML Northern Blower, PennBarry, Broan, Nutone, Twin City Fan and Blower	Y
Fans – Roof Mounted Exhaust	Loren Cook Co., Greenheck Fan Corp., Delhi, Twin City Fan and Blower, Carnes Company Inc.	Y
Firestopping and Smoke Seals	3M Canada "Fire Barrier", Tremco Inc. Fire Protection Systems Group "TREMstop", Hilti (Canada) Ltd. Firestop Systems	Y
Gas Pressure Regulating Valves	Fisher, Rockwell	
Grilles, Registers and Diffusers	Titus, Tuttle & Bailey, Metalaire, Price Industries Inc., Nailor Industries, Krueger Division of Air System Components Inc.	Y
Identification – Pipe and Duct	3M, SMS, Duramark, Bradley	
Industrial Exhaust Fume Arms	Oskar, Plymovent, Coral, Sourcetec Industries, Henlex	Y
Insulation – Piping and Duct	3M, Dow, Fibrex, Knauf, Johns-Manville, Owens Corning, Pittsburgh Corning, Manson, Roxul, Fibreglass Canada, Certainteed	
Insulation Jacketing	Childers, Fiberglass, Johns-Manville	
Pipe Couplings – Grooved	Victaulic, Grinnell, Shur Joint	
Lavatory Sinks	American Standard, Crane, Kohler, Toto, Eljer	Y
Pressure Gauges	Weiss, Ashcroft, Trerice, Marsh, Winter, Miljoco	
Pressure Reducing Valves	Watts, Singer	
Seismic Control and Restraint	Mason Industries Inc., Vibro-Acoustics Ltd.,	
Slack Cable Restraints	Square M, Vibra Sonic, VMC-Korfund	
Testing, Adjusting and Balancing Agencies	MDT Systems, Scott Technical, Flotech, Honey's Technical, Western Mechanical, KD Engineering, BC Tech Engineering, Stasis, Airmec	
Valves (Ball)	Red & White/Toyo, Grinnell, Watts, Kitz, Crane, Milwaukee, Conbraco	
Vibration Isolation	Mason Industries, Kinetics Noise Control, The VMC Group, Vibro-Acoustics	Y
Backflow Preventers	Watts Industries (Canada) Ltd., Zurn Industries Ltd., Conbraco "Apollo".	Y
Faucets and Trim	American Standard, Crane, Cambridge Brass, Chicago Faucet, Delta, Kohler, Moen, Bradley, Acorn, Symmons	Y
Fixture Carriers	Watts Industries (Canada) Ltd., Jay R. Smith Mfg. Co., Zurn Industries Ltd., Mifab Inc., and Bibby-Ste-Croix "Wade"	Y
Fixture Water Supply and Drain Fittings	American Standard, Delta Faucet Co., Zurn Industries Ltd., Chicago Faucet, Cambridge Brass Inc., Moen Inc.	Y
Lavatory Thermostatic Mixing valves	Watts Water Technologies (Canada) Ltd. "Powers", Lawler Manufacturing Co. Inc., Leonard Valve Co., and Symmons Industries Inc.	
Vitreous China Fixtures	American Standard, Kohler Co.,Toto Ltd.	cop
Water Closets	Toto, American Standard	
Water Closet Seats	Toto Ltd., Olsonite, Centoco, Beamis, Moldex, Beneke	Y



A-A M4.0 NEW WELDING EXHAUST SYSTEMDETAIL
SCALE :N.T.S.



NOTE:
1. PROVIDE MINIMUM 12" FLANGE TO FLANGE CLEARANCE BETWEEN ADJACENT STRIP-IN HVAC ROOF FLASHINGS.
2. ROOF STRUCTURE SHOWN FOR REFERENCE ONLY. CONTRACTOR TO CONFIRM ONSITE AND COORDINATE WITH THE GENERAL CONTRACTOR.
3. ALL INSTALLATIONS TO BE AS PER THE MANUFACTURERS AND GAS CODE REQUIREMENTS.
12" MIN
36" MIN
VENT (FLUE EXHAUST) TERMINAL
4"ø B-VENT PIPE
INTAKE VENT CAP
SHEET METAL CAP
FLASHING
SEALANT – TYPICAL
VAPOUR BARRIER, INSULATION, & ROOF MEMBRANE
STEEL DECK
SPRING ISOLATORS
SEISMIC RESTRAINT REFER TO SPECIFICATIONS
SUPPORT
GAS SHUT OFF & GAS REGULATOR
4"ø COMBUSTION AIR
UNIT HEATER
DRIP LEG
ACTUAL HEIGHT TO BE COORDINATED ON SITE

2 M4.0 UNIT HEATER DETAIL
SCALE :N.T.S.

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PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA R. GUHRA # 20184

2025-01-24
Seal

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PROJECT STATUS

GLOBAL REVISIONS LIST*

NO.	DATE	DESCRIPTION
1	22-10-2024	ISSUE FOR REVIEW
2	31-10-2024	ISSUE FOR OWNER REVIEW
3	18-11-2024	FINAL COORDINATION
4	03-12-2024	ISSUE FOR BUILDING PERMIT
5	20-12-2024	ISSUE FOR TENDER
6	24-01-2025	ISSUE FOR RFP

*Sheet changes clouded and tagged respectively.

Project Number
24590-M

Project
CITY OF COQUITLAM AUSTIN WORKS YARD
51104 FMB REPURPOSE - HVAC UPGRADE
500 MARINER WAY, COQUITLAM, BC V3K7B6

Sheet Number
M4.0

Drawing
MECHANICAL DETAILS & SCHEDULES

Plot Date: 2024-10-09 Scale: N.T.S.

1 GENERAL INTENT AND REQUIREMENTS

.1 THE MECHANICAL SPECIFICATIONS FORM PART OF THE PROJECT REQUIREMENTS AND SHALL BE READ IN CONJUNCTION WITH ALL OTHER CONTRACTUAL DOCUMENTS, DRAWINGS AND SPECIFICATIONS.

.2 THE CONTRACTOR SHALL PROVIDE A COMPLETE, TESTED AND FULLY OPERATIONAL MECHANICAL, HEATING, VENTILATION, AIR CONDITIONING, PLUMBING, CONTROLS AND FIRE SUPPRESSION SYSTEM INSTALLATION. ALL INSTALLATIONS SHALL BE IN ACCORDANCE WITH ALL CODES, CONTRACT DOCUMENTS AND CLIENT REQUIREMENTS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVISION OF ALL MATERIALS AND LABOUR TO COMPRISE A COMPLETE INSTALLATION.

.3 ALL INSTALLATIONS SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S INSTALLATION INSTRUCTIONS AND REQUIREMENTS.

.4 THE LAYOUTS AND ARRANGEMENTS SHOWN ON THE MECHANICAL DRAWINGS ARE APPROXIMATE AND MAY BE DIAGRAMMATIC. THE CONTRACTOR SHALL PROVIDE ALL ADDITIONAL FITTINGS, EQUIPMENT, MATERIAL, LABOUR, ETC. TO COMPRISE A COMPLETE INSTALLATION.

.5 THE MECHANICAL DRAWINGS AND SPECIFICATIONS ARE NOT DETAILED INSTALLATION INSTRUCTIONS, NOR PROVIDE A METHOD OF CONSTRUCTION.

.6 REFER TO AND FOLLOW MANUFACTURER'S REFERENCE AND INSTALLATION LITERATURE, SUPPLEMENTED BY THE CONTRACT DOCUMENTS.

.7 THE CONTRACTOR SHALL BE SKILLED AND EXPERIENCED IN THE MECHANICAL WORKS RELATING TO THE PROJECT. ONLY LICENSED TRADES PERSONS SHALL BE RETAINED TO UNDERTAKE THE WORK. WHERE APPRENTICES ARE UTILIZED, WORK SHALL BE UNDER THE DIRECT SUPERVISION OF AN ON-SITE LICENSED JOURNEYMAN.

.8 ONLY NEW MATERIAL SHALL BE USED OF FULL WEIGHT AND OF FIRST CLASS QUALITY, UNLESS STATED OTHERWISE.

.9 USE THE SAME BRAND OR MANUFACTURER FOR EACH SPECIFIED APPLICATION.

.10 ALL INSTALLATIONS AND MATERIALS SHALL BE TO THE APPROVAL OF THE ENGINEER AND AUTHORITY HAVING JURISDICTION. REJECTED MATERIALS OR INSTALLATIONS SHALL BE REMOVED AND REPLACED BY THE CONTRACTOR AT NO COST TO THE CLIENT.

2 DEFINITIONS

.1 THE FOLLOWING DEFINITIONS SHALL APPLY TO THE MECHANICAL DRAWINGS AND SPECIFICATIONS:
- .1 AHJ – AUTHORITY HAVING JURISDICTION
- .2 CLIENT – THE COMPANY OR INDIVIDUAL REPRESENTING THE PROJECT END USER.
- .3 CONTRACTOR – THE COMPANY UNDERTAKING THE MECHANICAL SCOPE OF WORK.
- .4 ENGINEER – ROCKY POINT ENGINEERING LTD. AND THEIR REPRESENTATIVES
- .5 MECHANICAL – REFERRING TO THE HVAC, PLUMBING, CONTROLS AND/OR FIRE SUPPRESSION SCOPE OF WORK.
- .6 LOA – SCHEDULE LETTERS OF ASSURANCE
- .7 RPR – REGISTERED PROFESSIONAL OF RECORD
- .8 SRP – SUPPORTING REGISTERED PROFESSIONAL

3 GENERAL DESCRIPTION OF WORK

.1 THE FOLLOWING IS INTENDED TO PROVIDE A GENERAL DESCRIPTION OF THE MECHANICAL WORKS IN ORDER TO ASSIST IN CLARIFICATION OF PROJECT REQUIREMENTS. THIS LIST IS NOT COMPREHENSIVE AND IS INTENDED TO BE READ IN CONJUNCTION WITH THE MECHANICAL DRAWINGS, MECHANICAL SPECIFICATIONS AND ALL OTHER PROJECT RELATED DOCUMENTS.

.2 HVAC
- .1 REMOVE EXISTING HEATERS FOR REPLACEMENT WITH NEW
- .2 PROVIDE NEW EXHAUST VENTILATION SYSTEMS.
- .3 PROVIDE NEW WELDING EXHAUST SYSTEMS.

.3 PLUMBING
- .1 REVISE NATURAL GAS SYSTEMS AND CONNECTION.
- .2 REPLACE WASHROOM PLUMBING FIXTURES WHERE SHOWN.
- .3 CAP-OFF/ISOLATE DOMESTIC WATER AND SANITARY DRAINAGE ASSOCIATED WITH LEVEL 2 WASHROOMS/CHANGE ROOMS.

.4 FIRE SUPPRESSION
- .1 PROVIDE NEW APPROVED MAIN BACKFLOW ASSEMBLY STATION AND FLOW SWITCH. COORDINATE WITH FIRE ALARM SYSTEM CONNECTIONS.

.5 CONTROLS
- .1 PROVIDE NEW HEATER CONTROLS
- .2 PROVIDE NEW VENTILATION SYSTEM CONTROLS.

4 REGULATIONS

.1 ALL MATERIALS, EQUIPMENT AND INSTALLATIONS ARE TO COMPLY WITH APPLICABLE CODES, REGULATIONS, BYLAWS AND THE AHJ REQUIREMENTS, INCLUDING BUT NOT LIMITED TO:
- .1 [BRITISH COLUMBIA BUILDING CODE]
- .2 CITY OR DISTRICT BYLAWS
- .3 ANSI
- .4 ASHRAE
- .5 ASME
- .6 ASPE
- .7 AWWA
- .8 BRITISH COLUMBIA BOILER AND PRESSURE VESSEL ACT
- .9 BRITISH COLUMBIA AND CANADIAN GAS CODE
- .10 BRITISH COLUMBIA PLUMBING CODE
- .11 BRITISH COLUMBIA AND CANADIAN REFRIGERATION CODE
- .12 CANADIAN ELECTRICAL CODE
- .13 CANADIAN ENVIRONMENTAL PROTECTION ACT
- .14 CSA STANDARDS
- .15 FALL PROTECTION REQUIREMENTS
- .16 FIRE MARSHALL
- .17 INSURERS ASSURANCE ORGANIZATION (IAO)
- .18 NATIONAL FIRE PROTECTION AGENCY (NFPA)
- .19 SMACNA
- .20 ULC STANDARDS
- .21 WHMIS
- .22 WORKSAFEBC

5 PERMITS, FEES AND INSPECTIONS

.1 THE CONTRACTOR SHALL PAY FOR AND OBTAIN ALL NECESSARY PERMITS AND INSPECTIONS IN ORDER TO UNDERTAKE THE INSTALLATIONS. ALL COST SHALL BE INCLUDED IN THE CONTRACTOR'S PROJECT PRICING/TENDER VALUES.

.2 THE CONTRACTOR SHALL PROVIDE THE ENGINEER WITH PROOF OF ALL OBTAINED PERMITS, CERTIFICATES AND INSPECTIONS AS REQUESTED.

6 CONTRACTOR QUERIES

.1 SHOULD THERE BE A CONFLICT BETWEEN THE DRAWINGS, SPECIFICATIONS OR CONTRACT DOCUMENTS, THE CONTRACTOR SHALL ADVISE THE ENGINEER IN WRITING TO SEEK CLARIFICATION DURING THE PRICING/TENDERING STAGE OF THE PROJECT. SHOULD CLARIFICATION NOT BE PROVIDED, THE CONTRACTOR SHALL ALLOW FOR THE HIGHER QUALITY OR GREATER EXTENT OF WORK IN THEIR SCOPE.

.2 ALL QUERIES SHALL BE SUBMITTED IN ACCORDANCE WITH THE CONTRACT REQUIREMENTS.

.3 ENSURE QUERIES ARE SUBMITTED TO THE ENGINEER WITHIN 7 WORKING DAYS PRIOR TO THE PRICING/TENDER CLOSE TO ALLOW FOR RESPONSE TO ALL REQUIRED PARTIES. SHOULD A RESPONSE BE DEEMED REQUIRED, IT WILL BE MADE VIA ADDENDA AS PER THE PROJECT REQUIREMENTS.

.4 SHOULD NO QUERIES BE MADE, MATERIALS AND INSTALLATIONS SHALL BE GOVERNED BY THE REASONABLE INTERPRETATION OF THE ENGINEER.

7 PRICING/TENDERING

.1 PRIOR TO SUBMITTING THEIR PRICING/TENDER BID, THE CONTRACTOR SHALL VISIT THE SITE AND MAKE THEMSELVES THOROUGHLY AWARE OF ALL ASPECTS RELATING TO THE WORK. REQUESTED CHANGES TO CONTRACT SCOPE, CONTRACT COST OR CONTRACT TIME DUE TO FAILURE IN REVIEWING THE SITE CONDITIONS WILL NOT BE CONSIDERED.

.2 PRICING/TENDERS ARE TO BE BASED ON THE EQUIPMENT SPECIFIED. BASE BID REFERS TO ITEMS SPECIFIED BY MANUFACTURER AND MODEL NUMBER WHICH MEETS THE SPECIFICATIONS IN ALL RESPECTS REGARDING PERFORMANCE, QUALITY OF MATERIAL AND WORKMANSHIP AND IS DEEMED ACCEPTABLE TO THE ENGINEER WITHOUT QUALIFICATION. BASE BID EQUIPMENT AND MATERIALS ARE AS LISTED ON THE MECHANICAL DRAWINGS AND IN THE MECHANICAL SPECIFICATIONS.

.3 REFER TO THE "ALTERNATE EQUIPMENT" SECTION OF THESE SPECIFICATIONS FOR FURTHER INFORMATION.

.4 REQUEST FOR REVIEW FROM MANUFACTURERS OF EQUIPMENT AND MATERIALS NOT INCLUDED ON THE "ALTERNATE EQUIPMENT" LIST SHALL BE MADE A MINIMUM 7 WORKING DAYS PRIOR TO CLOSE OF TENDER/PRICING. ALL INFORMATION REQUIRED BY THE ENGINEER TO EVALUATE THE PROPOSED MANUFACTURER SHALL BE PROVIDED AT THE TIME OF REQUEST.

.5 SEPARATE PRICES/SCOPE OF WORK, UNLESS STATED OTHERWISE, SHALL BE INCLUDED IN THE BASE/TENDER PRICE. HOWEVER, THE COST AND SCHEDULE VALUES SHALL BE IDENTIFIED SEPARATELY FOR REVIEW BY THE ENGINEER.

8 SCHEDULE

.1 THE CONTRACTOR SHALL UNDERTAKE ALL WORKS IN ACCORDANCE WITH THE PROJECT SCHEDULE AND IN COORDINATION WITH THE GENERAL CONTRACTOR.

