

### MECHANICAL DRAWING LIST

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M-300	HVAC SYSTEM- FLOOR PLAN AND DETAILS DUCTWORK NEW
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M-700	SPECIFICATIONS

### GENERAL NOTES

- ALL DEMOLITION AND INSTALLATIONS SHALL BE IN ACCORDANCE WITH CODES, AMENDMENTS, BULLETINS ETC. AND REQUIREMENTS OF ALL INSPECTION AUTHORITIES FOR THE CITY OF OTTAWA.
  - CONTRACTOR IS TO VERIFY LOCATIONS OF ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION.
  - ALL EXISTING UTILITIES AND SERVICES ARE TO BE MAINTAINED AND SUPPORTED BY THE CONTRACTOR TO THE SATISFACTION OF THE OWNER.
  - ALL VALVES, DAMPER CONTROLS, ACCESS DOORS, TEST PORTS, AND FILTERS TO BE LOCATED SO THAT THEY ARE EASILY ACCESSIBLE. ALL GAUGES TO BE LOCATED AT EYE LEVEL.
  - DO NOT SCALE DRAWINGS FOR INSTALLATION PURPOSES. OBTAIN ALL DIMENSIONS FROM ARCHITECTURAL PLANS, MANUFACTURER'S SHOP DRAWINGS, AND ON SITE INSPECTIONS.
  - MECHANICAL, GENERAL AND ELECTRICAL TRADES SHALL WORK IN CONJUNCTION WITH ONE ANOTHER SO AS TO AVOID INTERFERENCES BETWEEN PIPING, DUCTWORK, CONDUIT, LIGHTING FIXTURES, ETC.
  - CO-ORDINATE LOCATION OF NEW PIPING WITH EXISTING OR NEW SERVICES (PIPING, DUCTWORK, ELECTRICAL CONDUITS, LIGHTS AND BUILDING STRUCTURE). IF REQUIRED REMOVE EXISTING SERVICES AND REINSTALL. TEST SERVICES AFTER WORK IS COMPLETED.
  - CHECK AND VERIFY LOCATION OF ALL PIPES, DUCTS AND EQUIPMENT WITH ALL OTHER TRADES TO PREVENT INTERFERENCE. REMOVAL OR RELOCATION OF ANY SUCH WORK INTERFERING WITH WORK OF OTHER TRADES IS THE RESPONSIBILITY OF THE MECHANICAL TRADE CONCERNED UNLESS OTHERWISE APPROVED IN WRITING.
  - COORDINATE MECHANICAL WORK WITH PHASING PLAN, ENVIRONMENT CANADA PERSONNEL, ALL SPECIFICATIONS AND OTHER CONTRACTORS TO ENSURE ALL STRINGENT CONSTRUCTION PROCEDURES ARE FOLLOWED (INCLUDING CONTAINMENT PROCEDURES)
- DUE TO INCONSISTENT RECORD OF EXISTING SERVICES NOT ALL DUCTWORK MAY BE SHOWN, OR IF SHOWN MAY NOT BE ACCURATE. IT IS THE CONTRACTORS RESPONSIBILITY TO VERIFY EXACT SIZE AND LOCATION OF ALL EXISTING SERVICES ON SITE AND SHALL REMOVE ALL REDUNDANT SERVICES IN THE AREAS OF CONSTRUCTION.

### DEMOLITION NOTES

- DISCONNECT AND MAKE SAFE ALL MECHANICAL AND ELECTRICAL SERVICES REQUIRED TO BE REMOVED.
- CONTRACTOR SHALL REPAIR THE WALLS AND FLOORS AFFECTED BY THIS CONTRACT TO MATCH EXISTING.
- CONFORM TO ALL CODES AND OWNER'S PROCEDURES FOR DEMOLITION WORK, DUST CONTROL, PRODUCTS REQUIRING DISCONNECTION AND RECONNECTION.
- PROTECT FIRE ALARM AND LIFE SAFETY SYSTEMS DURING CONSTRUCTION.
- ARRANGE EXECUTION OF WORK TO MAINTAIN PRESENT BUILDING OPERATIONS, AND TO MINIMIZE THE EFFECT OF WORK UNDER THIS DIVISION ON EXISTING OPERATIONS.
- ALL DEMOLITION AND NEW INSTALLATION WORK SHALL CONFORM TO OCCUPATIONAL HEALTH AND SAFETY AND ENVIRONMENTAL REGULATIONS. ENSURE THAT ALL PARTIES ARE FAMILIAR WITH REQUIREMENTS AND EXPERIENCED IN THE WORK TO BE UNDERTAKEN.
- MAKE GOOD ALL SURFACES AND FINISHES IN AREAS FROM WHICH ITEMS HAVE BEEN REMOVED AND IN WHICH ITEMS ARE RELOCATED. CAP ALL EXISTING SERVICES REQUIRED TO BE SEVERED TO EFFECT ALTERATIONS AND DO ALL OTHER WORK NECESSARY TO MAKE GOOD SUCH AREAS TO SATISFACTION OF CONSULTANT.
- ALL EXISTING AIR INTAKE AND EXHAUST OPENINGS THAT MAY BE AFFECTED BY DUST AND/OR DEBRIS FROM THE CONSTRUCTION WORK SHALL BE FITTED WITH APPROPRIATE FILTER MEDIA TO PROTECT AGAINST ENTRY OF DUST AND/OR DEBRIS INTO THE BUILDING AND ITS AIR DISTRIBUTION SYSTEMS. FILTERS SHALL BE CLOSELY MONITORED AND REPLACED WHEN NECESSARY. THE CONTRACTOR SHALL REPLACE EXISTING FILTERS THAT BECOME CONTAMINATED WITH DUST AND/OR DEBRIS FROM CONSTRUCTION WORK WITH NEW FILTERS.
- PROTECT EXISTING EQUIPMENT AND SERVICES TO REMAIN FROM DEBRIS AND UNWANTED MATERIALS. CLEAN AS NECESSARY TO MAINTAIN SERVICE DURING DEMOLITION PERIOD AND ON COMPLETION OF THE WORK.
- CONTRACTOR IS TO ENSURE THAT ALL EXISTING PIPING SERVING EXISTING AREAS REMAIN IN SERVICE UNTIL THESE AREAS ARE RECONNECTED TO NEW SERVICES. ONLY THEN OBSOLETE PIPING IS TO BE REMOVED AS SHOWN.
- CONTRACTOR IS TO ENSURE THAT ALL EXISTING REMOVED EQUIPMENT IS REMAIN THE PROPERTY OF THE OWNER, AND TO BE HANDED OVER TO THE OWNER.

### MECHANICAL LEGEND

SYMBOL	DESCRIPTION
EX (NAME)	EXISTING PIPING TO REMAIN
RL	REFRIGERANT LIQUID
RS	REFRIGERANT SUCTION
C	CONDENSATE
GLYS	GLYCOL SUPPLY
GLYR	GLYCOL RETURN
O	PIPING RISER UP
D	PIPING DROP
	UNION
	FLANGE
W	FLEXIBLE CONNECTOR
P	INLINE PUMP
S	STRAINER
3-WAY	3-WAY CONTROL VALVE
2-WAY	2-WAY CONTROL VALVE
ISOLATING	ISOLATING (SHUT-OFF) VALVE
THROTTLING	THROTTLING (BALANCING) VALVE
CBV	CIRCUIT BALANCING VALVE
CHECK	CHECK (FLOW CONTROL)
SAFETY	SAFETY (S) OR RELIEF (R) VALVE
DC	DRAIN COCK
VENT	AUTOMATIC AIR VENT
BACKFLOW	BACKFLOW PREVENTOR
THERM	THERMOMETER
PRESS	PRESSURE GAUGE
AIR VENT	AUTOMATIC AIR VENT
POSITIVE	POSITIVE PRESSURE (SUPPLY) DUCT DOWN
NEGATIVE	NEGATIVE PRESSURE (RETURN) DUCT DOWN
EXISTING DUCTWORK	EXISTING DUCTWORK TO BE REMOVED
EXISTING DUCTWORK	EXISTING DUCTWORK TO REMAIN
NEW DUCTWORK	NEW DUCTWORK
FULL RADIUS	FULL RADIUS DUCT CONNECTION
TAP-IN	TAP-IN DUCT CONNECTION
ROUND	ROUND DUCT CONNECTION
TURNING	TURNING VANES
SQUARE	SUPPLY AIR DIFFUSER (SQUARE)
GRILLE	RETURN/EXHAUST GRILLE
TEMPERATURE	TEMPERATURE SENSOR
FIRE	FIRE DAMPER
HUMIDISTAT	HUMIDISTAT
CAP	CAP
THERMOSTAT	THERMOSTAT
BALANCING	BALANCING DAMPER
MOTORIZED	MOTORIZED DAMPER
CFM	INDICATES EXISTING AIR OUTLET TO BE REBALANCED TO AIR QUANTITY INDICATED.
EX CFM	INDICATES EXISTING AIR OUTLET TO REMAIN.
CONNECT	CONNECT TO EXISTING

### COMMISSIONING SPECIFICATIONS

1.1 COMMISSIONING AGENCY  
THE MECHANICAL ENGINEER HAS OVERALL RESPONSIBILITY FOR PLANNING AND COORDINATING THE COMMISSIONING PROCESS. COMMISSIONING INVOLVES ALL PARTIES TO THE DESIGN AND CONSTRUCTION PROCESS, INCLUDING THE CONTRACTOR AND HIS SUBCONTRACTORS AND SUPPLIERS.

1.2 DESCRIPTION OF WORK  
THE PURPOSE OF THE COMMISSIONING PROCESS IS TO PROVIDE THE OWNER/OPERATOR OF THE FACILITY WITH ASSURANCE THAT THE MECHANICAL SYSTEMS HAVE BEEN INSTALLED ACCORDING TO THE CONTRACT DOCUMENTS, AND OPERATE WITHIN THE PERFORMANCE GUIDELINES SET OUT IN THE DESIGN INTENT DOCUMENTS AND THESE SPECIFICATIONS. THE COMMISSIONING PROCESS DOES NOT TAKE AWAY OR REDUCE THE RESPONSIBILITY OF THE INSTALLING CONTRACTORS TO PROVIDE A FINISHED PRODUCT, INSTALLED AND FULLY FUNCTIONAL IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.

THE MECHANICAL CONTRACTOR, ALL SUB-CONTRACTORS AND SUPPLIERS, AND THE CONTRACTORS FOR OTHER DIVISIONS AND SECTIONS OF THE WORK SHALL BE RESPONSIBLE FOR COOPERATING, AND COORDINATING THEIR WORK, WITH THE MECHANICAL ENGINEER. THEY SHALL ALSO BE RESPONSIBLE FOR CARRYING OUT ALL THE PHYSICAL ACTIVITIES REQUIRED FOR INSTALLATION OF COMPONENTS AND SYSTEMS, AND OPERATING THEM DURING THE COMMISSIONING PROCESS AS REQUIRED IN THIS SECTION.

CONTRACTOR SHALL INCLUDE IN THE PROGRESS BILLING BREAKDOWN SUFFICIENT FUNDS FOR COMMISSIONING PERFORMANCE TESTING/VERIFICATION, TRAINING, AND POST CONSTRUCTION EVALUATION. THE MAJORITY OF THE FUNDS (85%) SHALL BE ALLOCATED TO PERFORMANCE TESTING AND VERIFICATION.

1.3 SYSTEMS TO BE COMMISSIONED  
HVAC SYSTEMS UNDER THIS CONTRACT ARE TO BE INSPECTED, TESTED, AND SIGNED OFF AS COMPLETE AND OPERATIONAL, AND OPERATED FOR CONSULTANT VERIFICATION AS DESCRIBED IN PART 3 OF THIS SECTION. THIS INCLUDES, BUT IS NOT NECESSARY LIMITED TO THE WORK LISTED FOR EACH SYSTEM. THE FOREGOING INCLUDES ALL THE FOLLOWING:

- DUCT AND AIR HANDLING SYSTEMS - WORK INCLUDES INSTALLATION INSPECTIONS AND CHECKS; CONFIRMATION OF FLOW BALANCING COMPLETION; LEAK TESTING AS APPLICABLE; SEISMIC RESTRAINTS INSTALLATION CERTIFICATION.
- REFRIGERATION COMPRESSOR/CONDENSING UNIT(S) - WORK INCLUDES INSTALLATION INSPECTION AND CHECKS (INCLUDING SEISMIC RESTRAINTS INSTALLATION CERTIFICATION); CHECKOUT AND STARTUP BY MANUFACTURER'S REPRESENTATIVE AS SPECIFIED; DOCUMENTED PERFORMANCE MEASUREMENTS INCLUDING CAPACITY, EVAPORATOR AND CONDENSER PRESSURES, MOTOR CURRENT DRAW, AND CONTROLS OPERATION.
- PUMPS - WORK INCLUDES DOCUMENTED CHECKS ON ALIGNMENT, ROTATION, MOTOR CURRENT DRAW, FLOWS AND PRESSURES.
- AIR TERMINAL DEVICES - WORK INCLUDES INSTALLATION INSPECTION AND CHECKS; FOR VAV & CAV UNITS, FLOW ADJUSTMENTS AND CALIBRATION COORDINATED WITH CONTROLS AND AIR BALANCING; CONTROLS OPERATION INCLUDING FLOW MODULATION, REHEAT, CONTROL RESPONSES.
- DIRECT DIGITAL CONTROL SYSTEM - WORK INCLUDES INSPECTIONS AND CHECKS OF INSTALLATION AND OPERATION OF ALL DEVICES; COMPLETE OPERATION OF CONTROL SEQUENCES, IN COORDINATION WITH COMMISSIONING OF ALL CONTROL SYSTEMS.
- AIR SAMPLING SYSTEM - WORK INCLUDES INSTALLATION INSPECTION AND CHECKS OF ENTIRE AIR SAMPLING SYSTEM AND ITS COMPONENTS, AND INTEGRATION OF ASSOCIATED DEMAND-CONTROL VENTILATION SYSTEM.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR CARRYING OUT ALL WORK REQUIRED FOR COMMISSIONING THESE SYSTEMS THAT ARE DEFINED AS A CONTRACTOR'S RESPONSIBILITY IN PART 3 OF THIS SECTION.

PROVIDE SEASONAL TESTING AND FINE-TUNING AS REQUIRED DURING THE WARRANTY PERIOD.

3 EXECUTION

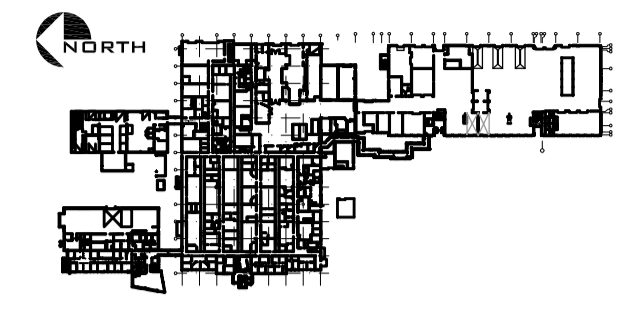
3.1 MECHANICAL ENGINEER'S RESPONSIBILITIES  
THE MECHANICAL ENGINEER SHALL:  
1. PLAN, ORGANIZE AND IMPLEMENT THE COMMISSIONING PROCESS AS SPECIFIED HEREIN;  
2. PREPARE THE COMMISSIONING PLAN, ENSURE ITS DISTRIBUTION FOR REVIEW AND COMMENT;  
3. REVISE THE COMMISSIONING PLAN AS REQUIRED DURING CONSTRUCTION;  
4. REVIEW CONTROLS POINT-TO-POINT CHECKS DONE BY THE CONTROLS CONTRACTOR  
5. WITNESS ALL INTEGRATED SYSTEM PERFORMANCE TESTS AND DOCUMENT THE RESULTS;  
6. PREPARE AND SUBMIT A COMMISSIONING REPORT WHICH DOCUMENTS ALL CHECKS AND TESTS DONE THROUGHOUT THE COMMISSIONING PROCESS, AND THEIR RESULTS

3.2 MECHANICAL CONTRACTOR'S RESPONSIBILITIES  
THE MECHANICAL CONTRACTOR, AND ALL THE SUB-CONTRACTORS AND SUPPLIERS WITHIN DIVISION 23, SHALL COOPERATE WITH THE MECHANICAL ENGINEER, AND OTHER COMMISSIONING TEAM MEMBERS, TO FACILITATE THE SUCCESSFUL COMPLETION OF THE COMMISSIONING PROCESS.

THE MECHANICAL CONTRACTOR, AND ALL MECHANICAL SUB-CONTRACTORS AND SUPPLIERS, SHALL COOPERATE WITH THE MECHANICAL ENGINEER IN CARRYING OUT THE HVAC COMMISSIONING PROCESS. IN THIS CONTEXT, THE MECHANICAL CONTRACTOR SHALL:  
1. EACH CONTRACTOR AND SUB-CONTRACTOR IN THIS DIVISION SHALL INCLUDE IN THEIR QUOTES THE COST OF PARTICIPATING IN THE COMMISSIONING PROCESS AS SPECIFIED HEREIN.  
2. PROVIDE INSTRUCTION AND DEMONSTRATIONS FOR THE OWNER'S DESIGNATED OPERATING STAFF, IN CONJUNCTION WITH THE MECHANICAL ENGINEER, AND WITH THE PARTICIPATION OF QUALIFIED TECHNICIANS FROM MAJOR EQUIPMENT SUPPLIERS AND THE CONTROLS CONTRACTOR.  
3. INCLUDE REQUIREMENTS FOR SUBMITTAL DATA, O&M DATA, AND TRAINING INFORMATION IN EACH PURCHASE ORDER OR SUB-CONTRACT WRITTEN.  
4. ENSURE COOPERATION AND PARTICIPATION OF SPECIALTY SUB-CONTRACTORS SUCH AS SHEET METAL, PIPING, REFRIGERATION, AND AIR SAMPLING AS APPLICABLE.  
5. ENSURE PARTICIPATION OF MAJOR EQUIPMENT MANUFACTURING IN APPROPRIATE START-UP, TESTING AND TRAINING ACTIVITIES.

