

PLANS FOR CONSTRUCTION OF:

# SPRING MEADOW, MONTANA WILD REHAB ANIMAL FACILITY VENTILATION UPGRADE

HELENA, MONTANA  
FWP PROJECT # 7219143

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**NOTE:**

- CONTRACTOR TO COORDINATE ALL ACTIVITY WITH THE OWNER AND PROVIDE ALL NECESSARY PROTECTIVE COVERS, BARRIERS, ETC. TO PROTECT EXISTING EQUIPMENT.
- CONTRACTOR TO PROVIDE COMPLETE O&M MANUAL IN ELECTRONIC FORMAT AT PROJECT COMPLETION.
- CONTRACTOR TO PROVIDE OWNER TRAINING SESSION AT PROJECT COMPLETION.

**NOTE:**

ALL WORK SHALL BE IN STRICT COMPLIANCE WITH ALL APPLICABLE CODES & STANDARDS, INCLUDING, BUT NOT LIMITED TO, 2021 IMC, 2021 UPC, 2021 IBC, 2021 IFGC, 2021 IECC. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING PERMITS, PLAN REVIEWS, AND ALL REQUIRED INSPECTIONS BY THE CODE AUTHORITIES HAVING JURISDICTION.



**MONTANA FISH, WILDLIFE AND PARKS  
DESIGN AND CONSTRUCTION**

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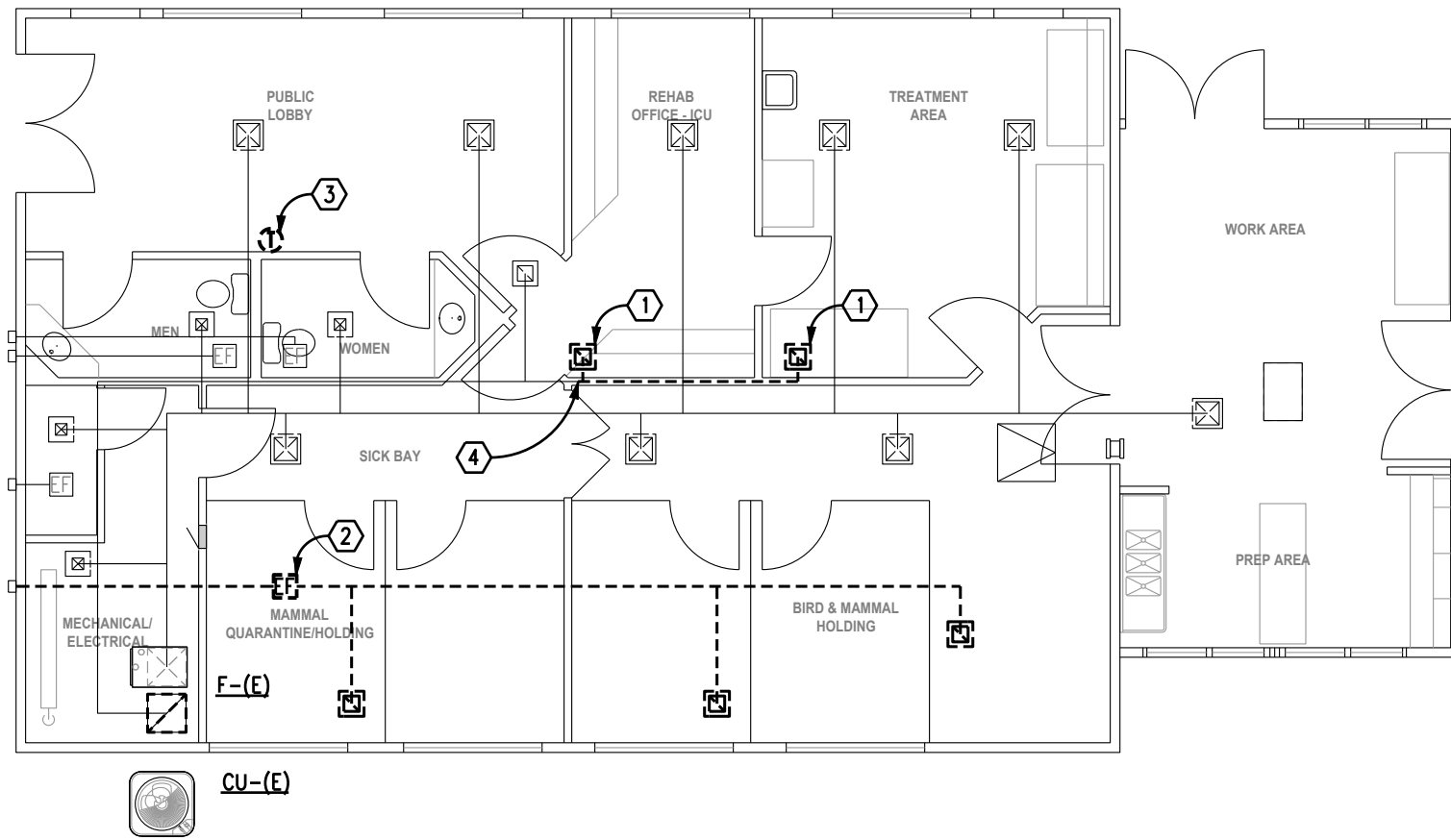


