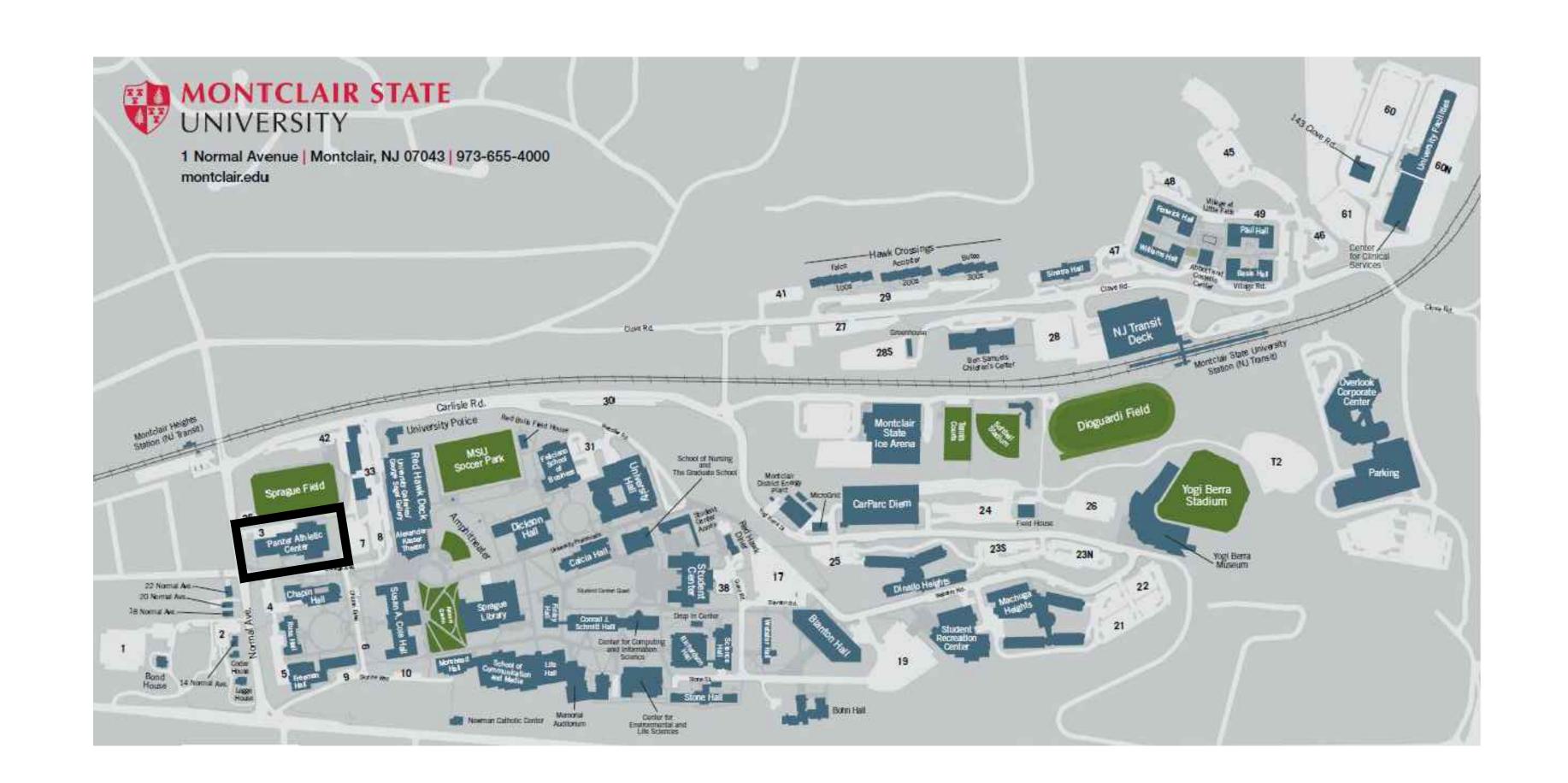
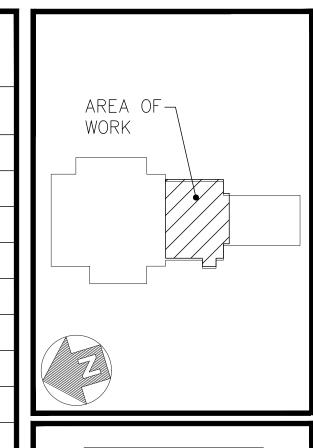
# MONTCLAIR STATE UNIVERSITY

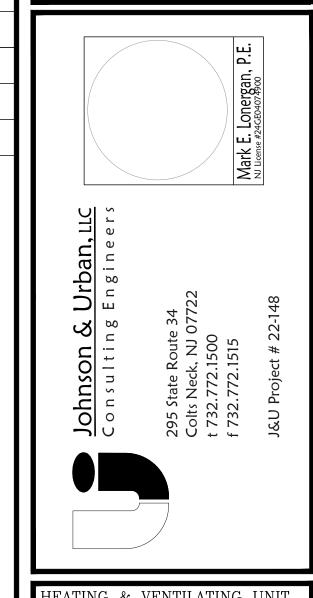
NORMAL AVE MONTCLAIR, NJ 07043

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



	LIST OF DRAWINGS							
Dwg. #	Drawing Title							
T.01	PROJECT COVER SHEET							
MO.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							
м3.0	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							





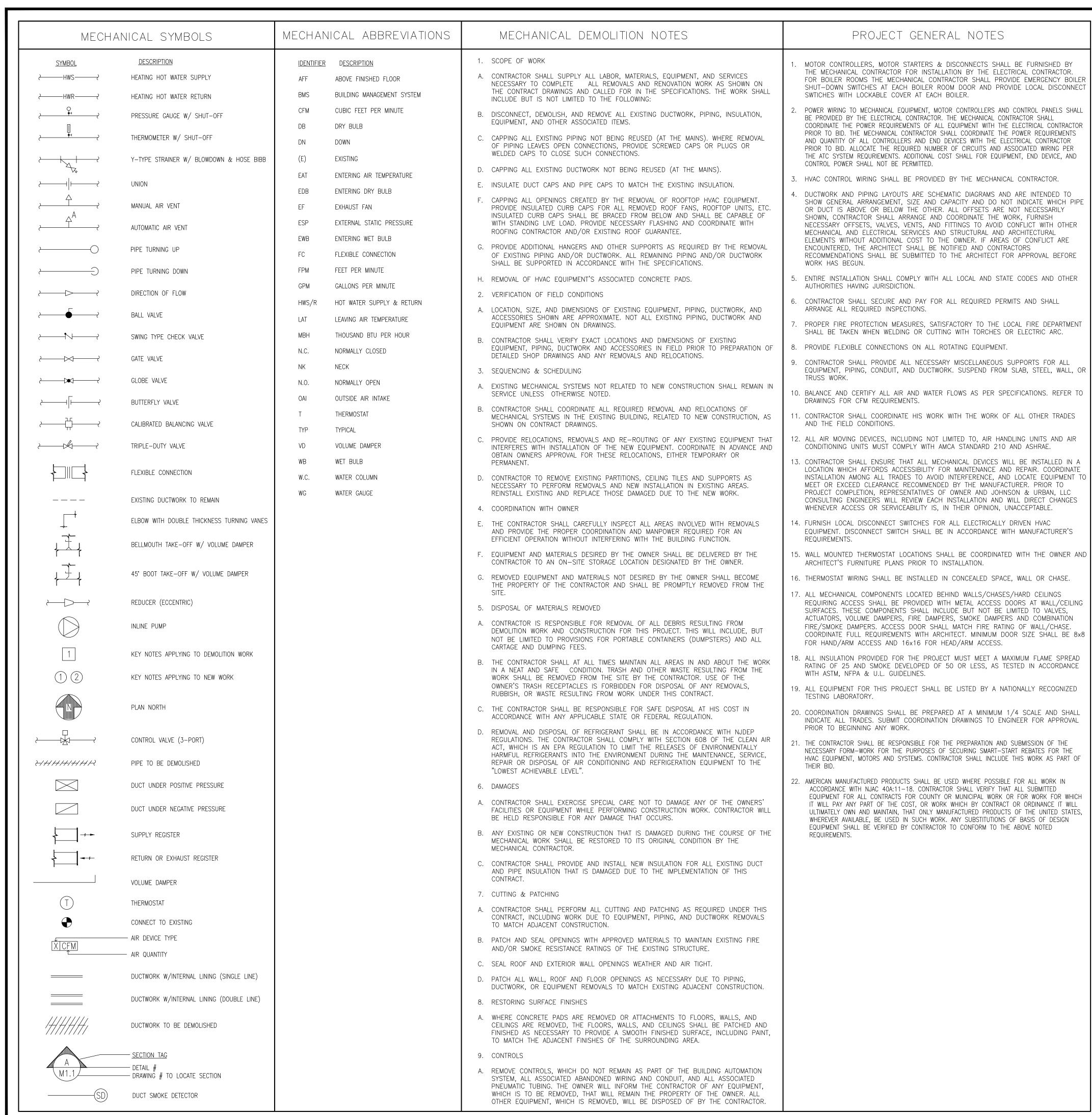
HEATING & VENTILATING UNIT REPLACEMENT AT:
MONTCLAIR STATE UNIVERSITY
PANZER GYMNASIUM
1 NORMAL AVE. MONTCLAIR, NJ 07424

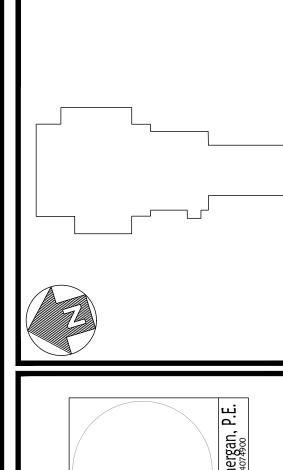
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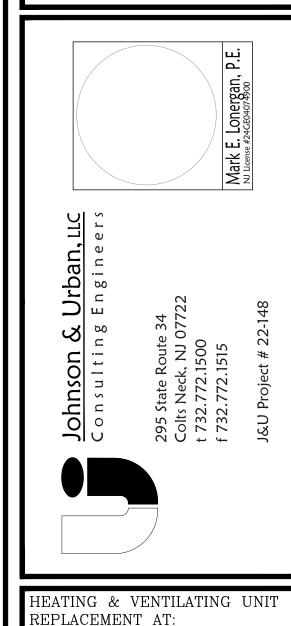
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DATE:	02/01/2024
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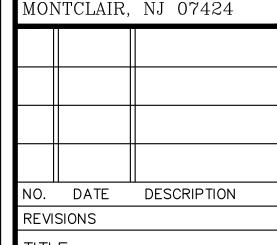




HEATING & VENTILATING UNIT REPLACEMENT AT:

MONTCLAIR STATE UNIVERSITY

PANZER GYMNASIUM



NORMAL AVE.

MECHANICAL NOTES, SYMBOLS
ABBREVIATIONS

ISSUANCE: FOR BID
DATE: 02/01/2024

SCALE: AS INDICATED

DRAWN BY: MML

CHECKED BY:

SHEET:

10.1

- 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 ¼" 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 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 PIPING 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 FLOOR SLABS FOR THE PENETRATION OF DUCT AND PIPE RISERS, AND DUE TO EQUIPMENT, PIPING, 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
- 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 ½ H.P. AND ABOVE SHALL BE 3 PHASE AND MOTORS UNDER ½ 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 ¼ 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.

- 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 1½ 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 REFILLING, 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 EBCO 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.
- 14. 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.
- 15. PROVIDE HANGER RODS OF SUITABLE LENGTH AND DIAMETER TO ADEQUATELY SUPPORT PIPING.
- 16. FURNISH AND INSTALL PIPE SLEEVES PASSING THROUGH INTERIOR WALLS. SLEEVES SHALL BE STEEL PIPE: ASTM A 53, TYPE E, GRADE A, SCHEDULE 40, GALVANIZED, PLAIN ENDS, LENGTH EQUAL TO WIDTH OF WALL.
- 17. PROVIDE WEISS "VARI-ANGLE" 9" THERMOMETERS WITH WELLS AND 4-1/2" DIAMETER LIQUID-FILLED PRESSURE GAUGES WITH SHUT-OFF COCKS WHERE INDICATED ON DRAWINGS AND DETAILS.
- 18. PROVIDE SIGNAGE, AS MANUFACTURED BY SETON NAMEPLATE, INDICATING TYPE OF FLUID AND DIRECTION OF FLOW. ALL SIGNAGE SHALL BE IN ACCORDANCE WITH ANSI A13.1.
- 19. ALL PIPING SHALL BE TESTED FOR A PERIOD OF NOT LESS THAN FOUR (4) HOURS AT 1-1/2" TIMES THE MAXIMUM ALLOWABLE WORKING PRESSURE OF THE SYSTEM

# 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
- 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). EXERIOR 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

CONDITIONED SPACE AIR TEMPERATURE

PRIOR TO MAKING ALTERATIONS TO THE EXISTING SYSTEMS AND ORDERING EQUIPMENT, THIS CONTRACTOR SHALL HIRE A LICENSED (AABC 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

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

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

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 FLUID OPERATING TEMPERATURE INSULATION CONDUCTIVITY NOMINAL PIPE OR TUBE SIZE (INCHES) CONDUCTIVITY RANGE (F) AND USAGE MEAN RATING Btu\*in/(h\*ft^2\*F) TEMPERATURE (F <1 1 to <1.5 1.5 to <4 4 to <8 201-250 - LP STEAM 0.27 - 0.30150 0 2.5 125.0 1.5 110-200 - HOT WATER 0.25-0.29 1.5 2 1 40-60 - CONDENSATE DRAIN 0 21-0 27 75.0 0.5 0.5 0.21-0.27 75.0 1 1.5 1.5 40-60 - CHILLED WATER (INTERIOR) 40-60 - REFRIGERANT (INTERIOR) 0.21 - 0.2775.0 <40 - GEOTHERMAL 0.20 - 0.2650.0 1 1.5 1.5 40-60 - CHILLED WATER (EXTERIOR) 0.21-0.27 75.0 0.21-0.27 40-60 - REFRIGERANT(EXTERIOR) 75.0

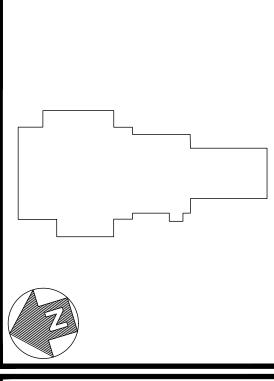
BUT NOT TO A THICKNESS LESS THAN 1 INCH.

#### 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.
- 2. SEE SPECIFICATION SECTION 230700 HVAC INSULATION FOR ADDITIONAL INFORMATION.