### COMMISSIONING SPECIFICATIONS CONT'D

- NOTIFY THE MECHANICAL ENGINEER A MINIMUM OF ONE WEEK IN ADVANCE OF SCHEDULED EQUIPMENT AND SYSTEM START-UPS.
  - PROVIDESUFFICIENT PERSONNEL TO ASSIST THE MECHANICAL ENGINEER AS REQUIRED DURING INTEGRATED SYSTEM TESTING,
  - PRIOR TO START-UP, INSPECT, CHECK AND CONFIRM THE CORRECT AND COMPLETE INSTALLATION OF ALL EQUIPMENT AND SYSTEMS.
  - PROVIDE EQUIPMENT AND SYSTEMS START-UP RESOURCES AS SPECIFIED AND REQUIRED.
  - CARRY-OUT PERFORMANCE CHECKS TO ENSURE THAT ALL EQUIPMENT AND SYSTEMS FULLY FUNCTIONAL AND READY FOR THE MECHANICAL ENGINEER TO WITNESS FORMAL INTEGRATED SYSTEM TESTS (ISTS).
  - OPERATE EQUIPMENT AND SYSTEMS FOR ISTS IN ACCORDANCE WITH THE COMMISSIONING PLAN AND AS DIRECTED BY THE MECHANICAL ENGINEER.
- IN THE EVENT THAT ANY SCHEDULED INTEGRATED SYSTEM TESTS (ISTS) ARE TERMINATED BECAUSE THE OWNER OR MECHANICAL ENGINEER DISCOVERS DEFICIENT OR INCOMPLETE WORK, OR DUE TO THE NON-ATTENDANCE OF REQUIRED CONTRACTOR OR SUPPLIER PERSONNEL, THE CONTRACTOR OR SUBCONTRACTOR RESPONSIBLE FOR THE TERMINATION SHALL ALSO BE RESPONSIBLE FOR PAYING REASONABLE COSTS OF TIME AND TRAVEL EXPENSES OF ANY OR ALL OF THE FOLLOWING REPRESENTATIVES WHO WERE PHYSICALLY PRESENT FOR THE PURPOSE OF WITNESSING THE START-UP OR THE IST: THE MECHANICAL ENGINEER, AND THE OWNER. THE OWNER MAY PROVIDE A STATEMENT TO THE MECHANICAL CONTRACTOR IDENTIFYING THE SPECIFIC ACTIVITY THAT WAS TERMINATED, THE SCHEDULED DATE, AND A LIST OF THOSE IN ATTENDANCE, ALONG WITH THEIR REASONABLE TIME AND TRAVEL EXPENSE COSTS.
- 3.3COMMISSIONING PLANNING  
COMMISSIONING SHALL BE CARRIED AS A REGULAR ITEM IN THE CONSTRUCTION MEETINGS. NO DEDICATED COMMISSIONING MEETINGS SHALL BE HELD UNLESS DEEMED NECESSARY BY THE OWNER OR MECHANICAL ENGINEER DUE TO DEFICIENT WORK OR PROBLEMATIC SYSTEM OPERATION.
- 3.4MANUFACTURER'S START-UP DOCUMENTATION  
CONTRACTOR SHALL SUBMIT MANUFACTURER'S BLANK START-UP FORM TEMPLATES TO CONSULTANT WITHIN TWO WEEKS OF AWARDED OF CONTRACT. AFTER SUCCESSFUL START-UP OF EQUIPMENT, CONTRACTOR SHALL SUBMIT COMPLETED START-UP FORMS TO MECHANICAL ENGINEER WITHIN ONE WEEK.
- 3.5INTEGRATED SYSTEM TESTING  
ONCE THE INDIVIDUAL SYSTEM COMPONENTS HAVE BEEN SUCCESSFULLY STARTED UP AND VERIFIED BY THEIR INSTALLERS AND/OR MANUFACTURERS' REPRESENTATIVES, THE MECHANICAL CONTRACTOR SHALL SUBMIT THE COMPLETED START-UP DOCUMENTATION TO THE MECHANICAL ENGINEER AND NOTIFY THAT THE SYSTEM IS READY FOR INTEGRATED TESTING. UPON SATISFACTORY REVIEW OF THE START-UP DOCUMENTATION, THE MECHANICAL ENGINEER SHALL SCHEDULE AN INTEGRATED SYSTEM TEST.
- THE INTEGRATED SYSTEM TESTING (IST) SHALL BE A JOINT EFFORT BETWEEN THE MECHANICAL CONTRACTOR AND HIS SUBCONTRACTORS, THE AIR SAMPLING SYSTEM MANUFACTURER (OR MANUFACTURER'S REPRESENTATIVE), AND THE MECHANICAL ENGINEER. THE MECHANICAL ENGINEER SHALL PROVIDE TESTING FORMS FOR INTEGRATED SYSTEM TESTING AT LEAST TWO WEEKS PRIOR TO SCHEDULED INTEGRATED SYSTEM TESTING.
- CONTRACTOR SHALL OPERATE EQUIPMENT AND SYSTEMS FOR ISTS IN ACCORDANCE WITH THE COMMISSIONING PLAN AND AS DIRECTED BY THE MECHANICAL ENGINEER. IN THE EVENT OF DEFICIENT OR INCOMPLETE WORK PREVENTING A SUCCESSFUL IST, THOSE RESPONSIBLE FOR DEFICIENT OR INCOMPLETE WORK WILL BE RESPONSIBLE FOR COSTS IN ACCORDANCE WITH 3.2 IN THIS SECTION.
- 3.6 O&M STAFF TRAINING  
1. CONTRACTOR SHALL PREPARE A PRELIMINARY SCHEDULE FOR MECHANICAL SYSTEM ORIENTATION AND INSPECTIONS.  
2. O&M MANUAL SUBMISSION, TRAINING SESSIONS, PIPE AND DUCT SYSTEM TESTING, FLUSHING AND CLEANING, EQUIPMENT START-UP TAB, AND TASK COMPLETION FOR USE BY THE MECHANICAL ENGINEER.  
3. UPDATE SCHEDULE AS APPROPRIATE THROUGHOUT THE CONSTRUCTION PERIOD.  
4. ATTEND INITIAL O&M STAFF TRAINING SESSION.  
5. CONDUCT MECHANICAL SYSTEM ORIENTATION AND INSPECTION AT THE EQUIPMENT PLACEMENT COMPLETION STAGE.  
6. PARTICIPATE IN, AND SCHEDULE VENDORS AND CONTRACTORS TO PARTICIPATE IN THE O&M STAFF TRAINING SESSIONS AS SET-UP BY THE MECHANICAL ENGINEER.

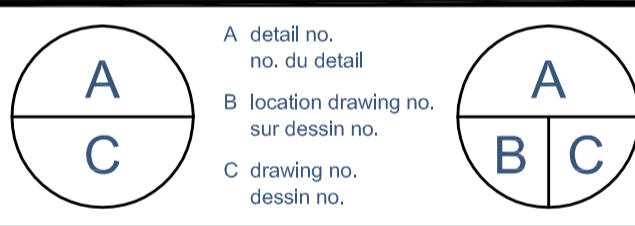


BUILDING KEY PLAN

### LEGEND

02	RESSUED FOR TENDER	28-NOV-2014
01	ISSUED FOR TENDER	28-FEB-2014
REV	Description	Date

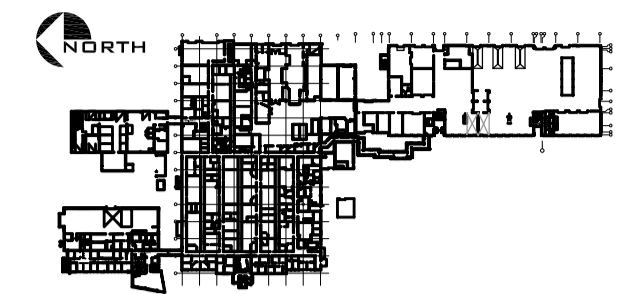
**VRM**  
VANDERWESTEN RUTHERFORD MANTECON INC.  
CONSULTING STRUCTURAL/MECHANICAL/ELECTRICAL ENGINEERS  
LONDON - HAMILTON - WINDSOR - OTTAWA  
1130 MORRISON DRIVE, SUITE 280, OTTAWA, ON K2H 9N6  
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VRM13-110



project ENVIRONMENT CANADA  
MODULE 5 VRF SYSTEM  
ENVIRONMENT CANADA  
335 River Rd  
Ottawa ON, K1V 1C7  
drawing MECHANICAL LEGEND,  
SPECIFICATIONS,  
DRAWING LIST,  
AND NOTES

Designed By	Conçu par
Date	(yyyy/mm/dd)
Drawn By	J.V.S. Dessiné par
Date	13.06.26 (yyyy/mm/dd)
Reviewed By	M.C. Examiné par
Date	13.06.26 (yyyy/mm/dd)
Approved By	Approuvé par
Date	(yyyy/mm/dd)
Tender	Soumission
Project Manager	Administrateur de projets
EC PMDI Proj no.	Consultant Proj no.
RR-072-J8062	13-110
Drawing no.	No. du dessin

# M-100



BUILDING KEY PLAN

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A	detail no. no. du détail	A
B	location drawing no. sur dessin no.	B
C	drawing no. dessin no.	C

project ENVIRONMENT CANADA  
MODULE 5 VRF SYSTEM  
ENVIRONMENT CANADA  
335 River Rd  
Ottawa ON, K1V 1C7  
drawing dessein

HVAC SYSTEMS  
FLOOR PLAN  
DUCTWORK - DEMO

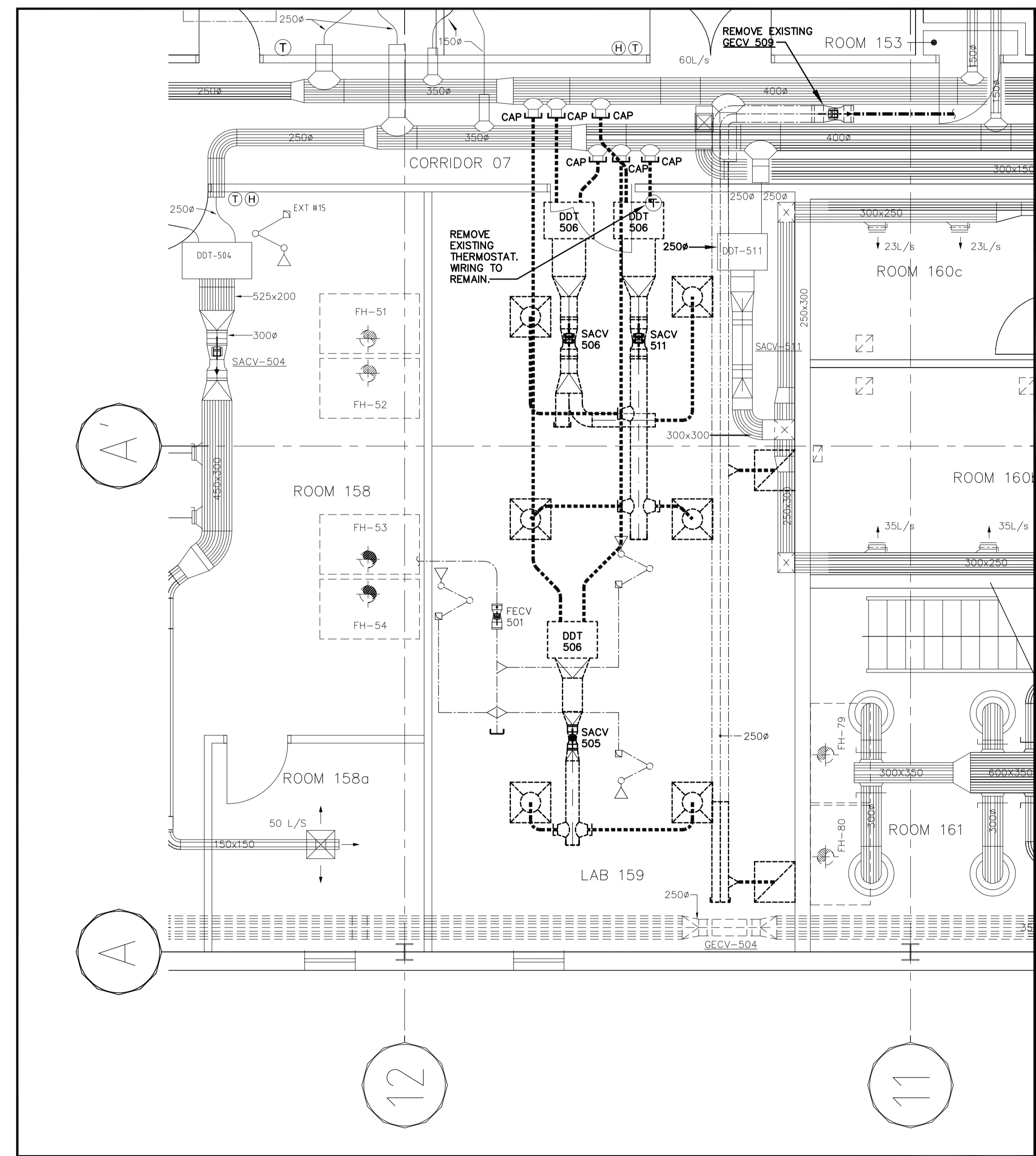
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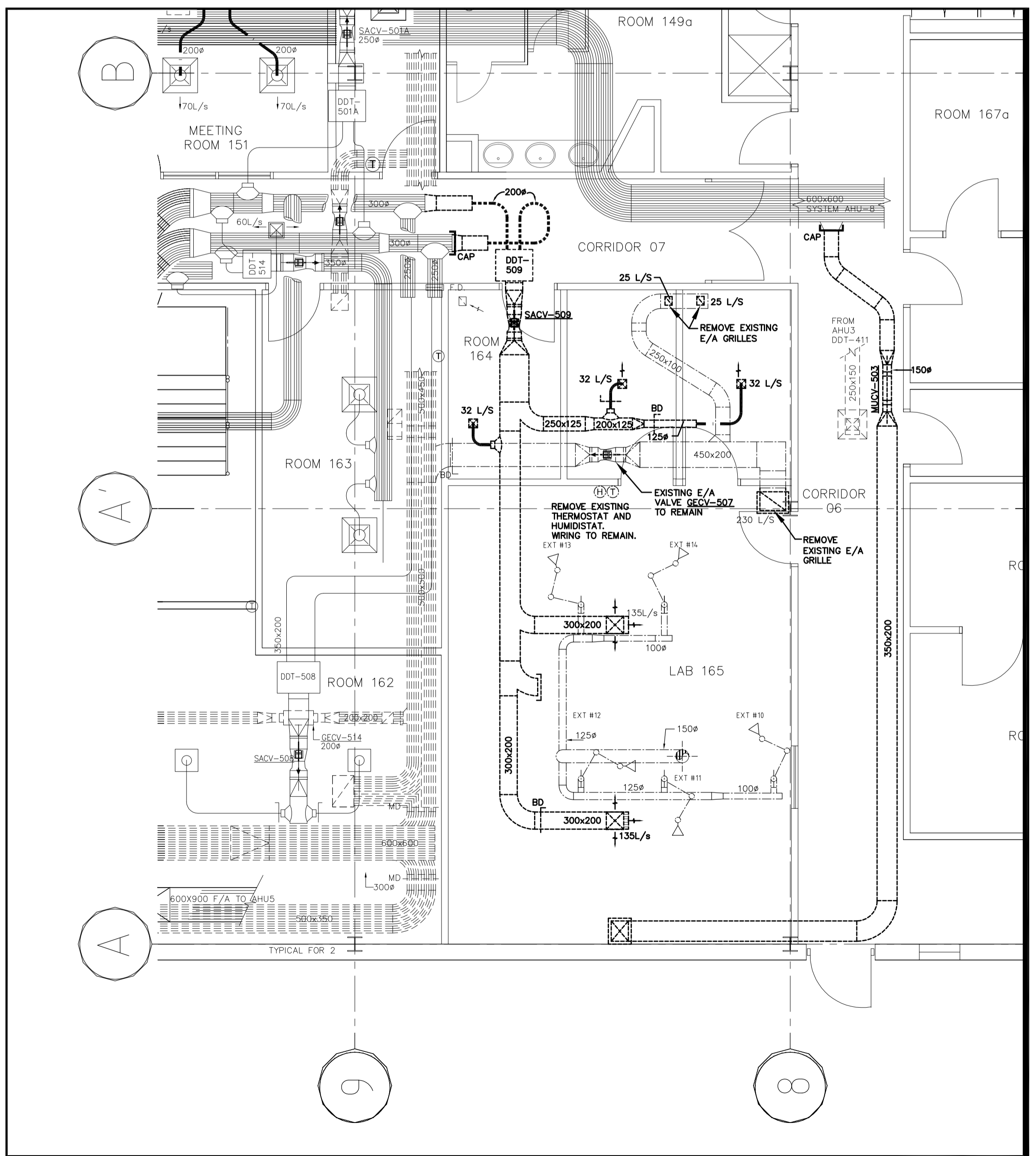
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M-200

**NOTES**  
1. DISCONNECT AND REMOVE ALL DUCWORK, EQUIPMENT AND ACCESSORIES SHOWN IN BOLD DASHED LINES.

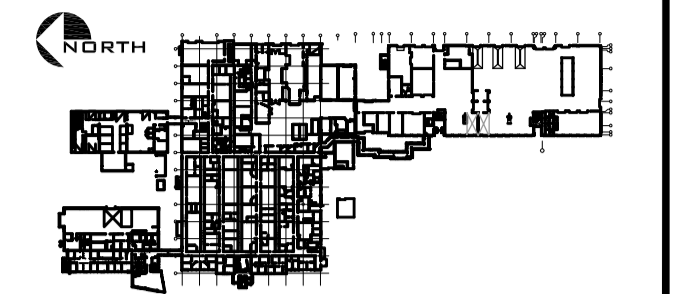


01 LAB 159 - MECHANICAL - DEMO  
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02 LAB 165 - MECHANICAL - DEMO  
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BUILDING KEY PLAN

