

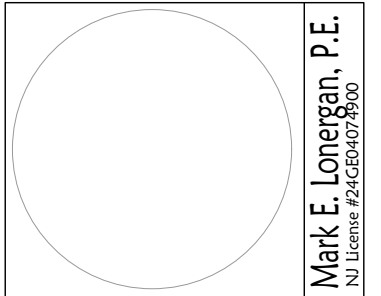
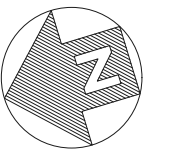
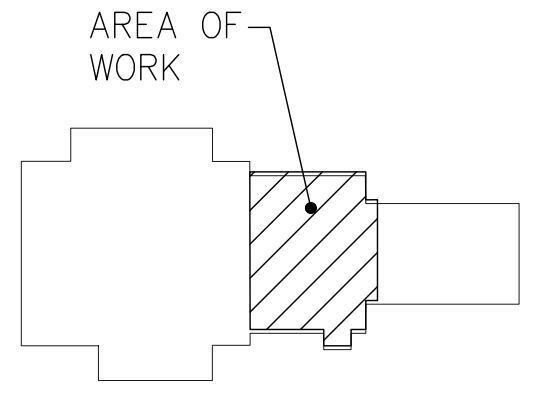
MONTCLAIR STATE UNIVERSITY

I NORMAL AVE
MONTCLAIR, NJ 07043

HEATING & VENTILATING UNIT #3 REPLACEMENT PANZER GYMNASIUM MSU PROJECT No. 23 CO 45

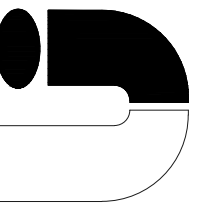
LIST OF DRAWINGS

Dwg. #	Drawing Title
T.01	PROJECT COVER SHEET
M0.1	MECHANICAL – NOTES, SYMBOLS & ABBREVIATIONS
M0.2	MECHANICAL – SPECIFICATIONS
M1.0	MECHANICAL – PARTIAL FIRST FLOOR PLAN – DEMOLITION
M2.0	MECHANICAL – PARTIAL FIRST FLOOR PLAN – NEW WORK
M2.1	MECHANICAL – NATATORIUM AIR BALANCING PLAN – NEW WORK
M3.0	MECHANICAL – SCHEDULES
M4.0	MECHANICAL – DETAILS
M5.0	MECHANICAL – CONTROL DIAGRAMS AND SEQUENCE OF OPERATIONS
E0.1	ELECTRICAL – SYMBOLS, NOTES, ABBREVIATIONS & DETAILS
E0.2	ELECTRICAL – SPECIFICATIONS
E1.1	ELECTRICAL – FIRST FLOOR PLAN



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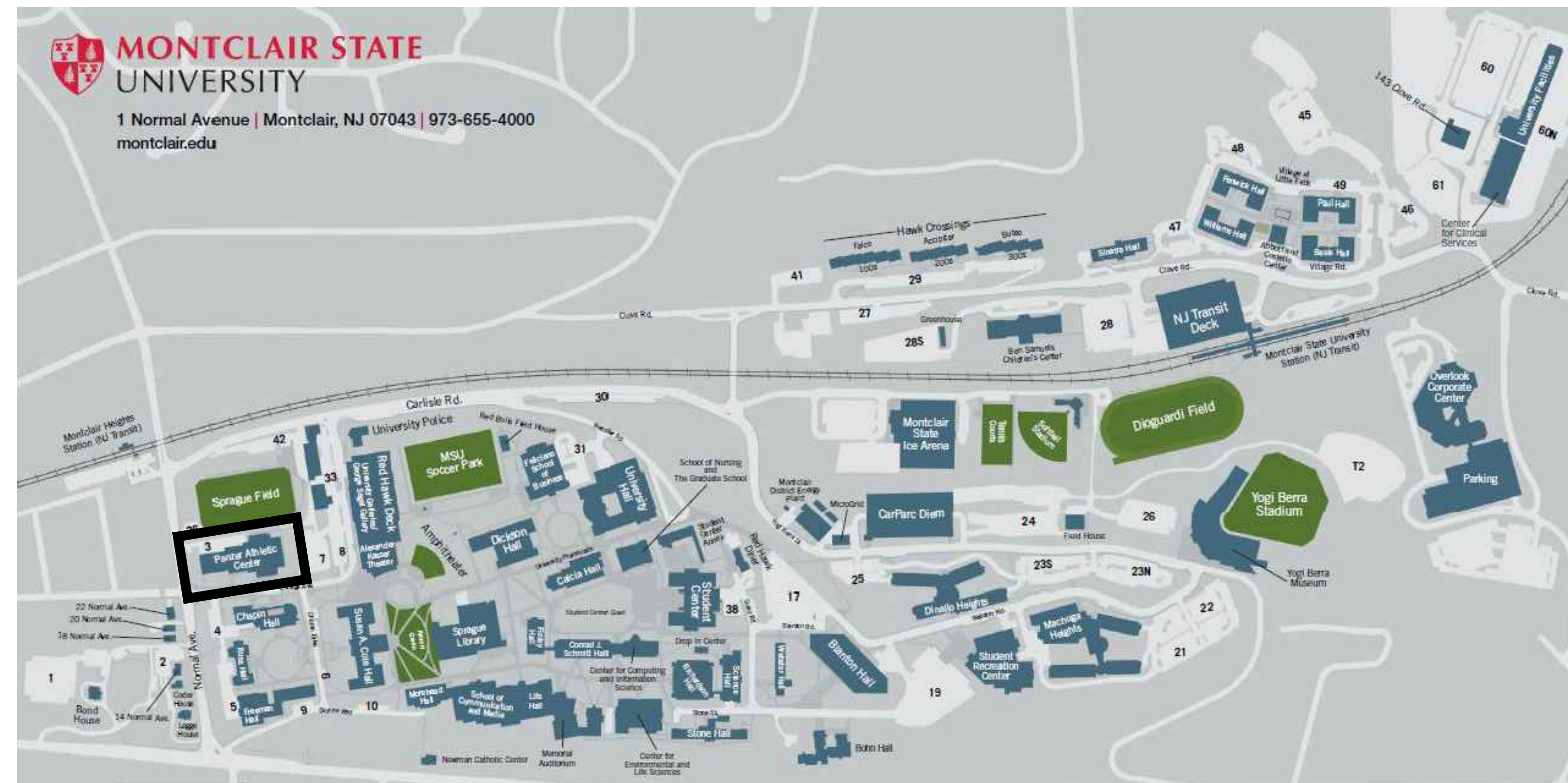


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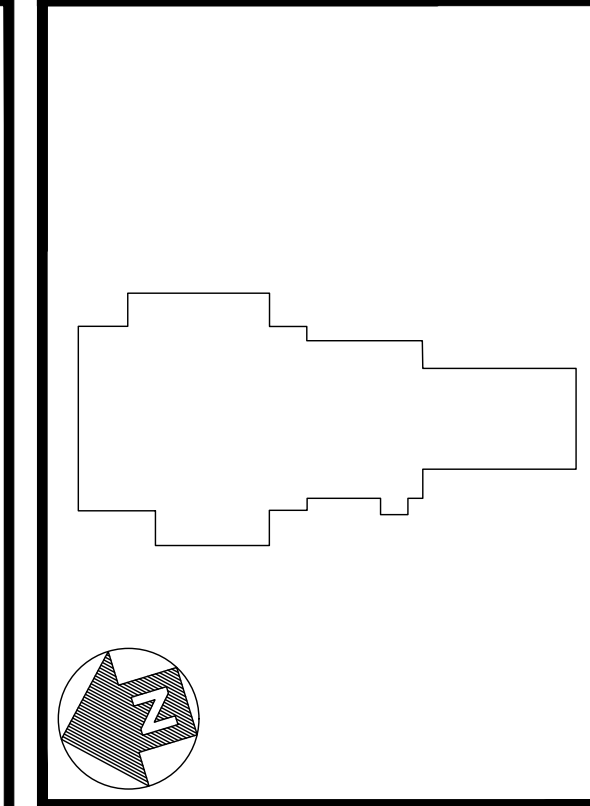
PANZER GYMNASIUM

1 NORMAL AVE.
MONTCLAIR, NJ 07424



NO.	DATE	DESCRIPTION
REVISIONS		
TITLE: PROJECT COVER SHEET		
ISSUANCE:	FOR BID	
DATE:	02/01/2024	
SCALE:	AS INDICATED	
DRAWN BY:	MML	
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MECHANICAL SYMBOLS		MECHANICAL ABBREVIATIONS		MECHANICAL DEMOLITION NOTES		PROJECT GENERAL NOTES	
SYMBOL	DESCRIPTION	IDENTIFIER	DESCRIPTION				
	HEATING HOT WATER SUPPLY	AFF	ABOVE FINISHED FLOOR	1. SCOPE OF WORK			
	HEATING HOT WATER RETURN	BMS	BUILDING MANAGEMENT SYSTEM	A. CONTRACTOR SHALL SUPPLY ALL LABOR, MATERIALS, EQUIPMENT, AND SERVICES NECESSARY TO COMPLETE ALL REMOVALS AND RENOVATION WORK AS SHOWN ON THE CONTRACT DRAWINGS AND CALLED FOR IN THE SPECIFICATIONS. THE WORK SHALL INCLUDE BUT IS NOT LIMITED TO THE FOLLOWING:			
	PRESSURE GAUGE W/ SHUT-OFF	CFM	CUBIC FEET PER MINUTE	B. DISCONNECT, DEMOLISH, AND REMOVE ALL EXISTING DUCTWORK, PIPING, INSULATION, EQUIPMENT, AND OTHER ASSOCIATED ITEMS.			
	THERMOMETER W/ SHUT-OFF	DB	DRY BULB	C. CAPPING ALL EXISTING PIPING NOT BEING REUSED (AT THE MAINS), WHERE REMOVAL OF PIPING LEAVES OPEN CONNECTIONS, PROVIDE SCREWED CAPS OR PLUGS OR WELDED CAPS TO CLOSE SUCH CONNECTIONS.			
	Y-TYPE STRAINER W/ BLOWDOWN & HOSE BIBB	DN	DOWN	D. CAPPING ALL EXISTING DUCTWORK NOT BEING REUSED (AT THE MAINS).			
	UNION	(E)	EXISTING	E. INSULATE DUCT CAPS AND PIPE CAPS TO MATCH THE EXISTING INSULATION.			
	MANUAL AIR VENT	EAT	ENTERING AIR TEMPERATURE	F. CAPPING ALL OPENINGS CREATED BY THE REMOVAL OF ROOFTOP HVAC EQUIPMENT, PROVIDE INSULATED CURB CAPS FOR ALL REMOVED ROOF FANS, ROOFTOP UNITS, ETC. INSULATED CURB CAPS SHALL BE BRACED FROM BELOW AND SHALL BE CAPABLE OF WITHSTANDING LIVE LOAD. PROVIDE NECESSARY FLASHING AND COORDINATE WITH ROOFING CONTRACTOR AND/OR EXISTING ROOF GUARANTEE.			
	AUTOMATIC AIR VENT	EDB	ENTERING DRY BULB	G. PROVIDE ADDITIONAL HANGERS AND OTHER SUPPORTS AS REQUIRED BY THE REMOVAL OF EXISTING PIPING AND/OR DUCTWORK. ALL REMAINING PIPING AND/OR DUCTWORK SHALL BE SUPPORTED IN ACCORDANCE WITH THE SPECIFICATIONS.			
	PIPE TURNING UP	ESP	EXTERNAL STATIC PRESSURE	H. REMOVAL OF HVAC EQUIPMENT'S ASSOCIATED CONCRETE PADS.			
	PIPE TURNING DOWN	EWB	ENTERING WET BULB	2. VERIFICATION OF FIELD CONDITIONS			
	DIRECTION OF FLOW	HWS/R	HOT WATER SUPPLY & RETURN	A. LOCATION, SIZE, AND DIMENSIONS OF EXISTING EQUIPMENT, PIPING, DUCTWORK, AND ACCESSORIES SHOWN ARE APPROXIMATE. NOT ALL EXISTING PIPING, DUCTWORK AND EQUIPMENT ARE SHOWN ON DRAWINGS.			
	BALL VALVE	LAT	LEAVING AIR TEMPERATURE	B. CONTRACTOR SHALL VERIFY EXACT LOCATIONS AND DIMENSIONS OF EXISTING EQUIPMENT, PIPING, DUCTWORK AND ACCESSORIES IN FIELD PRIOR TO PREPARATION OF DETAILED SHOP DRAWINGS AND ANY REMOVALS AND RELOCATIONS.			
	SWING TYPE CHECK VALVE	MBH	THOUSAND BTU PER HOUR	3. SEQUENCING & SCHEDULING			
	GATE VALVE	N.C.	NORMALLY CLOSED	A. EXISTING MECHANICAL SYSTEMS NOT RELATED TO NEW CONSTRUCTION SHALL REMAIN IN SERVICE UNLESS OTHERWISE NOTED.			
	GLOBE VALVE	NK	NECK	B. CONTRACTOR SHALL COORDINATE ALL REQUIRED REMOVAL AND RELOCATIONS OF MECHANICAL SYSTEMS IN THE EXISTING BUILDING, RELATED TO NEW CONSTRUCTION, AS SHOWN ON CONTRACT DRAWINGS.			
	BUTTERFLY VALVE	N.O.	NORMALLY OPEN	C. PROVIDE RELOCATIONS, REMOVALS AND RE-ROUTING OF ANY EXISTING EQUIPMENT THAT INTERFERES WITH INSTALLATION OF THE NEW EQUIPMENT. COORDINATE IN ADVANCE AND OBTAIN OWNERS APPROVAL FOR THESE RELOCATIONS, EITHER TEMPORARY OR PERMANENT.			
	CALIBRATED BALANCING VALVE	OAI	OUTSIDE AIR INTAKE	D. CONTRACTOR TO REMOVE EXISTING PARTITIONS, CEILING TILES AND SUPPORTS AS NECESSARY TO PERFORM REMOVALS AND NEW INSTALLATION IN EXISTING AREAS. REINSTALL EXISTING AND REPLACE THOSE DAMAGED DUE TO THE NEW WORK.			
	TRIPLE-DUTY VALVE	T	THERMOSTAT	4. COORDINATION WITH OWNER			
	FLEXIBLE CONNECTION	TYP	TYPICAL	A. THE CONTRACTOR SHALL CAREFULLY INSPECT ALL AREAS INVOLVED WITH REMOVALS AND PROVIDE THE PROPER COORDINATION AND MANPOWER REQUIRED FOR AN EFFICIENT OPERATION WITHOUT INTERFERING WITH THE BUILDING FUNCTION.			
	EXISTING DUCTWORK TO REMAIN	VD	VOLUME DAMPER	F. EQUIPMENT AND MATERIALS DESIRED BY THE OWNER SHALL BE DELIVERED BY THE CONTRACTOR TO AN ON-SITE STORAGE LOCATION DESIGNATED BY THE OWNER.			
	ELBOW WITH DOUBLE THICKNESS TURNING VANES	WB	WET BULB	G. REMOVED EQUIPMENT AND MATERIALS NOT DESIRED BY THE OWNER SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE PROMPTLY REMOVED FROM THE SITE.			
	BELLMOUTH TAKE-OFF W/ VOLUME DAMPER	W.C.	WATER COLUMN	5. DISPOSAL OF MATERIALS REMOVED			
	45° BOOT TAKE-OFF W/ VOLUME DAMPER	WG	WATER GAUGE	A. CONTRACTOR IS RESPONSIBLE FOR REMOVAL OF ALL DEBRIS RESULTING FROM DEMOLITION WORK AND CONSTRUCTION FOR THIS PROJECT. THIS WILL INCLUDE, BUT NOT BE LIMITED TO PROVISIONS FOR PORTABLE CONTAINERS (DUMPSTERS) AND ALL CARTAGE AND DUMPING FEES.			
	REDUCER (ECCENTRIC)			B. THE CONTRACTOR SHALL AT ALL TIMES MAINTAIN ALL AREAS IN AND ABOUT THE WORK IN A NEAT AND SAFE CONDITION. TRASH AND OTHER WASTE RESULTING FROM THE WORK SHALL BE REMOVED FROM THE SITE BY THE CONTRACTOR. USE OF THE OWNER'S TRASH RECEPTACLES IS FORBIDDEN FOR DISPOSAL OF ANY REMOVALS, RUBBISH, OR WASTE RESULTING FROM WORK UNDER THIS CONTRACT.			
	INLINE PUMP			C. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SAFE DISPOSAL AT HIS COST IN ACCORDANCE WITH ANY APPLICABLE STATE OR FEDERAL REGULATION.			
	KEY NOTES APPLYING TO DEMOLITION WORK			D. REMOVAL AND DISPOSAL OF REFRIGERANT SHALL BE IN ACCORDANCE WITH NJDEP REGULATIONS. THE CONTRACTOR SHALL COMPLY WITH SECTION 608 OF THE CLEAN AIR ACT, WHICH IS AN EPA REGULATION TO LIMIT THE RELEASES OF ENVIRONMENTALLY HARMFUL REFRIGERANTS INTO THE ENVIRONMENT DURING THE MAINTENANCE, SERVICE, REPAIR OR DISPOSAL OF AIR CONDITIONING AND REFRIGERATION EQUIPMENT TO THE "LOWEST ACHIEVABLE LEVEL".			
	KEY NOTES APPLYING TO NEW WORK			6. DAMAGES			
	PLAN NORTH			A. CONTRACTOR SHALL EXERCISE SPECIAL CARE NOT TO DAMAGE ANY OF THE OWNERS' FACILITIES OR EQUIPMENT WHILE PERFORMING CONSTRUCTION WORK. CONTRACTOR WILL BE HELD RESPONSIBLE FOR ANY DAMAGE THAT OCCURS.			
	CONTROL VALVE (3-PORT)			B. ANY EXISTING OR NEW CONSTRUCTION THAT IS DAMAGED DURING THE COURSE OF THE MECHANICAL WORK SHALL BE RESTORED TO ITS ORIGINAL CONDITION BY THE MECHANICAL CONTRACTOR.			
	PIPE TO BE DEMOLISHED			C. CONTRACTOR SHALL PROVIDE AND INSTALL NEW INSULATION FOR ALL EXISTING DUCT AND PIPE INSULATION THAT IS DAMAGED DUE TO THE IMPLEMENTATION OF THIS CONTRACT.			
	DUCT UNDER POSITIVE PRESSURE			7. CUTTING & PATCHING			
	DUCT UNDER NEGATIVE PRESSURE			A. CONTRACTOR SHALL PERFORM ALL CUTTING AND PATCHING AS REQUIRED UNDER THIS CONTRACT, INCLUDING WORK DUE TO EQUIPMENT, PIPING, AND DUCTWORK REMOVALS TO MATCH ADJACENT CONSTRUCTION.			
	SUPPLY REGISTER			B. PATCH AND SEAL OPENINGS WITH APPROVED MATERIALS TO MAINTAIN EXISTING FIRE AND/OR SMOKE RESISTANCE RATINGS OF THE EXISTING STRUCTURE.			
	RETURN OR EXHAUST REGISTER			C. SEAL ROOF AND EXTERIOR WALL OPENINGS WEATHER AND AIR TIGHT.			
	VOLUME DAMPER			D. PATCH ALL WALL, ROOF AND FLOOR OPENINGS AS NECESSARY DUE TO PIPING, DUCTWORK, OR EQUIPMENT REMOVALS TO MATCH EXISTING ADJACENT CONSTRUCTION.			
	THERMOSTAT			8. RESTORING SURFACE FINISHES			
	CONNECT TO EXISTING			A. WHERE CONCRETE PADS ARE REMOVED OR ATTACHMENTS TO FLOORS, WALLS, AND CEILINGS ARE REMOVED, THE FLOORS, WALLS, AND CEILINGS SHALL BE PATCHED AND FINISHED AS NECESSARY TO PROVIDE A SMOOTH FINISHED SURFACE, INCLUDING PAINT, TO MATCH THE ADJACENT FINISHES OF THE SURROUNDING AREA.			
	AIR DEVICE TYPE			9. CONTROLS			
	AIR QUANTITY			A. REMOVE CONTROLS, WHICH DO NOT REMAIN AS PART OF THE BUILDING AUTOMATION SYSTEM, ALL ASSOCIATED ABANDONED WIRING AND CONDUIT, AND ALL ASSOCIATED PNEUMATIC TUBING. THE OWNER WILL INFORM THE CONTRACTOR OF ANY EQUIPMENT, WHICH IS TO BE REMOVED, THAT WILL REMAIN THE PROPERTY OF THE OWNER. ALL OTHER EQUIPMENT, WHICH IS REMOVED, WILL BE DISPOSED OF BY THE CONTRACTOR.			
	DUCTWORK W/INTERNAL LINING (SINGLE LINE)						
	DUCTWORK W/INTERNAL LINING (DOUBLE LINE)						
	DUCTWORK TO BE DEMOLISHED						
	SECTION TAG						
	DETAIL #						
	DRAWING # TO LOCATE SECTION						
	DUCT SMOKE DETECTOR						



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REVISIONS

TITLE:
MECHANICAL – NOTES, SYMBOLS & ABBREVIATIONS

ISSUANCE: FOR BID

DATE: 02/01/2024

SCALE: AS INDICATED

DRAWN BY: MML

CHECKED BY: ML

SHEET:

MO.1

MECHANICAL GENERAL NOTES

HVAC DESIGN CRITERIA

- 1. APPLICABLE CODES AND REFERENCES:
A. INTERNATIONAL BUILDING CODE, 2021 - LATEST ADOPTED NEW JERSEY EDITION.
B. INTERNATIONAL MECHANICAL CODE, 2021 - LATEST ADOPTED NEW JERSEY EDITION.
C. INTERNATIONAL FUEL GAS CODE, 2021 - LATEST ADOPTED NEW JERSEY EDITION.
D. ASHRAE 90.1, 2019 - LATEST ADOPTED NEW JERSEY EDITION.
E. NATIONAL STANDARD PLUMBING CODE, 2021.
F. NFPA No. 90A - AIR CONDITIONING AND VENTILATING SYSTEMS.
G. ASHRAE HANDBOOKS - AMERICAN SOCIETY OF HEATING, REFRIGERATION, AND AIR CONDITIONING ENGINEERS.
H. UNIFORM CONSTRUCTION CODE OF NEW JERSEY.
2. SUMMER OUTDOOR DESIGN CONDITIONS (1.0% FOR NEWARK, NJ PER ASHRAE 90.1 - 2019):
A. DRY BULB: 91 DEG. F.
B. WET BULB: 74 DEG. F.
3. SUMMER INDOOR DESIGN CONDITIONS:
A. DRY BULB: 75 DEG. F. (+/- 2 DEG. F.)
B. RELATIVE HUMIDITY: 50%
4. WINTER OUTDOOR DESIGN CONDITIONS (1.0% FOR NEWARK, NJ PER ASHRAE 90.1 - 2019):
A. DRY BULB: 11 DEG. F.
5. WINTER INDOOR DESIGN CONDITIONS:
A. DRY BULB: 70 DEG. F. (+/- 2 DEG. F.)
B. RELATIVE HUMIDITY: NO MINIMUM HUMIDITY CONTROL PROVIDED
6. VENTILATION:
A. OUTSIDE AIR VENTILATION DESIGN AIR QUANTITIES WILL BE AS REQUIRED BY THE INTERNATIONAL MECHANICAL CODE, 2021 - LATEST ADOPTED NEW JERSEY EDITION.
7. FILTRATION:
A. MINIMUM MERV 8 FILTER MEDIA.