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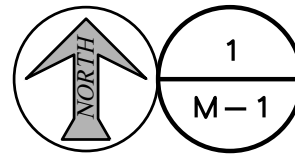
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**NOTE:**  
 ALL NEW WASTE PIPING SHALL BE SCHEDULE 40 PVC OR CAST IRON WHERE NOTED.  
 ALL NEW DOMESTIC WATER PIPING SHALL BE TYPE L COPPER PIPING.  
 ALL NEW DOMESTIC WATER PIPING SHALL BE INSULATED WITH 1" THICK FIBERGLASS INSULATION WITH ASJ.  
 ALL GAS PIPING SHALL BE SCHEDULE 40 STEEL PIPE.  
 ALL DUCT SHALL BE GALVANIZED DUCT AS PER SMACNA STANDARDS.  
 ALL NEW SUPPLY DUCT SHALL BE INSULATED WITH 1½" THICK FIBERGLASS INSULATION WITH FSK.



# HVAC PLAN

DEMOLITION

1/8" = 1'-0"

## WORK NOTES

- ① DEMO RETURN GRILLE AND CAP RETURN DUCT AT MAIN TRUNK. PATCH GYP BOARD CEILING AND PAINT TO MATCH.
- ② DEMO AND REMOVE EXISTING EXHAUST DUCT SYSTEM. REMOVE ELECTRICAL WIRING TO NEAREST JUNCTION BOX. PATCH GYP BOARD CEILING AND PAINT TO MATCH. SEAL ABANDONED TERMINATION ON ATTIC WALL TO BE AIR TIGHT.
- ③ REMOVED EXISTING THERMOSTAT, PREPARE WIRING FOR NEW PROGRAMMABLE THERMOSTAT.
- ④ DEMO EXISTING DUCT BACK TO MAIN RETURN DUCT TRUNK OF 16X14, OR EQUIVALENT DUCT SIZE, FIELD VERIFY.