.2 ALLOW FOR ALL PHASING OF WORK AS REQUIRED AND DIRECTED.

.3 ALLOW FOR ALL OUT OF HOURS OR PREMIUM LABOUR TO COMPLETE WORK IN ACCORDANCE WITH THE PROJECT SCHEDULE.

9 WARRANTY, GUARANTEE, QUALITY ASSURANCE AND LIABILITY

.1 THE CONTRACTOR SHALL ASSUME FULL RESPONSIBILITY FOR LAYOUT OF THE MECHANICAL WORK AND FOR ANY DAMAGE CAUSED BY IMPROPER LOCATION OR PERFORMANCE OF WORK.

.2 PROTECT WORK AND BUILDING SURFACES FROM DAMAGE DUE TO THE CONTRACTOR'S PERFORMANCE OF THE WORK. PAY PARTICULAR ATTENTION TO PROTECTION OF BUILDING VAPOUR BARRIERS AND WATERPROOF MEMBRANES.

.3 THE CONTRACTOR SHALL COVER FLOORS AND OTHER FINISHED SURFACES TO AVOID DAMAGE.

.4 DURING PERIODS OF FREEZING OR POTENTIAL FREEZING, ENSURE ALL SYSTEMS ARE PROTECTED AND THAT MECHANICAL OPENINGS IN THE BUILDING ENVELOPE ARE WEATHER AND TEMPERATURE PROTECTED.

.5 MAINTAIN THE SITE IN A CLEAN AND ORDERLY CONDITION AT ALL TIMES.

.6 AT THE COMPLETION OF WORK REMOVE TOOLS, WASTE AND SURPLUS EQUIPMENT/MATERIALS FROM THE SITE.

.7 THE CONTRACTOR SHALL PROVIDE A WRITTEN GUARANTEE WARRANTING THAT EQUIPMENT, MATERIALS AND SYSTEMS SUPPLIED AS PART OF THE PROJECT WILL BE FREE OF DEFECTS AND IN A SERVABLE CONDITION IN CONJUNCTION WITH THE PROJECT REQUIREMENTS FOR A MINIMUM 2 YEAR FROM THE DATE OF THE PROJECT SUBSTANTIAL COMPLETION, WHICH SHALL INCLUDE ONE COMPLETE SUMMER AND ONE COMPLETE WINTER OF UNINTERRUPTED OPERATIONS..

.8 DURING THE WARRANTEE PERIOD THE CONTRACTOR SHALL PROMPTLY REMEDY ALL DEFECTS IN EQUIPMENT, MATERIALS, SYSTEMS OR INSTALLATIONS TO THE SATISFACTION OF THE CLIENT, ENGINEER AND AT NO COST.

10 LIABILITY INSURANCE

.1 THE CONTRACTOR SHALL MAINTAIN COMPREHENSIVE LIABILITY INSURANCE FOR AN AMOUNT NOT LESS THAN $2,000,000. INSURANCE TO INCLUDE NON-OWNED CAR INSURANCE AND CONTRACTUAL LIABILITY WITH CROSS LIABILITY CLAUSE. COVERAGE SHALL INCLUDE LOSS OR DAMAGE CAUSED BY THE CONTRACTOR TO THE PROJECT, THE BUILDING, WORK BY OTHER TRADES AND TO THE CLIENT'S STAFF, EQUIPMENT AND PERSONNEL.

.2 INSURANCE DEDUCTIBLE CLAUSE SHALL NOT BE MORE THAN $1,000.

.3 LIABILITY INSURANCE SHALL BE MAINTAINED IN ACCORDANCE WITH WORKSAFEBC REQUIREMENTS.

.4 COST OF INSURANCE COVERAGE SHALL BE INCLUDED IN THE CONTRACT PRICE.

.5 THE CONTRACTOR SHALL PROVIDE PROOF OF INSURANCE TO THE ENGINEER IF REQUESTED.

11 CONTRACT PRICE BREAKDOWN AND PROGRESS CLAIMS

.1 AT THE REQUEST OF THE ENGINEER AND WITHIN 10 DAYS OF AWARD OF CONTRACT, PROVIDE A PRICE BREAKDOWN OF ALL VALUES ASSOCIATED WITH THE SCOPE OF WORK PRICING/TENDER.

.2 PRICE BREAKDOWNS SHALL IDENTIFY COST OF MATERIAL AND LABOUR SEPARATELY.

.3 THE SUM OF THE COST BREAKDOWN SHALL BE EQUAL TO THE CONTRACT PRICE.

.4 THE CONTRACTOR SHALL PROVIDE FOR EACH PROGRESS CLAIM AN UPDATED CONTRACT PRICE BREAKDOWN INDICATING FOR EACH VALUE THE CONTRACT PRICE, AMOUNT PREVIOUSLY BILLED, AMOUNT COMPLETED TO DATE AND REMAINING AMOUNT TO BE COMPLETED.

.5 COST BREAKDOWNS SHALL BE PROVIDED FOR ALL CHANGES IN SCOPE OF WORK.

12 SHOP DRAWINGS

.1 PRIOR TO ORDERING ANY EQUIPMENT THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS TO THE ENGINEER FOR REVIEW AND ACCEPTANCE.

.2 ALL SHOP DRAWINGS SHALL BE SUBMITTED A MAXIMUM OF 30 DAYS AFTER AWARD OF CONTRACT.

.3 SHOP DRAWINGS SHALL INCLUDE THE NAME OF THE MANUFACTURER, MODEL NUMBER, PERFORMANCE/OPERATING CHARACTERISTICS, ELECTRICAL REQUIREMENTS, PHYSICAL DIMENSIONS, AVAILABLE/SELECTION OPTIONS, WEIGHT AND CONTROLS CONNECTION REQUIREMENTS. APPLICABLE HEATING OUTPUT, COOLING OUTPUT, FLOW RATES, PRESSURE LOSSES, POWER REQUIREMENTS, ETC. TO BE IDENTIFIED.

.4 SUBMIT WEIGHTS OF ALL MAJOR EQUIPMENT FOR REVIEW SUCH THAT THE LOADS CAN BE REVIEWED BY THE APPROPRIATE CONSULTANT.

.5 SUBMIT LISTS OF ALL ELECTRICAL MOTORS AND POWER REQUIREMENTS TO THE ELECTRICAL TRADE AND THROUGH THE SPECIFIED SHOP DRAWING PROCESS FOR REVIEW BY THE ELECTRICAL CONSULTANT.

.6 CLEARLY MARK SHOP DRAWING SUBMITTALS WITH ARROWS, UNDERLINING OR CIRCLING TO SHOW DIFFERENCES BETWEEN SPECIFIED AND SELECTED RATINGS. CROSS OUT NONAPPLICABLE MATERIAL.

.7 UNLESS STATED OTHERWISE, ALL PERFORMANCE DATA IS TO BE OF NET VALUES AND ARE TO BE EXTERNAL OF ANY INTERNAL LOSSES OR GAINS OF THE EQUIPMENT.

.8 ALL SHOP DRAWINGS SHALL BE IN THE SAME UNITS AS THE PROJECT DESIGNS.

.9 THE CONTRACTOR SHALL REVIEW ALL SHOP DRAWINGS PRIOR TO SUBMITTAL TO THE ENGINEER. THE CONTRACTOR SHALL STAMP, SIGN AND DATE ALL SHOP DRAWINGS AS REVIEWED PRIOR TO SUBMITTAL. THE CONTRACTOR'S STAMP SHALL BE THEIR CERTIFICATION THAT SHOP DRAWINGS ARE ACCURATE, IN CONFORMANCE WITH THE PROJECT REQUIREMENTS AND HAVE BEEN COORDINATED WITH SITE REQUIREMENTS. SHOP DRAWINGS NOT STAMPED AS REVIEWED WILL BE REJECTED AND RETURNED TO THE CONTRACTOR WITHOUT BEING REVIEWED BY THE ENGINEER.

.10 SUBMIT SHOP DRAWINGS IN ACCORDANCE WITH ENGINEERS AND GEOSCIENTISTS OF BRITISH COLUMBIA (EGBC) PROFESSIONAL PRACTICE GUIDELINES AND IN ACCORDANCE WITH THE MECHANICAL CONTRACTORS ASSOCIATION OF BRITISH COLUMBIA (MCABC).

.11 THE CONTRACTOR SHALL SUBMIT DRAWING TO THE GENERAL CONTRACTOR/PROJECT MANAGER WHO SHALL THEN FORWARD TO THE PROJECT ARCHITECT ONCE REVIEWED. THEREON THE ARCHITECT WILL FORWARD SHOP DRAWINGS TO THE ENGINEER. ONCE REVIEWED, SHOP DRAWINGS WILL BE RETURNED FROM THE ENGINEER TO THE ARCHITECT WHO SHALL FORWARD TO THE GENERAL CONTRACTOR/PROJECT MANAGER AND THEREON THE CONTRACTOR.

.12 REVIEW OF SHOP DRAWINGS BY THE ENGINEER SHALL BE UNDERSTOOD TO REFLECT THE GENERAL PROJECT REQUIREMENTS AND DOES NOT RELIEVE THE CONTRACTOR OF FULFILLING THEIR CONTRACTUAL/PROJECT REQUIREMENTS.

.13 THE CONTRACTOR SHALL BE RESPONSIBLE FOR ERRORS OR OMISSIONS IN THE SHOP DRAWINGS AND FOR MEETING ALL REQUIREMENTS OF THE CONTRACT DOCUMENTS.

.14 THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONFIRMING AND CORRELATING SYSTEM/EQUIPMENT DIMENSIONS.

.15 SUBMIT SHOP DRAWINGS IN ELECTRONIC PDF FORMAT.

.16 SHOULD SHOP DRAWINGS BE SUBMITTED IN HARD COPY FORMAT, THE CONTRACTOR SHALL ENSURE A SUITABLE QUANTITY OF SHOP DRAWINGS ARE PROVIDED. ALLOW FOR ONE COPY TO BE RETAINED BY THE ENGINEER, ARCHITECT AND GENERAL CONTRACTOR/PROJECT MANAGER, IN ADDITION TO REQUIREMENTS OF THE PROJECT OPERATING AND MAINTENANCE MANUALS.

.17 ALL EQUIPMENT SHALL COMPLY WITH THE PROJECT AND CONTRACT REQUIREMENTS REGARDLESS OF HAVING BEEN REVIEWED.

.18 REFER TO THE "ALTERNATE EQUIPMENT" SCHEDULE FOR A LIST OF REQUIRED SHOP DRAWINGS.

.19 IF SHOP DRAWINGS OF ALTERNATE EQUIPMENT ARE REJECTED 3 TIMES FOR TECHNICAL REASONS, THE CONTRACTOR SHALL PROVIDE PRODUCTS AS SPECIFIED WITH NO ADDITIONAL COST OR IMPACT TO THE PROJECT SCHEDULE. COSTS FOR TIME INCURRED DURING THE ABORTIVE SHOP DRAWINGS REVIEW PROCESS WILL BE FOR THE CONTRACTOR'S ACCOUNT.

.20 THE ENGINEER SHALL NOT BE RESPONSIBLE FOR DETERMINING PRODUCT QUANTITIES OR HANDLING.

.21 THE CONTRACTOR SHALL FURNISH SAMPLES OF PRODUCTS OR MATERIALS FOR THE ENGINEER'S REVIEW AS REQUESTED.

.22 EQUIPMENT MANUFACTURERS 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 ITSELF TO THE SUPPORTING STRUCTURE.

.23 WHERE REQUIRED AND REQUESTED, THE CONTRACTOR SHALL SUBMIT WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS) MATERIAL SAFETY DATA SHEETS (MSDS) FOR PRODUCTS USED ON SITE.

13 ALTERNATE EQUIPMENT

.1 ALL CONTRACTOR PROPOSED EQUIPMENT OR MATERIALS SHALL BE SIMILAR AND EQUAL IN ALL RESPECTS TO THAT SPECIFIED.

.2 THE CONTRACTOR SHALL IDENTIFY THE COST AND SCHEDULE DIFFERENCES FOR ALL PROPOSED ALTERNATE EQUIPMENT AND MATERIALS FOR REVIEW AND ACCEPTANCE BY THE ENGINEER AND CLIENT PRIOR TO PROCEEDING. LIST ALL AND ANY REVISIONS REQUIRED TO FACILITATE THE ALTERNATE EQUIPMENT AND/OR MATERIAL.

.3 ALL ALTERNATE EQUIPMENT AND MATERIALS SHALL NOT EXCEED SPACE LIMITATIONS. REPLACE ALL WHICH DOES NOT MEET THE PROJECT DOCUMENTS OR SPACE LIMITATIONS AT NO COST.

.4 THE CONTRACTOR SHALL ASSUME ALL COST ASSOCIATED WITH REDESIGN REQUIREMENTS OF ALTERNATE PROPOSED EQUIPMENT OR MATERIALS.

14 SEISMIC RESTRAINT REQUIREMENTS

.1 SEISMIC RESTRAINT SHALL BE PROVIDED FOR ALL MECHANICAL SYSTEMS AND EQUIPMENT FORMING PART OF THE WORK. WORK PERTAINS TO MECHANICAL, HVAC, PLUMBING, CONTROLS AND FIRE PROTECTION SYSTEMS.

.2 SEISMIC RESTRAINT MEASURES SHALL BE IN ACCORDANCE WITH SMACNA GUIDELINES FOR SEISMIC RESTRAINTS, NFPA, THE [BRITISH COLUMBIA BUILDING CODE] AND THE AHJ.

.3 THE CONTRACTOR SHALL RETAIN THE SERVICES OF A BRITISH COLUMBIA REGISTERED PROFESSIONAL ENGINEER WHO SHALL DESIGN THE PROJECT SPECIFIC RESTRAINT MEASURES AND PROVIDE SCHEDULE LETTERS OF ASSURANCE FOR SUCH.

.4 THE SEISMIC ENGINEER SHALL ACT AS A SUPPORTING REGISTERED PROFESSIONAL (SRP) PROVIDING DOCUMENTATION TO THE ENGINEER, ACTING AS THE REGISTERED PROFESSIONAL OF RECORD (RPR).

.5 THE SEISMIC ENGINEER (SRP) SHALL CARRY LIABILITY INSURANCE NOT LESS THAN $1,000,000 AND SHALL PROVIDE PROOF OF COVERAGE TO THE ENGINEER (RPR) UPON REQUEST.

.6 THE CONTRACTOR SHALL INSTALL SEISMIC RESTRAINT MEASURES IN ACCORDANCE WITH THE SEISMIC ENGINEER'S REQUIREMENTS.

.7 SEISMIC RESTRAINT MEASURES SHALL NOT COMPROMISE VIBRATION ISOLATION OF MOTOR DRIVEN EQUIPMENT.

.8 PRIOR TO CONSTRUCTION COMMENCEMENT, THE CONTRACTOR SHALL ORGANIZE A MEETING WITH THE GENERAL CONTRACTOR, MECHANICAL CONTRACTOR, STRUCTURAL CONSULTANT AND OETHER 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.

15 COORDINATION AND EXAMINATION

.1 THE CONTRACTOR SHALL BE RESPONSIBLE FOR EXAMINATION OF ALL APPLICABLE SITE CONDITIONS.

.2 COORDINATE INSTALLATION WITH THE GENERAL CONTRACTOR AND ALL OTHER TRADES TO AVOID CONFLICTS. DO NOT PROCEED WITH INSTALLATIONS UNTIL COMPLETE COORDINATION HAS BEEN MADE WITH ALL TRADES.

.3 FIELD VERIFY ALL BUILDING AND SITE DIMENSIONS PRIOR TO ANY FABRICATION AND INSTALLATION OF EQUIPMENT OR MATERIALS. NO ADDITIONAL CHARGE SHALL BE ENTERTAINED FOR FAILURE TO VERIFY THESE DIMENSIONS ON SITE.

.4 IMPROPERLY COORDINATED INSTALLATIONS SHALL BE REMOVED AND REINSTALLED TO THE SATISFACTION OF THE ENGINEER, REGARDLESS OF INSTALLATION ORDER.

.5 THE CONTRACTOR SHALL CLOSELY COORDINATE INSTALLATIONS WITH ALL OTHER TRADES TO ENSURE THAT SUITABLE ACCESS CLEARANCES AND PIPE/EQUIPMENT SLOPES ARE MAINTAINED.

.6 REPORT TO THE ENGINEER ANY CONDITIONS WHICH MAY PREVENT THE INSTALLATION OF EQUIPMENT OR SYSTEMS IN THE MANNER INTENDED.

.7 ALTER LOCATION AND ROUTING OF MECHANICAL SYSTEMS AT THE DIRECTION OF THE ENGINEER AT NO COST TO THE ENGINEER OR CLIENT, PROVIDED THE REVISION IS MADE BEFORE INSTALLATION AND DOES NOT NECESSITATE ADDITIONAL MATERIALS.

