SECTION 23 00 00 - MECHANICAL GENERAL REQUIREMENTS

PART 1 - GENERAL

1. THE TERM “TENANT,” “TENANT'S CONSTRUCTION MANAGER,” “OWNER,” OR “OWNER'S CONSTRUCTION MANAGER” SHALL REFER TO SWEETGREEN.
2. THE GENERAL CONTRACTOR SHALL PROVIDE ALL MATERIALS AND LABOR AS REQUIRED TO PROVIDE A COMPLETE WORKING SYSTEM AND AS DESCRIBED IN THESE DRAWINGS.
3. THE GENERAL CONTRACTOR SHALL REVIEW A COMPLETE SET OF THE CONSTRUCTION DOCUMENTS. EACH SUB-CONTRACTOR SHALL MAINTAIN A COMPLETE SET OF DRAWINGS ON SITE DURING THE CONSTRUCTION PROCESS.
4. COORDINATE WORK AS REQUIRED WITH THE LANDLORD. THE GENERAL CONTRACTOR SHALL UTILIZE LANDLORD-REQUIRED CONTRACTORS AT THE GENERAL CONTRACTOR'S EXPENSE.

PART 2 - PRODUCTS

1. PRODUCTS SHALL BE AS DESCRIBED IN THE DRAWINGS AND AS REQUIRED FOR A COMPLETE AND FUNCTIONING SYSTEM.

PART 3 - EXECUTION

1. UNLESS DIMENSIONS HAVE BEEN PROVIDED, THE DRAWINGS ARE DIAGRAMMATIC IN NATURE, SHOWING THE GENERAL LOCATION, TYPE, LAYOUT AND REQUIRED EQUIPMENT. THEY SHALL NOT BE SCALED. COORDINATE WITH THE ARCHITECTURAL DRAWINGS, TENANT VENDORS AND MANUFACTURER'S INSTALLATION INSTRUCTIONS AND CUTSHEETS AS REQUIRED.
2. COMPLETE ALL WORK IN COMPLIANCE WITH THE CODES LISTED ON SHEET G-001 INCLUDING ALL LOCAL AMENDMENTS, ALL RELEVANT NFPA CODES AND STANDARDS AND SMACNA STANDARDS.
    - A. VERIFY ALL CODE REQUIREMENTS AND LOCAL AMENDMENTS WITH THE AUTHORITY HAVING JURISDICTION PRIOR TO BID.
    - B. WHEN THERE IS A DISCREPANCY BETWEEN THE ADOPTED CODES AND THESE DRAWINGS, THE MORE STRINGENT REQUIREMENT SHALL APPLY.
3. COORDINATE WITH THE LOCAL AUTHORITY HAVING JURISDICTION AND ARRANGE ALL INSPECTIONS AS REQUIRED.
4. MAINTAIN A CLEAN CONSTRUCTION SITE DURING CONSTRUCTION. CLEAN SCRAP MATERIAL AND REMOVE FROM SITE DAILY AND MAINTAIN WORKING AREA IN AN ORDERLY FASHION.
5. PROVIDE SUBMITTALS AS NOTED IN THESE SPECIFICATIONS AND AS REQUESTED BY THE TENANT'S CONSTRUCTION MANAGER.
    - A. ALL SHOP DRAWINGS SHALL BE REVIEWED AND STAMPED BY THE GENERAL CONTRACTOR PRIOR TO SUBMITTING TO THE TENANT'S CONSTRUCTION MANAGER.
    - B. SHOP DRAWINGS SHALL BE SUBMITTED TO ALLOW FOR FIVE BUSINESS DAYS OF REVIEW TIME.
6. PROVIDE REQUESTS FOR INFORMATION TO THE TENANT'S CONSTRUCTION MANAGER.
    - A. REQUESTS FOR INFORMATION SHALL PROVIDE A DETAILED DESCRIPTION OF THE SITE CONDITION OR DISCREPANCY AND THE CONTRACTORS PROPOSED REMEDY.
    - B. REQUESTS FOR INFORMATION SHALL BE SUBMITTED TO ALLOW FOR FIVE BUSINESS DAYS OF REVIEW TIME.
7. UPON COMPLETION OF WORK, THE GENERAL CONTRACTOR SHALL PROVIDE THE TENANT'S CONSTRUCTION MANAGER WITH A BOUND RECORD OF ALL MECHANICAL EQUIPMENT UTILIZED IN THE JOB. THE GENERAL CONTRACTOR SHALL PROVIDE THE SAME INFORMATION ON A COMPACT DISC. THE BINDER SHALL CONTAIN:
    - A. COVER SHEET INDICATING THE PROJECT NAME, ADDRESS AND TURNOVER DATE.
    - B. COMPANY NAME AND CONTACT INFORMATION OF THE CONTRACTORS UTILIZED FOR THE MECHANICAL SCOPE OF WORK.
    - C. CUTSHEETS, INSTALLATION MANUALS AND MAINTENANCE REQUIREMENTS FOR ALL MECHANICAL EQUIPMENT.
8. UPON COMPLETION OF WORK, THE GENERAL CONTRACTOR SHALL PROVIDE THE TENANT'S CONSTRUCTION MANAGER A FULL SET OF DRAWINGS WITH ANY DEVIATIONS FROM THE DRAWINGS INDICATED IN RED INK.

(END OF SECTION 23 00 00)

SECTION 23 05 93 - TESTING, ADJUSTING AND BALANCING FOR HVAC

PART 1 - GENERAL

1. QUALITY ASSURANCE: ALL TESTING AND BALANCING WORK SHALL BE COMPLETED BY AN INDEPENDENT CONTRACTOR, CERTIFIED BY NEBB OR TABB AS A T&B TECHNICIAN. BALANCE THE SYSTEM IN ACCORDANCE WITH GENERALLY ACCEPTED ENGINEERING STANDARDS.

PART 2 - PRODUCTS: N/A

PART 3 - EXECUTION

1. AIR SYSTEMS
    - A. PROVIDE ALL LABOR AND MATERIALS REQUIRED TO BALANCE THE SYSTEM AS NOTED ON THE PLANS.
    - B. FAN SYSTEMS SHALL BE ADJUSTED SUCH THAT THE LOWEST FAN SPEED IS UTILIZED TO DELIVER THE REQUIRED CFM TO THE AIR TERMINALS.
    - C. ADJUST DAMPERS AS REQUIRED TO BALANCE THE SUPPLY, RETURN AND EXHAUST DEVICES TO 10% OF THE DESIGN RATES. ADJUST THE OUTSIDE AIR DAMPER AS REQUIRED TO OBTAIN THE MINIMUM OUTSIDE AIR REQUIREMENTS AS NOTED IN THE SCHEDULES.
    - D. RECORD THE OPERATING VOLTAGE, AMPACITY, SUPPLY/RETURN SYSTEM STATIC PRESSURES, SUPPLY/MIXED AIR TEMPERATURES (BOTH HEATING AND COOLING) AND FINAL FAN RPM.
    - E. VERIFY SYSTEM CONTROLS ARE FUNCTIONING AS INTENDED.
2. REPORTING
    - A. THE TEST AND BALANCE AGENT SHALL PREPARE A REPORT INCLUDING THE FINAL VALUES OF THE AIR AND WATER SYSTEM BALANCING, SYSTEM DIAGRAMS, AND SYSTEM NOTES.
    - B. THE GENERAL CONTRACTOR SHALL REVIEW THE FINAL BALANCE REPORT PRIOR TO SENDING TO THE TENANT'S CONSTRUCTION MANAGER.
    - C. PROVIDE T&B REPORT TO THE LANDLORD AND THE AUTHORITY HAVING JURISDICTION AS REQUIRED.

(END OF SECTION 23 05 93)

SECTION 23 07 13 - DUCT INSULATION

PART 1 - GENERAL

1. INSULATION SHALL BE PROVIDED ON THE FOLLOWING DUCT SERVICES:
    - A. INDOOR, CONCEALED SUPPLY AND OUTDOOR AIR.
    - B. INDOOR, CONCEALED RETURN.
    - C. INDOOR, CONCEALED OVEN AND WAREWASH EXHAUST FROM AIR TERMINAL TO PENETRATION OF BUILDING EXTERIOR.
    - D. INDOOR, CONCEALED GENERAL EXHAUST FROM AIR TERMINAL TO PENETRATION OF BUILDING EXTERIOR.
    - E. OUTDOOR, SUPPLY AND RETURN.
2. QUALITY ASSURANCE
    - A. INSULATION INSTALLED INDOORS SHALL HAVE A FLAME-SPREAD INDEX OF 25 OR LESS, AND SMOKE-DEVELOPED INDEX OF 50 OR LESS.
    - B. INSULATION INSTALLED OUTDOORS SHALL HAVE A FLAME-SPREAD INDEX OF 75 OR LESS, AND SMOKE-DEVELOPED INDEX OF 150 OR LESS.

PART 2 - PRODUCTS

1. INTERIOR DUCTWORK SHALL HAVE FLEXIBLE FIBERGLASS DUCT WRAP LAMINATED TO FOIL REINFORCED KRAFT VAPOR BARRIER FACING WITH 2” STAPLING FLANGE AND AN INSTALLED THICKNESS OF 1-1/2" WITH AN R-VALUE OF 6.0.
2. EXTERIOR DUCTWORK SHALL BE INSULATED WITH 2" THICK RIGID INSULATION WITH A MINIMUM R-VALUE OF 12.0, PROTECTED WITH ROOFING MEMBRANE.

PART 3 - EXECUTION

1. PREPARATION: CLEAN AND DRY SURFACES. REMOVE MATERIALS THAT WILL ADVERSELY AFFECT INSULATION APPLICATION.
2. GENERAL INSTALLATION REQUIREMENTS:
    - A. INSTALL INSULATION ACCORDING TO MANUFACTURER'S INSTALLATION INSTRUCTIONS.
    - B. INSTALL INSULATION AND ACCESSORIES AND FINISHES WITH SMOOTH, STRAIGHT AND EVEN SURFACES; FREE OF VOIDS THROUGHOUT THE LENGTH OF DUCT AND FITTINGS.
    - C. INSTALL ACCESSORIES COMPATIBLE WITH INSULATION MATERIALS AND SUITABLE FOR THE SERVICE. ACCESSORIES SHALL NOT CORRODE, SOFTEN OR OTHERWISE ATTACK INSULATION OR JACKET IN EITHER WET OR DRY STATE.
    - D. INSTALL INSULATION WITH LONGITUDINAL SEAMS AT TOP OF HORIZONTAL RUNS. LONGITUDINAL SEAMS AND END JOINTS SHALL BE TIGHT. BOND SEAMS AND JOINTS WITH ADHESIVE RECOMMENDED BY INSULATION MANUFACTURER TO MAINTAIN VAPOR BARRIER INTEGRITY.
    - E. APPLY ADHESIVES, MASTICS AND SEALANTS AT MANUFACTURER'S RECOMMENDED COVERAGE RATE.
    - F. CUT INSULATION IN A MANNER TO AVOID COMPRESSING INSULATION MORE THAN 75 PERCENT ITS NOMINAL THICKNESS.
3. PENETRATIONS
    - A. ROOF PENETRATIONS: INSTALL INSULATION CONTINUOUSLY THROUGH ROOF PENETRATIONS. FOR APPLICATIONS REQUIRING ONLY INDOOR INSULATION, TERMINATE INSULATION ABOVE ROOF SURFACE AND SEAL WITH JOINT SEALANT. FOR APPLICATIONS REQUIRING INDOOR AND OUTDOOR INSULATION, INSTALL INSULATION FOR OUTDOOR APPLICATIONS TIGHTLY JOINED TO INDOOR INSULATION ENDS. SEAL JOINT WITH JOINT SEALANT.
    - B. WALL PENETRATIONS: INSTALL INSULATION CONTINUOUSLY THROUGH WALL PENETRATIONS. FOR APPLICATIONS REQUIRING ONLY INDOOR INSULATION, TERMINATE INSULATION ABOVE ROOF SURFACE AND SEAL WITH JOINT SEALANT. FOR APPLICATIONS REQUIRING INDOOR AND OUTDOOR INSULATION, INSTALL INSULATION FOR OUTDOOR APPLICATIONS TIGHTLY JOINED TO INDOOR INSULATION ENDS. SEAL JOINT WITH JOINT SEALANT.
    - C. INTERIOR WALLS: INSTALL INSULATION CONTINUOUSLY THROUGH WALLS AND PARTITIONS THAT ARE NOT FIRE RATED. TERMINATE INSULATION AT FIRE DAMPER SLEEVES FOR FIRE-RATED WALL AND PARTITION PENETRATIONS. EXTERNALLY INSULATE THE DAMPER SLEEVES TO MATCH ADJACENT INSULATION AND OVERLAP DUCT INSULATION AT LEAST 2 INCHES.

(END OF SECTION 23 07 13)

SECTION 23 31 13 - METAL DUCTS

PART 1 - GENERAL

1. SECTION INCLUDES
    - A. RECTANGULAR DUCTS AND FITTINGS
    - B. ROUND DUCTS AND FITTINGS
    - C. FLAT-OVAL DUCTS AND FITTINGS
    - D. SHEET METAL MATERIALS
    - E. SEALANTS AND GASKETS
    - F. HANGERS AND SUPPORTS
2. PERFORMANCE REQUIREMENTS
    - A. DUCT CONSTRUCTION, INCLUDING SHEET METAL THICKNESS, SEAM AND JOINT CONSTRUCTION, REINFORCEMENTS AND HANGERS/SUPPORTS SHALL COMPLY WITH THE LATEST VERSION OF SMACNA'S “HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE.”
    - B. DUCT HANGERS AND SUPPORTS SHALL WITHSTAND THE EFFECTS OF GRAVITY LOADS AND STRESSES WITHIN LIMITS UNDER CONDITIONS DESCRIBED IN SMACNA'S “HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE.”
    - C. SURFACES IN CONTACT WITH THE AIRSTREAM SHALL COMPLY WITH REQUIREMENTS IN ANSI/ASHRAE 62.1.
3. SECTION REQUIREMENTS
    - A. SUBMITTALS: NONE REQUIRED.

PART 2 - PRODUCTS

1. RECTANGULAR DUCTS AND FITTINGS:
    - A. COMPLY WITH SMACNA'S “HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE” BASED ON INDICATED STATIC-PRESSURE CLASS UNLESS NOTED OTHERWISE.
    - B. TRAVERSE JOINTS: SELECT JOINT TYPES AND FABRICATE ACCORDING TO SMACNA'S “HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE,” FIGURE 2-1 FOR STATIC-PRESSURE CLASS, APPLICABLE SEALING REQUIREMENTS, MATERIALS INVOLVED, DUCT SUPPORT INTERVALS AND OTHER PROVISIONS AS REQUIRED.
    - C. LONGITUDINAL SEAMS: SELECT SEAM TYPES AND FABRICATE ACCORDING TO SMACNA'S “HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE,” FIGURE 2-2 FOR STATIC-PRESSURE CLASS, APPLICABLE SEALING REQUIREMENTS, MATERIALS INVOLVED, DUCT SUPPORT INTERVALS AND OTHER PROVISIONS AS REQUIRED.
    - D. ELBOWS, TRANSITIONS OFFSETS, BRANCH CONNECTIONS AND OTHER DUCT CONSTRUCTION: SELECT TYPES AND FABRICATE ACCORDING TO SMACNA'S “HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE,” CHAPTER 4 FOR STATIC-PRESSURE CLASS, APPLICABLE SEALING REQUIREMENTS, MATERIALS INVOLVED, DUCT SUPPORT INTERVALS AND OTHER PROVISIONS AS REQUIRED.
2. ROUND DUCTS AND FITTINGS:
    - A. SPIRAL LOCK SEAM, WITHOUT INSULATION,
    - B. BASIS OF DESIGN: LINDAB SAFE SINGLE WALL DUCTS AND FITTINGS. ALTERNATES BY MCGILL AIRFLOW.
3. FLAT-OVAL DUCTWORK AND FITTINGS
    - A. SPIRAL LOCK SEAM, WITHOUT INSULATION.
    - B. BASIS OF DESIGN: LINDAB FOSR FLAT-OVAL SPIRAL DUCTS AND FITTINGS. ALTERNATES BY MCGILL AIRFLOW. ALL DUCTWORK SHALL BE PREPPED AND READY TO RECEIVE PAINT.
4. MATERIALS: GALVANIZED SHEET STEEL. COMPLY WITH ASTM A 653/A 653M. G90 COATING DESIGNATION.
5. SEALANTS AND GASKETS:
    - A. MAXIMUM FLAME-SPREAD INDEX: 25 (WHEN TESTED ACCORDING TO UL 723).
    - B. MAXIMUM SMOKE-DEVELOPED INDEX: 50 (WHEN TESTED ACCORDING TO UL 723).
    - C. TWO-PART TAPE SEALING SYSTEM: PROVIDE 3” TAPE CONSTRUCTED OF WOVEN COTTON FIBER IMPREGNATED WITH MINERAL GYPSUM AND MODIFIED ACRYLIC/SILICONE TO FORM A HARD, DURABLE AIRTIGHT SEAL. SEALANT SHALL BE A MODIFIED STYRENE ACRYLIC. COMPATIBLE WITH GALVANIZED SHEET STEEL. WATER, MOLD AND MILDEW RESISTANT. VOC CONTENT OF 250g/L OR LESS.
    - D. WATER BASED JOINT AND SEAM SEALANT: BRUSH ON WITH MINIMUM OF 65% SOLIDS CONTENT. MINIMUM SHORE A HARDNESS OF 20. COMPATIBLE WITH GALVANIZED SHEET STEEL. WATER, MOLD AND MILDEW RESISTANT. VOC CONTENT OF 75g/L (LESS WATER).
6. HANGERS AND SUPPORT:
    - A. RECTANGULAR DUCTWORK: HANGER RODS SHALL BE CADMIUM-PLATED STEEL RODS AND NUTS. STRAP AND ROD SIZE SHALL COMPLY WITH SMACNA'S “HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE,” TABLE 5-1. SECURE TO DUCT WITH SHEET METAL SCREWS COMPATIBLE WITH DUCT MATERIALS.
    - B. ROUND DUCTWORK: SUPPORT WITH AIRCRAFT CABLE COMPLYING WITH ASTM A 603. CONNECT ENDS WITH CADMIUM-PLATED STEEL ASSEMBLIES WITH BRACKETS, SWIVEL AND BOLTS DESIGNED FOR DUCT HANGER SERVICE.
    - C. EXTERIOR DUCTWORK SHALL BE PROVIDED WITH DUCT SUPPORTS, SPACED PER THE MANUFACTURER'S RECOMMENDATIONS.

PART 3 - EXECUTION

1. INSTALLATION
    - A. DRAWING PLANS, SCHEMATICS AND DIAGRAMS INDICATE GENERAL LOCATION AND ARRANGEMENT OF DUCTWORK ROUTING. COORDINATE INSTALLATION WITH WORK OF ALL OTHER TRADES AND EXISTING CONDITIONS. ACCOMMODATE DUCT HANGER, RODS, INSULATION AND OTHER REQUIREMENTS AS REQUIRED.
    - B. INSTALL DUCTS ACCORDING TO SMACNA'S “HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE” IN MAXIMUM PRACTICAL LENGTHS WITH FEWEST POSSIBLE JOINTS.
    - C. UNLESS NOTED OTHERWISE, INSTALL DUCTS PARALLEL AND PERPENDICULAR TO BUILDING LINES.
    - D. INSTALL DUCTS WITH CLEARANCES AS REQUIRED TO ACCOMMODATE THE INSTALLATION OF INSULATION.
    - E. INSTALLATION OF EXPOSED DUCTWORK: PROTECT DUCTWORK FROM DAMAGE. REPAIR/REPLACE ALL DAMAGED SECTIONS AND FINISHED WORK. TRIM SEALANTS FLUSH WITH METAL. CREATE A SMOOTH AND UNIFORM EXPOSED BEAD. DO NOT USE TWO-PART TAPING SYSTEM. MAINTAIN CONSISTENCY, SYMMETRY AND UNIFORMITY IN THE INSTALLATION.
2. DUCT SEALING: CONSTRUCT DUCTS WITH 2 INCH POSITIVE AND NEGATIVE DUCT PRESSURE CLASSIFICATIONS.
3. HANGER AND SUPPORT INSTALLATION: COMPLY WITH SMACNA'S “HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE,” CHAPTER 5. HANGERS EXPOSED TO VIEW SHALL BE AIRCRAFT IN ACCORDANCE WITH THE MECHANICAL DETAILS.
4. CONNECTIONS: MAKE CONNECTIONS TO EQUIPMENT WITH FLEXIBLE CONNECTORS COMPLYING WITH SECTION 23 33 00 “AIR DUCT ACCESSORIES.” COMPLY WITH SMACNA'S “HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE” FOR BRANCH, OUTLET AND INLET, AND TERMINAL UNIT CONNECTIONS.
5. CLEANING: CLEAN ALL EXISTING DUCTWORK TO REMAIN PRIOR TO TESTING, ADJUSTING AND BALANCING. REMOVE ALL SURFACE CONTAMINANTS AND DEPOSITS ON AIR OUTLETS AND INLETS PRIOR TO PUNCH.
6. PROVIDE AIR BALANCE IN ACCORDANCE WITH SECTION 23 05 93 “TESTING, ADJUSTING, AND BALANCING FOR HVAC.”
7. DUCT ELBOWS
    - A. RECTANGULAR: PROVIDE HOLLOW-FORMED, DOUBLE-THICKNESS TURNING VANES OR RADIUSED ELBOWS WITH INSIDE RADIUS NO SMALLER THAN 1/2 OF THE DUCT WIDTH.
    - B. ROUND DUCT ELBOWS: PROVIDE RADIUSED ELBOWS WITH AN INSIDE RADIUS NO SMALLER THAN 1/2 OF THE DUCT WIDTH.
8. BRANCH CONFIGURATION
    - A. RECTANGULAR: COMPLY WITH SMACNA'S “HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE,” FIGURE 4-6. RECTANGULAR MAIN TO RECTANGULAR BRANCH SHALL BE A 45-DEGREE ENTRY. RECTANGULAR MAIN TO ROUND BRANCH SHALL BE A SPIN-IN FITTING.
    - B. ROUND: COMPLY WITH SMACNA'S “HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE,” FIGURE 3-5 AND FIGURE 3-6. PROVIDE 90 DEGREE TAP.

