

USC COLUMBIA COLUMBIA, SC

MIRC FILM VAULT INSTALLATION

707 CATAWBA STREET, COLUMBIA, SC STATE PROJECT #H27-Z269

A/E Project #15030.01

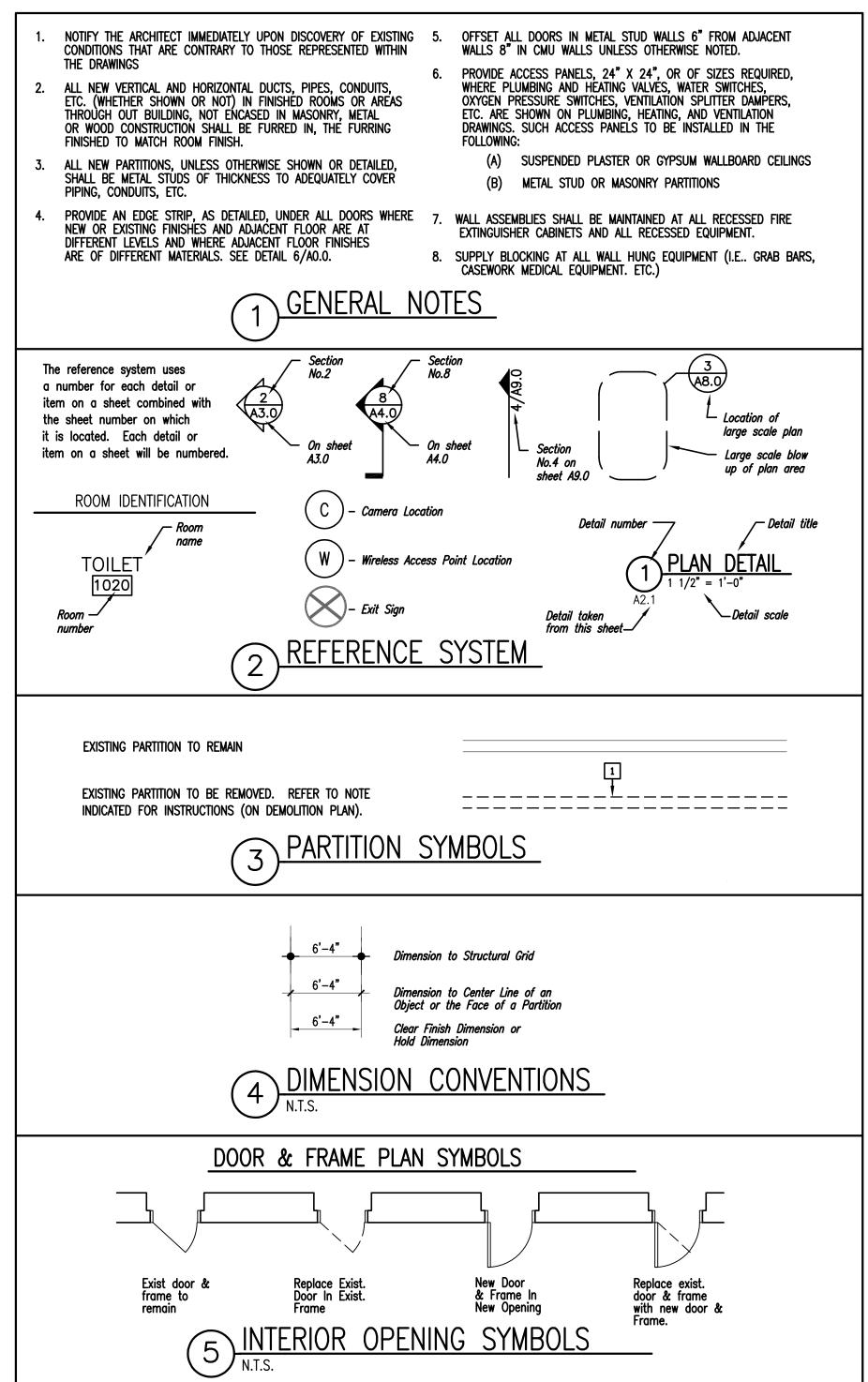
APRIL 13, 2016
ISSUED FOR CONSTRUCTION DOCUMENTS

Prepared by:

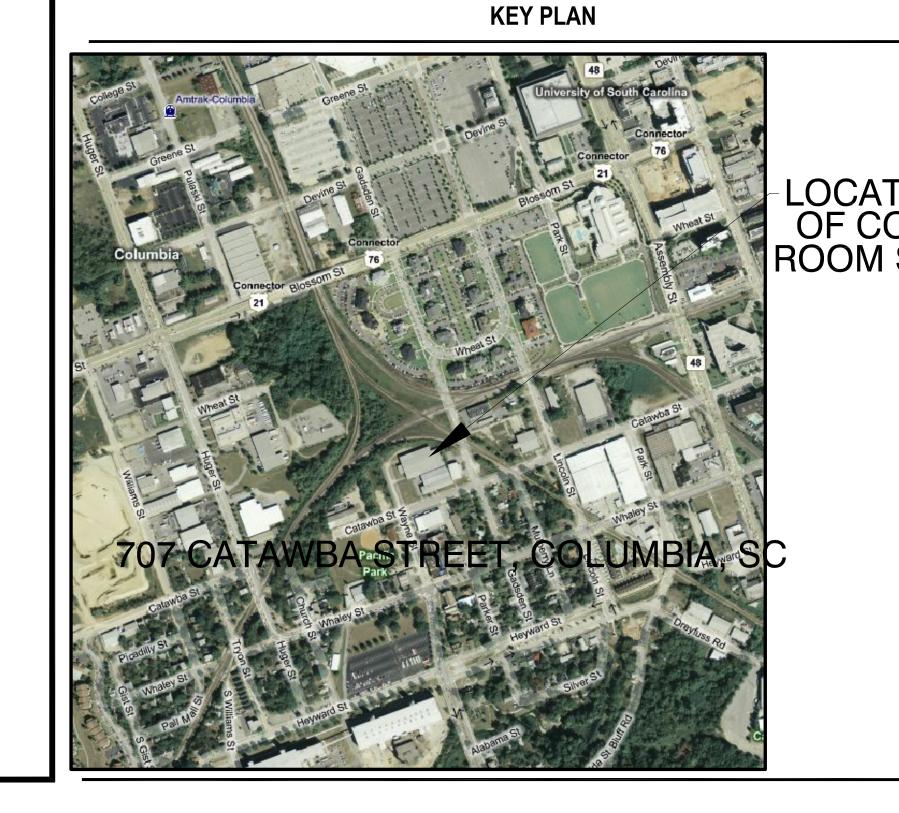


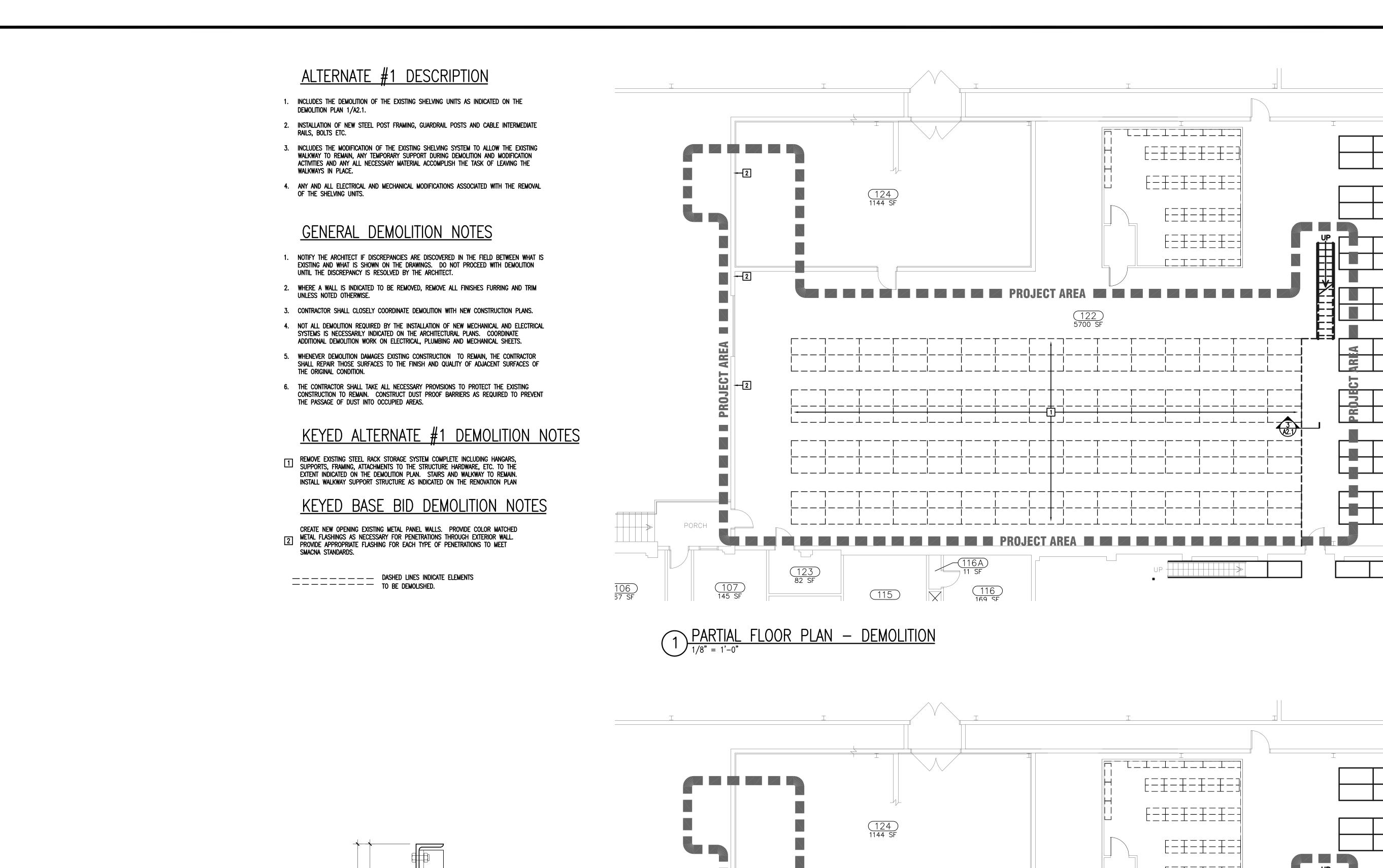
Architects/Engineers/Planners 1201 Main Street Columbia, South Carolina 29201-3299 tel. 803-256-0000 fax 803-255-7243

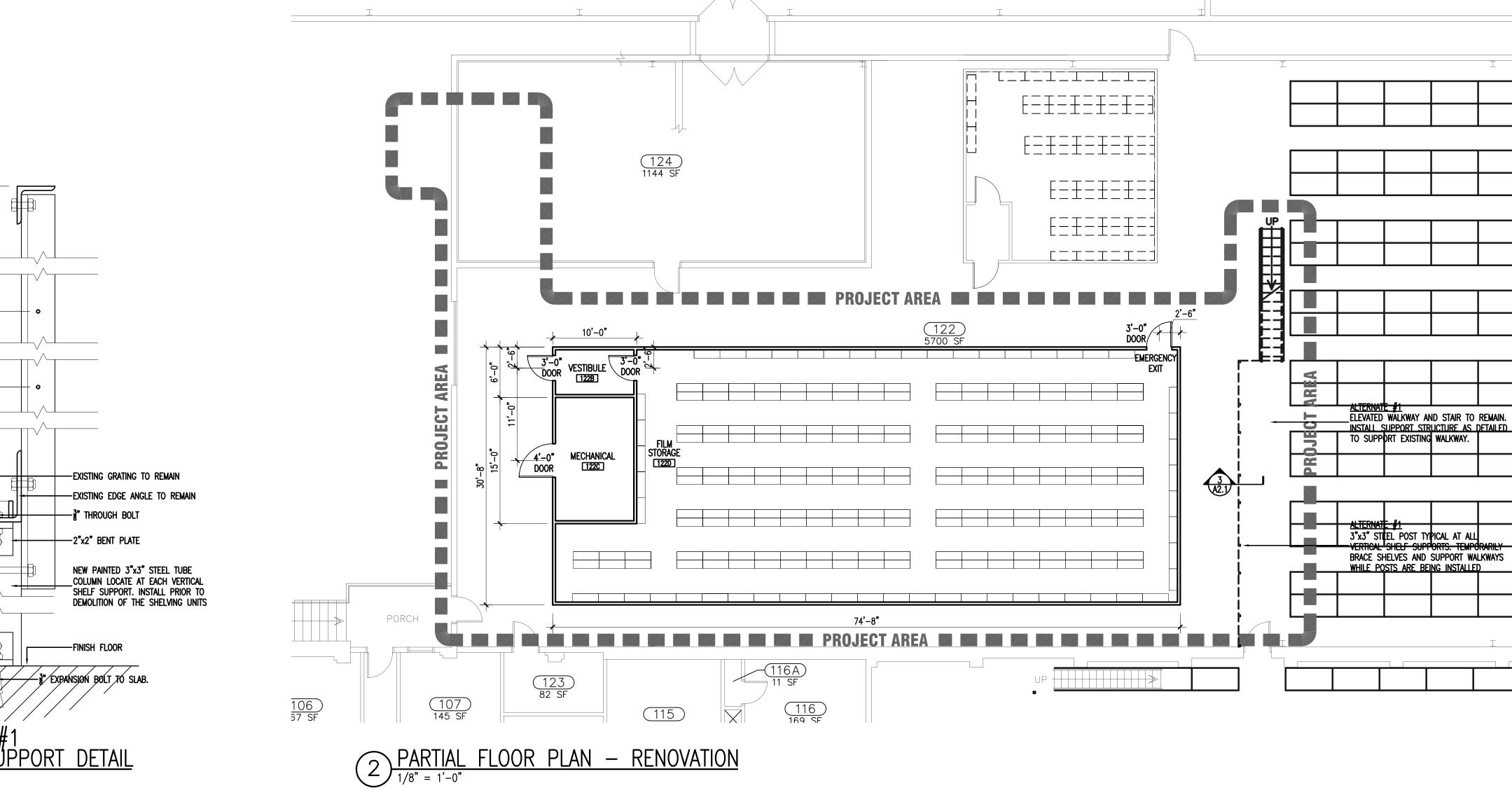
ARCHITECTURAL A2.1 DEMOLITION PLAN, RENOVATION PLAN AND MISCELLANEOUS DETAILS MECHANICAL MO.0 HVAC SPECIFICATIONS M2.1 COLD ROOM HVAC PLAN M7.1 HVAC SCHEDULES NOTES AND DETAILS ELECTRICAL E2.1 COLD ROOM ELECTRICAL PLAN ABBREVIATIONS, SYMBOLS AND LEGENDS 1. NOTIFY THE ARCHITECT IMMEDIATELY UPON DISCOVERY OF EXISTING CONDITIONS THAT ARE CONTRARY TO THOSE REPRESENTED WITHIN THE DRAWNINS 2. ALL NEW VERTICAL AND HORIZONTAL DUCTS, PIPES, CONDUITS, ETC. (WHICHER SHOWN OR NOT!) IN FINISHED ROOMS OR AREAS THROUGH OUT BUILDING, NOT ENCASED IN MASONRY, METAL. OR WOOD CONSTRUCTION SPLITTED DAMPERS, ETC. ARE SHOWN ON PLUMBRING, HEATING, AND VERTILATION DIFFURNATION.



