

NRC BUILDING M7 - CHILLER AND HEAT PUMP REPLACEMENTS

1200 MONTREAL ROAD, OTTAWA, ON.
MECHANICAL



GENERAL NOTES

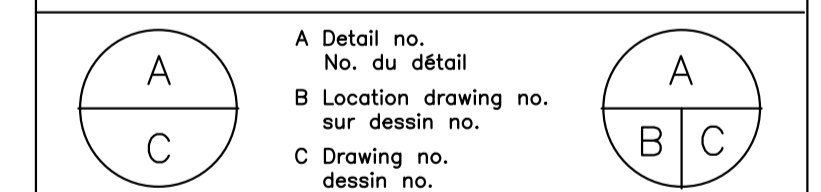
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No.	Date	Revision
1	2022-01-25	ISSUED FOR TENDER
-	2021-12-15	ISSUED FOR 100% REVIEW
-	2021-11-17	ISSUED FOR 99% REVIEW
-	2021-10-13	ISSUED FOR 66% REVIEW
-	2021-08-27	ISSUED FOR 33% REVIEW

- Verify all dimensions and site conditions and be responsible for same.
- Vérifier toutes les dimensions et l'état des lieux et en assumer la responsabilité.



project: **M7 CHILLER AND HEAT PUMP REPLACEMENTS**

drawing: **MONTREAL ROAD CAMPUS**

MECHANICAL LEGENDS AND SCHEDULES

designed	conçu	date	date
K.N.			
drawn	dessiné	scale	échelle
K.N.		AS NOTED	
checked	vérifié	sheet	feuille
R.L.		of/de	
approved	approuvé	W.O.no.	D.T.no.
R.L.			

dwg.no. **5988-M01** dessin no.

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

DRAWING LIST	
SYMBOL	DESCRIPTION
5988-M01	MECHANICAL - LEGENDS & SCHEDULES
5988-M02	MECHANICAL - DETAILS
5988-M03	MECHANICAL - CHILLER REPLACEMENT - DEMO & NEW WORK
5988-M04	MECHANICAL - CHILLER REPLACEMENT - SCHEMATICS
5988-M05	MECHANICAL - HEAT PUMP REPLACEMENTS - DEMO & NEW WORK
5988-M06	MECHANICAL - CONTROL VALVE REPLACEMENTS

CONTROLS LEGEND	
SYMBOL	DESCRIPTION
---	LOW VOLTAGE CONTROL WIRING
□	TEMPERATURE SENSOR

PLUMBING & UTILITIES LEGEND	
SYMBOL	DESCRIPTION
---	CHILLED GLYCOL SUPPLY PIPING
---	CHILLED GLYCOL RETURN PIPING
---	CHILLED WATER SUPPLY
---	CHILLED WATER RETURN
---	COOLING TOWER SUPPLY PIPING
---	COOLING TOWER RETURN PIPING
□	THERMOMETER
□	PRESSURE GAUGE C/W VALVE
□	AUTOMATIC AIR VENT C/W VALVE
---	PIPING OFFSET
---	BRANCH PIPING DOWN
---	PIPING DOWN
---	PIPING UP
---	REDUCER
---	FLOW
---	CAP
---	ISOLATION VALVES
---	PRESSURE REDUCING VALVE (PRV)
---	CIRCUIT BALANCING VALVE (CBV)
---	2-WAY CONTROL VALVE (DDC)
---	3-WAY CONTROL VALVE (DDC)
---	STRAINER
---	CHECK VALVE
---	FLEXIBLE CONNECTION
---	UNION
---	RELIEF VALVES
---	DRAIN VALVE C/W CAP & CHAIN
---	PUMP (P)

CONTROL VALVE SCHEDULE								
EQUIPMENT	FLUID TYPE	VALVE TYPE	MAXIMUM FLUID FLOW (L/S)	VALVE SIZE (MM)	VALVE MAX FLUID PRESSURE DROP (FT.WC)	MAX SYSTEM PRESSURE (kPa)	CONTROL TYPE	VALVE FAILURE POSITION
07FCU01	CHW	2-WAY	0.95	40	5.75	1034	MODULATING	FAIL CLOSED
07FCU02	CHW	2-WAY	0.95	40	5.75	1034	MODULATING	FAIL CLOSED
07FCU03	CHW	2-WAY	0.36	25	5.75	1034	MODULATING	FAIL CLOSED
07FCU04	CHW	2-WAY	0.36	25	5.75	1034	MODULATING	FAIL CLOSED
07FCU05	CHW	2-WAY	1.0	40	5.75	1034	MODULATING	FAIL CLOSED
07FCU06	CHW	2-WAY	0.15	20	5.75	1034	MODULATING	FAIL CLOSED
07FCU07	CHW	2-WAY	0.15	20	5.75	1034	MODULATING	FAIL CLOSED
07AHU07	CHW	2-WAY	1.62	50	5.75	1034	MODULATING	FAIL CLOSED
07AHU05	CHW	2-WAY	0.67	50	5.75	1034	MODULATING	FAIL CLOSED

NOTES: 1. FOR DETAILS REFER TO SPECIFICATIONS.

CHILLED WATER BUFFER TANK						
UNIT NO.	VOLUME (L)	INLET SIZE (MM)	OUTLET SIZE (MM)	SHIPPING WEIGHT (KG)	BASIS OF DESIGN	REMARKS
07PVE04	568	75	75	232	TACO BTLO150F02-125N	* TOP VENT, BOTTOM DRAIN, 450'F MAX OPERATING TEMP, 125 PSI MAX WORKING PRESSURE.

NOTES: 1. FOR DETAILS REFER TO SPECIFICATIONS.

GLYCOL FEED STATION SCHEDULE									
TAG	LOCATION	SYSTEM	FLUID CAPACITY (L)	PUMP DATA		ELECTRICAL DATA		BASIS OF DESIGN	REMARKS
				FLOW (L/S)	HEAD (kPa)	MOTOR SIZE (HP)	V/PH/Hz		
07GLP01	GROUND FLOOR MECH ROOM	CHILLED GLYCOL	65	0.06	310	-	115/1/60	AXIOM DMF300	* C/W RIA10-1-SAA LOW LEVEL ALARM MONITORING PANEL

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EXPANSION TANK SCHEDULE												
TAG	LOCATION	FUNCTION	TYPE (DIAPHRAGM/BLADDER)	OPERATING PRESSURE		OPERATING TEMPERATURE		TANK VOLUME (L)	ACCEPTANCE VOLUME (L)	ORIENTATION (HORIZONTAL/VERTICAL)	BASIS OF DESIGN	REMARKS
				MIN (kPa)	MAX (kPa)	MIN (°C)	MAX (°C)					
07PVE05	GROUND FLOOR MECH RM	CHILLED GLYCOL	DIAPHRAGM	93	414	4.4	23.9	211	86	VERTICAL	BELL & GOSSETT - D-100V	* ASME - NON-POTABLE, 50% P.G.

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

PUMP SCHEDULE																
TAG	LOCATION	FUNCTION	TYPE	PUMP DATA								ELECTRICAL DATA		BASIS OF DESIGN	REMARKS	
				DUTY POINT #1				DUTY POINT #2				END SUCTION DIFFUSER (YES/NO)	MOTOR SIZE (HP)			V/PH/Hz
				DESIGN FLOW (L/S)	DESIGN HEAD (kPa)	RPM	EFFICIENCY (%)	DESIGN FLOW (L/S)	DESIGN HEAD (kPa)	RPM	EFFICIENCY (%)					
07CWP01	GROUND FLOOR MECH ROOM	CHILLED WATER CIRC	INLINE CENTRIFUGAL	6.31	225	1765	56.49	5.55	225	1800	55.1	Y	5	575/3/60	ARMSTRONG 4380 2x2x10	C/W REMOTE MOUNT VFD
07CWP02	GROUND FLOOR MECH ROOM	CHILLED WATER CIRC	INLINE CENTRIFUGAL	6.31	225	1765	56.49	5.55	225	1800	55.1	Y	5	575/3/60	ARMSTRONG 4380 2x2x10	C/W REMOTE MOUNT VFD

NOTES: 1. FOR DETAILS REFER TO SPECIFICATIONS.

HEAT EXCHANGER SCHEDULE																	
TAG	FUNCTION	CAPACITY (BTU/H)	TYPE	HEAT EXCHANGER SURFACE AREA (sq. M)	DUTY POINT	PRIMARY PASS				SECONDARY PASS				NOMINAL SIZE (mmH x mmL x mmW)	BASIS OF DESIGN		
						INLET TEMP (°C)	OUTLET TEMP (°C)	FLOW (L/S)	FLUID TYPE	INLET TEMP (°C)	OUTLET TEMP (°C)	FLOW (L/S)	FLUID TYPE				
						PD (kPa)	PD (kPa)	PD (kPa)	PD (kPa)								
07HEX01	CHILLED WATER	441,191	BRAZED PLATE	38.74	1	5.56	11.11	6.23	50% PG	73.23	12.10	7.22	6.31	WATER	39.99	685 x 490 x 255	AIC LC170-200MGR-2P
					2	5.56	11.11	6.23	73.08	12.78	7.22	5.55	WATER	31.68			

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CHILLER SCHEDULE																												
UNIT NO.	LOCATION	SYSTEM	CAPACITY (TONS)	WEIGHT (KG)	EVAPORATOR				EER (BTU/W.H)	IPLV (BTU/W.H)	ELECTRICAL V/PH/Hz	MCA	STAGE	AMBIENT (°C)	SOUND POWER LEVELS (dB)								PART LOAD RATING DATA					
					FLOW (L/S)	PD (kPa)	EWT (°C)	LWT (°C)							FLUID	63	125	250	500	1000	2000	4000	8000	LWA	CAPACITY (TON.R)	TOTAL KW	EFFICIENCY (BTU/W.H)	
					63	125	250	500							1000	2000	4000	8000	LWA	CAPACITY (TON.R)	TOTAL KW	EFFICIENCY (BTU/W.H)						
07CCH01	ROOF	CHILLED WATER	36.74	2484	6.18	59.48	11.11	5.56	50% PG	10.96	18.56	575/3/60	75		1	35	96	95	92	92	88	84	81	79	93	36.74	40.24	10.96
															2	28.83	94	93	90	86	82	79	77	91	29.89	24.88	14.41	
															3	21.67	90	88	85	81	77	74	73	87	21.97	14.25	18.50	
															4	12.78	87.85	8	2	82	78	74	71	70	84	11.31	6.557	20.69

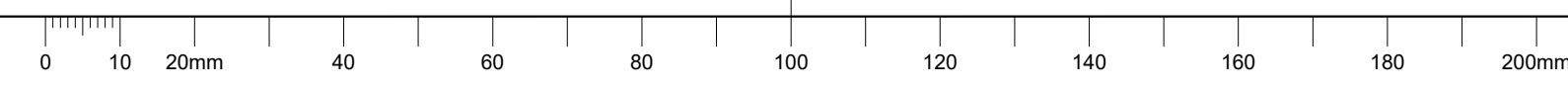
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2. ALTERNATE MANUFACTURER SHALL MEET THE OPERATING ENTERING AND LEAVING CONDITIONS WITH THE CAPACITY NO LOWER THAN STATED. ALTERNATE SHALL BE 4 STAGE ON/OFF OR 2 STAGE MODULATING.

CHILLER SCHEDULE, CONT'D																
HYDROKIT						ECONOMIZER DATA								BASIS OF DESIGN	REMARKS	
FLOW (L/S)	HEAD (kPa)	PUMP QTY.	MOTOR HP	MOTOR RPM	HYDROKIT REMARKS	CAPACITY (KW)	PD (kPa)	FLOW (L/S)	EWT (°C)	LWT (°C)	EAT (°C)	COMBINED PD (kPa)	COMBINED FLUID VOLUME (L)			ACCESSORIES
6.18	279.8	1	5	2940	SERIES 4380 DESIGN ENVELOPE PUMP C/W VSD	129.21	144	6.18	11.11	5.56	2.33	207.73	118	C/W 3-WAY ON/OFF CONTROL VALVE, BALANCING VALVE, LOOP ISOLATION VALVE, BACNET COMPATIBLE CONTROLS	YORK YLAA0041H58XCBSXTQ	* C/W HYDRO KIT PUMP PACKAGE, ECONOMIZER COILS AND ASSOCIATED CONTROLS AND ACCESSORIES. R410A REFRIGERANT

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HEAT PUMP SCHEDULE																								
TAG	LOCATION	TYPE	AIR FLOW (L/S)	ESP (Pa)	COOLING						HEATING						ELECTRICAL DATA			BASIS OF DESIGN	REMARKS			
					SENSIBLE (KW)	TOTAL (BTU/H)	EAT (DB/WB)(°F)	LAT (°F)	EWT (°F)	PD (kPa)	HEAT REJECTION (BTU/H)	EER	CAPACITY (KW)	EAT (°C)	LAT (°C)	EWT (°C)	PD (kPa)	HEAT EXTRACTION (KW)	WATER FLOW (L/S)			MOTOR HP	FLA/MCA	V/PH/Hz
					13.17	19.17	26.67/19.44	13.44	29.44	10.16	23.65	14.6	23.79	21.11	45.0	29.44	10.16	18.93	0.5			1	24.1/28.2	208-230/3/60
07HEP01	TRIBOLOGY LAB G31B	HEAT PUMP	823	132	13.17	19.17	26.67/19.44	13.44	29.44	10.16	23.65	14.6	23.79	21.11	45.0	29.44	10.16	18.93	0.5	1	24.1/28.2	208-230/3/60	WATER FURNACE ENVISION COMPACT HORIZONTAL (NB) - 064	* LEFT DISCHARGE, RIGHT RETURN, FILTER RACK, OPTIONAL CONTROLLER FOR CONNECTION TO BAS
07HEP02	TRIBOLOGY LAB G31C	HEAT PUMP	696	190	9.8	14.5	26.67/19.44	15.0	29.44	5.38	18.1	13.9	18.57	21.11	43.2	29.44	5.38	14.77	0.38	0.5	20/24	208-230/3/60	WATER FURNACE VERSATEC ULTRA (US) - 048	* LEFT DISCHARGE, RIGHT RETURN, FILTER RACK, OPTIONAL CONTROLLER FOR CONNECTION TO BAS
07HEP03	TRIBOLOGY LAB G31D	HEAT PUMP	823	132	13.17	19.17	26.67/19.44	13.44	29.44	10.16	23.65	14.6	23.79	21.11	45.0	29.44	10.16	18.93	0.5	1	24.1/28.2	208-230/3/60	WATER FURNACE ENVISION COMPACT HORIZONTAL (NB) - 064	* LEFT DISCHARGE, RIGHT RETURN, FILTER RACK, OPTIONAL CONTROLLER FOR CONNECTION TO BAS