LEGEND

REV	Description	Date
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01	ISSUED FOR TENDER	28-FEB-2014

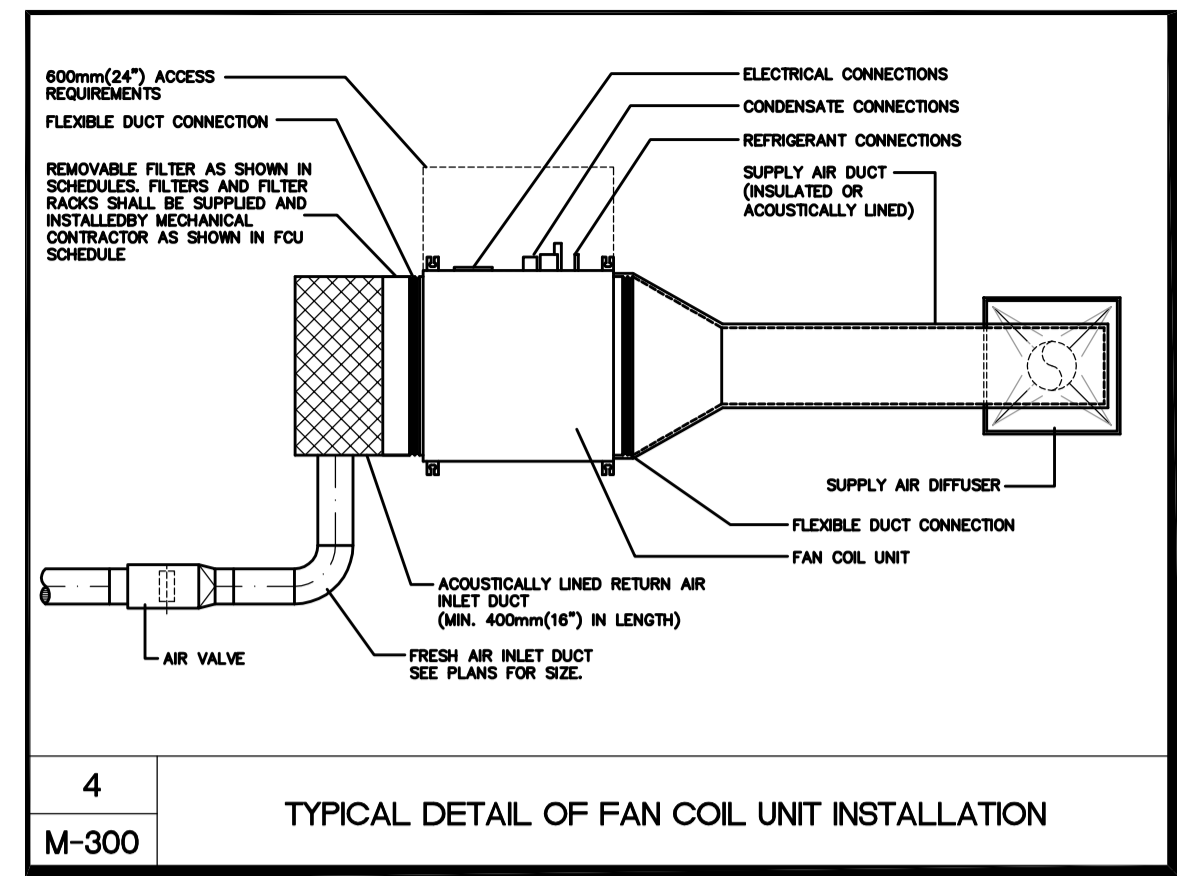
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C	no. du detail	B
	B location drawing no.	C
	sur dessin no.	
	C drawing no.	
	dessin no.	

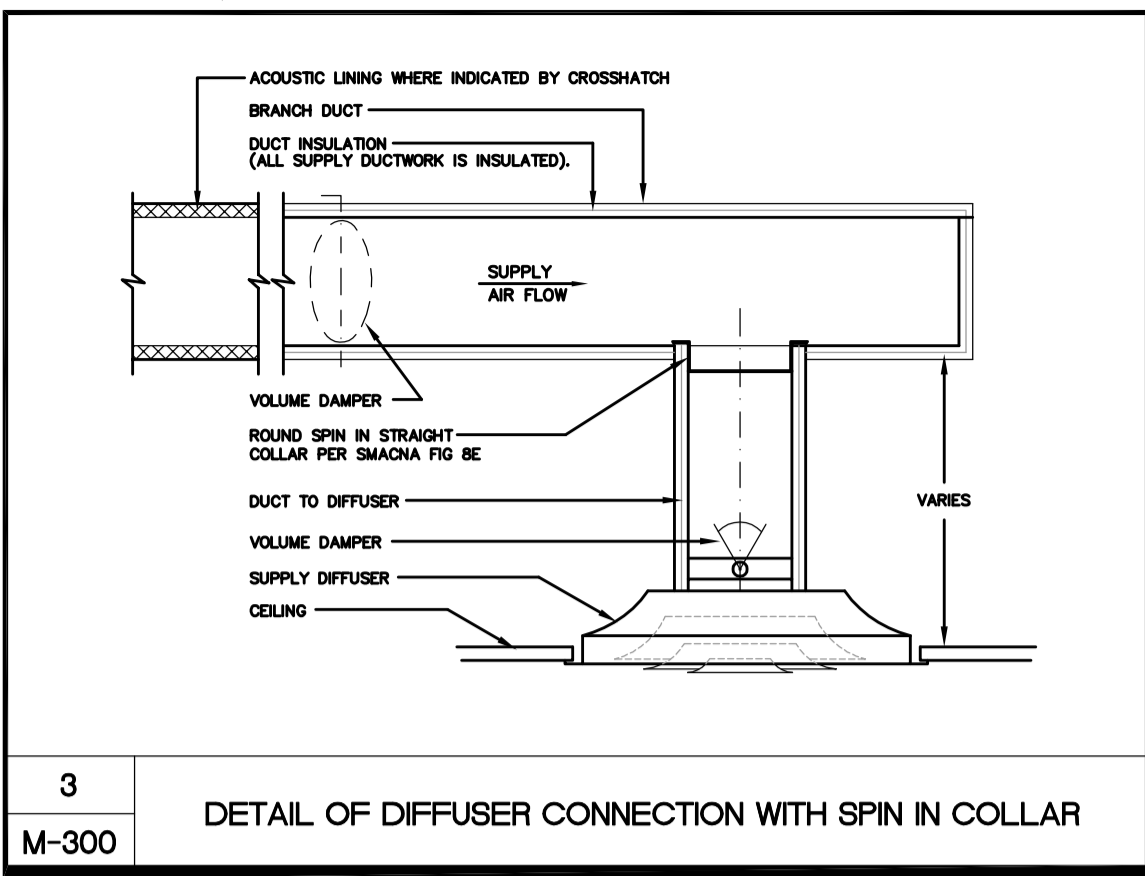
project ENVIRONMENT CANADA  
 project MODULE 5 VRF SYSTEM  
 ENVIRONMENT CANADA  
 335 River Rd  
 Ottawa ON, K1V 1C7  
 drawing ENVIRONMENT CANADA  
 dessin  
 HVAC SYSTEMS  
 FLOOR PLAN AND  
 DETAILS - DUCTWORK  
 NEW

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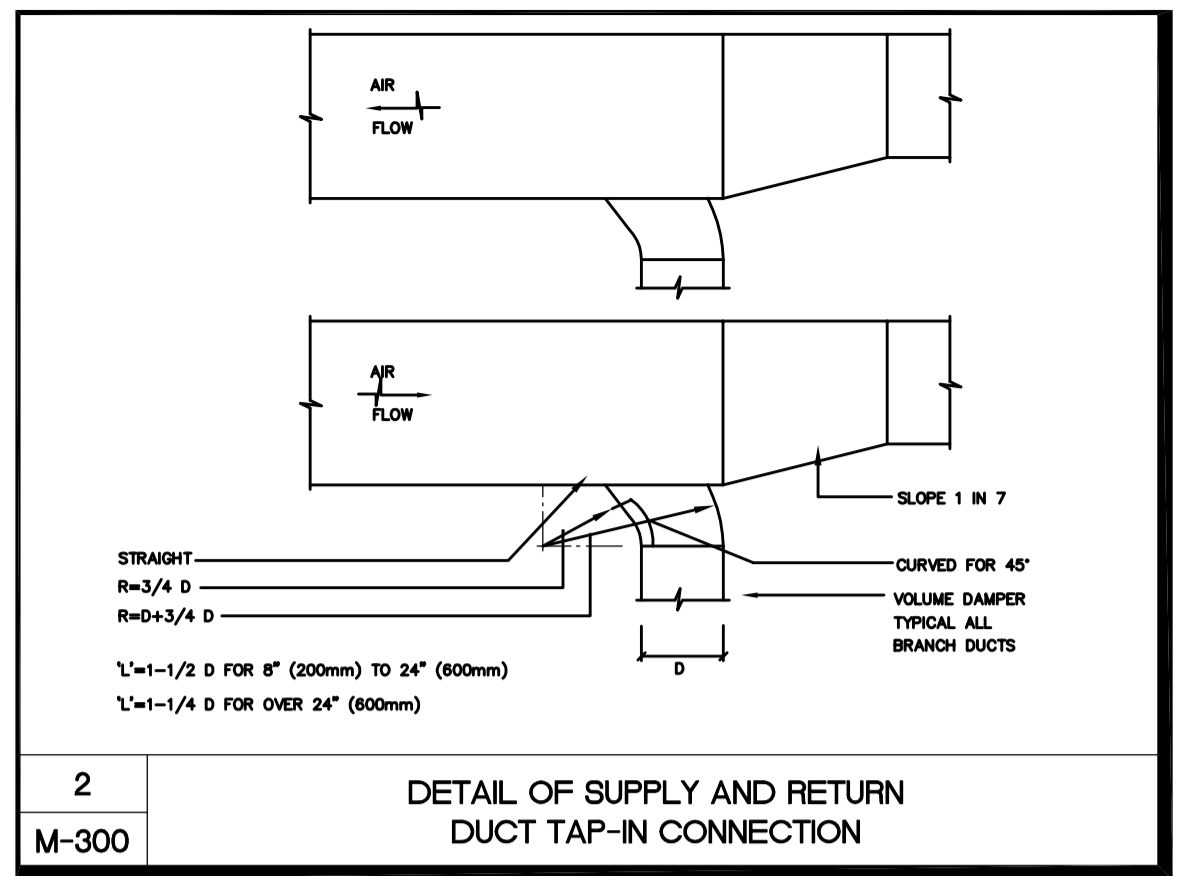
M-300



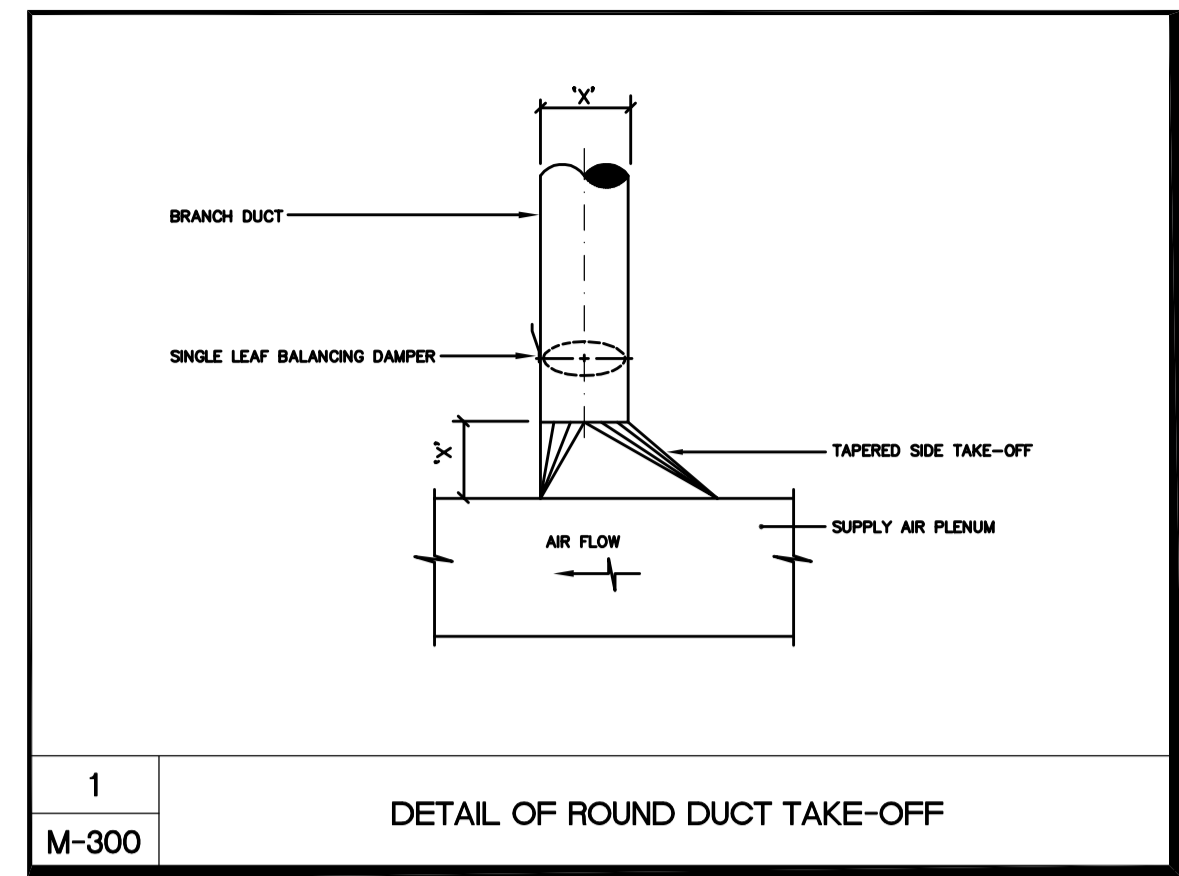
4  
M-300 TYPICAL DETAIL OF FAN COIL UNIT INSTALLATION



