

ABBREVIATIONS

AAD	AUTOMATIC AIR DAMPER	HRU	HEAT RECOVERY UNIT
AC	AIR CONDITIONING UNIT	HTR	HEATER
AD	ACCESS DOOR	HUM	HUMIDITY OR HUMIDIFIER
AFF	ABOVE FINISHED FLOOR	HVAC	HEATING, VENTILATING, AIR CONDITIONING
AHU	AIR HANDLING UNIT	HW	HOT WATER
AL or (L)	ACOUSTICAL LINING	HZ	HERTZ
AP	ACCESS PANEL	ID	INSIDE DIAMETER
AS	AIR SEPARATOR	IN	INCH
B	BOILER	IN/WG	INCHES WATER GAUGE
BAS	BUILDING AUTOMATION SYSTEM	KW	KILOWATT
BDD	BACKDRAFT DAMPER	LAT	LEAVING AIR TEMPERATURE
BG	BLAST GATE	LB	POUND(S)
BHP	BRAKE HORSEPOWER	LB/HR	POUNDS PER HOUR
BI	BACKWARD INCLINE	LF	LINEAR FEET
BOD	BOTTOM OF DUCT	LWT	LEAVING WATER TEMPERATURE
BOP	BOTTOM OF PIPE	MBH	1000 BTU PER HOUR
BOS	BOTTOM OF STEEL	MC	MECHANICAL CONTRACTOR
BTU	BRITISH THERMAL UNIT	MCC	MOTOR CONTROL CENTER
BTUH	BRITISH THERMAL UNIT PER HOUR	(N)	NEW
CA	COMBUSTION AIR	NIC	NOT IN CONTRACT
CC	COOLING COIL	NG	NATURAL GAS
CFH	CUBIC FEET PER HOUR	NC	NORMALLY CLOSED
CFM	CUBIC FEET PER MINUTE	NO	NORMALLY OPEN
CH	CHILLER	NTS	NOT TO SCALE
CP	CONDENSATE PUMP	OA	OUTSIDE AIR
CT	COOLING TOWER	OAI	OUTSIDE AIR INTAKE
CU	CONDENSING UNIT	OBD	OPPOSED BLADE DAMPER
CUH	CABINET UNIT HEATER	OCC	OCCUPIED
CV	CONSTANT VOLUME	OD	OUTSIDE DIAMETER
DB	DRY BULB	P	PUMP
DC	DUST COLLECTOR	P.G.	PROPYLENE GLYCOL
DDC	DIRECT DIGITAL CONTROLS	PC	PLUMBING CONTRACTOR
DH	DEHUMIDIFIER	PD	PRESSURE DROP
DIA./Ø	DIAMETER	PH	PHASE
DN	DOWN	PHC	PREHEAT COIL
DOM	DOMESTIC	PRD	PRESSURE REDUCING DEVICE
DSD	DUCT SMOKE DETECTOR	PRV	PRESSURE REDUCING VALVE
DX	DIRECT EXPANSION	PS	PRESSURE SENSOR DUCT STATIC
EXISTING	EXISTING	PSF	POUND PER SQUARE FOOT
EAT	ENTERING AIR TEMPERATURE	PSIG	POUNDS PER SQUARE INCH GAUGE
EA	EXHAUST AIR	PTAC	PACKAGED TERMINAL AIR CONDITIONER
EC	ELECTRICAL CONTRACTOR	PTHP	PACKAGED TERMINAL HEAT PUMP
EC	EVAPORATIVE COOLER	PVC	POLYVINYL CHLORIDE
EDH	ELECTRIC DUCT HEATER	RA	RETURN AIR
EF	EXHAUST FAN	RAD	FIN TUBE RADIATION
ERV	ENERGY RECOVERY VENTILATOR	RCP	RADIANT CEILING PANEL
ESP	EXTERNAL STATIC PRESSURE	REF	REFRIGERANT
ETR	EXPANSION TANK	RF	RETURN AIR FAN
ETR	EXISTING TO REMAIN	RH	RELATIVE HUMIDITY
EWT	ENTERING WATER TEMPERATURE	RHC	REHEAT COIL
(F)	FUTURE	RPM	REVOLUTIONS PER MINUTE
°F	DEGREES FAHRENHEIT	RTU	ROOFTOP UNIT
F	FILTER or FAN	SA	SUPPLY AIR
FC	FORWARD CURVED	SF	SUPPLY AIR FAN
FCU	FAN COIL UNIT	SH	SENSIBLE HEAT
FD	FUME HOOD	SP	STATIC PRESSURE
FD	FIRE DAMPER	SQ FT	SQUARE FEET
FLA	FULL LOAD AMPS	S.S.	STAINLESS STEEL
FM	FLOW METER	T	THERMOSTAT
FOB	FLAT ON BOTTOM	TAB	TESTING AND BALANCING
FOT	FLAT ON TOP	TE(F)	TOILET EXHAUST (FAN)
FPM	FEET PER MINUTE	TEMP	TEMPERATURE
FPS	FEET PER SECOND	TOD	TOP OF DUCT
FS	FLOW SWITCH	TOP	TOP OF PIPE
FT	FEET	TOS	TOP OF STEEL
FT/WG	FEET WATER GAUGE	TP	TOTAL PRESSURE
FUR	FURNACE	TSP	TOTAL STATIC PRESSURE
FV	FACE VELOCITY	TT	TEMPERATURE TRANSMITTER
FZ	FREEZESTAT	UC	UNDERCUT
G	GAS	UH	UNIT HEATER
GPH	GALLONS PER HOUR	UNO	UNLESS NOTED OTHERWISE
GPM	GALLONS PER MINUTE	UNOCC	UNOCCUPIED
GAL	GALLONS	UV	UNIT VENTILATOR
GC	GENERAL CONTRACTOR	V	VENT OR VOLTS
GR/LB	GRAINS PER POUND	VAV	VARIABLE AIR VOLUME
H	HUMIDISTAT	VB	VACUUM BREAKER
HC	HEATING COIL	VEL	VELOCITY
HD	HEAD	VI	VIBRATION ISOLATOR
HX	HEAT EXCHANGER	VIB	VIBRATION
HEPA	HIGH EFFICIENCY PARTICULATE	VP	VACUUM PUMP
	ARRESTANCE FILTER	VRF	VARIABLE REFRIGERANT FLOW
HOA	HAND-OFF AUTOMATIC SELECTOR SWITCH	VRV	VARIABLE REFRIGERANT VOLUME
H/O	HAND-OFF SELECTOR SWITCH	VTR	VENT THROUGH ROOF
	WITH PILOT LIGHT	WB	WET BULB
HP	HORSEPOWER or HEAT PUMP	WG	WATER GAUGE

DUCTWORK SYMBOLS

SINGLE LINE	DOUBLE LINE	DESCRIPTION
		DENOTES RECTANGULAR OR SQUARE DUCT, SIZE IN INCHES
		DENOTES FLAT OVAL DUCT, SIZE IN INCHES
		FLEXIBLE DUCT (SIZE PER TABLE, THIS SHEET)
		SUPPLY/OUTSIDE AIR DUCT
		RETURN AIR DUCT
		EXHAUST AIR DUCT
		SUPPLY/OUTSIDE AIR DUCT ELBOW RECTANGULAR (UP AND DOWN)
		RETURN DUCT BELOW RECTANGULAR (UP AND DOWN)
		EXHAUST AIR DUCT ELBOW RECTANGULAR (UP AND DOWN)
		ROUND OR FLAT OVAL DUCT SUPPLY/OUTSIDE AIR DUCT (UP AND DOWN)
		ROUND OR FLAT OVAL DUCT RETURN AIR DUCT (UP AND DOWN)
		ROUND OR FLAT OVAL DUCT EXHAUST AIR DUCT (UP AND DOWN)
		SQUARE VANED ELBOW - 90°
		SHORT RADIUS ELBOW - 90°
		TRANSITION - CONCENTRIC
		TRANSITION - ECCENTRIC
		TRANSITION - RECTANGULAR TO ROUND
		90° TAKEOFF, RECTANGULAR TO ROUND SHOE TAP
		90° TAKEOFF, ROUND TO ROUND, STRAIGHT SHOE TAP
		90° CONICAL TAKEOFF, ROUND TO ROUND
		45° CONICAL LATERAL, ROUND TO ROUND
		45° LATERAL, ROUND TO ROUND
		DUCT SPLIT - SQUARE ELBOW (SIZE INDICATED)
		DUCT SPLIT - RADIUS ELBOW (SIZE INDICATED)
		END OF DUCT (CAPPED)
		SUPPLY AIR TERMINAL, CEILING OR DUCT MOUNTED, SQUARE & RECTANGULAR (SHADED AREA(S) DENOTE # & DIRECTION OF BLANKED OFF SECTION(S))
		RETURN/EXHAUST REGISTER, CEILING OR DUCT MOUNTED
		SIDEWALL AIR TERMINAL WITH VD (ARROWS DENOTE THROW DIRECTION)
		LINEAR DIFFUSER
		SUPPLY AIR DIFFUSER/GRILLE
		RETURN/EXHAUST AIR REGISTER/GRILLE
		DUCT RISE (IN DIRECTION OF ARROW)
		CLOSED CELL FOAM ACOUSTICAL LINING - DUCT DIMENSIONS SHOWN INDICATE INSIDE CLEAR DIMENSIONS
		EXHAUST AIR DESIGNATION
		RETURN AIR DESIGNATION
		SUPPLY AIR DESIGNATION
		TRANSFER AIR DESIGNATION

PIPING SYMBOLS

SYMBOL	DESCRIPTION
	3-WAY MODULATING VALVE
	3-WAY TWO POSITION VALVE
	2-WAY MODULATING VALVE
	2-WAY TWO POSITION VALVE
	GATE VALVE
	TRIPLE DUTY VALVE
	CHECK VALVE
	PRESSURE REDUCING VALVE
	PRESSURE RELIEF VALVE
	PRESSURE REGULATING VALVE
	BALL VALVE
	BALANCE VALVE
	BUTTERFLY VALVE
	VACUUM BREAKER
	SUCTION DIFFUSER
	PUMP - GENERIC
	PUMP - END SUCTION
	AIR SEPARATOR
	Y-STRAINER
	TEMPERATURE ELEMENT
	TEMPERATURE SENSOR

PIPING SYMBOLS CONT.

SYMBOL	DESCRIPTION
	PRESSURE GAUGE WITH GAUGE COCK
	PRESSURE GAUGE WITH GAUGE COCK AND BOURDON TUBE
	THERMOMETER
	PRESSURE/TEMPERATURE TEST FITTING
	FLOW METER
	PIPE UP AND DOWN
	TEE CONNECTION - STRAIGHT, DOWN, AND UP
	UNION
	END CAP
	FLEXIBLE CONNECTION
	PIPE ANCHOR
	PIPE GUIDE
	AIR VENT - (MANUAL) MV
	AUTOMATIC AIR VENT
	CONCENTRIC REDUCER
	PITCH OF PIPE, DROP (D) RISE (R)

PIPE SIZING SCHEDULE

SIZE	MIN GPM	MAX GPM
3/4"	0	3.5
1"	3.6	7.5
1 1/4"	7.6	13
1 1/2"	13.5	20
2"	21	40
2 1/2"	41	75
3"	76	120
4"	121	250
5"	251	450
6"	451	750

NOTES: 1. PIPE SIZING TABLE SHALL BE UTILIZED IF PIPE TAG IS NOT PRESENT.

