

**SEISMIC GENERAL REQUIREMENTS**

- THE PROJECT HAS SEISMIC LOAD SUPPORT REQUIREMENTS BASED ON THE SEISMIC USE GROUP (OCCUPANCY) DESIGNATION OF THE FACILITY OF "IV" AND SEISMIC DESIGN CATEGORY "C". REFER TO DRAWING S0.01 FOR ADDITIONAL INFORMATION.
- SEISMIC DESIGN REQUIREMENTS FOR MECHANICAL AND ELECTRICAL COMPONENTS SHALL BE PROVIDED AS REQUIRED BY 2017 OHIO BUILDING CODE CHAPTER 16, SECTION 1613 EARTHQUAKE LOADS AND BY REFERENCE, THE AMERICAN SOCIETY OF STRUCTURAL ENGINEERS (ASCE) STANDARD 7-10 "MINIMUM DESIGN LOADS FOR BUILDING AND OTHER STRUCTURES" (2010).
- CHAPTER 13 OF ASCE 7-10 DEFINES THE REQUIREMENTS FOR THE MECHANICAL AND ELECTRICAL COMPONENTS.
- THE COMPONENT IMPORTANCE FACTOR,  $I_p$  SHALL BE 1.5 FOR ALL COMPONENTS PER ASCE 7-10, 13.1.3 SINCE THE COMPONENTS ARE REQUIRED TO FUNCTION FOR LIFE SAFETY PURPOSES AFTER AN EARTHQUAKE AS WELL AS THE COMPONENTS ARE ALL LOCATED WITHIN AN OCCUPANCY CATEGORY "IV" STRUCTURE.
- ASCE 7-10, TABLE 13.6-1 DEFINES THE SEISMIC AMPLIFICATION FACTOR  $A_p$  AND RESPONSE FACTOR  $R_p$  FOR EACH COMPONENT THAT SHALL BE USED IN DETERMINING THE ATTACHMENT REQUIREMENTS.
- CERTAIN COMPONENTS TO BE SEISMICALLY BRACED AND SUPPORTED ARE TO ALSO INCLUDE VIBRATION ISOLATION WHERE INDICATED.
- COMPONENTS OR SYSTEMS CAN BE INSTALLED IN A MANNER TO REDUCE SEISMIC BRACING OR SUPPORT REQUIREMENTS. ALL MECHANICAL AND ELECTRICAL SYSTEMS MUST FUNCTION AFTER AN EARTHQUAKE. EQUIPMENT, COMPONENTS, PIPING, DUCTWORK, CONDUIT, COMMUNICATION CABLING, ETC. SHALL BE SEISMICALLY BRACED. GENERAL GUIDELINES OR APPROACH FOR PROJECT SYSTEMS:
  - DUCTWORK IS DESIGNED TO BE LESS THAN 6 SQ. FT., NO SEISMIC BRACING.
  - PIPING SHOULD BE HUNG TIGHT TO STRUCTURE WITH THREADED ROD LESS THAN 1/2"; NO SEISMIC BRACING IF INSTALLED IN THIS MANNER.
  - HVAC SYSTEMS IN-LINE WITH DUCT SYSTEM (FANS, HUMIDIFIERS) ARE LESS THAN 75 LBS., NO SEISMIC BRACING.
  - FLOOR OR GRADE SET EQUIPMENT, TO BE ANCHORED TO EQUIPMENT PAD AND IN TURN SECURED TO THE FLOOR.
  - FIRE SUPPRESSION PIPING SHALL BE SEISMIC BRACED PER THE REQUIREMENTS OF NFPA 13.
  - FLOOR/WALL MOUNTED ELECTRICAL EQUIPMENT, PANELBOARDS, AUTOMATIC TRANSFER SWITCHES, ETC. SHALL BE SEISMICALLY BRACED/SUPPORTED.
  - LIGHTING FIXTURES SHALL BE SUPPORTED INDEPENDENTLY OF SUSPENDED CEILING SYSTEMS.
  - CEILING FANS SHALL BE SEISMICALLY BRACED/SUPPORTED.
  - CONDUITS 2" AND LARGER SHALL BE SEISMICALLY BRACED/SUPPORTED.

**SEISMIC CONTROL SPECIFICATIONS**

- PART 1 - GENERAL**
- 1.1 SUMMARY
- THIS SECTION INCLUDES THE FOLLOWING:
    - SEISMIC CONTROL REQUIREMENTS.
- 1.2 PERFORMANCE REQUIREMENTS
- SEISMIC CERTIFICATION AND ANALYSIS:
    - EACH TRADE CONTRACTOR SHALL RETAIN A SPECIALTY CONSULTANT OR EQUIPMENT MANUFACTURER TO DEVELOP A SEISMIC RESTRAINT SYSTEM AND PERFORM SEISMIC CALCULATIONS IN ACCORDANCE WITH THE OBC AND ASCE 7, AND ADDITIONAL REQUIREMENTS SPECIFIED IN THIS SECTION. A PROFESSIONAL ENGINEER EXPERIENCED IN SEISMIC RESTRAINT DESIGN AND INSTALLATION AND LICENSED IN THE STATE OF OHIO SHALL BE RESPONSIBLE FOR CALCULATIONS, RESTRAINT SELECTIONS AND INSTALLATION DETAILS.
    - THE SEISMIC RESTRAINT DESIGN SHALL CLEARLY INDICATE THE ATTACHMENT POINTS TO THE BUILDING STRUCTURE AND DESIGN FORCES IN ALL HORIZONTAL AND VERTICAL AXES AT THE ATTACHMENT POINTS. THE SEISMIC RESTRAINT ENGINEER SHALL COORDINATE ALL ATTACHMENTS WITH THE BUILDING'S STRUCTURAL ENGINEER OF RECORD, WHO SHALL VERIFY THE ATTACHMENT METHODS AND THE ABILITY OF THE BUILDING STRUCTURE TO ACCEPT THE LOADS IMPOSED.
    - THE SEISMIC RESTRAINT DESIGN SHALL BE BASED ON ACTUAL EQUIPMENT DATA (DIMENSIONS, WEIGHT, CENTER OF GRAVITY, ETC.) OBTAINED FROM SUBMITTALS OR THE MANUFACTURERS. THE EQUIPMENT MANUFACTURER SHALL VERIFY THAT THE ATTACHMENT POINTS ON THE EQUIPMENT CAN ACCEPT THE COMBINATION OF SEISMIC, WEIGHT, AND OTHER LOADS IMPOSED. FOR LIFE SAFETY SYSTEMS AND OTHER SYSTEMS THAT MUST REMAIN OPERATIONAL DURING AND AFTER AN EARTHQUAKE, THE MANUFACTURER SHALL PROVIDE CERTIFICATION THAT THE EQUIPMENT CAN ACCEPT THE LOADS IMPOSED AND REMAIN OPERATIONAL.
    - ANALYSIS SHALL INCLUDE CALCULATED DEAD LOADS, STATIC SEISMIC LOADS, AND CAPACITY OF MATERIALS UTILIZED FOR THE CONNECTION OF THE EQUIPMENT OR SYSTEM TO THE STRUCTURE. ANALYSIS SHALL DETAIL ANCHORING METHODS, BOLT DIAMETER, EMBEDMENT AND/OR WELDED LENGTH. ALL SEISMIC RESTRAINT DEVICES SHALL BE DESIGNED TO ACCEPT, WITHOUT FAILURE, THE FORCES DETAILED IN THE CODE ACTING THROUGH THE EQUIPMENT OR SYSTEM'S CENTER OF GRAVITY.
- 1.3 SUBMITTALS
- DELEGATED-DESIGN SUBMITTAL: THE SEISMIC RESTRAINT DESIGN, CONSISTING OF CALCULATIONS, RESTRAINT SELECTION, INSTALLATION DETAILS, AND OTHER DOCUMENTATION, SHALL BE SUBMITTED. THIS SUBMITTAL SHALL BE SIGNED AND SEALED BY A PROFESSIONAL ENGINEER, AS STATED ABOVE. THIS SUBMITTAL WILL BECOME PART OF THE PROJECT DESIGN CALCULATIONS, INCLUDED IN THE PROJECT RECORDS, AND WHEN REQUIRED, WILL BE SUBMITTED TO THE AUTHORITY HAVING JURISDICTION.
  - SEISMIC RESTRAINT DEVICES: PRODUCT DATA, VERIFICATION OF SEISMIC CAPABILITIES AND INSTALLATION DETAILS.
  - WELDING CERTIFICATES.
  - FIELD QUALITY-CONTROL TEST REPORTS.
- 1.4 QUALITY ASSURANCE
- COMPLY WITH SEISMIC-RESTRAINT REQUIREMENTS IN THE OBC, UNLESS REQUIREMENTS IN THIS SECTION ARE MORE STRINGENT.
  - WELDING: QUALIFY PROCEDURES AND PERSONNEL ACCORDING TO AWS D1.1/D1.1M, "STRUCTURAL WELDING CODE - STEEL."
  - ALL SEISMIC RESTRAINTS AND COMBINATION ISOLATOR / RESTRAINTS SHALL HAVE VERIFICATION OF THEIR SEISMIC CAPABILITIES. MANUFACTURERS MAY VERIFY THEIR CAPABILITIES BY TESTING THAT IS WITNESSED BY AN INDEPENDENT PROFESSIONAL ENGINEER OR AN ASSOCIATION THAT HAS DEVELOPED A UNIFORM SET OF TEST STANDARDS. INDEPENDENT APPROVAL CAN ALSO BE OBTAINED BY AGENCIES SUCH AS OSHIP (OFFICE OF STATEWIDE HEALTH, PLANNING AND DEVELOPMENT) FROM THE STATE OF CALIFORNIA, NES, ICBO ES, FACTORY MUTUAL, UNDERWRITERS LAB, RECOGNIZED INDUSTRY STANDARDS ORGANIZATIONS SUCH AS VISCMA, ETC.
- PART 2 - PRODUCTS**
- 2.1 SEISMIC-RESTRAINT DEVICES
- SEISMIC RESTRAINT DEVICES MAY INCLUDE ANY MANUFACTURER'S SYSTEM(S) SUITABLE FOR THE BUILDING CONSTRUCTION APPLICATION.
  - MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
    - THE VMC GROUP (VIBRATION MOUNTING AND CONTROLS)
    - MASON INDUSTRIES
    - KINETICS NOISE CONTROL.

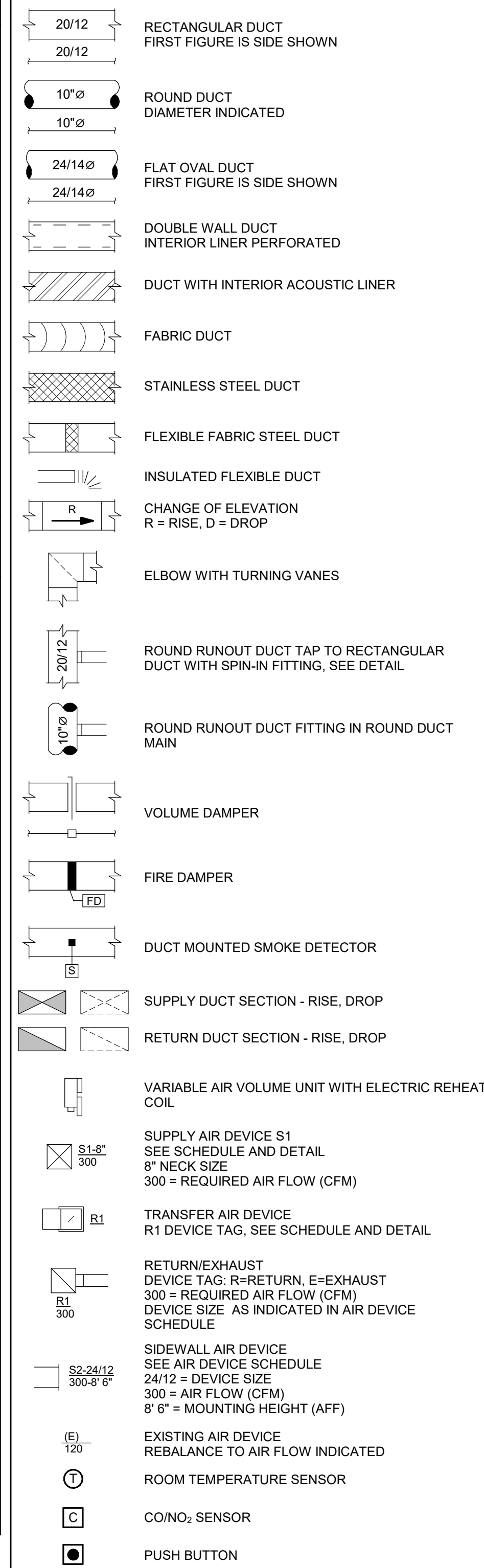
**GENERAL NOTES - HVAC**

- PROVIDE COMPLETE AND FUNCTIONAL HVAC SYSTEMS PER HVAC PLANS INCLUDING FURNISHING, INSTALLING, TESTING AND WARRANTY OF ALL WORK.
- WORK SHALL BE IN ACCORDANCE WITH THE 2017 OHIO BUILDING AND MECHANICAL CODES INCLUDING REFERENCED CODES AND STANDARDS, ALL FEDERAL, STATE, AND LOCAL CODES AND ALL APPLICABLE LAWS, ORDINANCES AND REGULATIONS.
- WORK SHALL BE PERFORMED USING BEST QUALITY INSTALLATION PRACTICE BY A QUALIFIED TRADE CONTRACTOR AND THEIR QUALIFIED SUBCONTRACTORS. ALL CONTRACTORS SHALL BE LICENSED AND BE BONDED FOR THE WORK.
- ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH OSHA AND OWNER SAFETY STANDARDS AND PRACTICES. ALL ON SITE PERSONNEL SHALL BE SAFETY TRAINED AND OWNER CERTIFIED.
- OBTAIN REQUIRED PERMITS RELATED TO THE WORK AND PAY ALL PERMIT AND INSPECTION FEES.
- THE AUTHORITY HAVING JURISDICTION SHALL INSPECT AND APPROVE ALL WORK. PROVIDE A FINAL CERTIFICATE OF APPROVAL FROM THE AUTHORITY HAVING JURISDICTION AND PRESENT TO THE OWNER BEFORE REQUESTING FINAL PAYMENT AND RELEASE OF RETAINAGE.
- ALL EQUIPMENT AND MATERIAL REQUIRED FOR COMPLETE AND FUNCTIONAL HVAC SYSTEMS ARE INCLUDED IN THE CONTRACT.

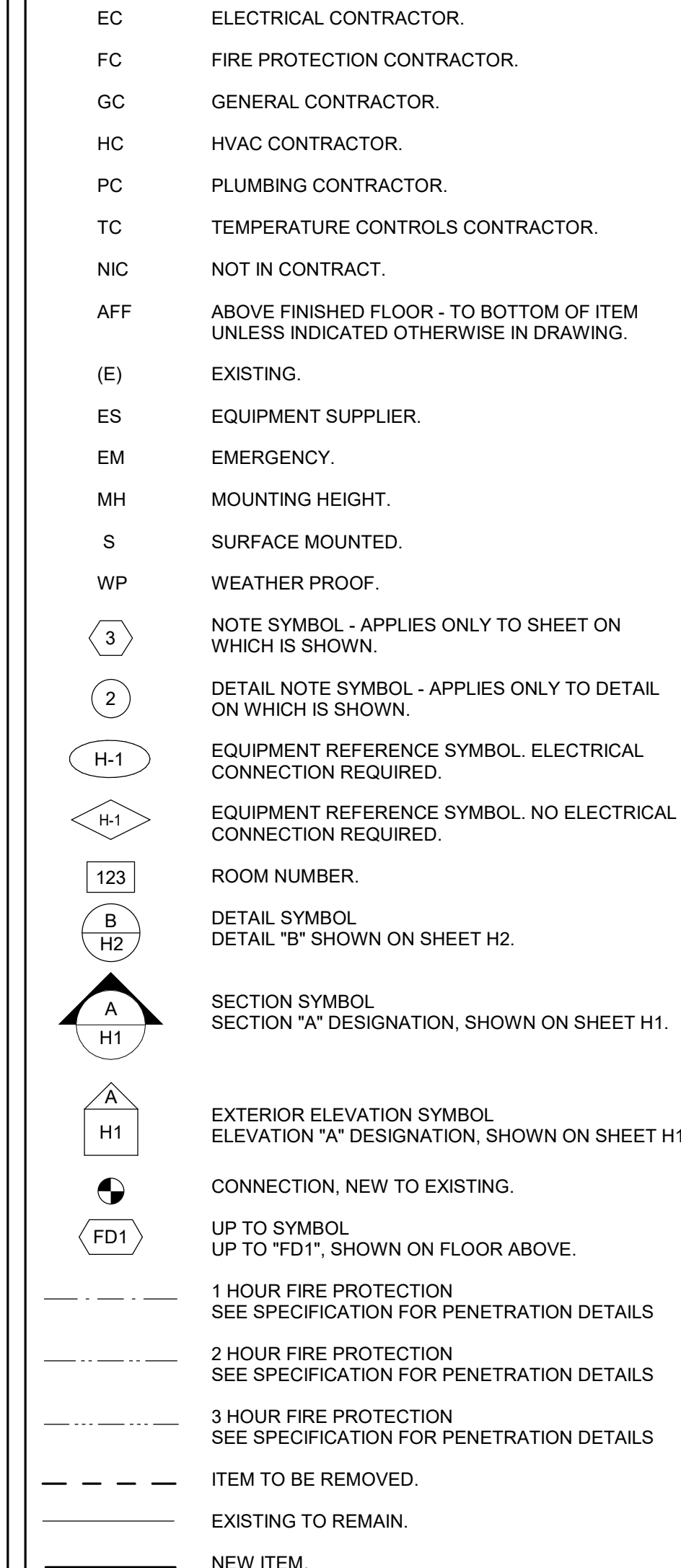
**GENERAL REQUIREMENTS - HVAC**

- PROTECT ALL FURNISHED MATERIAL AND EQUIPMENT FROM THEFT AND DETERIORATION OR CONTAMINATION DUE TO WEATHER OR CONSTRUCTION ACTIVITIES.
- PROTECT OWNERS PROPERTY AND PROPERTY OF OTHER CONTRACTORS.
- REMOVE ALL CONSTRUCTION DEBRIS FROM SITE. RECYCLE DEBRIS WHERE POSSIBLE. DISPOSE OF ALL HAZARDOUS MATERIAL IN ACCORDANCE WITH ENVIRONMENTAL LAWS.
- PROVIDE ALL CUTTING AND PATCHING REQUIRED TO INSTALL MATERIAL AND EQUIPMENT.
- PROVIDE APPROPRIATE FIRESTOPPING SYSTEM FOR ANNULAR SPACE OPENINGS AROUND DUCT AND PIPE PENETRATIONS THROUGH FIRE RESISTANCE RATED CONSTRUCTION. ANNULAR SPACE OPENINGS AT DUCT OR PIPE PENETRATIONS IN NON RATED CONSTRUCTION TO BE CLOSED AIR AND WATER TIGHT.
- MATERIALS AND EQUIPMENT SHALL BE ONE OF THE BRAND OR MANUFACTURERS LISTED OR AN APPROVED EQUAL.
- ELECTRONIC SHOP DRAWINGS SHALL BE PROVIDED IN .PDF FORMAT FOR THE ENGINEER'S APPROVAL FOR ALL MATERIALS AND EQUIPMENT. SHOP DRAWINGS SHALL BE SPECIFICALLY EDITED TO ELIMINATE SUPERFLUOUS INFORMATION AND SHALL CLEARLY SHOW SPECIFICS FOR THE MATERIAL AND EQUIPMENT PROVIDED.
- COORDINATE INSTALLATION OF ACTUAL EQUIPMENT AND SYSTEMS PROVIDED WITH OTHER TRADES AND NEW OR EXISTING CONDITIONS.
- INSTALL ALL MATERIALS AND EQUIPMENT IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND REQUIREMENTS. PROVIDE REQUIRED CLEARANCES TO MEET CODE REQUIREMENTS. MANUFACTURER'S RECOMMENDATIONS AND MAINTENANCE SERVICE.
- ALL WORK AREAS SHALL BE CLEANED TO MATCH ORIGINAL CONDITION.
- PROVIDE TESTING, ADJUSTING AND BALANCING (TAB) REPORTS FOR AIR AND WATER SYSTEMS. A CERTIFIED ABC OR NEBB FIRM SHALL PROVIDE THE BALANCE.
- PROVIDE FINAL COORDINATION/INSTALLATION DRAWINGS TO THE OWNER IN BOUND PAPER AS WELL AS ELECTRONIC FORMAT FOR RECORD.
- MAINTAIN RECORD DRAWINGS AND PROVIDE TO THE OWNER OR HIS AGENT.
- PROVIDE TWO (2) BOUND, PAPER COPIES OF ALL OPERATING AND MAINTENANCE MANUALS. PROVIDE AN ELECTRONIC COPY OF THE OPERATING AND MAINTENANCE MANUAL.
- PROVIDE WARRANTY FOR ALL WORKMANSHIP, EQUIPMENT AND MATERIAL. WARRANTY SHALL BE 1 YEAR FOR PART AND LABOR, PROVIDE EXTENDED WARRANTY PERIOD FOR PARTS AND/OR LABOR AS IDENTIFIED OR AS STANDARD FOR CERTAIN ITEMS OF EQUIPMENT.