I/E\/ BL AI









Architects/Engineers/Planners 1201 Main Street, Suite 2100 Columbia, S.C. 29201 tel. 803-256-0000 fax 803-255-7243

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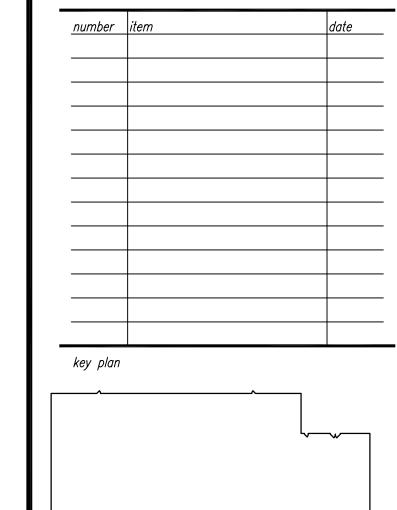
MIRC Film Vault Installation

state project number H27-Z269 GMK project number 15030.01

seals/signature

CONSTRUCTION DOCUMENTS

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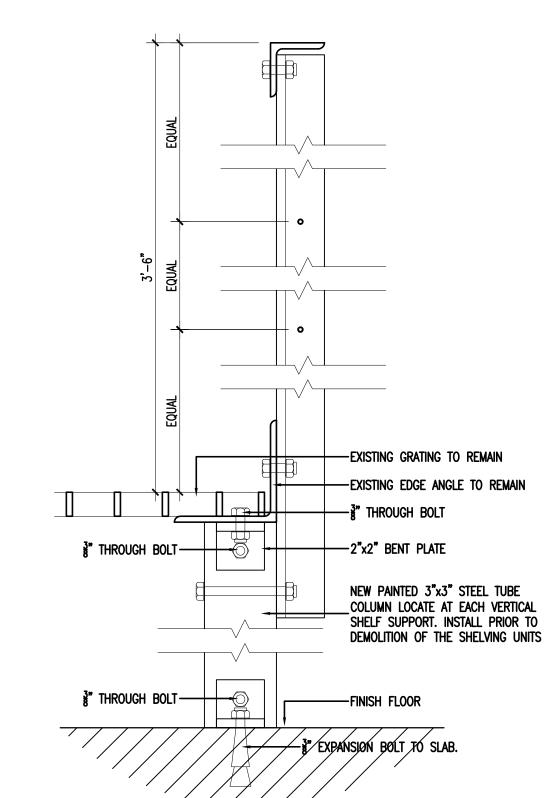


707 CATAWBA

sheet title
DEMOLITION PLAN, RENOVATION
PLAN AND MISCELLANEOUS DETAILS

sheet number

A2.1



HVAC SPECIFICATIONS

GENERAL REQUIREMENTS:

INTERNATIONAL BUILDING CODE.

- A. ALL ELECTRICAL EQUIPMENT SHALL BE UL LISTED. B. ALL ITEMS TO BE PROPERLY LUBRICATED AND IN PERFECT OPERATION UPON COMPLETION OF THE PROJECT AND PRIOR TO FINAL ACCEPTANCE BY
- C. PROVIDE SEISMIC BRACING AND RESTRAINT AS REQUIRED BY THE
- D. PROVIDE A COMPLETE HEATING, VENTILATING, AND AIR CONDITIONING SYSTEM AS SPECIFIED AND AS INDICATED ON THE MECHANICAL DRAWINGS FOR THE
- E. ALL MATERIALS AND EQUIPMENT SHALL BE NEW AND FREE FROM FLAWS AND DEFECTS OF ANY NATURE. MATERIALS CALLED FOR ARE TO BE CONSIDERED AS STANDARD QUALITY; WHICH HOWEVER, IMPLIES NO PART OF CONTRACTOR TO SUBSTITUTE OTHER MATERIALS AND METHODS WITHOUT WRITTEN AUTHORITY FROM ENGINEER.
- F. ALL WORK SHALL BE PERFORMED BY SKILLED MECHANICS, UNDER COMPETENT SUPERVISION. EMPLOYING LATEST AND BEST PRACTICES OF THE TRADE. WORK SHALL BE INSTALLED IN ACCORDANCE WITH RECOMMENDATIONS OF ASHRAE GUIDE, AND EQUIPMENT MANUFACTURER'S INSTALLATION INSTRUCTIONS. IN THE EVENT THERE IS ANY CONFLICT OR DOUBT, CONSULT ARCHITECT/ENGINEER FOR CLARIFICATION AND APPROVAL.

- A. PROVIDE MECHANICAL UNITS, DUCTWORK, REFRIGERANT AND CONDENSATE PIPING, AIR DISTRIBUTION, AND THERMOSTATIC CONTROLS AS SPECIFIED AND
- B. INSULATE ALL DUCTWORK, PIPING, AND EQUIPMENT AS HEREIN SPECIFIED AND AS INDICATED ON MECHANICAL DRAWINGS.
- C. PROVIDE ALL CONTROL, INTERLOCK AND STARTING CIRCUIT WIRING. WIRING SHALL BE 120 VOLTS OR LESS. PROVIDE TRANSFORMERS AND RELAYS AS REQUIRED TO COMPLY WITH THIS REQUIREMENT. CONDUIT SHALL BE STEEL CONFORMING TO THE REQUIREMENTS OF THE ELECTRICAL SPECIFICATIONS, EXCEPT AS OTHERWISE SPECIFIED.
- D. START, TEST, ADJUST, BALANCE AND PLACE INTO OPERATION ALL SYSTEMS. THE BUILDING AIR DISTRIBUTION SYSTEMS ARE TO BE BALANCED TO PROVIDE THE QUANTITY OF AIR AS SHOWN ON DRAWINGS. SYSTEM AIR BALANCE IS TO BE ACCOMPANIED WITH CERTIFIED TEST FORMS AS TO OBTAINED AIR QUANTITIES. PROPER FAN PERFORMANCE AND COIL DISCHARGE AIR TEMPERATURE READING SHALL ALSO BE CERTIFIED ON TEST

- A. THE CONTRACTOR AGREES TO CORRECT DEFECTS IN WORKMANSHIP, NEW MATERIALS, NEW EQUIPMENT, AND THE OPERATION OF SYSTEM FOR A PERIOD OF ONE YEAR AFTER DATE OF ACCEPTANCE (SUBSTANTIAL COMPLETION). EQUIPMENT AND MATERIALS, REPAIRED OR REPLACED ARE GUARANTEED FOR ONE YEAR FOLLOWING DATE OF CORRECTION.
- B. THE CONTRACTOR AGREES TO REPAIR ANY DAMAGE TO BUILDING AND EQUIPMENT RESULTING FROM DEFECTS IN WORKMANSHIP, MATERIALS, EQUIPMENT, AND SYSTEM OPERATION.
- C. THE CONTRACTOR AGREES TO REMOVE ANY ITEM NOT SPECIFIED OR GIVEN APPROVAL AND REPLACE IT WITH SPECIFIED OR APPROVED ITEM.
- THE CONTRACTOR AGREES THAT ANY ITEM SUBMITTED FOR APPROVAL THAT DOES NOT CONFORM TO THESE SPECIFICATIONS SHALL HAVE ACCOMPANYING NOTE OF EXCEPTION.
- E. THE CONTRACTOR AGREES THAT THE SYSTEM AS INSTALLED SHALL COMPLY WITH ALL CODE REQUIREMENTS.
- F. CONTRACTOR SHALL COORDINATE DUCTWORK FABRICATION/LOCATIONS WITH ROOF TRUSS SHOP DRAWINGS.
- **OPERATING AND MAINTENANCE INSTRUCTIONS:** A. THE CONTRACTOR SHALL ACQUAINT AND INSTRUCT THE OWNER'S REPRESENTATIVE WITH ALL DETAILS OF PERFORMANCE, OPERATION, AND MAINTENANCE OF THE SYSTEMS. IN ADDITION, THE CONTRACTOR SHALL FURNISH TWO COPIES OF A BROCHURE TO THE OWNER THROUGH THE ARCHITECT, WHICH SHALL CONTAIN PRINTED OPERATING AND MAINTENANC INSTRUCTIONS, PARTS LIST, CONTROL DIAGRAM, ETC. INCLUDING A LIST C SPARE PARTS AND ANY SPECIAL TOOLS RECOMMENDED BY THE EQUIPMENT

UNDER THIS SECTION OF SPECIFICATIONS

B. THE BASIS OF OWNER'S INSTRUCTIONS SHALL BE WRITTEN FOR INCLUSION IN THE MAINTENANCE AND OPERATING INSTRUCTIONS DATA SPECIFIED ABOVE. OBTAIN CERTIFICATES, SIGNED BY THE OWNER'S REPRESENTATIVE, THAT THESE INSTRUCTIONS HAVE BEEN RECEIVED AND UNDERSTOOD.

MANUFACTURERS TO BE STOCKED BY THE OWNER. THE MANUALS SHALL

INCLUDE A COMPLETE SE OF ALL APPROVED SHOP DRAWINGS FURNISHED

A. THE CONTRACTOR SHALL PLACE THE SYSTEMS IN FULL OPERATION BEFORE TESTING BEGINS. THE CONTRACTOR SHALL MAKE CORRECTIONS IN THE SYSTEM, INCLUDING FURNISHING AND INSTALLING DRIVES, MOTORS, DAMPERS, VALVES, ETC., IF REQUIRED TO BALANCE THE SYSTEMS. ALL SUCH CORRECTIONS SHALL BE INCLUDED IN THE CONTRACTOR'S BASE BID AND SHALL BE ACCOMPLISHED AT NO ADDITIONAL COST TO THE OWNER.

- A. THE ENGINEER WILL REVIEW AND TAKE APPROPRIATE ACTION ON SHOP DRAWINGS, PRODUCT DATA, SAMPLES, AND OTHER SUBMITTALS REQUIRED BY THE CONTRACT DOCUMENTS. SUCH REVIEW SHALL BE FOR GENERAL COMPLIANCE WITH THE DESIGN AND WITH THE INFORMATION GIVEN IN THE CONTACT DOCUMENTS. IT SHALL NOT INCLUDE THE REVIEW OF QUANTITIES DIMENSIONS, WEIGHTS, FABRICATION PROCESSES, CONSTRUCTION METHODS, COORDINATION WITH THE WORK OF OTHER TRADES, OR CONSTRUCTION SAFETY PRECAUTIONS, ALL OF WHICH ARE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
- B. CONTRACTOR SHALL PROVIDE ALL EQUIPMENT AS SPECIFIED IN THE CONTRACT DOCUMENTS. ANY SUBSTITUTIONS SHALL BE APPROVED BY THE ENGINEER PRIOR TO SUBMITTAL. CONTRACTOR IS RESPONSIBLE FOR REVIEW OF ANY EQUIPMENT SUBSTITUTIONS BEFORE SUBMITTING TO THE ENGINEER TO VERIFY THAT SUBSTITUTED EQUIPMENT AT A MINIMUM IS EQUAL TO EQUIPMENT SPECIFIED IN THE CONSTRUCTION DOCUMENTS.

