

MECHANICAL GENERAL NOTES

- THE FOLLOWING NOTES ARE GENERAL IN NATURE AND PERTAIN TO THE ENTIRE PROJECT. WHERE THERE ARE EXCEPTIONS, ADDITIONS, OR REVISIONS TO THESE NOTES, SUCH EXCEPTIONS, ADDITIONS OR REVISIONS ARE SO NOTED ON THE PARTICULAR DRAWING WHERE THEY
- THE DRAWINGS ARE DIAGRAMMATIC AND SHOULD NOT BE SCALED TO ESTABLISH LOCATION OF WORK. THEY DO NOT SHOW ALL OFFSETS, BENDS, ELBOWS, OR OTHER ELEMENTS WHICH MAY BE REQUIRED. CONTRACTOR SHALL PROVIDE ALL ACCESSORIES AS NECESSARY FOR A COMPLETE INSTALLATION, WITH NO ADDITIONAL COST TO THE OWNER. THE CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS AND MAKE ADJUSTMENTS AS NECESSARY TO COMPLETE THE WORK. VERIFY EXISTING CONDITIONS BEFORE FABRICATION OF DUCTWORK OR OTHER NEW
- THE CONTRACTOR SHALL FULLY COORDINATE ALL WORK WITH OTHER TRADES TO ASSURE ALL WORK CAN BE PROPERLY INSTALLED WITHOUT
- CONTRACTOR SHALL OBTAIN AND PAY FOR ALL NECESSARY PERMITS AND SHALL ARRANGE FOR ALL INSPECTIONS AS REQUIRED.
- ABBREVIATIONS & SYMBOLS ON THIS SHEET ARE COMPREHENSIVE LISTS AND ARE NOT NECESSARILY ALL UTILIZED FOR THIS PROJECT
- EXACT LOCATIONS OF ALL CEILING DIFFUSERS, REGISTERS AND GRILLES ARE DETAILED ON THE ARCHITECTURAL REFLECTED CEILING PLANS AND INTERIOR ELEVATIONS.
- EXACT LOCATION OF ALL ROOF AND STRUCTURAL OPENINGS SHALL BE COORDINATED WITH THE STRUCTURAL AND ARCHITECTURAL DRAWINGS. MECHANICAL EQUIPMENT PLATFORMS AND ROOF CURBS SHALL BE AS INDICATED ON THE STRUCTURAL PLANS. THE CONTRACTOR SHALL COORDINATE EXACT SIZES OF REQUIRED OPENING AND SUPPORTS FOR FURNISHED EQUIPMENT. SEE ARCHITECTURAL PLANS FOR ROOFING
- ALL EQUIPMENT, DUCTS, PIPING, AND OTHER DEVICES AND MATERIALS INSTALLED OUTSIDE OF THE BUILDING OR OTHERWISE EXPOSED TO THE WEATHER SHALL BE COMPLETELY WEATHERPROOFED
- ALL MATERIALS EXPOSED WITHIN AN AIR PLENUM AND DUCT LINING MATERIAL SHALL HAVE A FLAME SPREAD OF NOT MORE THAN 25 AND SMOKE DEVELOPED RATING OF NOT MORE THAN 50 WHEN TESTED AS A COMPOSITE INSTALLATION INCLUDING INSULATION, FACING MATERIALS, TAPES AND ADHESIVES AS NORMALLY APPLIED. DUCT AND PIPE LABELS LOCATED IN THE CEILING SPACE USED A SA RETURN AIR PLENUM SHALL COMPLY WITH THE SAME REQUIREMENTS
- ALL SUPPLY AND EXHAUST AIR EQUIPMENT SHALL INCORPORATE DAMPERS THAT AUTOMATICALLY CLOSE DURING PERIODS OF NON-USE. THE
- DAMPERS SHALL BE EITHER MOTORIZED OR OF THE GRAVITY TYPE AS INDICATED ON DRAWINGS OR SPECIFIED. EXTERIOR OPENINGS SHALL BE COVERED WITH A SCREEN HAVING NOT LESS THAN 1/4-INCH OPENINGS AND NOT MORE THAN 1/2-INCH
- AT THE TIME OF ROUGH INSTALLATION, OR DURING STORAGE ON THE CONSTRUCTION SITE AND UNTIL FINAL STARTUP OF THE HEATING. COOLING, AND VENTILATING EQUIPMENT, ALL DUCTS, PIPING, AND EQUIPMENT OPENINGS, SHALL BE COVERED WITH TAPE, PLASTIC, SHEET METAL, OR OTHER ACCEPTABLE METHODS TO REDUCE THE AMOUNT OF DUST, WATER, AND DEBRIS WHICH MAY ENTER THE SYSTEM.
- SPECIFICATIONS. ALL AIR DISTRIBUTION SYSTEM DUCTS AND PLENUMS, INCLUDING, BUT NOT LIMITED TO, BUILDING CAVITIES, MECHANICAL CLOSETS, AIR-HANDLER BOXES AND SUPPORT PLATFORMS USED AS DUCTS OR PLENUMS SHALL BE INSTALLED, SEALED, AND INSULATED TO MEET THE

HEATING, VENTILATING, AND AIR CONDITIONING SYSTEMS SHALL BE BALANCED IN ACCORDANCE WITH AN APPROVED METHODS PER PROVIDED

REQUIREMENTS OF SMACNA DUCT CONSTRUCTION STANDARDS, ASHRAE 90.1, THE INTERNATIONAL MECHANICAL CODE, AND HVAC DESIGN

- SUPPLY-AIR AND RETURN-AIR DUCTS CONVEYING HEATED OR COOLED AIR SHALL BE INSULATED TO A MINIMUM INSTALLED LEVEL OF R-4.2 (R-8 IF
- INSTALLED IN AN UNCONDITIONED SPACE) UNLESS DUCTS ARE IN CONDITIONED SPACE OR NOTED OTHERWISE.
- DUCT SYSTEMS SHALL BE CONSTRUCTED OF METAL AS SET FORTH IN THE SMACNA HVAC DUCT CONSTRUCTION STANDARDS METAL AND
- AIR-MOVING SYSTEMS SUPPLYING AIR IN EXCESS OF 2,000 CFM SHALL BE EQUIPPED WITH AN AUTOMATIC SHUTOFF ACTIVATED BY SMOKE DETECTOR LOCATED IN THE MAIN SUPPLY-AIR DUCT. A SYSTEM MAY INCLUDE MORE THAN ONE PIECE OF AC UNIT WHICH SERVES A COMMON SPACE WITH AGGREGATE SUPPLY AIR OF MORE THAN 2,000 CFM.
- PROCESS SHALL BE PROVIDED TO THE OWNER OR OWNER'S REPRESENTATIVE AND FACILITIES OPERATOR AND FORM TESTING AND ADJUSTING AND COMMISSIONING VERIFICATION SHALL BE COMPLETED AND PROVIDED TO THE INSPECTOR. IF THE HVAC SYSTEM IS USED DURING CONSTRUCTION. PROVIDE RETURN AIR FILTERS WITH A MINIMUM EFFICIENCY REPORTING VALUE (MERV)

PRIOR TO PERMIT BEING FINALIZED, A COMPLETE REPORT OF THE TESTING AND ADJUSTING AND A COMPLETE REPORT OF THE COMMISSIONING

- OF 8. BASED ON ASHRAE 52.2-1999, OR AN AVERAGE EFFICIENCY OF 30 PERCENT. BASED ON ASHRAE 52.1-1992, REPLACE ALL FILTERS WITH SCHEDULED FILTERS PRIOR TO OCCUPANCY OR AT THE CONCLUSION OF CONSTRUCTION.
- ALL EQUIPMENT AND MATERIALS CAPABLE OF BEING UL LABELED OR LISTED SHALL BEAR THE UL OR SIMILAR LABEL. ALL EQUIPMENT BEARING
- CONTRACTOR SHALL GUARANTEE ALL WORK AGAINST DEFECTIVE EQUIPMENT OR WORKMANSHIP FOR A PERIOD OF ONE YEAR STARTING FROM FINAL ACCEPTANCE. ALL CLAIMS FOR CORRECTIONS OR DEFICIENCIES COVERED UNDER THIS GUARANTEE SHALL BE HANDLED QUICKLY AND PROFESSIONALLY AND SHALL INCLUDE ALL PATCHING AND REPAIR NEEDED TO MAKE SUCH CORRECTIONS. SEE SPECIFICATIONS FOR DETAILED

DAMPER OPERATORS SUCH AS YOUNG'S REGULATOR OR EQUAL WHEN DAMPERS ARE LOCATED ABOVE INACCESSIBLE CEILINGS.

PROVIDE A FLANGED AND GASKETED "AIR-TIGHT" FITTING WITH VOLUME DAMPER AT EACH CONNECTION BETWEEN MAIN DUCT AND BRANCH DUCT. SECURE FITTING TO MAIN DUCTWORK USING SELF-ADHESIVE GASKET AND SHEET METAL SCREWS. WHERE THE DEPTH OF THE TAPPED

DUCTWORK IS LESS THAN TAP DIAMETER, A FACTORY-FABRICATED OVAL FITTING OF EQUIVALENT FREE AREA SHALL BE USED. PROVIDE REMOTE

- DUCT SIZES SHOWN ON DRAWINGS ARE IN INCHES AND REPRESENT THE FREE OR UNOBSTRUCTED AREA REQUIRED ON THE INSIDE OF THE
- ALL DUCT RUN-OUTS TO TERMINAL BOX INLETS SHALL BE THE SAME SIZE AS THE BOX INLET UNLESS OTHERWISE NOTED.
- ALL DUCTWORK AND PIPING SHALL RUN AS HIGH AS POSSIBLE, UNLESS OTHERWISE NOTED.

THE UL LABEL SHALL BE INSTALLED IN ACCORDANCE WITH UL REQUIREMENTS.

- OUTSIDE AIR INTAKES SHALL BE LOCATED MORE THAN 10 FEET FROM ANY PLUMBING VENT OR EXHAUST. EQUIPMENT SHALL BE LOCATED MORE THAN 10 FEET FROM THE EDGE OF THE BUILDING WITHOUT FALL PROTECTION.
- ALL LOUVERS EXPOSED TO OUTSIDE AIR SHALL BE FITTED WITH 1/2 INCH WIRE MESH SCREEN. ALL UNUSED PORTIONS OF THE LOUVERS SHALL BE BLANKED OFF WITH 22 GAUGE GALVANIZED SHEET METAL. PAINTED BLACK AND 2" RIGID INSULATION. BOTTOM PANEL OF PLENUM BEHIND
- LOUVER SHALL BE SLOPED 1" PER 12" TO ALLOW ANY WATER THAT ENTERS LOUVER TO DRAIN OUT TO THE EXTERIOR WALL.
- PROVIDE MISCELLANEOUS STEEL AND/OR WOOD BLOCKING AS REQUIRED TO SUPPORT ROOF CURBS AND/OR EQUIPMENT. PAINT STEEL WITH ONE PRIME COAT AND ONE FINISH COAT OF ENAMEL. COORDINATE REQUIREMENTS WITH ARCHITECTURAL AND STRUCTURAL DRAWINGS.
- AVOID LOCATING EQUIPMENT, DUCTS, PIPES, ETC. OVER ELECTRICAL EQUIPMENT.

OPENINGS, UNLESS NOTED OTHERWISE.

- INSTALL ALL ROOF CURBS LEVEL. INSULATE THE OUTSIDE OF THE ROOF CURBS WITH ONE AND ONE-HALF (1.5) INCH THICK RIGID INSULATION AND INSTALL INSULATION CANT BETWEEN THE ROOF AND CURB.
- INSTALL GASKETS BETWEEN THE ROOF CURB AND THE BASE OF THE CURB-MOUNTED EQUIPMENT TO CREATE AN AIR-TIGHT JOINT
- COORDINATE WEIGHT OF EQUIPMENT WITH STRUCTURAL ENGINEER FOR ADEQUATE STRUCTURAL SUPPORT
- PROVIDE ACCESS PANELS FOR ALL VALVES AND MECHANICAL EQUIPMENT IN THE CEILING.
- THE CONTRACTOR SHALL NOT CORE DRILL CONCRETE SLABS WITHOUT THE KNOWLEDGE AND WRITTEN CONSENT OF THE STRUCTURAL ENGINEER AND THE BUILDING OWNER.
- 36. CONTRACTOR TO RADIOGRAPH PROBABLE CORE DRILL LOCATIONS TO PREVENT CUTTING CONCEALED RE-BARS AND/OR CONDUIT IN CONCRETE
- ALL DUCTWORK AND PIPING SHALL CONNECT TO EQUIPMENT WITH FLEXIBLE CONNECTIONS.
- COORDINATE FRAMING OF SLAB TO SLAB PARTITIONS WITH EXISTING DUCTWORK. FRAMING SHALL NOT BE ATTACHED TO DUCTWORK.
- SEAL AROUND ALL PENETRATIONS THROUGH FIRE RATED FLOORS AND WALLS WITH UL LISTED FIRESTOP ASSEMBLIES.
- REMOVE CONSTRUCTION DUST AND DEBRIS FROM ALL AIR DISTRIBUTION DEVICES AND EQUIPMENT. COVER ALL DUCTWORK ENDS DURING CONSTRUCTION TO PREVENT CONSTRUCTION DUST FROM ENTERING DUCTWORK.
- AT ALL POINTS WHERE FLEXIBLE BRANCH DUCTS WOULD PENETRATE SLAB-TO-SLAB PARTITIONS OR FLOOR SLABS, PROVIDE RIGID METAL DUCT IN LIEU OF FLEX 12" ON EITHER SIDE OF WALL OR SLAB.
- SUPPLY AND INSTALL FIRE/SMOKE DAMPERS WITH ACCESS DOOR IN ACCORDANCE WITH NFPA, AND IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS AND CONSISTENT WITH THEIR LISTING. DAMPERS SHALL BE LISTED UNDER UL 555, UL 555S AND/OR UL 555C. INSTALL
- DAMPERS AND PROVIDE ACCESS DOORS SO THEY ARE ACCESSIBLE FOR INSPECTION AND SERVICE.
- SUPPLY AND INSTALL VIBRATION ISOLATION HANGERS FOR ALL EQUIPMENT SUSPENDED FROM STRUCTURE AS PER SPECIFICATIONS.
- ALL DUCT BRANCH LINES AND BRANCH TAKEOFFS SHALL BE THE SAME SIZE AS THE INLET OF THE DIFFUSER TO WHICH THEY CONNECT UNLESS OTHERWISE SHOWN. THE MAXIMUM LENGTH OF FLEXIBLE DUCTWORK BETWEEN BRANCH DUCTS AND DIFFUSERS SHALL BE 5'-0" UNLESS OTHERWISE SPECIFIED. FLEXIBLE DUCTWORK SHALL BE RUN WITH SMOOTH BENDS NO GREATER THAN 90° SO AS TO NOT RESTRICT AIRFLOW.
- ALL THERMOSTAT AND TEMPERATURE SENSORS SHALL BE INSTALLED 44" A.F.F. UNLESS OTHERWISE NOTED. THERMOSTATS AND TEMPERATURE SENSORS LOCATED ON PERIMETER WALLS/COLUMNS SHALL BE PROVIDED WITH INSULATED SUB-BASES AND SOLAR SHADING.
- CONTRACTOR SHALL FURNISH AND INSTALL TEMPERATURE SENSORS IN LOCATIONS INDICATED ON THE DRAWINGS. TEMPERATURE SENSORS SHALL NOT BE LOCATED ABOVE DIMMER SWITCHES OR OTHER HEAT-PRODUCING ELECTRICAL DEVICES. THERMOSTATS AND TEMPERATURE
- ALL SPECIFIED EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. PROVIDE SERVICE AND
- OPERATING CLEARANCES AROUND ALL SIDES OF EACH PIECE OF EQUIPMENT IN ACCORDANCE WITH THE MANUFACTURER'S PRINTED REQUIREMENTS AND RECOMMENDATIONS AND PER ANY APPLICABLE CODES.
- CONTRACTOR SHALL COORDINATE THE LOCATION OF ALL ABOVE CEILING MECHANICAL EQUIPMENT TO ENSURE THAT ALL REQUIRED SERVICE AREAS BELOW AND AROUND AIR TERMINAL BOXES BETWEEN CEILING AND UNDERSIDE OF SLAB ARE FREE FROM PARTITION FRAMING, PIPING. CONDUIT, OR OTHER IMPEDIMENTS. WHERE PARTITION FRAMING MUST BE LOCATED WITHIN AIR TERMINAL BOX CONTROLLER ACCESS AREA, CONTRACTOR SHALL FRAME A FULL SIZED OPENING IN THE PARTITION FRAMING FROM TOP OF CEILING TO UNDERSIDE OF BUILDING
- 49. WHERE INSULATED DUCTS PENETRATE WALLS, CONTINUE THE INSULATION UNINTERRUPTED THROUGH THE WALL PENETRATIONS. EXCEPT IN
- WHERE VOLUME DAMPERS, SPLITTER DAMPERS, ETC., ARE LOCATED ABOVE OR BEHIND DRYWALL CEILING ENCLOSURES COORDINATE WITH ARCHITECT ACCESS DOORS IN THE CEILING, REMOTELY LOCATE DAMPER IN ACCESSIBLE CEILING, OR PROVIDE REMOTE ACCESSIBLE DAMPER SIMILAR TO YOUNG REGULATOR WITH ACCESS POINT TO BE COORDINATED WITH ENGINEER.
- PROVIDE EXTENSIONS ON ALL DAMPERS OR OPERATORS LOCATED ON INSULATED DUCTS AND PIPES.

SENSORS/TRANSMITTERS SHALL BE ALIGNED WITH TOP EDGE OF ADJACENT LIGHT SWITCH (ES).

- MOTORIZED DAMPERS THAT ARE INTERLOCKED VIA DAMPER END SWITCHES WITH FANS OR OTHER EQUIPMENT ARE TO OPEN PRIOR TO START-UP OF ASSOCIATED FANS OR EQUIPMENT.
- 53. BLANK OFF ALL INACTIVE SECTIONS OF SLOT LINEAR DIFFUSERS AND LINEAR BAR GRILLES.
- USE RADIUSED ELBOWS WHEREVER SPACE PERMITS. WHERE THERE IS INSUFFICIENT SPACE FOR A RADIUSED ELBOW, USE A SQUARE ELBOW
- ALL DUCTWORK, PIPING, EQUIPMENT, AND DEVICES SHALL BE LABELED OR TAGGED. REFER TO SPECIFICATIONS.
- MECHANICAL EQUIPMENT THAT IS NOT COVERED BY THE U.S. NATIONAL APPLIANCE ENERGY CONSERVATION ACT (NAECA) OF 1987 SHALL CARRY A PERMANENT LABEL INSTALLED BY THE MANUFACTURER STATING THAT THE EQUIPMENT COMPLIES WITH THE REQUIREMENTS OF ASHRAE STANDARD 90.1.
 - ELECTRICAL ROOMS, AV ROOMS, IDF ROOMS, AND ALL OTHER ROOMS OF THAT TYPE ARE COVERED IN A HATCH PATTERN TO INDICATE THAT NON-RELATED EQUIPMENT SHALL NOT TRAVERSE OR BE POSITIONED WITHIN THOSE SPACES.

IN128 - JAMES T. **MORRIS ARENA**

Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEE 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408

> 812-855-1692 Architect RATIO

101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204 317-633-4040

Structural Engineer

FINK ROBERTS AND PETRIE, INC. 3535 EAST 96TH STREET

SUITE 126 INDIANAPOLIS, IN 46240

317-872-8400

Mechanical / Electrical

INTROBA 8250 HAVERSTICK ROAD SUITE 285

INDIANAPOLIS, IN 46240

800-404-7677 Plumbing Engineer

INDIANAPOLIS, IN 46204 317-633-4120

Acoustics / Technology Enginee WJHW 7220 W. JEFFERSON AVE

138 N. DELAWARE ST

SUITE 216 LAKEWOOD, CO 80235 972-934-3700

Civil Engineer AMERICAN STRUCTUREPOINT, INC.

9025 RIVER ROAD SUITE 200 INDIANAPOLIS, IN 46240

317-547-5580 Food Service Consultant

CINILITTLE 3405 NW 9TH AVENUE #1202 -ORT LAUDERDALE, FL 33309

Code Consultant **FORZA**

954-846-9600

2502 WEST MECHANIC ST, SUITE C HARRISONVILLE, MO 64701 816-806-3729

DD PROGRESS SET



DESIGN DEVELOPMENT 50% CONSTRUCTION DOCUMENTS 95% CONSTRUCTION DOCUMENTS **CONSTRUCTION DOCUMENTS ADDENDUM 01**

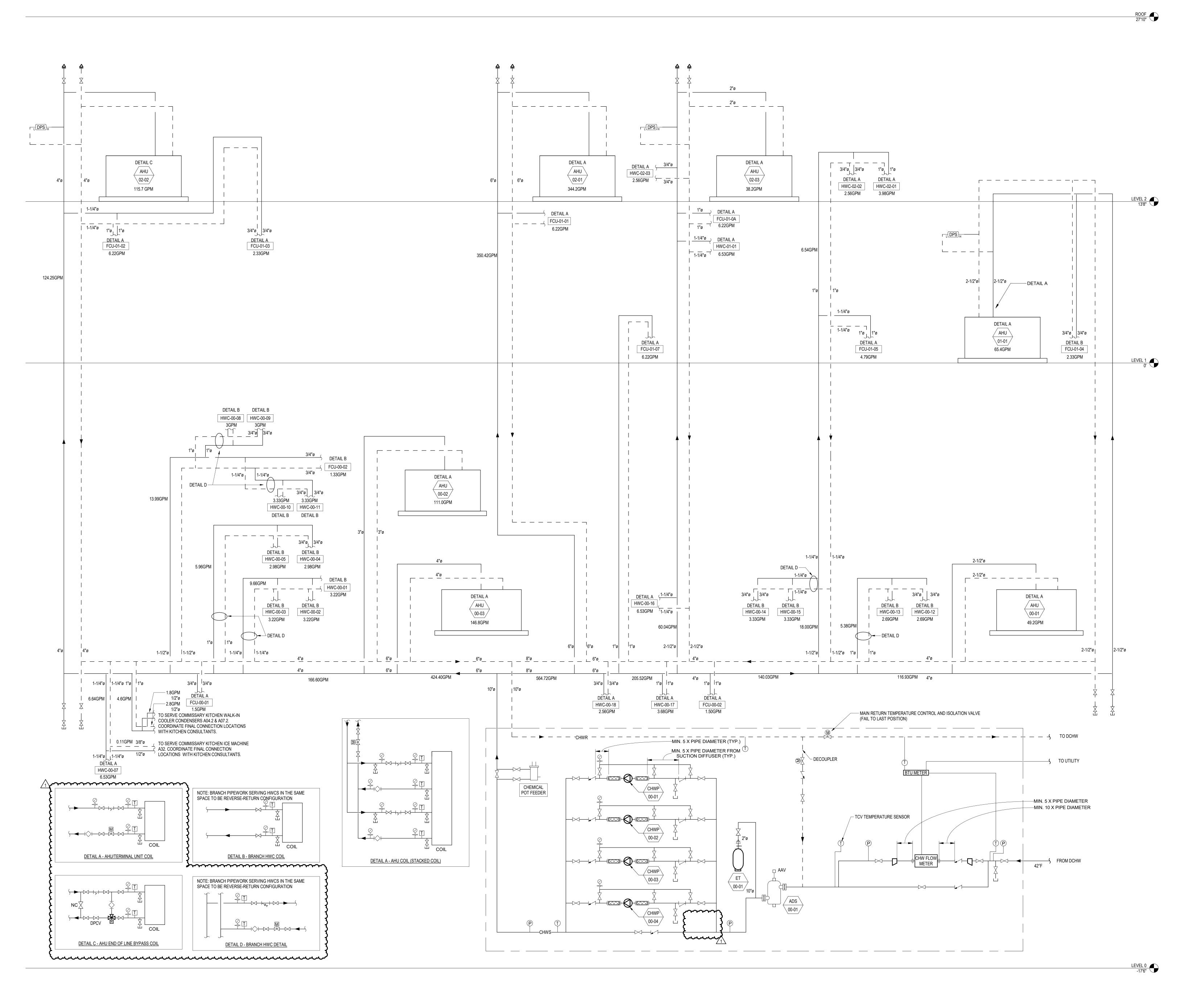


PROJECT NO.

23112.000

MECHANICAL LEGEND, ABBREVIATIONS, AND GEN. NOTES

SHEET NUMBER



Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

Owner
INDIANA UNIVERSITY BOARD OF TRUSTEE
2901 EAST DISCOVERY PARKWAY
BLOOMINGTON, IN 47408
812-855-1692

Architect
RATIO
101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204

317-633-4040

Structural Engineer

FINK ROBERTS AND PETRIE, INC.

3535 EAST 96TH STREET SUITE 126 INDIANAPOLIS, IN 46240

INDIANAPOLIS, IN 46240 317-872-8400 Mechanical / Electrical

INTROBA

8250 HAVERSTICK ROAD
SUITE 285
INDIANAPOLIS, IN 46240
800-404-7677

Plumbing Engineer
DLZ

138 N. DELAWARE ST INDIANAPOLIS, IN 46204 317-633-4120

Acoustics / Technology Engineer
WJHW

7220 W. JEFFERSON AVE SUITE 216 LAKEWOOD, CO 80235 972-934-3700

Civil Engineer

AMERICAN STRUCTUREPOINT, INC.

9025 RIVER ROAD SUITE 200 INDIANAPOLIS, IN 46240 317-547-5580

Food Service Consultant

CINILITTLE3405 NW 9TH AVENUE #1202
FORT LAUDERDALE, FL 33309
954-846-9600

Code Consultant
FORZA

2502 WEST MECHANIC ST, SUITE C HARRISONVILLE, MO 64701

816-806-3729

SEAL



SH	EET ISSUE	
1	DD PROGRESS SET	07/18/
2	DESIGN DEVELOPMENT	08/30/
3	50% CONSTRUCTION DOCUMENTS	11/01/
4	95% CONSTRUCTION DOCUMENTS	12/19/
5	CONSTRUCTION DOCUMENTS	01/13/
6	ADDENDUM 01	01/27/



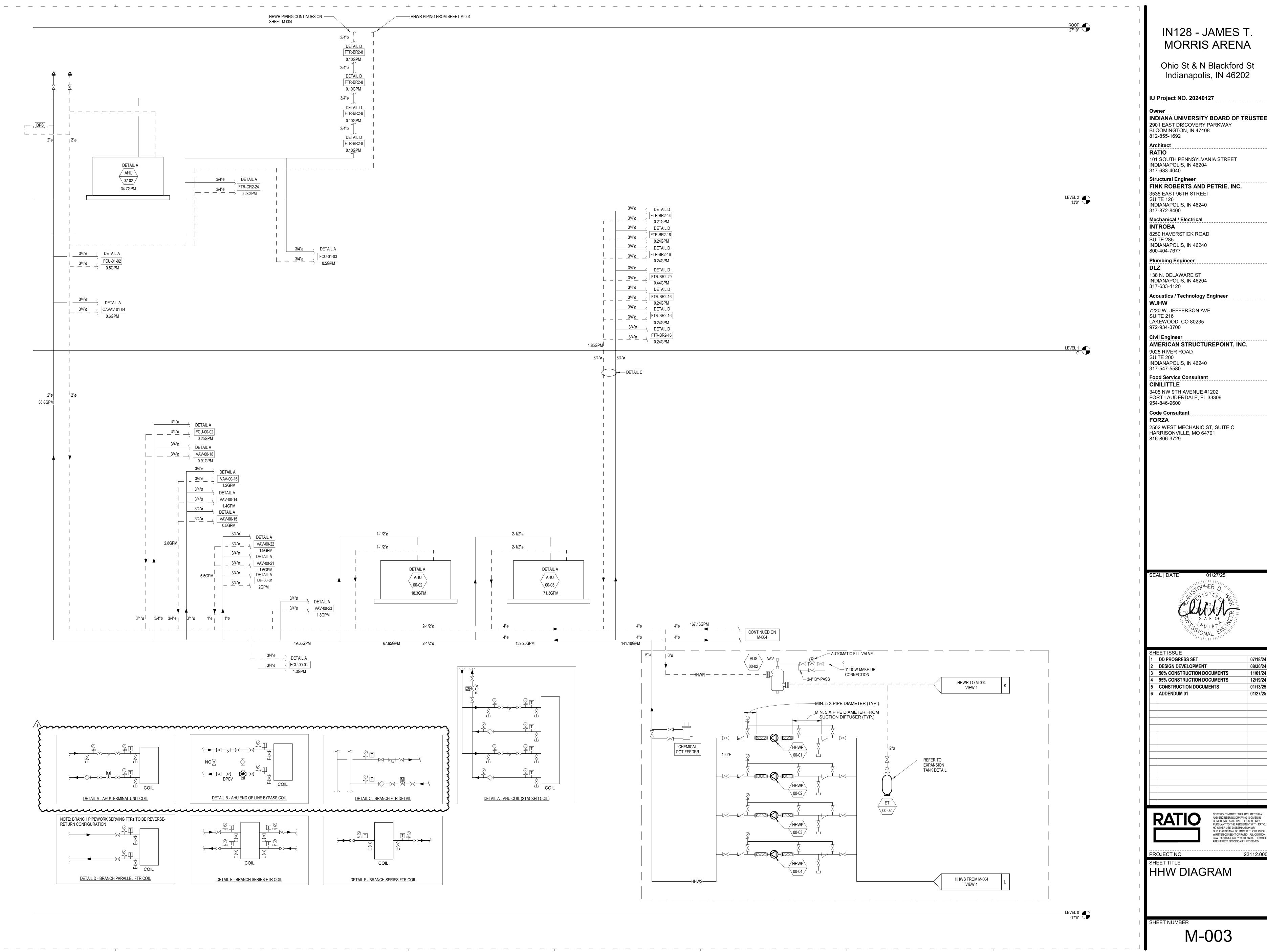
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SHEET TITLE

CHW DIAGRAM

SHEET NUMBER

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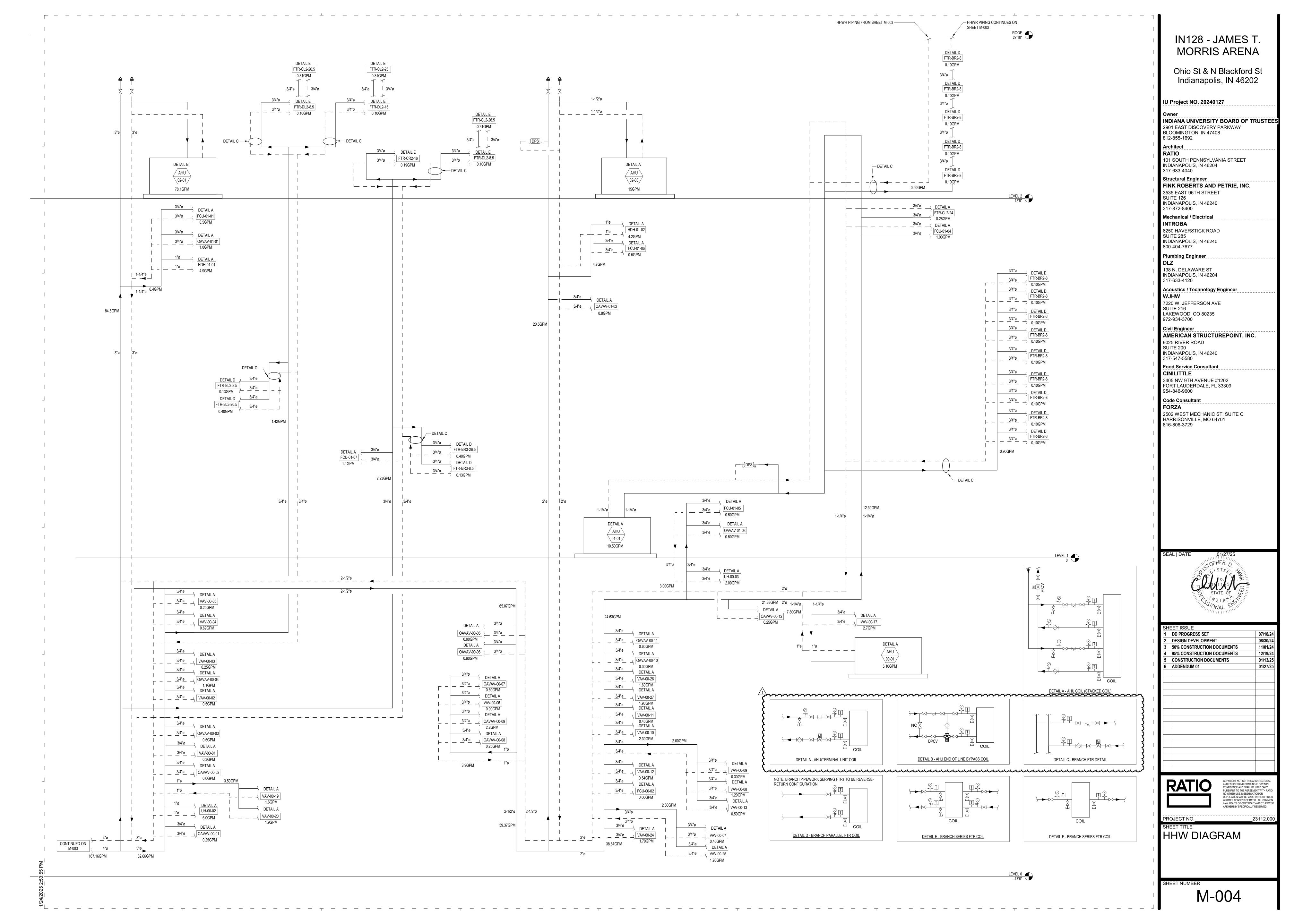
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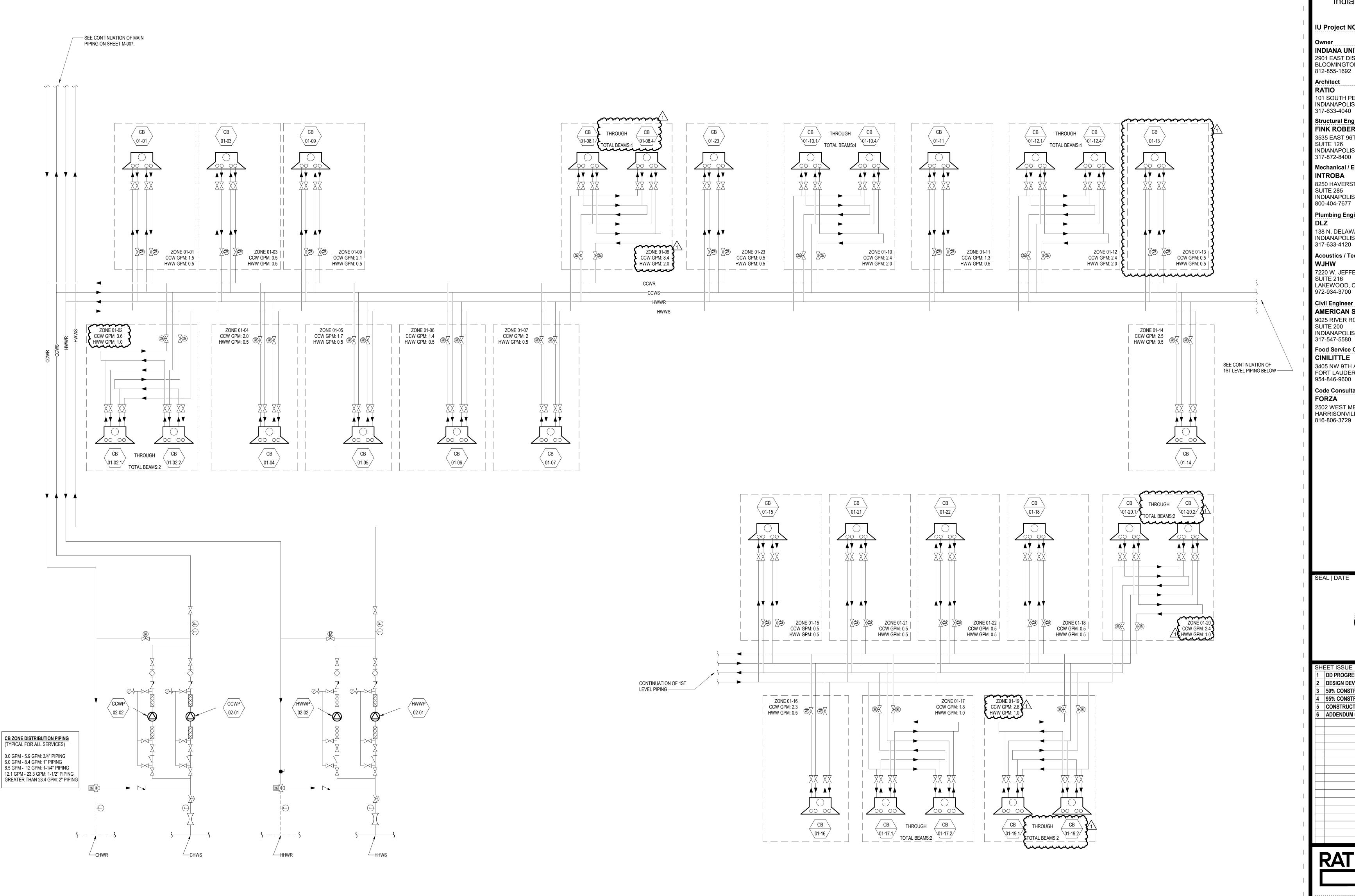


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Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEE 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408 812-855-1692

Architect RATIO

101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204 317-633-4040

Structural Engineer FINK ROBERTS AND PETRIE, INC. 3535 EAST 96TH STREET

SUITE 126 INDIANAPOLIS, IN 46240 317-872-8400

Mechanical / Electrical INTROBA 8250 HAVERSTICK ROAD SUITE 285

INDIANAPOLIS, IN 46240 800-404-7677 Plumbing Engineer

138 N. DELAWARE ST INDIANAPOLIS, IN 46204

317-633-4120 Acoustics / Technology Engineer

WJHW 7220 W. JEFFERSON AVE SUITE 216 LAKEWOOD, CO 80235

Civil Engineer AMERICAN STRUCTUREPOINT, INC.

9025 RIVER ROAD SUITE 200 INDIANAPOLIS, IN 46240

317-547-5580 Food Service Consultant

CINILITTLE 3405 NW 9TH AVENUE #1202 FORT LAUDERDALE, FL 33309 954-846-9600

Code Consultant

FORZA 2502 WEST MECHANIC ST, SUITE C HARRISONVILLE, MO 64701 816-806-3729

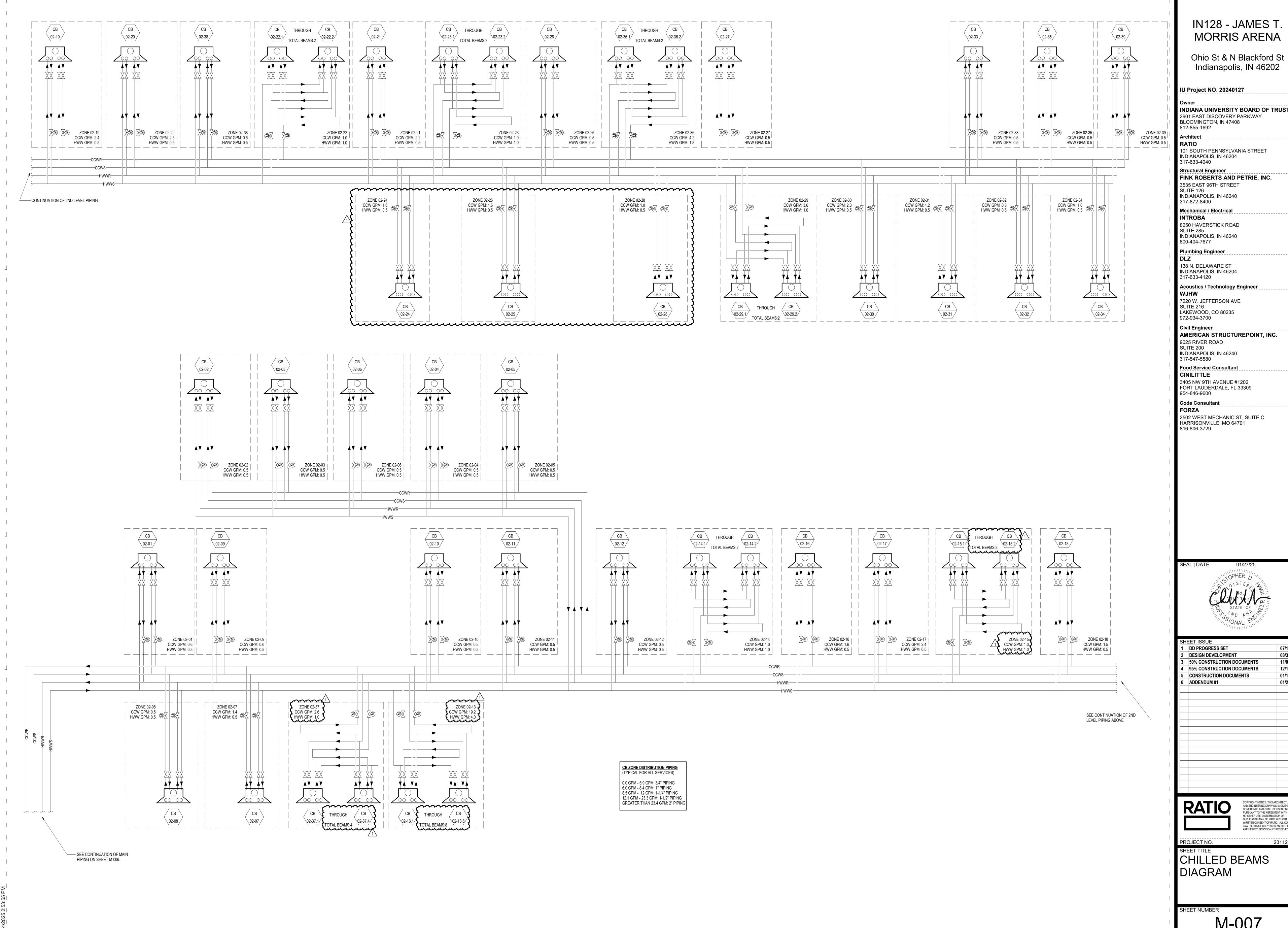


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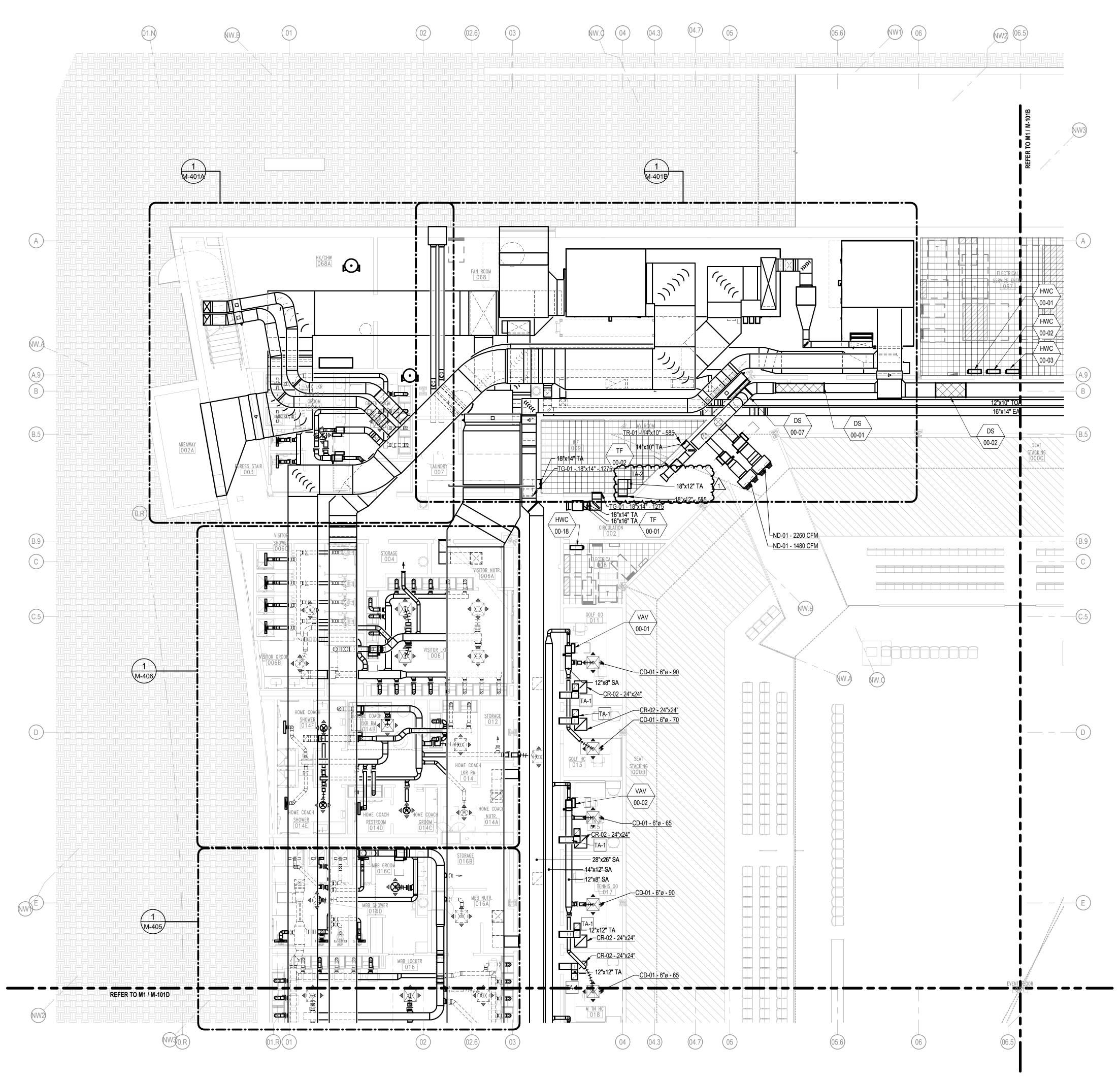
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INDIANA UNIVERSITY BOARD OF TRUSTEE

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EVENT FLOOR PLAN - AREA A - HVAC 1/8" = 1'-0"

IN128 - JAMES T. MORRIS ARENA

Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEES 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408 812-855-1692

Architect RATIO 101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204

317-633-4040 Structural Engineer

FINK ROBERTS AND PETRIE, INC. 3535 EAST 96TH STREET SUITE 126

INDIANAPOLIS, IN 46240 317-872-8400

Mechanical / Electrical INTROBA 8250 HAVERSTICK ROAD

138 N. DELAWARE ST INDIANAPOLIS, IN 46204

Acoustics / Technology Engineer

AMERICAN STRUCTUREPOINT, INC.

7220 W. JEFFERSON AVE

LAKEWOOD, CO 80235

317-633-4120

WJHW

SUITE 216

972-934-3700

Civil Engineer

SUITE 200

317-547-5580

CINILITTLE

954-846-9600

816-806-3729

FORZA

Code Consultant

9025 RIVER ROAD

INDIANAPOLIS, IN 46240

Food Service Consultant

3405 NW 9TH AVENUE #1202

HARRISONVILLE, MO 64701

FORT LAUDERDALE, FL 33309

2502 WEST MECHANIC ST, SUITE C

SUITE 285

INDIANAPOLIS, IN 46240 800-404-7677 Plumbing Engineer

PERMITTED UNLESS OTHERWISE INDICATED. E. INSULATION SHALL BE APPLIED WHERE INDICATED BY

AREA DIMENSIONS OF THE INSIDE OF THE DUCT. F. DUCT AND EQUIPMENT ABOVE CEILING TO BE INSTALLED SO

AS TO LEAVE ROOM TO INSTALL LIGHTS AND ASSOCIATED HARDWARE.

SPECIFICALLY NOTED OTHERWISE.

I. ALL TRANSFER OPENINGS UNDER 2 SQFT SHALL BE FREE OF OBSTRUCTION BY MIN. 12". ALL TRANSFER OPENINGS BETWEEN 2 SQFT AND 6 SQFT SHALL BE FREE OF OBSTRUCTION BY MIN. 18". ALL TRANSFER OPENINGS LARGER THAN 6 SQFT SHALL BE FREE OF OBSTRUCTION BY MIN. 24"

J. MC TO ENSURE ALL VOLUME CONTROL DAMPERS LOCATED ABOVE GYP CEILING TO HAVE REMOTE OPERATION CAPABILITIES OR BE PROVIDED WITH AN ACCESS PANEL. COORDINATE USE OF ACCESS PANELS WITH ARCHITECT.

K. WHERE LINEAR SLOTS ARE INSTALLED IN LINE AND ARE

GENERAL HVAC NOTES:

- A. VERIFY ALL DIMENSIONS, CLEARANCES AND INTERFERENCES AGAINST ON SITE CONDITIONS AND OTHER DISCIPLINE DRAWINGS PRIOR TO ORDERING MATERIAL. CONTRACTOR IS RESPONSIBLE FOR COORDINATING EQUIPMENT AND DUCT LOCATIONS WITH OTHER TRADES.
- B. ALL DUCT ELBOWS TO BE RADIUS 1.5 R/W WHERE SPACE ALLOWS. RECTANGULAR ELBOWS TO BE C/W TURNING VANES. SEE DETAILS FOR ADDITIONAL INFORMATION. C. DIRECTIONAL BAFFLES SHALL BE INSTALLED INSIDE OF
 - D. ALL VOLUME DAMPERS SHALL BE PROVIDED IN THE SUPPLY DUCTWORK NEAR THE BRANCH TAKEOFF FROM THE MAIN.

DIFFUSERS TO ACHIEVE AIRFLOW DIRECTIONS INDICATED ON

- BALANCING DAMPERS AT THE GRILLE FACE ARE NOT
- SPECIFICATIONS. DIMENSIONS ON PLANS INDICATE FREE-
- G. BRANCH DUCTS TO TERMINAL DEVICES (CHILLED BEAMS, DIFFUSERS, ETC.) SHALL BE THE SAME SIZE AS INLET UNLESS
- H. GREASE DUCT CLEANOUTS SHALL BE LOCATED TO COMPLY WITH IMC 506.3.8.
- UNLESS OTHERWISE NOTED
- UNBROKEN BY WALL DIVIDERS, PROVIDE BLANK SECTIONS OF SLOTS MATCHING THE APPEARANCE OF THE ACTIVE SECTIONS FOR A CONTINUOUS APPEARANCE.



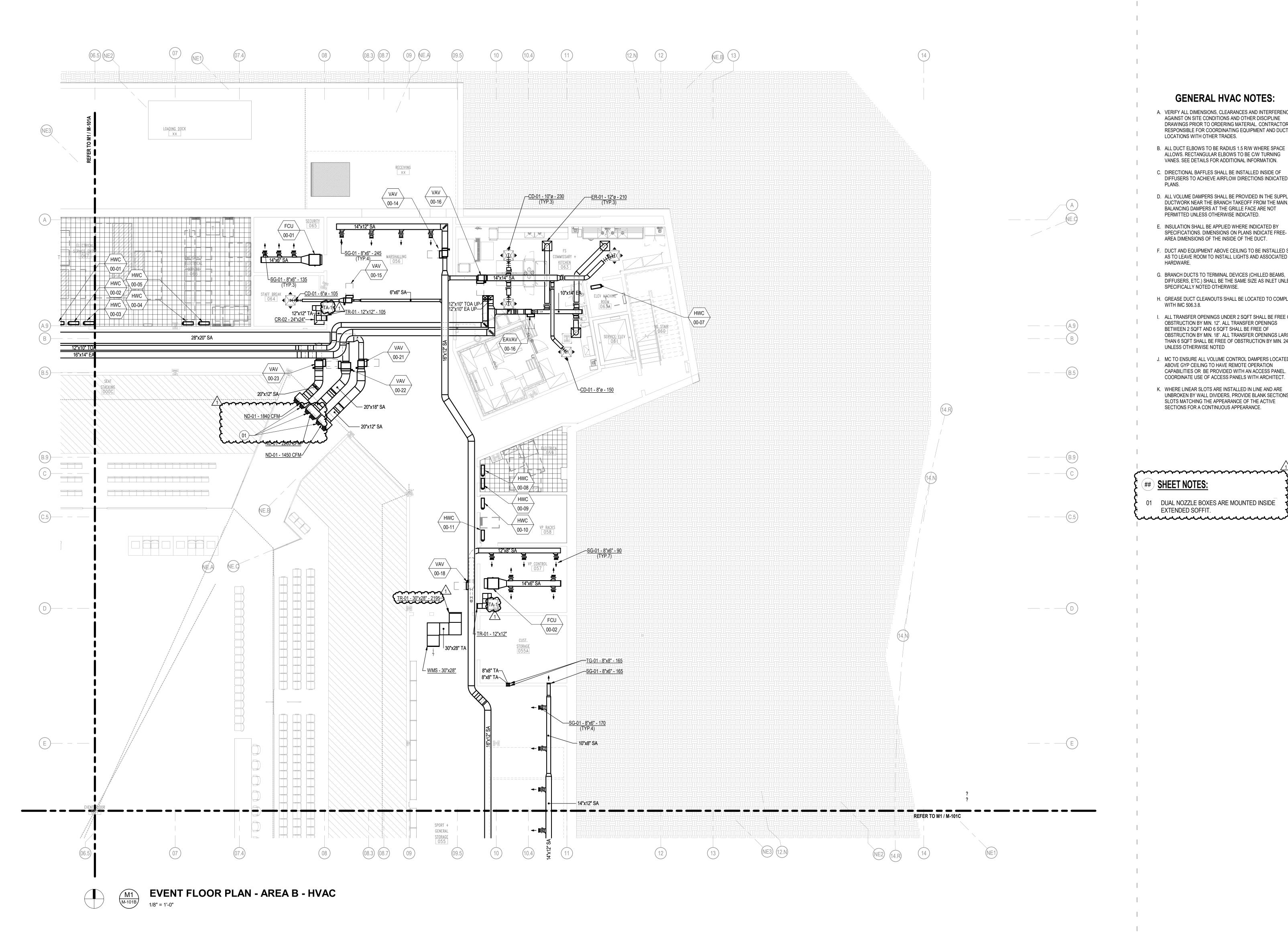
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EVENT FLOOR PLAN

- AREA A - HVAC

M-101A



Ohio St & N Blackford St Indianapolis, IN 46202

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INDIANA UNIVERSITY BOARD OF TRUSTEE 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408 812-855-1692

Architect RATIO

101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204 317-633-4040

Structural Engineer FINK ROBERTS AND PETRIE, INC. 3535 EAST 96TH STREET

SUITE 126 INDIANAPOLIS, IN 46240

317-872-8400 Mechanical / Electrical INTROBA

8250 HAVERSTICK ROAD SUITE 285 INDIANAPOLIS, IN 46240 800-404-7677

Plumbing Engineer

138 N. DELAWARE ST INDIANAPOLIS, IN 46204

Acoustics / Technology Engineer

AMERICAN STRUCTUREPOINT, INC.

7220 W. JEFFERSON AVE

LAKEWOOD, CO 80235

317-633-4120

WJHW

SUITE 216

972-934-3700

Civil Engineer

SUITE 200

317-547-5580

CINILITTLE

954-846-9600

816-806-3729

FORZA

Code Consultant

9025 RIVER ROAD

INDIANAPOLIS, IN 46240

Food Service Consultant

3405 NW 9TH AVENUE #1202

HARRISONVILLE, MO 64701

FORT LAUDERDALE, FL 33309

2502 WEST MECHANIC ST, SUITE C

PERMITTED UNLESS OTHERWISE INDICATED.

E. INSULATION SHALL BE APPLIED WHERE INDICATED BY SPECIFICATIONS. DIMENSIONS ON PLANS INDICATE FREE-AREA DIMENSIONS OF THE INSIDE OF THE DUCT.

F. DUCT AND EQUIPMENT ABOVE CEILING TO BE INSTALLED SO AS TO LEAVE ROOM TO INSTALL LIGHTS AND ASSOCIATED HARDWARE.

SPECIFICALLY NOTED OTHERWISE.

WITH IMC 506.3.8. I. ALL TRANSFER OPENINGS UNDER 2 SQFT SHALL BE FREE OF

OBSTRUCTION BY MIN. 18". ALL TRANSFER OPENINGS LARGER THAN 6 SQFT SHALL BE FREE OF OBSTRUCTION BY MIN. 24" UNLESS OTHERWISE NOTED J. MC TO ENSURE ALL VOLUME CONTROL DAMPERS LOCATED

CAPABILITIES OR BE PROVIDED WITH AN ACCESS PANEL. COORDINATE USE OF ACCESS PANELS WITH ARCHITECT.

K. WHERE LINEAR SLOTS ARE INSTALLED IN LINE AND ARE SLOTS MATCHING THE APPEARANCE OF THE ACTIVE

EXTENDED SOFFIT.

GENERAL HVAC NOTES:

A. VERIFY ALL DIMENSIONS, CLEARANCES AND INTERFERENCES AGAINST ON SITE CONDITIONS AND OTHER DISCIPLINE DRAWINGS PRIOR TO ORDERING MATERIAL. CONTRACTOR IS RESPONSIBLE FOR COORDINATING EQUIPMENT AND DUCT LOCATIONS WITH OTHER TRADES.

ALLOWS. RECTANGULAR ELBOWS TO BE C/W TURNING VANES. SEE DETAILS FOR ADDITIONAL INFORMATION. C. DIRECTIONAL BAFFLES SHALL BE INSTALLED INSIDE OF

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H. GREASE DUCT CLEANOUTS SHALL BE LOCATED TO COMPLY

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ABOVE GYP CEILING TO HAVE REMOTE OPERATION

UNBROKEN BY WALL DIVIDERS, PROVIDE BLANK SECTIONS OF SECTIONS FOR A CONTINUOUS APPEARANCE.

SHEET NOTES:

01 DUAL NOZZLE BOXES ARE MOUNTED INSIDE

DD PROGRESS SET 2 DESIGN DEVELOPMENT 50% CONSTRUCTION DOCUMENTS 11/01/24 4 95% CONSTRUCTION DOCUMENTS CONSTRUCTION DOCUMENTS **ADDENDUM 01**

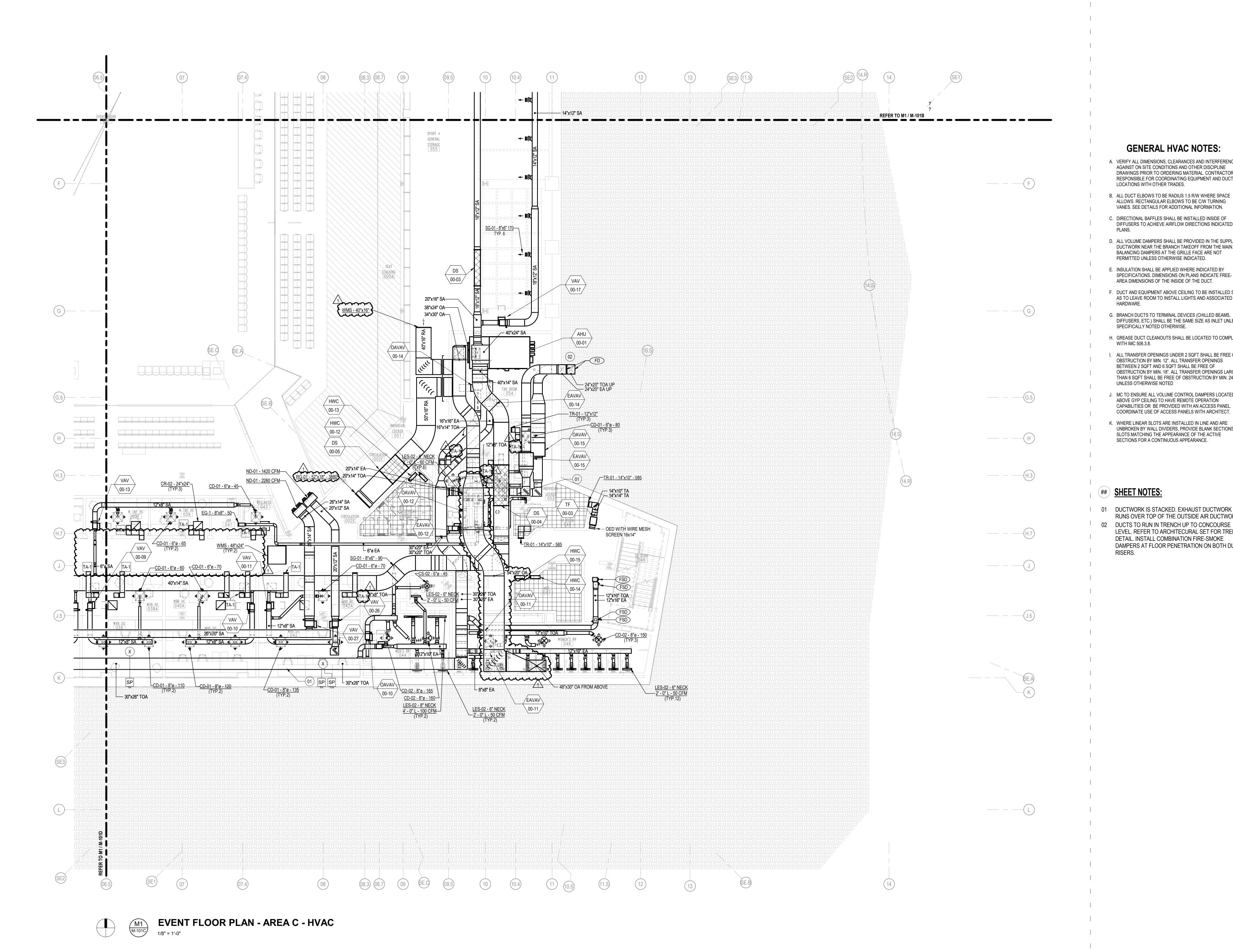


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EVENT FLOOR PLAN - AREA B - HVAC

AND ENGINEERING DRAWING IS GIVEN IN CONFIDENCE AND SHALL BE USED ONLY

M-101B



Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEES 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408 812-855-1692

Architect RATIO

101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204 317-633-4040

Structural Engineer FINK ROBERTS AND PETRIE, INC. 3535 EAST 96TH STREET

SUITE 126 INDIANAPOLIS, IN 46240

317-872-8400 Mechanical / Electrical

INTROBA 8250 HAVERSTICK ROAD SUITE 285

INDIANAPOLIS, IN 46240

INDIANAPOLIS, IN 46204

7220 W. JEFFERSON AVE

LAKEWOOD, CO 80235

Acoustics / Technology Engineer

AMERICAN STRUCTUREPOINT, INC.

800-404-7677

317-633-4120

WJHW

SUITE 216

972-934-3700

Civil Engineer

SUITE 200

317-547-5580

CINILITTLE

954-846-9600

816-806-3729

FORZA

Code Consultant

9025 RIVER ROAD

INDIANAPOLIS, IN 46240

Food Service Consultant

3405 NW 9TH AVENUE #1202

HARRISONVILLE, MO 64701

FORT LAUDERDALE, FL 33309

2502 WEST MECHANIC ST, SUITE C

Plumbing Engineer 138 N. DELAWARE ST

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SPECIFICALLY NOTED OTHERWISE.

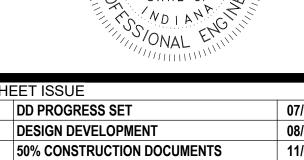
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J. MC TO ENSURE ALL VOLUME CONTROL DAMPERS LOCATED

K. WHERE LINEAR SLOTS ARE INSTALLED IN LINE AND ARE

SHEET NOTES:

01 DUCTWORK IS STACKED. EXHAUST DUCTWORK RUNS OVER TOP OF THE OUTSIDE AIR DUCTWORK. 02 DUCTS TO RUN IN TRENCH UP TO CONCOURSE LEVEL. REFER TO ARCHITECURAL SET FOR TRENCH DETAIL. INSTALL COMBINATION FIRE-SMOKE DAMPERS AT FLOOR PENETRATION ON BOTH DUCT

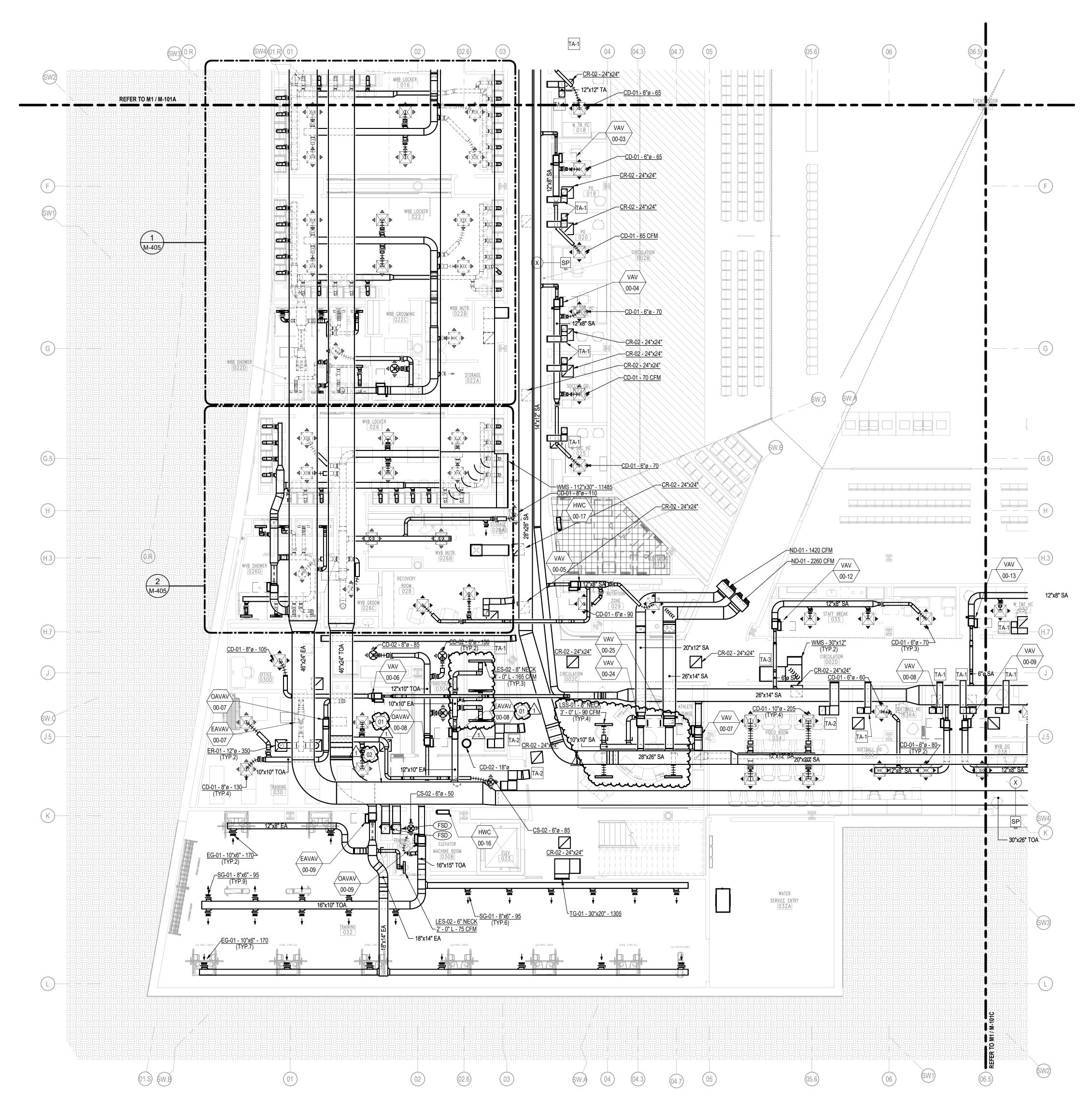


	DD PROGRESS SET	0//10/2
	DESIGN DEVELOPMENT	08/30/2
	50% CONSTRUCTION DOCUMENTS	11/01/2
ı	95% CONSTRUCTION DOCUMENTS	12/19/2
	CONSTRUCTION DOCUMENTS	01/13/2
	ADDENDUM 01	01/27/2



EVENT FLOOR PLAN - AREA C - HVAC

M-101C



EVENT FLOOR PLAN - AREA D - HVAC M1 M-101D

A. VERIFY ALL DIMENSIONS, CLEARANCES AND INTERFERENCES AGAINST ON SITE CONDITIONS AND OTHER DISCIPLINE DRAWINGS PRIOR TO ORDERING MATERIAL. CONTRACTOR IS RESPONSIBLE FOR COORDINATING EQUIPMENT AND DUCT LOCATIONS WITH OTHER TRADES.

GENERAL HVAC NOTES:

- B. ALL DUCT ELBOWS TO BE RADIUS 1.5 R/W WHERE SPACE ALLOWS. RECTANGULAR ELBOWS TO BE C/W TURNING VANES. SEE DETAILS FOR ADDITIONAL INFORMATION.
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IN128 - JAMES T. MORRIS ARENA

Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEES 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408 812-855-1692

Architect

RATIO 101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204 317-633-4040

Structural Engineer FINK ROBERTS AND PETRIE, INC.

3535 EAST 96TH STREET SUITE 126

INDIANAPOLIS, IN 46240 317-872-8400

Mechanical / Electrical INTROBA 8250 HAVERSTICK ROAD

SUITE 285 INDIANAPOLIS, IN 46240 800-404-7677

Plumbing Engineer 138 N. DELAWARE ST

INDIANAPOLIS, IN 46204 317-633-4120

Acoustics / Technology Engineer WJHW 7220 W. JEFFERSON AVE SUITE 216

LAKEWOOD, CO 80235 972-934-3700 Civil Engineer

INDIANAPOLIS, IN 46240

Food Service Consultant

3405 NW 9TH AVENUE #1202

HARRISONVILLE, MO 64701

FORT LAUDERDALE, FL 33309

2502 WEST MECHANIC ST, SUITE C

317-547-5580

CINILITTLE

954-846-9600

816-806-3729

FORZA

Code Consultant

AMERICAN STRUCTUREPOINT, INC. 9025 RIVER ROAD SUITE 200

OBSTRUCTION BY MIN. 12". ALL TRANSFER OPENINGS

J. MC TO ENSURE ALL VOLUME CONTROL DAMPERS LOCATED ABOVE GYP CEILING TO HAVE REMOTE OPERATION CAPABILITIES OR BE PROVIDED WITH AN ACCESS PANEL. COORDINATE USE OF ACCESS PANELS WITH ARCHITECT.

UNBROKEN BY WALL DIVIDERS, PROVIDE BLANK SECTIONS OF SLOTS MATCHING THE APPEARANCE OF THE ACTIVE SECTIONS FOR A CONTINUOUS APPEARANCE.

SHEET NOTES:

AIR TERMINAL DEVICES SERVING THE HYDROTHERAPY ROOM SHALL BE

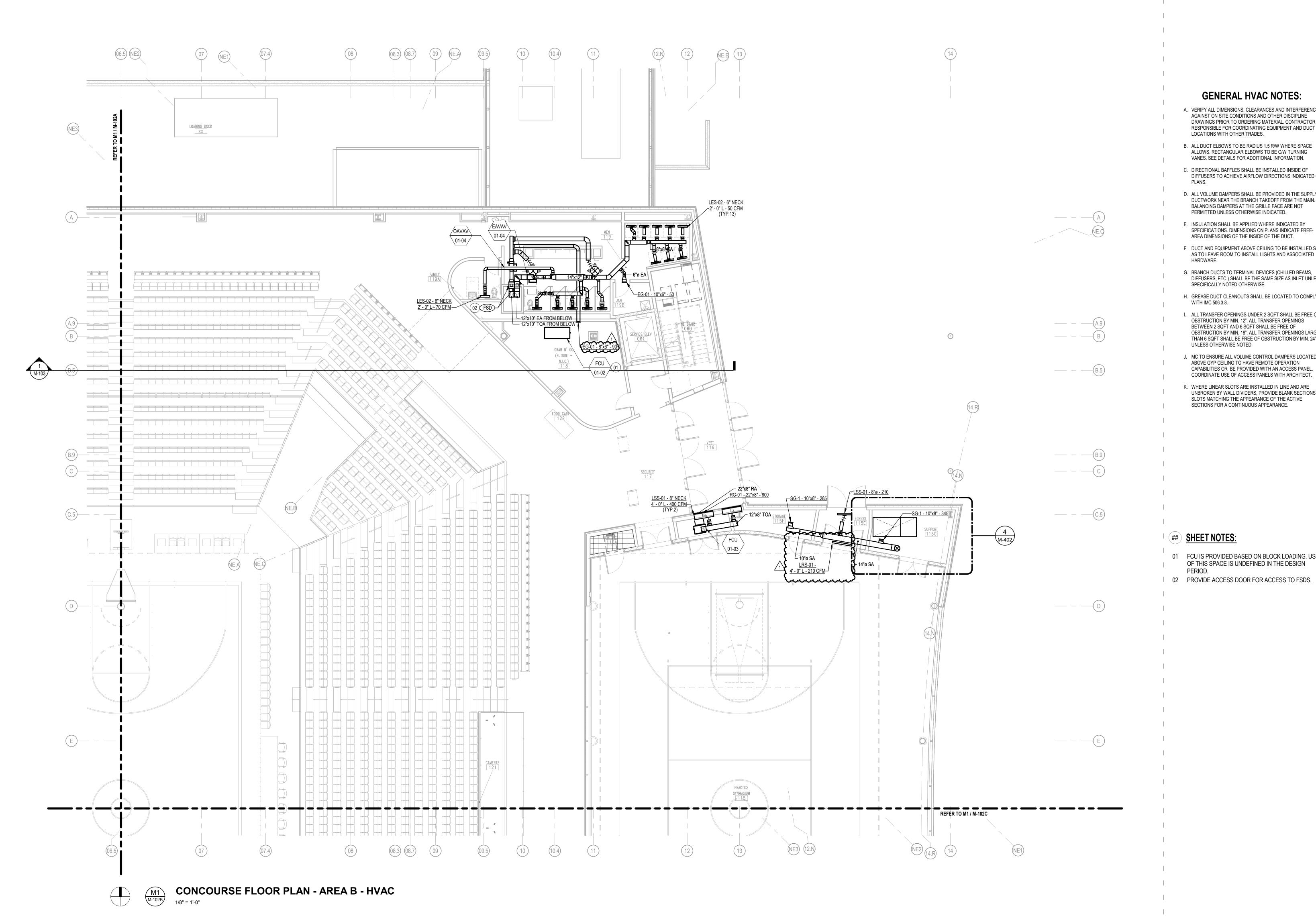


DD PROGRESS SET 2 DESIGN DEVELOPMENT 50% CONSTRUCTION DOCUMENTS 4 95% CONSTRUCTION DOCUMENTS CONSTRUCTION DOCUMENTS **ADDENDUM 01**

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EVENT FLOOR PLAN - AREA D - HVAC

M-101D



Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEES 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408 812-855-1692

Architect RATIO

101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204 317-633-4040

Structural Engineer FINK ROBERTS AND PETRIE, INC. 3535 EAST 96TH STREET

SUITE 126 INDIANAPOLIS, IN 46240

317-872-8400 Mechanical / Electrical

800-404-7677

317-633-4120

WJHW

SUITE 216

972-934-3700

Civil Engineer

SUITE 200

317-547-5580

CINILITTLE

954-846-9600

816-806-3729

FORZA

Code Consultant

9025 RIVER ROAD

INDIANAPOLIS, IN 46240

Food Service Consultant

3405 NW 9TH AVENUE #1202

FORT LAUDERDALE, FL 33309

2502 WEST MECHANIC ST, SUITE C HARRISONVILLE, MO 64701

Plumbing Engineer

138 N. DELAWARE ST INDIANAPOLIS, IN 46204

Acoustics / Technology Engineer

AMERICAN STRUCTUREPOINT, INC.

7220 W. JEFFERSON AVE

LAKEWOOD, CO 80235

INTROBA 8250 HAVERSTICK ROAD SUITE 285 INDIANAPOLIS, IN 46240

BALANCING DAMPERS AT THE GRILLE FACE ARE NOT PERMITTED UNLESS OTHERWISE INDICATED. E. INSULATION SHALL BE APPLIED WHERE INDICATED BY

AREA DIMENSIONS OF THE INSIDE OF THE DUCT. F. DUCT AND EQUIPMENT ABOVE CEILING TO BE INSTALLED SO

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SHEET NOTES:

- 01 FCU IS PROVIDED BASED ON BLOCK LOADING. USE OF THIS SPACE IS UNDEFINED IN THE DESIGN
- 02 PROVIDE ACCESS DOOR FOR ACCESS TO FSDS.

GENERAL HVAC NOTES:

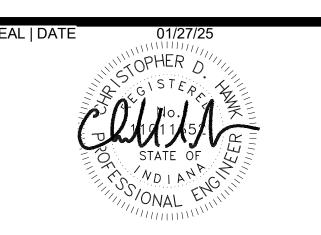
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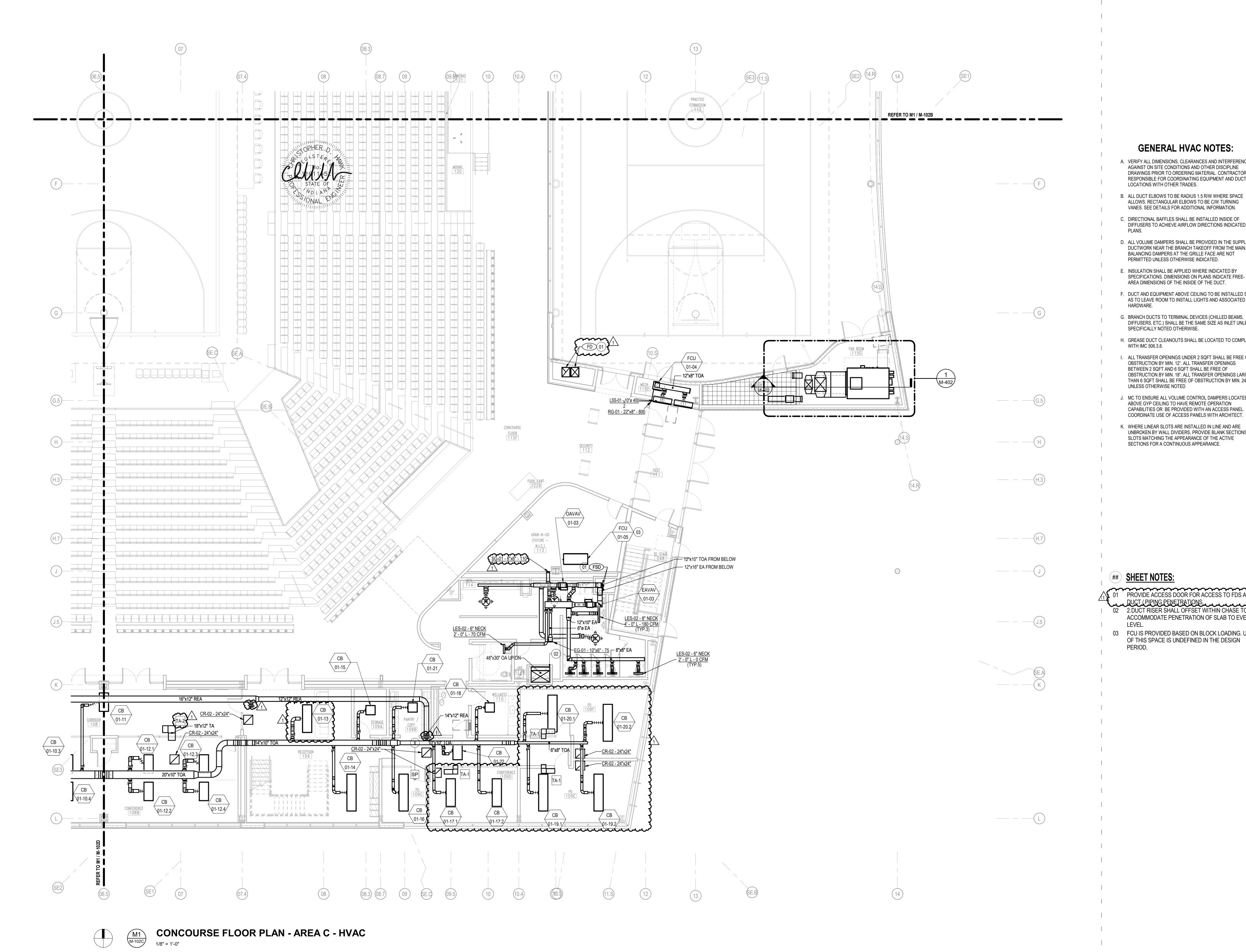


SH	EET ISSUE	,
1	DD PROGRESS SET	07/18/
2	DESIGN DEVELOPMENT	08/30/
3	50% CONSTRUCTION DOCUMENTS	11/01/
4	95% CONSTRUCTION DOCUMENTS	12/19/
5	CONSTRUCTION DOCUMENTS	01/13/
6	ADDENDUM 01	01/27/



CONCOURSE FLOOR PLAN - AREA B -HVAC

M-102B



Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEE 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408 812-855-1692

Architect RATIO

101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204 317-633-4040 Structural Engineer

FINK ROBERTS AND PETRIE, INC. 3535 EAST 96TH STREET

SUITE 126 INDIANAPOLIS, IN 46240 317-872-8400

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SHEET NOTES:

01 PROVIDE ACCESS DOOR FOR ACCESS TO FDS AND DUCT / PIPING PENETRATIONS.

02 2.DUCT RISER SHALL OFFSET WITHIN CHASE TO ACCOMMODATE PENETRATION OF SLAB TO EVENT

03 FCU IS PROVIDED BASED ON BLOCK LOADING. USE OF THIS SPACE IS UNDEFINED IN THE DESIGN

Mechanical / Electrical

8250 HAVERSTICK ROAD SUITE 285 INDIANAPOLIS, IN 46240 800-404-7677

Plumbing Engineer

138 N. DELAWARE ST INDIANAPOLIS, IN 46204 317-633-4120

Acoustics / Technology Engineer WJHW 7220 W. JEFFERSON AVE

SUITE 216 LAKEWOOD, CO 80235 972-934-3700

AMERICAN STRUCTUREPOINT, INC. 9025 RIVER ROAD SUITE 200 INDIANAPOLIS, IN 46240

Civil Engineer

954-846-9600

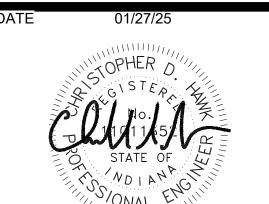
Code Consultant

317-547-5580 Food Service Consultant CINILITTLE 3405 NW 9TH AVENUE #1202

K. WHERE LINEAR SLOTS ARE INSTALLED IN LINE AND ARE

FORZA 2502 WEST MECHANIC ST, SUITE C HARRISONVILLE, MO 64701 816-806-3729

FORT LAUDERDALE, FL 33309



DD PROGRESS SET P. DESIGN DEVELOPMENT 50% CONSTRUCTION DOCUMENTS 4 95% CONSTRUCTION DOCUMENTS CONSTRUCTION DOCUMENTS **ADDENDUM 01**



CONCOURSE FLOOR PLAN - AREA C -HVAC

M-102C

06 REFER TO M1 / M-102A _____F G ---18"x14" OA FROM ABOVE-16"x18" TOA FROM BELOW-**** 26"x16" REA 22"x12" TOA

CONCOURSE FLOOR PLAN - AREA D - HVAC

M1 M-102D

MORRIS ARENA

IN128 - JAMES T.

Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEE 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408 812-855-1692

Architect RATIO

101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204 317-633-4040

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3535 EAST 96TH STREET SUITE 126

INDIANAPOLIS, IN 46240 317-872-8400 Mechanical / Electrical

INTROBA 8250 HAVERSTICK ROAD SUITE 285

138 N. DELAWARE ST INDIANAPOLIS, IN 46204

Acoustics / Technology Engineer

AMERICAN STRUCTUREPOINT, INC.

7220 W. JEFFERSON AVE

LAKEWOOD, CO 80235

317-633-4120

WJHW

SUITE 216

972-934-3700

Civil Engineer

SUITE 200

317-547-5580

CINILITTLE

954-846-9600

816-806-3729

FORZA

Code Consultant

9025 RIVER ROAD

INDIANAPOLIS, IN 46240

Food Service Consultant

3405 NW 9TH AVENUE #1202

HARRISONVILLE, MO 64701

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2502 WEST MECHANIC ST, SUITE C

INDIANAPOLIS, IN 46240 800-404-7677 Plumbing Engineer

PERMITTED UNLESS OTHERWISE INDICATED.

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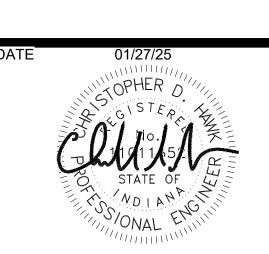
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SHEET NOTES:

01 GREASE DUCT SHALL CONNECT TO THE TOP OF THE EXHAUST HOOD (BY OTHERS) AND RUN HORIZONTALLY ABOVE CEILING. THE DUCT SHALL BE INSTALLED AS A ZERO-CLEARANCE RATED DUCT PRODUCT IN LIUE OF A BUILT-OUT RATED DUCT ENCLOSURE. PRODUCT SHALL BE PROVIDED AS CAPTIVEAIRE DW-3Z OR APPROVED EQUAL. ALL HANGING, PENETRATION, AND CONSTRUCTION DETAILS SHALL BE COMPLIANT WITH MANUFACTURER'S RECOMMENDATIONS.

02 PROVIDE ACCESS DOOR FOR ACCESS TO FSDS.



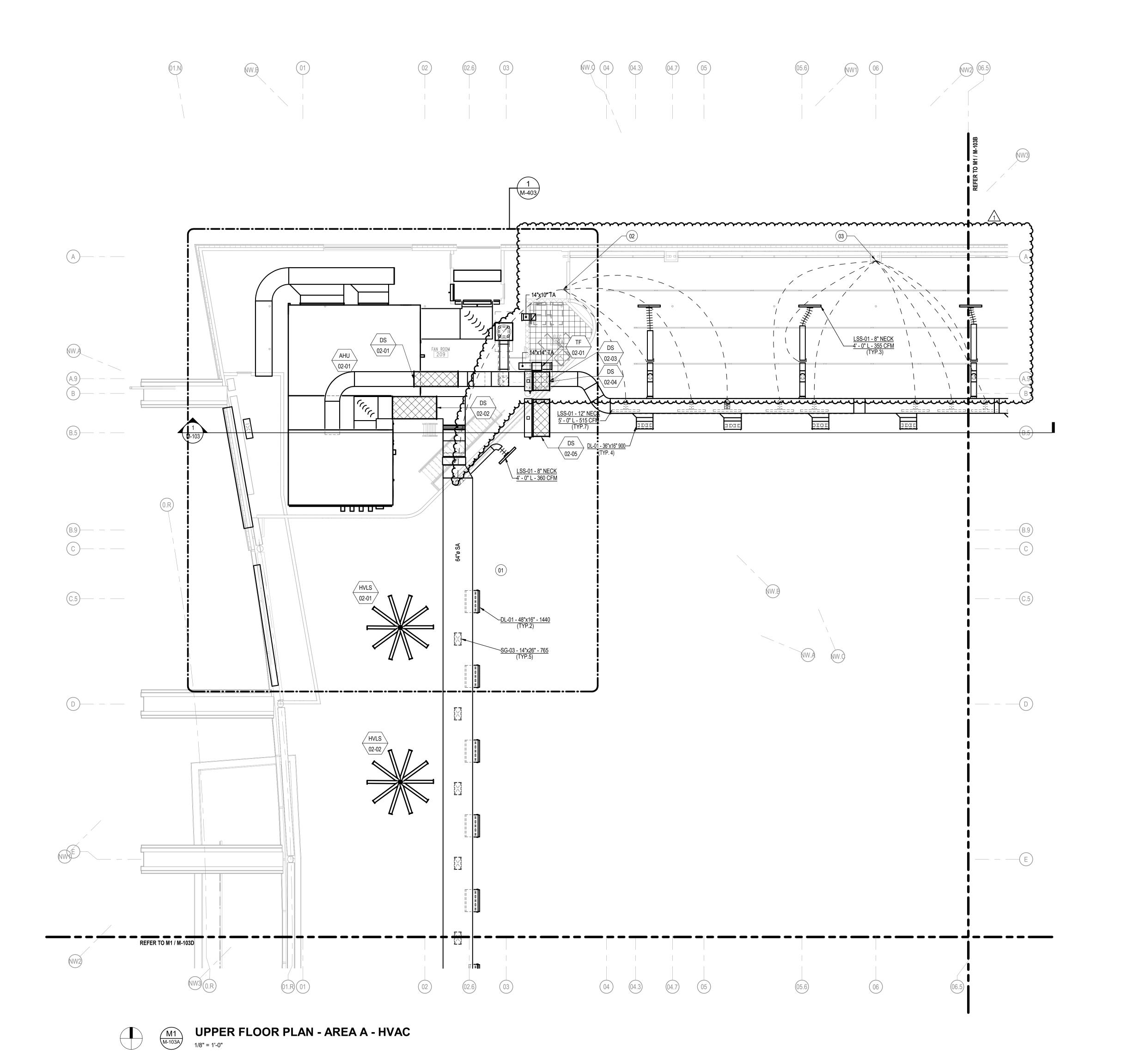
DD PROGRESS SET DESIGN DEVELOPMENT 50% CONSTRUCTION DOCUMENTS 4 95% CONSTRUCTION DOCUMENTS CONSTRUCTION DOCUMENTS **ADDENDUM 01**



CONCOURSE FLOOR PLAN - AREA D -

HVAC

M-102D



Ohio St & N Blackford St

IN128 - JAMES T.

MORRIS ARENA

Indianapolis, IN 46202

IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEES 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408 812-855-1692

Architect RATIO

101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204 317-633-4040

FINK ROBERTS AND PETRIE, INC. 3535 EAST 96TH STREET

SUITE 126 INDIANAPOLIS, IN 46240

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317-872-8400

Mechanical / Electrical INTROBA 8250 HAVERSTICK ROAD

138 N. DELAWARE ST INDIANAPOLIS, IN 46204

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7220 W. JEFFERSON AVE

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972-934-3700

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FORZA

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Food Service Consultant

3405 NW 9TH AVENUE #1202

HARRISONVILLE, MO 64701

FORT LAUDERDALE, FL 33309

2502 WEST MECHANIC ST, SUITE C

SUITE 285

DIFFUSERS TO ACHIEVE AIRFLOW DIRECTIONS INDICATED ON INDIANAPOLIS, IN 46240 800-404-7677 Plumbing Engineer

E. INSULATION SHALL BE APPLIED WHERE INDICATED BY

SPECIFICATIONS. DIMENSIONS ON PLANS INDICATE FREE-AREA DIMENSIONS OF THE INSIDE OF THE DUCT.

AS TO LEAVE ROOM TO INSTALL LIGHTS AND ASSOCIATED HARDWARE.

SPECIFICALLY NOTED OTHERWISE.

I. ALL TRANSFER OPENINGS UNDER 2 SQFT SHALL BE FREE OF OBSTRUCTION BY MIN. 12". ALL TRANSFER OPENINGS BETWEEN 2 SQFT AND 6 SQFT SHALL BE FREE OF THAN 6 SQFT SHALL BE FREE OF OBSTRUCTION BY MIN. 24"

J. MC TO ENSURE ALL VOLUME CONTROL DAMPERS LOCATED ABOVE GYP CEILING TO HAVE REMOTE OPERATION CAPABILITIES OR BE PROVIDED WITH AN ACCESS PANEL. COORDINATE USE OF ACCESS PANELS WITH ARCHITECT.

K. WHERE LINEAR SLOTS ARE INSTALLED IN LINE AND ARE UNBROKEN BY WALL DIVIDERS, PROVIDE BLANK SECTIONS OF SLOTS MATCHING THE APPEARANCE OF THE ACTIVE SECTIONS FOR A CONTINUOUS APPEARANCE.

INTERSTITIAL INSULATION

02 ROUTE REMOTE ACCESS CABLES TO LOCATION PROVIDE ACCESS PANEL FOR TERMINATION POINTS OR A TERMINATION PANEL BY MANUFACTURER'S RECOMMENDED LENGTH. COORDINATE EXACT LOCATION WITH 03 ROUTE REMOTE ACCESS CABLES TO LOCATION PROVIDE ACCESS DOOR FOR TERMINATION

> POINTS. DOOR SELECTION AND TREATMENT BY ARCHITECT. CABLE LENGTH NOT TO EXCEED MANUFACTURER'S RECOMMENDED LENGTH. COORDINATE EXACT HEIGHT WITH ARCHITECTUR

GENERAL HVAC NOTES:

- A. VERIFY ALL DIMENSIONS, CLEARANCES AND INTERFERENCES AGAINST ON SITE CONDITIONS AND OTHER DISCIPLINE DRAWINGS PRIOR TO ORDERING MATERIAL. CONTRACTOR IS RESPONSIBLE FOR COORDINATING EQUIPMENT AND DUCT LOCATIONS WITH OTHER TRADES.
- ALLOWS. RECTANGULAR ELBOWS TO BE C/W TURNING VANES. SEE DETAILS FOR ADDITIONAL INFORMATION. C. DIRECTIONAL BAFFLES SHALL BE INSTALLED INSIDE OF

B. ALL DUCT ELBOWS TO BE RADIUS 1.5 R/W WHERE SPACE

- D. ALL VOLUME DAMPERS SHALL BE PROVIDED IN THE SUPPLY DUCTWORK NEAR THE BRANCH TAKEOFF FROM THE MAIN.
- BALANCING DAMPERS AT THE GRILLE FACE ARE NOT PERMITTED UNLESS OTHERWISE INDICATED.
- F. DUCT AND EQUIPMENT ABOVE CEILING TO BE INSTALLED SO
- G. BRANCH DUCTS TO TERMINAL DEVICES (CHILLED BEAMS, DIFFUSERS, ETC.) SHALL BE THE SAME SIZE AS INLET UNLESS
- H. GREASE DUCT CLEANOUTS SHALL BE LOCATED TO COMPLY WITH IMC 506.3.8.
- OBSTRUCTION BY MIN. 18". ALL TRANSFER OPENINGS LARGER UNLESS OTHERWISE NOTED

01 ALL DUCT EXPOSED TO VIEW IN THE CONCOURSE AREA SHALL BE DOUBLE-WALL DUCTWORK WITH PERFORATED INNER WALL AND 2" ELASTOMERIC

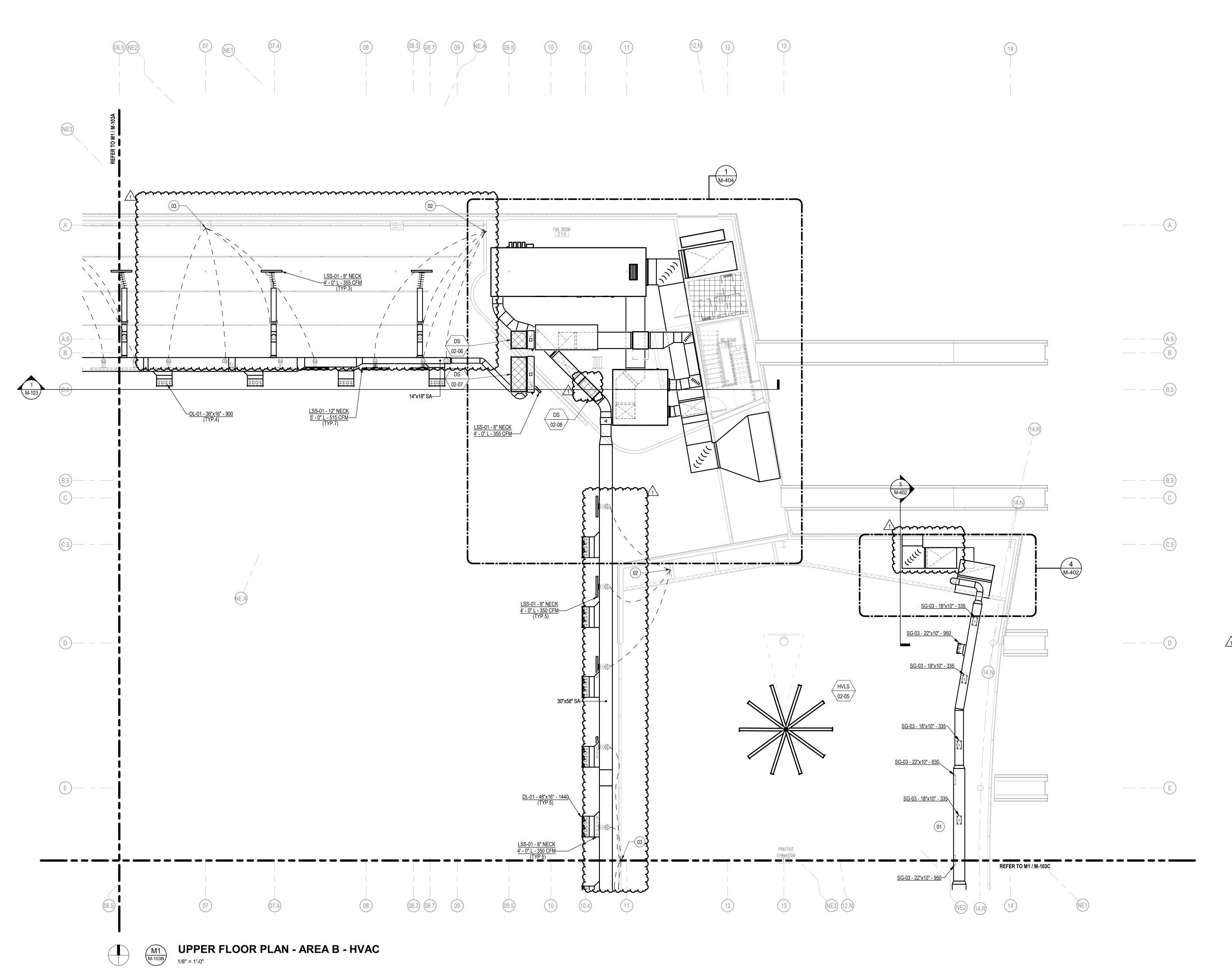
> INDICATED AND LABEL EACH CABLE INDIVIDUALL MANUFACTURER. CABLE LENGTH NOT TO EXCEE ARCHITECTURAL DRAWINGS CABLES SHALL BE ACCESSIBLE WITHOUT THE NEED FOR A LADDER INDICATED AND LABEL EACH CABLE INDIVIDUALL

SH	EET ISSUE	
1	DD PROGRESS SET	07/18
2	DESIGN DEVELOPMENT	08/30
3	50% CONSTRUCTION DOCUMENTS	11/01
4	95% CONSTRUCTION DOCUMENTS	12/19
5	CONSTRUCTION DOCUMENTS	01/13
6	ADDENDUM 01	01/27



UPPER FLOOR PLAN - AREA A - HVAC

M-103A



Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEES 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408 812-855-1692

Architect RATIO

101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204 317-633-4040 Structural Engineer

FINK ROBERTS AND PETRIE, INC. 3535 EAST 96TH STREET

SUITE 126 INDIANAPOLIS, IN 46240 317-872-8400

Mechanical / Electrical INTROBA

8250 HAVERSTICK ROAD SUITE 285 INDIANAPOLIS, IN 46240 800-404-7677

Plumbing Engineer

138 N. DELAWARE ST

317-633-4120

WJHW

SUITE 216

972-934-3700

Civil Engineer

SUITE 200

317-547-5580

CINILITTLE

954-846-9600

Code Consultant

9025 RIVER ROAD

INDIANAPOLIS, IN 46240

Food Service Consultant

3405 NW 9TH AVENUE #1202

FORT LAUDERDALE, FL 33309

INDIANAPOLIS, IN 46204

7220 W. JEFFERSON AVE

LAKEWOOD, CO 80235

Acoustics / Technology Engineer

AMERICAN STRUCTUREPOINT, INC.

DUCTWORK NEAR THE BRANCH TAKEOFF FROM THE MAIN. BALANCING DAMPERS AT THE GRILLE FACE ARE NOT PERMITTED UNLESS OTHERWISE INDICATED.

AREA DIMENSIONS OF THE INSIDE OF THE DUCT.

HARDWARE. G. BRANCH DUCTS TO TERMINAL DEVICES (CHILLED BEAMS,

H. GREASE DUCT CLEANOUTS SHALL BE LOCATED TO COMPLY

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J. MC TO ENSURE ALL VOLUME CONTROL DAMPERS LOCATED ABOVE GYP CEILING TO HAVE REMOTE OPERATION

K. WHERE LINEAR SLOTS ARE INSTALLED IN LINE AND ARE UNBROKEN BY WALL DIVIDERS, PROVIDE BLANK SECTIONS OF SLOTS MATCHING THE APPEARANCE OF THE ACTIVE SECTIONS FOR A CONTINUOUS APPEARANCE.

SHEET NOTES:

01 ALL DUCT EXPOSED TO VIEW SHALL BE DOUBLE-WALL DUCTWORK WITH PERFORATED INNER WALL AND 2" ELASTOMERIC INTERSTITIAL A THE TOWN T ROUTE REMOTE ACCESS CABLES TO LOCATION INDICATED AND LABEL EACH CABLE INDIVIDUALLY. PROVIDE ACCESS PANEL FOR TERMINATION POINTS OR A TERMINATION PANEL BY MANUFACTURER. CABLE LENGTH NOT TO EXCEED MANUFACTURER'S RECOMMENDED LENGTH. COORDINATE EXACT LOCATION WITH ARCHITECTURAL DRAWINGS CABLES SHALL BE ACCESSIBLE WITHOUT THE NEED

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you would the same that the sa

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GENERAL HVAC NOTES:

ALLOWS. RECTANGULAR ELBOWS TO BE C/W TURNING VANES. SEE DETAILS FOR ADDITIONAL INFORMATION. C. DIRECTIONAL BAFFLES SHALL BE INSTALLED INSIDE OF

DIFFUSERS TO ACHIEVE AIRFLOW DIRECTIONS INDICATED ON

B. ALL DUCT ELBOWS TO BE RADIUS 1.5 R/W WHERE SPACE

D. ALL VOLUME DAMPERS SHALL BE PROVIDED IN THE SUPPLY

E. INSULATION SHALL BE APPLIED WHERE INDICATED BY SPECIFICATIONS. DIMENSIONS ON PLANS INDICATE FREE-

F. DUCT AND EQUIPMENT ABOVE CEILING TO BE INSTALLED SO AS TO LEAVE ROOM TO INSTALL LIGHTS AND ASSOCIATED

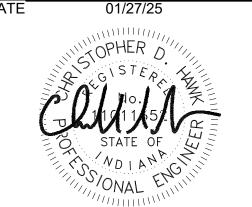
DIFFUSERS, ETC.) SHALL BE THE SAME SIZE AS INLET UNLESS SPECIFICALLY NOTED OTHERWISE.

WITH IMC 506.3.8.

OBSTRUCTION BY MIN. 18". ALL TRANSFER OPENINGS LARGER THAN 6 SQFT SHALL BE FREE OF OBSTRUCTION BY MIN. 24" UNLESS OTHERWISE NOTED

CAPABILITIES OR BE PROVIDED WITH AN ACCESS PANEL. COORDINATE USE OF ACCESS PANELS WITH ARCHITECT.

> FORZA 2502 WEST MECHANIC ST, SUITE C HARRISONVILLE, MO 64701 816-806-3729

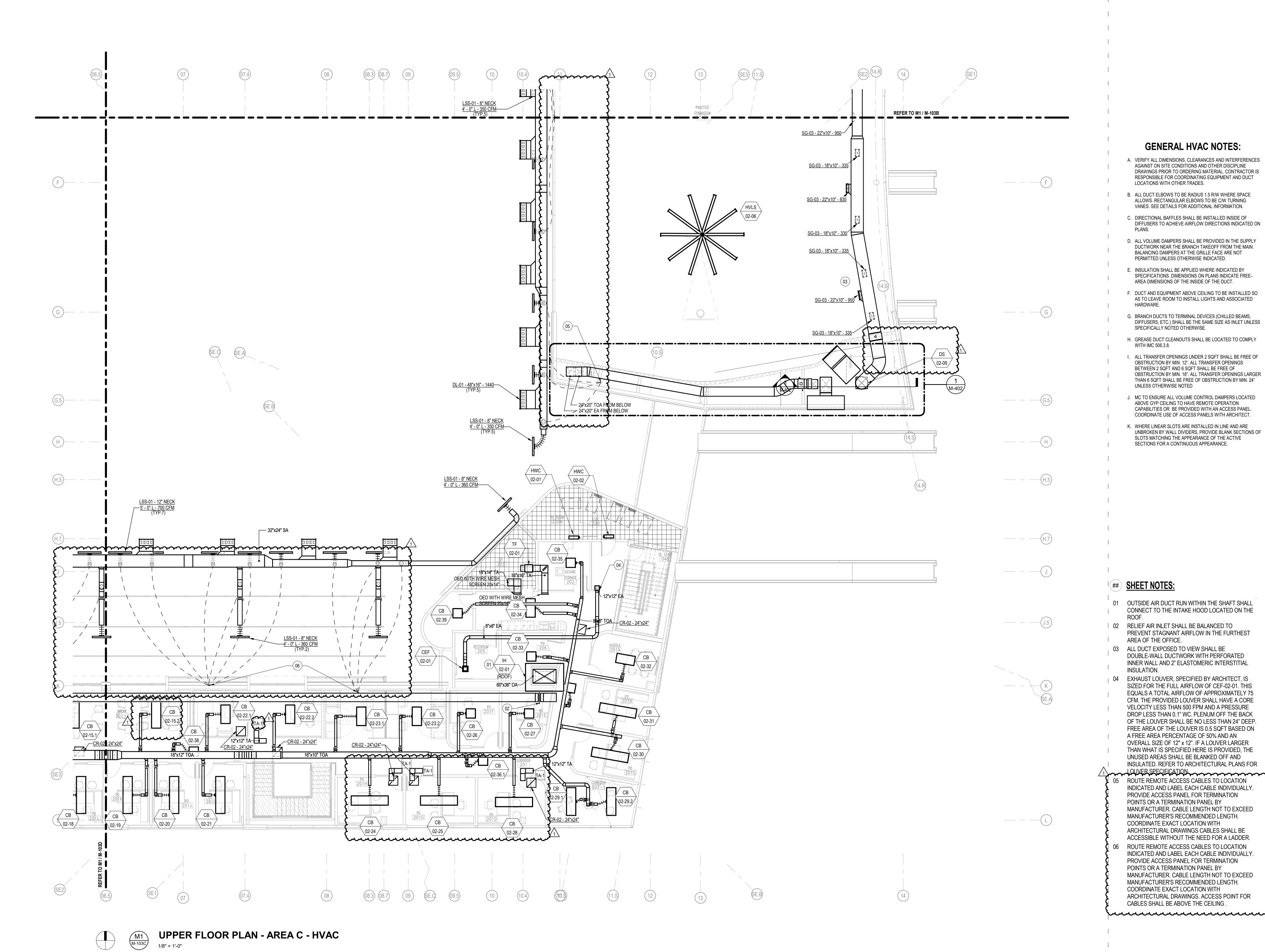


1 DD PROGRESS SET 2 DESIGN DEVELOPMENT 50% CONSTRUCTION DOCUMENTS 4 95% CONSTRUCTION DOCUMENTS CONSTRUCTION DOCUMENTS **ADDENDUM 01**



UPPER FLOOR PLAN - AREA B - HVAC

M-103B



Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEE 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408 812-855-1692

Architect RATIO 101 SOUTH PENNSYLVANIA STREET

INDIANAPOLIS, IN 46204

317-633-4040

Structural Engineer FINK ROBERTS AND PETRIE, INC.

3535 EAST 96TH STREET SUITE 126 INDIANAPOLIS, IN 46240

317-872-8400 Mechanical / Electrical

INTROBA 8250 HAVERSTICK ROAD SUITE 285 INDIANAPOLIS, IN 46240

138 N. DELAWARE ST INDIANAPOLIS, IN 46204

Acoustics / Technology Engineer

AMERICAN STRUCTUREPOINT, INC.

7220 W. JEFFERSON AVE

LAKEWOOD, CO 80235

317-633-4120

WJHW

SUITE 216

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Civil Engineer

317-547-5580

CINILITTLE

954-846-9600

816-806-3729

FORZA

Code Consultant

SUITE 200

9025 RIVER ROAD

INDIANAPOLIS, IN 46240

Food Service Consultant

3405 NW 9TH AVENUE #1202

HARRISONVILLE, MO 64701

FORT LAUDERDALE, FL 33309

2502 WEST MECHANIC ST, SUITE C

800-404-7677 D. ALL VOLUME DAMPERS SHALL BE PROVIDED IN THE SUPPLY Plumbing Engineer DUCTWORK NEAR THE BRANCH TAKEOFF FROM THE MAIN. BALANCING DAMPERS AT THE GRILLE FACE ARE NOT PERMITTED UNLESS OTHERWISE INDICATED.

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DRAWINGS PRIOR TO ORDERING MATERIAL. CONTRACTOR IS

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AGAINST ON SITE CONDITIONS AND OTHER DISCIPLINE

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UNLESS OTHERWISE NOTED

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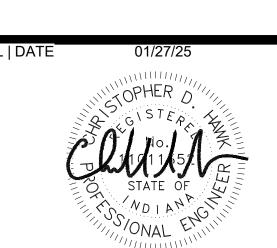
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K. WHERE LINEAR SLOTS ARE INSTALLED IN LINE AND ARE UNBROKEN BY WALL DIVIDERS, PROVIDE BLANK SECTIONS OF SLOTS MATCHING THE APPEARANCE OF THE ACTIVE SECTIONS FOR A CONTINUOUS APPEARANCE.

(##) SHEET NOTES:

- 01 OUTSIDE AIR DUCT RUN WITHIN THE SHAFT SHALL CONNECT TO THE INTAKE HOOD LOCATED ON THE
- 02 RELIEF AIR INLET SHALL BE BALANCED TO PREVENT STAGNANT AIRFLOW IN THE FURTHEST AREA OF THE OFFICE.
- 03 ALL DUCT EXPOSED TO VIEW SHALL BE DOUBLE-WALL DUCTWORK WITH PERFORATED INNER WALL AND 2" ELASTOMERIC INTERSTITIAL
- 04 EXHAUST LOUVER, SPECIFIED BY ARCHITECT, IS SIZED FOR THE FULL AIRFLOW OF CEF-02-01. THIS EQUALS A TOTAL AIRFLOW OF APPROXIMATELY 75 CFM. THE PROVIDED LOUVER SHALL HAVE A CORE VELOCITY LESS THAN 500 FPM AND A PRESSURE DROP LESS THAN 0.1" WC. PLENUM OFF THE BACK OF THE LOUVER SHALL BE NO LESS THAN 24" DEEP. FREE AREA OF THE LOUVER IS 0.5 SQFT BASED ON A FREE AREA PERCENTAGE OF 50% AND AN OVERALL SIZE OF 12" x 12". IF A LOUVER LARGER THAN WHAT IS SPECIFIED HERE IS PROVIDED, THE UNUSED AREAS SHALL BE BLANKED OFF AND INSULATED. REFER TO ARCHITECTURAL PLANS FOR
- LOUVER SPECIFICATION 05 ROUTE REMOTE ACCESS CABLES TO LOCATION INDICATED AND LABEL EACH CABLE INDIVIDUALLY. PROVIDE ACCESS PANEL FOR TERMINATION POINTS OR A TERMINATION PANEL BY MANUFACTURER. CABLE LENGTH NOT TO EXCEED MANUFACTURER'S RECOMMENDED LENGTH. COORDINATE EXACT LOCATION WITH ARCHITECTURAL DRAWINGS CABLES SHALL BE ACCESSIBLE WITHOUT THE NEED FOR A LADDER. 06 ROUTE REMOTE ACCESS CABLES TO LOCATION INDICATED AND LABEL EACH CABLE INDIVIDUALLY. PROVIDE ACCESS PANEL FOR TERMINATION POINTS OR A TERMINATION PANEL BY MANUFACTURER. CABLE LENGTH NOT TO EXCEED MANUFACTURER'S RECOMMENDED LENGTH. COORDINATE EXACT LOCATION WITH ARCHITECTURAL DRAWINGS. ACCESS POINT FOR

CABLES SHALL BE ABOVE THE CEILING



DD PROGRESS SET DESIGN DEVELOPMENT 50% CONSTRUCTION DOCUMENTS 4 95% CONSTRUCTION DOCUMENTS CONSTRUCTION DOCUMENTS **ADDENDUM 01**

RATIO AND ENGINEERING DRAWING IS GIVEN IN CONFIDENCE AND SHALL BE USED ONLY PURSUANT TO THE AGREEMENT WITH RA NO OTHER USE, DISSEMINATION OR WRITTEN CONSENT OF RATIO. ALL COMMON LAW RIGHTS OF COPYRIGHT AND OTHERWIS ARE HEREBY SPECIFICALLY RESERVED.

PROJECT NO.

UPPER FLOOR PLAN - AREA C - HVAC

M-103C

REFER TO M1 / M-103A ____F ____G -H LSS-01 - 8" NECK 4' - 0" L - 360 CFM —(H.3) LSS-01 - 12" NECK 5' - 0" L - 700 CFM (TYP.7) <u>5' - 0" L - 700 CFN</u> (TYP.7) M-407 H.7 - 26"x16" TOA TO BELOW 32"x36" SA - 26"x16" REA FROM BELOW OED WITH WIRE 30"x16" TOA MESH SCREEN 18x16" — Complete the property of the complete the co 02-14.2 representation of the second o 04) (04.3)

UPPER FLOOR PLAN - AREA D - HVAC

M1 M-103D

MORRIS ARENA

IN128 - JAMES T.

Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEE 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408 812-855-1692

Architect RATIO 101 SOUTH PENNSYLVANIA STREET

INDIANAPOLIS, IN 46204 317-633-4040 Structural Engineer

FINK ROBERTS AND PETRIE, INC. 3535 EAST 96TH STREET

SUITE 126 INDIANAPOLIS, IN 46240

317-872-8400

SUITE 285

Mechanical / Electrical INTROBA 8250 HAVERSTICK ROAD

138 N. DELAWARE ST INDIANAPOLIS, IN 46204

Acoustics / Technology Engineer

AMERICAN STRUCTUREPOINT, INC.

7220 W. JEFFERSON AVE

LAKEWOOD, CO 80235

317-633-4120

WJHW

SUITE 216

972-934-3700

Civil Engineer

SUITE 200

317-547-5580

CINILITTLE

954-846-9600

816-806-3729

FORZA

Code Consultant

9025 RIVER ROAD

INDIANAPOLIS, IN 46240

Food Service Consultant

3405 NW 9TH AVENUE #1202

HARRISONVILLE, MO 64701

FORT LAUDERDALE, FL 33309

2502 WEST MECHANIC ST, SUITE C

INDIANAPOLIS, IN 46240 800-404-7677 Plumbing Engineer

PERMITTED UNLESS OTHERWISE INDICATED.

AREA DIMENSIONS OF THE INSIDE OF THE DUCT.

G. BRANCH DUCTS TO TERMINAL DEVICES (CHILLED BEAMS, DIFFUSERS, ETC.) SHALL BE THE SAME SIZE AS INLET UNLESS

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UNBROKEN BY WALL DIVIDERS, PROVIDE BLANK SECTIONS OF SLOTS MATCHING THE APPEARANCE OF THE ACTIVE SECTIONS FOR A CONTINUOUS APPEARANCE.

SHEET NOTES:

01 CONNECT TO GREASE FAN THROUGH WALL, WHERE FAN IS MOUNTED HORIZONTALLY ABOVE

03 RELIEF AIR INLET SHALL BE BALANCED TO

PROVIDE ACCESS PANEL FOR TERMINATION POINTS OR A TERMINATION PANEL BY MANUFACTURER'S RECOMMENDED LENGTH. COORDINATE EXACT LOCATION WITH CABLES SHALL BE ABOVE THE CEILING.

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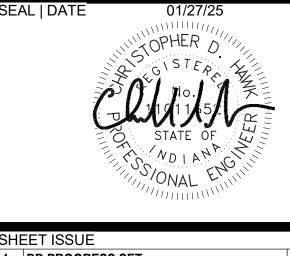
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- SPECIFICALLY NOTED OTHERWISE.
- WITH IMC 506.3.8.
- OBSTRUCTION BY MIN. 18". ALL TRANSFER OPENINGS LARGER UNLESS OTHERWISE NOTED
- K. WHERE LINEAR SLOTS ARE INSTALLED IN LINE AND ARE

02 A SECOND DAMPER OR OTHER STATIC ORIFICE PRESSURE REDUCER MAY BE REQUIRED FOR PROPER BALANCING OF THE FIRST 50% OF CHILLED BEAMS. CONTRACTOR SHALL DETERMINE DURING TAB WHERE ADDITIONAL AIR PRESSURE REDUCTION MEASURES ARE REQUIRED AND APPLY THEM AS NECESSARY.

PREVENT STAGNANT AIRFLOW IN THE FURTHEST

AREA OF THE OFFICE ROUTE REMOTE ACCESS CABLES TO LOCATION INDICATED AND LABEL EACH CABLE INDIVIDUALLY. MANUFACTURER. CABLE LENGTH NOT TO EXCEED ARCHITECTURAL DRAWINGS. ACCESS POINT FOR

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4	95% CONSTRUCTION DOCUMENTS	12/19/24
5	CONSTRUCTION DOCUMENTS	01/13/25
6	ADDENDUM 01	01/27/25



UPPER FLOOR PLAN - AREA D - HVAC

M-103D

06 MBB LOCKER 016 ____F 6" CHWS 3" HHWR 3" HHWS 3/4" HHWS UP-3/4" HHWR UP-G ----WBB SHOWER 00-05 - 6" CHWR — 6" CHWS ☐ - 2 1/2" HHWR – 2 1/2" HHWS SOCCER OO M SOC HC 025 H — — (H.7)------ 3/4" HHWR TYP. VAV 00-07 CIRCULATION 002D 00-25 00-24 OAVAV 00-07 K — — — 3/4" CHWS — 3/4" CHWR └ 1" CD WATER SERVICE ENTRY 032A L — — 03 6W.A 04 04.3 06 01.S (W.B)

M1
M-201D

EVENT FLOOR PLAN - AREA D - PIPING

1/8" = 1'-0"

IN128 - JAMES T. MORRIS ARENA

Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

Owner

INDIANA UNIVERSITY BOARD OF TRUSTEE
2901 EAST DISCOVERY PARKWAY
BLOOMINGTON, IN 47408
812-855-1692

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Architect

RATIO

101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204 317-633-4040

Structural Engineer

FINK ROBERTS AND PETRIE, INC. 3535 EAST 96TH STREET

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Plumbing Engineer
DLZ

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WJHW7220 W. JEFFERSON AVE
SUITE 216

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INDIANAPOLIS, IN 46240 317-547-5580 Food Service Consultant

CINILITTLE
3405 NW 9TH AVENUE #1202

FORT LAUDERDALE, FL 33309 954-846-9600

Code Consultant

FORZA
2502 WEST MECHANIC ST, SUITE C
HARRISONVILLE, MO 64701
816-806-3729

SHEET NOTES:

CONDENSATE PIPING SHALL RUN DOWN THROUGH WALL AND DISCHARGE INTO FLOOR SINK BELOW UTILITY SINK. MAINTAIN A MINIMUM 3" AIR GAP.
 PROVIDE A PIPE ANCHOR FOR EXPANSION LOOP SYSTEM. PROVIDE ADDITIONAL PIPE GUIDES COMPLIANT WITH MANUFACTURER RECOMMENDATIONS. EXACT LOCATIONS OF ANCHORS AND GUIDES TO BE COMPLIANT WITH MANUFACTURER RECOMMENDATIONS.

GENERAL PIPING NOTES:

INTERFERENCES AGAINST ON SITE CONDITIONS AND

OTHER DISCIPLINE DRAWINGS PRIOR TO ORDERING

B. PIPING AND EQUIPMENT ABOVE CEILING TO BE INSTALLED

SO AS TO LEAVE ROOM TO INSTALL LIGHTS AND

C. PUMPED CONDENSATE PIPING FIELD ROUTED TO A

307.2.2 "CONDENSATE DRAIN SIZING" IN THE

307.2.5 "DRAIN LINE MAINTENANCE" OF THE

D. CONDENSATE PIPING SHALL BE INSTALLED IN SUCH A MANNER AS TO ALLOW CLEARING OF BLOCKAGES AND

E. CONDENSATE PUMPS SHALL BE INSTALLED IN SUCH A

F. DRAIN VALVES WITH CAPS SHALL BE INSTALLED AT ALL

SHALL BE PIPED TO AN ACCESSIBLE LOCATION OR

G. ALL PIPING TO REMAIN SHALL BE CLEANED AND SEALED

H. PROVIDE AIR VENTS OR DRAINS AS APPROPRIATE FOR

I. ALL PRESSURIZED PIPING SYSTEMS IMPACTED BY

STRAINERS OR COILS BEING ENGAGED.

LOCAL HIGH OR LOW PIPING LOCATIONS. ALL DRAINS

SHALL BE SEALED WITH VALVE AND CAP. SEE DETAILS

CONSTRUCTION SHALL BE FLUSHED CLEAN PRIOR TO ANY

INTERNATIONAL MECHANICAL CODE.

INTERNATIONAL MECHANICAL CODE.

ASSOCIATED UNIT FROM OPERATING.

PROVIDED WITH AN ACCESS PANEL.

DURING CONSTRUCTION.

FOR ADDITIONAL INFORMATION.

COORDINATING EQUIPMENT AND DUCT LOCATIONS WITH

CONDENSATE HEADER SHALL CONNECT ON TOP OF THE

HEADER, WHICH IS SLOPED AT 1/8" PER FOOT TOWARDS THE POINT OF DISCHARGE. CONDENSATE MAINS SHALL

NOT TURN UP IN THE DIRECTION OF FLOW. CONDENSATE MAINS SHALL BE SIZED IN ACCORDANCE WITH TABLE

PERFORMANCE OF MAINTENANCE WITHOUT REQUIRING THE LINE TO BE CUT IN ACCORDANCE WITH SECTION

WAY THAT FAILURE OF THE PUMP SHALL PREVENT THE

LOCAL LOW POINTS IN THE HYDRONIC PIPING SYSTEM. IF

THIS DRAIN VALVE IS LOCATED OVER A HARD CEILING, IT

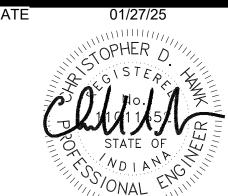
MATERIAL. CONTRACTOR IS RESPONSIBLE FOR

A. VERIFY ALL DIMENSIONS, CLEARANCES AND

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ASSOCIATED HARDWARE.

SEAL | D



SHI	EET ISSUE	
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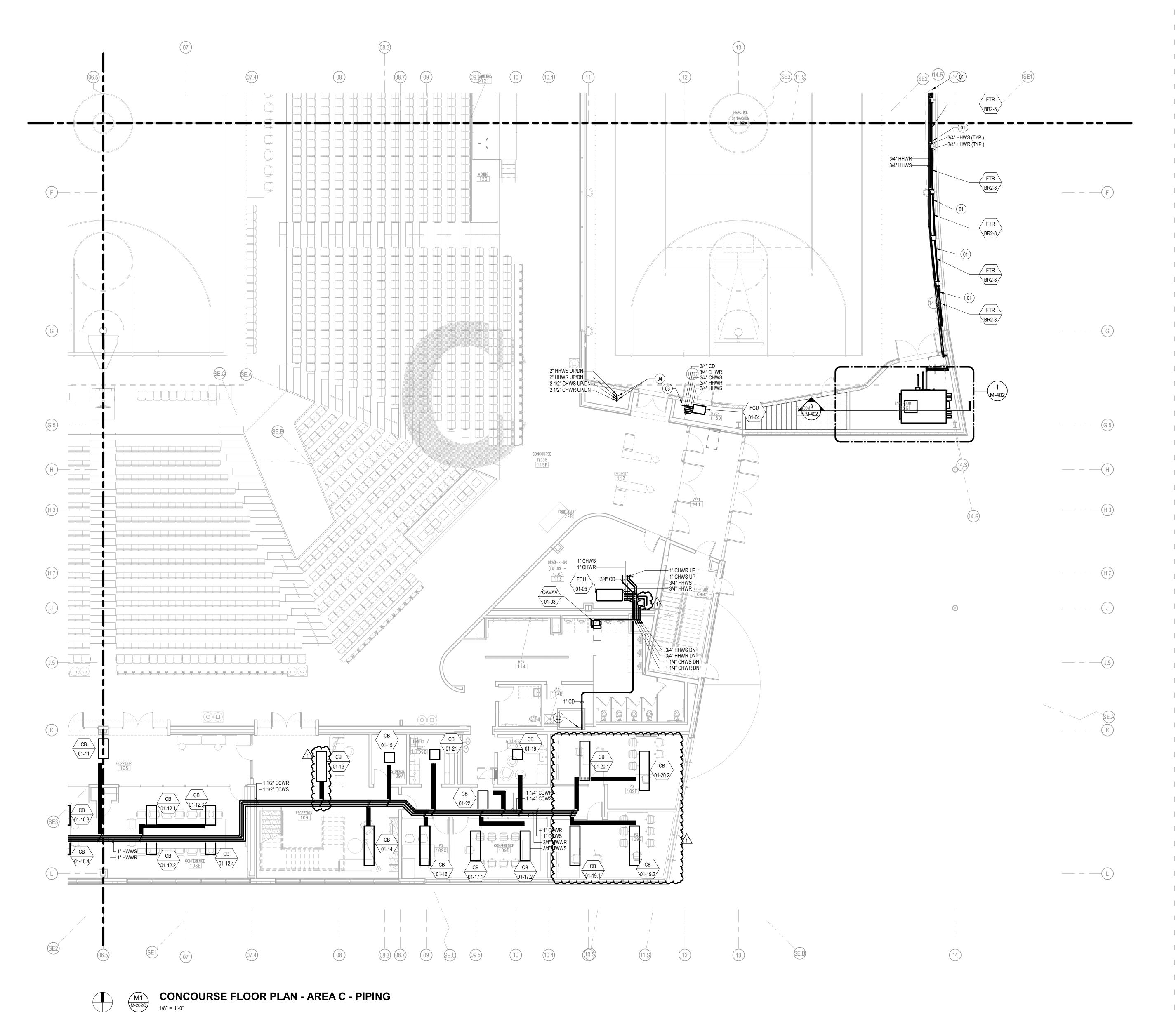


PROJECT NO.
SHEET TITLE

EVENT FLOOR PLAN
- AREA D - PIPING

EET NUMBER

M-201D



Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEE 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408 812-855-1692

Architect RATIO 101 SOUTH PENNSYLVANIA STREET

INDIANAPOLIS, IN 46204

317-633-4040 Structural Engineer

FINK ROBERTS AND PETRIE, INC. 3535 EAST 96TH STREET

SUITE 126 INDIANAPOLIS, IN 46240

317-872-8400 Mechanical / Electrical

INTROBA 8250 HAVERSTICK ROAD SUITE 285 INDIANAPOLIS, IN 46240

800-404-7677 Plumbing Engineer

138 N. DELAWARE ST

317-633-4120

WJHW

SUITE 216

972-934-3700

SUITE 200

317-547-5580

CINILITTLE

954-846-9600

816-806-3729

FORZA

Code Consultant

Civil Engineer

9025 RIVER ROAD

INDIANAPOLIS, IN 46240

Food Service Consultant

3405 NW 9TH AVENUE #1202

HARRISONVILLE, MO 64701

FORT LAUDERDALE, FL 33309

2502 WEST MECHANIC ST, SUITE C

INDIANAPOLIS, IN 46204

7220 W. JEFFERSON AVE

LAKEWOOD, CO 80235

Acoustics / Technology Engineer

AMERICAN STRUCTUREPOINT, INC.

D. CONDENSATE PIPING SHALL BE INSTALLED IN SUCH A PERFORMANCE OF MAINTENANCE WITHOUT REQUIRING

E. CONDENSATE PUMPS SHALL BE INSTALLED IN SUCH A

F. DRAIN VALVES WITH CAPS SHALL BE INSTALLED AT ALL SHALL BE PIPED TO AN ACCESSIBLE LOCATION OR PROVIDED WITH AN ACCESS PANEL.

G. ALL PIPING TO REMAIN SHALL BE CLEANED AND SEALED DURING CONSTRUCTION.

H. PROVIDE AIR VENTS OR DRAINS AS APPROPRIATE FOR LOCAL HIGH OR LOW PIPING LOCATIONS. ALL DRAINS SHALL BE SEALED WITH VALVE AND CAP. SEE DETAILS

I. ALL PRESSURIZED PIPING SYSTEMS IMPACTED BY CONSTRUCTION SHALL BE FLUSHED CLEAN PRIOR TO ANY STRAINERS OR COILS BEING ENGAGED.

- 01 FLOOR MOUNTED FIN-TUBE RADIATORS TO BE PIPED IN PARALLEL UTILIZING A REVERSE RETURN
- 02 CONDENSATE SHALL RUN DOWN THROUGH WALL THE WATER LEVEL OF THE TRAP.
- 03 CONDENSATE SHALL DROP DOWN TO DISCHARGE INTO FLOOR DRAIN. MAINTAIN MINIMUM 3" AIR GAP.
- HYDRONIC DIFFERENTIAL PRESSURE SENSORS SHALL BE LOCATED ABOVE THE FLOOR PENETRATION. COORDINATE ACCESS DOOR BE USED FOR BOTH THE FIRE DAMPER AND DIFFERENTIAL PRESSURE SENSORS.