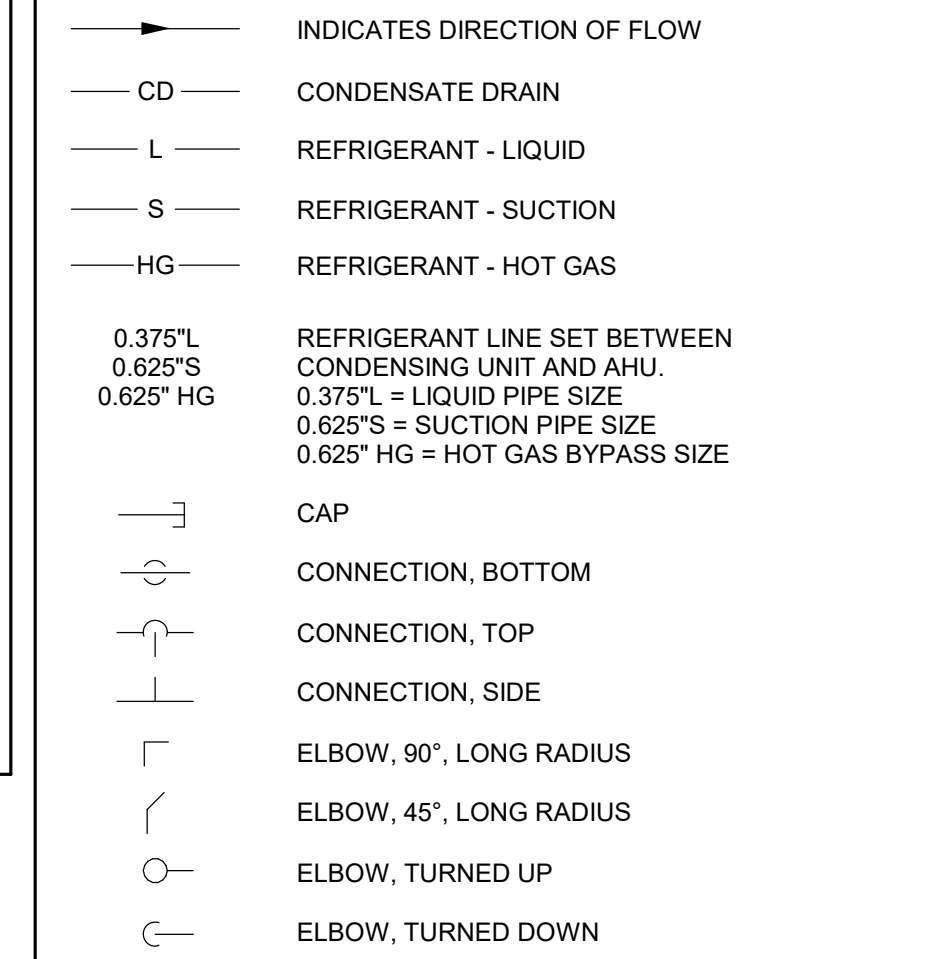
**DUCTWORK LEGEND**



**GENERAL LEGEND**



**PIPING LEGEND**



**HVAC INDEX OF DRAWINGS**

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EXPIRATION DATE 12/21/2023

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PHOTO: ANDREW HARRIS  
PROJECT #2021

City of Middletown  
**Fire Station No. 83 & Headquarters**  
1630 Yankee Road, Middletown, Ohio 45044

NO.	DATE	DESCRIPTION
101623	FOR CONSTRUCTION	

DATE	10/16/2023
JOB NO.	4069.00
DRAWN	DJZ
CHECKED	JDZ
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TITLE  
**LEGENDS & SCHEDULES**

SHEET NO.  
**H0.1**

**DUCT INSULATION SCHEDULE**

**QUALITY ASSURANCE**  
 INSULATION SHALL MEET NFPA 255, 25 FLAME SPREAD & 50 SMOKE DEVELOPMENT, UL 181, NFPA 90A/90B, ASTM 1136, AND ASTM...  
 MINIMUM INSULATION THICKNESS SHALL COMPLY WITH ASHRAE 90.1-2010

**PRODUCTS**  
 - PROTECTIVE METAL JACKET COVERS - 0.016" ALUMINUM.

**EXECUTION**  
 - INSULATION SHALL BE INSTALLED IN STRICT ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.  
 - DUCTWORK SHALL BE SEALED PRIOR TO INSTALLATION OF INSULATION.  
 - ALL EXTERIOR DUCT INSULATION SHALL BE SEALED WATERTIGHT.  
 - REINSULATE DUCTWORK WHERE EXISTING INSULATION IS DAMAGED IN CONNECTION OF NEW DUCTWORK  
 - ALL INSULATION VAPOR BARRIERS SHALL BE MAINTAINED.  
 - ADHESIVE SHALL BE APPLIED TO AID INSTALLATION  
 - REQUIRED INTERNAL DUCT LINING IS INDICATED ON DRAWINGS. LINED DUCTWORK NEED NOT BE FURTHER INSULATED.  
 - DUCT COILS, REHEAT BOX COILS, CONTROL DAMPER, FIRE DAMPERS & SMOKE DAMPERS SHALL BE INSULATED IF SYSTEM INSULATION IS INDICATED.  
 - ALL INSULATION SHALL BE MARKED WITH MANUFACTURER, "R" VALUE, FLAME SPREAD & SMOKE DEVELOPMENT.

SYSTEM	INSULATION THICKNESS	TYPE	LOCATION	NOTES
SUPPLY AIR DUCT	1.5"	1	CONCEALED	
SUPPLY AIR DUCT	2"	2	EXPOSED - UNCONDITIONED	
SUPPLY AIR DUCT	-	-	EXPOSED - CONDITIONED	

SYSTEM	INSULATION THICKNESS	TYPE	LOCATION	NOTES
OUTDOOR AIR DUCT & PLENUMS	2"	2	EXPOSED	
RETURN AIR DUCT	-	-	CONCEALED	
RETURN AIR DUCT	-	-	EXPOSED	
RETURN AIR DUCT	1"	4	AHU-1 RETURN DUCT	2
RELIEF AIR DUCT & PLENUMS	-	-	EXPOSED	
EXHAUST AIR DUCT & PLENUMS	-	-	CONCEALED	
EXHAUST AIR DUCT & PLENUMS	-	-	EXPOSED	

TYPE	BASIS OF DESIGN	APPROVED EQUALS	DESCRIPTION
1	OWENS-CORNING SOFTR TYPE 75	KNAUF JOHN MANVILLE MANSION CERTAIN TEED	MATERIAL: FIBERGLASS DUCT WRAP ON DUCT K = 0.30 @ 75 DEG. F. DENSITY - 0.75 PCF JACKET - FOIL REINFORCED JOINTS - OVERLAPPING STAPLE ALL JOINTS AT 6" CENTERS. FASTENERS - MECHANICAL ON 24" & WIDER DUCT. ADHESIVE - NONE TAPE - 3" WIDE
2	OWENS-CORNING TYPE 703	KNAUF JOHN MANVILLE MANSION CERTAIN TEED	MATERIAL: FIBERGLASS BOARD ON DUCT K = 0.23 @ 75 DEG. F. DENSITY - 3.0 PCF JACKET - ASJ JOINTS - BUTT FASTENERS - METAL PINS & CLIPS ON 12" CENTERS ADHESIVE - NONE TAPE - 3" WIDE VAPOR PATCHED
3	3M FIRE BARRIER DUCT WRAP 615	UNIFRAX	HIGH TEMPERATURE FIBROUS BLANKET FIBERGLASS REINFORCED ALUMINIZED POLYESTER FOIL. DENSITY - 6.0 PCF CONTINUOUS USE LIMIT = 1000 DEG. C. R-VALUE - 6.3 @ 77 DEG. F. SMOKE DEVELOP INDEX - 0 FLAME SPREAD INDEX - 0 TAPE - FSK S.S. BANDING MATERIAL
4	OWENS-CORNING QUIET R ROTARY DUCT LINER	KNAUF JOHN MANVILLE MANSION CERTAIN TEED	MATERIAL: FIBERGLASS DUCT LINER K = 0.23 @ 75 DEG. F. JACKET - NONE JOINTS - BUTT FASTENERS - METAL PINS & CLIPS ON 12" CENTERS ADHESIVE COMPLIES WITH ASTM C916 TAPE - LEADING NOSE - METAL NOSING

- NOTES:**  
 1. PROVIDE TWO LAYERS OF FIRE BARRIER WRAP ON ALL INTERIOR KITCHEN HOOD EXHAUST DUCT.  
 2. DUCTWORK DIMENSION NOTED ON DRAWING IS OPEN DUCT INTERIOR DIMENSION.

**PIPE INSULATION SCHEDULE**

**QUALITY ASSURANCE**  
 PRODUCTS SHALL COMPLY WITH ASTM E84 FIRE, SMOKE RATINGS:  
 - INDOORS - FLAME SPREAD RATING OF 25 OR LESS, SMOKE DEVELOPED RATING OF 50 OR LESS.  
 - OUTDOORS - FLAME SPREAD RATING OF 75 OR LESS, SMOKE DEVELOPED RATING OF 150 OR LESS.  
 GREEN GUARD INDOOR AIR QUALITY CERTIFIED.  
 THICKNESSES SHALL COMPLY WITH MOST CURRENT VERSION OF ASHRAE 90.1.

**PRODUCTS**  
 REQUIREMENTS ARE FOR BOTH SUPPLY & RETURN SYSTEMS.

**MANUFACTURERS**  
 FIBERGLASS - JOHNS MANVILLE, OWENS CORNING, KNAUF, MANSION INSULATION  
 CALCIUM SILICATE - PABCO, CALSILITE, JOHNS MANVILLE (IG)  
 FLEXIBLE ELASTOMERIC - AEROFLEX, ARMACELL, RUBATEX  
 POLYISOCYANURATE - ITW

**EXECUTION**  
 INSTALLATION PER MANUFACTURER'S RECOMMENDATIONS.  
 COLD SERVICE PIPE INSULATION AND VAPOR BARRIER/JACKET TO BE CONTINUOUS THRU FLOOR AND WALL SLEEVES AT ALL PIPE DEVICES AND PUMP CASINGS.  
 INSULATION AND VAPOR BARRIER TO BE CONTINUOUS AT PIPE HANGERS AND SUPPORTS ON HORIZONTAL PIPING.  
 VERTICAL PIPE SUPPORTS SHALL ATTACH DIRECTLY TO PIPE. INSULATE SUPPORT AND OTHER SURFACES WITH FLEXIBLE CLOSED CELL INSULATION, SAME THICKNESS AS SYSTEM INSULATION ON COLD SERVICE PIPES TO PREVENT CONDENSATION.  
 EXISTING PIPE INSULATION THAT IS DAMAGED, REMOVED OR NOT PRESENT WITHIN THE CONSTRUCTION AREA SHALL BE INSULATED PER SCHEDULE FOR THE SYSTEM SERVICE INDICATED.  
 INSULATION MAY BE OMITTED ON HOT WATER VALVES AND DEVICES 2" AND SMALLER PIPE SIZE (EXCEPT WITHIN 12" OF AIR REHEAT BOXES), HOT WATER PIPING WITHIN UNIT HEATERS, EXPOSED COOLING COIL CONDENSATE PIPING AND SAFETY RELIEF VALVE PIPING. SEE HEATING COIL PIPING DETAIL.

SYSTEM & SIZE	INSULATION THICKNESS	TYPE	LOCATION
REFRIGERANT LIQUID	0.75"	E1, E2	INTERIOR (E1) / EXTERIOR (E2)
REFRIGERANT HOT GAS	0.75"	E1, E2	INTERIOR (E1) / EXTERIOR (E2)
REFRIGERANT SUCTION	0.75"	E1, E2	INTERIOR (E1) / EXTERIOR (E2)
COOLING COIL CONDENSATE	0.5"	F1	INTERIOR

TYPE	BASIS OF DESIGN	APPROVED EQUALS	DESCRIPTION
F1	OWENS CORNING #ALL SERVICE JACKET	-KNAUF #1000" PIPE -JOHNS MANVILLE #MICRO-LOK HP	PREFORMED, TUBULAR, INORGANIC GLASS FIBER WITH RESIN BONDING K=0.24 @ 100 DEG. F. 3.5 - 5.5 PCF WHITE FSRK JACKET. LONGITUDINAL LAP SELF-SEALING ADHESIVE. ELBOWS, TEES, VALVES, CAPS, ETC., WHITE ONE PIECE, PREMOLDED 2550 0.20" PVC FITTING COVERS WITH HIGH DENSITY FIBERGLASS INSULATION INSERTS SAME THICKNESS, K=0.26 EQUAL TO ZESTON OR PROTO.
E1	AEROFLEX #AEROCCEL EPDM	-ARMACELL -RUBATEX	FLEXIBLE, PRE-FORMED, CLOSED CELL, EPDM ELASTOMERIC TUBULAR INSULATION, OR SHEET INSULATION. K=0.25 @ 75 DEG. F. CLEAN PIPE SURFACE WITH DENATURED ALCOHOL PRIOR TO INSULATING.
E2	ARMACELL #AP ARMAFLEX FS	-AEROFLEX -RUBATEX	FLEXIBLE, PRE-FORMED, CLOSED CELL, ELASTOMERIC TUBULAR INSULATION. CLEAN PIPE SURFACE WITH DENATURED ALCOHOL PRIOR TO INSULATING. K=0.25 @ 75 DEG. F. 2550 FLAME/SMOKE RATING. PROVIDE 0.20" ROLL ALLOY ALUMINUM EMBOSSED JACKET, SEAM SIDE DOWN WITH 0.50" WIDE, 0.015" S.S. STRAP AND SEALS EQUAL TO PABCO-CHILDERS METALS/GERRARD.

**PIPING SYSTEMS - HVAC**

**GENERAL NOTES:**  
**QUALITY ASSURANCE:**  
 PIPING SHALL CONFORM TO OBC REQUIREMENTS.  
 PIPING SHALL COMPLY WITH ASME B31.9 "BUILDING SERVICES PIPING"  
 WELDING PROCEDURES & TESTING SHALL COMPLY WITH ANSI STANDARD B31.1.0.

**PRODUCTS**  
 REINFORCED FORGED WELDING OUTLETS EQUAL TO BONNET WELD/LET AND THREAD/LET MAY BE USED WHERE BRANCH IS TWO SIZES SMALLER THAN THE MAIN.  
 DIELECTRIC CONNECTORS SHALL BE PROVIDED AT CONNECTIONS BETWEEN FERROUS & COPPER PIPING.  
 PIPING WITHIN 2'-0" OF SMALL HEATING/COOLING UNITS MAY BE TYPE "CS" PIPING.  
 MECHANICALLY FORMED TEES AND COUPLING (T-DRILL) ARE NOT PERMITTED.  
 MECHANICAL JOINT PIPING SYSTEM SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURED RECOMMENDATIONS.

**UNIONS:**  
 COPPER TUBING - WROUGHT OR CAST COPPER, CLASS 150, SOLDERED ENDS  
 THREADED STEEL PIPE - MALLEABLE IRON W/GROUND SEAT, 300 LB SCREWED ENDS

**FLANGES:**  
 COPPER TUBING - CLASS 150 CAST COPPER ALLOY, SOLDERED  
 STEEL PIPE - CLASS 150 SUP/ON OR WELD NECK  
 GASKETS - 1/16" THICK FULL FACE COMPRESSED SHEET GASKET SUITABLE FOR PRESSURE AND TEMPERATURE RANGES OF THE APPLICATION

**BULB WELLS FOR TEMPERATURE SENSING SPECIFIED IN THE CONTROLS AND INSTRUMENTATION SECTION SHALL BE FURNISHED BY THE CONTROL SUBCONTRACTOR AND INSTALLED BY THE PIPING CONTRACTOR. OTHER TYPES OF CONTROL DEVICES (DIFFERENTIAL PRESSURE SWITCHES, FLOW METERS, ETC) SHALL ALSO BE INSTALLED BY THE PIPING CONTRACTOR. DEVICES, FITTINGS (TEES, WELD/LETS, THREAD/LETS), LOCATIONS AND INSTALLATION DETAILS SHALL BE CLOSELY COORDINATED WITH THE CONTROLS SUBCONTRACTOR AND DEVICE MANUFACTURER'S INSTRUCTIONS.**

**AUTOMATIC CONTROL VALVES SHALL BE FURNISHED BY THE CONTROLS SUBCONTRACTOR FOR INSTALLATION BY THE HVAC PIPING CONTRACTOR. FLARE FITTINGS FOR FLARE END VALVES SHALL BE PROVIDED BY THE HVAC PIPING CONTRACTOR.**

**EXECUTION**  
 PIPE AND TUBING SHALL BE CUT AND FABRICATED TO FIELD MEASUREMENTS AND RUN PARALLEL TO NORMAL BUILDING LINES. PIPE INTERIOR SHALL BE CLEANED OF FOREIGN MATTER AND BURRS BEFORE ERECTION OF PIPE.  
 SUPPORT PIPING FROM BUILDING STRUCTURE WITH RODS, ANGLES & CLAMPS ATTACHED TO STRUCTURE. HANG PIPING WITH GLEVIS HANGER OR ROLLER SUPPORTS. HANGERS SHALL BE INSTALLED ON CENTERS AS RECOMMENDED BY MANUFACTURER.  
 PIPING SHALL BE PITCHED FOR DRAINAGE. THE LOW POINTS SHALL BE FITTED WITH A 3/4" BALL DRAIN VALVE WITH HOSE THREAD ADAPTOR.  
 PROVIDE PIPING SLEEVES AT FLOORS, WALLS & ROOFS IN NEW CONSTRUCTION. EXISTING WALL TO BE SAW CUT TO PASS NEW PIPING.  
 PIPING SHALL NOT BE RUN ABOVE ELECTRICAL SWITCHGEAR OR PANELBOARDS, NOR ABOVE THE ACCESS SPACE OF SUCH EQUIPMENT - NEC ARTICLE 384.  
 ANNULAR SPACE AROUND PIPING THRU ALL WALLS SHALL BE SEALED OFF WITH PERMANENT PLIABLE CAULKING OR APPROVED PATCHING SEALANT.  
 CLOSE OPEN ENDS OF PIPING DURING CONSTRUCTION.  
 CLEAN INTERIOR PIPING AFTER INSTALLATION BY FLUSHING WITH CLEAN POTABLE WATER TO CLEAR ALL INTERNAL DEBRIS.  
**TESTING**  
 PIPING SHALL BE AIR TESTED AT 50% HIGHER THAN MAXIMUM SYSTEM OPERATING PRESSURE FOR EIGHT (8) HOURS BEFORE FLUSHING  
**IDENTIFICATION & MARKING**  
 PLASTIC SNAP-ON PIPE MARKERS SHALL BE INSTALLED ON PIPING INDICATING SERVICE AND DIRECTION OF FLOW.

PIPING SYSTEM	TYPE
COIL CONDENSATE DRAINAGE	C3
COPPER TUBE REFRIGERANT PIPING - AHU	C1
COPPER COIL REFRIGERANT PIPING - IT SPLIT SYSTEM	C1

TYPE	DESCRIPTION	TYPE	DESCRIPTION
C1	BRAZED COPPER REFER TO SPECIFICATION 23 2300 FOR INFORMATION	C3	SOLDERED COPPER TYPE "DWV" HARD COPPER ASTM B88 CAST DWV COPPER FITTINGS 95-5 SOLDER

**DUCT CONSTRUCTION MATERIAL SCHEDULE**

DUCTWORK SYSTEMS	LOCATION	MATERIAL	SMACNA CLASS.		NOTES
			SP. CONSTR.	SEAL CLASS	
RETURN AIR	CONCEALED	G1	-2"	C	
RETURN AIR	EXPOSED	G2	-2"	C	1
OUTDOOR SUPPLY AIR	ALL	G1	+4"	A	
EXHAUST AIR	CONCEALED	G1	-2"	C	
EXHAUST AIR	EXPOSED	G2	-2"	C	1
AIR TRANSFER	ALL	G1	-1"	NOT RECD.	
SUPPLY AIR - VAV UPSTREAM	CONCEALED	G1	+4"	A	
SUPPLY AIR - VAV UPSTREAM	EXPOSED	G2	+4"	A	1
SUPPLY AIR - VAV DOWNSTREAM	CONCEALED	G1	+1"	C	
SUPPLY AIR - VAV DOWNSTREAM	EXPOSED	G2	+1"	C	1
SUPPLY AIR - CONSTANT VOLUME	CONCEALED	G1	+3"	B	
FLEXIBLE DUCTWORK - SUPPLY	CONCEALED OR UNCONDITIONED	C1	+10" -5"	N.A.	
TYPE 1 KITCHEN HOOD EXHAUST	CONCEALED	SS1	-2"	C	2
TYPE 1 KITCHEN HOOD EXHAUST	EXPOSED	SS2	-2"	C	2
DOMESTIC WATER HEATER	INTAKE / FLUE	P1	-2" / +4"	A	
GAS FIRED UNIT HEATER	INTAKE / FLUE	P1	-2" / +4"	A	
RADIANT HEATER INTAKE	ALL	G1	-2"	A	
RADIANT HEATER FLUE - TYPE B	APP. BAY	D1	+4"	A	
GEAR DRYER EXHAUST	DECON	SS1	+2"	C	

TYPE	MATERIAL	DESCRIPTION
C1	CHLORINATED POLYETHYLENE	BLACK INNER FABRIC WITH GALVANIZED STEEL HELIX REINFORCING, R = 6.0 (MIN.) FIBERGLASS INSULATION, REINFORCED METALIZED VAPOR BARRIER, 0.05 PERM, UL 181, CLASS 1 DUCT, MEET NFPA 90A & 90B, 2550 FLAME/SMOKE SPREAD
D1	ALUMINUM / GALVANIZED DOUBLE WALL	DOUBLE WALL TYPE B VENT. REFER TO SPEC. 235100.
G1	GALVANIZED STEEL	24 GA. MIN., HOT DIPPED, GALVANIZED BOTH SIDES, 900 PER ASTM A653.
G2	GALVANIZED STEEL	24 GA. MIN., HOT DIPPED, HEAT TREATED GALVANNEALED BOTH SIDES PER ASTM A653, PAINT COLOR OR SELECTION BY ARCHITECT, FINAL PAINTING BY G.C., 440 PER ASTM A653.
P1	POLYPROPYLENE	SCHEDULE 40 POLYPROPYLENE UL 1738 HIGH TEMPERATURE RATED, 230 DEG. F. FLUE GAS RATING CENTROHERM INNOFLUE SINGLE WALL OR EQUAL.
SS1	STAINLESS STEEL KITCHEN EXHAUST DUCT	TYPE 304 STAINLESS STEEL SHEET CONSTRUCTION: 18 GA. MIN. - ASTM A480. JOINTS & SEAMS: CONTINUOUSLY WELDED FINISH: CONDITION A, NO. 4 (BRUSHED) NO. 8 (MIRROR) POLISH FINISH WITH WELDS GROUND SMOOTH AND POLISHED. FITTINGS/TRANSITIONS: ELBOWS SHALL BE RADIUSED. DUCT ACCESSORIES: PROVIDE BOLTED AND GASKETED LIQUID TIGHT CLEANOUT DOORS IN THE SIDE OF THE DUCT AT 20FT CENTERS IN HORIZONTAL RUNS.
SS2	STAINLESS STEEL KITCHEN EXHAUST DUCT	TYPE 304 STAINLESS STEEL SHEET CONSTRUCTION: 18 GA. MIN. - ASTM A480. JOINTS & SEAMS: CONTINUOUSLY WELDED. FINISH: CONDITION A, NO. 4 (BRUSHED) NO. 8 (MIRROR) POLISH FINISH WITH WELDS GROUND SMOOTH AND POLISHED. FITTINGS/TRANSITIONS: ELBOWS SHALL BE RADIUSED. DUCT ACCESSORIES: PROVIDE BOLTED AND GASKETED LIQUID TIGHT CLEANOUT DOORS IN THE SIDE OF THE DUCT AT 20FT CENTERS IN HORIZONTAL RUNS.

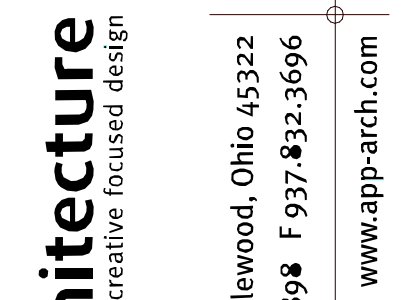
- NOTES:**  
 1. DUCTWORK SYSTEMS ARE TO MATCH BASE MATERIALS FOR CONCEALED AND EXPOSED INSTALLATIONS.  
 2. PROVIDE 2 LAYERS OF FIRE BARRIER WRAP ON ALL INTERIOR KITCHEN HOOD EXHAUST DUCT.

**DUCT CONSTRUCTION GENERAL REQUIREMENTS**

**QUALITY ASSURANCE**  
 • COMPLY WITH GENERAL WELDING PERSONNEL & PROCEDURES UNDER AWS D1.1/D1.1M, AWS D1.2/D1.2M & AWS D9.1/D9.1M.  
 • COMPLY WITH GENERAL DUCT CONSTRUCTION STANDARDS UNDER SMACNA HVAC DUCT CONSTRUCTION STANDARDS METAL AND FLEXIBLE - THIRD EDITION AND MOST CURRENT VERSION OF APPLICABLE ASHRAE 90.1 SECTION 6.4.4 AND ASHRAE 62.1 SECTIONS 5 & 7.  
 • COMPLY WITH SEISMIC REQUIREMENTS PRESCRIBED UNDER SMACNA DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE THIRD EDITION & ASCE/SEI 7.