16 RESPONSIBILITIES, LAYOUT OF WORK AND STORAGE

.1 THE CONTRACTOR SHALL BE RESPONSIBLE FOR LAYOUT FOR THEIR WORK.

.2 PRIOR TO INSTALLATIONS, THE CONTRACTOR SHALL EXAMINE ALL ASSOCIATED EXISTING CONDITIONS.

.3 PROTECT ALL MATERIAL AND EQUIPMENT FROM DAMAGE DURING DELIVERY, WHILE TEMPORARILY STORED ON SITE AND PRIOR TO FINAL TURN OVER TO THE CLIENT.

.4 KEEP ALL MATERIAL AND EQUIPMENT WITHIN FACTORY PROVIDED COVERS UNTIL TIME OF INSTALLATION.

.5 DO NOT ASSUME THAT THE CLIENT WILL PROVIDE STORAGE SPACE ON SITE FOR MATERIALS.

.6 ROUTE MECHANICAL SYSTEMS IN AN ORDERLY MANNER AND AS INDICATED ON THE DRAWINGS. GENERALLY FOLLOW ROUTES PARALLEL AND PERPENDICULAR TO THE BUILDING STRUCTURE.

.7 WHERE SERVICES ARE INTENDED TO BE RUN WITHIN OPEN WEB STRUCTURAL JOISTS, THE CONTRACTOR SHALL OBTAIN SHOP DRAWINGS FOR THE STRUCTURAL MEMBERS AND LAYOUT THEIR WORK ACCORDING TO THE BUILDING STRUCTURE.

17 EXISTING SYSTEMS AND SERVICES

.1 MAINTAIN EXISTING SERVICES THROUGHOUT THE COURSE OF CONSTRUCTION, UNLESS INDICATED OTHERWISE.

.2 THE CONTRACTOR SHALL NOTIFY THE ENGINEER IN WRITING SHOULD ANY EXISTING SYSTEMS, EQUIPMENT OR INSTALLATION BE FOUND TO BE NON-OPERATIONAL, DEFECTIVE, DANGEROUS OR DEEMED TO IMPEDE THE PROJECT REQUIREMENTS.

.3 THE CONTRACTOR SHALL NOTIFY THE ENGINEER IN WRITING SHOULD ANY EXISTING SYSTEM BE FOUND DEVIATING FROM THOSE SHOWN ON THE DRAWINGS AND SPECIFICATIONS. THE CONTRACTOR SHALL SEEK CLARIFICATION FROM THE ENGINEER PRIOR TO PROCEEDING FURTHER.

.4 CONNECT INTO EXISTING SYSTEMS WITH MINIMUM DISRUPTION TO THE EXISTING SYSTEMS.

.5 INCLUDE PREMIUM TIME FOR CONNECTION TO EXISTING SYSTEMS SO THAT NORMAL USE OF THE EXISTING SYSTEMS WILL NOT BE AFFECTED.

.6 BEFORE INTERRUPTING ANY SERVICES, COMPLETE ALL PREPARATORY WORK AS FAR AS REASONABLY POSSIBLE AND HAVE ALL NECESSARY MATERIALS ON SITE AND PREFABRICATED (WHERE PRACTICAL) AND WORK CONTINUOUSLY TO KEEP THE LENGTH OF INTERRUPTION TO A MINIMUM.

18 DEMOLITION

.1 THE CONTRACTOR SHALL COORDINATE ALL REQUIRED DEMOLITION WORK WITH THE GENERAL CONTRACTOR AND OTHER TRADES.

.2 MATERIALS OR EQUIPMENT INTENDED FOR REUSE SHALL BE CAREFULLY REMOVED AND STORED IN A DRY, CLEAN AND SAFE AREA. PROTECT FROM DAMAGE.

.3 ALL EQUIPMENT AND MATERIALS BEING REMOVED SHALL BE DISPOSED OF IN A SUITABLE MANNER OFF SITE. EQUIPMENT AND MATERIALS SHALL BE RECYCLED AS FAR AS POSSIBLE.

.4 SHOULD THE CLIENT REQUEST TO RETAIN ANY EQUIPMENT OR MATERIALS, THE CONTRACTOR SHALL COORDINATE AND OBTAIN A RECEIPT FOR SUCH.

.5 SYSTEMS OR EQUIPMENT REQUIRING TO BE DRAINED OR PURGED, SUCH AS AIR CONDITIONING REFRIGERANT OR FIRE SUPPRESSION SYSTEMS, SHALL BE DONE SO BY A SPECIALIST IN THE FIELD.

.6 ALL THERMOSTATS, TEMPERATURE SENSORS, PRESSURE SENSORS, CONTROL DEVICES, ETC. WITHIN THE PROJECT AREA SHALL BE CAREFULLY WRAPPED IN POLY SHEET TO PROTECT FROM DUST AND DIRT INGRESS DURING THE CONSTRUCTION PROCESS. PLACE THERMOSTATS AND SPACE TEMPERATURE SENSORS COILED IN PLASTIC WRAPPING TEMPORARILY SUSPENDED ADJACENT TO THE ASSOCIATED EQUIPMENT. DO NOT DISCONNECT THERMOSTATS OR TEMPERATURE SENSORS UNLESS REQUIRED TO UNDERTAKE THE WORKS.

.7 DUCTWORK, DIFFUSER, GRILLE AND REGISTER OPENINGS WITHIN THE PROJECT AREA SHALL BE WRAPPED IN POLY SHEET TO PROTECT FROM DUST AND DIRT INGRESS DURING THE CONSTRUCTION PROCESS.

.8 IF DUCTWORK OR RETURN AIR OPENINGS CANNOT BE COVERED OR WRAPPED, PROVIDE WITH TEMPORARY FILTER MEDIA DURING THE CONSTRUCTION PROCESS. REPLACE FILTER MEDIA IF IT BECOMES DIRTY.

.9 ALL EQUIPMENT AND SYSTEMS WITHIN THE PROJECT AREA SHALL BE PROTECTED FROM DAMAGE OR INGRESS OF DIRT AND DEBRIS BY SUITABLE MEANS OF PROTECTION.

.10 ALL DUCTWORK OR BRANCH TAKEOFFS THAT BECOME REDUNDANT SHALL BE CAPPED AND SEALED.

.11 REMOVE AND RECLAIM REFRIGERANT FROM DEMOLISHED EQUIPMENT IN ACCORDANCE WITH REFRIGERANT MANAGEMENT CANADA GUIDELINES AND GOVERNING CODES AND REGULATIONS. DO NOT VENT REFRIGERANT TO ATMOSPHERE. DISPOSE OF RECLAIMED REFRIGERANT BY ENGAGING THE SERVICES OF A LICENSED FIRM SPECIALIZING IN RECYCLING OF RECLAIMED REFRIGERANT. IF REQUESTED, PROVIDE DOCUMENTATION INDICATING REFRIGERANT HAS BEEN SUITABLY REMOVED, RECYCLED AND/OR DISPOSED OF.

19 SYSTEM SHUT DOWNS AND CONNECTIONS

.1 THE CONTRACTOR SHALL COORDINATE WITH THE CLIENT ANY SERVICE SHUT DOWNS OR SERVICE INTERRUPTIONS DURING THE CONSTRUCTION WORKS. TIME AND DURATION OF ALL SHUT DOWNS SHALL BE AGREED WITH THE CLIENT.

.2 ALL CONNECTIONS SHALL BE MADE TO MINIMIZE IMPACTS OR DISRUPTION TO EXISTING SYSTEMS.

.3 THE CONTRACTOR SHALL BE LIABLE FOR ANY DAMAGES CAUSED TO THE EXISTING SYSTEMS BY THE SHUTDOWN WORK.

.4 THE CONTRACTOR SHALL INCLUDE IN THEIR PRICING ANY ASSOCIATED REGULAR OR PREMIUM COSTS ASSOCIATED WITH SHUT DOWN WORK.

.5 IF EXISTING ISOLATION VALVES ARE NOT AVAILABLE TO ISOLATE SECTIONS OF PIPING TO BE REMOVED OR MODIFIED, PROVIDE SUCH VALVES AS PART OF THE CONNECTION AND/OR SHUT DOWN WORK.

20 SITE UTILITY SERVICES

.1 THE CONTRACTOR SHALL COORDINATE WITH THE CLIENT ANY SERVICE SHUT DOWNS OR SERVICE INTERRUPTIONS TO THE SITE UTILITY SERVICES DURING THE CONSTRUCTION WORKS. TIME AND DURATION OF ALL SHUT DOWNS SHALL BE AGREED WITH THE CLIENT.

.2 THE CONTRACTOR SHALL CONTACT AND COORDINATE ALL WORKS WITH THE UTILITY PROVIDERS AS REQUIRED.

21 TEMPORARY FACILITIES AND SERVICES

.1 THE CONTRACTOR SHALL PROVIDE ANY NECESSARY TEMPORARY FACILITIES SUCH AS BUILDINGS, WORKSHOPS, STORAGE AREAS, WASHROOMS, LAYOUT AREAS, ETC. TO UNDERTAKE THE WORK.

.2 LOCATION OF TEMPORARY FACILITIES SHALL BE COORDINATED WITH THE GENERAL CONTRACTOR AND CLIENT. DO NOT ASSUME THAT THE CLIENT WILL PROVIDE SPACE ON SITE.

.3 THE CONTRACTOR SHALL PROVIDE TEMPORARY HEATING SERVICES AS REQUIRED THROUGHOUT THE PROJECT TO FACILITATE THE CONSTRUCTION PROCESS. COORDINATE WITH THE GENERAL CONTRACTOR.

.4 TEMPORARILY DISCONNECT, REMOVE AND LIFT EQUIPMENT AND/OR SERVICES AS REQUIRED TO FACILITATE ROOFING WORK. REINSTALL AFTER WORKING ROOF IS COMPLETE.

22 TEMPORARY USE OF EQUIPMENT AND SYSTEMS

.1 TEMPORARY USE OF PERMANENT SYSTEMS OR EQUIPMENT DURING CONSTRUCTION SHALL NOT BE PERMITTED UNLESS PRIOR APPROVED IN WRITING BY THE ENGINEER AND CLIENT.

.2 EQUIPMENT OR SYSTEMS USED DURING CONSTRUCTION IS TO BE THOROUGHLY CLEANED AND OVERHAULED AS REQUIRED AND PRIOR TO SUBSTANTIAL COMPLETION. REPLACE WORN OR DAMAGED PARTS SO EQUIPMENT IS IN PERFECT CONDITION TO THE SATISFACTION OF THE ENGINEER AND CLIENT.

.3 TEMPORARY USE OF EQUIPMENT AND/OR SYSTEMS SHALL NOT IMPACT OR BE DEEMED AS PROJECT SUBSTANTIAL COMPLETION, NOR IMPACT THE CONTRACTOR'S WARRANTY/GUARANTEE.

23 HOISTING AND SCAFFOLDING

.1 THE CONTRACTOR SHALL BE RESPONSIBLE TO PROVIDE ALL HOISTING, SCAFFOLDING, LIFTS, LADDERS, ETC. REQUIRED TO UNDERTAKE THE MECHANICAL INSTALLATIONS.

.2 ALL WORKS TO BE IN ACCORDANCE WITH WORKSAFEBC REQUIREMENTS.

.3 COORDINATE ALL WORKS WITH THE GENERAL CONTRACTOR.

24 ELECTRICAL COORDINATION AND REQUIREMENTS

.1 THE CONTRACTOR SHALL BE RESPONSIBLE FOR LIAISING WITH THE ELECTRICAL TRADE FOR PROVISION OF ELECTRICAL CONNECTIONS TO SERVE THE MECHANICAL EQUIPMENT. COORDINATION TO BE COMPLETED PRIOR TO SHOP DRAWING SUBMITTALS, ORDERING OF EQUIPMENT AND INSTALLATIONS.

.2 THE CONTRACTOR SHALL BE RESPONSIBLE FOR SUPPLY OF MOTORS WITH PROPER VOLTAGE CHARACTERISTICS TO SUIT THE ELECTRICAL DISTRIBUTION SYSTEMS AND OF SUITABLE CONSTRUCTION, SUCH AS DUST PROOF, EXPLOSION PROOF, ETC. AS REQUIRED TO SUIT OPERATING CONDITIONS. MOTORS SHALL BE DESIGNED FOR CONTINUOUS SERVICES AND TO LIMIT TEMPERATURE RISE TO 104F (40C) FOR OPEN HOUSING AND 122F (50C) FOR CLOSED HOUSING INSTALLATIONS. MOTORS SHALL OPERATE AT 1200 OR 1800 RPM UNLESS SPECIFIED OTHERWISE. MOTORS SHALL HAVE BALL OR ROLLER TYPE BEARINGS WITH GREASE LUBRICATION FITTINGS. MOTORS GREATER THAN 20 HP (15 KW) SHALL HAVE CAPACITOR AND THERMISTOR OVER HEAT PROTECTION. BELT DRIVEN DEVICES SHALL HAVE MOTORS MOUNTED ON ADJUSTABLE BASES TO ENSURE PROPER BELT TENSIONING CAN BE ACHIEVED. DO NOT USE AIR OVER MOTOR RATINGS.

.3 THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING PROVISION OF POWER TO THE CONTROLS SYSTEM.

.4 ALL ELECTRICAL EQUIPMENT SUPPLIED BY THE CONTRACTOR SHALL BEAR A CSA OR ULC LABEL. OBTAIN SPECIAL INSPECTION LABELS REQUIRED BY THE PROVINCIAL AUTHORITY OR AHJ FOR EQUIPMENT THAT DOES NOT HAVE AN APPROPRIATE LABEL. ALL SHALL BE IN ACCORDANCE WITH THE CANADIAN ELECTRICAL CODE AND TO THE APPROVAL OF THE PROVINCIAL ELECTRICAL INSPECTOR AND AHJ.

.5 THE ELECTRICAL TRADE SHALL PROVIDE ALL POWER WIRING, CONNECTIONS AND OTHER ELECTRICAL ITEMS REQUIRED FOR OPERATION OF THE MECHANICAL SYSTEMS, EXCEPT FOR FACTORY INSTALLED WIRING, CONTROLS AND EQUIPMENT ON PACKAGED UNITS PROVIDED BY THE CONTRACTOR.

.6 THE ELECTRICAL TRADE SHALL PROVIDE AND INSTALL MOTOR STARTERS FOR ELECTRIC MOTORS, EXCEPT WHERE EQUIPMENT IS FURNISHED WITH FACTORY INSTALLED INTEGRAL STARTERS.

.7 ALL MOTORS SHALL CONFORM TO ELECTRICAL EQUIPMENT MANUFACTURERS ASSOCIATION OF CANADA (EEMAC) STANDARD MG11, INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS (IEEE) STANDARDS AND APPLICABLE CSA C22.2 STANDARDS.

.8 MOTORS SHALL MEET NEMA STANDARDS FOR THE APPLICATION AND HAVE ASSOCIATED MAXIMUM SOUND RATINGS UNDER FULL LOAD CONDITIONS.

.9 MINIMUM MOTOR EFFICIENCIES SHALL MEET THE REQUIREMENTS OF CAN/CSA C747, CAN/CSA C390, IEE 112B AND ASHRAE ENERGY STANDARD 90.1.

25 CUTTING AND PATCHING

.1 UNLESS NOTED OTHERWISE, THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CUTTING, PATCHING AND TRENCH WORK TO FACILITATE THE PROJECT REQUIREMENTS. COORDINATE ALL WORKS WITH THE GENERAL CONTRACTOR.

.2 INCLUDE FOR ALL CUTTING AND PATCHING WORK TO FACILITATE THE INSTALLATIONS, INCLUDING THAT FOR BEAMS, WALLS, FLOOR SLABS AND MASONRY WORK NECESSARY FOR HANGERS, BRACKETS AND SLEEVES.

.3 THE CONTRACTOR SHALL REVIEW WITH THE PROJECT STRUCTURAL ENGINEER LOCATIONS AND SIZES OF ALL ROOF AND WALL OPENINGS TO ACCOMMODATE THE MECHANICAL SERVICES.

.4 RELOCATE IMPROPERLY LOCATED HOLES, SLEEVES, HANGERS, BRACKETS, ETC.

.5 CUTTING AND PATCHING WORK SHALL INCLUDE, BUT NOT BE LIMITED TO:
- .1 IDENTIFICATION OF REQUIRED OPENINGS FOR THE MECHANICAL SERVICES.
- .2 X-RAY OR SCANNING (GPR, ULTRASONIC, PACHOMETER, IMPACT-ECHO, ETC.), REVIEW OF FLOORS, SLABS AND/OR STRUCTURAL MEMBERS PRIOR TO CUTTING. ALL WORKS TO BE UNDERTAKEN BY SPECIALISTS IN THIS FIELD.
- .3 SUBMIT X-RAY OR SCANNING RESULTS TO THE PROJECT STRUCTURAL ENGINEER FOR THEIR REVIEW AND APPROVAL PRIOR TO PROCEEDING.
- .4 UNDERTAKE THE CUTTING WORKS.