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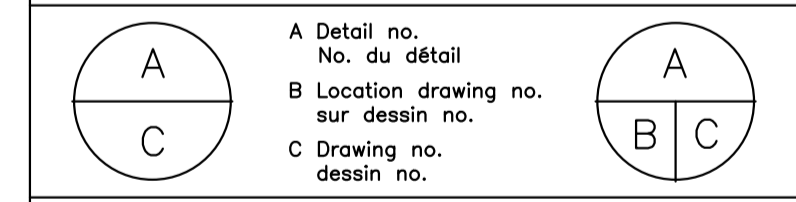
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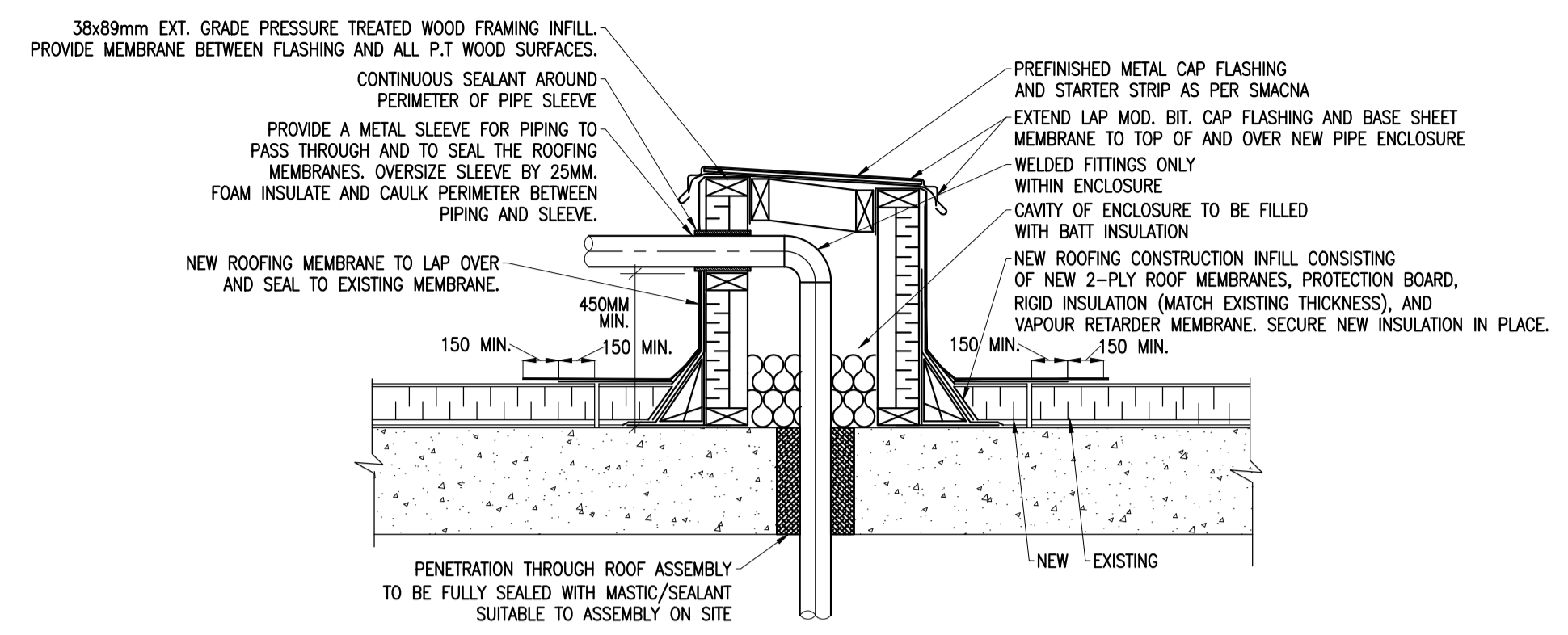
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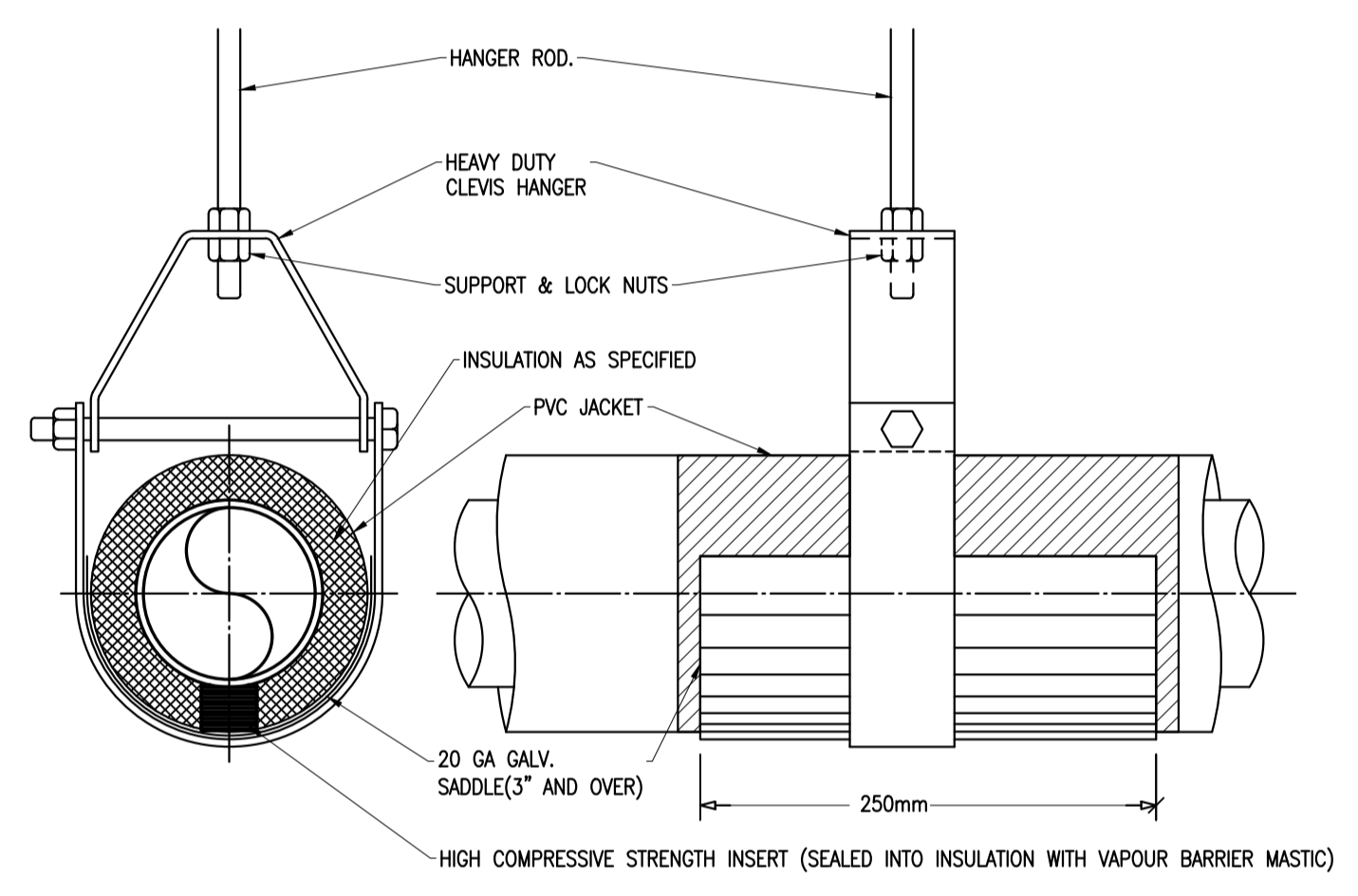
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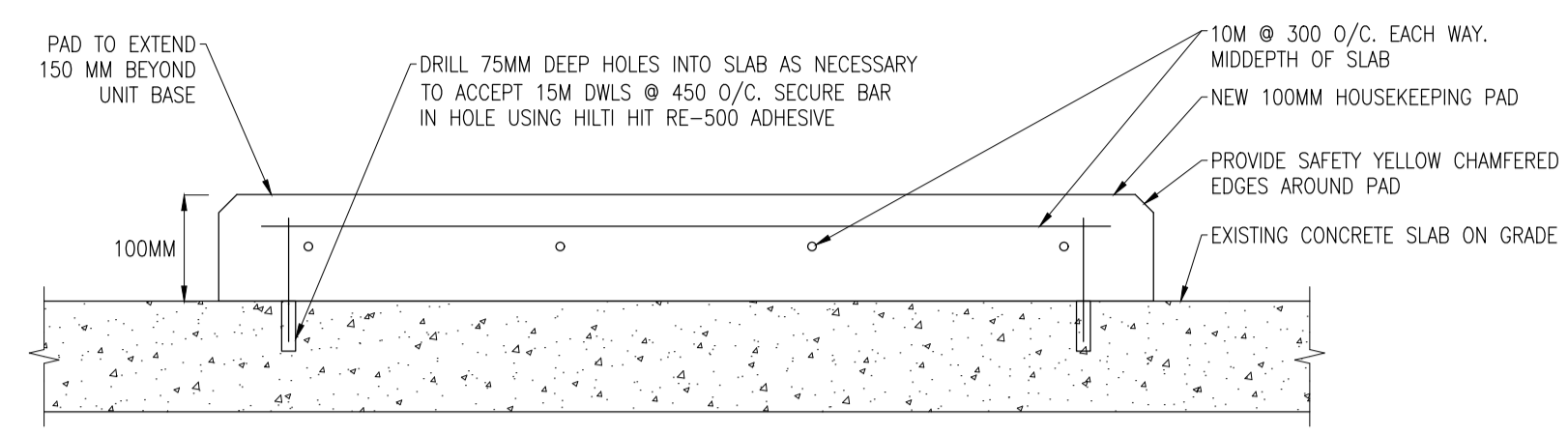
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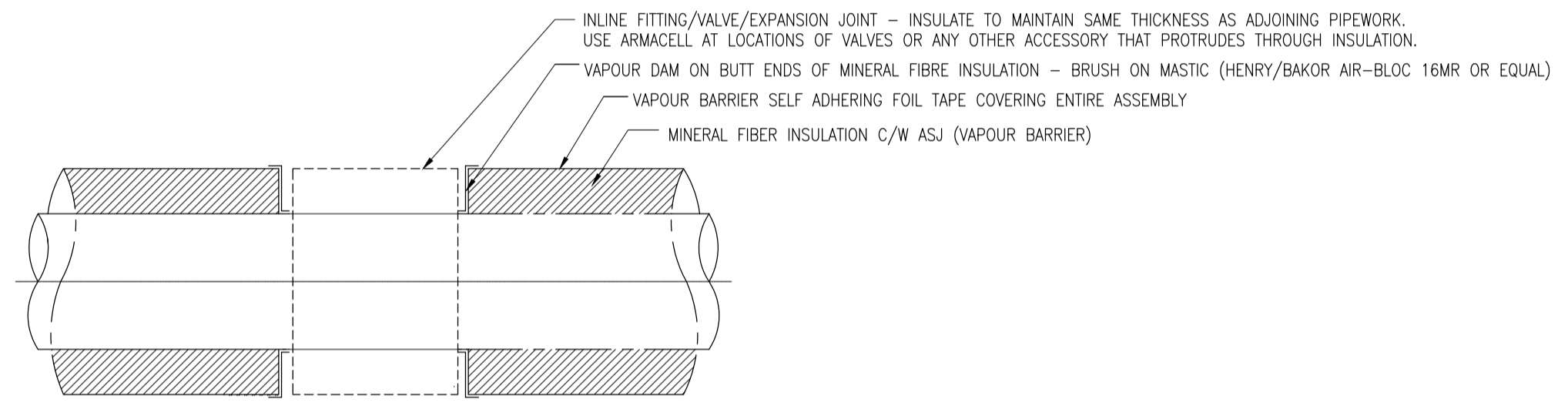
1
M02 N.T.S.
ROOFTOP PIPE PENETRATION ENCLOSURE DETAIL



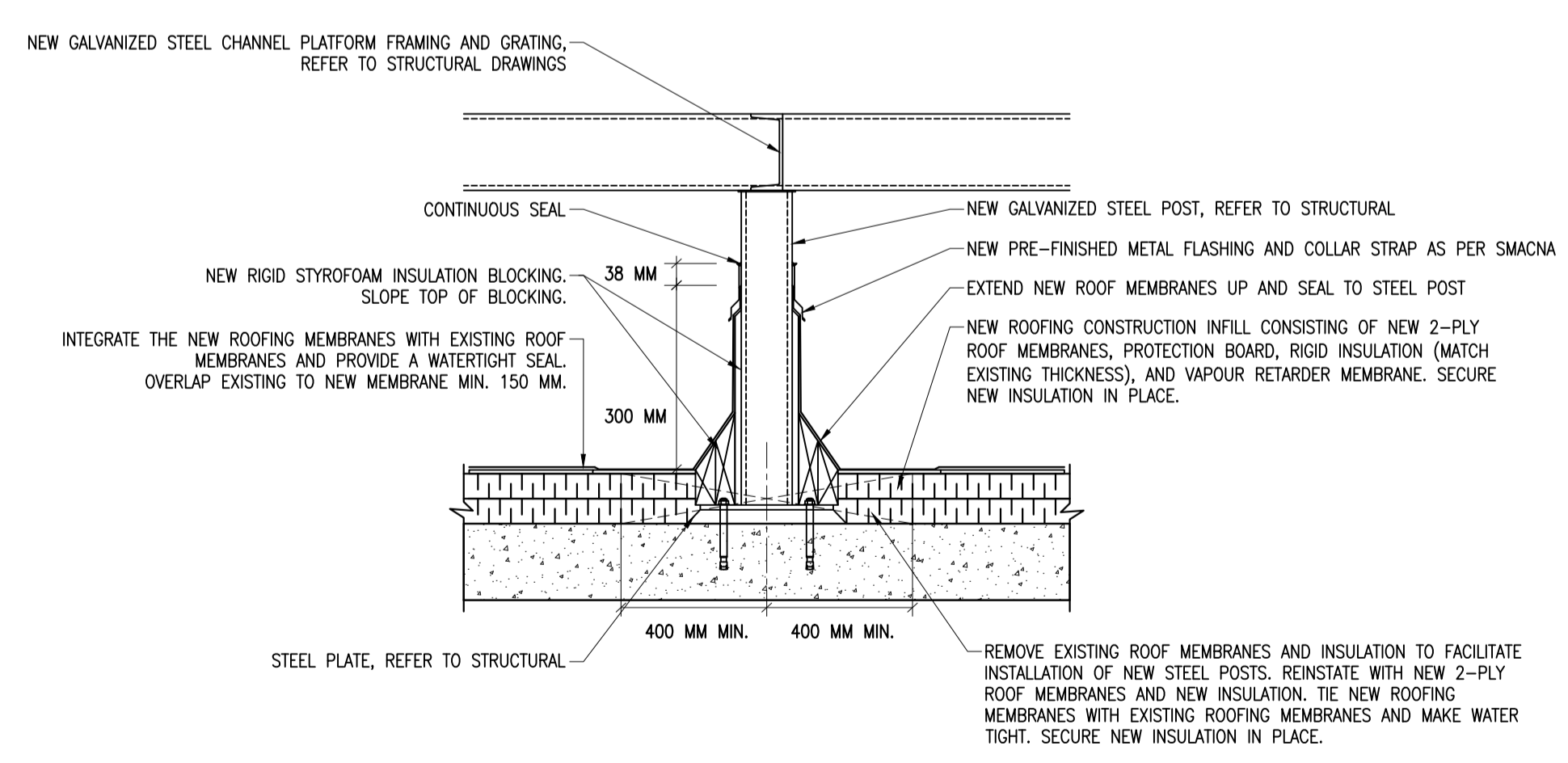
3
M02 N.T.S.
CHILLED WATER - PIPE HANGAR DETAIL



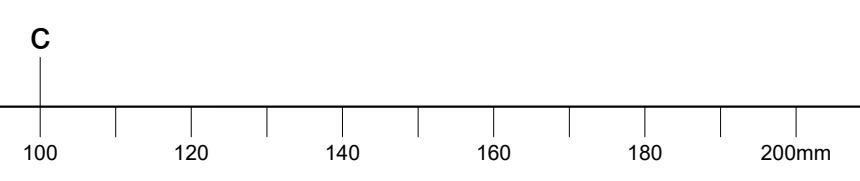
2
M02 N.T.S.
TYPICAL HOUSEKEEPING PAD DETAIL



4
M02 N.T.S.
VAPOUR DAM - TYPICAL



5
M02 N.T.S.
ROOFTOP STEEL FRAMING DETAIL





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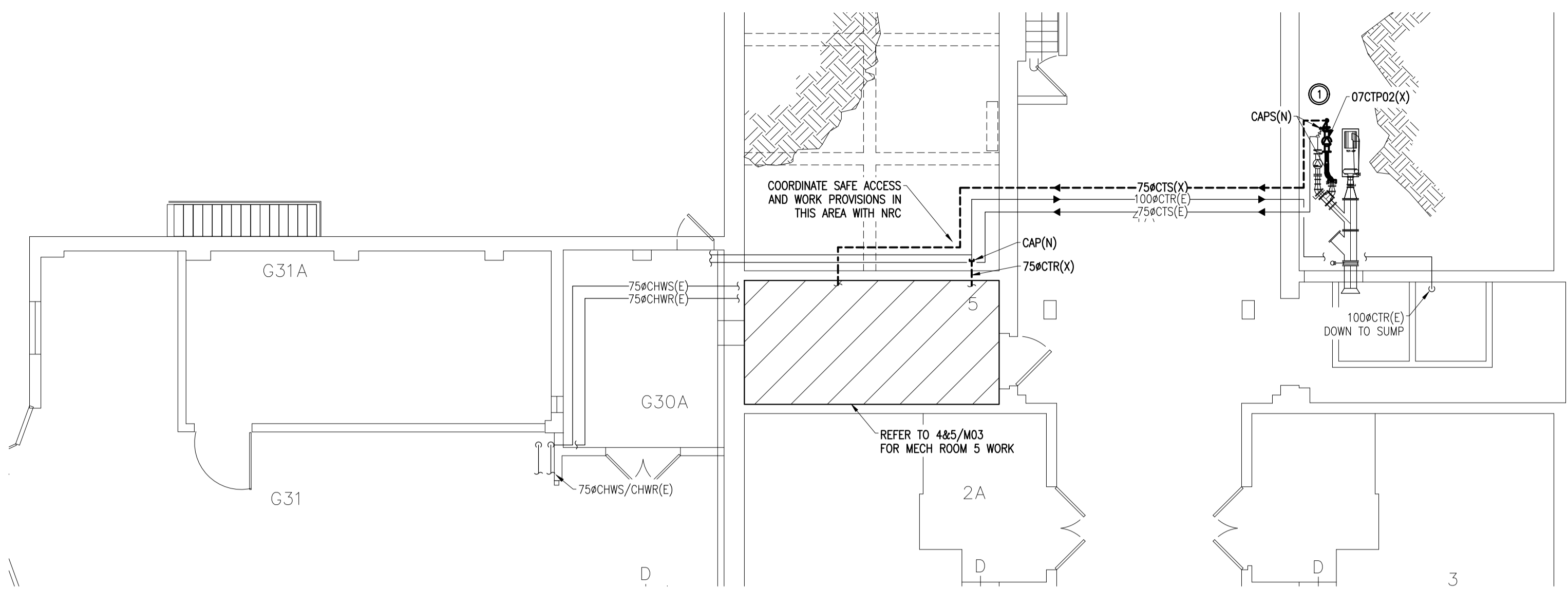
DESCRIPTION OF WORK

- REMOVE EXISTING CONDENSER WATER PUMP (CTP02) AS INDICATED C/W ASSOCIATED PIPING AND ACCESSORIES. CAP WHERE INDICATED. ENSURE SAFE WORK PRACTICES ARE FOLLOWED WHILE CARRYING OUT REMOVAL OF PUMP, PIPING AND ACCESSORIES.
- REMOVE EXISTING CHILLER AND CHILLED WATER CIRC PUMP AS INDICATED C/W ASSOCIATED PIPING, CONTROLS, AND ACCESSORIES SERVING CHILLER/CHILLED WATER SYSTEM LOCATED IN MECH ROOM THAT DO NOT ALSO SERVE EXISTING SYSTEMS TO REMAIN.
- PROVIDE NEW CHILLED WATER PUMPS, HEAT EXCHANGER, BUFFER TANK, GLYCOL FEED STATION, AND EXPANSION TANK AS INDICATED C/W ALL ASSOCIATED PIPING AND ACCESSORIES. REFERENCE CHILLED WATER SCHEMATIC ON DRAWING M03 FOR SYSTEM PIPING AND ACCESSORY DETAILS.
- PROVIDE NEW CHILLER ON ROOF IN LOCATION INDICATED C/W ASSOCIATED PIPING AND ACCESSORIES. COORDINATE EXACT PLACEMENT AND PIPE ROUTING TO ROOF AROUND EXISTING EQUIPMENT AND TO RESPECT MANUFACTURERS RECOMMENDED CLEARANCE REQUIREMENTS. REFERENCE STRUCTURAL DRAWINGS FOR CHILLER PLATFORM/FRAMING REQUIREMENTS AND DETAILS. REFERENCE 1/M02 FOR NEW ROOFTOP PIPE ENCLOSURE DETAILS. PROVIDE NEW INSULATION AND JACKETING ON INTEGRAL CHILLER PIPING AND PUMP PACKAGE.
- ROUTE CHILLED WATER PIPING TO NEW CHILLER THROUGH SUB-BASEMENT ALONG APPROXIMATE ROUTING SHOWN. ENSURE SAFE WORK PRACTICES ARE FOLLOWED WHEN ROUTING PIPING THROUGH CRAWLSPACE BELOW COMPRESSOR ROOM G30A. ROUTE PIPING UP FROM SUB-BASEMENT AND OVER LAB G31A UP TO NEW ROOF PIPE ENCLOSURE. COORDINATE EXACT ROUTING ON SITE AND ALLOW FOR OFFSETS AS REQUIRED TO AVOID INTERFERENCE WITH EXISTING SERVICES.
- PROVIDE NEW 100MM HIGH HOUSEKEEPING PADS AND REPAIR OF EXISTING MECH ROOM CONCRETE FLOOR FOLLOWING REMOVALS. REFERENCE DETAIL 2/M02 FOR TYPICAL HOUSEKEEPING PAD DETAILS. PROVIDE SLAB PREPARATION, AND NEW GREY EPOXY FLOOR FINISH TO MEET NRC REQUIREMENTS. ACCEPTABLE MATERIAL: STONEHARD STONKOTE GS4, HT PRIMER OR APPROVED EQUIVALENT.

