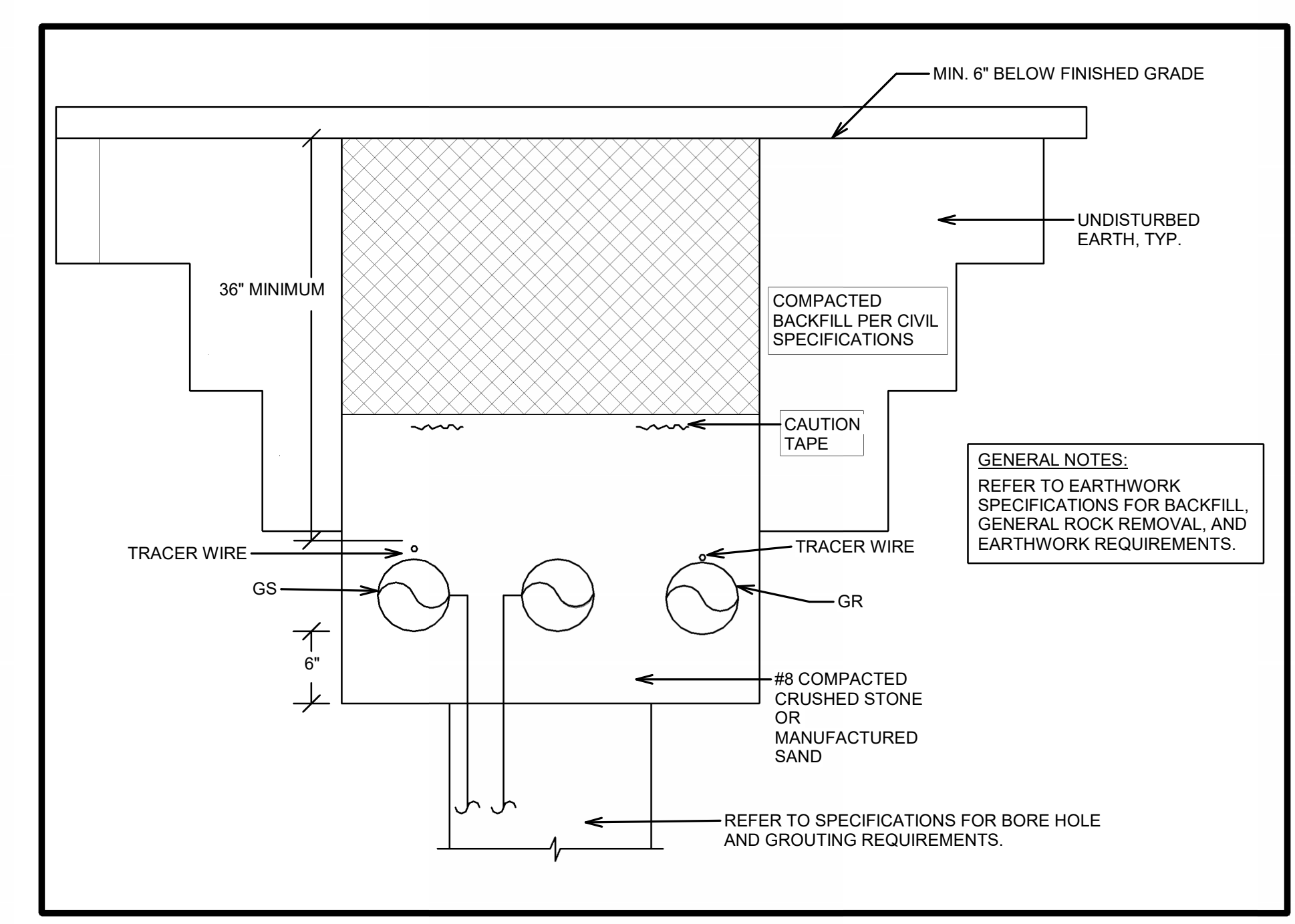
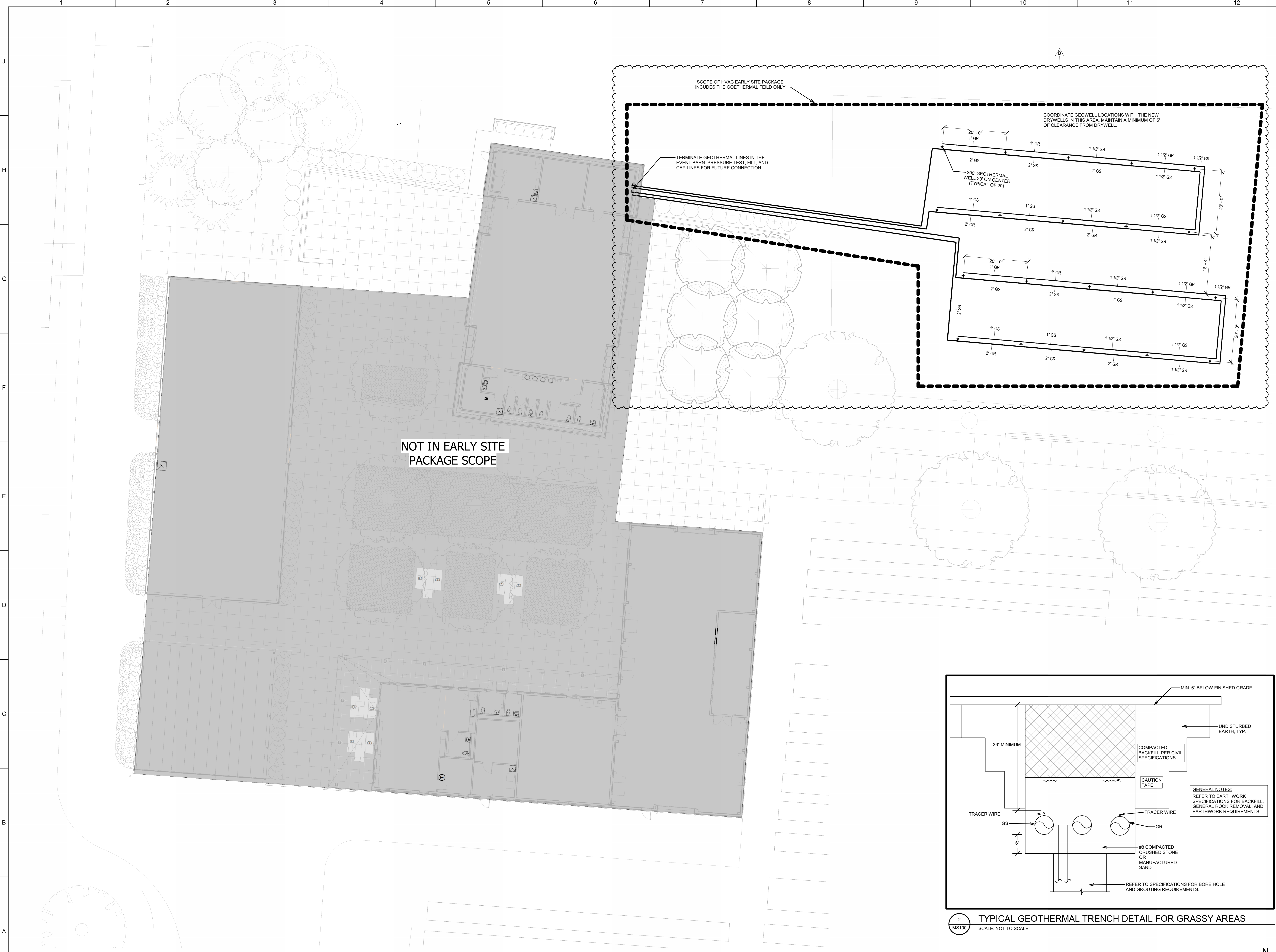


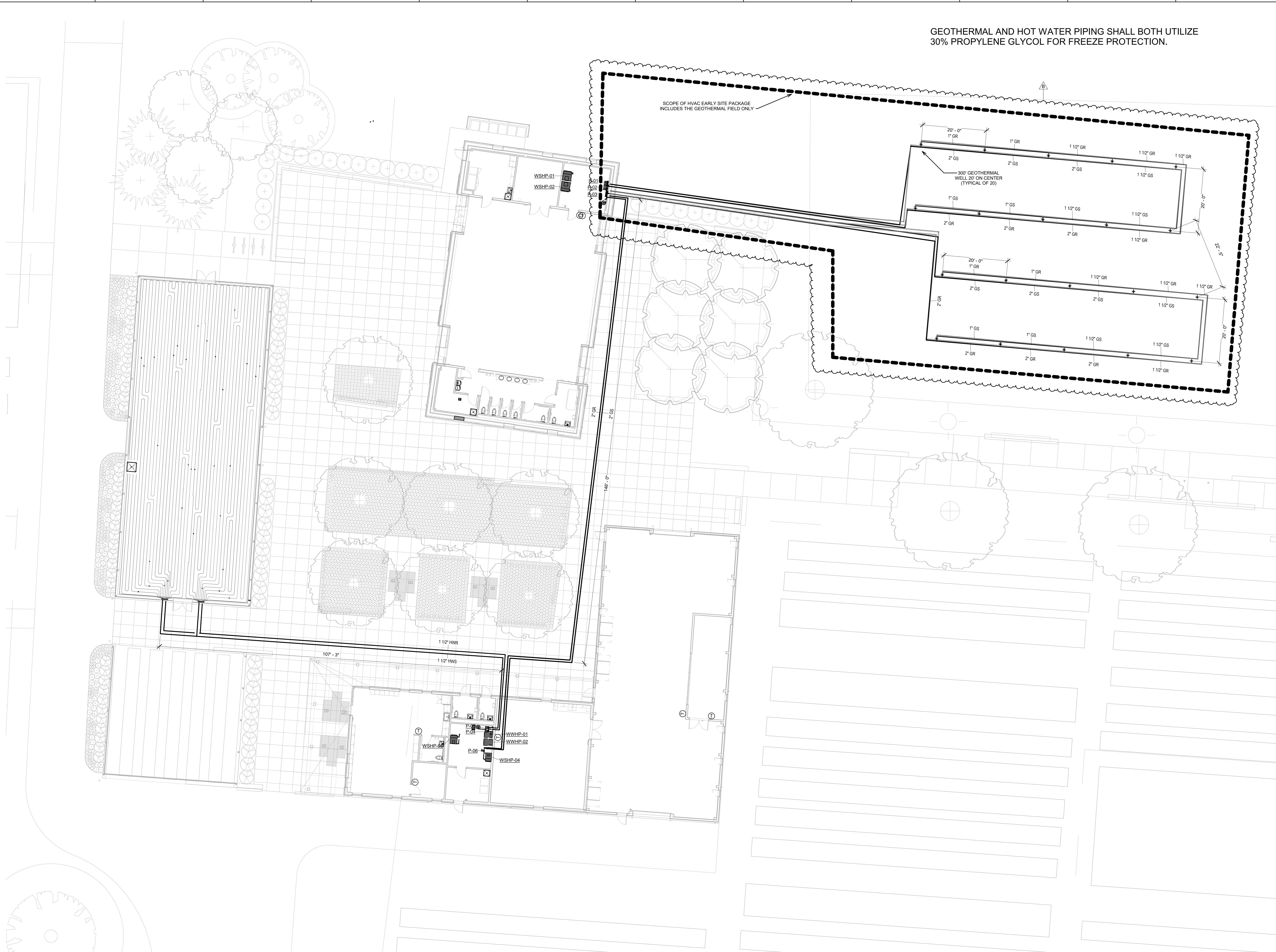
1 HVAC SITE PLAN - GEOTHERMAL LAYOUT
SCALE: 3/32" = 1'-0"



