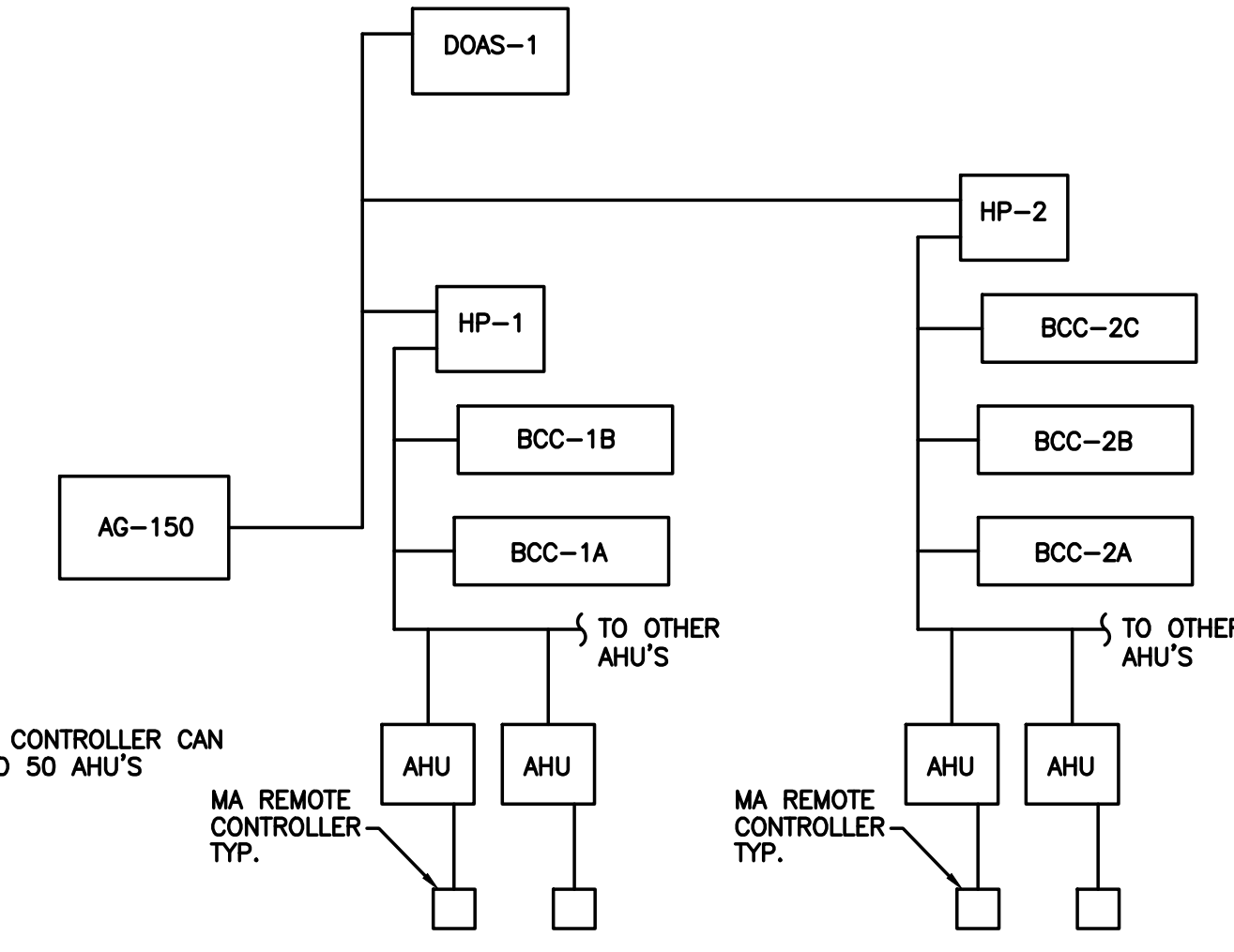


### HVAC LEGEND AND ABBREVIATIONS

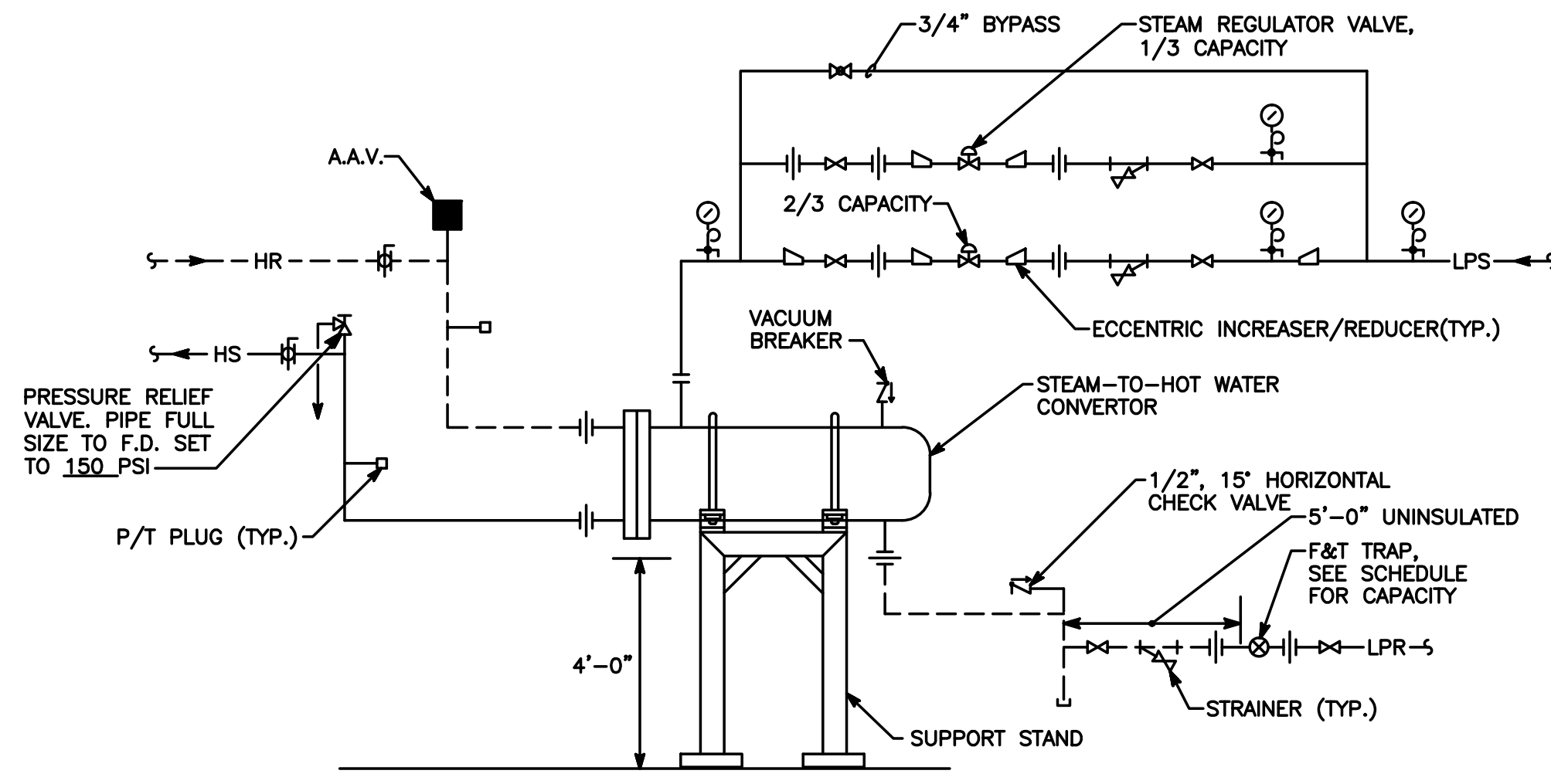
ACCU	AIR COOLED CONDENSING UNIT	RAG	RETURN AIR GRILLE
AD	ACCESS DOOR	RAR	RETURN AIR REGISTER
AFF	ABOVE FINISHED FLOOR	RECT.	RECTANGULAR
AHU	AIR HANDLING UNIT	RH	RELATIVE HUMIDITY
ALUM.	ALUMINUM	RL	REFRIGERANT LIQUID
APD	AIR PRESSURE DROP	RLX	RELOCATE EXISTING
ARCH.	ARCHITECT	RPM	REVOLUTIONS PER MINUTE
BD	BYPASS DAMPER	RS	REFRIGERANT SUCTION
BDD	BACKDRAFT DAMPER	RTU	ROOFTOP UNIT
B.I.	BUILT-IN	RX	REMOVE EXISTING
BT0	BOTTOM TAKEOFF	SA	SUPPLY AIR
BTU	BRITISH THERMAL UNITS	SAG	SUPPLY AIR GRILLE
CO2	CARBON DIOXIDE SENSOR	SAR	SUPPLY AIR REGISTER
CD	CEILING DIFFUSER	SEER	SEASONAL ENERGY EFFICIENCY RATING
CFM	CUBIC FEET PER MINUTE	SF	SUPPLY FAN
COORD.	COORDINATE	SFR	SUPPLY FLOOR REGISTER
CW	CHILLED WATER COIL	SP	STATIC PRESSURE
DB	DRY BULB	TC	TOTAL CAPACITY
DX	DIRECT EXPANSION COOLING COIL	TG	TRANSFER GRILLE