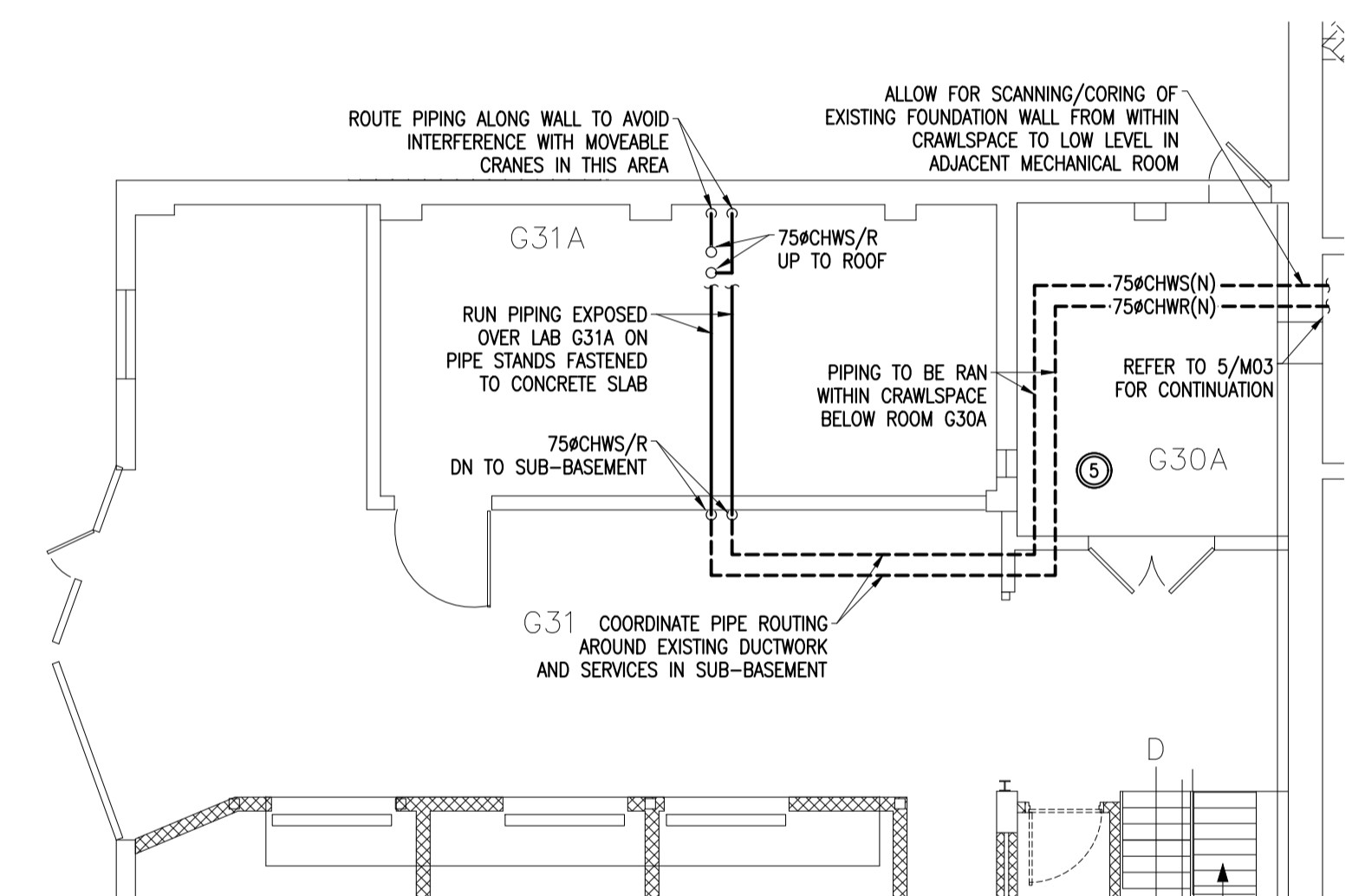
DESCRIPTION OF WORK
CHILLED WATER SYSTEM FLUSHING & CLEANING

THE CONTRACTOR SHALL:

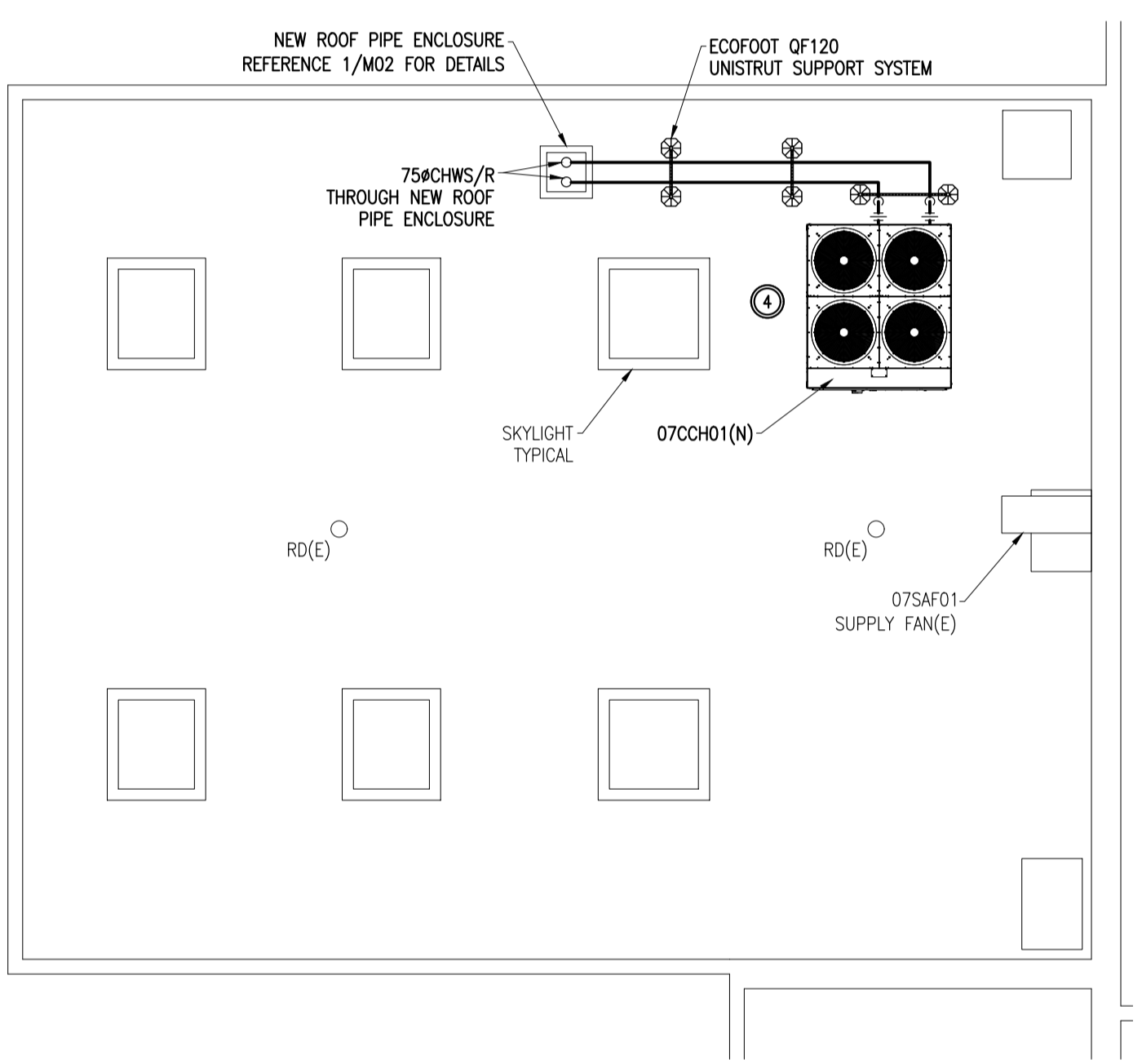
- PRIOR TO COMMENCING WORK: CALL A PRELIMINARY CONSTRUCTION MEETING IN WHICH HE/SHE WILL OUTLINE THE CONSTRUCTION SCHEDULES. DATES ARE NOT TO BE CHANGED WITHOUT NOTIFICATION AND ACCEPTANCE FROM NRC. CARRY THE COST AND COORDINATE THE SERVICES OF A SPECIALIZED WATER TREATMENT COMPANY TO PROVIDE CHILLED WATER SYSTEM WATER CONDITION AND CHEMICAL ANALYSIS.
 IT IS IMPERATIVE THIS IS DONE BEFORE THE SYSTEM IS DRAINED
 PROVIDE TEST RESULTS TO NRC DEPARTMENTAL REPRESENTATIVE AS SOON AS THEY ARE AVAILABLE.
- AFTER WATER QUALITY ANALYSIS TESTS HAVE BEEN PERFORMED, DRAIN THE ENTIRE CHILLED WATER SYSTEM TO PERFORM VALVE REPLACEMENTS AS INDICATED ON DRAWING M05.
- PROVIDE A COMPLETE CHILLED WATER SYSTEM CHEMICAL FLUSH. ALL PARTS OF THE SYSTEM NEED TO BE OPEN/BYPASSED FOR THIS PROCEDURE. FILL AND FLUSH UNTIL THE WATER QUALITY IS WITHIN BEST OPERATIONAL PARAMETERS FOR A CHILLED WATER SYSTEM. FOLLOWING THE FLUSHING, CHILLED WATER SYSTEM TO BE FILLED WITH FRESH WATER AND CHEMICALLY TREATED. CONTRACTOR TO EMPLOY THE SERVICES OF A SPECIALIZED WATER TREATMENT COMPANY FOR THESE OPERATIONS. A REPORT ON WATER CONDITION AND CHEMICAL ANALYSIS AFTER TREATMENT TO BE FORWARDED TO NRC DEPARTMENTAL REPRESENTATIVE IMMEDIATELY AFTER THE RESULTS ARE AVAILABLE.



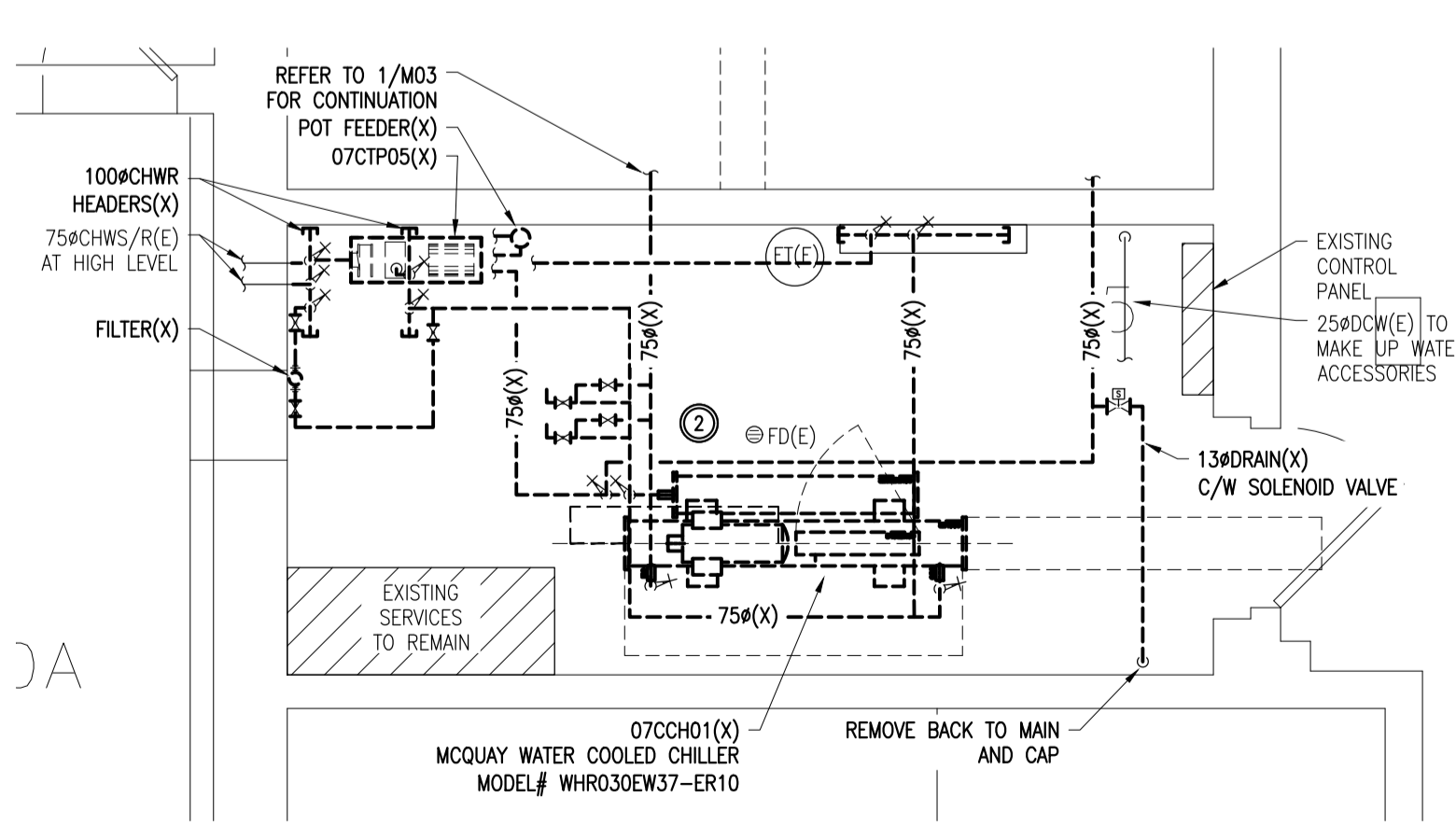
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M03
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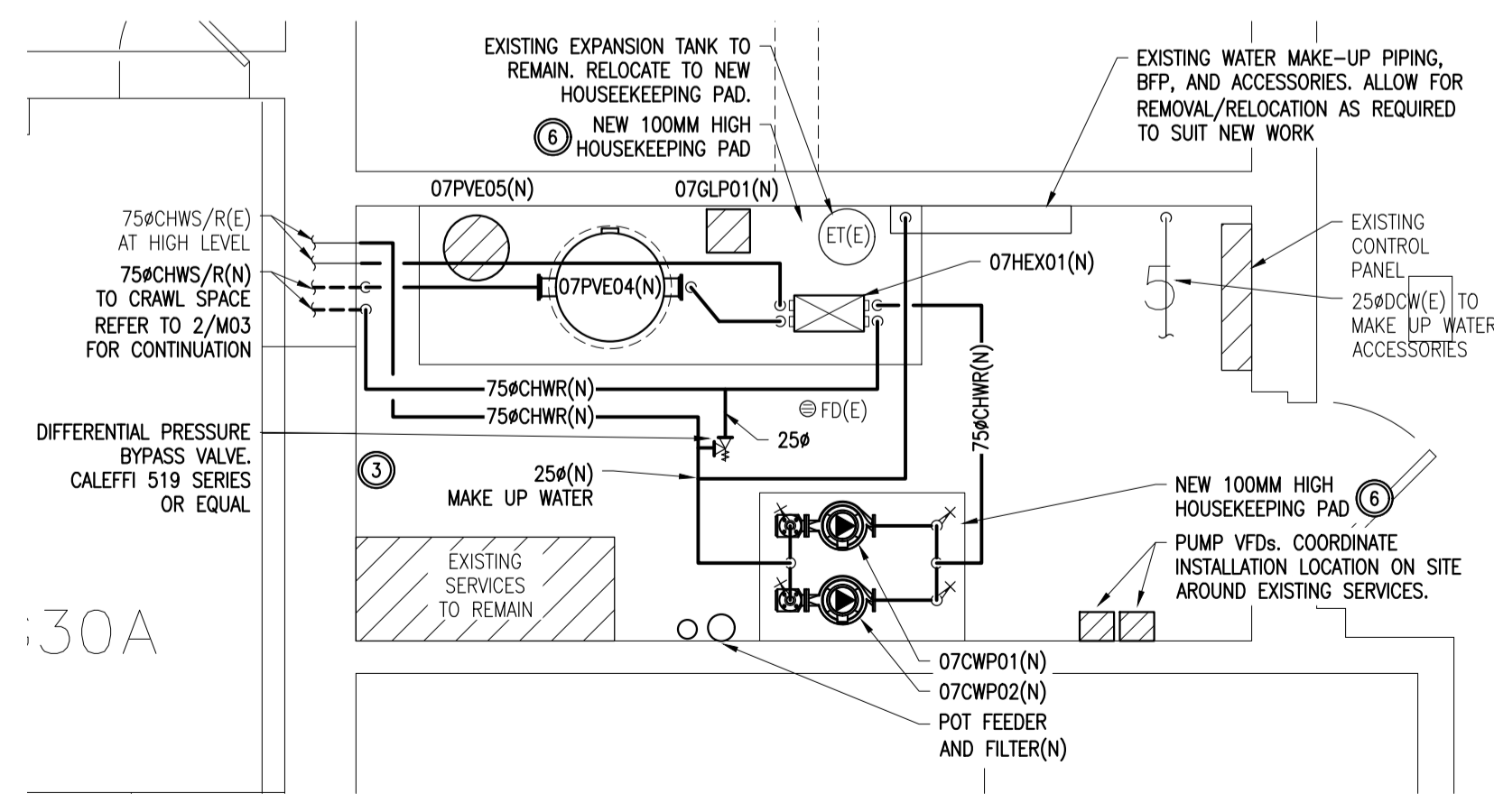
2
M03
 1/8"=1'0"



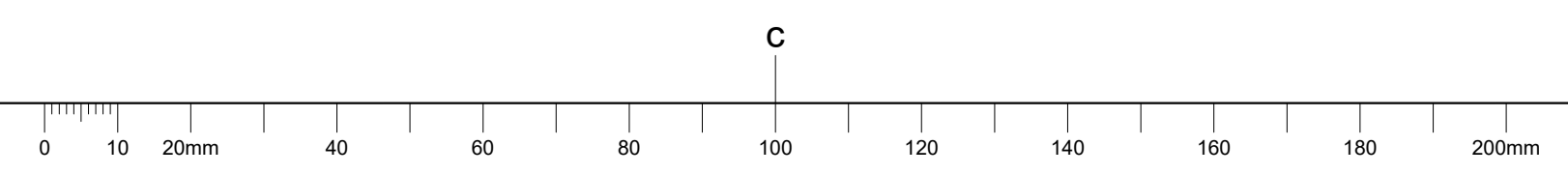
3
M03
 1/8"=1'0"