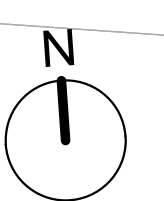
2 TYPICAL GEOTHERMAL TRENCH DETAIL FOR GRASSY AREAS
SCALE: NOT TO SCALE

| | | | |
|---|--|--------------------------------|--|
| | | | |
| | | | |
| emerson design llc ARCHITECTURE INTERIORS SUSTAINABILITY PLANNING ENGINEERING 310 Gilbert Street Suite 100 Cincinnati, Ohio 45202 513 841 9180 emersondesign.com | | PROJECT NO. 02204 | |
| DESIGNED BY: JTW | | DATE: JULY 17, 2024 | |
| DRAWN BY: JTW | | CHECKED BY: BMR | |
| PROJECT MANAGER: BM | | PLOT SCALE: As indicated | |
| SHEET SIZE: 30x42 | | FILE NAME: GMP_ADDENDUM_02 | |
| SHAKER TRACE SEED NURSERY IMPROVEMENTS MIAMI WHITEWATER PARK, HAMILTON COUNTY 8867 NEW HAVEN RD, HARRISON, OHIO 46030 HVAC SITE PLAN | | MARK B | |
| | | | |
| SHEET IDENTIFICATION MS100 | | ISSUED FOR GMP - JULY 17, 2024 | |

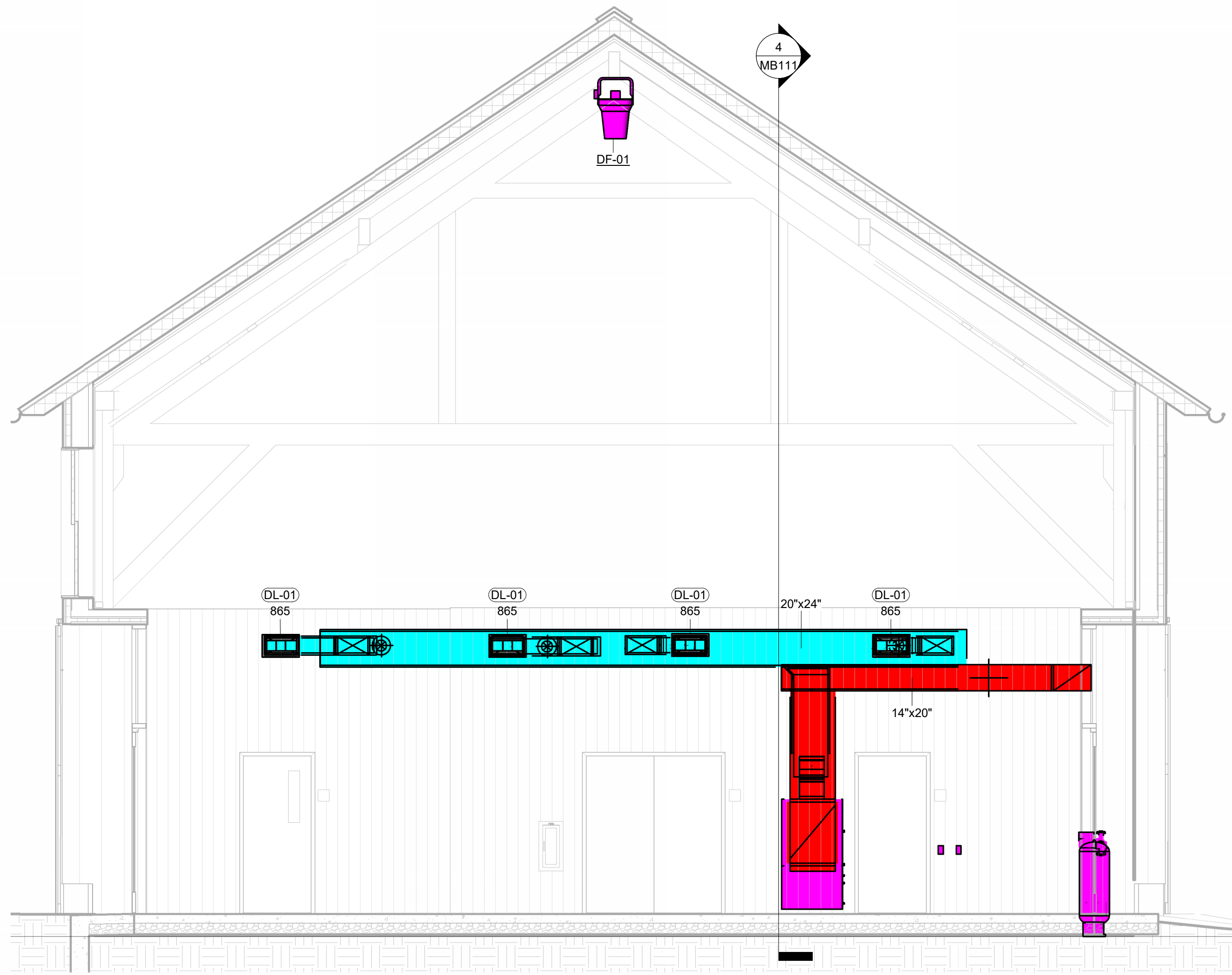
GEOTHERMAL AND HOT WATER PIPING SHALL BOTH UTILIZE 30% PROPYLENE GLYCOL FOR FREEZE PROTECTION.



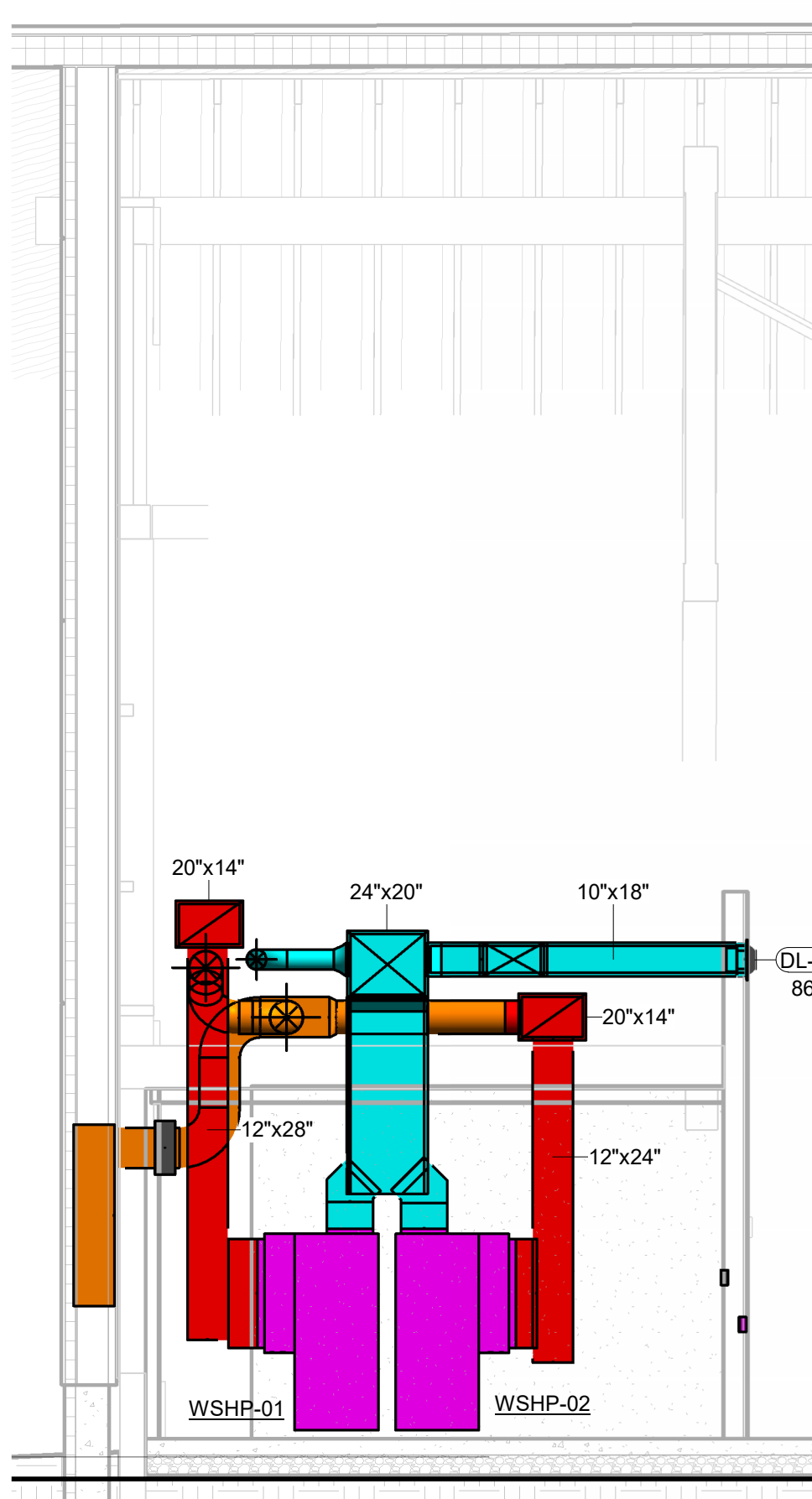
1 HVAC SITE PLAN - HVAC PIPING
SCALE: 3/32" = 1'-0"