.6 CAST HOLES AND OPENINGS GREATER THAN 4" (100MM) IN DIAMETER. CAST OR FIELD CUT HOLES AND OPENING LESS THAN 4" (100MM) DIAMETER.

.7 CAULK GAPS BETWEEN WALL FINISHES GREAT THAN 1/2" (12MM). FOR GAPS LARGER THAN 1/2" (12MM) PROVIDE ESCUTCHEON PLATES.

.8 PATCH AND MAKE GOOD ALL OPENINGS AND HOLES TO THE SATISFACTION OF THE ENGINEER AND CLIENT.

26 PAINTING

.1 THE CONTRACTOR SHALL COORDINATE ALL PAINTING WITH THE GENERAL CONTRACTOR.

.2 CLEAN ALL EXPOSED BARE METAL SURFACES ON MECHANICAL SYSTEMS CLEAR OF DIRT, DUST, GREASE, SCALE, ETC. IN ORDER TO FACILITATE PAINTING.

.3 ALL EXPOSED BARE METAL SURFACES EXPOSED TO OUTDOOR WEATHER CONDITIONS SHALL BE PAINTED WITH A SUITABLE WEATHERPROOF PAINT.

.4 ALL OUTDOOR GAS PIPING TO BE PAINTED WITH SUITABLE WEATHERPROOF PAINT. COORDINATE PAINT COLOUR IN CONJUNCTION WITH SYSTEM IDENTIFICATION.

.5 ALL MARRED FACTORY FINISHED EQUIPMENT SHALL BE REPAINTED TO MATCH THE ORIGINAL FACTORY FINISH.

.6 PAINT ALL VISIBLE DUCTWORK THROUGH GRILLES AND DIFFUSER WITH A MATT BLACK FINISH.

27 EQUIPMENT PROTECTION AND CLEAN-UP

.1 PROVIDE TEMPORARY COVERS OVER DUCTWORK, PIPING, DIFFUSERS, GRILLES, ETC. DURING THE COURSE OF CONSTRUCTION TO PREVENT INGRESS OF DUST, DIRT AND DEBRIS. PROTECT ALL FROM DAMAGE DURING CONSTRUCTION.

.2 ANY DIRT, RUBBISH OR GREASE ON WALLS, FLOOR, FIXTURES, ETC. WHICH ARE CAUSED BY THE CONTRACTOR SHALL BE REMOVED AND THE PREMISES LEFT IN A FIRST CLASS CONDITION IN EVERY RESPECT.

.3 CLEAN ALL SYSTEMS PRIOR TO TESTING AND TURN OVER TO THE CLIENT.

.4 ALL DUCTWORK TO BE CLEAN FROM DUST AND DEBRIS. IF IN THE ENGINEER'S OPINION THE DUCTWORK HAS NOT BEEN MAINTAINED IN A CLEAN CONDITION THE CONTRACTOR SHALL RETAIN THE SERVICES OF A CERTIFIED DUCT CLEANING COMPANY TO THOROUGHLY VACUUM AND CLEAN ALL OUTDOOR AIR, SUPPLY AIR, RETURN AIR, EXHAUST AIR, TRANSFER AIR, ETC. DUCTWORK.

.5 PROTECT BEARINGS AND SHAFTS DURING THE PROJECT CONSTRUCTION. GREASE SHAFTS AND SHEAVES TO PREVENT CORROSION. PROVIDE EXTENDED NIPPLES FOR LUBRICATION PURPOSES AS REQUIRED.

28 HAZARDOUS MATERIALS

.1 CEASE OPERATIONS AND NOTIFY THE GENERAL CONTRACTOR, CLIENT AND ENGINEER IN WRITING SHOULD ANY MATERIALS BE DISCOVERED WHICH ARE SUSPECTED OF BEING HAZARDOUS MATERIAL CONTAINING, INCLUDING BUT NOT LIMITED TO: ASBESTOS, MOULD, LEAD PAINT, ETC.

.2 COORDINATE WITH THE GENERAL CONTRACTOR ANY REQUIRED SPECIAL PROTECTIVE MEASURES AND/OR DISPOSAL INSTRUCTIONS WHEN WORKING WITH HAZARDOUS MATERIALS.

29 ENGINEER SITE REVIEWS

.1 THE CONTRACTOR SHALL CONTACT THE ENGINEER TO COORDINATE REVIEW OF THE CONSTRUCTED WORK THROUGHOUT THE PROJECT. THE ENGINEER WILL CONDUCT SITE REVIEWS AS DEEMED REQUIRED AND AT THEIR DISCRETION.

.2 THE CONTRACTOR SHALL NOTIFY THE ENGINEER IN WRITING A MINIMUM OF 3 WORKING DAYS PRIOR TO REQUESTED SITE REVIEW.

.3 THE CONTRACTOR SHALL REQUEST SITE REVIEWS FOR:
- .1 ROUGH-IN OF PLUMBING SYSTEMS.
- .2 COMPLETION OF CEILING MOUNTED SYSTEMS, PRIOR TO INSTALLATION OF SUSPENDED CEILINGS/T-BAR CEILING TILES.
- .3 COMPLETION OF DUCTWORK AND PIPING INSTALLATIONS PRIOR TO APPLICATION OF INSULATION.
- .4 COMPLETION OF DUCTWORK AND PIPING INSULATION, PRIOR TO CONCEALMENT.
- .5 COMPLETION OF ANY AND ALL WORKS PRIOR TO BACKFILL OR CONCEALMENT.
- .6 COMPLETION OF FIRE STOPPING PRIOR TO CONCEALMENT.
- .7 FINAL PLUMBING FIXTURE CONNECTIONS.
- .8 TESTING AND DEMONSTRATION OF SYSTEMS.
- .9 FIRE SUPPRESSION SYSTEM TRIP TEST(S).
- .10 FOR PROJECT SUBSTANTIAL COMPLETION.

.4 SHOULD THE ENGINEER PREPARE A WRITTEN FIELD REVIEW REPORT, THE CONTRACTOR SHALL COMPLETE ALL OUTSTANDING WORKS/DEFICIENCIES, INITIAL FIELD REPORT ITEMS AS BEING COMPLETE AND RETURN A COPY TO THE ENGINEER FOR THEIR RECORDS.

.5 ALL FINAL DEFICIENCIES TO BE COMPLETED A MAXIMUM OF 15 WORKING DAYS AFTER THE PROJECT SUBSTANTIAL COMPLETION, UNLESS AGREED UPON WITH THE ENGINEER AND CLIENT.

.6 SHOULD FURTHER SITE REVIEWS BE REQUIRED BY THE ENGINEER AFTER THE CONTRACTOR HAS REQUESTED REVIEW FOR FINAL OCCUPANCY, COST FOR SUCH WILL BE PAID BY THE CONTRACTOR TO THE ENGINEER AT A MINIMUM RATE OF $500 PER SITE REVIEW.

30 DEMONSTRATION AND TESTING

.1 TEST AND DEMONSTRATE OPERATION OF ALL EQUIPMENT AND SYSTEMS AS REQUESTED OR REQUIRED BY THE ENGINEER, CLIENT AND/OR AHJ. THE CONTRACTOR SHALL COORDINATE ALL REQUIREMENTS WITH THEIR SUBTRADES AS REQUIRED.

.2 ALL TESTING AND DEMONSTRATION PROCEDURES AND DURATIONS SHALL BE IN ACCORDANCE WITH APPLICABLE STANDARDS. WHERE MULTIPLE STANDARDS EXIST, APPLY THE MORE STRINGENT MEASURES.

.3 THE FOLLOWING SYSTEMS SHALL BE DEMONSTRATED IN REGARDS TO PERFORMANCE AND SAFETY FEATURES, TO THE FULLEST DEGREE:
- .1 AIR HANDLING SYSTEMS
- .2 HEATING SYSTEMS
- .3 PLUMBING SYSTEMS
- .4 CONTROLS SYSTEMS
- .5 FIRE PROTECTION SYSTEMS

.4 DO NOT PRESSURE TEST MECHANICAL EQUIPMENT.

.5 THE CONTRACTOR SHALL CONSIDER ALL NECESSARY PRECAUTIONS IN PROTECTING EXISTING SYSTEMS AND ARRANGEMENTS PRIOR TO UNDERTAKING TESTING WORKS.

.6 IF TEST PROCEDURES ARE NOT PROVIDED BY STANDARD OR THE AHJ, THE CONTRACTOR SHALL SEEK CLARIFICATION WITH THE ENGINEER PRIOR TO PROCEEDING.

.7 THE CONTRACTOR SHALL PROVIDE A MINIMUM 3 WORKING DAY'S NOTICE TO THE ENGINEER AND AHJ PRIOR TO DEMONSTRATION OF ANY REQUIRED SYSTEMS.

.8 UPON COMPLETION OF INSTALLATIONS, THE CONTRACTOR SHALL SATISFACTORILY DEMONSTRATE ALL SYSTEM OPERATIONS AND MAINTENANCE TO THE CLIENT AND/OR THEIR REPRESENTATIVE. TRAINING TIME SHALL BE A MINIMUM OF 4 HOURS. THE CONTRACTOR SHALL RECORD THE DATE OF THE DEMONSTRATION AND THOSE IN ATTENDANCE. THIS WRITTEN RECORD TO BE INCLUDED IN THE PROJECT CLOSE OUT DOCUMENTATION.

.9 THE CONTRACTOR SHALL BE RESPONSIBLE FOR PRESSURE TESTING OF ALL PIPING AND TUBING SYSTEMS.

.10 PRESSURE TESTING MEDIA SHALL BE AIR, NITROGEN OR WATER, UNLESS SPECIFIED OTHERWISE OR REQUIRED.

.11 IF A DECREASE IN PRESSURE OCCURS DURING THE TESTING, THE CONTRACTOR SHALL CEASE THE TEST, IDENTIFY THE CAUSE OF PRESSURE LOSS, RECTIFY THE ISSUE AND RECONDUCT THE TEST IN ITS ENTIRETY. REPEAT THE PROCESS UNTIL PRESSURE TESTS ARE SUCCESSFULLY COMPLETED.

.12 THE FOLLOWING MINIMUM PIPE TESTING SHALL BE PERFORMED:
- .1 DOMESTIC WATER SYSTEMS: 150PSIG (1030 KPA) HYDRAULIC TEST FOR 8 HOURS
- .2 SANITARY DRAINAGE AND VENT SYSTEMS: 10 FT (3000MM) STANDING WATER TEST FOR 8 HOURS
- .3 NATURAL GAS: 150PSIG (1030 KPA) HYDRAULIC TEST FOR 8 HOURS

.13 THE CONTRACTOR SHALL ARRANGE FOR A THIRD PARTY TO WITNESS PRESSURE TESTS. A WRITTEN COPY OF THE PRESSURE TEST RESULTS WITH DATE AND SIGNATURE OF THE CONTRACTOR, ALONG WITH THE THIRD PARTY ACKNOWLEDGEMENT, SHALL BE INCLUDED WITH THE PROJECT CLOSE OUT DOCUMENTATION.

.14 ALL PLUMBING FIXTURES SHALL BE TESTED FOR SOUNDNESS, STABILITY OF SUPPORT AND CORRECT OPERATION.

.15 TEST OPERATION OF ALL FIRE, FIRE/SMOKE, SMOKE AND MOTORIZED DAMPERS.

.16 MAINTAIN BUILDING COMFORT CONDITIONS WHEN EQUIPMENT OR SYSTEMS ARE BEING TESTED OR HAVING THEIR PERFORMANCE VERIFIED.

31 START-UP, COMMISSIONING AND PERFORMANCE VERIFICATION

.1 THE CONTRACTOR SHALL INCLUDE FOR SYSTEM COMMISSIONING AND PERFORMANCE VERIFICATION BY A LICENSED TRADE EXPERIENCED IN THE SCOPE OF WORK.

.2 PRIOR TO COMMISSIONING, AND UNDER THE SUPERVISION OF THE EQUIPMENT/SYSTEM MANUFACTURERS' REPRESENTATIVE, START-UP EQUIPMENT/SYSTEMS, MAKE REQUIRED ADJUSTMENTS, DOCUMENT PROCEDURES AND LEAVE EQUIPMENT/SYSTEMS IN PROPER OPERATING CONDITION.

.3 ALL EQUIPMENT SHALL BE COMMISSIONING IN ACCORDANCE WITH:
- .1 ASHRAE STANDARD 202 – COMMISSIONING PROCESS FOR BUILDINGS AND SYSTEMS
- .2 ASHRAE GUIDELINE 1.1 – HVAC&R TECHNICAL REQUIREMENTS FOR THE COMMISSIONING PROCESS
- .3 CSA Z320 – BUILDING COMMISSIONING
- .4 EQUIPMENT MANUFACTURER'S REQUIREMENTS.

.4 THE CONTRACTOR SHALL COORDINATE WITH THE GENERAL CONTRACTOR SUFFICIENT TIME IN THE PROJECT SCHEDULE TO UNDERTAKE THE COMMISSIONING PROCESS.

.5 COMPLETE EQUIPMENT COMMISSIONING VERIFICATIONS FORMS AS PROVIDED BY THE MANUFACTURER OR THE COMMISSIONING AGENT. INCLUDE FORMS AS PART OF THE OPERATING AND MAINTENANCE MANUALS.

.6 COMMISSIONING SHALL INCLUDE THE EQUIPMENT/SYSTEM MANUFACTURER'S AUTHORIZED REPRESENTATIVE TO ATTEND THE PROJECT SITE TO REVIEW THE INSTALLATION. ALL TO BE COORDINATED BY THE CONTRACTOR AT THEIR COST. CORRECT ANY MEASURES IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.

.7 ALL CONTROLS COMPONENTS AND EQUIPMENT SHALL BE COMMISSIONED, TESTED, CALIBRATED AND ADJUSTED TO PLACE THE SYSTEMS INTO AUTOMATIC OPERATION, SUBJECT TO THE APPROVAL OF THE ENGINEER AND CLIENT.

.8 COMMISSIONING SHALL INCLUDE ALL END TO END CHECKS FOR ALL CONTROL POINTS, VERIFYING THEIR PROPER OPERATION. END TO END CHECKS ARE DEFINED AS VISUAL CONFIRMATION THAT AN INPUT OR OUTPUT SIGNAL FROM THE CONTROLS SYSTEM RESULTS IN CORRECT OPERATION OF PHYSICAL SYSTEM COMPONENTS, NOT ASSUMED OPERATION AS IMPLIED BY OUTPUT STATUS INDICATED ON SYSTEM INTERFACE SCREENS OR GRAPHICS. PRODUCE DOCUMENTS INDICATING DATE AND RESULTS OF ALL END TO END CHECKS, INCLUDING CALIBRATION FACTORS ENTERED.

.9 UNDERTAKE COMMISSIONING OF SYSTEMS IN COORDINATION AND IN CONJUNCTION WITH AIR BALANCING.

.10 INSTALLED EQUIPMENT OR SYSTEMS WHOSE PERFORMANCE IS QUESTIONED BY THE ENGINEER MAY BE SUBJECT TO PERFORMANCE VERIFICATIONS.

.11 WHERE REQUESTED BY THE ENGINEER, EQUIPMENT OR SYSTEMS SHALL BE TESTED BY THE CONTRACTOR TO DETERMINE COMPLIANCE WITH THE SPECIFIED PERFORMANCE REQUIREMENTS. WHERE REQUESTED THE ENGINEER, TESTING SHALL BE UNDERTAKEN BY AN INDEPENDENT THIRD PARTY ENGAGED BY THE CONTRACTOR.
- .1 PROMPTLY PROVIDE ALL PERFORMANCE VERIFICATION RESULTS TO THE ENGINEER.
- .2 SHOULD THE PERFORMANCE VERIFICATION RESULTS INDICATE THE EQUIPMENT OR SYSTEMS COMPLY, COSTS FOR PERFORMANCE VERIFICATION WILL BE CARRIED BY THE CLIENT.
- .3 SHOULD THE PERFORMANCE VERIFICATION RESULTS INDICATE THE EQUIPMENT OR SYSTEMS DO NOT MEET THE PERFORMANCE REQUIREMENTS, THE CONTRACTOR SHALL:
  - .1 REMOVE AND REPLACE THE ASSOCIATED EQUIPMENT AND/OR SYSTEMS WITH THAT MEETING THE SPECIFIED PERFORMANCE REQUIREMENTS.
  - .2 UNDERTAKE FURTHER PERFORMANCE VERIFICATION OF REPLACEMENT EQUIPMENT AND/OR SYSTEMS. REPEAT UNTIL PERFORMANCE REQUIREMENTS ARE MET.
  - .3 CARRY ALL COSTS OF PERFORMANCE VERIFICATION AND REPLACEMENT OF EQUIPMENT AND SYSTEMS

32 AIR BALANCING

.1 THE CONTRACTOR SHALL INCLUDE FOR SYSTEM BALANCING BY A LICENSED TRADE EXPERIENCED IN THE SCOPE OF WORK.