(END OF SECTION 23 31 13)

SECTION 23 33 00 - AIR DUCT ACCESSORIES

PART 1 - GENERAL

1. SECTION INCLUDES
    - A. BACKDRAFT AND PRESSURE RELIEF DAMPERS
    - B. MANUAL VOLUME DAMPERS
    - C. CONTROL DAMPERS
    - D. FIRE DAMPERS
    - E. TURNING VANES
    - F. FLEXIBLE CONNECTORS
    - G. DUCT ACCESSORY HARDWARE
2. SECTION REQUIREMENTS
    - A. SUBMITTALS: NONE REQUIRED.

PART 2 - PRODUCTS

1. COMPLY WITH NFPA 90A AND WITH NFPA 90B.
2. COMPLY WITH SMACNA'S “HVAC DUCT CONSTRUCTION STANDARDS-METAL AND FLEXIBLE” FOR ACCEPTABLE MATERIALS, THICKNESS AND DUCT CONSTRUCTION METHODS UNLESS NOTED OTHERWISE. SHEET METAL MATERIALS SHALL BE FREE FROM PITTING, SEAM MARKS, ROLLER MARKS, STAINS, DISCOLORATIONS AND OTHER IMPERFECTIONS.
3. GALVANIZED SHEET STEEL: COMPLY WITH ASTM A 653/A 653M. G90 COATING DESIGNATION.
4. BACKDRAFT AND PRESSURE RELIEF DAMPERS: GRAVITY BALANCED. AS SPECIFIED ON THE PLANS.
5. MANUAL VOLUME DAMPERS: STANDARD LEAKAGE RATING WITH LINKAGE OUTSIDE OF AIRFRAME. SUITABLE FOR HORIZONTAL OR VERTICAL APPLICATIONS
    - A. FRAME: HAT SHAPED WITH MITERED AND WELDED CORNERS. FLANGELESS FRAMES FOR INSTALLING IN DUCTS.
    - B. BLADES: RECTANGULAR DAMPERS SHALL BE MULTIPLE BLADES WITH OPPOSED-BLADE DESIGN. ROUND DAMPERS SHALL BE SINGLE BLADE.
    - C. BLADE AXLES: GALVANIZED STEEL.
    - D. BEARINGS: MOLDED SYNTHETIC.
    - E. TIE BARS AND BRACKETS: GALVANIZED STEEL.
    - F. JACKSHAFT: 1/2" DIAMETER CONSTRUCTED OF GALVANIZED STEEL WITHIN PIPE-BEARING ASSEMBLY WITH SUPPORTS. LENGTH AND NUMBER OF MOUNTINGS AS REQUIRED.
    - G. HARDWARE: ZINC-PLATED, DIE CAST CORE WITH DIAL HANDLE AND A LOCKING NUT.
6. CONTROL DAMPERS
    - A. FRAME: HAT SHAPED WITH MITERED AND WELDED CORNERS. FLANGELESS FRAMES FOR INSTALLING IN DUCTS.
    - B. BLADES: RECTANGULAR DAMPERS SHALL BE MULTIPLE BLADES WITH OPPOSED-BLADE DESIGN. ROUND DAMPERS SHALL BE SINGLE BLADE. BLADE EDGING SHALL BE REPLACEABLE RUBBER SEALS.
    - C. BLADE AXLES: 1/2" DIAMETER. BLADE LINKAGE HARDWARE OF ZINC-PLATED STEEL AND BRASS; ENDS SEALED AGAINST BLADE BEARING.
    - D. BEARINGS: MOLDED SYNTHETIC.
7. FIRE DAMPERS
    - A. TYPE: STATIC; RATED AND LABELED ACCORDING TO UL 555.
    - B. CLOSING RATINGS IN DUCTS UP TO 4” STATIC PRESSURE CLASS AND MAXIMUM 2,000 FPM VELOCITY.
    - C. FIRE RATING: 1-1/2 HOURS, OR AS NOTED IN THE SCHEDULES.
    - D. FRAME: CURTAIN TYPE WITH BLADES INSIDE AIRSTREAM. CONSTRUCTED OF GALVANIZED STEEL.
    - E. MOUNTING SLEEVE: FACTORY FURNISHED.
    - F. MOUNTING ORIENTATION: AS NOTED ON PLANS.
    - G. BLADES: INTERLOCKING, CONSTRUCTED OF GALVANIZED STEEL.
    - H. HEAT-RESPONSIVE DEVICE: 165 DEGREE F RATED FUSIBLE LINK OR AS NOTED IN THE SCHEDULES.
8. TURNING VANES: CURVED BLADES OF GALVANIZED SHEET STEEL. PROVIDED WITH SUPPORT BARS PERPENDICULAR TO BLADE SET SUITABLE FOR DUCT MOUNTING. COMPLY WITH SMACNA'S “HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE." SINGLE WALL CONSTRUCTION.
9. FLEXIBLE CONNECTORS: CONSTRUCTED OF FLAME-RETARDANT OR NONCOMBUSTIBLE FABRIC. FABRIC SHALL BE A GLASS FABRIC, DOUBLE COATED WITH NEOPRENE. COMPLY WITH UL 181 CLASS 1. FACTORY-FABRICATED WITH A FABRIC STRIP 3-1/2 INCHES WIDE ATTACHED TO TWO STRIPS OF 2-3/4 INCH THICK GALVANIZED SHEET STEEL.

PART 3 - EXECUTION

1. INSTALLATION
    - A. INSTALL DUCT ACCESSORIES ACCORDING TO APPLICABLE DETAILS IN SMACNA'S “HVAC DUCT CONSTRUCTION STANDARDS-METAL AND FLEXIBLE.”
    - B. INSTALL VOLUME DAMPERS AT POINTS NOTED ON PLANS AND AS REQUIRED FOR SYSTEM BALANCING. WHERE DAMPERS ARE INSTALLED IN DUCTS WITH DUCT LINER, INSTALL DAMPERS WITH HAT CHANNELS OF SAME DEPTH AS LINER AND TERMINATE LINER WITH NOSING AT HAT CHANNEL.
    - C. SET DAMPERS TO FULLY OPEN POSITION BEFORE TESTING, ADJUSTING AND BALANCING.
    - D. INSTALL TEST HOLES AT FAN INLETS AND OUTLETS AND WHERE REQUIRED FOR TESTING AND BALANCING PURPOSES.
    - E. INSTALL FIRE DAMPERS ACCORDING TO UL LISTING.
    - F. INSTALL FLEXIBLE CONNECTORS TO CONNECT DUCTS TO EQUIPMENT.
2. TESTS AND INSPECTIONS
    - A. OPERATE DAMPERS TO VERIFY FULL RANGE OF MOVEMENT.
    - B. OPERATE FIRE DAMPERS TO VERIFY FULL RANGE OF MOVEMENT AND VERIFY THAT PROPER HEAT-RESPONSE DEVICE IS INSTALLED.
    - C. INSPECT TURNING VANES FOR PROPER AND SECURE INSTALLATION.

(END OF SECTION 23 33 00)

SECTION 23 33 46 - FLEXIBLE DUCTS

PART 1 - GENERAL

1. SECTION REQUIREMENTS
    - A. SUBMITTALS: NONE REQUIRED.

PART 2 - PRODUCTS

1. COMPLY WITH NFPA 90A AND NFPA 90B.
2. COMPLY WITH SMACNA'S “HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE” FOR ACCEPTABLE MATERIALS, MATERIAL THICKNESS AND DUCT CONSTRUCTION METHODS UNLESS NOTED OTHERWISE.
3. COMPLY WITH ASTM E 96/E 96M.
4. INSULATED, FLEXIBLE DUCT UL 181, CLASS 1. FACTORY FABRICATED AND INSULATED. PROVIDED WITH INTERIOR LINER, FIBROUS-GLASS INSULATION AND VAPOR-BARRIER FILM.
    - A. PRESSURE RATING: 10” W.G. POSITIVE.
    - B. MAXIMUM VELOCITY: 4,000 FPM
    - C. INSULATION R-VALUE: R6.0
5. FLEXIBLE DUCT CONNECTORS SHALL BE NYLON STRAPS IN SIZES 3 THROUGH 18 INCHES TO SUIT DUCT SIZE.

PART 3 - EXECUTION

1. INSTALLATION
    - A. INSTALL FLEXIBLE DUCTS ACCORDING TO APPLICABLE DETAILS IN SMACNA'S “HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE.”
    - B. INSTALL IN INDOOR APPLICATIONS ONLY. FLEXIBLE DUCTWORK IS ONLY PERMITTED TO CONNECT TO SUPPLY-AIR GRILLES, REGISTERS AND DIFFUSERS. MAXIMUM LENGTH SHALL BE 60 INCHES.
    - C. CONNECT FLEXIBLE DUCTS TO METAL DUCTS WITH DRAW BANDS AND TAPE.
    - D. INSTALL DUCTS FULLY EXTENDED.
    - E. DO NOT BEND DUCTS ACROSS SHARP CORNERS.
    - F. BENDS OF FLEXIBLE DUCTING SHALL NOT EXCEED A MINIMUM OF ONE DUCT DIAMETER.
    - G. AVOID CONTACT WITH METAL FIXTURES, WATER LINES, PIPES, ADJACENT DUCTWORK OR CONDUIT.
    - H. INSTALL FLEXIBLE DUCTS IN A DIRECT LINE, WITHOUT SAGS, TWISTS OR TURNS.
    - I. SUSPEND FLEXIBLE DUCTS WITH BANDS 1-1/2 INCHES WIDE AND SPACED A MAXIMUM OF 48 INCHES APART. PROVIDE ADDITIONAL SUPPORT AT BENDS. DUCTS MAY REST ON CEILING JOISTS OR TRUSS SUPPORTS. SPACING BETWEEN THESE ELEMENTS SHALL NOT EXCEED 48 INCHES.

(END OF SECTION 23 33 46)

SECTION 23 34 00 - SQUARE INLINE FANS

PART 1 - GENERAL

1. SECTION REQUIREMENTS
    - A. SUBMITTALS: PROVIDE SHOP DRAWINGS INDICATING THE DIMENSIONS, WEIGHTS, REQUIRED CLEARANCES, COMPONENTS, ELECTRICAL CHARACTERISTICS, CFM, STATIC PRESSURE AND FAN CURVE.
    - B. WARRANTY: SUBMIT A WRITTEN WARRANTY, SIGNED BY THE MANUFACTURER AGREEING TO REPAIR OR REPLACE COMPONENTS OF RTUS THAT FAIL IN MATERIALS OR WORKMANSHIP WITHIN THE MANUFACTURER'S STANDARD WARRANTY PERIOD.

PART 2 - PRODUCTS

1. DESCRIPTION
    - A. INLINE TYPE FAN WITH SQUARE INLET AND OUTLET DESIGNED FOR FLOOR-MOUNTING OR HUNG INSTALLATIONS IN-LINE WITH DUCTWORK WITH CENTRIFUGAL OR MIXED-FLOW WHEEL.
2. MANUFACTURERS: AS NOTED IN THE MECHANICAL SCHEDULES. NO SUBSTITUTIONS SHALL BE PERMITTED.
3. CHARACTERISTICS. PROVIDED WITH:
    - A. FAN: CONSTRUCTED OF CORROSION RESISTANT STEEL, DIRECT DRIVEN, SQUARE INLINE BLOWER.
    - B. HOUSING: CONSTRUCTED OF HEAVY-GAUGE GALVANIZED STEEL OR STAINLESS STEEL FOR UL762 LISTED FANS. SIDE PANELS SHALL BE REMOVEABLE FOR SERVICE ACCESS.
    - C. WHEEL: BACKWARD INCLINED, NON-OVERLOADING, ALL-ALUMINUM WHEEL. BALANCED IN ACCORDANCE WITH AMCA STANDARD 204-96.
    - D. MOTOR: VOLTAGE AS NOTED IN THE MECHANICAL SCHEDULES. MOTOR SHALL HAVE PERMANENTLY LUBRICATED BALL BEARINGS, SUPPLIED WITH A MOTOR COVER.
    - E. ACCESSORIES: AS NOTED ON THE MECHANICAL SCHEDULES.

PART 3 - EXECUTION

1. INSTALLATION
    - A. SUSPEND THE INLINE FAN FROM STRUCTURE WITH NEOPRENE-TYPE VIBRATION ISOLATORS AS NOTED IN THE STRUCTURAL DRAWINGS.
2. CONNECTIONS
    - A. COMPLY WITH DUCT INSTALLATION REQUIREMENTS SPECIFIED IN OTHER HVAC SECTIONS. DRAWINGS INDICATE GENERAL ARRANGEMENTS OF DUCTS.
    - B. WHERE INSTALLING ADJACENT TO OTHER BUILDING SYSTEMS, ALLOW SPACE FOR SERVICE AND MAINTENANCE.
    - C. CONNECT DUCTWORK TO FAN WITH FLEXIBLE DUCT CONNECTORS.
    - D. CONNECT ELECTRICAL WIRING IN ACCORDANCE WITH THE ELECTRICAL SPECIFICATIONS.
    - E. GROUND EQUIPMENT IN ACCORDANCE WITH THE ELECTRICAL SPECIFICATIONS.
3. FIELD QUALITY CONTROL
    - A. AFTER INSTALLING FANS, TEST UNITS FOR COMPLIANCE WITH REQUIREMENTS.
    - B. CONFIRM PROPER MOTOR ROTATION AND UNIT OPERATIONS.
    - C. OPERATIONAL TEST: AFTER ELECTRICAL CIRCUITRY HAS BEEN ENERGIZED, START UNITS TO CONFIRM PROPER MOTOR ROTATION AND UNIT OPERATION.

(END OF SECTION 23 34 00)

SECTION 23 34 01 - CEILING AND INLINE FANS

PART 1 - GENERAL

1. SECTION REQUIREMENTS
    - A. SUBMITTALS: PROVIDE SHOP DRAWINGS INDICATING THE DIMENSIONS, WEIGHTS, REQUIRED CLEARANCES, COMPONENTS, ELECTRICAL CHARACTERISTICS, CFM, STATIC PRESSURE AND FAN CURVE.
    - B. WARRANTY: SUBMIT A WRITTEN WARRANTY, SIGNED BY THE MANUFACTURER AGREEING TO REPAIR OR REPLACE COMPONENTS OF RTUS THAT FAIL IN MATERIALS OR WORKMANSHIP WITHIN THE MANUFACTURER'S STANDARD WARRANTY PERIOD.

PART 2 - PRODUCTS

1. DESCRIPTION
    - A. HIGH-CAPACITY FAN CAPABLE OF BEING MOUNTED IN THE CEILING OR INLINE ORIENTATION.
2. MANUFACTURERS: AS NOTED IN THE MECHANICAL SCHEDULES. NO SUBSTITUTIONS SHALL BE PERMITTED.
3. CHARACTERISTICS. PROVIDED WITH:
    - A. FAN: CONSTRUCTED OF GALVANIZED STEEL, FORWARD CURVED AND DIRECT DRIVE.
    - B. HOUSING: CONSTRUCTED OF 20 GAUGE GALVANIZED STEEL WITH 1/2" THICK ACOUSTIC INSULATION. PROVIDED WITH AN AUTOMATIC BACKDRAFT DAMPER ON THE DISCHARGE SIDE OF THE FAN LOCATED WITHIN THE DUCT CONNECTOR. PROVIDED WITH TWO 8-POSITION MOUNTING BRACKETS.
    - C. WHEEL: FORWARD CURVED, DYNAMICALLY BALANCED, POLYMERIC CENTRIFUGAL WHEEL ATTACHED TO THE MOTOR SHAFT WITH SET SCREWS.
    - D. MOTOR: 120 VOLT, OPEN DRIP MOTOR, PERMANENTLY LUBRICATED, RATED FOR CONTINUOUS DUTY, THERMALLY PROTECTED AND MOUNTED ON VIBRATION ISOLATORS. DISCONNECT SHALL BE INTERNAL AND OF THE PLUG TYPE.
    - E. ACCESSORIES: AS NOTED ON THE MECHANICAL SCHEDULES.

PART 3 - EXECUTION

1. INSTALLATION
    - A. INSTALL CEILING-MOUNTED UNITS LEVEL, PLUMB AND SQUARE WITH CEILINGS AND WALLS.
    - B. SUPPORT CEILING-MOUNTED UNITS SO THEY WILL NOT FALL OR SAG. SUPPORT SUCH THAT THAT THE CEILING WILL NOT BE DEFORMED AFTER MAINTENANCE.
    - C. INSTALL INLINE UNITS PER THE MANUFACTURER'S INSTRUCTIONS.
2. CONNECTIONS
    - A. COMPLY WITH DUCT INSTALLATION REQUIREMENTS SPECIFIED IN OTHER HVAC SECTIONS. DRAWINGS INDICATE GENERAL ARRANGEMENTS OF DUCTS.
    - B. WHERE INSTALLING ADJACENT TO OTHER BUILDING SYSTEMS, ALLOW SPACE FOR SERVICE AND MAINTENANCE.
    - C. CONNECT DUCTWORK TO FAN WITH FLEXIBLE DUCT CONNECTORS.
    - D. CONNECT ELECTRICAL WIRING IN ACCORDANCE WITH THE ELECTRICAL SPECIFICATIONS.
    - E. GROUND EQUIPMENT IN ACCORDANCE WITH THE ELECTRICAL SPECIFICATIONS.
3. FIELD QUALITY CONTROL
    - A. AFTER INSTALLING FANS, TEST UNITS FOR COMPLIANCE WITH REQUIREMENTS.
    - B. CONFIRM PROPER MOTOR ROTATION AND UNIT OPERATIONS.
    - C. OPERATIONAL TEST: AFTER ELECTRICAL CIRCUITRY HAS BEEN ENERGIZED, START UNITS TO CONFIRM PROPER MOTOR ROTATION AND UNIT OPERATION.

(END OF SECTION 23 34 01)

MECHANICAL GENERAL NOTES

A GENERAL NOTES APPLY TO ALL HVAC SHEETS.

B WORK SHALL COMPLY WITH STATE AND LOCAL CODE REQUIREMENTS AS APPROVED AND AMENDED BY THE AUTHORITY HAVING JURISDICTION, INCLUDING APPLICABLE SECTIONS OF NFPA, THE MECHANICAL CODE, AND ANY INTERIM AMENDMENTS AT THE TIME OF THE PROPOSAL. PURCHASE PERMITS ASSOCIATED WITH THE WORK. OBTAIN INSPECTIONS REQUIRED BY CODE. SEE SHEET G-001 FOR THE PREVAILING CODES.

C CONTRACTOR AND SUBCONTRACTORS SHALL REVIEW A COMPLETE SET OF THE CONSTRUCTION DOCUMENTS.

