

# Regional District Of Nanaimo

## Oceanside Place Energy Recovery



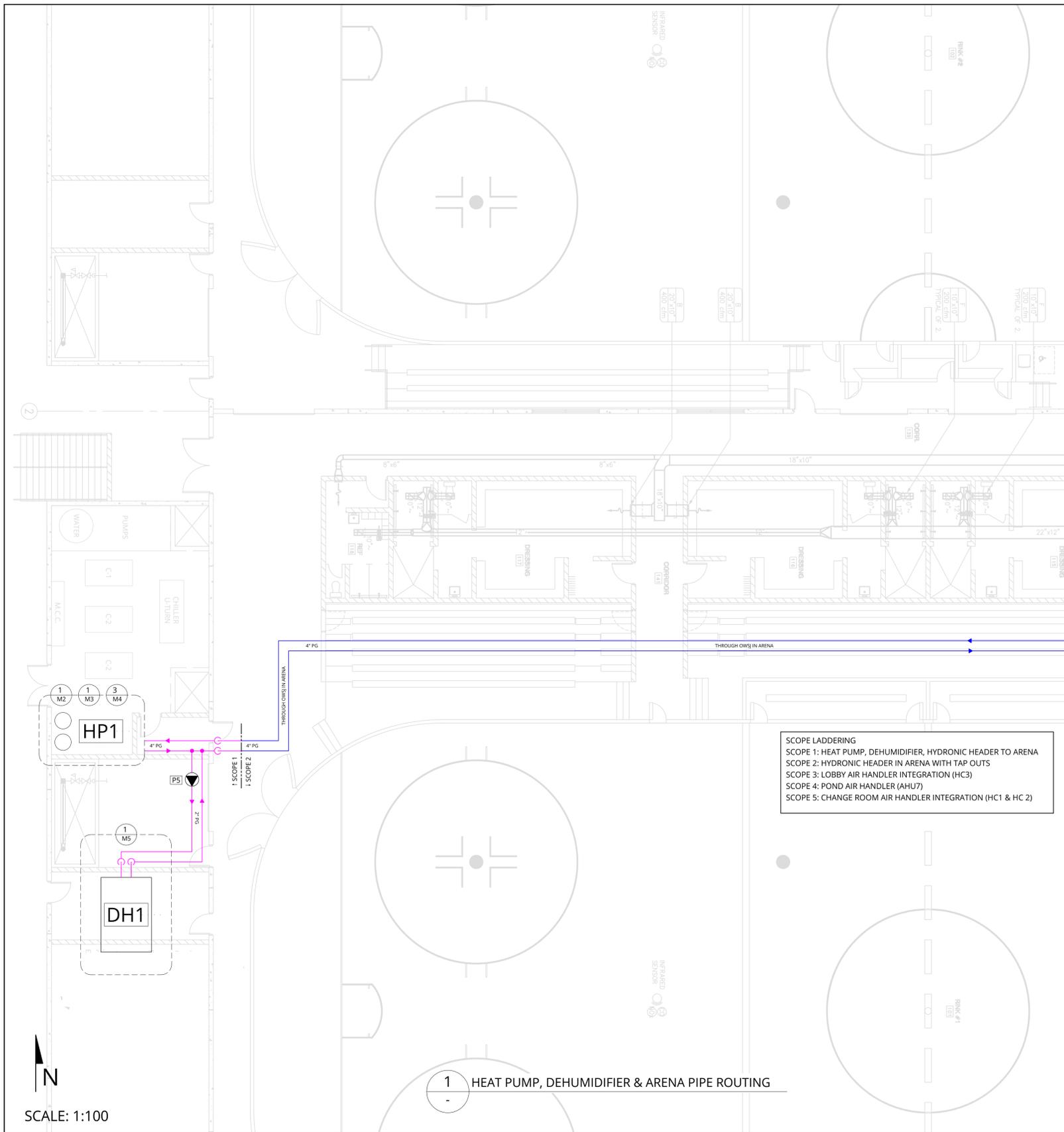
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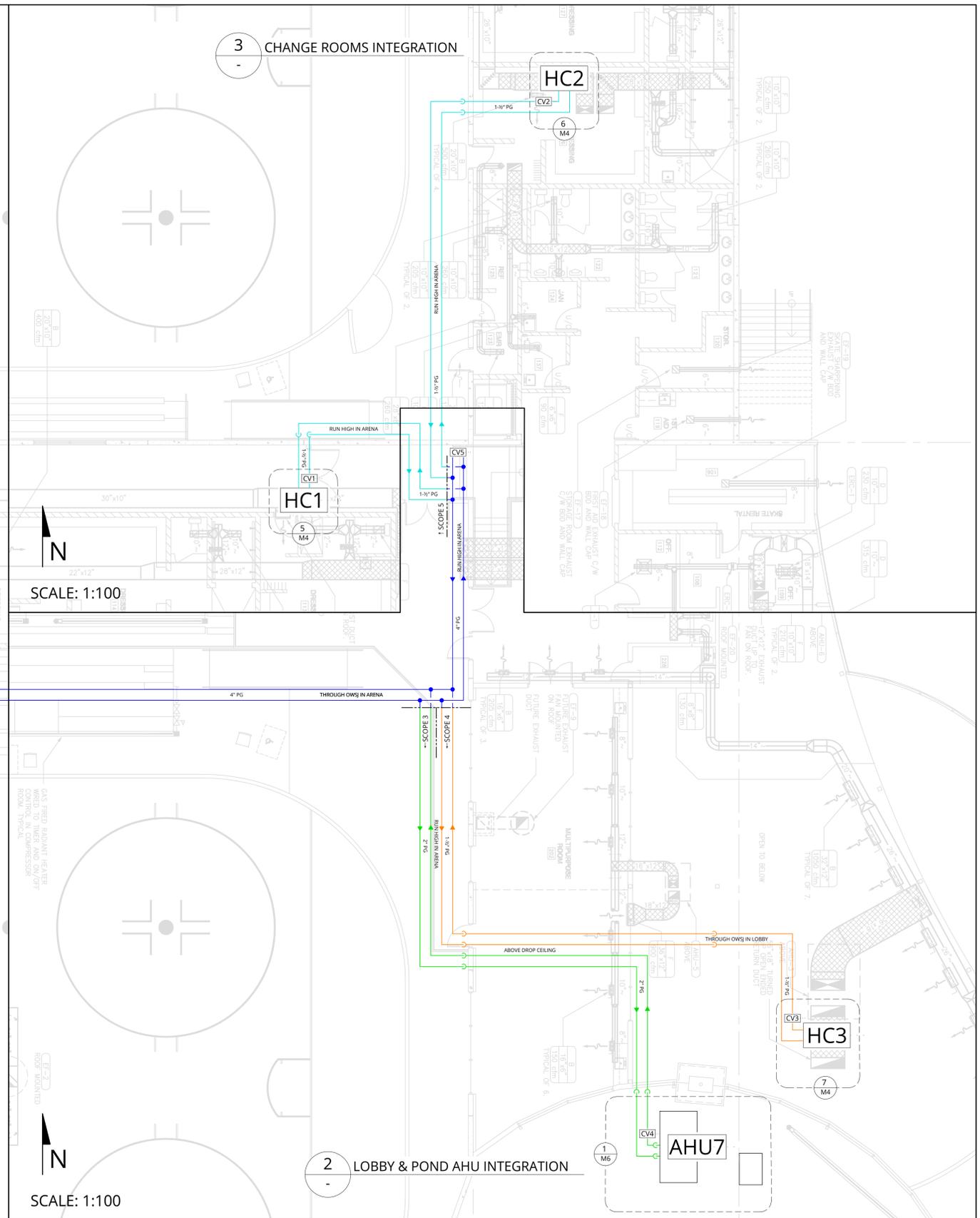


Regional District Of Nanaimo - Oceanside Place  
830 West Island Highway Parksville, BC V9P 2X4

PRIME CONSULTANT  POLAR ENGINEERING	CLIENT  REGIONAL DISTRICT OF NANAIMO	ENGINEER OF RECORD  IAN WELLE P.ENG. 2025-02-03 EGBC PERMIT TO PRACTICE NUMBER 1003657	PROJECT TITLE OCEANSIDE PLACE - ENERGY RECOVERY	REV #	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	PROJ #
			DRAWING TITLE TITLE PAGE	1	2024-09-06	NG	IW	ISSUED FOR REVIEW	2409
				2	2024-10-04	NG	IW	ISSUED FOR REVIEW 90%	SHEET SIZE
				3	2024-12-20	NG	IW	ISSUED FOR REVIEW FINAL	D
				4	2025-01-31	NG	IW	ISSUED FOR TENDER	SHEET NAME
				5	-	-	-	-	M0
				6	-	-	-	-	



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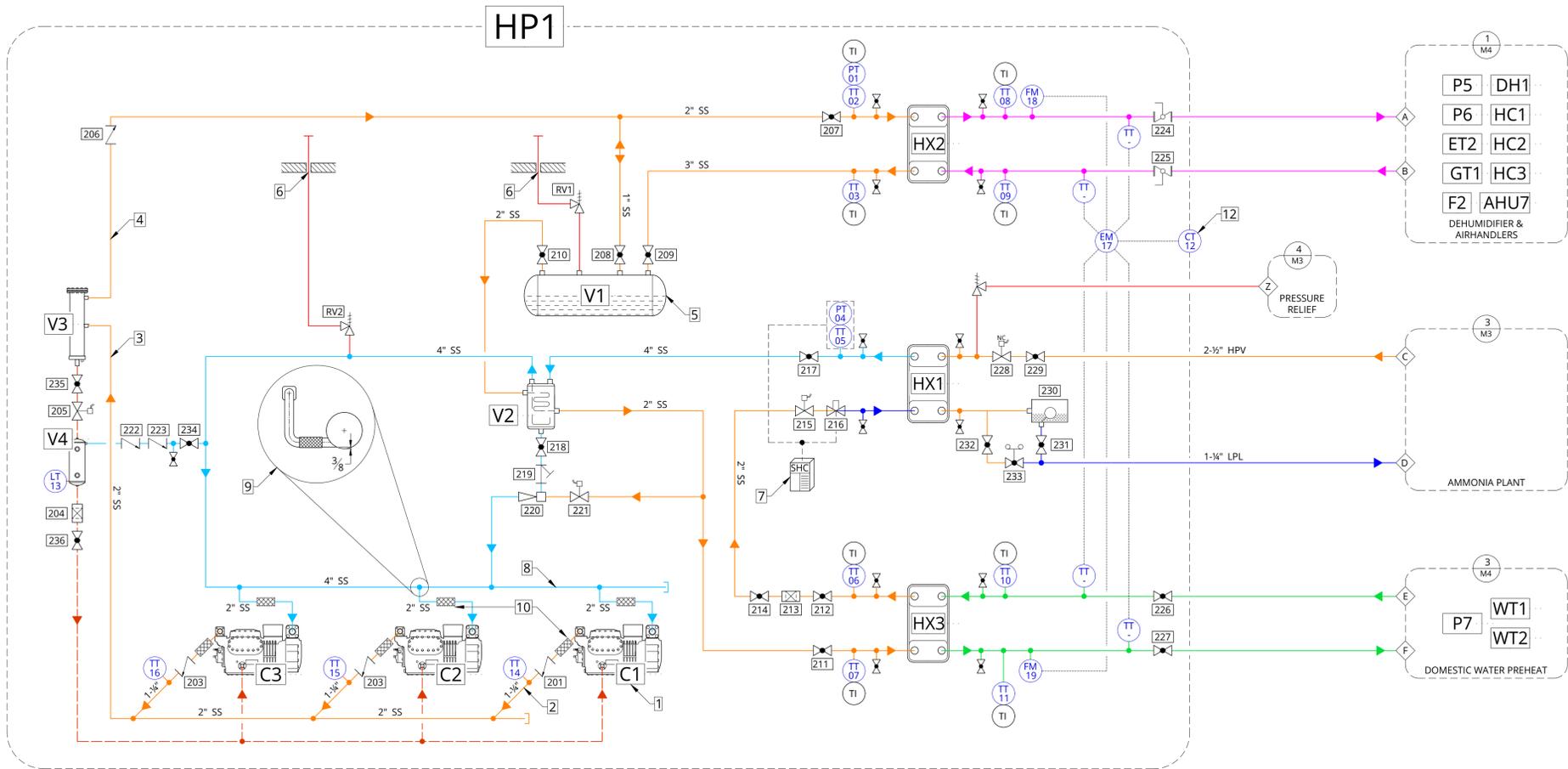