#### EVCEDTIONS:

- 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)





HEATING & VENTILATING UNIT REPLACEMENT AT:

MONTCLAIR STATE UNIVERSITY

PANZER GYMNASIUM

1 NORMAL AVE.
MONTCLAIR, NJ 07424

NO. DATE DESCRIPTION REVISIONS

MECHANICAL -SPECIFICATIONS

ISSUANCE: FOR BIED DATE: 02/01/2024

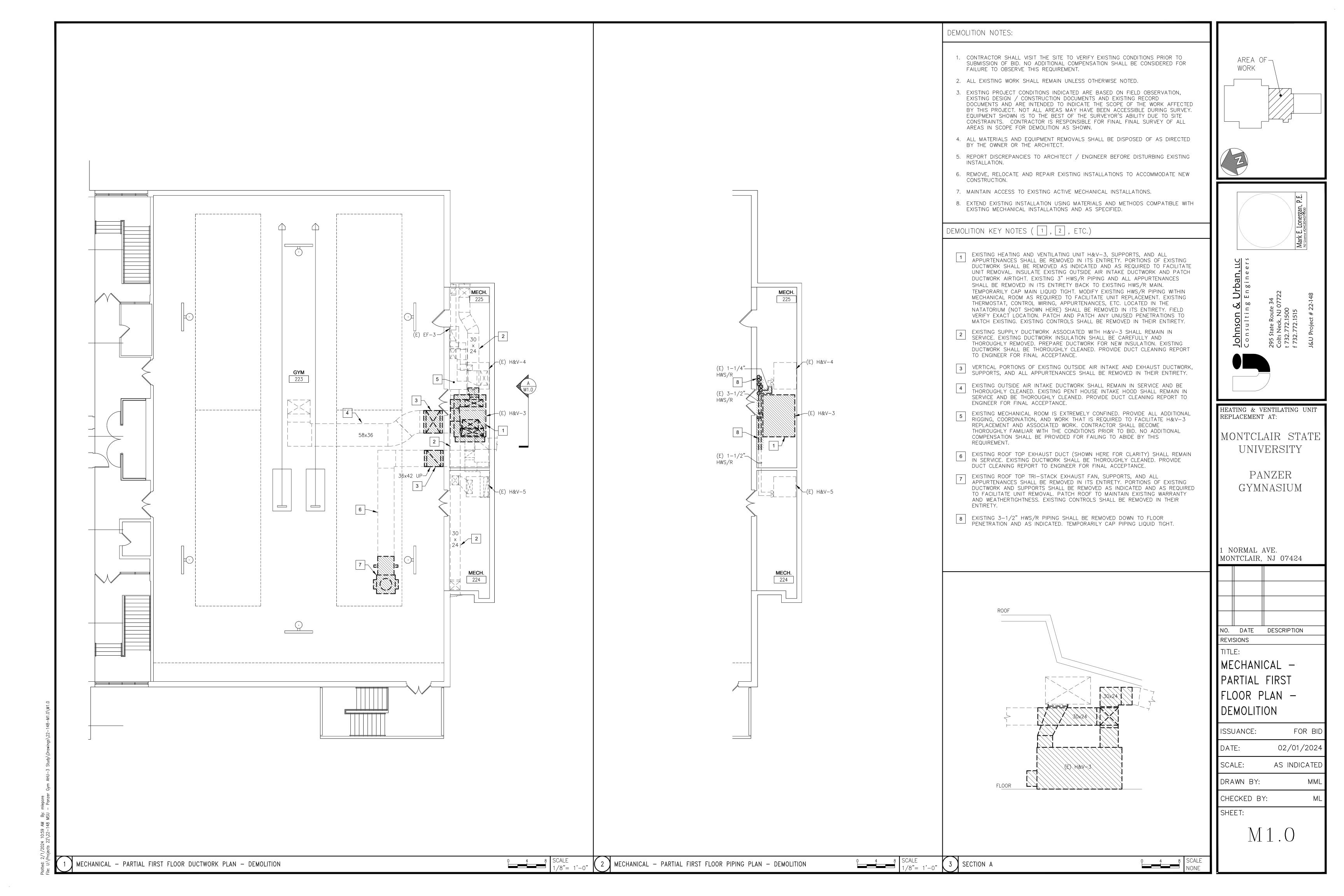
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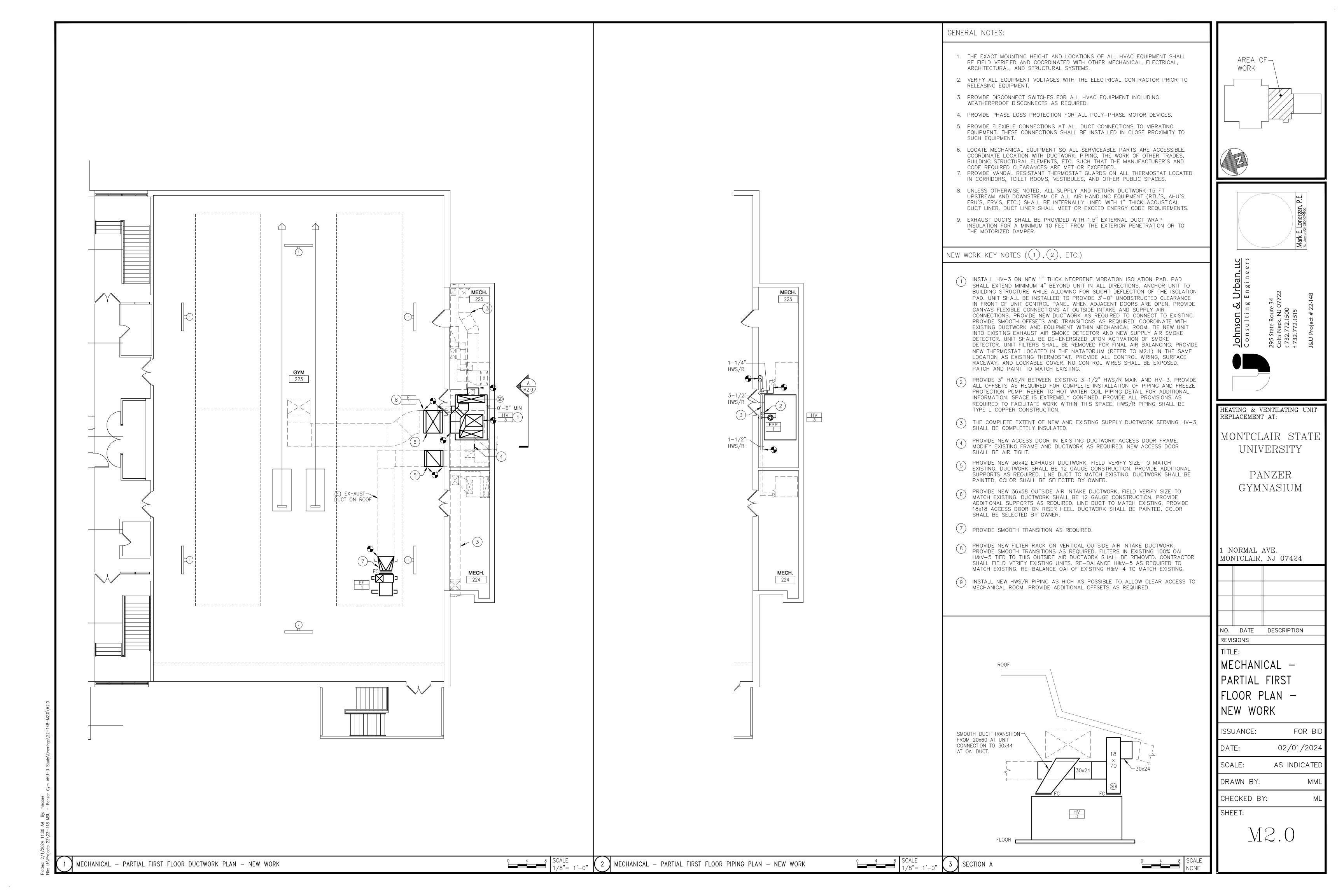
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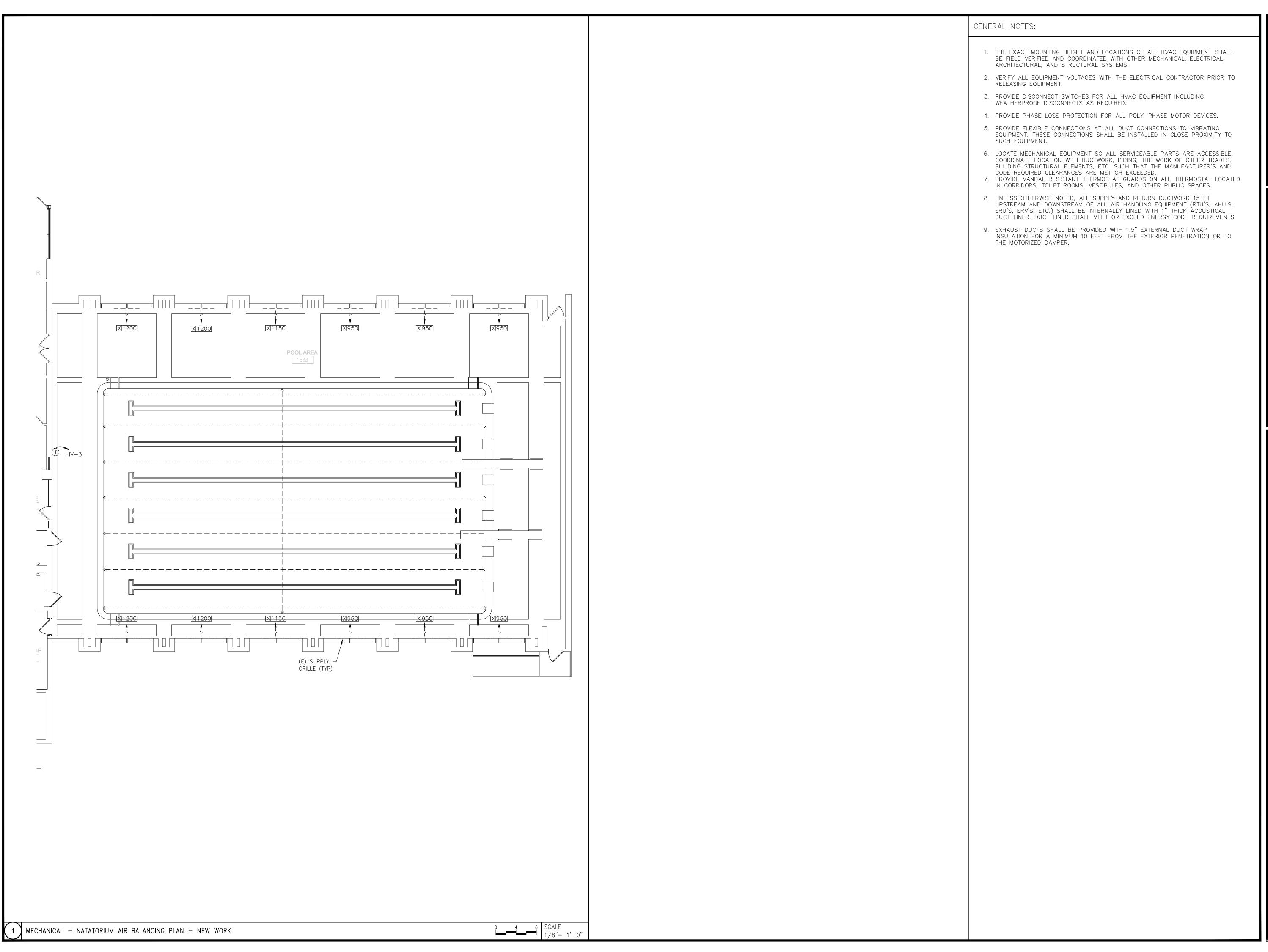
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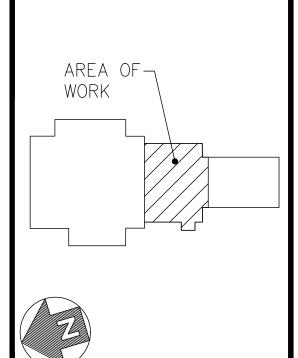
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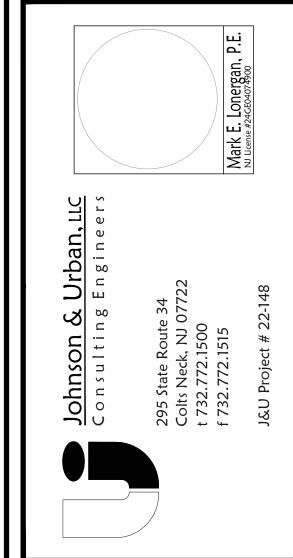
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1 NORMAL AVE. MONTCLAIR, NJ 07424

NO. DATE DESCRIPTION
REVISIONS
TITLE:

MECHANICAL —
NATATORIUM AIR
BALANCING PLAN NEW WORK

ISSUANCE: FOR BID

DATE: 02/01/2024

SCALE: AS INDICATED

DRAWN BY: MI

CHECKED BY:

SHEET:

M2.1

### **HEATING & VENTILATING UNIT SCHEDULE**

-		AREA		OUTDOOR		S	UPPLY FAN	IS			HOT W	TER HEATI	NG COIL		FILTERS		ELECTRIC	CAL			NOTES
	UNIT ID.	SERVED	MODEL NO.	AIR	SUPPLY	ESP	FAN	#	MOTOR	TOTAL	NO. OF	EAT/LAT	EWT/LWT	GPM		MCA N	MOCP VOLT	S PHASI	E H	Z WEIGHT	
				(CFM)	(CFM)	(IN W.G.)	RPM	FANS	HP	(MBH)	ROWS	(°F)	(°F)							(LBS)	
	HV-3	NATATORIUM	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	0 3,000	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15

INTERLOCKED

WEIGHT

925

NOTES

1,2,3,4

#### NOTES:

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

FAN SO	CHEDULE											
ID	AREA	MODEL NO.	TYPE	DRIVE	CFM	FAN	S.P.		MOTO	R		ĺ
	SERVED					RPM	(IN. W.G.)	HP	VOLTS	PHASE	HZ	ĺ
EF-1	NATATORIUM	FJI-24-BI-X	CENTRIFUGAL	DIRECT	13,000	1,625	1.5	10	208	3	60	ſ

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

#### FREEZE PROTECTION PUMP SCHEDULE

					PUMP DA	ATA				MOTOR DAT	A			
UNIT ID	MODEL NO.	MANUFACTURER	SERVICE	FLOW RATE	HEAD	IMPELLER	TYPE	RPM	HP	VOLTS	PHASE	HZ	WEIGHT	NOTES
				(GPM)	(FT)	DIA. (IN.)							(LBS)	
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:

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

# NEEDLEPOINT BIPOLAR IONIZATION SCHEDULE

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

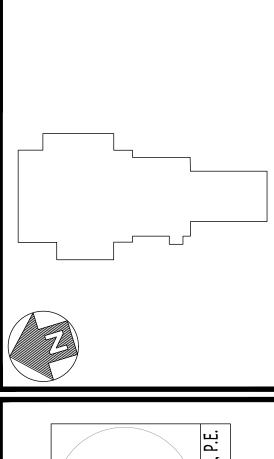
- NOTES:
- 1. UNIT SELECTION IS BASED ON GLOBAL PLASMA SOLUTIONS, INC.
- 2. PROVIDE ZERO MAINTENANCE SELF-CLEANING.
- 3. UL 2998 CERTIFIED FOR ZERO OZONE PRODUCTION.
- 4. PROVIDE TRANSFORMER AND BAS ALARM CONTACT. ATC CONTRACTOR TO TIE INTO BMS.
- 5. INSTALL IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS.

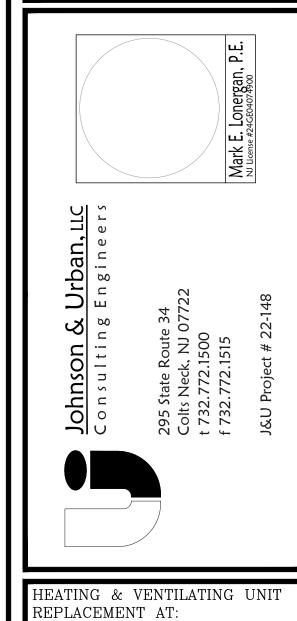
# DUCT MOUNTED FILTER BOX SCHEDULE

TAG	MODEL NUMBER	FILTER	FILTER	SIZE	NOTES
			QTY	LxWxH	
F-1	SA\/R-4-212H2\\/\/F	MFR\/ 8	10	62x50x28	123456789

# NOTES:

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





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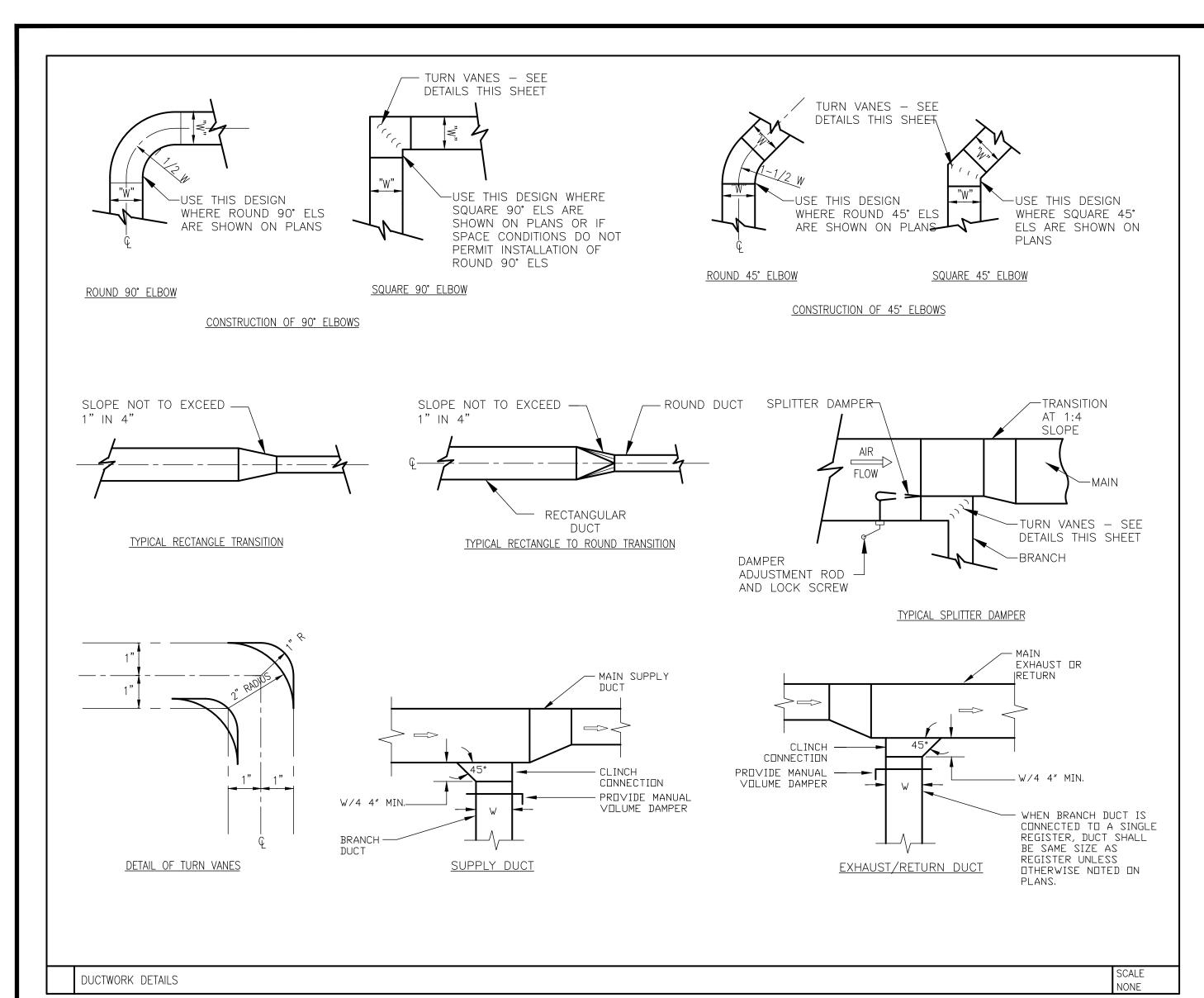
MECHANICAL -SCHEDULES