**PRODUCTS**  
 ROUND OR FLAT OVAL SINGLE WALL DUCTWORK - 2" S.P. AND HIGHER  
 • CONTINUOUS HELICAL (SPIRAL) LOCK SEAM CONSTRUCTION.  
 • SLIP CONNECTIONS; GASKETED FLANGES ARE NOT ACCEPTABLE.  
 • USE 45 DEG. LATERAL TEES WHEREVER POSSIBLE.  
 • 90 DEG. TEES SHALL BE CONICAL SPIN-IN TYPE.  
 • DIE STAMPED ELBOWS, r/D = 1.5 (MIN.)  
 • RADIUSED, ANGLED (15" MAX.) OR MITERED (15" MAX.) OFFSETS.  
 • CONCENTRIC TRANSITIONS, 0 = 45" MAX.  
 • ECCENTRIC TRANSITIONS, 0 = 30" MAX.  
 ROUND OR FLAT OVAL DOUBLE WALL DUCTWORK - 2" S.P. AND HIGHER (SAME AS ABOVE EXCEPT)  
 • INSULATION THICKNESS PER INSULATION SCHEDULE FOR INTENDED SERVICE.  
 • PERFORATED INNER LINER/SOLID INNER LINER.  
 • OUTER PRESSURE SHELL.  
 ROUND DUCTWORK - 1" S.P. OR LESS (SAME AS ABOVE EXCEPT)  
 • LONGITUDINAL SEALED SEAM CONSTRUCTION ACCEPTABLE AT FINAL AIR DEVICE ONLY.  
 • STANDARD TEES ALLOWED.  
 • SEGMENTED ELBOWS ALLOWED.  
 RECTANGULAR DUCTWORK - 2" S.P. AND HIGHER  
 • FLAT SLIP, STANDING DRIVE OR GASKETED FLANGE DUCT SYSTEM CONNECTIONS.  
 • RADIUS OR SQUARE THROAT WITH DOUBLE WALL TURNING VANES ELBOW.  
 • 45 DEG. ENTRY OR CONICAL SPIN-IN BRANCH CONNECTIONS.  
 • RADIUSED, ANGLED (15" MAX.) OR MITERED (15" MAX.) OFFSETS.  
 • CONCENTRIC TRANSITIONS, 0 = 45" MAX.  
 • ECCENTRIC TRANSITIONS, 0 = 30" MAX.  
 • BRANCH DUCTS SHALL BE CONICAL TEE FITTINGS.  
 • SQUARE THROAT, RADIUS HEEL 90° ELBOWS ARE NOT PERMITTED.  
 RECTANGULAR DUCTWORK - 1" S.P. OR LESS (SAME AS ABOVE EXCEPT)  
 • TURNING VANES IN ELBOWS NOT REQUIRED FOR AIR VELOCITIES LESS THAN 800 FPM.  
 • STRAIGHT TAP AND STANDARD SPIN-IN BRANCH CONNECTIONS PERMITTED.  
 FLEXIBLE DUCTWORK - SUPPLY/RETURN/TRANSFER/EXHAUST  
 • PROVIDE MANUFACTURED DUCT SUPPORTS AT 90 DEGREE ELBOWS TO CEILING AIR DEVICES.  
 • FLAME SPREAD LESS THAN 25, SMOKE DEVELOPMENT LESS THAN 50.  
 DUCT SEALANT & GASKETS  
 • GALVANIZED DUCT SEALANT - WATER BASED SYNTHETIC LATEX EMULSION, GRAY IN COLOR.  
 • FLANGE GASKETS - BUTYL RUBBER, NEOPRENE, OR EPDM POLYMER W/ POLYISOBUTYLENE PLASTICIZER.  
 • ALUMINUM DUCT SEALANT - ALUMINUM SILICONE, GRAY IN COLOR.  
 • PVC COATED DUCT SEALANT - PVS SEALANT OR CAULK/MINERAL IMPREGNATED FIBER TYPE.  
 DUCT HANGER SUPPORTS  
 • DUCT HANGER SUPPORTS SHALL DIRECTLY ATTACH TO DUCTWORK.  
 • EXTERIOR DUCT INSULATION WRAP SHALL BE APPLIED OVER DUCT AND HANGER SUPPORTS.  
 • ANGLE OR UNISTRUT SUPPORTS SHALL BE INSULATED A MINIMUM OF 4" BEYOND DUCT BEARING POINT TO PREVENT CONDENSATION.

**EXECUTION**  
 • DRAWINGS INDICATE GENERAL LOCATION OF DUCTWORK. COORDINATE DUCT LAYOUT CAREFULLY WITH OTHER TRADES TO AVOID CONFLICT. PROVIDE OFFSETS AS REQUIRED.  
 • SPAN DUCTWORK FROM STRUCTURAL CONCRETE/STEEL MEMBERS OR SUPPLEMENTARY STEEL SHAPES.  
 • FOR EXPOSED DUCTWORK, GRIND WELDS SMOOTH AND POLISH AND TRIM SEALANTS FLUSH WITH DUCT SURFACES.  
 • PROTECT DUCTWORK DURING CONSTRUCTION AND CLEAN PRIOR TO SYSTEM OPERATION.  
 • ROUTE DUCTWORK TO AVOID PASSING THRU TRANSFORMER VAULTS OR ABOVE ELECTRICAL SWITCHGEAR OR PANELBOARDS PER NEC REQUIREMENTS.  
 • SEAL DUCTS ACCORDING TO SMACNA SEAL CLASS NOTED IN SCHEDULE.  
 • SYSTEMS OPERATING AT 3" S.P. OR HIGHER AND ALL EXTERIOR DUCTWORK SHALL REQUIRE DUCT PRESSURE TESTING.  
 • WET DUCT SYSTEMS SHALL BE PITCHED FOR DRAINAGE. PROVIDE TRAPPED DRAIN AT SYSTEM LOW POINTS AND PIPE TO LOCAL DRAIN POINT.  
 • ALL EXPOSED DUCTWORK SHALL BE PAINTED TO MATCH BASE MATERIAL COLORS. PAINTING BY G.C.



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JEFFREY D. ZELINSKI, LICENSE #63822  
 EXPIRATION DATE 12/21/2023



204 S. Ludlow Street Suite 400 Dayton, Ohio 45402  
 (937) 233-8888  
 PROJECT #2021

City of Middletown  
**Fire Station No. 83 & Headquarters**  
 1630 Yankee Road, Middletown, Ohio 45044

NO.	DATE	DESCRIPTION
10/16/23		FOR CONSTRUCTION

DATE	10/16/2023
JOB NO.	4069.00
DRAWN	DJZ
CHECKED	DJZ
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TITLE <b>MATERIAL SCHEDULES</b>	

SHEET NO.  
**H0.2**

EQUIPMENT NOTES	
DS-1	DUCT SILENCER BASIS OF DESIGN: VIBRO-ACOUSTICS AIRFLOW: 8,010 CFM PRESSURE DROP: 0.2" CASING: 22 GA GALVANIZED MEDIA FILL: ACOUSTIC GRADE GLASS FIBER REFER TO SPECIFICATION 23.3330 FOR SOUND DISSIPATION CHARACTERISTICS DIMENSIONS: 60" L / 38" W / 24" H

KITCHEN HOOD - KH-1 SCHEDULE	
RESIDENTIAL RANGE HOOD CAPTIVE AIRE #2424-WRH	FEATURES: • 5' LENGTH • EXHAUST COLLAR WITH STANDARD WRAPPER, H.C. TO COORDINATE WRAPPER DIMENSIONS WITH G.C. • STAINLESS STEEL BACKSPASH • TOUCHSCREEN USER INTERFACE • RECESSED LED LIGHTS • 1-1/4" GAS SOLENOID VALVE WITH COOKING SURFACE SHUTOFF • INTEGRATED FIRE SUPPRESSION SYSTEM • INTEGRATED SYSTEM CONTROLS (INTERLOCK WITH BAS) & GREASE FILTER WITH GREASE CUP HOOD TO INCLUDE TEMPERATURE SENSOR WHICH WILL AUTOMATICALLY START EF-4 (REMOTE KITCHEN EF) WHEN TEMPERATURE EXCEEDS 125° (ADJ) HOOD POWER: 120V/1PH/50A/15MOCP REFER TO DETAIL 3, SHEET H3.4 FOR INSTALLATION DIAGRAM.

AIR DEVICE SCHEDULE					
<b>GENERAL NOTES</b>		STANDARD WHITE BAKED ACRYLIC FINISH UNLESS NOTED OTHERWISE. DEVICES NOTED WITH PC-12 FINISH SHALL HAVE COLOR SELECTED BY THE ARCHITECT, FINAL PAINTING BY THE G.C.			
BASIS OF DESIGN: PRICE EQUAL BY TITUS, TUTTLE & BAILEY		MAXIMUM SOUND LEVEL AT NC-25 AT INDICATED AIR FLOW. BALANCING DAMPER GENERALLY PROVIDED IN DUCT, NOT AT DEVICE.			
DIFFUSERS SHALL BE 4-WAY THROW UNLESS OTHERWISE NOTED OR INDICATED ON DRAWINGS. VERIFY CEILING TYPE AND PROVIDE APPROPRIATE MOUNTING FRAME WHERE REQUIRED.					

TAG	DESCRIPTION	MODEL NO.	MATERIAL	ACCESSORIES	NOTES
S1 & S1A	2'X2' SQUARE PLAQUE DIFFUSER ROUND DUCT CONNECTION	SPD (ASPD)	STEEL (A) = ALUMINUM	INSULATED BACKPAN (STYLE 31)	
S2 & S2A	12"X12" SQUARE PLAQUE DIFFUSER ROUND DUCT CONNECTION	SPD (ASPD)	STEEL (A) = ALUMINUM	INSULATED BACKPAN (STYLE 31)	1
S3	SPIRAL DUCT GRILLE DEVICE SIZE - REFER TO FLOOR PLAN DOUBLE DEFLECTION BLADES - 3/4" SPACING AIR SCOUP & BALANCING DAMPER	520	ALUMINUM	AIR SCOUP BALANCING DAMPER PC-12	
S4	LOUVERED SUPPLY GRILLE DOUBLE DEFLECTION W/ LONG FRONT BLADES 3/4" BLADE SPACING	520	STEEL	BALANCING DAMPER	
R1	RETURN GRILLE DEVICE SIZE - 24" X 24" 45° HORIZONTAL BLADES 1/2" SPACING	635	ALUMINUM		
R2	RETURN GRILLE DEVICE SIZE - 24" X 12" 45° HORIZONTAL BLADES 1/2" SPACING BLADES PARALLEL TO LONG DIMENSION	635	ALUMINUM		
R3	RETURN GRILLE DEVICE SIZE PER DRAWING 45° HORIZONTAL BLADES 1/2" SPACING	635	ALUMINUM	SURFACE MOUNT FRAME	
E1	RETURN GRILLE DEVICE SIZE - 24" X 24" 45° HORIZONTAL BLADES 1/2" SPACING	635	ALUMINUM		
E2	RETURN GRILLE DEVICE SIZE - 24" X 12" 45° HORIZONTAL BLADES 1/2" SPACING BLADES PARALLEL TO LONG DIMENSION	635	ALUMINUM		
E3	EXHAUST GRILLE DEVICE SIZE - 12" X 12" 45° HORIZONTAL BLADES 1/2" SPACING	635	ALUMINUM		1
E4	RETURN GRILLE DEVICE SIZE - REFER TO FLOOR PLAN 45° HORIZONTAL BLADES 1/2" SPACING BLADES PARALLEL TO LONG DIMENSION	635	ALUMINUM	PC-12	2

- NOTES:  
 1. DEVICE TO BE SURFACE MOUNTED IN CENTER OF ACOUSTIC CEILING PAD FOR LAY-IN APPLICATION.  
 2. DUCT MOUNTED TO END OF DUCTWORK.

FAN & ROOF VENTILATOR SCHEDULE									
BASIS OF DESIGN - GREENHECK REFER TO SPECIFICATIONS FOR OTHER MANUFACTURERS									
VFD DRIVEN MOTORS SHALL BE PROVIDED WITH SHAFT GROUNDING RINGS, VFD DUTY MOTORS. REFER TO INSTALLATION DETAILS.									

TAG	SERVICE	DESCRIPTION	MODEL NUMBER & SIZE	ROOF OPENING (L x W)	CAPACITY		ELECTRICAL		DISCONNECT WITH FAN DISCONNECT BY E.C.	VFD	ECM	DIRECT	BELT	MOUNTING	APPLICATION	ACCESSORIES & OPTIONS	CONTROLS	NOTES	
					AIRFLOW (CFM)	E.S.P. (IN. W.C.)	MOTOR HP	VIPH											
EF-1	APPARATUS BAY	INLINE CENTRIFUGAL	SQ-20-M2-VG	-	6,560	1	3	460 / 3											2
EF-2	LIVING QUARTERS	DOWNBLAST CENTRIFUGAL	G-095-VG	12.5 x 12.5	450	0.75	1/6	120 / 1											2
EF-3	OFFICE	DOWNBLAST CENTRIFUGAL	G-095-VG	12.5 x 12.5	400	0.75	1/6	120 / 1											2
EF-4	KITCHEN HOOD	UPBLAST CENTRIFUGAL	DU33HFA (SEE NOTE 1)	16 x 16	750	1"	1/3	120 / 1											1
EF-5	TOG	INLINE CENTRIFUGAL	SQ-99-VG	-	550	0.75	1/4	120 / 1											2, 3
EF-6	DECON	INLINE CENTRIFUGAL	SQ-90-VG	-	300	0.5	1/10	120 / 1											2
EF-7	HOSE DRYING TOWER	UPBLAST CENTRIFUGAL	CUE-090-VG	12.5 x 12.5	450	0.25	1/10	120 / 1											2
EF-8	TRAINING TOWER	UPBLAST CENTRIFUGAL	CUE-160-VG	18.5 x 18.5	2,255	0.25	1/2	120 / 1											2
EH-1	EF-5	GRAVITY RELIEF VENTILATOR	GRSR-10	12.5 x 12.5	550	-	-	-											2
IF-1	GEAR DRYING CABINET	INLINE CENTRIFUGAL	SO-140-VG	-	900	0.25	3/4	120 / 1											2

- NOTES:  
 1. EXHAUST FAN PROVIDED WITH CAPTIVE AIRE KITCHEN HOOD. FAN IS POWERED AND CONTROLLED THROUGH KITCHEN HOOD.  
 2. REFER TO HOA CONTROLLER FOR INSTALLATION & WIRING.  
 3. FAN POWERED THROUGH STORM SHELTER UPS PROVIDED BY E.C.

LOUVER SCHEDULE						
<b>GENERAL NOTES</b>						
BASIS OF DESIGN: GREENHECK EQUAL BY: POTTORFF, RUSKIN, AIRLOITE						
MAXIMUM 500 FPM ON INTAKE LOUVERS, 1000 FPM ON EXHAUST LOUVERS. MINIMUM 50% FREE AREA						
PRIME COAT PAINT COLOR. FINAL COLOR SELECTION BY ARCHITECT, PAINTED BY G.C.						

TAG	DESCRIPTION	LOCATION	MODEL NO.	MATERIAL	ACCESSORIES	NOTES
L-1-1	FIXED BLADE LOUVER DEVICE SIZE - 108"X48" LOUVER FRAME SIZE - 6" FRAME MIN. 50% FREE AREA	AHU-1 INTAKE	ESD-635	ALUMINUM	BLACK BIRDSCREEN	
L-1-2	FIXED BLADE LOUVER DEVICE SIZE - 72"X48" LOUVER FRAME SIZE - 6" FRAME MIN. 50% FREE AREA	APPARATUS BAY INTAKE	ESD-635	ALUMINUM	BLACK BIRDSCREEN	
L-1-3	FIXED BLADE LOUVER DEVICE SIZE - 34"X24" LOUVER FRAME SIZE - 6" FRAME	GEAR DRYER INTAKE	ESD-635	ALUMINUM	BLACK BIRDSCREEN	
L-1-4	FIXED BLADE LOUVER DEVICE SIZE - 36"X36" LOUVER FRAME SIZE - 6" FRAME	TRAINING TOWER	ESD-635	ALUMINUM	BLACK BIRDSCREEN	
L-E-1	FIXED BLADE LOUVER DEVICE SIZE - 34"X36" LOUVER FRAME SIZE - 6" FRAME MIN. 50% FREE AREA	AHU-1 RELIEF	ESD-635	ALUMINUM	BLACK BIRDSCREEN	
L-E-2	FIXED BLADE LOUVER DEVICE SIZE - 48"X36" LOUVER FRAME SIZE - 6" FRAME MIN. 50% FREE AREA	APPARATUS BAY EXHAUST	ESD-635	ALUMINUM	BLACK BIRDSCREEN	
L-E-3	FIXED BLADE LOUVER DEVICE SIZE - 24"X18" LOUVER FRAME SIZE - 6" FRAME	GEAR DRYER	ESD-635	ALUMINUM	BLACK BIRDSCREEN	
L-E-4	FIXED BLADE LOUVER DEVICE SIZE - 18"X18" LOUVER FRAME SIZE - 6" FRAME	EF-6	ESD-635	ALUMINUM	BLACK BIRDSCREEN	

AIR TERMINAL UNIT SCHEDULE - ELECTRIC										
<b>GENERAL NOTES</b>										
UNITS ARE VARIABLE AIR VOLUME, ELECTRIC REHEAT. ENTERING AIR TEMP. (DEG. F) 55 MAX AIR PRES. DROP INCL. HW COIL 0.6" S.P.										
CV - CONSTANT VOLUME VV - VARIABLE VOLUME DESIGN BASIS - PRICE MODULE SDV MAX. NC. 25. WITH 10db ROOM ABSORPTION AT 1.5" SP AND MAX AIR FLOW.										
UNITS TO HAVE SCR CONTROL DISCONNECT SWITCH PROVIDED WITH UNIT.										
UNIT NO.	INLET SIZE	VV	COOLING MAX. (CFM)	COOLING MIN. (CFM)	HEATING CFM	MBH	KW	LAT	VIPH	SEE NOTES
1-1	7	VV	360	75	225	11	3.2	95	460 / 3	
1-2	7	VV	450	90	315	13.6	4.0	95	460 / 3	
1-3	12	VV	1200	240	840	36.3	10.6	95	460 / 3	
1-4	9	VV	610	125	430	18.6	5.4	95	460 / 3	
1-5	10	VV	825	165	580	25.1	7.3	95	460 / 3	
1-6	8	VV	675	205	475	20.5	6.0	95	460 / 3	
1-7	8	CV	550	550	550	23.8	7.0	95	460 / 3	
1-8	8	VV	350	105	245	10.6	3.1	95	460 / 3	
1-9	7	VV	370	75	260	11.2	3.3	95	460 / 3	
1-10	14	VV	1675	335	1175	50.8	14.9	95	460 / 3	
1-11	6	VV	350	70	245	10.6	3.1	95	460 / 3	
1-12	8	VV	530	110	375	16.2	4.7	95	460 / 3	
1-13	6	VV	315	65	225	9.7	2.8	95	460 / 3	
1-14	9	VV	610	125	430	18.6	5.4	95	460 / 3	
1-15	6	CV	325	325	325	14.0	4.1	95	460 / 3	
1-16	5	VV	165	35	120	5.2	1.5	95	460 / 3	
1-17	5	VV	80	20	80	3.5	1.0	95	460 / 3	
1-18	5	VV	175	35	125	5.5	1.6	95	460 / 3	
1-19	7	VV	500	100	350	15.9	4.7	95	460 / 3	
1-20	10	CV	750	750	750	32.4	9.5	95	460 / 3	

CONDENSING UNIT SCHEDULE - IT SPLIT SYSTEM														
<b>GENERAL NOTES</b>														
BASIS OF DESIGN: MITSUBISHI TRANE EQUAL BY: DAIKIN, LG, LIEBERT														
OUTDOOR UNIT TEMPERATURE RANGE: 115°F DB TO 40°F DB. UNIT SHALL BE CAPABLE OF STARTING AT ANY TEMPERATURE WITHIN THE OPERATING RANGE.														

UNIT	FAN COIL UNIT SERVED	AREA SERVED	COOLING CAPACITY		REFRIGERANT PIPING	MAX PIPING LENGTH (FT)	REFRIGERANT		ELECTRICAL			DIMENSIONS			UNIT WEIGHT (LBS)	MODEL NO.	NOTES	
			MBH @ 95°F	MBH @ 40°F			GAS	LIQUID	TYPE	FACTORY CHARGE (LBS)	VIPH	MCA	MOCP	WIDTH				DEPTH
CD-IT	FC-IT	IT ROOM	30	30	5/8	3/8	225	R-410A	7	208V / 1PH	19	26	31-13/16	11-13/16	24-13/16	151	PUY-A30NH47	ALL

- NOTES:  
 1. PROVIDE FRONT AND SIDE WIND BAFFLE KIT TO PROVIDE LOW AMBIENT COOLING.  
 2. INVERTER DUTY COMPRESSOR.  
 3. PROVIDE HAIL GUARD.  
 4. ADDITIONAL REFRIGERANT CHARGE BY H.C.  
 5. BACNET CONNECTION.

FAN COIL UNIT SCHEDULE - IT SPLIT SYSTEM														
<b>GENERAL NOTES</b>														
BASIS OF DESIGN: MITSUBISHI TRANE EQUALS BY: DAIKIN, LG, LIEBERT														
- COOLING CAPACITIES BASED ON 95°F OUTDOOR AIR TEMP.														

UNIT	DESCRIPTION	MOUNTING	CONDENSING UNIT	CFM	E.S.P.	COOLING CAPACITY				REFRIGERANT PIPING		ELECTRICAL			CABINET DIMENSIONS			UNIT WEIGHT (LBS)	MODEL NO.	NOTES
						SENS. MBH	TOTAL MBH	EAT (DB/WB)	LAT (DB/WB)	GAS	LIQUID	VIPH	MCA	MOCP	WIDTH	DEPTH	HEIGHT			
FC-IT	SPLIT SYSTEM	WALL MOUNTED	CD-IT	450	-	21	30	76/64	55/54	5/8	3/8	208V / 1PH	1	NOTE 1	35-23/64	9-11/32	11-25/32	46	PKA-A30KA8	ALL

- NOTES:  
 1. PROVIDE FLUSH MOUNT REMOTE TEMPERATURE SENSOR.  
 2. PROVIDE BACNET INTERFACE.  
 3. PROVIDE CONDENSATE PUMP.

ELECTRIC DUCT REHEAT COIL SCHEDULE											
<b>GENERAL NOTES</b>											
BASIS OF DESIGN: RAYWALL											

UNIT NO.	DESCRIPTION	MODEL	DUCT WIDTH	DUCT HEIGHT	EAT (°F)	LAT (°F)	KW	VOLT / PH	AIR FLOW (CFM)	DIMENSIONS			WEIGHT (LBS)	NOTES
										L (IN.)	D (IN.)	H (IN.)		
DH-1	DUCT MOUNTED HEATER	RAYWALL #4PD15-1812-2-3	18"	12"	0	50	15	480V / 3PH	900	11-1/2"	9-1/8"	11"	34	1, 2

- NOTES:  
 1. INTEGRAL DISCONNECT SWITCH.  
 2. DDC CONNECTION.

VARIABLE FREQUENCY DRIVES					
<b>GENERAL NOTES</b>					
ALL VFD'S SHALL BE FROM SAME MANUFACTURER ALL VFD'S SHALL HAVE A BACNET COMMUNICATION CARD VFD'S FULL LOAD AMPS SHALL BE EQUAL TO OR GREATER THAN THE SUM OF THE INDIVIDUAL MOTOR FULL LOAD AMPS. VFD FURNISHED BY THE H.C. INSTALLATION BY THE E.C.					