.2 SYSTEMS INSTALLATIONS SHALL BE COMPLETE AND OPERATIONAL PRIOR TO COMPLETING THE BALANCING WORK, UNLESS SPECIFIED OTHERWISE.

.3 BALANCE SYSTEMS WITHIN -5% OR +10% OF DESIGN VALUES, EXCEPT IN AIR RELATED LIFE SAFETY SYSTEM WHICH SHALL HAVE A RANGE OF 0% TO +5%, OR AS REQUIRED OTHERWISE BY CODE OR STANDARD.

.4 NEW FILTERS ARE TO BE INSTALLED BY THE CONTRACTOR PRIOR TO UNDERTAKING BALANCING WORK.

.5 REPLACE FAN/MOTOR PULLEY/SHEAVES AS REQUIRED TO FACILITATE THE BALANCING WORK AND TO ACHIEVE THE REQUIRED SYSTEM PERFORMANCE.

.6 UPON COMPLETION OF THE BALANCING WORK, THE CONTRACTOR SHALL PROVIDE A BALANCING REPORT SUMMARIZING THE FINAL SETPOINTS AND ARRANGEMENTS. THE REPORT SHALL BE STAMPED AND SIGNED BY A BRITISH COLUMBIA REGISTERED PROFESSIONAL ENGINEER OR CERTIFIED TECHNICIAN.

.7 THE BALANCING REPORT SHALL INCLUDE A SCHEMATIC DIAGRAM OF THE SYSTEM SHOWING ALL EQUIPMENT, OUTLETS, VALVES, ETC. BEING BALANCED.

.8 BALANCING REPORT TO INCLUDE ANY NOTABLE OBSERVATIONS, DEFICIENCIES OR EXCESSIVE NOISE ISSUES.

.9 BALANCING REPORTS SHALL BE SUBMITTED WITHIN [10] WORKING DAYS OF THE PROJECT SUBSTANTIAL COMPLETION.

.10 UPON REVIEW OF THE BALANCING REPORT THE ENGINEER MAY REQUEST UP TO 10% OF THE TERMINAL DEVICES AND EQUIPMENT BE RETESTED AT NO ADDITIONAL COST TO THE CLIENT.

.11 BALANCING SHALL BE UNDERTAKEN IN ACCORDANCE WITH THE NATIONAL STANDARDS FOR A TOTAL SYSTEM BALANCE PUBLISHED BY THE ASSOCIATED AIR BALANCE COUNCIL, OR THE PROCEDURAL STANDARDS FOR TESTING, ADJUSTING & BALANCING OF ENVIRONMENTAL SYSTEMS PUBLISHED BY THE NATIONAL ENVIRONMENTAL BALANCING BUREAU.

.12 THE FOLLOWING INFORMATION SHALL BE INCLUDED AS PART OF THE BALANCING REPORT:

.13 FANS
- .1 EQUIPMENT MANUFACTURER, MODEL AND SERIAL NUMBER
- .2 REQUIRED AIR FLOW AND ACTUAL AIR FLOW
- .3 SUCTION PRESSURE, DISCHARGE PRESSURE AND TOTAL PRESSURE
- .4 MOTOR HORSEPOWER RATING, VOLTAGE, LISTED CURRENT AND RUNNING CURRENT
- .5 FAN AND MOTOR SHEAVE SIZE

33 RECORD & AS-BUILT DRAWINGS

.1 THE CONTRACTOR SHALL RETAIN ONE LEGIBLE SET OF MECHANICAL DRAWINGS ON SITE FOR THE PURPOSES OF RECORDING AS-CONSTRUCTED CONDITIONS. UPDATE THE AS-BUILT DRAWINGS ON A DAILY BASIS, INCLUDING REVISIONS MADE BY MEANS OF ADDENDA, SITE INSTRUCTION, CHANGE ORDERS, OR OTHERWISE.

.2 AS-BUILT DRAWINGS SHALL INCLUDE, BUT ARE NOT LIMITED TO:
- .1 SIZE, LOCATION, ARRANGEMENT, ROUTE AND EXTENT OF DUCTWORK, PIPING, CONDUIT, TERMINAL UNITS, EQUIPMENT, FIXTURES, CLEANOUTS, VALVES, ROUGH-IN, ETC ABOVE AND BELOW GRADE INSIDE THE BUILDING, INCLUDING LOCATIONS OF BURIED PIPNG.
- .2 LOCATION, TAGGING AND NUMBERING OF ALL VALVES, EXCEPT INDIVIDUAL PLUMBING FIXTURES OR EQUIPMENT ISOLATION VALVES.

.3 MAINTAIN AS-BUILT DRAWING ON SITE FOR REVIEW BY THE ENGINEER OR CLIENT.

.4 UPON COMPLETING THE INSTALLATIONS, THE CONTRACTOR SHALL FORWARD AS-BUILT DRAWINGS TO THE ENGINEER FOR CREATION OF RECORD DRAWINGS. DRAWINGS SHALL INCLUDE ALL MECHANICAL SYSTEMS, EQUIPMENT AND DEVICES INCLUDING FIRE DAMPERS, VALVES AND VALVE TAGS, CLEANOUTS, ACCESS DOORS AND ACTUAL ROOM NAMES.

.5 THE ENGINEER WILL RETURN THE RECORD DRAWINGS TO THE CONTRACTOR, WHO SHALL VERIFY THEIR CORRECTNESS, STAMP AS REVIEWED AND SIGN.

.6 THE CONTRACTOR SHALL PRINT THREE HARD COPY SETS OF RECORD DRAWINGS AND INCLUDE WITH AN ELECTRONIC PDF COPY OF THE DRAWINGS WHEN SUBMITTING OPERATING AND MAINTENANCE MANUALS TO THE CLIENT.

.7 THE CONTRACTOR SHALL INCLUDE $1,000 IN THEIR COSTS FOR PREPARATION OF THE PROJECT RECORD DRAWINGS. THIS AMOUNT SHALL BE PAID BY THE CONTRACTOR TO THE ENGINEER FOR PREPARATION OF THE RECORD DRAWINGS FROM THE HVAC AND PLUMBING AS-BUILT MARKUPS. THE CONTRACTOR SHALL ISSUE A PURCHASE ORDER TO THE ENGINEER OR PAY IN FULL PRIOR TO PROCEEDING WITH THE RECORD DRAWING PREPARATION.

.8 UNDER NO CIRCUMSTANCES WILL THE ENGINEER'S AUTOCAD FILES USED TO PREPARE PERMIT, TENDER OR CONSTRUCTION DRAWINGS. THE AUTOCAD FILES WILL NOT BE PROVIDED TO ANY OTHER THIRD PARTY.

34 OPERATING AND MAINTENANCE MANUALS

.1 THE CONTRACTOR SHALL BE RESPONSIBLE FOR PREPARATION OF OPERATING AND MAINTENANCE MANUALS FOR THE CLIENT'S USE.

.2 SUBMIT A DRAFT COPY OF THE MANUALS TO THE ENGINEER FOR REVIEW AND COMMENT. THEREON, UPDATE THE MANUALS AND PROVIDE 3 HARD COPIES AND 1 SOFT COPY IN BOOKMARKED PDF FORMAT ON USB STICK TO THE CLIENT. OBTAIN A RECEIPT FOR DELIVERY OF THE MANUALS AND FORWARD TO THE ENGINEER FOR RECORD PURPOSES.

.3 UNLESS STATED OTHERWISE, OPERATING AND MAINTENANCE MANUALS SHALL BE WITHIN A 3 "D" RING HARD BINDER WITH THE FOLLOWING TABBED SECTIONS:
- .1 NAME OF THE PROJECT, CLIENT, GENERAL CONTRACTOR, CONTRACTOR, ARCHITECT, ENGINEER AND AGENCY PREPARING THE OPERATING AND MAINTENANCE MANUALS.
- .2 NAME AND CONTACT INFORMATION FOR MANUFACTURERS, TRADES AND EQUIPMENT SUPPLIERS.
- .3 DESCRIPTION OF THE MECHANICAL SYSTEMS INCLUDING COMPONENTS AND SEQUENCE OF OPERATIONS.
- .4 LIST OF THE MECHANICAL DRAWINGS.
- .5 A COPY OF ALL SHOP DRAWINGS, INCLUDING REVIEW COMMENTS.
- .6 COPY OF ALL TEST AND INSPECTION REPORTS.
- .7 ALL PROJECT RELATED WARRANTY AND GUARANTEE LETTERS.
- .8 OPERATING AND MAINTENANCE INSTRUCTIONS INCLUDING MAINTENANCE PROCEDURES, LUBRICATION REQUIREMENTS, PREVENTATIVE MAINTENANCE PROCEDURES, LUBRICATION SCHEDULE AND BELT SCHEDULE.
- .9 VALVE TAG LIST NOTING SERVICE, LOCATION AND SIZE.
- .10 COMMISSIONING REPORTS.
- .11 BALANCING REPORTS.
- .12 RECORD DRAWINGS.

35 PROJECT AND SUBSTANTIAL COMPLETION

.1 THE CONTRACTOR SHALL PROVIDE THE FOLLOWING DOCUMENTATION TO THE ENGINEER AS PART OF THE PROJECT AND PRIOR TO THE PROJECT BEING DEEMED COMPLETE. DOCUMENTS INDICATED WITH AND ASTERISK "*" ARE REQUIRED TO BE RECEIVED BY THE ENGINEER PRIOR TO THEIR ISSUANCE OF THE MECHANICAL SCHEDULE C-B LETTER OF ASSURANCE.

.2 THE CONTRACTOR SHALL BE RESPONSIBLE FOR ASSEMBLING ALL DOCUMENTATION FROM THEIR SUBTRADES AS REQUIRED TO FULFILL THE PROJECT REQUIREMENTS.

.3 GENERAL
- .1 * WRITTEN CERTIFICATION BY THE CONTRACTOR THAT ALL INSTALLATIONS ARE COMPLETE, FUNCTIONING, OPERATIONAL AND IN COMPLIANCE WITH THE CONTRACT DOCUMENTS.
- .2 DEMONSTRATION TO THE CLIENT ON SYSTEM OPERATIONS AND MAINTENANCE.
- .3 PROVISION OF A LIST CONTAINING ALL OUTSTANDING OR DEFICIENCY ITEMS WHICH ARE REQUIRED TO BE COMPLETED. SHOULD THE ENGINEER DEEM THE LIST TO BE EXCESSIVE, THE PROJECT WILL NOT BE DEEMED SUBSTANTIALLY COMPLETE.
- .4 * OPERATING AND MAINTENANCE MANUALS
- .5 * EQUIPMENT/SYSTEM COMMISSIONING REPORTS
- .6 * FIRE STOPPING LETTER OF COMPLETION
- .7 AIR BALANCE REPORTS
- .8 AS-BUILT/RECORD DRAWINGS
- .9 * CONTRACTOR'S SEISMIC ENGINEER'S SCHEDULE B AND C-B SCHEDULE LETTERS OF ASSURANCE
- .10 CONTRACTORS GUARANTEE/WARRANTY LETTER

.4 HVAC
- .1 VIBRATION ISOLATION REPORT
- .2 FINAL ELECTRICAL CERTIFICATE FOR ELECTRICAL WIRING BY THE CONTROLS TRADE

.5 PLUMBING
- .1 * FINAL PLUMBING INSPECTION ACCEPTANCE REPORT FROM THE AHJ
- .2 * FINAL GAS INSPECTION ACCEPTANCE REPORT FROM THE AHJ
- .3 PRESSURE TEST REPORTS
- .4 PLUMBING VALVE TAG SCHEDULE

.6 FIRE SUPPRESSION SYSTEMS
- .1 * FINAL FIRE SUPPRESSION INSPECTION ACCEPTANCE REPORT FROM THE AHJ
- .2 * SPRINKLER MATERIAL AND TEST CERTIFICATE
- .3 * FIRE SUPPRESSION BACKFLOW PREVENTION TEST REPORT
- .4 * FIRE ALARM VERIFICATION REPORT
- .5 * SPRINKLER SYSTEM DEMONSTRATION

36 ACCESSIBILITY, ACCESS DOORS AND PANELS

.1 INSTALL ALL SYSTEMS TO PROVIDE MAXIMUM AND ADEQUATE ACCESSIBILITY.

.2 MAINTAIN ALL CODE AND MANUFACTURER'S REQUIRED CLEARANCES.

.3 THE CONTRACTOR SHALL COOPERATE AND COORDINATE WITH OTHER TRADES TO ENSURE THAT ALL EQUIPMENT AND SYSTEMS ARE PROPERLY PLACED WITHOUT INTERFERENCE WITH OTHER SERVICES.

.4 LOCATE DISTRIBUTION SYSTEMS, EQUIPMENT AND MATERIALS TO ELIMINATE INTERFERENCE, CONSERVE HEADROOM AND LEAVE MAXIMUM USABLE SPACE. ALL SYSTEMS SHALL BE COORDINATED FOR ELEVATION HEIGHT TO ENSURE THEY ARE CONCEALED WITHIN CEILING SPACES, UNLESS NOTED OTHERWISE.

.5 ALL EQUIPMENT MUST BE IN A LOCATION WHERE IT MAY BE SERVICED, OPERATED AND MAINTAINED.

.6 PROVIDE ADEQUATE ACCESS PANELS AS REQUIRED IN CEILINGS, WALLS, PARTITIONS AND/OR FINISHES. ACCESS PANELS TO BE MINIMUM 12"X12" (300MM X 300MM) FOR HAND ACCESS OR OTHERWISE 18"X18" (450MM X 450MM), OF METAL CONSTRUCTION, PROVIDED WITH A HINGED DOOR AND CAM LOCK. INSTALL LARGER SIZED ACCESS DOORS ARE REQUIRED AND WITH THE APPROVAL OF THE ENGINEER.

.7 ACCESS DOOR SHALL BE SIMILAR TO:
- .1 MILCOR STYLE DW FOR DRYWALL INSTALLATIONS
- .2 MILCOR STYLE M FOR MASONRY TILE SURFACES
- .3 MILCOR STYLE K FOR PLASTERED WALL SURFACES

.8 OBTAIN APPROVAL FROM THE PROJECT ARCHITECT FOR THE ACCESS DOOR TYPE AND STYLE PRIOR TO INSTALLING.

.9 PROVIDE ACCESS DOORS TO ANY AND ALL CONCEALED MECHANICAL EQUIPMENT OR SYSTEMS WHICH REQUIRES MAINTENANCE OR ADJUSTMENT. PROVIDE ACCESS DOORS AS DIRECTED BY THE ENGINEER.

.10 THE CONTRACTOR SHALL DEMONSTRATE ALL OR ANY REASONABLE ACCESS TO THE ENGINEER AS REQUESTED.

.11 PROVIDE ACCESS DOOR IN DUCTWORK UPSTREAM AND DOWNSTREAM OF ALL COILS, SQUARE ELBOWS, FIRE DAMPERS, ETC.

.12 WHERE ACCESS DOORS ARE PROVIDED IN FIRE RATED SEPARATIONS, THEY SHALL MEET THE FIRE RATING AS TO MAINTAIN THE FIRE INTEGRITY. ALL FIRE RATED ACCESS DOORS SHALL BE CSA OR ULC LISTED FOR THE APPLICABLE APPLICATION.

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PROJECT STATUS

GLOBAL REVISIONS LIST*

NO.	DATE	DESCRIPTION
1	22-10-2024	ISSUE FOR REVIEW
2	31-10-2024	ISSUE FOR OWNER REVIEW
3	18-11-2024	FINAL COORDINATION
4	03-12-2024	ISSUE FOR BUILDING PERMIT
5	20-12-2024	ISSUE FOR TENDER
6	24-01-2025	ISSUE FOR RFP

*Sheet changes clouded and tagged respectively.

Project Number: 24590-M

Project: CITY OF COQUITLAM AUSTIN WORKS YARD 51104 FMB REPURPOSE - HVAC UPGRADE
500 MARINER WAY, COQUITLAM, BC V3K7B6

Sheet Number: M5.0

Drawing: MECHANICAL SPECIFICATIONS

Plot Date: 2024-10-09 Scale: N.T.S.

37 PIPE CHASES AND DUCT SHAFTS

.1 UNLESS OTHERWISE INDICATED, CONCEAL ALL PIPING, DUCTWORK AND MECHANICAL SYSTEMS WITHIN THE CONSTRUCTION OF WALLS, CEILINGS, FURRINGS, CHASES AND SHAFTS.

