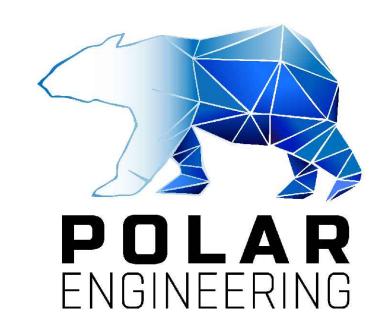
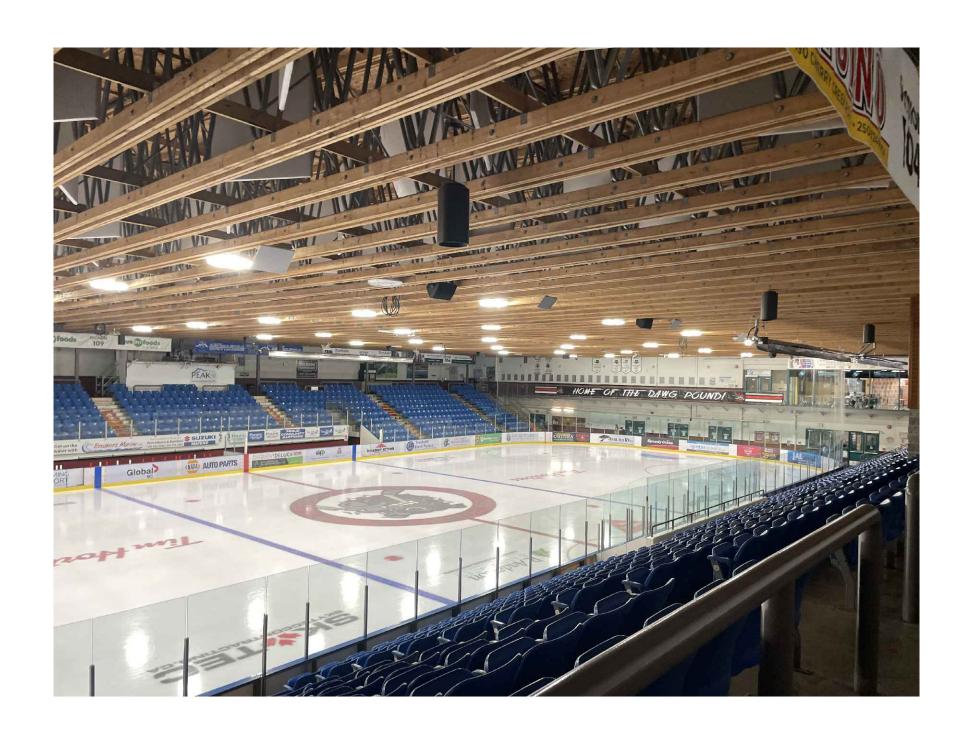
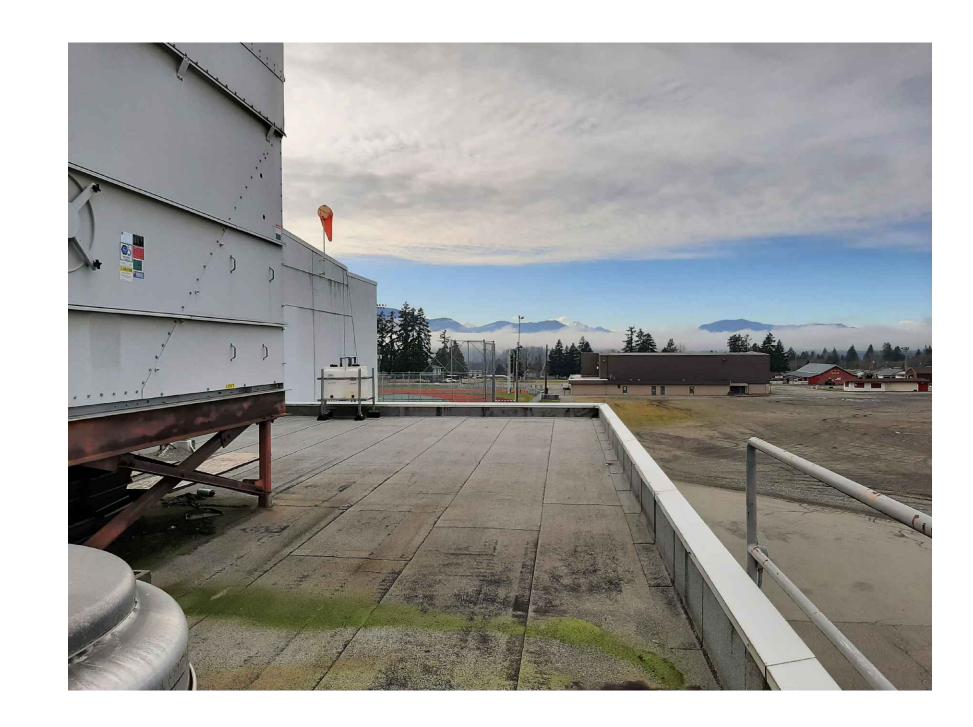
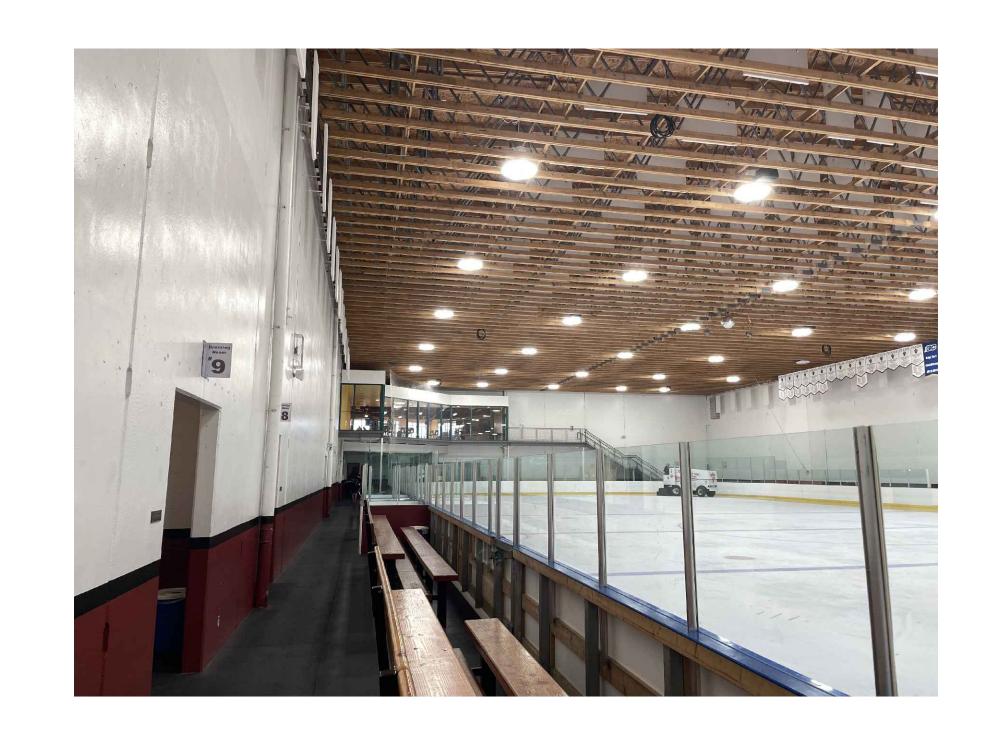


# Alberni Valley Multiplex Energy Recovery and Dehumidification









### **MECHANICAL DRAWING LIST**

SHEET NO. DESCRIPTION M0 COVER SHEET M1 P&ID - OVERALL SYSTEM KEY PLAN M2 SITE PLAN - SCOPE AREAS AND SHOWERS М3 MECHANICAL - DEMO M4 MECHANICAL - NEW M5 P&ID - AMMONIA PLANT - DEMO P&ID - AMMONIA PLANT - NEW M7 P&ID - HEAT PUMP AND HYDRONIC INTEGRATION

P&ID - DHW INTEGRATION

M9 MECHANICAL SCHEDULES AND CONTROLS
M10 CONTROLS

### NOTES TO CONTRACTOR:

THE CITY OF PORT ALBERNI IS INCLUDING A CASH ALLOWANCE FOR THE STRUCTURAL UPGRADES INVOLVED IN THIS PROJECT. SEE STRUCTURAL DRAWINGS AND CITY OF PORT ALBERNI DOCUMENTS FOR FURTHER INFORMATION.

PROVIDE BREAKOUT PRICING FOR EACH OF THE FOLLOWING SEPARATE PRICE ITEMS.

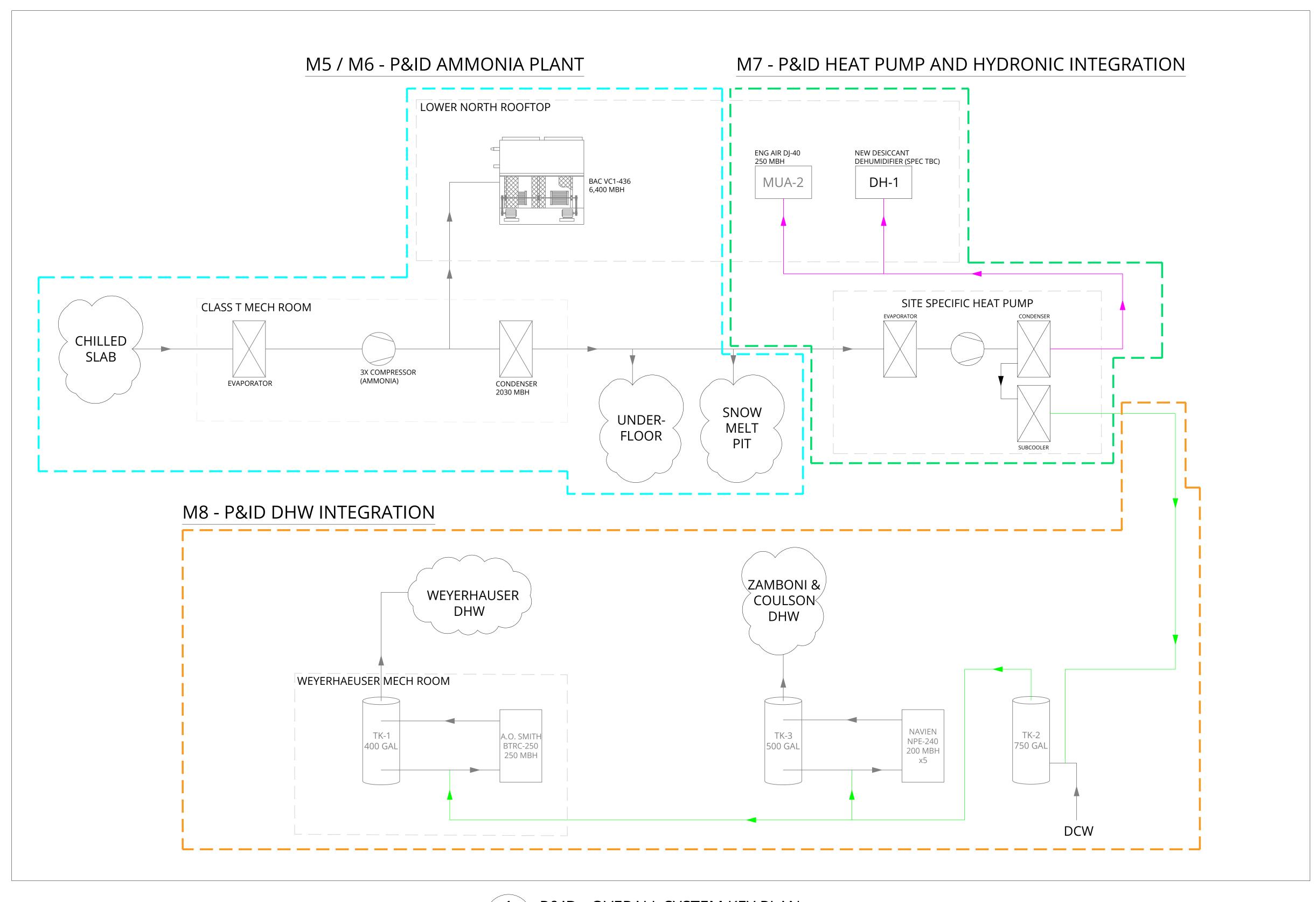
1. SEPARATE PRICE **SP-1:** PROVIDE NEW DUCTSOX IN WEYERHAUSER ARENA FOR DH-1 SUPPLY AIR. PROVIDE PRICE DIFFERENCE BETWEEN SUPPLY SYSTEM AS DRAWN AND DUCTSOX RUN

 SEPARATE PRICE SP-2: PROVIDE NEW 1.5" STEEL PIPING AND ASSOCIATED EQUIPMENT FOR MUA-2 HEATING COIL INTEGRATION WITH HEAT PUMP CONDENSER LOOP.