3  
M-300 DETAIL OF DIFFUSER CONNECTION WITH SPIN IN COLLAR

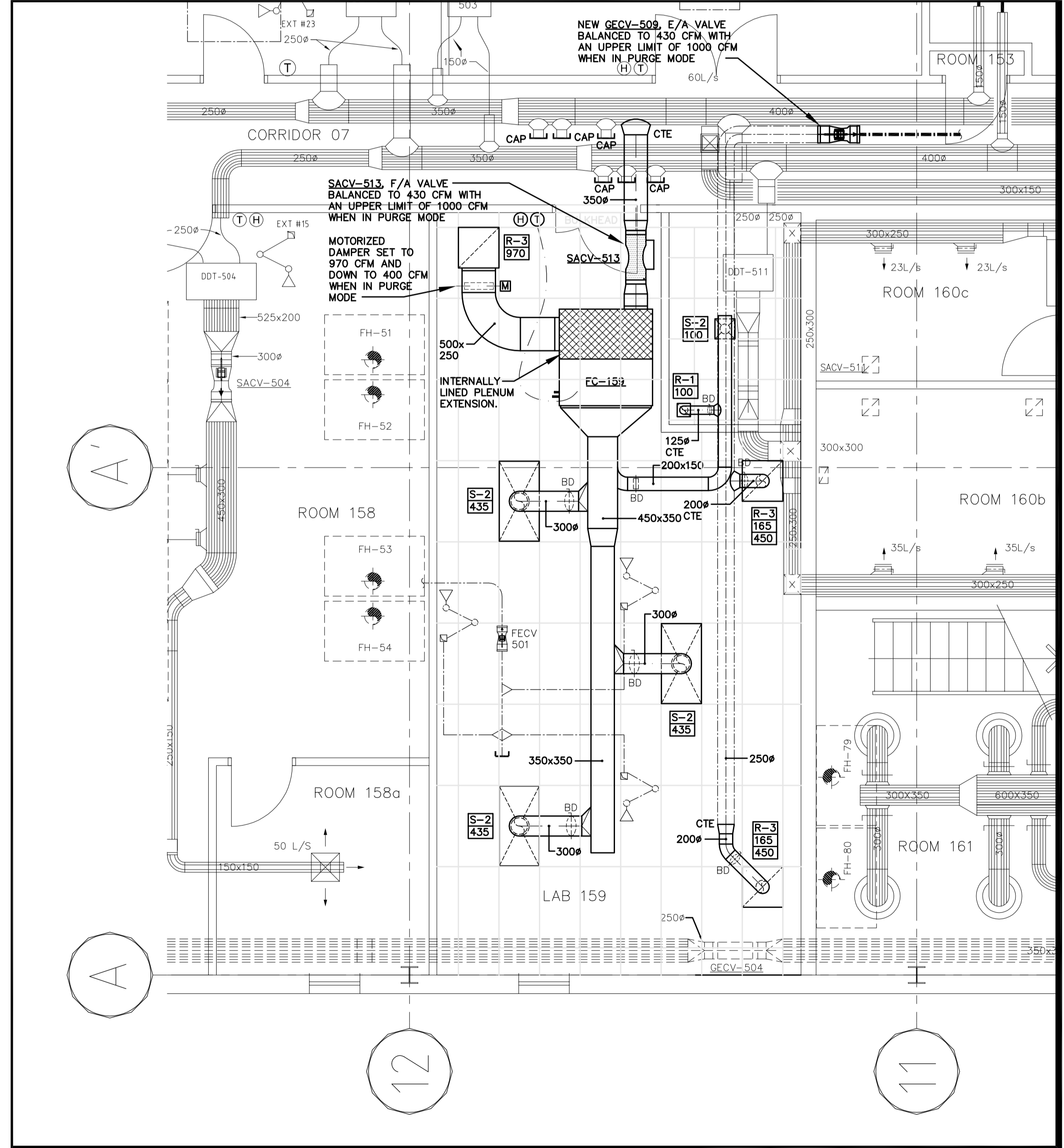


2  
M-300 DETAIL OF SUPPLY AND RETURN DUCT TAP-IN CONNECTION

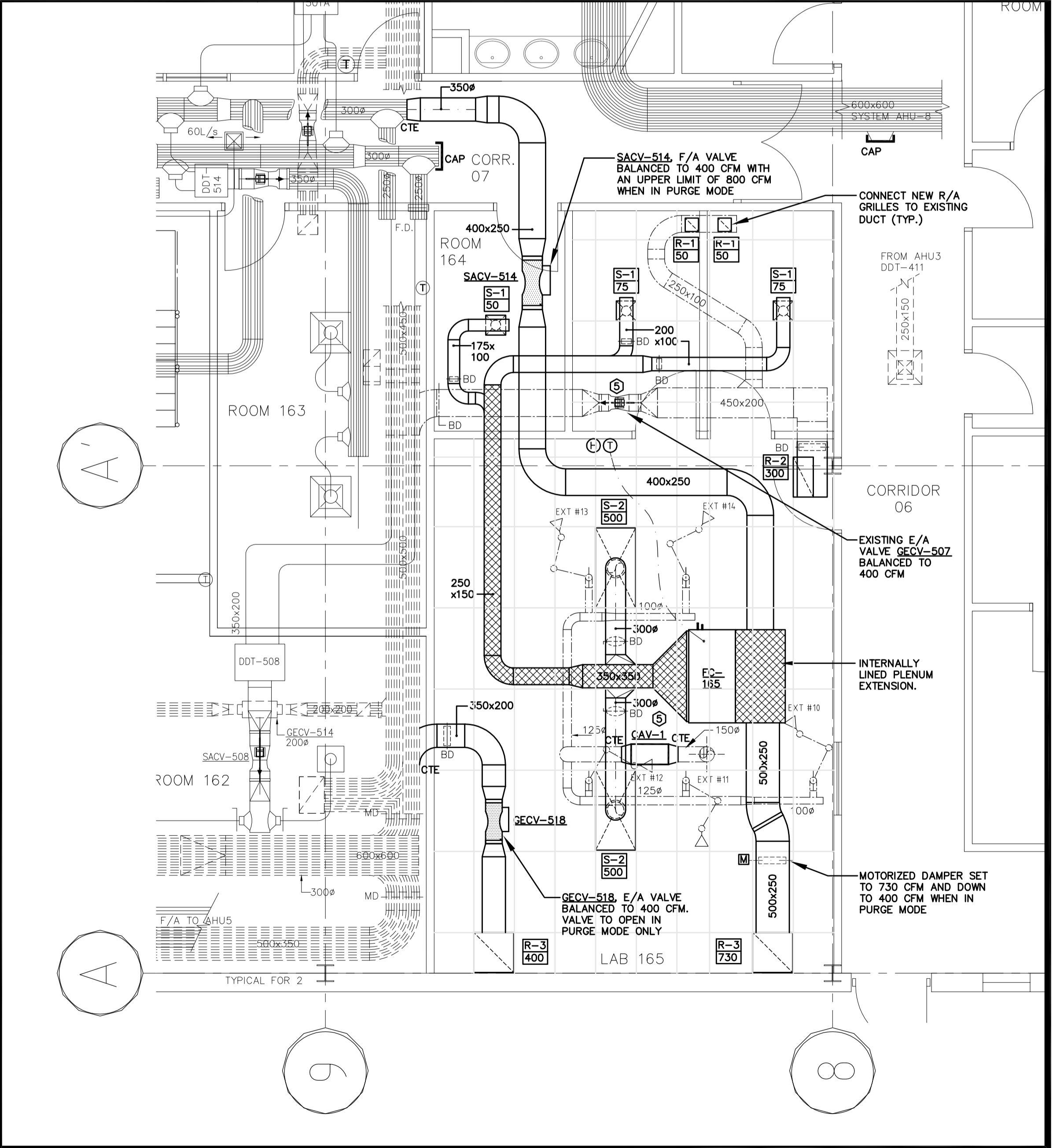


1  
M-300 DETAIL OF ROUND DUCT TAKE-OFF

- NOTES**
- ADD NEW ROUTER BY AIR SAMPLING CONTRACTOR (AIRGENUITY), WIRE THE ROUTER TO THE SENSOR SUITE, INSTALL NEW TUBING FROM SENSOR SUITE TO LABS (1 TUBE TO LAB 159 AND 1 TUBE TO LAB 165. INSTALL DUCT PROBE IN GENERAL EXHAUST FOR EACH LAB.
  - EXISTING GYPSUM BOARD CEILING AT 9'-0" IN LAB 159 TO REMAIN. PATCH, REPAIR AND SEAL DRYWALL (ABOVE CEILING) TO MATCH EXISTING CONDITIONS.
  - REBALANCE CONNECTED SUPPLY AND EXHAUST SYSTEMS AS PER NEW DESIGN.
  - SEE MECHANICAL DETAIL 5 ON DRAWING M-400
  - CONNECT NEW CAV TO EXISTING SNORKEL EXHAUST.

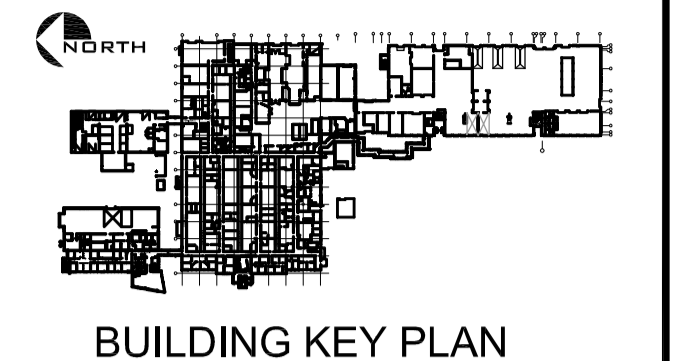


01 LAB 159 - MECHANICAL - NEW  
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02 LAB 165 - MECHANICAL - NEW  
SCALE:1:50





**BUILDING KEY PLAN**

**LEGEND**

REV	Description	Date
02	REISSUED FOR TENDER	28-NOV-2014
01	ISSUED FOR TENDER	26-FEB-2014

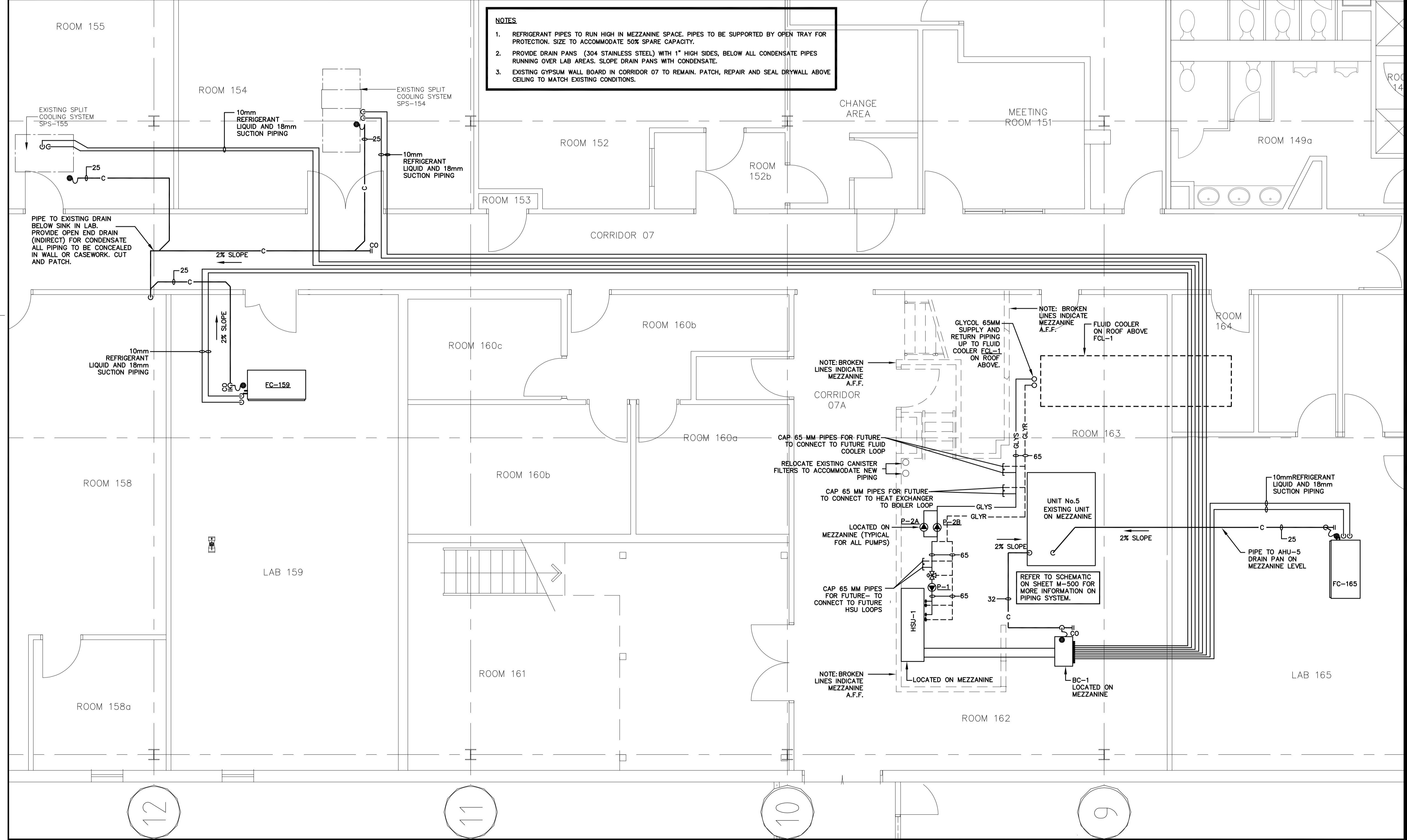
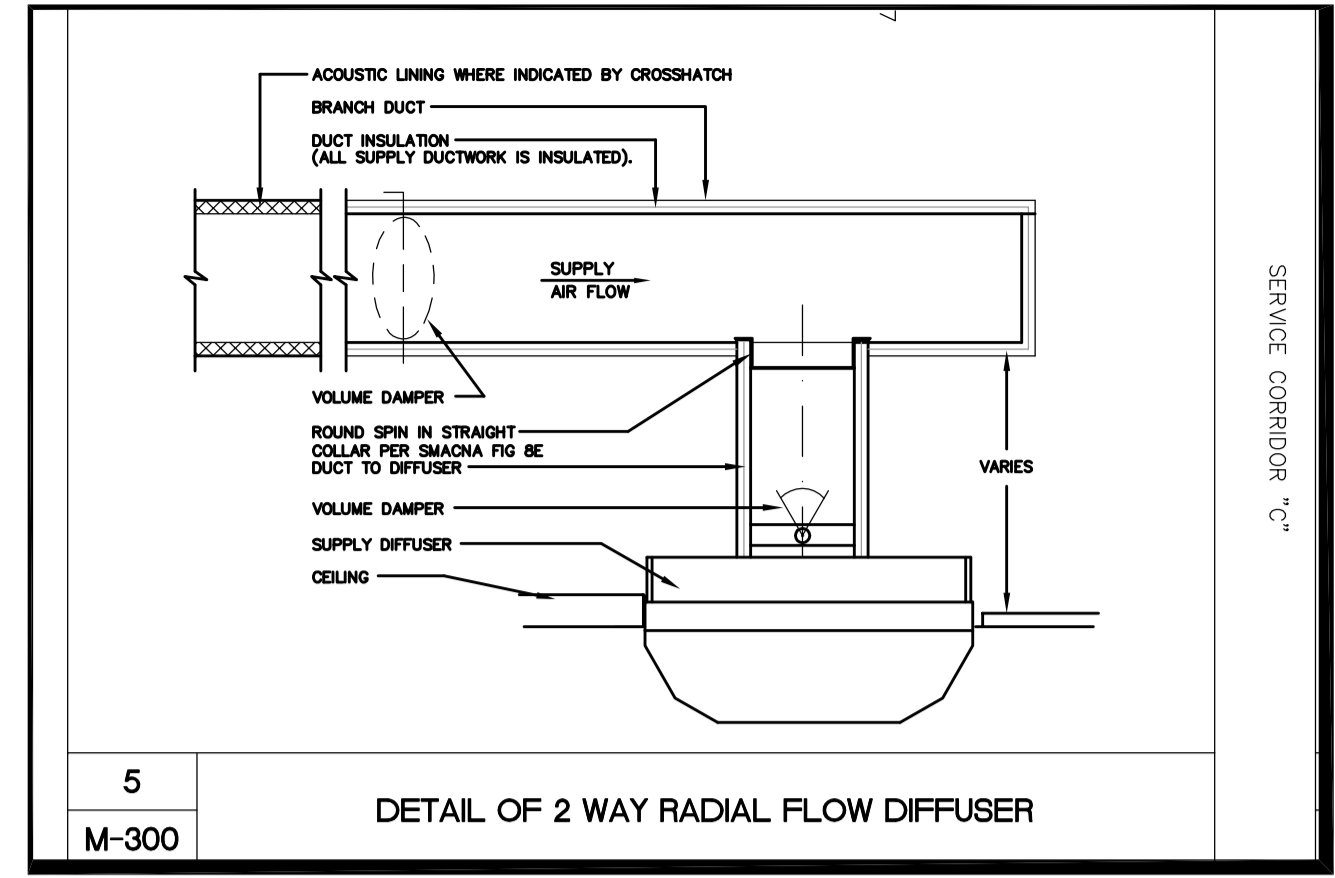
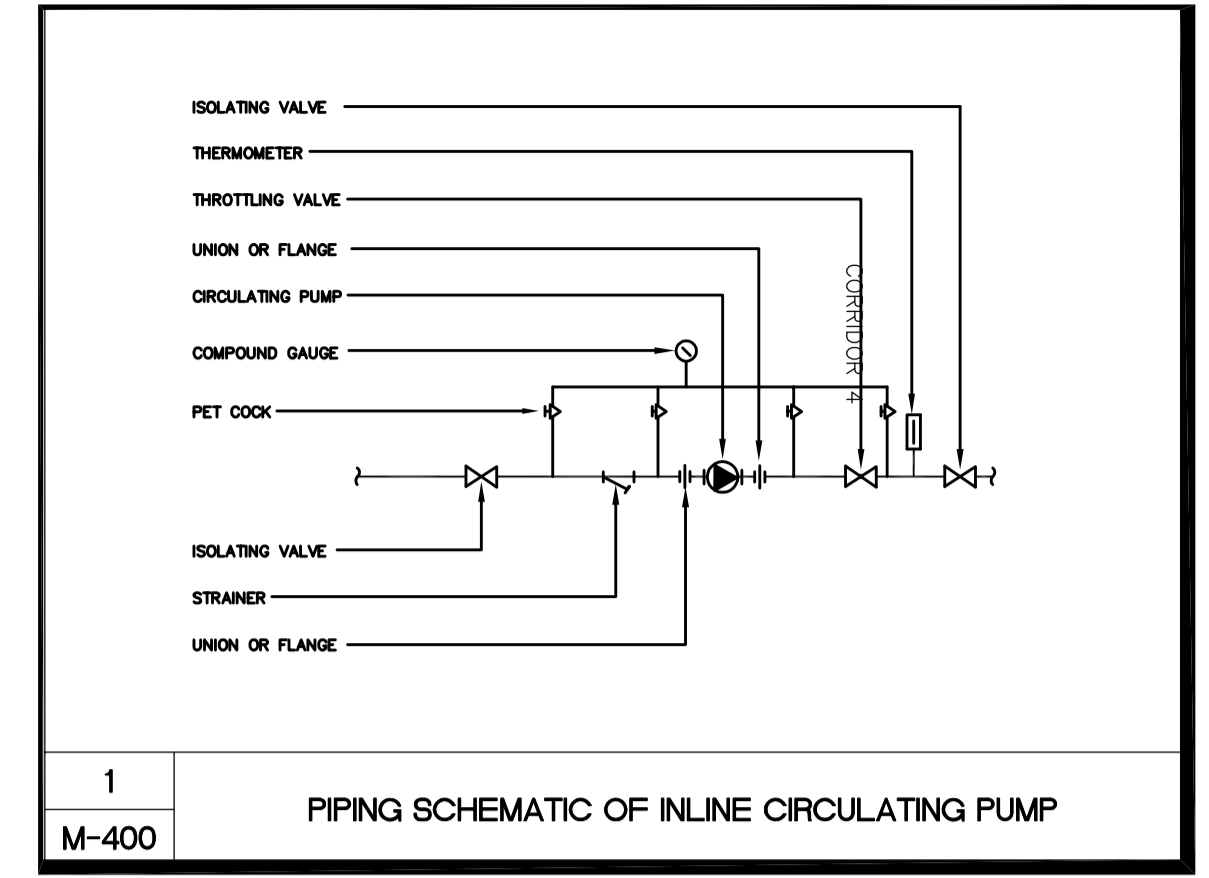
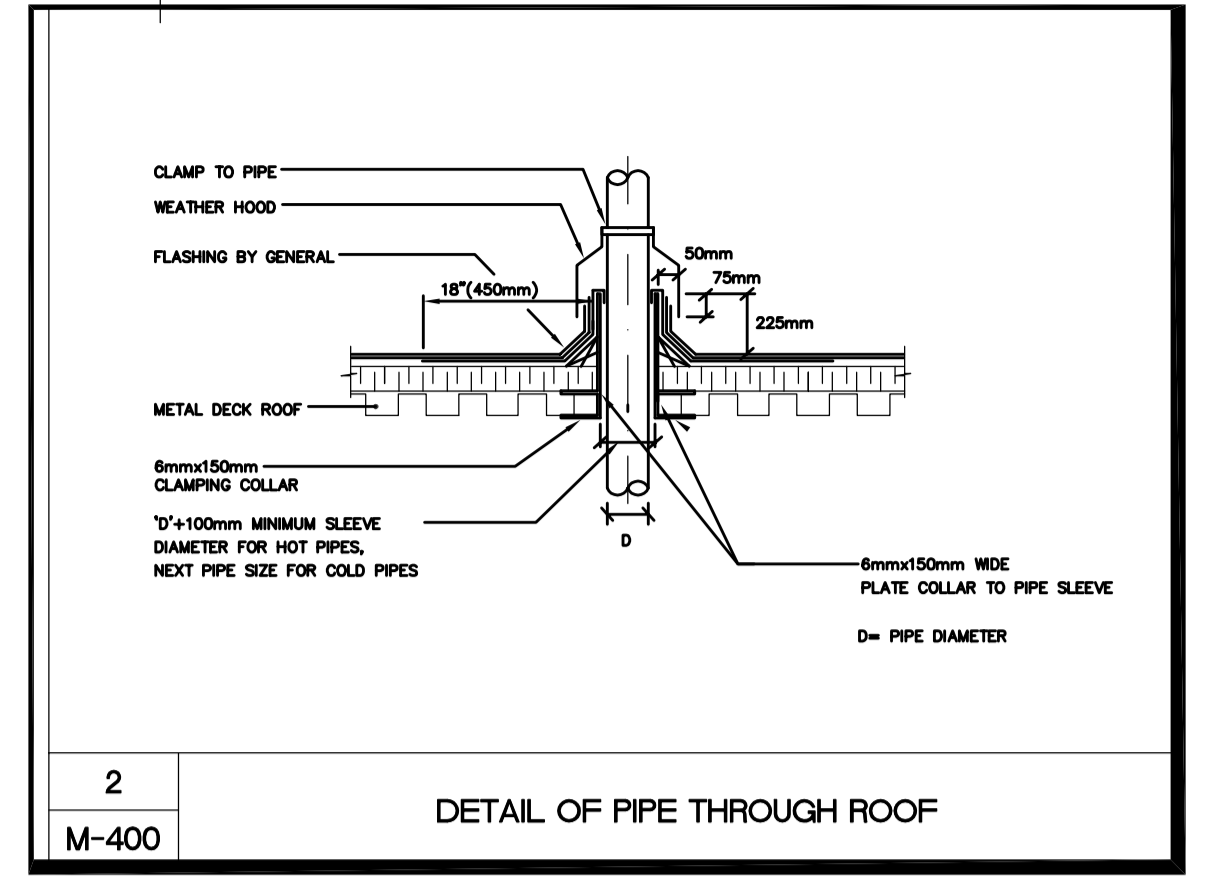
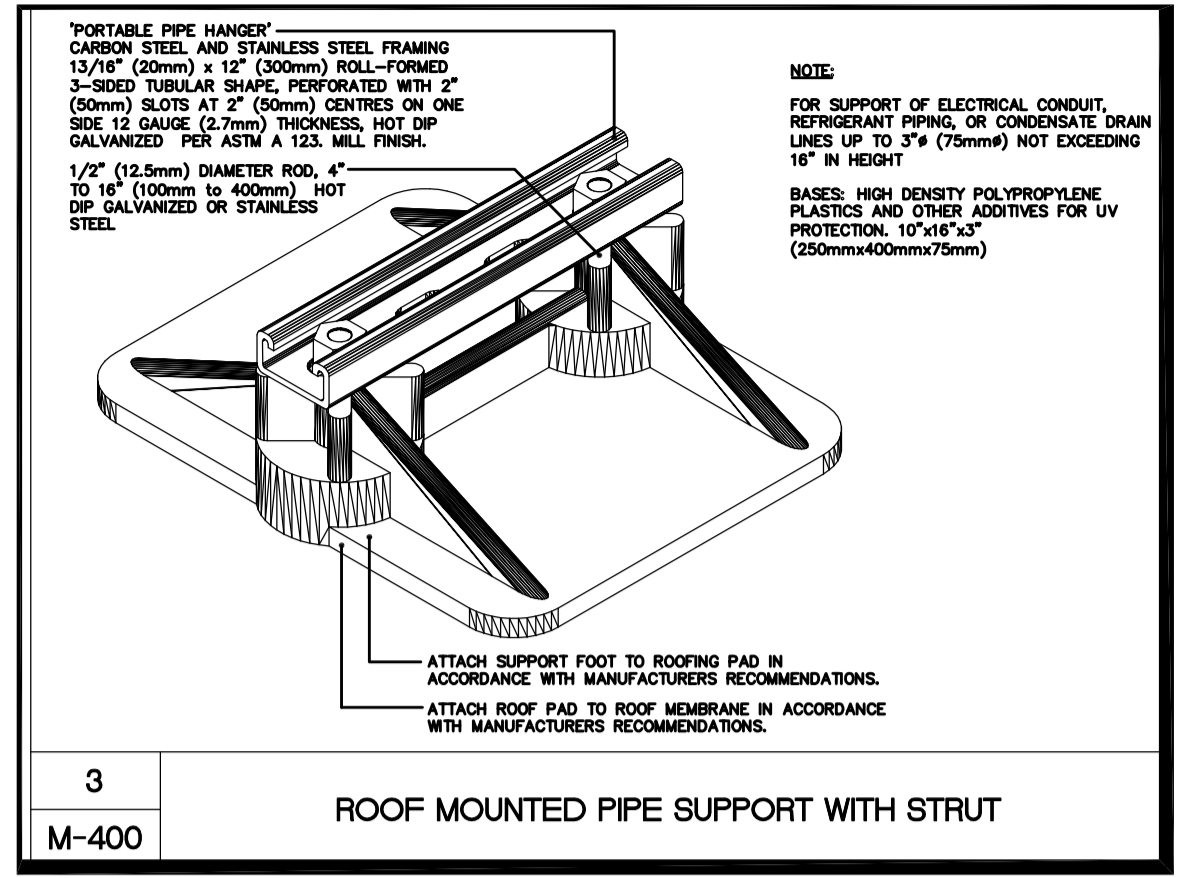
**VRM**  
 VANDERWESTEN RUTHERFORD MANTECON INC.  
 CONSULTING STRUCTURAL/MECHANICAL/ELECTRICAL ENGINEERS  
 LONDON - HAMILTON - WINDSOR - OTTAWA  
 1130 MORRISON DRIVE, SUITE 280, OTTAWA, ON K2H 9N6  
 PHONE: (613)563-2100 - FAX: (519)852-5058 - www.vrmeng.com  
 VRM13-110