ISSUANCE: FOR BID DATE: 02/01/2024

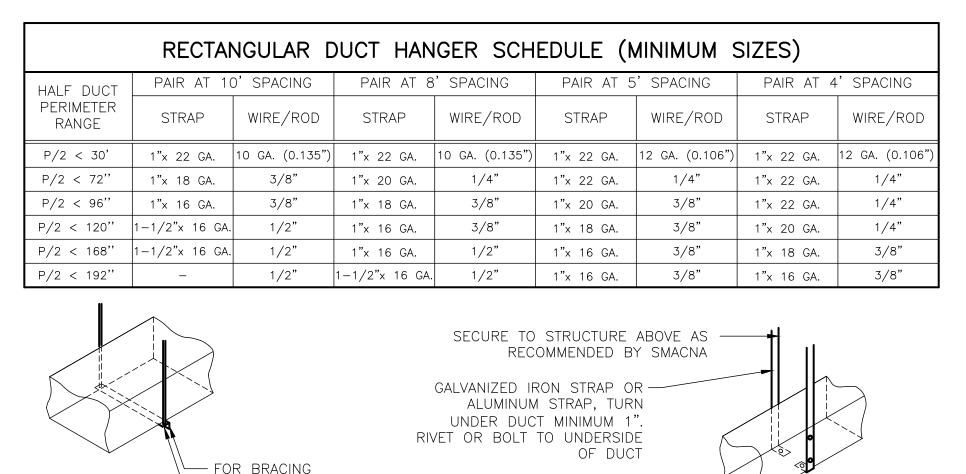
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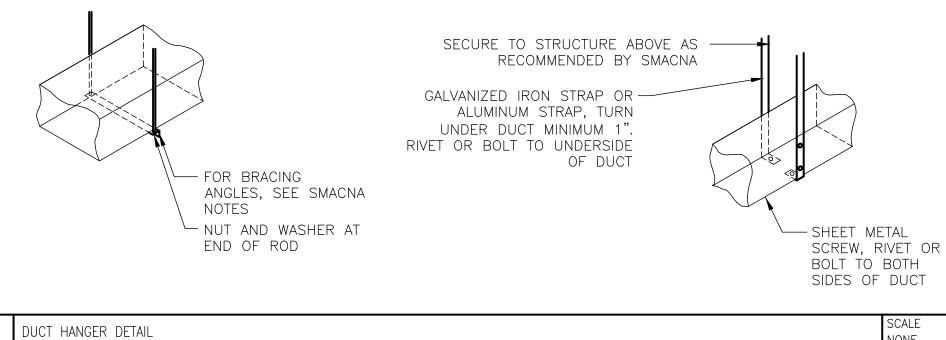
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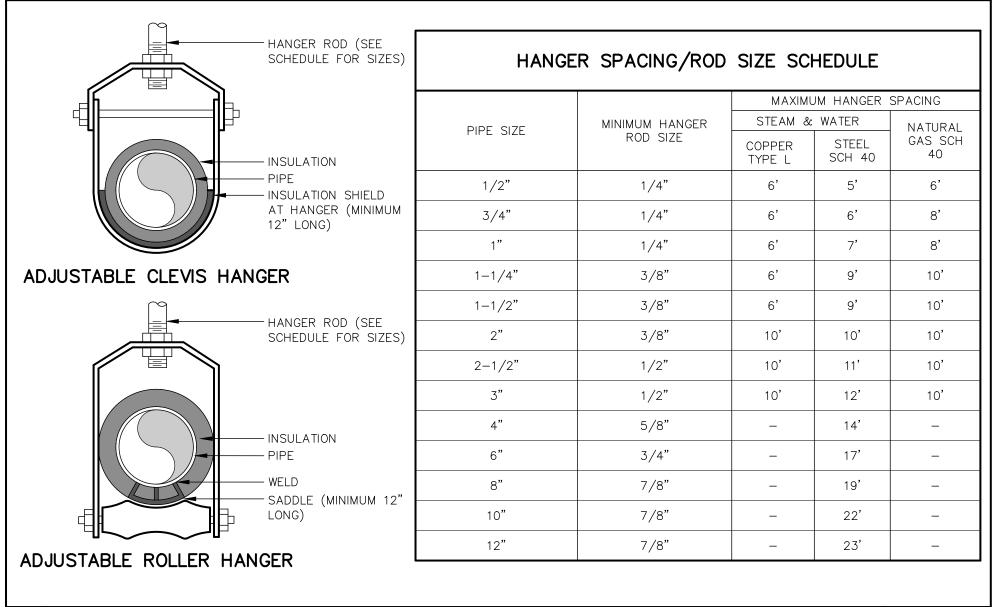
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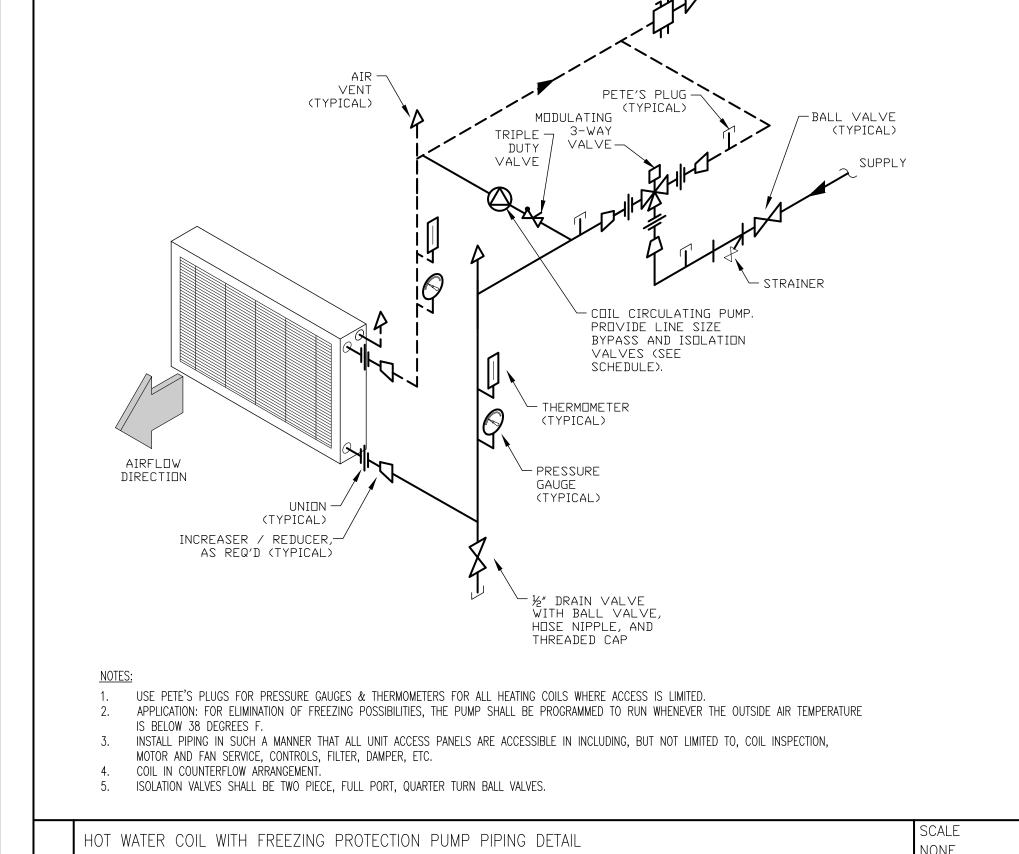


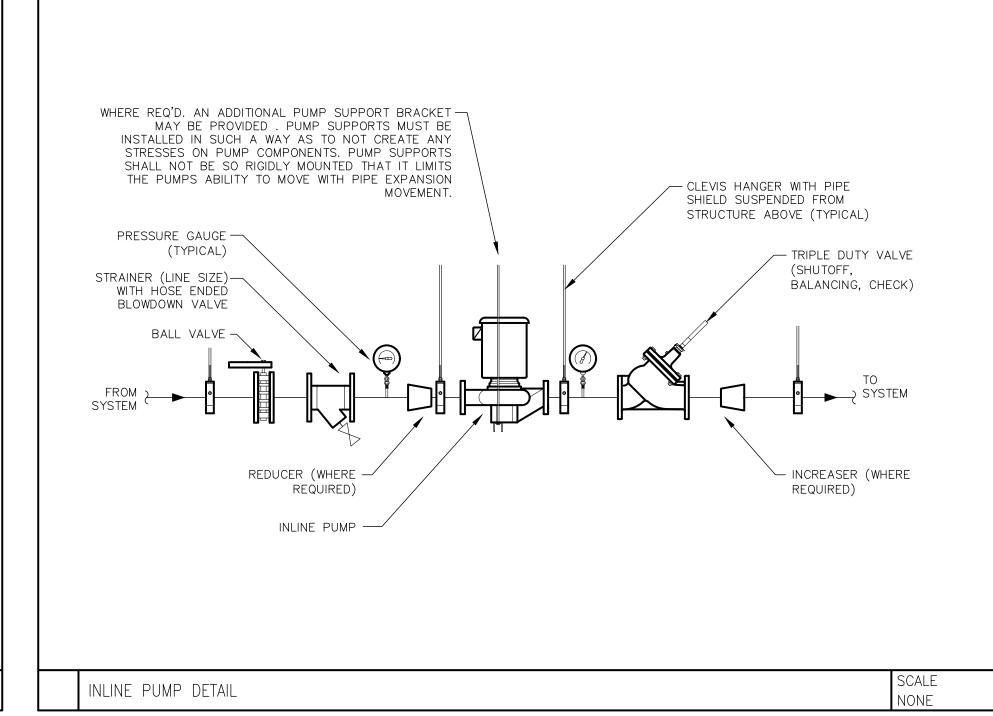
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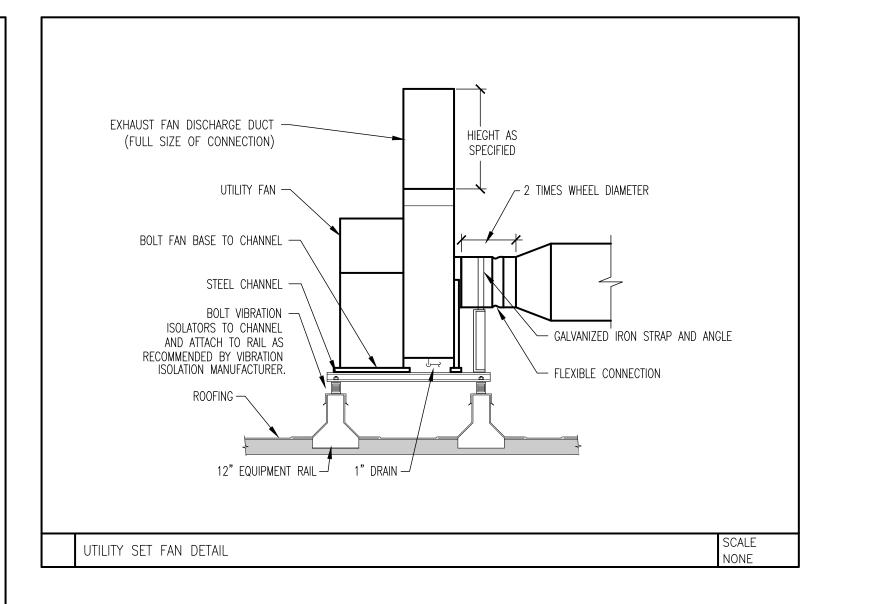


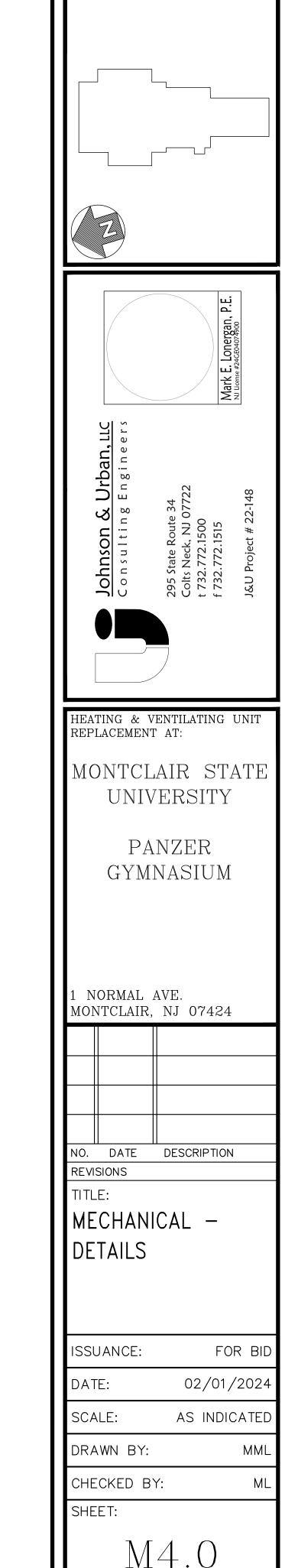


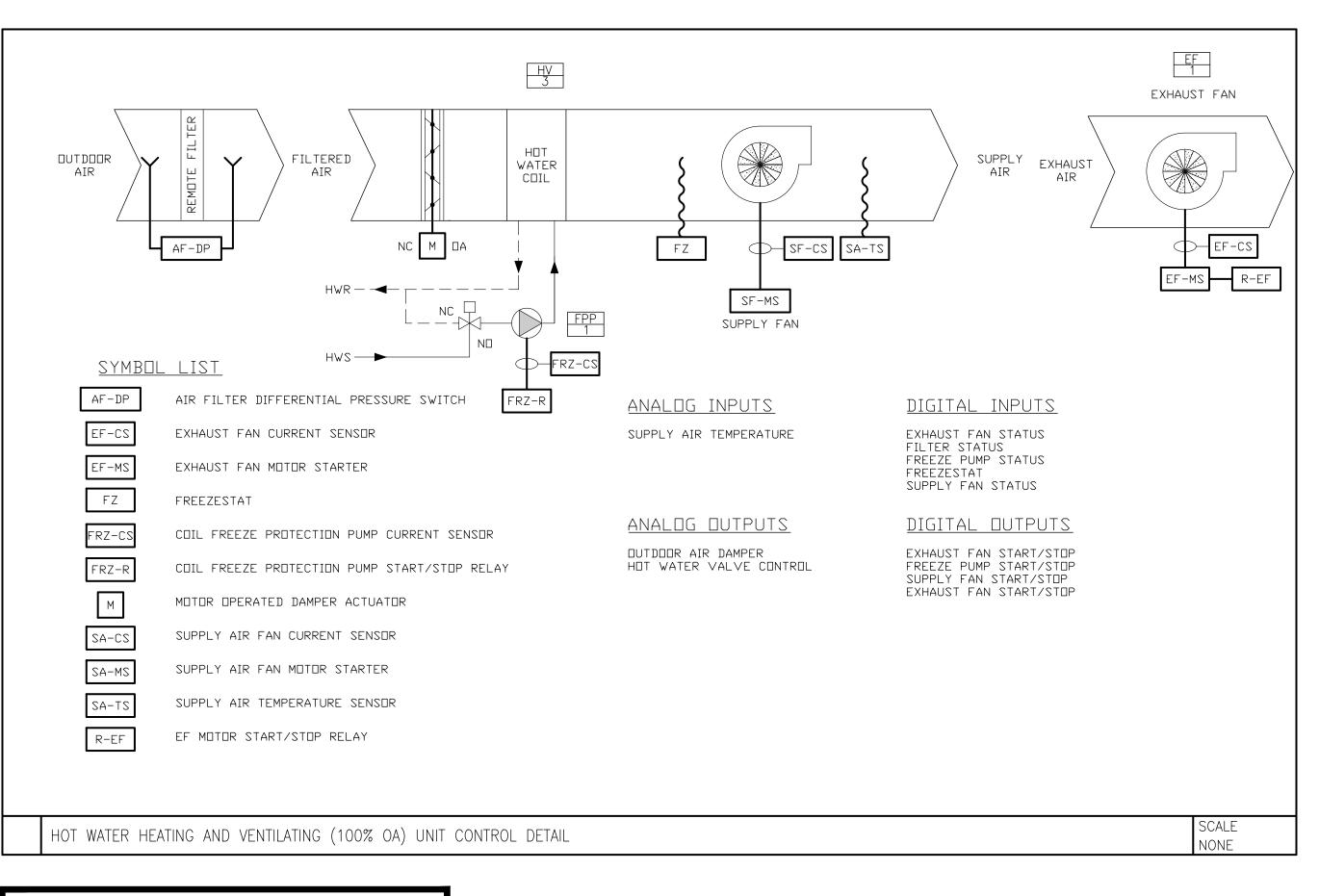




PIPE HANGER DETAIL







#### 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. DWNER'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

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. DUTDOOR AIR DAMPERS WILL BE FAIL SAFE CLOSE UPON A LOSS OF POWER OR CONTROL SIGNAL.