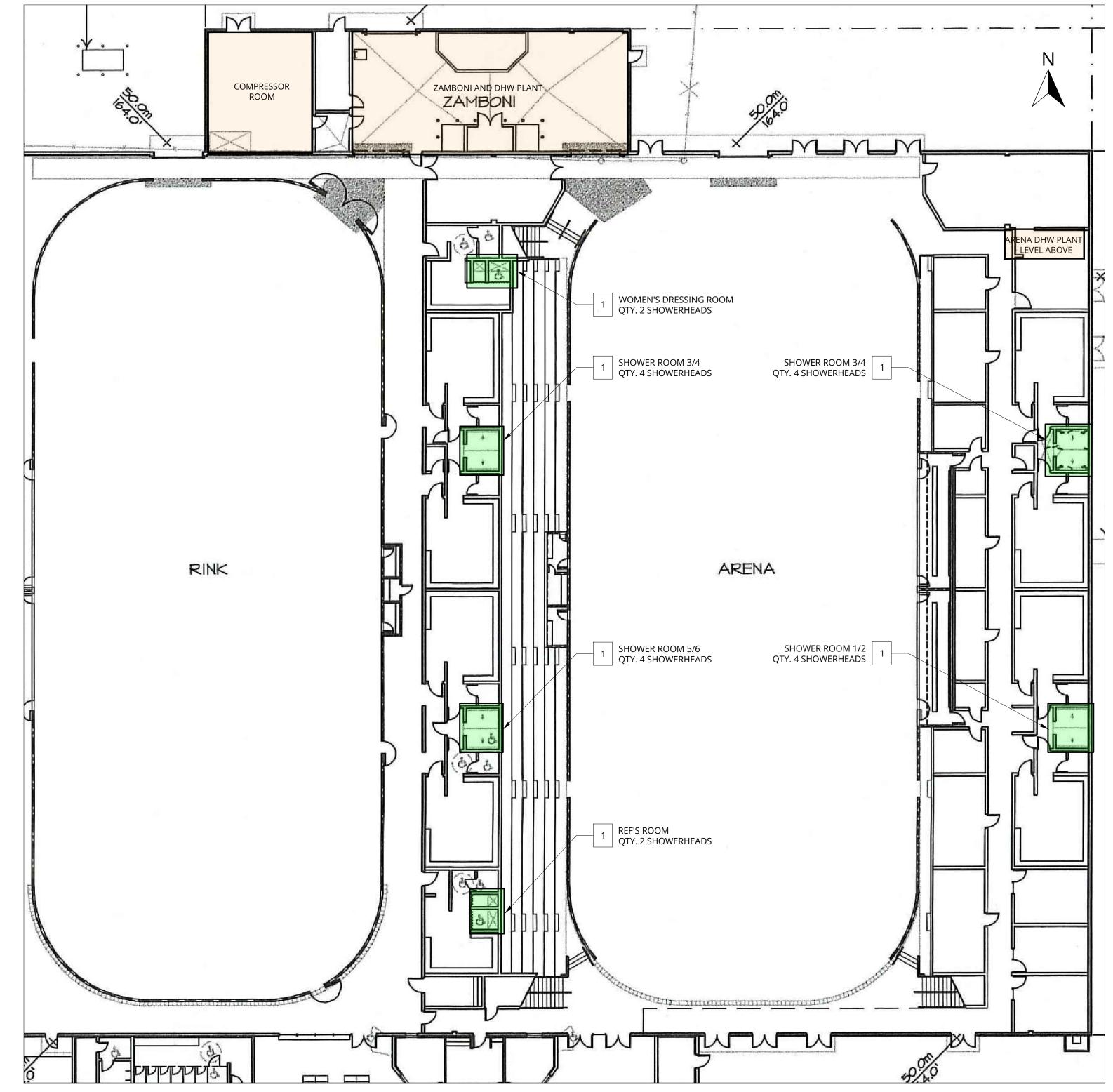
City of Port Alberni - Alberni Valley Multiplex 3737 Roger St, Port Alberni, BC

| PRIME CONSULTANT            | CONSULTANT   | CLIENT                         | ENGINEER OF RECORD   | PROJECT TITLE   | REV# | DATE       | DRAWN BY | CHECKED BY | DESCRIPTION             | PROJ # 2453 |
|-----------------------------|--------------|--------------------------------|--|---|------|------------|----------|------------|-------------------------|-------------|
|                             |              |                                | WOODE ESSION   | ALBERNI VALLEY MULTIPLEX - ENERGY RECOVERY AND DEHUMIDIFICATION | 1    | 2024-11-13 | EVN      | ВС         | ISSUED FOR COORDINATION | 2433        |
|                             |              |                                | I. L. WELLE  # 47179  OBBUTTON  OBBU | AND DEFICION IN   | 2    | 2025-01-10 | EVN      | ВС         | ISSUED FOR REVIEW       | SHEET SIZE  |
|                             |              | — CITY OF —<br>PORT ALBERNI    | WE HOW   | DRAWING TITLE   | - 3  | 2025-02-03 | EVN      | ВС         | ISSUED FOR TENDER       |             |
| POLAR                       |              | PORT ALBERTA                   | 2025-10-30   | COVER SHEET   | 4    | 2025-02-07 | EVN      | ВС         | RE-ISSUED FOR TENDER    | SHEET NAME  |
| ENGINEERING PHONE WEBSITE   | PHONE WEBSIT | E PHONE WEBSITE                | IAN WELLE P.ENG.  EGBC PERMIT TO PRACTICE NUMBER   |   | 5    | 2025-10-30 | AH       | ВС         | RE-ISSUED FOR TENDER    | MO          |
| 778-700-1086 www.polareng.c | ca           | 250-723-2146 www.portalberni.c | a 1003657  |   | 6    | -          | -        | -          | -                       |             |



1 P&ID - OVERALL SYSTEM KEY PLAN
M1 SCALE: NTS

| PRIME CONSULTANT             | CONSULTANT    | CLIENT                          | ENGINEER OF RECORD   | PROJECT TITLE   | REV# | DATE       | DRAWN BY | CHECKED BY | DESCRIPTION             | PROJ # <b>2453</b> |
|------------------------------|---------------|---------------------------------|--|---|------|------------|----------|------------|-------------------------|--------------------|
|                              |               |                                 | CONTROL OF THE STATE OF THE STA | ALBERNI VALLEY MULTIPLEX - ENERGY RECOVERY AND DEHUMIDIFICATION | 1    | 2024-11-13 | EVN      | ВС         | ISSUED FOR COORDINATION | 2433               |
|                              |               |                                 | I. L. WELLE  O BRITISH  O BRITISH | 7 (IVD DEFICIVITDII TC/TTOTV                                    | 2    | 2025-01-10 | EVN      | ВС         | ISSUED FOR REVIEW       | SHEET SIZE         |
|                              |               | — CITY OF —<br>PORT ALBERNI     | TO NEET ON   | DRAWING TITLE   | 3    | 2025-02-03 | EVN      | ВС         | ISSUED FOR TENDER       |                    |
| POLAR<br>ENGINEERING         |               | PORT ALBERTA                    | 2025-10-30   | OVERALL SYSTEM KEY PLAN   | 4    | 2025-02-07 | EVN      | ВС         | RE-ISSUED FOR TENDER    | SHEET NAME         |
| PHONE WEBSITE                | PHONE WEBSITE | PHONE WEBSITE                   | IAN WELLE P.ENG.  EGBC PERMIT TO PRACTICE NUMBER   |   | 5    | 2025-10-30 | AH       | ВС         | RE-ISSUED FOR TENDER    | M1                 |
| 778-700-1086 www.polareng.ca |               | 250-723-2146 www.portalberni.ca | 1003657  |   | 6    | -          | -        | -          | -                       |                    |



## 1 SITE PLAN - GROUND LEVEL - SCOPE AREAS AND SHOWERS M2 SCALE: 1:200

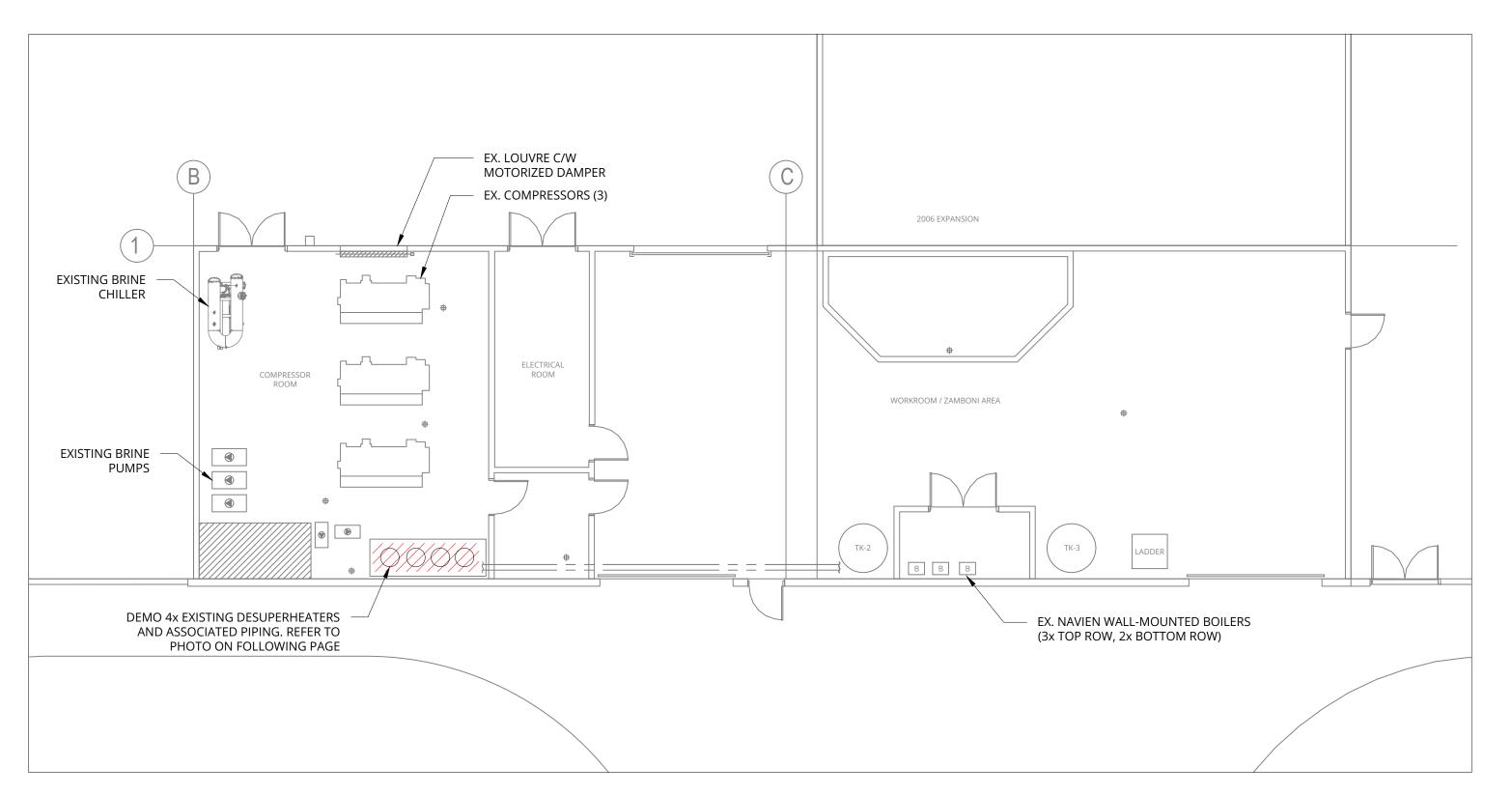
### KEYED NOTES:

 REMOVE EXISTING SHOWERHEADS AND REPLACE WITH 1.5GPM SHOWER HEAD; BRADLEY MODEL #S15.



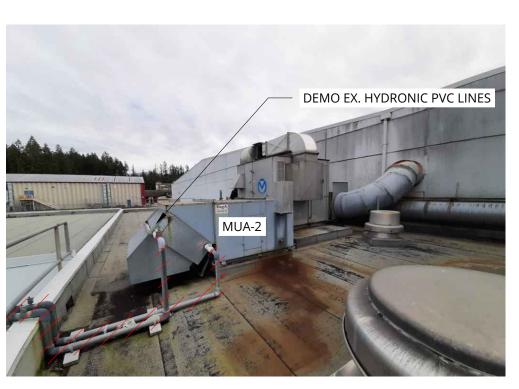
2 TYPICAL SHOWER HEADS
M2 SCALE: NTS

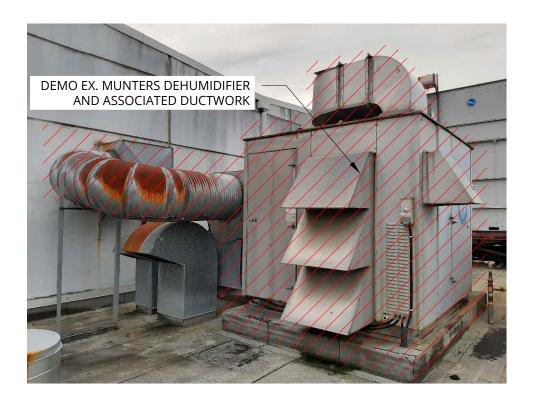
| PRIME CONSULTANT             | CONSULTANT |        | CLIENT                          | ENGINEER OF RECORD                              | PROJECT TITLE   | REV# | DATE       | DRAWN BY | CHECKED BY | DESCRIPTION             | PROJ # <b>2453</b> |
|------------------------------|------------|--------|---------------------------------|---|---|------|------------|----------|------------|-------------------------|--------------------|
|                              |            |        |                                 | LESSION AND AND AND AND AND AND AND AND AND AN  | ALBERNI VALLEY MULTIPLEX - ENERGY RECOVERY AND DEHUMIDIFICATION | 1    | 2024-11-13 | EVN      | ВС         | ISSUED FOR COORDINATION | 2455               |
|                              |            |        |                                 | I. L. WELLE  #47179  C. BRITTON                 | AND DETIONIDITICATION   | 2    | 2025-01-10 | EVN      | ВС         | ISSUED FOR REVIEW       | SHEET SIZE         |
|                              |            |        | — CITY OF —<br>PORT ALBERNI     | NOWEE   | DRAWING TITLE   | 3    | 2025-02-03 | EVN      | ВС         | ISSUED FOR TENDER       |                    |
| POLAR<br>ENGINEERING         |            |        | PORT ALBERTI                    | 2025-10-30                                      | SITE PLAN - SCOPE AREAS AND SHOWERS                             | 4    | 2025-02-07 | EVN      | ВС         | RE-ISSUED FOR TENDER    | SHEET NAME         |
| PHONE WEBSITE                | PHONE WEI  | SITE P | HONE WEBSITE                    | IAN WELLE P.ENG. EGBC PERMIT TO PRACTICE NUMBER |   | 5    | 2025-10-30 | AH       | ВС         | RE-ISSUED FOR TENDER    | M2                 |
| 778-700-1086 www.polareng.ca |            |        | 250-723-2146 www.portalberni.ca | 1003657   |   | 6    | -          | -        | -          | -                       |                    |



### GENERAL NOTES:

- 1. ALL DIMENSIONS ARE APPROXIMATE AND MUST BE CONFIRMED ON SITE BY THE CONTRACTOR.
- CONTRACTOR TO COORDINATE ANY DEMOLITION OR SHUT-OFF OF EXISTING WATER LINES WITH BASE BUILDING.
   PATCH AND MAKE GOOD (TO BASE BUILDING STANDARDS) MECHANICAL COMPONENTS AND FINISHES DAMAGED DURING CONSTRUCTION.