4
M03
 1/4"=1'0"



5
M03
 1/4"=1'0"





GENERAL NOTES

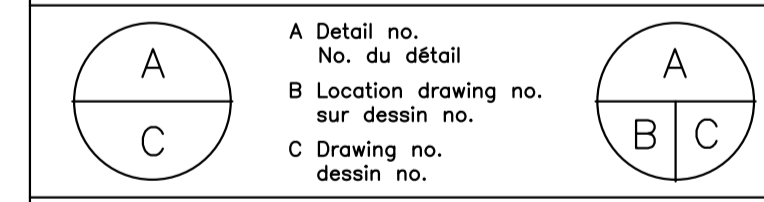
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- Verify all dimensions and site conditions and be responsible for same
- Vérifier toutes les dimensions et l'état des lieux et en assumer la responsabilité



project: **M7 CHILLER AND HEAT PUMP REPLACEMENTS** / projet

drawing: **MONTREAL ROAD CAMPUS** / dessin

MECHANICAL CHILLER REPLACEMENT SCHEMATICS

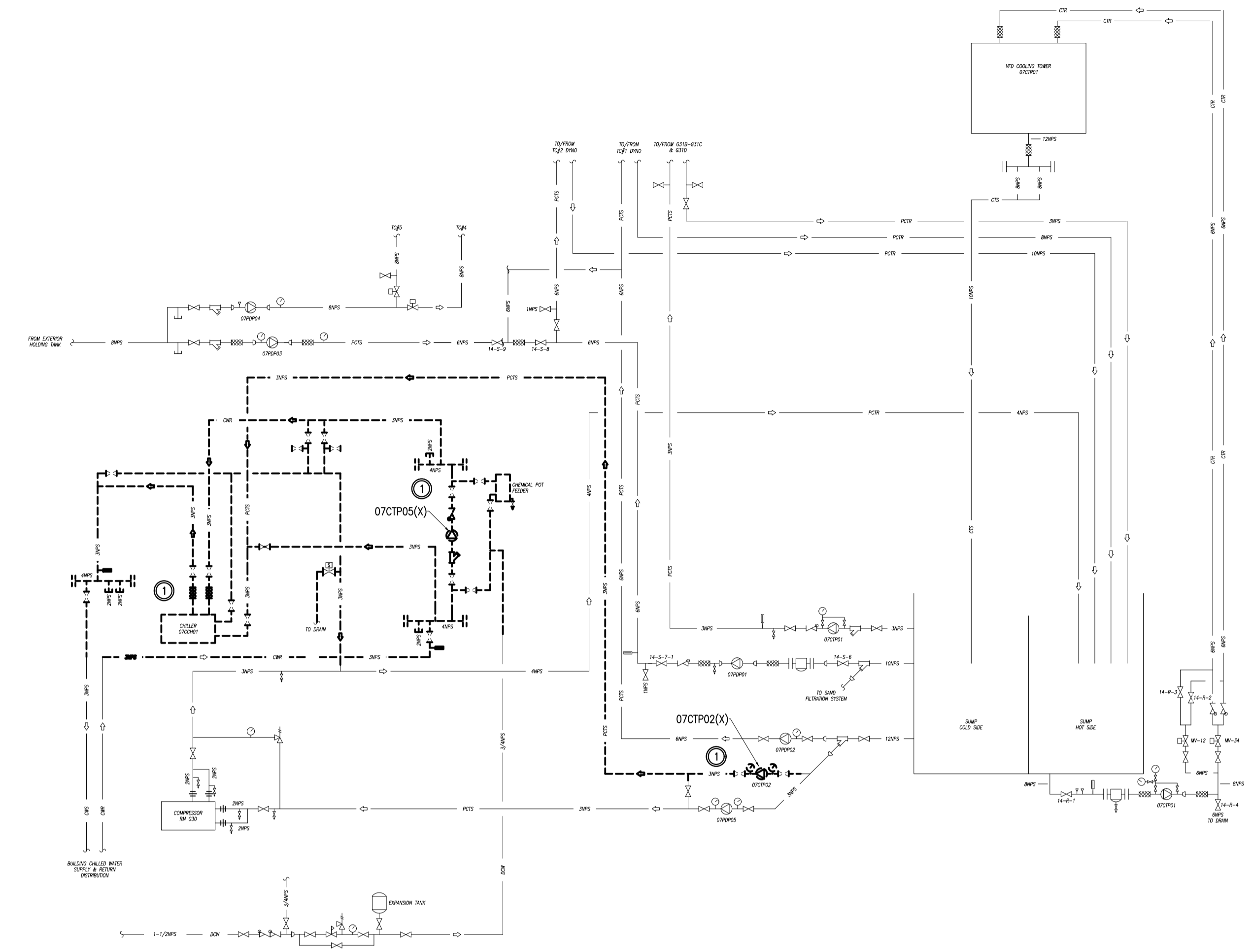
designed	conçu	date	date
K.N.		-	
drawn	dessiné	scale	échelle
K.N.		AS NOTED	
checked	vérifié	sheet	feuille
R.L.		of/de -	
approved	approuvé	W.O.no.	D.T.no.
R.L.		-	
dwg.no.	dessin no.		
	5988-M04		

CONTROLS NOTES

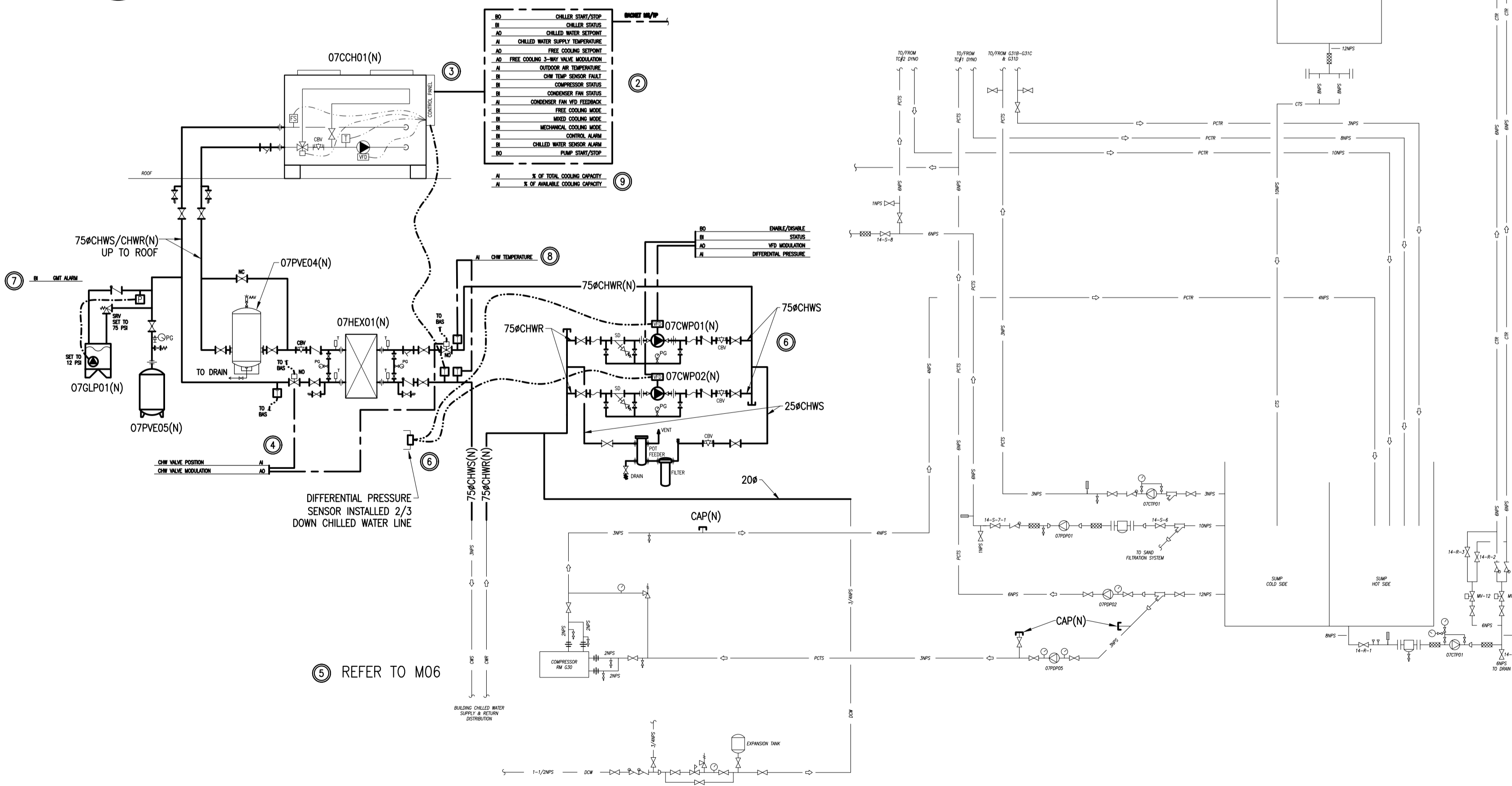
- REMOVE EXISTING CONTROLS ASSOCIATED WITH REMOVED EQUIPMENT AND UPDATE GRAPHICS.
- 07CCH01(N) TO BE SUPPLIED WITH PACKAGED CONTROLLER WITH BACNET INTEGRATION. BAS TO MONITOR OPERATION THROUGH BACNET MAPPING. PACKAGED CONTROLLER TO PROVIDE ALL CONTROL FEATURES, DEVICES, SAFETIES, PROGRAMMING, AND COMMISSIONING TO MAINTAIN CHILLED WATER SUPPLY TEMPERATURE, LIMIT CYCLING, AND MAXIMIZE USE OF FREE COOLING. ON BOARD CONTROLLER TO MODULATE CHILLER CAPACITY AND PUMP SPEED TO OPTIMIZE SYSTEM EFFICIENCY AND LIMIT CYCLING.
- PROVIDE ALL FIELD WIRING, CONDUIT, AND COORDINATION TO ACCOMMODATE PACKAGED CONTROLS FROM CHILLER MANUFACTURER
- PROVIDE TWO-WAY FLOW ISOLATION CONTROL VALVES (FULL PORT NORMALLY OPEN) ON EITHER SIDE OF HEAT EXCHANGER C/W BAS CONTROL AS PER NRC REQUEST. PROVIDE INTERLOCK TO SHUTDOWN CHILLER AND/OR ASSOCIATED PUMPS ON VALVE CLOSURE.
- PROVIDE NEW CONTROL VALVES AND ASSOCIATED WIRING AND ACCESSORIES TO ACCOMMODATE REPLACEMENT OF EXISTING 3-WAY VALVES WITH 2-WAY VALVES AS INDICATED ON M06.
- PROVIDE NEW CHILLED WATER PRESSURE DIFFERENTIAL SENSOR AND VARIABLE SPEED CONTROL OF NEW PUMPS AS INDICATED. PROVIDE DUTY STANDBY PUMP OPERATION AND DUTY CYCLING BASED ON RUNTIME.
- PROVIDE ALARM MONITORING ON NEW GLYCOL MAKEUP TANK.
- PROVIDE CHILLED WATER SUPPLY AND CHILLED WATER RETURN TEMPERATURE MONITORING.
- PROVIDE ALGORITHM TO PROVIDE BAS READOUT TO VISUALIZE CHILLER OPERATION AS PERCENT OF TOTAL AVAILABLE COOLING CAPACITY.
- PROVIDE RELOCATION OF EXISTING CONTROLS AND RELATED ACCESSORIES ASSOCIATED WITH HEAT PUMP REPLACEMENTS AS SHOWN ON M05.

NOTE:
 ALL DDC WORK TO BE CARRIED OUT BY AINSWORTH CANADA.

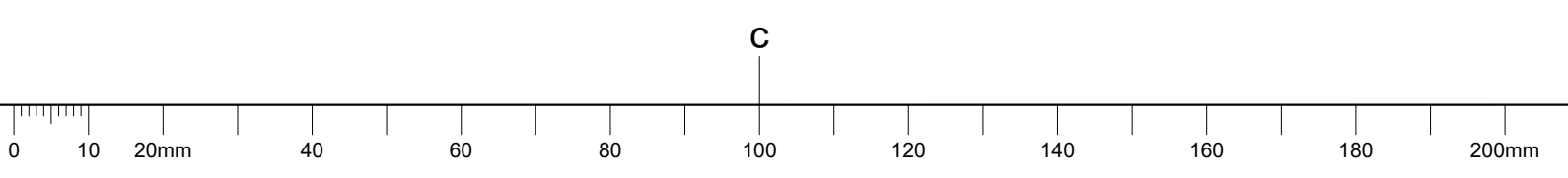
CONTACT:
 AARON DOBSON
 (613) 247-7938
 AARON.DOBSON@AINSWORTH.COM



1 CHILLED WATER SCHEMATIC - DEMOLITION WORK
 M04 NTS



2 CHILLED WATER SCHEMATIC - NEW WORK
 M04 NTS





GENERAL NOTES

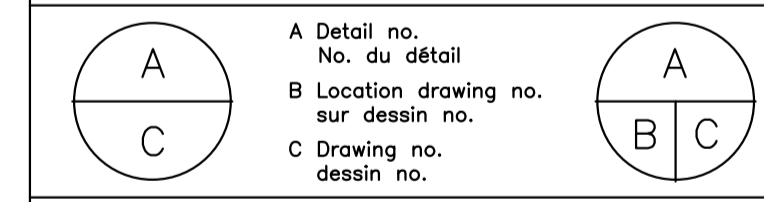
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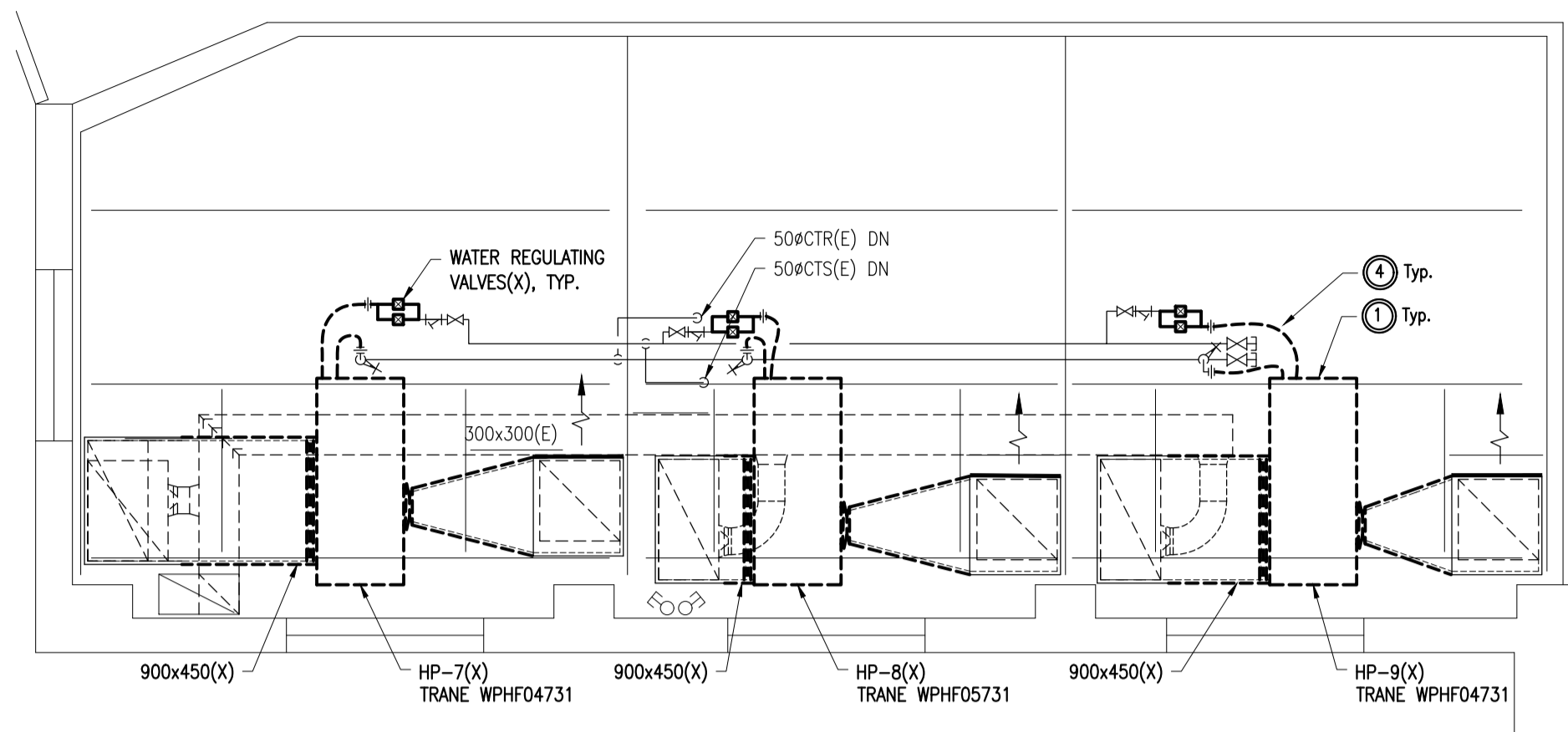


project: M7 CHILLER AND HEAT PUMP REPLACEMENTS

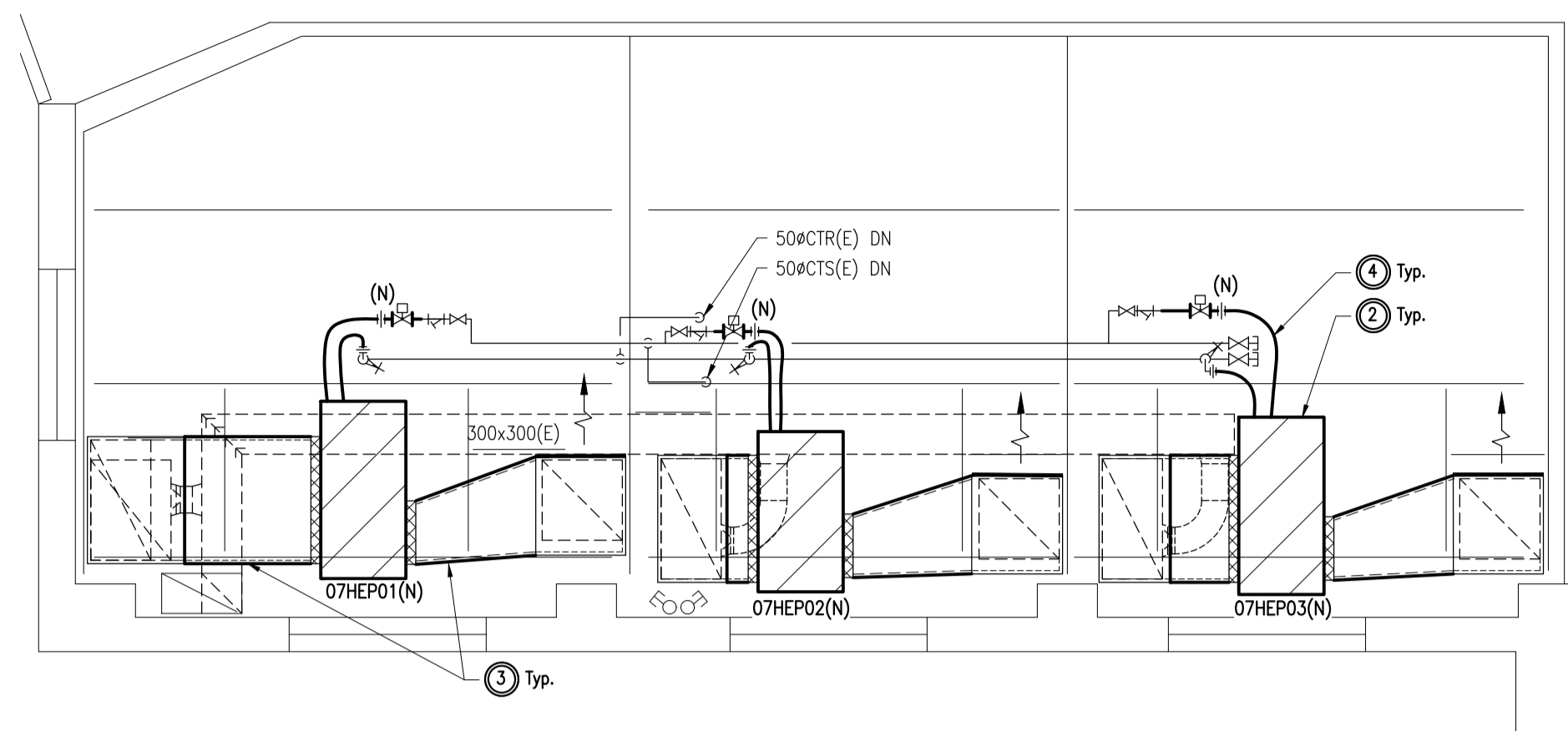
drawing: MECHANICAL HEAT PUMP REPLACEMENTS DEMOLITION AND NEW WORK

designed	conçu	date	date
drawn	dessiné	scale	échelle
checked	vérifié	sheet	feuille
approved	approuvé	W.O.no.	D.T.no.

dwg.no. 5988-M05 dessin no.