SCALE: 1:100

SCOPE LADDERING  
 SCOPE 1: HEAT PUMP, DEHUMIDIFIER, HYDRONIC HEADER TO ARENA  
 SCOPE 2: HYDRONIC HEADER IN ARENA WITH TAP OUTS  
 SCOPE 3: LOBBY AIR HANDLER INTEGRATION (HC3)  
 SCOPE 4: POND AIR HANDLER (AHU7)  
 SCOPE 5: CHANGE ROOM AIR HANDLER INTEGRATION (HC1 & HC 2)

PRIME CONSULTANT  <b>POLAR ENGINEERING</b> PHONE 778-700-1086 WEBSITE www.polareng.ca	CLIENT  <b>REGIONAL DISTRICT OF NANAIMO</b> PHONE 250-390-4111 WEBSITE www.rdn.bc.ca	ENGINEER OF RECORD  <b>IAN WELLE P.ENG.</b> EGBC PERMIT TO PRACTICE NUMBER 1003657	PROJECT TITLE <b>OCEANSIDE PLACE - ENERGY RECOVERY</b>	REV # 1 2 3 4 5 6	DATE 2024-09-06 2024-10-03 2024-12-20 2025-01-31 - -	DRAWN BY NG NG NG NG - -	CHECKED BY IW IW IW IW - -	DESCRIPTION ISSUED FOR REVIEW ISSUED FOR REVIEW 90% ISSUED FOR REVIEW FINAL ISSUED FOR TENDER - -	PROJ # 2409 SHEET SIZE D SHEET NAME M1
			DRAWING TITLE <b>PROJECT OVERVIEW</b>						

FILE NAME: 2409-OCEANSIDE-ENERGY-RECOVERY (PLOT DATE: 2025-01-31) (DRAWN BY: NG)



1 HEAT PUMP SCHEMATIC

PIPING LEGEND

- LOW PRESSURE LIQUID REFRIGERANT
- HIGH PRESSURE LIQUID REFRIGERANT
- LOW PRESSURE VAPOR REFRIGERANT
- HIGH PRESSURE VAPOR REFRIGERANT
- GLYCOL
- POTABLE WATER
- COMPRESSOR OIL

- KEYNOTES:
- INSTALL COMPRESSORS WITH SPRING ISOLATORS.
  - 45° CONNECTIONS BETWEEN COMPRESSOR DISCHARGES AND HEADER.
  - INSULATE ALL REFRIGERATION LINES.
  - VERTICAL RISER AFTER OIL SEPARATOR TO FACILITATE OIL RETURN UNDER LOW LOAD CONDITIONS.
  - INSULATE HIGH-PRESSURE RECEIVER (HP-V1) & SUCTION ACCUMULATOR (HP-V2).
  - ROUTE PRESSURE RELIEF TO EXTERIOR OF THE BUILDING IN COMPLIANCE WITH CSA B52 (SECTION 7.3.6).
  - MAINTAIN A MINIMUM OF 18R SUPERHEAT AT HP1-HX1 REFRIGERANT OUTLET.
  - SUCTION HEADER MUST BE INSTALLED DEAD LEVEL.
  - COMPRESSOR TAKEOFFS ELEVATED FROM HEADER BY 3/8-IN, TYPICAL.
  - INSTALL FLEXIBLE CONNECTIONS ON COMPRESSOR SUCTION AND DISCHARGE.
  - INSTALL TANK ABOVE HIGHEST POINT IN GLYCOL CIRCUIT.
  - INSTALL CT12 ON SINGLE POINT HEAT PUMP CONNECTION.

HEAT PUMP COMPRESSORS

TAG	MAKE	MODEL	FLUID	OPERATION (F)		COOLING CAPACITY [MBH]	HEATING CAPACITY [MBH]	MOTOR [KW]	ELECTRICAL [V/PH/Hz]	NOTES
				SST	SDT					
HP1-C1	BITZER	6FE-50Y	R513A	62	165	447	495	61.6	575/3/60	1,2,3,4
HP1-C2	BITZER	6FE-50Y	R513A	62	165	447	495	61.6	575/3/60	1,2,3,4
HP1-C3	BITZER	6FE-50Y	R513A	62	165	447	495	61.6	575/3/60	1,2,3,4

- NOTES:
- TO BE SUPPLIED WITH BITZER CM-RC IQ MODULE, VARISTEP CAPACITY CONTROL, HEAD COOLING FAN, AND KRIVAN INT 280B OIL LEVEL REGULATOR.
  - M1 MOTOR
  - 175F MAXIMUM CONDENSING TEMPERATURE
  - 35F MINIMUM EVAPORATING TEMPERATURE

HEAT PUMP VESSELS

TAG	MAKE	MODEL	DESCRIPTION	FLUID	DIAMETER [IN]	LENGTH [IN]	OPERATING TEMPERATURE [F]	OPERATING PRESSURE [PSIG]	DWP [PSIG]	NOTES
HP1-V1	HENRY	TBD	LIQUID RECIEVER	R513A	-	-	165	344	450	1
HP1-V2	HENRY	AF-16042	SUCTION ACCUMULATOR	R513A	16	42	165	72	450	2
HP1-V3	TEMPRITE	928	OIL SEPARATOR	R513A	13	42	165	344	650	
HP1-V4	TEMPRITE	47115	OIL RESERVOIR	R513A OIL	6	28	165	344	650	

- NOTES:
- CONTRACTOR TO FINALIZE RECIEVER BASED ON FINAL CHARGE
  - C/W BOIL OFF COIL

HEAT PUMP HEAT EXCHANGERS

TAG	MAKE	MODEL	DESCRIPTION	CAPACITY [KBTU/HR]	DWP [PSI]	SIDE 1				SIDE 2				NOTES
						FLUID	FLOW [LB/HR]	TEMP IN [F]	TEMP OUT [F]	FLUID	FLOW	TEMP IN [F]	TEMP OUT [F]	
HX1	ALFA LAVAL	M10-BWFD	CASCADE	1,287	300	NH3	2,610	85	84.9	R513A	25,590 LB/HR	62	80	
HX2	ALFA LAVAL	ACH502DQ-214AH-F	CONDENSER	1,435	653	R513A	25,590	201	165	30% PG	134 GPM	137.4	160	
HX3	DOUCETTE	BPDW-422-50	SUBCOOLER	340	435	R513A	25,590	165	135	WATER	34.5 GPM	120	140	1

- NOTES:
- DOUBLE WALL VENTED

HEAT PUMP PRESSURE RELIEF VALVES

TAG	MAKE	MODEL	DESCRIPTION	NOTES
RV1	TO SPEC	TO SPEC	HP1 HIGH SIDE PRESSURE RELIEF VALVE	1
RV2	TO SPEC	TO SPEC	HP1 LOW SIDE PRESSURE RELIEF VALVE	1

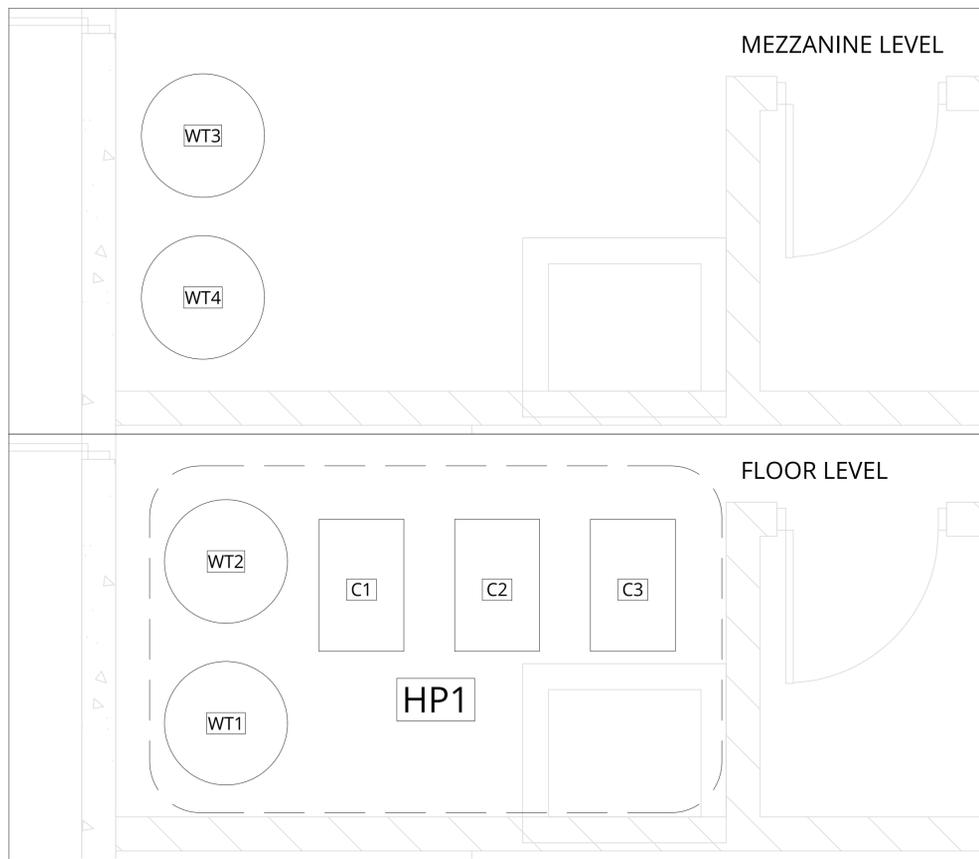
- NOTES:
- PRESSURE RELIEF VALVE TO BE SIZED BASED ON THE CHARGE OF THE FABRICATED HEAT PUMP.

