23: HEATING, VENTILATING, AND AIR CONDITIONING

23 1 GENERAL INSTRUCTIONS

23 1-1 GENERAL REQUIREMENTS

REQUIREMENTS UNDER DIVISION ONE AND THE GENERAL AND SUPPLEMENTARY CONDITIONS OF THESE SPECIFICATIONS SHALL BE A PART OF THIS SECTION. CONTRACTOR SHALL BECOME THOROUGHLY ACQUAINTED WITH ITS CONTENTS AS TO REQUIREMENTS THAT AFFECT THIS DIVISION OR SECTION. THE WORK REQUIRED UNDER THIS SECTION INCLUDES MATERIAL, EQUIPMENT, APPLIANCES, TRANSPORTATION, SERVICES, AND LABOR REQUIRED TO COMPLETE THE ENTIRE SYSTEM AS REQUIRED BY THE DRAWINGS AND SPECIFICATIONS.

THE SPECIFICATIONS AND DRAWINGS FOR THE PROJECT ARE COMPLEMENTARY, AND PORTIONS OF THE WORK DESCRIBED IN ONE SHALL BE PROVIDED AS IF DESCRIBED IN BOTH. IN THE EVENT OF DISCREPANCIES, NOTIFY THE ENGINEER AND REQUEST CLARIFICATION PRIOR TO PROCEEDING WITH THE WORK INVOLVED.

23 1-2 DEFINITIONS

FURNISH: THE TERM "FURNISH" IS USED TO MEAN "SUPPLY AND DELIVER TO THE PROJECT SITE, READY FOR UNLOADING, UNPACKING, ASSEMBLY, INSTALLATION AND SIMILAR OPERATIONS."

INSTALL: THE TERM "INSTALL" IS USED TO DESCRIBE OPERATIONS AT THE PROJECT SITE INCLUDING THE ACTUAL "UNLOADING, UNPACKING, ASSEMBLY, ERECTION, PLACING, ANCHORING, APPLYING, WORKING TO DIMENSION, FINISHING, CURING, PROTECTING, CLEANING, AND SIMILAR OPERATIONS."

PROVIDE: THE TERM "PROVIDE" MEANS "TO FURNISH AND INSTALL, COMPLETE AND READY FOR THE INTENDED USE."

FURNISHED BY OWNER OR FURNISHED BY OTHERS: THE ITEM WILL BE FURNISHED BY THE OWNER OR OTHERS. IT IS TO BE INSTALLED AND CONNECTED UNDER THE REQUIREMENTS OF THIS DIVISION, COMPLETE AND READY FOR OPERATION, INCLUDING ITEMS INCIDENTAL TO THE WORK, INCLUDING SERVICES NECESSARY FOR PROPER INSTALLATION AND OPERATION. THE INSTALLATION SHALL BE INCLUDED UNDER THE GUARANTEE REQUIRED BY THIS DIVISION.

ENGINEER: WHERE REFERENCED IN THIS DIVISION, "ENGINEER" IS THE ENGINEER OF RECORD AND THE DESIGN PROFESSIONAL FOR THE WORK UNDER THIS DIVISION, AND IS A CONSULTANT TO, AND AN AUTHORIZED REPRESENTATIVE OF, THE ARCHITECT, AS DEFINED IN THE GENERAL AND/OR SUPPLEMENTARY CONDITIONS. WHEN USED IN THIS DIVISION, IT MEANS INCREASED INVOLVEMENT BY, AND OBLIGATIONS TO, THE ENGINEER, IN ADDITION TO INVOLVEMENT BY, AND OBLIGATIONS TO, THE "ARCHITECT".

AHJ: THE LOCAL CODE AND/OR INSPECTION AGENCY (AUTHORITY) HAVING JURISDICTION OVER THE WORK.

THE TERMS "APPROVED EQUAL", "EQUIVALENT", OR "EQUAL" ARE USED SYNONYMOUSLY AND SHALL MEAN "ACCEPTED BY OR ACCEPTABLE TO THE ENGINEER AS EQUIVALENT TO THE ITEM OR MANUFACTURER SPECIFIED". THE TERM "APPROVED" SHALL MEAN LABELED, LISTED, OR BOTH, BY A NATIONALLY RECOGNIZED TESTING LABORATORY (E.G. UL, ETL, CSA), AND ACCEPTABLE TO THE AHJ OVER THIS PROJECT.

23 1-3 PREBID SITE VISIT

PRIOR TO SUBMITTING BID, VISIT THE SITE OF THE PROPOSED WORK AND BECOME FULLY INFORMED AS TO THE CONDITIONS UNDER WHICH THE WORK IS TO BE DONE. FAILURE TO DO SO WILL NOT BE CONSIDERED SUFFICIENT JUSTIFICATION TO REQUEST OR OBTAIN EXTRA COMPENSATION OVER AND ABOVE THE CONTRACT PRICE. COORDINATE SITE VISIT WITH ARCHITECT & BUILDING OWNER.

23 1-4 MATERIAL AND WORKMANSHIP

PROVIDE NEW MATERIAL, EQUIPMENT, AND APPARATUS UNDER THIS CONTRACT UNLESS OTHERWISE STATED HEREIN, OF BEST QUALITY NORMALLY USED FOR THE PURPOSE IN GOOD COMMERCIAL PRACTICE, AND FREE FROM DEFECTS. MODEL NUMBERS LISTED IN THE SPECIFICATIONS OR SHOWN ON THE DRAWINGS ARE NOT NECESSARILY INTENDED TO DESIGNATE THE REQUIRED TRIM, WRITTEN DESCRIPTIONS OF THE TRIM GOVERN MODEL NUMBERS. CONTRACTOR RESPONSIBLE FOR NOTIFYING ENGINEER OF ANY DISCREPANCIES.

PIPE, PIPE FITTINGS, PIPE SPECIALTIES AND VALVES SHALL BE MANUFACTURED IN PLANTS LOCATED IN THE UNITED STATES.

WORK PERFORMED UNDER THIS CONTRACT SHALL PROVIDE A NEAT AND "WORKMANLIKE" APPEARANCE WHEN COMPLETED, TO THE SATISFACTION OF THE ARCHITECT AND ENGINEER. WORKMANSHIP SHALL BE THE FINEST POSSIBLE BY EXPERIENCED MECHANICS. INSTALLATIONS SHALL COMPLY WITH APPLICABLE CODES AND LAWS.

THE COMPLETE INSTALLATION SHALL FUNCTION AS DESIGNED AND INTENDED WITH RESPECT TO EFFICIENCY, CAPACITY, NOISE LEVEL, ETC. ABNORMAL NOISE CAUSED BY RATTLING EQUIPMENT, PIPING, DUCTS, AIR DEVICES, AND SQUEAKS IN ROTATING COMPONENTS WILL NOT BE ACCEPTABLE. IN GENERAL, MATERIALS AND EQUIPMENT SHALL BE OF COMMERCIAL SPECIFICATION GRADE IN QUALITY. LIGHT DUTY AND RESIDENTIAL TYPE EQUIPMENT WILL NOT BE ACCEPTED.

REMOVE FROM THE PREMISES WASTE MATERIAL PRESENT AS A RESULT OF WORK, INCLUDING CARTONS, CRATING, PAPER, STICKERS, AND/OR EXCAVATION MATERIAL NOT USED IN BACKFILLING, ETC. CLEAN EQUIPMENT INSTALLED UNDER THIS CONTRACT TO PRESENT A NEAT AND CLEAN INSTALLATION AT THE TERMINATION OF THE WORK.

REPAIR OR REPLACE PUBLIC AND PRIVATE PROPERTY DAMAGED AS A RESULT OF WORK PERFORMED UNDER THIS CONTRACT TO THE SATISFACTION OF AUTHORITIES AND REGULATIONS HAVING JURISDICTION.

23 1-5 COORDINATION

COORDINATE WORK WITH THAT OF OTHER TRADES SO THAT THE VARIOUS COMPONENTS OF THE SYSTEMS WILL BE INSTALLED AT THE PROPER TIME, WILL FIT THE AVAILABLE SPACE, AND WILL ALLOW PROPER SERVICE ACCESS TO THOSE ITEMS REQUIRING MAINTENANCE. COMPONENTS WHICH ARE INSTALLED WITHOUT REGARD TO THE ABOVE SHALL BE RELOCATED AT NO ADDITIONAL COST TO THE OWNER.

UNLESS OTHERWISE INDICATED, THE GENERAL CONTRACTOR WILL PROVIDE CHASES AND OPENINGS IN BUILDING CONSTRUCTION REQUIRED FOR INSTALLATION OF THE SYSTEMS SPECIFIED HEREIN. CONTRACTOR SHALL FURNISH THE GENERAL CONTRACTOR WITH INFORMATION WHERE CHASES AND OPENINGS ARE REQUIRED. KEEP INFORMED AS TO THE WORK OF OTHER TRADES ENGAGED IN THE CONSTRUCTION OF THE PROJECT, AND EXECUTE WORK IN A MANNER AS TO NOT INTERFERE WITH OR DELAY THE WORK OF OTHER TRADES.

FIGURED DIMENSIONS SHALL BE TAKEN IN PREFERENCE TO SCALE DIMENSIONS. CONTRACTOR SHALL TAKE HIS OWN MEASUREMENTS AT THE BUILDING, AS VARIATIONS MAY OCCUR. CONTRACTOR WILL BE HELD RESPONSIBLE FOR ERRORS THAT COULD HAVE BEEN AVOIDED BY PROPER CHECKING AND INSPECTION.

PROVIDE MATERIALS WITH TRIM THAT WILL PROPERLY FIT THE TYPES OF CEILING, WALL, OR FLOOR FINISHES ACTUALLY INSTALLED. MODEL NUMBERS LISTED IN THE SPECIFICATIONS OR SHOWN ON THE DRAWINGS ARE NOT INTENDED TO DESIGNATE THE REQUIRED TRIM.

23 1-6 ORDINANCES AND CODES

WORK PERFORMED UNDER THIS CONTRACT SHALL, AT A MINIMUM, BE IN CONFORMANCE WITH 2012 INTERNATIONAL SERIES OF CODES AND LOCAL CODES HAVING JURISDICTION. EQUIPMENT FURNISHED AND ASSOCIATED INSTALLATION WORK PERFORMED UNDER THIS CONTRACT SHALL BE IN STRICT COMPLIANCE WITH CURRENT APPLICABLE CODES ADOPTED BY THE LOCAL AHJ INCLUDING ANY AMENDMENTS AND STANDARDS AS SET FORTH BY THE NATIONAL FIRE PROTECTION ASSOCIATION (NFPA), UNDERWRITERS LABORATORIES (UL), OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA), AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME), AMERICAN SOCIETY OF HEATING, REFRIGERATION, AND AIR CONDITIONING ENGINEERS (ASHRAE), AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI), AMERICAN SOCIETY OF TESTING MATERIALS (ASTM) AND OTHER NATIONAL STANDARDS AND CODES WHERE APPLICABLE. WHERE THE CONTRACT DOCUMENTS EXCEED THE REQUIREMENTS OF THE REFERENCED CODES, STANDARDS, ETC., THE CONTRACT DOCUMENTS SHALL TAKE PRECEDENCE.

PROCURE AND PAY FOR PERMITS AND LICENSES REQUIRED FOR THE ACCOMPLISHMENT OF THE WORK HEREIN DESCRIBED. WHERE REQUIRED, OBTAIN, PAY FOR AND FURNISH CERTIFICATES OF INSPECTION TO OWNER. CONTRACTOR WILL BE HELD RESPONSIBLE FOR VIOLATIONS OF THE LAW.

23 1-7 PROTECTION OF EQUIPMENT AND MATERIALS

STORE AND PROTECT FROM DAMAGE EQUIPMENT AND MATERIALS DELIVERED TO JOB SITE. COVER WITH WATERPROOF, TEAR-RESISTANT, HEAVY TARP OR POLYETHYLENE PLASTIC AS REQUIRED TO PROTECT FROM PLASTER, DIRT, PAINT, WATER, OR PHYSICAL DAMAGE. EQUIPMENT AND MATERIAL THAT HAS BEEN DAMAGED BY CONSTRUCTION ACTIVITIES WILL BE REJECTED, AND CONTRACTOR IS OBLIGATED TO FURNISH NEW EQUIPMENT AND MATERIAL OF A LIKE KIND.

KEEP PREMISES BROOM CLEAN FROM FOREIGN MATERIAL CREATED DURING WORK PERFORMED UNDER THIS CONTRACT. PIPING, EQUIPMENT, ETC. SHALL HAVE A NEAT AND CLEAN APPEARANCE AT THE TERMINATION OF THE WORK.

PLUG OR CAP OPEN ENDS OF DUCTWORK AND PIPING SYSTEMS WHILE STORED AND INSTALLED DURING CONSTRUCTION WHEN NOT IN USE TO PREVENT THE ENTRANCE OF DEBRIS INTO THE SYSTEMS.

23 1-8 SUBSTITUTIONS

THE BASE BID SHALL INCLUDE ONLY THE PRODUCTS FROM MANUFACTURERS SPECIFICALLY NAMED IN THE DRAWINGS AND SPECIFICATIONS. NO SUBSTITUTION WILL BE CONSIDERED PRIOR TO RECEIPT OF BIDS UNLESS WRITTEN REQUEST FOR APPROVAL TO BID HAS BEEN RECEIVED BY THE ENGINEER AT LEAST TEN CALENDAR DAYS PRIOR TO THE DATE FOR RECEIPT OF BIDS. EACH SUCH REQUEST SHALL INCLUDE THE NAME OF THE MATERIAL OR EQUIPMENT FOR WHICH IT IS TO BE SUBSTITUTED AND A COMPLETE DESCRIPTION OF THE PROPOSED SUBSTITUTE INCLUDING DRAWINGS, CUTS, PERFORMANCE AND TEST DATA AND OTHER INFORMATION NECESSARY FOR AN EVALUATION. A STATEMENT SETTING FORTH CHANGES IN OTHER MATERIALS, EQUIPMENT OR OTHER WORK THAT INCORPORATION OF THE SUBSTITUTE WOULD REQUIRE SHALL BE INCLUDED. THE BURDEN OF PROOF OF THE MERIT OF THE PROPOSED SUBSTITUTE IS UPON THE PROPOSER. THE ENGINEER'S DECISION OF APPROVAL OR DISAPPROVAL TO BID OF A PROPOSED SUBSTITUTION SHALL BE FINAL.

THE TERMS "APPROVED", "APPROVED EQUAL", AND "EQUAL" REFER TO APPROVAL BY THE ENGINEER AS AN ACCEPTABLE ALTERNATE BID. NO SUBSTITUTIONS WILL BE CONSIDERED THAT ARE NOT BID AS AN ALTERNATE. NO MATERIAL SUBSTITUTIONS SHALL BE CONSIDERED FOR APPROVAL PRIOR TO AWARD OF CONTRACT.

COORDINATE AND VERIFY WITH OTHER TRADES WHETHER OR NOT THE SUBSTITUTED EQUIPMENT CAN BE INSTALLED AS SHOWN ON THE CONSTRUCTION DRAWINGS WITHOUT MODIFICATION TO ASSOCIATED SYSTEMS OR ARCHITECTURAL OR ENGINEERING DESIGN. INCLUDE ADDITIONAL COSTS FOR ARCHITECTURAL AND ENGINEERING DESIGN FEES IN BID IF DRAWING MODIFICATIONS ARE REQUIRED BECAUSE OF SUBSTITUTED EQUIPMENT.

23 1-9 SHOP DRAWINGS

UPON BEING AWARDED A CONTRACT, SUBMIT TO THE ARCHITECT FOR APPROVAL, ONE (1) COPY OF MANUFACTURER'S SHOP DRAWINGS FOR EQUIPMENT TO BE FURNISHED UNDER THIS CONTRACT, ITEMS REQUIRING COORDINATION BETWEEN CONTRACTORS AND SHEET METAL DUCTWORK FABRICATION DRAWINGS. BEFORE SUBMITTING SHOP DRAWINGS AND MATERIAL LISTS, VERIFY THAT EQUIPMENT SUBMITTED IS MUTUALLY COMPATIBLE AND SUITABLE FOR THE INTENDED USE, AND WILL FIT THE AVAILABLE SPACE AND ALLOW AMPLE ROOM FOR MAINTENANCE. HIGHLIGHT, MARK, LIST OR INDICATE THE MATERIALS, PERFORMANCE CRITERIA AND ACCESSORIES THAT ARE BEING PROPOSED. SUBMIT SHOP DRAWINGS AS EARLY AS REQUIRED TO SUPPORT THE PROJECT SCHEDULE. ALLOW FOR TWO WEEKS ENGINEER REVIEW TIME PLUS MAILING TIME PLUS A DUPLICATION OF THIS TIME FOR RESUBMITTAL IF REQUIRED.

SUBMITTALS AND SHOP DRAWINGS SHALL NOT CONTAIN RTM'S FIRM NAME OR LOGO, NOR SHALL IT CONTAIN THE RTM'S ENGINEERS' SEAL AND SIGNATURE. THEY SHALL NOT BE COPIES OF RTM'S WORK PRODUCT. IF THE CONTRACTOR DESIRES TO USE ELEMENTS OF SUCH PRODUCT, REFER TO PARAGRAPH "ELECTRONIC DRAWING FILES" FOR PROCEDURES TO BE USED.

THE ENGINEER'S CHECKING AND SUBSEQUENT APPROVAL OF SUCH SHOP DRAWINGS WILL NOT RELIEVE THE CONTRACTOR FROM RESPONSIBILITY FOR ERRORS IN DIMENSIONS, DETAILS, SIZE OF MEMBERS, QUANTITIES, OMISSIONS OF COMPONENTS OR FITTINGS; COORDINATION OF ELECTRICAL REQUIREMENTS; OR FOR COORDINATING ITEMS WITH ACTUAL BUILDING CONDITIONS. PROCEED WITH THE PROCUREMENT AND INSTALLATION OF EQUIPMENT ONLY AFTER RECEIVING APPROVED SHOP DRAWINGS RELATIVE TO EACH ITEM.

CATALOG DATA SHALL BE PROPERLY BOUND, IDENTIFIED, INDEXED AND TABBED IN A 3-RING BINDER. LABEL THE CATALOG DATA WITH THE EQUIPMENT IDENTIFICATION ACRONYM OR NUMBER AS USED ON THE DRAWINGS AND INCLUDE PERFORMANCE CURVES, CAPACITIES, SIZES, WEIGHTS, MATERIALS, FINISHES, WIRING DIAGRAMS, ELECTRICAL REQUIREMENTS AND DEVIATIONS FROM SPECIFIED EQUIPMENT OR MATERIALS. FOR EQUIPMENT WITH MOTOR STARTERS OR VFDS, INCLUDE SHORT CIRCUIT CURRENT RATINGS. MARK OUT INAPPLICABLE ITEMS. SHOP DRAWINGS WILL BE RETURNED WITHOUT REVIEW IF THE ABOVE MENTIONED REQUIREMENTS ARE NOT MET.

REFER TO DIVISION 1 FOR ACCEPTANCE OF ELECTRONIC SUBMITTALS FOR THIS PROJECT. FOR ELECTRONIC SUBMITTALS, CONTRACTOR SHALL SUBMIT THE DOCUMENTS IN ACCORDANCE WITH THE PROCEDURES SPECIFIED IN DIVISION 1. CONTRACTOR SHALL NOTIFY THE ARCHITECT AND ENGINEER THAT THE SHOP DRAWINGS HAVE BEEN POSTED. IF ELECTRONIC SUBMITTAL PROCEDURES ARE NOT DEFINED IN DIVISION 1, CONTRACTOR SHALL INCLUDE THE WEBSITE, USER NAME AND PASSWORD INFORMATION NEEDED TO ACCESS THE SUBMITTALS. FOR SUBMITTALS SENT BY E-MAIL, CONTRACTOR SHALL COPY THE ARCHITECT AND ENGINEER'S DESIGNATED REPRESENTATIVES. CONTRACTOR SHALL ALLOW THE ENGINEER REVIEW TIME AS SPECIFIED ABOVE IN THE CONSTRUCTION SCHEDULE. CONTRACTOR SHALL SUBMIT ONLY THE DOCUMENTS REQUIRED TO PURCHASE THE MATERIALS AND/OR EQUIPMENT IN THE ELECTRONIC SUBMITTAL AND SHALL CLEARLY INDICATE THE MATERIALS, PERFORMANCE CRITERIA AND ACCESSORIES BEING PROPOSED. GENERAL PRODUCT CATALOG DATA NOT SPECIFICALLY NOTED TO BE PART OF THE SPECIFIED PRODUCT WILL BE REJECTED AND RETURNED WITHOUT REVIEW.

23 1-10 ELECTRONIC DRAWING FILES

IN PREPARATION OF SHOP DRAWINGS OR RECORD DRAWINGS, CONTRACTOR MAY, AT HIS OPTION, OBTAIN ELECTRONIC DRAWING FILES IN AUTOCAD OR DXF FORMAT ON CD-ROM DISK, DVD DISK, FLASH DRIVE OR DIRECT DOWNLOAD, AS DESIRED, FROM THE ENGINEER FOR A SHIPPING AND HANDLING FEE OF $200 FOR A DRAWING SET UP TO 12 SHEETS AND $15 PER SHEET FOR EACH ADDITIONAL SHEET. CONTRACTOR SHALL CONTACT THE ARCHITECT FOR WRITTEN AUTHORIZATION AND ENGINEER FOR THE NECESSARY RELEASE AGREEMENT FORM AND TO SPECIFY SHIPPING METHOD AND DRAWING FORMAT. IN ADDITION TO PAYMENT, ARCHITECT'S WRITTEN AUTHORIZATION AND ENGINEER'S RELEASE AGREEMENT FORM MUST BE RECEIVED BEFORE ELECTRONIC DRAWING FILES WILL BE SENT.

23 1-11 OPERATION AND MAINTENANCE INSTRUCTIONS

DURING THE COURSE OF CONSTRUCTION, COLLECT AND COMPILE A COMPLETE BROCHURE OF EQUIPMENT FURNISHED AND INSTALLED ON THIS PROJECT. INCLUDE OPERATIONAL AND MAINTENANCE INSTRUCTIONS, MANUFACTURER'S CATALOG SHEETS, WIRING DIAGRAMS, PARTS LISTS, APPROVED SHOP DRAWINGS, AND DESCRIPTIVE LITERATURE AS FURNISHED BY THE EQUIPMENT MANUFACTURER. INCLUDE AN INSIDE COVER SHEET THAT LISTS THE PROJECT NAME, DATE, OWNER, ARCHITECT, CONSULTING ENGINEER, GENERAL CONTRACTOR, SUB-CONTRACTOR, AND AN INDEX OF CONTENTS.

SUBMIT THREE COPIES OF LITERATURE BOUND IN APPROVED BINDERS WITH INDEX AND TABS SEPARATING EQUIPMENT TYPES TO THE ARCHITECT AT THE TERMINATION OF THE WORK. PAPER CLIPS, STAPLES, RUBBER BANDS, AND MAILING ENVELOPES ARE NOT CONSIDERED APPROVED BINDERS. FINAL APPROVAL OF MECHANICAL SYSTEMS INSTALLED UNDER THIS CONTRACT WILL BE WITHHELD UNTIL THIS EQUIPMENT BROCHURE IS RECEIVED AND DEEMED COMPLETE BY THE ARCHITECT AND ENGINEER. INSTRUCT WORKMEN TO SAVE REQUIRED LITERATURE SHIPPED WITH THE EQUIPMENT ITSELF, FOR INCLUSION IN THIS BROCHURE.

PROVIDE "AS-BUILT" DRAWINGS (SEE DIVISION 1 AND GENERAL CONDITIONS).

23 1-12 TRAINING

AT A TIME MUTUALLY AGREED UPON BETWEEN THE OWNER AND CONTRACTOR, PROVIDE THE SERVICES OF A FACTORY TRAINED AND AUTHORIZED REPRESENTATIVE TO TRAIN OWNER'S DESIGNATED PERSONNEL ON THE OPERATION AND MAINTENANCE OF THE EQUIPMENT PROVIDED FOR THIS PROJECT.

PROVIDE TRAINING TO INCLUDE BUT NOT BE LIMITED TO AN OVERVIEW OF THE SYSTEM AND/OR EQUIPMENT AS IT RELATES TO THE FACILITY AS A WHOLE; OPERATION AND MAINTENANCE PROCEDURES AND SCHEDULES RELATED TO STARTUP AND SHUTDOWN, TROUBLESHOOTING, SERVICING, PREVENTIVE MAINTENANCE AND APPROPRIATE OPERATOR INTERVENTION; AND REVIEW OF DATA INCLUDED IN THE OPERATION AND MAINTENANCE MANUALS.

SUBMIT A CERTIFICATION LETTER TO THE ARCHITECT STATING THAT THE OWNER'S DESIGNATED REPRESENTATIVE HAS BEEN TRAINED AS SPECIFIED HEREIN. LETTER SHALL INCLUDE DATE, TIME, ATTENDEES AND SUBJECT OF TRAINING. THE CONTRACTOR AND THE OWNER'S REPRESENTATIVE SHALL SIGN THE CERTIFICATION LETTER INDICATING AGREEMENT THAT THE TRAINING HAS BEEN PROVIDED.

SCHEDULE OWNER TRAINING WITH AT LEAST 7 DAYS' ADVANCE NOTICE.

23 1-13 SPARE PARTS

FURNISH TO OWNER, WITH RECEIPT, THE FOLLOWING SPARE PARTS FOR THE EQUIPMENT FURNISHED FOR THIS PROJECT:

A. ONE SET OF SPARE FILTERS OF EACH TYPE REQUIRED FOR EACH UNIT. IN ADDITION TO THE SPARE SET OF FILTERS, INSTALL NEW FILTERS PRIOR TO TESTING, ADJUSTING, AND BALANCING WORK AND BEFORE TURNING SYSTEM OVER TO OWNER.
B. FURNISH ONE COMPLETE SET OF BELTS FOR EACH FAN.

23 1-14 WARRANTIES

WARRANT EACH SYSTEM AND EACH ELEMENT THEREOF AGAINST ALL DEFECTS DUE TO FAULTY WORKMANSHIP, DESIGN OR MATERIAL FOR A PERIOD OF 12 MONTHS FROM DATE OF SUBSTANTIAL COMPLETION, UNLESS SPECIFIC ITEMS ARE NOTED TO CARRY A LONGER WARRANTY IN THE CONSTRUCTION DOCUMENTS OR MANUFACTURER'S STANDARD WARRANTY EXCEEDS 12 MONTHS. REMEDY ALL DEFECTS, OCCURRING WITHIN THE WARRANTY PERIOD(S), AS STATED IN THE GENERAL CONDITIONS AND DIVISION 1.

IF HVAC EQUIPMENT IS USED DURING CONSTRUCTION, THE WARRANTY PERIOD SHALL BEGIN ON DATA OF SUBSTANTIAL COMPLETION.

WARRANTIES SHALL INCLUDE LABOR AND MATERIAL. MAKE REPAIRS OR REPLACEMENTS WITHOUT ANY ADDITIONAL COSTS TO THE OWNER.

PERFORM THE REMEDIAL WORK PROMPTLY, UPON WRITTEN NOTICE FROM THE ENGINEER OR OWNER.

AT THE TIME OF SUBSTANTIAL COMPLETION, DELIVER TO THE OWNER ALL WARRANTIES, IN WRITING AND PROPERLY EXECUTED, INCLUDING TERM LIMITS FOR WARRANTIES EXTENDING BEYOND THE ONE YEAR PERIOD, EACH WARRANTY INSTRUMENT BEING ADDRESSED TO THE OWNER AND STATING THE COMMENCEMENT DATE AND TERM.

23 1-15 CUTTING AND PATCHING

PERFORM CUTTING OF WALLS, FLOORS, CEILINGS, ETC. AS REQUIRED TO INSTALL WORK UNDER THIS SECTION. OBTAIN PERMISSION FROM THE ARCHITECT PRIOR TO CUTTING. DO NOT CUT OR DISTURB STRUCTURAL MEMBERS WITHOUT PRIOR APPROVAL FROM THE ARCHITECT. CUT HOLES AS SMALL AS POSSIBLE. GENERAL CONTRACTOR SHALL PATCH WALLS, FLOORS, ETC. AS REQUIRED BY WORK UNDER THIS SECTION. PATCHING SHALL MATCH THE ORIGINAL MATERIAL AND CONSTRUCTION. REPAIR AND REFINISH AREAS DISTURBED BY WORK TO THE CONDITION OF ADJOINING SURFACES IN A MANNER SATISFACTORY TO THE ARCHITECT.

23 1-16 ROUGH-IN

COORDINATE WITHOUT DELAY ROUGHING-IN WITH GENERAL CONSTRUCTION. CONCEAL PIPING AND CONDUIT ROUGH-IN EXCEPT IN UNFINISHED AREAS AND WHERE OTHERWISE SHOWN.

23 1-17 STRUCTURAL STEEL

STRUCTURAL STEEL USED FOR SUPPORT OF EQUIPMENT, DUCTWORK AND PIPING SHALL BE NEW, CLEAN, AND CONFORM TO ASTM DESIGNATION A-36.

SUPPORT MECHANICAL COMPONENTS FROM THE BUILDING STRUCTURE. DO NOT SUPPORT MECHANICAL COMPONENTS FROM CEILINGS, OTHER MECHANICAL OR ELECTRICAL COMPONENTS, AND OTHER NON-STRUCTURAL ELEMENTS.

23 1-18 ACCESS DOORS

CONTRACTOR TO FIELD DETERMINE REQUIRED LOCATIONS FOR ACCESS OR MAINTENANCE OF INSTALLED EQUIPMENT, VALVES, DAMPERS, ETC. AND PROVIDE ACCESS DOORS IN CEILINGS, WALLS, ETC. WHERE INDICATED OR REQUIRED. OBTAIN ARCHITECT'S APPROVAL OF TYPE, SIZE, LOCATION AND COLOR BEFORE ORDERING. PROVIDE CONCEALED HINGES, SCREWDRIVER-TYPE LOCK, ANCHOR STRAPS; MANUFACTURED BY MILCOR, ZURN, TITUS, OR EQUAL.

23 1-19 PENETRATIONS

PROVIDE SLEEVES FOR PIPES PASSING THROUGH ABOVE GRADE CONCRETE OR MASONRY WALLS, CONCRETE FLOOR OR ROOF SLABS. SLEEVES ARE NOT REQUIRED FOR CORE DRILLED HOLES IN EXISTING MASONRY WALLS, CONCRETE FLOORS OR ROOFS. PROVIDE 10 GAUGE GALVANIZED STEEL SLEEVES FOR SLEEVES 6" AND SMALLER. PROVIDE GALVANIZED SHEET METAL SLEEVES FOR LARGER THAN 6". SCHEDULE 40 PVC SLEEVES ARE ACCEPTABLE FOR INSTALLATION IN AREAS WITHOUT RETURN AIR PLENUMS.

SEAL ELEVATED FLOOR, EXTERIOR WALL AND ROOF PENETRATIONS WATERTIGHT AND WEATHERTIGHT WITH NON-SHRINK, NON-HARDENING COMMERCIAL SEALANT. PACK WITH MINERAL WOOL AND SEAL BOTH ENDS WITH MINIMUM OF 1/2" OF SEALANT. SEAL AROUND PENETRATIONS OF FIRE RATED ASSEMBLIES. COORDINATE FIRE RATINGS AND LOCATIONS WITH THE ARCHITECTURAL DRAWINGS. REFER TO ARCHITECTURAL SPECIFICATIONS FOR FIRE STOPPINGS. PROVIDE A PRODUCT SCHEDULE FOR UL LISTING, LOCATION, WALL OR FLOOR RATING AND INSTALLATION DRAWING FOR EACH PENETRATION FIRE STOP SYSTEM.

EXTEND PIPE INSULATION FOR INSULATED PIPE THROUGH FLOOR, WALL AND ROOF PENETRATIONS, INCLUDING FIRE RATED WALLS AND FLOORS. THE VAPOR BARRIER SHALL BE MAINTAINED. SIZE SLEEVE FOR A MINIMUM OF 1" ANNULAR CLEAR SPACE BETWEEN INSIDE OF SLEEVE AND OUTSIDE OF INSULATION.