D COORDINATE WORK WITH THE WORK OF OTHER TRADES, EQUIPMENT FURNISHED BY OTHERS, REQUIREMENTS OF THE OWNER, AND OF THE EXISTING CONDITIONS AT THE PROJECT SITE.

E DRAWINGS FOR THE MECHANICAL WORK ARE DIAGRAMMATIC, SHOWING THE GENERAL LOCATION, TYPE, LAYOUT, AND EQUIPMENT REQUIRED. THE DRAWING SHALL NOT BE SCALED FOR EXACT MEASUREMENTS, REFER TO ARCHITECTURAL DRAWINGS FOR DIMENSIONS. REFER TO MANUFACTURER'S STANDARD INSTALLATION DRAWINGS FOR EQUIPMENT CONNECTIONS AND INSTALLATION REQUIREMENTS. PROVIDE DUCTWORK, CONNECTIONS, OFFSETS, ACCESSORIES, AND MATERIALS NECESSARY FOR A COMPLETE SYSTEM.

F DUCT DIMENSIONS ON PLANS INDICATE DIMENSIONS OF INTERNAL FREE AREA.

G PERFORATED CEILING DIFFUSERS SHALL BE 4-WAY UNLESS NOTED OTHERWISE.

H COORDINATE ROOF WORK WITH THE LANDLORD AND THE OWNER'S CONSTRUCTION MANAGER PRIOR TO CONSTRUCTION. UTILIZE THE LANDLORD’S ROOFING CONTRACTOR AT THE GENERAL CONTRACTOR’S EXPENSE WHEN REQUIRED.

I UNLESS NOTED OTHERWISE RECTANGULAR DUCT ELBOWS SHALL BE MITERED ELBOWS WITH DOUBLE-THICKNESS TURNING VANES.

J REPLACE AIR FILTERS WITH NEW, CLEAN MERV8 FILTERS AT TURNOVER.

K THE TERM "FURNISH" OR "SUPPLY" MEANS SUPPLY AND DELIVER TO THE PROJECT SITE, READY FOR UNLOADING, UNPACKING, ASSEMBLY, INSTALLATION, AND SIMILAR OPERATIONS. THE TERM "INSTALL" DESCRIBES THE OPERATIONS AT THE PROJECT SITE INCLUDING THE ACTUAL UNLOADING, UNPACKING, ASSEMBLY, ERECTING, PLACING, ANCHORING, APPLYING, WORKING TO DIMENSION, FINISHING, CURING, PROTECTING, CLEANING, AND SIMILAR OPERATIONS. THE TERM "PROVIDE" MEANS TO FURNISH AND INSTALL, COMPLETE AND READY FOR THE INTENDED USE.

L A FINAL REPORT FOR THE TESTING AND ADJUSTMENTS OF ALL NEW SYSTEMS FROM ALL DISCIPLINES SHALL BE COMPLETED WITH FINAL APPROVAL BY THE FIELD INSPECTOR. THIS REPORT SHALL BE SIGNED BY THE INDIVIDUAL RESPONSIBLE FOR PERFORMING THESE SERVICES.

M TESTING AND BALANCING OF THE MECHANICAL SYSTEMS TO BE COMPLETED BY NATIONALTAB AT THE GENERAL CONTRACTOR’S EXPENSE. THE CONTRACTOR SHALL CONTRACT WITH, SCHEDULE AND SUPERVISE/ASSIST NATIONALTAB AS REQUIRED. REFER TO THE COVER SHEET, OR CONTACT SWEETGREEN’S CONSTRUCTION MANAGER FOR CONTACT INFORMATION.

N ALL DUCT AND OTHER RELATED AIR DISTRIBUTION COMPONENT OPENINGS SHALL BE COVERED WITH TAPE, PLASTIC, OR SHEET METAL UNTIL THE FINAL START UP OF THE HEATING, COOLING, AND VENTILATION EQUIPMENT.

O REFER TO THE TRANE AND CAPTIVE-AIRE NATIONAL ACCOUNT INFORMATION BLOCKS ON SHEET M-300 FOR REPRESENTATIVE CONTACT INFORMATION.

P CONTRACTOR SHALL BE RESPONSIBLE TO VERIFY UNIT CONFIGURATIONS, COORDINATE DELIVERY WITH TRANE, RECEIVE AND UNLOAD EQUIPMENT, INSPECT EQUIPMENT AND PROPERLY INSTALL EQUIPMENT INCLUDING FIELD-INSTALLED ITEMS. PROVIDE EQUIPMENT STARTUP AND 1ST YEAR LABOR WARRANTY AND ADMINISTRATION.

Q PROVIDE ALL REQUIRED FIRESTOPPING AND SLEEVES AS REQUIRED FOR ALL LINESET PIPING, CONTROL AND POWER WIRING AND ALL OTHER SYSTEMS PENETRATING FIRE-RATED PARTITIONS.

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01/11/2022

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SG DESIGN MANAGER: LK
SG CONSTR. MANAGER: JB
PROJECT NO: 210010
TEMPLATE VERSION: 12/21/2021

REVISIONS

REV.	DATE	DESCRIPTION

MECHANICAL SPECIFICATIONS

M-010

1/11/2022 8:40:45 AM

SECTION 23 37 13 - GRILLES, REGISTERS & DIFFUSERS

PART 1 - GENERAL
1. SECTION REQUIREMENTS
    A. SUBMITTALS: NONE REQUIRED.

PART 2 - PRODUCTS
1. GRILLES: MANUFACTURER, MODEL, MATERIAL, FINISH, MOUNTING AND ACCESSORIES SHALL BE AS NOTED IN THE MECHANICAL SCHEDULES. NO SUBSTITUTIONS SHALL BE PERMITTED.
2. REGISTERS: MANUFACTURER, MODEL, MATERIAL, FINISH, MOUNTING AND ACCESSORIES SHALL BE AS NOTED IN THE MECHANICAL SCHEDULES. NO SUBSTITUTIONS SHALL BE PERMITTED.
3. DIFFUSERS: MANUFACTURER, MODEL, MATERIAL, FINISH, MOUNTING AND ACCESSORIES SHALL BE AS NOTED IN THE MECHANICAL SCHEDULES. NO SUBSTITUTIONS SHALL BE PERMITTED.

PART 3 - EXECUTION
1. INSTALLATION
    A. INSTALL GRILLES, REGISTERS & DIFFUSERS LEVEL AND PLUMB.
    B. INSTALL GRILLES, REGISTERS & DIFFUSERS AS INDICATED. REFER TO ARCHITECTURAL REFLECTED CEILING PLAN FOR EXACT LOCATION.
    C. INSTALL GRILLES, REGISTERS & DIFFUSERS WITH AIRTIGHT CONNECTIONS TO DUCTS AND TO ALLOW SERVICE AND MAINTENANCE OF DAMPERS, EXTRACTORS AND OTHER ACCESSORIES.
    D. AFTER INSTALLATION, ADJUST REGISTERS & DIFFUSERS TO AIR PATTERNS (IF NOTED) OR AS DIRECTED BY THE TENANT'S CONSTRUCTION MANAGER PRIOR TO STARTING AIR BALANCING.

(END OF SECTION 23 37 13)

SECTION 23 81 29 - VARIABLE REFRIGERANT FLOW SYSTEMS

PART 1 - GENERAL
1. SECTION REQUIREMENTS
    A. SUBMITTALS: PROVIDE SHOP DRAWINGS INDICATING THE DIMENSIONS, WEIGHTS, REQUIRED CLEARANCES, COMPONENTS, EFFICIENCIES, CAPACITIES, ELECTRICAL CHARACTERISTICS AND LOCATION AND SIZE OF EACH FIELD CONNECTION FOR EACH INDOOR AND OUTDOOR UNIT.
    B. WARRANTY: SUBMIT A WRITTEN WARRANTY, SIGNED BY THE MANUFACTURER AGREEING TO REPAIR OR REPLACE COMPONENTS OF THE SYSTEM FOR A PERIOD OF ONE YEAR. COMPRESSORS SHALL HAVE A WARRANTY OF SEVEN YEARS.

PART 2 - PRODUCTS
1. DESCRIPTION
    A. A VARIABLE CAPACITY, HEAT PUMP HEAT RECOVERY AIR CONDITIONING SYSTEM CAPABLE OF SIMULTANEOUS HEATING AND COOLING.
    B. SYSTEM SHALL CONSISTS OF AN OUTDOOR UNIT, BRANCH CIRCUIT CONTROLLER, MULTIPLE INDOOR UNITS AND AN INTEGRAL DIRECT DIGITAL CONTROLS SYSTEM.
    C. EACH INDOOR UNIT, OR GROUP THEREOF SHALL BE ABLE TO OPERATE IN EITHER COOLING OR HEATING MODE INDEPENDENTLY OF OTHER UNITS/GROUPS AND SHALL BE CAPABLE OF CHANGING MODE WITH NO INTERRUPTION TO SYSTEM FUNCTION.
    D. ENERGY COMPLIANCE: COMPLY WITH THE APPLICABLE REQUIREMENTS OF THE ENERGY CODE LISTED ON THE COVER SHEET.
    E. ELECTRICAL COMPONENTS, DEVICES AND ACCESSORIES SHALL BE LABELED AND LISTED AS DEFINED IN NFPA 70 BY A QUALIFIED TESTING AGENCY.
2. MANUFACTURERS: AS NOTED IN THE MECHANICAL SCHEDULES. ALTERNATES BY DAIKIN OR PANASONIC. THIS CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING ALL STRUCTURAL, ELECTRICAL AND OTHER REQUIREMENTS RESULTING FROM THE SUBSTITUTION. ALL CHANGE ORDERS RESULTING IN THE USE OF AN ALTERNATE SHALL BE PAID FOR BY THIS CONTRACTOR.
3. OUTDOOR UNIT CHARACTERISTICS:
    A. AN AIR-COOLED, DIRECT EXPANSION MULTI-ZONE UNIT SPECIFICALLY FOR USE WITH VRF COMPONENTS.
    B. UNITS SHALL BE EQUIPPED WITH A SINGLE, INVERTER-DRIVEN SCROLL TYPE, HERMETIC, MULTI-PORT COMPRESSOR. THE CAPACITY OF THE COMPRESSOR SHALL BE VARIABLE, WITH A MINIMUM TURNDOWN NOT GREATER THAN 15%.
    C. UNIT SHALL BE FACTORY ASSEMBLED, PIPED AND WIRED AND RUN TESTED AT THE FACTORY.
    D. OUTDOOR UNITS MAY BE COMPRISED OF MULTIPLE MODULES, CONNECTED VIA A TWINNING KIT INSTALLED IN THE FIELD.
    E. ALL LINESETS TO THE INDOOR UNITS SHALL BE INSULATED IN ACCORDANCE WITH THE MANUFACTURER'S INSTALLATION INSTRUCTIONS.
    F. THE OUTDOOR UNIT SHALL HAVE AN ACCUMULATOR WITH REFRIGERANT LEVEL SENSORS AND CONTROLS. UNITS SHALL ACTIVELY CONTROL LIQUID LEVEL VIA LINEAR EXPANSION VALVES.
    G. THE OUTDOOR UNIT SHALL HAVE A HIGH-EFFICIENCY OIL SEPARATOR.
    H. UNIT SHALL DEFROST ALL CIRCUITS SIMULTANEOUSLY DURING LOW-AMBIENT TEMPERATURES (BELOW 23 DEGREES F.). WHILE IN HOT GAS DEFROST, THE SYSTEM SHALL SLOW THE INDOOR UNIT FAN SPEED TO MAINTAIN A HIGH DISCHARGE AIR TEMPERATURE.
    I. THE OUTDOOR UNIT SHALL BE FURNISHED WITH A 20 GAUGE HOT DIPPED GALVANIZED SNOW/HAIL GUARD.
    J. THE OUTDOOR UNIT SHALL BE FURNISHED WITH A FOUR-LEGGED OUTDOOR MOUNTING SYSTEM FROM THE MANUFACTURER.
    K. UNIT CASING SHALL BE GALVANIZED STEEL, BONDERIZED AND FINISHED.
    L. OUTDOOR UNIT FAN SHALL BE DIRECT DRIVE WITH A VARIABLE SPEED PROPELLER. FAN SHALL HAVE INHERENT PROTECTION WITH PERMANENTLY LUBRICATED BEARINGS. FANS SHALL BE PROVIDED WITH A RAISED GUARD TO PREVENT CONTACT WITH MOVING PARTS.
    M.OUTDOOR COIL SHALL BE A 4-SIDED COIL, ELEVATED AT LEAST 12” FROM THE BASE OF THE UNIT. COIL SHALL BE CORRUGATED PLATE FINS ON COPPER TUBING WITH FACTORY-APPLIED CORROSION RESISTANT FINISH. UNCOATED ALUMINUM COIL/FINS ARE NOT ALLOWED.
    N. UNIT SHALL HAVE PREWIRED PLUGS FOR OPTIONAL PANEL HEATERS.
    O. UNIT POWER SHALL BE AS NOTED IN THE EQUIPMENT SCHEDULES.
    P. CONTROL CIRCUITING BETWEEN THE INDOOR UNITS, BRANCH CIRCUIT CONTROLLER AND THE OUTDOOR UNIT SHALL BE 24V DC COMPLETED USING 2-CONDUCTOR, TWISTED PAIR SHIELDED CABLE.
4. REFRIGERANT AND REFRIGERANT PIPING
    A. R410A REFRIGERANT SHALL BE REQUIRED FOR SYSTEMS.
    B. POLYOLESTER (POE) OIL SHALL BE REQUIRED FOR SYSTEMS.
    C. REFRIGERANT PIPING SHALL BE PHOSPHORUS DEOXIDIZED COPPER WITH A THICKNESS AS DEFINED BY THE MANUFACTURER'S RECOMMENDATIONS.
    D. ALL PIPING SHALL BE INSULATED WITH 1/2" CLOSED-CELL INSULATION WITH A FLAME-SPREAD INDEX OF LESS THAN 25, AND A SMOKE-DEVELOPMENT INDEX OF LESS THAN 50. R-VALUE SHALL BE 3.0 OR GREATER.
    E. ALL REFRIGERANT PIPING CONNECTIONS SHALL BE BRAZED.
5. BRANCH CIRCUIT (BC) CONTROLLERS
    A. BC CONTROLLERS SHALL INCLUDE MULTIPLE BRANCHES TO ALLOW SIMULTANEOUS HEATING AND COOLING.
    B. BC CONTROLLERS SHALL BE EQUIPPED WITH A CIRCUIT BOARD THAT INTERFACES TO THE CONTROLS SYSTEM AND SHALL PERFORM ALL FUNCTIONS NECESSARY FOR OPERATION.
    C. THE UNIT CASING SHALL BE FABRICATED OF GALVANIZED STEEL.
    D. EACH CABINET SHALL HOUSE A LIQUID-GAS SEPARATOR AND MULTIPLE REFRIGERATION CONTROL VALVES AND TWO TUBE-IN-TUBE HEAT EXCHANGERS.
    E. REFRIGERANT SERVICE SHUT OFF VALVES SHALL BE FIELD-PROVIDED FOR EACH BRANCH TO ALLOW SERVICE TO INDOOR UNITS WITHOUT OPERATION TO OVERALL SYSTEM.
    F. BC CONTROLLERS SHALL HAVE INTEGRAL RESIN DRAIN PAN.
    G. UNIT POWER SHALL BE AS NOTED IN THE EQUIPMENT SCHEDULES.
    H. CONTROL CIRCUITING BETWEEN THE INDOOR UNITS, BRANCH CIRCUIT CONTROLLER AND THE OUTDOOR UNIT SHALL BE 24V DC COMPLETED USING 2-CONDUCTOR, TWISTED PAIR SHIELDED CABLE.
6. WALL-MOUNTED INDOOR UNIT
    A. WALL-MOUNTED UNIT SHALL BE FACTORY ASSEMBLED, WIRED AND RUN TESTED, CONTAINED WITH FACTORY WIRING, PIPING, ELECTRONIC MODULATING LINEAR EXPANSION DEVICE, CONTROL BOARD AND FAN MOTOR.
    B. UNIT CABINET SHALL HAVE A SEPARATE BACK PLATE WHICH SECURES THE UNIT FIRMLY TO THE WALL.
    C. INDOOR FAN SHALL BE DIRECT DRIVEN, BALANCED AND WITH PERMANENTLY LUBRICATED BEARINGS WITH MANUAL ADJUSTMENT GUIDE VANE AND MOTORIZED AIR SWEEP LOUVER.
    D. UNIT SHALL BE FURNISHED WITH A WASHABLE RETURN AIR FILTER.
    E. COIL SHALL BE CONSTRUCTED OF SMOOTH PLATE FINS ON COPPER TUBING WITH INNER GROOVES.
    F. UNIT POWER SHALL BE AS NOTED IN THE EQUIPMENT SCHEDULES.
    CONTROL CIRCUITING BETWEEN THE INDOOR UNITS, BRANCH CIRCUIT CONTROLLER AND THE OUTDOOR UNIT SHALL BE 24V DC COMPLETED USING 2-CONDUCTOR, TWISTED PAIR SHIELDED CABLE.
7. ONE-WAY CEILING-RECESSED CASSETTE UNITS WITH GRILLE.
    A. 1-WAY CEILING-RECESSED CASSETTES WITH GRILL SHALL BE FACTORY ASSEMBLED, WIRED AND RUN TESTED, CONTAINED WITH FACTORY WIRING, PIPING, ELECTRONIC MODULATING LINEAR EXPANSION DEVICE, CONTROL BOARD AND FAN MOTOR.
    B. UNIT CABINET SHALL BE CONSTRUCTED TO FIT IN A CEILING GRID WITH PROVISIONS FOR A FIELD-INSTALLED OUTSIDE AIR INTAKE AND ONE-WAY GRILLE.
    C. INDOOR FAN SHALL BE DIRECT DRIVEN, BALANCED AND WITH PERMANENTLY LUBRICATED BEARINGS AND FOUR SPEED SETTINGS.
    D. UNIT SHALL BE FURNISHED WITH A WASHABLE RETURN AIR FILTER.
    E. COIL SHALL BE CONSTRUCTED OF SMOOTH PLATE FINS ON COPPER TUBING WITH INNER GROOVES.
    F. UNIT POWER SHALL BE AS NOTED IN THE EQUIPMENT SCHEDULES.
    G. CONTROL CIRCUITING BETWEEN THE INDOOR UNITS, BRANCH CIRCUIT CONTROLLER AND THE OUTDOOR UNIT SHALL BE 24V DC COMPLETED USING 2-CONDUCTOR, TWISTED PAIR SHIELDED CABLE.
8. HIGH-STATIC, CEILING-CONCEALED, DUCTED INDOOR UNITS
    A. FACTORY-ASSEMBLED, WIRED AND RUN TESTED, CONTAINING FACTORY WIRING, PIPING, ELECTRONIC MODULATING LINEAR EXPANSION DEVICE, CONTROL CIRCUIT BOARD AND MOTOR.
    B. UNIT CABINET SHALL BE CEILING-CONCEALED, DUCTED WITH A FIXED REAR RETURN.
    C. FAN SHALL BE DYNAMICALLY BALANCED, DIRECT DRIVEN BY A SINGLE MOTOR WITH PERMANENTLY LUBRICATED BEARINGS.
    D. FILTER BOX SHALL BE FURNISHED WITH ALL UNITS.
    E. COIL SHALL BE CONSTRUCTED OF SMOOTH PLATE FINS ON COPPER TUBING WITH INNER GROOVES.
    F. UNIT POWER SHALL BE AS NOTED IN THE EQUIPMENT SCHEDULES.
    G. CONTROL CIRCUITING BETWEEN THE INDOOR UNITS, BRANCH CIRCUIT CONTROLLER AND THE OUTDOOR UNIT SHALL BE 24V DC COMPLETED USING 2-CONDUCTOR, TWISTED PAIR SHIELDED CABLE.