TAG	SERVICE	VOLTAGE / PHASE	HP	ENCLOSURE	NOTES
VFD-SF	AHU-1 SUPPLY AIR FAN	460 / 3	20	NEMA 1	1
VFD-RF	AHU-1 RETURN AIR FAN	460 / 3	5	NEMA 1	1

- NOTES:  
 1. INTEGRAL DISCONNECT SWITCH WITH DRIVE.

RADIANT HEATER SCHEDULE - GAS												
<b>GENERAL NOTES</b>												
BASIS OF DESIGN: REVERBER-RAY EQUAL BY: REFER TO SPECIFICATION												

UNIT NO.	MODEL #	SERVICE	MOUNTING	MODULATING RANGE (MBH)	BLAST MODE (MBH)	AMPS	VOLT/PH	DIMENSIONS L	WEIGHT (LBS)	MOUNTING HEIGHT (FT)	NOTES
RH-1	MP-50-150	APPARATUS BAY	CEILING SUSPENDED	97.5 - 150	155	5	120 / 1	50" - 9"	235	16'-8"	1, 2, 3
RH-2	MP-50-150	APPARATUS BAY	CEILING SUSPENDED	97.5 - 150	155	5	120 / 1	50" - 9"	235	16'-8"	1, 3
RH-3	MP-50-150	APPARATUS BAY	CEILING SUSPENDED	97.5 - 150	155	5	120 / 1	50" - 9"	235	16'-8"	1, 3
RH-4	MP-50-150	APPARATUS BAY	CEILING SUSPENDED	97.5 - 150	155	5	120 / 1	50" - 9"	235	16'-8"	1, 3
RH-5	MP-25-80	APPARATUS BAY	CEILING SUSPENDED	52 - 80	85	5	120 / 1	26" - 5"	145	16'-8"	1, 2, 3
RH-6	MP-25-80	APPARATUS BAY	CEILING SUSPENDED	52 - 80	85	5	120 / 1	26" - 5"	145	16'-8"	1, 2, 3

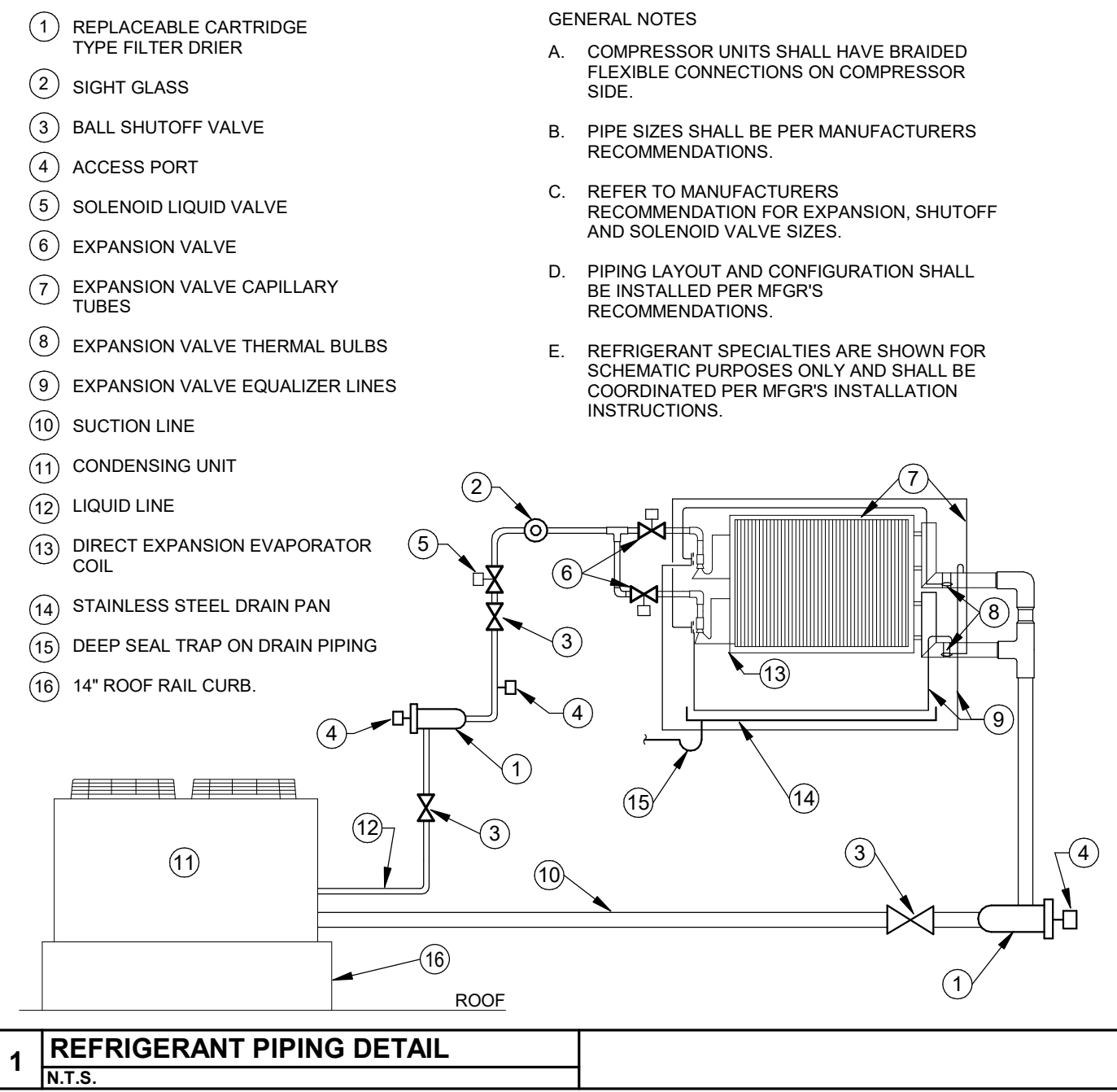
- NOTES:  
 1. PROVIDED WITH MICROPROCESSOR BASED THERMOSTAT, MODEL #TH-PUI. CAPABLE OF TOGGING BLAST MODE OPERATION.  
 2. PROVIDE SIDE SHIELD TO PROJECT HEAT AWAY FROM UPPER STORAGE AREA / SIDEWALL.  
 3. TYPE B ROOF VENT. FINAL PAINTING BY G.C., COLOR SELECTION BY H.C. UTILIZE HIGH TEMPERATURE RESISTANT PAINT FOR FLUES.

GAS FIRED UNIT HEATER SCHEDULE												
<b>GENERAL NOTES</b>												
BASIS OF DESIGN: MODINE												

UNIT NO.	MODEL #	MOUNTING	(MBH) INPUT/OUTPUT	CFM	AMPS	VOLT/PH	DIMENSIONS			WEIGHT	NOTES
							L (IN.)	D (IN.)	H (IN.)		
GUH-1	PTC-260	CEILING SUSPENDED	260 / 242	4,585	10.95	120 / 1	42.				

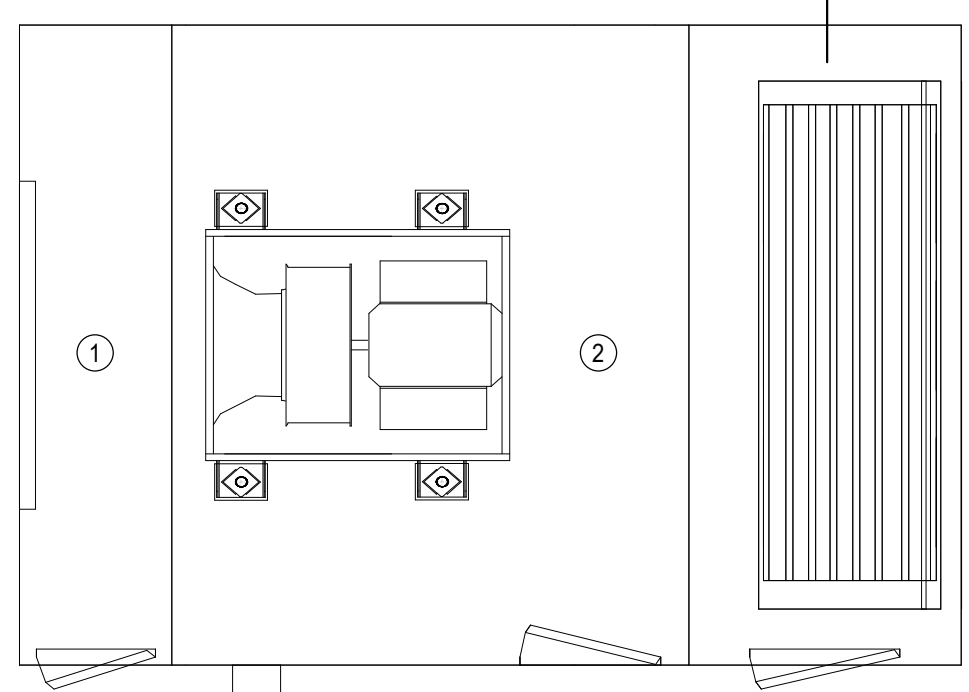
**GENERAL AHU NOTES**

1. THE AIR HANDLING UNIT AND ASSOCIATED CONDENSING UNIT SHOWN ON THIS SHEET, HAVE BEEN PRE-PURCHASED BY THE PROJECT CONSTRUCTION MANAGER. UNIT DATA IS REPORTED FOR INFORMATION ONLY.
2. THE H.C. SHALL COORDINATE WITH THE CONSTRUCTION MANAGER TO RECEIVE SHIPMENT OF THE AHU AND CONDENSING UNIT AT THE PROJECT SITE AND INSTALL THE NEW AIR HANDLING UNIT.
3. THE H.C. SHALL PROVIDE THE REFRIGERANT COIL COMPONENTS SPECIFIED IN DETAIL 1. THIS SHEET. REFER TO UNIT MANUFACTURERS RECOMMENDATIONS FOR COMPONENTS.
4. THE H.C. SHALL PROVIDE ALL ADDITIONAL REFRIGERANT CHARGE REQUIRED.

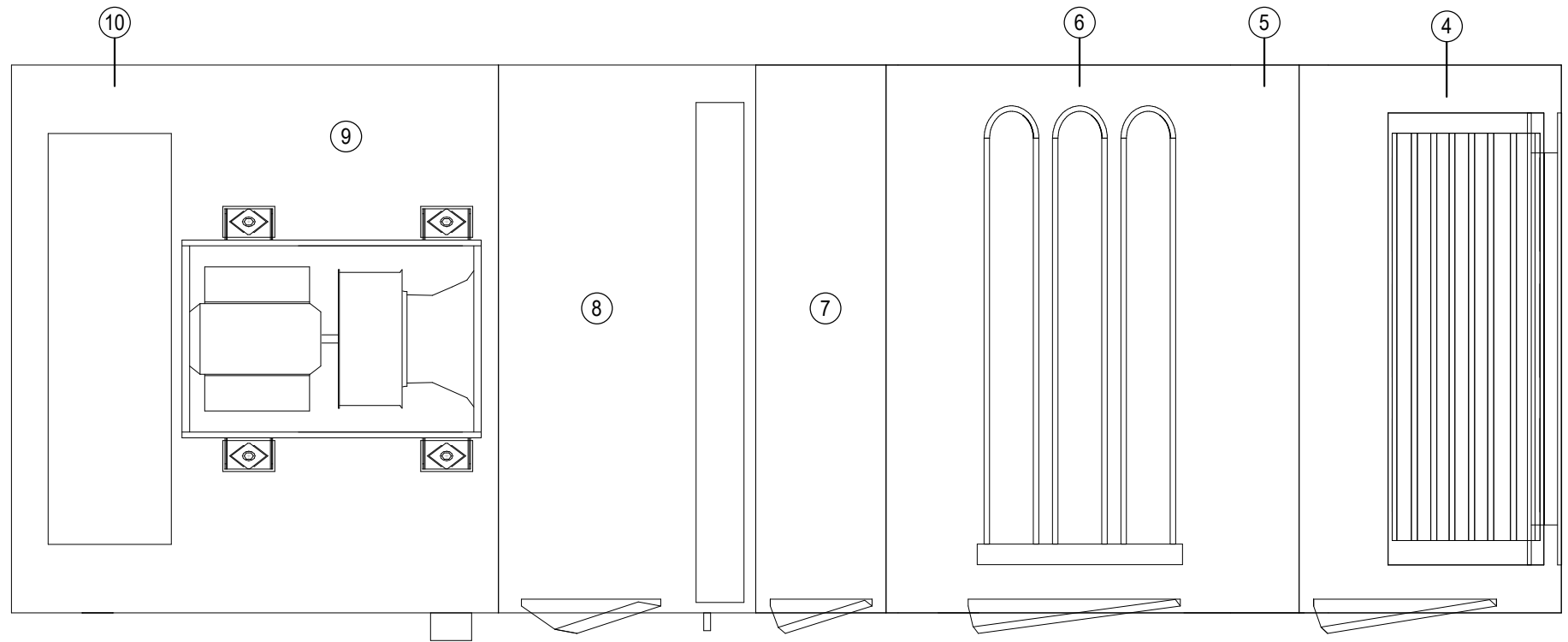


**AHU NOTES**

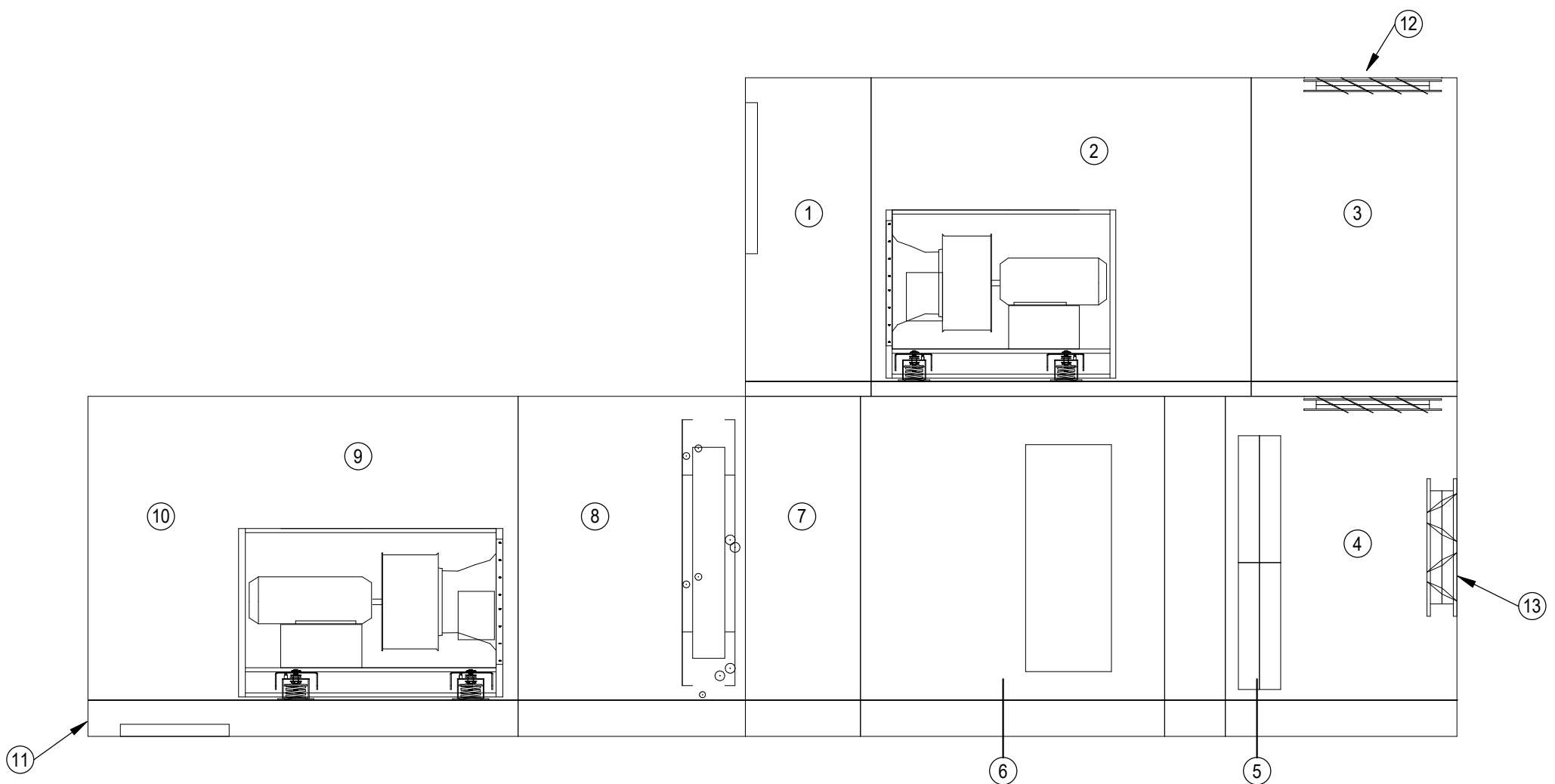
- RETURN AIR PLENUM
  - ACCESS DOOR - 20" W x 38" H
  - END OPENING
- RETURN AIR FAN
  - ACCESS DOOR 24" W x 38" H
  - LED MARINE LIGHT
- MIXING SECTION - TOP HALF
  - RELIEF AIR DAMPER TOP
  - RETURN AIR DAMPER MIDDLE
  - ACCESS DOOR - 26" W x 38" H
- MIXING SECTION - BOTTOM HALF
  - RELIEF AIR DAMPER MIDDLE
  - OUTSIDE AIR DAMPER END
  - ACCESS DOOR - 26" W x 38" H
- COMBINATION FILTER SECTION
  - 2" MERV 8 & 4" MERV 13
  - ACCESS DOOR - 12" W x 52" H
  - LED MARINE LIGHT.
- ELECTRIC PREHEAT COIL WITH DISCONNECT SWITCH
- ACCESS SECTION - 20"
  - LED MARINE LIGHT
  - ACCESS DOOR - 20" W x 58" H
- DX COOLING COIL
  - ACCESS DOOR - 12" W x 52" H
  - LED MARINE LIGHT.
- SUPPLY AIR FAN
  - ACCESS DOOR - 30" W x 58" H
  - LED MARINE LIGHT.
- SUPPLY AIR PLENUM
  - 54" W x 20" D, BOTTOM OPENING
  - METAL SAFETY GRATE OVER OPENING
  - LED MARINE LIGHT
  - ACCESS DOOR - 16" W x 58" H
- 6" BASE RAIL
- OUTSIDE AIR DAMPER
- RELIEF AIR DAMPER



**AHU-1 TOP SECTION - PLAN**  
SCALE: 1/2" = 1'-0"



**AHU-1 BOTTOM SECTION - PLAN**  
SCALE: 1/2" = 1'-0"



**AHU-1 - ELEVATION**  
SCALE: 1/2" = 1'-0"

**AIR HANDLING UNIT SCHEDULE**

UNIT	AHU-1
UNIT LOCATION	MECHANICAL ROOM
DESCRIPTION	STACKED UNIT - DIRECT DRIVE PLENUM FANS
MANUF./SIZE LENGTH/WIDTH/HEIGHT	TRANE CSAA021 226.5 / 80 / 109
UNIT WEIGHT (LBS)	5,666
<b>SUPPLY FAN</b>	
FAN TYPE	DIRECT DRIVE PLENUM FAN
TOTAL AIR FLOW	10,875
EXTERNAL S.P. (INCHES W.G.)	2
<b>FAN SIZE</b>	
MOTOR H.P. / V-PH (EACH)	20 HP 480V/3PH
VARIABLE FREQUENCY DRIVE	BY H.C.
<b>FILTER</b>	
PRE-FILTER TYPE	2" MERV 8
FINAL FILTER TYPE	4" MERV 13
<b>HEATING COIL - ELECTRIC - BASED ON 0°F DB / 75°F WB OUTSIDE AIR, 68°F DB RETURN AIR</b>	
HEATING AIR FLOW (CFM)	8,155
CAPACITY (MBH)	102
CAPACITY (KW)	30
ENT. AIR TEMP (DB)	44
LVG. AIR TEMP (DB)	53
VOLTAGE / PHASE	460 / 3
CONTROL TYPE	SCR
<b>COOLING COIL - DX COIL - BASED ON 92.5°F DB / 75°F WB OUTSIDE AIR, 76°F DB / 50% RH RETURN AIR</b>	
COOLING AIR FLOW (CFM)	10,875
MIN. FACE AREA (SQ. FT)	22.3
TOTAL CAPACITY (MBH)	399
SENS. CAPACITY (MBH)	296
ENT. AIR TEMP (DB/WB)	80.7 / 67
LVG. AIR TEMP (DB/WB)	55.9 / 54.3
REFRIGERANT TYPE	R-410A
COIL FACE VELOCITY (FPM)	523
<b>RETURN FAN</b>	
FAN TYPE	DIRECT DRIVE PLENUM FAN
TOTAL AIR FLOW	8,010
TOTAL S.P. (INCHES W.G.)	0.75
FAN SIZE	18.25
MOTOR H.P. / V-PH	5 HP 480V / 3PH
VARIABLE FREQUENCY DRIVE	BY H.C.
MIN. OUTSIDE AIR (CFM)	2,865

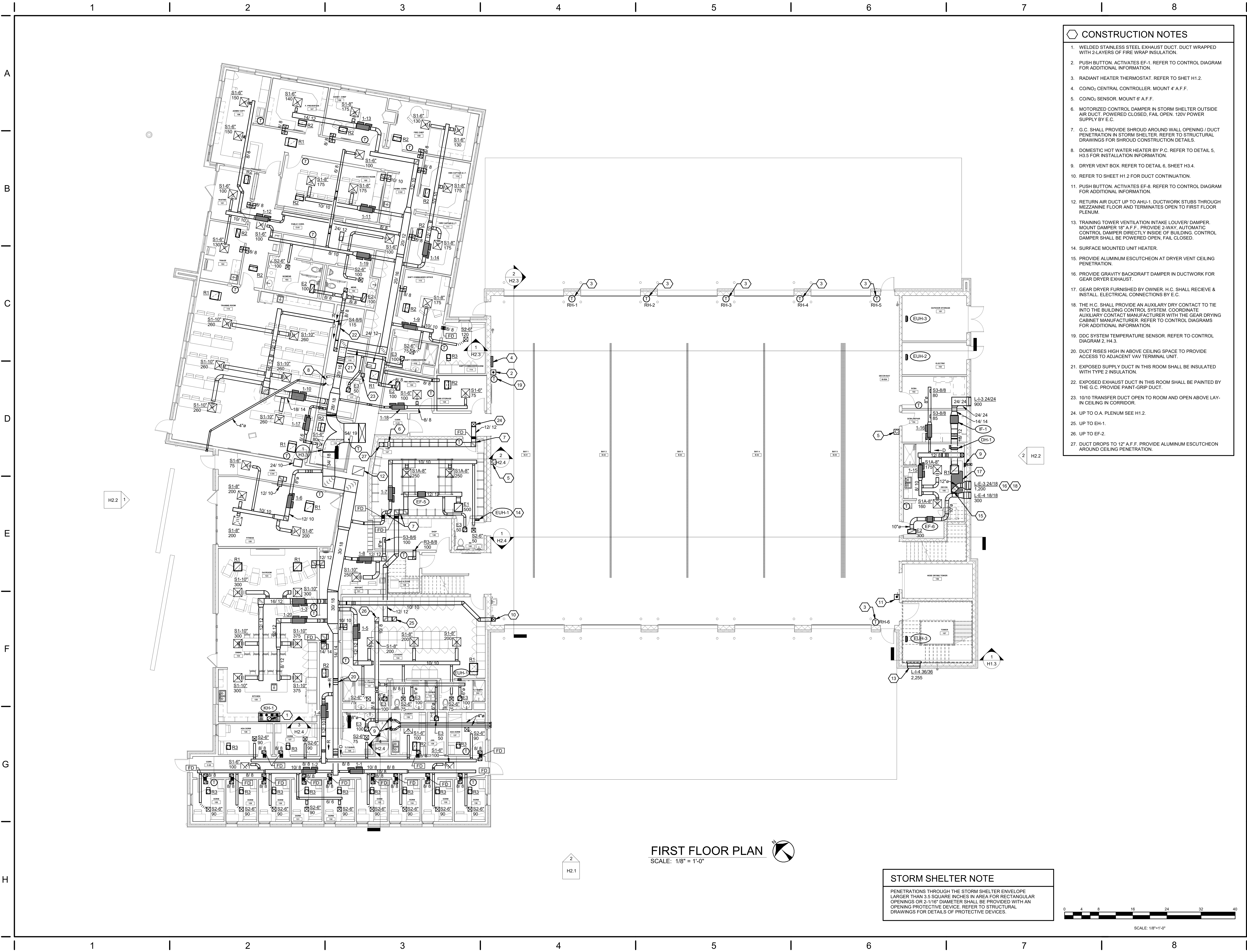
**CONDENSING UNIT SCHEDULE**

UNIT	CD-1
UNIT LOCATION	ROOF
MANUFACTURER	TRANE
MODEL #	RAUJ
LENGTH / WIDTH / HEIGHT (IN)	88 / 60 / 74
UNIT WEIGHT (LBS)	1,936
COOLING CAPACITY (MBH)	417
REFRIGERANT	R-410A
SUCTION LINE SIZE	2-1/8
LIQUID LINE SIZE	2-1/8
REFRIGERANT CHARGE (LBS)	50
EER	11.4
MCA	63
MOCF	80
VOLTAGE / PHASE	460 / 3