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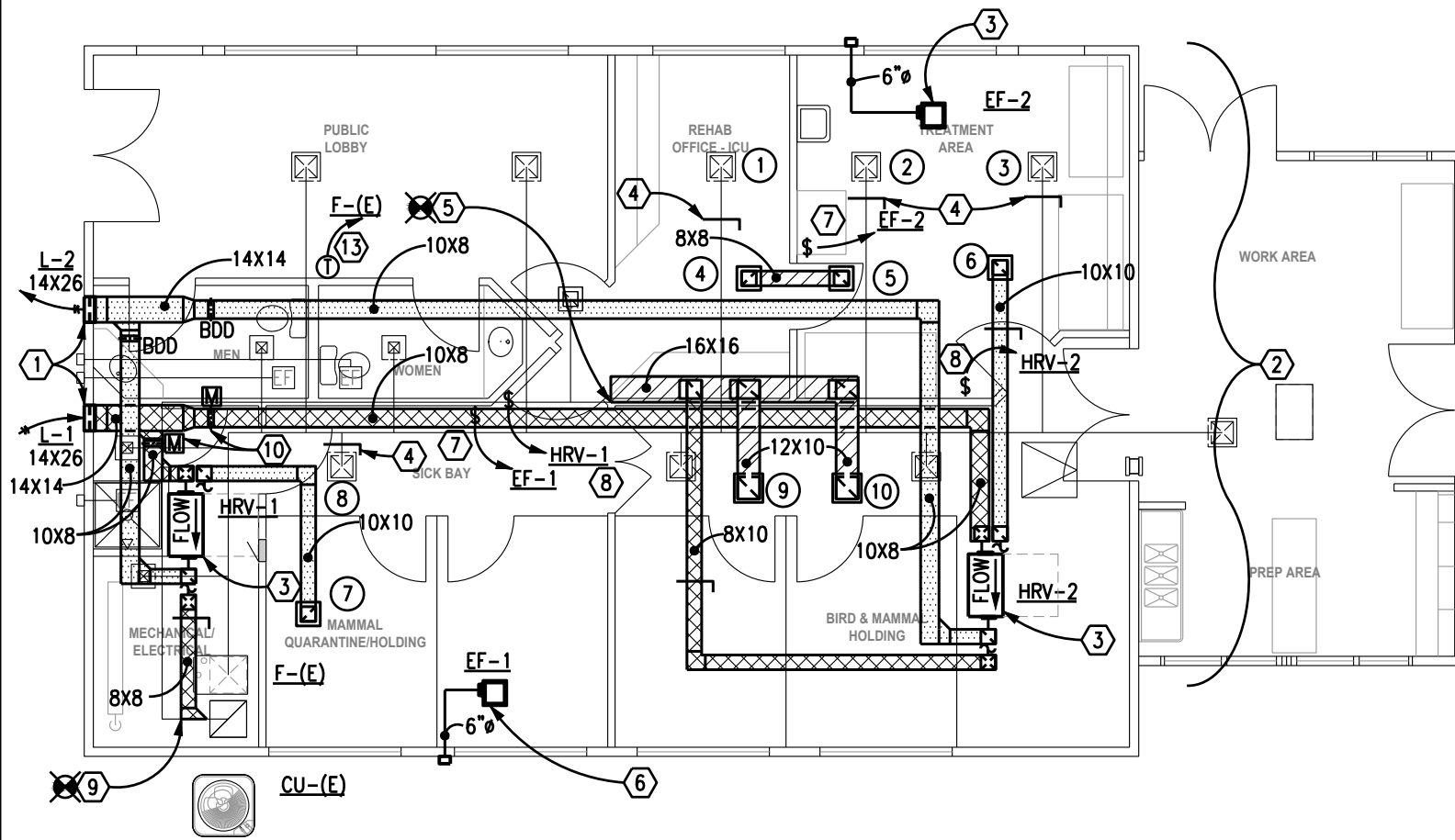


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MECHANICAL WORK NOTES



- ① FURNISH AND INSTALL NEW LOUVER IN EXTERIOR WALL, SLOPE BOTTOM OF DUCT SO WATER DRAINS TO THE EXTERIOR. FLASH AND TRIM LOUVER TO BE WATER TIGHT WITH EXTERIOR.
- ② ALL NEW DUCTWORK SHOWN SHALL BE LOCATED IN COLD ATTIC SPACE UNLESS OTHERWISE NOTED. INSULATE WITH 1" DUCT WRAP ALL EXHAUST DUCT FROM OCCUPIED AREAS TO HRV UNITS, SUPPLY AIR FROM HRV UNITS TO RETURN DUCT CONNECTION, AND ALL NEW RETURN DUCT. OFFSET ALL NEW DUCT AS NECESSARY TO AVOID EXISTING DUCT AND STRUCTURAL MEMBER CONFLICTS.
- ③ FURNISH & INSTALL HRV UNIT IN OCCUPIED SPACE HIGH ON WALL TIGHT TO CEILING. ROUTE DUCT CONNECTIONS DOWN THROUGH GYP BOARD CEILING LID TO CONNECT TO HRV. SEAL ALL GYPBOARD PENETRATIONS TO BE AIR TIGHT.
- ④ FURNISH AND INSTALL NEW BALANCING DAMPER IN DUCT RUNOUT TO EXISTING GRILLE. FIELD VERIFY DUCT SIZE BY CONTRACTOR.
- ⑤ CONNECT NEW RETURN DUCT TO EXISTING RETURN DUCT IN THIS APPROXIMATE LOCATION, TRANSITION DUCT AS NECESSARY.
- ⑥ FURNISH AND INSTALL EXHAUST FAN IN GYP CEILING IN THIS APPROXIMATE LOCATION. ROUTE EXHAUST DUCT IN ATTIC SPACE TO SOFFIT VENT TERMINATION.
- ⑦ APPROXIMATE LOCATION OF ON/OFF SWITCH FOR EXHAUST FAN. CLEARLY LABEL SWITCH WITH FAN TAG.
- ⑧ APPROXIMATE LOCATION OF ON/OFF SWITCH FOR HRV. CLEARLY LABEL SWITCH WITH HRV TAG.
- ⑨ CONNECT SUPPLY DUCT FROM HRV TO FURNACE RETURN DUCT. FURNISH & INSTALL BALANCING DAMPER.
- ⑩ FURNISH & INSTALL MOTORIZED DAMPERS AND DAMPER ACTUATORS IN OA SUPPLY DUCTS SERVING EACH HRV. SEE SEQUENCE OF CONTROL FOR ADDITIONAL INFORMATION.
- ⑪ BALANCE GRILLES, REGISTERS AND DIFFUSERS WITH BOTH EXISTING FURNACE AND HRV-2 ARE RUNNING. THE SUM AIRFLOW OF GRILLES TAGGED 1,2 AND 3 SHALL ALWAYS BE A MINIMUM OF 75 CFM LESS THAN EXHAUST GRILLE #6.
- ⑫ BALANCE GRILLES, REGISTERS AND DIFFUSERS WITH BOTH EXISTING FURNACE AND HRV-1 ARE RUNNING. THE AIRFLOW OF GRILLE TAGGED 8 SHALL ALWAYS BE A MINIMUM OF 75 CFM LESS THAN EXHAUST GRILLE #7.
- ⑬ FURNISH AND INSTALL NEW 7 DAY PROGRAMMABLE THERMOSTAT TO CONTROL EXISTING FURNACE/CU.

