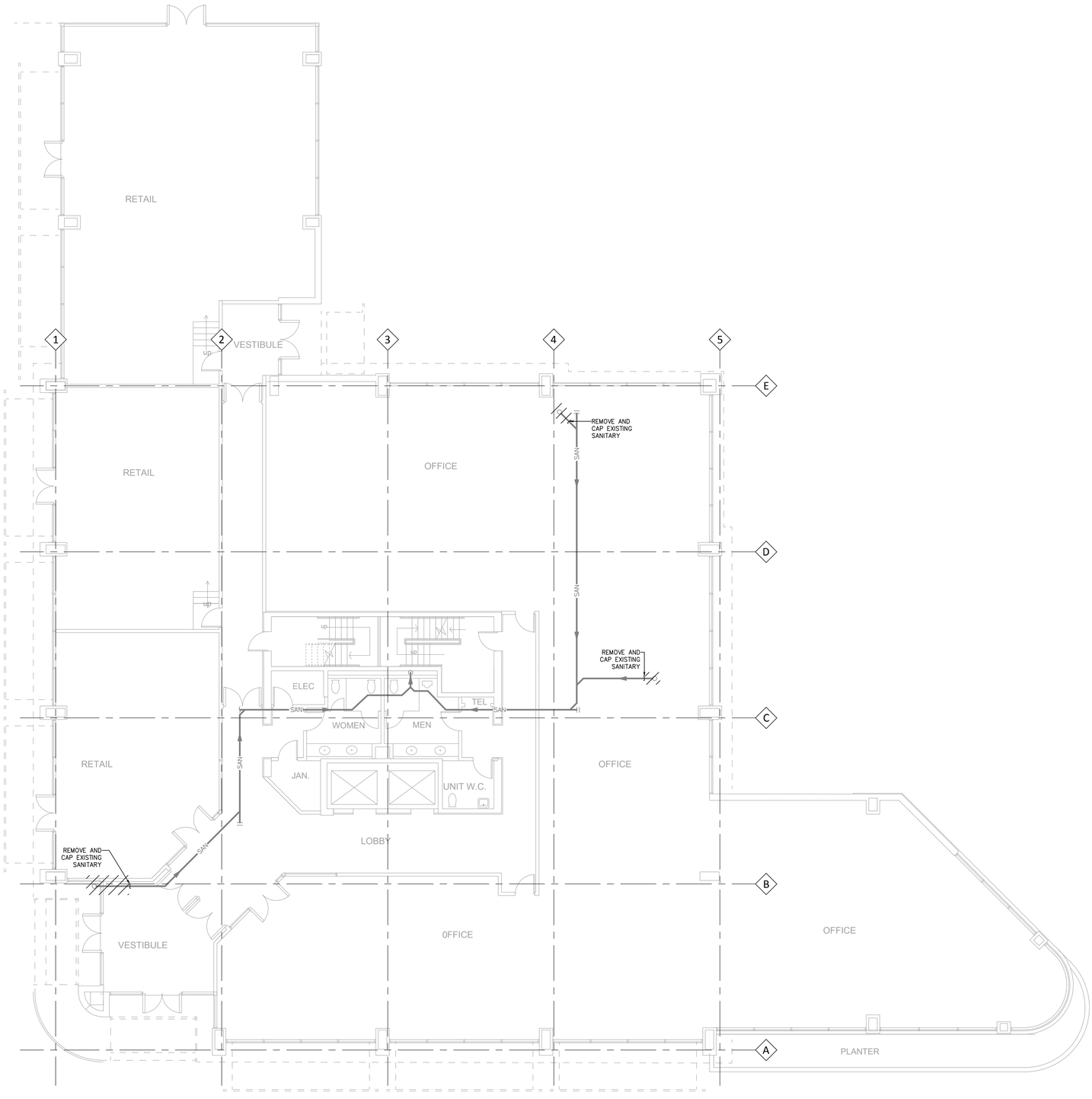

1 / M1.0 GROUND FLOOR DEMOLITION PLAN – PLUMBING
1:100

DRAWING LIST

DWG #	TITLE
M1.0	GROUND FLOOR DEMOLITION PLAN – PLUMBING
M1.1	GROUND FLOOR RENOVATION PLAN – PLUMBING/MECHANICAL
M2.0	SECOND FLOOR DEMOLITION AND RENOVATION PLANS – PLUMBING
M3.0	SECOND FLOOR RENOVATION PLAN – FIRE PROTECTION
M4.0	SECOND FLOOR DEMOLITION AND RENOVATION PLANS – HVAC
M5.0	MECHANICAL SCHEDULES AND DETAILS
M6.0	MECHANICAL SPECIFICATIONS
M6.1	MECHANICAL SPECIFICATIONS

PIPE SIZE CONVERSION TABLE

DIAMETER NOMINAL DN (mm)	NOMINAL PIPE SIZE NPS (in)
6	¼
10	⅜
12	½
20	¾
25	1
32	1¼
40	1½
50	2
65	2½
75	3
100	4
150	6

SYMBOL SCHEDULE

- ELBOW DOWN
- ELBOW UP
- TEE DOWN
- TEE UP
- FLOW DIRECTION
- P–TRAP
- GATE VALVE
- BALL VALVE
- PLUG VALVE
- CHECK VALVE
- BALANCING VALVE
- 2–WAY CONTROL VALVE
- 3–WAY CONTROL VALVE
- PRESSURE REDUCING VALVE
- STRAINER
- BACKFLOW DEVICE
- PIPE BREAK
- CLEANOUT AT GRADE
- PIPE CAP
- PIPE UNION
- HOSE BIB
- PUMP
- RELIEF VALVE
- AIR VENT
- PRESSURE GAUGE
- THERMOMETER
- DIFFERENTIAL PRESSURE REGULATOR
- PIPE TO DRAIN
- FLOOR DRAIN
- FUNNEL FLOOR DRAIN
- SAN — SANITARY DRAIN
- ST — STORM DRAIN
- SAN — SANITARY – BELOW GRADE
- ST — STORM – BELOW GRADE
- X — DRAIN TILE (PERFORATED)
- G — GAS – PROPANE
- V — SANITARY VENT
- DOMESTIC COLD WATER
- DOMESTIC HOT WATER
- DOMESTIC HOT WATER RECIRC.
- HWS — HEATING WATER SUPPLY
- HWR — HEATING WATER RETURN
- RS — REFRIGERANT SUPPLY
- RR — REFRIGERANT RETURN
- SUPPLY AIR DUCT
- RETURN AIR DUCT
- EXHAUST AIR DUCT
- ROUND DUCT BREAK
- DUCT ACOUSTIC INSULATION
- SQUARE ELBOW WITH TURNING VANES
- ROUND ELBOW, r/W = 1.5
- ROUND DUCT UP
- ROUND DUCT DOWN
- FLOOR GRILLE
- BALANCING DAMPER
- SUPPLY AIR DIFFUSER / GRILLE
- RETURN GRILLE
- EXHAUST GRILLE
- CABINET EXHAUST FAN
- FIRE DAMPER IN VERTICAL DUCT
- FIRE DAMPER IN HORIZONTAL DUCT
- AIRFLOW DIRECTIONAL ARROW
- THERMOSTAT
- 3 / M101 — DETAIL DESIGNATION / DRAWING TO FIND DETAIL
- # — EQUIPMENT IDENTIFIER – REFER TO EQUIPMENT SCHEDULES FOR NEW EQUIPMENT.
- GRILLE TYPE – REFER TO EQUIPMENT SCHEDULES.
- INLET SIZE
- AIRFLOW (CFM)
- INV. ___.__' — PIPE INVERT RELATIVE TO REFERENCE FLOOR ELEVATION

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GLOBAL REVISIONS LIST

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1	2018.11.02	ISSUED FOR SPSC REVIEW
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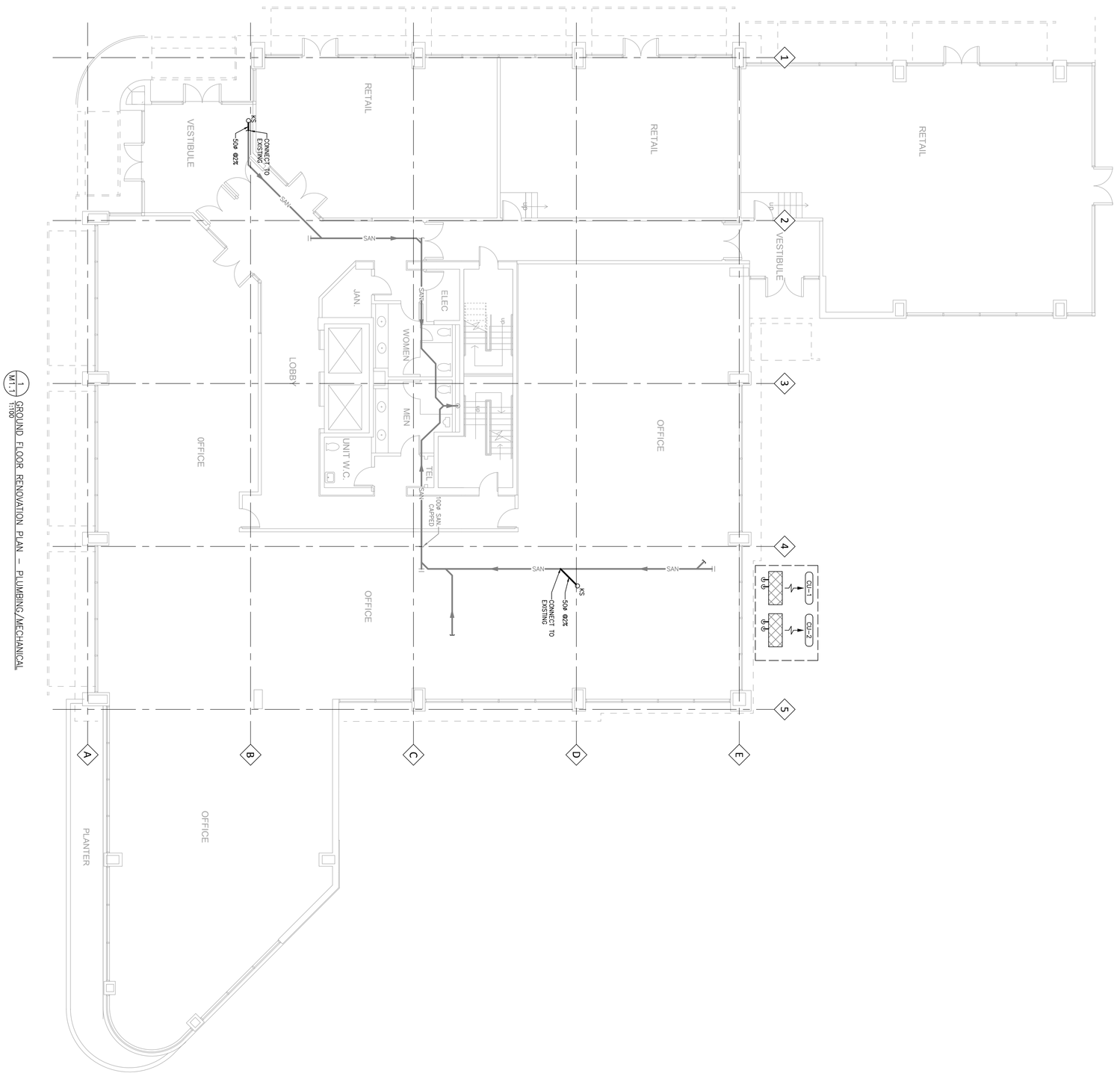
Project: **FIRST NATION HEALTH AUTHORITY OFFICE TI RENOVATION, PRINCE GEORGE**
177 VICTORIA STREET, PRINCE GEORGE, BC

Project Number: **18263**

Drawing: **GROUND FLOOR DEMOLITION PLAN PLUMBING**

Sheet Number: **M1.0**



Project Number	Project
18263	FIRST NATION HEALTH AUTHORITY OFFICE TI RENOVATION, PRINCE GEORGE 177 VICTORIA STREET, PRINCE GEORGE, BC
Sheet Number	Drawing
M1.1	GROUND FLOOR RENOVATION PLAN PLUMBING/MECHANICAL