A	detail no.	A
C	no. du detail	B
		C

project ENVIRONMENT CANADA  
**MODULE 5 VRF SYSTEM**  
 ENVIRONMENT CANADA  
 335 River Rd  
 Ottawa ON, K1V 1C7  
 drawing dessein  
**HVAC SYSTEMS FLOOR AND ROOF PLAN AND DETAILS - PIPING**

Designed By	Conçu par
Date	13.06.26 (yyyy/mm/dd)
Drawn By	J.V.S. Dessiné par
Date	13.06.26 (yyyy/mm/dd)
Reviewed By	M.C. Examiné par
Date	(yyyy/mm/dd)
Approved By	Approuvé par
Date	(yyyy/mm/dd)
Tender	Soumission
Project Manager	Administrateur de projets
EC PMDI Proj no.	Consultant Proj no.
RR-072-J8062	13-110
Drawing no.	No. du dessein

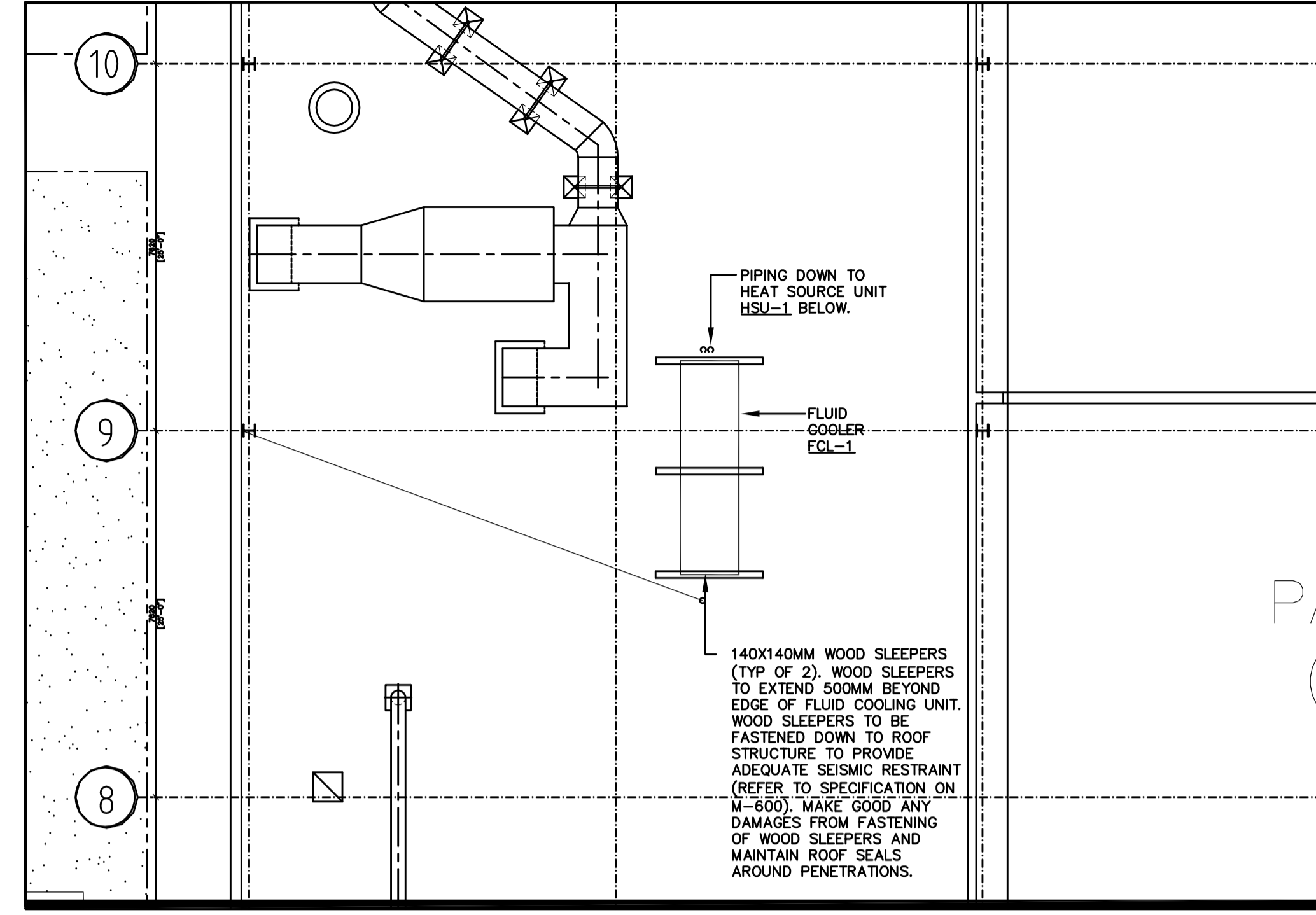
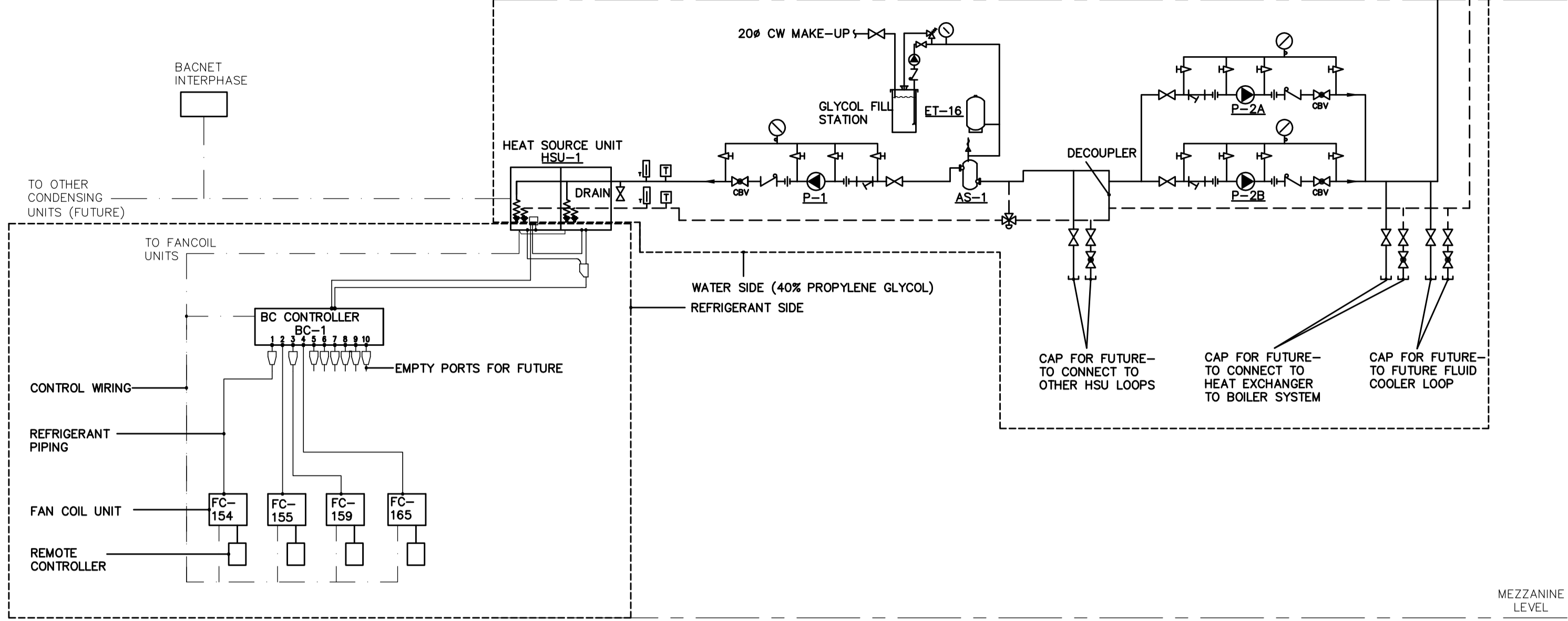
**M-400**



- NOTES**
- REFRIGERANT PIPES TO RUN HIGH IN MEZZANINE SPACE. PIPES TO BE SUPPORTED BY OPEN TRAY FOR PROTECTION. SIZE TO ACCOMMODATE 50% SPARE CAPACITY.
  - PROVIDE DRAIN PANS (304 STAINLESS STEEL) WITH 1" HIGH SIDES, BELOW ALL CONDENSATE PIPES RUNNING OVER LAB AREAS. SLOPE DRAIN PANS WITH CONDENSATE.
  - EXISTING GYPSUM WALL BOARD IN CORRIDOR 07 TO REMAIN. PATCH, REPAIR AND SEAL DRYWALL ABOVE CEILING TO MATCH EXISTING CONDITIONS.



- NOTES:  
 1. PROVIDE BALL VALVES FOR EACH REFRIGERANT PIPE FROM THE BC CONTROLLER  
 2. PROVIDE BALL VALVES FOR EACH EMPTY PORT IN THE BC CONTROLLER  
 3. 3-WAY VALVES SHALL BE FULLY MODULATING



**01 PIPING SCHEMATIC**  
SCALE: N/A

**02 ROOF PLAN - PIPING - NEW**  
SCALE: 1:100

LAB HVAC OPERATIONS							
LAB 159	AREA	ROOM HEIGHT	ACH	AIRFLOW	OFFSET	SNORKEL EXHAUST	GENERAL EXHAUST
MODE	FT2 (M2)	FT (M)	-	CFM (L/S)	CFM (L/S)	CFM (L/S)	CFM (L/S)
SETBACK	600 (55.8)	8.3 (2.54)	2	170 (79)	200 (94)	0 (0)	380 (173)
SNORKEL EXHAUST ON	600 (55.8)	8.3 (2.54)	2	170 (79)	200 (94)	225 (106)	142 (67)
PURGE	600 (55.8)	8.3 (2.54)	15	1250 (590)	200 (94)	0 (0)	1450 (683)
LAB 165	AREA	ROOM HEIGHT	ACH	AIRFLOW	OFFSET	SNORKEL EXHAUST	GENERAL EXHAUST
MODE	FT2 (M2)	FT (M)	-	CFM (L/S)	CFM (L/S)	CFM (L/S)	CFM (L/S)
SETBACK	520 (48.3)	8.3 (2.54)	2	145 (68)	200 (94)	0 (0)	345 (162)
SNORKEL EXHAUST ON	520 (48.3)	8.3 (2.54)	2.4	175 (82)	200 (94)	375 (177)	0 (0)
PURGE	520 (48.3)	8.3 (2.54)	15	1100 (510)	200 (94)	0 (0)	1300 (605)
NOTES	1. LAB 159 AND LAB 165 SHALL BE CONNECTED TO THE EXISTING AIRCIRCUIT SYSTEM						

FAN COIL UNIT SCHEDULE					
DESCRIPTION	FC-154 (BY OTHERS)	FC-155 (BY OTHERS)	FC-159	FC-165	
FAN	885 (471)	671 (417)	1412 (665)	1165 (650)	
EXT. STATIC PRESSURE: IN.WG (PA)	0.2 (50)	0.2 (50)	0.6 (150)	0.6 (150)	
SOUND PRESS. LEVEL (LOW-MID-HI)-dBA	26-28-29	26-28-29	35-40-44	32-37-41	
TOTAL CAPACITY: MBH (KW)	34 (10)	27 (7.9)	54 (15.8)	40 (11.7)	
ENTERING AIR TEMP.: °F (°C)	70 (21.1)	70 (21.1)	70 (21.1)	70 (21.1)	
COOL					
TOTAL CAPACITY: MBH (KW)	30 (8.8)	24 (7.0)	48 (14.1)	36 (10.5)	
SENSIBLE CAPACITY: MBH (KW)	24 (7)	18 (5.3)			
ENTERING AIR TEMP.: °F (°C)	70 (21.1)	70 (21.1)	70 (21.1)	70 (21.1)	
ELEC.					
VOLTAGE: V/PH/Hz	208/1/60	208/1/60	208/1/60	208/1/60	
DRIVE TYPE	DIRECT, ECM MOTOR	DIRECT, ECM MOTOR	DIRECT, ECM MOTOR	DIRECT, ECM MOTOR	
MODEL REFERENCE: (MITSUBISHI)	PEFY-P30NMHJ-E	PEFY-P24NMHJ-E	PEFY-P48NMAJ-E	PEFY-P36NMAJ-E	
1. COOLING AND HEATING CONDITIONS BASED ON INDOOR: (70°F) DBT & (54°F) WBT 2. FEATURES: 25%-100% CAPACITY CONTROL, CONDENSATE PUMP, ELECTRONIC EXPANSION VALVE, R410A REFRIGERANT, 3. MODELS INDICATED ARE BASED ON MITSUBISHI CITY MULTI SYSTEM. 4. UNIT AIRFLOW TO BE SET AS SHOWN ON DRAWINGS 5. FILTERS TO BE INSTALLED IN RETURN SIDE OF UNIT TO BE REMOVABLE FOR MAINTENANCE PURPOSES. FILTERS AND FILTER RACKS SHALL BE FIELD PROVIDED AND INSTALLED. 6. FC-154 AND FC-155 ARE SUPPLIED AND INSTALLED BY OTHERS. NEW VRF SYSTEM TO CONNECT TO EXISTING FC-154 AND FC-155.					