SHALL MODULATE TO MAINTAIN A 60 DEG F. SETPOINT (ADJUSTABLE).

THE UNIT WILL BE INDEXED FOR OCCUPIED/UNDCCUPIED CYCLE FROM THE UNIT MOUNTED DDC CONTROLLER AND FRONT END WORKSTATION. THE UNIT CAN BE INDEXED TO THE OCCUPIED MODE FROM THE PUSH-BUTION 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

#### UNDCCUPIED MODE

WHEN THE UNIT IS IN UNDCCUPIED MODE THE OUTDOOR DAMPER WILL BE CLOSED AND THE LOCAL EXHAUST FAN SHALL BE DE-ENERGIZED. THE SUPPLY FAN SHALL SHALL CYCLE AND THE HOT WATER COIL VALVE

#### OCCUPIED MODE

WHEN THE SYSTEM IS IN THE OCCUPIED MODE, THE HEATING HOT WATER VALVE SHALL FULLY OPEN IF THE DUTDOOR AIR TEMPERATURE IS 65°F (ADJUSTABLE) OR BELOW, DNCE THE VALVE HAS REACH THE FULLY OPEN lacksquarePOSITION, AN AUXILLARY 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 FAN(S) 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

IF THE DUTDOOR 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 DUTDOOR 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.

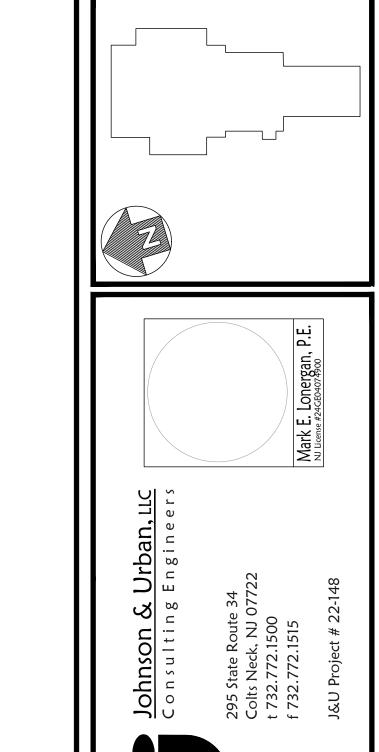
# BMS INTERFACE

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

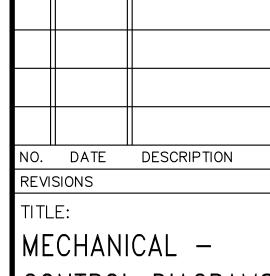
- CONTROL BOARD LOSS OF COMMUNICATION
- HIGH SPACE TEMPERATURE (5 DEG. F ABOVE SETPOINT) • LOW SPACE TEMPERATURE (5 DEG, F BELOW SETPOINT)
- FAN FAILURE
- FREEZE PROTECTION PUMP FAILURE
- CLOGGED AIR FILTER
- FREEZSTAT FIRE ALARM

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)
- DUTSIDE AIR DAMPER (COMMANDED POSITION) FREEZE PROTECTION PUMP STATUS
- EXHAUST FAN STATUS
- DCCUPIED/UNDCCUPIED CYCLE
- LOW LIMIT ALARM INCLUDING RESET FILTER STATUS



HEATING & VENTILATING UNIT REPLACEMENT AT: MONTCLAIR STATE UNIVERSITY PANZER GYMNASIUM NORMAL AVE. MONTCLAIR, NJ 07424



CONTROL DIAGRAMS AND SEQUENCE OF OPERATIONS ISSUANCE: FOR BID

02/01/2024 DATE: SCALE: AS INDICATED

DRAWN BY: CHECKED BY:

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### ELECTRICAL GENERAL NOTES

- ALL ELECTRICAL WORK SHALL CONFORM TO THE LATEST ADOPTED EDITIONS OF THE NATIONAL ELECTRICAL CODE, NFPA, IBC, UCC, NATIONAL ELECTRIC SAFETY, THE NEW JERSEY UNIFORM CONSTRUCTION CODE TITLE 5:23-3.16, AND LOCAL CODES.
   DRAWINGS ARE DIAGRAMMATIC AND DEFINE THE INTENT OF THE WORK. LOCATIONS OF EQUIPMENT, FIXTURES, DEVICES, DANIEL BOARDS, DIAGRAM, DIEFUSERS, DAPTITIONS.
- DRAWINGS ARE DIAGRAMMATIC AND DEFINE THE INTENT OF THE WORK. LOCATIONS OF EQUIPMENT, FIXTURES, DEVICES, PANELBOARDS, DUCTS, PIPING, DIFFUSERS, PARTITIONS, OPENINGS, ETC. ARE APPROXIMATE AND ARE SUBJECT TO MODIFICATIONS CAUSED BY STRUCTURAL CONDITIONS AND EQUIPMENT PROVIDED BY OTHER CONTRACTORS, SUBCONTRACTORS OR THE OWNER. COORDINATE ALL WORK WITH THE WORK OF OTHER TRADES. DETERMINE ROUGHING LOCATIONS FROM APPROVED SHOP DRAWINGS. MINOR MODIFICATIONS OF LOCATIONS REQUIRED TO EFFECT SUCH COORDINATION SHALL BE MADE AT NO COST TO THE OWNER.
- 3. DRAWINGS AND SPECIFICATIONS ARE INTENDED TO BE COMPLEMENTARY TO EACH OTHER. WHERE DISCREPANCIES OR CONFLICTS OCCUR, THE CONTRACTOR SHALL INCLUDE THE MORE COSTLY METHOD IN HIS PROPOSAL UNLESS CLARIFIED BY BULLETIN OR ADDENDUM ACKNOWLEDGED PRIOR TO RECEIPT OF BIDS.
- 4. REFER TO MECHANICAL, PLUMBING, AND FIRE PROTECTION DRAWINGS FOR EXACT LOCATIONS OF ALL MECHANICAL AND PLUMBING/FIRE PROTECTION EQUIPMENT. THE CONTRACTOR MUST HAVE THE MECHANICAL, PLUMBING, AND FIRE PROTECTION DRAWINGS FOR LOCATIONS OF EQUIPMENT AND CONTROL WIRING REQUIREMENTS. ONLY POWER FEEDER TO MECHANICAL EQUIPMENT ARE SCHEDULED ON THE ELECTRICAL DRAWINGS. FURNISH AND INSTALL ALL CODE REQUIRED DISCONNECT SWITCHES FOR MECHANICAL AND PLUMBING EQUIPMENT UNLESS SPECIFIED ON MECHANICAL OR PLUMBING DRAWINGS TO BE SUPPLIED BY MANUFACTURER. PROVIDE FUSED SWITCHES WHEREVER MANUFACTURER REQUIRES THEM..
- 5. CONDUCTOR SIZES (PHASE AND GROUND) SHALL BE INCREASED DUE TO DE-RATING AND VOLTAGE DROP REQUIREMENTS AS NECESSARY. CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING VOLTAGE DROP BASED ON THE FEEDER AND BRANCH CIRCUIT RUNS SUCH THAT THE TOTAL VOLTAGE DROP ON EACH RUN DOES NOT EXCEED 5% TOTAL. PROVIDE AND INSTALL SPLICE/TAP J-BOX BEFORE CONNECTION TO LOAD AND TRANSFER TO SMALLER CONDUCTORS (PER CODE) FOR CONNECTION TO DEVICE TERMINALS WHERE REQUIRED.
- 6. ALL NEW ELECTRICAL SYSTEMS, INCLUDING LIGHTING, CONDUIT, PANELS, ETC., SHALL BE SEISMICALLY BRACED IN ACCORDANCE WITH INTERNATIONAL BUILDING CODE.
- 7. PROVIDE ALL SAFETY SWITCHES AS SHOWN ON THE DRAWINGS AND/OR AS REQUIRED BY NECFOR MOTOR, APPLIANCE AND ELECTRIC HEAT EQUIPMENT DISCONNECTION. ALL DISCONNECT SWITCHES SHALL BE LOCAL TO THE EQUIPMENT THEY ARE SERVING AND SHALL BE LOCKABLE IN THE "ON" OR "OFF" POSITION. LOCKABLE CIRCUIT BREAKERS SHALL NOT BE ACCEPTABLE.
- 8. AS-BUILTS SHALL BE PROVIDED WITHIN 30 DAYS OF SYSTEM ACCEPTANCE, INCLUDING BUT NOT LIMITED TO SINGLE-LINE OF ELECTRICAL DISTRIBUTION SYSTEM AND FLOOR PLAN WITH LOCATIONS OF DISTRIBUTION EQUIPMENT AND AREAS SERVED BY THAT EQUIPMENT. (ASHRAE STANDARD 90.1-2016.)

- 9. O & M MANUALS MUST BE PROVIDED FOR THE ELECTRICAL DISTRIBUTION SYSTEM, INCLUDING BUT NOT LIMITED TO NAMEPLATE RATINGS, SCHEDULED MAINTENANCE, SPECIFIC EQUIPMENT SUPPLIED, NAMES AND ADDRESSES OF QUALIFIED SERVICE AGENCIES, COMPLETE NARRATIVE AND SCHEMATIC OF SYSTEM IN NORMAL OPERATION. (ASHRAE STANDARD 90.1–2016.)
- 10. RELOCATE EXISTING JUNCTION BOXES, PULL/SPLICE BOXES, ETC. WHICH REQUIRE ACCESS THAT WILL BE BLOCKED BY NEW CONSTRUCTION (MECHANICAL AND ELECTRICAL). CONTRACTOR SHALL COORDINATE WITH FIELD CONDITIONS AND OTHER TRADES FOR NEW OR EXISTING ELECTRICAL ITEMS REQUIRING ACCESS LOCATED OVER G.W.B. OR OTHER INACCESSIBLE CEILINGS. PROVIDE ACCESS PANELS TO BE LOCATED IN COORDINATION WITH ARCHITECT AND INSTALLED BY G.C.
- 11. DEVICE AND EQUIPMENT MOUNTING HEIGHTS ARE AS LISTED ON DRAWING AND/OR DESCRIBED IN SPECIFICATIONS UNLESS ITEMIZED BY ARCHITECTURAL DOCUMENTS.
- 12. CONTRACTOR SHALL COORDINATE WITH OTHER TRADES TO SUBMIT MEP COORDINATION DRAWINGS AS EARLY AS POSSIBLE IN THE CONSTRUCTION PERIOD.
- 13. THE ELECTRICAL CONTRACTOR SHALL MEASURE THE STEADY STATE LOAD CURRENT AT EACH AFFECTED PANEL BOARD FEEDER AND DOCUMENT PRE—CONSTRUCTION VALUES FOR EXISTING LIGHTING AND MECHANICAL LOADS TO UNDERSTAND AVAILABILITY OF ADDITIONAL PANEL BOARD LOADING WITHIN THE CONSTRAINTS OF THE STATE BUILDING AND ELECTRICAL CODES. PROVIDE FINDINGS IN REPORT FORM WITH MARKED UP DRAWINGS, TO THE ENGINEER AS SOON AS COMPLETED. NO REWIRING SHALL BEGIN UNTIL THIS STEP IS COMPLETED.
- 14. AT COMPLETION OF ALL BRANCH WIRING DESCRIBED ON CONTRACT DOCUMENTS, ELECTRICAL CONTRACTOR SHALL COMPILE A LIST OF EXISTING AND NEW CIRCUITS TO PROVIDE A FULL PANEL SCHEDULE DIRECTORY WITH DEVICE NAME (LIGHTING, RECEPTACLES, EQUIPMENT, ETC.) AND ROOM NUMBERS BEING SERVED. LABEL ALL CIRCUIT BREAKERS NOT BEING USED AS SPARE AND REMOVE CONDUCTORS FROM PANEL BOARD AND CONDUITS.
- 15. ELECTRICAL CONTRACTOR SHALL REVIEW ARCHITECTURAL AND MECHANICAL DRAWINGS TO UNDERSTAND THE EXTENT OF LIGHTING FIXTURE REMOVAL AND REPLACEMENT TO ACCOMMODATE OUT OF CONTRACT AREAS THAT ARE AFFECTED IN SYSTEMS CONSTRUCTION.
- 16. CONTRACTOR SHALL TEMPORARILY SUPPORT AND/OR DISCONNECT ALL EXISTING CEILING MOUNTED DEVICES THAT ARE NOT BEING DEMOLISHED TO ALLOW FOR THE REMOVAL AND/OR INSTALLATION OF A NEW CEILING AND/OR MECHANICAL EQUIPMENT. IF THERE ARE OTHER DEVICES BEING SERVED BY THE SAME CIRCUIT IN ANOTHER AREA, CONTRACTOR SHALL EXTEND THE WIRING/CONDUIT TO THE NEXT DEVICE IN LINE TO MAINTAIN CONTINUITY. FIRE ALARM SYSTEM SHALL REMAIN OPERATIONAL AT ALL TIMES. ALL ELECTRICAL DEVICES ARE NOT SPECIFICALLY SHOWN ON THIS PLAN. CONTRACTOR SHALL VERIFY ALL EXISTING DEVICES IN THE FIELD.
- 17. ALL SWITCHES AND RECEPTACLES SHALL BE LABELED WITH CIRCUIT NUMBER(S) AND PANEL OF ORIGIN. UTILIZE AN ELECTRONIC LABEL MAKER (E.G. DYMO OR EQUAL) WITH BLACK LETTERS/NUMBERS ON A CLEAR BACKGROUND.