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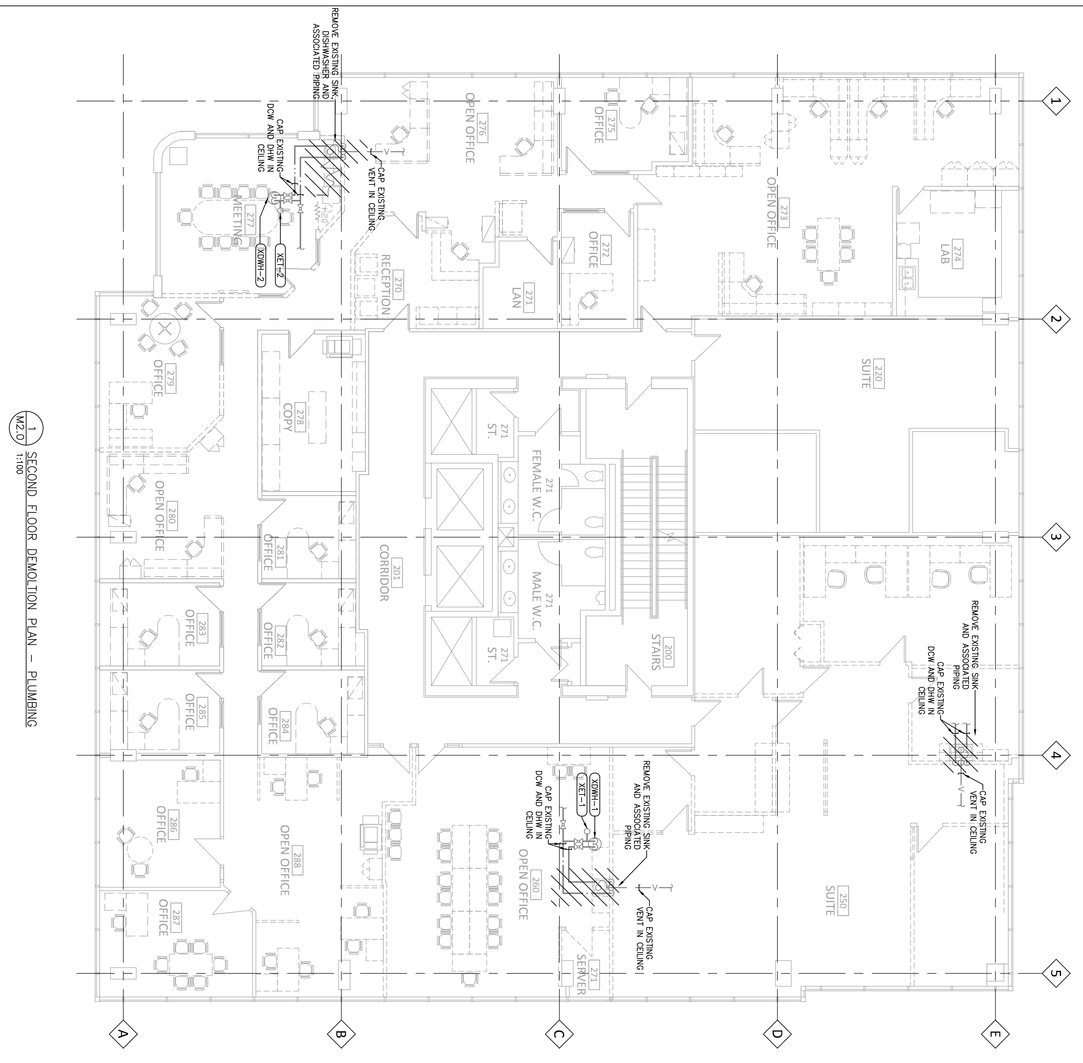
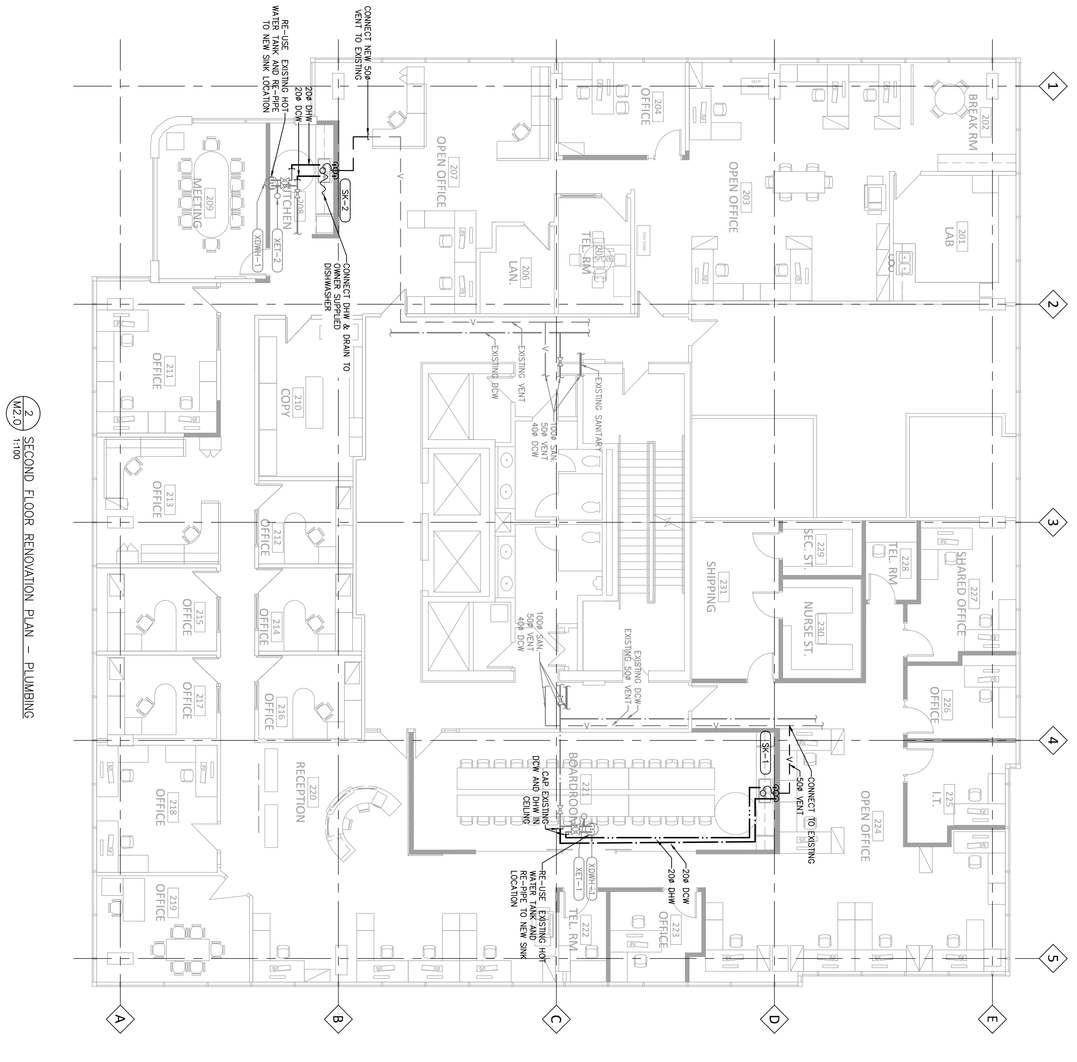


1 M2.0 1:100 SECOND FLOOR DEMOLITION PLAN – PLUMBING



2 M2.0 1:100 SECOND FLOOR RENOVATION PLAN – PLUMBING

Project Number	Project
18263	FIRST NATION HEALTH AUTHORITY OFFICE TI RENOVATION, PRINCE GEORGE 177 VICTORIA STREET, PRINCE GEORGE, BC
Sheet Number	Drawing
M2.0	SECOND FLOOR DEMOLITON AND RENOVATION PLANS - PLUMBING

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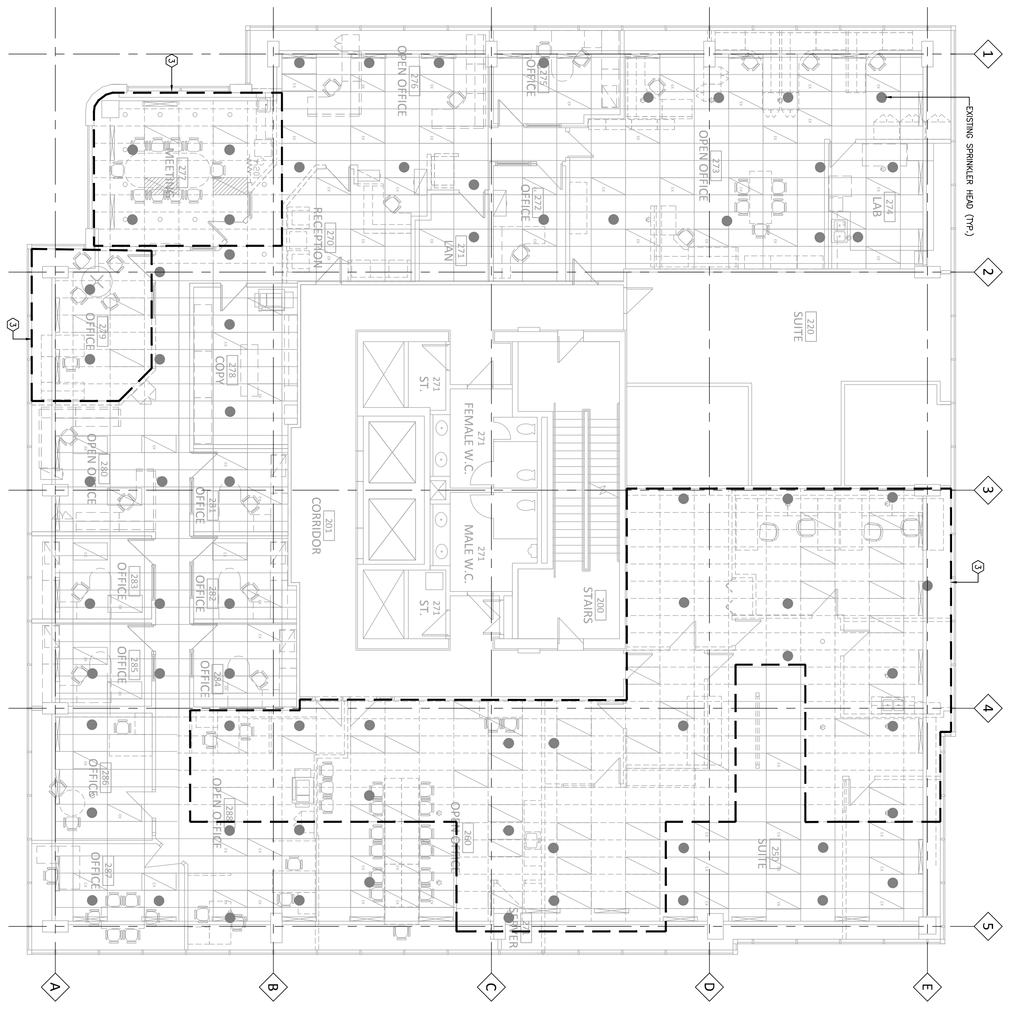
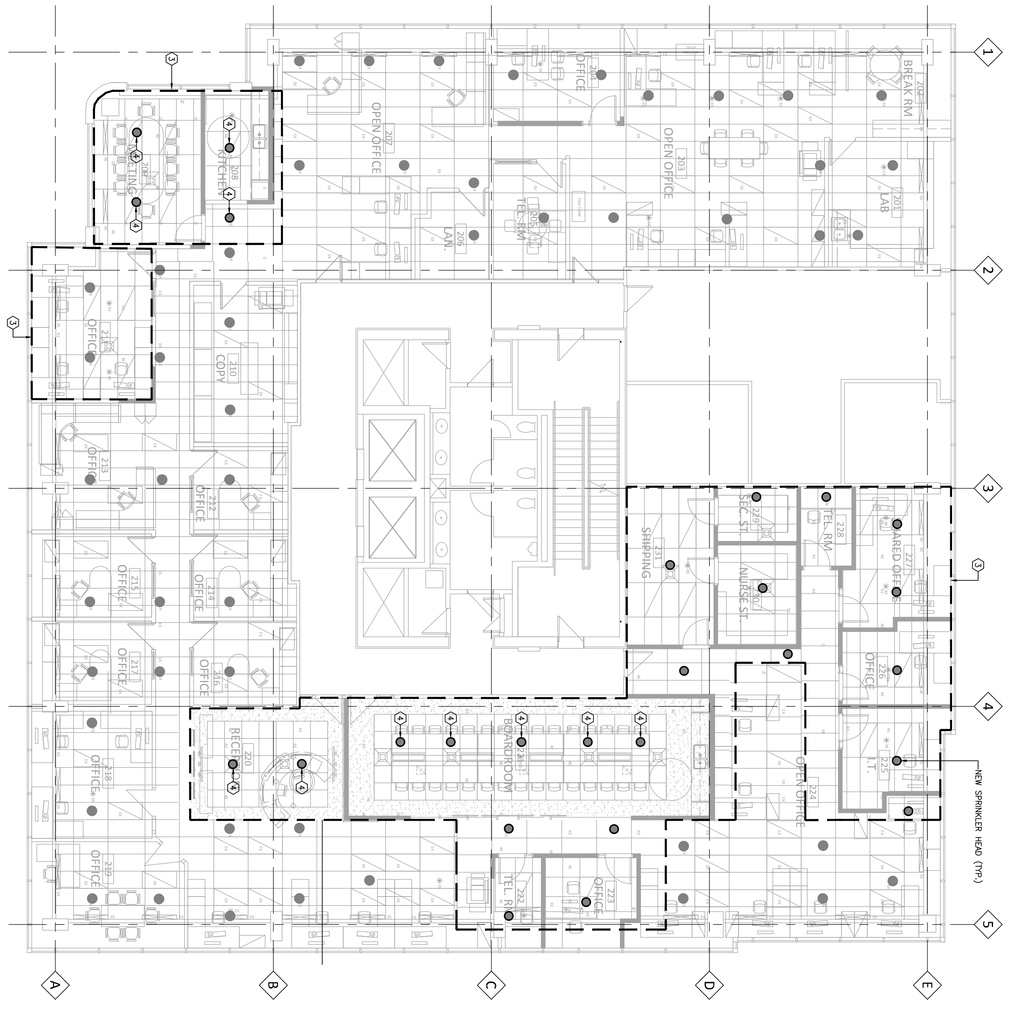
KEYED NOTES:

1. THE HEAD LAYOUTS, PIPING, AND COMPONENTS SHOWN HAVE BEEN SHOWN FOR GENERAL COORDINATION PURPOSES ONLY. THERE SHALL BE NO ADDITIONAL COST TO THE CLIENT FOR ADDITIONAL HEADS THAT ARE REQUIRED.
2. SPRINKLER HEAD LOCATION SHALL SUBJECT TO APPROVAL BY THE ARCHITECT. PROVIDE ADDITIONAL HEADS UNDER OBSTRUCTIONS TO MEET CODE.
3. EXISTING SUSPENDED TEE BAR CEILINGS ARE REMOVED IN THESE AREAS FOR NEW ELECTRICAL ROUGH-IN. ADJUST EXISTING SPRINKLER PIPING AS REQUIRED TO SUIT NEW CEILING
4. PROVIDE NEW FLUSH MOUNTED SPRINKLER HEADS IN KITCHEN, MEETING ROOM, BOARDROOM, AND RECEPTION AREAS.



1 / M3.0 SECOND FLOOR DEMOLITION PLAN — FIRE PROTECTION
1:100



1 / M3.0 SECOND FLOOR RENOVATION PLAN — FIRE PROTECTION
1:100

Project Number	Project
18263	FIRST NATION HEALTH AUTHORITY OFFICE TI RENOVATION, PRINCE GEORGE 177 VICTORIA STREET, PRINCE GEORGE, BC
Sheet Number	Drawing
M3.0	SECOND FLOOR DEMOLITION AND RENOVATION PLAN - FIRE PROTECTION

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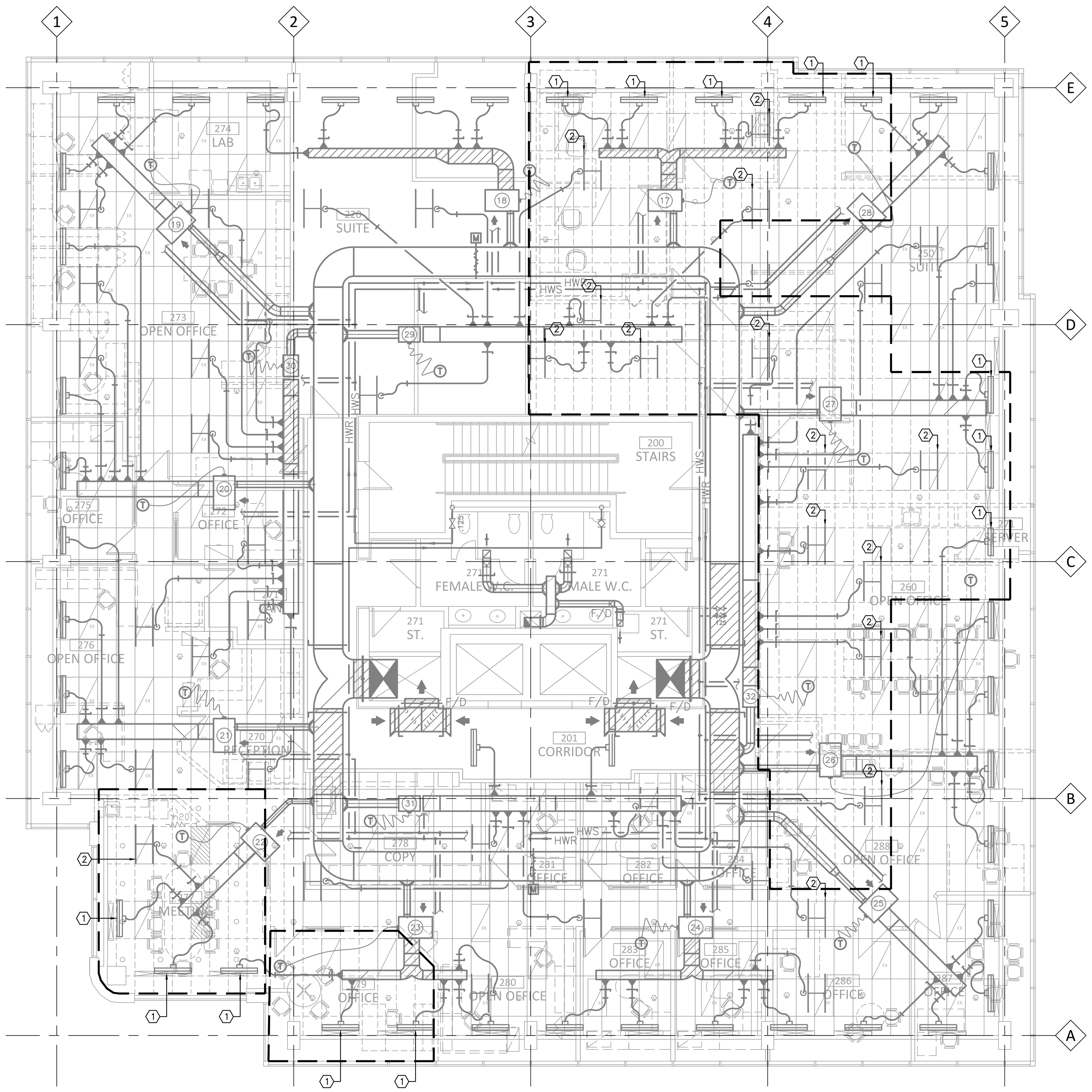
KEYED NOTES:

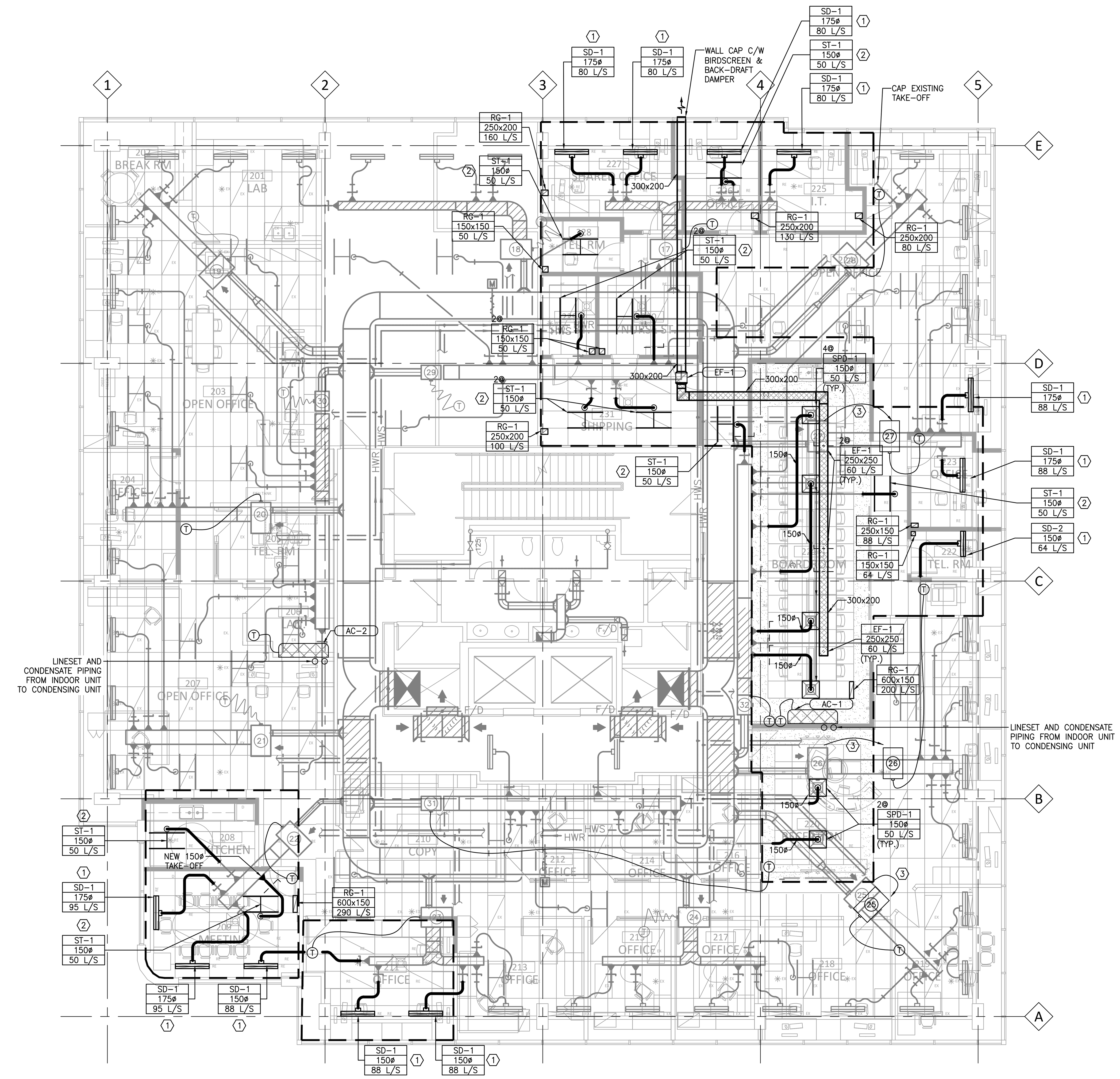
1. REMOVE EXISTING LINEAR DIFFUSER AND REPLACE IN NEW SUSPENDED CEILING
2. REMOVE EXISTING SUPPLY TROFFER AND REPLACE IN NEW SUSPENDED CEILING
3. RELOCATE EXISTING VAV BOXES C/W CONTROLS AND NEW DUCTWORK SO THAT VAV BOXES ARE NOT LOCATED AT PARTITION WALLS. BOXES ARE TO BE RELOCATED OUTSIDE OF THE BOARDROOM & RECEPTIONS AREA. ALL COMPONENTS REQUIRED FOR SERVICING SHALL BE ACCESSABLE.

GENERAL NOTES:

1. ALL EXISTING THERMOSTATS SHALL BE RELOCATED AS REQUIRED FOR NEW LAYOUT.
2. ALL EXISTING TROFFERS SHALL BE RELOCATED AS REQUIRED FOR NEW LAYOUT.



1 M4.0 SECOND FLOOR DEMOLITION PLAN – HVAC
1:100



2 M4.0 SECOND FLOOR RENOVATION PLAN – HVAC
1:100

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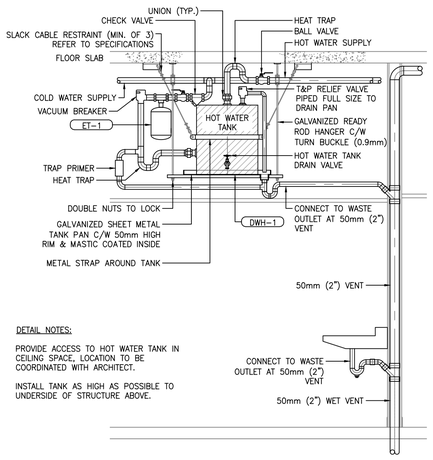
Project Number	Project
18263	**FIRST NATION HEALTH AUTHORITY OFFICE TI RENOVATION, PRINCE GEORGE** 177 VICTORIA STREET, PRINCE GEORGE, BC
Sheet Number	Drawing
M4.0	**SECOND FLOOR DEMOLITION AND RENOVATIONS PLANS - HVAC**



1 / M5.0 DOMESTIC HOT WATER TANK DETAIL
NTS

2 / M5.0 DISHWASHER CONNECTION DETAIL
NTS

3 / M906 DIFFUSER CONNECTION DETAIL
SCALE: N.T.S.

PLUMBING FIXTURE SCHEDULE

FIXTURE TAG	LOCATION	DESCRIPTION
SK-1	BOARDROOM 221	KINDRED MODEL "LBD6408P-1/1" S.S. DOUBLE COMPARTMENT SINK, 1x FAUCET HOLE, 20-1/2"x31-1/4"x8", COUNTER MOUNTED, BACK LEDGE, 18GA. 18-10 S.S., CRUMB CUP AND 3-1/2" WASTE ASSEMBLY, EXPOSED SURFACES W/ SATIN BOWL FINISH, FULLY UNDERCOATED, KOHLER FAUCETS MALLECO PULL-DOWN KITCHEN SINK FAUCET MODEL# K-R562-SD SINGLE HANDLE FAUCET, 6.8 LPM (1.8 GPM) OUTLET, PULL-OUT SPRAY. LAWLER #TMM-1070, BELOW DECK MECHANICAL WATER MIXING VALVE, BRONZE BODY, TEMPERATURE ADJUSTING DIAL, 10 MM (3/8") INLETS AND OUTLET COMPRESSION FITTINGS, HIGH TEMPERATURE THERMOSTATIC LIMIT STOP, SHUT-OFF WITH AUTOMATIC RESET WHEN TEMPERATURE EXCEEDS 120 °F (48.8 °C), INTEGRAL CHECKS, OFFER TEMPERATURE RANGE FROM FULL COLD THROUGH 46 °C (114.8 °F). NOTE : PROVIDE TEE, ADAPTORS AND FLEX. COPPER TUBING TO SUIT INSTALLATION. PROVIDE TEMPERED WATER TO HOT SIDE OF FAUCET. MCGUIRE #LFBV170 FAUCET SUPPLIES, CHROME PLATED FINISH POLISHED BRASS, COMMERCIAL DUTY 1/4 TURN BALL VALVE ANGLE STOPS, 13 MM (1/2") I.D. INLET X 127 MM (5") HORIZONTAL EXTENSION TUBES, CONVERTIBLE 1/4 TURN/LOOSE KEY HANDLES, ESCUTCHEON AND FLEXIBLE COPPER RISERS. MCGUIRE #8912CB P-TRAP, HEAVY CAST BRASS ADJUSTABLE BODY, WITH SLIP NUT, 38 MM (1-1/2") SIZE, BOX FLANGE AND SEAMLESS TUBULAR WALL BEND.
SK-2	KITCHEN 208	KINDRED MODEL "LBD6408P-1/1" S.S. DOUBLE COMPARTMENT SINK, 1X FAUCET HOLE, 20-1/2"X31-1/4"X8", COUNTER MOUNTED, BACK LEDGE, 18GA. 18-10 S.S., CRUMB CUP AND 3-1/2" WASTE ASSEMBLY, EXPOSED SURFACES W/ SATIN BOWL FINISH, FULLY UNDERCOATED, KOHLER FAUCETS MALLECO PULL-DOWN KITCHEN SINK FAUCET MODEL# K-R562-SD SINGLE HANDLE FAUCET, 6.8 LPM (1.8 GPM) OUTLET, PULL-OUT SPRAY. LAWLER #TMM-1070, BELOW DECK MECHANICAL WATER MIXING VALVE, BRONZE BODY, TEMPERATURE ADJUSTING DIAL, 10 MM (3/8") INLETS AND OUTLET COMPRESSION FITTINGS, HIGH TEMPERATURE THERMOSTATIC LIMIT STOP, SHUT-OFF WITH AUTOMATIC RESET WHEN TEMPERATURE EXCEEDS 120 °F (48.8 °C), INTEGRAL CHECKS, OFFER TEMPERATURE RANGE FROM FULL COLD THROUGH 46 °C (114.8 °F). NOTE : PROVIDE TEE, ADAPTORS AND FLEX. COPPER TUBING TO SUIT INSTALLATION. PROVIDE TEMPERED WATER TO HOT SIDE OF FAUCET. MCGUIRE #LFBV170 FAUCET SUPPLIES, CHROME PLATED FINISH POLISHED BRASS, COMMERCIAL DUTY 1/4 TURN BALL VALVE ANGLE STOPS, 13 MM (1/2") I.D. INLET X 127 MM (5") HORIZONTAL EXTENSION TUBES, CONVERTIBLE 1/4 TURN/LOOSE KEY HANDLES, ESCUTCHEON AND FLEXIBLE COPPER RISERS. MCGUIRE #8912CB P-TRAP, HEAVY CAST BRASS ADJUSTABLE BODY, WITH SLIP NUT, 38 MM (1-1/2") SIZE, BOX FLANGE AND SEAMLESS TUBULAR WALL BEND.

FAN SCHEDULE

FAN No.	SERIVCE	LOCATION	MANUFACTURER	MODEL No.	AIR FLOW (L/S)	TOTAL STATIC PRESS. (Pa)	MOTOR (W)	RPM	ELECTRICAL (V/Ph/Hz)	TYPE	REMARKS
EF-1	BOARDROOM 221	CEILING	GREENHECK	SQ-95-VG	180	62	124.3	1725	120/1/60	INLINE	CONTROLLED BY TIMER SWITCH

AC UNIT SCHEDULE

TAG No.	MANUFACTURER	MODEL No.	AIR		HEATING CAPACITY (MBH)	TOTAL COOLING (kW)	MOTOR		REMARKS
			S/A FLOW (L/S)	EXT. PRESS. DROP (in. H2O)			ELECTRICAL (V/Ph/Hz)	MCA	
AC-1	LG	LSN120HSV4	167/128/90	–	–	3.28	208/1/60	–	1,2,3
AC-2	LG	LSN090HSV5	160/150/110	–	–	3.0	208/1/60	–	1,2,3

REMARKS:
1. ELECTRIC POWER SUPPLIED BY THE OUTDOOR UNIT.
2. MAX PIPING LENGTH 100FT.
3. CONDENSATE DRAIN PUMP WITH FLOW SWITCH AND DRAIN LINE UP TO CONDENSING UNIT LOCATED ON GROUND LEVEL.

CONDENSING UNIT SCHEDULE

TAG No.	MANUFACTURER	MODEL No.	SIZE	COOLING CAPACITY (kW)	EER	ELECTRICAL (V/Ph/Hz)	MCA	REMARKS
CU-1	LG	LSU120HSV4	1.0 TONS	3.28	12.5	208/1/60	10A / 15A MAX	ULTRA LOW AMBIENT OPTION FOR -40°F OPERATION c/w LINESET & POWER WIRING TO OUTDOOR UNIT AC-1 & WALL MOUNTING BRACKETS
CU-2	LG	LSU090HV3	0.75 TONS	2.64	14.5	208/1/60	10A / 15A MAX	ULTRA LOW AMBIENT OPTION FOR -40°F OPERATION c/w LINESET & POWER WIRING TO OUTDOOR UNIT AC-1 & WALL MOUNTING BRACKETS

GRILLE, DIFFUSER, LOUVRE SCHEDULE

GRILLE TYPE	DESCRIPTION
SUPPLY AIR	
SPD-1	E.H. PRICE MODEL SPD/31 600x600 SQUARE PLAQUE DIFFUSER FOR T-BAR LAY-IN/SURFACE MOUNTING.
SD-1	RE-USE EXISTING SLOT DIFFUSER C/W SUPPLY AIR PLENUM, 1200mm
SD-2	RE-USE EXISTING SLOT DIFFUSER C/W SUPPLY AIR PLENUM, 900mm
ST-1	RE-USE EXISTING LIGHT TROFFER DIFFUSER
RETURN / EXHAUST AIR	
RG-1	E.H. PRICE MODEL 80/F/A EGG CRATE FACE RETURN GRILLE. REFER TO DRAWINGS FOR MOUNTING TYPE.
EG-1	E.H. PRICE 530/F/L/A/B12 SINGLE DEFLECTION EXHAUST GRILLE

NOTES:

NOTE 1: COLOURS SHALL BE AS SELECTED BY THE ARCHITECT. CONFIRM COLOUR SELECTIONS PRIOR TO ORDERING.