2453

M3

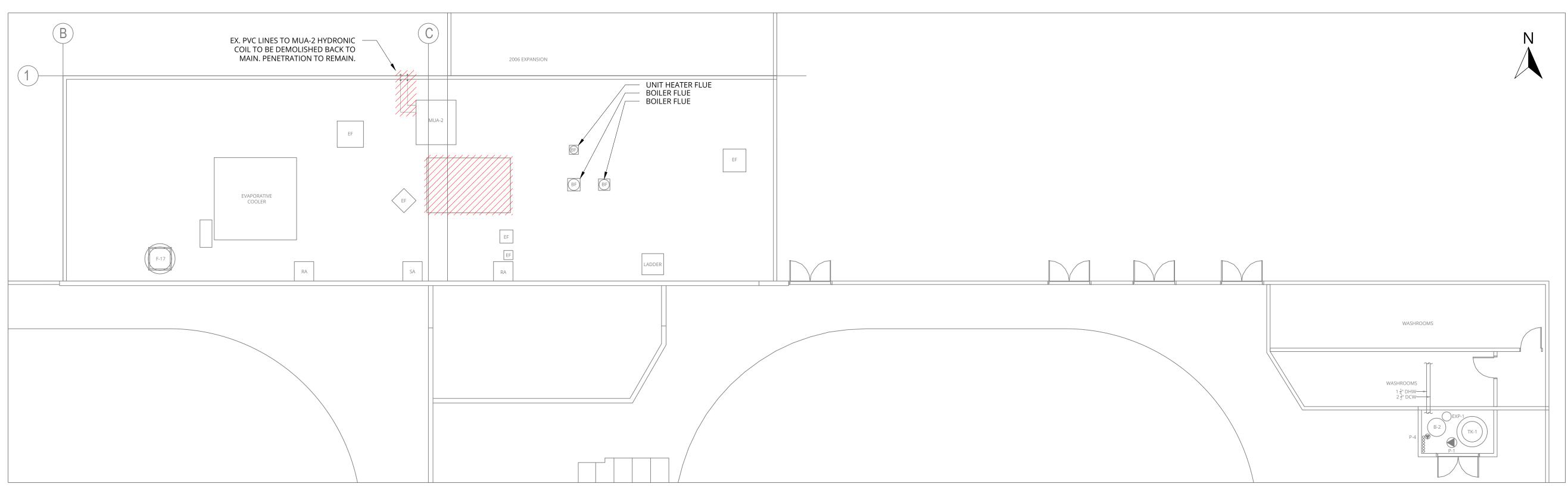
SHEET NAME

3 MUA-2 AND DEHUMIDIFIER
M3 SCALE: -

4 DEHUMIDIFIER AND DUCT
M3 SCALE: -

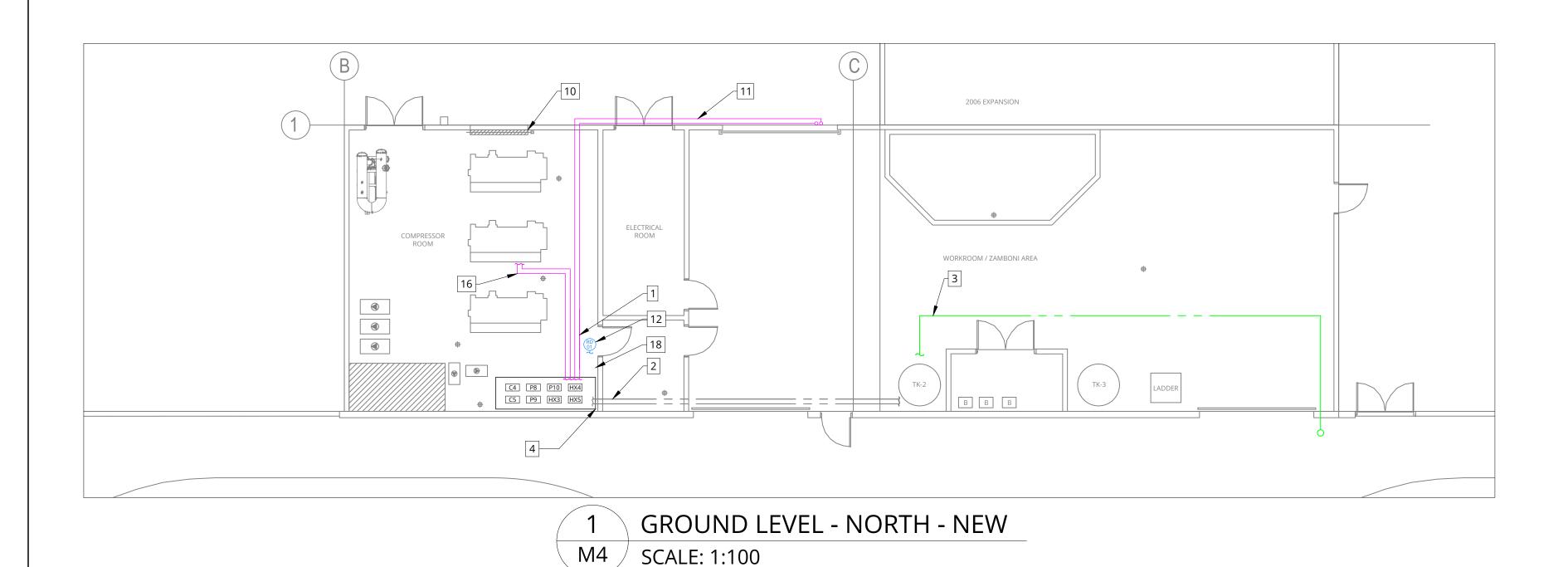
5 INTERIOR DUCT M3 SCALE: -





2 ROOF LEVEL - NORTH - DEMO M3 SCALE: 1:100

| PRI  | RIME CONSULTANT  |             | CONSULTAN | NT      | CLIENT       |                      | ENGINEER OF RECORD   | PROJECT TITLE   | REV# | DATE       | DRAWN BY | CHECKED BY | DESCRIPTION             |
|------|------------------|-------------|-----------|---------|--------------|----------------------|--|---|------|------------|----------|------------|-------------------------|
|      |                  |             |           |         |              |                      | With State of State o | ALBERNI VALLEY MULTIPLEX - ENERGY RECOVERY AND DEHUMIDIFICATION | 1    | 2024-11-13 | EVN      | ВС         | ISSUED FOR COORDINATION |
|      |                  |             |           |         |              |                      | 1. L. WELLE  # 47179  BRITISH  STATES  AND  STATES  ST | 7 (IND DEFICIONDIFICATION                                       | 2    | 2025-01-10 | EVN      | ВС         | ISSUED FOR REVIEW       |
|      |                  |             |           |         |              | CITY OF              | WO WEEK ON   | DRAWING TITLE   | 3    | 2025-02-03 | EVN      | ВС         | ISSUED FOR TENDER       |
|      | POL              |             |           |         |              | ORT ALBERTI          | 2025-10-30   | MECHANICAL - DEMO   | 4    | 2025-02-07 | EVN      | ВС         | RE-ISSUED FOR TENDER    |
| PHON | ENGINEE WEBSITE  | KIINU       | PHONE     | WEBSITE | PHONE        | WEBSITE              | IAN WELLE P.ENG.  EGBC PERMIT TO PRACTICE NUMBER   |   | 5    | 2025-10-30 | AH       | ВС         | RE-ISSUED FOR TENDER    |
| 778  | 78-700-1086 www. | polareng.ca |           |         | 250-723-2146 | 6 www.portalberni.ca | 1003657  |   | 6    | -          | -        | -          | -                       |