(E)	EXISTING	TSC	TOTAL SENSIBLE CAPACITY
EA	EXHAUST AIR	TSP	TOTAL STATIC PRESSURE
EAG	EXHAUST AIR GRILLE	TTO	TOP TAKEOFF
EAT	ENTERING AIR TEMPERATURE	TYP.	TYPICAL
EC	ELECTRICAL CONTRACTOR	UL	UNDERWRITER'S LABORATORY LISTED
EER	ENERGY EFFICIENCY RATING	UNO	UNLESS NOTED OTHERWISE
EF	EXHAUST FAN	VAV	VARIABLE AIR VOLUME
EP	ELECTRICAL PANEL	VD	VOLUME DAMPER
ERV	ENERGY RECOVERY VENTILATOR	V	VOLT
ESP	EXTERNAL STATIC PRESSURE	W	WATTS
EW	ELECTRIC WALL HEATER	W/	WITH
EWT	ENTERING WATER TEMPERATURE	WB	WET BULB
F	DEGREE IN FAHRENHEIT	WG	WATER GAUGE
FA	FRESH AIR	WPD	WATER PRESSURE DROP
FCU	FAN COIL UNIT	⊕	CONNECT TO EXISTING
FOB	FLAT ON BOTTOM	⊙	DIAMETER
FOT	FLAT ON TOP	⊙	THERMOSTAT OR TEMPERATURE SENSOR
FRAC.	FRACTIONAL	⊕	HUMIDISTAT
FSC	FAN SPEED CONTROL	⊙	CO2 SENSOR
FT	FEET	⊕	RETURN AIR DUCT
GC	GENERAL CONTRACTOR	⊕	SUPPLY AIR DUCT
GPM	GALLONS PER MINUTE	⊕	EXHAUST AIR DUCT