BASIC MECHANICAL MATERIALS & METHODS

- 1. THE CONTRACTOR SHALL FURNISH ALL EQUIPMENT AND MATERIALS AS INDICATED ON THE CONTRACT DRAWINGS AND THESE SPECIFICATIONS.
2. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE LATEST ADOPTED EDITIONS OF THE UNIFORM CONSTRUCTION CODE OF NEW JERSEY, IBC, NFPA, ASHRAE, AND ALL OTHER APPLICABLE CODES.
3. ALL NEW EQUIPMENT AND MATERIAL SHALL BE FREE OF DEFECTS AND SHALL PERFORM AS INTENDED. THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS OF ALL MAJOR MANUFACTURED ITEMS REQUIRED ON THIS PROJECT. SHEET METAL SHOP DRAWINGS SHALL BE SUBMITTED MINIMUM 3/4" SCALE. SHOP DRAWINGS SHALL ILLUSTRATE COORDINATION OF ALL TRADES INVOLVED IN THE PROJECT. SHOP DRAWINGS SHALL BE COMPLETE IN ALL RESPECTS, INCORPORATING AND IDENTIFYING ALL INFORMATION REQUIRED FOR THE EVALUATION OF THE PROPOSED MECHANICAL EQUIPMENT AND SYSTEM'S COMPLIANCE WITH THE CONTRACT DOCUMENTS. PARTIAL, INCOMPLETE OR ILLEGIBLE SUBMISSIONS WILL BE RETURNED TO THE CONTRACTOR WITHOUT REVIEW FOR RESUBMITTAL.
4. THE CONTRACTOR SHALL VISIT THE SITE AND INSPECT THE EXISTING INSTALLATION PRIOR TO SUBMITTING A PROPOSAL FOR WORK. HE SHALL INVESTIGATE ALL CONDITIONS AND DIMENSIONS AND INCLUDE IN HIS PRICE THE COST FOR OVERCOMING ALL DIFFICULTIES DUE TO FIELD CONDITIONS. NO PART OF THE WORK SHALL BEGIN BEFORE EXISTING CONDITIONS ARE CAREFULLY CHECKED AND ALL DISCREPANCIES ARE REPORTED TO THE ARCHITECT OR ENGINEER.
5. THE CONTRACTOR SHALL PAY ALL FEES AND OBTAIN ALL PERMITS REQUIRED FOR CONSTRUCTION AND SHALL ARRANGE ALL REQUIRED INSPECTIONS.
6. ALL WORK SHALL BE DONE DURING NORMAL WORKING HOURS UNLESS OTHERWISE REQUESTED BY OWNER.
7. THE DRAWINGS DO NOT INDICATE ALL EQUIPMENT, PIPING, DUCTWORK AND CONDUIT LOCATED WITHIN THE SPACE OR ABOVE THE CEILING. THE CONTRACTOR SHALL COORDINATE HIS WORK WITH ALL OTHER TRADES PRIOR TO FABRICATION OF PIPING AND DUCTWORK AND INSTALLATION OF EQUIPMENT. THE CONTRACTOR SHALL, AT NO ADDITIONAL EXPENSE TO THE OWNER, MAKE ANY REQUIRED CHANGES AS A RESULT OF A FAILURE TO COORDINATE HIS WORK WITH ALL TRADES.
8. SEE THE ARCHITECT'S REFLECTED CEILING PLAN FOR FINAL LOCATION OF CEILING DIFFUSERS, RETURN AIR GRILLES, LIGHT FIXTURES AND SPRINKLER HEADS.
9. ALL APPLIANCES REGULATED BY THE INTERNATIONAL MECHANICAL CODE SHALL BE LISTED AND LABELED FOR THE APPLICATION IN WHICH THEY ARE INSTALLED AND USED
10. THE CONTRACTOR SHALL FURNISH THE QUALIFIED PERSONNEL, SUPPLIERS, EQUIPMENT REQUIRED TO MAKE ALL NECESSARY TESTS AND VERIFICATION OF EQUIPMENT PERFORMANCE AND CONTROLS. ELECTRICAL POWER, WATER AND FUEL CONSUMPTION FOR TESTING SHALL BE FROM THE OWNER'S SUPPLY.
11. CONTRACTOR SHALL PROVIDE ALL NECESSARY MISCELLANEOUS STEEL FOR THE SUPPORT OF ALL EQUIPMENT SUSPENDED FROM SLAB OR STEEL. CONTRACTOR SHALL VERIFY THE LOCATION OF EXISTING CEILING JOISTS, ETC. PRIOR TO SUSPENDING EQUIPMENT. THE CONTRACTOR SHALL SUBMIT FOR APPROVAL, SHOP DRAWINGS AND DETAILS, INDICATING THE PROPOSED EQUIPMENT, PIPING AND DUCT SUPPORTING METHODS PRIOR TO INSTALLATION.
12. DAMAGE TO BUILDING AND EQUIPMENT, WHICH IS TO REMAIN, RESULTING FROM DEMOLITION SHALL BE REPAINTED, REPAIRED AND/OR REPLACED BY THE CONTRACTOR.
13. CONTRACTOR SHALL PERFORM ALL CUTTING AND PATCHING AS REQUIRED UNDER THIS CONTRACT, INCLUDING WORK FOR ROOF AND WALL PENETRATIONS OF PIPING AND DUCTWORK, CORE DRILLING, AND DUCTWORK REMOVALS. SEAL OPENINGS WITH APPROVED MATERIALS TO MAINTAIN EXISTING FIRE RESISTANCE RATINGS OF STRUCTURE. SEAL ROOF AND EXTERIOR WALL OPENINGS WEATHER AND AIR TIGHT.
14. PATCH ALL WALL, ROOF AND FLOOR OPENINGS AS NECESSARY DUE TO PIPING, DUCTWORK OR EQUIPMENT REMOVALS TO MATCH EXISTING ADJACENT CONSTRUCTION. PAINT WALLS AND CEILINGS TO MATCH ADJACENT EXISTING FINISHES.
15. EQUIPMENT MANUFACTURERS NAMES AND MODEL NUMBERS ARE SHOWN FOR THE BASIS OF DESIGN. THE EQUIPMENT HAS BEEN SELECTED BY THE ENGINEER FOR CONFORMANCE TO VARIOUS CRITERIA SUCH AS, CAPACITIES, ELECTRICAL CRITERIA, STANDARD FEATURES, ETC. SUBSTITUTION OF ANY EQUIPMENT SHALL NOT BE ALLOWED UNLESS APPROVED BY THE ENGINEER. ALL COSTS RESULTING FROM SELECTION OF OTHER THAN SPECIFIED EQUIPMENT SHALL BE BORNE BY THE CONTRACTOR, INCLUDING BUT NOT LIMITED TO, WORK AFFECTING OTHER CONTRACTORS, OWNER, OR DESIGN, INCLUDING REVISING SUPPORTS AND STRUCTURES, ELECTRICAL PROVISIONS AND CONTROLS.
16. UNLESS OTHERWISE NOTED ON THE DRAWINGS, ALL MECHANICAL EQUIPMENT SHALL BE MOUNTED ON OR SUSPENDED FROM VIBRATION ISOLATORS TO PREVENT THE TRANSMISSION OF SOUND TO THE BUILDING STRUCTURE. VIBRATION ISOLATORS SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS, LOCAL SEISMIC CODES AND ON ACTUAL WEIGHT DISTRIBUTION OF THE EQUIPMENT FURNISHED. DEFLECTIONS SHALL BE AS NOTED ON THE EQUIPMENT SHOP DRAWING SUBMITTALS.
17. THE CONTRACTOR SHALL PROVIDE THE OWNER WITH REPRODUCIBLE "AS-BUILT" DRAWINGS AND FOUR (4) COPIES OF AN OPERATING AND MAINTENANCE MANUAL AT THE CONCLUSION OF THE JOB.
18. THE CONTRACTOR SHALL PROVIDE THE OWNER WITH A ONE (1) YEAR WRITTEN GUARANTEE OF ALL WORK (LABOR AND MATERIALS) AND A 5 YEAR WARRANTY ON THE COMPRESSORS, STARTING FROM THE DATE OF THE OWNER ACCEPTANCE.
19. ALL AUTOMATIC TEMPERATURE CONTROL WIRING SHALL BE THE RESPONSIBILITY OF THE MECHANICAL CONTRACTOR.
20. THE MECHANICAL CONTRACTOR SHALL FURNISH ALL LOCAL POWER DISCONNECT SWITCHES FOR ALL HVAC EQUIPMENT. FOR BOILER ROOMS THE MECHANICAL CONTRACTOR SHALL PROVIDE EMERGENCY BOILER SHUT-DOWN SWITCHES AT EACH BOILER ROOM DOOR AND PROVIDE LOCAL DISCONNECT SWITCHES WITH LOCKABLE COVER AT EACH BOILER. THE MECHANICAL CONTRACTOR SHALL COORDINATE THE ELECTRICAL REQUIREMENTS OF HIS WORK WITH THE GENERAL AND ELECTRICAL CONTRACTORS PRIOR TO SUBMISSION OF BIDS.
21. UNLESS OTHERWISE SPECIFIED, ALL MOTORS 1/2 H.P. AND ABOVE SHALL BE 3 PHASE AND MOTORS UNDER 1/2 H.P. SHALL BE SINGLE PHASE. ALL MOTORS SHALL MEET MINIMUM EFFICIENCIES AS OUTLINED BY ASHRAE/ IESNA STANDARD 90.1-2016 "ENERGY EFFICIENT DESIGN OF NEW BUILDINGS EXCEPT LOW-RISE RESIDENTIAL BUILDINGS".
22. HVAC CONTRACTOR IS RESPONSIBLE FOR SUPPLYING ALL MOTOR STARTERS ASSOCIATED WITH HIS

- WORK. PROVIDE COMBINATION STARTER/DISCONNECTS WHEN EQUIPMENT IS NOT IN SIGHT OF ELECTRIC PANEL SERVING SAME. ALL STARTERS SHALL HAVE "HAND-OFF-AUTO" SELECTION SWITCHES WITH INDICATOR LIGHTS AND 120V HOLDING COILS. COORDINATE STARTER REQUIREMENTS WITH THE ATC CONTRACTOR.
23. ELECTRICAL CONTRACTOR SHALL PROVIDE DUCT MOUNTED SMOKE DETECTORS (SUPPLY & RETURN) TO BE INSTALLED BY THE MECHANICAL CONTRACTOR AND WIRED BY THE ELECTRICAL CONTRACTOR. DUCT MOUNTED SMOKE DETECTORS SHALL BE PRESENT IN THE MAIN RETURN DUCT FOR ALL AIR HANDLING UNITS SUPPLYING AIR QUANTITIES GREATER THAN OR EQUAL TO 2,000 CFM. DETECTORS SHALL BE PROVIDED IN BOTH SUPPLY AND RETURN MAINS IF THE SYSTEM IS GREATER THAN 15,000 CFM OR AN AIR HANDLING SYSTEM, WHICH EXHAUSTS GREATER THAN 50% OF THE SUPPLY AIR.
24. THE MECHANICAL CONTRACTOR SHALL PROVIDE CARBON MONOXIDE (CO) DETECTION AND ALARM SYSTEM IN ROOMS OR SPACES THAT CONTAIN FUEL-BURNING APPLIANCES OR ROOMS OR SPACES THAT ARE SERVED BY FUEL BURNING FORCED AIR FURNACES. CO DETECTORS SHALL BE HARD-WIRED BY THE ELECTRICAL CONTRACTOR AND PROVIDED WITH BATTERY BACKUP. FOR EDUCATIONAL OCCUPANCIES THE CO DETECTION SYSTEM SHALL SIGNAL AN ALARM TO AN ON-SITE LOCATION STAFFED BY SCHOOL PERSONNEL AND TO THE SCHOOL'S ATC SYSTEM BY THE MECHANICAL CONTRACTOR. THE ELECTRICAL CONTRACTOR SHALL PROVIDE A CO DETECTION SUPERVISORY ALARM TO THE SCHOOL'S FIRE ALARM SYSTEM.
25. ALL PIPE, DUCT, CONDUIT, AND CABLE PENETRATIONS OF FIRE-RESISTANCE-RATED WALLS AND HORIZONTAL ASSEMBLIES SHALL BE PROTECTED WITH APPROVED FIRESTOP SYSTEMS THAT COMPLY WITH ASTM E 814 AND UL 1479 AS MANUFACTURED BY HILTI, 3M (FIRE PROTECTION PRODUCTS DIVISION), JOHNS MANVILLE, OR APPROVED EQUAL. COMPLY WITH THE INSTALLATION REQUIREMENTS ESTABLISHED BY THE QUALIFIED TESTING AND INSPECTING AGENCY.
26. ALL EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S WRITTEN INSTALLATION INSTRUCTIONS.
27. ALL MOUNTING HARDWARE AND SUPPORTS SHALL BE GALVANIZED.

VALVES

- 1. PROVIDE VALVES OF THE TYPE AND SIZE AS INDICATED ON THE DRAWINGS AND DETAILS. PROVIDE BRASS VALVE TAGS & CHAINS FOR THE PURPOSE OF IDENTIFICATION. CONSULT OWNER'S REPRESENTATIVE FOR PROPER NUMBER SEQUENCING. PROVIDE A CHART COMPILING ALL VALVES AND LOCATIONS AND FURNISH SAME TO OWNER.
2. PROVIDE SHUT OFF VALVES ON EACH TERMINAL UNIT AND AT ALL TAKEOFFS THAT SERVE MORE THAN ONE TERMINAL UNIT.
3. PROVIDE BALL VALVES FOR SHUT-OFF SERVICE ON PIPING UP TO 2". PROVIDE GATE OR BUTTERFLY VALVES FOR PIPING LARGER THAN 2". GATE VALVES SHALL BE OF THE RISING STEM TYPE. PROVIDE CHAIN OPERATORS FOR VALVES LOCATED 7'-0" OF MORE ABOVE THE FINISHED FLOOR. BUTTERFLY VALVES SHALL BE 1/2 TURN, LUG-, TYPE, SPRING-LEVER OPERATED. PROVIDE GEAR OPERATORS FOR VALVES 6" AND LARGER.
4. PROVIDE GLOBE-TYPE, CALIBRATED BALANCE VALVES (B&G - CIRCUIT SETTER, TACO - ACCU-FLO, OR ARMSTRONG - CBV) FOR THROTTLING FLOW.
5. PROVIDE MULTI-DUTY VALVES, ONLY IF SPECIFICALLY CALLED OUT ON THE DRAWINGS.
6. PROVIDE BRONZE, SWING-TYPE CHECK VALVES (HORIZONTAL INSTALLATION) AS INDICATED ON THE DRAWINGS. PROVIDE SILENT, NON-SLAM CHECK VALVES FOR PUMP AND VERTICAL PIPING INSTALLATIONS.
7. PROVIDE DRAIN VALVES FOR ALL LOW POINTS IN WATER SYSTEMS. VALVES SHALL HAVE HOSE END CONNECTIONS WITH CAP AND CHAIN.

PIPING

- 1. PROVIDE AND ERECT IN A WORKMANLIKE MANNER, ACCORDING TO THE BEST PRACTICE OF THE TRADE, ALL PIPING SHOWN ON THE DRAWINGS OR REQUIRED TO COMPLETE THE INSTALLATION INTENDED BY THESE SPECIFICATIONS.
2. IN CONCEALED LOCATIONS WHERE PIPING, OTHER THAN CAST-IRON OR STEEL, IS INSTALLED THROUGH HOLES OR NOTCHES IN STUDS, JOISTS, RAFTERS OR SIMILAR MEMBERS LESS THAN 1 1/2 INCHES FROM THE NEAREST EDGE OF THE MEMBER, THE PIPE SHALL BE PROTECTED BY SHIELD PLATES, PROTECTIVE STEEL SHIELDPLATES HAVING A MINIMUM THICKNESS OF 0.0575-INCH (NO. 16 GAGE) SHALL COVER THE AREA OF THE PIPE WHERE THE MEMBER IS NOTCHED OR BORED, AND SHALL EXTEND A MINIMUM OF 2 INCHES ABOVE SOLE PLATES AND BELOW TOP PLATES.
3. PROVIDE A SHUT-OFF VALVE ON SUPPLY PIPE AND A COMBINATION BALANCING SHUT-OFF VALVE ON RETURN PIPE AT ALL BRANCH PIPING CONNECTIONS SERVING MORE THAN ONE PIECE OF EQUIPMENT OR BRANCH PIPING GREATER THAN 100 FEET SERVING ONE PIECE OF EQUIPMENT.
4. ALL BRANCH TAKE-OFFS FROM PIPING MAINS SHALL BE MADE OF A MINIMUM OF THREE 90-DEGREE ELBOWS TO ACCOMMODATE EXPANSION AND CONTRACTION OF BOTH THE MAIN LINES AND THE BRANCH TAKE-OFFS.
5. FOR ANY RENOVATION OR DEMOLITION WORK TO AN EXISTING HYDRONIC SYSTEM, ALL OR PART OF THE SYSTEM MUST BE DRAINED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL MATERIAL, LABOR, AND COSTS ASSOCIATED WITH REFLILING, AIR REMOVAL, AND REBALANCING THE SYSTEM.
6. PROVIDE EXPANSION DEVICES (EXPANSION LOOP OR SLIP-STYLE EXPANSION FITTING) AT ALL LOCATIONS WHERE THERE IS A BUILDING EXPANSION JOINT OR A CONNECTION OF AN ADDITION TO AN EXISTING BUILDING.
7. IN WATER SYSTEMS, PROVIDE DRAINS AT ALL LOW POINTS AND MANUAL AIR VENTS AT ALL SYSTEM HIGH POINTS.
8. DISSIMILAR PIPING SHALL BE CONNECTED WITH DIELECTRIC FITTINGS AS MANUFACTURED BY EBEO OR EQUAL.
9. PROVIDE UNIONS AT ALL PIPING CONNECTIONS TO EQUIPMENT TO FACILITATE EASY REMOVAL FOR SERVICING. UNIONS 2" AND SMALLER SHALL BE SCREWED. UNIONS 2-1/2" AND LARGER SHALL BE FLANGED.
10. HOT WATER PIPING
A. ALL NEW PIPING SHALL BE COPPER TYPE 'L' WITH SOLDERED WROUGHT COPPER FITTINGS.