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M-2  
**HVAC PLAN**  
NEW WORK 1/8" = 1'-0"



GRILLE AND REGISTER BALANCE SCHEDULE

| MARK | TYPE | SIZE | BAL. CFM | MARK | TYPE | SIZE  | BAL. CFM | MARK | TYPE | SIZE  | BAL. CFM | MARK | TYPE | SIZE  | BAL. CFM |
|------|------|------|----------|------|------|-------|----------|------|------|-------|----------|------|------|-------|----------|
| ①    | S(E) | -    | 75       | ④    | T-1  | 8X8   | -        | ⑦    | E-1  | 10X10 | 350      | ⑩    | R-1  | 12X12 | 660      |
| ②    | S(E) | -    | 100      | ⑤    | T-1  | 8X8   | -        | ⑧    | S(E) | -     | 275      |      |      |       |          |
| ③    | S(E) | -    | 100      | ⑥    | E-1  | 10X10 | 350      | ⑨    | R-1  | 12X12 | 660      |      |      |       |          |

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## MECHANICAL LEGEND

(NOTE: NOT ALL SYMBOLS MAY BE USED)

| SYMBOL | DESCRIPTION                              | SYMBOL | DESCRIPTION                             | SYMBOL | DESCRIPTION                                   |
|--------|--|--------|---|--------|---|
|        | LIGHT, EXISTING TO REMAIN                |        | UNION                                   |        | PRESSURE GAUGE                                |
|        | DARK, NEW                                |        | REDUCER                                 |        | THERMOMETER                                   |
|        | DARK DASHED, ITEMS TO REMOVE             |        | STRAINER                                |        | ELECTRIC THERMOSTAT                           |
|        | DOMESTIC COLD WATER (CW)                 |        | DRAIN VALVE                             |        | SENSOR (ELECTRIC):<br>TEMPERATURE OR PRESSURE |
|        | DOMESTIC HOT WATER (HW)                  |        | HOSE BIBB                               |        | SUPPLY DUCT (NEW)                             |
|        | DOMESTIC RECIRCULATING WATER             |        | AIR OUTLET                              |        | FLEX DUCT                                     |
|        | SANITARY SEWER (ABOVE GRADE)             |        | CIRCUIT SETTER                          |        | RETURN DUCT                                   |
|        | SANITARY SEWER (BELOW GRADE)             |        | BACKFLOW PREVENTER                      |        | EXHAUST DUCT                                  |
|        | NATURAL GAS                              |        | AUTOMATIC FLOW CONTROL VALVE            |        | OUTSIDE & MIXED AIR DUCT                      |
|        | DRAIN                                    |        | MANUAL AIR VENT                         |        | ELBOW UP                                      |
|        | HEATING WATER SUPPLY                     |        | GATE VALVE                              |        | ELBOW DOWN                                    |
|        | HEATING WATER RETURN                     |        | LUBRICATED PLUG VALVE                   |        | RISE IN DUCT (OR DROP "D")                    |
|        | REFRIGERANT SUCTION                      |        | MOTORIZED VALVE<br>(ELECTRIC OPERATOR)  |        | BALANCING DAMPER                              |
|        | REFRIGERANT LIQUID                       |        | MOTORIZED VALVE<br>(PNEUMATIC OPERATOR) |        | FIRE DAMPER                                   |
|        | CHILLED WATER SUPPLY                     |        | TRAP PRIMER DISTRIBUTION UNIT           |        | SMOKE/FIRE DAMPER                             |
|        | CHILLED WATER RETURN                     |        | BALL VALVE                              |        | ACCESS DOOR                                   |
|        | AIR                                      |        | CHECK VALVE                             |        | MOTORIZED DAMPER                              |
|        | VENT                                     |        | THREE WAY MIXING VALVE                  |        | BACKDRAFT DAMPER                              |
|        | KEYED WORK NOTES                         |        | MANUAL BALANCING VALVE                  |        | LOUVER  |
|        | POINT OF CONNECTION<br>(NEW TO EXISTING) |        | PRESSURE RELIEF                         |        | SUPPLY AIR IN SECTION                         |
|        | TEE UP AND TEE DOWN                      |        | PRESSURE REDUCING VALVE                 |        | RETURN, OUTDOOR OR<br>EXHAUST IN SECTION      |
|        | ELBOW UP AND ELBOW DOWN                  |        | RECIRCULATING PUMP                      |        | DUCT MOUNTED SMOKE DETECTOR                   |
|        | SEWER CLEAN OUT                          |        |   |        | SWITCH, MOTOR STARTER/DISCONNECT              |