AIR VALVE SCHEDULE				
DESIGNATION	SACV-513	SACV-514	GEVCV-509	GEVCV-518
ROOM SERVED / USE	159 / SUPPLY	165 / SUPPLY	159 / GENERAL EXHAUST	159 / GENERAL EXHAUST
MINIMUM AIRFLOW: CFM, (L/S)	0 (0)	0 (0)	0 (0)	0 (0)
MAXIMUM AIRFLOW: CFM, (L/S)	1200 (565)	1200 (565)	1200 (565)	900 (428)
PRESSURE DROP: IN.WG, (PA)	0.3 (75)	0.3 (75)	0.3 (75)	0.3 (75)
VALVE SIZE, IN (MM)	12"Ø (300 MM)	12"Ø (300 MM)	12"Ø (300 MM)	10"Ø (250 MM)
BASIS OF DESIGN:	PHOENIX MODEL MAVA112M-AMEHZ-PSL	PHOENIX MODEL MAVA112M-AMEHZ-PSL	PHOENIX MODEL EXVA112M-AMEHZ-PSL	PHOENIX MODEL EXVA110M-AMEHZ-PSL
DISCHARGE SOUND PERFORMANCE				
125	62	63	60	60
250	58	59	55	55
500	55	55	53	53
1000	60	60	57	57
2000	55	54	52	52
4000	54	53	52	52
NOTES	1. CONTRACTOR TO CONFIRM ORIENTATION PRIOR TO ORDERING			

RETURN AIR OUTLET SCHEDULE			
DESIGNATION	R-1	R-2	R-3
MOUNTING:	CEILING T-BAR	CEILING T-BAR	CEILING T-BAR
OUTLET TYPE:	REGISTER	REGISTER	REGISTER
NOMINAL FACE SIZE: IN (MM)	12x12 (300x300)	12x24 (300x600)	24x24 (600x600)
AIRFLOW RANGE: CFM (L/S)	300 (141)	1000 (471)	2000 (942)
MAXIMUM NOISE CRITERIA:	NC 30	NC 30	NC 30
E. H. PRICE MODEL REFERENCE:	80 DAL	80 DAL	80 DAL

HEAT SOURCE UNIT (VRF)	
DESCRIPTION	HSU-1
COOLING CAPACITY, MBH (KW)	168 (49.2)
POWER INPUT, KW	10.67
HEATING CAPACITY, MBH (KW)	188 (55.0)
POWER INPUT, KW	10.19
NET WEIGHT, LBS (KG)	808 (366)
COMPRESSOR TYPE	INVERTER SCROLL HERMETIC
COMPRESSOR STARTING METHOD	INVERTER
SOUND PRESSURE LEVEL: dBA	50.0
WATER FLOW RATE, L/MIN (GPM)	192 (50.8)
PRESSURE DROP, FT.H2O (KPA)	6.0 (17.9)
DIMENSIONS: (MM) H X W X D	2 @ 1100 x 880 x 550
ELECTRICAL: V/PH/Hz	575/3/60
ELECTRICAL: MCA	1 @ 11A & 1 @ 9A
REFRIGERANT TYPE:	R410A
MODEL REFERENCE: (MITSUBISHI)	PQRY-P168ZSKMU-A
NOTES:	1. Cooling conditions based on Indoor: 80°F (26.7°C) DBT & 67°F (19.4°C) WBT; Water: 85°F (29.4°C) 2. Heating conditions based on Indoor: 70°F (21.1°C); Water: 70°F (21.1°C) 3. Models indicated are based on Mitsubishi City Multi System with R410A refrigerant.

FLUID COOLER SCHEDULE	
DESIGNATION	FCL-1
LOCATION:	ROOF
SERVICE:	HSU-1
FLUID TYPE:	50% PROPYLENE GLYCOL
CAPACITY: MBH (KW)	212 (62)
FLUID FLOW: USGPM (L/S)	47 (3.0)
FLUID PRESS. DROP: FT.H2O (KPA)	19.4 (57.9)
ENTERING FLUID TEMP.: °F (°C)	115 (46)
LEAVING FLUID TEMP.: °F (°C)	104 (40)
OUTSIDE AIR TEMP.: °F DB (°C DB)	95 (35)
FAN MOTOR: HP (KW)	2 @ 2 HP (1.5KW)
VOLTAGE: (V/PH/Hz)	575/3/60
ELECTRICAL: MCA	6.1
RPM:	1140
ACCESSORIES:	SUPER LOW SOUND FAN VIBRATION SWITCH 2 FANS (2-SPEED EACH)
OPERATING WEIGHT: LBS (KG)	1137 (520)
BASIS OF DESIGN	REFPLUS FND124C-8-F19

PUMP SCHEDULE			
DESCRIPTION	P-1	P-2A	P-2B
SERVICE:	HEAT SOURCE UNIT (HSU-1) PUMP	FLUID COOLER	FLUID COOLER
FLUID:	50% PROPYLENE GLYCOL	50% PROPYLENE GLYCOL	50% PROPYLENE GLYCOL
FLUID FLOW RATE: USGPM (L/S)	50 (3.2)	50 (3.2)	50 (3.2)
HEAD: FT.H2O (KPA)	30 (90)	40 (119)	40 (119)
PUMP SPEED: (RPM)	3,330	3,380	3,380
MOTOR SIZE: HP (KW)	1.09 (0.81)	1.40 (1.04)	1.40 (1.04)
ELECTRICAL CHARACTERISTICS: (V/PH/Hz)	230/3/60	230/3/60	230/3/60
PUMP TYPE:	CENTRIFUGAL INLINE, CLOSE COUPLED	CENTRIFUGAL INLINE, CLOSE COUPLED	CENTRIFUGAL INLINE, CLOSE COUPLED
ARRANGEMENT:	-	STANDBY/DUTY	STANDBY/DUTY
CONTROLS:	CONSTANT SPEED	CONSTANT SPEED	CONSTANT SPEED
MODEL REFERENCE:	WILO TOPS S 1.5x40	WILO TOPS S 1.5x50	WILO TOPS S 1.5x50

SUPPLY AIR OUTLET SCHEDULE		
DESIGNATION	S1	S2
FLOW CHARACTERISTIC:	ASPIRATED	RADIAL FLOW
MOUNTING:	CEILING T-BAR	CEILING T-BAR
OUTLET TYPE:	DIFFUSER	DIFFUSER
NOMINAL FACE SIZE: IN (MM)	12x12 (300x300)	48x24 (1200x600)
CONNECTION SIZE: IN (MM)	4 (100)	12 (300)
AIRFLOW RANGE: CFM (L/S)	105(50)	700 (330)
MAXIMUM NOISE CRITERIA:	NC 25	NC 25
MATERIAL	ALUMINUM	ALUMINUM
ACCESSORIES:		
MODEL REFERENCE	PRICE-ASPD	PRICE-RFD

TERMINAL UNIT SCHEDULE		
CHARACTERISTIC	UNITS	CAV-1
TYPE / MODEL REFERENCE	-	PRES. INDEP. PRICE SDV
AIR INLET SIZE	MM (IN)	125 (5)
MAX AIRFLOW	L/S (CFM)	94 (200)
MIN. AIR STATIC PRESSURE	PA (IN.WG)	2.5 (0.01)
ELECTRICAL	V/PH/Hz	240/1/60
REMARKS		CONST. VOLUME

BRANCH CONTROLLER SCHEDULE	
DESCRIPTION	BC-1
NUMBER OF BRANCHES	10
COOLING POWER INPUT, KW	0.138
HEATING POWER INPUT, KW	0.066
ELECTRICAL: V/PH/Hz	208/1/60
NET WEIGHT, LBS (KGS)	132 (59)
ACCESSORIES	DRAIN CONNECTION WITH FLEXIBLE HOSE AND INSULATION CW CONDENSATE PUMP
MODEL REFERENCE	CMB-P1010NU-GA

Environment Canada  
 Gestion de l'immobilier  
 District 1

**BUILDING KEY PLAN**

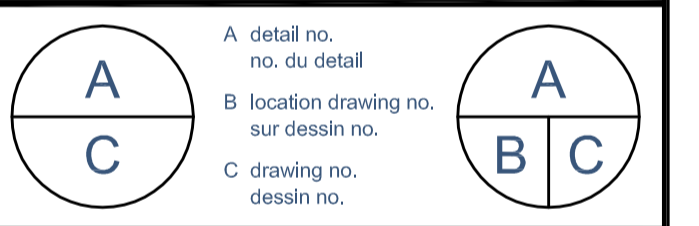
**LEGEND**

REV	Description	Date
02	REISSUED FOR TENDER	28-NOV-2014
01	ISSUED FOR TENDER	28-FEB-2014

VANDERWESTEN RUTHERFORD MANTECON INC.  
 CONSULTING STRUCTURAL/MECHANICAL/ELECTRICAL ENGINEERS  
 LONDON - HAMILTON - WINDSOR - OTTAWA

1130 MORRISON DRIVE, SUITE 280, OTTAWA, ON K2H 9N6  
 PHONE: (613)563-2100 - FAX: (519)852-5058 - www.vrmeng.com

VRM13-110



ENVIRONMENT CANADA  
 MODULE 5 VRF  
 SYSTEM

ENVIRONMENT CANADA  
 335 River Rd  
 Ottawa ON, K1V 1C7

**EQUIPMENT SCHEDULES AND SCHEMATICS**

Designed By: Conçu par  
 Date: (yyyy/mm/dd)

Drawn By: J.V.S.  
 Dessiné par  
 Date: 13.06.26  
 (yyyy/mm/dd)

Reviewed By: M.C.  
 Examiné par  
 Date: 13.06.26  
 (yyyy/mm/dd)

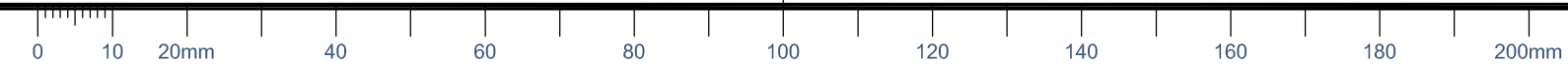
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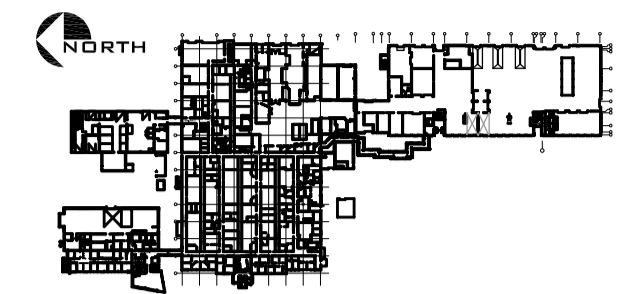
Tender: Soumission

Project Manager: Administrateur de projets  
 EC PMDI Proj no.: Consultant Proj no.  
 RR-072-8062 13-110

Drawing no.: No. du dessin  
**M-500**

Plotted by: jemm Nov 26, 2014 - 2:02pm





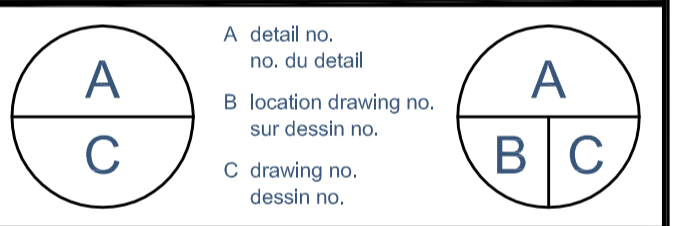
BUILDING KEY PLAN

LEGEND

REV	Description	Date
02	REISSUED FOR TENDER	28-NOV-2014
01	ISSUED FOR TENDER	20-FEB-2014



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project ENVIRONMENT CANADA project

ENVIRONMENT CANADA  
MODULE 5 VRF  
SYSTEM  
ENVIRONMENT CANADA  
335 River Rd  
Ottawa ON, K1V 1C7

drawing ENVIRONMENT CANADA dessin

CONTROLS  
SCHEMATICS AND  
SEQUENCES

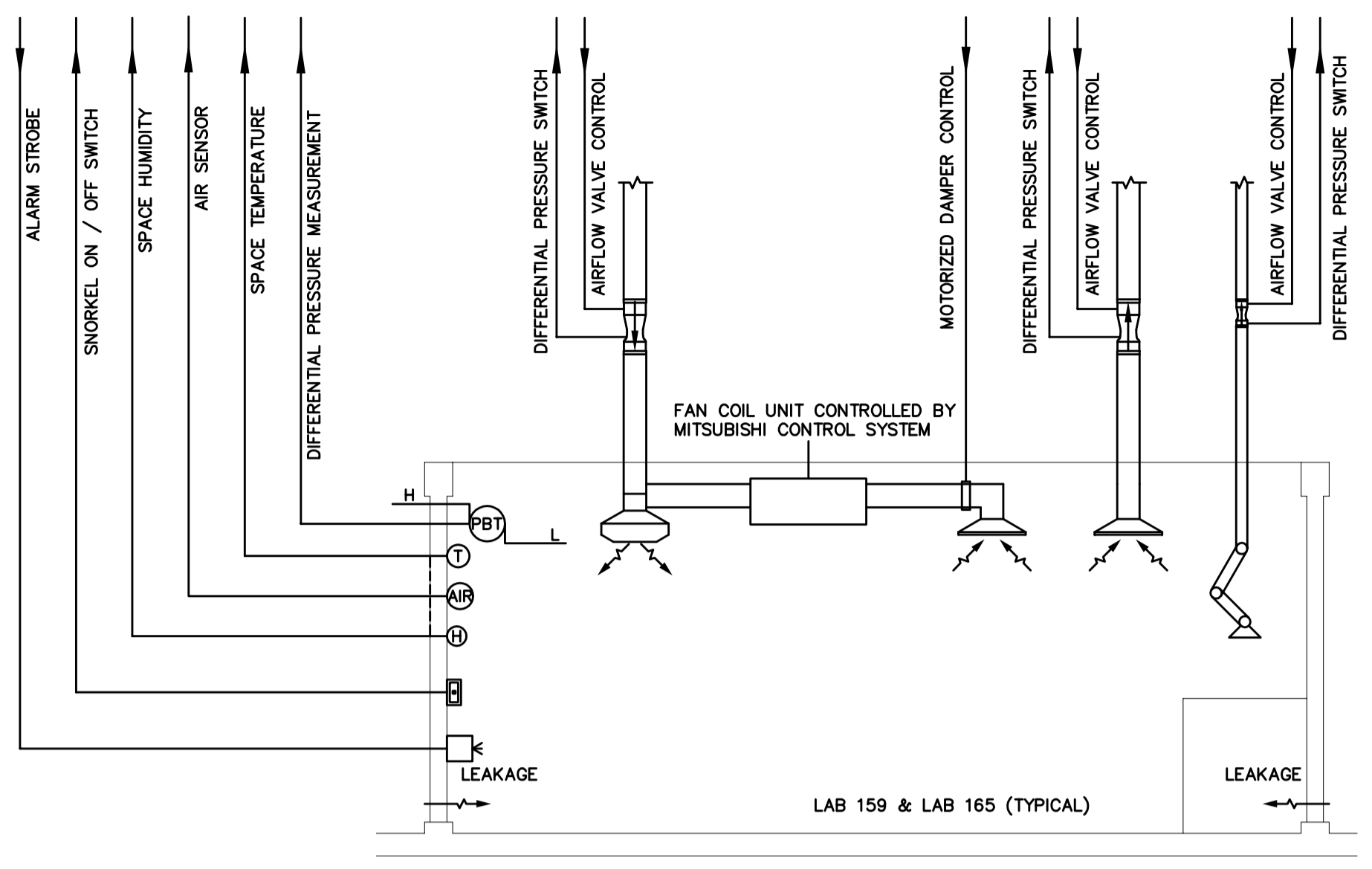
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Date	(yyyy/mm/dd)
Tender	Soumission
Project Manager	Administrateur de projets
EC PMDI Proj no.	Consultant Proj no.
	13-110
Drawing no.	No. du dessin