HANGERS

- A. PROVIDE NECESSARY STRUCTURAL MEMBERS, HANGERS AND SUPPORTS OF APPROVED DESIGN TO KEEP PIPING IN PROPER ALIGNMENT.
B. PIPE HANGERS SHALL BE OF THE CLEVIS, PIPE ROLL AND PIPE CLAMP TYPES, HANGERS SHALL BE GRINNELL OR EQUAL.
C. SUPPORT ALL HORIZONTAL PIPING 1-1/4" AND SMALLER NOT MORE THAN 6' ON CENTERS. ALL HORIZONTAL PIPING 1-1/2" AND LARGER SHALL BE SUPPORTED NOT MORE THAN 10' ON CENTERS, EXCEPT THAT COPPER TUBING SHALL NOT BE MORE THAN 8' ON CENTERS.

DUCTWORK

- 1. FURNISH AND INSTALL SHEET METAL DUCTWORK WHERE INDICATED ON THE DRAWINGS.
2. ALL DUCTWORK, UNLESS OTHERWISE NOTED, SHALL BE GALVANIZED SHEET METAL FABRICATED AND INSTALLED TO THE LATEST SMACNA STANDARDS AND SECURED WITH SHEET METAL SCREWS. ALL JOINTS 18" IN LENGTH OR GREATER SHALL BE OF THE DUCTMATE SYSTEM OR THE SMACNA EQUIVALENT CONNECTION AND CONSTRUCTION. PROVIDE GASKETS AT MATING FLANGES. ALL

- TRANSVERSE JOINTS AND SEAMS SHALL BE SEALED WITH HIGH PRESSURE DUCT SEALANT. SIZES ON DRAWINGS ARE CLEAR INSIDE DIMENSIONS, INCREASE SIZE BY 1" ALL AROUND TO ACCOMMODATE LINING IF REQUIRED.
3. ALL NEW FLEXIBLE DUCTWORK SHALL BE THERMAFLEX TYPE M-KE OR APPROVED EQUAL. SUPPORTED NOT MORE THAN 3'-0" INTERVALS WITH 1" WIDE STRAPS. ALL FLEXIBLE DUCTWORK SHALL MEET ALL IMC AND NFPA REQUIREMENTS FOR USE IN A RETURN AIR PLENUM. PROVIDE SPIN COLLARS WITH VOLUME DAMPERS AT ALL NEW FLEXIBLE CONNECTIONS. MAXIMUM ALLOWABLE RUN OF FLEX SHALL NOT EXCEED 3'-0".
4. PROVIDE FLEXIBLE DUCT CONNECTIONS AT ROTATING EQUIPMENT, "VENTGLASS" OR EQUAL.
5. ALL NEW FIRE DAMPERS SHALL BE INSTALLED IN ACCORDANCE WITH THE LATEST EDITIONS OF NFPA, SMACNA AND UCC. ALL DAMPERS SHALL BE RUSKIN OR APPROVED EQUAL WITH THE BLADE STACK OUT OF THE AIRSTREAM (TYPE 'B'). FURTHERMORE, DAMPERS SHALL BEAR A U.L. RATING FOR "DYNAMIC OPERATION".
6. ALL NEW DUCTWORK SHALL BE TESTED FOR AIR LEAKAGE. THE NEW DUCTWORK SHALL BE SEAL CLASS "A" AND LEAKAGE CLASS-12, AS DEFINED BY THE SMACNA "HVAC SYSTEMS DUCT DESIGN" MANUAL. THE CONTRACTOR SHALL REPAIR ALL LEAKS AT HIS OWN EXPENSE AND RE-TEST SAME.
7. INSTALL SUITABLE SIZED ACCESS DOORS WHERE REQUIRED AT ALL DAMPERS, COILS, FAN BEARINGS, VOLUME CONTROLS ETC. PROVIDE INSULATED DOORS WHERE DUCTWORK IS INSULATED.
8. EXTEND ALL BALANCING DAMPERS BEYOND INSULATION.

OUTDOOR AIR INTAKE AND EXHAUST

- 1. ALL INTAKE AND EXHAUST LOUVERS SHALL BE WIND DRIVEN RAIN RESISTANT TYPE, HAVING AN "A" RATING ACCORDING TO AMCA STANDARD 550 FOR WIND DRIVEN RAIN (50 MPH WIND VELOCITY, 8"/HR RAINFALL RATE).
2. ALL OUTDOOR AIR INTAKE AND EXHAUST OPENINGS SHALL BE PROVIDED WITH A MINIMUM CLASS 1 LEAKAGE RATED MOTORIZED DAMPER. IF THE SYSTEM CAPACITY IS LESS THAN 300 CFM A GRAVITY BACKDRAFT DAMPER CAN BE INSTALLED. DAMPERS SHALL BE CONTROLLED TO BE SHUT WHEN THE OUTDOOR AIR INTAKE OR EXHAUST SYSTEMS ARE NOT IN USE.

MECHANICAL INSULATION

- 1. ALL INSULATION MUST BE APPLIED IN STRICT ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
2. APPLY INSULATION AFTER ALL TESTING HAS BEEN COMPLETED AND APPROVED.
3. ALL INSULATION PROVIDED FOR THE PROJECT MUST MEET A MAXIMUM FLAME SPREAD RATING OF 25 AND SMOKE DEVELOPED INDEX OF 50 OR LESS, AS TESTED IN ACCORDANCE WITH ASTM, NFPA & U.L. GUIDELINES.
4. ALL INSULATION FOR EQUIPMENT AND PIPING WITH A SURFACE TEMPERATURE BELOW 65 DEGREES F, SHALL CONTAIN A COMPLETE VAPOR BARRIER SEAL.

PIPING INSULATION - SEE MINIMUM PIPE INSULATION SCHEDULE FOR REQUIRED INSULATION THICKNESS.

- A. ALL HEATING HOT WATER PIPING SHALL BE INSULATED WITH FIBERGLASS INSULATION WITH AN ALL SERVICE JACKET. PROVIDE ONE-PIECE, MOLDED PVC JACKETS, AS MANUFACTURED BY JOHNS MANVILLE CORP. ZESTON 2000 OR EQUAL, AT ALL FITTINGS AND VALVES.
6. DUCTWORK INSULATION
A. ALL SUPPLY AND OUTDOOR AIR DUCTS WITHIN THE BUILDING ENVELOPE SHALL BE INSULATED WITH A MINIMUM INSULATION VALUE OF R-3.5 (INSTALLED) FOIL-SCRIM-KRAFT, FORMALDEHYDE FREE FLEXIBLE FIBERGLASS DUCT WRAP (APPROXIMATE 1-1/2" THICK).
B. ALL OUTDOOR AIR INTAKE DUCTS, PLENUMS AND DUCTS IN MECH. EQUIP. ROOMS SHALL BE INSULATED WITH A MINIMUM INSULATION VALUE OF R-3.5 RIGID FIBERGLASS BOARD AND FOIL-SCRIM-KRAFT FACING (APPROXIMATE 1" THICK).
C. WHERE INDICATED ON THE DRAWINGS PROVIDE 1" THICK DUCT LINING AS MANUFACTURED BY JOHNS MANVILLE CORP. "PERMACOTE LINACOUSTIC HP". PROVIDE METAL NOSINGS AT EXPOSED EDGES. PROVIDE MINIMUM 15'-0" LENGTH OF ACOUSTICAL DUCT LINING UPSTREAM AND DOWNSTREAM OF MECHANICAL AIR HANDLING EQUIPMENT. DUCTWORK DIMENSIONS INDICATED ON THE PLANS ARE CLEAR INSIDE DIMENSIONS, INCREASE DUCT SIZE TO ACCOMMODATE THE DUCT LINER. LINER THICKNESS TO BE INCREASED TO MEET INSULATION REQUIREMENTS OR PROVIDE ADDITIONAL EXTERIOR DUCT INSULATION TO COMPENSATE.
D. ALL SUPPLY AND RETURN DUCTWORK OUTSIDE OF THE BUILDING ENVELOPE SHALL BE COVERED WITH A MINIMUM INSULATION VALUE OF R-8 RIGID FIBERGLASS BOARD AND FOIL-SCRIM-KRAFT FACING (APPROXIMATE 2" THICK). EXTERIOR EXPOSED DUCTWORK TO BE INSTALLED WITH LAMINATED VAPOR BARRIER CONSISTING OF RUBBERIZED RESIN ON A CROSSLAMINATED POLYETHYLENE FIRM COVERED WITH WHITE ALUMINUM-FOIL FACING SIMILAR TO VENTURE-CLAD OR ALUMA-GUARD.
E. EXHAUST DUCTWORK BETWEEN THE EXHAUST DUCT'S MOTORIZED OR BACKDRAFT DAMPER AND THE PENETRATION OF THE EXTERIOR OF THE BUILDING SHALL BE INSULATED WITH A MINIMUM INSULATION VALUE OF R-3.5 (INSTALLED) FOIL-SCRIM-KRAFT, FORMALDEHYDE FREE FLEXIBLE FIBERGLASS DUCT WRAP (APPROXIMATE 1-1/2" THICK).

TESTING, ADJUSTING, AND BALANCING

- 1. BALANCING THE AIR SYSTEMS
A. OPERATE ALL SYSTEMS FOR AS LONG AS NECESSARY TO TEST AIR FLOW AT ALL OPENINGS. ADJUST DAMPERS, FANS, AND SHEAVES UNTIL EVEN DISTRIBUTION AND REQUIRED CFM OF AIR IS OBTAINED THROUGHOUT. SUBMIT FOR APPROVAL FOUR (4) TEST REPORTS SHOWING ALL PERTINENT OPERATING DATA, SUCH AS CFM AND FPM AT EACH OUTLET. FAN RPM, MOTOR CURRENT, ETC., SHALL BE SUBMITTED FOR PERMANENT RECORD. BALANCE AIR VOLUME TO WITHIN 10% OF DESIGN VALUES. DURING ADJUSTMENT PERIOD, MAKE ALL NECESSARY SETTINGS AND ADJUSTMENTS OF TEMPERATURE REGULATING EQUIPMENT. TEST REPORTS SHALL BE CERTIFIED BY A LICENSED PROFESSIONAL ENGINEER WHO SHALL BE A MEMBER OF THE BALANCING FIRM.
2. BALANCING THE WATER SYSTEMS
A. OPERATE ALL SYSTEMS FOR AS LONG AS NECESSARY TO TEST WATER FLOW AT ALL COILS, ELEMENTS, ETC. MAKE NECESSARY ADJUSTMENTS UNTIL EVEN DISTRIBUTION AND REQUIRED OUTPUT IS OBTAINED THROUGHOUT. SUBMIT FOR APPROVAL FOUR (4) TEST REPORTS SHOWING ALL PERTINENT OPERATING DATA. DURING THE ADJUSTMENT PERIOD, MAKE ALL NECESSARY SETTINGS AND ADJUSTMENTS OF TEMPERATURE AND FLOW REGULATING EQUIPMENT. BALANCE WATER FLOWS TO WITHIN 10% OF DESIGN VALUES. TEST REPORTS SHALL BE CERTIFIED BY A LICENSED PROFESSIONAL ENGINEER WHO SHALL BE A MEMBER OF THE BALANCING FIRM.

PRE-BALANCING EXISTING AIR OR HYDRONIC SYSTEMS

PRIOR TO MAKING ALTERATIONS TO THE EXISTING SYSTEMS AND ORDERING EQUIPMENT, THIS CONTRACTOR SHALL HIRE A LICENSED (ABC OR NEBB) BALANCING CONTRACTOR WHO SHALL PERFORM AND RECORD THE FOLLOWING READINGS ON ALL SYSTEMS TO BE ALTERED OR AFFECTED BY THIS WORK TO INCLUDE BUT NOT TO BE LIMITED BY THE FOLLOWING:

- AIR FLOW AT EACH DIFFUSER OR REGISTER
STATIC PRESSURE AT FAN SYSTEM
WATER FLOW AND HEAD AT EACH COIL
WATER FLOW AND HEAD AT PUMP SUCTION AND DISCHARGE
WATER FLOW AND HEAD AT EACH ZONE SUPPLY & RETURN TO THE BUILDING
WATER SUPPLY AND RETURN TEMPERATURE
OUTDOOR AIR TEMPERATURE
CONDITIONED SPACE AIR TEMPERATURE

ALL DATA SHALL BE RECORDED IN THE MANNER DESCRIBED AND ON THE FORMS REQUIRED BY THE BOOK SPECIFICATION AND SHALL BE SUBMITTED TO THE ARCHITECT AND ENGINEER FOR THEIR REVIEW AND COMMENT, PRIOR TO PERFORMING ANY WORK AND ORDERING ANY EQUIPMENT AFFECTING THESE SYSTEMS.

AFTER COMPLETION OF THE ALTERATION WORK TO THE AFFECTED SYSTEMS, THE BALANCING CONTRACTOR

WHO PERFORMED THE INITIAL READINGS SHALL RETURN TO THE SITE AND BALANCE THE ALTERED SYSTEMS TO PROVIDE THE READINGS PREVIOUSLY TABULATED. THE BALANCING CONTRACTOR SHALL PROVIDE ANY NECESSARY EQUIPMENT AS REQUIRED BY THE SPECIFICATION TO PERFORM HIS WORK AT NO EXTRA COST TO THE OWNER.

IF ANY EQUIPMENT IS FOUND TO BE FUNCTIONALLY DEFICIENT AT THE TIME OF THE COMMENCEMENT OF THE CONTRACT, THE CONTRACTOR SHALL NOTIFY THE ARCHITECT AND ENGINEER IMMEDIATELY PRIOR TO PERFORMING ANY WORK INVOLVING THE EQUIPMENT IN QUESTION.

MINIMUM PIPE INSULATION THICKNESS SCHEDULE

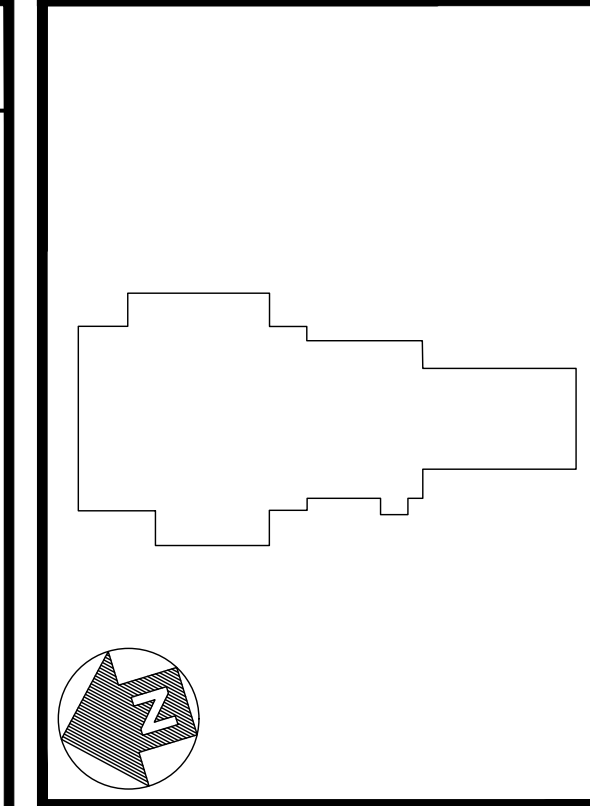
Table with columns: FLUID OPERATING TEMPERATURE RANGE (F) AND USAGE, INSULATION CONDUCTIVITY (CONDUCTIVITY Btu-in/(h-ft^2-F), MEAN RATING TEMPERATURE (F)), and NOMINAL PIPE OR TUBE SIZE (INCHES) with sub-columns <1, 1 to <1.5, 1.5 to <4, 4 to <8, >8.

NOTES:

- 1. FOR PIPING SMALLER THAN 1.5" AND LOCATED IN PARTITIONS WITHIN CONDITIONED SPACES, REDUCTION OF THESE THICKNESS BY 1 INCH SHALL BE PERMITTED. BUT NOT TO A THICKNESS LESS THAN 1 INCH.
2. SEE SPECIFICATION SECTION 230700 HVAC INSULATION FOR ADDITIONAL INFORMATION.

EXCEPTIONS:

- 1. FACTORY-INSTALLED PIPING WITHIN HVAC EQUIPMENT TESTED AND RATED IN ACCORDANCE WITH ASHRAE 90.1 SECTION 6.4.1
2. PIPING THAT CONVEYS FLUIDS THAT HAVE NOT BEEN HEATED OR COOLED THROUGH THE USE OF FOSSIL FUELS OR ELECTRIC POWER.
3. PIPING THAT CONVEYS FLUIDS THAT HAVE A DESIGN OPERATING TEMPERATURE RANGE BETWEEN 60°F (15°C) AND 105°F (41°C).
4. WHERE HEAT GAIN OR HEAT LOSS WILL NOT INCREASE ENERGY USAGE (SUCH AS LIQUID REFRIGERANT PIPING)



Professional seal for Mark E. Longigan, P.E., Mechanical Engineer, No. License 042000020. Contact information for Johnson & Urban, LLC Consulting Engineers, 295 State Route 34, Colts Neck, NJ 07722. Phone: 732.772.1500, 732.772.1515. J&U Project # 22-148.

HEATING & VENTILATING UNIT REPLACEMENT AT:

MONTCLAIR STATE UNIVERSITY
PANZER GYMNASIUM

1 NORMAL AVE.
MONTCLAIR, NJ 07424

Table with 3 columns and 3 rows for revision tracking.