### EXHAUST FAN SCHEDULE

| MARK | AREA SERVING | MANUFACTURER | MODEL   | TYPE    | DRIVE  | CFM | TSP<br>(IN WG) | RPM  | HP  | VOLT/PHASE | BDD | DISCONNECT | NOTES |
|------|--------------|--------------|---------|---------|--------|-----|----------------|------|-----|------------|-----|------------|-------|
| EF-1 | MAMMAL       | ACME         | VQ220EC | CEILING | DIRECT | 150 | 0.5            | 1199 | 30W | 120/1      | YES | YES        | ①     |
| EF-2 | TREATMENT    | ACME         | VQ220EC | CEILING | DIRECT | 215 | 0.5            | 1260 | 30W | 120/1      | YES | YES        | ①     |

① E.C. TO INSTALL DISCONNECT, STARTER, AND ON/OFF WALL SWITCH.

### HEAT EXCHANGER SCHEDULE

| MARK  | MFR        | MODEL   | EXHAUST AIR SIDE |                |            |     | OUTSIDE AIR SIDE |                |            |     | VOLT/<br>PHASE | NOTES |
|-------|------------|---------|------------------|----------------|------------|-----|------------------|----------------|------------|-----|----------------|-------|
|       |            |         | CFM              | ESP<br>(IN WG) | EFFICIENCY | HP  | CFM              | ESP<br>(IN WG) | EFFICIENCY | HP  |                |       |
| HRV-1 | LIFEBREATH | 330 ERV | 350              | 0.3            | 65%        | 1/8 | 350              | 0.3            | 65%        | 1/8 | 120/1          | ①     |
| HRV-2 | LIFEBREATH | 330 ERV | 350              | 0.3            | 65%        | 1/8 | 350              | 0.3            | 65%        | 1/8 | 120/1          | ①     |

① INDOOR UNIT COMPLETE WITH FAN DEFROST, WALL MOUNTED ON/OFF CONTROLLER, HANGING VIBRATION ISOLATORS.

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SEQUENCE OF CONTROL

TEMPERATURE CONTROLS SYSTEM SHALL BE FURNISHED, INSTALLED, AND ENGINEERED BY A BONA FIDE TC CONTRACTOR.

ALL TEMPERATURE CONTROL WIRING SHALL BE INSTALLED IN CONDUIT. SENSORS ARE TO BE FURNISHED BY THE T.C. SUBCONTRACTOR. THE THERMOSTATS FOR THE FURNACES ARE TO BE "CONTROLLERS" IN THAT OCCUPANCY SCHEDULES MAY BE OVERRIDDEN, TEMPERATURE SETPOINTS MAY BE ADJUSTED, ETC. FINAL SETUP AND CONFIGURATION OF THE FUNCTIONALITY AND DISPLAY SCREEN ON THE DEVICE SHALL BE MADE AT THE COMPLETION OF THE PROJECT WITH THE OWNER'S REPRESENTATIVE. PROVIDE FULL SUBMITTALS INDICATING ALL FEATURES AND CAPABILITIES OF THESE DEVICES.