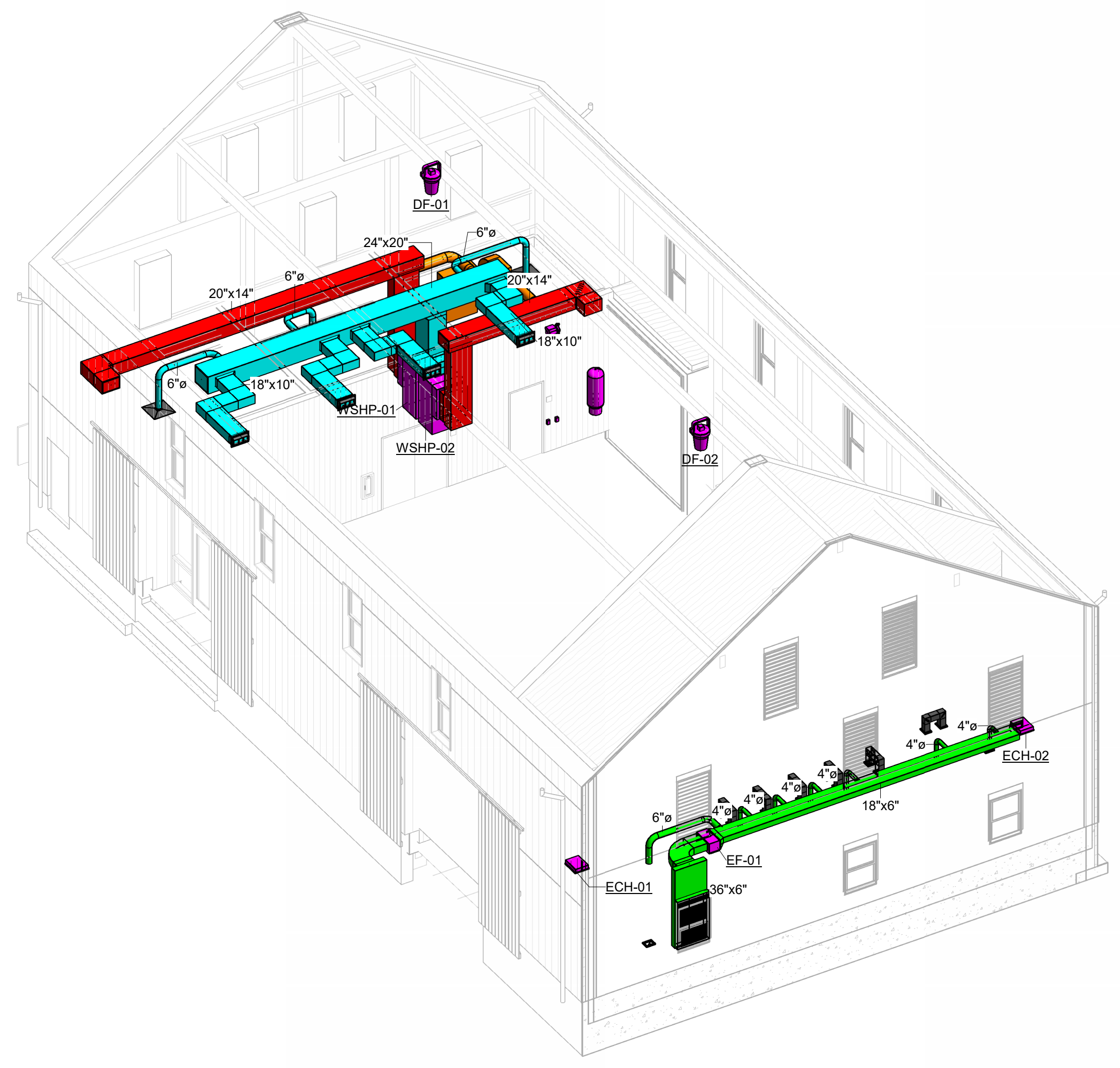
| | | | | | |
|--|------------------------|------------------------------|-----------------------|-----------------------------------|-------------------------------|
| | | | | | |
| emerson design llc 310 Gilbert Street Suite 100 Cincinnati, Ohio 45202 513.841.9180 emersondesign.com | | schaefer AARCADIS | | schaefer AARCADIS | |
| DESIGNED BY: J. WAMMEYER | CHECKED BY: E. ROSE | DATE: JULY 17, 2024 | PROJECT NO. 082204 | DESCRIPTION B. GMP ADDENDUM 02 | DATE 08/27/2024 |
| DRAWN BY: J. WAMMEYER | PROJECT MANAGER: BM | PLOT SCALE: 3/32" = 1'-0" | SHEET SIZE: 30x42 | MARK B | FILE NAME: GMP_ADDENDUM_02 |
| SHAKER TRACE SEED NURSERY IMPROVEMENTS MIAMI WHITEWATER PARK, HAMILTON COUNTY 8867 NEW HAVEN RD, HARRISON, OHIO 46030 HVAC SITE PIPING PLAN | | | | | |
| | | | | | |
| | | | | | |
| SHEET IDENTIFICATION MS101 | | | | | |



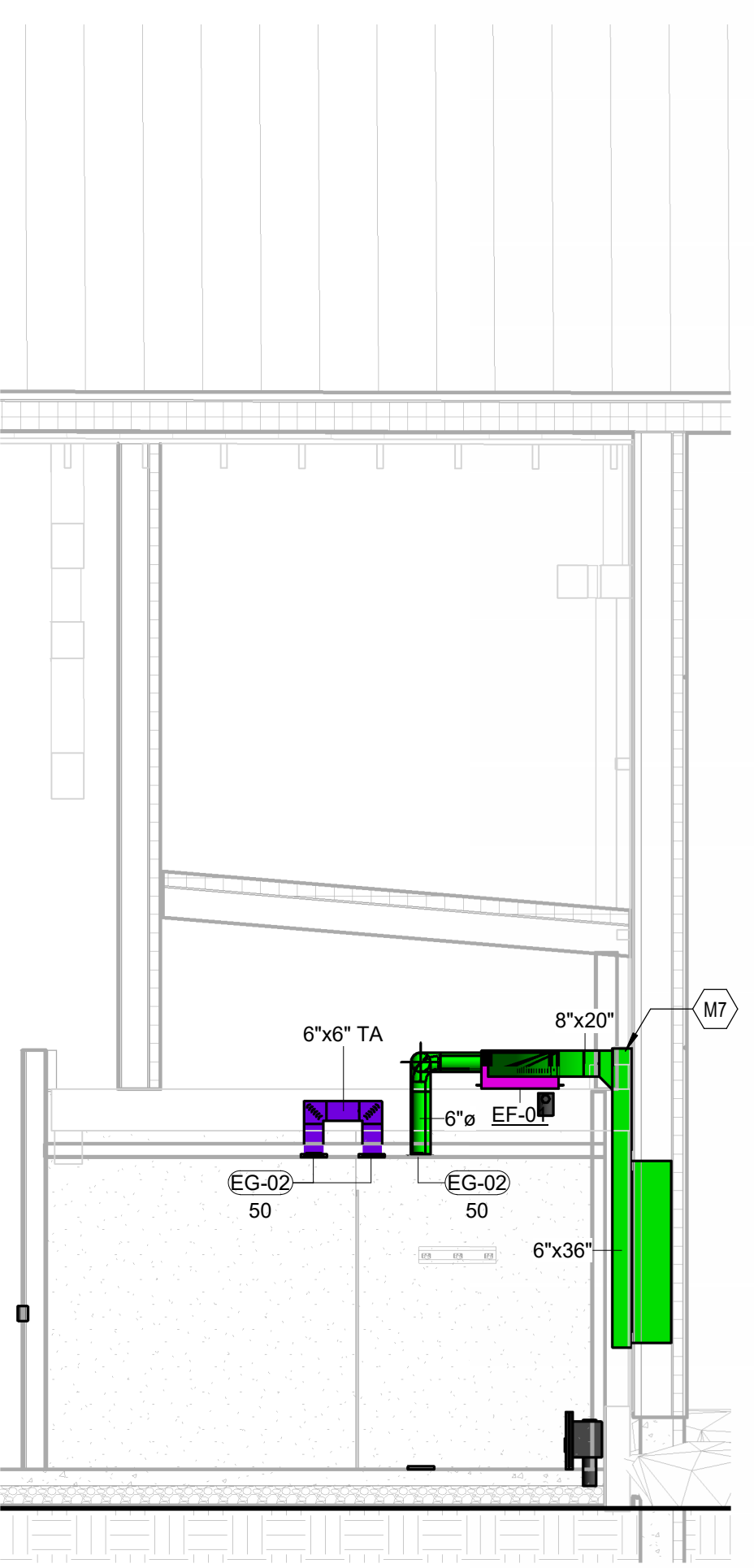
3 MECHANICAL BARN SECTION
SCALE: 1/4" = 1'-0"



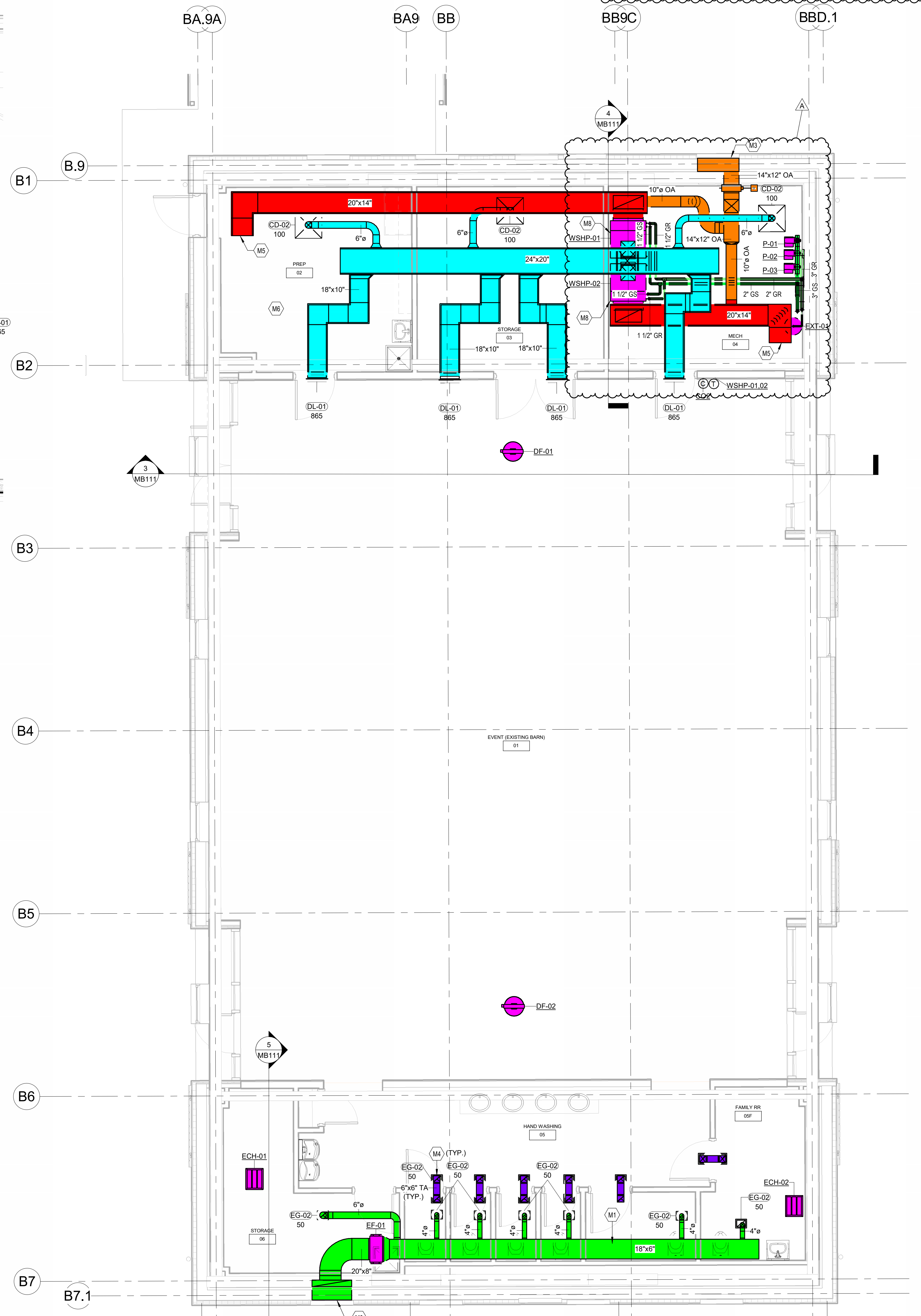
4 MECHANICAL SECTION 2
SCALE: 1/4" = 1'-0"