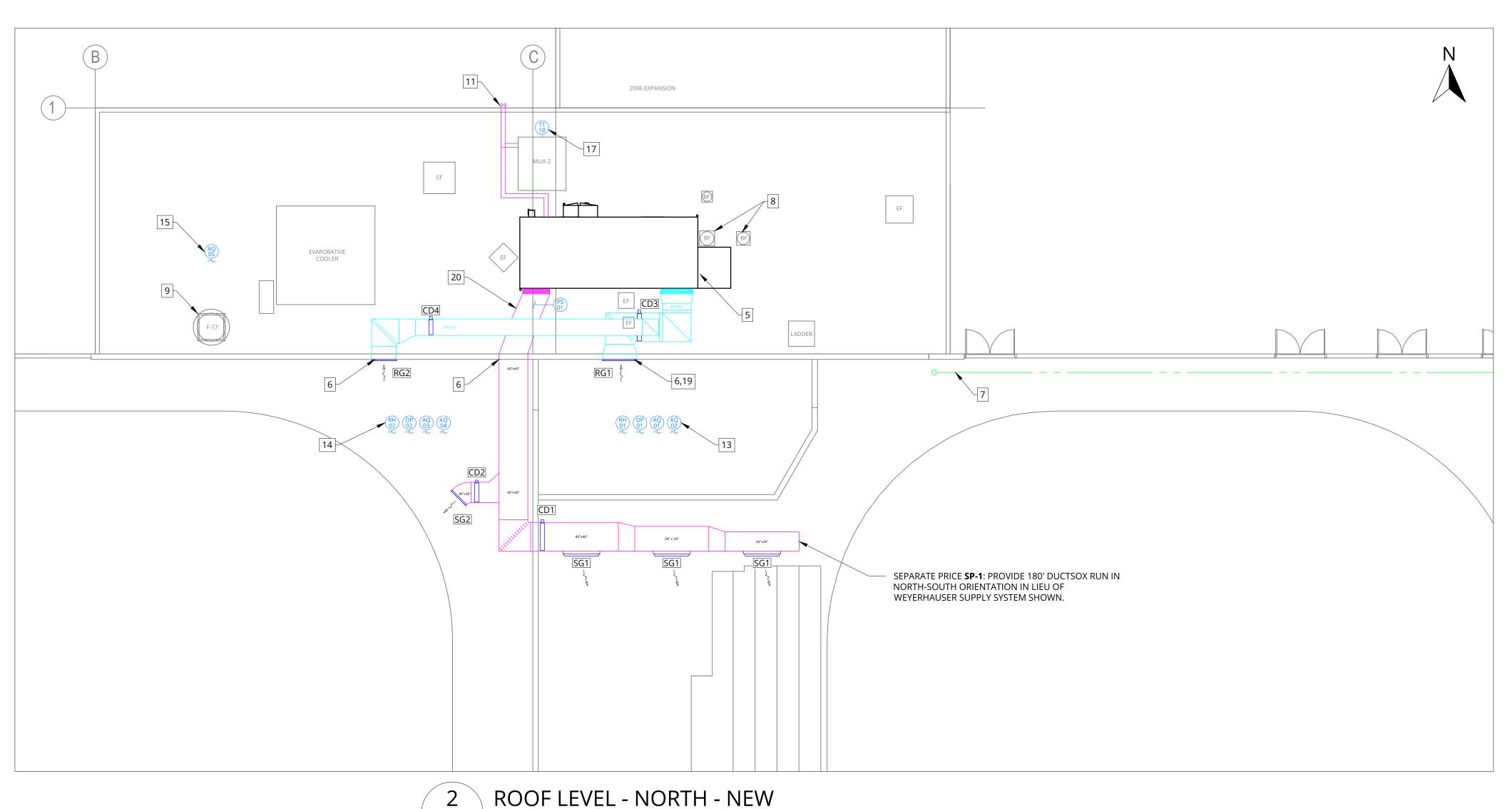




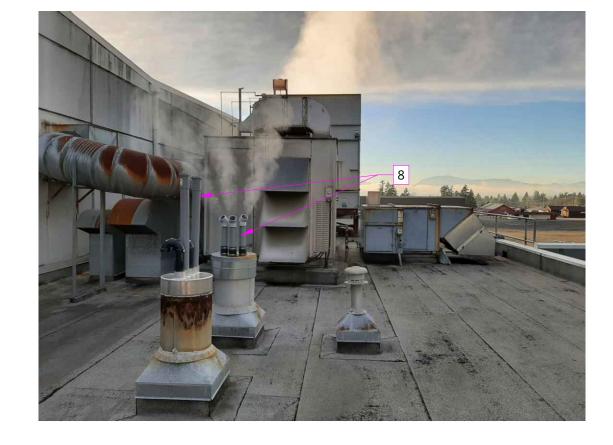








 $\overline{M4}$  / SCALE: 1:100



### BOILER FLUE RE-WORK

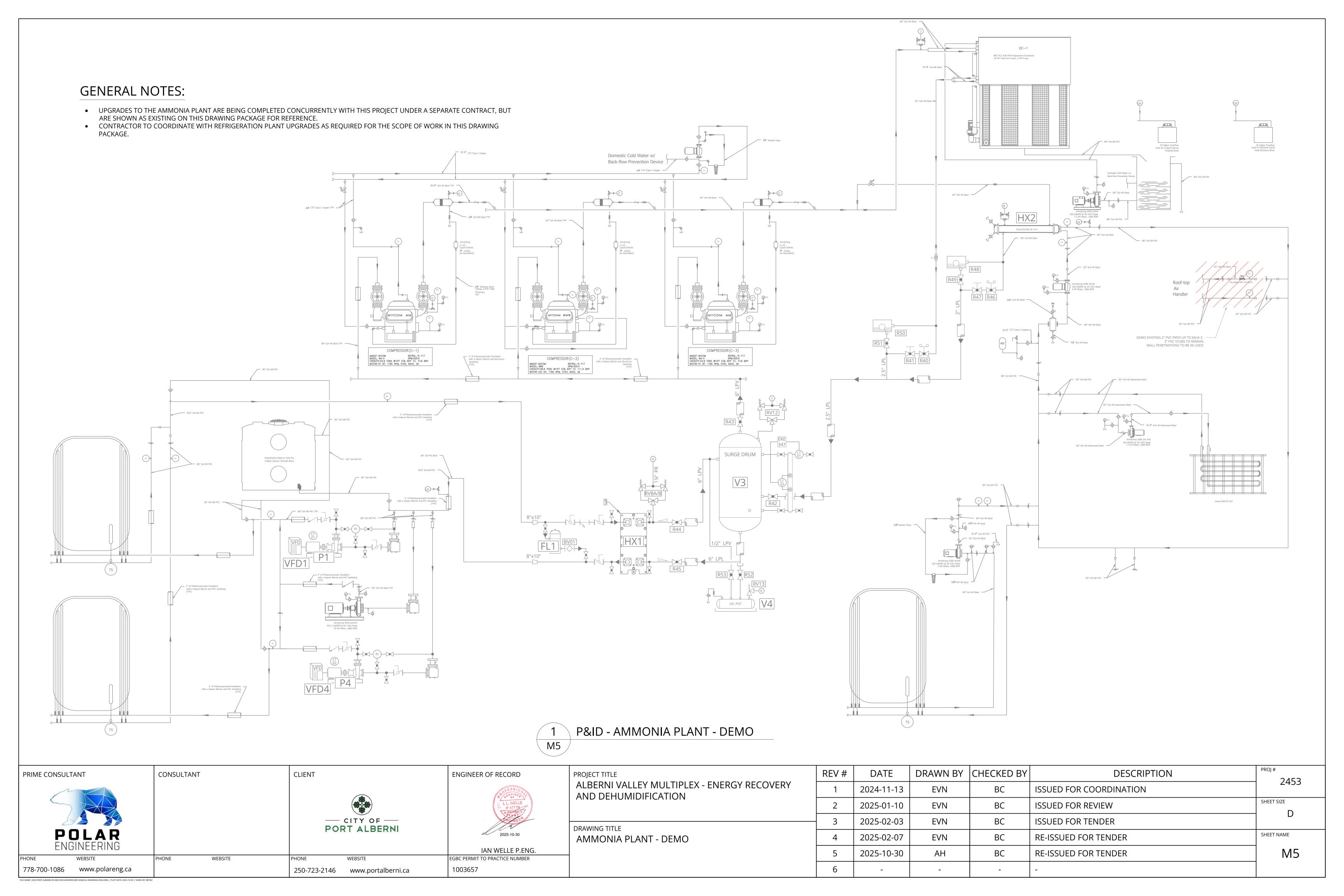
### **GENERAL NOTES:**

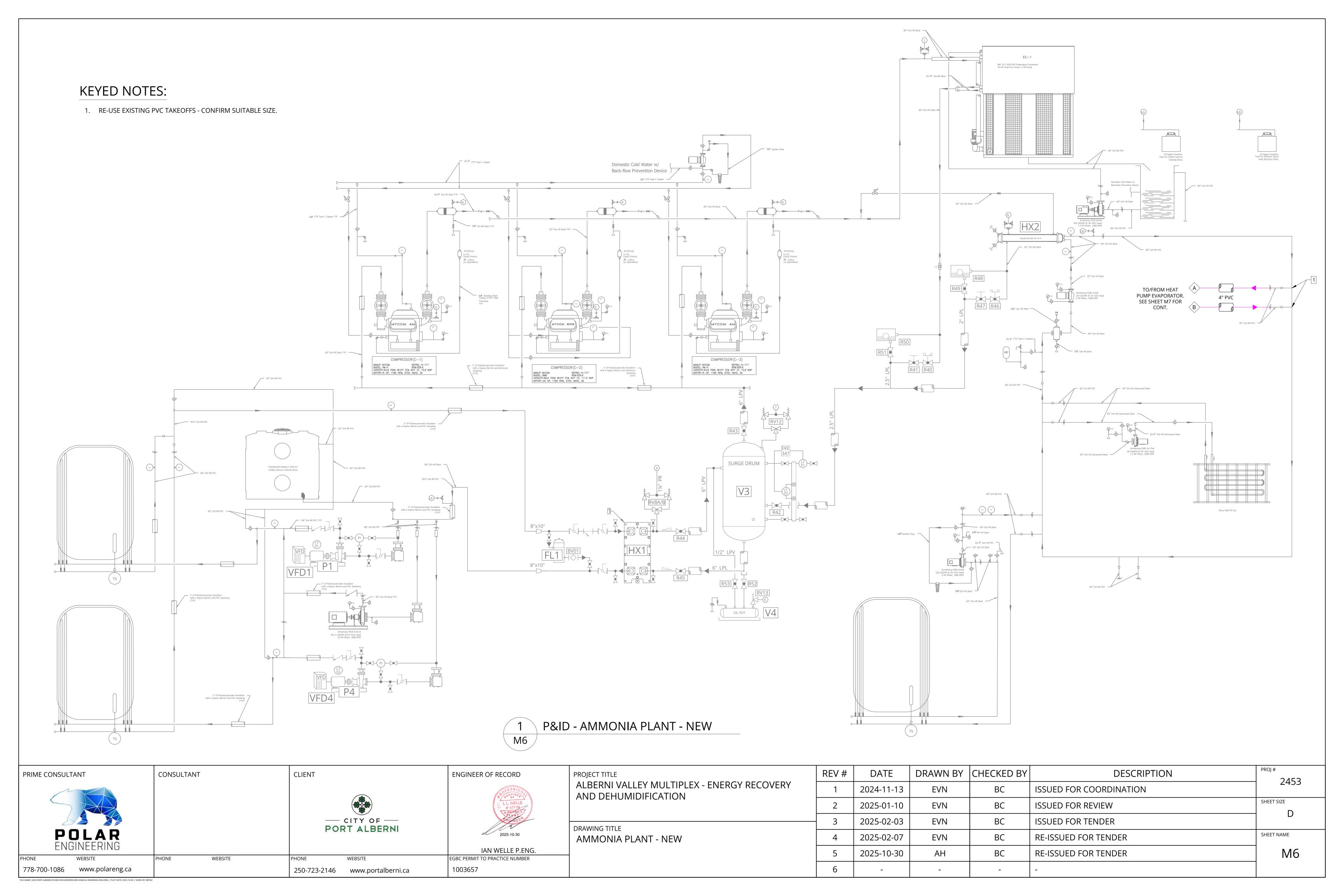
- 1. ALL DIMENSIONS ARE APPROXIMATE AND MUST BE CONFIRMED ON SITE BY THE CONTRACTOR.
- 2. CONTRACTOR TO COORDINATE ANY DEMOLITION OR SHUT-OFF OF EXISTING WATER LINES WITH BASE BUILDING.
- 3. PATCH AND MAKE GOOD (TO BASE BUILDING STANDARDS) MECHANICAL COMPONENTS AND FINISHES DAMAGED DURING CONSTRUCTION.
- 4. NEW DEHUMIDIFIER UNIT DH-1.

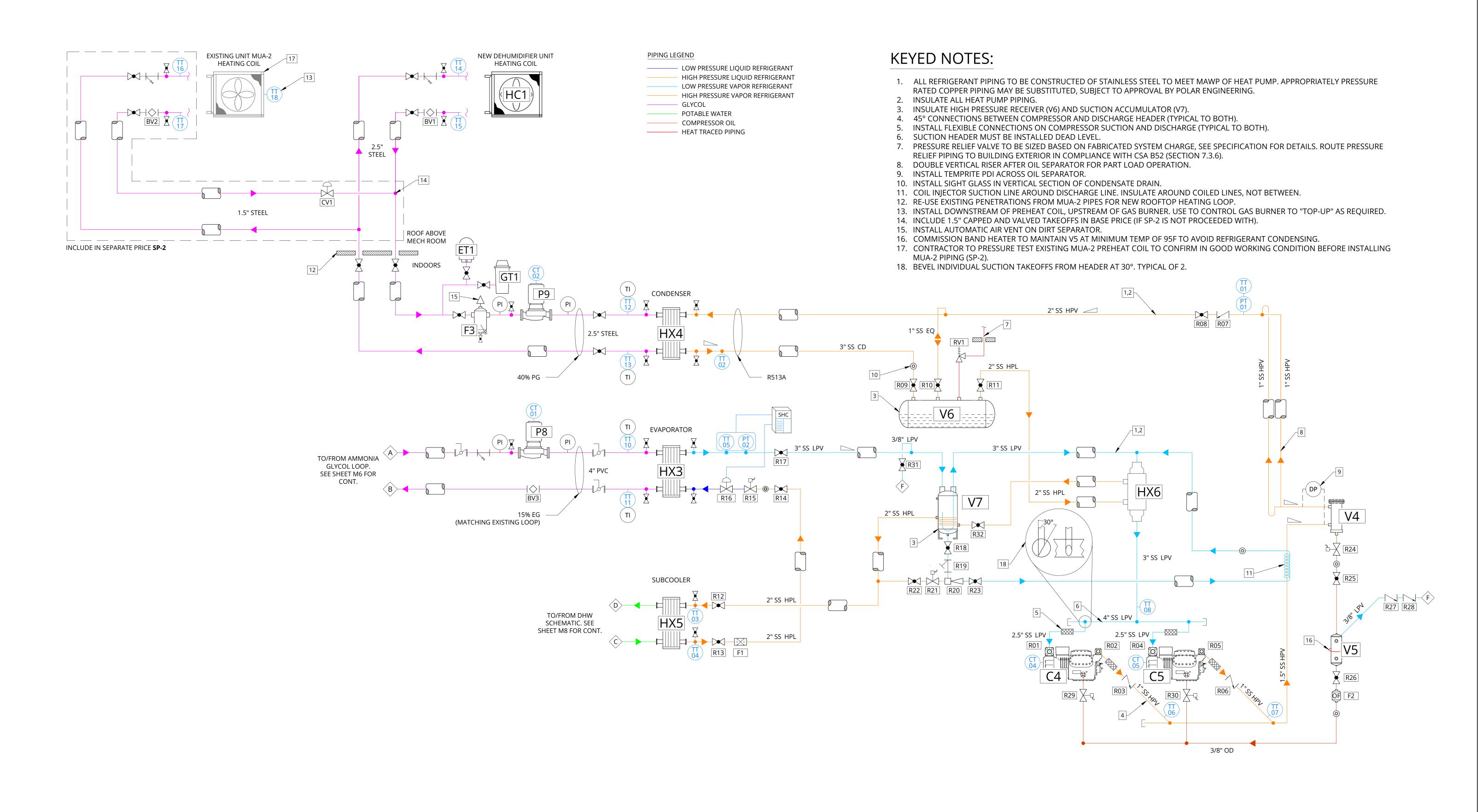
### **KEYED NOTES:**

- 1. NEW 3" S/R PIPES BETWEEN HEAT PUMP CONDENSER AND ROOF EQUIPMENT.
- 2. REUSE EXISTING DESUPERHEATER SUPPLY AND RETURN PIPING FOR HEAT PUMP SUBCOOLER INTEGRATION. SEE SHEET M8.
- 3. NEW  $1\frac{1}{4}$ "ø DHW LINE FROM TK-3 (PREHEAT TANK) TO TK-1 (WEYERHAUSER DHW).
- 4. PROPOSED LOCATION FOR NEW SITE SPECIFIC HEAT PUMP. SEE STRUCTURAL DRAWINGS FOR UNIT LOCATION AND STRUCTURAL REINFORCEMENT.
- 5. NEW DEHUMIDIFIER UNIT DH-1.
- 6. RE-WORK EXISTING PENETRATION TO ACCOMMODATE NEW DUCT.
- 7. NEW DHW FROM BELOW SERVING UPPER LEVEL ARENA DHW ROOM.
- 8. MODIFY BOILER FLUES TO MEET 15' MINIMUM SEPARATION FROM DEHUMIDIFIER INTAKE. CONTRACTOR TO SUBMIT PROPOSED
- CONFIGURATION TO POLAR ENGINERRING FOR APPROVAL PRIOR TO CONSTRUCTION. 9. EXISTING EXHAUST FAN F-17 PROGRAMMING TO BE UPDATED. SEE CONTROL SEQUENCES.
- 10. EXISTING MOTORIZED DAMPER MD-6 PROGRAMMING TO BE UPDATED. SEE CONTROL SEQUENCES.
- 11. NEW HEAT PUMP CONDENSER PIPES TO MIMIC EXISTING PVC PIPE ROUTING ALONG BUILDING AND UP TO ROOF. 12. INSTALL REFRIGERANT DETECTOR PROBE NEAR GROUND LEVEL, BENEATH NEW HEAT PUMP.
- 13. LOCATE IN WEYERHAUSER ARENA.
- 14. LOCATE IN COULSON ARENA. 15. LOCATE OUTDOORS.
- 16. NEW 4" S/R PIPES BETWEEN HEAT PUMP EVAPORATOR AND EXISTING HEAT RECOVERY LOOP.
- 17. INSTALL TT18 DOWNSTREAM OF HEATING COIL, UPSTREAM OF GAS BURNER. USE TO CONTROL GAS BURNER "TOP-UP".
- 18. SEE STRUCTURAL DRAWINGS FOR HEAT PUMP STAND DESIGN.
- 19. COORDINATE RG1 INSTALL LOCATION WITH INTERIOR TRUSS CEILING.
- 20. BUMP UP FROM DH1 SUPPLY CONNECTION, TO COORDINATE WITH EXISTING WALL PENETRATION. CONTRACTOR TO SUBMIT SKETCH OF DUCTING BEFORE FABRICATION.

| PRIME CONSULTANT             | CONSULTANT    | CLIENT                          | ENGINEER OF RECORD   | PROJECT TITLE   | REV# | DATE       | DRAWN BY | CHECKED BY | DESCRIPTION             | PROJ# 2453 |
|------------------------------|---------------|---------------------------------|--|---|------|------------|----------|------------|-------------------------|------------|
|                              |               |                                 | WEESSION TO VINOR TO SE  | ALBERNI VALLEY MULTIPLEX - ENERGY RECOVERY AND DEHUMIDIFICATION | 1    | 2024-11-13 | EVN      | ВС         | ISSUED FOR COORDINATION | 7 2455     |
|                              |               |                                 | I. L. WELLE  # 47179  OR NEWSON  OR NEWSON | AND DETIONIBILICATION   | 2    | 2025-01-10 | EVN      | ВС         | ISSUED FOR REVIEW       | SHEET SIZE |
|                              |               | PORT ALBERNI                    | TWO WEELD WAY  | DRAWING TITLE   | 3    | 2025-02-03 | EVN      | ВС         | ISSUED FOR TENDER       |            |
| POLAR                        |               | PORT ALBERNI                    | 2025-10-30   | MECHANICAL - NEW  | 4    | 2025-02-07 | EVN      | ВС         | RE-ISSUED FOR TENDER    | SHEET NAME |
| ENGINEERING PHONE WEBSITE    | PHONE WEBSITE | PHONE WEBSITE                   | IAN WELLE P.ENG.  EGBC PERMIT TO PRACTICE NUMBER   |   | 5    | 2025-10-30 | AH       | ВС         | RE-ISSUED FOR TENDER    | M4         |
| 778-700-1086 www.polareng.ca |               | 250-723-2146 www.portalberni.ca | 1003657  |   | 6    | -          | -        | -          | -                       |            |