TAP AND FLEX DUCT SIZING TABLE

TAP AND FLEX DUCT SIZE	SUPPLY DIFFUSER CFM RANGE	RETURN/EXHAUST REGISTER CFM RANGE
6"Ø FLEX / DUCT	1 CFM THRU 100 CFM	1 CFM THRU 80 CFM
8"Ø FLEX / DUCT	105 CFM THRU 200 CFM	85 CFM THRU 175 CFM
10"Ø FLEX / DUCT	205 CFM THRU 400 CFM	180 CFM THRU 300 CFM
12"Ø FLEX / DUCT	405 CFM THRU 600 CFM	305 CFM THRU 525 CFM
14"Ø FLEX / DUCT	605 CFM THRU 900 CFM	530 CFM THRU 800 CFM

NOTES: 1. PROVIDE A VOLUME DAMPER ON SUPPLY, RETURN, EXHAUST AND OUTSIDE AIR TAPS, BALANCE TO DIFFUSER/REGISTER TAG VOLUME.

REQUIRED 2015 IECC ENERGY CONSERVATION COMPLIANCE (WITH GEORGIA AMENDMENTS)

CODE SECTION	COMPLIANCE
C105.2.1	REFERENCE MECHANICAL AND PLUMBING DOCUMENTS FOR DUCT AND PIPE INSULATION MATERIALS, ARCHITECTURAL DOCUMENTS FOR ALL OTHER INSULATION MATERIALS
C105.2.2	REFERENCE ARCHITECTURAL PLANS FOR FENESTRATION U-FACTORS AND SOLAR HEAT GAIN COEFFICIENTS
C105.2.3	REFERENCE ARCHITECTURAL PLANS FOR AREA-WEIGHTED U-FACTORS AND SOLAR HEAT GAIN COEFFICIENTS
C105.2.4	MECHANICAL DESIGN CONFORMS TO CURRENT IECC AND IMC CODE REQUIREMENTS
C105.2.5	REFERENCE MECHANICAL AND PLUMBING DOCUMENTS FOR EQUIPMENT TYPES, SIZES AND EFFICIENCIES
C105.2.6	REFERENCE MECHANICAL DOCUMENTS FOR EQUIPMENT TYPES, SIZES AND EFFICIENCIES
C105.2.7	REFERENCE MECHANICAL DOCUMENTS FOR EQUIPMENT/TAMD SYSTEM CONTROLS
C105.2.8	REFERENCE MECHANICAL DOCUMENTS FOR EQUIPMENT HORSEPOWER AND CONTROLS
C105.2.9	REFERENCE MECHANICAL AND PLUMBING SPECIFICATIONS FOR SEALING AND INSULATION LOCATIONS
C105.2.10	REFERENCE ELECTRICAL DOCUMENTS FOR LIGHTING FIXTURE SCHEDULE AND CONTROLS
C105.2.11	REFERENCE ELECTRICAL DRAWINGS FOR DAYLIGHTING ZONES
C105.2.12	REFERENCE MECHANICAL SPECIFICATIONS FOR AIR SEALING DETAILS
C303.3	OPERATION AND MAINTENANCE MANUAL SHALL BE PROVIDED TO OWNER BY CONTRACTOR FOR ALL EQUIPMENT
C401.2	BUILDING COMPLIES WITH THE APPLICABLE SECTIONS OF CODE BASED ON METHOD 2
C402.5	REFERENCE ARCHITECTURAL PLANS FOR AIR LEAKAGE CRITERIA
C403.1.1	HVAC LOAD SIZING HAS BEEN PERFORMED IN THE CARRIER HAP PROGRAM, USING RTS (HEAT BALANCE) METHODOLOGY
C403.3.2	ALL HVAC EQUIPMENT MEETS OR EXCEEDS MINIMUM EFFICIENCIES, REFERENCE MECHANICAL DOCUMENTS
C403.4	REQUIRED HVAC CONTROLS SHALL BE PROVIDED, REFERENCE MECHANICAL DOCUMENTS
C403.7.7	MOTORIZED DAMPERS PROVIDED FOR EXHAUST AND OUTSIDE AIR INTAKES GREATER THAN 300 CFM OR IN BUILDINGS 3 STORIES OR LESS
C403.11.2	DUCT IS REQUIRED TO BE INSULATED TO THE INDICATED MINIMUM LEVEL, REFERENCE MECHANICAL DOCUMENTS
C403.11.2	INSTALLING CONTRACTOR SHALL ENSURE THAT ALL AIR DISTRIBUTION COMPONENTS ARE PROPERLY SEALED
C403.2.9.5	DUCT SIZING AND DUCT DESIGN HAS BEEN PERFORMED, REFERENCE MECHANICAL DOCUMENTS
C403.11.3	ALL PIPING INSULATION CRITERIA HAS BEEN MET, REFERENCE MECHANICAL / PLUMBING DOCUMENTS
C408.2	MECHANICAL SYSTEMS SHALL BE COMMISSIONED AS REQUIRED
C404.2	ALL WATER HEATING EQUIPMENT MEETS OR EXCEEDS MINIMUM EFFICIENCIES, REFERENCE PLUMBING DOCUMENTS
C404.4	ALL DOMESTIC HOT WATER PIPING INSULATION CRITERIA HAS BEEN MET, REFERENCE PLUMBING DOCUMENTS
C405.2	LIGHTING CONTROL CRITERIA HAS BEEN MET, REFERENCE ELECTRICAL DOCUMENTS
C405.3	INTERIOR LIGHTING TOTAL POWER DOES NOT EXCEED THE ALLOWANCE, REFERENCE ELECTRICAL DOCUMENTS
C405.4	EXTERIOR LIGHTING TOTAL POWER DOES NOT EXCEED THE ALLOWANCE, REFERENCE ELECTRICAL DOCUMENTS
C408.2.2	INSTALLING CONTRACTOR SHALL TEST AND BALANCE ALL HVAC SYSTEMS AND PROVIDE REPORT TO ENGINEER

LINE DESIGNATIONS

C	COIL CONDENSATE DRAIN
CS	CONDENSER WATER SUPPLY
CR	CONDENSER WATER RETURN
CWS	CHILLED WATER SUPPLY
CWR	CHILLED WATER RETURN
HWS	HOT WATER SUPPLY
HWR	HOT WATER RETURN
HPWS	HEAT PUMP WATER SUPPLY
HPWR	HEAT PUMP WATER RETURN
GWS	GLYCOL WATER SUPPLY
GWR	GLYCOL WATER RETURN
REF	REFRIGERANT PIPING
---	EXISTING PIPING/DUCTWORK
---	REMOVAL PIPING/DUCTWORK
---	NEW WORK PIPING/DUCTWORK

MINIMUM REQUIRED CONTROLS:

- A. UNLESS OTHERWISE SPECIFIED IN THESE DOCUMENTS, ALL EXHAUST AND RELIEF FANS SHALL BE CONTROLLED BY TIME CLOCK, TIME CLOCK PROVIDED BY HVAC CONTRACTOR CONNECTED TO HAND-OFF-AUTO RELAYS OF FAN MOTOR STARTERS, OR START-STOP OF VFD'S. ALL POWER WIRING OF TIME CLOCK BY HVAC CONTRACTOR.
- B. ALL EXHAUST AND RELIEF FANS SHALL HAVE POSITIVE CLOSURE DAMPERS INTERLOCKED TO OPEN WHEN FAN IS ENERGIZED, EXCEPTING SMOKE MANAGEMENT SYSTEMS, DRYER VENTS AND COOKING EQUIPMENT.
- C. ALL DIRECT DRIVE FANS SHALL BE PROVIDED WITH SOLID STATE MOTOR CONTROLLERS OR ELECTRONICALLY COMMUTATED MOTORS WITH ALL REQUIRED CONTROL DEVICES FOR SPEED ADJUSTMENT OF THE FAN MOTOR.
- D. FOR ALL HVAC EQUIPMENT (EXCLUDING SMOKE MANAGEMENT SYSTEMS AND COOKING APPLICATIONS) PROVIDE AN INTERLOCK TO THE MOTORIZED DAMPER SUCH THAT THE DAMPERS WILL CLOSE UP UNOCCUPIED CONDITION, HVAC CONTRACTOR TO PROVIDE TIME CLOCK OR DDC CONTROL.
- E. EACH ZONE SHALL HAVE A 7 DAY-4 FUNCTION PER DAY PROGRAMMABLE CONTROLLER WITH A 5'F DEADBAND AND SETPOINT OVERLAP RESTRICTIONS. MOUNT AT 48" ABOVE FINISHED FLOOR.
- F. MINIMUM AUTOMATIC CONTROLS SHALL SETBACK TO 55°F (HEAT) AND 85°F (COOL); 7-DAY CLOCK, 2-HOUR OCCUPANT OVERRIDE, 10-HOUR BACKUP.
- G. PROVIDE ECONOMIZER AND RETURN SIDE DUCT SMOKE DETECTORS ON ALL HVAC EQUIPMENT OVER 2000 CFM.
- H. PROVIDE ECONOMIZER AND RETURN SIDE DUCT SMOKE EQUIPMENT OVER 5000 CFM SUPPLY.
- I. SEE SCHEDULES, SPECIFICATIONS, DETAILS AND NOTES WHICH MAY SUPERCEDE THESE MINIMUM PERFORMANCE REQUIREMENTS.
- J. FOR SMOKE DAMPERS, MC SHALL INSTALL DUCT SMOKE DETECTORS FURNISHED BY OTHERS.

NOTES

- 1. NOT ALL SYMBOLS, ABBREVIATIONS AND LINE DESIGNATIONS ARE NECESSARILY USED ON THIS PROJECT.

ENERGY CONSERVATION CODE COMPLIANCE STATEMENT

TO THE BEST OF MY KNOWLEDGE, BELIEF AND PROFESSIONAL JUDGMENT, THE PLANS AND SPECIFICATIONS ARE IN COMPLIANCE WITH THE INTERNATIONAL ENERGY CODE, AS ADOPTED BY THE STATE.

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Mark	Date	Description

Project ID: 2572
 Drawn By: JCC
 Checked By: DBK
 Sheet Title:

Drawing No. **M-0.1**
LEGEND & ABBREVIATIONS



Mark	Date	Description
Project ID	2572	
Drawn By	JCC	
Checked By	DBK	
Sheet Title		

SPECIFICATIONS

Drawing No.