NOTE 2: GRILLES, DIFFUSERS AND REGISTERS SHALL BE PROVIDED TO CONFORM TO ARCHITECTURAL AND STRUCTURAL DETAILING. CONFIRM:
a) STRUCTURAL OPENING SIZES RELATIVE TO GRILLE REQUIREMENTS
b) ARCHITECTURAL CEILING GRID MEASUREMENTS (ie. HARD METRIC / IMPERIAL)

GENERAL NOTE:

ALL GRILLES, DIFFUSERS AND REGISTERS WHICH ARE DUCT CONNECTED ARE TO BE PROVIDED WITH MANUAL DAMPERS AT CONNECTION DUCTS EXCEPT WHERE MANUAL DAMPERS ARE SPECIFIED INTEGRAL TO GRILLES.

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Project: **FIRST NATION HEALTH AUTHORITY OFFICE TI RENOVATION, PRINCE GEORGE**
177 VICTORIA STREET, PRINCE GEORGE, BC

Project Number: **18263**

Drawing: **MECHANICAL SCHEDULES AND DETAILS**

Sheet Number: **M5.0**

15000 GENERAL MECHANICAL PROVISIONS

1. GENERAL

1.1. THIS DIVISION SHALL CONFORM TO THE TERMS AND CONDITIONS OF THE GENERAL CONTRACT DOCUMENT.

2. SCOPE

2.1. PROVIDE COMPLETE, FULLY TESTED AND OPERATIONAL MECHANICAL SYSTEMS TO MEET THE REQUIREMENTS DESCRIBED HEREIN AND IN COMPLETE ACCORDANCE WITH ALL APPLICABLE CODES AND ORDINANCES.

2.2. CONTRACT DOCUMENTS OF THIS DIVISION AND DRAWINGS ARE DIAGRAMMATIC AND APPROXIMATELY TO SCALE UNLESS DETAILED OTHERWISE. THEY ESTABLISH SCOPE, MATERIAL AND INSTALLATION QUALITY AND ARE NOT DETAILED INSTALLATION INSTRUCTIONS.

2.3. FOLLOW MANUFACTURER'S RECOMMENDED INSTALLATION DETAILS AND PROCEDURES FOR EQUIPMENT, SUPPLEMENTED BY THE REQUIREMENTS OF THE CONTRACT DOCUMENTS.

2.4. INSTALL EQUIPMENT GENERALLY IN LOCATIONS AND ROUTES SHOWN CLOSE TO BUILDING STRUCTURE WITH MINIMUM INTERFERENCE WITH OTHER SERVICES OR FREE SPACE. REMOVE AND REPLACE IMPROPERLY INSTALLED EQUIPMENT TO SATISFACTION OF THE CONSULTANT AT NO EXTRA COST.

2.5. THE DRAWINGS INDICATE THE GENERAL LOCATION AND ROUTE TO BE FOLLOWED BY THE PIPING AND DUCTWORK. WHERE DETAILS ARE NOT SHOWN ON THE DRAWINGS OR ONLY SHOWN DIAGRAMMATICALLY, THE PIPES AND DUCTWORK SHALL BE INSTALLED IN SUCH A WAY AS TO CONSERVE HEAD ROOM AND INTERFERE AS LITTLE AS POSSIBLE WITH THE FREE USE OF SPACE THROUGH WHICH THEY PASS. SERVICE LINES SHALL RUN PARALLEL TO BUILDING LINES. ALL DUCT AND PIPES AT CEILING SHALL BE KEPT AS TIGHT AS POSSIBLE TO BEAMS OR OTHER LIMITING MEMBERS AT HIGH END. ALL PIPES AND DUCTS SHALL BE COORDINATED IN ELEVATION TO ENSURE THAT THEY ARE CONCEALED IN THE CEILING SPACE PROVIDED UNLESS DETAILED AND DIMENSIONED OTHERWISE ON DRAWINGS AND PERMITTED OTHERWISE BY THE CONSULTANT.

2.6. CONNECT TO EQUIPMENT SPECIFIED IN OTHER SECTIONS AND TO EQUIPMENT SUPPLIED AND INSTALLED BY OTHER CONTRACTORS OR BY THE OWNER. UN-CRATE EQUIPMENT, MOVE IN PLACE AND INSTALL COMPLETELY; START-UP AND TEST.

2.7. CONNECT INTO EXISTING SYSTEMS WITH MINIMUM DISRUPTION TO THE EXISTING SYSTEMS AND ONLY AFTER WORK IN THIS CONTRACT IS BEEN CLEANED AND APPROVED BY THE ENGINEER FOR CONNECTION.

2.8. PROVIDE SEISMIC RESTRAINTS FOR ALL EQUIPMENT, PIPING AND DUCTWORK WHEN REQUIRED BY CODE.

2.9. 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.

2.10. IDENTIFY ALL OPENING AND HOLES REQUIRED FOR THE PASSAGE OF MECHANICAL SERVICES THROUGH STRUCTURES AND DIVIDING WALLS TO THE GENERAL CONTRACTOR. SUCH IDENTIFICATION SHALL BE VIA MARKED UP DRAWINGS SHOWING OPENING LOCATIONS, SIZES, AND LEVELS. IF REQUIRED, THE CONTRACTOR IS TO CLEARLY MARK ON SITE THE INTENDED OPENINGS FOR REVIEW BY THE STRUCTURAL ENGINEER.

2.11. THE WORK SHALL INCLUDE BUT NOT LIMIT TO THE FOLLOWING:
2.11.1. TENANT IMPROVEMENT HEATING / VENTILATING INSTALLATION
2.11.2. TENANT IMPROVEMENT PLUMBING INSTALLATION.
2.11.3. TENANT IMPROVEMENT SPRINKLER INSTALLATION, TESTING AND CERTIFICATION.
2.11.4. TENANT IMPROVEMENT AUTOMATIC CONTROL AND RELATED WIRING INSTALLATION
2.11.5. COMMISSIONING AND BALANCING.

3. MATERIALS

3.1. MATERIALS AND EQUIPMENT INSTALLED SHALL BE NEW, FULL WEIGHT AND OF QUALITY SPECIFIED. USE SAME BRAND OR MANUFACTURER FOR EACH SPECIFIED APPLICATION.

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

4. CUTTING AND PATCHING

4.1. PROVIDE HOLES AND SLEEVES, CUTTING AND FITTING REQUIRED FOR MECHANICAL WORK. RELOCATE IMPROPERLY LOCATED HOLES AND SLEEVES.

4.2. DRILL FOR EXPANSION BOLTS, HANGER RODS, BRACKETS, AND SUPPORTS.

4.3. OBTAIN WRITTEN APPROVAL FROM STRUCTURAL CONSULTANT BEFORE CUTTING OR BURNING STRUCTURAL MEMBERS. THIS WORK SHALL BE CARRIED OUT BY THE SPECIALIST TRADE ONLY.

4.4. PROVIDE OPENINGS AND HOLES REQUIRED IN PRE-CAST MEMBERS FOR MECHANICAL WORK. CAST HOLES LARGER THAN 100MM IN DIAMETER TIGHT TO COLUMNS SHALL NOT EXCEED 200MM IN DIAMETER. CAST OR FIELD CUT HOLES SMALLER THAN 100MM.

4.5. REPAIR BUILDING WHERE DAMAGED FROM THE EQUIPMENT INSTALLATION, IMPROPERLY LOCATED HOLES, ETC., BY THIS SECTION OF THE WORK. THIS REPAIR WORK SHALL BE CARRIED OUT BY THE SPECIALIST TRADE AT THE EXPENSE OF THIS SECTION OF WORK. USE MATCHING MATERIALS AS SPECIFIED IN THE RESPECTIVE SECTIONS.

5. SHOP DRAWINGS

5.1. PROVIDE SHOP DRAWINGS IN PDF FORM AS INDICATED IN ACCORDANCE WITH THE MCA-BC STANDARDS FOR SHOP DRAWINGS.

5.2. IDENTIFY MATERIALS AND EQUIPMENT BY MANUFACTURER, TRADE NAME AND MODEL NUMBER. INCLUDE COPIES OF APPLICABLE BROCHURE OR CATALOGUE MATERIAL.

5.3. CLEARLY MARK SUBMITTAL MATERIAL USING ARROWS, UNDERLINING OR CIRCLING TO SHOW DIFFERENCES FROM SPECIFIED, EG. RATINGS, CAPABILITIES AND OPTIONS BEING PROPOSED. CROSS OUT NON-APPLICABLE MATERIAL. SPECIFICALLY NOTE ON THE SUBMITTAL SPECIFIED FEATURES SUCH AS SPECIAL TANK LININGS, PUMPS, SEALS, MATERIAL, OR PAINTING.

5.4. INCLUDE DIMENSIONAL AND TECHNICAL DATA SUFFICIENT TO CHECK IF EQUIPMENT MEETS REQUIREMENTS. INCLUDE WIRING, PIPING, AND SERVICE CONNECTION DATA AND MOTOR SIZES.

5.5. INSTALLED MATERIALS AND EQUIPMENT SHALL MEET SPECIFIED REQUIREMENTS REGARDLESS OF WHETHER OR NOT SHOP DRAWINGS ARE REVIEWED BY THE CONSULTANT.

5.6. DO NOT ORDER EQUIPMENT OR MATERIAL UNTIL THE CONSULTANT HAS REVIEWED AND RETURNED APPROVED SHOP DRAWINGS.

5.7. SHOP DRAWINGS SHALL BE ENDORSED BY THE GENERAL CONTRACTOR AND MECHANICAL SUB-CONTRACTOR INDICATING THAT THE SHOP DRAWINGS HAVE BEEN REVIEWED AND SUBMITTED WITHOUT QUALIFICATIONS.

5.8. SUBMIT A DIGITAL COPES OF SHOP DRAWINGS IN PDF FORMAT PRIOR TO ORDERING EQUIPMENT.

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

5.10. SUBMIT LIST OF ALL ELECTRICAL MOTORS AND POWER REQUIREMENTS TO ELECTRICAL CONSULTANT AND CONTRACTOR.

5.11. CONTRACTOR TO PROVIDE COMPLETE LIST OF ALL MOTORS, VOLTAGE AND PHASE REQUIRED FOR MECHANICAL EQUIPMENT TO THE ELECTRICAL CONTRACTOR FOR COORDINATION.

6. STANDARDS OF MATERIALS, EQUIPMENT AND INSTALLATION

6.1. REQUESTS FOR CHANGES TO THE SPECIFICATION IN STANDARDS, MATERIALS, AND EQUIPMENT OR INSTALLATION TECHNIQUES SHALL BE SUBMITTED FOR REVIEW SEVEN (7) WORKING DAYS PRIOR TO CLOSE OF TENDERS, AND IF APPLICABLE WILL BE INCORPORATED IN AN ADDENDUM TO THE SPECIFICATION.

6.2. EQUIPMENT USED SHALL NOT EXCEED SPACE LIMITATIONS IN ANY DIMENSION. REPLACE ANY EQUIPMENT OR APPARATUS WHICH DOES NOT MEET THIS SPECIFICATION AT NO COST. ASSUME FULL RESPONSIBILITY FOR THE EXPENSE OF REDESIGN AND ADJUSTMENT TO OTHER PARTS OF THE BUILDING WHEN PROPOSING THE USE OF APPROVED EQUAL OR ALTERNATE EQUIPMENT.

6.3. SUBMIT SAMPLES, IN ADDITION TO DRAWINGS, OF ALL ITEMS WHICH IN THE CONSULTANT'S JUDGMENT, CAN BE BETTER EXAMINED FOR CAPACITY, QUALITY, FINISH OR DETAIL BY SAMPLE RATHER THAN BY DRAWINGS. SAMPLES SHALL BE SUBMITTED BEFORE EQUIPMENT IS ORDERED.

6.4. PROVIDE EQUIPMENT FROM THE SPECIFIED APPROVED MANUFACTURERS. ALL MECHANICAL EQUIPMENT SHALL HAVE THE APPROVED MANUFACTURERS NAME PERMANENTLY AFFIXED TO IT.

6.5. EQUIPMENT ON ALTERNATE & APPROVED MANUFACTURERS LIST MUST BE EQUAL IN QUALITY AND PERFORMANCE TO THE MODEL SPECIFIED. EQUIPMENT WHICH IS NOT EQUAL WILL BE REPLACED WITH THE SPECIFIED EQUIPMENT AT NO COST TO THE OWNER.

6.6. IF SHOP DRAWINGS ARE REJECTED TECHNICALLY AFTER 3 SUBMISSIONS. THE CONTRACTOR, AT NO ADDITIONAL EXPENSE TO THE OWNER, SHALL REVERT TO THE SPECIFIED PRODUCT AND MANUFACTURER FOR THIS PROJECT.

6.7. THE EQUIPMENT MANUFACTURER SHALL ENSURE THAT THE STRENGTH AND ANCHORAGE OF THE INTERNAL COMPONENTS OF THE EQUIPMENT EXCEEDS THE FORCE LEVEL USED TO RESTRAIN AND ANCHOR THE UNIT ITSELF TO THE SUPPORTING STRUCTURE.

6.8. PROVIDE THE FOLLOWING WHEN REQUIRED:

6.8.1.1.1. ITEM:	APPROVED MANUFACTURES:
ACCESS DOORS	ACUDOR, MAXAM, MILCOR
AUTOMATIC AIR VENT	ARMSTRONG, HOFFMAN, BRAUKMAN, SARCO,
BACKFLOW PROTECTION	WATTS, FEBCO, CLAYTON, BEECO, WILKINS
CONTROLS	TRANE
DOMESTIC HOT WATER HEATERS	BRADFORD WHITE, A.O. SMITH, RHEEM/RUUD
EXHAUST FANS (CABINET)	PANASONIC, BROAN
EXPANSION TANK	AMTROL, ENERMAX, CLEMMER, WESTEEL-ROSCO
FIRE PROTECTION	VICTAULIC, TYCO,
FLEXIBLE AIR DUCT	THERMOFLEX, WIREMOLD, FLEXMASTER
GRILLES, DIFFUSERS AND REGISTERS	E.H. PRICE, NAILOR, TITUS
HEAT PUMP HOSE KITS	VICTAULIC
INSULATION – DUCT/PIPING	FIBERGLAS, KNAUF, JOHNS-MANVILLE, ATLAS, PPG, MANSON, ARMSTRONG, ARMAFLEX JACKETING MATERIAL CHILDERS.
PIPE FITTINGS AND FLANGES	CRANE, GRINNELL, JENKINS, VICTAULIC
PIPE SUPPORTS AND HANGERS	CRANE, UNISTRUT, MYATT, L.E. TAYLOR, GRINNELL, SARCO
PLUMBING DRAINAGE ACCESSORIES	SMITH, ENPOCO, ZURN, ANCON
PLUMBING TRIM	KOHLER
PLUMBING FIXTURES	BLANCO, AMERICAN STANDARD, KOHLER, FRANKE, KINDRED, TOTO
SOUND ATTENUATION	I.A.C., VIBRON, VIBRO ACOUSTICS, EH PRICE
VALVES – BALL	RED & WHITE, GRINNELL, WATTS, HILL, MCCANNA
VALVES – GATE & GLOBE	RED & WHITE, CRANE, JENKINS, GRINNELL, KITZ
VALVES – BUTTERFLY	CENTERLINE, KEYSTONE, GRINNELL
VALVES – BALANCING / FLOW METER	TOUR ANDERSON, BELL & GOSSETT, ARMSTRONG
VALVES – CHECK SPRING LOADED	MISSION, MOYES & GROVES
VIBRATION CONTROL EQUIPMENT	VIBRO-ACOUSTICS, LO-REZ, VIBRON, KORFUND, MASON
WATER PRESSURE REDUCING VALVES	WILKINS, SLINGER, WATTS, CLAYTON, BERMAD
SPLIT SYSTEMS	MITSUBISHI, LG

7. APPROVED SUB-CONTRACTORS

7.1. WHEN REQUIRED THE SERVICES OF THE FOLLOWING CONTRACTORS SHALL BE PROVIDED:

TRADE:	APPROVED CONTRACTOR(S):
FIRE PROTECTIONS	ALL POINTS FIRE PROTECTION, RH JONES & SONS
TESTING AND BALANCING	BERNIE McKAY (250-961-2873)

8. PERFORMANCE VERIFICATION OF INSTALLED EQUIPMENT

8.1. INSTALLED MECHANICAL EQUIPMENT WHOSE PERFORMANCE IS QUESTIONED BY THE CONSULTANT, MAY BE SUBJECT TO PERFORMANCE VERIFICATION AS SPECIFIED HEREIN.