.2 REVISE THE LOCATION OF SERVICES IF REQUIRED TO BE CONCEALED AS DESCRIBED. THE CONTRACTOR IS TO CONSULT THE ENGINEER AND OBTAIN WRITTEN APPROVAL PRIOR TO PROCEEDING WITH REVISED LOCATION OF SERVICES.

38 INSULATION

.1 REFER TO THE MECHANICAL DRAWINGS FOR PIPE AND DUCTWORK INSULATION REQUIREMENTS, WHICH LISTS INSULATION MATERIAL, THICKNESSES AND FINISHING REQUIREMENTS.

.2 ALL INSULATION JOINTS TO BE TAPED AND VAPOUR SEALED TO SUIT THE APPLICATION.

.3 DUCTWORK

- .1 ALL DUCTWORK INSULATION SHALL BE IN ACCORDANCE WITH BCICA QUALITY STANDARDS SPECIFICATIONS 1502.
- .2 SUPPLY AIR DUCTWORK SHALL BE EXTERNALLY INSULATED UNLESS PROVIDED WITH INTERNAL INSULATION LINER OR NOTED OTHERWISE.
- .3 ALL DUCTWORK SHALL BE EXTERNALLY INSULATED A MINIMUM OF 5FT (1500 MM) FROM EXTERIOR OPENINGS/SHEATHING CONNECTIONS AND WITHIN SOFFITS.
- .4 PROVIDE INTERNAL INSULATION LINER ON ALL DUCTWORK AS INDICATED AND A MINIMUM OF 10 FT (3000 MM) UPSTREAM AND DOWNSTREAM OF ALL FANS.
- .5 ALL INTERNAL DUCTWORK INSULATION TO BE PROVIDED WITH METALLIC Z NOSING TO AVOID EXPOSED INSULATION EDGES WITHIN THE AIR STREAM.
- .6 ATTACH INTERNAL DUCTWORK INSULATION AS PER SMACNA STANDARDS AND WITH PINS AT 12" (300 MM) ON CENTRE. PINS TO BE SPOT WELDED TO THE INNER SURFACE OF THE DUCTWORK. DO NOT USE PRESSURE SENSITIVE ADHESIVES.
- .7 ALL DUCTWORK INSULATION SHALL BE ADEQUATELY GLUED AND STRAPPED.
- .8 PROVIDE INTERNAL DUCT INSULATION LINING FOR ALL TRANSFER AIR DUCTS, UNLESS NOTED OTHERWISE.

.4 PIPING

- .1 ALL PIPING INSULATION SHALL BE IN ACCORDANCE WITH BCICA QUALITY STANDARDS SPECIFICATIONS 1501.
- .2 PROVIDE SHEET METAL SHIELDS BETWEEN PIPE INSULATION AND PIPING SUPPORTS.
- .3 PROVIDE CALCIUM SILICATE INSULATION AT LOCATIONS OF PIPE HANGERS IN CONJUNCTION WITH METAL SHIELDS.
- .4 PROVIDE INSULATION FOR DRAINAGE P–TRAPS WITH REMOVABLE CAP WITHIN PARKADES OR WHEN SUBJECT TO FREEZING CONDITIONS.
- .5 INSULATE SANITARY DRAINS FROM REFRIGERATED DRINKING FOUNTAINS UNTIL CONNECTION POINT TO 3" (75MM) DRAIN OR LARGER.
- .6 INSULATE ALL PIPING PROVIDED WITH HEAT TRACE CABLING.
- .7 PROVIDE INSULATION ON SANITARY WASTE ARMS AND TRAPS OF BARRIER FREE LAVATORIES.

.5 EQUIPMENT

- .1 ALL EQUIPMENT INSULATION SHALL BE IN ACCORDANCE WITH BCICA QUALITY STANDARDS SPECIFICATIONS 1503.

.6 DO NOT USE SPRAY ON INSULATION SYSTEMS.

.7 DO NOT APPLY INSULATION PRIOR TO PRESSURE TESTING OF SYSTEMS.

.8 ENSURE SURFACES ARE CLEAN AND DRY PRIOR TO APPLICATION OF INSULATION.

.9 INSULATION SYSTEM MATERIAL INSIDE THE BUILDING SHALL NOT HAVE A FLAME SPREAD RATING GREATER THAN 25 OR A SMOKE DEVELOPED RATING GREATER THAN 50 IN ACCORDANCE WITH CODE REQUIREMENTS AND IN CONJUNCTION WITH CAN/ULC S102.

.10 THERMAL INSULATION PERFORMANCE (CONDUCTIVITY, THICKNESS, ETC) SHALL MEET OR EXCEED THE REQUIREMENTS OF THE NATIONAL ENERGY CODE OF CANADA AND ASHRAE 90.1.

.11 MINERAL FIBRE INSULATION SHALL CONFORM WITH THE REQUIREMENTS OF CAN/ULC–S114. ELASTOMETRIC INSULATION SHALL CONFORM WITH THE REQUIREMENTS OF ASTM C534

.12 BLANKET MINERAL FIBRE INSULATION TO ASTM STANDARD C553. APPLY TO CHILLED OR DOMESTIC COLD WATER PUMP CASINGS, ROOF DRAIN SUMPS INSIDE THE BUILDING, WATER METERS, TOP OF RADIANT CEILING PANEL, TOP OF CEILING ACTIVE CHILLED WATER BEAMS

.13 SEMI RIGID MINERAL FIBRE INSULATION TO ASTM STANDARD C1393. APPLY TO UNINSULATED HOT WATER STORAGE TANKS, SHELL AND TUBE HEAT EXCHANGERS, HEATING WATER AIR SEPARATORS, CHILLED WATER EXPANSION TANKS.

.14 REMOVABLE INSULATION SHALL BE CERAMIC FIBRE INSULATION BETWEEN SILICONE IMPREGNATED FIBREGLASS FABRIC AND PROVIDED FOR PLATE HEAT EXCHANGERS AND 6" (150MM) AND LARGER STRAINERS, BACKFLOW PREVENTERS, ETC. OVERLAP INSULATION AND PROVIDE WITH DOUBLE SIDED VELCRO STITCHED IN PLACE.

39 SYSTEM IDENTIFICATION

.1 IDENTIFY ALL DUCTWORK, PIPING AND SYSTEMS IN ACCORDANCE WITH THE SPECIFICATIONS AND BASE BUILDING STANDARDS.

.2 UNLESS SPECIFIED OTHERWISE UTILIZE ANSI AND CSA PIPING IDENTIFICATION STANDARDS, INCLUDING NOMENCLATURE AND COLOURS.

.3 EACH MAJOR COMPONENT OF EQUIPMENT SHALL BEAR MANUFACTURER'S NAME, ADDRESS, CATALOG, AND SERIAL NUMBER.

.4 UTILIZE WH BRADY IDENTIFICATION TAPES, BANDS AND MARKERS MADE OF VINYL FILM MATERIAL UNLESS NOTED OTHERWISE.

.5 ALL MARKINGS SHALL BE SUITABLE FOR THE SURFACE OPERATING CONDITIONS IN WHICH THEY ARE INSTALLED.

.6 PIPING MARKING LETTERS SHALL BE 2" (50MM) HIGH FOR PIPES 3" (75MM) AND LARGER DIAMETER AND NOT LESS THAN 3/4" (20MM) FOR SMALLER PIPES.

.7 PIPE MARKING ARROWS SHALL BE 6" (150MM) LONG X 2" (50MM) WIDE FOR PIPES 3" (75MM) AND LARGER DIAMETER AND NOT LESS THAN 4" (100MM) LONG X 3/4" (20MM) WIDE FOR SMALLER PIPES. MINI MARKERS MAY BE USED FOR VERY SMALL DIAMETER PIPES.

.8 DUCTWORK IDENTIFICATION SHALL CONSIST OF 2" (50MM) HIGH BLACK STENCILED LETTERS INDICATING SERVICE AND DIRECTION OF FLOW.

.9 ALL DUCTWORK AND PIPING TO BE LABELLED AT MINIMUM 20 FT (6000 MM) INTERVALS WITH SERVICE AND DIRECTION OF FLOW. PROVIDE MINIMUM ONE LABEL PER ROOM, AT MAJOR CHANGES IN DIRECTION, AT CONNECTIONS TO EQUIPMENT, ON EITHER SIDE OF FLOOR PENETRATIONS AND PRIOR TO ENTER/EXISTING SHAFTS. MARKER AND DIRECTION ARROWS SHALL BE PLACED SIDE BY SIDE ON THE BOTTOM QUARTER OF PIPES.

.10 PROVIDE CEILING DOT IDENTIFICATION FOR ALL BALANCE DAMPERS, FIRE DAMPERS, VALVES, EQUIPMENT, ETC. LOCATED ABOVE T–BAR CEILINGS. PROVIDE IDENTIFICATION DOTS ON T–BAR RAILS AND NOT ON THE CEILING TILES.

.11 PROVIDE VALVE TAGS IN ASSOCIATION WITH PIPING SYSTEMS. VALVE TAGS SHALL BE LAMACOID 1–1/2" (40MM) DIAMETER, UNLESS NOTED OTHERWISE, OR IN ACCORDANCE WITH THE BASE BUILDING IDENTIFICATION SYSTEM.

.12 PREPARE A VALVE TAG CHART.

.13 VALVE TAGS ARE TO MATCH THE EXISTING BUILDING SYSTEMS.

.14 SHOULD THERE BE NO EXISTING VALVE TAG SYSTEM IN PLACE, NEW VALVE TAGS SHALL BE CONSTRUCTED OF PLASTIC AND PROVIDED WITH A SIX DIGIT NUMBERING SYSTEMS; THE FIRST THREE DIGITS INDICATING THE SERVICE AND THE LAST THREE DIGITS INDICATING THE INDIVIDUAL VALVE NUMBER.

.15 ALL FACTORY SUPPLIED EQUIPMENT SHALL BE INSTALLED WITH THE MANUFACTURER'S NAMEPLATES.

.16 PROVIDE EQUIPMENT REGISTRATION/NAMEPLATES (CSA, ULC, ASME, ETC.) AS REQUIRED AN IN ACCORDANCE WITH THE AHJ.

.17 GAS AND PROPANE PIPING SHALL BE IDENTIFIED IN ACCORDANCE WITH CODE REQUIREMENTS INCORPORATING APPROPRIATE COLOURED PAINT OVER THE ENTIRE LENGTH, BANDING AT SPECIFIED INTERVALS AND/OR LABELING WITH TYPE OF SERVICE.

.18 PROVIDE LAMACOID LABELS FOR EQUIPMENT AND CONTROL PANELS WITH BLACK BACKING AND WHITE LABELLING. SIZE SHALL BE 1/2" X 2" (12MM X 50MM) FOR SMALL EQUIPMENT, 1" X 2–1/2" (25MM X 65MM) FOR EQUIPMENT AND 2" X 4" (50MM X 100MM) FOR PANELS. SECURE TO EQUIPMENT/PANELS WITH STAINLESS STEEL SCREWS OR SUITABLE EPOXY CEMENT.

.19 EQUIPMENT TERMINOLOGY SHALL MATCH WITH THE SYSTEM NOTED IN THE MECHANICAL DRAWINGS/SPECIFICATIONS, OR IN ACCORDANCE WITH THE CLIENT'S REQUIREMENTS WHEN PROVIDED. THE CONTRACTOR SHALL REQUEST CLARIFICATION FROM THE CLIENT PRIOR TO PROVIDING SYSTEM IDENTIFICATION.

40 DUCTWORK & SHEET METAL

.1 ALL DUCTWORK SHALL BE FABRICATED AND INSTALLED IN ACCORDANCE WITH SMACNA, ASHRAE AND NFPA STANDARDS.

.2 ALL DUCTWORK SHALL BE GALVANIZED STEEL LOCK FORMING WITH GALVANIZED COATING CONFORMING TO ASTM A525 G90, UNLESS SPECIFIED OTHERWISE.

.3 DUCTWORK SHALL BE LOCK FORMED AND SEALED TO SMACNA CLASS B STANDARDS FOR LOW AND MEDIUM VELOCITY DUCTWORK IN SYSTEMS RATED UP TO 2" (50MM) WG. SEAL DUCTWORK TO SMACNA CLASS A STANDARDS FOR DUCTWORK IN SYSTEMS IN EXCESS OF 2" (20MM) WG.

.4 ALL DUCTWORK TO BE CLEAN AND FREE OF SCALE.

.5 ANY DEVIATIONS IN DUCTWORK DIMENSIONS OR SIZES SHALL BE BASED ON SMACNA OR ASHRAE SIZING CRITERIA.

.6 ALL DUCTWORK SIZES SHALL REPRESENT INTERIOR DIMENSIONS. THE CONTRACTOR SHALL MAKE ALLOWANCES FOR DUCTWORK THICKNESS, INSULATION, BRACING, ETC.

.7 DUCTWORK SHALL BE SEALED AND JOINTS AND SEAMS IN ACCORDANCE WITH SMACNA STANDARDS, ASHRAE STANDARDS AND CODE REQUIREMENTS. USE OF DUCT TAPE WILL NOT BE ACCEPTED.

.8 DUCTWORK PENETRATING THROUGH EXTERIOR WALL ASSEMBLIES SHALL BE SEALED TO THE WEATHER BARRIER WITH SELF–ADHESIVE BITUMINOUS MEMBRANE AND EXPANDING FOAM SEALANT.

.9 PROVIDE BALANCING DAMPERS WHERE BRANCH DUCTWORK IS INSTALLED, AT GRILLES AND DIFFUSERS. PROVIDE ADDITIONAL BALANCING DAMPERS AT THE REQUEST OF THE BALANCING TRADE. BALANCE DAMPERS TO BE PROVIDED WITH SHAFT, STANDOFF BRACKET, LOCKING HAND QUADRANT AND BE CONSTRUCTED OF MINIMUM 1.6MM THICK GALVANIZED STEEL.

.10 PROVIDE TURNING VANES FOR ALL RECTANGULAR DUCTWORK ELBOWS AS INDICATED, INSTALLED TO SMACNA STANDARDS.

.11 ROOF MOUNTED DUCTWORK SHALL HAVE STANDING SEAMS AND SEALED WATER/WEATHER TIGHT.

.12 DO NOT CONNECT FLEXIBLE DUCTWORK DIRECTLY TO DIFFUSER OR GRILLE OUTLETS.

.13 FLEXIBLE DUCTWORK SHALL BE A MAXIMUM OF 5 FT (1500 MM) IN LENGTH AND STRETCHED TIGHT TO AVOID SAGGING, SHARP CHANGES IN DIRECTION OR EXCESSIVE PRESSURE DROPS. DO NOT USE FLEXIBLE DUCTWORK AS OFFSETS OR ELBOWS. REFER TO SPECIFICATIONS/SCHEDULES FOR INSULATION REQUIREMENTS.

.14 THE CONTRACTOR SHALL ENSURE THAT ALL COOLING COILS ARE INSTALLED TO PROVIDE POSITIVE SLOPE AND COMPLETE DRAINAGE TO THE DRAIN POINT. DEMONSTRATE COOLING COIL DRAINAGE AT THE REQUEST OF THE ENGINEER.

.15 IN SLAB DUCTWORK SYSTEMS SHALL BE ECCO HEATING PRODUCTS ECCODUCT OR APPROVED ALTERNATE.

.16 DUCTWORK SERVING AS EXHAUST FOR DISHWASHING EQUIPMENT SHALL BE CONSTRUCTED OF WELDED 304 STAINLESS STEEL OR HEAVY GAUGE ALUMINUM. THE ENTIRE SYSTEM SHALL BE SLOPED BACK TO THE DISHWASHER OR TO A 2" (50MM) DEPRESSED DRAIN PAN.

.17 ALL RECTANGULAR DUCT FLAT SURFACES ARE TO BE CROSS BROKEN.

.18 PROVIDE A MINIMUM OF 5 DIAMETERS OF STRAIGHT DUCTWORK PRIOR TO VAV BOXES.

.19 INSTALL BACKDRAFT DAMPERS ON ALL EXHAUST OUTLETS AT EXTERIOR DISCHARGES, UNLESS SPECIFIED OTHERWISE.

.20 PROVIDE GALVANIZED STEEL BIRD SCREEN MESH ON ALL EXTERIOR INTAKE AND EXHAUST DISCHARGE POINTS.

.21 SUPPORT ROOF MOUNTED DUCTWORK ON FACTORY FABRICATED ALUMINUM SUPPORT ASSEMBLIES TO SUIT THE ROOF CONSTRUCTION, SPACED, SIZED AND ARRANGED TO SUIT THE DUCTWORK.