PART 3 - EXECUTION
1. INSTALLATION
    A. OUTDOOR UNITS: INSTALL OUTDOOR UNITS ON MANUFACTURER'S FURNISHED STANDS.
    B. INDOOR UNITS: INSTALL UNITS LEVEL FROM STRUCTURE, ON NEOPRENE TYPE VIBRATION ISOLATORS AS NOTED ON THE STRUCTURAL DRAWINGS.
2. CONNECTIONS
    A. COMPLY WITH DUCT INSTALLATION REQUIREMENTS SPECIFIED IN OTHER HVAC SECTIONS. DRAWINGS INDICATE GENERAL ARRANGEMENTS OF DUCTS.
    B. CONNECT SUPPLY AND RETURN AIR DUCTS WITH FLEXIBLE DUCT CONNECTORS AS NOTED IN SECTION 23 33 00.
    C. INSTALL CONDENSATE DRAIN WITH TRAP AND INDIRECT CONNECTION AS NOTED ON THE PLANS AND PER THE MANUFACTURER'S INSTALLATION INSTRUCTIONS.
    D. CONNECT REFRIGERANT PIPING PER THE MANUFACTURER'S INSTALLATION INSTRUCTIONS.
    E. INSTALL PIPING AND DUCTWORK ADJACENT TO EQUIPMENT TO ALLOW SPACE FOR SERVICE AND MAINTENANCE .
    F. CONNECT CONTROLS WIRING TO THE THERMOSTAT, TEMPERATURE SENSOR AND UNIT AS DESCRIBED IN THE MANUFACTURER'S INSTALLATION INSTRUCTIONS.
    G. CONNECT ELECTRICAL WIRING IN ACCORDANCE WITH THE ELECTRICAL SPECIFICATIONS.
3. FIELD QUALITY CONTROL
    A. AFTER INSTALLING ALL EQUIPMENT, TEST UNITS FOR COMPLIANCE WITH REQUIREMENTS.
    B. INSPECT AND REMOVE SHIPPING BOLTS, BLOCKS AND TIE-DOWN STRAPS.
    C. CONFIRM PROPER MOTOR ROTATION AND UNIT OPERATIONS.
    D. TEST AND ADJUST CONTROLS AND SAFETIES. REPLACE DAMAGED AND MALFUNCTIONING CONTROLS AND EQUIPMENT.
    E. OPERATIONAL TEST: AFTER ELECTRICAL CIRCUITRY HAS BEEN ENERGIZED, START UNITS TO CONFIRM PROPER MOTOR ROTATION AND UNIT OPERATION.
    F. CLEAN FILTER HOUSINGS AND CHANGE FILTERS PRIOR TO AIR BALANCE AND IMMEDIATELY PRIOR TO TURNOVER.

(END OF SECTION 23 81 29)

SECTION 23 90 00 - LOUVERS

PART 1 - GENERAL
1. SECTION INCLUDES
    A. EXTRUDED ALUMINUM LOUVERS
2. PERFORMANCE REQUIREMENTS
    A. UL CLASSIFIED FOR WIND RESISTANT BUILDING COMPONENTS IN ACCORDANCE WITH ASTM E330-02 FOR +- FSF WINDLOAD.
    B. LOUVERS SHALL BEAR THE AMCA CERTIFIED RATINGS SEAL, LISTED FOR BASE PROTECTION.
3. SECTION REQUIREMENTS
    A. SUBMITTALS: PROVIDE SHOP DRAWINGS INDICATING SIZE, FACE AREA , FREE AREA, AIRFLOW, PRESSURE DROP, MATERIAL, FINISH AND FURNISHED ACCESSORIES.
4. WARRANTY: SUBMIT A WRITTEN WARRANTY, SIGNED BY THE MANUFACTURER INDICATING THAT THE PRODUCT WILL BE FREE FROM DEFECTS IN MATERIAL AND WORKMANSHIP FOR A PERIOD OF 5-YEARS AS OF THE DATE OF DELIVERY TO THE DELIVERY LOCATION.

PART 2 - PRODUCTS
1. DESCRIPTION
    A. LOUVERS SHALL BE STATIONARY DRAINABLE TYPE WITH DRAIN GUTTERS IN EACH BLADE AND DOWNSPOUTS IN JAMBS AND MULLIONS.
    B. STATIONARY DRAINABLE BLADES SHALL BE CONTAINED WITHIN A FRAME.
    C. LOUVER COMPONENTS (HEADS, JAMBS, SILLS, BLADES & MULLIONS) SHALL BE FACTORY ASSEMBLED BY THE MANUFACTURER.
    D. LOUVER SIZES TOO LARGE FOR SHIPPING SHALL BE BUILT-UP BY THE CONTRACTOR FROM FACTORY-ASSEMBLED SECTIONS.
    E. LOUVERS SHALL BE FURNISHED WITH A FLATTENED ALUMINUM BIRD SCREEN IN REMOVEABLE FRAME.
    F. FINISH SHALL BE AS NOTED IN THE MATERIAL SCHEDULES.
2. MANUFACTURERS: AS NOTED IN THE MECHANICAL SCHEDULES. ALTERNATES BY GREENHECK AND NAILOR.

PART 3 - EXECUTION
1. INSTALLATION
    A. INSPECT AREAS TO RECEIVE LOUVERS. NOTIFY THE ARCHITECT OF CONDITIONS THAT WOULD ADVERSELY AFFECT THE INSTALLATION OR UTILIZATION OF THE LOUVERS.
    B. CLEAN OPENING THOROUGHLY PRIOR TO INSTALLATION AND PREPARE SURFACES USING THE METHODS RECOMMENDED BY THE MANUFACTURER.
    C. INSTALL LOUVERS AT LOCATIONS INDICATED AND IN ACCORDANCE WITH THE STRUCTURAL DETAILS AND MANUFACTURER'S INSTRUCTIONS.
    D. INSTALL LOUVERS LEVEL, PLUMB, IN PLANE OF WALL AND IN ALIGNMENT WITH ANY ADJACENT WORK.
    E. INSTALL JOINT SEALANTS AS REQUIRED.
2. FIELD QUALITY CONTROL
    A. CLEAN LOUVER SURFACES IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.
    B. TOUCH-UP, REPAIR OR REPLACE DAMAGED PRODUCTS.

(END OF SECTION 23 90 00)

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SG DESIGN MANAGER: LK
SG CONSTR. MANAGER: JB
PROJECT NO: 210010
TEMPLATE VERSION: 12/21/2021

REVISIONS

REV.	DATE	DESCRIPTION

MECHANICAL SPECIFICATIONS

SYMBOLS & ABBREVIATIONS

HVAC SYMBOLS

- MITERED CORNER WITH TURNING VANES
- DUCTWORK INTERNAL FREE DIMENSIONS (WIDTH/HEIGHT) — W/H
- RECTANGULAR TO ROUND DUCT TRANSITION
- S — DUCT-MOUNTED SMOKE DETECTOR
- M — MOTOR-OPERATED DAMPER
- MANUAL VOLUME DAMPER
- GREASE DUCT CLEANOUT
- MITERED CORNER WITHOUT TURNING VANES
- ⊠ CEILING DIFFUSER
- CEILING-MOUNTED RETURN OR EXHAUST REGISTER
- SUPPLY REGISTER
- RETURN REGISTER
- FLEXIBLE DUCT
- (T) THERMOSTAT
- (S) REMOTE TEMPERATURE SENSOR
- (X) PLAN NOTE: SEE PLAN NOTES LISTED ON THE SAME SHEET FOR NOTE MEANING
- ◑ CONNECT TO EXISTING
- (XX-#) EQUIPMENT TAG: SEE EQUIPMENT SCHEDULE ON SHEET M-300 FOR EQUIPMENT INFORMATION
- A/V AUDIO/VISUAL REMOTE SMOKE DETECTOR ANNUNCIATOR WITH REMOTE KEY OPERATED RESET
- CD1 — TAG; 12"Ø — NECK SIZE; 350 — AIRFLOW [CFM]

HVAC ABBREVIATIONS

(E)	EXISTING
(R)	RELOCATED
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AHU	AIR HANDLING UNIT
BC	BLOWER COIL
CD	CEILING DIFFUSER
CU	CONDENSING UNIT
EF	EXHAUST FAN
ER	EXHAUST REGISTER
EXT'G	EXISTING
GC	GENERAL CONTRACTOR
HES	TENANT'S HVAC EQUIPMENT SUPPLIER
KES	TENANT'S KITCHEN EQUIPMENT SUPPLIER
OBD	BLADE DAMPER
PL	PLENUM
RG	RETURN GRILLE
RTU	ROOFTOP UNIT
SD	SLOT DIFFUSER
SR	SUPPLY REGISTER
VSC	VARIABLE SPEED CONTROL
WSHP	WATER SOURCE HEAT PUMP

CODED NOTES

1 INSTALL EQUIPMENT PER MANUFACTURER'S INSTALLATION INSTRUCTION AND PER THE STRUCTURAL DETAILS.

2 INSTALL THE OWNER-FURNISHED MAIN CONTROLLER FOR THE HVAC EQUIPMENT NOTED AT THIS LOCATION AT 48" AFF. COORDINATE WITH ELECTRICAL SWITCHING IN THE AREA AND EXTEND CONTROLS WIRING AS NOTED IN THE TRANE SHOP DRAWINGS. COORDINATE CONTROLLER LOCATION WITH WALL-MOUNTED EQUIPMENT SO THAT THE THERMOSTATS ARE NOT BLOCKED BY SHELVING, COAT RACKS OR DOORS.

3 INSTALL THE TEMPERATURE SENSOR FOR THE BASEMENT SYSTEM AT THIS LOCATION AT 5'-0" AFF. COORDINATION LOCATION WITH EQUIPMENT AND WALL-MOUNTED FIXTURES AS REQUIRED SUCH THAT THE SENSOR IS NOT BLOCKED.

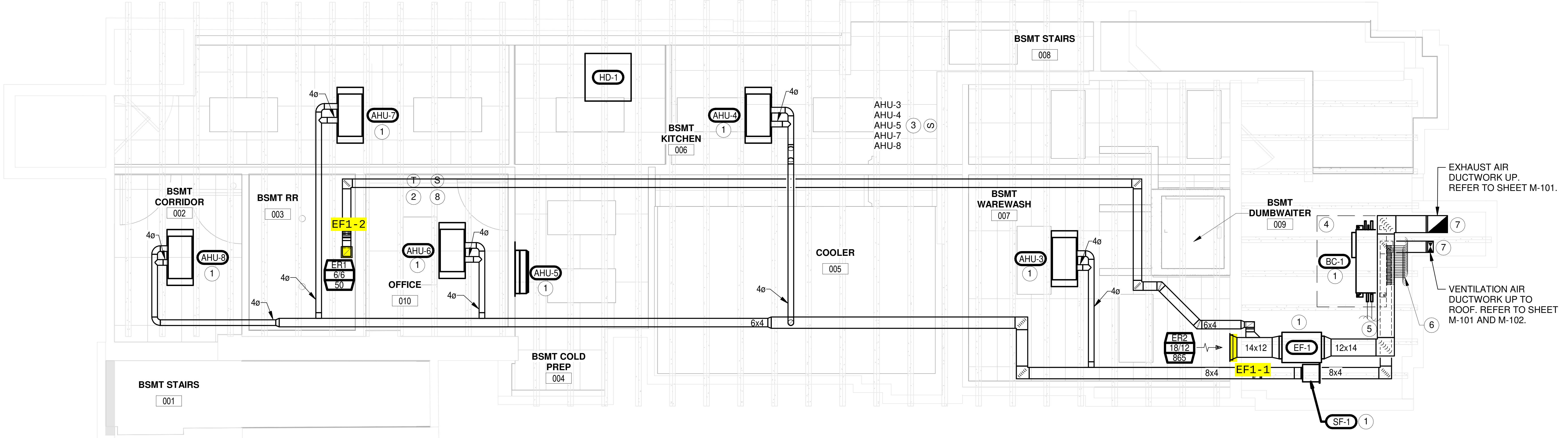
4 MAINTAIN MANUFACTURER'S RECOMMENDED CLEARANCE ZONES. NO DUCTWORK, PIPING, CONDUIT OR OTHER SYSTEMS SHALL BER PERMITTED IN THIS AREA. COORDINATE WITH SITE CONDITIONS AND WORK OF OTHER TRADES AS REQUIRED. TYPICAL.

5 INSTALL THE OWNER-FURNISHED REFRIGERANT PIPING BETWEEN THE ROOF-MOUNTED CONDENSING UNIT AND THE BRANCH CONTROLLER. REFER TO SHEET M-102 AND SHEET M-401 FOR MORE INFORMATION. COORDINATE LINESET PATHWAY WITH THE LANDLORD AND SITE CONDITIONS AS REQUIRED. COORDINATE LINESET LENGTH AND QUANTITIES REQUIRED WITH THE OWNER'S NATIONAL ACCOUNT REPRESENTATIVE PRIOR TO EQUIPMENT SHIPPING.

6 INSTALL THE OWNER-FURNISHED REFRIGERANT PIPING BETWEEN THE BRANCH CONTROLLER AND THE AIR HANDLING UNITS. REFER TO SHEET M-401 FOR MORE INFORMATION. COORDINATE LINESET LENGTH AND QUANTITYS REQUIRED WITH THE OWNER'S NATIONAL ACCOUNT REPRESENTATIVE PRIOR TO EQUIPMENT SHIPPING.

7 PROVIDE BACKDRAFT DAMPER OUTSIDE THE SPACE JUST BEFORE THE DUCTWORK PENETRATES THE GROUND.

8 INSTALL THE TEMPERATURE SENSOR FOR THE OFFICE UNIT AT THIS LOCATION AT 5'-0" AFF. COORDINATE LOCATION WITH EQUIPMENT AND WALL-MOUNTED FIXTURES AS REQUIRED SUCH THAT THE SENSOR IS NOT BLOCKED.



EXHAUST AIR DUCTWORK UP. REFER TO SHEET M-101.

VENTILATION AIR DUCTWORK UP TO ROOF. REFER TO SHEET M-101 AND M-102.

NORTH

1 HVAC PLAN - BASEMENT

1/4" = 1'-0"

1/11/2022 8:40:47 AM

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LOS ANGELES, CALIFORNIA 90018

ENGINEER OF RECORD:

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01/11/2022

PROJECT INFORMATION:
DOWNTOWN ANN ARBOR

PROJECT INFORMATION:
311 SOUTH STATE ST.
ANN ARBOR, MI 48104

DRAWN BY:	JAE
CHECKED BY:	MK
PROJECT MANAGER:	JAE
SG DESIGN MANAGER:	LK
SG CONSTR. MANAGER:	JB
PROJECT NO:	210010
TEMPLATE VERSION:	12/21/2021

REVISIONS

REV.	DATE	DESCRIPTION

HVAC PLAN - BASEMENT

M-100

SYMBOLS & ABBREVIATIONS

HVAC SYMBOLS

- MITERED CORNER WITH TURNING VANES
- DUCTWORK INTERNAL FREE DIMENSIONS (WIDTH/HEIGHT)
- RECTANGULAR TO ROUND DUCT TRANSITION
- DUCT-MOUNTED SMOKE DETECTOR
- MOTOR-OPERATED DAMPER
- MANUAL VOLUME DAMPER
- GREASE DUCT CLEANOUT
- MITERED CORNER WITHOUT TURNING VANES
- CEILING DIFFUSER
- CEILING-MOUNTED RETURN OR EXHAUST REGISTER
- SUPPLY REGISTER
- RETURN REGISTER
- FLEXIBLE DUCT
- THERMOSTAT
- REMOTE TEMPERATURE SENSOR
- PLAN NOTE: SEE PLAN NOTES LISTED ON THE SAME SHEET FOR NOTE MEANING
- CONNECT TO EXISTING
- EQUIPMENT TAG: SEE EQUIPMENT SCHEDULE ON SHEET M-300 FOR EQUIPMENT INFORMATION
- AUDIO/VISUAL REMOTE SMOKE DETECTOR ANNUNCIATOR WITH REMOTE KEY OPERATED RESET
- TAG
- NECK SIZE
- AIRFLOW [CFM]

HVAC ABBREVIATIONS

(E)	EXISTING
(R)	RELOCATED
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AHU	AIR HANDLING UNIT
BC	BLOWER COIL
CD	CEILING DIFFUSER
CU	CONDENSING UNIT
EF	EXHAUST FAN
ER	EXHAUST REGISTER
EXT'G	EXISTING
GC	GENERAL CONTRACTOR
HES	TENANT'S HVAC EQUIPMENT SUPPLIER
KES	TENANT'S KITCHEN EQUIPMENT SUPPLIER
OBD	BLADE DAMPER
PL	PLENUM
RG	RETURN GRILLE
RTU	ROOFTOP UNIT
SD	SLOT DIFFUSER
SR	SUPPLY REGISTER
VSC	VARIABLE SPEED CONTROL
WSHP	WATER SOURCE HEAT PUMP

CODED NOTES

1 INSTALL EQUIPMENT PER MANUFACTURER'S INSTALLATION INSTRUCTION AND PER THE STRUCTURAL DETAILS.

2 PROVIDE SUPPLY DIFFUSER CONNECTION PER DETAIL 1/SHEET M-400.

3 REFER TO THE ARCHITECTURAL RCP FOR CEILING MOUNTED EQUIPMENT LOCATION. TYPICAL.

4 PROVIDE AUDIO/VISUAL REMOTE SMOKE DETECTOR ANNUNCIATOR WITH REMOTE KEY OPERATED RESET. WIRE A UNIT BACK TO EACH SMOKE DETECTOR. MOUNT UNIT 60" AFF. TYPICAL.

5 INSTALL THE TEMPERATURE SENSOR FOR THE HVAC EQUIPMENT NOTED AT THIS LOCATION AT 5'-0" AFF. COORDINATION LOCATION WITH EQUIPMENT AND WALL-MOUNTED FIXTURES AS REQUIRED SUCH THAT THE SENSOR IS NOT BLOCKED.

6 REFER TO DETAIL 4/SHEET M-400 FOR AIR HANDLER INSTALLATION DETAILS.

7 PROVIDE EXPOSED DUCTWORK AS SHOWN, PER THE SPECIFICATIONS AND PER DETAIL 2/SHEET M-400.

8 THE GENERAL CONTRACTOR SHALL FURNISH A REME HALO AIR PURIFICATION SYSTEM AND REQUIRED TRANSFORMER, PURCHASED THROUGH SWEETGREEN'S VENDOR (NATIONAL TAB) AND INSTALL SYSTEM IN THE SUPPLY AIR DUCTWORK AND PER THE MANUFACTURER'S INSTALLATION INSTRUCTIONS. ADJUST AS REQUIRED FOR THE SUPPLY AIRFLOW.

9 PROVIDE A BELIMO ZIP ECONOMIZER FOR MECHANICAL EQUIPMENT. PROVIDE 24V FULLY-MODULATING DAMPERS, SENSORS AND WIRING AS REQUIRED FOR A FULLY FUNCTIONING ENTHALPY ECONOMIZER SYSTEM. INSTALL PER THE MANUFACTURER'S INSTALLATION INSTRUCTIONS.

10 THE GENERAL CONTRACTOR SHALL PROVIDE A DUCT-MOUNTED SMOKE DETECTOR IN THE RETURN AIR STREAM. UPON DETECTION OF SMOKE, THE SUPPLY AIR FAN SHALL DE-ENERGIZE. COORDINATE ALL REQUIREMENTS WITH THE LANDLORD AND ALARM PROVIDER.

11 MAINTAIN MANUFACTURER'S RECOMMENDED CLEARANCE ZONES. NO DUCTWORK, PIPING, CONDUIT OR OTHER SYSTEMS SHALL BER PERMITTED IN THIS AREA. COORDINATE WITH SITE CONDITIONS AND WORK OF OTHER TRADES AS REQUIRED. TYPICAL.

12 APPROXIMATE LOCATION OF CHASE TO ROOF. PROVIDE SUPPORTS WITHIN THE CHASE AS REQUIRED FOR REFRIGERANT PIPING. PROVIDE SUPPORTS WITHIN THE CHASE PER SMACNA GUIDELINES FOR DUCTWORK.

13 INSTALL THE OWNER-FURNISHED FILTER BOX FOR THE AIR HANDLING UNIT PER THE MANUFACTURER'S INSTALLATION INSTRUCTIONS. COORDINATE ADEQUATE CLEARANCE FOR FILTER CHANGES WITH SITE CONDITIONS AND FINAL CONSTRUCTION AS REQUIRED.

14 PROVIDE A DUCT HEATER IN THE SUPPLY-AIR STREAM IN LOCATION SHOWN. ENSURE THAT THERE IS A MINIMUM OF 4'-0" OF STRAIGHT DUCT AT THE INLET AND OUTLET OF THE HEATER. INSTALL PER THE MANUFACTURER'S INSTALLATION INSTRUCTIONS AND PER DETAIL 5/SHEET M-400.

15 PROVIDE ACCESS DOOR IN THE HVAC DUCTWORK TO FACILITATE TESTING AND REPLACING OF THE FIRE DAMPER FUSIBLE LINK. REFER TO DETAIL 7/SHEET M-400 FOR MORE INFORMATION.