NO. DATE DESCRIPTION

REVISIONS

TITLE:

MECHANICAL - SPECIFICATIONS

ISSUANCE: FOR BID

DATE: 02/01/2024

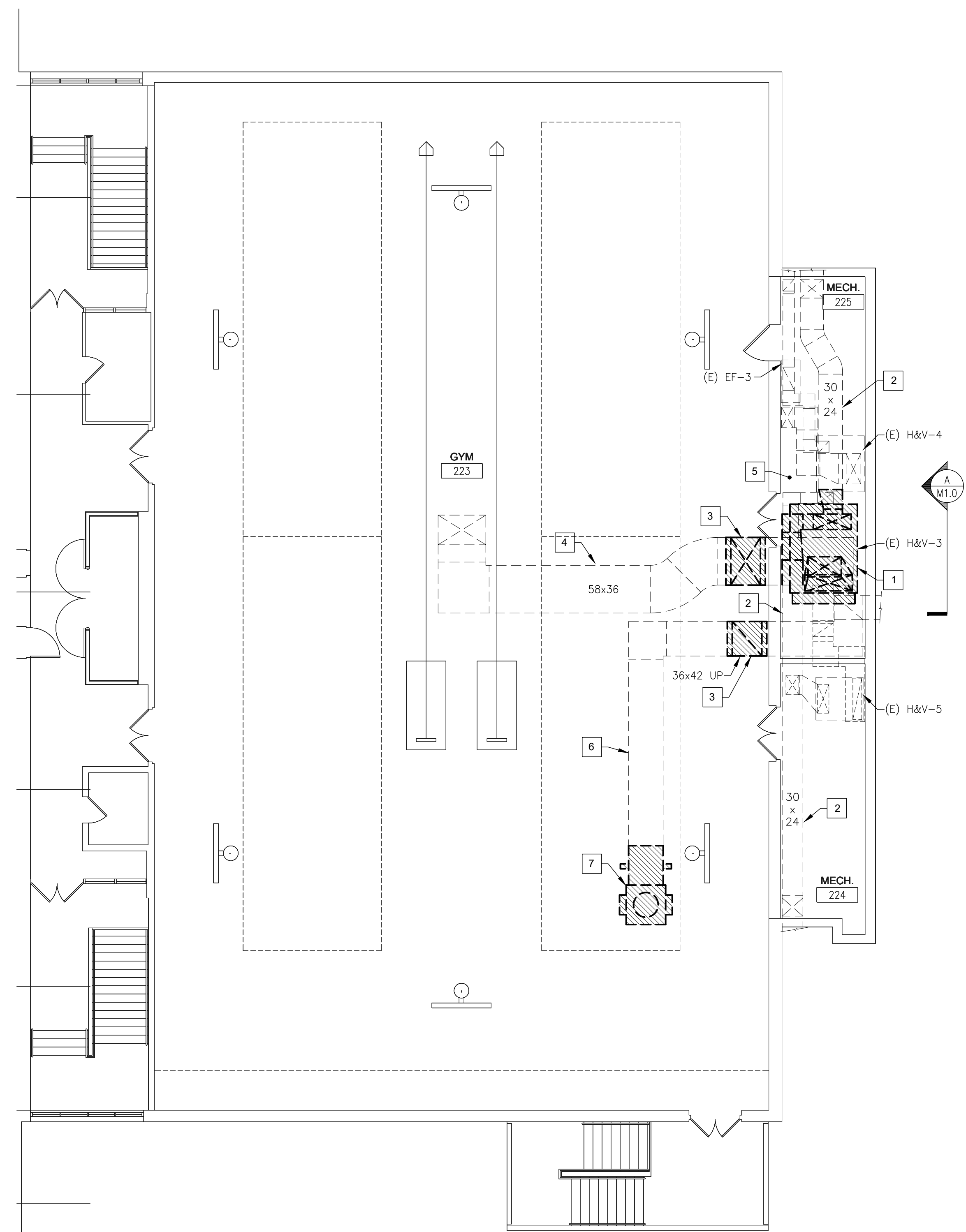
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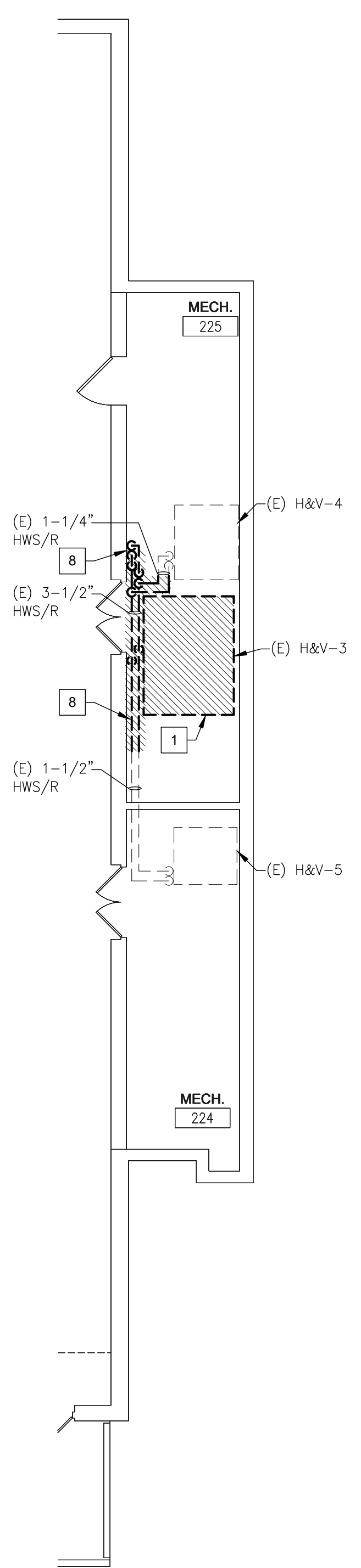
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1 MECHANICAL - PARTIAL FIRST FLOOR DUCTWORK PLAN - DEMOLITION

SCALE 1/8" = 1'-0"



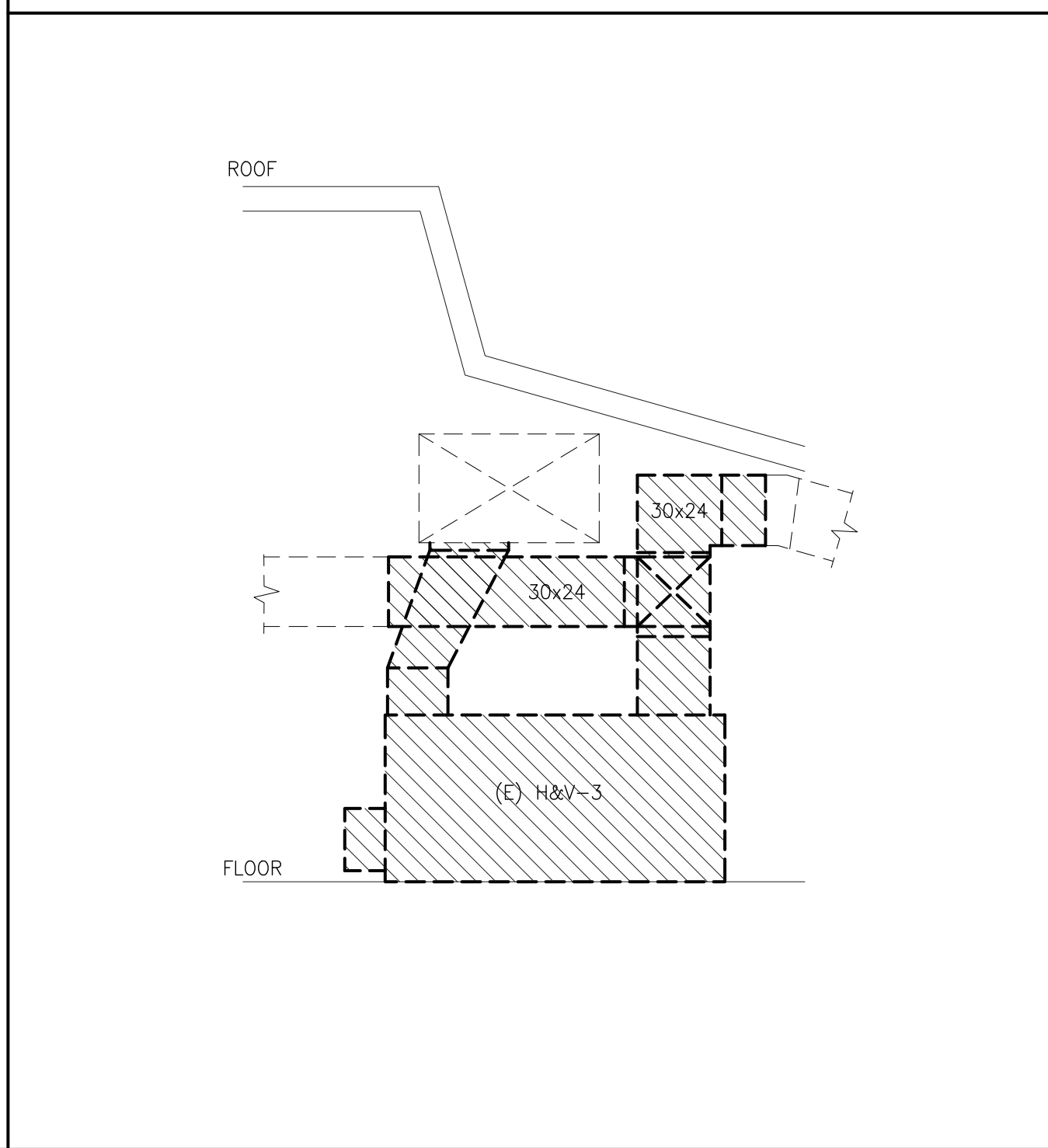
2 MECHANICAL - PARTIAL FIRST FLOOR PIPING PLAN - DEMOLITION

SCALE 1/8" = 1'-0"

- DEMOLITION NOTES:
- CONTRACTOR SHALL VISIT THE SITE TO VERIFY EXISTING CONDITIONS PRIOR TO SUBMISSION OF BID. NO ADDITIONAL COMPENSATION SHALL BE CONSIDERED FOR FAILURE TO OBSERVE THIS REQUIREMENT.
 - ALL EXISTING WORK SHALL REMAIN UNLESS OTHERWISE NOTED.
 - EXISTING PROJECT CONDITIONS INDICATED ARE BASED ON FIELD OBSERVATION, EXISTING DESIGN / CONSTRUCTION DOCUMENTS AND EXISTING RECORD DOCUMENTS AND ARE INTENDED TO INDICATE THE SCOPE OF THE WORK AFFECTED BY THIS PROJECT. NOT ALL AREAS MAY HAVE BEEN ACCESSIBLE DURING SURVEY. EQUIPMENT SHOWN IS TO THE BEST OF THE SURVEYOR'S ABILITY DUE TO SITE CONSTRAINTS. CONTRACTOR IS RESPONSIBLE FOR FINAL FINAL SURVEY OF ALL AREAS IN SCOPE FOR DEMOLITION AS SHOWN.
 - ALL MATERIALS AND EQUIPMENT REMOVALS SHALL BE DISPOSED OF AS DIRECTED BY THE OWNER OR THE ARCHITECT.
 - REPORT DISCREPANCIES TO ARCHITECT / ENGINEER BEFORE DISTURBING EXISTING INSTALLATION.
 - REMOVE, RELOCATE AND REPAIR EXISTING INSTALLATIONS TO ACCOMMODATE NEW CONSTRUCTION.
 - MAINTAIN ACCESS TO EXISTING ACTIVE MECHANICAL INSTALLATIONS.
 - EXTEND EXISTING INSTALLATION USING MATERIALS AND METHODS COMPATIBLE WITH EXISTING MECHANICAL INSTALLATIONS AND AS SPECIFIED.

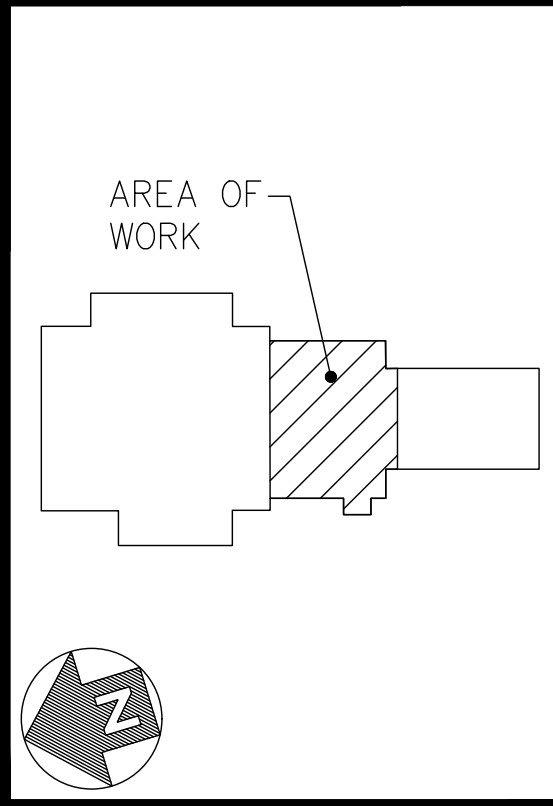
DEMOLITION KEY NOTES (1 , 2 , ETC.)

- EXISTING HEATING AND VENTILATING UNIT H&V-3, SUPPORTS, AND ALL APPURTENANCES SHALL BE REMOVED IN ITS ENTIRETY. PORTIONS OF EXISTING DUCTWORK SHALL BE REMOVED AS INDICATED AND AS REQUIRED TO FACILITATE UNIT REMOVAL. INSULATE EXISTING OUTSIDE AIR INTAKE DUCTWORK AND PATCH DUCTWORK AIRTIGHT. EXISTING 3" HWS/R PIPING AND ALL APPURTENANCES SHALL BE REMOVED IN ITS ENTIRETY BACK TO EXISTING HWS/R MAIN. TEMPORARILY CAP MAIN LIQUID TIGHT. MODIFY EXISTING HWS/R PIPING WITHIN MECHANICAL ROOM AS REQUIRED TO FACILITATE UNIT REPLACEMENT. EXISTING THERMOSTAT, CONTROL WIRING, APPURTENANCES, ETC. LOCATED IN THE NATATORIUM (NOT SHOWN HERE) SHALL BE REMOVED IN ITS ENTIRETY. FIELD VERIFY EXACT LOCATION. PATCH AND PATCH ANY UNUSED PENETRATIONS TO MATCH EXISTING. EXISTING CONTROLS SHALL BE REMOVED IN THEIR ENTIRETY.
- EXISTING SUPPLY DUCTWORK ASSOCIATED WITH H&V-3 SHALL REMAIN IN SERVICE. EXISTING DUCTWORK INSULATION SHALL BE CAREFULLY AND THOROUGHLY REMOVED. PREPARE DUCTWORK FOR NEW INSULATION. EXISTING DUCTWORK SHALL BE THOROUGHLY CLEANED. PROVIDE DUCT CLEANING REPORT TO ENGINEER FOR FINAL ACCEPTANCE.
- VERTICAL PORTIONS OF EXISTING OUTSIDE AIR INTAKE AND EXHAUST DUCTWORK, SUPPORTS, AND ALL APPURTENANCES SHALL BE REMOVED IN THEIR ENTIRETY.
- EXISTING OUTSIDE AIR INTAKE DUCTWORK SHALL REMAIN IN SERVICE AND BE THOROUGHLY CLEANED. EXISTING PENT HOUSE INTAKE HOOD SHALL REMAIN IN SERVICE AND BE THOROUGHLY CLEANED. PROVIDE DUCT CLEANING REPORT TO ENGINEER FOR FINAL ACCEPTANCE.
- EXISTING MECHANICAL ROOM IS EXTREMELY CONFINED. PROVIDE ALL ADDITIONAL RIGGING, COORDINATION, AND WORK THAT IS REQUIRED TO FACILITATE H&V-3 REPLACEMENT AND ASSOCIATED WORK. CONTRACTOR SHALL BECOME THOROUGHLY FAMILIAR WITH THE CONDITIONS PRIOR TO BID. NO ADDITIONAL COMPENSATION SHALL BE PROVIDED FOR FAILING TO ABIDE BY THIS REQUIREMENT.
- EXISTING ROOF TOP EXHAUST DUCT (SHOWN HERE FOR CLARITY) SHALL REMAIN IN SERVICE. EXISTING DUCTWORK SHALL BE THOROUGHLY CLEANED. PROVIDE DUCT CLEANING REPORT TO ENGINEER FOR FINAL ACCEPTANCE.
- EXISTING ROOF TOP TRI-STACK EXHAUST FAN, SUPPORTS, AND ALL APPURTENANCES SHALL BE REMOVED IN ITS ENTIRETY. PORTIONS OF EXISTING DUCTWORK AND SUPPORTS SHALL BE REMOVED AS INDICATED AND AS REQUIRED TO FACILITATE UNIT REMOVAL. PATCH ROOF TO MAINTAIN EXISTING WARRANTY AND WEATHERTIGHTNESS. EXISTING CONTROLS SHALL BE REMOVED IN THEIR ENTIRETY.
- EXISTING 3-1/2" HWS/R PIPING SHALL BE REMOVED DOWN TO FLOOR PENETRATION AND AS INDICATED. TEMPORARILY CAP PIPING LIQUID TIGHT.



3 SECTION A

SCALE NONE



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REPLACEMENT AT:
**MONTCLAIR STATE
UNIVERSITY**

**PANZER
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MONTCLAIR, NJ 07424

NO.	DATE	DESCRIPTION
REVISIONS		

TITLE:
**MECHANICAL -
PARTIAL FIRST
FLOOR PLAN -
DEMOLITION**

ISSUANCE: FOR BID

DATE: 02/01/2024

SCALE: AS INDICATED

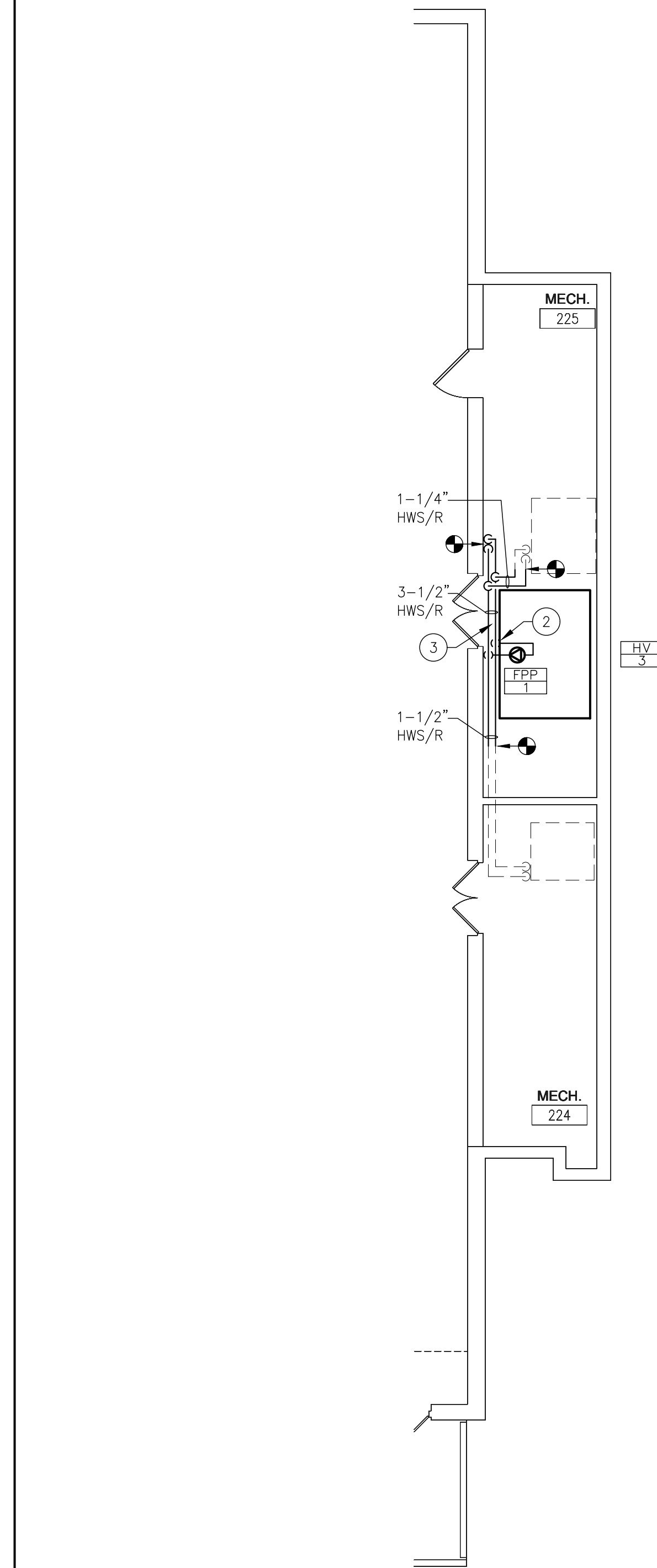
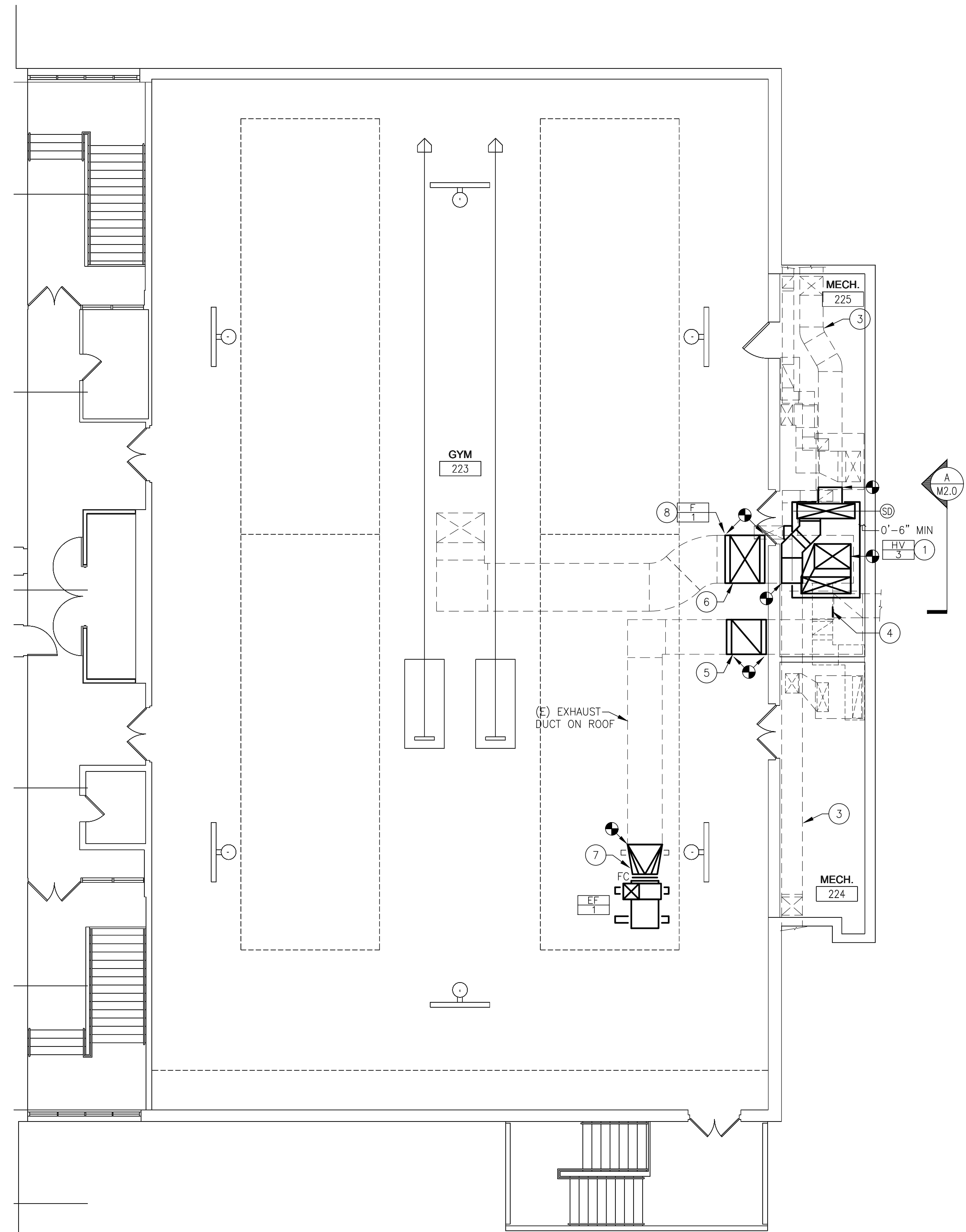
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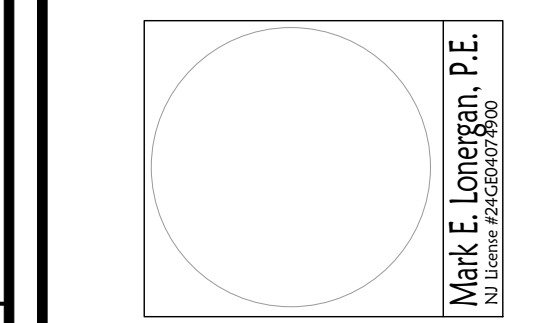
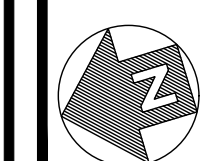
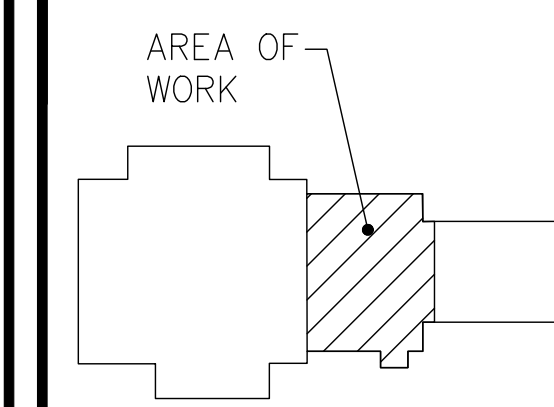
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GENERAL NOTES:

1. THE EXACT MOUNTING HEIGHT AND LOCATIONS OF ALL HVAC EQUIPMENT SHALL BE FIELD VERIFIED AND COORDINATED WITH OTHER MECHANICAL, ELECTRICAL, ARCHITECTURAL, AND STRUCTURAL SYSTEMS.
2. VERIFY ALL EQUIPMENT VOLTAGES WITH THE ELECTRICAL CONTRACTOR PRIOR TO RELEASING EQUIPMENT.
3. PROVIDE DISCONNECT SWITCHES FOR ALL HVAC EQUIPMENT INCLUDING WEATHERPROOF DISCONNECTS AS REQUIRED.
4. PROVIDE PHASE LOSS PROTECTION FOR ALL POLY-PHASE MOTOR DEVICES.
5. PROVIDE FLEXIBLE CONNECTIONS AT ALL DUCT CONNECTIONS TO VIBRATING EQUIPMENT. THESE CONNECTIONS SHALL BE INSTALLED IN CLOSE PROXIMITY TO SUCH EQUIPMENT.
6. LOCATE MECHANICAL EQUIPMENT SO ALL SERVICEABLE PARTS ARE ACCESSIBLE. COORDINATE LOCATION WITH DUCTWORK, PIPING, THE WORK OF OTHER TRADES, BUILDING STRUCTURAL ELEMENTS, ETC. SUCH THAT THE MANUFACTURER'S AND CODE REQUIRED CLEARANCES ARE MET OR EXCEEDED.
7. PROVIDE VANDAL RESISTANT THERMOSTAT GUARDS ON ALL THERMOSTAT LOCATED IN CORRIDORS, TOILET ROOMS, VESTIBULES, AND OTHER PUBLIC SPACES.
8. UNLESS OTHERWISE NOTED, ALL SUPPLY AND RETURN DUCTWORK 15 FT UPSTREAM AND DOWNSTREAM OF ALL AIR HANDLING EQUIPMENT (RTU'S, AHU'S, ERU'S, ERV'S, ETC.) SHALL BE INTERNALLY LINED WITH 1" THICK ACOUSTICAL DUCT LINER. DUCT LINER SHALL MEET OR EXCEED ENERGY CODE REQUIREMENTS.
9. EXHAUST DUCTS SHALL BE PROVIDED WITH 1.5" EXTERNAL DUCT WRAP INSULATION FOR A MINIMUM 10 FEET FROM THE EXTERIOR PENETRATION OR TO THE MOTORIZED DAMPER.



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NEW WORK KEY NOTES (1), (2), ETC.)

1. INSTALL HV-3 ON NEW 1" THICK NEOPRENE VIBRATION ISOLATION PAD. PAD SHALL EXTEND MINIMUM 4" BEYOND UNIT IN ALL DIRECTIONS. ANCHOR UNIT TO BUILDING STRUCTURE WHILE ALLOWING FOR SLIGHT DEFLECTION OF THE ISOLATION PAD. UNIT SHALL BE INSTALLED TO PROVIDE 3'-0" UNOBSTRUCTED CLEARANCE IN FRONT OF UNIT CONTROL PANEL WHEN ADJACENT DOORS ARE OPEN. PROVIDE CANVAS FLEXIBLE CONNECTIONS AT OUTSIDE INTAKE AND SUPPLY AIR CONNECTIONS. PROVIDE NEW DUCTWORK AS REQUIRED TO CONNECT TO EXISTING. PROVIDE SMOOTH TRANSITIONS AS REQUIRED. COORDINATE WITH EXISTING DUCTWORK AND EQUIPMENT WITHIN MECHANICAL ROOM. TIE NEW UNIT INTO EXISTING EXHAUST AIR SMOKE DETECTOR AND NEW SUPPLY AIR SMOKE DETECTOR. UNIT SHALL BE DE-ENERGIZED UPON ACTIVATION OF SMOKE DETECTOR. UNIT FILTERS SHALL BE REMOVED FOR FINAL AIR BALANCING. PROVIDE NEW THERMOSTAT LOCATED IN THE NATATORIUM (REFER TO M2.1) IN THE SAME LOCATION AS EXISTING THERMOSTAT. PROVIDE ALL CONTROL WIRING, SURFACE RACEWAY, AND LOCKABLE COVER. NO CONTROL WIRES SHALL BE EXPOSED. PATCH AND PAINT TO MATCH EXISTING.
2. PROVIDE 3" HWS/R BETWEEN EXISTING 3-1/2" HWS/R MAIN AND HV-3. PROVIDE ALL OFFSETS AS REQUIRED FOR COMPLETE INSTALLATION OF PIPING AND FREEZE PROTECTION PUMP. REFER TO HOT WATER COIL PIPING DETAIL FOR ADDITIONAL INFORMATION. SPACE IS EXTREMELY CONFINED. PROVIDE ALL PROVISIONS AS REQUIRED TO FACILITATE WORK WITHIN THIS SPACE. HWS/R PIPING SHALL BE TYPE L COPPER CONSTRUCTION.
3. THE COMPLETE EXTENT OF NEW AND EXISTING SUPPLY DUCTWORK SERVING HV-3 SHALL BE COMPLETELY INSULATED.
4. PROVIDE NEW ACCESS DOOR IN EXISTING DUCTWORK ACCESS DOOR FRAME. MODIFY EXISTING FRAME AND DUCTWORK AS REQUIRED. NEW ACCESS DOOR SHALL BE AIR TIGHT.
5. PROVIDE NEW 36x42 EXHAUST DUCTWORK. FIELD VERIFY SIZE TO MATCH EXISTING. DUCTWORK SHALL BE 12 GAUGE CONSTRUCTION. PROVIDE ADDITIONAL SUPPORTS AS REQUIRED. LINE DUCT TO MATCH EXISTING. DUCTWORK SHALL BE PAINTED, COLOR SHALL BE SELECTED BY OWNER.
6. PROVIDE NEW 36x58 OUTSIDE AIR INTAKE DUCTWORK. FIELD VERIFY SIZE TO MATCH EXISTING. DUCTWORK SHALL BE 12 GAUGE CONSTRUCTION. PROVIDE ADDITIONAL SUPPORTS AS REQUIRED. LINE DUCT TO MATCH EXISTING. PROVIDE 18x18 ACCESS DOOR ON RISER HEEL. DUCTWORK SHALL BE PAINTED, COLOR SHALL BE SELECTED BY OWNER.
7. PROVIDE SMOOTH TRANSITION AS REQUIRED.
8. PROVIDE NEW FILTER RACK ON VERTICAL OUTSIDE AIR INTAKE DUCTWORK. PROVIDE SMOOTH TRANSITIONS AS REQUIRED. FILTERS IN EXISTING 100% OAI H&V-5 TIED TO THIS OUTSIDE AIR DUCTWORK SHALL BE REMOVED. CONTRACTOR SHALL FIELD VERIFY EXISTING UNITS. RE-BALANCE H&V-5 AS REQUIRED TO MATCH EXISTING. RE-BALANCE OAI OF EXISTING H&V-4 TO MATCH EXISTING.
9. INSTALL NEW HWS/R PIPING AS HIGH AS POSSIBLE TO ALLOW CLEAR ACCESS TO MECHANICAL ROOM. PROVIDE ADDITIONAL OFFSETS AS REQUIRED.

HEATING & VENTILATING UNIT REPLACEMENT AT:

MONTCLAIR STATE UNIVERSITY
 PANZER GYMNASIUM

1 NORMAL AVE.
 MONTCLAIR, NJ 07424

NO.	DATE	DESCRIPTION
REVISIONS		

TITLE:
MECHANICAL - PARTIAL FIRST FLOOR PLAN - NEW WORK

ISSUANCE: FOR BID

DATE: 02/01/2024

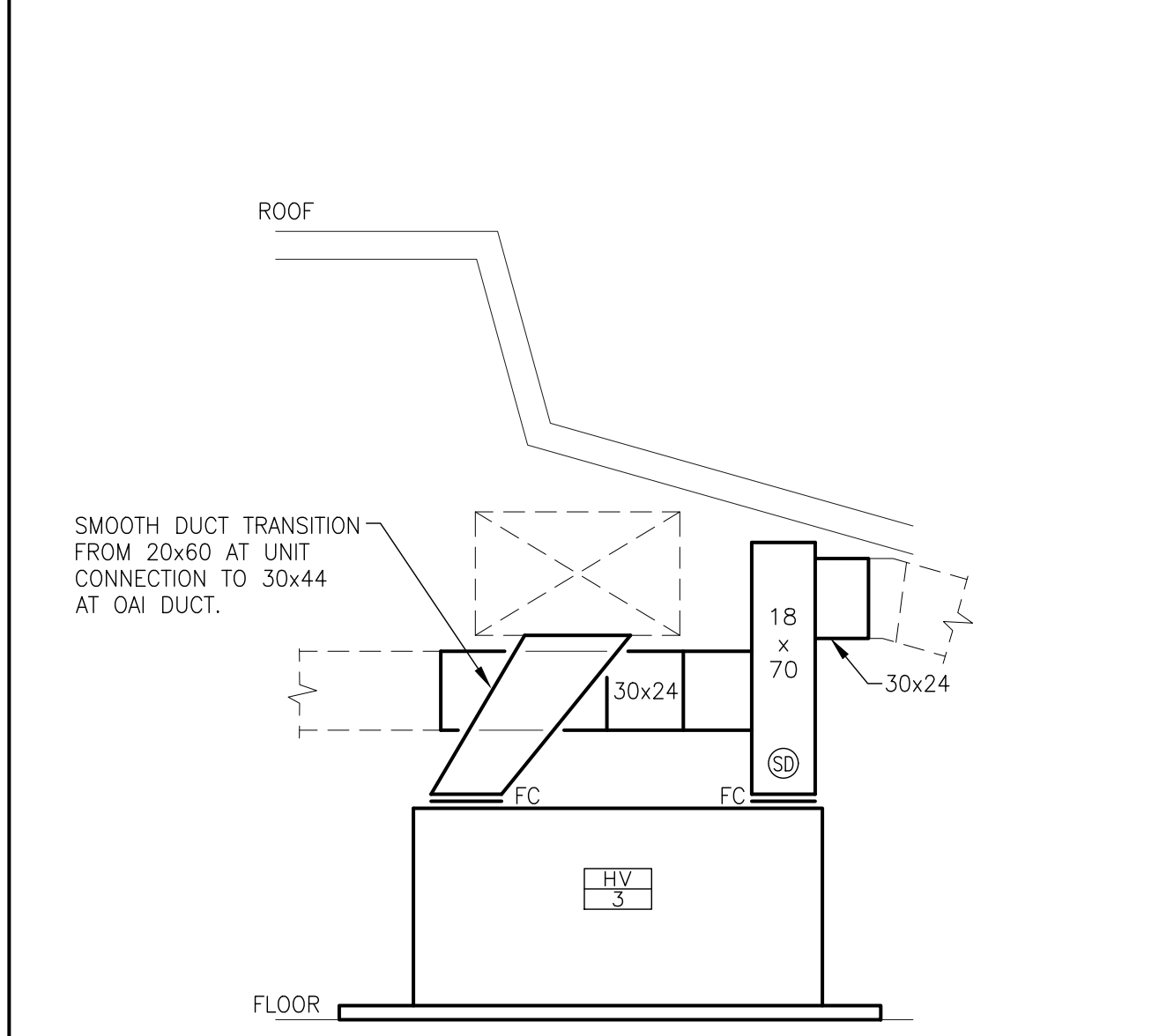
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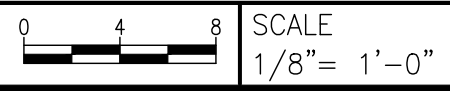
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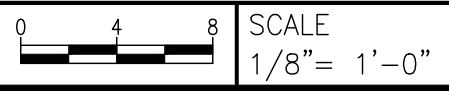
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1 MECHANICAL - PARTIAL FIRST FLOOR DUCTWORK PLAN - NEW WORK

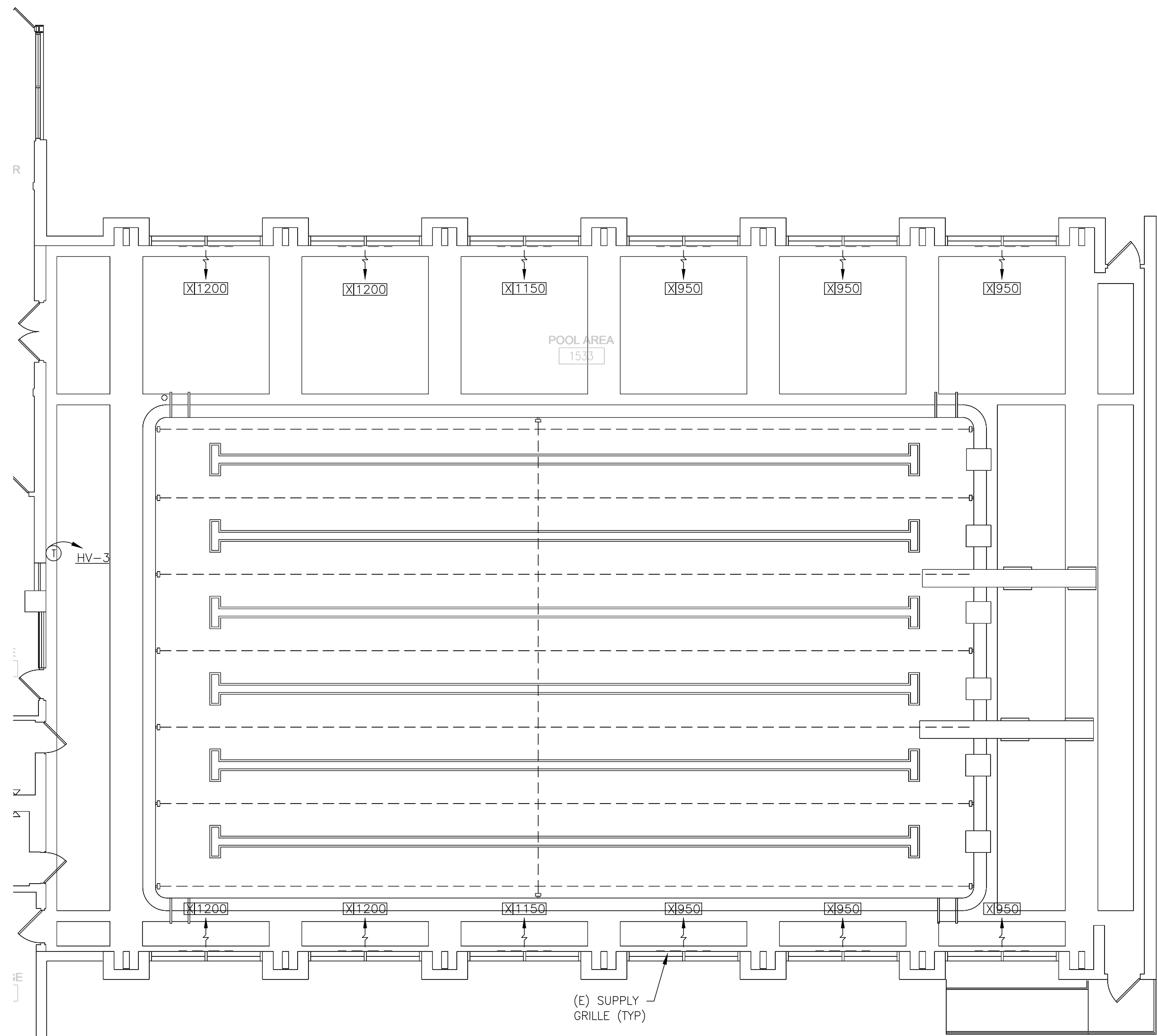


2 MECHANICAL - PARTIAL FIRST FLOOR PIPING PLAN - NEW WORK



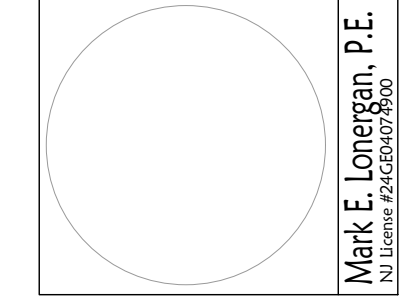
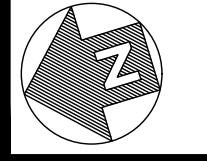
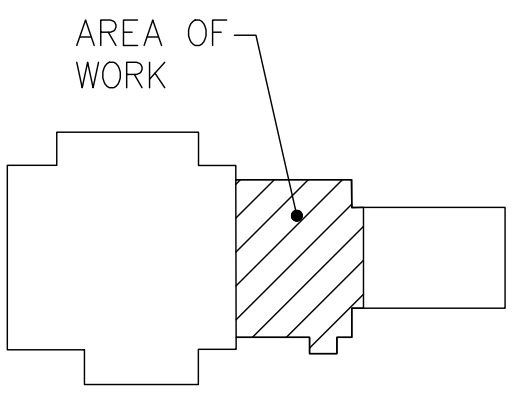
3 SECTION A





GENERAL NOTES:

1. THE EXACT MOUNTING HEIGHT AND LOCATIONS OF ALL HVAC EQUIPMENT SHALL BE FIELD VERIFIED AND COORDINATED WITH OTHER MECHANICAL, ELECTRICAL, ARCHITECTURAL, AND STRUCTURAL SYSTEMS.
2. VERIFY ALL EQUIPMENT VOLTAGES WITH THE ELECTRICAL CONTRACTOR PRIOR TO RELEASING EQUIPMENT.
3. PROVIDE DISCONNECT SWITCHES FOR ALL HVAC EQUIPMENT INCLUDING WEATHERPROOF DISCONNECTS AS REQUIRED.
4. PROVIDE PHASE LOSS PROTECTION FOR ALL POLY-PHASE MOTOR DEVICES.
5. PROVIDE FLEXIBLE CONNECTIONS AT ALL DUCT CONNECTIONS TO VIBRATING EQUIPMENT. THESE CONNECTIONS SHALL BE INSTALLED IN CLOSE PROXIMITY TO SUCH EQUIPMENT.
6. LOCATE MECHANICAL EQUIPMENT SO ALL SERVICEABLE PARTS ARE ACCESSIBLE. COORDINATE LOCATION WITH DUCTWORK, PIPING, THE WORK OF OTHER TRADES, BUILDING STRUCTURAL ELEMENTS, ETC. SUCH THAT THE MANUFACTURER'S AND CODE REQUIRED CLEARANCES ARE MET OR EXCEEDED.
7. PROVIDE VANDAL RESISTANT THERMOSTAT GUARDS ON ALL THERMOSTAT LOCATED IN CORRIDORS, TOILET ROOMS, VESTIBULES, AND OTHER PUBLIC SPACES.
8. UNLESS OTHERWISE NOTED, ALL SUPPLY AND RETURN DUCTWORK 15 FT UPSTREAM AND DOWNSTREAM OF ALL AIR HANDLING EQUIPMENT (RTU'S, AHU'S, ERU'S, ERV'S, ETC.) SHALL BE INTERNALLY LINED WITH 1" THICK ACOUSTICAL DUCT LINER. DUCT LINER SHALL MEET OR EXCEED ENERGY CODE REQUIREMENTS.
9. EXHAUST DUCTS SHALL BE PROVIDED WITH 1.5" EXTERNAL DUCT WRAP INSULATION FOR A MINIMUM 10 FEET FROM THE EXTERIOR PENETRATION OR TO THE MOTORIZED DAMPER.