8.2. WHEN PERFORMANCE VERIFICATION IS REQUESTED, EQUIPMENT SHALL BE TESTED TO DETERMINE COMPLIANCE WITH SPECIFIED PERFORMANCE REQUIREMENTS.

8.3. THE CONSULTANT WILL DETERMINE BY WHOM TESTING SHALL BE CARRIED OUT. WHEN REQUESTED, THE CONTRACTOR SHALL ARRANGE FOR SERVICES OF AN INDEPENDENT TESTING AGENCY.

8.4. TESTING PROCEDURES SHALL BE APPROVED BY THE CONSULTANT.

8.5. MAINTAIN BUILDING COMFORT CONDITIONS WHEN EQUIPMENT IS REMOVED FROM SERVICE FOR TESTING PURPOSES.

8.6. PROMPTLY PROVIDE THE CONSULTANT WITH ALL TEST REPORTS.

8.7. SHOULD TEST RESULTS REVEAL THAT ORIGINALLY INSTALLED EQUIPMENT MEETS SPECIFIED PERFORMANCE REQUIREMENTS, OWNER WILL PAY ALL COSTS RESULTING FROM PERFORMANCE VERIFICATION PROCEDURE.

8.8. SHOULD TEST RESULTS REVEAL THAT EQUIPMENT DOES NOT MEET SPECIFIED PERFORMANCE REQUIREMENTS, EQUIPMENT WILL BE REJECTED AND THE FOLLOWING SHALL APPLY:
8.8.1. REMOVE REJECTED EQUIPMENT. REPLACE WITH EQUIPMENT WHICH MEETS REQUIREMENTS OF CONTRACT DOCUMENTS INCLUDING SPECIFIED PERFORMANCE REQUIREMENTS.
8.8.2. REPLACEMENT EQUIPMENT WILL BE SUBJECT TO PERFORMANCE VERIFICATION AS WELL, USING SAME TESTING PROCEDURES ON ORIGINALLY INSTALLED EQUIPMENT.
8.8.3. CONTRACTOR SHALL PAY ALL COSTS RESULTING FROM PERFORMANCE VERIFICATION PROCEDURE.

9. OPERATING AND MAINTENANCE DATA

9.1. INSTRUCT THE BUILDING OPERATORS IN THE OPERATION AND PREVENTATIVE MAINTENANCE OF EACH PIECE OF EQUIPMENT AND SYSTEM SUPPLIED AND INSTALLED. COMPLETE AND TURN OVER DOCUMENTATION PRIOR TO SUBSTANTIAL PERFORMANCE.

9.2. SUBMIT 3 SETS O & M MANUALS IN 3-RING BINDERS, TO INCLUDE THE FOLLOWING:
9.2.1. A CD OR DVD CONTAINING PDF VERSIONS OF ALL THE ITEMS BELOW.
9.2.2. NAME OF ENGINEER AND MECHANICAL CONTRACTOR AND PHONE NUMBER.
9.2.3. DESCRIPTION OF OPERATION OF ALL MECHANICAL SYSTEMS.
9.2.4. SHOP DRAWING OF ALL EQUIPMENT.
9.2.5. LIST OF TAGGED VALVES.
9.2.6. EXTENDED WARRANTIES.
9.2.7. MAINTENANCE AND OPERATION INSTRUCTIONS.
9.2.8. LIST OF MANUFACTURERS SOURCE AND TRADE NAMES
9.2.9. BALANCE REPORT OF AIR & WATER SYSTEMS.
9.2.10. COPY OF RECORD DRAWINGS.
9.2.11. LIST OF INSPECTION AND TEST CERTIFICATES.

9.3. BINDERS ARE TO BE PROVIDED WITH PERMANENT LABELS AFFIXED TO THE SPINE AND COVER. THESE LABELS ARE TO HAVE THE PROJECT NAME, PROJECT DATE, MANUAL TITLE, OWNER, ARCHITECT, AND CONSULTANT NAMES.

10. RECORD DRAWINGS

10.1. SUBMIT RECORD DRAWINGS IDENTIFYING LOCATION OF ALL FIRE DAMPERS, MAJOR CONTROL LINES, ACCESS DOORS, TAGGED VALVES AND ACTUAL ROOM NAMES.

10.2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR AND KEEP ONE SET OF WHITE PRINTS, INCLUDING REVISION DRAWINGS, IN JOB SITE OFFICE. BACKFILLING WILL NOT BE ALLOWED UNTIL UNDERGROUND SERVICE DIMENSIONS ARE MARKED ON PLANS. SET OF WHITE PRINTS SHALL BE MAINTAINED IN CONSTANT UP-TO-DATE CONDITION BY EACH TRADE (AS-BUILT CONDITIONS MARKED IN RED PENCIL). THE 1 WHITE SET OF PRINTS WILL BE PROVIDED TO THE CONTRACTOR BY THE CONSULTANT AT THE CONTRACTOR'S COST.

10.3. THE "RECORD DRAWINGS" SHALL INCLUDE, BUT NOT BE LIMITED TO, THE FOLLOWING CHANGES AND SHALL BE RECORDED DAILY.

10.4. 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 PIPING.

10.5. SANITARY SEWERS: ALL SANITARY SEWERS. INVERT ELEVATIONS AND LOCATIONS TO BE GIVEN AT EACH CLEAN-OUT.

10.6. STORM DRAINS & SEWERS: ALL STORM DRAINS AND SEWERS. INVERT ELEVATIONS TO BE GIVEN AT EACH MANHOLE, CLEAN OUT, CHANGE OF DIRECTION, JUNCTION, AND AT EVERY 30 M RUN.

10.7. LOCATION, TAGGING AND NUMBERING OF ALL VALVES EXCEPT INDIVIDUAL PLUMBING FIXTURES OR EQUIPMENT ISOLATION VALVES.

10.8. THE AS-BUILT DAILY MARKED-UP PRINTS SHALL CONFORM TO THE STANDARDS OF THE CONTRACT DRAWINGS AND SHALL INCLUDE ALL DETAILS FROM REVISION DRAWINGS, SUPPLEMENTARY DRAWINGS, CHANGE ORDERS, ADDENDA AND SITE REVISIONS, ETC.

10.9. AT THE END OF CONSTRUCTION, THE RECORD DRAWINGS SHALL BE SCANNED AT FULL SIZE (TO SCALE), AND IN COLOR AND THE ORIGINALS AND PDF COPIES SHALL BE TURNED OVER TO THE CONSULTANT.

10.10. AT THE END OF CONSTRUCTION, ALL OF THE ABOVE CHANGES SHALL BE TRANSFERRED BY THE CONSULTANT, AT THE CONTRACTORS COST, TO A SET OF "AUTOCAD" DISKS. THE CADD FILES SHALL BE USED TO PRODUCE 1-SET OF ORIGINALS TURNED OVER TO THE OWNER. THE CONTRACTOR SHALL ALLOW $150.00 / REVISED DRAWING.

11. PAINTING AND IDENTIFICATION

11.1. CLEAN ALL EXPOSED BARE METAL SURFACES SUPPLIED BY THE MECHANICAL AND PLUMBING TRADE BY REMOVING ALL DIRT, DUST, GREASE AND MILL SCALE.

11.2. REPAINT ALL MARRED FACTORY FINISHED EQUIPMENT, WHICH IS NOT SCHEDULED TO BE REPAINTED, TO MATCH THE ORIGINAL FACTORY FINISH.

11.3. SPRINKLER PIPING SHALL BE COLOUR BANDED AT 6' INTERVALS OVER THEIR ENTIRE LENGTHS THROUGHOUT:

11.3.1.1.1. FIRE: RED – C.G.S.B. 509-102

11.4. PIPE MARKERS AND DIRECTION ARROWS – IN ALL EXPOSED AREAS AND IN THE MECHANICAL ROOM:
11.4.1. PROVIDE COMMERCIALLY AVAILABLE PIPE MARKERS HAVING STANDARD SIZES OF LETTERING AND COLOURS. STANDARD COLOURS DESIGNATE CLASSES OF MATERIALS AS FOLLOWS, AND ARE CONSISTENT WITH THOSE SPECIFIED BY THE CSA AND THE USASI.

PROVIDE MARKERS TO ALL PIPES PROVIDED UNDER THIS CONTRACT.

YELLOW	DANGEROUS MATERIALS
BLUE	PROTECTIVE MATERIALS
GREEN	SAFE MATERIALS
RED	FIRE PROTECTION EQUIPMENT

11.5. LOCATION OF PIPE MARKERS AND DIRECTION ARROWS:
11.5.1. PIPE MARKER AND DIRECTION ARROW SHALL BE PLACED SIDE BY SIDE IN THE BOTTOM QUARTER OF THE PIPE TO BE IDENTIFIED.
11.5.2. ADJACENT TO ALL MAJOR CHANGES IN DIRECTION AND AT CONNECTIONS TO EACH PIECE OF EQUIPMENT.
11.5.3. AT LEAST ONCE IN EACH ROOM THAT THE PIPE PASSES THROUGH.
11.5.4. WHERE PIPING PASSES THROUGH WALLS, PARTITIONS, OR FLOORS, IDENTIFY PIPING ON BOTH SIDES OF THE SECTION AND AT ENTRY AND EXITS TO SHAFTS.

11.6. CEILING ACCESS PANEL IDENTIFICATION THE LOCATION OF TERMINAL UNITS, VALVES, ETC. ABOVE CEILING PANELS SHALL HAVE THEIR LOCATION IDENTIFIED BY MEANS OF A COLOURED ADHESIVE DOT.

11.7. DUCT ACCESS PANEL IDENTIFICATION IDENTIFY THE FUNCTION OF DUCT ACCESS PANELS BY THE FOLLOWING SCHEDULE:

SYMBOL	
CLEANING & SERVICE ACCESS	C.A.
CONTROLS (INCLUDING SENSORS)	C
DAMPERS (BACKDRAFT, BALANCE & CONTROL)	D
FIRE DAMPERS	F.D.
SMOKE DAMPERS	S.D.

11.8. VALVE TAGS
11.8.1. ALL VALVES, EXCEPT CONVECTOR HAND VALVES AND INDIVIDUAL PLUMBING FIXTURE STOP VALVES, SHALL BE PROVIDED WITH 50MM X 30MM BRASS TAGS WITH STAMPED NUMBERS, SECURED BY CHAINS TO THE VALVE CONCERNED. NUMBERS SHALL BE PREFIXED BY THE LETTER "P" OR THE LETTER "H" INDICATING THAT THE VALVE IS ON PLUMBING OR HEATING SERVICE.
11.8.2. EACH TRADE SHALL PREPARE A LIST DETAILING THE VALVES, LOCATION; NORMAL POSITION, AND PURPOSE SERVED. THE LIST SHALL BE INCLUDED IN THE MAINTENANCE MANUAL.

12. EQUIPMENT PROTECTION AND CLEAN-UP

12.1. PROTECT EQUIPMENT AND MATERIAL IN STORAGE ON SITE AND AFTER INSTALLATION UNTIL FINAL ACCEPTANCE. LEAVE FACTORY COVERS IN PLACE. TAKE SPECIAL PRECAUTIONS TO PREVENT ENTRY OF FOREIGN MATERIAL INTO WORKING PARTS OF PIPING AND DUCT SYSTEMS.

12.2. THOROUGHLY CLEAN PIPING, DUCTS AND EQUIPMENT OF DIRT, CUTTINGS, AND OTHER FOREIGN MATERIAL.

12.3. PROTECT BEARINGS AND SHAFTS DURING INSTALLATION. GREASE SHAFTS AND SHEAVES TO PREVENT CORROSION. SUPPLY AND INSTALL NECESSARY EXTENDED NIPPLES FOR LUBRICATION PURPOSES.

12.4. ENSURE THAT EXISTING EQUIPMENT IS CAREFULLY DISMANTLED AND NOT DAMAGED OR LOST. DO NOT REUSE EXISTING MATERIALS AND EQUIPMENT UNLESS SPECIFICALLY INDICATED.

13. CONNECTION AND INTERRUPTION TO EXISTING SYSTEMS

13.1. COORDINATE ANY AND ALL INTERRUPTION OF EXISTING BUILDING SYSTEMS WITH THE OWNER'S DESIGNATED REPRESENTATIVE.

13.2. COORDINATE AND MAINTAIN LIAISON WITH THE OWNER'S DESIGNATED REPRESENTATIVE TO INTERRUPT, RE-ROUTE OR CONNECT TO WATER, SEWER, STORM, HEATING, AND COOLING OR GAS SYSTEMS, WITH MINIMUM INTERRUPTION OF SERVICE. CONTACT RESPECTIVE UTILITY COMPANIES PRIOR TO STARTING WORK.

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

13.4. SCOPE OF WORK:
13.4.1. IN THE ABSENCE OF A DESCRIPTION OF RESPONSIBILITIES IN THE CONTRACT DOCUMENTS THE CONTACTOR SHALL ASSUME THEY ARE TO BARE THE COMPLETE COST OF MATERIALS AND LABOUR REQUIRED TO CONNECT TO EXISTING SYSTEMS.
13.4.1.1. THIS SHALL INCLUDE BUT NOT BE LIMITED TO:
13.4.1.1.1. THE MEANS AND METHODS REQUIRED TO MAKE THE CONNECTIONS
13.4.1.1.2. RETURNING THE SYSTEM TO ITS REQUIRED OPERATING CONDITION
13.4.1.1.3. ALL MATERIAL, LABOUR AND EQUIPMENT TO COMPLETE THE REQUIRED CONNECTIONS.

13.4.2. THE CONTRACTOR, AT THEIR DISCRETION MAY REQUEST CLARIFICATION FOR THE SCOPE OF WORK REQUIRED FOR CONNECTION TO EXISTING SYSTEMS UP TO SEVEN (7) WORKING DAYS PRIOR TO CLOSE OF TENDERS, AND IF APPLICABLE A CLARIFICATION TO THE SCOPE WILL BE ISSUED BY ADDENDUM.

14. ELECTRICAL MOTORS

14.1. PROVIDE MOTORS TO NEMA AND C.S.A. STANDARDS FOR HARD, CONTINUOUS SERVICE, DESIGNED TO LIMIT TEMPERATURE RISE TO 40°C FOR OPEN HOUSING AND 50°C FOR DRIP PROOF HOUSING, AND OPERATE 1200 OR 1800 R.P.M. UNLESS OTHERWISE SPECIFIED. DO NOT USE AIR OVER RATINGS.