M-0.2

SECTION 237800 - AIR SOURCE HEAT PUMP MULTI-SPLIT SYSTEM

- 1.1 WORK INCLUDED
- PROVIDE LABOR, MATERIALS, EQUIPMENT AND SERVICES AS REQUIRED FOR THE COMPLETE INSTALLATION DESIGNED IN CONTRACT DOCUMENTS.
- 1.2 SUBMITTALS
- AIR SOURCE HEAT PUMP AIR-COOLED CONDENSING UNIT AND WALL MOUNTED REFRIGERANT UNITS, COMPLETE WITH ALL ACCESSORIES.
 - COMPLETE WIRING AND PIPING DIAGRAMS, SHOWING ALL PIPING AND CONTROL INTERCONNECTION.
 - INSTALLATION DETAILS AND REQUIREMENTS.
- 1.3 GENERAL REQUIREMENTS
- THE SYSTEM REFRIGERANT SHALL BE R-32.
 - THE SYSTEM MANUFACTURER SHALL BE RESPONSIBLE FOR THE FOLLOWING:
 - FURNISH COMPLETE INSTALLATION DRAWINGS, TEMPLATES, WIRING DIAGRAMS AND INSTRUCTION MANUALS FOR THE EQUIPMENT. MANUFACTURER'S "INSTALLATION INSTRUCTIONS" AND "START-UP AND SERVICE INSTRUCTION" AND CATALOG FOR WIRING AND PIPING SHALL BECOME A PART OF THE CONTRACT DOCUMENTS.
 - PROVIDE ADDITIONAL COPIES OF ABOVE DATA FOR O&M MANUAL.
 - PROVIDE REFRIGERANT PIPING DIAGRAM PRIOR TO INSTALLATION SHOWING EXACT LOCATION AND ARRANGEMENT OF PIPING THERMOSTATS, FLOW SWITCHES, GAUGES, THERMOMETERS AND INSERTION WELLS REQUIRED.
 - SUPERVISE AND CHECK INSTALLATION FOR COMPLIANCE WITH MANUFACTURER'S RECOMMENDATIONS.
 - COMPLETE START-UP FOR EACH UNIT SHALL BE PERFORMED UNDER THE DIRECTION OF THE MANUFACTURER'S AUTHORIZED REPRESENTATIVE.
- CONTRACTOR SHALL:
- PROVIDE PIPING, VALVES AND ACCESSORIES TO CONNECT THE CONDENSING UNITS TO THEIR RESPECTIVE UNITS, INCLUDING MISCELLANEOUS DEVICES TO MAKE A COMPLETE AND OPERABLE REFRIGERATION SYSTEM.
 - PROVIDE ONE YEAR, 24-HOUR SERVICE AND GUARANTEE, FROM DATE OF FINAL ACCEPTANCE.
- ELECTRICAL WIRING:
- DIVISION 16 SHALL PROVIDE POWER WIRING TO CONDENSING UNIT.
 - DIVISION 15A SHALL PROVIDE CONTROL WIRING INTERLOCKS AT UNITS AND INTERLOCKS TO AIR HANDLING UNITS AS REQUIRED.
- START-UP, TESTING AND INSTRUCTIONS:
- PROVIDE COMPLETE INSTALLATION, TESTING, WIRING, START-UP, AND INSTRUCTIONS TO OWNER'S REPRESENTATIVE'S.
- OPERATING CONDITIONS:
- COOLING: +4 °F DB TO +18 °F DB
 - HEATING: -4 °F WB TO +64 °F WB
- 1.4 AIR-COOLED CONDENSING UNITS
- GENERAL:
 - FACTORY ASSEMBLED AIR-COOLED CONDENSING UNITS WITH GALVANIZED STEEL CASINGS AND BAKED ENAMEL FINISH. UNITS SELECTED FOR OPERATION IN CONJUNCTION WITH RESPECTIVE AIR HANDLING UNITS.
 - UNITS CONSTRUCTED IN ACCORDANCE WITH ANSI B9 1 AND NEC.
 - UNIT PERFORMANCE SHALL BE CERTIFIED IN ACCORDANCE WITH ARI STANDARD 460, LATEST EDITION.
 - CONDENSING UNIT CAPACITIES AS SCHEDULED.
 - COMPRESSORS:
 - CONDENSING UNIT WITH INTERNALLY ISOLATED REFRIGERATION COMPRESSOR PROVIDED WITH OVERLOAD AND INHERENT WINDING THERMOSTAT PROTECTION, AND CRANKCASE HEATERS.
 - FIVE YEAR COMPRESSOR PARTS WARRANTY FROM DATE OF SHIPMENT.
 - CONDENSER COILS:
 - CONDENSER COILS OF ALUMINUM FINS MECHANICALLY BONDED TO SEAMLESS COPPER TUBING, PRESSURE TESTED FOR 425 PSI WORKING PRESSURE.
 - TUBES CLEANED, DEHYDRATED, SEALED AND LEAK TESTED AT 150 PSIG.
 - REFRIGERATION CIRCUITS:
 - REFRIGERATION CIRCUITS WITH SUB-COOLING COILS, SERVICE VALVES GAUGE PORTS, AND DRYERS.
 - CONTROLS:
 - HIGH AND LOW PRESSURE CUT-OUTS INCORPORATING AUTOMATIC RESET, PRESSURE OPERATED, REMOTE CONTROL TRANSFORMER, POSITIVE ACTING TIMER TO PREVENT SHORT CYCLING OF COMPRESSOR.
 - CONDENSER FAN CONTROL SHALL PERMIT OPERATION OF THE SYSTEM TO (-4 °F AMBIENT).
 - CONDENSER FANS AND MOTORS:
 - DIRECT DRIVEN PROPELLER FANS, VERTICAL DISCHARGE, WITH FAN GUARDS.
 - MOTORS RESILIENTLY MOUNTED AND PRE-LUBRICATED, WITH BUILT-IN OVERLOAD PROTECTION AND EQUIPPED WITH CORROSION PROTECTED FAN SHAFTS.
 - FANS STATICALLY AND DYNAMICALLY BALANCED, STEEL OR ALUMINUM BLADES AND ZINC PLATED STEEL HUBS.
 - CASINGS:
 - ZINC-COATED STEEL, PHOSPHATIZED CASINGS COATED WITH EPOXY RESIN PRIMER AND FINISHED WITH BAKED ENAMEL.
 - EQUIPPED WITH UNIT MOUNTING RAILS AND DRAIN HOLES.
 - SPRING ISOLATORS BETWEEN UNIT AND ROOF SUPPORTS.
 - DESIGN EQUIPMENT: LG.
 - ACCEPTABLE MAKE: CARRIER, DAIKIN, TRANE, YORK.
- 1.5 REFRIGERATION ACCESSORIES
- FILTER DRYERS:
 - LIQUID LINES DRYER AHEAD OF SOLENOID VALVES IN EACH SYSTEM.
 - REPLACEABLE CARTRIDGE TYPE.
 - MAKE: ANSUL, MCINTIRE, MUELLER, SPORLAN.
 - SIGHT GLASS:
 - IN EACH LIQUID LINE CLOSE TO EVAPORATOR, AFTER FILTER DRYER.
 - MAKE: ANSUL, SUPER DRY-EY, HENRY, WITH ELEMENTS TO ACT AS MOISTURE INDICATOR. SPORLAN.
 - THERMAL EXPANSION VALVE:
 - IN EACH LIQUID LINE AT THE EVAPORATOR COIL.
 - MAKE: SPORLAN.
 - SOLENOID VALVE:
 - IN EACH LIQUID LINE AT THE EVAPORATOR COIL AHEAD OF THE EXPANSION VALVE.
 - MAKE: ALCO, SPORLAN.
 - SHUT-OFF VALVES:
 - TO ISOLATE EQUIPMENT COMPONENTS, PACKLESS TYPE.
 - MAKE: HENRY, MUELLER, SUPERIOR.
 - CHARGING VALVE:
 - LOCATE AND INSTALL AT A POINT TO FACILITATE CHARGING OF THE SYSTEM.
- 1.6 INSTALLATION
- CONNECT SERVICES TO THE UNITS WHERE CALLED FOR, IN COMPLETE ACCORDANCE WITH THE MANUFACTURER'S INSTALLATION INSTRUCTIONS. FURNISH DIVISION 16 WITH WIRING DIAGRAMS AND ELECTRICAL DATA TO PERMIT POWER WIRING CONNECTIONS TO THE UNIT. PROVIDE CONTROL WIRING SERVING AIR HANDLING UNIT FROM ASSOCIATED CONDENSING UNIT, AND THE AUXILIARY CONTROL PANEL IN ACCORDANCE WITH SECTION "ELECTRIC WIRING." CHARGE SYSTEM WITH REFRIGERANT AFTER LEAK TESTING, AND IN ACCORDANCE WITH MANUFACTURER'S INSTALLATION INSTRUCTIONS.

SECTION 232500 - INSULATION

- 1.1 GENERAL:
- INSULATION, JACKETS, ADHESIVES, AND COATINGS, SHALL COMPLY WITH THE FOLLOWING:
 - TREATMENT OF JACKETS OR FACINGS FOR FLAME AND SMOKE SAFETY MUST BE PERMANENT. WATER SOLUBLE TREATMENTS NOT PERMITTED.
 - INSULATION SHALL HAVE A FLAME SPREAD RATING OF 25 OR LESS AND A SMOKE DEVELOPED RATING OF 50 OR LESS.
 - ASBESTOS OR ASBESTOS BEARING MATERIALS ARE PROHIBITED.
- 1.2 DUCT INSULATION:
- CONDUCTIVITY: MAXIMUM THERMAL CONDUCTIVITY (K) SHALL BE 0.285 BTU/SQ. FT. HR. OF IN. EXCLUDING AIR FILM AT 100°F MEAN TEMPERATURE.
 - RIGID BOARD TYPE - EXPOSED: 6 LB. MINIMUM DENSITY, GLASS FIBERBOARD, 1 IN. MINIMUM THICKNESS. FACTORY APPLIED WHITE KRAFT OUTER SURFACE BONDED TO ALUMINUM FOIL AND REINFORCED WITH FIBERGLASS YARN JOINTS FINISHED WITH CORNER BEADING AND FIBERGLASS TAPE.
 - FLEXIBLE BLANKET TYPE: LONG GLASS FIBER BLANKET, FACTORY APPLIED, FIBERGLASS YARN, REINFORCED ALUMINUM FOIL FACED VAPOR SEAL.
- 1.3 DUCTWORK INSULATION:
- PROVIDE EXTERNAL THERMAL INSULATION FOR DUCT.
 - RIGID BOARD TYPE: IMPALE BOARD OVER MECHANICAL FASTENERS, WELDED PINS OR ADHERED CLIPS, 12 IN. TO 18 IN. CENTERS; MINIMUM OF TWO ROWS PER SIDE. SECURE INSULATION WITH WASHERS ON CLIPS. SEAL BREAKS AND JOINTS IN VAPOR BARRIER WITH 4 IN. WIDE MATCHING TAPE OR 4 IN. GLASS-FAB APPLIED WITH BF 35-00. APPLY TAPE OVER CORNER BEADING WHERE EXPOSED.
 - FLEXIBLE BLANKET TYPE: JOINTS AND SEAMS MADE WITH 2 IN. LAP OF VAPOR BARRIER. ROUND DUCTS: APPLY BF 85-20 ADHESIVE TO DUCTS IN 6 IN. BRUSH WIDTHS AT 1 FT. INTERVALS AND AT EACH FACINGEDGE. SQUARE DUCTS: FASTEN BY IMPALING INSULATION ON ADHERED OR WELDED CLIPS. SECURE INSULATION WITH WASHERS ON CLIPS. SEAL JOINTS AND BREAKS WITH 4 IN. WIDE MATCHING TAPE OR 4 IN. GLASS-FAB APPLIED WITH BF 35-00.
- 1.4 PIPE INSULATION
- INSULATE PIPING SYSTEMS INCLUDING FITTINGS, VALVES, FLANGES, UNIONS, STRAINERS, AND OTHER ATTACHEMENTS INSTALLED IN PIPING SYSTEM, WHETHER EXPOSED OR CONCEALED EXCEPT WITHIN RADIATION ENCLOSURES.
 - PIPING IN EXTERIOR WALLS, SPACES, OVERHANGS, ATTICS, OR WHERE SUBJECT TO FREEZING, INSULATE PIPE WITH DOUBLE THE THICKNESS CALLED FOR. PIPING IN WALL CHASES, IN ADDITION TO THE ABOVE, PACK CHASE WITH LOOSE GLASS FIBER INSULATION.
 - HANGER SHIELDS: REFER TO SECTION "PIPING SYSTEMS AND ACCESSORIES."
 - PRE-INSULATED TYPE: BUTT INSULATION TO HANGER SHIELDS AND APPLY A WET COAT OF VAPOR BARRIER CEMENT TO THE JOINTS AND SEAL WITH 3 IN. WIDE VAPOR BARRIER TAPE.
 - FIELD INSULATED TYPE: PROVIDE 1-1/2" CALCIUM SILICATE INSULATION BETWEEN PIPE AND SHIELD.
 - JOINTS IN SECTION PIPE COVERING MADE AS FOLLOWS:
 - STANDARD: LONGITUDINAL LAPS AND BUTT JOINT SEALING STRIPS CEMENTED WITH BF 85-20, OR FACTORY APPLIED PRESSURE SENSITIVE ADHESIVE LAP SEAL.
 - VAPOR BARRIER: FOR COLD SERVICES, LONGITUDINAL LAPS AND 4 IN. VAPOR BARRIER STRIP AT BUTT JOINTS SHALL BE SEALED WITH WHITE BF 85-20. SEAL ENDS OF PIPE INSULATION AT VALVES, FLANGES, AND FITTINGS WITH WHITE BF 85-20.
 - FITTINGS, VALVES AND FLANGES:
 - CHILLED WATER: PREMOLDED FITTING INSULATION OF THE SAME MATERIAL AND THICKNESS AS THE ADJACENT PIPE INSULATION. VAPOR SEALED WITH BF 30-35 "TITE-FIT".
 - HOT SERVICES AND DOMESTIC COLD WATER: PREMOLDED FITTING INSULATION OF THE SAME MATERIAL AND THICKNESS AS THE ADJACENT PIPE INSULATION.
 - 0.020" THICK WHITE PVC JACKETING.
 - EQUAL TO ZESTON OR PROTO SYSTEM.
 - FLEXIBLE PIPE INSULATION:
 - SPLIT LONGITUDINAL JOINT AND SEAL WITH ADHESIVE.
 - FITTINGS MADE FROM MITER-CUT PIECES PROPERLY SEALED WITH ADHESIVE, OR ELLS MAY BE CONTINUOUS.
 - WHERE EXPOSED OUTDOORS, APPLY UV RESISTANT COATING AS RECOMMENDED BY MANUFACTURER.