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 J&U Project # 22-148

HEATING & VENTILATING UNIT REPLACEMENT AT:

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PANZER GYMNASIUM

1 NORMAL AVE.
 MONTCLAIR, NJ 07424

NO.	DATE	DESCRIPTION
REVISIONS		

TITLE:
MECHANICAL – NATATORIUM AIR BALANCING PLAN – NEW WORK

ISSUANCE: FOR BID

DATE: 02/01/2024

SCALE: AS INDICATED

DRAWN BY: MML

CHECKED BY: ML

SHEET:

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Project: 2/1/2024, 11:00 AM, By: release
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HEATING & VENTILATING UNIT SCHEDULE

UNIT ID.	AREA SERVED	MODEL NO.	OUTDOOR					SUPPLY FANS					HOT WATER HEATING COIL					FILTERS	ELECTRICAL					NOTES
			AIR (CFM)	SUPPLY (CFM)	ESP (IN W.G.)	FAN RPM	# FANS	MOTOR HP	TOTAL (MBH)	NO. OF ROWS	EAT/LAT (°F)	EWT/LWT (°F)	GPM	MCA	MOC	VOLTS	PHASE		HZ	WEIGHT (LBS)				
HV-3	NATORIUM	CAH019GHGM	12,800	12,800	0.50	1,133	1	7.5	1283.5	2	0.0/91.7	200/169	83	NONE	31.3	40	208	3	60	3,000	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15			

NOTES:

- UNIT SELECTION IS BASED ON DAIKIN AC.
- STATIC PRESSURE LISTED IS THE EXTERNAL STATIC PRESSURE AND EXCLUDES ANY PRESSURE DROP WITHIN THE UNIT.
- FURNISH UNIT WITH NON-FUSED DISCONNECT SWITCH AND SINGLE POINT ELECTRICAL CONNECTION. COORDINATE DISCONNECT SWITCH LOCATION IN FIELD.
- UNIT SHALL BE SOLID, DOUBLE-WALL CONSTRUCTION AND FURNISHED WITH HINGED ACCESS PANELS WITH QUARTER-TURN, LOCKABLE HANDLES.
- PROVIDE FLEXIBLE CONNECTIONS AT DUCT CONNECTIONS.
- FURNISH UNIT WITH PREMIUM EFFICIENCY MOTORS AND VFDs ON SUPPLY FANS.
- FURNISH UNIT WITH FACTORY MOUNTED AND WIRED GLOBAL PLASMA SOLUTIONS NEEDLEPOINT BI-POLAR IONIZATION KIT. REFER TO NEEDLEPOINT BI-POLAR IONIZATION SCHEDULE.
- PROVIDE UNIT WITH 1" THICK NEOPRENE VIBRATION ISOLATION BASE.
- PROVIDE UNIT WITH MIXING BOX WITH TOP CONNECTION AND MOTORIZED DAMPERS.
- UNIT SHALL BE PROVIDED WITH LEFT SIDE HANDLING. COORDINATE REQUIREMENTS WITH FIELD CONDITIONS PRIOR TO RELEASE.
- UNIT SHALL BE FURNISHED IN SECTIONS FOR FIELD ASSEMBLY. ASSEMBLY SHALL BE SUPERVISED BY A FACTORY AUTHORIZED REPRESENTATIVE. NUMBER OF SECTIONS SHALL BE FIELD DETERMINED.
- UNIT SHALL BE PROVIDED WITH FACTORY MOUNTED CONTROLS. COORDINATE REQUIRED CONTROL / MONITORING POINTS, WIRING, ETC. WITH ATC CONTRACTOR.
- FURNISH UNIT CONFIGURED FOR SINGLE ZONE VAV OPERATION.
- PROVIDE FACTORY START UP AND PERSONEL TRAINING.
- PROVIDE UNIT WITH FLAT FIN COIL.

FAN SCHEDULE

ID	AREA SERVED	MODEL NO.	TYPE	DRIVE	CFM	FAN RPM	S.P. (IN. W.G.)	MOTOR				INTERLOCKED WITH	WEIGHT LBS	NOTES
								HP	VOLTS	PHASE	HZ			
EF-1	NATORIUM	FJ1-24-BI-X	CENTRIFUGAL	DIRECT	13,000	1,625	1.5	10	208	3	60	HV-3	925	1,2,3,4

NOTES:

- UNIT SELECTION IS BASED ON GREENHECK.
- PROVIDE UNIT WITH 12" HIGH EQUIPMENT RAILS WITH SPRING VIBRATION ISOLATORS.
- PROVIDE UNIT WITH PRE-WIRED DISCONNECT, VFD, FLEXIBLE DUCT CONNECTION, ALUMINUM BIRD SCREEN, 75" HIGH DISCHARGE STACK, 1" DRAIN CONNECTION, AND HINGED ACCESS DOOR.
- PROVIDE FAN AND ACCESSORIES WITH HI-PRO POLYESTER COATING AND CORROSION RESISTANT FASTENERS.

FREEZE PROTECTION PUMP SCHEDULE

UNIT ID	MODEL NO.	MANUFACTURER	SERVICE	PUMP DATA				MOTOR DATA					WEIGHT (LBS)	NOTES
				FLOWRATE (GPM)	HEAD (FT)	IMPELLER DIA. (IN.)	TYPE	RPM	HP	VOLTS	PHASE	HZ		
FPP-1	E-90	BELL & GOSSETT	HV-3	83.0	20.0	5.125	INLINE	1800	3/4	120	1	60	95	1,2,3,4

NOTES:

- PROVIDE DISCONNECT SWITCH
- FURNISH ALL REQUIRED VALVES AND SPECIALTIES IN ACCORDANCE WITH THE APPROPRIATE PUMP DETAILS.
- FURNISH WITH PREMIUM EFFICIENCY, INVERTER DUTY MOTOR WITH VARIABLE SPEED DRIVE (VFD).
- PROVIDE THREADED HANGING RODS AND SPRING VIBRATION ISOLATORS.

NEEDLEPOINT BIPOLAR IONIZATION SCHEDULE

TAG	MODEL NUMBER	IONIZATION RATE	QTY (EACH UNIT)	VOLTAGE V/PHz	WATTAGE (AMPS)	NOTES
HV-3	GPS-Mod-72-Snap	>480 Million Ions/cc	2	277/1/60	15	1,2,3,4,5

NOTES:

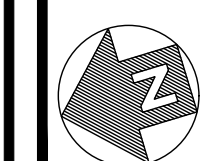
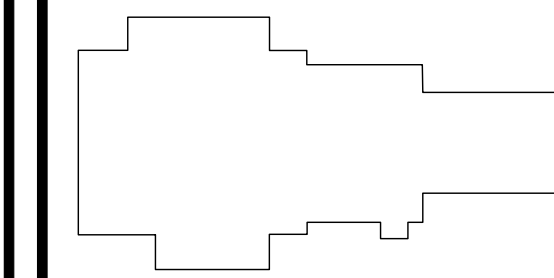
- UNIT SELECTION IS BASED ON GLOBAL PLASMA SOLUTIONS, INC.
- PROVIDE ZERO MAINTENANCE SELF-CLEANING.
- UL 2998 CERTIFIED FOR ZERO OZONE PRODUCTION.
- PROVIDE TRANSFORMER AND BAS ALARM CONTACT. ATC CONTRACTOR TO TIE INTO BMS.
- INSTALL IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS.

DUCT MOUNTED FILTER BOX SCHEDULE

TAG	MODEL NUMBER	FILTER	FILTER QTY	SIZE LxWxH	NOTES
F-1	SAVB-4-212H2W-VF	MERV 8	10	62x50x28	1,2,3,4,5,6,7,8,9

NOTES:

- UNIT SELECTION IS BASED ON AIRE-LOC.
- PROVIDE UNIT WITH 12 GAUGE GALVANIZED STEEL OUTER CASING.
- PROVIDE 20 GAUGE GALVANIZED STEEL FILTER TRACKING.
- PROVIDE ACCESS DOOR WITH QUICK ACTION POSITIVE PRESURE LATCHES AND 4" HINGES.
- PROVIDE ACCESS DOOR WITH NEOPRENE GASKET.
- PROVIDE 2# DENSITY URETHANE FOAM MOUNTED ON ACCESS DOOR TO SEAL AGAINST FILTERS.
- ALL METAL TO METAL COMPONENTS SHALL BE SEALED AIR TIGHT WITH SILICONE.
- UNIT SHALL BE CONFIGURATION FOR VERTICAL FLOW.
- UNIT SHALL BE PAINTED. COLOR SELECTED BY OWNER.



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REVISIONS		

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MECHANICAL – SCHEDULES

ISSUANCE: FOR BID

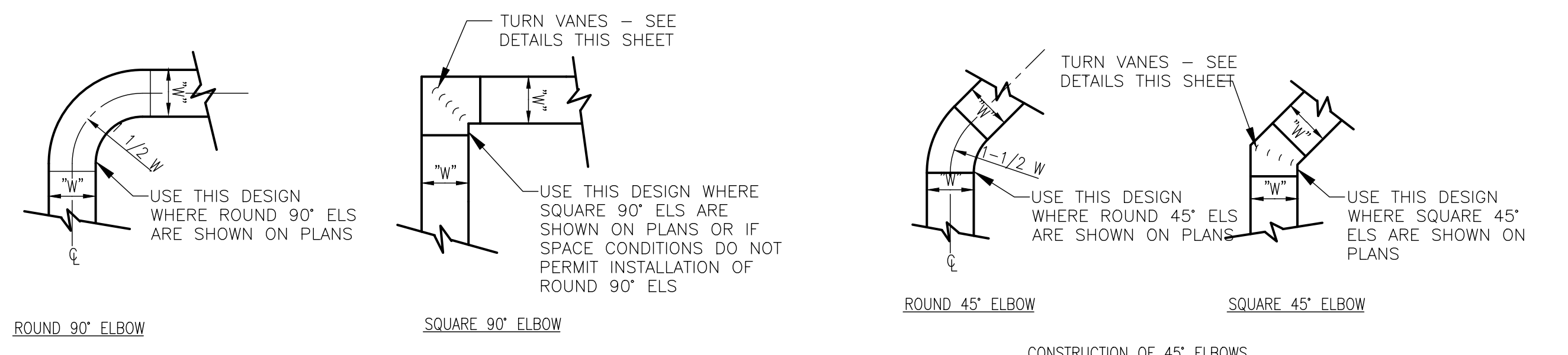
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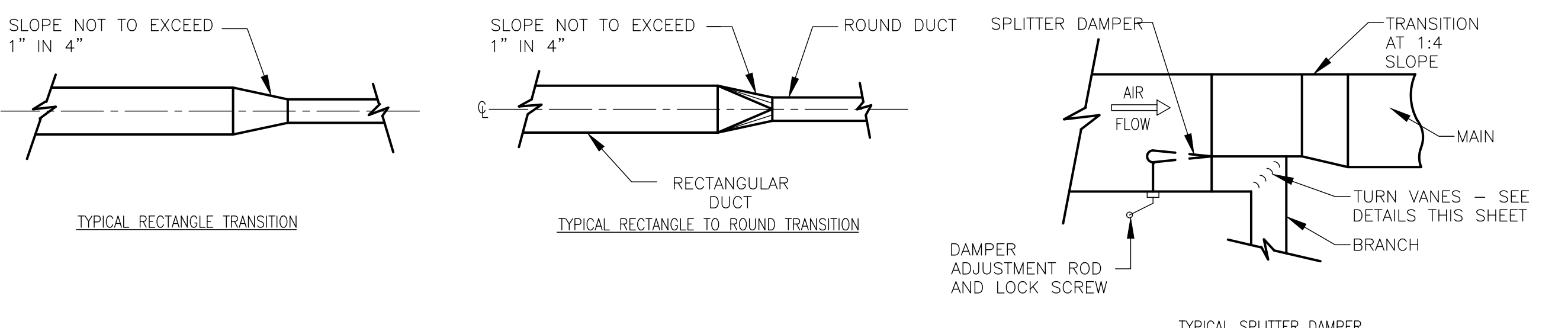
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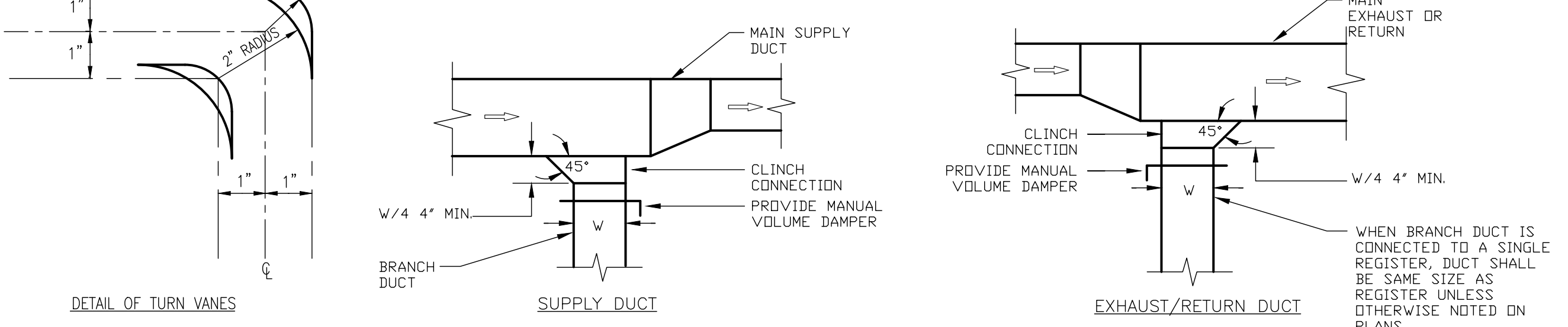
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ROUND 90° ELBOW CONSTRUCTION OF 90° ELBOWS SQUARE 90° ELBOW CONSTRUCTION OF 45° ELBOWS



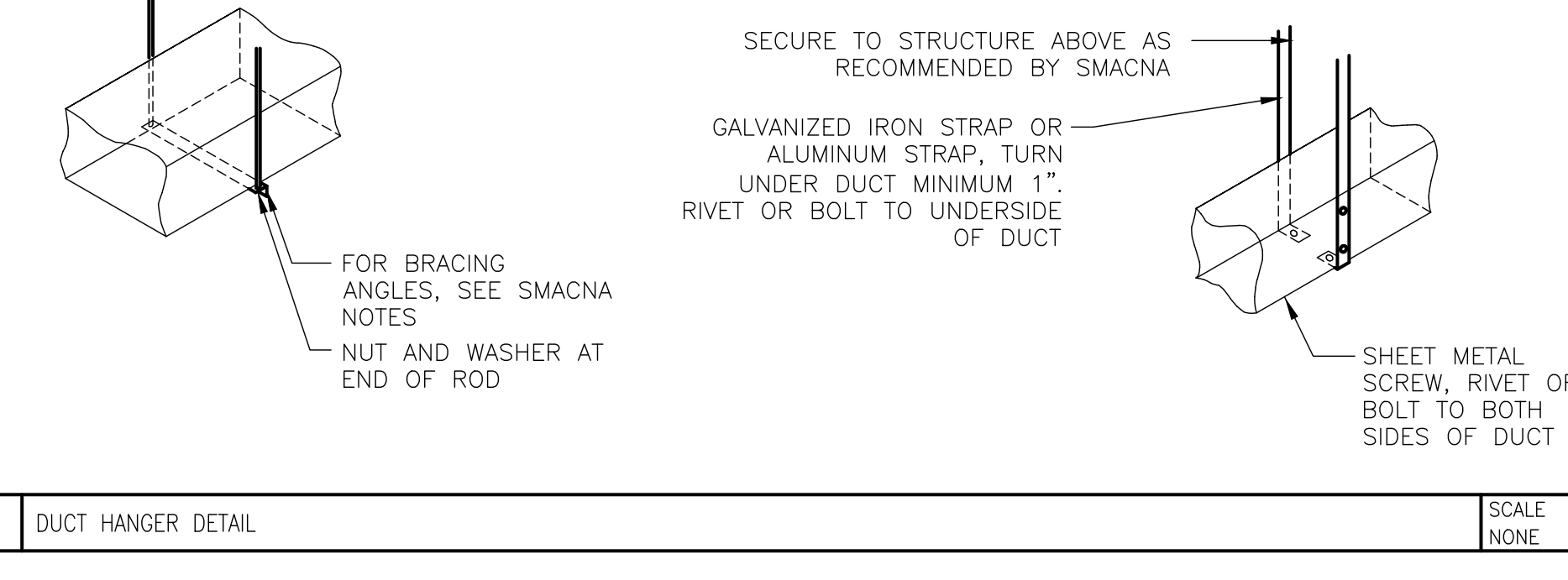
TYPICAL RECTANGLE TRANSITION TYPICAL RECTANGLE TO ROUND TRANSITION TYPICAL SPLITTER DAMPER



DUCTWORK DETAILS SCALE NONE

RECTANGULAR DUCT HANGER SCHEDULE (MINIMUM SIZES)

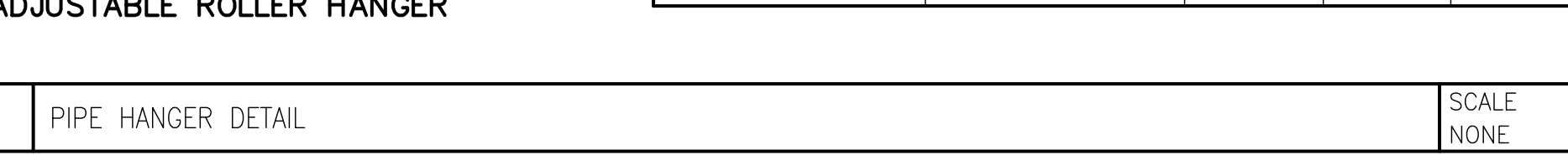
HALF DUCT PERIMETER RANGE	PAIR AT 10' SPACING		PAIR AT 8' SPACING		PAIR AT 5' SPACING		PAIR AT 4' SPACING	
	STRAP	WIRE/ROD	STRAP	WIRE/ROD	STRAP	WIRE/ROD	STRAP	WIRE/ROD
P/2 < 30"	1"x 22 GA.	10 GA. (0.135")	1"x 22 GA.	10 GA. (0.135")	1"x 22 GA.	12 GA. (0.106")	1"x 22 GA.	12 GA. (0.106")
P/2 < 72"	1"x 18 GA.	3/8"	1"x 20 GA.	1/4"	1"x 22 GA.	1/4"	1"x 22 GA.	1/4"
P/2 < 96"	1"x 16 GA.	3/8"	1"x 18 GA.	3/8"	1"x 20 GA.	3/8"	1"x 22 GA.	1/4"
P/2 < 120"	1-1/2"x 16 GA.	1/2"	1"x 16 GA.	3/8"	1"x 18 GA.	3/8"	1"x 20 GA.	1/4"
P/2 < 168"	1-1/2"x 16 GA.	1/2"	1"x 16 GA.	1/2"	1"x 16 GA.	3/8"	1"x 18 GA.	3/8"
P/2 < 192"	-	1/2"	1-1/2"x 16 GA.	1/2"	1"x 16 GA.	3/8"	1"x 16 GA.	3/8"