14.2. MOTORS SHALL HAVE BALL OR ROLLER TYPE BEARINGS WITH GREASE LUBRICATION FITTINGS.

14.3. ALL BELT-DRIVEN DEVICES SHALL HAVE THE MOTORS MOUNTED ON ADJUSTABLE BASES WITH ADJUSTING SCREWS SO THAT PROPER BELT TENSION CAN BE OBTAINED.

14.4. WHERE EQUIPMENT HAS BEEN SPECIFIED IN DIVISION 15 TO BE COMPLETE WITH STARTERS, DISCONNECTS, AND/OR CONTROL PANELS, THIS CONTRACTOR SHALL PROVIDE ANY REQUIRED WIRING AND CONDUIT BETWEEN THE EQUIPMENT AND THE ABOVE ITEMS.

15. ACCESS DOORS AND PANELS

15.1. PROVIDE ACCESS PANELS REQUIRED IN BUILDING CONSTRUCTION INCLUDING IN ARCHITECTURAL WALLS AND CEILINGS FOR ACCESS TO ANY CONCEALED MECHANICAL EQUIPMENT WHICH, IN THE CONSULTANT'S OPINION, REQUIRES MAINTENANCE OR ADJUSTMENT. ACCESS PANEL SHALL MATCH WALL/ CEILING FINISH. OBTAIN APPROVAL FROM ARCHITECT PRIOR TO INSTALLATION.

15.2. SUCH PANELS SHALL BE MANUFACTURED PANELS, WITH FASTENING DEVICES, APPROPRIATE TO THE CONSTRUCTION INVOLVED, PROVIDE ACCESS PANEL (12"X 12" FOR HAND ACCESS, OTHERWISE 18"X 18" MIN.) IN WALL / CEILING TO ALL MECHANICAL SYSTEM (SUCH AS VALVE, DAMPER) REQUIRING ACCESS. DRY WALL SURFACE: MILCOR STYLE DW FLUSH PANEL ACCESS DOOR; MASONRY TILE SURFACE: MILCOR STYLE M; PLASTERED WALL: MILCOR STYLE K.

16. ACCESS OF EQUIPMENT

16.1. MAKE ALL ARRANGEMENTS TO ENSURE THAT ADEQUATE ACCESS IS AVAILABLE FOR ALL MECHANICAL EQUIPMENT. DO ALL HOISTING AND RIGGING INTO PLACE OF ALL SPECIFIED EQUIPMENT AND BE RESPONSIBLE FOR ANY DAMAGES INCURRED THERE FROM.

16.2. CONTRACTOR TO DEMONSTRATE REASONABLE ACCESS TO ALL EQUIPMENT SERVICE LOCATIONS.

17. LIABILITY

17.1. ASSUME FULL RESPONSIBILITY FOR LAYING OUT THE WORK AND FOR ANY DAMAGE CAUSED TO THE OWNER OR OTHER TRADES BY IMPROPER LOCATION, OR CARRYING OUT OF THE WORK.

17.2. BE RESPONSIBLE FOR PROMPT INSTALLATION OF HIS WORK IN ADVANCE OF CONCRETE POURING OR SIMILAR WORK. PROVIDE AND SET SLEEVES WHERE REQUIRED. SHOULD ANY CUTTING OR REPAIRING OF EITHER UNFINISHED OR FINISHED WORK BE REQUIRED, THIS CONTRACTOR SHALL DIRECT THE PARTICULAR SUB-CONTRACTOR WHOSE WORK IS INVOLVED TO DO SUCH CUTTING AND REPAIRING WITHOUT EXPENSE TO THE OWNER. BEFORE BEING UNDERTAKEN, SUCH WORK SHALL BE LAID OUT FOR THE CONSULTANT'S REVIEW.

17.3. EXAMINE THE SITE AND THE LOCAL CONDITIONS AFFECTING WORK UNDER THIS CONTRACT. EXAMINE CAREFULLY THE MECHANICAL, ELECTRICAL, STRUCTURAL AND ARCHITECTURAL DRAWINGS AND CONFIRM THAT THE WORK UNDER THIS CONTRACT CAN BE SATISFACTORILY CARRIED OUT WITHOUT CHANGES TO THE BUILDING AS SHOWN ON THESE PLANS. BEFORE COMMENCING THE WORK, EXAMINE THE WORK OF THE OTHER TRADES AND REPORT AT ONCE ANY DEFECT OR INTERFERENCE AFFECTING THE WORK OF THIS SECTION, OF THE GUARANTEE OF SAME. NO EXTRAS WILL BE SUBSEQUENTLY ALLOWED TO COVER ANY SUCH ERROR, OMISSION OR OVERSIGHT ON THE THOROUGH INSPECTION OF THE GROUNDS, BUILDING, CONDITIONS, ETC.

17.4. ARRANGE WORK IN CO-OPERATION WITH OTHER TRADES SO AS NOT TO INTERFERE WITH OTHER WORK BEING CARRIED OUT IN THE BUILDING CO-OPERATE WITH THE OTHER TRADES TO GET ALL THE PIPES, DUCTS, CONDUIT, ETC., INSTALLED TO THE BEST ADVANTAGE. WHEN OPEN WEB STRUCTURAL JOISTS ARE USED, OBTAIN STRUCTURAL SHOP DRAWINGS TO ENSURE SPACE IS AVAILABLE FOR INSTALLATION OF PIPES AND DUCTWORK.

17.5. WHERE ANY PIPES, DUCTS AND EQUIPMENT MUST BE BUILT INTO THE WORK OF OTHER TRADES SUCH AS MASONRY, STRUCTURAL, OR PLASTERING, BE RESPONSIBLE FOR SUPPLYING THE EQUIPMENT TO BE BUILT IN OR MEASUREMENTS TO ALLOW THE NECESSARY OPENINGS TO BE LEFT. ALL PIPES AND DUCTS WHICH ARE TO BE CONCEALED SHALL BE INSTALLED NEATLY AND CLOSELY TO THE BUILDING STRUCTURE SO THAT THE NECESSARY FURRING CAN BE KEPT AS SMALL AS POSSIBLE. ANY PIPES, DUCTS, OR OTHER WORK WHICH ARE NOT, IN THE OPINION OF THE CONSULTANT, INSTALLED AS THEY SHOULD BE, SHALL BE TAKEN OUT AND REPLACED WITHOUT COST TO THE OWNER.

17.6. PROTECT FINISHED AND UNFINISHED WORK FROM DAMAGE DUE TO THE CARRYING OUT OF HIS WORK, GIVING SPECIAL ATTENTION TO THE PROTECTION OF BUILDING VAPOUR BARRIERS, WATERPROOF MEMBRANES, ETC. COVER FLOORS AND OTHER PARTS OF THE BUILDING WITH TARPAULINS, ETC., AND REPAIR ALL DAMAGE TO THE SATISFACTION OF THE OWNER AND THE CONSULTANT. DURING FREEZING WEATHER, PROTECT ALL HIS MATERIALS IN SUCH A MANNER THAT NO HARM CAN BE DONE TO THE INSTALLATION ALREADY MADE AND/OR TO MATERIALS AND EQUIPMENT ON THE JOB.

17.7. BE RESPONSIBLE FOR THE CONDITION OF ALL MATERIALS AND EQUIPMENT SUPPLIED AND PROVIDE ALL NECESSARY PROTECTION FOR SAME.

17.8. BE RESPONSIBLE FOR THE PROTECTION AND MAINTENANCE OF THE WORK OF THIS SECTION UNTIL THE BUILDING HAS BEEN COMPLETED AND ACCEPTED BY THE OWNER, AND BE RESPONSIBLE FOR THE SORTING OF HIS MATERIAL INSIDE AND OUT OF THE WAY, AND TO CLEAN UP ALL REFUSE CAUSED BY HIS WORK TO MEET CONSULTANT'S REVIEW.

17.9. ON COMPLETION OF THE WORK ALL TOOLS, SURPLUS AND WASTE MATERIALS SHALL BE REMOVED AND THE WORK SITE LEFT IN A CLEAN AND PERFECT CONDITION.

18. LIABILITY INSURANCE

18.1. THIS CONTRACTOR SHALL MAINTAIN SUCH INSURANCE AS WILL FULLY PROTECT BOTH THE OWNER AND HIMSELF FROM ANY AND ALL CLAIMS, ALL AS NOTED WITHIN THE GENERAL CONDITIONS AND SUPPLEMENTARY GENERAL CONDITIONS. WHEN REQUESTED THE CONTRACTOR SHALL PROVIDE AND SHOW PROOF OF, AT HIS EXPENSE, COMPREHENSIVE GENERAL LIABILITY INSURANCE OF NOT LESS THAN $2,000,000.00 INCLUDING NON-OWNED CAR COVERAGE, CONTRACTUAL LIABILITY AND CONTAINING A CROSS LIABILITY CLAUSE. COVERAGE SHALL INCLUDE LOSS OR DAMAGE THE CONTRACTOR MAY CAUSE TO ANY WORK, BUILDING, EQUIPMENT, STRUCTURAL, ON THE OWNER'S PROPERTY,. THE INSURANCE MAY CONTAIN A DEDUCTIBLE CLAUSE NOT TO EXCEED $500.00.

18.2. THE CONTRACTOR SHALL CARRY FULL EMPLOYEE'S LIABILITY INSURANCE FOR THE WHOLE OF THE WORK IN ACCORDANCE WITH THE WORKERS' COMPENSATION ACT.

19. GUARANTEE WARRANTY

19.1. THIS CONTRACTOR SHALL FURNISH A WRITTEN WARRANTY STATING THAT ALL WORK EXECUTED UNDER THIS DIVISION WILL BE FREE FROM DEFECTS OF MATERIAL AND WORKMANSHIP FOR A PERIOD OF ONE (1) YEAR FROM THE DATE OF SUBSTANTIAL PERFORMANCE, WHICH SHALL INCLUDE ONE (1) COMPLETE SUMMER AND ONE (1) COMPLETE WINTER OF UNINTERRUPTED OPERATION. WARRANTY SHALL INCLUDE ANY PART OF EQUIPMENT, UNITS OR STRUCTURES FURNISHED HEREUNDER THAT SHOW DEFECTS IN THE WORKS UNDER NORMAL OPERATING CONDITIONS AND/OR FOR THE PURPOSE OF WHICH THEY WERE INTENDED.

19.2. THE CONTRACTOR SHALL AT HIS OWN EXPENSE PROMPTLY INVESTIGATE ANY MECHANICAL OR CONTROL MALFUNCTION, AND REPAIR OR REPLACE ALL SUCH DEFECTIVE WORK, AND ALL OTHER DAMAGES THEREBY WHICH BECOMES DEFECTIVE DURING THE TIME OF THE GUARANTY-WARRANTY.

20. HOISTS AND SCAFFOLDS

20.1. PROVIDE INTERIOR MOVABLE OR ROLLER SCAFFOLDS FOR THE INSTALLATION OF THE MECHANICAL WORK. ALL OTHER HOISTS, SCAFFOLDS, TEMPORARY ELEVATORS, LADDERS, RUNWAYS, ETC., SHALL BE REQUESTED BY THIS CONTRACTOR AND ARRANGED WITH THE GENERAL CONTRACTOR.

21. PIPE CHASES AND DUCT SHAFTS

21.1. UNLESS OTHERWISE INDICATED, CONCEAL PIPING AND DUCTWORK IN THE CONSTRUCTION OF THE WALLS AND CEILINGS, AND IN PIPE CHASES, DUCT SHAFTS AND FURRING. IF IT IS NECESSARY, MOVE THE LOCATION OF PIPES AND DUCTS FROM THOSE INDICATED AND PROVIDED. CONSULT THE CONSULTANT FOR REVIEW BEFORE INSTALLATION OF THIS WORK.

22. INSPECTION

22.1. THE CONSULTANT OR HIS REPRESENTATIVE MAY CHOOSE TO INSPECT ALL WORK PRIOR TO IT BEING CONCEALED.

22.2. THE CONTRACTOR SHALL NOTIFY THE CONSULTANT IN WRITING FOR THE FOLLOWING MINIMUM, BUT NOT LIMITED TO, INSPECTIONS: (REQUIRED TO PROVIDE A SCHEDULE 'C' FOR OCCUPANCY)
22.2.1. ALL HVAC AND PLUMBING ROUGH-IN PRIOR TO WALL AND CEILING FINISH INSTALLATION.
22.2.2. FIRE STOPPING OF ALL OPENINGS.
22.2.3. DROP TEST ALL FIRE DAMPERS AND DEMONSTRATE ACCESS.
22.2.4. TRIP TEST THE FIRE PROTECTION SYSTEM.
22.2.5. PRE-OCCUPANCY INSPECTION.
22.2.6. FINAL OCCUPANCY INSPECTION AND VERIFICATION OF ALL EQUIPMENT BEING FULLY OPERATIONAL.

22.3. ALL WORK SHALL BE APPROVED BY ANY OTHER REGULATORY BODY HAVING JURISDICTION WHERE REQUIRED.

22.4. THE CONTRACTOR IS TO PROVIDE COPIES OF ALL PERMITS, INSPECTION REPORTS AND CERTIFICATES FOR INSERTION INTO THE MAINTENANCE MANUAL.

22.5. THE CONTRACTOR IS TO PROVIDE THE CONSULTANT REASONABLE NOTICE PRIOR TO CALLING AN INSPECTION.
22.5.1. A MINIMUM OF 24 HOURS NOTICE IS REQUIRED FOR LOCAL SITES
22.5.2. A MINIMUM OF ONE WEEK IS REQUIRED WHERE FLIGHTS ARE REQUIRED.
22.5.3. A MINIMUM OF TWO DAYS IS REQUIRED FOR OUT OF TOWN DRIVES.

22.6. AFTER THE PRE-OCCUPANCY INSPECTION FOR SUBSTANTIAL PERFORMANCE ALL DEFICIENCIES SHALL BE COMPLETED FOR THE FINAL INSPECTION.

23. SUBSTANTIAL PERFORMANCE INSPECTION

23.1. PRIOR TO THE CONTRACTOR REQUESTING AN INSPECTION FOR SUBSTANTIAL PERFORMANCE ALL THE FOLLOWING ITEMS MUST BE COMPLETED.
23.1.1. MAINTENANCE AND OPERATING MANUALS TO BE SUBMITTED. (IF REQUIRED)
23.1.2. AS-BUILT DRAWINGS SUBMITTED. (IF REQUIRED)
23.1.3. BALANCING REPORTS (AIR AND WATER.) (IF REQUIRED)
23.1.4. ALL SYSTEMS SHALL BE CERTIFIED IN WRITING BY THE CONTRACTOR AS COMPLETE AND FULLY OPERATIONAL.
23.1.5. INSTRUCTIONS TO THE OWNER'S OPERATING PERSONNEL SHALL BE PROVIDED IN ACCORDANCE WITH THE SPECIFICATIONS.
23.1.6. A COMPLETE LIST OF ALL ITEMS WHICH THE CONTRACTOR HAS NOT FINISHED, OR ARE DEFICIENT SHALL BE PROVIDED. IF, IN THE OPINION OF THE CONSULTANT, THIS LIST INDICATES THE PROJECT IS EXCESSIVELY INCOMPLETE, A SUBSTANTIAL COMPLETION INSPECTION WILL NOT BE PERFORMED.
23.1.7. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE TO ACCUMULATE ALL NECESSARY DATA FROM HIS SUB-TRADES AND SUPPLIERS AND PRESENT SAME IN THE SPECIFIED FORMAT FOR THE APPROVAL BY THE CONSULTANT.
23.1.8. ALL LIFE/SAFETY ITEMS SUCH AS SPRINKLER SYSTEMS, FIRE STOPPING, FIRE DAMPERS, PLUMBING AND VENTILATION FIXTURES AND VENTILATION MUST BE OPERATIONAL.