- 18. APPLY U.L. APPROVED FIRE STOPPING ("3M" FIRE STOP SEALANT 2000 AND/OR "3M" FIRE BARRIER CP25 WB) TO ALL PENETRATIONS OF FIRE RATED FLOORS, WALL AND CEILING ASSEMBLIES. RATING MUST RE-ESTABLISH THE ORIGINAL FIRE RESISTANCE.
- 19. WHERE ELECTRICAL EQUIPMENT (I.E. SWITCHBOARDS, PANELBOARDS, BUS DUCTS, TRANSFORMERS, DISCONNECTS, ETC.) OR SYSTEMS (I.E. FIRE ALARM, SOUND, INTERCOMMUNICATIONS, ALARM, ETC.) IS INDICATED TO BE MODIFIED TO ACCEPT NEW WORK, SAID MODIFICATIONS SHALL BE PERFORMED BY ELECTRICAL EQUIPMENT FABRICATORS OR MANUFACTURER'S REPRESENTATIVES WHO CAN AFFECT SUCH MODIFICATIONS WITHOUT VOIDING THE U.L. LABEL OR MANUFACTURER'S WARRANTIES.
- 20. IN THE EVENT ANY OF THE WIRE AND CONDUIT THAT IS EXISTING TO REMAINS NEED TO BE REPLACED, THE CONTRACTOR SHALL PROVIDE A UNIT PRICE FOR WIRE AND CONDUIT.
- 21. IN ALL AREAS WHERE WORK IS BEING PERFORMED UNDER THIS CONTRACT, CONTRACTOR SHALL BE RESPONSIBLE FOR SUPPORTING ALL EXISTING ELECTRICAL DEVICES AND WIRING/CONDUIT ABOVE THE EXISTING CEILINGS, PER NEC. ALL TELE/DATA AND FIRE ALARM WIRING SHALL BE INDEPENDENTLY SUPPORTED FROM THE STRUCTURE WITH J-HOOKS AND NOT TIE-WRAPPED TO CONDUITS OR MECHANICAL PIPING. ALL EXISTING POWER WIRING/CONDUIT AND JUNCTION BOXES SHALL BE INDEPENDENTLY SUPPORTED TO THE STRUCTURE AND NOT TO THE CEILING GUIDE WIRES, HVAC DUCTS, PIPING, ETC. PROVIDE ALL REQUIRED SUPPORTS AND ACCESSORIES AS REQUIRED PER NEC. CONTRACTOR SHALL PROVIDE ALL REQUIRED FIRE-RATED SLEEVES FOR EXISTING AND NEW WIRING THAT IS TO PASS THROUGH NEW FIRE RATED WALLS.
- 22. ALL CABLE MUST BE SUPPORTED ABOVE THE CEILING APPROXIMATELY EVERY (4) TO (6) FEET. USAGE OF METALLIC D-RINGS AND DRIVE RINGS ARE PERMITTED. ALL CABLE TIES ABOVE THE CEILING MUST BE PLENUM RATED. ALL CABLES MUST BE NEATLY BUNDLED AND SUPPORTED IN A PROFESSIONAL MANNER. ANY CABLE RUNS IN EXPOSED PUBLIC VIEWING AREAS, I.E., CLASSROOMS, HALLWAYS, ETC., MUST BE ENCLOSED IN RACEWAY.
- 23. A DUPLEX RECEPTACLE SHALL BE INSTALL ON THE SAME LEVEL AND WITHIN 25 FT OF ALL MECHANICAL EQUIPMENT. REFER TO MECHANICAL DRAWING FOR LOCATION OF EQUIPMENT. CONNECT WITH 2#12, 1#12G., IN 3/4"C. TO NEAREST 120-VOLT UN-SWITCHED CIRCUIT OR TO NEW 20-AMP, 1-POLE, CIRCUIT BREAKER IN NEAREST PANEL. EXTERIOR RECEPTACLES SHALL BE GFI AND IN A WEATHERPROOF ENCLOSURE. U.O.N.
- 24. AMERICAN MANUFACTURED PRODUCTS SHALL BE USED WHERE POSSIBLE FOR ALL WORK IN ACCORDANCE WITH NJAC 40A:11-18. CONTRACTOR SHALL VERIFY THAT ALL SUBMITTED EQUIPMENT FOR ALL CONTRACTS FOR COUNTY OR MUNICIPAL WORK OR FOR WORK FOR WHICH IT WILL PAY ANY PART OF THE COST, OR WORK WHICH BY CONTRACT OR ORDINANCE IT WILL ULTIMATELY OWN AND MAINTAIN, THAT ONLY MANUFACTURED PRODUCTS OF THE UNITED STATES, WHEREVER AVAILABLE, BE USED IN SUCH WORK. ANY SUBSTITUTIONS OF BASIS OF DESIGN EQUIPMENT SHALL BE VERIFIED BY CONTRACTOR TO CONFORM TO THE ABOVE NOTED REQUIREMENTS.
- 25. DURING THE INSTALLATION OF ELECTRICAL EQUIPMENT AND ASSOCIATED SYSTEMS, THE CONTRACTOR SHALL IDENTIFY ANY DAMAGE TO FIREPROOFING MATERIAL CAUSED BY WORK OF THE TRADE. THE CONTRACTOR SHALL PROVIDE WRITTEN REPORT DESIGNATION LOCATIONS, TO GENERAL CONTRACTOR, BEFORE FIREPROOFING IS COVERED BY SUBSEQUENT CONSTRUCTION.

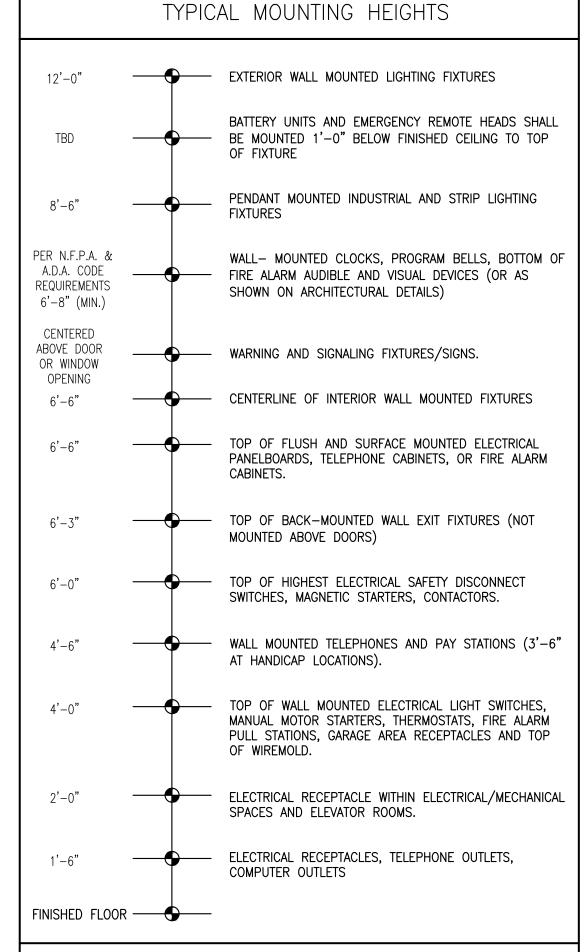
4 4

	POWER DEVICE LEGEND						
SYMBOLS	DESCRIPTION						
	SURFACE MOUNTED PANELBOARD, POWER AND LIGHTING						
Q.	JUNCTION BOX — WALL MOUNTED						
<b>J</b>	JUNCTION BOX — CEILING MOUNTED (OR ABOVE CEILING)						
M	MOTOR						
	DISCONNECT SWITCH.						
S <sub>M</sub>	MOTOR RATED DISCONNECT SWITCH.						
	HOMERUN TO PANELBOARD						
•— •	GROUND ROD OR AS NOTED ON DRAWING OR DETAIL						
	EXPOSED CONDUIT OR CABLE						
	CONCEALED CONDUIT OR CABLE						
	ELECTRICAL WIRING						
1///	DEMOLITION HATCH. REMOVE ALL ASSOCIATED DEVICES, BOXES, WIRING, ETC IN THEIR ENTIRETY UNLESS SPECIFICALLY NOTED OTHERWISE.						

	FIRE ALARM DEVICE LEGEND					
SYMBOLS	DESCRIPTION					
(DD)	DUCT SMOKE DETECTOR					

	ABBREV	/IATIONS	
A AFF AFG C CB CH CO CT CU EC EG EM EMT ETR EWC FA GFI	AMPERE ABOVE FINISHED FLOOR ABOVE FINISHED GRADE CONDUIT(S) CIRCUIT BREAKER COUNTER HEIGHT CONDUIT ONLY CURRENT TRANSFORMER COPPER ELECTRICAL CONTRACTOR EQUIPMENT GROUND EMERGENCY ELECTRICAL METALLIC TUBING EXISTING TO REMAIN ELECTRIC WATER COOLER FIRE ALARM FURNISHED BY OTHERS GROUND FAULT INTERRUPTER	GND, G ICIG  I/L MC MOD NIC NL NTS RGS SPD TVSS  T/C UON V W WP	GROUND INTERRUPTING CAPACITY ISOLATED GROUND INTERLOCKED MECHANICAL CONTRACTOR MOTOR OPERATED DAMPER NOT IN CONTRACT NIGHT LIGHT NOT TO SCALE RIGID GALVANIZED STEEL SURGE PROTECTIVE DEVICE TRANSIENT VOLTAGE SURGE SUPPRESSOR TIME CLOCK UNLESS OTHERWISE NOTED VOLTS WALL MOUNTED WEATHERPROOF

	ELECTRICAL DRAWING LIST									
DWG #	DRAWING TITLE									
E0.1	ELECTRICAL - SYMBOLS, NOTES, ABBREVIATIONS & DETAILS									
E0.2	ELECTRICAL - SPECIFICATIONS									
E0.2	ELECTRICAL - FIRST FLOOR PLANS									
EU.2	ELECTRICAL - TIRST FLOOR FLANS									



NOTES:

1. MOUNTING HEIGHTS TO CENTER OF OUTLETS UNLESS OTHERWISE NOTED. IN MASONRY WALL CONSTRUCTION THE ABOVE MOUNTING HEIGHTS SHALL BE USED FOR REFERENCE TO NEAREST BLOCK OR BRICK COURSING.

- 2. THE ABOVE MOUNTING HEIGHTS SHALL BE ADHERED TO UNLESS SPECIFICALLY
- NOTED OR DETAILED OTHERWISE ON THE DRAWINGS OR SPECIFICATIONS.

  3. VERIFY ALL MOUNTING HEIGHTS WITH OWNER AND ARCHITECT PRIOR TO ROUGH—IN.
- 4. ALL MOUNTING HEIGHTS SHALL COMPLY WITH ANSI A117.1

COP	PER BRANCH CIF	RCUIT	WIRE	SIZIN	IG TA	BLES	5 –	208V	- 3	% V	OLTA	GE I	DROP	
C/B TRIP			208V, 0/208\	•		120V, 1P, 2W								
15	DISTANCE IN FEET MINIMUM WIRE SIZE	109 12	173 10	275 8	94 12	150 10	238 8	379 6	54 12	87 10	138 8	219 6	348 4	449 3
20	DISTANCE IN FEET MINIMUM WIRE SIZE	82 12	130 10	207 8	71 12	112 10	179 8	284 6	41 12	65 10	103 8	164 6	261 4	329 3
30	DISTANCE IN FEET MINIMUM WIRE SIZE	87 10	138 8	219 6	75 10	119 8	190 6	301 4	43 10	69 8	109 6	174 4	219 3	277 2
40	DISTANCE IN FEET MINIMUM WIRE SIZE	103 8	164 6	261 4	89 8	142 6	226 4	285 3	52 8	82 6	130 4	164 3	207 2	262 1
50	DISTANCE IN FEET MINIMUM WIRE SIZE	83 8	131 6	209 4	72 8	114 6	181 4	228 3	41 8	66 6	104 4	132 3	166 2	209 1
60	DISTANCE IN FEET MINIMUM WIRE SIZE	109 6	174 4	219 3	95 6	151 4	190 3	240 2	55 6	87 4	110 3	138 2	174 1	
70	DISTANCE IN FEET MINIMUM WIRE SIZE	149 4	188 3	237 2	129 4	163 3	205 2	259 1	75 4	94 3	119 2	149 1		
80	DISTANCE IN FEET MINIMUM WIRE SIZE	131 4	165 3	208 2	113 4	143 3	180 2	227 1	65 4	82 3	104 2	131 1		
90	DISTANCE IN FEET MINIMUM WIRE SIZE	146 3	184 2	233 1	127 3	160 2	201 1		73 3	92 2	116 1			
100	DISTANCE IN FEET MINIMUM WIRE SIZE	132 3	166 2	209 1	114 3	144 2	181 1		66 3	83 2	105 1			

1. READ ACROSS TO THE RIGHT FROM C/B TRIP TO DESIRED VOLTAGE CHARACTERISTICS AND NEXT GREATER DISTANCE THAN CIRCUIT IN QUESTION.

2. READ DOWN TO MINIMUM WIRE SIZE.

3. DISTANCES ARE TO THE CENTER OF CONCENTRATED LOAD SUCH AS CLASSROOM LIGHTING OR THE MIDPOINT OF DISTRIBUTED LOAD SUCH AS CORRIDOR LIGHTING.

208V BRANCH CIRCUIT WIRE SIZING TABLE

| SCALE | | NONE |

		4 3		E E E F, F	CC EL CG EG M EM MT EL TR EX WC EL A FIF BO FL FFI GF	JRRENT TRANSFORM DPPER ECTRICAL CONTRACE DIPMENT GROUND ERGENCY ECTRICAL METALLICE TUBING JUSTING TO REMAIN ECTRIC WATER COCE RE ALARM JURNISHED BY OTHE ROUND FAULT JINTERRUPTER	TOR DLER		NL NTS RGS SPD TVS: T/C UON V W WP	s S	NOT RIGII SUR TRAI S TIME UNLI VOL WALI	TO SIGN THERPI	CALE VANIZE OTEC VOLT SUPP CK THERV
	KEY NOTES: (1), (2), ETC.)  1. CONCRETE SLAB OR CONCRETE OVER STEEL DECK.								,				
	2. MAXIMUM 8" TRADE SIZE STEEL CONDUIT. ANNULUS RANG	IGING FROM POINT CONTACT* TO 1.4" MAXIMUM.											
	3. STI SPECSEAL SERIES 100 SEALANT INSTALLED TO A 1/2	." DEPTH. **											
	4. MINERAL WOOL BATT, NOMINAL 4PCF. TO FULL THICKNESS	RECESSED FROM BOTH SIDES TO ACCOMMODATE FILL MAT	ERIAL.										
	5. STEEL SLEEVE.				1								
	*NOTE: A MINIMUM ANNULAR SPACE OF 1/4" AND A 28 GAU	IGE STEEL COVER PLATE ARE REQUIRED FOR A 4 HOUR RA	TING.	BUS SIZE:	225	MAIN LUGS ONL	_Y	22	25				
	**NOTE: AT POINT CONTACT APPLY A 3/8" COVE BEAD OF SI	EALANT BETWEEN PIPE AND BOTH SURFACES OF WALL.		LOCATION: FED FROM:	GYM STORA	GE							
	<u> </u>			CKT.		IRCUIT	LOAD		REAKER			JIT WIRIN	<b>N</b> G
2	3 HOUR RATED FIRESTOP FOR METALLIC CONDU	UIT THRU NEW MASONRY	SCALE	NO. 1	DES	CRIPTION	VA	POLE	SIZE	TYPE	No. WIRE	GND	COND
	O HOOK KATED TIMESTOT TOK WETALLIO COMBK	- TINO NEW MASONN	NONE	3	,	SPARE		3	40				
				5 7					-+				
				9	E:	KISTING		3	15		E	XISTING	
				11					$\dashv$	_			
				<del></del>					. 1				

BUS SIZE	: 225 MAIN LUGS ONL	<u> </u>	2	25	PANEL GYM PANEL TYPE: NEMA 1																							
					4												SURFACE											
LOCATION										208 /	(EXISTING)											FULLY RATED						
FED FRO	w: — CIRCUIT	LOAD	Τ.	BREAK		ı -	CIRCUIT	WIDING		208/120V, 3 PH, 4W  PHASE   PHASE   PHASE				CIDCLI	IT WIRI	NC		REAKE		LOAD	EXISTING	CIRCUIT	CKT.					
NO.	DESCRIPTION	VA		SIZE		No.		- 1	OND	A	F F B	C	No.	WIRE		COND	TYPE			VA		DESCRIPTION	NO.					
1	DESCRIPTION	**	I OLL	JIZL	1111 E	NO.	WIKE	GND C	JIND	0		— <u> </u>	NO.		ISTING	COND	III	15	1	**		EXISTING	2					
3	SPARE		3	40							0				ISTING			15	1			EXISTING	4					
5			1									0	1	EX	ISTING			15	1			EXISTING	6					
7										0													8					
9	EXISTING		3	15			EXIS1	TING			0		EXISTI		ISTING	STING		15	3			EXISTING	10					
11												0											12					
13										0													14					
15	EXISTING		3	15			EXIS1	TING					XISTING		15	3		EXISTING		16								
17									0					$\bot$					18									
19	EVICTING		١.	1		EXISTING		E1//07/10		EVICTIVO		5,407,110		0	4050		<b> </b>		ISTING	7/4		15	1	4050		EXISTING	20	
21	EXISTING		3	15						1650		4		10	3/4		25	1	1650		FPP-1	22	<del>-</del> (1)					
23 25										0		0	-	EX	isting I			15	1			EXISTING	24 26					
27	EXISTING		3	15			EXIS1	TING		$\vdash$	0		4	6	10	1		60	3			NEW EF-1	28					
29	LAISTING		┨ઁ	'			LAISI	1110			"	0	┨╹	"	10	'		00				NEW EI I	30					
31										0													32					
33	EXISTING		3	20			EXIS1	TING			0		4 8		10 3/4			40	3			NEW HV-3	34					
35			1									0	1								7		36					
37										0													38					
39	EXISTING		3	40			EXIS1	TING			0			EX	ISTING			40	3			EXISTING	40					
41												0											42					
						_	TOTAL (F	PHASE):		0	1650	0																
															NOTE	<u> </u>												
	CIRCUIT BREAKER TYPES					TOTAL	L CONNE	CTED I	<b>-</b> ΛΛΓ•		1.7	KVA				L BUSING												
AF	ARC FAULT CIRCUIT BREAKER					LIOIA	L CONNE	CILD L	JAD.		4.6	AMPS	]							75 DEGRE		CIRCUIT RATING PER THE						
GF	GROUND FAULT CIRCUIT BREAKER																				NG ANY EQUIPMENT.							
AG														4. PROVIDE 3-POLE 30A CIRCUIT BREAKER AND EXTERNAL MOUNTE						UNTED TVSS FOR ALL EMERG	ENCY							
ST	SHUNT TRIP CIRCUIT BREAKER													PANELBOARDS 5 A 'RLANK' SPACE				' SPACE UNDER BREAKER TYPE DENOTES A STANDARD CIRCUIT BREAKER.										
[10	0% 100% RATED CIRCUIT BREAKER		_												] `` ``	20	J. 7.0L	J. 10 LIV	J., L			THE STREET						
				1																								

# KEYNOTES

CONTRACTOR SHALL REPLACE THE EXISTING CIRCUIT BREAKER WITH A NEW ONE, SIZE AS INDICATED. NEW BREAKER SHALL HAVE THE SAME RATINGS, INCLUDING KAIC, AS THE REST OF THE EXISTING BREAKERS.