NO.	DATE	DESCRIPTION
101623	10/16/23	FOR CONSTRUCTION

DATE	10/16/2023
JOB NO.	4069.00
DRAWN	DJZ
CHECKED	JDZ



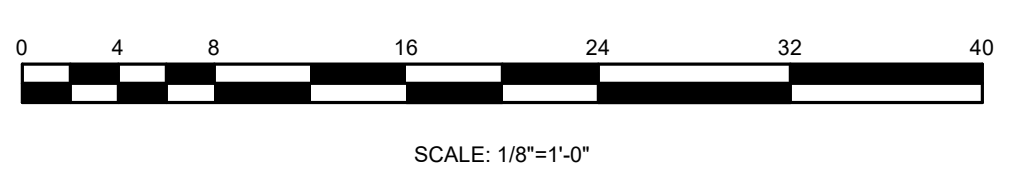


**CONSTRUCTION NOTES**

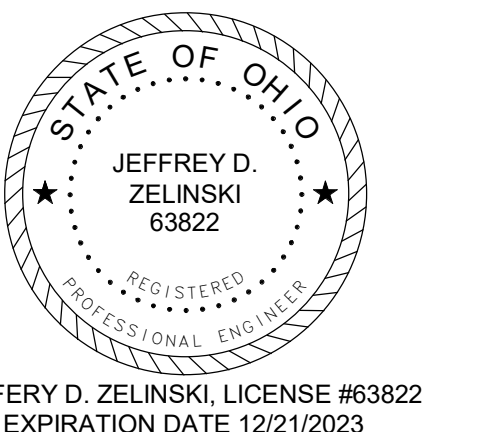
1. WELDED STAINLESS STEEL EXHAUST DUCT, DUCT WRAPPED WITH 2-LAYERS OF FIRE WRAP INSULATION.
2. PUSH BUTTON, ACTIVATES EF-1. REFER TO CONTROL DIAGRAM FOR ADDITIONAL INFORMATION.
3. RADIANT HEATER THERMOSTAT. REFER TO SHET H1.2.
4. COIN2; CENTRAL CONTROLLER. MOUNT 4" A.F.F.
5. COIN2; SENSOR. MOUNT 6" A.F.F.
6. MOTORIZED CONTROL DAMPER IN STORM SHELTER OUTSIDE AIR DUCT. POWERED CLOSED, FAIL OPEN. 120V POWER SUPPLY BY E.C.
7. G.C. SHALL PROVIDE SHROUD AROUND WALL OPENING / DUCT PENETRATION IN STORM SHELTER. REFER TO STRUCTURAL DRAWINGS FOR SHROUD CONSTRUCTION DETAILS.
8. DOMESTIC HOT WATER HEATER BY P.C. REFER TO DETAIL 5, H3.5 FOR INSTALLATION INFORMATION.
9. DRYER VENT BOX. REFER TO DETAIL 6, SHEET H3.4.
10. REFER TO SHEET H1.2 FOR DUCT CONTINUATION.
11. PUSH BUTTON, ACTIVATES EF-8. REFER TO CONTROL DIAGRAM FOR ADDITIONAL INFORMATION.
12. RETURN AIR DUCT UP TO AHU-1. DUCTWORK STUBS THROUGH MEZZANINE FLOOR AND TERMINATES OPEN TO FIRST FLOOR PLENUM.
13. TRAINING TOWER VENTILATION INTAKE LOUVER/ DAMPER. MOUNT DAMPER 18" A.F.F. PROVIDE 2-WAY, AUTOMATIC CONTROL DAMPER DIRECTLY INSIDE OF BUILDING. CONTROL DAMPER SHALL BE POWERED OPEN, FAIL CLOSED.
14. SURFACE MOUNTED UNIT HEATER.
15. PROVIDE ALUMINUM ESCUTCHEON AT DRYER VENT CEILING PENETRATION.
16. PROVIDE GRAVITY BACKDRAFT DAMPER IN DUCTWORK FOR GEAR DRYER EXHAUST.
17. GEAR DRYER FURNISHED BY OWNER. H.C. SHALL RECIEVE & INSTALL. ELECTRICAL CONNECTIONS BY E.C.
18. THE H.C. SHALL PROVIDE AN AUXILIARY DRY CONTACT TO TIE INTO THE BUILDING CONTROL SYSTEM. COORDINATE AUXILIARY CONTACT MANUFACTURER WITH THE GEAR DRYING CABINET MANUFACTURER. REFER TO CONTROL DIAGRAMS FOR ADDITIONAL INFORMATION.
19. DDC SYSTEM TEMPERATURE SENSOR. REFER TO CONTROL DIAGRAM 2, H4.3.
20. DUCT RISES HIGH IN ABOVE CEILING SPACE TO PROVIDE ACCESS TO ADJACENT VAV TERMINAL UNIT.
21. EXPOSED SUPPLY DUCT IN THIS ROOM SHALL BE INSULATED WITH TYPE 2 INSULATION.
22. EXPOSED EXHAUST DUCT IN THIS ROOM SHALL BE PAINTED BY THE G.C. PROVIDE PAINT-GRIP DUCT.
23. 10/10 TRANSFER DUCT OPEN TO ROOM AND OPEN ABOVE LAY- IN CEILING IN CORRIDOR.
24. UP TO O.A. PLENUM SEE H1.2.
25. UP TO EH-1.
26. UP TO EF-2.
27. DUCT DROPS TO 12" A.F.F. PROVIDE ALUMINUM ESCUTCHEON AROUND CEILING PENETRATION.

**STORM SHELTER NOTE**  
 PENETRATIONS THROUGH THE STORM SHELTER ENVELOPE LARGER THAN 3.5 SQUARE INCHES IN AREA FOR RECTANGULAR OPENINGS OR 2-1/16" DIAMETER SHALL BE PROVIDED WITH AN OPENING PROTECTIVE DEVICE. REFER TO STRUCTURAL DRAWINGS FOR DETAILS OF PROTECTIVE DEVICES.

**FIRST FLOOR PLAN**  
 SCALE: 1/8" = 1'-0"



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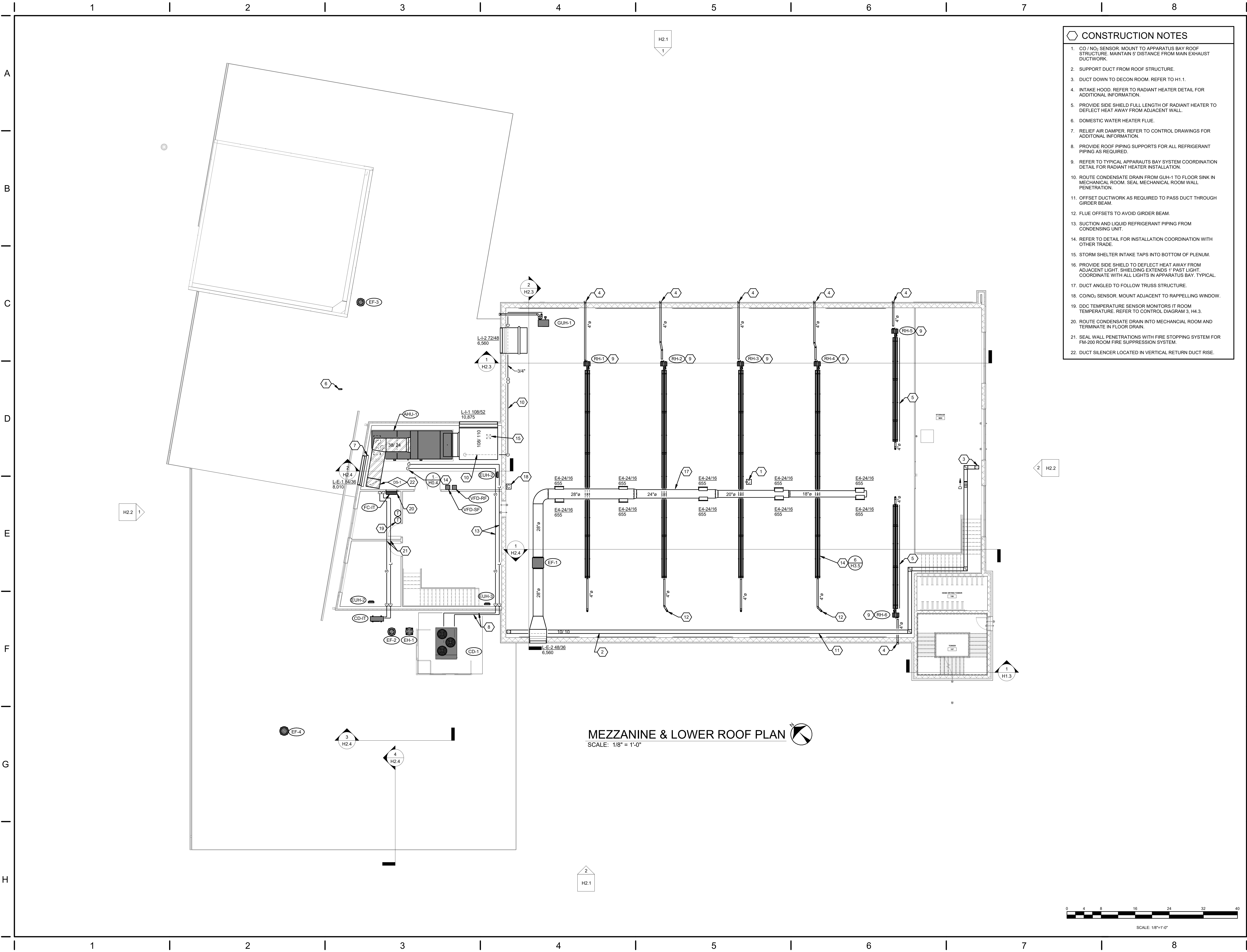
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DATE	10/16/2023
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CHECKED	DJZ
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TITLE	GROUND FLOOR PLAN

SHEET NO.  
**H1.1**

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**MEZZANINE & LOWER ROOF PLAN**  
SCALE: 1/8" = 1'-0"

- CONSTRUCTION NOTES**
- CO / NO<sub>2</sub> SENSOR. MOUNT TO APPARATUS BAY ROOF STRUCTURE. MAINTAIN 5' DISTANCE FROM MAIN EXHAUST DUCTWORK.
  - SUPPORT DUCT FROM ROOF STRUCTURE.
  - DUCT DOWN TO DECON ROOM. REFER TO H1.1.
  - INTAKE HOOD. REFER TO RADIANT HEATER DETAIL FOR ADDITIONAL INFORMATION.
  - PROVIDE SIDE SHIELD FULL LENGTH OF RADIANT HEATER TO DEFLECT HEAT AWAY FROM ADJACENT WALL.
  - DOMESTIC WATER HEATER FLUE.
  - RELIEF AIR DAMPER. REFER TO CONTROL DRAWINGS FOR ADDITIONAL INFORMATION.
  - PROVIDE ROOF PIPING SUPPORTS FOR ALL REFRIGERANT PIPING AS REQUIRED.
  - REFER TO TYPICAL APPARATUS BAY SYSTEM COORDINATION DETAIL FOR RADIANT HEATER INSTALLATION.
  - ROUTE CONDENSATE DRAIN FROM GUH-1 TO FLOOR SINK IN MECHANICAL ROOM. SEAL MECHANICAL ROOM WALL PENETRATION.
  - OFFSET DUCTWORK AS REQUIRED TO PASS DUCT THROUGH GIRDER BEAM.
  - FLUE OFFSETS TO AVOID GIRDER BEAM.
  - SUCTION AND LIQUID REFRIGERANT PIPING FROM CONDENSING UNIT.
  - REFER TO DETAIL FOR INSTALLATION COORDINATION WITH OTHER TRADE.
  - STORM SHELTER INTAKE TAPS INTO BOTTOM OF PLENUM.
  - PROVIDE SIDE SHIELD TO DEFLECT HEAT AWAY FROM ADJACENT LIGHT. SHIELDING EXTENDS 1' PAST LIGHT. COORDINATE WITH ALL LIGHTS IN APPARATUS BAY. TYPICAL.
  - DUCT ANGLED TO FOLLOW TRUSS STRUCTURE.
  - CO/NO<sub>2</sub> SENSOR. MOUNT ADJACENT TO RAPPELLING WINDOW.
  - DDC TEMPERATURE SENSOR MONITORS IT ROOM TEMPERATURE. REFER TO CONTROL DIAGRAM 3, H4.3.
  - ROUTE CONDENSATE DRAIN INTO MECHANICAL ROOM AND TERMINATE IN FLOOR DRAIN.
  - SEAL WALL PENETRATIONS WITH FIRE STOPPING SYSTEM FOR FM-200 ROOM FIRE SUPPRESSION SYSTEM.
  - DUCT SILENCER LOCATED IN VERTICAL RETURN DUCT RISE.

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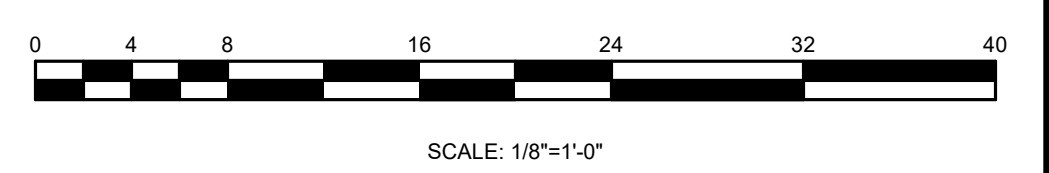
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63822  
PROFESSIONAL ENGINEER  
JEFFREY D. ZELINSKI, LICENSE #63822  
EXPIRATION DATE 12/21/2023

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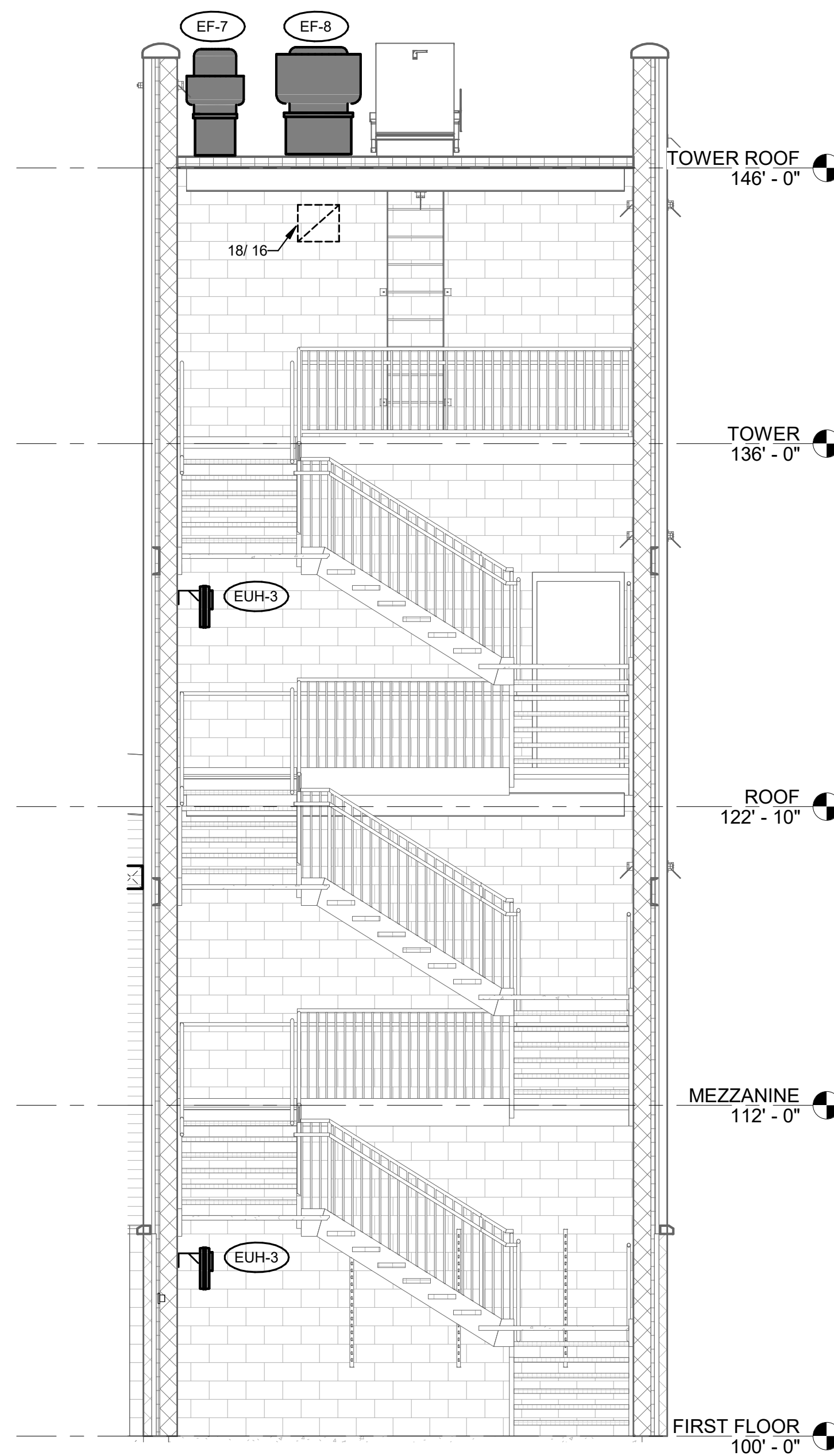
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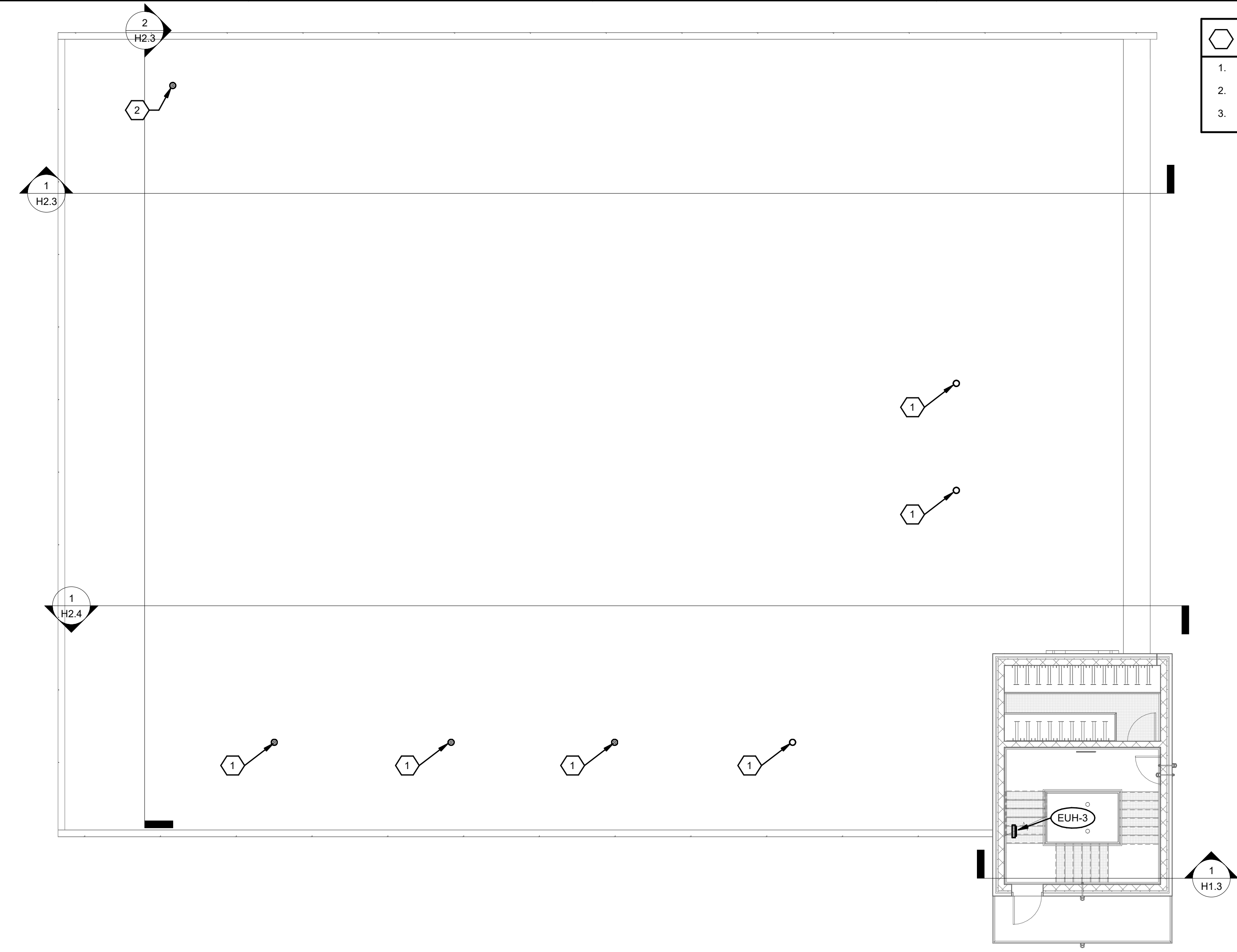
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TITLE <b>MEZZANINE &amp; LOWER ROOF PLAN</b>	