M-600

POINTS LIST						
DEVICE #	ROOM #	DESCRIPTION	AI	DI	AO	DO
ST	159	SPACE TEMPERATURE	1			
SP	159	SPACE PRESSURE	1			
SH	159	SPACE HUMIDITY	1			
FC-RD	159	FAN COIL RETURN DAMPER				1
FC-RD	159	FAN COIL RETURN DAMPER		1		
AFVC-S	159	SUPPLY AIRFLOW VALVE CONTROL			1	
AFVS-S	159	SUPPLY AIRFLOW VALVE STATIC PRESSURE SWITCH		1		
AFVC-E	159	EXHAUST AIRFLOW VALVE CONTROL			1	
AFVS-E	159	EXHAUST AIRFLOW VALVE STATIC PRESSURE SWITCH		1		
AFVC-SN	159	SNORKEL AIRFLOW VALVE CONTROL			1	
AFVS-SN	159	SNORKEL AIRFLOW VALVE STATIC PRESSURE SWITCH		1		
ALM	159	ALARM STROBE				1
ST	165	SPACE TEMPERATURE	1			
SP	165	SPACE PRESSURE	1			
SH	165	SPACE HUMIDITY	1			
FC-RD	165	FAN COIL RETURN DAMPER				1
FC-RD	165	FAN COIL RETURN DAMPER		1		
AFVC-S	165	SUPPLY AIRFLOW VALVE CONTROL			1	
AFVS-S	165	SUPPLY AIRFLOW VALVE STATIC PRESSURE SWITCH		1		
AFVC-E	165	EXHAUST AIRFLOW VALVE CONTROL			1	
AFVS-E	165	EXHAUST AIRFLOW VALVE STATIC PRESSURE SWITCH		1		
AFVC-SN	165	SNORKEL CAV CONTROL			1	
AFVS-SN	165	SNORKEL CAV STATIC PRESSURE SWITCH		1		
ALM	165	ALARM STROBE				1
P-1	MEZANINE	HEAT SOURCE UNIT PUMP		1		
P-1	MEZANINE	HEAT SOURCE UNIT PUMP				1
P-2A	MEZANINE	FLUID COOLER PUMP (LEAD)		1		
P-2A	MEZANINE	FLUID COOLER PUMP (LAG)				1
P-2B	MEZANINE	FLUID COOLER PUMP (LAG)		1		
P-2B	MEZANINE	FLUID COOLER PUMP (LAG)				1
FCL-1	ROOF	FLUID COOLER			1	
FCL-1	ROOF	FLUID COOLER				1
HSU-1-EWT	MEZANINE	HEAT SOURCE UNIT ENTERING WATER TEMP	1			
HSU-1-LWT	MEZANINE	HEAT SOURCE UNIT LEAVING WATER TEMP	1			
FCL-1-EWT	MEZANINE	FAN COIL UNIT ENTERING WATER TEMP	1			
FCL-1-LWT	MEZANINE	FAN COIL UNIT LEAVING WATER TEMP	1			

MECHANICAL EQUIPMENT SCHEDULE										
No.	Item	Equipment		Controls			Responsibility			
		Characteristics	Location	Type	Location	Manufact. Reference	Supplied by Div.	Installed by Div.	Wired & Connected by Div.	
1	HEAT SOURCE UNIT HSU-1	MCA	1 @ 11 1 @ 9	MEZANINE LEVEL	Disconnect	At Unit	See Spec	16	16	16
		Voltage	575		Variable Speed Drive	In Unit		15	15	16
		Phases	3		Other Controls	At Unit		15	15	15
		Freq.	60							
2	BRANCH CONTROLLERS BC-1	KW	0.138	MEZANINE LEVEL	Service Switch	At unit	See Spec	16	16	16
		Voltage	208		Other Controls	See Dwg.		15	15	15
		Phases	1							
		Freq.	60							
Division 16 shall provide 1/2" conduit complete with pullwire from Condensing Unit HSU-1 to BC-1 to fan coil units (daisy chain) for controls connection by Division 15.										
3	FAN COIL UNITS	MCA	1 @ 3.41 1 @ 3.33	SEE DWGS	Starter	In Unit		15	15	16
		Voltage	208		Disconnect	At unit		15	15	16
		Phases	1		Thermostat	See Dwg.		15	15	16
		Freq.	60		Other Controls	See Dwg.		15	15	15
Division 16 shall provide outlet box & run 1/2" conduit complete with pullwire from box to unit for thermostat controls.										
4	PUMP P-1	KW	0.81	MEZANINE LEVEL	Disconnect	At unit	See Spec	16	16	16
		Voltage	230		Starter	See Dwg.		15	15	16
		Phases	3		Other Controls	See Dwg.		15	15	15
		Freq.	60							
5	PUMP P-2A	KW	1.04	MEZANINE LEVEL	Disconnect	At unit	See Spec	16	16	16
		Voltage	230		Starter	See Dwg.		15	15	16
		Phases	3		Other Controls	See Dwg.		15	15	15
		Freq.	60							
5	PUMP P-2B	KW	1.04	MEZANINE LEVEL	Disconnect	At unit	See Spec	16	16	16
		Voltage	230		Starter	See Dwg.		15	15	16
		Phases	3		Other Controls	See Dwg.		15	15	15
		Freq.	60							
6	FLUID COOLER FCL-1	MCA	6.10	ROOF LEVEL	Disconnect (V/F)	At unit	See Spec	16	16	16
		Voltage	575		Starter			15	15	16
		Phases	3		Other Controls	See Dwg.		15	15	15
		Freq.	60							
7	GLYCOL FILL STATION (AXIOM MODEL SF100)	MCA	0.70	MEZANINE LEVEL	Disconnect	Pkg		15	15	16
		Voltage	120							
		Phases	1							
		Freq.	60							

DIVISION 15: REFERS TO MECHANICAL  
DIVISION 16: REFERS TO ELECTRICAL



LAB 159 & LAB 165 (TYPICAL)

- NOTES
- FAN COIL UNIT CONTROLLED BY MITSUBISHI CONTROL SYSTEM. MITSUBISHI CONTROL SYSTEM TO BE PROVIDED WITH BACNET INTERPHASE WITH CAPABILITIES TO ADD FUTURE MITSUBISHI UNITS.
  - PHOENIX VALVES TO BE TIED INTO PHOENIX CONTROL SYSTEM (WHICH IS CONNECTED BY BACNET INTERFACE)
  - CONTROLS SHALL PICK UP 1 AIRCUTY POINT FOR EACH LAB.

01 ROOM SCHEMATIC

SCALE: N/A

SEQUENCE OF OPERATION

- SYSTEM COMPONENTS: THE SYSTEM CONSISTS OF THE FOLLOWING:
  - FLUID COOLER
  - PUMPS P-1, P-2A AND P-2B
  - HEAT SOURCE UNIT
- HYDRONIC LOOP OPERATION: WHEN HEAT SOURCE UNIT IS ENABLED, PUMP P-1 WILL START. WHEN THE WATER TEMPERATURE EXCEEDS 110°F (ADJ.) IN THE PRIMARY HEAT SOURCE UNIT LOOP OR DROPS BELOW 50°F (ADJ.), THE FLUID COOLER & P-2A WILL BE ENABLED AND THE 3-WAY VALVE SHALL MODULATE. THE FLUID COOLER SHALL OPERATE IN 6 STAGES (THREE FANS WITH TWO SPEEDS EACH) BASED UPON LEAVING FLUID COOLER TEMPERATURE. P-2B WILL BE ENABLED WHEN REQUIRED WHEN TEMPERATURE SETPOINT IS NOT MET WITH P-2A ONLY RUNNING. THE MINIMUM RUNTIMES AND USER DEFINABLE (ADJ.) DELAYS FOR EACH PIECE OF EQUIPMENT ON START AND STOP APPROPRIATELY SET TO ALLOW FOR ORDERLY SYSTEM START-UP, SHUTDOWN AND SEQUENCING. ON SHUT DOWN OR WHEN THE FLUID COOLER IS NO LONGER NEEDED, THE FLUID COOLER AND PUMPS SHALL STOP.
- MONITORING: THE FOLLOWING SHALL BE MONITORED:
  - HEAT SOURCE UNIT SUPPLY AND RETURN WATER TEMPERATURES
  - FLUID COOLER SUPPLY AND RETURN WATER TEMPERATURES
  - HEAT SOURCE UNIT OPERATING CONDITIONS, STATUSES AND ALARMS
  - FLUID COOLER OPERATING CONDITIONS, STATUSES AND ALARMS
  - STATUS OF ALL PUMPS FROM CURRENT SENSING RELAYS
- ALARMS: ALARMS SHALL BE PROVIDED AS FOLLOWS:
  - PUMPS
    - FAILURE: COMMANDED ON, BUT THE STATUS IS OFF
    - RUNTIME EXCEEDED: STATUS RUNTIME EXCEEDS A USER DEFINABLE LIMIT
    - LEAD PUMP FAILURE: LEAD PUMP IS IN FAILURE AND THE LAG PUMP IS ON.
  - FLUID COOLERS
    - ALARMS
    - FAILURE: COMMANDED ON, BUT THE STATUS IS OFF
    - HIGH /LOW HEAT SOURCE UNIT RETURN TEMP: TEMPERATURE GREATER THAN 115°F (ADJ.) / LESS THAN 45° F (ADJ.).
- SHUTDOWN: SYSTEM SHUTS DOWN UNDER THE FOLLOWING CONDITIONS:
  - EMERGENCY SHUTDOWN SIGNAL
- VRF SYSTEM: THE VRF CONTROL SYSTEM WILL BE SUPPLIED WITH INDEPENDENT CONTROLS (MITSUBISHI M-NET SYSTEM) THAT WILL CONNECT TO THE BAS VIA A BACNET INTERACE. THE VRF CONTROL SYSTEM WILL TIE IN AND COMMUNICATE WITH THE BMS SYSTEM. THE SYSTEM SHALL CYCLE ON/OFF TO MAINTAIN SPACE SET POINTS 21°C (ADJ.) IN THE UNOCCUPIED MODE. IN OCCUPIED MODE, SYSTEM SHALL RUN CONTINUOUSLY AND MODULATE HEATING AND COOLING CAPACITIES TO MEET SPACE HEATING AND COOLING DEMAND AS DETERMINED BY SPACE TEMPERATURE VARIATION FROM SET POINT OF 21°C (ADJ.). THE AHU AND PHOENIX VALVES SERVING THE SPACE ARE INTERLOCKED WITH THE VRF FAN COIL UNITS AND OPERATE TOGETHER.
- FAN COIL UNITS: FAN COIL UNITS SHALL OPERATE BASED ON A ROOM SETPOINTS. UNITS PROVIDE HEATING AND COOLING AS REQUIRED TO MEET SPACE TEMPERATURE SET POINT. ON AN INCREASE IN SPACE TEMPERATURE, FAN SPEEDS UP AND REFRIGERANT VALVE MODULATES OPEN TO PROVIDE MORE COOLING. ON A DROP IN SPACE TEMPERATURE, HEATING IS ACTIVATED. ON FURTHER DROP IN TEMPERATURE, FAN SPEEDS UP AND REFRIGERANT VALVE MODULATES OPEN UP TO PROVIDE MORE HEATING. BC CONTROLLER MONITORS WHICH FAN COIL UNITS NEED HEATING AND COOLING AND SENDS HOT OR COLD REFRIGERANT ACCORDINGLY.
- LAB OPERATION MODES:
 

STARTUP:

  - THE ROOM SHALL START UP WHEN BOTH THE SUPPLY AND EXHAUST SYSTEMS ARE PROVEN STATUS. ALLOW FOR 2 MINUTES (ADJ.) BEFORE ENABLING THE PRESSURE ALARMS. THE SUPPLY AIRFLOW SHALL RAMP UP SIMULTANEOUSLY WITH THE SNORKEL EXHAUST AND GENERAL EXHAUST VALVES TO MAINTAIN THE DESIRED VOLUMETRIC OFFSET. THE FAN COIL UNIT SHALL OPERATE TO MAINTAIN ROOM SETPOINTS. THE HEAT SOURCE UNIT AND HYDRONIC SYSTEM WILL ACT ACCORDING TO THEIR SEQUENCES.

STEADY STATE OPERATION:

  - THE SUPPLY SHALL TRACK THE TOTAL EXHAUST AND MAINTAIN THE VOLUMETRIC DIFFERENCE. THE ROOM SHALL SUPPLY AIR (FROM AHUS) SUPPLIED AT 2 ACH (ADJ.). THE FAN COIL UNIT WILL MAINTAIN ROOM SET POINTS.
  - SNORKEL EXHAUST: THE SNORKEL EXHAUST SHALL BE TURN ON UPON ROOM STARTUP. THE GENERAL EXHAUST VALVE WILL MODULATE WITH THE SUPPLY VALVE TO MAINTAIN VOLUMETRIC AIRFLOW DIFFERENCE.

SETBACK OPERATION:

  - SETBACK OPERATION IS SAME AS STEADY STATE (ADJ.)

PURGE OPERATION:

  - UPON A SIGNAL FROM THE BAS, THE RETURN AIR DAMPER IN THE ROOM WILL CLOSE. THE GENERAL EXHAUST VALVE WILL RAMP UP TO 10 ACH IN THE LABORATORY. THE SNORKEL CAV WILL CONTINUE TO EXHAUST AT CONSTANT FLOW, AND THE SUPPLY VALVE WILL RAMP UP MAINTAINING THE VOLUMETRIC DIFFERENCE.

EMERGENCY OPERATION:

  - UPON A SIGNAL FROM AIRCUTY SYSTEM, THE SYSTEM WILL ENTER INTO PURGE OPERATION.

MECHANICAL SPECIFICATIONS

ABBREVIATED SPECIFICATION DESCRIBES SOME EQUIPMENT AND MATERIALS TO BE INCLUDED IN THE WORK...

1. GENERAL CONDITIONS

- A. CONFORM TO ONTARIO BUILDING CODE INCLUDING PART 7 - PLUMBING AND AMENDING REGULATIONS.

2. SCOPE OF WORK

- A. THE REMOVAL OR RELOCATION OF EXISTING, AND THE SUPPLY AND INSTALLATION OF NEW EQUIPMENT, DUCTWORK AND PIPING AS SHOWN ON THE DRAWINGS AND AS NOTED.

B. GENERAL

- a. COMPLY WITH GENERAL CONDITIONS.
b. PROVIDE ELECTRONIC COPIES OF SHOP DRAWINGS OF ALL MAJOR EQUIPMENT FOR APPROVAL.
c. BALANCE ALL AIR SYSTEMS AND SUBMIT BALANCING REPORT ON COMPLETION.

3. LIABILITY

- A. THIS CONTRACTOR SHALL ASSUME FULL RESPONSIBILITY FOR LAYING OUT HIS WORK AND ANY DAMAGE OR EXTENSION CAUSED TO THE OWNER OR OTHER CONTRACTORS BY IMPROPER LOCATION OR CARRYING OUT HIS WORK.

4. CERTIFICATES, FEES, ETC.

- A. GIVE ALL NOTICES, OBTAIN ALL PERMITS AND PAY ALL FEES SO THAT THE WORK SPECIFIED HEREIN MAY BE CARRIED OUT.

5. CEILING TILE REMOVAL / REPLACEMENT

- A. EACH RESPECTIVE SUB-TRADE OR PRIME MECHANICAL CONTRACTOR AS THE CASE MAY BE SHALL BE RESPONSIBLE FOR THE REMOVAL AND REINSTALLATION OF ANY CEILING TILES TO SUIT WORK WITHIN THE CEILING SPACE.

6. TESTING AND BALANCING

- A. BALANCE ALL SYSTEMS WHERE AIRFLOW IS GIVEN FOR RATED AIR FLOW, ROOM TEMPERATURE CONTROL AND CHECK CURRENT DRAW AFTER INSTALLATION IS COMPLETE AND IN FULL WORKING ORDER.

7. HOURS OF WORK

- A. ANY AUDIBLE TESTING, CORE DRILLING OR ANY OTHER NOISY WORK MUST BE PERFORMED "AFTER HOURS".

8. SEISMIC RESTRAINTS

SEISMIC ENGINEER

- 1. PROFESSIONAL ENGINEER HOLDING A CERTIFICATE OF AUTHORIZATION IN THE PROVINCE OF ONTARIO WITH A MINIMUM OF 5 YEARS EXPERIENCE IN SEISMIC DESIGN...

SEISMIC CONTROL MEASURES

- 1. A SINGLE SUPPLIER SHALL PROVIDE SEISMIC DESIGN, VIBRATION INTERNAL PARTS AND SEISMIC RESTRAINTS TO BE PROVIDED FOR ALL OPERATIONAL AND FUNCTIONAL COMPONENTS OF BUILDING SERVICES...

MECHANICAL SPECIFICATIONS

SEISMIC CONTROL MEASURES CONT'D

- 4. CONNECTION MATERIALS SHALL BE SELECTED BY AND SITE SPECIFIC DESIGN TO BE PREPARED BY THE SEISMIC ENGINEER.

9. CONTROLS

- A. ALL CONTROLS SHALL BE BY DELTA CONTROLS (REGULAR), LOCATE THERMOSTATS AS SHOWN ON THE DRAWINGS, AND VERIFY CONNECTION TO CORRECT TERMINAL UNITS AS SHOWN ON THE DRAWINGS.

10. VARIABLE REFRIGERANT FLOW SYSTEM

- A. WATER SOURCE HEAT RECOVERY UNITS: THE WR2-SERIES SHALL CONSIST OF THE PORY-P-ZKMU CONDENSING UNIT, INDOOR UNITS, AND IN-UNIT DDC (DIRECT DIGITAL CONTROLS).

B. FAN COIL UNITS:

- THE UNIT SHALL BE A CEILING-CONCEALED DUCTED AIR FAN COIL DESIGN THAT MOUNTS ABOVE THE CEILING WITH A 2-POSITION, FIELD ADJUSTABLE RETURN AND A FIXED HORIZONTAL DISCHARGE SUPPLY AND SHALL HAVE A MODULATING LINEAR EXPANSION DEVICE.

C. BRANCH CONTROLLERS:

- THE BC (BRANCH CIRCUIT) CONTROLLERS SHALL BE SPECIFICALLY USED WITH R410A SYSTEMS. THESE UNITS SHALL BE EQUIPPED WITH A CIRCUIT BOARD THAT IS CONTROLLED BY THE MAIN CONTROLLER.

D. CONTROLS:

- MITSUBISHI M-NET CONTROL SYSTEM AND COMPONENTS (INCLUDING BAGNET INTERPHASE) SHALL BE SUPPLIED BY MITSUBISHI.