24. LAWS, NOTICES, PERMITS AND FEES

24.1. GIVE ALL NECESSARY NOTICES, OBTAIN ALL NECESSARY PERMITS AND PAY ALL FEES IN ORDER THAT THE WORK SPECIFIED MAY BE CARRIED OUT, AND FURNISH ANY CERTIFICATES NECESSARY AS EVIDENCE THAT THE WORK INSTALLED CONFORMS WITH THE LAW AND REGULATIONS OF ALL AUTHORITIES HAVING JURISDICTION.

24.2. ALL WORK SHALL BE IN ACCORDANCE WITH THE REGULATIONS OF THE FOLLOWING AUTHORITATIVE BODIES, THE CODES IN EFFECT AT THE TIME OF TENDER, AND ANY OTHERS HAVING JURISDICTION:
24.2.1. FIRE MARSHALL
24.2.2. CANADIAN ELECTRICAL CODE
24.2.3. B.C. BUILDING CODE AND LOCAL BUILDING BY-LAWS
24.2.4. WORKER'S COMPENSATION BOARD
24.2.5. CANADIAN STANDARDS ASSOCIATION
24.2.6. POLLUTION CONTROL BOARD
24.2.7. B.C. REFRIGERATION CODE AND C.S.A. CODES GOVERNING REFRIGERATION PLANTS
24.2.8. B.C. GAS CODE
24.2.9. CANADIAN GAS CODE B-149.1
24.2.10. NATIONAL BUILDING CODE OF CANADA
24.2.11. B.C. BOILER AND PRESSURE VESSEL ACT.
24.2.12. NATIONAL FIRE PROTECTION ASSOCIATION

25. DEMONSTRATION AND INSTRUCTION TO OWNER

25.1. DEMONSTRATE TO AND INSTRUCT THE REPRESENTATIVE DESIGNATED BY THE OWNER ON THE COMPLETE MECHANICAL SYSTEMS OPERATING AND MAINTENANCE PROCEDURES USING THE ASSISTANCE OF SPECIALIST SUB-TRADES AND MANUFACTURER'S REPRESENTATIVES.

25.2. THE FOLLOWING SYSTEMS SHALL BE DEMONSTRATED IN REGARDS TO PERFORMANCE AND SAFETY FEATURES (TO THE FULLEST):
25.2.1. HVAC SYSTEMS. AIR HANDLING SYSTEMS (SUPPLY, RETURN, EXHAUST)
25.2.2. HEATING SYSTEMS (H.W. HEATING, D.H.W.S.)
25.2.3. CONTROLS SYSTEM
25.2.4. FIRE PROTECTION SYSTEMS
25.2.5. PLUMBING SYSTEMS

25.3. OBTAIN A SIGNED STATEMENT FROM THE OWNER CERTIFYING THAT THE DEMONSTRATION AND INSTRUCTIONS HAVE BEEN GIVEN TO HIS SATISFACTION. INCLUDE THIS DOCUMENT IN THE MECHANICAL MAINTENANCE MANUALS.

26. TESTING

26.1. PERFORM ALL TESTING REQUIRED BY THE AUTHORITY HAVING JURISDICTION.

26.2. OBTAIN TEST CERTIFICATES FOR ALL TESTS PERFORMED AND INCLUDE IN OPERATING MANUALS.

26.3. PERFORM THE FOLLOWING TEST: (WHERE APPLICABLE)
26.3.1. SANITARY & STORM HYDRAULIC TEST.
26.3.2. HEATING, CHILLED AND CONDENSER WATER TO MIN 1 1/2 TIMES WORKING PRESSURE.
26.3.3. SPRINKLER SYSTEM TESTED TO NFPA STANDARDS.
26.3.4. DOMESTIC WATER TEST TO 1 1/2 TIMES MAX WATER PRESSURE OR (200PSI).
26.3.5. DUCTWORK – TEST MEDIUM VELOCITY SYSTEMS TO A STATIC PRESSURE OF SYSTEM + 2" OF W.G.
26.3.6. DROP TEST ALL FIRE DAMPERS.

26.4. ALL TESTS SHALL BE DOCUMENTED AND WITNESSED BY THE CONSULTANT OR GENERAL CONTRACTOR.

27. BALANCING

27.1. CONTRACTOR IS TO PROVIDE THE SERVICES OF A APPROVED PROFESSIONAL TESTING & BALANCING FIRM.

27.2. PROVIDE A BALANCE REPORT OF ALL AIR & WATER BALANCE POINTS AND PERFORMANCE TESTING & BALANCING OF ALL EQUIPMENT AS PER THE AABC.

27.3. BALANCE ALL AIR AND WATER QUANTITIES TO 10% OF THE DESIGN REQUIREMENT.

27.4. PROVIDE ALL REQUIRED SHEAVE, BELT AND IMPELLER CHANGES TO ACHIEVE THE REQUIRED FAN AND PUMP FLOW RATES.

27.5. MEASURE AND BALANCE THE FOLLOWING (WHERE APPLICABLE):
27.5.1. SUPPLY, EXHAUST AND RETURN FAN VOLUMES AND SPEEDS.
27.5.2. AIRFLOW AT EACH AIR OUTLET AND BRANCH CONNECTION.
27.5.3. ADJUST PATTERN CONTROL ON SUPPLY DIFFUSERS FOR OPTIMAL PERFORMANCE.
27.5.4. MOTOR AMPERAGE DRAW ON ALL MOTORS AND COMPARE WITH MOTOR RATING.
27.5.5. WATER AT EACH BALANCE VALVE AND TERMINAL HEATING OR COOLING UNIT.

27.6. PROVIDE A SINGLE LINE SYSTEM SCHEMATIC WITH DESIGN AND ACTUAL FLOW RATES INDICATED ON THE DRAWING.

27.7. ADDITIONAL TESTING OF THE SYSTEM MAY BE REQUESTED BY THE CONSULTANT TO SPOT CHECK AIR AND WATER FLOW QUANTITIES. (10% OF THE SYSTEM WILL BE RE-CHECKED AT THE DISCRETION OF THE CONSULTANT) AT THE CONTRACTORS COST.

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Drawing
MECHANICAL SPECIFICATIONS

28. PIPE & PIPE FITTINGS

28.1. ENSURE ALL PIPE MATERIALS AND FITTINGS ARE ACCEPTABLE TO THE AUTHORITY HAVING JURISDICTION.

28.2. ALL TYPE 'K' COPPER MUST BE CERTIFIED TO ASTM B88. PROVIDE WRITTEN GUARANTEE THAT LEAD FEE SOLDER WAS USED ON ALL DOMESTIC WATER SYSTEMS.

28.3. APPROVED PIPE & FITTINGS: (NON-COMBUSTIBLE CONSTRUCTION)

SERVICE	PIPE	FITTINGS
SANITARY ABOVE GRADE	DWV COPPER COPPER OR CAST BRASS 95-5 CAST IRON	WROUGHT SOLDER GASKET WITH STAINLESS STEEL COUPLING
DOMESTIC WATER ABOVE	TYPE 'K' COPPER (LEAD-FREE)	WROUGHT COPPER OR BRASS WITH 95.5% SOLDER
FIRE PROTECTION	SCHEDULE 40 TO N.F.P.A. STANDARDS	SCREWED OR MECHANICAL JOINTS
SPLIT SYSTEM	REFRIGERATION PIPING	SILVER SOLDERED JOINTS

28.4. CONTRACTOR TO PROVIDE DRAINS AT ALL LOW POINTS IN THE PIPING SYSTEM.

29. SUPPORT, ANCHORS & SEALS

29.1. PROVIDE ALL NECESSARY SUPPORTS, AND HANGERS TO SECURE MECHANICAL SYSTEMS AND EQUIPMENT.

29.2. PROVIDE FIRE STOPPING AT ALL DUCT AND PIPING PENETRATIONS THROUGH RATED FLOORS/WALLS AND SHAFTS.

29.3. PROVIDE OVERSIZE HANGERS ON ALL COLD PIPES TO FIT OVER PIPE INSULATION WHERE REQUIRED.

29.4. PROVIDE ISOLATION AND PREVENT CONTACT WITH DISSIMILAR METALS.

29.5. ALL SLEEVES FOR MECHANICAL PIPING TO EXTEND 1" ABOVE THE FLOOR IN ALL MECHANICAL ROOM, SHAFTS AND WET AREAS.

29.6. ALL DUCTWORK TO BE SUPPORTED AS PER SMACNA.

29.7. ALL EXPOSED PIPING PENETRATIONS SHALL BE PROVIDED WITH ESCUTCHEONS AT THE PENETRATION POINT.

30. VALVES

30.1. PROVIDE VALVES FOR HEATING WATER, DOMESTIC WATER, GAS AND REFRIGERATION SYSTEMS.

30.2. PROVIDE GATE, GLOBE, BALL, BUTTERFLY, DRAIN AND CHECK VALVES.

30.3. PROVIDE ALL NECESSARY VALVES SUITABLE FOR THE FLUID AND PIPING SYSTEM.

30.4. INSTALL ALL VALVES IN UPRIGHT OR HORIZONTAL POSITION.

30.5. PROVIDE DRAIN VALVES AT ALL LOW POINTS IN THE PIPING SYSTEM.

30.6. PROVIDE ISOLATION VALVE AT EACH PLUMBING FIXTURE.

VALVES PERMITTED:	< 2" DIAMETER	2" DIAMETER >
DOMESTIC HOT & COLD	BALL	BALL
HEAT PUMP WATER	GATE OR BALL	BALL

30.7. VALVES UP TO 2" DIAMETER CAN BE SWEATED OR SCREWED CONNECTION. VALVES LARGER THAN 2" DIAMETER MUST BE SCREWED, FLANGED OR MECHANICALLY COUPLED TO PIPING SYSTEM.

31. VIBRATION ISOLATION

31.1. PROVIDE VIBRATION ISOLATION FOR ALL MOTOR DRIVEN EQUIPMENT. TO MAINTAIN NOISE CRITERIA LEVELS AT OR BELOW ASHRAE RECOMMENDED LEVELS.
31.2. PROVIDE SPRING ISOLATOR FOR ALL MOTOR DRIVEN EQUIPMENT LARGER THAN 1/2 H.P. FOR EQUIPMENT 1/2 H.P. AND LESS NEOPRENE ISOLATORS MAY BE USED.
31.3. ALL ISOLATORS PROVIDED SHALL INCORPORATE SEISMIC RESTRAINTS. ISOLATORS FOR BASE MOUNTED EQUIPMENT SHALL BE SEISMIC ISOLATORS.
31.4. PROVIDE HORIZONTAL LIMIT SPRINGS ON ALL FANS (EXCEPT VERTICAL DISCHARGE) IN EXCESS OF 0.3" STATIC PRESSURE.

31.5. ALL FLOOR MOUNTED NON-ISOLATED EQUIPMENT (I.E. BOILERS, TANKS, AIR HANDLING UNITS) SHALL BE BOLTED TO STRUCTURE AND BE DESIGNED FOR A 2G APPLIED HORIZONTAL FORCE.

31.6. SUBMIT SHOP DRAWINGS OF ISOLATORS WHICH ARE NOT SUPPLIED BY THE EQUIPMENT MANUFACTURER.

31.7. ALL ELECTRICAL CONNECTIONS TO EQUIPMENT ARE TO BE PROVIDED WITH FLEXIBLE CONNECTORS AND CABLE WITH A MINIMUM 30" BEND OR FLEXIBLE CONDUIT.

31.8. PROVIDE FLEXIBLE DUCTWORK AND PIPING CONNECTIONS TO ALL EQUIPMENT WHICH INCORPORATES VIBRATION ISOLATIONS.

32. SEISMIC REQUIREMENTS

32.1. PROVIDE AND INSTALL SEISMIC RESTRAINTS FOR ALL EQUIPMENT, DUCTWORK AND PIPING INSTALLED BY THIS DIVISION IN ACCORDANCE WITH THE FOLLOWING CODES AND STANDARDS:
32.2. BC BUILDING CODE 2012
32.2.1. NFPA 13 2013
32.2.2. NFPA 20
32.2.3. SMACNA "GUIDELINES FOR SEISMIC RESTRAINTS OF MECHANICAL SYSTEMS AND PLUMBING PIPING SYSTEMS".

32.3. THE INSTALLATION OF SEISMIC RESTRAINS SHALL NOT COMPROMISE VIBRATION ISOLATION CAPABILITIES.

32.4. PRIOR TO CONSTRUCTION COMMENCEMENT, CONTRACTOR SHALL ORGANIZE A MEETING WITH THE GENERAL CONTRACTOR, MECHANICAL CONTRACTOR, STRUCTURAL CONSULTANTS AND OTHER APPROPRIATE PARTIES. AT THAT MEETING, THE CONTRACTOR SHALL PRESENT IN GENERAL THE APPROACHES/DETAILS USED TO PROVIDE SEISMIC BRACING FOR EQUIPMENT, DUCTWORK AND PIPING HIGHLIGHTING ATTACHMENTS TO STRUCTURE AND TRADE COORDINATION.

32.5. SEISMIC RESTRAINTS FOR HOT WATER TANKS TO BE VIBRA-SONIC CONTROL MODEL VS-100 FOR TANKS LARGER THAN 50 GALLONS. SMALL TANKS TO BE PROVIDED WITH STEEL STRAP SECURED TO STRUCTURE.

32.6. CONTRACTOR TO PROVIDE PROFESSIONAL CERTIFICATION FOR ALL ITEMS INSTALLED BY THIS DIVISION PRIOR TO REPORT FOR COMPLETION OR OCCUPANCY INSPECTION.

33. INSULATION

33.1. INSTALLATION SHALL CONFORM TO THE B.C.I.C.A. QUALITY STANDARDS MANUAL FOR MECHANICAL INSULATION.

33.2. PIPING INSULATION:
33.2.1. PROVIDE VAPOUR BARRIER FOR ALL COLD PIPES.
33.2.2. RAINWATER LEADERS TO BE INSULATED.
33.2.3. INSULATION TO BE PROVIDED FOR ALL DOMESTIC HOT AND COLD AND RE-CIRCULATION PIPING.
33.2.4. INSULATION IS TO BE PROVIDED FOR ALL HEATING WATER AND CHILLED WATER PIPING.
33.2.5. INSULATE ALL PLUMBING TRAPS IN NON-HEATED AREAS WITH REMOVABLE INSULATED CAP.
33.2.6. ALL EXPOSED PIPING TO BE COMPLETE WITH PF-5 PVC FINISH. NO FINISH REQUIRED ON CONCEALED PIPING.
33.2.7. PROVIDE INSULATION THICKNESS AND TYPE AS FOLLOWS: (WHERE APPLICABLE)
33.2.8. INSULATE ALL EXPOSED TRAPS UNDER HANDICAPPED SINKS WITH FACTORY MADE INSULATION KIT.