EO.

HEATING & VENTILATING UNIT

MONTCLAIR STATE

PANZER

GYMNASIUM

NORMAL AVE.

MONTCLAIR, NJ 07424

NO. DATE DESCRIPTION

ABBREVIATIONS &

FOR BID

02/01/2024

AS INDICATED

REVISIONS

**ELECTRICAL** 

**DETAILS** 

ISSUANCE:

DRAWN BY:

CHECKED BY:

UNIVERSIT

REPLACEMENT AT:

Plotted: 2/1/2024 11:00 AM By: gsolari File: U:\Projects 22\22-148 MSU - Panzer Gym AHU-3 Study\Drawings\22-148-E0.x\E0.1

### 1.01 DEFINITIONS

- A. THE TERM "FURNISH" SHALL MEAN TO OBTAIN AND DELIVER TO THE JOB SITE.
- B. THE TERM "INSTALL" SHALL MEAN TO UNPACK, STORE, ASSEMBLE, FIX IN POSITION, AND CONNECT
- C. THE TERM "PROVIDE" SHALL MEAN TO FURNISH AND INSTALL.
- D. THE TERM "CONTRACTOR" SHALL MEAN THE ELECTRICAL CONTRACTOR OR ANY ELECTRICAL SUBCONTRACTOR.

#### 1.02 SCOPE OF WORK

- THE WORK SHALL INCLUDE, BUT NOT BE LIMITED TO THE FOLLOWING:
- A. EACH CONTRACTOR SHALL HAVE LIMITED USE OF PREMISES FOR CONSTRUCTION OPERATIONS AS INDICATED ON DRAWINGS BY AREAS SHOWN.
- MAINTAIN EXISTING BUILDING IN A WEATHER-TIGHT CONDITION THROUGHOUT CONSTRUCTION PERIOD. ALL WORK NOT SPECIFICALLY CALLED FOR, BUT REASONABLY IMPLIED, INCLUDING THE CUTTING, PATCHING AND REPAIR OF DAMAGE CAUSED BY CONSTRUCTION OPERATIONS SHALL BE PROVIDED BY THE CONTRACTOR.
- C. THE CONTRACTOR SHALL ENSURE THAT ALL RULES AND REGULATIONS, INCLUDING THOSE WHICH MAY BE ISSUED BY THE OWNER, ARE BEING OBSERVED. THE CONTRACTOR SHALL INSTALL SIGNAGE, BARRIERS AND OTHER MEANS TO PROVIDE WARNINGS AND RESTRICT ACCESS TO CONSTRUCTION AREAS.
- DO NOT INTERRUPT UTILITIES SERVING AREAS OCCUPIED BY THE OWNER OR OTHERS UNLESS ARRANGEMENTS WITH THE OWNER HAVE BEEN MADE. NOTIFY OWNER NOT LESS THAN ONE WEEK IN ADVANCE OF PROPOSED UTILITY INTERRUPTIONS. DO NOT PROCEED WITH UTILITY INTERRUPTIONS WITHOUT OWNER'S WRITTEN PERMISSION.
- WORK SHALL BE GENERALLY PERFORMED DURING NORMAL BUSINESS WORKING HOURS OF 8 AM TO 5 PM, MONDAY THROUGH FRIDAY UNLESS OTHER ARRANGEMENTS WITH THE OWNER HAVE BEEN MADE. WORK THAT GENERATES EXCESSIVE NOISE OR REQUIRES A UTILITY SHUTDOWN SHALL BE PERFORMED DURING OFF HOURS AND SHALL BE SCHEDULED WITH OWNER. PROVIDE A MINIMUM OF ONE (1) WEEK NOTICE TO OWNER.
- THE WORK TO BE DONE UNDER THE SCOPE OF THIS PROJECT INCLUDES PROVIDING ALL EQUIPMENT, MATERIALS, LABOR AND SERVICES, AND PERFORMING ALL OPERATIONS FOR A COMPLETE AND OPERATIONAL SYSTEM. ANY WORK NOT SPECIFICALLY COVERED, BUT NECESSARY TO COMPLETE INSTALLATION. SHALL BE PROVIDED BY THE CONTRACTOR. ALL EQUIPMENT AND WIRING TO BE NEW AND PROVIDED UNDER THIS CONTRACT, UNLESS OTHERWISE NOTED.
- THE ELECTRICAL DRAWINGS ARE DIAGRAMMATIC AND ALL SPECIALTIES AND APPURTENANCES ARE NOT SHOWN, BUT SHALL BE PROVIDED AS REQUIRED. REFER TO ARCHITECTURAL DRAWINGS FOR EXACT LOCATIONS OF EQUIPMENT, UNLESS OTHERWISE NOTED. DISCREPANCIES SHALL BE CLARIFIED BY ARCHITECT AND/OR ENGINEER.
- CONTRACTOR SHALL PROVIDE TEMPORARY POWER AND LIGHTING FOR ALL TRADES, AS REQUIRED FOR CONSTRUCTION OR SO AS TO MAINTAIN NORMAL OPERATIONS OF THE BUILDING/SITE'S ACTIVITIES. CONTRACTOR SHALL PROVIDE EQUIPMENT AND MAKE ARRANGEMENTS WITH UTILITY COMPANY, AS NECESSARY.

#### 1.03 PROJECT MANAGEMENT

A. CONTRACTOR SHALL PREPARE AND SUBMIT THREE (3) COPIES OF A PROJECT SCHEDULE INDICATING SPECIFIC ACTIVITIES WITH START AND COMPLETION DATES FOR EACH ACTIVITY.

ITEM SUBMITTED, NAME OF SUBCONTRACTOR, SCHEDULED DATE FOR APPROVAL.

- CONTRACTOR SHALL ATTEND REGULAR PROJECT MEETINGS AS SCHEDULED BY THE PROJECT SUPERINTENDENT. CONTRACTOR SHALL PREPARE A CONSTRUCTION SCHEDULE TO REVIEW PROGRESS SINCE PREVIOUS MEETING AND TO DETERMINE WHICH ACTIVITIES ARE ON TIME, AHEAD OF SCHEDULE, OR BEHIND SCHEDULE IN RELATION TO THE PROJECT SCHEDULE.
- CONTRACTOR SHALL PREPARE AND SUBMIT THREE (3) COPIES OF A SUBMITTALS SCHEDULE. THE SCHEDULE SHALL INCLUDE THE FOLLOWING: DATE FOR FIRST SUBMITTAL, DESCRIPTION OF WORK OR

# 1.04 COORDINATION

- EACH CONTRACTOR SHALL COORDINATE ITS OPERATIONS WITH THE OPERATIONS OF OTHER TRADE CONTRACTORS THAT DEPEND ON EACH OTHER FOR PROPER INSTALLATION, CONNECTION AND
- ALL CONDUIT ROUTING LAYOUTS INDICATED ON DRAWINGS ARE PURELY DIAGRAMMATIC AND SHOWN FOR DIAGRAMMATICAL PURPOSES ONLY. CONTRACTOR SHALL COORDINATE CONDUIT ROUTING LAYOUT WITH EQUIPMENT LOCATIONS AND SPECIFICATIONS FOR ALL OTHER DISCIPLINES, UNLESS OTHERWISE INDICATED ON ENGINEERING PLANS.
- CONTRACTOR SHALL PREPARE AND SUBMIT FIVE (5) COPIES OF PROJECT SPECIFIC COORDINATION DRAWINGS DRAWN ACCURATELY TO SCALE FOR AREAS INDICATED. DO NOT BASE COORDINATION DRAWINGS ON REPRODUCTIONS OF THE CONTRACT DOCUMENTS OR STANDARD, PRINTED DATA. INDICATE FUNCTIONAL AND SPATIAL RELATIONSHIPS OF COMPONENTS OF ARCHITECTURAL, STRUCTURAL, CIVIL, MECHANICAL AND ELECTRICAL SYSTEMS. INDICATE DIMENSIONS AND MAKE SPECIFIC NOTE OF DIMENSIONS THAT APPEAR TO BE IN CONFLICT WITH SUBMITTED EQUIPMENT AND MINIMUM CLEARANCE REQUIREMENTS. PROVIDE ALTERNATE SKETCHES FOR RESOLUTION OF SUCH CONFLICTS.

# 1.05 SUBMITTAL PROCEDURES

- CONTRACTOR SHALL PREPARE AND SUBMIT FIVE (5) COPIES OF SUBMITTALS FOR WORK AND ITEMS INDICATED. PROVIDE SUBMITTALS FOR THE FOLLOWING: PERFORMANCE DATA AND MATERIAL SPECIFICATIONS FOR ALL EQUIPMENT LISTED IN SCHEDULES, DIMENSIONED CONDUIT LAYOUT DRAWINGS, DIMENSIONED EQUIPMENT SERVICE AND ACCESS CLEARANCE REQUIREMENTS, WIRING DIAGRAMS, ELECTRICAL SPECIFICATIONS AND MATERIAL SPECIFICATIONS FOR ITEMS LISTED IN PRODUCTS SECTION. FOR ALL EQUIPMENT AND MATERIALS PROPOSED BY THE ENGINEER, CONTRACTOR SHALL BE RESPONSIBLE FOR CHECKING PROPOSED EQUIPMENT PRIOR TO SUBMITTAL TO THE ENGINEER. THE CAUSE OF ANY RE-DESIGNING DUE TO A SUBSTITUTION OR LACK OF COORDINATION SHALL BE BORNE BY THE CONTRACTOR.
- CONTRACTOR SHALL ALLOW SUFFICIENT PROCESSING OF SUBMITTALS FOR REVIEW PRIOR TO START DATES OF FABRICATION, PURCHASING, TESTING, AND DELIVERY NECESSARY TO MEET PROJECT SCHEDULE. CONTRACTOR SHALL ALLOW TWELVE (12) DAYS FOR THE REVIEW AND TRANSMISSION OF EACH SUBMITTAL.
- ALL SUBMITTALS SHALL INCLUDE THE FOLLOWING INFORMATION: PROJECT NAME AND LOCATION, DATE, NAME AND ADDRESS OF ENGINEER, NAME AND ADDRESS OF CONTRACTOR AND/OR SUBCONTRACTOR, NAME AND ADDRESS OF SUPPLIER, NAME OF MANUFACTURER, SUBMITTAL NUMBER, AND A DESCRIPTION OF THE WORK OR ITEM SUBMITTED. IDENTIFY ALL DEVIATIONS FROM THE CONTRACT DOCUMENTS ON THE SUBMITTALS.
- D. TRANSMIT EACH SUBMITTAL WITH A TRANSMITTAL FORM LISTING SUBMITTALS AND QUANTITY OF EACH SUBMITTAL.
- RE-SUBMITTALS WILL FOLLOW THE SAME PROCEDURES AS STATED FOR SUBMITTALS.
- ENGINEER SHALL REVIEW EACH SUBMITTAL, MAKE MARKS TO INDICATE CORRECTIONS OR MODIFICATIONS, AND STAMP EACH SUBMITTAL WITH ACTION STAMP INDICATING ACTION TO BE TAKEN. APPROVAL OF SUBMITTAL SHALL NEITHER RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR PROPER INSTALLATION NOR ACCURACY OF MEASUREMENTS.

# 1.06 REFERENCES

- UNLESS THE CONTRACT DOCUMENTS INCLUDE MORE STRINGENT REQUIREMENTS, APPLICABLE CONSTRUCTION INDUSTRY STANDARDS HAVE THE SAME FORCE AND EFFECT AS IF COPIED DIRECTLY INTO THE CONTRACT DOCUMENTS TO THE EXTENT REFERENCED. SUCH STANDARDS ARE MADE PART OF THE CONTRACT DOCUMENTS BY REFERENCE.
- COMPLY WITH STANDARDS IN EFFECT AS OF THE DATE OF THE CONTRACT DOCUMENTS, UNLESS OTHERWISE INDICATED.
- ALL WORK SHALL COMPLY WITH THE CODES, REQUIREMENTS, AND RECOMMENDED PRACTICES OF THE LATEST APPLICABLE VERSION OF THE NATIONAL ELECTRICAL CODE (NEC).
- THE CONTRACTOR SHALL BE FAMILIAR WITH INDUSTRY STANDARDS APPLICABLE TO ITS CONSTRUCTION ACTIVITY. WHERE COPIES OF STANDARDS ARE NEEDED TO PERFORM A REQUIRED

CONSTRUCTION ACTIVITY, OBTAIN COPIES DIRECTLY FROM PUBLICATION SOURCE.

THE CONTRACTOR SHALL COMPLY WITH ALL LAWS, ORDINANCES, STATUTES, AND LAWFUL ORDERS ISSUED BY AUTHORITIES HAVING JURISDICTION AND RULES, CONVENTIONS, AND AGREEMENTS WITHIN THE CONSTRUCTION INDUSTRY THAT CONTROL THE PERFORMANCE OF THE WORK.

#### 1.07 WASTE MANAGEMENT

- THE CONTRACTOR SHALL PERFORM THE FOLLOWING FOR ITEMS SALVAGED FOR REUSE IN THE WORK: CLEAN SALVAGED ITEMS. PROTECT AND STORE ITEMS UNTIL INSTALLATION. AND INSTALL SALVAGED ITEMS TO COMPLY WITH INSTALLATION REQUIREMENTS FOR NEW MATERIALS AND
- THE CONTRACTOR SHALL PERFORM THE FOLLOWING FOR ITEMS SALVAGED FOR OWNER'S USE: CLEAN SALVAGED ITEMS, PROTECT AND STORE ITEMS UNTIL DELIVERY, TRANSPORT ITEMS TO OWNER'S STORAGE AREA.
- C. THE CONTRACTOR SHALL FOLLOW THE LOCAL ORDINANCES FOR RECYCLED MATERIALS.
- D. THE CONTRACTOR SHALL DISPOSE OF ALL DEMOLITION AND CONSTRUCTION WASTE FROM THE PROJECT SITE IN A LANDFILL OR INCINERATOR ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION.

#### 1.08 PRODUCT REQUIREMENTS

- THE PRODUCTS SHOWN ON THE DRAWINGS ARE BASED ON A SPECIFIC MANUFACTURER, MAKE, AND MODEL. THESE PRODUCTS ESTABLISH SIGNIFICANT QUALITIES RELATED TO TYPE, FUNCTION, DIMENSION, IN-SERVICE PERFORMANCE, PHYSICAL PROPERTIES, APPEARANCE, AND OTHER CHARACTERISTICS FOR THE PURPOSES OF EVALUATING PRODUCTS OF OTHER NAMED
- THE ENGINEER WILL CONSIDER REQUESTS FOR SUBSTITUTION WHEN THE FOLLOWING CONDITIONS ARE SATISFIED: REQUESTED SUBSTITUTION OFFERS OWNER A SUBSTANTIAL ADVANTAGE IN COST. TIME, OR ENERGY CONSERVATION AFTER DEDUCTING ADDITIONAL RESPONSIBILITIES THE SUBSTITUTION MAY PRESENT TO THE OWNER INCLUDING COMPENSATION TO ENGINEER FOR RE-DESIGN AND EVALUATION SERVICES AND INCREASED CONSTRUCTION COSTS OF RELATED WORK; WORK DOES NOT REQUIRE EXTENSIVE REVISIONS TO THE CONTRACT DOCUMENTS: WORK IS CONSISTENT WITH THE CONSTRUCTION DOCUMENTS AND WILL PRODUCE THE INDICATED RESULTS; WORK IS FULLY DOCUMENTED AND PROPERLY SUBMITTED: WORK WILL NOT ADVERSELY AFFECT THE CONTRACTOR'S CONSTRUCTION SCHEDULE; AND HAS BEEN COORDINATED WITH OTHER RELATED WORK.
- C. ALL NEW ELECTRICAL MATERIALS AND EQUIPMENT SHALL BE LISTED BY THE UNDERWRITERS' LABORATORIES, INC. (UL) AND CLEARLY BEAR THE "UL" LABEL.
- SOURCE LIMITATIONS SHALL BE TO OBTAIN EACH PIECE OF ELECTRICAL EQUIPMENT THROUGH ONE (1) SOURCE FROM A SINGLE MANUFACTURER, UNLESS CLEARLY SPECIFIED OTHERWISE ON DRAWINGS BY THE ENGINEER.
- E. THE CONTRACTOR SHALL DELIVER, STORE, AND HANDLE PRODUCTS USING MEANS AND METHODS THAT WILL PREVENT DAMAGE, DETERIORATION, AND LOSS. COMPLY WITH MANUFACTURER'S WRITTEN INSTRUCTIONS. THE CONTRACTOR SHALL STORE MATERIALS IN A MANNER THAT WILL NOT ENDANGER PROJECT STRUCTURE.
- THE CONTRACTOR SHALL PROVIDE THE MANUFACTURER'S STANDARD WRITTEN PRODUCT WARRANTY TO THE OWNER. WHERE SPECIAL WARRANTIES ARE INDICATED, THE CONTRACTOR SHALL PROVIDE THE WRITTEN WARRANTY FOR THE GIVEN TIME PERIOD TO THE OWNER. WARRANTIES SPECIFIED IN OTHER SECTIONS SHALL BE IN ADDITION TO, AND RUN CONCURRENT WITH OTHER WARRANTIES REQUIRED BY THE CONTRACT DOCUMENTS. MANUFACTURER'S DISCLAIMERS AND LIMITATIONS ON PRODUCT WARRANTIES DO NOT RELIEVE THE CONTRACTOR OF OBLIGATIONS UNDER THE REQUIREMENTS OF THE CONTRACT DOCUMENTS.