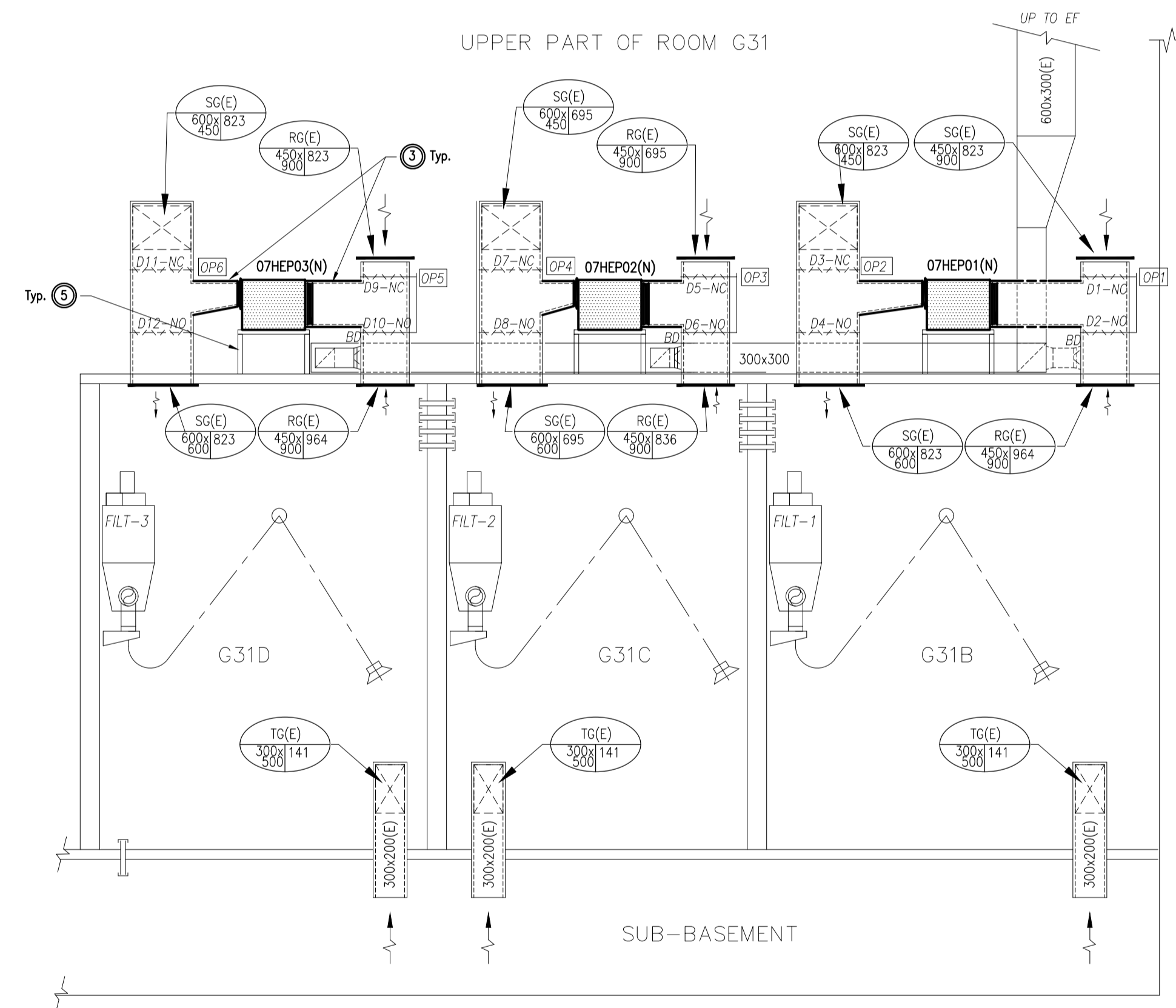
1 TRIBOLOGY LAB HEAT PUMP REPLACEMENTS - DEMOLITION WORK
 M05 1/4"=1'0"



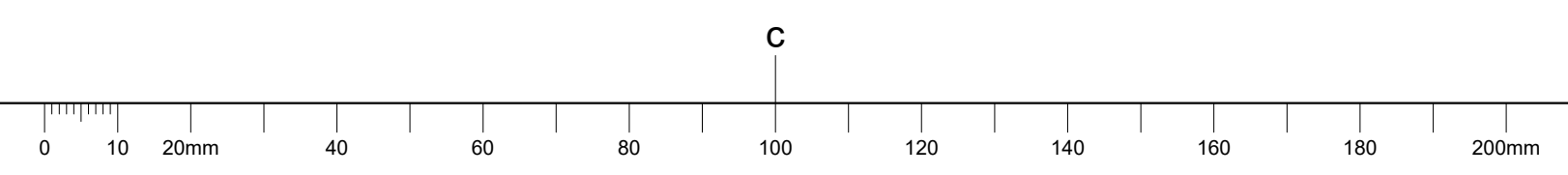
2 TRIBOLOGY LAB HEAT PUMP REPLACEMENTS - NEW WORK
 M05 1/4"=1'0"

DESCRIPTION OF WORK

- REMOVE EXISTING HEAT PUMPS AS INDICATED C/W ASSOCIATED DUCTWORK, PIPING, CONTROLS, & ACCESSORIES.
- PROVIDE NEW HEAT PUMPS AS INDICATED C/W ASSOCIATED ACCESSORIES.
- PROVIDE NEW DUCT TRANSITIONS FROM NEW HEAT PUMP SUPPLY/RETURN OUTLETS AS REQUIRED TO CONNECT BACK TO EXISTING VERTICAL SUPPLY AND RETURN PLENUM OPENINGS C/W NEW FLEXIBLE CONNECTIONS, FILTER RACK, AND ACCESSORIES. BALANCE AIRFLOWS AS INDICATED IN 3/M05. EXISTING BALANCING/OPERATING DAMPERS, CONTROLS, DUCT TEMP SENSORS, AND OTHER CONTROLS ACCESSORIES ARE TO REMAIN AND BE REUSED. REMOVE/RELOCATE CONTROLS ACCESSORIES AS REQUIRED TO SUIT NEW UNIT/DUCT CONFIGURATION.
- REMOVE EXISTING FLEXIBLE PIPE CONNECTIONS AND PROVIDE NEW TO CONNECT BACK TO NEW HEAT PUMPS. PROVIDE ADDITIONAL PIPING/FITTINGS AS REQUIRED TO SUIT NEW INSTALLATION CONFIGURATION. EXISTING ISOLATION VALVES AND STRAINERS TO BE REUSED. PROVIDE NEW REGULATING VALVES AND BALANCE TO FLOWS INDICATED ON HEAT PUMP SCHEDULE.
- NEW HEAT PUMPS TO BE INSTALLED ON EXISTING SUPPORT STANDS IN SAME ORIENTATION AS EXISTING UNITS. MODIFY STANDS AS REQUIRED TO ACCOMMODATE NEW UNITS. CONFIRM EXACT UNIT ORIENTATION ON SITE PRIOR TO ORDER.



3 TRIBOLOGY LAB HEAT PUMP REPLACEMENTS - SECTION VIEW
 M05 NTS





GENERAL NOTES

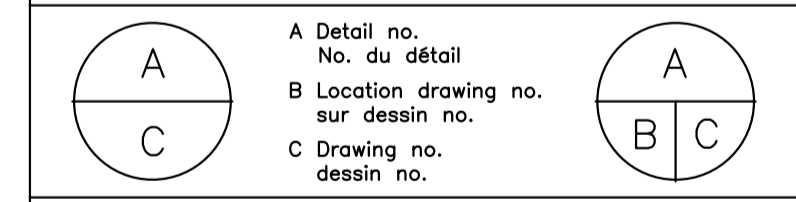
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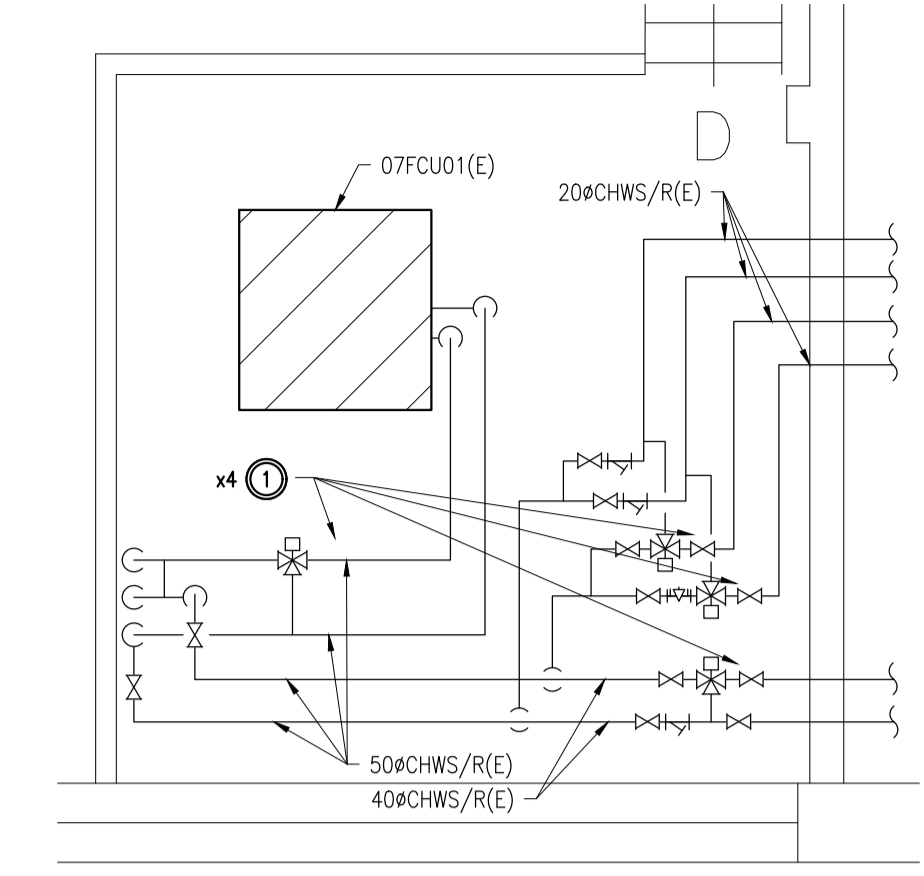
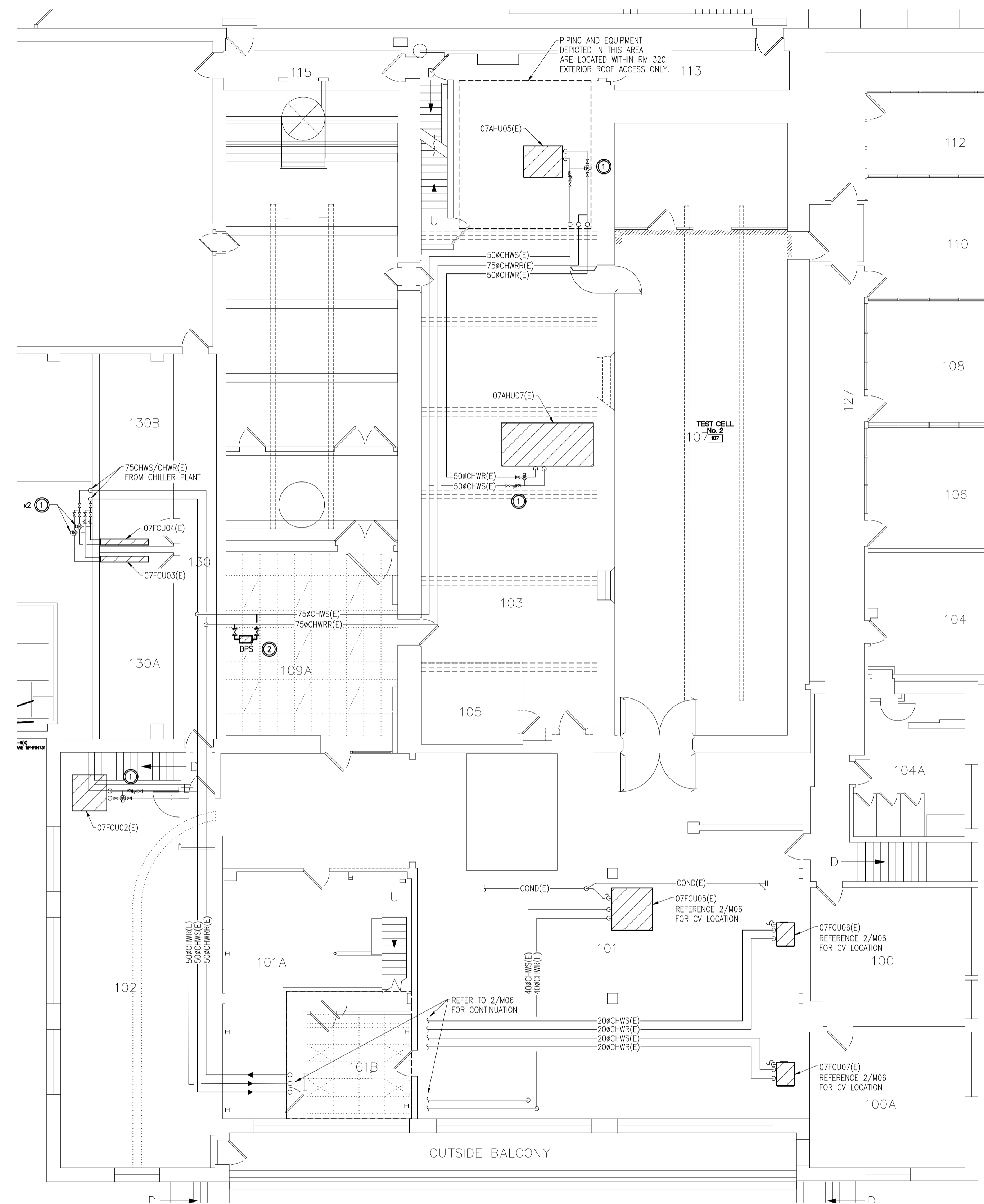
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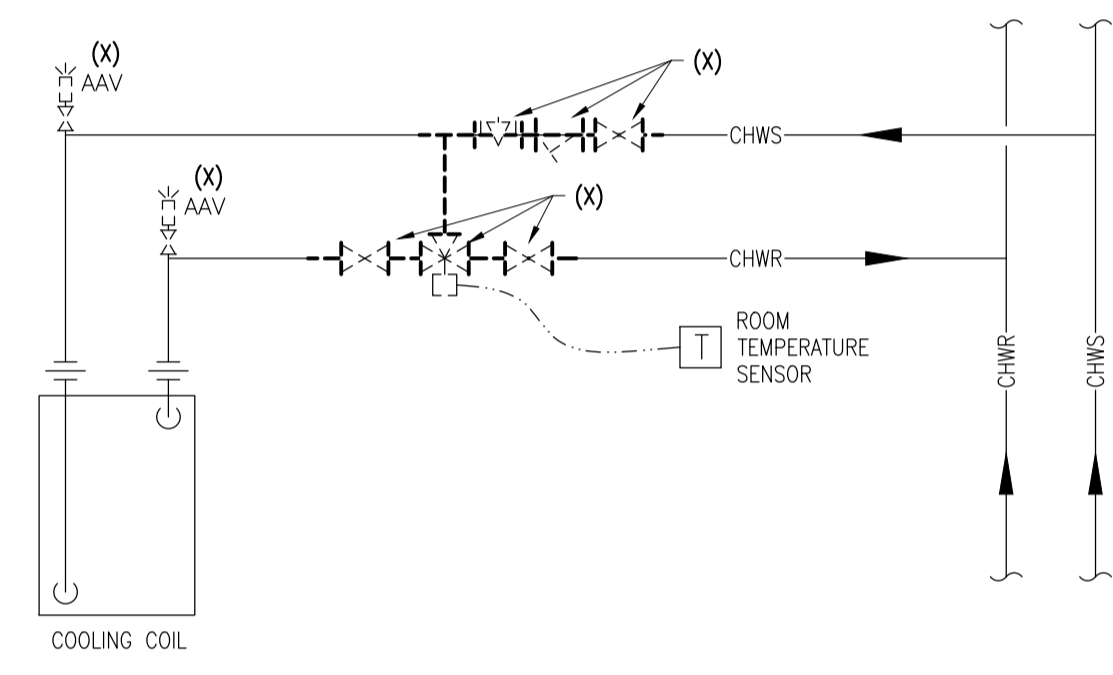
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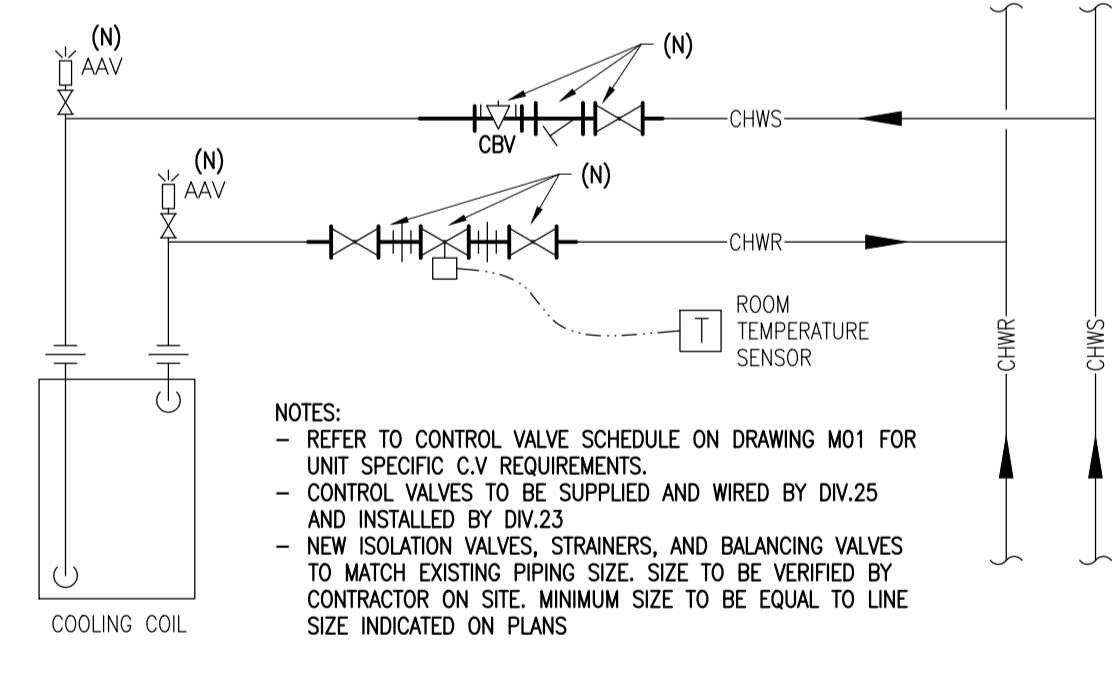
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M7 CHILLER AND HEAT PUMP REPLACEMENTS			
MONTREAL ROAD CAMPUS			
drawing		dessin	
MECHANICAL CONTROL VALVE REPLACEMENTS			
designed	conçu	date	date
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drawn	dessiné	scale	échelle
K.N.		AS NOTED	
checked	vérifié	sheet	feuille
R.L.		of/de	-
approved	approuvé	W.O.no.	D.T.no.
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dwg.no.	5988-M06		dessin no.