HC	HEATING COIL	⊕	DUCT UP
HP	HEAT PUMP	⊕	DUCT DOWN
HP	HORSEPOWER	⊕	VOLUME DAMPER
HR	HOUR	⊕	FLEXIBLE CONNECTION
HSPF	HEATING SEASON PERFORMANCE FACTOR	⊕	FIRE DAMPER HORIZONTAL
HTT	HUMIDITY/TEMP. TRANSMITTER	⊕	FIRE DAMPER VERTICAL
HZ	HERTZ	⊕	SMOKE DETECTOR
IN.	INCHES	⊕	MOTORIZED DAMPER
KW	KILOWATTS	MOD	MOTORIZED DAMPER
LA	LOW AMBIENT		
LAT	LEAVING AIR TEMPERATURE		
LWT	LEAVING WATER TEMPERATURE		
LD	LINEAR DIFFUSER		
LR	LINEAR RETURN		
MANUF.	MANUFACTURER		
MAX.	MAXIMUM		
MBH	THOUSAND BTU PER HOUR		
MC	MECHANICAL CONTRACTOR		
MCA	MINIMUM CIRCUIT AMPACITY		
MIN.	MINIMUM		
MNT.	MOUNT		
MOC	MAXIMUM OVER CURRENT PROTECTION		
MOD	MOTORIZED DAMPER		
MUA	MAKE-UP AIR		
NTS	NOT TO SCALE		
OA	OUTSIDE AIR		
PCF	POUND PER CUBIC FOOT		
PH	PHASE		
PREP.	PREPARE		
RA	RETURN AIR		

### MECHANICAL DRAWING NOTES

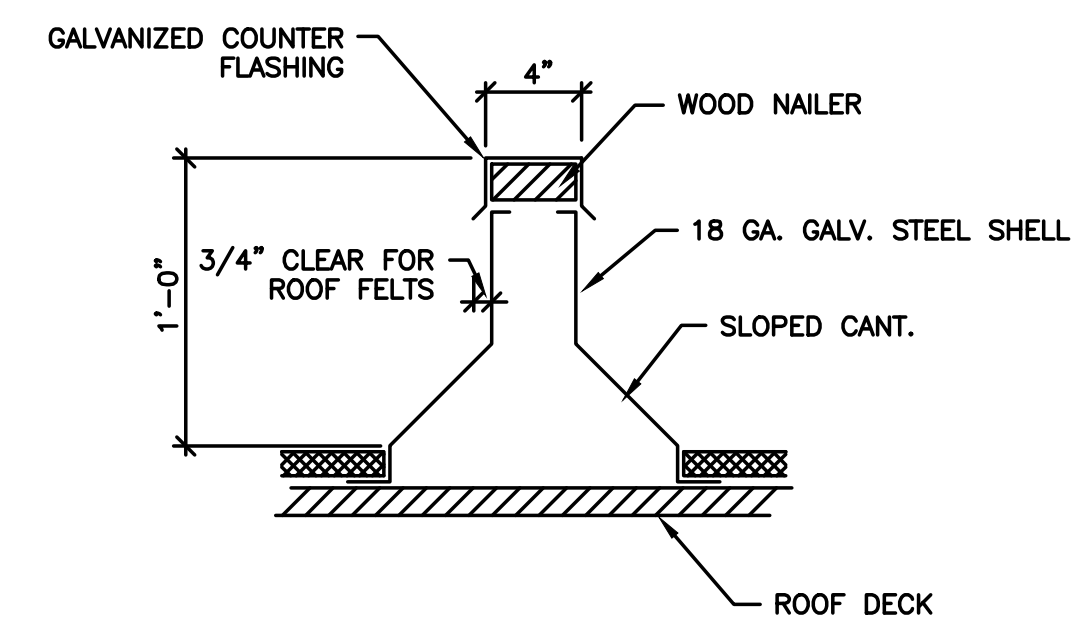