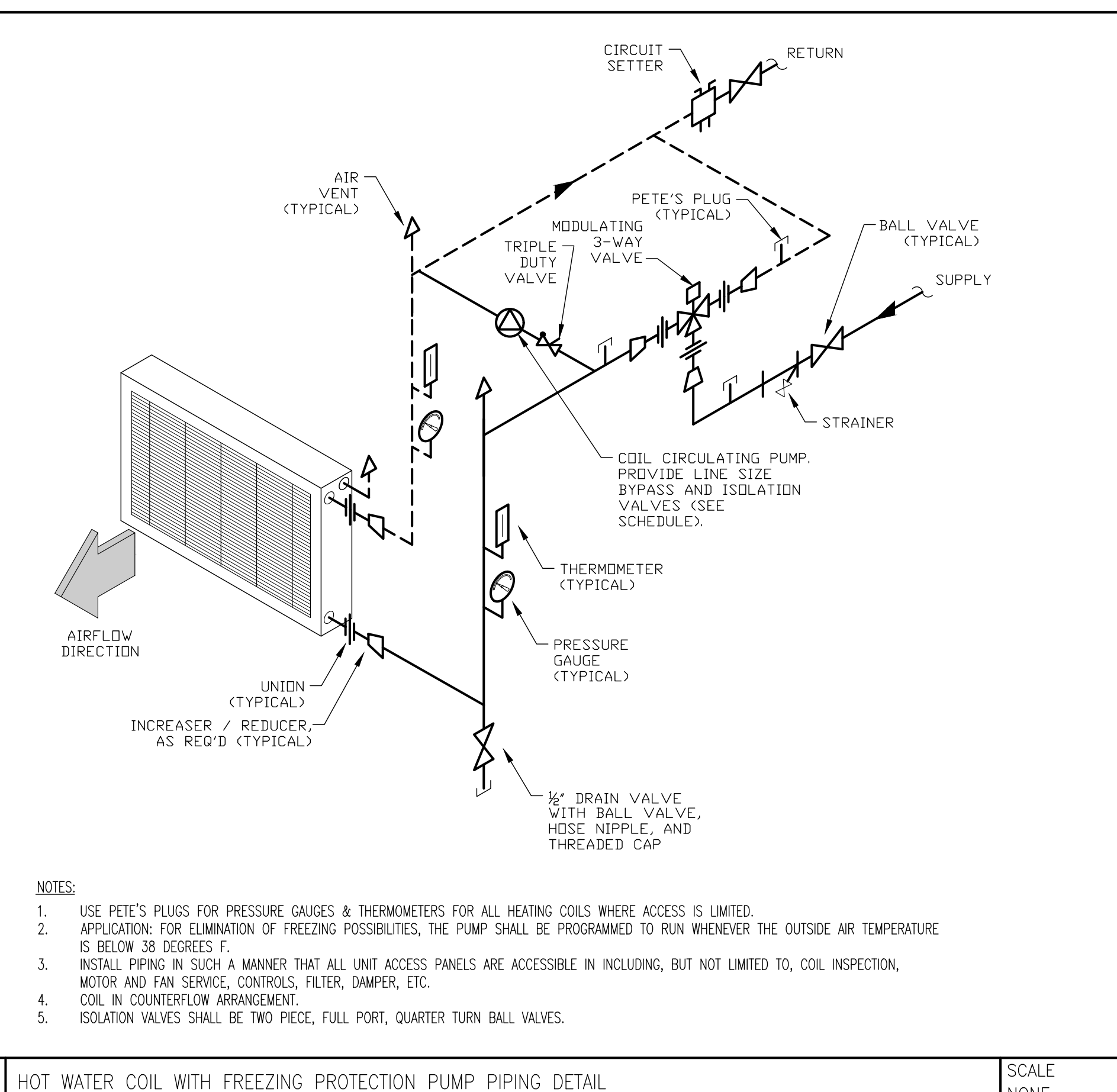
DUCT HANGER DETAIL SCALE NONE

HANGER SPACING/ROD SIZE SCHEDULE

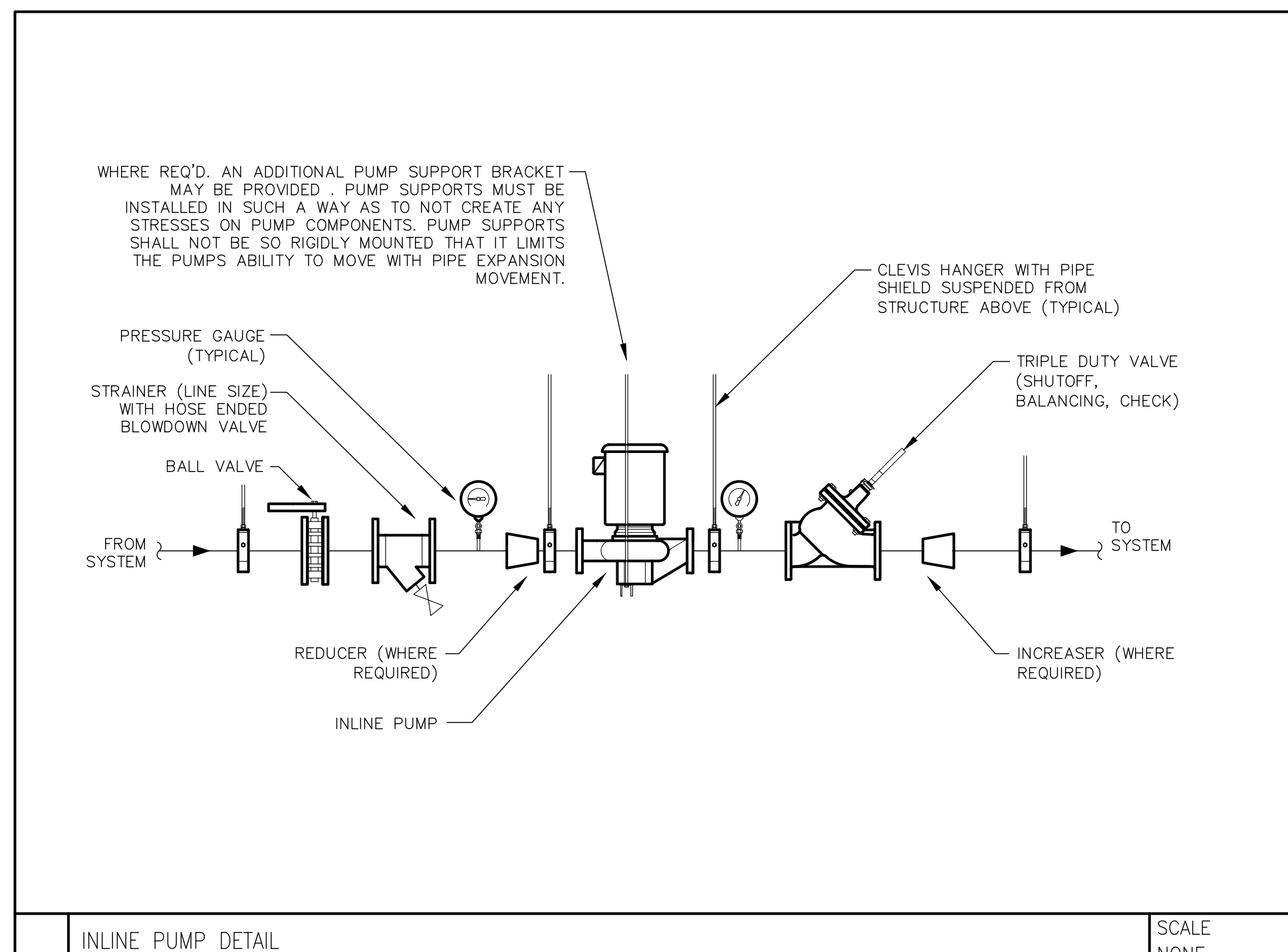
PIPE SIZE	MINIMUM HANGER ROD SIZE	MAXIMUM HANGER SPACING		
		STEAM & WATER COPPER TYPE L	STEEL SCH 40	NATURAL GAS SCH 40
1/2"	1/4"	6'	5'	6'
3/4"	1/4"	6'	6'	8'
1"	1/4"	6'	7'	8'
1-1/4"	3/8"	6'	9'	10'
1-1/2"	3/8"	6'	9'	10'
2"	3/8"	10'	10'	10'
2-1/2"	1/2"	10'	11'	10'
3"	1/2"	10'	12'	10'
4"	5/8"	-	14'	-
6"	3/4"	-	17'	-
8"	7/8"	-	19'	-
10"	7/8"	-	22'	-
12"	7/8"	-	23'	-



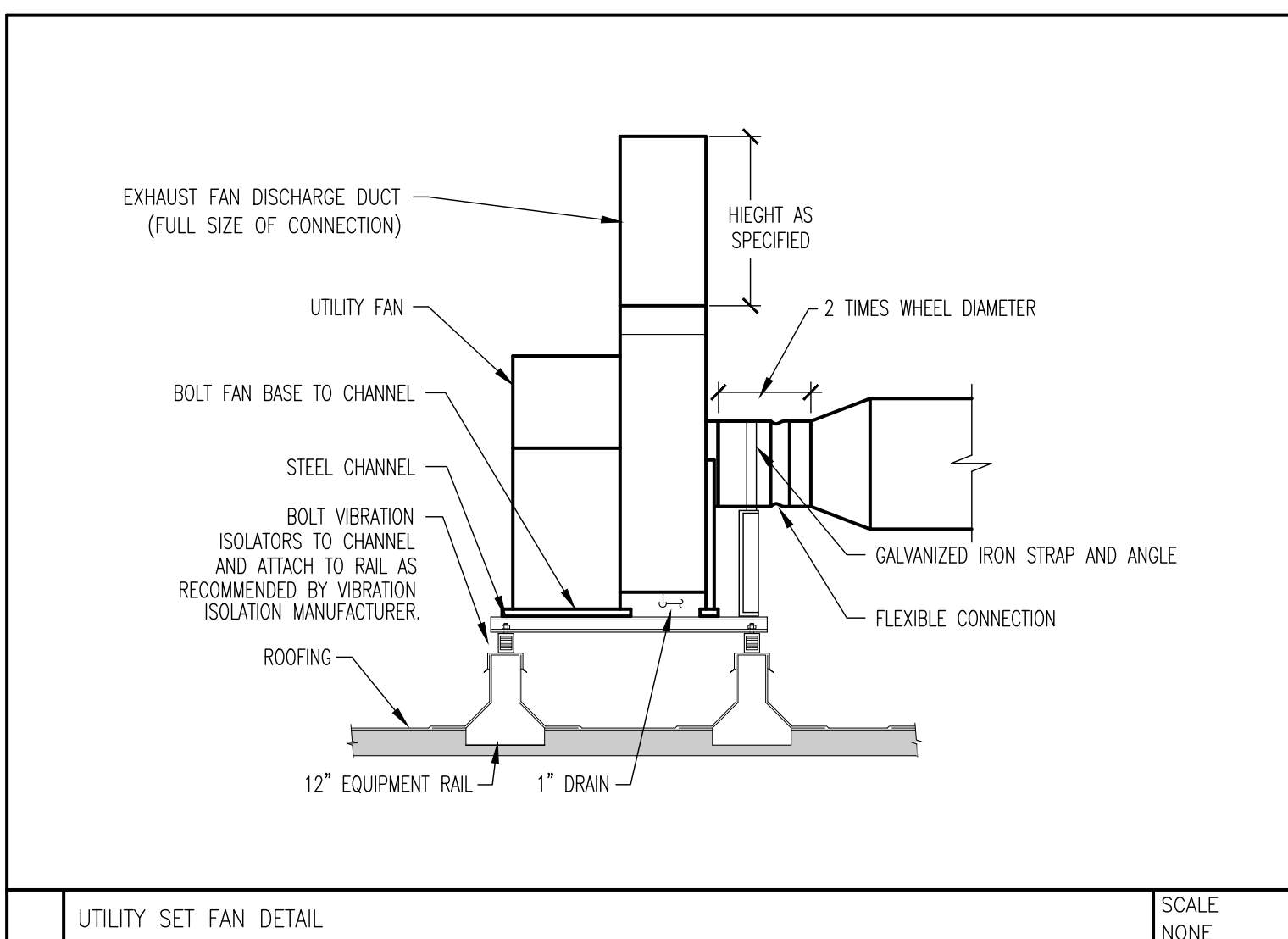
PIPE HANGER DETAIL SCALE NONE



HOT WATER COIL WITH FREEZING PROTECTION PUMP PIPING DETAIL SCALE NONE

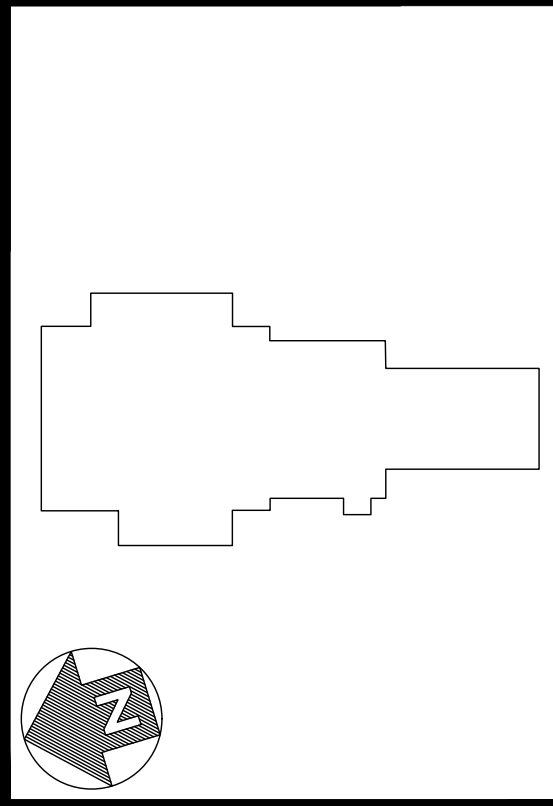


INLINE PUMP DETAIL SCALE NONE



UTILITY SET FAN DETAIL SCALE NONE

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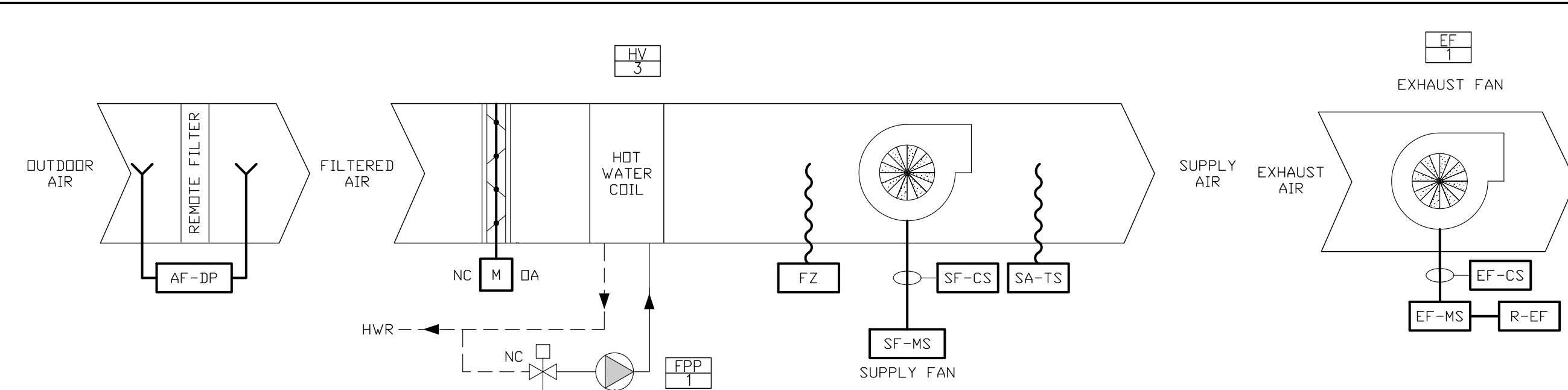
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SYMBOL LIST

AF-DP	AIR FILTER DIFFERENTIAL PRESSURE SWITCH
EF-CS	EXHAUST FAN CURRENT SENSOR
EF-MS	EXHAUST FAN MOTOR STARTER
FZ	FREEZESTAT
FRZ-CS	COIL FREEZE PROTECTION PUMP CURRENT SENSOR
FRZ-R	COIL FREEZE PROTECTION PUMP START/STOP RELAY
M	MOTOR OPERATED DAMPER ACTUATOR
SA-CS	SUPPLY AIR FAN CURRENT SENSOR
SA-MS	SUPPLY AIR FAN MOTOR STARTER
SA-TS	SUPPLY AIR TEMPERATURE SENSOR
R-EF	EF MOTOR START/STOP RELAY

ANALOG INPUTS

SUPPLY AIR TEMPERATURE

ANALOG OUTPUTS

OUTDOOR AIR DAMPER
HOT WATER VALVE CONTROL

DIGITAL INPUTS

EXHAUST FAN START/STOP
FILTER STATUS
FREEZE PUMP STATUS
FREEZESTAT
SUPPLY FAN STATUS

DIGITAL OUTPUTS

EXHAUST FAN START/STOP
FREEZE PUMP START/STOP
SUPPLY FAN START/STOP
EXHAUST FAN START/STOP

HOT WATER HEATING AND VENTILATING (100% OA) UNIT CONTROL DETAIL

SCALE
NONE

CONTROL SCOPE NOTES

CONTROL SCOPE SHALL BE PROVIDED BY THE OWNER'S BMS CONTRACTOR OF CHOICE. THE MECHANICAL, ELECTRICAL, AND GENERAL CONTRACTOR SHALL COORDINATE WITH THE OWNER'S BMS CONTRACTOR TO PROVIDE A FULLY FUNCTIONING CONTROL SYSTEM INTEGRATED INTO THE EXISTING BMS. OWNER'S BMS CONTRACTOR SHALL PROVIDE ALL MATERIAL AND LABOR AS REQUIRED FOR A FULLY FUNCTIONING CONTROL SYSTEM INTEGRATED INTO THE EXISTING BMS TO THE OWNER'S SATISFACTION.

HOT WATER HEATING & VENTILATING AIR HANDLING (100% OA) UNIT – SEQUENCE OF OPERATION

GENERAL

THE ATC CONTRACTOR SHALL FURNISH A BACNET DDC CONTROLLER AND ALL REQUIRED SENSORS, ACTUATORS, DAMPERS, VALVES, ETC. FOR OPERATION AS DESCRIBED HEREIN.

HOT WATER VALVES WILL BE FAIL SAFE OPEN UPON A LOSS OF POWER OR CONTROL SIGNAL. OUTDOOR AIR DAMPERS WILL BE FAIL SAFE CLOSE UPON A LOSS OF POWER OR CONTROL SIGNAL.

THE UNIT WILL BE INDEXED FOR OCCUPIED/UNOCCUPIED CYCLE FROM THE UNIT MOUNTED DDC CONTROLLER AND FRONT END WORKSTATION. THE UNIT CAN BE INDEXED TO THE OCCUPIED MODE FROM THE PUSH-BUTTON OVERRIDE ON THE ROOM TEMPERATURE SENSOR.

THE ROOM TEMPERATURE SENSOR WILL HAVE LOCAL SETPOINT ADJUSTMENTS AND WILL BE INITIALLY SET FOR 70 DEG F. THE SETPOINT ADJUSTMENT WILL BE LIMITED FROM THE CONTROLLER TO PLUS OR MINUS 3 DEG F OF SETPOINT.

UNOCCUPIED MODE

WHEN THE UNIT IS IN UNOCCUPIED MODE THE OUTDOOR DAMPER WILL BE CLOSED AND THE LOCAL EXHAUST FAN SHALL BE DE-ENERGIZED. THE SUPPLY FAN SHALL CYCLE AND THE HOT WATER COIL VALVE SHALL MODULATE TO MAINTAIN A 60 DEG F. SETPOINT (ADJUSTABLE).

OCCUPIED MODE

WHEN THE SYSTEM IS IN THE OCCUPIED MODE, THE HEATING HOT WATER VALVE SHALL FULLY OPEN IF THE OUTDOOR AIR TEMPERATURE IS 65°F (ADJUSTABLE) OR BELOW. ONCE THE VALVE HAS REACH THE FULLY OPEN POSITION, AN AUXILIARY SWITCH ON THE VALVE ACTUATOR SHALL INDICATE THE VALVE POSITION AND THEN BEGIN A 30 SECOND TIME DELAY. AT THE END OF THE 30 SECOND TIME DELAY, THE OUTDOOR AIR DAMPER SHALL OPEN, ONCE THE DAMPER HAS REACHED THE OPEN POSITION, AS PROVEN BY AND END SWITCH ON THE DAMPER ACTUATOR, THE HEATING AND VENTILATING UNIT SUPPLY FANS AND INTERLOCKED EXHAUST FANS) SHALL START AND RUN CONTINUOUSLY. ONCE THE HEATING AND VENTILATING UNITS HAVE STARTED, THE HOT WATER COIL CONTROL VALVE SHALL MODULATE TO MAINTAIN A CONSTANT, 65°F DISCHARGE AIR TEMPERATURE (ADJUSTABLE).