2 BARN - HVAC ISOMETRIC
SCALE:



5 MECHANICAL SECTION 1
SCALE: 1/4" = 1'-0"



1 BARN - HVAC PLAN
SCALE: 1/4" = 1'-0"

| TAGGED NOTES | |
|--------------|--|
| M1 | DUCTWORK TO BE INSTALLED IN SPACE BELOW THE BAT HABITAT FLOOR |
| M3 | CONNECT TO NEW WOOD LOUVER. FLENUM BOX SHALL SLOPE TOWARDS THE EXTERIOR WALL WITH WEEP HOLES |
| M4 | PROVIDE TRANSFER DUCT WITH 1/2" ELASTOMETRIC LINER |
| M5 | PROVIDE BIRDSCREEN COVER ON THE END OF THE OPEN DUCT |
| M6 | DO NOT HANG DUCT FROM ABOVE. PROVIDE UNISTRUT SUPPORT GRID SO THAT HANGERS ARE NOT VISIBLE FROM THE SPACE. SUPPORT GRID CAN BE SUPPORTED FROM EXTERIOR WALLS AND COLUMNS CAN BE WITHIN THE WALLS |
| M7 | DO NOT HANG DUCT FROM ABOVE. PROVIDE UNISTRUT SUPPORT GRID SO THAT HANGERS ARE NOT VISIBLE FROM THE SPACE. SUPPORT GRID CAN BE SUPPORTED FROM EXTERIOR WALLS AND COLUMNS CAN BE WITHIN THE WALLS |
| M8 | ROUTE 3/4" CONDENSATE LINE TO NEAREST FLOOR DRAIN |

EMERSON DESIGN
 emerson design llc
 ARCHITECTURE 310 Culvert Street Suite 100
 INTERIORS Cincinnati, Ohio 45202
 SUSTAINABILITY PLANNING 513 841 9180
 ENGINEERING emersondesign.com

| DATE | PROJECT NO. | DESCRIPTION |
|---------------------|----------------------|---|
| JULY 17, 2024 | 082204 | SHAKER TRACE SEED NURSERY IMPROVEMENTS |
| CHECKED BY: BMR | DRAWN BY: BMR | DATE: 08/01/2024 |
| DESIGNED BY: BMR | PROJECT MANAGER: BMR | FILE NAME: A_GMP_ADDENDUM_01 |
| DATE: JULY 17, 2024 | PROJECT NO.: 082204 | DESCRIPTION: SHAKER TRACE SEED NURSERY IMPROVEMENTS |
| CHECKED BY: BMR | DRAWN BY: BMR | DATE: 08/01/2024 |
| DESIGNED BY: BMR | PROJECT MANAGER: BMR | FILE NAME: A_GMP_ADDENDUM_01 |
| DATE: JULY 17, 2024 | PROJECT NO.: 082204 | DESCRIPTION: SHAKER TRACE SEED NURSERY IMPROVEMENTS |
| CHECKED BY: BMR | DRAWN BY: BMR | DATE: 08/01/2024 |
| DESIGNED BY: BMR | PROJECT MANAGER: BMR | FILE NAME: A_GMP_ADDENDUM_01 |

SHAKER TRACE SEED NURSERY IMPROVEMENTS
 MIAMI WHITEWATER PARK, HAMILTON COUNTY
 8667 NEW HAVEN RD, HARRISON, OHIO 46030

BARN FIRST FLOOR HVAC PLAN

SHEET IDENTIFICATION
MB111

Load Calculation Summary

| | | | |
|--------------------------|-----------------------|----------------------|----------------|
| Load Calculation Method: | User Entered (Manual) | Component Losses: | 117,508 Btu/hr |
| Floors/Floor Levels: | | Radiant Back Losses: | 23,502 Btu/hr |
| Ground Floor | 4,010 ft ² | Total Heating Load: | 141,010 Btu/hr |
| Total Area: | 4,010 ft ² | Radiant Heating: | 117,508 Btu/hr |
| | | Radiant Back Losses: | 23,502 Btu/hr |
| | | Total Heating Load: | 141,010 Btu/hr |
| | | Surface Temperature: | 69 °F |

Load Calculation Results

| Room | Area | Heating Type | Room Temp | Walls | Windows | Doors | Skylights | Floor | Ceiling | Infiltration | Additional | Recovered Panel Loss | Design Load | Unit Loss |
|-------------------|-------|--------------|-----------|-------|---------|-------|-----------|--------|---------|--------------|------------|----------------------|-------------|-----------|
| Total For Project | 4,010 | RH | 50.0 | 0 | 0 | 0 | 0 | 23,502 | 0 | 0 | 0 | 0 | 141,010 | 36.0 |

Ground Floor Slab On Grade Construction

| Room | Area | Heating Type | Room Temp | Walls | Windows | Doors | Skylights | Floor | Ceiling | Infiltration | Additional | Recovered Panel Loss | Design Load | Unit Loss |
|-----------|-------|--------------|-----------|-------|---------|-------|-----------|--------|---------|--------------|------------|----------------------|-------------|-----------|
| Room A-01 | 4,010 | RH (M) | 50.0 | 0 | 0 | 0 | 0 | 23,502 | 0 | 0 | 0 | 0 | 141,010 | 36.0 |
| Sub Total | 4,010 | RH (M) | 50.0 | 0 | 0 | 0 | 0 | 23,502 | 0 | 0 | 0 | 0 | 141,010 | 36.0 |

Zone Heating Summary

| Zone # | Gross Area | Construction | Heating Types | RH Circuits | Total Tubing | Manifolds | Flowrate | Head Loss (Circuit Only) | RH Load ² | Supplemental | Zone Load ³ |
|----------|------------|---------------|---------------|-------------|--------------|-----------|----------|--------------------------|----------------------|--------------|------------------------|
| Zone 101 | 4,010 | Embedded Slab | RH | 12 | 4,091 | 2 | 14.15 | 7.3 | 141,010 | 0 | 141,010 |

(1) Complete circuits assigned to this zone. (2) Total Radiant heating load for rooms in zone, including all panel back loss. (3) Total load for zone including all panel back loss. Does not account for reclaimed loss within building envelope.

Room Heating Summary (By Construction Type)

| Zone # | Room Name | Heating Type | Floor Area | Heated Area | Manifold # | Tube Size | RH Circuits | Tube Spacing | Tubing In Room | Floor Cover RV | Required Temp. | Unit RH Load | RH Load ² | Supplemental | Total Load ³ |
|----------|-----------|--------------|------------|-------------|------------------------|-----------|-------------|--------------|----------------|----------------|----------------|--------------|----------------------|--------------|-------------------------|
| Zone 101 | Room A-01 | RH | 3,917 | 3,897 | Manifold 1, Manifold 2 | 5/8" | 12 | 12 | 3,925 | 0.5 | 107 | 36.2 | 141,010 | 0 | 141,010 |

(1) Circuits assigned to this room. Leaders from other rooms may not be counted. (2) Includes panel back loss. (3) Total load including panel back loss. Does not account for reclaimed loss within building envelope.

Manifold Summary

| Manifold Name | # Zones | # Circuits | Flow | Head Loss ¹ | Required Temp. | Supplied Temp. | Temp Drop | Manifold Type | Control Type | # Actuators | S/R Length ² | S/R Pipe |
|---------------|---------|------------|-------|------------------------|----------------|----------------|-----------|---|--------------|-------------|-------------------------|----------|
| Manifold 1 | 1 | 6 | 7.06 | 9.3 | 107 | 120 | 20 | PRO-BALANCE 1" Stainless Steel Manifold With Gauges | Manifold | 0 | - | - |
| Manifold 2 | 1 | 6 | 7.08 | 9.0 | 107 | 120 | 20 | PRO-BALANCE 1" Stainless Steel Manifold With Gauges | Manifold | 0 | - | - |
| Total | 1 | 12 | 14.15 | 9.3 | - | - | - | - | - | 0 | - | - |

(1) Total Head loss includes manifold, circuits and supply/return piping if specified. (2) S/R Length = one way.

Supply Summary

| Name | Temp | Total Fluid Vol | Total Flow | Head Loss ¹ | Load ² | # Circuits | # Zones |
|-------------------|------|-----------------|------------|------------------------|-------------------|------------|---------|
| Water Temperature | 120 | 56.93 | 14.15 | 9.3 | 141,010 | 12 | 1 |

(1) Head loss includes manifolds, circuits, and supply/return piping if specified. (2) Load includes all panel back losses.

Manifold Summary

| Manifold Name | Circuits | Flowrate | Required Temp. | Supplied Temp. | Manifold Type | S/R Length ¹ | S/R Pipe | Manifold Head Loss | Circuit Head Loss | S/R Head Loss | Total Head Loss ² |
|---------------|----------|----------|----------------|----------------|---|-------------------------|----------|--------------------|-------------------|---------------|------------------------------|
| Manifold 1 | 6 | 7.06 | 107 | 120 | PRO-BALANCE 1" Stainless Steel Manifold With Gauges | - | - | 2.0 | 7.3 | 0.0 | 9.3 |
| Manifold 2 | 6 | 7.08 | 107 | 120 | PRO-BALANCE 1" Stainless Steel Manifold With Gauges | - | - | 2.1 | 6.9 | 0.0 | 9.0 |
| Total | 12 | 14.15 | - | - | - | - | - | 2.1 | 7.3 | 0.0 | 9.3 |

(1) S/R Length = one way. (2) Total Head loss includes manifold, circuits and supply/return piping if specified.