- A. THE FOLLOWING NOTES ARE GENERAL IN NATURE AND APPLY TO THE WHOLE PROJECT. WHERE THERE ARE ALTERATIONS, OR ADDITIONS TO THE GENERAL NOTES THEY ARE NOTED ON THE DRAWING SPECIFICALLY WHERE THEY OCCUR.
- B. CONTRACTOR SHALL BE RESPONSIBLE TO MEET ALL STATE & LOCAL CODES REQUIRED FOR THIS PROJECT.
- C. PRIOR TO THE BEGINNING OF WORK, SUBMIT SHOP DRAWINGS FOR ALL EQUIPMENT, DUCTWORK, ETC., IN ACCORDANCE WITH PROJECT SPECIFICATIONS FOR ARCHITECT ENGINEERS REVIEW AND APPROVAL.
- D. ALL CONCEALED DUCTWORK AND PIPING SHALL RUN AS HIGH AS POSSIBLE ABOVE SCHEDULED HEIGHT OF FINISHED CEILINGS UNLESS OTHERWISE NOTED.
- E. CONTRACTOR TO FIELD VERIFY ALL DIMENSIONS, CLEARANCES, & EXISTING CONDITIONS PRIOR TO ANY TYPE OF WORK. ALL WORK SHALL BE IN THIS DIVISION SHALL BE COORDINATED WITH ALL OTHER DIVISIONS.
- F. CONTRACTOR TO MAINTAIN ALL SERVICE CLEARANCES REQUIRED FOR EXISTING & NEW EQUIPMENT.
- G. CONTRACTOR SHALL SEAL ALL HOLES & PENETRATIONS IN ALL WALLS FOR THEIR WORK.