.22 AT OUTDOOR AIR INTAKES, WHERE OUTDOORS OR OTHERWISE REQUIRED TO BE WEATHERTIGHT, CONSTRUCT DUCTWORK WITHOUT BOTTOM LONGITUDINAL SEAMS. SOLDER OR WELD THE JOINTS OF BOTTOM AND SIDE SHEETS. SEAL ALL OTHER JOINTS WITH DUCT SEALER. SLOPE HORIZONTAL DUCT TO HOODS, RISERS OR DRAIN POINTS. PROVIDE DUCT DRAIN FITTINGS AT DRAIN POINTS.

.23 PROVIDE CURB, FLASHING AND COUNTER FLASHING FOR ALL DUCTWORK PASSING THROUGH ROOF AND EXTERNAL ENVELOPE OF THE BUILDING.

.24 SNAPLOCK DUCTWORK SHALL NOT BE USED UNLESS APPROVED BY THE ENGINEER.

.25 INSTALL SHEET METAL DRAIN PANS UNDER ALL HOT WATER HEATER AND STORAGE TANKS.

.26 INSTALL SHEET METAL TRIP SHIELDS OVER ELECTRICAL EQUIPMENT TO PROTECT FROM FIRE PROTECTION SPRINKLERS.

41 VIBRATION ISOLATION

.1 ALL COMPONENTS WITH ROTATING OR DYNAMICALLY OPERATING COMPONENTS SHALL BE PROVIDED WITH VIBRATION ISOLATORS.

.2 VIBRATION ISOLATION PRODUCTS SHALL BE SUITABLE FOR THE APPLICATION IN ORDER TO ENSURE THAT AVERAGE NOISE CRITERIA AS PUBLISHED BY ASHRAE ARE NOT EXCEEDED.

.3 DUCTWORK CONNECTED TO FANS OR VIBRATING EQUIPMENT SHALL BE PROVIDED WITH FLEXIBLE CANVAS CONNECTIONS. FLEXIBLE DUCTWORK CONNECTIONS SHALL NOT HAVE A METAL GAP MORE THAN 1–1/2" AND BE MORE THAN ½" (12 MM) OUT OF ALIGNMENT FROM THE EQUIPMENT. ENSURE FLEX CONNECTIONS DO NOT IMPEDE AIR FLOW AND ALLOWS MOVEMENT OF THE EQUIPMENT WITHOUT TRANSMITTING VIBRATION TO THE DUCTWORK.

.4 PROVIDE SPRING VIBRATION ISOLATORS ON MOTOR DRIVEN EQUIPMENT WITH MOTORS 0.5 HP (0.37 KW) AND GREATER. PROVIDE NEOPRENE GROMMETS AT SUPPORT POINTS FOR MOTOR DRIVEN EQUIPMENT WITH MOTORS LESS THAN 0.5 HP (0.37KW).

42 GENERAL PLUMBING AND PIPING

.1 REFER TO THE MECHANICAL DRAWINGS FOR THE PIPE AND FITTING MATERIAL SCHEDULE.

.2 AVOID CONTACT BETWEEN DISSIMILAR METALLIC COMPONENTS. PROVIDE DIELECTRIC CONNECTIONS BETWEEN DISSIMILAR METALLIC MATERIALS.

.3 USE ONLY STRAP WRENCHES ON CHROMIUM PLATED PIPING AND FITTINGS. REPLACE ANY SURFACE DAMAGE CAUSED BY WRENCH MARKUPS.

.4 ALL PIPING SYSTEMS, INCLUDING ALL TAKE OFFS, SHALL BE INSTALLED WITHIN THE BUILDING SO THAT THE CONNECTED PIPING AND EQUIPMENT WILL IN NO WAY BE DISTORTED BY EXPANSION, CONTRACTION OR SETTLING.

.5 INSTALL PIPING WITH ALL NECESSARY CHANGES OF DIRECTION, EXPANSION LOOPS, ANCHORS AND GUIDES TO PREVENT OVERSTRESSING THE PIPING AND EQUIPMENT PIPING CONNECTIONS FROM THERMAL EXPANSION AND CONTRACTION.

.6 MAINTAIN MINIMUM 1/2" (12MM) SPACE BETWEEN PIPES, STUDS, ELECTRICAL CONDUITS, ETC. TO AVOID RATTLING. IF CLEARANCE MUST BE REDUCED, UTILIZE ARMAFLEX INSULATION.

.7 PROVIDE ANY EXCAVATIONS NECESSARY FOR THE INSTALLATION OF THE MECHANICAL WORK. DO NOT UNDERTAKE EXCAVATION, CUTTING, BORING, ETC. WORKS WHICH WILL WEAKEN THE STRUCTURE OR CAUSE DAMAGE. OBTAIN THE WRITTEN APPROVAL OF THE PROJECT STRUCTURAL ENGINEER PRIOR TO PROCEEDING.

.8 TRENCHES SHALL BE EXCAVATED SLIGHTLY DEEPER THAN REQUIRED GRADE OF SERVICES IN ORDER TO ALLOW FOR SUFFICIENT SLOPE, BEDDING AND BACKFILL.

.9 PRIOR TO COMMENCING WITH UNDERGROUND INSTALLATIONS, EXCAVATE AND VERIFY:

- .1 THE LOCATION, ELEVATION AND SIZE OF SERVICE CONNECTIONS.
- .2 SUFFICIENTLY SLOPED DRAINAGE ROUTING WITH ADEQUATE COVER.
- .3 ROUTING OF TRAP PRIMER CONNECTIONS.

.10 BACKFILL SERVICES WITH A 6" (150MM) BEDDING AND COVER OF SAND OR PEA GRAVEL WHERE APPROVED. COORDINATE REMAINDER OF BACKFILL REQUIREMENTS WITH THE GENERAL CONTRACTOR. ALL SHALL MEET THE REQUIREMENTS OF THE BURIED SERVICE MATERIAL MANUFACTURER.

.11 ALL WATER PIPING SYSTEMS AND COMPONENTS USED ON CONJUNCTION WITH DOMESTIC WATER SYSTEMS SHALL NOT CONTAIN A WEIGHTED AVERAGE LEAD CONTENT IN EXCESS OF 0.25% AS PER CSA B125.1–2012 AND CSA B125.3–2012. ALL SYSTEMS AND COMPONENTS SHALL BE IN ACCORDANCE WITH NSF 61.

.12 DO NOT INSTALL DOMESTIC WATER PIPING IN EXTERIOR WALLS. WHERE UNAVOIDABLE, FUR OUT CHASES AND PROTECT THE PIPING WITH INSULATION 1.5 TIMES THE R–VALUE OF THE BUILDING INSULATION OF THE ADJACENT WALL CONSTRUCTION.

.13 PROVIDE ISOLATION VALVES AND UNIONS AT ALL EQUIPMENT AND FIXTURES IN AN ACCESSIBLE LOCATION TO ALLOW FOR SHUT OFF AND REMOVAL.

.14 PROVIDE ISOLATION VALVES AS INDICATED ON THE MECHANICAL DRAWINGS, AT BRANCH PIPING TAKE OFFS AND AT THE BASE OF ALL RISERS.

.15 BALL VALVES TO BE FULL PORT OF BRASS CONSTRUCTION WITH BLOW OUT PROOF STEM, CHROME PLATED BRASS.

.16 VALVES TO BE MINIMUM 150 PSI WATER PRESSURE RATING, UNLESS STATED OTHERWISE.

.17 COMPRESSION TYPE FITTINGS SHALL NOT BE PERMITTED UNLESS APPROVED BY THE ENGINEER.

.18 PROVIDE STAINLESS STEEL BELLOWS HAMMER ARRESTORS ON WATER PIPING CONNECTED TO GROUPS OF PLUMBING FIXTURES WITH FAST ACTING/QUICK CLOSING VALVES OR OPERATORS AND AT THE TOP OF ALL DOMESTIC COLD WATER RISERS. HAMMER ARRESTORS TO BE INSTALLED WITH ISOLATION VALVES UPSTREAM TO FACILITATE REPLACEMENT.

.19 PROVIDE BACKFLOW PROTECTION VALVES ON WATER DISTRIBUTION SYSTEMS AS INDICATED ON THE MECHANICAL DRAWINGS AND IN ACCORDANCE WITH CODE REQUIREMENTS, THE "CROSS CONNECTION CONTROL MANUAL" LATEST EDITION AS PUBLISHED BY THE BC CHAPTER OF THE AMERICAN WATER WORKS AND AT THE DIRECTION OF THE AHJ.

.20 BRACE AND SECURE DOMESTIC WATER SERVICES ENTERING THE BUILDING BELOW GRADE. PAINT BELOW GRADE METALLIC DEVICES WITH 2 COATS OF CORROSION RESISTANT BLACK ASPHALT BASE COATING PRIOR TO BACKFILLING.

.21 PIPE ALL VENT CONNECTIONS AND DIFFERENTIAL RELIEF OUTLETS FULL SIZE TO DRAIN.

.22 PROVIDE TEMPERATURE AND PRESSURE RELIEF VALVES AT ALL BOILERS, DOMESTIC WATER HEATERS AND HEATING SOURCES. ALL RELIEF VALVES TO BE ASME RATED AND PIPED WITH FULL OUTLET PIPE SIZE TO DRAIN IN A MANNER TO AVOID SPLASH OVER.

.23 IN ADDITION TO THE PLUMBING CODE REQUIREMENTS PROVIDE CLEANOUTS ON DRAINAGE SYSTEMS AT CHANGES IN DIRECTION, BASE OF RISERS, MAINS EXITING THE BUILDING, FIXTURE DRAINS OF SINKS, WHERE INDICATED ON THE DRAWINGS AND AT REGULAR INTERVALS.

- .1 CLEANOUTS SHALL BE FULL SIZE FOR PIPE UP TO 4" (100MM) AND NOT LESS THAN 4" (100MM) FOR LARGER PIPE SIZES.
- .2 COORDINATE INSTALLATION OF CLEANOUTS WITH MILLWORK AND OTHER ARCHITECTURAL OBSTRUCTIONS SUCH THAT THEY ARE LOCATED FOR EASY ACCESS WITH SUFFICIENT CLEARANCE FOR RODDING AND CLEANING.
- .3 EXTEND CLEANOUTS TO FINISHED FLOOR OR WALLS ABOVE THE MAIN FLOOR.
- .4 CLEANOUTS IN WET FLOOR AREAS SHALL EXTEND TO WALLS, OR BE PROVIDED WITH GASKETED WATERPROOF TOPS.
- .5 CLEANOUTS ON OUTSIDE DRAINS SHALL BE BROUGHT TO GRADE AND ANCHORED IN A CONCRETE COLLAR.

.24 WHERE DRAINS ARE LOCATED OVER AN OCCUPIED AREA, A MEMBRANE CLAMP IS TO BE PROVIDED WITH THE DRAIN FOR A WATERPROOF INSTALLATION.

.25 ALL SANITARY FLOOR, AREA, FUNNEL AND HUB DRAINS SHALL BE PROVIDED WITH AND CONNECTED TO TRAP PRIMERS.

.26 TRAP PRIMERS SHALL BE AUTOMATICALLY ACTIVATED AND CONNECTED TO THE NEAREST COLD WATER PIPING, COMPLETE WITH ISOLATION VALVE.

.27 TERMINATE VERTICAL WASTE STACKS AND RAIN WATER LEADERS IN TWO 45 DEGREE BENDS AT THE BOTTOM OF VERTICAL RUNS.

.28 PROVIDE FLASHING AND COUNTER FLASHING FOR PIPING PASSING THROUGH EXTERIOR BUILDING COMPONENTS.

43 DISINFECTION OF POTABLE WATER SYSTEMS

.1 AT THE COMPLETION OF CONSTRUCTION, OR ON A PHASED MANNER IN CONJUNCTION WITH THE CONSTRUCTION SCHEDULE, THE DOMESTIC WATER SYSTEMS ARE TO BE FLUSHED, AND CLEANED FREE OF SCALE, SEDIMENT, CONSTRUCTION DEBRIS, ETC.

.2 THE CONTRACTOR SHALL MAKE ALLOWANCES FOR ALL VALVES, FITTINGS, PORTS, ETC. TO FACILITATE THE, FLUSHING AND CLEANING PROCESS.

.3 ALL PROCEDURES ARE TO BE IN ACCORDANCE WITH AWWA STANDARDS.

44 PLUMBING FIXTURES

.1 ALL FIXTURES AND EQUIPMENT FOR BARRIER FREE APPLICATIONS SHALL BE PROVIDED IN ACCORDANCE WITH ALL APPLICABLE CODES AND REGULATIONS.

.2 ALL FIXTURES SHALL HAVE A STAMP BEARING CSA OR ULC LISTING.

.3 ALL FIXTURES SHALL BE FREE OF FLAWS OR BLEMISHES. SURFACES SHALL BE CLEAR, SMOOTH, BRIGHT AND HAVE DIMENSIONAL STABILITY.

.4 EXPOSED TRIM, SUPPLIES, TUBING, TRAPS, ESCUTCHEONS, VALVES, ETC. TO FIXTURES SHALL BE CHROME PLATED, UNLESS NOTED OTHERWISE.

.5 PROVIDE WALL CARRIERS FOR WALL HUNG FIXTURES. COORDINATE BACKING AND SUPPORT WITH THE GENERAL CONTRACTOR.

.6 WHERE FIXTURES ARE IN CONTACT WITH WALL AND/OR FLOOR, JOINTS SHALL BE SEALED AND MADE WATERTIGHT.

.7 UNLESS NOTED OTHERWISE VITREOUS CHINA, PORCELAIN ENAMELED AND ACRYLIC FIXTURES FINISHES SHALL BE WHITE.

.8 FIXTURE FITTINGS IN AREAS OTHER THAN PRIVATE WASHROOMS SHALL BE VANDAL RESISTANT.

.9 CONCEALED TRAPS FOR FIXTURES WITHOUT INTEGRAL TRAPS, SUCH AS SINKS, SHALL BE PROVIDED WITH CLEANOUT PLUGS.

.10 PROVIDE FIXTURES FOR BARRIER FREE APPLICATION IN COMPLIANCE WITH CODES AND REGULATIONS.

45 MECHANICAL PIPING

.1 REAM PIPING TO CLEAN SCALE AND DIRT FROM INSIDE AND OUTSIDE SURFACES PRIOR TO INSTALLATION.

.2 PROVIDE ECCENTRIC PIPE REDUCERS TO PREVENT COLLECTION OF AIR POCKETS.

.3 ENSURE NO JOINTS OF DISSIMILAR METALS ARE PROVIDED. BRASS ADAPTORS TO BE PROVIDED WHERE JOINING DISSIMILAR METALS.

.4 PROVIDE 3/4" (20MM) DRAIN VALVES WITH CAP AND CHAIN AT ALL LOW POINTS IN THE PIPING TO ALLOW DRAINAGE OF THE SYSTEM.

55 PIPE HANGERS AND SUPPORT

.1 PIPE HANGERS AND SUPPORTS SHALL BE IN COMPLIANCE WITH ANSI B31.9 AND ANSI B31.1 FOR POWER PIPING AS APPLICABLE. WERE LOCAL REQUIREMENTS PREVAIL THE MORE STRINGENT APPLICATIONS WILL APPLY. ALL SHALL COMPLY WITH THE PIPE MANUFACTURER'S REQUIREMENTS.

.2 FOR NON–COMBUSTIBLE PIPING 3" (75MM) AND LARGER USE STEEL RING AND CLEVIS TYPE HANGERS ATTACHED TO GALVANIZED STEEL RODS.

.3 HANGER RODS TO BE GALVANIZED STEEL CONTINUOUSLY THREADED TYPE.

.4 HANGERS AND SUPPORTS SHALL BE CAPABLE OF WITHSTANDING DEAD LOADS, LIVE LOADS, SUPERIMPOSED DEAD LOADS AND ANY VIBRATION ASSOCIATED WITH THE INSTALLED SYSTEMS.

.5 USE OF PERFORATED METALLIC BAND SUPPORT IS NOT PERMITTED.

.6 HANGERS FOR COPPER PIPING SHALL BE COPPER PLATED AND PLASTIC DIPPED, OR WRAPPED IN POLYKEN TAPE.

.7 PROVIDE SUITABLE HANGERS AND SUPPORTS TO AVOID SAGGING.

.8 PROVIDE PIPING SUPPORT HANGERS WITHIN 12" (300 MM) OF PIPING JOINTS AND TEES.

.9 SUPPORT VERTICAL PIPING AT MINIMUM INTERVALS OF 10 FT (3000MM) AND AT EVERY FLOOR UNLESS NOTED OTHERWISE OR REQUIRED BY THE MANUFACTURER'S REQUIREMENTS.