IF THE OUTDOOR AIR TEMPERATURE IS ABOVE 65°F (ADJUSTABLE), THE HEATING AND VENTILATING UNIT SUPPLY FANS AND EXHAUST FANS SHALL START UPON PROOF OF THE OUTDOOR AIR DAMPER OPENING WITHOUT THE 30 SECOND, HOT WATER VALVE TIME DELAY.

FREEZE PROTECTION

PROVIDE A MANUAL RESET ANTI-FREEZE STAT IN THE SUPPLY AIR DUCT OF THE HEATING AND VENTILATING (HV) UNIT ON THE LEAVING AIRSIDE OF THE HOT WATER COIL. WHEN THE DISCHARGE AIR TEMPERATURE FALLS BELOW 40°F, THE SENSOR SHALL CLOSE THE UNIT OUTDOOR AIR INTAKE, DE-ENERGIZE THE UNIT SUPPLY FAN, OPEN THE HOT WATER COIL CONTROL VALVE, AND DISPLAY AN ALARM STATUS WILL BE INDICATED AT THE FRONT END WORKSTATION. THIS ALARM MUST BE ACKNOWLEDGED AND RESET THROUGH A SOFTWARE SWITCH LOCATED ON THE FRONT END GRAPHICS.

THE HOT WATER COIL FREEZE PROTECTION PUMPS SHALL START AND RUN CONTINUOUSLY WHENEVER THE OUTDOOR AIR TEMPERATURE IS BELOW 65°F. THE PUMP STATUS SHALL BE MONITORED. UPON FAILURE OF A FREEZE PROTECTION PUMP, AN ALARM STATUS WILL BE INDICATED AT THE FRONT END WORKSTATION. THIS ALARM MUST BE ACKNOWLEDGED AND RESET THROUGH A SOFTWARE SWITCH LOCATED ON THE FRONT END GRAPHICS.

FIRE ALARM SYSTEM INTERLOCK

COORDINATE WITH THE FIRE ALARM CONTRACTOR TO PROVIDE AN INTERCONNECTION BETWEEN THE NEW HEATING & VENTILATING UNIT SUPPLY FANS AND THE EXISTING BUILDING FIRE ALARM SYSTEM. UPON ACTIVATION OF AN ALARM, THE UNIT SUPPLY FANS SHALL BE DE-ENERGIZED AND THE OUTDOOR AIR INTAKE DAMPER SHALL CLOSE.

FILTER STATUS

PROVIDE A DIFFERENTIAL PRESSURE SWITCH AT THE REMOTE FILTER BANKS. THE SWITCH SHALL BE SET AS PER THE FILTER MANUFACTURER'S RATING FOR A DIRTY FILTER. WHENEVER THE FILTER EXCEEDS THIS RATING, THE FILTER SWITCH SHALL INDICATE A DIRTY FILTER ALARM TO THE ATC SYSTEM.

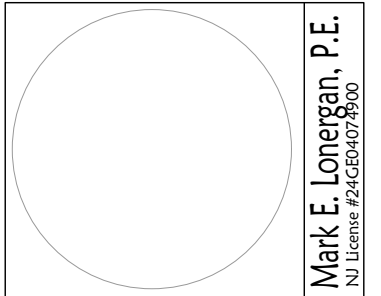
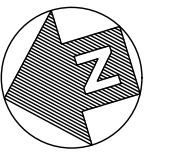
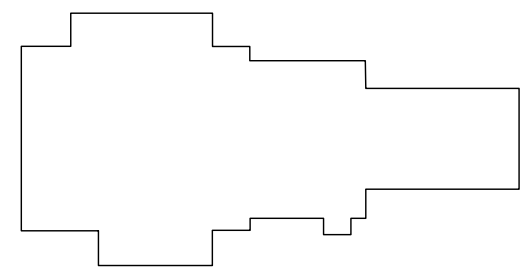
BMS INTERFACE

AN ALARM SHALL BE GENERATED AT THE FRONT END WORKSTATION UPON:

- CONTROL BOARD LOSS OF COMMUNICATION
- HIGH SPACE TEMPERATURE (> 5 DEG. F ABOVE SETPOINT)
- LOW SPACE TEMPERATURE (< 5 DEG. F BELOW SETPOINT)
- FAN FAILURE
- FREEZE PROTECTION PUMP FAILURE
- CLOGGED AIR FILTER
- FREEZESTAT
- FIRE ALARM

AT THE FRONT END WORKSTATION, PROVIDE A DYNAMIC COMPUTERIZED GRAPHICAL REPRESENTATION OF THE UNIT AND COMPONENTS. THE USER SHALL BE CAPABLE OF VIEWING AND ADJUSTING SETPOINTS AND OPERATIONAL CONDITIONS OF THE FOLLOWING:

- ROOM TEMPERATURE AND SETPOINT
- DISCHARGE AIR TEMPERATURE
- HEATING VALVE (COMMANDED POSITION)
- OUTSIDE AIR DAMPER (COMMANDED POSITION)
- FREEZE PROTECTION PUMP STATUS
- EXHAUST FAN STATUS
- OCCUPIED/UNOCCUPIED CYCLE
- LOW LIMIT ALARM INCLUDING RESET
- FILTER STATUS



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J&U Project # 22-148

HEATING & VENTILATING UNIT
REPLACEMENT AT:

**MONTCLAIR STATE
UNIVERSITY**

**PANZER
GYMNASIUM**

1 NORMAL AVE.
MONTCLAIR, NJ 07424

NO. DATE DESCRIPTION

REVISIONS

TITLE:

**MECHANICAL –
CONTROL DIAGRAMS
AND SEQUENCE OF
OPERATIONS**

ISSUANCE: FOR BID

DATE: 02/01/2024

SCALE: AS INDICATED

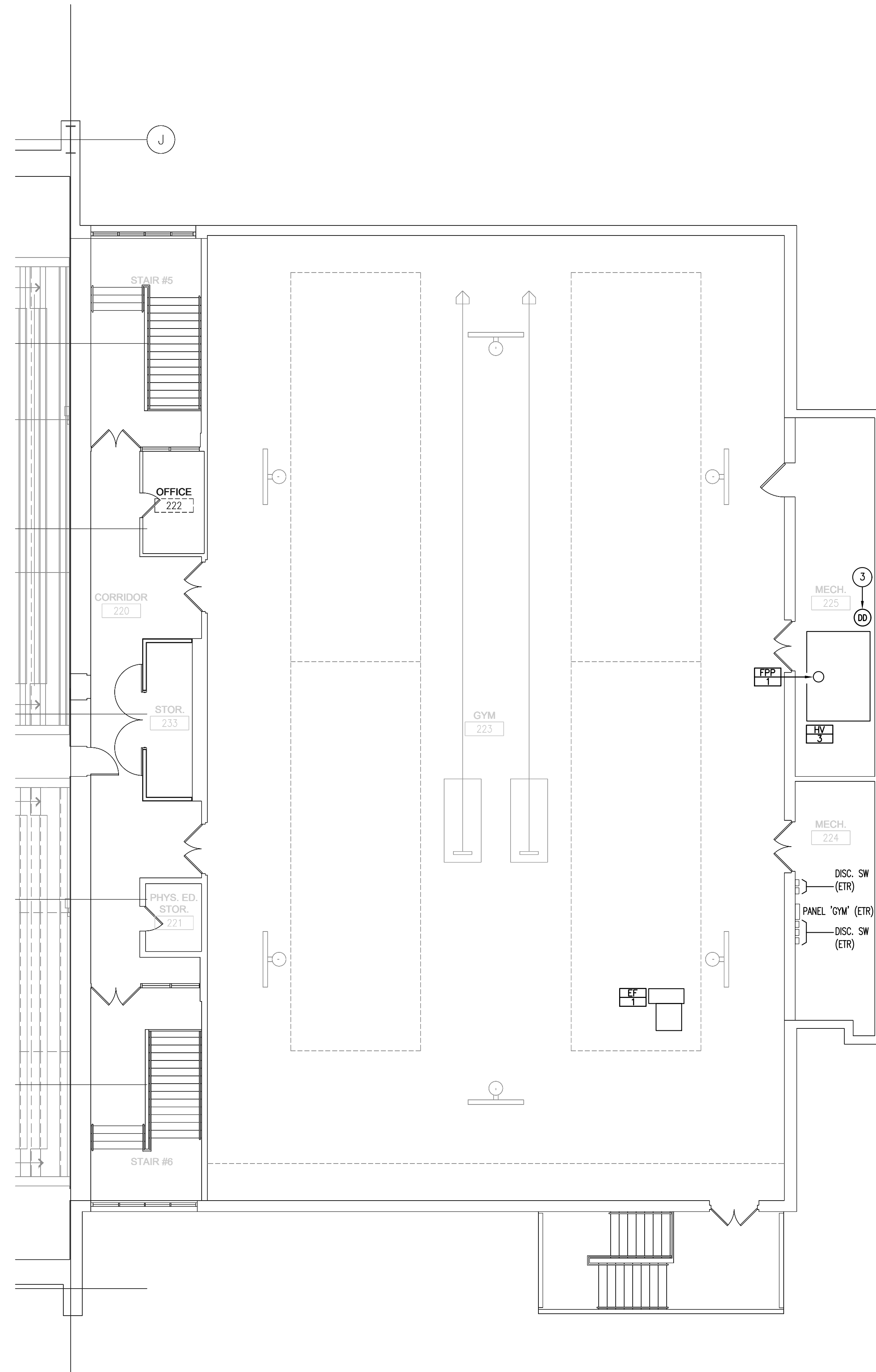
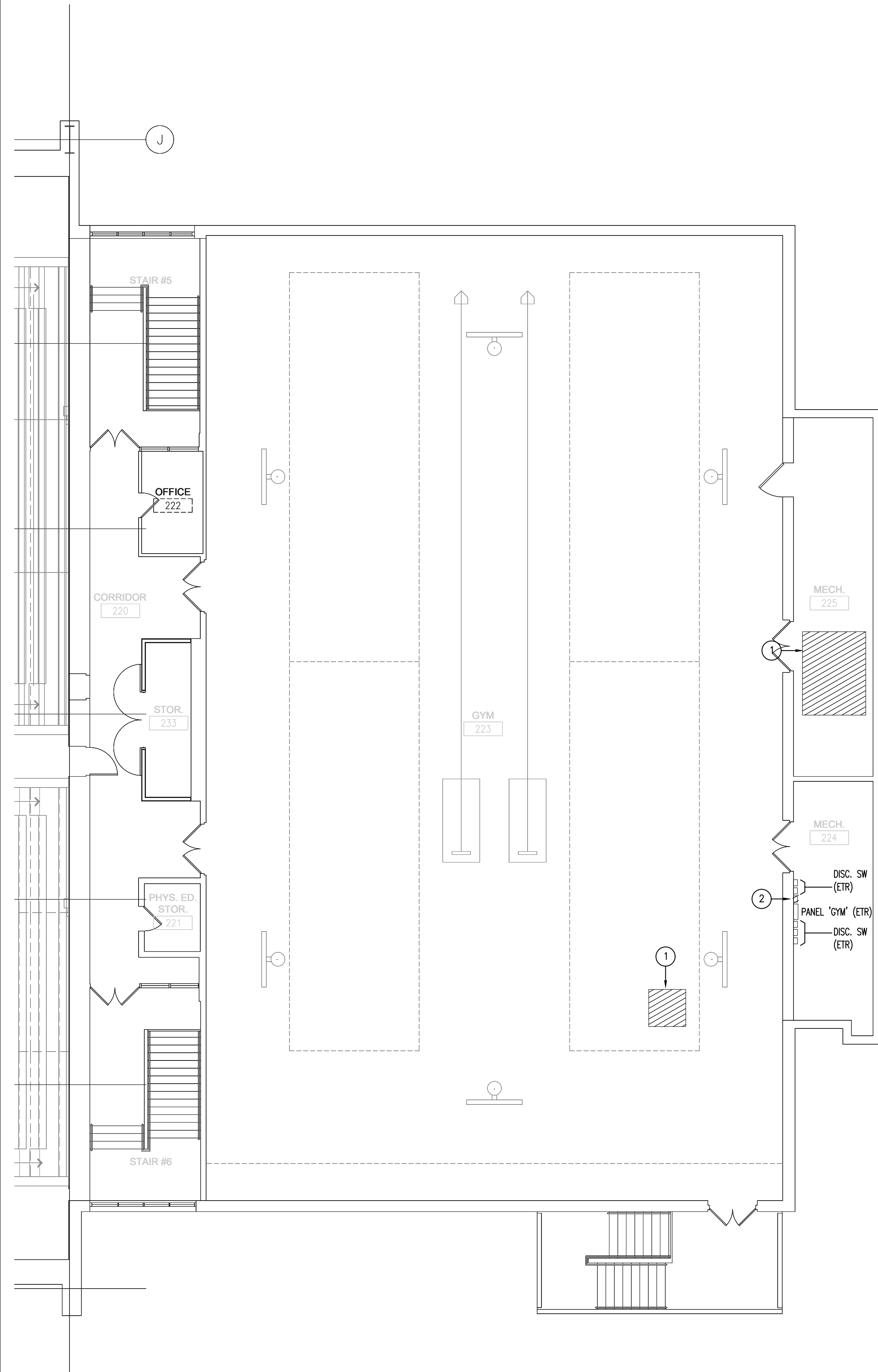
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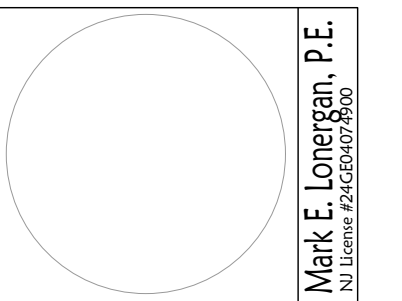
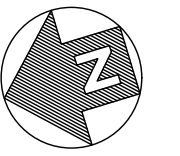
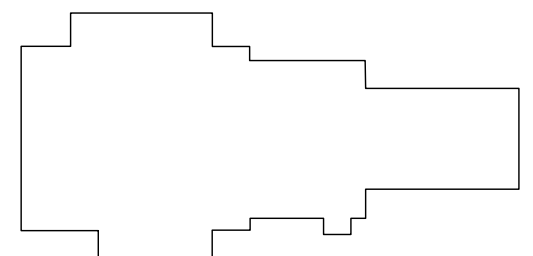


GENERAL NOTES

1. CONTRACTOR SHALL VISIT THE SITE TO VERIFY EXISTING CONDITIONS PRIOR TO SUBMISSION OF BID. NO ADDITIONAL COMPENSATION SHALL BE CONSIDERED FOR FAILURE TO OBSERVE THIS REQUIREMENT.
2. THE CONTRACTOR SHALL DISCONNECT AND REMOVE ALL ELECTRICAL WIRING AND EQUIPMENT AS REQUIRED WITHIN ALL AREAS TO BE RENOVATED. THIS SHALL INCLUDE BUT NOT BE LIMITED TO FIXTURES, DEVICES, OUTLETS, SWITCHES, RECEPTACLES, STARTERS, DISCONNECTS, PANELS, FEEDERS, ETC.
3. WHERE ELECTRICAL ITEMS ARE REMOVED, ALL BRANCH DEVICES WIRING SHALL BE REMOVED BACK TO PANEL SERVICING THE EQUIPMENT. WHERE CIRCUITS SERVE ADDITIONAL DEVICES OR EQUIPMENT REMAINING, WIRING SHALL BE REMOVED BACK TO THE NEAREST ACTIVE JUNCTION BOX.
4. THE CONTRACTOR SHALL MAINTAIN CONTINUITY OF EXISTING CIRCUITS THAT ARE TO REMAIN IN OPERATION AND SCHEDULE FOR RE-FEEDING FROM NEW PANELS. FORWARD FINDINGS TO ENGINEER FOR REVIEW AND COORDINATION.
5. ALL UNUSED CIRCUITS REMAINING AFTER REMOVALS SHALL BECOME SPARE IN PANELS AND LABELED AS SPARE.
6. THE CONTRACTOR SHALL REFER TO ARCHITECTURAL DEMOLITION DRAWINGS FOR ADDITIONAL INFORMATION AND SCOPE OF DEMOLITION.
7. ALL MATERIALS AND EQUIPMENT REMOVALS SHALL BE DISPOSED OF AS DIRECTED BY THE OWNER OR THE ARCHITECT.
8. NOT ALL AREAS MAY HAVE BEEN ACCESSIBLE DURING SURVEY. EQUIPMENT SHOWN IS TO THE BEST OF THE SURVEYOR'S ABILITY DUE TO SITE CONSTRAINTS. CONTRACTOR IS RESPONSIBLE FOR FINAL SURVEY OF ALL AREAS IN SCOPE FOR DEMOLITION AS SHOWN.
9. REFER TO ARCHITECTURAL AND EQUIPMENT PLANS FOR EXACT LOCATIONS OF ALL EQUIPMENT.
10. MECHANICAL AND/OR PLUMBING EQUIPMENT IS INDICATED FOR REFERENCE ONLY. REFER TO MECHANICAL AND PLUMBING DRAWINGS FOR EXACT QUANTITY AND LOCATIONS OF ALL MECHANICAL AND PLUMBING EQUIPMENT. THE CONTRACTOR MUST HAVE THE H.V.A.C. AND PLUMBING DRAWINGS FOR LOCATIONS OF EQUIPMENT AND CONTROL WIRING REQUIREMENTS. POWER FEEDER TO MECHANICAL AND/OR PLUMBING EQUIPMENT ARE SCHEDULED ON THE ELECTRICAL DRAWINGS. FURNISH AND INSTALL ALL CODE REQUIRED DISCONNECT SWITCHES FOR MECHANICAL EQUIPMENT UNLESS SPECIFIED ON MECHANICAL DRAWINGS TO BE SUPPLIED BY MANUFACTURER. PROVIDE FUSED SWITCHES WHEREVER MANUFACTURER REQUIRES THEM.
11. COORDINATE EXACT DEVICE LOCATIONS AND MOUNTING HEIGHTS WITH ARCHITECT AND ARCHITECTURAL DOCUMENTS PRIOR TO INSTALLATION.
12. ALL WIRING IN AREAS WITH EXPOSED CEILINGS SHALL BE WITHIN CONDUIT. MC CABLE SHALL ONLY BE USED IN AREAS WITH CEILINGS OR CONCEALED WITHIN WALLS.
13. ALL WIRING ABOVE ACCESSIBLE SUSPENDED CEILINGS SHALL BE SUPPORTED WITH J-HOOKS SPACED AT MAXIMUM 4'-0" ON CENTERS.

KEY NOTES

- ① EXISTING HVAC UNIT TO BE DISCONNECTED AND REMOVED. CONTRACTOR SHALL DISCONNECT EXISTING CIRCUIT AND REMOVE IT BACK TO THE SOURCE, UNLESS SPECIFICALLY NOTED OTHERWISE. EXPOSED J-BOXES AND RACEWAY SHALL BE REMOVED IN THEIR ENTIRETY. REFER TO THE NEW WORK PLAN FOR ADDITIONAL INFORMATION.
- ② EXISTING HVAC UNIT STARTER/DISCONNECT SWITCH TO BE DISCONNECTED AND REMOVED. CONTRACTOR SHALL DISCONNECT EXISTING CIRCUIT AND REMOVE IT BACK TO THE SOURCE, UNLESS SPECIFICALLY NOTED OTHERWISE. EXPOSED J-BOXES AND RACEWAY SHALL BE REMOVED IN THEIR ENTIRETY. REFER TO THE NEW WORK PLAN FOR ADDITIONAL INFORMATION.
- ③ NEW FIRE ALARM DEVICE (COMPATIBLE WITH THE EXISTING DEVICES/SYSTEM). PROVIDE WIRING/CONDUIT (QTY AND SIZE TO MATCH EXISTING) BETWEEN THE PREVIOUS AND NEXT DEVICE IN LINE IN THE NEAREST CIRCUIT. COORDINATE EXACT LOCATION IN THE FIELD. CONTRACTOR SHALL BE RESPONSIBLE FOR HAVING THE SYSTEM TESTED AND REPROGRAMMED BY A MANUFACTURERS CERTIFIED TECHNICIAN.



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NO.	DATE	DESCRIPTION
REVISIONS		

TITLE:
ELECTRICAL
FIRST FLOOR PLANS

ISSUANCE: FOR BID

DATE: 02/01/2024

SCALE: AS INDICATED

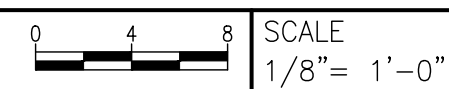
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1 ELECTRICAL FIRST FLOOR DEMOLITION PLAN



2 ELECTRICAL FIRST FLOOR NEW WORK PLAN