- H. DO NOT SCALE DRAWING - ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED BY THIS CONTRACTOR. CONTRACTOR SHALL NOTIFY ENGINEER OF ANY DEVIATIONS THAT ARE FOUND BETWEEN THE DRAWINGS AND SITE CONDITIONS
- I. CONTRACTOR SHALL REPORT ALL DISCREPANCIES FOUND IN THE DRAWINGS AND/OR IN THE SPECIFICATIONS DURING THE BIDDING PROCESS FOR CLARIFICATION.
- J. THE DRAWINGS ARE DIAGRAMMATIC AND SHOW ONLY THE GENERAL ARRANGEMENT OF ALL DUCTWORK, PIPING AND EQUIPMENT LAYOUT. BECAUSE OF THE SMALL SCALE OF THE DRAWINGS, IT IS NOT POSSIBLE TO SHOW OR INDICATE ALL OFFSETS, FITTINGS AND ACCESSORIES WHICH MAY BE REQUIRED TO AVOID EXISTING/NEW PIPING OR STRUCTURAL FEATURES THEREFORE THE CONTRACTOR SHALL PROVIDE WHAT IS REQUIRED TO INSTALL A COMPLETE SYSTEM. EXACT LOCATION OF ALL COMPONENTS SHALL BE DETERMINED AND COORDINATED IN THE FIELD.
- K. CONTRACTOR TO COORDINATE LOCATION OF WALL MOUNTED THERMOSTATS, HUMIDISTATS & CO2 SENSORS WITH OWNER & ARCHITECT PRIOR TO ROUGH-IN. ALL WALL MOUNTED THERMOSTATS, HUMIDISTATS & CO2 SENSORS SHALL BE MOUNTED 4'-0" AFF UNLESS NOTED OTHERWISE.
- L. NO DUCT OR PIPING SHALL BE INSTALLED ABOVE ANY ELECTRICAL PANEL.
- M. CONTRACTOR TO MAINTAIN THE MINIMUM SEPARATION BETWEEN EA OUTLETS & OA INTAKES/OPENINGS AS REQUIRED BY CODE.
- N. ALL DUCTWORK SHALL BE SEALED WITH "MASTIC" TYPE DUCT SEALER. TAPE WILL NOT BE ACCEPTED AS A METHOD TO SEAL DUCT.
- O. ALL CONCEALED SUPPLY, RETURN & OUTSIDE AIR DUCTWORK LOCATED WITHIN THE BUILDING INSULATION SHALL BE INSULATED WITH 2" THICK 1.0 PCF DUCT WRAP WITH A MINIMUM INSTALLED R-6.0 VALUE. ALL EXPOSED SUPPLY, RETURN & OUTSIDE AIR DUCTWORK LOCATED WITHIN THE BUILDING INSULATION SHALL BE INSULATED WITH 1.5" THICK DUCT BOARD WITH A MINIMUM INSTALLED R-6.5 VALUE. ALL SUPPLY, RETURN & OUTSIDE AIR LOCATED OUTSIDE THE BUILDING INSULATION SHALL BE INSULATED WITH 3" THICK 0.75 PCF DUCT WRAP WITH A MINIMUM INSTALLED R-8.0 VALUE. ALL SUPPLY & RETURN DUCTWORK LOCATED OUTSIDE THE BUILDING SHALL BE INSULATED WITH 2" THICK DUCT BOARD WITH A MINIMUM INSTALLED R-8.7 VALUE & SHALL BE COVERED WITH EPDM ROOFING AND SHALL BE SEALED WATER TIGHT. ALL TRANSFER DUCTWORK SHALL BE INSULATED WITH 1/2" THICK 2.0 PCF ACOUSTICAL FIBERGLASS DUCTLINER WITH A MINIMUM INSTALLED R-2.1 VALUE.
- P. ALL VISIBLE DUCTWORK THROUGH A GRILLE, REGISTER OR DIFFUSER SHALL BE PAINTED FLAT BLACK.
- Q. ALL DUCTWORK SIZES NOTED ARE FREE AREA SIZES. ALL DUCTWORK SHALL BE CONSTRUCTED PER SMACNA REQUIREMENTS (LATEST EDITION).