PROJECT JOB DRAWINGS AND AS-BUILT DRAWINGS

- A. THE CONTRACTOR SHALL KEEP A RECORD SET OF DRAWINGS ON THE JOB AND, AS CONSTRUCTION PROGRESSES, SHALL SHOW THE ACTUAL INSTALLED LOCATION OF ALL ITEMS, MATERIAL, AND EQUIPMENT ON THE PROJECT JOB
- SHALL BE DELIVERED TO THE OWNER. ALL DRAWING COSTS TO BE BY THE

B. AT THE TIME OF FINAL INSPECTION, TWO CORRECTED SETS OF PRINTS

- C. AS BUILT DRAWINGS SHALL HAVE THE INFORMATION TRANSFERRED FROM THE PROJECT JOB DRAWINGS INCLUDING ALL ADDENDUM, SUPPLEMENTAL INSTRUCTIONS, CHANGE ORDERS, AND SIMILAR INFORMATION.
- D. QUALIFIED DRAFTSMEN SHALL PERFORM THIS TASK

MANUAL DAMPERS

- A. DAMPERS SHALL BE RUSKIN, NCA, LOUVERS AND DAMPERS OR APPROVED
- A. FURNISH ALL LABOR, MATERIALS, EQUIPMENT, AND SERVICES NECESSARY FOR THE INSTALLATION OF ALL SUPPLY, RETURN, VENTILATION, AND EXHAUST DUCTWORK AND RELATED EQUIPMENT AND ACCESSORIES AS INDICATED ON THE DRAWINGS, REQUIRED, AND AS SPECIFIED.
- B. ALL DUCT SHALL BE IN ACCORDANCE WITH THE LATEST RECOMMENDATIONS OF THE ASHRAE GUIDE, WITH THE SMACNA DUCT CONSTRUCTION STANDARDS, SMACNA DUCT LINER APPLICATION STANDARD, AND WITH DETAILS ON THE DRAWINGS. CONSTRUCT T'S, BENDS, AND ELBOWS WITH RADIUS OF 1.5 TIMES WIDTH OF DUCT OR PROVIDE RECTANGULAR ELBOWS WITH AIRFOIL TURNING VANES. PROVIDE 45 DEGREE LATERAL TAKE-OFFS.
- C. ALL METAL DUCTWORK SHALL BE DESIGNED FOR 3.0" WG PRESSURE.

PROVIDE MANUAL BALANCING DAMPER ON ALL TAKE-OFFS.

- D. ALL JOINTS SHALL BE MADE UTILIZING HARDCAST IRON GRIP WATER DUCT SEALANT 601 OR APPROVED EQUAL.
- GALVANIZED STEEL DUCT SHALL BE ASTM A 653/A653M GALVANIZED STEEL SHEET, FORMING STEEL (FS) DESIGNATION, WITH G90/Z275 ZINC COATING. SHEET STEEL FREE FROM BLISTERS OR OTHER MECHANICAL DEFECTS. THE GENERAL LOCATION OF DUCTS SHALL BE AS SHOWN. EXACT LOCATION OF DUCTWORK MAY BE ALTERED SLIGHTLY TO INTEGRATE WITH FEATURES OF THE BUILDING. COORDINATE DUCT WITH PRE-FABRICATED WOOD
- G. WHERE CHANGES ARE MADE IN SHAPE OF DUCTS FULL AREAS SHALL BE MAINTAINED AND CHANGES SHALL BE GRADUAL TO MINIMIZE PRESSURE
- OBSTRUCTIONS IN DUCTWORK SHALL BE STREAMLINED AND SHALL CONFORM SHEET METAL GAUGES, CROSS JOINTS AND REINFORCING SHALL BE AS INDICATED BY SMACNA.
- J. THE PITTSBURGH LOCK SHALL BE USED FOR LONGITUDINAL SEAMS AND SHALL CONFORM TO SMACNA.

- K. ELBOWS SHALL BE 1.5R LONG RADIUS WHERE SPACE PERMITS OF INDICATED ON DRAWINGS. MITERED SQUARE ELBOWS WITH SINGLE THICKNESS TURNING VANES MAY BE PROVIDED IF INDICATED IN THE
- . TAPERS AND OFFSETS SHALL CONFORM TO SMACNA.
- M. ALL CONNECTIONS BETWEEN EQUIPMENT AND DUCTWORK SHALL BE MADE WITH A FLEXIBLE CONNECTION CONSISTING OF A HEAVY GLASS FABRIC DOUBLE COATED WITH NEOPRENE. MATERIAL SHALL WITHSTAND THE AIR PRESSURE, 250 DEGREES F. TEMPERATURE CONTINUOUSLY, BE FIRE RESISTANT, WATERPROOF AND AIRTIGHT AND SHALL BE THE PRODUCT OF VENT FABRICS, INC. OR EQUAL.
- N. HANGERS AND SUPPORTS SHALL CONFORM TO THE LATEST EDITION OF SMACNA STANDARDS.
- O. HANGERS AND SUPPORTS FOR DUCTWORK SHALL NOT SUPPORT ANY OTHER
- P. S.ALL DUCTWORK SHALL BE PROPERLY SECURED DIRECTLY TO THE STRUCTURE OF THE BUILDING USING SUITABLE STRAP OR ANGLE HANGERS.
- Q. ALL CHANGES IN DIRECTION SHALL EITHER BE WITH A RADIUS NOT LESS THAN 1/2 WIDTH OF THE DUCT, OR SQUARE ELBOW WITH TURNING VANES.
- R. SIZES SHOWN ON DRAWINGS ARE INSIDE DIMENSIONS, INCREASE SHEET METAL SIZES TO ALLOW FOR DUCTLINER ON TRANSFER DUCTS.
- S. WIPE THE INSIDE OF ALL DUCTWORK TO REMOVE THE DEBRIS, OIL, GREASE, ETC. ONCE DUCTWORK IS CLEAN, COVER WITH PLASTIC OR METAL TEMPORARY CLOSURE MATERIAL. SEAL ALL DUCTWORK IN ACCORDANCE WITH SMACNA RECOMMENDATIONS. PROVIDE SEAL CLASS "A" ON ALL SUPPLY, RETURN, AND EXHAUST DUCTWORK, PROTECT DUCTWORK FROM ENTRY OF DUST AND DEBRIS DURING SHOP STORAGE, SHIPMENT AND TEMPORARY STORAGE AT THE JOB SITE.

HVAC PIPE AND PIPE FITTINGS

A. PROVIDE PIPE HANGERS AND SUPPORTS IN ACCORDANCE WITH ASME B31.5 UNLESS INDICATED OTHERWISE.

SCHEDULE 40 PVC. FITTING SHALL BE ASTM D 2466 OR D 2467 PVC.

- CONDENSATE DRAIN PIPING AND FITTINGS: A. PIPE MATERIAL FOR ABOVE GROUND INSTALLATION SHALL BE ASTM D 1785,
- JOINTS SHALL BE SOLVENT WELDED. B. SEE INSULATION SPECIFICATION SECTION FOR INSULATION THICKNESS.
- REFRIGERANT PIPING AND FITTINGS: A. SYSTEM SHALL BE COMPLETE AND SIZED TO CONFORM TO CURRENT ASHRAE STANDARDS AND REFRIGERATION EQUIPMENT MANUFACTURER'S
- JOINTS SHALL BE SOLDERED WITH HIGH TEMPERATURE SILVER SOLDER SUITABLE FOR 300 PSI WORKING PRESSURE. B. INSTALL REFRIGERANT SERVICE VALVES IN SUCTION AND DISCHARGE LINES ADJACENT TO THE COMPRESSOR UNLESS BUILT—IN DOUBLE SEATED VALVES ARE FURNISHED. REFRIGERANT VALVES SHALL BE DESIGNED FOR

RECOMMENDATIONS. PIPING SHALL BE TYPE "L" HARD DRAWN COPPER

- REFRIGERANT USED AND SHALL HAVE SEAL CAPS . INSTALL A THREE DESICCANT TYPE FILTER DRIER ON THE INLET SIDE OF EACH THERMOSTATIC EXPANSION VALVE. FILTER DRIERS UP TO TEN TON CAPACITY SHALL BE SEALED TYPE. FILTER DRIERS FOR HEAT PUMP SYSTEMS SHALL BE DESIGNED FOR HEAT PUMP DUTY AND SHALL BE
- D. INSTALL REFRIGERATION SPECIALTIES IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

FURNISHED BY THE HEAT PUMP MANUFACTURER.

- E. PRESSURE TEST REFRIGERANT PIPING AT A PRESSURE OF 300 PSI (HIGH SIDE) AND 150 PSI (LOW SIDE). WHILE THE SYSTEM IS BEING PRESSURE TESTED, AN ELECTRONIC LEAK DETECTOR SHALL BE USED TO CHECK FOR
- F. PRESSURE SHALL BE MAINTAINED ON THE PIPING FOR A MINIMUM OF 12 HOURS. ALL FIELD INSTALLED PIPING SHALL BE EVACUATED WHEN SURROUNDING AMBIENT AIR IS NOT LESS THAN 60 DEGREES F. A MINIMUM VACUUM OF 2.0 mm OF MERCURY SHALL BE PULLED ON PIPING SYSTEM AND MAINTAINED FOR 12 HOURS. THE VACUUM PRESSURE DISPLACEMENT SHALL BE NOT LESS THAN 5 CFM. THE VACUUM SHALL BE CHECKED WITH AN FLECTRONIC GAUGE
- G. SEE INSULATION SPECIFICATION SECTION FOR INSULATION THICKNESS. 1.02 QUALITY ASSURANCE:
- A. BUILDING CODES AND STANDARDS: 1. PRODUCT MUST BE CLASSIFIED BY UNDERWRITER'S LABORATORIES IN ACCORDANCE WITH THE 25/50 FLAME SPREAD / SMOKE DEVELOPED REQUIREMENTS OF NFPA 90-A AND ARE ALSO CLASSIFIED IN ACCORDANCE WITH ICC EVALUATION SERVICE AC167 AND UL 2518.. PRODUCT MUST MEET UL-C (CANADA), BS 5867, PART 2, 1980 AND
- GB8624-2006 B-S1, D0, T1 LEVEL. 2. ALL PRODUCT SECTIONS MUST BE LABELED WITH THE LOGO AND CLASSIFICATION MARKING OF UNDERWRITER'S LABORATORIES. B. DESIGN & QUALITY CONTROL 1. MANUFACTURER MUST HAVE DOCUMENTED DESIGN SUPPORT INFORMATION INCLUDING DUCT SIZING, VENT AND ORIFICE LOCATION, VENT AND ORIFICE
- PERMEABILITY, SHALL BE CONSIDERED AND DOCUMENTED. A. PRODUCT DATA: SUBMIT MANUFACTURER'S SPECIFICATIONS ON MATERIALS AND MANUFACTURED PRODUCTS USED FOR WORK OF THIS SECTION. B. BUILDING CODE DATA: SUBMIT UL FILE NUMBER UNDER WHICH PRODUCT IS

INCLUDING MAXIMUM AIR TEMPERATURE, VELOCITY, PRESSURE AND FABRIC

SIZING, LENGTH, AND SUSPENSION. PARAMETERS FOR DESIGN,

- CLASSIFIED BY UNDERWRITER'S LABORATORIES NFPA 90, ICC AC167 AND A. MANUFACTURER MUST PROVIDE A 5 YEAR PRODUCT WARRANTY FOR
- PRODUCTS SUPPLIED FOR THE FABRIC PORTION OF THIS SYSTEM AS WELL AS A DESIGN AND PERFORMANCE WARRANTY.
- 1.05 DELIVERY, STORAGE AND HANDLING: A. PROTECT FABRIC AIR DISPERSION SYSTEMS FROM DAMAGE DURING SHIPPING, STORAGE AND HANDLING.

2.01 MANUFACTURER:

- OR EQUAL WITH PRIOR APPROVAL
- 2.02 FABRIC AIR DISPERSION SYSTEM: A. VERONA FABRIC: AIR DIFFUSERS SHALL BE CONSTRUCTED OF A WOVEN FIRE RETARDANT FABRIC COMPLYING WITH THE FOLLOWING PHYSICAL CHARACTERISTICS 1. FABRIC CONSTRUCTION: 100% FLAME RETARDANT
- 2. WEIGHT: 6.2 OZ. /YD2 PER ASTM D3776 3. COLOR: WHITE
- 4. FABRIC POROSITY: 2 (+2/-1) CFM/FT2 PER ASTM D737, FRAZIER. CUSTOM POROSITY 5. TEMPERATURE RANGE: O DEGREES F TO 180 DEGREES F 6. FIRE RETARDANCY: CLASSIFIED BY UNDERWRITERS LABORATORIES ACCORDANCE WITH THE REQUIREMENTS OF NFPA 90-A AND AC-167 (NOTED ABOVE).