16 MOTORIZED DAMPER SHALL BE ACCESSIBLE WHEN THE CEILING DIFFUSER IS REMOVED FROM THE RAPID MOUNT FRAME.

17 9'-2" CLEAR OVER HEAD HEIGHT REQUIRED FOR THE DUMBWAITER. COORDINATE THE HEIGHT AND LOCATION OF DUCTWORK, SUPPORTS, ACCESSORIES AND MECHANICAL EQUIPMENT AS NECESSARY.

18 EXTEND EXHAUST DUCTWORK UP THE SIDE OF THE BUILDING AND TERMINATE IN A GOOSENECK NO LESS THAN 10'-0" ABOVE THE GROUND, 3'-0" FROM OPERABLE OPENINGS INTO BUILDINGS AND 10'-0" FROM MECHANICAL INTAKES. FIELD-VERIFY EXACT LOCATION.

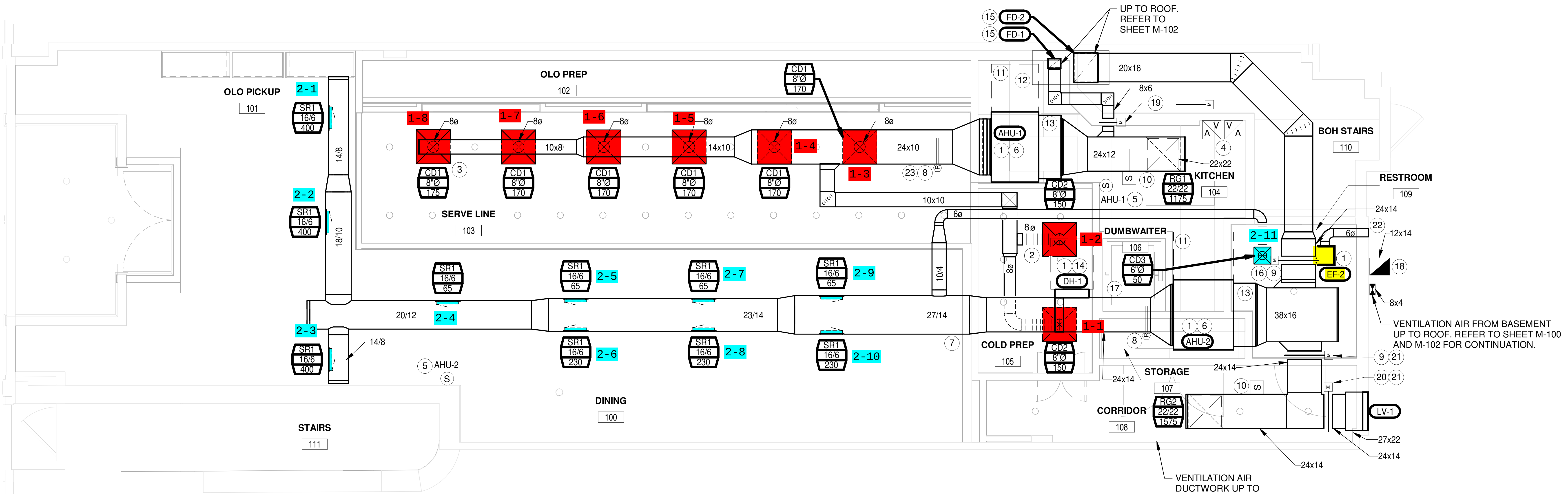
19 PROVIDE A TWO-POSITION DAMPER IN LOCATION SHOWN. WHEN THE SPACE IS SCHEDULED TO BE IN OCCUPIED MODE, THE DAMPER SHALL POWER OPEN. DURING UNOCCUPIED MODE, THE DAMPER SHALL SPRING CLOSED.

20 PROVIDE A MOTORIZED DAMPER IN THE PRESSURE RELIEF DUCTWORK. INTERLOCK DAMPER OPERATION WITH THE ECONOMIZER OPERATION SUCH THAT WHEN THE RETURN AIR DAMPER CLOSES, THE PRESSURE RELIEF DAMPER OPENS TO MAINTAIN THE SPACE PRESSURE. PROVIDE ALL CONTROLLERS AND SENSORS AS REQUIRED.

21 INSTALL DAMPERS SO THAT THEY ARE ACCESSIBLE FROM THE ACCESS PANEL.

22 INSTALL WALL CAP WITH BACKDRAFT DAMPER AND BIRD SCREEN FURNISHED WITH EF-2.

23 REME HALO PURIFICATION SYSTEM SHALL BE ACCESSIBLE FROM THE ACCESS PANEL LOCATED BELOW.



1 **HVAC PLAN - MAIN LEVEL**

1/4" = 1'-0"

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ENGINEER OF RECORD:

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01/11/2022

PROJECT INFORMATION:
DOWNTOWN ANN ARBOR

PROJECT INFORMATION:
311 SOUTH STATE ST.
ANN ARBOR, MI 48104

DRAWN BY:	JAE
CHECKED BY:	MK
PROJECT MANAGER:	JAE
SG DESIGN MANAGER:	LK
SG CONSTR. MANAGER:	JB
PROJECT NO:	210010
TEMPLATE VERSION:	12/21/2021

REVISIONS

REV.	DATE	DESCRIPTION

HVAC PLAN - MAIN LEVEL

M-101

1/11/2022 8:40:50 AM

SYMBOLS & ABBREVIATIONS

HVAC SYMBOLS

	MITERED CORNER WITH TURNING VANES
W/H	DUCTWORK INTERNAL FREE DIMENSIONS (WIDTH/HEIGHT)
	RECTANGULAR TO ROUND DUCT TRANSITION
S	DUCT-MOUNTED SMOKE DETECTOR
M	MOTOR-OPERATED DAMPER
	MANUAL VOLUME DAMPER
	GREASE DUCT CLEANOUT
	MITERED CORNER WITHOUT TURNING VANES
⊠	CEILING DIFFUSER
⧄	CEILING-MOUNTED RETURN OR EXHAUST REGISTER
	SUPPLY REGISTER
	RETURN REGISTER
	FLEXIBLE DUCT
Ⓣ	THERMOSTAT
Ⓢ	REMOTE TEMPERATURE SENSOR
Ⓧ	PLAN NOTE: SEE PLAN NOTES LISTED ON THE SAME SHEET FOR NOTE MEANING
◐	CONNECT TO EXISTING
XX-#	EQUIPMENT TAG: SEE EQUIPMENT SCHEDULE ON SHEET M-300 FOR EQUIPMENT INFORMATION
A/V	AUDIO/VISUAL REMOTE SMOKE DETECTOR ANNUNCIATOR WITH REMOTE KEY OPERATED RESET
CD1	TAG
12"Ø	NECK SIZE
350	AIRFLOW [CFM]

HVAC ABBREVIATIONS

(E)	EXISTING
(R)	RELOCATED
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AHU	AIR HANDLING UNIT
BC	BLOWER COIL
CD	CEILING DIFFUSER
CU	CONDENSING UNIT
EF	EXHAUST FAN
ER	EXHAUST REGISTER
EXT'G	EXISTING
GC	GENERAL CONTRACTOR
HES	TENANT'S HVAC EQUIPMENT SUPPLIER
KES	TENANT'S KITCHEN EQUIPMENT SUPPLIER
OBD	BLADE DAMPER
PL	PLENUM
RG	RETURN GRILLE
RTU	ROOFTOP UNIT
SD	SLOT DIFFUSER
SR	SUPPLY REGISTER
VSC	VARIABLE SPEED CONTROL
WSHP	WATER SOURCE HEAT PUMP

CODED NOTES

1 INSTALL EQUIPMENT MOUNTED ON OWNER-FURNISHED STANDS PER MANUFACTURER'S INSTALLATION INSTRUCTIONS.

2 INSTALL THE OWNER-FURNISHED TWINNING KIT PER THE MANUFACTURER'S INSTALLATION INSTRUCTIONS.

3 INSTALL THE OWNER-FURNISHED REFRIGERANT PIPING BETWEEN THE ROOF-MOUNTED CONDENSING UNIT AND THE BRANCH CONTROLLER. REFER TO SHEET M-100 AND SHEET M-401 FOR MORE INFORMATION. COORDINATE LINESET PATHWAY WITH THE LANDLORD AND EXISTING CONDITIONS AS REQUIRED. COORDINATE LINESET LENGTH AND QUANTITYS REQUIRED WITH THE OWNER'S NATIONAL ACCOUNT REPRESENTATIVE PRIOR TO EQUIPMENT SHIPPING.

4 APPROXIMATE LOCATION OF CHASE TO ROOF. PROVIDE SUPPORTS WITHIN THE CHASE AS REQUIRED FOR REFRIGERANT PIPING. PROVIDE SUPPORTS WITHIN THE CHASE PER SMACNA GUIDELINES FOR DUCTWORK.

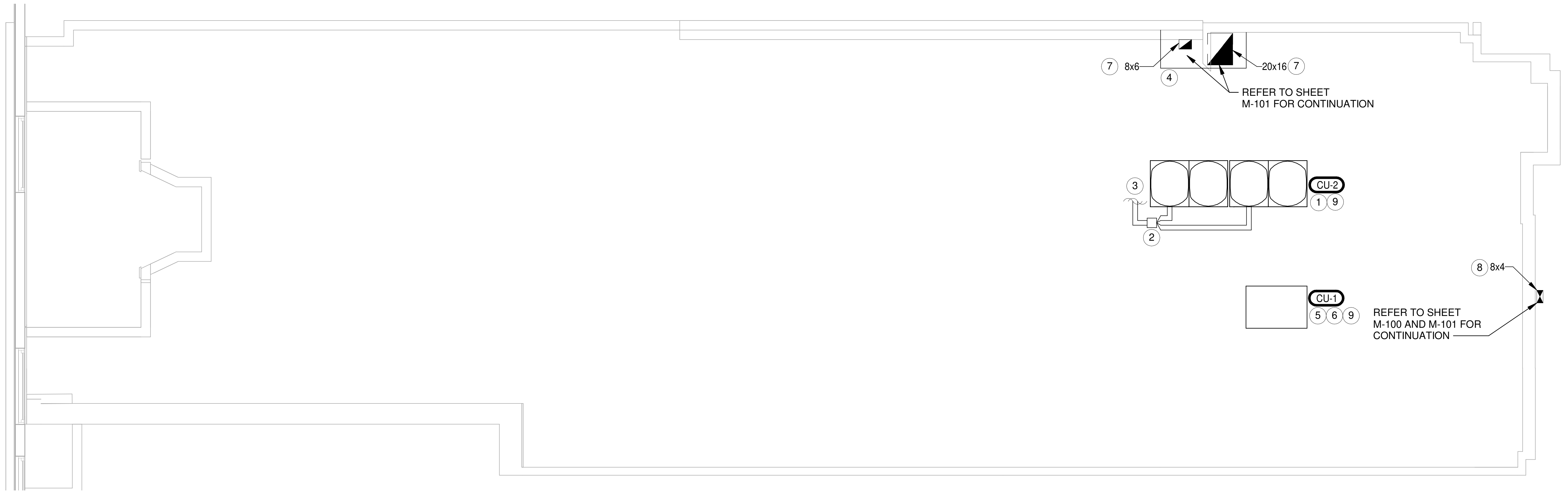
5 COORDINATE MOUNTING LOCATION FOR WALK-IN COOLER CONDENSING UNIT, CU-1 ON ROOF WITH THE KITCHEN EQUIPMENT SUPPLIER PRIOR TO ROUGH-IN. ENSURE ALL CLEARANCE REQUIREMENTS FOR THE UNIT ARE MAINTAINED. PROVIDE UNIT SUPPORTS AS SHOWN IN THE STRUCTURAL DRAWINGS. KITCHEN EQUIPMENT SUPPLIER SHALL PROVIDE LINESET, SPECIALTIES AND MAKE ALL FINAL CONNECTIONS BETWEEN THE CONDENSING UNIT AND EVAPORATOR COIL.

6 INSTALL EQUIPMENT MOUNTED ON EQUIPMENT RAILS PER THE STRUCTURAL DETAILS.

7 OUTSIDE AIR DUCTWORK SERVING AHU-1 AND AHU-2. TERMINATE AT ROOF WITH A GOOSENECK 24" ABOVE THE ROOF LINE.

8 OUTSIDE AIR DUCTWORK SERVING THE EQUIPMENT IN THE BASEMENT SPACE. TERMINATE AT ROOF WITH A GOOSENECK 24" ABOVE THE ROOF LINE.

9 COORDINATE ALL UNIT LOCATIONS WITH EXISTING CONDITIONS PRIOR TO ROUGH-IN.



① HVAC ROOF PLAN
1/4" = 1'-0"

NORTH

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01/11/2022

PROJECT INFORMATION:
DOWNTOWN ANN ARBOR

PROJECT INFORMATION:
311 SOUTH STATE ST.
ANN ARBOR, MI 48104

DRAWN BY:	JAE
CHECKED BY:	MK
PROJECT MANAGER:	JAE
SG DESIGN MANAGER:	LK
SG CONSTR. MANAGER:	JB
PROJECT NO:	210010
TEMPLATE VERSION:	12/21/2021

REVISIONS

REV.	DATE	DESCRIPTION

HVAC ROOF PLAN

M-102

1/11/2022 8:40:50 AM

SYMBOLS & ABBREVIATIONS

HVAC PIPING SYMBOLS

⤷───○	ELBOW UP
⤷───◐	ELBOW DOWN
— · CD· —	CONDENSATE DRAIN
Ⓧ	PLAN NOTE: SEE KEYNOTES LISTED ON THE SAME SHEET FOR NOTE MEANING
◑	CONNECT TO EXISTING
(XX-#)	EQUIPMENT TAG: SEE EQUIPMENT SCHEDULE ON SHEET M-300 FOR EQUIPMENT INFORMATION
⋈	VALVE
⋈	SOLENOID-OPERATED VALVE
N	CHECK VALVE
⋈	CIRCUIT-SETTER BALANCE VALVE RATED FOR POTABLE WATER
(BTU)	BTU METER

HVAC PIPING ABBERVIATIONS

AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AHU	AIR HANDLING UNIT
BC	BLOWER COIL
CD	CONDENSATE DRAIN
CHWR	CHILLED WATER RETURN
CHWS	CHILLED WATER SUPPLY
CWR	CONDENSER WATER RETURN
CWS	CONDENSER WATER SUPPLY
EXT'G	EXISTING
GC	GENERAL CONTRACTOR
HES	TENANT'S HVAC EQUIPMENT SUPPLIER
HWR	HOT WATER RETURN
HWS	HOT WATER SUPPLY
KES	TENANT'S KITCHEN EQUIPMENT SUPPLIER
RTU	ROOFTOP UNIT
WSHP	WATER SOURCE HEAT PUMP

CODED NOTES

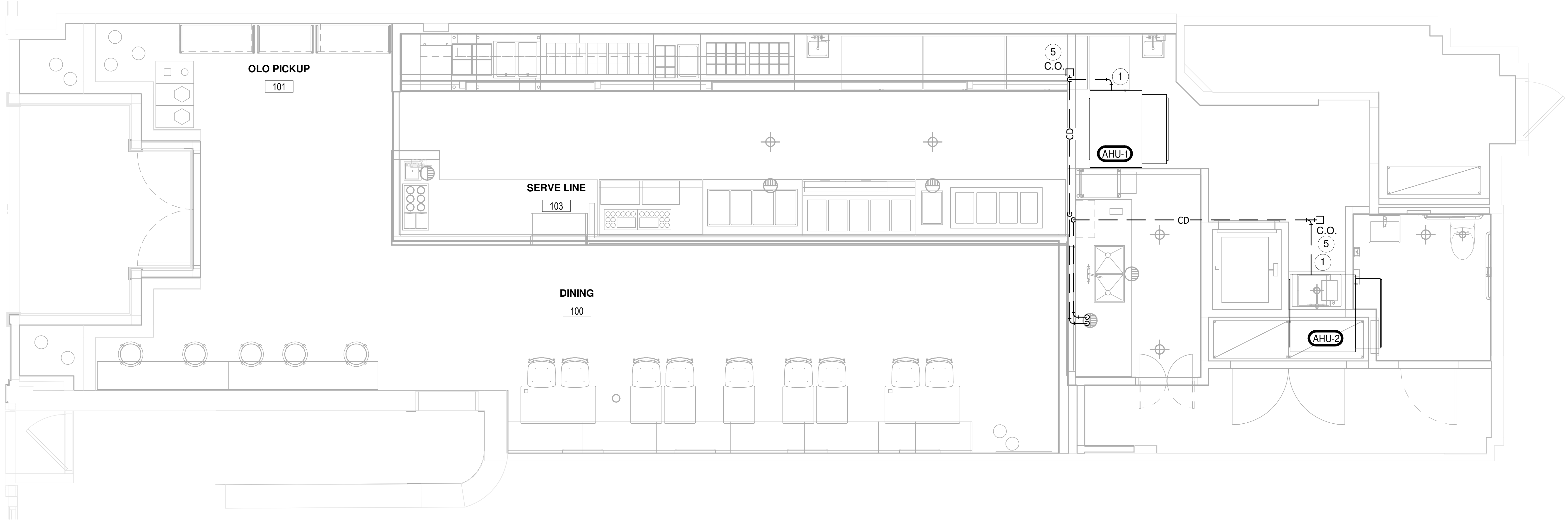
1 PROVIDE CONDENSATE DRAIN FROM THE AIR-HANDLING UNIT AS SHOWN, PER DETAIL 4/SHEET M-400 AND PER THE MANUFACTURER'S INSTALLATION INSTRUCTIONS. CONDENSATE DRAIN PIPING SHALL BE 3/4" OR THE CONNECTION SIZE TO THE EQUIPMENT, WHICHEVER IS LARGER. PROVIDE INDIRECT DRAIN PER DETAIL 5/SHEET P-400. ALL DRAIN PIPING SHALL BE CONCEALED ABOVE CEILINGS AND WITHIN FRAMED WALLS UNLESS OTHERWISE NOTED.

2 REFER TO THE PLUMBING WASTE AND VENT - BASEMENT PLAN FOR WALK-IN COOLER DRAINAGE REQUIREMENTS.

3 CEILING CASSETTE UNIT SHALL BE FURNISHED WITH A CONDENSATE PUMP. INSTALL PUMP PER THE MANUFACTURER'S INSTALLATION INSTRUCTIONS. CONTRACTOR SHALL PROVIDE PIPING UP TO A HEIGHT SUFFICIENT ENOUGH TO DRAIN THE CONDENSATE VIA GRAVITY AND PROVIDE PIPING TO THE INDIRECT WASTE RECEPTOR PER THE MANUFACTURER'S INSTALLATION INSTRUCTIONS. TERMINATE PER DETAIL 5/SHEET P-400. ALL DRAIN PIPING SHALL BE CONCEALED ABOVE CEILINGS AND WITHIN FRAMED WALLS UNLESS OTHERWISE NOTED. COORDINATE WITH FIELD-CONDITIONS AS REQUIRED.

4 PROVIDE CONDENSATE DRAIN FROM THE EQUIPMENT AS SHOWN AND PER THE MANUFACTURER'S INSTALLATION INSTRUCTIONS. PROVIDE INDIRECT DRAIN PER DETAIL 5/SHEET P-400. ALL DRAIN PIPING SHALL BE CONCEALED ABOVE CEILINGS AND WITHIN FRAMED WALLS UNLESS OTHERWISE NOTED.