- R. ALL ROUND DUCT SHALL BE A MIN. 26 GAUGE INCLUDING ALL FITTINGS.
- S. ALL TAKE-OFFS SHALL BE EXPANDED TYPE TAKEOFFS AS DETAILED.
- T. VOLUME DAMPERS LESS THAN 10" IN HEIGHT SHALL BE SINGLE BLADE (GREENHECK #MBD-10). VOLUME DAMPERS 10" AND GREATER IN HEIGHT SHALL BE MULTIPLE OPPOSED BLADE (GREENHECK #MBD-15). ROUND VOLUME DAMPERS SHALL BE SINGLE BLADE (GREENHECK #MBDR-50). ALL DAMPERS SHALL BE BY GREENHECK AS LISTED OR APPROVED EQUAL BY RUSKIN, AIR BALANCE OR AMERICAN WARMING & VENTILATING. ALL VOLUME DAMPERS SHALL HAVE ADJUSTABLE LOCKING QUADRANT AND END BEARING. A STAND-OFF BRACKET WITH INSULATION SHALL BE PROVIDED FOR ALL VOLUME DAMPERS INSTALLED ON DUCT WITH EXTERNAL INSULATION. VOLUME DAMPER HARDWARE SHALL BE VENTLOK-555 OR APPROVED EQUAL.
- U. ALL MOTORIZED DAMPERS SHALL BE LOW LEAKAGE TYPE WITH BLADE EDGE SEALS AND JAMB SEALS. COORDINATE ACTUATOR VOLTAGE WITH ATC AND ELECTRICAL. MODULATING DAMPERS SHALL BE OPPOSED BLADE AND TWO POSITION SHALL BE PARALLEL BLADE TYPE. DAMPERS SHALL BE RUSKIN CD60 OR APPROVED EQUAL BY GREENHECK, UNITED ENERTECH, LOUVERS & DAMPERS, OR NATIONAL CONTROLLED AIR.
- V. ALL FIRE DAMPERS SHALL BE DYNAMIC TYPE WITH "B" STYLE FRAME UNO. DAMPERS SHALL BE UL555 LABELED MULTI-BLADE TYPE WITH U.L. APPROVED 165°F FUSIBLE LINKS. EACH DAMPER SHALL BE PROVIDED WITH A TIGHTLY FITTED ACCESS PANEL OF SUFFICIENT SIZE TO MAKE DAMPER ACCESSIBLE FOR INSPECTION, MAINTENANCE AND RESETTING. DAMPER SHALL BE RATED PER FIRE RATINGS AS SHOWN ON ARCHITECTURAL DRAWINGS UNO. DAMPERS SHALL BE RUSKIN OR APPROVED EQUAL BY GREENHECK, PERFCO, UNITED ENERTECH, OR NATIONAL CONTROLLED AIR.
- W. LOUVERS SHALL BE 6" DEEP. EXTRUDED ALUMINUM WITH DRAINABLE BLADES POSITIONED AT 37.5° ANGLE AND SPACED APPROXIMATELY 6" ON CENTER. LOUVERS SHALL BE PROVIDED WITH INSECT SCREENS & EXTENDED SILLS. ARCHITECT TO SELECT FINISH & COLOR. LOUVERS SHALL BE RUSKIN ELF6375DX OR APPROVED EQUAL BY GREENHECK, LOUVERS & DAMPERS, NCA, UNITED ENERTECH OR AMERICAN WARMING & VENTILATING. BRICK VENTS SHALL BE 4" DEEP. EXTRUDED ALUMINUM WITH DRAINABLE BLADES POSITIONED AT 45° ANGLE. BRICK VENT SHALL BE PROVIDED WITH INSECT SCREEN. ARCHITECT TO SELECT FINISH & COLOR. BRICK VENT SHALL BE SUN VENT EX OR APPROVED EQUAL.
- X. ALL FANS SHALL BE CONNECTED TO DUCTWORK WITH FLEXIBLE CONNECTIONS. FLEXIBLE CONNECTIONS SHALL BE NEOPRENE COATED 30 OUNCE/SQUARE YARD CANVAS. DURODYNE MODEL MF6N4 OR APPROVED EQUAL BY VENTFABRICS OR DUCTMATE INDUSTRIES.