B. SYSTEMS FABRICATION REQUIREMENTS: 1. AIR DISPERSION ACCOMPLISHED BY PERMEABLE FABRIC. 2. INLET CONNECTION TO METAL DUCT VIA FABRIC DRAW BAND WITH ANCHOR PATCHES AS SUPPLIED BY MANUFACTURER. ANCHOR PATCHES

TO BE SECURED TO METAL DUCT VIA ZIP SCREW FASTENER - SUPPLIED

- BY CONTRACTOR 3. INLET CONNECTION INCLUDES ZIPPER FOR EASY REMOVAL / MAINTENANCE.
- 4. LENGTHS TO INCLUDE REQUIRED ZIPPERS AS SPECIFIED BY
- MANUFACTURER. 5. SYSTEM TO INCLUDE ADJUSTABLE FLOW DEVICES TO BALANCE TURBULENCE, AIRFLOW AND DISTRIBUTION AS NEEDED. FLOW RESTRICTION DEVICE SHALL INCLUDE ABILITY TO ADJUST THE AIRFLOW
- RESISTANCE FROM 0.06 0.60 IN W.G. STATIC PRESSURE. 6. FABRIC SYSTEM SHALL INCLUDE CONNECTORS TO ACCOMMODATE SUSPENSION SYSTEM LISTED BELOW. 7. ANY DEVIATION FROM A STRAIGHT RUN SHALL BE MADE USING A GORED ELBOW OR AN EFFICIENCY TEE. NORMAL 90 DEGREE ELBOWS ARE 5
- GORES AND THE RADIUS OF THE ELBOW IS 1.5 TIMES THE DIAMETER OF D. SUSPENDED H-TRACK: SYSTEM SHALL INCLUDE A SINGLE (1 ROW) OF ALUMINUM H-TRACK SYSTEM LOCATED 1.5" ABOVE TOP-DÈAD-CENTER LOCATION OF DUCT SYSTEM. HARDWARE TO INCLUDE 10' SECTIONS OF FRACK, SPLICE CONNECTORS, TRACK ENDCAPS AND VERTICAL CABLE SUPPORT KITS - CONSISTING OF A LENGTH OF CABLE WITH A LOCKING
- FRACK MUST BE INCLUDED FOR ALL RADIUS SECTIONS. FABRIC / TRACK ATTACHMENT a.TRACK TABS ARE A DETACHABLE TAB POSITIONED EVERY 24" ALONG THE LENGTH OF THE SYSTEM (ALL DIAMETERS).

STUD END AND GRIPPLE QUICK CABLE CONNECTORS. RADIUS ALUMINUM

8. SURFACE MOUNT: SYSTEM SHALL INCLUDE ALUMINUM FLUSH-MOUNT SYSTEM LOCATED FLUSH WITH THE TOP OF DUCT SYSTEM. WIDTH BETWEEN MOUNTING POINTS (OF THE TRACK TO THE CEILING) SHALL BE " WIDER THAN THE SPECIFIÈD DIAMETER OF THE D-SHAPE DUCTSOX. HARDWARE TO INCLUDE 12' SECTIONS OF TRACK, SPLICE CONNECTIONS AND END CAPS AS REQUIRED. SYSTEM ATTACHMENT SHALL BE MADE BY CORD SEWN INTO TOP SIDE FLAPS OF DUCT SYSTEM SUPPORTED ENTIRE

<u> PART 3 – INSTALLATION</u>

3.01 INSTALLATION OF FABRIC AIR DISPERSION SYSTEM: A. INSTALL SUSPENSION SYSTEM IN ACCORDANCE WITH THE REQUIREMENTS OF THE MANUFACTURER. INSTRUCTIONS FOR INSTALLATION SHALL BE PROVIDED BY THE MANUFACTURER WITH PRODUCT.

A. ALL INSULATION SHALL HAVE A FLAME SPREAD RATING OF 25 AND A

- SMOKE DEVELOPED RATING OF 50. B. ALL INSULATION SHALL BE INSTALLED IN A WORKMANLIKE MANNER BY QUALIFIED INSULATION MECHANICS. INSTALL ALL INSULATION IN STRICT ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS, USING APPROVED TYPE LAGGINGS, ADHESIVES, MASTICS, AND OTHER MATERIALS
- C. DUCT INSULATION INSULATE ALL SUPPLY, RETURN, EXISTING, AND OUTSIDE AIR DUCTS INSIDE OF BUILDING. FINISH WITH TAPE AND VAPOR BARRIER JACKET. CONTINUE INSULATION THROUGH WALLS, SLEEVES, HANGERS, AND OTHER DUCT PENETRATIONS. INSULATION SHALL BE 2 INCHES THICK FLEXIBLE OR RIGID FIBERGLASS INSULATION WITH FOIL/SCRIM/KRAFT VAPOR BARRIER AND MIN R-VALUE OF R-6.
- REFRIGERANT LINE INSULATION PROVIDE 1" THICK ARMAFLEX INSULATION ON 1-1/2" NOMINAL DIAMETER AND SMALLER PIPE. PROVIDE 1-1/2" ARMAFLEX INSULATION FOR PIPE SIZES LARGER THAN 1-1/2" NOMINAL DIAMETER. PROVIDE 1" THICK INSULATION FOR FITTINGS AS RECOMMENDED BY MANUFACTURER. SEAL ALL SEAMS AND JOINTS WITH ADHESIVE EQUAL
- INSULATE ALL CONDENSATE LINES WITH 3/4" ARMAFLEX AP FOAMED RUBBER PIPE INSULATION OR EQUAL PRODUCT BY RUBATEX, IMCOA, OR

MANVILLE. SEAL ALL SEAMS AND JOINTS WITH ADHESIVE EQUAL TO

INSULATION SHALL BE SECURED WITH BENJAMIN-FOSTER 85-20 ADHESIVE OR EQUAL. ALL JOINTS SHALL BE SEALED BY ADHERING A 2" SEALING LAP AT ALL JOINTS WITH BF 85-20 ADHESIVE OR EQUAL. INSULATION SHALL THEN BE FASTENED WITH 16 GAUGE COPPER WITH ON 12" CENTERS. ON RECTANGULAR DUCT, CORNER ANGLES SHALL BE USED UNDER TIE WIRES TO PREVENT CUTTING OF VAPOR BARRIER.

THIS SECTION INCLUDES DESIGN, REFRIGERANTS, CONTROLS, AND INSTALLATION REQUIREMENTS FOR INDOOR AIR HANDLING UNITS.

FIELD-INSTALLED WIRING.

PRODUCT DATA: PROVIDE LITERATURE THAT INDICATES DIMENSIONS, WEIGHTS, CAPACITIES, RATINGS, FAN PERFORMANCE, DATA OF FILTER MEDIA, AND ELECTRICAL CHARACTERISTICS AND CONNECTION REQUIREMENTS.

SHOP DRAWINGS: INDICATE ASSEMBLY, UNIT DIMENSIONS, CONSTRUCTION DETAILS, FIELD CONNECTION DETAILS, AND CONNECTION REQUIREMENTS COMPUTER GENERATED FAN CURVES FOR EACH AIR HANDLING UNIT SHALL BE SUBMITTED WITH SPECIFIC DESIGN OPERATING POINT NOTED. WIRING DIAGRAMS: DETAIL WIRING FOR POWER, SIGNAL, AND CONTROL SYSTEMS AND DIFFERENTIATE BETWEEN MANUFACTURER-INSTALLED AND

WARRANTIES: SPECIAL WARRANTIES SPECIFIED IN THIS SECTION. SAFETY AGENCY LISTED AND CERTIFICATION

FAN PERFORMANCE RATINGS SHALL CONFORM TO AMCA 210 PROCEDURES. DELIVERY AND HANDLING UNIT SHALL BE WRAPPED BY THE MANUFACTURER PRIOR TO SHIPMENT TO PREVENT DAMAGE DUE TO WEATHER AND ROAD DEBRIS DURING

PROTECTION OF THE COMPLETE UNIT FOR AVOIDANCE OF GENERAL RUSTING MUST BE HANDLED AS BEST SUITS THE CIRCUMSTANCES. STORE IN CLEAN DRY PLACE AND PROTECT FROM WEATHER AND CONSTRUCTION TRAFFIC. HANDLE CAREFULLY TO AVOID DAMAGE TO COMPONENTS, ENCLOSURES AND FINISH.

TRANSPORTATION AND THEREAFTER WHILE IN STORAGE AWAITING INSTALLATION.

THE REFRIGERATION EQUIPMENT MANUFACTURER'S WARRANTY SHALL BE FOR A PERIOD OF ONE YEAR FROM DATE OF EQUIPMENT START UP BUT NOT MORE THAN 18 MONTHS FROM DATE OF SHIPMENT. THE WARRANTY SHALL COVER MATERIAL AND WORKMANSHIP THAT PROVE DEFECTIVE WITHIN THE ABOVE PERIOD, EXCLUDING REFRIGERANT

<u>MAINTENANCE</u> MAINTENANCE OF THE UNIT SHALL BE RESPONSIBILITY OF THE OWNER AND PERFORMED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS. PART 2: PRODUCTS

<u>MANUFACTURERS</u> MANUFACTURERS: SUBJECT TO STRICT COMPLIANCE WITH THE REQUIREMENTS OF THIS SPECIFICATION, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING: INDOOR AIR HANDLERS:

UNIT DESCRIPTION:

AAON OR PRIOR APPROVED EQUAL

- FABRICATE AIR HANDLING UNITS SUITABLE FOR THE SCHEDULED CAPACITIES. UNITS SHALL BE ETL LISTED IN COMPLIANCE WITH UL/ANSI STANDARD 1995 FACTORY TEST AND BALANCE FAN DESIGN TO LIMIT VIBRATION AT OPERATING
- ALL INTERNAL COMPONENTS SPECIFIED IN THE AIR HANDLING UNIT SCHEDULE SHALL BE FACTORY FURNISHED AND INSTALLED. CONSTRUCTION
- UNIT STRUCTURAL MEMBERS SHALL BE MANUFACTURED OF G90 GALVANIZED SHEET METAL. JNITS SHALL BE SPECIFICALLY DESIGNED FOR INDOOR APPLICATION. THE INTERIOR AIR SIDE OF THE CABINET SHALL BE ENTIRELY INSULATED ON ALL EXTERIOR PANELS WITH 1/2" THICK, 1 1/2 LB. DENSITY FIBERGLASS
- ACCESS TO THE BLOWER, COILS, AND OTHER ITEMS NEEDING PERIODIC CHECKING OR MAINTENANCE SHALL BE THROUGH REMOVABLE ACCESS
- AIR SIDE SERVICE ACCESS PANELS SHALL BE FULLY GASKETED. VERTICAL POSITION MODELS SHALL HAVE A TOP VERTICAL DISCHARGE AIR PATTERN WHEN VIEWED FROM THE FRONT SIDE OF THE UNIT. MULTI-POSITION MODELS SHALL INCORPORATE A MULTI-POSITION CONDENSATE DRAIN PAN ALLOWING THE UNIT TO BE MADE VERTICAL WITH

TOP DISCHARGE AIR PATTERN OR HORIZONTAL WITH A STRAIGHT THROUGH

DISCHARGE AIR PATTERN WHEN VIEWED FROM THE FRONT SIDE OF THE

AIR HANDLERS SHALL HAVE A SLOPED CONDENSATE DRAIN PAN OF COMPOSITE CONSTRUCTION, WITH A CONNECTION PROVIDED ON EACH SIDE OF THE UNIT. THE MULTI—POSITION UNIT CONDENSATE DRAIN PAN SHALL BE ADJUSTABLE SO THAT HORIZONTAL AIR FLOW IS FROM RIGHT TO LEFT OR FROM LEFT TO RIGHT WHEN VIEWED FROM THE ACCESS PANEL SIDE OF

EVAPORATOR COIL

REFRIGERATION CIRCUIT:

- SUPPLY BLOWER SHALL BE DIRECT DRIVE FORWARD CURVED, DRIVEN BY AN ECM, ELECTRONICALLY COMMUTATED MOTOR.
- JNIT SHALL HAVE A SINGLE POINT POWER CONNECTION TERMINAL BLOCK FOR FIELD CONNECTION TO THE ELECTRICAL POWER SOURCE. ELECTRIC HEAT CIRCUITS SHALL REQUIRE ADDITIONAL POWER WIRING. EACH UNIT SHALL INCLUDE A 24 VOLT CONTROL CIRCUIT TRANSFORMER AND A FAN CONTACTOR FOR OPERATION OF THE BLOWER MOTOR.
- COIL SHALL BE FABRICATED OF SEAMLESS COPPER TUBES WITH ALUMINUM FINS MECHANICALLY BONDED TO THE TUBES. HEADERS ON THE COILS SHALL BE EXTRA HEAVY WALL SEAMLESS DRAWN COPPER TUBING WITH DIE FORMED END CLOSURES FOR ADDED STRENGTH. EVAPORATOR SHALL BE DESIGNED FOR USE WITH R-410A REFRIGERANT
- AND BE FURNISHED WITH AN EXTERNALLY EQUALIZED, THERMOSTATIC EXPANSION VALVE, FACTORY SUPPLIED, MOUNTED AND PIPED. FIELD CONNECTIONS SHALL BE MADE TO THE SUCTION AND LIQUID LINE CONNECTIONS FURNISHED BY THE MANUFACTURER AT THE SIDE OF THE UNIT. THE SENSING BULB FOR THE EXPANSION VALVE SHALL BE FIELD INSTALLED ON THE SUCTION LINE IMMEDIATELY OUTSIDE THE AIR HANDLER
- CIRCUIT SHALL OPERATE ON R-410A REFRIGERANT, LIQUID LINE FILTER DRYER SHALL BE SUPPLIED WITH MATCHING CONDENSER. THE FINISHED FIELD INSTALLED REFRIGERANT CIRCUIT FURNISHED BY THE CONTRACTOR SHALL INCLUDE THE LOW SIDE COOLING COMPONENTS, REFRIGERANT, THERMAL EXPANSION VALVE, LIQUID LINE, (INSULATED HOT GAS LINE), AND INSULATED SUCTION LINE.