12. DUCTWORK

ALL DUCTWORK TO BE FABRICATED FROM GALVANIZED STEEL TO CLEAR INSIDE DIMENSIONS AS NOTED ON THE DRAWINGS WITH ALL FLAT SURFACES CROSS BROKEN.

A. DUCT CLEANING

- 1. CLEAN ALL NEW AND RENOVATED DUCTWORK. CLEAN INTERIOR SURFACES OF ALL NEW DUCTWORK AND ACCESSORIES INSTALLED AS PART OF THIS PROJECT.

B. GRILLES AND DIFFUSERS REFER TO SCHEDULE

e. H. PRICE MODELS AS INDICATED, EQUIVALENTS: TITUS, CARNES.

- 1. L TYPE: SHORT VERTICAL SECTIONS OF 2" (50 MM) DIAMETER PIPE TO FORM AIR CHAMBER, WITH 3 MM BRASS NEEDLE VALVE AT TOP OF CHAMBER.

MECHANICAL SPECIFICATIONS

C. DUCT INSULATION

- a. RIGID DUCT INSULATION SHALL BE FIBROUS GLASS WOOL. FIBERGLASS CANADA INC. VAPOUR-SEAL DUCT INSULATION AF330 WITH RFRFK FACING OR MANSON INSULATION INC. AK BOARD WITH FSK FACING.

D. DUCT LINING

- a. LINE INTERNAL SURFACES OF ALL DUCTWORK SHOWING CROSS HATCH WITH 1" THICK FIBREGLASS DUCT LINING, IMPALING LINING ON WELD PINS, SECURING WITH SPEED WASHERS.

13. MOTORIZED DAMPERS

- 1. TAMCO SERIES 1500 ENHANCED AIR-FOIL DAMPER AS MANUFACTURED BY T. A. MORRISON & CO OR EQUIVALENT BY RUSKIN, NAILOR.

14. PIPE AND PIPE FITTINGS

- A. CORROSION ALLOWANCE 0.0625 IN.
B. STEEL PIPE ASTM A53 GRB ERW OR ASTM A106 GRB SMLS, SCH 40.
C. JOINTS, 2" AND SMALLER SCREWED.

T. HYDRONIC SYSTEM COMPONENTS

- 1. DIAPHRAGM-TYPE EXPANSION TANKS
1. MANUFACTURER:
.1 AMITROL
.2 OTHER ACCEPTABLE MANUFACTURERS OFFERING EQUIVALENT PRODUCTS.

2. AIR VENTS

- 1. L TYPE: SHORT VERTICAL SECTIONS OF 2" (50 MM) DIAMETER PIPE TO FORM AIR CHAMBER, WITH 3 MM BRASS NEEDLE VALVE AT TOP OF CHAMBER.

MECHANICAL SPECIFICATIONS

.3 AIR SEPARATORS

- 1. MANUFACTURERS:
.1 AMITROL
.2 ITT BELL & GOSSETT.

15. PIPE INSULATION

- A. MINIMUM PIPE INSULATION SHALL CONFORM TO CURRENT ASHRAE 90.1 AND SHALL BE MOUNTED GLASS FIBRE INSULATION WITH VAPOUR BARRIER JACKET, EQUAL TO FIBREGLASS OF CANADA INC.

Table with columns: SERVICE, THICKNESS, CONDENSER WATER (EXTERIOR) 50MM (2"), GLYCOL HOT WATER HEATING SUPPLY 25MM (1"), etc.

16. VERTICAL IN-LINE PUMPS

- 1. TYPE: VERTICAL, SINGLE STAGE, CLOSE COUPLED, RADIAL OR HORIZONTALLY SPLIT CASING, FOR IN-LINE MOUNTING, FOR 175 PSI (1200 KPA) WORKING PRESSURE.

17. REFRIGERANT PIPING

- A. GENERAL PRODUCT
a. TUBING: SHALL BE PROCESSED FOR REFRIGERATION INSTALLATIONS.

C. PIPE SLEEVES

- 1. HARD COPPER OR STEEL, SIZED TO PROVIDE 6MM (1/4") CLEARANCE AROUND BETWEEN SLEEVE AND UNINSULATED PIPE OR BETWEEN SLEEVE AND INSULATION.

D. VALVES

- a. 22MM (13/16") AND UNDER - CLASS 500, 3.5MPA (508PSI) GLOBE OR ANGLE NON-DIRECTIONAL TYPE, DIAPHRAGM, PACKLESS TYPE, WITH FORGED BRASS BODY AND BONNET, MOISTURE PROOF SEAL FOR BELOW FREEZING APPLICATIONS.

E. EXECUTION GENERAL

- 1. CONSTRUCTION IN ACCORDANCE WITH CSA B52, EPS 1/RA/1 AND ANSI/ASME B31.5, CONNECT TO EQUIPMENT WITH ISOLATING VALVES.

G. BRAZING PROCEDURES

- 1. BLEED INERT GAS INTO PIPE DURING BRAZING. REMOVE VALVE INTERNAL PARTS, SOLENOID VALVE CONES AND SHIRT GLASSES. DO NOT APPLY HEAT NEAR EXPANSION VALVE AND BULK AND OTHER TEMPERATURE SENSITIVE COMPONENTS.

MECHANICAL SPECIFICATIONS

I. HOT GAS LINES AND SUCTION LINES

- a. PITCH AT LEAST 12MM PER 3M (1/2" PER 10') DOWN IN DIRECTION OF FLOW TO PROMOTE OIL RETURN TO COMPRESSOR DURING OPERATION.

J. PRESSURE AND LEAK TESTING

- a. CLOSE VALVES ON ALL FACTORY CHARGED EQUIPMENT AND OTHER EQUIPMENT NOT DESIGNED FOR TEST PRESSURES. LEAK TEST TO CSA B52 BEFORE EVACUATION TO 1.5 TIMES WORKING PRESSURE ON BOTH HIGH AND LOW SIDES.

K. DEHYDRATION AND CHARGING

- a. CLOSE SERVICE VALVES ON FACTORY CHARGED EQUIPMENT AMBIENT TEMPERATURES TO BE AT LEAST +13° (55°) FOR AT LEAST 12 HOURS BEFORE AND DURING DEHYDRATION.

L. INSULATION

- a. APPLY INSULATION AFTER REQUIRED TESTS HAVE BEEN COMPLETED AND REVIEWED BY CONSULTANT.

18. FLUID COOLER

- 1. GENERAL
A. CONFORM TO THE GENERAL PROVISIONS FOR MECHANICAL SECTION 1- GENERAL CONDITIONS.

2. PRODUCTS

- A. GENERAL
B. PROVIDE REF-PLUS AIR COOLED FLUID COOLER OR EQUIVALENT (EVAPCO OR OTHER - TO BE APPROVED BY CONSULTANT).

3. CASING

- A. THE CONDENSER CASING SHALL BE OF HEAVY GAUGE G90 GALVANIZED STEEL WITH PLATED HARDWARE FOR CORROSION FREE ASSEMBLY.

5. MOTORS

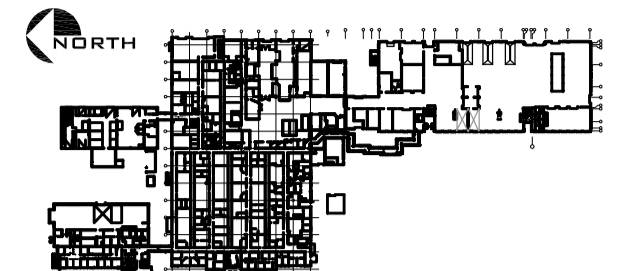
- A. MOTORS SHALL BE TOTALLY ENCLOSED, SOFT START, REVERSE ROTATION DESIGN. CHARGERS SHALL BE PERMANENTLY LUBRICATED DOUBLE SEALED, DEEP GROOVE. MOTORS SHALL BE TWO SPEED (550/780 RPM), CLASS F INSULATION, THERMALLY PROTECTED 575/3/60 VOLT.

6. OPTIONS

- A. FAN CYCLING CONTROL PANEL - UNIT SHALL BE SUPPLIED WITH FACTORY INSTALLED LINE VOLTAGE TERMINAL BLOCK, 24 VOLT TRANSFORMER, TIME CLOCK TERMINALS, FAN CYCLING THERMOSTATS, SENSORS, AND FAN CONTACTORS, ALL MOUNTED ON A WEATHERPROOF CONTROL PANEL. FAN MOTORS ARE WIRED THROUGH THE CONTACTORS BACK TO THE MAIN UNIT TERMINAL BLOCK.

7. INSTALLATION

- A. INSTALL UNITS IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.

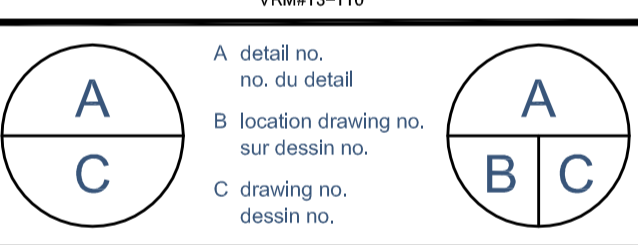


BUILDING KEY PLAN

LEGEND

Table with columns: REV, Description, Date. Includes entries for 'RESUBMITTED FOR TENDER' and 'ISSUED FOR TENDER'.

VRM logo and contact information for Vanderwesten Rutherford Mantecon Inc.



project / projet

ENVIRONMENT CANADA / ENVIRONNEMENT CANADA logo and address: 335 River Rd, Ottawa, ON, K1V 1C7

drawing / dessin

MECHANICAL SPECIFICATIONS

Designed By / Conçu par / Date / (yyyy/mm/dd) / Drawn By / M.C. / Dessiné par / Date / 13.06.26 / (yyyy/mm/dd)

Reviewed By / M.C. / Examiné par / Date / 13.06.26 / (yyyy/mm/dd)

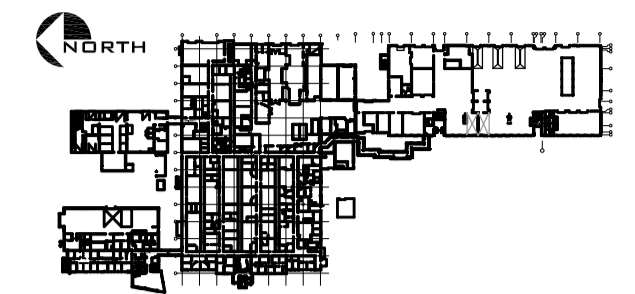
Approved By / Approuvé par / Date / (yyyy/mm/dd) / Tender / Soumission

Project Manager / Administrateur de projets / EC PMDI Proj no. / Consultant Proj no. / 13-110

Drawing no. / No. du dessin

**MECHANICAL SPECIFICATIONS**

- 19 VFD (FOR GENERAL EXHAUST FAN 5)
- A. BASE BID : DANFOSS VLT HVAC FC102 VARIABLE FREQUENCY DRIVE (5 HP, 575V).
  - B. ALTERNATE SUPPLIERS BY ABB AND ALLEN BRADLEY MAY BE CONSIDERED. CONTRACTOR SHALL ENSURE MODELS PROPOSED ARE EQUAL TO DANFOSS MODEL SPECIFIED.
  - C. THE VFD SHALL BE C-UL, AND NEMA TYPE 1 AS REQUIRED FOR INDOOR APPLICATIONS.
  - D. THE VFD SHALL INCLUDE A STANDARD EIA-485 COMMUNICATIONS PORT AND CAPABILITIES TO BE CONNECTED TO THE FOLLOWING SERIAL COMMUNICATION PROTOCOLS AT NO ADDITIONAL COST AND WITHOUT A NEED TO INSTALL ANY ADDITIONAL HARDWARE OR SOFTWARE IN THE VFD: REGULVAR (DELTA CONTROLS).
  - E. THREE-CONTACTOR BYPASS SHALL BE PROVIDED THAT ALLOWS OPERATION OF THE MOTOR VIA LINE POWER IN THE EVENT OF A FAILURE OF THE VFD. MOTOR CONTROL SELECTION SHALL BE THROUGH EITHER A VFD OUTPUT CONTACTOR OR A BYPASS CONTACTOR THAT ARE ELECTRICALLY INTERLOCKED TO ENSURE THAT BOTH CONTACTORS ARE NOT ENERGIZED SIMULTANEOUSLY. A THIRD CONTACTOR, THE DRIVE INPUT CONTACTOR, SHALL BE SUPPLIED AS STANDARD. THIS ALLOWS THE POWERING OF THE VFD WITH THE MOTOR OFF OR OPERATING IN BYPASS MODE FOR TESTING, PROGRAMMING AND TROUBLESHOOTING PURPOSES. IF A TWO CONTACTOR BYPASS WITH A SERVICE SWITCH FOR THE VFD INPUT IS PROVIDED, THEN A DOOR MOUNTED HANDLE MUST BE PROVIDED TO POWER ON/OFF THE INPUT TO THE VFD WITHOUT THE NEED TO OPEN THE PANEL.
  - F. THE MANUFACTURER SHALL PROVIDE START-UP COMMISSIONING OF THE VFD AND ITS OPTIONAL CIRCUITS BY A FACTORY CERTIFIED SERVICE TECHNICIAN WHO IS EXPERIENCED IN START-UP AND REPAIR SERVICES. SALES PERSONNEL AND OTHER AGENTS WHO ARE NOT FACTORY CERTIFIED SHALL NOT BE ACCEPTABLE AS COMMISSIONING AGENTS. START-UP SERVICES SHALL INCLUDE CHECKING FOR VERIFICATION OF PROPER OPERATION AND INSTALLATION FOR THE VFD, ITS OPTIONS AND ITS INTERFACE WIRING TO THE BUILDING AUTOMATION SYSTEM.
  - G. THE COMPLETE VFD SHALL BE WARRANTED BY THE MANUFACTURER FOR A PERIOD OF 60 MONTHS FROM DATE OF SHIPMENT. THE WARRANTY SHALL INCLUDE PARTS, LABOR, TRAVEL COSTS AND LIVING EXPENSES INCURRED BY THE MANUFACTURER TO PROVIDE FACTORY AUTHORIZED ON-SITE SERVICE. THE WARRANTY SHALL BE PROVIDED BY THE VFD MANUFACTURER AND NOT A THIRD PARTY
- 20 EXHAUST FAN UPGRADE GENERAL:
- A. CONTRACTOR SHALL UPGRADE EXISTING GENERAL EXHAUST FAN NO.5 FROM 2 HP TO 5 HP. EXISTING MOTOR AND VFD SHALL BE DISCONNECTED BY ELECTRICAL CONTRACTOR AND REMOVED BY MECHANICAL CONTRACTOR. EXISTING FAN IS CARNES MODEL VUBK24P1H1CA20SPC1 (1.26" SP, 2 HP, 575/3/60, 1759 RPM, BELT DRIVE). MECHANICAL CONTRACTOR SHALL SUPPLY AND INSTALL NEW VFD COMPATIBLE RATED MOTOR, AND VFD. ELECTRICAL CONTRACTOR SHALL WIRE MOTOR AND VFD. FAN MOTOR UPGRADE SHALL ALSO INCLUDE FOR NEW BELTS, PULLEYS, AND MOUNTS AS NECESSARY FOR NEW MOTOR.
21. CONTROLS CONTRACTOR SHALL:
- A) DISCONNECT EXISTING VFD CONTROLS POINTS and RECONNECT NEW VFD POINTS BACK to BAS
  - A) ADJUST STATIC PRESSURE SETPOINT FROM 1" WC TO MAXIMUM OF 1.75" WC (USER ADJUSTABLE).
  - C) VERIFY and UPDATE BAS FRONT END GRAPHICS as NECESSARY.
22. AIR BALANCER SHALL:
- TAKE TOTAL AIR VOLUME and STATIC PRESSURE SYSTEM READINGS BEFORE AND AFTER FAN UPGRADE AND PROVIDE IN FINAL FAN PERFORMANCE REPORT. AIR BALANCER TO TAKE FINAL FAN READINGS WITH LAB 159 GENERAL EXHAUST OPERATING IN A PURGE MODE WHILE NEW FAN OPERATING AT NEW STATIC PRESSURE SET POINT, AND ALTERNATIVELY SAME VERIFICATION WITH LAB 165 in PURGE MODE. CONFIRM and REPORT LAB 159 and 165 OPERATION AT NEW PURGE AIR VOLUMES ALONG WITH FAN OPERATING at NEW STATIC PRESSURE SET POINT. COORDINATE SYSTEM VERIFICATION WITH CONTROLS CONTRACTOR.



**BUILDING KEY PLAN**

**LEGEND**

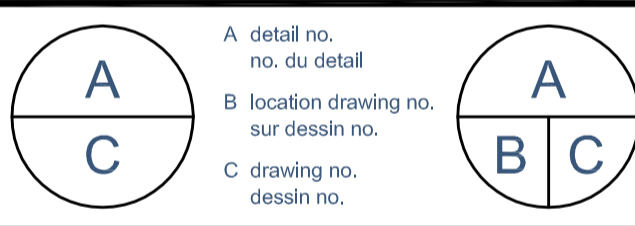
REV	Description	Date
02	REISSUED FOR TENDER	28-NOV-2014
01	ISSUED FOR TENDER	28-FEB-2014

**VRM**

VANDERWESTEN RUTHERFORD MANTECON INC.  
CONSULTING STRUCTURAL/MECHANICAL/ELECTRICAL ENGINEERS  
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VRM13-110



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**ENVIRONMENT CANADA**  
**MODULE 5 VRF**  
**SYSTEM**

ENVIRONMENT CANADA  
335 River Rd  
Ottawa ON, K1V 1C7

**MECHANICAL SPECIFICATIONS**

Designed By	Conçu par
Date	(yyyy/mm/dd)
Drawn By M.C.	Dessiné par
Date 13.06.26	(yyyy/mm/dd)
Reviewed By M.C.	Examiné par
Date 13.06.26	(yyyy/mm/dd)
Approved By	Approuvé par
Date	(yyyy/mm/dd)
Tender	Soumission
Project Manager	Administrateur de projets
EC PMDI Proj no.	Consultant Proj no.
	13-110
Drawing no.	No. du dessin

**M-701**