Water Temperature (120 °F)

Manifold 1 (120 °F, PRO-BALANCE 1" Stainless Steel Manifold With Gauges, 6 Circuits)

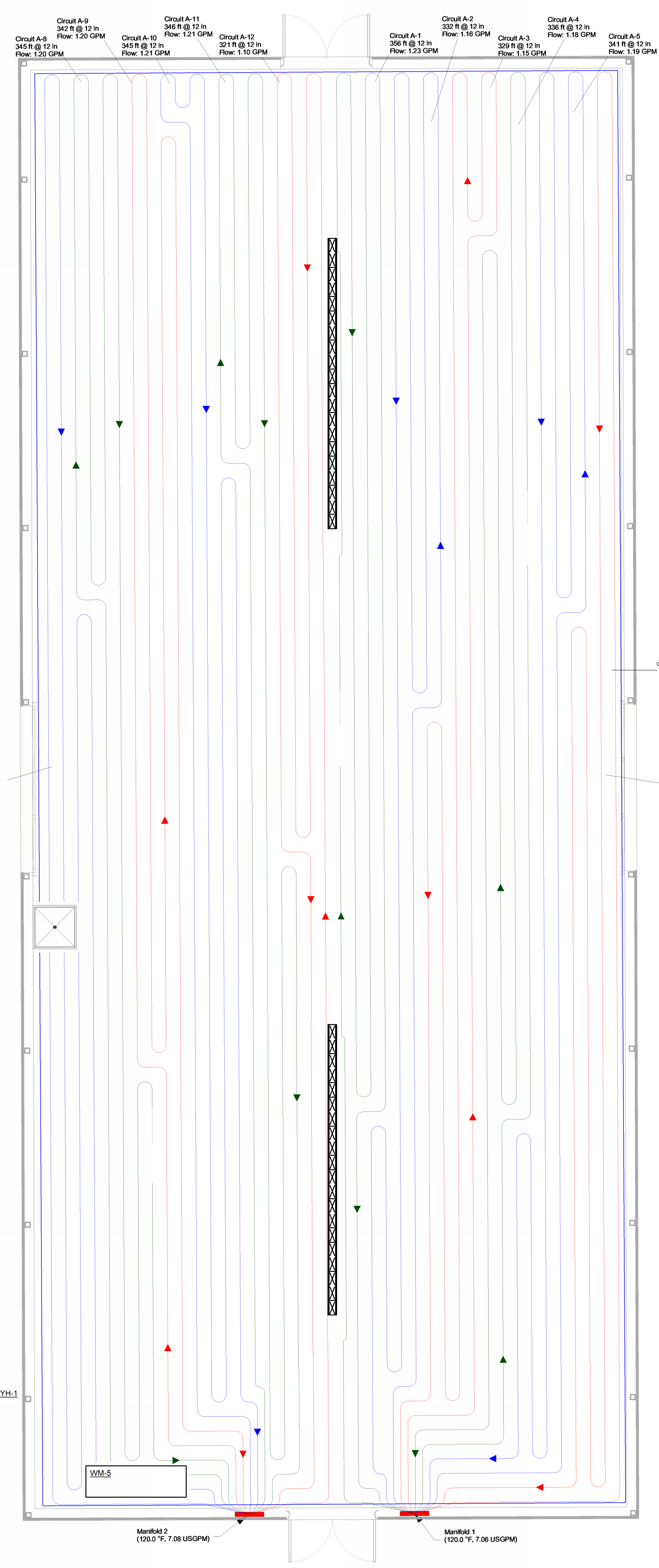
| Circuit | Rooms Served | Total Length | Tube Spacing | Area Covered | Tubing | Flowrate | Head Loss ¹ | Temp Drop ² | Load ³ | Actuator |
|---------|--------------|--------------|--------------|--------------|-----------------------------|----------|------------------------|------------------------|-------------------|----------|
| A-1 | Room A-01 | 356 | 12 | 337 | 5/8" RAUPEX O2 Barrier Pipe | 1.23 | 7.3 | 20 | 12,209 | No |
| A-2 | Room A-01 | 332 | 12 | 318 | 5/8" RAUPEX O2 Barrier Pipe | 1.16 | 6.1 | 20 | 11,516 | No |
| A-3 | Room A-01 | 329 | 12 | 317 | 5/8" RAUPEX O2 Barrier Pipe | 1.15 | 6.1 | 20 | 11,472 | No |
| A-4 | Room A-01 | 336 | 12 | 324 | 5/8" RAUPEX O2 Barrier Pipe | 1.18 | 6.4 | 20 | 11,718 | No |
| A-5 | Room A-01 | 341 | 12 | 328 | 5/8" RAUPEX O2 Barrier Pipe | 1.19 | 6.7 | 20 | 11,872 | No |
| A-6 | Room A-01 | 348 | 12 | 321 | 5/8" RAUPEX O2 Barrier Pipe | 1.17 | 6.5 | 20 | 11,617 | No |
| Total | - | 2,043 | - | 1,946 | - | 7.06 | 7.3 | - | 70,404 | 0 |

(1) Head loss for circuit tubing only. (2) Design Temp Drop (Estimated Actual Drop). (3) Required load. Includes panel back losses. Does not reflect maximum capacity of the circuit.

Manifold 2 (120 °F, PRO-BALANCE 1" Stainless Steel Manifold With Gauges, 6 Circuits)

| Circuit | Rooms Served | Total Length | Tube Spacing | Area Covered | Tubing | Flowrate | Head Loss ¹ | Temp Drop ² | Load ³ | Actuator |
|---------|--------------|--------------|--------------|--------------|-----------------------------|----------|------------------------|------------------------|-------------------|----------|
| A-7 | Room A-01 | 349 | 12 | 322 | 5/8" RAUPEX O2 Barrier Pipe | 1.17 | 6.5 | 20 | 11,659 | No |
| A-8 | Room A-01 | 345 | 12 | 331 | 5/8" RAUPEX O2 Barrier Pipe | 1.20 | 6.9 | 20 | 11,993 | No |
| A-9 | Room A-01 | 342 | 12 | 330 | 5/8" RAUPEX O2 Barrier Pipe | 1.20 | 6.8 | 20 | 11,950 | No |
| A-10 | Room A-01 | 345 | 12 | 333 | 5/8" RAUPEX O2 Barrier Pipe | 1.21 | 6.9 | 20 | 12,044 | No |
| A-11 | Room A-01 | 346 | 12 | 332 | 5/8" RAUPEX O2 Barrier Pipe | 1.21 | 6.9 | 20 | 12,016 | No |
| A-12 | Room A-01 | 321 | 12 | 302 | 5/8" RAUPEX O2 Barrier Pipe | 1.10 | 5.4 | 20 | 10,944 | No |
| Total | - | 2,049 | - | 1,951 | - | 7.08 | 6.9 | - | 70,606 | 0 |

(1) Head loss for circuit tubing only. (2) Design Temp Drop (Estimated Actual Drop). (3) Required load. Includes panel back losses. Does not reflect maximum capacity of the circuit.



1 GREENHOUSE - HVAC PLAN
SCALE: 1/4" = 1'-0"
0 2' 4' 8'

CMTA

HUMAN NATURE

schaefer

ARCADIS

EMERSON DESIGN

ARCHITECTURE INTERIORS SUSTAINABILITY PLANNING ENGINEERING

emersondesign.com

DATE: _____ DESCRIPTION: _____

| | | | | | |
|--------------|---------------|------------------|--------------|-------------|------------|
| DESIGNED BY: | DATE: | PROJECT NO.: | SHEET NO.: | SHEET SIZE: | FILE NAME: |
| ATW | JULY 17, 2024 | 00204 | 00204 | 30x42 | |
| DRAWN BY: | CHECKED BY: | PROJECT MANAGER: | PLANT SCALE: | | |
| ATW | BRK | BM | 1/4" = 1'-0" | | |