GENERAL PIPING NOTES:

- A. VERIFY ALL DIMENSIONS, CLEARANCES AND INTERFERENCES AGAINST ON SITE CONDITIONS AND OTHER DISCIPLINE DRAWINGS PRIOR TO ORDERING MATERIAL. CONTRACTOR IS RESPONSIBLE FOR COORDINATING EQUIPMENT AND DUCT LOCATIONS WITH OTHER TRADES.
- B. PIPING AND EQUIPMENT ABOVE CEILING TO BE INSTALLED SO AS TO LEAVE ROOM TO INSTALL LIGHTS AND ASSOCIATED HARDWARE.
- C. PUMPED CONDENSATE PIPING FIELD ROUTED TO A CONDENSATE HEADER SHALL CONNECT ON TOP OF THE HEADER, WHICH IS SLOPED AT 1/8" PER FOOT TOWARDS THE POINT OF DISCHARGE. CONDENSATE MAINS SHALL NOT TURN UP IN THE DIRECTION OF FLOW. CONDENSATE MAINS SHALL BE SIZED IN ACCORDANCE WITH TABLE 307.2.2 "CONDENSATE DRAIN SIZING" IN THE INTERNATIONAL MECHANICAL CODE.
- MANNER AS TO ALLOW CLEARING OF BLOCKAGES AND THE LINE TO BE CUT IN ACCORDANCE WITH SECTION 307.2.5 "DRAIN LINE MAINTENANCE" OF THE INTERNATIONAL MECHANICAL CODE.
- WAY THAT FAILURE OF THE PUMP SHALL PREVENT THE ASSOCIATED UNIT FROM OPERATING.
- LOCAL LOW POINTS IN THE HYDRONIC PIPING SYSTEM. IF THIS DRAIN VALVE IS LOCATED OVER A HARD CEILING, IT
- FOR ADDITIONAL INFORMATION.

SHEET NOTES:

- CONFIGURATION.
- CHASE TO TIE INTO JANITOR SINK TAILPIECE ABOVE
- LOCATION SUCH THAT A SINGLE ACCESS DOOR CAN

DD PROGRESS SET 2 DESIGN DEVELOPMENT 50% CONSTRUCTION DOCUMENTS 4 95% CONSTRUCTION DOCUMENTS CONSTRUCTION DOCUMENTS **ADDENDUM 01**



CONCOURSE FLOOR PLAN - AREA C -PIPING

M-202C

____F H — — (H.3)—— — 01-02 3/4" HHWS----3/4" HHWR₩ — 1 1/2" HHWR UP≝ – 2 1/2" CHWS UP 2 1/2" CCWR UP\ 2 1/2" CCWS UP 1 1/2" HWWR UP 1 1/2" HWWS UP 01-02 K — — 1 1/4" CHWS 1 1/4" CHWR - 1 1/2" CCWR 1 1/4" HWWS CB 1 1/4" HWWR 01-10.2

CONCOURSE FLOOR PLAN - AREA D - PIPING M1 M-202D

IN128 - JAMES T. MORRIS ARENA

Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEE 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408

812-855-1692 Architect

Structural Engineer

RATIO 101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204 317-633-4040

FINK ROBERTS AND PETRIE, INC. 3535 EAST 96TH STREET

SUITE 126

INDIANAPOLIS, IN 46240 317-872-8400

Mechanical / Electrical INTROBA 8250 HAVERSTICK ROAD

SUITE 285 INDIANAPOLIS, IN 46240 CONDENSATE HEADER SHALL CONNECT ON TOP OF THE 800-404-7677 HEADER, WHICH IS SLOPED AT 1/8" PER FOOT TOWARDS THE POINT OF DISCHARGE. CONDENSATE MAINS SHALL Plumbing Engineer

972-934-3700

SUITE 200

317-547-5580

CINILITTLE

954-846-9600

816-806-3729

FORZA

Code Consultant

Civil Engineer

9025 RIVER ROAD

INDIANAPOLIS, IN 46240

Food Service Consultant

3405 NW 9TH AVENUE #1202

HARRISONVILLE, MO 64701

FORT LAUDERDALE, FL 33309

2502 WEST MECHANIC ST, SUITE C

138 N. DELAWARE ST

INDIANAPOLIS, IN 46204 317-633-4120

Acoustics / Technology Engineer

AMERICAN STRUCTUREPOINT, INC.

THE LINE TO BE CUT IN ACCORDANCE WITH SECTION WJHW 307.2.5 "DRAIN LINE MAINTENANCE" OF THE 7220 W. JEFFERSON AVE SUITE 216 LAKEWOOD, CO 80235

ASSOCIATED UNIT FROM OPERATING. F. DRAIN VALVES WITH CAPS SHALL BE INSTALLED AT ALL LOCAL LOW POINTS IN THE HYDRONIC PIPING SYSTEM. IF

G. ALL PIPING TO REMAIN SHALL BE CLEANED AND SEALED

I. ALL PRESSURIZED PIPING SYSTEMS IMPACTED BY CONSTRUCTION SHALL BE FLUSHED CLEAN PRIOR TO ANY STRAINERS OR COILS BEING ENGAGED.

SHEET NOTES:

- PIPED IN PARALLEL UTILIZING A REVERSE RETURN CONFIGURATION.
- 02 CONDENSATE PIPING SHALL RUN DOWN THROUGH WALL AND DISCHARGE INTO FLOOR SINK BELOW UTILITY SINK. MAINTAIN A MINIMUM 3" AIR GAP.

GENERAL PIPING NOTES:

A. VERIFY ALL DIMENSIONS, CLEARANCES AND

INTERFERENCES AGAINST ON SITE CONDITIONS AND

OTHER DISCIPLINE DRAWINGS PRIOR TO ORDERING

MATERIAL. CONTRACTOR IS RESPONSIBLE FOR COORDINATING EQUIPMENT AND DUCT LOCATIONS WITH OTHER TRADES. B. PIPING AND EQUIPMENT ABOVE CEILING TO BE INSTALLED

SO AS TO LEAVE ROOM TO INSTALL LIGHTS AND ASSOCIATED HARDWARE. C. PUMPED CONDENSATE PIPING FIELD ROUTED TO A

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DURING CONSTRUCTION.

H. PROVIDE AIR VENTS OR DRAINS AS APPROPRIATE FOR LOCAL HIGH OR LOW PIPING LOCATIONS. ALL DRAINS SHALL BE SEALED WITH VALVE AND CAP. SEE DETAILS

FOR ADDITIONAL INFORMATION.

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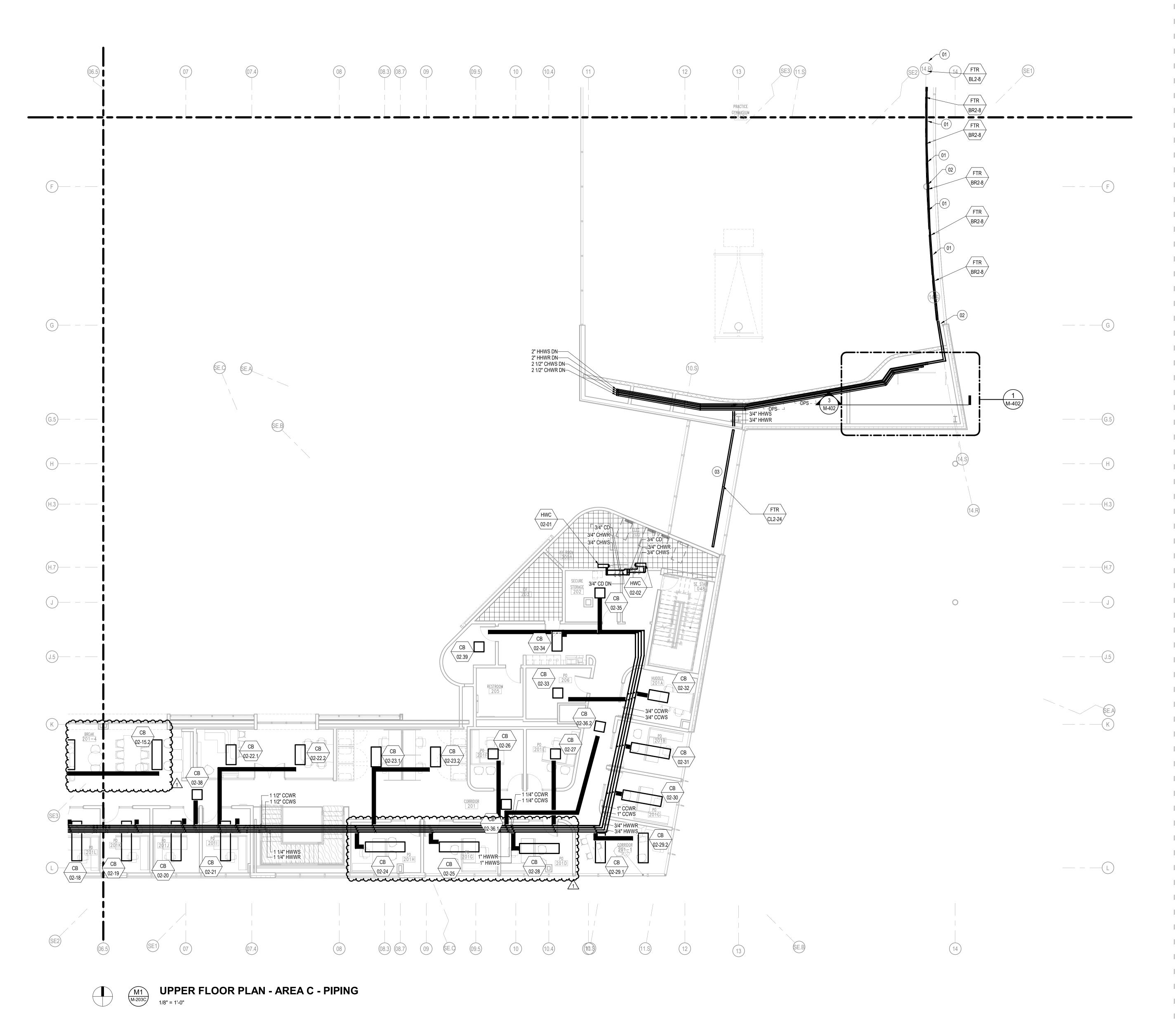
DD PROGRESS SET 2 DESIGN DEVELOPMENT 3 50% CONSTRUCTION DOCUMENTS 4 95% CONSTRUCTION DOCUMENTS CONSTRUCTION DOCUMENTS **ADDENDUM 01**



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CONCOURSE FLOOR PLAN - AREA D -PIPING

M-202D



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INDIANA UNIVERSITY BOARD OF TRUSTEES 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408 812-855-1692

Architect RATIO 101 SOUTH PENNSYLVANIA STREET

317-633-4040 Structural Engineer FINK ROBERTS AND PETRIE, INC.

3535 EAST 96TH STREET SUITE 126

INDIANAPOLIS, IN 46204

INDIANAPOLIS, IN 46240

317-872-8400 Mechanical / Electrical

138 N. DELAWARE ST

317-633-4120

WJHW

SUITE 216

972-934-3700

Civil Engineer

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317-547-5580

CINILITTLE

954-846-9600

816-806-3729

FORZA

Code Consultant

9025 RIVER ROAD

INDIANAPOLIS, IN 46240

Food Service Consultant

3405 NW 9TH AVENUE #1202

HARRISONVILLE, MO 64701

FORT LAUDERDALE, FL 33309

2502 WEST MECHANIC ST, SUITE C

INDIANAPOLIS, IN 46204

7220 W. JEFFERSON AVE

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AMERICAN STRUCTUREPOINT, INC.

INTROBA 8250 HAVERSTICK ROAD SUITE 285

C. PUMPED CONDENSATE PIPING FIELD ROUTED TO A INDIANAPOLIS, IN 46240 800-404-7677 Plumbing Engineer

D. CONDENSATE PIPING SHALL BE INSTALLED IN SUCH A 307.2.5 "DRAIN LINE MAINTENANCE" OF THE

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SHEET NOTES:

- MIDSPAN STRUCTURAL MEMBER AND BE PIPED IN AN OPPOSITE END SERIES CONFIGURATION. 02 PIPING WILL PASS THROUGH CUT-OUTS IN
- 03 FIN-TUBE RADIATORS TO BE INSTALLED ON THE

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- 01 FIN-TUBE RADIATORS TO BE INSTALLED ON THE COLUMNS IN A STACKED ORIENTATION.
- MIDSPAN STRUCTURAL MEMBER OF THE CURTAIN

DD PROGRESS SET 2 DESIGN DEVELOPMENT 3 50% CONSTRUCTION DOCUMENTS 4 95% CONSTRUCTION DOCUMENTS CONSTRUCTION DOCUMENTS **ADDENDUM 01**

UPPER FLOOR PLAN - AREA C - PIPING

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M-203C

CL2-25 02 / FTR \ DL2-15/ / 3/4" HHWS DN ___ 3/4" HHWR DN / FTR \ DR2-8.5 ^{_} 3/4" HHWR —(G) 02) / FTR \ CR2-26.5 — (H) (1 M-407) 02-01 HWWP 02-02 CCWP 02-01/ CCWP 2 1/2" HWWS 2 1/2" HWWR 2 1/2" CCWR DN-2 1/2" CCWS DN-1 1/2" HWWR DN 3/4" CCWR-02-06 3/4" CCWS----1 1/2" HWWS DN 3/4" HWWR---3/4" HWWS---— 2" CCWS CB 02-18 03) 6W.A 04 04.3

M1 M-203D

UPPER FLOOR PLAN - AREA D - PIPING

IN128 - JAMES T. MORRIS ARENA

Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEES 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408 812-855-1692

Architect RATIO 101 SOUTH PENNSYLVANIA STREET

INDIANAPOLIS, IN 46204

317-633-4040

Structural Engineer FINK ROBERTS AND PETRIE, INC. 3535 EAST 96TH STREET

SUITE 126 INDIANAPOLIS, IN 46240 317-872-8400

Mechanical / Electrical INTROBA

8250 HAVERSTICK ROAD SUITE 285 INDIANAPOLIS, IN 46240 800-404-7677

Acoustics / Technology Engineer

AMERICAN STRUCTUREPOINT, INC.

7220 W. JEFFERSON AVE

LAKEWOOD, CO 80235

Plumbing Engineer

WJHW

SUITE 216

972-934-3700

SUITE 200

317-547-5580

CINILITTLE

954-846-9600

816-806-3729

FORZA

Code Consultant

Civil Engineer

9025 RIVER ROAD

INDIANAPOLIS, IN 46240

Food Service Consultant

3405 NW 9TH AVENUE #1202

HARRISONVILLE, MO 64701

FORT LAUDERDALE, FL 33309

2502 WEST MECHANIC ST, SUITE C

138 N. DELAWARE ST INDIANAPOLIS, IN 46204 317-633-4120

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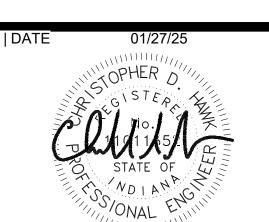
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- MIDSPAN STRUCTURAL MEMBER AND BE PIPED IN A SAME END SERIES CONFIGURATION.
- PENETRATION, ACCESSIBLE FROM STANDING

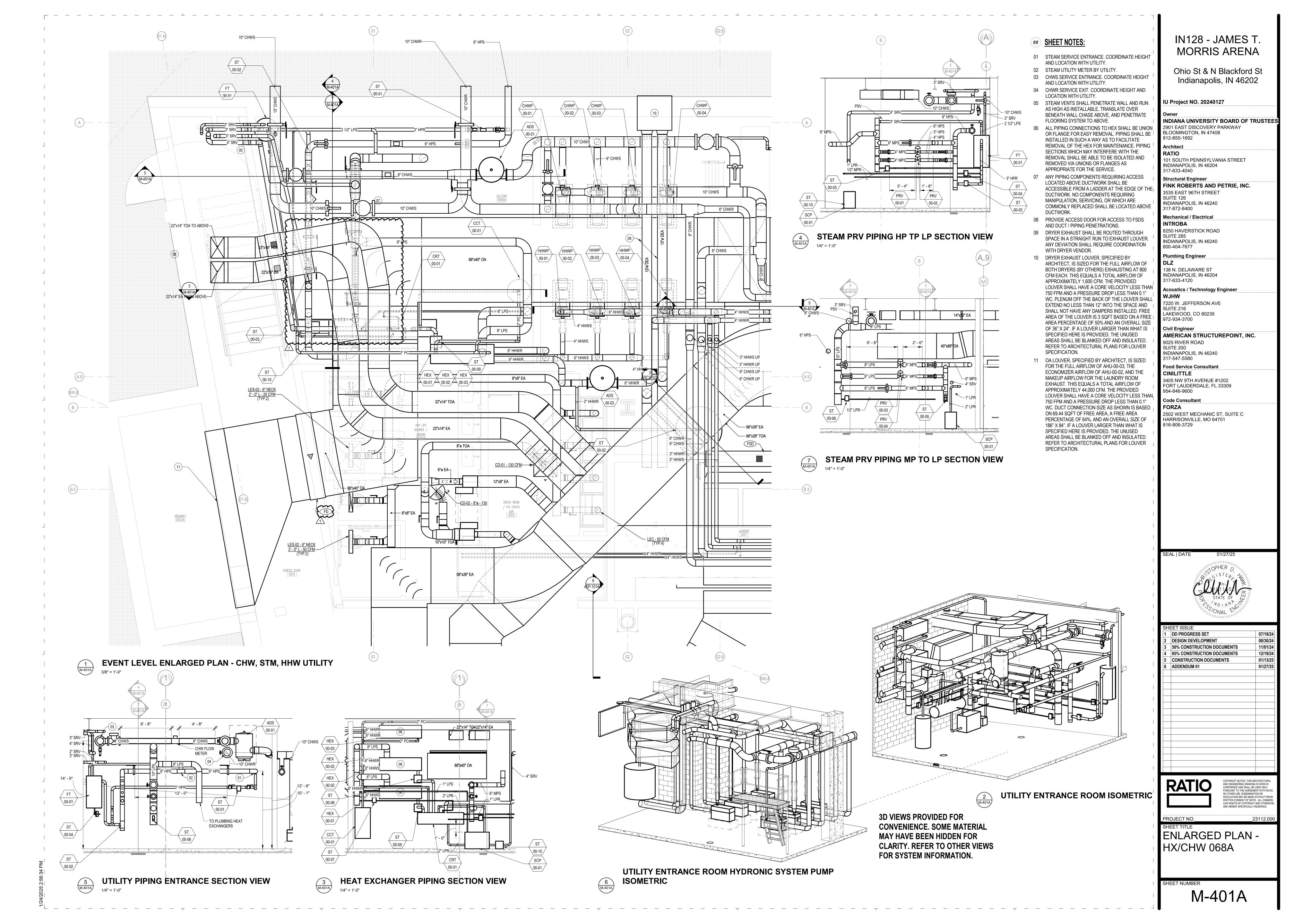


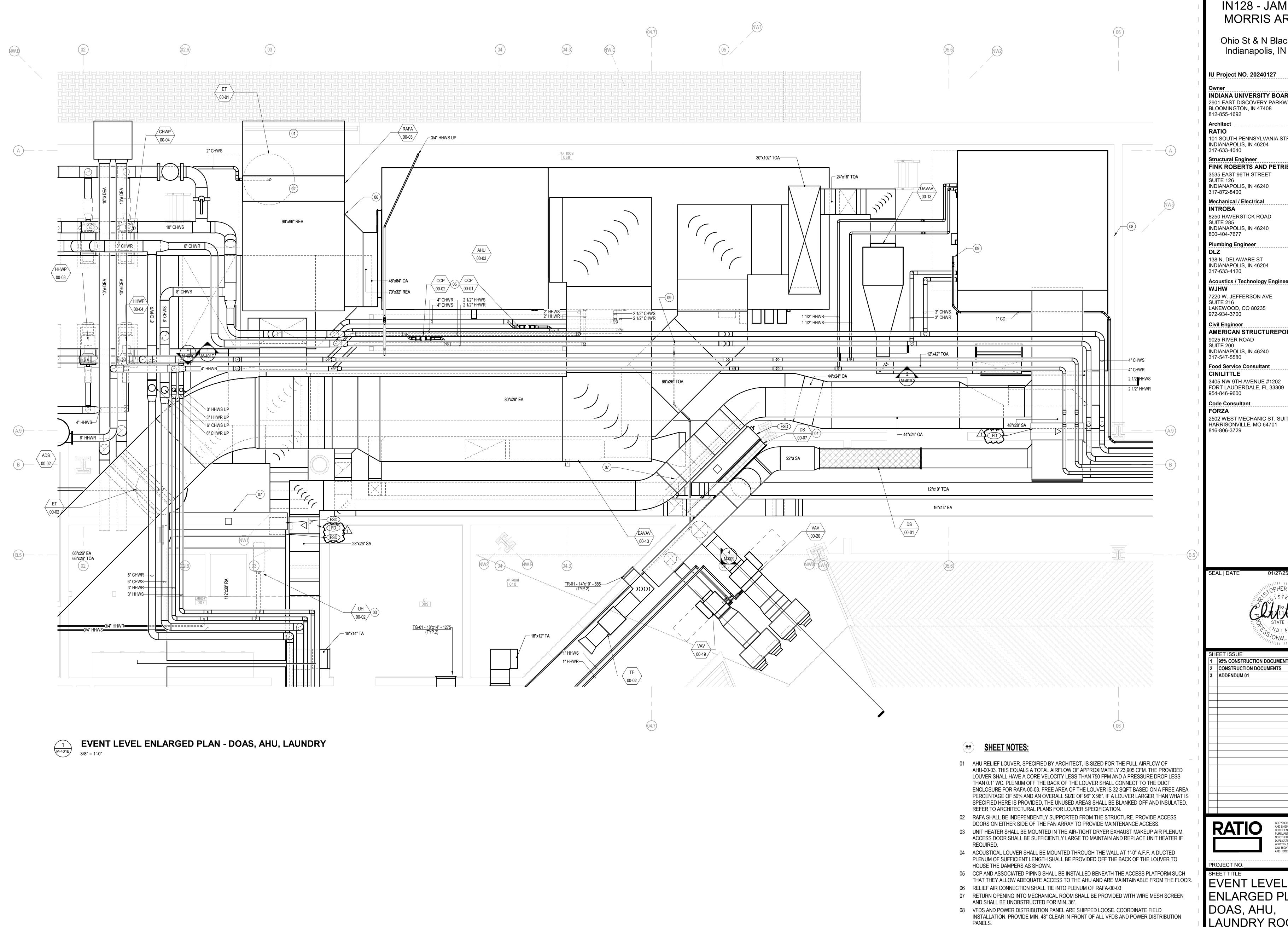
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UPPER FLOOR PLAN - AREA D - PIPING

M-203D





Ohio St & N Blackford St Indianapolis, IN 46202

INDIANA UNIVERSITY BOARD OF TRUSTEE 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408

101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204

FINK ROBERTS AND PETRIE, INC.

8250 HAVERSTICK ROAD

Acoustics / Technology Engineer

AMERICAN STRUCTUREPOINT, INC.

3405 NW 9TH AVENUE #1202

2502 WEST MECHANIC ST, SUITE C HARRISONVILLE, MO 64701

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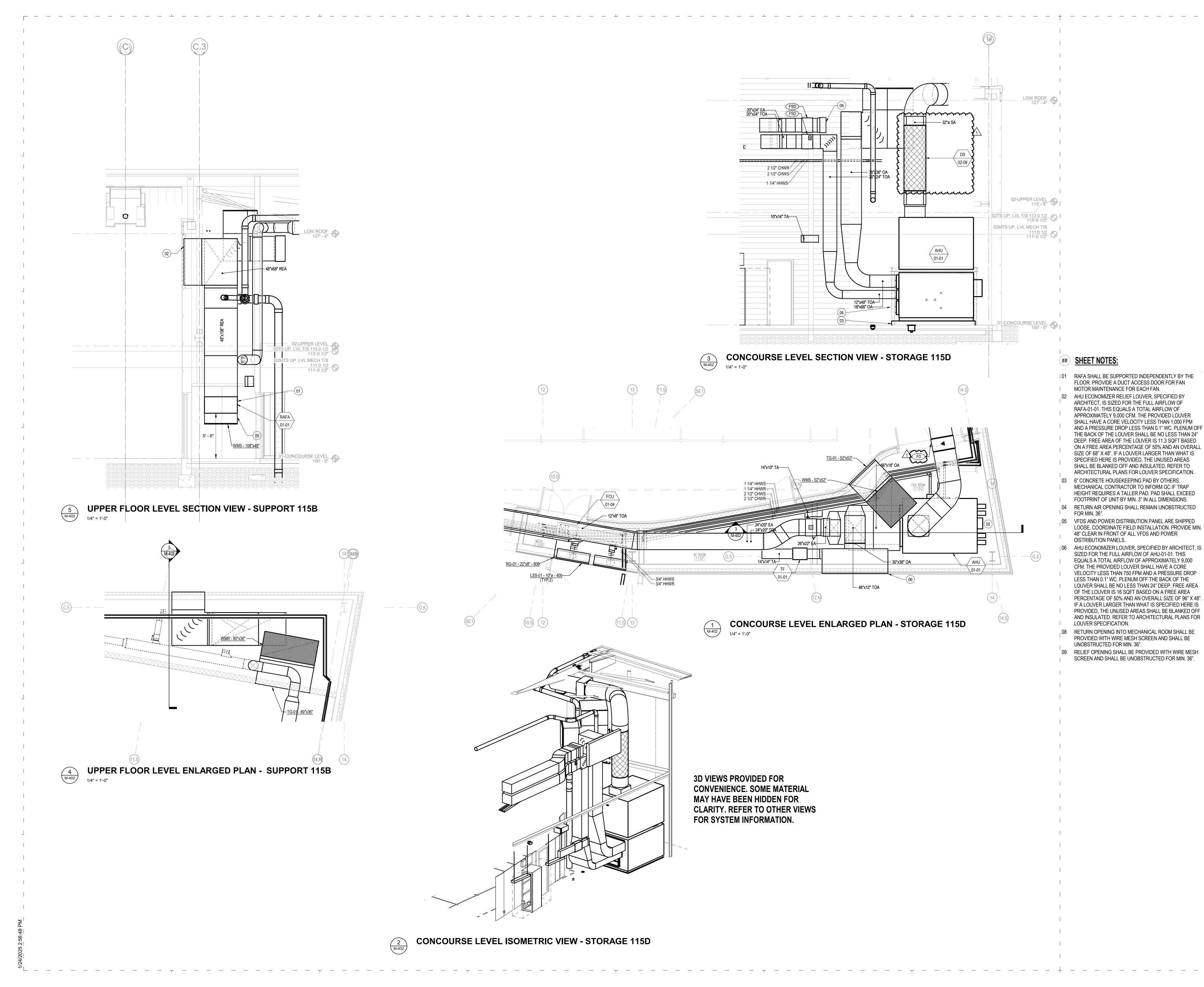
EVENT LEVEL ENLARGED PLAN -

LAUNDRY ROOMS

09 CONDENSATE SHALL SPILL INTO FLOOR SINK. COORDINATE EXACT ROUTE TO AVOID

INTERFERING WITH ACCESS TO AHU.

M-401B



Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEE
2901 EAST DISCOVERY PARKWAY
BLOOMINGTON, IN 47408

812-855-1692 **Architect**

RATIO

101 SOUTH PENNSYLVANIA STREET
INDIANAPOLIS, IN 46204

317-633-4040 Structural Engineer

FINK ROBERTS AND PETRIE, INC. 3535 EAST 96TH STREET

SUITE 126 INDIANAPOLIS, IN 46240

317-872-8400

Mechanical / Electrical

INTROBA

8250 HAVERSTICK ROAD
SUITE 285
INDIANAPOLIS, IN 46240

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800-404-7677

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9025 RIVER ROAD

138 N. DELAWARE ST INDIANAPOLIS, IN 46204 317-633-4120

Acoustics / Technology Engineer
WJHW

7220 W. JEFFERSON AVE SUITE 216 LAKEWOOD, CO 80235

Civil Engineer

AMERICAN STRUCTUREPOINT, INC.

SUITE 200 INDIANAPOLIS, IN 46240

317-547-5580

Food Service Consultant

CINILITTLE

3405 NW 9TH AVENUE #1202
FORT LAUDERDALE, FL 33309

954-846-9600

Code Consultant
FORZA

2502 WEST MECHANIC ST, SUITE C HARRISONVILLE, MO 64701 816-806-3729

SEAL | DAT

OPHER DIMINITION NO. STATE OF WOLANG

 SHEET ISSUE

 1 DESIGN DEVELOPMENT
 08/30/24

 2 50% CONSTRUCTION DOCUMENTS
 11/01/24

 3 95% CONSTRUCTION DOCUMENTS
 12/19/24

 4 CONSTRUCTION DOCUMENTS
 01/13/25

 5 ADDENDUM 01
 01/27/25

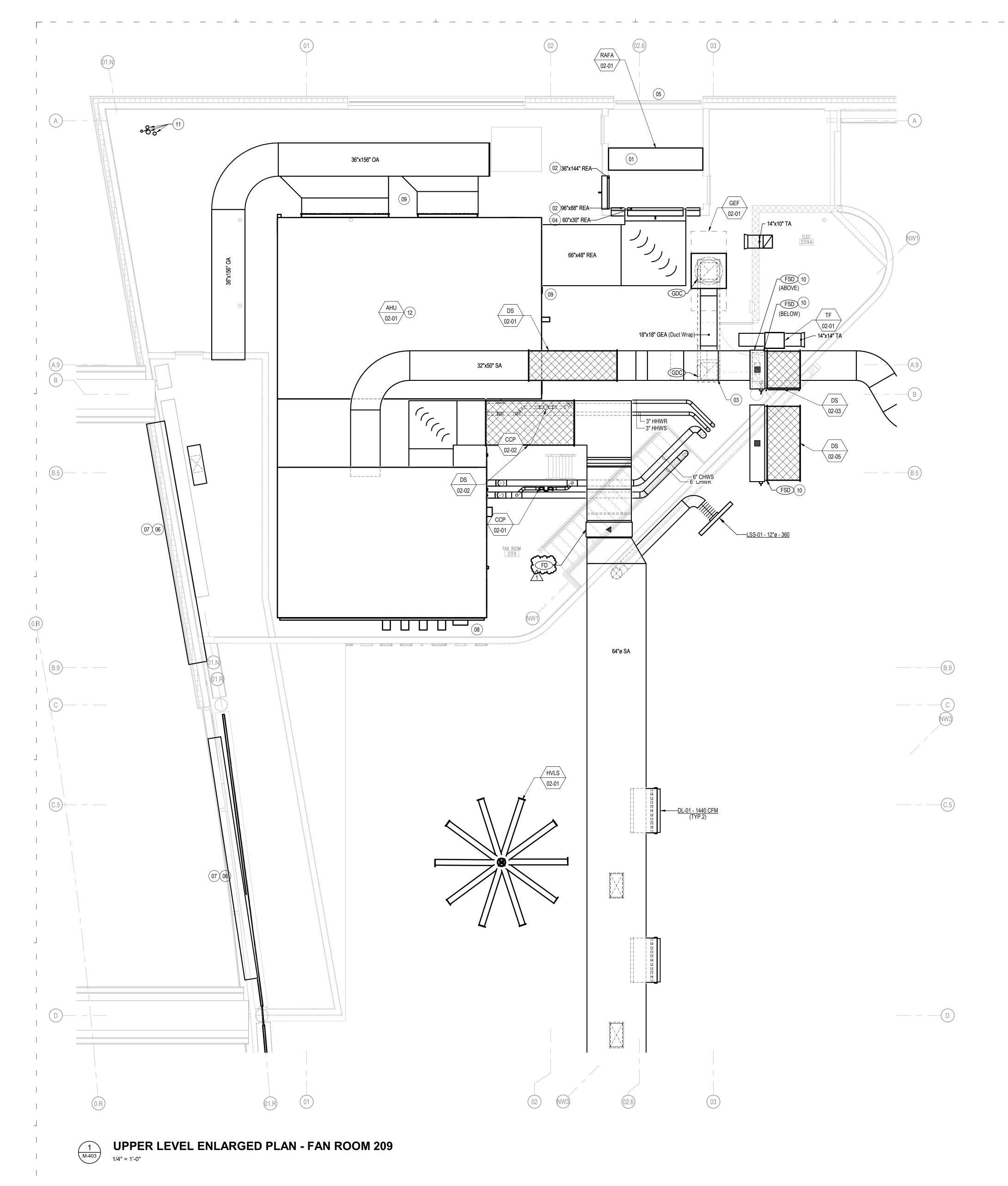
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PROJECT NO.
SHEET TITLE

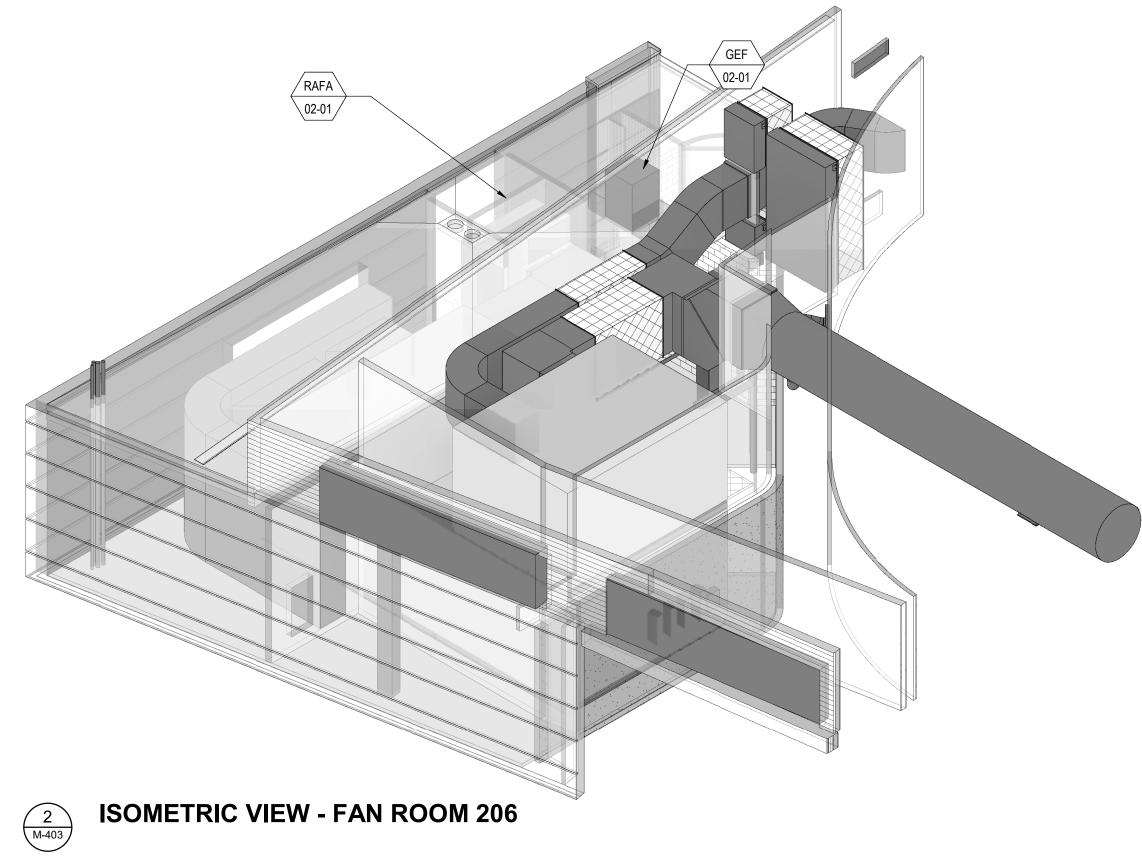
ET TITLE

ENLARGED PLANS -PRACTICE GYM

SHEET NUMBER



3D VIEWS PROVIDED FOR CONVENIENCE. SOME MATERIAL MAY HAVE BEEN HIDDEN FOR **CLARITY. REFER TO OTHER VIEWS** FOR SYSTEM INFORMATION.



SHEET NOTES:

- 01 FAN WALL IS HOSTED IN BUILT-UP FRAME INSIDE RELIEF FAN ROOM. ROOM CONSTRUCTION DETAILS BY ARCHITECT, FAN WALL STRUCTURE BY STRUCTURAL ENGINEER.
- 02 FAN WALL ROOM INLET DAMPER SHALL BE INSTALLED IN THE FACE OF THE WALL AND SHALL BE MOTOR OPERATED. OPERATION OF THE DAMPER IS INTERLOCKED WITH AHU-02-01.DAMPER SHALL BE MOUNTED APPROXIMATELY 6" A.F.F.
- 03 GREASE DUCT SHALL BE PROVIDED AND INSTALLED AS A ZERO-CLEARANCE RATED DUCT PRODUCT IN LIUE OF A BUILT-OUT RATED DUCT ENCLOSURE. PRODUCT SHALL BE PROVIDED AS CAPTIVEAIRE DW-3Z OR APPROVED EQUAL.
- O4 FAN WALL ROOM INLET DAMPER SHALL BE INSTALLED IN THE FACE OF THE WALL AND SHALL BE MOTOR OPERATED. OPERATION OF THE DAMPER IS INTERLOCKED WITH AHU-02-01. DAMPER SHALL BE MOUNTED APPROXIMATELY 6" ABOVE THE PENETRATION OF THE AHU RELIEF AIR
- 05 RELIEF AIR OUTLET LOUVER, SPECIFIED BY ARCHITECT, IS SIZED FOR THE FULL AIRFLOW OF RAFA-02-01. THIS EQUALS A TOTAL AIRFLOW OF APPROXIMATELY 55,000 CFM. THE PROVIDED LOUVER SHALL HAVE A CORE VELOCITY LESS THAN 1000 FPM AND A PRESSURE DROP LESS THAN 0.1" WC. LOUVER CONNECTS INTO BUILT-UP FAN ROOM. FREE AREA OF THE LOUVER IS 60 SQFT BASED ON A FREE AREA PERCENTAGE OF 50% AND AN OVERALL SIZE OF 96" X 180". REFER
- 06 OA INLET LOUVER, SPECIFIED BY ARCHITECT, IS SIZED FOR THE FULL ECONOMIZER AIRFLOW OF AHU-02-01 AND THE MAKEUP AIR TO THE KITCHEN HOOD ON THE FLOOR BELOW. BETWEEN THE TWO EQUALLY SIZED LOUVERS SHARING THIS PLENUM. THIS EQUALS A TOTAL AIRFLOW OF APPROXIMATELY 56,700 CFM. THE PROVIDED LOUVER SHALL HAVE A CORE VELOCITY LESS THAN 1000 FPM AND A PRESSURE DROP LESS THAN 0.1" WC. LOUVER CONNECTS INTO BUILT-UP SHARED PLENUM. FREE AREA OF THE LOUVER IS 60.5 SQFT BASED ON A FREE AREA PERCENTAGE OF 50% AND AN OVERALL SIZE OF 264" X 66". THIS RESULTS IN AN OVERALL FREE AREA OF 121 SQFT, WHICH IS REDUCED TO APPROXIMATELY 66 SQFT DUE TO THE WRAPPED BEAMS DIRECTLY BEHIND THE FACE OF THE LOUVER. REFER TO ARCHITECTURAL PLANS FOR LOUVER SPECIFICATION.
- 07 THE CONNECTION TO THE OA LOUVER SHALL BE A BUILT-OUT INSULATED PLENUM. THE INNER WALL OF THE PLENUM SHALL CONSIST OF A SHEET METAL SKIN AND SHALL MEET ALL THE REQUIREMENTS OF 1" PRESSURE CLASS DUCTWORK PER SMACNA. WALL INSULATION SHALL MEET OR EXCEED THE REQUIREMENT OF OA DUCTWORK PER THE PROVIDED SPECIFICATIONS.
- 08 VFDS AND POWER DISTRIBUTION PANEL ARE SHIPPED LOOSE. COORDINATE FIELD INSTALLATION. PROVIDE MIN. 48" CLEAR IN FRONT OF ALL VFDS AND POWER DISTRIBUTION
- 09 ALL DUCT SHALL BE HUNG SUCH THAT 7'-0" CLEAR A.F.F. IS MAINTAINED.

TO ARCHITECTURAL PLANS FOR LOUVER SPECIFICATION.

- 10 FIRE-SMOKE DAMPERS WITH AN HOUR RATING COMPLIANT WITH THE WALL CONSTRUCTION SHALL BE INSTALLED IN A BUILT-UP WALL DIVIDING THE COMMON RETURN PLENUM AND THE MECHANICAL ROOM.
- 11 STEAM VENT PIPING FROM BELOW TO ABOVE ROOF. SEE RELIEF VENT DETAILS FOR INFORMATION ON TERMINATION HEIGHT.
- 12 6" CONCRETE HOUSEKEEPING PAD BY OTHERS. MECHANICAL CONTRACTOR TO INFORM GC IF TRAP HEIGHT REQUIRES A TALLER PAD. PAD SHALL EXCEED FOOTPRINT OF UNIT BY MIN. 3" IN ALL DIMENSIONS.

IN128 - JAMES T. MORRIS ARENA

Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEE 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408

Architect

101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204

317-633-4040 Structural Engineer

FINK ROBERTS AND PETRIE, INC.

3535 EAST 96TH STREET SUITE 126 INDIANAPOLIS, IN 46240 317-872-8400

Mechanical / Electrical

INTROBA 8250 HAVERSTICK ROAD SUITE 285 INDIANAPOLIS, IN 46240

Plumbing Engineer

800-404-7677

138 N. DELAWARE ST INDIANAPOLIS, IN 46204 317-633-4120

Acoustics / Technology Engineer

7220 W. JEFFERSON AVE SUITE 216 LAKEWOOD, CO 80235 972-934-3700

Civil Engineer AMERICAN STRUCTUREPOINT, INC.

9025 RIVER ROAD SUITE 200

INDIANAPOLIS, IN 46240 317-547-5580 Food Service Consultant

CINILITTLE 3405 NW 9TH AVENUE #1202

FORT LAUDERDALE, FL 33309 954-846-9600

Code Consultant

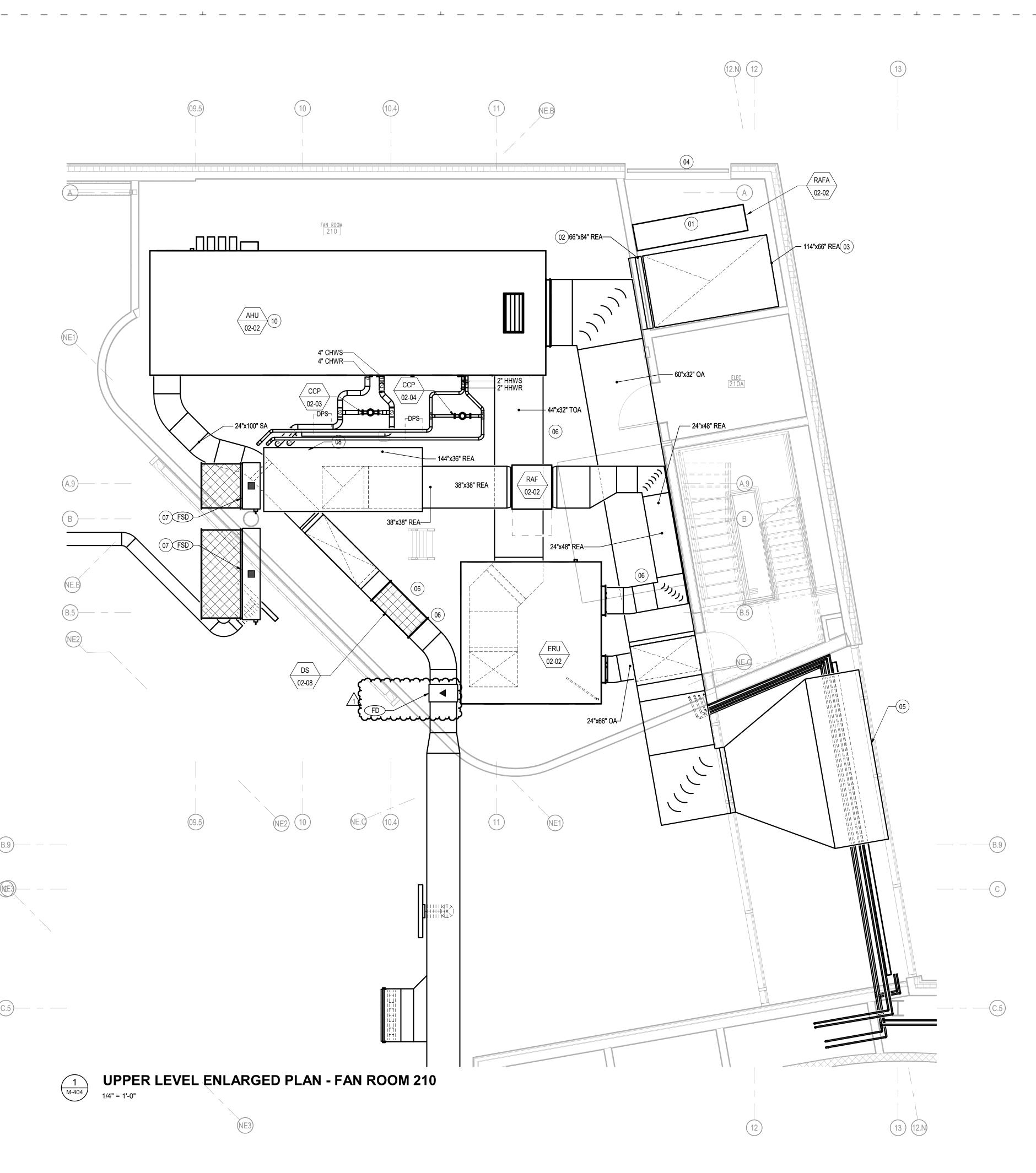
FORZA 2502 WEST MECHANIC ST, SUITE C HARRISONVILLE, MO 64701 816-806-3729

DESIGN DEVELOPMENT 2 50% CONSTRUCTION DOCUMENTS 95% CONSTRUCTION DOCUMENTS 4 CONSTRUCTION DOCUMENTS **ADDENDUM 01**

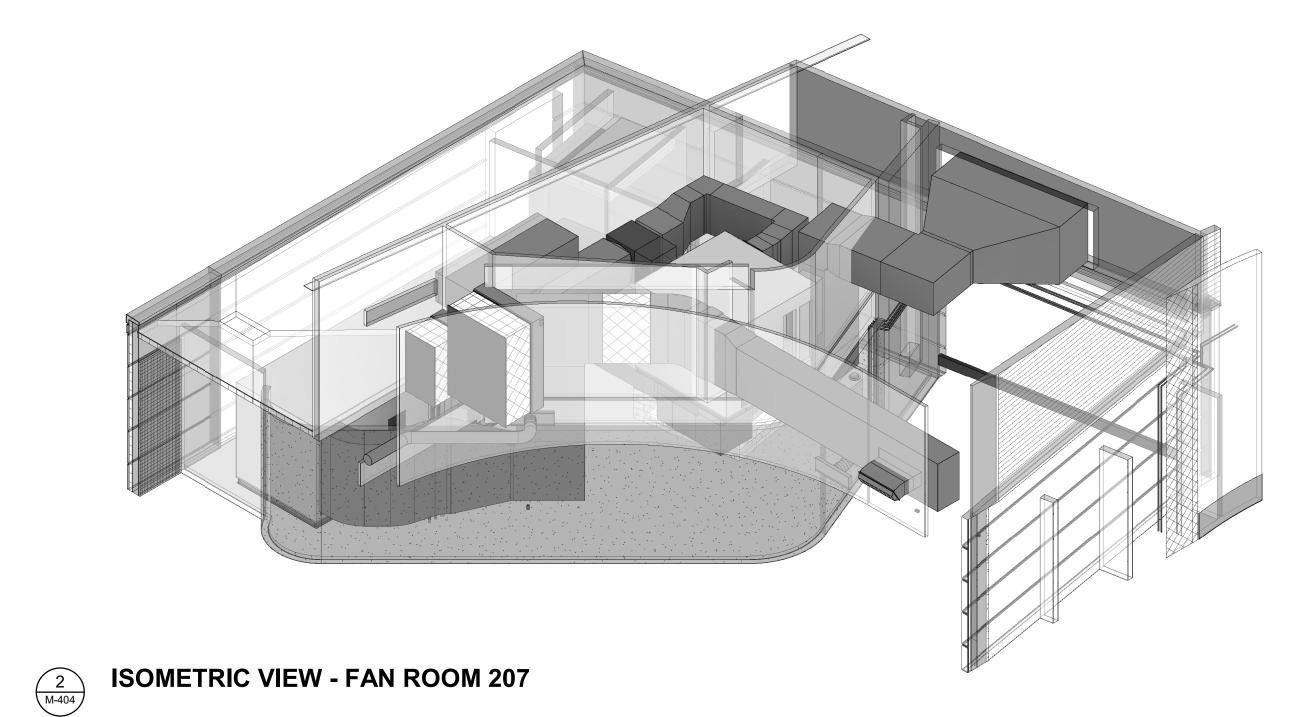
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PROJECT NO.

ENLARGED PLAN -FAN ROOM 209



3D VIEWS PROVIDED FOR CONVENIENCE. SOME MATERIAL MAY HAVE BEEN HIDDEN FOR **CLARITY. REFER TO OTHER VIEWS** FOR SYSTEM INFORMATION.



SHEET NOTES:

- 01 FAN WALL IS HOSTED IN BUILT-UP FRAME INSIDE RELIEF FAN ROOM. ROOM CONSTRUCTION DETAILS BY ARCHITECT, FAN WALL STRUCTURE BY STRUCTURAL ENGINEER. EACH FAN IS PROVIDED WITH A WEIGHTED BACKDRAFT DAMPER ON THE INLET.
- 02 FAN WALL ROOM INLET DAMPER SHALL BE INSTALLED IN THE FACE OF THE WALL AND SHALL BE MOTOR OPERATED. OPERATION OF THE DAMPER IS INTERLOCKED WITH AHU-02-01. DAMPER SHALL BE MOUNTED APPROXIMATELY 6" A.F.F. DAMPER SHALL BE INSTALLED SUCH THAT IT IS REMOVABLE TO PROVIDE ACCESS TO THE FAN ARRAY.
- 03 FAN WALL ROOM INLET DAMPER SHALL BE INSTALLED HORIZONTALLY IN THE FACE OF THE LID AND SHALL BE MOTOR OPERATED. OPERATION OF THE DAMPER IS INTERLOCKED WITH RAFA-02-02.
- 04 RELIEF AIR OUTLET LOUVER, SPECIFIED BY ARCHITECT, IS SIZED FOR THE FULL AIRFLOW OF RAFA-02-01. THIS EQUALS A TOTAL AIRFLOW OF APPROXIMATELY 42,660 CFM. THE PROVIDED LOUVER SHALL HAVE A CORE VELOCITY LESS THAN 750 FPM AND A PRESSURE DROP LESS THAN 0.1" WC. LOUVER CONNECTS INTO BUILT-UP FAN ROOM. FREE AREA OF THE LOUVER IS 60 SQFT BASED ON A FREE AREA PERCENTAGE OF 50% AND AN OVERALL SIZE OF 96" X 180". REFER TO ARCHITECTURAL PLANS FOR LOUVER SPECIFICATION.
- 05 OA INLET LOUVER, SPECIFIED BY ARCHITECT, IS SIZED FOR THE FULL ECONOMIZER AIRFLOW OF AHU-02-02. THIS EQUALS A TOTAL AIRFLOW OF APPROXIMATELY 18,000 CFM. THE PROVIDED LOUVER SHALL HAVE A CORE VELOCITY LESS THAN 500 FPM AND A PRESSURE DROP LESS THAN 0.1" WC. LOUVER CONNECTS INTO BUILT-UP SHARED PLENUM. FREE AREA OF THE LOUVER IS 38 SQFT BASED ON A FREE AREA PERCENTAGE OF 50% AND AN OVERALL SIZE OF 156" X 70". REFER TO ARCHITECTURAL PLANS FOR LOUVER SPECIFICATION.
- 06 ALL DUCT SHALL BE HUNG SUCH THAT 7'-0" CLEAR A.F.F. IS MAINTAINED.
- 07 FIRE-SMOKE DAMPERS WITH AN HOUR RATING COMPLIANT WITH THE WALL CONSTRUCTION SHALL BE INSTALLED IN A BUILT-UP WALL DIVIDING THE COMMON RETURN PLENUM AND THE MECHANICAL
- 08 EA OUTLET LOUVER, SPECIFIED BY ARCHITECT, IS SIZED FOR THE FULL ECONOMIZER AIRFLOW OF ERU-02-02. THIS EQUALS A TOTAL AIRFLOW OF APPROXIMATELY 12,500 CFM. THE PROVIDED LOUVER SHALL HAVE A CORE VELOCITY LESS THAN 750 FPM AND A PRESSURE DROP LESS THAN 0.1" WC. LOUVER CONNECTS INTO BUILT-UP SHARED PLENUM. FREE AREA OF THE LOUVER IS 18 SQFT BASED ON A FREE AREA PERCENTAGE OF 50% AND AN OVERALL SIZE OF 144" X 36". REFER TO ARCHITECTURAL PLANS FOR LOUVER SPECIFICATION.
- 10 6" CONCRETE HOUSEKEEPING PAD BY OTHERS. MECHANICAL CONTRACTOR TO INFORM GC IF TRAP HEIGHT REQUIRES A TALLER PAD. PAD SHALL EXCEED FOOTPRINT OF UNIT BY MIN. 3" IN ALL DIMENSIONS.

IN128 - JAMES T. MORRIS ARENA

Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEE 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408

101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204 317-633-4040

Structural Engineer FINK ROBERTS AND PETRIE, INC.

3535 EAST 96TH STREET SUITE 126 INDIANAPOLIS, IN 46240 317-872-8400

Mechanical / Electrical

INTROBA 8250 HAVERSTICK ROAD SUITE 285 INDIANAPOLIS, IN 46240 800-404-7677

Plumbing Engineer

138 N. DELAWARE ST INDIANAPOLIS, IN 46204 317-633-4120

Acoustics / Technology Engineer

7220 W. JEFFERSON AVE SUITE 216 LAKEWOOD, CO 80235 972-934-3700

Civil Engineer AMERICAN STRUCTUREPOINT, INC.

9025 RIVER ROAD SUITE 200

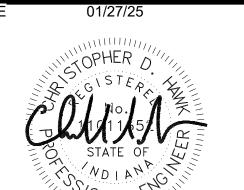
INDIANAPOLIS, IN 46240 317-547-5580 Food Service Consultant

CINILITTLE 3405 NW 9TH AVENUE #1202 FORT LAUDERDALE, FL 33309

954-846-9600

Code Consultant FORZA

2502 WEST MECHANIC ST, SUITE C HARRISONVILLE, MO 64701 816-806-3729

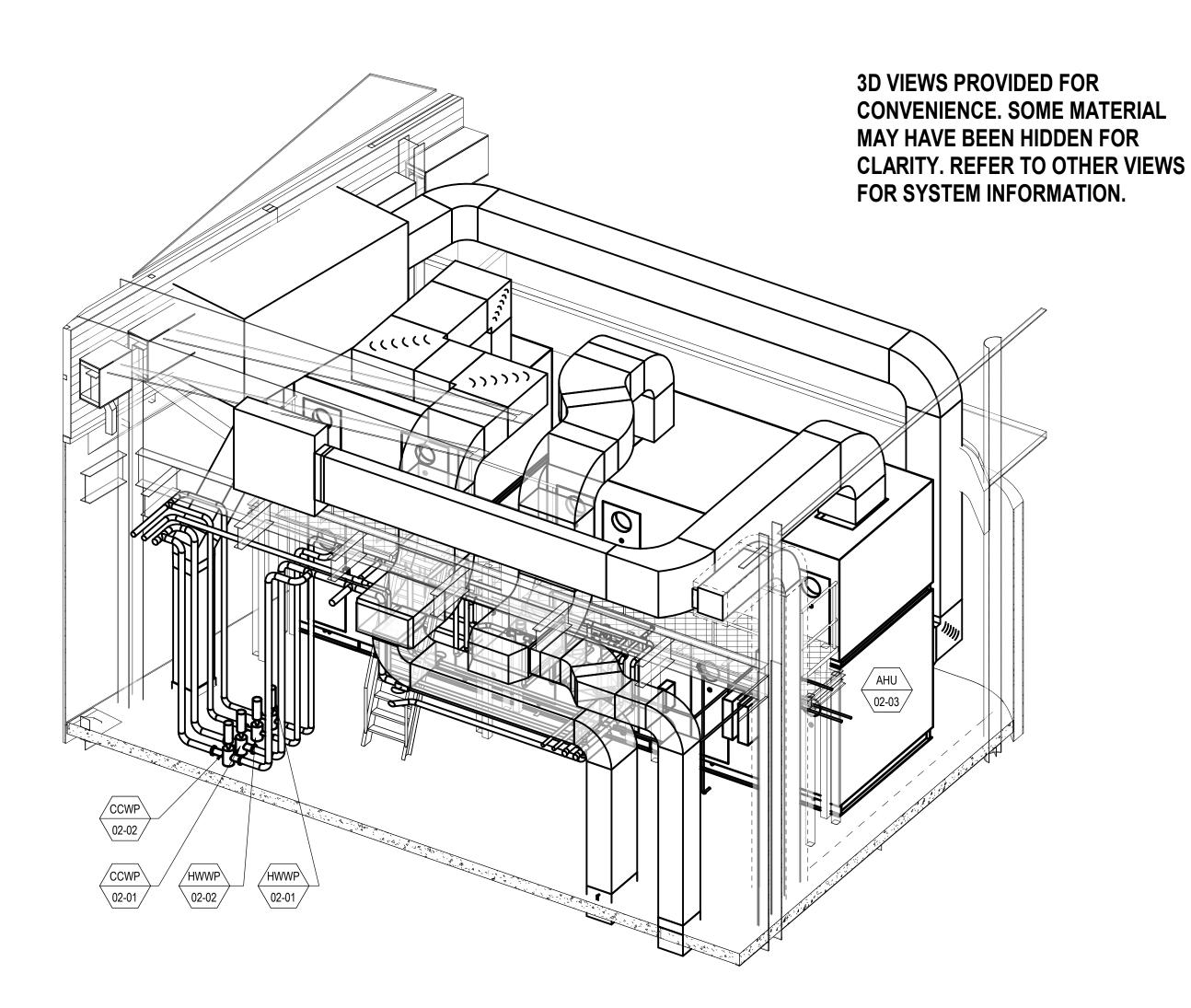


EET ISSUE	
DESIGN DEVELOPMENT	08/30/24
50% CONSTRUCTION DOCUMENTS	11/01/24
95% CONSTRUCTION DOCUMENTS	12/19/24
CONSTRUCTION DOCUMENTS	01/13/25
ADDENDUM 01	01/27/25

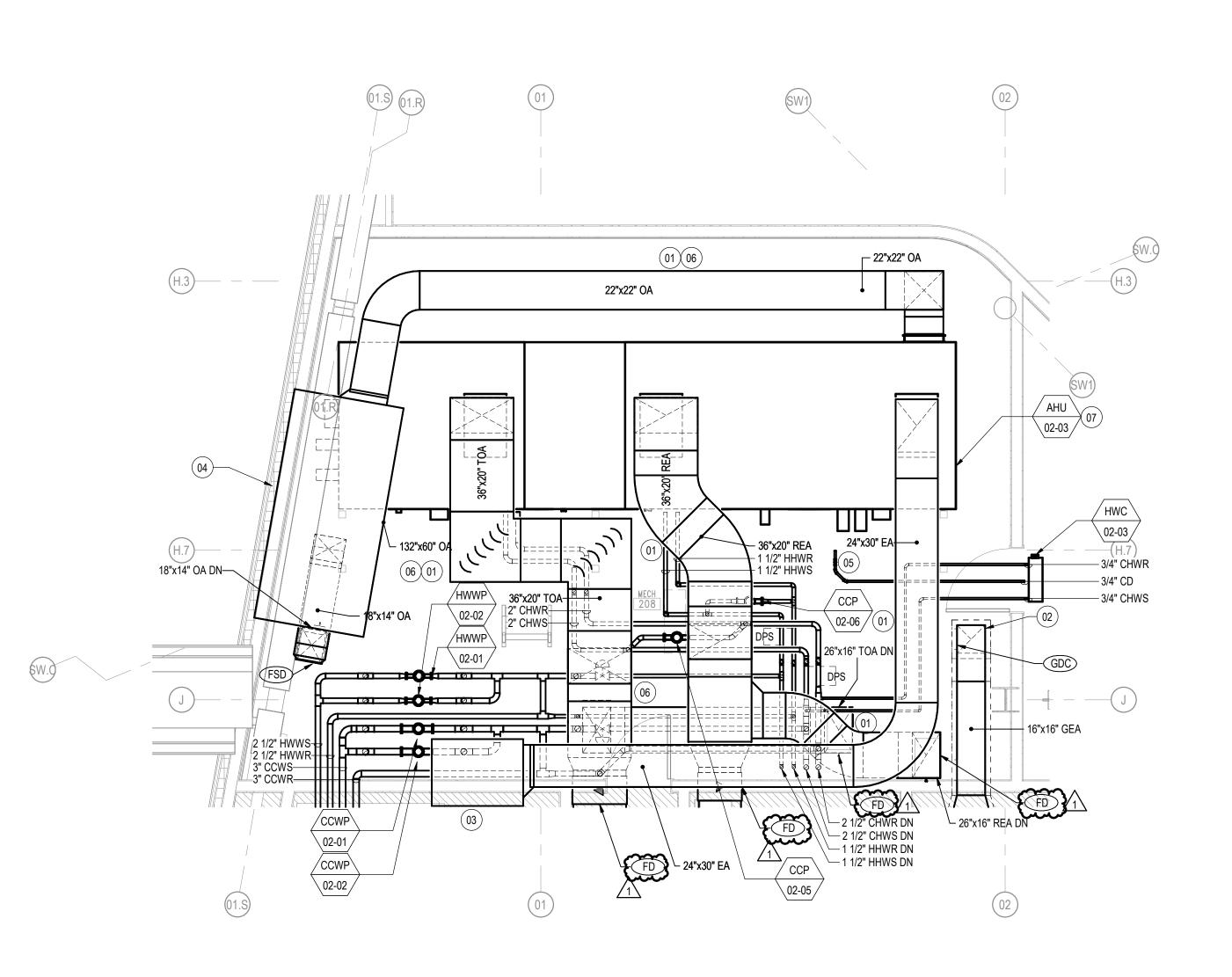


PROJECT NO.

ENLARGED PLAN -FAN ROOM 210







1 ENLARGED PLAN - MECH ROOM 208 (TENANT OFFICE)

1/4" = 1'-0"

SHEET NOTES:

01 ALL DUCT INSIDE MECHANICAL ROOM SHALL BE DOUBLE-WALL DUCTWORK WITH PERFORATED INNER WALL AND 2" ELASTOMERIC INTERSTITIAL INSULATION. 02 GREASE DUCT SHALL BE PROVIDED AND INSTALLED AS A ZERO-CLEARANCE RATED DUCT PRODUCT IN LIUE OF A BUILT-OUT RATED DUCT ENCLOSURE. PRODUCT SHALL BE PROVIDED AS CAPTIVEAIRE DW-3Z OR APPROVED EQUAL.

03 EXHAUST AIR OUTLET LOUVER, SPECIFIED BY ARCHITECT, IS SIZED FOR THE FULL EXHAUST AIRFLOW OF AHU 02-03. THIS EQUALS A TOTAL AIRFLOW OF APPROXIMATELY 6310 CFM. THE PROVIDED LOUVER SHALL HAVE A CORE VELOCITY LESS THAN 750 FPM AND A PRESSURE DROP LESS THAN 0.1" WC. FREE AREA OF THE LOUVER IS 9.4 SQFT BASED ON A FREE AREA PERCENTAGE OF 50% AND AN OVERALL SIZE OF 52" X 52". REFER TO ARCHITECTURAL PLANS FOR LOUVER SPECIFICATION

04 OA INLET LOUVER, SPECIFIED BY ARCHITECT, IS SIZED FOR THE FULL ECONOMIZER AIRFLOW OF AHU-02-03 AND THE MAKEUP AIR TO THE KITCHEN HOOD ON THE FLOOR BELOW. THIS EQUALS A TOTAL AIRFLOW OF APPROXIMATELY 7,820 CFM. THE PROVIDED LOUVER SHALL HAVE A CORE VELOCITY LESS THAN 500 FPM AND A PRESSURE DROP LESS THAN 0.1" WC. LOUVER CONNECTS INTO BUILT-UP SHARED PLENUM. FREE AREA OF THE LOUVER IS 60.5 SQFT BASED ON A FREE AREA PERCENTAGE OF 50% AND AN OVERALL SIZE OF 132" X 60". THIS RESULTS IN AN OVERALL FREE AREA OF 55 SQFT, WHICH IS REDUCED TO APPROXIMATELY 15.6 SQFT DUE TO THE WRAPPED BEAMS DIRECTLY BEHIND THE FACE OF THE LOUVER. REFER TO ARCHITECTURAL PLANS FOR LOUVER SPECIFICATION. 05 CONDENSATE SHALL SPILL INTO FLOOR SINK.

COORDINATE EXACT ROUTE TO AVOID INTERFERING WITH ACCESS TO AHU.

1 06 ALL DUCT AND PIPING SHALL BE HUNG SUCH THAT 7'-0" CLEAR A.F.F. IS MAINTAINED. 07 6" CONCRETE HOUSEKEEPING PAD BY OTHERS.

MECHANICAL CONTRACTOR TO INFORM GC IF TRAP HEIGHT REQUIRES A TALLER PAD. PAD SHALL EXCEED FOOTPRINT OF UNIT BY MIN. 3" IN ALL DIMENSIONS.

IN128 - JAMES T. MORRIS ARENA

Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEES 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408

812-855-1692 **Architect**

RATIO 101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204 317-633-4040

Structural Engineer FINK ROBERTS AND PETRIE, INC.

3535 EAST 96TH STREET SUITE 126 INDIANAPOLIS, IN 46240

317-872-8400 Mechanical / Electrical INTROBA

8250 HAVERSTICK ROAD SUITE 285 INDIANAPOLIS, IN 46240

800-404-7677 Plumbing Engineer

138 N. DELAWARE ST

INDIANAPOLIS, IN 46204

317-633-4120 Acoustics / Technology Engineer

WJHW 7220 W. JEFFERSON AVE SUITE 216 LAKEWOOD, CO 80235

972-934-3700

Civil Engineer AMERICAN STRUCTUREPOINT, INC.

9025 RIVER ROAD SUITE 200

INDIANAPOLIS, IN 46240 317-547-5580 Food Service Consultant

CINILITTLE 3405 NW 9TH AVENUE #1202 FORT LAUDERDALE, FL 33309 954-846-9600

Code Consultant

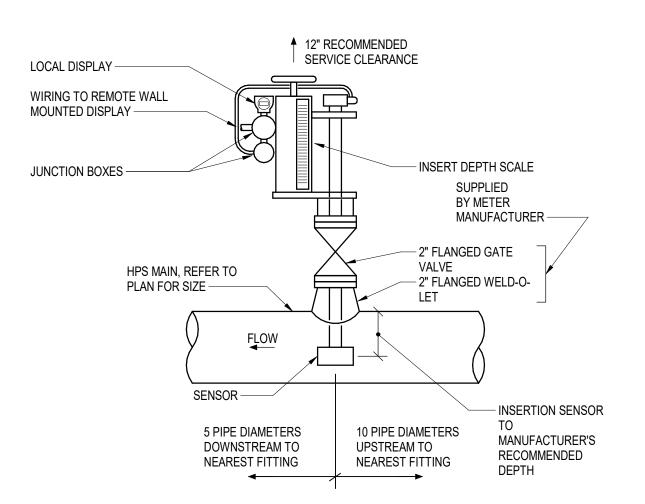
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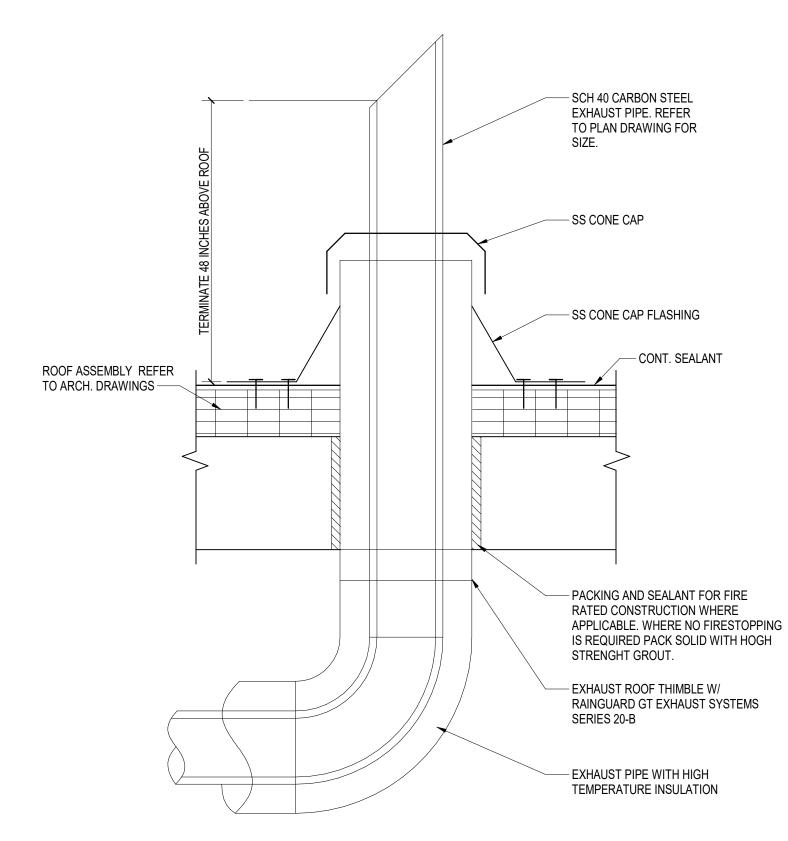
SH	EET ISSUE	
1	DESIGN DEVELOPMENT	08/30/24
2	50% CONSTRUCTION DOCUMENTS	11/01/24
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-		



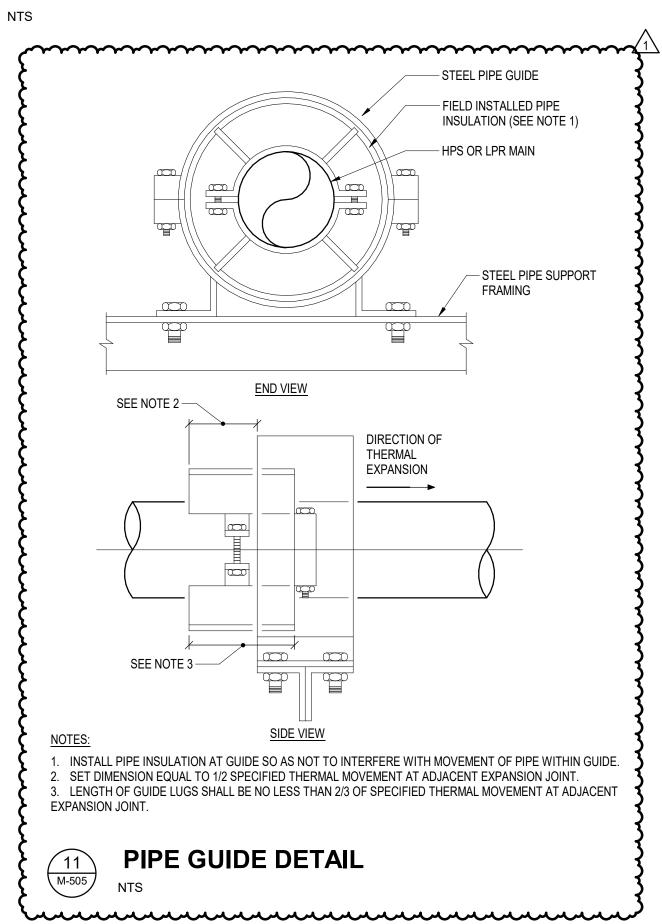
ENLARGED PLAN -MECHANICAL ROOM

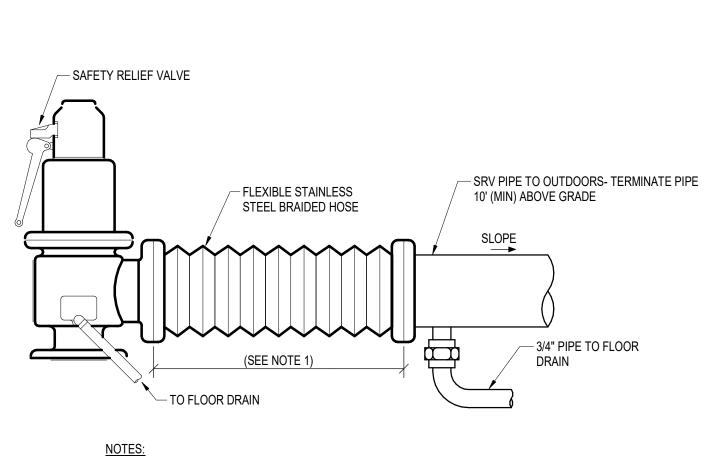


4 STEAM FLOW METER INSTALLATION DETAIL NTS



STEAM VENT ROOF PENETRATION DETAIL NTS



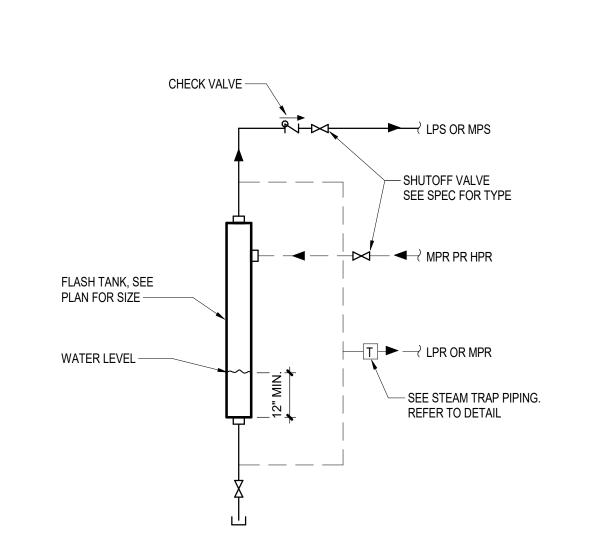


 BRAIDED FLEXIBLE HOSE SHALL BE OF SUFFICIENT LENGTH TO ACCOMMODATE AN OFFSET FROM CENTERLINE OF 1".
 EXTERIOR VENT PIPING SHALL BE GALVANIZED STEEL.

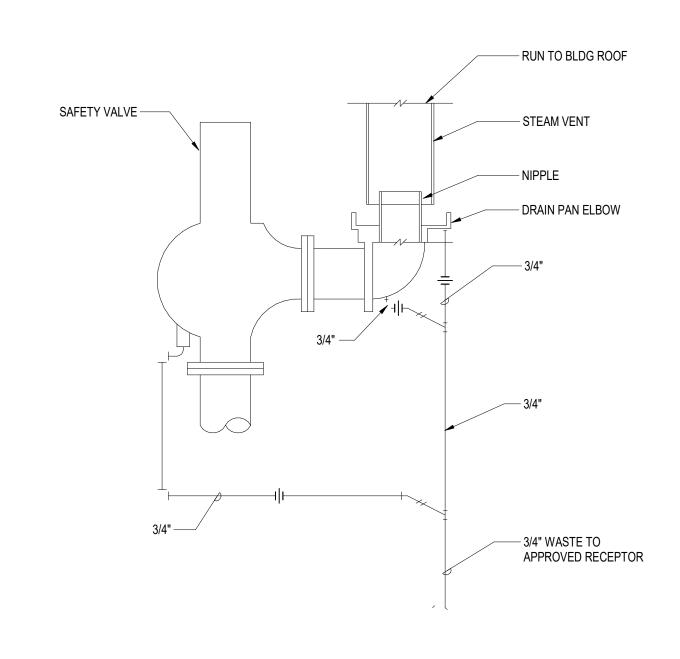
3 RELIEF TO PLANS AND PIPING DIAGRAMS FOR PIPE SIZES.

3. RELIEF TO PLANS AND PIPING DIAGRAMS FOR PIPE SIZES.

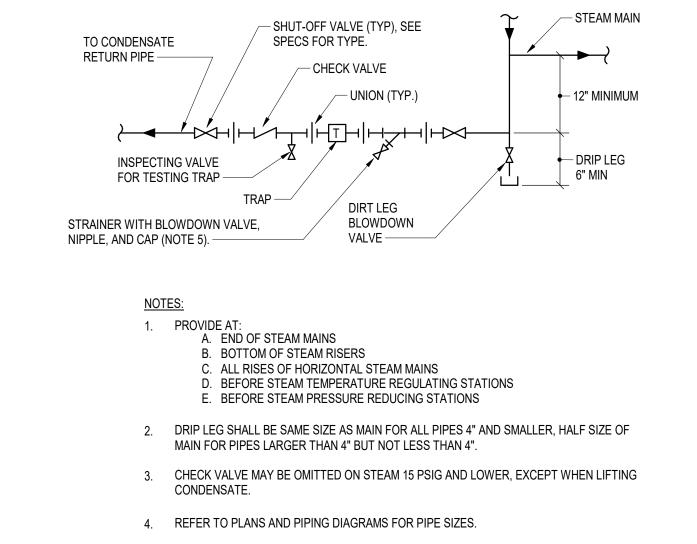
SAFETY RELIEF VALVE WITH FLEXIBLE HOSE DETAIL NTS



7 STEAM FLASH TANK DETAIL NTS



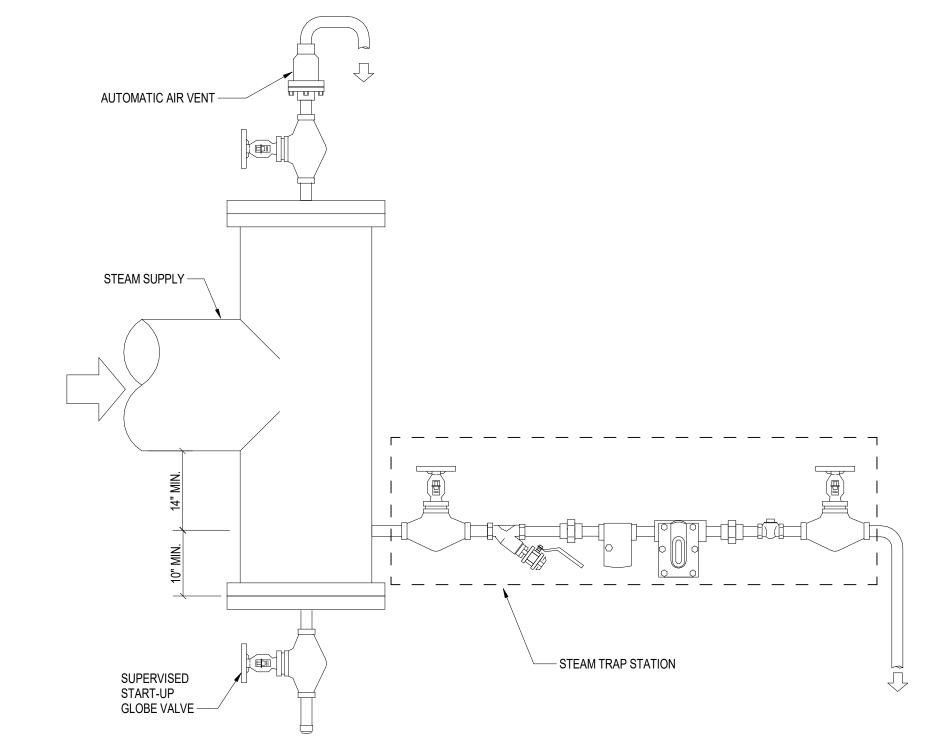




STEAM CONDENSATE DRIP TRAP ASSEMBLY DETAIL

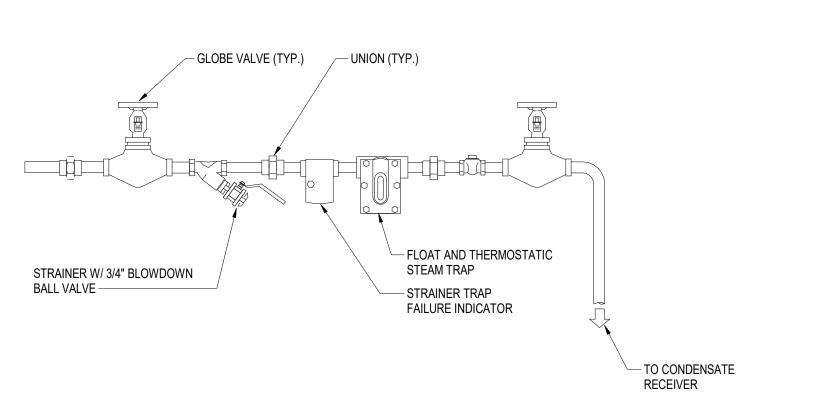
NTS

5. INSTALL "Y" IN THE 3 O'CLOCK OR 9 O'CLOCK POSITION.

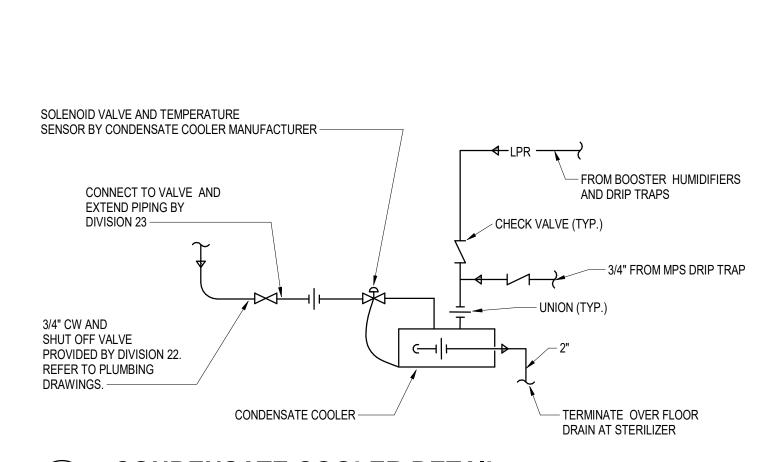


STEAM MAINS DRAINAGE-END OF RUN

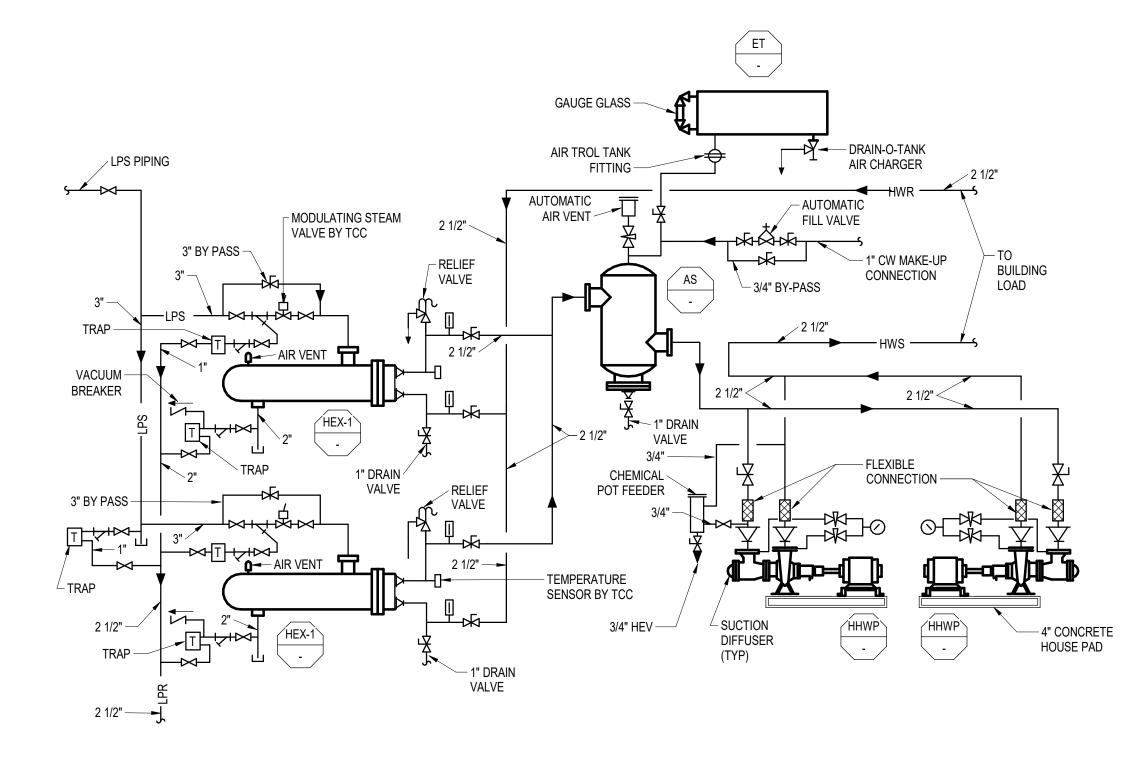
NTS



FLOAT AND THERMOSTATIC STEAM TRAP STATION



CONDENSATE COOLER DETAIL
NTS



9 STEAM HX TO HOT WATER PIPING DIAGRAM
NTS

IN128 - JAMES T. MORRIS ARENA

Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

Owner
INDIANA UNIVERSITY BOARD OF TRUSTEE
2901 EAST DISCOVERY PARKWAY
BLOOMINGTON, IN 47408
812-855-1692

Architect
RATIO

101 SOUTH PENNSYLVANIA STREET
INDIANAPOLIS, IN 46204
317-633-4040

Structural Engineer
FINK ROBERTS AND PETRIE, INC.
3535 EAST 96TH STREET
SUITE 126

SUITE 126 INDIANAPOLIS, IN 46240 317-872-8400 Mechanical / Electrical

INTROBA

8250 HAVERSTICK ROAD
SUITE 285
INDIANAPOLIS, IN 46240

Plumbing Engineer
DLZ

800-404-7677

138 N. DELAWARE ST INDIANAPOLIS, IN 46204 317-633-4120

Acoustics / Technology Engineer
WJHW
7220 W. JEFFERSON AVE

SUITE 216 LAKEWOOD, CO 80235 972-934-3700

Civil Engineer

AMERICAN STRUCTUREPOINT, INC.

9025 RIVER ROAD

SUITE 200 INDIANAPOLIS, IN 46240 317-547-5580

Food Service Consultant
CINILITTLE

3405 NW 9TH AVENUE #1202 FORT LAUDERDALE, FL 33309 954-846-9600

Code Consultant
FORZA
2502 WEST MECHANIC ST, SUITE C
HARRISONVILLE, MO 64701
816-806-3729

SEAL | DATE 01/27/25

O1/27/25

ON STEP 10.

SH	EET ISSUE	
1	DD PROGRESS SET	07/18/2
2	DESIGN DEVELOPMENT	08/30/2
3	50% CONSTRUCTION DOCUMENTS	11/01/2
4	95% CONSTRUCTION DOCUMENTS	12/19/2
5	CONSTRUCTION DOCUMENTS	01/13/2
6	ADDENDUM 01	01/27/2

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PROJECT NO. 23112.000
SHEET TITLE

MECHANICAL

DETAILS - STEAM AND PIPING

SHEET NUMBER

MECHANICAL - AHU GENERAL INFORMATION SCHEDULE (COMPONENTS) (i) FILTER PRESSURE DROP IS AT 100% AIR FLOW PROVIDE WITH SEPARATE MIN OA AND MODULATING OA DAMPER SECTIONS. PROVIDE WITH FULL ECONOMIZER SECTION IF APPLICABLE. REFER TO SPECIFICATION FOR VIBRATION ISOLATION AND SEISMIC RESTRAINT REQUIREMENTS (230548). HEATING COIL TO BE SIZED TO MINIMIZE PRESSURE DROP AT PEAK COOLING AIR FLOW. PROVIDE AIR BLENDER (TEMPS LESS THAN 35 DEG F ONLY). PROVIDE INTAKE HOOD. PROVIDE SMOKE DETECTOR ON SUPPLY DUCT OF ALL UNITS >=2,000CFM HARD WIRED TO SHUT DOWN UNIT. FANS SHALL BE SELECTED SUCH THAT THE LOSS OF ONE FAN REMAINING FANS CAN STILL PROVIDE FULL AIR FLOW. ALL DAMPERS CONTROLLING OR ISOLATING OUTSIDE AIR SHALL BE PROVIDED WITH SPRING RETURN FAIL-CLOSED DAMPERS. ALL VEDS AND POWER DISTRIBUTION PANELS SHIPPED LOOSE SHALL BE INSTALLED NEARBY BY EC WITH A MINIMUM CLEARANCE TO OBSTRUCTIONS OF 48". 1 (11) PEAK AIRFLOW FOR THIS UNIT IS A COMBINATION OF HEATING AND COOLING AIRFLOWS. AIRFLOW ON PLANS SHOW PEAK AIRFLOW PER ZONE.

				UNIT AIR	OSA		FANS				COILS			FILTE	RS		SIZE (IN)				ELE	CTRICAL				
	QUIPMENT NUMBER	MANUFACTURER	LOCATION		MIN OSA (CFM)	AHU EA FAN (Y/N)	AHU RA FAN (Y/N)	AHU SA FAN (Y/N)	AHU ECONOMIZER (Y/N)	CC COIL (Y/N)	RE-HEAT COIL (Y/N)	PREHEAT COIL Y(/N)	ERW (Y/N)	PREFILTER (Y/N)	FINAL FILTER (Y/N)	WIDTH	HEIGHT	LENGTH	VOLTAGE	PHASE	FREQUENCY (HZ)	120 V CONTROL Y/N	SINGLE POINT OF CONN Y/N	EMERGENCY POWER	OPERATING WEIGHT (LB)	NOTES
4HU	00-01	HAAKON	FAN ROOM 054	6520	2,300	No	No	Yes	Yes	Yes	Yes	No	No	Yes	Yes	84"	133"	159"	460	3	60	Yes	Yes	No	10910.00	1,2,3,4,5,6,7,8,9 11
\HU	00-02	HAAKON	FAN ROOM 068	16680	5,550	No	No	Yes	Yes	Yes	Yes	No	No	Yes	Yes	134"	160"	216"	460	3	60	Yes	No	Yes	22320.00	2,3,4,5,7,8,9,10
AHU	00-03	HAAKON	FAN ROOM 068	23905	23,905	No	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	137"	168"	430"	460	3	60	Yes	Yes	No	35750.00	2,3,4,5,7,8,9
AHU	01-01	HAAKON	FAN ROOM 115D	8030	3,620	No	No	Yes	Yes	Yes	Yes	No	No	Yes	Yes	83"	210"	118"	460	3	60	Yes	No	No	9020.00	2,3,4,5,7,8,9,10
\HU	02-01	HAAKON	FAN ROOM 209	55000	30,000	No	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	286"	174"	441"	460	3	60	Yes	No	No	68320.00	2,3,4,5,7,8,9,10
\HU	02-02	HAAKON	FAN ROOM 210	18000	12,500	No	No	Yes	Yes	Yes	No	Yes	No	Yes	Yes	113"	126"	367"	460	3	60	Yes	Yes	No	24490.00	2,3,4,5,7,8,9
\HU	02-03	HAAKON	MECH 208	6120	6,120	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	71"	154"	317"	460	3	60	Yes	Yes	No	27480.00	2,3,4,5,7,8,9

									M	ECHANIC	AL - AHU S	CHEDULE	E (ENERG	SY RECO	VERY WH	EEL)									
													ENERGY RECO	VERY WHEEL											
						SU	MMER									WIN	ΓER								
ТҮРЕ	EQUIPMENT NUMBER	ERW COOLING LOAD SUMMER (BTU/H)	ERW EA DB SUMMER (°F)	ERW EA WB SUMMER (°F)		ERW OA WB SUMMER (°F)		ERW RA WB SUMMER (°F)			ERW PRESS DROP SUMMER (IN-WG)	ERW HEATING LOAD WINTER (BTU/H)	ERW EA DB WINTER (°F)	ERW EA WB WINTER (°F)	_	ERW OA WB WINTER (°F)	ERW RA DB WINTER (°F)	ERW RA WB WINTER (°F)	ERW SA DB WINTER (°F)	ERW SA WB WINTER (°F)	ERW PRESS DROP WINTER (IN-WG)	ERW CFM PER WHEEL (CFM)	ERW NO OF WHEELS	RW MOTOR HP (W)	ERW NO OF MOTOR
AHU	00-03	545,000	90.7	73.9	95.0	76.0	78.0	68.0	81.8	70.1	0.9	2,345,000	10.3	16.7	-10.2	-10.7	68.0	60.0	49.5	47.9	0.9	23,905	1	1.0	1
AHU	02-01	593,000	91.7	74.4	95.0	76.0	78.0	68.0	83.6	70.9	0.8	2,602,000	5.8	11.7	-10.2	-10.7	68.0	60.0	41.8	42.4	0.8	30,000	1	1.0	1
AHU	02-03	146,000	91.2	74.2	95.0	76.0	78.0	68.0	81.3	69.8	0.7	624,000	8.2	14.4	-10.2	-10.7	68.0	60.0	52.1	49.6	0.7	6,120	1	0.5	1
ERU	02-02	293,000	91.1	74.1	95.0	76.0	78.0	68.0	81.5	69.9	0.7	1,258,000	8.5	14.8	-10.2	-10.7	68.0	60.0	51.3	49.1	0.7	12,500	1	0.5	1

		MECH	ANICAL	AHU S	CHEDUL	E (FILTER	R - ALL)			
						FILTE	RS			
TYPE	EQUIPMENT	LEVEL		PRI	EFILTER			FINAL	. FILTER	
IIFL	NUMBER	LLVLL	MERV RATING	CLEAN APD (IN-WG)	DIRTY APD (IN-WG)	PREFILTER DEPTH	MERV RATING	CLEAN APD (IN-WG)	DIRTY APD (IN-WG)	FILTER DEPTH
AHU	00-01	00-EVENT LEVEL	8	0.2	0.6	2"	13	0.3	0.9	12"
AHU	00-02	00-EVENT LEVEL	8	0.2	0.6	2"	13	0.3	0.9	12"
AHU	00-03	00-EVENT LEVEL	8	0.2	0.6	2"	13	0.3	0.9	12"
AHU	01-01	01-CONCOURSE LEVEL	8	0.2	0.6	2"	13	0.3	0.9	12"
AHU	02-01	02-UPPER LEVEL	8	0.2	0.6	2"	13	0.3	0.9	12"
AHU	02-02	02-UPPER LEVEL	8	0.2	0.6	2"	13	0.3	0.9	12"
AHU	02-03	02-UPPER LEVEL	8	0.2	0.6	2"	13	0.3	0.9	12"

					MECH	ANICAL - C	OIL REC	CIRCULA	ATION P	UMP SCHED	ULE						
NOTES: I. IN-LINE I	ECM RECIRCULA	TION PUMPS.															
	COLUDATA								PUMP				El	ECTRICA	L		
TYPE	EQUIPMENT NUMBER	MANUFACTURER	MODEL	LOCATION	SERVICE	PUMP TYPE	FLOW (GPM)	HEAD (FT.WC)	SPEED (RPM)	MIN. STATIC EFF. [%]	ВНР	НР	VOLT (V)	PHASE	FREQUENCY (HZ)	EMERG. PWR. (Y/N)	NOTES
CCP	00-01	BELL & GOSSETT	20-140	FAN ROOM 068	CHW	CIRCULATION	65.0	10.0	2531	58.8	0.28	0.5	115	1	60	No	ALL
CCP	00-02	BELL & GOSSETT	20-140	FAN ROOM 068	HHW	CIRCULATION	42.0	10.0	2334	54.9	0.19	0.5	115	1	60	No	ALL
CCP	02-01	BELL & GOSSETT	40-200	FAN ROOM 068	CHW	CIRCULATION	90.0	10.0	2139	51.2	0.44	1.0	115	1	60	No	ALL
CCP	02-02	BELL & GOSSETT	20-140	FAN ROOM 068	HHW	CIRCULATION	65.0	10.0	2531	58.8	0.28	0.5	115	1	60	No	ALL
CCP	02-03	BELL & GOSSETT	20-140	FAN ROOM 068	CHW	CIRCULATION	65.0	10.0	2531	58.8	0.28	0.5	115	1	60	No	ALL
CCP	02-04	BELL & GOSSETT	20-140	FAN ROOM 068	HHW	CIRCULATION	42.0	10.0	2334	54.9	0.19	0.5	115	1	60	No	ALL
CCP	02-05	BELL & GOSSETT	36-45	FAN ROOM 068	CHW	CIRCULATION	21.0	10.0	2707	47.8	0.11	0.2	115	1	60	No	ALL
CCP	02-06	BELL & GOSSETT	36-45	FAN ROOM 068	HHW	CIRCULATION	21.0	10.0	2707	47.8	0.11	0.2	115	1	60	No	ALL

				COOLING	COIL							COOLING COIL		
TYPE	00-01	CC DESIGN AIRFLOW (CFM)	CC TOTAL CAPACITY (BTU/H)	CC EAT DB (°F)	CC EAT WB(°F)	CC LAT DB(°F)	CC LAT WB(°F)	CC FPI	CC NO ROWS	APD [IN WG]	CC EWT(°F)	CC LWT(°F)	CC (GPM)	CC WPD (FT.WC)
AHU	00-01	6,520	320,200	82.9	70.3	55.5	55.0	10	6	0.61	42.0	55.0	49.2	4.5
AHU	00-02	16,680	722,100	73.4	68.7	55.2	55.0	10	6	0.64	42.0	55.0	111.0	4.7
AHU	00-03	23,905	954,700	73.4	67.7	55.2	55.0	10	6	0.64	42.0	55.0	146.8	3.3
AHU	01-01	8,030	425,000	84.9	71.3	55.6	55.0	10	6	0.62	42.0	55.0	65.4	4.0
AHU	02-01	55,000	2,238,100	76.1	68.0	55.3	55.0	10	6	0.64	42.0	55.0	344.2	12.2
AHU	02-02	18,000	752,000	76.3	68.3	55.4	55.0	10	6	0.65	42.0	55.0	115.7	4.5
AHU	02-03	6,120	248,400	75.5	68.1	55.2	55.0	10	6	0.63	42.0	55.0	38.2	11.0

			ME	CHANICA	L - AHU S	CHEDUL	E (COILS	- HEATIN	IG)			
	FOLUDMENT					HE	ATING COIL					
TYPE	EQUIPMENT NUMBER	HC DESIGN AIRFLOW (CFM)	HC CAPACITY (BTU/H)	HC EAT DB (°F)	HC LAT DB (°F)	HC NO OF ROWS	HC FPI	HC APD (IN-WG)	HC EWT (°F)	HC LWT (°F)	HC (GPM)	HC WPD (FT WG)
AHU	00-01	6,520	100,700	45.7	60.0	2	6	0.17	140.0	100.0	5.1	0.10
AHU	00-02	16,680	358,300	40.1	60.0	2	6	0.18	140.0	100.0	18.3	0.50
AHU	00-03	23,905	1,397,400	6.2	60.0	2	8	0.21	140.0	100.0	71.3	5.60
AHU	01-01	8,030	205,400	36.3	60.0	2	6	0.17	140.0	100.0	10.5	0.50
AHU	02-01	55,000	1,531,600	34.2	60.0	2	8	0.22	140.0	100.0	78.1	1.50
AHU	02-02	18,000	379,800	25.0	60.0	2	6	0.18	140.0	100.0	34.7	4.40
AHU	02-03	6,120	319,700	6.0	55.0	2	8	0.20	140.0	96.6	15.0	3.10

				M	ECHANIC	AL - AHU	SCHEDUL	E (FAN -	EXHAUS ⁻	Γ)				
ТҮРЕ	EQUIPMENT NUMBER	AHU FAN EA NO OF FANS/MOTORS	AHU FAN EA CFM PER FAN (FCM)	AHU FAN EA TYPE	AHU FAN EA ESP (IN-WG)	AHU FAN EA TSP (IN-WG)	AHU FAN EA FAN RPM	EXHAUS AHU FAN EA MIN WHEEL DIA	AHU FAN EA EFF	AHU FAN EA MOTOR HP	AHU FAN EA BHP (HP)	AHU FAN EA FLA (A)	AHU FAN EA VFD Y/N	AHU FAN EA DRIVE (DIRECT/BELT)
AHU	02-03	2	6,309	CENTRIFUGAL	1.0	2.5	2159	18	0.61	10	4.1	12.0	Yes	DIRECT

				Ŋ	MECHANICA	L - AHU S	SCHEDUL	E (FAN - SU	JPPLY)					
TYPE	EQUIPMENT NUMBER	AHU FAN SA NO OF FANS/MOTORS	AHU FAN SA TYPE	AHU FAN SA CFM PER FAN (CFM)	AHU FAN SA ESP (IN-WG)	AHU FAN SA TSP (IN-WG)	AHU FAN SA FAN RPM	AHU FAN SA MIN WHEEL DIA	AHU FAN SA EFF	AHU FAN SA MOTOR HP	AHU FAN SA BHP (HP)	AHU FAN SA FLA (A)	AHU FAN SA VFD Y/N	AHU FAN SA DRIVE (DIRECT/BELT)
AHU	00-01	4	CENTRIFUGAL	1630	1.8	4.6	2652	15	0.66	5	1.7	6	Yes	DIRECT
AHU	00-02	4	CENTRIFUGAL	4170	2.5	5.7	2601	18	0.67	15	5.6	17.5	Yes	DIRECT
AHU	00-03	4	CENTRIFUGAL	5976	2.5	6.4	2699	18	0.71	20	8.9	23.5	Yes	DIRECT
AHU	01-01	4	CENTRIFUGAL	2008	1.8	4.5	2690	15	0.66	5	2.1	6	Yes	DIRECT
AHU	02-01	4	CENTRIFUGAL	13750	1.4	5.5	1450	30	0.76	25	16.8	30	Yes	DIRECT
AHU	02-02	4	CENTRIFUGAL	4500	1.2	4.4	2154	18	0.71	15	4.6	17.5	Yes	DIRECT
AHU	02-03	2	CENTRIFUGAL	6120	1.9	5.6	2629	18	0.71	15	8.2	17.5	Yes	DIRECT

					SOUNI	O ATTENUA	ATOR :	SCHE	DULE											
NOTES: 1. 2.		AL PRESSURE DROF ENCER INCLUDES AL) PER ASTM E477-20 IN A NVLAP-ACCRE	DITED ACOUSTICAL LA	BORATORY.														
MARK										AIR FLOW				DYNAMI	C INSEF	RTION LO	OSS -dB	3		
ID #	#	MFR.	MODEL	TYPE	LOCATION	SERVICE	SIZE WxH	LENGTH	AIRFLOW (CFM)	VELOCITY	STATIC PN (IN WC)			0	CTAVE E	BAND (H	Z)			NOTES
10 #	#						(114)	(114)	(01 141)	(FPM)	(114 440)	63	125	250	500	1000	2000	4000	8000	
OS 00-)-01	VIBRO-ACOUSTICS	RD-UHV-F7	RECTANGULAR DISSIPATIVE	CIRCULATION 002F	AHU-00-02 SUPPLY	18x18	96	3802	1690	0.11	4	6	19	37	42	26	16	12	1
S 00-)-02	VIBRO-ACOUSTICS	RD-HV-F8	RECTANGULAR DISSIPATIVE	CIRCULATION 002F	AHU-00-02 SUPPLY	28x20	60	6571	1690	0.19	4	5	15	27	32	18	14	11	1
S 00-)-03	VIBRO-ACOUSTICS	RD-HV-F8	RECTANGULAR DISSIPATIVE	LOCKER 052	AHU-00-01 SUPPLY	16x12	96	2045	1534	0.24	7	9	26	46	50	28	20	16	1
OS 00-)-04	VIBRO-ACOUSTICS	RD-HV-F6	RECTANGULAR DISSIPATIVE	SPORT STORAGE 055	AHU-00-01 SUPPLY	40x14	108	5686	1462	0.16	5	13	26	43	46	26	17	11	1
S 00-)-05	VIBRO-ACOUSTICS	RD-UHV-F7	RECTANGULAR DISSIPATIVE	CIRCULATION 002F	AHU-00-01 RETURN	50x16	60	8100	1458	0.06	5	4	11	22	29	24	20	19	1
OS 00-)-06	KINETICS NOISE	KCFL	LOUVER	CIRCULATION 002F	FAN ROOM 068	96x72	8"	11485	239	0.04	12	12	14	17	21	21	19	19	
OS 02-	2-01	VIBRO-ACOUSTICS	RD-HV-F8	RECTANGULAR DISSIPATIVE	FAN ROOM 209	AHU-02-01 SUPPLY	32x50	96	17405	1566	0.25	7	9	22	41	50	37	25	20	1
S 02-	2-02	VIBRO-ACOUSTICS	RED-MHV-32271	RECTANGULAR ELBOW DISSIPATIVE	FAN ROOM 209	AHU-02-01 SUPPLY	48x72	96	20000	833	0.18	9	17	15	25	28	27	22	16	1, 2
S 02-	2-03	VIBRO-ACOUSTICS	RD-MLV-F6	RECTANGULAR DISSIPATIVE		AHU-02-01 RETURN	40x56	36	7700	495	0.04	5	7	13	21	27	21	13	10	1
OS 02-	2-04	VIBRO-ACOUSTICS	RD-MLV-F6	RECTANGULAR DISSIPATIVE		AHU-02-01 RETURN	40x34	36	4950	524	0.05	5	7	13	21	27	21	13	10	1
OS 02-	2-05	VIBRO-ACOUSTICS	RD-MLV-F3	RECTANGULAR DISSIPATIVE		AHU-02-01 RETURN	80x150	36	42350	508	0.04	5	8	15	19	20	16	12	10	1
S 02-	2-06	VIBRO-ACOUSTICS	RD-LV-F6	RECTANGULAR DISSIPATIVE		AHU-02-02 RETURN	40x72	36	10415	521	0.07	6	8	15	23	30	24	15	11	1
OS 02-	2-07	VIBRO-ACOUSTICS	RD-LV-F3	RECTANGULAR DISSIPATIVE		AHU-02-02 RETURN	80x108	36	31245	521	0.07	6	9	17	21	23	18	13	11	1
OS 02-	2-08	VIBRO-ACOUSTICS	RED-UHV-F9	RECTANGULAR ELBOW DISSIPATIVE	FAN ROOM 210	AHU-02-02 SUPPLY	24x68	48	18000	1588	0.21	4	6	10	17	23	19	14	14	1
SA		·																		

IN128 - JAMES T. MORRIS ARENA

Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEE 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408 812-855-1692

Architect RATIO 101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204

317-633-4040 Structural Engineer

FINK ROBERTS AND PETRIE, INC. 3535 EAST 96TH STREET

SUITE 126 INDIANAPOLIS, IN 46240

317-872-8400

Mechanical / Electrical INTROBA

8250 HAVERSTICK ROAD SUITE 285 INDIANAPOLIS, IN 46240

Plumbing Engineer

800-404-7677

138 N. DELAWARE ST

INDIANAPOLIS, IN 46204

317-633-4120 Acoustics / Technology Engineer

WJHW 7220 W. JEFFERSON AVE SUITE 216

LAKEWOOD, CO 80235

972-934-3700 Civil Engineer

AMERICAN STRUCTUREPOINT, INC. 9025 RIVER ROAD

SUITE 200 INDIANAPOLIS, IN 46240 317-547-5580

Food Service Consultant

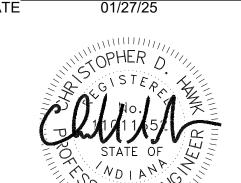
CINILITTLE 3405 NW 9TH AVENUE #1202

FORT LAUDERDALE, FL 33309 954-846-9600

Code Consultant

FORZA

2502 WEST MECHANIC ST, SUITE C HARRISONVILLE, MO 64701 816-806-3729



SH	EET ISSUE	
1	DD PROGRESS SET	07/18/2
2	DESIGN DEVELOPMENT	08/30/2
3	50% CONSTRUCTION DOCUMENTS	11/01/2
4	95% CONSTRUCTION DOCUMENTS	12/19/2
5	CONSTRUCTION DOCUMENTS	01/13/2
6	ADDENDUM 01	01/27/2



PROJECT NO.

MECHANICAL

SCHEDULES - AHU

MECHANICAL - VAV OUTSIDE AIR WITH REHEAT COIL SCHEDULE

(1) CONNECT TO DDC SYSTEM.

(2) NO RE-HEAT COIL (3) IF DCV AIRFLOW REQUIRED IS "0" THEN DCV IS NOT REQUIRED FOR THE SPACES BEING SERVED.

									AIRFLOW (C	FM)				Н	IEATING	COIL						
	EQUIPMENT					ZONE	INLET SIZE				TOTAL	DESIGN					HYDRON	IIC			OPERATING	3
TYPE	NUMBER	MANUFACTURER	MODEL	LOCATION	AREA SERVED	WEIGHTING FACTOR	(IN)	DESIGN AIRFLOW	BOX MINIMUM AIRFLOW	DCV AIRFLOW REQUIRED	HEATING (BTU/H)	HEATING AIR FLOW (CFM)	eat db (°F)	LAT DB (°F)	EWT (°F)	LWT (°F)	WATER FLOW (GPM)	WPD (PSI)	NO. OF ROWS	APD (IN.WG)		
OAVAV	00-01	PRICE	SDV	AUX LKR SHOWER / GROOM 005A	AUX LCKR ROOM	1	6	260	65	0	2,526	170	60.0	83.0	140.0	133.1	1.54	1.53	1	0.05	19	1
OAVAV	00-02	PRICE	SDV	VISITOR LKR 006	VISITOR LCKR ROOM	1	9	905	160	0	7,803	530	60.0	83.0	140.0	101.3	0.64	0.25	2	0.36	29	1
OAVAV	00-03	PRICE	SDV	HOME COACH LKR RM 014B	HOME COACH LCKR ROOM	1	8	615	95	6	5,456	370	60.0	83.0	140.0	102.1	0.46	0.11	2	0.35	22	1
OAVAV	00-04	PRICE	SDV	MBB GROOM 016C	MENS BBALL	1	12	1,125	300	0	12,833	860	60.0	83.0	140.0	104.0	1.11	0.81	2	0.31	36	1
OAVAV	00-05	PRICE	SDV	WBB GROOMING 022C	WOMENS BBALL	1	12	1,090	300	0	10,608	720	60.0	83.0	140.0	100.9	0.86	0.52	2	0.29	36	1
OAVAV	00-06	PRICE	SDV	WVB GROOM 026C	WOMENS VBALL	1	12	1,220	300	0	11,436	770	60.0	83.0	140.0	102.0	0.94	0.61	2	0.36	36	1
OAVAV	00-07	PRICE	SDV	TRAINING 030	TRAINING ROOM	1	8	605	125	0	6,451	440	60.0	83.0	140.0	105.5	0.59	0.17	2	0.34	22	1
OAVAV	00-08	PRICE	SDV	HYDROTHERAPY 030A	HYDROTHERAPY	1	6	345	65	0	2,609	190	60.0	83.0	140.0	98.6	0.25	0.02	2	0.18	19	1
OAVAV	00-09	PRICE	SDV	STORAGE 030B	SPORTS PERFORMANCE	1	12	1,470	300	0	20,129	1,350	60.0	83.0	140.0	114.8	2.18	3.35	2	0.52	36	1
OAVAV	00-10	PRICE	SDV	MENS RR 044	MENS RR	1	7	450	65	0	3,624	250	60.0	83.0	140.0	96.8	0.33	0.03	2	0.21	22	1
OAVAV	00-11	PRICE	SDV	WOMENS RR 046	WOMENS RR	1	7	455	95	0	6,573	445	60.0	83.0	140.0	105.8	0.59	0.18	2	0.21	22	1
OAVAV	00-12	PRICE	SDV	INDIVIDUAL LOCKER 051	INDIVIDUAL LCKRS	1	6	240	65	0	2,578	180	60.0	83.0	140.0	97.9	0.25	0.02	2	0.10	19	1
OAVAV	00-13	PRICE	SDV	FAN ROOM 068	AHU 00-02	0	24X16	5,550	1,185	0	0	0	0.0	0.0	0.0	0.0	0.00	0.00	0	0.00	62	1,2
OAVAV	00-14	PRICE	SDV	FAN ROOM 054	AHU 00-01	1,2	16	2,640	575	0	0	0	0.0	0.0	0.0	0.0	0.00	0.00	0	0.00	54	1,2
OAVAV	00-15	PRICE	SDV	INDIVIDUAL LOCKER 053	AHU 01-01	0	24X16	3,650	1,185	0	0	0	0.0	0.0	0.0	0.0	0.00	0.00	0	0.00	62	1,2
OAVAV	01-01	PRICE	SDV	WOMEN 105	NW WOMENS RR	1	12	1,165	300	0	11,805	800	60.0	83.0	140.0	102.7	1.33	0.67	2	0.33	36	1
OAVAV	01-02	PRICE	SDV	WOMEN 118	SW WOMENS RR	1	12	1,140	300	0	9,627	650	60.0	83.0	140.0	98.9	0.98	0.39	2	0.32	36	1
OAVAV	01-03	PRICE	SDV	MEN 114	SE MENS RR	1	8	795	125	0	6,224	450	60.0	83.0	140.0	106.1	0.83	0.18	2	0.54	22	1
OAVAV	01-04	PRICE	SDV	MEN 119	NE MENS RR	1	8	585	125	0	6,292	430	60.0	83.0	140.0	105.3	0.77	0.16	2	0.32	22	1

MECHANICAL - VAV SUPPLY AIR WITH REHEAT COIL SCHEDULE

(1) CONNECT TO DDC SYSTEM.
(2) IF DCV AIRFLOW REQUIRED IS "0" THEN DCV IS NOT REQUIRED FOR THE SPACES BEING SERVED.

										AIDEL OW (OF II)	<u> </u>					IE A TINIO	0011						
							70115			AIRFLOW (CFM)					<u> </u>	HEATING	COIL	LIVERO	\!I.O				
TYPE	EQUIPMENT	ASSOCIATED	MANUFACTURER	MODEL	LOCATION	ADEA SEDVED	ZONE WEIGHTING	INLET SIZE	DECION	DOY MINIMUM		TOTAL	DESIGN	FATOD	LATED		T	HYDRO	NIC	T		OPERATING	NOTES
ITPE	NUMBER	AHU	MANUFACTURER	WIODEL	LOCATION	AREA SERVED	FACTOR	(IN)	DESIGN AIRFLOW	BOX MINIMUM AIRFLOW	DCV MIN AIRFLOW	HEATING (BTU/H)	HEATING AIR FLOW (CFM)	R (°F)	(°F)	EWT (°F)	LWT (°F)	WATER FLOW (GPM)	WPD (PSI)	NO. OF ROWS	APD (IN.WG)	WEIGHT (LB)	NOTES
VAV	00-01	AHU-00-01	PRICE	SDV	GOLF OO 059AA	GOLF	ALL	5	160	60	0	1,501	105	60.0	83.0	140.0	125.0	0.45	0.17	1	0.02	18	ALL
VAV	00-02	AHU-00-01	PRICE	SDV	W TN HC 028	TENNIS	ALL	5	220	60	0	2,197	150	60.0	83.0	140.0	130.6	1.00	0.71	1	0.04	18	ALL
VAV	00-03	AHU-00-01	PRICE	SDV	M T&F HC 028	UNASSIGNED OFFICES	ALL	4	130	45	0	1,279	90	60.0	83.0	140.0	122.9	0.33	0.11	1	0.02	18	ALL
VAV	00-04	AHU-00-01	PRICE	SDV	W SOC HC 490	SOCCER	ALL	5	210	60	0	1,934	130	60.0	83.0	140.0	128.1	0.69	0.37	1	0.02	18	ALL
VAV	00-05	AHU-00-01	PRICE	SDV	NUTRITION ZONE 038	NUTRITION	ALL	6	340	65	0	2,859	195	60.0	83.0	140.0	99.3	0.31	0.02	2	0.17	19	ALL
VAV	00-06	AHU-00-01	PRICE	SDV	OFFICE 024C	TRAINING OFFICE	ALL	4	105	45	0	1,488	100	60.0	83.0	140.0	124.4	0.41	0.15	1	0.01	18	ALL
VAV	00-07	AHU-00-01	PRICE	SDV	ATHLETE LOUNGE 039	ATHLETE LOUNGE	ALL	12	1,180	300	326	5,463	370	60.0	83.0	140.0	92.0	0.47	0.11	2	0.31	36	ALL
VAV	00-08	AHU-00-01	PRICE	SDV	SOFTBALL OO 059Y	SOFTBALL	ALL	5	220	60	0	3,194	215	60.0	83.0	140.0	99.0	0.33	0.02	2	0.04	20	ALL
VAV	00-09	AHU-00-01	PRICE	SDV	WVB OO 059V	VOLLEYBALL	ALL	6	280	60	0	3,294	225	60.0	83.0	140.0	99.5	0.34	0.02	2	0.13	19	ALL
VAV	00-10	AHU-00-01	PRICE	SDV	WBB AC 044A	WBB OFFICES	ALL	6	310	60	0	3,733	250	60.0	83.0	140.0	101.2	0.40	0.04	2	0.07	19	ALL
VAV	00-11	AHU-00-01	PRICE	SDV	WBB AC 044A	MBB OFFICES	ALL	6	340	60	0	4,155	280	60.0	83.0	140.0	103.3	0.47	0.05	2	0.17	19	ALL
VAV	00-12	AHU-00-01	PRICE	SDV	STAFF BREAK 045	STAFF BREAK S	ALL	5	210	60	110	1,649	115	60.0	83.0	140.0	126.4	0.54	0.24	1	0.01	18	ALL
VAV	00-13	AHU-00-01	PRICE	SDV	EXAM ROOM 046	T&F	ALL	5	175	60	0	2,189	150	60.0	83.0	140.0	130.6	1.00	0.71	1	0.04	18	ALL
VAV	00-14	AHU-00-01	PRICE	SDV	MARSHALLING 056	MARSHALLING	ALL	10	980	210	0	13,616	910	60.0	83.0	140.0	113.1	2.09	1.20	2	0.42	29	ALL
VAV	00-15	AHU-00-01	PRICE	SDV	MARSHALLING 056	STAFF BREAK N	ALL	4	105	65	65	1,118	95	60.0	83.0	140.0	123.7	0.37	0.13	1	0.01	18	ALL
VAV	00-16	AHU-00-01	PRICE	SDV	FS COMMISSARY + KITCHEN 063	FS COMMISSARY + KITCHEN 063	ALL	10	840	210	0	9,310	840	60.0	83.0	140.0	111.0	1.79	0.91	2	0.32	29	ALL
VAV	00-17	AHU-00-01	PRICE	SDV	SPORT + GENRAL STORAGE 059	SPORT + GENERAL STORAGE 059	ALL	12	1,525	300	0	22,531	1,530	60.0	83.0	140.0	118.9	4.46	5.69	2	0.53	36	ALL
VAV	00-18	AHU-00-01	PRICE	SDV	MARSHALLING 056	VP CONTROL 057	ALL	6	270	65	0	1,973	145	60.0	83.0	140.0	130.0	0.91	0.60	1	0.02	17	ALL
VAV	00-19	AHU-00-02	PRICE	SDV	CIRCULATION 060	NW OPEN COURT	ALL	12	1,480	300	0	16,823	1,130	60.0	83.0	140.0	110.0	2.33	1.80	2	0.50	36	ALL
VAV	00-20	AHU-00-02	PRICE	SDV	CIRCULATION 060	NW COURT	ALL	16	2,260	575	0	22,862	1,535	60.0	83.0	140.0	102.1	2.50	0.98	2	0.39	54	ALL
VAV	00-21	AHU-00-02	PRICE	SDV	CIRCULATION 060	NE OPEN COURT	ALL	12	1,480	300	0	16,823	1,110	60.0	83.0	140.0	109.6	2.26	1.70	2	0.50	36	ALL
VAV	00-22	AHU-00-02	PRICE	SDV	CIRCULATION 060	NE COURT	ALL	16	2,260	575	0	22,862	1,535	60.0	83.0	140.0	102.1	2.50	0.98	2	0.38	54	ALL
VAV	00-23	AHU-00-02	PRICE	SDV	CIRCULATION 060	N OPEN COURT	ALL	14	1,840	430	0	20,755	1,400	60.0	83.0	140.0	104.6	2.44	0.88	2	0.39	47	ALL
VAV	00-24	AHU-00-02	PRICE	SDV	ATHLETE LOUNGE 039	SW OPEN COURT	ALL	12	1,480	300	0	17,015	1,150	60.0	83.0	140.0	110.4	2.40	1.90	2	0.50	36	ALL
VAV	00-25	AHU-00-02	PRICE	SDV	VIDEO ROOM 040	SW COURT	ALL	16	2,260	575	0	22,862	1,535	60.0	83.0	140.0	102.1	2.50	0.98	2	0.38	54	ALL
VAV	00-26	AHU-00-02	PRICE	SDV	WBB HC 036	SE OPEN COURT	ALL	12	1,480	300	0	16,832	1,130	60.0	83.0	140.0	110.0	2.33	1.80	2	0.50	36	ALL
VAV	00-27	AHU-00-02	PRICE	SDV	WBB HC 036	SE COURT	ALL	16	2,260	575	0	22,862	1,535	60.0	83.0	140.0	102.1	2.50	0.98	2	0.38	54	ALL

				MECHANICAL - '	VAV EXHAUST AIR SCI	HEDULE					
NOTES: (1) CONNE	ECT TO DDC SYST	EM.									
							AIRFL	OW (CFM)	MAX	ODEDATINO	
TYPE	EQUIPMENT NUMBER	MANUFACTURER	MODEL	LOCATION	AREA SERVED	INLET SIZE (IN)	DESIGN AIRFLOW	MINIMUM AIRFLOW	PRESS. DROP (IN-WG)	OPERATING WEIGHT (LB)	NOTES
EAVAV	00-01	PRICE	SDV	GREEN ROOM / VIS COACH LOCKER 003	AUX LCKR ROOM	6	340	65	0.2	12	ALL
EAVAV	00-02	PRICE	SDV	VISITOR LOCKER 019	VISITOR LCKR ROOM	12	1,130	300	0.2	22	ALL
EAVAV	00-03	PRICE	SDV	HOME COACH LKR RM 023	HOME COACH LCKR ROOM	8	690	125	0.2	14	ALL
EAVAV	00-04	PRICE	SDV	MBB NUTR. 020	MENS BBALL	12	1,360	300	0.2	22	ALL
EAVAV	00-05	PRICE	SDV	WBB LOUNGE 021B	WOMENS BBALL	12	1,360	300	0.2	22	ALL
EAVAV	00-06	PRICE	SDV	WVB LOCKER 022	WOMENS VBALL	12	1,360	300	0.2	22	ALL
EAVAV	00-07	PRICE	SDV	TRAINING 024	TRAINING ROOM	8	700	125	0.2	14	ALL
EAVAV	80-00	PRICE	SDV	HYDROTHERAPY 024AA	HYDROTHERAPY	7	495	95	0.2	14	ALL
EAVAV	00-09	PRICE	SDV	SPORTS PERFORMANCE 025	SPORTS PERFORMANCE	12	1,605	300	0.2	22	ALL
EAVAV	00-10	PRICE	SDV	MENS RR 050	MENS RR	7	440	95	0.2	14	ALL
EAVAV	00-11	PRICE	SDV	WOMENS RR 051	WOMENS RR	8	600	125	0.2	14	ALL
EAVAV	00-12	PRICE	SDV	INDIVIDUAL LOCKER 057	INDIVIDUAL LCKRS	6	410	65	0.2	12	ALL
EAVAV	00-13	PRICE	SDV	FAN ROOM 068	FAN ROOM 068	24X16	5.550	1,185	0.2	62	ALL
EAVAV	00-14	PRICE	SDV	FAN ROOM 054	FAN ROOM 054	16	2,640	1 430	0.2	33	ALL
EAVAV	00-15	PRICE	SDV	INDIVIDUAL LOCKER 053	SUPPORT 115D	24X16	3,620	1,185	0.2	62	ALL
EAVAV	00-16	PRICE	SDV	FS COMMISSARY + KITCHEN 063	FS COMMISSARY + KITCHEN 063	8	630	125	0.2	14	ALL
EAVAV	01-01	PRICE	SDV	CONCESSIONS 102	NW WOMENS RR	14	1,845	430	0.2	28	ALL
EAVAV	01-02	PRICE	SDV	WOMEN 118	SW WOMENS RR	14	1,865	430	0.2	28	ALL
EAVAV	01-03	PRICE	SDV	MEN 112	SE MENS RR	10	1,070	210	0.2	18	ALL
EAVAV	01-04	PRICE	SDV	MEN 104	NE MENS RR	8	750	125	0.2	14	ALL

IN128 - JAMES T. MORRIS ARENA

Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEES 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408 812-855-1692

Architect

RATIO 101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204 317-633-4040

Structural Engineer FINK ROBERTS AND PETRIE, INC.

3535 EAST 96TH STREET SUITE 126 INDIANAPOLIS, IN 46240 317-872-8400

Mechanical / Electrical INTROBA 8250 HAVERSTICK ROAD SUITE 285 INDIANAPOLIS, IN 46240 800-404-7677

Plumbing Engineer
DLZ

138 N. DELAWARE ST INDIANAPOLIS, IN 46204 317-633-4120

Acoustics / Technology Engineer WJHW

7220 W. JEFFERSON AVE SUITE 216 LAKEWOOD, CO 80235 972-934-3700

Civil Engineer

AMERICAN STRUCTUREPOINT, INC.

9025 RIVER ROAD SUITE 200 INDIANAPOLIS, IN 46240 317-547-5580

Food Service Consultant CINILITTLE

3405 NW 9TH AVENUE #1202 FORT LAUDERDALE, FL 33309 954-846-9600

Code Consultant

FORZA 2502 WEST MECHANIC ST, SUITE C HARRISONVILLE, MO 64701 816-806-3729



ЭΠ	EET 1000E	
1	DD PROGRESS SET	07/18/24
2	DESIGN DEVELOPMENT	08/30/24
3	50% CONSTRUCTION DOCUMENTS	11/01/24
4	95% CONSTRUCTION DOCUMENTS	12/19/24
5	CONSTRUCTION DOCUMENTS	01/13/25
6	ADDENDUM 01	01/27/25



PROJECT NO.

SHEET TITLE

MECHANICAL SCHEDULES - VAV

MECHANICAL - RELIEF AIR FAN ARRAY

(1) RAFA IS PROVIDED AS AN ASSEMBLED UNIT FROM MANUFACTURER WITH SINGLE POINT OF POWER CONNECTION AND SPEED CONTROLLER.

(2) UNIT IS SIZED WITH N-1 OPERATION OF FANS. PERFORMANCE IS INDICATED WITH ALL FANS RUNNING.

(3) UPON ANY SINGULAR FAN FAILURE, THE UNIT SHALL ADJUST THE REMAINING FANS TO COMPENSATE.

(4) ALL FAN MOTORS ARE DIRECT-DRIVE. (5) ADD-ALT SHALL BE PROVIDED FOR UNIT TO BE PROVIDED BY AHU MANUFACTURER WITH INDEPENDENT VFDS WITH MOTORIZED SHUTOFF DAMPERS ON EACH FAN. IF THE ADD-ALT IS SELECTED, A REVISION TO THE ELECTRICAL DESIGN WILL BE REQUIRED.

									FANS								ELECTR	ICAL					
TYPE	EQUIPMENT NUMBER	MANUFACTURER	MODEL	LOCATION	SERVICE	AIR FLOW (EACH) (CFM)	OVERALL ESP (IN-WG)	OVERALL TSP (IN-WG)	1	PEED RPM)	FAN QTY	HP (EACH)	BHP (EACH)	MCA (A)	MOCP (A)	VOLT (V)	PHASE	FREQUENCY (HZ)	EMERG. PWR. (Y/N)	OPERATING WEIGHT (LB)	HEIGHT	WIDTH	NOTES
RAFA	00-03	GREENHECK	MOA-560	FAN ROOM 068	RELIEF AIR	6,625	2.0	2.0	Yes 1	1295	4	8	5.1	32	40	460	3	60	No	902	8' - 0"	8' - 0"	ALL
RAFA	01-01	GREENHECK	MOA-560	SUPPORT 115B	RELIEF AIR	4,470	1.0	1.0	Yes	994	2	8	5.2	17	25	460	3	60	No	518	4' - 0"	9' - 0"	ALL
RAFA	02-01	GREENHECK	MOA-560	FAN ROOM 209	RELIEF AIR	9,165	1.0	1.0	Yes 1	1780	6	8	5.1	46	50	460	3	60	No	1133	12' - 0"	8' - 6"	ALL
RAFA	02-02	GREENHECK	MOA -560	FAN ROOM 210	RELIEF AIR	6,945	1.0	1.0	Yes 1	1356	6	8	5.1	46	50	460	3	60	No	1133	12' - 0"	8' - 6"	ALL

MECHANICAL - RELIEF FAN SCHEDULE

(1) BACKDRAFT DAMPER. (2) REFER TO SPECIFICATIONS FOR VIBRATION ISOLATION REQUIREMENTS

MOTOR DRIVE ELECTRICAL EMERG. PWR. EQUIPMENT FLA MOCP VOLT(V) PH HZ MODEL NOTES LOCATION SERVICE TYPE AIR FLOW ESP TSP SPEED MIN. STATIC TYPE ESP TSP SPEED MIN. STATIC HP BHP ECM (A) (A) WEIGHT (LB) (CFM) SQ-27-M2-VG **EXHAUST** IN-LINE 12,500 IN-LINE 2.0 2.0 1111 02-02 GREENHECK FAN ROOM 203 10 | 6.6 | Yes | 14 | 20 | 460 | 3 | 60 | No 494

MECHANICAL - GREASE EXHAUST FAN SCHEDULE

NOTES:

(1) GREASE TRAP (2) HERESITE COATED FAN

(3) REFER TO SPECIFICATIONS FOR VIBRATION ISOLATION REQUIREMENTS (4) PROVIDE MATCHED VENTILATED ROOF CURB

(5) PROVIDE WALL MOUNTING SUPPORT FOR GREASE EXHAUST APPLICATIONS BY MANUFACTURER.

									FA	N			MC	OTOR DR	IVE		ELE	CTRICAL					
TYPE	EQUIPMENT NUMBER	MANUFACTURER	MODEL	LOCATION	SERVICE	TYPE	AIR FLOW (CFM)	TYPE	ESP (IN-WG)	TSP (IN-WG)	SPEED [RPM]	STATIC EFFICIENCY [%]	НР	ВНР	ECM	FLA (A)	MOCP (A)	VOLT(V)	PH	HZ	EMERG. PWR. (Y/N)	OPERATING WEIGHT (LB)	NOTES
GEF	02-01	GREENHECK	CUE-180HP-VG	ROOF	GREASE EXHAUST	UPBLAST	1,890	UP-BLAST	1.5	1.5	1220	59	1	0.8	Yes	4	15	208	3	60	No	119	1-4
GEF	02-02	GREENHECK	CUE-180HP-VG	ROOF	GREASE EXHAUST	UPBLAST	1.890	UP-BLAST	1.5	1.5	1220	59	1	0.8	Yes	4	15	208	3	60	No	119	1-3. 5

MECHANICAL - MAKE UP AIR FAN SCHEDULE

(1) BACKDRAFT DAMPER. (2) REFER TO SPECIFICATIONS FOR VIBRATION ISOLATION REQUIREMENTS.