CONSTRUCTION:

CONDENSER:

AREA OF THE COIL.

- UNIT SHALL DEHUMIDIFY USING A HOT GAS REHEAT COIL, MODULATING HOT GAS REHEAT CONTROL VALVES PIPED TO THE REFRIGERANT SYSTEM AND AN ELECTRONIC CONTROLLER. A FACTORY-WIRED, FIELD INSTALLED, SUPPLY AIR TEMPERATURE SENSOR AND A FIELD-INSTALLED HUMIDISTAT OR THERMOSTAT WITH HUMIDISTAT SHALL CONTROL THE DEHUMIDIFICATION. HE SUPPLY AIR TEMPERATURE SETPOINT SHALL BE ADJUSTABLE ON THE ELECTRONIC CONTROLLER WITHIN THE CONTROLS COMPARTMENT.
- THE UNIT SHALL BE FURNISHED WITH 1" FIBERGLASS PANEL FILTERS. FILTER SHALL BE REMOVABLE FROM THE SIDE OF THE CABINET.
- 1. WIRING DIAGRAMS SHALL BE IN COLOR AND MARKED TO MATCH THE COLOR AND MARKINGS OF THE WIRES. 2.INSTALLATION, OPERATION, AND MAINTENANCE MANUAL SHALL BE SUPPLIED WITH EACH UNIT WITHIN THE CONTROL COMPARTMENT.
- UNIT DESCRIPTION: PROVIDE AND INSTALL AS SHOWN ON THE PLANS. FACTORY ASSEMBLED, AIR-COOLED SCROLL COMPRESSOR CONDENSING UNITS IN THE QUANTITY SPECIFIED. EACH UNIT SHALL CONSIST OF AN AIR-COOLED CONDENSER SECTION WITH HERMETIC SCROLL COMPRESSOR AND ISOLATED CONTROL COMPARTMENT CONTAINING: CONTROL SYSTEM, SUCTION AND LIQUID CONNECTION VALVES, AND ALL COMPONENTS NECESSARY FOR SAFE AND CONTROLLED UNIT OPERATION WHEN CONNECTED TO THE SPECIFIED LOW SIDE EQUIPMENT.
- UNIT SHALL BE COMPLETELY FACTORY ASSEMBLED, PIPED, AND WIRED AND UNIT SHALL BE SPECIFICALLY DESIGNED FOR OUTDOOR APPLICATION. PAINT FINISH SHALL BE CAPABLE OF WITHSTANDING AT LEAST 1000 HOURS, WITH NO VISIBLE CORROSIVE EFFECTS, WHEN TESTED IN A SALT SPRAY AND FOG ATMOSPHERE IN ACCORDANCE WITH ASTM B 117-95 TEST PROCEDURE. THE CONDENSER COIL SHALL BE MECHANICALLY PROTECTED FROM PHYSICAL

DAMAGE BY PAINTED GALVANIZED STEEL LOUVERS COVERING THE FULL

- DESIGN REQUIREMENTS GENERAL: PROVIDE A COMPLETE SCROLL COMPRESSOR CONDENSING UNIT AS SPECIFIED HEREIN AND AS SHOWN ON THE DRAWINGS.
- REFER TO THE SCHEDULE OF PERFORMANCE ON THE UNIT RATING PAGE. THE UNIT SHALL BE CAPABLE OF STABLE COOLING OPERATION TO A MINIMUM OF 10°F OUTDOOR TEMPERATURE. CONDENSING UNIT FEATURES
- THE COMPRESSOR SHALL BE TWO STEP, SINGLE CIRCUITED, SEALED HERMETIC SCROLL TYPE, WITH INHERENT THERMAL OVERLOAD PROTECTION AND SHALL BE MOUNTED ON RUBBER VIBRATION ISOLATORS. EACH COMPRESSOR SHALL BE FURNISHED WITH A CRANKCASE HEATER.
- THE CONDENSER COIL SHALL CONSIST OF SEAMLESS COPPER TUBES MECHANICALLY BONDED INTO PLATE TYPE ALUMINUM FINS. THE FINS SHALL HAVE FULL DRAWN COLLARS TO COMPLETELY COVER THE TUBES. A SUBCOOLING SECTION SHALL BE AN INTEGRAL PART OF THE MAIN CONDENSER COIL. THE CONDENSER FAN SHALL BE PROPELLER TYPE ARRANGED FOR VERTICAL

AIR DISCHARGE. AND DRIVEN BY A DIRECT DRIVE FAN MOTOR. THE FAN

- DISCHARGE AREA SHALL BE EQUIPPED WITH A HEAVY-GAUGE FAN GUARD. FAN MOTOR SHALL BE WEATHER PROTECTED, SINGLE PHASE, DIRECT DRIVE, ECM 2.3 MOTOR. REFRIGERANT CIRCUIT: THE CONDENSING UNIT SHALL OPERATE WITH R-410A REFRIGERANT. THE
- CONDENSING UNIT SHALL BE FURNISHED WITH A LIQUID LINE FILTER DRIER AND SERVICE VALVES FOR LIQUID AND SUCTION CONNECTIONS. THE FINISHED FIELD INSTALLED REFRIGERANT CIRCUIT FURNISHED BY THE CONTRACTOR SHALL INCLUDE THE LOW SIDE COOLING COMPONENTS, REFRIGERANT, THERMAL EXPANSION VALVE, LIQUID LINE, (INSULATED HOT GAS BYPASS LINE) (INSULATED HOT GAS LINE), AND INSULATED SUCTION
- EXTERNAL HOT GAS BYPASS SHALL BE PROVIDED ON THE REFRIGERANT CONDENSING UNIT SHALL BE PROVIDED WITH ADJUSTABLE CONDENSER HEAD PRESSURE CONTROL TO ALLOW COOLING OPERATION DOWN TO 35°F. UNIT SHALL DEHUMIDIFY USING MODULATING HOT GAS REHEAT CONTROL VALVES, AN ELECTRONIC CONTROLLER, AND A MATCHING AIR HANDLER THAT INCLUDES A HOT GAS REHEAT COIL. FIELD INSTALLED LIQUID LINE RECEIVER TANK SHALL BE FACTORY PROVIDED.
- 1.A CENTRALLY LOCATED WEATHERPROOF CONTROL PANEL SHALL BE ISOLATED FROM CONDENSER COIL AIRFLOW, AND SHALL CONTAIN THE FIELD POWER CONNECTION POINTS, CONTROL TERMINAL BLOCK AND
- CONTROL SYSTEM. 2.POWER AND STARTING COMPONENTS SHALL INCLUDE FAN MOTOR CONTACTORS, 5 MINUTE OFF TIME DELAY RELAYS FOR THE COMPRESSOR, INHERENT FAN MOTOR OVERLOAD PROTECTION AND UNIT POWER TERMINAL BLOCKS FOR CONNECTION TO REMOTE DISCONNECT SWITCH. SAFETY AND OPERATING CONTROLS SHALL INCLUDE A MANUALLY RESET HIGH PRESSURE SWITCH AND AN AUTOMATIC RESET LOW PRESSURE SWITCH. BARRIER PANELS SHALL BE FURNISHED TO PROTECT AGAINST ACCIDENTAL CONTACT WITH LINE VOLTAGE WHEN ACCESSING THE CONTROL SYSTEM. CONTROL CIRCUIT TRANSFORMER AND WIRING SHALL PROVIDE 24\

CONTROL VOLTAGE FROM THE LINE VOLTAGE PROVIDED TO THE UNIT.

- 1.COLOR-CODED AND MARKED WIRING DIAGRAMS SHALL BE PROVIDED TO MATCH THE COLOR AND MARKINGS OF THE UNIT WIRING. 2.DIAGRAMS SHALL BE LAMINATED IN PLASTIC AND PERMANENTLY FIXED TO THE CONTROL COMPARTMENT DOOR.
- 3.INSTALLATION, OPERATION, AND MAINTENANCE MANUAL SHALL BE SUPPLIED WITH UNIT WITHIN THE CONTROL COMPARTMENT. PART 3 - EXECUTION
- INSTALL IN STRICT ACCORDANCE WITH MANUFACTURER'S REQUIREMENTS, SHOP DRAWINGS, AND CONTRACT DOCUMENTS.
- ADJUST AND LEVEL UNIT ON SUPPORTS. INSTALL REFRIGERANT PIPING IN ACCORDANCE WITH DRAWINGS. EVACUATE THE SYSTEM AND CHARGE WITH REFRIGERANT IN ACCORDANCE WITH STANDARD PRACTICE.
- COORDINATE ELECTRICAL INSTALLATION WITH ELECTRICAL CONTRACTOR. COORDINATE CONTROLS WITH CONTROL CONTRACTOR. PROVIDE ALL APPURTENANCES REQUIRED TO INSURE A FULLY OPERATION AND
- DO NOT OPERATE UNITS FOR ANY PURPOSE, TEMPORARY OR PERMANEN' UNTIL DUCTWORK IS CLEAN, FILTERS ARE IN PLACE, BEARINGS LUBRICATED, AND FAN HAS BEEN TEST RUN UNDER OBSERVATION. MANUFACTURER'S START-UP REQUIREMENTS MUST BE COMPLIED WITH TO
- <u>STARTUP:</u> CHECK AND ASSURE PROPER SYSTEM CHARGE OF REFRIGERANT AND OIL. PROVIDED TESTING, AND STARTING OF SYSTEM, AND INSTRUCT THE OWNER IN ITS PROPER OPERATION AND MAINTENANCE.

ALL COMPRESSORS SHALL BE PROVIDED WITH THE FOLLOWING MINIMUM

A. OVERCURRENT B. OVERTEMPERATURE . SHORT CYCLE WITH LOCK-OUT LIGHT ON ROOM THERMOSTAT). HIGH PRESSURE RELIEF E. LOW PRESSURE RELIEF

F. LIQUID SLUGGING (SUCTION LINE ACCUMULATOR)

G. LOSS OF CHARGE

COMPRESSORS SHALL HAVE STANDARD 5 YEAR WARRANTY.

CONDENSER COIL SHALL HAVE ALUMINUM PLATE FINS MECHANICALLY BONDED TO COPPER TUBES, CLEANED, DEHYDRATED, LEAK TESTED AT 150 PSIG AND PRESSURE TESTED AT 450 PSIG. PROVIDE COIL GUARDS. OUTDOOR FANS SHALL BE OF THE DIRECT DRIVEN PROPELLER TYPE WITH STEEL WIRE SAFETY GUARDS AND SHALL BE BALANCED STATISTICALLY AND

OUTDOOR FAN MOTORS SHALL HAVE INHERENT OVERCURRENT AND OVERTEMPERATURE PROTECTION. REFRIGERANT PIPING SHALL BE SIZED AND INSTALLED PER THE MANUFACTURER'S RECOMMENDATIONS. PROVIDE FILTER DRYER, SIGHT GLASS, AND ANY RECOMMENDED REFRIGERATION SPECIALTIES. STARTUP SHOULD BE

PERFORMED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.

DESSICANT DEHUMIDIFICATION UNIT:

SCOPE OF WORK CONTRACTOR SHALL FURNISH, INSTALL AND PLACE IN OPERATION, ACCEPTABLE TO THE ENGINEER, ALL DEHUMIDIFIER UNITS WITH FLEXIBLE CONNECTORS, FILTERS, VOLUME DAMPERS, CONTROL PANEL, AND ALL NECESSARY CONTROLS FOR PROPER OPERATION OF THE SYSTEM, AS SHOWN ON CONTRACT DRAWINGS AND AS SPECIFIED HEREIN. THE DEHUMIDIFIER UNIT SHALL BE ARRANGED TO PROVIDE CONTINUOUS DEHUMIDIFICATION WITH CONSTANT OUTLET TEMPERATURE AND HUMIDITY FOR A GIVEN INLET CONDITION. THE UNIT SHALL BE A TWO COMPARTMENT TYPE USING DESICCANT MEDIA WITH PROCESS AND REGENERATIVE SECTIONS.