- Y. ALL ROOF WORK SHALL BE DONE IN COMPLIANCE WITH THE ROOF WARRANTY.
- Z. AT THE COMPLETION OF THE JOB THE CONTRACTOR SHALL FURNISH 3 SETS OF OPERATION & MAINTENANCE MANUALS IN LOOSE LEAF BINDERS FOR ALL HVAC EQUIPMENT TO THE OWNER. THE MANUAL SHALL INCLUDE AT A MINIMUM: TABLE OF CONTENTS, DESCRIPTIVE BROCHURES ON ALL EQUIPMENT, MAINTENANCE INSTRUCTIONS, LUBRICATION SCHEDULE, PARTS LIST FOR ALL EQUIPMENT, NAME & SERVICE PHONE NUMBER OF INSTALLING CONTRACTOR, AND ATC DIAGRAMS.
- AA. ALL EQUIPMENT, PIPING AND DUCTWORK SHALL BE SUPPORTED FROM BLDG. STRUCTURE SO TO PROVIDE A VIBRATION FREE INSTALLATION. NOTIFY ARCHITECT AND STRUCTURAL ENGINEER OF ALL WEIGHTS AND METHODS OF SUPPORT.
- BB. ALL CONTROL WIRING LOCATED IN CONCEALED CEILINGS & WALLS SHALL BE PLENUM RATED CABLE. ALL EXPOSED CONTROL WIRING & CONTROL WIRING LOCATED IN MECHANICAL/ELECTRICAL ROOM & UNFINISHED AREAS SHALL BE RUN IN CONDUIT. ALL CONTROL WIRE AND CONDUIT FOR CONTROL WIRE SHALL COMPLY WITH NEC AND DIVISION 16 OF SPECIFICATIONS.
- CC. SMOKE DETECTORS SHALL BE FURNISHED AND WIRED TO THE FIRE ALARM SYSTEM BY THE ELECTRICAL CONTRACTOR. THE MECHANICAL CONTRACTOR SHALL MOUNT THE DETECTORS IN DUCTWORK, WHERE REQUIRED BY CODE. THE MECHANICAL CONTRACTOR SHALL PROVIDE THE CONTROL WIRING FROM FIRE ALARM CONTACT TO THE HVAC EQUIPMENT. UPON ACTIVATION OF THE DUCT MOUNTED SMOKE DETECTOR AND/OR THE HVAC SHUT DOWN SWITCH THE HVAC FANS AND ASSOCIATED COMPRESSORS SHALL BE SHUT DOWN.
- DD. MECHANICAL CONTRACTOR SHALL PROVIDE ACCESS PANELS IN ALL INACCESSIBLE CEILINGS TO CLEAN & SERVICE COILS, DAMPERS, HEATERS, VALVES AND ALL MECHANICAL EQUIPMENT. ACCESS PANEL SHALL BE CLEANED AND PREPARED FOR FIELD PAINTING.
- EE. ALL EXTERIOR RS & RL PIPING INSULATION SHALL BE COVERED WITH VENTURECLAD 1577CW JACKETING SYSTEM OR APPROVED EQUAL.
- FF. FLEXIBLE AIR DUCT SHALL BE MINIMUM 4' & A MAXIMUM OF 6'. ALL FLEXIBLE AIR DUCTS SHALL HAVE 2" FIBERGLASS BLANKET (R=6.0) WITH FLAME RESISTANT VAPOR BARRIER AND SHALL BE ATCO #076 OR APPROVED EQUAL BY GENFLEX OR HART & COOLEY.