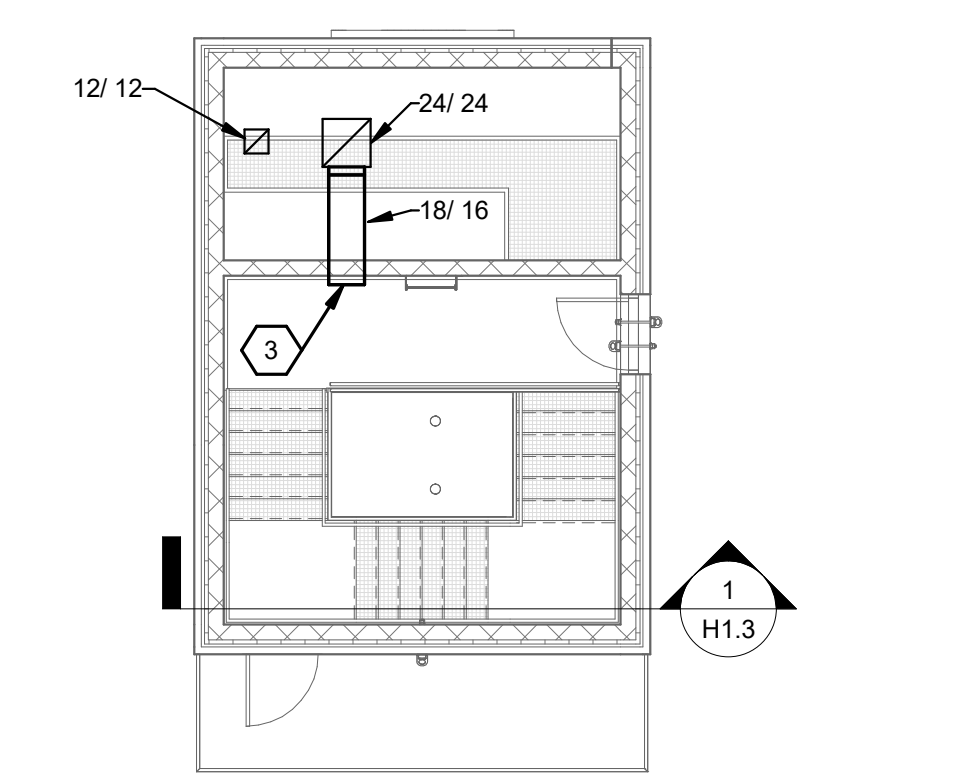
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**H1.2**



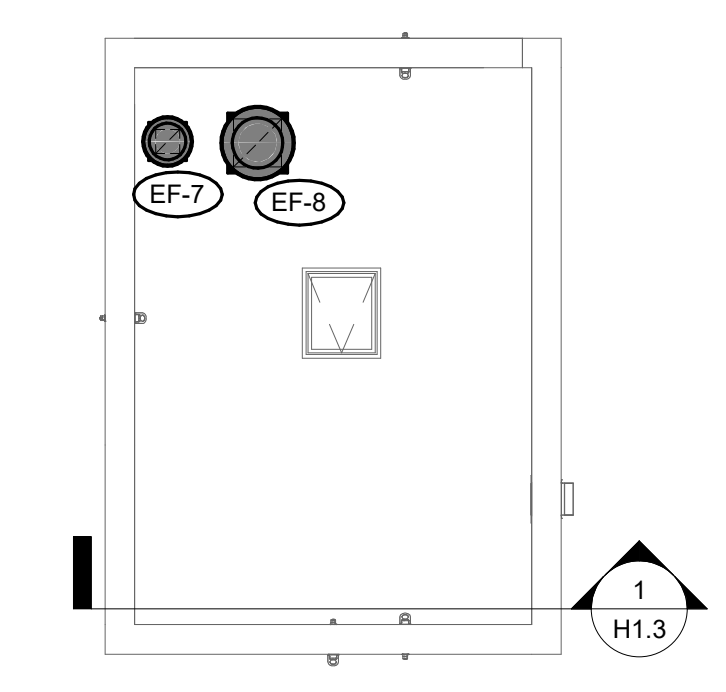
Section 1  
SCALE: 1/4" = 1'-0"



THIRD FLOOR PLAN  
SCALE: 1/8" = 1'-0"

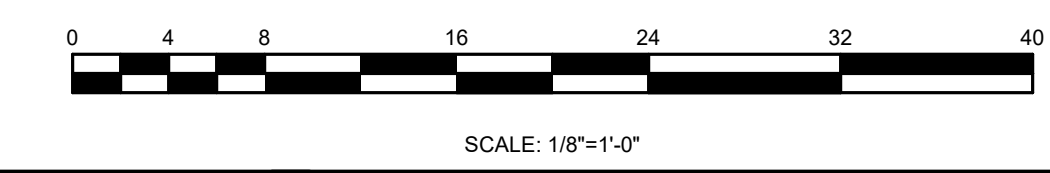


TOWER - TOP LANDING  
SCALE: 1/8" = 1'-0"



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

- CONSTRUCTION NOTES**
1. RADIANT HEATER FLUE.
  2. GAS FIRED UNIT HEATER FLUE.
  3. DUCT OPEN TO TRAINING TOWER.



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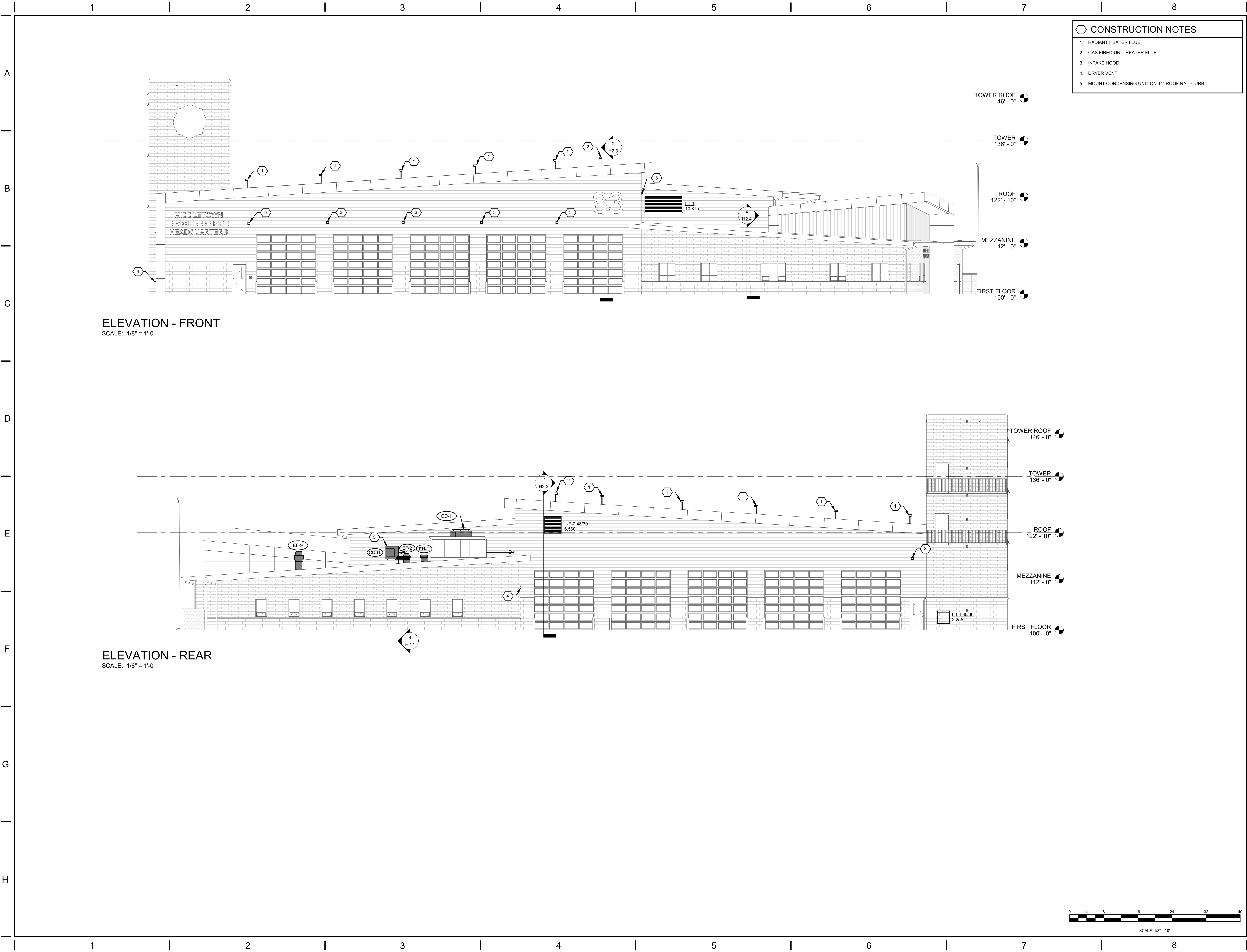
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TITLE: APPARATUS BAY ROOF & TRAINING TOWER

SHEET NO.  
**H1.3**



- CONSTRUCTION NOTES**
1. RADIANT HEATER FLUE.
  2. GAS FIRED UNIT HEATER FLUE.
  3. INTAKE HOOD.
  4. DRYER VENT.
  5. MOUNT CONDENSING UNIT ON 14" ROOF RAIL CURB.

**ELEVATION - FRONT**  
SCALE: 1/8" = 1'-0"

**ELEVATION - REAR**  
SCALE: 1/8" = 1'-0"

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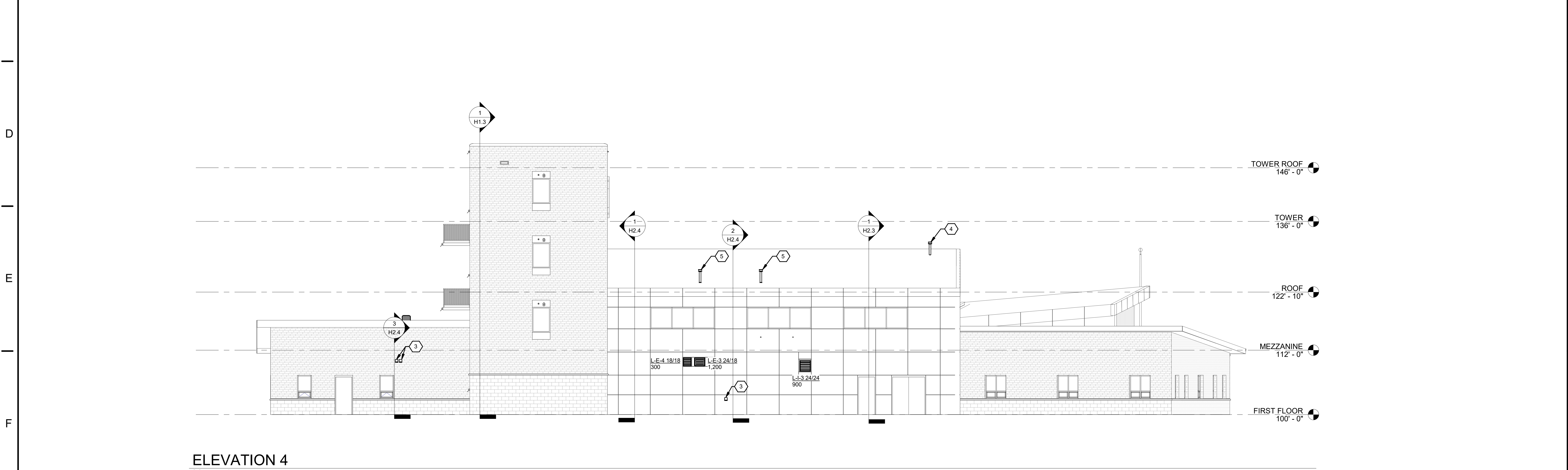
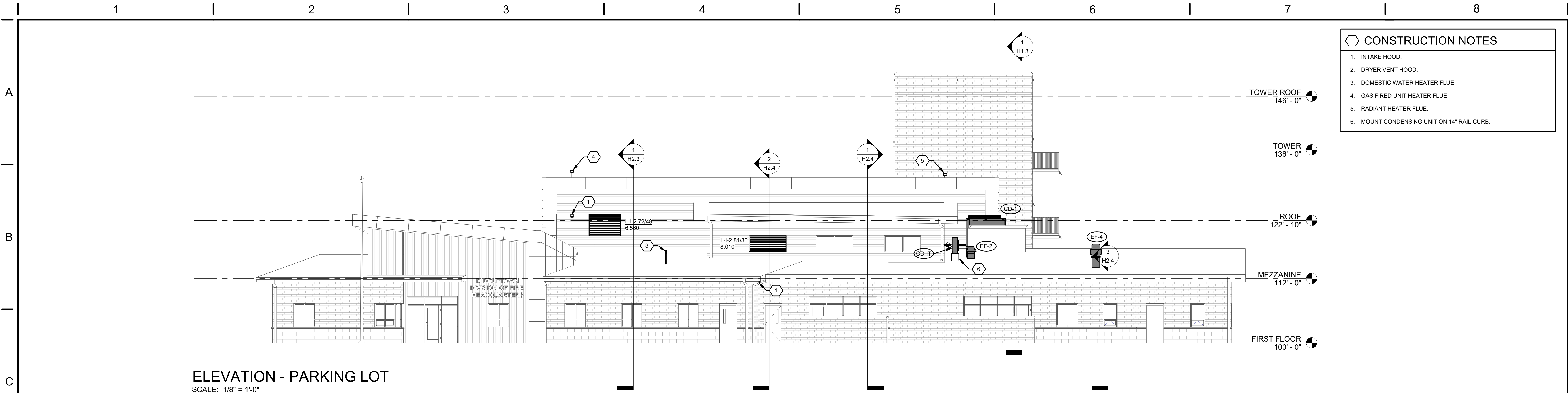
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TITLE  
**ELEVATIONS**

SHEET NO.  
**H2.1**



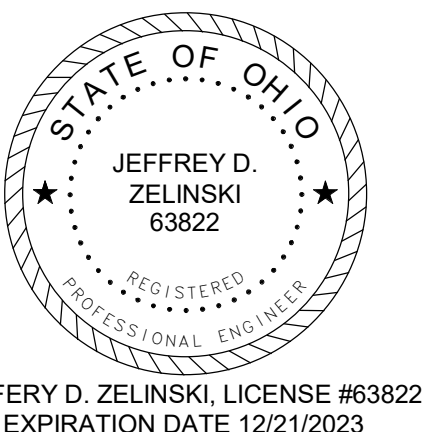
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**CONSTRUCTION NOTES**

1. INTAKE HOOD.
2. DRYER VENT HOOD.
3. DOMESTIC WATER HEATER FLUE.
4. GAS FIRED UNIT HEATER FLUE.
5. RADIANT HEATER FLUE.
6. MOUNT CONDENSING UNIT ON 14" RAIL CURB.

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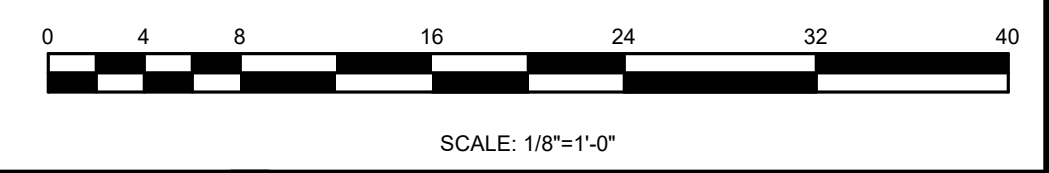
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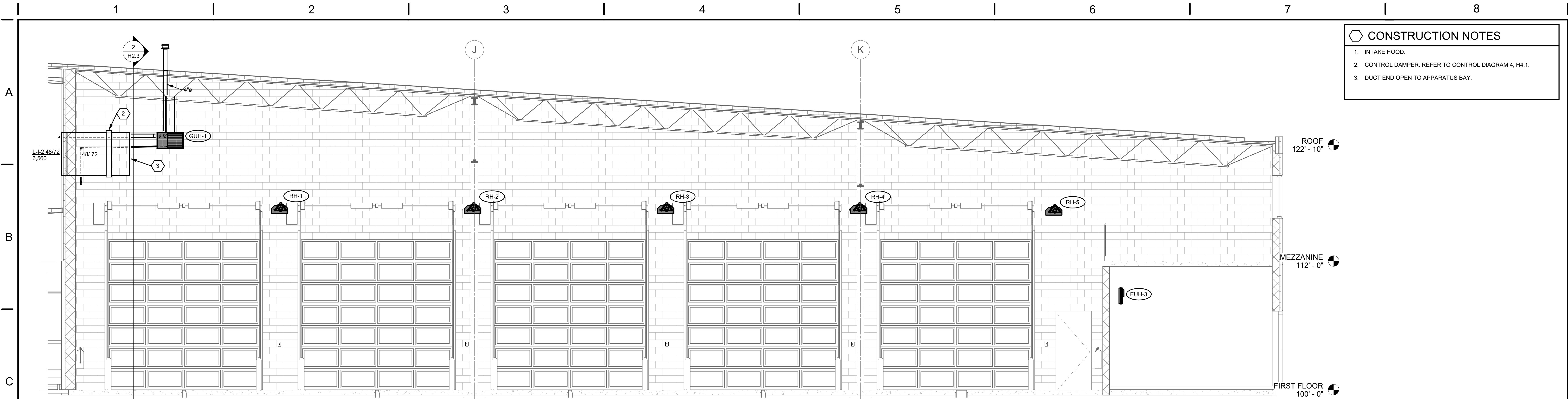
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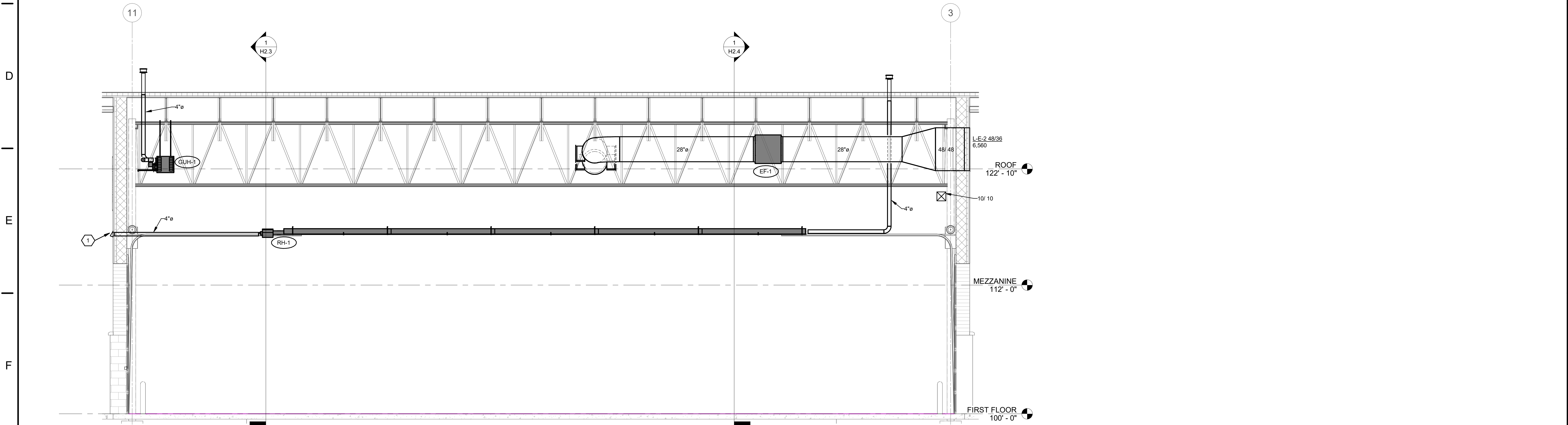


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- CONSTRUCTION NOTES**
1. INTAKE HOOD.
  2. CONTROL DAMPER. REFER TO CONTROL DIAGRAM 4, H4-1.
  3. DUCT END OPEN TO APPARATUS BAY.

**1 APPARATUS BAY SECTION A**  
SCALE: 1/4" = 1'-0"



**2 APPARATUS BAY SECTION B**  
SCALE: 1/4" = 1'-0"

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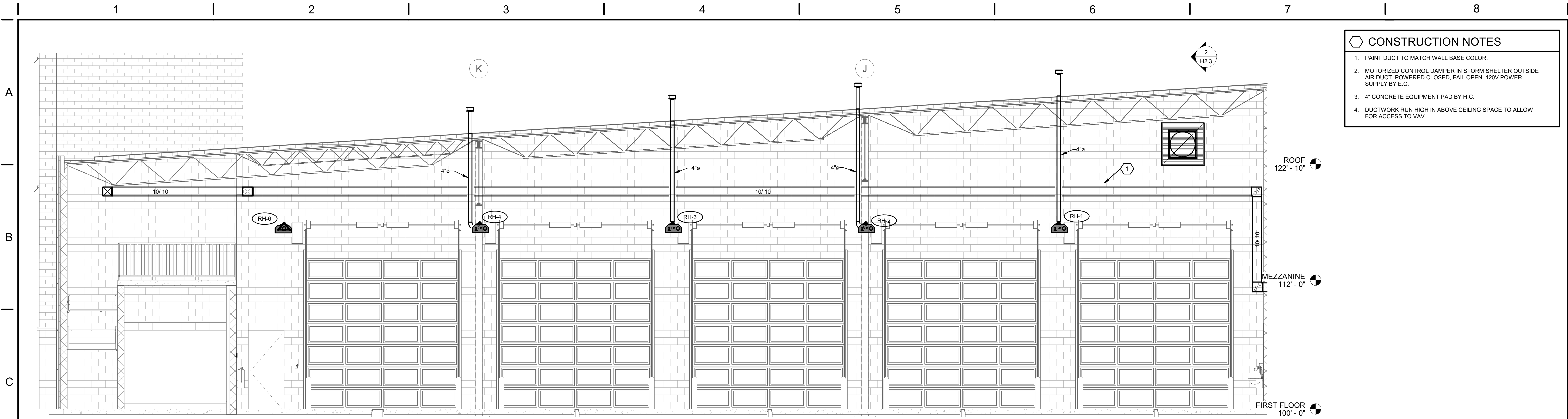
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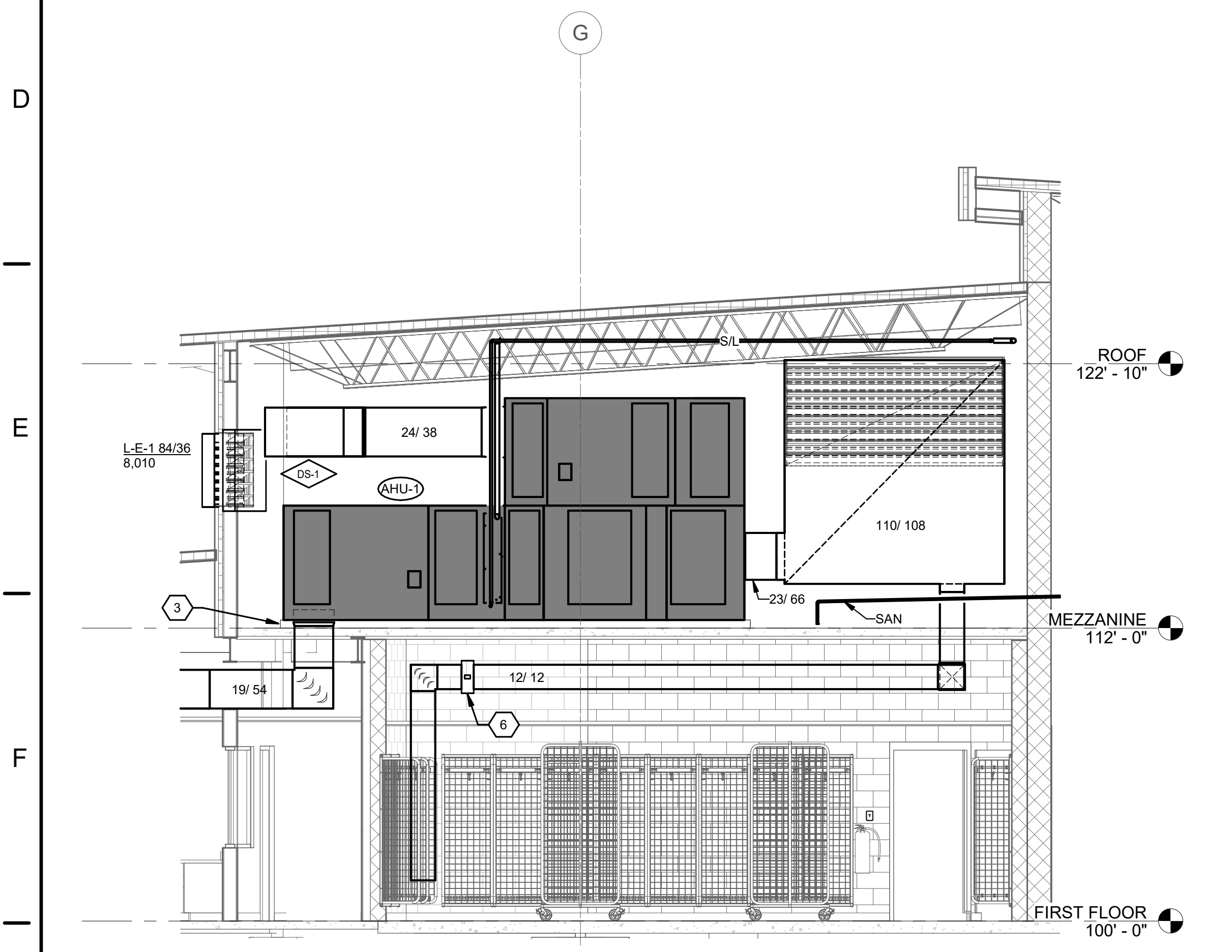
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TITLE **SECTIONS**