F-(E), AND ASSOCIATED CU-(E) FURNISH AND INSTALL NEW THERMOSTAT AS SHOWN ON PLAN. UNIT SHALL HAVE ITS OWN OCCUPIED SCHEDULE. FAN OPERATION SHALL BE OWNER SELECTABLE ON/OFF/CONTINUOUS ON DAY CYCLE AND INTERMITTENT ON NIGHT CYCLE. COORDINATE WITH OWNER FOR SCHEDULING.

HRV-1 & HRV-2, HRV'S SHALL BE CONTROLLED WITH A ON/OFF WALL SWITCH AND SHALL RUN CONTINUOUSLY WHEN IN THE ON POSITION. WHEN THE UNIT IS TURNED ON, THE DAMPER ACTUATOR ASSOCIATED WITH THE OUTDOOR AIR INTAKE DAMPER FOR THE UNIT SHALL OPEN. THE HRV UNITS ARE FURNISHED WITH THEIR OWN DEFROST CONTROLS. WHEN THE HRV'S ARE IN DEFROST MODE, THEIR EXHAUST FAN WILL CONTINUE TO RUN WITH THEIR OUTDOOR AIR FANS OFF. DURING THIS TIME, THE OA DAMPER SERVING THE HRV SHALL CLOSE. DETERMINING IF A UNIT IS IN DEFROST WILL BE ACCOMPLISHED BY A CURRENT SENSING RELAY (FURNISHED AND INSTALLED BY TC CONTRACTOR) FOR THE OUTDOOR AIR FAN IN EACH HRV.

EF-1 AND EF-2 FURNISH WALL MOUNTED ON/OFF SWITCH IN LOCATIONS SHOWN ON PLANS.

SHEET METAL ACCESSORIES SCHEDULE

| MARK                       | MANUFACTURER | MATERIAL  | FEATURES   | NOTES   |
|----------------------------|--------------|---|--|---|
| MANUAL BALANCING DAMPERS   | NAILOR       | MODEL 1820, 1870, OR 1890, 16 GA BLADES CHANNEL FRAME WITH LOCKING QUADRANT OPERATOR. | 12" x 8" & SMALLER, SINGLE BLADE. LARGER SIZES SHALL BE OPPOSED BLADE TYPE.  |   |
| MD (MOTORIZED DAMPER)      | NAILOR       | MODEL 1110 OR 1120, 16 GA FRAME, AIRFOIL BLADES. ROUND DAMPERS                        | CERTIFIED LOW LEAKAGE DAMPERS WITH BLADE & JAMB SEALS. PROPORTIONING DAMPERS SHALL BE OPPOSED BLADE CONFIGURATION. TWO POSITION DAMPERS MAY BE PARALLEL BLADE. | PROVIDE ACCESS DOOR IN DUCTWORK AT ALL DAMPERS. MOTORIZED DAMPERS & ACTUATORS FURNISHED BY TEMPERATURE CONTROLS CONTRACTOR.   |
| BDD-1 (BACKDRAFT DAMPER)   | NAILOR       | MODEL 1370, 6063-T5 ALUMINUM BLADES AND FRAMES, SYNTHETIC BEARINGS, PVC SEALS.        | ALUMINUM BLADE CONFIGURATION PROVIDE COUNTERBALANCE FOR BAROMETRIC RELIEF APPLICATION  | PROVIDE ACCESS DOOR IN DUCTWORK AT ALL DAMPERS.   |
| L-1 (VERTICAL WALL LOUVER) | NAILOR       | MODEL 1604DD, 0.080" EXTRUDED ALUMINUM BLADES, DRAINABLE, 3/4" ALUMINUM BIRDSCREEN.   | 6" DEEP DRAINABLE BLADE & FRAME CONFIGURATION WITH WEEP HOLES IN FLANGE.   | FACTORY APPLIED AAMA 2605 - SUPERIOR FINISH, 1.2 MIL DRY THICKNESS. PROVIDE STANDARD COLOR CHART FOR SELECTION. ATTACH TO WALL WITH RUSTPROOF VANDAL RESISTANT FASTENERS. |