PROVIDE PREFABRICATED ROOF CURBS MANUFACTURED BY CUSTOM CURB, INC., PATE COMPANY, THYCURB OR FROM EQUIPMENT'S MANUFACTURER. PROVIDE ROOF CURB WITH FACTORY INSTALLED WOOD NAILER; WELDED, 18 GAUGE GALVANIZED STEEL SHELL, BASE PLATE AND FLASHING; 1-1/2" THICK, 3 POUND RIGID INSULATION; FULLY MITERED 3-INCH RAISED CANT; COVER OF WEATHER-RESISTANT, WEATHER-PROOF MATERIAL AND PIPE COLLAR OF WEATHER-RESISTANT MATERIAL WITH STAINLESS STEEL PIPE CLAMPS. COORDINATE RESPONSIBILITY OF ROOF CURBS FOR EQUIPMENT PROVIDED BY KITCHEN EQUIPMENT CONSULTANT WITH KITCHEN EQUIPMENT CONSULTANT.

PROVIDE BOX FRAMES FOR RECTANGULAR OPENINGS WELDED 12 GAUGE GALVANIZED STEEL ATTACHED TO FORMS AND OF A MAXIMUM DIMENSION ESTABLISHED BY THE ARCHITECT. NOTIFY THE GENERAL CONTRACTOR OR ARCHITECT BEFORE INSTALLING ANY BOX OPENINGS NOT SHOWN ON THE ARCHITECTURAL OR STRUCTURAL DRAWINGS.

SEAL CONCRETE OR MASONRY EXTERIOR WALL PENETRATIONS BELOW GRADE WITH "WALL PIPES" AND MECHANICAL SLEEVE SEALS. PROVIDE CAST IRON "WALL PIPES" WITH INTEGRAL WATERSTOP RING MANUFACTURED BY JOSAM, JAY R. SMITH, WADE, WATTS OR ZURN. PROVIDE MODULAR MECHANICAL SLEEVE SEALS, MANUFACTURED BY THUNDERLINE / LINK SEAL, CALPICO, INC. AND METRAFLEX.

SEAL ELEVATED CONCRETE SLAB WITH WATER PROOF MEMBRANE PENETRATIONS WITH "WALL PIPES" AND WATER PROOF SEALANT. SECURE WATERPROOF MEMBRANE FLASHING BETWEEN "WALL PIPE" CLAMPING FLANGE AND CLAMPING RING. PROVIDE CAST IRON "WALL PIPES" WITH INTEGRAL WATERSTOP RING MANUFACTURED BY JOSAM, JAY R. SMITH, WADE, WATTS OR ZURN.

PROVIDE SLEEVES FOR HORIZONTAL PIPE PASSING THROUGH OR UNDER FOUNDATION. SLEEVES SHALL BE CAST IRON SOIL PIPE TWO NOMINAL PIPE SIZES LARGER THAN THE PIPE SERVED.

PROVIDE SCHEDULE 40 PVC PIPE SLEEVES FOR VERTICAL PRESSURE PIPE PASSING THROUGH CONCRETE SLAB ON GRADE. SLEEVES SHALL BE ONE NOMINAL PIPE SIZE LARGER THAN THE PIPE SERVED AND TWO PIPE SIZES LARGER THAN PIPE SERVED FOR DUCTILE IRON PIPES WITH RESTRAINING RODS. SEAL WATER-TIGHT WITH SILICONE CAULK.

PROVIDE 1/2" THICK CELLULAR FOAM INSULATION AROUND PERIMETER OF NON-PRESSURE PIPE PASSING THRU CONCRETE SLAB ON GRADE. INSULATION SHALL EXTEND TO 2" ABOVE AND BELOW THE CONCRETE SLAB.

23 1-20 AIR FILTERS

PROVIDE FARR 30/30, PLEATED, THROWAWAY TYPE FILTERS, OR SIMILAR AS MANUFACTURED BY AMERICAN AIR FILTER, FLANDERS OR APPROVED EQUAL, UNLESS OTHERWISE INDICATED. AIR UNITS SHALL HAVE NEW FILTERS INSTALLED WHEN THEY ARE OPERATED BEFORE FINAL ACCEPTANCE.

IF HVAC EQUIPMENT IS USED DURING THE CONSTRUCTION PERIOD, CONTRACTOR SHALL PROVIDE ONE SET OF FILTERS WHEN THE UNIT IS STARTED AND REPLACE FILTERS WHEN NEEDED, BUT NOT LESS THAN EVERY MONTH. ON THE DAY OF SUBSTANTIAL COMPLETION, THE CONTRACTOR SHALL CLEAN THE UNIT AND PROVIDE A NEW SET OF FILTERS IN THE UNIT.

23 1-21 ELECTRICAL WIRING

LINE VOLTAGE WIRING SHALL BE PROVIDED BY THE ELECTRICAL CONTRACTOR. LINE VOLTAGE CONTROL AND INTERLOCK WIRING FOR MECHANICAL SYSTEMS SHALL ALSO BE PROVIDED BY THE ELECTRICAL CONTRACTOR. LOW VOLTAGE CONTROL WIRING SHALL BE PROVIDED BY THE MECHANICAL CONTRACTOR. FURNISH WIRING DIAGRAMS TO THE ELECTRICAL CONTRACTOR AS REQUIRED FOR PROPER EQUIPMENT HOOKUP. COORDINATE WITH THE ELECTRICAL CONTRACTOR THE ACTUAL WIRE SIZING AMPS FOR MECHANICAL EQUIPMENT (FROM THE EQUIPMENT NAMEPLATE) TO ENSURE PROPER INSTALLATION.

23 1-22 REFRIGERANT AND OIL

PROVIDE FULL REFRIGERANT AND OIL CHARGE IN NEW AIR CONDITIONING REFRIGERATION SYSTEMS, AND MAINTAIN IT FOR FULL TERM OF THE GUARANTEE.

23 1-23 FINAL TESTING AND ADJUSTMENTS

PERFORM TEST READINGS ON FANS, UNITS, COILS, ETC. AND ADJUST EQUIPMENT TO DELIVER SPECIFIED AMOUNTS OF AIR. PREPARE TESTING AND BALANCING REPORT LOG SHOWING AIR SUPPLY QUANTITIES, AIR ENTERING AND LEAVING TEMPERATURES AND PRESSURES, FAN AND UNIT TEST READINGS, MOTOR VOLTAGE AND AMP DRAWS, ETC., AND SUBMIT TWO COPIES OF THE FINAL COMPILATION OF DATA TO THE ARCHITECT FOR EVALUATION AND APPROVAL BEFORE FINAL INSPECTION OF THE PROJECT. BALANCE AIR SYSTEMS TO WITHIN PLUS OR MINUS 10 PERCENT FOR TERMINAL DEVICES AND BRANCH LINES AND PLUS OR MINUS 5 PERCENT FOR MAIN DUCTS AND AIR HANDLING EQUIPMENT OF THE AMOUNT OF AIR SHOWN ON THE DRAWINGS. FURTHER ADJUSTMENTS SHALL BE MADE TO OBTAIN UNIFORM TEMPERATURE IN SPACES. ADJUST EQUIPMENT TO OPERATE AS INTENDED BY THE SPECIFICATION. ALIGN BEARINGS AND REPLACE BEARINGS THAT HAVE DIRT OR FOREIGN MATERIAL IN THEM WITH NEW BEARINGS WITHOUT ADDITIONAL COST TO THE OWNER. BALANCE CONTRACTOR SHALL INCLUDE IN THE REPORT ANY IMPROPERLY INSTALLED OR MISSING BALANCING DEVICES THAT WOULD NEGATIVELY IMPACT THE SYSTEM OPERATION.

ADJUST THERMOSTATS AND CONTROL DEVICES TO OPERATE AS INTENDED. ADJUST BURNERS, PUMPS, FANS, ETC. FOR PROPER AND EFFICIENT OPERATION. CERTIFY TO ARCHITECT THAT ADJUSTMENTS HAVE BEEN MADE AND THAT SYSTEM IS OPERATING SATISFACTORILY. FURTHER ADJUSTMENTS SHALL BE MADE TO OBTAIN UNIFORM TEMPERATURE IN SPACES. CALIBRATE, SET, AND ADJUST AUTOMATIC TEMPERATURE CONTROLS. CHECK PROPER SEQUENCING OF INTERLOCK SYSTEMS, AND OPERATION OF SAFETY CONTROLS.

23 1-24 EQUIPMENT FURNISHED BY OTHERS

PROVIDE NECESSARY EQUIPMENT AND ACCESSORIES THAT ARE NOT PROVIDED BY THE EQUIPMENT SUPPLIER OR OWNER TO COMPLETE INSTALLATION OF EQUIPMENT FURNISHED BY OTHERS, IN LOCATIONS AS INDICATED ON THE DRAWINGS AND/OR DESCRIBED IN THE GENERAL NOTES TO THIS CONTRACTOR. EQUIPMENT AND ACCESSORIES NOT PROVIDED BY THE EQUIPMENT SUPPLIER MAY INCLUDE FLUES, VENTS, INTAKES, ASSOCIATED ROOF JACKS AND CAPS TO OUTDOORS, DAMPERS, IN-LINE FANS, ROOF FANS, CONTROL INTERLOCKS, ETC. AS REQUIRED FOR PROPER OPERATION OF THE COMPLETE SYSTEM IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.

CONTRACTOR SHALL BE RESPONSIBLE FOR CORRECT ROUGH-IN DIMENSIONS, AND SHALL VERIFY SAME WITH ARCHITECT AND/OR EQUIPMENT SUPPLIER PRIOR TO SERVICE INSTALLATIONS.

23 1-25 MISCELLANEOUS REMODELING WORK

REMOVE ALL UNUSED EQUIPMENT, DUCTWORK, PIPING AND ASSOCIATED SUPPORTS. CAP DUCTWORK AND PIPING AT MAINS AND SEAL AIR AND WATER TIGHT.

PROVIDE ITEMS OF HVAC SYSTEMS MODIFICATION REQUIRED BECAUSE OF BUILDING REMODELING, AS NOTED ON THE DRAWINGS OR NECESSARY FOR PROPER OPERATION. MATCH EXISTING MATERIALS AND CONSTRUCTION TECHNIQUES WHEN MODIFYING EXISTING SYSTEMS UNLESS SPECIFIED OTHERWISE. COORDINATE ADDITIONAL REQUIREMENTS WITH GENERAL CONTRACTOR AND ARCHITECT.

SEAL AIRTIGHT EXISTING DUCTWORK REQUIRED TO BE ABANDONED IN PLACE OR NOT IN USE AT THE TERMINATION OF THE WORK.

23 1-26 VIBRATION ISOLATION

MANUFACTURERS: PROVIDE VIBRATION ISOLATION EQUIPMENT AND MATERIALS BY A SINGLE MANUFACTURER. APPROVED MANUFACTURERS PROVIDED THEIR SYSTEMS ARE IN COMPLIANCE WITH THE SPECIFIED DESIGN AND PERFORMANCE REQUIREMENTS INCLUDE AMBER BOOTH, KINETICS NOISE CONTROL, MASON INDUSTRIES, INC., VIBRATION ELIMINATOR CO., INC., AND VIBRATION MOUNTING AND CONTROLS.

GENERAL REQUIREMENTS: SELECT VIBRATION ISOLATORS BY THE WEIGHT DISTRIBUTION TO PRODUCE UNIFORM DEFLECTION. VIBRATION ISOLATORS SHALL HAVE EITHER KNOWN UN-DEFLECTED HEIGHTS OR CALIBRATION MARKINGS SO THAT, AFTER ADJUSTMENT, THE STATIC DEFLECTION CAN BE VERIFIED, THUS DETERMINING THAT THE LOAD IS WITHIN THE PROPER RANGE OF THE ISOLATOR. ISOLATORS SHALL OPERATE IN THE LINEAR PORTION OF THEIR LOAD VERSUS DEFLECTION CURVES. SPRING ISOLATORS SHALL HAVE 50 PERCENT EXCESS CAPACITY WITHOUT BECOMING COIL BOUND. COAT VIBRATION ISOLATORS WITH FACTORY-APPLIED PAINT. COAT VIBRATION ISOLATORS EXPOSED TO WEATHER AND OTHER CORROSIVE ENVIRONMENTS WITH FACTORY-APPLIED CORROSION RESISTANCE PROTECTION. INSTALL AND ADJUST VIBRATION ISOLATORS IN ACCORDANCE WITH MANUFACTURERS WRITTEN INSTRUCTIONS.

PIPE CONNECTIONS. PROVIDE FLEXIBLE CONNECTORS FOR PIPING SYSTEM CONNECTIONS ON EQUIPMENT SIDE OF SHUTOFF VALVES FOR ALL PUMPS, MECHANICAL EQUIPMENT SUPPORTED OR SUSPENDED BY SPRING ISOLATORS, AND WHERE INDICATED ON DRAWINGS. FABRICATE FLEXIBLE PIPING CONNECTORS FROM STAINLESS STEEL, BRONZE OR RUBBER MATERIALS AS SUITABLE FOR SYSTEM FLUID. FLEXIBLE PIPING CONNECTORS SHALL BE BELLOWS, SPHERICAL OR BRAIDED HOSE TYPE AS RECOMMENDED BY THE MANUFACTURER FOR THE APPLICATION.

ISOLATOR TYPES

A. TYPE WP (WAFFLE PADS): PROVIDE 5/16 INCH THICK NEOPRENE PADS RIBBED OR WAFFLED ON BOTH SIDES. MANUFACTURE PADS WITH BRIDGE BEARING QUALITY NEOPRENE, AND SELECT FOR A MAXIMUM DUROMETER OF 50 AND DESIGNED FOR 15 PERCENT STRAIN. INCORPORATE STEEL LOAD-SPREADING PLATES WHERE REQUIRED BETWEEN THE EQUIPMENT AND THE NEOPRENE PAD. IF THE ISOLATOR IS BOLTED TO THE STRUCTURE, INSTALL A NEOPRENE VIBRATION ISOLATION WASHER AND SLEEVE (UNIROYAL TYPE 620/660 OR AS APPROVED) SHALL BE INSTALLED UNDER THE BOLT HEAD BETWEEN THE STEEL WASHER AND THE BASE PLATE. PROVIDE MASON INDUSTRIES TYPE W OR EQUAL.

B. TYPE CMB (CURB MOUNTED BASE): CURB MOUNTED BASE FOR ROOF-MOUNTED EQUIPMENT SHALL BE A STRUCTURAL STEEL BASE MOUNTED DIRECTLY TO THE STRUCTURE WITH AN UPPER FLOATING SECTION ON ADJUSTABLE STEEL SPRINGS. THE UPPER FRAME SHALL PROVIDE CONTINUOUS SUPPORT FOR THE EQUIPMENT. STEEL SPRINGS SHALL REST ON 1/4" MIN. THICKNESS NEOPRENE PADS AND SHALL HAVE A MINIMUM STATIC DEFLECTION OF 2" UNLESS OTHERWISE SPECIFIED. ALL-DIRECTIONAL SNUBBER BUSHINGS SHALL BE 1/4" MINIMUM THICKNESS NEOPRENE. ALL HARDWARE SHALL BE CADMIUM OR ZINC ELECTROPLATED TO PROVIDE A RUST RESISTANT FINISH. WEATHER PROOFING SHALL CONSIST OF A CONTINUOUS GALVANIZED FLEXIBLE COUNTERFLASHING NAILED OVER THE LOWER CURB'S WATERPROOFING AND JOINED AT THE CORNERS BY EPDM BELLOWS. ALL SPRING LOCATIONS SHALL HAVE ACCESS PORTS WITH REMOVABLE WATERPROOF COVERS TO ALLOW FOR ADJUSTMENT OR REPLACEMENT OF SPRINGS. LOWER CURBS SHALL HAVE PROVISION FOR 2" INSULATION. DUCT CONNECTIONS SHALL BE MADE USING A LENGTH OF FLEXIBLE DUCT DIMENSIONED TO MATCH THE EQUIPMENT OPENING, USING A FOAM RUBBER GASKET TO SEAL AGAINST THE UNIT BOTTOM. PROVIDE MASON INDUSTRIES TYPE RSC, OR EQUAL.

C. TYPE NR (NEOPRENE MOUNTS): PROVIDE NEOPRENE, RUBBER-IN-SHEAR MOUNTS FOR LIGHT WEIGHT, SUSPENDED EQUIPMENT SUPPORTED FROM STRUCTURE WITH ALL THREAD ROD AND ANGLE IRON OR UNISTRUT. PROVIDE MASON INDUSTRIES TYPE HMIB OR EQUAL.

23 2 DUCT INSULATION, DUCTWORK, ACCESSORIES, FLUES AND FANS

23 2-1 DUCT INSULATION

PROVIDE INSULATION PER DUCTWORK INSULATION SCHEDULE ON DRAWINGS. PROVIDE INCREASED THICKNESS WHERE ENERGY CODES DICTATE A MORE STRINGENT REQUIREMENT.

LINER SURFACE SHALL SERVE AS A BARRIER AGAINST INFILTRATION OF DUST AND DIRT, SHALL MEET ASTM C 1338 FOR FUNGI RESISTANCE AND SHALL BE CLEANABLE USING DUCT CLEANING METHODS AND EQUIPMENT OUTLINED BY NORTH AMERICAN INSULATION MANUFACTURERS ASSOCIATION (NAIMA) DUCT CLEANING GUIDE. INSTALL WITH LINER ADHESIVE AND MECHANICAL FASTENERS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS AND RECOMMENDATIONS. DUCTWORK SIZES SHOWN ON DRAWINGS ARE INSIDE CLEAR DIMENSIONS. INCREASE SHEET METAL BY LINER THICKNESS IN BOTH DIRECTIONS WHERE LINER IS INSTALLED.

INSULATING MATERIALS, ADHESIVES, COATINGS, ETC., SHALL NOT EXCEED FLAME SPREAD RATING OF 25 AND SMOKE DEVELOPED RATING OF 50 PER ASTM E 84. CONTAINERS FOR MASTICS AND ADHESIVES SHALL HAVE U.L. LABEL.

PROVIDE EXTERIOR RECTANGULAR DUCT WITH INTERNAL AND EXTERNAL INSULATION PER DUCTWORK INSULATION SCHEDULE.

PROVIDE EXTERNAL FIREPROOFING FOR RECTANGULAR OR ROUND KITCHEN EXHAUST DUCT SYSTEMS PER DUCTWORK INSULATION SCHEDULE.

23 2-2 DUCTWORK

ALL METAL DUCTWORK SCHEDULED FOR INTERIOR THERMAL AND ACOUSTICAL LINER IS NOT SIZED ON PLANS TO INCLUDE THE PROPER THICKNESS OF INSULATION. ADD 1 INCH OR 2 INCHES IN HEIGHT AND WIDTH OF DUCTWORK TO ACCOMMODATE INSULATION THICKNESS. MOUNT DUCT SPECIALTIES SUCH AS TURNING VANES, DAMPER, ETC., TO DUCTWORK WITH THE SECTION INSULATED “BUILD OUTS” TO MAINTAIN CONTINUITY OF THERMAL BARRIER.

PROVIDE GALVANIZED STEEL DUCTWORK AND HOUSINGS AS SHOWN ON DRAWINGS. CONSTRUCT DUCTWORK INCLUDING FITTINGS AND TRANSITIONS IN CONFORMANCE WITH CURRENT SMACNA STANDARDS RELATIVE TO GAUGE, BRACING, JOINTS, ETC. MINIMUM THICKNESS OF DUCT SHALL BE 26-GAUGE SHEET METAL. REINFORCE HOUSINGS AND DUCTWORK OVER 30" WITH 1-1/4" ANGLES NOT LESS THAN 5'-6" ON CENTERS, AND CLOSER IF REQUIRED FOR SUFFICIENT RIGIDITY TO PREVENT VIBRATION. SUPPORT HORIZONTAL RUNS OF DUCT FROM STRAP IRON HANGERS ON CENTERS NOT TO EXCEED 8'-0". DO NOT SUPPORT CEILING GRID, CONDUITS, PIPES, EQUIPMENT, ETC. FROM DUCTWORK. COORDINATE ROUTING OF DUCTWORK WITH OTHER CONTRACTORS SUCH THAT PIPING, ELECTRICAL CONDUIT, AND ASSOCIATED SUPPORTS ARE NOT ROUTED THROUGH THE DUCTWORK.

CONSTRUCT SUPPLY DUCTS TO MEET SMACNA POSITIVE PRESSURE OF 2" W.G. CONSTRUCT RETURN, OUTDOOR AND EXHAUST DUCTWORK UPSTREAM OF FANS TO MEET SMACNA NEGATIVE PRESSURE OF 1" W.G. CONSTRUCT GREASE EXHAUST DUCTWORK UPSTREAM OF FANS TO MEET SMACNA NEGATIVE PRESSURE OF 2" W.G. CONSTRUCT EXHAUST DUCTWORK DOWNSTREAM OF FANS TO MEET SMACNA POSITIVE PRESSURE OF 1" W.G.

PROVIDE MILL PHOSPHATIZED OR GALVANEALED FINISH FOR EXPOSED DUCTWORK TO BE FIELD PAINTED. SHOP TREATED SHEET METAL SHALL HAVE GALVANIZED METAL PRIMER APPLIED IN THE SHOP AFTER FABRICATION AND PRIOR TO SHIPPING.

ALL EXPOSED ROUND DUCTWORK AND FITTINGS SHALL BE DOUBLE-WALL, GALVANIZED STEEL, SPIRAL LOCK SEAM, WITH1-INCH FIBERGLASS INSULATION. OUTER SHELL SHALL BE “PAINT-GRIP” SHEET METAL. PROVIDE DOUBLE-WALL ROUND DUCTWORK AND FITTINGS AS MANUFACTURED BY UNITED MCGILL OR APPROVED EQUAL.

SEAL DUCTWORK WITH HEAVY LIQUID SEALANT, HARDCAST IRONGRIP 601, DESIGN POLYMER DP 1010 , UNITED MCGILL DUCT SEALER OR APPROVED EQUAL, APPLIED ACCORDING TO SEALANT MANUFACTURER'S INSTRUCTIONS. FOR DUCTS WITH PRESSURE CLASSIFICATION OF 2" W.G. AND GREATER SEAL LONGITUDINAL AND TRANSVERSE DUCTWORK JOINTS AIRTIGHT TO MEET SMACNA CLASS B. FOR DUCTS WITH PRESSURE CLASSIFICATION LESS THAN 2" W.G. SEAL TRANSVERSE JOINTS AIRTIGHT TO MEET SMACNA CLASS C. TAPES AND MASTICS SHALL BE LISTED AND LABELED IN ACCORDANCE WITH UL 181A. FOR EXHAUST DUCTS OPERATING UNDER POSITIVE PRESSURE SEAL JOINTS AND PENETRATIONS TO MEET SMACNA SEAL CLASS A.

PROVIDE RADIUS ELBOWS, TURNS, AND OFFSETS WITH A MINIMUM CENTERLINE RADIUS OF 1-1/2 TIMES THE DUCT WIDTH. WHERE SPACE DOES NOT PERMIT FULL RADIUS ELBOWS, PROVIDE SHORT RADIUS ELBOWS WITH A MINIMUM OF TWO CONTINUOUS SPLITTER VANES. VANES SHALL BE THE ENTIRE LENGTH OF THE BEND. PROVIDE MITERED ELBOWS WHERE SPACE DOES NOT PERMIT RADIUS ELBOWS, WHERE SHOWN ON THE DRAWINGS, OR AT THE OPTION OF THE CONTRACTOR WITH THE ENGINEER'S APPROVAL. MITERED ELBOWS LESS THAN 45 DEGREES SHALL NOT REQUIRE TURNING VANES. MITERED ELBOWS 45-DEGREES AND GREATER SHALL HAVE SINGLE THICKNESS TURNING VANES OF SAME GAUGE AS DUCTWORK, RIGIDLY FASTENED WITH GUIDE STRIPS IN DUCTWORK. VANES FOR MITERED ELBOWS SHALL BE PROVIDED IN ALL SUPPLY AND EXHAUST DUCTWORK AND IN RETURN AND OUTSIDE AIR DUCTWORK THAT HAS AN AIR VELOCITY EXCEEDING 1000 FPM. DO NOT INSTALL VANES IN GREASE DUCTWORK.

DUCTS SHALL BE CONNECTED TO FANS, FAN CASINGS AND FAN PLENUMS BY MEANS OF FLEXIBLE CONNECTORS. FLEXIBLE CONNECTORS SHALL BE NEOPRENE COATED GLASS CLOTH CANVAS CONNECTIONS, DURO-DYNE, ELGEN, VENTFABRIC OR EQUAL. FLEXIBLE CONNECTORS SHALL HAVE A FLAME SPREAD OF 25 OR LESS AND SMOKE DEVELOPED RATING NOT HIGHER THAN 50. MAKE AIRTIGHT JOINTS AND INSTALL WITH MINIMUM 1-1/2" SLACK.

PROVIDE BALANCING DAMPERS, MANUFACTURED BY RUSKIN, GREENHECK, NAILOR INDUSTRIES, CESCO, LOUVERS & DAMPERS, POTTORFF OR APPROVED EQUAL, WHERE SHOWN ON DRAWINGS AND WHEREVER NECESSARY FOR COMPLETE CONTROL OF AIR FLOW. SPLITTER DAMPERS SHALL BE CONTROLLED BY LOCKING QUADRANTS; PROVIDE YOUNG REGULATOR OR VENTLOK END BEARINGS FOR THE DAMPER ROD. RECTANGULAR VOLUME DAMPERS SHALL BE OPPOSED BLADE INTERLOCKING TYPE. ROUND VOLUME DAMPERS SHALL BE BUTTERFLY TYPE CONSISTING OF CIRCULAR BLADE MOUNTED TO A SHAFT. DAMPER LEAKAGE FOR OUTSIDE AIR DAMPERS SHALL NOT EXCEED 4.0 CFM/SQUARE FOOT IN FULL CLOSED POSITION AT 1" WG PRESSURE DIFFERENTIAL ACROSS DAMPER. REFERENCE MANUFACTURER AND MODEL NUMBER FOR OUTSIDE AIR DAMPERS IS RUSKIN MODEL CD-50. PROVIDE FLEXMASTER MODEL STO OR EQUAL 45 DEGREE RECTANGULAR/ROUND SIDE TAKEOFF FITTING WITH MODEL SLBO DOUBLE BEARING DAMPER WITH INSULATION BUILD OUT FOR ROUND DUCTWORK BRANCH TAKEOFFS TO INDIVIDUAL AIR DEVICES. OMIT DAMPER AT TAKEOFF FITTING WHEN DAMPER IS LOCATED DOWNSTREAM OF TAKEOFF.

WHERE ACCESS TO DAMPERS THROUGH A HARD CEILING IS REQUIRED, PROVIDE A METROPOLITAN AIR TECHNOLOGY MODEL RT-250 OR EQUAL BY YOUNG'S REGULATOR CONCEALED, CABLE OPERATED VOLUME DAMPER WITH REMOTE OPERATOR. DAMPER SHALL BE ADJUSTABLE THROUGH THE DIFFUSER FACE OR FRAME WITH STANDARD 1/4" NUTDRIVER OR FLAT SCREWDRIVER. CABLE ASSEMBLY SHALL ATTACH TO DAMPER AS ONE PIECE WITH NO LINKAGE ADJUSTMENT. POSITIVE, DIRECT, TWO-WAY DAMPER CONTROL SHALL BE PROVIDED WITH NO SLEEVES, SPRINGS OR SCREW ADJUSTMENTS TO COME LOOSE AFTER INSTALLATION. SUPPORT CABLE ASSEMBLY TO AVOID BENDS AND KINKS IN CABLE.

ROUND OR OVAL DUCTWORK SHALL BE SEMCO, UNITED, WESCO OR EQUAL, SHEETMETAL, WITH SMOOTH INTERIOR SURFACE, WITH LOW PRESSURE (DUCT PRESSURE CLASS UP TO AND INCLUDING 2" W.G.) ROUND DUCTWORK GAUGES PER THE FOLLOWING TABLE (REFERENCE SMACNA HVAC DUCT CONSTRUCTION STANDARDS FOR GAUGES WHEN PRESSURES EXCEED 2" W.G.):

LOW PRESSURE (DUCT PRESSURE CLASS UP TO AND INCLUDING 2" W.G.) FITTINGS 24" IN DIAMETER AND LESS SHALL BE PREFABRICATED, SPOTWELDED AND INTERNALLY SEALED. CONTINUOUSLY WELD FITTINGS LARGER THAN 24" IN DIAMETER. FITTING GAUGE SHALL BE 22 GAUGE FOR 36" FITTINGS AND UNDER, 20 GAUGE FOR LARGER SIZES. 90 DEGREE TEE'S SHALL BE CONICAL TYPE. SEAL LONGITUDINAL AND TRANSVERSE DUCTWORK JOINTS AIRTIGHT WITH HEAVY LIQUID SEALANT APPLIED ACCORDING TO MANUFACTURER'S INSTRUCTIONS. PROVIDE GAUGE THICKNESS IN MEDIUM PRESSURE (DUCT PRESSURE CLASS 3" TO 6" W.G.) DUCTWORK AS RECOMMENDED BY SMACNA.

AT CONTRACTORS OPTION, PROVIDE DUCTMATE, GRIPPLE, OR APPROVED EQUAL WIRE ROPE DUCT HANGING SYSTEM. PROVIDE DUCTMATE WR10 THROUGH WR40 OR GRIPPLE NO. 1 THROUGH NO. 5 WIRE ROPE USING 7X7 OR 7X19 AIRCRAFT QUALITY ZINC COATED CABLE OR GALVANIZED STEEL WIRE ROPE. SECURE WIRE ROPE TO DUCT USING DUCTMATE CLUTCHER OR GRIPPLE HANG FAST ADJUSTABLE ROPE ATTACHMENT. FOR SEISMIC APPLICATIONS, WIRE ROPE SYSTEMS SHALL BE SEISMIC TESTED, CONFORMING TO GR 63, LEVEL 4 SEISMIC. WHERE APPLICABLE FOR UPPER ATTACHMENT, PROVIDE DUCTMATE EZ-LOCK WIRE ROPE BEAM CLAMP WITH LOCKING NUT ADJUSTMENT OR GRIPPLE CEILING, BEAM, OR PURLIN CLIPS. WIRE ROPE, ADJUSTABLE DUCT ATTACHMENT, AND UPPER ATTACHMENT TO STRUCTURE SHALL EACH HAVE MINIMUM 5 TO 1 LOAD SAFETY FACTOR.

ALL GREASE EXHAUST DUCTWORK FROM THE KITCHEN EXHAUST HOOD TO THE KITCHEN EXHAUST FAN SHALL BE 16-GAUGE WELDED BLACK IRON, LIQUID TIGHT, AND SHALL CONFORM TO THE LATEST EDITION OF NFPA BULLETIN 96 AND TO ALL LOCAL CODES REGARDING ELBOWS, TRAPS, ACCESS DOORS, AND INSULATION. ALL DUCTWORK FROM THE TEMPERED SUPPLY MAKE-UP AIR FAN TO THE EXHAUST HOOD SHALL CONFORM TO CURRENT SMACNA STANDARDS AND THE LATEST EDITION OF NFPA BULLETIN 96. ALL WELDED BLACK IRON DUCT SHALL BE WRAPPED WITH 3M, 615 +, ZERO CLEARANCE INSULATING MATERIAL AS SPECIFIED.

23 2-3 FLEXIBLE DUCT

LOW PRESSURE (DUCT PRESSURE CLASS UP TO AND INCLUDING 2" W.G.) AND MEDIUM PRESSURE (DUCT PRESSURE CLASS 2.1" TO 6" W.G.) FLEXIBLE DUCT SHALL BE FLEXMASTER TYPE 8B, THERMAFLEX TYPE G-KM, M-KE, OR EQUAL (FIRE RETARDANT POLYETHYLENE) PROTECTIVE VAPOR BARRIER, U.L.181 CLASS 1, ACOUSTICAL INSULATED DUCT, R-5.0 FIBERGLASS INSULATION. PROVIDE CPE LINER WITH STEEL WIRE HELIX MECHANICALLY LOCKED OR PERMANENTLY BONDED TO THE LINER.

FLEXIBLE DUCT RUNS SHALL NOT EXCEED 5 FEET IN LENGTH, AND SHALL BE INSTALLED FULLY EXTENDED AND STRAIGHT AS POSSIBLE AVOIDING TIGHT TURNS. INSTALL FLEXIBLE DUCT IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. SUPPORT FLEXIBLE DUCT AT MAXIMUM 5 FEET ON CENTER AND WITHIN 6 INCHES OF BENDS. BENDS SHALL NOT EXCEED A CENTERLINE RADIUS OF ONE DUCT DIAMETER. DUCT SAG SHALL NOT EXCEED 1/2 INCH. SUPPORTING MATERIAL IN DIRECT CONTACT WITH THE DUCT SHALL NOT BE LESS THAN 1-1/2 INCHES IN WIDTH.

CONNECT FLEXIBLE DUCT TO RIGID METAL DUCT OR AIR DEVICES AS RECOMMENDED BY THE MANUFACTURER. AT A MINIMUM, INSTALL TWO WRAPS OF DUCT TAPE AROUND THE INNER CORE CONNECTION AND A METALLIC OR NON-METALLIC CLAMP OVER THE TAPE AND TWO WRAPS OF DUCT TAPE OR A CLAMP OVER THE OUTER JACKET. DUCT CLAMPS SHALL BE LABELED IN ACCORDANCE WITH UL-181B AND MARKED 181B-C. DUCT TAPE SHALL BE LABELED IN ACCORDANCE WITH UL 181B AND MARKED 181B-FX.

23 2-4 AIR DEVICES

PROVIDE AIR DEVICES AS SCHEDULED ON DRAWINGS, MANUFACTURED BY CARNES, E.H. PRICE, KRUEGER, NAILOR INDUSTRIES, TITUS, OR TUTTLE & BAILEY. SELECT AIR DEVICES TO LIMIT ROOM NOISE LEVEL TO NO HIGHER THAN NC-30 UNLESS OTHERWISE SHOWN. PROVIDE DEVICES WITH A SOFT PLASTIC GASKET TO MAKE AN AIRTIGHT SEAL AGAINST THE MOUNTING SURFACE. COORDINATE FINAL LOCATION, FRAME, AND MOUNTING TYPE OF AIR DEVICES WITH ARCHITECTURAL REFLECTED CEILING PLANS.

SUBMIT COMPLETE SHOP DRAWINGS INCLUDING INFORMATION ON NOISE LEVEL, PRESSURE DROP, THROW, CFM FOR EACH AIR DEVICE, STYLES, BORDERS, ETC. CLEARLY MARKED WITH SPECIFIED EQUIPMENT NUMBER. SUBMIT SAMPLES OF EACH AIR DEVICE AS REQUESTED BY THE ENGINEER.

PROVIDE CEILING MOUNTED AIR DEVICES OF LAY-IN OR SURFACE MOUNTED TYPE AS REQUIRED TO BE COMPATIBLE WITH CEILING CONSTRUCTION. PROVIDE CEILING DIFFUSERS AND GRILLES WITH WHITE ENAMEL FINISH UNLESS NOTED OTHERWISE.

23 2-5 EXHAUST AIR SYSTEMS

PROVIDE ROOF MOUNTED EXHAUST FANS AS SCHEDULED ON THE DRAWINGS, OR EQUAL COOK, GREENHECK, CARNES, TWIN CITY FANS, ACME OR PENNBARRY COMPLETE WITH ISOLATED BLOWER UNIT AND CEILING GRILLE. PROVIDE DISCONNECT SWITCH, BACKDRAFT DAMPER, ROOF CURB, AND SPEED CONTROLLER.

23 3 HVAC EQUIPMENT

23 3-1 REFRIGERANT PIPING AND INSULATION

PROVIDE ASTM B 280, TYPE ACR HARD DRAWN COPPER REFRIGERANT PIPING, CLEANED AND SEALED AT THE FACTORY, AND SPECIFICALLY DESIGNED FOR REFRIGERANT. FITTINGS SHALL BE HARD DRAWN AND HAVE LONG RADIUS TURNS. SOLDER JOINTS WITH "SILFOS" (15 PERCENT SILVER, 5 PERCENT PHOSPHORUS, 80 PERCENT COPPER, 1300 DEGREES FAHRENHEIT FLOW TEMPERATURE). SOLDER JOINTS WITH A SLOW STREAM OF DRY NITROGEN PASSING THROUGH THE PIPING.

INSULATE SUCTION LINES WITH 1" AND LIQUID LINES WITH 1/2" FOAMED PLASTIC INSULATION, ARMAFLEX OR EQUAL. PIPING INSULATION SHALL HAVE A FLAME SPREAD OF 25 OR LESS, AND A SMOKE DEVELOPED RATING OF 50 OR LESS WHEN TESTED IN ACCORDANCE WITH ASTM E84. COAT INSULATION THAT IS EXPOSED TO THE ELEMENTS WITH A PROTECTIVE SEALER. INSTALL AND SUPPORT PIPING TO KEEP NOISE AND VIBRATION TO A MINIMUM. SUPPORT AND SECURE PIPING TO UNISTRUT TYPE SUPPORTS SO THAT NO VIBRATION PASSES TO THE BUILDING STRUCTURE. PIPE ATTACHMENTS SHALL BE COPPER-PLATED OR HAVE NONMETALLIC COATING FOR ELECTROLYTIC PROTECTION WHERE ATTACHMENTS ARE IN DIRECT CONTACT WITH COPPER TUBING. INSTALL A SUPPORT WITHIN ONE FOOT OF EACH CHANGE OF DIRECTION. MOUNT PIPE HANGERS AROUND THE OUTSIDE OF THE INSULATION WITH SADDLES TO PREVENT HANGERS FROM RUPTURING THE INSULATION. REPLACE INSULATION THAT IS CUT OR BROKEN BY THE HANGERS. RUN REFRIGERANT LINES PARALLEL AND PERPENDICULAR TO WALL AND FLOOR LINES AND TO APPEAR STRAIGHT AND IN GOOD ORDER. PITCH SUCTION LINES DOWN SLIGHTLY (1" IN 20') TOWARDS THE

COMPRESSOR. PROVIDE OIL TRAPS AT THE BASE OF VERTICAL SUCTION RISERS OVER 6 FEET HIGH.

INSTALL LIQUID LINE SIGHT GLASSES IN LIQUID LINES NEAREST THE EXPANSION VALVE. FACTORY MOUNT EXPANSION VALVES WITH THE SENSING BULBS SHIPPED LOOSE. FIELD MOUNT EXPANSION VALVE BULB AFTER REFRIGERANT PIPING IS COMPLETE (DAMAGE MAY OCCUR IF BULBS COME IN CONTACT WITH HEAT).

FOR SYSTEMS OF 5 TON CAPACITY AND SMALLER, THE CONTRACTOR SHALL HAVE THE OPTION TO PROVIDE COPPER REFRIGERANT TUBING LINE SET SIZED AS RECOMMENDED BY EQUIPMENT MANUFACTURER AND OF LENGTH AS REQUIRED FOR THE INSTALLATION. PROVIDE 1" THICK FOAMED PLASTIC INSULATION, ARMAFLEX OR EQUAL, ON THE SUCTION LINE. COAT INSULATION THAT IS EXPOSED TO THE ELEMENTS WITH A PROTECTIVE SEALER. PROVIDE QUICK-CONNECT FLARE TUBING COMPRESSION FITTINGS OR SOLDER CONNECTIONS AS REQUIRED TO MATCH THE CONNECTIONS OF THE CONDENSING UNIT AND EVAPORATOR COIL.

23 3-2 SYSTEM EVACUATION AND CHARGING

BLOW OUT REFRIGERATION LINES WITH DRY NITROGEN AT A SUITABLE PRESSURE BEFORE MAKING FINAL CONNECTION AT THE CONDENSING UNIT OR COIL TO ENSURE AGAINST DIRT, SCALE, OR OTHER FOREIGN MATERIAL BEING IN THE LINES. DRAW A VACUUM TO 29" OF MERCURY. BREAK THIS VACUUM BY CHARGING DRY REFRIGERANT GAS INTO THE SYSTEM, RAISING THE PRESSURE TO 0 PSIG. REPEAT THE LATTER TWO STEPS FOR A TRIPLE EVACUATION BEFORE THE FINAL EVACUATION IS STARTED. MAKE FINAL EVACUATION BY REDUCING THE SYSTEM ABSOLUTE PRESSURE TO A MAXIMUM OF 0.5 MILLIMETERS (500 MICRONS) AND ALLOWING THE PUMP TO RUN AT THIS PRESSURE FOR A MINIMUM OF TWO HOURS.

REPEAT THE PROPER AMOUNT OF REFRIGERANT CHARGE PER THE MANUFACTURER'S RECOMMENDATIONS. RECORD THE AMOUNT OF REFRIGERANT BY WEIGHT CHARGED INTO THE SYSTEM FOR EACH CIRCUIT RECORDED TO THE NEAREST 1/4 POUND ON TAGS AND ATTACH TAGS TO THE LIQUID LINE NEAR THE CONDENSING UNIT. REFRIGERANT SHALL BE SUPPLIED BY THE HVAC CONTRACTOR.

23 4 TEMPERATURE CONTROLS

23 4-1 GENERAL REQUIREMENTS

PROVIDE A SYSTEM OF TEMPERATURE CONTROLS INCLUDING THERMOSTATS, CONTROL PANELS, TIME SWITCHES, OVERRIDE TIMERS, DAMPER MOTORS, AND RELAYS REQUIRED TO PROVIDE THE DESIRED SEQUENCE OF OPERATION. PROVIDE INTEGRATED WIRING DIAGRAMS SHOWING INTERCONNECTIONS BETWEEN FIELD INSTALLED EQUIPMENT AND PACKAGE WIRING FURNISHED WITH THE HVAC EQUIPMENT. CONTROL WIRING SHALL BE SIZED TO ACCOMMODATE THE VOLTAGE DROP ASSOCIATED WITH THE DISTANCE BETWEEN THE CONTROL DEVICE AND THE CONTROLLER.

PROVIDE SUPERVISION AND ON-JOB CHECKOUT SERVICE AS REQUIRED TO ENSURE THAT INSTALLATION MEETS REQUIREMENTS OF THE SPECIFICATION. THE SYSTEM SHALL BE GUARANTEED FOR A PERIOD OF ONE YEAR FOLLOWING THE ACCEPTANCE OF THE SYSTEM BY THE ARCHITECT/ENGINEER. CORRECT DEFECTS OCCURRING DURING THIS PERIOD AT NO ADDITIONAL COST TO THE OWNER.

23 5 SEQUENCE OF OPERATION

THE SCOPE OF WORK INCLUDES ALL WORK (I.E. TIME AND MATERIALS) ASSOCIATED WITH CONTROLS AND INTEGRATION TO MAKE THE EQUIPMENT OPERATE ACCORDING TO THE SEQUENCE OF OPERATIONS DESCRIBED BELOW.

23 5-1 AIR HANDLING UNITS

UNITS SHALL OPERATE ACCORDING TO DEDICATED THERMOSTAT. CONTRACTOR TO PROGRAM OCCUPIED AND UNOCCUPIED SCHEDULES PER OWNER.

23 5-2 RESTROOM EXHAUST FAN CONTROL

EXHAUST FAN SHALL BE INTERLOCKED WITH RESPECTIVE RESTROOM LIGHT SWITCH AND BE ENERGIZED WHEN LIGHT SWITCH IS 'ON' AND DE-ENERGIZED WHEN LIGHT SWITCH IS 'OFF'.

END OF SECTION 23

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ISSUE RECORD: 100% CD
REVISIONS:

MECHANICAL SPECIFICATIONS

M0.00

SECTION 21: AUTOMATIC SPRINKLER SYSTEM:

211 GENERAL

21 1-1 GENERAL REQUIREMENTS

ALL REQUIREMENTS UNDER THE GENERAL AND SUPPLEMENTARY CONDITIONS OF THESE SPECIFICATIONS SHALL BE A PART OF THIS SECTION. EACH CONTRACTOR SHALL BE RESPONSIBLE TO THOROUGHLY BECOME FAMILIAR WITH ALL ITS CONTENTS AS TO CODES AND REQUIREMENTS THAT AFFECT THIS DIVISION OR SECTION. THE WORK REQUIRED UNDER THIS SECTION INCLUDES ALL MATERIAL, EQUIPMENT, APPLIANCES, TRANSPORTATION, SERVICES, AND LABOR REQUIRED TO COMPLETE THE ENTIRE SYSTEM AS REQUIRED BY THE DRAWINGS AND SPECIFICATIONS.

THE SPECIFICATIONS WRITTEN HEREIN AND THE ASSOCIATED DRAWINGS ARE COMPLEMENTARY, AND ANY PORTION OF THE WORK DESCRIBED IN ONE, SHALL BE PROVIDED AS IF DESCRIBED IN BOTH. IN THE EVENT OF DISCREPANCIES ON THE DRAWINGS AND SPECIFICATIONS, THE CONTRACTOR SHALL ADVISE THE ENGINEER OF SAME PRIOR TO PROCEEDING WITH THE WORK INVOLVED IN ORDER THAT CORRECT PROGRESS OF THE WORK MAY BE ENSURED. REFER TO SECTION 15B PLUMBING FOR ADDITIONAL REQUIREMENTS THAT APPLY TO THIS INSTALLATION THAT ARE NOT WRITTEN HEREIN.

21 1-2 DEFINITIONS

FURNISH: THE TERM "FURNISH" IS USED TO MEAN "SUPPLY AND DELIVER TO THE PROJECT SITE, READY FOR UNLOADING, UNPACKING, ASSEMBLY, INSTALLATION AND SIMILAR OPERATIONS."

INSTALL: THE TERM "INSTALL" IS USED TO DESCRIBE OPERATIONS AT THE PROJECT SITE INCLUDING THE ACTUAL "UNLOADING, UNPACKING, ASSEMBLY, ERECTION, PLACING, ANCHORING, APPLYING, WORKING TO DIMENSION, FINISHING, CURING, PROTECTING, CLEANING, AND SIMILAR OPERATIONS."

PROVIDE: THE TERM "PROVIDE" MEANS "TO FURNISH AND INSTALL, COMPLETE AND READY FOR THE INTENDED USE."

FURNISHED BY OWNER OR FURNISHED BY OTHERS: THE ITEM WILL BE FURNISHED BY THE OWNER OR OTHERS. IT IS TO BE INSTALLED AND CONNECTED UNDER THE REQUIREMENTS OF THIS DIVISION, COMPLETE AND READY FOR OPERATION, INCLUDING ITEMS INCIDENTAL TO THE WORK, INCLUDING SERVICES NECESSARY FOR PROPER INSTALLATION AND OPERATION. THE INSTALLATION SHALL BE INCLUDED UNDER THE GUARANTEE REQUIRED BY THIS DIVISION.

ENGINEER: WHERE REFERENCED IN THIS DIVISION, "ENGINEER" IS THE ENGINEER OF RECORD AND THE DESIGN PROFESSIONAL FOR THE WORK UNDER THIS DIVISION, AND IS A CONSULTANT TO, AND AN AUTHORIZED REPRESENTATIVE OF, THE ARCHITECT, AS DEFINED IN THE GENERAL AND/OR SUPPLEMENTARY CONDITIONS. WHEN USED IN THIS DIVISION, IT MEANS INCREASED INVOLVEMENT BY, AND OBLIGATIONS TO, THE ENGINEER, IN ADDITION TO INVOLVEMENT BY, AND OBLIGATIONS TO, THE "ARCHITECT".

AHJ: THE LOCAL CODE AND/OR INSPECTION AGENCY (AUTHORITY) HAVING JURISDICTION OVER THE WORK.

THE TERMS "APPROVED EQUAL", "EQUIVALENT" OR "EQUAL" ARE USED SYNONYMOUSLY AND SHALL MEAN "ACCEPTED BY OR ACCEPTABLE TO THE ENGINEER AS EQUIVALENT TO THE ITEM OR MANUFACTURER SPECIFIED". THE TERM "APPROVED" SHALL MEAN LABELED, LISTED, OR BOTH, BY A NATIONALLY RECOGNIZED TESTING LABORATORY (E.G. UL, ETL, CSA), AND ACCEPTABLE TO THE AHJ OVER THIS PROJECT.

21 1-3 INSPECTION OF SITE

THE CONTRACTOR SHALL PERSONALLY INSPECT THE SITE OF THE PROPOSED WORK AND BECOME FULLY INFORMED AS TO THE CONDITIONS UNDER WHICH THE WORK IS TO BE DONE. FAILURE TO DO SO WILL NOT BE CONSIDERED SUFFICIENT JUSTIFICATION TO REQUEST OR OBTAIN EXTRA COMPENSATION OVER AND ABOVE THE CONTRACT PRICE.

21 1-4 SCOPE

THE ENTIRE TENANT SPACE SHALL BE PROVIDED WITH AN NFPA 13 COMPLIANT AUTOMATIC FIRE SPRINKLER SYSTEM. PROVIDE A WET-PIPE, FIRE PROTECTION AUTOMATIC SPRINKLER SYSTEM, WITH ALL RELATED ITEMS. CONTRACTOR SHALL BE APPROVED AND STATE LICENSED FOR DESIGN AND INSTALLATION OF FIRE PROTECTION SYSTEMS. THE WORK DONE UNDER THIS SECTION SHALL BE PERFORMED ONLY BY A CONTRACTOR WHOSE WORKMEN ARE EXPERIENCED AND REGULARLY ENGAGED IN THE INSTALLATION OF FIRE PROTECTION SYSTEMS. CONTRACTOR SHALL BE CAPABLE OF PREPARING HYDRAULIC CALCULATIONS AND SYSTEM LAYOUTS.

SYSTEM SHALL, AT A MINIMUM, BE IN ACCORDANCE WITH THE LATEST EDITION OF NFPA 13, UNDERWRITERS LABORATORIES (UL), AND MUST BE ACCEPTABLE TO THE OWNER'S INSURER, THE AUTHORITY HAVING JURISDICTION AND ALL APPLICABLE LOCAL, STATE AND NATIONAL CODES AND STANDARDS. WHERE THE CONTRACT DOCUMENTS EXCEED THE REQUIREMENTS OF THE REFERENCED CODES, STANDARDS, ETC., THE CONTRACT DOCUMENTS SHALL TAKE PRECEDENCE.

WORK SHALL INCLUDE, BUT SHALL NOT NECESSARILY BE LIMITED TO THE FOLLOWING:

PROVIDE A WET-PIPE, FIRE PROTECTION AUTOMATIC SPRINKLER SYSTEM, WITH ALL RELATED ITEMS, FOR THE TENANT SPACE. SPRINKLER HEADS SHALL BE SIDEWALL HEADS SEMI-RECESSED IN PARTY WALLS.

21 1-5 SYSTEM DESIGN

CONTRACTOR SHALL VERIFY DESIGN CRITERIA AND RATING HAZARDS WITH THE OWNER'S INSURER PRIOR TO DESIGNING THE SYSTEM. WATERFLOW AND PRESSURE TEST DATA SHALL BE ACQUIRED BEFORE SYSTEM IS CALCULATED AND BE DATED NOT MORE THAN 12 MONTHS PRIOR TO THE SUBMITTAL OF SPRINKLER DRAWINGS. ARRANGEMENTS FOR AND COST OF FLOW TESTS SHALL BE THE CONTRACTOR'S RESPONSIBILITY.

HYDRAULIC CALCULATIONS SHALL BE SUBMITTED INCLUDING SUPPLY AND DEMAND GRAPH; ALL HYDRAULIC REFERENCE POINTS AND AREA OF APPLICATION SHALL APPEAR ON THE PLAN. CONTRACTOR SHALL VERIFY WITH AUTHORITY HAVING JURISDICTION ANY MINIMUM SAFETY FACTOR REQUIREMENTS. DEMAND SHALL NOT BE LESS THAN 10% BELOW THE SUPPLY AT THE DEMAND POINT.

DESIGN SYSTEM FOR ORDINARY HAZARD GROUP 2.

THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE HYDRAULIC CALCULATIONS, THE FINAL SYSTEM DESIGN, AND THE LAYOUT OF ALL COMPONENTS OF THE SYSTEM AS REQUIRED FOR THE APPROVAL BY THE OWNER'S INSURER, THE AUTHORITY HAVING JURISDICTION AND ALL APPLICABLE LOCAL, STATE AND NATIONAL CODES AND STANDARDS.

THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR COORDINATING SYSTEM LAYOUT WITH OTHER CONTRACTORS. CHANGES TO SYSTEM DESIGN DUE TO LACK OF COORDINATION SHALL BE PAID FOR BY THIS CONTRACTOR.

DESIGNS REQUIRING CUTTING OF STRUCTURAL MEMBERS FOR PASSAGE OF SPRINKLER PIPES OR HANGERS SHALL NOT BE ACCEPTED. WHEN DESIGN APPEARANCE OR SIMILAR ASPECTS REQUIRES CUTTING, DUE TO ECONOMY, IT SHALL BE HELD TO AN ABSOLUTE MINIMUM AND DONE ONLY WITH THE ARCHITECT AND STRUCTURAL ENGINEER'S WRITTEN APPROVAL. ANY EXCESSIVE REQUIREMENTS OF THIS TYPE SHALL BE IDENTIFIED DURING THE BID PERIOD.

SPRINKLER SPACING SHALL CONFORM TO NFPA 13. EXTENDED COVERAGE SPRINKLERS SHALL NOT BE USED IN UNFINISHED (SHELL) SPACES.

THE HYDRAULIC AREA OF OPERATION SHALL NOT BE REDUCED AS ALLOWED BY NFPA 13 FOR AREAS UTILIZING QUICK RESPONSE SPRINKLERS.

21 1-6 SHOP DRAWINGS

AN ELECTRONIC PDF COPY OF SHOP DRAWINGS AND HYDRAULIC CALCULATIONS SHALL BE FURNISHED TO THE ARCHITECT AND/OR ENGINEER, FOR HIS APPROVAL. SUBMIT SHOP DRAWINGS AS EARLY AS REQUIRED TO SUPPORT THE PROJECT SCHEDULE. ALLOW FOR TWO WEEKS ENGINEER REVIEW TIME PLUS A DUPLICATION OF THIS TIME FOR RESUBMITTAL IF REQUIRED.

SUBMITTALS AND SHOP DRAWINGS SHALL NOT CONTAIN RTM'S FIRM NAME OR LOGO, NOR SHALL IT CONTAIN RTM'S ENGINEERS' SEAL AND SIGNATURE. THEY SHALL NOT BE COPIES OF RTM'S WORK PRODUCT. IF THE CONTRACTOR DESIRES TO USE ELEMENTS OF SUCH PRODUCT, REFER TO PARAGRAPH "ELECTRONIC DRAWING FILES" FOR PROCEDURES TO BE USED.

SHOP DRAWINGS SHALL MEET THE REQUIREMENTS OF NFPA 13R FOR WORKING LEVEL DRAWINGS AND SHALL INCLUDE THE FOLLOWING:

1. SUBMIT WORKING PLANS PER NFPA 13R INCLUDING LAYOUT DRAWINGS OF THE COMPLETE OVERHEAD SPRINKLER SYSTEM INDICATING RELATIONSHIP OF SPRINKLER PIPING AND SPRINKLERS TO ALL OTHER OVERHEAD ITEMS INCLUDING CEILING GRID AND TILES, LIGHT FIXTURES, DIFFUSERS, REGISTERS, GRILLES, DUCTWORK, STRUCTURE, SOFFITS, OBSTRUCTIONS, ETC. LOCATION OF RISERS, PIPING, ETC., SHALL BE AS INCONSPICUOUS AS POSSIBLE AND SHALL FULFILL ALL FUNCTIONAL REQUIREMENTS. SYSTEM DESIGN CAPABILITIES AND DEMAND SHALL ALSO BE NOTED ON THE DRAWINGS.
2. SUBMIT COMPLETE DETAILS AND SECTIONS AS REQUIRED TO CLEARLY DEFINE AND CLARIFY THE DESIGN, INCLUDING A MATERIALS LIST DESCRIBING ALL PROPOSED MATERIALS BY MANUFACTURER'S NAME AND CATALOG NUMBER.
3. HYDRAULIC CALCULATIONS (AS REQUIRED)
4. PRODUCT DATA FOR ALL FIRE SPRINKLER SYSTEM COMPONENTS. CLEARLY INDICATE COMPONENTS TO BE USED WHERE MULTIPLE COMPONENTS APPEAR ON THE SAME CUT SHEET.

FOR ELECTRONIC SUBMITTALS, CONTRACTOR SHALL SUBMIT THE DOCUMENTS IN ACCORDANCE WITH THE PROCEDURES SPECIFIED IN DIVISION 1. CONTRACTOR SHALL NOTIFY THE ARCHITECT AND ENGINEER THAT THE SHOP DRAWINGS HAVE BEEN POSTED. FOR SUBMITTALS SENT BY E-MAIL, CONTRACTOR SHALL COPY THE ARCHITECT AND ENGINEER'S DESIGNATED REPRESENTATIVES. CONTRACTOR SHALL ALLOW THE ENGINEER REVIEW TIME AS SPECIFIED ABOVE IN THE CONSTRUCTION SCHEDULE. CONTRACTOR SHALL SUBMIT ONLY THE DOCUMENTS REQUIRED TO PURCHASE THE MATERIALS AND/OR EQUIPMENT IN THE ELECTRONIC SUBMITTAL AND SHALL CLEARLY INDICATE THE MATERIALS, PERFORMANCE CRITERIA AND ACCESSORIES BEING PROPOSED. GENERAL PRODUCT CATALOG DATA NOT SPECIFICALLY NOTED TO BE PART OF THE SPECIFIED PRODUCT WILL BE REJECTED AND RETURNED WITHOUT REVIEW.

21 1-7 ELECTRONIC DRAWINGS

IN PREPARATION OF SHOP DRAWINGS OR RECORD DRAWINGS, CONTRACTOR MAY, AT HIS OPTION, OBTAIN ELECTRONIC DRAWING FILES IN AUTOCAD VERSION 2013 OR DXF FORMAT, AS DESIRED, FROM THE ENGINEER FOR A FEE OF $200 FOR A DRAWING SET UP TO 12 SHEETS AND $15 PER SHEET FOR A SET OF MORE THAN 12 SHEETS. CONTRACTOR SHALL CONTACT THE ENGINEER TO OBTAIN THE NECESSARY RELEASE AGREEMENT FORM AND TO SPECIFY SHIPPING METHOD AND DRAWING FORMAT. PAYMENT MUST BE RECEIVED BEFORE ELECTRONIC DRAWING FILES WILL BE SENT.

21 1-8 RECORD DRAWINGS

DURING PROGRESS OF THE WORK OF THIS SECTION, THIS CONTRACTOR SHALL MAINTAIN AN ACCURATE RECORD OF ALL CHANGES MADE IN THE INSTALLATION OF THE SYSTEM. UPON COMPLETION OF THE WORK, ACCURATELY TRANSFER ALL RECORD INFORMATION TO THREE IDENTICAL BLUELINE PRINT SETS OF THE APPROVED SHOP DRAWINGS. INSERT ONE SET INTO EACH COPY OF THE MANUAL DESCRIBED BELOW.

21 1-9 SYSTEM MANUAL

UPON COMPLETION OF THE INSTALLATION, AND AS A CONDITION OF ITS ACCEPTANCE, CONTRACTOR SHALL COMPILE THREE 8-1/2" BY 11" MANUALS, FIRMLY BOUND IN HEAVYWEIGHT PLASTIC OR PAPER COVER TO WITHSTAND HARD USE. LOOSE-LEAF BINDING IS NOT ACCEPTABLE. MANUALS SHALL BE DELIVERED TO THE ARCHITECT, AND SHALL CONTAIN THE FOLLOWING ITEMS:

1. IDENTIFICATION CLEARLY VISIBLE ON OR THROUGH THE COVER, THE NAME OF THE PROJECT AND "FIRE SPRINKLER SYSTEM MANUAL".
2. NEATLY TYPED INDEX AT FRONT WITH ALL EMERGENCY INFORMATION CLEARLY IDENTIFIED.
3. COMPLETE LIST OF ALL SYSTEM COMPONENTS WITH MANUFACTURER'S NAMES, CATALOG NUMBERS, AND ALL DATA FOR ORDERING PARTS.
4. ONE COPY OF THE RECORD DRAWINGS, AS DESCRIBED ABOVE.
5. ALL INFORMATION REQUIRED TO SECURE EMERGENCY REPAIRS OR SERVICE.
6. TEST REPORTS AND CERTIFICATES INCLUDE "CONTRACTOR'S MATERIAL AND TEST CERTIFICATE(S) FOR ABOVEGROUND PIPING" AS DESCRIBED IN NFPA 13R.

21 1-10 GUARANTEE

THE ENTIRE INSTALLATION SHALL BE GUARANTEED FOR A PERIOD OF ONE YEAR FROM THE DATE OF SUBSTANTIAL COMPLETION. LABOR (INCLUDING TRAVEL EXPENSES) TO TROUBLE-SHOOT, REPAIR, REPROGRAM, OR REPLACE COMPONENTS SHALL BE FURNISHED BY THIS CONTRACTOR AT NO CHARGE DURING THE WARRANTY PERIOD.

21 2 MATERIALS AND INSTALLATION

21 2-1 PRODUCTS

ALL FIRE PROTECTION SYSTEM COMPONENTS SHALL BE UNDERWRITER'S LABORATORIES LISTED FOR THEIR INTENDED USE.

21 2-2 PIPING AND COMPONENTS

SPRINKLER PIPING 2-1/2" AND LARGER SHALL BE SCHEDULE 10 OR SCHEDULE 40 BLACK STEEL. SPRINKLER PIPING 2" AND SMALLER SHALL BE SCHEDULE 40. PIPES SHALL HAVE WELDED, THREADED, OR MECHANICALLY JOINED FITTINGS, BASED ON THE PIPE MATERIAL AND SIZE PER NFPA 13R REQUIREMENTS.

ACCEPTABLE ALTERNATIVES TO SCHEDULE 10 AND SCHEDULE 40 PIPE SHALL BE MANUFACTURED TO STANDARDS RECOGNIZED BY NFPA 13R. PIPE SHALL HAVE A CORROSION RESISTANCE RATING OF 1.0 OR GREATER. CRIMP-TYPE COUPLINGS SHALL NOT BE USED. THREADABLE THIN WALL PIPE WITH CORROSION RESISTANCE RATING LESS THAN 1.0 NOT PERMITTED.

ALL PIPING ON THE EXTERIOR OF THE BUILDING AND/OR EXPOSED TO THE ELEMENTS SHALL BE EXTERNALLY GALVANIZED.

21 2-3 SPRINKLERS

SPRINKLER HEAD TYPE SHALL BE SIDEWALL HEADS SEMI-RECESSED IN PARTY WALLS. SPRINKLER HEADS WITHOUT CEILINGS WILL BE UPRIGHT BRONZE. STANDARD SPRINKLER HEADS IN AREAS WITH FINISHED CEILINGS WILL BE SEMI RECESSED WITH CHROME HEADS.

21 3 EXECUTION

21 3-1 PIPING AND FINISHES

PIPING IN AREAS HAVING CEILINGS, OTHER THAN THE UNDERSIDE OF THE ROOF DECK, SHALL BE CONCEALED. PIPING IN AREAS WITHOUT CEILINGS MAY BE EXPOSED BUT KEPT AT A MINIMUM DISTANCE FROM THE DECK. ALL PIPING SHALL BE CLEAN AND FREE OF RUST. INSTALL SYSTEM SUCH THAT ALL PIPING IS RIGIDLY SECURED AND SUPPORTED. ALL DUCTWORK, LIGHTS, STRUCTURAL MEMBERS AND MAIN RUNS OF PIPING SHALL TAKE PRECEDENCE OVER SPRINKLER PIPING. CUTTING OF STRUCTURAL MEMBERS FOR PASSAGE OF SPRINKLER PIPES OR HANGERS WILL NOT BE PERMITTED. ALL HORIZONTAL PIPING IN CEILING SPACE SHALL BE AT AN ELEVATION ABOVE THE TOP OF LIGHT FIXTURES AND AIR OUTLETS TO ALLOW FOR ACCESS TO LIGHT FIXTURES AND AIR OUTLETS WITHOUT REMOVING HORIZONTAL PIPING. ROUTE ALL SPRINKLER PIPING AND PROVIDE ALL OFFSETS, BENDS, AND ELBOWS AROUND ALL MECHANICAL, ELECTRICAL, AND STRUCTURAL MEMBERS AS REQUIRED.

WHERE EXPOSED PIPING PASSES THROUGH FINISH WORK, CHROME PLATED (OR OTHER FINISH ACCEPTABLE TO THE ARCHITECT) SPLIT WALL PLATES OR ESCUTCHEONS SHALL BE INSTALLED TO FIT SNUGLY AROUND THE PIPING. WHERE PIPING IS CONCEALED OR INSTALLED IN UNFINISHED AREAS, SUITABLE PLATES SHALL BE PROVIDED AT EACH PENETRATION TO ASSURE EFFECTIVENESS OF CONSTRUCTION AS A FIRE STOP.

ALL OPENINGS FOR PIPING SHALL BE ANTICIPATED AND INDICATED ON THE APPROVED SHOP DRAWINGS. ANY ADDITIONAL CUTTING OF OPENINGS MUST HAVE THE WRITTEN APPROVAL OF THE ARCHITECT.

PIPING SHALL BE ROUTED PARALLEL TO MAJOR BUILDING LINES.

DESIGN SHALL ALLOW FOR SUITABLE DRAINAGE OF SYSTEM, ALL TO MEET WITH THE APPROVAL OF THE AFOREMENTIONED AUTHORITIES. PROVIDE ACCESS PANELS AS REQUIRED. ALL DRAIN LOCATIONS REQUIRING ACCESS PANELS SHALL BE APPROVED BY THE ARCHITECT PRIOR TO INSTALLATION.

SPRINKLERS IN SUSPENDED CEILINGS SHALL BE NOT LESS THAN 6- INCHES FROM THE GRID IN ALL DIRECTIONS.

21 3-2 COORDINATION

CONTRACTOR SHALL COORDINATE THE CONNECTION OF THE FIRE SPRINKLER ALARM DEVICES TO THE FIRE ALARM SYSTEM OR FIRE SPRINKLER MONITORING PANEL AS REQUIRED.

COORDINATE ALL SCHEDULING AND WORK WITH OTHER TRADES SO AS TO PREVENT CONFLICTS, AND TO ENSURE ORDERLY PROGRESS OF THE WORK, WITH A MINIMUM OF DELAYS. WHEN SPRINKLER PIPING IS INSTALLED WITHOUT COORDINATING WITH OTHER TRADES AND CONFLICTS OCCUR, SPRINKLER PIPING SHALL BE RELOCATED AS REQUIRED AT NO ADDITIONAL COST TO THE OWNER TO RESOLVE THE CONFLICTS.

21 3-3 PENETRATIONS

SEAL ALL FIRE PROTECTION FLOOR, WALL AND ROOF PENETRATIONS WATERTIGHT AND WEATHERTIGHT. CAULK AROUND FIRE PROTECTION PENETRATIONS WITH 3M CP-25, OR APPROVED EQUAL FIRE BARRIER CAULK (THICKNESS AS REQUIRED AND RECOMMENDED BY MANUFACTURER) TO MAINTAIN FIRE RESISTANCE RATING OF FIRE- RATED ASSEMBLIES.

21 3-4 TESTING AND ACCEPTANCE

CONTRACTOR SHALL COMPLETE THE AUTOMATIC FIRE SPRINKLER SYSTEM, AS SOON AS POSSIBLE, WHEN BUILDING CONSTRUCTION ALLOWS. FOLLOWING SYSTEM INSTALLATION, THE CONTRACTOR SHALL PLACE THE SYSTEM IN SERVICE. AFTER THE SYSTEM HAS BEEN PLACED IN SERVICE FOR CONTINUOUS USE, WATER CHARGES, IF ANY WILL BE PAID BY OWNER.

UPON COMPLETION OF THE SYSTEMS INSTALLATION, AND PRIOR TO ACCEPTANCE BY THE ENGINEER AND OWNER, THIS CONTRACTOR SHALL MAKE GENERAL OPERATING TESTS TO DEMONSTRATE THAT ALL EQUIPMENT AND SYSTEMS ARE IN PROPER WORKING ORDER, AND ARE FUNCTIONING IN CONFORMANCE WITH THE INTENT OF THE DRAWINGS AND SPECIFICATIONS.

ABOVE GROUND PIPING SHALL BE TESTED IN ACCORDANCE WITH NFPA 13. ALL SPRINKLER PIPING SHALL BE HYDROSTATICALLY TESTED AT A MINIMUM PRESSURE OF 200-PSI FOR A MINIMUM 2-HOUR PERIOD OF TIME. CORRECT ANY FAULTY OR LEAKING JOINTS AND PIPE. THE USE OF ANY SUBSTANCE OR MATERIAL ADDED TO THE WATER TO CORRECT LEAKS SHALL NOT BE PERMITTED. CAULKING OF DEFECTIVE JOINTS, CRACKS OR HOLES WILL NOT BE PERMITTED. TESTS SHALL BE REPEATED AFTER DEFECTS HAVE BEEN ELIMINATED. ALL TESTS SHALL BE MADE IN THE PRESENCE OF THE AHJ AND/OR THE OWNER'S AUTHORIZED REPRESENTATIVE.

UPON COMPLETION OF EACH PHASE OF THE INSTALLATION, EACH SYSTEM SHALL BE TESTED IN CONFORMANCE WITH LOCAL CODE REQUIREMENTS. THE CONTRACTOR SHALL FURNISH ALL LABOR AND EQUIPMENT REQUIRED TO PROPERLY TEST ALL SPRINKLER EQUIPMENT INSTALLED UNDER THIS CONTRACT, AND HE SHALL ASSUME ALL COSTS INVOLVED IN MAKING THE TESTS, AND REPAIRING AND/OR REPLACING ALL DAMAGE RESULTING THEREFROM.

THE CONTRACTOR SHALL NOTIFY THE ARCHITECT AND THE AUTHORITY HAVING JURISDICTION, THREE (3) WORKING DAYS PRIOR TO MAKING SPRINKLER SYSTEM TESTS. CONCEALED WORK SHALL REMAIN UNCOVERED UNTIL THE REQUIRED TESTS HAVE BEEN COMPLETED, BUT IF NECESSARY DUE TO CONSTRUCTION PROCEDURE, TESTS ON PORTIONS OF THE WORK MAY BE MADE, AND IF SATISFACTORY, THE WORK MAY BE CONCEALED.

21 3-5 INSTRUCTIONS

AFTER COMPLETION OF ALL INSTALLATION, TESTS, ETC., AND PRIOR TO THE FINAL ACCEPTANCE DATE, THE CONTRACTOR SHALL INSTRUCT THE BUILDING OWNER AND HIS SELECTED PERSONNEL IN THE OPERATION OF THE SPRINKLER SYSTEM AND THE PROCEDURE TO CONDUCT QUARTERLY MAIN DRAIN TESTS AS REQUIRED BY NFPA 25. SPECIAL CARE SHALL BE TAKEN TO MAKE SURE THE BUILDING PERSONNEL WILL IMMEDIATELY RECOGNIZE WHETHER THE MAIN VALVE IS IN AN OPEN POSITION, WILL KNOW HOW TO DRAIN THE SYSTEM, AND WILL KNOW HOW TO TEST THE SYSTEM. THE BUILDING PERSONNEL SHALL ALSO BE MADE FAMILIAR WITH THE EXISTENCE AND CONTENTS OF THE SYSTEM MANUAL DESCRIBED IN THIS SPECIFICATION.

END OF SECTION 21

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DATE: 05/25/23
ISSUE RECORD: 100% CD

REVISIONS:

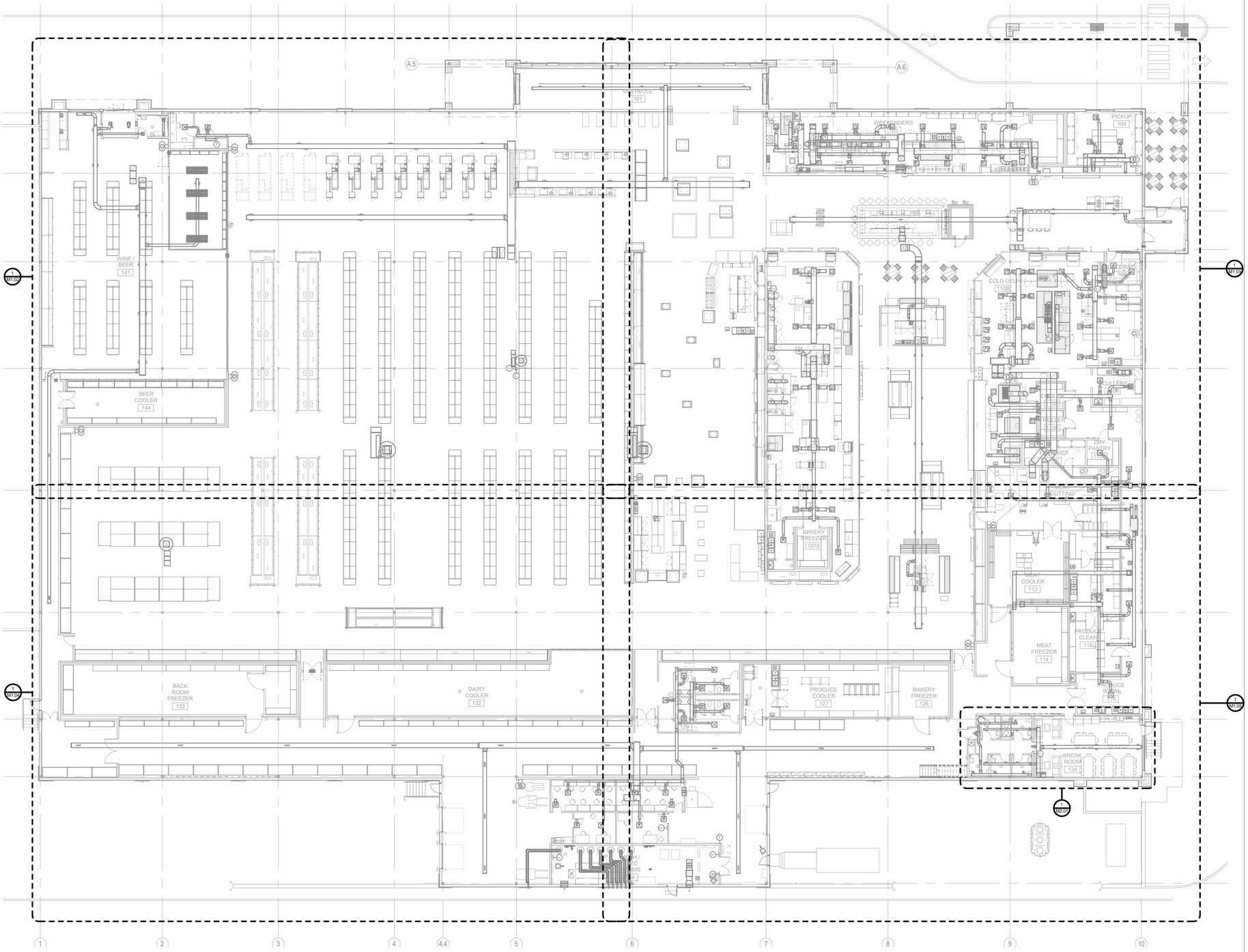
MECHANICAL SPECIFICATIONS

M0.01

GENERAL NOTES:

REFER TO SHEET M3.01 FOR GENERAL NOTES.

PLAN HEX NOTES:



1 M1.01 **FIRST FLOOR HVAC PLAN**
SCALE: 1/16" = 1'-0"

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OVERALL FIRST FLOOR HVAC PLAN

M1.01

GENERAL NOTES:

REFER TO SHEET M3.01 FOR GENERAL NOTES.

PLAN HEX NOTES:

1 PROVIDE STEEL GRATE ON END OF DUCTWORK FITTING UP TO MATCH SIZE OF DUCT OPENING.

2 28"X20" SUPPLY & 80"X15" RETURN UP TO RTU7 ON ROOF. TRANSITION AS NECESSARY TO MATCH DUCT CONNECTION SIZES.

3 28"X20" SUPPLY & 80"X15" RETURN UP TO RTU8 ON ROOF. TRANSITION AS NECESSARY TO MATCH DUCT CONNECTION SIZES.

4 18"X18" SUPPLY & 19"X11" RETURN UP TO RTU14 ON ROOF. TRANSITION AS NECESSARY TO MATCH DUCT CONNECTION SIZES.

5 28"X20" SUPPLY & 24"X20" RETURN UP TO RTU1 ON ROOF. TRANSITION AS NECESSARY TO MATCH DUCT CONNECTION SIZES.

6 6" Ø EXHAUST DUCT UP TO EF1 ON ROOF.

7 RETURN AIR GRILLE SOUND BOOT. (TYPICAL) SEE DETAIL.

8 AIR DISTRIBUTION SUPPLY REGISTERS SHALL BE MOUNTED AT 30° FROM BOTTOM OF DUCT. COORDINATE SUPPLY REGISTER LOCATIONS WITH STRUCTURE AND LIGHTS FOR SYMMETRICAL APPEARANCE. TYPICAL.

9 AIR DISTRIBUTION SUPPLY REGISTERS SHALL BE MOUNTED AT 45° FROM BOTTOM OF DUCT. COORDINATE SUPPLY REGISTER LOCATIONS WITH STRUCTURE AND LIGHTS FOR SYMMETRICAL APPEARANCE. TYPICAL.

10 COORDINATE LOCATION OF AIR DISTRIBUTION OUTLETS WITH OTHER EQUIPMENT SUCH AS FIRE ALARM DEVICES, SPRINKLER HEADS, LIGHTS, ETC. (TYPICAL)

11 EXPOSED ROUND DUCTWORK SHALL BE DOUBLE WALL SPIRAL WITH 1" PERFORATED INNER LINER. KEEP DUCTWORK TIGHT TO BOTTOM OF STRUCTURE. EXPOSED DUCTWORK SHALL BE CLEAN AND FREE OF DEFECTS. EXPOSED DUCTWORK SHALL BE CONSTRUCTED OF PAINT GRIP SHEET METAL FOR PAINTING AS DIRECTED BY ARCHITECT.

12 28"X26" SUPPLY & 42"X20" RETURN UP TO RTU2 ON ROOF. TRANSITION AS NECESSARY TO MATCH DUCT CONNECTION SIZES.

13 INSTALL TRANSFER AIR DUCT AS HIGH AS POSSIBLE.

1 M1.02 **FIRST FLOOR HVAC PLAN - AREA A**
SCALE: 1/8" = 1'-0"

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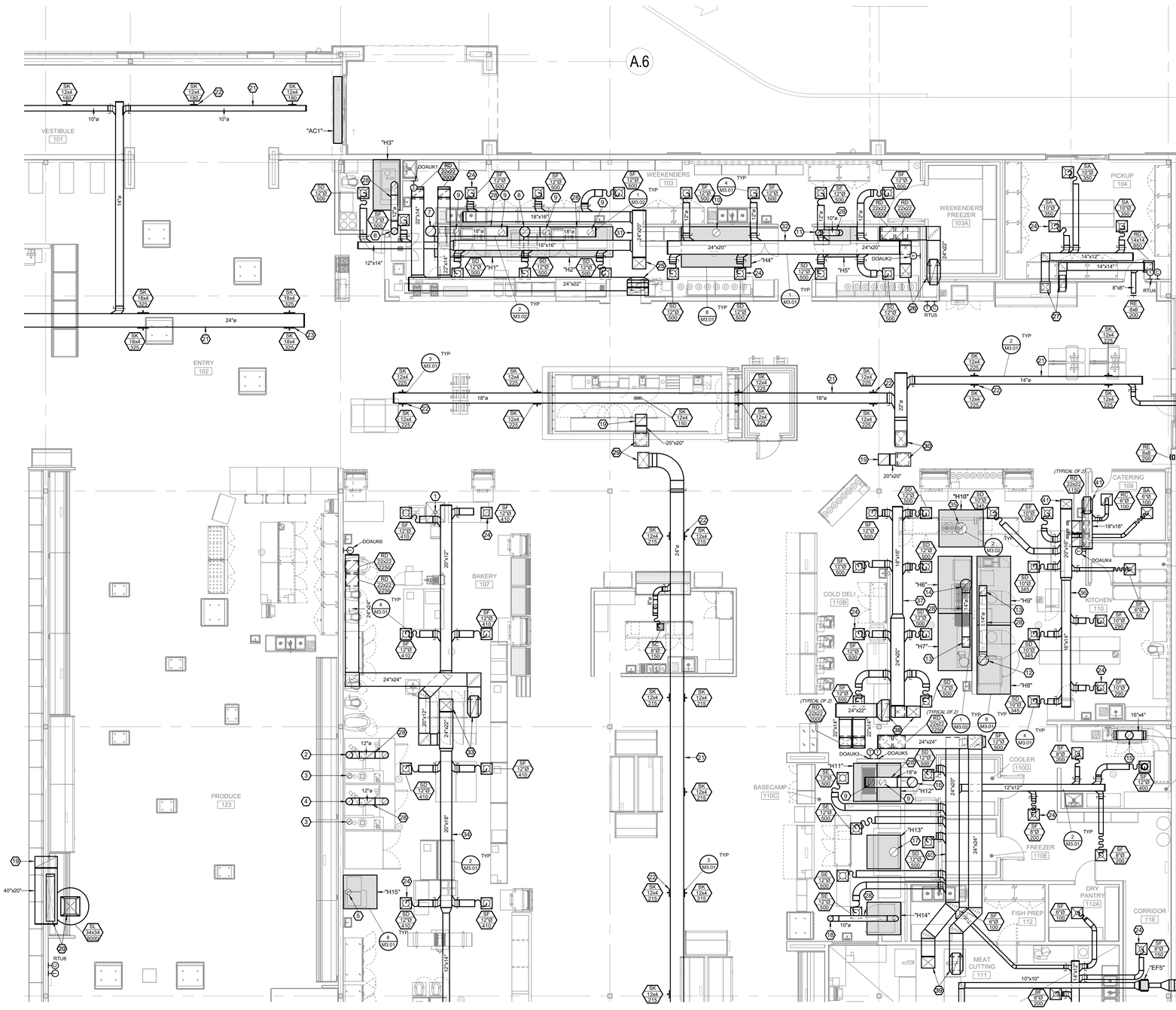
FIRST FLOOR HVAC PLAN - AREA A

M1.02



1 M1.03

FIRST FLOOR HVAC PLAN - AREA B

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

PLAN HEX NOTES:

1. 6"Ø TYPE B EXHAUST DUCT UP THROUGH ROOF. TERMINATE WITH EQUIPMENT MANUFACTURER APPROVED ROOF CAP.
2. 12"Ø GREASE EXHAUST DUCT UP TO KEF15 ON ROOF. TRANSITION AS NECESSARY TO MATCH DUCT CONNECTIONS ON HOOD AND EXHAUST FAN.
3. 8"Ø TYPE B EXHAUST DUCT UP THROUGH ROOF. TERMINATE WITH EQUIPMENT MANUFACTURER APPROVED ROOF CAP.
4. 12"Ø GREASE EXHAUST DUCT UP TO KEF16 ON ROOF. TRANSITION AS NECESSARY TO MATCH DUCT CONNECTIONS ON HOOD AND EXHAUST FAN.
5. 10"Ø GREASE EXHAUST DUCT UP TO KEF12 ON ROOF. TRANSITION AS NECESSARY TO MATCH DUCT CONNECTIONS ON HOOD AND EXHAUST FAN.
6. 12"Ø GREASE EXHAUST DUCT UP TO KEF3 ON ROOF. TRANSITION AS NECESSARY TO MATCH DUCT CONNECTIONS ON HOOD AND EXHAUST FAN.
7. 18"Ø GREASE EXHAUST DUCT UP TO KEF1 ON ROOF. TRANSITION AS NECESSARY TO MATCH DUCT CONNECTIONS ON HOOD AND EXHAUST FAN.
8. 18"Ø GREASE EXHAUST DUCT UP TO KEF2 ON ROOF. TRANSITION AS NECESSARY TO MATCH DUCT CONNECTIONS ON HOOD AND EXHAUST FAN.
9. 12" GREASE EXHAUST DUCT DOWN TO HOOD CONNECTION.
10. 14"Ø GREASE EXHAUST DUCT UP TO KEF4 ON ROOF. TRANSITION AS NECESSARY TO MATCH DUCT CONNECTIONS ON HOOD AND EXHAUST FAN.
11. 10"Ø GREASE EXHAUST DUCT UP TO KEF5 ON ROOF. TRANSITION AS NECESSARY TO MATCH DUCT CONNECTIONS ON HOOD AND EXHAUST FAN.
12. 20"Ø GREASE EXHAUST DUCT UP TO KEF7 ON ROOF AND 14"Ø GREASE EXHAUST DUCT DOWN TO HOOD CONNECTION. TRANSITION AS NECESSARY TO MATCH DUCT CONNECTIONS ON HOOD AND EXHAUST FAN.
13. 14"Ø GREASE EXHAUST DUCT DOWN TO HOOD CONNECTION.

GENERAL NOTES:

REFER TO SHEET M3.01 FOR GENERAL NOTES.

PLAN HEX NOTES:

14. 20"Ø GREASE EXHAUST DUCT UP TO KEF6 ON ROOF AND 14"Ø GREASE EXHAUST DUCT DOWN TO HOOD CONNECTION. TRANSITION AS NECESSARY TO MATCH DUCT CONNECTIONS ON HOOD AND EXHAUST FAN.
15. 14"Ø EXHAUST DUCT UP TO KEF13 ON ROOF. TRANSITION AS NECESSARY TO MATCH DUCT CONNECTIONS ON HOOD AND EXHAUST FAN. ALL DUCTWORK ASSOCIATED WITH DISHWASHER HOOD SHALL BE CONSTRUCTED WITH STAINLESS STEEL. DUCTWORK SHALL BE INSTALLED WITH A 2% SLOPE FROM EXHAUST FAN BACK TO THE DISHWASHER. JOINTS SHALL BE WATER TIGHT. COORDINATE DUCTWORK WITH STRUCTURE.
16. 18"Ø GREASE EXHAUST DUCT UP TO KEF9 ON ROOF. TRANSITION AS NECESSARY TO MATCH DUCT CONNECTIONS ON HOOD AND EXHAUST FAN.
17. 16"Ø GREASE EXHAUST DUCT UP TO KEF10 ON ROOF. TRANSITION AS NECESSARY TO MATCH DUCT CONNECTIONS ON HOOD AND EXHAUST FAN.
18. 10"Ø GREASE EXHAUST DUCT UP TO KEF11 ON ROOF. TRANSITION AS NECESSARY TO MATCH DUCT CONNECTIONS ON HOOD AND EXHAUST FAN.
19. PROVIDE STEEL GRATE ON END OF DUCTWORK FITTING UP TO MATCH SIZE OF DUCT OPENING.
20. 28"X20" SUPPLY & 80"X15" RETURN UP TO RTU8 ON ROOF. TRANSITION AS NECESSARY TO MATCH DUCT CONNECTION SIZES.
21. EXPOSED ROUND DUCTWORK SHALL BE DOUBLE WALL SPIRAL WITH 1" PERFORATED INNER LINER. KEEP DUCTWORK TIGHT TO BOTTOM OF STRUCTURE. EXPOSED DUCTWORK SHALL BE CLEAN AND FREE OF DEFECTS. EXPOSED DUCTWORK SHALL BE CONSTRUCTED OF PAINT GRIP SHEET METAL FOR PAINTING AS DIRECTED BY ARCHITECT.
22. AIR DISTRIBUTION SUPPLY REGISTERS SHALL BE MOUNTED AT 30" FROM BOTTOM OF DUCT. COORDINATE SUPPLY REGISTER LOCATIONS WITH STRUCTURE AND LIGHTS FOR SYMMETRICAL APPEARANCE. TYPICAL.
23. AIR DISTRIBUTION SUPPLY REGISTERS SHALL BE MOUNTED AT 45° FROM BOTTOM OF DUCT. COORDINATE SUPPLY REGISTER LOCATIONS WITH STRUCTURE AND LIGHTS FOR SYMMETRICAL APPEARANCE. TYPICAL.
24. COORDINATE LOCATION OF AIR DISTRIBUTION OUTLETS WITH OTHER EQUIPMENT SUCH AS FIRE ALARM DEVICES, SPRINKLER HEADS, LIGHTS, ETC. (TYPICAL)
25. 24"X20" SUPPLY & 24"X22" RETURN UP TO DOAUK1 ON ROOF. TRANSITION AS NECESSARY TO MATCH DUCT CONNECTION SIZES.
26. 24"X20" SUPPLY & 24"X22" RETURN UP TO DOAUK2 ON ROOF. TRANSITION AS NECESSARY TO MATCH DUCT CONNECTION SIZES.
27. 14"X12" SUPPLY & 14"X14" RETURN UP TO RTU4 ON ROOF. TRANSITION AS NECESSARY TO MATCH DUCT CONNECTION SIZES.
28. GREASE DUCT SHALL BE CONSTRUCTED AND INSTALLED SO THAT GREASE WILL NOT ACCUMULATE IN DUCTWORK. DUCTWORK SHALL SLOPE AT 2% TOWARD HOOD OR GREASE RESERVOIR. PROVIDE DUCT CLEAN OUTS AT CHANGE OF DIRECTION WITH GREASE TIGHT ACCESS DOORS. DUCTWORK TO BE WRAPPED WITH TWO LAYERS OF 3M FIRE BARRIER, ZERO CLEARANCE. DUCT WRAP 615+. SEE DETAIL. OR SHALL PROVIDE CAPTIVE AIRE OR EQUAL 0 CLEARANCE GREASE EXHAUST DUCT SYSTEM.
29. 28"X20" SUPPLY & 20"X20" RETURN UP TO RTU3 ON ROOF. TRANSITION AS NECESSARY TO MATCH DUCT CONNECTION SIZES.
30. 22"X22" SUPPLY & 20"X20" RETURN UP TO RTU5 ON ROOF. TRANSITION AS NECESSARY TO MATCH DUCT CONNECTION SIZES.
31. MAKE-UP AIR FOR KITCHEN HOOD(S) H1, H2, & H3 IS PROVIDED BY DOAUK1. REFER TO CONTROLS DIAGRAM FOR REQUIREMENTS.
32. MAKE-UP AIR FOR KITCHEN HOOD(S) H4 & H5 IS PROVIDED BY DOAUK2. REFER TO CONTROLS DIAGRAM FOR REQUIREMENTS.
33. 24"X22" SUPPLY & 24"X24" RETURN UP TO DOAUK6 ON ROOF. TRANSITION AS NECESSARY TO MATCH DUCT CONNECTION SIZES.
34. MAKE-UP AIR FOR KITCHEN HOOD(S) H15, DOUBLE RACK OVEN HOODS, & POT WASHER IS PROVIDED BY DOAUK6. REFER TO CONTROLS DIAGRAM FOR REQUIREMENTS.
35. 20"Ø GREASE EXHAUST DUCT UP TO KEF8 ON ROOF. TRANSITION AS NECESSARY TO MATCH DUCT CONNECTIONS ON HOOD AND EXHAUST FAN.
36. MAKE-UP AIR FOR KITCHEN HOOD(S) H8, H9, & DISHWASHER IS PROVIDED BY DOAUK4. REFER TO CONTROLS DIAGRAM FOR REQUIREMENTS.
37. MAKE-UP AIR FOR KITCHEN HOOD(S) H6, H7, & H10 IS PROVIDED BY DOAUK3. REFER TO CONTROLS DIAGRAM FOR REQUIREMENTS.
38. 24"X20" SUPPLY & 24"X22" RETURN UP TO DOAUK3 ON ROOF. TRANSITION AS NECESSARY TO MATCH DUCT CONNECTION SIZES.
39. 24"X20" SUPPLY & 24"X24" RETURN UP TO DOAUK5 ON ROOF. TRANSITION AS NECESSARY TO MATCH DUCT CONNECTION SIZES.
40. MAKE-UP AIR FOR KITCHEN HOOD(S) H12, H13, & H14 IS PROVIDED BY DOAUK5. REFER TO CONTROLS DIAGRAM FOR REQUIREMENTS.
41. 20"X16" SUPPLY & 18"X16" RETURN UP TO DOAUK4 ON ROOF. TRANSITION AS NECESSARY TO MATCH DUCT CONNECTION SIZES.

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FIRST FLOOR HVAC PLAN - AREA B

M1.03

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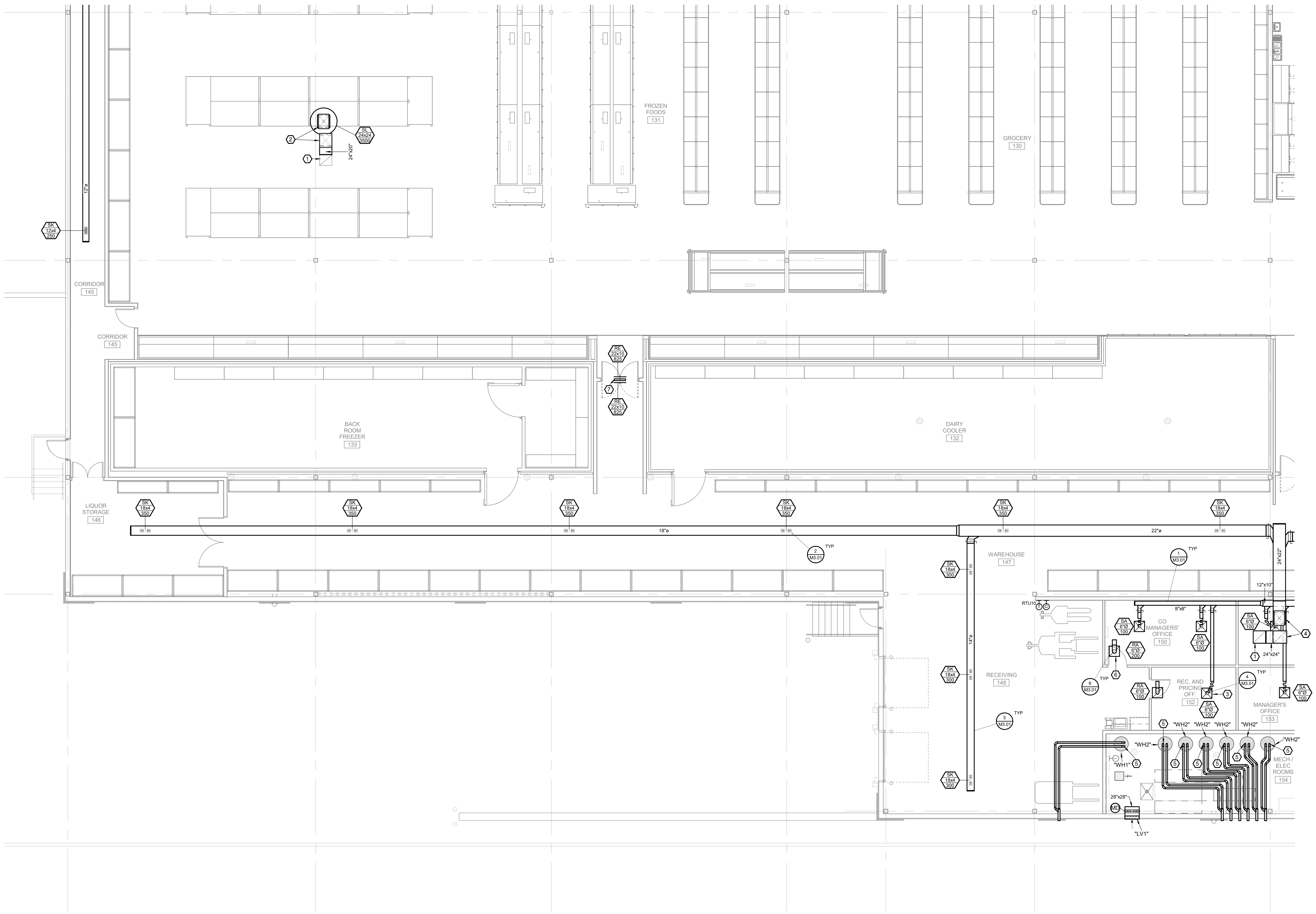

1 M1.04 FIRST FLOOR HVAC PLAN - AREA C

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

GENERAL NOTES:

REFER TO SHEET M3.01 FOR GENERAL NOTES.

PLAN HEX NOTES:

1 PROVIDE STEEL GRATE ON END OF DUCTWORK FITTING UP TO MATCH SIZE OF DUCT OPENING.

2 24"X24" SUPPLY & 24"X20" RETURN UP TO RTU6 ON ROOF. TRANSITION AS NECESSARY TO MATCH DUCT CONNECTION SIZES.

3 COORDINATE LOCATION OF AIR DISTRIBUTION OUTLETS WITH OTHER EQUIPMENT SUCH AS FIRE ALARM DEVICES, SPRINKLER HEADS, LIGHTS, ETC. (TYPICAL)

4 24"X22" SUPPLY & 24"X24" RETURN UP TO RTU10 ON ROOF. TRANSITION AS NECESSARY TO MATCH DUCT CONNECTION SIZES.

5 WATER HEATER CONCENTRIC VENT ROUTED THROUGH WALL AND TERMINATED. INSTALL PER MANUFACTURER'S REQUIREMENTS. VERIFY TERMINATION POINT IS MINIMUM OF 10' FROM MECHANICAL INTAKES.

6 RETURN AIR GRILLE SOUND BOOT. (TYPICAL) SEE DETAIL.

7 INSTALL TRANSFER AIR DUCT AS HIGH AS POSSIBLE.

COLORADO LICENSED JAMES R. BASQUETTE 0060317 PROFESSIONAL ENGINEER

James R. Basquette

Digitally signed by James R. Basquette DN: C=US, E=jim.basquette@rtmec.com, O=RTM Engineering Consultants, CN=James R. Basquette Date: 2023.05.25 15:55:54-05'00'

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FIRST FLOOR HVAC PLAN - AREA C

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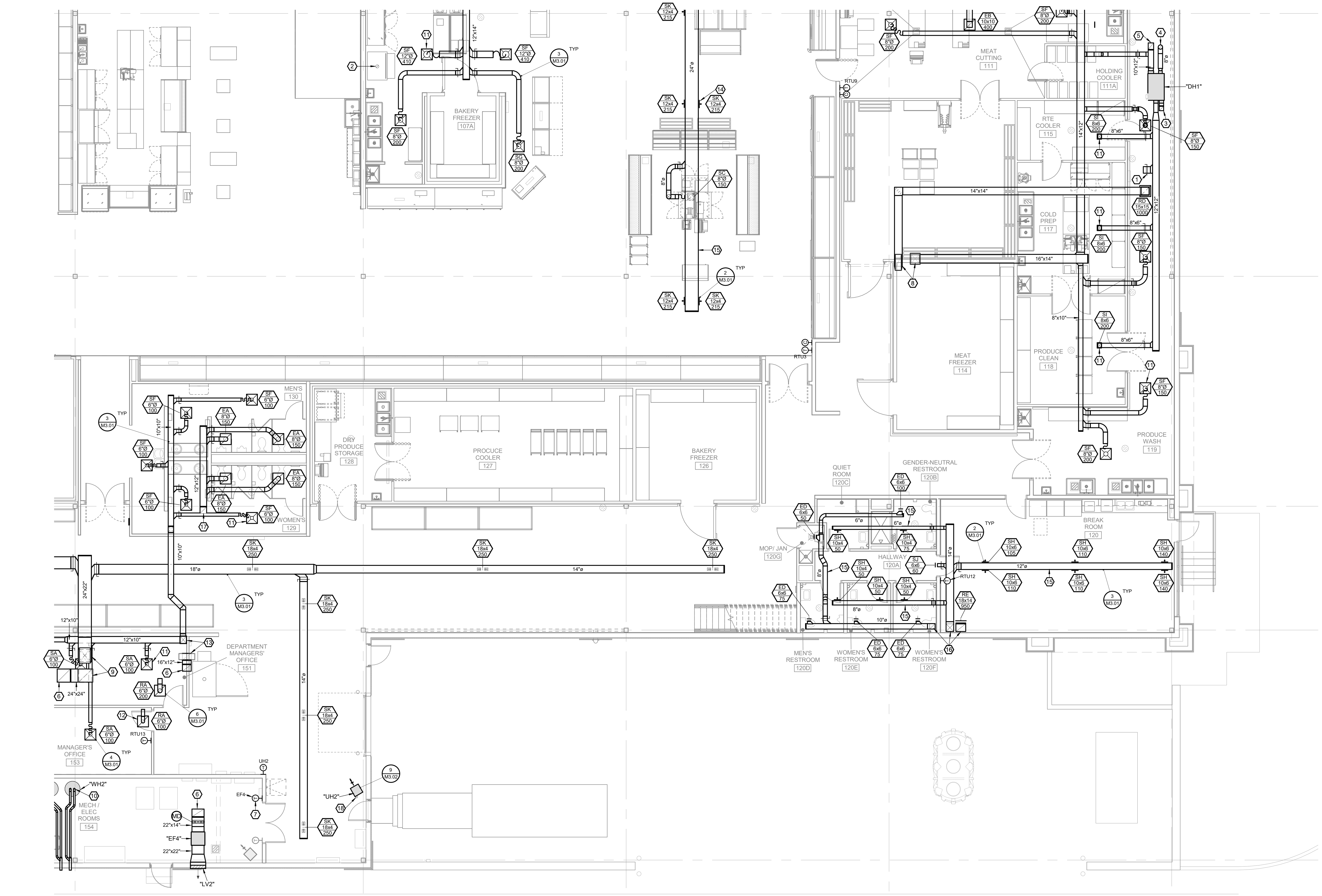
M1.04



FIRST FLOOR HVAC PLAN - AREA D

1 / M1.05

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

GENERAL NOTES:

REFER TO SHEET M3.01 FOR GENERAL NOTES.

PLAN HEX NOTES:

1 12"X8" PRESSURE RELIEF DAMPER, DURODYNE MODEL WDD12X8 OR EQUIVALENT MANUFACTURER SET TO RELIEVE PRESSURE AT 0.125" WC.

2 6"Ø EXHAUST DUCT UP TO KEF14 ON ROOF. TRANSITION AS NECESSARY TO MATCH DUCT CONNECTIONS ON HOOD AND EXHAUST FAN. ALL DUCTWORK ASSOCIATED WITH POT WASHER SHALL BE CONSTRUCTED WITH STAINLESS STEEL. DUCTWORK SHALL BE INSTALLED WITH A 2% SLOPE FROM EXHAUST FAN BACK TO THE DISHWASHER. JOINTS SHALL BE WATER TIGHT. COORDINATE DUCTWORK WITH STRUCTURE.

3 8"X8" REACTION INLET DUCT TURNED UP AND OPEN TO PLENUM.

4 8" REACTION OUTLET UP TO ROOF AND TERMINATE WITH GOOSE NECK 2' ABOVE ROOF LEVEL. REFER TO DETAIL.

5 10"X12" PROCESS INLET DUCT TURNED UP AND OPEN TO PLENUM WITH 8"Ø OUTSIDE AIR DUCT CONNECTION.

6 PROVIDE STEEL GRATE ON END OF DUCTWORK FITTING UP TO MATCH SIZE OF DUCT OPENING.

7 EF4 SHALL ENERGIZE WHEN SPACE TEMPERATURE REACHES 80°F AND SHALL SIMULTANEOUSLY OPEN MOTORIZED DAMPER ON INTAKE LOUVER LV1. REFER TO CONTROL DIAGRAM.

8 16"X14" SUPPLY & 14"X14" RETURN UP TO RTU9 ON ROOF. TRANSITION AS NECESSARY TO MATCH DUCT CONNECTION SIZES.

9 24"X22" SUPPLY & 24"X24" RETURN UP TO RTU10 ON ROOF. TRANSITION AS NECESSARY TO MATCH DUCT CONNECTION SIZES.

10 WATER HEATER CONCENTRIC VENT ROUTED THROUGH WALL AND TERMINATED. INSTALL PER MANUFACTURER'S REQUIREMENTS. VERIFY TERMINATION POINT IS MINIMUM OF 10' FROM MECHANICAL INTAKES.

11 COORDINATE LOCATION OF AIR DISTRIBUTION OUTLETS WITH OTHER EQUIPMENT SUCH AS FIRE ALARM DEVICES, SPRINKLER HEADS, LIGHTS, ETC. (TYPICAL)

12 RETURN AIR GRILLE SOUND BOOT. (TYPICAL) SEE DETAIL.

13 14"X12" SUPPLY & 16"X12" RETURN UP TO RTU13 ON ROOF. TRANSITION AS NECESSARY TO MATCH DUCT CONNECTION SIZES.

14 AIR DISTRIBUTION SUPPLY REGISTERS SHALL BE MOUNTED AT 30° FROM BOTTOM OF DUCT. COORDINATE SUPPLY REGISTER LOCATIONS WITH STRUCTURE AND LIGHTS FOR SYMMETRICAL APPEARANCE. TYPICAL.

15 EXPOSED ROUND DUCTWORK SHALL BE DOUBLE WALL SPIRAL WITH 1" PERFORATED INNER LINER. KEEP DUCTWORK TIGHT TO BOTTOM OF STRUCTURE. EXPOSED DUCTWORK SHALL BE CLEAN AND FREE OF DEFECTS. EXPOSED DUCTWORK SHALL BE CONSTRUCTED OF PAINT GRIP SHEET METAL FOR PAINTING AS DIRECTED BY ARCHITECT.

16 14"X14"X SUPPLY, 18"X14" RETURN, & 10"X10" EXHAUST DUCTS UP IN CHASE TO MEZZANINE CEILING LEVEL.

17 12"X12" EXHAUST DUCT UP TO EF2 ON ROOF.

18 VENT CONNECTION SERVING GAS FIRED UNIT HEATER UP THRU ROOF. SIZE AND INSTALL PER MANUFACTURER'S REQUIREMENTS. INTAKE AIR PROVIDED FROM WAREHOUSE SPACE.

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FIRST FLOOR HVAC PLAN - AREA D

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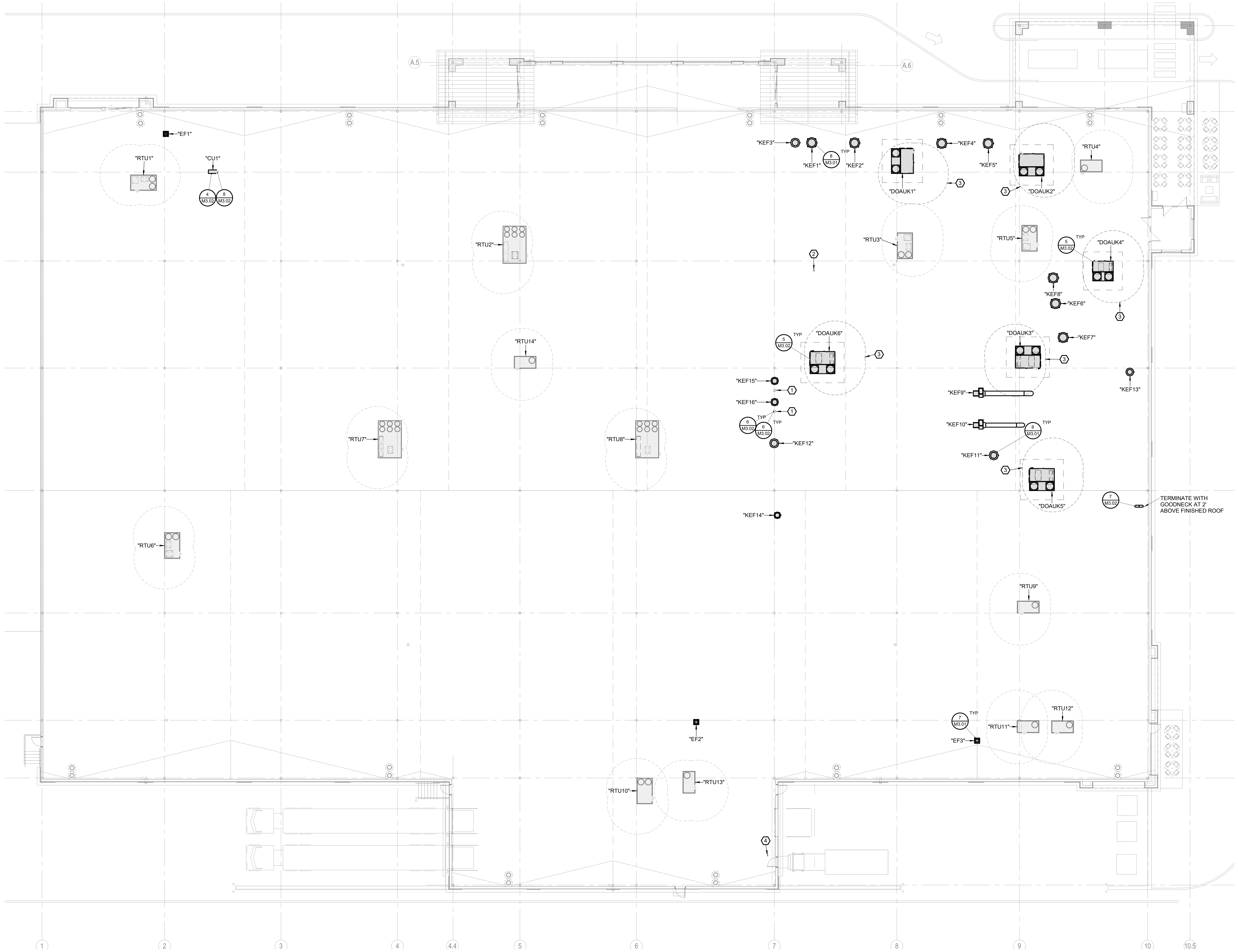
INSTALL ALL MECHANICAL EQUIPMENT MINIMUM OF 10'-0" FROM ROOF EDGE WHERE PARAPET IS LESS THAN 42".



1 M1.06
ROOF - HVAC PLAN
SCALE: 1/16" = 1'-0"

GENERAL NOTES:

REFER TO SHEET M3.01 FOR GENERAL NOTES.

PLAN HEX NOTES:

1 8"Ø TYPE B EXHAUST DUCT UP THROUGH ROOF. TERMINATE WITH EQUIPMENT MANUFACTURER APPROVED ROOF CAP.

2 6"Ø TYPE B EXHAUST DUCT UP THROUGH ROOF. TERMINATE WITH EQUIPMENT MANUFACTURER APPROVED ROOF CAP.

3 CIRCLE REPRESENTS THE 10'-0" MINIMUM DISTANCE REQUIRED FOR RTU OUTSIDE AIR INTAKE CLEARANCE FROM EXHAUST, FLUE, VENT, GAS REGULATOR OR ANY OTHER SOURCE OF CONTAMINATED AIR. NO EXHAUST FANS, FLUE OUTLETS, PLUMBING VENTS, ETC. SHALL BE LOCATED INSIDE THIS CIRCLE. (TYPICAL OF ALL RTU / DOAS INTAKES.)

4 VENT CONNECTION SERVING GAS FIRED UNIT HEATER UP THRU ROOF. SIZE AND INSTALL PER MANUFACTURER'S REQUIREMENTS. INTAKE AIR PROVIDED FROM WAREHOUSE SPACE.

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ROOF HVAC PLAN

M1.06

KITCHEN VENTILATION SEQUENCES VIA DOAUK:

SINGLE SPEED EXHAUST FAN WITH PACKAGED HEATING AND COOLING DEDICATED OUTSIDE AIR MAKE-UP AIR UNIT WITH RETURN FOR SPACE CONDITIONING:

KITCHEN DOAS UNIT (DOAUK) MANUFACTURER SHALL PROVIDE PACKAGED UNIT WITH BACNET COMPLIANT UNIT CONTROLLER TO PERFORM ALL FUNCTIONS AS LISTED IN THIS SEQUENCE OF OPERATION. MECHANICAL CONTRACTOR SHALL INTEROCK THE HOOD CONTROL PANEL, EXHAUST FAN, AND RTU UNIT MANUFACTURER'S CONTROLLER. INTERLOCKED SYSTEM SHALL PROVIDE ALL PROGRAMMING LISTED IN THE SEQUENCE BELOW. ALL OTHER REQUIRED SENSORS, RELAYS, SWITCHES, ETC. NOT PROVIDED BY MANUFACTURER SHALL BE PROVIDED BY MECHANICAL CONTRACTOR.

MECHANICAL CONTRACTOR SHALL PROVIDE APPLICATION SPECIFIC CONTROLLER TO CONTROL ALL FUNCTIONS IN THIS SEQUENCE OF OPERATION WHICH ARE NOT SPECIFICALLY CONTROLLED BY MAKE-UP AIR MANUFACTURER'S INTEGRAL CONTROLLER.

OCCUPIED / KITCHEN HOOD ON: THE KITCHEN HOOD SHALL BE PROVIDED WITH A CONTROLLER AND ALL NECESSARY HEAT SENSORS TO START THE FANS, HOODS, AND MAKE-UP AIR UNITS BASED ON THE TEMPERATURE OF THE SENSORS LOCATED IN THE HOOD. THE HOOD SHALL ALSO BE PROVIDED WITH ON-OFF SWITCH IN THE CONTROL BOX TO ALLOW THE KITCHEN HOOD, EXHAUST FAN, AND KITCHEN DOAS UNIT TO OPERATE WHEN MANUALLY SWITCHED ON. WHEN THE KITCHEN EXHAUST HOOD IS TURNED ON AT THE HOOD CONTROL UNIT, THE APPROPRIATE CORRESPONDING EXHAUST FAN(S) SHALL BE STARTED SIMULTANEOUSLY WITH THE APPROPRIATE KITCHEN DOAS UNIT. THE KITCHEN DOAS UNIT SHALL RUN WITH OUTSIDE AIR DAMPER AT 100% OPEN AND RETURN AIR DAMPER CLOSED ANY TIME THAT THE EXHAUST FAN(S) IS RUNNING.

OCCUPIED / KITCHEN HOOD OFF: KITCHEN HOOD IS TURNED OFF AT HOOD CONTROL UNIT AND BUILDING SCHEDULE INDICATES OCCUPIED MODE. DOAUK SHALL BE ENERGIZED. OUTSIDE AIR DAMPER SHALL CLOSE TO MINIMUM POSITIONED AS BALANCED BY BALANCING CONTRACTOR TO PROVIDE MINIMUM OUTSIDE AIR TO SPACE AND RETURN AIR DAMPER SHALL OPEN. UNIT SHALL OPERATING IN COOLING / HEATING AS INDICATED BY UNIT MANUFACTURER'S CONTROLLER AND SHALL MODULATE TO MAINTAIN SPACE TEMPERATURE AND HUMIDITY.

UNOCCUPIED / KITCHEN HOOD OFF: KITCHEN HOOD IS TURNED OFF AT HOOD CONTROL UNIT AND BUILDING SCHEDULE INDICATES UNOCCUPIED MODE. DOAUK SHALL BE ENERGIZED AND SET BACK TO NIGHT SETBACK MODE. OUTSIDE AIR DAMPER SHALL CLOSE AND RETURN AIR DAMPER SHALL OPEN. UNIT SHALL OPERATE IN COOLING / HEATING AS INDICATED BY UNIT MANUFACTURERS CONTROLLER AND SHALL MODULATE TO MAINTAIN NIGHT SETBACK TEMPERATURES (SUMMER 80 DEGREES / WINTER 65 DEGREES (ADJUSTABLE).

DOAUK DX COOLING COIL CONTROL BY UNIT MANUFACTURER'S CONTROLLER: UPON A CALL FOR COOLING, THE UNIT SHALL ENERGIZE AND MODULATE COMPRESSORS TO PROVIDE PROPER SUPPLY AIR TEMPERATURE 55 DEGREES (ADJUSTABLE) TO MAINTAIN PROPER SPACE TEMPERATURE 75 DEGREES (ADJUSTABLE) AS MEASURED BY THE SPACE TEMPERATURE SENSOR.

DOAUK DEHUMIDIFICATION CONTROL BY UNIT MANUFACTURER'S CONTROLLER: UPON A CALL FOR COOLING, THE UNIT SHALL ENERGIZE AND MODULATE COMPRESSORS IN CONJUNCTION WITH THE MODULATING HOT GAS REHEAT COIL TO PROVIDE PROPER SUPPLY AIR TEMPERATURE AND HUMIDITY.

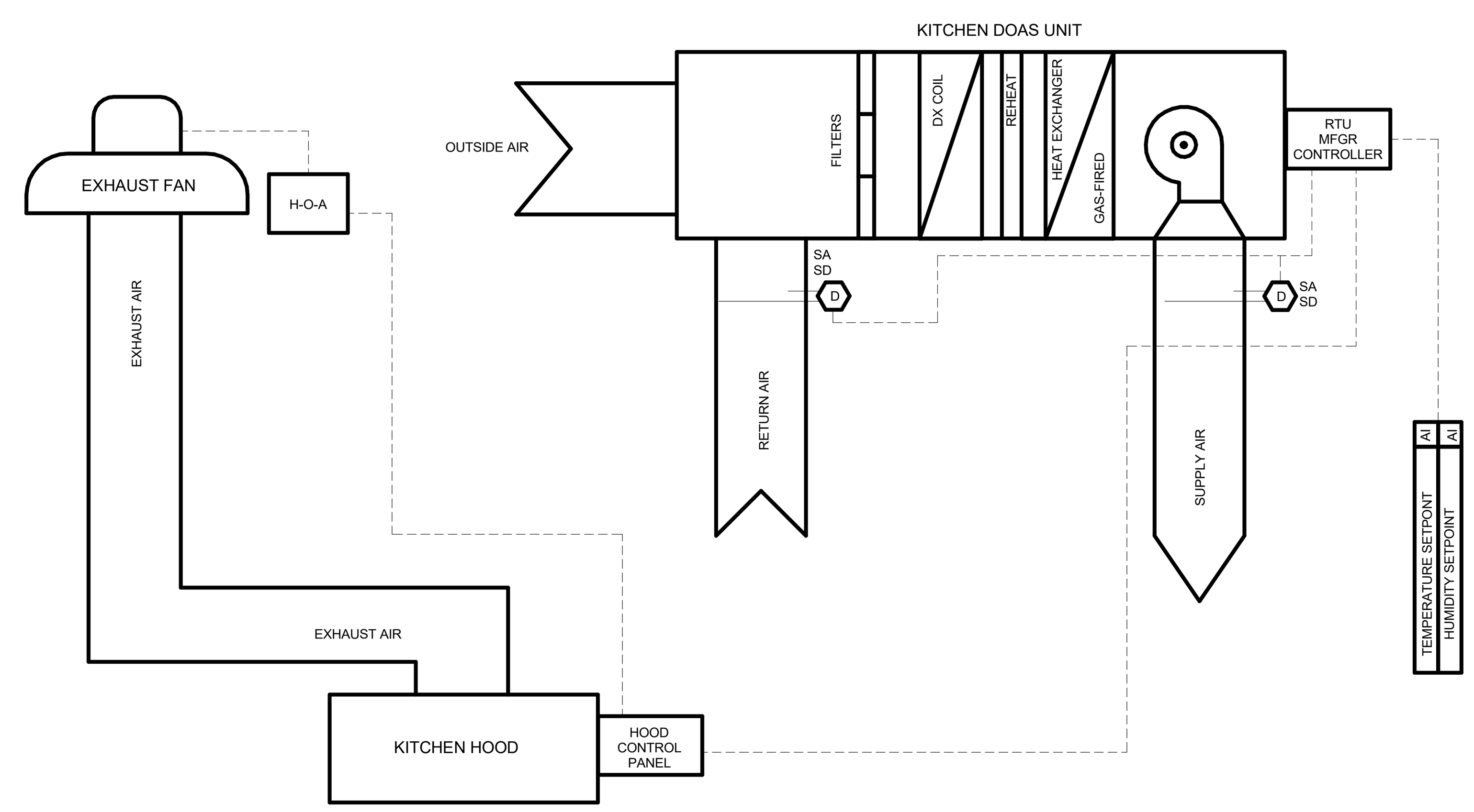
DOAUK HEATING CONTROL BY UNIT MANUFACTURER'S CONTROLLER: UPON A CALL FOR HEATING, THE UNIT SHALL ENERGIZE AND MODULATE THE GAS FIRED FURNACE FOR HEATING IN ORDER TO PROVIDE PROPER SUPPLY AIR TEMPERATURE 95 DEGREES (ADJUSTABLE) TO MAINTAIN PROPER SPACE TEMPERATURE 70 DEGREES (ADJUSTABLE) AS MEASURED BY THE SPACE TEMPERATURE SENSOR.

ECONOMIZER CONTROL: PROVIDE OUTSIDE AIR HUMIDITY AND TEMPERATURE MONITORING. IF THE OUTSIDE AIR CONDITIONS ARE APPROPRIATE, THE UNIT SHALL BE IN ECONOMIZER MODE AND MECHANICAL COOLING AND HEATING SHALL NOT BE USED. ECONOMIZER MODE SHALL HAPPEN BETWEEN 65 DEGREES F AND 75 DEGREES F WITH MAXIMUM HUMIDITY OF 60% RH (ALL VALUES ADJUSTABLE THROUGH THE BMS SYSTEM).

SMOKE ACTIVATED FIRE PROTECTION CONTROL: DUCT MOUNTED SMOKE DUCT DETECTORS SHALL BE INSTALLED AS SHOWN ON THE HVAC AIR FLOW SCHEMATIC TO AUTOMATICALLY SHUT DOWN THE SUPPLY FANS AND SEND SIGNAL TO THE FIRE ALARM SYSTEM. IF THIS ACTION OCCURS, CONTROLLER SHALL SEND EMERGENCY ALARM SIGNAL TO SYSTEM. UNIT SHALL REQUIRE MANUAL START-UP IF THIS ACTION OCCURS.

FILTER MONITORING: PROVIDE DIFFERENTIAL PRESSURE SENSOR TO MEASURE PRESSURE ACROSS THE PRE-FILTERS. CONTROLLER SHALL SEND ALARM SIGNAL WHEN FILTERS ARE IN NEED OF HANGING BASED UPON THE DIFFERENTIAL PRESSURE SENSOR SETPOINT (ADJUSTABLE). PROVIDE DIFFERENTIAL PRESSURE SENSOR TO MEASURE PRESSURE ACROSS THE FINAL FILTERS. CONTROLLER SHALL SEND ALARM SIGNAL WHEN FILTERS ARE IN NEED OF CHANGING BASED UPON THE DIFFERENTIAL PRESSURE SENSOR SETPOINT (ADJUSTABLE).

ALARMS:
FINAL ALARMS SHALL BE COORDINATED WITH OWNER PRIOR TO OCCUPANCY.
- SPACE TEMPERATURE HIGH / LOW LIMIT (80°F / 60°F) (ADJUSTABLE)
- SPACE RELATIVE HUMIDITY HIGH LIMIT (60%RH) (ADJUSTABLE)
- FILTER STATUS - DIRTY FILTER



2
M2.01
KITCHEN VENTILATION CONTROLS
SCALE: NOT TO SCALE

GENERAL NOTES:

REFER TO SHEET M3.01 FOR GENERAL NOTES.

PLAN HEX NOTES:

1 14"X14"X SUPPLY, 18"X14" RETURN, & 10"X10" EXHAUST DUCTS DOWN IN CHASE TO FIRST FLOOR CEILING LEVEL.

2 COORDINATE LOCATION OF AIR DISTRIBUTION OUTLETS WITH OTHER EQUIPMENT SUCH AS FIRE ALARM DEVICES, SPRINKLER HEADS, LIGHTS, ETC. (TYPICAL)

3 RETURN AIR GRILLE SOUND BOOT. (TYPICAL) SEE DETAIL.

4 10"X10" EXHAUST DUCT UP TO EF3 ON ROOF.

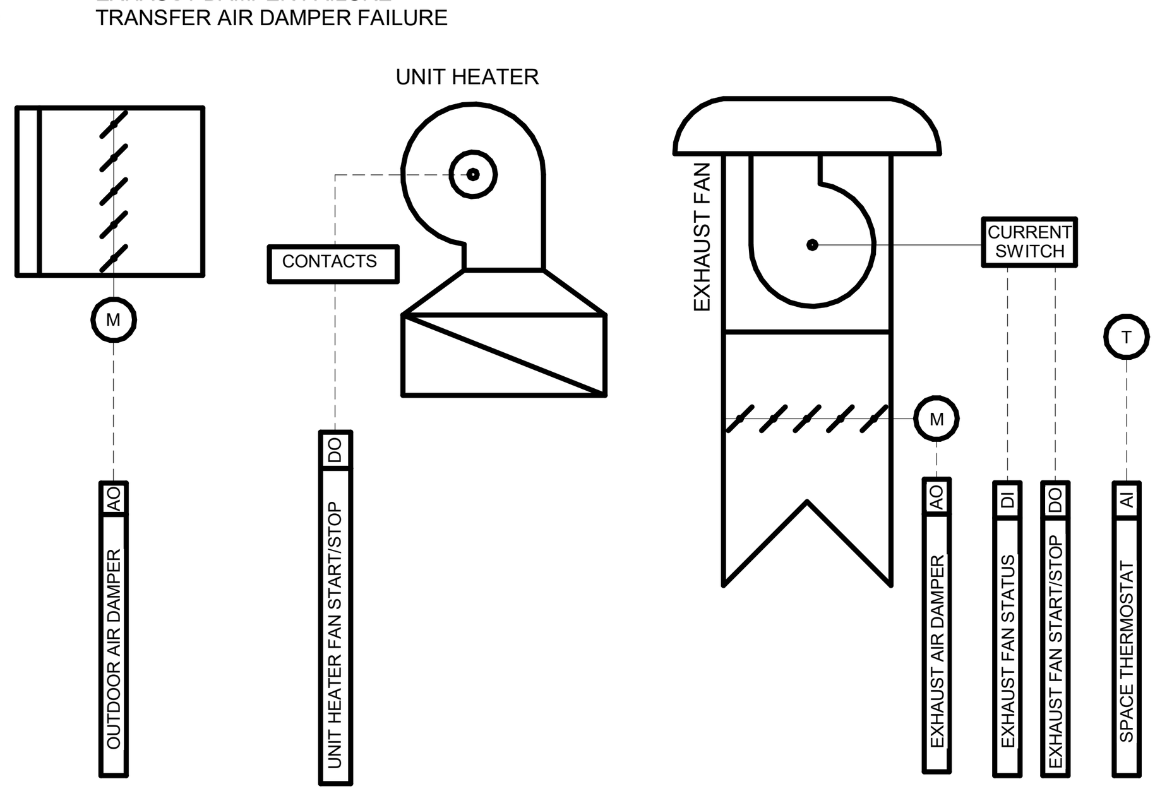
5 18"X10"" SUPPLY & 16"X12" RETURN UP TO RTU11 ON ROOF. TRANSITION AS NECESSARY TO MATCH DUCT CONNECTION SIZES.

6 18"X10"" SUPPLY & 18"X10" RETURN UP TO RTU12 ON ROOF. TRANSITION AS NECESSARY TO MATCH DUCT CONNECTION SIZES.

MECH. ROOM HEAT AND EXHAUST SYSTEM:

MECHANICAL CONTRACTOR SHALL PROVIDE AND INSTALL CONTROLLER TO CONTROL MECHANICAL ROOM VENTILATION EXHAUST SYSTEM. WHEN THE ROOM TEMPERATURE REACHES 80 DEGREES F (ADJUSTABLE) AND ABOVE, THE CONTROLLER SHALL OPEN BOTH THE OUTDOOR AIR DAMPER AND EXHAUST DAMPER AND ENERGIZE THE EXHAUST FAN. THE FAN SHALL BE STOPPED AND THE DAMPERS SHALL BE CLOSED WHEN THE ROOM TEMPERATURE DROPS BELOW 80 DEGREES F (ADJUSTABLE). DURING HEATING SEASON, OUTSIDE AIR TEMPERATURE 50°F, (ADJUSTABLE) THE CONTROLLER WILL CYCLE THE UNIT HEATER'S FAN AND ELECTRIC HEATING COIL TO MAINTAIN TEMPERATURE SETPOINT OF 68°F (ADJUSTABLE).

ALARMS:
FINAL ALARMS SHALL BE COORDINATED WITH OWNER PRIOR TO OCCUPANCY.
- EXHAUST FAN PROOF OF RUN
- SPACE TEMPERATURE HIGH / LOW LIMIT (90°F / 50°F) (ADJUSTABLE)
- EXHAUST DAMPER FAILURE
- TRANSFER AIR DAMPER FAILURE



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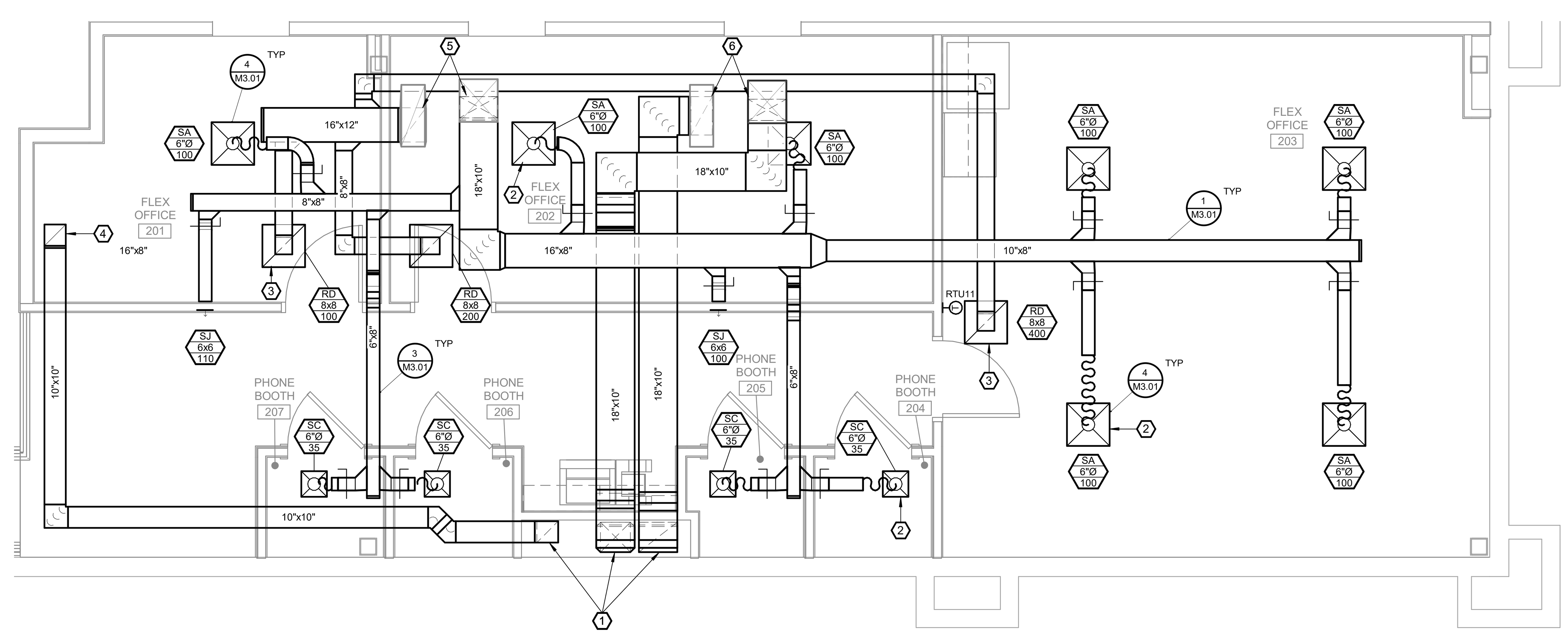
M2.01
MECH ROOM VENTILATION CONTROL
SCALE: NOT TO SCALE



1
M2.01
HVAC ENLARGED PLAN - MEZZANINE
SCALE: 1/4" = 1'-0"

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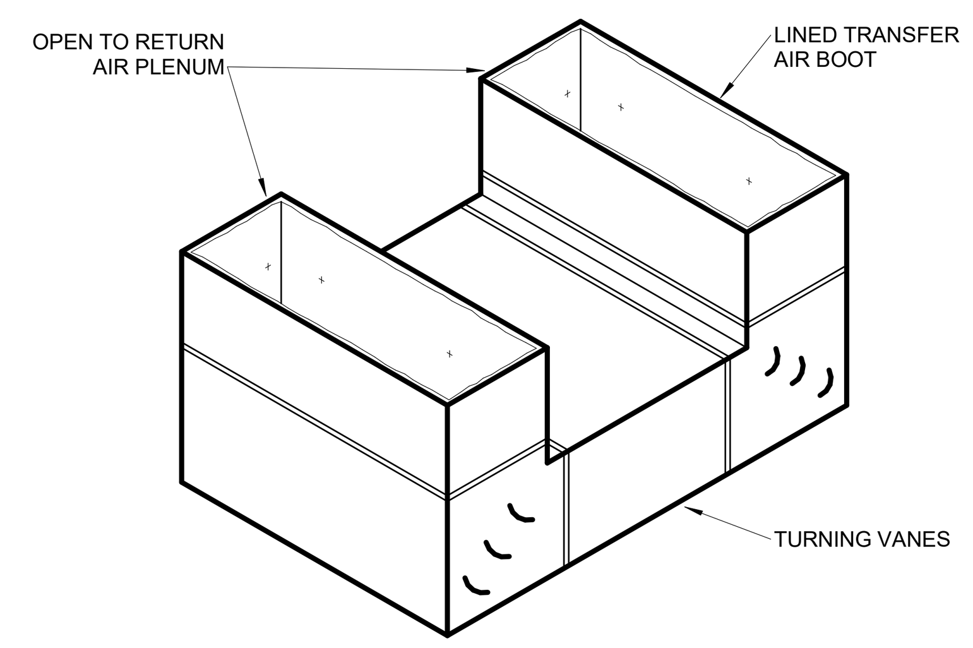
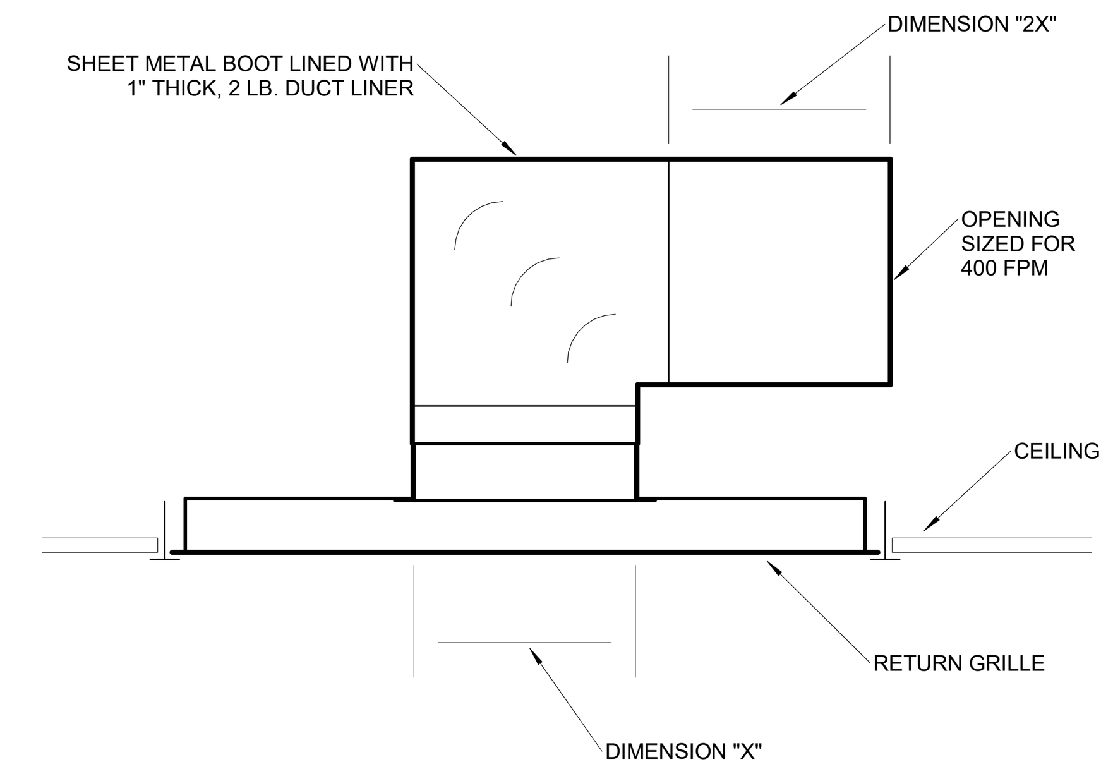
ENLARGED HVAC PLANS & CONTROLS DIAGRAM

M2.01



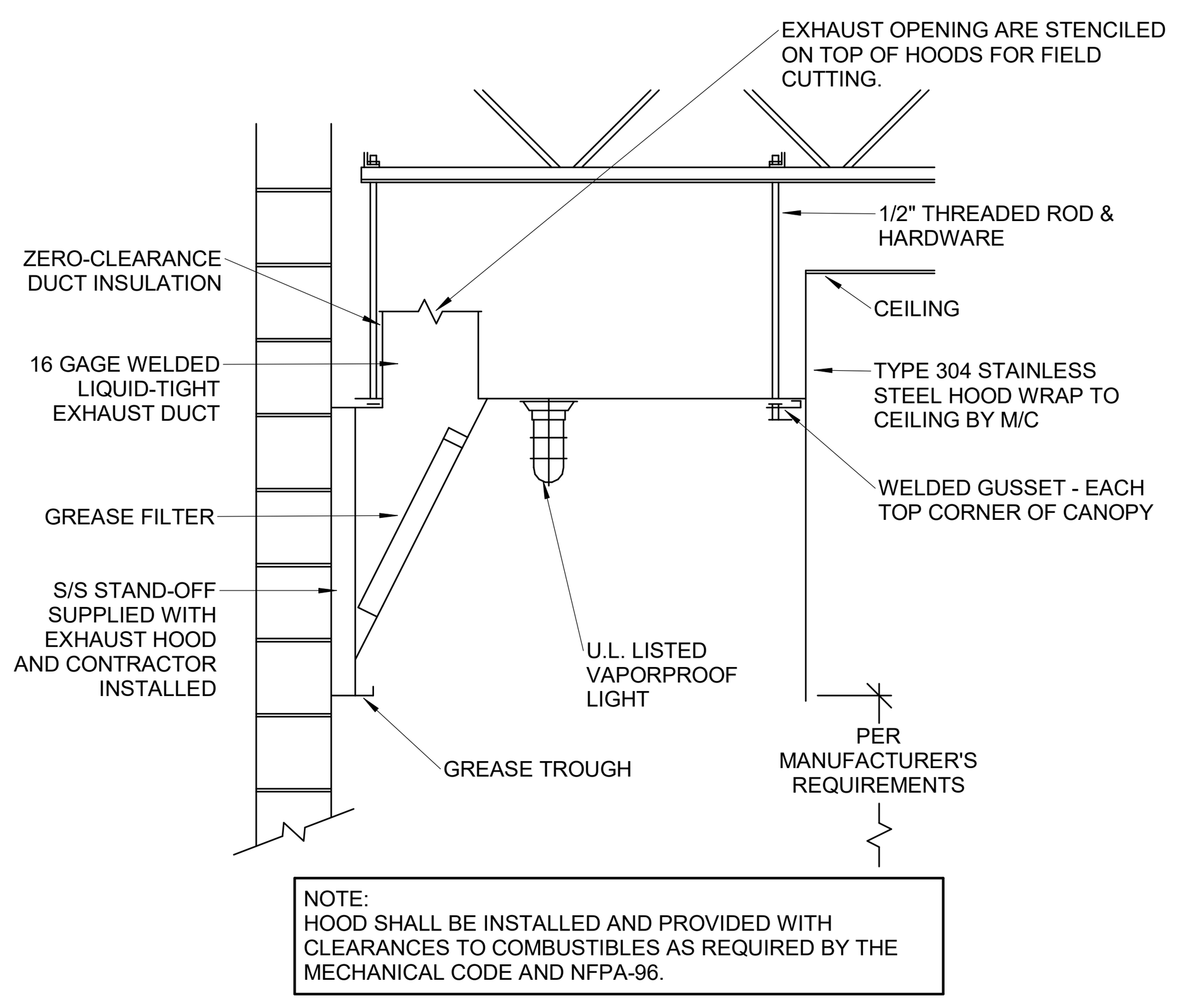
5 M3.01 **TRANSFER AIR DUCT DETAIL**

SCALE: NOT TO SCALE



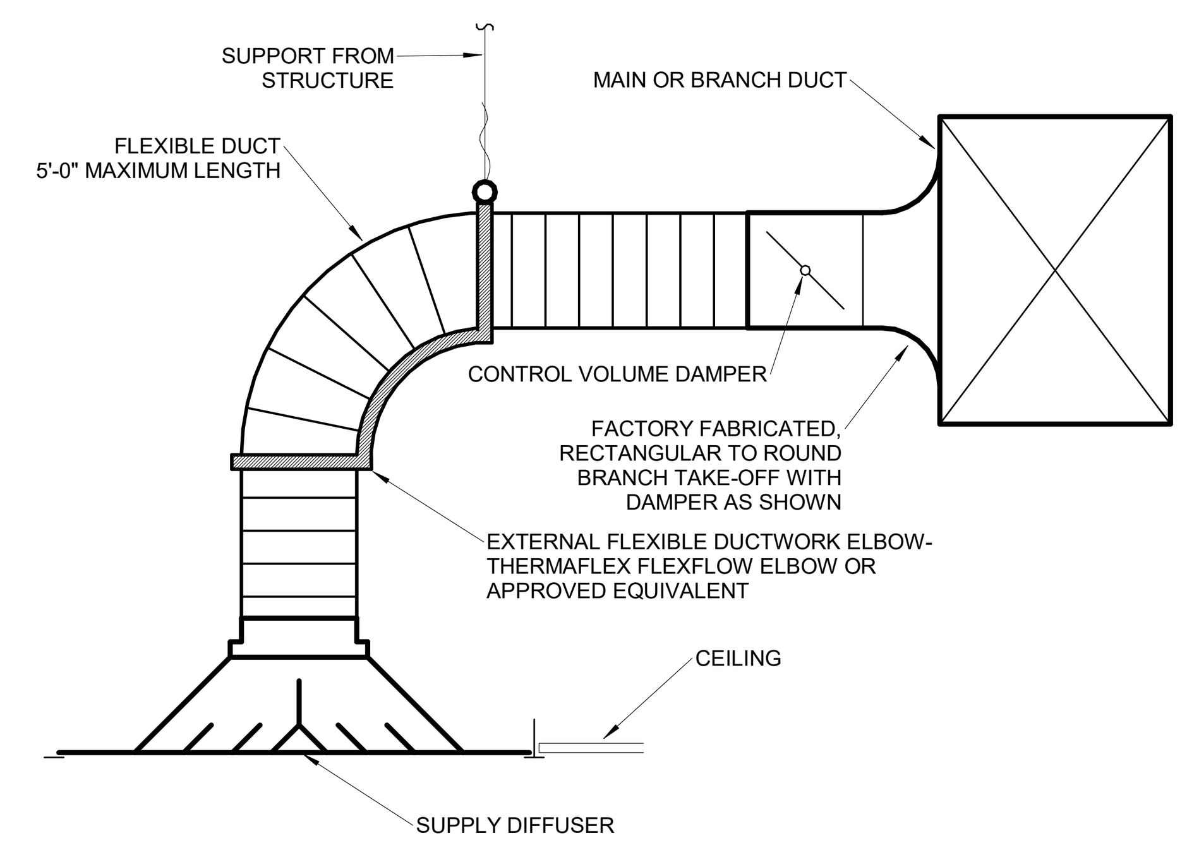
6 M3.01 **RETURN AIR BOOT DETAIL**

SCALE: NOT TO SCALE



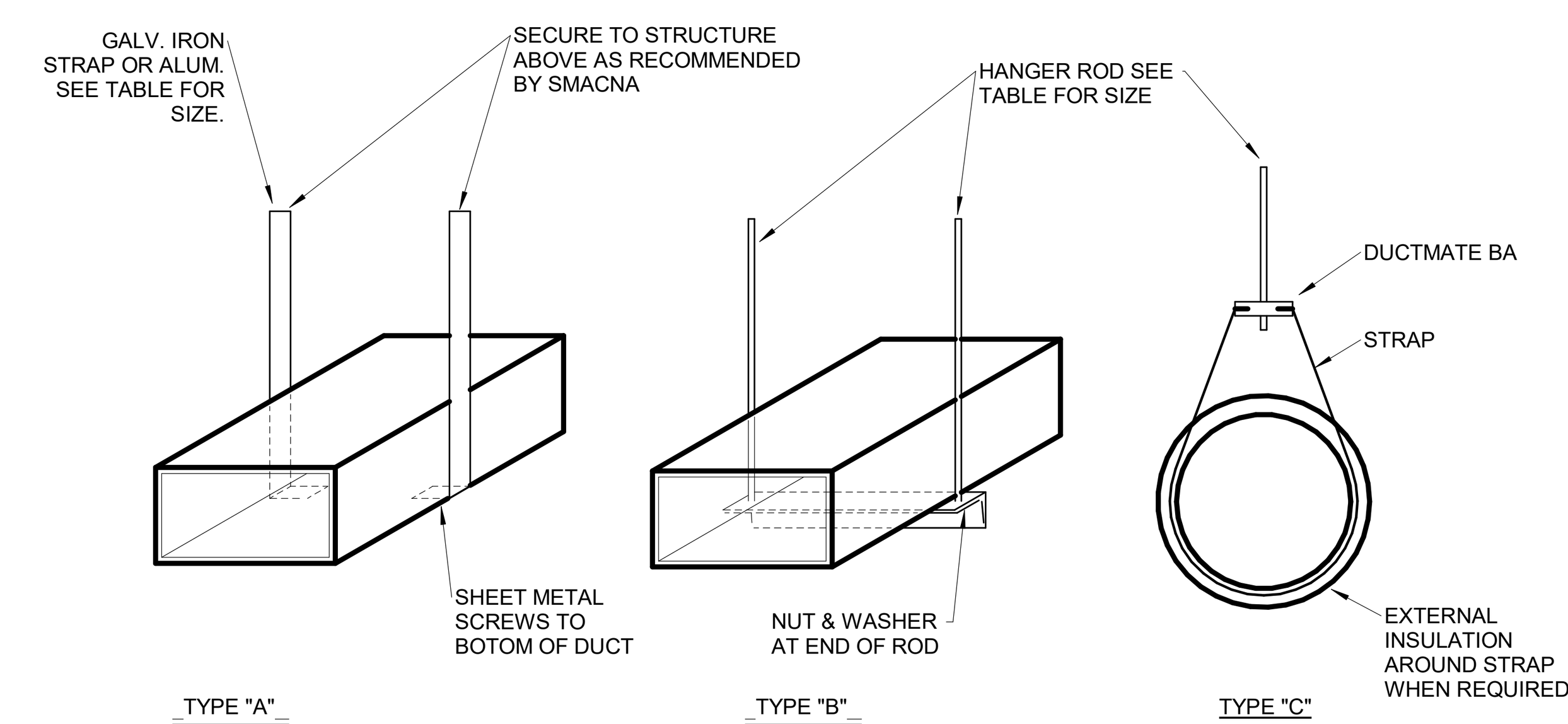
9 M3.01 **KITCHEN HOOD SECTION DETAIL**

SCALE: NOT TO SCALE



4 M3.01 **CEILING DIFFUSER DETAIL**

SCALE: NOT TO SCALE



DUCT HANGER SCHEDULE					
DUCT SIZE (INCH)	TYPE OF HANGER	HANGER SPACING (FT)	STRAP SIZE	ROD SIZE (INCH)	ANGLE FOR BRACING
UP TO 12	A	8'-0"	1"x16GA	N.A.	N.A.
13 TO 18	A	8'-0"	1"x16GA	N.A.	N.A.
19 TO 30	A/B	8'-0"	1"x16GA	1/4"	1-1/2"x1-1/2"x1/8"
31 TO 42	B	8'-0"	N.A.	1/4"	1-1/2"x1-1/2"x1/8"
43 TO 54	B	8'-0"	N.A.	1/4"	1-1/2"x1-1/2"x1/8"
55 TO 60	B	8'-0"	N.A.	1/4"	1-1/2"x1-1/2"x1/8"
61 TO 84	B	8'-0"	N.A.	1/4"	1-1/2"x1-1/2"x3/16"
85 TO 96	B	8'-0"	N.A.	1/4"	1-1/2"x1-1/2"x3/16"
OVER 96	B	8'-0"	N.A.	3/8"	2"x2"x1/4"

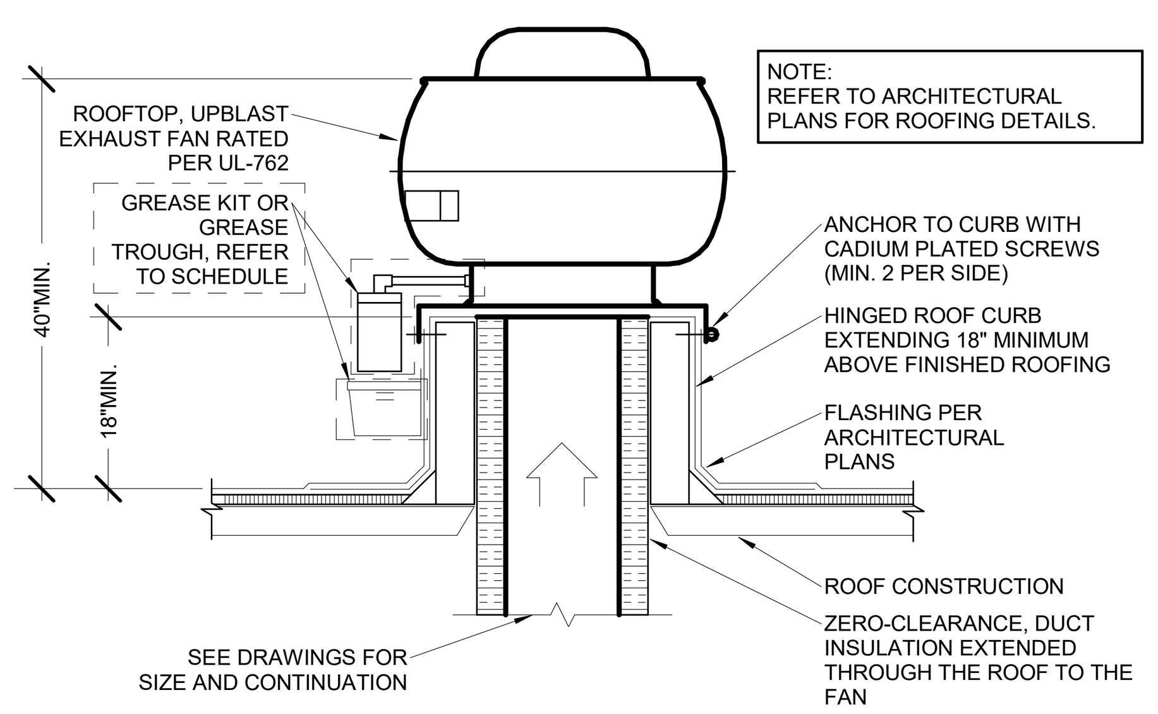
NOTES:

1) FOR SEVERAL DUCTS ON ONE HANGER, TYPE "B" MAY BE USED. SIZE OF HANGER WILL BE SELECTED ON THE SUM OF DUCT WIDTHS EQUAL TO MAX WIDTH OF DUCT SCHEDULE.

2) ON TYPE "A" HANGER, PROVIDE 3 HANGERS AT EACH TAKE-OFF OR BRANCH.

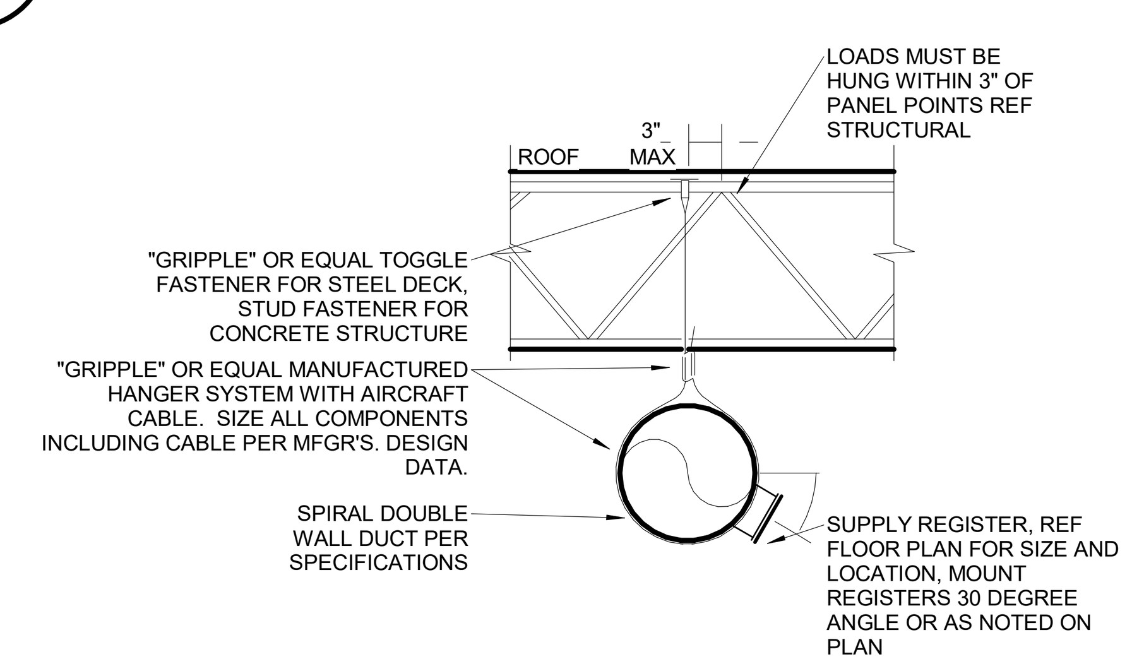
3 M3.01 **DUCT SUPPORT DETAIL**

SCALE: NOT TO SCALE



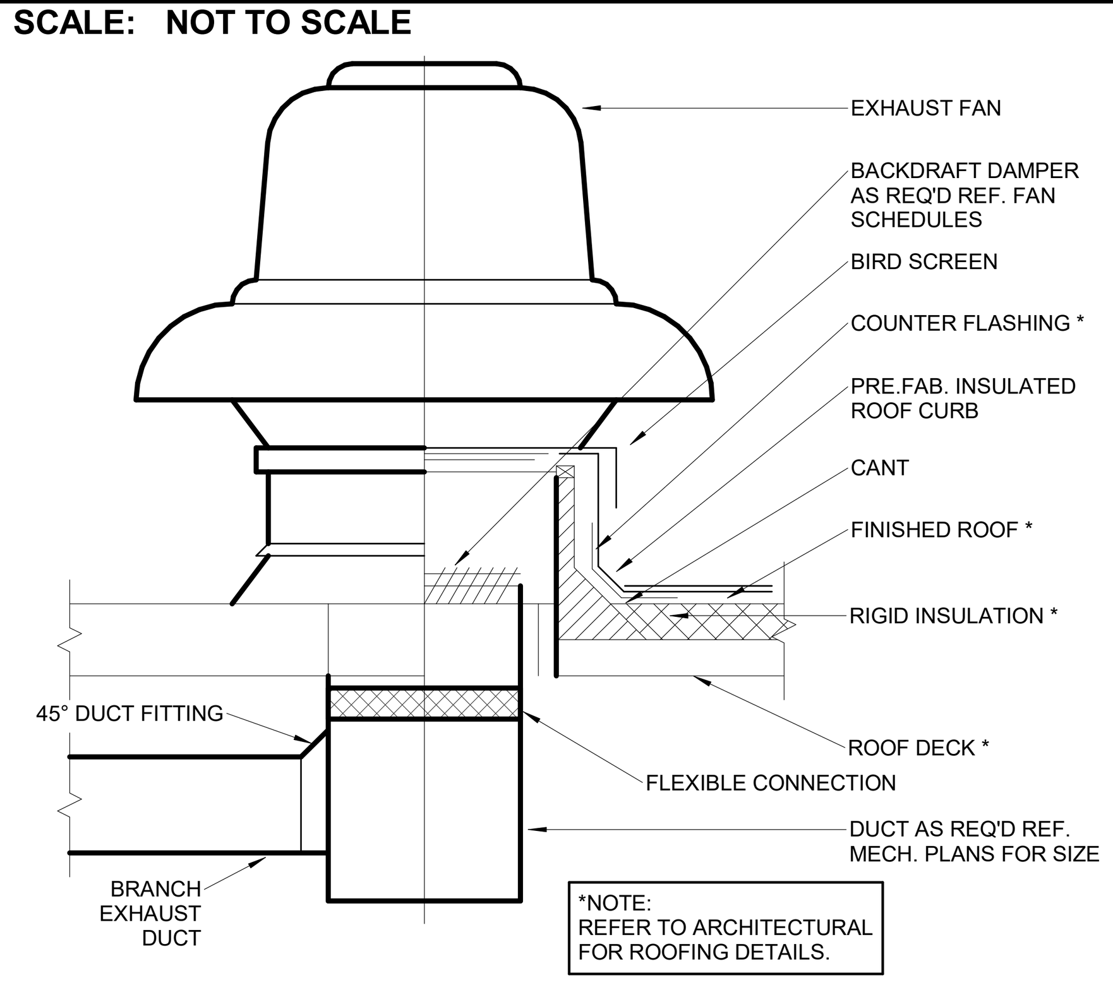
8 M3.01 **KITCHEN HOOD EXHAUST FAN DETAIL**

SCALE: NOT TO SCALE



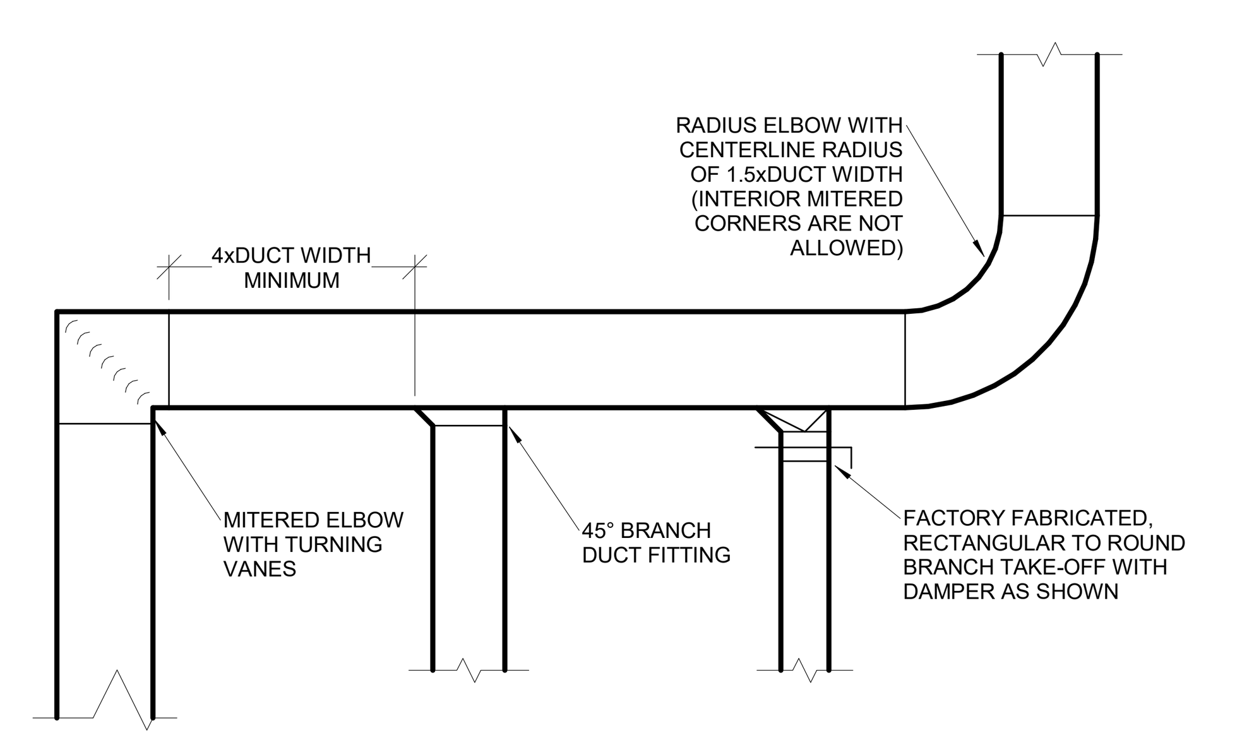
2 M3.01 **ROUND DUCT SUPPORT AND GRILLE**

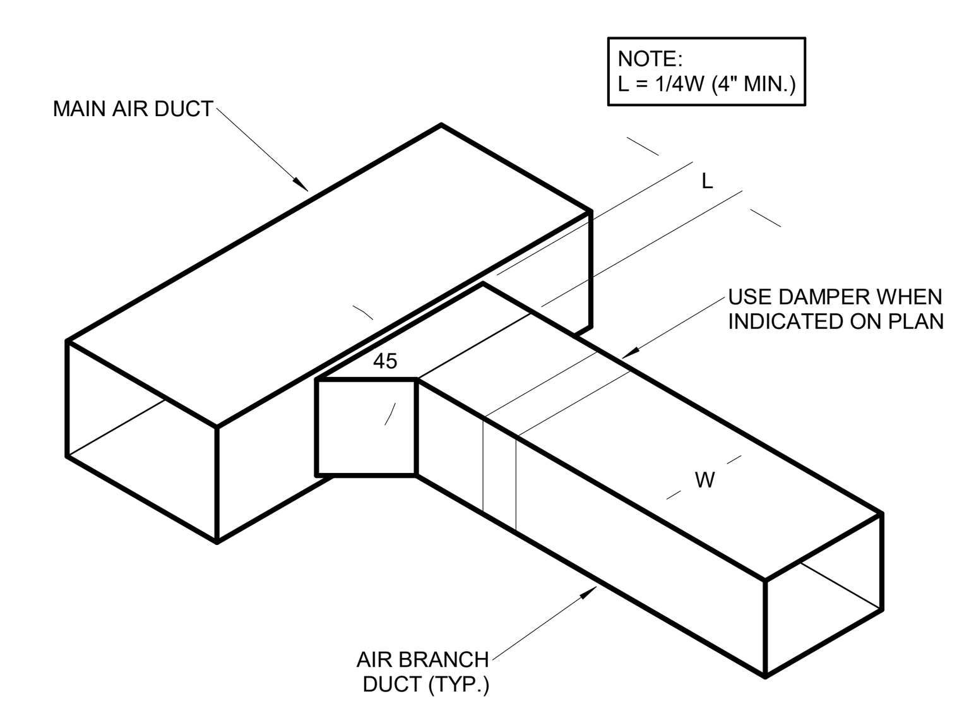
SCALE: NOT TO SCALE



7 M3.01 **EXHAUST FAN DETAIL**

SCALE: NOT TO SCALE





1 M3.01 **DUCTWORK CONSTRUCTION DETAIL**

SCALE: NOT TO SCALE

GENERAL NOTES:

A. ALL MECHANICAL WORK SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE 2018 INTERNATIONAL MECHANICAL CODE AS ADOPTED BY THE CITY OF JOHNSTOWN, CO.

B. FOR ALL MECHANICAL QUESTIONS ON THIS PROJECT, CONTACT RTM ENGINEERING CONSULTANTS AT (913) 322-1400. CONTACT: JARED SOMMERS.

C. CONTRACTOR SHALL SECURE AND PAY FOR NECESSARY MEP PERMITS AND CERTIFICATES OF INSPECTION REQUIRED BY GOVERNMENTAL ORDINANCES, LAWS, RULES, OR REGULATIONS.

D. FINAL ACCEPTANCE OF WORK SHALL BE SUBJECT TO THE CONDITION THAT ALL SYSTEMS, EQUIPMENT, APPARATUS, AND APPLIANCES OPERATE SATISFACTORILY AS DESIGNED AND INTENDED; WORK SHALL INCLUDE REQUIRED REPLACEMENT, ADJUSTMENT OF SYSTEMS AND CONTROL EQUIPMENT AND ALL REQUIRED PROGRAMMING INSTALLED. PROVIDE FOR ALL WORK INDICATED ON DRAWINGS OR AS REASONABLY IMPLIED.

E. TEST ALL LINES, SYSTEMS, EQUIPMENT BEFORE THEY ARE INSULATED, PAINTED, OR CONCEALED BY CONSTRUCTION OR BACKFILLING. PROVIDE FUEL, WATER, ELECTRICITY, MATERIALS, LABOR, AND EQUIPMENT REQUIRED FOR TESTS. REPAIR OR REPLACE DEFECTS, LEAKS, AND MATERIALS FAILURES REVEALED BY TESTS AND THEN RETESTED UNTIL SATISFACTORY. MAKE REPAIRS WITH NEW MATERIALS.

F. PROVIDE NECESSARY MATERIALS AND ACCESSORIES FOR INSTALLATION OF FIXTURES, EQUIPMENT, ETC AS REQUIRED FOR COMPLETE AND FUNCTIONAL OPERATION AS NOTED ON DRAWINGS OR IN NOTES.

G. ACCESS PANELS SHALL BE PROVIDED WHEREVER NECESSARY TO PROVIDE ACCESS TO VALVES, JUNCTION BOXES, ETC., LOCATED IN CONCEALED SPACES. PROVIDE ACCESS DOOR FOR ALL FIRE DAMPERS AS REQUIRED FOR SERVICE.

H. ALL EQUIPMENT, FIXTURES, MATERIALS, ETC SHALL BE INSTALLED IN NEAT, PROFESSIONAL MANNER IN ACCORDANCE WITH MANUFACTURER RECOMMENDATIONS.

I. THE CONTRACTOR SHALL CONTACT THE OWNER AND COORDINATE ALL OUTAGES 5 DAYS PRIOR TO ANY SHUT-OFF OF SERVICES.

J. PROVIDE ALL FIRE RATED MATERIAL FOR PATCH AND REPAIR FOR ALL FIRE RATED ASSEMBLIES. ALL OPENINGS SHALL BE SEALED AND CLOSED IN APPROVED MANNER. PROVIDE SLEEVE WHERE NEEDED DUE TO SCOPE OF WORK.

K. EXISTING CONDITIONS ON THIS SET OF BID DOCUMENTS WERE TAKEN FROM EXISTING DRAWINGS, LIMITED SITE VISITS, AND VISUAL OBSERVATIONS. FIELD VERIFY ALL EXISTING CONDITIONS PRIOR TO SUBMITTING FINAL BIDS. CHANGE ORDERS WILL NOT BE PAID DUE TO UNANTICIPATED CONDITIONS TO MEET INTENT OF WORK.

L. CONTRACTOR SHALL SCHEDULE AND EXECUTE ALL WORK WITH REGARD TO THE OWNER'S USE OF THE BUILDING.

M. PLANS ARE DIAGRAMMATIC AND SHALL NOT BE SCALED. REFER TO ARCHITECTURAL DRAWINGS FOR DIMENSIONS.

N. ALL METAL DUCTWORK SPECIFIED TO RECEIVE INTERIOR THERMAL AND ACOUSTICAL LINER IS NOT SIZED ON PLANS TO INCLUDE THE PROPER THICKNESS OF INSULATION. ADD 1" OR 2" IN HEIGHT AND WIDTH OF DUCTWORK TO ACCOMMODATE THICKNESS OF INSULATION.

O. BRANCH DUCTS SHALL BE THE SAME SIZE AS DIFFUSER NECK UNLESS NOTED OTHERWISE.

P. PROVIDE TURNING VANES IN ALL RECTANGULAR MITERED ELBOWS.

Q. THERMOSTATS AND CONTROL WIRING SHALL BE SUPPLIED BY THE HVAC CONTRACTOR. THE ELECTRICAL ONTRACTOR SHALL FURNISH AND INSTALL THE NECESSARY CONDUIT, BOXES, ETC. FOR THE ISTALLATION OF THERMOSTATS. THE HVAC CONTRACTOR SHALL BE RESPONSIBLE FOR THE NSTALLATION AND CONNECTION OF THERMOSTATS.

R. ALL NEW THERMOSTATS LOCATED ON EXISTING WALLS SHALL BE PROVIDED WITH A SURFACE MOUNTED BACK BOX AND WIREMOLD FROM THE BACKBOX TO THE ACCESSIBLE CEILING. WIREMOLD IS REQUIRED UP TO 9'-0" A.F.F. CONDUIT MAY BE UTILIZED ABOVE 9'-0". ALL EXPOSED SURFACE MOUNTED BACK BOXES, WIREMOLD, CONDUIT, SUPPORTS AND SCREWS SHALL BE PAINTED TO MATCH THE ADJACENT SURFACE. IN LOCATIONS WHERE THERMOSTATS ARE REPLACING EXISTING STATS AND THERE IS CONDUIT CONCEALED IN THE WALL, THE CONTRACTOR SHALL REUTILIZE THE EXISTING CONDUIT.

S. NEW PIPING AND DUCTWORK SHALL NOT BE ROUTED OVER EXISTING AND NEW ELECTRICAL PANELS.

T. ALL ROOF WORK SHALL BE IN ACCORDANCE WITH ARCHITECTURAL REQUIREMENTS SO THAT ROOF WARRANTY IS NOT VOIDED.

U. ALL EQUIPMENT SHALL BE INSTALLED TO ALLOW FULL MAINTENANCE ACCESS PER MANUFACTURER'S RECOMMENDATIONS.

V. PROVIDE BALANCE DAMPER ON ALL SUPPLY, EXHAUST, AND OUTSIDE AIR BRANCH DUCTS TO OUTLETS, WHETHER INDICATED IN PLANS OR NOT.

W. INSULATE AND SEAL ALL CAPPED DUCTS WHERE NOTED.

X. MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE FOR TRANSITIONS TO ALL EQUIPMENT OPENING SIZES.

Y. MECHANICAL CONTRACTOR SHALL REMOVE AND REPLACE CEILING TILES IN ALL EXISTING AREAS WITH NEW DUCT AND IS RESPONSIBLE FOR REPLACING TILES IF DAMAGED DURING CONSTRUCTION.

Z. REFER TO ARCHITECTURAL PLANS FOR ANY ADDITIONAL CONSTRUCTION PHASING REQUIREMENTS.

AA. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY TEMPORARY EQUIPMENT REQUIRED FOR DUST CONTROL AND TEMPORARY EXHAUST. COORDINATE REQUIREMENTS WITH OWNER.

COLORADO LICENSED JAMES R. BASQUETTE 0060317 PROFESSIONAL ENGINEER

James R. Basquette

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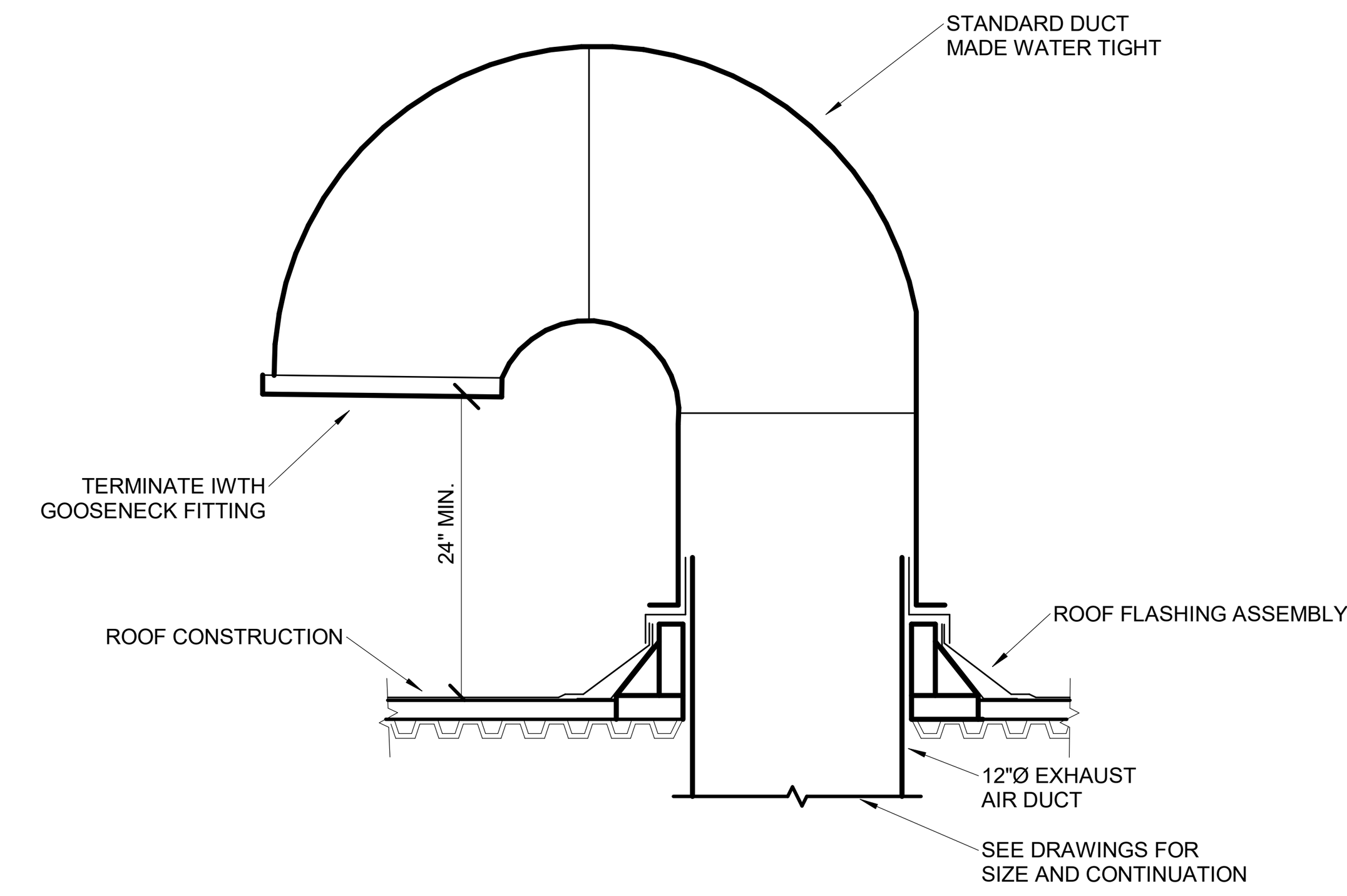
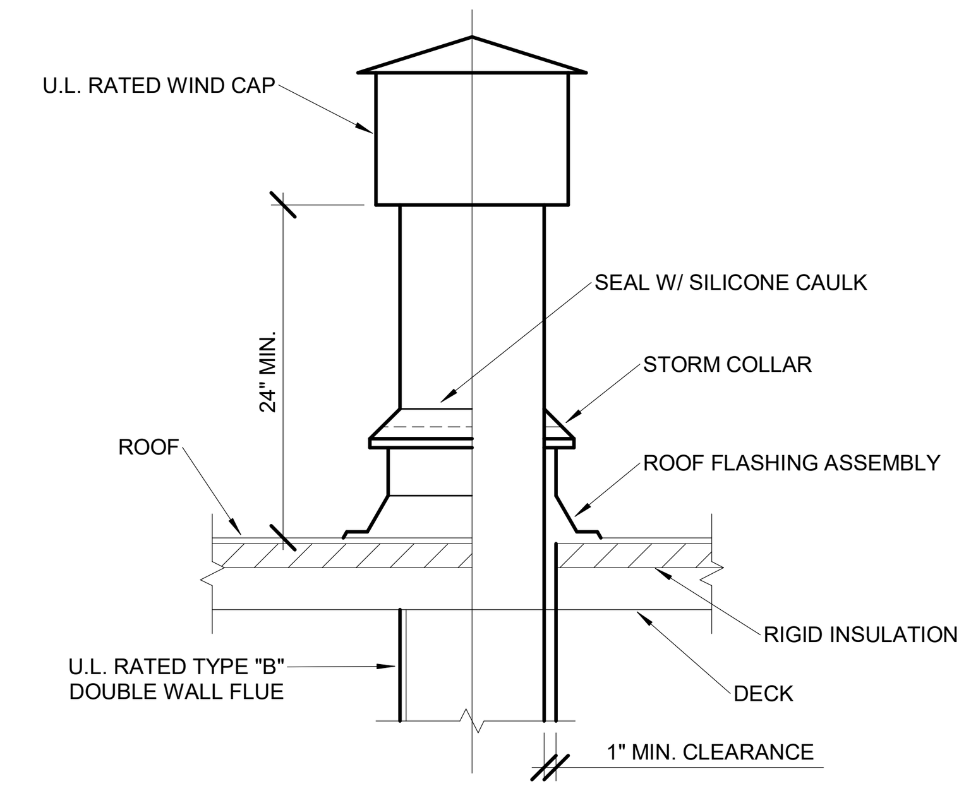
JOB NO: 22.010
DATE: 05/25/23
ISSUE RECORD: 100% CD
REVISIONS:

MECHANICAL DETAILS

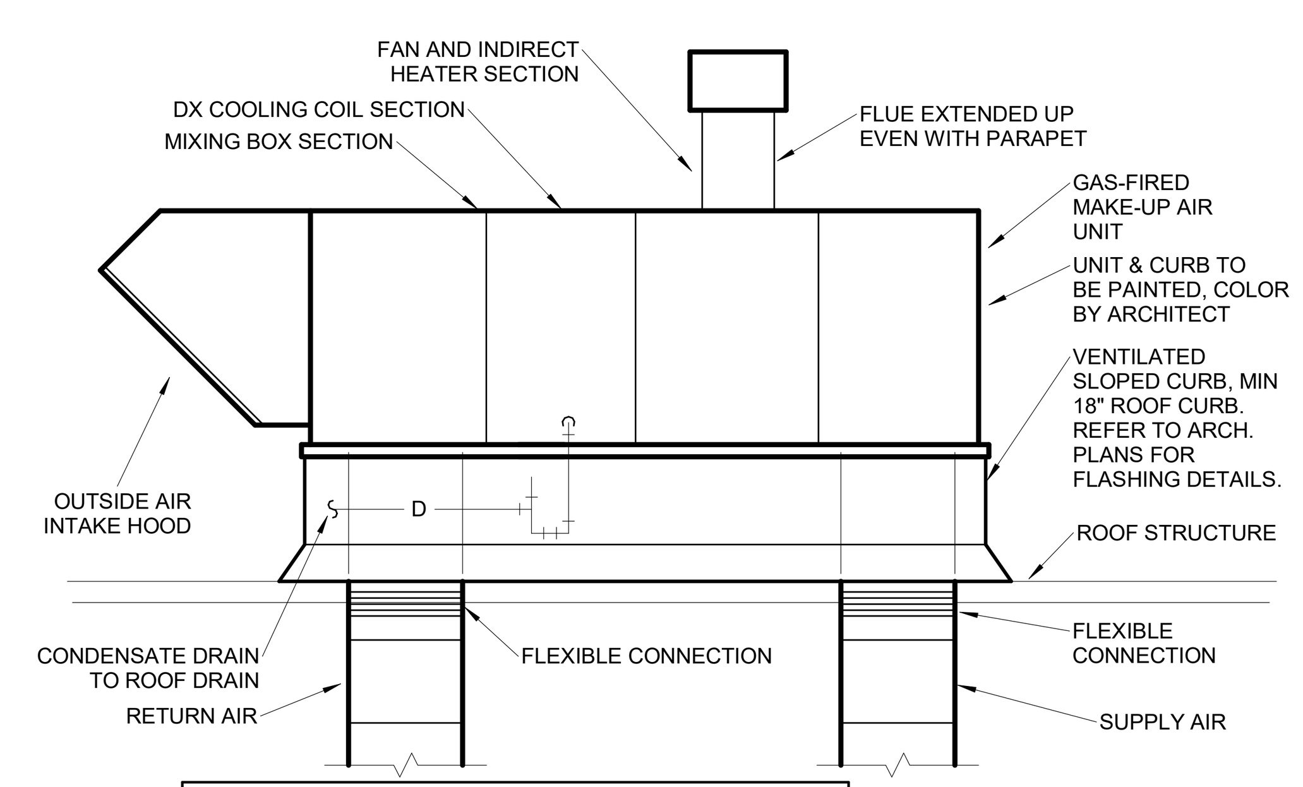
M3.01



7 M3.02
COMBUSTION AIR GOOSENECK VENT DETAIL
SCALE: NOT TO SCALE

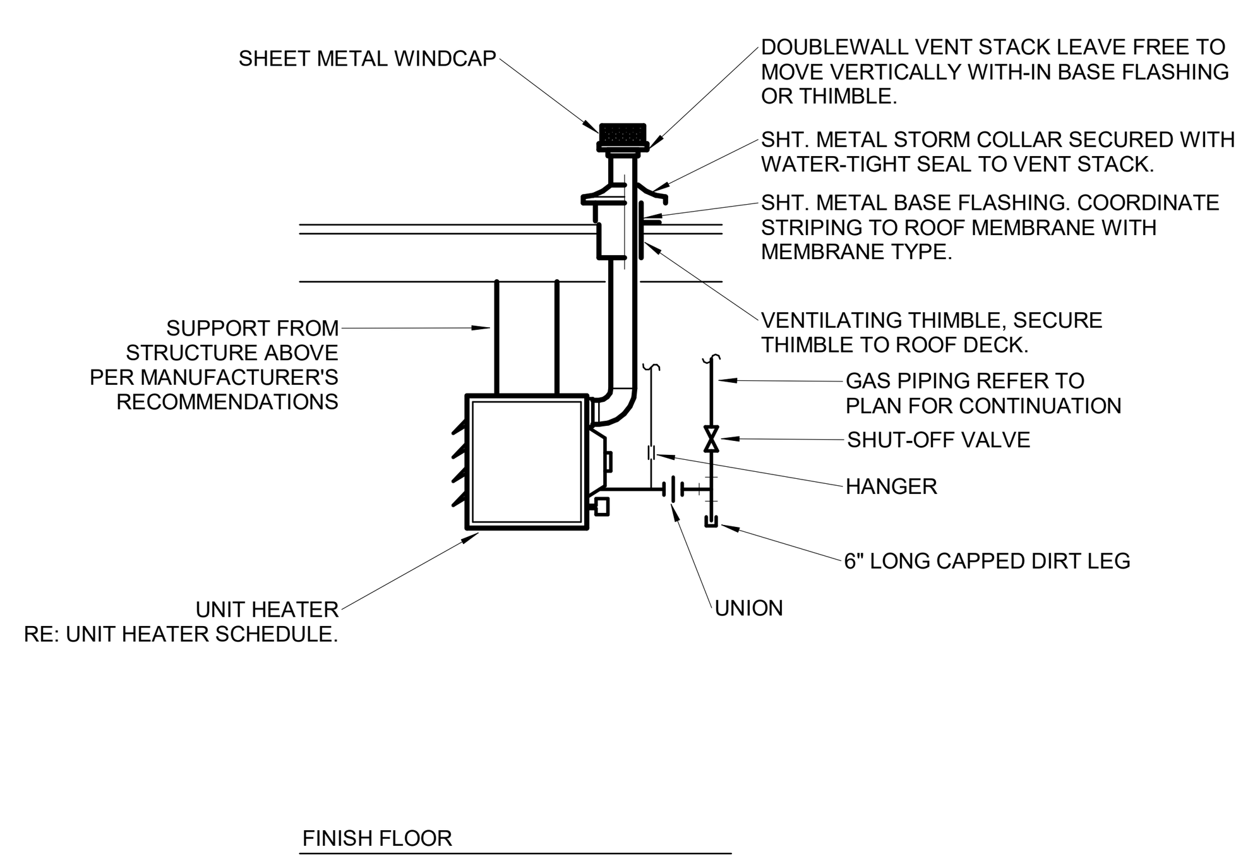


6 M3.02
FLUE VENT THROUGH ROOF DETAIL
SCALE: NOT TO SCALE

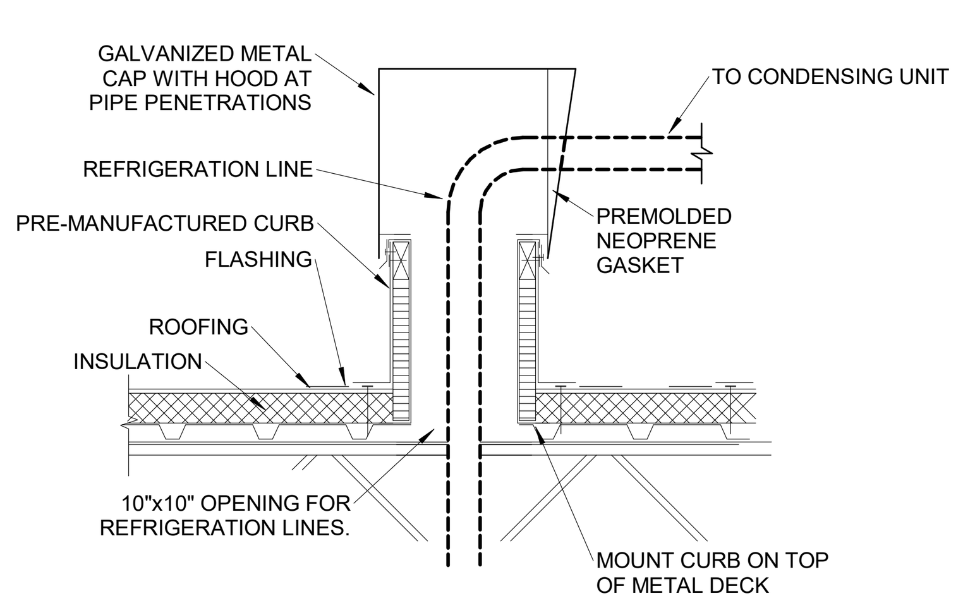


NOTE:
REFER TO ARCHITECTURAL PLANS FOR ROOFING DETAILS.

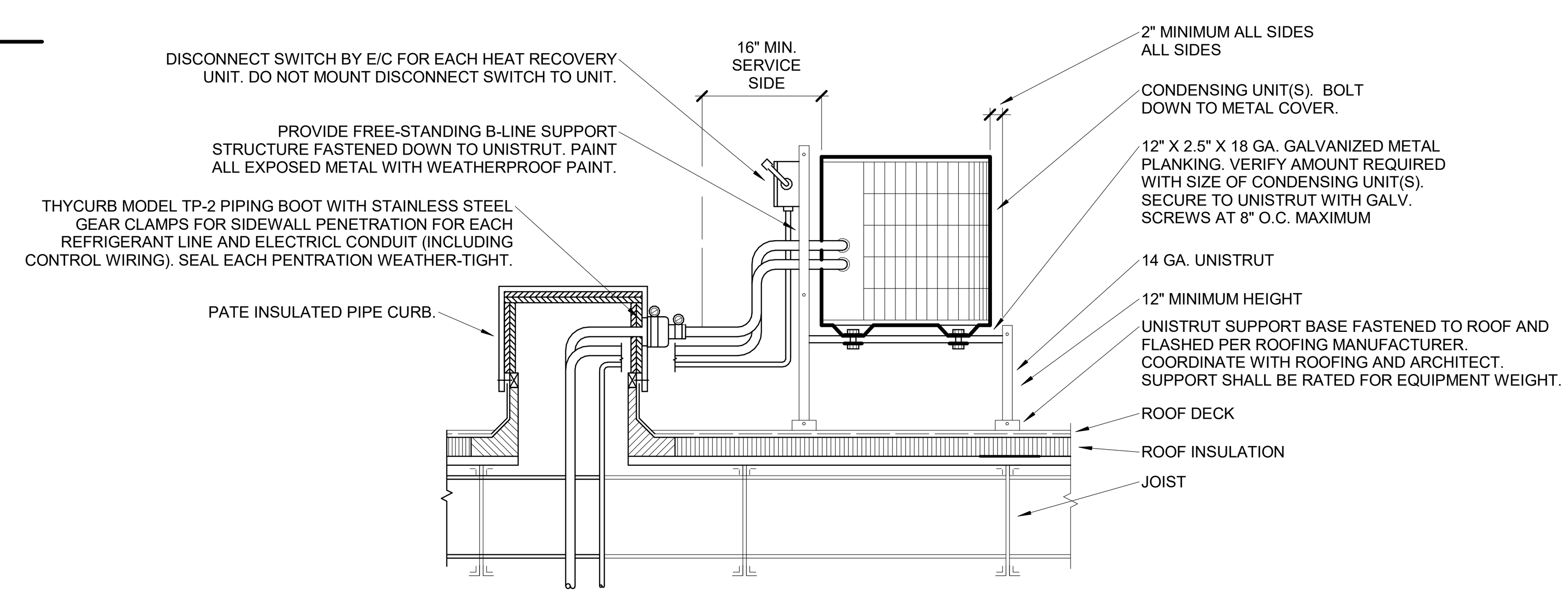
5 M3.02
MAKE-UP AIR UNIT DETAIL
SCALE: NOT TO SCALE



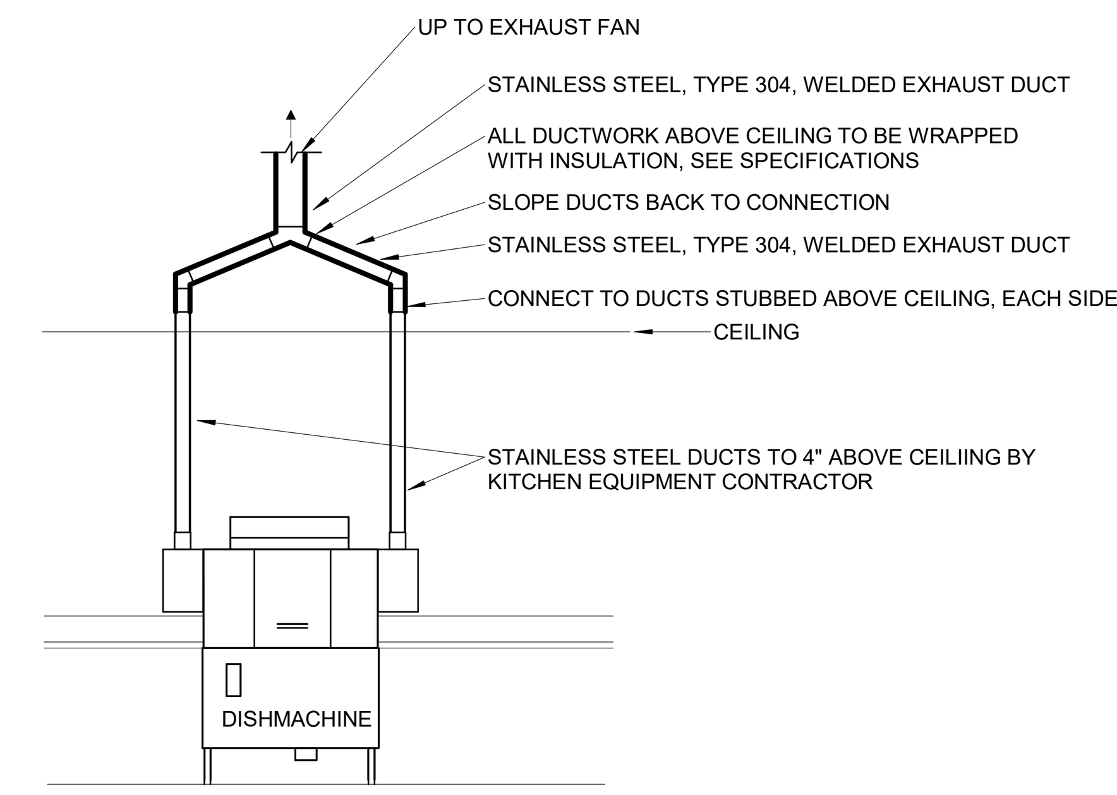
9 M3.02
GAS UNIT HEATER DETAIL
SCALE: NOT TO SCALE



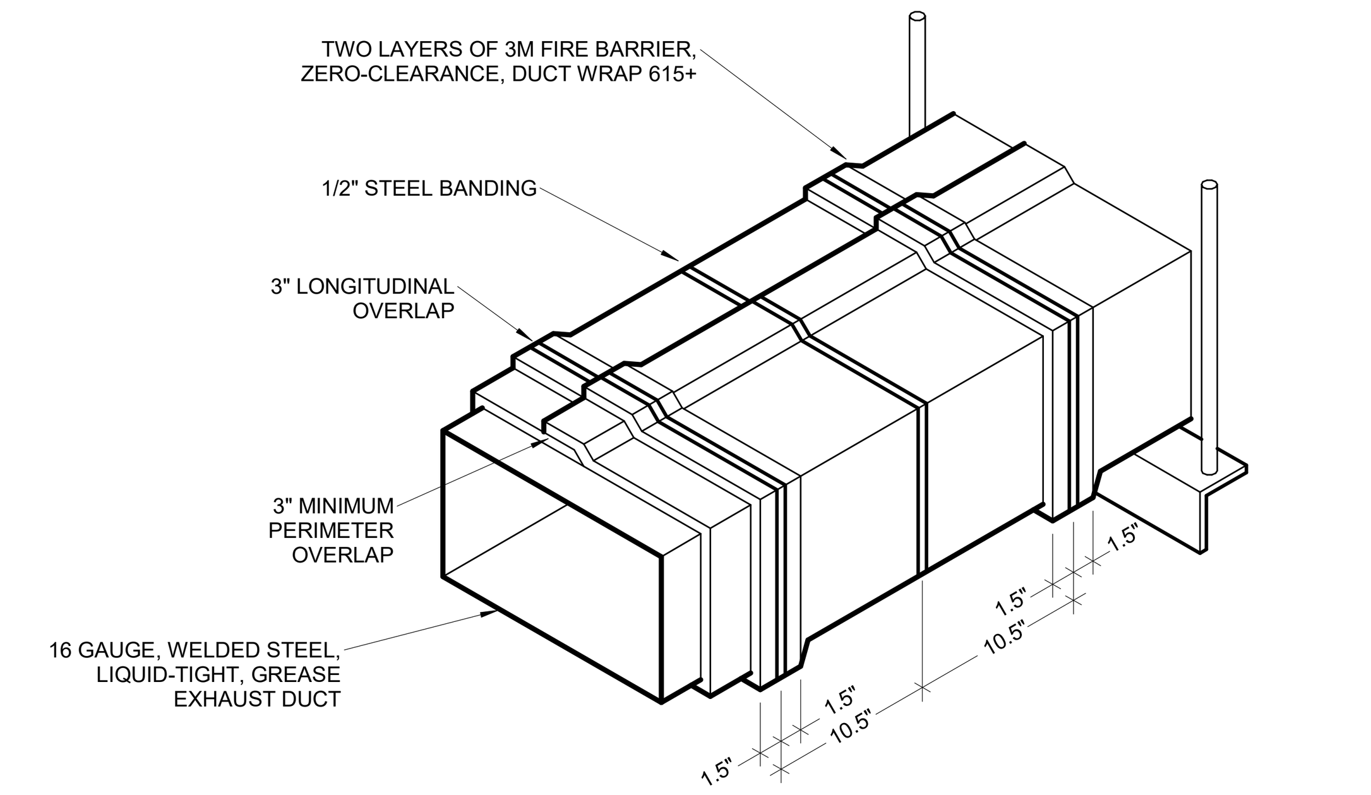
8 M3.02
REFRIGERATION LINE ROOF PENETRATION
SCALE: NOT TO SCALE



4 M3.02
ROOF MOUNTED CONDENSING UNIT DETAIL
SCALE: NOT TO SCALE



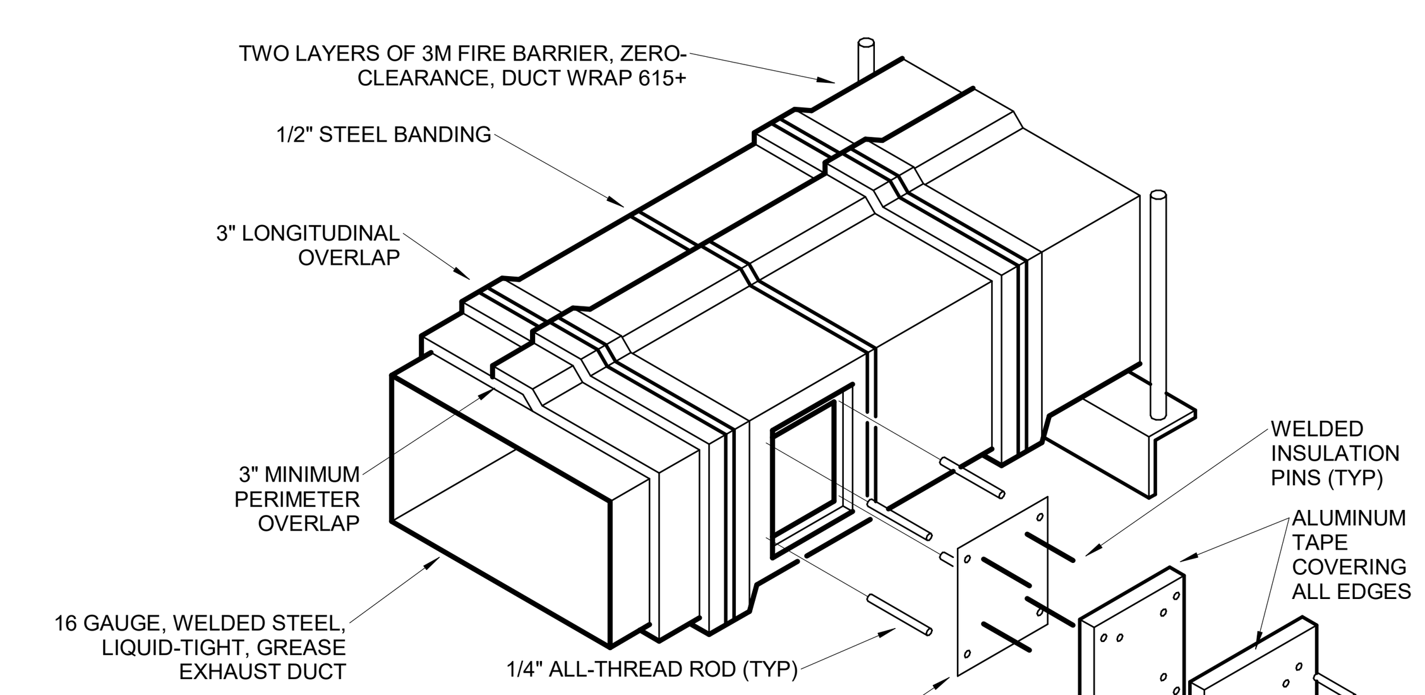
3 M3.02
DISHWASHER EXHAUST DUCT
SCALE: NOT TO SCALE



NOTES:
REFER TO MANUFACTURER'S LITERATURE FOR EXACT INSTALLATION REQUIREMENTS.