(3) REQUIRES GREENHECK SQ DIRECT DRIVE FILTER BOX EQUAL OR APPROVED.

											FAN			MC	OTOR DR	RIVE		ELE	CTRICAL					FILTE	R BOX		
1	V D L	EQUIPMENT NUMBER	MANUFACTURER	MODEL	LOCATION	SERVICE	TYPE	AIR FLOW (CFM)		ESP (IN-WG)	TSP (IN-WG)	SPEED	STATIC ICIENCY		ВНР	ECM	FLA (A)	MOCP (A)	VOLT(V)	PH	HZ	EMERG. PWR. (Y/N)	FILTER TYPE	FILTER QUANTITY	FILTER SIZE (IN)	FILTER BOX LENGTH (IN)	NOTES
	1AF	01-01	GREENHECK	SQ-140-VG	CONCESSIONS 102	MAKE-UP AIR	IN-LINE	1,700	AXIAL	1.3	1.3	1522	49	1.00	0.6	Yes	4	15	230	3	60	No	MERV 8	2	20x25	28	ALL
	1AF	01-02	GREENHECK	SQ-140-VG	CONCESSIONS 119	MAKE-UP AIR	IN-LINE	1,700	AXIAL	1.3	1.3	1522	49	1.00	0.6	Yes	4	15	230	3	60	No	MERV 8	2	20x25	28	ALL

HVLS 02-06

						М	ECHAI	VICAL	TRAI	NSFER	FAN S	CHED	ULE											
	DRAFT DAMPER. TO SPECIFICATIO	NS FOR VIBRATION ISOLATI	ON REQUIREMENTS.																					
										FAN				MO	TOR DRI	VΕ		ELE	CTRICAL			EMEDO		
ТҮРЕ	EQUIPMENT NUMBER	MANUFACTURER	MODEL	LOCATION	SERVICE	TYPE	AIR FLOW (CFM)	<i>I</i>	HEEL MIN. DIA. [IN]	ESP (IN-WG)	TSP (IN-WG)	SPEED [RPM]	STATIC EFFICIENCY [%]	HP	ВНР	ECM (Y/N)	FLA (A)	MOCP (A)	VOLT(V)	РН	HZ	EMERG. PWR. (Y/N)	OPERATING WEIGHT (LB)	NOTES
TF	00-01	GREENHECK	SQ-120-VG	IDF 009	TRANSFER AIR	IN-LINE	1,275	AXIAL	19	0.5	0.5	1409	40	0.25	0.17	Yes	6	15	115	1	60	Yes	63	ALL
TF	00-02	GREENHECK	SQ-100-VG	AV ROOM 010	TRANSFER AIR	IN-LINE	585	AXIAL	17	0.5	0.5	1221	59	0.25	0.17	Yes	3	15	115	1	60	No	55	ALL
TF	00-03	GREENHECK	SQ-100-VG	AV ROOM 049	TRANSFER AIR	IN-LINE	585	AXIAL	17	0.5	0.5	1221	59	0.25	0.17	Yes	3	15	115	1	60	No	55	ALL
TF	01-01	GREENHECK	SQ-100-VG	AV ROOM 010	TRANSFER AIR	IN-LINE	585	AXIAL	17	0.5	0.5	1221	59	0.25	0.17	Yes	3	15	115	1	60	No	55	ALL
TF	01-02	GREENHECK	SQ-120-VG	IDF 107D	TRANSFER AIR	IN-LINE	1,275	AXIAL	19	0.5	0.5	1409	40	0.25	0.17	Yes	6	15	115	1	60	Yes	63	ALL
TF	02-01	GREENHECK	SQ-120-VG	IDF 202	TRANSFER AIR	IN-LINE	1,275	AXIAL	19	0.5	0.5	1409	40	0.25	0.17	Yes	6	15	115	1	60	Yes	63	ALL
TF	02-01	GREENHECK	SQ-100-VG	AV ROOM 010	TRANSFER AIR	IN-LINE	730	AXIAL	17	0.5	0.5	1297	56	0.25	0.10	Yes	3	15	115	1	60	Yes	55	ALL

SQ-120-VG IDF 204 TRANSFER AIR IN-LINE 1,275 AXIAL 19 0.5 0.5 1409 40 0.25 0.17 Yes 6 15 115 1 60 Yes 63

MECHANICAL - CEILING EXHAUST FAN SCHEDULE'

* CELLS WITH SHADED BACKGROUNDS ARE UNASSIGNED OR UNDER REVIEW

(1) BACKDRAFT DAMPER. (2) FAN INTERLOCK WITH LIGHTING POWER AND WIRING BY ELECTRICAL.

(3) FAN CONTROLLED BY WALL ON/OFF SWITCH WITH LIGHT INDICATOR. (4) PROVIDE LAY-IN FRAMING FOR GYPSUM INSTALLATION TO ALLOW UNIT ACCESS THROUGH CEILING.

							FAN			ELI	ECTRICAL	L	EMERGENCY	OPERATING	G
TYPE	EQUIPMENT NUMBER	MANUFACTURER	SYSTEM MODEL/ FAN MODEL	LOCATION SPACE NAME NUMBER	SERVICE	TYPE	AIR FLOW	ESP	FLA (A)	VOLT	PHASE	FREQUENCY	DOWED (V/N)	WEIGHT (LE	NOTES
							(CFM)	(IN-WG)	FLA (A)	(V)	PHASE	(HZ)	POWER (1/N)	WEIGHT (EE	"
CEF	02-01	GREENHECK	SP-A200-QD	RESTROOM 205	RESTROOM EXHAUST	CENTRIFUGAL	75	0.04	0.47	115	1	60	No	18	ALL

		ME	ECHANICA	AL - HIGH VOLUMI	E LOW SPI	EED FAN	SCHE	DULE			
NOTES:											
	BACNET ADAPTER E	BY MANUFACTURER									
	E REVERSIBLE RIVE IP56 MOTOR W	TH VFD BY MANUFACTURER.									
		<u>-</u>									
7/05	EQUIPMENT	MANUEAGTURER		LOCATION	BIAMETER		ELI	ECTRICAL		OPERATING	NOTES
TYPE	EQUIPMENT NUMBER	MANUFACTURER	MODEL	LOCATION	DIAMETER	MOTOR (HP)	ELI VOLT	ECTRICAL PHASE	- FREQUENCY (HZ)	OPERATING WEIGHT (LB)	
TYPE HVLS	1 '	MANUFACTURER BAF	MODEL PFX4.0	LOCATION WEST CONCOURSE	DIAMETER 12' - 0"	MOTOR (HP)					
	NUMBER		_			MOTOR (HP) 2 2	VOLT	PHASE	FREQUENCY (HZ)	WEIGHT (LB) 245	NOTES
HVLS	NUMBER 02-01	BAF	PFX4.0	WEST CONCOURSE	12' - 0"	2	VOLT 460	PHASE 3	FREQUENCY (HZ)	WEIGHT (LB) 245	ALL
HVLS HVLS	02-01 02-02	BAF BAF	PFX4.0 PFX4.0	WEST CONCOURSE WEST CONCOURSE	12' - 0" 12' - 0"	2 2	VOLT 460 460	PHASE 3 3	60 60	245 245	ALL ALL

18' - 0" 2 460 3

OTES:												
,	E MOTORIZED BACKDRAFT D	AMPER										
.) PROVID	E MATCHED ROOF CURB											
					AIR FI OW	MAX VELOCITY	MAX APD	THROAT	DII	MENSIONS (IN)	
TYPE	EQUIPMENT NUMBER	MANUFACTURER	MODEL	LOCATION	AIR FLOW	MAX VELOCITY	MAX APD _(I <u>N</u> -WG)	THROAT AREA (SF)	DII LENGIH	MENSIONS (IN) _ HEIGHI _	NOTES

PRACTICE COURT

IN128 - JAMES T. MORRIS ARENA

Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEE 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408

812-855-1692 Architect

RATIO 101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204 317-633-4040

Structural Engineer FINK ROBERTS AND PETRIE, INC.

3535 EAST 96TH STREET

SUITE 126 INDIANAPOLIS, IN 46240 317-872-8400

Mechanical / Electrical INTROBA 8250 HAVERSTICK ROAD SUITE 285

INDIANAPOLIS, IN 46240 800-404-7677 Plumbing Engineer

138 N. DELAWARE ST

LAKEWOOD, CO 80235

INDIANAPOLIS, IN 46240

972-934-3700

INDIANAPOLIS, IN 46204 317-633-4120

Acoustics / Technology Engineer WJHW 7220 W. JEFFERSON AVE SUITE 216

Civil Engineer AMERICAN STRUCTUREPOINT, INC.

9025 RIVER ROAD SUITE 200

317-547-5580 Food Service Consultant CINILITTLE

3405 NW 9TH AVENUE #1202

FORT LAUDERDALE, FL 33309 954-846-9600 Code Consultant

FORZA 2502 WEST MECHANIC ST, SUITE C HARRISONVILLE, MO 64701 816-806-3729



SH	EET ISSUE	
1	DD PROGRESS SET	07/18/2
2	DESIGN DEVELOPMENT	08/30/2
3	50% CONSTRUCTION DOCUMENTS	11/01/2
4	95% CONSTRUCTION DOCUMENTS	12/19/2
5	CONSTRUCTION DOCUMENTS	01/13/2
6	ADDENDUM 01	01/27/2



PROJECT NO.

MECHANICAL SCHEDULES - FAN

									DDIMADV	TOTAL						OLING COIL		\A/A	ATED OID	F		AID C		TING COIL		\A/A TF	D CIDE	DUCT	MAX APD
	EQUIPM NUMB		IFACTURER	MODEL	ТҮРЕ	LENGTH	WIDTH	COIL CIRCUI	PRIMARY AIRFLOW (CFM)	TOTAL DISCHARGE (CFM)	INDUCTION RATIO	BEAM APD (IN-WG)	COOLING AIR SIDE CAPACITY (BTU/H)	COOLING PRIMARY AIR	COOLING PRIMARY AIR TEMP WB (°F)	COOLING ROOM AIR TEMP DB (°F)	LAT DB E	WA WT LW °F) (°F)	T FLOV (GPM	V WPD	HEATING AIR SIDE CAPACITY (BTU/H)	AIR-S HEATIN PRIMARY TEMP (°	IG HEAT		AT EW	T LWT	FLOW (GPM)	WPD (FT WC)	SOUND PRESSURE (dbA)
3	01-02 01-02	1	PRICE PRICE	ACBL24_2W ACBL24_2W	4 PIPE	8'-0" 6'-0"	2' - 0"	SINGLE		307.5803 302.4321	~~ 5 8~~	0.72	5564.4 5512.2	` '	54.9	78 78	61.5 5	8.0 64.1 8.0 62.9	1 1 5 9 1.8	7.4 8.1	6396.9 5615.1	60	68.	86	7 120 1.7 120	0 93.2	0.5	0.3 5"	²⁶
3	01-02		PRICE	ACBL24_2W	4 PIPE	6' - 0"	2' - 0"	SINGLE	50	302.4321	5	0.72	5512.2 2159.6	57.5	54.9	78	61.5 5	8.0 62.9	0 1.0	8.1	5615.1 1848	60	68.	0 84	1.7 120	.0 96.1	0.5	0.3 5"	31
	01-04	1	PRICE PRICE	ACBL24_2W ACBL24_2W	4 PIPE	8' - 0" 8' - 0"	2' - 0" 2' - 0"	SINGLE SINGLE	50 50	341.7559 341.7559	5.8 5.8	0.65 0.65	5905.2 5990.2	57.5 57.5	54.9 54.9	78 78	62.4 5	68.0 65.3 68.0 64.9		5.7 6.6	6722.1 6722.1	60	68. 68.			0 91.7	0.5 0.5	0.4 5" 0.4 5"	28
	01-0	6	PRICE	ACBL24_2W	4 PIPE	8' - 0" 8' - 0"	2' - 0"	SINGLE	50	341.7559 362.9186	5.8	0.65 0.58	6203.2 6526.9	57.5 57.5	54.9 54.9	78 78	61.6 5	68.0 64.0 68.0 63.2		9.3	6722.1 6349.5	60	68.			0 91.7	0.5	0.4 5"	28
**	01-08	7	PRICE	ACBL24_2W ACBL24_2W	4 PIPE 4 PIPE	8' - 0"	2'-0"	DUAL	105	532.0735	4.1	0.69	8917.2	57.5	54.9	78	62.9 5	8.0 64.2		3.1	6925.4	60	68.).7 120).7 120	0 89.0 0 89.0	0.5	0.4 5"	38
}	01-08 01-08 01-08	.3	PRICE PRICE	ACBL24_2W ACBL24_2W	4 PIPE 4 PIPE	8' - 0" 8' - 0"	2' - 0"	DUAL DUAL	105 105	532.0735 532.0735	4.1	0.69 0.69	8917.2 8917.2	57.5 57.5	54.9 54.9 54.9	78		68.0 64.2 68.0 64.2 68.0 64.2		3.1	6925.4 6925.4	60	68. 68.		9.7 120 9.7 120		0.5	0.4 5"	38 38
_	01-0			ACBL24_2W ACBL24_2W								0.56		57.5	54.9				6 2.1	4.3	6925.4 2281.7	60	68.	0 81	1.7 120 1.9 120	0 114.2	0.9	0.4 5"	34
}	01-10	2	PRICE PRICE	ACBL24_2W ACBL24_2W	4 PIPE 4 PIPE	4' - 0" 4' - 0"	2' - 0"	SINGLE	115	425.8558 425.8558	2.7	0.74	6008.9	57.5 57.5	54.9 54.9	78	65.2 5	88.0 69.4 88.0 69.4	4 0.6	0.8	4159.9 4159.9	60	68. 68.	0 76	5.8 120 5.8 120	.0 99.6	0.5	0.2 8"	45 45
} }	01-10 01-10	.4	PRICE PRICE	ACBL24_2W ACBL24_2W	4 PIPE 4 PIPE	4' - 0" 4' - 0"	2' - 0" 2' - 0"	SINGLE SINGLE	115 115	425.8558 425.8558	2.7 2.7	0.74 0.74	6008.9 6008.9	57.5 57.5	54.9 54.9	78 78	65.2 5	68.0 69.4 68.0 69.4	4 0.6	0.8	4159.9 4159.9	60	68. 68.	0 76	6.8 120 6.8 120	.0 99.6	0.5 0.5	0.2 8"	45 45
,	01-1 ²	.1	PRICE PRICE	ACBL24_2W ACBL24_2W	4 PIPE 4 PIPE	4' - 0" 4' - 0"	2' - 0" 2' - 0"	SINGLE SINGLE	50 115	253.3684 425.8558	4.1 2.7	0.70 0.74	4504.2 6008.9	57.5 57.5	54.9 54.9	78 78	<u> </u>	68.0 63.2 68.0 69.4		3.2 0.8	4277.1 4159.9	60 60	68. 68.		3.2 120 3.8 120		0.5 0.5	0.2 5" 0.2 8"	34 45
,	01-12 01-12		PRICE PRICE	ACBL24_2W ACBL24_2W	4 PIPE 4 PIPE	4' - 0" 4' - 0"	2' - 0" 2' - 0"	SINGLE SINGLE	115 115	425.8558 425.8558	2.7 2.7	0.74 0.74	6008.9 6008.9	57.5 57.5	54.9 54.9	78 78	<u> </u>	68.0 69.4 68.0 69.4		0.8	4159.9 4159.9	60	68. 68.		5.8 120 5.8 120		0.5 0.5	0.2 8" 0.2 8"	45 45
	01-1	مرمر	PRICE	ACBL24 2W	4 PIPE	6' - 0"	2' - 0"	SINGLE	165	611.0105	2.7	0.60	7402.1	57.5	54.9	78	67.0 5	8.0 72.7	7 0.5	0.8	5639.0	60	68.	0 76	5.3 120	.0 92.0	0.5	0.2 8"	44
	01-1		PRICE PRICE	ACBL24_2W ACBL24_2W	4 PIPE 4 PIPE	8' - 0" 2' - 0"	2' - 0" 2' - 0"	DUAL SINGLE	50 40	341.7559 148.1237	5.8	0.65 0.56	6307.2 2159.6	57.5 57.5	54.9 54.9	78 78		8.0 62.1 8.0 63.0			6381.1 1848.7	60	68. 68.		1.8 120 0.2 120		0.5	0.4 5" 0.1 5"	28 34
	01-10 01-17	6	PRICE PRICE	ACBL24_2W ACBL24_2W	4 PIPE 4 PIPE	8' - 0" 6' - 0"	2' - 0" 2' - 0"	DUAL SINGLE	50 100	341.7559 432.4117	5.8 3.3	0.65 0.52	6233.2 6644.4	57.5 57.5	54.9 54.9	78 78	61.5 5	58.0 62.4 58.0 67.7	4 2.3	3.7 2.3	6381.1 5647.2	60 60	68. 68.	0 84	1.8 120 9.8 120	.0 93.1	0.5 0.5	0.4 5" 0.3 5"	28 38
	01-17	.2	PRICE	ACBL24_2W	4 PIPE	6' - 0" - 2' - 0"	2' - 0"	SINGLE - SINGLE -	100	432.4117 _148.1237	3.3	0.52	6644.4	57.5	54.9 - 54.9	78	 	8.0 67.7	_	2.3	5647.2	60	68.		9.8 120	0 94.3	0.5	0.3 5"	38
~~	01-19 01-19	.1	PRICE PRICE	ACBL24_2W ACBL24_2W	4 PIPE 4 PIPE	8' - 0" 8' - 0"	2' - 0" 2' - 0"	SINGLE SINGLE	50 50	341.7559 341.7559	5.8 5.8	0.65 0.65	5990.2 5990.2	57.5 57.5	54.9 54.9	78 78	<u> </u>	8.0 64.9 8.0 64.9		6.6 6.6	6722.1 6722.1	60 60	68. 68.	_	5.7 120	.0 91.7	0.5 0.5	0.4 5" 0.4 5"	28
	01-20		PRICE	ACBL24_2W ACBL24_2W	4 PIPE	8' - 0"	2' - 0"	SINGLE	45	307.5803	5.8	0.54	5340.4	57.5	54.9	78	62.3 5	68.0 65.2		5.0	6396.9 6396.9	60	68.				0.5	0.4 5"	26
•	01-2	tuu.	PRICE	ACBL24_2W	4 PIPE	2' - 0"	2' - 0"	SINGLE	40	148.1237	2.7	0.56	2159.6	57.5	54.9	78	64.8 5	8.0 63.0	0 0.5	0.3	1848.7	60	68.	0 79	9.2 120	.0 111.3	0.5	0.1 5"	34
	01-2	3	PRICE PRICE	ACBL24_2W ACBL24_2W	4 PIPE 4 PIPE	4' - 0"	2' - 0"	SINGLE	40 80	202.6947 316.8694	3	0.46	3174.6 4322.1	57.5 57.5	54.9 54.9	78	65.7 5	68.0 67.1 68.0 68.0	0 0.5	0.6	3958.7 4079.4	60	68. 68.	0 79	5.6 120 9.6 120	.0 101.1	0.5	0.2 5"	28 38
	02-0	2	PRICE PRICE	ACBL24_2W ACBL24_2W	4 PIPE 4 PIPE	2' - 0" 2' - 0"	2' - 0" 2' - 0"	SINGLE SINGLE	40 40	148.1237 148.1237	2.7 2.7	0.56 0.56	2159.6 2159.6	57.5 57.5	54.9 54.9	78 78	64.8 5	68.0 63.0 68.0 63.0	0 0.5	0.3	1848.7 1848.7	60	68. 68.		9.2 120 9.2 120	.0 111.3	0.5	0.1 5" 0.1 5"	34 34
	02-0 02-0		PRICE PRICE	ACBL24_2W ACBL24_2W	4 PIPE 4 PIPE	2' - 0" 2' - 0"	2' - 0" 2' - 0"	SINGLE SINGLE	40 40	148.1237 148.1237	2.7 2.7	0.56 0.56	2159.6 2159.6	57.5 57.5	54.9 54.9	78 78		68.0 63.0 68.0 63.0		0.3	1848.7 1848.7	60 60	68. 68.		9.2 120 9.2 120		0.5 0.5	0.1 5" 0.1 5"	34 34
	02-0 02-0		PRICE PRICE	ACBL24_2W ACBL24_2W	4 PIPE 4 PIPE	2' - 0" 2' - 0"	2' - 0" 2' - 0"	SINGLE SINGLE	40 40	202.6947 273.4047	4.1 5.8	0.46 0.43	3174.6 4987.6	57.5 57.5	54.9 54.9	78 78		68.0 67.1 68.0 63.8		0.6 6.6	3958.7 6042.7	60 60	68. 68.		5.6 120 7.9 120		0.5	0.2 5" 0.4 5"	28 23
 	02-0		PRICE PRICE	ACBL24_2W ACBL24_2W	4 PIPE 4 PIPE	8' - 0" 2' - 0"	2' - 0" 2' - 0"	SINGLE SINGLE	40	148.1237 202.6947	2.7 4.1	0.56 0.46	2159.6 3355.6	57.5 57.5	54.9 54.9	78 78	64.8 5 63.0 5	68.0 63.0 68.0 66.2		0.3	1848.7 3958.7	60 60	68. 68.		9.2 120 5.6 120	.0 111.3 .0 103.0		0.1 5" 0.2 5"	34 28
\	02-09 02-10		PRICE PRICE	ACBL24_2W ACBL24_2W	4 PIPE 4 PIPE	2' - 0" 2' - 0"	2' - 0" 2' - 0"	SINGLE SINGLE	40 40	148.1237 148.1237	2.7 2.7	0.56 0.56	2159.6 2159.6	57.5 57.5	54.9 54.9	78 78	_	8.0 63.0 8.0 63.0		0.3	1848.7 1848.7	60 60	68. 68.		9.2 120 9.2 120		0.5 0.5	0.1 5" 0.1 5"	34 34
}	02-1 02-1		PRICE PRICE	ACBL24_2W ACBL24_2W	4 PIPE 4 PIPE	2' - 0" 2' - 0"	2' - 0" 2' - 0"	SINGLE DUAL	40 75	148.1237 402.6013	2.7 4.4	0.56 0.60	2159.6 7505.3	57.5 57.5	54.9 54.9	78 78	_	8.0 63.0 8.0 62.8	8 24	0.3 4.0	1848.7 6534.2	60 60	68. 68.	0 79 0 82	9.2 120 2.6 120	.0 91.6	0.5 0.5	0.1 5" 0.4 5"	34 32
~~	02-13 02-13	2	PRICE PRICE	ACBL24_2W ACBL24_2W	4 PIPE 4 PIPE	8' - 0" 8' - 0"	2' - 0" 2' - 0"	DUAL	75 75	402.6013 402.6013	4.4	0.60	7505.3 7505.3	57.5 57.5	54.9 54.9	78 78		8.0 62.8 8.0 62.8	8 2.4 8 2.4	4.0	6534.2 6534.2	60	68. 68.		2.6 120 2.6 120	.0 91.6 .0 91.6	0.5	0.4 5" 0.4 5"	32 32
,	02-13 02-13	.3	PRICE PRICE	ACBL24_2W ACBL24_2W	4 PIPE 4 PIPE	8' - 0" 8' - 0"	2' - 0" 2' - 0"	DUAL DUAL	75 75	402.6013 402.6013	4.4 4.4	0.60 0.60	7505.3 7505.3	57.5 57.5	54.9 54.9	78 78	61.2 5	68.0 62.8 68.0 62.8	8 2.4	4.0	6534.2 6534.2	60	68. 68.	0 82	2.6 120 2.6 120		0.5 0.5	0.4 5"	32 32
	02-13 02-13	.5	PRICE PRICE	ACBL24_2W ACBL24_2W	4 PIPE	8' - 0" 8' - 0"	2' - 0" 2' - 0"	DUAL	75 75	402.6013 402.6013	4.4	0.60 0.60	7505.3 7505.3	57.5 57.5	54.9 54.9	78 78	61.2 5	8.0 62.8 8.0 62.8	8 2.4		6534.2 6534.2	60	68. 68.	0 82	2.6 120 2.6 120	.0 91.6 .0 91.6	0.5	0.4 5"	32
	02-13		PRICE	ACBL24_2W	4 PIPE	8' - 0"	2' - 0"	DUAL	75 75	402.6013	4.4	0.60	7505.3 5416.0	57.5	54.9	78		8.0 62.8	_	4.0	6534.2	60	68.		2.6 120 2.8 120		0.5	0.4 5"	32
•	02-13	<u> </u>	PRICE	ACBL24_2W	4 PIPE	4' - 0"	2' - 0"	SINGLE	115	425.8558	2.7	0.74	5416.9	57.5	54.9	78	66.5 5	8.0 69.3	3 0.5	0.6	4159.9 5500.6	60	68.	$\frac{0}{0}$ $\frac{76}{76}$	5.8 120 5.7 120	0 99.6	0.5	0.2 5"	45
~~	02-14	j	PRICE		4 PIPE	4 - 0 6' - 0"	31-91- -10-15-15-1-		155		~~2.7~~		7078.5	57.5 57.5	54.9	~~ 78 ~~	66.8 5	8.0 72.3	3 0.5	0.8		~~60 60				0 92.7	0.5	0.3	45
4		,	PRICE PRICE				2 - 0"				<u></u>					/8 				4.0 -	6591.5 6349.5	60		~~~8 3		0 92.9	0.5	0.4 6"	29 29
	02-1	3	PRICE PRICE	ACBL24_2W ACBL24_2W	4 PIPE 4 PIPE	8' - 0" 8' - 0"	2' - 0"	SINGLE	60	362.9186 362.9186	5	0.58	6349.9 6700.9	57.5 57.5	54.9 54.9	78 78	61.3 5	68.0 64.6 68.0 62.4	4 2.4	7.4	6591.5 6349.5	60	68. 68.	0 83	1.4 120 3.8 120		0.5	0.4 5" 0.4 5"	29
	02-19)	PRICE PRICE	ACBL24_2W ACBL24_2W	4 PIPE 4 PIPE	8' - 0" 8' - 0"	2' - 0" 2' - 0"	DUAL DUAL	60 60	362.9186 362.9186	5	0.58 0.58	6737.9 6618.9	57.5 57.5	54.9 54.9	78 78	61.5 5	68.0 62.3 68.0 62.8	8 2.2	3.4	6349.5 6349.5	60	68. 68.	0 83	3.8 120 3.8 120	.0 92.9 .0 92.9	0.5 0.5	0.4 5" 0.4 5"	29 29
	02-2 02-22		PRICE PRICE	ACBL24_2W ACBL24_2W	4 PIPE 4 PIPE	8' - 0" 4' - 0"	2' - 0" 2' - 0"	SINGLE SINGLE	95 95	351.7939 351.7939	2.7 2.7	0.51 0.51	4711.6 4711.6	57.5 57.5	54.9 54.9	78 78		68.0 68.2 68.0 68.2		0.6 0.6	3936.0 3936.0	60 60	68. 68.			.0 101.2 .0 101.2	0.5 0.5	0.2 5" 0.2 5"	41 41
	02-22 02-23		PRICE PRICE	ACBL24_2W ACBL24_2W	4 PIPE 4 PIPE	4' - 0" 4' - 0"	2' - 0" 2' - 0"	SINGLE SINGLE	85 85	336.6737 336.6737	3	0.61 0.61	4516.0 4516.0	57.5 57.5	54.9 54.9	78 78		68.0 68.4 68.0 68.4		0.6 0.6	4159.6 4159.6	60	68. 68.		9.1 120 9.1 120	.0 100.6 .0 100.6	0.5 0.5	0.2 5" 0.2 5"	40 40
	02-23 02-2	2	PRICE PRICE	ACBL24_2W ACBL24_2W	4 PIPE 4 PIPE	4' - 0" 8' - 0"	2' - 0"	SINGLE SINGLE	100	506.7367 506.7367	4.1 4.1	0.63	8697.4 8588.4	57.5 57.5	54.9 54.9	78 78	62.5 5 62.7 5	8.0 66.0 8.0 66.4	0 1.6 4 1.5	7.4	7265.2 7265.2	60	68.	0 80).9 120	0 87.9 0 87.9	0.5	0.4 5"	37
4	02-29 02-20		PRICE PRICE	ACBL24_2W ACBL24_2W	4 PIPE 4 PIPE	8' - 0" 2' - 0"	2' - 0" 2' - 0"	SINGLE	40	148.1237 148.1237	2.7 2.7	0.56 0.56	2159.6 2159.6	57.5 57.5	54.9 54.9	78 78	64.8 5 64.8 5	8.0 63.0 8.0 63.0	0 0.5	0.3	1848.7 1848.7	60 60	68.	79 0 79).2 120).2 120	0 111.3	0.5	0.1 0.1 5"	34
*	02-2 02-2	<u>}</u>	PRICE PRICE	ACBL24 2W ACBL24 2W	4 PIPE	2' - 0" 8' - 0"	2' - 0" 2' - 0"	SINGLE	$\frac{100}{40}$	506.7367 241.9457	4.1 5	0.63	7865.4 4600.6	57.5 57.5	54.9 54.9	78 - 78 - 78	64.0 5 60.8 5	8.0 69.2 8.0 62.1	2 1.0 1 1.8	3.6	7265.2 5025.7	60	68.	$\begin{array}{c} 0 & 80 \\ 0 & 86 \end{array}$).9 120 6.7 120	0 87.9 0 98.8	0.5	0.4 5"	37 25
•	02-29	. I	PRICE PRICE	ACBL24_2W ACBL24_2W	4 PIPE 4 PIPE	6' - 0"	2' - 0"	SINGLE	50	241.9457 341.7559	5.8	0.65	4600.6 6233.2	57.5 57.5	54.9 54.9	78 78	00.8 5	8.0 62.1 8.0 62.4	1 1.0	0.1	5025.7 6381.1	60	68.	0 86	5.7 120 1.8 120	.0 98.8	0.5	0.3 0.4 5"	25 28
	02-29)	PRICE PRICE	ACBL24_2W ACBL24_2W ACBL24_2W	4 PIPE 4 PIPE	8' - 0" 8' - 0"	2' - 0" 2' - 0"	SINGLE SINGLE	40	273.4047 202.6947	5.8 4.1	0.43 0.46	4853.6 3174.6	57.5	54.9 54.9	78 79		8.0 64.6	6 1.2	5.0	6042.7 3958.7	60	68. 68.	0 87	7.9 120	.0 94.8	0.5	0.4 5" 0.2 5"	23 28
	02-3	2	PRICE	ACBL24_2W	4 PIPE	4' - 0"	2' - 0"	SINGLE	40	148.1237	2.7	0.56	2159.6	57.5 57.5	54.9	78	64.8 5	8.0 63.0	0 0.5	0.3	1848.7	60	68.	0 79	9.2 120	.0 111.3		0.1 5"	34
	02-3	1	PRICE PRICE	ACBL24_2W ACBL24_2W	4 PIPE 4 PIPE	2' - 0"	2' - 0"	SINGLE SINGLE	40	202.6947 148.1237	4.1 2.7	0.46 0.56	3719.6 2159.6	57.5 57.5	54.9 54.9	78 78	64.8 5	88.0 63.6 88.0 63.0	0 0.5	0.3	3958.7 1848.7	60	68. 68.	0 79	5.6 120 9.2 120	.0 111.3	0.5	0.2 5" 0.1 5"	28 34
	02-36		PRICE PRICE	ACBL24_2W ACBL24_2W	4 PIPE 4 PIPE	2' - 0"	2' - 0"	SINGLE	40	148.1237 148.1237	2.7	0.56 0.56	2618.6 2618.6	57.5 57.5	54.9 54.9	78 78		58.0 59.6 58.0 59.6		4.3	2281.7 2281.7	60	68. 68.		I.9 120 I.9 120		0.9	0.4 5" 0.4 5"	34
\	02-36 02-37	2	PRICE PRICE	ACBL24_2W ACBL24_2W	4 PIPE	2' - 0"	2'-0"	SINGLE	85 85	430.7262 430.7262	4.1	0.47	7512.0 7512.0	57.5 57.5	54.9 54.9	78 78	62.3 5 62.3 5	8.0 66.6 8.0 66.6	6 1.3	5.7	6960.6 6960.6	60	68. 68.	$\begin{array}{c c} 0 & 82 \\ \hline 0 & 82 \end{array}$	2.5 120 2.5 120	0 89.6 0 89.6	0.5	0.4 0.4 5"	33
	02-37	$\frac{2}{2}$	PRICE	ACBL24_2W ACBL24_2W	4 PIPE	8' - 0" 	2' - 0"	SINGLE	40	148.1237	2.7	0.56	2250.6	57.5	54.9	78	64.3 5	62.5	5 0.6	0.4	1848.7	60	68.	79	120	0 111.3	0.5	0.1 5"	34

IN128 - JAMES T. MORRIS ARENA

Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEES 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408 812-855-1692

Architect RATIO

101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204 317-633-4040

Structural Engineer FINK ROBERTS AND PETRIE, INC.

3535 EAST 96TH STREET SUITE 126 INDIANAPOLIS, IN 46240 317-872-8400

Mechanical / Electrical

INTROBA 8250 HAVERSTICK ROAD SUITE 285 INDIANAPOLIS, IN 46240 800-404-7677

Plumbing Engineer

138 N. DELAWARE ST INDIANAPOLIS, IN 46204 317-633-4120

Acoustics / Technology Engineer WJHW

7220 W. JEFFERSON AVE SUITE 216 LAKEWOOD, CO 80235 972-934-3700

Civil Engineer AMERICAN STRUCTUREPOINT, INC.

9025 RIVER ROAD SUITE 200 INDIANAPOLIS, IN 46240 317-547-5580

Food Service Consultant

CINILITTLE 3405 NW 9TH AVENUE #1202 FORT LAUDERDALE, FL 33309 954-846-9600

Code Consultant FORZA

2502 WEST MECHANIC ST, SUITE C HARRISONVILLE, MO 64701 816-806-3729

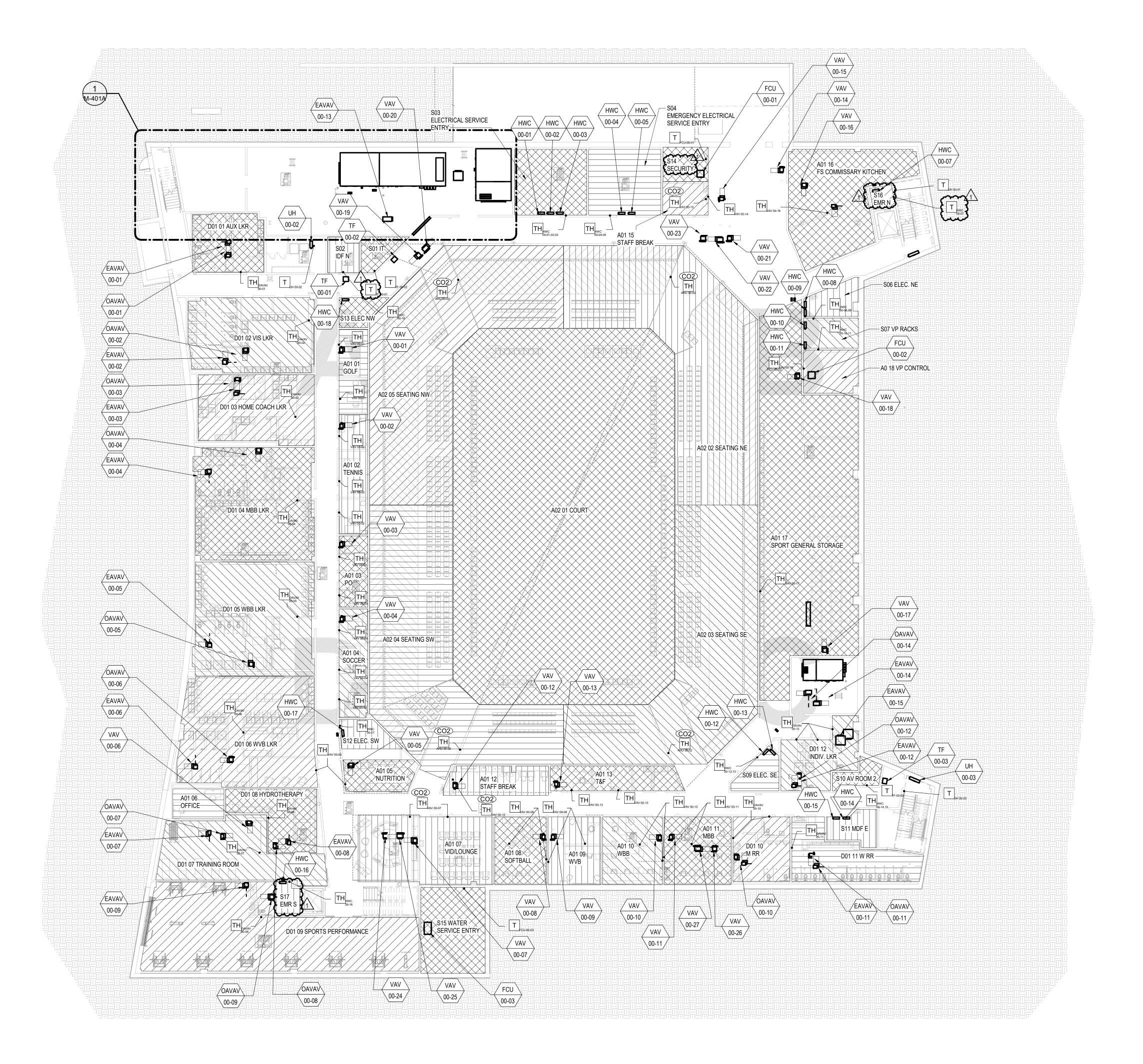
	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			
SH	SHEET ISSUE			
1	DD PROGRESS SET	07/18/24		
2	DESIGN DEVELOPMENT	08/30/24		
3	50% CONSTRUCTION DOCUMENTS	11/01/24		
4	95% CONSTRUCTION DOCUMENTS	12/19/24		
5	CONSTRUCTION DOCUMENTS	01/13/25		
6	ADDENDUM 01	01/27/25		



PROJECT NO.

SHEET TITLE

MECHANICAL SCHEDULES -ACTIVE CHILLED BEAMS



1 EVENT FLOOR PLAN - OVERALL - ZONE

GENERAL CONTROLS NOTES:

- A. TEMPERATURE SENSORS, HUMIDISTATS, AND THERMOSTATS SHALL NOT BE INSTALLED ON EXTERIOR WALLS OR COLUMNS, OR WHERE EXPOSED TO SOLAR RADIATION. WHERE THERE ARE NO OTHER OPTIONS, A SOLAR BLOCKING ENCLOSURE AND INSULATED BACKPLATE TO ELIMINATE TEMPERATURE INFLUENCE FROM DIRECT SOLAR EXPOSURE SHALL BE PROVIDED.
- B. VAVS ARE POWERED BY CONTROL VOLTAGE. CONTRACTOR IS RESPONSIBLE FOR COORDINATING ROUTING, GROUPING, AND POWER FOR THE LOW-VOLTAGE VAV UNITS.
- C. ALL NECESSARY CONTROL POINTS SHALL BE PROVIDED TO ACHIEVE THE WRITTEN SEQUENCES OF OPERATION WHETHER OR NOT THEY ARE EXPLICITLY NAMED.
- D. PROVIDE ANALOGUE FIELD SENSORS NEXT TO ALL
- TEMPERATURE AND PRESSURE CONTROL POINTS. E. CONTROLS CONTRACTOR SHALL COORDINATE WITH THE IU CONTROL INTEGRATOR.
- F. ALL IN-SPACE TEMPERATURE, HUMIDITY, AND CO2 SENSORS SHALL BE BLIND SENSORS WITH ONLY THE ABILITY TO INDUCE AN OCCUPANCY OVERRIDE WITH A BUTTON UNLESS OTHERWISE REQUESTED BY IU.
- G. LOCAL MAGNEHELIC GAUGE SUPPLIED AT EACH FILTER SECTION.
- H. WHERE AIRFLOW MONITORING IS INDICATED ON FANS, PIEZIOMETER RING SHALL BE SUPPLIED AT EACH INLET CONE BY MANUFACTURER.

IN128 - JAMES T. MORRIS ARENA

Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEES 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408

812-855-1692 Architect

RATIO 101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204 317-633-4040

Structural Engineer FINK ROBERTS AND PETRIE, INC.

3535 EAST 96TH STREET SUITE 126

INDIANAPOLIS, IN 46240 317-872-8400

Mechanical / Electrical INTROBA

8250 HAVERSTICK ROAD SUITE 285 INDIANAPOLIS, IN 46240 800-404-7677

Plumbing Engineer

138 N. DELAWARE ST INDIANAPOLIS, IN 46204

LAKEWOOD, CO 80235

972-934-3700

317-547-5580

317-633-4120 Acoustics / Technology Engineer

WJHW 7220 W. JEFFERSON AVE SUITE 216

Civil Engineer AMERICAN STRUCTUREPOINT, INC.

9025 RIVER ROAD SUITE 200 INDIANAPOLIS, IN 46240

Food Service Consultant CINILITTLE 3405 NW 9TH AVENUE #1202

FORT LAUDERDALE, FL 33309 954-846-9600 **Code Consultant**

FORZA 2502 WEST MECHANIC ST, SUITE C HARRISONVILLE, MO 64701 816-806-3729



SH	EET ISSUE	
1	DD PROGRESS SET	07/18/24
2	DESIGN DEVELOPMENT	08/30/24
3	50% CONSTRUCTION DOCUMENTS	11/01/24
4	95% CONSTRUCTION DOCUMENTS	12/19/24
5	CONSTRUCTION DOCUMENTS	01/13/25
6	ADDENDUM 01	01/27/25

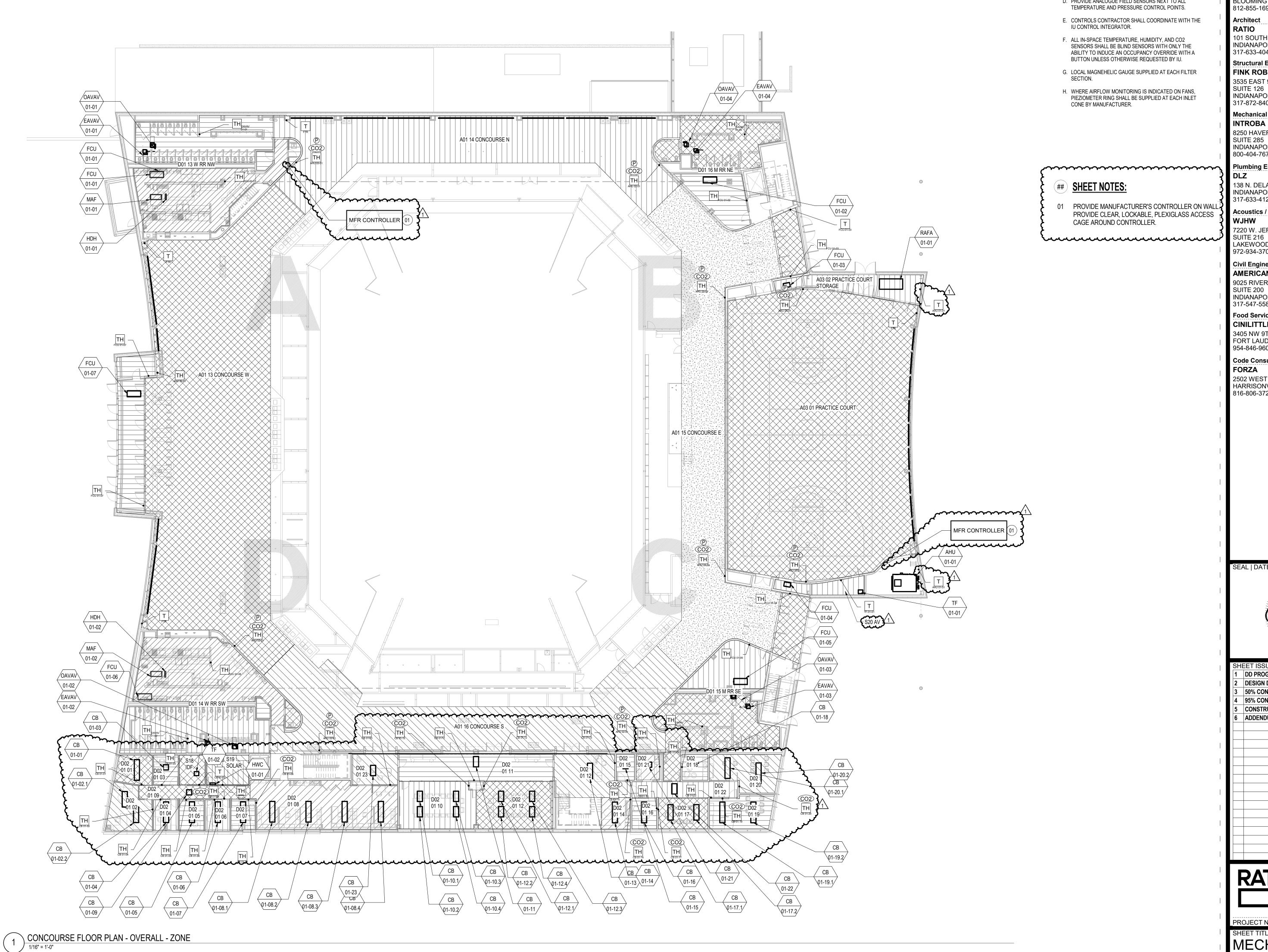


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MECHANICAL ZONING PLAN -EVENT LEVEL



GENERAL CONTROLS NOTES:

- A. TEMPERATURE SENSORS, HUMIDISTATS, AND THERMOSTATS SHALL NOT BE INSTALLED ON EXTERIOR WALLS OR COLUMNS, OR WHERE EXPOSED TO SOLAR RADIATION. WHERE THERE ARE NO OTHER OPTIONS, A SOLAR BLOCKING ENCLOSURE AND INSULATED BACKPLATE TO ELIMINATE TEMPERATURE INFLUENCE FROM DIRECT SOLAR EXPOSURE SHALL BE PROVIDED.
- B. VAVS ARE POWERED BY CONTROL VOLTAGE. CONTRACTOR IS RESPONSIBLE FOR COORDINATING ROUTING, GROUPING, AND POWER FOR THE LOW-VOLTAGE VAV UNITS.
- C. ALL NECESSARY CONTROL POINTS SHALL BE PROVIDED TO ACHIEVE THE WRITTEN SEQUENCES OF OPERATION WHETHER OR NOT THEY ARE EXPLICITLY NAMED.
- D. PROVIDE ANALOGUE FIELD SENSORS NEXT TO ALL TEMPERATURE AND PRESSURE CONTROL POINTS.
- E. CONTROLS CONTRACTOR SHALL COORDINATE WITH THE IU CONTROL INTEGRATOR. F. ALL IN-SPACE TEMPERATURE, HUMIDITY, AND CO2 SENSORS SHALL BE BLIND SENSORS WITH ONLY THE ABILITY TO INDUCE AN OCCUPANCY OVERRIDE WITH A
- G. LOCAL MAGNEHELIC GAUGE SUPPLIED AT EACH FILTER SECTION.
- H. WHERE AIRFLOW MONITORING IS INDICATED ON FANS, PIEZIOMETER RING SHALL BE SUPPLIED AT EACH INLET CONE BY MANUFACTURER.

SHEET NOTES:

01 PROVIDE MANUFACTURER'S CONTROLLER ON WAI PROVIDE CLEAR, LOCKABLE, PLEXIGLASS ACCESS CAGE AROUND CONTROLLER.

IN128 - JAMES T. MORRIS ARENA

Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEES 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408

812-855-1692

Architect RATIO 101 SOUTH PENNSYLVANIA STREET

INDIANAPOLIS, IN 46204 317-633-4040

Structural Engineer FINK ROBERTS AND PETRIE, INC.

3535 EAST 96TH STREET SUITE 126

INDIANAPOLIS, IN 46240

317-872-8400 Mechanical / Electrical

INTROBA 8250 HAVERSTICK ROAD SUITE 285 INDIANAPOLIS, IN 46240 800-404-7677

Plumbing Engineer

138 N. DELAWARE ST INDIANAPOLIS, IN 46204

317-633-4120 **Acoustics / Technology Engineer**

WJHW 7220 W. JEFFERSON AVE

LAKEWOOD, CO 80235 972-934-3700

Civil Engineer

AMERICAN STRUCTUREPOINT, INC.

9025 RIVER ROAD SUITE 200 INDIANAPOLIS, IN 46240

317-547-5580 Food Service Consultant

CINILITTLE 3405 NW 9TH AVENUE #1202 FORT LAUDERDALE, FL 33309 954-846-9600

Code Consultant

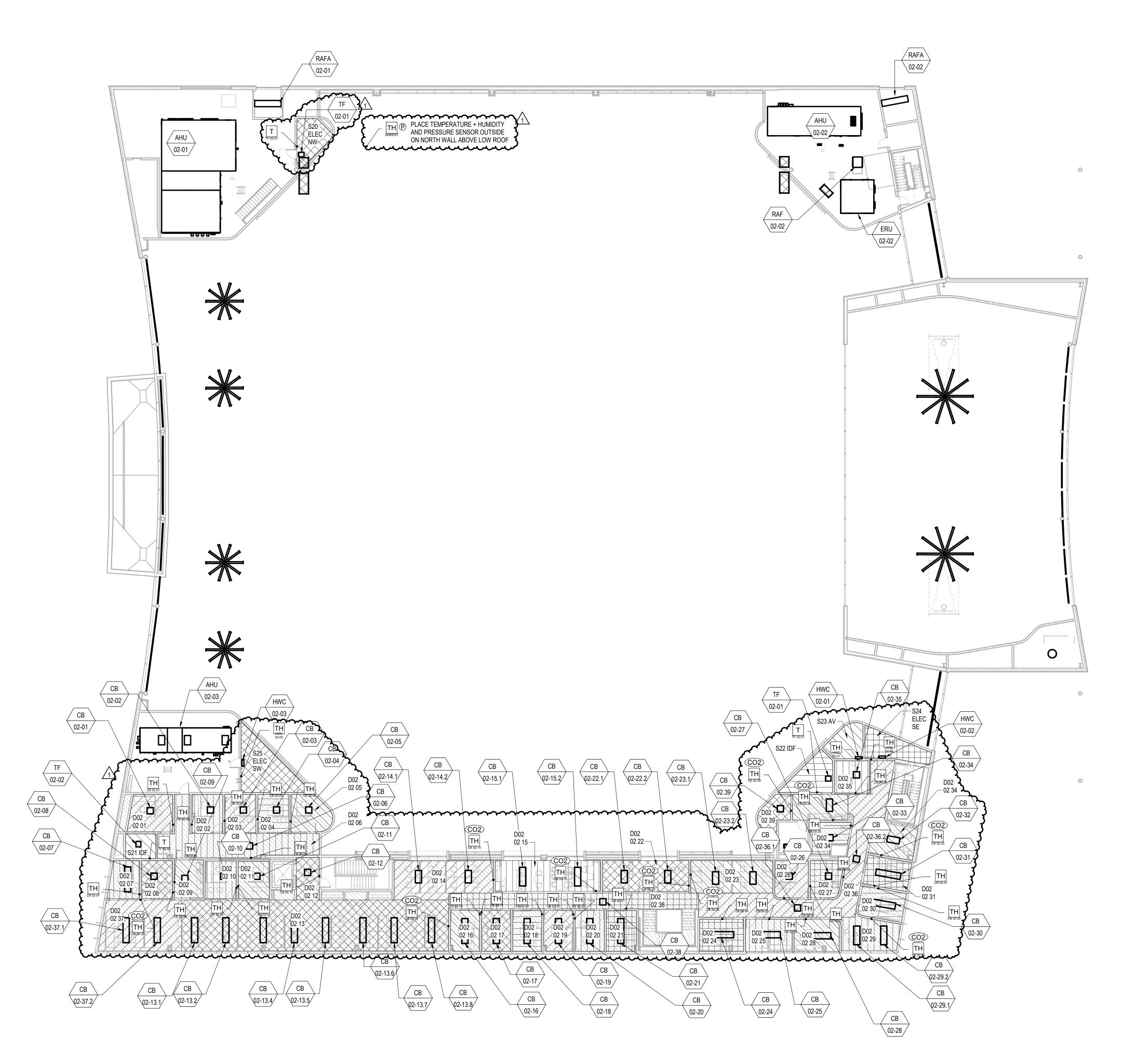
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CONSTRUCTION DOCUMENTS **ADDENDUM 01**

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PROJECT NO.

MECHANICAL **ZONING PLAN -**CONCOURSE LEVEL



1 UPPER LEVEL - OVERALL - ZONE

GENERAL CONTROLS NOTES:

- A. TEMPERATURE SENSORS, HUMIDISTATS, AND THERMOSTATS SHALL NOT BE INSTALLED ON EXTERIOR WALLS OR COLUMNS, OR WHERE EXPOSED TO SOLAR RADIATION. WHERE THERE ARE NO OTHER OPTIONS, A SOLAR BLOCKING ENCLOSURE AND INSULATED BACKPLATE TO ELIMINATE TEMPERATURE INFLUENCE FROM DIRECT SOLAR EXPOSURE SHALL BE PROVIDED.
- B. VAVS ARE POWERED BY CONTROL VOLTAGE. CONTRACTOR IS RESPONSIBLE FOR COORDINATING ROUTING, GROUPING, AND POWER FOR THE LOW-VOLTAGE VAV UNITS.
- C. ALL NECESSARY CONTROL POINTS SHALL BE PROVIDED TO ACHIEVE THE WRITTEN SEQUENCES OF OPERATION
- D. PROVIDE ANALOGUE FIELD SENSORS NEXT TO ALL

WHETHER OR NOT THEY ARE EXPLICITLY NAMED.

- TEMPERATURE AND PRESSURE CONTROL POINTS. E. CONTROLS CONTRACTOR SHALL COORDINATE WITH THE IU CONTROL INTEGRATOR.
- F. ALL IN-SPACE TEMPERATURE, HUMIDITY, AND CO2 SENSORS SHALL BE BLIND SENSORS WITH ONLY THE ABILITY TO INDUCE AN OCCUPANCY OVERRIDE WITH A BUTTON UNLESS OTHERWISE REQUESTED BY IU.
- G. LOCAL MAGNEHELIC GAUGE SUPPLIED AT EACH FILTER SECTION.
- H. WHERE AIRFLOW MONITORING IS INDICATED ON FANS, PIEZIOMETER RING SHALL BE SUPPLIED AT EACH INLET CONE BY MANUFACTURER.

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812-855-1692 Architect

RATIO 101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204 317-633-4040

Structural Engineer FINK ROBERTS AND PETRIE, INC.

3535 EAST 96TH STREET SUITE 126

INDIANAPOLIS, IN 46240 317-872-8400

Mechanical / Electrical INTROBA 8250 HAVERSTICK ROAD

SUITE 285 INDIANAPOLIS, IN 46240 800-404-7677

Plumbing Engineer

138 N. DELAWARE ST INDIANAPOLIS, IN 46204

LAKEWOOD, CO 80235

317-633-4120 Acoustics / Technology Engineer

WJHW 7220 W. JEFFERSON AVE SUITE 216

972-934-3700 Civil Engineer AMERICAN STRUCTUREPOINT, INC.

9025 RIVER ROAD

SUITE 200 INDIANAPOLIS, IN 46240 317-547-5580

Food Service Consultant CINILITTLE 3405 NW 9TH AVENUE #1202 FORT LAUDERDALE, FL 33309 954-846-9600

Code Consultant

FORZA 2502 WEST MECHANIC ST, SUITE C HARRISONVILLE, MO 64701 816-806-3729

CONSTRUCTION DOCUMENTS



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PROJECT NO.

MECHANICAL

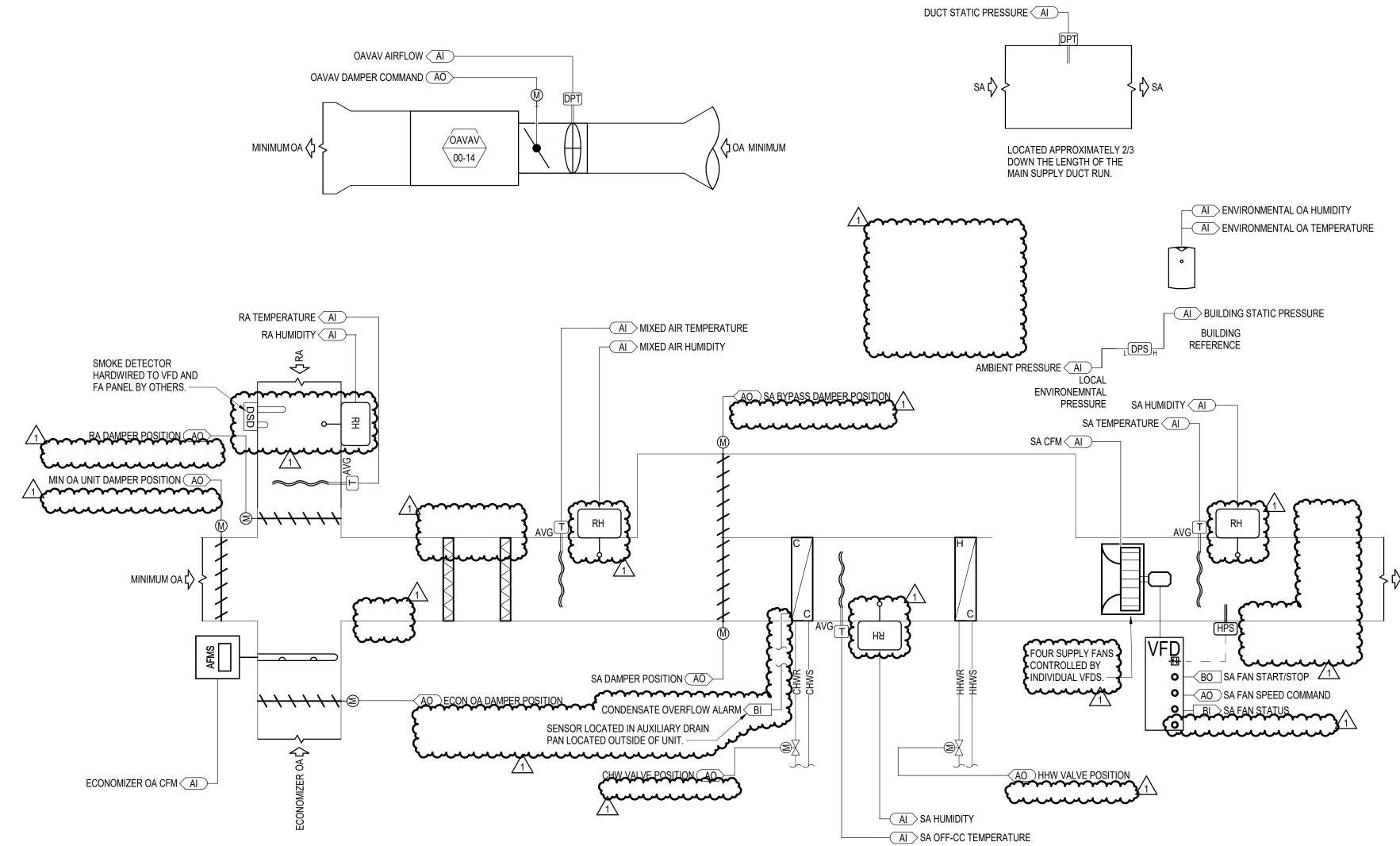
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ZONING PLAN -UPPER FLOOR

- A. TEMPERATURE SENSORS, HUMIDISTATS, AND THERMOSTATS SHALL NOT BE INSTALLED ON EXTERIOR WALLS OR COLUMNS, OR WHERE EXPOSED TO SOLAR RADIATION. WHERE THERE ARE NO OTHER OPTIONS, A SOLAR BLOCKING ENCLOSURE AND INSULATED BACKPLATE TO ELIMINATE TEMPERATURE INFLUENCE FROM DIRECT SOLAR EXPOSURE SHALL BE PROVIDED
- B. VAVS ARE POWERED BY CONTROL VOLTAGE. CONTRACTOR IS RESPONSIBLE FOR COORDINATING ROUTING, GROUPING, AND POWER FOR THE LOW-VOLTAGE VAV UNITS.
- C. ALL NECESSARY CONTROL POINTS SHALL BE PROVIDED TO ACHIEVE THE WRITTEN SEQUENCES OF OPERATION WHETHER OR NOT THEY ARE EXPLICITLY NAMED.
- D. PROVIDE ANALOGUE FIELD SENSORS NEXT TO ALL TEMPERATURE AND PRESSURE CONTROL POINTS.
- E. CONTROLS CONTRACTOR SHALL COORDINATE WITH THE IU CONTROL INTEGRATOR.
- F. ALL IN-SPACE TEMPERATURE, HUMIDITY, AND CO2 SENSORS SHALL BE BLIND SENSORS WITH ONLY THE ABILITY TO INDUCE AN OCCUPANCY OVERRIDE WITH A BUTTON UNLESS OTHERWISE REQUESTED BY IU.
- G. LOCAL MAGNEHELIC GAUGE SUPPLIED AT EACH FILTER

SECTION.

WHERE AIRFLOW MONITORING IS INDICATED ON FANS. PIEZIOMETER RING SHALL BE SUPPLIED AT EACH INLET CONE BY MANUFACTURER.



SEQUENCE OF OPERATIONS – AHU-00-01, ASSOCIATED OAVAV, AND VAVS

- A. AHU-00-01 IS A VARIABLE-VOLUME HYDRONIC AHU CONSISTING OF A SUPPLY FAN ARRAY, COOLING COIL, AND RE-HEAT COIL. THE AHU SERVES OFFICE AND SUPPORT STYLE SPACES ON THE EVENT LEVEL, WHICH ARE NOT DIRECTLY SERVED BY DOAS-00-01. THE AHU RECEIVED OA FROM A DEDICATED EAVAV AND OAVAV FROM DOAS-00-01. ADDITIONALLY, THE AHU HAS THE CAPABILITY OF OPERATING IN ECONOMIZER MODE VIA A SEPARATE ECONOMIZER AIR CONNECTION.
- 2. CONTROLS ARCHITECTURE: A. CONTROL POINTS SHALL BE CONTROLLED BY THE CENTRAL BAS VIA BACNET COMMUNICATION PROTOCOL. ALL CONTROL POINTS, WHETHER EXPLICITLY LISTED OR NOT, SHALL BE VISIBLE AND CONTROLLABLE VIA THE BAS.
- B. UNIT START COMMAND: a. OPERATIONALLY RELEVANT DAMPER ACTUATORS ARE POWERED.
- b. SUPPLY FANS START AFTER A 15 SEC (ADJ.) DELAY WHEN THE ASSOCIATED DAMPERS ARE PROVEN OPEN. c. TEMPERING OPTIONS TO FUNCTION AS DESCRIBED.
- C. UNIT STOP COMMAND (OR DE-ENERGIZED) a. SUPPLY FANS, ASSOCIATED OAVAV, AND TEMPERING OPTIONS DE-ENERGIZED.
- b. OPERATIONAL DAMPERS ARE CLOSED AND DAMPER ACTUATOR IS SPRING RETURN CLOSE. 3. OCCUPIED/UNOCCUPIED MODES A. TEMPERATURE SETPOINTS
 - a. OCCUPIED: COOLING: 78°F +/- 2°F
 - HEATING: 68°F +/- 2°F RELATIVE HUMIDITY: 55%
- b. UNOCCUPIED: COOLING: 82°F +/- 2°F
- HEATING: 60°F +/- 2°F B. SCHEDULE SHALL BE BASED ON AN OCCUPANCY SCHEDULE PROVIDED BY THE OWNER.
- C. OCCUPANCY OVERRIDE: IF DURING THE UNOCCUPIED PERIOD THERE IS A REQUEST FOR OCCUPANCY OVERRIDE, THE OCCUPANCY MODE SHALL BECOME ACTIVE
- D. PRIOR TO SCHEDULED OCCUPANCY, OCCUPIED MODE SHALL BE ENGAGED WITH SUFFICIENT TIME TO ENSURE THE SPACES SERVED ARE AT THE OCCUPIED TEMPERATURE SETPOINT AND VENTILATION RATES PRIOR TO THE SCHEDULED OCCUPANCY.
- E. OCCUPIED MODE:
- a. SUPPLY FANS ON.
- b. ALL COILS AVAILABLE FOR OPERATION. c. OPERATIONAL DAMPERS PROVEN OPEN AND ENGAGED TO THEIR OPERATING POSITION.
- d. TEMPERATURE CONTROL PER SUPPLY AIR RESET SEQUENCE F. UNOCCUPIED MODE (UNIT OFF): UNIT REMAINS OFF WHEN IN UNOCCUPIED MODE
- a. SUPPLY FANS OFF b. ASSOCIATED RAFA OFF
- c. TEMPERING OFF
- d. OPERATIONAL DAMPERS CLOSED 4. SUPPLY FANS SEQUENCE:
- A. START/STOP: BAS SHALL COMMAND THE RELEVANT OPERATIONAL DAMPERS OPEN WHENEVER THE DOAS IS ENERGIZED. UPON PROOF OF THE DAMPER POSITION,
- THE INTERLOCKED SUPPLY FANS SHALL RUN CONTINUOUSLY. B. THE SUPPLY FANS ARE PROVIDED WITH A FACTORY PROVIDED VARIABLE FREQUENCY DRIVE(S). THE SUPPLY FAN SPEED WILL BE CONTROLLED TO MEET THE AIRFLOW SPECIFIED IN THE DESIGN DOCUMENTS.
- ECONOMIZER MODE A. WHEN OUTSIDE AIR ENTHALPY IS LESS THAN RETURN AIR ENTHALPY AND OUTSIDE AIR TEMPERATURE IS ABOVE 53°F, THE BAS SHALL:
- a. CLOSE THE ASSOCIATED OAVAV b. MODULATE THE ECONOMIZER OUTSIDE AIR AND RETURN AIR DAMPERS TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT c. SEND A SIGNAL TO THE PRESSURIZATION EAVAV ASSOCIATED WITH DOAS-00-01 AND RAFA-02-02 TO OPERATE UNDER ECONOMIZER CONDITIONS.
- B. WHEN OUTSIDE AIR ENTHALPY IS GREATER THAN RETURN AIR ENTHALPY, THE BAS SHALL: a. RETURN THE ASSOCIATED OAVAV TO STANDARD OPERATION
- b. CLOSE THE ECONOMIZER OA DAMPER AND OPEN THE MINIMUM OA AND RA DAMPER.
- c. SEND A SIGNAL TO THE PRESSURIZATION EAVAV ASSOCIATED WITH DOAS-00-01 AND RAFA-02-02 TO RETURN TO NORMAL OPERATION. 6. FAN OPERATION AND PROTECTION:
- A. THE FAN SPEEDS WILL NOT DROP BELOW 20 HZ (ADJ) AND SHALL NOT EXCEED 60 HZ. B. THE DUCT STATIC PRESSURE SHALL BE ESTABLISHED DURING THE SYSTEM TESTING AND BALANCING.
- C. MECHANICAL HIGH STATIC PROTECTION CUTOFFS SHALL BE INSTALLED TO PROTECT THE SYSTEM AND EQUIPMENT FROM PRESSURIZATION-RELATED DAMAGE D. THE FANS ARE SIZED FOR N-1 OPERATION. IN THE EVENT OF A FAN FAILURE, THE REMAINING FANS WILL ADJUST TO COMPENSATE FOR THE MISSING FAN.
- 7. DUCT STATIC PRESSURE CONTROL: A. THE CONTROLLER WILL MEASURE DUCT STATIC PRESSURE AND MODULATE THE SUPPLY FAN VFD SPEEDS TO MAINTAIN A DUCT STATIC PRESSURE SETPOINTS. THE FAN SPEEDS WILL NOT DROP BELOW 20HZ (ADJ) AND SHALL NOT EXCEED 60 HZ.
- B. THE STATIC PRESSURE SETPOINT WILL BE RESET BASED UPON THE POSITION OF THE DOWNSTREAM SUPPLY VAV AND EXHAUST VAV ZONE DAMPERS, WITH A GOAL OF REDUCING THE STATIC PRESSURES UNTIL AT LEAST ONE SUPPLY OR EXHAUST ZONE DAMPER IS 90% (ADJ) OPEN. THE INITIAL DUCT STATIC PRESSURE SETPOINTS SHALL BE DETERMINED BY TAB. IF NO ZONE DAMPER IS NEARLY WIDE OPEN AT THE INITIAL SETPOINT, IT WILL INCREMENTALLY RESET DOWN TO A PREDEFINED MINIMUM, AS DETERMINED BY TAB (ADJ). AS ONE OR MORE DAMPERS EXCEEDS 90% OPEN, THE SETPOINT WILL INCREMENTALLY RESET UP TO A
- MAXIMUM SETPOINT, AS DETERMINED BY TAB (ADJ). . THE DUCT STATIC PRESSURE SHALL BE ESTABLISHED DURING THE SYSTEM TESTING AND BALANCING.
- . THE CONTROLLER WILL MODULATE THE FANS BASED UPON A COMPARISON OF THE DUCT STATIC PRESSURE SET POINT (ADJ.) TO THE ACTUAL DUCT STATIC E. MECHANICAL HIGH STATIC PROTECTION CUTOFFS SHALL BE INSTALLED TO PROTECT THE SYSTEM AND EQUIPMENT FROM PRESSURIZATION-RELATED DAMAGE
- . THE SUPPLY FANS ARE SIZED FOR N-1 OPERATION. IN THE EVENT OF A FAN FAILURE, THE REMAINING FANS WILL ADJUST TO COMPENSATE FOR THE MISSING FAN. SUPPLY AIR TEMPERATURE CONTROL (OPTIMIZED): A. THE CONTROLLER WILL MAINTAIN A SUPPLY AIR TEMPERATURE SETPOINT RESET BASED ON ZONE COOLING AND HEATING REQUIREMENTS. THE SUPPLY AIR TEMPERATURE SETPOINT WILL BE RESET BASED UPON VAV TERMINAL EQUIPMENT HEATING AND COOLING REQUESTS, WITH A GOAL OF REDUCING THE SUM OF ALL REQUESTS TO ZERO. ALL SUPPLY AIR TEMPERATURES SHALL BE OFF-COIL TEMPERATURES. EACH ZONE SHALL HAVE ITS REQUESTS WEIGHTED ACCORDING TO THE
- SIZE AND CRITICALITY OF THE SPACE (A LARGER, MORE CRITICAL ENVIRONMENT GENERATES MORE REQUESTS THAN A SMALLER, LESS CRITICAL ONE). CUMULATIVE REQUESTS SHALL BE GENERATED BY EACH ZONE AS FOLLOWS:
- a. 1 HEATING OR COOLING REQUEST WHEN THE ASSOCIATED VAV IS >90% OPEN FOR COOLING OR THE HHW REHEAT VALVE IS 90% OPEN(ADJ) b. HEATING OR COOLING REQUEST WHEN THE ZONE TEMP IS <2°F (ADJ) FROM HOT/COLD ALARM c. HEATING OR COOLING REQUEST WHEN THE ZONE TEMP IS IN HOT/COLD ALARM
- d. TOTAL REQUESTS AND MULTIPLY BY ZONE WEIGHTING FACTOR (ADJ) e. IF THE NUMBER OF COOLING REQUESTS EXCEEDS THE NUMBER OF HEATING REQUESTS FOR 30 MINUTES (ADJ), THE SUPPLY AIR TEMPERATURE SETPOINT WILL BE RESET FOR "COOLING MODE" AS FOLLOWS: THE INITIAL SUPPLY AIR TEMPERATURE SETPOINT WILL BE 60°F (ADJ.).
- AS COOLING DEMAND INCREASES, THE SETPOINT WILL INCREMENTALLY RESET DOWN TO A MINIMUM OF 53°F (ADJ.). AS COOLING DEMAND DECREASES, THE SETPOINT WILL INCREMENTALLY RESET UP TO A MAXIMUM OF 72°F (ADJ.).
- f. IN THE EVENT THAT COOLING DEMAND IS DECREASING, BUT A ZONE DEWPOINT IS ABOVE 58°F(ADJ.), THE SETPOINT WILL INCREMENTALLY RESET DOWN TO A MINIMUM OF 53°F AND THE REHEAT COIL VALVE SHALL BE ENGAGED TO HEAT THE SUPPLY AIR TO MATCH THE SYSTEM-INDICATED SUPPLY AIR TEMPERATURE. AFTER THE ZONE DEWPOINT IS BELOW 56°F(ADJ.) FOR 30 MINUTES (ADJ.) THE REHEAT COIL VALVE WILL BE DISENGAGED AND THE SYSTEM WILL RETURN TO THE PRESCRIBED RESET STRATEGY AT THE TEMPERATURE CALLED FOR BY THE SEQUENCE AT THE TIME.
- g. IF THE NUMBER OF HEATING REQUESTS EXCEEDS THE NUMBER OF COOLING REQUESTS FOR 30 MINUTES (ADJ), THE SUPPLY AIR TEMPERATURE SETPOINT WILL BE RESET FOR "HEATING MODE" AS FOLLOWS:
- THE INITIAL SUPPLY AIR TEMPERATURE SETPOINT WILL BE 65°F (ADJ.). AS HEATING DEMAND INCREASES, THE SETPOINT WILL INCREMENTALLY RESET UP TO A MAXIMUM OF 70°F (ADJ.). AS HEATING DEMAND DECREASES, THE SETPOINT WILL INCREMENTALLY RESET DOWN TO A MINIMUM OF 65°F (ADJ.).
- B. UPON INITIAL START-UP THE CONTROLLER WILL DEFAULT TO "COOLING MODE". A HYSTERESIS/DEADBAND OF 2 REQUESTS (ADJ) SHALL BE USED TO PREVENT SHORT CYCLING BETWEEN HEATING/COOLING MODES.

- 9. DEMAND CONTROLLED VENTILATION A. THE OAVAV AND RETURN AIR DAMPER SHALL MODULATE IN RESPONSE TO CO2 SENSORS LOCATED THROUGHOUT THE SPACE TO MAINTAIN A CO2 CONCENTRATION LESS THAN 900 PPM (ADJ.)
- 10. BUILDING FREEZE PROTECTION A. IF THE SUPPLY AIR TEMPERATURE DROPS BELOW 40°F (ADJ.) FOR 90 SEC (ADJ.), THE BAS WILL DE-ENERGIZE THE UNIT AND ASSOCIATED EQUIPMENT, CLOSE ALL OPERATIONAL DAMPERS, AND ACTIVATE THE ALARM OUTPUT.
- 11. CONDENSATE OVERFLOW: A. IN THE EVENT THAT THE HIGH-LEVEL CONDENSATE SWITCH IS TRIPPED, ALL COOLING COMPONENTS SHALL SHUT DOWN AND ALARMS SHALL BE SENT TO THE BAS.
- 12. SMOKE DETECTION: A. SMOKE DETECTORS LOCATED IN THE SUPPLY AND EXHAUST AIR DUCT SHALL INDICATE AN ALARM AT THE BAS WORKSTATION WHEN AN ALARM CONDITION IS DETECTED FOR SECONDARY MONITORING. THE WIRING AND CONDUIT FOR SECONDARY MONITORING FROM THE DUCT SMOKE DETECTOR'S AUXILIARY CONTACT TO THE BAS SHALL BE PROVIDED. THE WIRING AND CONDUIT FROM THE DUCT DETECTOR FOR FAN SHUT DOWN SHALL BE PROVIDED FIRE COMMAND CONTROL
- a. NORMAL: UNITS SHALL OPERATE PER SEQUENCES ABOVE. b. OFF: WHEN THE FIRE COMMAND OVERRIDE IS INDEXED TO OFF, THE AHU SHALL BE DE-ENERGIZED AND ALL OPERATIONAL DAMPERS SHALL CLOSE. 13. ALARMS INDICATION: THE CONTROLLER WILL DISPLAY ALARMS AND HAVE ONE DIGITAL OUTPUT FOR REMOTE INDICATION OF AN ALARM CONDITION. POSSIBLE ALARMS
- A. BUILDING MANAGEMENT SYSTEM:
- a. THE CONTROLLER WILL SEND ALL ALARMS TO THE BAS. B. DIRTY FILTER ALARM:
- a. A DIGITAL SIGNAL IS SENT TO THE CONTROLLER INDICATING AN INCREASED PRESSURE DROP ACROSS AN AIR FILTER (MUST BE ADJUSTED IN FIELD DURING START UP). THE CONTROLLER WILL THEN PROVIDE A DIRTY FILTER ALARM.
- C. SUPPLY AND EXHAUST AIR ALARM: a. THE CONTROLLER MONITORS THE PROVING SWITCH ON EACH BLOWER AND SENDS AN ALARM IN THE CASE OF EITHER BLOWER PROVING SWITCH NOT
- ENGAGING.
- D. TEMPERATURE SENSOR ALARM: a. THE CONTROLLER SENDS AN ALARM IN THE CASE OF A FAILED AIR TEMPERATURE SENSOR.
- E. PRESSURE SENSOR ALARM: a. THE CONTROLLER SENDS AN ALARM IN THE CASE OF A FAILED PRESSURE SENSOR.
- F. HUMIDITY SENSOR ALARM:
- a. THE CONTROLLER SENDS AN ALARM IN THE CASE OF A FAILED HUMIDITY SENSOR. G. BUILDING FREEZE PROTECTION:
- a. THE CONTROLLER SENDS AN ALARM IN CASE OF BUILDING FREEZE PROTECTION BEING ENGAGED. H. SMOKE DETECTION:
- a. THE CONTROLLER SENDS AN ALARM TO THE BAS AND THE FIRE ALARM CONTROL PANEL UPON POSITIVE DETECTION OF SMOKE. I. FAN FAILURE:
- a. BAS SHALL PROVE FAN ARRAY OPERATION AND USE THE STATUS INDICATION TO ACCUMULATE RUNTIME. UPON FAILURE OF ANY OF THE FANS, THE BAS SHALL ALARM THAT FAN FAILURE CONDITION OCCURRED. UPON FAILURE OF MORE THAN ONE FAN IN AN ARRAY, THE BAS SHALL REMOVE THE COMMAND TO RUN THE REMAINING FANS (BOTH INTERNAL TO THE AHU AND THE ASSOCIATED RAFA), LOCKOUT THE RUN COMMAND TO BOTH FAN ARRAYS AND ANNUNCIATE AN ALARM.
- J. HIGH OR LOW PRESSURE SAFETY: a. UPON ACTIVATION OF A HIGH OR LOW PRESSURE SAFETY SWITCH, AH SHALL BE DEENERGIZED, FANS SHALL BE DEENERGIZED VIA A HARD WIRED INTERLOCK, AND AN INDICATION OF THE OPERATION SHALL BE SENSED BY THE BAS. BAS SHALL ANNUNCIATE APPROPRIATE ALARM AND REMOVE AND LOCK OUT THE START 14. ACCESSORIES: PROVIDE THE FOLLOWING.
- A. BAS INTERFACING:
- a. A BAS PORT OR SERIAL CARD IS PROVIDED WITH THE CONTROLLER FOR FIELD INTERFACING WITH A BUILDING AUTOMATION SYSTEM. b. UPDATE DEFAULT SETTINGS TO THE APPROPRIATE ADDRESSES TO MATCH THE BAS SETTINGS.
- a. FACTORY PROVIDED, FIELD MOUNTED INTERFACE PANEL THAT WILL BE WIRED TO THE MAIN CONTROLLER FOR MONITORING AND REMOTE ADJUSTMENTS OF SET POINTS.
- C. PHASE AND BROWNOUT PROTECTION
- a. FACTORY MOUNTED AND WIRED COMPONENT WHICH MONITORS THE MAIN POWER COMING INTO THE UNIT. b. IF A PHASE DROPS OUT, OR IF THE INCOMING VOLTAGE EXCEEDS THE ACCEPTABLE RANGE, THE COMPONENT WILL TURN OFF THE UNIT TO HELP PROTECT THE
- ELECTRICAL SYSTEMS. D. CONDENSATE OVERFLOW UNIT SHUTDOWN a. FACTORY MOUNTED CONDENSATE OVERFLOW SWITCH WIRED TO THE UNIT CONTROLLER. THE CONTROLLER MONITORS THE CONDENSATE OVERFLOW SWITCH.
- b. IF THE WATER LEVEL IN THE DRAIN PAN REACHES A CERTAIN LEVEL, THE UNIT WILL SHUTDOWN AND SEND AN ALARM. E. AIRFLOW MONITORING
- a. THE SUPPLY AND EXHAUST FANS WILL EACH HAVE AN AIRFLOW MONITORING PRESSURE TAP ON THE INLET CONE. b. THE DIFFERENTIAL PRESSURE ACROSS THE FAN CONE IS CONVERTED TO AN AIRFLOW READING BY USING THE ENERGY CONSERVATION PRINCIPLE AND THE
- FAN WHEEL K-FACTOR. c. THE AIRFLOW CAN BE MONITORED VIA THE LCD AND BAS.
- a. DAMPER END SWITCHED WILL BE PROVIDED TO ENSURE THE SUPPLY AND EXHAUST FANS DO NOT ENABLE UNTIL THE DAMPERS ARE PROVEN OPEN.
- 15. MINIMUM REQUIREMENTS FOR OPERATOR WORKSTATION DISPLAY A. SUPPLY AIRFLOW
- B. SUPPLY FAN ON-OFF STATUS C. SUPPLY FAN SPEED

O. ALARMS

- D. ECONOMIZER STATUS E. ALL TEMPERATURE SENSORS ON THE UNIT F. DEWPOINT OF SA, RA, AND EA
- G. CHW AND HHW VALVE POSITIONS
- H. HEAT PIPE STATUS I. COOLING DEMAND % OF TOTAL CAPACITY
- J. TEMPERATURE LEAVING COOLING COIL K. TEMPERATURE LEAVING REHEAT COIL
- L. TEMPERATURE LEAVING UNIT M. DAMPER POSITIONS N. LINKS TO ASSOCIATED OAVAV AND EAVAV

POINT DISCRIPTION HARDWIRED (H) OR POINT TYPE **EXPECTED RANGE** NETWORKED (N)? AMBIENT PRESSURE -.05" WC - 0.5" WC BUILDING STATIC PRESSURE -.05" WC - 0.5" WC CHW VALVE POSITION 0-100% CONDENSATE OVERFLOW ALARM ON/OFF DUCT STATIC PRESSURE 0-3 IN. W.C. ECON OA DAMPER POSITION 0-100% ECONOMIZER OA CFM 0-75000 CFM ENVIRONMENTAL OA | TEMPERATURE 30-110°F ENVIRONMENTAL OA HUMIDITY 20%-80% HHW VALVE POSITION 0-100% MIN OA UNIT DAMPER POSITION 0-100% MIXED AIR HUMIDITY 20%-80% MIXED AIR **TEMPERATURE** 30-110°F OAVAV AIRFLOW VARIES BY BOX SIZE OAVAV DAMPER COMMAND 0-100% TEMPERATURE 30-110°F HUMIDITY 20%-80% RA DAMPER POSITION 0-100% CFM 50-90°F HUMIDITY 20%-80% TEMPERATURE 30-110°F OFF-CC TEMPERATURE 30-110°F HUMIDITY 20%-80% POSITION SA BYPASS DAMPER 0-100% SA DAMPER POSITION 0-100% START/STOP START/STOP SA FAN SA FAN SPEED COMMAND 0-100%

POINTS TABLE AHU-00-01

IN128 - JAMES T **MORRIS ARENA**

Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEE 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408 812-855-1692

Architect RATIO

101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204 317-633-4040

Structural Engineer FINK ROBERTS AND PETRIE, INC. 3535 EAST 96TH STREET

SUITE 126 INDIANAPOLIS, IN 46240 317-872-8400 Mechanical / Electrical

INTROBA 8250 HAVERSTICK ROAD SUITE 285 INDIANAPOLIS. IN 46240 800-404-7677

Plumbing Engineer

138 N. DELAWARE ST INDIANAPOLIS, IN 46204

317-633-4120

Acoustics / Technology Engineer WJHW

7220 W. JEFFERSON AVE SUITE 216 LAKEWOOD, CO 80235 972-934-3700

Civil Engineer AMERICAN STRUCTUREPOINT, INC.

9025 RIVER ROAD SUITE 200 INDIANAPOLIS. IN 46240

317-547-5580 Food Service Consultant CINILITTLE

3405 NW 9TH AVENUE #1202 FORT LAUDERDALE, FL 33309 954-846-9600

Code Consultant

FORZA 2502 WEST MECHANIC ST, SUITE C HARRISONVILLE, MO 64701 816-806-3729

SHEET ISSUE 95% CONSTRUCTION DOCUMENTS CONSTRUCTION DOCUMENTS **ADDENDUM 01**



AHU-00-01

PROJECT NO.

MECHANICAL

SHEET NUMBER

M-703

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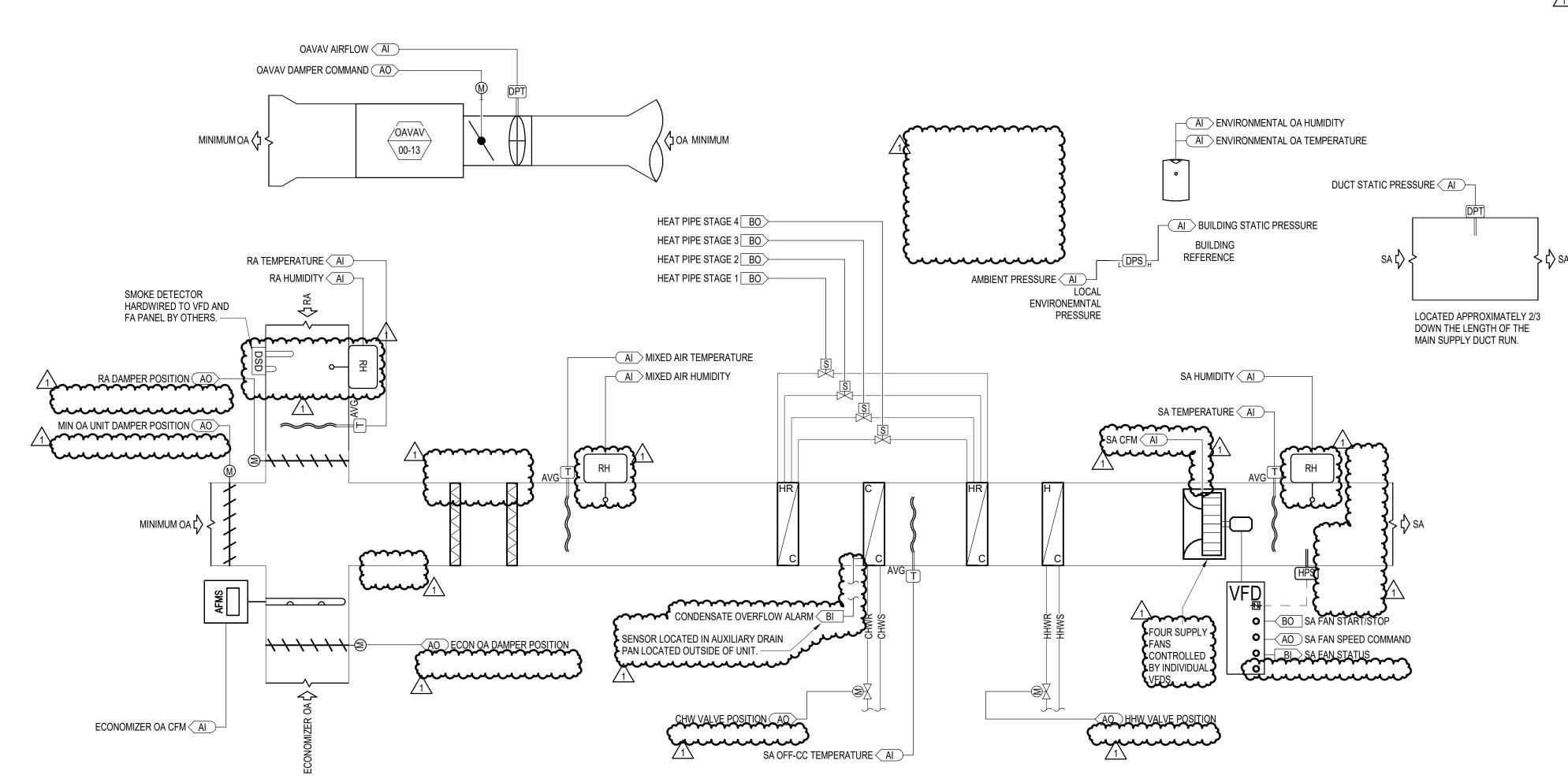
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- A. TEMPERATURE SENSORS, HUMIDISTATS, AND THERMOSTATS SHALL NOT BE INSTALLED ON EXTERIOR WALLS OR COLUMNS, OR WHERE EXPOSED TO SOLAR RADIATION. WHERE THERE ARE NO OTHER OPTIONS, A SOLAR BLOCKING ENCLOSURE AND INSULATED BACKPLATE TO ELIMINATE TEMPERATURE INFLUENCE FROM DIRECT SOLAR EXPOSURE SHALL BE PROVIDED
- B. VAVS ARE POWERED BY CONTROL VOLTAGE. CONTRACTOR IS RESPONSIBLE FOR COORDINATING ROUTING, GROUPING, AND POWER FOR THE LOW-VOLTAGE VAV UNITS.
- C. ALL NECESSARY CONTROL POINTS SHALL BE PROVIDED TO ACHIEVE THE WRITTEN SEQUENCES OF OPERATION WHETHER OR NOT THEY ARE EXPLICITLY NAMED.
- D. PROVIDE ANALOGUE FIELD SENSORS NEXT TO ALL TEMPERATURE AND PRESSURE CONTROL POINTS.
- E. CONTROLS CONTRACTOR SHALL COORDINATE WITH THE IU CONTROL INTEGRATOR.
- F. ALL IN-SPACE TEMPERATURE, HUMIDITY, AND CO2 SENSORS SHALL BE BLIND SENSORS WITH ONLY THE ABILITY TO INDUCE AN OCCUPANCY OVERRIDE WITH A BUTTON UNLESS OTHERWISE REQUESTED BY IU.
- \sim G. LOCAL MAGNEHELIC GAUGE SUPPLIED AT EACH FILTER SECTION.
- WHERE AIRFLOW MONITORING IS INDICATED ON FANS. PIEZIOMETER RING SHALL BE SUPPLIED AT EACH INLET CONE BY MANUFACTURER.



SEQUENCE OF OPERATIONS – AHU-00-02, ASSOCIATED OAVAV, AND VAVS

A. AHU-00-02 IS A VARIABLE-VOLUME HYDRONIC AHU CONSISTING OF A SUPPLY FAN ARRAY, COOLING COIL, RE-HEAT COIL, AND A DECOUPLED RELIEF AIR FAN ARRAY (RAFA). THE AHU SERVES THE ARENA FLOOR IN TWO CONSTANT-VOLUME OPERATION MODES: COURT-ONLY AND SEATING-RETRACTED COURT. THE AHU RECEIVED OA FROM A DEDICATED EAVAV AND OAVAV FROM AHU-00-03. ADDITIONALLY, THE AHU HAS THE CAPABILITY OF OPERATING IN ECONOMIZER MODE VIA A SEPARATE ECONOMIZER AIR

A. CONTROL POINTS SHALL BE CONTROLLED BY THE CENTRAL BAS VIA BACNET COMMUNICATION PROTOCOL. ALL CONTROL POINTS, WHETHER EXPLICITLY LISTED OR NOT,

- SHALL BE VISIBLE AND CONTROLLABLE VIA THE BAS. B. UNIT START COMMAND:
- a. OPERATIONALLY RELEVANT DAMPER ACTUATORS ARE POWERED. b. SUPPLY FANS START AFTER A 15 SEC (ADJ.) DELAY WHEN THE ASSOCIATED DAMPERS ARE PROVEN OPEN.
- c. TEMPERING OPTIONS TO FUNCTION AS DESCRIBED. C. UNIT STOP COMMAND (OR DE-ENERGIZED):
- a. SUPPLY FANS, ASSOCIATED OAVAY, AND TEMPERING OPTIONS DE-ENERGIZED. b. OPERATIONAL DAMPERS ARE CLOSED AND DAMPER ACTUATOR IS SPRING RETURN CLOSE.
- 3. OCCUPIED/UNOCCUPIED MODES A. TEMPERATURE SETPOINTS

a. OCCUPIED:

2. CONTROLS ARCHITECTURE:

- COOLING: 78°F +/- 2°F HEATING: 68°F +/- 2°F
- RELATIVE HUMIDITY: 55% b. UNOCCUPIED:
- COOLING: 82°F +/- 2°F
- B. SCHEDULE SHALL BE BASED ON AN OCCUPANCY SCHEDULE PROVIDED BY THE OWNER.
- C. OCCUPANCY OVERRIDE: IF DURING THE UNOCCUPIED PERIOD THERE IS A REQUEST FOR OCCUPANCY OVERRIDE, THE OCCUPANCY MODE SHALL BECOME ACTIVE FOR 2
- D. PRIOR TO SCHEDULED OCCUPANCY, OCCUPIED MODE SHALL BE ENGAGED WITH SUFFICIENT TIME TO ENSURE THE SPACES SERVED ARE AT THE OCCUPIED TEMPERATURE SETPOINT AND VENTILATION RATES PRIOR TO THE SCHEDULED OCCUPANCY. E. OCCUPIED MODE:
- a. SUPPLY FANS ON. b. ALL COILS AVAILABLE FOR OPERATION.
- c. OPERATIONAL DAMPERS PROVEN OPEN AND ENGAGED TO THEIR OPERATING POSITION.
- d. TEMPERATURE CONTROL PER SUPPLY AIR RESET SEQUENCE
- a. COURT-ONLY: THIS OPERATION MODE IS A CONSTANT VOLUME MODE UTILIZING THOSE VAVS WHICH ARE DIRECTED TOWARDS THE COURT ONLY. THIS MODE IS EMPLOYED ANY TIME THE BUILDING IS OCCUPIED TO ANY CAPACITY EXCEPT WITH THE "SEATING-RETRACTED COURT" MODE IS EMPLOYED. b. SEATING-RETRACTED COURT: THIS OPERATION MODE IS A CONSTANT VOLUME MODE UTILIZING ALL CONNECTED VAVS. THIS MODE IS EMPLOYED WHEN THE SEATING IS
- RETRACTED AND THE FULL COURT FLOOR IS IN USE. c. A TOUCHSCREEN PANEL SHALL BE PROVIDED IN A LOCATION DETERMINED BY THE OWNER TO CONTROL WHICH OPERATION MODE IS ASSIGNED TO THE AHU. LOGIN CREDENTIALS AND PANEL ACCESS SHALL BE COORDINATED WITH OWNER.
- G. UNOCCUPIED MODE (UNIT OFF): UNIT REMAINS OFF WHEN IN UNOCCUPIED MODE. a. SUPPLY FANS OFF
- b. ASSOCIATED RAFA OFF
- c. TEMPERING OFF d. OPERATIONAL DAMPERS CLOSED 4. SUPPLY FANS SEQUENCE:
- A. START/STOP: BAS SHALL COMMAND THE RELEVANT OPERATIONAL DAMPERS OPEN WHENEVER THE AHU IS ENERGIZED. UPON PROOF OF THE DAMPER POSITION, THE INTERLOCKED SUPPLY FANS SHALL RUN CONTINUOUSLY.
- B. THE SUPPLY FANS ARE PROVIDED WITH A FACTORY PROVIDED VARIABLE FREQUENCY DRIVE(S). THE SUPPLY FAN SPEED WILL BE CONTROLLED TO MEET THE AIRFLOW SPECIFIED IN THE DESIGN DOCUMENTS.
- A. WHEN OUTSIDE AIR ENTHALPY IS LESS THAN RETURN AIR ENTHALPY AND OUTSIDE AIR TEMPERATURE IS ABOVE 53°F, THE BAS SHALL: a. CLOSE THE ASSOCIATED OAVAV
- b. MODULATE THE ECONOMIZER OUTSIDE AIR AND RETURN AIR DAMPERS TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT c. SEND A SIGNAL TO THE PRESSURIZATION EAVAV ASSOCIATED WITH AHU-00-03 AND RAFA-02-02 TO OPERATE UNDER ECONOMIZER CONDITIONS. B. WHEN OUTSIDE AIR ENTHALPY IS GREATER THAN RETURN AIR ENTHALPY, THE BAS SHALL:
- a. RETURN THE ASSOCIATED OAVAV TO STANDARD OPERATION b. CLOSE THE ECONOMIZER OA DAMPER AND OPEN THE MINIMUM OA AND RA DAMPER.
- c. SEND A SIGNAL TO THE PRESSURIZATION EAVAV ASSOCIATED WITH AHU-00-03 AND RAFA-02-02 TO RETURN TO NORMAL OPERATION. 6. FAN OPERATION AND PROTECTION:
- A. THE FAN SPEEDS WILL NOT DROP BELOW 20 HZ (ADJ) AND SHALL NOT EXCEED 60 HZ. B. THE DUCT STATIC PRESSURE SHALL BE ESTABLISHED DURING THE SYSTEM TESTING AND BALANCING.

C. THE DUCT STATIC PRESSURE SHALL BE ESTABLISHED DURING THE SYSTEM TESTING AND BALANCING.

- C. MECHANICAL HIGH STATIC PROTECTION CUTOFFS SHALL BE INSTALLED TO PROTECT THE SYSTEM AND EQUIPMENT FROM PRESSURIZATION-RELATED DAMAGE. D. THE FANS ARE SIZED FOR N-1 OPERATION. IN THE EVENT OF A FAN FAILURE, THE REMAINING FANS WILL ADJUST TO COMPENSATE FOR THE MISSING FAN.
- 7. DUCT STATIC PRESSURE CONTROL:
- A. THE CONTROLLER WILL MEASURE DUCT STATIC PRESSURE AND MODULATE THE SUPPLY FAN VFD SPEEDS TO MAINTAIN A DUCT STATIC PRESSURE SETPOINTS. THE FAN SPEEDS WILL NOT DROP BELOW 20HZ (ADJ) AND SHALL NOT EXCEED 60 HZ. B. THE STATIC PRESSURE SETPOINT WILL BE RESET BASED UPON THE POSITION OF THE DOWNSTREAM SUPPLY VAV AND EXHAUST VAV ZONE DAMPERS, WITH A GOAL OF REDUCING THE STATIC PRESSURES UNTIL AT LEAST ONE SUPPLY OR EXHAUST ZONE DAMPER IS 90% (ADJ) OPEN. THE INITIAL DUCT STATIC PRESSURE SETPOINTS SHALL BE F. DEWPOINT OF SA, RA, AND EA
- DETERMINED BY TAB. IF NO ZONE DAMPER IS NEARLY WIDE OPEN AT THE INITIAL SETPOINT, IT WILL INCREMENTALLY RESET DOWN TO A PREDEFINED MINIMUM, AS DETERMINED BY TAB (ADJ). AS ONE OR MORE DAMPERS EXCEEDS 90% OPEN, THE SETPOINT WILL INCREMENTALLY RESET UP TO A MAXIMUM SETPOINT, AS DETERMINED BY
- D. THE CONTROLLER WILL MODULATE THE FANS BASED UPON A COMPARISON OF THE DUCT STATIC PRESSURE SET POINT (ADJ.) TO THE ACTUAL DUCT STATIC PRESSURE LEVEL REPORTED FROM THE SENSOR. E. MECHANICAL HIGH STATIC PROTECTION CUTOFFS SHALL BE INSTALLED TO PROTECT THE SYSTEM AND EQUIPMENT FROM PRESSURIZATION-RELATED DAMAGE.
- F. THE SUPPLY FANS ARE SIZED FOR N-1 OPERATION. IN THE EVENT OF A FAN FAILURE, THE REMAINING FANS WILL ADJUST TO COMPENSATE FOR THE MISSING FAN. 8. SUPPLY AIR TEMPERATURE CONTROL (OPTIMIZED): A. THE CONTROLLER WILL MAINTAIN A SUPPLY AIR TEMPERATURE SETPOINT RESET BASED ON ZONE COOLING AND HEATING REQUIREMENTS. THE VALVES TO THE COOLING
- AND REHEAT COILS WILL MODULATE TO MAINTAIN SPACE TEMPERATURE AND HUMIDITY REQUIREMENTS. B. DEHUMIDIFICATION: a. IN THE EVENT THAT COOLING DEMAND IS SATISFIED, BUT A ZONE DEWPOINT IS ABOVE 58°F(ADJ.), THE SETPOINT WILL INCREMENTALLY RESET DOWN TO A MINIMUM OF 53°F AND THE HEAT PIPE SHALL BE ENGAGED TO RE-HEAT THE SUPPLY AIR TO MATCH THE SYSTEM-INDICATED SUPPLY AIR TEMPERATURE. AFTER THE ZONE DEWPOINT
- TEMPERATURE CALLED FOR BY THE SEQUENCE AT THE TIME. b. IN THE EVENT THAT THE PREVIOUS DEHUMIDIFICATION STRATEGY IS ENGAGED AND THE CONDITIONS STILL EXIST FOR MORE THAN 60 MINUTES (ADJ.),, THE OAVAV AND EAVAV WILL MODULATE OPEN INCREMENTALLY AS A SECONDARY FORM OF DEHUMIDIFICATION. AFTER THE ZONE DEWPOINT IS BELOW 56°F(ADJ.) FOR 30 MINUTES (ADJ.), THE UNIT WILL RETURN TO STANDARD CONDITIONING MODE.

IS BELOW 56°F(ADJ.) FOR 30 MINUTES (ADJ.) THE HEAT PIPE WILL BE DISENGAGED AND THE SYSTEM WILL RETURN TO THE PRESCRIBED RESET STRATEGY AT THE

DE	MAND CONTROLLED VENTILATION
A.	THE OAVAV AND RETURN AIR DAMPER SHALL MODULATE IN RESPONSE TO CO2 SENSORS LOCATED THROUGHOUT THE SPACE TO MAINTAIN A CO2 CONCENTRATION
	LESS THAN 900 PPM (ADJ.)

- 10. BUILDING FREEZE PROTECTION A. IF THE SUPPLY AIR TEMPERATURE DROPS BELOW 40°F (ADJ.) FOR 90 SEC (ADJ.), THE BAS WILL DE-ENERGIZE THE UNIT AND ASSOCIATED EQUIPMENT, CLOSE ALL OPERATIONAL DAMPERS, AND ACTIVATE THE ALARM OUTPUT.
- 11. CONDENSATE OVERFLOW: A. IN THE EVENT THAT THE HIGH-LEVEL CONDENSATE SWITCH IS TRIPPED, ALL COOLING COMPONENTS SHALL SHUT DOWN AND ALARMS SHALL BE SENT TO THE BAS.
- 12. SMOKE DETECTION: A. SMOKE DETECTORS LOCATED IN THE SUPPLY AND EXHAUST AIR DUCT SHALL INDICATE AN ALARM AT THE BAS WORKSTATION WHEN AN ALARM CONDITION IS DETECTED FOR SECONDARY MONITORING. THE WIRING AND CONDUIT FOR SECONDARY MONITORING FROM THE DUCT SMOKE DETECTOR'S AUXILIARY CONTACT TO THE BAS SHALL BE PROVIDED. THE WIRING AND CONDUIT FROM THE DUCT DETECTOR FOR FAN SHUT DOWN SHALL BE PROVIDED.
- FIRE COMMAND CONTROL a. NORMAL: UNITS SHALL OPERATE PER SEQUENCES ABOVE. b. OFF: WHEN THE FIRE COMMAND OVERRIDE IS INDEXED TO OFF, THE AHU SHALL BE DE-ENERGIZED AND ALL OPERATIONAL DAMPERS SHALL CLOSE.
- 13. ALARMS INDICATION: THE CONTROLLER WILL DISPLAY ALARMS AND HAVE ONE DIGITAL OUTPUT FOR REMOTE INDICATION OF AN ALARM CONDITION. POSSIBLE ALARMS A. BUILDING MANAGEMENT SYSTEM:
- a. THE CONTROLLER WILL SEND ALL ALARMS TO THE BAS. a. A DIGITAL SIGNAL IS SENT TO THE CONTROLLER INDICATING AN INCREASED PRESSURE DROP ACROSS AN AIR FILTER (MUST BE ADJUSTED IN FIELD DURING START UP). THE CONTROLLER WILL THEN PROVIDE A DIRTY FILTER ALARM.
- C. SUPPLY AND EXHAUST AIR ALARM: a. THE CONTROLLER MONITORS THE PROVING SWITCH ON EACH BLOWER AND SENDS AN ALARM IN THE CASE OF EITHER BLOWER PROVING SWITCH NOT ENGAGING. D. TEMPERATURE SENSOR ALARM:
- a. THE CONTROLLER SENDS AN ALARM IN THE CASE OF A FAILED AIR TEMPERATURE SENSOR.
- E. PRESSURE SENSOR ALARM: a. THE CONTROLLER SENDS AN ALARM IN THE CASE OF A FAILED PRESSURE SENSOR.
- F. HUMIDITY SENSOR ALARM: a. THE CONTROLLER SENDS AN ALARM IN THE CASE OF A FAILED HUMIDITY SENSOR.
- G. BUILDING FREEZE PROTECTION: a. THE CONTROLLER SENDS AN ALARM IN CASE OF BUILDING FREEZE PROTECTION BEING ENGAGED.
- H. SMOKE DETECTION: a. THE CONTROLLER SENDS AN ALARM TO THE BAS AND THE FIRE ALARM CONTROL PANEL UPON POSITIVE DETECTION OF SMOKE.
- I. FAN FAILURE:
- a. BAS SHALL PROVE FAN ARRAY OPERATION AND USE THE STATUS INDICATION TO ACCUMULATE RUNTIME. UPON FAILURE OF ANY OF THE FANS, THE BAS SHALL ALARM THAT FAN FAILURE CONDITION OCCURRED. UPON FAILURE OF MORE THAN ONE FAN IN AN ARRAY, THE BAS SHALL REMOVE THE COMMAND TO RUN THE REMAINING FANS (BOTH INTERNAL TO THE AHU AND THE ASSOCIATED RAFA), LOCKOUT THE RUN COMMAND TO BOTH FAN ARRAYS AND ANNUNCIATE AN ALARM.
- a. UPON ACTIVATION OF A HIGH OR LOW PRESSURE SAFETY SWITCH, AH SHALL BE DEENERGIZED, FANS SHALL BE DEENERGIZED VIA A HARD WIRED INTERLOCK, AND AN INDICATION OF THE OPERATION SHALL BE SENSED BY THE BAS. BAS SHALL ANNUNCIATE APPROPRIATE ALARM AND REMOVE AND LOCK OUT THE START
- a. A BAS PORT OR SERIAL CARD IS PROVIDED WITH THE CONTROLLER FOR FIELD INTERFACING WITH A BUILDING AUTOMATION SYSTEM.
- b. UPDATE DEFAULT SETTINGS TO THE APPROPRIATE ADDRESSES TO MATCH THE BAS SETTINGS. B. DDC REMOTE INTERFACE:
- a. FACTORY PROVIDED, FIELD MOUNTED INTERFACE PANEL THAT WILL BE WIRED TO THE MAIN CONTROLLER FOR MONITORING AND REMOTE ADJUSTMENTS OF SET
- C. PHASE AND BROWNOUT PROTECTION a. FACTORY MOUNTED AND WIRED COMPONENT WHICH MONITORS THE MAIN POWER COMING INTO THE UNIT. b. IF A PHASE DROPS OUT, OR IF THE INCOMING VOLTAGE EXCEEDS THE ACCEPTABLE RANGE, THE COMPONENT WILL TURN OFF THE UNIT TO HELP PROTECT THE
- ELECTRICAL SYSTEMS. D. CONDENSATE OVERFLOW UNIT SHUTDOWN
- a. FACTORY MOUNTED CONDENSATE OVERFLOW SWITCH WIRED TO THE UNIT CONTROLLER. THE CONTROLLER MONITORS THE CONDENSATE OVERFLOW SWITCH. b. IF THE WATER LEVEL IN THE DRAIN PAN REACHES A CERTAIN LEVEL, THE UNIT WILL SHUTDOWN AND SEND AN ALARM.
- a. THE SUPPLY AND EXHAUST FANS WILL EACH HAVE AN AIRFLOW MONITORING PRESSURE TAP ON THE INLET CONE.
- b. THE DIFFERENTIAL PRESSURE ACROSS THE FAN CONE IS CONVERTED TO AN AIRFLOW READING BY USING THE ENERGY CONSERVATION PRINCIPLE AND THE FAN WHEEL K-FACTOR.
- c. THE AIRFLOW CAN BE MONITORED VIA THE LCD AND BAS.
- F. DAMPER END SWITCH a. DAMPER END SWITCHED WILL BE PROVIDED TO ENSURE THE SUPPLY AND EXHAUST FANS DO NOT ENABLE UNTIL THE DAMPERS ARE PROVEN OPEN.
- 15. MINIMUM REQUIREMENTS FOR OPERATOR WORKSTATION DISPLAY
- A. SUPPLY AIRFLOW B. SUPPLY FAN ON-OFF STATUS C. SUPPLY FAN SPEED

14. ACCESSORIES: PROVIDE THE FOLLOWING.

- E. ALL TEMPERATURE SENSORS ON THE UNIT
- G. CHW AND HHW VALVE POSITIONS
- H. HEAT PIPE STATUS COOLING DEMAND % OF TOTAL CAPACITY
- J. TEMPERATURE LEAVING COOLING COIL
- K. TEMPERATURE LEAVING REHEAT COIL TEMPERATURE LEAVING UNIT
- M. DAMPER POSITIONS N. LINKS TO ASSOCIATED OAVAV AND EAVAV O. ALARMS

	POINTS	TABLE AHU-	00-02	
POI	NT DISCRIPTION	POINT TYPE	HARDWIRED (H) OR NETWORKED (N)?	EXPECTED RANGE
AMBIENT	PRESSURE	Al	Н	05" WC - 0.5" WC
BUILDING	STATIC PRESSURE	Al	Н	05" WC - 0.5" WC
CHW VALVE	POSITION	AO	N	0-100%
CONDENSATE	OVERFLOW ALARM	BI	N	ON/OFF
DUCT	STATIC PRESSURE	Al	Н	0-3 IN. W.C.
DUCT	STATIC PRESSURE	Al	Н	0-3 IN. W.C.
ECON OA DAMPER	POSITION	AO	N	0-100%
ECONOMIZER OA	CFM	Al	Н	0-75000 CFM
ENVIRONMENTAL OA	TEMPERATURE	Al	Н	30-110°F
ENVIRONMENTAL OA	HUMIDITY	Al	Н	20%-80%
HEAT PIPE	STAGE 1	ВО	Н	ON/OFF
HEAT PIPE	STAGE 2	ВО	Н	ON/OFF
HEAT PIPE	STAGE 3	ВО	Н	ON/OFF
HEAT PIPE	STAGE 4	ВО	Н	ON/OFF
HHW VALVE	POSITION	AO	N	0-100%
MIN OA UNIT DAMPER	POSITION	AO	N	0-100%
MIXED AIR	HUMIDITY	Al	Н	20%-80%
MIXED AIR	TEMPERATURE	Al	Н	30-110°F
OAVAV	AIRFLOW	Al	Н	VARIES BY BOX SIZ
OAVAV	DAMPER COMMAND	AO		0-100%
RA	TEMPERATURE	Al	Н	30-110°F
RA	HUMIDITY	Al	Н	20%-80%
RA DAMPER	POSITION	AO	N	0-100%
SA	CFM	Al	Н	50-90°F
SA	HUMIDITY	Al	Н	20%-80%
SA	TEMPERATURE	Al	Н	30-110°F
SA	OFF-CC TEMPERATURE	Al	Н	30-110°F
SA FAN	START/STOP	ВО	N	START/STOP
SA FAN	SPEED COMMAND	AO	N	0-100%
SA FAN	STATUS	BI	N	ON/OFF

IN128 - JAMES T **MORRIS ARENA**

Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEE 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408 812-855-1692

Architect RATIO 101 SOUTH PENNSYLVANIA STREET

317-633-4040 Structural Engineer

FINK ROBERTS AND PETRIE, INC. 3535 EAST 96TH STREET

INDIANAPOLIS, IN 46204

SUITE 126 INDIANAPOLIS, IN 46240 317-872-8400

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> INDIANAPOLIS. IN 46240 800-404-7677

SUITE 285

Plumbing Engineer 138 N. DELAWARE ST

INDIANAPOLIS, IN 46204 317-633-4120

Acoustics / Technology Engineer WJHW 7220 W. JEFFERSON AVE SUITE 216

LAKEWOOD, CO 80235

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AMERICAN STRUCTUREPOINT, INC. 9025 RIVER ROAD SUITE 200

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FROM DIRECT SOLAR EXPOSURE SHALL BE PROVIDED

- B. VAVS ARE POWERED BY CONTROL VOLTAGE. CONTRACTOR IS RESPONSIBLE FOR COORDINATING ROUTING, GROUPING, AND POWER FOR THE LOW-VOLTAGE VAV UNITS.
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SECTION.

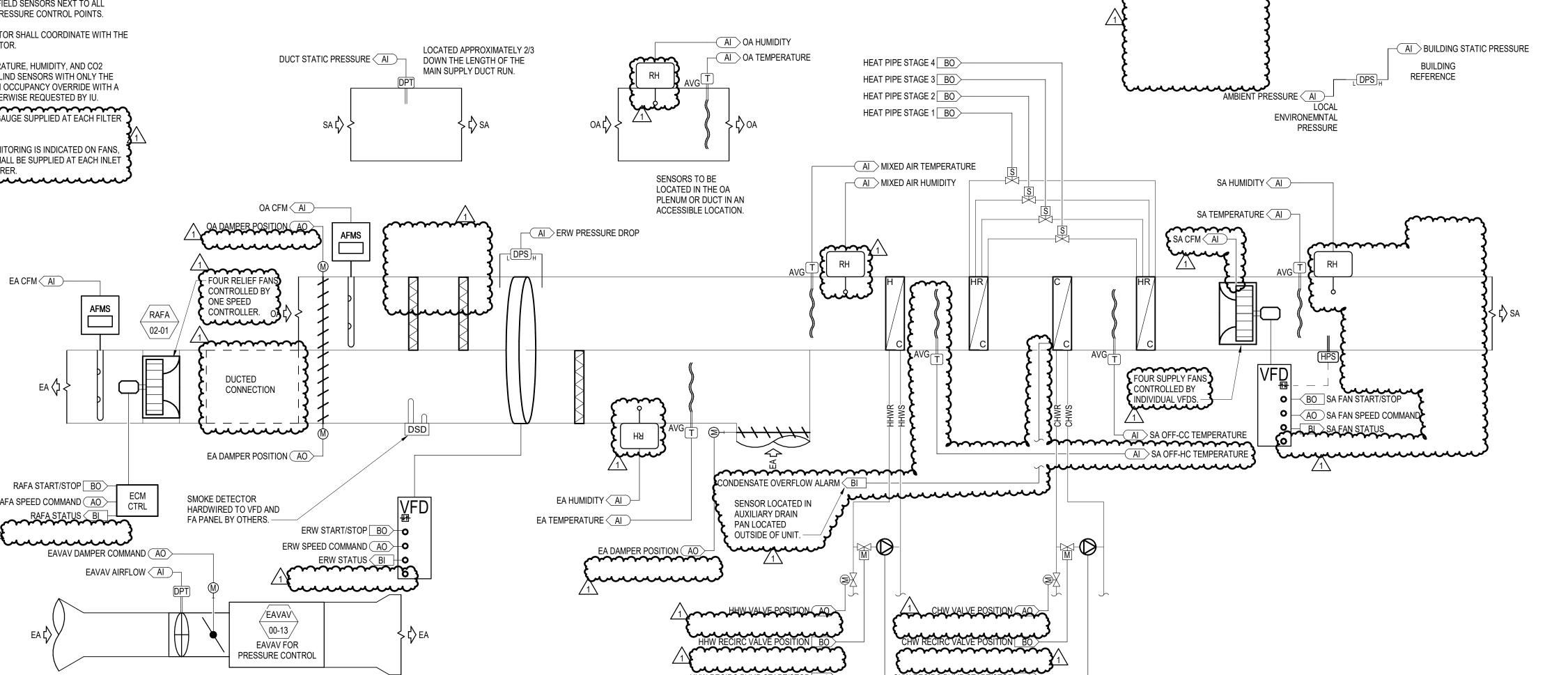
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EA CFM AI

RAFA SPEED COMMAND (AO

RAFA STATUS BI

LOCAL MAGNEHELIC GAUGE SUPPLIED AT EACH FILTER



HHW RECIRC PUMP STATUS BI

POINTS TABLE DOAS-00-01					
PC	DINT DISCRIPTION	POINT TYPE	HARDWIRED (H) OR NETWORKED (N)?	EXPECTED RANGE	
AMBIENT	PRESSURE	Al	Н	05" WC - 0.5" WC	
BUILDING	STATIC PRESSURE	Al	Н	05" WC - 0.5" WC	
CHW RECIRC PUMP	START/STOP	ВО	N	START/STOP	
CHW RECIRC PUMP	STATUS	BI	N	ON/OFF	
CHW VALVE	POSITION	AO	N	0-100%	
CONDENSATE	OVERFLOW ALARM	BI	N	ON/OFF	
EA	TEMPERATURE	Al	Н	30-110°F	
EA	HUMIDITY	Al	Н	20%-80%	
EA	CFM	Al	Н	0-75000 CFM	
EA DAMPER	POSITION	AO	N	0-100%	
EA DAMPER	POSITION	AO	N	0-100%	
EAVAV	AIRFLOW	Al	Н	VARIES BY BOX SIZE	
EAVAV	DAMPER COMMAND	AO		0-100%	
ERW	START/STOP	ВО	N	START/STOP	
ERW	SPEED COMMAND	AO	N	0-100%	
ERW	STATUS	BI	N	ON/OFF	
ERW	PRESSURE DROP	Al	Н	0-2 IN. W.C.	
HEAT PIPE	STAGE 1	ВО	Н	ON/OFF	
HEAT PIPE	STAGE 2	ВО	Н	ON/OFF	
HEAT PIPE	STAGE 3	ВО	Н	ON/OFF	
HEAT PIPE	STAGE 4	ВО	Н	ON/OFF	
HHW RECIRC PUMP	START/STOP	ВО	N	START/STOP	
HHW RECIRC PUMP	STATUS	BI	N	ON/OFF	
HHW VALVE	POSITION	AO	N	0-100%	
MIXED AIR	HUMIDITY	Al	Н	20%-80%	
MIXED AIR	TEMPERATURE	Al	Н	30-110°F	
OA	CFM	Al	H	50-90°F	
OA	TEMPERATURE	Al	Н	30-110°F	
OA	HUMIDITY	Al	Н	20%-80%	
OA DAMPER	POSITION	AO	N	0-100%	
RAFA	START/STOP	ВО	N	START/STOP	
RAFA	SPEED COMMAND	AO	N	0-100%	
RAFA	STATUS	BI	N	ON/OFF	
SA	CFM	Al	Н	50-90°F	
SA	HUMIDITY	Al	Н	20%-80%	
SA	TEMPERATURE	Al	Н	30-110°F	
SA	OFF-CC TEMPERATURE	Al	H	30-110°F	
SA	OFF-HC TEMPERATURE	Al	H	30-110°F	
SA FAN	START/STOP	ВО	N	START/STOP	
SA FAN	SPEED COMMAND	AO	N	0-100%	
SA FAN	STATUS	BI	N	ON/OFF	

SEQUENCE OF OPERATIONS – AHU-00-03

- A. AHU UNIT CONSISTS OF A SUPPLY FAN ARRAY, COOLING COIL, PRE-HEAT COIL, HEAT PIPE PRE-COOL AND RE-HEAT SYSTEM, ENERGY RECOVERY WHEEL (ERW) AND A DECOUPLED RELIEF AIR FAN ARRAY (RAFA). THE AHU SERVES A SERIES OF SPACES WHOSE AIRFLOW NEEDS ARE PRIMARILY DRIVEN BY OA OR EA, INCLUDING LOCKER ROOMS, RESTROOM, AND TRAINING ROOMS. THE AHU ALSO HAS DEDICATED OAVAVS THAT PROVIDE OA TO AHU-00-01, AHU-00-02, AND AHU-01-01.
- CONTROLS ARCHITECTURE: A. CONTROL POINTS SHALL BE CONTROLLED BY THE CENTRAL BAS VIA BACNET COMMUNICATION PROTOCOL. ALL CONTROL POINTS, WHETHER EXPLICITLY LISTED OR NOT,
- SHALL BE VISIBLE AND CONTROLLABLE VIA THE BAS.
- a. OPERATIONALLY RELEVANT DAMPER ACTUATORS ARE POWERED. b. SUPPLY FANS START AFTER A 15 SEC (ADJ.) DELAY WHEN THE ASSOCIATED DAMPERS ARE PROVEN OPEN.
- c. TEMPERING OPTIONS AND ENERGY WHEEL OPTION TO FUNCTION AS DESCRIBED. d. HEAT PIPE COMPONENTS ARE POWERED. C. UNIT STOP COMMAND (OR DE-ENERGIZED):
- a. SUPPLY FANS, ASSOCIATED RAFA, ENERGY WHEEL, AND TEMPERING OPTIONS DE-ENERGIZED b. OPERATIONAL DAMPERS ARE CLOSED AND DAMPER ACTUATOR IS SPRING RETURN CLOSE.
- 3. OCCUPIED/UNOCCUPIED MODES A. TEMPERATURE SETPOINTS
- a. OCCUPIED: COOLING: 78°F +/- 2°F
- HEATING: 68°F +/- 2°F RELATIVE HUMIDITY: 55%
- b. UNOCCUPIED: COOLING: 82°F +/- 2°F
- B. SCHEDULE SHALL BE BASED ON AN OCCUPANCY SCHEDULE PROVIDED BY THE OWNER.
- C. OCCUPANCY OVERRIDE: IF DURING THE UNOCCUPIED PERIOD THERE IS A REQUEST FOR OCCUPANCY OVERRIDE, THE OCCUPANCY MODE SHALL BECOME ACTIVE FOR 2 D. PRIOR TO SCHEDULED OCCUPANCY, OCCUPIED MODE SHALL BE ENGAGED WITH SUFFICIENT TIME TO ENSURE THE SPACES SERVED ARE AT THE OCCUPIED TEMPERATURE
- SETPOINT AND VENTILATION AND EXHAUST RATES PRIOR TO THE SCHEDULED OCCUPANCY. E. OCCUPIED MODE:
- a. SUPPLY FANS ON. b. ALL COILS AVAILABLE FOR OPERATION.
- c. OPERATIONAL DAMPERS PROVEN OPEN AND ENGAGED TO THEIR OPERATING POSITION d. ASSOCIATED RAFA IS AVAILABLE FOR EXHAUST DEMAND AND PRESSURIZATION CONTROL
- e. TEMPERATURE CONTROL PER SUPPLY AIR RESET SEQUENCE F. UNOCCUPIED MODE (UNIT OFF): UNIT REMAINS OFF WHEN IN UNOCCUPIED MODE.
- a. SUPPLY FANS OFF
- b. ASSOCIATED RAFA OFF c. TEMPERING OFF
- d. HEAT PIPE SYSTEM OFF e. OPERATIONAL DAMPERS CLOSED
- 4. SUPPLY FANS SEQUENCE: A. START/STOP: BAS SHALL COMMAND THE RELEVANT OPERATIONAL DAMPERS OPEN WHENEVER THE AHU IS ENERGIZED. UPON PROOF OF THE DAMPER POSITION, THE INTERLOCKED SUPPLY FANS SHALL RUN CONTINUOUSLY.
- B. THE SUPPLY FANS ARE PROVIDED WITH A FACTORY PROVIDED VARIABLE FREQUENCY DRIVE(S). THE SUPPLY FAN SPEED WILL BE CONTROLLED WITH THE DUCT STATIC PRESSURE CONTROL SEQUENCE.
- 5. RAFA SEQUENCE A. THE RAFA IS PROVIDED WITH A FACTORY PROVIDED VARIABLE FREQUENCY DRIVE.
- B. THE RAFA SPEED WILL BE CONTROLLED WITH THE FOLLOWING SEQUENCE. C. BUILDING PRESSURIZATION SHALL BE MAINTAINED AT MINIMUM 0.025" WC (ADJ.):
- a. THE BUILDING PRESSURIZATION SHALL BE RELAYED THROUGH A SERIES OF SPACE PRESSURE SENSORS LOCATED THROUGHOUT THE BUILDING. b. SOME SPACES SERVED (EXAMPLE: RESTROOMS AND LOCKER ROOMS) ARE REQUIRED TO MAINTAIN CONSTANT EXHAUST RATES WHEN OCCUPIED. THOSE SPACES WILL BE PROVIDED WITH OCCUPANCY SENSORS WHICH, ONCE ACTIVATED, HAVE A 3-HOUR (ADJ.) OCCUPANCY NOTICE SIGNAL. WHEN ANY OF THOSE OCCUPANCY SENSORS ARE TRIGGERED, THE RAFA SHALL RAMP UP UNTIL THE AIRFLOW IN THE ASSOCIATED SPACES ARE REPORTED TO BE IN RANGE. THE SUPPLY FANS SHALL RAMP IN
- TANDEM TO MAINTAIN POSITIVE BUILDING PRESSURIZATION. c. ASSOCIATED EAVAY FOR PRESSURE CONTROL
- AN EAVAV IS LOCATED IN THE MECHANICAL ROOM AS THE LAST INLET TO THE EXHAUST AIR DUCT TO THE ERW. THAT EAVAV SHALL MODULATE TO ACCOUNT FOR THE DIFFERENCE BETWEEN THE SUPPLY AND EXHAUST AIRFLOW RATES REQUIRED TO SATISFY THE RUN CONDITIONS AND THE AIRFLOW RATE REQUIRED TO MAINTAIN POSITIVE BUILDING PRESSURIZATION.
- WHILE AHU-00-01, AHU-00-02, AND/OR AHU-02-02 ARE IN ECONOMIZER MODE, RAFA-02-02 SHALL BE USED TO CONTROL BUILDING PRESSURIZATION INSTEAD OF THE ASSOCIATED EAVAY. THE ASSOCIATED EAVAY WILL INSTEAD MODULATE TO MAINTAIN EQUAL AIRFLOWS ACROSS THE ERW. SEE THE ASSOCIATED SEQUENCE FOR ADDITIONAL INFORMATION. d. MECHANICAL HIGH STATIC PROTECTION CUTOFFS SHALL BE INSTALLED TO PROTECT THE SYSTEM AND EQUIPMENT FROM PRESSURIZATION RELATED DAMAGE.
- 6. DUCT STATIC PRESSURE CONTROL: A. THE CONTROLLER WILL MEASURE DUCT STATIC PRESSURE AND MODULATE THE SUPPLY FAN AND RAFA VFD SPEEDS TO MAINTAIN A DUCT STATIC PRESSURE SETPOINTS.
- THE FAN SPEEDS WILL NOT DROP BELOW 20HZ (ADJ) AND SHALL NOT EXCEED 60 HZ. B. THE STATIC PRESSURE SETPOINT WILL BE RESET BASED UPON THE POSITION OF THE DOWNSTREAM SUPPLY VAV AND EXHAUST VAV ZONE DAMPERS, WITH A GOAL OF REDUCING THE STATIC PRESSURES UNTIL AT LEAST ONE SUPPLY OR EXHAUST ZONE DAMPER IS 90% (ADJ) OPEN. THE INITIAL DUCT STATIC PRESSURE SETPOINTS SHALL BE DETERMINED BY TAB. IF NO ZONE DAMPER IS NEARLY WIDE OPEN AT THE INITIAL SETPOINT, IT WILL INCREMENTALLY RESET DOWN TO A PREDEFINED MINIMUM, AS DETERMINED BY TAB (ADJ). AS ONE OR MORE DAMPERS EXCEEDS 90% OPEN, THE SETPOINT WILL INCREMENTALLY RESET UP TO A MAXIMUM SETPOINT, AS DETERMINED BY
- C. THE DUCT STATIC PRESSURE SHALL BE ESTABLISHED DURING THE SYSTEM TESTING AND BALANCING. D. THE CONTROLLER WILL MODULATE THE FANS BASED UPON A COMPARISON OF THE DUCT STATIC PRESSURE SET POINT (ADJ.) TO THE ACTUAL DUCT STATIC PRESSURE
- LEVEL REPORTED FROM THE SENSOR. E. MECHANICAL HIGH STATIC PROTECTION CUTOFFS SHALL BE INSTALLED TO PROTECT THE SYSTEM AND EQUIPMENT FROM PRESSURIZATION-RELATED DAMAGE F. THE SUPPLY FANS ARE SIZED FOR N-1 OPERATION. IN THE EVENT OF A FAN FAILURE, THE REMAINING FANS WILL ADJUST TO COMPENSATE FOR THE MISSING FAN.