EXHIBIT "I" - DUCT INSULATION MATERIALS			
SERVICE	INSTALLATION MATERIAL	THICKNESS	REMARKS
AIR CONDITIONING SUPPLY / RETURN	EXPOSED: RIGID FIBERGLASS CONCEALED: FLEXIBLE	1 1/2 IN. FIBERGLASS
VENTILATION SUPPLY / EXHAUST	EXPOSED: RIGID FIBERGLASS CONCEALED: FLEXIBLE	1 1/2 IN. FIBERGLASS
OUTSIDE AIR DUCT	RIGID FIBERGLASS	2 IN.	PROVIDE NEAT FIT AT INTAKE PLENUM

NOTES FOR EXHIBIT "I"

NOTE 1:
SUPPLY, RETURN, EXHAUST, AND VENTILATION DUCT IN UNCONDITIONED SPACES TO HAVE MINIMUM R-6 INSULATION. SUPPLY, RETURN, EXHAUST, AND VENTILATION DUCT OUTSIDE OF BUILDING THERMAL ENVELOPE TO HAVE MINIMUM R-8 INSULATION.

EXHIBIT "II" - PIPE INSULATION MATERIALS			
SERVICE	INSULATION MATERIALS	THICKNESS	REMARKS
REFRIGERATION	ELASTOMERIC	3/4"	SEE NOTE 1 SEE NOTE 2
AC UNIT DRAINS AND OVERFLOWS	GLASS FIBER (ELASTOMERIC)	ALL SIZES 1/2"	

NOTES FOR EXHIBIT "II"

NOTE 1:
PIPE INSULATION EXPOSED TO WEATHER SHALL BE DOUBLE ABOVE THICKNESS. COVER WITH ALUMINUM STAINLESS JACKET AND SEAL WATERTIGHT. INSTALL IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

NOTE 2:
SUCTION LINES SHALL BE INSULATED INDOORS AND OUTDOORS. LIQUID LINES AND HOT GAS LINES SHALL NOT BE INSULATED, EXCEPT WHERE THEY RUN EXPOSED IN OCCUPIED OR TRANSIENT USE SPACES.

SECTION 230600 - PIPING SYSTEMS AND ACCESSORIES

- 1.1 COPPER PIPE AND SOLDER FITTINGS:
- PIPE: HARD TEMPER, ASTM B88; TYPE K, L, M, OR DWV.
 - TEES, ELBOWS, REDUCERS: WROUGHT COPPER OR CAST BRONZE; SOLDER END CONNECTIONS; ASTM B62, ANSI B16.22.
 - UNIONS AND FLANGES: 2 IN. AND SMALLER USE UNIONS, SOLDER TYPE. CAST BRONZE GROUND JOINT, 150 LB. SWP; 2-1/2 IN. AND OVER USE FLANGES, CAST BRONZE, COMPANION TYPE, ASME DRILLED, SOLDER CONNECTION, 150LB. SWP.
 - SOLDER MATERIALS: NO-LEAD SOLDER, USING ALLOYS MADE FROM TIN, COPPER, SILVER AND NICKEL.
 - MAKE: HARRIS "STAY-SAFE 50" AND "BRIGHT" ENGLEHART "SILVERBRIGHT 100" WILLARD INDUSTRIES "SOLDER SAFE (SILVER BEARING), CANFIELD "WATERSAFE".
- 1.2 DIELECTRIC PIPE FITTINGS:
- TENSILE STRENGTH, ASME B16.8 UNION 250 PSI, OR FLANGE DESIGN, 175 PSI. PRESSURE RATING, THREADED OR SOLDER JOINT, CONSTRUCTED TO PREVENT GASKET FROM SQUEEZING INTO INTERNAL OPENING.
 - MAKE: CAPITOL MANUFACTURING, EPCO, WATTS.
- 1.3 HANGERS AND SUPPORTS:
- HANGERS AND CLAMPS: CARPENTER AND PATTERSON, CENTRAL IRON, FEE AND MASON, ITT GRINNELL.
- HANGERS:
- ADJUSTABLE, WROUGHT MALLEABLE IRON OR STEEL. COPPER PLATED OR PVC COATED WHERE IN CONTACT WITH COPPER PIPING.
 - ADJUSTABLE RING TYPE WHERE PIPING IS INSTALLED DIRECTLY ON HANGER FOR PIPING 3 IN. AND SMALLER.
 - ADJUSTABLE STEEL CLEVIS TYPE FOR PIPING 4 IN. AND LARGER, AND WHERE INSULATION PASSES THROUGH HANGER.
- SPACING SCHEDULE:
- | PIPE SIZE | STEEL | COPPER |
|----------------|--------|--------|
| 3/4 TO 1 IN. | 8 FT. | 8 FT. |
| 1-1/4 TO 2 IN. | 10 FT. | 8 FT. |
| 2-1/2 TO 4 IN. | 14 FT. | 10 FT. |
| 5 AND 6 IN. | 14 FT. | 10 FT. |

- SLEEVES:
- STANDARD TYPE:
 - SCHEDULE 40 BLACK STEEL PIPE SLEEVES, TWO PIPE SIZES LARGER THAN THE PIPE, FOR STRUCTURAL SURFACES.
 - SCHEDULE 40, PVC SLEEVES OR SHEET METAL SLEEVES FOR NONSTRUCTURAL SURFACES AND EXISTING CONSTRUCTION. SHEET METAL SLEEVES SHALL BE 18 GAUGE MINIMUM AND BRACED TO PREVENT COLLAPSING.
 - FIRESTOP SYSTEM FOR OPENINGS THROUGH FIRE RATED WALL AND FLOOR ASSEMBLIES:
 - MATERIALS FOR FIRESTOPPING SEALS SHALL BE LISTED BY AN APPROVED INDEPENDENT TESTING LABORATORY FOR "THROUGH-PENETRATION FIRESTOP SYSTEMS". THE SYSTEM SHALL MEET THE STANDARD FIRE TEST FOR THROUGH-PENETRATION FIRESTOP SYSTEMS. DESIGNATED ASTM E814. FIRESTOP SYSTEM SEALS SHALL BE PROVIDED AT LOCATIONS WHERE PIPING PASS THROUGH FIRE RATED WALL, FLOOR/CEILING, OR CEILING/ROOF ASSEMBLY.
 - EXECUTION:
 - EQUIPMENT AND SYSTEMS:
 - PROVIDE ADEQUATE MEANS OF DRAINABLE AND VENTING UNITS, RISERS, CIRCUITS AND SYSTEMS. INSTALL DIELECTRIC FITTINGS BETWEEN DISSIMILAR METALS.
 - SLEEVES:
 - PROVIDE FOR PIPES PASSING THROUGH FLOORS, WALLS OR CEILINGS. NOT REQUIRED FOR FLOORS WHICH ARE CORE-DRILLED. EXTEND 1/8 IN. ABOVE FINISHED FLOOR IN FINISHED AREAS. USE STEEL PIPE SLEEVES IN BEARING WALLS, STRUCTURAL SLABS, BEAMS AND OTHER STRUCTURAL SURFACES.
 - SLEEVE PACKING:
 - SEAL VOID SPACE AT SLEEVES AS FOLLOWS:
 - INTERIOR LOCATIONS: FIRMLY PACK WITH FIBERGLASS AND CAULK.
 - FIRE RATED, PARTITIONS AND FLOOR SLABS: USE FIRE RATED SEALING ELEMENTS, MATERIALS AND METHODS.
 - TESTS:
 - TEST PIPING AND ACCESSORIES BEFORE CONCEALMENT. NOTIFY OWNER'S REPRESENTATIVE AT LEAST SEVEN DAYS IN ADVANCE OF EACH TEST. ISOLATE VALVES AND EQUIPMENT NOT CAPABLE OF WITHSTANDING TEST PRESSURES.

EXHIBIT "A" - PIPING MATERIALS (HVAC)

SERVICE	PIPE MATERIALS	FITTINGS	CONNECTIONS
REFRIGERANT	TYPE L REFRIGERANT GRADE HARD TEMPER DEOXIDIZED COPPER	WROUGHT COPPER, SOLDER END	SIL-FLO 5" SILVER BRAZING

SECTION 239350 - REGISTERS AND DIFFUSERS

- 1.1 REGISTER TYPES:
- TYPE A - (EXHAUST AND RETURN GRILLES - MINIMUM SECURITY LEVEL):
 - ALUMINUM CONSTRUCTION WITH HORIZONTAL BARS ON A 3/4" SPACING SET AT 35 DEG.
 - 1-1/4 INCH WIDE FLANGE WITH SPONGE RUBBER GASKET.
 - PROVIDE WITH MINIMUM SECURITY GRILLE SG-LFO-AA FOR USE OVER STANDARD REGISTERS. GRILLE FACE WITH 1-3/16" SQUARE HOLES ON 1" CENTERS.
 - MODEL: TITUS 350FL (SG-LFO-AA).
- 1.2 DIFFUSER TYPES:
- TYPE 2 - (SUPPLY AIR REGISTER - MINIMUM SECURITY LEVEL):
 - ALUMINUM CONSTRUCTION WITH DOUBLE DEFLECTION CAPABILITY AND HORIZONTAL FRONT BARS. SOLID EXTRUDED ALUMINUM AIR FOIL BLADES MOUNTED IN FRICTION PIVOTS FOR INDIVIDUAL BLADE ADJUSTMENT, SPACED ON 3/4" CENTERS.
 - KEY OPERATED OPPOSED BLADE DAMPER WHICH SHALL ASSURE EVEN AIR DISTRIBUTION OF AIR ACROSS THE GRILLE FACE AS WELL AS VOLUME CONTROL.
 - 1-1/4 INCH WIDE FLANGE WITH SPONGE RUBBER GASKET.
 - PROVIDE WITH MINIMUM SECURITY GRILLE SG-LFO-AA FOR USE OVER STANDARD DIFFUSERS. GRILLE FACE WITH 1-3/16" SQUARE HOLES ON 1" CENTERS.
 - MODEL: TITUS 272FL (SG-LFO-AA).