SHAKER TRACE SEED NURSERY IMPROVEMENTS

MIAMI WHITEWATER PARK, HAMILTON COUNTY
8867 NEW HAVEN RD, HARRISON, OHIO 46030

GREENHOUSE HVAC PLAN

Great Parks

STATE OF OHIO

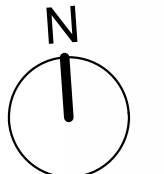
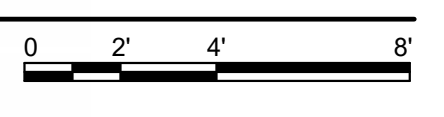
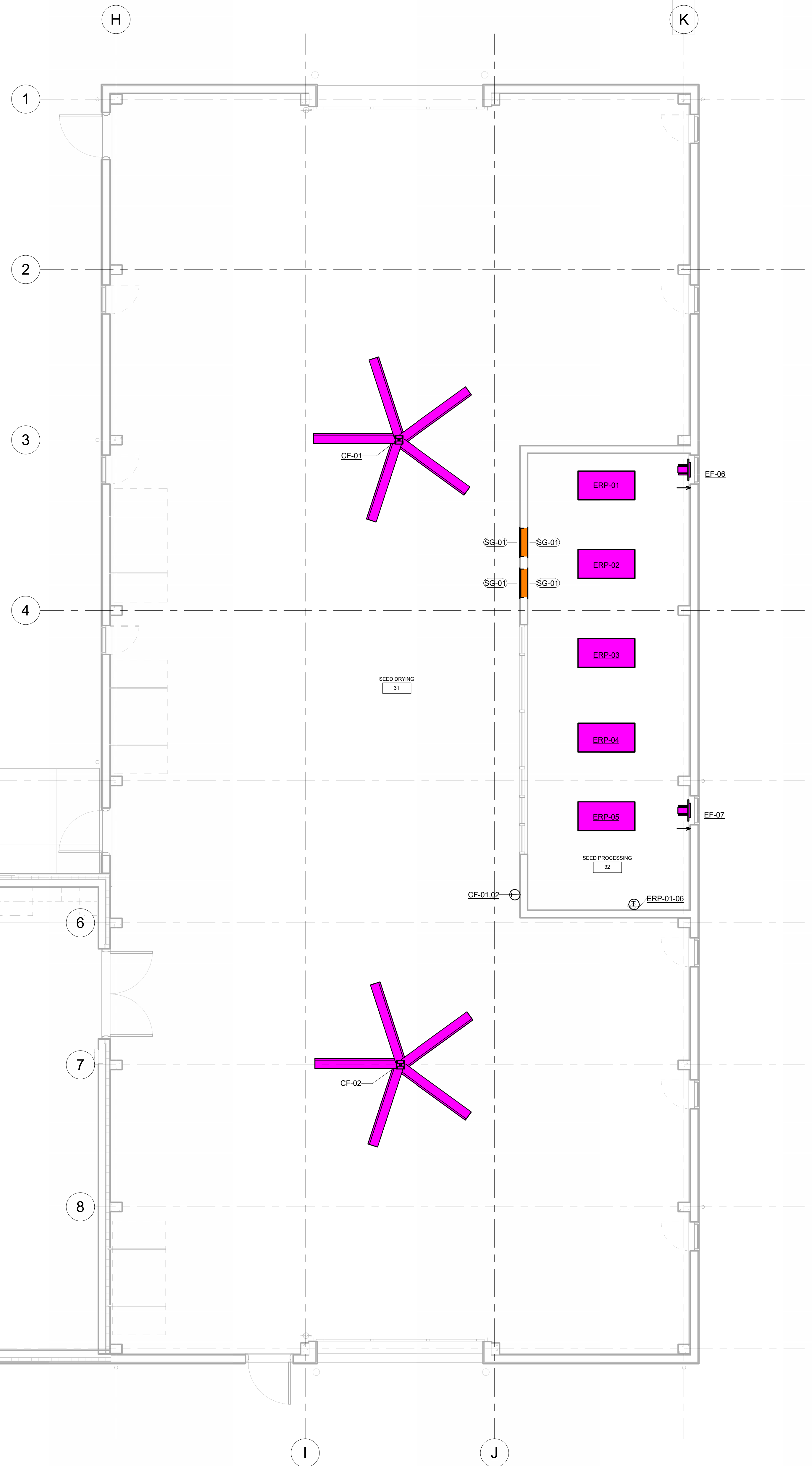
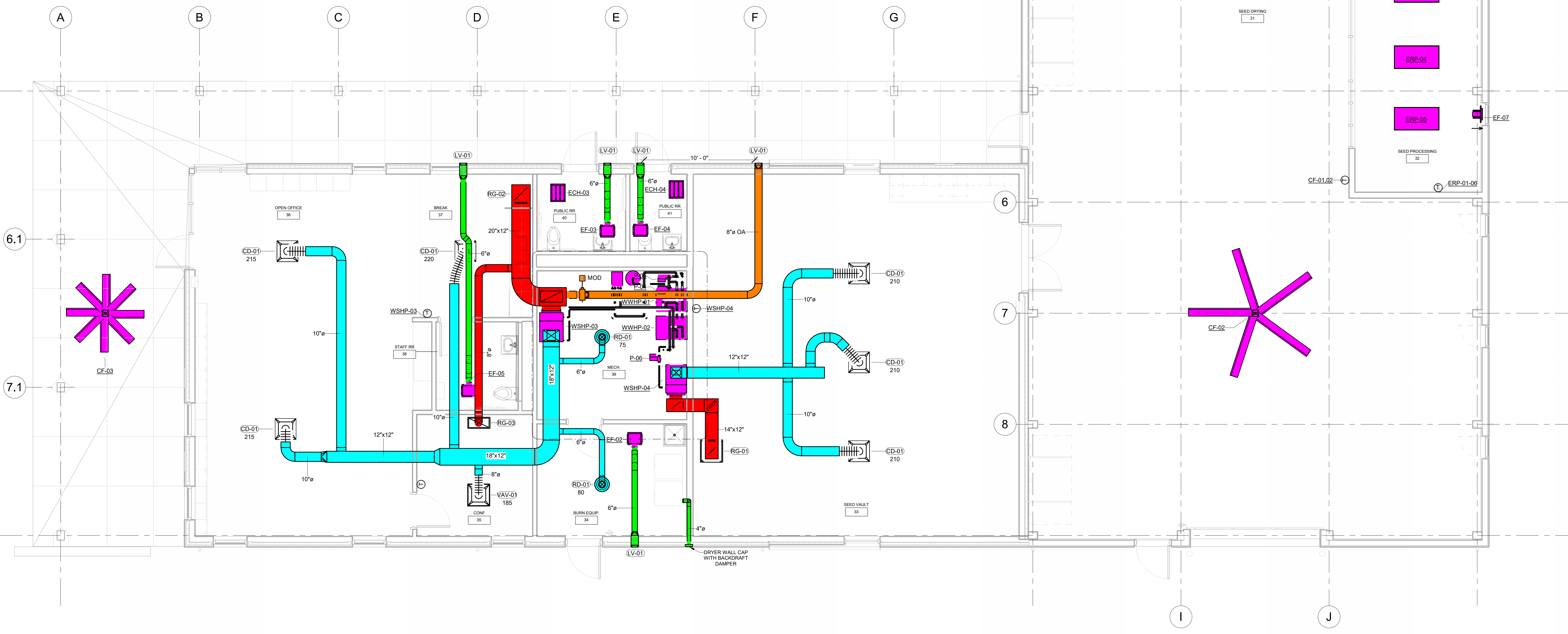
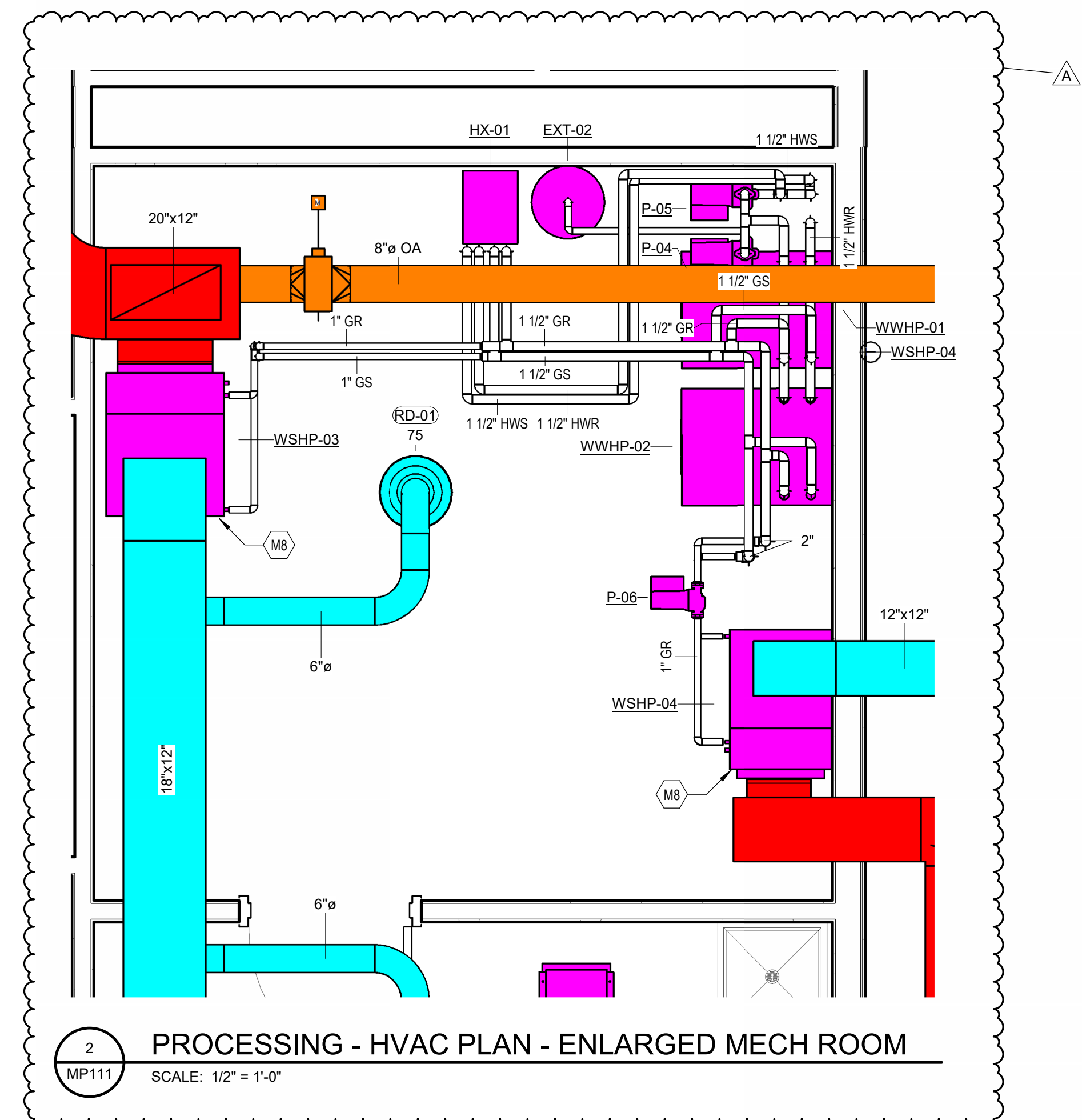
BRIAN K. ROSE
E-56979

REGISTERED PROFESSIONAL ENGINEER

SHEET IDENTIFICATION

MG111

ISSUED FOR GMP - JULY 17, 2024



SHAKER TRACE SEED NURSERY IMPROVEMENTS
 MIAMI WHITEWATER PARK, HAMILTON COUNTY
 8867 NEW HAVEN RD, HARRISON, OHIO 46030
PROCESSING BUILDING HVAC PLAN

DESIGNED BY: [blank]
 DRAWN BY: [blank]
 CHECKED BY: [blank]
 DATE: JULY 17, 2024
 PROJECT NO.: 002204
 SHEET NO.: 30442
 SHEET SIZE: As Indicated
 FILE NAME: A_GMP_ADDENDUM_01