.10 INSERTS

- .1 PROVIDE PLASTIC INSERTS BETWEEN PIPING AND STEEL STUDS.
- .2 HANGER INSERTS SHALL BE MALLEABLE IRON CASE OR GALVANIZED STEEL SHELL WITH EXPANDER PLUG FOR THREADED CONNECTION WITH LATERAL ADJUSTMENT, TOP SLOT FOR REINFORCING RODS AND LUGS FOR ATTACHING TO FORMS.
- .3 CAST IN PLACE CONCRETE HANGER INSERTS SHALL BE GALVANIZED MALLEABLE IRON OR STEEL TO GRINNELL FIG 281 OR FIG 282 OR UNISTRUT.
- .4 DRILLED CONCRETE INSERTS SHALL BE HILTI MODEL HSL OR HVA.
- .5 ALL INSERTS SHALL BE ICBO APPROVED WITH ICBO DESIGN LOAD RATINGS.
- .6 SIZE HANGER INSERTS TO SUIT THREADED HANGER RODS.

.11 COORDINATE PIPE SUPPORT AND HANGER REQUIREMENTS IN CONJUNCTION WITH SEISMIC RESTRAINT MEASURES LISTED IN THESE SPECIFICATIONS AND AS REQUIRED BY CODE.

.12 MINIMUM PIPE HANGER SPACING SHALL BE AS FOLLOWS:

PIPE SIZE DIA.	HORI. MAX.	SUPPORT ROD
1/2"– 11/2"(12– 40MM)	6'(1800MM)	3/8"(10MM)
2" – 21/2" (50– 65MM)	10'(3000MM)	3/8"(10MM)
3" – 4" (75– 100MM)	12'(3600MM)	5/8"(16MM)
6" – 12" (150– 300MM)	12'(3600MM)	3/4"(20MM)

.13 SIZE OF PIPE HANGERS SHALL ALLOW FOR PIPE INSULATION.

.14 STRAP HANGERS SHALL NOT BE USED.

.15 PIPING INSTALLED ON THE ROOF SHALL BE SUITABLY SUPPORTED BY MEANS OF FLOATING SUPPORT SYSTEMS SIMILAR TO THAT PRODUCED BY "PORTABLE PIPE HANGERS (CANADA) INC" OR "QUICK BLOCKS" SYSTEM. PROVIDE ALL BASES, GALVANIZED STRUCTURAL STEEL FRAMES, GALVANIZED STEEL HANGERS, SUPPORTS, ETC. ROOF PIPING SUPPORTS SHALL TIE INTO THE ROOFING SYSTEM WHERE DETAILED BY THE PROJECT ARCHITECT. ALL SHALL BE TO THE APPROVAL OF THE CONTRACTOR'S SEISMIC ENGINEER'S REQUIREMENTS.

.16 DO NOT SUPPORT PIPING FROM STEEL DECK WITHOUT WRITTEN APPROVAL FROM THE ENGINEER.

.17 ALL BELOW GRADE PIPING SUPPORT, ATTACHMENTS, NUTS, BOLTS, ETC SHALL BE OF STAINLESS STEEL CONSTRUCTION.

46 NATURAL GAS SYSTEMS

.1 ALL INSTALLATIONS SHALL BE IN ACCORDANCE WITH CAN/CSA–B149.1 "NATURAL GAS AND PROPANE INSTALLATION CODE" LATEST ADOPTED VERSION.

.2 PROVIDE REGULATING VALVES AT EQUIPMENT/APPLIANCE CONNECTIONS WHERE NOT PROVIDED BY THE MANUFACTURER.

.3 PROVIDE REGULATING AND RELIEF VALVE VENTING TO ATMOSPHERE IN ACCORDANCE WITH CODE AND REGULATION REQUIREMENTS.

.4 PROVIDE 6" (150MM) DRIP POCKETS WHERE SHOWN, AT THE BOTTOM OF VERTICAL RISERS AND AT PIPING LOW POINTS.

.5 FOR UNDERGROUND SERVICES PROVIDE A CONTINUOUS 3" (75MM) WIDE YELLOW PVC WARING TAPE WITH "CAUTION – GAS LINE BURIED BELOW" WORDING AT 30" (750MM) INTERVALS, LOCATED ABOVE THE PIPE APPROXIMATELY 12" (300MM) BELOW GRADE.

.6 REGULATING VALVES FOR INDOOR APPLIANCES SHALL USE LEVER ACTING DESIGN, DEAD END LOCKUP TYPE WITH A VENT LIMITER, SELF–ALIGNING VALVE, DIE CAST ALUMINIUM HOUSING, SYNTHETIC RUBBER COMPOUND DIAPHRAGM, MOUNTED IN A HORIZONTAL UPRIGHT POSITION. REGULATOR VALES SHALL NOT REQUIRE VENTING TO ATMOSPHERE.

.7 REGULATING VALVES FOR OUTDOOR APPLIANCES SHALL USE SPRING LOADED SELF–OPERATED DESIGN, TIGHT CLOSING, CAST IRON BODY WITH CORROSIVE RESISTANT EPOXY ENAMEL, ALUMINUM DIAPHRAGM AND SPRING CASE WITH NITRILE DIAPHRAGM. PROVIDE 1/4" (6MM) TEST PORTS UPSTREAM AND DOWNSTREAM OF REGULATOR ASSEMBLIES. EXTEND VENT PIPING A MINIMUM 10 FT (3000MM) FROM AIR INTAKES AND BUILDING OPENINGS. VENT TERMINATIONS SHALL BE COMPLETE WITH A DOWN TURN FITTING AND BRONZE BUG SCREEN.

47 FIRE STOPPING

.1 ALL PIPE PENETRATIONS PASSING THROUGH FIRE SEPARATIONS SHALL BE PROVIDED WITH A LISTED FIRE STOPPING ASSEMBLY MEETING OR EXCEEDING THE FIRE RESISTIVE RATING OF THE PENETRATING SURFACE. ALL FIRE STOPPING ASSEMBLIES SHALL BEAR A CSA OR ULC LISTING.

.2 FIRE STOPPING ASSEMBLIES SHALL BE TESTED IN ACCORDANCE WITH CAN4–S115–M85 STANDARD METHOD OF FIRE TESTS OF FIRESTOP SYSTEMS, CAN/ULC–S101, AND IN ACCORDANCE WITH THE APPLICABLE BUILDING CODE/BUILDING BYLAW. ALL TO BE CAPABLE OF MAINTAINING AN EFFECTIVE BARRIER AGAINST FLAME, SMOKE AND GASES IN ACCORDANCE WITH THE TESTING STANDARDS.

.3 CONTRACTOR SHALL PROVIDE FIRE STOPPING WITH APPLICABLE TEMPERATURE RATINGS TO SUIT THE APPLICATION.

.4 FIRE STOPPING MATERIALS SHALL BE FREE OF ASBESTOS CONTAINING MATERIALS.

.5 MAINTAIN A SAMPLE OF FIRE STOPPING MATERIALS ON SITE FOR REVIEW BY THE ENGINEER.

.6 ALL FIRE STOPPING SHALL BE INSTALLED AS PER THE MANUFACTURER'S REQUIREMENTS. PROVIDE ALL FASTENERS, STAPLES, MINERAL FIBRE, SEALANT, TAPES, ADHESIVES, COATINGS, FRAMES, ETC. TO COMPRISE A COMPLETE INSTALLATION.

.7 WHERE THE TOTAL SIZE OF HOLES IN FIRE RATED WALLS EXCEEDS $645\ MM^2$ ($20\ IN^2$), THE CONDITION IS UNACCEPTABLE AND MUST BE PATCHED WITH FIRE RATED DRYWALL OR SIMILAR TO MAINTAIN THE REQUIRED FIRE RESISTANCE RATING.

.8 UPON REQUEST BY THE ENGINEER, THE CONTRACTOR SHALL REMOVE UP TO [4] FIRE STOPPING ASSEMBLY LOCATIONS FOR RANDOM REVIEW. UPON REVIEW THE CONTRACTOR SHALL REINSTALL THE ASSEMBLIES AT NO COST TO THE CLIENT. SHOULD THE REVIEWED LOCATIONS BE FOUND IN NON–COMPLIANCE WITH MANUFACTURER OR CODE REQUIREMENTS ADDITIONAL LOCATIONS MAY BE REQUESTED BY THE ENGINEER FOR DISASSEMBLY, REVIEW AND REASSEMBLY, ALL AT THE CONTRACTOR'S COST.

.9 FIRE STOPPING SHALL HAVE F, FT, FH AND/OR FTH RATINGS IN ACCORDANCE WITH THE PROJECT REQUIREMENTS.

48 CONTROLS

.1 PROVIDE A COMPLETE AND OPERATIONAL CONTROLS SYSTEM IN ACCORDANCE WITH THE MECHANICAL DRAWINGS, SPECIFICATIONS AND PROJECT REQUIREMENTS.

.2 CONTROL SYSTEMS ARE TO GENERALLY BE AS INDICATED ON THE DRAWINGS, CONTROL DIAGRAMS, WITHIN THE SPECIFICATIONS AND ARE TO HAVE ALL ELEMENTS THEREIN INDICATED OR IMPLIED.

.3 THE CONTROLS DRAWINGS, DIAGRAMS AND DESCRIPTIONS SHOW ONLY THE PRINCIPAL COMPONENTS CONTROLLING THE EQUIPMENT AND SYSTEMS. SUPPLEMENT EACH CONTROL SYSTEM WITH RELAYS, TRANSFORMERS, SENSOR, ETC REQUIRED TO ENABLE EACH SYSTEM TO PERFORM AS SPECIFIED AND TO PERMIT PROPER OPERATION AND SUPERVISION.

.4 THE CONTROL SYSTEM INSTALLATION COMPANY SHALL HAVE LOCAL PARTS AND SERVICE ABILITY ON A 24/7 BASIS.

.5 THE CONTROLS SCOPE OF WORK SHALL INCLUDE ALL REQUIRED SERVICE AND SUPPORT UNTIL THE END OF THE WARRANTY/GUARANTEE PERIOD. INCLUDE INTERNET SUPPORT AS REQUESTED BY THE CLIENT IN ORDER TO SOLVE OCCUPANT COMFORT ISSUES AND EQUIPMENT PERFORMANCE DIAGNOSIS AND PROBLEM RESOLUTION.

.6 RESPONSE TIME FOR ON–SITE REPAIR/REPLACEMENT OF CONTROLS COMPONENTS WITHIN THE WARRANTY/GUARANTEE PERIOD SHALL BE WITHIN 24 HOURS OF THE CLIENT'S REQUEST.

.7 ALL CONTROLS WORK SHALL BE UNDERTAKEN BY A BASE BUILDING APPROVED CONTROLS CONTRACTOR.

.8 THE CONTROLS SYSTEM SHALL BE COMMISSIONED AND FULLY OPERATIONAL PRIOR TO THE PROJECT BEING DEEMED COMPLETE.

.9 PROVIDE ALL REQUIRED HARDWARE AND SOFTWARE TO COMPRISE A COMPLETE AND OPERATIONAL CONTROLS SYSTEM.

.10 ALL CONTROLS SWITCHGEAR TO BE PROVIDED WITH LAMACOID LABELLING.

.11 CONTROLS WORK AND WIRING ABOVE 24V SHALL BE COMPLETED BY AN APPROVED ELECTRICAL TRADE. LOW VOLTAGE WIRING SHALL BE BY THE CONTROLS CONTRACTOR.

.12 ALL CONTROLS WIRING TO BE INSTALLED WITHIN CONDUITS, UNLESS NOTED OTHERWISE. THE FINAL 24" (600MM) CONNECTION TO SENSORS AND TRANSMITTERS, AND WHERE WIRING EXTENDS ACROSS FLEXIBLE DUCT CONNECTIONS, SHALL BE PROVIDED WITH LIQUID TIGHT CONDUIT.

.13 CONTROL WIRING AND SYSTEMS WITHIN CEILING SPACES AND WALL CAVITIES SHALL BE PLENUM RATED FOR THE APPLICATION.

.14 ALL NEW AND EXISTING THERMOSTATS/TEMPERATURE SENSORS WITHIN THE PROJECT AREA SHALL BE CHECKED AND CALIBRATED.

.15 THERMOSTATS/ROOM TEMPERATURE SENSORS SHALL BE MOUNTED 5FT (1500MM) ABOVE THE FINISHED FLOOR, UNLESS NOTED OTHERWISE. THERMOSTATS INTENDED TO BE OPERATED BY THE OCCUPANTS SHALL BE MOUNTED 47" (1200MM) ABOVE THE FINISHED FLOOR IN ACCORDANCE WITH BARRIER FREE ACCESS AND SHALL BE INSTALLED IN AN ACCESSIBLE PATH OF TRAVEL.

.16 INSTALL VANDAL RESISTANT THERMOSTATS IN PUBLIC AREAS.

.17 CONTROL DAMPERS FOR MODULATING AND MIXING APPLICATIONS SHALL BE PARALLEL BLADE TYPE. DAMPERS FOR OPEN/CLOSED APPLICATIONS SHALL BE OPPOSED BLADE TYPE. MAXIMUM BLADE LENGTH SHALL BE 48" (1200MM).

.18 MOTORIZED DAMPER MOTORS SHALL BE SIZED TO CONTROL THE DAMPER AGAINST MAXIMUM PRESSURE OR DYNAMIC CLOSING PRESSURE, WHICHEVER IS GREATER.

.19 MOTORIZED DAMPERS CONNECTED TO THE BUILDING FIRE ALARM SYSTEMS OR FREEZE PROTECTION MEASURES SHALL BE EQUIPPED TO PERMIT DAMPERS TO RESPOND AND MOVE TO THE REQUIRED POSITION WITHIN 15 SECONDS FROM RECEIPT OF SIGNAL.

.20 MOTORIZED DAMPER OPERATORS, SEALS AND RATINGS SHALL BE SUITABLE FOR THE ENVIRONMENT IN WHICH THEY ARE LOCATED.

.21 CONTROLS SHALL OPERATE MOTORIZED DAMPERS OPEN ON OUTDOOR AIR INTAKES AND EXHAUST OPENINGS PRIOR TO ENABLING THE ASSOCIATED FAN SYSTEM. DAMPERS TO CLOSE UPON SYSTEM SHUT DOWN.

49 FIRE PROTECTION

.1 FIRE PROTECTION AND SPRINKLER INSTALLATIONS SHALL BE UNDERTAKEN BY AN APPROVED BASE BUILDING AND LICENCED TRADE.

.2 FIRE PROTECTION AND SPRINKLER INSTALLATIONS SHALL BE IN ACCORDANCE WITH NFPA 10, 13 AND 14.

.3 FIRE PROTECTION AND SPRINKLER INSTALLATIONS SHALL BE IN ACCORDANCE WITH BASE BUILDING STANDARDS AND CLIENT'S REQUIREMENTS.

.4 THE EXISTING FIRE PROTECTION SYSTEMS SHALL BE MAINTAINED THROUGHOUT THE COURSE OF THE PROJECT, INCLUDING ALARMS, STAND PIPES, AND SAFETY COMPONENTS.

.5 SHOULD THE SYSTEM REQUIRE TO BE SHUT DOWN, THE CONTRACTOR SHALL COORDINATE ALL DATES, TIMES AND DURATIONS WITH THE CLIENT AND BUILDING OPERATIONS. THE CONTRACTOR SHALL OBTAIN APPROVALS FOR SYSTEM SHUT DOWNS IN WRITING PRIOR TO PROCEEDING.

.6 THE CONTRACTOR SHALL ARRANGE FOR AND MAINTAIN A FIRE WATCH DURING ALL SYSTEM SHUT DOWNS.

.7 NO SYSTEM SHUT DOWNS SHALL BE PERMITTED OVERNIGHT.

.8 SLOPE HORIZONTAL PIPING SO THAT IT MAY BE COMPLETELY DRAINED. PROVIDE CAPPED DRAIN POINTS AT ALL SYSTEM LOW POINTS TO FACILITATE COMPLETE DRAINING.

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PROJECT STATUS

GLOBAL REVISIONS LIST*

NO.	DATE	DESCRIPTION
1	22-10-2024	ISSUE FOR REVIEW
2	31-10-2024	ISSUE FOR OWNER REVIEW
3	18-11-2024	FINAL COORDINATION
4	03-12-2024	ISSUE FOR BUILDING PERMIT
5	20-12-2024	ISSUE FOR TENDER
6	24-01-2025	ISSUE FOR RFP

*Sheet changes clouded and tagged respectively.

Project Number
24590-M

Project
CITY OF COQUITLAM AUSTIN WORKS YARD
51104 FMB REPURPOSE - HVAC UPGRADE
500 MARINER WAY, COQUITLAM, BC V3K7B6

Sheet Number
M5.1

Drawing
MECHANICAL SPECIFICATIONS

Plot Date: 2024-10-09 Scale: N.T.S.