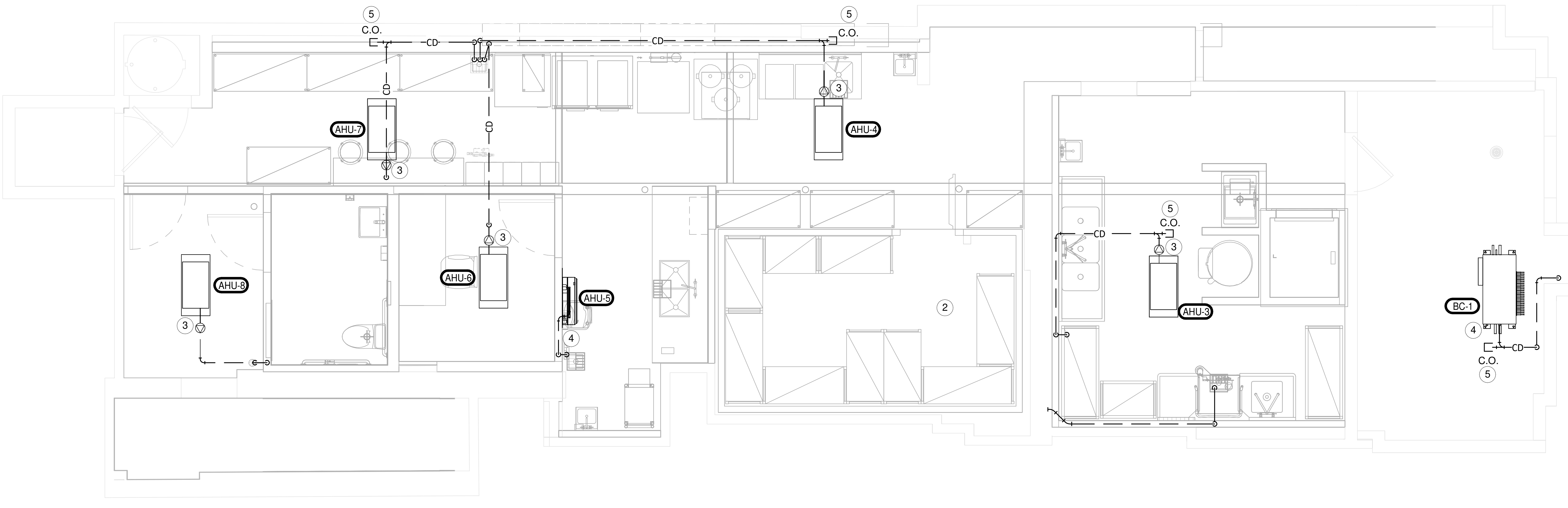
5 PROVIDE CLEANOUTS IN CONDENSATE PIPING AS SHOWN AND AS REQUIRED TO CLEAR BLOCKAGES IN THE CONDENSATE DRAIN SYSTEM. TYPICAL FOR EACH UNIT.



NORTH

2 **HVAC PIPING PLAN - MAIN LEVEL**

1/4" = 1'-0"



NORTH

1 **HVAC PIPING PLAN - BASEMENT**

1/4" = 1'-0"

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DOWNTOWN ANN ARBOR

PROJECT INFORMATION:
311 SOUTH STATE ST.
ANN ARBOR, MI 48104

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SG CONSTR. MANAGER:	JB
PROJECT NO:	210010
TEMPLATE VERSION:	12/21/2021

REVISIONS

REV.	DATE	DESCRIPTION

HVAC PIPING PLAN

M-200

1/11/2022 8:40:52 AM

MATERIAL SCHEDULE

CATEGORY	APPLICATION	ALLOWABLE MATERIAL
DUCT	EXPOSED, SUPPLY	FLAT OVAL AS SHOWN. PAINTED TO MATCH ROOF DECK.
	EXPOSED, RETURN	FLAT OVAL AS SHOWN. PAINTED TO MATCH ROOF DECK.
	CONCEALED, SUPPLY	RECTANGULAR OR ROUND AS SHOWN. INSULATED.
	CONCEALED, RETURN	RECTANGULAR OR ROUND AS SHOWN. INSULATED.
	CONCEALED, GEN. EXHAUST	RECTANGULAR OR ROUND AS SHOWN. INSULATED.
	CONCEALED, VENTILATION AIR	RECTANGULAR OR ROUND AS SHOWN. INSULATED
PIPING	HYDRONIC PIPING: HOT, CHILLED AND CONDENSER WATER	TYPE L COPPER TUBE.
	CONDENSATE DRAINS	SCHEDULE 40 PVC PIPE AND FITTINGS.

CAPTIVEAIRE - HVAC SYSTEM INFORMATION

CONTACT THE CAPTIVEAIRE NATIONAL ACCOUNT TEAM FOR HVAC SYSTEM INFORMATION AT:

BALA SETHURAMAN
(301)654-2649 X6321
BALA.SETHURMAN@CAPTIVEAIRE.COM

- THE KITCHEN EQUIPMENT SUPPLIER SHALL FURNISH THE EXHAUST FAN, TYPE II HOOD (WHEN APPLICABLE), MAKEUP AIR UNIT (WHEN APPLICABLE) AND ASSOCIATED ACCESSORIES. THE GENERAL CONTRACTOR SHALL COORDINATE WITH THE KITCHEN EQUIPMENT SUPPLIER AS REQUIRED.

- ANY CHANGES OR VARIATION TO THE EQUIPMENT PACKAGE THAT WOULD AFFECT THE HVAC EQUIPMENT PACKAGE SHOULD BE BROUGHT TO THE ATTENTION OF THE ARCHITECT/ENGINEER OF RECORD AT THE TIME OF QUOTATION.

TRANE NATIONAL ACCOUNT - HVAC SYSTEM INFORMATION

CONTACT THE TRANE NATIONAL ACCOUNT TEAM FOR HVAC SYSTEM INFORMATION AT:
EMAIL - SOCALNA@TRANE.COM
PHONE - (714)983-0505 OPTION 4 (NATIONAL ACCOUNTS TEAM)
OR ANY OF THE BELOW SOUTHERN CALIFORNIA NATIONAL ACCOUNTS TEAM MEMBERS:

DEREK VAN RIPER	MARIA G. GARCIA	JEFF SWANSON
(714)227-9366	(714)983-0464	(626)945-6049
DEREK.VANRIPPER@TRANE.COM	MGGARCIA@TRANE.COM	JSWANSON@TRANE.COM

- SWEETGREEN SHALL FURNISH THE MECHANICAL SYSTEM AND ASSOCIATED ACCESSORIES THROUGH THEIR NATIONAL ACCOUNTS REPRESENTATIVES NOTED ABOVE. THE GENERAL CONTRACTOR SHALL INSTALL THE SYSTEM AND ACCESSORIES AS NOTED IN THESE DRAWINGS AND AS REQUIRED FOR A COMPLETE AND FUNCTIONING SYSTEM. COORDINATE WITH SWEETGREEN AND THE REPRESENTATIVES AS REQUIRED AND NOTED ON THE PLANS.

- ANY CHANGES OR VARIATION TO THE EQUIPMENT PACKAGE THAT WOULD AFFECT THE HVAC EQUIPMENT PACKAGE SHOULD BE BROUGHT TO THE ATTENTION OF THE TRANE NATIONAL ACCOUNT TEAM AND THE ARCHITECT/ENGINEER OF RECORD AT THE TIME OF QUOTATION.

EXHAUST SCHEDULE

[PER THE 2015 MICHIGAN MECHANICAL CODE]

CATEGORY	AREA (SF)	NUMBER OF FIXTURES	AIR RATE		EXHAUST REQUIRED (CFM)		VENTILATION REQUIRED (CFM)	VENTILATION PROVIDED (CFM)
			CFM / FIXTURE	CFM / SF	FIXTURES	FLOOR AREA		
KITCHEN	1230.2	0	0.00	-0.70	0.0	-861.1	-861.1	-865.0
RESTROOMS	109.4	2	-50.00	0.00	-100.0	0.0	-100.0	-100.0
TOTAL							-961.1	-965.0

AIR BALANCE SCHEDULE

TAG	SUPPLY AIRFLOW (CFM)	RETURN AIRFLOW (CFM)	OUTSIDE AIRFLOW (CFM)	EXHAUST AIRFLOW (CFM)	SUBTOTAL (CFM)
AHU-1	1325	1175	150	0	150
AHU-2	2200	1575	625	0	625
EF-1	0	0	0	915	-915
EF-2	0	0	0	50	-50
SF-1	0	0	100	0	100
TOTAL (CFM)			875	965	-90

VENTILATION SCHEDULE

[PER THE 2015 MICHIGAN MECHANICAL CODE]

CATEGORY	OCCUPANT DENSITY (# / 1000 SF)	AREA (SF)	OCCUPANCY BY AREA (PEOPLE)	AIR RATE (CFM)		VENTILATION REQUIRED (CFM)		EFFECTIVENESS	VENTILATION REQUIRED (CFM)	VENTILATION PROVIDED (CFM)
				CFM / PERSON	CFM / SF	OCCUPANCY	FLOOR AREA			
BREAK AREA	50	64.0	4	5.00	0.06	20.0	3.8	0.8	29.8	30.0
CORRIDOR - FIRST	0	191.2	0	0.00	0.06	0.0	11.5	0.8	14.3	15.0
CORRIDOR - LOWER LEVEL	0	148.3	0	0.00	0.06	0.0	8.9	0.8	11.1	15.0
DINING ROOM	70	652.6	46	7.50	0.18	345.0	117.5	0.8	578.1	605.0
KITCHEN STAIRS	0	94.4	0	0.00	0.06	0.0	5.7	0.8	7.1	10.0
OFFICE	5	75.3	1	5.00	0.06	5.0	4.5	0.8	11.9	15.0
STORAGE AREAS - FIRST	0	19.0	0	0.00	0.12	0.0	2.3	0.8	2.9	5.0
TOTAL									655.2	695.0

FIRE DAMPER SCHEDULE

TAG	TYPE	RATING (HOURS)	FLOW	ORIENTATION	SUPPLIER	INSTALLER	MANUFACTURER	MODEL	REMARKS
FD-1	A	1.5	DYNAMIC	HORIZONTAL	GC	GC	RUSKIN	DIBD23	
FD-2	A	1.5	DYNAMIC	HORIZONTAL	GC	GC	RUSKIN	DIBD23	

GRILLS, REGISTERS, AND DIFFUSERS SCHEDULE

EVERJ TAG	Description	FACE SIZE	MATERIAL	FINISH	MOUNTING	SUPPLIER	INSTALLER	MANUFACTURER	MODEL	REMARKS
CD1	PLAQUE FACE DIFFUSER	24'' x 24''	ALUMINUM	WHITE	GYPSUM BOARD	GC	GC	TITUS	OMNI-AA	PROVIDE WITH INTEGRAL OBD
CD2	PLAQUE FACE DIFFUSER	24'' x 24''	ALUMINUM	WHITE	GYPSUM BOARD	GC	GC	TITUS	OMNI-AA	PROVIDE INTEGRAL OBD AND TITUS TRM RAPID-MOUNT FRAME.
CD3	PLAQUE FACE DIFFUSER	12'' x 12''	ALUMINUM	WHITE	GYPSUM BOARD	GC	GC	TITUS	OMNI-AA	PROVIDE INTEGRAL OBD AND TITUS TRM RAPID-MOUNT FRAME.
ER1	3/4" SPACING, 35° DEGREE DEFLECTION RETURN GRILLE	8" x 8"	STEEL	WHITE	GYPSUM BOARD	GC	GC	TITUS	350RL	PROVIDE INTEGRAL OBD
ER2	3/4" SPACING, 35° DEGREE DEFLECTION RETURN GRILLE	20" x 14"	ALUMINUM	WHITE	GYPSUM BOARD	GC	GC	TITUS	350FL	PROVIDE INTEGRAL OBD
RG1	PERFORATED CEILING RETURN	24'' x 24''	ALUMINUM	WHITE	LAY-IN	GC	GC	TITUS	PAR-AA	PROVIDE WITH INTEGRAL OBD
RG2	PERFORATED CEILING RETURN	24'' x 24''	ALUMINUM	WHITE	GYPSUM BOARD	GC	GC	TITUS	PAR-AA	
SR1	DOUBLE DIRECTIONAL, DUCT-MOUNTED SUPPLY	18"x8"	ALUMINUM	WHITE	DUCT	GC	GC	TITUS	S300FS	PROVIDE WITH MODEL ASD AIR SCOOP DEVICE

BRANCH CONTROLLER SCHEDULE

TAG	DESCRIPTION	NUMBER OF PORTS	ELECTRICAL			SUPPLIER	INSTALLER	MANUFACTURER	MODEL	REMARKS
			MOCP (A)	MCA (A)	V/P/H					
BC-1	BRANCH CONTROLLER	12	15	1.6	208/1/60	OWNER	GC	TRANE	TCMBM1012JA11N4	

RECIRCULATING HOOD SCHEDULE

TAG	DESCRIPTION	MAX COOKING TEMP.	EXHAUST PLENUM	APPROXIMATE WEIGHT [lbs]	SUPPLIER	INSTALLER	ELECTRICAL DATA		MANUFACTURER	MODEL	REMARKS
			AIRFLOW [CFM]				WATTS	V/P/H			
HD-1	VENTLESS CANOPY RECIRCULATING HOOD	N/A	415	175	OWNER	OWNER	170 W	120/1/60	RATIONAL	60.76.177	

DUCT HEATER SCHEDULE

TAG	DESCRIPTION	AIRFLOW (CFM)	HEATING				ELECTRICAL		SUPPLIER	INSTALLER	MANUFACTURER	MODEL	REMARKS
			NUMBER OF STEPS	OUTPUT (BTU/H)	EAT (DEG. F)	LAT (DEG. F)	KW	V/P/H					
DH-1	AHU-2 DUCT HEATER	2200	2	71694	65.8	95.4	21.0	208/3//60	GC	GC	INDEECO	QUA	PROVIDE WITH DISCONNECT SWITCH, THERMAL CUTOUTS, AIRFLOW SWITCH, CONTACTORS, CONTROL TRANSFORMER AND FUSES.

FAN SCHEDULE

TAG	AIRFLOW (CFM)		E.S.P. (IN. W.C.)	DRIVE TYPE	MOTOR POWER (HP)	WEIGHT (LBF)	V/P/H	FURNISHED BY	INSTALLED BY	MANUFACTURER	MODEL	SPECIAL REMARKS
	EXHAUST	SUPPLY										
EF-1	915	0	0.7	DIRECT	0.50	150	120/1/60	KES	GC	CAPTIVE-AIRE	SIF11DD	WITH DISCONNECT, SPEED CONTROLLER AND VIBRATION ISOLATION HANGERS.
EF-2	50	0	0.5	DIRECT	0.13	30	120/1/60	KES	GC	CAPTIVEAIRE	CFA 150CA	FURNISHED WITH METAL GRILLE KIT, WALL CAP WITH BACKDRAFT DAMPER AND BIRD SCREEN AND SPEED CONTROLLER.
SF-1	0	100	0.6	DIRECT	0.17	30	120/1/60	KES	GC	CAPTIVEAIRE	CFA 200CA	FURNISHED WITH INLINE KIT, VIBRATION ISOLATORS AND SPEED CONTROLLER.

LOUVER SCHEDULE

TAG	DESCRIPTION	SIZE			AIRFLOW		MATERIAL	FINISH	SUPPLIER	INSTALLER	MANUFACTURER	MODEL	REMARKS
		FACE SIZE (W" x H")	FACE AREA (SF)	FREE AREA (SF)	TOTAL AIRFLOW (CFM)	PRESSURE DROP (IN W.C.)							
LV-1	OUTSIDE AIR RELIEF LOUVER	27"x22"	4.13	2.72	1575	0.05	ALUMINUM	TO MATCH EXISTING	GC	GC	RUSKIN	ELF6375DFL	PROVIDED WITH BIRD SCREEN AND MOUNTING SYSTEM COMPATIBLE WITH THE BUILDING CONSTRUCTION.

CONDENSING UNIT SCHEDULE

TAG	DESCRIPTION	PAIRED WITH	NOMINAL CAPACITY (TONS)	NUMBER OF COMPRESSORS	REFRIGERANT TYPE	WEIGHT (LBS)	ELECTRICAL					SUPPLIER	INSTALLER	MANUFACTURER	MODEL	REMARKS
							MOCP, CKT 1 (A)	MCA, CKT 1 (A)	MOCP, CKT 2 (A)	MCA, CKT 2 (A)	V/P/H					
CU-1	WALK-IN COOLER REMOTE CONDENSING UNIT	N/A	0	1	R448A	260	25	16.3			208/1/60	KES	KES	BY KES	BY KES	FURNISHED WITH THE WALK-IN COOLER.
CU-2	VRF SYSTEM CONDENSING UNIT	AHU-1 THRU AHU-8	20	2	R410A	1,400	70	47.0	70	47.0	208/3/60	OWNER	GC	TRANE	TURYH2403BN40AN	FURNISHED WITH TWINNING KIT, PANEL HEATER, SNOW/HAIL GUARDS, SNOW HOOD AND STANDS.

AIR HANDLING UNIT SCHEDULE

TAG	DESCRIPTION	COOLING CAPACITY (TONS)	EER	AIRFLOW				COOLING				HEATING				ELECTRICAL			SUPPLIER	INSTALLER	MANUFACTURER	MODEL	REMARKS
				TOTAL (CFM)	RETURN (CFM)	OA (CFM)	E.S.P. (IN W.C.)	NET TOTAL MBH)	NET SENSIBLE (MBH)	EAT (DEG. F)		EAT (DEG. F)	TOTAL (MBH)	LAT (DEG. F)	WEIGHT (LBF)	MOCP (A)	MCA (A)	V/P/H					
										DB	WB												
AHU-1	KITCHEN AIR HANDLING UNIT	4	11.2	1325	1175	150	0.8	48.3	26.4	74.7	67.1	61.8	27.3	80.4	250	15	4.2	208/1/60	OWNER	GC	TRANE	TPEFYP048MH142A	FURNISHED WITH FILTER BOX, FLUSH-MOUNT REMOTE SENSOR AND JOINT PIPE.
AHU-2	DINING ROOM AIR HANDLING UNIT	8	11.2	2200	1575	625	0.8	99.5	61.6	77.2	67.8	49.1	54.2	65.8	300	15	8.2	208/1/60	OWNER	GC	TRANE	TPEFYP096MH140A	FURNISHED WITH FILTER BOX, FLUSH-MOUNT REMOTE SENSOR, JOINT PIPE AND EXTERNAL HEATER ADAPTOR.
AHU-3	WAREWASH 1-WAY CASSETTE	1	11.7	275	255	20	0.0	11.9	6.8	74.5	66.2	63.7	6.7	82.5	50	15	0.3	208/1/60	OWNER	GC	TRANE	TPMFYP012BM140F	FURNISHED WITH TRIM PANEL, DISCONNECT SWITCH AND MAXIBLUE CONDENSATE PUMP.
AHU-4	HOT PREP 1-WAY CASSETTE	1.25	11.7	275	255	20	0.0	14.9	8.2	74.5	66.2	63.7	8.3	84.3	50	15	0.3	208/1/60	OWNER	GC	TRANE	TPMFYP015BM140F	FURNISHED WITH TRIM PANEL, DISCONNECT SWITCH AND MAXIBLUE CONDENSATE PUMP.
AHU-5	COLD PREP WALL-MOUNTED UNIT	0.5	11.7	175	0	0	0.0	6.0	3.5	74.5	66.2	63.7	3.2	85.5	50	15	0.2	208/1/60	OWNER	GC	TRANE	TPKFYP006LM140A	FURNISHED WITH DISCONNECT SWITCH.
AHU-6	OFFICE 1-WAY CASSETTE	1	11.7	275	260	15	0.0	11.9	6.7	74.5	66.2	63.7	6.7	82.5	50	15	0.3	208/1/60	OWNER	GC	TRANE	TPMFYP012BM140F	FURNISHED WITH TRIM PANEL, DISCONNECT SWITCH AND MAXIBLUE CONDENSATE PUMP.
AHU-7	BREAK AREA 1-WAY CASSETTE	1	11.7	275	245	30	0.0	11.9	6.7	74.5	66.2	63.7	6.7	82.5	50	15	0.3	208/1/60	OWNER	GC	TRANE	TPMFYP012BM140F	FURNISHED WITH TRIM PANEL, DISCONNECT SWITCH AND MAXIBLUE CONDENSATE PUMP.
AHU-8	HALLWAY 1-WAY CASSETTE	0.5	11.7	250	235	15	0.0	6.0	4.0	74.5	66.2	63.7	3.2	79.7	50	15	0.3	208/1/60	OWNER	GC	TRANE	TPMFYP006BM140F	FURNISHED WITH TRIM PANEL, DISCONNECT SWITCH AND MAXIBLUE CONDENSATE PUMP.

sg

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01/11/2022

PROJECT INFORMATION:
DOWNTOWN ANN ARBOR

PROJECT INFORMATION:
311 SOUTH STATE ST.
ANN ARBOR, MI 48104

DRAWN BY:	JAE
CHECKED BY:	MK
PROJECT MANAGER:	JAE
SG DESIGN MANAGER:	LK
SG CONSTR. MANAGER:	JB
PROJECT NO:	210010
TEMPLATE VERSION:	12/21/2021