BRY-AIR, INC., DESERT-AIR, OR APPROVED EQUAL

UNIT SHALL BE CAPABLE OF SUSTAINED OPERATION OF EITHER PROCESS OR REACT FAN WITHOUT ENERGIZED REACTIVATION HEAT FOR PROLONGED PERIODS OF OPERATION WITHOUT DAMAGE TO THE HUMIDITY TRANSFER MEDIA. THE DEHUMIDIFIER SHALL BE A FULLY AUTOMATIC FACTORY ASSEMBLED PACKAGE UNIT COMPLETE WITH REACTIVATION HEATERS. FILTERS. MOTORS. FANS, DESICCANT ROTOR AND ROTOR DRIVE ASSEMBLY, ACCESS PANELS, VOLUME DAMPERS, AUTOMATIC ELECTRICAL PANEL, AND ALL COMPONENT AUXILIARIES AS RECOMMENDED BY THE MANUFACTURER FOR SAFE, UNATTENDED AUTOMATIC OPERATION. UNIT CASING SHALL BE CONSTRUCTED OF 18 GAUGE STEEL TO ENSURE AIR AND VAPOR TIGHT CONSTRUCTION. AIR PLENUMS AND DUCTS SHALL BE CONSTRUCTED OF 18 GAUGE STEEL. EASY_TO_REMOVE ACCESS PANELS WITH VAPOR PROOF GASKETING SHALL ALLOW FOR SIMPLE SERVICE AND INSPECTION. THE UNIT SHALL HAVE A HIGH GRADE INDUSTRIAL POWDER COATED FINISH FOR CORROSION PROTECTION. UNIT SHALL NOT REQUIRE FIELD PIPING, PNEUMATICS, OR FIELD ERECTION OF FANS UNLESS SPECIFICALLY REQUESTED BY THE ENGINEER. FIELD CONNECTION OF THE UTILITIES SHALL BE PERFORMED BY THE INSTALLATION CONTRACTOR. THE DEHUMIDIFIER DESICCANT SHALL CONSIST OF HIGH EFFICIENCY DESICCANT MEDIA. THE MEDIA SHALL BE ADSORBENT, NON-TOXIC, NON-CORROSIVE AND NON-FLAMMABLE. THE PROCESS AND REACTIVATION SECTIONS SHALL BE DIVIDED BY SEALS

DESIGNED FOR LONG LIFE. HIGH QUALITY PTFE PROTECTED SILICONE RUBBER WIPER SEALS SHALL BE UTILIZED TO SEAL AIRSTREAMS . SEALS SHALL BE ADJUSTABLE AND REMOVABLE AND ACCESS SHALL BE PROVIDED TO FACILITATE STARTING AND STOPPING OF THE UNIT SHALL BE ACCOMPLISHED BY A WALL MOUNTED HUMIDISTAT FURNISHED BY THE DEHUMIDIFIER MANUFACTURER WITH PROVISIONS MADE FOR ITS CONNECTION ON THE TERMINAL STRIP OF THE CONTROL PANEL REACTIVATION HEAT FOR THE DEHUMIDIFIER SHALL BE SUPPLIED BY

ALL AIR ENTERING THE DEHUMIDIFIER MUST BE FILTERED. UNLESS OTHERWISE SPECIFIED, FILTERS SHALL BE CLEANABLE WITH MINIMUM 30% EFFICIENCY AND OF A SIZE AND CAPACITY AS RECOMMENDED FOR AIR VOLUMES SHOWN. FILTERS SHALL BE INSTALLED FOR REMOVAL FROM THE SIDE OF THE HOUSING.

ELECTRICITY, AND INSTALLED WITH FILTERS.

DAMPERS SHALL BE FACTORY INSTALLED AT THE OUTLETS OF BOTH PROCESS. AND REACTIVATION AIR FANS. THE DAMPER SHAFT EXPOSED AT THE QUADRAN SHALL BE CLEARLY MARKED TO INDICATE POSITION OF DAMPER BLADES.

ELECTRICAL CHARACTERISTICS OF ALL DEHUMIDIFIERS SHALL BE AS SHOWN IN THE SCHEDULE ON THE CONTRACT DRAWINGS. CONTROL PANEL SHALL BE FACTORY MOUNTED AND PREWIRED FOR THE SYSTEM OPERATION AND SHALL BE SUPPLIED WITH ALL NECESSARY COMPONENTS TO INSURE CONTINUOUS AUTOMATIC OPERATION. A FACTORY MOUNTED AND WIRED TERMINAL STRIP SHALL BE SUPPLIED WITHIN THE CONTROL PANEL. THE DEHUMIDIFIER SHALL BE EQUIPPED WITH CIRCUIT BREAKERS FOR CIRCUIT

ADDITIONAL STANDARD FEATURES SHALL INCLUDE REACTIVATION OVERHEAT

SWITCH. THE DEHUMIDIFIER SHALL BE EQUIPPED WITH PANEL INDICATOR LAMPS

SHUT-DOWN CIRCUIT IN THE EVENT OF THE ROTOR FAILING TO TURN. MANUAL

FOR POWER, RUN, AND FAULT CONDITIONS, AND SHALL HAVE AN AUTOMATIC

THERMOSTAT, COOL-DOWN THERMOSTAT, AND REACTIVATION AIR PROVING

- HAND_OFF_AUTO SWITCH SHALL BE PROVIDED ON DEHUMIDIFIER PANEL. THE DEHUMIDIFIER SHALL BE ABLE TO OPERATE THE PROCESS FAN CONSTANTLY WITH THE SIMPLE ADDITION OF A JUMPER ON THE TERMINAL STRIP. .WALL MOUNTED HUMIDISTAT - TO SENSE THE AIR CONDITIONS AND CYCLE HE DEHUMIDIFIER ON AND OFF IN RESPONSE TO THE DEHUMIDIFICATION
- 2.WALL MOUNTED THERMOSTAT TO SENSE SPACE TEMPERATURE UPON FAILURE OF COOLING AND SHALL SHUT DOWN DEHUMIDIFIER IF TEMPERATURE EXCEEDS 90° F (SETABLE) 1. PROVIDE ALL CONTROLS NECESSARY TO ALERT UNIVERSITY PERSONNEL UPON ANY ALARMS FROM THE AIR HANDLER, CONDENSING UNIT OR
- DEHUMIDIFICATION UNIT. 2. THE CONTROLLER SHALL NOTIFY PERSONNEL VIA EXISTING COMMUNICATIONS INSTALLED IN PREVIOUS COLD ROOM PROJECT. 3. THE CONTROLLER SHALL BE CAPABLE OF CALLING MULTIPLE PERSONNEL WHEN IN ALARM.
- 4. THE CONTROLLER SHALL MONITOR THE FOLLOWING AS A MINIMUM: 4.A. HIGH SPACE TEMPERATURE 4.B. HIGH SPACE HUMIDITY 4.C. LOW SPACE TEMPERATURE
- 4.D. LOW SPACE HUMIDITY 4.E. COMPRESSOR FAILURE FAN FAILURE 4.G. OVERCURRENT
- 4.H. ANY ADDITIONAL AVAILABLE ALARMS TESTING, ADJUSTING AND BALANCING A. EXTENT OF TESTING, ADJUSTING AND BALANCING WORK REQUIRED BY THIS SECTION IS INDICATED ON DRAWINGS AND SCHEDULES, AND BY REQUIREMENTS OF THIS SECTION: AND IS DEFINED TO INCLUDE. BUT IS NOT NECESSARILY LIMITED TO, AIR DISTRIBUTION SYSTEMS AND ASSOCIATED EQUIPMENT AND APPARATUS OF MECHANICAL WORK. THE WORK CONSISTS OF SETTING SPEED AND VOLUME (FLOW) ADJUSTING FACILITIES PROVIDED FOR SYSTEMS, RECORDING

COMPONENT TYPES OF TESTING, ADJUSTING, AND BALANCING SPECIFIED IN

DATA, CONDUCTING TESTS, PREPARING AND SUBMITTING REPORTS.

THIS SECTION INCLUDES THE FOLLOWING AS APPLIED TO MECHANICAL AIR CONDITIONING UNITS

DUCTWORK SYSTEMS C. TESTER'S QUALIFICATIONS: FIRM CERTIFIED BY NATIONAL ENVIRONMENTAL BALANCING BUREAU (NEBB) OR AABC IN THOSE TESTING AND BALANCING DISCIPLINES SIMILAR TO THOSE REQUIRED FOR THIS PROJECT, WHO IS NOT

INSTALLER OF SYSTEM TO BE TESTED AND IS OTHERWISE INDEPENDENT OF

D. TEST AND BALANCE ALL AFFECTED AIRFLOWS TO PLUS OR MINUS (±) 10

PERCENT, AND PROVIDE REPORT TO OWNER AND ARCHITECT/ENGINEER FOR INDUSTRY STANDARDS: COMPLY WITH ASHRAE RECOMMENDATIONS PERTAINING TO MEASUREMENTS, INSTRUMENTS, AND TESTING, ADJUSTING AND BALANCING, EXCEPT AS OTHERWISE INDICATED. SUBMIT CERTIFIED TEST REPORTS, SIGNED BY TEST AND BALANCE SUPERVISOR WHO PERFORMED TAB WORK. G. INCLUDE IDENTIFICATION AND TYPES OF INSTRUMENTS USED, AND THEIR MOST RECENT CALIBRATION DATE WITH SUBMISSION OF FINAL TEST REPORT. H. MAINTENANCE DATA: INCLUDE IN MAINTENANCE MANUALS, COPIES OF CERTIFIED TEST REPORTS, AND IDENTIFICATION OF INSTRUMENTS. I. DO NO PROCEED WITH TESTING, ADJUSTING, AND BALANCING WORK UNTIL WORK HAS BEEN COMPLETED AND IS OPERABLE. ENSURE THAT THERE IS NO LATENT RESIDUAL WORK STILL TO BE COMPLETED. J. DO NOT PROCEED UNTIL WORK SCHEDULED FOR TESTING, ADJUSTING, AND BALANCING IS CLEAN AND FREE FROM DEBRIS, DIRT, AND DISCARDED BUILDING

K. EXCEPT AS OTHERWISE INDICATED, USE SAME PRODUCTS AS USED BY

INCLUDING ACCESS FOR TEST INSTRUMENTS, ATTACHING JIGS, AND SIMILAR

HOUSINGS WHICH HAVE BEEN CUT OR DRILLED FOR TEST PURPOSES,

ORIGINAL INSTALLER FOR PATCHING HOLES IN INSULATION, DUCTWORK AND

L. AT TESTER'S OPTION, PLASTIC PLUGS WITH RETAINERS MAY BE USED TO PATCH DRILLED HOLES M. UTILIZE TEST INSTRUMENTS AND EQUIPMENT FOR TAB WORK REQUIRED, OF TYPE, PRECISION,

BALANCING OF ENVIRONMENTAL SYSTEMS. N. EXAMINE INSTALLED WORK AND CONDITIONS UNDER WHICH TESTING IS TO BE DONE TO ENSURE THAT WORK HAS BEEN COMPLETED. CLEANED. AND IS OPERABLE. DO NOT PROCEED WITH TAB WORK UNTIL UNSATISFACTORY CONDITIONS HAVE BEEN CORRECTED IN MANNER ACCEPTABLE TO

O. TEST, ADJUST, AND BALANCE ENVIRONMENTAL SYSTEMS AND COMPONENTS, AS INDICATED, IN ACCORDANCE WITH PROCEDURES OUTLINED IN APPLICABLE STANDARDS. P. TEST, ADJUST AND BALANCE SYSTEM DURING SUMMER SEASON FOR AIR CONDITIONING SYSTEMS

AND DURING WINTER SEASON FOR HEATING SYSTEMS. Q. PREPARE FIVE (5) REPORTS OF TEST RESULTS, INCLUDING INSTRUMENTATION CALIBRATION REPORTS, IN FORMAT RECOMMENDED BY APPLICABLE STANDARDS.

. PATCH HOLES IN INSULATION, DUCTWORK, AND HOUSING, WHICH HAVE BEEN CUT OR DRILLED

MARK EQUIPMENT SETTINGS. INCLUDING DAMPER CONTROL POSITIONS. VALVE INDICATORS. FAN SPEED CONTROL LEVERS, AND SIMILAR CONTROLS AND DEVICES, TO SHOW FINAL SETTINGS AT COMPLETION OF TAB WORK. PROVIDE MARKINGS WITH PAINT OR OTHER SUITABLE PERMANENT IDENTIFICATION MATERIALS. F. RETEST, ADJUST AND BALANCE SYSTEMS SUBSEQUENT TO SIGNIFICANT SYSTEM MODIFICATIONS,

FOR TEST PURPOSES, IN MANNER RECOMMENDED BY ORIGINAL INSTALLER.

AND RESUBMIT TEST RESULTS.

of the shelving units.

- SEQUENCE OF OPERATION START SPLIT SYSTEM AIR HANDLER AND CONDENSING UNIT UPON VERIFICATION OF SPLIT SYSTEM OPERATION, ALLOW DEHUMIDIFICATION UNIT TO START
- SPLIT SYSTEM SHALL RUN CONTINUOUSLY. SPLIT SYSTEM CONDENSING UNIT SHALL CYCLE TO MAINTAIN TEMPERATURE SETPOINT. (ADJUSTABLE) DEHUMIDIFICATION UNIT SHALL CYCLE TO MAINTAIN ROOM HUMIDITY SETPOINT (ADJUSTABLE)
- UPON FAILURE OF ANY EQUIPMENT, SOUND AN AUDIBLE ALARM IN SPACE. UPON LOSS OF SETPOINT TEMPERATURE GREATER THAN 10°F, SOUND ALARM (MUTABLE) H. UPON LOSS OF SETPOINT HUMIDITY $\pm -5\%$ (SETABLE), SOUND ALARM (MUTABLE) NOTIFY REMOTE OPERATOR VIA TEXT OR E-MAIL UPON FAILURE OR SETPOINT ALARM OF ANY

ALL WORK SHALL BE DONE DURING NORMAL BUSINESS HOURS AND SHALL

BE COORDINATED TO ALLOW USC STAFF TO BE PRESENT AT ALL TIMES.

J. IF TEMPERATURE IN COLD ROOM RISES TO 90°F (SETABLE) SHUT DOWN DEHUMIDIFIER

ALTERNATE #1 DESCRIPTION

- 1. INCLUDES THE DEMOLITION OF THE EXISTING SHELVING UNITS AS INDICATED ON THE DEMOLITION PLAN 1/A2.1.
- 2. INSTALLATION OF NEW STEEL POST FRAMING, GUARDRAIL POSTS AND CABLE INTERMEDIATE RAILS, BOLTS ETC.
- . INCLUDES THE MODIFICATION OF THE EXISTING SHELVING SYSTEM TO ALLOW THE EXISTING WALKWAY TO REMAIN, ANY TEMPORARY SUPPORT DURING DEMOLITION AND MODIFICATION ACTIVITIES AND ANY ALL NECESSARY MATERIAL ACCOMPLISH THE TASK OF LEAVING THE

4. ANY AND ALL ELECTRICAL AND MECHANICAL MODIFICATIONS ASSOCIATED WITH THE REMOVAL

AND CAPACITY AS RECOMMENDED IN NEBB'S PROCEDURAL STANDARDS FOR TESTING, ADJUSTING, AND

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consultants



ASSOCIATES, INC.