ROOM 101B - SECOND LEVEL FAN COIL CONTROL VALVE LOCATIONS
 2 M06 NTS



TYPICAL COOLING COIL CONNECTION SCHEMATIC - DEMOLITION WORK
 3 M06 NTS

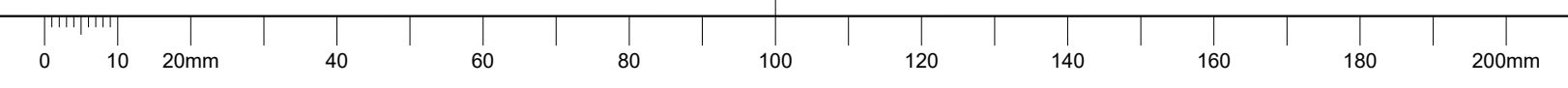


TYPICAL COOLING COIL CONNECTION SCHEMATIC - NEW WORK
 4 M06 NTS

FAN COIL UNITS CONTROL VALVE REPLACEMENTS
 1 M06 1/8"=1'0"

DESCRIPTION OF WORK

- EXISTING 3-WAY CONTROL VALVES SERVING EXISTING EQUIPMENTS COOLING COILS ON CHILLED WATER SYSTEM TO BE REPLACED WITH NEW 2-WAY CONTROL VALVES ALONG WITH ASSOCIATED ACCESSORIES AS INDICATED IN TYPICAL CONNECTION SCHEMATICS 3 & 4/M06, AND CONTROL VALVE SCHEDULE ON DRAWING M01. EXISTING CONTROL WIRING TO BE REMOVED AND REINSTATED TO ACCOMMODATE VALVE REPLACEMENT. VALVE REPLACEMENT WORK TO BE COORDINATED WITH SYSTEM FLUSHING & CLEANING WORK AS DESCRIBED ON DRAWING M03.
- INSTALL NEW DIFFERENTIAL PRESSURE SENSOR C/W PRESSURE PORTS AND ISOLATION VALVES WHERE INDICATED.



NRC BUILDING M7 - CHILLER AND HEAT PUMP REPLACEMENT

1200 MONTREAL ROAD, OTTAWA, ON.

ELECTRICAL



GENERAL NOTES

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GENERAL NOTES

DEMOLITION NOTES:

1. UNLESS OTHERWISE NOTED, MATERIALS FOR REMOVAL BECOME THE CONTRACTOR'S PROPERTY AND SHALL BE TAKEN FROM SITE AND DISPOSED OF IN ACCORDANCE WITH ALL APPLICABLE CODES, STANDARDS AND REGULATIONS.
2. DISCONNECT AND MAKE SAFE ALL SYSTEMS TO BE DEMOLISHED INCLUDING PANELS, FEEDERS, BRANCH CIRCUITS AND EQUIPMENT BY OTHER DIVISIONS. COORDINATE WITH OTHER DIVISIONS.
3. MAINTAIN EXISTING REMAINING CIRCUITS, SYSTEMS, ETC., WHICH PASS THROUGH AREA OF CONSTRUCTION AND IN CLOSE PROXIMITY. PROVIDE NECESSARY COMPONENTS TO MAINTAIN SYSTEMS. ENSURE COMPONENTS WILL BE CONCEALED WHEN CONSTRUCTION IS COMPLETE.
4. REINSTATE IMMEDIATELY ANY REMAINING EXISTING SYSTEMS IN-ADVERTENTLY INTERRUPTED DURING CONSTRUCTION.
5. THE DRAWINGS INDICATE KNOWN CONDITIONS AND MAY NOT INDICATE ALL DEMOLITION REQUIREMENTS. ELECTRICAL CONTRACTOR SHALL VISIT THE SITE PRIOR TO TENDER SUBMISSION AND VERIFY REQUIREMENTS AND INCLUDE ALL COSTS IN TENDER.
6. REMOVE REDUNDANT CONDUIT AND WIRING BACK TO SOURCE UNLESS OTHERWISE NOTED, AND MAKE SAFE.
7. DEVICES FROM DEMOLITION ARE NOT TO BE REUSED UNLESS NOTED OTHERWISE. NEW DEVICES SHALL BE SUPPLIED WHERE NECESSARY.
8. ALL FIRE ALARM DEVICES TO REMAIN IN OPERATION. PROTECT SMOKE DETECTORS FROM DUST EXPOSURE DURING CONSTRUCTION.
9. ENSURE FIRE ALARM SYSTEM IS OPERATIONAL AT THE END OF EACH SHIFT.
10. AFTER DEMOLITION WORK IS COMPLETE AND MINIMUM THREE (3) WORKING DAYS PRIOR TO PROCEEDING WITH NEW WORK, NOTIFY ENGINEER FOR INSPECTION.

GENERAL NOTES:

1. ELECTRICAL WORK TO BE DONE IN ACCORDANCE WITH THE ELECTRICAL SAFETY CODE OF ONTARIO, AND WITH NEW ARCHITECTURAL/INTERIOR DESIGNER'S LAYOUT (LOCATION/MOUNTING HEIGHTS). CONTRACTOR TO OBTAIN ALL NECESSARY PERMITS, PAY ALL APPLICABLE FEES AND INSPECTION COSTS.
2. COORDINATE WORK WITH ALL OTHER TRADES TO AVOID INTERFERENCE.
3. ENSURE ELECTRICAL COMPONENTS (E. WIRING, CONDUIT, ETC.) RELATING TO THE AREA OF WORK ARE INDEPENDENTLY SECURED TO COMPLY WITH CODE REQUIREMENTS. IT IS NOT ACCEPTABLE TO SECURE THE COMPONENTS TO DUCTWORK, DUCT WORK TO CONDUIT, OR ANY OTHER SYSTEMS.
4. ENSURE ALL EXISTING CEILING MOUNTED BOXES ARE CLOSED PRIOR TO COMPLETION OF PROJECT. PROVIDE LABELLED AND COLOUR CODED COVER PLATES (E. PANEL NAME AND CIRCUIT NUMBER) AS REQUIRED.
5. MINIMUM THREE (3) WORKING DAYS PRIOR TO CLOSING CEILING, NOTIFY THE ENGINEER FOR CEILING INSPECTION.

POWER NOTES:

1. ENSURE EXISTING REMAINING OUTLETS IN AFFECTED AREA ARE FUNCTIONAL.
2. DO NOT MOUNT WALL OUTLETS BACK TO BACK. LEAVE MINIMUM 300mm SPACE BETWEEN OUTLETS. STAGGER OUTLETS WITHIN ALTERNATE STUD CAVITIES. DO NOT ANCHOR BACK TO BACK OUTLETS TO THE SAME STUD.

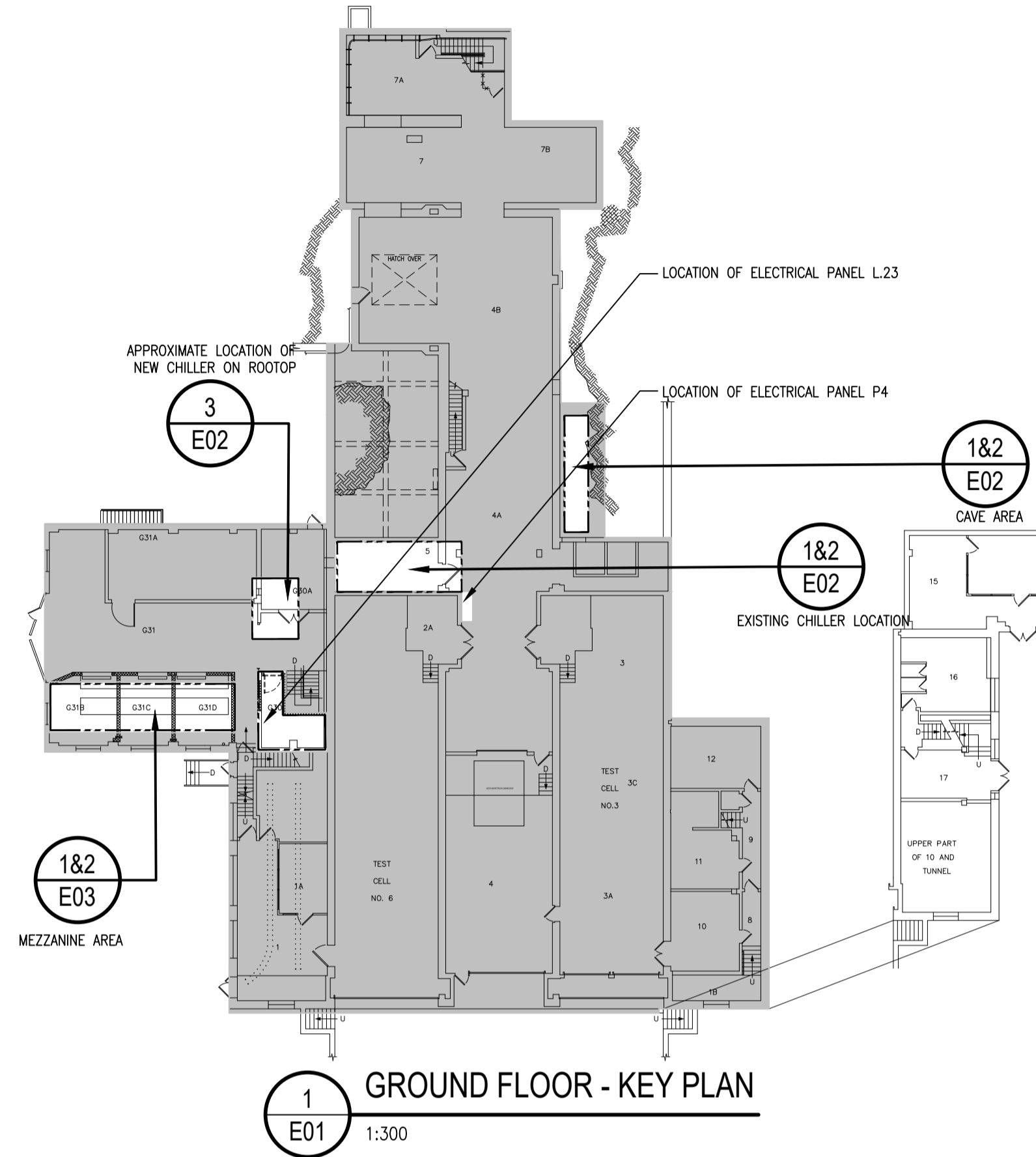
COLOR CODING:

APPLICABLE TO NEW OR RELOCATED WORK UNLESS OTHERWISE NOTED.

1. TO CONFORM TO CLIENT'S BUILDING CODING SYSTEM.
2. COLOUR CODE CONDUITS AND BOXES.
3. CODE WITH PLASTIC TAPE OR PAINT WHERE CONDUITS ENTER WALLS, CEILING, OR FLOOR AND AT 15 METER INTERVALS.
4. COLOURS: 25mm WIDE PRIME COLOUR AND 20mm WIDE AUXILIARY COLOUR.
5. REFER TO SPECIFICATIONS FOR COLOR CODING.

OUTLETS LOCATION:

1. EXACT LOCATION AND MOUNTING HEIGHTS OF OUTLETS TO BE COORDINATED WITH INTERIOR DESIGNER/ARCHITECTURAL DRAWINGS PRIOR TO ROUGH IN. REFER TO ARCHITECTURAL/DESIGNER DRAWINGS FOR MILLWORK, FURNITURE, SCREENS, COMPONENTS (E. TV, DRINKING FOUNTAIN, ETC.) FOR REQUIREMENTS.
2. BRING TO THE ATTENTION OF THE ARCHITECT / INTERIOR DESIGNER AND ENGINEER ANY CONFLICTS OR REQUIRED CLARIFICATION.
3. FAILING TO COORDINATE, THE CONTRACTOR WILL MODIFY THE INSTALLATION AT HIS EXPENSE, IF REQUIRED.



ELECTRICAL LEGEND	
SYMBOL	DESCRIPTION
	SURFACE MOUNTED LIGHT FIXTURE
	SURFACE MOUNTED ELECTRICAL PANEL
	SAFETY SWITCH
	MANUAL MOTOR STARTER
	VARIABLE FREQUENCY DRIVE
	120V, 15A SOLENOID VALVE
	MOTOR RATED SWITCH
	THREE-PHASE ELECTRICAL MOTOR
	HARDWIRED CONNECTION
	GFCI, 5-20R, WEATHERPROOF MAINTENANCE RECEPTACLE
	120V, 15A DUPLEX RECEPTACLE

DRAWING LIST	
DWG No.	DESCRIPTION
E01	GENERAL NOTES, ELECTRICAL LEGEND, DRAWING LIST, AND KEY PLAN
E02	GROUND LEVEL AND ROOFTOP - POWER & SYSTEMS DEMOLITION & NEW WORK
E03	MEZZANINE - TRIBOLOGY LAB - POWER & SYSTEMS DEMOLITION & NEW WORK

ABBREVIATION LEGEND	
SYMBOL	DESCRIPTION
C	CEILING MOUNTED
X	EXISTING, TO BE REMOVED
E	EXISTING, TO REMAIN
N	NEW
S	SURFACE MOUNTED
W.P.	WEATHERPROOF ENCLOSURE
GFCI	GROUND FAULT CIRCUIT INTERRUPTER

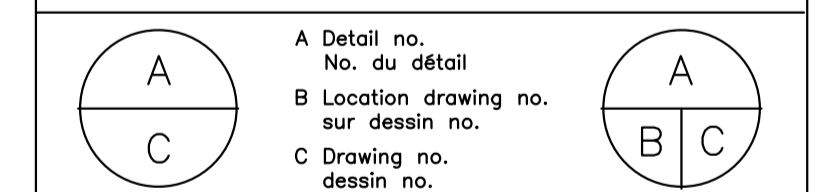
LINETYPE LEGEND	
SYMBOL	DESCRIPTION
	NEW WORK
	EXISTING
	DEMOLITION



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project
M7 CHILLER AND HEAT PUMP REPLACEMENTS
 project

drawing
MONTREAL ROAD CAMPUS
ELECTRICAL LEGENDS, DRAWING LIST, GENERAL NOTES AND KEY PLAN
 dessin

designed	conçu	date	date
D.A		-	
drawn	dessiné	scale	échelle
D.A		AS NOTED	
checked	vérifié	sheet of/de	feuille
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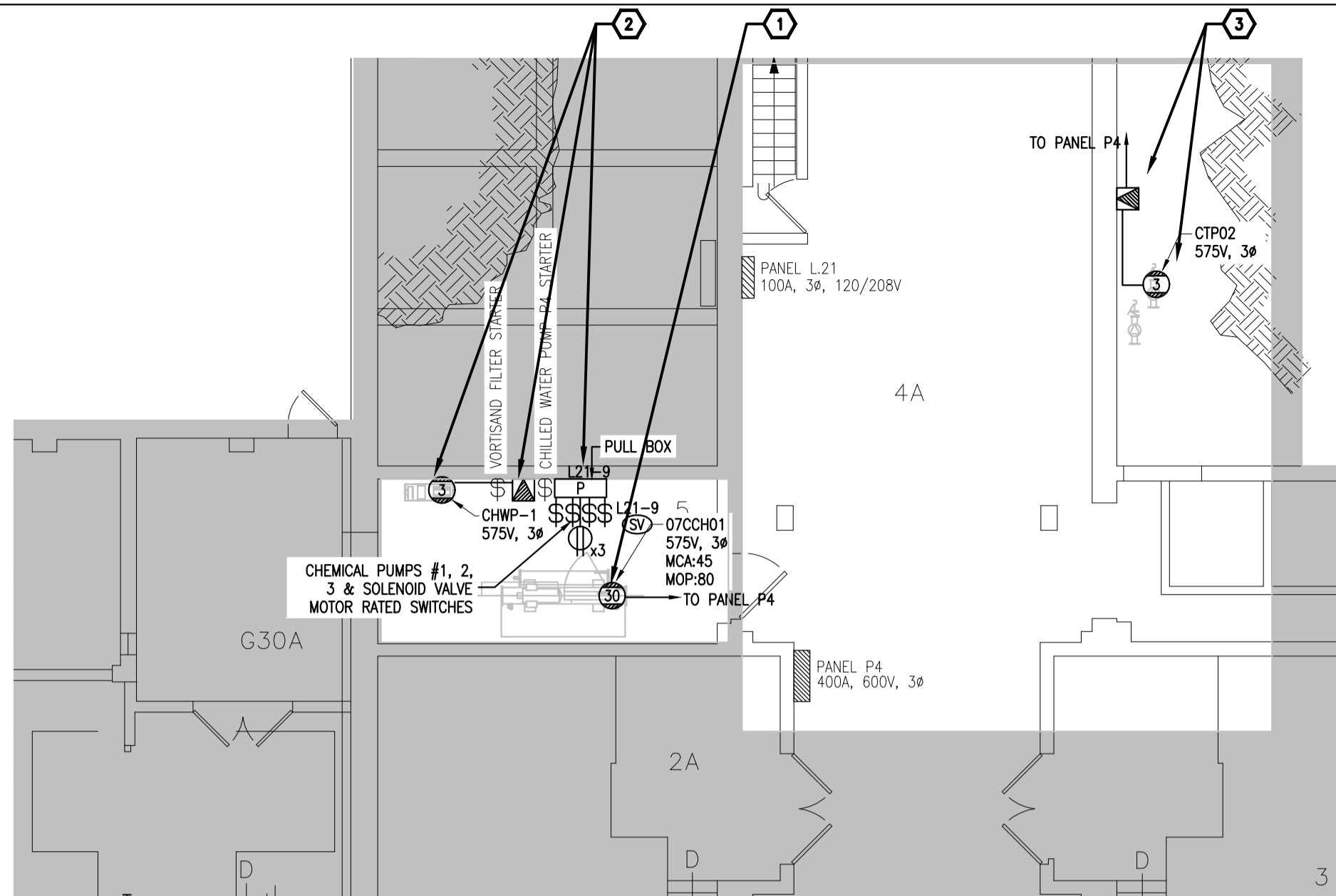
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DRAWING NOTES – DEMOLITION WORK