SERVICE	SIZE	THICKNESS	TYPE
DOMESTIC HOT & COLD	UP TO 1"Ø	1"	MINERAL FIBRE
CONDENSATE DRAIN	ALL	1/2"	MINERAL FIBRE

33.3. DUCTWORK INSULATION:
33.3.1. PROVIDE EXTERNAL DUCTWORK INSULATION AS PER THE FOLLOWING: (WHERE APPLICABLE)
33.3.2. ALL EXPOSED DUCTWORK IN MECHANICAL ROOMS TO BE RIGID INSULATION WITH RF4 ECONOMY FINISH.
33.3.3. EXPOSED HEATING AND AIR CONDITIONING DUCTWORK INSTALLED IN A EXPOSED AREA IN WHICH IT IS SERVING, NEED NOT BE INSULATED.
33.3.4. EXTERNAL INSULATION IS NOT REQUIRED WHERE DUCTWORK IS INTERNALLY LINED.
33.3.5. PROVIDE EXTERNAL DUCTWORK INSULATION ON EXHAUST AND OUTDOOR AIR INTAKES FOR A MINIMUM OF 10'-0" FROM PENETRATION OF EXTERIOR WALL OR ROOF.
33.3.6. DUCTWORK EXPOSED TO THE WEATHER SHALL BE PROVIDED WITH WEATHER PROOF JACKETING (P.V.C. OR ALUMINUM).

SERVICE	THICKNESS	TYPE
AIR CONDITIONED SUPPLY	1"	FLEXIBLE FOIL FACE FIBREGLASS
HEATING SUPPLY AIR DUCT	1"	FLEXIBLE FOIL FACE FIBREGLASS
UNDERGROUND DUCT	2"	SPRAY ON POLYURETHANE FOAM
EXHAUST DUCT (SEE ABOVE)	1"	FLEXIBLE FOIL FACE FIBREGLASS
DUCTWORK IN NON-HEATED SPACES	1"	FLEXIBLE FOIL FACE FIBREGLASS

33.4. ACOUSTIC INSULATION:
33.4.1. PROVIDE 1" INTERNAL ACOUSTIC INSULATION UPSTREAM AND DOWNSTREAM A MINIMUM OF 10'-0" FROM ALL SUPPLY, RETURN AND EXHAUST FANS.
33.4.2. PROVIDE 1" INTERNAL ACOUSTIC INSULATION WHERE SHOWN HATCHED ON DRAWINGS, IN ADDITION TO THE REQUIREMENTS OF SENTENCE 1 ABOVE.
33.4.3. ALL INSULATION EDGES MUST BE SEALED. PROVIDE FASTENERS AT 12" O.C. WITH PINS CUT AND CAPPED.

33.5. EXPOSED REFIGERATION PIPING HAVE ALUMINUM EXTERIOR JACKETING

34. PLUMBING GENERAL

34.1. TO COMPLY WITH BC BUILDING CODE 2006 AND LOCAL MUNICIPALITY REQUIREMENTS.

34.2. FIRE STOP ALL PENETRATIONS THROUGH RATED SEPARATIONS. PROVIDE NECESSARY THERMAL INSULATION AND VAPOUR BARRIER AT PENETRATIONS. CONTRACTOR TO PROVIDE PROFESSIONAL CERTIFICATION FROM SPECIALIST FIRE-STOPPING TRADE PRIOR TO REPORT FOR COMPLETION OR OCCUPANCY INSPECTION.

34.3. SUPPLY AND INSTALL CLEANOUTS ON ALL DRAINS, CHANGES IN DIRECTION, AT BASE OF RISER AND ON MAIN SANITARY AND STORM LEAVING BUILDING AND WHERE ADDITIONALLY REQUIRED BY THE BC BUILDING CODE.

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

34.5. PRIOR TO COMMENCING THE UNDERGROUND PLUMBING INSTALLATION EXCAVATE AND VERIFY:
34.5.1. THE LOCATION, ELEVATION AND SIZE OF STORM AND SANITARY SERVICE CONNECTIONS.
34.5.2. THE SANITARY AND STORM LINES CAN BE ROUTED AND SUFFICIENTLY SLOPED WITH ADEQUATE COVER FOR FREEZING PROTECTION TO MEET THE SERVICE CONNECTIONS.
34.5.3. INFORM THE ENGINEER IMMEDIATELY IF ANY CHANGES ARE REQUIRED.

34.6. ALL FLOOR DRAINS SHALL HAVE TRAP PRIMER CONNECTION.

34.7. EXPOSED WATER DISTRIBUTION PIPE TO BE 3/4" MINIMUM.

34.8. LEAD-FREE SOLDER TO BE USED FOR ALL POTABLE WATER SYSTEMS. CONTRACTOR TO ISSUE A LETTER OF GUARANTEE AND INCLUDE IN THE MAINTENANCE MANUALS.

34.9. PROVIDE UNIONS TO ALL EQUIPMENT AND VALVE CONNECTIONS FOR 2-1/2" AND BELOW. FLANGED CONNECTIONS FOR 3" AND OVER.

34.10. PROVIDE NECESSARY THRUST BLOCKS, ANCHOR, ETC. TO UNDERGROUND WATER PIPING AT ALL CHANGES OF DIRECTION, ALL TEES AND AT THE END OF ALL MAINS AND BRANCHES.

34.11. PROVIDE STAINLESS STEEL BELLOWS TYPE WATER HAMMER ARRESTORS ON WATER LINES CONNECTED TO CLOTHES WASHER AND DISH WASHER AND AT TOP OF RISERS. PROVIDE ACCESSIBLE ISOLATION VALVE AND ACCESS TO ARRESTORS FOR SERVICING.

34.12. PROVIDE CHROME ESCUTCHEON PLATE FOR ALL PLUMBING ROUGH-IN.

34.13. PROVIDE LEAD SHEET FLASHING AND SHEET METAL COUNTER FLASHING FOR PIPE PASSING THROUGH ROOF DECK STRUCTURE.

34.14. PROVIDE NON-CONDUCTING TYPE CONNECTION FOR JOINING OR SUPPORTING. PROVIDE SEPARATION BETWEEN DISSIMILAR METALS.

34.15. PROVIDE STOP VALVE TO ALL EQUIPMENT AND PLUMBING FIXTURE CONNECTION. PROVIDE STOP VALVE TO BASE OF WATER RISERS. PROVIDE ISOLATION VALVES FOR ALL FIXTURE TRIM UNLESS COMPLETE WITH INTEGRAL STOPS.

35. CLEANING & CHEMICAL TREATMENT

35.1. PROVIDE FOR CLEANING AND DISINFECTION OF ALL DOMESTIC HOT & COLD WATER SYSTEMS.

35.2. DURING SYSTEM FLUSHING ENSURE THAT ALL CONTROL VALVES AND OTHER SYSTEM VALVES ARE IN THE FULL OPEN POSITION.

35.3. ALL DOMESTIC WATER PIPING SHALL BE THOROUGHLY FLUSHED SO THAT IT IS FREE FROM ALL SCALE, SEDIMENT ETC.

36. FIRE PROTECTION (PERFORMANCE SPEC)

36.1. ADJUST EXISTING SPRINKLER PIPING AND HEADS FOR NEW LAYOUT AS REQUIRED TO NFPA NO. 13 AND LOCAL MUNICIPAL BY-LAWS AND REQUIREMENTS. IN ADDITION, TO COMPLY WITH OWNER'S INSURANCE AUTHORITY REQUIREMENTS. ALL MATERIAL SHALL BE LISTED BY ULC OR APPROVED FOR SPRINKLER/STANDPIPE USE. PIPE SIZING BY HYDRAULIC CALCULATIONS.

36.2. PROVIDE PDF SHOP DRAWINGS TO THE ENGINEER AND CERTIFIED PROFESSIONAL FOR CHECKING PRIOR TO WORK COMMENCEMENT. CONTRACTOR TO OBTAIN APPROVAL FROM AUTHORITY HAVING JURISDICTION AND PAY FOR ALL NECESSARY PERMITS.

36.3. SPRINKLER HEAD LOCATION SHALL SUBJECT TO APPROVAL BY THE ARCHITECT. FOLLOW HEAD LOCATION SHOWN ON REFLECTED CEILING PLAN. PROVIDE HEADS UNDER OBSTRUCTIONS TO MEET CODE.

36.4. CONTRACTOR TO PERFORM TESTING IN PRESENCE OF THE CONSULTANT AND SUBMIT NFPA TESTING CONTRACTOR'S CERTIFICATE.

36.5. PROVIDE SPARE SPRINKLER HEADS FOR SYSTEM (LESS THAN 300 HEADS, PROVIDE 6 AND UP TO 1000 HEADS PROVIDE 12), AND TURN OVER TO OWNER AT THE END OF CONSTRUCTION.

36.6. REFER TO DRAWING M3.0 FOR PROPOSED DESIGN INFORMATION.

36.7. PROVIDE PORTABLE FIRE EXTINGUISHERS 10LB ABC TYPE WITH LOCKABLE GLASS FRONT CABINET PER B.C. FIRE CODE REQUIREMENTS.

36.8. SUPPLY & INSTALL FOLLOWING FOR DIV.16 FIRE ALARM/TROUBLE SUPERVISION.

36.8.1. VALVE MOVEMENT SUPERVISORY SWITCH.

36.8.2. LOW WATER PRESSURE SWITCH.
LOW AIR PRESSURE SWITCH FOR DRY SYSTEM.

36.8. FIRE EXTINGUISHERS:
36.8.1. PROVIDE INSTALL AND IDENTIFY FIRE EXTINGUISHERS AND CABINETS IN ACCORDANCE WITH NFPA 10 AND BCBC 2012.
36.8.2. PROVIDE SHOP DRAWINGS FOR REVIEW AND INCLUSION IN MAINTENANCE MANUALS.

36.8.3. CONTRACTOR TO PROVIDE SEALED FIRE PROTECTION DRAWINGS TO THE CONSULTANT.

37. SHEET METAL DUCTWORK

37.1. DUCTWORK SHALL BE GALVANIZED STEEL, LOCK FORMED 2" W.G. SMACNA STANDARD FOR LOW VELOCITY AND MEDIUM VELOCITY DUCTWORK QUALITY. FABRICATED IN ACCORDANCE WITH SMACNA DUCT MANUALS AND ASHRAE HANDBOOKS. DUCTWORK SHALL MEET THE REQUIREMENTS OF NFPA 90A AND 91 AND CONFORM TO APPLICABLE CODES.

37.2. PRIOR TO FABRICATION OF DUCTWORK, CHECK ALL CEILING SPACES AND HEIGHTS AND CONFLICT WITH OTHER TRADES. INCLUDE AND PROVIDE NECESSARY OFFSET TO MAINTAIN CEILING HEIGHT, HEADROOM ETC.

37.3. PROVIDE MINIMUM 300MM X 300MM (12"X 12") ACCESS PANELS TO MANUAL DAMPERS, EQUIPMENT, FIRE DAMPERS.

37.4. ALL DUCTWORK SHALL BE DELIVERED TO SITE IN A CLEAN CONDITION AND REMAIN CLEAN. DURING INSTALLATION ALL OPEN ENDS OF DUCTWORK SHALL BE CAPPED AND KEPT CLEAN.

37.5. PROVIDE FLEXIBLE DUCT CONNECTIONS FROM CONCEALED DUCT BRANCHES TO SUPPLY AIR DIFFUSERS (NOT PERMITTED ON EXPOSED DUCTING). FLEX SHALL BE A MAXIMUM OF 1500MM LONG, SHALL BE SELF SUPPORTED TO PREVENT SAGGING AND SHALL NOT HAVE KINKED BENDS. FLEX SHALL ONLY BE CONNECTED DIRECTLY TO DIFFUSER PLENUMS OR FABRICATED SHEET METAL AIR CUSHIONS IT SHALL NO CONNECT DIRECTLY TO THE COLLAR OF DIFFUSERS. FLEX SHALL BE THERMALLY INSULATED IF SUPPLY DUCTWORK IS INSULATED.

37.6. ALL DUCTS ASSOCIATED WITH FANS, AND OTHER VIBRATION ISOLATED EQUIPMENT SHALL BE INSTALLED WITH FLEXIBLE CANVAS CONNECTIONS ON THE INLET AND OUTLET OPENINGS.

37.7. ALL DUCTWORK PENETRATING FLOOR SLABS ABOVE AND BELOW OR FIRE SEPARATIONS SHALL BE COMPLETE WITH FIRE DAMPERS. REFER TO THE ARCHITECTURAL DRAWINGS FOR FIRE RATINGS AND FIRE SEPARATION LOCATIONS.

37.8. PROVIDE RETURN AIR OPENINGS AND/OR SOUND TRAPS WHERE INDICATED COMPLETE WITH 1" ACOUSTIC LINING.

37.9. PROVIDE BALANCING DAMPERS WHERE INDICATED ON DRAWINGS AND AT ALL DUCT BRANCHES. IF ADDITIONAL DAMPERS ARE REQUIRED AT THE REQUEST OF THE BALANCING AGENT, TO FACILITATE PROPER BALANCING, THESE ARE TO BE PROVIDED AT NO ADDITIONAL COST.

37.10. PAINT ALL VISIBLE DUCTWORK THROUGH SUPPLY, RETURN OR EXHAUST GRILLES MATT BLACK. COORDINATE ON SITE WITH GENERAL CONTRACTOR.

37.11. SIZE ROUND DUCTS, INSTALLED IN PLACE OF RECTANGULAR DUCTS, FROM ASHRAE TABLE OF EQUIVALENT RECTANGULAR AND ROUND DUCTS. NO VARIATION OF DUCT CONFIGURATION OR SIZES PERMITTED EXCEPT BY PERMISSION FROM CONSULTANT.

37.12. PROVIDE SEISMIC SUPPORTS FOR GRILLES AND DIFFUSERS.

37.13. PROVIDE TURNING VANES FOR ALL RECTANGULAR ELBOWS INSTALLED AS PER SMACNA.

37.14. ROOF MOUNTED DUCTS SHALL HAVE STANDING SEAMS AND SEALED WATER-TIGHT.

37.15. PROVIDE BACK DRAFT DAMPER TO ALL EXHAUST OUTLETS AT EXTERIOR.

37.16. PROVIDE GALVANIZED STEEL SCREEN, 1/2" X 1/2" SQUARE MESH FOR EXTERIOR INTAKE & EXHAUST OUTLETS.

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

38. CONTROLS - GENERAL

38.1. EXISTING THERMOSTATS SHALL BE RELOCATED AND RECALIBRATED TO SUIT NEW LAYOUT

38.2. INSTALL COMPLETE NEW CONTROLS FOR SPLIT SYSTEMS.

38.3. DIVISION 16 TO PROVIDE WIRING TO 120V/1 PHASE AND 208V/3/60 MOTORS AND THE WIRING BETWEEN THE AC UNIT AND ITS CONTROL DEVICE SUCH AS THERMOSTAT IS BY DIVISION 15.

38.4. CONTROLS SEQUENCE TO MATCH EXISTING.

38.5. ALL DIVISION 15 WIRING AND CONDUIT REQUIREMENTS TO FOLLOW DIVISION 16 SPECIFICATIONS FOR THIS PROJECT. THIS SHALL INCLUDE LOW-VOLTAGE WIRING, MOUNT OF CONTROL DEVICES.

- END -

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