# PART 2 - PRODUCTS

2.01 BASIC ELECTRICAL MATERIALS AND METHODS

#### A. COORDINATION

- 1. THE INSTALLATION OF ALL ELECTRICAL EQUIPMENT AND DEVICES SHALL COMPLY WITH ALL REQUIREMENTS OF THE NATIONAL ELECTRIC CODE, INCLUDING ARTICLE 110.26. PROVIDE ALL NEC-REQUIRED WORKSPACE AND EQUIPMENT CLEARANCES.
- ARRANGEMENT, MOUNTING, AND SUPPORT OF FLECTRICAL FOUIPMENT SHALL BE PERFORMED. SUCH AS TO ALLOW RIGHT OF WAY FOR PIPING AND CONDUIT INSTALLED AT A REQUIRED SLOPE. TO PROVIDE FOR EASE OF DISCONNECTING ELECTRICAL EQUIPMENT WITH MINIMUM INTERFERENCE TO OTHER EQUIPMENT OR EQUIPMENT INSTALLATIONS, AND TO ALLOW THE CONNECTION OF RACEWAYS, CABLES, WIREWAYS, CABLE TRAYS, AND BUSWAYS TO BE CLEAR OF OBSTRUCTIONS AND OF THE SERVICE, ACCESS, AND CLEARANCE SPACE OF OTHER
- COORDINATE ELECTRICAL TESTING OF ELECTRICAL, MECHANICAL, AND ARCHITECTURAL ITEMS, SO THAT EQUIPMENT AND SYSTEMS THAT ARE FUNCTIONALLY INTERDEPENDENT ARE TESTED TO DEMONSTRATE SUCCESSFUL INTEROPERABILITY.

# B. FIRE-STOPPING FOR ELECTRICAL PENETRATIONS

- FIRE-RATED ASSEMBLY PENETRATIONS SHALL MAINTAIN INDICATED FIRE RATING OF WALLS, PARTITIONS, CEILINGS, AND FLOORS. APPLY FIRE-STOPPING TO ELECTRICAL PENETRATIONS OF FIRE-RATED FLOOR AND WALL ASSEMBLIES TO RESTORE ORIGINAL FIRE-RESISTANCE RATING OF ASSEMBLY.
- SLEEVES FOR RACEWAYS AND CABLES
- 1. STEEL PIPE SLEEVES SHALL BE ASTM A 53/A 53M, TYPE E, GRADE B, SCHEDULE 40, GALVANIZED STEEL, PLAIN ENDS.
- 2. CAST-IRON PIPE SLEEVES SHALL BE CAST OR FABRICATED "WALL PIPE," EQUIVALENT TO DUCTILE-IRON PRESSURE PIPE, WITH PLAIN ENDS AND INTEGRAL WATERSTOP, UNLESS OTHERWISE INDICATED.
- 3. SLEEVES FOR RECTANGULAR OPENINGS SHALL BE GALVANIZED SHEET STEEL WITH MINIMUM 0.138 INCH THICKNESS, AS INDICATED, AND OF LENGTH TO SUIT APPLICATION.

- 1. DESCRIPTION: MODULAR SEALING DEVICE, DESIGNED FOR FIELD ASSEMBLY, TO FILL ANNULAR SPACE BETWEEN SLEEVE AND RACEWAY OR CABLE.
- 2. AVAILABLE MANUFACTURERS SHALL BE ONE OF THE FOLLOWING, UNLESS OTHERWISE INDICATED ON ENGINEERING DRAWINGS:

# A) ADVANCE PRODUCTS & SYSTEMS, INC.

B) CALPICO, INC. C) METRAFLEX CO.

D) PIPELINE SEAL AND INSULATOR, INC.

- SEALING ELEMENTS SHALL BE EPDM (Ethylene-propylene-diene terpolymer rubber) OR NBR (Acrylonitrile-butadiene rubber) INTERLOCKING LINKS SHAPED TO FIT SURFACE OF CABLE OR CONDUIT. INDICATE TYPE AND NUMBER REQUIRED FOR MATERIAL AND SIZE OF RACEWAY OR
- 4. PRESSURE PLATES SHALL BE STAINLESS STEEL. INCLUDE TWO FOR EACH SEALING ELEMENT. CONNECTING BOLTS AND NUTS SHALL BE STAINLESS STEEL OF LENGTH REQUIRED TO SECURE PRESSURE PLATES TO SEALING ELEMENTS. INCLUDE ONE (1) FOR EACH SEALING

# GROUNDING AND BONDING

- 1. ALL GROUNDING WIRES, LUGS, CLAMPS, AND BUS BARS SHALL BE COPPER.
- 2. PROVIDE A COMPLETE EQUIPMENT GROUND SYSTEM, AS AN EXTENSION OF EXISTING SYSTEM IF EXISTING SYSTEM IS ALREADY IN PLACE, FOR THE ELECTRICAL SYSTEM AS REQUIRED BY ARTICLE 250 OF THE NEC AND AS SPECIFIED HEREIN.
- CONDUCTORS AND CONNECTORS
  - INSULATED CONDUCTORS SHALL BE COPPER WIRE OR CABLE INSULATED FOR 600V UNLESS
  - 2. ALL BRANCH CIRCUITS FOR POWER WIRING SHALL CONTAIN A COPPER EQUIPMENT SAFETY GROUND WIRE. NO FLEXIBLE METAL CONDUIT OF ANY KIND, TYPE, OR LENGTH SHALL BE USED AS AN EQUIPMENT GROUNDING CONDUCTOR.

OTHERWISE REQUIRED BY APPLICABLE CODE OR AUTHORITIES HAVING JURISDICTION.

- COPPER GROUNDING BUS SHALL BE INSTALLED IN ELECTRICAL AND TELEPHONE EQUIPMENT ROOMS, IN ROOMS HOUSING ELECTRICAL SERVICE EQUIPMENT, AND ELSEWHERE AS INDICATED
- GROUNDING CONDUCTORS SHALL BE ROUTED ALONG SHORTEST AND STRAIGHTEST PATHS POSSIBLE, UNLESS OTHERWISE INDICATED ON DRAWINGS OR REQUIRED BY CODE. AVOID OBSTRUCTING ACCESS OR PLACING CONDUCTORS WHERE THEY MAY BE SUBJECTED TO STRAIN, IMPACT, OR DAMAGE.

#### C. EQUIPMENT GROUNDING

- 1. INSTALL INSULATED EQUIPMENT GROUNDING CONDUCTORS WITH ALL FEEDERS AND BRANCH
- 2. INSTALL INSULATED EQUIPMENT GROUNDING CONDUCTORS WITH THE FOLLOWING ITEMS, IN ADDITION TO THOSE REQUIRED BY NFPA 70: FEEDERS AND BRANCH CIRCUITS, LIGHTING CIRCUITS, RECEPTACLE CIRCUITS, SINGLE-PHASE MOTOR AND APPLIANCE BRANCH CIRCUITS, THREE-PHASE MOTOR AND APPLIANCE BRANCH CIRCUITS, COMPUTER AND RACK-MOUNTED ELECTRONIC EQUIPMENT CIRCUITS, AND FLEXIBLE METAL RACEWAY RUNS.
- 3. FOR DESIGNATED EQUIPMENT SUPPLIED BY A BRANCH CIRCUIT OR FEEDER, ISOLATE EQUIPMENT ENCLOSURE FROM SUPPLY CIRCUIT RACEWAY WITH A NONMETALLIC RACEWAY FITTING LISTED FOR THE PURPOSE. INSTALL FITTING WHERE RACEWAY ENTERS ENCLOSURE AND INSTALL A SEPARATE INSULATED EQUIPMENT GROUNDING CONDUCTOR. ISOLATE CONDUCTOR FROM RACEWAY AND FROM PANELBOARD GROUNDING TERMINALS. TERMINATE AT EQUIPMENT GROUNDING CONDUCTOR TERMINAL OF THE APPLICABLE DERIVED SYSTEM OR SERVICE, UNLESS OTHERWISE INDICATED.

#### ELECTRICAL SUPPORTS AND SEISMIC RESTRAINTS

#### A. SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS.

- RATED STRENGTH SHALL BE ADEQUATE IN TENSION, SHEAR, AND PULLOUT FORCE TO RESIST MAXIMUM LOADS CALCULATED OR IMPOSED UNDER THIS PROJECT, WITH A MINIMUM STRUCTURAL SAFETY FACTOR OF FIVE TIMES THE APPLIED FORCE.
- RACEWAY AND CABLE SUPPORTS SHALL BE AS DESCRIBED IN NECA 1.
- CONDUIT AND CABLE SUPPORT DEVICES SHALL BE STEEL HANGERS, CLAMPS, AND ASSOCIATED FITTINGS, DESIGNED FOR TYPES AND SIZES OF RACEWAY OR CABLE TO BE
- 4. SUPPORT FOR CONDUCTORS IN VERTICAL CONDUIT SHALL BE FACTORY—FABRICATED ASSEMBLY CONSISTING OF THREADED BODY AND INSULATING WEDGING PLUG OR PLUGS FOR NON-ARMORED ELECTRICAL CONDUCTORS OR CABLES IN RISER CONDUITS. PLUGS SHALL HAVE NUMBER, SIZE, AND SHAPE OF CONDUCTOR GRIPPING PIECES AS REQUIRED TO SUIT INDIVIDUAL CONDUCTORS OR CABLES SUPPORTED. BODY SHALL BE MALLEABLE IRON.

#### **ELECTRICAL IDENTIFICATION**

#### A. COORDINATION

1. COORDINATE IDENTIFICATION NAMES, ABBREVIATIONS, COLORS, AND OTHER FEATURES WITH REQUIREMENTS IN THE CONTRACT DOCUMENTS, SHOP DRAWINGS, MANUFACTURER'S WIRING DIAGRAMS. ENGINEERING DRAWINGS. OPERATION AND MAINTENANCE MANUALS, AND WITH THOSE REQUIRED BY CODES, STANDARDS, AND 29 CFR 1910.145. CONSISTENT DESIGNATIONS SHALL BE USED THROUGHOUT PROJECT.

#### WARNING LABELS AND SIGNS

- 1. ALL WARNING LABELS AND SIGNS SHALL COMPLY WITH NFPA 70 AND 29 CFR 1910.145.
- SELF-ADHESIVE WARNING LABELS AND IDENTIFICATION TAGS SHALL BE FACTORY-PRINTED, MULTICOLOR, PRESSURE-SENSITIVE ADHESIVE LABELS, CONFIGURED FOR DISPLAY ON FRONT COVER, DOOR, OR OTHER ACCESS TO EQUIPMENT, UNLESS OTHERWISE INDICATED ON DRAWINGS.

#### C. IDENTIFICATION

- 1. APPLY IDENTIFICATION PRACTICES ON CONDUIT FOR LIFE SAFETY SYSTEMS AT MAXIMUM OR 25' CENTERS AND AT LEAST ONE (1) PER ROOM. USE PERMANENT VINYL, SELF-ADHERING MARKERS, UNLESS OTHERWISE NOTED.
- 2. APPLY CABLE/CONDUCTOR IDENTIFICATION MARKERS ON EACH CABLE AND CONDUCTOR IN EACH BOX, ENCLOSURE, OR CABINET (THOMAS & BETTS TY-RAP OR APPROVED EQUAL).
- 3. PROVIDE SELF-ADHESIVE PLASTIC SIGNS WITH APPROPRIATE INSTRUCTIONS OR WARNINGS AT ALL FLECTRICAL REQUIPMENT ROOMS AND ON ALL FLECTRICAL FOUIPMENT. FNCLOSURES INCLUDING, BUT NOT LIMITED TO, TRANSFORMERS, PANELBOARDS, MOTOR STARTERS, DISCONNECT SWITCHES, AND ELECTRICAL BOXES AND CABINETS.
- 4. PROVIDE ENGRAVED, SELF-ADHESIVE, FACTORY-PRINTED, PRESSURE-SENSITIVE IDENTIFICATION LABELS. CONFIGURED FOR DISPLAY ON FRONT COVERS, DOORS, ETC. FOR ALL ELECTRICAL EQUIPMENT ENCLOSURES INCLUDING. BUT NOT LIMITED TO. PANELBOARDS. TRANSFORMERS. MOTOR STARTERS, DISCONNECT SWITCHES, AND ELECTRICAL BOXES AND CABINETS.
- 5. PROVIDE CIRCUIT IDENTIFICATION TAGS TO ALL BRANCH CIRCUIT WIRING DEVICES. PANEL DESIGNATION AND CIRCUIT NUMBER SHALL BE TYPE WRITTEN BLACK LETTERS ON A CLEAR, SELF-ADHESIVE TAPE STRIP.
- 6. PROVIDE NEW DISTRIBUTION PANELBOARD DIRECTORIES WITHIN EACH PANELBOARD WITH A DESCRIPTION OF THE LOAD SERVED BY EACH CIRCUIT, INCLUDING LOCATION OF EACH LOAD.
- 7. PROVIDE PROFESSIONAL, SELF-ADHESIVE CIRCUIT IDENTIFICATION NUMBERS ADJACENT TO EACH CIRCUIT BREAKER POSITION WITHIN NEW DISTRIBUTION PANELBOARDS. CIRCUIT IDENTIFICATION NUMBERS SHALL CORRESPOND WITH THOSE INDICATED IN PANEL SCHEDULES.
- 8. COLOR-CODING FOR PHASE AND VOLTAGE LEVEL IDENTIFICATION, 600V AND LESS, SHALL BE OF THE COLORS LISTED BELOW FOR UNGROUNDED SERVICE, FEEDER, AND/OR BRANCH-CIRCUIT CONDUCTORS:
- A) COLOR SHALL BE FACTORY APPLIED OR, FOR SIZES LARGER THAN NO. 12 AWG, FIELD APPLIED IF AUTHORITIES HAVING JURISDICTION PERMIT.

# B) COLORS FOR CIRCUITS SHALL BE:

	208Y/120V	480Y/277V
PHASE A: PHASE B: PHASE C: NEUTRAL: GROUND:	BLACK RED BLUE WHITE GREEN	BROWN ORANGE YELLOW WHITE GREEN
ISOLATED GROUND:	GREEN/YELLOW	GREEN/YELLOW

# CONDUCTORS AND CABLES

# D. CONDUCTORS AND CABLES

- 1. SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE
- FOLLOWING, UNLESS OTHERWISE INDICATED ON ENGINEERING DRAWINGS: A) ALCAN PRODUCTS CORPORATION; ALCAN CABLE DIVISION B) AMERICAN INSULATED WIRE CORP.; A LEVITON COMPANY C) GENERAL CABLE CORPORATION
- D) SOUTHWIRE COMPANY 2. COPPER CONDUCTORS SHALL COMPLY WITH NEMA WC 70.
- 3. CONDUCTOR INSULATION SHALL COMPLY WITH NEMA WC 70 FOR TYPES THHN-THWN, XHHW, UF, USE, AND SO.
- 4. MULTI-CONDUCTOR CABLE SHALL COMPLY WITH NEMA WC 70 FOR METAL-CLAD CABLE, TYPE MC, WITH GROUND WIRE.
- 5. MINIMUM CONDUCTOR SIZE SHALL BE #12 FOR ALL POWER CONDUCTORS AND #14 FOR CONTROL CONDUCTORS. PROVIDE A SEPARATE NEUTRAL FOR EACH POWER CIRCUIT. NEUTRALS SHALL NOT BE SHARED.
- 6. ALL ELECTRICAL CONNECTIONS SHALL BE COPPER.
- 7. CIRCUIT NUMBERS AND DESIGNATIONS ARE SHOWN ONLY FOR GROUPING AND IDENTIFICATION. CONTRACTOR SHALL MAINTAIN LOAD BALANCE BETWEEN PHASES OF  $\pm /-$  10%.
- 8. CONTRACTOR SHALL PROVIDE #10 WIRE FOR 120 VOLTS CIRCUITS THAT EXCEED APPROXIMATELY 100 FEET TO THE FARTHEST ELECTRICAL CONNECTION (SUCH AS AN OUTLET) AND FOR 277V CIRCUITS THAT EXCEED 200 FEET TO THE FARTHEST ELECTRICAL
- 9. FEEDERS SHALL NOT BE SPLICED, UNLESS OTHERWISE INDICATED ON ENGINEERING DRAWINGS.