REVISIONS

REV.	DATE	DESCRIPTION

HVAC SCHEDULES

M-300

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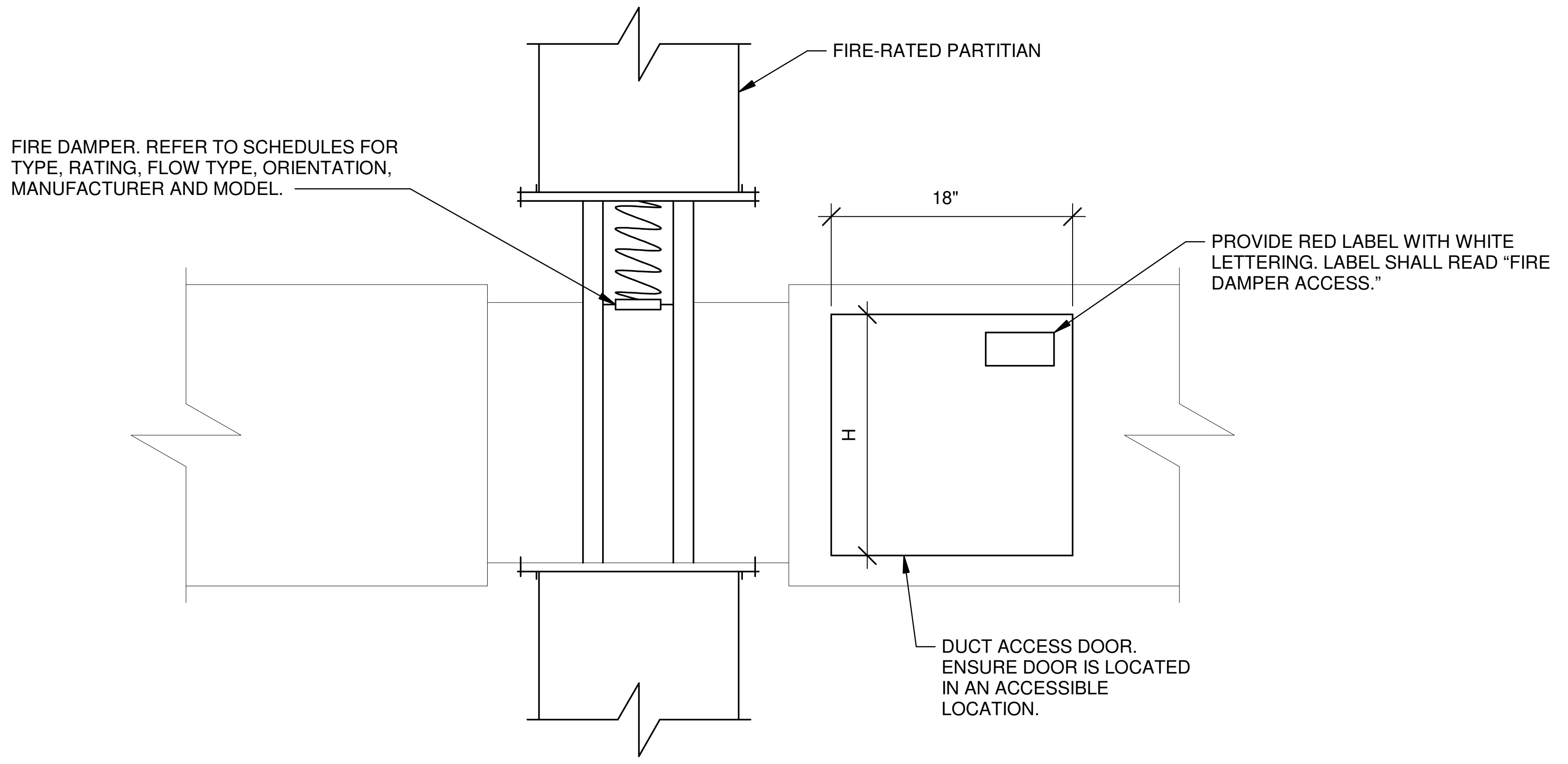
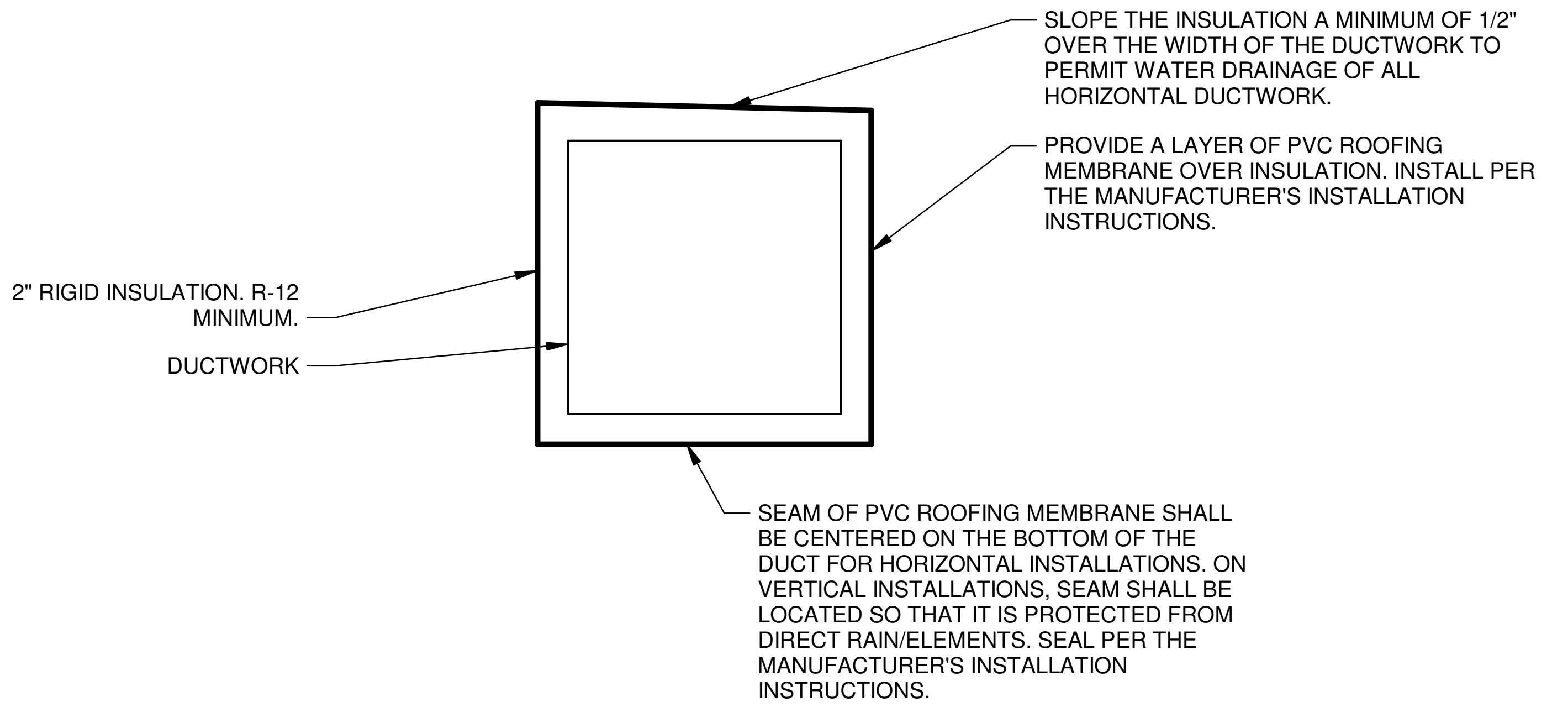
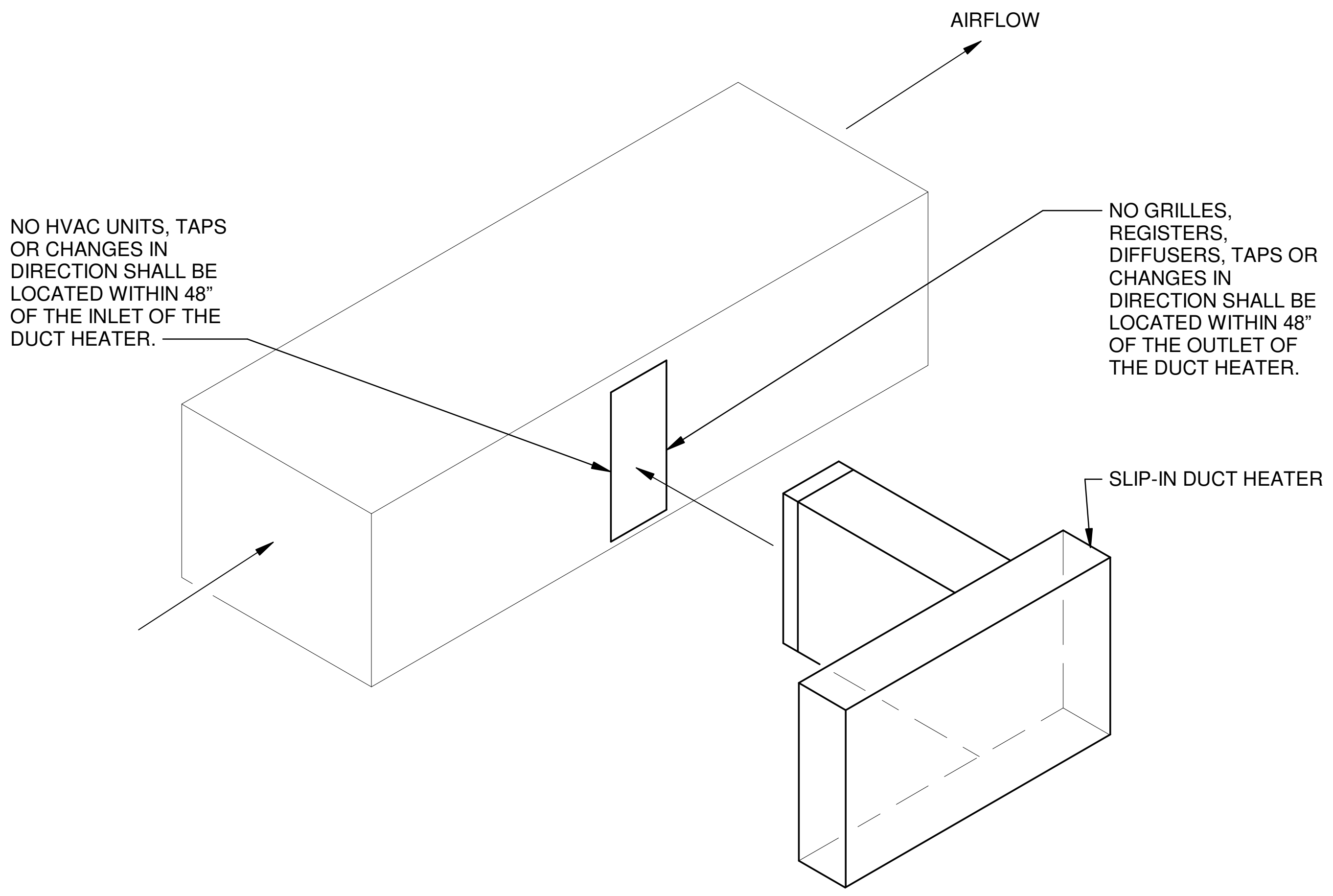


NOTES:
- "H" DIMENSION SHALL BE 2" SMALLER THAN THE DUCT HEIGHT.
- COORDINATE LOCATION OF THE ACCESS DOOR AND ACCESSIBILITY WITH WORK OF OTHER TRADES AND SITE CONDITIONS.

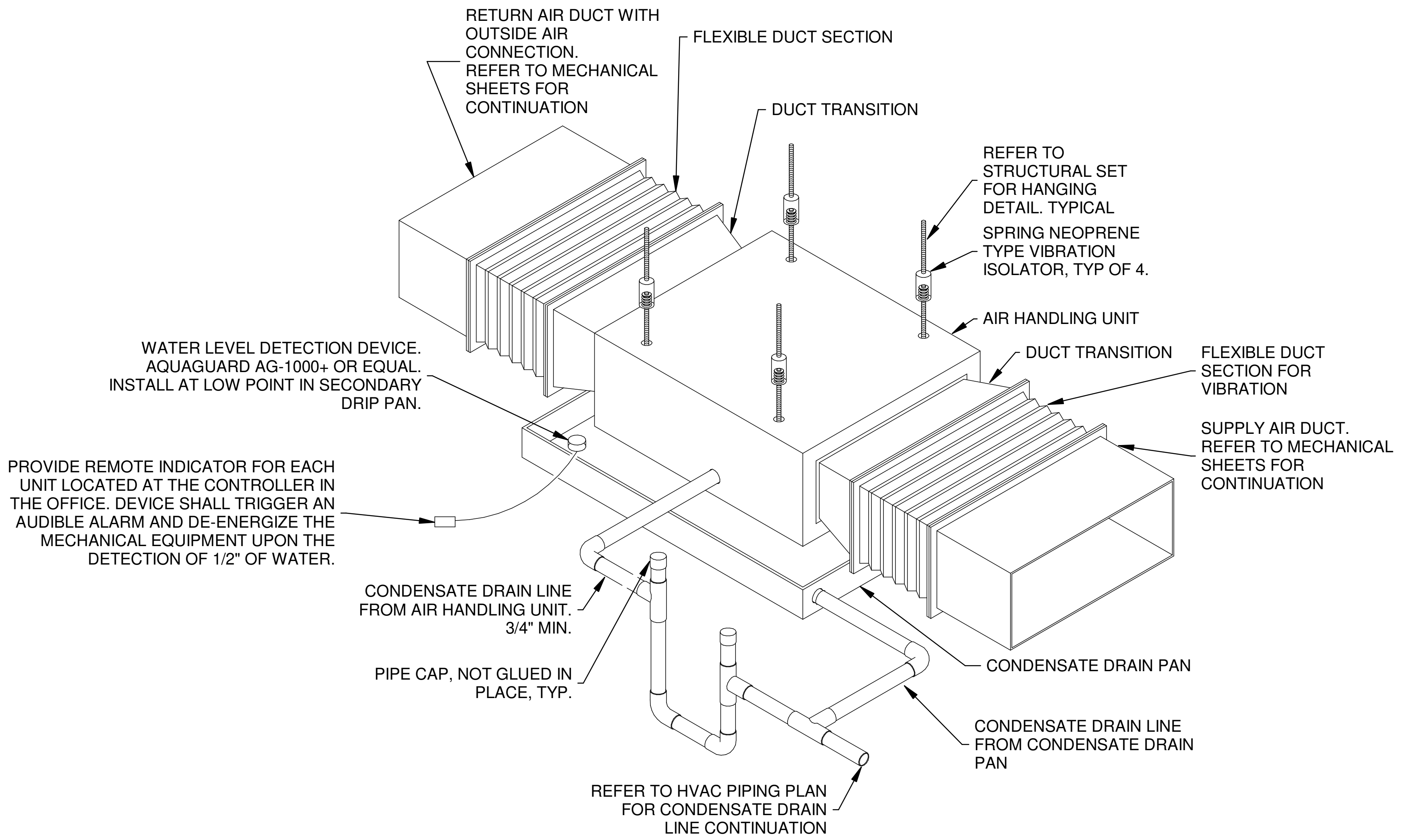
7 **FIRE DAMPER DETAIL**
N.T.S.



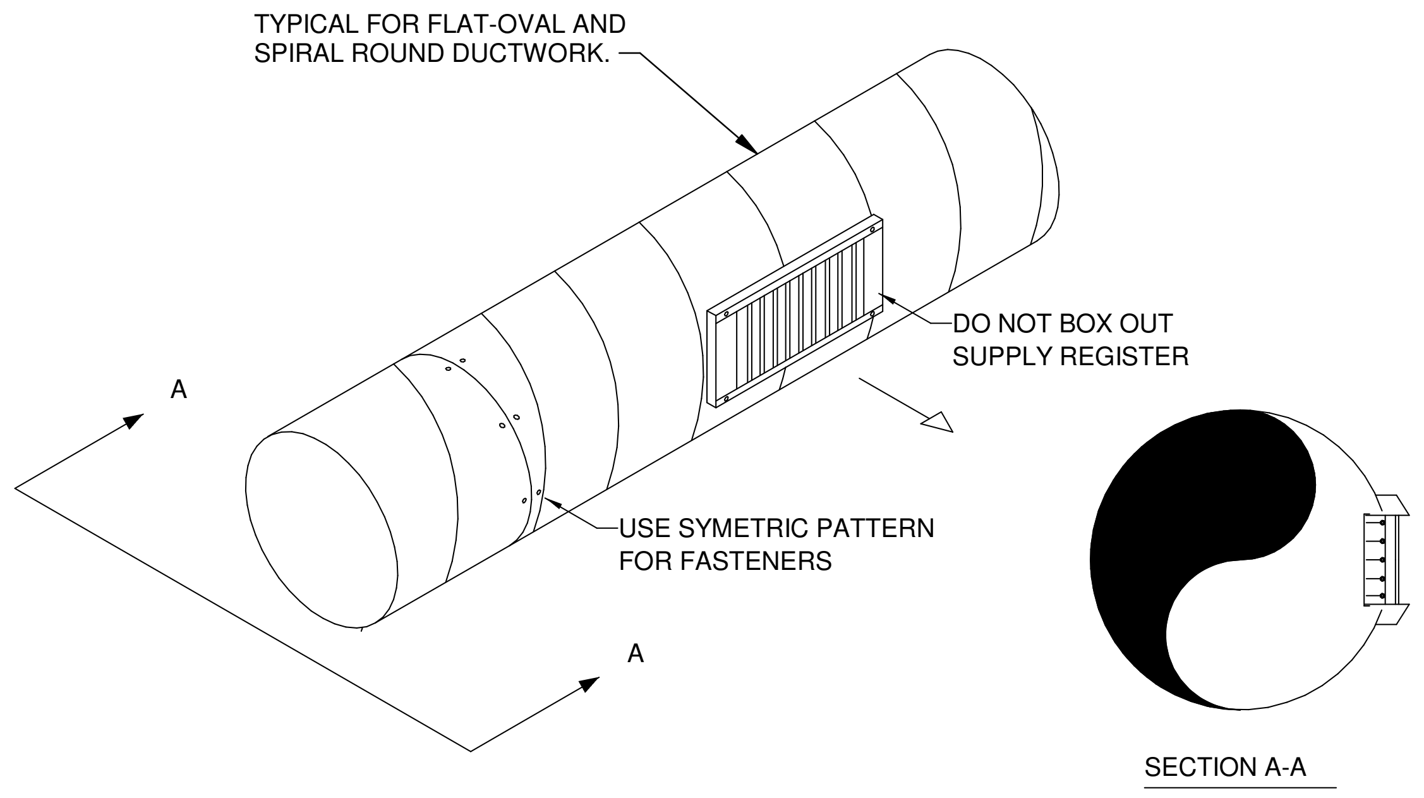
6 **EXTERIOR DUCTWORK DETAIL**
N.T.S.



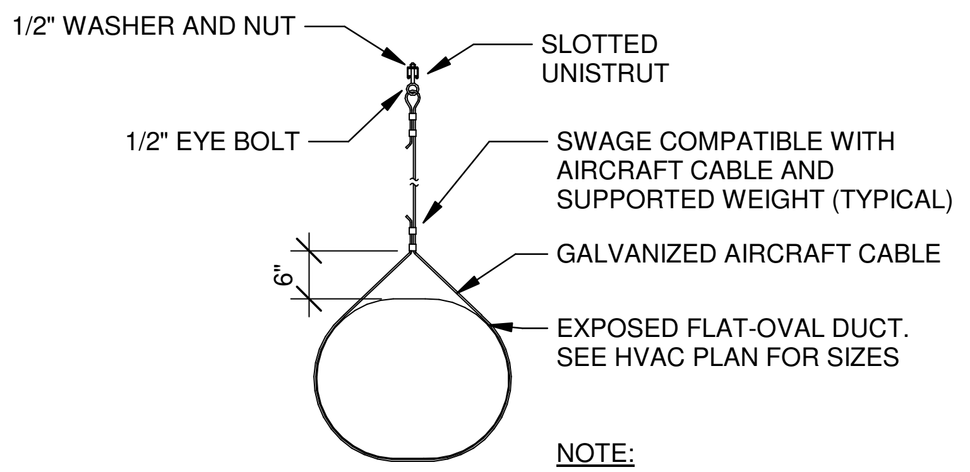
5 **DUCT HEATER INSTALLATION DETAIL**
N.T.S.



4 **AIR HANDLING UNIT INSTALLATION DETAIL**
N.T.S.