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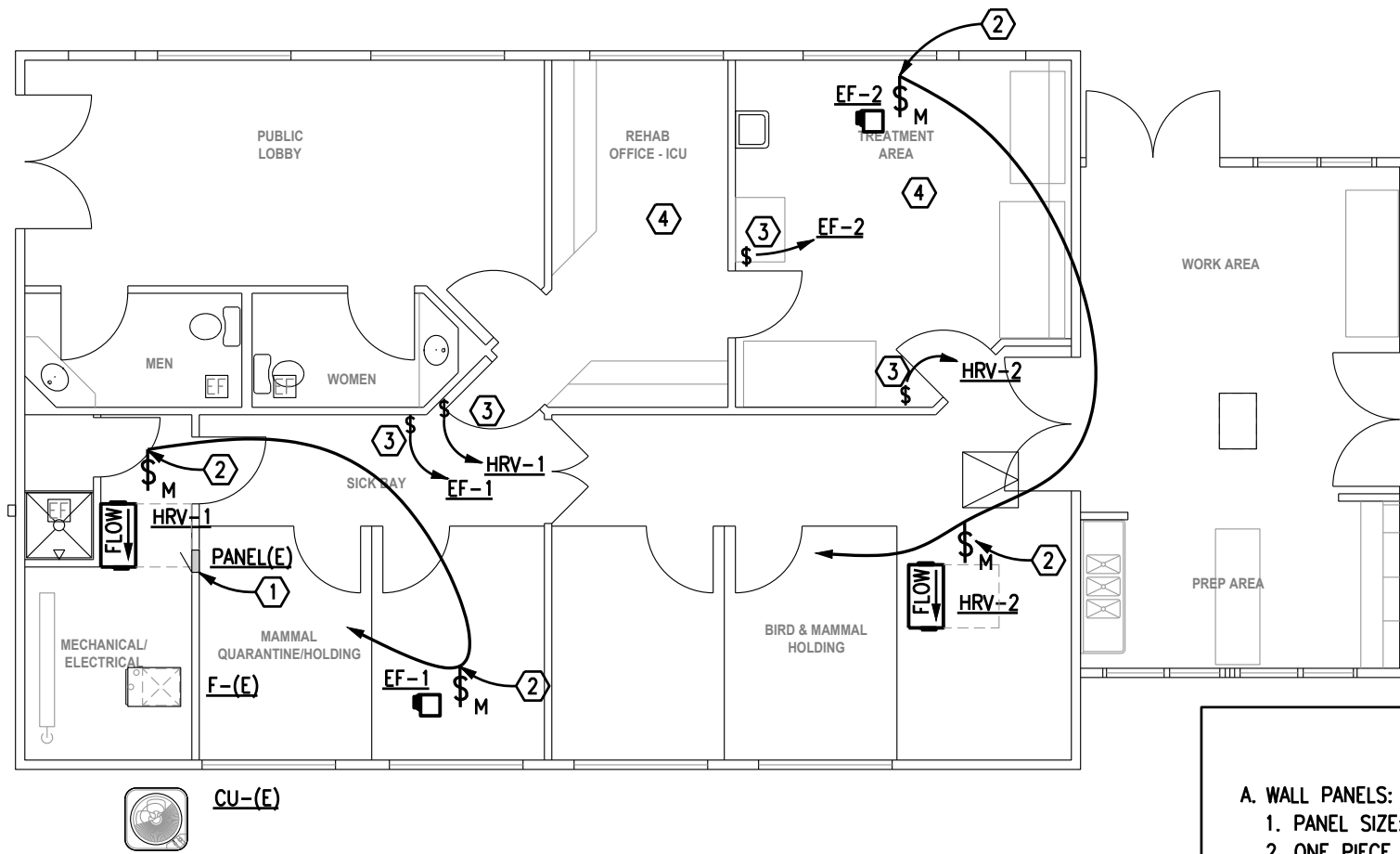


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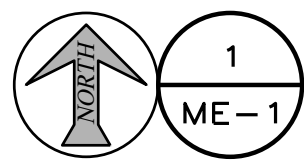


**WORK NOTES**

- ① FURNISH & INSTALL TWO NEW 20/1P BREAKERS IN EXISTING SQ D HOMELINE LOAD CENTER. CONNECT TO LOADS AS REQUIRED.
- ② FURNISH & INSTALL NEW 1P MANUAL MOTOR STARTER/DISCONNECT FOR HRV & EF PAIR. Extend 3-#12 IN CONDUIT AND CONNECT AS REQUIRED. ROUTE ALL CONDUIT IN ATTIC SPACE EXCEPT WHERE NEEDED TO CONNECT TO EQUIPMENT.
- ③ LOCATION OF WALL MOUNTED ON/OFF SWITCH. LABEL SWITCH PLATE COVER WITH CORRESPONDING EQUIPMENT TAG.
- ④ BID ADD ALTERNATE #1: REMOVE ANY EXISTING FRP WALL COVERING IN THESE ROOMS. FURNISH AND INSTALL NEW FRP WALL WALL FINISHES FROM FLOOR TO CEILING. SEAL WATER TIGHT AROUND ALL EXISTING TRIM, CABINETS AND COUNTERS. SEE NOTE ON THIS PAGE FOR ADDITIONAL SPECIFICATIONS.