EMERSON DESIGN
 ARCHITECTURE
 INTERIORS
 SUSTAINABILITY
 PLANNING
 ENGINEERING
 emersondesign.com

HUMAN NATURE
 CMTA
 schaefer
 ARCADIS

| MARK | DESCRIPTION | DATE |
|------|-----------------|------------|
| A | GMP ADDENDUM 01 | 08/01/2024 |

SHEET IDENTIFICATION
MP111

ISSUED FOR GMP - JULY 17, 2024

| WATER SOURCE HEAT PUMP SCHEDULE | | | | | | | | | | | | | | | | | | |
|---------------------------------|----------------|----------------------|--------------|---------------|---------------|----------|-------------|-------------|----------------|----------|---------------|------------|-----------------|-----------------|----------------|----------|----------|-------------|
| TAG | MANUFACTURER | MODEL | WEIGHT (LBS) | FULL LOAD EER | FULL LOAD COP | STAGES | HEATING MBH | COOLING MBH | GEOTHERMAL GPM | LOAD GPM | SUPPLY STATIC | SUPPLY CFM | OUTSIDE AIR CFM | TOTAL UNIT FLTA | TOTAL UNIT MCA | UNIT OCP | V/C/P | NOTES |
| WHP-01 | WATER FURNANCE | UVV060TR071DBEED3833 | 450 | 17.8 | 3.7 | VARIABLE | 45 | 62 | 17 | N/A | 0.5" W.C. | 1,725 | 380 | 27.7 | 32.7 | 50 | 240/60/1 | 1,2,3,4,5,8 |
| WHP-02 | WATER FURNANCE | UVV060T071DBEED3833 | 450 | 17.8 | 3.7 | VARIABLE | 45 | 62 | 17 | N/A | 0.5" W.C. | 1,725 | 380 | 27.7 | 32.7 | 50 | 240/60/1 | 1,2,3,4,5,8 |
| WHP-03 | WATER FURNANCE | UVV024TR071DBEED3833 | 400 | 23.6 | 3.9 | VARIABLE | 17.8 | 25.5 | 6 | N/A | 0.5" W.C. | 1,200 | 204 | 12.3 | 15.4 | 20 | 240/60/1 | 2,3,4,8 |
| WHP-04 | WATER FURNANCE | NBV018TR0B1DADCE3833 | 210 | 18.3 | 3.8 | 1 | 14.5 | 18.5 | 6 | N/A | 0.5" W.C. | 630 | 75 | 12.4 | 14.5 | 20 | 240/60/1 | 2,3,4,7 |
| WHP-01 | WATER FURNANCE | NDW100RDHAT1 | 390 | 16.8 | 3 | 2 | 82 | 100 | 23 | 23 | N/A | N/A | N/A | 26.4 | 33.0 | 50 | 240/60/1 | 3,4,6 |
| WHP-02 | WATER FURNANCE | NDW100RDHAT1 | 390 | 16.8 | 3 | 2 | 82 | 100 | 23 | 23 | N/A | N/A | N/A | 26.4 | 33.0 | 50 | 240/60/1 | 3,4,6 |

- NOTES
1. PROVIDE MODULATING HOT GAS REHEAT OPTION
 2. PROVIDE WATER SIDE ECONOMIZER OPTION WITH MODULATING VALVE
 3. PROVIDE HOSE KIT WITH AUTOMATIC BALANCING VALVE, BALL VALVES, AND Y STRAINER.
 4. PROVIDE AURORA (OR SIMILAR) FACTORY CONTROLS SYSTEM.
 5. PROVIDE TWINNING KIT FOR UNIT.
 6. REQUIRES A DUAL POWER FEED.
 7. PROVIDE MODULATING HOT GAS REHEAT AND HOT GAS BYPASS OPTION
 8. PROVIDE SOUND KIT.

ELECTRIC HEATER SCHEDULE

| TAG | MANUFACTURER | AREA SERVED | MODEL | KW | AMPS | COLOR | V/C/P | NOTES |
|--------|--------------|-------------------------|----------|-----|------|-------|----------|-------|
| ECH-01 | QMARK | BARN STORAGE 06 | OCH1207F | 1.5 | 6.3 | WHITE | 240/60/1 | 1,2,3 |
| ECH-02 | QMARK | BARN FAMILY RR 05F | OCH1207F | 1.5 | 6.3 | WHITE | 240/60/1 | 1,2,3 |
| ECH-03 | QMARK | PROCESSING PUBLIC RR 41 | OCH1207F | 1.5 | 6.3 | WHITE | 240/60/1 | 1,2,3 |
| ECH-04 | QMARK | PROCESSING PUBLIC RR 40 | OCH1207F | 1.5 | 6.3 | WHITE | 240/60/1 | 1,2,3 |
| ERP-01 | QMARK | SEED PROCESSING 32 | CP508F | 0.5 | 2.3 | WHITE | 240/60/1 | 3,4,5 |
| ERP-02 | QMARK | SEED PROCESSING 32 | CP508F | 0.5 | 2.3 | WHITE | 240/60/1 | 3,4,5 |
| ERP-03 | QMARK | SEED PROCESSING 32 | CP508F | 0.5 | 2.3 | WHITE | 240/60/1 | 3,4,5 |
| ERP-04 | QMARK | SEED PROCESSING 32 | CP508F | 0.5 | 2.3 | WHITE | 240/60/1 | 3,4,5 |
| ERP-05 | QMARK | SEED PROCESSING 32 | CP508F | 0.5 | 2.3 | WHITE | 240/60/1 | 3,4,5 |

- NOTES
1. Disconnect Switch, factory mounted
 2. Provide Integral, Factory Mounted Controls
 3. Provide recess kit
 4. 48" X 24" X 1" Panel
 5. Unit shall be tied to the occupancy sensor for the room and a line voltage thermostat in series.

FAN SCHEDULE

| TAG | MANUFACTURER | AREA SERVED | MODEL | DRIVE TYPE | CFM | TOTAL EXTERNAL SP | FAN RPM | BHP | FLA (AMPS) | V/C/P | SONES | NOTES |
|-------|--------------|---------------------------|--------------------|------------|--------|-------------------|---------|------|------------|----------|-------|---------|
| EF-01 | GREENHECK | BARN STORAGE 06 | CSF-A390VG | DIRECT | 350 | 0.350 | 1,080 | 0.05 | 1.50 | 115/60/1 | 0.9 | 1, 2, 3 |
| EF-02 | GREENHECK | PROCESSING BURN EQUIP. 34 | SP-A90 | DIRECT | 80 | 0.250 | 900 | 0.01 | 0.17 | 115/60/1 | 0.4 | 1, 2, 3 |
| EF-03 | GREENHECK | PROCESSING PUBLIC RR 40 | SP-A90 | DIRECT | 80 | 0.250 | 900 | 0.01 | 0.17 | 115/60/1 | 0.4 | 1, 2, 3 |
| EF-04 | GREENHECK | PROCESSING PUBLIC RR 41 | SP-A90 | DIRECT | 80 | 0.250 | 900 | 0.01 | 0.17 | 115/60/1 | 0.4 | 1, 2, 3 |
| EF-05 | GREENHECK | PROCESSING STAFF RR 38 | SP-A90 | DIRECT | 80 | 0.250 | 900 | 0.01 | 0.17 | 115/60/1 | 0.4 | 1, 2, 3 |
| EF-06 | GREENHECK | SEED PROCESSING | SDPHE-12-3-A4 | DIRECT | 1,253 | 0.157 | 1,750 | 0.14 | 0.87 | 115/60/1 | 13.5 | 1,2,6 |
| EF-07 | GREENHECK | SEED PROCESSING | SDPHE-12-3-A4 | DIRECT | 1,253 | 0.157 | 1,750 | 0.14 | 0.87 | 115/60/1 | 13.5 | 1,2,6 |
| CF-01 | GREENHECK | SEED DRYING 31 | DC-5-12 | DIRECT | 23,885 | 0.010 | 51 | N/A | 5 | 115/60/1 | N/A | 4 |
| CF-02 | GREENHECK | SEED DRYING 31 | DC-5-12 | DIRECT | 23,885 | 0.010 | 51 | N/A | 5 | 115/60/1 | N/A | 4 |
| CF-03 | MINVA AIRE | PROCESSING PORCH | 84" XTREME H2O WET | DIRECT | 10,989 | 0.010 | N/A | N/A | 0.26 | 115/60/1 | N/A | 5 |
| DF-01 | GREENHECK | BARN EVENT | DDF-14-VG | DIRECT | 784 | 0.010 | 968 | N/A | 0.35 | 115/60/1 | N/A | 7 |
| DF-01 | GREENHECK | BARN EVENT | DDF-14-VG | DIRECT | 784 | 0.010 | 968 | N/A | 0.35 | 115/60/1 | N/A | 7 |

- NOTES
1. Solid State Speed Control, factory mounted
 2. Disconnect Switch, factory mounted
 3. Backdraft damper, gravity
 4. Provide standard touchscreen controller
 5. Control via manual switch
 6. Provide fan guard
 7. Provide Vari-green (or equal) remote dial and tie power to occupancy sensor with relay

PUMP SCHEDULE

| TAG | MODEL NUMBER | FLOW RATE | TDH | PUMP SPEED | MOTOR TYPE | MOTOR HP | OPERATING HP | V/C/P | NOTES |
|-----|-------------------|-----------|-------|------------|------------|----------|--------------|----------|-------|
| P-1 | ecocirc XL 70-145 | 46 GPM | 60 FT | 3422 RPM | ECM | 2 | 1.59 | 240/60/1 | |
| P-2 | ecocirc XL 70-145 | 46 GPM | 60 FT | 3422 RPM | ECM | 2 | 1.59 | 240/60/1 | |
| P-3 | ecocirc XL 70-145 | 46 GPM | 60 FT | 3422 RPM | ECM | 2 | 1.59 | 240/60/1 | |
| P-4 | ecocirc XL 70-145 | 46 GPM | 32 FT | 2552 RPM | ECM | 2 | 0.74 | 240/60/1 | |
| P-5 | ecocirc XL 70-145 | 46 GPM | 32 FT | 2552 RPM | ECM | 2 | 0.74 | 240/60/1 | |
| P-6 | ecocirc XL 55-45 | 6 | 22 | 2943 | ECM | 0.5 | 0.132 | 240/60/1 | 1 |

1. PUMP IS INTENDED TO RUN ONLY WHEN THE SYSTEM IS ON EMERGENCY POWER SO THAT THE MAIN GEOTHERMAL PUMPS DO NOT NEED TO RUN.

LOUVER SCHEDULE

| MARK | MANUFACTURER | MODEL # | DEPTH (IN) | CONSTRUCTION | WIDTH (IN) | HEIGHT (IN) | VELOCITY (FPM) | APD (IN. WG.) | BIRD SCREEN | DRAINABLE BLADE | REMARKS |
|-------|--------------|---------|------------|-------------------|------------|-------------|----------------|---------------|-------------|-----------------|---------|
| LV-01 | GREENHECK | ESD-202 | 2 | EXTRUDED ALUMINUM | 8 | 10 | 725 | 0.08 | Yes | Yes | |

REGISTERS, GRILLES, AND DIFFUSERS

| MARK | MANUFACTURER | MODEL # | TYPE | GRILLE SIZE | DUCT INLET SIZE | DUCT BRANCH SIZE | NOISE CRITERIA | THROW PATTERN | REMARKS |
|--------|--------------|----------|------------------------------|-------------|-----------------|------------------|----------------|---------------|---------|
| CD-01 | PRICE | SPD | STEEL SQUARE PLAQUE DIFFUSER | 24"X24" | 10"Ø | 10"Ø | 35 | 4-WAY | |
| CD-02 | PRICE | SPD | STEEL SQUARE PLAQUE DIFFUSER | 24"X24" | 6"Ø | 6"Ø | 35 | 4-WAY | |
| DL-1 | PRICE | HCD | DRUM LOUVER | 18" X 10" | 18" X 10" | 18" X 10" | 33 | 2-WAY SPLIT | |
| EG-01 | PRICE | S30 | STEEL LOUVERED GRILLE | 12"X12" | 6"Ø | 6"Ø | 30 | N/A | |
| RD-01 | PRICE | RPD | ROUND PLAQUE DIFFUSER | N/A | 6"Ø | 6"Ø | 35 | 4-WAY | |
| RG-01 | PRICE | S30 | STEEL LOUVERED GRILLE | 22" X 22" | N/A | N/A | 20 | N/A | |
| RG-02 | PRICE | S30 | STEEL LOUVERED GRILLE | 18" X 18" | 20" X 12" | 20" X 12" | 20 | N/A | |
| RG-03 | PRICE | S30 | STEEL LOUVERED GRILLE | 22" X 10" | 10"Ø | 10"Ø | 20 | N/A | |
| SG-01 | PRICE | 90 | HEAVY DUTY GYM GRILLE | 22" X 22" | N/A | N/A | 20 | N/A | 1 |
| VAV-01 | PRICE | VARTHERM | POWERLESS VAV DIFFUSER | 24"X24" | 8"Ø | 8"Ø | 35 | 4-WAY | |