HEAT PUMP VALVES

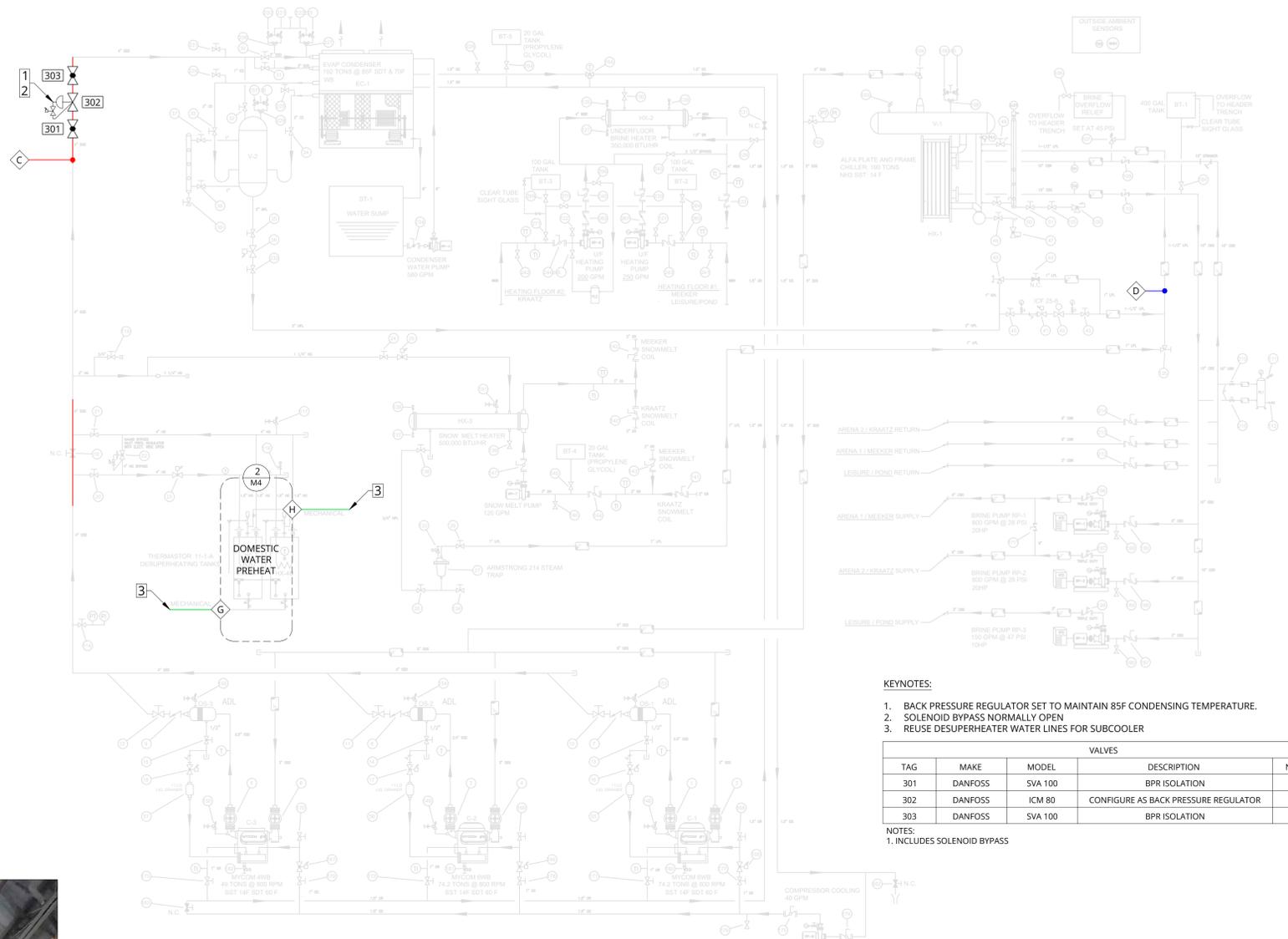
TAG	LOCATION	DESCRIPTION	MAKE/MODEL	NOTES
201	HP-C1	COMPR DISCHARGE CHECK	DANFOSS, CHV32	
202	HP-C2	COMPR DISCHARGE CHECK	DANFOSS, CHV32	
203	HP-C3	COMPR DISCHARGE CHECK	DANFOSS, CHV32	
204	HP-V4	OIL RETURN FILTER	-	1
205	HP-V3	OIL RETURN SOLENOID	DANFOSS, ERV V2 (NO)	
206	HP-V3	OIL SEP CHECK	DANFOSS, CHV65B	
207	HP-HX2	CONDENSER ISOLATION	DANFOSS, SVA50	
208	HP-V1	HPR EQL ISOLATION	DANFOSS, SVA25	
209	HP-V1	HPR INLET ISOLATION	DANFOSS, SVA80	
210	HP-V1	HPR OUTLET ISOLATION	DANFOSS, SVA50	
211	HP-HX3	SUBCOOLER INLET ISOLATION	DANFOSS, SVA50	
212	HP-HX3	SUBCOOLER OUTLET ISOLATION	DANFOSS, SVA50	
213	HP-HX3	FILTER DRIER	DANFOSS, DCR-09617-DM NS 54	
214	HP-HX3	EVAP INLET ISOLATION	DANFOSS, SVA50	
215	HP-HX1	SOLENOID VALVE	DANFOSS, ICS 50 + EVM	
216	HP-HX1	EXPANSION VALVE	ETS COLIBRI 100C	
217	HP-HX1	EVAP OUTLET ISOLATION	DANFOSS, SVA100	
218	HP-V2	V2 ISOLATION	TO SPEC	
219	HP-V2	V2 OIL STRAINER	TO SPEC	
220	HP-V2	INJECTOR	TO SPEC	
221	HP-V2	V2 OIL RETURN SOLENOID	TO SPEC	
222	HP-V4	V4 PRESSURE EQUALIZATION	OCV1	
223	HP-V4	V4 PRESSURE EQUALIZATION	OCV1	
224	HP-HX2	CONDENSER ISOLATION	TO SPEC	
225	HP-HX2	CONDENSER ISOLATION	TO SPEC	
226	HP-HX3	SUBCOOLER ISOLATION	TO SPEC	
227	HP-HX3	SUBCOOLER ISOLATION	TO SPEC	
228	HP-HX1	NH3 CONDENSER SOLENOID	DANFOSS, ICS 50 + EVM	
229	HP-HX1	SOLENOID ISOLATION	DANFOSS, SVA65	
230	HP-HX1	NH3 FLOAT	DANFOSS, HFI-50	
231	HP-HX1	FLOAT ISOLATION	DANFOSS, SVA32	
232	HP-HX1	MANUAL EXPANSION	DANFOSS, REG 15A	
233	HP-HX1	MEV ISOLATION	DANFOSS, SVA32	
234	HP-V4	V4 ISOLATION	TO SPEC	
235	HP-V4	V4 ISOLATION	TO SPEC	
236	HP-V4	V4 ISOLATION	TO SPEC	

- NOTES:
- ENSURE ACCESS FOR FILTER CHANGES

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				4	2025-01-31	NG	IW	ISSUED FOR TENDER	
				5	-	-	-	-	
	6	-	-	-	-				
			DRAWING TITLE HEAT PUMP P&ID						SHEET NAME M2



1 HEAT PUMP LAYOUT - FLOOR & MEZZANINE LEVELS



3 AMMONIA PLANT INTEGRATION SCHEMATIC

- KEYNOTES:
- BACK PRESSURE REGULATOR SET TO MAINTAIN 85F CONDENSING TEMPERATURE.
  - SOLENOID BYPASS NORMALLY OPEN
  - REUSE DESUPERHEATER WATER LINES FOR SUBCOOLER

VALVES				
TAG	MAKE	MODEL	DESCRIPTION	NOTES
301	DANFOSS	SVA 100	BPR ISOLATION	
302	DANFOSS	ICM 80	CONFIGURE AS BACK PRESSURE REGULATOR	1
303	DANFOSS	SVA 100	BPR ISOLATION	

- NOTES:
- INCLUDES SOLENOID BYPASS



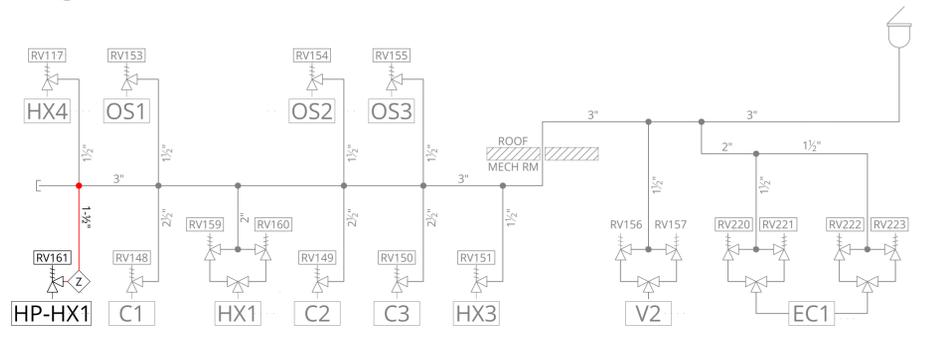
2 HEAT PUMP LOCATION IN MECH ROOM

- NOTES:
- SEE STRUCTURAL DRAWINGS FOR DETAILS ON MEZZANINE EXPANSION
  - SEE M7-1 FOR CHANGES TO DUCTING AND LADDER



5 DESUPERHEATERS WATERLINES IN BOILER ROOM

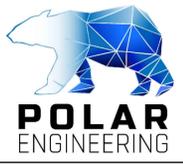
- NOTES:
- SEE KEYNOTE #3

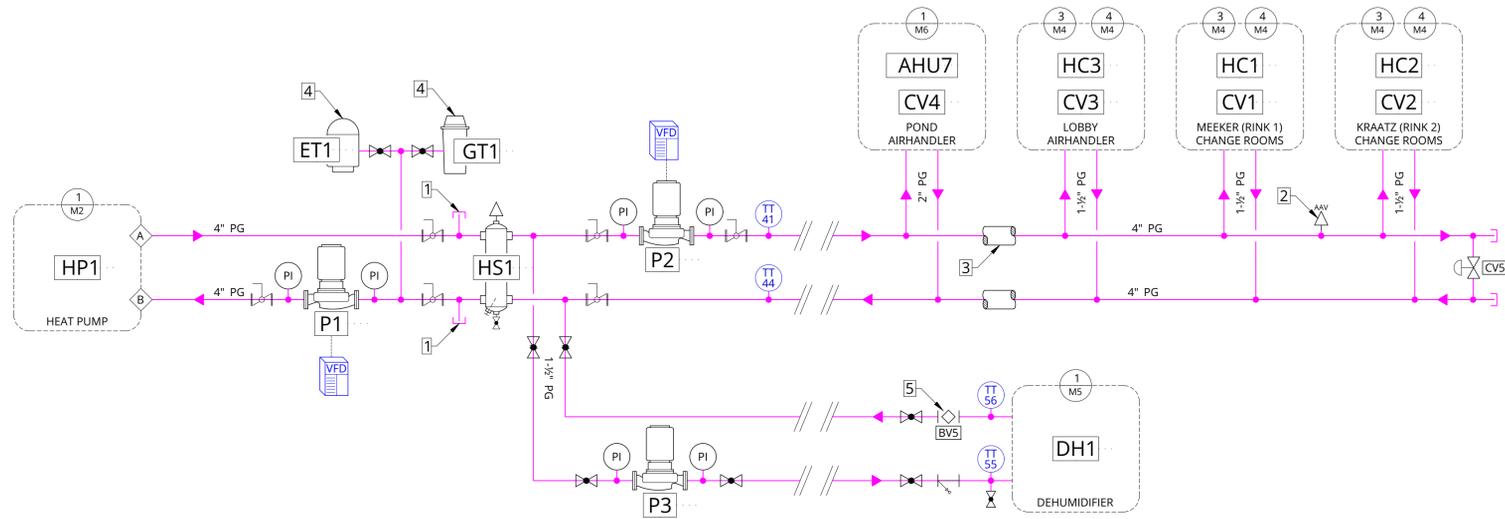


4 AMMONIA PRESSURE RELIEF SCHEMATIC

AMMONIA PRESSURE RELIEF VALVES									
TAG	MAKE	MODEL	SERVICE	SET PRESSURE (PSIG)	RELIEF NOTATION	RELIEF CAPACITY (LB-AIR/MIN)	INLET (IN)	OUTLET (IN)	NOTES
RV161/162	PARKER	SR1R	HXS	250	SINGLE	7.2	0.5	0.75	

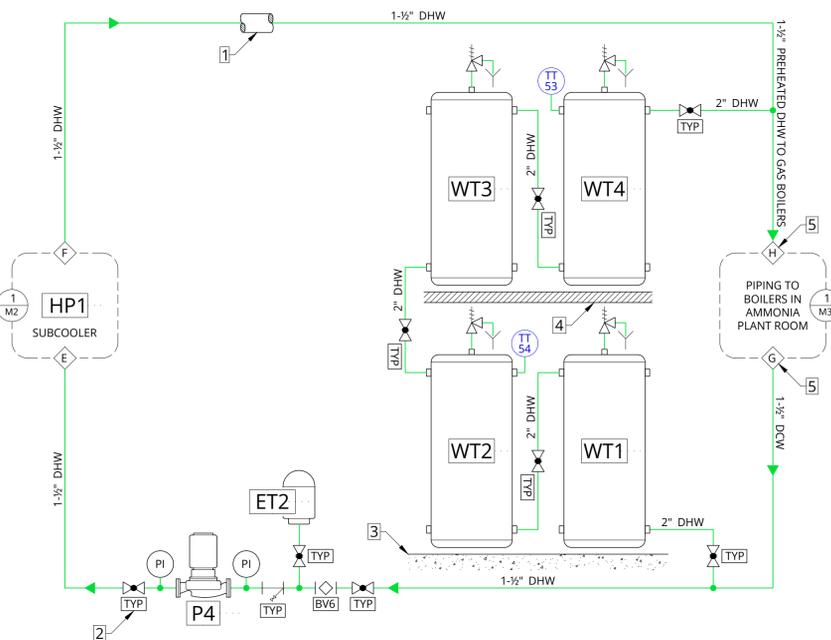
NOTES:

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			DRAWING TITLE AMMONIA PLANT INTEGRATION						



**1 HEAT PUMP CONDENSER LOOP SCHEMATIC**

- KEYNOTES:
1. CAPPED 4-INCH TEE FOR FUTURE EXPANSION
  2. LOCATE AIR VENT AT HIGHEST POINT IN GLYCOL SYSTEM AT TOP OF VERTICAL RISER
  3. INSULATE ALL GLYCOL PIPING
  4. COMMISSION TO MAINTAIN 25PSI STATIC PRESSURE FILL
  5. BALANCE TO MEET DESIGN FLOWRATE



**2 HEAT PUMP SUBCOOLER DHW PREHEAT SCHEMATIC**

- KEYNOTES:
1. INSULATE ALL DHW PIPING
  2. TYPICAL VALVES ARE TO SPECIFICATION
  3. LOCATE WT1 & WT2 ON THE FLOOR
  4. LOCATE WT3 & WT4 ON THE MEZZANINE
  5. REUSE DESUPERHEATER WATER LINES FOR SUBCOOLER

STORAGE TANKS						
TAG	MAKE	MODEL	DESCRIPTION	CAPACITY [GAL]	FLUID	NOTES
ST1	TUNSTALL	ST120-HP	INSULATED STORAGE TANK	120	WATER	
ST2	TUNSTALL	ST120-HP	INSULATED STORAGE TANK	120	WATER	
ST3	TUNSTALL	ST120-HP	INSULATED STORAGE TANK	120	WATER	
ST4	TUNSTALL	ST120-HP	INSULATED STORAGE TANK	120	WATER	

- NOTES:
1. PICKLED & PASSIVATED 316L STAINLESS INTERIOR MATERIAL. NO ANODE REQ'D
  2. R16-5 INSULATION
  3. SENSOR WELLS & 2-INCH INLET/OUTLET PORTS W INLET DIFFUSER

HYDRAULIC SEPARATOR						
TAG	MAKE	MODEL	DESCRIPTION	CAPACITY [GAL]	FLUID	NOTES
F1	CALEFFI	549510A	4-INCH HYDRAULIC SEPARATOR	8.0	30% PG	1, 2

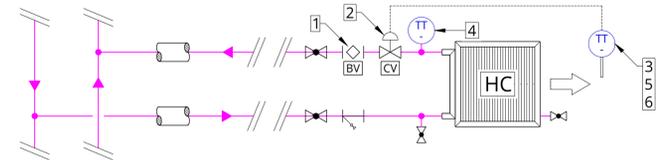
- NOTES:
1. CW AIR VENT, FILTER, MAGNETIC PLUG & BLOWDOWN
  2. ENSURE BLOWDOWN VALVE & MAGNETIC WELL HAVE ADEQUATE SERVICE CLEARANCE

EXPANSION TANKS						
TAG	MAKE	MODEL	DESCRIPTION	CAPACITY [GAL]	FLUID	NOTES
ET1	AMTROL	L-200	HYDRONIC	43	30% PG	1
ET2	-	-	DHW	10	WATER	1

- NOTES:
1. CHARGE AIR SIDE TO 25 PSI

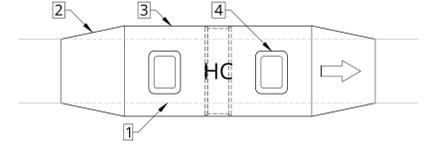
GLYCOL FEED TANKS							
TAG	MAKE	MODEL	DESCRIPTION	CAPACITY [GAL]	FLUID	POWER	NOTES
GT1	CALEFACTO	GMPLC55		55	30% PG	120V/60HZ/1P	1, 2, 3, 4

- NOTES:
1. CW ALARM PANEL KIT (#GMPAL)
  2. CW LIQUID LEVEL GAUGE, PUMP SUCTION HOSE W STRAINER, PRESSURE PUMP W CHECK VALVE, CUTOFF PIGGYBACK LEVEL FLOAT, ADJUSTABLE FRY
  3. PRESSURE REDUCING VALVE SET TO 25PSI
  4. HYDRONIC CONNECTION MAY BE OF FLEXIBLE TYPE W MINIMUM 50PSI RATING



**3 TYPICAL HEATING COIL DETAIL WITH CONTROL VALVE**

- KEYNOTES:
1. BALANCE VALVES: BV1, BV2, BV3, BV4. BALANCE TO MEET DESIGN FLOWRATE
  2. CONTROL VALVES: CV1, CV2, CV3, CV4
  3. PROVIDE AIR TEMPERATURE SENSOR SUPPLY DUCT DOWNSTREAM OF HEATING COIL
  4. LWT SENSORS: TT42, TT45, TT48, TT51
  5. LAT SENSORS: TT43, TT46, TT49, TT52
  6. CONNECT AHU1&2 TO TEMPERATURE SENSOR DOWNSTREAM OF COIL - USE TO CONTROL GAS HEATER



**4 TYPICAL HEATING COIL DUCT INTEGRATION**

- KEYNOTES:
1. DEMOLISH EXISTING DUCT SECTION
  2. EXPAND DUCTING TO MATCH AIR COIL SIZE WITH TRANSITIONS
  3. PROVIDE STRAIGHT DUCT SECTION FOR HEATING COIL
  4. INSTALL HAND ACCESS DOORS ON BOTH SIDES OF HEATING COIL

PUMPS					
TAG	P1	P2	P3	P4	
LOCATION	MECH RM (133)	MECH RM (133)	MECH RM (133)	MECH RM (133)	
SERVICE	HP1 CONDENSER	HYDRONICS	DH1	HP1 SUBCOOLER	
CAPACITY	SYSTEM FLOW [GPM]	134	109	49	34.5
	PUMP FLOW [GPM]	134	109	49	34.5
	HEAD [PSI]	1.75	35.4	8.25	5
	NPSH [PSI]	1.5	5.29	0.91	1.24
	PUMP EFFICIENCY [%]	69	73	59	57
TYPE	DESCRIPTION	VERTICAL INLINE	VERTICAL INLINE	VERTICAL INLINE	VERTICAL INLINE
	FLUID TYPE	30% PG	30% PG	30% PG	DOMESTIC WATER
	RPM @ DUTY POINT	865	3312	1083	1170
	BHP @ DUTY POINT [HP]	0.67	3.07	0.38	0.18
	SUCT CONN [IN]	4	1.5	2	2
	IMP DIA [IN]	4.93	4.96	7.15	5.24
	BASE TYPE	PIPE MOUNT	PIPE MOUNT	PIPE MOUNT	PIPE MOUNT
	SUCTION DIFFUSER	-	-	-	-
ELECTRICAL	MOTOR SIZE [HP]	0.5	5	0.75	0.33
	MOTOR RPM	-	-	1200	1200
	VOLT/PHASE/HZ	575/3P/60	575/3P/60	575/3P/60	575/3P/60
	DRIVE CONTROL	EXTERNAL VFD	EXTERNAL VFD	SINGLE SPEED	SINGLE SPEED
WEIGHT	WEIGHT [LB]	200	108	192	135
BASIS OF DESIGN	MAKE	ARMSTRONG	ARMSTRONG	ARMSTRONG	ARMSTRONG
	MODEL	4380-4x4x6-6P	4380-1.5x1.5x5	4380-2x2x8-6P	4380-2x2x6-6P
	NOTES	1, 3	1, 3	1, 3	1, 4

- NOTES:
1. INCLUDE SUCTION DIFFUSER AS INSTALLATION REQUIRES. MATCH SYSTEM SIZE & PUMP INLET SIZE
  3. BACNET MS/TP COMMUNICATION INTERFACE MODULE
  4. ALL BRONZE OR SS CONSTRUCTION SUITABLE FOR DOMESTIC WATER

HEATING COILS						
TAG	HC1	HC2	HC3	AHU7	DH1	
LOCATION	AHU1 SA DUCT	AHU2 SA DUCT	AHU3 RA DUCT	UNIT	UNIT	
SERVICE	HEATING	HEATING	HEATING	HEATING	HEATING	
CAPACITY	CAPACITY [MBH]	200	167	323	433	586
TYPE	DWP [PSI]	150	150	150	-	-
	FIN HEIGHT [IN]	15	12	24	-	-
	FIN LENGTH [IN]	42	34	65	-	-
	ROWS	3	3	2	-	-
	FPI	8	10	10	-	-
AIR SIDE	FLOWRATE [CFM]	2500	2000	8000	5000	6600
	VELOCITY [FPM]	599	744	772	501	-
	EAT [FDB]	18	18	53	15	66
	LAT [FDB]	92	95	90	95	147
	APD [IN-WG]	0.32	0.54	0.40	0.211	-
FLUID SIDE	FLUID TYPE	30% PG	30% PG	30% PG	30% PG	30% PG
	FLOWRATE [GPM]	18.0	13.5	32.0	45.7	49
	EWI [F]	160	160	160	160	160
	LWT [F]	137	134	139	140	135
	WPD [FT-WC]	4.6	3.7	1.9	16	10.7
	CONN SIZE [IN]	-	-	-	-	-
BASIS OF DESIGN	MAKE	ENGINEERED AIR	ENGINEERED AIR	ENGINEERED AIR	TRANE	EI SOLUTIONS
	MODEL	-	-	-	-	-
	NOTES	1, 2	1, 2	1, 2	3	3

- NOTES:
1. SELECT ROWS, FINs, AND CIRCUITING TO SUIT DESIGN CRITERIA
  2. FIELD CONFIRM COIL SIZING PRIOR TO ORDERING
  3. CW UNIT



**5 HEATING COIL (HC1) LOCATION IN SUPPLY DUCT**

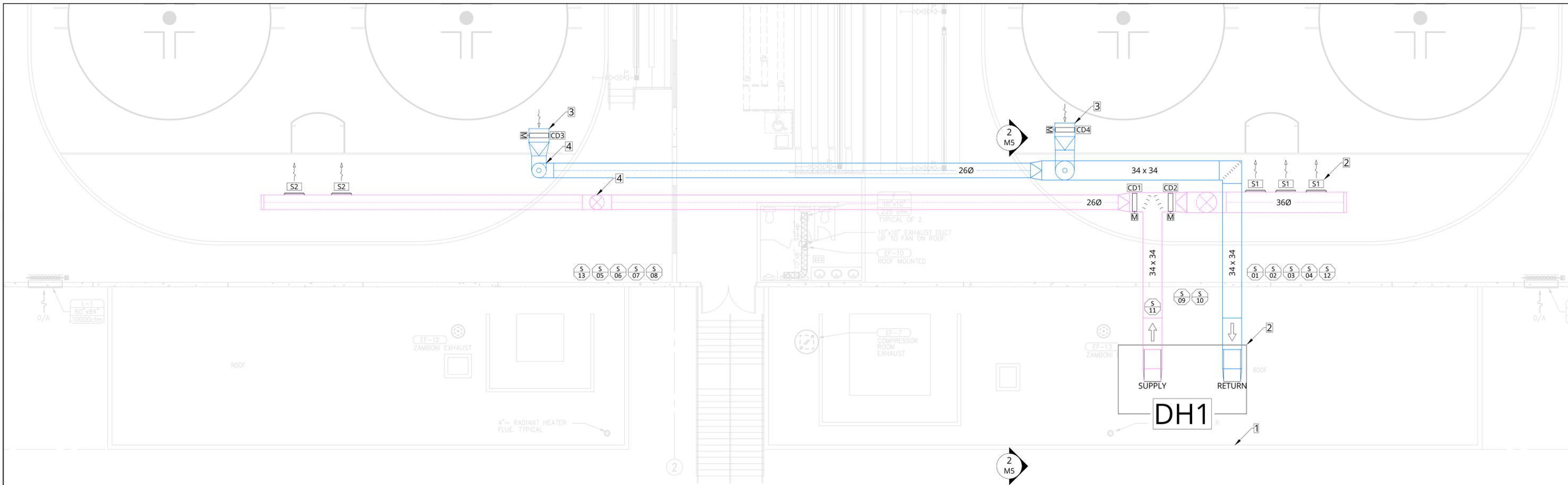


**6 HEATING COIL (HC2) LOCATION IN SUPPLY DUCT**



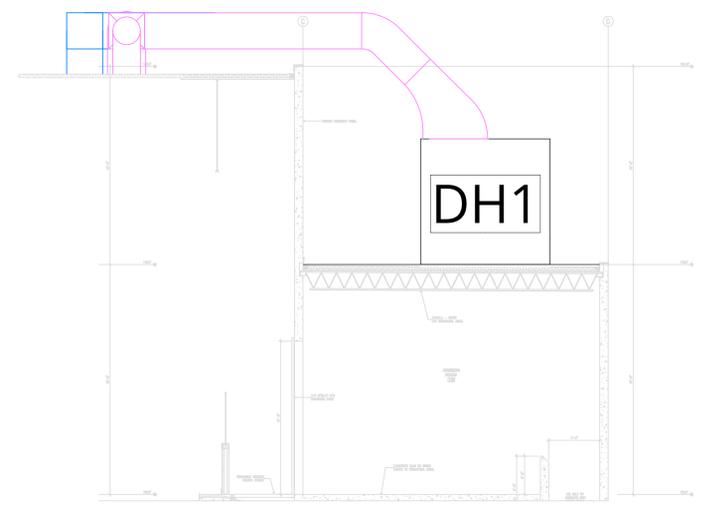
**7 HEATING COIL (HC3) LOCATION IN RETURN DUCT**

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				HYDRONIC P&ID	3	2024-12-20	NG	IW	ISSUED FOR REVIEW FINAL	SHEET NAME
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					5	-	-	-	-	
	6	-	-	-	-					



**1 DEHUMIDIFIER & DUCTWORK**

- KEYNOTES:**
1. SUPPLY AND INSTALL RAILING ALONG ROOF EDGE.
  2. DIRECT AWAY FROM ICE SURFACE ALONG CEILING.
  3. INSTALL BIRD SCREEN.
  4. REUSE AND ENLARGE EXISTING OPENINGS.
  5. SEE STRUCTURAL DRAWINGS FOR DETAILS FOR UNIT MOUNTING.



**2 SIDE VIEW**

DEHUMIDIFIERS										
TAG	DESCRIPTION	MAKE	MODEL	SUPPLY AIR (CFM)	SUPPLY AIR ESP (IN-WC)	H <sub>2</sub> O REMOVAL RATE (LB/HR)	REACT AIR (CFM)	POWER (V/PH/Hz)	HEATER (KBTU/H)	NOTES
DH1	DEHUMIDIFIER	EI SOLUTIONS	FLEX-120-PB	12,000	1.5	304.7	6,600	575/3/60	-	1,2,3

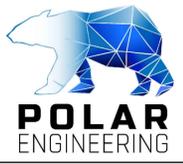
- NOTES:**
1. MOISTURE REMOVAL RATE BASED ON 100% OA & SUMMER CONDITIONS
  2. HEAT RECLAIM COIL CAPACITY EQUALS 585.7 KBTU/H
  3. HEATING COIL CAPACITY EQUALS 721.6 KBTU/H

CONTROL DAMPERS							
TAG	DESCRIPTION	MAKE	MODEL	AIRFLOW (CFM)	WIDTH (IN)	HEIGHT (IN)	NOTES
CD1	CONTROL DAMPER	TAMCO	SERIES 1000	6,000	34	34	1
CD2	CONTROL DAMPER	TAMCO	SERIES 1000	6,000	34	34	1
CD3	CONTROL DAMPER	TAMCO	SERIES 1000	6,000	34	34	2
CD4	CONTROL DAMPER	TAMCO	SERIES 1000	6,000	34	34	2

- NOTES:**
1. INSTALL WITH MODULATING ACTUATOR
  2. INSTALL WITH 2 POSITION ACTUATOR

GRILLE, REGISTERS & DIFFUSERS						
TAG	DESCRIPTION	MAKE	MODEL	AIRFLOW (CFM)	SIZE	NOTES
S1	HCD LOUVER	PRICE INDUSTRIES	HCD	2,000	36" x 15"	
S2	HCD LOUVER	PRICE INDUSTRIES	HCD	3,000	36" x 15"	

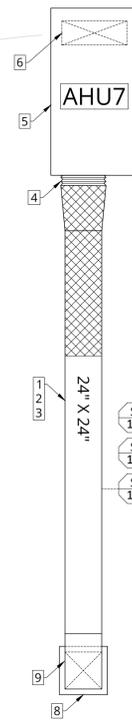
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PRIME CONSULTANT  POLAR ENGINEERING PHONE: 778-700-1086 WEBSITE: www.polareng.ca	CLIENT  REGIONAL DISTRICT OF NANAIMO PHONE: 250-390-4111 WEBSITE: www.rdn.bc.ca	ENGINEER OF RECORD  IAN WELLE P.ENG. EGBC PERMIT TO PRACTICE NUMBER: 1003657	PROJECT TITLE OCEANSIDE PLACE - ENERGY RECOVERY	REV # 1	DATE 2024-09-06	DRAWN BY NG	CHECKED BY IW	DESCRIPTION ISSUED FOR REVIEW	PROJ # 2409
			DRAWING TITLE DEHUMIDIFIER	2 2024-10-03 NG IW ISSUED FOR REVIEW 90%	3 2024-12-20 NG IW ISSUED FOR REVIEW FINAL	4 2025-01-31 NG IW ISSUED FOR TENDER	SHEET SIZE D		
SHEET NAME M5									SHEET NAME M5

AHU7 INPUT POINT LIST					
TAG	DESCRIPTION	PURPOSE	LOCATION	SIGNAL	NOTES
S12	CO2 SENSOR	SPACE CO2 CONCENTRATION	RA DUCT	AI	1
S13	TEMPERATURE	SPACE TEMPERATURE	POND	AI	
S14	RELATIVE HUMIDITY	SPACE HUMIDITY	POND	AI	
S15	OCCUPANCY SENSOR	CHECK SPACE OCCUPANCY	POND	AI	2
S16	CO2 SENSOR	OUTDOOR CO2 CONCENTRATION	ROOFTOP	DI	
S17	TEMPERATURE	OUTDOOR TEMPERATURE	ROOFTOP	AI	
AHU7	OUTDOOR AIR DAMPER	OUTDOOR AIR RATIO	AHU7	AO	3

- NOTES:  
 1. LOCATE CO2 SENSOR IN RETURN DUCTWORK  
 2. ENSURE OCCUPANCY SENSOR IS POSITIONED TO PROVIDE COVERAGE OF SPACE  
 3. PROVIDE MODULATING ACTUATOR FOR OUTDOOR AIR DAMPER

- GENERAL NOTES:  
 1. INSTALL DELTA BMS FOR AHU7 SEPARATE FROM THE HEAT PUMP AND AMMONIA PLANT. INCLUDE REMOTE ACCESS FOR OPERATORS  
 2. MECHANICAL CONTRACTOR RESPONSIBLE FOR PURCHASE, INSTALLATION, & CONNECTION OF MECHANICAL DEVICES, WELLS, SENSORS, LOW VOLTAGE WIRING, & CONTROLS  
 3. SIGNAL CODES: AI = ANALOG INPUT, DI = DIGITAL INPUT, AO = ANALOG OUTPUT, DO = DIGITAL OUTPUT



**1 ROOFTOP HVAC**

- KEYNOTES:  
 1. MIN 10' ACOUSTIC LINING  
 2. INSULATE EXTERIOR DUCT WITH 2-INCH ISOBOARD & VENTURE CLAD  
 3. SUPPORT DUCTWORK WITH RUBBER SLEEPERS  
 4. FLEX CONNECTION  
 5. SEE STRUCTURAL FOR UNIT LOCATION  
 6. BOTTOM RETURN  
 7. EXTERNAL HEATPUMP UNIT  
 8. INSTALL CURB AND INTEGRATE WITH ROOFING PACKAGE  
 9. SQUARE ELBOWS TO HAVE TURNING VANES AND ACCESS DOOR  
 10. GOOSE NECK WITH BIRD SCREEN ON OUTLET

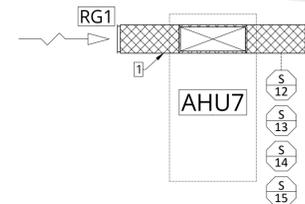
FIRED RADIANT HEATER  
 TD TO TIMER AND ON/OFF  
 TROL IN COMPRESSOR  
 M. TYPICAL

AIR HANDLER										
TAG	MAKE	MODEL	DESCRIPTION	TYPE	HEATING CAPACITY [KBTU/H]	COOLING CAPACITY [KBTU/H]	FLOW RATE [CFM]	POWER [V/PH/Hz]	FAN [HP]	NOTES
AHU7	TRANE	CSAAA010	SERVICES POND	HEAT PUMP	216	192	5,000	575/3/60	7.5	1,2

- NOTES:  
 1. AHU CW EXTERNAL SAMSUNG HEAT PUMP UNIT, MODEL AM192DXVQQH/AA  
 2. AHU CW HYDRONIC PREHEAT COIL

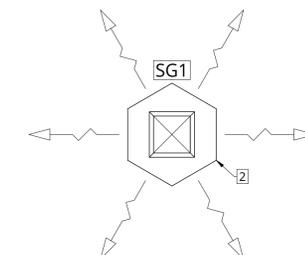
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16" x 6"  
 150 cfm  
 TYPICAL OF 6.



**2 INTERIOR HVAC**

- KEYNOTES:  
 1. RETURN DUCT WITH ACOUSTIC LINER  
 2. COORDINATE DIFFUSER HEIGHT TO ENSURE UNOBSTRUCTED AIRFLOW



GAS FIRED RADIANT HEATER  
 WIRED TO TIMER AND ON/OFF  
 CONTROL IN COMPRESSOR  
 ROOM. TYPICAL

AHU7: GRILLE, REGISTERS & DIFFUSERS						
TAG	DESCRIPTION	MAKE	MODEL	AIRFLOW (CFM)	SIZE	NOTES
SG1	DBH-20T-6WAY	PRICE INDUSTRIES	DBH-6WAY	5,000	20T	
RG1	EGG CRATE GRILLE	PRICE INDUSTRIES	80	2,500	26" x 18"	
RD1	RELIEF DAMPER	GREENHECK	BR-10	1,000	24" x 24"	1

1. ADJUST DAMPER TO MAINTAIN 0.05 IN-WG POSITIVE PRESSURE AT 1,000 CFM

SCALE: 1:60

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			DRAWING TITLE POND AIR HANDLER						

INPUT POINT LIST					
TAG	DESCRIPTION	PURPOSE	LOCATION	SIGNAL	NOTES
HP-C1	IQ MODULE	COMPRESSOR STATUS/ALARMS	C1	-	
HP-C2	IQ MODULE	COMPRESSOR STATUS/ALARMS	C2	-	
HP-C3	IQ MODULE	COMPRESSOR STATUS/ALARMS	C3	-	
HP-PT01	PRESSURE SENSOR	DISCHARGE PRESSURE	HX2	AI	1
HP-TT02	TEMPERATURE SENSOR	DISCHARGE TEMPERATURE	HX2	DI	1
HP-TT03	TEMPERATURE SENSOR	CONDENSING TEMPERATURE	HX2	AI	1
HP-PT04	PRESSURE SENSOR	SUCTION PRESSURE	HX1	AI	1
HP-TT05	TEMPERATURE SENSOR	SUCTION SUPERHEAT TEMPERATURE	HX1	AI	1
HP-TT06	TEMPERATURE SENSOR	SUBCOOLER OUTLET TEMPERATURE	HX3	AI	1
HP-TT07	TEMPERATURE SENSOR	SUBCOOLER INLET TEMPERATURE	HX3	AI	1
HP-TT08	TEMPERATURE SENSOR	CONDENSER LWT	HX2	AI	1,2
HP-TT09	TEMPERATURE SENSOR	CONDENSER EWT	HX2	AI	1,2
HP-TT10	TEMPERATURE SENSOR	SUBCOOLER EWT	HX3	AI	1,2
HP-TT11	TEMPERATURE SENSOR	SUBCOOLER LWT	HX3	AI	1,2
HP-CT12	CURRENT SENSOR	HEAP PUMP POWER	HP1	AI	1,2
HP-LT13	LEVEL SWITCH	LOW LEVEL OIL SWITCH	V2	DI	
HP-TT14	TEMPERATURE SENSOR	C1 DISCHARGE TEMPERATURE	C1	AI	1
HP-TT15	TEMPERATURE SENSOR	C2 DISCHARGE TEMPERATURE	C2	AI	1
HP-TT16	TEMPERATURE SENSOR	C3 DISCHARGE TEMPERATURE	C3	AI	1
HP-EM17	ONICON SYSTEM1000	CONDENSER & SUBCOOLER OUTPUT	HP1	BACNET	3
HP-FM18	F3104-11111-1111 FLOWMETER	CONDENSER FLOWRATE	HX2	AI	2
HP-FM19	F4600-150-010-16 FLOWMETER	SUBCOOLER FLOWRATE	HX3	AI	2
TT41	TEMPERATURE SENSOR	HYDRONIC SUPPLY TEMP	P2	AI	1
TT42	TEMPERATURE SENSOR	HEATING COIL LWT	HC1	AI	1
TT43	TEMPERATURE SENSOR	HEATING COIL LAT	HC1	AI	1
TT44	TEMPERATURE SENSOR	HYDRONIC RETURN TEMP	P2	AI	1
TT45	TEMPERATURE SENSOR	HEATING COIL LWT	HC2	AI	1
TT46	TEMPERATURE SENSOR	HEATING COIL LAT	HC2	AI	1
TT48	TEMPERATURE SENSOR	HEATING COIL LWT	HC3	AI	1
TT49	TEMPERATURE SENSOR	HEATING COIL LAT	HC3	AI	1
TT51	TEMPERATURE SENSOR	HEATING COIL LWT	AHU7	AI	1
TT52	TEMPERATURE SENSOR	HEATING COIL LAT	AHU7	AI	1
TT53	TEMPERATURE SENSOR	SUBCOOLER TANK LWT	ST4	AI	1
TT54	TEMPERATURE SENSOR	SUBCOOLER TANK EWT	ST1	AI	1
TT55	TEMPERATURE SENSOR	HEATING COIL EWT	DH1	AI	1
TT56	TEMPERATURE SENSOR	HEATING COIL LWT	DH1	AI	1
P1	PUMP STATUS	CONDENSER PUMP STATUS	P1	DI	
P2	PUMP STATUS	HYDRONIC PUMP STATUS	P2	DI	
P3	PUMP STATUS	DEHUMIDIFIER PUMP STATUS	P3	DI	
P4	PUMP STATUS	SUBCOOLER PUMP STATUS	P4	DI	
P1	PUMP SPEED	CONDENSER PUMP SPEED	P1	AI	
P2	PUMP SPEED	HYDRONIC PUMP SPEED	P2	AI	
GT1	ALARM	GLYCOL FEEDTANK LOW LEVEL	GT1	DI	
DH1	DEHUMIDIFIER	DEHUMIDIFIER RUN STATUS	DH1	DI	
S01	TEM & RH SENSOR	INTERIOR TEMPERATURE & RH	RINK 1	AI	1
S02	CO2 SENSOR	INTERIOR CO2	RINK 1	AI	1
S03	CO SENSOR	INTERIOR CO	RINK 1	AI	1,5
S04	DEWPOINT SENSOR	INTERIOR DEWPOINT	RINK 1	AI	1
S05	TEM & RH	INTERIOR TEMPERATURE & RH	RINK 2	AI	1
S06	CO2 SENSOR	INTERIOR CO2	RINK 2	AI	1
S07	CO SENSOR	INTERIOR CO	RINK 2	AI	1,5
S08	DEWPOINT SENSOR	INTERIOR DEWPOINT	RINK 2	AI	1
S09	TEM & RH SENSOR	EXTERIOR TEMPERATURE & RH	ROOFTOP	AI	1
S10	CO2 SENSOR	EXTERIOR CO2	ROOFTOP	AI	1
S11	AIR PRESSURE SWITCH	DUCT PRESSURE	SUPPLY DUCT	DI	
S12	NO2 SENSOR	INTERIOR NO2	RINK1	AI	6
S13	NO2 SENSOR	INTERIOR NO2	RINK2	AI	6
DH-S1	TEMPERATURE SENSOR	PROCESS EAT	DH1	AI	
DH-S2	RELATIVE HUMIDITY SENSOR	PROCESS EARH	DH1	AI	
DH-S3	TEMPERATURE SENSOR	PROCESS LAT	DH1	AI	
DH-S4	RELATIVE HUMIDITY SENSOR	PROCESS LARH	DH1	AI	
DH-S5	TEMPERATURE SENSOR	REGEN EAT	DH1	AI	
DH-S6	RELATIVE HUMIDITY SENSOR	REGEN EARH	DH1	AI	
DH-S7	TEMPERATURE SENSOR	REGEN LAT	DH1	AI	
DH-S8	TEMPERATURE SENSOR	PREHEAT COIL LAT	DH1	AI	
DH-S9	DIFFERENTIAL PRESSURE SENSOR	PROCESS FILTERS	DH1	DI	
DH-S10	DIFFERENTIAL PRESSURE SENSOR	REGEN FILTERS	DH1	DI	
DH-S11	FAN SPEED	PROCESS FANS	DH1	AI	
DH-S12	FAN SPEED	REGEN FANS	DH1	AI	
AHU1	RUN STATUS	HEATING DEMAND	AHU1	DI	4
AHU2	RUN STATUS	HEATING DEMAND	AHU2	DI	4
AHU3	RUN STATUS	HEATING DEMAND	AHU3	DI	4
AHU7	RUN STATUS	HEATING DEMAND	AHU7	DI	
DH1	RUN STATUS	HEATING DEMAND	DH1	DI	

- NOTES:  
1. ENSURE SENSOR RANGE ENCOMPASSES OPERATING RANGE  
2. CONNECT TO ENERGY METER  
3. INTEGRATE WITH HEAT PUMP DDC TO SUPPLY ENERGY, TEMPERATURE, FLOWRATE, POWER & COP TO HP1 GRAPHICS VIA BACNET  
4. SIGNAL FROM EXISTING UNITS  
5. MINIMUM SENSOR REQUIREMENTS: 1PPM RESOLUTION, 0-200PPM RANGE, ±5% PRECISION  
6. MINIMUM SENSOR REQUIREMENTS: 20PPB RESOLUTION, 0-10PPM RANGE, ±5% PRECISION

- GENERAL NOTES:  
1. MECHANICAL CONTRACTOR RESPONSIBLE FOR PURCHASE, INSTALLATION, & CONNECTION OF MECHANICAL DEVICES, WELLS, SENSORS, LOW VOLTAGE WIRING, & CONTROLS  
2. SIGNAL CODES: AI = ANALOG INPUT, DI = DIGITAL INPUT, AO = ANALOG OUTPUT, DO = DIGITAL OUTPUT