### B. CONNECTORS AND SPLICES

- 1. SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING, UNLESS OTHERWISE INDICATED ON ENGINEERING DRAWINGS:
- A) AFC CABLE SYSTEMS, INC. B) HUBBELL POWER SYSTEMS, INC. C) O-Z/GEDNEY; EGS ELECTRICAL GROUP LLC. D) 3M; ELECTRICAL PRODUCTS DIVISION E) TYCO ELECTRONICS CORP.

#### SLEAVE SEALS

1. SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING, UNLESS OTHERWISE INDICATED ON ENGINEERING DRAWINGS:

# A) ADVANCE PRODUCTS & POWER SYSTEMS, INC.

- B) CALPICO, INC. C) METRAFLEX CO. D) PIPELINE SEAL AND INSULATOR, INC.
- 2. SEALING ELEMENTS SHALL BE EPDM OR NBR INTERLOCKING LINKS SHAPED TO FIT SURFACE OF CABLE OR CONDUIT. INCLUDE TYPE AND NUMBER REQUIRED FOR MATERIAL AND SIZE OF RACEWAY OR CABLE.
- 3. PRESSURE PLATES SHALL BE STAINLESS STEEL, INCLUDE TWO (2) FOR EACH SEALING ELEMENT. CONNECTING BOLTS AND NUTS SHALL BE STAINLESS STEEL OF LENGTH REQUIRED TO SECURE PRESSURE PLATES TO SEALING ELEMENTS. INCLUDE ONE (1) FOR EACH SEALING

#### D. CONDUCTOR MATERIAL APPLICATIONS

- 1. FEEDERS SHALL BE COPPER. SOLID FOR NO. 10 AWG AND SMALLER; STRANDED NO. 8 AWG AND LARGER. MINIMUM FEEDER CONDUCTOR SIZE SHALL BE NO. 12 AWG FOR POWER CONDUCTORS AND NO. 14 AWG FOR CONTROL CONDUCTORS.
- 2. BRANCH CIRCUITS SHALL BE COPPER. SOLID FOR NO. 10 AWG AND SMALLER; STRANDED FOR NO. 8 AWG AND LARGER. MINIMUM BRANCH CIRCUIT CONDUCTOR SIZE SHALL BE NO. 12 AWG FOR POWER CONDUCTORS AND NO. 14 AWG FOR CONTROL CONDUCTORS.
- 3. BRANCH CIRCUITS CONCEALED IN CEILINGS, WALLS, AND PARTITIONS SHALL BE OF TYPE THHN-THWN. SINGLE CONDUCTORS IN RACEWAY, METAL-CLAD CABLE, TYPE MC, UNLESS OTHERWISE INDICATED ON ENGINEERING DRAWINGS.
- 4. ALL ELECTRICAL CONNECTORS SHALL BE COPPER OR TINNED-COPPER.
- CLASS 1 CONTROL CIRCUITS SHALL BE OF TYPE THHN—THWN, IN RACEWAY.
- 6. CLASS 2 CONTROL CIRCUITS SHALL BE OF TYPE THHN-THWN, IN RACEWAY.
- 7. 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.

#### RACEWAYS AND BOXES

- 5. ALL WIRING SHALL BE CONCEALED AND INSTALLED IN CONDUIT WITH A MINIMUM TRADE SIZE
- OF 3/4" FOR POWER CIRCUITS AND 1/2" FOR CONTROL CIRCUITS. 6. ELECTRICAL RACEWAY CONNECTIONS TO VIBRATING EQUIPMENT AND MACHINERY SUCH AS MOTORS, TRANSFORMERS, ETC., SHALL BE MADE WITH FLEXIBLE METAL CONDUIT (LIQUID TIGHT FLEXIBLE METAL CONDUIT IN OUTDOOR OR WET LOCATIONS).
- 7. LIQUID TIGHT FLEXIBLE METAL CONDUIT LOCATED BELOW ACCESS FLOORS SHALL BE
- JACKETED, FLEXIBLE STEEL CONDUIT WITH AN INTEGRAL COPPERING SHIELDING CONDUCTOR. 8. METAL CLAD (MC) CABLE MAY BE USED FOR DISTRIBUTION CIRCUITS WHEN CONCEALED IN FINISHED CEILINGS, WALLS, OR FLOORS, UNLESS OTHERWISE NOTED ON DRAWINGS, OR PROHIBITED BY CODE. ALL FEEDERS SHALL BE INSTALLED IN RIGID METAL RACEWAY SUCH AS ELECTRICAL METALLIC TUBING (EMT) OR GALVANIZED RIGID STEEL (GRS) CONDUIT, UNLESS OTHERWISE NOTED.
- 9. ALL PENETRATIONS SHALL BE SEALED WITH FIRE-PROOF COMPOUND USING A UL LISTED
- 10. GROUP AND INSTALL ALL CONDUITS PARALLEL TO OR PERPENDICULAR TO BUILDING
- 11. INDOOR CONDUIT SHALL BE ELECTRICAL METALLIC TUBING (EMT) WITH COMPRESSION-TYPE FITTINGS, UNLESS OTHERWISE NOTED ON DRAWINGS.
- 12. ALL CONDUIT IN OUTDOOR, WET, OR DAMP LOCATIONS SHALL BE GALVANIZED RIGID STEEL
- 13. CONTRACTOR SHALL PROVIDE EXPANSION FITTINGS FOR ALL RACEWAYS THAT CROSS BUILDING EXPANSION JOINTS.

14. FOR CONDUIT BELOW GRADE, PVC ENCASED IN CONCRETE MAY BE USED FOR STRAIGHT

(GRS), UNLESS OTHERWISE SPECICALLY INDICATED ON DRAWINGS.

#### RUNS BELOW GRADE. CONDUIT BELOW GRADE SHALL BE RIGID STEEL GALVANIZED FOR ALL BENDS AND RUNS.

- 1. INTERIOR OUTLET BOXES SHALL BE GALVANIZED STEEL, MINIMUM #14 GAUGE, NO LESS THAN 4" SQUARE OR OCTAGON WITH EXTENSION RINGS AND MOUNTING BRACKETS. SECTIONAL
- BOXES SHALL NOT BE PERMITTED. 2. JUNCTION BOXES SHALL BE OF CODE GAUGE GALVANIZED STEEL WITH SCREW COVERS.
- BOXES SHALL BE SUPPORTED INDEPENDENTLY OF CONDUITS. 3. JUNCTION BOXES UTILIZED FOR FIRE ALARM CIRCUITS SHALL BE OF THE COLOR RED.

# A. GENERAL WIRING

WIRING DEVICES

FIRE-STOP MATERIAL.

1. THE CONTRACTOR SHALL VERIFY COLOR, LOCATION, AND MOUNTING HEIGHT OF ALL DEVICES WITH ARCHITECT PRIOR TO INSTALLATION. OBSERVE HANDICAPPED HEIGHT REQUIREMENTS AND SATISFY ALL ADA-COMPLIANT REQUIREMENTS.

# B. MANUFACTURERS

- APPROVED MANUFACTURERS SHALL BE LIMITED TO THE FOLLOWING:
- COOPER WIRING DEVICES, A DIVISION OF COOPER INDUSTRIES, INC.
- HUBBELL, INC. (WIRING DEVICE-KELLEMS) LEVITON MANUFACTURING COMPANY, INC. (LEVITON)

ON THE ELECTRICAL DRAWINGS.

# RECEPTACLES

- 1. CONVENIENCE-TYPE STRAIGHT-BLADE RECEPTACLES SHALL BE RATED 125 VOLTS, 20 AMPS AND SHALL COMPLY WITH NEMA WD 1, NEMA WD 6 CONFIGURATION 5-20R.
- 2. GROUND-FAULT CIRCUIT INTERRUPTER (GFCI) STRAIGHT-BLADE, NON-FEED THROUGH-TYPE, RECEPTACLES SHALL COMPLY WITH NEMA WD 1, NEMA WD 6, UL 498, AND UL 943, CLASS A, AND SHALL INCLUDE AN INDICATOR LIGHT THAT IS LIGHTED WHEN THE DEVICE IS TRIPPED. GFCI RECEPTACLES SHALL BE RATED 125 VOLTS, 20 AMPS. GROUND-FAULT RECEPTACLES SHALL BE LOCATED WITHIN SIX (6) FEET OF ALL WET AREAS SUCH AS SINKS (TOILET ROOMS, KITCHEN AREAS, ETC.), UNDERGROUND PARKING, OUTDOORS AND WHERE INDICATED

# E. WALL PLATES

1. SINGLE AND COMBINATION TYPES TO MATCH CORRESPONDING WIRING DEVICES.

ARCHITECTURAL DRAWINGS FOR DETAILS AND SPECIFICATIONS.

2. PLATE-SECURING SCREWS SHALL BE METAL WITH HEAD COLOR TO MATCH PLATE FINISH, UNLESS OTHERWISE INDICATED BY ARCHITECT.

MATERIAL FOR FINISHED SPACES SHALL BE AS SELECTED BY ARCHITECT. REFER TO

ARCHITECTURAL DRAWINGS AND SPECIFICATIONS. 4. MATERIAL FOR UNFINISHED SPACES SHALL BE AS SELECTED BY ARCHITECT. REFER TO 5. MATERIAL FOR DAMP LOCATIONS SHALL BE THERMOPLASTIC WITH SPRING-LOADED LIFT COVER, AND LISTED AND LABELED FOR USE IN "WET LOCATIONS."

# FINISHES

A. EXTRA MATERIALS

ALL WIRING DEVICE COLORS SHALL BE CONFIRMED WITH ARCHITECT AND OWNER.

### ENCLOSED SWITCHES AND CIRCUIT BREAKERS

- 1. FURNISH EXTRA MATERIALS DESCRIBED BELOW THAT MATCH PRODUCTS INSTALLED AND THAT ARE PACKAGED WITH PROTECTIVE COVERING FOR STORAGE AND IDENTIFIED WITH LABELS
- DESCRIBING CONTENTS.
- 2. PROVIDE THE FOLLOWING SPARES: A) POTENTIAL TRANSFORMER FUSES: THREE (3)
- B) CONTROL-POWER FUSES: SIX (6) C) FUSES AND FUSIBLE DEVICES FOR FUSED CIRCUIT BREAKERS: THREE (3)
- D) FUSES FOR FUSIBLE SWITCHES: SIX (6) E) FUSES FOR FUSED POWER CIRCUIT DEVICES: SIX (6)
- MANUFACTURERS SHALL BE, UNLESS OTHERWISE INDICATED ON ENGINEERING DRAWINGS, ONE OF THE FOLLOWING:

A) GENERAL ELECTRIC CO.: ELECTRICAL DISTRIBUTION & CONTROL DIVISION

#### B) SIEMENS ENERGY & AUTOMATION, INC. C) SQUARE-D, INC.

C. FUSIBLE AND NON-FUSIBLE SWITCHES

- 1. FUSIBLE SWITCH, 1200A AND SMALLER SHALL BE NEMA KS 1. TYPE HD. WITH CLIPS OR BOLT PADS TO ACCOMMODATE SPECIFIED FUSES, LOCKABLE HANDLE WITH CAPABILITY TO
- ACCEPT TWO PADLOCKS, AND INTERLOCKED WITH COVER IN CLOSED POSITION. 2. NON-FUSIBLE SWITCH, 1200A AND SMALL SHALL BE NEMA KS 1. TYPE HD. LOCKABLE HANDLE WITH CAPABILITY TO ACCEPT TWO PADLOCKS, AND INTERLOCKED WITH COVER IN

# CLOSED POSITION.

- A) POTENTIAL TRANSFORMER FUSES: THREE (3) B) CONTROL-POWER FUSES: SIX (6)
- C) FUSES AND FUSIBLE DEVICES FOR FUSED CIRCUIT BREAKERS: THREE (3) D) FUSES FOR FUSIBLE SWITCHES: SIX (6) E) FUSES FOR FUSED POWER CIRCUIT DEVICES: SIX (6)

# MOLDED-CASE CIRCUIT BREAKERS AND SWITCHES

- 1. MOLDED-CASE CIRCUIT BREAKER SHALL BE NEMA AB 1, WITH INTERRUPTING CAPACITY TO MEET AVAILABLE FAULT CURRENTS.
- THERMAL MAGNETIC CIRCUIT BREAKERS SHALL HAVE AN INVERSE TIME—CURRENT ELEMENT FOR LOW-LEVEL OVERLOADS AND INSTANTANEOUS MAGNETIC TRIP ELEMENT FOR SHORT CIRCUITS. ADJUSTABLE MAGNETIC TRIP SETTING FOR CIRCUIT BREAKER FRAME SIZES 250A AND LARGER.
- 3. TYPE SWD FOR SWITCHING FLUORESCENT LIGHTING LOADS.
- ENCLOSURES

5. GFCI CIRCUIT BREAKERS SHALL BE SINGLE AND TWO-POLE CONFIGURATIONS WITH 5-MA TRIP

4. TYPE HACR FOR HEATING, AIR-CONDITIONING, AND REFRIGERATION EQUIPMENT.

1. ENCLOSURES SHALL BE NEMA AB 1 AND NEMA KS 1 TO MEET ENVIRONMENTAL CONDITIONS OF INSTALLED LOCATION:

A) OUTDOOR LOCATIONS: NEMA 250, TYPE 3R.

#### B) KITCHEN AREAS: NEMA 250, TYPE 4X, STAINLESS STEEL. C) OTHER WET AND DAMP INDOOR LOCATIONS: NEMA 250, TYPE 4.

- PANELBOARDS
- A. MANUFACTURED UNITS

1. NEW CIRCUIT BREAKERS INSTALLED IN EXISTING PANELBOARDS SHALL MATCH EXISTING

CIRCUIT BREAKERS WITHIN EXISTING PANELBOARD.

CONDUCTOR CONNECTORS SHALL BE COPPER.

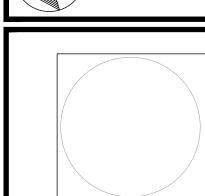
# ALL PANELS SHALL HAVE TYPEWRITTEN DIRECTORIES.

- A. ALL ELECTRICAL EQUIPMENT SHALL BE ADJUSTED AND TESTED FOR PROPER OPERATION. AFTER WIRES ARE IN PLACE AND CONNECTED TO DEVICES AND EQUIPMENT. THE SYSTEM SHALL BE TESTED FOR SHORTS AND GROUNDS. ALL HOT AND NEUTRAL CONDUCTORS. IF SHORTED OR GROUNDED, SHALL BE REMOVED AND REPLACED. ALL METERS, INSTRUMENTS, CABLE CONNECTIONS,
- EQUIPMENT OR APPARATUS NECESSARY FOR MAKING ALL TESTS, SHALL BE FURNISHED BY THIS CONTRACTOR AT HIS OWN EXPENSE.
- B. TOUCH-UP OR REFINISH DAMAGED SURFACES OF FIXTURES AND EQUIPMENT, EXPOSED TO VIEW.

D. CONTRACTOR SHALL SUBMIT AS—BUILT DRAWINGS AT COMPLETION OF PROJECT.

C. FURNISH WRITTEN ONE YEAR GUARANTEE FOR ALL ELECTRICAL WORK AND EQUIPMENT.

E. CONTRACTOR SHALL SUBMIT (3) THREE COPIES OF OPERATION AND MAINTENANCE MANUALS.



HEATING & VENTILATING UNIT REPLACEMENT AT:

MONTCLAIR STATE UNIVERSIT

PANZER

GYMNASIUM

NORMAL AVE.

MONTCLAIR, NJ 07424

NO. DATE DESCRIPTION REVISIONS

**SPECIFICATIONS** 

FOR BII

02/01/2024

AS INDICATE

DRAWN BY:

CHECKED BY:

