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ENGINEER'S STATEMENT

A. ENGINEER OF RECORD (EOR) ANDRE GILL ENGINEERING, LLC (AGE) WAS HIRED BY NBNERR TO PROVIDE AND UPGRADED HVAC SYSTEM AND SUPPORT ELECTRIFICATION INITIATIVES. ALSO, SELECT AND SPECIFY EQUIPMENT TO BE INSTALLED BY THE SUCCESSFUL CONTRACTOR FOR WORK DESCRIBED IN THE PROJECT SCOPE OF WORK. THE SELECTED EQUIPMENT REQUIRED AND UPGRADE TO THE MAIN DISTRIBUTION PANEL AS SHOWN ON THE ELECTRICAL DRAWINGS.
B. THE PREVIOUS FURNACES ARE TO BE REMOVED AND REPLACED WITH MITSUBISHI/ TRANE MULTI POSITION AIR HANDLERS AS SHOWN ON THE SCHEDULE UTILIZING THE EXISTING DUCTWORK. FRESH AIR/ VENTILATION AIR WILL BE PROVIDED VIA TWO CEILING MOUNTED DUCTED MITSUBISHI/ TRANE FRESH AIR UNITS THAT WILL BE RUN WITH NEW SEPARATE DUCTWORK AS SHOWN ON THE PLANS.
C. ALL SELECTED EQUIPMENT SHALL BE SUBMITTED FOR FINAL APPROVAL TO ENSURE ALL CODE REQUIREMENTS ARE MET. THE CONTRACTOR SHALL ENSURE PRIOR TO BID SUBMISSION THAT EQUIPMENT BEING SELECTED MEETS ALL MINIMUM REQUIREMENTS OF THE RHODE ISLAND STATE BUILDING CODE AND ALL OTHER APPLICABLE CODES.
D. TRANE/MITSUBISHI IS THE BASIS OF DESIGN FOR MECHANICAL EQUIPMENT AND SHALL NOT BE SUBSTITUTED WITHOUT APPROVAL OF THE EOR AND SUBSEQUENTLY NBNERR TO ENSURE COMPLIANCE AND CONFORMANCE WITH THE ELECTRICAL DESIGN. CONTRACTOR SHALL PROVIDE DATA SHOWING AT A MINIMUM EQUIVALENCE TO BASIS OF DESIGN EQUIPMENT. EQUIVALENCE SHALL BE IN ALL MAJOR ASPECT OF OPERATIONAL PERFORMANCE. ALTERNATE MANUFACTURERS MAY BE SUBMITTED FOR APPROVAL AS REQUIRED TO ENSURE COST TO THE OWNER IS REDUCED WHILE MEETING THE MINIMUM CODE COMPLIANCE OF THE AHJ, HOWEVER THE CONTRACTOR SHALL SUBMIT DETAILED INFORMATION HIGHLIGHTING EQUIVALENCY. .

SCOPE OF WORK

A. ALL CONTRACTORS SHALL FOLLOW THE CURRENT ENFORCED **RHODE ISLAND STATE BUILDING CODES** AS A MINIMUM, HOWEVER SECTIONS OF THESE DOCUMENTS REFLECT CURRENT VERSION OF ICC INTERNATIONAL CODES WHERE THEY SUPERSEDE RISBC. ALL CONTRACTORS SHALL FOLLOW ALL LOCAL REQUIREMENTS BY AUTHORITIES HAVING JURISDICTION.
B. CONTRACTORS SHALL INSTALL ALL EQUIPMENT FOLLOWING ASHRAE, ASME, ASTM, NFPA AND NEC STANDARDS.
C. CONTRACTORS SHALL PROVIDE ALL LABOR, MATERIALS, EQUIPMENT AND SERVICES AS SHOWN AND/OR IMPLIED ON DRAWINGS AND SPECIFICATIONS FOR A COMPLETE AND PROPER INSTALLATION. THE DRAWINGS ARE NOT ALL INCLUSIVE AND THE CONTRACTOR IS RESPONSIBLE FOR A COMPLETE INSTALLATION. THE DRAWINGS SHOW MAJOR COMPONENTS AND ALL QUALIFIED CONTRACTORS SHALL HAVE SUFFICIENT EXPERIENCE IN PERFORMANCE OF THIS INSTALLATION.
D. CONTRACTORS SHALL FURNISH AND INSTALL, PURGE, CHARGE, TEST AND OPERATE ALL EQUIPMENT, ACCESS DOORS, CAULKING, SLEEVES, FLASHING, FLEXIBLE CONNECTIONS, INSERTS, DEVICES, HANGERS, SUPPORTS, BRACING, FASTENERS, MISCELLANEOUS HARDWARE AND INSULATION.
E. CONTRACTOR SHALL OBTAIN AND PAY FOR PERMITS, INSPECTIONS AND TESTS REQUIRED BY GOVERNING AUTHORITIES HAVING JURISDICTION
F. PROVIDED EQUIPMENT AND/OR EQUIPMENT COMPONENTS WITH UL LABELS TO COMPLY WITH THE NATIONAL ELECTRIC CODE.
G. MAINTAIN COMPLIANCE WITH OSHA THROUGHOUT THE CONSTRUCTION PHASE AND WITH COMPLETED WORK.
H. PROVIDE ALL LABOR, MATERIALS, PLANT EQUIPMENT AND SERVICES NECESSARY AND REQUIRED TO COMPLETE MEP WORK AS SHOWN ON AND/OR REASONABLY IMPLIED BY THE DRAWINGS AND SPECIFICATIONS.
I. THE FOLLOWING ARE THE GENERAL CLASSIFICATIONS OF WORK INCLUDED IN, BUT NOT LIMITED TO THIS SECTION.
J. RECEIVING, RIGGING, SETTING AND INSTALLATION OF THE PURCHASED EQUIPMENT.
K. PROVIDING OF SHOP DRAWINGS FOR APPROVAL WITHIN ALLOWANCE OF ACCEPTANCE AND INSTALLATION TO NOT HINDER CONSTRUCTION SCHEDULE.
L. PURCHASE INSTALL, ELECTRICAL AND PIPING OF NEW EQUIPMENT AS SCHEDULED.
M. DEMOLITION AND MAKE SAFE EXISTING PIPING, DUCTWORK AND ASSOCIATED HANGERS AS INDICATED ON DRAWINGS.
N. DEMOLITION AND MAKE SAFE EXISTING ELECTRICAL AND CONDUIT AS REQUIRED
O. LOW PRESSURE COMPRESSED AIR PIPING, VALVES, FITTINGS, LABELING, TAGGING, ETC.
P. STEAM AND CONDENSATE PIPING, VALVES, FITTINGS, LABELING, TAGGING, ETC.
Q. PIPING SUPPORTS INSIDE AND OUTSIDE.
R. TIE-IN OF FIRE ALARMING DEVICES TO EXISTING SYSTEM.
S. CONTROL WIRING TO EQUIPMENT AND DEVICES.
T. WORK PERFORMED DURING SUMMER MONTHS SHALL MAINTAIN HUMIDITY IN ADDITION TO TEMPERATURES.
U. CUTTING AND PATCHING FOR ALL MECHANICAL WORK.
V. START- UP OPERATIONS.
W. CLEAN UP.
X. COORDINATION AND COOPERATION WITH CONTRACTORS AND SUPPLIERS FOR OTHER SECTIONS AND WITH THE OWNER.
Y. AS- BUILT DRAWINGS.
Z. WARRANTY AND GUARANTEE.
AA. ELECTRICAL POWER WIRING OF NEW EQUIPMENT.
AB. CONCRETE PADS AS REQUIRED

GENERAL SHEET NOTES

A. PROVIDE ACCESS PANELS IN NON-ACCESSIBLE AREAS (RATED OR NON-RATED) 12" X12" MINIMUM 12 COMBINATION FIRE/SMOKE DAMPERS. INSTALL LARGER ACCESS PANELS FOR LARGER EQUIPMENT AS REQUIRED BY CODE. COORDINATE WITH ARCHITECT FOR APPROVAL OF FINAL LOCATIONS PRIOR TO INSTALLATION.
B. PROVIDE FIRESTOPPING AT PASS THROUGH DUCT PENETRATIONS THROUGH RATED WALLS. DUCTWORK SHALL BE A MINIMUM 26 GA SHEET METAL. COORDINATE WITH OTHER TRADES THAT MAY HAVE PENETRANTS AROUND THE SAME AREA. REFER TO ARCHITECTURAL SHEETS FOR RATING ASSEMBLIES.
C. INSULATION MATERIALS APPLIED TO DUCTWORK SHALL HAVE A FLAME SPREAD INDEX OF NOT MORE THAN 25 AND SMOKE DENSITY NOT EXCEEDING 50.
D. REQUIRED OFFSETS, COMPONENTS, ACCESSORIES, AND FITTINGS MAY NOT BE SHOWN BUT SHALL BE PROVIDED AS REQUIRED TO AVOID INTERFERENCES WITH UNFORESEEN COMPONENTS.
E. PROVIDE DIELECTRIC UNIONS, GASKETS, AND FASTENERS AT DISSIMILAR METAL CONNECTIONS OF CONTACT POINTS.
F. ROUTE CONDENSATE DRAIN PIPE TO FOLLOW EXISTING HVAC PIPING CHASES AND RISERS.
G. MAINTAIN A 3-0" DISTANCE FROM ENVIRONMENTAL EXHAUST OUTLETS (AS DEFINED IN RI SBC) TO BUILD OPENINGS AND 10'-O" DISTANCE TO MECHANICALLY FORCED AIR INLET.
H. DUCT SIZE INDICATED ON PLANS ARE THE "FREE AREA" INSIDE DIMENSIONS OF THE DUCT. INCREASE THE SIZE OF THE DUCT TO ACCOMMODATE ACOUSTICAL SILENCERS AND/OR DUCT LINERS. FOR EXAMPLE, A DUCT SIZE SHOWN AS 12" X12" WITH 2" LINER SHALL BE SUPPLIED WITH A 16"X16" DUCT.
I. ROOF SUPPORTS SHALL BE POSITIVELY ATTACHED TO THE ROOF STRUCTURE.
J. INSTALL DUCT SYSTEMS IN THE FOLLOWING ORDER FROM LOWEST TO HIGHEST REFERENCED FROM THE FINISHED CEILING HEIGHT: - SUPPLY DUCT - RETURN/RELIEF DUCT - EXHAUST DUCT
K. PROVIDE MANUAL SHEET METAL VOLUME DAMPER PRIOR TO EACH SUPPLY DIFFUSER/REGISTER AT THE BRANCH DUCT LOCATION. IF THE MANUAL IS AN INACCESSIBLE LOCATION, CONTRACTOR TO PROVIDE CABLE OPERATED DAMPER (COD) FOR HIGH CEILINGS AND ALL DRYWALL CEILING LOCATIONS. DAMPERS SHALL BE INDICATED ON SHOP DRAWINGS FOR COORDINATION AND APPROVAL.
L. ALL LOW VOLTAGE CONDUIT SHALL BE CONCEALED ABOVE CEILING AND WITHIN WALLS

PROJECT SCOPE OF WORK

A. REMOVE ABANDONED HVAC EQUIPMENT, MATERIALS, DUCTWORK AND COMPONENTS:
   a. ENSURE THIS IS EITHER ABANDONED IN PLACE OR NO LONGER REQUIRED.
B. INSTALL NEW EQUIPMENT AND ACCESSORIES TO PROVIDE A COMPLETE INSTALLATION THAT COVERS THE INTENT OF THE DRAWINGS.
C. INSTALL NEW AND/OR MODIFY DUCTWORK AS APPROPRIATE TO COMPLETE PROJECT
D. PROVIDE ALL MECHANICAL, ELECTRICAL, CONTROL WIRING AND PLUMBING FOR NEW EQUIPMENT.

GENERAL NOTES

A. THERE SHALL BE NO SERVICE INTERRUPTION WITHOUT PRIOR APPROVAL
B. PROVIDE ALL MATERIALS AND EQUIPMENT AND PERFORM ALL LABOR REQUIRED TO INSTALL COMPLETE AND OPERABLE MECHANICAL SYSTEMS AS INDICATED ON THE DRAWINGS, AS SPECIFIED AND AS REQUIRED BY CODE
C. CONTRACT DOCUMENT DRAWINGS FOR MECHANICAL WORK (HVAC, PLUMBING, ELECTRICAL AND FIRE PROTECTION) ARE DIAGRAMMATIC AND ARE INTENDED TO CONVEY SCOPE AND GENERAL ARRANGEMENT ONLY.
D. INSTALL ALL MECHANICAL EQUIPMENT AND APPURTENANCES IN ACCORDANCE WITH MANUFACTURERS ' RECOMMENDATIONS, CONTRACT DOCUMENTS, AND APPLICABLE CODES AND REGULATIONS.
E. ALL PIPING ON THIS PLAN SHALL BE CONCEALED UNLESS OTHERWISE NOTED.
F. REPAIR PAVING/FLOOR AFTER INSTALLATION AND INSPECTION OF UTILITIES INSTALLED. PAINT FLOOR TO MATCH PREVIOUS OR MATCH AND COMPLY WITH ARCHITECTURAL DRAWINGS.
G. CONTRACTOR TO RECONNECT EXISTING ELECTRICAL GROUNDING/BONDING TO COLD WATER PIPING SYSTEM (AS APPLICABLE.)
H. PROVIDE VIBRATION ISOLATION FOR ALL MECHANICAL EQUIPMENT TO PREVENT TRANSMISSION OF VIBRATION TO BUILDING STRUCTURE.
I. PROVIDE VIBRATION ISOLATORS FOR ALL PIPING SUPPORTS CONNECTED TO AND WITHIN 50 FEET OF ISOLATED EQUIPMENT (EXCEPT AT BASE ELBOW SUPPORTS AND ANCHOR POINTS) THROUGHOUT MECHANICAL EQUIPMENT ROOMS. DO THE SAME FOR SUPPORTS OF STEAM MAINS WITHIN 50 FEET OF BOILER OR PRESSURE REDUCING VALVES.
J. PROVIDE VIBRATION ISOLATORS FOR ALL PIPING SUPPORTS OF STEAM MAINS WITHIN 50 FEET OF BOILERS AND PRESSURE REDUCING VALVES.
K. THE LOCATION OF EXISTING UNDERGROUND/UNDERSLAB UTILITIES IS SHOWN IN AN APPROXIMATE WAY ONLY. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK. THE CONTRACTOR SHALL PAY FOR AND REPAIR ALL DAMAGES CAUSED BY FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES UNLESS OTHERWISE INDICATED.
L. COORDINATE CONSTRUCTION OF ALL MECHANICAL WORK WITH ARCHITECTURAL, STRUCTURAL, CIVIL, ELECTRICAL WORK, ETC., SHOWN ON OTHER CONTRACT DOCUMENT DRAWINGS.
M. MAINTAIN A MINIMUM OF 6 '-8" CLEARANCE TO UNDERSIDE OF PIPES, DUCTS, CONDUITS, SUSPENDED EQUIPMENT, ETC., THROUGHOUT ACCESS ROUTES IN MECHANICAL ROOMS.
N. ALL TESTS SHALL BE COMPLETED BEFORE ANY MECHANICAL EQUIPMENT OR PIPING INSULATION IS APPLIED.
O. LOCATE ALL TEMPERATURE, PRESSURE, AND FLOW MEASURING DEVICES IN ACCESSIBLE LOCATIONS WITH STRAIGHT SECTION OF PIPE OR DUCT UP- AND DOWNSTREAM AS RECOMMENDED BY THE MANUFACTURER FOR GOOD ACCURACY. PROVIDE ACCESS PANELS WHERE REQUIRED.
P. TESTING, ADJUSTING, AND BALANCING AGENCY SHALL BE A MEMBER OF THE ASSOCIATED AIR BALANCE COUNCIL (AABC) OR THE NATIONAL ENVIRONMENTAL BALANCING BUREAU (NEBB). TESTING, ADJUSTING, AND BALANCING SHALL BE PERFORMED IN ACCORDANCE WITH THE AABC STANDARDS.
Q. WHERE TWO OR MORE ITEMS OF THE SAME TYPE OF EQUIPMENT ARE REQUIRED, THE PRODUCT OF ONE MANUFACTURER SHALL BE USED.
R. REINFORCEMENT, DETAILING, AND PLACEMENT OF CONCRETE SHALL CONFORM TO ASTM 315 AND ACI 318. CONCRETE SHALL CONFORM TO ASTM C94. CONCRETE WORK SHALL CONFORM TO ACI 318, PART ENTITLED "CONSTRUCTION REQUIREMENTS." COMPRESSIVE STRENGTH IN 28 DAYS SHALL BE 3,000 PSI. TOTAL AIR CONTENT OF EXTERIOR CONCRETE SHALL BE BETWEEN 5 AND 7 PERCENT BY VOLUME. SLUMP SHALL BE BETWEEN 3 AND 4 INCHES. CONCRETE SHALL BE CURED FOR 7 DAYS AFTER PLACEMENT.
S. COORDINATE ALL EQUIPMENT CONNECTIONS WITH MANUFACTURERS ' CERTIFIED DRAWINGS. COORDINATE AND PROVIDE ALL DUCT AND PIPING TRANSITIONS REQUIRED FOR FINAL EQUIPMENT CONNECTIONS TO FURNISHED EQUIPMENT. FIELD VERIFY AND COORDINATE ALL DUCT AND PIPING DIMENSIONS BEFORE FABRICATION.
T. ALL CONTROL WIRE AND CONDUIT SHALL COMPLY WITH THE NATIONAL ELECTRIC CODE AND DIVISION 16 OF THE SPECIFICATION.
U. CONCRETE HOUSEKEEPING PADS TO SUIT MECHANICAL EQUIPMENT SHALL BE SIZED AND LOCATED BY THE MECHANICAL CONTRACTOR. MINIMUM CONCRETE PAD THICKNESS SHALL BE 6 INCHES. PAD SHALL EXTEND BEYOND THE EQUIPMENT A MINIMUM OF 6 INCHES ON EACH SIDE. CONCRETE HOUSEKEEPING PADS SHALL BE PROVIDED BY THE GENERAL CONTRACTOR. IT SHALL BE THE RESPONSIBILITY OF THE MECHANICAL CONTRACTOR TO COORDINATE SIZE AND LOCATION OF CONCRETE HOUSEKEEPING PADS WITH GENERAL CONTRACTOR.
V. ALL MECHANICAL ROOM DOORS SHALL BE A MINIMUM OF 4 '-0" WIDE.
W. WHERE BEAMS ARE INDICATED TO BE PENETRATED WITH DUCTWORK OR PIPING, COORDINATE DUCTWORK AND PIPING LAYOUT WITH BEAM OPENING SIZE AND OPENING LOCATIONS. COORDINATION SHALL BE DONE PRIOR TO FABRICATION OF DUCTWORK, CUTTING OF PIPING, OR FABRICATION OF BEAMS.
X. WHEN MECHANICAL WORK (HVAC, PLUMBING, SHEET METAL, FIRE PROTECTION, ETC.) IS SUBCONTRACTED, IT SHALL BE THE MECHANICAL CONTRACTOR 'S RESPONSIBILITY TO COORDINATE SUBCONTRACTORS AND THE ASSOCIATED CONTRACTS. WHEN DISCREPANCIES ARISE PERTAINING TO WHICH CONTRACTOR PROVIDES A PARTICULAR ITEM OF THE MECHANICAL CONTRACT OR WHICH CONTRACTOR PROVIDES FINAL CONNECTIONS FOR A PARTICULAR ITEM OF THE MECHANICAL CONTRACT, IT SHALL BE BROUGHT TO THE ATTENTION OF THE MECHANICAL CONTRACTOR, WHOSE DECISION SHALL BE FINAL.
Y. THE LOCATIONS OF ALL ITEMS SHOWN ON THE DRAWINGS OR CALLED FOR IN THE SPECIFICATIONS THAT ARE NOT DEFINITELY FIXED BY DIMENSIONS ARE APPROXIMATE ONLY. THE EXACT LOCATIONS NECESSARY TO SECURE THE BEST CONDITIONS AND RESULTS MUST BE DETERMINED BY THE PROJECT SITE CONDITIONS AND SHALL HAVE THE APPROVAL OF THE ENGINEER BEFORE BEING INSTALLED. DO NOT SCALE DRAWINGS.
Z. ALL MISCELLANEOUS STEEL REQUIRED TO ENSURE PROPER INSTALLATION AND AS SHOWN IN DETAILS FOR PIPING, DUCTWORK, AND EQUIPMENT (UNLESS OTHERWISE NOTED) SHALL BE FURNISHED AND INSTALLED BY THE MECHANICAL CONTRACTOR.
AA. PROVIDE ACCESS PANELS FOR INSTALLATION IN WALLS AND CEILINGS, WHERE REQUIRED, TO SERVICE DAMPERS, VALVES, SMOKE DETECTORS, AND OTHER CONCEALED MECHANICAL EQUIPMENT. ACCESS PANELS SHALL BE TURNED OVER TO GENERAL CONTRACTOR FOR INSTALLATION.
AB. ALL EQUIPMENT, PIPING, DUCTWORK, ETC., SHALL BE SUPPORTED AS DETAILED, SPECIFIED, AND REQUIRED TO PROVIDE A VIBRATION FREE INSTALLATION.
AC. ALL DUCTWORK, PIPING AND EQUIPMENT SUPPORTED FROM STRUCTURAL STEEL SHALL BE COORDINATED WITH GENERAL CONTRACTOR. ALL ATTACHMENTS TO STEEL BAR JOISTS, TRUSSES, OR JOIST GIRDERS SHALL BE AT PANEL POINTS. PROVIDE BEAM CLAMPS MEETING MSS STANDARDS.
AD. WELDING TO STRUCTURAL MEMBERS SHALL NOT BE PERMITTED. THE USE OF C-CLAMPS SHALL NOT BE PERMITTED.
AE. MECHANICAL EQUIPMENT, DUCTWORK, AND PIPING SHALL NOT BE SUPPORTED FROM METAL DECK.
AF. ALL ROOF MOUNTED EQUIPMENT CURBS FOR EQUIPMENT PROVIDED BY THE MECHANICAL CONTRACTOR SHALL BE FURNISHED BY THE MECHANICAL CONTRACTOR AND INSTALLED BY THE GENERAL CONTRACTOR.
AG. LOCATIONS AND SIZES OF ALL FLOOR, WALL, AND ROOF OPENINGS SHALL BE COORDINATED WITH ALL OTHER TRADES INVOLVED.
AH. ALL OPENINGS IN FIRE WALLS DUE TO DUCTWORK, PIPING, CONDUIT, ETC., SHALL BE FIRE STOPPED WITH A PRODUCT SIMILAR TO 3M OR APPROVED EQUAL.
AI. ALL AIR CONDITIONING CONDENSATE DRAIN LINES FROM EACH AIR HANDLING UNIT AND ROOFTOP UNIT SHALL BE PIPED FULL SIZE OF THE UNIT DRAIN OUTLET, WITH "P" TRAP, AND PIPED TO NEAREST DRAIN. SEE DETAILS SHOWN ON THE DRAWINGS OR THE CONTRACT SPECIFICATIONS FOR DEPTH OF AIR CONDITIONING CONDENSATE TRAP.
AJ. REFER TO TYPICAL DETAILS FOR DUCTWORK, PIPING, AND EQUIPMENT INSTALLATION.

DRAWING AND SPECIFICATIONS

A. IT IS THE INTENTION OF THE SPECIFICATIONS AND DRAWINGS TO CALL FOR COMPLETE, FINISHED WORK, TESTED AND READY FOR CONTINUOUS OPERATION. ANY APPARATUS, APPLIANCE, MATERIAL OR WORK NOT SHOWN ON THE DRAWINGS, BUT MENTIONED IN THE SPECIFICATIONS OR VICE VERSA, OR ANY INCIDENTAL ACCESSORIES NECESSARY TO MAKE THE WORK COMPLETE IN ALL RESPECTS AND READY FOR OPERATION, EVEN IF NOT PARTICULARLY SPECIFIED, SHALL BE PROVIDED BY THE CONTRACTOR OR HIS/HER SUB-SUBCONTRACTORS, WITHOUT ADDITIONAL EXPENSE TO THE OWNER.
B. THE DRAWINGS ARE GENERALLY DIAGRAMMATIC. THE LOCATIONS OF ALL ITEMS THAT ARE NOT DEFINITELY FIXED BY DIMENSIONS ARE APPROXIMATE ONLY. THE EXACT LOCATIONS MUST BE DETERMINED AT THE SITE AND SHALL HAVE THE APPROVAL OF THE ARCHITECT BEFORE BEING INSTALLED. THE HVAC SUBCONTRACTOR SHALL FOLLOW DRAWINGS, INCLUDING SHOP DRAWINGS, IN LAYING OUT WORK AND SHALL CHECK THE DRAWINGS OF OTHER TRADES TO VERIFY SPACES IN WHICH WORK WILL BE INSTALLED. MAINTAIN MAXIMUM HEADROOM AND SPACE CONDITIONS. WHERE SPACE CONDITIONS APPEAR INADEQUATE, NOTIFY THE ARCHITECT BEFORE PROCEEDING WITH THE INSTALLATION. THE HVAC SUBCONTRACTOR SHALL, WITHOUT EXTRA CHARGE, MAKE REASONABLE MODIFICATIONS IN THE LAYOUT AS NEEDED TO PREVENT CONFLICT WITH WORK OF OTHER TRADES OR FOR PROPER EXECUTION OF THE WORK.

DEMO NOTES

A. EXISTING CONDITIONS SHOWN ARE BASED ON AND NON-DESTRUCTIVE FILED INVESTIGATION. FIELD VERIFY EXISTING CONDITIONS PRIOR TO COMMENCING WORK.
B. PATCH PENETRATIONS THAT ARE NOT USED FOR NEW HVAC SYSTEM. COORDINATE WITH ARCHITECTURAL WORK.

HVAC/ SHEETMETAL NOTES

A. PROVIDE ALL MATERIALS AND EQUIPMENT AND PERFORM ALL LABOR REQUIRED TO INSTALL COMPLETE AND OPERABLE HVAC SYSTEMS AS INDICATED ON THE DRAWINGS, AS SPECIFIED AND AS REQUIRED BY CODE.
B. CERTAIN ITEMS SUCH AS RISES AND DROPS IN DUCTWORK, ACCESS DOORS, VOLUME DAMPERS, ETC., ARE INDICATED ON THE CONTRACT DOCUMENT DRAWINGS FOR CLARITY FOR A SPECIFIC LOCATION REQUIREMENT AND SHALL NOT BE INTERPRETED AS THE EXTENT OF THE REQUIREMENTS FOR THESE ITEMS. CONTRACTOR IS REQUIRED TO INSTALL ACCESSORIES INCLUDED BUT NOT LIMITED TO ACCESS PANELS, DAMPERS (INCLUDING FIRE, SMOKE AND COMBO), TEST PORTS AS REQUIRED BY CODE. FIRE AND SMOKE DAMPERS SHALL BE INSTALLED AT A MINIMUM OF ALL FIRE WALL PENETRATIONS UNLESS EXEMPT BY CODE. FIRE AN DUCT SMOKES SHALL BE INSTALLED WITH IN 5' OF THE DAMPER WHEN REQUIRED, UNLESS OTHERWISE REQUIRED.
C. INSULATE THE FOLLOWING:
   a. ALL SUPPLY AIR, OUTDOOR AIR,
   b. EXHAUST AND RELIEF AIR BETWEEN THE MOTOR-OPERATED DAMPER AND PENETRATION OF THE BUILDING EXTERIOR.
   c. ALL DUCTWORK LOCATED IN UNCONDITIONED SPACES OR OUTSIDE BUILDING ENVELOPE
   d. ALL DUCTWORK LOCATED IN ATTICS, WHETHER VENTILATED OR UNVENTILATED.
   e. ALL DUCTWORK BURIED EITHER OUTSIDE THE BUILDING OR BELOW FLOORS
   f. ALL SURFACES SHOULD BE RESISTANT TO MOLD GROWTH AND RESIST EROSION, ACCORDING TO THE REQUIREMENTS OF ASHRAE STANDARD 62.1.
D. IN CORRIDORS WHERE CEILING SPEAKERS AND AIR DIFFUSERS ARE INDICATED BETWEEN THE SAME LIGHT FIXTURES, INSTALL BOTH DEVICES AT THE QUARTER POINTS BETWEEN THE SAME FIXTURE.
E. UNLESS OTHERWISE SHOWN, LOCATE ALL ROOM THERMOSTATS AND HUMIDISTATS 4 '-0" (CENTERLINE) ABOVE FINISHED FLOOR. NOTIFY THE ENGINEER OF ANY ROOMS WHERE THE ABOVE LOCATION CANNOT BE MAINTAINED OR WHERE THERE IS A QUESTION ON LOCATION.
F. ALL DUCTWORK SHALL CLEAR DOORS AND WINDOWS.
G. ALL DUCTWORK DIMENSIONS, AS SHOWN ON THE DRAWINGS, ARE INTERNAL CLEAR DIMENSIONS AND DUCT SIZE SHALL BE INCREASED TO COMPENSATE FOR DUCT LINING THICKNESS.
H. PROVIDE ALL 90 DEGREE SQUARE ELBOWS WITH DOUBLE RADIUS TURNING VANES UNLESS OTHERWISE INDICATED. ELBOWS IN DISHWASHER, KITCHEN, AND LAUNDRY EXHAUST SHALL BE UNVANED SMOOTH RADIUS CONSTRUCTION WITH A RADIUS EQUAL TO 1 1⁄2 TIMES THE WIDTH OF THE DUCT. PROVIDE ACCESS DOORS UPSTREAM OF ALL ELBOWS WITH TURNING VANES.
I. COORDINATE DIFFUSER, REGISTER, AND GRILLE LOCATIONS WITH ARCHITECTURAL REFLECTED CEILING PLANS, LIGHTING, AND OTHER CEILING ITEMS AND MAKE MINOR DUCT MODIFICATIONS TO SUIT.
J. FIELD ERECTED AND FACTORY ASSEMBLED AIR HANDLING UNIT COILS SHALL BE ARRANGED FOR REMOVAL FROM THE UPSTREAM SIDE WITHOUT DISMANTLING SUPPORTS. PROVIDE GALVANIZED STRUCTURAL STEEL SUPPORTS FOR ALL COILS (EXCEPT LOWEST COIL) IN BANKS OVER TWO COILS HIGH TO PERMIT INDEPENDENT REMOVAL OF ANY COIL.
K. ALL AIR HANDLING UNITS SHALL OPERATE WITHOUT MOISTURE CARRYOVER.
L. LOCATE ALL MECHANICAL EQUIPMENT (SINGLE DUCT, DUAL DUCT, VARIABLE VOLUME, CONSTANT VOLUME AND FAN POWERED BOXES, FAN COIL UNITS, CABINET HEATERS, UNIT HEATERS, UNIT VENTILATORS, COILS, STEAM HUMIDIFIERS, ETC.) FOR UNOBSTRUCTED ACCESS TO UNIT ACCESS PANELS, CONTROLS AND VALVING.
M. FINNED TUBE RADIATION ENCLOSURES SHALL BE WALL TO WALL UNLESS OTHERWISE INDICATED.
N. PROVIDE FLEXIBLE CONNECTIONS IN ALL DUCTWORK SYSTEMS (SUPPLY, RETURN, AND EXHAUST) CONNECTED TO AIR HANDLING UNITS, FANS, AND OTHER EQUIPMENT WHICH REQUIRE VIBRATION ISOLATION. FLEXIBLE CONNECTIONS SHALL BE PROVIDED AT THE POINT OF CONNECTION TO THE EQUIPMENT UNLESS OTHERWISE INDICATED.
O. UNLESS OTHERWISE NOTED, ALL DUCTWORK IS OVERHEAD, TIGHT TO THE UNDERSIDE OF THE STRUCTURE, WITH SPACE FOR INSULATION IF REQUIRED.
P. RUNS OF FLEXIBLE DUCT SHALL NOT EXCEED 5 FEET (EDIT MAXIMUM LENGTH OF FLEXIBLE DUCT TO SUIT PROJECT; 5 FEET MAXIMUM RECOMMENDED LENGTH, 8 FEET MAXIMUM LENGTH).
Q. ALL DUCTWORK SHALL BE COORDINATED WITH ALL TRADES INVOLVED. OFFSETS IN DUCTS, INCLUDING DIVIDED DUCTS AND TRANSITIONS AROUND OBSTRUCTIONS, SHALL BE PROVIDED AT NO ADDITIONAL COST TO THE OWNER.
R. PROVIDE ACCESS DOORS IN DUCTWORK TO PROVIDE ACCESS FOR ALL SMOKE DETECTORS, FIRE DAMPERS, SMOKE DAMPERS, VOLUME DAMPERS, HUMIDIFIERS, COILS, AND OTHER ITEMS LOCATED IN THE DUCTWORK WHICH REQUIRE SERVICE AND/OR INSPECTION.
S. PROVIDE ACCESS DOORS IN DUCTWORK FOR OPERATION, ADJUSTMENT, AND MAINTENANCE OF ALL FANS, VALVES, AND MECHANICAL EQUIPMENTS. ALL DUCTS SHALL BE GROUNDED ACROSS FLEXIBLE CONNECTIONS WITH FLEXIBLE COPPER GROUNDING STRAPS. GROUNDING STRAPS SHALL BE BOLTED OR SOLDERED TO BOTH THE EQUIPMENT AND THE DUCT.
T. SMOKE DETECTORS SHALL BE FURNISHED AND WIRED BY THE ELECTRICAL CONTRACTOR. THE MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE FOR MOUNTING THE SMOKE DETECTOR IN DUCTWORK AS SHOWN ON THE DRAWINGS AND IN ACCORDANCE WITH MANUFACTURER 'S PRINTED INSTRUCTIONS.
U. TERMINATE GAS VENTS FOR UNIT HEATERS, WATER HEATERS, HIGH PRESSURE PARTS WASHER, HIGH PRESSURE CLEANER, AND OTHER GAS APPLIANCES A MINIMUM OF 3 '0" ABOVE ROOF WITH RAIN CAP (EDIT APPLIANCES AND HEIGHT ABOVE ROOF TO MEET CODE AND TO SUIT PROJECT REQUIREMENTS).
V. SEE SPECIFICATIONS FOR DUCTWORK GAUGES, BRACING, HANGERS, AND OTHER REQUIREMENTS.
W. EXTERIOR LOUVERS ARE INDICATED FOR INFORMATION ONLY. DETAILED DESCRIPTIONS ARE PROVIDED IN THE ARCHITECTURAL SPECIFICATIONS.
X. EXTERIOR LOUVERS ARE INDICATED FOR INFORMATION ONLY. LOUVER SIZES, LOCATIONS, AND DETAILS SHALL BE COORDINATED WITH GENERAL CONTRACTOR.
Y. EXTERIOR LOUVERS ARE INDICATED FOR INFORMATION ONLY. LOUVER SIZES, LOCATIONS, MOUNTING, AND DETAILS SHALL BE COORDINATED WITH OTHER TRADES INVOLVED.

PIPING NOTES

A. PROVIDE ALL MATERIALS AND EQUIPMENT AND PERFORM ALL LABOR REQUIRED TO INSTALL COMPLETE AND OPERABLE PIPING SYSTEMS AS INDICATED ON THE DRAWINGS, AS SPECIFIED AND AS REQUIRED BY CODE.
B. ELEVATIONS AS SHOWN ON THE DRAWINGS ARE TO THE CENTERLINE OF ALL PRESSURE PIPING AND TO THE INVERT OF ALL GRAVITY PIPING.
C. MAINTAIN A MINIMUM OF 3 '6" OF GROUND COVER OVER ALL UNDERGROUND HVAC PIPING BUT ENSURE FROST LINE IN CONSIDERED AND MET.
D. UNLESS OTHERWISE NOTED, ALL CHILLED WATER AND HEATING WATER PIPING SHALL BE 3⁄4 INCH SIZE (EDIT SYSTEM TYPE OR PIPE SIZE TO SUIT PROJECT REQUIREMENTS).
E. PROVIDE AN AIR VENT AT THE HIGH POINT OF EACH DROP ALL HYDRONIC PIPING SYSTEMS INCLUDING BUT NOT LIMITED TO IN THE HEATING WATER, CHILLED WATER, AND OTHER CLOSED WATER PIPING SYSTEMS (EDIT SYSTEM TYPES TO SUIT PROJECT REQUIREMENTS). ALL PIPING SHALL GRADE TO LOW POINTS. PROVIDE HOSE END DRAIN VALVES AT THE BOTTOM OF ALL RISERS AND LOW POINTS.
F. UNLESS OTHERWISE NOTED, ALL PIPING IS OVERHEAD, TIGHT TO UNDERSIDE OF STRUCTURE OR SLAB, WITH SPACE FOR INSULATION IF REQUIRED.
G. INSTALL PIPING SO THAT ALL VALVES, STRAINERS, UNIONS, TRAPS, FLANGES, AND OTHER APPURTENANCES REQUIRING ACCESS ARE ACCESSIBLE.
H. ALL VALVES SHALL BE INSTALLED SO THAT VALVE REMAINS IN SERVICE WHEN EQUIPMENT OR PIPING ON EQUIPMENT SIDE OF VALVE IS REMOVED.
I. ALL BALANCING VALVES AND BUTTERFLY VALVES SHALL BE PROVIDED WITH POSITION INDICATORS AND MAXIMUM ADJUSTABLE STOPS (MEMORY STOPS)
J. PROVIDE CHAINWHEEL OPERATORS FOR ALL VALVES IN EQUIPMENT ROOMS MOUNTED GREATER THAN 7 '-0" ABOVE FLOOR LEVEL; CHAIN SHALL EXTEND TO 7 '-0" ABOVE FLOOR LEVEL.
K. ALL VALVES (EXCEPT CONTROL VALVES) AND STRAINERS SHALL BE FULL SIZE OF PIPE BEFORE REDUCING SIZE TO MAKE CONNECTIONS TO EQUIPMENT AND CONTROLS.
L. UNIONS AND/OR FLANGES SHALL BE INSTALLED AT EACH PIECE OF EQUIPMENT, IN BYPASSES, AND IN LONG PIPING RUNS (100 FEET OR MORE) TO PERMIT DISASSEMBLY FOR ALTERATION AND REPAIRS.
M. PITCH STEAM PIPING DOWNWARD IN THE DIRECTION OF FLOW 1⁄4 INCH IN 10 FEET (1 INCH IN 40 FEET) MINIMUM. PITCH ALL STEAM RETURN LINES DOWNWARD IN THE DIRECTION OF CONDENSATE FLOW 1⁄2 INCH PER 10 FEET (1 INCH IN 20 FEET) MINIMUM. WHERE LENGTH OF BRANCH LINES ARE LESS THAN 8 FEET, PITCH BRANCH LINES TOWARD MAINS 1⁄2 INCH PER FOOT MINIMUM.
N. PITCH UP ALL STEAM AND CONDENSATE RUNOUTS TO RISERS AND EQUIPMENT 1⁄2 INCH PER FOOT. WHERE THIS PITCH CANNOT BE OBTAINED, RUNOUTS OVER 8 FEET IN LENGTH SHALL BE ONE SIZE LARGER THAN NOTED.
O. TAP ALL BRANCH LINES FROM TOP OF STEAM MAINS (45 DEGREES PREFERRED, 90 DEGREES ACCEPTABLE).
P. PROVIDE AN END OF MAIN DRIP AT EACH RISE IN THE STEAM MAIN. PROVIDE CONDENSATE DRIPS AT THE BOTTOM OF ALL STEAM RISERS, DOWNFED RUNOUTS TO EQUIPMENT, RADIATORS, ETC., AT END OF MAINS AND LOW POINTS, AND AHEAD OF ALL PRESSURE REGULATORS, CONTROL VALVES, ISOLATION VALVES, AND EXPANSION JOINTS.
Q. ON STRAIGHT STEAM PIPING RUNS WITH NO NATURAL DRAINAGE POINTS, INSTALL DRIP LEGS AT INTERVALS NOT EXCEEDING 200 FEET WHERE PIPE IS PITCHED DOWNWARD IN THE DIRECTION OF STEAM FLOW AND A MAXIMUM OF 100 FEET WHERE THE PIPE IS PITCHED UP SO THAT CONDENSATE FLOW IS OPPOSITE OF STEAM FLOW.
R. STEAM TRAPS SHALL BE MINIMUM 3⁄4" SIZE.
S. INSTALL ALL PIPING WITHOUT FORCING OR SPRINGING.
T. ALL PIPING SHALL CLEAR DOORS AND WINDOWS.
U. ALL VALVES SHALL BE ADJUSTED FOR SMOOTH AND EASY OPERATION.
V. ALL PIPING WORK SHALL BE COORDINATED WITH ALL TRADES INVOLVED. OFFSETS IN PIPING AROUND OBSTRUCTIONS SHALL BE PROVIDED AT NO ADDITIONAL COST TO THE OWNER.
W. PROVIDE FLEXIBLE CONNECTIONS IN ALL PIPING SYSTEMS CONNECTED TO PUMPS, CHILLERS, COOLING TOWERS, AND OTHER EQUIPMENT WHICH REQUIRE VIBRATION ISOLATION EXCEPT WATER COILS. FLEXIBLE CONNECTIONS SHALL BE PROVIDED AS CLOSE TO THE EQUIPMENT AS POSSIBLE OR AS INDICATED ON THE DRAWINGS.
X. SLOPE REFRIGERANT PIPING ONE PERCENT IN THE DIRECTION OF OIL RETURN. LIQUID LINES MAY BE INSTALLED LEVEL.
Y. INSTALL HORIZONTAL REFRIGERANT HOT GAS DISCHARGE PIPING WITH 1⁄2" PER 10 FEET DOWNWARD SLOPE AWAY FROM THE COMPRESSOR.Z. INSTALL HORIZONTAL REFRIGERANT SUCTION LINES WITH 1⁄2" PER 10 FEET DOWNWARD SLOPE TO THE COMPRESSOR, WITH NO LONG TRAPS OR DEAD ENDS WHICH MAY CAUSE OIL TO SEPARATE FROM THE SUCTION GAS AND RETURN TO THE COMPRESSOR IN DAMAGING SLUGS.
Z. PROVIDE LINE SIZE LIQUID INDICATORS IN MAIN LIQUID LINE LEAVING CONDENSER OR RECEIVER. INSTALL MOISTURE-LIQUID INDICATORS IN LIQUID LINES BETWEEN FILTER DRYERS AND THERMOSTATIC EXPANSION VALVES AND IN LIQUID LINE TO RECEIVER.
AA. PROVIDE LINE SIZE STRAINER UPSTREAM OF EACH AUTOMATIC VALVE. PROVIDE SHUTOFF VALVE ON EACH SIDE OF STRAINER.
AB. PROVIDE PERMANENT FILTER DRYERS IN LOW TEMPERATURE SYSTEMS AND SYSTEMS USING HERMETIC COMPRESSORS.
AC. PROVIDE REPLACEABLE CARTRIDGE FILTER DRYERS WITH THREE VALVE BYPASS ASSEMBLY FOR SOLENOID VALVES, ADJACENT TO RECEIVERS.
AD. PROVIDE REFRIGERANT CHARGING VALVE CONNECTIONS IN LIQUID LINE BETWEEN RECEIVER SHUTOFF VALVE AND EXPANSION VALVE.

HVAC SHEET INDEX		
Sheet Number	Sheet Name	Sheet Issue Date
M0.0	MECHANICAL COVER SHEET	16SEP24
M1.1	EXISTING MECHANICAL FLOOR PLAN - LEVEL 1	16SEP24
M1.2	NEW CONSTRUCTION MECHANICAL FLOOR PLAN - LEVEL 1	16SEP24
M5.1	SCHEDULES	16SEP24
M5.2	SCHEDULES	16SEP24
M7.1A	VRF UNITS 1 AND 2	16SEP24
M7.1B	VRF UNITS 3 AND 4	16SEP24
M7.2	VRF CONTROLS	16SEP24
M7.3	VRF CONTROLS POINTS	16SEP24
M7.5	SEQUENCE OF OPERATIONS	16SEP24

Narragansett Bay Research Reserve

Revision 1	05MAR25
Revision:	Date:

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AGE

Project Title: HVAC AND ELECTRICAL UPGRADES

Project Number 2407

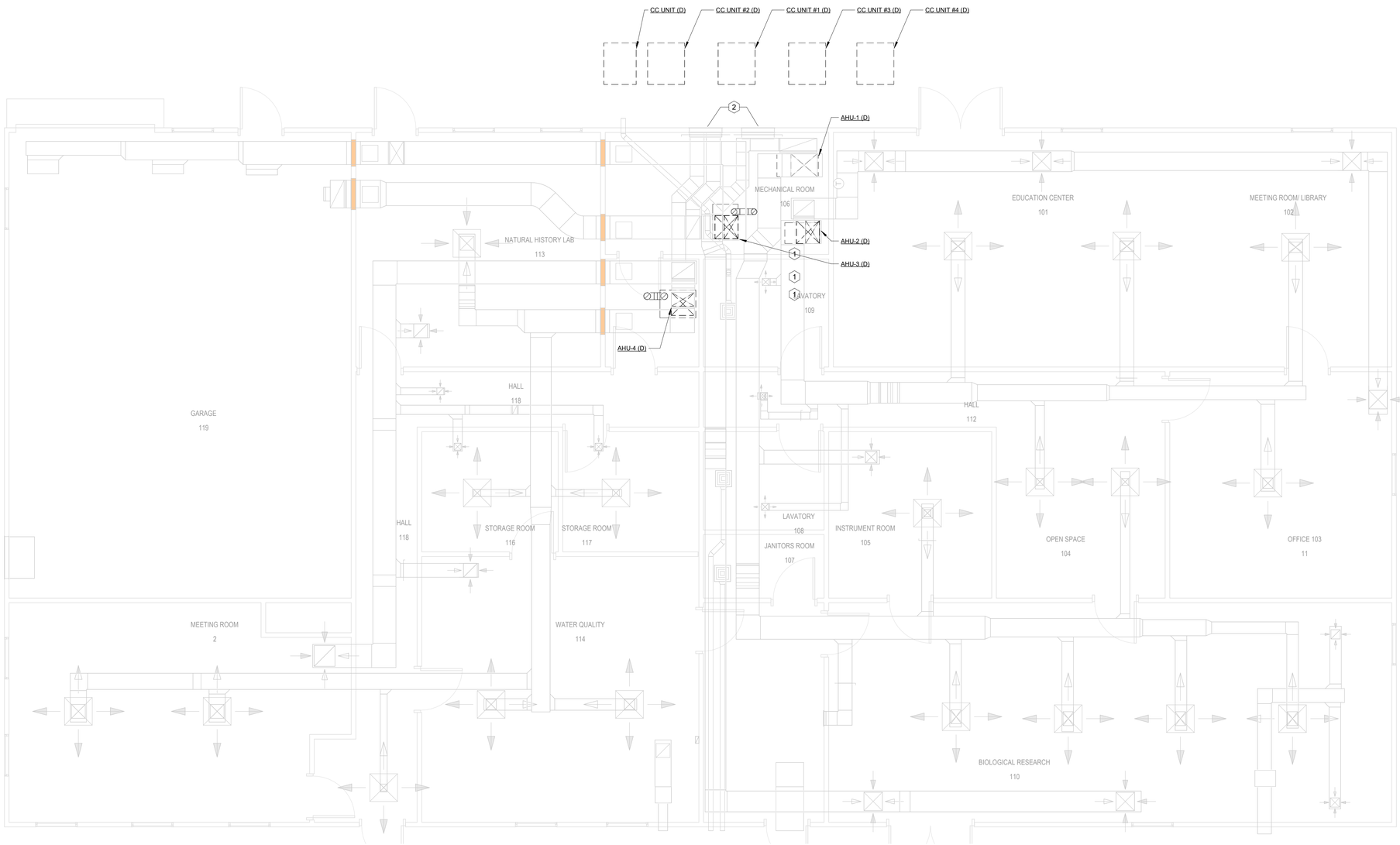
Location: FIELD STATION PHASE VI, PRUDENCE ISLAND, RI

Drawing Scale 12" = 1'-0"

Drawing Title: MECHANICAL COVER SHEET

Drawing Number M0.0

Issue Date:	Approved By:	Drawn By:	Checked By:
16SEP24	AG	AGE	AG



1 EXISTING MECHANICAL
1/4" = 1'-0"

(D) MECHANICAL CALLOUT NOTES	
#	NOTE
1	DEMO EXISTING FLUE DUCTWORK, CAP AND MAKE SAFE
2	EVALUATE LOUVERS FOR FIT FOR USE.

DEMO NOTES

HVAC MECHANICAL DEMOLITION NOTES

1. **GENERAL NOTES:**
   - A. COORDINATE ALL DEMOLITION WORK WITH THE OWNER'S REPRESENTATIVE AND OTHER TRADES PRIOR TO STARTING.
   - B. ALL WORK MUST COMPLY WITH APPLICABLE CODES, STANDARDS, AND PROJECT SPECIFICATIONS.
   - C. **ENSURE ALL SYSTEMS, REFRIGERANT, OIL, AND ELECTRICAL, ARE MADE SAFE AND PROPERLY ISOLATED BEFORE COMMENCING ANY WORK.**
   - D. PROTECT EXISTING SYSTEMS AND EQUIPMENT NOT SCHEDULED FOR DEMOLITION TO ENSURE THEY REMAIN OPERATIONAL.
   - E. **NOT ALL PIPING AND EQUIPMENT ARE DEPICTED ON THE DRAWINGS, AS THEY WERE CREATED BASED ON MULTIPLE PROJECTS OVER THE YEARS AND NON-INVASIVE SITE WALKDOWNS. CONTRACTOR MUST THOROUGHLY REVIEW EXISTING SITE CONDITIONS AND BECOME INTIMATELY FAMILIAR WITH THE PROJECT SCOPE. ANY DISCREPANCIES OR QUESTIONS SHOULD BE REFERRED TO THE OWNER AND ENGINEER OF RECORD FOR CLARIFICATION.**
2. **DEMOLITION PHASING:**
   - A. THE EXISTING AIR HANDLING UNIT (AHU), SHALL BE REMOVED IN PHASES TO MINIMIZE DISRUPTION TO BUILDING OPERATIONS.
   - B. DISCONNECT AND REMOVE ELECTRICAL CONNECTIONS ASSOCIATED WITH THE AHU. VERIFY IF THE EXISTING ELECTRICAL COMPONENTS WILL BE REUSED OR REPLACED.
   - C. REMOVE THE AHU AND ASSOCIATED PIPING. PROTECT SURROUNDING AREAS, INCLUDING DUCTWORK AND LOUVERS, TO AVOID DAMAGE DURING DEMOLITION.
   - D. **IN INSTANCES WHERE SYSTEMS SUCH AS OIL LINES OR BOILER BREECHING CANNOT BE FULLY SHUT DOWN DUE TO THEIR CONNECTION TO DOMESTIC HOT WATER SERVICE, THE PROJECT MAY REQUIRE ADDITIONAL PHASING TO MAINTAIN OPERATIONAL CONTINUITY.**
3. **DUCTWORK AND LOUVERS:**
   - A. EXISTING DUCTWORK AND LOUVERS WILL BE REUSED. PROTECT THESE COMPONENTS FROM DEBRIS AND DAMAGE DURING DEMOLITION.
   - B. CAP OPEN DUCT ENDS TEMPORARILY TO PREVENT CONTAMINATION.
4. **PIPING DEMOLITION:**
   - A. RECOVER REFRIGERANT PER EPA GUIDELINES BEFORE DISCONNECTING REFRIGERANT LINES. PROVIDE DOCUMENTATION OF RECOVERY FOR THE PROJECT RECORD.
   - B. REMOVE ALL ABANDONED PIPING BACK TO ITS NEAREST ACTIVE CONNECTION OR TO A LOCATION DESIGNATED BY THE OWNER.
5. **ELECTRICAL DEMOLITION:**
   - A. VERIFY WITH THE OWNER'S REPRESENTATIVE WHETHER THE EXISTING ELECTRICAL CONNECTIONS WILL BE REUSED OR REMOVED.
   - B. DISCONNECT POWER AND CONTROLS FROM THE AHU PER LOCAL ELECTRICAL CODES. LABEL AND IDENTIFY ALL WIRING FOR POTENTIAL REUSE.
6. **CLEAN-UP AND DISPOSAL:**
   - A. REMOVE ALL DEMOLISHED MATERIALS FROM THE SITE AND DISPOSE OF THEM PER LOCAL REGULATIONS. CLEAN THE AREA THOROUGHLY AFTER DEMOLITION TO PREPARE FOR THE INSTALLATION OF NEW EQUIPMENT.
7. **DOCUMENTATION:**
   - A. SUBMIT A DEMOLITION PLAN AND SCHEDULE TO THE OWNER'S REPRESENTATIVE FOR APPROVAL BEFORE STARTING WORK.
   - B. PROVIDE PHOTOGRAPHS AND WRITTEN DOCUMENTATION OF EXISTING CONDITIONS BEFORE AND AFTER DEMOLITION

Narragansett Bay Research Reserve

Revision 1	05MAR25
Revision:	Date:

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Project Title: HVAC AND ELECTRICAL UPGRADES	Project Number: 2407
Location: FIELD STATION PHASE VI, PRUDENCE ISLAND, RI	Drawing Scale: As indicated
Drawing Title: EXISTING MECHANICAL FLOOR PLAN - LEVEL 1	Drawing Number: M1.1

Issue Date:	Approved By:	Drawn By:	Checked By:
16SEP24	AG	AGE	AG

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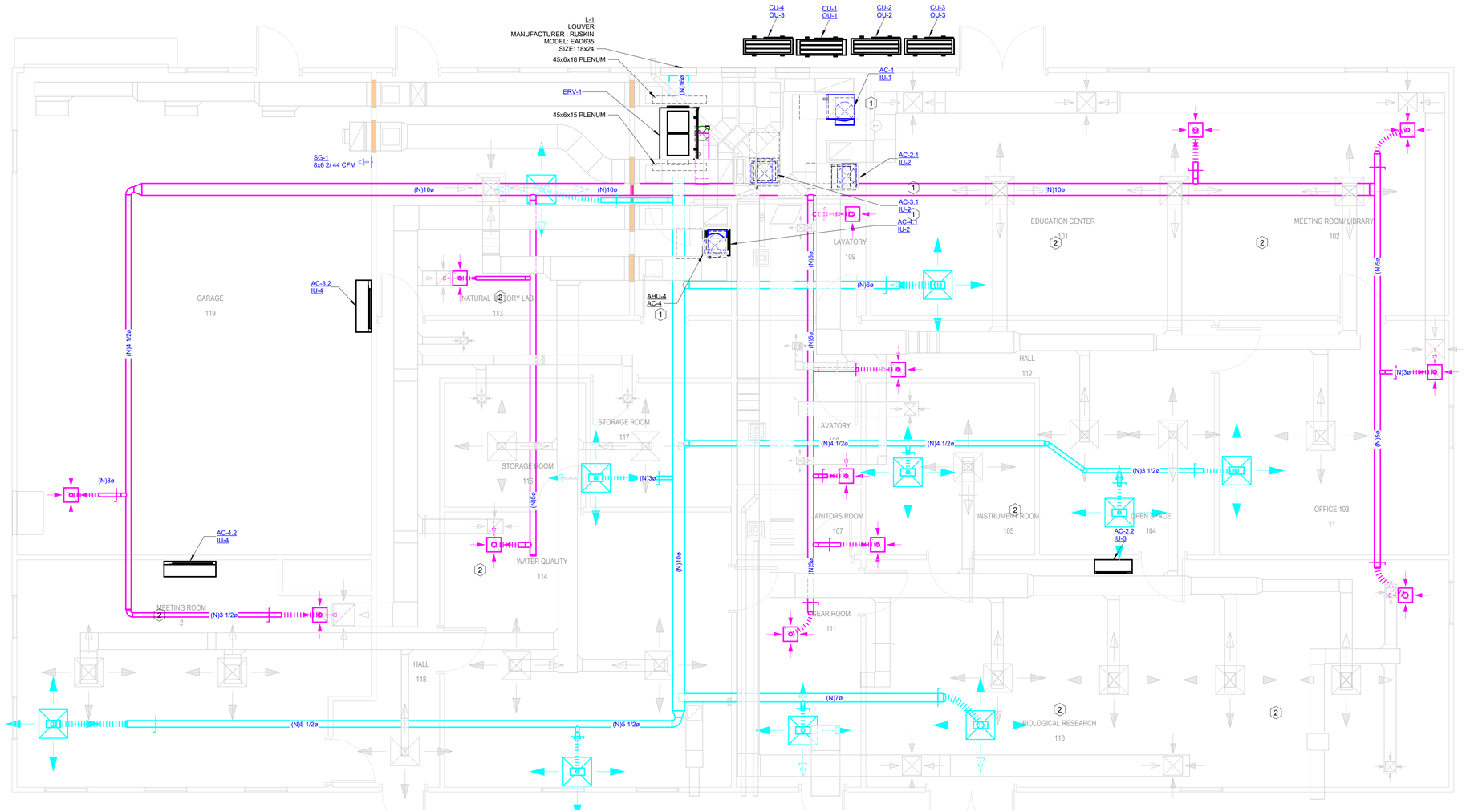

1 NEW CONSTRUCTION MECHANICAL
1/4" = 1'-0"

MECHANICAL CALLOUT NOTES	
#	NOTE
1	INSTALL AHU ON EQUIPMENT PAD
2	CONTRACTOR TO PROVIDE CURRENT AIR FLOW CONDITIONS AT EACH TERMINAL THROUGHOUT THE BUILDING AND PROVIDE EOR OF RECORD FOR CONFIRMATION OF AIRFLOW. UPON THE INSTALLATION OF NEW EQUIPMENT, THE AIRFLOW AT THE TERMINALS WILL BE RECONFIRMED AND BALANCED TO PROVIDE ADEQUATE AIRFLOW FOR HEATING AND COOLING.

SHEET NOTES

1. CONTRACTOR SHALL HAVE DISCRETION IN THE FINAL LAYOUT OF THE EQUIPMENT AS LONG AS IT MEETS THE INTENT OF THE PROJECT SCOPE.

Narragansett Bay Research Reserve

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Project Title: HVAC AND ELECTRICAL UPGRADES			Project Number 2407
Location: FIELD STATION PHASE VI PRUDENCE ISLAND, RI			Drawing Scale 1/4" = 1'-0"
Drawing Title: NEW CONSTRUCTION MECHANICAL FLOOR PLAN - LEVEL 1			Drawing Number M1.2
Issue Date: 16SEP24	Approved By: AG	Drawn By: AGE	Checked By: AG

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MITSUBISHI ELECTRIC TRANE HVAC US: CITY MULTI VRF INDOOR UNIT SCHEDULE

Outdoor Unit	Tag Reference	Type Mark	Model	Type	Nominal Cooling Capacity (BTU/h)	Nominal Heating Capacity (BTU/h)	Cooling Design Entering Temp DB/WB (°F)	Heating Design Entering Temp DB/WB (°F)	Corrected Capacity: Cooling Diversity Full/Partial (See Note 5, 6)	Corrected Capacity: Cooling Total Capacity (BTU/h)	Corrected Capacity: Cooling Sensible Capacity (BTU/h)	Corrected Capacity: Heating Diversity Full/Partial (See Note 5, 6)	Corrected Capacity: Heating Capacity (BTU/h)	Estimated Cooling Coil LAT (°F)	Estimated Heating Coil LAT (°F)	Refrig Pipe Dim Liquid/Suction (inch)	Fan Speed Setting	Peak Fan Airflow (cfm)	Max Fan ESP Setting 208V/230V (IN WG)	Sound Pressure Per Fan Speed 208V/230V (dBA)	Voltage / Phase	Electrical MCA/MFS	Condensate Removal Rate (gal/hr)	Notes / Options
CU-1	AC-1	IU-1	PVA-A36AA7	Multi Position	36,000	38,000	80.0/67.0	70	FULL DEMAND	38,404.8	28,741.3	FULL DEMAND	71,122.7	55.9	128.6	5/8 / 3/8	HIGH	1125		32 - 36 - 40	208/230V/1-phase	Powered by Outdoor	1.02	1, 2, 3, 4, 5
CU-2	AC-2.1	IU-2	SVZ-KP36NA	Multi Position	33,400	33,500	80.0/67.0	70	FULL DEMAND	33,375.0	27,853.0	FULL DEMAND	67,538.6	51.1	138.8	3/8 / 5/8	HIGH	910	0.30/0.50/0.80	35-39-43	208/230V/1-phase	4.13/15	1.07	1, 2, 3, 4, 5
CU-2	AC-2.2	IU-3	MSZ-GS12NA-U1	Wall -Mounted	12,000	14,400	80.0/67.0	70	FULL DEMAND	11,991.0	9,339.2	FULL DEMAND	14,364.4	57.4	104.1	1/4 / 3/8	HIGH	390		19-22-30-37-45/19-22-30-37-43	208/230V/1-phase	1/	0.34	1, 2, 3, 4, 5
CU-3	AC-3.1	IU-2	SVZ-KP36NA	Multi Position	33,400	33,500	80.0/67.0	70	FULL DEMAND	33,376.3	27,853.4	FULL DEMAND	54,460.7	51.1	125.5	3/8 / 5/8	HIGH	910	0.30/0.50/0.80	35-39-43	208/230V/1-phase	4.13/15	1.07	1, 2, 3, 4, 5
CU-3	AC-3.2	IU-4	MSZ-GS24NA-U1	Wall -Mounted	22,400	27,600	80.0/67.0	70	FULL DEMAND	22,384.1	16,789.8	FULL DEMAND	16,757.2	57.4	92.2	1/4 / 5/8	HIGH	701		34-41-47-53/32-41-47-52	208/230V/1-phase	1/	0.69	1, 2, 3, 4, 5
CU-4	AC-4.1	IU-2	SVZ-KP36NA	Multi Position	33,400	33,500	80.0/67.0	70	FULL DEMAND	33,376.3	27,853.4	FULL DEMAND	54,460.7	51.1	125.5	3/8 / 5/8	HIGH	910	0.30/0.50/0.80	35-39-43	208/230V/1-phase	4.13/15	1.07	1, 2, 3, 4, 5
CU-4	AC-4.2	IU-4	MSZ-GS24NA-U1	Wall -Mounted	22,400	27,600	80.0/67.0	70	FULL DEMAND	22,384.1	16,789.8	FULL DEMAND	16,757.2	57.4	92.2	1/4 / 5/8	HIGH	701		34-41-47-53/32-41-47-52	208/230V/1-phase	1/	0.69	1, 2, 3, 4, 5

NOTES & OPTIONS:

1. NOMINAL COOLING CAPACITIES ARE BASED ON INDOOR COIL EAT OF 80/67°F (DB/WB), OUTDOOR OF 95°F (DB)
2. NOMINAL HEATING CAPACITIES ARE BASED ON INDOOR COIL EAT OF 70°F (DB), OUTDOOR OF 43°F (WB)
3. SEE SCHEMATIC PIPING/CONTROL DIAGRAM FOR INDICATION OF REQUIRED INDOOR UNIT REMOTE CONTROLLERS, SYSTEM CONTROLLERS, AND INTEGRATION DEVICES.
4. SEE OUTDOOR UNIT SCHEDULE FOR OUTDOOR AMBIENT CONDITIONS, CONNECTED CAPACITY, AND OTHER FACTORS ASSOCIATED WITH CORRECTED CAPACITIES
5. FULL DEMAND CORRECTED CAPACITY INCLUDES DE-RATE ASSOCIATED WITH INDOOR VS. OUTDOOR CONNECTED CAPACITY INDICATED ON OUTDOOR UNIT SCHEDULE FOR ASSOCIATED SYSTEM.
   PARTIAL CORRECTED CAPACITY ASSUMES SUFFICIENT DIVERSITY EXISTS SUCH THAT THE CONNECTED CAPACITY DE-RATE DOES NOT APPLY.
   IT IS THE DESIGNER'S RESPONSIBILITY TO ENSURE "DIAMOND SYSTEM BUILDER" IS SET IN THE APPROPRIATE OUTPUT CAPACITY SETTING (FULL DEMAND/PARTIAL DEMAND) PRIOR TO GENERATING THIS SCHEDULE.
6. IT IS RECOMMENDED TO ALWAYS BASE HEATING CORRECTED CAPACITY ON FULL DEMAND.
7. PROVIDE 10KW ELECTRIC HEAT KIT

PROVIDE 10KW ELECTRIC HEAT KIT

MITSUBISHI ELECTRIC TRANE HVAC US: CITY MULTI VRF OUTDOOR UNIT SCHEDULE

System Tag	Type Mark	Model Number	Modules	Nominal Cooling Capacity (BTU/h)	Nominal Heating Capacity (BTU/h)	Cooling Efficiency (t)EER [SEER]	EER2 [SEER2]	Heating COP @ 47°F [HSPF]	Nom System Connected Capacity (% of NOM)	Design Cooling Outdoor Temp DB (°F)	Design Heating Outdoor Temp WB (°F)	Refrig Pipe Dim High/Low Pressure (inch) (See Note 4)	Corrected Cooling Total Capacity (BTU/h)	Corrected Heating Capacity (BTU/h)	Sound Pressure (dBA)	Inverter Driven Compressor Type / Quantity	Preliminary Added Field Charge (See Note 5)	Electrical-Per Module 208/230: Voltage / Phase	Electrical-Per Module 208/230: MCA 208/230	Electrical-Per Module 208/230: RFS	Electrical-Per Module 208/230: MOCP	Notes / Options
CU-1	OU-1	PUZ-HA36NKA		36,000	38,000	0 [18.20]	0 []	0 [11.20]	100.0 %	89.0	4.3	3/8 / 5/8	38,404.8	37,001.3	52/53	SCROLL/1	0.0	208/230V / 1-phase	26	35	42	1, 2, 3, 4, 5, 6, 7, 8, 9
CU-2	OU-2	MXZ-SM48NAMHZ2-U1	P48	48,000	54,000	0	19.5	3.600	100.0 %	89.0	4.3	3/8 / 5/8	47,624.8	50,355.8	51/54	SCROLL/1	6.9	208/230V / 1-phase	51	45	86	1, 2, 3, 4, 5, 6, 7, 8, 9
CU-3	OU-3	MXZ-SM60NAM2-U1	P60	60,000	66,000	0	11.9	3.740	100.0 %	89.0	4.3	3/8 / 3/4	59,768.8	37,096.5	58/59	SCROLL/1	8.5	208/230V / 1-phase	55	50	90	1, 2, 3, 4, 5, 6, 7, 8, 9
CU-4	OU-3	MXZ-SM60NAM2-U1	P60	60,000	66,000	0	11.9	3.740	100.0 %	89.0	4.3	3/8 / 3/4	59,768.8	37,096.5	58/59	SCROLL/1	8.5	208/230V / 1-phase	55	50	90	1, 2, 3, 4, 5, 6, 7, 8, 9

NOTES & OPTIONS:

1. NOMINAL COOLING CAPACITIES ARE BASED ON INDOOR COIL EAT OF 80/67°F (DB/WB), OUTDOOR OF 95°F (DB)
2. NOMINAL HEATING CAPACITIES ARE BASED ON INDOOR COIL EAT OF 70°F (DB), OUTDOOR OF 43°F (WB).
3. EFFICIENCY VALUES FOR EER, IEER, COP ARE BASED ON AHRI 1230 TEST METHOD FOR MIXTURE OF DUCTED & NON-DUCTED INDOOR UNITS.
4. FOR SYSTEMS WITH MULTIPLE MODULES, REFRIGERANT PIPE DIMENSIONS INDICATE TOTAL SYSTEM COMBINED PIPING DOWNSTREAM OF MODULE TWINNING.
5. ADDED FIELD CHARGE LISTED IS IN ADDITION TO FACTORY CHARGE, THIS MUST BE UPDATED BASED UPON FINAL AS-BUILT PIPING LAYOUT.
6. FACTORY REPRESENTATIVES SHALL REVIEW THE PROJECT PRIOR TO AND THROUGHOUT THE INSTALLATION OF CITY MULTI EQUIPMENT
7. FACTORY REPRESENTATIVES SHALL STARTUP AND COMMISSION CITY MULTI EQUIPMENT UPON COMPLETION OF EQUIPMENT INSTALLATIONS
8. FACTORY REPRESENTATIVES SHALL PROVIDE ON-SITE ASSISTANCE FOR THE BMS INTEGRATION OF THE CITY MULTI EQUIPMENT
9. FACTORY REPRESENTATIVES SHALL PROVIDE END-USER TRAINING ON THE CITY MULTI EQUIPMENT UPON COMPLETION OF THE INSTALLATION OF EQUIPMENT

Revision 1	05MAR25
Revision:	Date:

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Project Title: HVAC AND ELECTRICAL UPGRADES	Project Number: 2407
Location: FIELD STATION PHASE VI, PRUDENCE ISLAND, RI	Drawing Scale: 1" = 80'-0"
Drawing Title: SCHEDULES	Drawing Number: M5.1
Issue Date: 16SEP24 / Approved By: AG / Drawn By: AGE	Checked By: AG

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ERV SCHEDULE (ERV-1)

MARK	MANUFACTURER	MODEL	LOCATION/SERVICE	SUPPLY FAN				EXHAUST FAN				WHEEL PERFROMANCE						ELECTRICAL			WEIGHT (LBS)	REMARKS
												SUMMER			WINTER							
				CFM	ESP IN WC	FAN RPM	MOTOR HP	CFM	ESP IN WC	FAN RPM	MOTOR HP	OA DB/WB (F)	RA DB/WB (F)	SA DB/WB (F)	OA DB/WB (F)	RA DB/WB (F)	SA DB/WB (F)	MCA	MOP	VOLTAGE		
ERV-1	RENEWAIRE	HE1.5	MECHANICAL ROOM	935	1.25	1,475		900	1.33	1,475		90.1/73.3	75.0/62.5	79.1/67.7	8.5/5.5	70.0/51.5	53.4/40.8	7.7	15	208-230		

SUMMER/WINTER

SENSIBLE EFFECTIVENESS %	TOTAL EFFECTIVENESS %	ENTHALPY RECOVERY RATIO (ERR) %	SENSIBLE ENERGY RECOVERY RATIO %	MOISTURE REMOVED (GRAINS/LB)	TOTAL ENERGY SAVED (BTUH)		
					SENSIBLE	LATENT	TOTAL
73.0/73.0	55.3/70.6	55.3/70.6	73.0/73.0	13.3/ -14.7	10,7137/ 43,633	8,710/ 9,262	19,424/ 52,896

WHEEL PERFROMANCE						ELECTRICAL		
SUMMER MOISTURE RATIO (MR) GRAINS/LB			WINTER MOISTURE RATIO (MR) GRAINS/LB					
OA	RA	SA	OA	RA	SA	MCA	MOP	VOLTAGE
96.5	64.8	83.2	3.2	27.1	17.9	7.7	15	208-230

WHEEL PERFROMANCE					
SUMMER ENTHALPY (H) BTU/LB			WINTER ENTHALPY (H) BTU/LB		
OA	RA	SA	OA	RA	SA
36.8	28.1	32	2.5	21	15.6

ERV ELECTRIC HEATER

CFM	TEMP IN (F)	TEMP OUT (F)	KW	VOLTS	HERTZ	PHASE	FLA (A)	MCA (A)	MOPD (A)
900	53.4	88.05	10	208	60	1	47.6	59.5	60

MXZ BRANCH BOX

SYSTEM TAG	Model Number	Connectable number of Indoor unit (Maximum)	Voltage / Phase	Frequency - Hz	Power Input - kW	Running Current - A	External Finish	Unit Dimension			Weight - lb(kg)	Piping Connection				Notes / Options
												to Outdoor Unit		to Indoor Unit		
								Width - in(mm)	Depth - in(mm)	Height - in(mm)		Liquid - in(mm)	Gas - in(mm)	Liquid - in(mm)	Gas - in(mm)	
CU-2	PAC-MKA32BC	3	208/230 / 1-PHASE	60	0	0	GALVANIZED SHEETS	17-23/32 (450)	11-1/32 (280)	6-11/16 (170)	15 (6.7)	3/8 (9.52)	5/8 (15.88)	1/4 (6.35) X 3 {A, B, C}	3/8 (9.52) X 3 {A, B, C}	1
CU-3	PAC-MKA32BC	3	208/230 / 1-PHASE	60	0	0	GALVANIZED SHEETS	17-23/32 (450)	11-1/32 (280)	6-11/16 (170)	15 (6.7)	3/8 (9.52)	5/8 (15.88)	1/4 (6.35) X 3 {A, B, C}	3/8 (9.52) X 3 {A, B, C}	1
CU-4	PAC-MKA32BC	3	208/230 / 1-PHASE	60	0	0	GALVANIZED SHEETS	17-23/32 (450)	11-1/32 (280)	6-11/16 (170)	15 (6.7)	3/8 (9.52)	5/8 (15.88)	1/4 (6.35) X 3 {A, B, C}	3/8 (9.52) X 3 {A, B, C}	1

NOTES & OPTIONS:

1. THE PIPING CONNECTION SIZE DIFFERS ACCORDING TO THE TYPE AND CAPACITY OF INDOOR UNITS. MATCH THE PIPING CONNECTION SIZE FOR INDOOR AND BRANCH BOX. IF THE PIPING CONNECTION SIZE OF BRANCH BOX DOES NOT MATCH THE PIPING CONNECTION SIZE OF INDOOR UNITS, USE OPTIONAL DIFFERENT-DIAMETER (DEFORMED) JOINTS TO THE BRANCH BOX SIDE. (CONNECTED DEFORMED JOINT DIRECTLY TO THE BRANCH BOX SIDE.)

GRILLES REGISTERS & DIFFUSERS SCHEDULE

SYMBOL	MANUFACTURER	MODEL	MATERIAL	INLET SIZE (INCH)	FACE SIZE...	MOUNTING LOCATION	FACE TYPE	NOTES
SG-1	TITUS	300R	STEEL	SEE DWG.	INLET +2	DUCT MOUNTING	DOUBLE DEFLECTION	THE FRONT BLADES VERTICAL UNLESS NOTED OTHERWISE PAINTED TO MATCH...

NOTES:
1. ALL RUN OUT DUCTWORK TO DIFFUSERS SHALL BE NECK SIZE UNLESS OTHERWISE NOTED.
2. FRAME TYPE TO MATCH MOUNTING LOCATION CONSTRUCTION MATERIAL. COORDINATE WITH ARCHITECTURAL REFLECTED CEILING PLAN.

LOUVER SCHEDULE

SYMBOL	MANUFACTURER	MODEL	SIZE (W"xH")	CFM	FREE AREA VEL. (FPM)	MIN.FREE AREA (SF)	FINISH	MAX. VEL. (FPM)	MAX. P.D. (IN.W.C.)
L-1	RUSKIN	ELF6350DMP	24"X18"	938	900	1.04	MILL	680	0.06

Narragansett Bay Research Reserve

Revision 1	05MAR25
Revision:	Date:

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Project Title: HVAC AND ELECTRICAL UPGRADES	Project Number: 2407
Location: FIELD STATION PHASE VI PRUDENCE ISLAND, RI	Drawing Scale: 1" = 100'-0"
Drawing Title: SCHEDULES	Drawing Number: M5.2

Issue Date:	Approved By:	Drawn By:	Checked By:
16SEP24	AG	AGE	AG

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Quick Results

Connection Summary

Indoor Units:	1 / 1 to 1
Capacity:	36 / 18 to 36 (100.0%)
* Connectable capacity is not actual capacity.	
Total Pipe Length:	0.0 / 245.0 feet

Refrigerant

System Refrigerant:	**R410A**
Additional Field-Charge:	**0.00 lb**
Total System Charge:	**11.46 lb**

Correction Factors

	Cooling	Heating
Outdoor Temperature:	1.07	0.98
Piping Length:	1.00	1.00
Defrosting:	-	1.00
User Derate:	1.00	1.00
Outdoor Altitude:	1.00	1.00
	1.07	**0.97**

Conditions

Cooling		Heating	
Indoor Dry Bulb	80.0 °F	Indoor Dry Bulb	70.0 °F
Indoor Wet Bulb	67.0 °F		
Indoor Humidity	51.8 %	Outdoor Dry Bulb	5.0 °F
		Outdoor Wet Bulb	4.3 °F
Outdoor Dry Bulb	89.0 °F	Outdoor Humidity	77.5 %

Quick Results

Connection Summary

Indoor Units:	2 / 2 to 8
Capacity:	48 / 24 to 62 (100.0%)
* Connectable capacity is not actual capacity.	
Total Pipe Length:	40.0 / 492.0 feet
Furthest Actual:	40.0 / 262.0 feet
Furthest Equiv.:	43.9 / 262.0 feet

Refrigerant

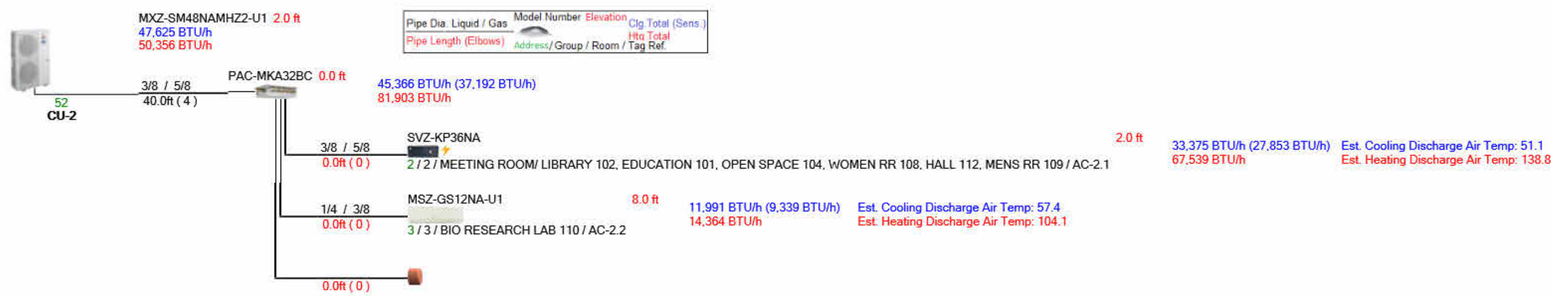
System Refrigerant:	**R410A**
Additional Field-Charge:	**6.88 lb**
Total System Charge:	**17.46 lb**

Correction Factors

	Cooling	Heating
Outdoor Unit Capacity:	1.00	1.00
Outdoor Temperature:	1.01	0.99
Piping Length:	0.98	0.99
Defrosting:	-	0.95
User Derate:	1.00	1.00
Outdoor Altitude:	1.00	1.00
	0.99	**0.93**

Conditions

Cooling		Heating	
Indoor Dry Bulb	80.0 °F	Indoor Dry Bulb	70.0 °F
Indoor Wet Bulb	67.0 °F		
Indoor Humidity	51.8 %	Outdoor Dry Bulb	5.0 °F
		Outdoor Wet Bulb	4.3 °F
Outdoor Dry Bulb	89.0 °F	Outdoor Humidity	77.5 %



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Revision 1	05MAR25
Revision:	Date:

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Project Title: HVAC AND ELECTRICAL UPGRADES	**Project Number** 2407
Location: FIELD STATION PHASE VI PRUDENCE ISLAND, RI	**Drawing Scale**
Drawing Title: VRF UNITS 1 AND 2	**Drawing Number** M7.1A

Issue Date:	Approved By:	Drawn By:	Checked By:
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Quick Results

Connection Summary

Indoor Units:	2 / 2 to 8	
Capacity:	60 / 30 to 78 (100.0%)	
* Connectable capacity is not actual capacity.		
Total Pipe Length:	40.0 / 492.0	feet
Furthest Actual:	40.0 / 262.0	feet
Furthest Equiv.:	43.9 / 262.0	feet

Refrigerant

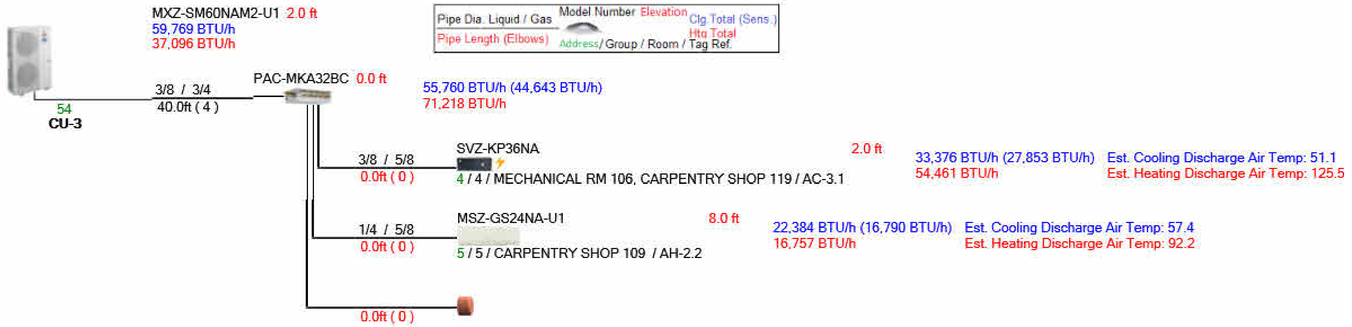
System Refrigerant:	**R410A**
Additional Field-Charge:	**8.50 lb**
Total System Charge:	**19.74 lb**

Correction Factors

	Cooling	Heating
Outdoor Unit Capacity:	1.00	1.00
Outdoor Temperature:	1.01	0.59
Piping Length:	0.99	1.00
Defrosting:	-	0.95
User Derate:	1.00	1.00
Outdoor Altitude:	1.00	1.00
	1.00	**0.56**

Conditions

Cooling		Heating	
Indoor Dry Bulb	80.0 °F	Indoor Dry Bulb	70.0 °F
Indoor Wet Bulb	67.0 °F		
Indoor Humidity	51.8 %	Outdoor Dry Bulb	5.0 °F
		Outdoor Wet Bulb	4.3 °F
Outdoor Dry Bulb	89.0 °F	Outdoor Humidity	77.5 %



Quick Results

Connection Summary

Indoor Units:	2 / 2 to 8	
Capacity:	60 / 30 to 78 (100.0%)	
* Connectable capacity is not actual capacity.		
Total Pipe Length:	40.0 / 492.0	feet
Furthest Actual:	40.0 / 262.0	feet
Furthest Equiv.:	43.9 / 262.0	feet

Refrigerant

System Refrigerant:	**R410A**
Additional Field-Charge:	**8.50 lb**
Total System Charge:	**19.74 lb**

Correction Factors

	Cooling	Heating
Outdoor Unit Capacity:	1.00	1.00
Outdoor Temperature:	1.01	0.59
Piping Length:	0.99	1.00
Defrosting:	-	0.95
User Derate:	1.00	1.00
Outdoor Altitude:	1.00	1.00
	1.00	**0.56**

Conditions

Cooling		Heating	
Indoor Dry Bulb	80.0 °F	Indoor Dry Bulb	70.0 °F
Indoor Wet Bulb	67.0 °F		
Indoor Humidity	51.8 %	Outdoor Dry Bulb	5.0 °F
		Outdoor Wet Bulb	4.3 °F
Outdoor Dry Bulb	89.0 °F	Outdoor Humidity	77.5 %

Narragansett Bay Research Reserve

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Project Title: HVAC AND ELECTRICAL UPGRADES	**Project Number** 2407
Location: FIELD STATION PHASE VI PRUDENCE ISLAND, RI	**Drawing Scale**
Drawing Title: VRF UNITS 3 AND 4	**Drawing Number** M7.1B

Issue Date:	Approved By:	Drawn By:	Checked By:
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EXTERNAL CONTROL DEVICE:

IN THIS SPECIFICATION THE TERM 'EXTERNAL CONTROL DEVICE' IS USED TO DENOTE ONE OR MORE USER INTERFACE CONTROL DEVICES THAT MAY BE PRESENT IN THE SYSTEM. THE CONTROL DEVICES THAT MAY BE PRESENT ARE A LOCAL CONTROL DEVICE, VRF SYSTEM CONTROL DEVICE, OR A BUILDING AUTOMATION SYSTEM. WHEN MORE THAN ONE EXTERNAL CONTROL DEVICE IS PRESENT IN THE CONTROL SYSTEM, THE LAST COMMAND OR CONFIGURATION VALUE RECEIVED BY THE INDOOR UNIT GOVERNS INDOOR UNIT OPERATION.

THERE MAY BE OTHER MEANS TO PROVIDE COMMANDS AND CONFIGURATION PARAMETERS TO THE VRF SYSTEM, SUCH AS HARDWIRED CONTROL INPUTS. HOWEVER, THESE ARE NOT CONSIDERED THE TYPICAL SYSTEM CONTROL USE CASE AND THE SPECIFICATION DOES NOT ADDRESS THEM AS WRITTEN.

ZONE TEMPERATURE SETPOINT CONTROL:

DUAL SETPOINT. TWO ZONE AIR TEMPERATURE SETPOINTS ARE PRESENT. WHEN THE TERMINAL UNIT IS IN A COOLING MODE, IT WILL CONTROL THE ZONE AIR TEMPERATURE VALUE TO THE COOLING TEMPERATURE SETPOINT VALUE. WHEN THE TERMINAL UNIT IS IN A HEATING MODE, IT WILL CONTROL THE ZONE AIR TEMPERATURE VALUE TO THE HEATING TEMPERATURE SETPOINT VALUE.

ON/OFF MODE:

THE TERMINAL UNIT HAS TWO MODES THAT DRIVE THE OVERALL OPERATION OF THE UNIT, ON AND OFF MODE.

ON. THE INTERNAL ALGORITHM WILL CONTROL THE UNIT TO MAINTAIN THE DESIRED ZONE AIR TEMPERATURE.

OFF. THE INTERNAL ALGORITHM WILL NOT CONTROL THE UNIT TO MAINTAIN THE DESIRE ZONE AIR TEMPERATURE. THE ALGORITHM WILL CONTROL COMPONENTS INTERNAL TO THE UNIT TO MINIMIZE ENERGY CONSUMPTION AND ISOLATE IT FROM VRF SYSTEM REFRIGERANT CIRCUIT. THE ZONE AIR TEMPERATURE SENSOR IN USE WILL BE MONITORED TO ALLOW THE ZONE AIR TEMPERATURE VALUE TO BE DISPLAYED AT AN EXTERNAL CONTROL DEVICE(S).

OPERATION MODE:

OPERATION MODE IS THE PRIMARY CONTROL PARAMETER OF THE INDOOR UNIT WHEN IT IS IN THE ON STATE. THE OPERATION MODE COMMAND PROVIDED TO THE INDOOR UNIT FROM AN ETERNAL CONTROL DEVICE WILL DETERMINE THE BASE HVAC CONTROL FUNCTION THE INDOOR UNIT IS PROVIDING. AVAILABLE MODES OF OPERATION ARE COOL, DRY, FAN, HEAT, SETBACK, AND AUTO.

COOL. WHEN THE TERMINAL UNIT OPERATION MODE IS THE COOL STATE, LIQUID REFRIGERANT IS PROVIDED TO THE TERMINAL UNIT. THE AMOUNT OF REFRIGERANT ENTERING THE EVAPORATOR COIL IS REGULATED BY THE LINEAR EXPANSION VALVE. THE POSITION OF LEV IS DETERMINED BY AN ALGORITHM INTERNAL TO THE TERMINAL UNIT. THE ALGORITHM CALCULATES THE TEMPERATURE DIFFERENCE VALUE BETWEEN THE MEASURED ZONE AIR TEMPERATURE VALUE AND THE COOLING TEMPERATURE SETPOINT VALUE. WHEN A LARGE DIFFERENCE VALUE EXISTS, THE LEV IS DRIVEN OPEN TO ALLOW MORE REFRIGERANT INTO THE EVAPORATOR COIL. AS THE ZONE AIR TEMPERATURE DECREASES THE DIFFERENCE VALUE BECOMES LESS. THE ALGORITHM WILL RESPOND AND DRIVE THE LEV TO MORE CLOSED POSITION REDUCING THE AMOUNT OF REFRIGERANT ENTERING INTO THE EVAPORATOR COIL. AS THE DIFFERENCE VALUE APPROACHES ZERO, THE SYSTEM STABILIZES AND THE AMOUNT OF LEV MODULATION IS MINIMAL.

DRY. WHEN THE TERMINAL UNIT OPERATION MODE IS THE DRY STATE, LIQUID REFRIGERANT IS PROVIDED TO THE TERMINAL UNIT. THE AMOUNT OF REFRIGERANT ENTERING THE EVAPORATOR COIL IS REGULATED BY THE LINEAR EXPANSION VALVE. *THE GOAL IN DRY MODE* IS TO REMOVE WATER VAPOR FROM THE AIR, NOT CONTROL THE ZONE AIR TEMPERATURE VALUE TO A ZONE TEMPERATURE SETPOINT. WHEN THE TERMINAL UNIT IS COMMANDED TO THE DRY STATE, AN ALGORITHM INTERNAL TO THE TERMINAL UNIT DRIVES THE LEV TO AN OPEN POSITION. IT IS ASSUMED THAT THE POSITION OF THE VALVE ALLOWS A SUFFICIENT AMOUNT OF REFRIGERANT TO ENTER THE COIL, TO CAUSE THE SURFACE TEMPERATURE OF THE COIL FINS TO FALL BELOW THE DEW POINT TEMPERATURE. THE RESULT IS CONDENSATION THAT REMOVES WATER VAPOR FROM THE AIR PASSING THROUGH THE COIL.

WHEN THE ZONE AIR TEMPERATURE VALUE IS GREATER THAN OR EQUAL TO THE COOLING TEMPERATURE SETPOINT, DRY STATE IS BENEFICIAL FROM BOTH A HUMIDITY AND ZONE TEMPERATURE PERSPECTIVE BECAUSE WATER VAPOR IS BEING REMOVED FROM THE AIR IN THE ZONE AND THE DIFFERENCE VALUE BETWEEN THE ZONE AIR TEMPERATURE VALUE AND THE COOLING TEMPERATURE SETPOINT VALUE IS REDUCED.

CONTINUED DEHUMIDIFICATION WILL CAUSE THE ZONE AIR TEMPERATURE VALUE TO BECOME LESS THAN THE COOLING TEMPERATURE SETPOINT, WHICH IS UNDESIRABLE. TO COMBAT THE EFFECT, THE ALGORITHM CALCULATES THE TEMPERATURE DIFFERENCE VALUE BETWEEN THE ZONE AIR TEMPERATURE VALUE AND COOLING TEMPERATURE SETPOINT. BASED ON THE DIFFERENCE VALUE, THE ALGORITHM USES A SLIDING TIME SCALE METHOD TO MODULATE THE LEV BETWEEN THE OPEN POSITION AND THE FULLY CLOSED POSITION FOR A VARIABLE LENGTH OF TIME. IT IS ASSUMED THAT WHEN THE LEV IS IN THE FULLY CLOSED POSITION LATENT HEAT WITHIN THE ZONE WILL CAUSE THE ZONE AIR TEMPERATURE VALUE TO INCREASE. THE METHOD ALLOWS SOME DEHUMIDIFICATION TO TAKE PLACE WITHOUT SIGNIFICANTLY LOWERING THE AIR TEMPERATURE IN THE ZONE BELOW THE COOLING TEMPERATURE SETPOINT.

FAN. WHEN THE TERMINAL UNIT OPERATION MODE IS THE FAN STATE, THE LEV IS CLOSED AND THE TERMINAL UNIT DOES NOT ATTEMPT REGULATE THE AIR TEMPERATURE IN THE ZONE. THE TEMPERATURE OF THE AIR IN THE ZONE MAY CHANGE DUE TO LATENT HEAT WITHIN THE ZONE. WITH THE USE OF AN EXTERNAL USER INTERFACE, THE SPEED OF THE FAN MAY BE MODULATED BETWEEN THE DISCRETE STATES SUPPORTED BY THE TERMINAL UNIT.

HEAT. WHEN THE TERMINAL UNIT OPERATION MODE IS THE HEAT STATE, HOT GAS REFRIGERANT IS PROVIDED TO THE TERMINAL UNIT. THE AMOUNT OF REFRIGERANT ENTERING THE EVAPORATOR COIL IS REGULATED BY THE LINEAR EXPANSION VALVE. THE POSITION OF LEV IS DETERMINED BY AN ALGORITHM INTERNAL TO THE TERMINAL UNIT. THE ALGORITHM CALCULATES THE TEMPERATURE DIFFERENCE VALUE BETWEEN THE MEASURED ZONE AIR TEMPERATURE VALUE AND THE HEATING TEMPERATURE SETPOINT VALUE. WHEN A LARGE DIFFERENCE VALUE EXISTS, THE LEV IS DRIVEN OPEN TO ALLOW MORE REFRIGERANT INTO THE EVAPORATOR COIL. AS THE ZONE AIR TEMPERATURE INCREASES THE DIFFERENCE VALUE BECOMES LESS. THE ALGORITHM WILL RESPOND AND DRIVE THE LEV TO MORE CLOSED POSITION REDUCING THE AMOUNT OF REFRIGERANT ENTERING INTO THE EVAPORATOR COIL. AS THE DIFFERENCE VALUE APPROACHES ZERO, THE SYSTEM STABILIZES AND THE AMOUNT OF LEV MODULATION IS MINIMAL.

SETBACK. SOME TERMINAL UNITS MAY NOT SUPPORT THE SETBACK STATE. WHEN THE TERMINAL UNIT OPERATION MODE TRANSITIONS TO SETBACK STATE, THE LEV IS DRIVEN CLOSED AND THE ZONE AIR TEMPERATURE IS ALLOWED TO DRIFT. THE AMOUNT OF DRIFT IS BOUNDED BY THE SETBACK COOLING TEMPERATURE SETPOINT AND THE SETBACK HEATING TEMPERATURE SETPOINT.

WHEN THE ZONE AIR TEMPERATURE VALUE IS GREATER THAN THE SETBACK COOLING TEMPERATURE SETPOINT THE TERMINAL UNIT WILL EXECUTE THE SETBACK COOL ALGORITHM. THE ALGORITHM MODULATES THE LEV TO MAINTAIN THE ZONE TEMPERATURE TO THE SETBACK COOLING TEMPERATURE SETPOINT.

WHEN THE ZONE AIR TEMPERATURE VALUE IS LESS THAN THE SETBACK HEATING TEMPERATURE SETPOINT THE TERMINAL UNIT WILL EXECUTE THE SETBACK HEAT ALGORITHM. THE ALGORITHM MODULATES THE LEV TO MAINTAIN THE ZONE TEMPERATURE TO THE SETBACK HEATING TEMPERATURE SETPOINT.

AUTO. SOME MANUFACTURERS' TERMINAL UNITS MAY NOT SUPPORT THE AUTO STATE OF OPERATION MODE.

AUTO MODE IS BENEFICIAL IN A HEAT RECOVERY SYSTEM BECAUSE IT ALLOWS THE TERMINAL UNIT TO AUTOMATICALLY SWITCH BETWEEN COOLING AND HEATING STATES BASED ON THE CURRENT ZONE AIR TEMPERATURE AND THE ZONE TEMPERATURE SETPOINT IN USE. WHEN THE TERMINAL UNIT OPERATION MODE IS THE AUTO STATE, TWO SUB-STATES ARE AVAILABLE, AUTO (COOL) AND AUTO (HEAT).

DEPENDING ON THE SETPOINT CONTROL CONFIGURATION OF THE TERMINAL UNIT, ONE OF THREE SETPOINTS IS USED FOR CONTROL. WHEN THE UNIT IS CONFIGURED FOR SINGLE SETPOINT CONTROL, THE AUTO ZONE TEMPERATURE SETPOINT IS USED. WHEN THE UNIT IS CONFIGURED FOR DUAL SETPOINT CONTROL, THE COOLING TEMPERATURE SETPOINT IS USED WHEN THE UNIT IS IN THE AUTO (COOL) STATE AND HEATING TEMPERATURE SETPOINT IS USED WHEN THE UNIT IS IN THE AUTO (HEAT) STATE.

WHEN THE TERMINAL UNIT OPERATION MODE IS THE AUTO (COOL) STATE, LIQUID REFRIGERANT IS PROVIDED TO THE TERMINAL UNIT. THE AMOUNT OF REFRIGERANT ENTERING THE EVAPORATOR COIL IS REGULATED BY THE LINEAR EXPANSION VALVE. THE POSITION OF LEV IS DETERMINED BY AN ALGORITHM INTERNAL TO THE TERMINAL UNIT.

THE ALGORITHM SUBTRACTS THE ZONE AIR TEMPERATURE VALUE FROM THE ZONE TEMPERATURE SETPOINT VALUE, THE RESULT IS THE TEMPERATURE DIFFERENCE VALUE. WHEN THE RESULT IS A LARGE POSITIVE VALUE, THE LEV IS DRIVEN OPEN TO ALLOW MORE REFRIGERANT INTO THE EVAPORATOR COIL. AS THE ZONE AIR TEMPERATURE DECREASES THE DIFFERENCE VALUE BECOMES SMALLER. THE ALGORITHM WILL RESPOND AND DRIVE THE LEV TO A MORE CLOSED POSITION TO REDUCE THE AMOUNT OF REFRIGERANT ENTERING INTO THE EVAPORATOR COIL. AS THE DIFFERENCE VALUE APPROACHES ZERO, THE SYSTEM STABILIZES AND THE AMOUNT OF LEV MODULATION IS MINIMAL. WHEN THE DIFFERENCE VALUE IS NEGATIVE, THE LEV IS DRIVEN CLOSED TO PREVENT REFRIGERANT FROM ENTERING THE EVAPORATOR.

WHEN THE TERMINAL UNIT OPERATION MODE IS THE AUTO (HEAT) STATE, HOT GAS REFRIGERANT IS PROVIDED TO THE TERMINAL UNIT. THE AMOUNT OF REFRIGERANT ENTERING THE EVAPORATOR COIL IS REGULATED BY THE LINEAR EXPANSION VALVE. THE POSITION OF LEV IS DETERMINED BY AN ALGORITHM INTERNAL TO THE TERMINAL UNIT.

THE ALGORITHM SUBTRACTS THE ZONE TEMPERATURE SETPOINT VALUE FROM THE ZONE AIR TEMPERATURE VALUE, THE RESULT IS THE TEMPERATURE DIFFERENCE VALUE. WHEN THE RESULT IS A LARGE POSITIVE VALUE, THE LEV IS DRIVEN OPEN TO ALLOW MORE REFRIGERANT INTO THE EVAPORATOR COIL. AS THE ZONE AIR TEMPERATURE INCREASES THE DIFFERENCE VALUE BECOMES SMALLER. THE ALGORITHM WILL RESPOND AND DRIVE THE LEV TO A MORE CLOSED POSITION REDUCING THE AMOUNT OF REFRIGERANT ENTERING INTO THE EVAPORATOR COIL. AS THE DIFFERENCE VALUE APPROACHES ZERO, THE SYSTEM STABILIZES AND THE AMOUNT OF LEV MODULATION IS MINIMAL. WHEN THE DIFFERENCE VALUE IS NEGATIVE, THE LEV IS DRIVEN CLOSED TO PREVENT REFRIGERANT FROM ENTERING THE EVAPORATOR.

AUTO MODE SYSTEM CHANGEOVER. THE STATE OF THE TERMINAL UNIT IS AUTO (COOL). WHEN THE ABSOLUTE VALUE OF THE DIFFERENCE VALUE IS GREATER THAN THE FACTORY DEFINED CHANGEOVER DELTA VALUE, THE TERMINAL UNIT WILL TRANSITION TO THE AUTO (HEAT) STATE.

THE STATE OF THE TERMINAL UNIT IS AUTO (HEAT). WHEN THE DIFFERENCE VALUE IS GREATER THAN THE FACTORY DEFINED CHANGEOVER DELTA SETPOINT, THE TERMINAL UNIT WILL TRANSITION TO THE AUTO (COOL) STATE.

FAN CONTROL. WHEN THE INDOOR UNIT IS IN THE OFF STATE, THE FAN IS CONTROLLED TO THE MINIMUM SPEED REQUIRED TO MEASURE ZONE AIR TEMPERATURE AT THE RETURN AIR TEMPERATURE SENSOR. THIS ALLOWS ZONE AIR TEMPERATURE TO BE ACCURATELY MEASURED WHILE THE INDOOR UNIT IS IN THE OFF STATE.

UPON TRANSITION FROM THE OFF STATE TO THE ON STATE, THE RPM OF THE FAN IS GOVERNED TO MATCH A MANUFACTURE SPECIFIED, RPM VALUE ASSIGNED TO THE EACH DISCRETE FAN SPEED STATE AVAILABLE IN THE UNIT. THE NUMBER OF DISTINCT FAN SPEED STATES AND THE FAN RPM VALUE FOR EACH STATE VARIES BY MANUFACTURE AND MODEL OF INDOOR UNIT. THE FAN SPEED STATE IS CONTROLLED BY ONE OF TWO METHODS, AUTOMATIC FAN SPEED CONTROL OR MANUAL FAN SPEED CONTROL. THE CHOICE OF CONTROL METHOD IS MADE BY A USER OF THE SYSTEM.

UPON INDOOR UNIT TRANSITION FROM THE ON STATE TO THE OFF STATE, THE FAN TRANSITIONS TO THE STATE DESCRIBED WHEN THE INDOOR UNIT IS IN THE OFF STATE.

MANUAL FAN SPEED CONTROL. A USER OF THE SYSTEM SELECTS A DESIRED FAN SPEED STATE. THE FAN SPEED RPM WILL CHANGE TO MATCH THE MANUFACTURE SPECIFIED RPM VALUE AND MAINTAIN THE RMP VALUE UNTIL A DIFFERENT FAN SPEED STATE IS SELECTED OR A CHANGE IS MADE TO ANOTHER CONTROL PARAMETER OF THE INDOOR UNIT THAT CAUSES THE FAN TO CHANGE TO A DIFFERENT STATE.

AUTOMATIC FAN SPEED CONTROL. WHEN A USER OF THE SYSTEM SELECTS THE FAN SPEED STATE AUTO, AN ALGORITHM INTERNAL TO THE INDOOR UNIT CONTROLS THE SELECTION OF THE FAN SPEED STATE. THE ALGORITHM CALCULATES THE TEMPERATURE DIFFERENCE VALUE BETWEEN THE MEASURED ZONE AIR TEMPERATURE VALUE AND THE ZONE TEMPERATURE SETPOINT VALUE IN USE. WHEN A LARGE DIFFERENCE VALUE EXISTS, THE FAN STATE SELECTED WILL HAVE A HIGHEST FAN SPEED RPM VALUE. AS THE DIFFERENCE VALUE IS REDUCED, THE ALGORITHM WILL CHANGE THE FAN SPEED IN USE TO A STATE WITH A SMALLER RPM VALUE.

CONDENSATE OVERFLOW MONITORING:

THE UNIT SHALL BE EQUIPPED WITH A CONDENSATE DRAIN PAN LEVEL SENSOR TO PROTECT AGAINST DRAIN PAN OVERFLOW. IF THE SENSOR DETECTS A HIGH CONDENSATE LEVEL IN THE DRAIN PAN, THE CONTROL SHALL SHUT DOWN THE INDOOR UNIT BEFORE AN OVERFLOW CAN OCCUR AND A CONDENSATE ALARM DIAGNOSTIC SHALL ANNUNCIATE AT THE BAS.

LOCAL OPERATOR TOUCH SENSITIVE DISPLAY

A. PROVIDE A COLOR TOUCH SENSITIVE DISPLAY THAT ALLOWS THE BUILDING OCCUPANTS TO ACCOMPLISH THE FOLLOWING TASKS:
   A. CONTROL THE SET POINTS FOR MULTIPLE PIECES OF EQUIPMENT WITH A SINGLE TOUCH. SET POINT ADJUSTMENT BY THE OCCUPANT SHALL BE BOUND BY EDITABLE LIMITS.
   B. OCCUPANT OVERRIDE OF THE SYSTEM/EQUIPMENT OPERATING MODE SHALL BE POSSIBLE WITH A SINGLE TOUCH ON THE LOCAL OPERATOR DISPLAY. WITH THE ABILITY TO SET UP POINT OVERRIDES TO EXPIRE AT DESIGNATED TIMES
   C. THE LOCAL OPERATOR DISPLAY SHALL PROVIDE OCCUPANT ACCESS TO SYSTEM TIME OF DAY SCHEDULING. OCCUPANTS SHALL HAVE THE ABILITY TO SCHEDULE EVENTS MORE THAN ONE YEAR IN ADVANCE. EXCEPTION SCHEDULES AND HOLIDAYS SHALL BE SHOWN CLEARLY ON THE CALENDAR, VISIBLE TO THE OCCUPANT ON THE TOUCHSCREEN DISPLAY.
   D. THE LOCAL OPERATOR DISPLAY SHALL OFFER PIN CONTROL, WHICH SHALL LIMIT SYSTEM CONTROL ACCESS TO ONLY THOSE WITH PROPER LOGIN CREDENTIALS.
   E. THE LOCAL OPERATOR DISPLAY SHALL DISPLAY THE ALERTS THAT REQUIRE SERVICE OF THE CONNECTED EQUIPMENT.
B. TO ENSURE INTEROPERABILITY WITH THE BUILDING AUTOMATION SYSTEM (BAS), THE LOCAL OPERATOR DISPLAY SHALL BE PROVIDED BY THE BAS SOLUTION PROVIDER ASSOCIATED WITH THIS PROJECT.
   A. LOCAL OPERATOR DISPLAY SHALL BE A MINIMUM OF 10 INCHES IN SIZE AND BE PROVIDED WITH MOUNTING HARDWARE TO ALLOW IT TO BE INSTALLED ON AN OFFICE WALL OR CONTROL PANEL DOOR.
   B. LOCAL OPERATOR TOUCH SENSITIVE DISPLAY OPERATING CONDITIONS:
      - TEMPERATURE: -40°F TO 158°F (-40°C TO 70°C)
      - HUMIDITY: BETWEEN 5% TO 100% (CONDENSING)

Narragansett Bay Research Reserve

Revision 1	05MAR25
Revision:	Date:

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Project Title: HVAC AND ELECTRICAL UPGRADES			Project Number: 2407
Location: FIELD STATION PHASE VI, PRUDENCE ISLAND, RI			Drawing Scale
Drawing Title: VRF CONTROLS			Drawing Number: M7.2
Issue Date: 16SEP24	Approved By: AG	Drawn By: AGE	Checked By: AG

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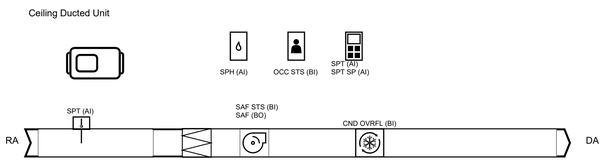
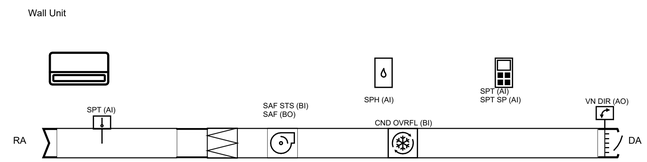
Flow Diagram: VRF INDOOR UNIT CD



Points List: VRF INDOOR UNIT CD [QTY: 3]

System Point Description	POINTS									ALARMS				
	GRAPHIC	ANALOG HARDWARE INPUT (AI)	BINARY HARDWARE INPUT (BI)	ANALOG HARDWARE OUTPUT (AO)	BINARY HARDWARE OUTPUT (BO)	SOFTWARE POINT (SFT)	HARDWARE INTERLOCK (HDW)	WIRELESS (WLS)	NETWORK (NET)	HIGH ANALOG LIMIT	LOW ANALOG LIMIT	BINARY	LATCH DIAGNOSTIC	SENSOR FAIL	COMMUNICATION FAIL
CONDENSATE OVERFLOW DETECTION LOCAL CND OVRFL			X										X		
FAN SPEED STATUS SAF STS			X												
SPACE HUMIDITY SENSOR LOCAL SPH	X	X													
SPACE OCCUPANCY STATUS OCC STS			X												
SPACE TEMPERATURE LOCAL SPT	X	X													
SPACE TEMPERATURE SETPOINT LOCAL SPT SP	X	X													
SPACE TEMPERATURE (TH1) SPT		X													
SUPPLY FAN SPEED SAF					X										
ALARM CODE ALM						X									
ALARM MESSAGE ALM MSG						X									
BAS COMMUNICATION STATE BAS COM						X									X
EXPANSION VALVE STATE XV RATE						X									
FILTER TIMER HOURS FIL HRS						X									
GAS PIPE TEMPERATURE (TH3) VAPT						X									
GAS PIPE TEMPERATURE (TH4) VAPT						X									
INDOOR LEV RATE LEV RATE						X									
LIQUID PIPE TEMPERATURE (TH2) LIQT						X									
OCCUPIED COOLING SETPOINT OCC CLG SP						X									
OCCUPIED HEATING SETPOINT OCC HTG SP						X									
SUBCOOL (SC) SC						X									
SUPERHEAT (SH) SH						X									
UNOCCUPIED COOLING SETPOINT UNOCC CLG SP						X									
UNOCCUPIED HEATING SETPOINT UNOCC HTG SP						X									

Flow Diagram: VRF INDOOR UNIT WA



Points List: VRF INDOOR UNIT

System Point Description	POINTS									ALARMS				
	GRAPHIC	ANALOG HARDWARE INPUT (AI)	BINARY HARDWARE INPUT (BI)	ANALOG HARDWARE OUTPUT (AO)	BINARY HARDWARE OUTPUT (BO)	SOFTWARE POINT (SFT)	HARDWARE INTERLOCK (HDW)	WIRELESS (WLS)	NETWORK (NET)	HIGH ANALOG LIMIT	LOW ANALOG LIMIT	BINARY	LATCH DIAGNOSTIC	SENSOR FAIL	COMMUNICATION FAIL
CONDENSATE OVERFLOW DETECTION LOCAL CND OVRFL			X										X		
FAN SPEED STATUS SAF STS			X												
SPACE HUMIDITY SENSOR LOCAL SPH	X	X													
SPACE TEMPERATURE LOCAL SPT	X	X													
SPACE TEMPERATURE SETPOINT LOCAL SPT SP	X	X													
SPACE TEMPERATURE (TH1) SPT		X													
SUPPLY FAN SPEED SAF					X										
VANE DIRECTION VN DIR	X			X											
ALARM CODE ALM						X									
ALARM MESSAGE ALM MSG						X									
BAS COMMUNICATION STATE BAS COM						X									X
EXPANSION VALVE STATE XV RATE						X									
FILTER TIMER HOURS FIL HRS						X									
GAS PIPE TEMPERATURE (TH3) VAPT						X									
GAS PIPE TEMPERATURE (TH4) VAPT						X									
INDOOR LEV RATE LEV RATE						X									
LIQUID PIPE TEMPERATURE (TH2) LIQT						X									
OCCUPIED COOLING SETPOINT OCC CLG SP						X									
OCCUPIED HEATING SETPOINT OCC HTG SP						X									
SUBCOOL (SC) SC						X									
SUPERHEAT (SH) SH						X									
UNOCCUPIED COOLING SETPOINT UNOCC CLG SP						X									
UNOCCUPIED HEATING SETPOINT UNOCC HTG SP						X									

Points List: VRF OUTDOOR UNIT

System Point Description	POINTS									ALARMS				
	GRAPHIC	ANALOG HARDWARE INPUT (AI)	BINARY HARDWARE INPUT (BI)	ANALOG HARDWARE OUTPUT (AO)	BINARY HARDWARE OUTPUT (BO)	SOFTWARE POINT (SFT)	HARDWARE INTERLOCK (HDW)	WIRELESS (WLS)	NETWORK (NET)	HIGH ANALOG LIMIT	LOW ANALOG LIMIT	BINARY	LATCH DIAGNOSTIC	SENSOR FAIL	COMMUNICATION FAIL
COMPRESSOR DISCHARGE TEMPERATURE CMP DT		X													
COMPRESSOR OUTPUT(S) CMP OUT				X											
DEMAND (EMERGENCY) STOP CMP ES			X												
HIGH SIDE SATURATION TEMPERATURE OAT HSAT TEMP		X													
INVERTER HEAT SINK TEMPERATURE IVR TEMP		X													
LOW SIDE SATURATION TEMPERATURE LSAT TEMP		X													
OUTDOOR AIR TEMPERATURE		X													
OUTDOOR UNIT FAN OUTPUT(S) OFN SPD				X											
POWER 3PH BUT ONLY MEASURING ONE LEG CURRENT (PH-A) CMP PHA		X													
POWER 3PH BUT ONLY MEASURING ONE LEG CURRENT (PH-C) CMP PHC		X													
REFRIGERANT HIGH SIDE PRESSURE HPRESS		X													
REFRIGERANT LOW SIDE PRESSURE LPRESS		X													
SUCTION LINE TEMPERATURE SUC TEMP		X													
ALARM CODE ALM						X									
ALARM MESSAGE ALM MSG						X									
COMPRESSOR OPERATION STATUS CMP STS						X									
LOW AMBIENT CAPACITY CONTROL LAMB CAP						X									
OPERATING SPEED OF THE MAIN ODU CMP FQ						X									
OPERATIONAL MODE STATUS MOD STS						X									
OUTDOOR UNIT FAN STATE OFN STS						X									
POWER LINE FREQUENCY PWR FQ						X									
REVERSING VALVE POSITION REV VLV POS						X									

Narragansett Bay Research Reserve

Revision 1	05MAR25
Revision:	Date:

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Project Title: HVAC AND ELECTRICAL UPGRADES			Project Number: 2407
Location: FIELD STATION PHASE VI PRUDENCE ISLAND, RI			Drawing Scale
Drawing Title: VRF CONTROLS POINTS			Drawing Number: M7.3
Issue Date: 16SEP24	Approved By: AG	Drawn By: AGE	Checked By: AG

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DIAGRAM SYMBOL LEGEND	
DISPLAY	DESCRIPTION
///	POWER WIRE
———	CONTROL WIRE
———	REF. PIPE

CONT.No | PAGE

CITY MULTI

SYSTEM SCHEMATIC DWG.

This drawing is schematic in nature. Final routing of piping & wiring
shall be determined by the installing contractor and/or designer of record.

Additional refrigerant charge is needed depending on the size and length of extended piping. Please refer the amount of pre-charge and the formula of calculation which is mentioned on the data book.
1.25mm²(16 AWG) : 1.25mm²(16 AWG) or more. 0.75mm²(20 AWG) : between 0.5mm²(24 AWG) and 0.75mm²(20 AWG).

PIPING AND CONTROLS

SYMBOL	BRANCH PIPE	MODEL NAME
J1	PAC-SG76RJ-E	
J2	PAC-493PI	

SYMBOL	LIQUID PIPE/GAS PIPE SIZE
P1	3/8 / 5/8
P2	1/4 / 3/8
P3	3/8 / 3/4
P4	1/4 / 5/8

SYMBOL	MODEL NUMBER
CR	TAC-YT53CRAU-J

Diamond System Builder
sw: 5.7.2.2
db: 5.7.0.51
2/2/2025
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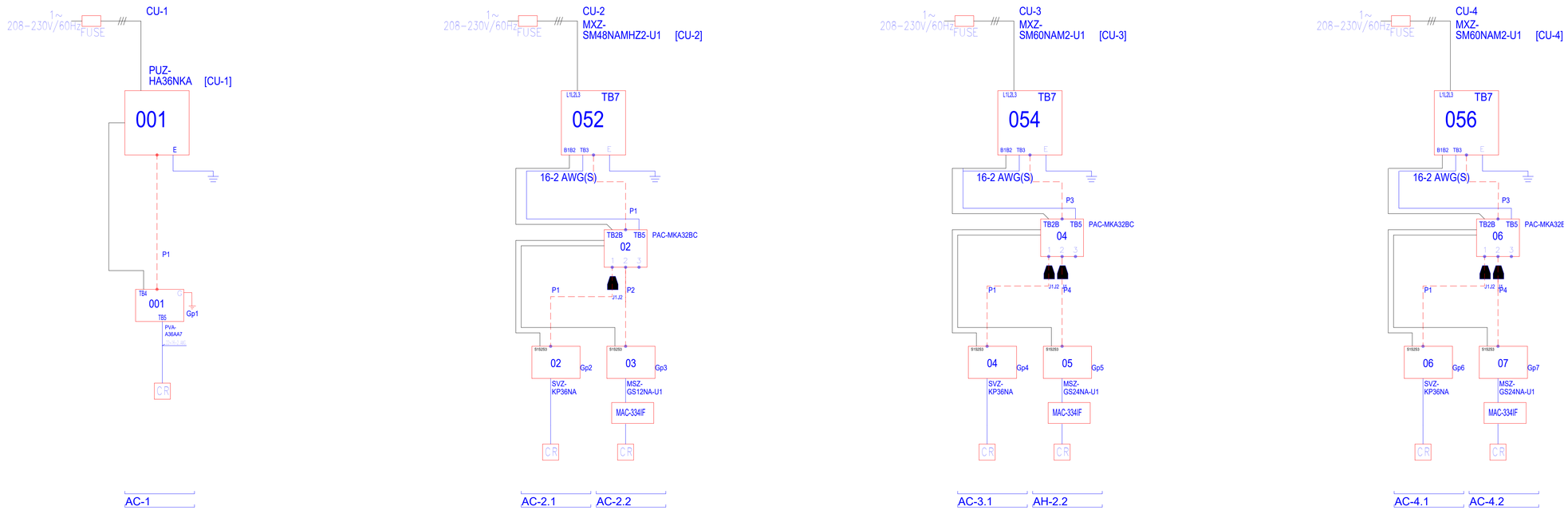

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Revision:	Date:

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Project Title: HVAC AND ELECTRICAL UPGRADES	Project Number: 2407
Location: FIELD STATION PHASE VI, PRUDENCE ISLAND, RI	Drawing Scale: 1/32" = 1'-0"
Drawing Title: VRF PIPING AND WIRING DIAGRAMS	Drawing Number: M7.4

Issue Date:	Approved By:	Drawn By:	Checked By:
16SEP24	AG	AGE	AG

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ERV CONTROL SEQUENCE

1. GENERAL OVERVIEW
   - A. THE ERV UNIT PROVIDES MECHANICAL VENTILATION WITH ENERGY RECOVERY FROM EXHAUST AIR. THE SYSTEM OPERATES IN RESPONSE TO OCCUPANCY AND ENVIRONMENTAL CONDITIONS TO OPTIMIZE ENERGY EFFICIENCY AND INDOOR AIR QUALITY (IAQ). THE ERV CONTROL SEQUENCE INTEGRATES WITH THE BUILDING AUTOMATION SYSTEM (BAS) FOR MONITORING AND ALARMS.
2. OPERATING MODES
   - A. NORMAL VENTILATION MODE (OCCUPIED)
     - a. THE ERV OPERATES CONTINUOUSLY WHEN THE SPACE IS OCCUPIED.
     - B. OUTDOOR AIR (OA) AND EXHAUST AIR (EA) DAMPERS MODULATE TO MAINTAIN THE DESIGNED VENTILATION RATE.
     - C. SUPPLY FAN (SF) AND EXHAUST FAN (EF) OPERATE AT THE MINIMUM REQUIRED AIRFLOW.
     - D. ENERGY RECOVERY WHEEL (OR CORE) TRANSFERS HEAT AND MOISTURE BETWEEN EXHAUST AND SUPPLY AIR STREAMS.
   - B. DEMAND-CONTROLLED VENTILATION (DCV) (OPTIONAL - IF CO_2 SENSORS INSTALLED)
     - A. IF CO_2 CONCENTRATION EXCEEDS THE SETPOINT (E.G., 800 PPM), THE ERV INCREASES OUTDOOR AIRFLOW UP TO THE MAXIMUM LIMIT.
     - B. WHEN CO_2 LEVELS DROP BELOW 750 PPM, AIRFLOW REVERTS TO THE MINIMUM VENTILATION RATE.
   - C. ECONOMIZER MODE (IF OUTDOOR CONDITIONS ALLOW FREE COOLING)
     - A. IF OUTDOOR TEMPERATURE AND HUMIDITY CONDITIONS MEET ECONOMIZER CRITERIA (E.G., OA TEMPERATURE < 55°F AND RH < 60%), THE ENERGY RECOVERY DEVICE IS BYPASSED, AND OA DAMPERS MODULATE TO MAXIMIZE FREE COOLING.
   - D. DEFROST MODE (FOR FROST PROTECTION IN COLD CLIMATES)
     - A. IF THE OUTDOOR AIR TEMPERATURE DROPS BELOW A THRESHOLD (E.G., 32°F), THE ERV ACTIVATES FROST PROTECTION:
     - B. THE ENERGY RECOVERY WHEEL SPEED MODULATES (IF APPLICABLE) OR STOPS TO PREVENT FROST BUILDUP.
     - C. THE UNIT MAY CYCLE TO A RECIRCULATION MODE OR PREHEAT COIL (IF INSTALLED) TO PREVENT FROST FORMATION.
     - D. ALARMS ARE TRIGGERED IF FROST CONDITIONS PERSIST.
   - E. UNOCCUPIED MODE
     - A. THE ERV REMAINS OFF UNLESS OVERRIDDEN BY A BAS SCHEDULE OR IAQ DEMAND SIGNAL.
     - B. THE SYSTEM CAN CYCLE PERIODICALLY (E.G., 15-MINUTE PURGE EVERY 4 HOURS) TO PREVENT AIR STAGNATION.
3. SYSTEM COMPONENTS AND CONTROL LOGIC
   - A. FANS
     - A. SUPPLY AND EXHAUST FANS (SF & EF): OPERATE IN UNISON TO MAINTAIN PROPER BUILDING PRESSURIZATION.
     - B. VARIABLE SPEED CONTROL (IF APPLICABLE): FANS MODULATE BASED ON AIRFLOW SENSORS OR STATIC PRESSURE SETPOINTS.
   - B. ENERGY RECOVERY WHEEL OR CORE
     - A. THE WHEEL (IF ROTARY) RUNS AT FULL SPEED DURING NORMAL OPERATION AND MODULATES OR SHUTS DOWN IN ECONOMIZER OR DEFROST MODE.
     - B. A BYPASS DAMPER (IF PRESENT) OPENS DURING ECONOMIZER MODE.
   - C. DAMPERS
     - A. OUTDOOR AIR (OA) AND EXHAUST AIR (EA) DAMPERS: MODULATE BASED ON AIRFLOW REQUIREMENTS.
     - B. BYPASS DAMPER (IF APPLICABLE): OPENS DURING ECONOMIZER MODE AND DEFROST MODE.
   - D. SENSORS
     - A. TEMPERATURE SENSORS: OA, RETURN AIR (RA), SUPPLY AIR (SA), AND EXHAUST AIR (EA).
     - B. HUMIDITY SENSORS: OA AND RA TO OPTIMIZE ENTHALPY RECOVERY.
     - C. CO_2 SENSORS (IF DEMAND CONTROL IS IMPLEMENTED).
   - E. ALARMS & FAULTS
     - A. HIGH CO_2 LEVELS (> 1,000 PPM).
     - B. SUPPLY OR EXHAUST FAN FAILURE.
     - C. FROST PROTECTION ALARM.
     - D. HIGH OR LOW TEMPERATURE LIMITS EXCEEDED.
   - F. INTEGRATION WITH BUILDING AUTOMATION SYSTEM (BAS)
     - A. ERV OPERATION IS MONITORED VIA BACNET OR MODBUS PROTOCOL.
     - B. BAS CAN OVERRIDE SCHEDULES OR ADJUST SETPOINTS REMOTELY.
     - C. DATA LOGGING FOR TEMPERATURE, HUMIDITY, CO_2, AND FAN SPEEDS

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Project Title: HVAC AND ELECTRICAL UPGRADES	Project Number: 2407
Location: FIELD STATION PHASE VI PRUDENCE ISLAND, RI	Drawing Scale: 12" = 1'-0"
Drawing Title: SEQUENCE OF OPERATIONS	Drawing Number: M7.5

Issue Date:	Approved By:	Drawn By:	Checked By:
16SEP24	AG	AGE	AG

SYMBOLS

GENERAL SYMBOLS:

DASHED SYMBOL INDICATES EXISTING FIXTURE, DEVICE, OUTLET OR EQUIPMENT TO REMAIN.

SOLID SYMBOL INDICATES NEW FIXTURE, DEVICE, OUTLET.

DASHED SYMBOL WITH HATCH INDICATES FIXTURE, DEVICE, OUTLET OR EQUIPMENT TO BE DEMOLISHED.

1 — KEY NOTE REFERENCE

3 / E1 — DETAIL NUMBER DESIGNATION. SHEET DETAIL REFERENCED ON.

3/E39 — DETAIL OR SECTION REFERENCES IN NOTES.

+48" — INDICATES MOUNTING HEIGHT ABOVE FINISHED FLOOR.

RACEWAY SYSTEMS

A–1 — HOMERUN TO PANELBOARD "A" – CIRCUITS 1. FEEDER OR CIRCUIT NUMBERS AS NOTED. UNLESS OTHERWISE INDICATED, 2#12 AWG (CU) & #12G.
LARGE LINE THROUGH ARROW REPRESENTS GROUNDED CONDUCTOR (NEUTRAL), SMALL LINE THROUGH ARROW REPRESENTS PHASE CONDUCTOR, DOT REPRESENTS EQUIPMENT GROUNDING CONDUCTOR. IF TWO LARGE LINES ARE SHOWN, THERE ARE TWO (2) PHASE CONDUCTORS AND TWO NUMBERS WILL BE GIVEN (A–1,3).

A–1,3,5 1/2"C,3#8,#10G — HOMERUN TO PANELBOARD "A" – CIRCUITS 1 & 3 & 5. FEEDER OR CIRCUIT NUMBERS AS NOTED. CONDUIT AND CONDUCTORS PROVIDED AS INDICATED (1/2" CONDUIT, 3 – #8AWG CURRENT CARRYING CONDUCTORS #10AWG EQUIPMENT GROUNDING CONDUCTOR)

OUTLETS AND RECEPTACLES

SUBSCRIPT ADJACENT TO OUTLET INDICATES:
"GFCI" = GROUND FAULT CIRCUIT INTERRUPTER, PERSONAL PROTECTION.
"+XX" = DIMENSIONED HEIGHT.

FLUSH / SURFACE — DUPLEX CONVENIENCE RECEPTACLE 20A, 125V. WALL MOUNTED DEVICE AT 18" AFF UON.

QUAD CONVENIENCE RECEPTACLE 20A, 125V. WALL MOUNTED DEVICE AT 18" AFF UON.

6–30R — SPECIAL RECEPTACLE OUTLET WITH NEMA CONFIGURATION NUMBER AS NOTED, AT +18" AFF UON.

SIMPLEX RECEPTACLE 20A, 125V. WALL MOUNTED DEVICE AT 18" AFF UON.

DUPLEX FLOOR CONVENIENCE RECEPTACLE 20A, 125V.

LIGHTING

a — MANUAL ON BUTTON. MOUNTED AT +48"UON. LOWERCASE LETTER INDICATES ZONE WHEN APPLIED. WHEN MULTIPLE LETTER SHOWN, MULTIPLE SWITCHES CONTAINED FOR EACH ZONE.

VS — WALL MOUNTED VACANCY SENSOR WITH MANUAL ON BUTTON. OS WOULD INDICATE OCCUPANCY SENSOR. MOUNTED AT 48". UON.

D — WALL MOUNTED DIMMER WITH MANUAL ON BUTTON. MOUNTED AT 48". UON.

f — LIGHT FIXTURE. UPPER CASE LETTER INDICATES FIXTURE TYPE, LOWER CASE LETTER INDICATES LIGHTING ZONE (WHEN APPLIED), PANEL # INDICATES SOURCE CIRCUIT

g — PANEL – # B; PANEL – # A

CEILING MOUNTED LED EXIT SIGN WITH GREEN LETTERING AND NICKEL CADMIUM BATTERY BACK UP, SHADED SIDE INDICATE LIT SIDE, ARROW INDICATES DIRECTION WHEN PRESENT

WALL MOUNTED LED EXIT SIGN, SAME ATTRIBUTES AS ABOVE CEILING MOUNTED EXIT SIGN.

OS — DUAL TECHNOLOGY (INFRARED AND ULTRASONIC) VACANCY/OCCUPANCY SENSOR CEILING MOUNTED

PC — PHOTOCELL

SYMBOLS (CONTINUED)

MISCELLANEOUS

DISCONNECT SWITCH WHEN ON POWER PLANS, MOUNTED AT +48"UON.

J — JUNCTION OR OUTLET BOX. CEILING OR WALL MOUNTED AS INDICATED. LOCATE ABOVE ACCESSIBLE CEILINGS UON.

FLUSH — PANELBOARD.

F — FUSED SAFETY DISCONNECT SWITCH

NON–FUSED SAFETY DISCONNECT SWITCH

M — MOTOR STARTER SWITCH.

T — TRANSFORMER

EQUIPMENT, TYPICALLY EQUIPMENT WITH A MOTOR.

SINGLE LINE DIAGRAM:

SPLICE/TERMINAL

GROUNDING ELECTRODE

G — GROUND BUS OR TERMINALS

42,000 — SHORT CIRCUIT CURRENT, AMPS

COLD WATER PIPE

GROUND ROD

DISCONNECT AND OVERCURRENT DEVICES

CIRCUIT BREAKER		SAFETY SWITCHES	
NUMBERS OF POLES	3	NUMBERS OF POLES	3
TRIP (AMPERES)	*	FUSE SIZE (AMPS)	*
FRAME (AMPERES)	100	RATING (AMPERES)	100
I.C. (1000 AMPS)	10	FUSE CLASS (UL)	RK5

* "NA" INDICATES NON–AUTOMATIC C/B
* "NF" INDICATES NON–FUSED SWITCH
* "50" INDICATES TRIP OR FUSE SIZE
* "**" INDICATES FUSE SIZE PER MANUFACTURER'S RECOMMENDATION

GENERAL NOTES:

1. THE FOLLOWING GENERAL NOTES APPLY TO ELECTRICAL DRAWINGS.
2. INSTALLATION OF ELECTRICAL MATERIAL SHALL CONFORM WITH LOCAL REGULATIONS AND THE 2020 NATIONAL ELECTRICAL CODE (NEC) AND OTHER GOVERNING CODES AND ORDINANCES.
3. ELECTRICAL EQUIPMENT SHALL BE NRTL LABELED.
4. THE CONTRACTOR SHALL COORDINATE HIS WORK WITH OTHER TRADES AT THE SITE.
5. CONDUIT SIZES ARE BASED ON COPPER CONDUCTORS WITH THHN/THWN–2 INSULATION UNLESS OTHERWISE NOTED. CONDUCTORS SHALL BE COPPER. CONDUCTOR INSULATION SHALL BE THHN/THWN–2 UNLESS OTHERWISE NOTED.
6. MINIMUM CONDUIT SIZE SHALL BE 1/2", UNLESS OTHERWISE NOTED.
7. CONDUIT OR MC CABLE IS PERMITTED INSIDE THE STRUCTURE UNLESS OTHERWISE NOTED. CONDUIT IS REQUIRED FOR THE EXTERIOR AND EXPOSED INTERIOR.
8. CONDUIT RUNS SHOWN ARE DIAGRAMMATIC ONLY. INSTALL CONDUITS TO SUIT FIELD CONDITIONS.
9. PROVIDE PROPERLY SIZED LUGS AT CIRCUIT BREAKER PANELS, FOR THE CONDUCTORS SHOWN TO CONNECT TO THESE LUGS.
10. INSTALL EXTERIOR MOUNTED ELECTRICAL EQUIPMENT IN WEATHERPROOF, NEMA 3R ENCLOSURES.
11. SEPARATE INSULATED EQUIPMENT GROUNDING CONDUCTOR, SIZED PER NEC TABLE 250.122, SHALL BE PROVIDED, INSTALLED IN THE SAME CONDUIT AS THE CIRCUIT CONDUCTORS, FOR FEEDER AND BRANCH CIRCUITS.
12. THE CONTRACTOR SHALL SUPPLY POWER TO AND MAKE CONNECTION TO MOTORS AND EQUIPMENT REQUIRING ELECTRICAL, INCLUDING FRACTIONAL HORSEPOWER MOTORS. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO REVIEW THE MECHANICAL AND PLUMBING DRAWINGS FOR DUCTS, LINES AND EQUIPMENT.
13. COMPLY WITH NFPA 70E.

ABBREVIATIONS:

A OR AMP	–	AMPERE
ACT	–	ABOVE COUNTER TOP
AF	–	AMP FUSE (FOR FUSED SWITCHES)
AF	–	AMP FRAME (FOR CIRCUIT BREAKERS)
AFCI	–	ARC–FLASH CIRCUIT INTERRUPTER
AIC	–	AMPS INTERRUPTING CAPACITY
AS	–	AMP SWITCH
AT	–	AMP TRIP
BCG	–	BARE COPPER GROUND
C	–	CONDUIT
CB, C/B	–	CIRCUIT BREAKER
CT	–	CIRCUIT
CONT	–	CONTINUED
CWP	–	COLD WATER PIPE
DIA	–	DIAMETER
DISC	–	POWER DISCONNECT
DIST	–	DISTRIBUTION
EQUIP	–	EQUIPMENT
FF	–	FINISHED FLOOR
FT	–	FOOT, FEET
G, GND	–	GROUND
GFI, GFCI	–	GROUND FAULT CIRCUIT INTERRUPTER
HP	–	HORSE POWER
KAIC	–	THOUSAND AMPERE INTERRUPT CURRENT
KCMIL	–	THOUSAND CIRCULAR MILS
KVA	–	KILA–VOLT–AMP (POWER)
KW	–	KILOWATT(S)
MFGR	–	MANUFACTURER
NEC	–	NATIONAL ELECTRICAL CODE
NTS	–	NOT TO SCALE
PH, ø	–	PHASE
PVC	–	POLYVINYL CHLORIDE
RMC	–	RIGID METAL CONDUIT
REF	–	REFERENCE
REQD	–	REQUIRED
TVSS	–	TRANSIENT VOLTAGE SURGE SUPPRESSOR
TYP	–	TYPICAL
UON	–	UNLESS OTHERWISE NOTED
3W	–	THREE WIRE
V	–	VOLT
WH	–	WATER HEATER
WP	–	WEATHERPROOF

Narragansett Bay Research Reserve

REV 1 - MECHANICAL EQUIPMENT	05MAR25
Revision:	Date:

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Project Title: THE NARRAGANSETT BAY NATIONAL ESTUARINE RESEARCH RESERVE			Project Number: 2407
Location: FIELD STATION PHASE VI PRUDENCE ISLAND			Drawing Scale
Drawing Title: GENERAL NOTES, SYMBOLS, ABBREVIATIONS			Drawing Number: E0.1
Issue Date: 09/16/24	Approved By: AGE	Drawn By: AGE	Checked By: MTO

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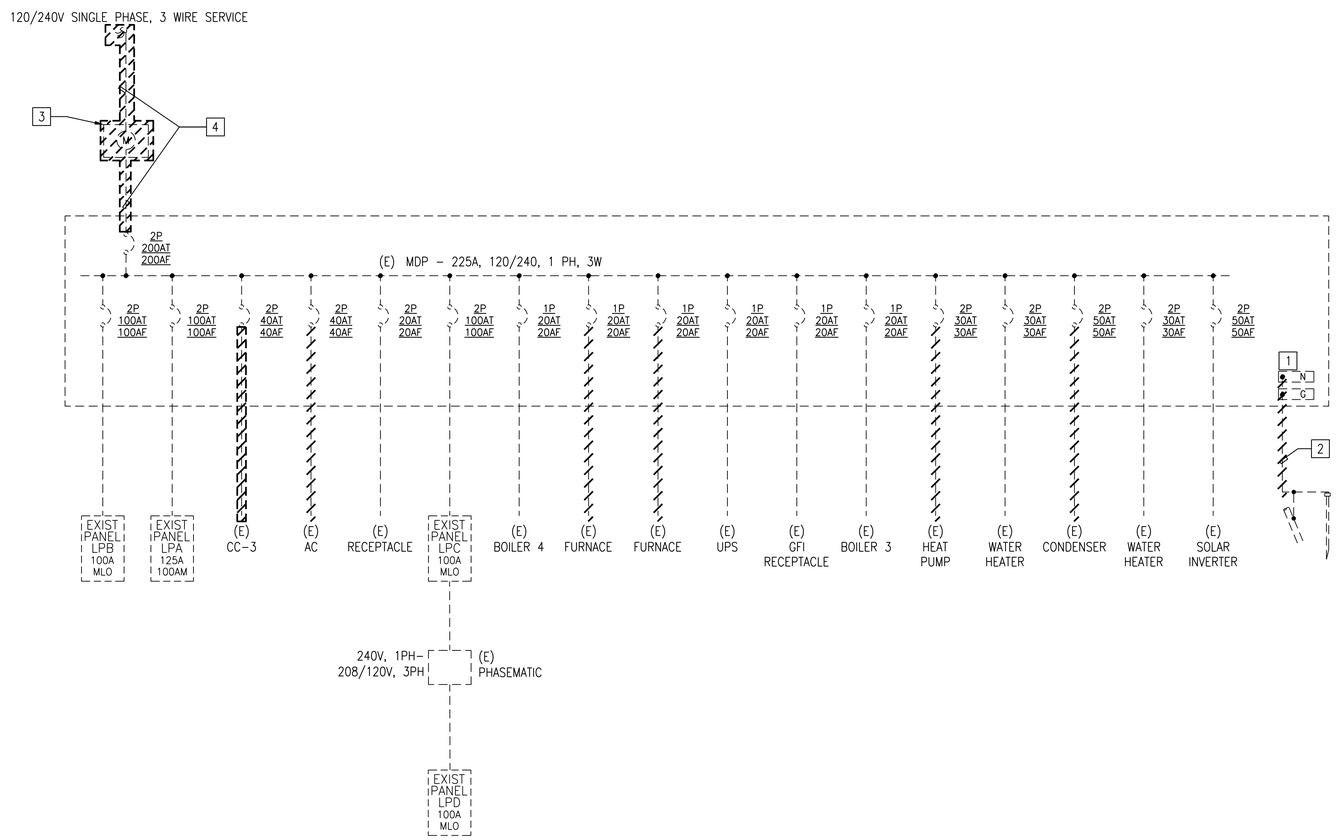

ELECTRICAL SINGLE-LINE DIAGRAM (DEMOLITION)

SCALE: NTS

PLAN NORTH

GENERAL SHEET NOTES

1. CONFIRM EXISTING CIRCUITING AS SHOWN PRIOR TO START OF WORK. NOTIFY ENGINEER IF FIELD CONDITIONS DIFFER.
2. DEMOLISH FEEDERS TO MECHANICAL EQUIPMENT AS SHOWN. CONFIRM CIRCUIT SUPPLIES EQUIPMENT SHOWN ON MECHANICAL DRAWINGS TO BE DEMOLISHED.

KEYNOTES

1. AFTER NEW WORK SHOWN ON E0.3 FOR NEW SERVICE AND PANEL SP IS COMPLETED, REMOVE CONNECTION BETWEEN GROUNDED CONDUCTOR (NEUTRAL) AND EQUIPMENT GROUND. THIS BOND MAY ONLY TAKE PLACE IN ONE LOCATION WHICH IS THE NEW PANEL SP.
2. AFTER NEW WORK SHOWN ON E0.3 FOR NEW SERVICE AND PANEL SP IS COMPLETED, REMOVE CONNECTION TO GROUNDING ELECTRODES. MAINTAIN GROUNDING ELECTRODES TO CONNECT TO NEW PANEL SP. REFER TO E0.3 FOR NEW WORK.
3. AFTER NEW WORK SHOWN ON E0.3 FOR NEW SERVICE AND PANEL SP IS COMPLETED, COORDINATE REMOVAL/RELOCATION OF METER WITH RHODE ISLAND ENERGY. AFTER METER IS REMOVED FROM METER ENCLOSURE, DEMOLISH METER ENCLOSURE.
4. DEMOLISH RISER, CONDUIT, AND CIRCUIT WIRING AFTER WORK IN KEYNOTE 3 ON THIS SHEET IS COMPLETED.

Narragansett Bay Research Reserve

REV 1 - MECHANICAL EQUIPMENT	05MAR25
Revision:	Date:

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Location: FIELD STATION PHASE VI PRUDENCE ISLAND			Drawing Scale
Drawing Title: ELECTRICAL SINGLE-LINE DIAGRAM (DEMOLITION)			Drawing Number: E0.2
Issue Date: 09/16/24	Approved By: AGE	Drawn By: AGE	Checked By: MTO

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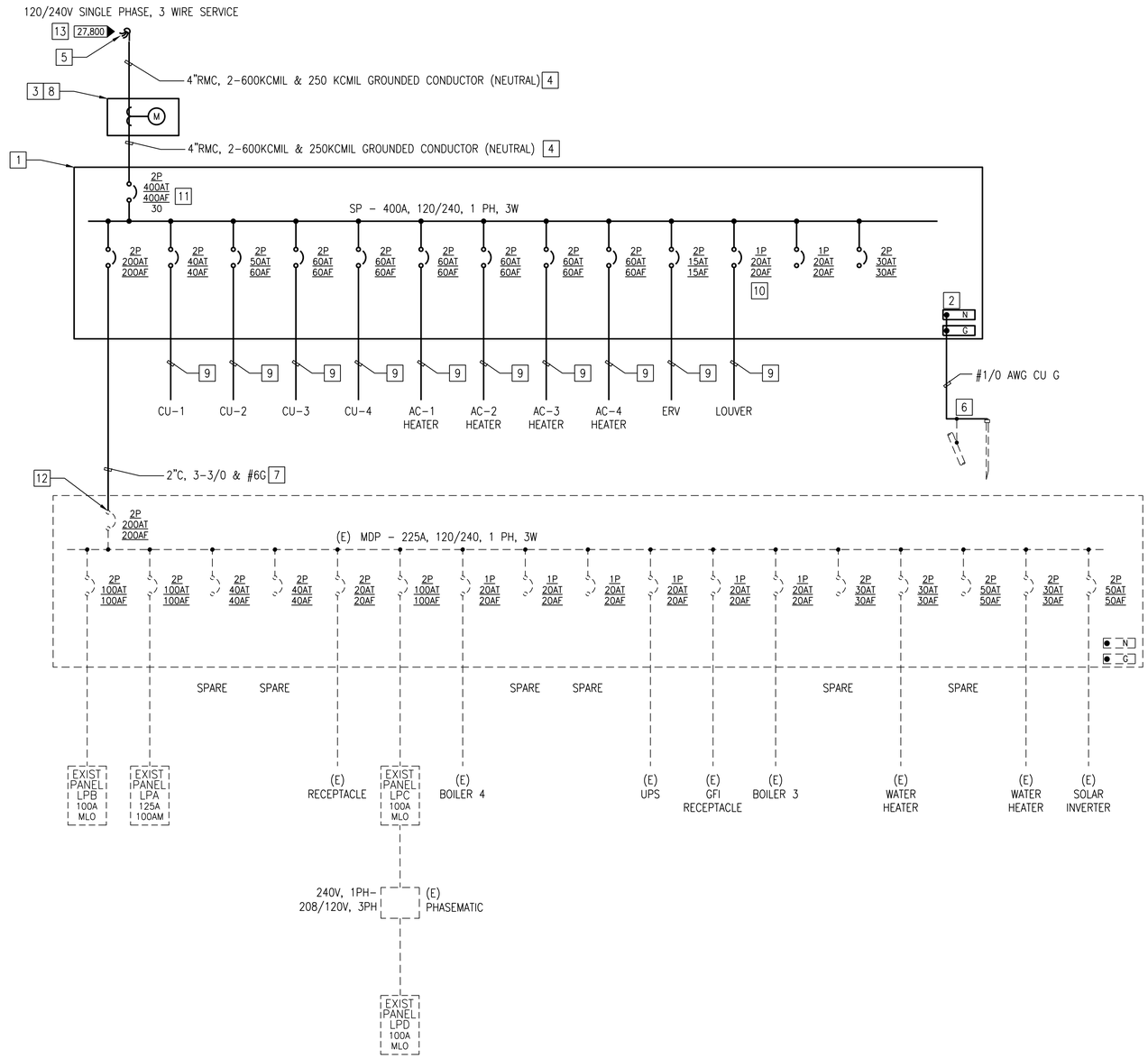

ELECTRICAL SINGLE-LINE DIAGRAM (NEW)

SCALE: NTS

PLAN NORTH

GENERAL SHEET NOTES

1. COORDINATION IS REQUIRED WITH RHODE ISLAND ENERGY.

KEYNOTES

1. PROVIDE PANEL AS SHOWN. ALL CIRCUIT BREAKERS ARE NOT SHOWN ON SINGLE-LINE FOR SIMPLICITY, REFER TO PANEL SCHEDULE ON E0.4 FOR CIRCUIT BREAKERS. PROVIDE PANEL WITH SURGE PROTECTIVE DEVICE. REFER TO E1.1 FOR PANEL LOCATION. PROVIDE PERMANENT PLAQUE OR DIRECTORY INDICATING SOURCES OF ENERGY AND STATING "CAUTION: MULTIPLE SOURCES OF POWER" PER NEC 705.10.
2. PROVIDE 1/0 AWG CU OR LARGER MAIN BONDING OR OTHER PERMITTED MEANS TO COMPLY WITH NEC 250.28.
3. PROVIDE METER ENCLOSURE PER RHODE ISLAND ENERGY REQUIREMENTS.
4. PROVIDE CONDUIT AND CONDUCTORS AS INDICATED. PROVIDE SERVICE ENTRANCE AND RISER PER NEC 230.50.
5. PROVIDE SERVICE HEAD PER NEC 230.54 AND PER RHODE ISLAND ENERGY'S REQUIREMENTS. COORDINATE NEW SERVICE WITH RHODE ISLAND ENERGY.
6. PROVIDE CONNECTION TO ALL PRESENT GROUNDING ELECTRODES DESCRIBED IN CEC 250.52. CONNECTION TO GROUND ROD MAY BE #6 AWG CU PER CEC 250.66(A).
7. PROVIDE CONDUIT AND CONDUCTORS AS INDICATED.
8. COORDINATE METER INSTALLATION WITH RHODE ISLAND ENERGY.
9. REFER TO E1.1 FOR FEEDER INFORMATION.
10. COORDINATE MOCP WITH LOUVER MANUFACTURER.
11. PROVIDE 100% RATED CIRCUIT BREAKER.
12. FEEDER TERMINATION IN MDP REQUIRES AN OUTAGE. COORDINATE OUTAGE WITH OWNER.
13. VALUE BASED ON ESB 750 MAXIMUM VALUE FOR THE SECONDARY OF A 100KVA TRANSFORMER. VALUE IS LIKELY MUCH LOWER. OBTAIN ACTUAL VALUE FROM RHODE ISLAND ENERGY; NOTIFY ENGINEER IF VALUE FROM RHODE ISLAND ENERGY IS HIGHER.

Narragansett Bay Research Reserve

REV 1 - MECHANICAL EQUIPMENT	05MAR25
Revision:	Date:

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Location: FIELD STATION PHASE VI PRUDENCE ISLAND			Drawing Scale
Drawing Title: ELECTRICAL SINGLE-LINE DIAGRAM (NEW)			Drawing Number E0.3
Issue Date: 09/16/24	Approved By: AGE	Drawn By: AGE	Checked By: MTO

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KEYNOTES

1 EXISTING MDP LOAD MUST BE LESS THAN 200A DUE TO OVERCURRENT PROTECTION. THEREFORE, NEW MDP LOAD MUST BE LESS THAN 105A SINCE EIGHT (8) MECHANICAL UNITS ARE BEING REMOVED WHICH DRAW APPROXIMATELY 95A (200−95=105).

SP

ROOM
MOUNTING FLUSH
FED FROM UTILITY
NOTE

VOLTS 240/120V 2P 3W
BUS AMPS 400
NEUTRAL 100%

AIC 30,000
MAIN BKR 400
LUGS STANDARD

CKT #	CKT BKR	CIRCUIT DESCRIPTION	LOAD KVA A	LOAD KVA B	CKT #	CKT BKR	CIRCUIT DESCRIPTION	LOAD KVA A	LOAD KVA B
1	200/2	PANEL MDP [1]	12.6		2	20/2	SPACE	0	
3	|			12.6	4	|			0
5	40/2	CU−1	2.83		6	60/2	CU−3	3	
7	|			2.83	8	|			3
9	50/2	CU−2	2.95		10	60/2	CU−4	3	
11	|			2.95	12	|			3
13	60/2	AC−1 HEATER	5		14	20/2	SPACE	0	
15	|			5	16	|			0
17	60/2	AC−2.1 HEATER	5		18	20/2	SPACE	0	
19	|			5	20	|			0
21	60/2	AC−3.1 HEATER	5		22	20/2	SPACE	0	
23	|			5	24	|			0
25	60/2	AC−4.1 HEATER	5		26	20/2	SPACE	0	
27	|			5	28	|			0
29	15/2	ERV	0.816		30	15/1	LOUVER	0.3	
31	|			0.816	32	20/1	SPACE		0
33	20/1	SPACE	0		34	20/1	SPACE	0	
35	20/1	SPACE		0	36	20/1	SPACE		0
37	20/1	SPACE	0		38	20/1	SPACE	0	
39	20/1	SPACE		0	40	20/1	SPACE		0
41	20/1	SPACE	0		42	20/1	SPACE	0	
							TOTAL CONNECTED KVA BY PHASE	45.5	45.2

	CONN KVA	CALC KVA	
LARGEST MOTOR	4.56	1.14	(25%)
MOTORS	0.3	0.3	(100%)

	CONN KVA	CALC KVA	
NONCONTINUOUS	25.3	25.3	(100%)
HEATING	65.1	65.1	(100%)
COOLING	25.1	0	(0%)
TOTAL LOAD		91.8	
BALANCED LOAD		383 A	

PANEL SCHEDULE

SCALE: NTS

PLAN NORTH

Narragansett Bay Research Reserve

REV 1 - MECHANICAL EQUIPMENT	05MAR25
Revision:	Date:

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Location: FIELD STATION PHASE VI PRUDENCE ISLAND	Drawing Scale:
Drawing Title: PANEL SCHEDULE	Drawing Number: E0.4
Issue Date: 09/16/24 · Approved By: AGE · Drawn By: AGE	Checked By: MTO

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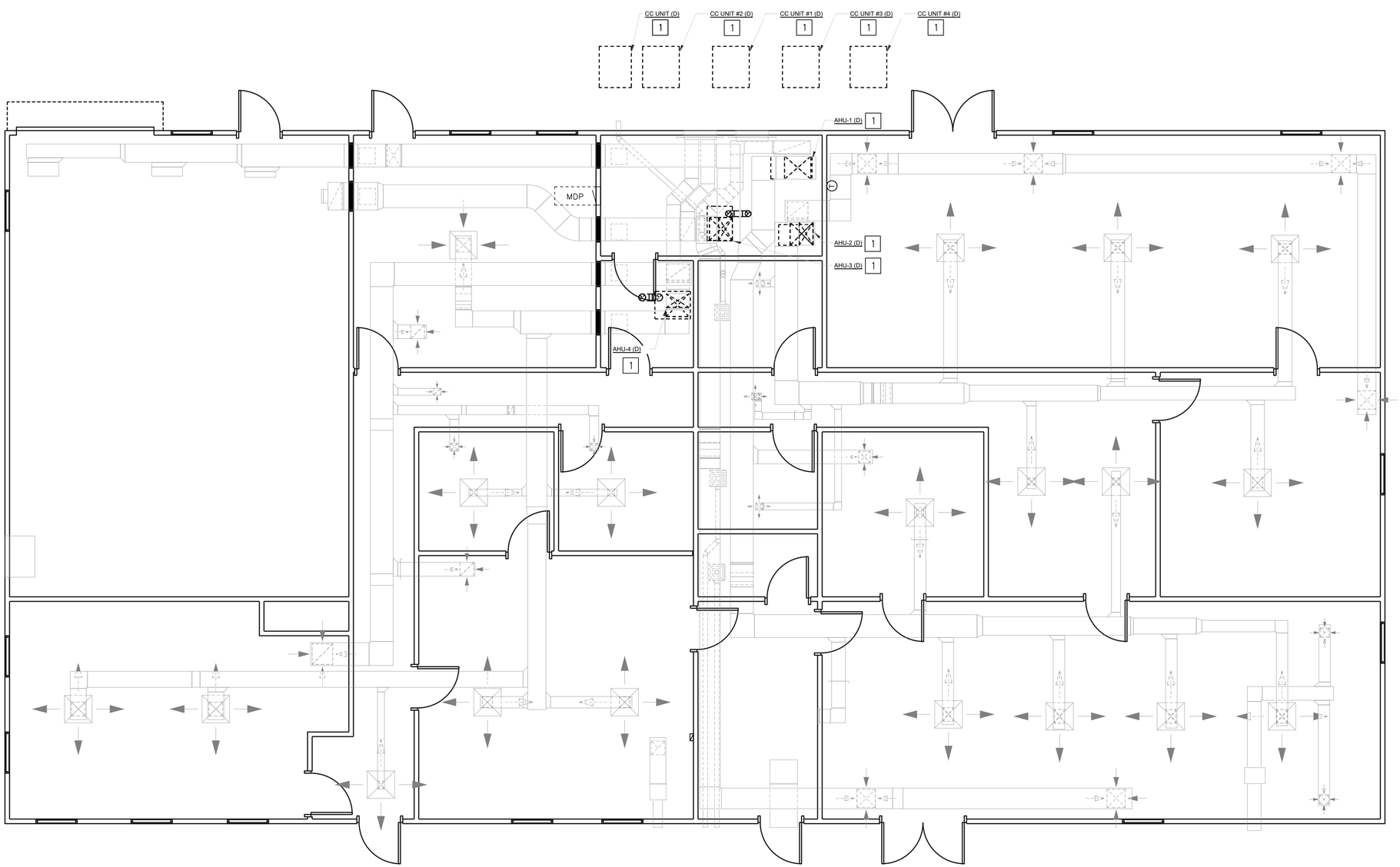

ELECTRICAL DEMOLITION PLAN

SCALE: 1/4" = 1'-0"

PLAN NORTH

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

KEYNOTES

1 DEMOLISH DISCONNECT FOR HVAC EQUIPMENT AND CIRCUITING INCLUDING CONDUIT BACK TO SOURCE PANEL.

Narragansett Bay Research Reserve

REV 1 - MECHANICAL EQUIPMENT	05MAR25
Revision:	Date:

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Location: FIELD STATION PHASE VI PRUDENCE ISLAND	Drawing Scale:
Drawing Title: ELECTRICAL DEMOLITION PLAN	Drawing Number: E1.0

Issue Date:	Approved By:	Drawn By:	Checked By:
09/16/24	AGE	AGE	MTO

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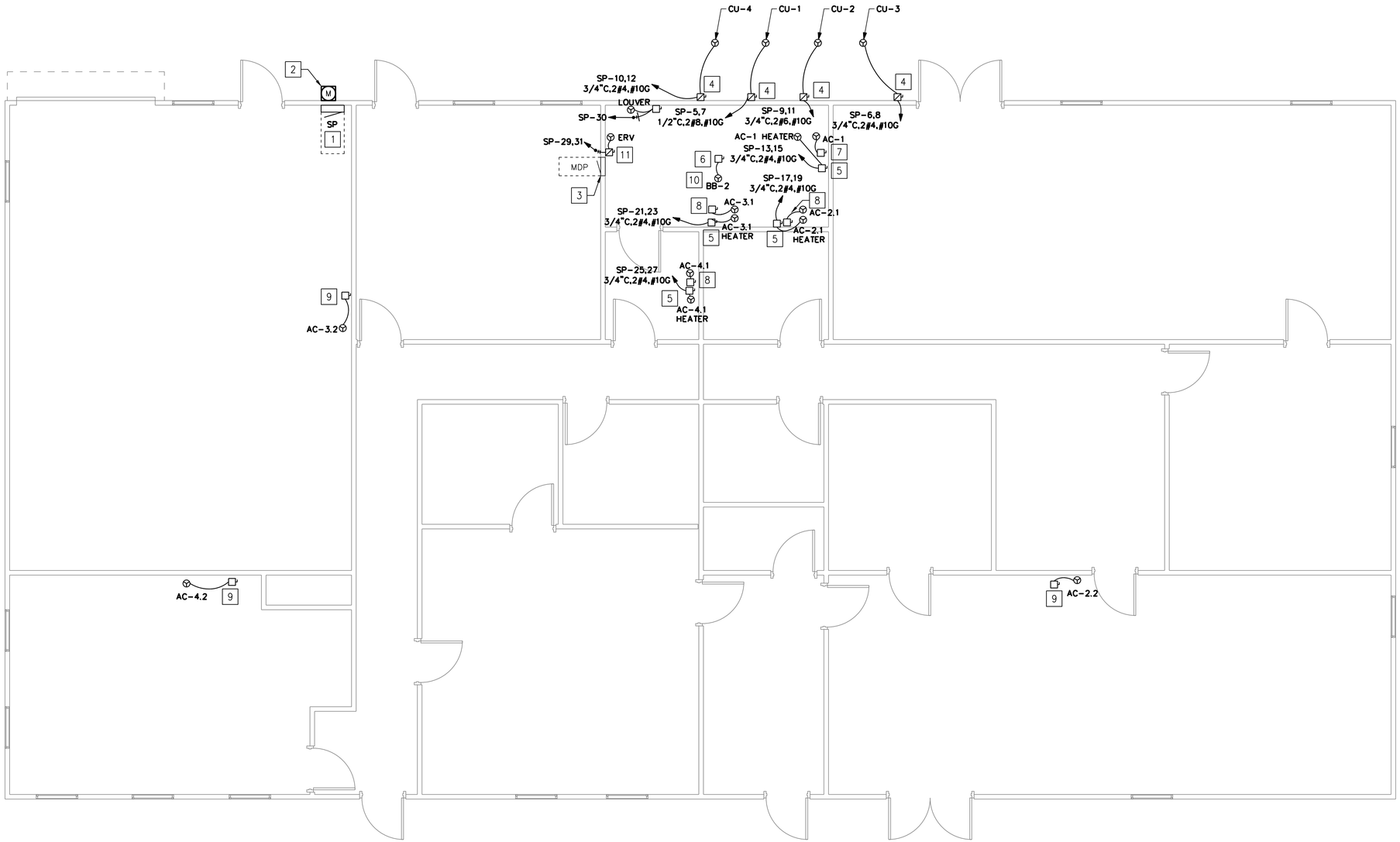

ELECTRICAL POWER PLAN

SCALE: 1/4" = 1'-0"

PLAN NORTH

0 1' 2' 4' 8'

SCALE: 1/4"=1'-0"

GENERAL SHEET NOTES

1. MINIMUM CONDUIT SIZE IS 3/4".
2. PROVIDE FINAL CONNECTIONS TO MOTORS WITH FLEXIBLE CONDUIT.
3. REFER TO MECHANICAL DRAWINGS FOR MORE PRECISE MECHANICAL EQUIPMENT LOCATIONS.

KEYNOTES

1. PROVIDE PANEL PER E0.3 AND E0.4. MAINTAIN CLEARANCE AS SHOWN.
2. PROVIDE METER ENCLOSURE AND RISER AND COORDINATE NEW SERVICE WITH RHODE ISLAND ENERGY PER E0.3.
3. PROVIDE NEW FEEDER TO MDP AND DEMOLISH EXISTING SERVICE TO MDP PER E0.3 AND E0.2.
4. PROVIDE TWO POLE, 60A, NEMA 3R HEAVY DUTY DISCONNECT SWITCH. FUSE PER MANUFACTURER'S RECOMMENDATIONS.
5. PROVIDE TWO POLE, 60A, HEAVY DUTY DISCONNECT SWITCH IF EQUIPMENT DOES NOT HAVE LOCAL DISCONNECT IN COMPLIANCE WITH NEC 424.19(B).
6. PROVIDE TWO POLE, 30A DISCONNECT SWITCH FOR BRANCH BOX. PROVIDE WIRING TO CU-2 IN 1/2"C PER MANUFACTURERS INSTRUCTIONS. COORDINATE LOCATION WITH BRANCH BOX LOCATION PER MECHANICAL INSTALLATION.
7. CONFIRM WITH MANUFACTURER THAT POWER SOURCE IS CU-1 AND NOT HEATER CIRCUIT (KEYNOTE 5); NOTIFY ENGINEER IF OTHERWISE. PROVIDE THREE POLE, 30A DISCONNECT SWITCH FOR AC. PROVIDE WIRING FROM DISCONNECT TO CU-1 IN 1/2"C PER MANUFACTURERS INSTRUCTIONS. ENSURE DISCONNECT IS GROUPED WITH AC-1 HEATER DISCONNECT AND LABELED PER NEC 424.19.
8. CONFIRM WITH MANUFACTURER THAT POWER SOURCE IS BRANCH BOX AND NOT HEATER CIRCUIT (KEYNOTE 5); NOTIFY ENGINEER IF OTHERWISE. PROVIDE THREE POLE, 30A DISCONNECT SWITCH FOR AC. PROVIDE WIRING FROM DISCONNECT TO SOURCE BRANCH BOX (AC 2.1 TO BB2; AC3.1 TO BB3; AC4.1 TO BB4) IN 1/2"C PER MANUFACTURERS INSTRUCTIONS. ENSURE DISCONNECT IS GROUPED WITH AC HEATER DISCONNECT AND LABELED PER NEC 424.19.
9. PROVIDE THREE POLE, 30A DISCONNECT SWITCH FOR UNIT. PROVIDE WIRING TO SOURCE BRANCH BOX (AC 2.2 TO BB2; AC3.2 TO BB3; AC4.2 TO BB4) IN 1/2"C PER MANUFACTURERS INSTRUCTIONS.
10. DISCONNECT AND CONNECTION IS TYPICAL FOR BB3 AND BB4. PROVIDE TWO POLE, 30A DISCONNECT SWITCH FOR EACH BRANCH BOX. PROVIDE WIRING TO CU-3 IN 1/2"C PER MANUFACTURERS INSTRUCTIONS. PROVIDE WIRING TO CU-4 IN 1/2"C PER MANUFACTURERS INSTRUCTIONS.
11. PROVIDE 30A FUSED HEAVY DUTY DISCONNECT. FUSE PER MANUFACTURER'S RECOMMENDATION.

Narragansett Bay Research Reserve

REV 1 - MECHANICAL EQUIPMENT	05MAR25
Revision:	Date:

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Location: FIELD STATION PHASE VI PRUDENCE ISLAND	Drawing Scale
Drawing Title: ELECTRICAL POWER PLAN	Drawing Number: E1.1
Issue Date: 09/16/24 / Approved By: AGE / Drawn By: AGE	Checked By: MTO

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