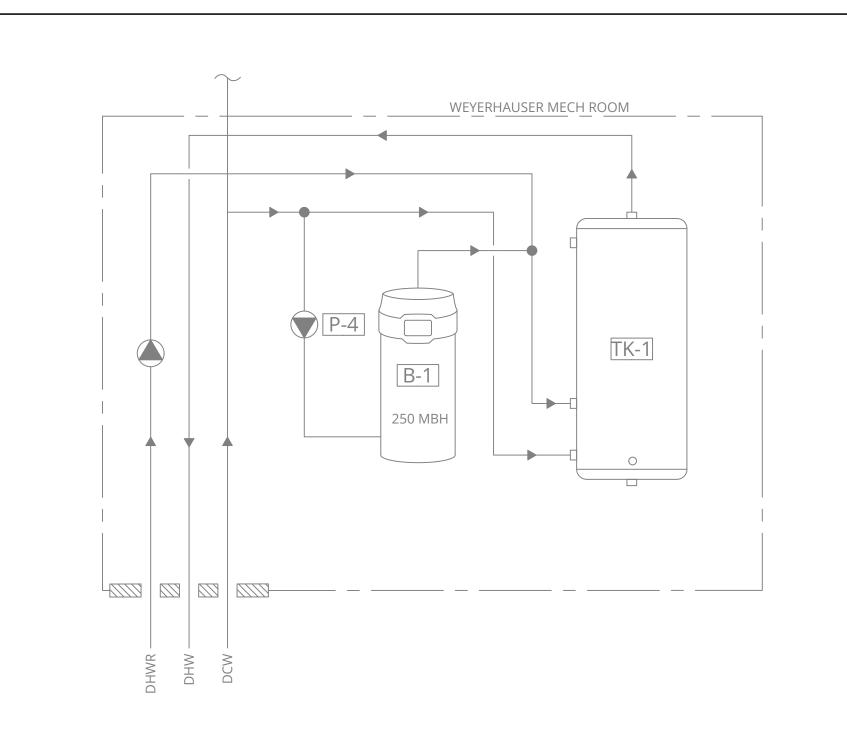


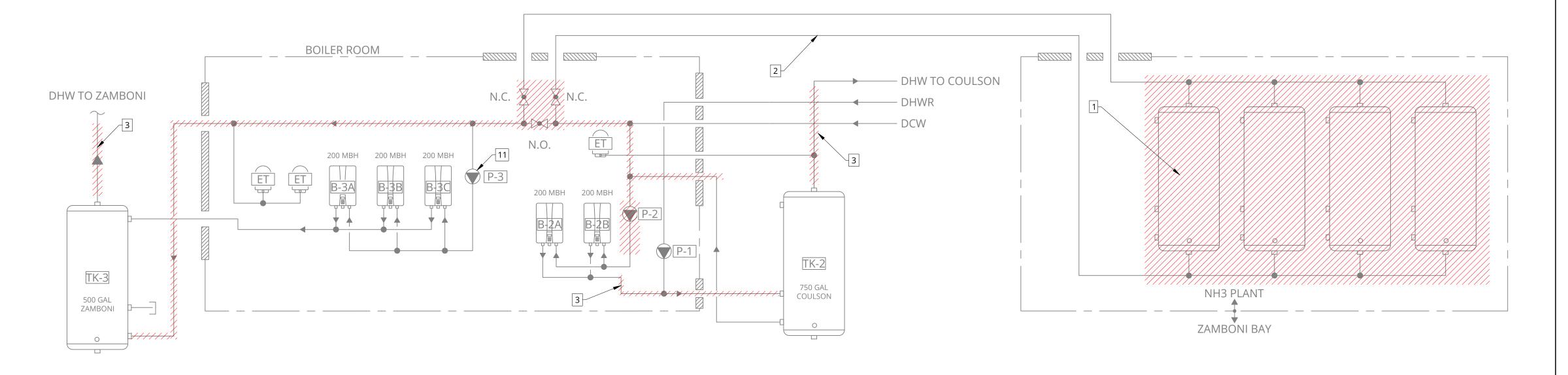




### 1 P&ID - HEAT PUMP AND HYDRONIC INTEGRATION M7

| PRIME CONSULTANT             | CONSULTANT |         | CLIENT     |                       | ENGINEER OF RECORD                              | PROJECT TITLE   | REV# | DATE       | DRAWN BY | CHECKED BY | DESCRIPTION             | PROJ # 2453 |
|------------------------------|------------|---------|------------|-----------------------|---|---|------|------------|----------|------------|-------------------------|-------------|
|                              |            |         |            |                       | STORESSION OF THE                               | ALBERNI VALLEY MULTIPLEX - ENERGY RECOVERY AND DEHUMIDIFICATION | 1    | 2024-11-13 | EVN      | ВС         | ISSUED FOR COORDINATION | 2433        |
|                              |            |         |            |                       | I. L. WELLE  # 47179                            | AND DETIONIBITICATION   | 2    | 2025-01-10 | EVN      | ВС         | ISSUED FOR REVIEW       | SHEET SIZE  |
|                              |            |         |            | ORT ALBERNI           | SVOMEE BOOM                                     | DRAWING TITLE   | 3    | 2025-02-03 | EVN      | ВС         | ISSUED FOR TENDER       |             |
| POLAR                        |            |         |            | ORI ALBERNI           | 2025-10-30                                      | HEAT PUMP AND HYDRONIC INTEGRATION                              | 4    | 2025-02-07 | EVN      | ВС         | RE-ISSUED FOR TENDER    | SHEET NAME  |
| ENGINEERING PHONE WEBSITE    | PHONE      | WEBSITE | PHONE      | WEBSITE               | IAN WELLE P.ENG. EGBC PERMIT TO PRACTICE NUMBER |   | 5    | 2025-10-30 | АН       | ВС         | RE-ISSUED FOR TENDER    | M7          |
| 778-700-1086 www.polareng.ca |            |         | 250-723-21 | 46 www.portalberni.ca | 1003657   |   | 6    | -          | -        | -          | -                       |             |





### 1 WEYERHAUSER DHW PLANT - EXISTING

2 COULSON DHW PLANT - EXISTING/DEMO

### **KEYED NOTES:**

1. DEMOLISH 4X THERMASTOR DESUPERHEATERS AND ASSOCIATED PIPING. STAND TO REMAIN.

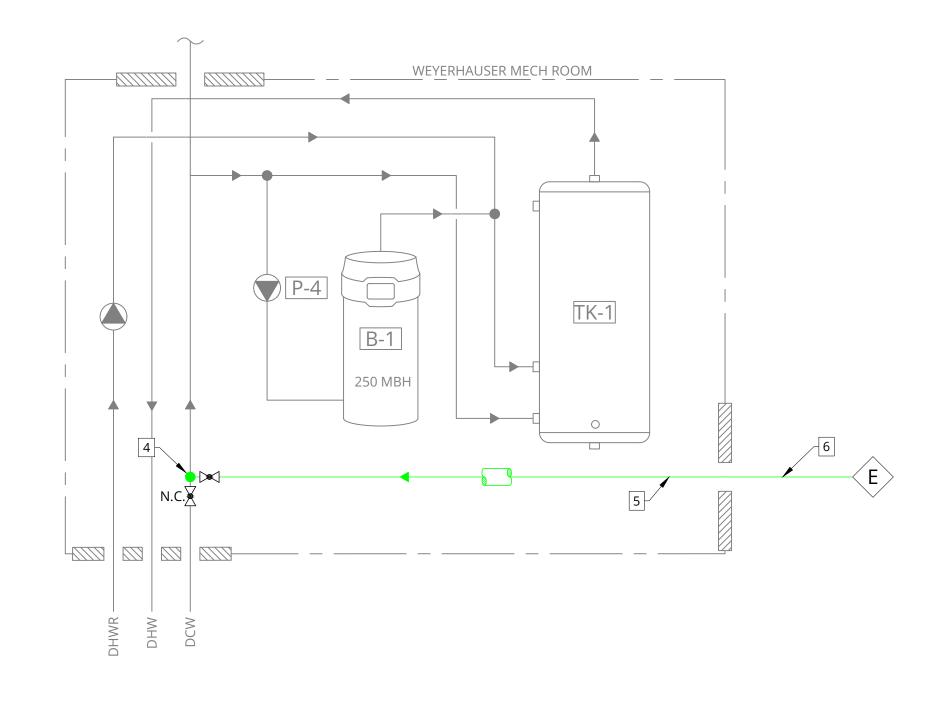
2453

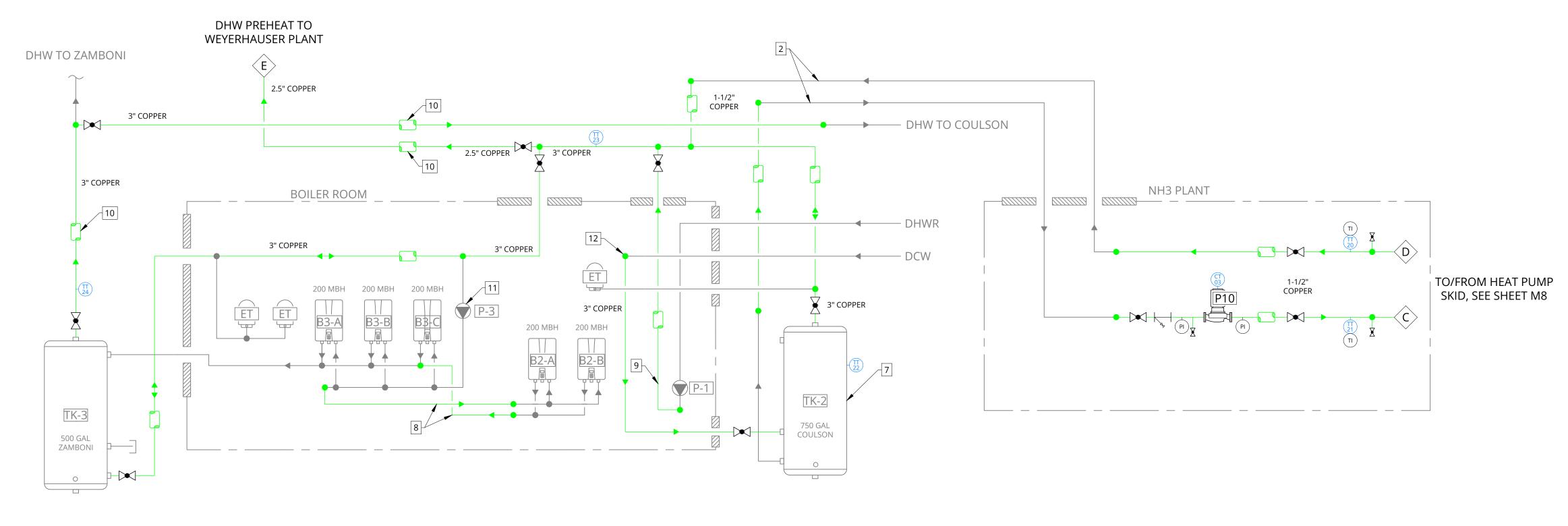
M8

SHEET SIZE

SHEET NAME

- 2. REUSE SUPPLY AND RETURN PIPING FOR NEW SUBCOOLER CONNECTION TO DHW SYSTEM.
- 3. PIPING TO BE REWORKED. SEE 2/M8.
- 4. INTERRUPT DCW FEED UPSTREAM OF P4 CONNECTION.
- 5. MATCH EXISTING DCW LINE SIZE.
- 6. SEE SHEET M4 FOR PIPE ROUTING.
- 7. TK-2 WILL FUNCTION AS THE PRE-HEAT TANK, TO FEED INTO THE FINAL TANKS TK-3 AND TK-1.
- 8. MATCH EXISTING LINE SIZE OF BOILER CIRCULATION PIPING TO/FROM TK-3.
- 9. MATCH EXISTING DHWR LINE SIZE.
- 10. INSULATE ALL NEW DHW PIPING.
- 11. EXISTING GRUNDFOS UPS26-150F THREE-SPEED CIRCULATION PUMP.
- 12. INTEGRATE WITH EXISTING 3" DCW FEED.





## 3 WEYERHAUSER DHW PLANT - INTEGRATION M8

4 COULSON DHW PLANT - INTEGRATION

| PRIME CONSULTANT             | CONSULTANT    | CLIENT                      | ENGINEER OF RECORD                               | PROJECT TITLE   | REV# | DATE       | DRAWN BY | CHECKED BY | DESCRIPTION             |
|------------------------------|---------------|-----------------------------|--|---|------|------------|----------|------------|-------------------------|
|                              |               |                             | STORESSION OF THE STORES                         | ALBERNI VALLEY MULTIPLEX - ENERGY RECOVERY AND DEHUMIDIFICATION | 1    | 2024-11-13 | EVN      | ВС         | ISSUED FOR COORDINATION |
|                              |               |                             | I. L. WELLE  # 47179                             | 7 (ND DEFICION IC/ (TION  | 2    | 2025-01-10 | EVN      | ВС         | ISSUED FOR REVIEW       |
|                              |               | — CITY OF —<br>PORT ALBERNI | SENOMEER PROPERTY.                               | DRAWING TITLE   | 3    | 2025-02-03 | EVN      | ВС         | ISSUED FOR TENDER       |
| POLAR<br>ENGINEERING         |               | PORT ALBERTA                | 2025-10-30                                       | DOMESTIC HOT WATER INTEGRATION                                  | 4    | 2025-02-07 | EVN      | ВС         | RE-ISSUED FOR TENDER    |
| PHONE WEBSITE                | PHONE WEBSITE | PHONE WEBSITE               | IAN WELLE P.ENG.  EGBC PERMIT TO PRACTICE NUMBER |   | 5    | 2025-10-30 | AH       | ВС         | RE-ISSUED FOR TENDER    |
| 778 700 1086 WWW polareng ca |               | 250 722 2146                | 1003657  |   | 6    |            |          |            |                         |

|     |                             |            |          | ŀ        | HEAT EXCH | ANGER SCHEDU           | JLE                |                     |       |                        |                    |                     |       |
|-----|-----------------------------|------------|----------|----------|-----------|------------------------|--------------------|---------------------|-------|------------------------|--------------------|---------------------|-------|
|     |                             |            |          |          |           | НОТ                    | SIDE               |                     |       | COLI                   | O SIDE             |                     |       |
| TAG | DESCRIPTION                 | MAKE       | MODEL    | CAPACITY | FLUID     | PRESSURE<br>DROP (PSI) | INLET<br>TEMP. (F) | OUTLET<br>TEMP. (F) | FLUID | PRESSURE<br>DROP (PSI) | INLET<br>TEMP. (F) | OUTLET<br>TEMP. (F) | NOTES |
| НХЗ | HEAT PUMP EVAPORATOR        | ALFA LAVAL | ACH502DQ | 860 MBH  | 15%EG     | 2.01                   | 81                 | 71                  | R513A | 16.2                   | 60                 | 79                  |       |
| HX4 | HEAT PUMP CONDENSER         | ALFA LAVAL | CBH112   | 920 MBH  | R513A     | 2.99                   | 204                | 165                 | 40%PG | 7.76                   | 140                | 160                 |       |
| HX5 | HEAT PUMP SUBCOOLER         | DOUCETTE   | BPDW415  | 240 MBH  | R513A     | 4.7                    | 165                | 130                 | WATER | 2.6                    | 120                | 140                 | 1     |
| HX6 | HEAT PUMP LIQUID-SUCTION HX | DOUCETTE   | SLHE     |          | R513A     | -                      | 165                | -                   | R513A | -                      | 80                 | 90                  | 2,3   |

|     |                     |            |        |       | CONTROL VA        | ALVE SCHEDULE             |                                 |    |           |                         |       |
|-----|---------------------|------------|--------|-------|-------------------|---------------------------|---------------------------------|----|-----------|-------------------------|-------|
| AG  | LOCATION            | ТҮРЕ       | MAKE   | MODEL | LINE SIZE<br>(IN) | DESIGN FLOW<br>RATE (GPM) | MINIMUM SHUT OFF PRESSURE (PSI) | CV | FAIL-SAFE | ELECTRICAL<br>(V/PH/HZ) | NOTES |
| CV1 | RTU-1 GLYCOL RETURN | 2-WAY, MOD | BELIMO | -     | 1.5               | 17                        | 75                              | 19 | CLOSED    | 24/1/60                 | 1,2   |
| TEC | •                   |            |        |       |                   |                           |                                 |    |           |                         | •     |

40% PG

1. SELECT VALVE AND ACTUATOR SUITABLE FOR OUTDOOR INSTALLATION. 2. INCLUDED IN SEPARATE PRICE SP-2.

1. DOUBLE-WALL VENTED FOR POTABLE WATER SERVICE.

2. REFER TO STRUCTURAL FOR LOCATION & CURB DETAILS. 3. INCLUDES HYDRONIC REACTIVATION PRE-HEAT COIL.

2. INSTALL IN VERTICAL ORIENTATION PER MANUFACTURER RECOMMENDATIONS.

3. EXACT PERFORMANCE TO BE CONFIRMED IN ADDENDUM.

1. INLINE CIRCULATOR-TYPE PUMP SUITABLE FOR POTABLE WATER SERVICE

|      |              |                |                  | DEI              | HUMIDIFIER SCHEDULE       |                             |                 |                 |                 |       |
|------|--------------|----------------|------------------|------------------|---------------------------|-----------------------------|-----------------|-----------------|-----------------|-------|
| TAG  | DESCRIPTION  | MAKE           | MODEL            | SUPPLY AIR (CFM) | SUPPLY AIR ESP<br>(IN-WC) | H₂0 REMOVAL RATE<br>(LB/HR) | REACT AIR (CFM) | POWER (V/PH/HZ) | HEATER<br>(MBH) | NOTES |
| DH-1 | DEHUMIDIFIER | ENGINEERED AIR | HE/DWD500/C/O/MV | 16,000           | 1.0                       | 297                         | 6,000           | 575/3/60        | 1590            | 1,2,3 |

SEPARATOR

1. ENSURE BLOWDOWN VALVE & MAGNETIC WELL HAVE ADEQUATE SERVICE CLEARANCE.

SERVICE

C4

C4

C4

C5

C5

CALEFFI NA546060AM

TAG

R01

R02

R03

R04

R05

FILTER SCHEDULE

1. REFER TO ELECTRICAL DRAWINGS FOR POWER DETAILS.

|        |                           |         |       | PUMP SCHEDULE |               |            |             |                      |       |
|--------|---------------------------|---------|-------|---------------|---------------|------------|-------------|----------------------|-------|
| TAG    | DESCRIPTION               | MAKE    | MODEL | FLUID         | HEAD<br>(PSI) | FLOW (GPM) | MOTOR<br>HP | ELECTRICAL (V/PH/HZ) | NOTES |
| P-8    | HEAT PUMP EVAPORATOR LOOP | TO SPEC | -     | 15% EG        | 10            | 180        | 1.5         | 575/3/60             |       |
| P-9    | HEAT PUMP CONDENSER LOOP  | TO SPEC | -     | 40% PG        | 24            | 82         | 3           | 575/3/60             |       |
| P-10   | HEAT PUMP SUBCOOLER LOOP  | TO SPEC | -     | POTABLE WATER | 8             | 23         | 0.5         | 120/1/60             | 1,2   |
| NOTEC: |                           |         |       | •             |               |            |             |                      |       |

|       |            |       | GLYCOL FEED            | TANK SCHEDUL | _E                      |                         |         |
|-------|------------|-------|------------------------|--------------|-------------------------|-------------------------|---------|
| TAG   | MAKE       | MODEL | MAKE-UP CAPACITY (GAL) | PUMP (GPM)   | FILL PRESSURE<br>(PSIG) | ELECTRICAL<br>(V/PH/HZ) | NOTES   |
| GT1   | CALEFACTIO | GMP6  | 6                      | 1.6          | 20                      | 120/1/60                | 1,2,3,4 |
| NOTES | 5:         |       |                        |              |                         |                         |         |

TAG DESCRIPTION MAKE

1. C/W REMOTE ALARM KIT (#GMPDC).

2. DIMENSIONS 12X12X39" WITH 12" CLEARANCE.

3. C/W LIQUID LEVEL GAUGE, PUMP SUCTION HOSE W/STRAINER, PRESSURE PUMP W/ CHECK VALVE, CUTOUT

PIGGYBACK LEVEL FLOAT SWITCH, ADJUSTABLE PRV.

4. 0.5" HYDRONIC CONNECTION MAY BE OF FLEXIBLE TYPE. MINIMUM 50PSI RATING.

|     | COMPRESSOR SCHEDULE |         |        |          |          |       |            |       |  |  |  |  |
|-----|---------------------|---------|--------|----------|----------|-------|------------|-------|--|--|--|--|
| TAG | MAKE                | MODEL   | OPERAT | ΓΙΟΝ (F) | CAPACITY | MOTOR | ELECTRICAL | NOTES |  |  |  |  |
|     |                     | WIODLE  | SST    | SDT      | (TR)     | (kW)  | (V/PH/HZ)  | NOTES |  |  |  |  |
| C4  | BITZER              | 6FE-50Y | 50     | 165      | 56       | 61.6  | 208/3/60   | 1,2   |  |  |  |  |
| C5  | BITZER              | 6FE-50Y | 50     | 165      | 56       | 61.6  | 208/3/60   | 1,2   |  |  |  |  |

### 1. TO BE SUPPLIED WITH MOTOR VERSION 1, BITZER CM-RC-01 IQ MODULE, BITZER SE-I1 COMPRESSOR PROTECTION MODULE, PRESSURE TRANSDUCER ADD-ON, VARISTEP CAPACITY CONTROL, BITZER OLM-IQ OIL LEVEL CONTROLLER MODULE, BITZER HEAD COOLING FAN.

2. COMPRESSORS TO BE PROVIDED WITH BITZER RECOMMENDED OIL (BSE 55). SUBSTITUTE OILS WILL NOT BE ACCEPTED.

|     | BALANCING VALVES |       |                     |          |               |       |  |  |  |  |  |  |
|-----|------------------|-------|---------------------|----------|---------------|-------|--|--|--|--|--|--|
| TAG | MAKE             | MODEL | DESCRIPTION         | FAILSAFE | FLOW<br>[GPM] | NOTES |  |  |  |  |  |  |
| BV1 | TO SPEC          | -     | BALANCE DH1 FLOW    | OPEN     | 82            | 1,2   |  |  |  |  |  |  |
| BV2 | TO SPEC          | -     | BALANCE MUA2 FLOW   | OPEN     | 17            | 1,3   |  |  |  |  |  |  |
| BV3 | TO SPEC          | -     | BALANCE P8/HX3 FLOW | OPEN     | 140           | 1     |  |  |  |  |  |  |

1. C/W TEST PORTS AND MEMORY. 2. BALANCE TO DESIRED FLOW WITH CV1 CLOSED. 3. BALANCE TO DESIRED FLOW WITH CV2 OPEN. 4. PART OF SEPARATE PRICE SP-2.

CONTROL DAMPER SCHEDULE DESCRIPTION MAKE MODEL SUPPLY AIR (CFM) WIDTH (IN) HEIGHT (IN) NOTES CONTROL DAMPER SERIES 1000 CONTROL DAMPER TAMCO SERIES 1000 5,000 2,3 16,000 CONTROL DAMPER SERIES 1000 2,3 CD4 CONTROL DAMPER TAMCO SERIES 1000 5,000

NOTES:

2. VARIABLE SPEED PUMP.

1. INSTALL WITH MODULATING ACTUATOR 2. INSTALL WITH 2 POSITION ACTUATOR

3. NEMA 3 OR EQUIVALENT RATING FOR OUTDOOR INSTALLATION.

| GRILLE & DIFFUSER SCHEDULE |                           |                  |                     |               |           |       |  |  |
|----------------------------|---------------------------|------------------|---------------------|---------------|-----------|-------|--|--|
| TAG                        | DESCRIPTION               | MAKE             | MODEL               | AIRFLOW (CFM) | SIZE      | NOTES |  |  |
| RG1                        | RETURN GRILLE             | PRICE INDUSTRIES | 80 SERIES EGG CRATE | 16,000        | 48" x 40" |       |  |  |
| RG2                        | RETURN LOUVER             | PRICE INDUSTRIES | 80 SERIES EGG CRATE | 5,000         | 36" x 24" |       |  |  |
| SG1                        | HIGH CAPACITY DRUM LOUVER | PRICE INDUSTRIES | HCD                 | 5,333         | 54" x 15" | 1     |  |  |
| SG2                        | AIRFOIL GRILLE            | PRICE INDUSTRIES | 20/30 - MODEL 22    | 5,000         | 30" x 30" |       |  |  |
| SG3                        | FABRIC DIFFUSER           | DUCTSOX          | VERONA NP           | 16,000        | 44"       | 2,3   |  |  |

1. DIAPHRAGM EXPANSION TANK.

|       | EXPANSION TANK SCHEDULE   |        |           |          |        |                    |       |  |  |  |  |
|-------|---------------------------|--------|-----------|----------|--------|--------------------|-------|--|--|--|--|
| TAG   | PURPOSE                   | MAKE   | MODEL     | CAPACITY | FLUID  | AIR-SIDE<br>CHARGE | NOTES |  |  |  |  |
| ET1   | UNDERFLOOR EXPANSION TANK | AMTROL | AX-20V-DD | 16.5 GAL | 40% PG | 20 PSIG            | 1     |  |  |  |  |
| NOTES | 5:                        |        |           |          |        |                    |       |  |  |  |  |

1. TYPICAL OF THREE.

2. 160' RUN, DIFFUSER HOLES AT 9 O'CLOCK AND 10:30. 3. PART OF SEPARATE PRICE SP-1.

|     | PRESSURE VESSEL SCHEDULE            |       |          |         |                |                    |              |          |           |       |  |  |
|-----|-------------------------------------|-------|----------|---------|----------------|--------------------|--------------|----------|-----------|-------|--|--|
| TAG | DESCRIPTION                         | DUTY  | DIAMETER | LENGTH  | OP<br>TEMP (F) | OP PRESS<br>(PSIA) | DWP<br>(PSI) | MAKE     | MODEL     | NOTES |  |  |
| V4  | OIL SEPARATOR                       | R513A | 8-5/8"   | 39"     | 204            | 344                | 650          | TEMPRITE | 928       | 2     |  |  |
| V5  | OIL RESERVOIR                       | R513A | 6"       | 13-1/2" | 204            | 344                | 650          | TEMPRITE | 47058     |       |  |  |
| V6  | HIGH PRESSURE RECEIVER              | R513A | -        | -       | 165            | 344                | MIN. 450     | TO SPEC  | TO SPEC   | 1     |  |  |
| V7  | SUCTION ACCUMULATOR W BOIL OFF COIL | R513A | 14"      | 42"     | 50             | 66                 | MIN. 450     | HENRY    | AF-14042+ | 3     |  |  |

1. TO BE SELECTED BY CONTRACTOR. RECEIVER MUST ACCOMMODATE 100% REFRIGERANT CHARGE AT 80% FILL LEVEL.

2. 3/8" SAE OIL RETURN CONNECTION.

3. VESSEL TO BE RE-RATED BY MANUFACTURER TO ACHIEVE MINIMUM DWP OF 450PSI @ -20F MDMT.

|     |                  |                            |          |                 | · . |
|-----|------------------|----------------------------|----------|-----------------|-----|
| R06 | C5               | CHECK VALVE                | DANFOSS  | CHV 25 STRAIGHT |     |
| R07 | DISCHARGE HEADER | CHECK VALVE                | DANFOSS  | CHV 50 STRAIGHT |     |
| R08 | DISCHARGE HEADER | ISOLATION VALVE            | DANFOSS  | SVA 50 STRAIGHT |     |
| R09 | V6               | ISOLATION VALVE            | DANFOSS  | SVA 75 STRAIGHT |     |
| R10 | V6               | ISOLATION VALVE            | DANFOSS  | SVA 25 STRAIGHT |     |
| R11 | V6               | ISOLATION VALVE            | DANFOSS  | SVA 50 STRAIGHT |     |
| R12 | HX5              | ISOLATION VALVE            | DANFOSS  | SVA 50 STRAIGHT |     |
| R13 | HX5              | ISOLATION VALVE            | DANFOSS  | SVA 50 STRAIGHT |     |
| R14 | HX3              | ISOLATION VALVE            | DANFOSS  | SVA 50 STRAIGHT |     |
| R15 | HX3              | SOLENOID VALVE             | DANFOSS  | EVR 40 V2 NS 54 |     |
| R16 | HX3              | ELECTRONIC EXPANSION VALVE | EMERSON  | EX8             |     |
| R17 | HX3              | ISOLATION VALVE            | DANFOSS  | SVA 75 STRAIGHT |     |
| R18 | V7               | ISOLATION VALVE            | DANFOSS  | GBC V2          |     |
| R19 | V7               | STRAINER                   | TO SPEC  | TO SPEC         |     |
| R20 | V7               | INJECTOR                   | PHILLIPS | TBD             |     |
| R21 | V7               | SOLENOID VALVE             | DANFOSS  | EVR V2          |     |
| R22 | V7               | ISOLATION VALVE            | DANFOSS  | GBC V2          |     |
| R23 | V7               | ISOLATION VALVE            | DANFOSS  | GBC V2          |     |
| R24 | V4               | SOLENOID VALVE             | SPORLAN  | B6F1 + MKC-1    | 2   |
| R25 | V4               | ISOLATION VALVE            | DANFOSS  | GBC 12S V2      |     |
| R26 | V5               | ISOLATION VALVE            | DANFOSS  | GBC 12S V2      |     |
| R27 | V5               | DIFFERENTIAL CHECK VALVE   | SPORLAN  | OCV-20          |     |
| R28 | V5               | DIFFERENTIAL CHECK VALVE   | SPORLAN  | OCV-20          |     |
| R29 | C4               | OIL LEVEL REGULATOR        | BITZER   | OLM-IQ          | 3   |
| R30 | C5               | OIL LEVEL REGULATOR        | BITZER   | OLM-IQ          | 3   |
| R31 | SUCTION HEADER   | ISOLATION VALVE            | TO SPEC  | TO SPEC         |     |
| R32 | HX6              | ISOLATION VALVE            | DANFOSS  | GBC V2          |     |
|     | _ <b>+</b>       | <del> </del>               |          |                 |     |

REFRIGERATION VALVES

VALVE DESCRIPTION

ISOLATION VALVE

ISOLATION VALVE

CHECK VALVE

ISOLATION VALVE

ISOLATION VALVE

MANUFACTURER

BITZER

BITZER

DANFOSS

BITZER

BITZER

DANFOSS

TO SPEC

TO SPEC

**NOTES** 

1

N/A

N/A

CHV 25 STRAIGHT

N/A

N/A

DCR-09617-DM

TO SPEC

TO SPEC

F1

F2

RV1

1. TO BE SUPPLIED WITH BITZER COMPRESSOR.

LIQUID LINE

OIL DRAIN LINE

2. SOLENOID TO REMAIN CLOSED WHILE COMPRESSOR IS OFF. TIME DELAY SOLENOID OPEN AFTER COMP. START TO ALLOW OIL WARMUP.

FILTER DRIER

COMPRESSOR OIL FILTER

PRESSURE RELIEF VALVE

3. PROVIDES OIL LEVEL CONTROL AND MONITORING. INTEGRATE WITH BITZER IQ MODULE. 4. CONTRACTOR TO SELECT OIL FILTER BASED ON COMPRESSOR MANUFACTURER RECOMMENDATION.

5. PRESSURE RELIEF VALVE TO BE SIZED BASED ON FABRICATED SYSTEM CHARGE. SEE SPECIFICATIONS FOR DETAILS. ROUTE PRESSURE RELIEF PIPING TO

EXTERIOR OF THE BUILDING IN COMPLIANCE WITH CSA B52 (SECTION 7.3.6).

| PRIME CONSULTANT             | CONSULTANT    | CLIENT                          | ENGINEER OF RECORD   | PROJECT TITLE   | REV# | DATE       | DRAWN BY | CHECKED BY | DESCRIPTION             | PROJ# 2453 |
|------------------------------|---------------|---------------------------------|--|---|------|------------|----------|------------|-------------------------|------------|
|                              |               |                                 | UCCE ESSION  | ALBERNI VALLEY MULTIPLEX - ENERGY RECOVERY AND DEHUMIDIFICATION | 1    | 2024-11-13 | EVN      | ВС         | ISSUED FOR COORDINATION | 2455       |
|                              |               |                                 | I. L. WELLE  # 47179  OBBITANT  OBBI | AND DETIONIBILICATION   | 2    | 2025-01-10 | EVN      | ВС         | ISSUED FOR REVIEW       | SHEET SIZE |
|                              |               | PORT ALBERNI                    | // 30000   | DRAWING TITLE   | 3    | 2025-02-03 | EVN      | ВС         | ISSUED FOR TENDER       |            |
| POLAR<br>ENGINEERING         |               | PORTALBERIN                     | 2025-10-30   | MECHANICAL SCHEDULES  | 4    | 2025-02-07 | EVN      | ВС         | RE-ISSUED FOR TENDER    | SHEET NAME |
| PHONE WEBSITE                | PHONE WEBSITE | PHONE WEBSITE                   | IAN WELLE P.ENG.  EGBC PERMIT TO PRACTICE NUMBER   |   | 5    | 2025-10-30 | AH       | ВС         | RE-ISSUED FOR TENDER    | M9         |
| 778-700-1086 www.polareng.ca |               | 250-723-2146 www.portalberni.ca | 1003657  |   | 6    | -          | -        | -          | -                       | 1          |

|                |                      | INPUTS - BUILDING AUTO              | MATION SYSTEM                |        |                  |       |
|----------------|----------------------|-------------------------------------|------------------------------|--------|------------------|-------|
| TAG            | DESCRIPTION          | PURPOSE                             | LOCATION                     | SIGNAL | DISPLAY<br>UNITS | NOTES |
| TT01           | TEMP SENSOR          | HP DISCHARGE TEMP                   | HP SKID - COMPRESSOR ROOM    | Al     | F                |       |
| TT02           | TEMP SENSOR          | HP CONDENSING TEMP                  | HP SKID - COMPRESSOR ROOM    | Al     | F                |       |
| TT03           | TEMP SENSOR          | HX5 ENTERING REFRIG TEMP            | HP SKID - COMPRESSOR ROOM    | Al     | F                |       |
| TT04           | TEMP SENSOR          | HX5 LEAVING REFRIG TEMP             | HP SKID - COMPRESSOR ROOM    | Al     | F                |       |
| TT05           | TEMP SENSOR          | HP EVAPORATING TEMP                 | HP SKID - COMPRESSOR ROOM    | Al     | F                |       |
| TT06           | TEMP SENSOR          | C4 DISCHARGE TEMP                   | HP SKID - COMPRESSOR ROOM    | Al     | F                |       |
| TT07           | TEMP SENSOR          | C5 DISCHARGE TEMP                   | HP SKID - COMPRESSOR ROOM    | Al     | F                |       |
| TT08           | TEMP SENSOR          | SUCTION HEADER TEMP                 | HP SKID - COMPRESSOR ROOM    | Al     | F                |       |
| TT10           | TEMP SENSOR          | HX3 ENTERING GLYCOL TEMP            | HP SKID - COMPRESSOR ROOM    | Al     | F                |       |
| TT11           | TEMP SENSOR          | HX3 LEAVING GLYCOL TEMP             | HP SKID - COMPRESSOR ROOM    | Al     | F                |       |
| TT12           | TEMP SENSOR          | HX4 ENTERING GLYCOL TEMP            | HP SKID - COMPRESSOR ROOM    | Al     | F                |       |
| TT13           | TEMP SENSOR          | HX4 LEAVING GLYCOL TEMP             | HP SKID - COMPRESSOR ROOM    | Al     | F                |       |
| TT14           | TEMP SENSOR          | DH1 HEATING COIL ENTERING TEMP      | DH1 - ROOFTOP                | Al     | F                |       |
| TT15           | TEMP SENSOR          | DH1 HEATING COIL LEAVING TEMP       | DH1 - ROOFTOP                | Al     | F                |       |
| TT16           | TEMP SENSOR          | MUA-2 HEATING COIL ENTERING TEMP    | MUA2 - ROOFTOP               | Al     | F                | 3     |
| TT17           | TEMP SENSOR          | MUA-2 HEATING COIL LEAVING TEMP     | MUA2 - ROOFTOP               | Al     | F                | 3     |
| TT18           | TEMP SENSOR          | MUA-2 HEATING COIL AIR LEAVING TEMP | MUA2 - ROOFTOP               | Al     | F                | 3     |
| TT20           | TEMP SENSOR          | HX5 LEAVING GLYCOL TEMP             | HP SKID - COMPRESSOR ROOM    | Al     | F                |       |
| TT21           | TEMP SENSOR          | HX5 ENTERING GLYCOL TEMP            | HP SKID - COMPRESSOR ROOM    | Al     | F                |       |
| TT22           | TEMP SENSOR          | TK-2 (PREHEAT TANK) TEMP            | ZAMBONI AREA                 | Al     | F                |       |
| TT23           | TEMP SENSOR          | TK-2 (PREHEAT TANK) SUPPLY TEMP     | ZAMBONI AREA                 | Al     | F                |       |
| TT24           | TEMP SENSOR          | TK-23 (FINAL HEAT TANK) SUPPLY TEMP | ZAMBONI AREA                 | Al     | F                |       |
| PT01           | PRESSURE TRANSDUCER  | HP DISCHARGE PRESS                  | HP SKID - COMPRESSOR ROOM    | Al     | PSI              |       |
| PT02           | PRESSURE TRANSDUCER  | HP SUCTION PRESS                    | HP SKID - COMPRESSOR ROOM    | Al     | PSI              |       |
| PS01           | PRESSURE SENSOR      | SUPPLY DUCT PRESSURE                | ROOFTOP - DH1 SUPPLY DUCTING | Al     | Pa               |       |
| CT01           | CURRENT TRANSDUCER   | P8 STATUS                           | HP SKID - COMPRESSOR ROOM    | Al     | Α                |       |
| CT02           | CURRENT TRANSDUCER   | P9 STATUS                           | HP SKID - COMPRESSOR ROOM    | Al     | Α                |       |
| CT03           | CURRENT TRANSDUCER   | P10 STATUS                          | HP SKID - COMPRESSOR ROOM    | Al     | Α                |       |
| CT04           | CURRENT TRANSDUCER   | C4 STATUS                           | HP SKID - COMPRESSOR ROOM    | Al     | Α                |       |
| CT05           | CURRENT TRANSDUCER   | C5 STATUS                           | HP SKID - COMPRESSOR ROOM    | Al     | Α                |       |
| RD01           | REFRIGERANT DETECTOR | R513A DETECTION                     | COMPRESSOR ROOM              | Al     | PPM              | 1,2   |
| RH01           | RH & TEMP SENSOR     | WEYERHAUSER RH & TEMP               | WEYERHAUSER ARENA            | Al     | %, F             |       |
| RH02           | RH & TEMP SENSOR     | COULSON RH & TEMP                   | COULSON ARENA                | Al     | %, F             |       |
| DP01           | DEWPOINT SENSOR      | WEYERHAUSER DEWPOINT                | WEYERHAUSER ARENA            | Al     | F                |       |
| DP02           | DEWPOINT SENSOR      | COULSON DEWPOINT                    | COULSON ARENA                | Al     | F                |       |
| AQ01           | CO2 SENSOR           | WEYERHAUSER CO2                     | WEYERHAUSER ARENA            | Al     | PPM              |       |
| AQ02           | CO & NO2 SENSOR      | WEYERHAUSER CO/NO2                  | WEYERHAUSER ARENA            | Al     | PPM/PPB          |       |
| AQ03           | CO2 SENSOR           | COULSON CO2                         | COULSON ARENA                | Al     | PPM              |       |
| AQ04           | CO & NO2 SENSOR      | COULSON CO/NO2                      | COULSON ARENA                | Al     | PPM/PPB          |       |
| AQ05           | CO2 SENSOR           | EXTERIOR CO2                        | OUTSIDE                      | Al     | PPM              |       |
|                |                      |                                     |                              |        | -                |       |
| AL01<br>NOTES: | LEVEL ALARM          | GT1 LOW LEVEL ALARM                 | HP SKID - COMPRESSOR ROOM    | DI     | -                |       |

1. FOR R513A REFRIGERANT.

2. INSTALL NEAR GROUND LEVEL, WHERE REFRIGERANT IS LIKELY TO ACCUMULATE. 3. PART OF SEPARATE PRICE SP-2.

| OUTPUTS - BUILDING AUTOMATION SYSTEM |                                 |   |                           |        |  |  |  |  |  |
|--------------------------------------|---------------------------------|---|---------------------------|--------|--|--|--|--|--|
|                                      | EQUIPMENT TO CONTROL            | PURPOSE                                 | LOCATION                  | SIGNAL |  |  |  |  |  |
| TAG                                  | DESCRIPTION                     | PURPOSE                                 | LOCATION                  | JIGNAL |  |  |  |  |  |
| R15                                  | SOLENOID VALVE                  | LIQUID REFRIGERANT SHUT-OFF             | HP SKID - COMPRESSOR ROOM | DO     |  |  |  |  |  |
| R16                                  | ELECTRONIC EXPANSION VALVE      | LIQUID REFRIGERANT CONTROL              | HP SKID - COMPRESSOR ROOM | AO     |  |  |  |  |  |
| R24                                  | SOLENOID VALVE                  | V4/V5 OIL WARM-UP CONTROL               | HP SKID - COMPRESSOR ROOM | DO     |  |  |  |  |  |
| R21                                  | SOLENOID VALVE                  | REFRIGERANT EJECTOR LIQUID FEED CONTROL | HP SKID - COMPRESSOR ROOM | DO     |  |  |  |  |  |
| C4                                   | HP COMPRESSOR                   | COMPRESSOR START                        | HP SKID - COMPRESSOR ROOM | DO     |  |  |  |  |  |
| C4                                   | HP COMPRESSOR                   | COMPRESSOR CAPACITY CONTROL             | HP SKID - COMPRESSOR ROOM | AO     |  |  |  |  |  |
| C5                                   | HP COMPRESSOR                   | COMPRESSOR START                        | HP SKID - COMPRESSOR ROOM | DO     |  |  |  |  |  |
| C5                                   | HP COMPRESSOR                   | COMPRESSOR CAPACITY CONTROL             | HP SKID - COMPRESSOR ROOM | AO     |  |  |  |  |  |
| P8                                   | HP EVAPORATOR PUMP              | PUMP START                              | HP SKID - COMPRESSOR ROOM | DO     |  |  |  |  |  |
| Р9                                   | HP CONDENSER PUMP               | PUMP START                              | HP SKID - COMPRESSOR ROOM | DO     |  |  |  |  |  |
| P10                                  | HP SUBCOOLER PUMP               | PUMP START                              | HP SKID - COMPRESSOR ROOM | DO     |  |  |  |  |  |
| P10                                  | HP SUBCOOLER PUMP               | PUMP SPEED CONTROL                      | HP SKID - COMPRESSOR ROOM | AO     |  |  |  |  |  |
| CV1                                  | HP CONDENSER LOOP CONTROL VALVE | DH1/MUA-1 HEATING COIL TEMP CONTROL     | ROOFTOP                   | AO     |  |  |  |  |  |
| CD1                                  | CONTROL DAMPER                  | WEYERHAUSER SUPPLY AIR                  | WEYERHAUSER SUPPLY DUCT   | AO     |  |  |  |  |  |
| CD2                                  | CONTROL DAMPER                  | COULSON SUPPLY AIR                      | COULSON SUPPLY DUCT       | AO     |  |  |  |  |  |
| CD3                                  | CONTROL DAMPER                  | WEYERHAUSER RETURN AIR                  | WEYERHAUSER RETURN DUCT   | DO     |  |  |  |  |  |
| CD4                                  | CONTROL DAMPER                  | COULSON RETURN AIR                      | COULSON RETURN DUCT       | DO     |  |  |  |  |  |

|        | INP           | UTS - TO BUILDING AUTOMATION SYSTEM | FROM DH1     |        |               |
|--------|---------------|-------------------------------------|--------------|--------|---------------|
| TAG    | DESCRIPTION   | PURPOSE                             | LOCATIO<br>N | SIGNAL | DISPLAY UNITS |
| DH-S1  | TEMP SENSOR   | PROCESS AIR INLET TEMP              |              | Al     | F             |
| DH-S2  | RH SENSOR     | PROCESS AIR INLET RH                |              | Al     | %             |
| DH-S3  | TEMP SENSOR   | PROCESS AIR OUTLET TEMP             |              | Al     | F             |
| DH-S4  | RH SENSOR     | PROCESS AIR OUTLET RH               |              | Al     | %             |
| DH-S5  | TEMP SENSOR   | REGEN AIR INLET TEMP                |              | Al     | F             |
| DH-S6  | RH SENSOR     | REGEN AIR INLET RH                  |              | Al     | %             |
| DH-S7  | TEMP SENSOR   | REGEN AIR OUTLET TEMP               | DU1          | Al     | F             |
| DH-S8  | RH SENSOR     | REGEN AIR OUTLET RH                 | DH1          | Al     | %             |
| DH-S9  | TEMP SENSOR   | REGEN AIR PREHEAT COIL LEAVING TEMP |              | Al     | F             |
| DH-S10 | TEMP SENSOR   | REGEN AIR GAS BURNER LEAVING TEMP   |              | Al     | F             |
| DH-S11 | FILTER STATUS | PROCESS FILTER STATUS               |              | DI     | -             |
| DH-S12 | FILTER STATUS | REGEN FILTER STATUS                 |              | DI     | -             |
| DH-S13 | FAN POWER     | PROCESS FAN POWER                   |              | Al     | Α             |
| DH-S14 | FAN POWER     | REGEN FAN POWER                     |              | Al     | Α             |

|     | OUTPUTS - TO DH <sup>2</sup> | 1 FROM BUILDING AUTOMATION S | SYSTEM   |         |
|-----|------------------------------|------------------------------|----------|---------|
| EQU | IPMENT TO CONTROL            | DUDDOCE                      | LOCATION | GIGNIAI |
| TAG | DESCRIPTION                  | PURPOSE                      | LOCATION | SIGNAL  |
|     | DEHUM ON/OFF                 | DEHUM ON/OFF                 |          | DO      |
|     | HUMIDISTAT                   | START REGEN                  |          | DO      |
|     | REGEN HEATER                 | REGEN TEMP                   |          | AO      |
| DH1 | PROCESS AIRFLOW              | FAN SPEED                    | DH1      | AO      |
|     | MIXING DAMPER                | OA & RA MIXING RATIO         |          | AO      |
|     | DUCT HIGH PRESS              | HIGH PRESS CUT-OFF           |          | DO      |
|     | FIRE ALARM                   | FIRE SIGNAL FROM BMS         |          | DO      |

#### GENERAL SPECIFICATIONS - DELTA CONTROLS BUILDING AUTOMATION SYSTEM

- 1. INSTALL LONG TERM TREND ARCHIVING EQUIPMENT AS REQUIRED TO STORE MIN 70,000 DATA-POINT TRENDS (2YR AT 15MIN POLLS) FOR MIN 100 SEPARATE TRENDLOGS.
- 2. ONLY RELIABLE CONTROLS BRAND IS ACCEPTED. ALLOW FOR SEQUENCE ITERATION WITH ENGINEER.
- 3. A BESPOKE GRAPHIC FOR DETAILED DIAGNOSTICS TO BE CREATED. ENGINEER TO PROVIDE DETAIL UPON CONTRACT AWARD.

#### SITE-SPECIFIC HEAT PUMP CONTROL STRATEGY - DELTA CONTROLS BUILDING AUTOMATION SYSTEM

- 1. COMPRESSORS SHALL BE STAGED WITH C4 AS THE LEAD COMPRESSOR.
- 2. MAXIMUM 4 COMPRESSOR STARTS PER HOUR.
- 3. MINIMUM COMPRESSOR RUNTIME IS 5 MINUTES.
- 4. MINIMUM HEAT PUMP EVAPORATION TEMPERATURE IS 40F. 5. ONLY ENABLE HP1 WHEN DH1 IS ENABLED AND CALLING FOR DEHUMIDIFICATION (REGEN IS ON).
- 5.1. ENSURE P8 AND P9 ARE CONFIRMED ENABLED BEFORE STARTING HP1.
- 6. CONTROL HEAT PUMP CAPACITY USING BITZER IQ MODULES ON EACH COMPRESSOR TO MAINTAIN HX4 LEAVING WATER TEMPERATURE (TTXX) AT 165F. 6.1. DISABLE HP WHEN TT13 > 170F.
- 6.2. MINIMUM HP CAPACITY IS 30% OF TOTAL CAPACITY, EQUIVALENT TO ONE COMPRESSOR AT 60% CAPACITY.

#### SUPERHEAT CONTROLLER AND EXPANSION VALVE

- 1. CONTROL SUPERHEAT USING VALVE R16 BASED ON PT02 AND TT05.
- 2. MAINTAIN MINIMUM 20F SUPERHEAT AT HX3 OUTLET.

- OIL WARM-UP SOLENOID VALVE R24 IS NORMALLY CLOSED.
- 2. OPEN R24 WITH 2-MINUTE DELAY WHEN HP1 IS ENABLED.
- 2.1. CONFIRM DURING COMMISSIONING THAT 2-MINUTE DELAY IS SUFFICIENT FOR OIL SEPARATOR (V4) TO REACH OPERATING TEMP. ADJUST DELAY AS REQUIRED.
- 3. CLOSE R24 WHEN HP1 IS DISABLED.

### 4. ENABLE P8 WHEN HP1 IS ENABLED.

1. ENABLE P9 WHEN HP1 IS ENABLED.

1. ENABLE P10 WHEN HP1 IS ENABLED AND TT22 < 140F.

- 2. WHEN ENABLING P-10, RAMP UP SPEED LINEARLY FROM 30% TO 100% OVER A MINIMUM ELAPSED TIME OF 30 SECONDS.
- 3. WHEN DISABLING P-10 (TT22 SETPOINT REACHED), RAMP DOWN SPEED LINEARLY FROM 100% TO 30% OVER A MINIMUM ELAPSED TIME OF 30 SECONDS BEFORE SHUTTING

### 1. MODULATE CV1 TO MAINTAIN SUPPLY AIR TEMP SETPOINT OF MUA-2.

2. ALLOW FOR TRANSFER OF SUPPLY AIR SETPOINT FROM MUA-2 TO DELTA CONTROLS SYSTEM TO CONTROL CV1.

### DEHUMIDIFIER CONTROL STRATEGY - DELTA CONTROLS BUILDING AUTOMATION SYSTEM

- 1. INTEGRATE DEHUMIDIFIER, SENSORS, & DAMPERS INTO BUILDING AUTOMATION SYSTEM AND UPDATE GRAPHICS PACKAGE
- 2. WEYERHAUSER AND COULSON ARENA SETPOINTS ARE CONTROLLED VIA DEW POINT TEMPERATURE. CONTRACTOR TO COORDINATE DEWPOINT TEMPERATURES WITH POLAR ENGINEERING DURING CONSTRUCTION.
- 3. THE DEHUMIDIFIER WILL PRIORITIZE ENERGY RECOVERY VIA THE HYDRONIC COIL WHEN AVAILABLE.
- 4. THE GAS BURNER WILL SUPPLEMENT THE HYDRONIC COIL TO MAINTAIN A MINIMUM REACTIVATION TEMPERATURE OF 150°F.
- 5. IF THE ARENA SETPOINT CANNOT BE MAINTAINED AT 150°F REACTIVATION TEMPERATURE, THE GAS HEATER WILL INCREASE THE REACTIVATION TEMPERATURE ABOVE 150°F TO MAINTAIN THE ARENA SETPOINT.
- 6. IMPLEMENT DEMAND CONTROL VENTILATION BY MODULATING THE DEHUMIDIFIER MIXING BOX. MAINTAIN WEYERHAUSER AND COULSON ARENA CO2 LEVELS WITHIN 700PPM OF OUTDOOR CO2 LEVELS.
- 7. ADD BUTTONS TO GRAPHICS FOR 'ICE OUT' IN THE WEYERHAUSER AND COULSON ARENAS.
- 8. CONTROL DAMPERS AND UNIT CFM AS FOLLOWS:
- 8.1. WHEN WEYERHAUSER "ICE OUT" IS ACTIVE, REDUCE CFM TO 5,000, CLOSE CD1, REDIRECTING 100% OF THE SUPPLY AIR TO COULSON ARENA. OPEN CD1 AS REQUIRED TO
- 8.2. WHEN COULSON "ICE OUT" IS ACTIVE, CLOSE CD3, REDIRECTING 100% OF THE SUPPLY AIR TO WEYERHAUSER ARENA. OPEN CD3 AS REQUIRED TO MAINTAIN ACCEPTABLE
- 8.3. WHEN 'ICE OUT' IS ACTIVE FOR BOTH SPACES, TURN THE DEHUMIDIFIER OFF.
- 8.4. WHEN 'ICE OUT' IS INACTIVE FOR BOTH SPACES, MAINTAIN 16,000 CFM. MODULATE CD1 AND CD2 TO EQUUALIZE HUMIDITY LEVELS BETWEEN THE TWO ARENAS.
- 8.4.1. DAMPERS MUST MODULATE WITHIN A SET RANGE (TO BE SET BY BALANCING CONTRACTOR) TO ENSURE NO MORE THAN 5,000 CFM IS DIRECTED TO COULSON ARENA IN ANY CONDITION.

### CONTROL MODIFICATIONS TO EXISTING EQUIPMENT - DELTA CONTROLS BUILDING AUTOMATION SYSTEM

1. ENABLE P5 DURING ICE-IN SEASON.

- 1. UPDATE EXISTING PUMP P6 PROGRAMMING TO MEET CONTROL INTENT BELOW. 2. DEFINE UF MIN SP AS THE MINIMUM DESIRED UNDERFLOOR TEMPERATURE (45F).
- 3. DEFINE UF\_MAX\_SP AS THE MAXIMUM DESIRED UNDERFLOOR TEMPERATURE (80F).
- 4. DEFINE UF\_AVG\_TEMP AS THE AVERAGE OF EXISTING UNDERFLOOR TEMPERATURE SENSORS.
- 5. DEFINE UF\_SUPPLY\_TEMP AS THE EXISTING UNDERFLOOR SUPPLY GLYCOL TEMPERATURE. 6. ENABLE P6 CONTINUOUSLY DURING ICE-IN SEASON UNLESS EITHER OF THE FOLLOWING CONDITIONS ARE TRUE:
- 6.1. UF AVG TEMP < UF MIN SP AND UF SUPPLY TEMP < UF AVG TEMP.
- 6.2. UF\_AVG\_TEMP > UF\_MAX\_SP AND UF\_SUPPLY\_TEMP > UF\_AVG\_TEMP.
- F-17 (EXISTING AMMONIA PLANT EXHAUST FAN)
- 1. UPDATE F-17 CONTROL SEQUENCE TO RUN AS USUAL, WITH THE FOLLOWING NEW CONDITION.
- 2. MONITOR NEW R513A REFRIGERANT DETECTOR (RD02)
- 2.1. IF A REFRIGERANT LEAK IS DETECTED BY RD02, CONTROL F-17 TO REFRIGERANT LEAK FLOW RATE.
- 2.2. MINIMUM RUNTIME OF 1 HOUR AT REFRIGERANT LEAK FLOW RATE.
- MD-6 (EXISTING MOTORIZED DAMPER ON AMMONIA PLANT INTAKE LOUVRE) 1. PER F-17 SEQUENCE ABOVE, ENSURE MD-6 OPENS WHEN A REFRIGERANT LEAK IS DETECTED AND REMAINS OPEN WHILE F-17 IS OPERATING AT REFRIGERANT LEAK FLOW RATE.

1. CREATE GRAPHIC FOR MUA-2 IN DELTA CONTROLS SYSTEM WITH ALL RELEVANT INFORMATION FOR UNIT OPERATION AND MONITORING.

2. INCLUDE CV-1 AND HEATING COIL TEMPERATURE SENSORS.

3. CONTROL MUA-2 GAS BURNER TO TRIM AS REQUIRED TO MAINTAIN DISCHARGE TEMP SETPOINT WITH HYDRONIC COIL PROVIDING PRE-HEAT.

| PRIME CONSULTANT             | CONSULTANT    | CLIENT                          | ENGINEER OF RECORD                                | PROJECT TITLE   | REV# | DATE       | DRAWN BY | CHECKED BY | DESCRIPTION             | PROJ# 2453 |
|------------------------------|---------------|---------------------------------|---|---|------|------------|----------|------------|-------------------------|------------|
|                              |               |                                 | to CEESION AND AND AND AND AND AND AND AND AND AN | ALBERNI VALLEY MULTIPLEX - ENERGY RECOVERY AND DEHUMIDIFICATION | 1    | 2024-11-13 | EVN      | ВС         | ISSUED FOR COORDINATION | 2433       |
|                              |               |                                 | I. L. WELLE  # 47179                              | AND DEFICION CATION   | 2    | 2025-01-10 | EVN      | ВС         | ISSUED FOR REVIEW       | SHEET SIZE |
|                              |               | PORT ALBERNI                    | WOWEE AND   | DRAWING TITLE   | 3    | 2025-02-03 | EVN      | ВС         | ISSUED FOR TENDER       |            |
| POLAR                        |               | PORT ALBERNI                    | 2025-10-30  | CONTROLS  | 4    | 2025-02-07 | EVN      | ВС         | RE-ISSUED FOR TENDER    | SHEET NAME |
| ENGINEERING PHONE WEBSITE    | PHONE WEBSITE | PHONE WEBSITE                   | IAN WELLE P.ENG.  EGBC PERMIT TO PRACTICE NUMBER  |   | 5    | 2025-10-30 | AH       | ВС         | RE-ISSUED FOR TENDER    | M10        |
| 778-700-1086 www.polareng.ca |               | 250-723-2146 www.portalberni.ca | 1003657   |   | 6    | -          | -        | -          | -                       |            |