- SUPPLY AIR TEMPERATURE CONTROL (OPTIMIZED): A. THE CONTROLLER WILL MAINTAIN A SUPPLY AIR TEMPERATURE SETPOINT RESET BASED ON ZONE COOLING AND HEATING REQUIREMENTS. THE SUPPLY AIR TEMPERATURE SETPOINT WILL BE RESET BASED UPON VAV TERMINAL EQUIPMENT HEATING AND COOLING REQUESTS, WITH A GOAL OF REDUCING THE SUM OF ALL REQUESTS TO ZERO.
 - a. 1 HEATING OR COOLING REQUEST WHEN THE ASSOCIATED VAV IS >90% OPEN FOR COOLING OR THE HHW REHEAT VALVE IS 90% OPEN(ADJ
 - c. HEATING OR COOLING REQUEST WHEN THE ZONE TEMP IS IN HOT/COLD ALARM

CHW RECIRC PUMP STATUS (BI

- d. TOTAL REQUESTS AND MULTIPLY BY ZONE WEIGHTING FACTOR (ADJ)
- THE INITIAL SUPPLY AIR TEMPERATURE SETPOINT WILL BE 60°F (ADJ.).
- g. IF THE NUMBER OF HEATING REQUESTS EXCEEDS THE NUMBER OF COOLING REQUESTS FOR 30 MINUTES (ADJ), THE SUPPLY AIR TEMPERATURE SETPOINT WILL BE
- C. MECHANICAL COOLING WILL BE LOCKED OUT WHEN THE OA TEMPERATURE IS BELOW 53°F. WHILE THE CHW IS NOT ENGAGED, THE RECIRCULATION VALVES WILL POSITION TO ALLOW FOR THE RECIRCULATION PUMP TO OPERATE IN THE EVENT OF A FREEZE ALARM.
- THE COOLING COIL AND PRE-HEAT COIL SHALL NEVER OPERATE SIMULTANEOUSLY.
- A. HEAT PIPE SOLENOID VALVES SHALL BE MIN. 4 STAGE, MODULATING AS REQUIRED TO SATISFY THE SUPPLY AIR RESET AND HUMIDITY CONTROL STRATEGIES.
- A. IF THE SUPPLY AIR TEMPERATURE DROPS BELOW 40°F (ADJ.) FOR 90 SEC (ADJ.), THE BAS WILL DE-ENERGIZE THE UNIT AND ASSOCIATED EQUIPMENT, CLOSE ALL
- 10. CONDENSATE OVERFLOW: A. IN THE EVENT THAT THE HIGH-LEVEL CONDENSATE SWITCH IS TRIPPED, ALL COOLING COMPONENTS SHALL SHUT DOWN AND ALARMS SHALL BE SENT TO THE BAS. 11. ENERGY RECOVERY WHEEL (ERW): A. BAS SHALL CONTROL THE ERW. THE ERW SHALL BE ENERGIZED WHENEVER THE AHU UNIT IS OPERATING AND THE SPEED OF THE ERW SHALL BE MODULATED TO MAINTAIN
- B. BAS SHALL CONTROL THE STARTING AND STOPPING OF THE ERW AS FOLLOWS: a. WHENEVER THE UNIT IS ENERGIZED AND THE OUTSIDE AIR ENTHALPY IS GREATER THAN THE ERW EXHAUST AIR ENTHALPY THE WHEEL SPEED SHALL BE MODULATED TO MAINTAIN A 52°F (ADJ) WHEEL DISCHARGED DEWPOINT TEMPERATURE.
- C. PERIODIC SELF-CLEANING: THE WHEEL SHALL RUN AT 5% SPEED FOR 10 SEC EVERY 4HRS THE UNIT RUNS.
- a. FROST CONTROL FOR THE ERW IS ENABLED WHEN FROST IS PRESENT ON THE WHEEL: BASED ON THE OUTSIDE AIR TEMPERATURE AND THE PRESSURE DROP ACROSS THE WHEEL. IF THE OUTDOOR AIR TEMPERATURE IS BELOW 5°F (ADJ.) AND THE DIFFERENTIAL PRESSURE ACROSS THE WHEEL IS 1.5" OR GREATER (ADJ.), FROST
- b. WHEEL VFD (MODULATE WHEEL): WHEN FROSTING IS OCCURRING, THE VFD MODULATES THE WHEEL DOWN TO A SLOW ROTATIONAL SPEED TO DEFROST WHEEL. ONCE EITHER THE PRESSURE DROP DECREASES BELOW THE PRESSURE SWITCH SET POINT, OR THE OUTDOOR AIR TEMPERATURE INCREASES ABOUT THE TEMPERATURE SET
- A. SMOKE DETECTORS LOCATED IN THE SUPPLY AND EXHAUST AIR DUCT SHALL INDICATE AN ALARM AT THE BAS WORKSTATION WHEN AN ALARM CONDITION IS DETECTED FOR SECONDARY MONITORING. THE WIRING AND CONDUIT FOR SECONDARY MONITORING FROM THE DUCT SMOKE DETECTOR'S AUXILIARY CONTACT TO THE BAS SHALL BE PROVIDED. THE WIRING AND CONDUIT FROM THE DUCT DETECTOR FOR FAN SHUT DOWN SHALL BE PROVIDED. FIRE COMMAND CONTROL
- a. NORMAL: UNITS SHALL OPERATE PER SEQUENCES ABOVE. b. OFF: WHEN THE FIRE COMMAND OVERRIDE IS INDEXED TO OFF, THE AHU SHALL BE DE-ENERGIZED AND ALL OPERATIONAL DAMPERS SHALL CLOSE.

ALL SUPPLY AIR TEMPERATURES SHALL BE OFF-COIL TEMPERATURES. EACH ZONE SHALL HAVE ITS REQUESTS WEIGHTED ACCORDING TO THE SIZE AND CRITICALITY OF THE

- SPACE (A LARGER, MORE CRITICAL ENVIRONMENT GENERATES MORE REQUESTS THAN A SMALLER, LESS CRITICAL ONE). CUMULATIVE REQUESTS SHALL BE GENERATED BY
- b. HEATING OR COOLING REQUEST WHEN THE ZONE TEMP IS <2°F (ADJ) FROM HOT/COLD ALARM
- e. IF THE NUMBER OF COOLING REQUESTS EXCEEDS THE NUMBER OF HEATING REQUESTS FOR 30 MINUTES (ADJ), THE SUPPLY AIR TEMPERATURE SETPOINT WILL BE
- RESET FOR "COOLING MODE" AS FOLLOWS:
- AS COOLING DEMAND INCREASES, THE SETPOINT WILL INCREMENTALLY RESET DOWN TO A MINIMUM OF 53°F (ADJ.).
- AS COOLING DEMAND DECREASES, THE SETPOINT WILL INCREMENTALLY RESET UP TO A MAXIMUM OF 72°F (ADJ.). IN THE EVENT THAT COOLING DEMAND IS DECREASING, BUT A ZONE DEWPOINT IS ABOVE 58°F(ADJ.), THE SETPOINT WILL INCREMENTALLY RESET DOWN TO A MINIMUM OF 53°F AND THE HEAT PIPE SHALL BE ENGAGED TO RE-HEAT THE SUPPLY AIR TO MATCH THE SYSTEM-INDICATED SUPPLY AIR TEMPERATURE. AFTER THE ZONE DEWPOINT IS BELOW 56°F(ADJ.) FOR 30 MINUTES (ADJ.) THE HEAT PIPE WILL BE DISENGAGED AND THE SYSTEM WILL RETURN TO THE PRESCRIBED RESET STRATEGY AT
- THE TEMPERATURE CALLED FOR BY THE SEQUENCE AT THE TIME.
- RESET FOR "HEATING MODE" AS FOLLOWS: THE INITIAL SUPPLY AIR TEMPERATURE SETPOINT WILL BE 82°F (ADJ.).
- AS HEATING DEMAND INCREASES, THE SETPOINT WILL INCREMENTALLY RESET UP TO A MAXIMUM OF 85°F (ADJ.). AS HEATING DEMAND DECREASES, THE SETPOINT WILL INCREMENTALLY RESET DOWN TO A MINIMUM OF 72°F (ADJ.)
- B. UPON INITIAL START-UP THE CONTROLLER WILL DEFAULT TO "COOLING MODE". A HYSTERESIS/DEADBAND OF 2 REQUESTS (ADJ) SHALL BE USED TO PREVENT SHORT CYCLING BETWEEN HEATING/COOLING MODES.
- D. THE RECIRCULATION VALVES ON THE PRE-HEAT COIL WILL ONLY MOVE TO RECIRCULATION POSITION IN THE EVENT OF UNIT SHUTDOWN DUE TO FREEZE ALARM.
- HEAT PIPE: BUILDING FREEZE PROTECTION:
- OPERATIONAL DAMPERS, AND ACTIVATE THE ALARM OUTPUT. IF THE UNIT IS EQUIPPED WITH COIL RECIRCULATION PUMPS, THE MODULATING CONTROL VALVE SHALL CLOSE, THE RECIRCULATION PUMP ISOLATION VALVE SHALL OPEN, AND THE RECIRCULATION PUMP SHALL OPERATE.
- THE CURRENT SUPPLY AIR TEMPERATURE SETPOINT. IF THE ERW IS FULLY UTILIZED AND THE SUPPLY AIR TEMPERATURE IS NOT MET PER THE SUPPLY AIR RESET
- STRATEGY, THE CORRESPONDING HYDRONIC VALVES WILL BE ENGAGED.
- b. WHENEVER THE UNIT IS ENERGIZED AND THE OUTSIDE AIR DEW POINT TEMPERATURE IS LESS THAN 52°F (ADJ). THE SPEED OF THE WHEEL SHALL BE MODULATED TO MAINTAIN THE SUPPLY AIR DEW POINT TEMPERATURE AT 52°F (ADJ). THE SPEED OF THE WHEEL SHALL BE INCREASED UPON A DROP IN SUPPLY AIR DEW POINT
- D. FROST PROTECTION:
- POINT, THE UNIT WILL RESUME NORMAL OPERATION.

- 13. ALARMS INDICATION: THE CONTROLLER WILL DISPLAY ALARMS AND HAVE ONE DIGITAL OUTPUT FOR REMOTE INDICATION OF AN ALARM CONDITION. POSSIBLE ALARMS
- A. BUILDING MANAGEMENT SYSTEM: a. THE CONTROLLER WILL SEND ALL ALARMS TO THE BAS.
- B. DIRTY FILTER ALARM: a. A DIGITAL SIGNAL IS SENT TO THE CONTROLLER INDICATING AN INCREASED PRESSURE DROP ACROSS AN AIR FILTER (MUST BE ADJUSTED IN FIELD DURING START UP).
- THE CONTROLLER WILL THEN PROVIDE A DIRTY FILTER ALARM. C. DIRTY WHEEL ALARM:
- a. THE CONTROLLER MONITORS PRESSURE ACROSS THE WHEEL AND SENDS AN ALARM IN THE CASE OF AN INCREASED PRESSURE DROP. D. WHEEL ROTATION ALARM:
- a. THE CONTROLLER MONITORS WHEEL ROTATION, IF THE WHEEL DOES NOT ROTATE FOR A SET PERIOD OF TIME (ADJ.) AN ALARM WILL GENERATE. E. SUPPLY AND EXHAUST AIR ALARM:
- a. THE CONTROLLER MONITORS THE PROVING SWITCH ON EACH BLOWER AND SENDS AN ALARM IN THE CASE OF EITHER BLOWER PROVING SWITCH NOT ENGAGING. F. TEMPERATURE SENSOR ALARM:
- a. THE CONTROLLER SENDS AN ALARM IN THE CASE OF A FAILED AIR TEMPERATURE SENSOR. G. PRESSURE SENSOR ALARM:
- THE CONTROLLER SENDS AN ALARM IN THE CASE OF A FAILED PRESSURE SENSOR. H. HUMIDITY SENSOR ALARM:
- a. THE CONTROLLER SENDS AN ALARM IN THE CASE OF A FAILED HUMIDITY SENSOR. I. FROST CONTROL:
- a. THE CONTROLLER SENDS AN ALARM IN CASE OF FROST CONTROL BEING ENGAGED. J. BUILDING FREEZE PROTECTION:
- a. THE CONTROLLER SENDS AN ALARM IN CASE OF BUILDING FREEZE PROTECTION BEING ENGAGED.
- K. SMOKE DETECTION:
- a. THE CONTROLLER SENDS AN ALARM TO THE BAS AND THE FIRE ALARM CONTROL PANEL UPON POSITIVE DETECTION OF SMOKE. L. FAN FAILURE:
- a. BAS SHALL PROVE FAN ARRAY OPERATION AND USE THE STATUS INDICATION TO ACCUMULATE RUNTIME. UPON FAILURE OF ANY OF THE FANS, THE BAS SHALL ALARM THAT FAN FAILURE CONDITION OCCURRED. UPON FAILURE OF MORE THAN ONE FAN IN AN ARRAY, THE BAS SHALL REMOVE THE COMMAND TO RUN THE REMAINING FANS (BOTH INTERNAL TO THE AHU AND THE ASSOCIATED RAFA), LOCKOUT THE RUN COMMAND TO BOTH FAN ARRAYS AND ANNUNCIATE AN ALARM.
- M. RECIRCULATION PUMP FAILURE: a. UPON A CALL FOR RECIRCULATION PUMP OPERATION, THE BAS SHALL PROVE PUMP OPERATION AND USE THE STATUS INDICATION TO ACCUMULATE RUNTIME. UPON
- FAILURE OF THE PUMP, THE BAS SHALL ENUNCIATE AN ALARM. N. HIGH OR LOW PRESSURE SAFETY: a. UPON ACTIVATION OF A HIGH OR LOW PRESSURE SAFETY SWITCH, AH SHALL BE DEENERGIZED, FANS SHALL BE DEENERGIZED VIA A HARD WIRED INTERLOCK, AND AN INDICATION OF THE OPERATION SHALL BE SENSED BY THE BAS. BAS SHALL ANNUNCIATE APPROPRIATE ALARM AND REMOVE AND LOCK OUT THE START COMMAND. 14. ACCESSORIES: PROVIDE THE FOLLOWING.
- A. BAS INTERFACING: a. A BAS PORT OR SERIAL CARD IS PROVIDED WITH THE CONTROLLER FOR FIELD INTERFACING WITH A BUILDING AUTOMATION SYSTEM. b. UPDATE DEFAULT SETTINGS TO THE APPROPRIATE ADDRESSES TO MATCH THE BAS SETTINGS.
- B. DDC REMOTE INTERFACE: a. FACTORY PROVIDED, FIELD MOUNTED INTERFACE PANEL THAT WILL BE WIRED TO THE MAIN CONTROLLER FOR MONITORING AND REMOTE ADJUSTMENTS OF SET
- C. PHASE AND BROWNOUT PROTECTION a. FACTORY MOUNTED AND WIRED COMPONENT WHICH MONITORS THE MAIN POWER COMING INTO THE UNIT.
- b. IF A PHASE DROPS OUT, OR IF THE INCOMING VOLTAGE EXCEEDS THE ACCEPTABLE RANGE, THE COMPONENT WILL TURN OFF THE UNIT TO HELP PROTECT THE ELECTRICAL SYSTEMS. D. CONDENSATE OVERFLOW UNIT SHUTDOWN
- a. FACTORY MOUNTED CONDENSATE OVERFLOW SWITCH WIRED TO THE UNIT CONTROLLER. THE CONTROLLER MONITORS THE CONDENSATE OVERFLOW SWITCH. b. IF THE WATER LEVEL IN THE DRAIN PAN REACHES A CERTAIN LEVEL, THE UNIT WILL SHUTDOWN AND SEND AN ALARM. E. AIRFLOW MONITORING
- a. THE SUPPLY AND EXHAUST FANS WILL EACH HAVE AN AIRFLOW MONITORING PRESSURE TAP ON THE INLET CONE. b. THE DIFFERENTIAL PRESSURE ACROSS THE FAN CONE IS CONVERTED TO AN AIRFLOW READING BY USING THE ENERGY CONSERVATION PRINCIPLE AND THE FAN WHEEL
- K-FACTOR. c. THE AIRFLOW CAN BE MONITORED VIA THE LCD AND BAS.
- F. DAMPER END SWITCH a. DAMPER END SWITCHED WILL BE PROVIDED TO ENSURE THE SUPPLY AND EXHAUST FANS DO NOT ENABLE UNTIL THE DAMPERS ARE PROVEN OPEN.
- 15. MINIMUM REQUIREMENTS FOR OPERATOR WORKSTATION DISPLAY A. SUPPLY AIRFLOW
- B. SUPPLY FAN ON-OFF STATUS C. SUPPLY FAN SPEED D. RAFA AIRFLOW
- E. RAFA ON-OFF STATUS F. RAFA SPEED
- G. SUPPLY FAN STATIC PRESSURE SET POINT H. SUPPLY FAN STATIC PRESSURE (ACTUAL)
- ERW ON OFF STATUS J. ERW SPEED
- K. ALL TEMPERATURE SENSORS ON THE UNIT L. DEWPOINT OF SA AND EA M. CHW AND HHW VALVE POSITIONS
- O. COOLING DEMAND % OF TOTAL CAPACITY P. ALL RELEVANT DATA POINTS FROM THE HEAT PIPE Q. TEMPERATURE LEAVING COOLING COIL
- R. TEMPERATURE LEAVING HEAT PIPE REHEAT COIL S. TEMPERATURE LEAVING UNIT T. DAMPER POSITIONS

U. ALARMS

N. RECIRCULATION PUMP STATUS

MORRIS ARENA

IN128 - JAMES T

Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEE 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408

812-855-1692 **Architect**

RATIO

101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204 317-633-4040

Structural Engineer FINK ROBERTS AND PETRIE, INC. 3535 EAST 96TH STREET

SUITE 126 INDIANAPOLIS, IN 46240 317-872-8400 Mechanical / Electrical

INTROBA

800-404-7677

WJHW

Civil Engineer

317-547-5580

816-806-3729

8250 HAVERSTICK ROAD SUITE 285 INDIANAPOLIS, IN 46240

Plumbing Engineer

7220 W. JEFFERSON AVE

138 N. DELAWARE ST

INDIANAPOLIS, IN 46204 317-633-4120 **Acoustics / Technology Engineer**

SUITE 216 LAKEWOOD, CO 80235 972-934-3700

AMERICAN STRUCTUREPOINT, INC. 9025 RIVER ROAD SUITE 200

Food Service Consultant CINILITTLE 3405 NW 9TH AVENUE #1202

FORT LAUDERDALE, FL 33309

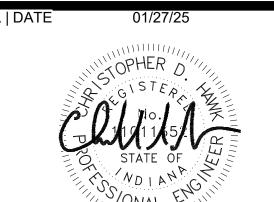
2502 WEST MECHANIC ST, SUITE C

954-846-9600 Code Consultant

HARRISONVILLE, MO 64701

INDIANAPOLIS, IN 46240

SHEET ISSUE



95% CONSTRUCTION DOCUMENTS CONSTRUCTION DOCUMENTS **ADDENDUM 01**



ARE HEREBY SPECIFICALLY RESERVED.

23112.000

PROJECT NO.

MECHANICAL AHU-00-03

SHEET NUMBER

A. TEMPERATURE SENSORS, HUMIDISTATS, AND THERMOSTATS SHALL NOT BE INSTALLED ON EXTERIOR WALLS OR COLUMNS, OR WHERE EXPOSED TO SOLAR RADIATION. WHERE THERE ARE NO OTHER OPTIONS, A SOLAR BLOCKING ENCLOSURE AND INSULATED BACKPLATE TO ELIMINATE TEMPERATURE INFLUENCE

FROM DIRECT SOLAR EXPOSURE SHALL BE PROVIDED

- B. VAVS ARE POWERED BY CONTROL VOLTAGE. CONTRACTOR IS RESPONSIBLE FOR COORDINATING ROUTING, GROUPING, AND POWER FOR THE LOW-VOLTAGE VAV UNITS.
- C. ALL NECESSARY CONTROL POINTS SHALL BE PROVIDED TO ACHIEVE THE WRITTEN SEQUENCES OF OPERATION WHETHER OR NOT THEY ARE EXPLICITLY NAMED.
- D. PROVIDE ANALOGUE FIELD SENSORS NEXT TO ALL TEMPERATURE AND PRESSURE CONTROL POINTS.
- E. CONTROLS CONTRACTOR SHALL COORDINATE WITH THE IU CONTROL INTEGRATOR.
- F. ALL IN-SPACE TEMPERATURE, HUMIDITY, AND CO2 SENSORS SHALL BE BLIND SENSORS WITH ONLY THE ABILITY TO INDUCE AN OCCUPANCY OVERRIDE WITH A BUTTON UNLESS OTHERWISE REQUESTED BY IU.
- G. LOCAL MAGNEHELIC GAUGE SUPPLIED AT EACH FILTER SECTION.
- CONTROLLER. 01-01 / minu AI ENVIRONMENTAL OA HUMIDITY AI ENVIRONMENTAL OA TEMPERATURE THERE WILL BE MULTIPLE SPACE SENSORS LOCATED THROUGHOUT THE SPACE BASED ON MANUFACTURER'S RECOMMENDATIONS. THE INPUT FROM THESE SENSORS WILL BE AVERAGED. AI SPACE HUMIDITY WHERE AIRFLOW MONITORING IS INDICATED ON FANS, AI SPACE TEMPERATURE AI BUILDING STATIC PRESSURE PIEZIOMETER RING SHALL BE SUPPLIED AT EACH INLET CONE BY MANUFACTURER. AI SPACE CO2 LEVEL BUILDING REFERENCE RA TEMPERATURE (AI)— AO REA DAMPER POSITION RAFA START/STOP B RA HUMIDITY (AI)— AMBIENT PRESSURE

 AI RAFA SPEED COMMAND (AC mmmm ENVIRONEMNTAL PRESSURE SMOKE DETECTOR mmmm HARDWIRED TO VFD AND FA PANEL BY OTHERS. -SA HUMIDITY (AI) AI MIXED AIR TEMPERATURE munumunti AI MIXED AIR HUMIDITY PADAMPER POSITION (AO) EAVAV DAMPER COMMAND (AO) SA TEMPERATURE (AI) EAVAV AIRFLOW (AI uuuuuu SA CFM <<u>AL</u> AI SA OFF-CC TEMPERATURE MIN OA UNIT DAMPER POSITION (AO mmy SA HUMIDITY \cdots mmymm /EAVAV\ \ 00-15 / MINIMUM OA () OAVAV AIRFLOW (AI)-OAVAV DAMPER COMMAND (AO) FOUR SUPPLY FANS CONTROLLED BY mmmm /OAVAV\ ◆ BO SA FAN START/STOP INDIVIDUAL VFDS. -MINIMUM OA (⟨ j OA MINIMUM \ 00-15 */* • AO SA FAN SPEED COMMAND AO ECON OA DAMPER POSITION O DI CA FANICTATUS

SEQUENCE OF OPERATIONS - AHU-01-01, RAFA-01-01, ASSOCIATED EAVAV AND OAVAV

A. AHU-01-01 IS A CONSTANT-VOLUME HYDRONIC AHU CONSISTING OF A SUPPLY FAN ARRAY, COOLING COIL, RE-HEAT COIL, AND A DECOUPLED RELIEF AIR FAN ARRAY (RAFA). THE AHU SERVES THE PRACTICE GYMNASIUM 115 AND THE ANCILLARY SPACES. THE AHU RECEIVED OA FROM A DEDICATED EAVAV AND OAVAV FROM AHU-00-03. ADDITIONALLY, THE AHU HAS THE CAPABILITY OF OPERATING IN ECONOMIZER MODE VIA A SEPARATE ECONOMIZER AIR CONNECTION.

ECONOMIZER OA CFM (AI)-

- 2. CONTROLS ARCHITECTURE: A. CONTROL POINTS SHALL BE CONTROLLED BY THE CENTRAL BAS VIA BACNET COMMUNICATION PROTOCOL. ALL CONTROL POINTS, WHETHER EXPLICITLY LISTED OR NOT,
- SHALL BE VISIBLE AND CONTROLLABLE VIA THE BAS.
- a. OPERATIONALLY RELEVANT DAMPER ACTUATORS ARE POWERED. b. SUPPLY FANS START AFTER A 15 SEC (ADJ.) DELAY WHEN THE ASSOCIATED DAMPERS ARE PROVEN OPEN.

— AI ECONOMIZER EA CFM

/RAFA\

TWO RELIEF FANS

CONTROLLED BY

ONE SPEED

- c. TEMPERING OPTIONS TO FUNCTION AS DESCRIBED.
- C. UNIT STOP COMMAND (OR DE-ENERGIZED) a. SUPPLY FANS, ASSOCIATED RAFA AND TEMPERING OPTIONS DE-ENERGIZED.
- b. OPERATIONAL DAMPERS ARE CLOSED AND DAMPER ACTUATOR IS SPRING RETURN CLOSE. 3. OCCUPIED/UNOCCUPIED MODES A. TEMPERATURE SETPOINTS
 - COOLING: 78°F +/- 2°F HEATING: 68°F +/- 2°F
 - RELATIVE HUMIDITY: 55%
- b. UNOCCUPIED: COOLING: 82°F +/- 2°F
- HEATING: 60°F +/- 2°F
- B. SCHEDULE SHALL BE BASED ON AN OCCUPANCY SCHEDULE PROVIDED BY THE OWNER.
- C. OCCUPANCY OVERRIDE: IF DURING THE UNOCCUPIED PERIOD THERE IS A REQUEST FOR OCCUPANCY OVERRIDE, THE OCCUPANCY MODE SHALL BECOME ACTIVE FOR 2 D. PRIOR TO SCHEDULED OCCUPANCY, OCCUPIED MODE SHALL BE ENGAGED WITH SUFFICIENT TIME TO ENSURE THE SPACES SERVED ARE AT THE OCCUPIED TEMPERATURE
- SETPOINT AND VENTILATION RATES PRIOR TO THE SCHEDULED OCCUPANCY. a. SUPPLY FANS ON.
- b. ALL COILS AVAILABLE FOR OPERATION. c. OPERATIONAL DAMPERS PROVEN OPEN AND ENGAGED TO THEIR OPERATING POSITION.
- d. ASSOCIATED RAFA IS AVAILABLE FOR PRESSURIZATION CONTROL. e. TEMPERATURE CONTROL PER SUPPLY AIR RESET SEQUENCE
- F. UNOCCUPIED MODE (UNIT OFF): UNIT REMAINS OFF WHEN IN UNOCCUPIED MODE.
- b. ASSOCIATED RAFA OFF c. TEMPERING OFF
- d. OPERATIONAL DAMPERS CLOSED
- A. START/STOP: BAS SHALL COMMAND THE RELEVANT OPERATIONAL DAMPERS OPEN WHENEVER THE AHU IS ENERGIZED. UPON PROOF OF THE DAMPER POSITION, THE
- INTERLOCKED SUPPLY FANS SHALL RUN CONTINUOUSLY. B. THE SUPPLY FANS ARE PROVIDED WITH A FACTORY PROVIDED VARIABLE FREQUENCY DRIVE(S). THE SUPPLY FAN SPEED WILL BE CONTROLLED TO MAINTAIN CONSTANT
- A. THE EAVAV RESPONDS TO ROOM-SIDE SPACE PRESSURIZATION SENSORS. IS PROVIDED WITH A FACTORY MOUNTED CONTROL ENCLOSURE.
- B. THE RAFA SPEED WILL BE CONTROLLED WITH THE FOLLOWING SEQUENCE. C. ROOM PRESSURIZATION SHALL BE MAINTAINED EQUAL TO THE BUILDING PRESSURIZATION OF MINIMUM 0.025" WC:
- a. THE ROOM PRESSURIZATION SHALL BE RELAYED THROUGH A SERIES OF SPACE PRESSURE SENSORS LOCATED THROUGHOUT THE SPACE SERVED. b. THE EAVAV SERVING THE SPACE SHALL MODULATE TO MAINTAIN THE ZONE PRESSURIZATION. c. MECHANICAL HIGH STATIC PROTECTION CUTOFFS SHALL BE INSTALLED TO PROTECT THE SYSTEM AND EQUIPMENT FROM PRESSURIZATION RELATED DAMAGE.
- 6. ECONOMIZER MODE (CONSTANT VOLUME): A. WHEN OUTSIDE AIR ENTHALPY IS LESS THAN RETURN AIR ENTHALPY AND OUTSIDE AIR TEMPERATURE IS ABOVE 53°F, THE BAS SHALL:
- a. CLOSE THE ASSOCIATED OAVAV AND EAVAV b. MODULATE THE ECONOMIZER OUTSIDE AIR AND RETURN AIR DAMPERS TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT
- 2. ENERGIZE THE ASSOCIATED RAFA AND OPEN THE ASSOCIATED DAMPERS d. MODULATE THE FAN SPEED OF THE ASSOCIATED RAFA TO MAINTAIN ROOM PRESSURIZATION EQUAL TO THE BUILDING PRESSURIZATION SETPOINT.
- B. WHEN OUTSIDE AIR ENTHALPY IS GREATER THAN RETURN AIR ENTHALPY, THE BAS SHALL: a. RETURN THE ASSOCIATED OAVAV AND EAVAV TO STANDARD OPERATION
- b. CLOSE THE ECONOMIZER OA DAMPER AND OPEN THE MINIMUM OA AND RA DAMPER. c. DE-ENERGIZE THE ASSOCIATED RAFA AND CLOSE THE ASSOCIATED DAMPERS
- 7. FAN OPERATION AND PROTECTION: A. THE FAN SPEEDS WILL NOT DROP BELOW 20 HZ (ADJ) AND SHALL NOT EXCEED 60 HZ.
- B. THE DUCT STATIC PRESSURE SHALL BE ESTABLISHED DURING THE SYSTEM TESTING AND BALANCING. C. MECHANICAL HIGH STATIC PROTECTION CUTOFFS SHALL BE INSTALLED TO PROTECT THE SYSTEM AND EQUIPMENT FROM PRESSURIZATION-RELATED DAMAGE.
- D. THE FANS ARE SIZED FOR N-1 OPERATION. IN THE EVENT OF A FAN FAILURE, THE REMAINING FANS WILL ADJUST TO COMPENSATE FOR THE MISSING FAN. 8. SUPPLY AIR TEMPERATURE CONTROL (OPTIMIZED):
- A. THE CONTROLLER WILL MAINTAIN A SUPPLY AIR TEMPERATURE SETPOINT RESET BASED ON ZONE COOLING AND HEATING REQUIREMENTS. THE VALVES TO THE COOLING AND REHEAT COILS WILL MODULATE TO MAINTAIN SPACE TEMPERATURE AND HUMIDITY REQUIREMENTS.
- B. DEHUMIDIFICATION: a. IN THE EVENT THAT COOLING DEMAND IS SATISFIED BUT A ZONE DEWPOINT IS ABOVE 58°F(ADJ.), THE OAVAV AND EAVAV WILL MODULATE OPEN INCREMENTALLY. AFTER
- THE ZONE DEWPOINT IS BELOW 56°F(ADJ.) FOR 30 MINUTES (ADJ.), THE UNIT WILL RETURN TO STANDARD CONDITIONING MODE. 9. DEMAND CONTROLLED VENTILATION A. THE OAVAV SHALL MODULATE IN RESPONSE TO CO2 SENSORS LOCATED THROUGHOUT THE SPACE TO MAINTAIN A CO2 CONCENTRATION LESS THAN 900 PPM (ADJ.)

10. BUILDING FREEZE PROTECTION:

mmm

SENSOR LOCATED IN AUXILIARY DRAIN PAN LOCATED OUTSIDE OF UNIT. -

mmmm

CHW VALVE POSITION (AO)

- A. IF THE SUPPLY AIR TEMPERATURE DROPS BELOW 40°F (ADJ.) FOR 90 SEC (ADJ.), THE BAS WILL DE-ENERGIZE THE UNIT AND ASSOCIATED EQUIPMENT, CLOSE ALL OPERATIONAL DAMPERS, AND ACTIVATE THE ALARM OUTPUT. IF THE UNIT IS EQUIPPED WITH COIL RECIRCULATION PUMPS, THE MODULATING CONTROL VALVE SHALL CLOSE, THE RECIRCULATION PUMP ISOLATION VALVE SHALL OPEN, AND THE RECIRCULATION PUMP SHALL OPERATE.
- 11. CONDENSATE OVERFLOW: A. IN THE EVENT THAT THE HIGH-LEVEL CONDENSATE SWITCH IS TRIPPED, ALL COOLING COMPONENTS SHALL SHUT DOWN AND ALARMS SHALL BE SENT TO THE BAS.

AO HHW VALVE POSITION

, manual manual

BI CONDENSATE OVERFLOW ALARM

- 12. SMOKE DETECTION: A. SMOKE DETECTORS LOCATED IN THE SUPPLY AND EXHAUST AIR DUCT SHALL INDICATE AN ALARM AT THE BAS WORKSTATION WHEN AN ALARM CONDITION IS DETECTED FOR SECONDARY MONITORING. THE WIRING AND CONDUIT FOR SECONDARY MONITORING FROM THE DUCT SMOKE DETECTOR'S AUXILIARY CONTACT TO THE BAS SHALL BE PROVIDED. THE WIRING AND CONDUIT FROM THE DUCT DETECTOR FOR FAN SHUT DOWN SHALL BE PROVIDED.
- a. NORMAL: UNITS SHALL OPERATE PER SEQUENCES ABOVE. b. OFF: WHEN THE FIRE COMMAND OVERRIDE IS INDEXED TO OFF, THE AHU SHALL BE DE-ENERGIZED AND ALL OPERATIONAL DAMPERS SHALL CLOSE. 13. ALARMS INDICATION: THE CONTROLLER WILL DISPLAY ALARMS AND HAVE ONE DIGITAL OUTPUT FOR REMOTE INDICATION OF AN ALARM CONDITION. POSSIBLE ALARMS

FIRE COMMAND CONTROL

- A. BUILDING MANAGEMENT SYSTEM: a. THE CONTROLLER WILL SEND ALL ALARMS TO THE BAS.
- B. DIRTY FILTER ALARM: a. A DIGITAL SIGNAL IS SENT TO THE CONTROLLER INDICATING AN INCREASED PRESSURE DROP ACROSS AN AIR FILTER (MUST BE ADJUSTED IN FIELD DURING START UP). THE CONTROLLER WILL THEN PROVIDE A DIRTY FILTER ALARM.
- C. SUPPLY AND EXHAUST AIR ALARM: a. THE CONTROLLER MONITORS THE PROVING SWITCH ON EACH BLOWER AND SENDS AN ALARM IN THE CASE OF EITHER BLOWER PROVING SWITCH NOT ENGAGING.
- D. TEMPERATURE SENSOR ALARM: a. THE CONTROLLER SENDS AN ALARM IN THE CASE OF A FAILED AIR TEMPERATURE SENSOR.
- E. PRESSURE SENSOR ALARM: a. THE CONTROLLER SENDS AN ALARM IN THE CASE OF A FAILED PRESSURE SENSOR.
- F. HUMIDITY SENSOR ALARM:
- a. THE CONTROLLER SENDS AN ALARM IN THE CASE OF A FAILED HUMIDITY SENSOR. G. BUILDING FREEZE PROTECTION:
- a. THE CONTROLLER SENDS AN ALARM IN CASE OF BUILDING FREEZE PROTECTION BEING ENGAGED. H. SMOKE DETECTION:
- a. THE CONTROLLER SENDS AN ALARM TO THE BAS AND THE FIRE ALARM CONTROL PANEL UPON POSITIVE DETECTION OF SMOKE. . FAN FAILURE:
- a. BAS SHALL PROVE FAN ARRAY OPERATION AND USE THE STATUS INDICATION TO ACCUMULATE RUNTIME. UPON FAILURE OF ANY OF THE FANS, THE BAS SHALL ALARM THAT FAN FAILURE CONDITION OCCURRED. UPON FAILURE OF MORE THAN ONE FAN IN AN ARRAY, THE BAS SHALL REMOVE THE COMMAND TO RUN THE REMAINING FANS (BOTH INTERNAL TO THE AHU AND THE ASSOCIATED RAFA), LOCKOUT THE RUN COMMAND TO BOTH FAN ARRAYS AND ANNUNCIATE AN ALARM.
- J. HIGH OR LOW PRESSURE SAFETY: a. UPON ACTIVATION OF A HIGH OR LOW PRESSURE SAFETY SWITCH, AH SHALL BE DEENERGIZED, FANS SHALL BE DEENERGIZED VIA A HARD WIRED INTERLOCK, AND AN INDICATION OF THE OPERATION SHALL BE SENSED BY THE BAS. BAS SHALL ANNUNCIATE APPROPRIATE ALARM AND REMOVE AND LOCK OUT THE START COMMAND. 14. ACCESSORIES: PROVIDE THE FOLLOWING.
- A. BAS INTERFACING: a. A BAS PORT OR SERIAL CARD IS PROVIDED WITH THE CONTROLLER FOR FIELD INTERFACING WITH A BUILDING AUTOMATION SYSTEM.
- b. UPDATE DEFAULT SETTINGS TO THE APPROPRIATE ADDRESSES TO MATCH THE BAS SETTINGS.
- a. FACTORY PROVIDED, FIELD MOUNTED INTERFACE PANEL THAT WILL BE WIRED TO THE MAIN CONTROLLER FOR MONITORING AND REMOTE ADJUSTMENTS OF SET
- . PHASE AND BROWNOUT PROTECTION a. FACTORY MOUNTED AND WIRED COMPONENT WHICH MONITORS THE MAIN POWER COMING INTO THE UNIT.
- b. IF A PHASE DROPS OUT, OR IF THE INCOMING VOLTAGE EXCEEDS THE ACCEPTABLE RANGE, THE COMPONENT WILL TURN OFF THE UNIT TO HELP PROTECT THE ELECTRICAL SYSTEMS.
- D. CONDENSATE OVERFLOW UNIT SHUTDOWN a. FACTORY MOUNTED CONDENSATE OVERFLOW SWITCH WIRED TO THE UNIT CONTROLLER. THE CONTROLLER MONITORS THE CONDENSATE OVERFLOW SWITCH.
- b. IF THE WATER LEVEL IN THE DRAIN PAN REACHES A CERTAIN LEVEL, THE UNIT WILL SHUTDOWN AND SEND AN ALARM.
- a. THE SUPPLY AND EXHAUST FANS WILL EACH HAVE AN AIRFLOW MONITORING PRESSURE TAP ON THE INLET CONE.
- b. THE DIFFERENTIAL PRESSURE ACROSS THE FAN CONE IS CONVERTED TO AN AIRFLOW READING BY USING THE ENERGY CONSERVATION PRINCIPLE AND THE FAN WHEEL c. THE AIRFLOW CAN BE MONITORED VIA THE LCD AND BAS.
- a. DAMPER END SWITCHED WILL BE PROVIDED TO ENSURE THE SUPPLY AND EXHAUST FANS DO NOT ENABLE UNTIL THE DAMPERS ARE PROVEN OPEN.
- 15. MINIMUM REQUIREMENTS FOR OPERATOR WORKSTATION DISPLAY A. SUPPLY AIRFLOW
- B. SUPPLY FAN ON-OFF STATUS C. SUPPLY FAN SPEED
- D. RAFA AIRFLOW E. RAFA ON-OFF STATUS
- F. RAFA SPEED G. ECONOMIZER STATUS
- H. ALL TEMPERATURE SENSORS ON THE UNIT
- I. DEWPOINT OF SA, RA, AND EA J. CHW AND HHW VALVE POSITIONS

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POIN	T DISCRIPTION	POINT TYPE	HARDWIRED (H) OR NETWORKED (N)?	EXPECTED RAM
AMBIENT	PRESSURE	Al	Н	05" WC - 0.5" V
BUILDING	STATIC PRESSURE	Al	Н	05" WC - 0.5" V
CHW VALVE	POSITION	AO	N	0-100%
CONDENSATE	OVERFLOW ALARM	BI	N	ON/OFF
EAVAV	AIRFLOW	Al	Н	VARIES BY BOX S
EAVAV	DAMPER COMMAND	AO		0-100%
ECON OA DAMPER	POSITION	AO	N	0-100%
ECONOMIZER EA	CFM	Al	Н	0-75000 CFM
ECONOMIZER OA	CFM	Al	Н	0-75000 CFM
ENVIRONMENTAL OA	TEMPERATURE	Al	Н	30-110°F
ENVIRONMENTAL OA	HUMIDITY	Al	Н	20%-80%
HHW VALVE	POSITION	AO	N	0-100%
MIN OA UNIT DAMPER	POSITION	AO	N	0-100%
MIXED AIR	HUMIDITY	Al	Н	20%-80%
MIXED AIR	TEMPERATURE	Al	Н	30-110°F
OAVAV	AIRFLOW	Al	Н	VARIES BY BOX S
OAVAV	DAMPER COMMAND	AO		0-100%
RA	TEMPERATURE	Al	Н	30-110°F
RA	HUMIDITY	Al	Н	20%-80%
RA DAMPER	POSITION	AO	N	0-100%
RAFA	START/STOP	ВО	N	START/STOP
RAFA	SPEED COMMAND	AO	N	0-100%
RAFA	STATUS	BI	N	ON/OFF
REA DAMPER	POSITION	AO	N	0-100%
SA	CFM	Al	Н	50-90°F
SA	HUMIDITY	Al	Н	20%-80%
SA	TEMPERATURE	Al	Н	30-110°F
SA	OFF-CC TEMPERATURE	Al	Н	30-110°F
SA	HUMIDITY	Al	Н	20%-80%
SA FAN	START/STOP	ВО	N	START/STOP
SA FAN	SPEED COMMAND	AO	N	0-100%
SA FAN	STATUS	BI	N	ON/OFF
SA FAN	STATUS	BI	N	ON/OFF
SPACE	CO2 LEVEL	Al	Н	0-1500 PPM
SPACE	TEMPERATURE	Al	Н	30-110°F
SPACE	HUMIDITY	Al	Н	20%-80%

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IN128 - JAMES T **MORRIS ARENA**

Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

Architect

SUITE 285

INDIANA UNIVERSITY BOARD OF TRUSTEE 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408 812-855-1692

RATIO 101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204 317-633-4040

Structural Engineer FINK ROBERTS AND PETRIE, INC. 3535 EAST 96TH STREET

SUITE 126 INDIANAPOLIS. IN 46240 317-872-8400

Mechanical / Electrical INTROBA

8250 HAVERSTICK ROAD

INDIANAPOLIS, IN 46240 800-404-7677 **Plumbing Engineer**

138 N. DELAWARE ST INDIANAPOLIS, IN 46204 317-633-4120

Acoustics / Technology Engineer WJHW 7220 W. JEFFERSON AVE SUITE 216

Civil Engineer AMERICAN STRUCTUREPOINT, INC.

9025 RIVER ROAD SUITE 200 INDIANAPOLIS. IN 46240 317-547-5580

LAKEWOOD, CO 80235

972-934-3700

Food Service Consultant CINILITTLE

FORT LAUDERDALE, FL 33309 954-846-9600 Code Consultant

2502 WEST MECHANIC ST, SUITE C HARRISONVILLE, MO 64701 816-806-3729

3405 NW 9TH AVENUE #1202



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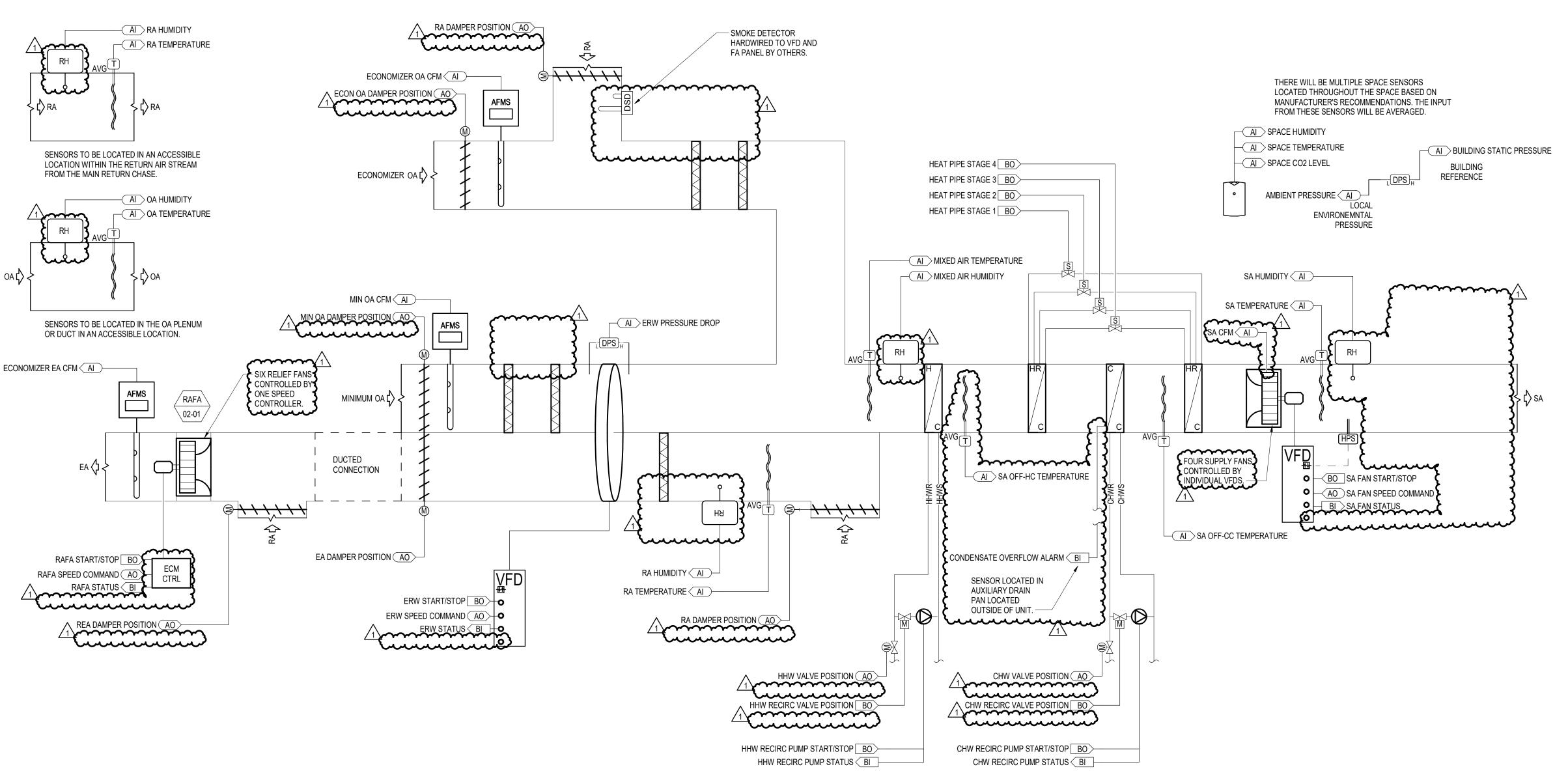
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MECHANICAL AHU-01-01

SHEET NUMBER



SEQUENCE OF OPERATIONS – AHU-02-01, RAFA-02-01

- A. AHU CONSISTS OF A SUPPLY FAN ARRAY, COOLING COIL, PRE-HEAT COIL, HEAT PIPE PRE-COOL AND RE-HEAT SYSTEM, ENERGY RECOVERY WHEEL (ERW) AND A DECOUPLED RELIEF AIR FAN ARRAY (RAFA). THE AHU SERVES THE ARENA SEATING AND CONCOURSE. THE UNIT IS FED OA DIRECTLY VIA A MINIMUM OA CONNECTION AND AN ECONOMIZER OA CONNECTION.
- A. CONTROL POINTS SHALL BE CONTROLLED BY THE CENTRAL BAS VIA BACNET COMMUNICATION PROTOCOL. ALL CONTROL POINTS, WHETHER EXPLICITLY LISTED OR NOT, SHALL BE VISIBLE AND CONTROLLABLE VIA THE BAS.
- a. OPERATIONALLY RELEVANT DAMPER ACTUATORS ARE POWERED. b. SUPPLY FANS START AFTER A 15 SEC (ADJ.) DELAY WHEN THE ASSOCIATED DAMPERS ARE PROVEN OPEN.
- c. TEMPERING OPTIONS AND ENERGY WHEEL OPTION TO FUNCTION AS DESCRIBED. d. HEAT PIPE COMPONENTS ARE POWERED.
- C. UNIT STOP COMMAND (OR DE-ENERGIZED): a. SUPPLY FANS, ASSOCIATED RAFA, ENERGY WHEEL, AND TEMPERING OPTIONS DE-ENERGIZED.
- b. OPERATIONAL DAMPERS ARE CLOSED AND DAMPER ACTUATOR IS SPRING RETURN CLOSE. 3. OCCUPIED/UNOCCUPIED MODES
- A. TEMPERATURE SETPOINTS a. OCCUPIED: COOLING: 78°F +/- 2°F

B. UNIT START COMMAND:

- HEATING: 68°F +/- 2°F RELATIVE HUMIDITY: 55%
- b. UNOCCUPIED: COOLING: 82°F +/- 2°F HEATING: 60°F +/- 2°F
- B. SCHEDULE SHALL BE BASED ON AN OCCUPANCY SCHEDULE PROVIDED BY THE OWNER. . OCCUPANCY OVERRIDE: IF DURING THE UNOCCUPIED PERIOD THERE IS A REQUEST FOR OCCUPANCY OVERRIDE, THE OCCUPANCY MODE SHALL BECOME ACTIVE FOR 2 HOURS (ADJ.).
- D. PRIOR TO SCHEDULED OCCUPANCY, OCCUPIED MODE SHALL BE ENGAGED WITH SUFFICIENT TIME TO ENSURE THE SPACES SERVED ARE AT THE OCCUPIED TEMPERATURE SETPOINT AND VENTILATION AND EXHAUST RATES PRIOR TO THE SCHEDULED OCCUPANCY.
- E. OCCUPIED MODE: a. SUPPLY FANS ON.
- b. ALL COILS AVAILABLE FOR OPERATION. c. OPERATIONAL DAMPERS PROVEN OPEN AND ENGAGED TO THEIR OPERATING POSITION.
- d. ASSOCIATED RAFA IS AVAILABLE FOR PRESSURIZATION CONTROL. e. TEMPERATURE CONTROL PER SUPPLY AIR RESET SEQUENCE
- F. UNOCCUPIED MODE (UNIT OFF): UNIT REMAINS OFF WHEN IN UNOCCUPIED MODE. a. SUPPLY FANS OFF
- b. ASSOCIATED RAFA OFF c. TEMPERING OFF
- d. HEAT PIPE SYSTEM OFF e. OPERATIONAL DAMPERS CLOSED
- 4. SUPPLY FANS SEQUENCE: A. START/STOP: BAS SHALL COMMAND THE RELEVANT OPERATIONAL DAMPERS OPEN WHENEVER THE AHU IS ENERGIZED. UPON PROOF OF THE DAMPER POSITION, THE INTERLOCKED SUPPLY FANS SHALL RUN CONTINUOUSLY. B. THE SUPPLY FANS ARE PROVIDED WITH A FACTORY PROVIDED VARIABLE FREQUENCY DRIVE(S). THE SUPPLY FAN SPEED WILL BE CONTROLLED TO MAINTAIN CONSTANT AIRFLOW.
- 5. RAFA SEQUENCE A. THE RAFA IS PROVIDED WITH A FACTORY MOUNTED VARIABLE FREQUENCY DRIVE.
- B. THE RAFA SPEED WILL BE CONTROLLED WITH THE FOLLOWING SEQUENCE. C. BUILDING PRESSURIZATION BASED ON OPERATION OF AHU:
- a. THE RAFA WILL BE ENGAGED WHEN THE ASSOCIATED AHU IS IN "OCCUPIED" MODE. UNDER NORMAL OPERATION, THE RAFA SHALL MODULATE IN RELATION TO THE POSITION OF THE MINIMUM OA DAMPER. THE AIRFLOW THROUGH THE RAFA SHALL BE MAINTAINED AT 10% LESS THAN THE AIRFLOW THROUGH THE MINIMUM OA DAMPER AS IT RESPONDS TO THE DEMAND CONTROL VENTILATION SEQUENCE. b. MECHANICAL HIGH STATIC PROTECTION CUTOFFS SHALL BE INSTALLED TO PROTECT THE SYSTEM AND EQUIPMENT FROM PRESSURIZATION RELATED DAMAGE.
- A. WHEN OUTSIDE AIR ENTHALPY IS LESS THAN RETURN AIR ENTHALPY AND OUTSIDE AIR TEMPERATURE IS ABOVE 53°F, THE BAS SHALL: a. CLOSE THE MINIMUM OA DAMPER.
- b. MODULATE THE ECONOMIZER OUTSIDE AIR AND RETURN AIR DAMPERS TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT
- c. ENERGIZE THE ASSOCIATED RAFA AND OPEN THE ASSOCIATED DAMPERS d. MODULATE THE FAN SPEED OF THE ASSOCIATED RAFA TO MAINTAIN AIRFLOW EQUAL TO THE OA (ECONOMIZER) AIRFLOW.
- B. WHEN OUTSIDE AIR ENTHALPY IS GREATER THAN RETURN AIR ENTHALPY, THE BAS SHALL: a. CLOSE THE ECONOMIZER OA DAMPER
- b. OPEN THE MINIMUM OA DAMPER
- c. RETURN THE RA DAMPER TO STANDARD OPERATION. d. DE-ENERGIZE THE ASSOCIATED RAFA AND CLOSE THE ASSOCIATED DAMPERS
- 7. FAN OPERATION AND PROTECTION:
- A. THE FAN SPEEDS WILL NOT DROP BELOW 20HZ (ADJ) AND SHALL NOT EXCEED 60 HZ. B. THE DUCT STATIC PRESSURE SHALL BE ESTABLISHED DURING THE SYSTEM TESTING AND BALANCING.
- . MECHANICAL HIGH STATIC PROTECTION CUTOFFS SHALL BE INSTALLED TO PROTECT THE SYSTEM AND EQUIPMENT FROM PRESSURIZATION-RELATED DAMAGE.
- D. THE FANS ARE SIZED FOR N-1 OPERATION. IN THE EVENT OF A FAN FAILURE, THE REMAINING FANS WILL ADJUST TO COMPENSATE FOR THE MISSING FAN. SUPPLY AIR TEMPERATURE CONTROL (OPTIMIZED):
- A. THE CONTROLLER WILL MAINTAIN A SUPPLY AIR TEMPERATURE SETPOINT RESET BASED ON ZONE COOLING AND HEATING REQUIREMENTS. THE VALVES TO THE COOLING AND REHEAT
- COILS WILL MODULATE TO MAINTAIN SPACE TEMPERATURE AND HUMIDITY REQUIREMENTS. a. IN THE EVENT THAT COOLING DEMAND IS SATISFIED BUT A ZONE DEWPOINT IS ABOVE 58°F(ADJ.), THE COOLING COIL VALVE WILL BE ALLOWED TO INCREMENTALLY DECREASE TO A
- MINIMUM OF 53°F (ADJ.). WHILE THIS IS OCCURRING, THE HEAT PIPE SYSTEM WILL BE ENGAGED TO PROVIDE REHEAT TO MAINTAIN THE SUPPLY AIR TEMPERATURE SETPOINT. AFTER THE ZONE DEWPOINT IS BELOW 56°F(ADJ.) FOR 30 MINUTES (ADJ.), THE UNIT WILL RETURN TO STANDARD CONDITIONING MODE.
- HEAT PIPE: A. HEAT PIPE SOLENOID VALVES SHALL BE MIN. 4 STAGE. MODULATING AS REQUIRED TO SATISFY THE SUPPLY AIR RESET AND HUMIDITY CONTROL STRATEGIES. 10. DEMAND CONTROLLED VENTILATION
- A. THE MINIMUM OA DAMPER AND THE RA DAMPER SHALL MODULATE IN RESPONSE TO CO2 SENSORS LOCATED THROUGHOUT THE SPACE TO MAINTAIN A CO2 CONCENTRATION LESS THAN 900 PPM (ADJ.) 11. BUILDING FREEZE PROTECTION:

A. IF THE SUPPLY AIR TEMPERATURE DROPS BELOW 40°F (ADJ.) FOR 90 SEC (ADJ.), THE BAS WILL DE-ENERGIZE THE UNIT AND ASSOCIATED EQUIPMENT, CLOSE ALL OPERATIONAL DAMPERS,

SUPPLY AIR TEMPERATURE SETPOINT. IF THE ERW IS FULLY UTILIZED AND THE SUPPLY AIR TEMPERATURE IS NOT MET PER THE SUPPLY AIR RESET STRATEGY. THE CORRESPONDING

- AND ACTIVATE THE ALARM OUTPUT. IF THE UNIT IS EQUIPPED WITH COIL RECIRCULATION PUMPS, THE MODULATING CONTROL VALVE SHALL CLOSE, THE RECIRCULATION PUMP ISOLATION VALVE SHALL OPEN, AND THE RECIRCULATION PUMP SHALL OPERATE. 12. CONDENSATE OVERFLOW:
- 13. IN THE EVENT THAT THE HIGH-LEVEL CONDENSATE SWITCH IS TRIPPED, ALL COOLING COMPONENTS SHALL SHUT DOWN AND ALARMS SHALL BE SENT TO THE BAS.ENERGY RECOVERY WHEEL (ERW): A. BAS SHALL CONTROL THE ERW. THE ERW SHALL BE ENERGIZED WHENEVER THE AHU UNIT IS OPERATING AND THE SPEED OF THE ERW SHALL BE MODULATED TO MAINTAIN THE CURRENT
- HYDRONIC VALVES WILL BE ENGAGED. B. BAS SHALL CONTROL THE STARTING AND STOPPING OF THE ERW AS FOLLOWS: a. WHENEVER THE UNIT IS ENERGIZED AND THE OUTSIDE AIR ENTHALPY IS GREATER THAN THE ERW EXHAUST AIR ENTHALPY THE WHEEL SPEED SHALL BE MODULATED TO MAINTAIN A 52°F (ADJ) WHEEL DISCHARGED DEWPOINT TEMPERATURE.
- b. WHENEVER THE UNIT IS ENERGIZED AND THE OUTSIDE AIR DEW POINT TEMPERATURE IS LESS THAN 52°F (ADJ). THE SPEED OF THE WHEEL SHALL BE MODULATED TO MAINTAIN THE SUPPLY AIR DEW POINT TEMPERATURE AT 52°F (ADJ). THE SPEED OF THE WHEEL SHALL BE INCREASED UPON A DROP IN SUPPLY AIR DEW POINT TEMPERATURE. C. PERIODIC SELF-CLEANING: THE WHEEL SHALL RUN AT 5% SPEED FOR 10 SEC EVERY 4HRS THE UNIT RUNS. D. FROST PROTECTION:
- a. FROST CONTROL FOR THE ERW IS ENABLED WHEN FROST IS PRESENT ON THE WHEEL; BASED ON THE OUTSIDE AIR TEMPERATURE AND THE PRESSURE DROP ACROSS THE WHEEL. IF THE OUTDOOR AIR TEMPERATURE IS BELOW 5°F (ADJ.) AND THE DIFFERENTIAL PRESSURE ACROSS THE WHEEL IS 1.5" OR GREATER (ADJ.), FROST CONTROL WILL ENABLE. b. WHEEL VFD (MODULATE WHEEL): WHEN FROSTING IS OCCURRING. THE VFD MODULATES THE WHEEL DOWN TO A SLOW ROTATIONAL SPEED TO DEFROST WHEEL. ONCE EITHER THE PRESSURE DROP DECREASES BELOW THE PRESSURE SWITCH SET POINT, OR THE OUTDOOR AIR TEMPERATURE INCREASES ABOUT THE TEMPERATURE SET POINT, THE UNIT WILL RESUME NORMAL OPERATION.

1.	SMOKE DETECTION:
	A. SMOKE DETECTORS LOCATED IN THE SUPPLY, RETURN, AND RAFA AIRSTREAMS SHALL INDICATE AN ALARM AT THE BAS WORKSTATION WHEN AN ALARM CONDITION IS
	DETECTED FOR SECONDARY MONITORING. THE WIRING AND CONDUIT FOR SECONDARY MONITORING FROM THE DUCT SMOKE DETECTOR'S AUXILIARY CONTACT TO THE
	BAS SHALL BE PROVIDED. THE WIRING AND CONDUIT FROM THE DUCT DETECTOR FOR FAN SHUT DOWN SHALL BE PROVIDED.
	FIDE COMMAND CONTROL

 a. NORMAL: UNITS SHALL OPERATE PER SEQUENCES ABOVE. b. OFF: WHEN THE FIRE COMMAND OVERRIDE IS INDEXED TO OFF, THE AHU SHALL BE DE-ENERGIZED AND ALL OPERATIONAL DAMPERS SHALL CLOSE.

15. ALARMS INDICATION: THE CONTROLLER WILL DISPLAY ALARMS AND HAVE ONE DIGITAL OUTPUT FOR REMOTE INDICATION OF AN ALARM CONDITION. POSSIBLE ALARMS

- A. BUILDING MANAGEMENT SYSTEM:
- a. THE CONTROLLER WILL SEND ALL ALARMS TO THE BAS. B. DIRTY FILTER ALARM: a. A DIGITAL SIGNAL IS SENT TO THE CONTROLLER INDICATING AN INCREASED PRESSURE DROP ACROSS AN AIR FILTER (MUST BE ADJUSTED IN FIELD DURING START UP).
- THE CONTROLLER WILL THEN PROVIDE A DIRTY FILTER ALARM. C. DIRTY WHEEL ALARM:
- a. THE CONTROLLER MONITORS PRESSURE ACROSS THE WHEEL AND SENDS AN ALARM IN THE CASE OF AN INCREASED PRESSURE DROP. D. WHEEL ROTATION ALARM:
- a. THE CONTROLLER MONITORS WHEEL ROTATION, IF THE WHEEL DOES NOT ROTATE FOR A SET PERIOD OF TIME (ADJ.) AN ALARM WILL GENERATE. E. SUPPLY AND EXHAUST AIR ALARM:
- a. THE CONTROLLER MONITORS THE PROVING SWITCH ON EACH BLOWER AND SENDS AN ALARM IN THE CASE OF EITHER BLOWER PROVING SWITCH NOT ENGAGING F. TEMPERATURE SENSOR ALARM:
- a. THE CONTROLLER SENDS AN ALARM IN THE CASE OF A FAILED AIR TEMPERATURE SENSOR. G. PRESSURE SENSOR ALARM:
- a. THE CONTROLLER SENDS AN ALARM IN THE CASE OF A FAILED PRESSURE SENSOR.
- H. HUMIDITY SENSOR ALARM: a. THE CONTROLLER SENDS AN ALARM IN THE CASE OF A FAILED HUMIDITY SENSOR.
- I. FROST CONTROL:
- THE CONTROLLER SENDS AN ALARM IN CASE OF FROST CONTROL BEING ENGAGED. J. BUILDING FREEZE PROTECTION:
- a. THE CONTROLLER SENDS AN ALARM IN CASE OF BUILDING FREEZE PROTECTION BEING ENGAGED. a. THE CONTROLLER SENDS AN ALARM TO THE BAS AND THE FIRE ALARM CONTROL PANEL UPON POSITIVE DETECTION OF SMOKE.
- L. FAN FAILURE:
- a. BAS SHALL PROVE FAN ARRAY OPERATION AND USE THE STATUS INDICATION TO ACCUMULATE RUNTIME. UPON FAILURE OF ANY OF THE FANS, THE BAS SHALL ALARM THAT FAN FAILURE CONDITION OCCURRED. UPON FAILURE OF MORE THAN ONE FAN IN AN ARRAY, THE BAS SHALL REMOVE THE COMMAND TO RUN THE REMAINING FANS (BOTH INTERNAL TO THE AHU AND THE ASSOCIATED RAFA), LOCKOUT THE RUN COMMAND TO BOTH FAN ARRAYS AND ANNUNCIATE AN ALARM. M. RECIRCULATION PUMP FAILURE:
- a. UPON A CALL FOR RECIRCULATION PUMP OPERATION, THE BAS SHALL PROVE PUMP OPERATION AND USE THE STATUS INDICATION TO ACCUMULATE RUNTIME. UPON FAILURE OF THE PUMP, THE BAS SHALL ENUNCIATE AN ALARM. N. HIGH OR LOW PRESSURE SAFETY:
- a. UPON ACTIVATION OF A HIGH OR LOW PRESSURE SAFETY SWITCH, AH SHALL BE DEENERGIZED, FANS SHALL BE DEENERGIZED VIA A HARD WIRED INTERLOCK, AND AN INDICATION OF THE OPERATION SHALL BE SENSED BY THE BAS. BAS SHALL ANNUNCIATE APPROPRIATE ALARM AND REMOVE AND LOCK OUT THE START COMMAND. 16. ACCESSORIES: PROVIDE THE FOLLOWING.
- A. BAS INTERFACING: a. A BAS PORT OR SERIAL CARD IS PROVIDED WITH THE CONTROLLER FOR FIELD INTERFACING WITH A BUILDING AUTOMATION SYSTEM. b. UPDATE DEFAULT SETTINGS TO THE APPROPRIATE ADDRESSES TO MATCH THE BAS SETTINGS.
- B. DDC REMOTE INTERFACE: a. FACTORY PROVIDED, FIELD MOUNTED INTERFACE PANEL THAT WILL BE WIRED TO THE MAIN CONTROLLER FOR MONITORING AND REMOTE ADJUSTMENTS OF SET
- C. PHASE AND BROWNOUT PROTECTION a. FACTORY MOUNTED AND WIRED COMPONENT WHICH MONITORS THE MAIN POWER COMING INTO THE UNIT. b. IF A PHASE DROPS OUT, OR IF THE INCOMING VOLTAGE EXCEEDS THE ACCEPTABLE RANGE, THE COMPONENT WILL TURN OFF THE UNIT TO HELP PROTECT THE
- ELECTRICAL SYSTEMS. D. CONDENSATE OVERFLOW UNIT SHUTDOWN
- a. FACTORY MOUNTED CONDENSATE OVERFLOW SWITCH WIRED TO THE UNIT CONTROLLER. THE CONTROLLER MONITORS THE CONDENSATE OVERFLOW SWITCH.
- b. IF THE WATER LEVEL IN THE DRAIN PAN REACHES A CERTAIN LEVEL, THE UNIT WILL SHUTDOWN AND SEND AN ALARM.
- a. THE SUPPLY AND EXHAUST FANS WILL EACH HAVE AN AIRFLOW MONITORING PRESSURE TAP ON THE INLET CONE.
- b. THE DIFFERENTIAL PRESSURE ACROSS THE FAN CONE IS CONVERTED TO AN AIRFLOW READING BY USING THE ENERGY CONSERVATION PRINCIPLE AND THE FAN WHEEL K-FACTOR.
- c. THE AIRFLOW CAN BE MONITORED VIA THE LCD AND BAS.
- F. DAMPER END SWITCH a. DAMPER END SWITCHED WILL BE PROVIDED TO ENSURE THE SUPPLY AND EXHAUST FANS DO NOT ENABLE UNTIL THE DAMPERS ARE PROVEN OPEN.
- 17. MINIMUM REQUIREMENTS FOR OPERATOR WORKSTATION DISPLAY A. SUPPLY AIRFLOW
- B. SUPPLY FAN ON-OFF STATUS C. SUPPLY FAN SPEED

F. RAFA SPEED

- D. RAFA AIRFLOW RAFA ON-OFF STATUS
- G. ALL DAMPER POSITIONS H. INDICATION FOR ECONOMIZER MODE STATUS
- I. SUPPLY FAN STATIC PRESSURE SET POINT SUPPLY FAN STATIC PRESSURE (ACTUAL
- K. ERW ON OFF STATUS L. ERW SPEED
- M. ALL TEMPERATURE SENSORS ON THE UNIT N. DEWPOINT OF SA, RA, OA, AND EA
- O. CHW AND HHW VALVE POSITIONS P. HEAT PIPE STATUS
- Q. RECIRCULATION PUMP STATUS R. COOLING DEMAND % OF TOTAL CAPACITY
- S. ALL RELEVANT DATA POINTS FROM THE HEAT PIPE TEMPERATURE LEAVING COOLING COIL
- U. TEMPERATURE LEAVING HEAT PIPE REHEAT COIL V. TEMPERATURE LEAVING UNIT
- W. DAMPER POSITIONS X. ALARMS

POINTS TABLE AHU-02-01				
POIN	IT DISCRIPTION	POINT TYPE	HARDWIRED (H) OR NETWORKED (N)?	EXPECTED RANG
AMBIENT	PRESSURE	Al	Н	05" WC - 0.5" WC
BUILDING	STATIC PRESSURE	Al	Н	05" WC - 0.5" WC
CHW RECIRC PUMP	START/STOP	ВО	N	START/STOP
CHW RECIRC PUMP	STATUS	BI	N	ON/OFF
CHW RECIRC VALVE	POSITION	ВО	N	YES/NO
CHW VALVE	POSITION	AO	N	0-100%
CONDENSATE	OVERFLOW ALARM	BI	N	ON/OFF
EA DAMPER	POSITION	AO	N	0-100%
ECON OA DAMPER	POSITION	AO	N	0-100%
ECONOMIZER EA	CFM	Al	Н	0-75000 CFM
ECONOMIZER OA	CFM	Al	Н	0-75000 CFM
ERW	START/STOP	ВО	N	START/STOP
ERW	SPEED COMMAND	AO	N	0-100%
ERW	STATUS	BI	N	ON/OFF
ERW	PRESSURE DROP	Al	Н	0-2 IN. W.C.
HEAT PIPE	STAGE 1	ВО	Н	ON/OFF
HEAT PIPE	STAGE 2	BO	Н	ON/OFF
HEAT PIPE	STAGE 3	BO	H	ON/OFF
HEAT PIPE	STAGE 4	BO	Н	ON/OFF
HHW RECIRC PUMP	START/STOP	BO	N	START/STOP
HHW RECIRC PUMP	STATUS	BI	N	ON/OFF
HHW RECIRC VALVE	POSITION	BO	N N	YES/NO
HHW VALVE	POSITION	AO	N	0-100%
MIN OA	CFM	Al	N	50-90°F
MIN OA DAMPER	POSITION	AO	 N	0-100%
MIXED AIR				20%-80%
	HUMIDITY	Al	<u> </u>	
MIXED AIR	TEMPERATURE	Al	<u> </u>	30-110°F
OA OA	TEMPERATURE	Al	<u> </u>	30-110°F
OA DA	HUMIDITY	Al	H	20%-80%
RA .	TEMPERATURE	Al	<u>H</u>	30-110°F
RA .	HUMIDITY	Al	<u>H</u>	20%-80%
RA	TEMPERATURE	Al	Н	30-110°F
RA	HUMIDITY	Al	Н	20%-80%
RA DAMPER	POSITION	AO	N	0-100%
RA DAMPER	POSITION	AO	N	0-100%
RAFA	START/STOP	ВО	N	START/STOP
RAFA	SPEED COMMAND	AO	N	0-100%
RAFA	STATUS	BI	N	ON/OFF
REA DAMPER	POSITION	AO	N	0-100%
SA	HUMIDITY	Al	Н	20%-80%
SA	TEMPERATURE	Al	Н	30-110°F
SA	OFF-CC TEMPERATURE	Al	Н	30-110°F
SA	OFF-HC TEMPERATURE	Al	Н	30-110°F
SA	CFM	Al	Н	50-90°F
SA FAN	START/STOP	ВО	N	START/STOP
SA FAN	SPEED COMMAND	AO	N	0-100%
SA FAN	STATUS	BI	N	ON/OFF
SPACE	CO2 LEVEL	Al	Н	0-1500 PPM
SPACE	TEMPERATURE	Al	Н	30-110°F
SPACE	HUMIDITY	Al	H	20%-80%

 \mathcal{L}

IN128 - JAMES T **MORRIS ARENA**

Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEE 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408 812-855-1692

Architect RATIO 101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204

Structural Engineer FINK ROBERTS AND PETRIE, INC.

3535 EAST 96TH STREET SUITE 126 INDIANAPOLIS, IN 46240

317-633-4040

317-872-8400 Mechanical / Electrical

INTROBA 8250 HAVERSTICK ROAD SUITE 285 INDIANAPOLIS. IN 46240

Plumbing Engineer

800-404-7677

138 N. DELAWARE ST INDIANAPOLIS, IN 46204 317-633-4120

Acoustics / Technology Engineer WJHW 7220 W. JEFFERSON AVE SUITE 216

LAKEWOOD, CO 80235

972-934-3700 Civil Engineer

AMERICAN STRUCTUREPOINT, INC.

9025 RIVER ROAD SUITE 200 INDIANAPOLIS, IN 46240

317-547-5580 Food Service Consultant

CINILITTLE 3405 NW 9TH AVENUE #1202 FORT LAUDERDALE, FL 33309

954-846-9600

816-806-3729

Code Consultant FORZA 2502 WEST MECHANIC ST, SUITE C

HARRISONVILLE, MO 64701

95% CONSTRUCTION DOCUMENTS CONSTRUCTION DOCUMENTS **ADDENDUM 01**



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PROJECT NO.

LOCAL MAGNEHELIC GAUGE SUPPLIED AT EACH FILTER SECTION. WHERE AIRFLOW MONITORING IS INDICATED ON FANS

PIEZIOMETER RING SHALL BE SUPPLIED AT EACH INLET

GENERAL CONTROLS NOTES:

THERMOSTATS SHALL NOT BE INSTALLED ON EXTERIOR

WALLS OR COLUMNS, OR WHERE EXPOSED TO SOLAR

RADIATION. WHERE THERE ARE NO OTHER OPTIONS, A

BACKPLATE TO ELIMINATE TEMPERATURE INFLUENCE

FROM DIRECT SOLAR EXPOSURE SHALL BE PROVIDED.

CONTRACTOR IS RESPONSIBLE FOR COORDINATING

ROUTING, GROUPING, AND POWER FOR THE LOW-

C. ALL NECESSARY CONTROL POINTS SHALL BE PROVIDED

WHETHER OR NOT THEY ARE EXPLICITLY NAMED.

TEMPERATURE AND PRESSURE CONTROL POINTS.

E. CONTROLS CONTRACTOR SHALL COORDINATE WITH THE

SENSORS SHALL BE BLIND SENSORS WITH ONLY THE ABILITY TO INDUCE AN OCCUPANCY OVERRIDE WITH A

BUTTON UNLESS OTHERWISE REQUESTED BY IU.

D. PROVIDE ANALOGUE FIELD SENSORS NEXT TO ALL

F. ALL IN-SPACE TEMPERATURE, HUMIDITY, AND CO2

TO ACHIEVE THE WRITTEN SEQUENCES OF OPERATION

SOLAR BLOCKING ENCLOSURE AND INSULATED

A. TEMPERATURE SENSORS, HUMIDISTATS, AND

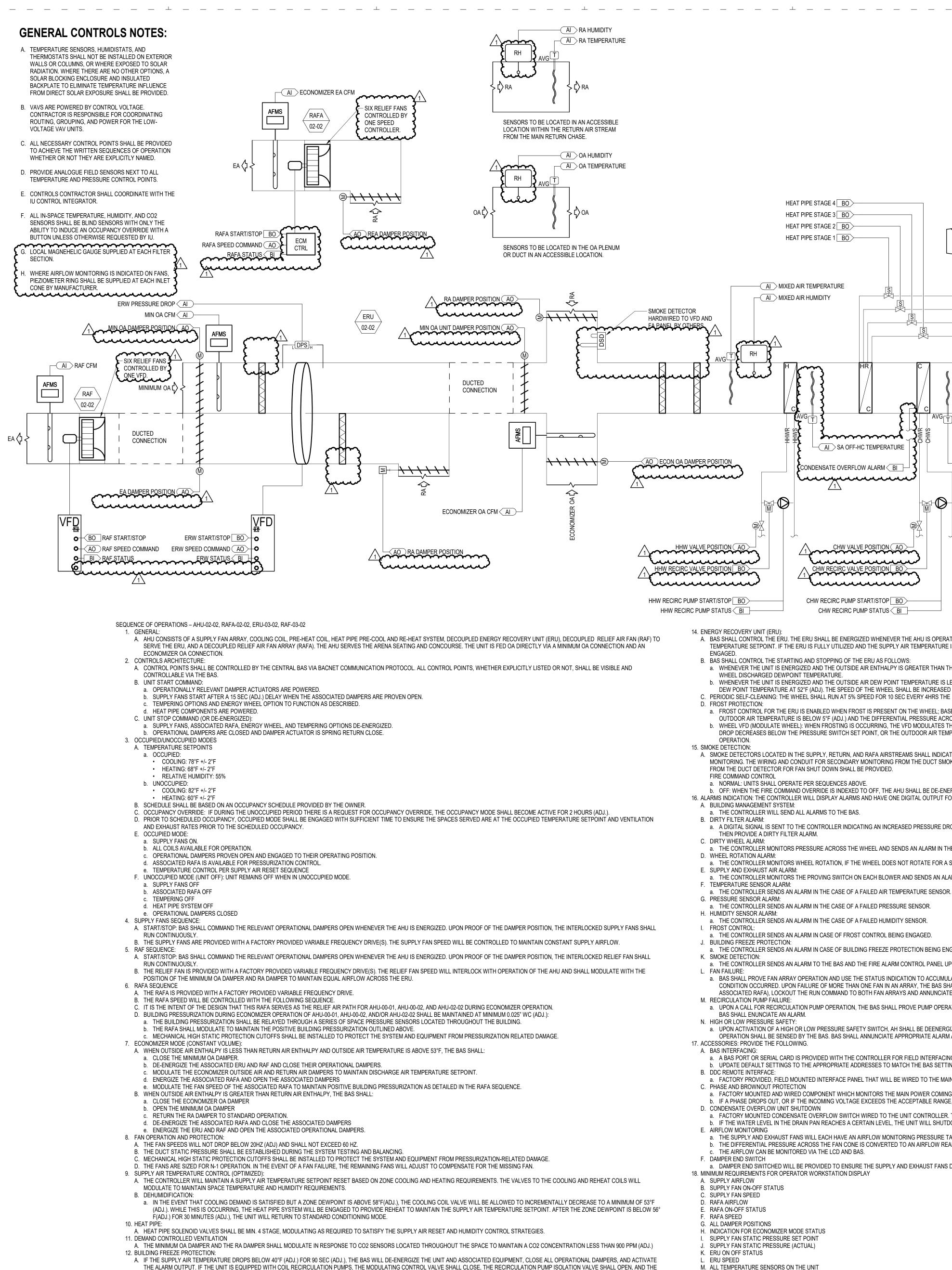
B. VAVS ARE POWERED BY CONTROL VOLTAGE.

VOLTAGE VAV UNITS.

IU CONTROL INTEGRATOR.

CONE BY MANUFACTURER.

SHEET NUMBER M-707



A. IN THE EVENT THAT THE HIGH-LEVEL CONDENSATE SWITCH IS TRIPPED, ALL COOLING COMPONENTS SHALL SHUT DOWN AND ALARMS SHALL BE SENT TO THE BAS.

RECIRCULATION PUMP SHALL OPERATE.

13. CONDENSATE OVERFLOW:

	AMBIENT BUILDING CHW RECIRC PUMP CHW RECIRC PUMP CHW RECIRC VALVE CHW VALVE CONDENSATE EA DAMPER ECON OA DAMPER ECONOMIZER EA ECONOMIZER OA	PRESSURE STATIC PRESSURE START/STOP STATUS POSITION POSITION OVERFLOW ALARM POSITION POSITION	AI AI BO BI BO AO BI	H H N N N	05" WC - 0.5" WC 05" WC - 0.5" WC START/STOP ON/OFF
	CHW RECIRC PUMP CHW RECIRC PUMP CHW RECIRC VALVE CHW VALVE CONDENSATE EA DAMPER ECON OA DAMPER ECONOMIZER EA	START/STOP STATUS POSITION POSITION OVERFLOW ALARM POSITION POSITION	BO BI BO AO BI	N N N	START/STOP
	CHW RECIRC PUMP CHW RECIRC VALVE CHW VALVE CONDENSATE EA DAMPER ECON OA DAMPER ECONOMIZER EA	STATUS POSITION POSITION OVERFLOW ALARM POSITION POSITION	BI BO AO BI	N N	
	CHW RECIRC VALVE CHW VALVE CONDENSATE EA DAMPER ECON OA DAMPER ECONOMIZER EA	POSITION POSITION OVERFLOW ALARM POSITION POSITION	BO AO BI	N	ON/OFF
	CHW VALVE CONDENSATE EA DAMPER ECON OA DAMPER ECONOMIZER EA ECONOMIZER OA	POSITION OVERFLOW ALARM POSITION POSITION	AO BI		t
	CONDENSATE EA DAMPER ECON OA DAMPER ECONOMIZER EA ECONOMIZER OA	OVERFLOW ALARM POSITION POSITION	BI		YES/NO
	EA DAMPER ECON OA DAMPER ECONOMIZER EA ECONOMIZER OA	POSITION POSITION		N	0-100%
	ECON OA DAMPER ECONOMIZER EA ECONOMIZER OA	POSITION	1 1	N	ON/OFF
E E E E	ECONOMIZER EA ECONOMIZER OA		AO	N	0-100%
E	ECONOMIZER OA		AO	N	0-100%
E		CFM	Al	Н	0-75000 CFM
E	-RW	CFM	Al	H	0-75000 CFM
E		START/STOP	ВО	N	START/STOP
E	ERW	SPEED COMMAND	AO	N	0-100%
H	ERW	STATUS	BI	N	ON/OFF
	RW	PRESSURE DROP	Al	<u>H</u>	0-2 IN. W.C.
	HEAT PIPE	STAGE 1	BO	<u>H</u>	ON/OFF
_	HEAT PIPE	STAGE 2	BO	<u>H</u>	ON/OFF
	HEAT PIPE	STAGE 3	ВО	<u>H</u>	ON/OFF
_	HEAT PIPE	STAGE 4	ВО	<u>H</u>	ON/OFF
-	HHW RECIRC PUMP	START/STOP	ВО	N	START/STOP
_	HHW RECIRC PUMP	STATUS	BI	N	ON/OFF
-	HHW RECIRC VALVE	POSITION	BO	N N	YES/NO
	HW VALVE	POSITION	AO	N	0-100%
	MIN OA	CFM	Al	<u>H</u>	50-90°F
	MIN OA DAMPER	POSITION	AO	N N	0-100%
	MIN OA UNIT DAMPER	POSITION	AO	N	0-100%
	MIXED AIR	HUMIDITY	Al	<u>H</u>	20%-80%
	MIXED AIR	TEMPERATURE	Al	<u>H</u>	30-110°F
-	DA .	TEMPERATURE	Al	<u>H</u>	30-110°F
-	DA .	HUMIDITY	Al	H	20%-80%
-	RA DA	TEMPERATURE HUMIDITY	Al Al	Н Н	30-110°F 20%-80%
-	RA RA DAMPER	POSITION	AO	<u>п</u> N	0-100%
	RA DAMPER	POSITION	AO	N	0-100%
	RAF	CFM	Al	N	0-75000 CFM
-	RAF	START/STOP	BO	N	START/STOP
-	RAF	SPEED COMMAND	AO	N N	0-100%
-	RAF	STATUS	BI	N	ON/OFF
-	RAFA	START/STOP	ВО	N N	START/STOP
-	RAFA	SPEED COMMAND	AO	N	0-100%
	RAFA	STATUS	BI	N	ON/OFF
_	REA DAMPER	POSITION	AO	N	0-100%
-	SA	CFM	Al	H	50-90°F
_	SA	HUMIDITY	Al	H	20%-80%
	SA	TEMPERATURE	Al	H	30-110°F
-	SA	OFF-CC TEMPERATURE	Al	H	30-110°F
_	SA	OFF-HC TEMPERATURE	Al	H	30-110°F
_	SA FAN	START/STOP	BO	N	START/STOP
	SA FAN	SPEED COMMAND	AO	N	0-100%
_	SA FAN	STATUS	BI	N	ON/OFF
_	SPACE	CO2 LEVEL	Al	H	0-1500 PPM
_	SPACE	TEMPERATURE	Al	H	30-110°F
_	SPACE	HUMIDITY	Al	H	20%-80%
~	mmmm	Lunium	u u u u u	······································	

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IU Project NO. 20240127

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RATIO 101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204 317-633-4040

Structural Engineer

FINK ROBERTS AND PETRIE, INC. 3535 EAST 96TH STREET SUITE 126 INDIANAPOLIS, IN 46240

Mechanical / Electrical **INTROBA** 8250 HAVERSTICK ROAD SUITE 285

317-872-8400

Plumbing Engineer

800-404-7677

138 N. DELAWARE ST INDIANAPOLIS, IN 46204 317-633-4120

INDIANAPOLIS. IN 46240

Acoustics / Technology Engineer WJHW

7220 W. JEFFERSON AVE SUITE 216 LAKEWOOD, CO 80235 972-934-3700

Civil Engineer AMERICAN STRUCTUREPOINT, INC. 9025 RIVER ROAD

SUITE 200 INDIANAPOLIS. IN 46240 317-547-5580

Food Service Consultant CINILITTLE 3405 NW 9TH AVENUE #1202 -ORT LAUDERDALE, FL 33309

954-846-9600 Code Consultant FORZA

2502 WEST MECHANIC ST, SUITE C

HARRISONVILLE, MO 64701 816-806-3729

SHEET ISSUE

CONSTRUCTION DOCUMENTS **ADDENDUM 01**

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PROJECT NO.

MECHANICAL AHU-02-02

SHEET NUMBER

M-708

A. BAS SHALL CONTROL THE ERU. THE ERU SHALL BE ENERGIZED WHENEVER THE AHU IS OPERATING AND THE SPEED OF THE ERU SHALL BE MODULATED TO MAINTAIN THE CURRENT SUPPLY AIR TEMPERATURE SETPOINT. IF THE ERU IS FULLY UTILIZED AND THE SUPPLY AIR TEMPERATURE IS NOT MET PER THE SUPPLY AIR RESET STRATEGY, THE CORRESPONDING HYDRONIC VALVES WILL B. BAS SHALL CONTROL THE STARTING AND STOPPING OF THE ERU AS FOLLOWS:

THERE WILL BE MULTIPLE SPACE SENSORS

FROM THESE SENSORS WILL BE AVERAGED.

ENVIRONEMNTAL

PRESSURE

SA TEMPERATURE (AI)

SA HUMIDITY AI

AI SPACE HUMIDITY

— AI SPACE TEMPERATURE

AMBIENT PRESSURE

AI SPACE CO2 LEVEL

~~~~~\1

FOUR SUPPLY FANS

AI SA OFF-CC TEMPERATURE

CONTROLLED BY

INDIVIDUAL VFDS.

mmm

LOCATED THROUGHOUT THE SPACE BASED ON

MANUFACTURER'S RECOMMENDATIONS. THE INPUT

AI > BUILDING STATIC PRESSURE

mmm

● BO SA FAN START/STOP

O AO SA FAN SPEED COMMAND

BI SA FAN STATUS

BUILDING

REFERENCE

a. WHENEVER THE UNIT IS ENERGIZED AND THE OUTSIDE AIR ENTHALPY IS GREATER THAN THE ERU EXHAUST AIR ENTHALPY THE WHEEL SPEED SHALL BE MODULATED TO MAINTAIN A 52°F (ADJ) WHEEL DISCHARGED DEWPOINT TEMPERATURE. b. WHENEVER THE UNIT IS ENERGIZED AND THE OUTSIDE AIR DEW POINT TEMPERATURE IS LESS THAN 52°F (ADJ). THE SPEED OF THE WHEEL SHALL BE MODULATED TO MAINTAIN THE SUPPLY AIR DEW POINT TEMPERATURE AT 52°F (ADJ). THE SPEED OF THE WHEEL SHALL BE INCREASED UPON A DROP IN SUPPLY AIR DEW POINT TEMPERATURE. PERIODIC SELF-CLEANING: THE WHEEL SHALL RUN AT 5% SPEED FOR 10 SEC EVERY 4HRS THE UNIT RUNS.

D. FROST PROTECTION: a. FROST CONTROL FOR THE ERU IS ENABLED WHEN FROST IS PRESENT ON THE WHEEL; BASED ON THE OUTSIDE AIR TEMPERATURE AND THE PRESSURE DROP ACROSS THE WHEEL. IF THE OUTDOOR AIR TEMPERATURE IS BELOW 5°F (ADJ.) AND THE DIFFERENTIAL PRESSURE ACROSS THE WHEEL IS 1.5" OR GREATER (ADJ.), FROST CONTROL WILL ENABLE. b. WHEEL VFD (MODULATE WHEEL): WHEN FROSTING IS OCCURRING. THE VFD MODULATES THE WHEEL DOWN TO A SLOW ROTATIONAL SPEED TO DEFROST WHEEL. ONCE EITHER THE PRESSURE

DROP DECREASES BELOW THE PRESSURE SWITCH SET POINT, OR THE OUTDOOR AIR TEMPERATURE INCREASES ABOUT THE TEMPERATURE SET POINT, THE UNIT WILL RESUME NORMAL 15. SMOKE DETECTION: A. SMOKE DETECTORS LOCATED IN THE SUPPLY, RETURN, AND RAFA AIRSTREAMS SHALL INDICATE AN ALARM AT THE BAS WORKSTATION WHEN AN ALARM CONDITION IS DETECTED FOR SECONDARY

MONITORING. THE WIRING AND CONDUIT FOR SECONDARY MONITORING FROM THE DUCT SMOKE DETECTOR'S AUXILIARY CONTACT TO THE BAS SHALL BE PROVIDED. THE WIRING AND CONDUIT FROM THE DUCT DETECTOR FOR FAN SHUT DOWN SHALL BE PROVIDED. FIRE COMMAND CONTROL

a. NORMAL: UNITS SHALL OPERATE PER SEQUENCES ABOVE. b. OFF: WHEN THE FIRE COMMAND OVERRIDE IS INDEXED TO OFF, THE AHU SHALL BE DE-ENERGIZED AND ALL OPERATIONAL DAMPERS SHALL CLOSE. 16. ALARMS INDICATION: THE CONTROLLER WILL DISPLAY ALARMS AND HAVE ONE DIGITAL OUTPUT FOR REMOTE INDICATION OF AN ALARM CONDITION. POSSIBLE ALARMS INCLUDE:

a. THE CONTROLLER WILL SEND ALL ALARMS TO THE BAS.

B. DIRTY FILTER ALARM: a. A DIGITAL SIGNAL IS SENT TO THE CONTROLLER INDICATING AN INCREASED PRESSURE DROP ACROSS AN AIR FILTER (MUST BE ADJUSTED IN FIELD DURING START UP). THE CONTROLLER WILL

C. DIRTY WHEEL ALARM:

a. THE CONTROLLER MONITORS PRESSURE ACROSS THE WHEEL AND SENDS AN ALARM IN THE CASE OF AN INCREASED PRESSURE DROP.

D. WHEEL ROTATION ALARM: a. THE CONTROLLER MONITORS WHEEL ROTATION, IF THE WHEEL DOES NOT ROTATE FOR A SET PERIOD OF TIME (ADJ.) AN ALARM WILL GENERATE.

a. THE CONTROLLER MONITORS THE PROVING SWITCH ON EACH BLOWER AND SENDS AN ALARM IN THE CASE OF EITHER BLOWER PROVING SWITCH NOT ENGAGING. F. TEMPERATURE SENSOR ALARM

G. PRESSURE SENSOR ALARM: a. THE CONTROLLER SENDS AN ALARM IN THE CASE OF A FAILED PRESSURE SENSOR.

HEAT PIPE STAGE 4 BO

HEAT PIPE STAGE 3 BO

HEAT PIPE STAGE 2 BO

HEAT PIPE STAGE 1 BO

ATTACATOR

AI SA OFF-HC TEMPERATURE

CONDENSATE OVERFLOW ALARM (BI

mmmmm

CHW VALVE POSITION AO

CHW RECIRC PUMP START/STOP BO

CHW RECIRC PUMP STATUS (BI

AI MIXED AIR TEMPERATURE

── AI > MIXED AIR HUMIDITY

H. HUMIDITY SENSOR ALARM: a. THE CONTROLLER SENDS AN ALARM IN THE CASE OF A FAILED HUMIDITY SENSOR.

I. FROST CONTROL: a. THE CONTROLLER SENDS AN ALARM IN CASE OF FROST CONTROL BEING ENGAGED.

J. BUILDING FREEZE PROTECTION: a. THE CONTROLLER SENDS AN ALARM IN CASE OF BUILDING FREEZE PROTECTION BEING ENGAGED.

K. SMOKE DETECTION: a. THE CONTROLLER SENDS AN ALARM TO THE BAS AND THE FIRE ALARM CONTROL PANEL UPON POSITIVE DETECTION OF SMOKE.

L. FAN FAILURE: a. BAS SHALL PROVE FAN ARRAY OPERATION AND USE THE STATUS INDICATION TO ACCUMULATE RUNTIME. UPON FAILURE OF ANY OF THE FANS, THE BAS SHALL ALARM THAT FAN FAILURE CONDITION OCCURRED. UPON FAILURE OF MORE THAN ONE FAN IN AN ARRAY, THE BAS SHALL REMOVE THE COMMAND TO RUN THE REMAINING FANS (BOTH INTERNAL TO THE AHU AND THE ASSOCIATED RAFA), LOCKOUT THE RUN COMMAND TO BOTH FAN ARRAYS AND ANNUNCIATE AN ALARM.

M. RECIRCULATION PUMP FAILURE: a. UPON A CALL FOR RECIRCULATION PUMP OPERATION, THE BAS SHALL PROVE PUMP OPERATION AND USE THE STATUS INDICATION TO ACCUMULATE RUNTIME. UPON FAILURE OF THE PUMP, THE BAS SHALL ENUNCIATE AN ALARM.

N. HIGH OR LOW PRESSURE SAFETY: a. UPON ACTIVATION OF A HIGH OR LOW PRESSURE SAFETY SWITCH, AH SHALL BE DEENERGIZED, FANS SHALL BE DEENERGIZED VIA A HARD WIRED INTERLOCK, AND AN INDICATION OF THE OPERATION SHALL BE SENSED BY THE BAS. BAS SHALL ANNUNCIATE APPROPRIATE ALARM AND REMOVE AND LOCK OUT THE START COMMAND. 17. ACCESSORIES: PROVIDE THE FOLLOWING.

a. A BAS PORT OR SERIAL CARD IS PROVIDED WITH THE CONTROLLER FOR FIELD INTERFACING WITH A BUILDING AUTOMATION SYSTEM. b. UPDATE DEFAULT SETTINGS TO THE APPROPRIATE ADDRESSES TO MATCH THE BAS SETTINGS.

B. DDC REMOTE INTERFACE: a. FACTORY PROVIDED, FIELD MOUNTED INTERFACE PANEL THAT WILL BE WIRED TO THE MAIN CONTROLLER FOR MONITORING AND REMOTE ADJUSTMENTS OF SET POINTS.

C. PHASE AND BROWNOUT PROTECTION a. FACTORY MOUNTED AND WIRED COMPONENT WHICH MONITORS THE MAIN POWER COMING INTO THE UNIT.

b. IF A PHASE DROPS OUT, OR IF THE INCOMING VOLTAGE EXCEEDS THE ACCEPTABLE RANGE, THE COMPONENT WILL TURN OFF THE UNIT TO HELP PROTECT THE ELECTRICAL SYSTEMS. D. CONDENSATE OVERFLOW UNIT SHUTDOWN

a. FACTORY MOUNTED CONDENSATE OVERFLOW SWITCH WIRED TO THE UNIT CONTROLLER. THE CONTROLLER MONITORS THE CONDENSATE OVERFLOW SWITCH.

b. IF THE WATER LEVEL IN THE DRAIN PAN REACHES A CERTAIN LEVEL, THE UNIT WILL SHUTDOWN AND SEND AN ALARM.

a. THE SUPPLY AND EXHAUST FANS WILL EACH HAVE AN AIRFLOW MONITORING PRESSURE TAP ON THE INLET CONE

b. THE DIFFERENTIAL PRESSURE ACROSS THE FAN CONE IS CONVERTED TO AN AIRFLOW READING BY USING THE ENERGY CONSERVATION PRINCIPLE AND THE FAN WHEEL K-FACTOR. c. THE AIRFLOW CAN BE MONITORED VIA THE LCD AND BAS.

F. DAMPER END SWITCH a. DAMPER END SWITCHED WILL BE PROVIDED TO ENSURE THE SUPPLY AND EXHAUST FANS DO NOT ENABLE UNTIL THE DAMPERS ARE PROVEN OPEN.

18. MINIMUM REQUIREMENTS FOR OPERATOR WORKSTATION DISPLAY

A. SUPPLY AIRFLOW

B. SUPPLY FAN ON-OFF STATUS

C. SUPPLY FAN SPEED D. RAFA AIRFLOW

E. RAFA ON-OFF STATUS F. RAFA SPEED

G. ALL DAMPER POSITIONS H. INDICATION FOR ECONOMIZER MODE STATUS

I. SUPPLY FAN STATIC PRESSURE SET POINT J. SUPPLY FAN STATIC PRESSURE (ACTUAL) K. ERU ON OFF STATUS

L. ERU SPEED M. ALL TEMPERATURE SENSORS ON THE UNIT

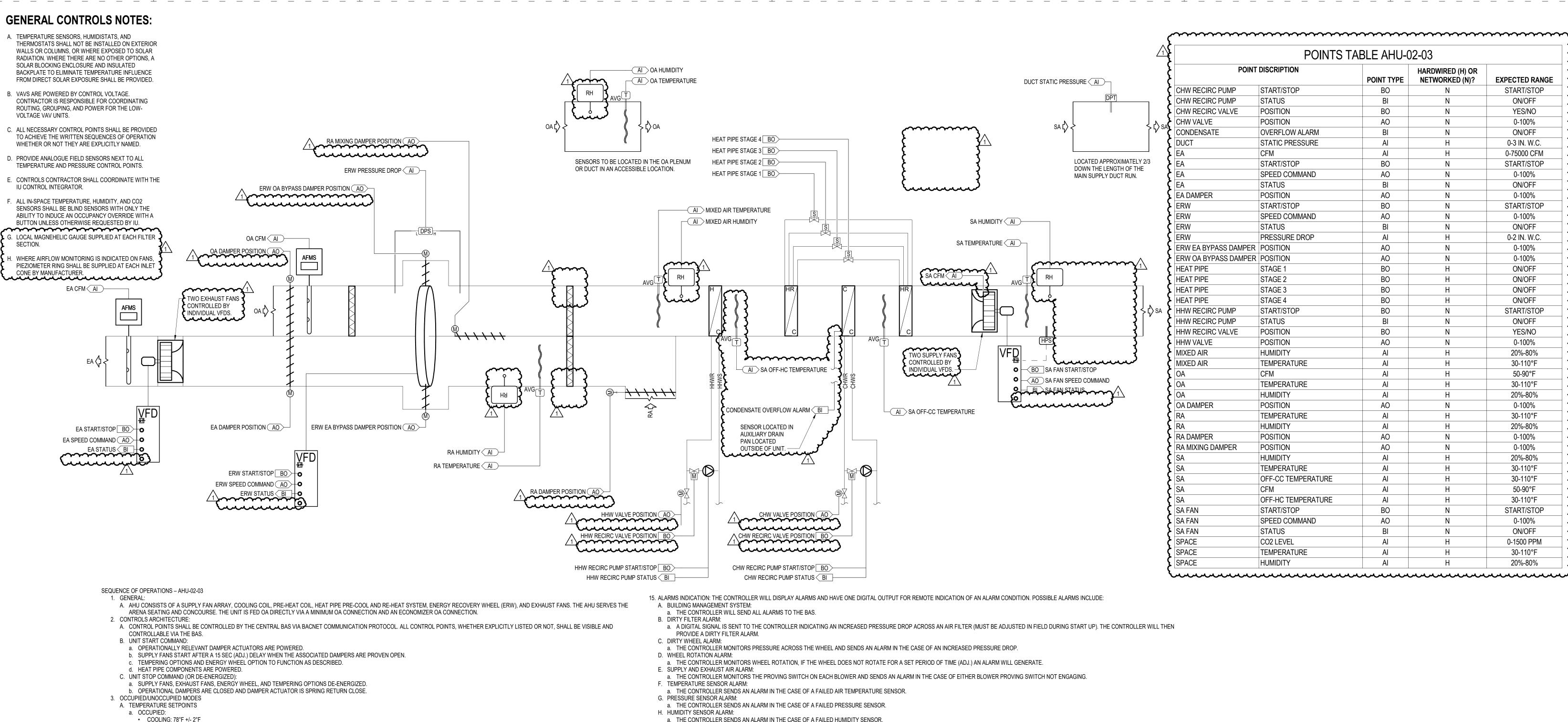
N. DEWPOINT OF SA, RA, OA, AND EA O. CHW AND HHW VALVE POSITIONS P. HEAT PIPE STATUS Q. RECIRCULATION PUMP STATUS

R. COOLING DEMAND % OF TOTAL CAPACITY S. ALL RELEVANT DATA POINTS FROM THE HEAT PIPE T. TEMPERATURE LEAVING COOLING COIL

U. TEMPERATURE LEAVING HEAT PIPE REHEAT COIL V. TEMPERATURE LEAVING UNIT

W. DAMPER POSITIONS

X._ALARMS __ __



a. THE CONTROLLER SENDS AN ALARM IN THE CASE OF A FAILED HUMIDITY SENSOR.

I. FROST CONTROL: a. THE CONTROLLER SENDS AN ALARM IN CASE OF FROST CONTROL BEING ENGAGED.

J. BUILDING FREEZE PROTECTION: a. THE CONTROLLER SENDS AN ALARM IN CASE OF BUILDING FREEZE PROTECTION BEING ENGAGED.

K. SMOKE DETECTION: a. THE CONTROLLER SENDS AN ALARM TO THE BAS AND THE FIRE ALARM CONTROL PANEL UPON POSITIVE DETECTION OF SMOKE.

L. FAN FAILURE: a. BAS SHALL PROVE FAN ARRAY OPERATION AND USE THE STATUS INDICATION TO ACCUMULATE RUNTIME. UPON FAILURE OF ANY OF THE FANS, THE BAS SHALL ALARM THAT FAN FAILURE CONDITION

OCCURRED. UPON FAILURE OF MORE THAN ONE FAN IN AN ARRAY, THE BAS SHALL REMOVE THE COMMAND TO RUN THE REMAINING FANS (BOTH INTERNAL TO THE AHU AND THE ASSOCIATED EXHAUST FANS), LOCKOUT THE RUN COMMAND TO BOTH FAN ARRAYS AND ANNUNCIATE AN ALARM. M. RECIRCULATION PUMP FAILURE:

a. UPON A CALL FOR RECIRCULATION PUMP OPERATION, THE BAS SHALL PROVE PUMP OPERATION AND USE THE STATUS INDICATION TO ACCUMULATE RUNTIME. UPON FAILURE OF THE PUMP, THE BAS

N. HIGH OR LOW PRESSURE SAFETY: a. UPON ACTIVATION OF A HIGH OR LOW PRESSURE SAFETY SWITCH, AH SHALL BE DEENERGIZED, FANS SHALL BE DEENERGIZED VIA A HARD WIRED INTERLOCK, AND AN INDICATION OF THE OPERATION

SHALL BE SENSED BY THE BAS. BAS SHALL ANNUNCIATE APPROPRIATE ALARM AND REMOVE AND LOCK OUT THE START COMMAND.

16. ACCESSORIES: PROVIDE THE FOLLOWING. A. BAS INTERFACING:

a. A BAS PORT OR SERIAL CARD IS PROVIDED WITH THE CONTROLLER FOR FIELD INTERFACING WITH A BUILDING AUTOMATION SYSTEM. b. UPDATE DEFAULT SETTINGS TO THE APPROPRIATE ADDRESSES TO MATCH THE BAS SETTINGS.

a. FACTORY PROVIDED, FIELD MOUNTED INTERFACE PANEL THAT WILL BE WIRED TO THE MAIN CONTROLLER FOR MONITORING AND REMOTE ADJUSTMENTS OF SET POINTS. C. PHASE AND BROWNOUT PROTECTION

a. FACTORY MOUNTED AND WIRED COMPONENT WHICH MONITORS THE MAIN POWER COMING INTO THE UNIT. b. IF A PHASE DROPS OUT, OR IF THE INCOMING VOLTAGE EXCEEDS THE ACCEPTABLE RANGE, THE COMPONENT WILL TURN OFF THE UNIT TO HELP PROTECT THE ELECTRICAL SYSTEMS.

D. CONDENSATE OVERFLOW UNIT SHUTDOWN a. FACTORY MOUNTED CONDENSATE OVERFLOW SWITCH WIRED TO THE UNIT CONTROLLER. THE CONTROLLER MONITORS THE CONDENSATE OVERFLOW SWITCH. b. IF THE WATER LEVEL IN THE DRAIN PAN REACHES A CERTAIN LEVEL, THE UNIT WILL SHUTDOWN AND SEND AN ALARM.

a. THE SUPPLY AND EXHAUST FANS WILL EACH HAVE AN AIRFLOW MONITORING PRESSURE TAP ON THE INLET CONE.

b. THE DIFFERENTIAL PRESSURE ACROSS THE FAN CONE IS CONVERTED TO AN AIRFLOW READING BY USING THE ENERGY CONSERVATION PRINCIPLE AND THE FAN WHEEL K-FACTOR. c. THE AIRFLOW CAN BE MONITORED VIA THE LCD AND BAS.

a. DAMPER END SWITCHED WILL BE PROVIDED TO ENSURE THE SUPPLY AND EXHAUST FANS DO NOT ENABLE UNTIL THE DAMPERS ARE PROVEN OPEN. 17. MINIMUM REQUIREMENTS FOR OPERATOR WORKSTATION DISPLAY

A. SUPPLY AIRFLOW B. SUPPLY FAN ON-OFF STATUS

C. SUPPLY FAN SPEED D. EXHAUST FANS AIRFLOW

F. DAMPER END SWITCH

B. DDC REMOTE INTERFACE:

E. EXHAUST FANS ON-OFF STATUS F. EXHAUST FANS SPEED

G. ALL DAMPER POSITIONS

H. INDICATION FOR ECONOMIZER MODE STATUS I. SUPPLY FAN STATIC PRESSURE SET POINT

J. SUPPLY FAN STATIC PRESSURE (ACTUAL) K. ERW ON OFF STATUS

L. ERW SPEED M. ALL TEMPERATURE SENSORS ON THE UNIT

N. DEWPOINT OF SA, RA, OA, AND EA O. CHW AND HHW VALVE POSITIONS

V. TEMPERATURE LEAVING UNIT

P. HEAT PIPE STATUS Q. RECIRCULATION PUMP STATUS

R. COOLING DEMAND % OF TOTAL CAPACITY S. ALL RELEVANT DATA POINTS FROM THE HEAT PIPE

T. TEMPERATURE LEAVING COOLING COIL U. TEMPERATURE LEAVING HEAT PIPE REHEAT COIL

A. IF THE SUPPLY AIR TEMPERATURE DROPS BELOW 40°F (ADJ.) FOR 90 SEC (ADJ.), THE BAS WILL DE-ENERGIZE THE UNIT AND ASSOCIATED EQUIPMENT, CLOSE ALL OPERATIONAL DAMPERS, AND ACTIVATE W. DAMPER POSITIONS THE ALARM OUTPUT. IF THE UNIT IS EQUIPPED WITH COIL RECIRCULATION PUMPS, THE MODULATING CONTROL VALVE SHALL CLOSE, THE RECIRCULATION PUMP ISOLATION VALVE SHALL OPEN, AND THE X. ALARMS

12. CONDENSATE OVERFLOW: A. IN THE EVENT THAT THE HIGH-LEVEL CONDENSATE SWITCH IS TRIPPED, ALL COOLING COMPONENTS SHALL SHUT DOWN AND ALARMS SHALL BE SENT TO THE BAS.

A. THE RA MIXING DAMPER SHALL MODULATE IN RESPONSE TO CO2 SENSORS LOCATED THROUGHOUT THE SPACE TO MAINTAIN A CO2 CONCENTRATION LESS THAN 900 PPM (ADJ.)

HEATING: 68°F +/- 2°F

COOLING: 82°F +/- 2°F

HEATING: 60°F +/- 2°F

b. ALL COILS AVAILABLE FOR OPERATION.

B. SCHEDULE SHALL BE BASED ON AN OCCUPANCY SCHEDULE PROVIDED BY THE OWNER.

c. OPERATIONAL DAMPERS PROVEN OPEN AND ENGAGED TO THEIR OPERATING POSITION.

A. THE EXHAUST FANS ARE PROVIDED WITH A FACTORY MOUNTED VARIABLE FREQUENCY DRIVES.

b. MODULATE THE RETURN AIR MIXING DAMPER TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT

B. THE DUCT STATIC PRESSURE SHALL BE ESTABLISHED DURING THE SYSTEM TESTING AND BALANCING.

F(ADJ.) FOR 30 MINUTES (ADJ.), THE UNIT WILL RETURN TO STANDARD CONDITIONING MODE.

C. PERIODIC SELF-CLEANING: THE WHEEL SHALL RUN AT 5% SPEED FOR 10 SEC EVERY 4HRS THE UNIT RUNS.

AIRFLOW THROUGH THE MINIMUM OA DAMPER AS IT RESPONDS TO THE DEMAND CONTROL VENTILATION SEQUENCE.

A. WHEN OUTSIDE AIR ENTHALPY IS LESS THAN RETURN AIR ENTHALPY AND OUTSIDE AIR TEMPERATURE IS ABOVE 53°F, THE BAS SHALL:

B. THE EXHAUST FANS' SPEEDS WILL BE CONTROLLED WITH THE FOLLOWING SEQUENCE.

B. WHEN OUTSIDE AIR ENTHALPY IS GREATER THAN RETURN AIR ENTHALPY, THE BAS SHALL:

A. THE FAN SPEEDS WILL NOT DROP BELOW 20HZ (ADJ) AND SHALL NOT EXCEED 60 HZ.

MODULATE TO MAINTAIN SPACE TEMPERATURE AND HUMIDITY REQUIREMENTS.

AND EXHAUST RATES PRIOR TO THE SCHEDULED OCCUPANCY.

e. TEMPERATURE CONTROL PER SUPPLY AIR RESET SEQUENCE

C. BUILDING PRESSURIZATION BASED ON OPERATION OF AHU:

b. RETURN THE RA DAMPER TO STANDARD OPERATION.

F. UNOCCUPIED MODE (UNIT OFF): UNIT REMAINS OFF WHEN IN UNOCCUPIED MODE.

b. UNOCCUPIED:

E. OCCUPIED MODE:

a. SUPPLY FANS ON.

d. EXHAUST FANS ON.

a. SUPPLY FANS OFF

c. TEMPERING OFF

4. SUPPLY FANS SEQUENCE:

5. EXHAUST FANS SEQUENCE

b. EXHAUST FANS OFF

d. HEAT PIPE SYSTEM OFF

e. OPERATIONAL DAMPERS CLOSED

ECONOMIZER MODE (CONSTANT VOLUME):

a. OPEN THE ERW BYPASS DAMPERS

a. CLOSE THE ERW BYPASS DAMPERS

8. SUPPLY AIR TEMPERATURE CONTROL (OPTIMIZED):

FAN OPERATION AND PROTECTION:

B. DEHUMIDIFICATION:

10. DEMAND CONTROLLED VENTILATION

RELATIVE HUMIDITY: 55%

13. ENERGY RECOVERY WHEEL (ERW): A. BAS SHALL CONTROL THE ERW. THE ERW SHALL BE ENERGIZED WHENEVER THE AHU UNIT IS OPERATING AND THE SPEED OF THE ERW SHALL BE MODULATED TO MAINTAIN THE CURRENT SUPPLY AIR TEMPERATURE SETPOINT. IF THE ERW IS FULLY UTILIZED AND THE SUPPLY AIR TEMPERATURE IS NOT MET PER THE SUPPLY AIR RESET STRATEGY, THE CORRESPONDING HYDRONIC VALVES WILL BE

A. THE CONTROLLER WILL MAINTAIN À SUPPLY AIR TEMPERATURE SETPOINT RESET BASED ON ZONE COOLING AND HEATING REQUIREMENTS. THE VALVES TO THE COOLING AND REHEAT COILS WILL

a. IN THE EVENT THAT COOLING DEMAND IS SATISFIED BUT A ZONE DEWPOINT IS ABOVE 58°F(ADJ.), THE COOLING COIL VALVE WILL BE ALLOWED TO INCREMENTALLY DECREASE TO A MINIMUM OF 53°F

(ADJ.), WHILE THIS IS OCCURRING, THE HEAT PIPE SYSTEM WILL BE ENGAGED TO PROVIDE REHEAT TO MAINTAIN THE SUPPLY AIR TEMPERATURE SETPOINT. AFTER THE ZONE DEWPOINT IS BELOW 56°

. OCCUPANCY OVERRIDE: IF DURING THE UNOCCUPIED PERIOD THERE IS A REQUEST FOR OCCUPANCY OVERRIDE, THE OCCUPANCY MODE SHALL BECOME ACTIVE FOR 2 HOURS (ADJ.).

D. PRIOR TO SCHEDULED OCCUPANCY, OCCUPIED MODE SHALL BE ENGAGED WITH SUFFICIENT TIME TO ENSURE THE SPACES SERVED ARE AT THE OCCUPIED TEMPERATURE SETPOINT AND VENTILATION

A. START/STOP: BAS SHALL COMMAND THE RELEVANT OPERATIONAL DAMPERS OPEN WHENEVER THE AHU IS ENERGIZED. UPON PROOF OF THE DAMPER POSITION, THE INTERLOCKED SUPPLY FANS SHALL

a. THE EXHAUST FANS WILL BE ENGAGED WHEN THE ASSOCIATED AHU IS IN "OCCUPIED" MODE. UNDER NORMAL OPERATION, THE EXHAUST FANS SHALL MODULATE IN TO MAINTAIN 10% LESS THAN THE

B. THE SUPPLY FANS ARE PROVIDED WITH A FACTORY PROVIDED VARIABLE FREQUENCY DRIVE(S). THE SUPPLY FAN SPEED WILL BE CONTROLLED TO MAINTAIN CONSTANT AIRFLOW.

b. MECHANICAL HIGH STATIC PROTECTION CUTOFFS SHALL BE INSTALLED TO PROTECT THE SYSTEM AND EQUIPMENT FROM PRESSURIZATION RELATED DAMAGE.

C. MECHANICAL HIGH STATIC PROTECTION CUTOFFS SHALL BE INSTALLED TO PROTECT THE SYSTEM AND EQUIPMENT FROM PRESSURIZATION-RELATED DAMAGE.

D. THE FANS ARE SIZED FOR N-1 OPERATION. IN THE EVENT OF A FAN FAILURE, THE REMAINING FANS WILL ADJUST TO COMPENSATE FOR THE MISSING FAN.

A. HEAT PIPE SOLENOID VALVES SHALL BE MIN. 4 STAGE, MODULATING AS REQUIRED TO SATISFY THE SUPPLY AIR RESET AND HUMIDITY CONTROL STRATEGIES.

c. MODULATE THE FAN SPEED OF THE ASSOCIATED EXHAUST FANS TO MAINTAIN AIRFLOW PRESSURIZATION DIFFERENTIAL EQUAL TO NORMAL OPERATING CONDITIONS

B. BAS SHALL CONTROL THE STARTING AND STOPPING OF THE ERW AS FOLLOWS: a. WHENEVER THE UNIT IS ENERGIZED AND THE OUTSIDE AIR ENTHALPY IS GREATER THAN THE ERW EXHAUST AIR ENTHALPY THE WHEEL SPEED SHALL BE MODULATED TO MAINTAIN A 52°F (ADJ) WHEEL DISCHARGED DEWPOINT TEMPERATURE. b. WHENEVER THE UNIT IS ENERGIZED AND THE OUTSIDE AIR DEW POINT TEMPERATURE IS LESS THAN 52°F (ADJ). THE SPEED OF THE WHEEL SHALL BE MODULATED TO MAINTAIN THE SUPPLY AIR DEW POINT TEMPERATURE AT 52°F (ADJ). THE SPEED OF THE WHEEL SHALL BE INCREASED UPON A DROP IN SUPPLY AIR DEW POINT TEMPERATURE.

a. FROST CONTROL FOR THE ERW IS ENABLED WHEN FROST IS PRESENT ON THE WHEEL; BASED ON THE OUTSIDE AIR TEMPERATURE AND THE PRESSURE DROP ACROSS THE WHEEL. IF THE OUTDOOR AIR TEMPERATURE IS BELOW 5°F (ADJ.) AND THE DIFFERENTIAL PRESSURE ACROSS THE WHEEL IS 1.5" OR GREATER (ADJ.), FROST CONTROL WILL ENABLE. b. WHEEL VFD (MODULATE WHEEL): WHEN FROSTING IS OCCURRING, THE VFD MODULATES THE WHEEL DOWN TO A SLOW ROTATIONAL SPEED TO DEFROST WHEEL. ONCE EITHER THE PRESSURE DROP DECREASES BELOW THE PRESSURE SWITCH SET POINT, OR THE OUTDOOR AIR TEMPERATURE INCREASES ABOUT THE TEMPERATURE SET POINT, THE UNIT WILL RESUME NORMAL OPERATION.

14. SMOKE DETECTION: A. SMOKE DETECTORS LOCATED IN THE SUPPLY, RETURN, AND EXHAUST FANS AIRSTREAMS SHALL INDICATE AN ALARM AT THE BAS WORKSTATION WHEN AN ALARM CONDITION IS DETECTED FOR SECONDARY MONITORING. THE WIRING AND CONDUIT FOR SECONDARY MONITORING FROM THE DUCT SMOKE DETECTOR'S AUXILIARY CONTACT TO THE BAS SHALL BE PROVIDED. THE WIRING AND CONDUIT FROM THE DUCT DETECTOR FOR FAN SHUT DOWN SHALL BE PROVIDED.

FIRE COMMAND CONTROL a. NORMAL: UNITS SHALL OPERATE PER SEQUENCES ABOVE. b. OFF: WHEN THE FIRE COMMAND OVERRIDE IS INDEXED TO OFF, THE AHU SHALL BE DE-ENERGIZED AND ALL OPERATIONAL DAMPERS SHALL CLOSE.

SPEED COMMAND 0-100% STATUS ON/OFF PRESSURE DROP 0-2 IN. W.C ERW EA BYPASS DAMPER | POSITION ΑO 0-100% ERW OA BYPASS DAMPER POSITION 0-100% HEAT PIPE STAGE 1 ON/OFF HEAT PIPE STAGE 2 BO ON/OFF HEAT PIPE STAGE 3 ON/OFF STAGE 4 HEAT PIPE ON/OFF START/STOP BO HHW RECIRC PUMP START/STOP HHW RECIRC PUMP STATUS ON/OFF POSITION YES/NO HHW RECIRC VALVE HHW VALVE POSITION ΑO 0-100% MIXED AIR HUMIDITY 20%-80% MIXED AIR **TEMPERATURE** ΑI 30-110°F CFM 50-90°F **TEMPERATURE** 30-110°F HUMIDITY 20%-80% OA DAMPER POSITION ΑO 0-100% **TEMPERATURE** 30-110°F HUMIDITY 20%-80% RA DAMPER POSITION 0-100% RA MIXING DAMPER POSITION ΑO 0-100% HUMIDITY 20%-80% **TEMPERATURE** OFF-CC TEMPERATURE 30-110°F CFM 50-90°F

POINTS TABLE AHU-02-03

BO

ΑO

HARDWIRED (H) OR

EXPECTED RANGE

START/STOP

ON/OFF

YES/NO

0-100%

ON/OFF

0-3 IN. W.C

0-75000 CFM

START/STOP

0-100%

ON/OFF

0-100%

START/STOP

30-110°F

START/STOP

0-100%

ON/OFF

0-1500 PPM

30-110°F

20%-80%

NETWORKED (N)?

POINT DISCRIPTION

START/STOP

STATUS

POSITION

POSITION

START/STOP

STATUS

POSITION

START/STOP

CFM

OVERFLOW ALARM

STATIC PRESSURE

SPEED COMMAND

OFF-HC TEMPERATURE

START/STOP

STATUS

CO2 LEVEL

HUMIDITY

IEMPERATURE

SPEED COMMAND

IN128 - JAMES T **MORRIS ARENA**

Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEE 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408 812-855-1692

Architect RATIO 101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204

Structural Engineer FINK ROBERTS AND PETRIE, INC.

3535 EAST 96TH STREET SUITE 126 INDIANAPOLIS, IN 46240

Mechanical / Electrical INTROBA

317-633-4040

317-872-8400

8250 HAVERSTICK ROAD SUITE 285 INDIANAPOLIS. IN 46240 800-404-7677

Plumbing Engineer

138 N. DELAWARE ST INDIANAPOLIS, IN 46204 317-633-4120

Acoustics / Technology Engineer WJHW 7220 W. JEFFERSON AVE SUITE 216

LAKEWOOD, CO 80235

972-934-3700

Civil Engineer AMERICAN STRUCTUREPOINT, INC.

9025 RIVER ROAD SUITE 200 INDIANAPOLIS. IN 46240

317-547-5580 **Food Service Consultant** CINILITTLE

3405 NW 9TH AVENUE #1202 ORT LAUDERDALE, FL 33309 954-846-9600

Code Consultant FORZA

2502 WEST MECHANIC ST, SUITE C HARRISONVILLE, MO 64701 816-806-3729

95% CONSTRUCTION DOCUMENTS CONSTRUCTION DOCUMENTS **ADDENDUM 01**



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DUPLICATION MAY BE MADE WITHOUT PRIO WRITTEN CONSENT OF RATIO. ALL COMMO

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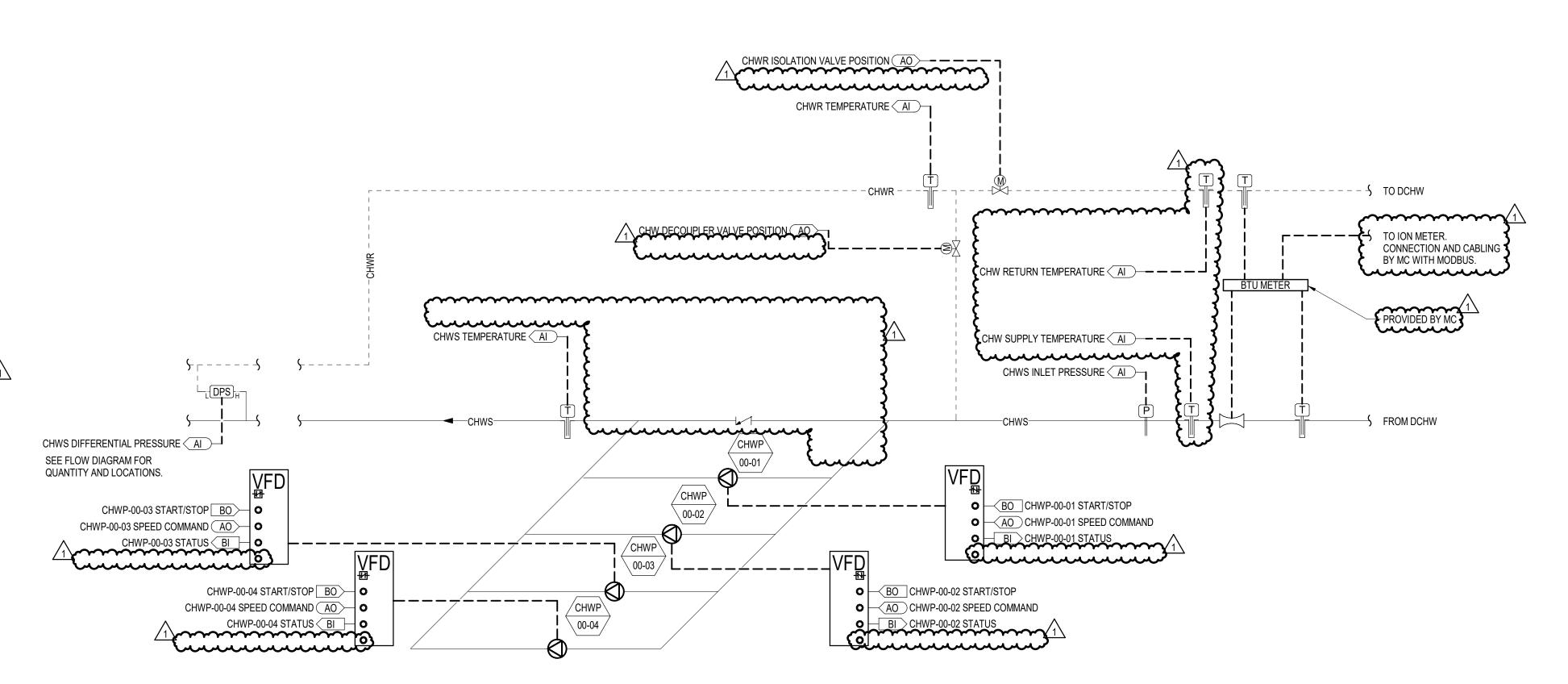
NO OTHER USE. DISSEMINATION OR

SHEET NUMBER

- A. TEMPERATURE SENSORS, HUMIDISTATS, AND THERMOSTATS SHALL NOT BE INSTALLED ON EXTERIOR WALLS OR COLUMNS, OR WHERE EXPOSED TO SOLAR RADIATION. WHERE THERE ARE NO OTHER OPTIONS, A SOLAR BLOCKING ENCLOSURE AND INSULATED BACKPLATE TO ELIMINATE TEMPERATURE INFLUENCE FROM DIRECT SOLAR EXPOSURE SHALL BE PROVIDED
- B. VAVS ARE POWERED BY CONTROL VOLTAGE. CONTRACTOR IS RESPONSIBLE FOR COORDINATING ROUTING, GROUPING, AND POWER FOR THE LOW-VOLTAGE VAV UNITS.
- C. ALL NECESSARY CONTROL POINTS SHALL BE PROVIDED TO ACHIEVE THE WRITTEN SEQUENCES OF OPERATION WHETHER OR NOT THEY ARE EXPLICITLY NAMED.
- D. PROVIDE ANALOGUE FIELD SENSORS NEXT TO ALL TEMPERATURE AND PRESSURE CONTROL POINTS.
- E. CONTROLS CONTRACTOR SHALL COORDINATE WITH THE IU CONTROL INTEGRATOR.
- F. ALL IN-SPACE TEMPERATURE, HUMIDITY, AND CO2 SENSORS SHALL BE BLIND SENSORS WITH ONLY THE ABILITY TO INDUCE AN OCCUPANCY OVERRIDE WITH A BUTTON UNLESS OTHERWISE REQUESTED BY IU. ,^^^^^^^^^^
- SECTION. WHERE AIRFLOW MONITORING IS INDICATED ON FANS, PIEZIOMETER RING SHALL BE SUPPLIED AT EACH INLET

CONE BY MANUFACTURER.

G. LOCAL MAGNEHELIC GAUGE SUPPLIED AT EACH FILTER



POINTS TABLE CHWPS						
POINT DISCRIPTION		POINT TYPE	HARDWIRED (H) OR NETWORKED (N)?	EXPECTED RANGE		
CHW	SUPPLY TEMPERATURE	Al	N	0-100%		
CHW	RETURN TEMPERATURE	Al	N	0-100%		
CHW DECOUPLER VALVE	POSITION	AO	N	0-100%		
CHWP-00-01	START/STOP	ВО	N	-		
CHWP-00-01	SPEED COMMAND	AO	N	0-100%		
CHWP-00-01	STATUS	BI	N	0-100%		
CHWP-00-02	START/STOP	ВО	N	-		
CHWP-00-02	SPEED COMMAND	AO	N	0-100%		
CHWP-00-02	STATUS	BI	N	0-100%		
CHWP-00-03	START/STOP	ВО	N	-		
CHWP-00-03	SPEED COMMAND	AO	N	0-100%		
CHWP-00-03	STATUS	BI	N	0-100%		
CHWP-00-04	START/STOP	ВО	N	-		
CHWP-00-04	SPEED COMMAND	AO	N	0-100%		
CHWP-00-04	STATUS	BI	N	0-100%		
CHWR	TEMPERATURE	Al	Н	35-65°F		
CHWR ISOLATION VALVE	POSITION	AO	N	0-100%		
CHWS	TEMPERATURE	Al	Н	35-65°F		
CHWS	DIFFERENTIAL PRESSURE	Al	Н	0-40 psi		
CHWS	INLET PRESSURE	Al	Н	0-200 psi		

SEQUENCE OF OPERATIONS – CHW SYSTEM

- GENERAL: A. THE BUILDING CHILLED WATER SYSTEM INCLUDES FOUR VARIABLE SPEED PRIMARY PUMPS (CHWP-00-01, CHWP-00-02, CHWP-00-03, CHWP-00-04). CHILLED WATER IS SUPPLIED BY LOCAL THERMAL UTILITY
- (CITEZEN'S ENERGY GROUP).
- 2. CONTROLS ARCHITECTURE: A. CONTROL POINTS SHALL BE CONTROLLED BY THE CENTRAL BAS VIA BACNET COMMUNICATION PROTOCOL. ALL CONTROL POINTS, WHETHER EXPLICITLY LISTED OR NOT, SHALL BE VISIBLE AND
- ↑ CONTROLLABLE VIA THE BAS.
 1 PRIMARY OPERATION
- a. THE CHW SYSTEM SHALL UTILIZE THE PRESSURE AVAILABLE BY THE UTILITY PROVIDER AS A PRIMARY MEANS OF SATISFYING THE PRESSURE AND FLOW REQUIREMENTS OF THE FACILITY AND MAINTAIN MINIMUM CHILLED WATER RETURN TEMPERATURE. IF MINIMUM CHW RETURN TEMPERATURE CANNOT BE MAINTAINED, THE DECOUPLER TIE-IN VALVE WILL BE UTILIZED TO MAINTAIN MINIMUM CHW RETURN TEMPERATURE. . SECONDARY OPERATION a. IN THE EVENT ANY CHW VALVE POSITION IS 100% ON ANY AHU AND THE ASSOCIATED COOLING COIL DISCHARGE AIR TEMP IS ABOVE SETPOINT OR ANY AHU IS IN DEHUMIDIFICATION MODE FOR MORE
- THAN 15 MINUTES (ADJ), THE CHW PUMPS SHALL BE ENGAGED. VERIFY PUMPS ARE RUNNING BY WAY OF PUMP STATUS. b. THIS OPERATION MODE SHALL CONTINUE UNTIL ALL COOLING CONTROL VALVE POSITIONS ARE BELOW 90% (ADJ) FOR MORE THAN 60 MINUTES (ADJ). WHEN THIS IS SATISFIED, THE PUMPS SHALL SHUTDOWN AND THEIR RELEVANT ISOLATION VALVES SHALL CLOSE. IF THE MAIN BUILDING RETURN TEMPERATURE, DROPS BELOW 53 F ENABLE THE TEMPERATURE RETURN CONTROL SEQUENCE.
- a. IN THE EVENT THAT ALL CHW VALVE POSITIONS ARE CLOSED FOR 30 MINUTES (ADJ), THE MAIN CHW SERVICE ISOLATION VALVES SHALL CLOSE. a. MODULATE MAIN BUILDING RETURN VALVE TO MAINTAIN A MINIMUM RETURN TEMPERATURE OF 53 F. PROVIDE METHOD OF MONITORING INDIVIDUAL COIL RETURN TEMPERATURES TO FACILITATE THE AVOIDANCE OF TEMPERATURE RETURN CONTROL. DISPLAY OF MINIMUM COIL RETURN TEMPERATURE ON GRAPHIC OR POINT NAME OF TEMPERATURE UNDER THE 53 F THRESHOLD WOULD SUFFICE.
- PUMP CONTROL A. PUMP START COMMAND: a. OPERATIONALLY RELEVANT VALVE ACTUATORS ARE POWERED.
- b. CHWPS START AFTER A 15 SEC (ADJ.) DELAY WHEN THE ASSOCIATED VALVES ARE PROVEN OPEN. c. PUMP STATUS PROVES ON.
- B. PUMP STOP COMMAND (OR DE-ENERGIZED): a. PUMPS DE-ENERGIZED.
- b. OPERATIONAL VALVES ARE CLOSED AND VALVE ACTUATOR IS SPRING RETURN CLOSE. 4. PUMP CONTROL (LEAD/LAG1/LAG2/STANDBY EACH PUMP SIZED AT 33%)
- A. ONCE ENABLED THE PUMP SPEED SHALL BE MODULATED TO MAINTAIN THE DIFFERENTIAL SETPOINT. SOFTWARE LEAD/LAG1/LAG2/STANDBY FUNCTION SHALL ALLOW ANY OF THE CHILLED WATER PUMPS TO ACT AS THE LEAD PUMP, SHOULD THE LEAD PUMP FAIL TO START, AS SENSED BY THE PUMPS C/T SWITCH, AN ALARM SHALL BE SENT TO THE OPERATORS WORKSTATION AND THE BAS SHALL START THE LAG PUMP. THE OBJECTIVE IS TO ALWAYS HAVE ONE COOLING COIL CONTROL VALVE 80% OPEN SO THE PUMPS OPERATE AT THE LOWEST SPEED AND PRESSURE POSSIBLE TO SATISFY THE CURRENT LOAD. CONTINUOUSLY MONITOR THE COOLING VALVE POSITIONS. WHEN THE MOST OPEN VALVE IS MORE THAT 80% OPEN FOR 10 MIN (ADJ), THE DIFFERENTIAL PRESSURE SETPOINT SHALL BE RESET UP BY 0.5 PSID (ADJ). WHEN ALL VALVES ARE 60% (ADJ) OR BELOW FOR 10 MIN (ADJ), THE DIFFERENTIAL SETPOINT SHALL BE RESET DOWN BY 0.25 PSID. CONTINUE TO RESET DIFFERENTIAL
- SETPOINT DOWN 0.25 PSID AT 10 MINUTE INTERVALS (ADJ) UNTIL ONE COOLING COIL CONTROL VALVE IS 75% (ADJ) OPEN. B. THE REMOTE DP SETPOINT SHALL BE MAINTAINED BETWEEN MAXIMUM AND MINIMUM PRESSURE. THE MAXIMUM PRESSURE LIMIT IS THE PRESSURE REQUIRED TO PROVIDE FULL FLOW TO ALL COOLING CONTROL VALVES SIMULTANEOUSLY (FINALIZED DURING THE INITIAL PROJECT TAB EFFORTS). THE MINIMUM PRESSURE LIMIT IS THE PRESSURE CORRELATING TO THE LOWEST SPEED THE PUMP MOTOR IS ALLOWED TO BE OPERATED (PER MOTOR MANUF. AND TAB). THE VFD INTERNAL SETTING WILL ALLOW THE VFD TO RUN THE PUMPS TO THEIR MINIMUMS.
- C. WHEN MULTIPLE REMOTE DIFFÈRENTIAL PRESSURE SENSORS ARE IN USE, CONTROL TO THE SENSOR WITH THE HIGHEST DIFFERENTIAL PRESSURE SETPOINT. D. PUMP STAGING: WITH ONE PUMP RUNNING, WHEN THE PUMP COMMAND REACHES 100% AND THE DIFFERENTIAL PRESSURE DROPS MORE THAN 2 PSI BELOW THE SETPOINT FOR 10 MINUTES (ALL ADJ), START THE LAG PUMP. BOTH PUMPS SHALL CONVERGE AND RUN IN PARALLEL TO MAINTAIN THE DIFFERENTIAL PRESSURE SETPOINT AND THE REMOTE DP SETPOINTS. WHEN THE PUMPS DROP TO THEIR MINIMUM OPERATING SPEED FOR 10 MINUTES (ADJ), THE LAG PUMP SHUTS OFF AND THE LEAD PUMP RESUMES CONTROL. THE SAME LOGIC SHALL APPLY TO THE SECOND LAG PUMP.
- E. THE BAS SHALL ALTERNATE THE DESIGNATION OF THE LEAD/LAG1/LAG2/STANDBY PUMP TO MAINTAIN THE OPERATING TIME OF EACH PUMP TO BE WITHIN 200 HOURS OF EACH OTHER. 5. PUMP OPERATION AND PROTECTION:
- A. THE PUMP SPEEDS WILL NOT DROP BELOW 20HZ (ADJ) AND SHALL NOT EXCEED 60 HZ.
- B. THE DIFFERENTIAL PRESSURE SETPOINT SHALL BE ESTABLISHED DURING THE SYSTEM TESTING AND BALANCING. C. MECHANICAL HIGH STATIC PROTECTION CUTOFFS SHALL BE INSTALLED TO PROTECT THE SYSTEM AND EQUIPMENT FROM PRESSURIZATION-RELATED DAMAGE.
- D. THE PUMPS ARE SIZED FOR N-1 OPERATION. IN THE EVENT OF A PUMP FAILURE, THE REMAINING PUMP(S) WILL ADJUST TO COMPENSATE FOR THE MISSING PUMP. 6. ALARMS INDICATION: THE CONTROLLER WILL DISPLAY ALARMS AND HAVE ONE DIGITAL OUTPUT FOR REMOTE INDICATION OF AN ALARM CONDITION. POSSIBLE ALARMS INCLUDE: A. BUILDING MANAGEMENT SYSTEM:
- a. THE CONTROLLER WILL SEND ALL ALARMS TO THE BAS.
- B. TEMPERATURE SENSOR ALARM: a. THE CONTROLLER SENDS AN ALARM IN THE CASE OF A FAILED AIR TEMPERATURE SENSOR.
- C. PRESSURE SENSOR ALARM:
- a. THE CONTROLLER SENDS AN ALARM IN THE CASE OF A FAILED PRESSURE SENSOR. D. PUMP FAILURE:
- a. BAS SHALL PROVE FAN ARRAY OPERATION AND USE THE STATUS INDICATION TO ACCUMULATE RUNTIME. UPON FAILURE OF ANY OF THE PUMPS, THE BAS SHALL ALARM THAT PUMP FAILURE CONDITION.
- E. HIGH OR LOW PRESSURE SAFETY: a. UPON ACTIVATION OF A HIGH OR LOW PRESSURE SAFETY SWITCH, AH SHALL BE DEENERGIZED, PUMPS SHALL BE DEENERGIZED VIA A HARD WIRED INTERLOCK, AND AN INDICATION OF THE OPERATION SHALL BE SENSED BY THE BAS. BAS SHALL ANNUNCIATE APPROPRIATE ALARM AND REMOVE AND LOCK OUT THE START COMMAND.
- 7. ACCESSORIES: PROVIDE THE FOLLOWING. A. BAS INTERFACING:
- a. A BAS PORT OR SERIAL CARD IS PROVIDED WITH THE CONTROLLER FOR FIELD INTERFACING WITH A BUILDING AUTOMATION SYSTEM.
- b. UPDATE DEFAULT SETTINGS TO THE APPROPRIATE ADDRESSES TO MATCH THE BAS SETTINGS. B. DDC REMOTE INTERFACE:
- a. FACTORY PROVIDED. FIELD MOUNTED INTERFACE PANEL THAT WILL BE WIRED TO THE MAIN CONTROLLER FOR MONITORING AND REMOTE ADJUSTMENTS OF SET POINTS. C. PHASE AND BROWNOUT PROTECTION
- a. FACTORY MOUNTED AND WIRED COMPONENT WHICH MONITORS THE MAIN POWER COMING INTO THE UNIT. b. IF A PHASE DROPS OUT, OR IF THE INCOMING VOLTAGE EXCEEDS THE ACCEPTABLE RANGE, THE COMPONENT WILL TURN OFF THE UNIT TO HELP PROTECT THE ELECTRICAL SYSTEMS.
- 8. MINIMUM REQUIREMENTS FOR OPERATOR WORKSTATION DISPLAY
- A. CHW SYSTEM FLOW B. ALL DATA FROM BTU METER C. MAJOR VALVE STATUS
- D. PUMP ON-OFF STATUS E. PUMP SPEED
- F. PUMP ASSIGNMENT (LEAD/LAG1/LAG2/STANDBY) G. ALL TEMPERATURE SENSORS
- H. ALL DIFFERENTIAL PRESSURE SENSORS I. OPERATIONAL STATUS OF EACH CHW USER
- J. ALARMS

POINT	DISCRIPTION	POINT TYPE	HARDWIRED (H) OR NETWORKED (N)?	EXPECTED RANGE
CHW	SUPPLY TEMPERATURE	Al	N	0-100%
CHW	RETURN TEMPERATURE	Al	N	0-100%
CHW DECOUPLER VALVE	POSITION	AO	N	0-100%
CHWP-00-01	START/STOP	ВО	N	-
CHWP-00-01	SPEED COMMAND	AO	N	0-100%
CHWP-00-01	STATUS	BI	N	0-100%
CHWP-00-02	START/STOP	ВО	N	-
CHWP-00-02	SPEED COMMAND	AO	N	0-100%
CHWP-00-02	STATUS	BI	N	0-100%
CHWP-00-03	START/STOP	ВО	N	-
CHWP-00-03	SPEED COMMAND	AO	N	0-100%
CHWP-00-03	STATUS	BI	N	0-100%
CHWP-00-04	START/STOP	ВО	N	-
CHWP-00-04	SPEED COMMAND	AO	N	0-100%
CHWP-00-04	STATUS	BI	N	0-100%
CHWR	TEMPERATURE	Al	Н	35-65°F
CHWR ISOLATION VALVE	POSITION	AO	N	0-100%
CHWS	TEMPERATURE	Al	Н	35-65°F
CHWS	DIFFERENTIAL PRESSURE	Al	Н	0-40 psi
CHWS	INLET PRESSURE	Al	Н	0-200 psi

95% CONSTRUCTION DOCUMENTS

SHEET ISSUE

IN128 - JAMES T

MORRIS ARENA

Ohio St & N Blackford St

Indianapolis, IN 46202

INDIANA UNIVERSITY BOARD OF TRUSTEE

IU Project NO. 20240127

BLOOMINGTON, IN 47408

INDIANAPOLIS, IN 46204

3535 EAST 96TH STREET

INDIANAPOLIS, IN 46240

Mechanical / Electrical

8250 HAVERSTICK ROAD

INDIANAPOLIS, IN 46240

Structural Engineer

812-855-1692

317-633-4040

SUITE 126

INTROBA

SUITE 285

800-404-7677

317-633-4120

WJHW

SUITE 216

972-934-3700

Civil Engineer

SUITE 200

317-547-5580

CINILITTLE

954-846-9600

816-806-3729

FORZA

Code Consultant

9025 RIVER ROAD

INDIANAPOLIS, IN 46240

Food Service Consultant

3405 NW 9TH AVENUE #1202

HARRISONVILLE, MO 64701

FORT LAUDERDALE, FL 33309

2502 WEST MECHANIC ST, SUITE C

Plumbing Engineer

138 N. DELAWARE ST

INDIANAPOLIS, IN 46204

7220 W. JEFFERSON AVE

LAKEWOOD, CO 80235

Acoustics / Technology Engineer

AMERICAN STRUCTUREPOINT, INC.

317-872-8400

Architect

RATIO

2901 EAST DISCOVERY PARKWAY

101 SOUTH PENNSYLVANIA STREET

FINK ROBERTS AND PETRIE, INC.

CONSTRUCTION DOCUMENTS 01/13/25 01/27/25 **ADDENDUM 01**

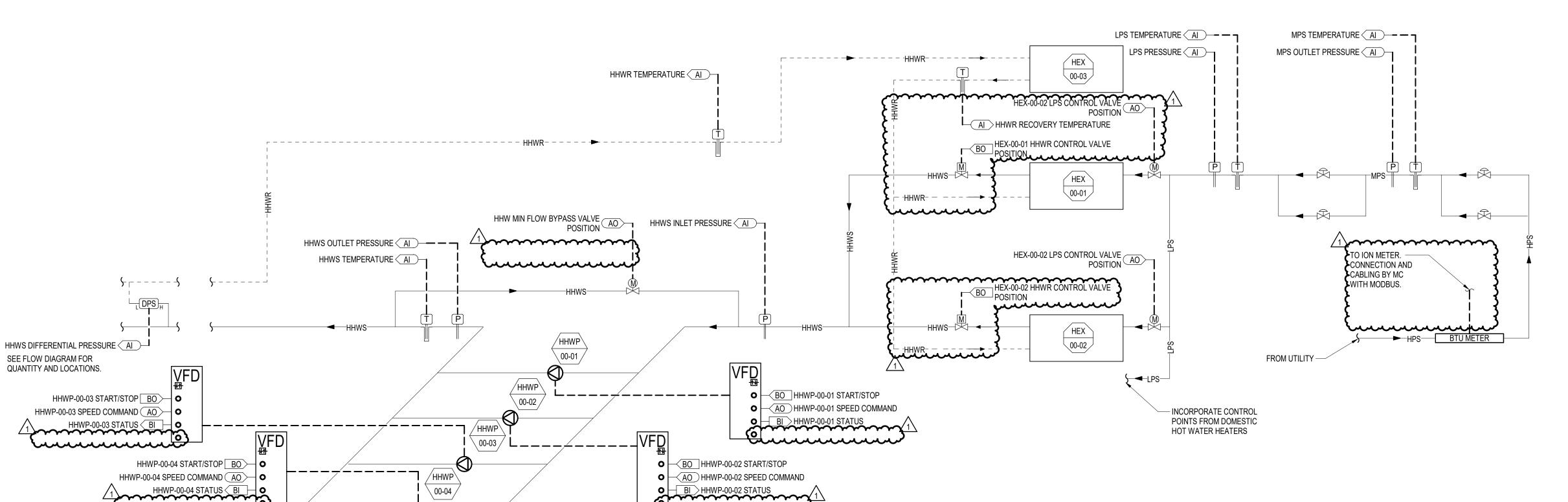
PROJECT NO.

MECHANICAL CONTROLS - CHW PUMPS

M-710

AND ENGINEERING DRAWING IS GIVEN IN CONFIDENCE AND SHALL BE USED ONLY

NO OTHER USE, DISSEMINATION OR WRITTEN CONSENT OF RATIO. ALL COMM



	POINTS TABLE	STEAM &	HHW	
POINT DISCRIPTION		POINT TYPE	HARDWIRED (H) OR NETWORKED (N)?	EXPECTED RANGE
HEX-00-01 HHWR CONTROL VALVE	POSITION	ВО	N	YES/NO
HEX-00-02 HHWR CONTROL VALVE	POSITION	ВО	N	YES/NO
HEX-00-02 LPS CONTROL VALVE	POSITION	AO	N	0-100%
HEX-00-02 LPS CONTROL VALVE	POSITION	AO	N	0-100%
HHW MIN FLOW BYPASS VALVE	POSITION	AO	N	0-100%
HHWP-00-01	START/STOP	ВО	N	-
HHWP-00-01	SPEED COMMAND	AO	N	0-100%
HHWP-00-01	STATUS	BI	N	0-100%
HHWP-00-02	START/STOP	ВО	N	-
HHWP-00-02	SPEED COMMAND	AO	N	0-100%
HHWP-00-02	STATUS	BI	N	0-100%
HHWP-00-03	START/STOP	ВО	N	-
HHWP-00-03	SPEED COMMAND	AO	N	0-100%
HHWP-00-03	STATUS	BI	N	0-100%
HHWP-00-04	START/STOP	ВО	N	-
HHWP-00-04	SPEED COMMAND	AO	N	0-100%
HHWP-00-04	STATUS	BI	N	0-100%
HHWR	TEMPERATURE	Al	Н	35-65°F
HHWR RECOVERY	TEMPERATURE	Al	Н	35-65°F
HHWS	TEMPERATURE	Al	Н	35-65°F
HHWS	OUTLET PRESSURE	Al	Н	0-200 psi
HHWS	DIFFERENTIAL PRESSURE	Al	Н	0-40 psi
HHWS	INLET PRESSURE	Al	Н	0-200 psi
LPS	PRESSURE	Al	Н	0-200 psi
LPS	TEMPERATURE	Al	Н	35-65°F
MPS	OUTLET PRESSURE	Al	Н	0-200 psi
MPS	TEMPERATURE	Al	Н	35-65°F

SEQUENCE OF OPERATIONS - STEAM & HHW SYSTEM

- A. THE BUILDING HEATING HOT WATER SYSTEM INCLUDES FOUR VARIABLE SPEED PRIMARY PUMPS (HHWP-00-01, HHWP-00-02, HHWP-00-03, HHWP-00-04), THE HOT WATER IS PROVIDED BY A SYSTEM OF STEAM TO HHW HEAT EXCHANGERS (HEX). THE STEAM CONDENSATE IS RUN THROUGH A THIRD HHW PREHEATING HEAT EXCHANGER, PIPED TO A CONDENSATE COOLER, AND IS DISPOSED OF THROUGH THE SANITARY WASTE SYSTEM.
- 2. CONTROLS ARCHITECTURE: A. CONTROL POINTS SHALL BE CONTROLLED BY THE CENTRAL BAS VIA BACNET COMMUNICATION PROTOCOL. ALL CONTROL POINTS, WHETHER EXPLICITLY LISTED OR NOT, SHALL BE VISIBLE AND

CONTROLLABLE VIA THE BAS. PUMP CONTROL

- A. PUMP START COMMAND a. OPERATIONALLY RELEVANT VALVE ACTUATORS ARE POWERED. b. HHWPS START AFTER A 15 SEC (ADJ.) DELAY WHEN THE ASSOCIATED VALVES ARE PROVEN OPEN.
- c. PUMP STATUS PROVES ON.
- B. PUMP STOP COMMAND (OR DE-ENERGIZED): a. PUMPS DE-ENERGIZED.
- b. OPERATIONAL VALVES ARE CLOSED AND VALVE ACTUATOR IS SPRING RETURN CLOSE. 4. PUMP CONTROL (LEAD/LAG1/LAG2/STANDBY EACH PUMP SIZED AT 33%)
- A. ONCE ENABLED THE PUMP SPEED SHALL BE MODULATED TO MAINTAIN THE DIFFERENTIAL SETPOINT. SOFTWARE LEAD/LAG1/LAG2/STANDBY FUNCTION SHALL ALLOW ANY OF THE HHW PUMPS TO ACT AS THE LEAD PUMP, SHOULD THE LEAD PUMP FAIL TO START, AS SENSED BY THE PUMPS C/T SWITCH, AN ALARM SHALL BE SENT TO THE OPERATORS WORKSTATION AND THE BAS SHALL START THE LAG PUMP. THE OBJECTIVE IS TO ALWAYS HAVE ONE HEATING COIL CONTROL VALVE 80% OPEN SO THE PUMPS OPERATE AT THE LOWEST SPEED AND PRESSURE POSSIBLE TO SATISFY THE CURRENT LOAD. CONTINUOUSLY MONITOR THE HEATING VALVE POSITIONS. WHEN THE MOST OPEN VALVE IS MORE THAT 80% OPEN FOR 10 MIN (ADJ), THE DIFFERENTIAL PRESSURE SETPOINT SHALL BE RESET UP BY 0.5 PSID (ADJ). WHEN ALL VALVES ARE 60% (ADJ) OR BELOW FOR 10 MIN (ADJ), THE DIFFERENTIAL SETPOINT SHALL BE RESET DOWN BY 0.25 PSID. CONTINUE TO RESET DIFFERENTIAL SETPOINT DOWN 0.25
- PSID AT 10 MINUTE INTERVALS (ADJ) UNTIL ONE HEATING COIL CONTROL VALVE IS 75% (ADJ) OPEN. B. THE REMOTE DP SETPOINT SHALL BE MAINTAINED BETWEEN MAXIMUM AND MINIMUM PRESSURE. THE MAXIMUM PRESSURE LIMIT IS THE PRESSURE REQUIRED TO PROVIDE FULL FLOW TO ALL HEATING CONTROL VALVES SIMULTANEOUSLY (FINALIZED DURING THE INITIAL PROJECT TAB EFFORTS). THE MINIMUM PRESSURE LIMIT IS THE PRESSURE CORRELATING TO THE LOWEST SPEED THE PUMP MOTOR
- IS ALLOWED TO BE OPERATED (PER MOTOR MANUF. AND TAB). THE VFD INTERNAL SETTING WILL ALLOW THE VFD TO RUN THE PUMPS TO THEIR MINIMUMS. C. WHEN MULTIPLE REMOTE DIFFERENTIAL PRESSURE SENSORS ARE IN USE. CONTROL TO THE SENSOR WITH THE HIGHEST DIFFERENTIAL PRESSURE SETPOINT.
- D. PUMP STAGING: WITH ONE PUMP RUNNING, WHEN THE PUMP COMMAND REACHES 100% AND THE DIFFERENTIAL PRESSURE DROPS MORE THAN 2 PSI BELOW THE SETPOINT FOR 10 MINUTES (ALL ADJ), START THE LAG PUMP. BOTH PUMPS SHALL CONVERGE AND RUN IN PARALLEL TO MAINTAIN THE DIFFERENTIAL PRESSURE SETPOINT AND THE REMOTE DP SETPOINTS. WHEN THE PUMPS DROP TO THEIR MINIMUM OPERATING SPEED FOR 10 MINUTES (ADJ), THE LAG PUMP SHUTS OFF AND THE LEAD PUMP RESUMES CONTROL. THE SAME LOGIC SHALL APPLY TO THE SECOND LAG PUMP.
- E. IF THE FOLLOWING CONDITIONS ARE MET, THE MINIMUM FLOW BYPASS VALVE SHALL MODULATE TO MAINTAIN MINIMUM PUMP FLOW: a. THE DIFFERENTIAL PRESSURE SETPOINT IS SATISFIED BY A SINGLE PUMP b. THAT PUMP REACHES THE MINIMUM FLOW CONDITION
- c. ANY HEATING VALVE IN THE SYSTEM IS OPEN AND IS UNABLE TO SATISFY IT'S OPERATING CONDITIONS FOR MORE THAN 15 MINUTES (ADJ.). F. THE BAS SHALL ALTERNATE THE DESIGNATION OF THE LEAD/LAG1/LAG2/STANDBY PUMP TO MAINTAIN THE OPERATING TIME OF EACH PUMP TO BE WITHIN 200 HOURS OF EACH OTHER.
- PUMP OPERATION AND PROTECTION: A. THE PUMP SPEEDS WILL NOT DROP BELOW 20HZ (ADJ) AND SHALL NOT EXCEED 60 HZ.
- B. THE DIFFERENTIAL PRESSURE SETPOINT SHALL BE ESTABLISHED DURING THE SYSTEM TESTING AND BALANCING. C. MECHANICAL HIGH STATIC PROTECTION CUTOFFS SHALL BE INSTALLED TO PROTECT THE SYSTEM AND EQUIPMENT FROM PRESSURIZATION-RELATED DAMAGE.
- D. THE PUMPS ARE SIZED FOR N-1 OPERATION. IN THE EVENT OF A PUMP FAILURE, THE REMAINING PUMP(S) WILL ADJUST TO COMPENSATE FOR THE MISSING PUMP. 6. HEX STEAM CONTROL VALVES
- A. EACH HEX IS SIZED FOR THE FULL LOAD REQUIRED BY THE HHW SYSTEM AND ARE FULLY REDUNDANT. B. UPON A CALL FOR HEAT THE BMS SHALL OPEN THE LEAD HEAT EXCHANGER WATER ISOLATION VALVE AND MODULATE THE STEAM CONTROL VALVES AT THE LEAD HEAT EXCHANGER TO MAINTAIN THE
- HHW SUPPLY TEMPERATURE SETPOINT PER THE RESET SCHEDULE BELOW. THE ASSOCIATED HEX HHW CONTROL VALVE SHALL OPEN AS WELL. THE STEAM CONTROL VALVE FOR THE LEAD HEAT EXCHANGER SHALL BE MODULATED BASED ON DEMAND.
- C. IN THE EVENT THE LEAD HEAT EXCHANGER BE UNABLE TO SATISFY THE SUPPLY WATER TEMPERATURE SETPOINT WITH THE STEAM VALVE FULLY OPEN, THE BMS SHALL AUTOMATICALLY ACTIVATE THE LAG HEAT EXCHANGER, ACCORDING TO THE SAME SEQUENCE ABOVE. PROVIDE A MINIMUM TIME DELAY OF 30 MINUTES (ADJ.) BEFORE STARTING AND STOPPING THE LAG HEAT EXCHANGER TO PREVENT
- D. THE BMS SHALL ALTERNATE THE LEAD AND LAG HEAT EXCHANGER DESIGNATIONS TO MAINTAIN THE OPERATING TIME OF EACH HEAT EXCHANGER TO BE WITHIN 200 HOURS OF EACH OTHER. E. THE HOT WATER SUPPLY TEMPERATURE SET-POINT SHALL BE RESET PROPORTIONALLY BETWEEN THE MINIMUM AND MAXIMUM SET-POINT BASED ON OUTDOOR AIR TEMPERATURE USING THE
- FOLLOWING RANGE: a. MINIMUM SAT = 130°F @ OAT = 60°F
- b. MAXIMUM SAT = 150°F @ OAT = 20°F 7. ALARMS INDICATION: THE CONTROLLER WILL DISPLAY ALARMS AND HAVE ONE DIGITAL OUTPUT FOR REMOTE INDICATION OF AN ALARM CONDITION. POSSIBLE ALARMS INCLUDE:
- A. BUILDING MANAGEMENT SYSTEM: a. THE CONTROLLER WILL SEND ALL ALARMS TO THE BAS.
- B. TEMPERATURE SENSOR ALARM: a. THE CONTROLLER SENDS AN ALARM IN THE CASE OF A FAILED AIR TEMPERATURE SENSOR.
- C. PRESSURE SENSOR ALARM: a. THE CONTROLLER SENDS AN ALARM IN THE CASE OF A FAILED PRESSURE SENSOR.
- D. PUMP FAILURE: a. BAS SHALL PROVE FAN ARRAY OPERATION AND USE THE STATUS INDICATION TO ACCUMULATE RUNTIME. UPON FAILURE OF ANY OF THE PUMPS, THE BAS SHALL ALARM THAT PUMP FAILURE CONDITION.
- E. HIGH OR LOW PRESSURE SAFETY: a. UPON ACTIVATION OF A HIGH OR LOW PRESSURE SAFETY SWITCH, AH SHALL BE DEENERGIZED, PUMPS SHALL BE DEENERGIZED VIA A HARD WIRED INTERLOCK, AND AN INDICATION OF THE OPERATION SHALL BE SENSED BY THE BAS. BAS SHALL ANNUNCIATE APPROPRIATE ALARM AND REMOVE AND LOCK OUT THE START COMMAND. 8. ACCESSORIES: PROVIDE THE FOLLOWING.
- A. BAS INTERFACING: a. A BAS PORT OR SERIAL CARD IS PROVIDED WITH THE CONTROLLER FOR FIELD INTERFACING WITH A BUILDING AUTOMATION SYSTEM.
- b. UPDATE DEFAULT SETTINGS TO THE APPROPRIATE ADDRESSES TO MATCH THE BAS SETTINGS.
- a. FACTORY PROVIDED, FIELD MOUNTED INTERFACE PANEL THAT WILL BE WIRED TO THE MAIN CONTROLLER FOR MONITORING AND REMOTE ADJUSTMENTS OF SET POINTS. C. PHASE AND BROWNOUT PROTECTION
- a. FACTORY MOUNTED AND WIRED COMPONENT WHICH MONITORS THE MAIN POWER COMING INTO THE UNIT. b. IF A PHASE DROPS OUT, OR IF THE INCOMING VOLTAGE EXCEEDS THE ACCEPTABLE RANGE, THE COMPONENT WILL TURN OFF THE UNIT TO HELP PROTECT THE ELECTRICAL SYSTEMS.
- MINIMUM REQUIREMENTS FOR OPERATOR WORKSTATION DISPLAY A. HHW SYSTEM FLOW
- B. ALL DATA FROM BTU METER C. MAJOR VALVE STATUS
-). PUMP ON-OFF STATUS E. PUMP SPEED
- F. PUMP ASSIGNMENT (LEAD/LAG1/LAG2/STANDBY) G. ALL TEMPERATURE SENSORS
- H. ALL DIFFERENTIAL PRESSURE SENSORS I. OPERATIONAL STATUS OF EACH HHW USER
- J. ALARMS

GENERAL CONTROLS NOTES:

- A. TEMPERATURE SENSORS, HUMIDISTATS, AND THERMOSTATS SHALL NOT BE INSTALLED ON EXTERIOR WALLS OR COLUMNS, OR WHERE EXPOSED TO SOLAR RADIATION. WHERE THERE ARE NO OTHER OPTIONS, A SOLAR BLOCKING ENCLOSURE AND INSULATED BACKPLATE TO ELIMINATE TEMPERATURE INFLUENCE FROM DIRECT SOLAR EXPOSURE SHALL BE PROVIDED.
- B. VAVS ARE POWERED BY CONTROL VOLTAGE. CONTRACTOR IS RESPONSIBLE FOR COORDINATING ROUTING, GROUPING, AND POWER FOR THE LOW-VOLTAGE VAV UNITS.
- C. ALL NECESSARY CONTROL POINTS SHALL BE PROVIDED TO ACHIEVE THE WRITTEN SEQUENCES OF OPERATION WHETHER OR NOT THEY ARE EXPLICITLY NAMED.
- D. PROVIDE ANALOGUE FIELD SENSORS NEXT TO ALL
- TEMPERATURE AND PRESSURE CONTROL POINTS. E. CONTROLS CONTRACTOR SHALL COORDINATE WITH THE

IU CONTROL INTEGRATOR.

- F. ALL IN-SPACE TEMPERATURE, HUMIDITY, AND CO2 SENSORS SHALL BE BLIND SENSORS WITH ONLY THE ABILITY TO INDUCE AN OCCUPANCY OVERRIDE WITH A BUTTON UNLESS OTHERWISE REQUESTED BY IU.
- *,* G. LOCAL MAGNEHELIC GAUGE SUPPLIED AT EACH FILTE
- . WHERE AIRFLOW MONITORING IS INDICATED ON FANS, PIEZIOMETER RING SHALL BE SUPPLIED AT EACH INLET CONE BY MANUFACTURER.

mmmmmmm

IN128 - JAMES T **MORRIS ARENA**

Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEE 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408

812-855-1692 Architect RATIO

101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204 317-633-4040

Structural Engineer FINK ROBERTS AND PETRIE, INC. 3535 EAST 96TH STREET

SUITE 126 INDIANAPOLIS, IN 46240 317-872-8400

Mechanical / Electrical INTROBA 8250 HAVERSTICK ROAD

INDIANAPOLIS, IN 46240 800-404-7677 **Plumbing Engineer**

138 N. DELAWARE ST INDIANAPOLIS, IN 46204

SUITE 285

317-633-4120

Acoustics / Technology Engineer WJHW

7220 W. JEFFERSON AVE SUITE 216 LAKEWOOD, CO 80235 972-934-3700

Civil Engineer AMERICAN STRUCTUREPOINT, INC.

9025 RIVER ROAD

SUITE 200 INDIANAPOLIS, IN 46240 317-547-5580

Food Service Consultant CINILITTLE

3405 NW 9TH AVENUE #1202 FORT LAUDERDALE, FL 33309 954-846-9600

Code Consultant

FORZA 2502 WEST MECHANIC ST, SUITE C HARRISONVILLE, MO 64701 816-806-3729



2	CONSTRUCTION DOCUMENTS	01/13/25
3	ADDENDUM 01	01/27/25

95% CONSTRUCTION DOCUMENTS



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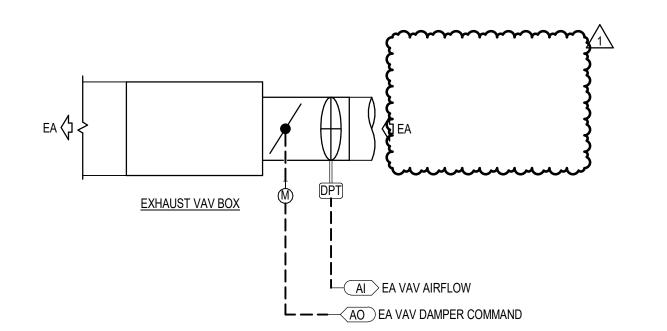
PROJECT NO.

MECHANICAL CONTROLS - HHW AND STEAM PLANT

SHEET NUMBER

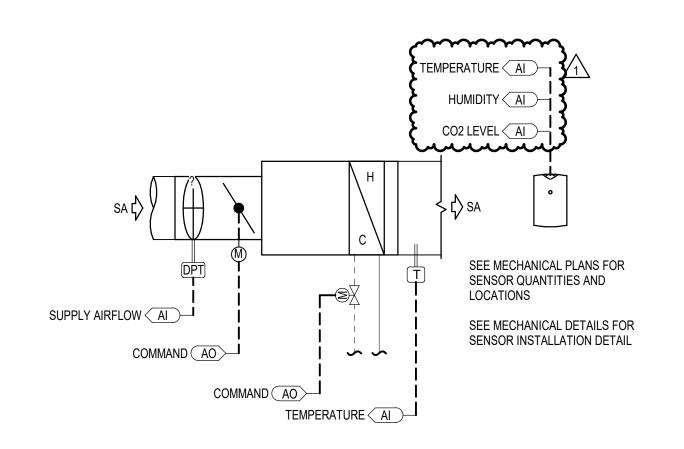
- A. TEMPERATURE SENSORS, HUMIDISTATS, AND THERMOSTATS SHALL NOT BE INSTALLED ON EXTERIOR WALLS OR COLUMNS, OR WHERE EXPOSED TO SOLAR RADIATION. WHERE THERE ARE NO OTHER OPTIONS, A SOLAR BLOCKING ENCLOSURE AND INSULATED BACKPLATE TO ELIMINATE TEMPERATURE INFLUENCE FROM DIRECT SOLAR EXPOSURE SHALL BE PROVIDED
- B. VAVS ARE POWERED BY CONTROL VOLTAGE. CONTRACTOR IS RESPONSIBLE FOR COORDINATING ROUTING, GROUPING, AND POWER FOR THE LOW-VOLTAGE VAV UNITS.
- C. ALL NECESSARY CONTROL POINTS SHALL BE PROVIDED TO ACHIEVE THE WRITTEN SEQUENCES OF OPERATION WHETHER OR NOT THEY ARE EXPLICITLY NAMED.
- D. PROVIDE ANALOGUE FIELD SENSORS NEXT TO ALL TEMPERATURE AND PRESSURE CONTROL POINTS.
- E. CONTROLS CONTRACTOR SHALL COORDINATE WITH THE IU CONTROL INTEGRATOR.
- F. ALL IN-SPACE TEMPERATURE, HUMIDITY, AND CO2 SENSORS SHALL BE BLIND SENSORS WITH ONLY THE ABILITY TO INDUCE AN OCCUPANCY OVERRIDE WITH A BUTTON UNLESS OTHERWISE REQUESTED BY IU.
- ᠬᠬᠬᠬᠬᠬᠬᠬᠬᠬᠬᠬᠬᠬᠬᠬᠬ LOCAL MAGNEHELIC GAUGE SUPPLIED AT EACH FILTÉF
- WHERE AIRFLOW MONITORING IS INDICATED ON FANS, PIEZIOMETER RING SHALL BE SUPPLIED AT EACH INLET CONE BY MANUFACTURER.

POINTS TABLE CAV EXHAUST CONTROL						
	POINT DESCRIPTION		HARDWIRED (H) OR			
		POINT TYPE	NETWORKED (N)?	EXPECTED RANGE		
EA VAV	AIRFLOW	Al	Н	VARIES BY BOX SIZE		
EA VAV	DAMPER COMMAND	AO		0-100%		

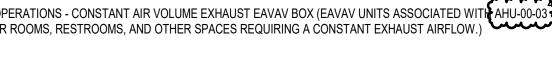


EAVAV BOX - CONSTANT VOLUME CONTROL DIAGRAM

POINTS TABLE CAV SUPPLY, REHEAT									
POINT DESCRIPTION	POINT TYPE	HARDWIRED (H) OR NETWORKED (N)?	EXPECTED RANGE						
COMMAND	AO		0-100%						
TEMPERATURE	Al		50-90°F						
SUPPLY AIRFLOW	Al		VARIES BY BOX SIZE						
COMMAND	AO	Н	0-100%						
CO2 LEVEL	Al	Н	0-1500 PPM						
HUMIDITY	Al	Н	0-100%						



SEQUENCE OF OPERATIONS - CONSTANT AIR VOLUME EXHAUST EAVAY BOX (EAVAY UNITS ASSOCIATED WITH AHU-00-03 SERVING LOCKER ROOMS, RESTROOMS, AND OTHER SPACES REQUIRING A CONSTANT EXHAUST AIRFLOW.)



A. BAS EAVAV CONTROLLER SHALL MODULATE THE EAVAV DAMPER TO MAINTAIN CONSTANT EXHAUST AIRFLOW. THE SYSTEM CONSIST OF: a. AIR FLOW CONTROL DAMPER b. FLOW STATION

A. THE AIR TERMINAL UNIT SHALL BE UNDER CONTROL OF THE BAS AND CONFIGURED FOR BOTH OCCUPIED AND UNOCCUPIED MODES OF OPERATION AND FULLY COORDINATE WITH ASSOCIATED DOAS. THE SYSTEM SHALL BE CONFIGURED WITH AN OPERATING SCHEDULE AND UTILIZE NIGHT SETUP/SETBACK AND OPTIMUM START/MORNING 1 WARM-UP ROUTINES

B. EAVAV IS INTERLOCKED WITH THE OPERATION OF THE CORRESPONDING CAVAV. OCCUPANCY SENSORS LOCATED IN THE SPACE WILL SEND AN OCCUPANCY SIGNAL TO THE ASSOCIATED DOAS UNIT AND WILL SET THE ZONE TO

OCCUPIED MODE FOR A PERIOD OF 3 HOURS (ADJ.). A. OCCUPIED MODE: MODULATE DAMPER POSITION TO MAINTAIN A CONSTANT AIRFLOW THROUGH THE UNIT.

B. UNOCCUPIED MODE: DAMPER SHALL CLOSE DURING UNOCCUPIED MODE. 4. ALARMS

A. IF THE PRIMARY AIR DAMPER IS UNABLE TO MAINTAIN THE AIR FLOW WITHIN 10% OF THE SETPOINT DURING A 10 MINUTE PERIOD (ADJ.) AN ALARM SHALL BE INITIATED TO THE BAS. B. FAILURE STATUS OF ANY OPERATING COMPONENT.

SEQUENCE OF OPERATIONS - CONSTANT AIR VOLUME SUPPLY VAV BOX (VAV UNITS ASSOCIATED WITH AHU-00-02)

A. BAS VAV CONTROLLER SHALL MODULATE THE VAV DAMPER AND THE HYDRONIC HEATING COIL OUTPUT TO MAINTAIN A SPACE TEMPERATURE AND CONSTANT AIRFLOW BASED ON A SIGNAL FROM A WALL MOUNTED TEMPERATURE SENSOR. THE SYSTEM

CONSIST OF: a. AIR FLOW CONTROL DAMPER b. FLOW STATION

d. WALL MOUNTED THERMOSTATS WITH OCCUPANCY OVERRIDE ABILITY. 2. SETPOINTS A. THE OCCUPIED COOLING SETPOINT SHALL BE 78°F.

B. THE OCCUPIED HEATING SETPOINT SHALL BE 68°F. C. THE UNOCCUPIED COOLING SETPOINT SHALL BE 82°F.

c. HYDRONIC HEATING COIL CONTROL

c. OCCUPANCY SENSOR

OPERATING MODES:

D. THE UNOCCUPIED HEATING SETPOINT SHALL BE 60°F.

3. OPERATING MODES: A. THE AIR TERMINAL UNIT SHALL BE UNDER CONTROL OF THE BAS AND CONFIGURED FOR BOTH OCCUPIED AND UNOCCUPIED MODES OF OPERATION AND FULLY COORDINATE WITH ASSOCIATED AHU. THE SYSTEM SHALL BE CONFIGURED WITH AN OPERATING SCHEDULE AND UTILIZE NIGHT SETUP/SETBACK AND OPTIMUM START/MORNING WARM-UP ROUTINES. VENTILATION AIR SHALL BE ENABLED DURING OCCUPIED PERIODS AND DISABLED DURING UN-OCCUPIED PERIODS.

B. ALL VERBIAGE ASSOCIATED WITH CONTROL OF HEATING COILS SHALL ONLY APPLY TO VAVS SUPPLIED WITH HEATING COILS. A. OCCUPIED COOLING MODE: MODULATE DAMPER POSITION TO MAINTAIN A CONSTANT AIRFLOW THROUGH THE UNIT. INCOMING AIR TEMPERATURE WILL BE RESET VIA THE AHU CONTROL LOGIC IN RESPONSE TO FEEDBACK FROM THE ZONE TEMPERATURE

SENSOR. THE HEATING OUTPUT REMAINS AT ZERO. B. OCCUPIED HEATING MODE: THE CONTROL LOOP SHALL DETERMINE THE AIR TERMINAL UNIT DISCHARGE AIR TEMPERATURE SETPOINT AND THEN THE HEATING COIL SHALL BE MODULATED TO MAINTAIN THAT SETPOINT AS FOLLOWS.

AIRFLOW.
UNOCCUPIED MODES: ALL UNOCCUPIED MODES SHALL BE TREATED THE SAME AS OCCUPIED MODES ABOVE, EXCEPT THAT COOLING/HEATING MINIMUM AIR FLOWS SETPOINTS SHALL BE RESET TO ZERO; HEATING ZONE TEMPERATURE SETPOINT SHALL BE RESET LOWER; COOLING ZONE TEMPERATURE SETPOINT SHALL BE RESET HIGHER, AND DEADBAND BETWEEN HEATING AND COOLING BECOMES LARGER.

C. IN HEATING MODE, THE HEATING LOOP OUTPUT SHALL RESET DISCHARGE AIR TEMPERATURE SETPOINT INCREMENTALLY. ∖¶ FROM THE CURRENT ASSOCIATED AHU SUPPLY AIR TEMPERATURE SETPOINT TO 83°F , WHILE MAINTAINING MINIMUM HEATINI

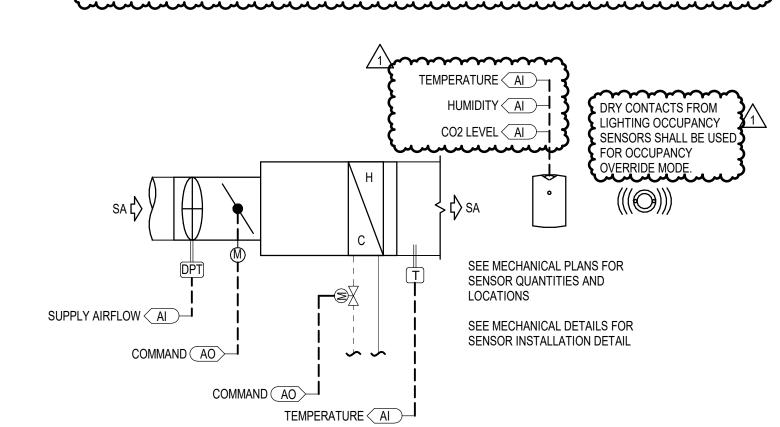
A. SEND AN ALARM TO THE BAS OPERATOR INTERFACE IF THE SPACE TEMPERATURE FALLS 3°F BELOW SETPOINT FOR MORE THAN 30 MINUTES.

B. IF THE PRIMARY AIR DAMPER IS UNABLE TO MAINTAIN THE AIR FLOW WITHIN 10% OF THE SETPOINT DURING A 10 MINUTE PERIOD AN ALARM SHALL BE INITIATED TO THE BAS. C. FAILURE STATUS OF ANY OPERATING COMPONENT. 6. AHU DEMAND CONTROLLED VENTILATION (DCV)

A. CO2 SENSORS SHALL BE PROVIDED IN ZONES EXCEEDING AN OCCUPANCY OF 25 PEOPLE/1000 SQFT. THE CO2 CONCENTRATION OF THESE ZONES SHALL BE MAINTAINED BELOW 900 PPM (ADJ.). IF CONCENTRATIONS ABOVE THAT LIMIT ARE OBSERVED, THE OA AND RA DAMPERS SERVING THE AHU SHALL INCREMENTALLY MODULATE OPEN UNTIL THE CO2 SETPOINT

POINTS TABLE OAVAV SUPPLY, REHEAT

POINT DESCRIPTION		HARDWIRED (H) OR	
	POINT TYPE	NETWORKED (N)?	EXPECTED RANGE
COMMAND	AO		0-100%
TEMPERATURE	Al		50-90°F
SUPPLY AIRFLOW	Al		VARIES BY BOX SIZE
COMMAND	AO	Н	0-100%
CO2 LEVEL	Al	Н	0-1500 PPM
TEMPERATURE	Al	Н	65-80°F
HUMIDITY	Al	Н	0-100%



SEQUENCE OF OPERATIONS - VARIABLE VOLUME SUPPLY OAVAV BOX (OAVAV DIRECTLY SERVING SPACES ASSOCIATED WITH

A. BAS ATU CONTROLLER SHALL MODULATE THE OAVAV DAMPER AND THE HYDRONIC HEATING COIL OUTPUT TO MAINTAIN A SPACE TEMPERATURE AND CO2 CONCENTRATION BASED ON A SIGNAL FROM A WALL MOUNTED TEMPERATURE SENSOR. THE

SYSTEM CONSIST OF: a. AIR FLOW CONTROL DAMPER

b. FLOW STATION c. HYDRONIC HEATING COIL CONTROL

d. OCCUPANCY SENSOR e. WALL MOUNTED THERMOSTATS WITH OCCUPANCY OVERRIDE ABILITY.

SETPOINTS A. THE OCCUPIED COOLING SETPOINT SHALL BE 78°F.

B. THE OCCUPIED HEATING SETPOINT SHALL BE 68°F. THE UNOCCUPIED COOLING SETPOINT SHALL BE 82°F. D. THE UNOCCUPIED HEATING SETPOINT SHALL BE 60°F.

A. THE AIR TERMINAL UNIT SHALL BE UNDER CONTROL OF THE BAS AND CONFIGURED FOR BOTH OCCUPIED AND UNOCCUPIED MODES OF OPERATION AND FULLY COORDINATE WITH ASSOCIATED AHU. THE SYSTEM SHALL BE CONFIGURED WITH AN OPERATING SCHEDULE AND UTILIZE NIGHT SETUP/SETBACK AND OPTIMUM START/MORNING WARM-UP ROUTINES. B. OCCUPANCY SENSORS LOCATED IN THE SPACE WILL SEND AN OCCUPANCY SIGNAL TO THE ASSOCIATED DOAS UNIT AND

WILL SET THE ZONE TO OCCUPIED MODE FOR A PERIOD OF 3 HOURS (ADJ.). C. ALL VERBIAGE ASSOCIATED WITH CONTROL OF HEATING COILS SHALL ONLY APPLY TO VAVS SUPPLIED WITH HEATING COILS. A. OCCUPIED COOLING MODE: MODULATE DAMPER POSITION BETWEEN THE COOLING MINIMUM AND MAXIMUM FLOW

SENSOR. THE HEATING OUTPUT REMAINS AT ZERO. B. OCCUPIED DEADBAND MODE: WHEN THE ZONE TEMPERATURE SENSOR IS CALLING FOR NEITHER HEATING NOR COOLING. THE DAMPER IS TO CONTROL TO THE COOLING MINIMUM AIR FLOW SETPOINT. C. OCCUPIED HEATING MODE: THE CONTROL LOOP SHALL DETERMINE THE AIR TERMINAL UNIT DISCHARGE AIR TEMPERATURE

D. IN HEATING MODE, THE HEATING LOOP OUTPUT SHALL RESET DISCHARGE AIR TEMPERATURE SETPOINT INCREMENTALLY.

SETPOINTS TO MAINTAIN THE SPACE TEMPERATURE SETPOINT IN RESPONSE TO FEEDBACK FROM THE ZONE TEMPERATURE

FROM THE CURRENT ASSOCIATED DOAS SUPPLY AIR TEMPERATURE SETPOINT TO 83°F WHILE MAINTAINING MINIMUM E. UNOCCUPIED MODES: ALL UNOCCUPIED MODES SHALL BE TREATED THE SAME AS OCCUPIED MODES ABOVE, EXCEPT THA COOLING/HEATING MINIMUM AIR FLOWS SETPOINTS SHALL BE RESET TO ZERO: HEATING ZONE TEMPERATURE SETPOINT SHALL BE RESET LOWER; COOLING ZONE TEMPERATURE SETPOINT SHALL BE RESET HIGHER, AND DEADBAND BETWEEN AL IF OCCUPANCY OF A SPACE IS REPORTED BY THE OCCUPANCY SENSOR WHILE THE ASSOCIATED AHU IS IN UNOCCUPIED

MODE, THE ASSOCIATED AHU SHALL RUN IN OCCUPIED MODE FOR A PERIOD OF 1 HOUR (ADJ.). COORDINATE ANY SCHEDULED CLEANING HOURS WITH OWNER A. A "REQUEST" IS A CALL TO RESET A STATIC PRESSURE. THE REQUEST IS SENT UPSTREAM TO THE SYSTEM THAT SERVES THE ZONE. FOR EACH VAV PROVIDE THE FOLLOWING SOFTWARE POINTS:

IMPORTANCE MULTIPLIER (DEFAULT = 1) C. REQUEST. THE REQUEST IS EQUAL TO THE IMPORTANCE MULTIPLIER WHEN THE VAV DAMPER IS GREATER THAN 95% OPEN AND UNTIL IT DROPS TO 80% OPEN. D. REQUEST-HOURS. IF THE REQUEST IS GREATER THAN ZERO AND THE VAV IS OCCUPIED ADD 0.083 TO THE REQUEST HOURS

ACCUMULATOR EVERY 5 MINUTES. . RUN-HOURS. THE NUMBER OF HOURS THE VAV IS OCCUPIED. F. CUMULATIVE %. THIS IS THE ZONE REQUEST-HOURS DIVIDED BY THE ZONE RUN-HOURS. C REQUEST ALARM-A LATCHING ALARM IS CENERATED AND THE ZONE REQUEST IS ZERO IF THE ZONE CUMULATIVE %REQUEST-HOURS EXCEEDS 70% AND THE RUN-HOURS ARE GREATER THAN 8.

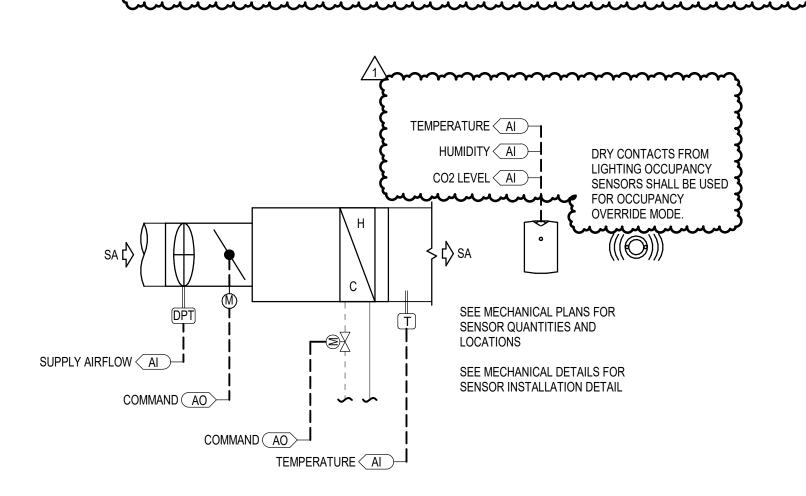
H. THE REQUEST-HOURS AND RUN-HOURS WILL BE RESET TO ZERO AT 12:00 AM. A. SEND AN ALARM TO THE BAS OPERATOR INTERFACE IF THE SPACE TEMPERATURE FALLS 3°F BELOW SETPOINT FOR MORE B. IF THE PRIMARY AIR DAMPER IS UNABLE TO MAINTAIN THE AIR FLOW WITHIN 10% OF THE SETPOINT DURING A 10 MINUTE

(ADJ.) PERIOD AN ALARM SHALL BE INITIATED TO THE BAS. FAILURE STATUS OF ANY OPERATING COMPONENT. 7. AHU DEMAND CONTROLLED VENTILATION (DCV)

A. CO2 SENSORS SHALL BE PROVIDED IN ZONÉS EXCEEDING AN OCCUPANCY OF 25 PEOPLE/1000 SQFT. THE CO2 CONCENTRATION OF THESE ZONES SHALL BE MAINTAINED BELOW 900 PPM (ADJ.). IF CONCENTRATIONS ABOVE THAT LIMIT ARE OBSERVED, THE OA AND RA DAMPERS SERVING THE AHU SHALL INCREMENTALLY MODULATE OPEN UNTIL THE CO2 SETPOINT IS SATISFIED.

POINTS TABLE VAV SUPPLY, REHEAT POINT DESCRIPTION HARDWIRED (H) OR POINT TYPE **NETWORKED (N)? EXPECTED RANGE** COMMAND 0-100% **TEMPERATURE** 50-90°F SUPPLY AIRFLOW VARIES BY BOX SIZE COMMAND 0-100% CO2 LEVEL 0-1500 PPM HUMIDITY 0-100% **TEMPERATURE** 65-80°F

VAV BOX WITH REHEAT - CONSTANT VOLUME CONTROL DIAGRAM



VAV BOX WITH REHEAT - VARIABLE VOLUME CONTROL DIAGRAM

SEQUENCE OF OPERATIONS - VARIABLE VOLUME SUPPLY VAV BOX (VAV UNITS ASSOCIATED WITH AHU-00-01)

A. BAS ATU CONTROLLER SHALL MODULATE THE VAV DAMPER AND THE HYDRONIC HEATING COIL OUTPUT TO MAINTAIN A SPACE TEMPERATURE BASED ON A SIGNAL FROM A WALL MOUNTED TEMPERATURE SENSOR. THE SYSTEM CONSIST OF:

a. AIR FLOW CONTROL DAMPER b. FLOW STATION c. HYDRONIC HEATING COIL CONTROL

d. WALL MOUNTED THERMOSTATS WITH OFFSET ADJUSTMENT AND OCCUPANCY OVERRIDE ABILITY. e. ALL SET-POINTS SHALL BE ADJUSTABLE BY AN OPERATOR WITHOUT ADDITIONAL SOFTWARE.

2. SETPOINTS A. THE OCCUPIED COOLING SETPOINT SHALL BE 78°F. B. THE OCCUPIED HEATING SETPOINT SHALL BE 68°F

C. THE UNOCCUPIED COOLING SETPOINT SHALL BE 82°F.

D. THE UNOCCUPIED HEATING SETPOINT SHALL BE 60°F.

C. FAILURE STATUS OF ANY OPERATING COMPONENT.

OPERATING MODES: A. THE AIR TERMINAL UNIT SHALL BE UNDER CONTROL OF THE BAS AND CONFIGURED FOR BOTH OCCUPIED AND UNOCCUPIED MODES OF OPERATION AND FULLY COORDINATE WITH ASSOCIATED AHU. THE SYSTEM SHALL BE CONFIGURED WITH AN OPERATING SCHEDULE AND UTILIZE NIGHT SETUP/SETBACK AND OPTIMUM START/MORNING WARM-UP ROUTINES. VENTILATION AIR SHALL BE ENABLED DURING OCCUPIED PERIODS AND DISABLED DURING UN-OCCUPIED PERIODS.

B. ALL VERBIAGE ASSOCIATED WITH CONTROL OF HEATING COILS SHALL ONLY APPLY TO VAVS SUPPLIED WITH HEATING COILS. A. OCCUPIED COOLING MODE: MODULATE DAMPER POSITION BETWEEN THE COOLING MINIMUM AND MAXIMUM FLOW SETPOINTS TO MAINTAIN THE SPACE TEMPERATURE SETPOINT IN RESPONSE TO FEEDBACK FROM THE ZONE TEMPERATURE SENSOR.

THE HEATING OUTPUT REMAINS AT ZERO. B. OCCUPIED DEADBAND MODE: WHEN THE ZONE TEMPERATURE SENSOR IS CALLING FOR NEITHER HEATING NOR COOLING, THE DAMPER IS TO CONTROL TO THE COOLING MINIMUM AIR FLOW SETPOINT. C. OCCUPIED HEATING MODE: THE CONTROL LOOP SHALL DETERMINE THE AIR TERMINAL UNIT DISCHARGE AIR TEMPERATURE

SETPOINT AND THEN THE HEATING COIL SHALL BE MODULATED TO MAINTAIN THAT SETPOINT AS FOLLOWS.

D IN HEATING MODE, THE HEATING LOOP OUTPUT SHALL BESET DISCHARGE AIR TEMPERATURE SETPOINT INCREMENTALLY.

FROM THE CURRENT ASSOCIATED AHU SUPPLY AIR TEMPERATURE SETPOINT TO 83°F WHILE MAINTAINING MINIMUM HEATING. AIRFLOW F. UNOCCUPIED MODES: ALL UNOCCUPIED MODES SHALL BE TREATED THE SAME AS OCCUPIED MODES ABOVE, EXCEPT THAT

COOLING/HEATING MINIMUM AIR FLOWS SETPOINTS SHALL BE RESET TO ZERO: HEATING ZONE TEMPERATURE SETPOINT SHALL BE RESET LOWER; COOLING ZONE TEMPERATURE SETPOINT SHALL BE RESET HIGHER, AND DEADBAND BETWEEN HEATING AND COOLING BECOMES LARGER.

THE DOCTUPANOY OF A SPACE IS REPORTED BY THE OCCUPANCY SENSOR WHILE THE ASSOCIATED AHU IS IN UNOCCUPIED.

MODE, THE ASSOCIATED AHU SHALL RUN IN OCCUPIED MODE FOR A PERIOD OF 1 HOUR (ADJ.). COORDINATE ANY CHENNING HOURS WITH OWNER CONTROL OF STREET OF A. A "REQUEST" IS A CALL TO RESET A STATIC PRESSURE. THE REQUEST IS SENT UPSTREAM TO THE SYSTEM THAT SERVES THE

ZONE. FOR EACH VAV PROVIDE THE FOLLOWING SOFTWARE POINTS: B. IMPORTANCE MULTIPLIER (DEFAULT = 1) C. REQUEST. THE REQUEST IS EQUAL TO THE IMPORTANCE MULTIPLIER WHEN THE VAV DAMPER IS GREATER THAN 95% OPEN AND UNTIL IT DROPS TO 80% OPEN.

D. REQUEST-HOURS. IF THE REQUEST IS GREATER THAN ZERO AND THE VAV IS OCCUPIED ADD 0.083 TO THE REQUEST HOURS ACCUMULATOR EVERY 5 MINUTES. E. RUN-HOURS. THE NUMBER OF HOURS THE VAV IS OCCUPIED. F. CUMULATIVE %. THIS IS THE ZONE REQUEST-HOURS DIVIDED BY THE ZONE RUN-HOURS.

G. REQUEST ALARM, A LATCHING ALARM IS GENERATED AND THE ZONE REQUEST IS ZERO IF THE ZONE CUMULATIVE %-REQUEST-HOURS EXCEEDS 70% AND THE RUN-HOURS ARE GREATER THAN 8. HE THE REQUEST HOURS AND RUN HOURS WILL BE RESET TO ZERO AT 12:00 AM.

A. SEND AN ALARM TO THE BAS OPERATOR INTERFACE IF THE SPACE TEMPERATURE FALLS 3°F BELOW SETPOINT FOR MORE THAN 30 MINUTES. B. IF THE PRIMARY AIR DAMPER IS UNABLE TO MAINTAIN THE AIR FLOW WITHIN 10% OF THE SETPOINT DURING A 10 MINUTE PERIOD AN ALARM SHALL BE INITIATED TO THE BAS.

7. AHU DEMAND CONTROLLED VENTILATION (DCV) A. CO2 SENSORS SHALL BE PROVIDED IN ZONES EXCEEDING AN OCCUPANCY OF 25 PEOPLE/1000 SQFT. THE CO2 CONCENTRATION OF THESE ZONES SHALL BE MAINTAINED BELOW 900 PPM (ADJ.). IF CONCENTRATIONS ABOVE THAT LIMIT ARE OBSERVED, THE OA AND RA DAMPERS SERVING THE AHU SHALL INCREMENTALLY MODULATE OPEN UNTIL THE CO2 SETPOINT IS SATISFIED.

MORRIS ARENA

IN128 - JAMES T

Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEE 2901 EAST DISCOVERY PARKWAY

BLOOMINGTON, IN 47408 812-855-1692 **Architect**

RATIO 101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204 317-633-4040

Structural Engineer FINK ROBERTS AND PETRIE, INC.

3535 EAST 96TH STREET SUITE 126 INDIANAPOLIS. IN 46240

317-872-8400 Mechanical / Electrical

INTROBA 8250 HAVERSTICK ROAD SUITE 285 INDIANAPOLIS. IN 46240 800-404-7677

Plumbing Engineer

138 N. DELAWARE ST INDIANAPOLIS, IN 46204

317-633-4120

Acoustics / Technology Engineer WJHW 7220 W. JEFFERSON AVE

SUITE 216 LAKEWOOD, CO 80235 972-934-3700

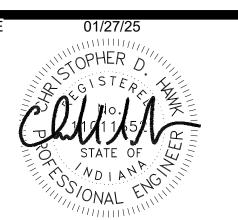
Civil Engineer AMERICAN STRUCTUREPOINT, INC.

9025 RIVER ROAD SUITE 200 INDIANAPOLIS, IN 46240 317-547-5580

Food Service Consultant CINILITTLE 3405 NW 9TH AVENUE #1202

FORT LAUDERDALE, FL 33309 954-846-9600 **Code Consultant**

FORZA 2502 WEST MECHANIC ST. SUITE C HARRISONVILLE, MO 64701 816-806-3729



DD PROGRESS SET DESIGN DEVELOPMENT 11/01/24 50% CONSTRUCTION DOCUMENTS 12/19/24 95% CONSTRUCTION DOCUMENTS **CONSTRUCTION DOCUMENTS** ADDENDUM 01

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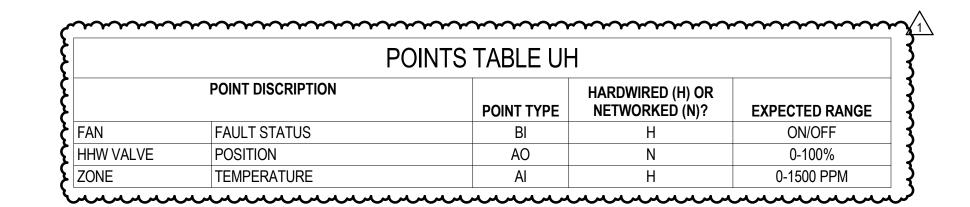
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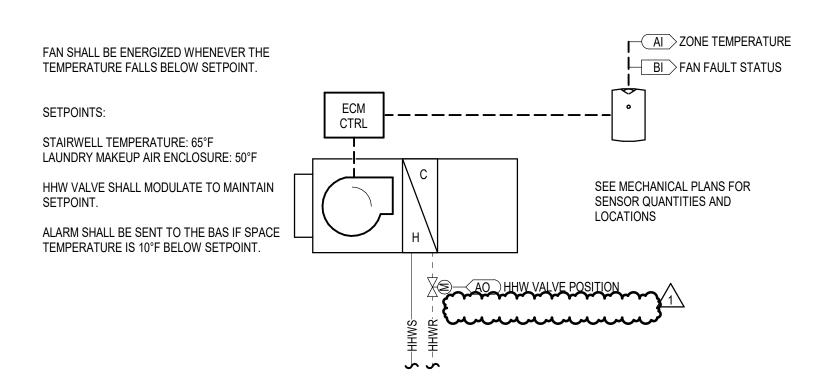
MECHANICAL **CONTROLS** -TERMINAL UNITS

SHEET NUMBER

M-712

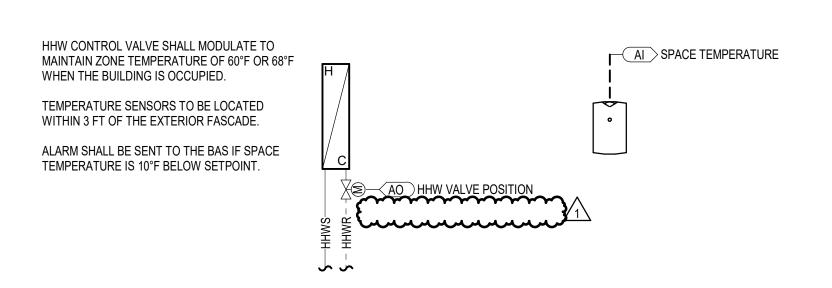
OAVAV BOX WITH REHEAT CONTROL DIAGRAM



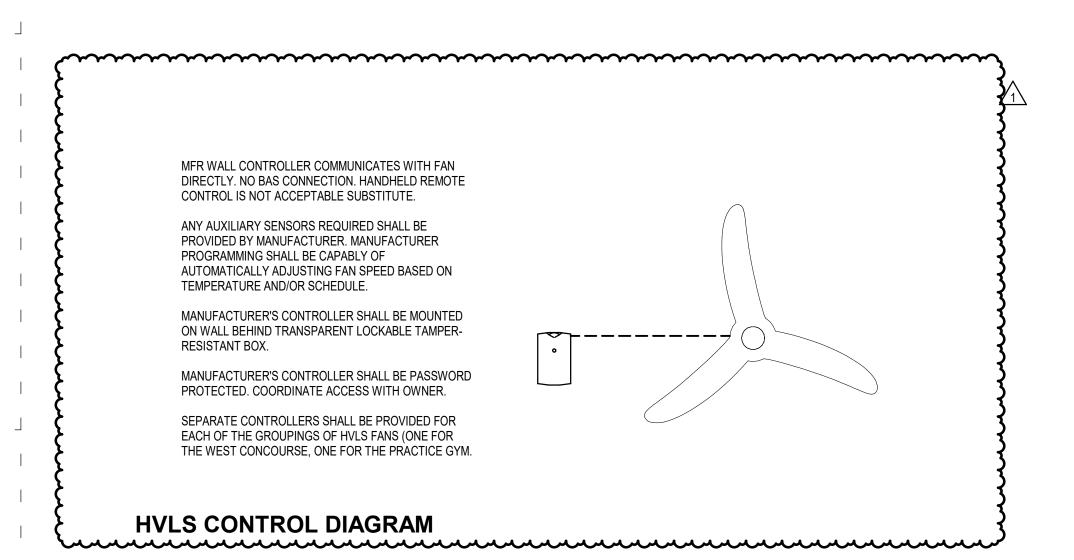


UH CONTROL DIAGRAM

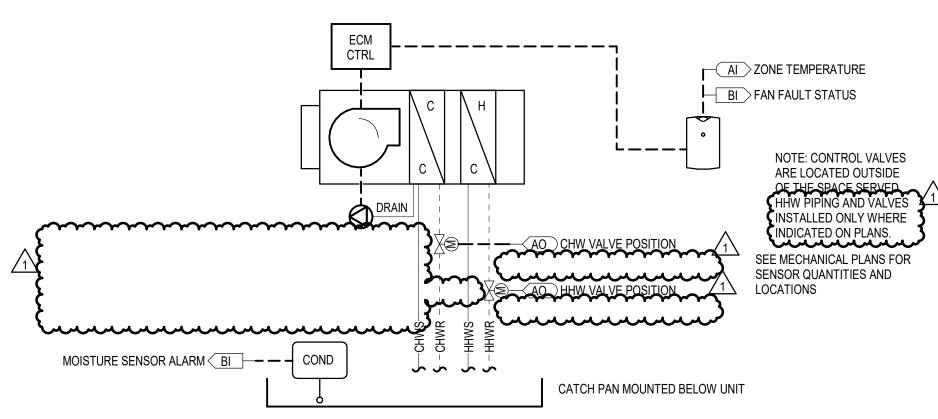
	PO	INTS TABLE FT	R		
	POINT DISCRIPTION	POINT TYPE	HARDWIRED (H) OR NETWORKED (N)?	EXPECTED RANGE	
HHW VALVE	POSITION	AO	N	0-100%	
SPACE	PACE TEMPERATURE		Н	0-1500 PPM	



FTR CONTROL DIAGRAM



	POI	NTS TABLE HWC	· •		
	POINT DISCRIPTION	POINT TYPE	HARDWIRED (H) OR NETWORKED (N)?	EXPECTED RANGE	
CHW VALVE	POSITION	AO	N	0-100%	
FAN	FAULT STATUS	BI	Н	ON/OFF	
HHW VALVE	POSITION	AO	N	0-100%	
MOISTURE SENSOR	ALARM	BI	N	ON/OFF	
ZONE	TEMPERATURE	Al	Н	0-1500 PPM	

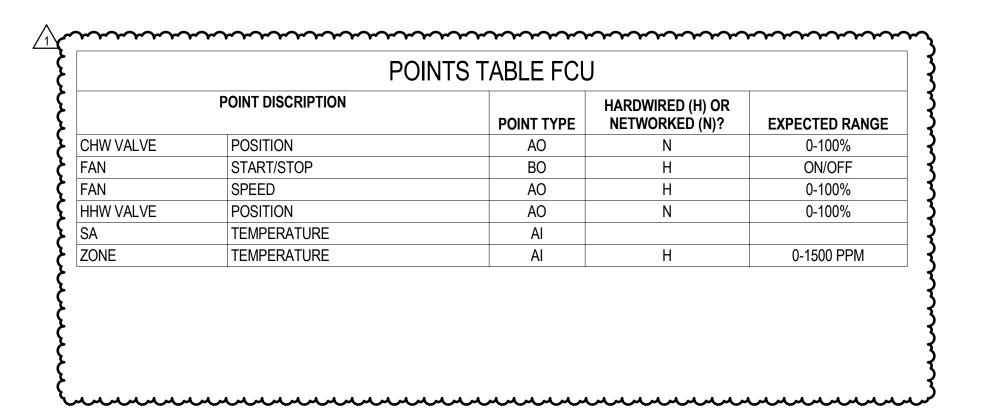


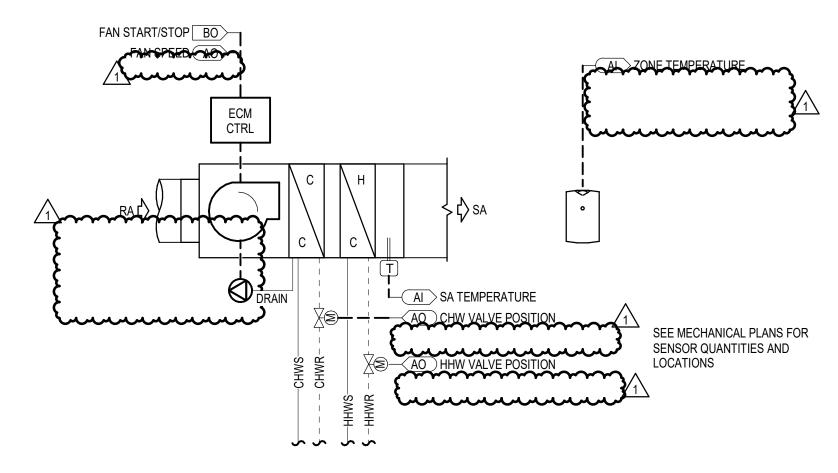
HWC CONTROL DIAGRAM

- SEQUENCE OF OPERATIONS HWC
- A. HYDRONIC WALL CASSETTE (HWC) ON THIS PROJECT ARE CONSTANT AIR VOLUME (CAV) HYDRONIC HEATING AND COOLING HWCS AS SPECIFIED AND SERVE SPACES WHICH EITHER **REQUIRE 24/7 AVAILABILITY**
- 2. CONTROLS ARCHITECTURE
- A. CONTROL POINTS SHALL BE CONTROLLED BY THE CENTRAL BAS VIA BACNET COMMUNICATION PROTOCOL. HWC SHALL BE SUPPLIED WITH A BACNET CAPABLE THERMOSTAT, WHICH WILL RELAY THE FAN STATUS OF THE UNIT. ALL CONTROL POINTS, WHETHER EXPLICITLY LISTED OR NOT, SHALL BE VISIBLE AND CONTROLLABLE VIA THE BAS.
- B. UNIT START COMMAND: a. SUPPLY FAN SHALL ALWAYS RUN.
- C. UNIT STOP COMMAND (OR DE-ENERGIZED): a. SUPPLY FAN AND TEMPERING OPTIONS DE-ENERGIZED.
- 3. OCCUPIED/UNOCCUPIED MODES A. TEMPERATURE SETPOINTS
- a. OCCUPIED: COOLING: 78°F +/- 2°F
- HEATING: 68°F +/- 2°F B. ZONES CONDITIONED BY HWCS ARE ALWAYS CONSIDERED OCCUPIED.
- C. OCCUPIED MODE: a. SUPPLY FAN ON.
- b. ALL COILS AVAILABLE FOR OPERATION. 4. SUPPLY FAN SEQUENCE:
- A. START/STOP: BAS SHALL COMMAND THE SUPPLY FAN TO RUN CONTINUOUSLY. B. THE SUPPLY FAN ARE PROVIDED WITH ECMS. THE SUPPLY FAN SPEED WILL BE CONTROLLED TO MEET THE AIRFLOW SPECIFIED IN THE DESIGN DOCUMENTS.
- A. THE CHW COIL OR THE HHW COIL CONTROL VALVE SHALL BE MODULATED TO MAINTAIN THE TEMPERATURE WITHIN THE SPACE SERVED. THE VALVES SHALL NOT BE OPEN
- SIMULTANEOUSLY. THERE SHALL BE A 30 MIN (ADJ.) DELAY IN CHANGEOVER FROM COOLING MODE TO HEATING MODE TO PREVENT SHORT CYCLING. CONDENSATE OVERFLOW:
- A. IN THE EVENT THAT THE HIGH-LEVEL CONDENSATE SWITCH IS TRIPPED, ALL COOLING COMPONENTS SHALL SHUT DOWN AND ALARMS SHALL BE SENT TO THE BAS.
- A. IN THE EVENT THAT THE MOISTURE SENSOR MOUNTED IN THE CATCH PAN BELOW THE HWC SENSES MOISTURE, THE CHW CONTROL AND ISOLATION VALVES SHALL CLOSE AND THE UNIT SHALL SEND A HIGH-PRIORITY ALARM TO THE BAS. 8. ALARMS INDICATION: THE CONTROLLER WILL DISPLAY ALARMS AND HAVE ONE DIGITAL OUTPUT FOR REMOTE INDICATION OF AN ALARM CONDITION. POSSIBLE ALARMS INCLUDE:
- A. BUILDING MANAGEMENT SYSTEM: a. THE CONTROLLER WILL SEND ALL ALARMS TO THE BAS.
- B. DIRTY FILTER ALARM: a. A DIGITAL SIGNAL IS SENT TO THE CONTROLLER INDICATING AN INCREASED PRESSURE DROP ACROSS AN AIR FILTER (MUST BE ADJUSTED IN FIELD DURING START UP). THE
- CONTROLLER WILL THEN PROVIDE A DIRTY FILTER ALARM. C. TEMPERATURE SENSOR ALARM:
- a. THE CONTROLLER SENDS AN ALARM IN THE CASE OF A FAILED AIR TEMPERATURE SENSOR. D. FAN FAILURE: a. BAS SHALL PROVE FAN OPERATION AND USE THE STATUS INDICATION TO ACCUMULATE RUNTIME. UPON FAILURE OF ANY OF THE FAN, THE BAS SHALL ALARM THAT FAN FAILURE
- E. CONDENSATE OVERFLOW a. THE OVERFLOW SENSOR SHALL SEND AN ALARM TO THE BAS UPON EITHER CONDENSATE PUMP FAILURE OR OVERFLOW SENSOR ACTIVATION.
- a. THE MOISTURE SENSOR IN THE CATCH TRAY WILL SEND AN ALARM TO THE BAS UPON DETECTION OF MOISTURE. 9. ACCESSORIES: PROVIDE THE FOLLOWING.
- A. BAS INTERFACING: a. A BAS PORT OR SERIAL CARD IS PROVIDED WITH THE CONTROLLER FOR FIELD INTERFACING WITH A BUILDING AUTOMATION SYSTEM.
- b. UPDATE DEFAULT SETTINGS TO THE APPROPRIATE ADDRESSES TO MATCH THE BAS SETTINGS. B. DDC REMOTE INTERFACE:
- a. FACTORY PROVIDED, FIELD MOUNTED INTERFACE PANEL THAT WILL BE WIRED TO THE MAIN CONTROLLER FOR MONITORING AND REMOTE ADJUSTMENTS OF SET POINTS.
- a. FACTORY MOUNTED AND WIRED COMPONENT WHICH MONITORS THE MAIN POWER COMING INTO THE UNIT. b. IF A PHASE DROPS OUT, OR IF THE INCOMING VOLTAGE EXCEEDS THE ACCEPTABLE RANGE, THE COMPONENT WILL TURN OFF THE UNIT TO HELP PROTECT THE ELECTRICAL SYSTEMS.
- a. FACTORY MOUNTED CONDENSATE OVERFLOW SWITCH WIRED TO THE UNIT CONTROLLER. THE CONTROLLER MONITORS THE CONDENSATE OVERFLOW SWITCH.
- b. IF THE WATER LEVEL IN THE DRAIN PAN REACHES A CERTAIN LEVEL, THE UNIT WILL SHUTDOWN AND SEND AN ALARM. 10. MINIMUM REQUIREMENTS FOR OPERATOR WORKSTATION DISPLAY
- A. SUPPLY FAN ON-OFF STATUS B. SUPPLY FAN SPEED
- C. ALL TEMPERATURE SENSORS ON THE UNIT D. CHW AND HHW VALVE POSITIONS
- E. COOLING DEMAND % OF TOTAL CAPACITY F. TEMPERATURE LEAVING UNIT
- G. ALARMS

MAF STATUS BI MAF STATUS BI ECM CTRL	AI HHW VALVE POSITION AI HHW VALVE POSITION AI MA TEMPERATURE C OA
MAF ##-##	HDH ##-##
GEF, MAF, HDH CONTROL DIAGRAM	GREASE FAN, MAKEUP AIR FAN, ISOLATION DAMPER, AND HYDRONIC DUCT HEATER OPERATION IS INTERLOCKED WITHIN AND CONTROLLED BY THE MILINK KITCHEN CONTROL SYSTEM (BY OTHERS). OUTPUT TO BAS IS FOR MONITORING STATUS ONLY. COORDINATE REQUIREMENTS WITH KITCHEN DESIGN DRAWINGS. HEATING COIL CONTROL VALVE SHALL MODULATE TO MAINTAIN 55°F LAT.

	POINT DESCRIPTION	DOINT TYPE	HARDWIRED (H) OR	EVECTED DANC
GEF	STATUS	POINT TYPE BI	NETWORKED (N)?	0-100%
HHW VALVE	POSITION	Al	N	0-100%
MA	TEMPERATURE	Al	Н	30-110°F
MA DAMPER	POSITION	Al	N	0-100%
MAF	STATUS	BI	N	0-100%





FCU CONTROL DIAGRAM

SEQUENCE OF OPERATIONS - FCU

- A. FAN COIL UNITS (FCU) ON THIS PROJECT ARE CONSTANT AIR VOLUME (CAV) HYDRONIC HEATING AND COOLING FCUS AS SPECIFIED AND SERVE SPACES WHICH EITHER REQUIRE 24/7
- AVAILABILITY OR ARE OTHERWISE NOT SUITABLE TO BE SERVED BY ONE OF THE AHUS.
- A. CONTROL POINTS SHALL BE CONTROLLED BY THE CENTRAL BAS VIA BACNET COMMUNICATION PROTOCOL. ALL CONTROL POINTS, WHETHER EXPLICITLY LISTED OR NOT, SHALL BE
- VISIBLE AND CONTROLLABLE VIA THE BAS. B. UNIT START COMMAND:
- a. SUPPLY FAN STARTS AFTER A 15 SEC (ADJ.) DELAY WHEN THE ASSOCIATED DAMPERS ARE PROVEN OPEN. b. TEMPERING OPTIONS TO FUNCTION AS DESCRIBED.
- C. UNIT STOP COMMAND (OR DE-ENERGIZED):
- a. SUPPLY FAN AND TEMPERING OPTIONS DE-ENERGIZED. 3. OCCUPIED/UNOCCUPIED MODES
- A. TEMPERATURE SETPOINTS
- COOLING: 78°F +/- 2°F HEATING: 68°F +/- 2°F
- RELATIVE HUMIDITY: 55% IDF, ELECTRICAL, AV, AND OTHER ROOMS CONTAINING HEAT GENERATING ELECTRICAL EQUIPMENT ARE CONSIDERED OCCUPIED 24/7
- b. UNOCCUPIED: COOLING: 82°F +/- 2°F
- HEATING: 60°F +/- 2°F B. SCHEDULE SHALL BE BASED ON AN OCCUPANCY SCHEDULE PROVIDED BY THE OWNER.
- C. OCCUPANCY OVERRIDE: IF DURING THE UNOCCUPIED PERIOD THERE IS A REQUEST FOR OCCUPANCY OVERRIDE, THE OCCUPANCY MODE SHALL BECOME ACTIVE FOR 2 HOURS (ADJ.). D. PRIOR TO SCHEDULED OCCUPANCY, OCCUPIED MODE SHALL BE ENGAGED WITH SUFFICIENT TIME TO ENSURE THE SPACES SERVED ARE AT THE OCCUPIED TEMPERATURE SETPOINT
- AND VENTILATION RATES PRIOR TO THE SCHEDULED OCCUPANCY. E. OCCUPIED MODE:
- a. SUPPLY FAN ON. b. ALL COILS AVAILABLE FOR OPERATION. F. UNOCCUPIED MODE (UNIT OFF): UNIT REMAINS OFF WHEN IN UNOCCUPIED MODE.
- a. SUPPLY FAN OFF b. TEMPERING OFF
- 4. SUPPLY FAN SEQUENCE: A. START/STOP: BAS SHALL COMMAND THE SUPPLY FAN TO RUN CONTINUOUSLY.
- B. THE SUPPLY FAN ARE PROVIDED WITH ECMS. THE SUPPLY FAN SPEED WILL BE CONTROLLED TO MEET THE AIRFLOW SPECIFIED IN THE DESIGN DOCUMENTS. 5. TEMPERING OPTIONS:
- A. THE CHW COIL OR THE HHW COIL CONTROL VALVE SHALL BE MODULATED TO MAINTAIN THE TEMPERATURE WITHIN THE SPACE SERVED. THE VALVES SHALL NOT BE OPEN SIMULTANEOUSLY. THERE SHALL BE A 30 MIN (ADJ.) DELAY IN CHANGEOVER FROM COOLING MODE TO HEATING MODE TO PREVENT SHORT CYCLING.
- A. IN THE EVENT THAT THE HIGH-LEVEL CONDENSATE SWITCH IS TRIPPED, ALL COOLING COMPONENTS SHALL SHUT DOWN AND ALARMS SHALL BE SENT TO THE BAS. 7. ALARMS INDICATION: THE CONTROLLER WILL DISPLAY ALARMS AND HAVE ONE DIGITAL OUTPUT FOR REMOTE INDICATION OF AN ALARM CONDITION. POSSIBLE ALARMS INCLUDE:
- A. BUILDING MANAGEMENT SYSTEM: a. THE CONTROLLER WILL SEND ALL ALARMS TO THE BAS.
- a. A DIGITAL SIGNAL IS SENT TO THE CONTROLLER INDICATING AN INCREASED PRESSURE DROP ACROSS AN AIR FILTER (MUST BE ADJUSTED IN FIELD DURING START UP). THE
- CONTROLLER WILL THEN PROVIDE A DIRTY FILTER ALARM. C. TEMPERATURE SENSOR ALARM:
- a. THE CONTROLLER SENDS AN ALARM IN THE CASE OF A FAILED AIR TEMPERATURE SENSOR.
- a. BAS SHALL PROVE FAN OPERATION AND USE THE STATUS INDICATION TO ACCUMULATE RUNTIME. UPON FAILURE OF ANY OF THE FAN, THE BAS SHALL ALARM THAT FAN FAILURE
- CONDITION 8. ACCESSORIES: PROVIDE THE FOLLOWING.
- A. BAS INTERFACING: a. A BAS PORT OR SERIAL CARD IS PROVIDED WITH THE CONTROLLER FOR FIELD INTERFACING WITH A BUILDING AUTOMATION SYSTEM.
- b. UPDATE DEFAULT SETTINGS TO THE APPROPRIATE ADDRESSES TO MATCH THE BAS SETTINGS.
- B. DDC REMOTE INTERFACE:
- a. FACTORY PROVIDED, FIELD MOUNTED INTERFACE PANEL THAT WILL BE WIRED TO THE MAIN CONTROLLER FOR MONITORING AND REMOTE ADJUSTMENTS OF SET POINTS. C. PHASE AND BROWNOUT PROTECTION a. FACTORY MOUNTED AND WIRED COMPONENT WHICH MONITORS THE MAIN POWER COMING INTO THE UNIT.
- b. IF A PHASE DROPS OUT, OR IF THE INCOMING VOLTAGE EXCEEDS THE ACCEPTABLE RANGE, THE COMPONENT WILL TURN OFF THE UNIT TO HELP PROTECT THE ELECTRICAL
- D. CONDENSATE OVERFLOW UNIT SHUTDOWN a. FACTORY MOUNTED CONDENSATE OVERFLOW SWITCH WIRED TO THE UNIT CONTROLLER. THE CONTROLLER MONITORS THE CONDENSATE OVERFLOW SWITCH.
- b. IF THE WATER LEVEL IN THE DRAIN PAN REACHES A CERTAIN LEVEL, THE UNIT WILL SHUTDOWN AND SEND AN ALARM. 9. MINIMUM REQUIREMENTS FOR OPERATOR WORKSTATION DISPLAY
- A. SUPPLY FAN ON-OFF STATUS B. SUPPLY FAN SPEED
- C. ALL TEMPERATURE SENSORS ON THE UNIT D. CHW AND HHW VALVE POSITIONS
- E. COOLING DEMAND % OF TOTAL CAPACITY F. TEMPERATURE LEAVING UNIT G. ALARMS

GENERAL CONTROLS NOTES:

- A. TEMPERATURE SENSORS, HUMIDISTATS, AND THERMOSTATS SHALL NOT BE INSTALLED ON EXTERIOR WALLS OR COLUMNS, OR WHERE EXPOSED TO SOLAR RADIATION. WHERE THERE ARE NO OTHER OPTIONS, A SOLAR BLOCKING ENCLOSURE AND INSULATED BACKPLATE TO ELIMINATE TEMPERATURE INFLUENCE FROM DIRECT SOLAR EXPOSURE SHALL BE PROVIDED
- B. VAVS ARE POWERED BY CONTROL VOLTAGE. CONTRACTOR IS RESPONSIBLE FOR COORDINATING ROUTING, GROUPING, AND POWER FOR THE LOW-VOLTAGE VAV UNITS.
- C. ALL NECESSARY CONTROL POINTS SHALL BE PROVIDED TO ACHIEVE THE WRITTEN SEQUENCES OF OPERATION WHETHER OR NOT THEY ARE EXPLICITLY NAMED.
- D. PROVIDE ANALOGUE FIELD SENSORS NEXT TO ALL TEMPERATURE AND PRESSURE CONTROL POINTS.
- E. CONTROLS CONTRACTOR SHALL COORDINATE WITH THE IU CONTROL INTEGRATOR.
- F. ALL IN-SPACE TEMPERATURE, HUMIDITY, AND CO2 SENSORS SHALL BE BLIND SENSORS WITH ONLY THE ABILITY TO INDUCE AN OCCUPANCY OVERRIDE WITH A
- BUTTON UNLESS OTHERWISE REQUESTED BY IU. *,* G. LOCAL MAGNEHELIC GAUGE SUPPLIED AT EACH FILTER SECTION.
- WHERE AIRFLOW MONITORING IS INDICATED ON FANS, PIEZIOMETER RING SHALL BE SUPPLIED AT EACH INLET CONE BY MANUFACTURER.

IN128 - JAMES T **MORRIS ARENA**

Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

BLOOMINGTON, IN 47408

812-855-1692

INDIANA UNIVERSITY BOARD OF TRUSTEE 2901 EAST DISCOVERY PARKWAY

Architect RATIO 101 SOUTH PENNSYLVANIA STREET

INDIANAPOLIS, IN 46204 317-633-4040

FINK ROBERTS AND PETRIE, INC. 3535 EAST 96TH STREET

SUITE 126 INDIANAPOLIS, IN 46240 317-872-8400

Structural Engineer

Mechanical / Electrical INTROBA

> SUITE 285 INDIANAPOLIS. IN 46240 800-404-7677

8250 HAVERSTICK ROAD

Plumbing Engineer

SUITE 216

138 N. DELAWARE ST INDIANAPOLIS, IN 46204

317-633-4120

Acoustics / Technology Engineer WJHW 7220 W. JEFFERSON AVE

LAKEWOOD, CO 80235

972-934-3700 Civil Engineer

AMERICAN STRUCTUREPOINT, INC. 9025 RIVER ROAD

SUITE 200 INDIANAPOLIS, IN 46240 317-547-5580

Food Service Consultant CINILITTLE

3405 NW 9TH AVENUE #1202 FORT LAUDERDALE, FL 33309 954-846-9600

Code Consultant FORZA

2502 WEST MECHANIC ST, SUITE C HARRISONVILLE, MO 64701 816-806-3729

95% CONSTRUCTION DOCUMENTS CONSTRUCTION DOCUMENTS **ADDENDUM 01**

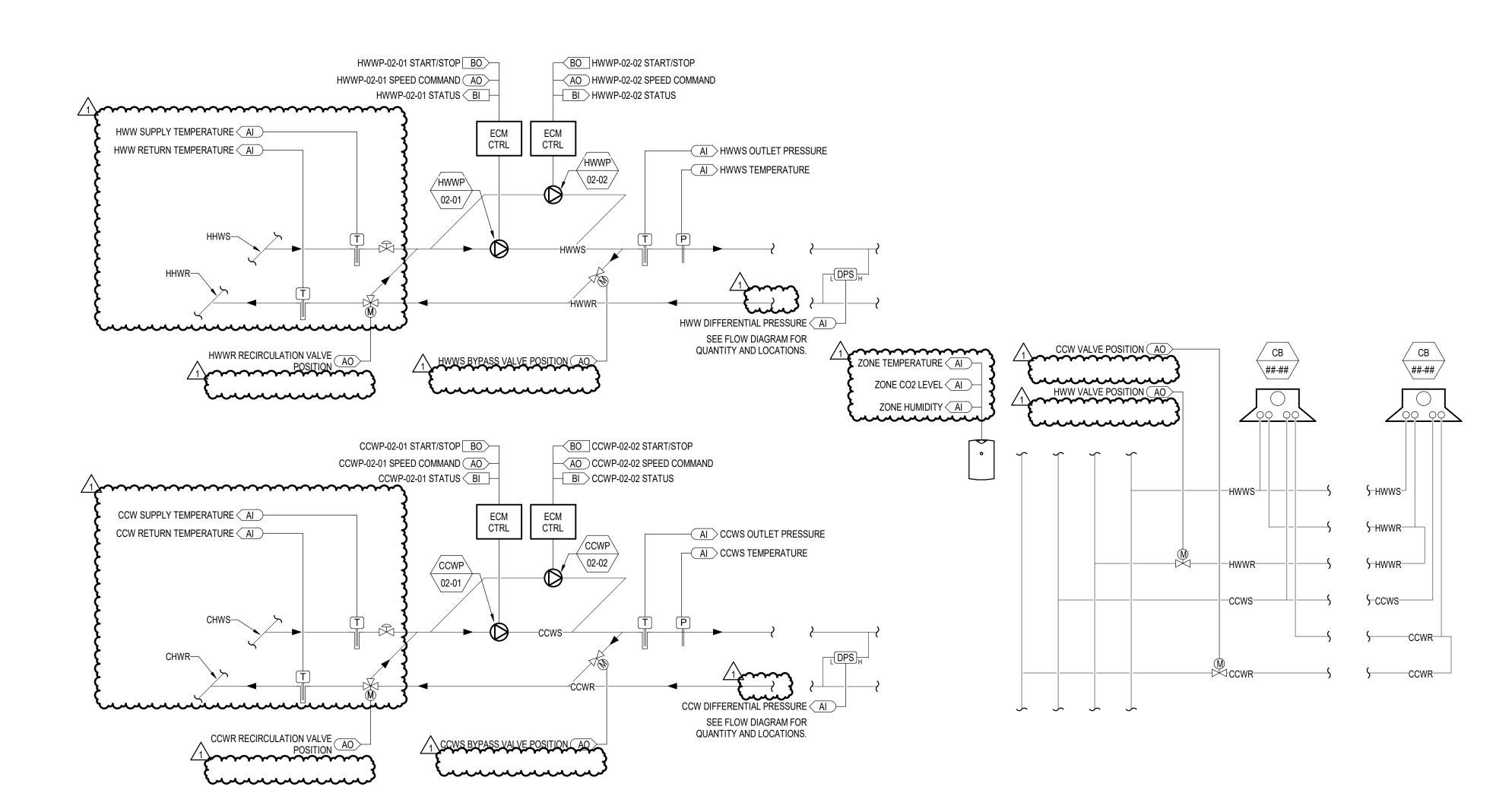


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CONTROLS - FANS

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	POINTS TABLE CH	ILLED BEAM S	SYSTEM	
POIN	T DISCRIPTION	POINT TYPE	HARDWIRED (H) OR NETWORKED (N)?	EXPECTED RANG
CCW	SUPPLY TEMPERATURE	Al	N	0-100%
CCW	RETURN TEMPERATURE	Al	N	0-100%
CCW	DIFFERENTIAL PRESSURE	Al	Н	0-40 psi
CCW VALVE	POSITION	AO	N	0-100%
CCWP-02-01	START/STOP	ВО	N	-
CCWP-02-01	SPEED COMMAND	AO	N	0-100%
CCWP-02-01	STATUS	BI	N	0-100%
CCWP-02-02	START/STOP	ВО	N	-
CCWP-02-02	SPEED COMMAND	AO	N	0-100%
CCWP-02-02	STATUS	BI	N	0-100%
CCWR RECIRCULATION VALVE	POSITION	AO	N	0-100%
CCWS	TEMPERATURE	Al	Н	35-65°F
CCWS	OUTLET PRESSURE	Al	Н	0-200 psi
CCWS BYPASS VALVE	POSITION	AO	N	0-100%
HWW	SUPPLY TEMPERATURE	Al	N	0-100%
HWW	RETURN TEMPERATURE	Al	N	0-100%
HWW	DIFFERENTIAL PRESSURE	Al	Н	0-40 psi
HWW VALVE	POSITION	AO	N	0-100%
HWWP-02-01	START/STOP	ВО	N	-
HWWP-02-01	SPEED COMMAND	AO	N	0-100%
HWWP-02-01	STATUS	BI	N	0-100%
HWWP-02-02	START/STOP	ВО	N	-
HWWP-02-02	SPEED COMMAND	AO	N	0-100%
HWWP-02-02	STATUS	BI	N	0-100%
HWWR RECIRCULATION VALVE	POSITION	AO	N	0-100%
HWWS	TEMPERATURE	Al	Н	35-65°F
HWWS	OUTLET PRESSURE	Al	Н	0-200 psi
HWWS BYPASS VALVE	POSITION	AO	N	0-100%
ZONE	CO2 LEVEL	Al	Н	0-1500 PPM
ZONE	TEMPERATURE	Al	Н	65-80°F
ZONE	HUMIDITY	Al	Н	20%-80%

CHILLED BEAM SYSTEM CONTROL DIAGRAM

SEQUENCE OF OPERATIONS – CB, CCWPS, HWWPS

- GENERAL:

 A. THE TENANT OFFICE IS SERVED BY A SYSTEM OF ACTIVE CHILLED BEAMS (CB) GROUPED IN ZONES. THE CHILLED BEAMS RECEIVE COOLING CIRCUIT WATER (CCW) AND HEATING WARM WATER (HWW)
- FROM LOOPS LOCALIZED TO THE TENANT OFFICE.

 B. THE HYDRONIC LOOPS OPERATE BY ADMITTING EITHER CHW OR HHW TO THE LOOP AS REQUIRED TO SATISFY THE LEAVING WATER TEMPERATURE OF THE LOOP. THE TEMPERATURE OF THE CCW LOOP IS MAINTAINED ABOVE THE DEWPOINT OF THE SPACE TO PREVENT CONDENSATION.
- C. THE PRESSURE INDEPENDENT BALANCING VALVES OF THE CB ZONES MODULATE BASED ON DEMAND.
 D. THE AHU (SEPARATE SEQUENCE) PROVIDES CONSTANT SUPPLY AIR VOLUME TO THE CBS.
- 2. CONTROLS ARCHITECTURE:

 A. CONTROL POINTS SHALL BE CONTROLLED BY THE CENTRAL BAS VIA BACNET COMMUNICATION PROTOCOL. ALL CONTROL POINTS, WHETHER EXPLICITLY LISTED OR NOT, SHALL BE VISIBLE AND
- CONTROLLABLE VIA THE BAS.
 B. PUMP CONTROL
- a. PUMP START COMMAND:

 OPERATIONALLY RELEVANT VALVE ACTUATORS ARE POWERED.
- PUMPS START AFTER A 15 SEC (ADJ.) DELAY WHEN THE ASSOCIATED VALVES ARE PROVEN OPEN.
 PUMP STATUS PROVES ON.
- b. PUMP STOP COMMAND (OR DE-ENERGIZED):PUMPS DE-ENERGIZED.
- OPERATIONAL VALVES ARE CLOSED AND VALVE ACTUATOR IS SPRING RETURN CLOSE
 OCCUPIED/UNOCCUPIED MODES

 A. TEMPERATURE SETPOINTS
- a. OCCUPIED:

 COOLING: 78°F +/- 2°F
- HEATING: 68°F +/- 2°FRELATIVE HUMIDITY: 55%
- RELATIVE HUMIDITY: 53
 UNOCCUPIED:
 COOLING: 82°F +/- 2°F
- HEATING: 60°F +/- 2°F
 SCHEDULE SHALL BE BASED ON AN OCCUPANCY SCHEDULE PROVIDED BY THE OWNER.

 OCCUPANCY OVERPINE. IF DURING THE UNDOCUMED PERSON THERE IS A PEOULECT FOR
- C. OCCUPANCY OVERRIDE: IF DURING THE UNOCCUPIED PERIOD THERE IS A REQUEST FOR OCCUPANCY OVERRIDE, THE OCCUPANCY MODE SHALL BECOME ACTIVE FOR 2 HOURS (ADJ.).
 D. PRIOR TO SCHEDULED OCCUPANCY, OCCUPIED MODE SHALL BE ENGAGED WITH SUFFICIENT TIME TO ENSURE THE SPACES SERVED ARE AT THE OCCUPIED TEMPERATURE SETPOINT AND VENTILATION AND EXHAUST RATES PRIOR TO THE SCHEDULED OCCUPANCY.
- E. OCCUPIED MODE: a. ASSOCIATED AHU ENERGIZED.
- b. ALL COILS AVAILABLE FOR OPERATION.F. UNOCCUPIED MODE (UNIT OFF): UNIT REMAINS OFF WHEN IN UNOCCUPIED MODE.
- a. ASSOCIATED AHU DE-ENERGIZED.b. TEMPERING OFFc. HEAT PIPE SYSTEM OFF
- d. OPERATIONAL CONTROL VALVES CLOSED

 4 PLIMP CONTROL (LEAD), AG-STANDRY EACH PLIMP SIZED AT 100%
- 4. PUMP CONTROL (LEAD/LAG-STANDBY EACH PUMP SIZED AT 100%)
 A. ONCE ENABLED THE PUMP SPEED SHALL BE MODULATED TO MAINTAIN THE DIFFERENTIAL SETPOINT. SOFTWARE LEAD/LAG-STANDBY FUNCTION SHALL ALLOW EITHER OF THE PUMPS TO ACT AS THE LEAD PUMP. SHOULD THE LEAD PUMP FAIL TO START, AS SENSED BY THE PUMPS C/T SWITCH, AN ALARM SHALL BE SENT TO THE OPERATORS WORKSTATION AND THE BAS SHALL START THE LAG PUMP. THE OBJECTIVE IS TO ALWAYS HAVE ONE ZONE CONTROL VALVE 80% OPEN SO THE PUMPS OPERATE AT THE LOWEST SPEED AND PRESSURE POSSIBLE TO SATISFY THE CURRENT LOAD. CONTINUOUSLY MONITOR THE ZONE CONTROL VALVE POSITIONS. WHEN THE MOST OPEN VALVE IS MORE THAT 90% OPEN FOR 10 MIN (ADJ), THE DIFFERENTIAL PRESSURE SETPOINT SHALL BE RESET UP BY 0.5 PSID (ADJ). WHEN ALL VALVES ARE 60% (ADJ) OR BELOW FOR 10 MIN (ADJ), THE DIFFERENTIAL SETPOINT SHALL BE RESET DOWN BY 0.25 PSID. CONTINUE TO RESET DIFFERENTIAL SETPOINT DOWN 0.25 PSID
- AT 10 MINUTE INTERVALS (ADJ) UNTIL ONE ZONE CONTROL VALVE IS 75% (ADJ) OPEN.

 B. THE REMOTE DP SETPOINT SHALL BE MAINTAINED BETWEEN MAXIMUM AND MINIMUM PRESSURE. THE MAXIMUM PRESSURE LIMIT IS THE PRESSURE REQUIRED TO PROVIDE FULL FLOW TO ALL HEATING CONTROL VALVES SIMULTANEOUSLY (FINALIZED DURING THE INITIAL PROJECT TAB EFFORTS). THE MINIMUM PRESSURE LIMIT IS THE PRESSURE CORRELATING TO THE LOWEST SPEED THE PUMP MOTOR IS ALLOWED TO BE OPERATED (PER MOTOR MANUF. AND TAB). THE SPEED CONTROLLER INTERNAL SETTING WILL ALLOW THE SPEED CONTROLLER TO RUN THE PUMPS TO THEIR MINIMUMS.
- C. WHEN MULTIPLE REMOTE DIFFERENTIAL PRESSURE SENSORS ARE IN USE, CONTROL TO THE SENSOR WITH THE HIGHEST DIFFERENTIAL PRESSURE SETPOINT.

 D. PUMP STAGING: WITH ONE PUMP RUNNING, WHEN THE PUMP COMMAND REACHES 100% AND THE DIFFERENTIAL PRESSURE DROPS MORE THAN 2 PSI BELOW THE SETPOINT FOR 10 MINUTES (ALL ADJ), START THE LAG PUMP. BOTH PUMPS SHALL CONVERGE AND RUN IN PARALLEL TO MAINTAIN THE DIFFERENTIAL PRESSURE SETPOINT AND THE REMOTE DP SETPOINTS. WHEN THE PUMPS DROP TO THEIR MINIMUM OPERATING SPEED FOR 10 MINUTES (ADJ), THE LAG PUMP SHUTS OFF AND THE LEAD PUMP RESUMES CONTROL.
- E. IF THE FOLLOWING CONDITIONS ARE MET, THE MINIMUM FLOW BYPASS VALVE SHALL MODULATE TO MAINTAIN MINIMUM PUMP FLOW:

 a. THE DIFFERENTIAL PRESSURE SETPOINT IS SATISFIED BY A SINGLE PUMP
- b. THAT PUMP REACHES THE MINIMUM FLOW CONDITION
 c. ANY HEATING VALVE IN THE SYSTEM IS OPEN AND IS UNABLE TO SATISFY IT'S OPERATING CONDITIONS FOR MORE THAN 15 MINUTES (ADJ.).
 F. THE BAS SHALL ALTERNATE THE DESIGNATION OF THE LEAD/LAG PUMP TO MAINTAIN THE OPERATING TIME OF EACH PUMP TO BE WITHIN 200 HOURS OF EACH OTHER.
- F. THE BAS SHALL ALTERNATE THE DESIGNATION OF THE LEAD/LAG PUMP TO MAINTAIN THE OPERATING TIME OF EACH PUMP TO BE WITHIN 200 HOURS OF EACH OTHER.
 G. WHEN THERE ARE NO ZONES CALLING FOR COOLING FOR MORE THAN 30 MINUTES (ADJ.), THE CCWPS SHALL BE REMOVED FROM SERVICE UNTIL THERE IS A CALL FOR COOLING.
- H. WHEN THERE ARE NO ZONES CALLING FOR HEATING FOR MORE THAN 30 MINUTES (ADJ.), THE HWWPS SHALL BE REMOVED FROM SERVICE UNTIL THERE IS A CALL FOR HEATING.
 PUMP OPERATION AND PROTECTION:

 A. THE PUMP SPEEDS WILL NOT DROP BELOW 20HZ (ADJ) AND SHALL NOT EXCEED 60 HZ.
- B. THE DIFFERENTIAL PRESSURE SETPOINT SHALL BE ESTABLISHED DURING THE SYSTEM TESTING AND BALANCING.

 C. MECHANICAL HIGH STATIC PROTECTION CUTOES SHALL BE INSTALLED TO PROTECT THE SYSTEM AND FOLIPMENT FROM PRESSURIZATION-RELATED DAMAGE
- C. MECHANICAL HIGH STATIC PROTECTION CUTOFFS SHALL BE INSTALLED TO PROTECT THE SYSTEM AND EQUIPMENT FROM PRESSURIZATION-RELATED DAMAGE.

 D. THE PUMPS ARE SIZED FOR N-1 OPERATION. IN THE EVENT OF A PUMP FAILURE, THE REMAINING PUMP(S) WILL ADJUST TO COMPENSATE FOR THE MISSING PUMP
 6. CCW WATER TEMPERATURE RESET STRATEGY
- A. PRIOR TO THE SUCTION OF THE PUMPS, AN AUTOMATED 3-WAY MIXING VALVE SHALL BE INSTALLED. IN PIPING 3' FROM THE DISCHARGE OF THE PUMP, A TEMPERATURE SENSOR SHALL BE INSTALLED AND REPORT TO THE BAS. THE BAS SHALL MODULATE THE 3-WAY VALVE TO ADMIT 45° CHW FROM THE BASE BUILDING SUPPLY TO MAINTAIN THE CCW SUPPLY SETPOINT AT 57.5°F.
- B. IF THE DEWPOINT OF ALL OF THE ZONES IS MORE THAN 2°F BELOW THE CCW TEMPERATURE AND ONE OR MORE CCW CONTROL VALVES ARE MORE THAN 80% OPEN, THE CCW TEMPERATURE SHALL REDUCE BY 0.5°F IN 15 MINUTE INCREMENTS UNTIL ALL CCW VALVES ARE LESS THAN 80% OPEN (ADJ.). THE FLOOR OF THE CCW SUPPLY TEMPERATURE RESET SHALL BE 56°F.

 C. IF AT ANY POINT THE SPACE DEWPOINT TEMPERATURE IS WITHIN 1°F OF THE CCW DISCHARGE TEMPERATURE, THE COOLING WATER DISCHARGE TEMPERATURE SETPOINT SHALL RISE BY 1°F AND AHU SHALL BE COMMANDED INTO DEHUMIDIFICATION MODE (SEE AHU SEQUENCE). THIS SHALL CONTINUE UNTIL THE SPACE DEWPOINT TEMPERATURE HAS FALLEN BELOW THE HIGH LIMIT DESCRIBED ABOVE
- FOR LONGER THAN 30 MINUTES (ADJ.).

 7. HWW WATER TEMPERING STRATEGY

 A. PRIOR TO THE SUCTION OF THE PUMPS, AN AUTOMATED 3-WAY MIXING VALVE SHALL BE INSTALLED. IN PIPING 3' FROM THE DISCHARGE OF THE PUMP, A TEMPERATURE SENSOR SHALL BE INSTALLED AND REPORT TO THE BAS. THE BAS SHALL MODULATE THE 3-WAY VALVE TO ADMIT 140° HHW FROM THE BASE HHW LOOP TO MAINTAIN THE HWW LOOP SUPPLY SETPOINT AT 120°F.
- A. THE CB ZONES WILL BE PIPED SUCH THAT TWO PRESSURE INDEPENDENT 2-WAY CONTROL VALVES SHALL REGULATE THE FLOW IN THE HWW AND CCW. WHEN IN SETPOINT DEADBAND, BOTH CONTROL VALVES WILL DEFAULT TO THE UNPOWERED POSITION WITH HEATING AND COOLING CLOSED. THE VALVES SHALL NEVER BE OPEN SIMULTANEOUSLY.

 B. WHEN THE SPACE TEMPERATURE OF A ZONE EXCEEDS THE COOLING SETPOINT FOR MORE THAN 15 MINUTES (ADJ.), THE CCW ZONE CONTROL VALVE SHALL BE ENGAGED AND MODULATE TO MAINTAIN SPACE TEMPERATURE. IF THE CONTROL VALVE IS FULLY OPEN, THE ZONE COOLING TEMPERATURE IS STILL ABOVE SETPOINT, AND THE CCW SUPPLY TEMPERATURE CANNOT BE REDUCED ANY MORE,
- C. WHEN THE SPACE TEMPERATURE OF A ZONE IS BELOW THE HEATING SETPOINT FOR MORE THAN 15 MINUTES (ADJ.), THE HWW ZONE CONTROL VALVE SHALL BE ENGAGED AND MODULATE TO MAINTAIN SPACE TEMPERATURE. IF THE CONTROL VALVE IS FULLY OPEN AND THE ZONE TEMPERATURE HEATING SETPOINT CANNOT BE MAINTAINED, THE AHU SHALL ENGAGE THE SUPPLY AIR RESET STRATEGY (SEE AHU SEQUENCE FOR DETAILS). THIS LOGIC WILL BE SLOW ACTING TO ALLOW FOR INHERENTLY SLOW RESPONSE TIME OF ACTIVE BEAM SYSTEMS.

THE AHU SHALL ENGAGE THE SUPPLY AIR RESET STRATEGY (SEE AHU SEQUENCE FOR DETAILS). THIS LOGIC WILL BE SLOW ACTING TO ALLOW FOR INHERENTLY SLOW RESPONSE TIME OF ACTIVE BEAM

- 9. ALARMS INDICATION: THE CONTROLLER WILL DISPLAY ALARMS AND HAVE ONE DIGITAL OUTPUT FOR REMOTE INDICATION OF AN ALARM CONDITION. POSSIBLE ALARMS INCLUDE:
- A. BUILDING MANAGEMENT SYSTEM:a. THE CONTROLLER WILL SEND ALL ALARMS TO THE BAS.
- B. TEMPERATURE SENSOR ALARM:

 a. THE CONTROLLER SENDS AN ALARM IN THE CASE OF A FAILED AIR TEMPERATURE SENSOR.
- C. PRESSURE SENSOR ALARM:

 a. THE CONTROLLER SENDS AN ALARM IN THE CASE OF A FAILED PRESSURE SENSOR.
- a. THE CONTROLLER SENDS AN ALARM IN THE CASE OF A FAILED PRESSURE SENSOR.
 D. PUMP FAILURE:
 a. BAS SHALL PROVE FAN ARRAY OPERATION AND USE THE STATUS INDICATION TO ACCUMULATE RUNTIME. UPON FAILURE OF ANY OF THE PUMPS, THE BAS SHALL ALARM THAT PUMP FAILURE
- CONDITION.
 HIGH OR LOW PRESSURE SAFETY:

 A LIPON ACTIVATION OF A HIGH OR LOW PRESSURE SAFETY SWITCH, AH SHALL BE DEFNERGIZED, PLIMPS SHALL BE DEFNERGIZED VIA A HARD WIRED INTERLOCK, AND AN INDICATION OF
- a. UPON ACTIVATION OF A HIGH OR LOW PRESSURE SAFETY SWITCH, AH SHALL BE DEENERGIZED, PUMPS SHALL BE DEENERGIZED VIA A HARD WIRED INTERLOCK, AND AN INDICATION OF THE OPERATION SHALL BE SENSED BY THE BAS. BAS SHALL ANNUNCIATE APPROPRIATE ALARM AND REMOVE AND LOCK OUT THE START COMMAND.
- 10. ACCESSORIES: PROVIDE THE FOLLOWING.
 A. BAS INTERFACING:
- a. A BAS PORT OR SERIAL CARD IS PROVIDED WITH THE CONTROLLER FOR FIELD INTERFACING WITH A BUILDING AUTOMATION SYSTEM.
 b. UPDATE DEFAULT SETTINGS TO THE APPROPRIATE ADDRESSES TO MATCH THE BAS SETTINGS.
- B. DDC REMOTE INTERFACE:
 a. FACTORY PROVIDED, FIELD MOUNTED INTERFACE PANEL THAT WILL BE WIRED TO THE MAIN CONTROLLER FOR MONITORING AND REMOTE ADJUSTMENTS OF SET POINTS.
- C. PHASE AND BROWNOUT PROTECTION

 a. FACTORY MOUNTED AND WIRED COMPONENT WHICH MONITORS THE MAIN POWER COMING INTO THE UNIT.
- b. IF A PHASE DROPS OUT, OR IF THE INCOMING VOLTAGE EXCEEDS THE ACCEPTABLE RANGE, THE COMPONENT WILL TURN OFF THE UNIT TO HELP PROTECT THE ELECTRICAL SYSTEMS.

 11. MINIMUM REQUIREMENTS FOR OPERATOR WORKSTATION DISPLAY
- A. CCW AND HWW SYSTEM FLOW
 B. ALL DATA FROM BTU METER
 C. MAJOR VALVE STATUS
- C. MAJOR VALVE STATUSD. PUMP ON-OFF STATUS
- E. PUMP SPEED
 F. PUMP ASSIGNMENT (LEAD/LAG)
 G. ALL TEMPERATURE SENSORS
- H. ALL DIFFERENTIAL PRESSURE SENSORS

 OPERATIONAL STATUS OF FACH CR ZON
- I. OPERATIONAL STATUS OF EACH CB ZONE J. ALARMS

IN128 - JAMES T. MORRIS ARENA

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IU Project NO. 20240127

Owner
INDIANA UNIVERSITY BOARD OF TRUSTEE
2901 EAST DISCOVERY PARKWAY
BLOOMINGTON, IN 47408
812-855-1692

Architect
RATIO
101 SOUTH PENNSYLVANIA STREET
INDIANAPOLIS, IN 46204
317-633-4040

Structural Engineer
FINK ROBERTS AND PETRIE, INC.
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SUITE 126 INDIANAPOLIS, IN 46240 317-872-8400

Mechanical / Electrical
INTROBA
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800-404-7677

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138 N. DELAWARE ST INDIANAPOLIS, IN 46204 317-633-4120

Acoustics / Technology Engineer
WJHW
7220 W JEFFERSON AVE

7220 W. JEFFERSON AVE SUITE 216 LAKEWOOD, CO 80235 972-934-3700

Civil Engineer

AMERICAN STRUCTUREPOINT, INC.

9025 RIVER ROAD SUITE 200 INDIANAPOLIS. IN 46240

317-547-5580

Food Service Consultant

CINILITTLE

3405 NW 9TH AVENUE #1202
FORT LAUDERDALE, FL 33309
954-846-9600

Code Consultant
FORZA

2502 WEST MECHANIC ST, SUITE C HARRISONVILLE, MO 64701 816-806-3729

SEAL | DATE



1 95% CONSTRUCTION DOCUMENTS 12/19/24
2 CONSTRUCTION DOCUMENTS 01/13/25
3 ADDENDUM 01 01/27/25



23112.000

PROJECT NO.

SHEET TITLE

MECHANICAL

CONTROLS -

SYSTEM
SHEET NUMBER

PLUMBING EQUIPMENT ELECTRICAL CONNECTION SCHEDULE

GENERAL NOTES:

A. MAKE CONNECTIONS TO EQUIPMENT VIA STARTER AND/OR DISCONNECT SWITCH(ES). B. WHERE STARTER IS NOT WITHIN LINE OF SITE OF EQUIPMENT OR SOURCE BREAKER, PROVIDE ADDITIONAL DISCONNECT SWITCH FOR STARTER. C. ALL CONNECTIONS, MOTOR CONTROLS, AND DISCONNECTS USED OUTSIDE OR IN DAMP OR WET LOCATIONS SHALL BE NEMA 3R OR BETTER.

D. PROVIDE FUSES IN DISCONNECT SWITCHES PER MANUFACTURER'S RECOMMENDATIONS. DO NOT EXCEED MOCP RATINGS ON NAMEPLATES. E. ALL CIRCUIT BREAKERS FEEDING EQUIPMENT SHALL BE HACR RATED. F. CONTRACTOR SHALL CONFIRM EXACT SIZE, LOCATION, AND WIRING REQUIREMENTS OF ACTUAL EQUIPMENT BEING PROVIDED PRIOR TO ROUGH-IN.

G. ALL STARTERS AND DISCONNECT SWITCHES SHALL BE PROVIDED BY DIVISION 26 UNLESS SCHEDULED OR NOTED ON THE DRAWINGS OF OTHER DIVISIONS. H. ALL EQUIPMENT SHALL HAVE LOCAL DISCONNECTING MEANS UNLESS WITHIN LINE OF SIGHT OF SOURCE BREAKER. I. ALL DISCONNECT SWITCHES LOCATED DOWNSTREAM OF VFDS SHALL HAVE SIGN READING, "DO NOT OPERATE WHILE VFD IS ENERGIZED".

KEYED NOTES:

1. PROVIDE GFI BREAKER TO SERVE EQUIPMENT.

STARTER ABBREVIATIONS: FVNR = FULL VOLTAGE NON-REVERSING FVR = FULL VOLTAGE REVERSING RV = REDUCED VOLTAGE VFD = VARIABLE FREQUENCY DRIVE INT = INTEGRAL TO EQUIPMENT HOA = FURNISH WITH HAND-OFF-AUTO SWITCH MAN = MANUAL MOTOR STARTER WITH PILOT ENCB = ENCLOSED CIRCUIT BREAKER DISCONNECT

MTS = MOTOR RATED TOGGLE SWITCH

REC - RECEPTACLE SERVES AS LOCAL

DISCONNECT

ITEN	/I ID		DOL 50	CALCULATED	APPARENT						EMERGENCY	5	
EQUIP.	N0.	VOLTAGE	POLES	AMPS	LOAD (VA)	PANEL	CIRCUIT#	FEEDER SIZE	EDER SIZE DISCONNECT	VFD	POWER	LEVEL 3	KEYED NOTE
DWBP	1	480 V	3	43.3 A	36000	EOSHD1	7,9,11	3#4,#8G,1 1/4"C.	60A/3P	No	Yes	00-EVENT LEVEL	
IBP	1	480 V	3	7.6 A	6300	ENHD1	26,28,30	3#10,1#10G,3/4"C.	60A/3P	No	No	00-EVENT LEVEL	
RCP	1	120 V	1	0.8 A	100	ENLB1	27	2#12,1#12G,1/2"C.	MTR RD SWITCH	No	No	00-EVENT LEVEL	
RCP	2	120 V	1	0.8 A	100	ENLB1	27	2#12,1#12G,1/2"C.	MTR RD SWITCH	No	No	00-EVENT LEVEL	
RPZ	1	120 V	1	0.4 A	50	EOSLD1	15	2#12,1#12G,1/2"C.	MTR RD SWITCH	No	Yes	00-EVENT LEVEL	
RPZ	2	120 V	1	0.4 A	50	EOSLD1	15	2#12,1#12G,1/2"C.	MTR RD SWITCH	No	Yes	00-EVENT LEVEL	
SE	1	480 V	3	6.8 A	5653.4	OSDP	4	3#12,#12G,1/2"C.	30A/3P	No	Yes	00-EVENT LEVEL	
SE	2	480 V	3	7.6 A	6300	EOSHD1	13,15,17	3#10,1#10G,3/4"C.	30A/3P	No	Yes	00-EVENT LEVEL	
TMZ	1	120 V	1	0.8 A	100	EOSLB2	13	2#12,1#12G,1/2"C.	MTR RD SWITCH	No	Yes	00-EVENT LEVEL	
WH	1	120 V	1	0.7 A	86	EOSLB1	3	2#12,1#12G,1/2"C.	SIMPLEX OUTLET	No	Yes	00-EVENT LEVEL 1	
WH	2	120 V	1	0.7 A	86	EOSLB1	5	2#12,1#12G,1/2"C.	SIMPLEX OUTLET	No	Yes	00-EVENT LEVEL 1	
WS	1	120 V	1	0.4 A	50	EOSLD1	15	2#12,#12G,1/2"C.	MTR RD SWITCH	No	Yes	00-EVENT LEVEL	

SCHEDULE

GENERAL NOTES: COORDINATE EXACT REQUIREMENTS WITH MECHANICAL. B. CONTROL CABLING BY OTHERS. **KEYED NOTES:**

ITEN	M ID				
EQUIP.	N0.	PANEL	CONDUIT SIZE	LEVEL	NOTES
EAVAV	00-01	BAS	1/2"C	00-EVENT LEVEL	
EAVAV	00-02	BAS	1/2"C	00-EVENT LEVEL	
EAVAV	00-03	BAS	1/2"C	00-EVENT LEVEL	
EAVAV	00-04	BAS	1/2"C	00-EVENT LEVEL	
EAVAV	00-05	BAS	1/2"C	00-EVENT LEVEL	
EAVAV	00-06	BAS	1/2"C	00-EVENT LEVEL	
EAVAV	00-07	BAS	1/2"C	00-EVENT LEVEL	
EAVAV	80-00	BAS	1/2"C	00-EVENT LEVEL	
EAVAV	00-09	BAS	1/2"C	00-EVENT LEVEL	
EAVAV	00-10	BAS	1/2"C	00-EVENT LEVEL	
EAVAV	00-11	BAS	1/2"C	00-EVENT LEVEL	
EAVAV	00-12	BAS	1/2"C	00-EVENT LEVEL	
EAVAV	00-13	BAS	1/2"C	00-EVENT LEVEL	
EAVAV	00-14	BAS	1/2"C	00-EVENT LEVEL	
EAVAV	00-15	BAS	1/2"C	00-EVENT LEVEL	
EAVAV	01-01	BAS	1/2"C	01-CONCOURSE LEVEL	
EAVAV	01-02	BAS	1/2"C	01-CONCOURSE LEVEL	
EAVAV	01-03	BAS	1/2"C	01-CONCOURSE LEVEL	
EAVAV	01-04	BAS	1/2"C	01-CONCOURSE LEVEL	
OAVAV	00-01	BAS	1/2"C	00-EVENT LEVEL	
OAVAV	00-02	BAS	1/2"C	00-EVENT LEVEL	
OAVAV	00-03	BAS	1/2"C	00-EVENT LEVEL	
OAVAV	00-04	BAS	1/2"C	00-EVENT LEVEL	
OAVAV	00-05	BAS	1/2"C	00-EVENT LEVEL	
OAVAV	00-06	BAS	1/2"C	00-EVENT LEVEL	
OAVAV	00-07	BAS	1/2"C	00-EVENT LEVEL	
OAVAV	00-08	BAS	1/2"C	00-EVENT LEVEL	
OAVAV	00-09	BAS	1/2"C	00-EVENT LEVEL	
OAVAV	00-10	BAS	1/2"C	00-EVENT LEVEL	
OAVAV	00-11 00-12	BAS BAS	1/2"C 1/2"C	00-EVENT LEVEL	
OAVAV OAVAV	00-12	BAS	1/2 C	00-EVENT LEVEL 00-EVENT LEVEL	
OAVAV		BAS	1/2 C		
OAVAV	00-14 00-15	BAS	1/2 C	00-EVENT LEVEL 00-EVENT LEVEL	
OAVAV	01-01	BAS	1/2 C	01-CONCOURSE LEVEL	
OAVAV	01-01	BAS	1/2 °C	01-CONCOURSE LEVEL	
OAVAV	01-02	BAS	1/2 °C	01-CONCOURSE LEVEL	
OAVAV	01-03	BAS	1/2 °C	01-CONCOURSE LEVEL	
VAV	00-01	BAS	1/2 °C	00-EVENT LEVEL	
VAV	00-01	BAS	1/2 °C	00-EVENT LEVEL	
VAV	00-02	BAS	1/2 °C	00-EVENT LEVEL	
VAV	00-03	BAS	1/2 °C	00-EVENT LEVEL	
VAV	00-05	BAS	1/2"C	00-EVENT LEVEL	
VAV	00-06	BAS	1/2"C	00-EVENT LEVEL	
VAV	00-07	BAS	1/2"C	00-EVENT LEVEL	
VAV	00-08	BAS	1/2"C	00-EVENT LEVEL	
VAV	00-00	BAS	1/2"C	00-EVENT LEVEL	
VAV	00-10	BAS	1/2"C	00-EVENT LEVEL	
VAV	00-10	BAS	1/2 °C	00-EVENT LEVEL	
VAV	00-11	BAS	1/2 °C	00-EVENT LEVEL	
VAV	00-12	BAS	1/2 °C	00-EVENT LEVEL	
VAV	00-13	BAS	1/2 °C	00-EVENT LEVEL	
VAV	00-14	BAS	1/2 °C	00-EVENT LEVEL	
VAV	00-13	BAS	1/2 °C	00-EVENT LEVEL	
VAV	00-16	BAS	1/2 °C	00-EVENT LEVEL	
VAV	00-17	BAS	1/2 C	00-EVENT LEVEL	
VAV	00-19	BAS	1/2 C	00-EVENT LEVEL	
VAV	00-20	BAS	1/2"C	00-EVENT LEVEL	

1/2"C

1/2"C

1/2"C

1/2"C

1/2"C

VAV 00-22

VAV 00-23

VAV 00-24

VAV 00-25

VAV 00-26 BAS

VAV 00-27 BAS

00-EVENT LEVEL

CONTROL VOLTAGE ELECTRICAL CONNECTION

ABBREVIATIONS: A. PROVIDE CONDUIT (SIZE AS INDICATED) FROM EQUIPMENT INDICATED TO BAS. | BAS = BUILDING AUTOMATION SYSTEM

<u>(S:</u>							S AND DISCON T SHALL HAV CT SWITCHES OPTIONAL ST RACTOR. UPD	NECT S E LOCAI LOCAT ANDBY ATE PAN	WITCHES SHALL I L DISCONNECTING ED DOWNSTREAN POWER AS REQUI NEL LEGENDS AS	BE PROVIDED BY D B MEANS UNLESS V M OF VFDS SHALL I RED TO ALL OF TH	OIVISION 26 UI WITHIN LINE (HAVE SIGN RI IE BAS CONTI	NLESS SCHEDL DF SIGHT OF SC EADING, "DO NO ROL PANELS. C	QUIPMENT BEING PROVIDED F ILED OR NOTED ON THE DRAW DURCE BREAKER. OT OPERATE WHILE VFD IS ENI OORDINATE EXACT QUANTITIE	/INGS OF OTHER DIVISION ERGIZED".		SHOP DRAWINGS AI	HOA = FURNISH W MAN = MANUAL MI LIGHT ENCB = ENCLOSE ND DISCONNECT MTS = MOTOR RA REC = RECEPTAC DISCONNECT BAS = BUILDING A
	PANEL	CONDUIT CITE	LEVEL	NOTES	1 MAK	E EINIAI DO	WER CONNE	CTIONS:	TO VED EROM SEI	SVING BREAKER/D	ISCONNECT A	AS BEOLIBED 1	PROVIDE 1/2" CONDUIT FROM V	/FD TO BAS FOR CONTRO	NIS COORDINATE	ΕΕΙΝΔΙ /ΕΥΔΟΤ	
J.	BAS	CONDUIT SIZE 1/2"C	00-EVENT LEVEL	NOTES						CONTROLS CONTE		NEQUINED. I	NOVIDE 1/2 CONDOTT I NOW	VI D TO DAO I ON GONTING	DEG. GOORDINATE	I IIVAL/LXACT	
01	BAS	1/2 C 1/2"C	00-EVENT LEVEL							MENTS WITH FIRE							
03	BAS	1/2 C	00-EVENT LEVEL		3. WHE	N VFD MOU	INTED TO UN	IT, MOUI	NT VFD CLEAR OF	ALL ACCESS PANI	ELS AND DOC	RS. PROVIDE N	METAL CHANNEL RACKS TO MO	OUNT VFD TO AS REQUIRE	ED.		
03	BAS	1/2 C	00-EVENT LEVEL														
05	BAS	1/2 C 1/2"C	00-EVENT LEVEL														
05	BAS	1/2 C	00-EVENT LEVEL														
00	BAS	1/2 C	00-EVENT LEVEL														
08	BAS	1/2 °C	00-EVENT LEVEL			EM ID		POLES	CALCULATED	APPARENT						EMERGENCY	
09	BAS	1/2 °C	00-EVENT LEVEL		EQUIP.	N0.	VOLTAGE	. 0220	AMPS	LOAD (VA)	PANEL	CIRCUIT#	FEEDER SIZE	DISCONNECT	VFD	POWER	LEVEL
10	BAS	1/2 °C	00-EVENT LEVEL		AHU	00-01	480 V	3	43.0 A	35749.53	HCDP	4	3#6,#8G,1"C.	60A/3P	Yes	No	00-EVENT LEV
11	BAS	1/2 °C	00-EVENT LEVEL		AHU	00-02 #1	480 V	3	18.0 A	15000	EOSHA1	26,28,30	3#10,1#10G,3/4"C.	NONE	Yes	Yes	00-EVENT LEV
12	BAS	1/2 °C	00-EVENT LEVEL		AHU	00-02 #2	480 V	3	18.0 A	15000	EOSHA1	25,27,29	3#10,1#10G,3/4"C.	NONE	Yes	Yes	00-EVENT LEV
13	BAS	1/2 °C	00-EVENT LEVEL		AHU	00-02 #3	480 V	3	18.0 A	15000	EOSHA1	31,33,35	3#10,1#10G,3/4"C.	NONE	Yes	Yes	00-EVENT LEV
14	BAS	1/2 °C	00-EVENT LEVEL		AHU	00-02 #4	480 V	3	18.0 A	15000	EOSHA1	32,34,36	3#10,1#10G,3/4"C.	NONE	Yes	Yes	00-EVENT LEV
15	BAS	1/2 C	00-EVENT LEVEL		AHU	00-03	480 V	3	117.5 A	97687	HBDP	5	3#1/0,#6G,1 1/2"C.	200A/3P			00-EVENT LEV
01	BAS	1/2 C 1/2"C	01-CONCOURSE LEVEL		AHU	01-01 #1	480 V	3	6.0 A	5000	CNHC1	1,3,5	3#12,1#12G,3/4"C.	NONE	Yes	Yes	01-CONCOURSE
01	BAS	1/2 C 1/2"C	01-CONCOURSE LEVEL		AHU	01-01 #2	480 V	3	6.0 A	5000	CNHC1	2,4,6	3#12,1#12G,3/4"C.	NONE	Yes	Yes	01-CONCOURSE
02	BAS	1/2 C 1/2"C	01-CONCOURSE LEVEL		AHU	01-01 #3	480 V	3	6.0 A	5000	CNHC1	7,9,11	3#12,1#12G,3/4"C.	NONE	Yes	Yes	01-CONCOURSE
0.5	DAO	1/2 0	01-CONCOURSE LEVEL		AHU	01-01 #4	480 V	3	6.0 A	5000	CNHC1	8,10,12	3#12,1#12G,1/2"C.	NONE	Yes	Yes	01-CONCOURSE

A. MAKE CONNECTIONS TO EQUIPMENT VIA STARTER AND/OR DISCONNECT SWITCH(ES).

E. ALL CIRCUIT BREAKERS FEEDING EQUIPMENT SHALL BE HACR RATED.

B. WHERE STARTER IS NOT WITHIN LINE OF SITE OF EQUIPMENT OR SOURCE BREAKER, PROVIDE ADDITIONAL DISCONNECT SWITCH FOR STARTER.

C. ALL CONNECTIONS, MOTOR CONTROLS, AND DISCONNECTS USED OUTSIDE OR IN DAMP OR WET LOCATIONS SHALL BE NEMA 3R OR BETTER.

D. PROVIDE FUSES IN DISCONNECT SWITCHES PER MANUFACTURER'S RECOMMENDATIONS. DO NOT EXCEED MOCP RATINGS ON NAMEPLATES.

GENERAL NOTES:

QUIP. AHU	NO. 00-01	VOLTAGE 480 V	POLES 3	CALCULATED AMPS 43.0 A	APPARENT LOAD (VA) 35749.53	PANEL HCDP	CIRCUIT#	FEEDER SIZE 3#6,#8G,1"C.	DISCONNECT 60A/3P	VFD Yes	EMERGENCY POWER No	LEVEL 00-EVENT LEVEL	KEYED NOTES
AHU	00-02 #1	480 V	3	18.0 A	15000	EOSHA1	26,28,30	3#10,1#10G,3/4"C.	NONE	Yes	Yes	00-EVENT LEVEL	1,2,3
AHU AHU	00-02 #2 00-02 #3	480 V 480 V	3	18.0 A 18.0 A	15000 15000	EOSHA1	25,27,29 31,33,35	3#10,1#10G,3/4"C. 3#10,1#10G,3/4"C.	NONE NONE	Yes Yes	Yes Yes	00-EVENT LEVEL 00-EVENT LEVEL	1,2,3 1,2,3
\HU	00-02 #4	480 V	3	18.0 A	15000	EOSHA1	32,34,36	3#10,1#10G,3/4"C.	NONE	Yes	Yes	00-EVENT LEVEL	1,2,3
\HU \HU	00-03 01-01 #1	480 V 480 V	3	117.5 A 6.0 A	97687 5000	HBDP CNHC1	5 1,3,5	3#1/0,#6G,1 1/2"C. 3#12,1#12G,3/4"C.	200A/3P NONE	Yes	Yes	00-EVENT LEVEL 01-CONCOURSE LEVEL	1,2,3
λHU	01-01 #2	480 V	3	6.0 A	5000	CNHC1	2,4,6	3#12,1#12G,3/4"C.	NONE	Yes	Yes	01-CONCOURSE LEVEL	1,2,3
\HU \HU	01-01 #3 01-01 #4	480 V 480 V	3	6.0 A 6.0 A	5000 5000	CNHC1 CNHC1	7,9,11 8,10,12	3#12,1#12G,3/4"C. 3#12,1#12G,1/2"C.	NONE NONE	Yes Yes	Yes Yes	01-CONCOURSE LEVEL 01-CONCOURSE LEVEL	1,2,3
\HU	02-01 #1	480 V	3	33.7 A	28000	UNHA1	7,9,11	3#8,1#10G,3/4"C.	NONE	Yes	Yes	02-UPPER LEVEL	1,2,3
\HU \HU	02-01 #2 02-01 #3	480 V 480 V	3	33.7 A 33.7 A	28000 28000	UNHA1 UNHA1	1,3,5 10,12,14	3#8,1#10G,3/4"C. 3#8,1#10G,3/4"C.	NONE NONE	Yes Yes	Yes Yes	02-UPPER LEVEL 02-UPPER LEVEL	1,2,3
AHU	02-01 #4	480 V	3	33.7 A	28000	UNHA1	13,15,17	3#8,1#10G,3/4"C.	NONE	Yes	Yes	02-UPPER LEVEL	1,2,3
HU	02-02	480 V	3	74.4 A	61830	UNHB1	1,3,5	3#2,#6G,1 1/4"C.	100A/3P	Yes	No	02-UPPER LEVEL	1,2,3
AHU CCP	02-03 00-01	480 V 120 V	3	46.7 A 10.0 A	38825.65 1200	UNHD1 ENLB1	2,4,6	3#4,#8G,1"C. 2#12,#12G,1/2"C.	60A/3P MTR RD SWITCH	Yes No	No No	02-UPPER LEVEL 00-EVENT LEVEL	1,2,3
CCP	00-02	120 V	1	10.0 A	1200	ENLB1	13	2#12,#12G,1/2"C.	MTR RD SWITCH	No	Yes	00-EVENT LEVEL	
CP CP	02-01 02-02	120 V 120 V	1	16.7 A 10.0 A	2000 1200	UNLA1 UNLA1	3 11	2#12,1#12G,1/2"C. 2#12,1#12G,1/2"C.	MTR RD SWITCH MTR RD SWITCH			02-UPPER LEVEL 02-UPPER LEVEL	
CCP	02-03	120 V	1	10.0 A	1200	UNLB1	2	2#12,1#12G,1/2"C.	MTR RD SWITCH			02-UPPER LEVEL	
CCP CCP	02-04 02-05	120 V 120 V	1	10.0 A 10.0 A	1200 1200	UNLB1 UNLD1	4 29	2#12,1#12G,1/2"C. 2#12,1#12G,1/2"C.	MTR RD SWITCH MTR RD SWITCH			02-UPPER LEVEL 02-UPPER LEVEL	
CP	02-06	120 V	1	10.0 A	1200	UNLD1	38	2#12,1#12G,1/2"C.	MTR RD SWITCH			02-UPPER LEVEL	
CWP CWP	02-01 02-02	480 V 480 V	3	3.4 A 3.4 A	2826.71 2826.71	UOSHD1	7,9,11 13,15,17	3#12,#12G,1/2"C. 3#12,#12G,1/2"C.	30A/3P 30A/3P	Yes Yes	Yes Yes	02-UPPER LEVEL 02-UPPER LEVEL	1,3
HWP	02-02	480 V	3	21.7 A	18000	EOSHA1	2,4,6	3#8,1#10G,3/4"C.	NONE	Yes	Yes	00-EVENT LEVEL	1,3
HWP	00-02	480 V	3	21.7 A	18000	EOSHA1	8,10,12	3#8,1#10G,3/4"C.	NONE	Yes	Yes	00-EVENT LEVEL	1,3
HWP HWP	00-03 00-04	480 V 480 V	3	21.7 A 21.7 A	18000 18000	EOSHA1	14,16,18 20,22,24	3#8,1#10G,3/4"C. 3#8,1#10G,3/4"C.	NONE NONE	Yes Yes	Yes Yes	00-EVENT LEVEL 00-EVENT LEVEL	1,3 1,3
СР	00-01	120 V	1	1.0 A	120	EOSLB1	15	2#12,#12G,1/2"C.	MTR RD SWITCH	No	Yes	00-EVENT LEVEL	,
CP CP	00-02 00-03	120 V 120 V	1	1.0 A 1.0 A	120 120	EOSLB1 EOSLC1	17 17	2#12,#12G,1/2"C. 2#12,#12G,1/2"C.	MTR RD SWITCH MTR RD SWITCH	No No	Yes Yes	00-EVENT LEVEL 00-EVENT LEVEL	
СР	00-04	120 V	1	1.0 A	120	EOSLD1	25	2#12,#12G,1/2"C.	MTR RD SWITCH	No	Yes	00-EVENT LEVEL	
CP	00-05 00-01	120 V 208 V	1 2	1.0 A 0.6 A	120 120	EOSLD1 EOSLB2	20 15,17	2#12,#12G,1/2"C.	MTR RD SWITCH 30/3/1	No	Yes	00-EVENT LEVEL 00-EVENT LEVEL	
CU	00-01	208 V	2	0.6 A	120	EOSLB2	25,27	2#12,1#12G,1/2"C. 2#12,1#12G,1/2"C.	30/3/1			00-EVENT LEVEL	
CU	01-01	277 V	1	4.0 A	1100	ENHA1	20	2#12,1#12G,1/2"C.	30/3/1			01-CONCOURSE LEVEL	
CU	01-02 01-03	277 V 480 V	3	4.0 A 3.0 A	1100 2500	UNHB1 UNHB1	14 13,15,17	2#12,1#12G,1/2"C. 3#12,1#12G,1/2"C.	30/3/1 30/3/1			01-CONCOURSE LEVEL 01-CONCOURSE LEVEL	
CU	01-04	480 V	3	3.0 A	2500	ENHC1	9,11,13	3#12,1#12G,1/2"C.	30/3/1			01-CONCOURSE LEVEL	
CU	01-05 01-06	277 V 277 V	1	4.0 A 4.0 A	1100 1100	ENHC1 ENHD1	10 23	2#12,1#12G,1/2"C. 2#12,1#12G,1/2"C.	30/3/1 30/3/1			01-CONCOURSE LEVEL 01-CONCOURSE LEVEL	
CU	01-07	277 V	1	2.2 A	600	ENHA1	21	2#12,1#12G,1/2"C.	30/3/1			01-CONCOURSE LEVEL	
EF	02-01 02-02	208 V 208 V	3	13.8 A	4988.3	UNLA1	2,4,6	3#10,#10G,3/4"C.	30A/3P/3R		No	02-UPPER LEVEL	
GEF HWP	02-02	480 V	3	13.8 A 11.0 A	4988.3 9110	UNLD1 EOSHA1	2,4,6 1,3,5	3#10,#10G,3/4"C. 3#12,1#12G,3/4"C.	30A/3P/3R NONE	Yes	No Yes	02-UPPER LEVEL 00-EVENT LEVEL	1,3
HWP	00-02	480 V	3	11.0 A	9110	EOSHA1	7,9,11	3#12,1#12G,3/4"C.	NONE	Yes	Yes	00-EVENT LEVEL	1,3
HWP HWP	00-03 00-04	480 V 480 V	3	11.0 A 11.0 A	9110 9110	EOSHA1	13,15,17 19,21,23	3#12,1#12G,3/4"C. 3#12,1#12G,3/4"C.	NONE NONE	Yes Yes	Yes Yes	00-EVENT LEVEL 00-EVENT LEVEL	1,3
VLS	02-01	480 V	3	3.6 A	3000	UNHA1	22,24,26	3#12,1#12G,3/4"C.	NONE	Yes	Yes	02-UPPER LEVEL	1,3
VLS VLS	02-02 02-03	480 V 480 V	3	3.6 A 3.6 A	3000 3000	UNHA1 UNHD1	19,21,23 24,26,28	3#12,1#12G,3/4"C. 3#12,1#12G,3/4"C.	NONE NONE	Yes Yes	Yes Yes	02-UPPER LEVEL 02-UPPER LEVEL	1,3
VLS	02-04	480 V	3	3.6 A	3000	UNHD1	23,25,27	3#12,1#12G,3/4"C.	NONE	Yes	Yes	02-UPPER LEVEL	1,3
VLS VLS	02-05 02-06	480 V 480 V	3	3.6 A 3.6 A	3000 3000	UNHB1 UNHC1	8,10,12 20,22,24	3#12,1#12G,3/4"C. 3#12,1#12G,3/4"C.	NONE NONE	Yes Yes	Yes Yes	02-UPPER LEVEL 02-UPPER LEVEL	1,3 1,3
WC	02-06	120 V	1	1.0 A	120	EOSLB1	9	2#12,#12G,1/2"C.	SIMPLEX OUTLET	res	Yes	00-EVENT LEVEL	1,3
WC	00-02	120 V	1	1.0 A	120	EOSLB1	9	2#12,#12G,1/2"C.	SIMPLEX OUTLET		Yes	00-EVENT LEVEL	
WC WC	00-03 00-04	120 V 120 V	1	1.0 A 1.0 A	120 120	EOSLB1	9	2#12,#12G,1/2"C. 2#12,#12G,1/2"C.	SIMPLEX OUTLET SIMPLEX OUTLET		Yes Yes	00-EVENT LEVEL 00-EVENT LEVEL	
WC	00-05	120 V	1	1.0 A	120	EOSLB1	11	2#12,#12G,1/2"C.	SIMPLEX OUTLET		Yes	00-EVENT LEVEL	
WC WC	00-07 00-08	120 V 120 V	1	1.0 A 1.0 A	120 120	EOSLB1	15 17	2#12,#12G,1/2"C. 2#12,#12G,1/2"C.	SIMPLEX OUTLET SIMPLEX OUTLET		Yes Yes	00-EVENT LEVEL 00-EVENT LEVEL	
WC	00-09	120 V	1	1.0 A	120	EOSLB1	17	2#12,#12G,1/2"C.	SIMPLEX OUTLET		Yes	00-EVENT LEVEL	
WC	00-10	120 V	1	1.0 A	120	LAV	14	2#12,#12G,1/2"C.	SIMPLEX OUTLET		No	00-EVENT LEVEL	
WC WC	00-11 00-12	120 V 120 V	1	1.0 A 1.0 A	120 120	LAV EOSLC1	14 17	2#12,#12G,1/2"C. 2#12,#12G,1/2"C.	SIMPLEX OUTLET SIMPLEX OUTLET		No Yes	00-EVENT LEVEL 00-EVENT LEVEL	
WC	00-13	120 V	1	1.0 A	120	EOSLC1	17	2#12,#12G,1/2"C.	SIMPLEX OUTLET		Yes	00-EVENT LEVEL	
WC WC	00-14 00-15	120 V 120 V	1	1.0 A 1.0 A	120 120	EOSLC2	22 24	2#12,#12G,1/2"C. 2#12,#12G,1/2"C.	SIMPLEX OUTLET SIMPLEX OUTLET		Yes Yes	00-EVENT LEVEL 00-EVENT LEVEL	
WC	00-16	120 V	1	1.0 A	120	EOSLD1	14	2#12,#12G,1/2"C.	SIMPLEX OUTLET		Yes	00-EVENT LEVEL	
WC WC	00-17 00-18	120 V 120 V	1	1.0 A 1.0 A	120 120	EOSLD1 EOSLB1	20 19	2#12,#12G,1/2"C. 2#12,#12G,1/2"C.	SIMPLEX OUTLET SIMPLEX OUTLET		Yes Yes	00-EVENT LEVEL 00-EVENT LEVEL	
WC	01-01	120 V	1	1.0 A	120	CNLD1	20	2#12,#12G,1/2"C.	SIMPLEX OUTLET		No	01-CONCOURSE LEVEL	
WC	02-01 02-02	120 V 120 V	1	1.0 A 1.0 A	120 120	UOSLC2 UOSLC2	12 12	2#12,#12G,1/2"C.	SIMPLEX OUTLET SIMPLEX OUTLET		Yes Yes	02-UPPER CONCOURSE 02-UPPER LEVEL	
WC WC	02-02	120 V 120 V	1	1.0 A 1.0 A	120	UOSLC2 UOSLD1	12	2#12,#12G,1/2"C. 2#12,#12G,1/2"C.	SIMPLEX OUTLET		Yes	02-UPPER LEVEL	
VWP	02-01	480 V	3	3.4 A	2826.71	UOSHD1	2,4,6	3#12,#12G,1/2"C.	30A/3P	Yes	Yes	02-UPPER LEVEL	1,3
WP IAF	02-02 01-01	480 V 208 V	3	3.4 A 4.2 A	2826.71 1500	UOSHD1 CNLA2	8,10,12 19,21,23	3#12,#12G,1/2"C. 3#12,#12G,1/2"C.	30A/3P 30A/3P/3R	Yes	Yes No	02-UPPER LEVEL 01-CONCOURSE LEVEL	1,3
IAF	01-02	208 V	3	4.2 A	1500	CNLD3	16,18,20	3#12,#12G,1/2"C.	30A/3P/3R		No	01-CONCOURSE LEVEL	2
AFA	02-02 00-03	480 V 480 V	3	13.2 A 32.5 A	11000 27000	UNHB1 HBDP	7,9,11 4	3#10,1#10G,3/4"C. 3#6,#8G,1"C.	60/3/1		No	02-UPPER LEVEL 00-EVENT LEVEL	2
4FA	01-03	480 V	3	10.8 A	9000	HBDP	7	3#8,1#10G,3/4"C.	60/3/1		INU	01-CONCOURSE LEVEL	2
AFA	02-01	480 V	3	54.1 A	45000	UNHA1	16,18,20	3#4,1#8G,1 1/4"C.	NONE	Yes	Yes	02-UPPER LEVEL	1,2,3
AFA TF	02-02 00-01	480 V 120 V	3	54.1 A 4.2 A	45000 500	UNHB1 EOSLB2	2,4,6 29	3#4,1#8G,1 1/4"C. 2#12,1#12G,1/2"C.	NONE MTR RD SWITCH	Yes	Yes	02-UPPER LEVEL 00-EVENT LEVEL	1,2,3
TF	00-02	120 V	1	4.2 A	500	EOSLB2	29	2#12,#12G,1/2"C.	MTR RD SWITCH			00-EVENT LEVEL	
TF TF	00-03 01-01	120 V 120 V	1	4.2 A 4.2 A	500 500	EOSLC2	28 30	2#12,1#12G,1/2"C. 2#12,1#12G,1/2"C.	MTR RD SWITCH MTR RD SWITCH			00-EVENT LEVEL 01-CONCOURSE LEVEL	
TF	01-02	120 V	1	4.2 A	500	UOSLD1	15	2#12,1#12G,1/2"C.	MTR RD SWITCH			01-CONCOURSE LEVEL	
TF	02-01	120 V	1	4.2 A	500	UOSLC1	13	2#12,1#12G,1/2"C.	MTR RD SWITCH			02-UPPER CONCOURSE	
TF TF	02-02 03-01	120 V 120 V	1	4.2 A 4.2 A	500 500	UOSLD1 UNLA1	16 1	2#12,1#12G,1/2"C. 2#12,1#12G,1/2"C.	MTR RD SWITCH MTR RD SWITCH			02-UPPER CONCOURSE 02-UPPER LEVEL	
JH	00-01	120 V	1	0.8 A	100	EOSLB2	21	2#12,1#12G,1/2"C.	MTR RD SWITCH		Yes	00-EVENT LEVEL	
JH	00-02	120 V	1	3.3 A 0.8 A	400 100	EOSLB2 EOSLC1	23 20	2#12,1#12G,1/2"C. 2#12,#12G,1/2"C.	MTR RD SWITCH MTR RD SWITCH		Yes	00-EVENT LEVEL 00-EVENT LEVEL	

MECHANICAL EQUIPMENT ELECTRICAL CONNECTION SCHEDULE

IN128 - JAMES T. MORRIS ARENA

Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

STARTER ABBREVIATIONS:

RV = REDUCED VOLTAGE

FVNR = FULL VOLTAGE NON-REVERSING

HOA = FURNISH WITH HAND-OFF-AUTO SWITCH

MAN = MANUAL MOTOR STARTER WITH PILOT

FVR = FULL VOLTAGE REVERSING

VFD = VARIABLE FREQUENCY DRIVE

ENCB = ENCLOSED CIRCUIT BREAKER

MTS = MOTOR RATED TOGGLE SWITCH

REC = RECEPTACLE SERVES AS LOCAL

BAS = BUILDING AUTOMATION SYSTEM

INT = INTEGRAL TO EQUIPMENT

INDIANA UNIVERSITY BOARD OF TRUSTEE 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408 812-855-1692

Architect

RATIO 101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204

317-633-4040 Structural Engineer

FINK ROBERTS AND PETRIE, INC. 3535 EAST 96TH STREET

SUITE 126 INDIANAPOLIS, IN 46240

317-872-8400

Mechanical / Electrical INTROBA

8250 HAVERSTICK ROAD SUITE 285 INDIANAPOLIS, IN 46240 800-404-7677

Plumbing Engineer

138 N. DELAWARE ST INDIANAPOLIS, IN 46204 317-633-4120

Acoustics / Technology Engineer

WJHW 7220 W. JEFFERSON AVE SUITE 216 LAKEWOOD, CO 80235 972-934-3700

Civil Engineer AMERICAN STRUCTUREPOINT, INC.

9025 RIVER ROAD SUITE 200 INDIANAPOLIS, IN 46240

317-547-5580 Food Service Consultant

CINILITTLE 3405 NW 9TH AVENUE #1202

FORT LAUDERDALE, FL 33309 954-846-9600

Code Consultant

FORZA 2502 WEST MECHANIC ST, SUITE C HARRISONVILLE, MO 64701 816-806-3729



SH	EET ISSUE	
1	DD PROGRESS SET	07/18/24
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4	95% CONSTRUCTION DOCUMENTS	12/19/24
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6	ADDENDUM 01	01/27/25



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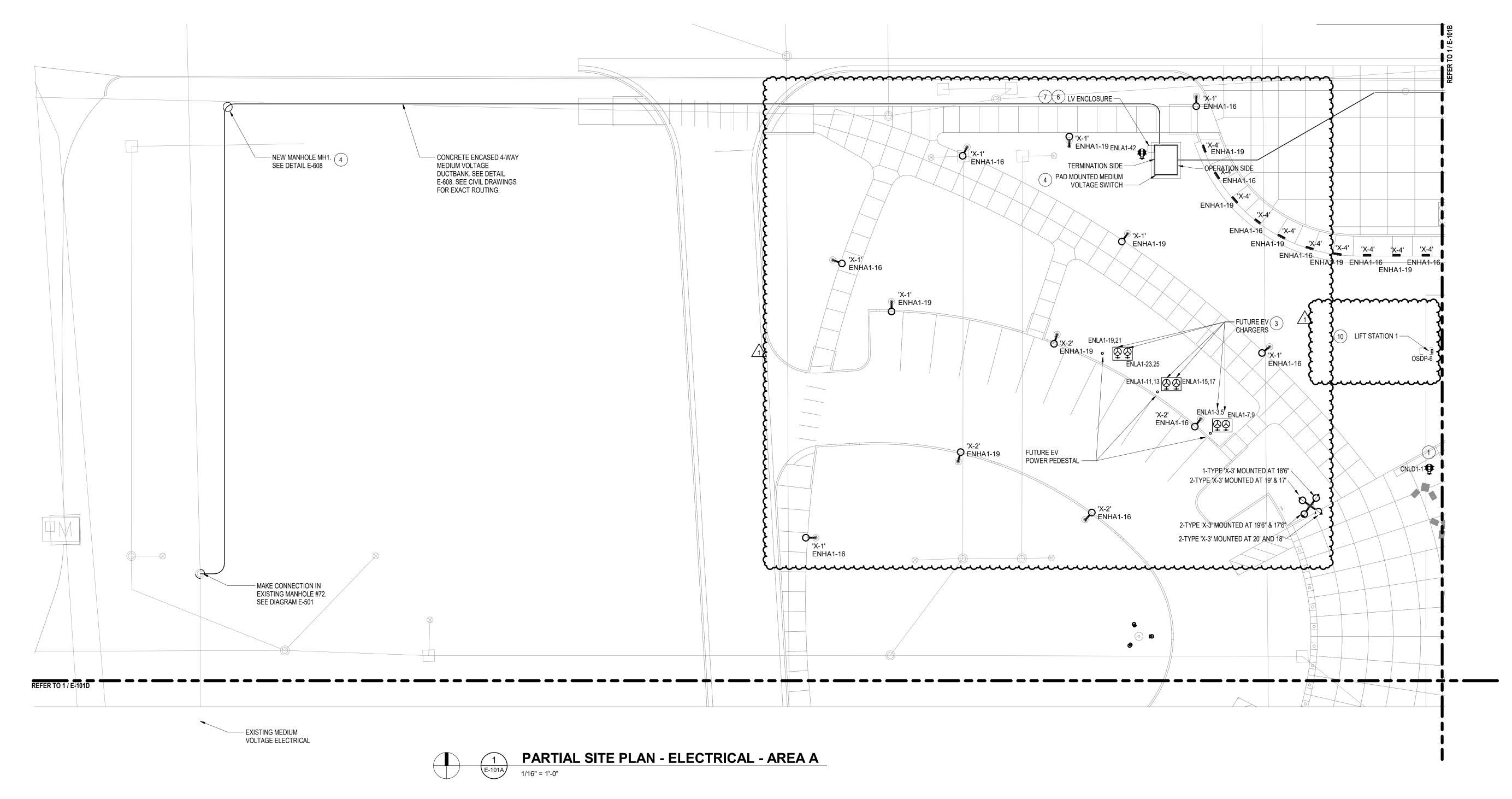
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PROJECT NO.

ELECTRICAL CONNECTION SCHEDULES

E-009



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- B. CONTRACTOR TO EXERCISE PRECAUTIONARY MEANS INCLUDING HAND DIGGING OR VACUUM EXCAVATION TO PROTECT THE EXISTING UTILITIES AND STRUCTURES. WHERE EXACT LOCATIONS OF UTILITIES AND STRUCTURES CAN NOT BE DETERMINED HAND OR VACUUM EXCAVATION
- WILL BE REQUIRED.

 C. UNDERGROUND ELECTRICAL UTILITIES ARE SHOWN DIAGRAMMATICALLY.
 CONTRACTOR SHALL COORDINATE ACTUAL ROUTING AND DEPTH.
 WHERE ELECTRICAL SERVICE UTILITIES ARE INDICATED CONTRACTOR
 SHALL COORDINATE INSTALLATION REQUIREMENTS WITH CIVIL

DRAWINGS PRIOR TO INSTALLATION.

- D. ALL UNDERGROUND FEEDER RACEWAYS SHALL BE 4" MINIMUM CONDUIT SIZE UNTIL THEY DAYLIGHT ABOVE GRADE AND CAN TRANSITION TO RACEWAY SIZES INDICTED ON SINGLE LINE DIAGRAMS.
- RACEWAY SIZES INDICTED ON SINGLE LINE DIAGRAMS.

 E. ALL UNDERGROUND DUCT BANKS SHALL INCLUDE 25% SPARE RACEWAYS AND MINIMUM OF (2) RACEWAYS PER DUCT BANK.
- F. ALL UNDERGROUND AND EXTERIOR BRANCH CIRCUIT RACEWAYS SHALL
 BE 1-1/2" MINIMUM AND CAN TRANSITION TO 3/4" MINIMUM AFTER THEY
 DAYLIGHT ON THE INTERIOR OF THE BUILDING IN ACCESSIBLE
 LOCATIONS.
- G. ALL EXTERIOR ELECTRICAL DEVICES, EQUIPMENT, BOXES AND ENCLOSURES SHALL BE WEATHERPROOF AND RATED FOR INSTALLATION IN THE ENVIRONMENT THEY ARE LOCATED. ALL EXTERIOR RECEPTACLES SHALL INCLUDE WEATHERPROOF "WHILE-IN-USE" COVERS AND GFCI PROTECTION FOR EACH DEVICE.
- H. FOR TEMPORARY POWER, CONTRACTOR MUST PAY TO FURNISH AND INSTALL ALL EQUIPMENT AND METERING NECESSARY. CONTRACTOR MUST PAY THE UTILITY BILLS UNTIL SUBSTANTIAL COMPLETION.

SHEET KEYNOTES

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 DRAWINGS FOR EXACT LOCATION.
- 2 EMERGENCY BLUE LIGHT STATION. ROUTE 2#10, 1#10G - 1" C TO INDICATED. MAKE FINAL CONNECTION TO DEVICE. SEE L-SERIES DRAWINGS FOR EXACT LOCATION.
- PROVISIONS FOR FUTURE EV CHARGER. PROVIDE LUGS IN HANDHOLE FOR CONNECTION TO FUTURE EV CHARGER. ROUTE 3#6, 1#8G 1 1/4"C TO CIRCUIT INDICATED. TWO CIRCUITS IN EACH HANDHOLE. ROUTE 2"C FROM HANDLHOLE TO FUTURE PEDESTAL LOCATION, STUB UP 6" AND CAP. SEE L-SERIES DRAWINGS FOR EXACT LOCATION.
- 4 PROVIDE PULLING CALCULATIONS AT SWITCH,
 TRANSFORMER AND ALL MANHOLES.
 5 PROVIDE LOCKED FLUSH MOUNTED SHUT OFF
- 5 PROVIDE LOCKED FLUSH MOUNTED SHUT OFF
 DEVICES AND FLUSH MOUNTED KNOX BOX FOR
 ACCESS. COORDINATE EXACT LOCATION WITH FIRE
 MARSHAL.
 6 PROVIDE 120V POWER TO LOW VOLTAGE
- COMPARTMENT. ROUTE 2#4, 1#8G 2"C TO CIRCUIT INDICATED.

 7 ROUTE 2"C FOR LOW VOLTAGE CONNECTIONS TO
- NEAREST IDF ROOM IN BUILDING.

 8 PROVIDE CONCRETE PAD. SEE DETAIL SHEET E
- PROVIDE CONCRETE PAD. SEE DETAIL SHEET E-604.
 PROVIDE BREAK GLASS TYPE STATION FOR GENERATOR EMERGENCY SHUTOFF AT EGRESS
- DOOR FROM AREA.

 10 MAKE CONNECTION TO LIFT STATION 1. ROUTE 3#10, 1#10G 1"C TO CIRCUIT INDICATED. PROVIDE 30/3/3R DISCONNECT MOUNTED ON GALVANIZED STEEL CHANNEL. COORDINATE EXACT LOCATION IN FIELD.
- 11 MAKE CONNECTION TO LIFT STATION 2. ROUTE 3#4,
 1#8G 2"C TO CIRCUIT INDICATED. PROVIDE 100/3/3R
 DISCONNECT MOUNTED ON GALVANIZED STEEL
 CHANNEL. COORDINATE EXACT LOCATION IN FIELD.

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INDIANA UNIVERSITY BOARD OF TRUSTEES
2901 EAST DISCOVERY PARKWAY
BLOOMINGTON, IN 47408

812-855-1692 **Architect**

RATIO
101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204
317-633-4040

Structural Engineer
FINK ROBERTS AND PETRIE, INC.

3535 EAST 96TH STREET

SUITE 126 INDIANAPOLIS, IN 46240

317-872-8400

Mechanical / Electrical
INTROBA
8250 HAVERSTICK ROAD

INDIANAPOLIS, IN 46240 800-404-7677

SUITE 285

Plumbing Engineer

138 N. DELAWARE ST INDIANAPOLIS, IN 46204 317-633-4120

Acoustics / Technology Engineer
WJHW

7220 W. JEFFERSON AVE SUITE 216 LAKEWOOD, CO 80235 972-934-3700

Civil Engineer

AMERICAN STRUCTUREPOINT, INC.

9025 RIVER ROAD SUITE 200 INDIANAPOLIS, IN 46240

INDIANAPOLIS, IN 46240 317-547-5580

Food Service Consultant
CINILITTLE

3405 NW 9TH AVENUE #1202 FORT LAUDERDALE, FL 33309 954-846-9600

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FORZA
2502 WEST MECHANIC ST, SUITE C
HARRISONVILLE, MO 64701
816-806-3729

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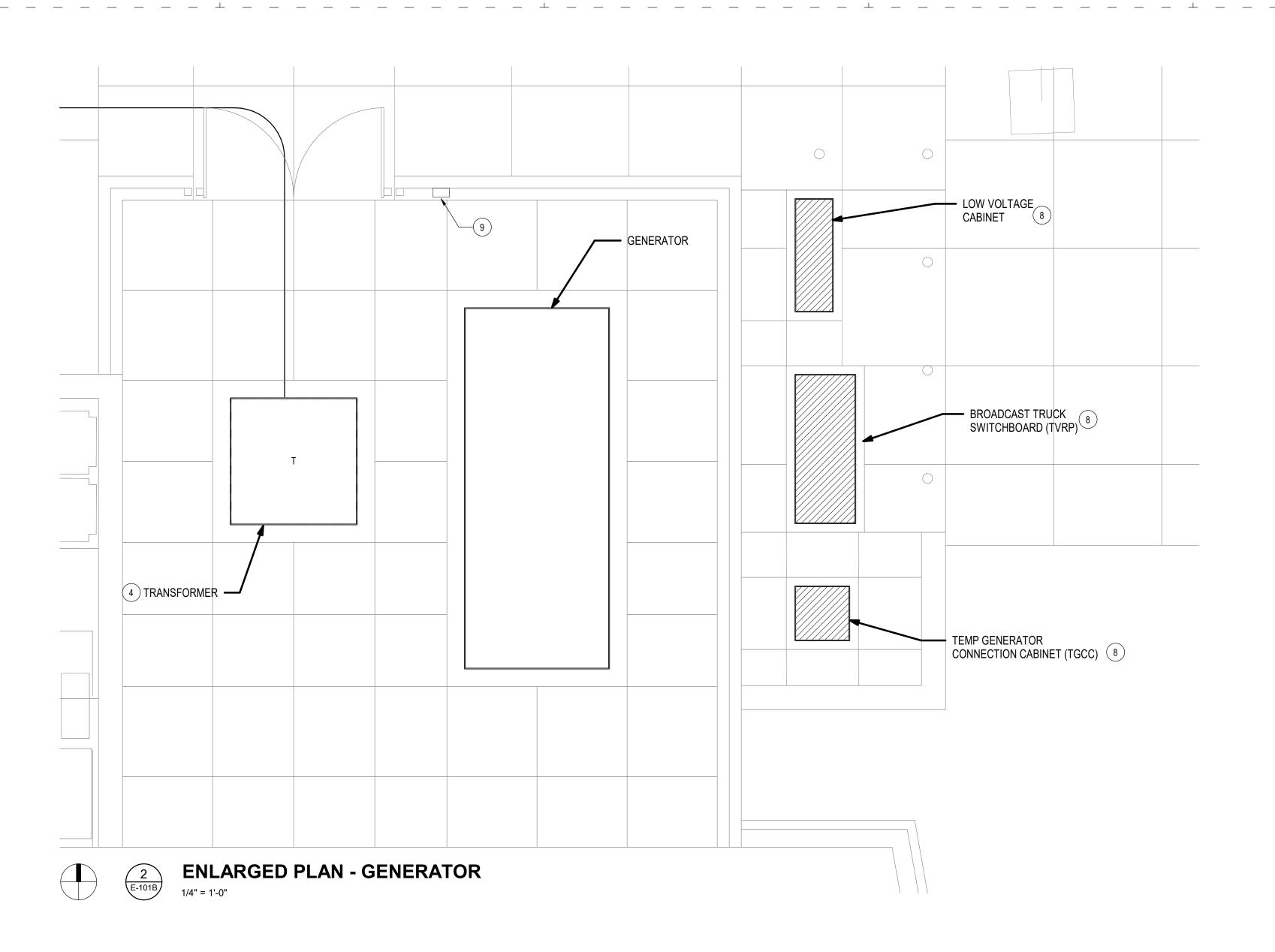
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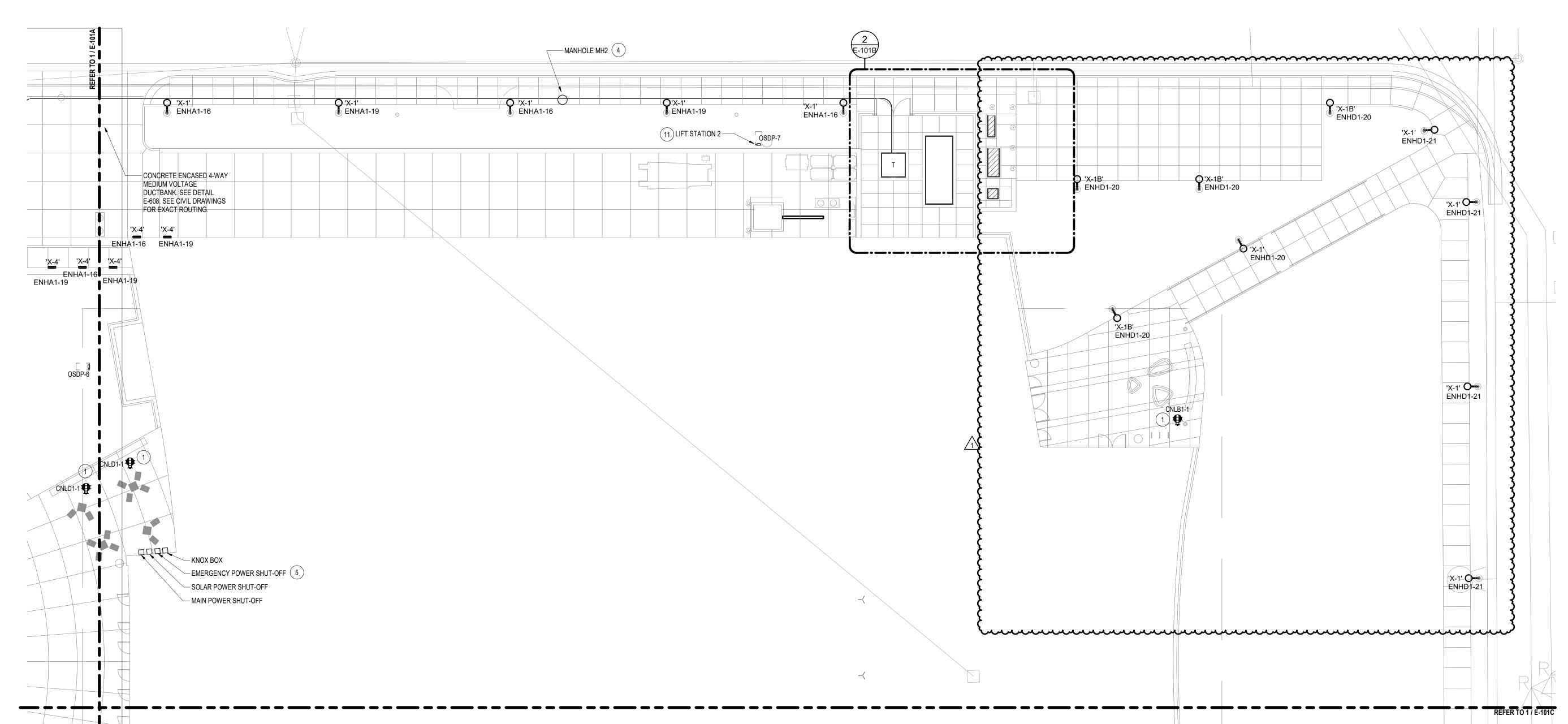
PROJECT NO.
SHEET TITLE

PARTIAL SITE PLAN ELECTRICAL - AREA

EET NUMBER

E-101A





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- D. ALL UNDERGROUND FEEDER RACEWAYS SHALL BE 4" MINIMUM CONDUIT SIZE UNTIL THEY DAYLIGHT ABOVE GRADE AND CAN TRANSITION TO
- RACEWAY SIZES INDICTED ON SINGLE LINE DIAGRAMS. E. ALL UNDERGROUND DUCT BANKS SHALL INCLUDE 25% SPARE RACEWAYS

SHALL COORDINATE INSTALLATION REQUIREMENTS WITH CIVIL

DRAWINGS PRIOR TO INSTALLATION.

- AND MINIMUM OF (2) RACEWAYS PER DUCT BANK. F. ALL UNDERGROUND AND EXTERIOR BRANCH CIRCUIT RACEWAYS SHALL BE 1-1/2" MINIMUM AND CAN TRANSITION TO 3/4" MINIMUM AFTER THEY DAYLIGHT ON THE INTERIOR OF THE BUILDING IN ACCESSIBLE LOCATIONS.
- G. ALL EXTERIOR ELECTRICAL DEVICES, EQUIPMENT, BOXES AND ENCLOSURES SHALL BE WEATHERPROOF AND RATED FOR INSTALLATION IN THE ENVIRONMENT THEY ARE LOCATED. ALL EXTERIOR RECEPTACLES SHALL INCLUDE WEATHERPROOF "WHILE-IN-USE" COVERS AND GFCI PROTECTION FOR EACH DEVICE.
- H. FOR TEMPORARY POWER, CONTRACTOR MUST PAY TO FURNISH AND INSTALL ALL EQUIPMENT AND METERING NECESSARY. CONTRACTOR MUST PAY THE UTILITY BILLS UNTIL SUBSTANTIAL COMPLETION.

SHEET KEYNOTES

- 1 POWER PEDESTAL. PEDOC. STAINLESS STEEL, 5X5 WITH INTEGRAL BASE AND HINGED TOP. 24". NEMA 3R. TWO WP/GFI DUPLEX RECEPTACLES. ROUTE 2#10, 1#10G - 1"C TO CIRCUIT INDICATED. SEE L-SERIES DRAWINGS FOR EXACT LOCATION.
- 2 EMERGENCY BLUE LIGHT STATION. ROUTE 2#10, 1#10G - 1" C TO INDICATED. MAKE FINAL CONNECTION TO DEVICE. SEE L-SERIES DRAWINGS FOR EXACT LOCATION.
- 3 PROVISIONS FOR FUTURE EV CHARGER. PROVIDE LUGS IN HANDHOLE FOR CONNECTION TO FUTURE EV CHARGER. ROUTE 3#6, 1#8G - 1 1/4"C TO CIRCUIT INDICATED. TWO CIRCUITS IN EACH HANDHOLE. ROUTE 2"C FROM HANDLHOLE TO FUTURE PEDESTAL LOCATION, STUB UP 6" AND CAP. SEE L-SERIES DRAWINGS FOR EXACT LOCATION.
- 4 PROVIDE PULLING CALCULATIONS AT SWITCH, TRANSFORMER AND ALL MANHOLES.
- 5 PROVIDE LOCKED FLUSH MOUNTED SHUT OFF DEVICES AND FLUSH MOUNTED KNOX BOX FOR ACCESS. COORDINATE EXACT LOCATION WITH FIRE MARSHAL 6 PROVIDE 120V POWER TO LOW VOLTAGE
- COMPARTMENT. ROUTE 2#4, 1#8G 2"C TO CIRCUIT INDICATED.
- 7 ROUTE 2"C FOR LOW VOLTAGE CONNECTIONS TO NEAREST IDF ROOM IN BUILDING.
- 8 PROVIDE CONCRETE PAD. SEE DETAIL SHEET E-604. 9 PROVIDE BREAK GLASS TYPE STATION FOR GENERATOR EMERGENCY SHUTOFF AT EGRESS
- DOOR FROM AREA. 10 MAKE CONNECTION TO LIFT STATION 1. ROUTE 3#10, 1#10G - 1"C TO CIRCUIT INDICATED. PROVIDE 30/3/3R DISCONNECT MOUNTED ON GALVANIZED STEEL
- CHANNEL. COORDINATE EXACT LOCATION IN FIELD. 11 MAKE CONNECTION TO LIFT STATION 2. ROUTE 3#4, 1#8G - 2"C TO CIRCUIT INDICATED. PROVIDE 100/3/3R DISCONNECT MOUNTED ON GALVANIZED STEEL CHANNEL. COORDINATE EXACT LOCATION IN FIELD.

IN128 - JAMES T. MORRIS ARENA

Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEES 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408

812-855-1692 Architect

RATIO 101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204

317-633-4040 Structural Engineer FINK ROBERTS AND PETRIE, INC.

3535 EAST 96TH STREET SUITE 126

INDIANAPOLIS, IN 46240

317-872-8400

Mechanical / Electrical INTROBA

8250 HAVERSTICK ROAD SUITE 285

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WJHW 7220 W. JEFFERSON AVE

SUITE 216 LAKEWOOD, CO 80235 972-934-3700

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FORZA 2502 WEST MECHANIC ST, SUITE C HARRISONVILLE, MO 64701 816-806-3729

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3	50% CONSTRUCTION DOCUMENTS	11/01/2
Ļ	95% CONSTRUCTION DOCUMENTS	12/19/2
5	CONSTRUCTION DOCUMENTS	01/13/2
;	ADDENDUM 01	01/27/2



PARTIAL SITE PLAN ELECTRICAL - AREA

E-101B



Control of the contro

PARTIAL SITE PLAN - ELECTRICAL - AREA C

1/16" = 1'-0"

GENERAL NOTES

- A. CAUTION: EXISTING UNDERGROUND UTILITIES AND STRUCTURES ARE KNOWN TO EXIST ON THE PROJECT SITE. CONTRACTOR TO MAKE USE OF ALL CONSTRUCTION DOCUMENTS TO ASSIST IN LOCATING THE UNDERGROUND UTILITIES AND STRUCTURES. NO REPRESENTATION AS TO ACCURACY OR COMPLETENESS OF THE LOCATION OF THE UNDERGROUND UTILITIES OR STRUCTURES EXISTS.
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- DRAWINGS PRIOR TO INSTALLATION.

 D. ALL UNDERGROUND FEEDER RACEWAYS SHALL BE 4" MINIMUM CONDUIT SIZE UNTIL THEY DAYLIGHT ABOVE GRADE AND CAN TRANSITION TO RACEWAY SIZES INDICTED ON SINGLE LINE DIAGRAMS
- RACEWAY SIZES INDICTED ON SINGLE LINE DIAGRAMS.

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 PROVIDE PULLING CALCULATIONS AT SWITCH,
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- DEVICES AND FLUSH MOUNTED KNOX BOX FOR ACCESS. COORDINATE EXACT LOCATION WITH FIRE MARSHAL.
- 6 PROVIDE 120V POWER TO LOW VOLTAGE COMPARTMENT. ROUTE 2#4, 1#8G 2"C TO CIRCUIT INDICATED.
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- 9 PROVIDE BREAK GLASS TYPE STATION FOR GENERATOR EMERGENCY SHUTOFF AT EGRESS DOOR FROM AREA.
- 10 MAKE CONNECTION TO LIFT STATION 1. ROUTE 3#10, 1#10G 1"C TO CIRCUIT INDICATED. PROVIDE 30/3/3R DISCONNECT MOUNTED ON GALVANIZED STEEL CHANNEL. COORDINATE EXACT LOCATION IN FIELD.
- 11 MAKE CONNECTION TO LIFT STATION 2. ROUTE 3#4, 1#8G 2"C TO CIRCUIT INDICATED. PROVIDE 100/3/3R DISCONNECT MOUNTED ON GALVANIZED STEEL CHANNEL. COORDINATE EXACT LOCATION IN FIELD.

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- 1		



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ROJECT NO. 23112.00

PARTIAL SITE PLAN -ELECTRICAL - AREA

SHEET NUMBER

E-101C

- EXISTING MEDIUM VOLTAGE ELECTRICAL 1-TYPE 'X-3' MOUNTED AT 2-TYPE 'X-3' MOUNTED AT 19'6" & 17'6" -ENHA1-19 2-TYPE 'X-3' MOUNTED AT 19' & 17' ENHA1-16 - EMERGENCY BLUE LIGHT ENHA1-16 ENHD1-21 ENHA1-19 ENHA1-19 ENHD1-20 (X-1' ENHD1-21 ENHD1-20 munimum munimum manumum manumu

PARTIAL SITE PLAN - ELECTRICAL - AREA D

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 C. UNDERGROUND ELECTRICAL UTILITIES ARE SHOWN DIAGRAMMATICALLY. CONTRACTOR SHALL COORDINATE ACTUAL ROUTING AND DEPTH. WHERE ELECTRICAL SERVICE UTILITIES ARE INDICATED CONTRACTOR SHALL COORDINATE INSTALLATION REQUIREMENTS WITH CIVIL

DRAWINGS PRIOR TO INSTALLATION.

- D. ALL UNDERGROUND FEEDER RACEWAYS SHALL BE 4" MINIMUM CONDUIT SIZE UNTIL THEY DAYLIGHT ABOVE GRADE AND CAN TRANSITION TO RACEWAY SIZES INDICTED ON SINGLE LINE DIAGRAMS.
- RACEWAY SIZES INDICTED ON SINGLE LINE DIAGRAMS.

 E. ALL UNDERGROUND DUCT BANKS SHALL INCLUDE 25% SPARE RACEWAYS
- AND MINIMUM OF (2) RACEWAYS PER DUCT BANK.

 F. ALL UNDERGROUND AND EXTERIOR BRANCH CIRCUIT RACEWAYS SHALL
 BE 1-1/2" MINIMUM AND CAN TRANSITION TO 3/4" MINIMUM AFTER THEY
 DAYLIGHT ON THE INTERIOR OF THE BUILDING IN ACCESSIBLE
 LOCATIONS.
- G. ALL EXTERIOR ELECTRICAL DEVICES, EQUIPMENT, BOXES AND ENCLOSURES SHALL BE WEATHERPROOF AND RATED FOR INSTALLATION IN THE ENVIRONMENT THEY ARE LOCATED. ALL EXTERIOR RECEPTACLES SHALL INCLUDE WEATHERPROOF "WHILE-IN-USE" COVERS AND GFCI PROTECTION FOR EACH DEVICE.
- H. FOR TEMPORARY POWER, CONTRACTOR MUST PAY TO FURNISH AND INSTALL ALL EQUIPMENT AND METERING NECESSARY. CONTRACTOR MUST PAY THE UTILITY BILLS UNTIL SUBSTANTIAL COMPLETION.

SHEET KEYNOTES

- 1 POWER PEDESTAL. PEDOC. STAINLESS STEEL, 5X5
 WITH INTEGRAL BASE AND HINGED TOP. 24". NEMA
 3R. TWO WP/GFI DUPLEX RECEPTACLES. ROUTE 2#10,
 1#10G 1"C TO CIRCUIT INDICATED. SEE L-SERIES
 DRAWINGS FOR EXACT LOCATION.
- 2 EMERGENCY BLUE LIGHT STATION. ROUTE 2#10, 1#10G - 1" C TO INDICATED. MAKE FINAL CONNECTION TO DEVICE. SEE L-SERIES DRAWINGS FOR EXACT LOCATION.
- PROVISIONS FOR FUTURE EV CHARGER. PROVIDE LUGS IN HANDHOLE FOR CONNECTION TO FUTURE EV CHARGER. ROUTE 3#6, 1#8G 1 1/4"C TO CIRCUIT INDICATED. TWO CIRCUITS IN EACH HANDHOLE. ROUTE 2"C FROM HANDLHOLE TO FUTURE PEDESTAL LOCATION, STUB UP 6" AND CAP. SEE L-SERIES DRAWINGS FOR EXACT LOCATION.
- 4 PROVIDE PULLING CALCULATIONS AT SWITCH, TRANSFORMER AND ALL MANHOLES.
- 5 PROVIDE LOCKED FLUSH MOUNTED SHUT OFF DEVICES AND FLUSH MOUNTED KNOX BOX FOR ACCESS. COORDINATE EXACT LOCATION WITH FIRE MARSHAL.
- 6 PROVIDE 120V POWER TO LOW VOLTAGE COMPARTMENT. ROUTE 2#4, 1#8G 2"C TO CIRCUIT INDICATED.
- 7 ROUTE 2"C FOR LOW VOLTAGE CONNECTIONS TO NEAREST IDF ROOM IN BUILDING.
 8 PROVIDE CONCRETE PAD. SEE DETAIL SHEET E-604
- PROVIDE CONCRETE PAD. SEE DETAIL SHEET E-604.
 PROVIDE BREAK GLASS TYPE STATION FOR GENERATOR EMERGENCY SHUTOFF AT EGRESS DOOR FROM AREA.
- 10 MAKE CONNECTION TO LIFT STATION 1. ROUTE 3#10, 1#10G 1"C TO CIRCUIT INDICATED. PROVIDE 30/3/3R DISCONNECT MOUNTED ON GALVANIZED STEEL CHANNEL. COORDINATE EXACT LOCATION IN FIELD.
- 11 MAKE CONNECTION TO LIFT STATION 2. ROUTE 3#4, 1#8G 2"C TO CIRCUIT INDICATED. PROVIDE 100/3/3R DISCONNECT MOUNTED ON GALVANIZED STEEL CHANNEL. COORDINATE EXACT LOCATION IN FIELD.

IN128 - JAMES T. MORRIS ARENA

Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

Owner
INDIANA UNIVERSITY BOARD OF TRUSTEES
2901 EAST DISCOVERY PARKWAY
BLOOMINGTON, IN 47408

812-855-1692

Architect

RATIO

101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204
317-633-4040

Structural Engineer

FINK ROBERTS AND PETRIE, INC. 3535 EAST 96TH STREET

SUITE 126 INDIANAPOLIS, IN 46240

317-872-8400

Mechanical / Electrical

INTROBA 8250 HAVERSTICK ROAD SUITE 285

INDIANAPOLIS, IN 46240

Plumbing Engineer
DLZ

800-404-7677

138 N. DELAWARE ST INDIANAPOLIS, IN 46204

317-633-4120

Acoustics / Technology Engineer

WJHW 7220 W. JEFFERSON AVE SUITE 216 LAKEWOOD, CO 80235

972-934-3700

Civil Engineer

AMERICAN STRUCTUREPOINT, INC.

9025 RIVER ROAD SUITE 200 INDIANAPOLIS, IN 46240

317-547-5580

Food Service Consultant

CINILITTLE

3405 NW 9TH AVENUE #1202

FORT LAUDERDALE, FL 33309 954-846-9600 Code Consultant

FORZA
2502 WEST MECHANIC ST, SUITE C
HARRISONVILLE, MO 64701
816-806-3729

SEAL | DA



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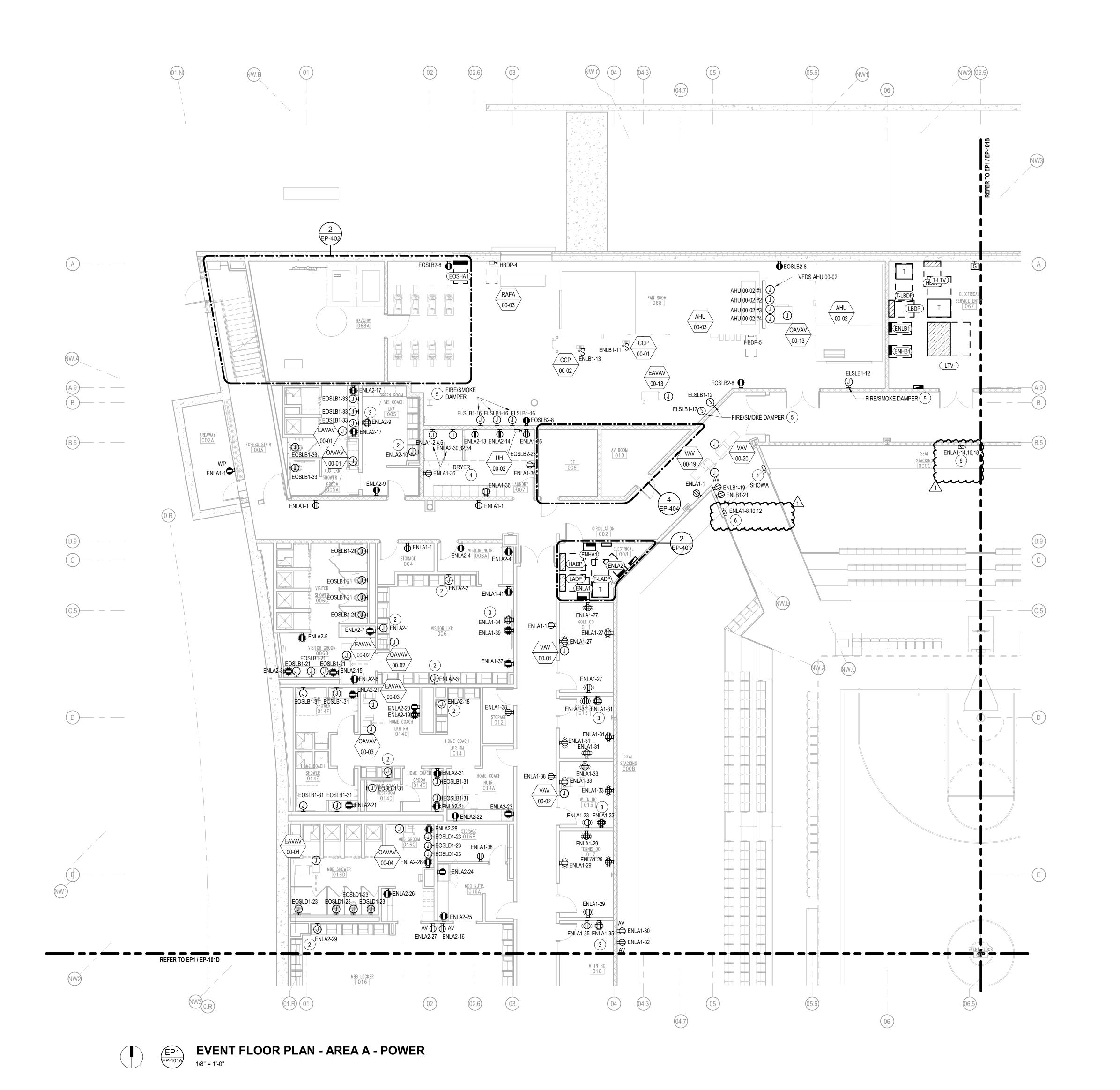
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PROJECT NO.
SHEET TITLE

PARTIAL SITE PLAN -ELECTRICAL - AREA

HEET NUMBER

E-101D



A. CONTRACTOR TO REFER TO MECHANICAL AND PLUMBING DRAWINGS FOR EXACT LOCATION OF ALL MECHANICAL AND PLUMBING EQUIPMENT AND DEVICES INCLUDING INTERLOCK AND OTHER SPECIFIC REQUIREMENTS.

B. REFER TO DATA/TELECOM, AUDIO-VISUAL AND SECURITY PLANS FOR ALL ITEMS, LOCATIONS, DEVICES AND EQUIPMENT TO BE FURNISHED AND INSTALLED BY CONTRACTOR INCLUDING BUT NOT LIMITED TO ALL CONDUITS AND JUNCTION BOXES.

SHEET KEYNOTES

- 1 PROVIDE A COMPANY SWITCH WITH CIRCUIT BREAKER AND CAM-LOCK CONNECTORS. SEE SINGLE LINE DIAGRAM FOR CIRCUITING AND FEEDER SIZE.
- PROVIDE POWER CONNECTION TO LOCKER SYSTEM
 PROVIDE DEVICE TO BE MOUNTED IN DISPLAY BOX, SEE AV DRAWINGS FOR ADDITIONAL INFORMATION.
- 4 PROVIDE POWER CONNECTION TO DRYER. ROUTE
 4#1, 1#6G 2"C TO CIRCUIT INDICATED.
- 5 PROVIDE POWER CONNECTION TO FIRE ALARM EQUIPMENT. COORDINATE LOCATION SO THAT DEVICE IS LOCATED ADJACENT TO UNIT
- 6 PROVIDE POWER CONNECTION TO RETRACTABLE SEATING. PROVIDE 30/3/1 DISCONNECT SWITCH. ROUTE 3#10, 1#10G-3/4"C TO CIRCUIT INDICATED. COORDINATE EXACT LOCATION WITH SEATING MANUFACTURER.

IN128 - JAMES T. MORRIS ARENA

Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

Owner
INDIANA UNIVERSITY BOARD OF TRUSTEES
2901 EAST DISCOVERY PARKWAY

2901 EAST DISCOVERY PA BLOOMINGTON, IN 47408 812-855-1692

Architect RATIO

101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204 317-633-4040

Structural Engineer
FINK ROBERTS AND PETRIE, INC.

3535 EAST 96TH STREET

SUITE 126 INDIANAPOLIS, IN 46240

317-872-8400

Mechanical / Electrical

INTROBA 8250 HAVERSTICK ROAD SUITE 285 INDIANAPOLIS, IN 46240

Plumbing Engineer DLZ

800-404-7677

972-934-3700

138 N. DELAWARE ST INDIANAPOLIS, IN 46204 317-633-4120

Acoustics / Technology Engineer

WJHW 7220 W. JEFFERSON AVE SUITE 216 LAKEWOOD, CO 80235

Civil Engineer

AMERICAN STRUCTUREPOINT, INC.

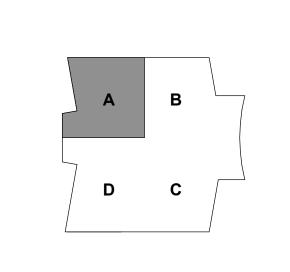
9025 RIVER ROAD SUITE 200 INDIANAPOLIS, IN 46240

317-547-5580 Food Service Consultant

CINILITTLE
3405 NW 9TH AVENUE #1202

FORT LAUDERDALE, FL 33309 954-846-9600 Code Consultant

FORZA
2502 WEST MECHANIC ST, SUITE C
HARRISONVILLE, MO 64701



KEY PLAN

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PROJECT NO.

EVENT FLOOR PLAN
- AREA A - POWER

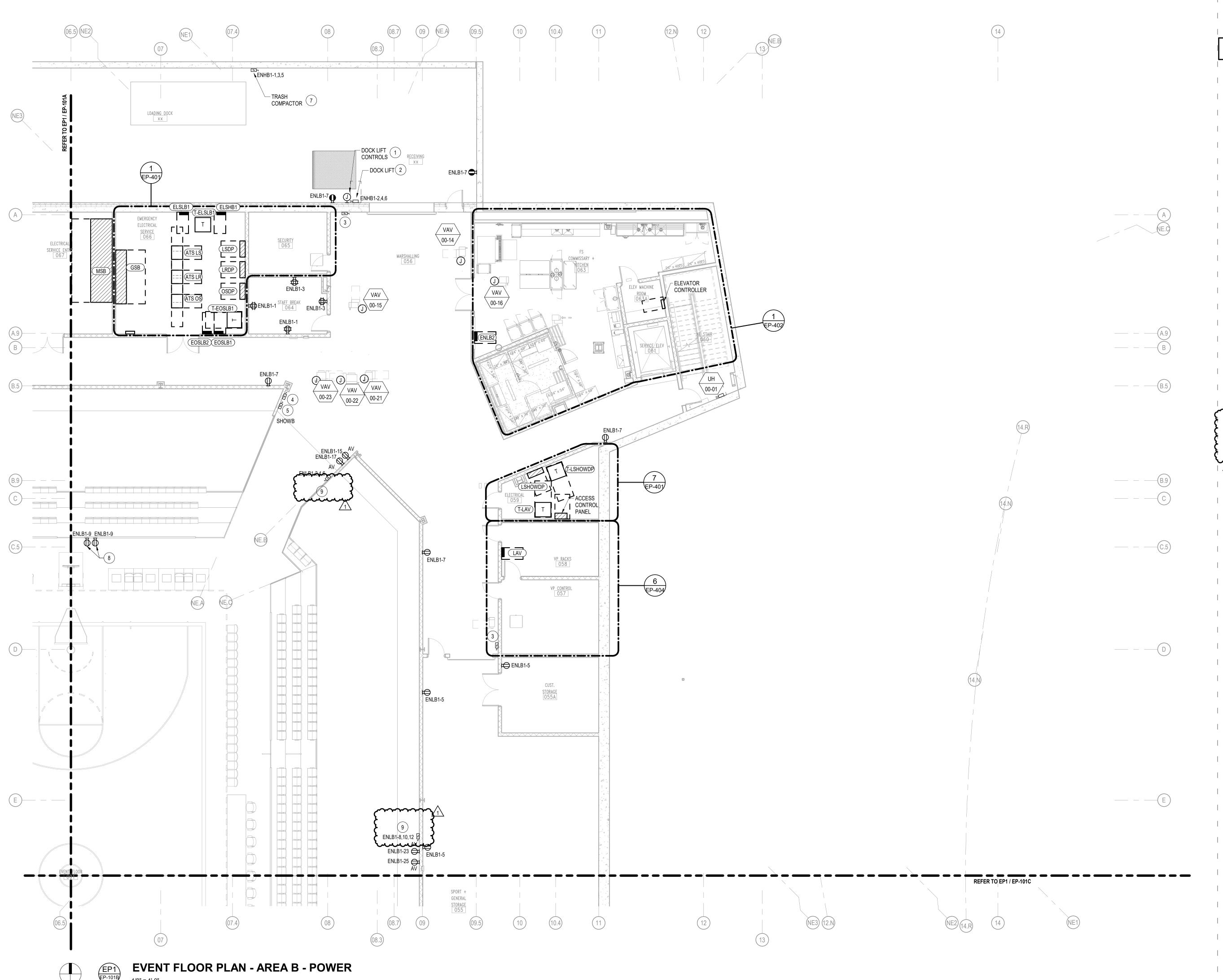
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EP-101A



A. CONTRACTOR TO REFER TO MECHANICAL AND PLUMBING DRAWINGS FOR EXACT LOCATION OF ALL MECHANICAL AND PLUMBING EQUIPMENT AND DEVICES INCLUDING INTERLOCK AND OTHER SPECIFIC REQUIREMENTS.

B. REFER TO DATA/TELECOM, AUDIO-VISUAL AND SECURITY PLANS FOR ALL ITEMS, LOCATIONS, DEVICES AND EQUIPMENT TO BE FURNISHED AND INSTALLED BY CONTRACTOR INCLUDING BUT NOT LIMITED TO ALL CONDUITS AND JUNCTION BOXES.

SHEET KEYNOTES

- 1 CONNECT CONTROL BOX FOR DOCK LIFT.
 PROVIDE ALL CONDUIT AND WIRING AS DIRECTED
 BY MANUFACTURER AND CONNECT ALL LIMIT
 SWITCHES, SENSORS, CONTROLS, ETC. CONTROL
 BOX BY MANUFACTURER.
- 2 PROVIDE 30/3P NEMA 3R NOT FUSIBLE
 DISCONNECT SWITCH FOR DOCK LIFT. ROUTE 3#8,
 1#10G 3/4"C TO CIRCUIT INDICATED. LOCATE
 DISCONNECT SWITCH AS RECOMMENDED BY
 MANUFACTURER.
 3 PROVIDE 30A/3P NON-FUSIBLE DISCONNECT
 - SWITCH FOR CONNECTION TO OVERHEAD DOOR OPERATOR. PROVIDE (4)#12, (1)#12G. 3/4"C. HOMERUN FOR BRANCH CIRCUIT INDICATED. CONNECT ALL PUSHBUTTON OPERATOR STATIONS, SENSORS, ETC. COORDINATE ALL REQUIREMENTS WITH SUPPLIER.

 4 PROVIDE 30A/3P NON-FUSIBLE DISCONNECT
- 4 PROVIDE 30A/3P NON-FUSIBLE DISCONNECT SWITCH FOR CONNECTION TO RETRACTABLE SEATING. PROVIDE (4)#12, (1)#12G. 3/4"C. HOMERUN FOR BRANCH CIRCUIT INDICATED. LOCATE DISCONNECT SWITCH AND CONNECTION AS DIRECTED BY RETRACTABLE SEATING SUPPLIER.
- PROVIDE A COMPANY SWITCH WITH CIRCUIT BREAKER AND CAM-LOCK CONNECTORS. SEE SINGLE LINE DIAGRAM FOR CIRCUITING AND FEEDER SIZE.
- PROVIDE POWER CONNECTION TO HYDRONIC WALL CASSETTE. COORDINATE MOUNTING HEIGHT SO THAT RECEPTACLE IS LOCATED ADJACENT TO UNIT.
 PROVIDE 30/3P NEMA 3R NON-FUSIBLE
- DISCONNECTION SWITCH FOR CONNECTION TO TRASH COMPACTOR. 10 HP. ROUTE 3#8, 1#10G 3/4"C TO CIRCUIT INDICATED.

 8 PROVIDE RECEPTACLES FOR POWER CONNECTIONS FOR SCOREBOARD AND GAME CLOCK. COORDINATE EXACT LOCATION WITH AV
- 9 PROVIDE POWER CONNECTION TO RETRACTABLE SEATING. PROVIDE 30/3/1 DISCONNECT SWITCH. ROUTE 3#10, 1#10G-3/4"C TO CIRCUIT INDICATED. COORDINATE EXACT LOCATION WITH SEATING MANUFACTURER.

IN128 - JAMES T. MORRIS ARENA

Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

Owner
INDIANA UNIVERSITY BOARD OF TRUSTEES
2901 EAST DISCOVERY PARKWAY

BLOOMINGTON, IN 47408 812-855-1692

Architect
RATIO
101 SOUTH PENNSYLVANIA STREET
INDIANAPOLIS, IN 46204

317-633-4040
Structural Engineer

FINK ROBERTS AND PETRIE, INC.

3535 EAST 96TH STREET SUITE 126 INDIANAPOLIS, IN 46240

317-872-8400

Mechanical / Electrical

INTROBA
8250 HAVERSTICK ROAD
SUITE 285
INDIANAPOLIS, IN 46240

800-404-7677

Plumbing Engineer

Plumbing Engineer
DLZ
138 N. DELAWARE ST

INDIANAPOLIS, IN 46204

972-934-3700

317-633-4120

Acoustics / Technology Engineer
W.IHW

WJHW 7220 W. JEFFERSON AVE SUITE 216 LAKEWOOD, CO 80235

Civil Engineer

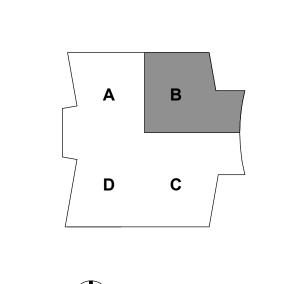
AMERICAN STRUCTUREPOINT, INC.

9025 RIVER ROAD SUITE 200 INDIANAPOLIS, IN 46240 317-547-5580

Food Service Consultant
CINILITTLE
3405 NW 9TH AVENUE #1202
FORT LAUDERDALE, FL 33309
954-846-9600

Code Consultant

FORZA
2502 WEST MECHANIC ST, SUITE C
HARRISONVILLE, MO 64701
816-806-3729



KEY PLAN

EAL | DATE 01/27/



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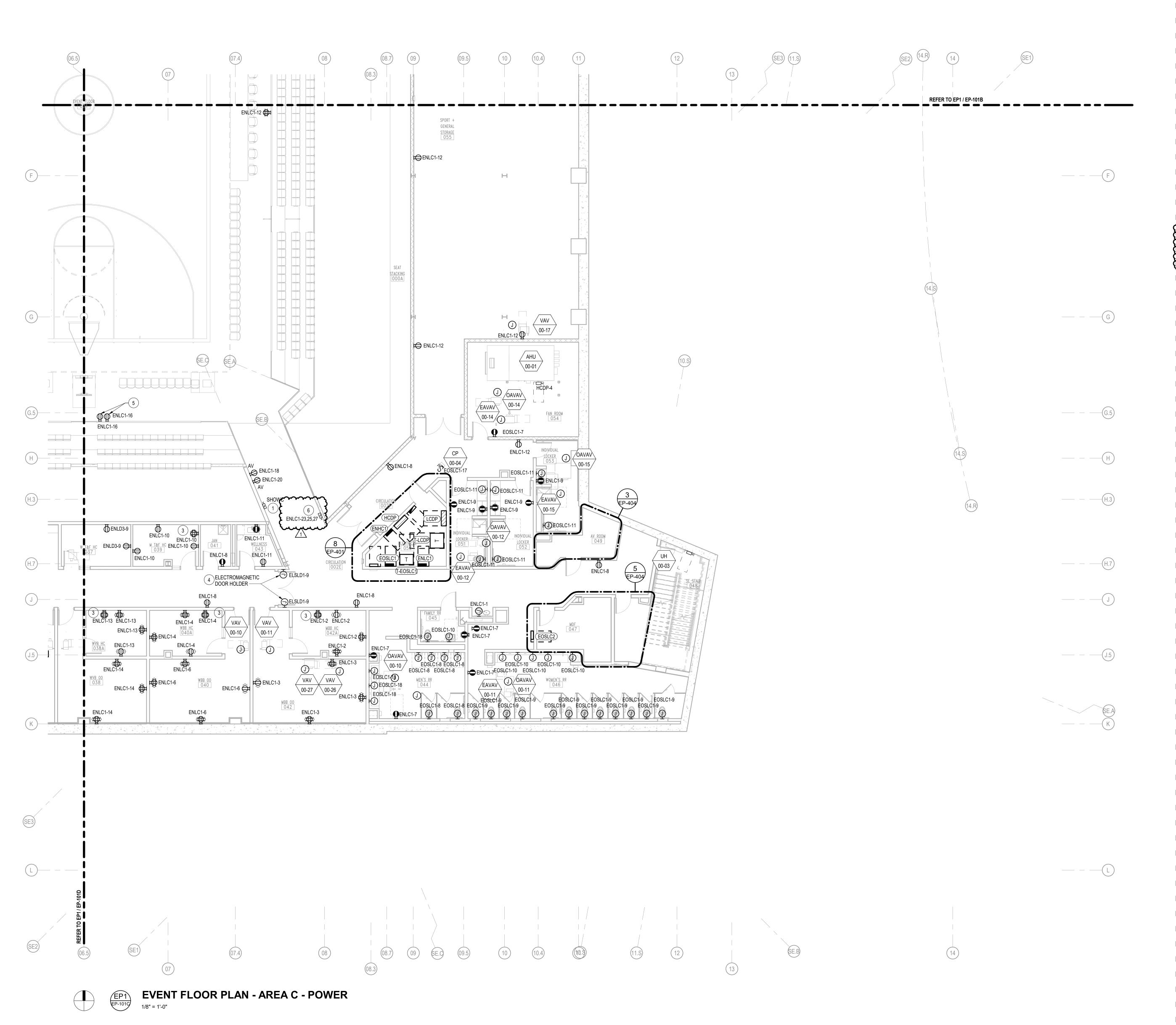


PROJECT NO.
SHEET TITLE

EVENT FLOOR PLAN - AREA B - POWER

EET NUMBER

EP-101B



A. CONTRACTOR TO REFER TO MECHANICAL AND PLUMBING DRAWINGS FOR EXACT LOCATION OF ALL MECHANICAL AND PLUMBING EQUIPMENT AND DEVICES INCLUDING INTERLOCK AND OTHER SPECIFIC REQUIREMENTS. B. REFER TO DATA/TELECOM, AUDIO-VISUAL AND SECURITY PLANS FOR ALL ITEMS, LOCATIONS, DEVICES AND EQUIPMENT TO BE FURNISHED AND INSTALLED BY CONTRACTOR INCLUDING BUT NOT LIMITED TO ALL CONDUITS AND JUNCTION BOXES.

SHEET KEYNOTES

PROVIDE A COMPANY SWITCH WITH CIRCUIT BREAKER AND CAM-LOCK CONNECTORS. SEE SINGLE LINE DIAGRAM FOR CIRCUITING AND FEEDER SIZE. 2 PROVIDE POWER CONNECTION TO HYDRONIC WALL CASSETTE. COORDINATE MOUNTING HEIGHT SO THAT RECEPTACLE IS LOCATED ADJACENT TO UNIT PROVIDE DEVICE TO BE MOUNTED IN DISPLAY BOX, SEE AV DRAWINGS FOR ADDITIONAL INFORMATION. PROVIDE POWER CONNECTION TO FIRE ALARM EQUIPMENT. COORDINATE LOCATION SO THAT DEVICE IS LOCATED ADJACENT TO UNIT.

5 PROVIDE RECEPTACLES FOR POWER CONNECTIONS FOR SCOREBOARD AND GAME CLOCK. COORDINATE

6 PROVIDE POWER CONNECTION TO RETRACTABLE SEATING. PROVIDE 30/3/1 DISCONNECT SWITCH. ROUTE 3#10, 1#10G-3/4"C TO CIRCUIT INDICATED. COORDINATE EXACT LOCATION WITH SEATING MANUFACTURER.

IN128 - JAMES T. MORRIS ARENA

Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEE 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408

812-855-1692 Architect

RATIO 101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204 317-633-4040

Structural Engineer FINK ROBERTS AND PETRIE, INC.

3535 EAST 96TH STREET SUITE 126 INDIANAPOLIS, IN 46240

317-872-8400 Mechanical / Electrical

INTROBA 8250 HAVERSTICK ROAD

SUITE 285 INDIANAPOLIS, IN 46240 800-404-7677

DLZ 138 N. DELAWARE ST

Plumbing Engineer

INDIANAPOLIS, IN 46204 317-633-4120

Acoustics / Technology Engineer WJHW

7220 W. JEFFERSON AVE SUITE 216 LAKEWOOD, CO 80235 972-934-3700

Civil Engineer AMERICAN STRUCTUREPOINT, INC. 9025 RIVER ROAD

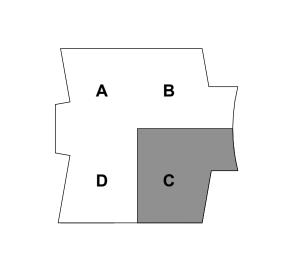
SUITE 200 INDIANAPOLIS, IN 46240 317-547-5580

Food Service Consultant CINILITTLE

3405 NW 9TH AVENUE #1202 FORT LAUDERDALE, FL 33309 954-846-9600

Code Consultant

FORZA 2502 WEST MECHANIC ST, SUITE C HARRISONVILLE, MO 64701 816-806-3729



KEY PLAN



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EVENT FLOOR PLAN

- AREA C - POWER

EP-101C

(0.R) 04 ENLA2-27 ENLA2-16 REFER TO EP1 / EP-101A TENLD1-34,36,38 MBB LOCKER ENLD1-2 ENLD1-6 ENLD1-2 ENLD1-12 VAV 00-03 (7) ENLD1-10 (7) ENLD1-10 ____F 7 ENLD1-20 (7 ENLD1-20 ENLD1-4 P0 7 ₄ ENLD1-4 🏚 ENLD1-4 l**Ю** 00-04 ENLD1-1 EOSLD1-13 EOSLD1-13 EOSLD1-13 EOSLD1-13 EAVAV G — — **ENLD1-16** 00-05 7 〈**(**)〉ENLD1-5 10/2EOSLD1-13(=) SOCCER 00 OAVAV JEOSLD1-13 H ENLD1-5 ENLD1-29 6W.A 00-05 ENLD1-5 ENLD1-5) ENLD1-25 () ENLD1-25 √**(**) **(**ENLD1-3) ENLD1-3 M SOC HC (7) ENLD1-13 \bigcirc ENLD2-22 H — — (H.3)—— — DOOR HOLDER FNLD2-13 ELECTROMAGNETIC ENLD2-14 OFFICE ${\cal O}$ door holder -ENLD2-20 ENLD2-24 ENLD2-24 ENLD2-21 ENLD2-18 ENLD2-16 ENLD2-16 7 9 0 K — — E E O S L B 2-25, 27 PN PT - 26 1/28 ? — SOUTH ELEVATOR ENLD3-16 ENLD3-16 POWER SWITCH 9 7 9 ENLD3-17 ENLD3-17 EOSLD1-15 EOSLD1-15 RPZ-1 S_M S_M RPZ-2 ENLD3-17 ENLD3-17 ENLD3-18 ENLD3-18 ENLD3-16 *ىلىنىتىنىنىڭىتىنىنىتىنىتىنىنىنىلىنىنىنى*ل

EVENT FLOOR PLAN - AREA D - POWER

GENERAL NOTES

A. CONTRACTOR TO REFER TO MECHANICAL AND PLUMBING DRAWINGS FOR EXACT LOCATION OF ALL MECHANICAL AND PLUMBING EQUIPMENT AND DEVICES INCLUDING INTERLOCK AND OTHER SPECIFIC REQUIREMENTS. B. REFER TO DATA/TELECOM, AUDIO-VISUAL AND SECURITY PLANS FOR ALL ITEMS, LOCATIONS, DEVICES AND EQUIPMENT TO BE FURNISHED AND INSTALLED BY CONTRACTOR INCLUDING BUT NOT LIMITED TO ALL CONDUITS AND JUNCTION BOXES.

SHEET KEYNOTES

- 1 PROVIDE A COMPANY SWITCH WITH CIRCUIT BREAKER AND CAM-LOCK CONNECTORS. SEE SINGLE LINE DIAGRAM FOR CIRCUITING AND FEEDER SIZE. 2 PROVIDE POWER CONNECTION TO LOCKER SYSTEM PROVIDE POWER CONNECTION TO HYDRONIC WALL CASSETTE. COORDINATE MOUNTING HEIGHT SO THAT RECEPTACLE IS LOCATED ADJACENT TO UNIT 4 PROVIDE JUNCTION BOX WITH (1) 120V-20A CIRCUIT FOR PRESS JUNCTION BOX. MOUNT JUNCTION BOX
 - AT 4'-0" AFF. PROVIDE DUPLEX RECEPTACLE ADVACENT AV PLATE FOR MICROPHONE PLATE.
- 6 PROVIDE CEILING MOUNTED RECEPTACLES FOR TEMPORARY BROADCAST LIGHTING. COORDINATE EXACT LOCATION PRIOR TO INSTALLATION. RECEPTACLE TO BE MOUNTED IN DISPLAY BOX, SEE AV DRAWINGS FOR ADDITIONAL INFORMATION. NEMA 14-50R FOR HYDROTHERAPY UNIT. ROUTE 2#8,
- 1#10G 3/4"C TO CIRCUIT INDICATED. 9 COORDINATE LOCATION OF RECEPTACLES WITH LOCATION OF MIRRORS
- 10 PROVIDE POWER CONNECTION TO FIRE ALARM EQUIPMENT. COORDINATE LOCATION SO THAT DEVICE IS LOCATED ADJACENT TO UNIT. 11 PROVIDE POWER CONNECTION TO FIRE ALARM EQUIPMENT. COORDINATE LOCATION SO THAT DEVICE IS LOCATED INSIDE UNIT.
- 12 PROVIDE RECEPTACLE MOUNTED ADJACENT TO AV PLATE FOR CONNECTION TO PTZ CAMERA. REFER TO
- 13 PROVIDE POWER CONNECTION TO RETRACTABLE SEATING. PROVIDE 30/3/1 DISCONNECT SWITCH. ROUTE 3#10, 1#10G-3/4"C TO CIRCUIT INDICATED. COORDINATE EXACT LOCATION WITH SEATING MANUFACTURER. munimum minimum minimu

IN128 - JAMES T.

Ohio St & N Blackford St Indianapolis, IN 46202

MORRIS ARENA

IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEES 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408

812-855-1692

Architect RATIO 101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204

317-633-4040 Structural Engineer

FINK ROBERTS AND PETRIE, INC. 3535 EAST 96TH STREET

SUITE 126 INDIANAPOLIS, IN 46240

317-872-8400

Mechanical / Electrical INTROBA

8250 HAVERSTICK ROAD SUITE 285 INDIANAPOLIS, IN 46240

Plumbing Engineer

138 N. DELAWARE ST INDIANAPOLIS, IN 46204

317-633-4120

Acoustics / Technology Engineer WJHW 7220 W. JEFFERSON AVE

SUITE 216 LAKEWOOD, CO 80235 972-934-3700

Civil Engineer

800-404-7677

AMERICAN STRUCTUREPOINT, INC. 9025 RIVER ROAD J-----E&DRAHVINGS-FORADDITIONAL-INFORMATION----SUITE 200

> 317-547-5580 Food Service Consultant CINILITTLE

3405 NW 9TH AVENUE #1202

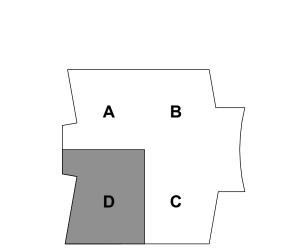
HARRISONVILLE, MO 64701

INDIANAPOLIS, IN 46240

FORT LAUDERDALE, FL 33309 954-846-9600

816-806-3729

Code Consultant FORZA 2502 WEST MECHANIC ST, SUITE C



KEY PLAN

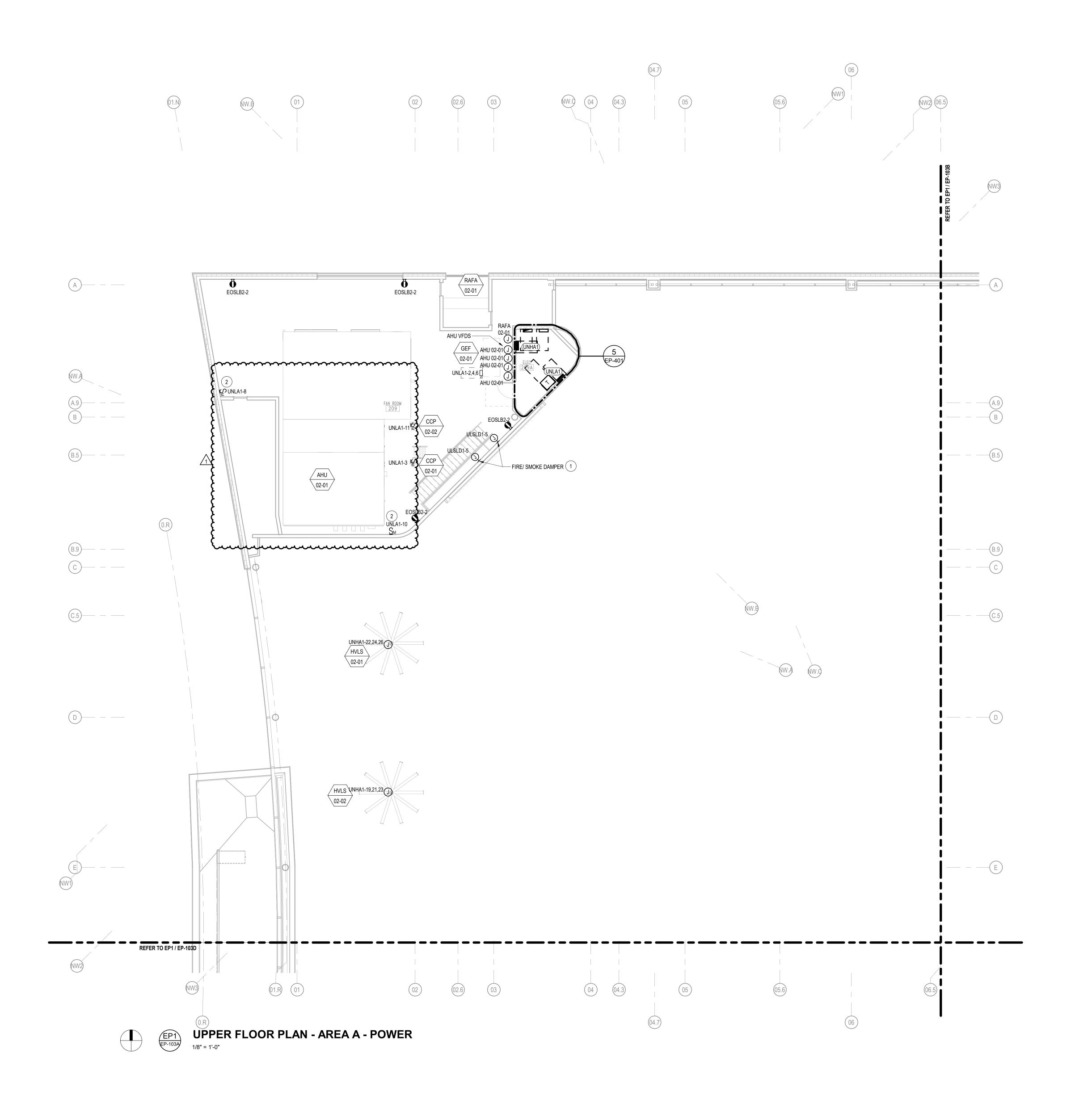


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EVENT FLOOR PLAN - AREA D - POWER

EP-101D



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SHEET KEYNOTES

1 PROVIDE POWER CONNECTION TO FIRE ALARM EQUIPMENT. COORDINATE LOCATION SO THAT $\sim\sim\sim$ 2 PROVIDE POWER CONNECTION TO HEAT TRACE. COORDINATE EXACT LOCATION WITH PLUMBING CONTRACTOR.

IN128 - JAMES T.

MORRIS ARENA

Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEE 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408

812-855-1692 Architect

RATIO 101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204

317-633-4040 Structural Engineer

FINK ROBERTS AND PETRIE, INC. 3535 EAST 96TH STREET

SUITE 126 INDIANAPOLIS, IN 46240

317-872-8400 Mechanical / Electrical

INTROBA 8250 HAVERSTICK ROAD SUITE 285 INDIANAPOLIS, IN 46240

800-404-7677

Plumbing Engineer

138 N. DELAWARE ST INDIANAPOLIS, IN 46204 317-633-4120

Acoustics / Technology Engineer WJHW

7220 W. JEFFERSON AVE SUITE 216 LAKEWOOD, CO 80235 972-934-3700

Civil Engineer AMERICAN STRUCTUREPOINT, INC.

9025 RIVER ROAD SUITE 200

INDIANAPOLIS, IN 46240 317-547-5580

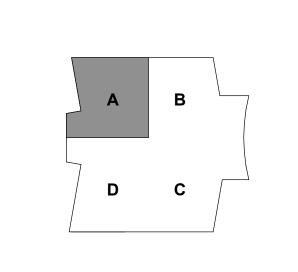
Food Service Consultant CINILITTLE

3405 NW 9TH AVENUE #1202 FORT LAUDERDALE, FL 33309 954-846-9600

Code Consultant

FORZA

2502 WEST MECHANIC ST, SUITE C
HARRISONVILLE, MO 64701
816-806-3729



KEY PLAN

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5	CONSTRUCTION DOCUMENTS	01/13/2
6	ADDENDUM 01	01/27/2



UPPER FLOOR PLAN - AREA A - POWER

EP-103A



A. CONTRACTOR TO REFER TO MECHANICAL AND PLUMBING DRAWINGS FOR EXACT LOCATION OF ALL MECHANICAL AND PLUMBING EQUIPMENT AND DEVICES INCLUDING INTERLOCK AND OTHER SPECIFIC REQUIREMENTS. B. REFER TO DATA/TELECOM, AUDIO-VISUAL AND SECURITY PLANS FOR ALL ITEMS, LOCATIONS, DEVICES AND EQUIPMENT TO BE FURNISHED AND INSTALLED BY CONTRACTOR INCLUDING BUT NOT LIMITED TO ALL CONDUITS AND JUNCTION BOXES.

SHEET KEYNOTES

- 1 100/3 DISCONNECT SWITCH FOR PRIMARY VIDEO SCREEN. EXACT LOCATION TO BE COORDINATED PRIOR TO INSTALLATION. ROUTE 4#3, 1#8G - 1 1/4"C TO CIRCUIT INDICATED. COORDINATE FINAL CONNECTION TO SCREEN WITH MANUFACTURER. 2 PROVIDE POWER CONNECTION TO FIRE ALARM
 - EQUIPMENT. COORDINATE LOCATION SO THAT DEVICE IS LOCATED ADJACENT TO UNIT.

IN128 - JAMES T. MORRIS ARENA

Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEE 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408

812-855-1692 Architect

RATIO 101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204

317-633-4040 Structural Engineer

FINK ROBERTS AND PETRIE, INC.

3535 EAST 96TH STREET SUITE 126

INDIANAPOLIS, IN 46240 317-872-8400

Mechanical / Electrical INTROBA

8250 HAVERSTICK ROAD SUITE 285 INDIANAPOLIS, IN 46240

800-404-7677 Plumbing Engineer

138 N. DELAWARE ST

INDIANAPOLIS, IN 46204 317-633-4120 Acoustics / Technology Engineer

WJHW 7220 W. JEFFERSON AVE

SUITE 216 LAKEWOOD, CO 80235 972-934-3700

AMERICAN STRUCTUREPOINT, INC. 9025 RIVER ROAD

SUITE 200 INDIANAPOLIS, IN 46240

317-547-5580

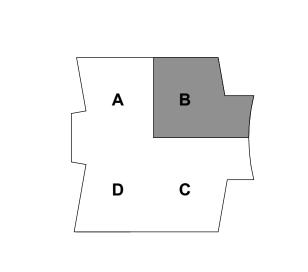
Civil Engineer

Food Service Consultant CINILITTLE 3405 NW 9TH AVENUE #1202

FORT LAUDERDALE, FL 33309 954-846-9600

Code Consultant

FORZA
2502 WEST MECHANIC ST, SUITE C
HARRISONVILLE, MO 64701
816-806-3729



KEY PLAN



SH	EET ISSUE	
1	DD PROGRESS SET	07/18/24
2	DESIGN DEVELOPMENT	08/30/24
3	50% CONSTRUCTION DOCUMENTS	11/01/24
4	95% CONSTRUCTION DOCUMENTS	12/19/24
5	CONSTRUCTION DOCUMENTS	01/13/25
6	ADDENDUM 01	01/27/25
1	1	1



UPPER FLOOR PLAN - AREA B - POWER

EP-103B

REFER TO EP1 / EP-103B PRACTICE GYNMASIUM 115 F ---— - F G — — H (H.3) (H.7)---- -J --- -J.5 UNLC1-22 Lunion of the contraction of the 10 UPPER FLOOR PLAN - AREA C - POWER

GENERAL NOTES

A. CONTRACTOR TO REFER TO MECHANICAL AND PLUMBING DRAWINGS FOR EXACT LOCATION OF ALL MECHANICAL AND PLUMBING EQUIPMENT AND DEVICES INCLUDING INTERLOCK AND OTHER SPECIFIC REQUIREMENTS. B. REFER TO DATA/TELECOM, AUDIO-VISUAL AND SECURITY PLANS FOR ALL ITEMS, LOCATIONS, DEVICES AND EQUIPMENT TO BE FURNISHED AND INSTALLED BY CONTRACTOR INCLUDING BUT NOT LIMITED TO ALL CONDUITS AND JUNCTION BOXES.

SHEET KEYNOTES

1 PROVIDE POWER CONNECTION TO HYDRONIC WALL CASSETTE. COORDINATE MOUNTING HEIGHT SO THAT RECEPTACLE IS LOCATED ADJACENT TO UNIT 2 FLOOR BOX FOR FURNITURE WITH TWO DUPLEX RECEPTACLES AND TWO GANGS FOR LOW VOLTAGE DEVICES. PROVIDE 1 1/2" CONDUIT FOR COMMUNICATION CABLING AND COORDINATE COVER STYLE, FINISH, AND LOCATION WITH ARCHITECT.

IN128 - JAMES T. MORRIS ARENA

Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEE 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408 812-855-1692

Architect RATIO 101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204

317-633-4040

Structural Engineer

FINK ROBERTS AND PETRIE, INC.

3535 EAST 96TH STREET SUITE 126 INDIANAPOLIS, IN 46240

317-872-8400 Mechanical / Electrical

800-404-7677

INTROBA 8250 HAVERSTICK ROAD SUITE 285 INDIANAPOLIS, IN 46240

Plumbing Engineer

138 N. DELAWARE ST INDIANAPOLIS, IN 46204 317-633-4120

Acoustics / Technology Engineer WJHW

7220 W. JEFFERSON AVE SUITE 216 LAKEWOOD, CO 80235 972-934-3700

Civil Engineer AMERICAN STRUCTUREPOINT, INC.

9025 RIVER ROAD SUITE 200 INDIANAPOLIS, IN 46240

317-547-5580

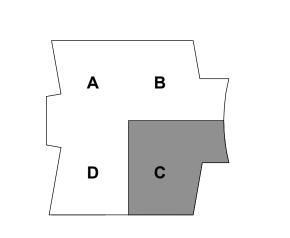
Food Service Consultant CINILITTLE

3405 NW 9TH AVENUE #1202

FORT LAUDERDALE, FL 33309 954-846-9600 **Code Consultant**

FORZA

2502 WEST MECHANIC ST, SUITE C HARRISONVILLE, MO 64701 816-806-3729



KEY PLAN



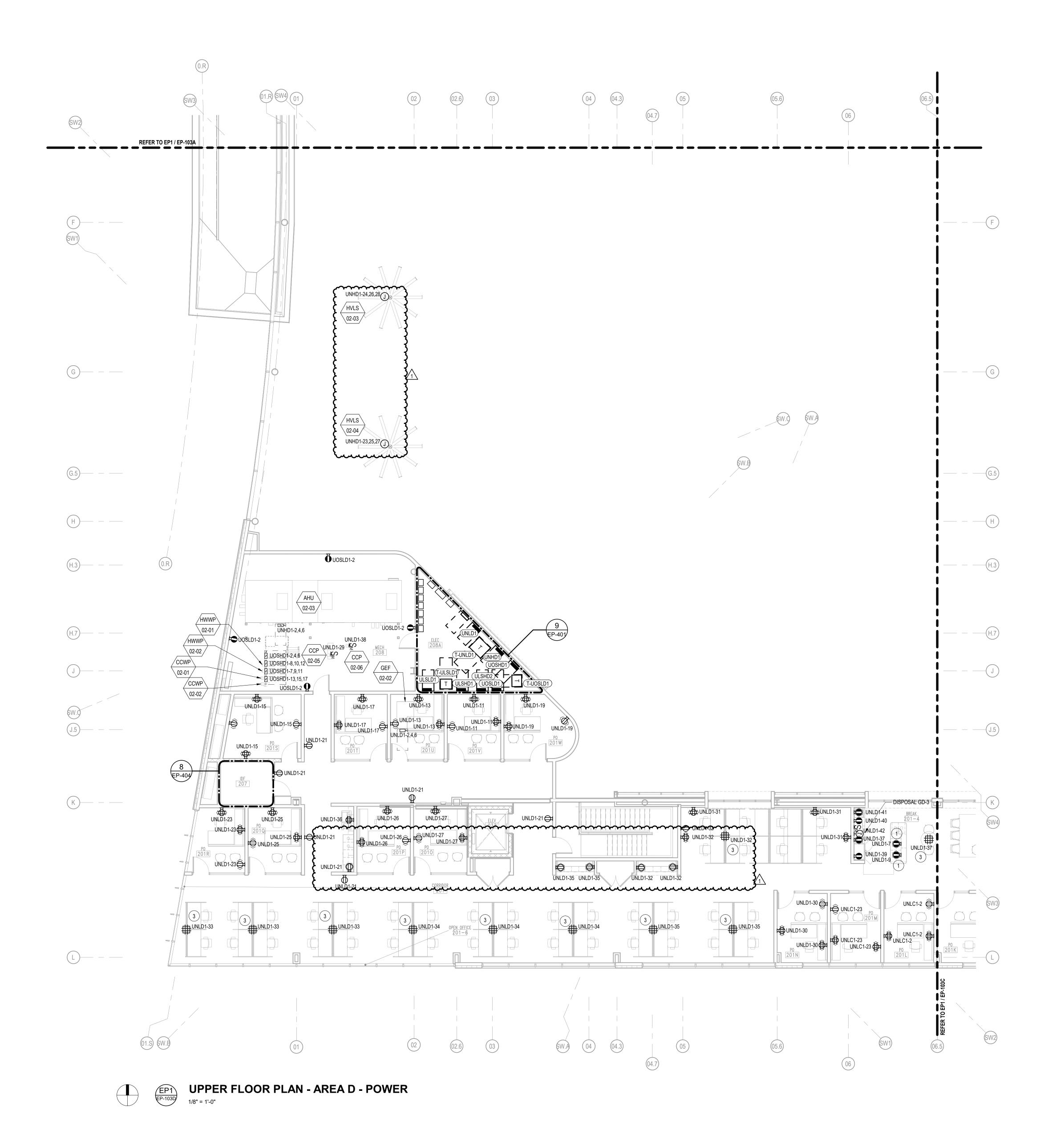
Sŀ	HEET ISSUE	
1	DD PROGRESS SET	07/18/24
2	DESIGN DEVELOPMENT	08/30/24
3	50% CONSTRUCTION DOCUMENTS	11/01/24
4	95% CONSTRUCTION DOCUMENTS	12/19/24
5	CONSTRUCTION DOCUMENTS	01/13/25
6	ADDENDUM 01	01/27/25



UPPER FLOOR PLAN

- AREA C - POWER

EP-103C



A. CONTRACTOR TO REFER TO MECHANICAL AND PLUMBING DRAWINGS FOR EXACT LOCATION OF ALL MECHANICAL AND PLUMBING EQUIPMENT AND DEVICES INCLUDING INTERLOCK AND OTHER SPECIFIC REQUIREMENTS. B. REFER TO DATA/TELECOM, AUDIO-VISUAL AND SECURITY PLANS FOR ALL ITEMS, LOCATIONS, DEVICES AND EQUIPMENT TO BE FURNISHED AND INSTALLED BY CONTRACTOR INCLUDING BUT NOT LIMITED TO ALL CONDUITS AND JUNCTION BOXES.

SHEET KEYNOTES

- 1 DUPLEX RECEPTACLE FOR MICROWAVE. COORDINATE LOCATION WITH ARCHITECT. 2 PROVIDE POWER CONNECTIONS TO ACCESS CONTROL PANEL. COORDINATE EXACT LOCATION PRIOR TO INSTALLATION.
- 3 FLOOR BOX FOR FURNITURE WITH TWO DUPLEX RECEPTACLES AND TWO GANGS FOR LOW VOLTAGE DEVICES. PROVIDE 1 1/2" CONDUIT FOR COMMUNICATION CABLING AND COORDINATE COVER STYLE, FINISH, AND LOCATION WITH ARCHITECT.

IN128 - JAMES T. MORRIS ARENA

Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEE 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408

812-855-1692 Architect

RATIO 101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204

317-633-4040 Structural Engineer

FINK ROBERTS AND PETRIE, INC. 3535 EAST 96TH STREET

SUITE 126 INDIANAPOLIS, IN 46240

317-872-8400 Mechanical / Electrical

INTROBA 8250 HAVERSTICK ROAD SUITE 285 INDIANAPOLIS, IN 46240

800-404-7677

Plumbing Engineer

138 N. DELAWARE ST

INDIANAPOLIS, IN 46204

317-633-4120 Acoustics / Technology Engineer

WJHW 7220 W. JEFFERSON AVE SUITE 216 LAKEWOOD, CO 80235 972-934-3700

Civil Engineer AMERICAN STRUCTUREPOINT, INC.

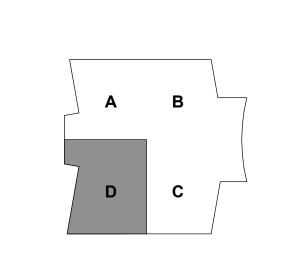
9025 RIVER ROAD SUITE 200 INDIANAPOLIS, IN 46240

317-547-5580 Food Service Consultant

CINILITTLE 3405 NW 9TH AVENUE #1202 FORT LAUDERDALE, FL 33309 954-846-9600

Code Consultant

FORZA 2502 WEST MECHANIC ST, SUITE C HARRISONVILLE, MO 64701 816-806-3729



KEY PLAN



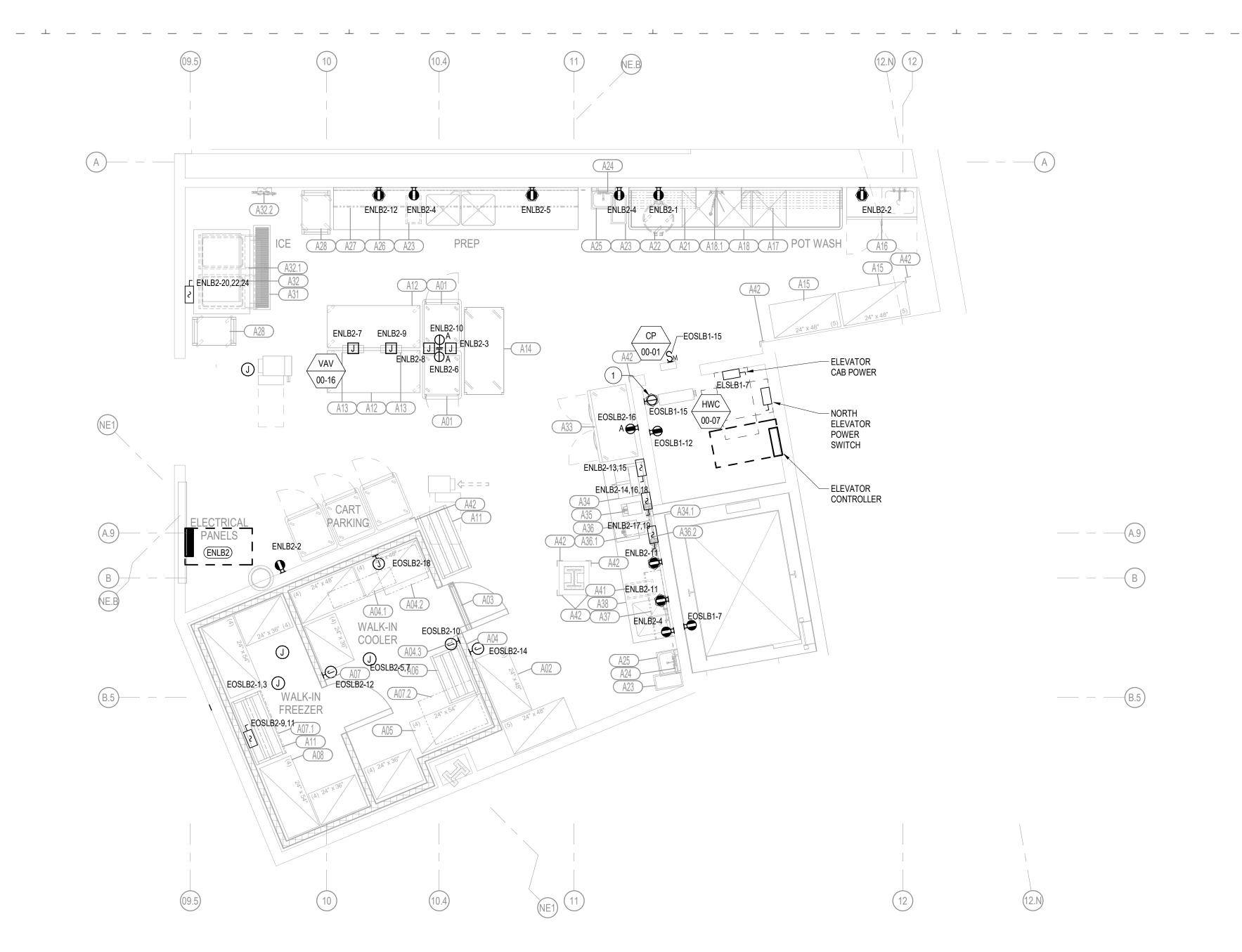
SH	EET ISSUE	
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3	50% CONSTRUCTION DOCUMENTS	11/01/24
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6	ADDENDUM 01	01/27/25



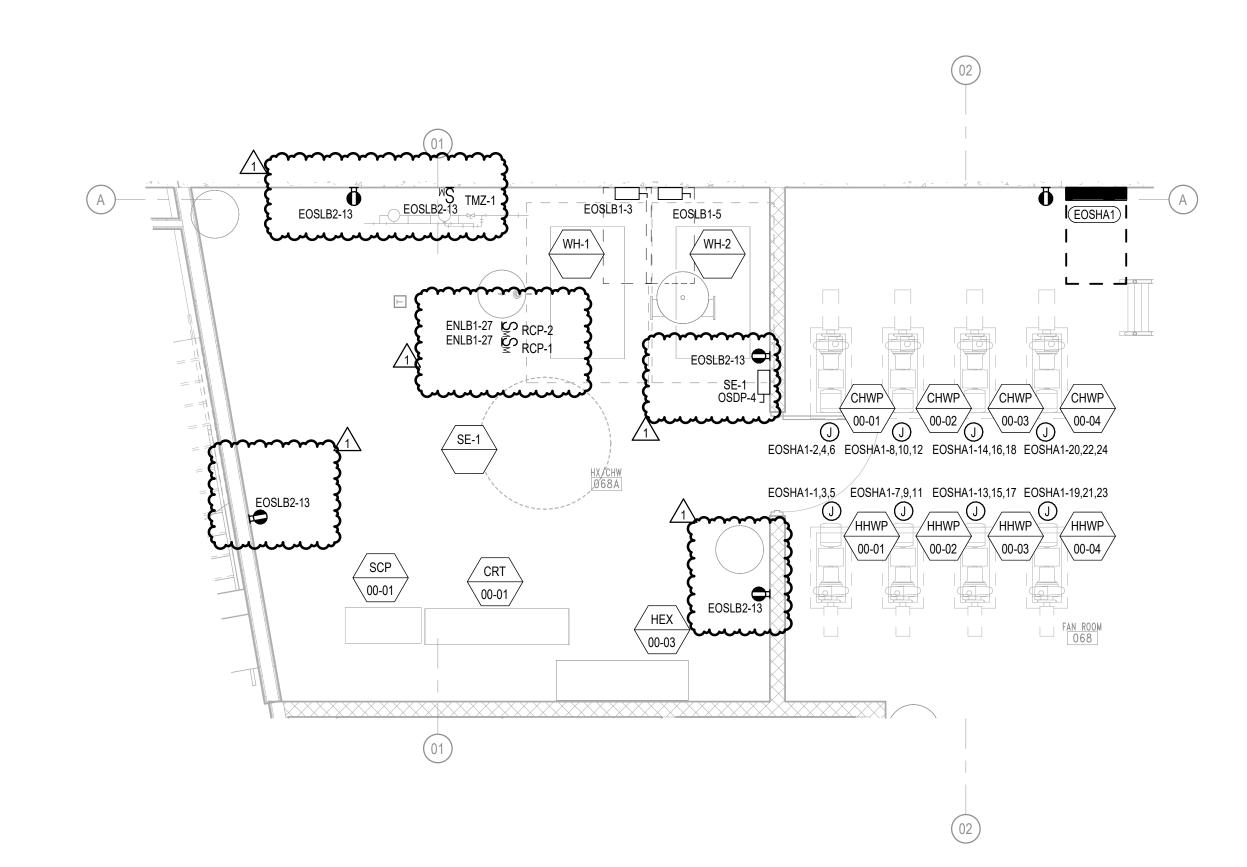
UPPER FLOOR PLAN - AREA D - POWER

EP-103D

FNFR	AL NOTES:									ABBREVIATIONS:	
. CO().	<u>al notes:</u> Drdinate exact outlet an <u>Notes:</u>	D DISCONN	ECT MEA	NS TYPE WITH FO	OD SERVICE DRA	WINGS/PRO\	/IDER. MAKE A	ILL CHANGES AS REQUIREI	D.	ABBREVIATIONS: INT = INTEGRAL TO EQI MTS = MOTOR RATED I REC - RECEPTACLE SE DISCONNECT	OGGLE SWITCH
EM ID					ADDADENT					N=144	
TEM ID NO.	EQUIPMENT TYPE	VOLTAGE	POLES	CALCULATED AMPS	APPARENT LOAD (VA)	PANEL	CIRCUIT#	BREAKER CIRCUIT	DISCONNECT	NEMA CONNECTION	NOTES
A01	HOT HOLDING CABINET	120 V	1	16.0 A	1920	ENLB2	6	2#12,#12G,1/2"C.		5-20P	
A01	HOT HOLDING CABINET	120 V	1	16.0 A	1920	ENLB2	10	2#12,#12G,1/2"C.		5-20P	
A04	WALK-IN COOLER	120 V	1	12.0 A	1440	EOSLB2	14	2#12,#12G,1/2"C.			
4 04.1	EVAPORATOR COIL, +35F	120 V	1	1.6 A	190	EOSLB2	18	2#12,#12G,1/2"C.			
404.2	CONDENSER	208 V	2	6.3 A	1310	EOSLB2	5,7	2#12,#12G,1/2"C.	30A/2P		
404.3	AIR SHIELD	120 V	1	1.0 A	120	EOSLB2	10	2#12,#12G,1/2"C.	M.T.S.		
A07	WALK-IN FREEZER	120 V	1	12.0 A	1440	EOSLB2	12	2#12,#12G,1/2"C.	M.T.S.		
A07.1	EVAPORATOR COIL, -10F	208 V	2	10.7 A	2230	EOSLB2	9,11	2#12,#12G,1/2"C.	30A/2P		
A07.2	CONDENSER	208 V	2	16.4 A	3410	EOSLB2	1,3	2#10,#10G,3/4"C.	30A/2P		
A13	DROP CORD REEL	120 V	1	16.0 A	1920	ENLB2	8	2#12,#12G,1/2"C.			
A13	DROP CORD REEL	120 V	1	16.0 A	1920	ENLB2	3	2#12,#12G,1/2"C.			
A13	DROP CORD REEL	120 V	1	16.0 A	1920	ENLB2	9	2#12,#12G,1/2"C.			
A13	DROP CORD REEL	120 V	1	16.0 A	1920	ENLB2	7	2#12,#12G,1/2"C.			
A22	TRASH REC 32 GAL	120 V	1	1.5 A	180	ENLB2	1	2#12,#12G,1/2"C.			
A23	TRASH REC 23 GAL	120 V	1	1.5 A	180	ENLB2	4	2#12,#12G,1/2"C.			
A23	TRASH REC 23 GAL	120 V	1	1.5 A	180	ENLB2	4	2#12,#12G,1/2"C.			
A27	WORKTABLE REC	120 V	1	16.0 A	1920	ENLB2	5	2#12,#12G,1/2"C.			
A27	WORKTABLE REC	120 V	1	16.0 A	1920	ENLB2	12	2#12,#12G,1/2"C.			
A32	ICE MACHINE	208 V	3	6.1 A	2200	ENLB2	20,22,24	3#12,#12G,1/2"C.	30A/3P		
A33	REFRIGERATOR REACH-IN	115 V	1	8.1 A	930	EOSLB2	16	2#12,#12G,1/2"C.		5-15P	
A34	COFFEE BREWER	208 V	2	28.8 A	6000	ENLB2	13,15	2#8,#10G,3/4"C.	30A/2P		
A35	HOT WATER DISPENSER	208 V	3	16.7 A	6000	ENLB2	14,16,18	3#12,#12G,1/2"C.	30A/3P		
A36	TEA BREWER	208 V	2	13.0 A	2700	ENLB2	17,19	2#12,#12G,1/2"C.	30A/2P		
A38	WORKTABLE REC	120 V	1	16.0 A	1920	ENLB2	11	2#12,#12G,1/2"C.			
A38	WORKTABLE REC	120 V	1	16.0 A	1920	ENLB2	11	2#12,#12G,1/2"C.			
A41	TRASH REC 23 GAL	120 V	1	1.5 A	180	ENLB2	4	2#12,#12G,1/2"C.			



EVENT LEVEL ENLARGED PLAN - FS COMMISSARY & KITCHEN 013 1 EP-402



EVENT LEVEL ENLARGED PLAN - MECHANICAL ROOM 069A

GENERAL NOTES

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INDIANAPOLIS, IN 46204 317-633-4040

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3535 EAST 96TH STREET SUITE 126 INDIANAPOLIS, IN 46240 317-872-8400

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Civil Engineer AMERICAN STRUCTUREPOINT, INC.

9025 RIVER ROAD SUITE 200

INDIANAPOLIS, IN 46240 317-547-5580 **Food Service Consultant**

CINILITTLE 3405 NW 9TH AVENUE #1202 FORT LAUDERDALE, FL 33309 954-846-9600

Code Consultant

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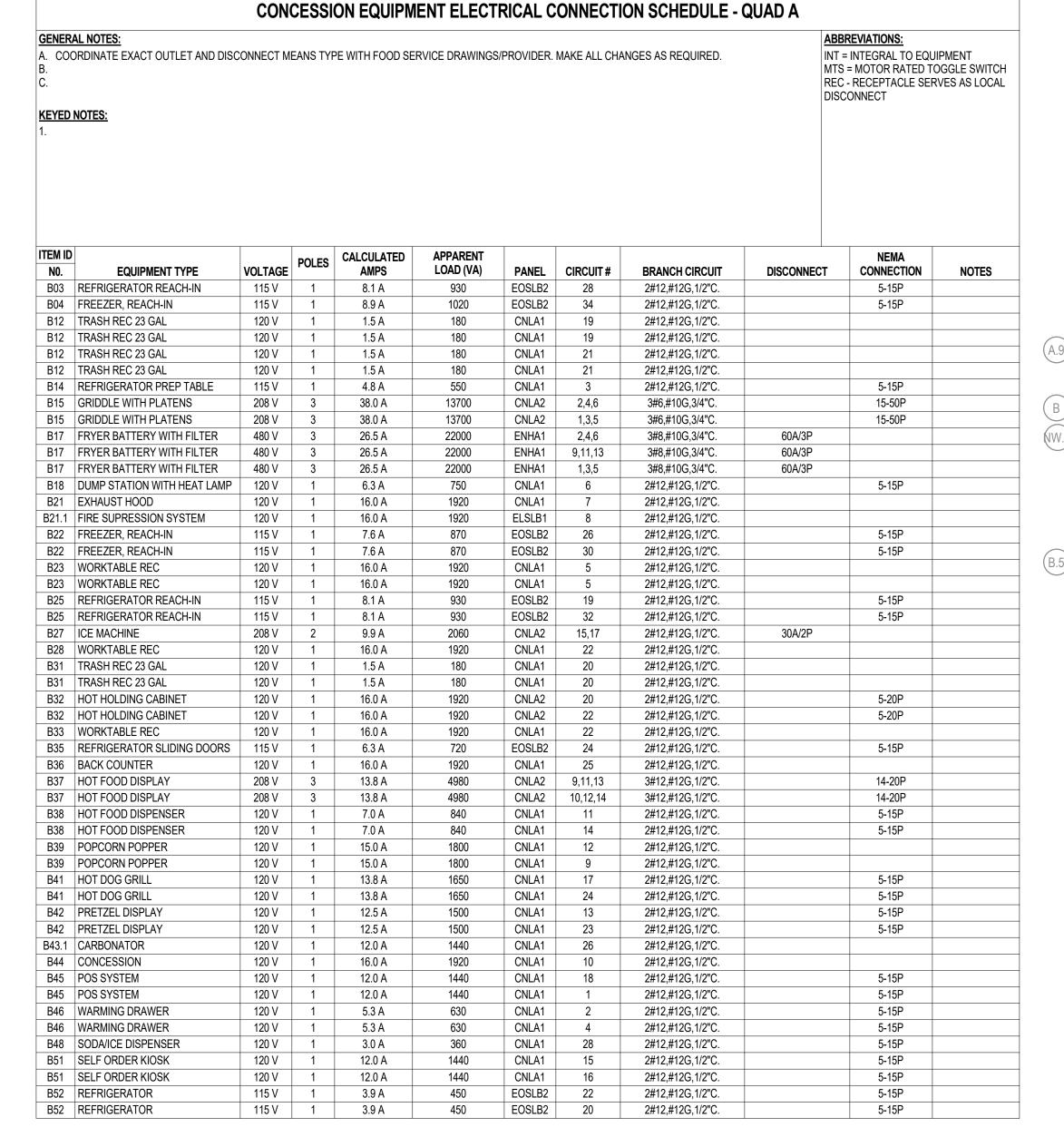


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1	DD PROGRESS SET	07/18/24
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3	50% CONSTRUCTION DOCUMENTS	11/01/24
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PROJECT NO.

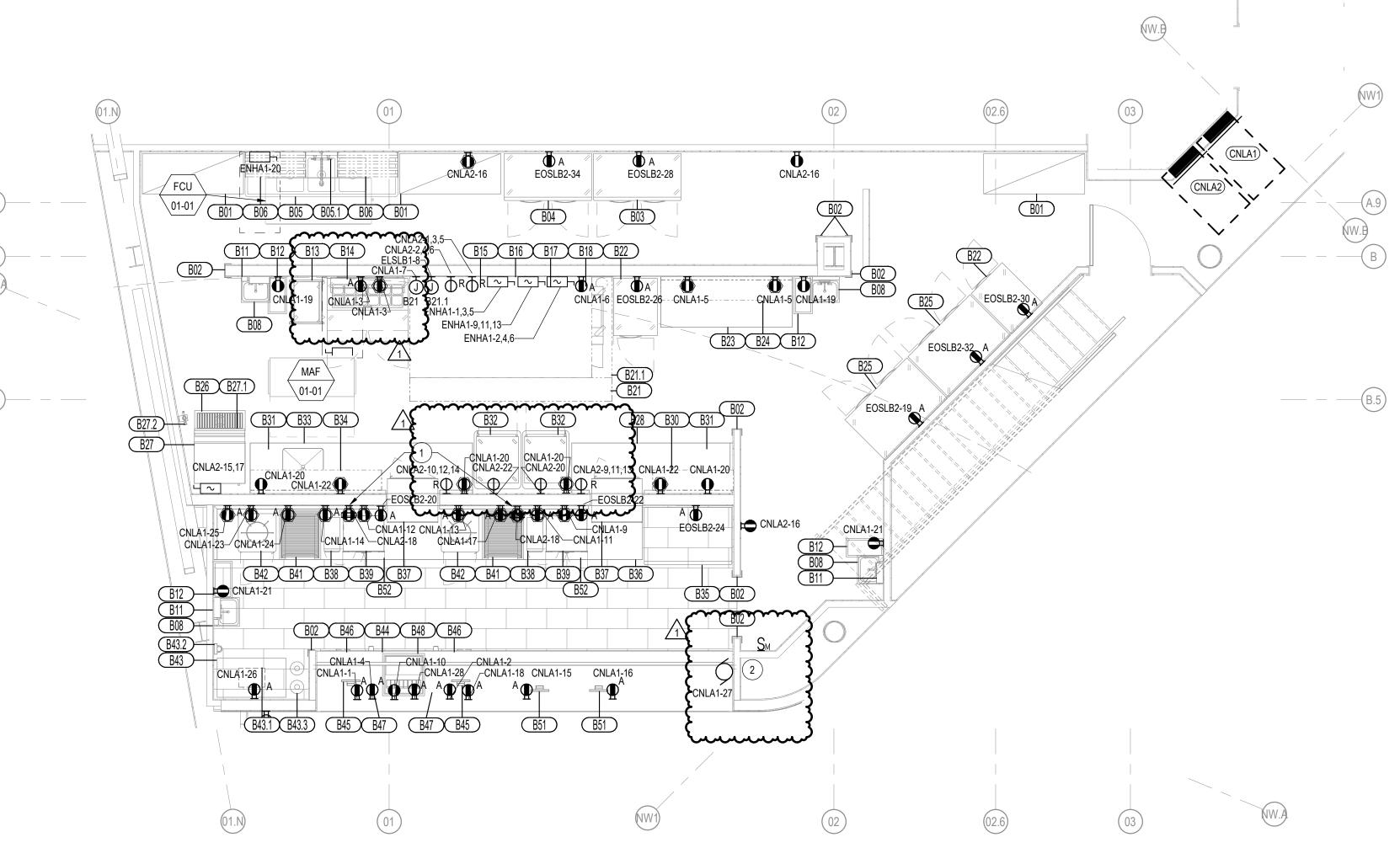
ENLARGED PLANS -POWER

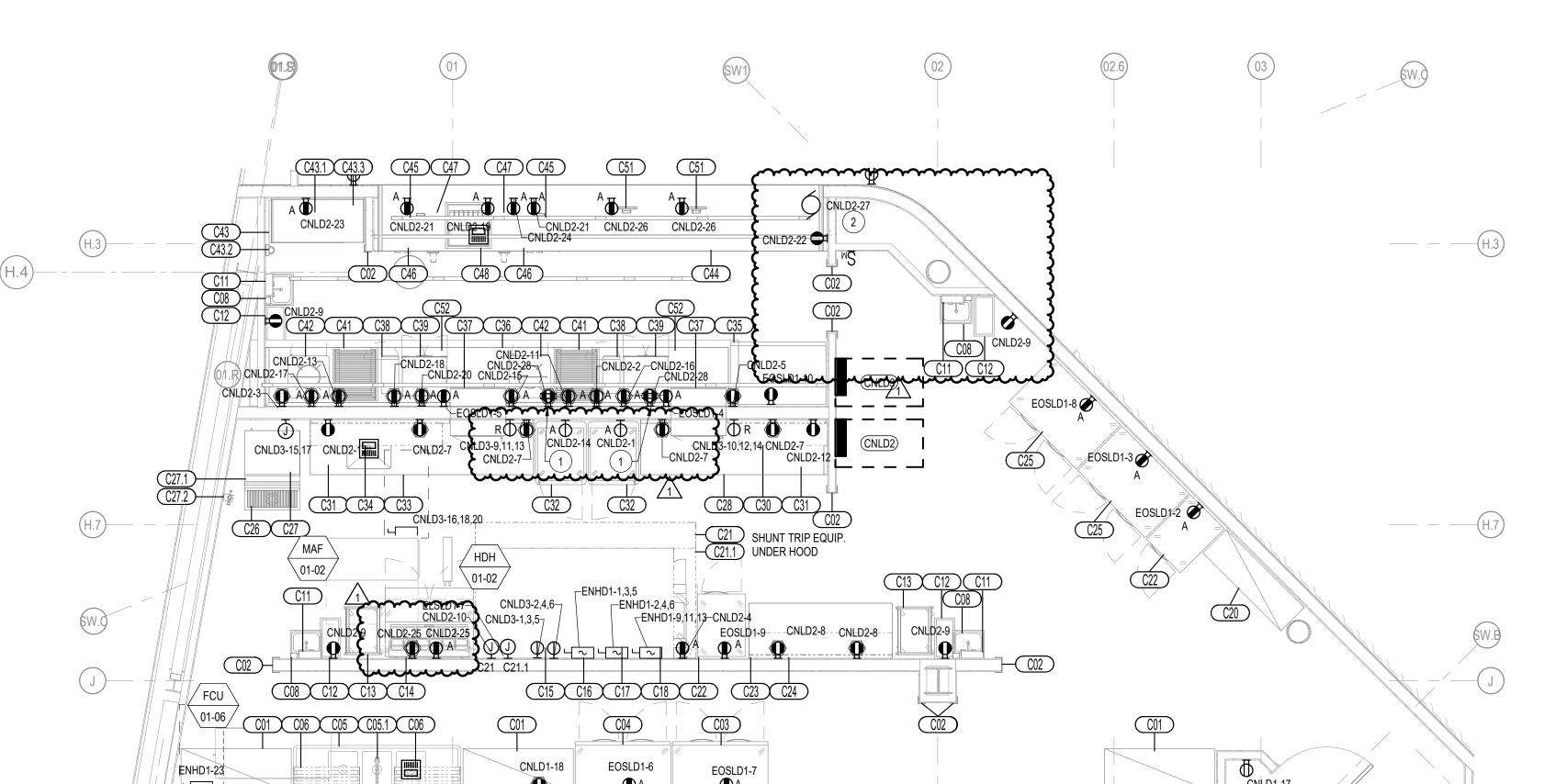


	<mark>AL NOTES:</mark> DRDINATE EXACT OUTLET AND DIS		MEANS TV	PE WITH FOOD SE	RVICE DRAWINGS	S/PROVIDER	MAKE VII UHV	NGES AS REOLIIRED		BREVIATIONS: = INTEGRAL TO EQUI	PMFNT
COC	INDINATE EXACT OUTLET AND DIS	CONNECTIV	ILANO III	FE WITHFOOD SE	RVICE DRAWINGS	OFROVIDER.	WARE ALL OF IA	INGES AS REQUIRED.	MTS	S = MOTOR RATED TO C - RECEPTACLE SER'	GGLE SWITCH
										CONNECT	LO AO LOCAL
YED	NOTES:										
EM ID				CALCULATED	APPARENT					NEMA	
N0.	EQUIPMENT TYPE	VOLTAGE	POLES	AMPS	LOAD (VA)	PANEL	CIRCUIT#	BRANCH CIRCUIT	DISCONNECT	CONNECTION	NOTES
C03	REFRIGERATOR REACH-IN	115 V	1	8.1 A	930	EOSLD1	7	2#12,#12G,1/2"C.		5-15P	
	FREEZER, REACH-IN	115 V	1	8.9 A	1020	EOSLD1	6	2#12,#12G,1/2"C.		5-15P	
C12	TRASH REC 23 GAL	120 V	1	1.5 A	180	CNLD2	9	2#12,#12G,1/2"C.			
C12	TRASH REC 23 GAL	120 V	1	1.5 A	180	CNLD2	9	2#12,#12G,1/2"C.			
C12	TRASH REC 23 GAL	120 V	1	1.5 A 1.5 A	180	CNLD2	9	2#12,#12G,1/2"C.			
C12 C14	TRASH REC 23 GAL REFRIGERATOR PREP TABLE	120 V 115 V	1	1.5 A 4.8 A	180 550	CNLD2 CNLD2	25	2#12,#12G,1/2"C. 2#12,#12G,1/2"C.		5-15P	
C14 C15	GRIDDLE WITH PLATENS	208 V	3	38.0 A	13700	CNLD2 CNLD3	1,3,5	3#6,#10G,3/4"C.		15-50P	
	GRIDDLE WITH PLATENS	208 V	3	38.0 A	13700	CNLD3	2,4,6	3#6,#10G,3/4"C.		15-50P	
	FRYER BATTERY WITH FILTER	480 V	3	26.5 A	22000	ENHD1	9,11,13	3#8,#10G,3/4"C.	60A/3P	10 001	
	FRYER BATTERY WITH FILTER	480 V	3	26.5 A	22000	ENHD1	2,4,6	3#8,#10G,3/4"C.	60A/3P		
C17	FRYER BATTERY WITH FILTER	480 V	3	26.5 A	22000	ENHD1	1,3,5	3#8,#10G,3/4"C.	60A/3P		
C18	DUMP STATION WITH HEAT LAMP	120 V	1	6.3 A	760	CNLD2	4	2#12,#12G,1/2"C.		5-15P	
C21	EXHAUST HOOD	120 V	1	16.0 A	1920	CNLD2	10	2#12,#12G,1/2"C.			
	FIRE SUPRESSION SYSTEM	120 V	1	16.0 A	1920	ELSLD1	7	2#12,#12G,1/2"C.			
	FREEZER, REACH-IN	115 V	1	7.6 A	870	EOSLD1	9	2#12,#12G,1/2"C.		5-15P	
	FREEZER, REACH-IN	115 V	1	7.6 A	870	EOSLD1	2	2#12,#12G,1/2"C.		5-15P	
C23 C23	WORKTABLE REC WORKTABLE REC	120 V 120 V	1	16.0 A 16.0 A	1920 1920	CNLD2 CNLD2	8 8	2#12,#12G,1/2"C. 2#12,#12G,1/2"C.			
	REFRIGERATOR REACH-IN	120 V	1	8.1 A	930	EOSLD1	8	2#12,#12G,1/2°C.		5-15P	
	REFRIGERATOR REACH-IN	115 V	1	8.1 A	930	EOSLD1	3	2#12,#12G,1/2"C.		5-15P	
C27	ICE MACHINE	208 V	2	9.9 A	2060	CNLD3	15,17	2#12,#12G,1/2"C.	30A/2P	0 101	
C28	WORKTABLE REC	120 V	1	16.0 A	1920	CNLD2	7	2#12,#12G,1/2"C.			
C31	TRASH REC 23 GAL	120 V	1	1.5 A	180	CNLD2	12	2#12,#12G,1/2"C.			
C31	TRASH REC 23 GAL	120 V	1	1.5 A	180	CNLD2	12	2#12,#12G,1/2"C.			
C32	HOT HOLDING CABINET	120 V	1	16.0 A	1920	CNLD2	1	2#12,#12G,1/2"C.		5-20P	
C32	HOT HOLDING CABINET	120 V	1	16.0 A	1920	CNLD2	14	2#12,#12G,1/2"C.		5-20P	
	WORKTABLE REC	120 V	1	16.0 A	1920	CNLD2	7	2#12,#12G,1/2"C.			
	REFRIGERATOR SLIDING DOORS BACK COUNTER	120 V 120 V	1 1	6.3 A 16.0 A	750 1920	EOSLD1 CNLD2	10	2#12,#12G,1/2"C.			
	BACK COUNTER BACK COUNTER	120 V	1	16.0 A	1920	CNLD2 CNLD2	5	2#12,#12G,1/2"C. 2#12,#12G,1/2"C.			
	HOT FOOD DISPLAY	208 V	3	13.8 A	4980	CNLD2	10,12,14	3#12,#12G,1/2"C.		14-20P	
C37	HOT FOOD DISPLAY	208 V	3	13.8 A	4980	CNLD3	9,11,13	3#12,#12G,1/2"C.		14-20P	
C38	HOT FOOD DISPENSER	120 V	1	7.0 A	840	CNLD2	2	2#12,#12G,1/2"C.		5-15P	
C38	HOT FOOD DISPENSER	120 V	1	7.0 A	840	CNLD2	18	2#12,#12G,1/2"C.		5-15P	
	POPCORN POPPER	120 V	1	15.0 A	1800	CNLD2	16	2#12,#12G,1/2"C.			
C39	POPCORN POPPER	120 V	1	15.0 A	1800	CNLD2	20	2#12,#12G,1/2"C.			
C41	HOT DOG GRILL	120 V	1	13.8 A	1650	CNLD2	11	2#12,#12G,1/2"C.		5-15P	
	HOT DOG GRILL	120 V	1	13.8 A	1650	CNLD2	13	2#12,#12G,1/2"C.		5-15P	
	PRETZEL DISPLAY	120 V	1	11.8 A	1410	CNLD2	15	2#12,#12G,1/2"C.		5-15P	
	PRETZEL DISPLAY CARBONATOR	120 V 120 V	1 1	11.8 A	1410 1440	CNLD2 CNLD2	17	2#12,#12G,1/2"C.		5-15P 5-15P	
	CONCESSION COUNTER	120 V	1	12.0 A 16.0 A	1920	CNLD2 CNLD2	23	2#12,#12G,1/2"C. 2#12,#12G,1/2"C.		D-10P	
	POS SYSTEM	120 V	1	10.0 A 12.0 A	1920	CNLD2 CNLD2	22	2#12,#12G,1/2°C.		5-15P	
	POS SYSTEM	120 V	1	12.0 A	1440	CNLD2	21	2#12,#12G,1/2°C.		5-15P 5-15P	
C46	WARMING DRAWER	120 V	1	5.3 A	630	CNLD2	24	2#12,#12G,1/2"C.		5-15P	
	SODA/ICE DISPENSER	115 V	1	3.0 A	340	CNLD2	19	2#12,#12G,1/2"C.		0.101	
	SELF ORDER KIOSK	120 V	1	12.0 A	1440	CNLD2	26	2#12,#12G,1/2"C.			
	SELF ORDER KIOSK	120 V	1	12.0 A	1440	CNLD2	26	2#12,#12G,1/2"C.			
C52	REFRIGERATOR	115 V	1	3.9 A	450	EOSLD1	4	2#12,#12G,1/2"C.			
	DEEDIGEDATOR	115 V		30Δ	450	EOSI D1	5	2#12 #12G 1/2"C			

450 EOSLD1 5 2#12,#12G,1/2"C.

C52 REFRIGERATOR





02.6

E04 - CONCOURSE LEVEL - QUAD A CONCESSION -

ELECTRICAL

E04 - CONCOURSE LEVEL - QUAD D CONCESSION - ELECTRICAL

GENERAL NOTES

A. CONTRACTOR TO REFER TO MECHANICAL AND PLUMBING DRAWINGS FOR EXACT LOCATION OF ALL MECHANICAL AND PLUMBING EQUIPMENT AND DEVICES INCLUDING INTERLOCK AND OTHER SPECIFIC REQUIREMENTS.

B. REFER TO DATA/TELECOM, AUDIO-VISUAL AND SECURITY PLANS FOR ALL ITEMS, LOCATIONS, DEVICES AND EQUIPMENT TO BE FURNISHED AND INSTALLED BY CONTRACTOR INCLUDING BUT NOT LIMITED TO ALL CONDUITS AND JUNCTION BOXES.

SHEET KEYNOTES

1 PROVIDE DEVICE TO BE MOUNTED IN DISPLAY BOX, SEE

AV BRAWINGS FOR ADDITIONAL INFORMATION.

2 MAKE POWER CONNECTION TO OVERHEAD COILING
DOOR. COORDINATE EXACT REQUIREMANTS IN FIELD.
PROVIDE SWITCH AND WIRING TO CONTROL LOCATION.

TA 1 PROVIDE DEVICE TO BE MOUNTED IN DISPLAY BOX SEE

AV DRAWINGS FOR ADDITIONAL INFORMATION.

TA 2 PROVIDE DEVICE TO BE MOUNTED IN DISPLAY BOX SEE

TA-2 PROVIDE DEVICE TO BE MOUNTED IN DISPLAY BOX, SEE AV DRAWINGS FOR ADDITIONAL INFORMATION.

IN128 - JAMES T. MORRIS ARENA

Ohio St & N Blackford St

Indianapolis, IN 46202

IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEE
2901 EAST DISCOVERY PARKWAY
BLOOMINGTON, IN 47408

812-855-1692

Architect
RATIO

101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204

317-633-4040 Structural Engineer

FINK ROBERTS AND PETRIE, INC.

3535 EAST 96TH STREET SUITE 126

SUITE 126 INDIANAPOLIS, IN 46240 317-872-8400

317-872-8400

Mechanical / Electrical

INTROBA 8250 HAVERSTICK ROAD

SUITE 285 INDIANAPOLIS, IN 46240 800-404-7677

Plumbing Engineer

138 N. DELAWARE ST INDIANAPOLIS, IN 46204 317-633-4120

Acoustics / Technology Engineer
WJHW

7220 W. JEFFERSON AVE SUITE 216 LAKEWOOD, CO 80235 972-934-3700

Civil Engineer

AMERICAN STRUCTUREPOINT, INC.

9025 RIVER ROAD SUITE 200

INDIANAPOLIS, IN 46240 317-547-5580

Food Service Consultant
CINILITTLE

3405 NW 9TH AVENUE #1202 FORT LAUDERDALE, FL 33309 954-846-9600

Code Consultant
FORZA

2502 WEST MECHANIC ST, SUITE C HARRISONVILLE, MO 64701 816-806-3729



SH	EET ISSUE	
1	DD PROGRESS SET	07/18/24
2	DESIGN DEVELOPMENT	08/30/24
3	50% CONSTRUCTION DOCUMENTS	11/01/24
4	95% CONSTRUCTION DOCUMENTS	12/19/24
5	CONSTRUCTION DOCUMENTS	01/13/25
6	ADDENDUM 01	01/27/25



PROJECT NO.

IO._____

ENLARGED PLANS -POWER

SHEET NUMBER

			H.	ADP				
	Volts: 277/480V/3PH/4W, 3PH-4W Phases: 3 Wires: 4		LOCATION: ELEC SUPPLY FROM: MSB KAIC: SEE S	TRICAL 008		Main Breaker: Amp Bussing:		
CKT	CIRCUIT DESCRIF	PTION		Load Classification	LOAD (KVA)	TYPE	BREAKE	R RATING
1	SPD				0		60	
2	UNHA1			M; L	197.3		400	
3	T-LADP			M; R; GC; G	189.9		250	;
4	ENHA1			M; L; GC;	74.3		200	;
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	<del>,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,</del>		<del>Manara</del>					
Load Classificat		Connected Load (VA)	Calc. Demand (VA),	<b>\</b>	kVA	Amps Notes:		
<u> </u>	al, Continuous Equipment = Constant, 125%	71060		Subtotal Connected Load:	462	555		
	= Constant, 125%	5613		Subtotal Estimated Deman		508		
• •	100% + 25% of largest	200488	211738 <b>°</b>	Desired Spare Capacit		5		
(R) - Receptad	cles = 10kVA @ 100% + Remainder @ 50%	114200	62100°	Spare Capacity use	ed: 84	102		
Lighting		1237	1546	Total Est. Demand w/ Spar	e: 507	610		
(G)		400	400					
R - RECEPTA	CLE	360	360.					
(GN) - Genera	al, Non Continuous Equipment = Constant, 100%	68150	68150	<b>.</b>				
<u> </u>			•					
			•	}				
		+						

	Volts: 120/208V/3PH/4W, 3PH-4W Phases: 3 Wires: 4		LOCATION: ELI SUPPLY FROM: T-L KAIC: SE	ADP			lain Breaker: mp Bussing:		
CKT	CIRCUIT DESCRIF	TION		Load Classification	LOAD (KVA)		TYPE	BREAK	ER RATING
1	CNLA1			M; R; GC; G	84.2			225	3
2	ENLA1			R; GC; G	65.3			225	3
3	ENLA2			R; G	40.3			200	3
4									
5									
6									
7									
8									
9									
10									
11									
12									
13 14									
15									
16									+
17									
18									
19									+
20									+
oad Classificati	ons:	Connected Load (VA)	Calc. Demand (V	A) Panel Totals:	kVA	A	Notes:		
GC) - General	, Continuous Equipment = Constant, 125%	5060	506	0 Subtotal Connected Load:	190	527	,		
M) - Motor =	100% + 25% of largest	1700	207	5 Subtotal Estimated Demand	<b>d:</b> 138	383			
	les = 10kVA @ 100% + Remainder @ 50%	114200	6210	Desired Spare Capacit	y: 20 9	6	1		
G)		400	40			77			
R - RECEPTAC	CLE	360		Total Est. Demand w/ Spare		460	4		
	, Non Continuous Equipment = Constant, 100%	68150	6815	-					
, 50	,	33.30	20.0						

	VOLTS: 120/	208V/3PH/4	W					ON: ELE		200 AL						KER: NONE	
	PHASES: 3					SUPI		OM: LAD								SING: 225	
	WIRES: 4							AIC: SEI						NE		BUS: WITH	
	MOUNTING: SUR	RFACE				KAIC A	VAILAB	BLE: SEI	E STUE	ΟY					IG	BUS: WITHOUT	
СКТ	Circuit Description	Load Class	Туре	BRK	(R	Ø	<b>A</b>	Q	íΒ	,	<b>2</b> C	В	RKR	Type	Load Class	Circuit Description	СКТ
1	CORRIDOR	R	7.	20	1	1080	10800									•	2
3	EV CHARGER	R		40	2			1800	10800			3	125		G	DRYER	4
5		- 1		10		4000	~~	~~~	~~	~480 <del>6</del> ~	~1 <del>0</del> 800~	$\sim$	~~	~~~	$\sim$	$\sim\sim\sim\sim\sim\sim\sim\sim\sim\sim\sim\sim\sim\sim\sim\sim\sim\sim\sim\sim\sim\sim\sim\sim\sim\sim\sim\sim\sim\sim\sim\sim\sim\sim\sim\sim$	
7 9	EV CHARGER	R		40	2	1800	500	1800	500			3	20		GC	RETRACTABLE SEATING	10
11					+	<del></del>		1800	500	1800	500	³	20		GC	NETRACTABLE SEATING	12
13	EV CHARGER	R		40	2	1800	500			1000	300						14
15	EV CHARCED			40		<u> </u>		1800	500			3	20		GC	RETRACTABLE SEATING	16
17	EV CHARGER	R		40	2	7				1800	500						18
19	EV CHARGER	R		40	2	1800	June		$\mathcal{M}$	AMM.	$\mathcal{M}$	مهر		W	~	SPARELLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLL	n
21	EV OTTAKOLIK	- 1		10				1800	0	1000		1	20			SPARE	22
23	EV CHARGER	R		40	2	4000				1800	0	1	20			SPARE	24
25 27	RM 011	R		20	1	1800	0	720	0			1	20 20			SPARE SPARE	26 28
	RM 017	R		20	1			120	0	720	180	1	20		R	AV RECEPTACLES	30
	RM 013	R		20	1	900	180			120	100	1	20		R	AV RECEPTACLES	32
	RM 015	R		20	1			900	180			1	20		R	RM 006	34
35	RM 018	R		20	1					900	720	1	20		R	RM 007	36
	RM 006	R		20	1	180	540					1	20		R	CORRIDOR AND STORAGE	38
	RM 006	R		20	1			180	400	4.5.5	0.00	1	20	GFI		WATER FOUNTAIN 115F	40
41	RM 006	R		20	1					180	360	1	20			EXTERIOR REC	42
			Total Lo	•	- 1	218			380		2060						
			Total I	Load (	A)	18			78 		84						
	15. 4			1.		Ø			B		ØC						
	classifications:		2 500/	С		Load (V	A) Calc.		d (VA)		Panel Tota			KVA			
	eceptacles = 10kVA @ 100% + F					29160		19580			connected			65			
	General, Continuous Equipment =	= Constant,	125%			3000		3000			Estimate					) -	
G)						400		400			sired Spa				%	-	
	CEPTACLE					360		360			Spare Cap		•			<u> </u>	
3N) - (	General, Non Continuous Equipm	ent = Cons	stant, 100	)%	;	32400		32400		Total Es	t. Deman	d w/	Spare	67	186		

	VOLTE: 400/000	)//2DU/4	۱۸/				LOCATI	ON. ELF	CTDIC	· ΛΙ ΛΛΟ				RA A II	N DDE 4	KED. NONE	
	VOLTS: 120/208	ov/3PH/4	٧V				LOCATION			AL UUX						KER: NONE	
	PHASES: 3					SUP	PLY FRO									SING: 200	
	WIRES: 4						KA	AIC: SEI	E STUD	Y				NE	UTRAL	BUS: WITH	
	MOUNTING: SURFA	CE				KAIC A	VAILAB	LE: SEI	STUD	Υ					IG	BUS: WITHOUT	
СКТ	Circuit Description	Load Class	Туре	BRI	KR	Ø	A	Ø	В	Q	oc .	В	RKR	Туре	Load Class	Circuit Description	СКТ
1	RM 006 LOCKER	G		20	1	250	250					1	20		G	RM 006 LOCKER	2
3	RM 006 LOCKER	G		20	1			250	360			1	20		R	RM 006A	4
	RM 006B	R		20	1					180	180	1	20		R	RM 006B	6
7	RM 006B	R		20	1	180	180					1	20		R	RM 006B	8
9	RM 005	R		20	1			360	250			1	20		G	RM 005 LOCKER	10
11	RM 115F, 102B, 102A	R		20	1					540	900	1	20		R	RM 115F	12
13	RM 007 LAUNDRY	R		20	1	180	180					1	20		R	RM 007 LAUNDRY	14
15	(R) - RECEPTACLES = 10KVA	R		20	1			180	180			1	20		R	AV RECEPTACLES	16
	RM 005A	R		20	1	400	100			360	180	1	20		G	RM 014 LOCKER	18
	RM 014B	R		20	1	180	180					1	20		R	RM 014B	20
	RM 014	R		20	1			720	180	400	400	1	20		R	REFRIGERATOR RM 014A	22
	RM 014A	R		20	1	400	400			180	180	1	20		R	REFRIGERATOR RM 016A	24
	RM 016A	R		20	1	180	180	400	200			1	20		R	RM 016C	26
27	AV RECEPTACLES	R		20	1			180	360	250	40000	1	20		R	RM 016C	28
29	RM 016 LOCKER	G		20	1	0	10800			250	10800	3	125		G	DRYER	30
	SPARE SPARE			20	1	U	10000	0	10800	\		3	125		G	DRIER	34
	SPARE			20	1			U	10000	0	0	1	20			SPARE	36
	SPARE			20	1	0	0			U	0	1	20			SPARE	38
	SPARE			20	1	<u> </u>	0	0	0			1	20			SPARE	40
	SPARE			20	1			0	0	0	0	1	20			SPARE	42
71	OI / II CL		Total Lo		/\/ \\	127	740	129	 320		750	+ '				OI / II C	74
			Total L	•	· · ·	127		130			750 16	-					
			. Jun L		. 7	Ø			iB		)C	_					
nad C	lassifications:				- Conn	یں Load (V.					anel Tota	ale:		KVA	Α Α	Notes:	
	eceptacles = 10kVA @ 100% + Rem	naindar 6	จ ธ∩⁰⁄-			6480	A) Caic.	6480	_ ` /	Subtotal of			۷٠	40	1		
'	<u> </u>			10/													
GN) - (	General, Non Continuous Equipment	= Cons	stant, 100	1%	,	33830		33830		Subtotal							
											sired Spar				%	_	
											Spare Cap		•			<b></b>	
										<b>Total Est</b>	. Demand	/w k	Spare:	: 48	134		
																1	
				1					- 1								

	VOLTS: 277/ PHASES: 3 WIRES: 4 MOUNTING: SUF	1W			SUP	LOCATION FROM NATION FROM NATI	OM: HAD	OP E STUD	ŊΥ				AN	MP BUSS	KER: NONE SING: 200 BUS: WITH BUS: WITHOUT		
СКТ	Circuit Description	Load Class	Туре	BRK	(R	Ø	A	Ø	В	Q	ØC .	В	RKR	Туре	Load Class	Circuit Description	СКТ
1 3 5	B17 FRYER BATTERY	GC		40	3	7333	7333	7333	7333	7333	7333	3	40		GC	B17 FRYER BATTERY	2 4 6
7	SHUNT TRIP				1					7 333	7 3 3 3	1				SHUNT TRIP	8
9	CHOINT HAI			<del>-</del>	+ +			7333	300			1	20		L	LTS OFFICES 011 THUR 017	10
11	B17 FRYER BATTERY	GC		40	3			7 000	300	7333	1567	1	20		J	LTS 068, 068A,005-010,006-6C	12
13	BITTICIENDATTEN	00		40	"	7333	1295			7 000	1001	1	20		l	LTS 014-F,016A-D	14
15	SHUNT TRIP				1	7 3 3 3	1233		658			1	20		L:	SITE LIGHTING FRONT	16
17	LTS BOH LEVEL 2			20	1				030	1832	432	1	20		∟,	UP LIGHTS & FLOOD LIGHTS	18
19	LIGHTING	L;		20	1	566	1100			1002	402	1	15		М	FCU 01-01	20
21	FCU 01-07	M		15	1	300	1100	600	0			1	20			SPARE	22
23	SPARE	IVI		20	_			000	U	0	0	1	20			SPARE	24
<u>25</u> 25	SPARE			20	1	0	0			U	U	-	20			SPARE	26
27	SPARE				1	U	0	0	0				40			SPARE	28
29				20	1			U	<u> </u>		0	_ 3	40			SPARE	
	SPARE			20	1					0							30
31	SPARE			20	1	0	0	0				_	40			ODADE	32
33	SPARE			20	1			0	0			3	40			SPARE	34
35	SPARE			20	1					0	0						36
37	SPACE				1		0						4.0			00.05	38
39	SPACE				1				0			3	40			SPARE	40
41	SPACE				1						0						42
			Total Lo	oad (k\	VA)	249	61	235	558	25	831						
			Total I	Load (	<b>A</b> ) [	9	1	8	5	(	94						
					-	Ø	A	Ø	В	<u> </u>	ØC .	_					
oad (	Classifications:			C	onn	Load (V					anel Tota	als:		KVA	A A	Notes:	
	ghting = Constant, 125%					5413	, 34.31	6766	· /	Subtotal of			q.	74			
	Notor = 100% + 25% of largest					1700		1975		Subtotal						4	
		Continuous Equipment = Constant, 125%				66000		66000			sired Spa				) %	-	
ghtin	9					1237		1546			Spare Cap		-			_	
										<b>Total Est</b>	. Deman	d w/	Spare	: 107	128		

	VOLTS: 277/ PHASES: 3 WIRES: 4 MOUNTING: SUF	4VV			SUP	LOCATION FROM NATION FROM NATI	OM: OSI	OP E STUD	)Y				AN	IP BUSS UTRAL	KER: 400 A SING: 400 BUS: 100% BUS: NONE		
CKT	Circuit Description	Load Class	Туре	BRM	<b>K</b> R	Ø	A	Ø	В	9	ØC	ВІ	RKR	Туре	Load Class	Circuit Description	СКТ
1 3 5	HHWP 00-01	М		20	3	3037	6000	3037	6000	3037	6000	3	40		М	CHWP 00-01	2 4 6
7 9	HHWP 00-02	М		20	3	3037	6000	3037	6000			3	40		М	CHWP 00-02	8 10
11 13 15 17	HHWP 00-03	M		20	3	3037	6000	3037	6000	3037	6000	3	40		M	CHWP 00-03	12 14 16 18
17 19 21 23	HHWP 00-04	M		20	3	3037	6000	3037	6000		6000	3	40		M	CHWP 00-04	20 22 24
25 27 29	AHU 00-02	М		40	3	5000	5000	5000	5000	5000	5000	3	40		М	AHU 00-02	26 28 30
31 33 35	AHU 00-02	М		40	3	5000	5000	5000	5000		5000	3	40		М	AHU 00-02	32 34 36
37 39 41							0		0		0	3	60			SPD	38 40 42
			Total Lo	-	- 1	561 20	)3	56 ²	)3	2	147						
	lassifications:				'onn	Ø. . Load (V		Doman		-	ØC Panel Tota	olor		KVA	Λ	Notes:	
	otor = 100% + 25% of largest					. <b>Load (v</b> . 168440	A) Calc.	172940	, ,	Subtotal Subtotal	connected	d load		168	203		
										De	sired Spar	re Ca	apacity	r: 20	%		
											Spare Cap :. <b>Deman</b> o						

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Plumbing Engineer DLZ

138 N. DELAWARE ST INDIANAPOLIS, IN 46204 317-633-4120

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SH	EET ISSUE	
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4	95% CONSTRUCTION DOCUMENTS	12/19/24
5	CONSTRUCTION DOCUMENTS	01/13/25
6	ADDENDUM 01	01/27/25



PROJECT NO.

PANEL SCHEDULES

				М	SB					,	
	Volts: 277/480V/3PH/4W, 3PH-4W Phases: 3 Wires: 4		SUPPLY FROM:	ELEC	CTRICAL SERVICE ENTRY 067 STUDY				Breaker: Bussing:		
CKT	CIRCUIT DESCRIP	TION			Load Classification	LOAD (KVA)		TYF	PE	BREAKE	R RATING
1	HADP				M; L; R; GC; G	461.5		LS	SI	800	3
2	HBDP				M; L; R; GC; M;	429.8		LS	SI	800	3
3	HCDP				M; L; R; GC; G	176.7		LS	SI	400	3
4	HDDP				M; L; R; GC; G	349.3		LS	SI	600	3
5	T-LTV					100		LS		350	3
6	T-LAV				R;	5.8		LS	SI	175	3
7	T-LSHOWDP				GC	120		LS		225	3
8	ATS LS (LSDP)				M; L; R; G	45.6		LS		400	3
9	ATS LR (LRDP)				M	43		LS		225	3
10	ATS OS (OSDP)				M; R; GC; M; G	432.3		LS	SI	600	3
11	SPD					0				60	3
12	SOLAR POWER					0				400	3
13											
14											
15											
16											
17 18											
19											
20											
Load Classification		Connected Load (VA)	Calc. Demand	J (\/A)	Panel Totals:	LAVA	A	a Na			
		Connected Load (VA)				kVA		os <u>No</u>	nes:		
, ,	Continuous Equipment = Constant, 125%	405652			Subtotal Connected Load:	2164	260				
, , ,	Constant, 125%	125595			Subtotal Estimated Demand		240	9			
` '	00% + 25% of largest	945719		0140							
	es = 10kVA @ 100% + Remainder @ 50%	445170		7585			48				
Lighting		7517	!	9396	Total Est. Demand w/ Spare:	2403	289	91			
(M)		450		475							
(G)		7900		7900							
(P)		100000	100	0000							
GENERAL LOA	D	0		0							
RECEPTACLE I	LOAD	1800		1800							
R - RECEPTAC	LE	12900	1	1450							
(GN) - General,	Non Continuous Equipment = Constant, 100%	111390	111390								
		1	1		<u> </u>						

				L1	ΓV					
	Volts: 120/208V/3PH/4W, 3PH-4W		LOCATION:	ELEC	CTRICAL SERVICE ENTRY 067		Ma	in Breaker:	600 A	
	Phases: 3		SUPPLY FROM:	T-LT\	<i>I</i>		Am	p Bussing:	600	
	Wires: 4		KAIC:	SEE :	STUDY			_		
2157							_			
СКТ	CIRCUIT DESCR	PTION			Load Classification	LOAD (KVA)	I	YPE		R RATING
1	TVDP					100			600	3
2										
3										
4										
Load Classificati	ons:	Connected Load (VA)	Calc. Demand	(AV)	Panel Totals:	kVA	Amps	Notes:		
(P)		100000	10	0000	Subtotal Connected Load:	100	278			
					Subtotal Estimated Demand	100	278			
					Desired Spare Capacity	/: 20 %				
					Spare Capacity used	l: 20	56			
					Total Est. Demand w/ Spare	: 120	333			
					-					

				T	VDP					
	Volts Phases Wires			LOCATION: IDF SUPPLY FROM: LTV KAIC:				Breaker: 60 Bussing: 60		
CKT		CIRCUIT DESC	RIPTION		Load Classification	LOAD (KVA)	ТУ	PE	BRFAKE	R RATING
1	TVRP-1					35			200	3
2	TVRP-2					35			200	3
3	TVRP-3					15			100	3
4	TVRP-4					15			100	3
5										
6										
Load Classifica	ations:		Connected Load (VA)	Calc. Demand (VA	Panel Totals:	kVA	Amps N	otes:		
(P)			100000	100000	Subtotal Connected Load:	100	278			
					Subtotal Estimated Demand:	100	278			
					Desired Spare Capacity:	9	6			
					Spare Capacity used:	0	0			
					Total Est. Demand w/ Spare:	100	278			
					_					

				HE	3DP					
	Volts: 277/480V/3PH/4W, 3PH-4W Phases: 3 Wires: 4		LOCATION: SUPPLY FROM: KAIC:	ELEC MSB	TRICAL SERVICE ENTRY 067			Main Breake Amp Bussing		
CKT	CIRCUIT DESCRI	PTION			Load Classification	LOAD (KVA	)	TYPE	BREAKE	R RATING
1	ENHB1				M; L; GC	20.7			100	3
2	T-LBDP				M; L; R; GC; M;	97			250	3
3	UNHB1				M; GC	124.4			225	3
4	RAFA 00-03				M	27			60	3
5	AHU 00-03				M	97.7			125	3
6	SERVICE ELEVATOR ( NORTH) 50 HP EST				M	54			125	3
7	RAFA 01-01				M	9			40	3
8										
9										
10										
11										
12										
13										
14										
15 16										
17										
18										
19										
20										
_oad Classificat	ions:	Connected Load (VA)	Calc. Demand	d (VA)	Panel Totals:	kVA		A Notes:		
(GC) - Genera	I, Continuous Equipment = Constant, 125%	91730	9	1730	Subtotal Connected Load:	430	5	17		
	= Constant, 125%	5108			Subtotal Estimated Demand	+		36		
	100% + 25% of largest	302587		7009		+				
` '	cles = 10kVA @ 100% + Remainder @ 50%	29460		9730			10	07		
(M)		200			Total Est. Demand w/ Spare:		-			
(G)		400		400			1			
R - RECEPTA	CLE	360		360						

				LB	DP					
	Volts: 120/208V/3PH/4W, 3PH-4W Phases: 3			ELECTI	RICAL SERVICE ENTRY 067			nin Breaker:		
	Wires: 4			SEE ST			All	ip bussing.	000	
СКТ	CIRCUIT DESCR	RIPTION			Load Classification	LOAD (KVA)	,   1	ГҮРЕ	BREAKE	R RATING
1	ENLB1				M; R; GC; M	9.9			200	3
2	CNLB1				M; L; R;	22.5			200	3
3	UNLB1				M	27.4			200	3
4	ENLB2				R; GC	37.2			200	3
5										
6										
7										
8										
9 10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
Load Classificat		Connected Load (VA)	Calc. Demand		Panel Totals:	kVA		Notes:		
-	I, Continuous Equipment = Constant, 125%	19900			Subtotal Connected Load:	97	269			
	= Constant, 125%	1882			Subtotal Estimated Demand:					
	100% + 25% of largest	44800	5′	1050	Desired Spare Capacity:	20	%			
(R) - Receptad	cles = 10kVA @ 100% + Remainder @ 50%	29460	19	9730	Spare Capacity used:	19	52			
(M)		200		225 <b>T</b>	Total Est. Demand w/ Spare:	113	313			
(G)		400		400						
R - RECEPTA	CLE	360		360						

	<b>VOLTS</b> : 120/20 <b>PHASES</b> : 3	18V/3PH/4	4W		SUI	LOCATI			CAL SERV	ICE ENTF	RY 0	67			KER: NONE SING: 200
	WIRES: 4 Mounting: Surf	ACE			KAIC	K/ AVAILAE	AIC: SE BLE: SE						NEUT		BUS: WITH BUS: WITHOUT
СКТ	Circuit Description	Load Class	Туре	BRKR	Q		~~~	B~	~~~	2 <b>6</b> ~~~	B	BKBI		oad	Circuit Description
1	RM 064	R		20 1	360	500									
3	RM 064	R		20 1	(	<u> </u>	360	500			3	20		GC	RETRACTABLE SEATING
5	RM 055 COORIDOR	R R		20 1	1620	500			540	500					
7	SCORE BOARD/GAME CLOCK	R		20 1	1620	500	360	500			3	20		GC	RETRACTABLE SEATING
_	CCP 00-01	M		20 1		<b>&gt;</b>	300	300	1200	500	3	20		GC	INCIABLE SEATING
	CCP 00-02	M		20 1	1200	Luce		M M	M M M	MMM	م لک	سه		<u></u>	SPARELLLAND
	AV RECEPTACLES	R		20 1			180	0			1	20			SPARE
17	AV RECEPTACLES	R		20 1					180	0	1	20			SPARE
19	AV RECEPTACLES	R		20 1	180	0					1	20			SPARE
21	AV RECEPTACLES	R		20 1			180	0			1	20			SPARE
23	AV RECEPTACLES AV RECEPTACLES	R	~~	20 1	2		~~		180	0	1	20			SPARE
		R		20 1	180	3 0	000	13			1	20			SPARE
27	RCP-1, RCP-2 SPACE	M		20 1			200	3			1				SPACE SPACE
29 <b>A</b> 164 A	SPACE		.4 .4 .4	1			4 .4 .4	<u> </u>			1				SPACE
33	SPACE			1							1				SPACE
35	SPACE			1							1				SPACE
37	SPACE			1							1				SPACE
39	SPACE			1							1				SPACE
41	SPACE			1							1				SPACE
			Total L	oad (kVA)	45	540	22	280	3	100					
			Total	Load (A)	3	39	1	19		27					
					Q	ðΑ	Q	ØΒ	Ś	ØC .	_				
Load C	lassifications:			Coni	n. Load (\	VA) Calc	. Deman	id (VA)	F	Panel Tota	als:		KVA	Α	Notes:
(M) - M	otor = 100% + 25% of largest				2400		2700		Subtotal	connected	lload	d:	10	28	
	eceptacles = 10kVA @ 100% + Rer				4320		4320		Subtotal	<b>Estimate</b>	d De	mand:	10	28	]
(GC) -	General, Continuous Equipment = 0	Constant,	, 125%		3000		3000		De	sired Spai	e Ca	apacity:	20 %	<u> </u>	
(M)					200		225		;	Spare Cap	acity	/ Used:	2	6	
										. Demand			12	34	1
															1

	<b>VOLTS</b> : 277/4	180V/3PH/4	1W			L	OCATI	ON: ELE	CTRIC	CAL SERV	/ICE ENT	RY 0	067	MAII	N BREA	KER: NONE	
	PHASES: 3					SUPF	LY FR	<b>ом</b> : нві	DP					AM	IP BUSS	SING: 100	
	WIRES: 4						K	AIC: SEI	= STUF	ŊΥ				NE	UTRAL	BUS: WITH	
	MOUNTING: SURI	FACE				KAIC A										BUS: WITHOUT	
		Load													Load		
CKT	Circuit Description	Class	Type	BRKI	R	ØA		Ø	В		ØС	В	RKR	Type	Class	Circuit Description	СКТ
1	TD 4 0 1 1 0 0 1 1 0 0 T 0 D 4 0 1 1 D					3333	2500	2222	0.500							DOOK LIET	2
3	TRASH COMPACTOR 10 HP	GC		30	3			3333	2500		2500	3	20		M	DOCK LIFT	4
5 7	CORRIDOR LTS	1		20	1	645	853			3333	2500	1	20		L	CORRIDOR LTS	6 8
-	KITCHEN 063/ 064	L L		20	1	045	000	390	320			1	20		L	LTS 055,055A,057	10
	LTS BOH LEVEL 2	L		20	1			390	320	1017	0	1	20		<u>L</u>	SPARE	12
13	SPARE			20	1	0	0			1017		1	20			SPARE	14
15	SPARE			20	1			0	0			1	20			SPARE	16
17	SPARE			20	1					0	0	1	20			SPARE	18
19	SPARE			20	1	0	0					1	20			SPARE	20
21	SPARE			20	1			0	0			1	20			SPARE	22
23	SPARE			20	1					0	0	1	20			SPARE	24
25	SPACE				1							1				SPACE	26
27	SPACE				1							1				SPACE	28
29	SPACE				1							1				SPACE	30
31	SPACE				1							1				SPACE	32
33	SPACE				1							1				SPACE	34
35	SPACE				1							1				SPACE	36
37	SPACE				1							1				SPACE	38
39	SPACE				1							1				SPACE	40
41	SPACE				1							1				SPACE	42
			Total Lo	•	· · ·	733		65			850						
			Total I	_oad (A	<b>(</b> )	27		2	:4		25						
						ØA	1	Ø	В		ØC						
oad C	lassifications:			Co	nn.	Load (VA	A) Calc	. Deman	d (VA)		Panel Tot	als:		KVA	Α	Notes:	
_) - Lig	hting = Constant, 125%					3225		4032		Subtotal	connected	d loa	d:	21	25		
Л) - M	otor = 100% + 25% of largest					7500		9375		Subtota	<b>Estimate</b>	ed D	emand:	23	28		
GC) - (	General, Continuous Equipment = Constant,				•	10000		10000		De	sired Spa	re C	apacity:	20	%	1	
	• •									Spare Ca							
											t. Deman		<u> </u>			1	
										2 3 3 3 . 20			242.0.			1	

# IN128 - JAMES T. MORRIS ARENA

Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEES 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408 812-855-1692

Architect RATIO

101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204 317-633-4040

Structural Engineer FINK ROBERTS AND PETRIE, INC.

3535 EAST 96TH STREET SUITE 126 INDIANAPOLIS, IN 46240 317-872-8400

Mechanical / Electrical

INTROBA 8250 HAVERSTICK ROAD SUITE 285 INDIANAPOLIS, IN 46240 800-404-7677

Plumbing Engineer DLZ

138 N. DELAWARE ST INDIANAPOLIS, IN 46204 317-633-4120

Acoustics / Technology Engineer WJHW

7220 W. JEFFERSON AVE SUITE 216 LAKEWOOD, CO 80235 972-934-3700

Civil Engineer

AMERICAN STRUCTUREPOINT, INC.

9025 RIVER ROAD SUITE 200 INDIANAPOLIS, IN 46240 317-547-5580

Food Service Consultant

CINILITTLE 3405 NW 9TH AVENUE #1202

FORT LAUDERDALE, FL 33309 954-846-9600

Code Consultant FORZA

2502 WEST MECHANIC ST, SUITE C HARRISONVILLE, MO 64701 816-806-3729



SH	IEET ISSUE	
1	DD PROGRESS SET	07/18/24
2	DESIGN DEVELOPMENT	08/30/24
3	50% CONSTRUCTION DOCUMENTS	11/01/24
4	95% CONSTRUCTION DOCUMENTS	12/19/24
5	CONSTRUCTION DOCUMENTS	01/13/25
6	ADDENDUM 01	01/27/25



PROJECT NO.

PANEL SCHEDULES

	<b>VOLTS</b> : 120/2	08V/3PH/4	4W			L	OCATI	ON: KIT	CHEN	102				MAI	N BREA	<b>KER</b> : 225 A	
	PHASES: 3					SUPP	LY FR	OM: LAD	)P					AM	IP BUS	SING: 225	
	WIRES: 4							AIC: SEI		ŊΥ				NE	IITRAI	BUS: WITH	
	MOUNTING: RECE	SSED				KAIC AV										BUS: WITHOUT	
	MOONTING. NEGL	JOSED				IVAIO AV		JEE. OLI	L 310L	<b>/</b> I					.0	<b>200.</b> Willioo1	
		Load													Load		
CKT	Circuit Description	Class	Type	BR		ØA		Ø	<b>B</b>	!	ØC	_	RKR	Type	Class	Circuit Description	CKT
1	B45 POS SYSTEM	R		20	_	1440	630					1	20		R	B46 WARMING DRAWER	2
3	B14 REFRIGERATED PREP	R		20	1			730	630			1	20		R	B46 WARMING DRAWER	4
5	B23 WORKTABLE REC	R		20	_	10				3840	750	1	20		R	B18 DUMP STATION	6
7	B21 EXHAUST HOOD	G		20	1	1920		4000	4000			1				SHUNT TRIP	8
9	B39 POPCORN POPPER	R		20	1			1800	1920			1	20		R	B44 CONCESSION	10
11	B38 HOT FOOD DISPENSER	R		20	1					840	1800	1	20		R	B39 POPCORN POPPER	12
13	B42 PRETZEL DISPLAY	R		20	1	1500	840					1	20		R	B38 HOT FOOD DISPENSER	14
15	B51 SELF ORDER KIOSK	R		20	1			1440	1440			1	20		R	B51 SELF ORDER KIOSK	16
17	B41 HOT DOG GRILL	R		20	1					1650	1440	1	20		R	B45 POS SYSTEM	18
19	B12 TRASH REC	R		20	1	360	720					1	20		R	B31 TRASH REC	20
21	B12 TRASH REC	R		20	1			360	3840			1	20		R	B28 WORKTABLE REC	22
23	B42 PRETZEL DISPLAY	R		20	1					1500	1650	1	20		R	B41 HOT DOG GRILL	24
	B56 BACK COUNTER REO		h		ىلىر	M920	1440		ገ			1	20		R	B43.1 CARBONATOR	26
27	OVERHEAD COILING DOOR	M		20	1			200	360			1	20		R	B48 SODA/ICE DISPENSER	28
سوي	SPARECULARION	سيب			مهم	<u>~~~</u>		m		0	0	1	20			SPARE	30
31	SPARE			20	1	0	0					1	20			SPARE	32
33	SPARE			20	1			0	0			1	20			SPARE	34
35	SPARE			20	1					0	0	1	20			SPARE	36
37	SPARE			20	1	0	0					1	20			SPARE	38
39	SPARE			20	1			0	0			1	20			SPARE	40
41	SPARE			20						0	0	1	20			SPARE	42
			Total Lo	•	•	2564	3	29	163	29	9433						
			Total L	oad	(A)	214		24	48	2	250						
					-	ØA		Ø	βB		ØC	_					
Load C	Classifications:			(	Conn	. Load (VA	) Calc	. Deman	d (VA)	ı	Panel Tota	als:		KVA			
(M) - M	otor = 100% + 25% of largest					1700		2075		Subtotal	connected	d loa	d:	84	234	<u>I</u>	
(R) - Re	eceptacles = 10kVA @ 100% + Re	emainder (	@ 50%			78560		44280		Subtotal	Estimate	ed De	emand	: 50	140		
(GC) -	General, Continuous Equipment =	Constant	, 125%			2060		2060		De	sired Spa	re Ca	apacity	: 40	%		
(GN) -	General, Non Continuous Equipme	nt = Cons	stant, 100	%		1920		1920			Spare Ca				56	3	
. ,			· ·								t. Deman						
										. J.u. =0			- Pa. 0				

	VOLTS: 120/20 PHASES: 3 WIRES: 4 MOUNTING: RECE		¥W			SUP	LOCATION PLY FROM KAN	OM: CNI	LA1 E STUD	Y				AN	UTRAL	<b>SING</b> : 225	
СКТ	Circuit Description	Load Class	Туре	BR	(R	Ø	A	Ø	íΒ	9	ØС	В	RKR	Туре	Load Class	Circuit Description	СКТ
1 3 5	B15 GRIDDLE WITH PLATENS	R		50	3	4567	4567	4567	4567	4567	4567	3	50		R	B15 GRIDDLE WITH PLATENS	2 4 6
7	SHUNT TRIP				1					4307	4307	1				SHUNT TRIP	8
9 11 13	B37 HOT FOOD DISPLAY	R		20	3	1660	1660	1660	1660	1660	1660	3	20		R	B37 HOT FOOD DISPLAY	10 12 14
15 17	B27 ICE MACHINE	GC		20	2			1030	540	1030	1980	1	20 20		R R	KITCHEN 102 KITCHEN 102	16 18
19 21	MAF 01-01	М		15	3	500	1920	500	1920			1	20 20		R R	B32 HOT HOLDING CABINET B32 HOT HOLDING CABINET	20 22
23 25	SPARE			20	1	0	0			500	0	3	20			SPARE	24 26
27 29	SPARE SPARE			20	1			0	0	0	0						28 30
31 33	SPARE SPARE			20	1	0	0	0	0			3	20			SPARE	32 34
35	SPARE			20	1			U	U	0	0	2	20			SPARE	36
37 39	SPARE SPARE			20	1	0	0	0	0			2	20			SPARE	38 40
41	SPARE		Total Lo	20 oad (k	1 <b>VΔ</b> )	148	 873	164	 443	0	0 5963		20			OI AILL	42
			Total	-	- 1	12	24	13	38	1	134						
_oad C	Classifications:			С	onn	Ø. . Load (V			iB d (VA)		ØC Panel Tot	als:		KVA	. A	Notes:	
	otor = 100% + 25% of largest					1500	7.9 54.15.	1875		Subtotal	connected	d loa		47	131		
	eceptacles = 10kVA @ 100% + Re					43720		26860			Estimate						
GC) - (	General, Continuous Equipment =	Constant,	125%			2060		2060			sired Spa Spare Ca				34		
											t. Deman					→	

	VOLTS: 120/ PHASES: 3 WIRES: 4 MOUNTING: SUF		1W			SUP	PLY FRO	OM: LBI	DP E STUD					AM	P BUSS	KER: 200 A BING: 200 BUS: WITH BUS: WITHOUT	
СКТ	Circuit Description	Load Class	Туре	BRK	R	Ø	A	Q	ØВ		ØC	BF	RKR	Туре	Load Class	Circuit Description	СКТ
1	EXTERIOR RECEPT.	R;		20	1	720	18					1	20		L	WALL SCONCE RESTROOM	2
3	ACCENT LIGHTS N	L		20	1			932	720			1	20		R	RM 115A	4
5	RM 115F	R		20	1					540	900	1	20		R	RM 115F	6
7	WATER FOUNTIAN 115F		GFI	20	1	400	5000										8
9	ACCENT LIGHTS N	L		20	1			932	5000			3	100		M	COMPANY SWITCH SHOWG	10
11	GRAB N' GO RM 118	R		20	1					540	5000						12
13	GRAB N' GO RM 118	R		20	1	540	180					1	20		R	AV RECEPTACLES	14
15	GRAB N' GO RM 118	R		20	1			540	180			1	20		R	AV RECEPTACLES	16
17	SPARE			20	1					0	180	1	20		R	AV RECEPTACLES	18
19	SPARE			20	1	0	180					1	20		R	AV RECEPTACLES	20
21	SPARE			20	1			0	0			1	20			SPARE	22
23	SPARE			20	1					0	0	1	20			SPARE	24
25	SPARE			20	1	0	0					1	20			SPARE	26
27	SPARE			20	1			0	0			1	20			SPARE	28
29	SPACE				1							1				SPACE	30
31	SPACE				1							1				SPACE	32
33	SPACE				1							1				SPACE	34
35	SPACE				1							1				SPACE	36
37	SPACE				1							1				SPACE	38
39	SPACE				1							1				SPACE	40
41	SPACE				1												42
			Total Lo	oad (kV	/A)	703	38	83	304	7	160						
			Total	Load (A	۱) (۱	59	9	6	69		60	1					
				•		Ø		•	ØΒ		ØC	_					
oad C	Classifications:			Co	onn	Load (V					Panel Tota	als:		KVA	Α	Notes:	
	ghting = Constant, 125%					1882	, , , , , , , , , , , , , , , , , , , ,	2353			connected		l:	23			
	lotor = 100% + 25% of largest					15000		18750			Estimate						
	eceptacles = 10kVA @ 100% + F	Remainder (	<del>ര</del> 50%			4860		4860			sired Spar				%	-	
G)	- 10KVA (# 10070 + 1	TOTALITUEL (	<u>u</u> 00 /0			400		400			Spare Cap					-	
	OFDTACLE										· ·					<b>≟</b>	
< - KΕ	CEPTACLE					360		360		Total Es	t. Demand	1 w/ S	Spare:	32	89		

	VOLTS: 120 PHASES: 3 WIRES: 4 MOUNTING: RE	0/208V/3PH/4W CESSED	1			SUP	PLY FRO	ON: CO OM: LCI AIC: SEI ILE: SEI	OP E STUD		OR 115F			AN	IP BUSS	KER: 200 A SING: 200 BUS: WITH BUS: WITHOUT	
СКТ	Circuit Description	Load Class	Туре	BRK	IR	Ø	Α.	Q	ØΒ	9	ØC	В	RKR	Туре	Load Class	Circuit Description	СКТ
1	EXTERNAL	R;		20	1	1080	18					1	20		L	WALL SCONCE RESTROOM	2
3	ACCENT LIGHTS S	L		20	1			468	180			1	20		R	MIXING RM 120	4
5	MIXING RM 120	R		20	1					180	180	1	20		R	MIXING RM 120	6
7	MIXING RM 120	R		20	1	180	720					1	20		R	RM 109F	8
9	RM 109F	R		20	1			720	720			1	20		R	RM 109	10
11	RM 109	R		20	1					540	540	1	20		R	RM 115F	12
13	RM 109C	R		20	1	540	720	700	700			1	20		R	RM 109D	14
15	RM 109D	R		20	1			720	720	400	400	1	20	051	R	RM 109B	16
17	PRINTER 109B RM 110	R		20	1	720	720			180	400	1	20	GFI	В	WATER FOUNTAIN 115F	18
19		R		20	1	720	720	F40	720			1	20		R	CORRIDOR AND STORAGE	20
21 23	RM 109E RM 108	R R		20 20	1			540	720	720	720	1	20 20		R R	RM 109E RM 108B	22
25	RM 108B	R		<u>20</u> 20	1	900	540			720	720	1	20		R	RM 115	26
27	RM 115	R		20	1	300	340	540	180			1	20		R	AV RECEPTACLES	28
29	DISPOSAL GD-2			20	1			040	100	250	180	1	20		R	AV RECEPTACLES	30
31	SPARE			20	1	0	180			200	100	1	20		R	AV RECEPTACLES	32
33	SPARE			20	1			0	180			1	20		R	AV RECEPTACLES	34
35	SPARE			20	1					0	0	1	20			SPARE	36
37	SPARE			20	1	0	0					1	20			SPARE	38
39	SPACE				1							1				SPACE	40
41	SPACE				1							1				SPACE	42
		Т	otal Loa	d (k\	/A)	63	18	56	888	3	890						
			Total Lo	ad ( <i>I</i>	A) [^]	55	5	5	50		32						
					7	Ø			βB		ØC .						
l nad C	Classifications:			C	onn	Load (V					Panel Tota	ale:		KVA	. A	Notes:	
	ghting = Constant, 125%					486	A) Caic.	608	• •	Subtotal			٩٠	16			
	eceptacles = 10kVA @ 100% +	Pomoindor @	500/ ₋			4040		12020		Subtotal							
	eceptacies - TokvA @ 100 % +	Remainder @	30 70			650		650							⊦  <b>3</b> 8 ) %	_	
(G)	OFDTA OLF										sired Spa					_	
R - RE	CEPTACLE					720		720			Spare Cap		<u> </u>			4	
										Total Est	t. Deman	d w/	Spare:	17	47		

	VOLTS: 120/ PHASES: 3 WIRES: 4 MOUNTING: SUR		₩			SUPI	PLY FRO	OM: LDI	DP E STUD		L 105A			AN	IP BUSS UTRAL	KER: 100 A SING: 100 BUS: WITH BUS: WITHOUT	
СКТ	Circuit Description	Load Class	Туре	BRK	R.	ØA			<b>B</b>		ØC .	В	RKR	Туре	Load Class	Circuit Description	СК
1	SITE RECEPTACLE			20	1	1440	540					1	20		R	RM 107A	2
3	RM 107B	R		20	1			540	720			1	20		R	RM 107H	4
5	RM 107G	R		20	1					540	540	1	20		R	RM 107F	6
7	RM 107E	R		20	1	540	540					1	20		R	RM 107C	8
9	ACCENT LIGHTS S	L		20	1			469	1440			1	20		R	RM 107	10
11	RM 108A	R		20	1					900	720	1	20		R	RM 108A	12
13	RM 108	R		20	1	720	1080					1	20		R	RM 107	1.
15	RM 107	R		20	1			720	360			1	20		R	PRINTER RM 107	10
17	RM 107	R		20	1					1440	180	1	20		R	RM 104B	1
19	RM 101	R		20	1	1080	120					1	15		R	HWC 01-01	2
21	AV RECEPTACLES	R		20	1			180	0			1	20			SPARE	2:
23	AV RECEPTACLES	R		20	1					180	0	1	20			SPARE	24
25	SPARE			20	1	0	0		_			1	20			SPARE	20
27	SPARE			20	1			0	0			1	20			SPARE	2
29	SPARE			20	1					0	0	1	20			SPARE	3
31	SPARE			20	1	0	0					1	20			SPARE	3:
33	SPACE				1							1				SPACE	3.
35	SPACE				1							1				SPACE	3
37	SPACE				1							1				SPACE	3
39	SPACE				1							1				SPACE	4
41	SPACE				1							1				SPACE	42
			Total Lo	-		606			129		500	_					
			Total I	Load (A	4)	51			37		38						
						ØA			ØB		ØC .						
oad C	lassifications:			C	onn	Load (V	A) Calc.	Deman	d (VA)	Р	anel Tota	als:		KVA			
_) - Lig	hting = Constant, 125%					469		586	٦	Subtotal of	connected	loa	d:	15	42		
R) - Re	eceptacles = 10kVA @ 100% + F	Remainder (	2) 50%			13080		11540		Subtotal	Estimate	ed De	emand	: 14	38		
	CEPTACLE					1440		1440			sired Spa				%	1	
											Spare Car					1	
										Total Est			•			1	
										I ULAI ESL	. Deman	u w/	Spare:	. 10	45		

VOLTS: 120/208V/3PH/4W PHASES: 3 WIRES: 4 MOUNTING: SURFACE					LOCATION: IDF 107D IDF 107D  SUPPLY FROM: LDDP  KAIC: SEE STUDY  KAIC AVAILABLE: SEE STUDY						MAIN BREAKER: 225 A  AMP BUSSING: 225  NEUTRAL BUS: WITH  IG BUS: WITHOUT					
СКТ	Circuit Description	Load Class	Туре	BRK	(R	Ø	A	Ø	iB	9	ØC	BRK	(R Type	Load Class		СКТ
1	C32 HOT HOLDING CABINET	R	<b>.</b>	20	1	1920	840					1 2	20	R	C38 HOT FOOD DISPENSER	2
	C36 BACK COUNTER REC	R		20	1			1920	760				20	R	C18 DUMP STATION	4
5	C36 BACK COUNTER REC	R		20	1					1920		1	-		SHUNT TRIP	6
7	C28 WORKTABLE REC	R		20	1	4200	3840					1 2	20	R	C23 WORKTABLE REC	8
9	C12 TRASH REC	R		20	1			720	1920				20	G	C21 EXHAUST HOOD	10
11	C41 HOT DOG GRILL	R		20	1					1650	360	1 2	20	R	C31 TRASH REC	12
13	C41 HOT DOG GRILL	R		20	1	1650	1920						20	R	C32 HOT HOLDING CABINET	14
	C42 PRETZEL DISPLAY	R		20	1			1410	1800			1 2	20	R	C39 POPCORN POPPER	16
17	C42 PRETZEL DISPLAY	R		20	1					1410	840		20	R	C38 HOT FOOD DISPENSER	18
19	C48 SODA/ICE DISPENSER	R		20	1	340	1800					1 2	20	R	C38 POPCORN POPPER	20
	C45 POS SYSTEM REC	R		20	1			2880	1920			1 2	20	R	C44 CONCESSION COUNTER	22
23	C43.1 CARBONATOR	R		20	1					1440	630		20	R	C46 WARMING DRAWER	24
<b>₩</b>	CAREFRIGERATED PREPY.	water.	$\sim$	<b>℃</b> 0℃	Y	10861	2860	$\sim$	1				20	R	C51 SELF ORDER KIOSK	26
27	OVERHEAD COILING DOOR	М		20	1			200	3840			1 2	20	R	RM 104C	28
عوهر	SPARE MANAGEMENT	ستسير	unn	سويس	بائر	nn	unn	برييرير	7	0	0		20		SPARE	30
	SPARE			20	1	0	0						20		SPARE	32
33	SPARE			20	1			0	0			1 2	20		SPARE	34
35	SPARE			20	1					0	0	1 2	20		SPARE	36
	SPARE			20	1	0	0						20		SPARE	38
39	SPARE			20	1			0	0			1 2	20		SPARE	40
41	SPARE			20	1					0	0	1 2	20		SPARE	42
			Total Lo	oad (k	VA)	330	73	313	353	22	233					
			Total I	•	•	28	37	27	73	1	85	1				
			. 5.64		7	Ø		Ø			<b>3C</b>	J				
oad C	lassifications:				onn	یں Load (V.					Panel Tota	ale:	· · · · · · · · · · · · · · · · · · ·	VA	A Notes:	
	otor = 100% + 25% of largest				OHII	1700	A) Calc.	2075	•		connected			87 24		
		omodinala i C	≈ F0º/													
	eceptacles = 10kVA @ 100% + Re			\0/		80980		45490			Estimate			52 14	ы	
GN) - (	General, Non Continuous Equipme	ent = Cons	stant, 100	1%		3980		3980			sired Spar			40 %	_	
											Spare Cap	<u> </u>			57	
										Total Est	. Demand	w/Sp	are:	72 20	00	
													,			

# IN128 - JAMES T. **MORRIS ARENA**

Ohio St & N Blackford St Indianapolis, IN 46202

# IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEES 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408 812-855-1692

Architect RATIO

101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204 317-633-4040

# Structural Engineer FINK ROBERTS AND PETRIE, INC.

3535 EAST 96TH STREET SUITE 126 INDIANAPOLIS, IN 46240 317-872-8400

# Mechanical / Electrical

INTROBA 8250 HAVERSTICK ROAD SUITE 285 INDIANAPOLIS, IN 46240 800-404-7677

# Plumbing Engineer DLZ

138 N. DELAWARE ST INDIANAPOLIS, IN 46204 317-633-4120

# Acoustics / Technology Engineer

WJHW 7220 W. JEFFERSON AVE SUITE 216 LAKEWOOD, CO 80235 972-934-3700

# Civil Engineer AMERICAN STRUCTUREPOINT, INC.

9025 RIVER ROAD SUITE 200 INDIANAPOLIS, IN 46240 317-547-5580

Food Service Consultant CINILITTLE 3405 NW 9TH AVENUE #1202 FORT LAUDERDALE, FL 33309 954-846-9600

Code Consultant

FORZA 2502 WEST MECHANIC ST, SUITE C HARRISONVILLE, MO 64701 816-806-3729

SH	IEET ISSUE	
1	DD PROGRESS SET	07/18/24
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3	50% CONSTRUCTION DOCUMENTS	11/01/24
4	95% CONSTRUCTION DOCUMENTS	12/19/24
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6	ADDENDUM 01	01/27/25



PROJECT NO.

PANEL SCHEDULES

# (TYPICAL) TWO LAYERS OF LINEARS: - SHINING DOWN FROM CEILING: TYPE 'F-K1' SHINING UP FROM FLOOR: TYPE 'F-K2' CNLB1-9 CNLB1-9 UNHA1-2 • ULSHD1-2 ULSHD1-2 UNHC1-8 / UNHC1-8 UNHA1-2 ULSHD1-2 / ULSHD2-7 ULSHD2-7 / ULSHD2-7 √ULSHD2-7 / ULSHD2-7 ELEC 209A UNHA1-2 FAN ROOM 209 UNHA1-2 ULSHD2-7 UNHD1-11 ULSHD2-7 ● EM ● ●EM 15NW 14NW 13NW 15NW UNHD1-16 'F-L' ULSHD2-7 **⊙** EM 'F-M' 'F-M' UNHD1-11 **⊙** UNHD1-11 UNHD1-11 C.5 — — — — <u>(C.5)</u> . ___'B-A' ___UNHD1-16 ULSHD2-7 ___UNHD1-16 'F-L' UNHD1-11 'F-L' ULSHD2-7 UNHD1-11 UNHD1-11 D - - -'F-M' **⊚** ULSHD2-7 9NW 8NW 7NW 'B-A' UNHD1-15 'B-A' UNHD1-15 'F-L' ULSHD2-7 **⊙** EM 'F-L' UNHD1-11 'F-L' UNHD1-11 UNHD1-11 ULSHD2-7 'B-B' ULSHD2-8 EM 'B-A' UNHD1-15 'B-A' UNHD1-15 UNHD1-11 UNHD1-20 'F-I'____ UNHC1-12 'F-M' **⊙** ULSHD2-3NW UNHD1-14 'B-A' UNHD1-14 'B-A' UNHD1-14 'F-L' ULSHD2-7 **⊙** EM ____UNHD1-14 UNHD1-11 'F-M' ULSHD2-6 REFER TO EL1 / EL-103D ____'B-A' UNHD1-14 1SW 'F-M' UNHD1-11

THIRD LEVEL FLOOR PLAN - AREA A - LIGHTING

1/8" = 1'-0"

# **GENERAL NOTES**

CEILINGS AND MATERIALS. COORDINATE LIGHTING FIXTURE CEILING ROUGH-IN, TRIMS AND SUPPORT WITH LIGHTING SUPPLIER PRIOR TO RELEASE OF LIGHTING FIXTURES. COORDINATE WITH ARCHITECTURAL REFLECTED CEILING PLAN DRAWINGS. B. FIELD MEASURE ALL LIGHTING COVES TO DETERMINE EXACT LENGTHS LIGHTING FIXTURES SHALL PROVIDE UNIFORM LIGHTING FROM END TO END OF COVE. MAXIMUM 6" SPACE IS ALLOWED AT EACH END OF COVE FOR CONTINUOUS INSTALLATIONS. C. REFER TO LIGHTING CONTROLS SEQUENCE OF OPERATIONS SCHEDULE FOR CONTROLS PROGRAMMING REQUIREMENTS IN EACH SPACE. D. LIGHTING IN ELECTRICAL AND MECHANICAL SPACES IS SHOWN FOR QUANTITIES ONLY. COORDINATE LIGHTING LAYOUT WITH ACTUAL EQUIPMENT LAYOUT AND WORK OF OTHER TRADES. FIXTURES SHALL BE PENDANT, WALL OR CEILING MOUNTED AS REQUIRED TO PROVIDE EVENLY DISTRIBUTED LIGHTING LEVELS AT FLOOR LEVEL AND TO FACILITATE MAINTENANCE OF ALL LIGHTING IN ROOM. E. ALL LIGHTING CONTROL WIRING SHALL BE ROUTED IN CONDUIT.

A. REFER TO ARCHITECTURAL CONSTRUCTION DOCUMENTS FOR TYPES OF

# IN128 - JAMES T. MORRIS ARENA

Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

Owner
INDIANA UNIVERSITY BOARD OF TRUSTEES
2901 EAST DISCOVERY PARKWAY
BLOOMINGTON, IN 47408
812-855-1692

812-855-1692

Architect

RATIO

101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204 317-633-4040

Structural Engineer
FINK ROBERTS AND PETRIE. INC

FINK ROBERTS AND PETRIE, INC. 3535 EAST 96TH STREET

3535 EAST 96TH STREET SUITE 126 INDIANAPOLIS, IN 46240 317-872-8400

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DLZ
138 N. DELAWARE ST

INDIANAPOLIS, IN 46204 317-633-4120

Acoustics / Technology Engineer
WJHW

7220 W. JEFFERSON AVE SUITE 216 LAKEWOOD, CO 80235 972-934-3700

Civil Engineer

AMERICAN STRUCTUREPOINT, INC.

9025 RIVER ROAD SUITE 200

INDIANAPOLIS, IN 46240 317-547-5580

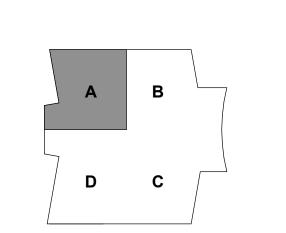
Food Service Consultant CINILITTLE

3405 NW 9TH AVENUE #1202 FORT LAUDERDALE, FL 33309 954-846-9600

Code Consultant

FORZA

2502 WEST MECHANIC ST, SUITE C HARRISONVILLE, MO 64701 816-806-3729



KEY PLAN

EAL LDATE



SH	HEET ISSUE	
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PROJECT NO.__

23112.000

UPPER FLOOR PLAN
- AREA A - LIGHTING
LAYOUT

SHEET NUMBER

EL-103A

# (TYPICAL) TWO LAYERS OF LINEARS: - SHINING DOWN FROM CEILING: TYPE 'F-K1' SHINING UP FROM FLOOR: TYPE 'F-K2' 'S1' UNHC1-9 'S1' ULSHD1-2 'S1' UNHC1-9 CNLB1-9 CNLB1-9 au∕[UNHC1-8 √UNHC1-8 √UNHC1-8 / UNHC1-8 'F-D2' 'S1' ULSHD1-2 'S1' ULSHD1-2 'S1' UNHC1-9 √ULSHD2-7 1 'F-D' ∬ULSHD2-7 √ULSHD2-7 ∬ULSHD2-7 √ULSHD2-7 / ULSHD2-7 ULSHD1-2 W2' ELSHB1-7 'S1' UNHC1-9 B.5 'S1' UNHC1-9 www.r.m. "F-M" ULSHD2-7 ©EM 'F-M' ULSHD2-7 ●EM (B.9) 'E-I' UNHC1-'B-A' UNHC1-11 ULSHD2-7 'F-M' ULSHD2-7 ●EM C.5 — — UNHC1-11 ÜNHC1-14 'F-I' UNHC1-14 **←O** 'B-H' UNHC1-15 UNHC1-10 UNHC1-10 8NE UNHC1-10 EM ˈB-H' **←O** ULSHD2-1 ULSHD2-10 'F-I' UNHC1-**◆○** 'B-H' UNHC1-15 'B-H' UNHC1-15 'F-I' UNHC1-14 UNHC1-5 REFER TO EL1 / EL-103C ULSHD2-10 ULSHD2-10 UNHC1-5 **UPPER FLOOR PLAN - AREA B - LIGHTING**

# **GENERAL NOTES**

A. REFER TO ARCHITECTURAL CONSTRUCTION DOCUMENTS FOR TYPES OF CEILINGS AND MATERIALS. COORDINATE LIGHTING FIXTURE CEILING ROUGH-IN, TRIMS AND SUPPORT WITH LIGHTING SUPPLIER PRIOR TO RELEASE OF LIGHTING FIXTURES. COORDINATE WITH ARCHITECTURAL REFLECTED CEILING PLAN DRAWINGS. B. FIELD MEASURE ALL LIGHTING COVES TO DETERMINE EXACT LENGTHS LIGHTING FIXTURES SHALL PROVIDE UNIFORM LIGHTING FROM END TO END OF COVE. MAXIMUM 6" SPACE IS ALLOWED AT EACH END OF COVE FOR CONTINUOUS INSTALLATIONS. C. REFER TO LIGHTING CONTROLS SEQUENCE OF OPERATIONS SCHEDULE FOR CONTROLS PROGRAMMING REQUIREMENTS IN EACH SPACE. D. LIGHTING IN ELECTRICAL AND MECHANICAL SPACES IS SHOWN FOR QUANTITIES ONLY. COORDINATE LIGHTING LAYOUT WITH ACTUAL EQUIPMENT LAYOUT AND WORK OF OTHER TRADES. FIXTURES SHALL BE PENDANT, WALL OR CEILING MOUNTED AS REQUIRED TO PROVIDE EVENLY DISTRIBUTED LIGHTING LEVELS AT FLOOR LEVEL AND TO FACILITATE MAINTENANCE OF ALL LIGHTING IN ROOM. E. ALL LIGHTING CONTROL WIRING SHALL BE ROUTED IN CONDUIT.

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IU Project NO. 20240127

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Architect RATIO

101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204 317-633-4040

Structural Engineer FINK ROBERTS AND PETRIE, INC.

3535 EAST 96TH STREET

SUITE 126 INDIANAPOLIS, IN 46240 317-872-8400

Mechanical / Electrical INTROBA 8250 HAVERSTICK ROAD

SUITE 285 INDIANAPOLIS, IN 46240 800-404-7677

Plumbing Engineer 138 N. DELAWARE ST

INDIANAPOLIS, IN 46204 317-633-4120

Acoustics / Technology Engineer WJHW

7220 W. JEFFERSON AVE SUITE 216 LAKEWOOD, CO 80235 972-934-3700

Civil Engineer AMERICAN STRUCTUREPOINT, INC.

9025 RIVER ROAD SUITE 200 INDIANAPOLIS, IN 46240

317-547-5580 Food Service Consultant

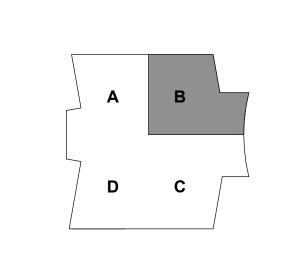
CINILITTLE

3405 NW 9TH AVENUE #1202 FORT LAUDERDALE, FL 33309 954-846-9600

**Code Consultant** 

FORZA

2502 WEST MECHANIC ST, SUITE C HARRISONVILLE, MO 64701 816-806-3729



KEY PLAN

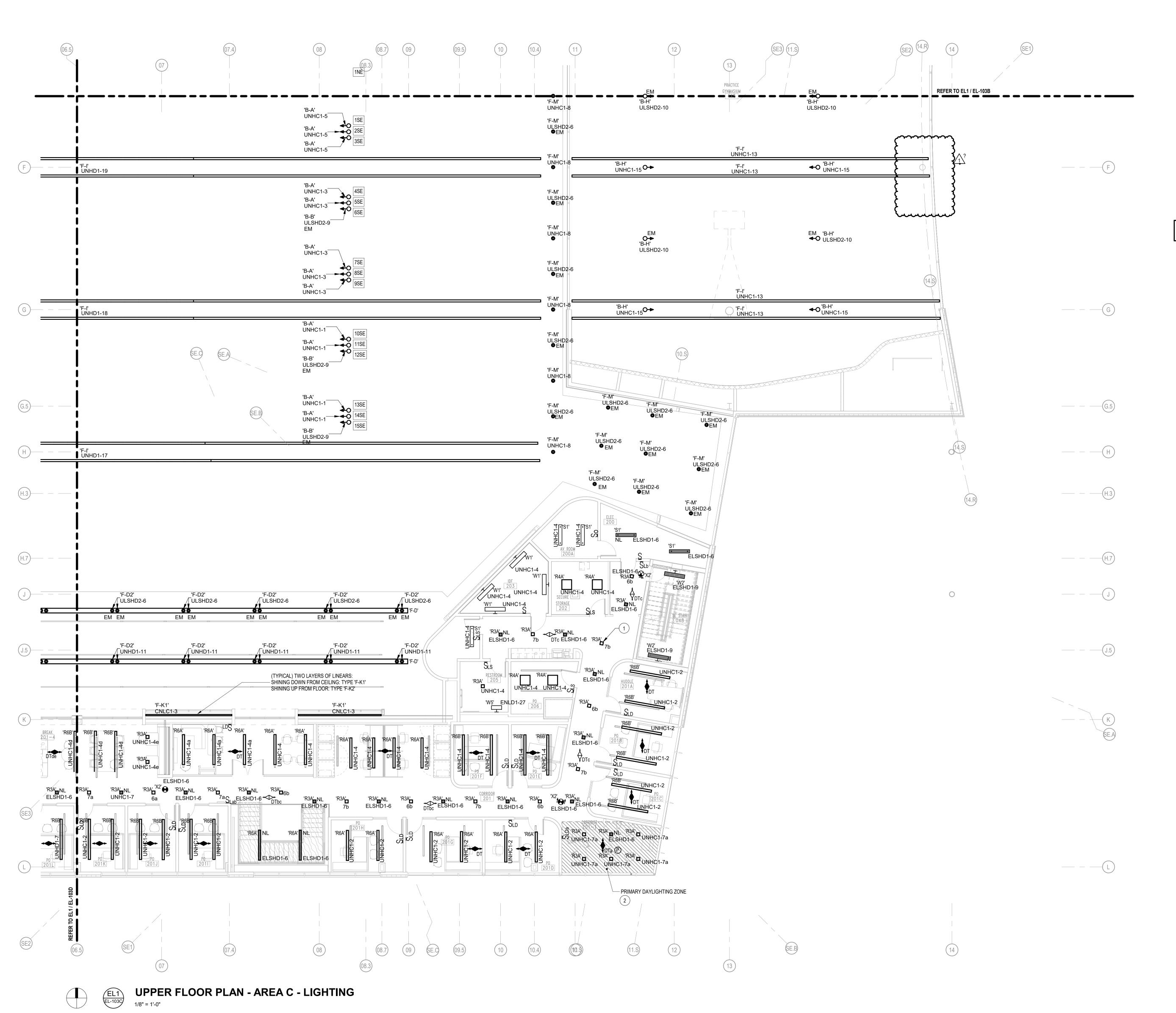


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5	CONSTRUCTION DOCUMENTS	01/13/25
6	ADDENDUM 01	01/27/25



UPPER FLOOR PLAN - AREA B - LIGHTING LAYOUT

EL-103B



A. REFER TO ARCHITECTURAL CONSTRUCTION DOCUMENTS FOR TYPES OF CEILINGS AND MATERIALS. COORDINATE LIGHTING FIXTURE CEILING ROUGH-IN, TRIMS AND SUPPORT WITH LIGHTING SUPPLIER PRIOR TO RELEASE OF LIGHTING FIXTURES. COORDINATE WITH ARCHITECTURAL REFLECTED CEILING PLAN DRAWINGS. B. FIELD MEASURE ALL LIGHTING COVES TO DETERMINE EXACT LENGTHS LIGHTING FIXTURES SHALL PROVIDE UNIFORM LIGHTING FROM END TO END OF COVE. MAXIMUM 6" SPACE IS ALLOWED AT EACH END OF COVE FOR CONTINUOUS INSTALLATIONS. REFER TO LIGHTING CONTROLS SEQUENCE OF OPERATIONS SCHEDULE FOR CONTROLS PROGRAMMING REQUIREMENTS IN EACH SPACE. D. LIGHTING IN ELECTRICAL AND MECHANICAL SPACES IS SHOWN FOR QUANTITIES ONLY. COORDINATE LIGHTING LAYOUT WITH ACTUAL EQUIPMENT LAYOUT AND WORK OF OTHER TRADES. FIXTURES SHALL BE PENDANT, WALL OR CEILING MOUNTED AS REQUIRED TO PROVIDE EVENLY DISTRIBUTED LIGHTING LEVELS AT FLOOR LEVEL AND TO FACILITATE MAINTENANCE OF ALL LIGHTING IN ROOM. E. ALL LIGHTING CONTROL WIRING SHALL BE ROUTED IN CONDUIT.

# SHEET KEYNOTES

1. UNLESS OTHERWISE NOTED, ALL NON-EMERGNENCY CORRIDOR LIGHTING IN AREA C, IS CIRCUITED TO PANEL 'UNHC1'. 2. ALL LIGHT FIXTURES COMPLETELY OR PARTIALLY WITHIN THE DAYLIGHTING ZONE SHALL BE CONTROLLED BY THE PHOTOSENSOR IN THAT DAYLIGHTING ZONE.

# IN128 - JAMES T. MORRIS ARENA

Ohio St & N Blackford St Indianapolis, IN 46202

### IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEES 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408 812-855-1692 Architect

RATIO 101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204 317-633-4040

### Structural Engineer FINK ROBERTS AND PETRIE, INC.

3535 EAST 96TH STREET

### SUITE 126 INDIANAPOLIS, IN 46240

317-872-8400

# Mechanical / Electrical INTROBA

8250 HAVERSTICK ROAD SUITE 285 INDIANAPOLIS, IN 46240 800-404-7677

# Plumbing Engineer

972-934-3700

138 N. DELAWARE ST INDIANAPOLIS, IN 46204 317-633-4120

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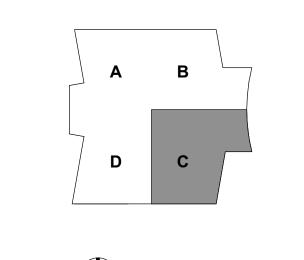
### 317-547-5580 Food Service Consultant

INDIANAPOLIS, IN 46240

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# **Code Consultant**

FORZA 2502 WEST MECHANIC ST, SUITE C HARRISONVILLE, MO 64701



KEY PLAN



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UPPER FLOOR PLAN - AREA C - LIGHTING LAYOUT

EL-103C

	NOT APPLICABLE	L	LENGTH, LEFT
@	AT	L/R LAN	LEFT/RIGHT LOCAL AREA NETWORK
		LB	POUNDS
3DC	3D CONTROLLER	LF LTG	LINEAR FEET LIGHTING
A/C ABV	AIR CONDITIONING ABOVE	MAX	MAXIMUM
AC	ALTERNATING CURRENT	MDF	MAIN DISTRIBUTION FRAME
ADA ADJ	AMERICANS WITH DISABILITIES ACT ADJUSTABLE	MECH MIN	MECHANICAL MINIMUM
AFC	ABOVE FINISHED CEILING	MMFO	MULTIMODE FIBER OPTIC CABLE
AFF AFG	ABOVE FINISHED FLOOR ABOVE FINISHED GRADE	MTD	MOUNTED
AHJ	AUTHORITY HAVING JURISDICTION	NA	NOT APPLICABLE
ALT ANSI	ALTERNATE AMERICAN NATIONAL STANDARDS INSTITUTE	NC NEC	NORMALLY CLOSED  NATIONAL ELECTRICAL CODE
ARCH ASME	ARCHITECT, ARCHITECTURAL AMERICAN SOCIETY OF MECHANICAL ENGINEERS	NEMA	NATIONAL ELECTRICAL MANUFACTURER'S ASSOC NETWORK
AUX	AUXILIARY	NIC	NOT IN CONTRACT
AWG	AMERICAN WIRE GAUGE	NO NTS	NORMALLY OPEN NOT TO SCALE
BFC	BELOW FINISHED CEILING		
BFF BLDG	BELOW FINISHED FLOOR BUILDING	OC OD	ON CENTER OUTSIDE DIAMETER
вон	BACK OF HOUSE	OFCI	OWNER FURNISHED CONTRACTOR INSTALLED
BOP BOS	BOTTOM OF PIPE BOTTOM OF STRUCTURE	OFE OFOI	OWNER FURNISHED EQUIPMENT OWNER FURNISHED OWNER INSTALLED
C CAT	CONDUIT CATEGORY CABLE	P P/O	PRIMARY PART OF
CKT CL	CIRCUIT CENTER LINE	PC PDU	PERSONAL COMPUTER POWER DISTRIBUTION UNIT
CLG	CEILING	PGM	PROGRAM
CMU COL	CONCRETE MASONRY UNIT COLUMN	PH PNL	PHASE PANEL
CTRL	CONTROL	PROC	PROCESSOR
)	DEPTH, DEEP	PRH PRX	PROJECT RECEPTACLE HEIGHT PROXIMITY SENSOR
OC	DIRECT CURRENT	PS	POWER SUPPLY
DC DEG	DOWNSTAGE CENTER DEGREES	PSF PSH	POUNDS PER SQUARE FOOT PROJECT SWITCH HEIGHT
DEMO	DEMOLITION	PSI	POUNDS PER SQUARE INCH
OFP DIA	DIRECTOR'S FLOOR POCKET DIAMETER	PT PVC	PASS THROUGH POLYVINYL CHLORIDE
OIM	DIMENSION	PWR	POWER
DIV DS	DIVISION DOWNSTAGE	QTY	QUANTITY
DSL DSR	DOWNSTAGE LEFT	R	
DWG	DOWNSTAGE RIGHT DRAWING	RCP	RIGHT REFLECTED CEILING PLAN
EΑ	EACH	REF REINF	REFERENCE, REFER REINFORCING
EC	ELECTRICAL CONTRACTOR	REQD	REQUIRED
EL ELEC	ELEVATION ELECTRICAL	REV RM	REVISION, REVISE ROOM
ENCL	ENCLOSURE	RO	ROUGH OPENING
EQ EQUIP	EQUAL EQUIPMENT	RPM	REVOLUTIONS PER MINUTE
ER	EQUIPMENT RACK	S	SURFACE, SECONDARY
ESW EXIST	ETHERNET SWITCH EXISTING	SCS SQFT	STRUCTURED CABLING SYSTEM SQUARE FEET
<b>-</b> ^		SIM	SIMILAR
FA FB	FIRE ALARM FLOOR BOX	SL SMFO	STAGE LEFT SINGLE MODE FIBER OPTIC CABLE
ELEX ELR	FLEXIBLE FLOOR	SMP SPEC	STAGE MANAGER POSITION SPECIFICATION
=O	FINISHED OPENING	SQ	SQUARE
FOH FPB	FRONT OF HOUSE FIBER OPTIC PATCHBAY	SR STD	STAGE RIGHT STANDARD
-PM	FEET PER MINUTE	STP	SHIELDED TWISTED PAIR
=T =V	FOOT, FEET FIELD VERIFY	SURF SUSP	SURFACE SUSPEND
GND GA	GROUND GAUGE	TBD THRU	TO BE DETERMINED THROUGH
4	HEIGHT	TYP	TYPICAL
ΗL	HOUSE LEFT	UC	UPSTAGE CENTER
HMP HOR	HOUSE MANAGER POSITION HORIZONTAL	UL UNO	UNDERWRITERS LABORATORIES, INC. UNLESS NOTED OTHERWISE
HP	HORSEPOWER	UPS	UNINTERRUPTIBLE POWER SUPPLY
HR HZ	HOUSE RIGHT HERTZ	US USL	UPSTAGE UPSTAGE LEFT
		USR	UPSTAGE RIGHT
/O D	INPUT/OUTPUT INSIDE DIAMETER	USB UTP	UNIVERSAL SERIAL BUS UNSHIELDED TWISTED PAIR
DF G	INTERMEDIATE DISTRIBUTION FRAME ISOLATED GROUND	V	VOLT
SO	ISOLATED GROUND ISOLATED	VA	VOLT-AMPERE
JB	JUNCTION BOX	VERT VIF	VERTICAL VERIFY IN FIELD
JBD	JUNCTION BOX - DATA	V II	VEIM I HALIEED
JP	JUNCTION BOX - SYSTEM POWER	W/	WITH
KPD	KEYPAD	W/O	WITHOUT
KW	KILOWATT	WP	WEATHERPROOF

# AUDIO VISUAL ABBREVIATIONS

	NOT APPLICABLE	KVM	KEYBOARD VIDEO MOUSE
ADA	AUDIO DISTRIBUTION AMPLIFIER	LA	LINE AMPLIFIER
ES	AUDIO ENGINEERING SOCIETY	LIM	LIMITER
LS	ASSISTED LISTENING SYSTEM	LL	LINE LEVEL
MP	AMPLIFIER		
NT	ANTENNAE	MATV	MASTER ANTENNA TELEVISION
NT DA	ANTENNA DISTRIBUTION AMPLIFIER	MIC	MICROPHONE
PB	AUDIO PATCH BAY	MICPRE	MICROPHONE PREAMP
.V .VS	AUDIO VIDEO AUDIO VIDEO SWITCHER	MIX ML	MIXER MICROPHONE LEVEL
.v3	AUDIO VIDEO SWITCHER	MOD	MODULATOR
SR.	BLU-RAY DISC PLAYER	MON	MONITOR / VIDEO DISPLAY
BDR	BLU-RAY DISC RECORDER	MTR	MULTITRACK PLAYER/RECORDER
6GM	BACKGROUND MUSIC PLAYER	MTX	MATRIX
CAM	CAMERA	NG	NOISE GENERATOR
CATV	CABLE TELEVISION		
CCTV	CLOSED CIRCUIT TELEVISION	PA	PUBLIC ADDRESS
CCU	CAMERA CONTROL UNIT	PAD	AUDIO ATTENUATOR
CDP	COMPACT DISC PLAYER	PEQ	PARAMETRIC EQUALIZER
CG CONV	CHARACTER GENERATOR CONVERTER	PSP PTZ	POWERED SPEAKER PAN/TILT/ZOOM
CUV	CONVERTER COLLABORATION UNIT		FAIN/TILT/ZOOIVI
)A	DISTRIBUTION AMPLIFIER	REC	RECORDER
da Dan	DIGITAL AUDIO NETWORK	SATRX	SATELLITE RECEIVER
OM	DIGITAL MEDIA	SB	SCOREBOARD
DM-MTX	DIGITAL MEDIA MATRIX	SC	SCAN CONVERTER
MP	DIGITAL MEDIA PLAYER	SDI	SERIAL DIGITAL INTERFACE
DMPS	DIGITAL MEDIA PRESENTATION SWITCHER	SPDT	SINGLE POLE DOUBLE THROW
OMR	DIGITAL MEDIA RECORDER	SPG	SYNC PULSE GENERATOR
OMRX	DIGITAL MEDIA RECEIVER / DECODER	SPL	SPLITTER
OMTX	DIGITAL MEDIA TRANSMITTER / ENCODER	SPK	SPEAKER
DMU	DIGITAL MESSAGE UNIT	SPLIT	MICROPHONE SPLITTER
OC CAM	DOCUMENT CAMERA DISPLAY PORT	SPST STREAM	SINGLE POLE SINGLE THROW DIGITAL VIDEO STREAMING
)PDT	DOUBLE-POLE, DOUBLE-THROW	SUM	AUDIO SUMMING DEVICE
PST	DOUBLE-POLE, SINGLE-THROW	SW	SWITCHER
)SP	DIGITAL SIGNAL PROCESSOR		
VE	DIGITAL VIDEO EFFECTS	TD	THROW DISTANCE
VR	DIGITAL VIDEO RECORDER	TP	TOUCH PANEL
		TV	TELEVISION
BU	EUROPEAN BROADCASTING UNION		
.Q	EQUALIZER	VBS	VIDEO BURST SYNC
·C	EODMAT CONVEDTED	VC	VOLUME CONTROLLED AMPLIELED
FC FPM	FORMAT CONVERTER FLAT PANEL MONITOR	VCA VDA	VOLTAGE CONTROLLED AMPLIFIER VIDEO DISTRIBUTION AMPLIFIER
ORX	FIBER OPTIC RECEIVER	VDA VGA	VIDEO DISTRIBUTION AMPLIFIER VIDEO GRAPHICS ARRAY
OKX	FIBER OPTIC RECEIVER FIBER OPTIC TRANSMITTER	VGA VP	VIDEO GRAPHICS ARRAY VIDEO PROJECTOR
J 170	. DER OF HO HOWATTER	VPB	VIDEO PATCH BAY
HDMI	HIGH DEFINITION MULTIMEDIA INTERFACE	VS	VECTOR SCOPE
HDRX	HDMI RECEIVER	VSG	VIDEO SYNC GENERATOR
IDSDI	HD SERIAL DIGITAL INTERFACE	VSR	VIDEO SERVER
IDTX	HDMI TRANSMITTER	VSW	VIDEO SWITCH
		VTC	VIDEO TELECONFERENCING SYSTEM
COM	INTERCOM	VWP	VIDEO WALL PROCESSOR
=B >T\/	INTERRUPTED FOLDBACK	\A/EN#	MAN/EEODM MONITOD
PTV	INTERNET PROTOCOL TELEVISION	WFM WMS	WAVEFORM MONITOR WIRELESS MICROPHONE SYSTEM
IBA	JUNCTION BOX - AUDIO	WTX	WIRELESS MICROPHONE SYSTEM WIRELESS TRANSMITTER
IBC	JUNCTION BOX - ADDIO JUNCTION BOX - CONTROL	VVIA	WINCLESS INANSWIIIIEN
BE	JUNCTION BOX - CONTROL  JUNCTION BOX - ENG TRUCKS	XFMR	TRANSFORMER
BL	JUNCTION BOX - AUDIO LINE LEVEL	XOVR	CROSSOVER
IBM	JUNCTION BOX - AUDIO MIC LEVEL	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	<del>-</del> - <del>-</del> - <del>-</del> · <del>-</del> ·
IBR	JUNCTION BOX - RADIO		
IBS	JUNCTION BOX - SPEAKER		
BT	JUNCTION BOX - BROADCAST		
IR\/	ILINCTION BOX - VIDEO		

JUNCTION BOX - VIDEO

# ROUGH-IN BOX SCHEDULE

TYPE 1 RECESSED: 1-GANG BOX. 2 1/8" DEEP WITH KNOCKOUTS. PROVIDE DEVICE EXTENSION AS REQUIRED TO ACCOMMODATE DEVICE COVER SIZE. DEVICE COVER/RING EDGE TO BE FLUSH WITH FINISHED WALL. MASONRY: 1-GANG BOX. 2 1/2" DEEP WITH KNOCKOUTS IN 4" CMU/BRICK/CONCRETE: 3

1/2" DEEP WITH KNOCKOUTS IN 6" OR 8" CMU/CONCRETE. COVER EDGE TO BE FLUSH WITH FINISHED WALL.

SURFACE MOUNTED: 1-GANG DIE CAST BOX. 2 5/8" DEEP WITH THREADED OUTLETS.

RECESSED: 4 11/16" SQUARE BOX. 2 1/8" DEEP WITH KNOCKOUTS. PROVIDE DEVICE

EXTENSION AS REQUIRED TO ACCOMMODATE DEVICE COVER SIZE. DEVICE COVER/ RING EDGE TO BE FLUSH WITH FINISHED WALL. MASONRY: 2-GANG BOX. 2 1/2" DEEP WITH KNOCKOUTS IN 4" CMU/BRICK/CONCRETE; 3 1/2" DEEP WITH KNOCKOUTS IN 6" OR 8" CMU/CONCRETE. COVER EDGE TO BE FLUSH

<u>SURFACE MOUNTED</u>: 2-GANG DIE CAST BOX. 2 5/8" DEEP WITH THREADED OUTLETS.

TYPE 3 RECESSED: 3-GANG BOX. 2 1/2" DEEP WITH KNOCKOUTS. PROVIDE DEVICE EXTENSION

AS REQUIRED TO ACCOMMODATE DEVICE COVER SIZE. DEVICE COVER/RING EDGE TO BE FLUSH WITH FINISHED WALL. MASONRY: 3-GANG BOX. 2 1/2" DEEP WITH KNOCKOUTS IN 4" CMU/BRICK/CONCRETE: 3 1/2" DEEP WITH KNOCKOUTS IN 6" OR 8" CMU/CONCRETE. COVER EDGE TO BE FLUSH WITH FINISHED WALL.

<u>SURFACE MOUNTED</u>: 3-GANG DIE CAST BOX. 2 5/8" DEEP WITH THREADED OUTLETS.

TYPE 4 RECESSED: 4-GANG BOX. 2 1/2" DEEP WITH KNOCKOUTS. PROVIDE DEVICE EXTENSION AS REQUIRED TO ACCOMMODATE DEVICE COVER SIZE. DEVICE COVER/RING EDGE TO BE FLUSH WITH FINISHED WALL.

MASONRY: 4-GANG BOX. 2 1/2" DEEP WITH KNOCKOUTS IN 4" CMU/BRICK/CONCRETE; 3 1/2" DEEP WITH KNOCKOUTS IN 6" OR 8" CMU/CONCRETE. COVER EDGE TO BE FLUSH

<u>SURFACE MOUNTED</u>: 4-GANG DIE CAST BOX. 2 5/8" DEEP WITH THREADED OUTLETS.

TYPE 5 RECESSED: 5" SQUARE BOX. 2 1/2" DEEP WITH KNOCKOUTS. PROVIDE DEVICE

EXTENSION AS REQUIRED TO ACCOMMODATE DEVICE COVER SIZE. DEVICE COVER/RING EDGE TO BE FLUSH WITH FINISHED WALL.

TYPE 12 RECESSED: 4 11/16" SQUARE BOX. 2 1/8" DEEP WITH KNOCKOUTS. PROVIDE DEVICE

EXTENSION AS REQUIRED TO ACCOMMODATE DEVICE COVER SIZE. DEVICE COVER/RING EDGE TO BE FLUSH WITH FINISHED WALL. MASONRY: 1-GANG BOX. 2 1/2" DEEP WITH KNOCKOUTS IN 4" CMU/BRICK/CONCRETE; 3 1/2" DEEP WITH KNOCKOUTS IN 6" OR 8" CMU/CONCRETE. COVER EDGE TO BE FLUSH

<u>SURFACE MOUNTED</u>: 1-GANG DIE CAST BOX. 2 5/8" DEEP WITH THREADED OUTLETS.

TYPE A JUNCTION BOX (HxWxD) WITH SCREW COVER. PROVIDE NEMA TYPE 1 AT INDOOR LOCATIONS; PROVIDE NEMA TYPE 3R AT OUTDOOR LOCATIONS. PAINTED AT EXPOSED

TYPE B JUNCTION BOX (HxWxD) WITH HINGED COVER. PROVIDE NEMA TYPE 1 AT INDOOR LOCATIONS; PROVIDE NEMA TYPE 3R AT OUTDOOR LOCATIONS. PAINTED AT EXPOSED LOCATIONS.

TYPE C JUNCTION BOX (HxWxD) WITH LOCKING HINGED COVER. PROVIDE NEMA TYPE 1 AT INDOOR LOCATIONS; PROVIDE NEMA TYPE 3R AT OUTDOOR LOCATIONS. PAINTED AT EXPOSED LOCATIONS

# CONDUIT AND PATHWAY NOTES

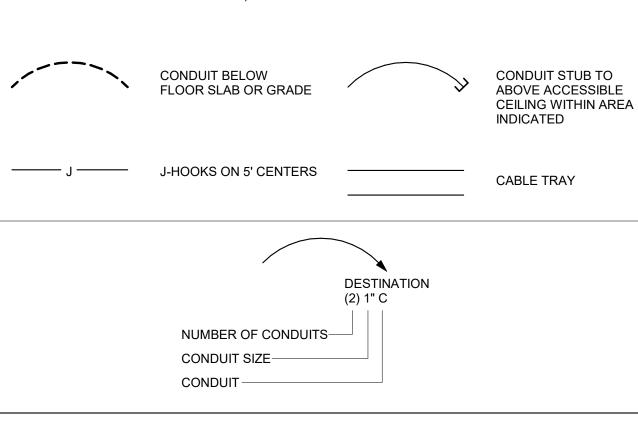
PROVIDE A COMPLETE RACEWAY SYSTEM TO CONSIST OF METALLIC CONDUIT (EXCLUDING IN-

- . COORDINATE LOCATION OF EQUIPMENT, JUNCTION BOXES, OUTLETS, CONDUIT, ETC. ACCORDING TO THE PROJECT GENERAL CONDITIONS.
- GROUND PATHWAY), JUNCTION BOXES, DEVICE BACK BOXES, AND FITTINGS UNLESS NOTED . THE DRAWINGS INDICATE ONE ROUTING METHOD OF THE CABLING PATHWAY. CHANGES MAY BE MADE TO THE PATHWAY SYSTEM ROUTING TO ACCOMMODATE SITE CONDITIONS OR TO SIMPLIFY INSTALLATION PROVIDING THAT NOTED CONDUIT SIZE OR LARGER IS MAINTAINED AND DISTANCE LIMITATIONS LISTED BELOW ARE NOT EXCEEDED.
- 4. CONDUIT STUBS FROM DEVICES TO THE NEAREST CABLE TRAY, ACCESSIBLE CEILING, OR OTHER DESTINATIONS SHALL BE CONTINUOUS.
- . UNLESS NOTED OTHERWISE, CONDUIT IS 3/4 INCH TRADE SIZE. SHOULD ROUGH-IN BOX DEVICE EXIST WITH NO CONDUIT INDICATED TO OR FROM, PROVIDE 3/4 INCH TRADE SIZE CONDUIT FROM DEVICE TO ACCESSIBLE CEILING.

NOT PERMITTED UNLESS NOTED OTHERWISE.

- CONDUIT BODIES (LB'S) ARE NOT PERMITTED. . CONDUITS SHALL BE REAMED TO ELIMINATE SHARP EDGES. METALLIC CONDUITS SHALL BE TERMINATED WITH AN INSULATED BUSHING. PULL STRINGS WITH A MINIMUM PULL RATING OF
- 400 POUNDS SHALL BE PROVIDED. 9. FOR CONDUIT WITH AN INTERNAL DIAMETER GREATER THAN 2 INCHES, MAINTAIN A BEND RADIUS OF AT LEAST 10 TIMES THE INTERNAL CONDUIT DIAMETER. 10. BENDS IN THE CONDUIT SHALL NOT CONTAIN ANY KINKS OR OTHER DISCONTINUITIES. FLEX IS
- 11. NO SECTION OF CONDUIT SHALL EXCEED 100 FEET. RUNS IN EXCESS OF 100 FEET REQUIRE A PULL BOX / HANDHOLE / VAULT.
- 12. NO SECTION OF CONDUIT SHALL CONTAIN MORE THAN TWO 90 DEGREE BENDS, OR EQUIVALENT 180 DEGREES, BETWEEN PULL BOXES. 13. PULL BOX SHALL NOT BE USED IN LIEU OF A BEND. CONDUITS MUST RUN STRAIGHT THROUGH
- A PULL BOX WITH THE BEND LOCATED EITHER BEFORE OR AFTER THE PULL BOX. 14. PULL BOX LENGTH TO BE NO LESS THAN 8 TIMES THE DIAMETER OF THE LARGEST TERMINATING CONDUIT. PULL BOX WIDTH TO BE NO LESS 1/4 THE LENGTH.
- 15. PROVIDE COVERS WITH LABELING FOR JUNCTION BOXES, BACK BOXES AND PULL BOXES WITHOUT FACEPLATES. LABELING MATCHES DEVICE NAME AS INDICATED ON DRAWINGS, FOR EXAMPLE "AV1", "ML".
- 16. ALL CONDUITS ENTERING OR EXITING EQUIPMENT RACKS TO BE ISOLATED WITH A NON-METALLIC SPACER OR FITTING.
- 17. PROVIDE CONDUIT TO CROSS INACCESSIBLE CEILINGS OR IN AREAS WITHOUT CEILINGS UNLESS NOTED OTHERWISE.
- 18. PROVIDE CONDUIT IN EXPOSED AREAS, MECHANICAL SPACES, FOOD SERVICES AREAS, AND ELEVATOR CONTROL ROOMS. 19. REGARDLESS OF PATHWAY TYPE, ALL CABLING SHALL BE SUPPORTED AT 4 FEET MAXIMUM
- INTERVALS. CABLES SHALL NOT BE LAID DIRECTLY ON THE CEILING TILE OR RAILS OR STRAPPED TO CONDUIT. 20. ROUTE CONDUIT WITH OTHER BUILDING SERVICES AND CONCEAL WHENEVER POSSIBLE.
- GROUP AND RUN PARALLEL ALONG A SINGLE BUILDING COLUMN LINE, HOLD TIGHT TO STRUCTURE AND PAINT AS DIRECTED BY THE ARCHITECT.
- 21. IF AV AND POWER CONDUITS MUST CROSS, CROSS AT RIGHT ANGLES. 22. FOR IN-SLAB OR UNDERGROUND CONDUIT ENTERING A BUILDING, TRANSITION BACK TO METALLIC CONDUIT WITHIN 3 FEET OF THE ENTRY POINT.
- 23. REFER TO PROJECT MANUAL FOR FIRE STOPPING REQUIREMENTS. 24. REFER TO ELECTRICAL DRAWINGS AND PROJECT MANUAL FOR ADDITIONAL REQUIREMENTS.

# PATHWAY DISTRIBUTION CONDUIT (CONCEALED CONDUIT HOME RUN CONDUIT BELOW CONDUIT STUB TO FLOOR SLAB OR GRADE ABOVE ACCESSIBLE **CEILING WITHIN AREA** INDICATED



						<u> </u>
	DEVICE SY	MBOL KEY - AUDIO/VISUA	L SYSTEMS			DEVICE ID
$\overline{x}$	CEILING / OVERHEAD	HINGE SIDE (IF SHOWN) FLOOR MOUNTED DEVICE	DESK / COUNTER MOUNTED DEVICE	⟨∑ <u>x</u> ∑⟩	UNDER DESK / COUNTER MOUNTED DEVICE	DEVICE TYPE

TYPE	DEVICE	ROUGH-IN BOX	DEVICE COVER		MOUNTING HEIGHT		DEVICE NOTES	CONDUIT NOTES	Owner
		(H"xW"xD")	SIZE	WALL/COLUMN	CEILING/OVERHEAD	FLOOR	DEVICE NOTES	CONDOTT NOTES	INDIANA UNIVERSITY E
۸1	ANTENNA PLATE - WIRELESS MIC	TYPE 1	1-GANG	REF ELEVATIONS	FLUSH IN CEILING			REF PLANS	2901 EAST DISCOVERY PA BLOOMINGTON, IN 47408
Λ2	ANTENNA PLATE - IN-EAR MONITOR	TYPE 1	1-GANG	REF ELEVATIONS				REF PLANS	812-855-1692
۸3	ANTENNA PLATE - ASSIST LISTENING SYSTEM	TYPE 1	1-GANG	REF ELEVATIONS	FLUSH IN CEILING			REF PLANS	Architect RATIO
۸4	ANTENNA PLATE - RADIO	TYPE 2	2-GANG		SEE MAST DETAIL			REF PLANS	101 SOUTH PENNSYLVANI INDIANAPOLIS, IN 46204
M	AUDIENCE MIC PLATE	TYPE 1	SPECIFIED PRODUCT	REF ELEVATIONS				REF PLANS	317-633-4040
NC	ANNOUNCER PLATE	TYPE 2	2-GANG	BUILDING OUTLET HEIGHT				REF PLANS	Structural Engineer FINK ROBERTS AND PE
NV2	AV PLATE	TYPE 2	2-GANG	BUILDING OUTLET HEIGHT				REF PLANS	3535 EAST 96TH STREET
\V4	AV PLATE	TYPE 4	4-GANG	BUILDING OUTLET HEIGHT		(	<del>-</del>	1" C TO CABLE TRAY OR NEAREST AV ROOM	
ВТ	BLUE TOOTH RECEIVER PLATE	TYPE 2	SPECIFIED PRODUCT	BUILDING SWITCH HEIGHT				1" C TO CABLE TRAY OR NEAREST AV ROOM	317-872-8400 Mechanical / Electrical
CM	CEILING MICROPHONE PLATE	TYPE 1	1-GANG		FLUSH IN CEILING			1" C TO CABLE TRAY OR NEAREST AV ROOM	
P	CONTROL PANEL	TYPE 2	2-GANG	BUILDING SWITCH HEIGHT				1" C TO CABLE TRAY OR NEAREST AV ROOM	8250 HAVERSTICK ROAD SUITE 285
В	DISPLAY BOX	SEE DEVICE NOTES		COORDINATE WITH ARCHITECT			PROVIDE FSR PWB320 W/ AC3 BACK BOX, REFERENCE DETAIL 5/AV092	REF PLANS AND DETAILS	INDIANAPOLIS, IN 46240 800-404-7677
)J	DJ PLATE	TYPE 3	3-GANG	BUILDING OUTLET HEIGHT			<u></u>	REFPLANS	Plumbing Engineer
В	FLOOR BOX	CUSTOM				INSTALL BACKBOX SUCH THAT LID IS FLUSH WITH FINISHED FLOOR	COORDINATE WITH ELECTRICAL REQUIREMENTS. SEE FUNCTIONAL DIAGRAMS FOR DEVICES INSTALLED IN FLOOR BOX.	REF PLANS	DLZ 138 N. DELAWARE ST
eC .	GAME CLOCK	TYPE 1		9'-0" AFF	1' 0" BELOW CEILING		REF SPEC FOR SIZE	3/4" C TO NEAREST CLOCK OR CABLE TRAY	INDIANAPOLIS, IN 46204 317-633-4120
ВА	JUNCTION BOX - AUDIO	TYPE A (18"x18"x4")	BLANK	REF ELEVATIONS/DETAILS				REF PLANS	Acoustics / Technology En
BL		SEE DEVICE NOTES		BUILDING OUTLET HEIGHT			INSTALL FSR PWB-250	REF PLANS	WJHW 7220 W. JEFFERSON AVE
BR	JUNCTION BOX - RACK	TYPE A (12"x12"x4") 1		REF ELEVATIONS/DETAILS				REF PLANS	SUITE 216
BS	JUNCTION BOX - SPEAKER	TYPE A (6"x6"x4")	}	REF ELEVATIONS/DETAILS	REF PLANS			REF PLANS	LAKEWOOD, CO 80235 972-934-3700
ВТ	JUNCTION BOX - TELEVISION		}				REF BROADCAST BOX SCHEDULE AND DETAILS	REF PLANS	Civil Engineer
BV	JUNCTION BOX - VIDEO	TYPE C (9"x14"x4")	}	REF ELEVATIONS/DETAILS				REF PLANS	AMERICAN STRUCTURI 9025 RIVER ROAD
.ED									SUITE 200 INDIANAPOLIS, IN 46240
ИIX	MICROPHONE PLATE	TYPE 3	3-GANG	BUILDING OUTLET HEIGHT				REF PLANS	317-547-5580
ΛL	MIC/LINE DEVICE	TYPE 2	SPECIFIED PRODUCT	BUILDING OUTLET HEIGHT				REF PLANS	Food Service Consultant CINILITTLE
ΥZ	PTZ CAMERA	TYPE 1	1-GANG	REF ELEVATIONS/DETAILS	COORDINATE WITH ARCHITECT			REF PLANS	3405 NW 9TH AVENUE #12
SB	SCOREBOARD JUNCTION BOX	TYPE 2	2-GANG	REF PLANS/ELEVATIONS				1" C TO CABLE TRAY OR NEAREST IDF ROOM	FORT LAUDERDALE, FL 33 954-846-9600
Р	TOUCH PANEL	TYPE 2		BUILDING SWITCH HEIGHT			/1	1" C TO CABLE TRAY OR NEAREST AV ROOM	Code Consultant
′C	VIDEO CONFERENCE CAMERA			REF ELEVATIONS/DETAILS	FLUSH IN CEILING			furumunit	FORZA 2502 WEST MECHANIC ST.
/JB	VIDEO PRODUCTION WALL BOX	TYPE A (12"x12"x4")		BUILDING OUTLET HEIGHT				REF PLANS	HARRISONVILLE, MO 6470
/S	VOLUME SELECT PLATE	TYPE 12	1-GANG	BUILDING SWITCH HEIGHT				1" C TO CABLE TRAY OR NEAREST AV ROOM	816-806-3729
VEN		TYPE C (12"x12"x4")		BUILDING SWITCH HEIGHT			HOFFMAN ASE12X12X4NK WITH SLDF1212W HINGED-COVER	REF PLANS	

SYMBOL LEGEND - AUDIO/VISUAL SYSTEMS

# LEGEND NOTES - AUDIO/VIDEO SYSTEMS

WALL / COLUMN MOUNTED DEVICE

1 CRITICAL DIMENSIONS ARE NOTED IN DOCUMENTATION. FOR ANY DIMENSION THAT IS NOT PROVIDED, FIELD COORDINATE FINAL LOCATION.

MOUNTED DEVICE

2 FIELD COORDINATE PLATE/PANEL COVER SIZE BASED ON MOUNTING CONDITIONS. SURFACE MOUNTED ROUGH-IN PLATE/PANEL SHOULD NOT EXTEND BEYOND THE ROUGH-IN BOX.

	DEVICE SYMBOL KEY - SPEAKER SYSTEMS											
		WALL / COLUMN MOUNTED SPEAKER			CEILING / C	OVERHEAD SPEAKER	SPEAKER TYPE					
			SYMBOL	LEGEND - SPE/	AKER SYSTEMS							
		SIZES, DIMENSIONS AND NOTES			ONS AND/OR ADDITIONAL REQU ARE TO CENTER OF ROUGH-IN	JIREMENTS WILL BE NOTED ON THE DRAWINGS. BOX.						
TYPE	DEVICE	ROUGH-IN BOX DEVICE COVER (H"xW"xD") SIZE	WALL/COLUMN	MOUNTING HEIGHT CEILING/OVERHEAD	FLOOR	DEVICE NOTES	CONDUIT NOTES					

TYPE	DEVICE	ROUGH-IN BOX	DEVICE COVER		MOUNTING HEIGHT		DEVICE NOTES	CONDUIT NOTES	
		(H"xW"xD")	SIZE	WALL/COLUMN	CEILING/OVERHEAD	FLOOR			
	RECESSED CEILING SPEAKER	TYPE 2						REF PLANS	
2	RECESSED CEILING SPEAKER	TYPE 2						REF PLANS	
3	RECESSED CEILING SPEAKER	TYPE 2					RATED HIGH HUMIDITY	REF PLANS	
10	PENDANT CEILING SPEAKER	TYPE 2						REF PLANS	
20	LINEAR WALL LOUDSPEAKER	TYPE 1	BLANK	REFER TO ELEVATION DETAILS				REF PLANS	
30	LOUDSPEAKER CABINET	TYPE A (6"x6"x4")	BLANK		REFER TO ELEVATIONS AND DETAILS			REF PLANS	
31	LOUDSPEAKER CABINET	TYPE A (6"x6"x4")	BLANK		REFER TO ELEVATIONS AND DETAILS			REF PLANS	

# LOUDSPEAKER MOUNTING AND INSTALLATION

- 1. RECESSED CEILING SPEAKERS UTILIZE MANUFACTURERS CEILING SUPPORT ACCESSORIES 2. PENDANT SPEAKERS – UTILIZE MANUFACTURERS SUPPORT ACCESSORIES
- 3. WALL SPEAKERS PROVIDE BLOCKING WITHIN WALL AND RATED HARDWARE TO SUPPORT SPEAKER WEIGHT 4. LOUDSPEAKER AND SUBWOOFER CABINETS – UTILIZE RIGGING SYSTEM
- 5. LOUDSPEAKER HEIGHTS COORDINATE LOUDSPEAKER HEIGHT WITH ADJACENT CEILING ELECTRICAL AND MECHANICAL ITEMS. 6. COORDINATE EXACT LOCATION OF ALL CEILING LOUDSPEAKERS WITH ARCHITECTURAL REFLECTED CEILING DRAWINGS.

# 7. PROVIDE SAFETY CABLE FOR ALL LOUDSPEAKERS

- 1. ACCESSIBLE CEILINGS RECESSED CEILING SPEAKERS LOCATED WITHIN SAME SERVICE AREA OR ZONE TO UTILIZE HOOKS AND RINGS WITHIN SPACE. 2. NON-ACCESSIBLE CEILINGS - RECESSED CEILING SPEAKERS LOCATED WITHIN SAME SERVICE AREA OR ZONE TO UTILIZE RACEWAY. REFER TO SPEAKER DETAILS.
- 3. PENDANT SPEAKERS PENDANT SPEAKERS LOCATED WITHIN SAME SERVICE AREA OR ZONE TO UTILIZE RACEWAY. REFER TO SPEAKER DETAILS 4. HOMERUNS - HOMERUNS TO UTILIZE RACEWAY TO DESIGNATED EQUIPMENT RACK JUNCTION BOX (JBR). PROVIDE RACEWAY SIZE AS INDICATED ON PLAN, IF NO INDICATION, 3/4" CONDUIT TO BE USED

# RACEWAY SYSTEMS

LOUDSPEAKER RACEWAY

1. SPEAKER ROUGH-IN BOX – ROUGH-IN BOX SIZE IS AS SCHEDULED, LOCATE ABOVE/NEAR LOUDSPEAKER POSITION 2. ROUGH-N BOX AT RIGGED LOUDSPEAKERS - ROUGH-IN BOX SIZE IS AS SCHEDULED, LOCATE ABOVE/NEAR LOUDSPEAKER POSITION AT STRUCTURE / RIGGING POINT. 3. HOMERUN RACEWAY CONSOLIDATION - COMMON SIGNAL TYPE HOMERUNS TO THE SAME DESTINATION CAN BE CONSOLIDATED, SIZE OF RACEWAY AND JUNCTION BOXES TO BE BASED ON RACEWAY SIZING CHART AND NATIONAL ELECTRICAL CODE REQUIREMENTS

# LOUDSPEAKER CABLING

1. DROP CABLE COLOR TO MATCH LOUDSPEAKER FINISH AT VISABLE LOCATIONS

IN128 - JAMES T. **MORRIS ARENA** 

> Ohio St & N Blackford St Indianapolis, IN 46202

DIANA UNIVERSITY BOARD OF TRUSTEES 901 EAST DISCOVERY PARKWAY OOMINGTON, IN 47408 12-855-1692 01 SOUTH PENNSYLVANIA STREET

ructural Engineer INK ROBERTS AND PETRIE, INC. 535 EAST 96TH STREET UITE 126

DIANAPOLIS, IN 46240 17-872-8400

38 N. DELAWARE ST DIANAPOLIS, IN 46204 17-633-4120 coustics / Technology Engineer

220 W. JEFFERSON AVE UITE 216 AKEWOOD, CO 80235 72-934-3700

ivil Engineer MERICAN STRUCTUREPOINT, INC. 25 RIVER ROAD JITE 200 DIANAPOLIS, IN 46240

17-547-5580 ood Service Consultant 405 NW 9TH AVENUE #1202 ORT LAUDERDALE, FL 33309

502 WEST MECHANIC ST, SUITE C ARRISONVILLE, MO 64701 16-806-3729

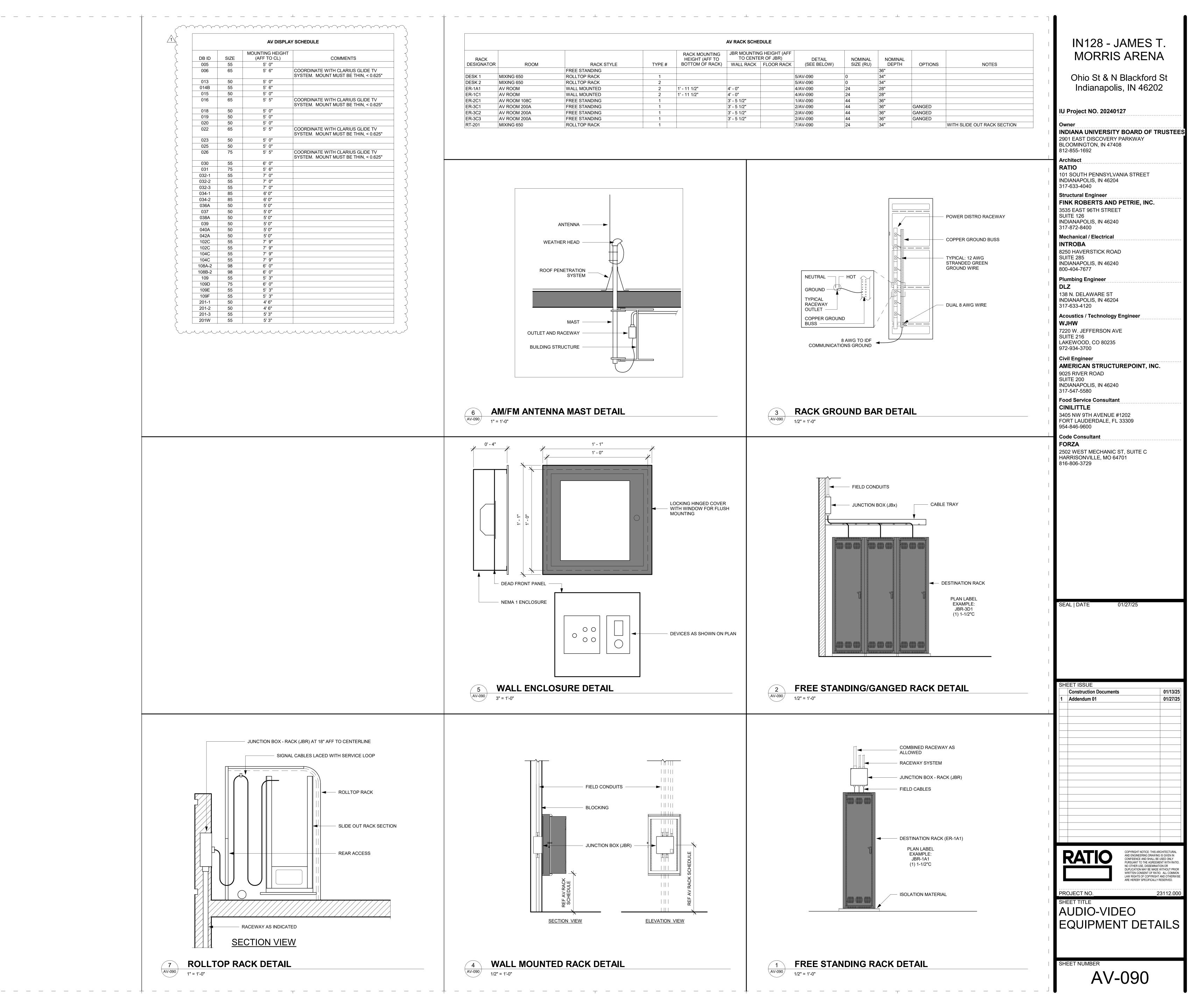
**Construction Documents** Addendum 01

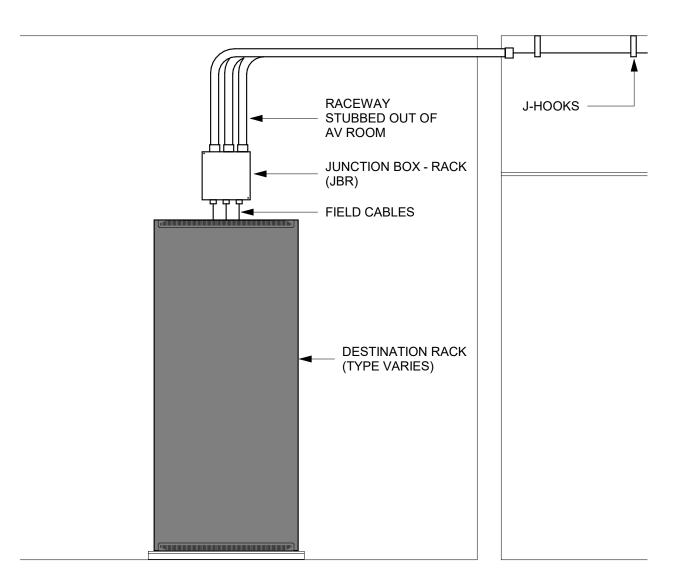
> AND ENGINEERING DRAWING IS GIVEN IN CONFIDENCE AND SHALL BE USED ONLY NO OTHER USE, DISSEMINATION OR DUPLICATION MAY BE MADE WITHOUT PRICE WRITTEN CONSENT OF RATIO. ALL COMMO

ARE HEREBY SPECIFICALLY RESERVED. PROJECT NO.

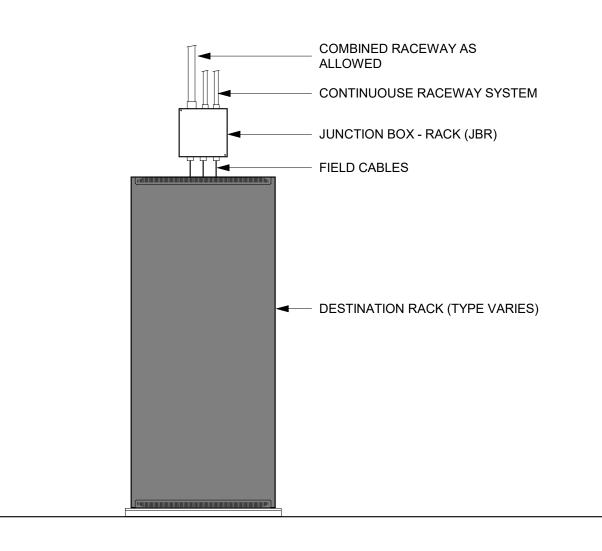
GENERAL NOTES AND LEGENDS

**AV-000** 

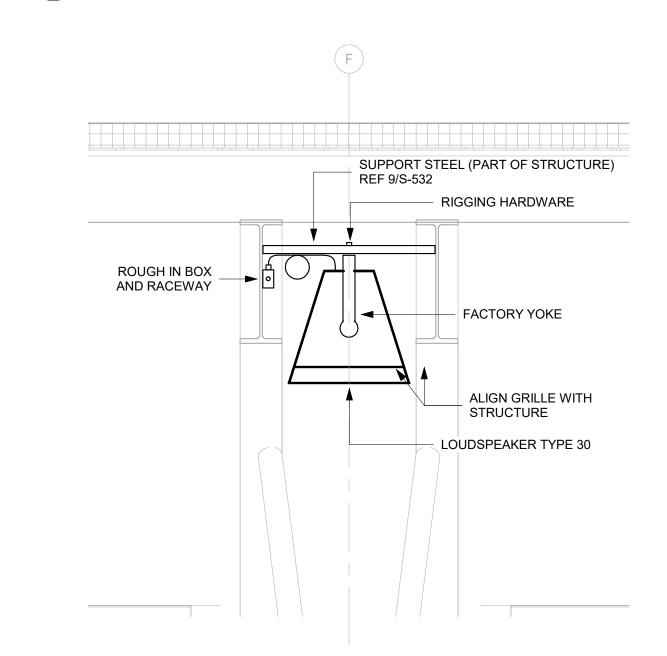




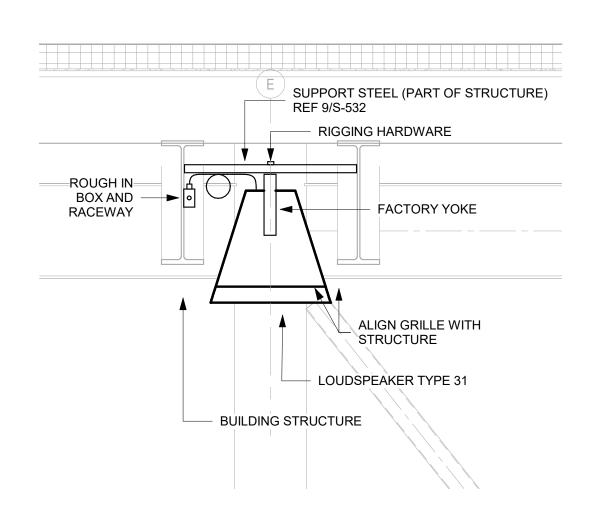




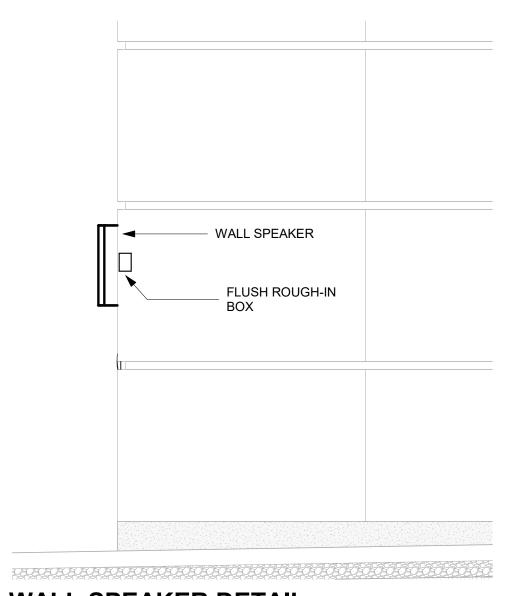
# **CONDUIT TO JBR RUN TYPE (CJBR)**



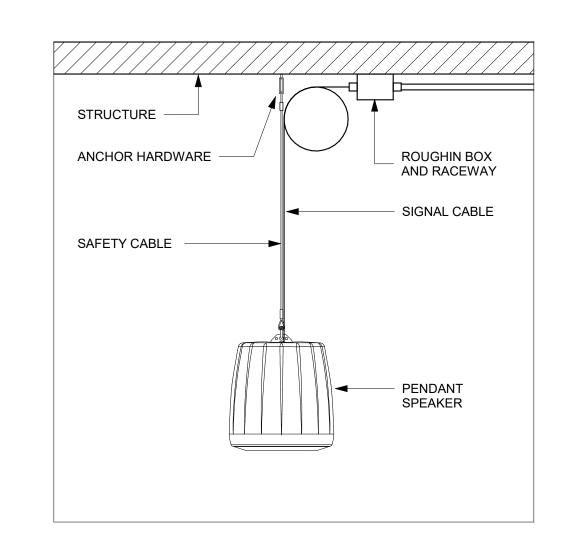
# ARENA LOUDSPEAKER DETAIL



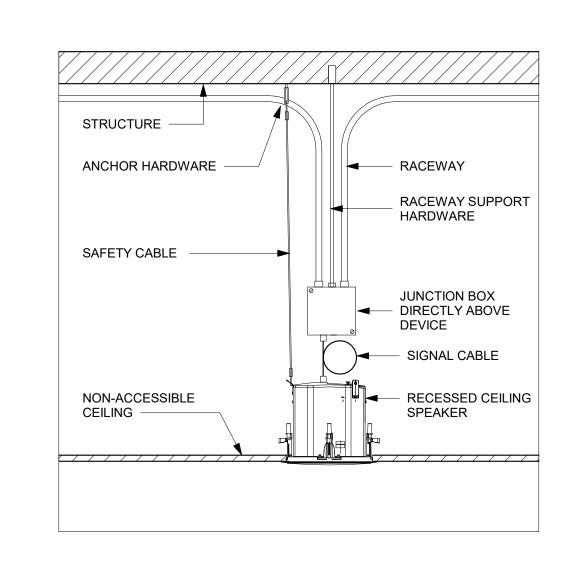
# PRACTICE GYM LOUDSPEAKER DETAIL



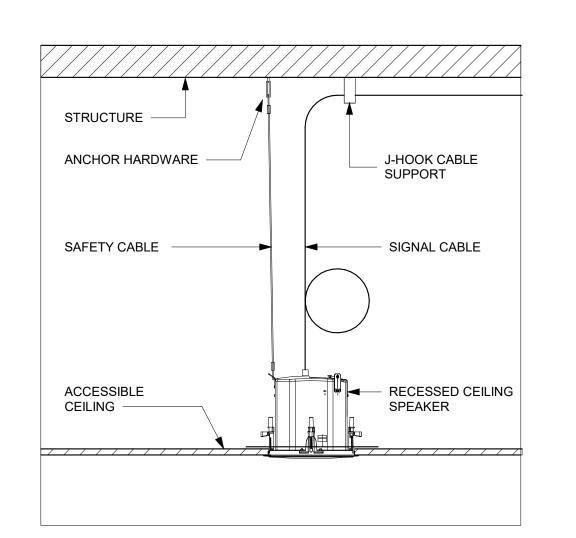
# WALL SPEAKER DETAIL 1/2" = 1'-0"



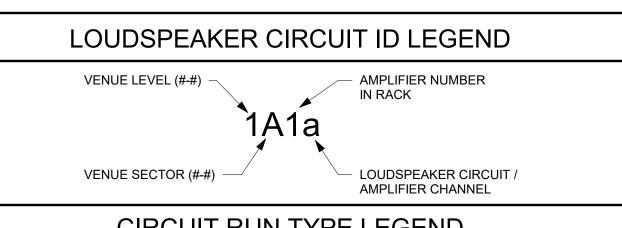
# PENDANT SPEAKER DETAIL



# RECESSED CEILING SPEAKER NON ACCESSIBLE CEILING DETAIL



# RECESSED CEILING SPEAKER **ACCESSIBLE CEILING DETAIL**



CIRCUIT RUN TYPE LEGEND

CJBR - CONDUIT TO RACK JUNCTION BOX (JBR) - SEE DETAIL 7/AV-091 JJBR - J-HOOK AND SLEEVES TO RACK JUNCTION BOX (JBR) - SEE DETAIL 8/AV-091

LOUDSPEAKER CIRCUIT SCHEDULE													
RACK DESIGNATION	CIRCUIT ID	SPEAKER TYPE REF AV-000	AMPLIFIER TYPE	CIRCUIT DETAIL REF AV11.11	CIRCUIT RUN TYPE	MOUNTING DETAIL	FINISH COLOR						
ER-1A1	1A1a	1	1	715	JJBR	1/AV-091	WHITE						
ER-1A1	1A1b	2	1	730	JJBR	1/AV-091	BLACK						
ER-1A1	1A1c	2	1	730	JJBR	1/AV-091	BLACK						
ER-1A1	1A1d	2	1	730	JJBR	1/AV-091	BLACK						
ER-1A1	1A2a	2	1	730	JJBR	1/AV-091	BLACK						
ER-1A1 ER-1A1	1A2b 1A2c	2 20	1	730 7100	JJBR CJBR	1/AV-091 4/AV-091	BLACK BLACK						
ER-1A1	1A2d	20	1	7100	CJBR	4/AV-091 4/AV-091	BLACK						
ER-1C1	1C1a	2	1	730	JJBR	1/AV-091	WHITE						
ER-1C1	1C1b	3	1	730	JJBR	2/AV-091	WHITE						
ER-1C1	1C1c	10	1	760	JJBR	3/AV-091	BLACK						
ER-1C1	1C1d	2	1	760	JJBR	1/AV-091	WHITE						
ER-1C1 ER-1C1	1C2a 1C2b	2	1 1	730 730	JJBR JJBR	1/AV-091 1/AV-091	WHITE WHITE						
ER-1C1	1C2b	2	1	730	JJBR	1/AV-091	WHITE						
ER-1C1	1C2d	2	1	730	JJBR	1/AV-091	WHITE						
ER-1C1	1C3a	1	1	730	JJBR	2/AV-091	WHITE						
ER-1C1	1C3b	1	1	730	JJBR	2/AV-091	WHITE						
ER-1C1	1C3c	1	1	730	JJBR	2/AV-091	WHITE						
ER-1C1 ER-3C3	1C3d 3C1a	20 30	4	7100 4	CJBR CJBR	4/AV-091 6/AV-091	BLACK CUSTOM COLOR						
ER-3C3	3C1b	30	4	4	CJBR	6/AV-091	CUSTOM COLOR						
ER-3C3	3C1c	30	4	4	CJBR	6/AV-091	CUSTOM COLOR						
ER-3C3	3C1d	30	4	4	CJBR	6/AV-091	CUSTOM COLOR						
ER-3C3	3C2a	30	4	4	CJBR	6/AV-091	CUSTOM COLOR						
ER-3C3	3C2b	30	4	4	CJBR	6/AV-091	CUSTOM COLOR						
ER-3C3	3C2c	30	4	4	CJBR	6/AV-091	CUSTOM COLOR						
ER-3C3	3C2d	30	4	4	CJBR	6/AV-091	CUSTOM						
ER-3C3 ER-3C3	3C3a 3C3b	30	4	4	CJBR	6/AV-091 6/AV-091	CUSTOM COLOR CUSTOM						
ER-3C3	3C3c	30	4	4	CJBR	6/AV-091	COLOR						
ER-3C3	3C3d	30	4	4	CJBR	6/AV-091	COLOR						
ER-3C3	3C4a	30	4	4	CJBR	9/AV-091	COLOR						
ER-3C3	3C4b	30	4	4	CJBR CJBR	9/AV-091	COLOR CUSTOM						
ER-3C3	3C4c	30	4	4	CJBR	9/AV-091	COLOR						
ER-3C3	3C4d	30	4	4	CJBR	9/AV-091	COLOR						
ER-3C3	3C5a	31	3	4	CJBR	5/AV-091	COLOR CUSTOM COLOR						
ER-3C3	3C5b	31	3	4	CJBR	5/AV-091	CUSTOM COLOR						
ER-3C3	3C5c	31	3	4	CJBR	5/AV-091	CUSTOM COLOR						
ER-3C3	3C6a	31	3	4	CJBR	5/AV-091	CUSTOM COLOR						
ER-3C3	3C6b	31	3	4	CJBR	5/AV-091	CUSTOM COLOR						
ER-3C3	3C6c	31	3	4	CJBR	5/AV-091	CUSTOM						
ER-3C3	3C6d	31	3	4	CJBR	5/AV-091	CUSTOM						
ER-3C3	3C7a	31	3	4	CJBR	5/AV-091	CUSTOM						
ER-3C3	3C7b	31	3	4	CJBR	5/AV-091	CUSTOM COLOR						

# IN128 - JAMES T. MORRIS ARENA

Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEE 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408

812-855-1692 **Architect** 

RATIO 101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204

317-633-4040 Structural Engineer

FINK ROBERTS AND PETRIE, INC.

3535 EAST 96TH STREET

SUITE 126 INDIANAPOLIS, IN 46240

317-872-8400 Mechanical / Electrical

INTROBA 8250 HAVERSTICK ROAD SUITE 285 INDIANAPOLIS, IN 46240

Plumbing Engineer

800-404-7677

138 N. DELAWARE ST INDIANAPOLIS, IN 46204 317-633-4120

Acoustics / Technology Engineer WJHW

7220 W. JEFFERSON AVE SUITE 216 LAKEWOOD, CO 80235 972-934-3700

Civil Engineer AMERICAN STRUCTUREPOINT, INC.

9025 RIVER ROAD SUITE 200 INDIANAPOLIS, IN 46240

317-547-5580 Food Service Consultant CINILITTLE 3405 NW 9TH AVENUE #1202

FORT LAUDERDALE, FL 33309 954-846-9600 **Code Consultant** 

FORZA 2502 WEST MECHANIC ST, SUITE C HARRISONVILLE, MO 64701 816-806-3729

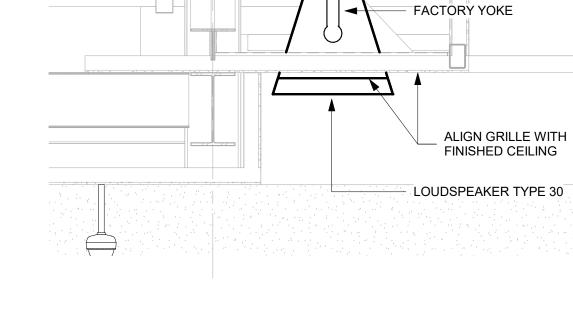
**Construction Documents** 01/27/25 Addendum 01

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DETAILS

LOUDSPEAKER SCHEDULE AND

AV-091



SUPPORT STEEL (PART OF STRUCTURE)

RIGGING HARDWARE

REF 8/S-534

**END ZONE LOUDSPEAKER DETAIL** 

ROUGH IN BOX AND

KEYNOTES

108 CONNECTIONS TO HOME TEAM BENCH IF NEEDED. 110 SCORING/OFFICIAL REPLAY CONNECTIONS 205 MTD AT 84-INCH AFF TO CENTER OF BOX

# IN128 - JAMES T. MORRIS ARENA

Ohio St & N Blackford St Indianapolis, IN 46202

### IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEE 2901 EAST DISCOVERY PARKWAY

BLOOMINGTON, IN 47408 812-855-1692

Architect RATIO

101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204

317-633-4040 Structural Engineer

FINK ROBERTS AND PETRIE, INC.

3535 EAST 96TH STREET SUITE 126 INDIANAPOLIS, IN 46240

317-872-8400

Mechanical / Electrical INTROBA

8250 HAVERSTICK ROAD SUITE 285 INDIANAPOLIS, IN 46240 800-404-7677

Plumbing Engineer

138 N. DELAWARE ST INDIANAPOLIS, IN 46204 317-633-4120

Acoustics / Technology Engineer

WJHW 7220 W. JEFFERSON AVE SUITE 216 LAKEWOOD, CO 80235

972-934-3700 Civil Engineer

AMERICAN STRUCTUREPOINT, INC. 9025 RIVER ROAD SUITE 200

INDIANAPOLIS, IN 46240 317-547-5580

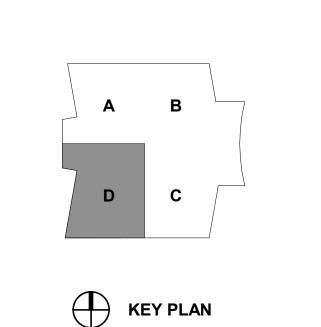
Food Service Consultant CINILITTLE

3405 NW 9TH AVENUE #1202 FORT LAUDERDALE, FL 33309 954-846-9600

Code Consultant

FORZA

2502 WEST MECHANIC ST, SUITE C HARRISONVILLE, MO 64701 816-806-3729

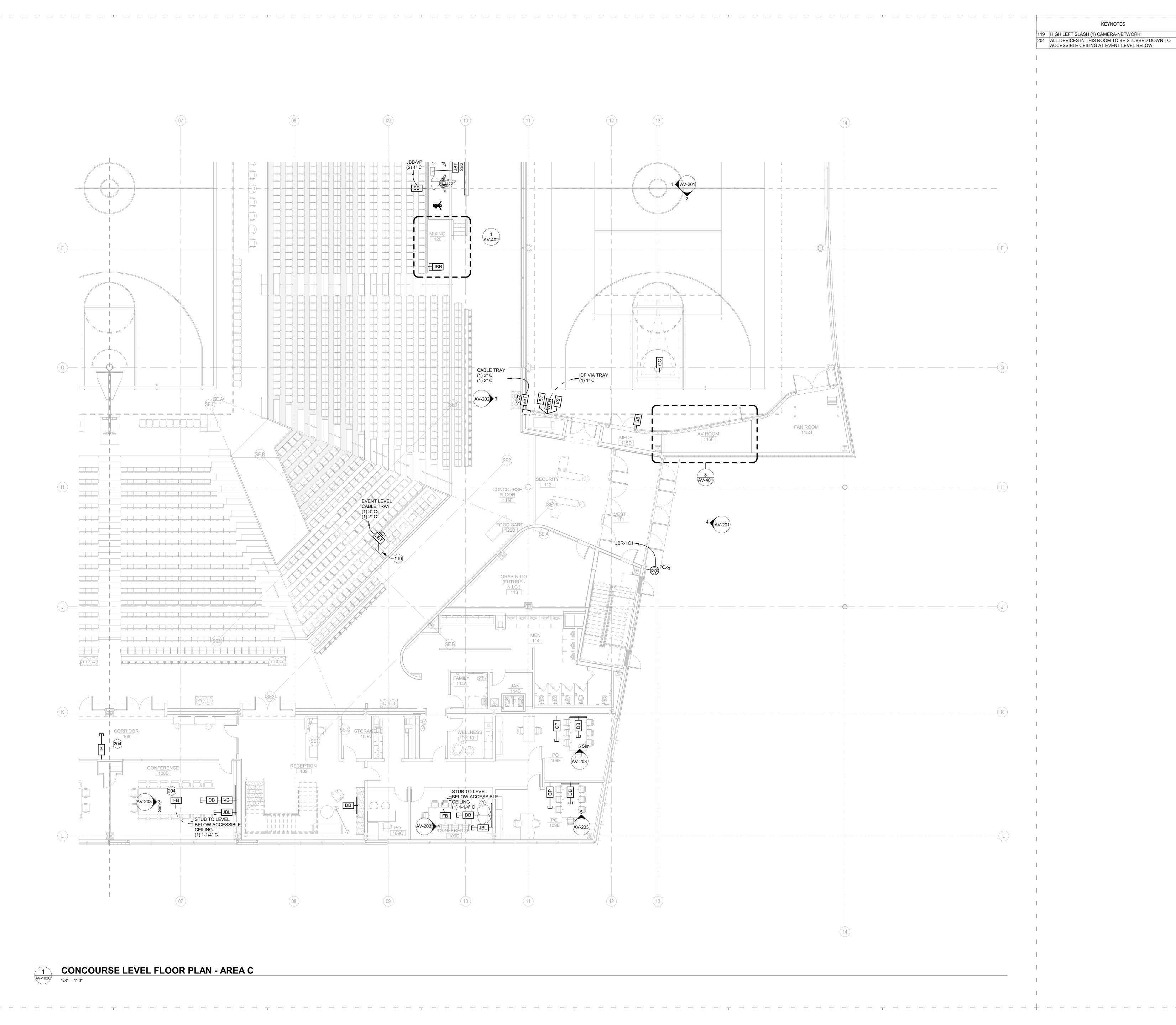


**Construction Documents** Addendum 01



EVENT FLOOR PLAN - AREA D

AV-101D



Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEE 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408

812-855-1692 Architect RATIO

101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204 317-633-4040

Structural Engineer FINK ROBERTS AND PETRIE, INC.

3535 EAST 96TH STREET SUITE 126 INDIANAPOLIS, IN 46240

317-872-8400 Mechanical / Electrical

INTROBA 8250 HAVERSTICK ROAD SUITE 285 INDIANAPOLIS, IN 46240

800-404-7677

Plumbing Engineer

138 N. DELAWARE ST INDIANAPOLIS, IN 46204 317-633-4120

Acoustics / Technology Engineer **WJHW** 

7220 W. JEFFERSON AVE SUITE 216 LAKEWOOD, CO 80235 972-934-3700

Civil Engineer AMERICAN STRUCTUREPOINT, INC. 9025 RIVER ROAD

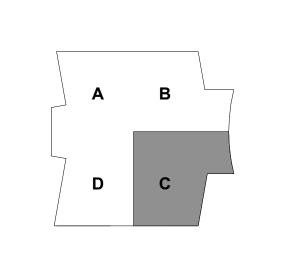
SUITE 200 INDIANAPOLIS, IN 46240 317-547-5580

**Food Service Consultant** CINILITTLE

3405 NW 9TH AVENUE #1202 FORT LAUDERDALE, FL 33309 954-846-9600

**Code Consultant** FORZA

2502 WEST MECHANIC ST, SUITE C HARRISONVILLE, MO 64701 816-806-3729



KEY PLAN

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CONCOURSE FLOOR

PLAN - AREA C

AV-102C

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INDIANA UNIVERSITY BOARD OF TRUSTEE 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408 812-855-1692

Architect RATIO

101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204 317-633-4040

Structural Engineer FINK ROBERTS AND PETRIE, INC.

3535 EAST 96TH STREET SUITE 126 INDIANAPOLIS, IN 46240 317-872-8400

Mechanical / Electrical INTROBA 8250 HAVERSTICK ROAD

SUITE 285 INDIANAPOLIS, IN 46240 800-404-7677

Plumbing Engineer

138 N. DELAWARE ST INDIANAPOLIS, IN 46204 317-633-4120 Acoustics / Technology Engineer

WJHW

7220 W. JEFFERSON AVE SUITE 216 LAKEWOOD, CO 80235 972-934-3700

Civil Engineer AMERICAN STRUCTUREPOINT, INC.

9025 RIVER ROAD SUITE 200 INDIANAPOLIS, IN 46240 317-547-5580

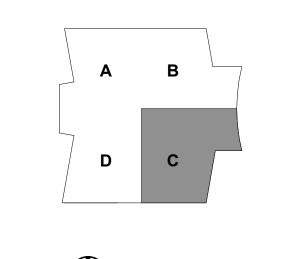
Food Service Consultant

CINILITTLE 3405 NW 9TH AVENUE #1202

FORT LAUDERDALE, FL 33309 954-846-9600 **Code Consultant** 

FORZA 2502 WEST MECHANIC ST, SUITE C HARRISONVILLE, MO 64701

816-806-3729



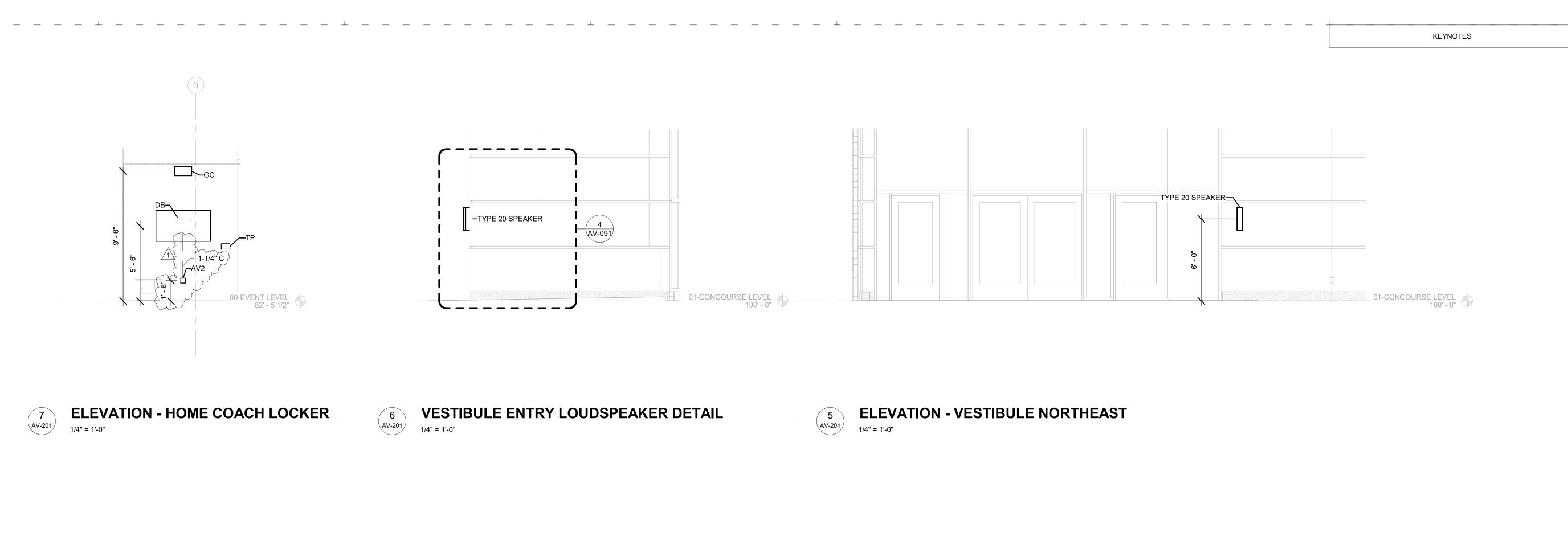
KEY PLAN

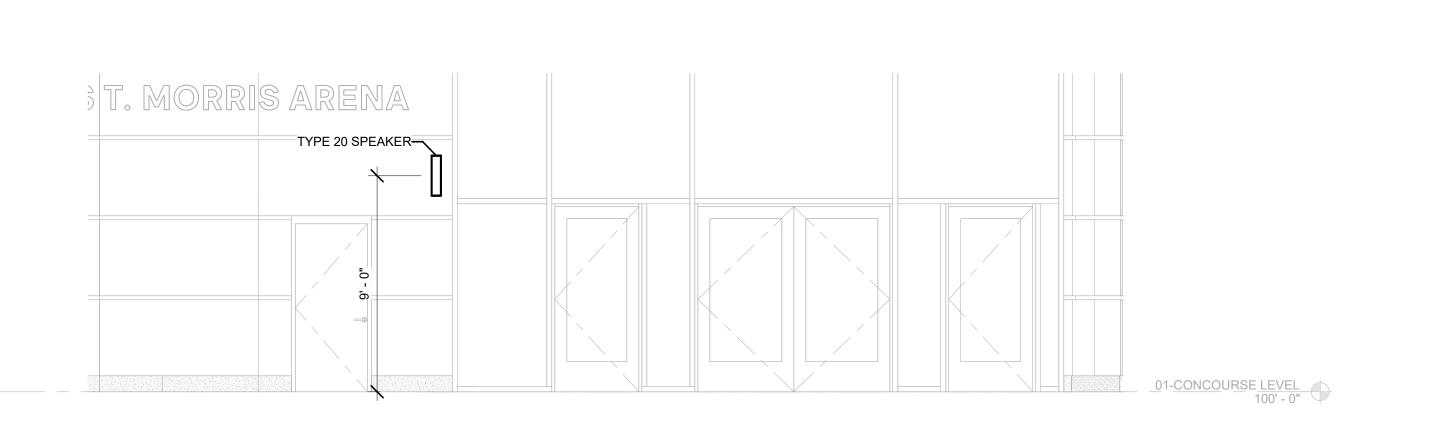
**Construction Documents** Addendum 01

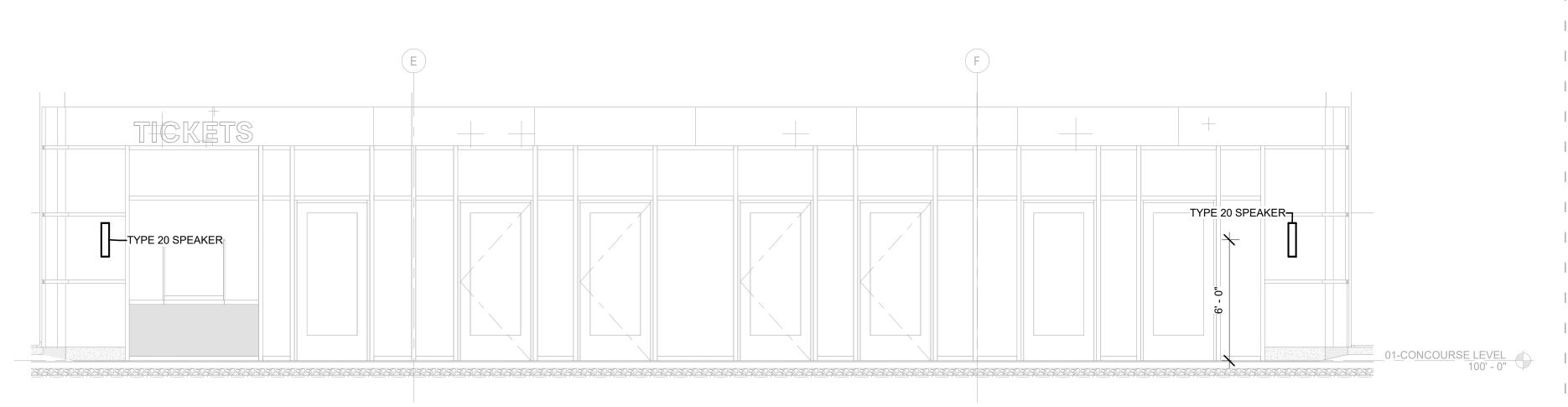
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UPPER FLOOR PLAN - AREA C

AV-103C

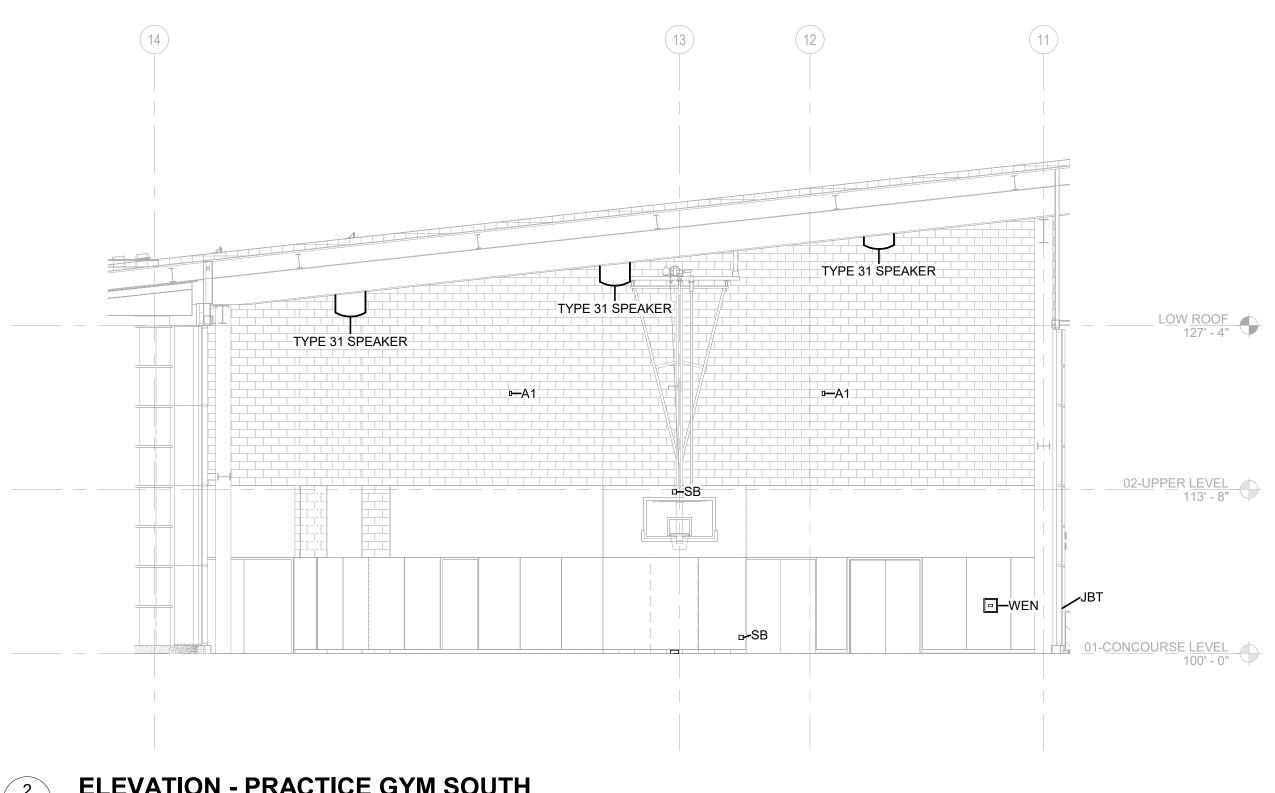






4 **ELEVATION - VESTIBULE SOUTHEAST**1/4" = 1'-0"

**ELEVATION - VESTIBULE WEST** 



TYPE 31 SPEAKER TYPE 31 SPEAKER TYPE 31 SPEAKER LOW ROOF 127' - 4" WEN

**ELEVATION - PRACTICE GYM SOUTH** 

**ELEVATION - PRACTICE GYM WEST** 

IN128 - JAMES T. MORRIS ARENA

Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEE 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408 812-855-1692

Architect RATIO

101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204 317-633-4040 Structural Engineer

FINK ROBERTS AND PETRIE, INC.

3535 EAST 96TH STREET SUITE 126 INDIANAPOLIS, IN 46240

317-872-8400

Mechanical / Electrical INTROBA 8250 HAVERSTICK ROAD

SUITE 285 INDIANAPOLIS, IN 46240 800-404-7677

Plumbing Engineer

138 N. DELAWARE ST INDIANAPOLIS, IN 46204 317-633-4120

Acoustics / Technology Engineer WJHW

7220 W. JEFFERSON AVE SUITE 216 LAKEWOOD, CO 80235 972-934-3700

Civil Engineer AMERICAN STRUCTUREPOINT, INC.

9025 RIVER ROAD SUITE 200

INDIANAPOLIS, IN 46240 317-547-5580 Food Service Consultant

CINILITTLE

3405 NW 9TH AVENUE #1202 FORT LAUDERDALE, FL 33309 954-846-9600

Code Consultant FORZA

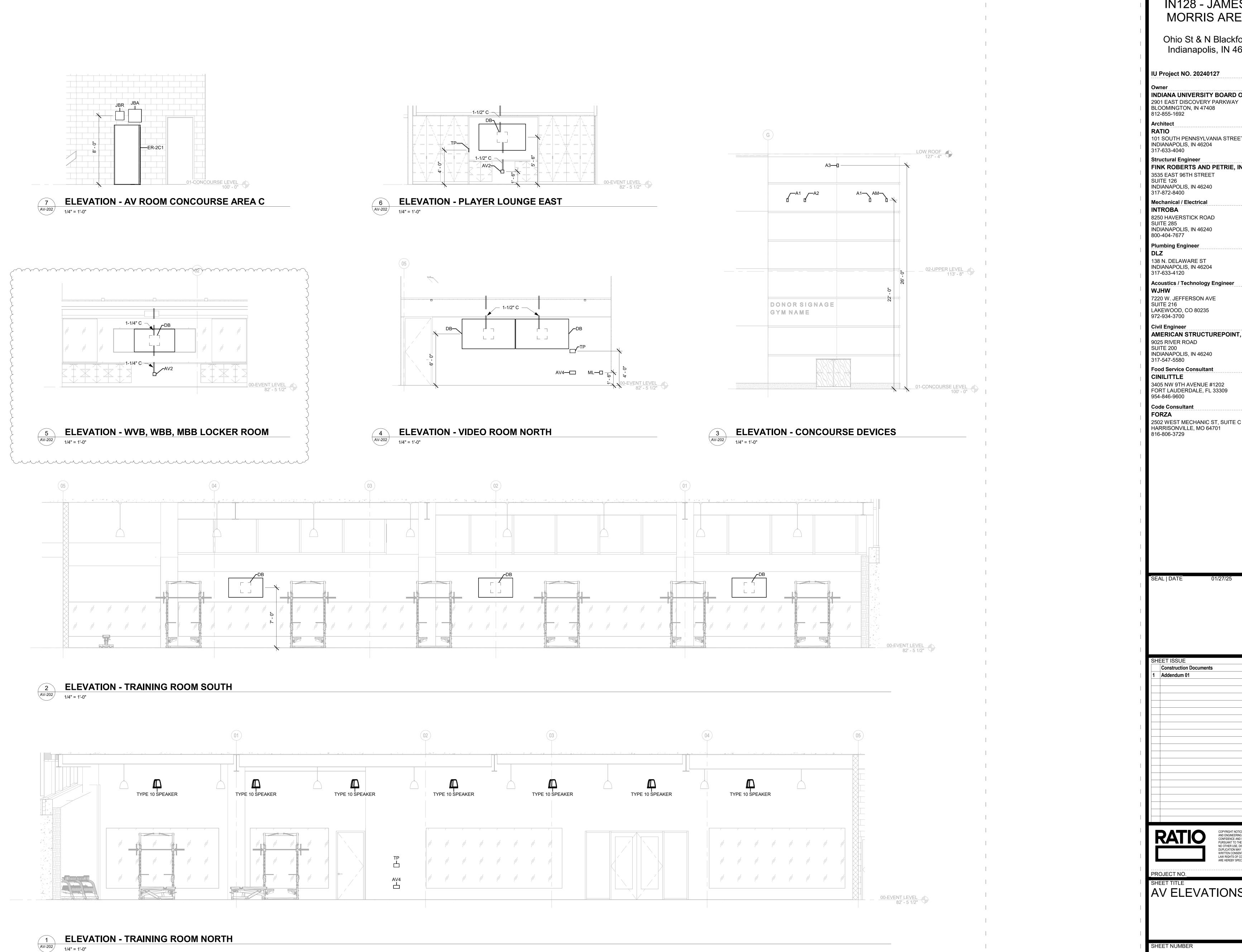
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KEYNOTES

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101 SOUTH PENNSYLVANIA STREET

FINK ROBERTS AND PETRIE, INC.

8250 HAVERSTICK ROAD

138 N. DELAWARE ST INDIANAPOLIS, IN 46204

AMERICAN STRUCTUREPOINT, INC.

3405 NW 9TH AVENUE #1202

2502 WEST MECHANIC ST, SUITE C

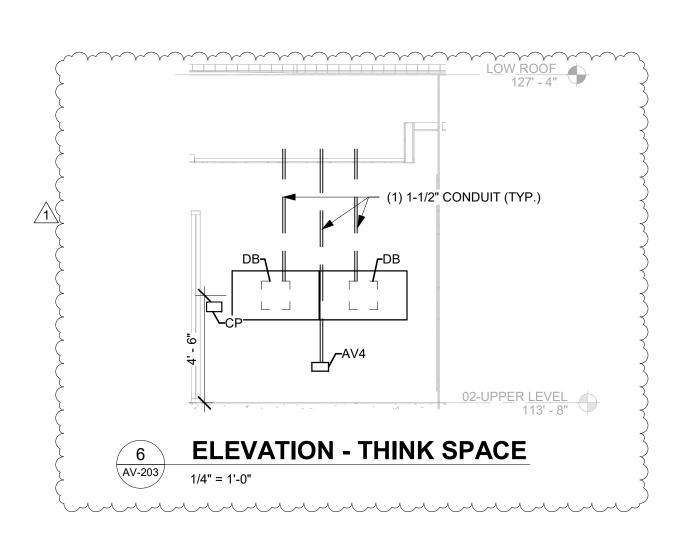
HARRISONVILLE, MO 64701

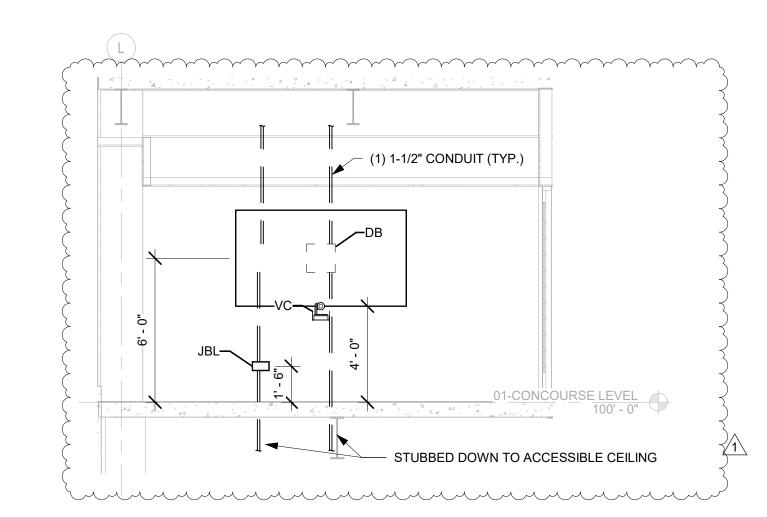
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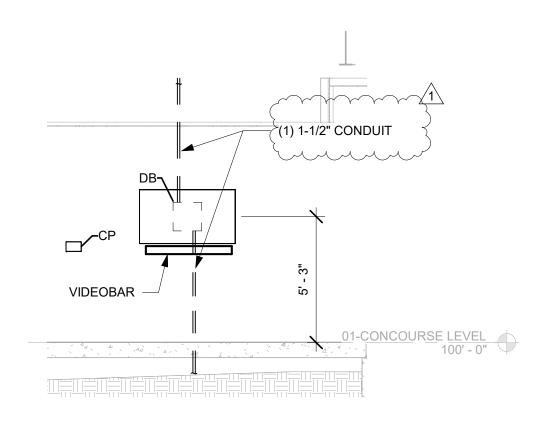
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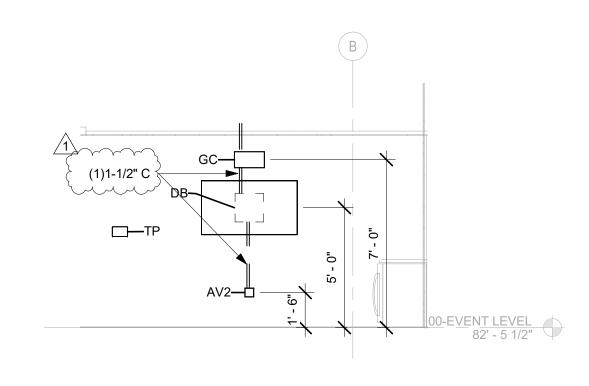




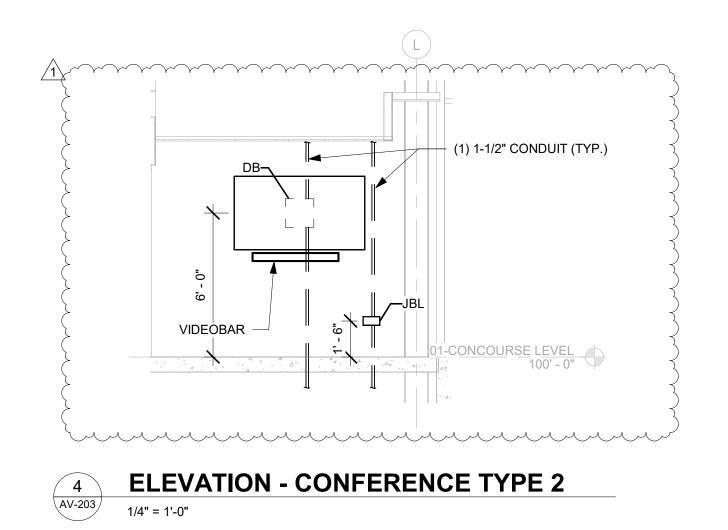
**ELEVATION - CONFERENCE TYPE 1** 

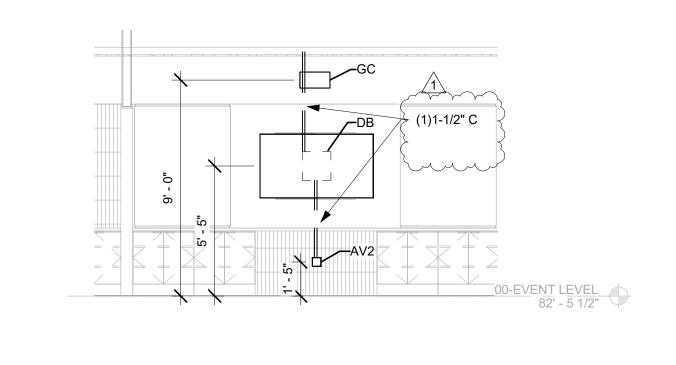


**ELEVATION - HUDDLE CONFERENCE** 



**ELEVATION - GREEN ROOM/VIS COACH LKR** 





**ELEVATION - VISITOR LKR** 

Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEE 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408 812-855-1692

Architect RATIO 101 SOUTH PENNSYLVANIA STREET

INDIANAPOLIS, IN 46204

317-633-4040 Structural Engineer FINK ROBERTS AND PETRIE, INC.

3535 EAST 96TH STREET SUITE 126 INDIANAPOLIS, IN 46240 317-872-8400

Mechanical / Electrical INTROBA 8250 HAVERSTICK ROAD SUITE 285 INDIANAPOLIS, IN 46240

800-404-7677 Plumbing Engineer

138 N. DELAWARE ST

INDIANAPOLIS, IN 46204 317-633-4120

Acoustics / Technology Engineer

WJHW 7220 W. JEFFERSON AVE SUITE 216 LAKEWOOD, CO 80235 972-934-3700

Civil Engineer

AMERICAN STRUCTUREPOINT, INC. 9025 RIVER ROAD SUITE 200

INDIANAPOLIS, IN 46240 317-547-5580

Food Service Consultant CINILITTLE

3405 NW 9TH AVENUE #1202 FORT LAUDERDALE, FL 33309 954-846-9600

Code Consultant FORZA

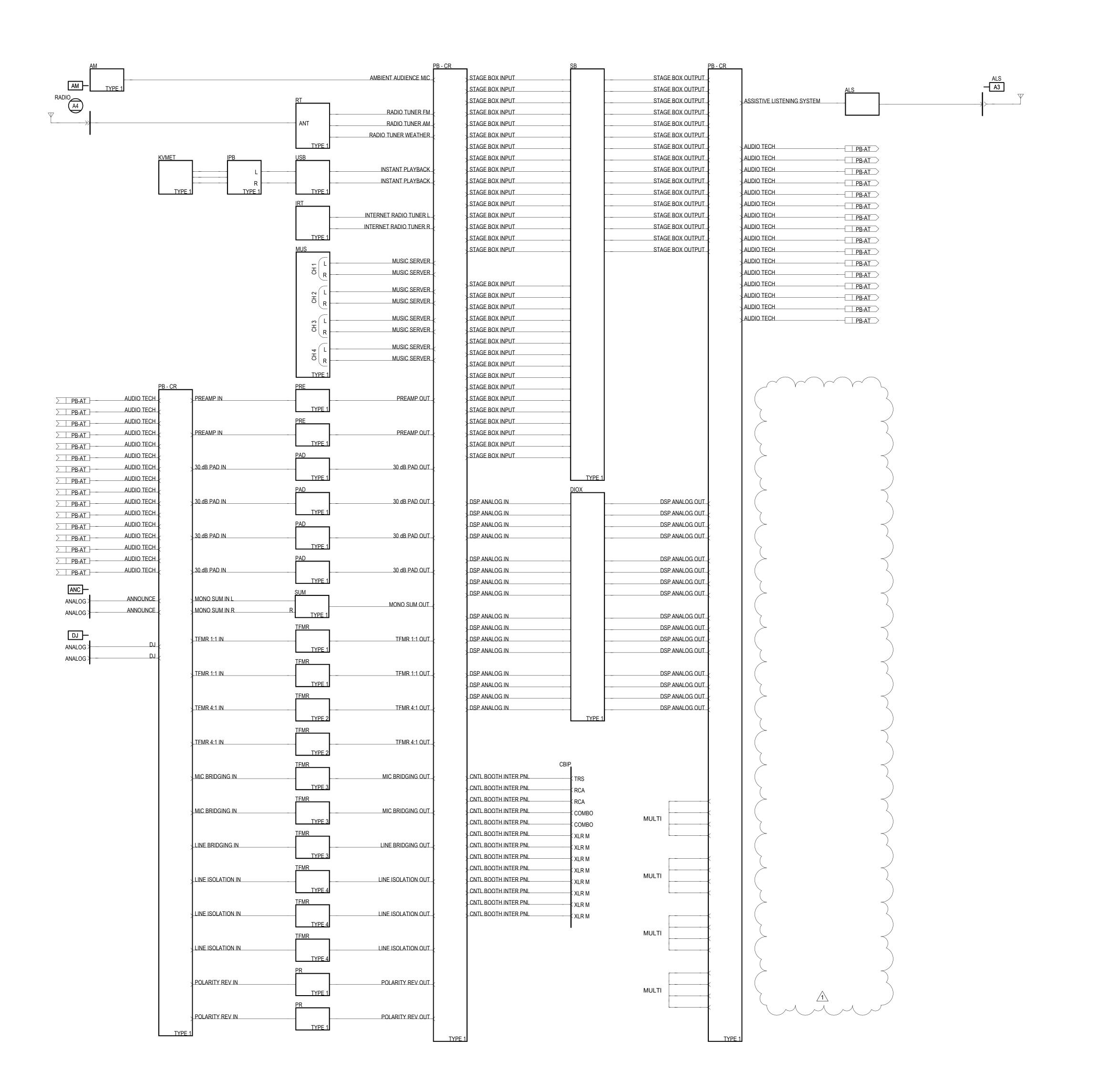
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AV ELEVATIONS



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INDIANA UNIVERSITY BOARD OF TRUSTEE 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408

812-855-1692 Architect

RATIO 101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204

317-633-4040 Structural Engineer FINK ROBERTS AND PETRIE, INC.

3535 EAST 96TH STREET SUITE 126 INDIANAPOLIS, IN 46240 317-872-8400

Mechanical / Electrical INTROBA

8250 HAVERSTICK ROAD SUITE 285 INDIANAPOLIS, IN 46240 800-404-7677

Plumbing Engineer

138 N. DELAWARE ST INDIANAPOLIS, IN 46204 317-633-4120

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7220 W. JEFFERSON AVE SUITE 216 LAKEWOOD, CO 80235 972-934-3700

Civil Engineer AMERICAN STRUCTUREPOINT, INC.

9025 RIVER ROAD SUITE 200 INDIANAPOLIS, IN 46240

317-547-5580 Food Service Consultant CINILITTLE

3405 NW 9TH AVENUE #1202 FORT LAUDERDALE, FL 33309 954-846-9600

**Code Consultant** FORZA

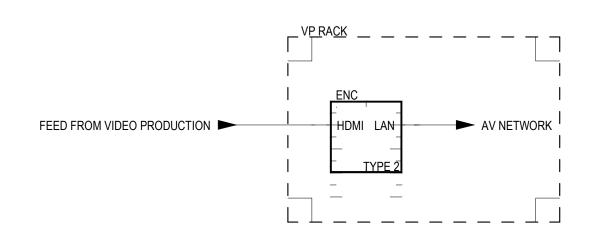
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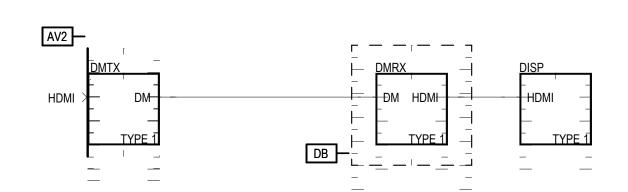
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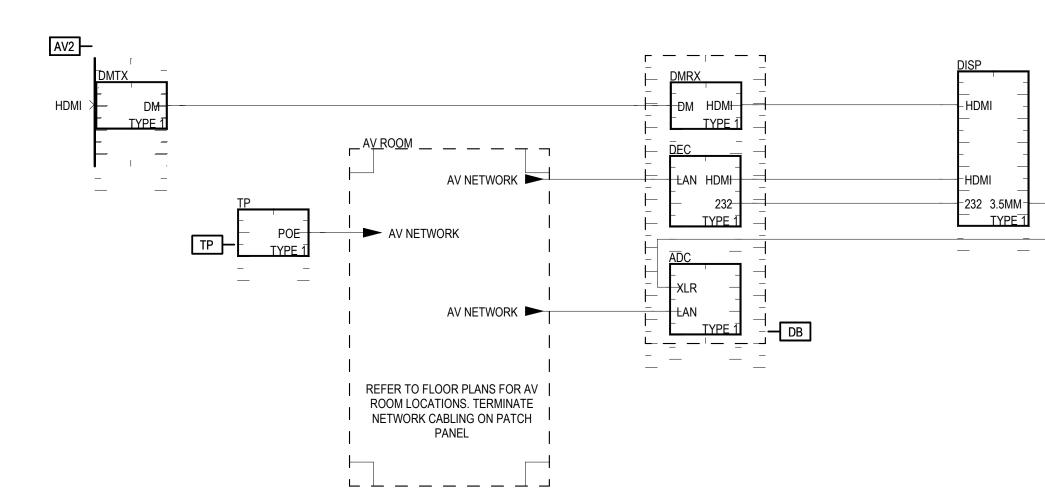
AUDIO CONTROL ROOM DIAGRAM



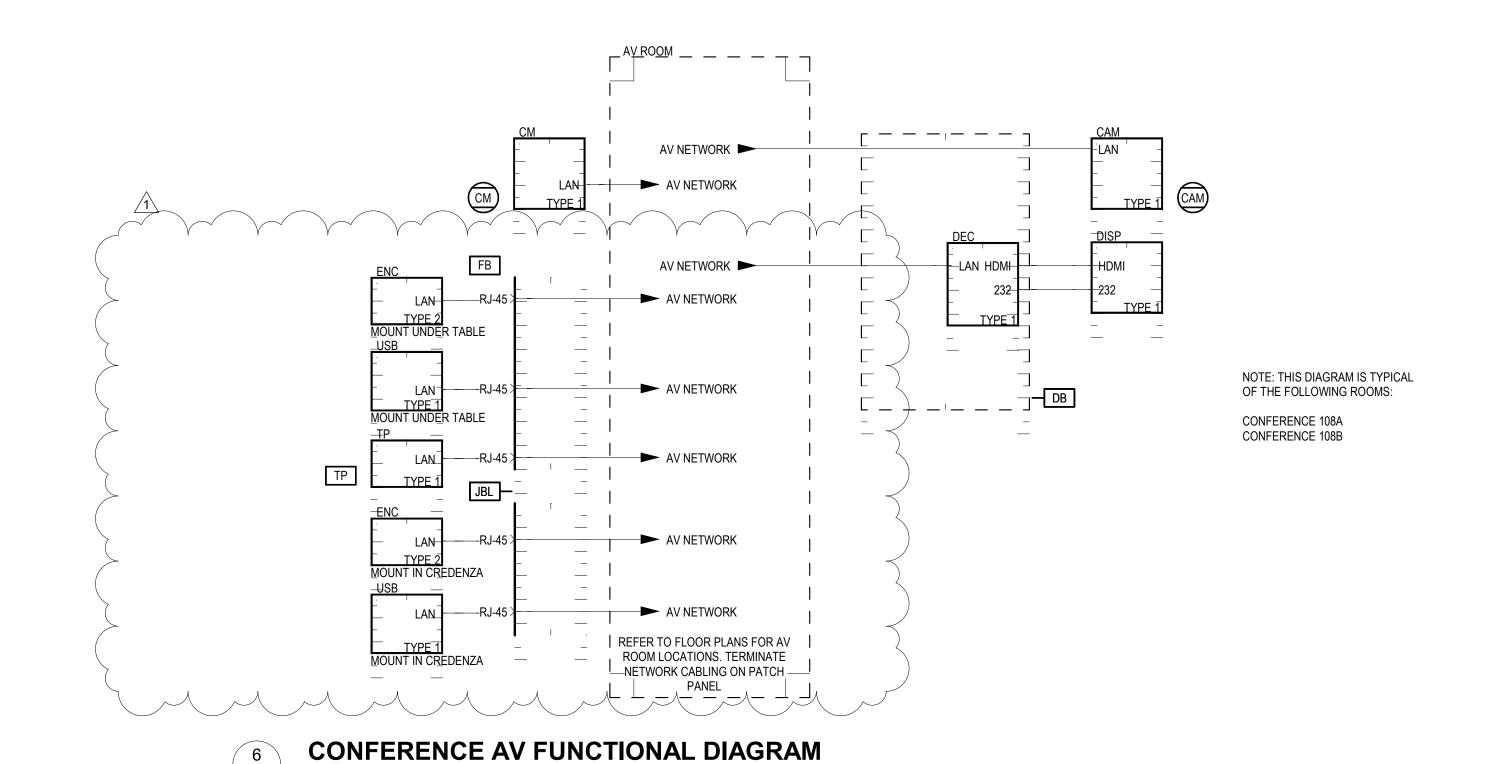


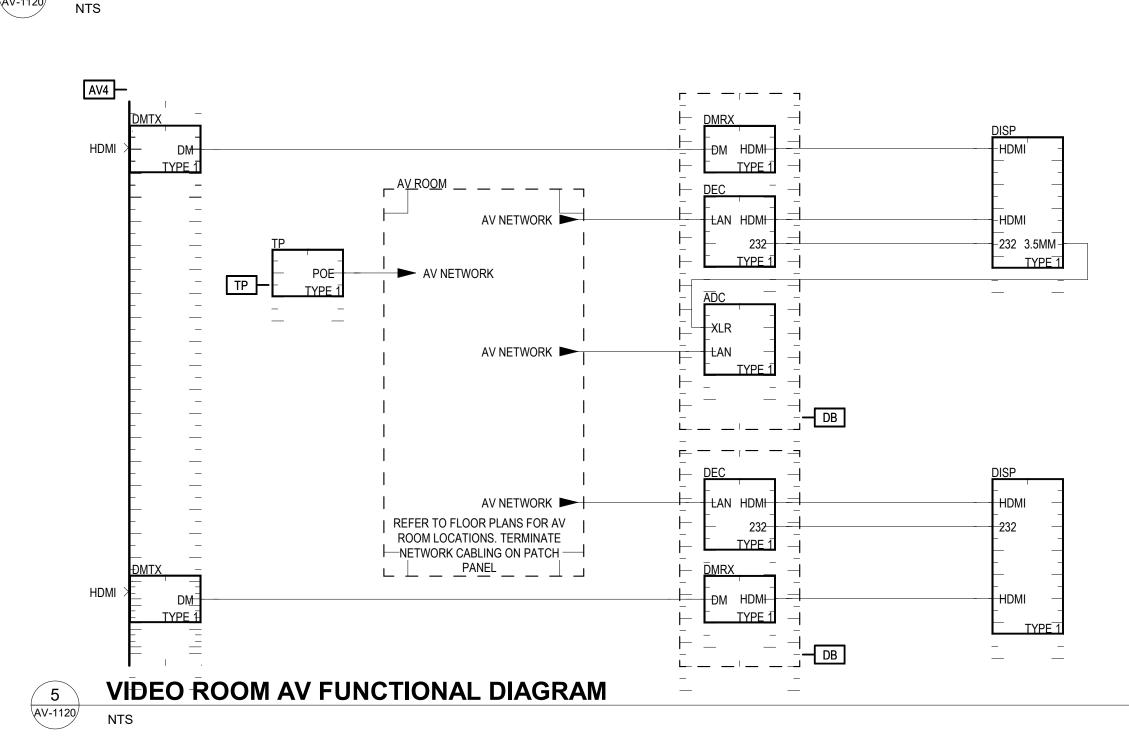


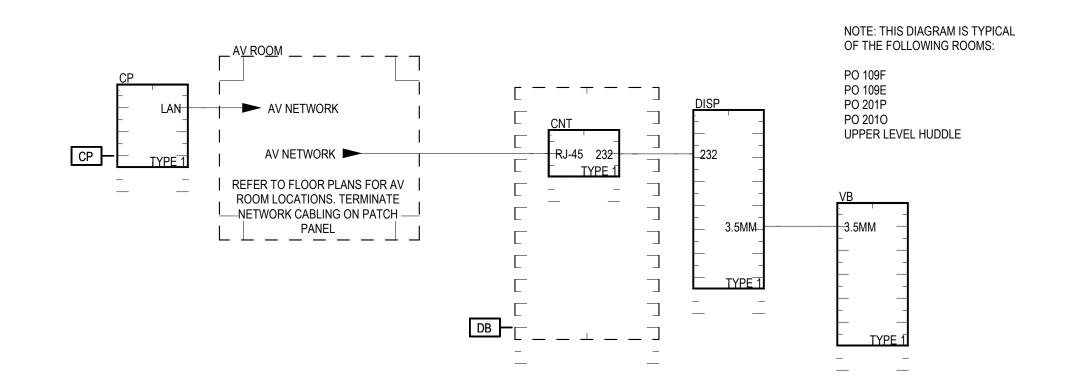






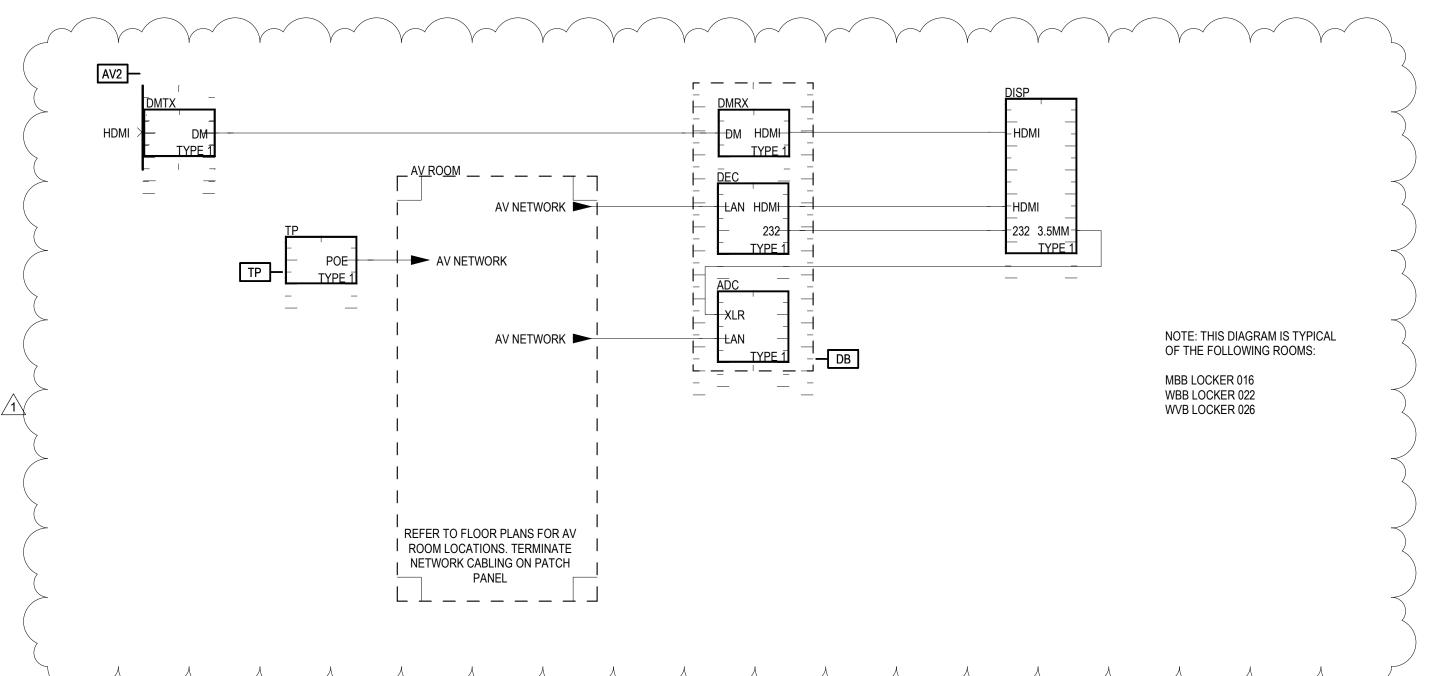




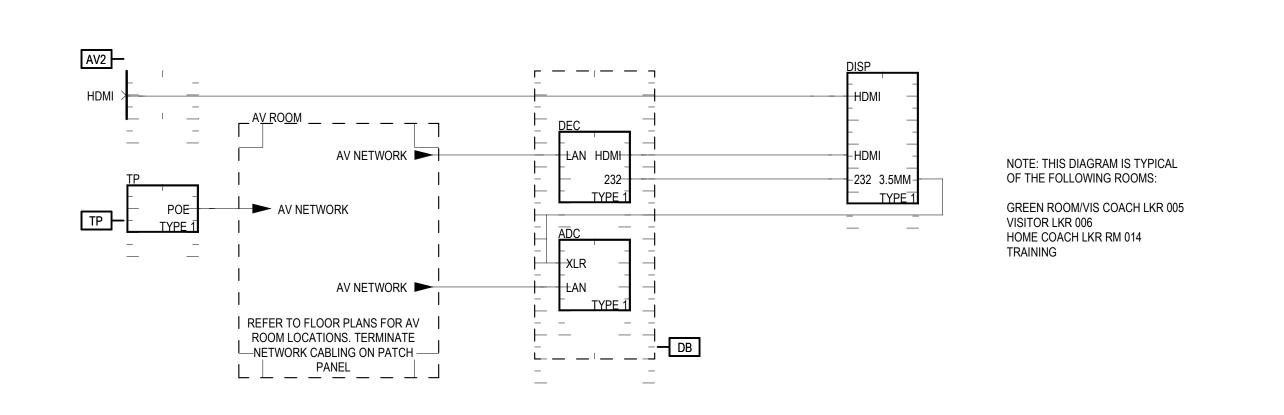


HUDDLE CONFERENCE AV FUNCTIONAL DIAGRAM

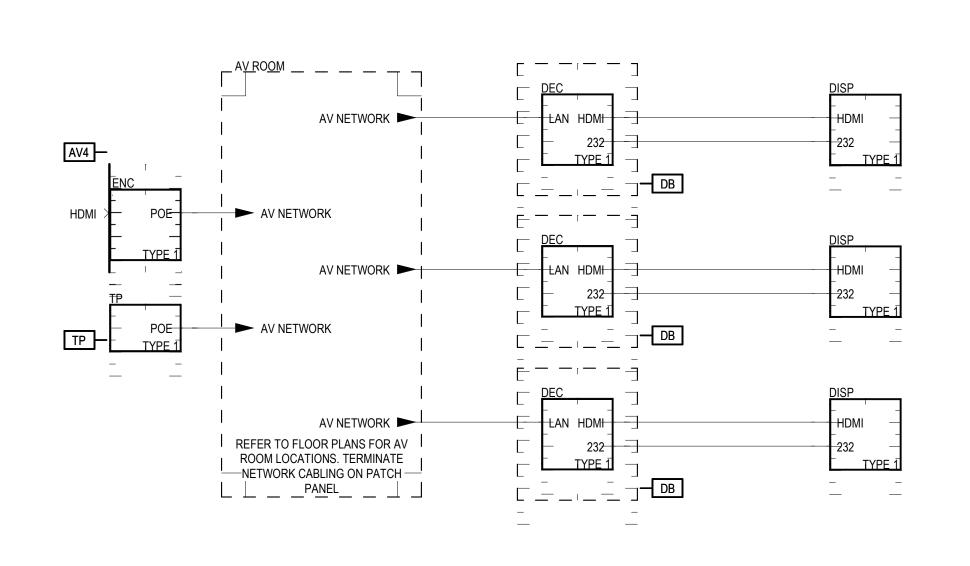
4 AV-1120



3 LOCKER ROOM TYPE 2 AV FUNCTIONAL DIAGRAM
NTS



LOCKER ROOM TYPE 1 AV FUNCTIONAL DIAGRAM



WEIGHT ROOM AV FUNCTIONAL DIAGRAM
NTS

IN128 - JAMES T. MORRIS ARENA

Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

Owner
INDIANA UNIVERSITY BOARD OF TRUSTEE
2901 EAST DISCOVERY PARKWAY
BLOOMINGTON, IN 47408
812-855-1692

Architect
RATIO
101 SOUTH PENNSYLVANIA STREET
INDIANAPOLIS, IN 46204

317-633-4040
Structural Engineer

FINK ROBERTS AND PETRIE, INC. 3535 EAST 96TH STREET

3535 EAST 96TH STREET SUITE 126 INDIANAPOLIS, IN 46240 317-872-8400

Mechanical / Electrical
INTROBA

8250 HAVERSTICK ROAD SUITE 285 INDIANAPOLIS, IN 46240 800-404-7677

Plumbing Engineer
DLZ

138 N. DELAWARE ST INDIANAPOLIS, IN 46204 317-633-4120

Acoustics / Technology Engineer WJHW

7220 W. JEFFERSON AVE SUITE 216 LAKEWOOD, CO 80235 972-934-3700

Civil Engineer

AMERICAN STRUCTUREPOINT, INC.

9025 RIVER ROAD SUITE 200 INDIANAPOLIS, IN 46240

317-547-5580

Food Service Consultant

CINILITTLE

3405 NW 9TH AVENUE #1202
FORT LAUDERDALE, FL 33309
954-846-9600

954-846-9600

Code Consultant

816-806-3729

FORZA
2502 WEST MECHANIC ST, SUITE C
HARRISONVILLE, MO 64701

	<b>Construction Documents</b>	01/13/
1	Addendum 1	01/27

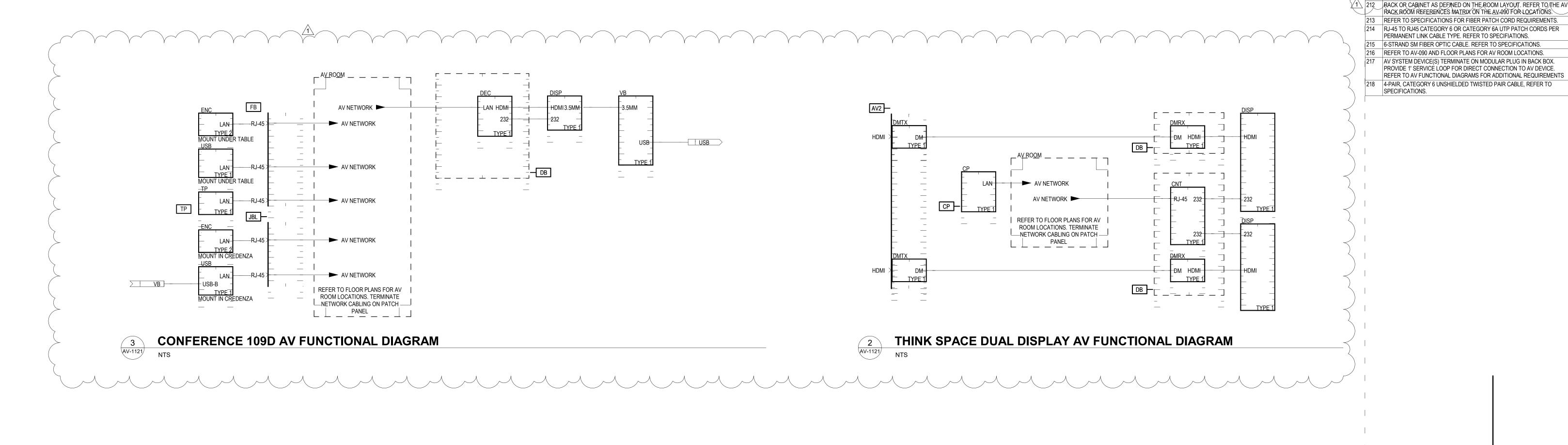
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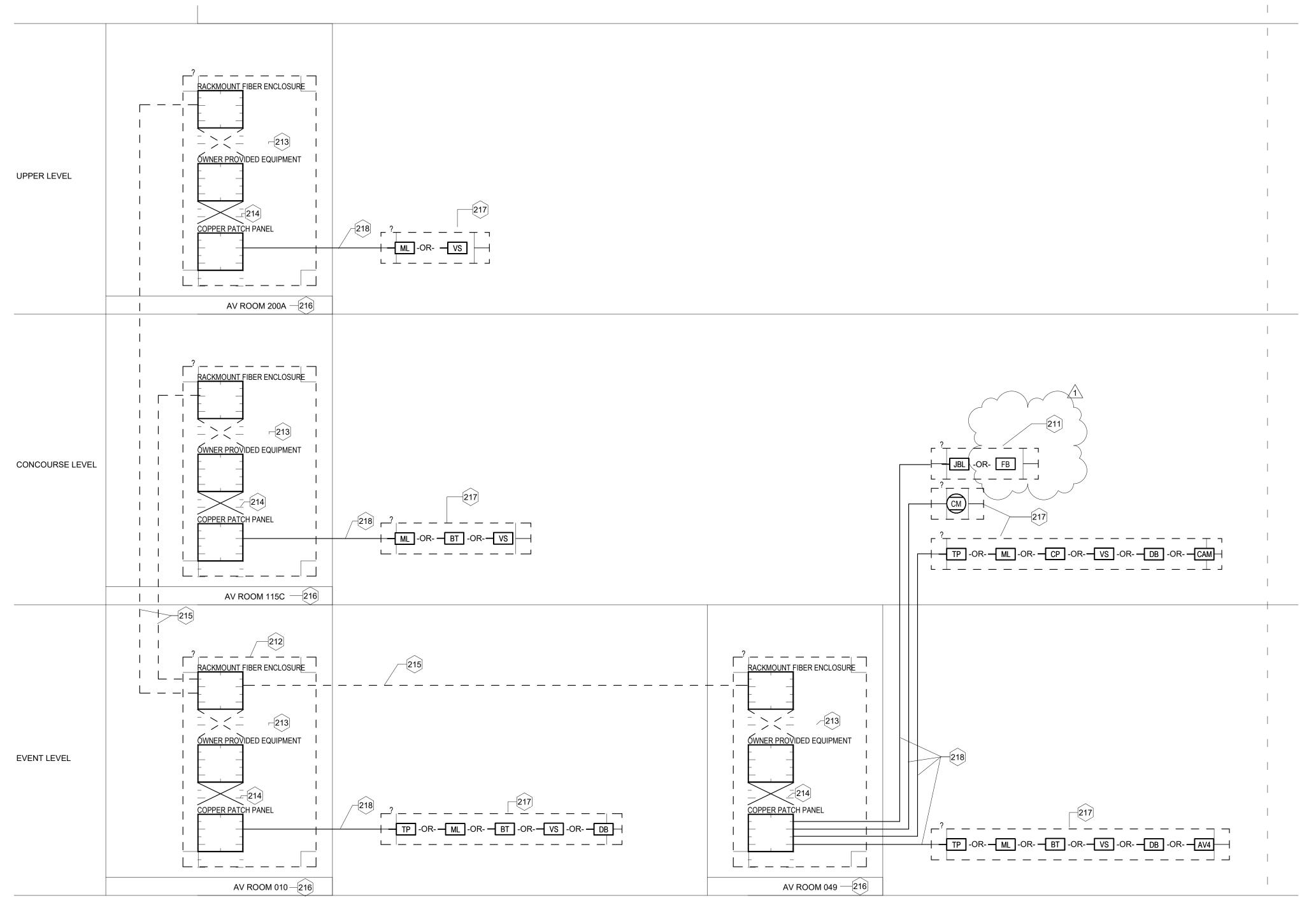
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PROJECT NO.

AUDIO VISUAL FUNCTIONAL DIAGRAMS

SHEET NUMBER





# AV FIBER AND COPPER CONNECTIVITY DIAGRAM

1.THIS RISER IS DIAGRAMMATIC AND MAY NOT SHOW ACTUAL ROUTING OR QUANTITIES OF MATERIALS SHOWN. THIS RISER IS SHOWN FOR CLARIFICATION OF CONNECTION(S), LOCATIONS AND CABLE TYPE. ALL INFORMATION OUTLETS ARE TYPICAL OF THE OUTLETS IN THE AREA SHOWN. REFER TO FLOOR PLANS FOR MORE SPECIFIC ROUTING INFORMATION.

2. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.

REFER TO FLOOR PLANS FOR QUANTITY OF CABLES AND JACKS TO BE INSTALLED AT EACH INFORMATION OUTLET.

3. REFER TO ES SHEETS AND SPECIFICATIONS 271000 - STRUCTURED CABLING SYSTEMS FOR LABELING, TESTING AND MANUFACTURERS OF EQUIPMENT

RACK ROOM REFERENCES MATRIX ON THE AV-090 FOR LOCATIONS. 13 REFER TO SPECIFICATIONS FOR FIBER PATCH CORD REQUIREMENTS IN128 - JAMES T. 214 RJ-45 TO RJ45 CATEGORY 6 OR CATEGORY 6A UTP PATCH CORDS PER PERMANENT LINK CABLE TYPE. REFER TO SPECIFIATIONS. MORRIS ARENA 215 6-STRAND SM FIBER OPTIC CABLE, REFER TO SPECIFICATIONS.

TERMINATE ON STANDARD 1 GANG FACEPLATE WITH KEYSTONE JACK

Ohio St & N Blackford St

IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEE 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408

Indianapolis, IN 46202

812-855-1692 Architect RATIO

101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204 317-633-4040

Structural Engineer FINK ROBERTS AND PETRIE, INC. 3535 EAST 96TH STREET

SUITE 126 INDIANAPOLIS, IN 46240 317-872-8400

Mechanical / Electrical INTROBA 8250 HAVERSTICK ROAD SUITE 285

INDIANAPOLIS, IN 46240 800-404-7677 Plumbing Engineer

138 N. DELAWARE ST INDIANAPOLIS, IN 46204 317-633-4120

Acoustics / Technology Engineer WJHW

7220 W. JEFFERSON AVE SUITE 216 LAKEWOOD, CO 80235 972-934-3700

Civil Engineer AMERICAN STRUCTUREPOINT, INC.

9025 RIVER ROAD SUITE 200 INDIANAPOLIS, IN 46240

317-547-5580 **Food Service Consultant** 

CINILITTLE 3405 NW 9TH AVENUE #1202 FORT LAUDERDALE, FL 33309 954-846-9600

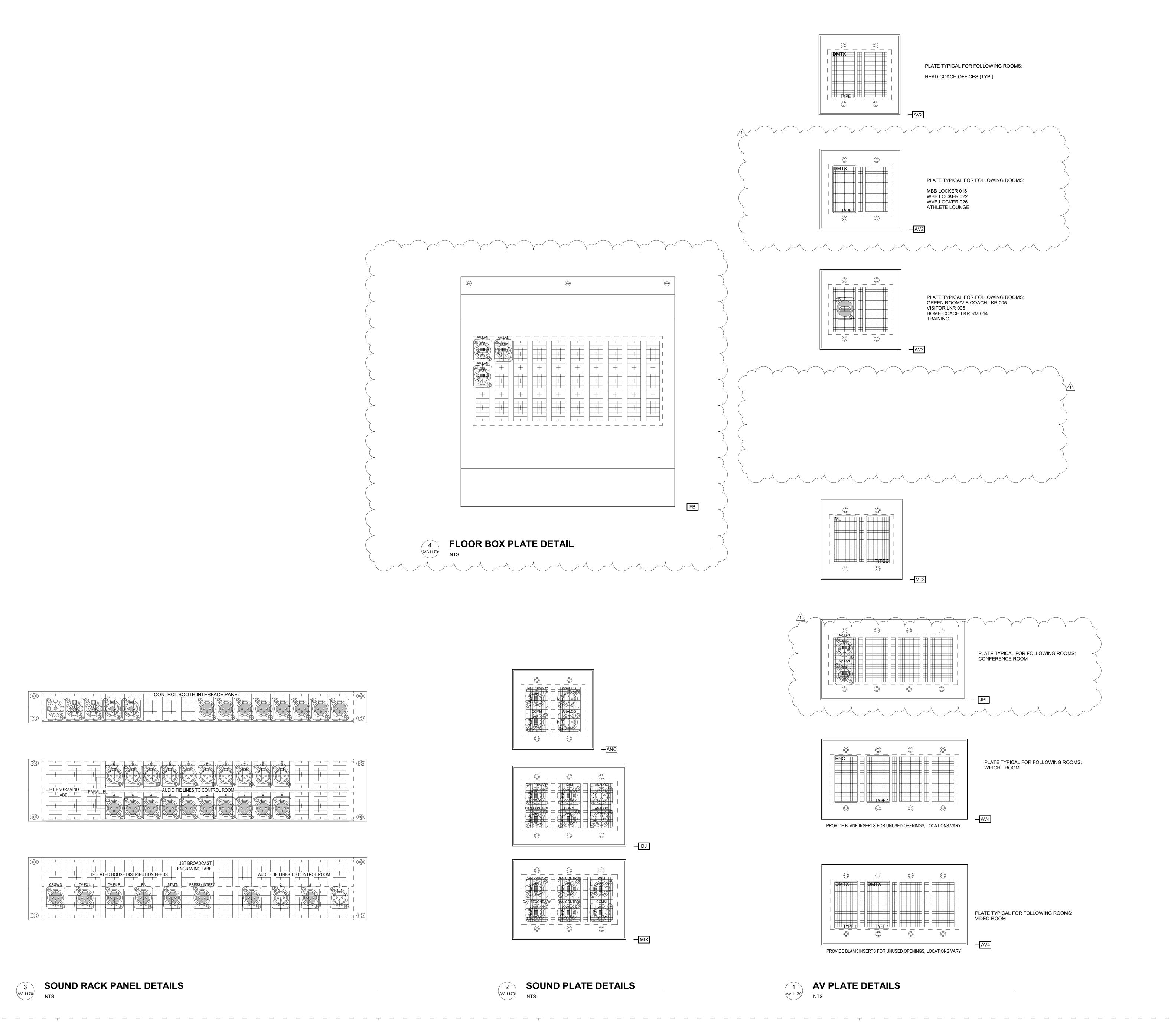
Code Consultant

FORZA 2502 WEST MECHANIC ST, SUITE C HARRISONVILLE, MO 64701 816-806-3729

	<b>Construction Documents</b>	01/13/2
1	Addendum 1	01/27/2
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AUDIO VISUAL



Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEE 2901 EAST DISCOVERY PARKWAY

BLOOMINGTON, IN 47408 812-855-1692 Architect

RATIO 101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204 317-633-4040

Structural Engineer FINK ROBERTS AND PETRIE, INC.

3535 EAST 96TH STREET SUITE 126 INDIANAPOLIS, IN 46240

317-872-8400 Mechanical / Electrical INTROBA

8250 HAVERSTICK ROAD SUITE 285 INDIANAPOLIS, IN 46240 800-404-7677

Plumbing Engineer

138 N. DELAWARE ST INDIANAPOLIS, IN 46204 317-633-4120

Acoustics / Technology Engineer WJHW 7220 W. JEFFERSON AVE

SUITE 216 LAKEWOOD, CO 80235 972-934-3700

AMERICAN STRUCTUREPOINT, INC. 9025 RIVER ROAD

SUITE 200 INDIANAPOLIS, IN 46240 317-547-5580

**Food Service Consultant** CINILITTLE

Civil Engineer

3405 NW 9TH AVENUE #1202 FORT LAUDERDALE, FL 33309 954-846-9600

Code Consultant

**FORZA** 2502 WEST MECHANIC ST, SUITE C HARRISONVILLE, MO 64701

816-806-3729

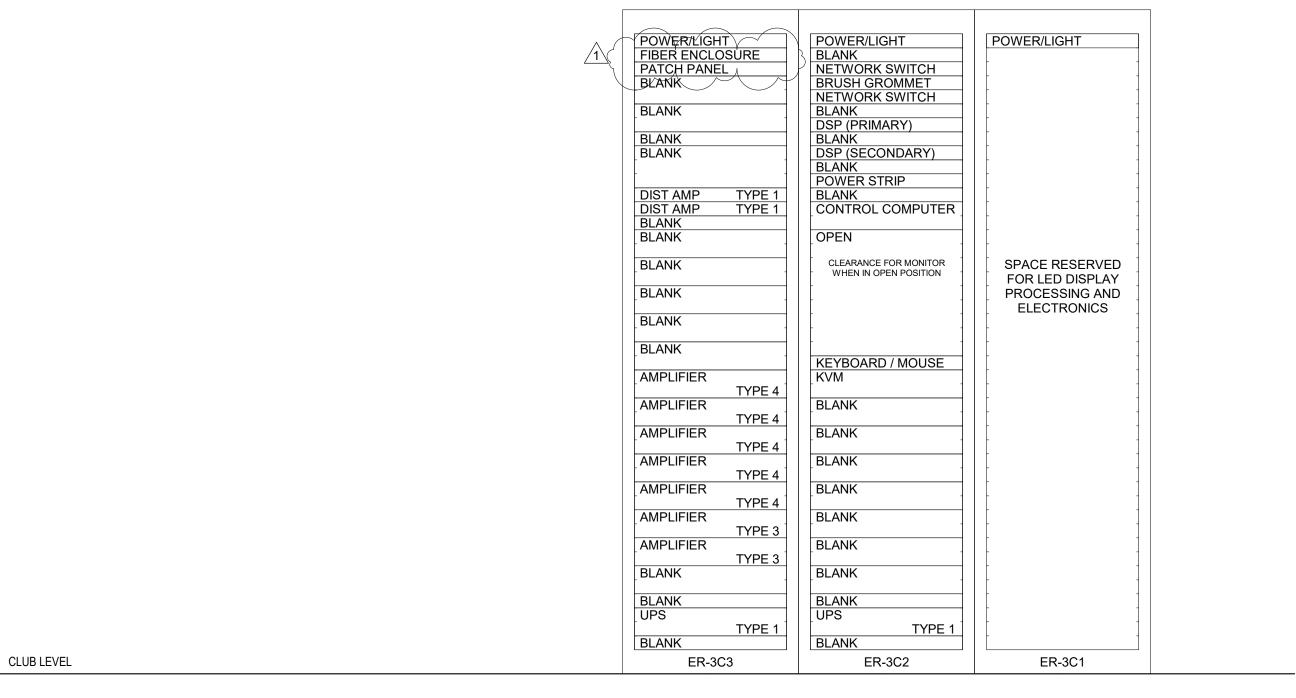
**Construction Documents** 01/27/25 Addendum 1

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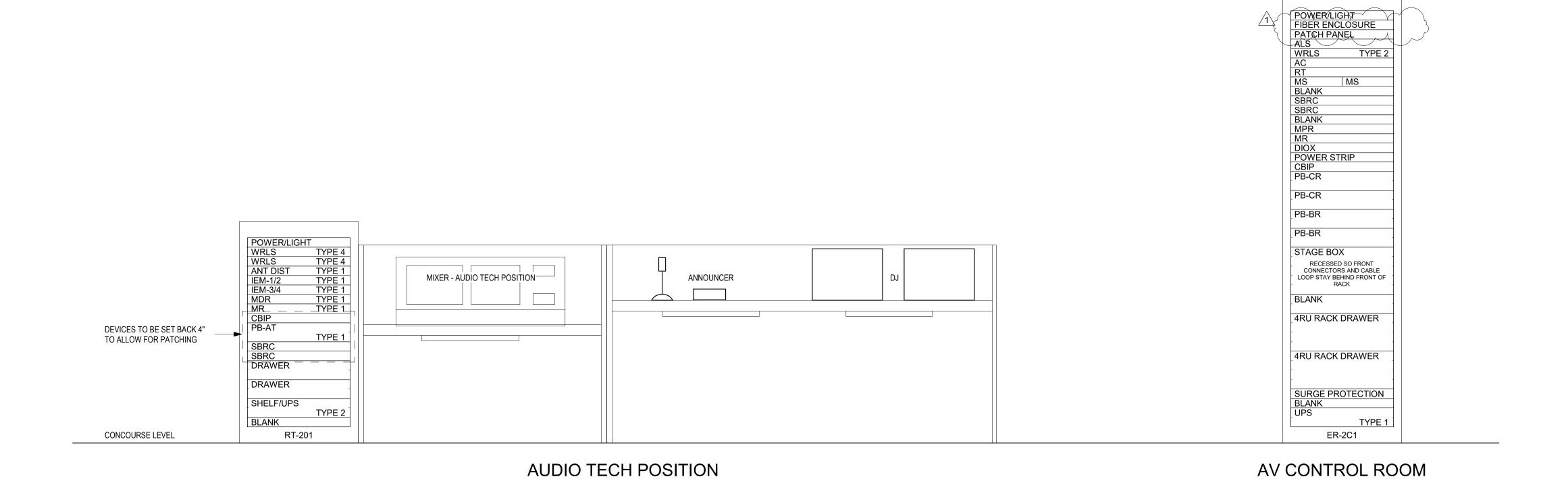
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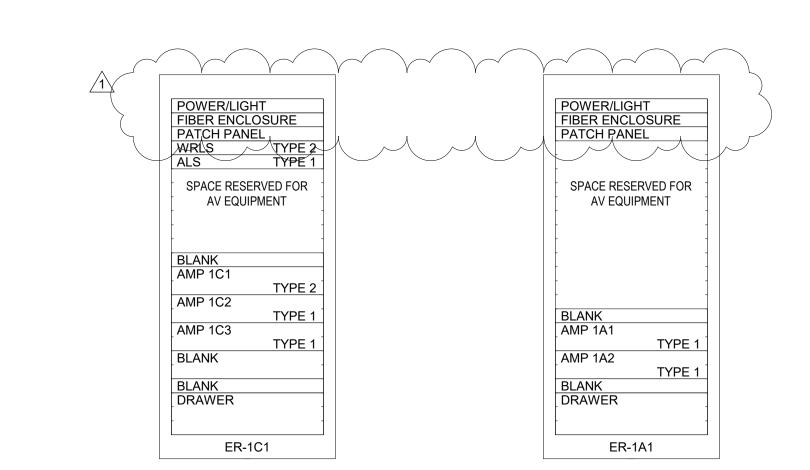
PLATE AND PANEL DETAILS

23112.000



**AV ROOM** 





EVENT LEVEL AV ROOM AV ROOM

AV AND SOUND EQUIPMENT RACK ELEVATIONS

NTS

IN128 - JAMES T. MORRIS ARENA

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Architect

RATIO

101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204
317-633-4040

Structural Engineer
FINK ROBERTS AND PETRIE, INC.

3535 EAST 96TH STREET SUITE 126 INDIANAPOLIS, IN 46240

INDIANAPOLIS, IN 46240 317-872-8400 Mechanical / Electrical

INTROBA

8250 HAVERSTICK ROAD

SUITE 285
INDIANAPOLIS, IN 46240
800-404-7677

Plumbing Engineer

138 N. DELAWARE ST INDIANAPOLIS, IN 46204 317-633-4120

Acoustics / Technology Engineer

WJHW
7220 W. JEFFERSON AVE
SUITE 216
LAKEWOOD, CO 80235
972-934-3700

Civil Engineer

AMERICAN STRUCTUREPOINT, INC.
9025 RIVER ROAD
SUITE 200

INDIANAPOLIS, IN 46240 317-547-5580 Food Service Consultant

**CINILITTLE**3405 NW 9TH AVENUE #1202
FORT LAUDERDALE, FL 33309
954-846-9600

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FORZA
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HARRISONVILLE, MO 64701
816-806-3729

Construction Documents 01/13/25

1 Addendum 1 01/27/25

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PROJECT NO.
SHEET TITLE

AV EQUIPMENT RACK ELEVATIONS

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#### **GENERAL ABBREVIATIONS** NOT APPLICABLE LENGTH, LEFT LEFT/RIGHT LAN LOCAL AREA NETWORK LB POUNDS 3DC 3D CONTROLLER LINEAR FEET LTG LIGHTING AIR CONDITIONING MAXIMUM ABV ALTERNATING CURRENT MDF MAIN DISTRIBUTION FRAME ADA AMERICANS WITH DISABILITIES ACT MECH MECHANICAL ADJ ADJUSTABLE MIN MINIMUM ABOVE FINISHED CEILING MMFO MULTIMODE FIBER OPTIC CABLE ABOVE FINISHED FLOOR MTD MOUNTED AFG ABOVE FINISHED GRADE AUTHORITY HAVING JURISDICTION AHJ NOT APPLICABLE ALT ALTERNATE NORMALLY CLOSED AMERICAN NATIONAL STANDARDS INSTITUTE NEC NATIONAL ELECTRICAL CODE ANSI ARCH ARCHITECT, ARCHITECTURAL NEMA NATIONAL ELECTRICAL MANUFACTURER'S ASSOC. AMERICAN SOCIETY OF MECHANICAL ENGINEERS ASME NETWORK NOT IN CONTRACT AUX AUXII IARY AWG AMERICAN WIRE GAUGE NORMALLY OPEN NTS NOT TO SCALE BFC BELOW FINISHED CEILING BFF BELOW FINISHED FLOOR ON CENTER BLDG BUILDING OUTSIDE DIAMETER BOH BACK OF HOUSE OFCI OWNER FURNISHED CONTRACTOR INSTALLED OWNER FURNISHED EQUIPMENT BOP BOTTOM OF PIPE OFE BOS **BOTTOM OF STRUCTURE** OFOI OWNER FURNISHED OWNER INSTALLED PRIMARY CONDUIT CATEGORY CABLE PART OF P/O PERSONAL COMPUTER CENTER LINE PDU POWER DISTRIBUTION UNIT CEILING PROGRAM **CONCRETE MASONRY UNIT** PHASE COL PNL PANEL COLUMN CTRL CONTROL PROC PROCESSOR PROJECT RECEPTACLE HEIGHT DEPTH. DEEP PROXIMITY SENSOR DIRECT CURRENT POWER SUPPLY DOWNSTAGE CENTER POUNDS PER SQUARE FOOT DEG DEGREES PROJECT SWITCH HEIGHT DEMO DEMOLITION POUNDS PER SQUARE INCH DFP **DIRECTOR'S FLOOR POCKET** PASS THROUGH DIAMETER POLYVINYL CHLORIDE **PWR** DIM DIMENSION POWER DIVISION DOWNSTAGE QUANTITY DOWNSTAGE LEFT DSL DSR DOWNSTAGE RIGHT RCP REFLECTED CEILING PLAN DRAWING REF REFERENCE, REFER REINFORCING **ELECTRICAL CONTRACTOR** REQD REQUIRED ELEVATION REV REVISION, REVISE ELEC ELECTRICAL ROOM **ENCLOSURE ROUGH OPENING ENCL** EQ RPM REVOLUTIONS PER MINUTE FQUAL **EQUIP EQUIPMENT EQUIPMENT RACK** SURFACE, SECONDARY ETHERNET SWITCH STRUCTURED CABLING SYSTEM SCS SQFT **EXISTING** EXIST SQUARE FEET SIMILAR FIRE ALARM STAGE LEFT SINGLE MODE FIBER OPTIC CABLE FB FLOOR BOX **FLEX** FLEXIBLE STAGE MANAGER POSITION FLOOR SPECIFICATION SQUARE FINISHED OPENING FRONT OF HOUSE STAGE RIGHT FPB FIBER OPTIC PATCHBAY STANDARD SHIELDED TWISTED PAIR FEET PER MINUTE FOOT, FEET SURFACE FIELD VERIFY SUSPEND TBD GND GROUND TO BE DETERMINED **THRU** GAUGE THROUGH TYPICAL HEIGHT HOUSE LEFT UPSTAGE CENTER HOUSE MANAGER POSITION UNDERWRITERS LABORATORIES, INC. HORIZONTAL UNLESS NOTED OTHERWISE HORSEPOWER UNINTERRUPTIBLE POWER SUPPLY HOUSE RIGHT UPSTAGE ΗZ HERTZ **UPSTAGE LEFT** UPSTAGE RIGHT INPUT/OUTPUT USB UNIVERSAL SERIAL BUS INSIDE DIAMETER UTP UNSHIELDED TWISTED PAIR INTERMEDIATE DISTRIBUTION FRAME VOLT ISOLATED GROUND ISO ISOLATED **VOLT-AMPERE** VERT VERTICAL JUNCTION BOX VERIFY IN FIELD JUNCTION BOX - DATA JBD JUNCTION BOX - SYSTEM POWER WITH KPD W/O WITHOUT KW KILOWATT WP WEATHERPROOF WEIGHT

# STRUCTURED CABLING ABBREVIATIONS

DAS	DISTRIBUTED ANTENNA SYSTEM
ER .	EQUIPMENT ROOM
BB	TELECOMMUNICATIONS BONDING BACKBONE
PBB	PRIMARY BONDING BUSBAR

SECONDARY BONDING BUSBAR

TELECOMMUNICATIONS ROOM

TR

GRADE.

	TYPE	DESCRIPTION	NOTES
RITY	Α	22AWG, 1 PAIR DATA, SHIELDED, 18 AWG, 2 CONDUCTOR STANDED - OSDP	REFERENCE SPECIFICATION 280513
SECURITY	В	18AWG, 4 CONDUCTOR, STRANDED, UNSHIELDED	REFERENCE SPECIFICATION 280513
S	С	16AWG, 2 CONDUCTOR, STRANDED, UNSHIELDED	REFERENCE SPECIFICATION 280513
	E	22AWG, 4 CONDUCTOR, STRANDED, UNSHIELDED	REFERENCE SPECIFICATION 280513
	F	COMPOSITE ACCESS CONTROLLED DOOR CABLE - OSDP	REFERENCE SPECIFICATION 280513
	М	NETWORK COMMUNICATION CABLE	REFERENCE SPECIFICATION 271000
	J	COMPOSITE COPPER FIBER	REFERENCE SPECIFICATION 271000
ZED ING	М	CATEGORY 6, BLUE	REFERENCE SPECIFICATION 271000
STRUCTURED CABLING	N	CATEGORY 6, WHITE	REFERENCE SPECIFICATION 271000
STRU	R	CATEGORY 6A, YELLOW	REFERENCE SPECIFICATION 271000
	S	CATEGORY 6, YELLOW	REFERENCE SPECIFICATION 271000

	CAMERA TYPES					
TYPE	DESCRIPTION					
5	FIXED 6 MP DOME WITH IR					
10	DUAL HEAD SENSOR					
20	12MP FISHEYE					
30	360-DEGREE MULTI-IMAGER					
NOTE:						

### ROUGH-IN BOX SCHEDULE

RECESSED: 4 11/16" SQUARE BOX. 2 1/8" DEEP WITH KNOCKOUTS. PROVIDE DEVICE EXTENSION AS REQUIRED TO ACCOMMODATE DEVICE COVER SIZE. DEVICE COVER/RING EDGE TO BE FLUSH WITH FINISHED WALL MASONRY: 2-GANG BOX. 2 1/2" DEEP WITH KNOCKOUTS IN 4" CMU/BRICK/CONCRETE; 3 1/2"

FINISHED WALL.

SURFACE MOUNTED (INDOOR): 4 11/16" SQUARE BOX. 2 1/8" DEEP WITH KNOCKOUTS. PROVIDE DEVICE EXTENSION AS REQUIRED TO ACCOMMODATE DEVICE COVER SIZE. SURFACE MOUNTED (OUTDOOR / WEATHER PROOF): 2-GANG DIE CAST BOX. 2 5/8" DEEP

DEEP WITH KNOCKOUTS IN 6" OR 8" CMU/CONCRETE. COVER EDGE TO BE FLUSH WITH

TYPE 11 RECESSED: 5" SQUARE BOX. 27/8" DEEP. PROVIDE DEVICE EXTENSION AS REQUIRED TO ACCOMMODATE DEVICE COVER SIZE. DEVICE COVER/ RING EDGE TO BE FLUSH WITH

MASONRY: 2-GANG BOX. 2 1/2" DEEP WITH KNOCKOUTS IN 4" CMU/BRICK/CONCRETE: 3 1/2" DEEP WITH KNOCKOUTS IN 6" OR 8" CMU/CONCRETE. COVER EDGE TO BE FLUSH WITH

SURFACE MOUNTED (INDOOR): 4 11/16" SQUARE BOX. 2 1/8" DEEP WITH KNOCKOUTS. PROVIDE DEVICE EXTENSION AS REQUIRED TO ACCOMMODATE DEVICE COVER SIZE. SURFACE MOUNTED (OUTDOOR / WEATHER PROOF): 2-GANG DIE CAST BOX. 2 5/8" DEEP WITH THREADED OUTLETS.

RECESSED: 4 11/16" SQUARE BOX. 2 1/8" DEEP WITH KNOCKOUTS. PROVIDE DEVICE EXTENSION AS REQUIRED TO ACCOMMODATE DEVICE COVER SIZE. DEVICE COVER/ RING EDGE TO BE FLUSH WITH FINISHED WALL.

MASONRY: 1-GANG BOX. 2 1/2" DEEP WITH KNOCKOUTS IN 4" CMU/BRICK/CONCRETE: 3 1/2" DEEP WITH KNOCKOUTS IN 6" OR 8" CMU/CONCRETE. COVER EDGE TO BE FLUSH WITH FINISHED WALL.

SURFACE MOUNTED (INDOOR): 4 11/16" SQUARE BOX. 2 1/8" DEEP WITH KNOCKOUTS. PROVIDE DEVICE EXTENSION AS REQUIRED TO ACCOMMODATE DEVICE COVER SIZE. SURFACE MOUNTED (OUTDOOR / WEATHER PROOF): 1-GANG DIE CAST BOX. 2 5/8" DEEP

- TYPE A JUNCTION BOX (HxWxD) WITH SCREW COVER. PROVIDE NEMA TYPE 1 AT INDOOR LOCATIONS; PROVIDE NEMA TYPE 3R AT OUTDOOR LOCATIONS. PAINTED AT EXPOSED LOCATIONS.
- JUNCTION BOX (HxWxD) WITH HINGED COVER. PROVIDE NEMA TYPE 1 AT INDOOR LOCATIONS; PROVIDE NEMA TYPE 3R AT OUTDOOR LOCATIONS. PAINTED AT EXPOSED LOCATIONS.
- TYPE C JUNCTION BOX (HxWxD) WITH LOCKING HINGED COVER. PROVIDE NEMA TYPE 1 AT INDOOR LOCATIONS; PROVIDE NEMA TYPE 3R AT OUTDOOR LOCATIONS. PAINTED AT EXPOSED LOCATIONS

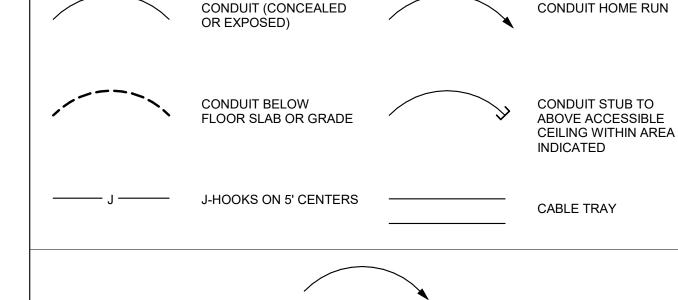
### **CONDUIT AND PATHWAY NOTES**

- COORDINATE LOCATION OF EQUIPMENT, JUNCTION BOXES, OUTLETS, CONDUIT, ETC.
- PROVIDE A COMPLETE RACEWAY SYSTEM TO CONSIST OF METALLIC CONDUIT (EXCLUDING IN-GROUND PATHWAY), JUNCTION BOXES, DEVICE BACK BOXES, AND
- FITTINGS UNLESS NOTED OTHERWISE THE DRAWINGS INDICATE ONE ROUTING METHOD OF THE CABLING PATHWAY. CHANGES MAY BE MADE TO THE PATHWAY SYSTEM ROUTING TO ACCOMMODATE SITE CONDITIONS
- OR TO SIMPLIFY INSTALLATION PROVIDING THAT NOTED CONDUIT SIZE OR LARGER IS MAINTAINED AND DISTANCE LIMITATIONS LISTED BELOW ARE NOT EXCEEDED.
- 4. CONDUIT STUBS FROM DEVICES TO THE NEAREST CABLE TRAY OR OTHER NOTED DESTINATIONS SHALL BE CONTINUOUS. UNLESS NOTED OTHERWISE, CONDUIT IS 1 INCH TRADE SIZE.
- CONDUIT BODIES (LB'S) ARE NOT PERMITTED. CONDUITS SHALL BE REAMED TO ELIMINATE SHARP EDGES. METALLIC CONDUITS SHALL
- BE TERMINATED WITH AN INSULATED BUSHING. PULL STRINGS WITH A MINIMUM PULL RATING OF 400 POUNDS SHALL BE PROVIDED. MAINTAIN PROPER CONDUIT BEND RADIUS. FOR CONDUIT WITH AN INTERNAL DIAMETER OF 2" OR LESS, MAINTAIN A BEND RADIUS OF AT LEAST SIX (6) TIMES THE INTERNAL CONDUIT DIAMETER. FOR CONDUIT WITH AN INTERNAL DIAMETER GREATER THAN 2",
- MAINTAIN A BEND RADIUS OF AT LEAST TEN (10) TIMES THE INTERNAL CONDUIT DIAMETER BENDS IN THE CONDUIT SHALL NOT CONTAIN ANY KINKS OR OTHER DISCONTINUITIES. FLEX IS NOT PERMITTED UNLESS NOTED OTHERWISE. 10. NO SECTION OF CONDUIT SHALL EXCEED 100 FEET. RUNS IN EXCESS OF 100 FEET REQUIRE A PULL BOX / HANDHOLE / VAULT.
- 11. NO SECTION OF CONDUIT SHALL CONTAIN MORE THAN TWO 90 DEGREE BENDS, OR EQUIVALENT 180 DEGREES, BETWEEN PULL BOXES. 12. PULL BOX SHALL NOT BE USED IN LIEU OF A BEND. CONDUITS MUST RUN STRAIGHT
- THROUGH A PULL BOX WITH THE BEND LOCATED EITHER BEFORE OR AFTER THE PULL 13. REFER TO PULL BOX SIZING TABLE FOR REQUIRED PULL BOX DIMENSIONS.
- 14. PROVIDE COVERS WITH LABELING FOR JUNCTION BOXES, BACK BOXES WITHOUT FACEPLATES AND PULL BOXES. LABELING SHALL INCLUDE THE CABLE TYPES AND THE APPLICABLE NUMBERING SCHEME FOR EACH CABLE CONTAINED WITHIN THE BOX.
- 15. PROVIDE CONDUIT TO CROSS INACCESSIBLE CEILINGS OR IN AREAS WITHOUT CEILINGS UNLESS NOTED OTHERWISE.
- 16. PROVIDE CONDUIT IN EXPOSED AREAS, MECHANICAL SPACES, AND ELEVATOR CONTROL 17. REGARDLESS OF PATHWAY TYPE, CABLING SHALL BE SUPPORTED AT 5 FEET MAXIMUM INTERVALS UTILIZING INDEPENDENT MOUNTING METHODS IN ACCORDANCE WITH
- MANUFACTURER INSTALLATION REQUIREMENTS. J-HOOK PATHWAYS SHALL BE ESTABLISHED TO SUPPORT EXPOSED CABLING AND PREVENT PHYSICAL CONTACT OF THE CABLING WITH BUILDING STRUCTURE AND OTHER MECHANICAL AND ELECTRICAL SYSTEMS INCLUDING MECHANICAL AND ELECTRICAL SYSTEMS MOUNTING PRODUCTS. 18. ROUTE CONDUIT WITH OTHER BUILDING SERVICES AND CONCEAL WHENEVER POSSIBLE.
- GROUP AND RUN PARALLEL ALONG A SINGLE BUILDING COLUMN LINE, HOLD TIGHT TO STRUCTURE AND PAINT AS DIRECTED BY THE ARCHITECT.
- 19. IF SCS AND POWER CONDUITS MUST CROSS, CROSS AT RIGHT ANGLES. 20. FOR IN-SLAB OR UNDERGROUND CONDUIT ENTERING A BUILDING, TRANSITION BACK TO METALLIC CONDUIT WITHIN 3 FEET OF THE ENTRY POINT.
- 21. REFER TO ELECTRICAL DRAWINGS AND PROJECT MANUAL FOR ADDITIONAL
- 22. PROVIDE SPECIFIED FIRE-STOPPING PRODUCTS AT FIRE-RATED WALL AND FLOOR

ACOUSTIC RATING OF A WALL.

PENETRATIONS IN ORDER TO MAINTAIN THE FIRE RATING OF THE MEMBRANE. 23. PROVIDE THROUGH-WALL ACOUSTICAL PATHWAY PRODUCTS IN ORDER TO MAINTAIN THE

# PATHWAY DISTRIBUTION



NUMBER OF CONDUITS-

CONDUIT-

**DESTINATION** (2) 1" C

# **DEVICE SYMBOL KEY - SECURITY SYSTEMS**

WALL / COLUMN DESK / COUNTER UNDER DESK / COUNTER CEILING / FLOOR XX MOUNTED DEVICE OVERHEAD MOUNTED MOUNTED DEVICE MOUNTED DEVICE MOUNTED DEVICE DEVICE

## SYMBOL LEGEND - SECURITY SYSTEMS

TYPE	DEVICE	ROUGH-IN BOX	DEVICE COVER	MOUNTING HEIGHT		OVER MOUNTING HEIGHT		CABLE	DEVICE NOTES	CONDUIT NOTES
		(H"xW"xD")	SIZE	WALL/COLUMN	CEILING/OVERHEAD	FLOOR	(QTY) TYPE			
CP	ACCESS CONTROL PANEL			4'-6" AFF TO CENTER OF PANEL			(2)M	INCLUDES ENCLOSURE, ACCESS CONTROL PANELS, AND ELECTRIC LOCK POWER SUPPLY.		
В	BLUE PHONE EMERGENCY STATION	REF DETAIL		BUILDING SWITCH HEIGHT TO CALL BUTTON		ON FLOOR	(1)M	INCLUDES A BLUE LIGHT EMERGENCY STATION DEVICE THAT INCLUDES THE LIGHT, THE ENCLOSURE, AND THE HANDSFREE COMMUNICATION DEVICE.	REF DETAIL	
RE	CARD READER SYSTEM - ELEVATOR	REF DETAIL	REF DETAIL	REF DETAIL			(1)F	SYSTEM INCLUDES MULTIPLE DEVICES; REF DETAIL. PROVIDE (1) TYPE B CABLE PER SECURED LEVEL. COORDINATE WITH DIV. 14.	REF DETAIL	
CRS	CARD READER SYSTEM	TYPE 12	1-GANG	BUILDING SWITCH HEIGHT			(1)F	SYSTEM INCLUDES MULTIPLE DEVICES; REF DETAIL.	REF DETAIL	
OC .	DOOR CONTACT						(1)E	INCLUDES A DOOR CONTACT MOUNTED DIRECTLY IN LINE WITH THE DOOR APPROXIMATELY 6" FROM THE STRIKE SIDE DOOR EDGE		
ELI	ELECTRIC LOCK INTERFACE	REF DETAIL	REF DETAIL				(1)F	THIS IS THE CONNECTION TO THE ELECTRIFIED LOCKING HARDWARE AT THE DOOR. THIS TYPICALLY CONNECTS TO AN OUTPUT ON THE ACCESS CONTROL SYSTEM FOR LOCKING OR UNLOCKING THE DOOR.	REF DETAIL	
ΞP	EMERGENCY PHONE	сиѕтом	CUSTOM	4'-6" AFF			(1)M, (1)B	AUXILIARY POWERED ANALOG SPEAKERPHONE THAT PROVIDES HANDS-FREE LINK TO FIRST RESPONDERS.	REF DETAIL	
DН	OVERHEAD DOOR CONTACT	TYPE 12	1-GANG			ON GROUND, BELOW DOOR	(1)E	INCLUDES GROUND MOUNTED CONTACT WITH ARMORED CABLE CONNECTED TO SINGLE GANG JUNCTION BOX.	REF DETAIL	
PB	PANIC BUTTON	TYPE 12	1-GANG	BUILDING SWITCH HEIGHT			(1)B	INCLUDES A PANIC BUTTON.	REF DETAIL	
VIC	VIDEO INTERCOM DOOR STATION	сиѕтом		4'-6" AFF			(1)M	INCLUDES POE POWERED INTERCOM THAT PROVIDES AUDIO AND VIDEO TO THE MASTER INTERCOM STATION	REF DETAIL	

#### **LEGEND NOTES - SECURITY SYSTEMS**

1 CATEGORY CABLING PROVIDED BY DIVISION 27

MOUNTED

CAMERA

- 2 PROVIDE QTY. (2) ADDITIONAL 18/6 CABLES FROM ACP TO ACCESS CONTROLLED DOOR LOCATIONS TO AUTO DOOR MOTOR. COORDINATE TERMINATIONS WITH DIVISION 08.
- 3 REFERENCE SCHEDULES FOR ADDITIONAL INFORMATION.
- 4 REFERENCE DIVISION 26 FOR ALL ELECTRICAL POWER AND CONDUIT.
- 5 REFER TO DIVISION 087100 FOR DOOR HARDWARE SPECIFICATIONS. COORDINATE ELECTRIC LOCK POWER AND CABLE PATHWAY REQUIREMENTS WITH DIVISION 08 AND DIVISION 26

# DEVICE SYMBOL KEY - VIDEO SURVEILLANCE SYSTEMS

WALL / COLUMN

ノロ こ	STIMBUL KET - VIDE	O SURVEILL	ANCE SYSTEMS		
<b>≫</b> ⊲	CEILING / OVERHEAD MOUNTED CAMERA	[XX]<	ROOF MOUNTED CAMERA	-⊗<	PARAPET MOUNTED CAMERA

## SYMBOL LEGEND - VIDEO SURVEILLANCE SYSTEMS

SIZES, DIMENSIONS AND NOTES DESCRIBE TYPICAL REQUIREMENTS. IF APPLICABLE, VARIATIONS AND/OR ADDITIONAL REQUIREMENTS WILL BE NOTED ON THE DRAWINGS.  UNLESS NOTED OTHERWISE, MOUNTING HEIGHTS ARE TO CENTER OF ROUGH-IN BOX.									
TYPE	DEVICE	ROUGH-IN BOX	DEVICE COVER		MOUNTING HEIGHT		CABLE	DEVICE NOTES	CONDUIT NOTES
		(H"xW"xD")	SIZE	WALL/COLUMN	CEILING/OVERHEAD	FLOOR	(QTY) TYPE		
Р	PENDANT MOUNTED CAMERA	TYPE 12	1-GANG	REF SCHEDULE	REF SCHEDULE		(1)S		REF DETAIL .
S	SURFACE MOUNTED CAMERA	TYPE 12	1-GANG	REF SCHEDULE	REF SCHEDULE		(1)S		REF DETAIL
W	WALL MOUNTED CAMERA	TYPE 12	1-GANG	REF SCHEDULE	REF SCHEDULE		(1)S	-	REF DETAIL

## LEGEND NOTES - VIDEO SURVEILLANCE SYSTEMS

- 1 CATEGORY CABLING PROVIDED BY DIVISION 27.
- 2 REFERENCE SCHEDULES FOR ADDITIONAL INFORMATION
- /3/ COORDINATE-COMPOSITE FIBER/COPPER CABLE-LOCATION-WITH DIVISION-27./COMPOSITE-FIBER/CABLING-REQUIRED-FOR VIDEO-SURVEILLANCE-CAMERAS-LOCATED ON LIGHT-POLES-AND AT-LOCATIONS EXCEEDING 100 METERS, FROM 10F/TELECOM-ROOMS.

## SYMBOL LEGEND - STRUCTURED CABLING SYSTEMS

SIZES, DIMENSIONS AND NOTES DESCRIBE TYPICAL REQUIREMENTS. IF APPLICABLE, VARIATIONS AND/OR ADDITIONAL REQUIREMENTS WILL BE NOTED ON THE DRAWINGS. UNLESS NOTED OTHERWISE, MOUNTING HEIGHTS ARE TO CENTER OF ROUGH-IN BOX.

TYPE	DEVICE	ROUGH-IN BOX	DEVICE COVER		MOUNTING HEIGHT		CABLE	DEVICE NOTES	CONDUIT NOTES
		(H"xW"xD")	SIZE	WALL/COLUMN	CEILING/OVERHEAD	FLOOR	TYPE		
<b>(</b> #)	COMMUNICATIONS WALL OUTLET	TYPE 10	REF DETAILS	BUILDING OUTLET HEIGHT			(#)N		
(#)	COMMUNICATIONS FLOOR OUTLET	SEE NOTE 2				COORDINATE WITH ELECTRICAL REQUIREMENTS	(#)N	REF ARCHITECTURAL FOR EXACT LOCATION	
<b>◄</b> (#) ANC	ANNOUNCER PLATE								
<b>∢</b> (#) AP	COMMUNICATIONS WALL OUTLET, WIRELESS ACCESS POINT	TYPE 10	REF DETAILS	10'-0" AFF			(#)R	ACCESS POINT DEVICE TO BE OWNER FUNISHED, CONTRACTOR INSTALLED	
<b>(</b> #) AP	COMMUNICATIONS CEILING OUTLET, WIRELESS ACCESS POINT	TYPE 10	REF DETAILS		FLUSH WITH CEILING (UNLESS IN ACCESSIBLE CEILING)		(#)R	ACCESS POINT DEVICE TO BE OWNER FUNISHED, CONTRACTOR INSTALLED	
<b>∢</b> (#) DB	DISPLAY BACKBOX DATA WALL OUTLET	TYPE *	* GANG				#A	COORDINATE ROUGH-IN BOX AND DEVICE COVER MOUNTING WITH INTEGRATED AV BOX.	
<b>∢</b> (#) ER	AV RACK								
<b>(</b> #) FB	FLOOR OUTLET	SEE NOTE 2				COORDINATE WITH AV AND ELECTRICAL REQUIREMENTS	#A	REF ARCHITECTURAL FOR EXACT LOCATION	
<b>◄</b> (#) JBL	AV PLATE								
<b>∢</b> (#) ML	MIC/LINE PLATE						-		
<b>◄</b> (#) POS	COMMUNICATIONS WALL OUTLET	TYPE 10	REF DETAILS	BUILDING OUTLET HEIGHT			(#)N		
<b>◄</b> (#) PTZ	AV CAMERA								

## LEGEND NOTES - STRUCTURED CABLING SYSTEMS

- 1 (#) REPRESENTS THE NUMBER OF CABLES FOR THAT LOCATION. IF NO NUMBER SHOWN, PROVIDE (1).
- PROVIDE NECESSARY ADAPTER, BEZELS, OR MODULES TO ACCOMODATE THE STRUCTURED CABLING SYSTEM WITH THE FLOOR OUTLET SYSTEM. REFERENCE ELECTRICAL DRAWING FOR FLOOR BOX INFORMATION.
- 3 PROVIDE NECESSARY ADAPTER, BEZELS, OR MODULES TO ACCOMODATE THE STRUCTURED CABLING SYSTEM WITH THE RACEWAY SYSTEM. REFERENCE ELECTRICAL DRAWING FOR RACEWAY INFORMATION.
- 4 PROVIDE LEGRAND RA9AM2TCxx FLOOR POKE-THRU DEVICE UNLESS OTHERWISE NOTED. FOR ABOVE GRADE APPLICATION AND LEGRAND 98114FFCTCxx COVER FOR ON GRADE APPLICATIONS. SERVE ON-GRADE INSTALLS WITH (2) 1 1/4" CONDUITS WITH PULL LINE. COORDINATE COVER FINISH WITH ARCHITECT.

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PULL BOX SIZING								
TRADE SIZE	WIDTH	LENGTH	DEPTH	WIDTH INCREASE FOR ADDITIONAL CONDUIT				
1	4"	16"	3"	2"				
1-1/4	6"	20"	3"	3"				
1-1/2	8"	27"	4"	4"				
2	8"	36"	4"	5"				
2-1/2	10"	42"	5"	6"				
3	12"	48"	5"	6"				
3-1/2	12"	54"	6"	6"				
4	15"	60"	8"	8"				

# IN128 - JAMES T **MORRIS ARENA**

Ohio St & N Blackford St Indianapolis, IN 46202

### IU Project NO. 20240127

DEVICE ID

DEVICE TYPE

CAMERA ID

- CAMERA

MOUNT TYPE

CAMERA TYPE

INDIANA UNIVERSITY BOARD OF TRUSTEE 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408 812-855-1692

#### Architect RATIO 101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204

317-633-4040 Structural Engineer FINK ROBERTS AND PETRIE, INC.

#### 3535 EAST 96TH STREET SUITE 126 INDIANAPOLIS, IN 46240

317-872-8400 Mechanical / Electrical

#### INTROBA 8250 HAVERSTICK ROAD SUITE 285 INDIANAPOLIS. IN 46240 800-404-7677

Plumbing Engineer

### 138 N. DELAWARE ST INDIANAPOLIS, IN 46204

317-633-4120 Acoustics / Technology Engineer

#### WJHW 7220 W. JEFFERSON AVE SUITE 216 LAKEWOOD, CO 80235

972-934-3700 Civil Engineer

### AMERICAN STRUCTUREPOINT, INC. 9025 RIVER ROAD

SUITE 200 INDIANAPOLIS, IN 46240 317-547-5580

### Food Service Consultant CINILITTLE

3405 NW 9TH AVENUE #1202 FORT LAUDERDALE, FL 33309 954-846-9600

### Code Consultant **FORZA**

2502 WEST MECHANIC ST, SUITE C HARRISONVILLE, MO 64701 816-806-3729

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	Construction Documents	01/13/2
1	Addendum 01	01/27/2

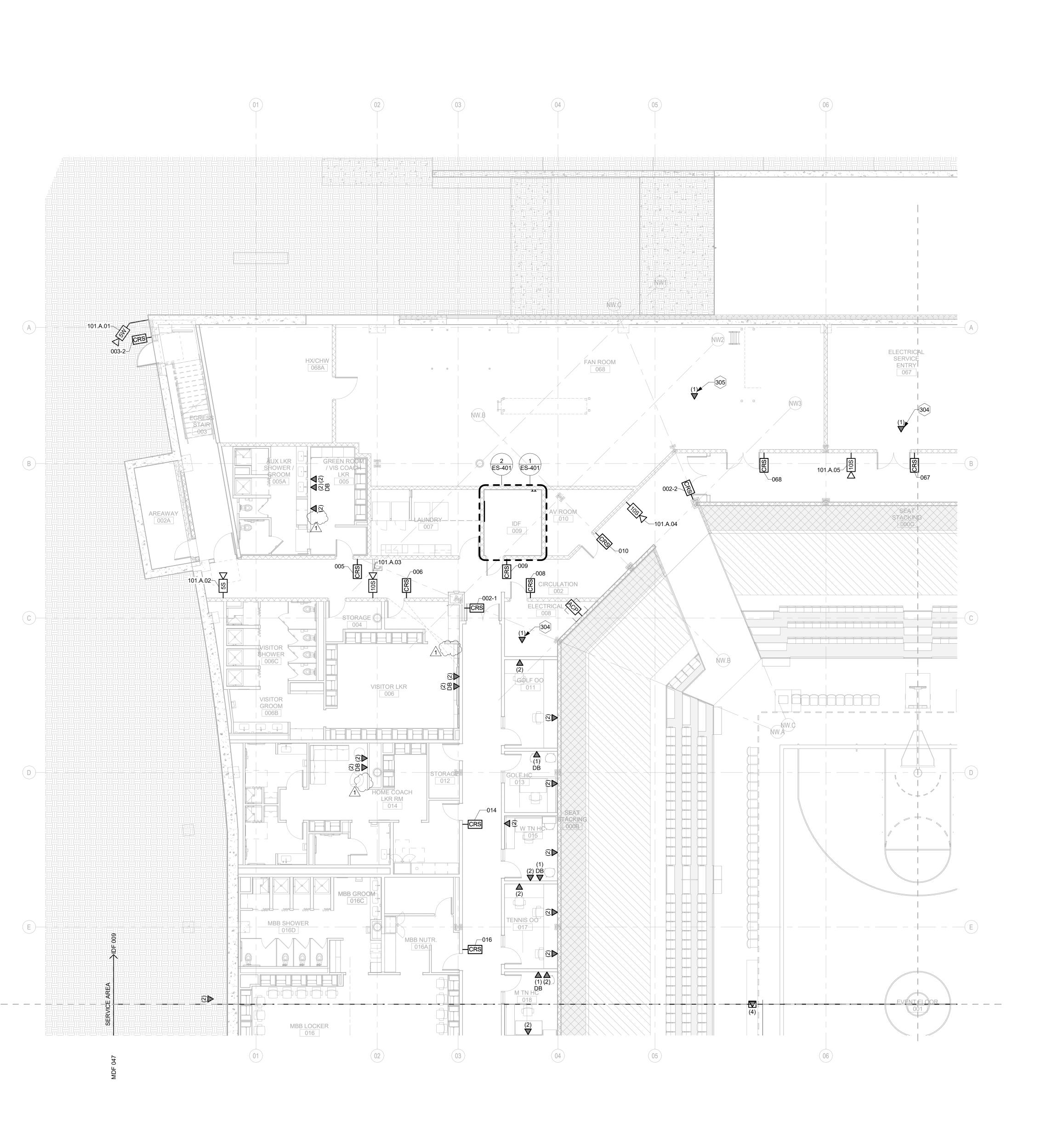


PROJECT NO. GENERAL NOTES

ARE HEREBY SPECIFICALLY RESERVED.

AND LEGENDS

**ES-000** 



KEYNOTES

304 COORDINATE LOCATION WITH ELECTRICAL PANEL. PROVIDE A CONTINUOUS CONDUIT PATHWAY WITHIN THIS SPACE. 305 COORDINATE LOCATION WITH BUILDING AUTOMATION PANEL PROVIDE A CONTINUOUS CONDUIT PATHWAY WITHIN THIS

# IN128 - JAMES T. MORRIS ARENA

Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEE 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408

812-855-1692 Architect

RATIO 101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204

317-633-4040 Structural Engineer

FINK ROBERTS AND PETRIE, INC.

3535 EAST 96TH STREET SUITE 126 INDIANAPOLIS, IN 46240

317-872-8400 Mechanical / Electrical

INTROBA 8250 HAVERSTICK ROAD SUITE 285 INDIANAPOLIS, IN 46240

800-404-7677

Plumbing Engineer

138 N. DELAWARE ST INDIANAPOLIS, IN 46204 317-633-4120

Acoustics / Technology Engineer WJHW

7220 W. JEFFERSON AVE SUITE 216 LAKEWOOD, CO 80235 972-934-3700

Civil Engineer AMERICAN STRUCTUREPOINT, INC.

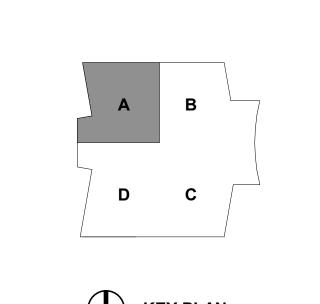
9025 RIVER ROAD SUITE 200 INDIANAPOLIS, IN 46240

317-547-5580 Food Service Consultant

CINILITTLE 3405 NW 9TH AVENUE #1202 FORT LAUDERDALE, FL 33309 954-846-9600

Code Consultant FORZA

2502 WEST MECHANIC ST, SUITE C HARRISONVILLE, MO 64701 816-806-3729



KEY PLAN

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PROJECT NO. **EVENT FLOOR PLAN** - AREA A

ES-101A

304 COORDINATE LOCATION WITH ELECTRICAL PANEL. PROVIDE A CONTINUOUS CONDUIT PATHWAY WITHIN THIS SPACE. MBB LOCKER (2)DB W SOC HO STORAGE WBB SHOWER 022A SOCCERTO WVB SHOWER RECOVERY ROOM 028 WVB GROOM NUTRITION STAFF BREAK /<del>-</del>101.D.01 CIRCULATION CIRCULATION (2)(2) DB (2)(2) DB VIDEO ROOM TRAINING SOFTBALL 00 036 PTZ LTRAINING RR ELEVATOR 033 MACHINE ROOM STORAGE WATER SERVICE ENTRY 032A 032-3− **EVENT LEVEL FLOOR PLAN - AREA D** 

IN128 - JAMES T. MORRIS ARENA

KEYNOTES

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Indianapolis, IN 46202

IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEE 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408

812-855-1692 Architect RATIO

101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204 317-633-4040

Structural Engineer FINK ROBERTS AND PETRIE, INC.

3535 EAST 96TH STREET SUITE 126 INDIANAPOLIS, IN 46240

317-872-8400

INTROBA 8250 HAVERSTICK ROAD SUITE 285 INDIANAPOLIS, IN 46240

Mechanical / Electrical

800-404-7677 Plumbing Engineer

138 N. DELAWARE ST INDIANAPOLIS, IN 46204 317-633-4120

Acoustics / Technology Engineer WJHW

7220 W. JEFFERSON AVE SUITE 216 LAKEWOOD, CO 80235 972-934-3700

Civil Engineer AMERICAN STRUCTUREPOINT, INC.

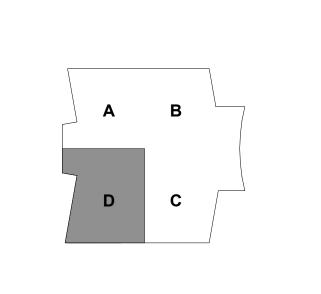
9025 RIVER ROAD SUITE 200 INDIANAPOLIS, IN 46240

317-547-5580 Food Service Consultant

CINILITTLE 3405 NW 9TH AVENUE #1202 FORT LAUDERDALE, FL 33309 954-846-9600

Code Consultant

FORZA 2502 WEST MECHANIC ST, SUITE C HARRISONVILLE, MO 64701 816-806-3729



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- AREA D

ES-101D

1/8" = 1'-0"

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IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEE 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408

812-855-1692 Architect

101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204

Structural Engineer FINK ROBERTS AND PETRIE, INC.

3535 EAST 96TH STREET SUITE 126 INDIANAPOLIS, IN 46240 317-872-8400

Mechanical / Electrical INTROBA 8250 HAVERSTICK ROAD

SUITE 285 INDIANAPOLIS, IN 46240 800-404-7677

Plumbing Engineer

138 N. DELAWARE ST INDIANAPOLIS, IN 46204 317-633-4120

Acoustics / Technology Engineer

7220 W. JEFFERSON AVE SUITE 216 LAKEWOOD, CO 80235 972-934-3700

AMERICAN STRUCTUREPOINT, INC.

9025 RIVER ROAD SUITE 200

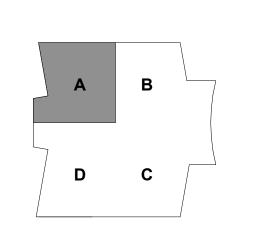
INDIANAPOLIS, IN 46240 317-547-5580

Food Service Consultant CINILITTLE

3405 NW 9TH AVENUE #1202 FORT LAUDERDALE, FL 33309 954-846-9600

**Code Consultant** 

2502 WEST MECHANIC ST, SUITE C HARRISONVILLE, MO 64701



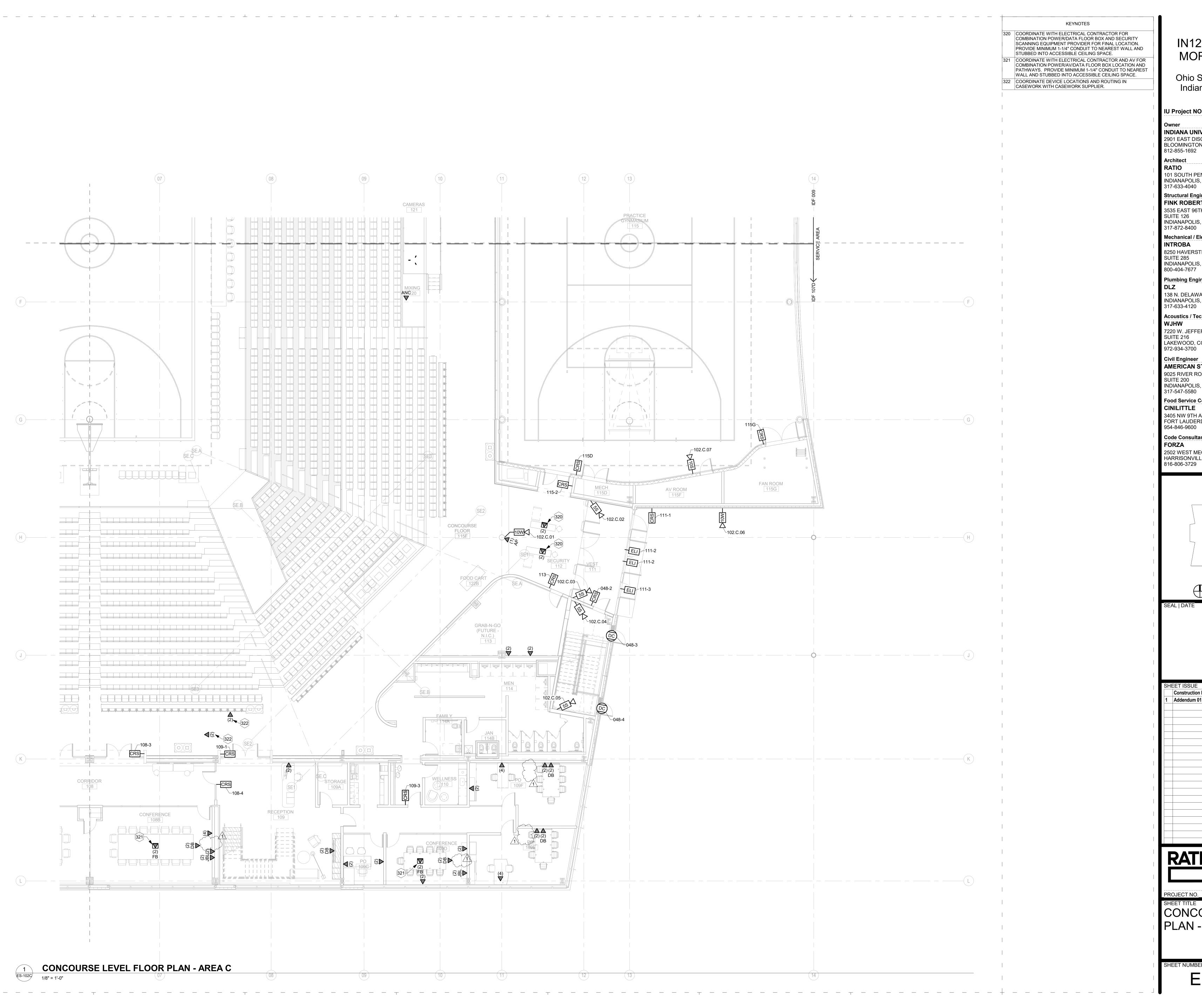
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CONCOURSE FLOOR PLAN - AREA A

ES-102A



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INDIANA UNIVERSITY BOARD OF TRUSTEE 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408

812-855-1692 Architect RATIO

101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204 317-633-4040

Structural Engineer

FINK ROBERTS AND PETRIE, INC. 3535 EAST 96TH STREET

SUITE 126

INDIANAPOLIS, IN 46240 317-872-8400

Mechanical / Electrical INTROBA 8250 HAVERSTICK ROAD

SUITE 285 INDIANAPOLIS, IN 46240 800-404-7677

Plumbing Engineer DLZ 138 N. DELAWARE ST

INDIANAPOLIS, IN 46204 317-633-4120

Acoustics / Technology Engineer WJHW

7220 W. JEFFERSON AVE SUITE 216 LAKEWOOD, CO 80235 972-934-3700

AMERICAN STRUCTUREPOINT, INC. 9025 RIVER ROAD

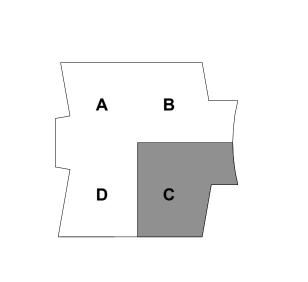
SUITE 200 INDIANAPOLIS, IN 46240 317-547-5580

Food Service Consultant CINILITTLE

3405 NW 9TH AVENUE #1202 FORT LAUDERDALE, FL 33309 954-846-9600

**Code Consultant** FORZA

2502 WEST MECHANIC ST, SUITE C HARRISONVILLE, MO 64701 816-806-3729



KEY PLAN

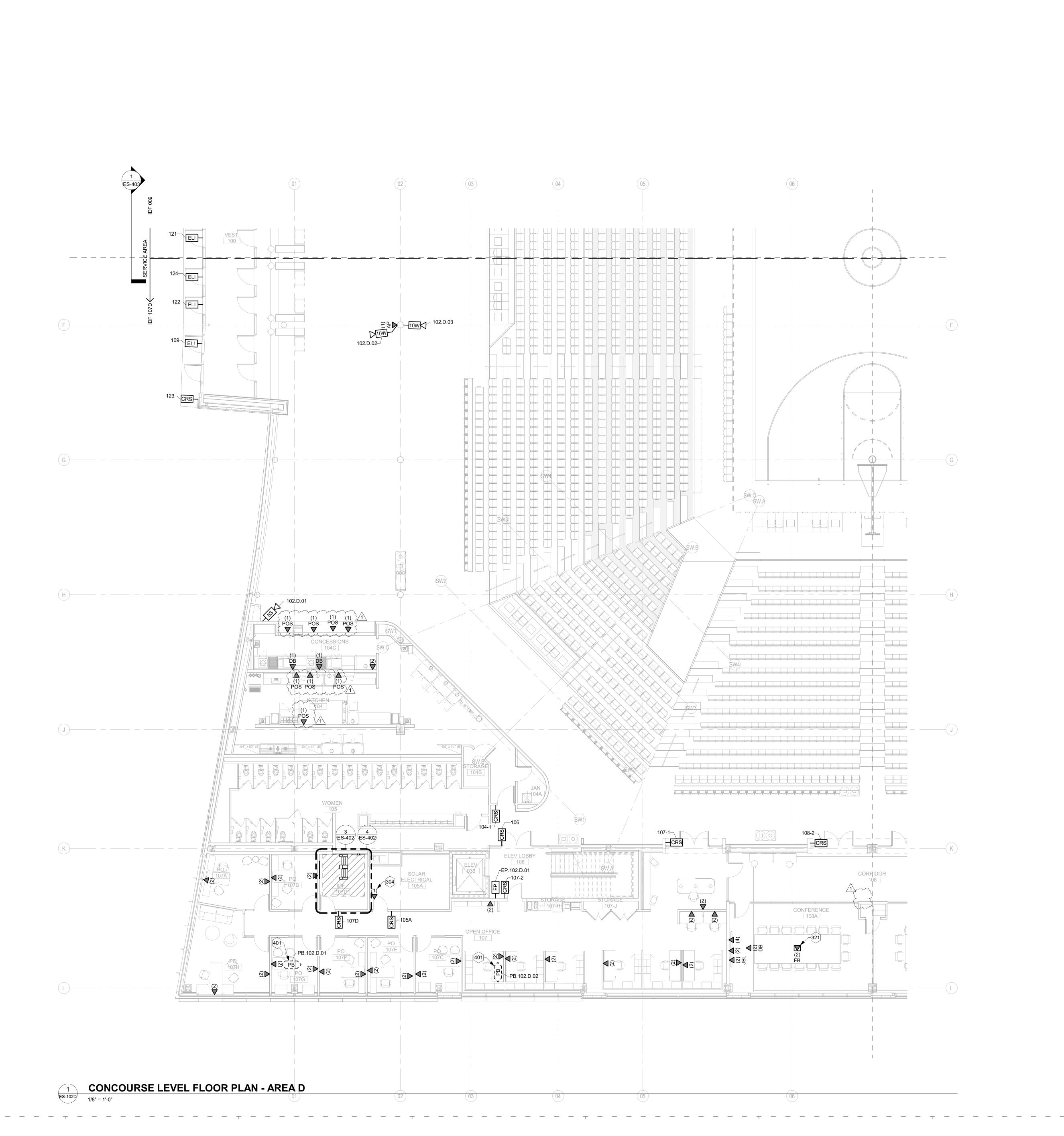
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CONCOURSE FLOOR PLAN - AREA C

ES-102C



KEYNOTES

304 COORDINATE LOCATION WITH ELECTRICAL PANEL. PROVIDE A CONTINUOUS CONDUIT PATHWAY WITHIN THIS SPACE. 321 COORDINATE WITH ELECTRICAL CONTRACTOR AND AV FOR COMBINATION POWER/AV/DATA FLOOR BOX LOCATION AND PATHWAYS. PROVIDE MINIMUM 1-1/4" CONDUIT TO NEAREST WALL AND STUBBED INTO ACCESSIBLE CEILING SPACE. 401 PROVIDE INTERFACE TO ACCESS CONTROL SYSTEM FOR EMERGENCY LOCKDOWN OF ALL ACCESS CONTROLLED OPENINGS UPON ACTIVIATION OF THE PANIC BUTTON.

# IN128 - JAMES T. MORRIS ARENA

Ohio St & N Blackford St Indianapolis, IN 46202

IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEE 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408

812-855-1692 Architect

RATIO 101 SOUTH PENNSYLVANIA STREET

INDIANAPOLIS, IN 46204 317-633-4040

Structural Engineer FINK ROBERTS AND PETRIE, INC.

3535 EAST 96TH STREET

SUITE 126 INDIANAPOLIS, IN 46240

317-872-8400

INTROBA 8250 HAVERSTICK ROAD

Mechanical / Electrical

SUITE 285 INDIANAPOLIS, IN 46240 800-404-7677

Plumbing Engineer

138 N. DELAWARE ST INDIANAPOLIS, IN 46204 317-633-4120

Acoustics / Technology Engineer WJHW

7220 W. JEFFERSON AVE SUITE 216 LAKEWOOD, CO 80235 972-934-3700

Civil Engineer AMERICAN STRUCTUREPOINT, INC.

9025 RIVER ROAD SUITE 200 INDIANAPOLIS, IN 46240

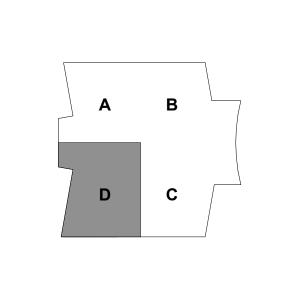
317-547-5580

Food Service Consultant CINILITTLE

3405 NW 9TH AVENUE #1202 FORT LAUDERDALE, FL 33309 954-846-9600

**Code Consultant** FORZA

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CONCOURSE FLOOR PLAN - AREA D

ES-102D

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IU Project NO. 20240127

INDIANA UNIVERSITY BOARD OF TRUSTEE 2901 EAST DISCOVERY PARKWAY BLOOMINGTON, IN 47408 812-855-1692

Architect RATIO

101 SOUTH PENNSYLVANIA STREET INDIANAPOLIS, IN 46204 317-633-4040 Structural Engineer

FINK ROBERTS AND PETRIE, INC.

3535 EAST 96TH STREET SUITE 126 INDIANAPOLIS, IN 46240 317-872-8400

Mechanical / Electrical INTROBA

8250 HAVERSTICK ROAD SUITE 285 INDIANAPOLIS, IN 46240 800-404-7677

Plumbing Engineer

138 N. DELAWARE ST INDIANAPOLIS, IN 46204 317-633-4120

Acoustics / Technology Engineer WJHW

7220 W. JEFFERSON AVE SUITE 216 LAKEWOOD, CO 80235 972-934-3700

Civil Engineer AMERICAN STRUCTUREPOINT, INC.

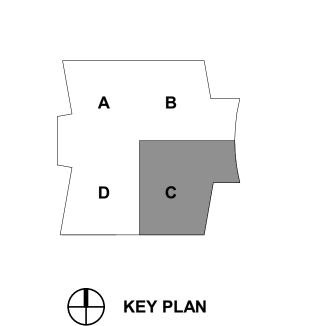
9025 RIVER ROAD SUITE 200 INDIANAPOLIS, IN 46240 317-547-5580

Food Service Consultant CINILITTLE

3405 NW 9TH AVENUE #1202 FORT LAUDERDALE, FL 33309 954-846-9600

Code Consultant

FORZA
2502 WEST MECHANIC ST, SUITE C
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CONCOURSE REFLECTED CEILING PLAN - AREA C

ES-132C

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CONCOURSE REFLECTED CEILING PLAN - AREA D

ES-132D