ALL GREASE EXHAUST DUCTWORK SHALL BE PRESSURE TESTED BY DRAWING A VACUUM OR PRESSURIZING THE INSTALLED DUCTWORK TO A MINIMUM OF 4" WATER COLUMN. THE TEST SHALL BE WITNESSED BY THE AUTHORITY HAVING JURISDICTION FOR PASSING WITH ZERO LEAKAGE FOR FIFTEEN MINUTES WITH A DIGITAL MANOMETER OR PRESSURE GAUGE WITH AN ACCURACY OF NO MORE THAN 0.5 PERCENT.

2 M3.02
KITCHEN GREASE DUCT WRAP DETAIL
SCALE: NOT TO SCALE



NOTES:
1. PROVIDE ACCESS DOORS AS REQUIRED BY THE MECHANICAL CODE AND NFPA-96

2. ALL GREASE EXHAUST DUCTWORK SHALL BE PRESSURE TESTED BY DRAWING A VACUUM OR PRESSURIZING THE INSTALLED DUCTWORK TO A MINIMUM OF 4" WATER COLUMN. THE TEST SHALL BE WITNESSED BY THE AUTHORITY HAVING JURISDICTION FOR PASSING WITH ZERO LEAKAGE FOR FIFTEEN MINUTES WITH A DIGITAL MANOMETER OR PRESSURE GAUGE WITH AN ACCURACY OF NO MORE THAN 0.5 PERCENT.

3. REFER TO MANUFACTURER'S LITERATURE FOR EXACT INSTALLATION REQUIREMENTS AND PROVIDE CLEANOUT COVERING AS SHOWN IN MANUFACTURER'S LITERATURE.

1 M3.02
KITCHEN GREASE DUCT ACCESS DOOR DETAIL
SCALE: NOT TO SCALE

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MECHANICAL DETAILS

M3.02

MAKE-UP AIR UNIT SCHEDULE

PLAN MARK	MANUFACTURER	MODEL	COOLING CAPACITY MIN SHC (BTU/H)	COOLING CAPACITY MIN THC (BTU/H)	HOT GAS REHEAT E.A.T. DB (°F)	HOT GAS REHEAT E.A.T.WB (°F)	HOT GAS REHEAT CAPACITY (BTU/H)	HOT GAS REHEAT L.A.T. (°F)	GAS HEATING GAS LOAD (BTU/H)	GAS HEATING OUTPUT (BTU/H)	GAS HEATING EFFICIENCY (%)	BLOWER AIR FLOW (CFM)	BLOWER O.A. (CFM)	BLOWER MIN. O.A. (CFM)	BLOWER EST. ESP (IN WG)	BLOWER MOTOR (HP)	ELECTRICAL DATA VOLTAGE	ELECTRICAL DATA PHASE	ELECTRICAL DATA FLA	ELECTRICAL DATA MCA	ELECTRICAL DATA MOCP (A)	NOTES
DOAUK1	CAPTIVEAIRE	CASRTU3-I.500-18-12.5T	154,000	154,000	53	43	101,000	70	423,038	342,661	81	4,000	4,000	300	0.5	5	460	3	28	33	35	CURB,D/R,DDC,DS,F,LA0,NG,T,VSC
DOAUK2	CAPTIVEAIRE	CASRTU3-I.500-18-12.5T	154,000	154,000	53	43	101,000	70	423,038	342,661	81	4,000	4,000	300	0.5	5	460	3	28	33	35	CURB,D/R,DDC,DS,F,LA0,NG,T,VSC
DOAUK3	CAPTIVEAIRE	CASRTU3-I.500-18-12.5T	154,000	154,000	53	43	101,000	70	423,038	342,661	81	4,000	4,000	450	0.5	5	460	3	28	33	35	CURB,D/R,DDC,DS,F,LA0,NG,T,VSC
DOAUK4	CAPTIVEAIRE	CASRTU2-I.500-15-8T	102,000	102,000	53	43	60,000	70	254,791	206,381	81	2,400	2,400	450	0.5	2	460	3	15	18	20	CURB,D/R,DDC,DS,F,LA0,NG,T,VSC
DOAUK5	CAPTIVEAIRE	CASRTU3-I.500-18-15T	186,000	186,000	44	38	129,600	70	423,038	342,661	81	4,500	4,500	200	0.5	5	460	3	28	34	40	CURB,D/R,DDC,DS,F,LA0,NG,T,VSC
DOAUK6	CAPTIVEAIRE	CASRTU3-I.500-18-15T	186,000	186,000	44	38	129,600	70	423,038	342,661	81	4,500	4,500	850	0.5	5	460	3	28	34	40	CURB,D/R,DDC,DS,F,LA0,NG,T,VSC

EXHAUST HOOD SCHEDULE

PLAN MARK	MANUFACTURER	MODEL	TYPE	EXHAUST AIR FLOW (CFM)	PRESSURE DROP (IN WG)	LENGTH (FT)	WIDTH (IN)	HEIGHT (FT)	EXHAUST COLLAR SIZE (IN)	ELECTRICAL DATA VOLTAGE	ELECTRICAL DATA PHASE	ELECTRICAL DATA FLA	ELECTRICAL DATA MOCP (A)	NOTES
H1	CAPTIVEAIRE	5424 ND-2	HEAVY	2,650	0.82	13.25	4.5	2	12	120	1	12	15	0C,AWCFS,CC,CP,CS,DM,IL,RIR,SS,SSW
H2	CAPTIVEAIRE	5424 ND-2	HEAVY	3,312	1.28	13.25	4.5	2	12	120	0	12	15	0C,AWCFS,CC,CP,CS,DM,IL,RIR,SS,SSW
H3	CAPTIVEAIRE	4824 ND-2	MEDIUM	1,312	0.73	7.50	4.0	2	12	120	0	12	15	0C,AWCFS,CC,CP,CS,DM,IL,RIR,SS,SSW
H4	CAPTIVEAIRE	7224 ND-2	HEAVY	1,800	0.83	12.00	6.0	2	14	120	0	12	15	0C,AWCFS,CC,CP,CS,DM,IL,RIR,SS,SSW
H5	CAPTIVEAIRE	5424 ND-2	MEDIUM	1,000	0.55	5.00	4.5	2	10	120	0	12	15	0C,AWCFS,CC,CP,CS,DM,IL,RIR,SS,SSW
H6	CAPTIVEAIRE	6024 ND-2	HEAVY	2,125	1.29	8.50	5.0	2	14	120	0	12	15	0C,AWCFS,CC,CP,CS,DM,IL,RIR,SS,SSW
H7	CAPTIVEAIRE	6024 ND-2	HEAVY	2,125	1.29	8.50	5.0	2	14	120	0	12	15	0C,AWCFS,CC,CP,CS,DM,IL,RIR,SS,SSW
H8	CAPTIVEAIRE	6024 ND-2	HEAVY	2,050	1.12	10.25	5.0	2	14	120	0	12	15	0C,AWCFS,CC,CP,CS,DM,IL,RIR,SS,SSW
H9	CAPTIVEAIRE	6024 ND-2	HEAVY	2,050	1.12	10.25	5.0	2	14	120	0	12	15	0C,AWCFS,CC,CP,CS,DM,IL,RIR,SS,SSW
H10	CAPTIVEAIRE	6624 ND-2	HEAVY	2,475	1.17	5.50	5.5	2	20	120	0	12	15	0C,AWCFS,CC,CP,CS,DM,IL,RIR,SS,SSW
H11	CAPTIVEAIRE	4224 ND-2	EXTRA-HEAVY	1,375	0.77	5.50	3.5	2	12	120	0	12	15	0C,AWCFS,CC,CP,CS,DM,IL,RIR,SS,SSW
H12	CAPTIVEAIRE	4224 ND-2	EXTRA-HEAVY	1,375	0.77	5.50	3.5	2	12	120	0	12	15	0C,AWCFS,CC,CP,CS,DM,IL,RIR,SS,SSW
H13	CAPTIVEAIRE	6024 ND-2	EXTRA-HEAVY	2,175	1.76	4.83	5.0	2	16	120	0	12	15	0C,AWCFS,CC,CP,CS,DM,IL,RIR,SS,SSW
H14	CAPTIVEAIRE	6024 ND-2	MEDIUM	1,000	0.91	4.67	5.0	2	10	120	0	12	15	0C,AWCFS,CC,CP,CS,DM,IL,RIR,SS,SSW
H15	CAPTIVEAIRE	6024 ND-2	MEDIUM	1,000	0.68	4.00	5.0	2	10	120	0	12	15	0C,AWCFS,CC,CP,CS,DM,IL,RIR,SS,SSW

DEHUMIDIFIER UNIT SCHEDULE

PLAN MARK	MANUFACTURER	MODEL	OUTDOOR AIR FLOW (CFM)	SUPPLY FAN SUPPLY AIR FLOW (CFM)	SUPPLY FAN MOTOR (HP)	SUPPLY FAN EST. ESP (IN WG)	L.A.T. DB (°F)	L.A.T. DP (°F)	ELECTRIC HEATING WATTS	ELECTRIC HEATING STEPS	ELECTRICAL DATA VOLTAGE	ELECTRICAL DATA PHASE	ELECTRICAL DATA FLA	ELECTRICAL DATA MCA	ELECTRICAL DATA MOCP (A)	NOTES
DH1	INNOVATIVE AIR TECHNOLOGIES	600REC	150	600	1	0.5	110.1	37.8	6,500	1	480	3	21	26	30	SILICA GEL DESICCANT ROTATING WHEEL, MERV 8 FILTER

AIR CURTAIN SCHEDULE

PLAN MARK	MANUFACTURER	MODEL	AIR FLOW (CFM)	MOTOR (HP)	HEATER WATTS	ELECTRICAL DATA VOLTAGE	ELECTRICAL DATA PHASE	ELECTRICAL DATA FLA	ELECTRICAL DATA MCA	ELECTRICAL DATA MOCP	NOTES
AC1	POWERED AIRE	EVE-2-120E	3,430	0.2	10,000	480	3	14	18	25	COLOR BY ARCHITECT. PROVIDE ON/OFF SWITCH, TIME DELAY RELAY, AND DOOR OPERATING SWITCH. PROVIDE ON/OFF CONTROL SWITCH FOR HEATING MODE.
AC1	POWERED AIRE	EVE-2-120E	3,430	0.2	10,000	480	3	14	18	25	COLOR BY ARCHITECT. PROVIDE ON/OFF SWITCH, TIME DELAY RELAY, AND DOOR OPERATING SWITCH. PROVIDE ON/OFF CONTROL SWITCH FOR HEATING MODE.

FAN SCHEDULE

PLAN MARK	MANUFACTURER	MODEL	AIR FLOW (CFM)	EST. ESP (IN WG)	VOLTAGE	PHASE	MOTOR (HP)	NOTES
EF1	GREENHECK	G-060-D	75	0.25	120	1	0.02	BS,CO,CURB,DD,DM,GBD,SC
EF2	GREENHECK	G-95-D	600	0.3	120	1	0.125	BS,CO,CURB,DD,DM,GBD,SC
EF3	GREENHECK	G-90-D	375	0.4	120	1	0.067	BS,CO,CURB,DD,DM,GBD,SC
EF4	GREENHECK	SQ-15-M2-VG	2,000	0.3	460	3	1	DD,DM,GBD,SC,T
EF5	GREENHECK	CSP-A510	400	0.3	120	1	0.22	DD,CO,DM,GBD,SC
KEF1	CAPTIVEAIRE	DU180HFA	2,650	1.25	480	3	1.5	DM,CURBK
KEF2	CAPTIVEAIRE	DU240HFA	3,312	1.75	480	3	3	DM,CURBK
KEF3	CAPTIVEAIRE	DU85HFA	1,312	1.25	480	3	0.75	DM,CURBK
KEF4	CAPTIVEAIRE	DU180HFA	1,800	1.25	480	3	1	DM,CURBK
KEF5	CAPTIVEAIRE	DU180HFA	1,000	1	480	3	1	DM,CURBK
KEF6	CAPTIVEAIRE	DU240HFA	4,250	2	480	3	5	DM,CURBK
KEF7	CAPTIVEAIRE	DU240HFA	4,100	2	480	3	5	DM,CURBK
KEF8	CAPTIVEAIRE	DU180HFA	2,475	2	480	3	3	DM,CURBK
KEF9	CAPTIVEAIRE	USBI18DD-RM	2,750	1.75	480	3	3	DM,CURBK
KEF10	CAPTIVEAIRE	USBI18DD-RM	2,175	2.5	480	3	3	DM,CURBK
KEF11	CAPTIVEAIRE	DU85HFA	1,000	1.25	480	3	0.75	DM,CURBK
KEF12	CAPTIVEAIRE	DU85HFA	1,000	1.25	480	3	0.75	DM,CURBK
KEF13	CAPTIVEAIRE	DU50HFA	800	0.5	120	1	0.5	DM,CURBK
KEF14	CAPTIVEAIRE	DU33HFA	500	0.5	120	1	0.33	DM,CURBK
KEF15	ACCUREX	XRUBS-160HP-7	1,500	0.75	480	3	0.75	BS,CURBK,DM,GBD,OOS,SC
KEF16	ACCUREX	XRUBS-160HP-7	1,500	0.75	480	3	0.75	BS,CURBK,DM,GBD,OOS,SC

GRILLE, REGISTER AND DIFFUSER SCHEDULE

PLAN MARK	MANUFACTURER	MODEL	APPLICATION	FINISH	FRAME TYPE	VOLUME DAMPER	MAXIMUM NC	MINIMUM THROW (FT)	MAXIMUM THROW (FT)	MAXIMUM ΔP (IN WG)	NOTES
EA	TITUS	PAR-24 x 24	EXHAUST	WHITE	GRID	No	30	0	0	0.10	24x24 SQUARE PERFORATED FACE WITH ROUND DUCT CONNECTION
EB	TITUS	PAR-24 x 24	EXHAUST	WHITE	GRID	No	30	0	0	0.10	24X24 SQUARE PERFORATED FACE WITH SQUARE DUCT CONNECTION
EC	TITUS	PAR-12 x 12	EXHAUST	WHITE	SURFACE	No	30	0	0	0.10	12x12 SQUARE PERFORATED FACE WITH ROUND DUCT CONNECTION
ED	TITUS	350-RL	EXHAUST	WHITE	SURFACE	No	30	0	0	0.10	WALL GRILLE - SINGLE DEFLECTION - STEEL - BLADES PARALLEL TO LONG DIMENSION
RA	TITUS	OMNI-24 x 24	RETURN	WHITE	GRID	No	30	0	0	0.10	24x24 SQUARE PLAQUE FACE WITH ROUND DUCT CONNECTION
RB	TITUS	OMNI-12 x 12	RETURN	WHITE	SURFACE	No	30	0	0	0.10	12x12 SQUARE PLAQUE FACE WITH ROUND DUCT CONNECTION
RC	TITUS	PAR-24 x 24	RETURN	WHITE	GRID	No	30	0	0	0.10	24x24 SQUARE PERFORATED FACE WITH ROUND DUCT CONNECTION
RD	TITUS	PAR-24 x 24	RETURN	WHITE	GRID	No	30	0	0	0.10	24X24 SQUARE PERFORATED FACE WITH SQUARE DUCT CONNECTION
RE	TITUS	350-RL	RETURN	BY ARCHITECT	SURFACE	No	30	0	0	0.10	WALL GRILLE - SINGLE DEFLECTION - STEEL - BLADES PARALLEL TO LONG DIMENSION
SA	TITUS	OMNI-24 x 24	SUPPLY	WHITE	GRID	No	30	1	14	0.10	24x24 SQUARE PLAQUE FACE WITH ROUND DUCT CONNECTION
SB	TITUS	OMNI-24 x 24	SUPPLY	WHITE	SURFACE	No	30	1	14	0.10	24x24 SQUARE PLAQUE FACE WITH ROUND DUCT CONNECTION
SC	TITUS	OMNI-12 x 12	SUPPLY	WHITE	SURFACE	No	30	3	8	0.10	12x12 SQUARE PLAQUE FACE WITH ROUND DUCT CONNECTION
SD	TITUS	PAS-24 x 24	SUPPLY	WHITE	GRID	No	30	7	17	0.10	24x24 SQUARE PERFORATED FACE WITH ROUND DUCT CONNECTION
SE	TITUS	PAS-24 x 24	SUPPLY	WHITE	SURFACE	No	30	7	17	0.10	24x24 SQUARE PERFORATED FACE WITH ROUND DUCT CONNECTION
SF	TITUS	TDCA-24 x 24	SUPPLY	WHITE	GRID	No	30	8	20	0.10	24x24 SQUARE LOUVER FACE WITH ROUND DUCT CONNECTION
SG	TITUS	TDCA-24 x 24	SUPPLY	WHITE	SURFACE	No	30	8	20	0.10	24x24 SQUARE LOUVER FACE WITH ROUND DUCT CONNECTION
SH	TITUS	S300FL	SUPPLY	BY ARCHITECT	DUCT	Yes	30	7	16	0.10	SPIRAL DUCT GRILL - DOUBLE DEFECTION - ALUMINUM - BLADES PARALLEL TO LONG DIMENSION - PROVIDE WITH AIR SCOOP
SI	TITUS	300-FL	SUPPLY	WHITE	SURFACE	No	30	15	27	0.10	WALL GRILLE - DOUBLE DEFLECTION - ALUMINUM
SJ	TITUS	300-RL	SUPPLY	BY ARCHITECT	SURFACE	No	30	5	20	0.10	WALL GRILLE - DOUBLE DEFLECTION - STEEL
SK	TITUS	DL	SUPPLY	BY ARCHITECT		Yes	30	13	36	0.10	LONG THROW, HIGH CAPACITY WITH ROTATING DRUM GRILLE - ALUMINUM
SL	DUCTSOX	C-SERIES	SUPPLY	BY ARCHITECT	DUCT	No	46	19	57	0.10	CONCENTRIC FABRIC DIFFUSER

UNIT HEATER SCHEDULE

PLAN MARK	MANUFACTURER	MODEL	SUPPLY AIR FLOW (CFM)	ELECTRIC HEATING WATTS	ELECTRIC HEATING STEPS	GAS HEATING GAS LOAD (BTU/H)	GAS HEATING OUPUT (BTU/H)	GAS HEATING EFFICIENCY (%)	ELECTRICAL DATA VOLTAGE	ELECTRICAL DATA PHASE	ELECTRICAL DATA FLA	ELECTRICAL DATA MCA	ELECTRICAL DATA MOCP (A)	NOTES
UH1	REZNOR	EHA	165	1,500	1			0	480	1	3	4	15	DM,LOK,T,TC
UH2	REZNOR	UBX075	1,265			75,000	61,500	82	120	1	7	9	15	DM,LOK,T

DUCTLESS SPLIT SYSTEM INDOOR UNIT SCHEDULE

PLAN MARK	SYSTEM	MANUFACTURER	MODEL	SUPPLY AIR FLOW (CFM)	COOLING DATA MIN. SHC (BTU/H)	COOLING DATA MIN. TCC (BTU/H)	HEATING DATA MIN. THC (BTU/H)	ELECTRICAL DATA VOLTAGE	ELECTRICAL DATA PHASE	NOTES
DSS-1	CU1	DAIKIN	FTK12AXVJU	436	9,090	10,900	0	208	1	POWERED BY OUTDOOR CONDENSING UNIT. CONDENSATE OVERFLOW SWITCH, CONDENSATE PUMPT, THERMOSTAT.

DUCTLESS SPLIT SYSTEM CONDENSING UNIT SCHEDULE

PLAN MARK	MANUFACTURER	MODEL	AMBIENT TEMPERATURE (°F)	COOLING MIN. SEER	ELECTRICAL DATA VOLTAGE	ELECTRICAL DATA PHASE	ELECTRICAL DATA FLA	ELECTRICAL DATA MCA	ELECTRICAL DATA MOCP (A)	NOTES
CU1	DAIKIN	RK12AXVJU	105	19	208	1	7	8	15	LOW AMBIENT COOLING DOWN TO -10°F. PROVIDE WIND BAFFLES, HAIL GAURD, AND CURB.

SCHEDULE LEGEND

ABBREVIATED SCHEDULE HEADINGS	
A	AMPS
CAP	CAPACITY
CFM	CUBIC FEET PER MINUTE
DB	DRY BULB
E.A.T.	ENTERING AIR TEMPERATURE
E.S.P.	EXTERNAL STATIC PRESSURE INCLUDES ALL WORK EXTERNAL TO UNIT
E.W.T.	ENTERING WATER TEMPERATURE
EER	ENERGY EFFICIENCY RATIO
EST.	ESTIMATED
FLA	FULL LOAD AMPS
FPM	FEET PER MINUTE
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GR/LB	GRAINS OF MOISTURE PER POUND OF DRY AIR
HP	HORSEPOWER
IN	INCH
ISP	INLET STATIC PRESSURE
L.A.T.	LEAVING AIR TEMPERATURE
L.W.T.	LEAVING WATER TEMPERATURE
LBS	POUNDS
LOAD	NOMINAL CONNECTED GAS LOAD TO UNIT, USED TO SIZE GAS PIPING
MCA	MINIMUM CIRCUIT AMPACITY
MIN.	MINIMUM
MOCP	MAXIMUM OVERCURRENT PROTECTION
NC	MAXIMUM NOISE CRITERIA RATING
NPSH	NET PRESSURE SUCTION HEAD
OA	OUTSIDE AIR
OUTPUT	MINIMUM REQUIRED OUTPUT TO SATIFY SCHEDULED HEATING REQUIREMENTS
PPH	POUNDS PER HOUR
PSI	POUNDS PER SQUARE INCH
RPM	REVOLUTIONS PER MINUTE
SEER	SEASONAL ENERGY EFFICIENCY RATIO
SHC	SENSIBLE HEAT CAPACITY
TCC	TOTAL COOLING CAPACITY
TEMP.	TEMPERATURE
THC	TOTAL HEAT CAPACITY
WB	WET BULB
WPD	WATER PRESSURE DROP
EXHAUST FAN SCHEDULE	
CO	CONTINUOUS OPERATION WHILE BUILDING IS OCCUPIED.
CURB	INSULATED FULL ROOF CURB (MINIMUM 12" HEIGHT).
CURBK	UL LISTED FOR TYPE I HOOD APPLICATION. PROVIDE VENTED HINGED CURB, GREASE COLLECTION, VARIABLE SPEED CONTROL, HIGH HEAT OPERATION. MAINTAIN CODE REQUIRED MIN. 40" ABOVE ROOF.
DD	DIRECT DRIVE MOTOR
DM	DISCONNECT MEANS
GBD	GRAVITY BACKDRAFT DAMPER
LOK	FAN INTERLOCK TO PREVENT HEATER FROM RUNNING UNLESS FAN IS RUNNING
OOS	PROVIDE ON/OFF SWITCH TO OPERATE WITH OVEN OPERATION
T	WALL MOUNTED THERMOSTAT
TC	THERMAL CUTOUT TO TRIP AT NO LESS THAN 125°F
EXHAUST HOOD SCHEDULE	
0C	PROVIDE HOOD WITH ZERO CLEARANCE TO COMBUSTIBLES
AWCFS	ANSUL WET CHEMICAL FIRE SUPPRESSION SYSTEM PER NFPA 96.
CC	CONSTRUCT HOOD WITH GUTTER FOR CONDENSATE COLLECTION AND PROVIDE CONDENSATE BAFFLE.
CP	PROVIDE REMOTE LCD CONTROL PANEL TO CONNECT FIRE SUPPRESSION SYSTEM AND SHALL CONTROL LIGHT SWITCH, FOR WALL INSTALLATION.
CS	PROVIDETYPE 430 STAINLESS STEEL CEILING SKIRT AS REQUIRED TO ENCLOSE TOP OF HOOD.
DM	DISCONNECTING MEANS.
IL	INTERNAL LIGHT WIRED TO LIGHT SWITCH.
RIR	REMOTE INTERLOCKED RELAY TO START EXHAUST FAND AND ASSOCIATED DOAS UNIT TO INCLUDE STARTER.
SS	TYPE 430 STAINLESS STEEL CONSTRUCTION 0 CLEARANCE TO WALL.
SSW	STAINLESS STEEL WASHABLE BAFFLE STYLE HIGH EFFICIENCY GREASE FILTERS.
MAKE-UP AIR UNIT SCHEDULE	
CURB	INSULATED FULL ROOF CURB (MINIMUM 18" HEIGHT).
D/R	DEDICATED OUTSIDE AIR UNIT INTERLOCKED WITHASSOCIATED KITCHEN HOOD PER PLANS AND MODULATING OUTSIDE AIR / RETURN AIR DAMPER FOR CIRCULATING RETURN AIR WHEN HOOD IS NOT OPERATING. REFER TO CONTROLS DIAGRAM FOR ADDITIONAL INFORMATION.
DDC	PROVIDE WITH BACNET COMPATIBLE CONTROLLER
DS	SINGLE POINT MEANS OF DISCONNECT.
F	PROVIDE MERVE 8 PRE-FILTER AND MERV 13 FINAL FILTER.
LA0	LOW AMBIENT COOLING CONTROLS CAPABLE OF OPERATING IN COOLING MODE DOWN TO 0°F
NG	NATURAL GAS MODULATING TURNDOWN.
T	PROGRAMMABLE AUTO-CHANGEOVER THERMOSTAT. SHALL BE COMBINATION THERMOSTAT AND HUMIDISTAT
VSC	VARIABLE SPEED COMPRESSOR, WITH ECM CONDENSING FANS FOR VARIABLE VOLUME UNIT.
PACKAGED ROOFTOP UNIT SCHEDULE	
2SH	2-STAGE BURNER FOR HEAT EXCHANGER
BRD	BAROMETRIC RELIEF DAMPER WITH HOOD
CCH	CRANKCASE HEATER
CO	UNIT SHALL OPERATE CONTINUOUSLY WHILE BUILDING IS OCCUPIED
CR	MANUFACTURER MOUNTED GFCI CONVENIENCE RECEPTACLE
CURB	INSULATED FULL ROOF CURB (MINIMUM 18" HEIGHT). IF APPLICABLE, COORDINATE WITH EXISTING ROOF TO PROVIDE CURB ACCEPTABLE WITH EXISTING ROOF SYSTEM.
DCV	DEMAND CONTROL VENTILATION
DDC	PROVIDE WITH BACNET COMPATIBLE CONTROLLER
DS	SINGLE POINT MEANS OF DISCONNECT
F	PROVIDE 2" MERV 13 PLEATED FILTER WITH HOLDING FRAME
FAC	PROVIDE LOW VOLTAGE CONTACTS FOR CONNECTION TO FIRE ALARM SYSTEM TO SHUT DOWN SUPPLY AND RETURN AIR FANS UPON A SIGNAL FROM FIRE ALARM SYSTEM WHEN SMOKE IS DETECTED IN THE SPACE.
LA32	LOW AMBIENT COOLING CONTROLS CAPABLE OF OPERATING IN COOLING MODE DOWN TO 32°F
MHGR	MODULATING HOT GAS REHEAT
MOAE	0-100% MODULATING OUTDOOR AIR ECONOMIZER WITH BAROMETRIC RELIEF
MPC	PROVIDE MICROPROCESSOR CONTROLS AND DIGITAL ROOM SENSOR
R410A	PROVIDE UNIT WITH R410 REFRIGERANT
RMMC	REMOTE MOUNT MINI CONTROLLER BY UNIT MANUFACTURER
SD	SMOKE DETECTORS IN SUPPLY AND RETURN WIRED TO SHUT UNIT DOWN
T	7 DAY PROGRAMMABLE THERMOSTAT PER SPECIFICATIONS.THERMOSTAT SHALL INDEPENDENTLY CONTORL 2 POSITION OUTSIDE AIR INTAKE DAMPER BASED ON THE TIME OF DAY AND UNIT ON/OFF STATUS.SHALL BE COMBINATION THERMOSTAT AND HUMIDISTAT
VVE	VERTICAL VENT EXTENSION KIT
UNIT HEATER SCHEDULE	
DM	DISCONNECT MEANS
LOK	FAN INTERLOCK TO PREVENT HEATER FROM RUNNING UNLESS FAN IS RUNNING
T	24V WALL OR INTEGRALL THERMOSTAT, REFER TO PLANS
TC	THERMAL CUTOUT TO TRIP AT NO LESS THAN 125°F

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MECHANICAL SCHEDULES

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