OUTPUT POINT LIST					
TAG	DESCRIPTION	PURPOSE	LOCATION	SIGNAL	NOTES
C1	COMPRESSOR START	RUN COMPRESSOR	HP1	DO	
C1	COMPRESSOR CAPACITY	SET COMPRESSOR CAPACITY	HP1	AO	
C2	COMPRESSOR START	RUN COMPRESSOR	HP1	DO	
C2	COMPRESSOR CAPACITY	SET COMPRESSOR CAPACITY	HP1	AO	
C3	COMPRESSOR START	RUN COMPRESSOR	HP1	DO	
C3	COMPRESSOR CAPACITY	SET COMPRESSOR CAPACITY	HP1	AO	
215	SOLENOID VALVE	EVAPORATOR SUPPLY CONTROL	HX1	DO	
216	ELECTRIC EXPANSION VALVE	EVAPORATOR EXPANSION VALVE	HX1	AO	
205	SOLENOID VALVE	COMPRESSOR OIL RETURN	V3	DO	
221	SOLENOID VALVE	CONTROL SA OIL RETURN	V2	DO	
VFD1	PUMP START	RUN CONDENSER PUMP	P1	DO	
VFD1	PUMP SPEED	CONDENSER PUMP SPEED	P1	AO	
VFD2	PUMP START	RUN HYDRONIC PUMP	P2	DO	
VFD2	PUMP SPEED	HYDRONIC PUMP SPEED	P2	AO	
P3	PUMP START	RUN DEHUMIDIFIER PUMP	P3	DO	
P4	PUMP START	RUN SUBCOOLER PUMP	P4	DO	
CD1	RINK 2 SUPPLY DUCT	CONTROL RINK 2 SUPPLY AIR	ROOFTOP	AO	
CD2	RINK 1 SUPPLY DUCT	CONTROL RINK 1 SUPPLY AIR	ROOFTOP	AO	
CD3	RINK 2 RETURN DUCT	CONTROL RINK 2 RETURN AIR	RINK 2	DO	
CD4	RINK 1 RETURN DUCT	CONTROL RINK 1 RETURN AIR	RINK 1	DO	
DH-S13	DEHUM START	DEHUMIDIFIER ON/OFF	DH1	DO	
DH-S14	HUMIDISTAT	START REGEN	DH1	DO	
DH-S15	REGEN BURNER	CONTROLS NATURAL GAS BURNER	DH1	AO	
DH-S16	PROCESS AIRFLOW	RELATIVE HUMIDITY	DH1	AO	
DH-S17	MIXING DAMPER	OA & RA MIX RATIO	DH1	AO	
DH-S18	DUCT HIGH PRESSURE	HIGH PRESSURE CUTOFF	DH1	DO	
DH-S19	FIRE ALARM	FIRE SIGNAL FROM BMS	DH1	DO	
DH-S20	HEAT	REQUEST FOR HEAT	DH1	DO	

- GENERAL NOTES:  
1. MECHANICAL CONTRACTOR RESPONSIBLE FOR PURCHASE, INSTALLATION, & CONNECTION OF MECHANICAL DEVICES, WELLS, SENSORS, LOW VOLTAGE WIRING, & CONTROLS  
2. SIGNAL CODES: AI = ANALOG INPUT, DI = DIGITAL INPUT, AO = ANALOG OUTPUT, DO = DIGITAL OUTPUT

### CONTROL SEQUENCES & OBJECTIVES

#### HEAT PUMP (HP1)

THE HEAT PUMP IS STARTED WHEN THE CONDENSER LOOP IS BELOW SETPOINT AND HEAT IS AVAILABLE FROM THE NH3 REFRIGERATION PLANT.

- CONDENSER LOOP SETPOINT IS 160F
- BEFORE HEAT PUMP STARTS, CONFIRM THAT
  - CONDENSER PUMP (P1) IS RUNNING
  - THE AMMONIA PLANT IS RUNNING
  - SOLENOID VALVE (V228) IS OPEN. *OBJECTIVE: TO ALLOW FLOW TO CASCADE HEAT EXCHANGER (HX1)*
  - BACK PRESSURE REGULATOR BYPASS SOLENOID (V302) IS CLOSED. *OBJECTIVE: INCREASE NH3 CONDENSING PRESSURE FOR ENERGY RECOVERY WITHOUT LIMITING COMPRESSOR COOLING*
- MODULATE COMPRESSOR CAPACITY TO MAINTAIN HEAT PUMP EVAPORATOR SETPOINT
- MODULATE EXPANSION VALVE TO MAINTAIN SUCTION SUPERHEAT
- LIMIT COMPRESSOR STARTS TO 4 PER HOUR
- MINIMUM COMPRESSOR RUNTIME IS 5 MINUTES
- MINIMUM COMPRESSOR DISCHARGE SUPERHEAT IS 40F TO ENSURE PROPER OIL SEPARATION
- SHUTDOWN HEAT PUMP 60S BEFORE AMMONIA PLANT SHUTDOWN

#### CONDENSER PUMP (P1)

THE CONDENSER PUMP CIRCULATES PROPYLENE GLYCOL THROUGH THE CONDENSER PIPING LOOP AND COOLS THE HEAT PUMP CONDENSER (HX2).

- WHEN HEAT PUMP IS ENABLED, MODULATE FLOW RATE TO MAINTAIN HEAT PUMP CONDENSING SETPOINT (165F)

#### HEATING LOOP CIRCULATION (P2)

THE CONDENSER PUMP CIRCULATES PROPYLENE GLYCOL THROUGH THE HEAT PUMP CONDENSER (HX2).

- WHEN HEAT PUMP IS ENABLED, USE A PID FEEDBACK LOOP TO CONTROL P2 VFD SPEED TO THE MAXIMUM OF CV1, CV2, CV3, CV4 AT 90% OPEN. NOTE THAT THE MOST OPEN VALVE IS CONTROLLED TO 90%.
- WHEN HEAT PUMP IS NOT RUNNING, TURN OFF PUMP
- COMMISSION CV5 TO A STATIC CONTROLLED POSITION WITH 5 PSI PRESSURE DROP WHEN CV1/2/3/4 ARE ALL 100% OPEN

#### SUBCOOLER PUMP (P7)

THE SUBCOOLER PUMP (P4) CIRCULATES WATER THROUGH THE PREHEAT WATER TANKS AND PROVIDES ADDITIONAL SUBCOOLING TO THE HEAT PUMP VIA HX3.

- RUN WHEN THE HEAT PUMP IS RUNNING & THE SUBCOOLER EWT IS BELOW SETPOINT OF 140F
- IF PRE-HEAT TANK TEMPERATURE (TT57) REACHES 140F, TURN OFF THE SUBCOOLER PUMP

#### HEATING COIL CONTROL VALVES (CV1/2/3/4)

- WHEN ASSOCIATED RTU/AHU CALLED FOR HEAT, USE A PID FEEDBACK LOOP TO CONTROL EACH CV TO A DISCHARGE AIR TEMPERATURE SETPOINT
- WHEN NO CALLS FOR HEAT CLOSE CV
- OPERATURE RTU/AHU GAS BURNER AS SECOND STAGE HEATING. *OBJECTIVE: TO PRIORITIZE HYDRONIC HEAT AND MINIMIZE GAS USAGE*

#### DEHUMIDIFIER HW CIRCULATION PUMP (P3)

ENABLE P3 WHEN HEATPUMP IS ENABLED AND DH1 IS CALL FOR HEAT IS ENABLED.

MECHANICAL EQUIPMENT MOTOR LIST											
TAG	DESCRIPTION	LOCATION	VOLTS	PHASE	FLA	MCA	HP	KW	STARTER	CONTROL	NOTES
HP1	HEAT PUMP (C1/C2/C3)	MECH RM (133)	575	3	-	-	-	185	CP	HP1	1,2
P1	HP CONDENSER PUMP	MECH RM (133)	575	3	-	-	0.5	-	VSD	BAS	
P2	HP HYDRONIC PUMP	MECH RM (133)	575	3	-	-	5	-	VSD	BAS	
P3	DEHUMIDIFIER CIRCULATOR	MECH RM (133)	575	3	-	-	0.75	-	MRR	BAS	
P4	HP SUBCOOLER PUMP	MECH RM (133)	575	3	-	-	0.33	-	MRR	BAS	
DH1	DEHUMIDIFIER	ROOF ABOVE MECH RM	575	3	32	33	-	-	CP	BAS	
AHU7	AHU FAN MOTORS	ROOF ABOVE POND	575	3	9	11.25	-	-	CP	AHU7	
AHU7	AHU GAS HEATER	ROOF ABOVE POND	575	3	2.61	3.26	-	-	CP	AHU7	
AHU7	AHU EXTERNAL HP	ROOF ABOVE POND	575	3	-	16.1	-	-	CP	AHU7	
GT1	GLYCOL FEED TANK	MECH RM (133)	115	1	-	-	-	-	PCS	PS	

- NOTES:  
1. HEAT PUMP REQUIRES SINGLE POINT CONNECTION AND CONTAINS THREE COMPRESSORS AT 60.6KW EACH  
2. HEAT PUMP COMPRESSORS CONTROLLER BY HEAT PUMP CONTROL PANEL  
3. FHP MOTORS ARE LESS THAN 1/4 HP

- STARTER CODES:  
CP = CONTROL PANEL  
MRR = MOTOR RATED RELAY  
VSD = VARIABLE SPEED DRIVE  
PCS = PACKAGED CONTROL SYSTEM

- CONTROL CODES:  
BAS = BUILDING AUTOMATION SYSTEM  
PS = PRESSURE SWITCH

HYDRONIC CONTROL VALVES								
TAG	MAKE	MODEL	DESCRIPTION	TYPE	FLOW [GPM]	CV	FAILSAFE	NOTES
CV1	BELIMO	B223	CONTROL FLOW TO HC1	2-WAY MODULATING	18	10.0	CLOSED	1
CV2	BELIMO	B222	CONTROL FLOW TO HC2	2-WAY MODULATING	13.5	7.4	CLOSED	1
CV3	BELIMO	B223	CONTROL FLOW TO HC3	2-WAY MODULATING	32	10.0	CLOSED	1
CV4	BELIMO	G225B-L	CONTROL FLOW TO AHU7	2-WAY MODULATING	45.7	14.0	CLOSED	1
CV5	BELIMO	-	BYPASS	2-WAY MODULATING	-	-	OPEN	1

- NOTES:  
1. COMPLETE W BELIMO MFT ACTUATOR, SPRING OR CAPACITOR. FAILSAFE

BALANCE VALVES					
TAG	MAKE	MODEL	DESCRIPTION	FLOW [GPM]	NOTES
BV1	TO SPEC	-	BALANCE HC1 FLOW	18	1
BV2	TO SPEC	-	BALANCE HC2 FLOW	13.5	1
BV3	TO SPEC	-	BALANCE HC3 FLOW	32	1
BV4	TO SPEC	-	BALANCE AHU7 FLOW	45.7	1
BV5	TO SPEC	-	BALANCE P3 FLOW	49	1
BV6	TO SPEC	-	BALANCE P4 FLOW	34	1

- NOTES:  
1. CW TEST PORTS & MEMORY

#### DEHUMIDIFIER (DH1)

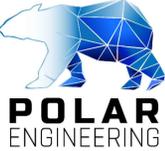
THE DESICCANT DEHUMIDIFIER MAINTAINS HUMIDITY LEVELS IN RINK 1 & RINK 2 WHILE PRIORITIZING ER HEAT FROM CONDENSER LOOP VIA PREHEAT COIL.

- DEWPOINT TEMPERATURE SHALL BE USED FOR THE DEHUMIDIFICATION SETPOINT WITH TYPICAL VALUES BEING BETWEEN 32FDP & 38FDP
- THE DEFAULT REGENERATION TEMPERATURE IS 150FDB. *OBJECTIVE: TO MINIMIZE NATURAL GAS USAGE WHILE MAINTAINING RINK HUMIDITY*
  - RESET THE REGENERATION TEMPERATURE UPWARDS TO A MAXIMUM 180FDB IF THE UNIT IS RUNNING AT 100% & THE DEWPOINT TEMPERATURE EXCEEDS 42FDP
  - RESET THE REGENERATION TEMPERATURE BACK TO 150FDB AFTER 30 MINUTES IF THE SETPOINT HAS BEEN MET
- ENABLE TRIM & RESPOND LOGIC TO CONTROL THE AIRFLOW TO EACH RINK VIA THE SUPPLY AIR CONTROL DAMPERS
  - MAXIMUM AIRFLOW TO RINK 1 IS 12,000CFM
  - MAXIMUM AIRFLOW TO RINK 2 IS 6,000CFM
- WHEN THERE IS NO ICE INSTALLED IN A RINK, THE DEHUMIDIFIER WILL NO LONGER PROVIDE DEHUMIDIFICATION TO THAT RINK
  - CLOSE CONTROL DAMPERS (SUPPLY & RETURN) FOR RINK
  - USER OPERABLE BUTTONS FOR 'ICE OUT' WILL BE PROVIDED ON THE GRAPHICS
- IMPLEMENT DEMAND CONTROL VENTILATION TO MODULATE THE OUTDOOR AIR DAMPER TO MAINTAIN BOTH ARENA CO2 LEVELS WITHIN 1000PPM OF OUTDOOR AIR
  - MODULATE OUTDOOR AIR DAMPER TO MANAGE CARBON MONOXIDE AND NITROGEN DIOXIDE LEVELS
    - MAINTAIN CARBON MONOXIDE LEVEL BELOW 10PPM
    - MAINTAIN CARBON MONOXIDE LEVEL BELOW 90PPB (0.09PPM)

#### POND AIR HANDLER (AHU7)

1. WHEN HEAT IS REQUIRED, PRIORITIZE HEAT FROM THE ENERGY RECOVERY SYSTEM FIRST AND THE HEAT PUMP SECOND

- IMPLEMENT DEMAND CONTROL VENTILATION
  - WHEN OCCUPANCY SENSOR IS TRIGGERED, MINIMUM OUTDOOR AIR DAMPER POSITION IS 1000CFM AND MAXIMUM OUTDOOR AIR DAMPER POSITION IS 2500CFM. CONTRACTOR TO DETERMINE MIN AND MAX OUTDOOR AIR DAMPER POSITION TO MEET CFM SETPOINTS DURING BALANCING AND COMMISSIONING
  - MODULATED OUTDOOR AIR DAMPER POSITION TO MAINTAIN INTERIOR CO2 LEVELS WITHIN 1000PPM OF OUTDOOR AIR CO2 LEVEL
- IMPLEMENT FREE COOLING
  - WHEN COOLING IS REQUIRED AND THE OUTDOOR AIR TEMPERATURE IS LESS THAN THE RETURN AIR TEMPERATURE, ALLOW THE OUTDOOR AIR DAMPER TO OPEN UP TO 100% TO MEET SAT SETPOINT

PRIME CONSULTANT	CLIENT	ENGINEER OF RECORD	PROJECT TITLE	REV #	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	PROJ #	
		 2025-02-03 STEFFEN TRANGELED P.ENG.	OCEANSIDE PLACE - ENERGY RECOVERY	1	2024-09-06	NG	IW	ISSUED FOR REVIEW	2409	
				2	2024-10-03	NG	IW	ISSUED FOR REVIEW 90%	SHEET SIZE	D
				3	2024-12-20	NG	IW	ISSUED FOR REVIEW FINAL	SHEET NAME	M7
				4	2025-01-31	NG	ST	ISSUED FOR TENDER		
				5	-	-	-	-		
				6	-	-	-	-		
PHONE 778-700-1086	WEBSITE www.polareng.ca	PHONE 250-390-4111	WEBSITE www.rdn.bc.ca	EGBC PERMIT TO PRACTICE NUMBER 1003657						



1 MECHANICAL ROOM PLATFORM

KEYNOTES:

1. DEMOLISH EXISTING PLATFORM AND REPLACE (SEE STRUCTURAL FOR DETAILS).
2. TRIM BACK DUCTWORK AND MOVE CONTROL DAMPER CLOSER TO WALL.
3. DEMOLISH LOWER HALF OF LADDER TO HEIGHT OF NEW PLATFORM.



2 EXISTING DEHUMIDIFIER

KEYNOTES:

1. DEMOLISH EXISTING DEHUMIDIFIER AND DUCTWORK.



3 DEHUMIDIFIER DUCTWORK

KEYNOTES:

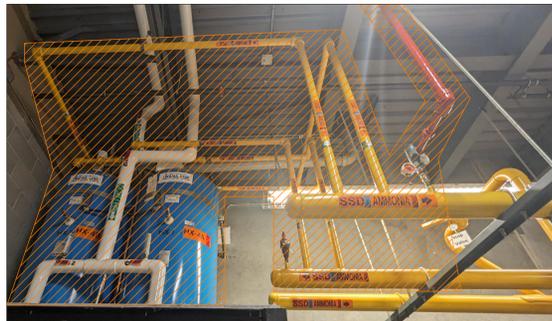
1. DEMOLISH DEHUMIDIFIER DUCTWORK ON ROOF AND INSIDE RINKS.



5 POND DEHUMIDIFIER

KEYNOTES:

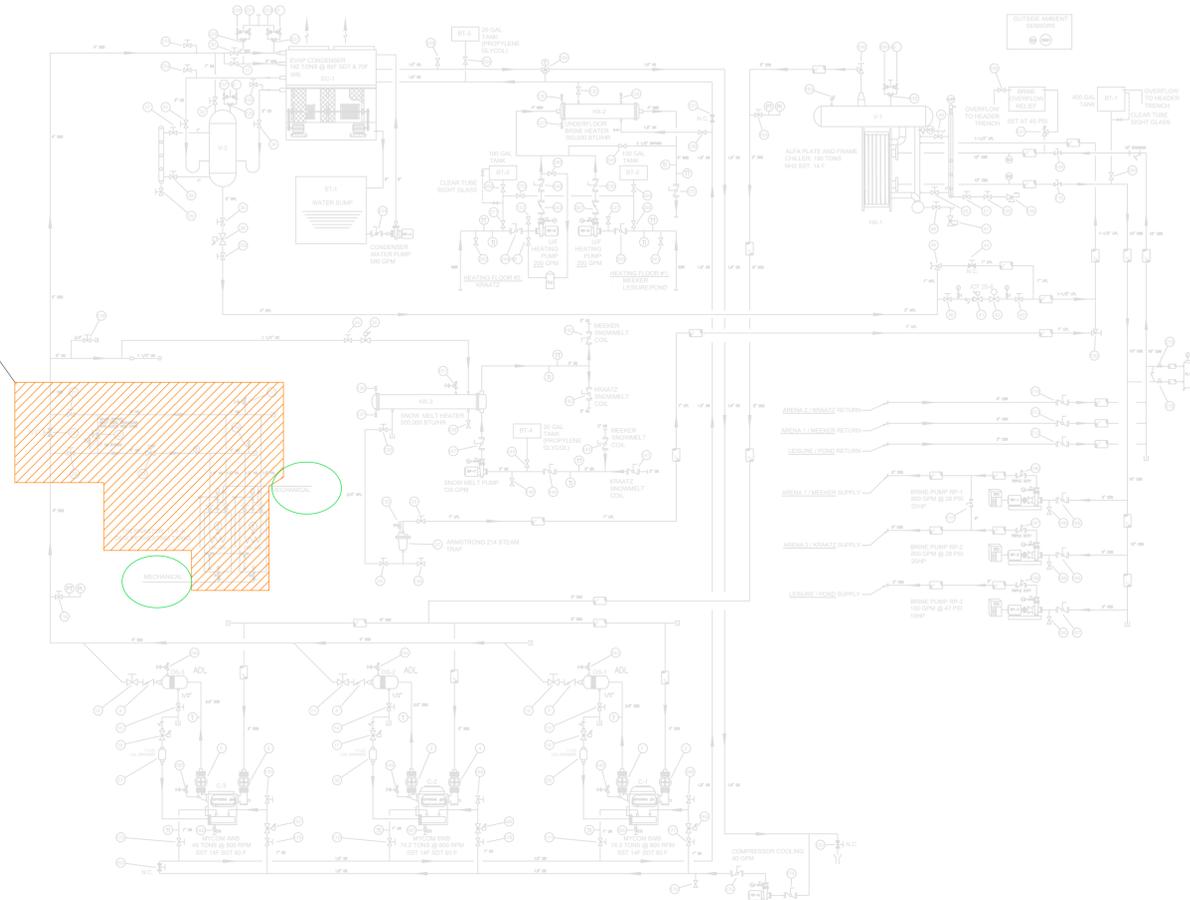
1. DEMOLISH POND DEHUMIDIFIER AND SHED.
2. LEAVE PAD.



6 DESUPERHEATERS 1 & 2

KEYNOTES:

1. DEMOLISH DESUPERHEATERS & AMMONIA PIPING.
2. REUSE WATER LINES DCWHR & DHW/R FOR SUBCOOLER.



8 DEHUMIDIFIER DUCTWORK IN THE POND

KEYNOTES:

1. DEMOLISH DEHUMIDIFIER DUCTWORK IN THE POND AND PATCH PENETRATIONS.

PRIME CONSULTANT  <b>POLAR ENGINEERING</b> PHONE: 778-700-1086 WEBSITE: www.polareng.ca	CLIENT  <b>REGIONAL DISTRICT OF NANAIMO</b> PHONE: 250-390-4111 WEBSITE: www.rdn.bc.ca	ENGINEER OF RECORD  <b>IAN WELLE P.ENG.</b> EGBC PERMIT TO PRACTICE NUMBER: 1003657	PROJECT TITLE <b>OCEANSIDE PLACE - ENERGY RECOVERY</b>	REV # 1	DATE 2024-09-06	DRAWN BY NG	CHECKED BY IW	DESCRIPTION ISSUED FOR REVIEW	PROJ # 2409
			DRAWING TITLE <b>MECHANICAL DEMOLITION</b>	2	2024-10-03	NG	IW	ISSUED FOR REVIEW 90%	SHEET SIZE D
				3	2024-12-20	NG	IW	ISSUED FOR REVIEW FINAL	SHEET NAME <b>M8</b>
				4	2025-01-31	NG	IW	ISSUED FOR TENDER	
				5	-	-	-	-	
				6	-	-	-	-	