Architects/Engineers/Planners

1201 Main Street, Suite 2100

ARCHITECT WILL BE SUBJECT TO LEGAL ACTION.

Columbia, S.C. 29201

tel. 803-256-0000

fax 803-255-7243

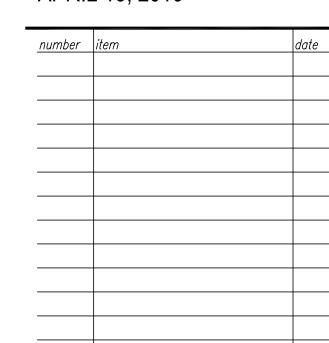
MIRC Film Vault Installation

state project number H27-Z269 GMK project number

15030.01

CONSTRUCTION DOCUMENTS

APRIL 13, 2016



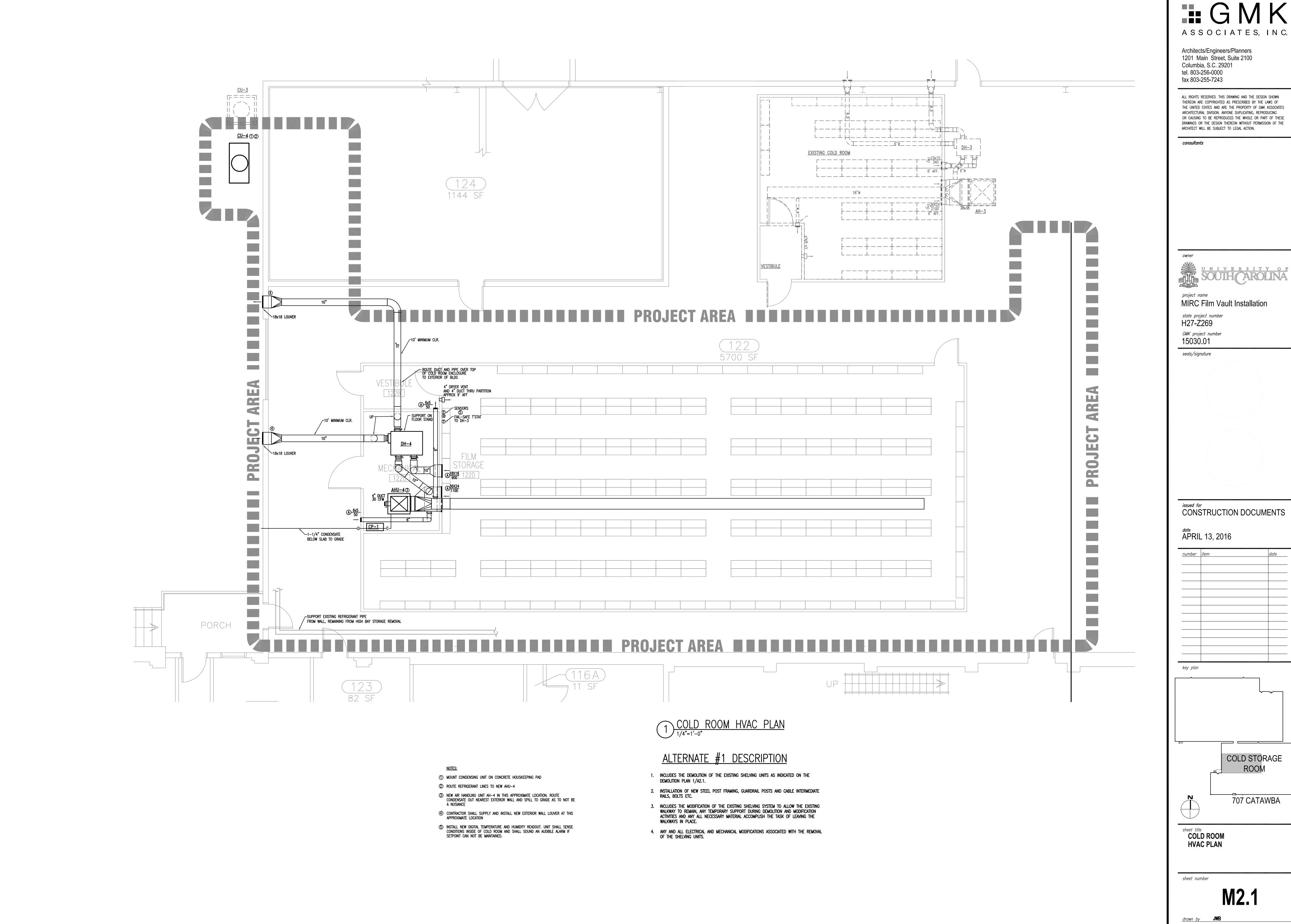
COLD STORAGE

HVAC SPECIFICATIONS

sheet number

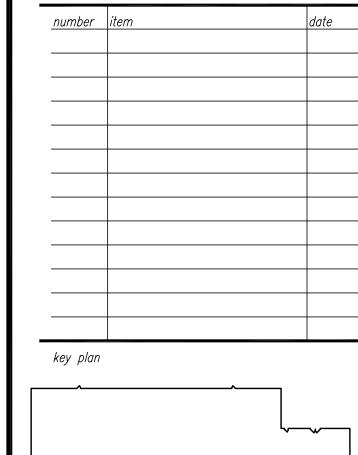
707 CATAWBA

<u>drawn by</u> **JWE** checked by XXX



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COLD STORAGE 707 CATAWBA

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MECHANICAL GENERAL NOTES

- DO NOT SCALE DRAWINGS; CONTRACTOR SHALL FIELD VERIFY BEFORE BIDDING. EXTEND ALL DRAIN LINES TO NEAREST FLOOR DRAIN OR
- AS INDICATED. ROUTE TO AVOID INTERFERENCE WITH PASSAGEWAYS. CONDENSATE DRAINS SHALL BE TRAPPED. SLOPE DRAIN LINES 1/8" PER FOOT.
- ALL PIPING AND DUCTWORK INSULATION SHALL BE RUN CONTINUOUSLY THROUGH FLOORS, ROOFS AND PARTITIONS EXCEPT WHERE PROHIBITED BY FIRE CODES.

4. LOCATE ALL THERMOSTATS, HUMIDISTATS AND SWITCHES

- 4'-0" ABOVE FINISH FLOOR; ALIGN WITH LIGHT SWITCHES. 5. ALL PIPING SHALL BE SUPPORTED IN ACCORDANCE WITH THE SPECIFICATIONS AND FURTHER SUPPORTS OR HANGERS SHALL BE ADJACENT TO ELBOWS, TO PREVENT WEIGHT OF PIPING BEING PLACED ON THE EQUIPMENT. SUPPORT DETAILS SHALL BE SUBMITTED TO THE
- MECHANICAL ENGINEER. 6. ALL PIPING AND DUCTWORK LOCATIONS SHALL BE COORDINATED WITH THE WORK UNDER OTHER DIVISIONS OF
- THE SPECIFICATIONS TO AVOID INTERFERENCE. CORRECT SETTINGS ON ALL BALANCING FITTINGS SHALL BE PERMANENTLY MARKED.
- 8. AIR DISTRIBUTION SYSTEMS WITH MORE THAN ONE BRANCH, OR MULTIPLE OUTLETS ON A BRANCH, SHALL HAVE VOLUME DAMPERS TO BALANCE AIR FLOWS. SPIN-IN FITTINGS ARE PERMITTED FOR CONNECTING FLEX DUCT TO BRANCH OR TRUNK DUCTS WHERE FLEX DUCTS ARE INDICATED. IF FLEX DUCT CANNOT BE CONNECTED WITH A SPIN-IN, A HARD DUCTED TAKEOFF MUST BE PROVIDED.
- 9. ALL PIPING, DUCTS, VENTS, ETC. EXTENDING THRU EXTERIOR WALLS AND ROOFS SHALL BE FLASHED AND COUNTERFLASHED.
- PROVIDE ALL TRANSITIONS REQUIRED FOR INSTALLATION OF DUCT, AIR VOLUME CONTROLLERS, AIR HANDLING UNITS, AND ALL OTHER EQUIPMENT AND APPURTENANCES.
- 11. BLANK-OFF ALL UNUSED PORTIONS OF LOUVERS (WHICH HAVE MECHANICAL DUCT CONNECTIONS) WITH 20 GAGE GALVANIZED SHEET METAL.
- 12. ALL DUCT IS GALVANIZED SHEET METAL EXCEPT AS NOTED. 13. DUCT SIZES ARE CLEAR INSIDE DIMENSIONS.
- 14. INTAKES FOR AIR HANDLING EQUIPMENT SHALL BE A MINIMUM OF TEN FEET AWAY FROM ANY EXHAUST OR
- 15. AIR DISTRIBUTION UNITS SHALL HAVE TRIM REQUIRED FOR FINISHED SERVICE.
- 16. COORDINATE ORIENTATION OF SUPPLY AND RETURN PIPING BEFORE FABRICATION. 17. PROVIDE DIELECTRIC FITTINGS AT ALL LOCATIONS WHERE DISSIMILAR METALS ARE JOINED IN PIPING AND DUCT

										SP	LIT S	SYST	ГЕМ	HE	AT :	PUI	MP SCH	IEDULE												
INDOOR UNIT (AIR HANDLER)								OUTDOOR UNIT (HEAT PUMP)						COOLING					HEATING											
T40	CAPACITY CFM	MINIMUM O.A.	RPM	MOTOR	EXTERNAL S.P.	ELECTRIC HEAT	ELECTRICAL	ELECTRICAL	MANUFACTURER MODEL	TAO	FANS		COMPRESSOR			ELECTRICAL	MANUSACTURER	MODEL	OUTDOOR	TOTAL	SENSIBLE	ENT.	ENT. AIR LVG. A		CEED	OUTDOOR	HEAT PUMP	000	DEMARKS	
IAG				HP	(IN. W.G.)	KW	FLA	VOLTS/PHASE		MODEL	IAG	HP	NO.	RLA	NO.	FLA	VOLTS/PHASE	TS/PHASE MANUFACTURER MC	MODEL	DB (°F)	(MBH)	(MBH)	DB	WB	DB WE	SEER	DB (*F)	(MBH)	COP	REMARKS
AH-4	2000	50	1044	1	1.0		5.2	208/3	AAON	V3-BRB-8-0-141D-000	CU-4	.33	1	16.9	1	20	208/3	AAON	CF-005	95	43	43	62	43	44 34	14.4				1
1. R410A	REFRIGERANT	•																												

ALTERNATE #1 DESCRIPTION

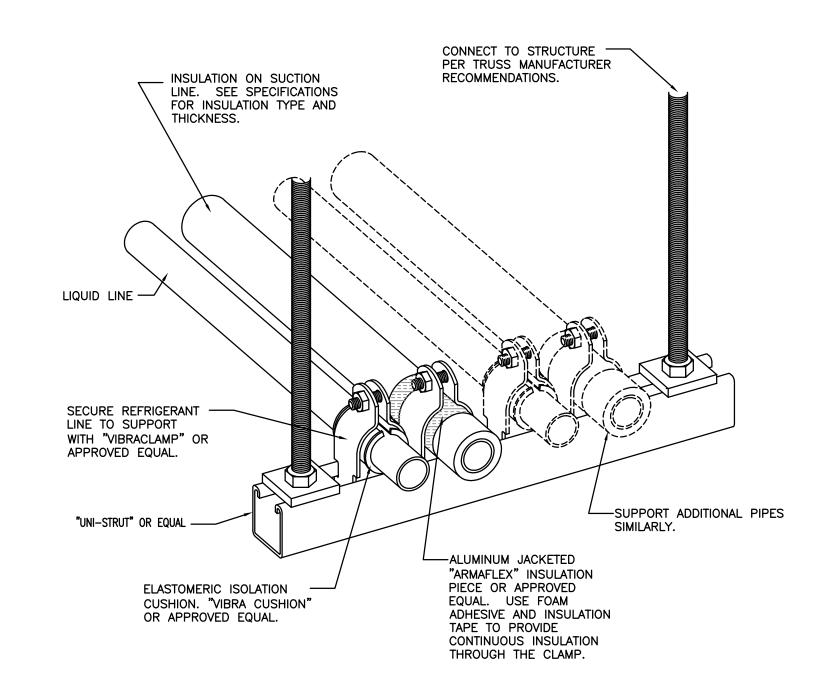
- INCLUDES THE DEMOLITION OF THE EXISTING SHELVING UNITS AS INDICATED ON THE DEMOLITION PLAN 1/A2.1.
- INSTALLATION OF NEW STEEL POST FRAMING, GUARDRAIL POSTS AND CABLE INTERMEDIATE RAILS, BOLTS ETC.
- INCLUDES THE MODIFICATION OF THE EXISTING SHELVING SYSTEM TO ALLOW THE EXISTING WALKWAY TO REMAIN, ANY TEMPORARY SUPPORT DURING DEMOLITION AND MODIFICATION ACTIVITIES AND ANY ALL NECESSARY MATERIAL ACCOMPLISH THE TASK OF LEAVING THE WALKWAYS IN PLACE.
- 4. ANY AND ALL ELECTRICAL AND MECHANICAL MODIFICATIONS ASSOCIATED WITH THE REMOVAL OF THE SHELVING UNITS.