DIVISION 23 - MECHANICAL

SECTION 230100 BASIC REQUIREMENTS

- PROVIDE ALL LABOR, MATERIALS, EQUIPMENT AND SERVICES TO PERFORM ALL OPERATIONS REQUIRED FOR THE COMPLETE INSTALLATION AND RELATED WORK AS SHOWN ON DRAWINGS AND SPECIFIED HEREIN.
- PROVIDE ALL REQUIRED SUPPORTS AND ACCESSORIES.
- INSTALL ALL WORK IN COMPLIANCE WITH LATEST EDITION OF:
 - GEORGIA UNIFORM FIRE PREVENTION AND BUILDING CODES.
 - GEORGIA ENERGY CONSERVATION CONSTRUCTION CODE.
 - OSHA REQUIREMENTS.
 - LOCAL ORDINANCES.
- REPAIR OR REPLACE ALL DEFECTS IN MATERIAL OR WORKMANSHIP WITHIN ONE YEAR OF PROJECT COMPLETION AND ACCEPTANCE BY THE OWNER, AT NO ADDITIONAL COST TO THE OWNER.
- PERFORM ALL OPERATIONS REQUIRED FOR COMPLETE TESTING OF SYSTEMS. PRIOR TO FINAL ACCEPTANCE, SUBMIT ALL TEST REPORTS IN WRITING.
- SUBMITTALS:
 - SUBMIT THREE (3) SETS OF SHOP DRAWINGS FOR REVIEW ON ALL CONTRACTOR FURNISHED ITEMS OF EQUIPMENT.
- IDENTIFICATION:
 - LABEL ALL MAJOR PIECES OF EQUIPMENT (I.E. BOILER, EVAPORATIVE COOLER, PUMPS, ETC.) AS DESIGNATED ON THE CONTRACT DOCUMENTS. PROVIDE BLACK PLASTIC NAMEPLATE WITH WHITE LETTERS. ATTACH TO EQUIPMENT WITH SCREWS OR POP RIVETS.
 - LABEL ALL PIPING IN THE MECHANICAL EQUIPMENT SPACE WITH PIPE DESIGNATION AND FLOW DIRECTIONAL ARROWS.
- OBSTACLES, INTERFERENCE AND COORDINATION:
 - DRAWINGS SHOW GENERAL DESIGN ARRANGEMENT. INSTALL WORK SUBSTANTIALLY AS INDICATED AND VERIFY EXACT LOCATIONS AND ELEVATIONS ON SITE.
 - DUE TO SMALL SCALE OF DRAWING, IT IS NOT POSSIBLE TO INDICATE ALL OFFSETS, FITTINGS, CHANGES IN EQUIPMENT LOCATIONS, ETC. TO ACCOMMODATE OBSTACLES AND INTERFERENCES ENCOUNTERED.
 - INSTALL ALL WORK SO THAT ALL ITEMS DO NOT INTERFERE WITH OTHER TRADES SUCH AS ELECTRIC, PLUMBING, ETC.
- CUTTING AND PATCHING:
 - PROVIDE ALL CUTTING AND PATCHING IN THE WORK AREA.
 - NEATLY CUT EXISTING CONSTRUCTION IN A MANNER TO AVOID DAMAGE TO ADJACENT WORK.
 - PATCH ALL WORK DISTURBED BY INSTALLATION OF NEW WORK.

SECTION 230190 - ELECTRIC WIRING

- 1.1 WIRING FOR CONTROL SYSTEMS:
- PROVIDE ALL WIRING FOR CONTROL OF AIR HANDLING UNITS AND FANS.
 - PROVIDE STARTERS FOR ALL EQUIPMENT FURNISHED UNDER THE HVAC WORK.
 - INSTALLATION AND WIRE INSULATION TYPES SHALL BE AS DESCRIBED BY NEC, ARTICLE 725. ALL LOW VOLTAGE WIRING CIRCUITS 50V AND UNDER SHALL:
 - WHEN INSTALLED HORIZONTALLY ABOVE LAY-IN OR SPLINE CEILINGS AND AT MECHANICAL ROOM CEILINGS MAY BE RUN WITHOUT CONDUIT. CABLES SHALL BE SUPPORTED USING BRIDLE RINGS ATTACHED TO BUILDING STRUCTURE. CABLE SHALL BE U.L. LISTED FOR PLENUM INSTALLATION.
 - ALL EXPOSED WIRING IN OCCUPIED SPACES SHALL BE RUN IN WALL CAVITY.
 - WHEN INSTALLED VERTICALLY IN MECHANICAL ROOMS FROM PANELS AND DEVICES UP TO CEILING SHALL BE INSTALLED IN ELECTRICAL METALLIC TUBING (EMT).
 - ALL CASES NOT SPECIFICALLY COVERED BY THE ABOVE CASES SHALL BE RUN IN EMT.

SECTION 230180 - MOTORS

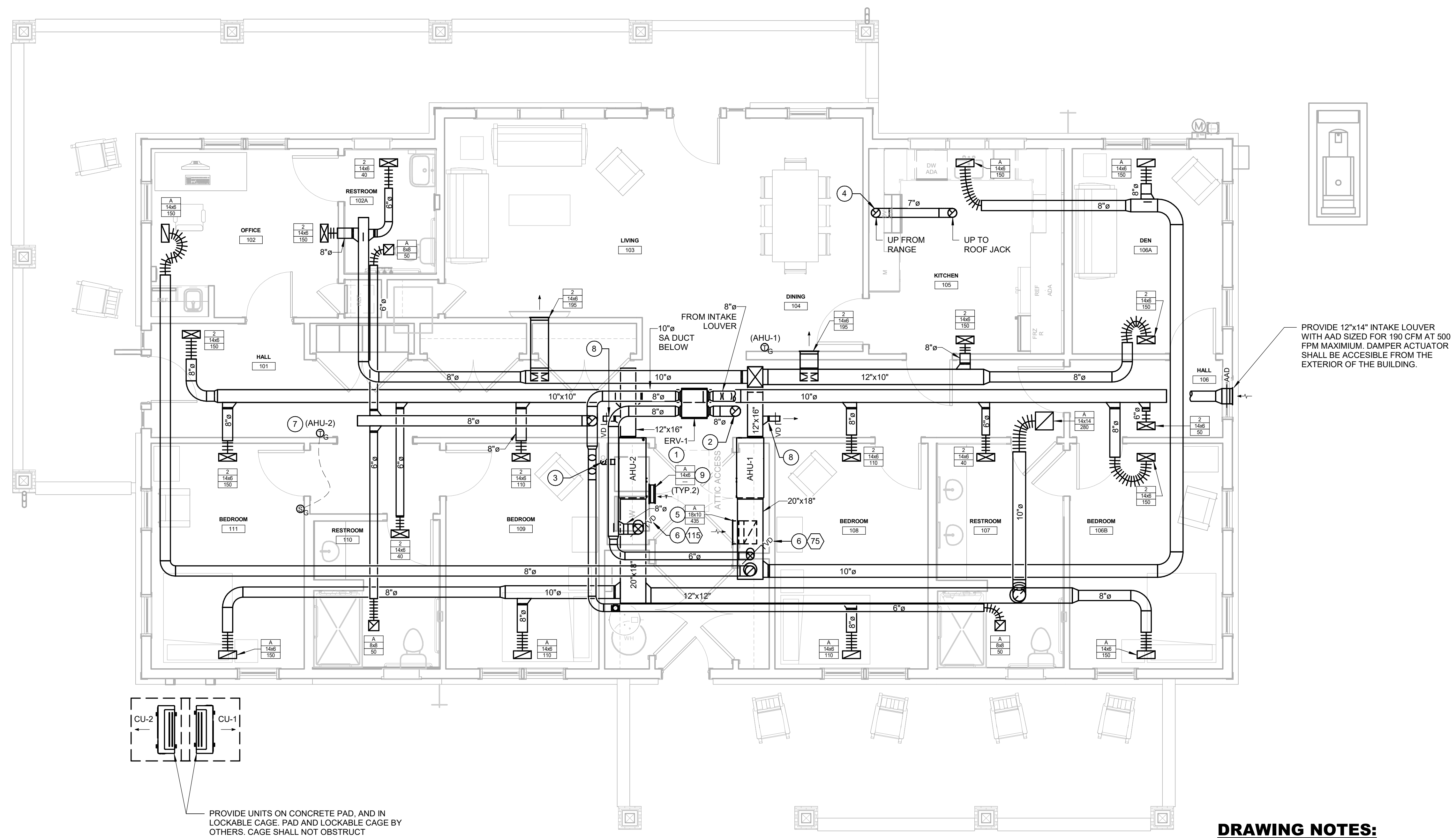
- MOTORS RATED 1 HP AND GREATER SHALL BE HIGH EFFICIENCY, ENERGY-SAVER TYPE WITH A GUARANTEED NEMA NOMINAL FULL-LOAD EFFICIENCY, BY IEEE STANDARD 112 TEST METHOD "B" AND GREATER THAN GEORGIA ENERGY CODE REQUIREMENTS.
- MOTOR APPLICATION:

ENVIRONMENTAL LOCATION	MOTOR ENCLOSURE TYPE
GENERAL PURPOSE	OPEN DRIP-PROOF, TEFC OR ENCAPSULATED
PACKAGED REFRIGERATION	HERMETIC OR SEMI-HERMETIC COMPRESSORS

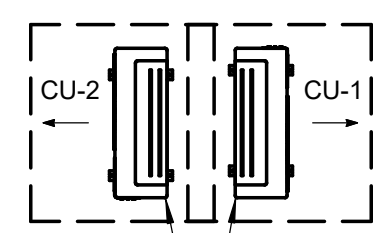
SECTION 239900 - ADJUSTING AND BALANCING

- 1.1 AIR SYSTEMS:
- TEST AND ADJUST FAN RPM TO DESIGN REQUIREMENTS. TEST AND RECORD MOTOR NO LOAD AND FULL LOAD AMPERES, AND DETERMINE OPERATING BRAKE HORSEPOWER. TEST AND RECORD SYSTEM STATIC PRESSURES, SUCTION AND DISCHARGE. TEST AND RECORD ENTERING AND LEAVING AIR TEMPERATURES AT COILS. TEST AND ADJUST EACH DIFFUSER, GRILLE, AND REGISTER TO WITHIN 10% OF DESIGN REQUIREMENTS. A RECORD OF FINAL SETTINGS SHALL BE MADE BY DESCRIPTION ON THE REPORT SCHEDULE.