**BID ADD ALTERNATE #1 - FIBERGLASS REINFORCED PANELING**

- A. WALL PANELS:**
1. PANEL SIZE: 4 BY 8 FEET, 4'X9', 4'X10', AND 4'X12'. INSTALL IN LONGEST RUNS POSSIBLE.
  2. ONE PIECE "H" AND "J" CHANNELS AT CORNERS AND JOINTS, COLOR TO MATCH PANEL.
  3. PANEL THICKNESS: 0.10 INCH.
  4. COLOR: VERIFY WITH OWNER, ATTEMPT TO MATCH ADJACENT ROOM FRP.
  5. TEXTURE: VERIFY WITH OWNER, ATTEMPT TO MATCH ADJACENT ROOM FRP.
  6. ATTACHMENT METHOD: ADHESIVE ONLY, WITH TRIM AND SEALANT IN JOINTS.
- B. PANELS: FIBERGLASS REINFORCED PLASTIC (FRP), COMPLYING WITH ASTM D5319.**
1. SURFACE BURNING CHARACTERISTICS: MAXIMUM FLAME SPREAD INDEX OF 25 AND SMOKE DEVELOPED INDEX OF 450; WHEN SYSTEM TESTED IN ACCORDANCE WITH ASTM E84.
  2. CLASS C FIRE RATING.
  3. MOLD RESISTANCE: SCORE OF 10, WHEN TESTED IN ACCORDANCE WITH ASTM D3273.
  4. SCRATCH RESISTANCE: BARCOL HARDNESS SCORE GREATER THAN 35, WHEN TESTED IN ACCORDANCE WITH ASTM D2583.
  5. IMPACT STRENGTH: GREATER THAN 6 FT LB FORCE PER INCH, WHEN TESTED IN ACCORDANCE WITH ASTM D256.
  6. SANITATION AND CLEANABILITY: COMPLY WITH 9 CFR 416.2.
  7. CHEMICAL CLEANABILITY: EXCELLENT CHEMICAL RESISTANCE TO COMMON CLEANERS AND DETERGENTS WHEN TESTED IN ACCORDANCE WITH ISO 2812-1.
- C. SEALANT: TYPE RECOMMENDED BY PANEL MANUFACTURER; WHITE.**
- EXAMINATION, STORAGE & INSTALLATION - WALLS**
- A. VERIFY EXISTING CONDITIONS AND SUBSTRATE FLATNESS BEFORE STARTING WORK.
  - B. VERIFY THAT SUBSTRATE CONDITIONS ARE READY TO RECEIVE THE WORK OF THIS SECTION.
  - C. STORE PANELS FLAT, INDOORS, ON A CLEAN, DRY SURFACE. REMOVE PACKAGING AND ALLOW PANELS TO ACCLIMATE TO ROOM TEMPERATURE FOR 48 HOURS PRIOR TO INSTALLATION.
  - D. INSTALL PANELS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
  - E. CUT AND DRILL PANELS WITH CARBIDE TIPPED SAW BLADES, DRILL BITS, OR SNIPS.
  - F. APPLY ADHESIVE TO THE BACK SIDE OF THE PANEL USING TROWEL AS RECOMMENDED BY ADHESIVE MANUFACTURER.
  - G. APPLY PANELS TO WALL WITH SEAMS PLUMB AND PATTERN ALIGNED WITH ADJOINING PANELS.
  - H. INSTALL PANELS WITH MANUFACTURER'S RECOMMENDED GAP FOR PANEL FIELD AND CORNER JOINTS.
  - I. DRIVE FASTENERS TO PROVIDE SNUG FIT, AND DO NOT OVER-TIGHTEN.
  - J. SEAL GAPS AT FLOOR, CEILING, AND BETWEEN PANELS WITH APPLICABLE SEALANT TO PREVENT MOISTURE INTRUSION.
  - K. REMOVE EXCESS SEALANT AFTER PANELING IS INSTALLED AND PRIOR TO CURING.



**M/E PLAN**

NEW WORK

1/8" = 1'-0"



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