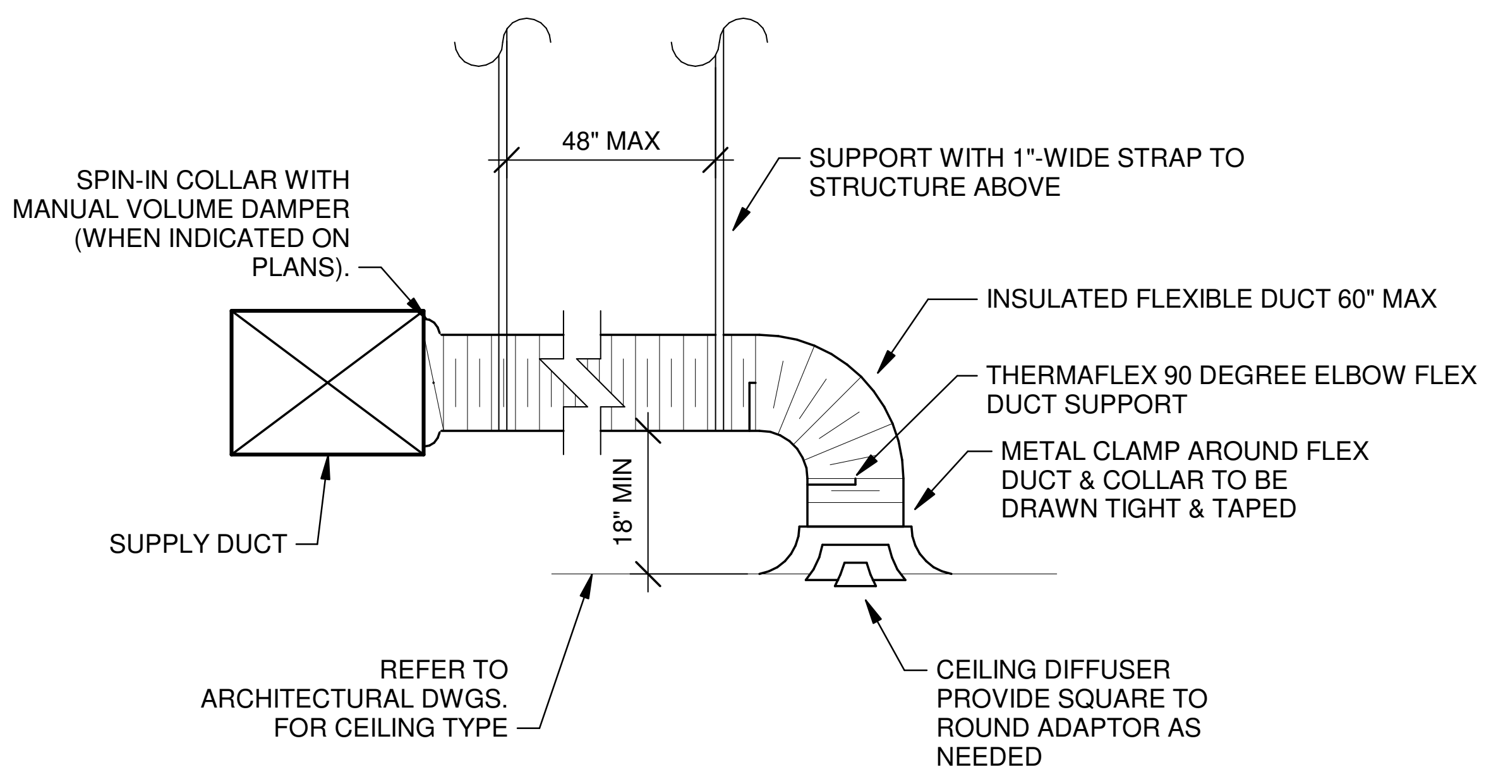


3 **EXPOSED DUCT DIFFUSER DETAIL**
N.T.S.



NOTE:
1. AIRCRAFT CABLE MUST ALWAYS HANG PLUMB AND PERPENDICULAR TO DUCT

2 **EXPOSED DUCTWORK SUPPORT**
N.T.S.



NOTE:
1. METHOD OF INSTALLATION FOR AIRTIGHT SEAL IS TYPICAL FOR ALL FLEX CONNECTIONS TO AIR DISTRIBUTION DEVICES.

1 **DIFFUSER CONNECTION**
N.T.S.

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REVISIONS

REV.	DATE	DESCRIPTION

HVAC DETAILS

M-400

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SEQUENCE OF OPERATIONS VRF GENERAL

GENERAL:
THE VRF SYSTEM SHALL BE A HEAT PUMP, HEAT RECOVERY SYSTEM CAPABLE OF SIMULTANEOUS HEATING AND COOLING. THE CONDENSING UNIT SHALL MODULATE CAPACITY AS REQUIRED TO SATISFY THE AIR HANDLING UNIT DEMAND. THE BRANCH CIRCUIT CONTROLLER SHALL PROVIDE CONTROL TO THE SYSTEM AS REQUIRED.

SEQUENCE OF OPERATIONS AHU-1

OCCUPIED MODE:
FAN OPERATION/OUTSIDE AIR DAMPER: WHEN SCHEDULED BY THE TIME CLOCK TO BE IN OCCUPIED MODE, THE AIR HANDLER FANS ARE TO START AND RUN CONTINUOUSLY AND THE OUTSIDE AIR DAMPER SHALL POWER TO THE OPEN POSITION.
HEATING: ON A FALL IN SPACE TEMPERATURE BELOW THE SETPOINT OF 70 DEGREES (ADJUSTABLE) THE AIR HANDLING UNIT SHALL BE SWITCHED TO HEATING MODE AND THE HEATING CAPACITY SHALL MODULATE UP TO MAXIMUM TO MAINTAIN THE TEMPERATURE SETPOINT.
COOLING: ON A RISE IN SPACE TEMPERATURE ABOVE THE SETPOINT OF 72 DEGREES (ADJUSTABLE) THE AIR HANDLING UNIT SHALL BE SWITCHED TO COOLING MODE AND THE COOLING CAPACITY SHALL MODULATE UP TO MAXIMUM TO MAINTAIN THE TEMPERATURE SETPOINT.

UNOCCUPIED MODE:
FAN OPERATION/OUTSIDE AIR DAMPER: WHEN SCHEDULED BY THE TIME CLOCK TO BE IN UNOCCUPIED MODE, THE AIR HANDLER FANS ARE TO BE OFF AND THE OUTSIDE AIR DAMPER SHALL REMAIN CLOSED.
HEATING: ON A FALL IN SPACE TEMPERATURE BELOW THE SETPOINT OF 65 DEGREES (ADJUSTABLE) THE AIR HANDLING UNIT FAN SHALL START AND THE UNIT SHALL BE SWITCHED TO HEATING MODE AND THE HEATING CAPACITY SHALL MODULATE UP TO MAXIMUM TO MAINTAIN THE TEMPERATURE SETPOINT.
COOLING: ON A RISE IN SPACE TEMPERATURE ABOVE THE SETPOINT OF 85 DEGREES (ADJUSTABLE) THE AIR HANDLING UNIT FAN SHALL START AND THE UNIT SHALL BE SWITCHED TO COOLING MODE AND THE COOLING CAPACITY SHALL MODULATE UP TO MAXIMUM TO MAINTAIN THE TEMPERATURE SETPOINT.

EMERGENCY MODE:
FAN OPERATION/OUTSIDE AIR DAMPER: UPON A SIGNAL FROM THE FIRE ALARM SYSTEM, THE FAN SHALL STOP AND THE OUTSIDE AIR DAMPER SHALL CLOSE

SEQUENCE OF OPERATIONS AHU-2

OCCUPIED MODE:
FAN OPERATION/OUTSIDE AIR DAMPER: WHEN SCHEDULED BY THE TIME CLOCK TO BE IN OCCUPIED MODE, THE AIR HANDLER FANS ARE TO START AND RUN CONTINUOUSLY AND THE OUTSIDE AIR DAMPER SHALL MODULATE TO THE MINIMUM POSITION.
HEATING: ON A FALL IN SPACE TEMPERATURE BELOW THE SETPOINT OF 70 DEGREES (ADJUSTABLE) THE AIR HANDLING UNIT SHALL BE SWITCHED TO HEATING MODE AND THE HEATING CAPACITY SHALL MODULATE UP TO MAXIMUM TO MAINTAIN THE TEMPERATURE SETPOINT. IF ADDITIONAL HEATING IS REQUIRED AND THE HEATING CAPACITY OF THE UNIT HAS BEEN REACHED, THE DUCT HEATER STAGES SHALL BE ENERGIZED REQUIRED TO MAINTAIN THE HEATING SETPOINT.
COOLING: ON A RISE IN SPACE TEMPERATURE ABOVE THE SETPOINT OF 72 DEGREES (ADJUSTABLE), WHEN THE ENTHALPY OF THE OUTSIDE AIR IS FAVORABLE, THE OUTSIDE AIR DAMPER SHALL MODULATE OPEN UP TO 100%, THE RETURN AIR DAMPER SHALL MODULATE CLOSED AND THE SPACE PRESSURE RELIEF DAMPER SHALL MODULATE OPEN UP TO 100%. IF THE ENTHALPY OF THE OUTSIDE AIR IS NOT FAVORABLE, OR UPON A SUDDEN RISE IN SPACE TEMPERATURE THE DAMPERS SHALL RETURN TO THEIR OCCUPIED SET POSITIONS AND THE AIR HANDLING UNIT SHALL BE SWITCHED TO COOLING MODE AND THE COOLING CAPACITY SHALL MODULATE UP TO MAXIMUM TO MAINTAIN THE TEMPERATURE SETPOINT.

UNOCCUPIED MODE:
FAN OPERATION/OUTSIDE AIR DAMPER: WHEN SCHEDULED BY THE TIME CLOCK TO BE IN UNOCCUPIED MODE, THE AIR HANDLER FANS ARE TO BE OFF AND THE OUTSIDE AIR DAMPERS SHALL REMAIN CLOSED.
HEATING: ON A FALL IN SPACE TEMPERATURE BELOW THE SETPOINT OF 65 DEGREES (ADJUSTABLE) THE AIR HANDLING UNIT FAN SHALL START, THE UNIT SHALL BE SWITCHED TO HEATING MODE AND THE HEATING CAPACITY SHALL MODULATE UP TO MAXIMUM TO MAINTAIN THE TEMPERATURE SETPOINT. IF ADDITIONAL HEATING IS REQUIRED AND THE HEATING CAPACITY OF THE UNIT HAS BEEN REACHED, THE DUCT HEATER STAGES SHALL BE ENERGIZED REQUIRED TO MAINTAIN THE HEATING SETPOINT.
COOLING: ON A RISE IN SPACE TEMPERATURE ABOVE THE SETPOINT OF 85 DEGREES (ADJUSTABLE) THE AIR HANDLING UNIT FAN SHALL START. WHEN THE ENTHALPY OF THE OUTSIDE AIR IS FAVORABLE, THE OUTSIDE AIR DAMPER SHALL MODULATE OPEN UP TO 100%, THE RETURN AIR DAMPER SHALL MODULATE CLOSED AND THE SPACE PRESSURE RELIEF DAMPER SHALL MODULATE OPEN UP TO 100%. IF THE ENTHALPY OF THE OUTSIDE AIR IS NOT FAVORABLE, OR UPON A SUDDEN RISE IN SPACE TEMPERATURE THE DAMPERS SHALL RETURN TO THEIR UNOCCUPIED SET POSITIONS AND THE AIR HANDLING UNIT SHALL BE SWITCHED TO COOLING MODE AND THE COOLING CAPACITY SHALL MODULATE UP TO MAXIMUM TO MAINTAIN THE TEMPERATURE SETPOINT.

EMERGENCY MODE:
FAN OPERATION/OUTSIDE AIR DAMPER: UPON A SIGNAL FROM THE FIRE ALARM SYSTEM, THE FAN SHALL STOP AND THE OUTSIDE AIR DAMPER SHALL CLOSE

SEQUENCE OF OPERATIONS AHU-3 THRU AHU-7

OCCUPIED MODE:
FAN OPERATION/OUTSIDE AIR DAMPER: WHEN SCHEDULED BY THE TIME CLOCK TO BE IN OCCUPIED MODE, THE AIR HANDLER FANS ARE TO START AND RUN CONTINUOUSLY.
HEATING: ON A FALL IN SPACE TEMPERATURE BELOW THE SETPOINT OF 70 DEGREES (ADJUSTABLE) THE AIR HANDLING UNIT SHALL BE SWITCHED TO HEATING MODE AND THE HEATING CAPACITY SHALL MODULATE UP TO MAXIMUM TO MAINTAIN THE TEMPERATURE SETPOINT.
COOLING: ON A RISE IN SPACE TEMPERATURE ABOVE THE SETPOINT OF 72 DEGREES (ADJUSTABLE) THE AIR HANDLING UNIT SHALL BE SWITCHED TO COOLING MODE AND THE COOLING CAPACITY SHALL MODULATE UP TO MAXIMUM TO MAINTAIN THE TEMPERATURE SETPOINT.

UNOCCUPIED MODE:
FAN OPERATION/OUTSIDE AIR DAMPER: WHEN SCHEDULED BY THE TIME CLOCK TO BE IN UNOCCUPIED MODE, THE AIR HANDLER FANS ARE TO BE OFF.
HEATING: ON A FALL IN SPACE TEMPERATURE BELOW THE SETPOINT OF 65 DEGREES (ADJUSTABLE) THE AIR HANDLING UNIT FAN SHALL START AND THE UNIT SHALL BE SWITCHED TO HEATING MODE AND THE HEATING CAPACITY SHALL MODULATE UP TO MAXIMUM TO MAINTAIN THE TEMPERATURE SETPOINT.
COOLING: ON A RISE IN SPACE TEMPERATURE ABOVE THE SETPOINT OF 85 DEGREES (ADJUSTABLE) THE AIR HANDLING UNIT FAN SHALL START AND THE UNIT SHALL BE SWITCHED TO COOLING MODE AND THE COOLING CAPACITY SHALL MODULATE UP TO MAXIMUM TO MAINTAIN THE TEMPERATURE SETPOINT.

EMERGENCY MODE:
FAN OPERATION/OUTSIDE AIR DAMPER: UPON A SIGNAL FROM THE FIRE ALARM SYSTEM, THE FAN SHALL STOP AND THE OUTSIDE AIR DAMPER SHALL CLOSE

SEQUENCE OF OPERATIONS EF-1, EF-2 & SF-1

OCCUPIED MODE:
FAN OPERATION: WHEN SCHEDULED BY THE TIME CLOCK TO BE IN OCCUPIED MODE, THE FANS ARE TO START AND RUN CONTINUOUSLY.

UNOCCUPIED MODE:
FAN OPERATION: WHEN SCHEDULED BY THE TIME CLOCK TO BE IN UNOCCUPIED MODE, THE FANS SHALL REMAIN OFF.

EMERGENCY MODE:
FAN OPERATION: UPON A SIGNAL FROM THE FIRE ALARM SYSTEM, THE FANS SHALL STOP.

2 SEQUENCE OF OPERATIONS
N.T.S.

Diamond System Builder
sw: 4.3.2.35
db: 4.3.2.22
1/5/2022
4:39 PM

CITY MULTI
SYSTEM SCHEMATIC DWG.

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

CONT.No		PAGE	

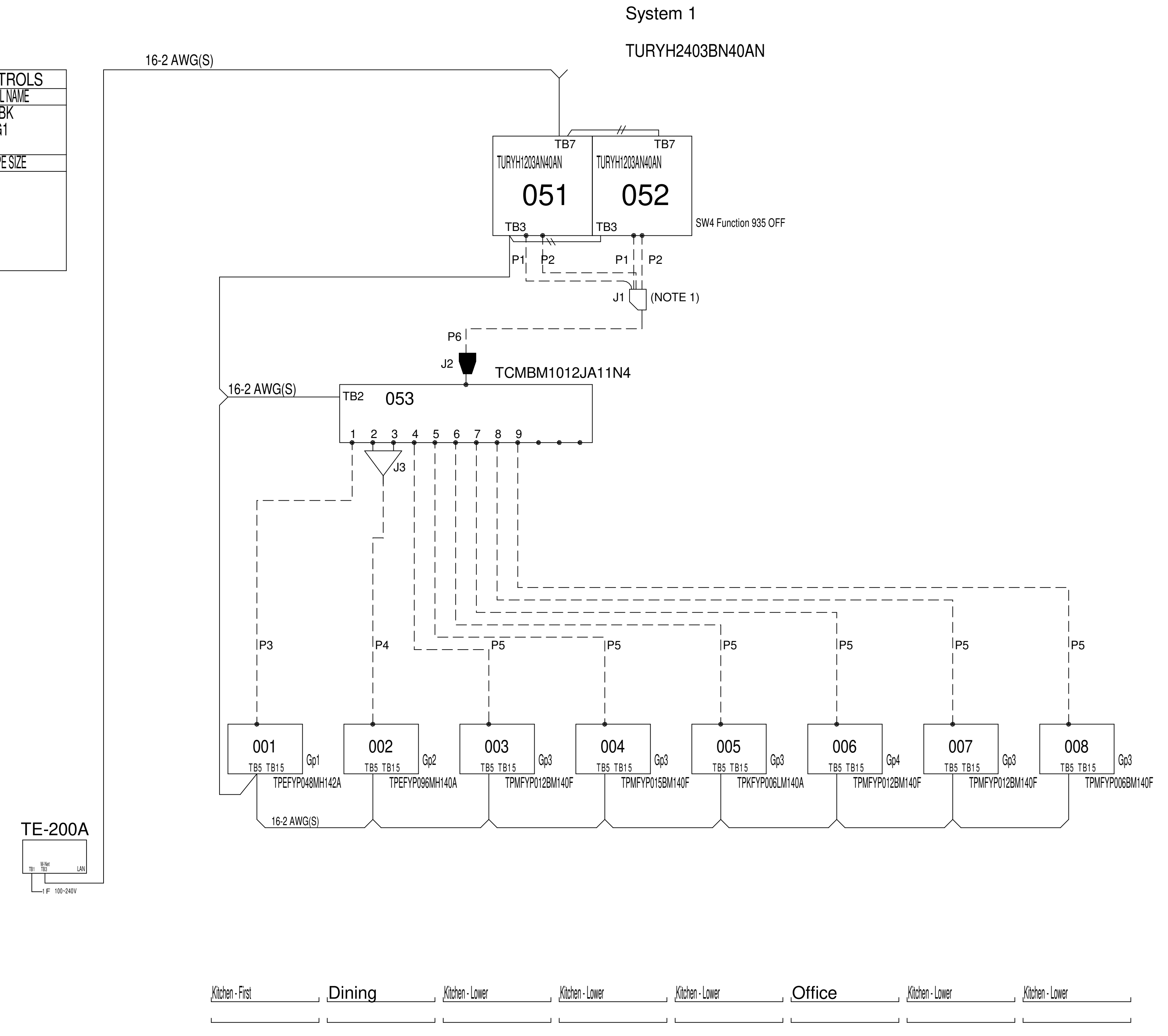
This drawing is schematic in nature. Final routing of piping & wiring shall be determined by the installing contractor and/or designer of record

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).

Coded Notes:
NOTE 1: Install twinning Y's within 15 degrees of level and with 20 inches of straight pipe on converging connection - reference installation manual for additional details including but not limited to special trapping requirements when twinning, and pipe slope requirements

PIPING AND CONTROLS	
SYMBOL	BRANCH PIPE MODEL NAME
J1	CMY-R200NCBK
J2	CMY-R302S-G1
J3	CMY-R160-J1
SYMBOL	LIQUID PIPE/GAS PIPE SIZE
P1	3/4 /
P2	/ 1-1/8
P3	3/8 / 5/8
P4	3/8 / 7/8
P5	1/4 / 1/2
P6	/ 7/8 / 1-3/8



REMARKS
Comments:

NOTE: DIAGRAMS ARE FOR REFERENCE ONLY. REFER TO THE TRANE SHOP DRAWINGS AND REVIEWED SUBMITTAL.

1 VRF WIRING/PIPING DIAGRAMS
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ANN ARBOR, MI 48104**

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PROJECT MANAGER:	JAE
SG DESIGN MANAGER:	LK
SG CONSTR. MANAGER:	JB
PROJECT NO:	210010
TEMPLATE VERSION:	12/21/2021

REVISIONS

REV.	DATE	DESCRIPTION

VRF DIAGRAMS AND SEQUENCE OF OPERATIONS

M-401

1/11/2022 8:40:56 AM