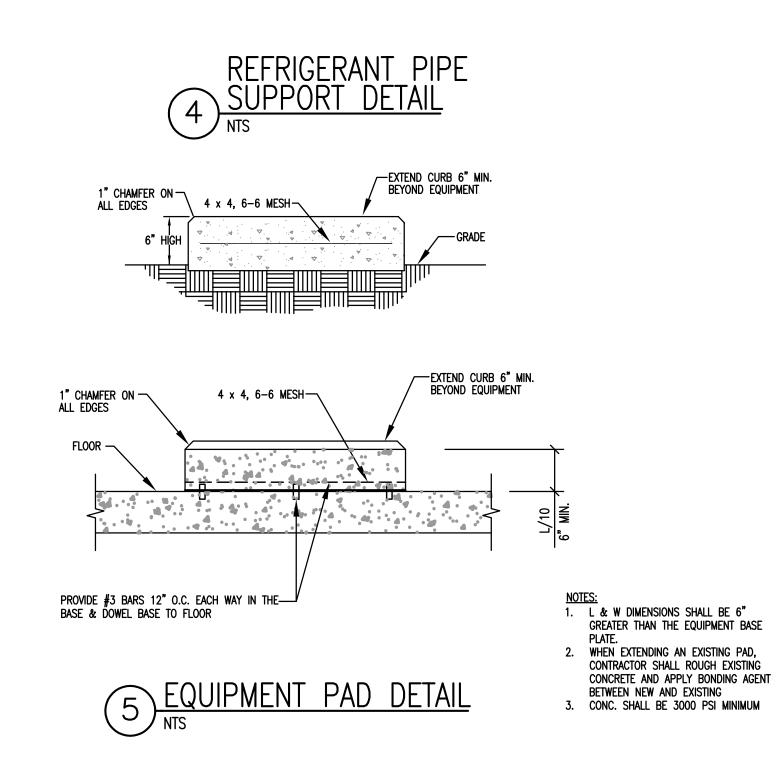
DESIGN CONDITIONS))
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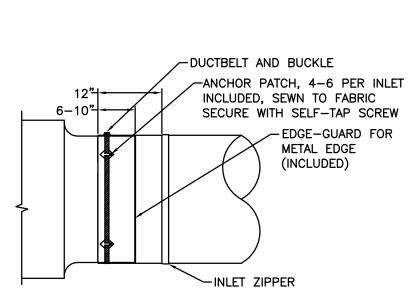
SPACE DESIGN TEMPERATURE - 48°-55° F DB +/- 5° SPACE DESIGN HUMIDITY -30% = /-5%OUTSIDE AIR TEMPERATURE - 95° F DB / 76° F WB NOTE: TEMPERATURE AND HUMIDITY MAY FLUCTUATE DEPENDING UPON NUMBER OF TIMES DOOR IS OPENED AND DURATION.

TAG	PROCESS	REACT	MAKE-UP	BYPASS CFM	MOISTURE REMOVAL LBS/HR	TEMPERATURE		I INDOOR DESIGN MOISTURE (GR/LB)		ELECTRICAL	MANUFACTURER	MODEL	REMARKS
IAG	CFM	CFM	CFM						FLA	VOLTS/PHASE	MANUFACTURER	MODEL	REMARKS
DH-4	900	300			1.65	96/78	48	14.8	62.7	208/3	BRY-AIR	MP-900	1, 2, 3
DH-4	900	300			1.65	96/78	48	14.8	62.7	208/3	BRY-AIK	MP-900	

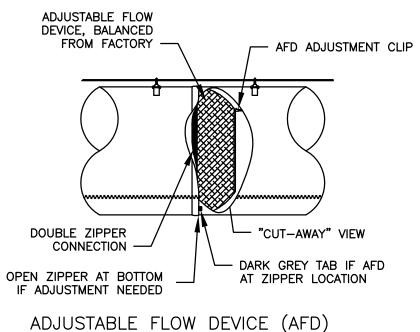
	AI	R DIST	'RIBU	TION	I SC	HEDU	JLE					
Т	TAG DESCRIPTION	NECK	MODULE SIZE	MOUNT	CONSTR.	MFGR	MODEL	NOTES				
	A SIDEWALL RETURN / EXHAUST	AS SHOW	AS SHOWN	SIDEWALL	ALUMINUM	PRICE	SERIES 630DAL	1				
N	NOTES: 1. FURNISH WITH OPPOSED BLADE DAMPER											



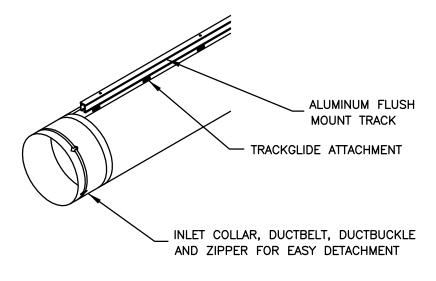




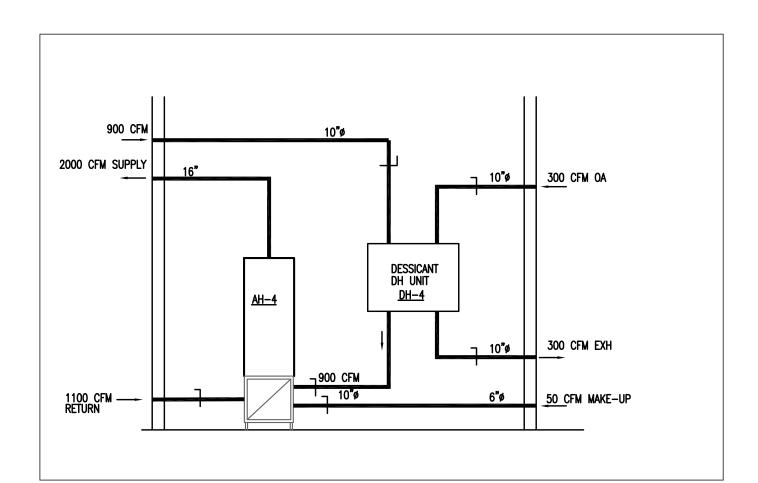
INLET ATTACHMENT DETAIL VERONA TYPE WITH ZIPPER AND OVERLAP



ADJUSTABLE FLOW DEVICE (AFD) INSTALLED AT ZIPPER LOCATION AT INLET OR AS SPECIFIED IN OTHER LOCAITONS. ZIPPER TO ZIPPER CONNECTION AS SHOWN. EXTERNAL LABEL IDENTIFIES LOCATION

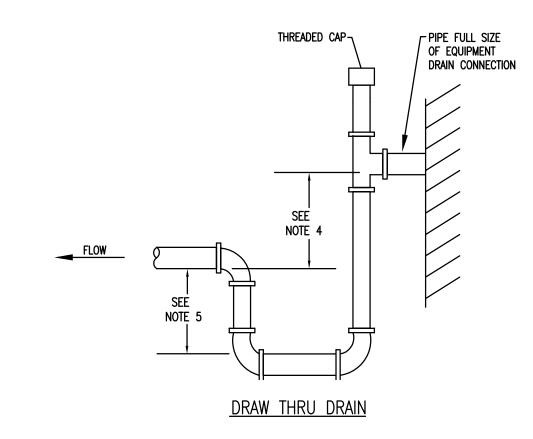


SUSPENSION DETAIL FLUSH MOUNT TRACK W/ 1 ROW TRACKGLIDE ATTACHMENT



NOTE:

1. DETAIL IS SCHEMATIC IN NATURE, CONSULT PLAN FOR EXACT ROUTING



NOTE:
1. LOCATE TRAPS SO AS TO BE ACCESSIBLE FOR CLEANING.
2. TRAP SHALL NOT BLOCK ACCESS TO EQUIPMENT. 4. HEIGHT SHALL BE EQUAL TO UNIT MAXIMUM NEGATIVE STATIC PRESSURE PLUS 1".
5. HEIGHT SHALL BE EQUAL TO UNIT MAXIMUM NEGATIVE STATIC PRESSURE.
6. PIPE TO NEAREST FLOOR DRAIN OR CONNECT TO EXIST DRAIN LINE.

2 EQUIPMENT CONDENSATE DRAIN DETAIL

Architects/Engineers/Planners 1201 Main Street, Suite 2100 Columbia, S.C. 29201 tel. 803-256-0000 fax 803-255-7243

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consultants



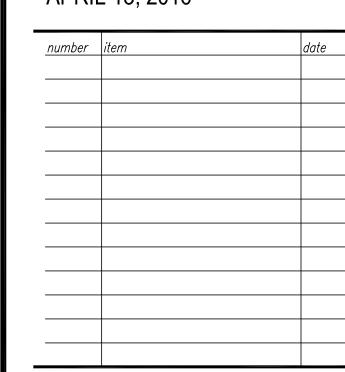
MIRC Film Vault Installation

state project number H27-Z269 GMK project number 15030.01

seals/signature

CONSTRUCTION DOCUMENTS

APRIL 13, 2016

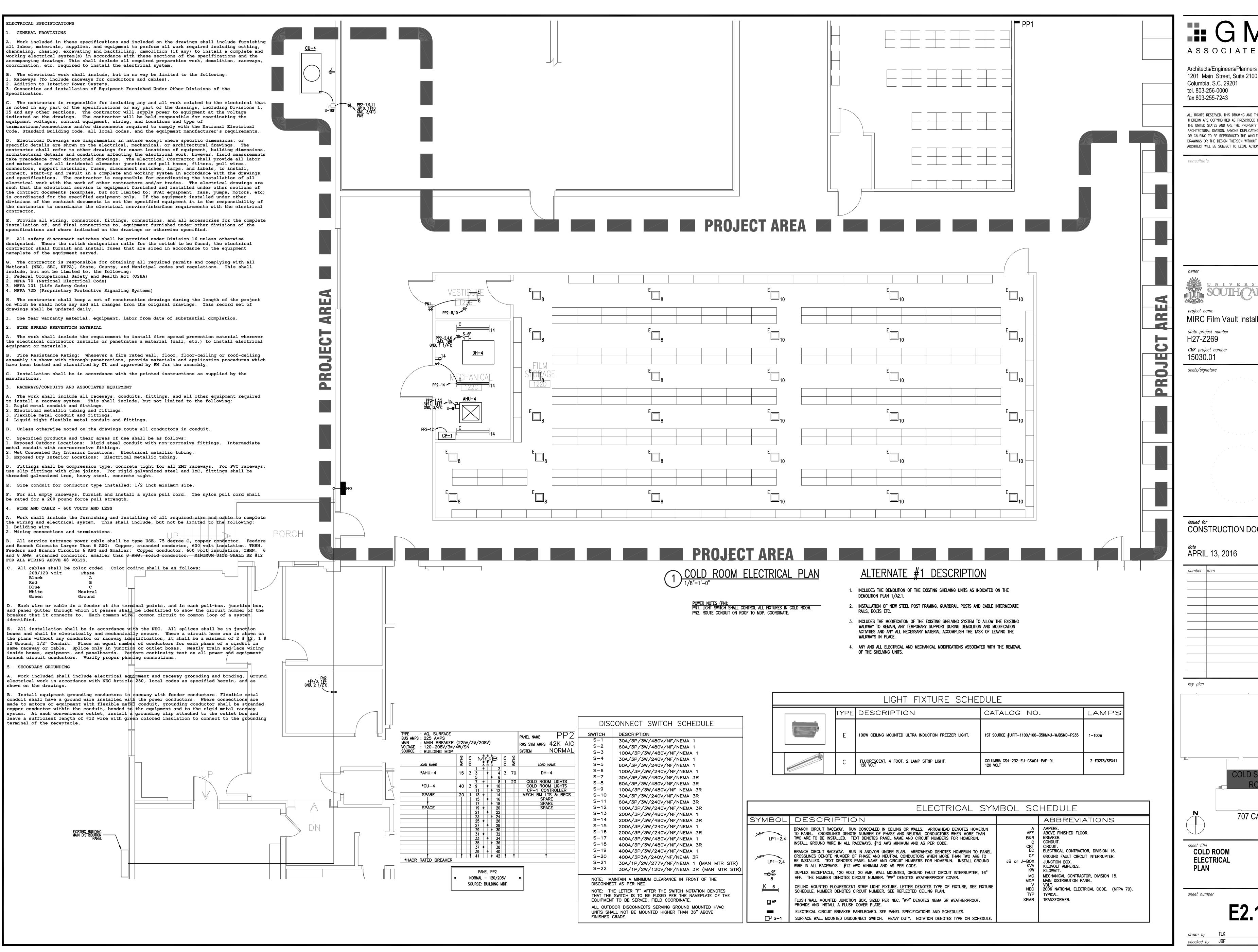




HVAC SCHEDULES, NOTES AND DETAILS

sheet number

checked by XXX



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MIRC Film Vault Installation

state project number H27-Z269 GMK project number

CONSTRUCTION DOCUMENTS

707 CATAWBA

COLD ROOM

checked by JBF