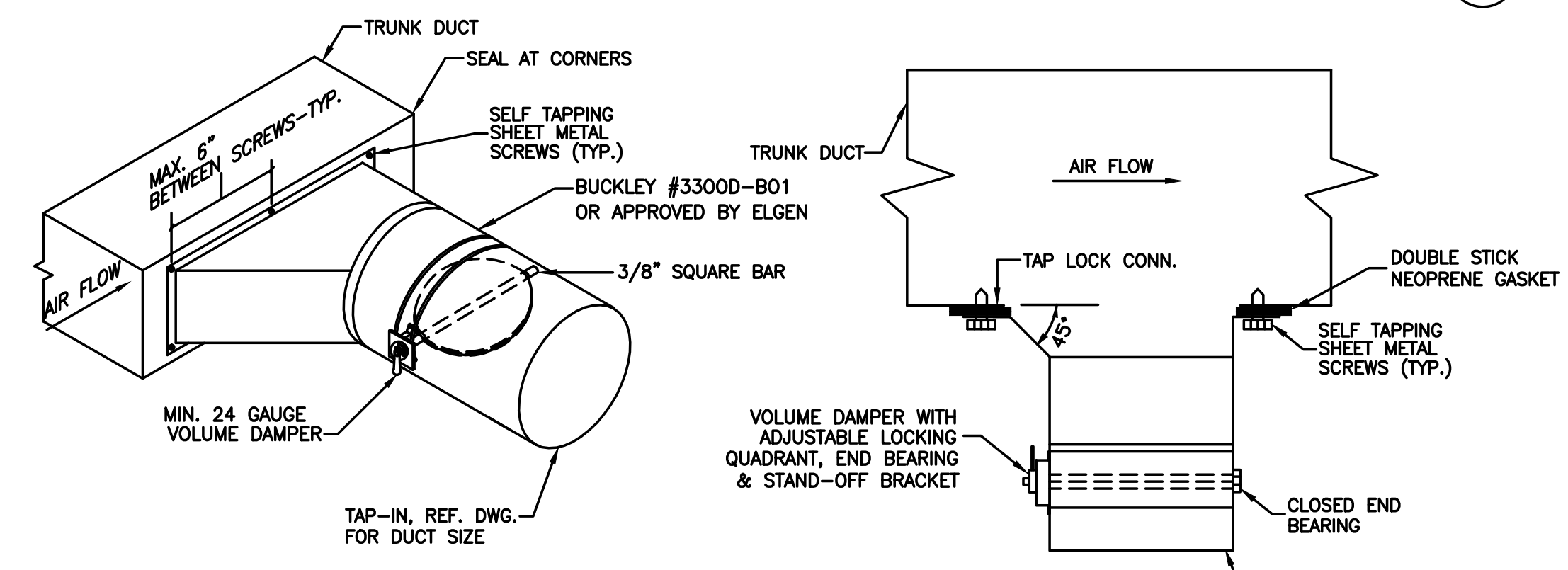
1 CITY MULTI-CONTROL WIRING SCHEMATIC NO SCALE



2 PIPING DETAIL - STEAM-TO-WATER CONVERTOR NO SCALE



3 EQUIPMENT CURB NO SCALE



4 TYPICAL ROUND EXPANDED TAKE-OFF DETAIL NO SCALE

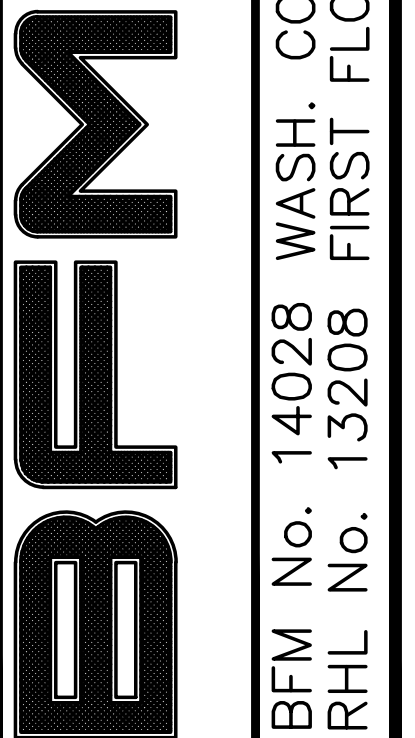
GENERAL NOTE: ALL TAKE-OFFS SHALL BE THE EXPANDED TYPE AS DETAILED. SEE DRAWINGS FOR VOLUME DAMPER LOCATIONS. ALL ROUND TAKE-OFFS SHALL BE BUCKLEY #33000-B01 OR APPROVED EQUAL BY ELGEN.



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Professional Certification. I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland. License No: 65511 Expiration Date: 06/03/2016

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SCHEDULES, NOTES & LEGEND HVAC  
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