SHEET NO.  
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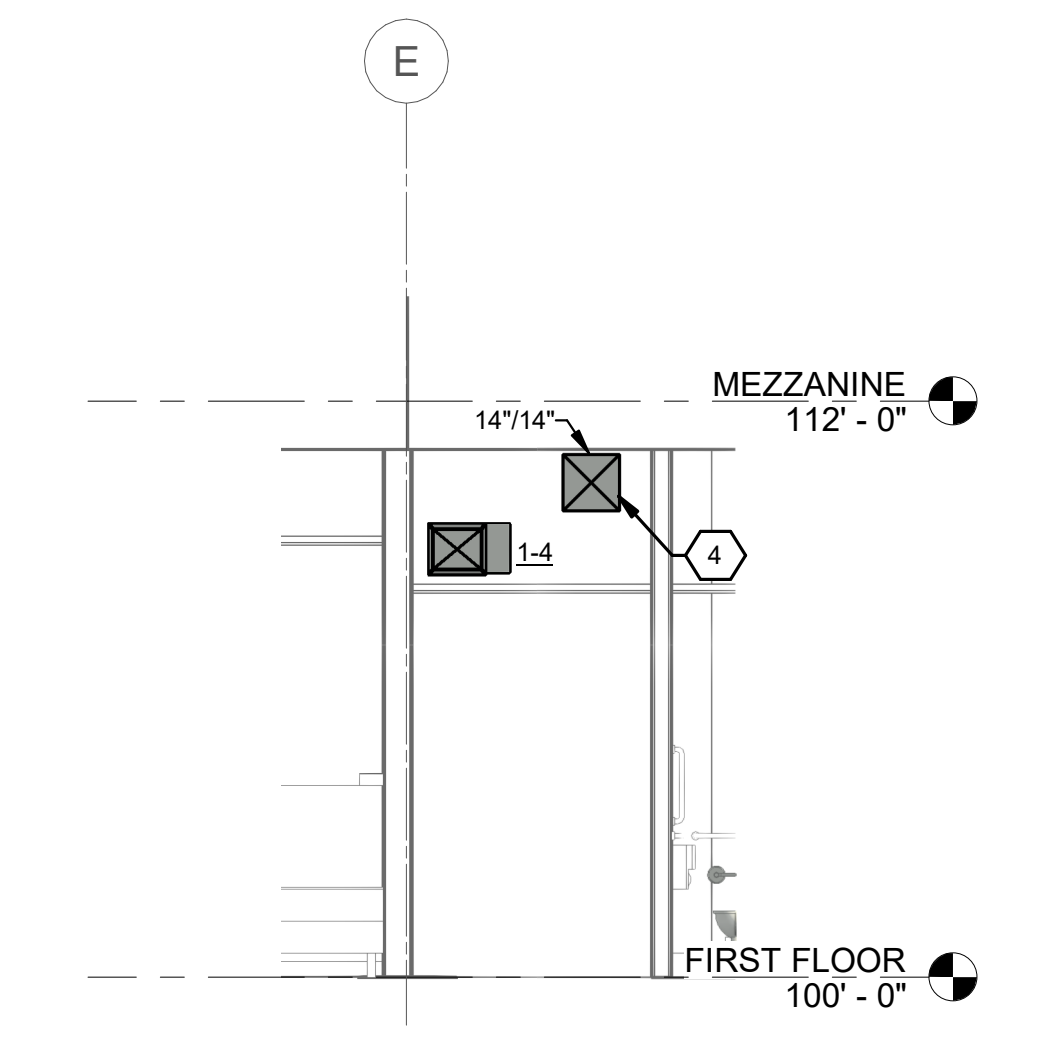


- CONSTRUCTION NOTES**
1. PAINT DUCT TO MATCH WALL BASE COLOR.
  2. MOTORIZED CONTROL DAMPER IN STORM SHELTER OUTSIDE AIR DUCT. POWERED CLOSED, FAIL OPEN. 120V POWER SUPPLY BY E.C.
  3. 4" CONCRETE EQUIPMENT PAD BY H.C.
  4. DUCTWORK RUN HIGH IN ABOVE CEILING SPACE TO ALLOW FOR ACCESS TO VAV.

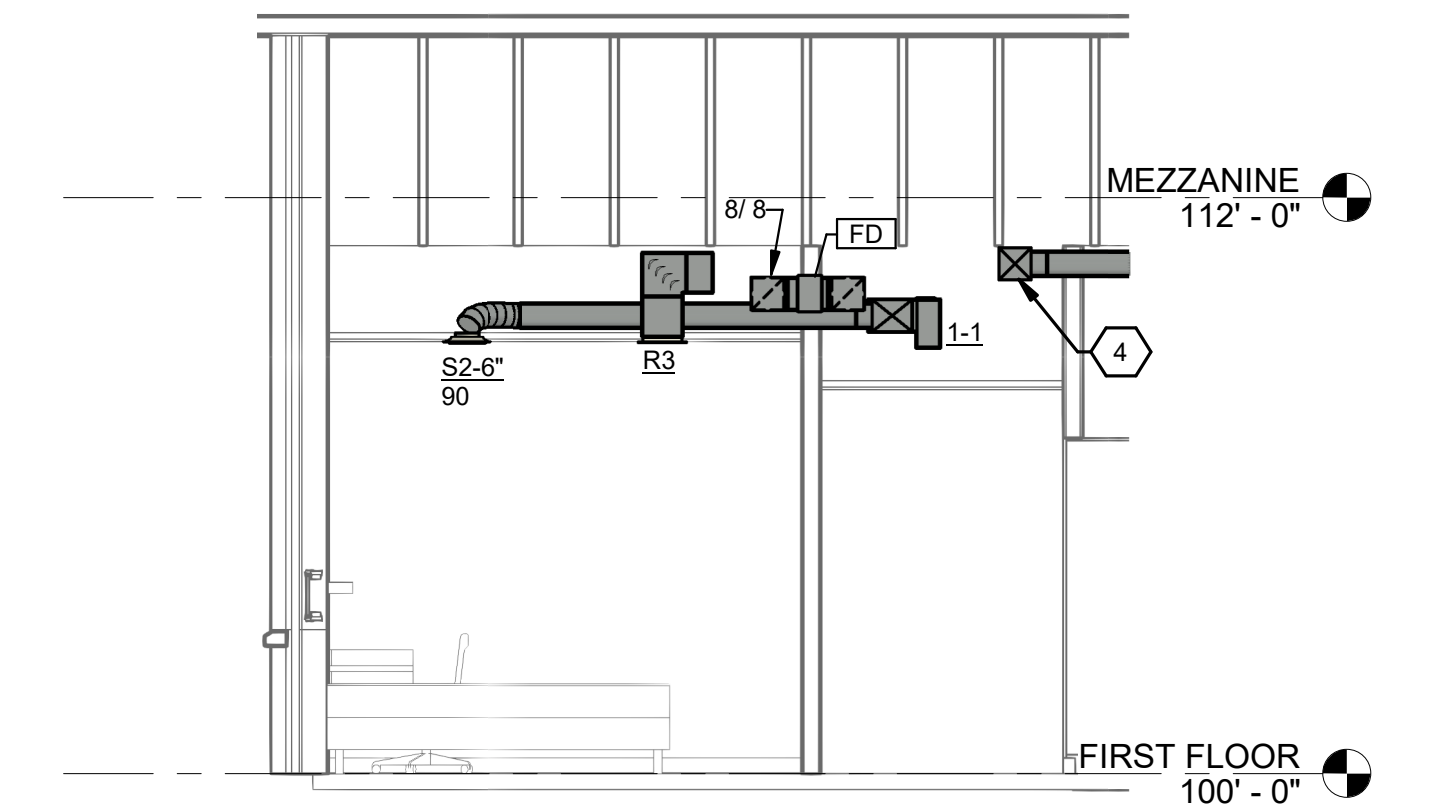
**1 APPARATUS BAY SECTION C**  
SCALE: 1/4" = 1'-0"



**2 LIVING QUARTERS SECTION 1**  
SCALE: 1/4" = 1'-0"



**3 LIVING QUARTERS SECTION 2**  
SCALE: 1/4" = 1'-0"



**4 LIVING QUARTERS SECTION 3**  
SCALE: 1/4" = 1'-0"

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STATE OF OHIO  
JEFFREY D. ZELINSKI  
63822  
PROFESSIONAL ENGINEER  
JEFFREY D. ZELINSKI, LICENSE #63822  
EXPIRATION DATE 12/21/2023

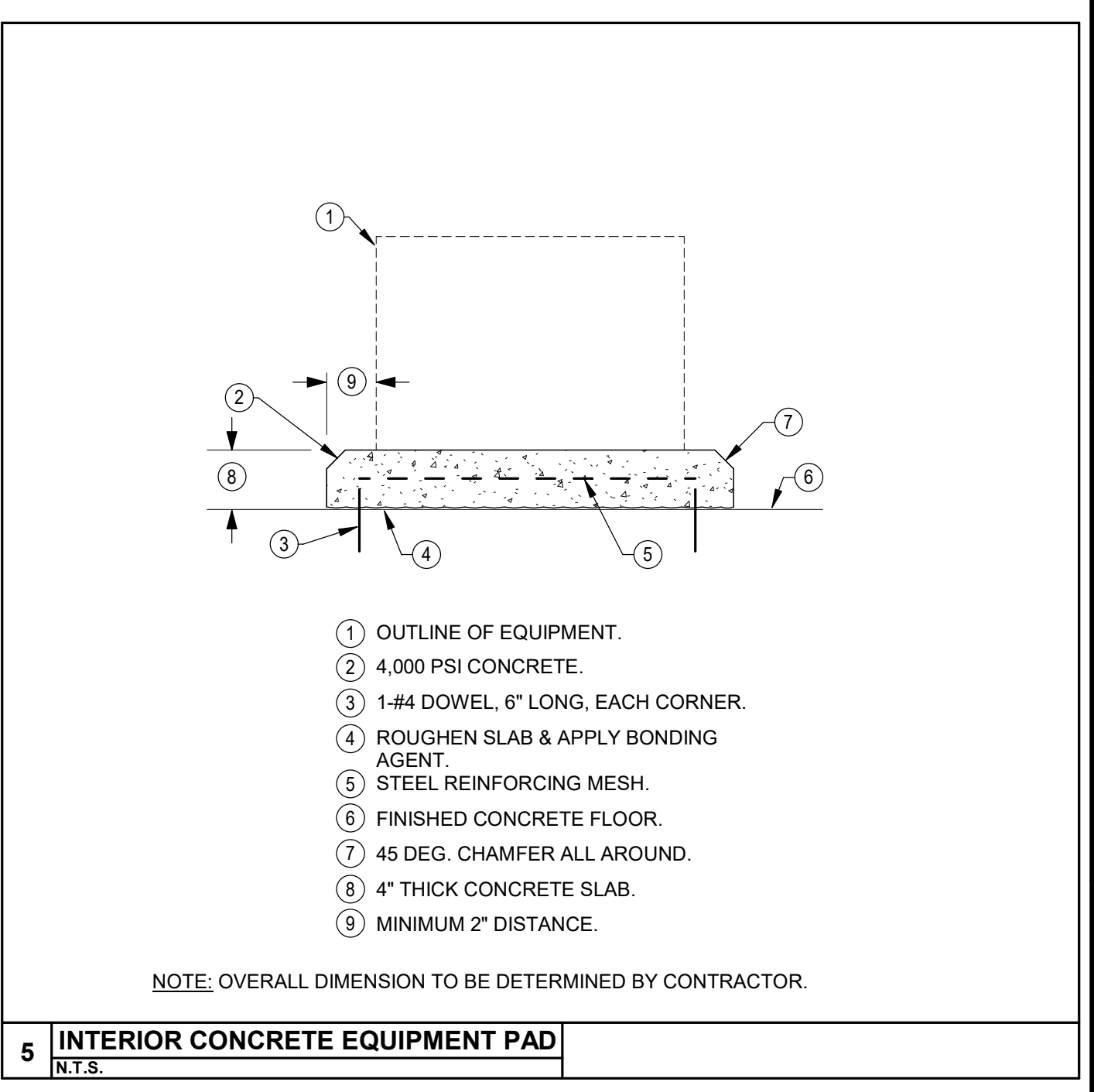
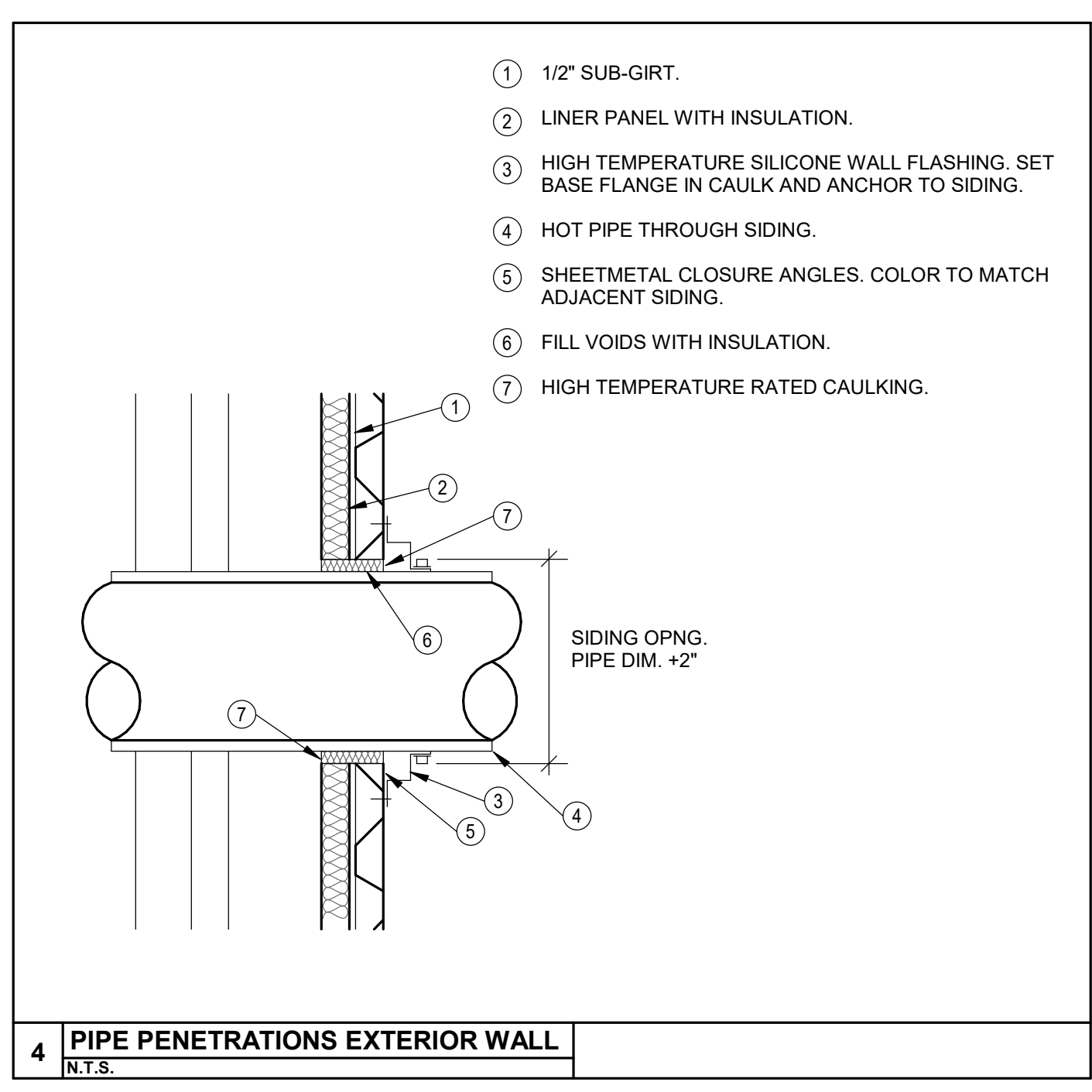
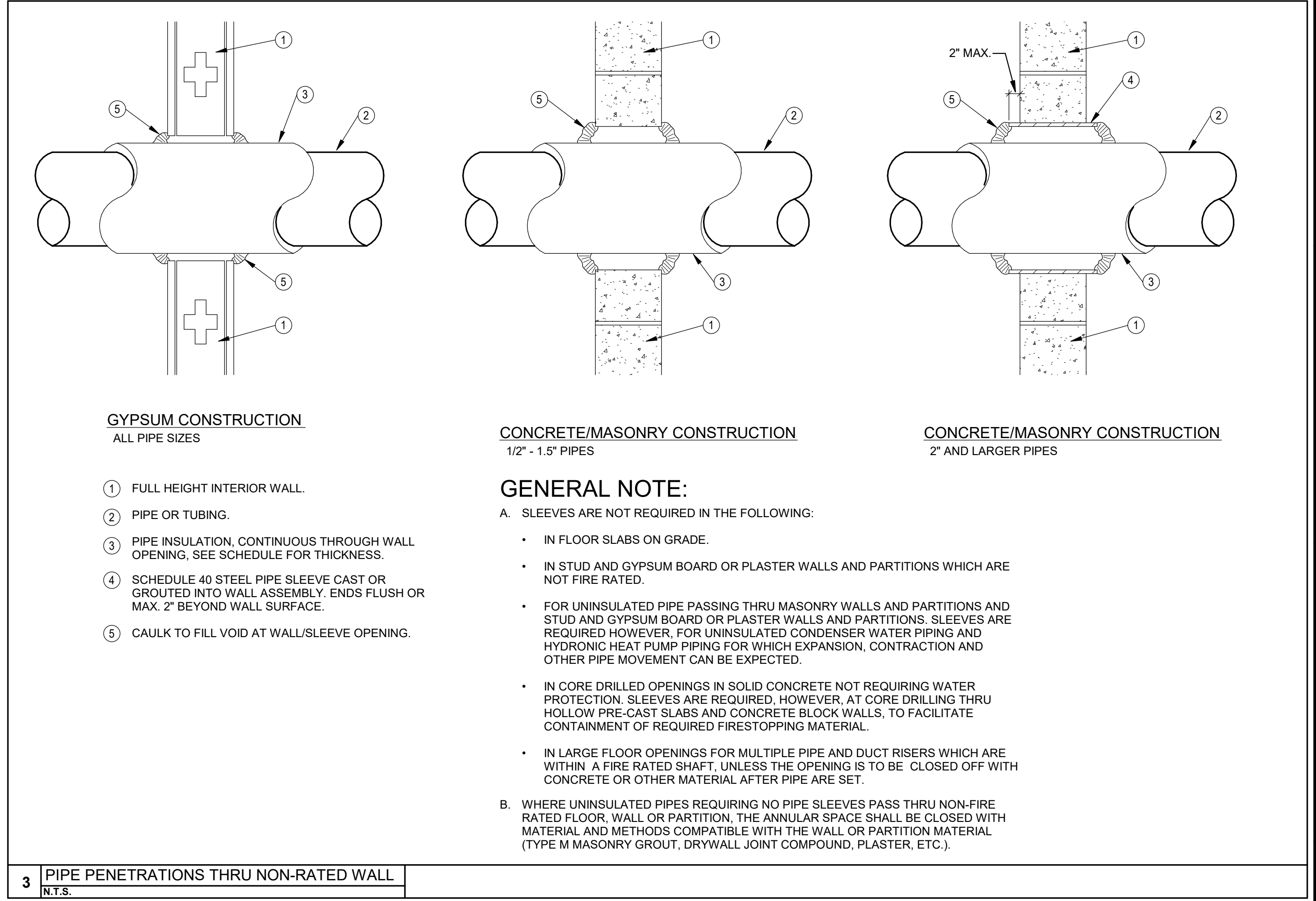
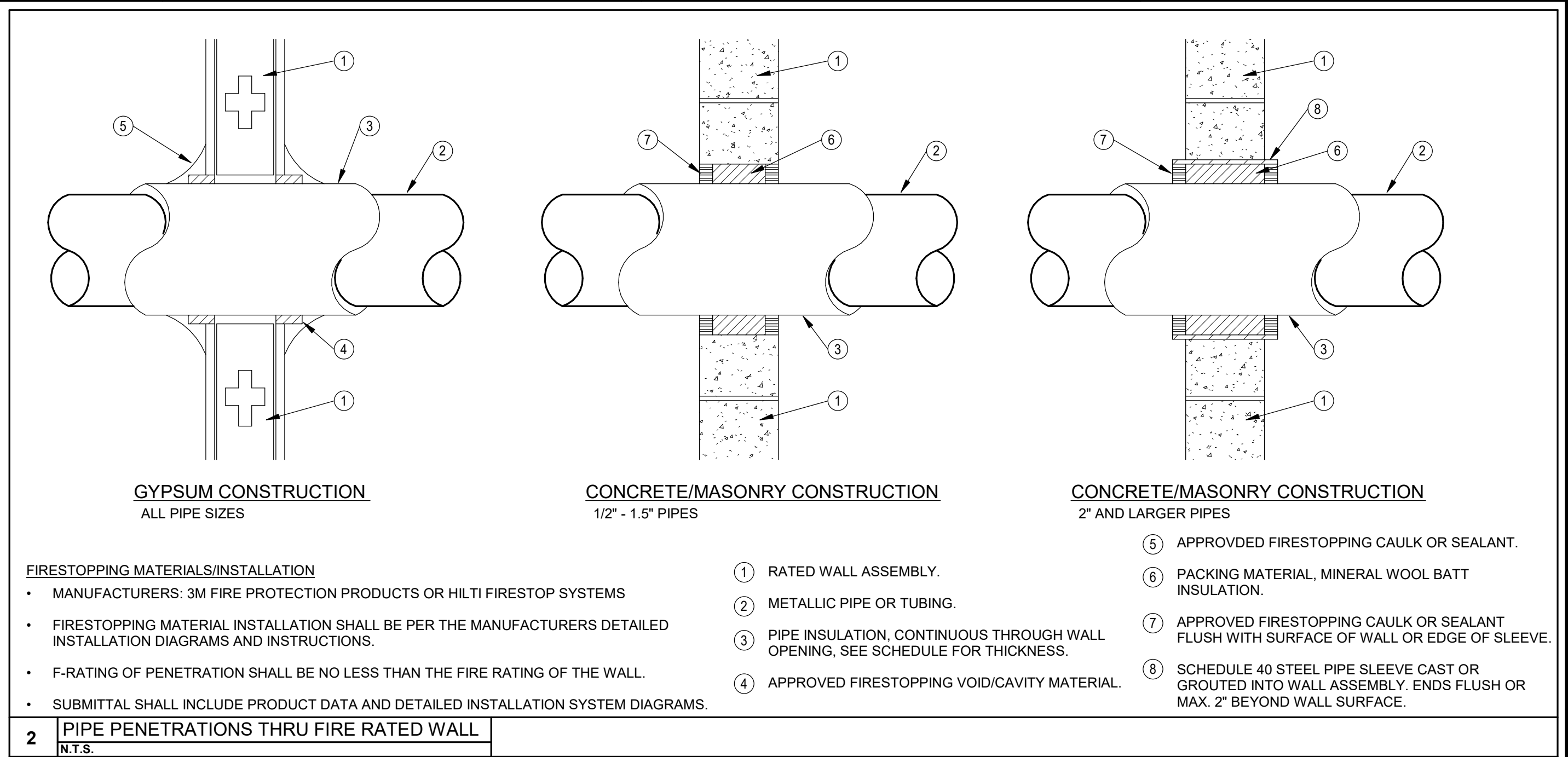
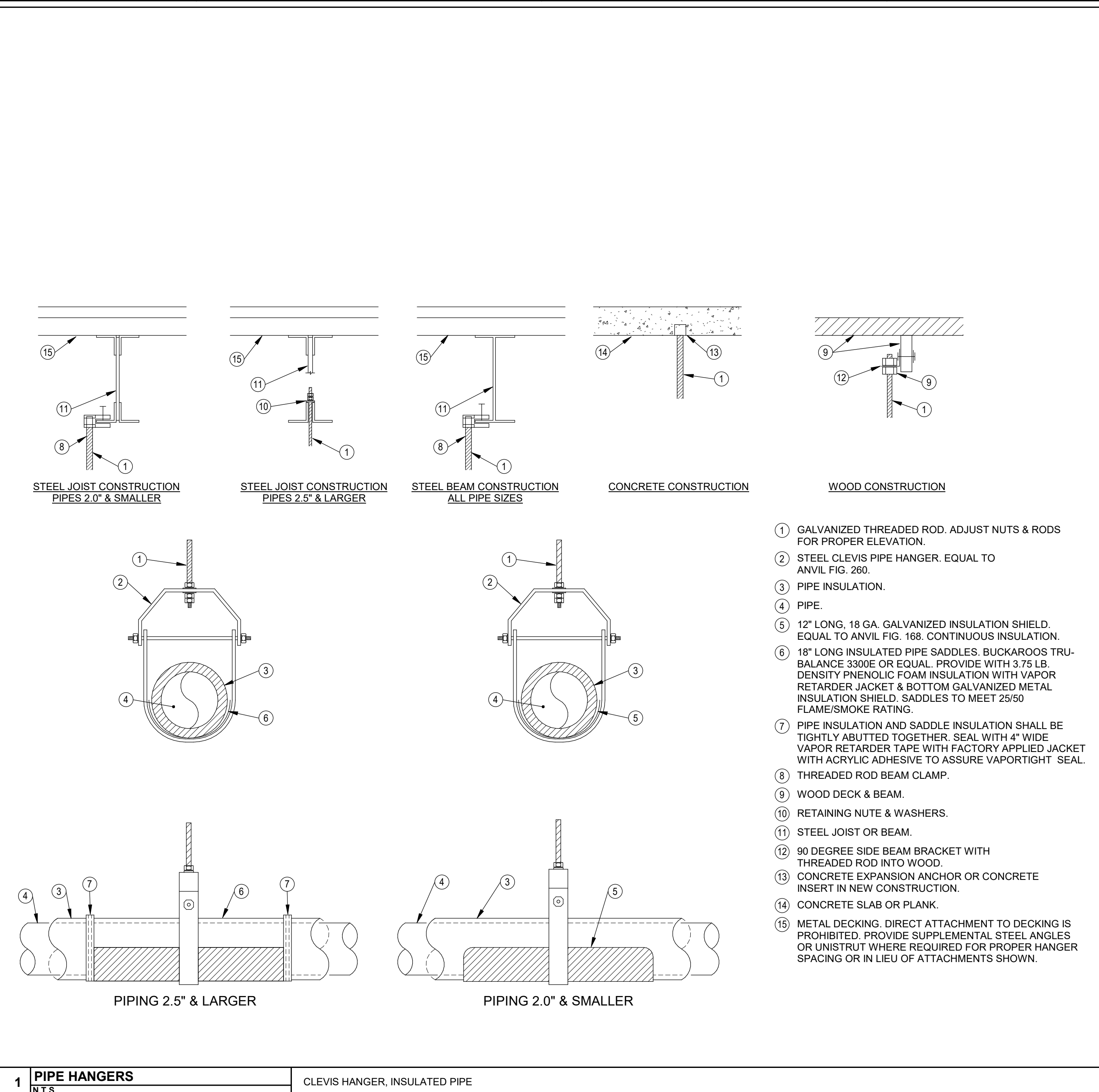
NAUMAN & ZELINSKI LLC.  
204 S. Ludlow Street Suite 400 Dayton, Ohio 45402  
Phone: 937-233-8888  
PROJECT # 2021