EQUIPMENT/MATERIALS SPECIFIED SHALL BE PROVIDED AS CALLED FOR IN SPEC SECTIONS AS WELL AS MANUFACTURER'S WRITTEN RECOMMENDATIONS. EQUIPMENT/MATERIALS NOT SPECIFIED SHALL BE PROVIDED PER MANUFACTURER'S WRITTEN RECOMMENDATIONS AND WITH ALL OPTIONS REQUIRED BY SCHEDULED MODEL NUMBER TO PROVIDE COMPLETE AND FUNCTIONAL SYSTEMS.



PROVIDE 12"x14" INTAKE LOUVER WITH AAD SIZED FOR 190 CFM AT 500 FPM MAXIMUM. DAMPER ACTUATOR SHALL BE ACCESSIBLE FROM THE EXTERIOR OF THE BUILDING.



PROVIDE UNITS ON CONCRETE PAD, AND IN LOCKABLE CAGE. PAD AND LOCKABLE CAGE BY OTHERS. CAGE SHALL NOT OBSTRUCT CONDENSING UNIT'S AIRFLOW, AND ALLOW ACCESS AS REQUIRED BY THE MANUFACTURER'S INSTALLATION INSTRUCTIONS.

1 FIRST FLOOR PLAN
1/4" = 1'-0"

GENERAL NOTES:

- A. AIR HANDLING UNITS, ENERGY RECOVERY VENTILATOR AND ASSOCIATED DUCT SYSTEMS ARE LOCATED IN THE ATTIC SPACE. ATTIC ACCESS HATCH TO BE PROVIDED BY OTHERS, SIZED AND LOCATED TO ALLOW ADEQUATE ACCESS FOR INSTALLATION SERVICE, MAINTENANCE, AND REMOVAL OF EQUIPMENT. COORDINATE FINAL ACCESS REQUIREMENTS WITH MANUFACTURER'S REQUIREMENTS AND ALL OTHER TRADES PRIOR TO INSTALLATION.
- B. DUCTWORK VARIATIONS ARE ALLOWED IN SIZE AND LOCATION. MAINTAIN THE SAME HYDRAULIC DIAMETER FOR DUCTWORK THAT IS CHANGED IN SIZE.
- C. PROVIDE EXHAUST TERMINATIONS A MINIMUM OF 3'-0" FROM ANY WINDOW OR FRESH AIR INTAKE INTO BUILDING. PROVIDE TERMINATIONS IN AN AESTHETICALLY PLEASING PATTERN, COORDINATE AND GET FINAL APPROVAL OF TERMINATION LOCATION WITH ARCHITECT PRIOR TO INSTALLATION.
- D. G.C. SHALL PROVIDE A 1" UNDERCUT ON ALL BATHROOM AND LAUNDRY CLOSET DOORS.
- E. OVER THE RANGE VENTED MICROWAVE WITH TOP EXHAUST DUCT CONNECTION FURNISHED AND INSTALLED BY OTHERS.
- F. ALL PENETRATIONS INTO DEMISING WALLS SHALL BE SEALED.
- G. THERE SHALL BE NO JOINTS OR SEAMS IN THE REFRIGERANT PIPING CIRCUITS RUNNING FROM THE CONDENSING UNITS TO THE ASSOCIATED INDOOR UNITS.
- H. COORDINATE MIRRORED ERV CONFIGURATIONS PRIOR TO PURCHASE BASED ON THE LAYOUTS SHOWN ON THE DRAWINGS. HARDWIRED CONFIGURATIONS MUST BE MIRRORED BY THE MANUFACTURER AND CANNOT BE MIRRORED IN THE FIELD.
- I. PROVIDE A MINIMUM OF 10'-0" FROM EXHAUST TERMINATIONS TO ANY FRESH AIR INTAKE LOCATION.

DRAWING NOTES:

- 1 MOUNT ERV A MINIMUM OF 5'-0" ABOVE LOWER TRUSS CHORD.
- 2 PROVIDE 8"Ø EXHAUST AIR DUCT UP THROUGH ROOF. TERMINATE WITH ROOF JACK EXHAUST VENTILATOR, MSC INDUSTRIAL SUPPLY PART NO. 76932300 OR APPROVED EQUAL, WITH BACK DRAFT DAMPER AND SCREEN. INSTALL AND TERMINATE PER MANUFACTURER'S WRITTEN INSTRUCTIONS.
- 3 PROVIDE 4"Ø, 26 GAUGE SHEET STEEL DRYER VENT UP TO THROUGH THE ROOF. PROVIDE WALL BOX, RUN FLEX TO WALL BOX. TERMINATE WITH ROOF JACK, INNOVATE DRYER JACK MODEL 477 OR APPROVED EQUAL, WITH BDD, NO SCREEN. INSTALL AND TERMINATE PER MANUFACTURER'S WRITTEN INSTRUCTIONS. COLOR SELECTION BY ARCH. ASSUME CUSTOM COLOR FOR BIDDING PURPOSES.
- 4 PROVIDE 10"x3.25" DUCTED CONNECTION OFF BACK OF RANGE HOOD, UP ADJACENT WALL TO CEILING CAVITY, THEN TRANSITION TO 7"Ø DUCT AND OFFSET IN CEILING TO RUN UP TO ROOF JACK. TERMINATE WITH ROOF JACK EXHAUST VENTILATOR, MSC INDUSTRIAL SUPPLY PART NO. 76932300 OR APPROVED EQUAL, WITH BACK DRAFT DAMPER AND SCREEN. INSTALL AND TERMINATE PER MANUFACTURER'S WRITTEN INSTRUCTIONS. RANGE WITH FAN BY OTHERS, MINIMUM 25 CFM CONTINUOUS AND 100 CFM EXHAUST INTERMITTENT.
- 5 PROVIDE 18"x10" RETURN DUCT OFF BOTTOM OF RETURN DUCT MAIN DOWN FROM ATTIC INTO CEILING SPACE BELOW. TERMINATE WITH 18"x10" TYPE A SIDEWALL RETURN REGISTER AS SHOWN.
- 6 PROVIDE VOLUME DAMPER IN OUTSIDE AIR DUCT AT LOCATION SHOWN. BALANCE DAMPER TO AIR FLOW RATE INDICATED IN ADJACENT HEX NOTE. DAMPER SHALL BE PROVIDED IN ACCESSIBLE LOCATION.
- 7 PROVIDE THERMOSTAT IN HALLWAY FOR CONTROL OF AHU-2 WITH REMOTE BUTTON SENSOR LOCATED IN BEDROOM - 111. PROVIDE AND INSTALL PER THE MANUFACTURER'S INSTALLATION INSTRUCTIONS. SENSOR AND T-STAT SHALL BE PROVIDED WITH LOCKABLE GUARD ENCLOSURE.
- 8 PROVIDE 4"Ø DUCT TAP OFF SUPPLY MAIN WITH VOLUME DAMPER. TERMINATE OPEN ENDED IN ATTIC SPACE WITH 1" WIRE MESH SCREEN AND BALANCE DAMPER TO 25 CFM.
- 9 PROVIDE DUCTED TRANSFER AS SHOWN ABOVE DOOR FRAME WITH (2) 14"x6" TYPE A GRILLES. COORDINATE WITH GC TO CENTER ABOVE DOOR PRIOR TO FRAMING.

CLARATEL CARE HOMES
3053 WESLEY CHAPEL RD
DECATUR, GA 30034

Mark	Date	Description

Project ID: 2572
 Drawn By: JCC
 Checked By: DBK
 Sheet Title: FIRST FLOOR PLAN
 Drawing No. **M-2.1**

Outside Air Ventilation Matrix - IMC 2024 Section 403.3

Space Information		Air Handler Information					Space Ventilation Information				Outside Air Information - Multizone Calculation (If Single Zone, Vot = Voz)										Exhaust Information																				
Room Name	Room Type	Floor	Area (Sq.Ft.) (Az)	Room Pressure	CFM per SF	Air Handler	AHU CFM	Space SA (cfm)	Default Values		Known Values		(RpPz)	(RaAz)	(Vbz)	(Ez)	(Voz)	(Zp)	(D)	(Vou)	(Ev)	(Vot)	Provided Outside Air (cfm)	Method of OA Delivery	Fixture Units	CFM per Fixture (cfm/unit)	CFM per SF (cfm/ft²)	Required Exhaust (cfm)	Provided Exhaust (cfm)												
									Density (ppi/1000 sf)	People (Pz)	CFM/ppi (Rp)	CFM/sf (Ra)																		Outside Air Population (cfm)	Outside Air Area (cfm)	Breathing Zone Outside Air (cfm)	Zone Air Distribution Effectiveness	Zone Outside Air (cfm)	Primary OA fraction	Occupant Diversity	Uncorrected Zone OA cfm	Zone Effectiveness	Outdoor Air Flow Rate (cfm)		
106A - Den	OB - Office space	1st	135	Positive	1.1	AHU-1	875	150	5	1	5	0.06	5	8	13	1	13	0.09	1.0	75	1.00	75	75	Percentage	0	0	0	0	0												
105 - Kitchen	OB - Office space	1st	165	Positive	0.9	AHU-1	875	150	5	1	5	0.06	5	10	15	1	15	0.10					Percentage	0	0	0	0	0													
103 - Living / 104 - Dining	OB - Office space	1st	395	Positive	1.0	AHU-1	875	385	5	2	5	0.06	10	24	34	1	34	0.09					Percentage	0	0	0	0	0													
102 - Office	OB - Office space	1st	135	Positive	1.1	AHU-1	875	150	5	1	5	0.06	5	8	13	1	13	0.09					Percentage	0	0	0	0	0													
102A - Restroom	PS - Toilet rooms - public - continuous	1st	50	Negative	0.8	AHU-1	875	40	0	0	0	0	0	0	0	1	0	0.00					Percentage	1	50	0	50	50													
111 - Bedroom	PD - Living areas	1st	150	Positive	1.0	AHU-2	800	150	0	2	7.5	0.03	15	5	20	1	20	0.13	1.0	109	0.97	112	115	Percentage	0	0	0	0	0												
109 - Bedroom	PD - Living areas	1st	150	Positive	0.7	AHU-2	800	110	0	2	7.5	0.03	15	5	20	1	20	0.18					Percentage	0	0	0	0	0													
108 - Bedroom	PD - Living areas	1st	150	Positive	0.7	AHU-2	800	110	0	2	7.5	0.03	15	5	20	1	20	0.18					Percentage	0	0	0	0	0													
106B - Bedroom	PD - Living areas	1st	155	Positive	1.0	AHU-2	800	150	0	2	7.5	0.03	15	5	20	1	20	0.13					Percentage	0	0	0	0	0													
110 - Restroom	PS - Toilet rooms - public - continuous	1st	75	Negative	0.5	AHU-2	800	40	0	0	0	0	0	0	0	1	0	0.00					Percentage	1	50	0	50	50													
101 / 106 - Hall	PS - Corridors	1st	510	Positive	0.4	AHU-2	800	200	0	0	0	0.06	0	31	31	1	31	0.15					Percentage	0	0	0	0	0													
107 - Restroom	PS - Toilet rooms - public - continuous	1st	120	Negative	0.3	AHU-2	800	40	0	0	0	0	0	0	0	1	0	0.00					Percentage	1	50	0	50	50													
Total Outside Air For Building >>>>>>>																						190					Total Exhaust Air For Building >>>>>>>										150				

Notes:

Single Zone - Outside Air is directly placed in the Air Handling Unit Return, and the Air Handler serves only one zone

Transfer - Outside Air is transferred from adjacent spaces for the use of exhaust make-up

Percentage - The zone identified represents part of the total air flow of the unit, with outside air calculated as a percentage of total AHU flow

Direct Space - Outside Air is delivered directly to the space, and is not part of the AHU air flow rate. Air is dehumidified at MAU.

IMC Table 403.3.1.1.2.3.2 =>

Max Zp	Ev
≤ 0.15	1
≤ 0.25	0.9
≤ 0.35	0.8
≤ 0.45	0.7
≤ 0.55	0.6
≤ 0.65	0.5
≤ 0.75	0.4
> 0.75	0.3

Key:

AF - Animal Facilities

CO - Correctional Facilities

DC - Dry Cleaners, Laundries

EF - Educational Facilities

FB - Food and Beverage

HM - Hotel, Motel, Resorts, Dormitories

OB - Office Buildings

HC - Outpatient Healthcare Facilities

PD - Private Dwellings, Single & Multiple

PS - Public Spaces

SF - Retail stores, sales floors and showroom floors

SS - Specialty Shops

SA - Sports and Amusement

ST - Storage

TH - Theaters

TR - Transportation

WR - Workrooms

MULTI-POSITION HEAT PUMP SYSTEM - INDOOR UNITS												MULTI-POSITION HEAT PUMP SYSTEM - OUTDOOR UNITS											
TAG	LOCATION	SERVICE	TYPE	CFM	E.S.P. (in. WG)	NOMINAL MBH	ELECTRICAL DATA			DESIGN EQUIPMENT	TAG	LOCATION	PAIRED INDOOR UNITS	SYSTEM REFRIGERANT	COOLING MBH	SEER2	HEATING MBH	HSPF2	ELECTRICAL DATA				DESIGN EQUIPMENT
							VOLT	PH	AMPS										VOLT	PH	MCA	MOCPPD	
AHU-1	ATTIC	COMMON AREAS & OFFICES	MULTI-POSITION DUCTED	875	0.60	30.0	240	1	3.40 A	LG KNSLB301A	CU-1	GRADE	AHU-1	R-32	27.0	17	34.0	9.6	240	1	19.1 A	30 A	LG KUSXB301A
AHU-2	ATTIC	RESIDENCE ROOMS	MULTI-POSITION DUCTED	800	0.60	24.0	240	1	2.80 A	LG KNSLB241A	CU-2	GRADE	AHU-2	R-32	23.2	17.5	27.0	9.7	240	1	16.0 A	25 A	LG KUSXB241A

NOTES:

- REFRIGERANT PIPING SYSTEMS SHALL BE PROVIDED AS RECOMMENDED BY EACH SYSTEM MANUFACTURER.
- EC TO PROVIDE DISCONNECTS AND STARTERS.
- ANY FAN COIL UNITS MOUNTED OVER 15'-0" ABOVE CONDENSING UNITS SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS. UNIT MANUFACTURER TO VERIFY OPERATIONAL CAPABILITY OF CONDENSING UNITS. PROVIDE REQUIRED ACCESSORIES INCLUDING ACCUMULATORS AND SOLENOIDS AS RECOMMENDED BY MANUFACTURER.
- EACH EVAPORATOR COIL SHALL BE PROVIDED WITH A NON-BLEED THERMAL EXPANSION VALVE.
- PROVIDE MERV-8 PLEATED FILTERS.
- PROVIDE SECONDARY (EMERGENCY) CONDENSATE DRAIN SHUT DOWN SWITCH.
- INDOOR AIR HANDLING UNIT IS POWERED BY THE OUTDOOR UNIT.
- SPACE TEMPERATURE CONTROLS:
 - EACH SPACE AIR CONDITIONING SYSTEM SHALL BE CONTROLLED BY A WALL MOUNTED 7-DAY PROGRAMMABLE THERMOSTAT.
 - PROVIDE REMOTE SENSORS AS REQUIRED, SEE FLOOR PLANS FOR LOCATIONS.
 - THERMOSTATS AND SENSORS SHALL BE PROVIDED WITH LOCKABLE GUARD ENCLOSURES.

NOTES:

- REFRIGERANT PIPING SYSTEMS SHALL BE PROVIDED AS RECOMMENDED BY EACH SYSTEM MANUFACTURER.
- EC TO PROVIDE DISCONNECTS AND STARTERS.
- PROVIDE OUTDOOR UNIT ON 24" EQUIPMENT RAILS.
- UNITS MOUNTED OVER 15'-0" ABOVE CONDENSING UNITS SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS. UNIT MANUFACTURER TO VERIFY OPERATIONAL CAPABILITY OF CONDENSING UNITS. PROVIDE REQUIRED ACCESSORIES INCLUDING ACCUMULATORS AND SOLENOIDS AS RECOMMENDED BY MANUFACTURER.
- PROVIDE EACH OUTDOOR UNIT WITH LOW AMBIENT HEATING CAPACITY AND BUILT IN DRAIN PAN HEATER. UNITS SHALL BE RATED TO PROVIDE HEATING DOWN TO -4 °F.
- PROVIDE PERMANENT NAMEPLATE ON EACH CONDENSING UNIT DENOTING THE AIR HANDLING UNIT SERVED.
- PROVIDE PIPING IDENTIFICATION FOR REFRIGERANT PIPING SYSTEMS CONTAINING A2L REFRIGERANTS IN ACCORDANCE WITH ANSI/ASME A13.1 - A2L REFRIGERANT PIPING LOCATED IN AREAS OTHER THAN THE ROOM OR SPACE WHERE THE REFRIGERATING EQUIPMENT IS LOCATED MUST BE LABELED WITH "WARNING - RISK OF FIRE. FLAMMABLE REFRIGERANT"

ENERGY RECOVERY VENTILATOR - SCHEDULE																					
TAG	LOCATION	OA FLOW (CFM)	EA FLOW (CFM)	SUPPLY & EXHAUST FAN E.S.P. (IN. WC)	WEIGHT (LBS)	HEAT EXCHANGER - WINTER				HEAT EXCHANGER - SUMMER				ELECTRICAL DATA					DESIGN EQUIPMENT		
						OA EAT (DB °F)	SA LAT (DB °F)	EA EAT (DB °F)	TOTAL EFFECTIVENESS	OA EAT (DB °F)	SA LAT (DB °F)	EA EAT (DB °F)	TOTAL EFFECTIVENESS	VOLT.	PH	MCA	MOCPPD	STARTER			
ERV-1	ATTIC	190	150	0.50	36.0	21.5 °F	49.5 °F	70.0 °F	55%	93.9 °F	83.0 °F	75.0 °F	49%	120	1	15.0 A	15 A	BY E.C.	RENEWAIRE PREMIUM M		

NOTES:

- INTERLOCK OPERATION OF ERV FANS TO ASSOCIATED AUTOMATIC AIR DAMPERS AT OUTSIDE AIR AND EXHAUST AIR TERMINATIONS.
- EC TO PROVIDE DISCONNECTS AND STARTERS.
- PROVIDE WITH MERV 8 FILTERS.
- MC TO PROVIDE PERCENTAGE TIMER CONTROL WITH AIR HANDLER INTERLOCK.

REGISTER, GRILLE & DIFFUSER SCHEDULE					
TAG	TYPE	MATERIAL	FINISH/COLOR	DAMPER	DESIGN EQUIPMENT
2	SUPPLY	ALUMINUM	BY ARCH	Yes	TITUS 272FL (SG-LFO-AA)
A	RETURN / EXHAUST	ALUMINUM	BY ARCH	Yes	TITUS 350FL (SG-LFO-AA)

NOTES:

- PROVIDE ALUMINUM REGISTERS AND DIFFUSERS IN ALL TOILET ROOMS, JANITOR CLOSETS, LOCKER ROOM OR ANY SPACE WITH POTENTIAL FOR HIGH HUMIDITY.
- PROVIDE ALL REGISTERS AND DIFFUSERS WITH OPPOSED BLADE DAMPER.
- FOR TYPE 2 AND TYPE A REGISTERS PROVIDE WITH TAMPER PROOF SCREW. PROVIDE 12 GAUGE LATTICE FACE COVER INSTALLED OVER GRILLE. MODEL SG-LFO-AA OR APPROVED EQUAL. CONTRACTOR TO DRILL HOLES IN BORDER OF GRILLE TO ACCOMMODATE LATTICE INSTALLATION.



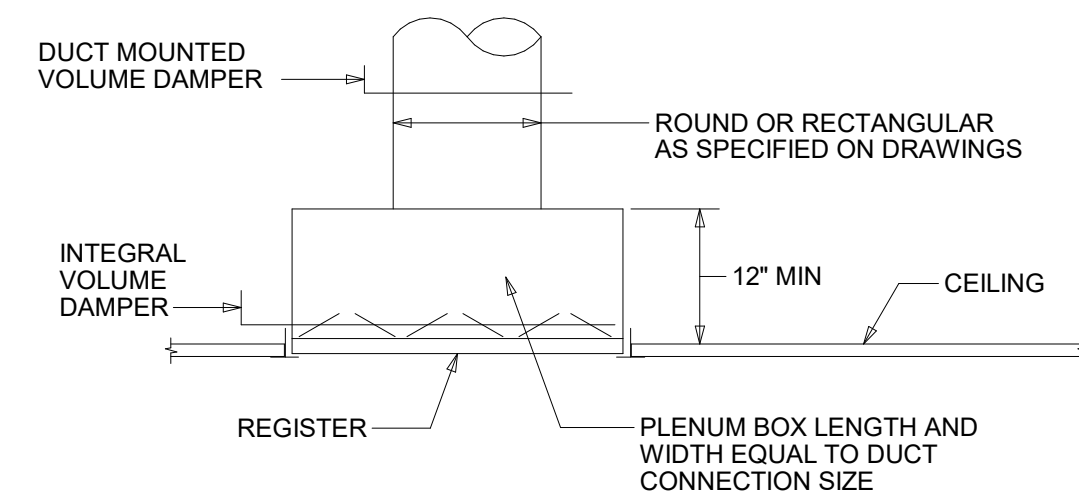
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Mark	Date	Description

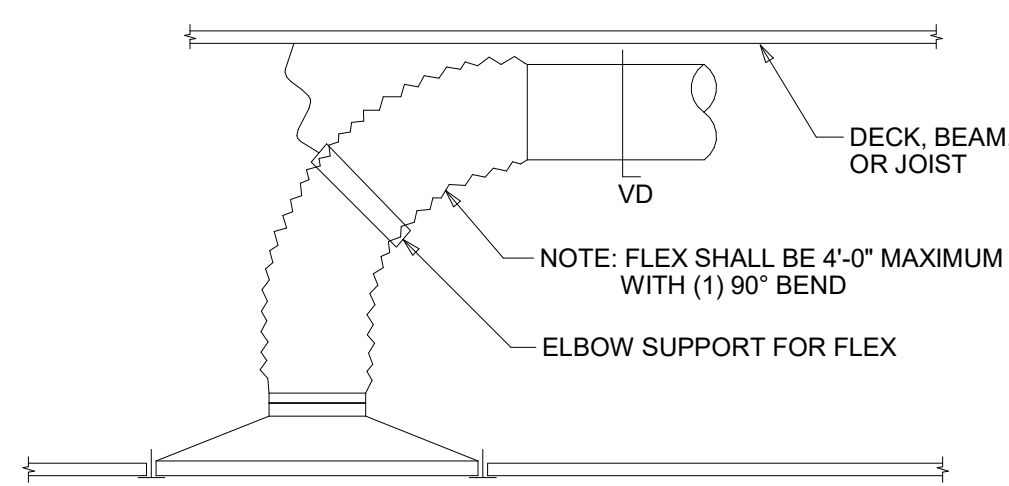
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 Checked By: DBK
 Sheet Title:

SCHEDULES

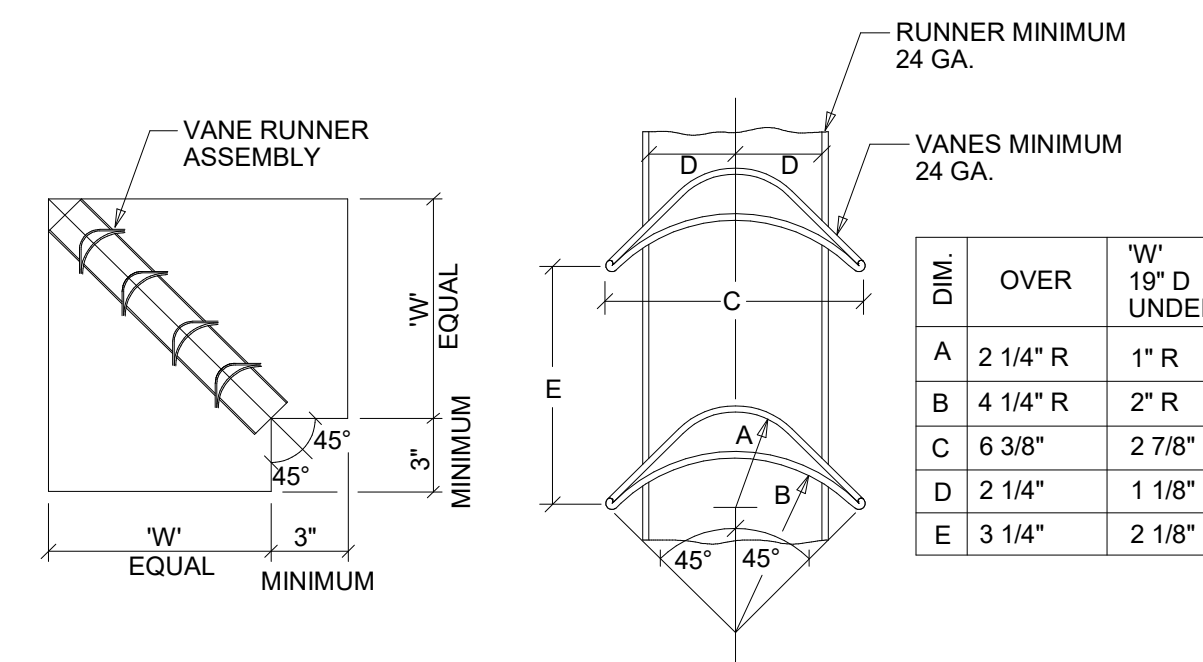
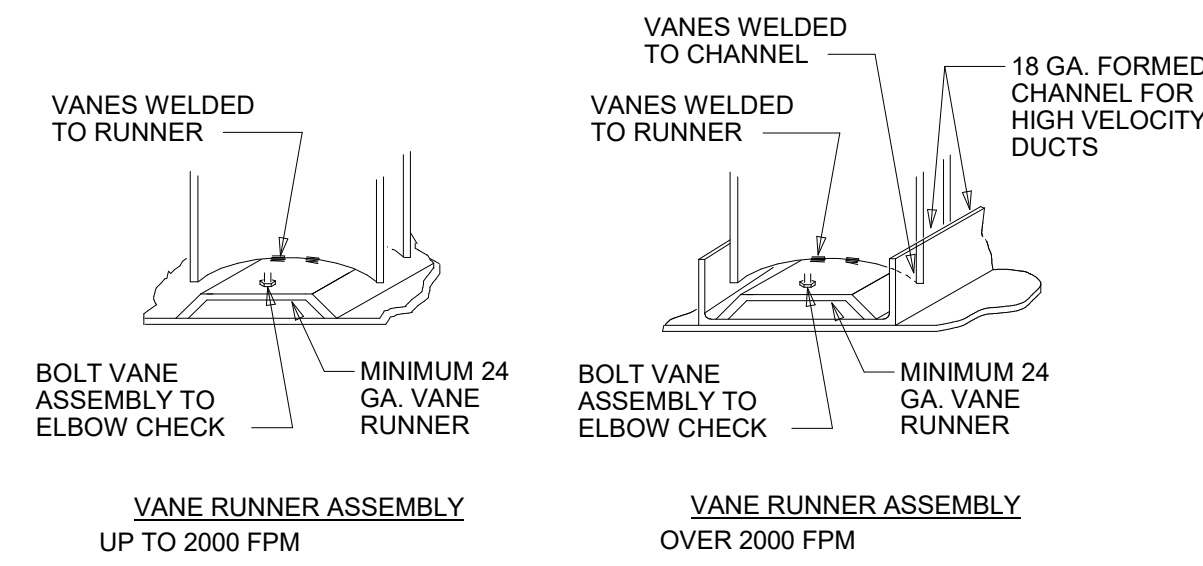
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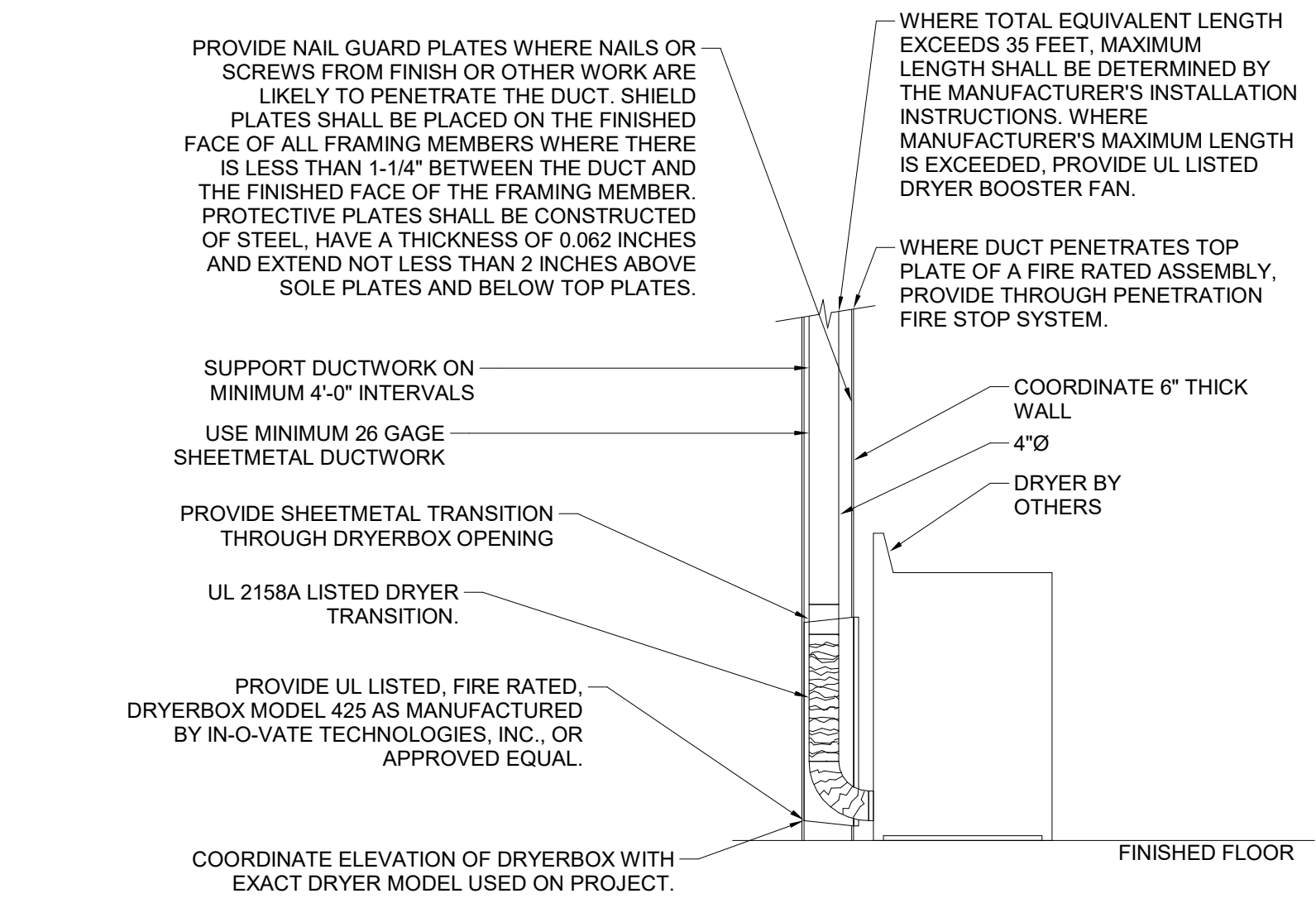
1 TYPICAL CEILING REGISTER INSTALLATION DETAIL



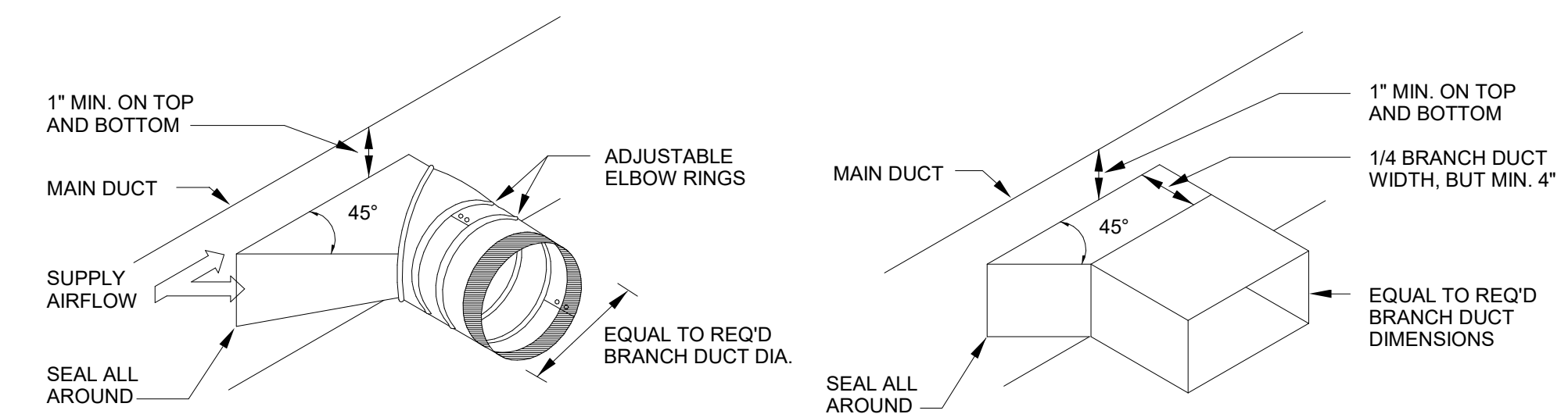
2 TYPICAL DIFFUSER INSTALLATION DETAIL



3 VANED ELBOW DETAIL



4 DRYER VENTING DETAIL



5 TYPICAL BRANCH TAKE-OFF FITTING

Mark	Date	Description

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