1. PROVIDE FILTERED GRILLE OPTION

SYSTEM 1 VENTILATION SCHEDULE

Shaker Trace Seed Facility

SYSTEM LEVEL CALCULATION

| System# | Maximum System Population (Ps) | Occupant Diversity (D) | Uncorrected Outdoor Air Intake CFM (Vou) | Total System Primary Air Flow CFM (Vps) | Mixing Ratio Outdoor Air to Primary (Ka) | System Ventilation Efficiency Min/Ev (Ev) | Minimum Outdoor Air Intake CFM Voul/Ev (Vot) | Actual Outdoor Air Intake CFM | Actual Percent Outdoor Air Intake |
|---------|--------------------------------|------------------------|--|---|--|---|--|-------------------------------|-----------------------------------|
| 1 | 16 | 1 | 192 | 1200 | 0.160 | 0.973 | 197 | 204 | 0.170 |

Decoupled Outside Air System

ZONE LEVEL CALCULATION

| System# | Room Number | Room Name | Floor Area Sq.Ft. (Aa) | Zone People (Pa) | Outdoor Air CFM per Person (Ra) | Outdoor Air CFM per Area (Ra) | Zone Effective (Ea) | Outdoor Air to Zone (Voa) | Required Outdoor Air Zone (Vot) | Actual Outdoor Air Zone (Voa) | Primary Airflow to Zone (Vpa) | Supply Airflow to Zone (Vsa) | Minimum Supply Discharge (Vdzm) | Outdoor Air Fraction to Zone (Za) | Primary Air Fraction to Zone (Zp) | Secondary Air Fraction to Zone (Zs) | Supply Source Fraction to Zone (Zf) | Full Mixed Primary Air (Fm) | Outdoor Air Sources Outside (Foc) | Zone Ventilation Efficiency (Eva) |
|---------|-------------|-------------|------------------------|------------------|---------------------------------|-------------------------------|---------------------|---------------------------|---------------------------------|-------------------------------|-------------------------------|------------------------------|---------------------------------|-----------------------------------|-----------------------------------|-------------------------------------|-------------------------------------|-----------------------------|-----------------------------------|-----------------------------------|
| 1 | 34 | BURN EQUIP | 134 | 0 | 0 | 0.06 | 0.8 | 10 | 13.0 | 14.0 | 80 | 80 | 0.125 | 1 | 0 | 1 | 1 | 1 | 1 | 1.035 |
| 1 | 35 | CORR | 112 | 4 | 5 | 0.06 | 0.8 | 34 | 30.0 | 31.0 | 185 | 185 | 0.184 | 1 | 0 | 1 | 1 | 1 | 1 | 0.976 |
| 1 | 38 | OPEN OFFICE | 670 | 10 | 5 | 0.06 | 0.8 | 112 | 104.0 | 107.0 | 630 | 630 | 0.330 | 1 | 0 | 1 | 1 | 1 | 1 | 0.982 |
| 1 | 37 | BREAK | 130 | 2 | 5 | 0.06 | 0.8 | 22 | 38.0 | 37.0 | 220 | 220 | 0.100 | 1 | 0 | 1 | 1 | 1 | 1 | 1.060 |
| 1 | 38 | STAFF RR | 52 | 0 | 0 | 0 | 0.8 | 0 | 2.0 | 10 | 10 | 10 | 0.000 | 1 | 0 | 1 | 1 | 1 | 1 | 1.160 |
| 1 | 39 | MECH | 181 | 0 | 0 | 0.06 | 0.8 | 14 | 12.0 | 13.0 | 75 | 75 | 0.187 | 1 | 0 | 1 | 1 | 1 | 1 | 0.973 |

SYSTEM 2

SYSTEM LEVEL CALCULATION

| System# | Maximum System Population (Ps) | Occupant Diversity (D) | Uncorrected Outdoor Air Intake CFM (Vou) | Total System Primary Air Flow CFM (Vps) | Mixing Ratio Outdoor Air to Primary (Ka) | System Ventilation Efficiency Min/Ev (Ev) | Minimum Outdoor Air Intake CFM Voul/Ev (Vot) | Actual Outdoor Air Intake CFM | Actual Percent Outdoor Air Intake |
|---------|--------------------------------|------------------------|--|---|--|---|--|-------------------------------|-----------------------------------|
| 2 | 0 | 1 | 71 | 630 | 0.113 | 1.000 | 71 | 0 | 0.000 |

Decoupled Outside Air System

ZONE LEVEL CALCULATION

| System# | Room Number | Room Name | Floor Area Sq.Ft. (Aa) | Zone People (Pa) | Outdoor Air CFM per Person (Ra) | Outdoor Air CFM per Area (Ra) | Zone Effective (Ea) | Outdoor Air to Zone (Voa) | Required Outdoor Air Zone (Vot) | Actual Outdoor Air Zone (Voa) | Primary Airflow to Zone (Vpa) | Supply Airflow to Zone (Vsa) | Minimum Supply Discharge (Vdzm) | Outdoor Air Fraction to Zone (Za) | Primary Air Fraction to Zone (Zp) | Secondary Air Fraction to Zone (Zs) | Supply Source Fraction to Zone (Zf) | Full Mixed Primary Air (Fm) | Outdoor Air Sources Outside (Foc) | Zone Ventilation Efficiency (Eva) |
|---------|-------------|------------|------------------------|------------------|---------------------------------|-------------------------------|---------------------|---------------------------|---------------------------------|-------------------------------|-------------------------------|------------------------------|---------------------------------|-----------------------------------|-----------------------------------|-------------------------------------|-------------------------------------|-----------------------------|-----------------------------------|-----------------------------------|
| 2 | 33 | SEED VAULT | 953 | 0 | 0 | 0.06 | 0.8 | 71 | 73.0 | 0.0 | 630 | 630 | 0.113 | 1 | 0 | 1 | 1 | 1 | 1 | 1.000 |

SYSTEM 3

SYSTEM LEVEL CALCULATION

| System# | Maximum System Population (Ps) | Occupant Diversity (D) | Uncorrected Outdoor Air Intake CFM (Vou) | Total System Primary Air Flow CFM (Vps) | Mixing Ratio Outdoor Air to Primary (Ka) | System Ventilation Efficiency Min/Ev (Ev) | Minimum Outdoor Air Intake CFM Voul/Ev (Vot) | Actual Outdoor Air Intake CFM | Actual Percent Outdoor Air Intake |
|---------|--------------------------------|------------------------|--|---|--|---|--|-------------------------------|-----------------------------------|
| 3 | 77 | 1 | 730 | 3450 | 0.212 | 0.978 | 746 | 759 | 0.220 |

Decoupled Outside Air System

ZONE LEVEL CALCULATION

| System# | Room Number | Room Name | Floor Area Sq.Ft. (Aa) | Zone People (Pa) | Outdoor Air CFM per Person (Ra) | Outdoor Air CFM per Area (Ra) | Zone Effective (Ea) | Outdoor Air to Zone (Voa) | Required Outdoor Air Zone (Vot) | Actual Outdoor Air Zone (Voa) | Primary Airflow to Zone (Vpa) | Supply Airflow to Zone (Vsa) | Minimum Supply Discharge (Vdzm) | Outdoor Air Fraction to Zone (Za) | Primary Air Fraction to Zone (Zp) | Secondary Air Fraction to Zone (Zs) | Supply Source Fraction to Zone (Zf) | Full Mixed Primary Air (Fm) | Outdoor Air Sources Outside (Foc) | Zone Ventilation Efficiency (Eva) |
|---------|-------------|-------------|------------------------|------------------|---------------------------------|-------------------------------|---------------------|---------------------------|---------------------------------|-------------------------------|-------------------------------|------------------------------|---------------------------------|-----------------------------------|-----------------------------------|-------------------------------------|-------------------------------------|-----------------------------|-----------------------------------|-----------------------------------|
| 3 | 01 | EVENT | 2365 | 75 | 5 | 0.06 | 0.8 | 646 | 601.0 | 612.0 | 2780 | 2780 | 0.232 | 1 | 0 | 1 | 1 | 1 | 1 | 0.979 |
| 3 | 02 | PREP | 207 | 2 | 5 | 0.06 | 0.8 | 28 | 61.0 | 62.0 | 280 | 280 | 0.100 | 1 | 0 | 1 | 1 | 1 | 1 | 1.112 |
| 3 | 03 | STORAGE | 190 | 0 | 0 | 0.06 | 0.8 | 14 | 13.0 | 13.0 | 60 | 60 | 0.233 | 1 | 0 | 1 | 1 | 1 | 1 | 0.978 |
| 3 | 04 | MECH | 208 | 0 | 0 | 0.06 | 0.8 | 15 | 38.0 | 26.0 | 120 | 120 | 0.125 | 1 | 0 | 1 | 1 | 1 | 1 | 1.087 |
| 3 | 05 | HANDWASHING | 224 | 0 | 0 | 0.06 | 0.8 | 16 | 22.0 | 22.0 | 100 | 100 | 0.160 | 1 | 0 | 1 | 1 | 1 | 1 | 1.052 |
| 3 | 05F | FAMILY RR | 231 | 0 | 0 | 0 | 0.8 | 0 | 13.0 | 13.0 | 60 | 60 | 0.000 | 1 | 0 | 1 | 1 | 1 | 1 | 1.212 |
| 3 | 06 | STORAGE | 151 | 0 | 0 | 0.06 | 0.8 | 11 | 11.0 | 11.0 | 50 | 50 | 0.220 | 1 | 0 | 1 | 1 | 1 | 1 | 0.992 |

HX-01

Performance of One Unit: AP20 PN: BY5444 **Units Connected in Parallel:** 1

| Property | Value | Value |
|------------|----------------------------|----------------------|
| Fluid Name | Propylene Glycol 30.0% v/v | Propylene Glycol 30. |