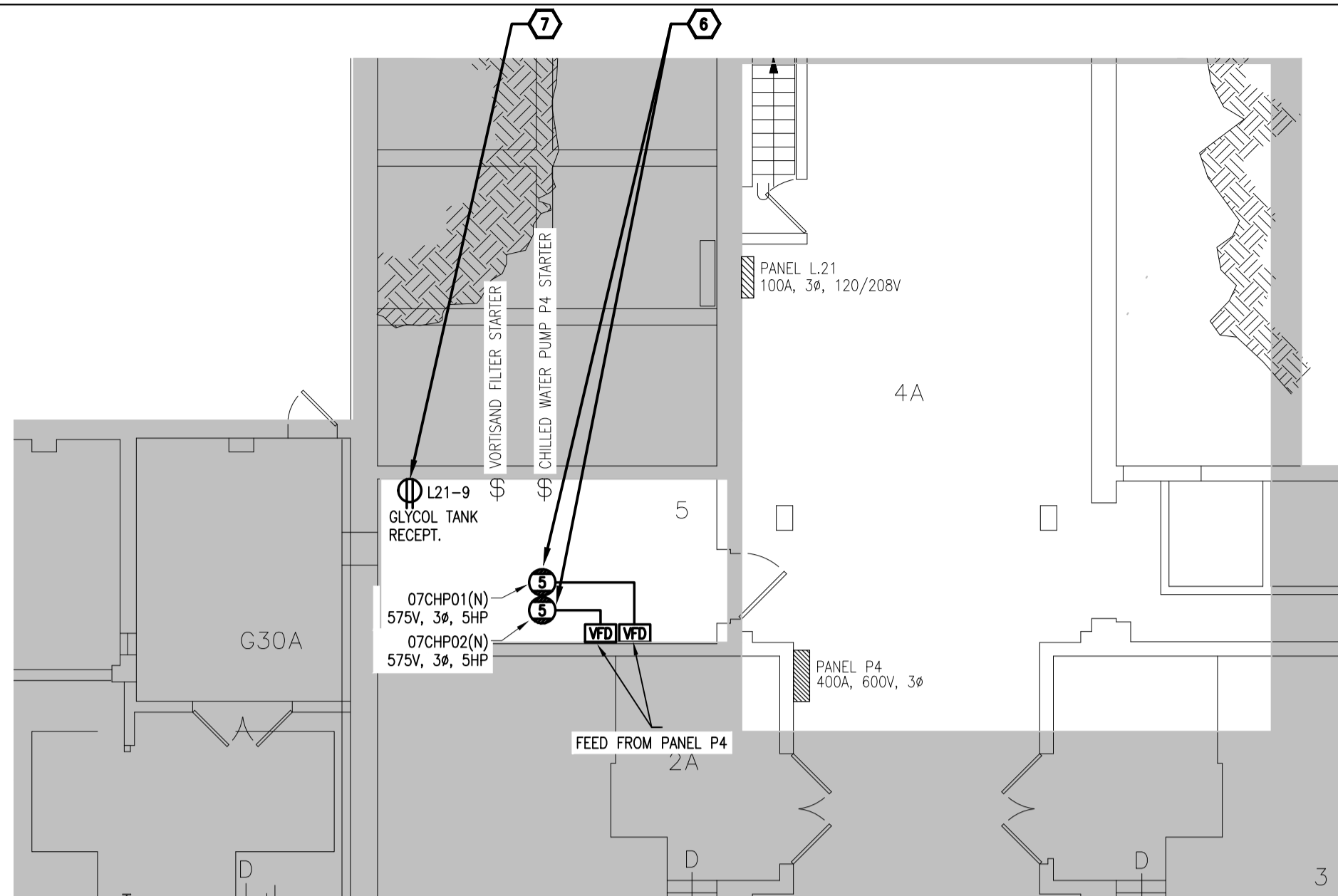
- EXISTING CHILLER (07CH01) TO BE REMOVED BY MECHANICAL TRADES. DISCONNECT AND MAKE SAFE. REMOVE CONDUIT AND WIRING BACK TO THE SOURCE. RETURN TO A CIRCUIT BREAKER TO NRC FOR STORAGE. COORDINATE WORK ON SITE WITH MECHANICAL TRADES.
- EXISTING CHILLER WATER PUMP (CHWP01) TO BE REMOVED BY MECHANICAL TRADES. DISCONNECT AND MAKE SAFE. RETAIN FEEDER FOR RE-USE IN NEW LAYOUT. REMOVE 120V, RECEPTACLES(x3) AS INDICATED ALONG WITH CHEMICAL PUMPS #1, 2, 3 AND SOLENOID VALVE STARTERS. RETAIN CIRCUIT FOR RE-USE IN NEW LAYOUT. COORDINATE WORK ON SITE WITH MECHANICAL TRADES.
- EXISTING CIRCULATING WATER PUMP (CTP02) TO BE REMOVED BY MECHANICAL TRADES. DISCONNECT AND MAKE SAFE. REMOVE MOTOR STARTER AS INDICATED. REMOVE CONDUIT AND WIRING BACK TO THE SOURCE AND MAKE SAFE. MARK CIRCUIT BREAKER AS SPARE. COORDINATE WORK ON SITE WITH MECHANICAL TRADES.

DRAWING NOTES – NEW WORK

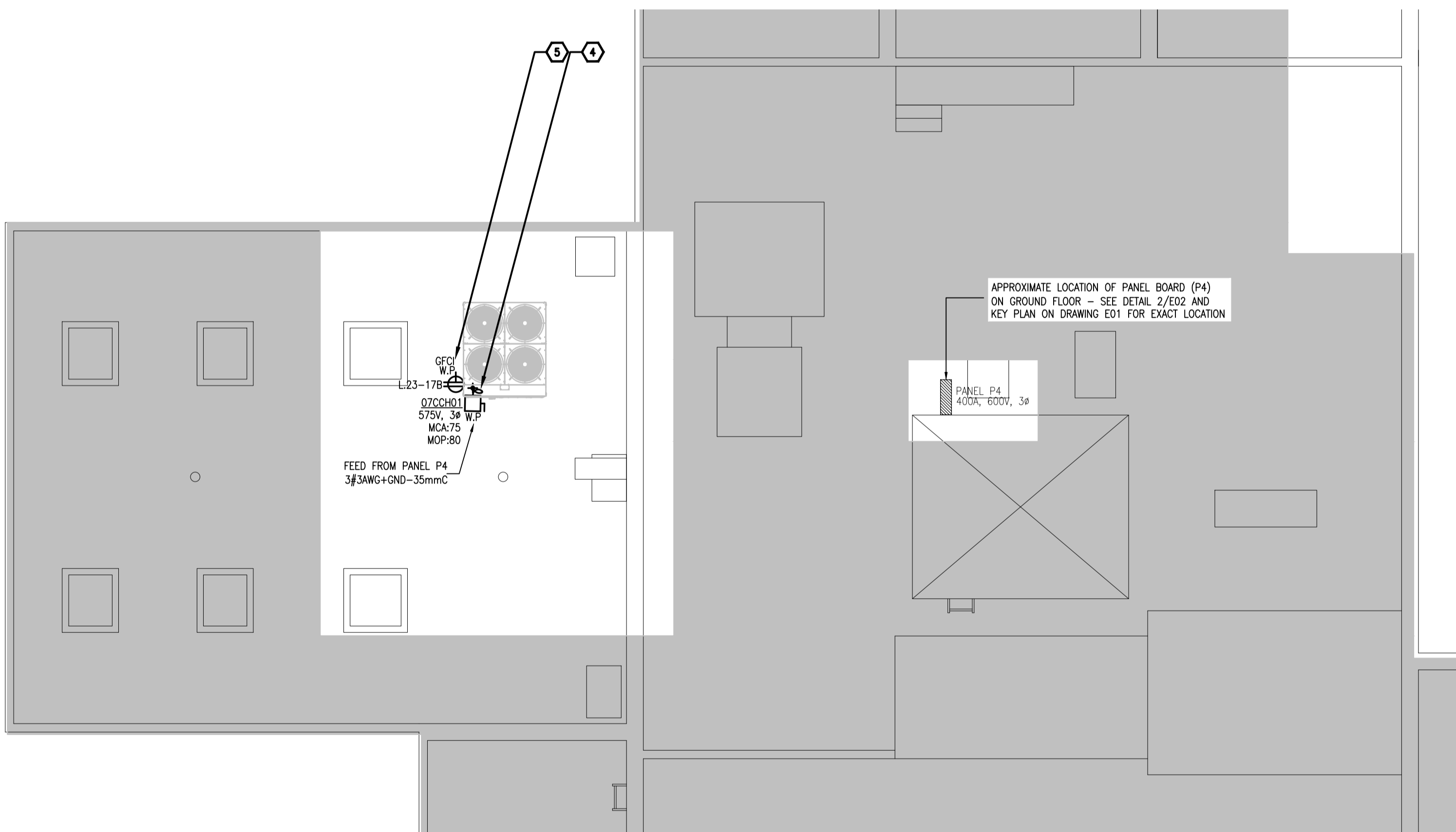
- NEW AIR-COOLED CHILLER (07CH01) ON ROOF TOP TO BE SUPPLIED AND INSTALLED BY MECHANICAL TRADES. PROVIDE WEATHER-PROOF SAFETY SWITCH, AND CONNECTION AS INDICATED C/W CONDUIT AND WIRING. CONNECT TO INDICATED CIRCUITS. CONDUIT AND WIRING TO FOLLOW REFRIGERANT PIPING. COORDINATE WORK ON SITE WITH MECHANICAL TRADES.
- PROVIDE NEW SERVICE MAINTENANCE, DEDICATED, 120V, 5-20R GFCI RECEPTACLE C/W WEATHER-PROOF WHILE-IN-USE COVER PLATE, CONDUIT AND WIRING. MOUNT RECEPTACLE AT 750mm A.F.F. PROVIDE REQUIRED UNISTRUT ASSEMBLY. COORDINATE EXACT LOCATION ON-SITE WITH MECHANICAL TRADES. CONNECT TO INDICATED CIRCUIT. REFER TO PANEL L23 ON DRAWING E03 FOR FURTHER INFORMATION.
- NEW CHILLER PUMPS 07CHP01 & 07CHP02 TO BE SUPPLIED AND INSTALLED BY MECHANICAL TRADES. VARIABLE FREQUENCY DRIVE (VFD) TO BE SUPPLIED BY MECHANICAL TRADES, INSTALLED AND WIRED BY ELECTRICAL. CONNECT NEW (07CHP01) RE-ROUTE EXISTING FEEDER AND EXTEND CONDUIT AND WIRING AS REQUIRED. PROVIDE NEW CONDUIT AND WIRING AS REQUIRED FOR (07CHP02). COORDINATE WORK ON SITE WITH MECHANICAL TRADES. REFER TO PANEL DIRECTORY ON THIS DRAWING FOR FURTHER DETAILS.
- PROVIDE NEW 120V, 15A (5-15R) RECEPTACLE AS INDICATED. EXTEND CONDUIT AND WIRING AS REQUIRED FROM PULLBOX. CONNECT TO EXISTING CIRCUIT THAT WAS FEEDING THE THREE RECEPTACLES FOR CHEMICAL PUMPS #1, 2, 3. COORDINATE EXACT LOCATION ON SITE WITH MECHANICAL TRADES.



1
E02 1:100
GROUND LEVEL
POWER & SYSTEMS - DEMOLITION WORK



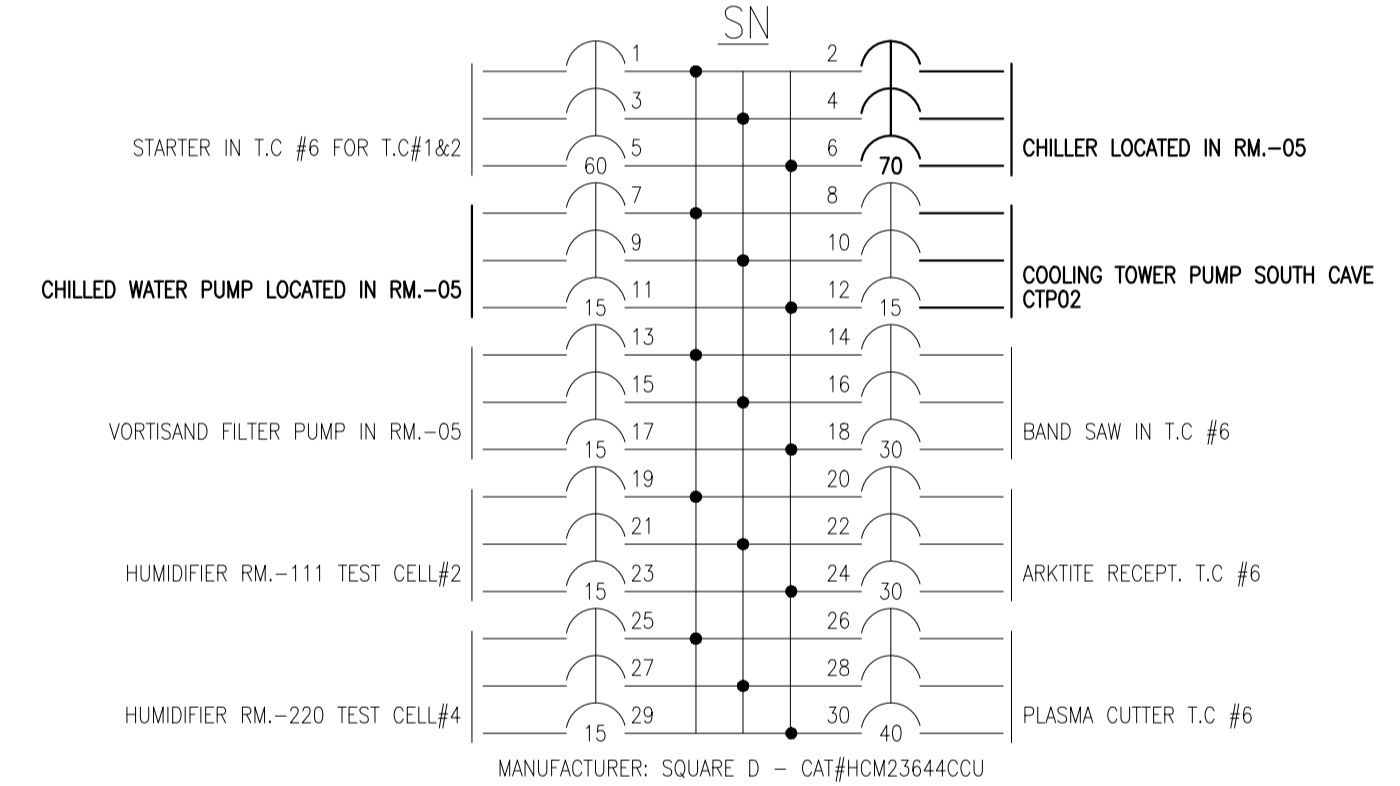
2
E02 1:100
GROUND LEVEL
POWER & SYSTEMS - NEW WORK



3
E02 1:100
ROOFTOP
POWER & SYSTEMS - NEW WORK

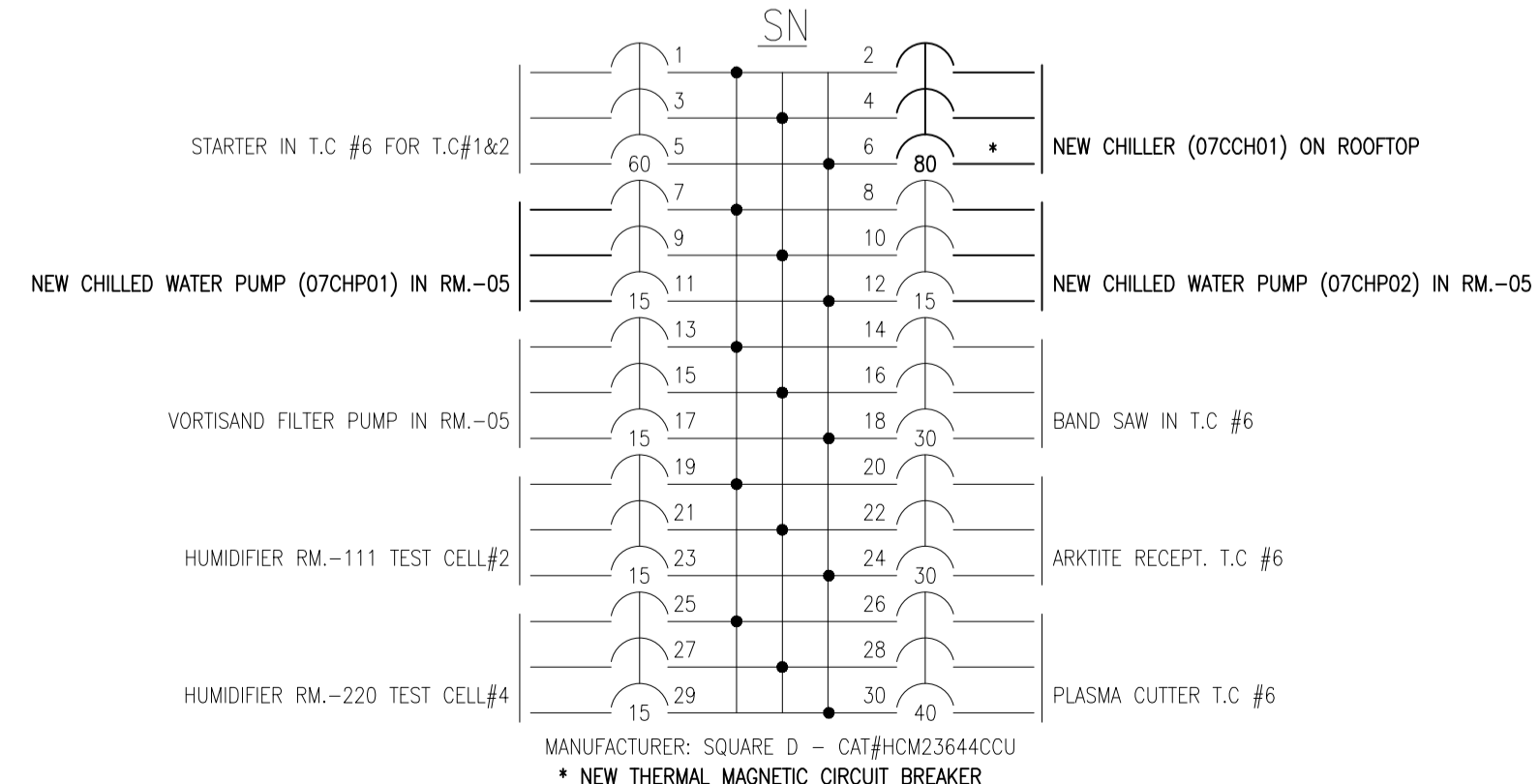
EXISTING PANEL P4

VOLTAGE	347/600V
PHASE	3φ
WIRE	4W
RATING AMPS	400A
TRIM	SURFACE



EXISTING REVISED PANEL P4

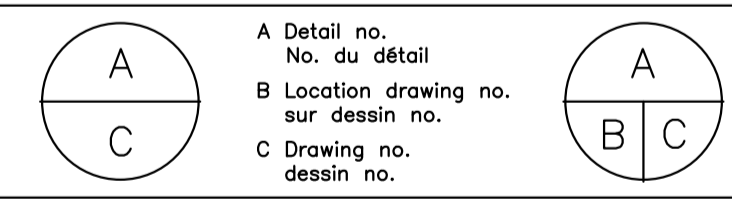
VOLTAGE	347/600V
PHASE	3φ
WIRE	4W
RATING AMPS	400A
TRIM	SURFACE



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No.	Date	Revision
1	2022-01-25	ISSUED FOR TENDER
-	2021-12-15	ISSUED FOR 100% REVIEW
-	2021-11-17	ISSUED FOR 99% REVIEW
-	2021-10-13	ISSUED FOR 66% REVIEW
-	2021-08-27	ISSUED FOR 33% REVIEW

o Verify all dimensions and site conditions and be responsible for same
o Vérifier toutes les dimensions et l'état des lieux et en assumer la responsabilité



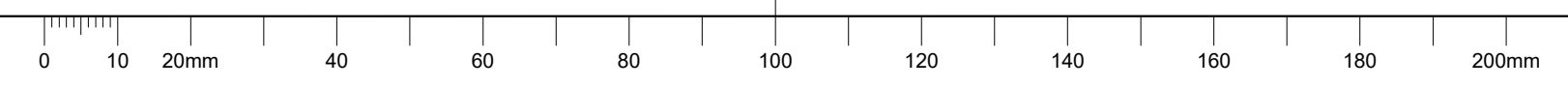
project M7 CHILLER AND HEAT PUMP REPLACEMENTS

drawing MONTREAL ROAD CAMPUS

GROUND LEVEL AND ROOFTOP POWER AND SYSTEMS DEMOLITION WORK AND NEW WORK

designed	conçu	date	date
D.A		-	
drawn	dessiné	scale	échelle
D.A		AS NOTED	
checked	vérifié	sheet	feuille
R.B		of/de -	
approved	approuvé	W.O.no.	D.T.no.
R.B		-	

dwg.no. 5988-E02 dessin.no.





GENERAL NOTES

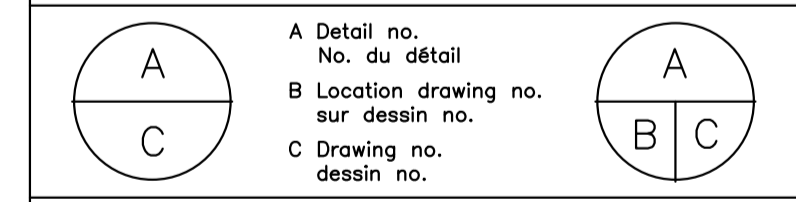
- CONTRACTOR TO VERIFY ALL DIMENSIONS AND CLEARANCES ON SITE PRIOR TO CONSTRUCTION AND REPORT ANY DISCREPANCIES AND/OR OMISSIONS TO DEPARTMENTAL REPRESENTATIVE.
- CONTRACTOR MUST VISIT THE SITE AND FULLY FAMILIARIZE THEMSELVES WITH THE SCOPE OF THE WORK PRIOR TO PROJECT COMMENCEMENT.
- ALL TRADES TO COORDINATE WORK ON SITE, WITH APPROVAL OF DEPARTMENTAL REPRESENTATIVE TO AVOID ANY CONFLICTS AND/OR INTERFERENCE.
- ANY AND ALL REQUIRED SHUTDOWNS SHALL BE COORDINATED WITH DEPARTMENTAL REPRESENTATIVE.
- INSTALLATION OF ALL SYSTEMS SHALL BE IN ACCORDANCE WITH APPLICABLE CODES AND STANDARDS.
- CONTRACTOR TO BE RESPONSIBLE FOR REINSTATEMENT AND REPAIR OF ANY DAMAGE CAUSED BY WORK.
- CONTRACTOR SHALL PREVENT THE SPREAD OF DUST AND DEBRIS BEYOND AREA OF WORK AND CLEAN ALL SURFACES AT COMPLETION.



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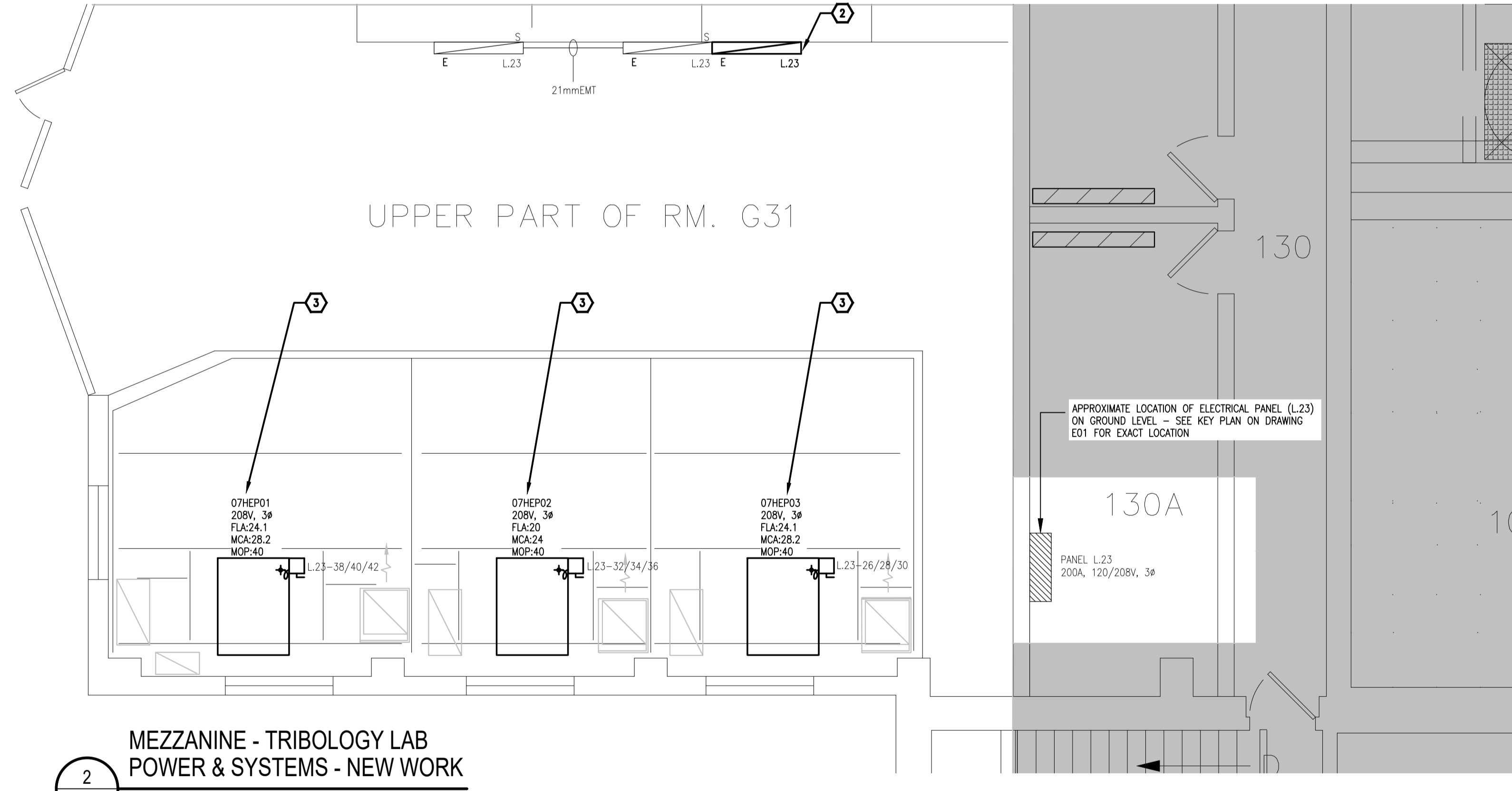
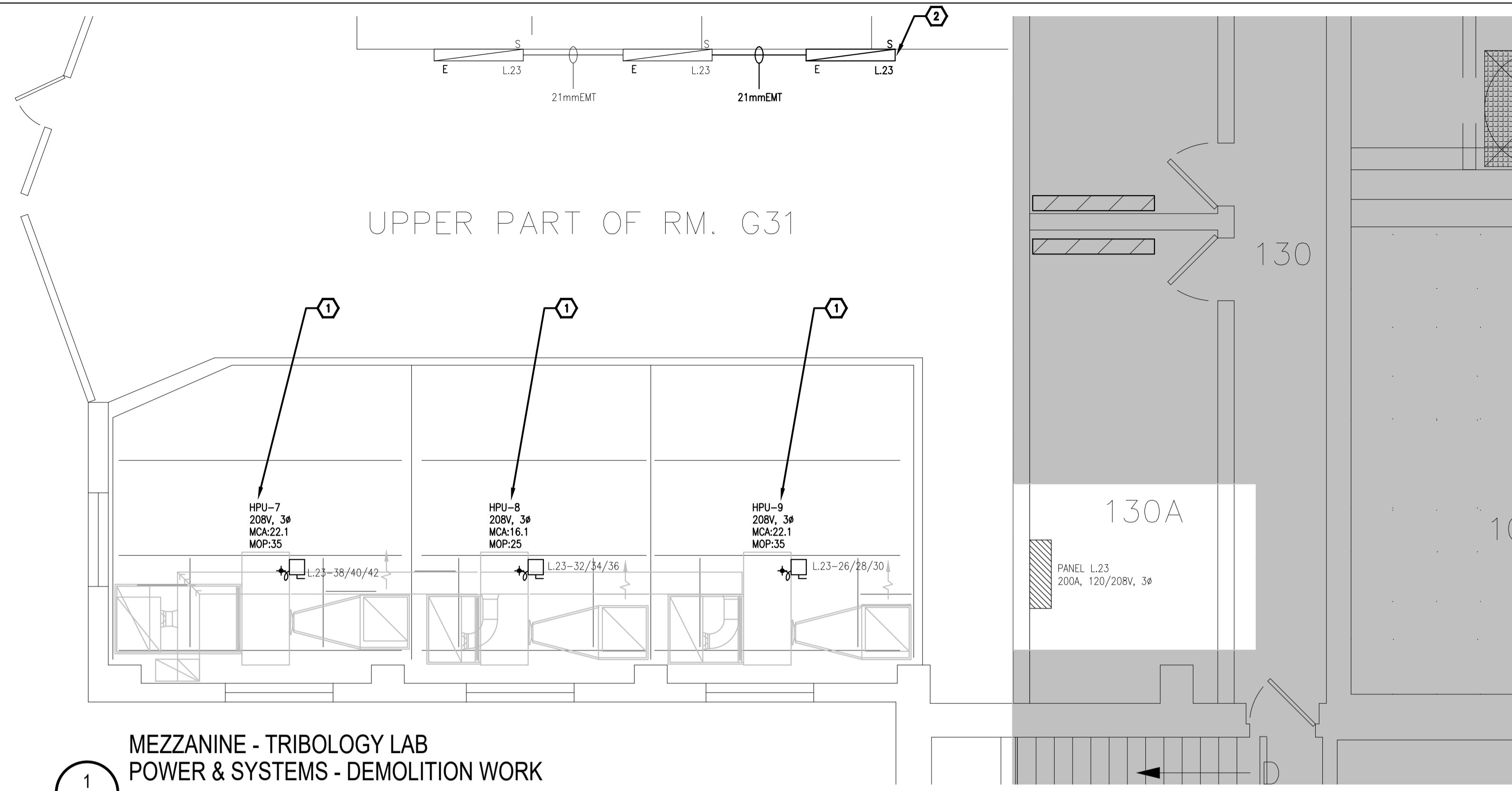
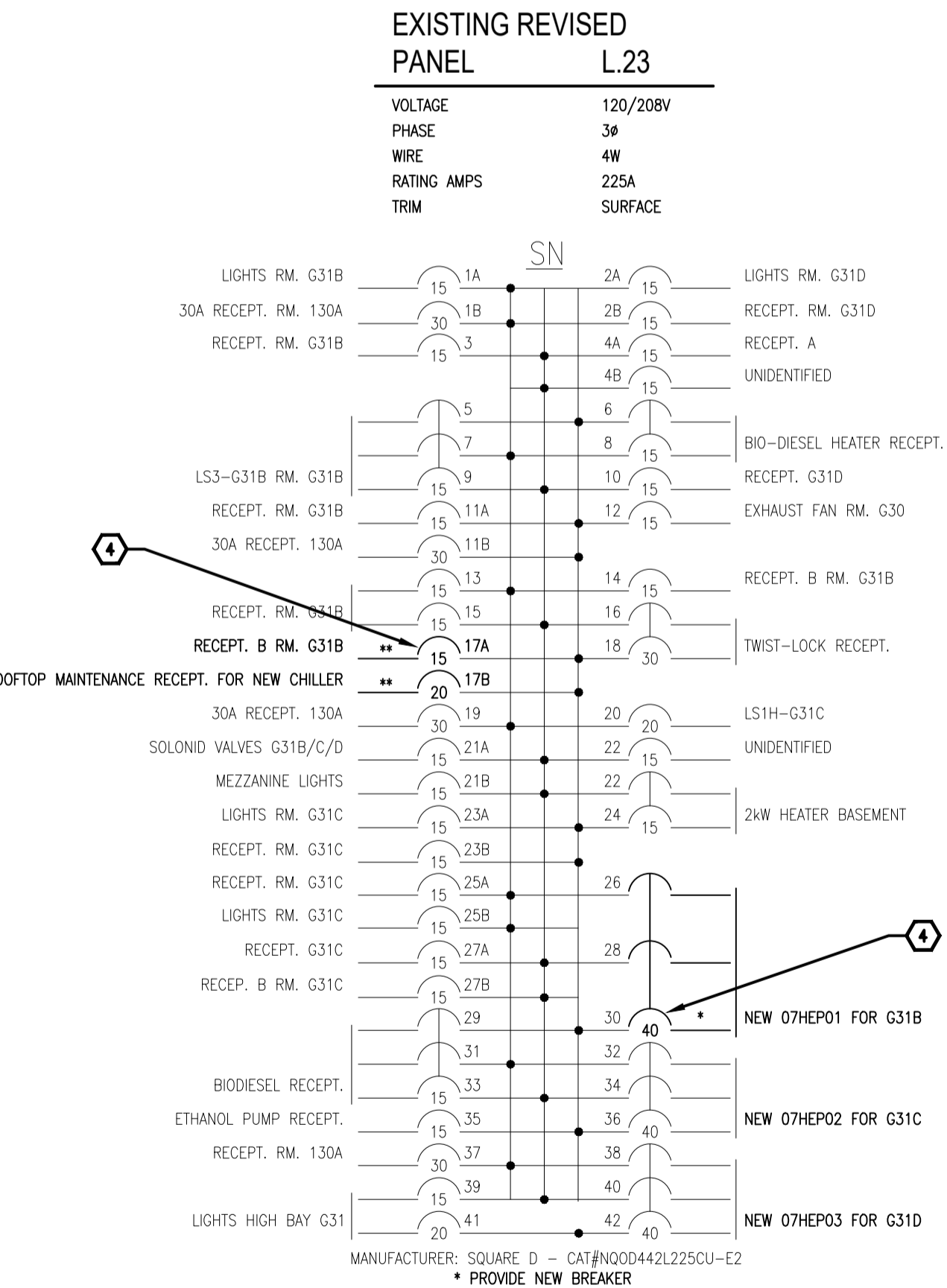
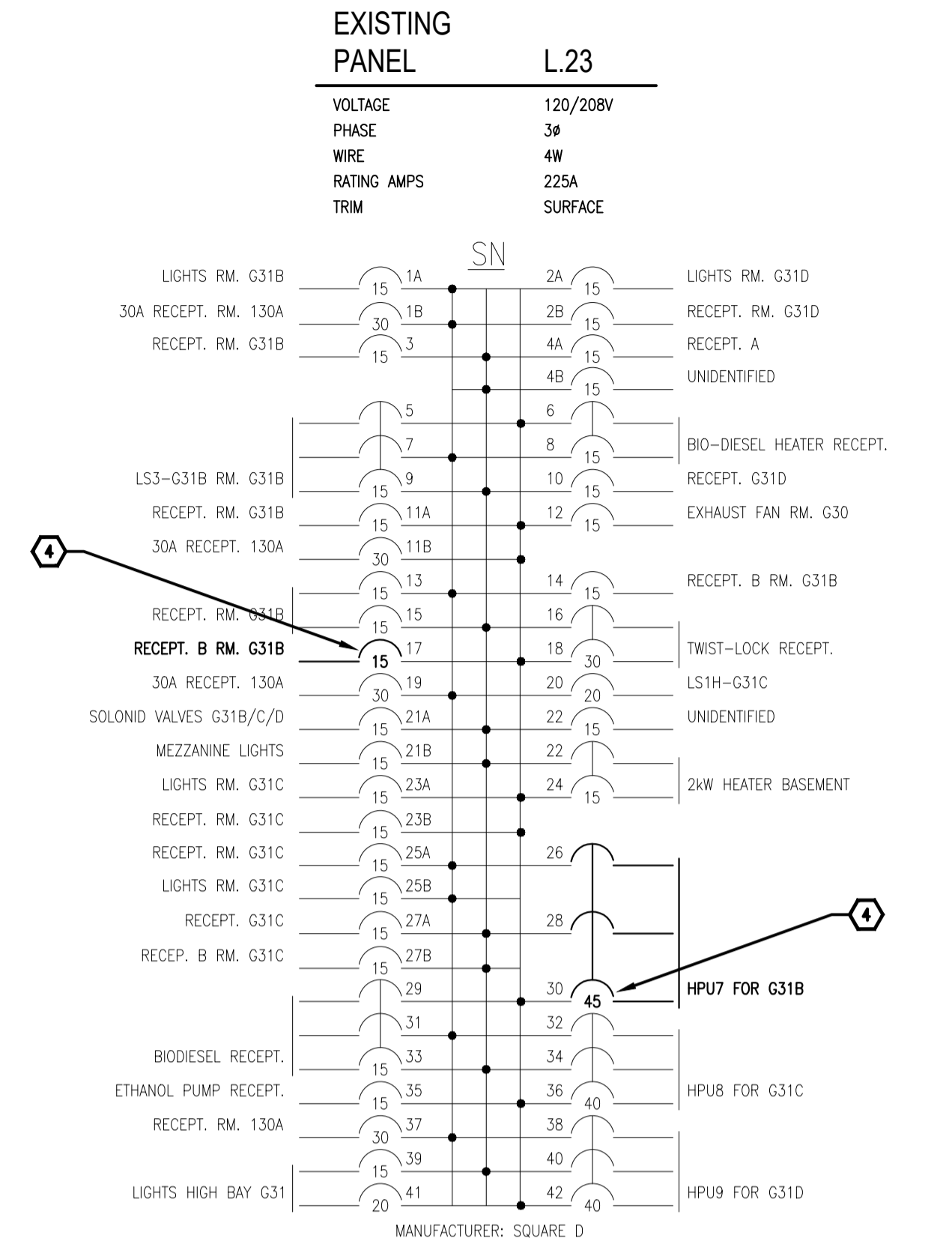
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- Verify all dimensions and site conditions and be responsible for same
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project: **M7 CHILLER AND HEAT PUMP REPLACEMENTS**
 MONTREAL ROAD CAMPUS
 drawing: **MEZZANINE - TRIBOLOGY LAB POWER AND SYSTEMS DEMOLITION AND NEW WORK**

designed	conçu	date	date
D.A		-	
drawn	dessiné	scale	échelle
D.A		AS NOTED	
checked	vérifié	sheet	feuille
R.B		of/de -	
approved	approuvé	W.O.no.	D.T.no.
R.B		-	
dwg.no.	dessin no.		
5988-E03			



DRAWING NOTES - DEMOLITION WORK

1 EXISTING HEAT PUMPS (HPU-7), (HPU-8) AND (HPU-9) TO BE REMOVED BY MECHANICAL TRADES. DISCONNECT, MAKE SAFE AND REMOVE SAFETY SWITCHES. RETAIN FEEDERS FOR RE-USE IN NEW LAYOUT. REFER TO KEY PLAN ON DRAWING E01 FOR APPROXIMATE LOCATION OF ELECTRICAL PANEL L.23. ON GROUND FLOOR. COORDINATE WORK ON SITE WITH MECHANICAL TRADES.

2 DISCONNECT AND RELOCATE EXISTING SURFACE MOUNTED LINEAR FIXTURE AS INDICATED TO ALLOW FOR NEW MECHANICAL PIPING INSTALLATION. EXTEND CONDUIT AND WIRING AS REQUIRED. COORDINATE WORK ON SITE WITH MECHANICAL TRADES.

DRAWING NOTES - NEW WORK

3 NEW HEAT PUMPS (07HEP01), (07HEP02) AND (07HEP03) TO BE SUPPLIED AND INSTALLED BY MECHANICAL TRADES. PROVIDE DISCONNECT SWITCHES, AND CONNECT TO EXISTING FEEDERS. EXTEND CONDUIT AND WIRING AS REQUIRED. COORDINATE WORK ON SITE WITH MECHANICAL TRADES.

4 TYPICAL: DISCONNECT AND REMOVE EXISTING CIRCUIT BREAKERS AS INDICATED TO ALLOW FOR THE INSTALLATION OF NEW STANDARD AND MINI BREAKERS. RE-WIRE ALL LOADS AS REQUIRED. REFER TO REVISED PANEL DIRECTORY FOR FURTHER DETAILS.