City of Middletown  
**Fire Station No. 83 & Headquarters**  
1630 Yankee Road, Middletown, Ohio 45044

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**H2.4**

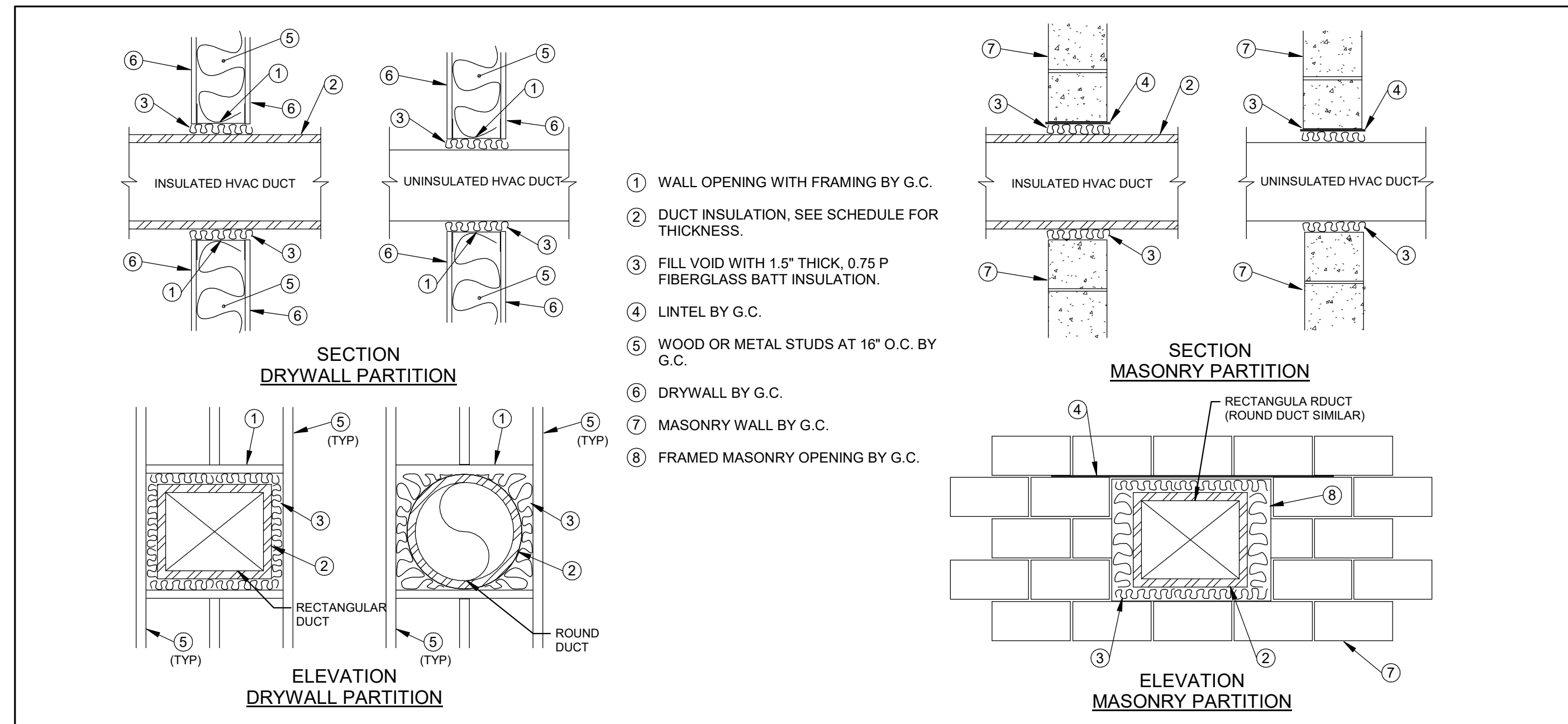


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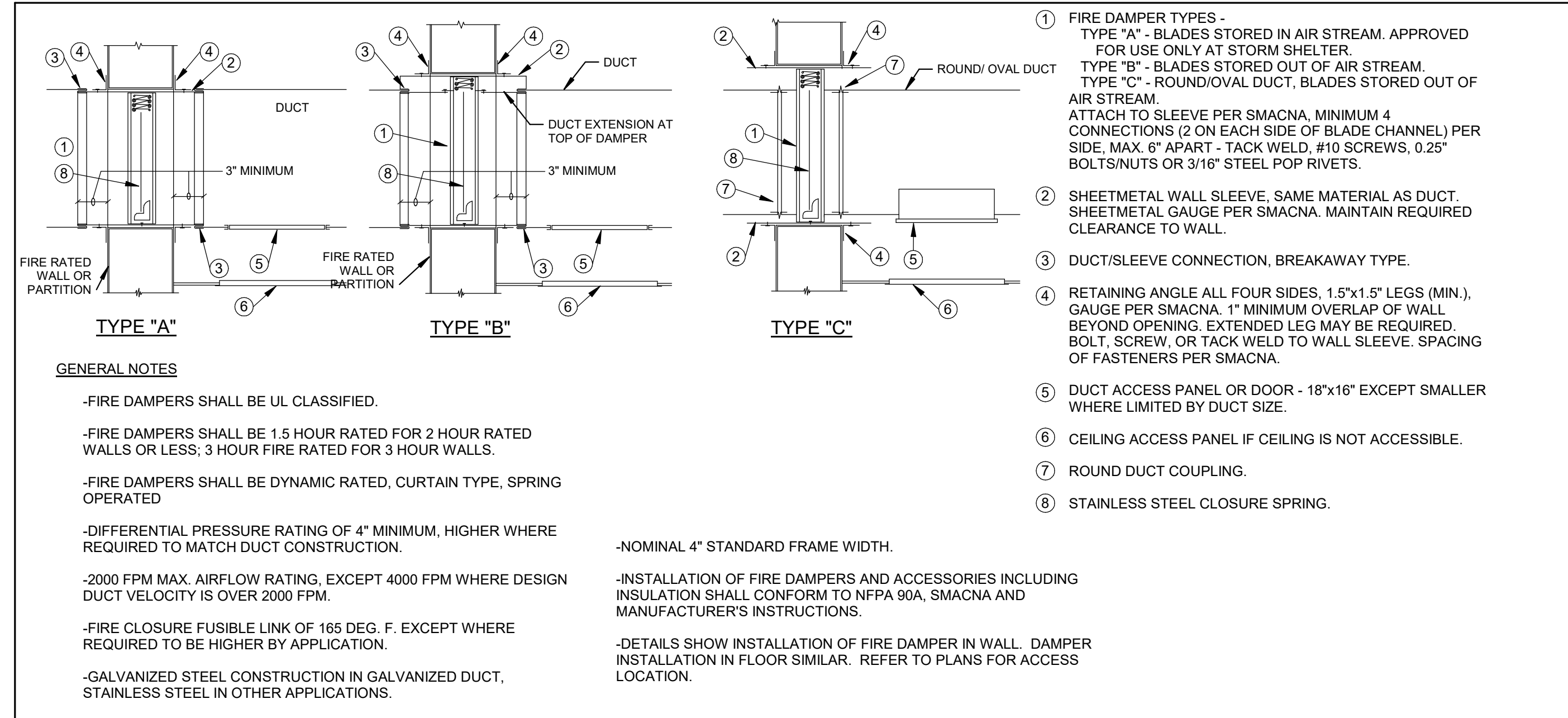
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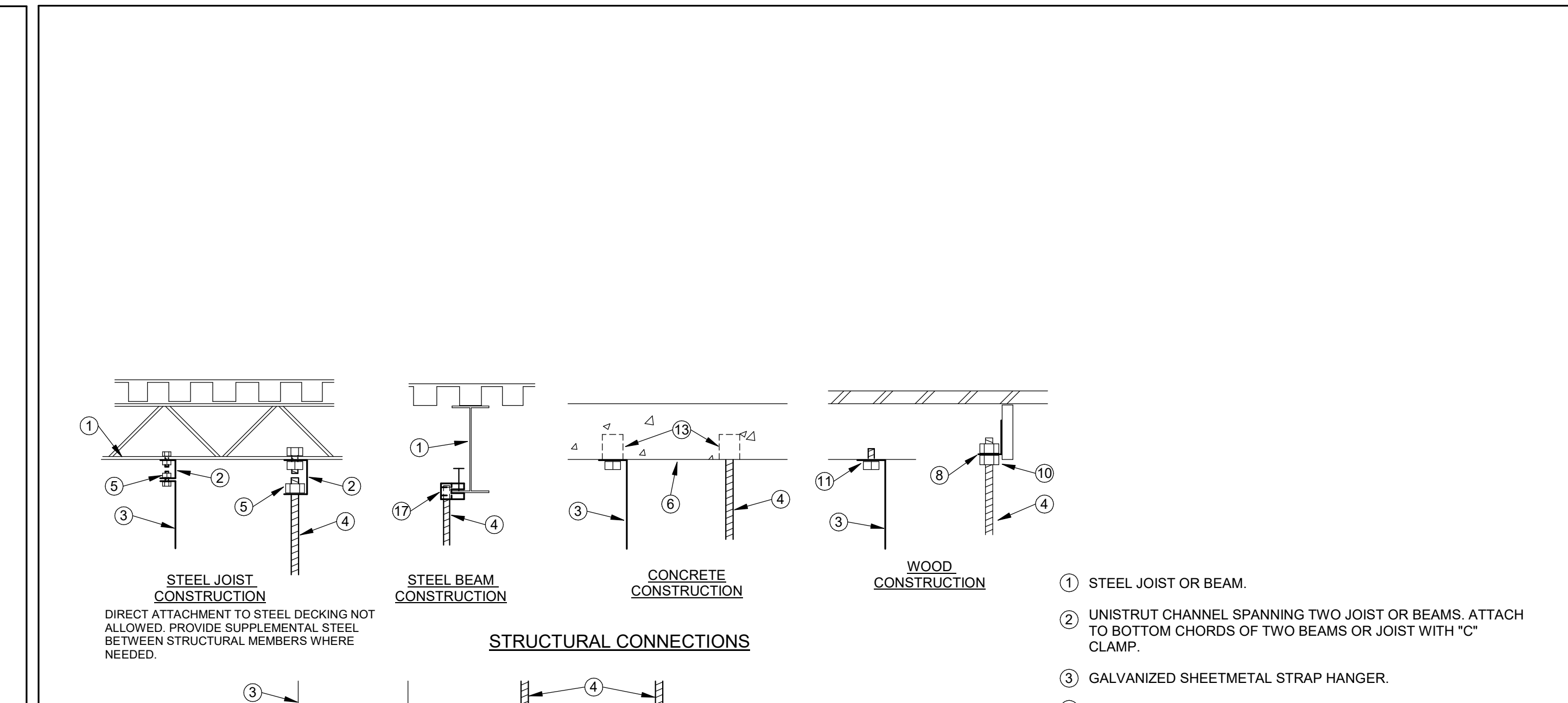
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**H3.1**



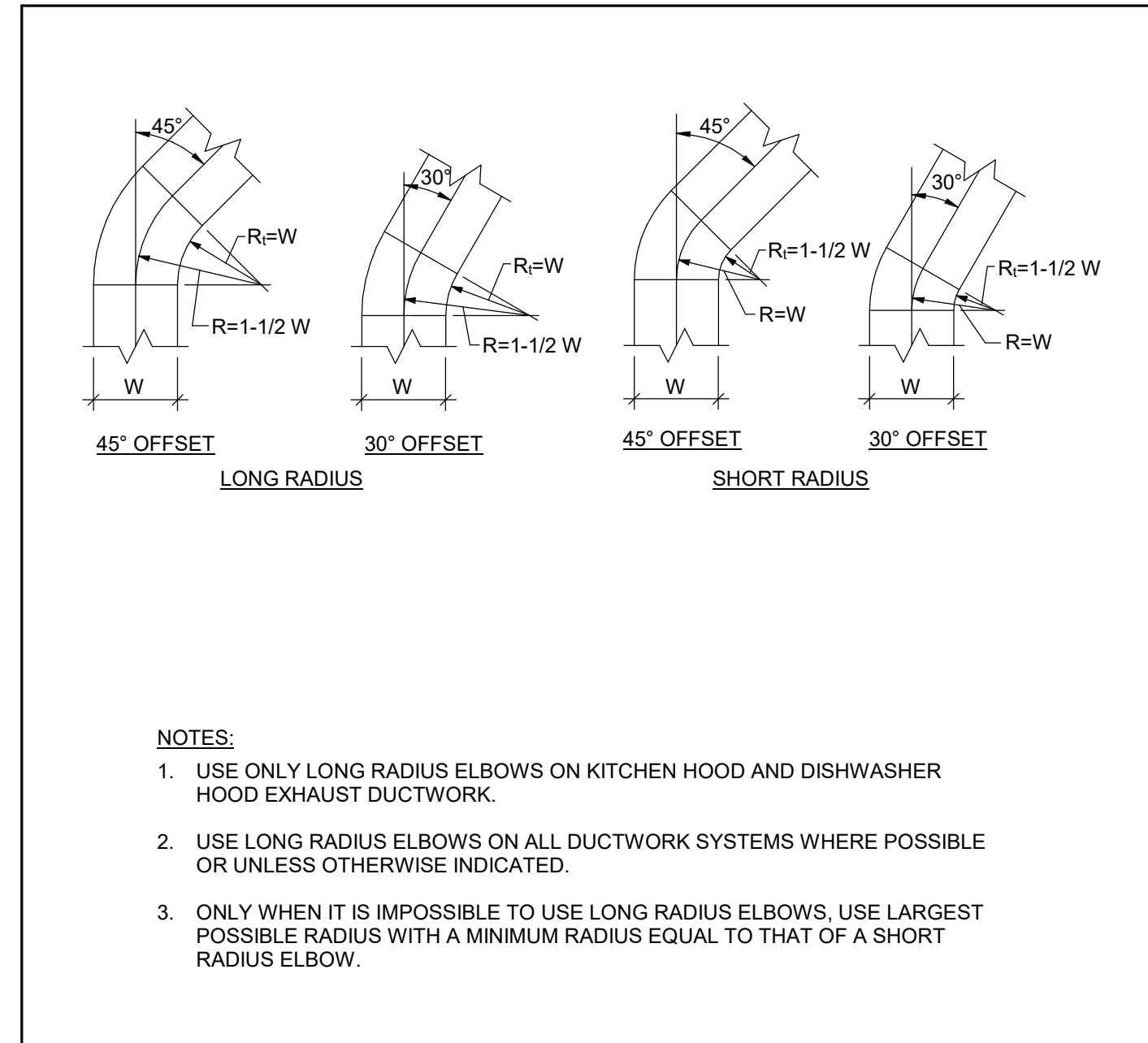
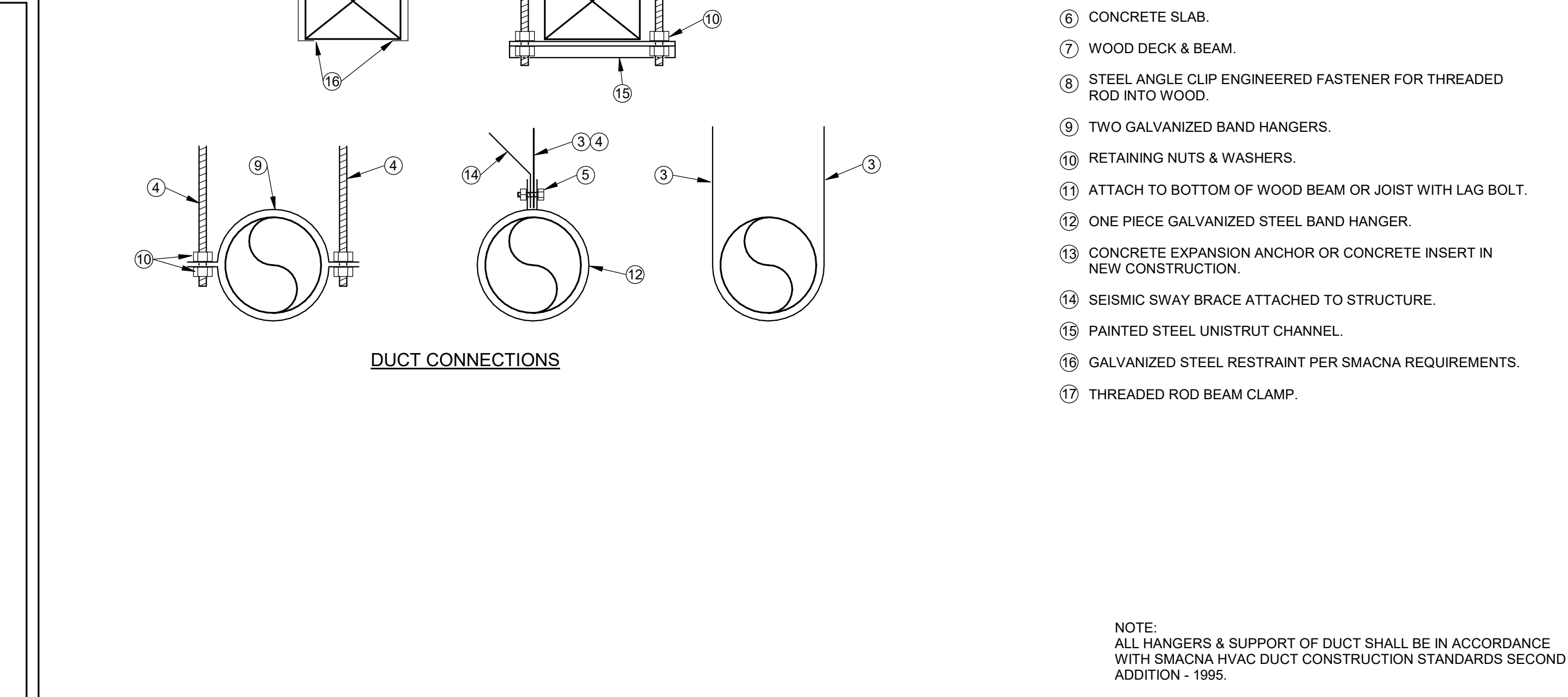
**1 DUCT SEALING THRU NON-FIRE RATED WALL**  
N.T.S. \* NEW CONSTRUCTION, FRAMED OPENING, DUCT SIDE OR DIA. ≥ 12"



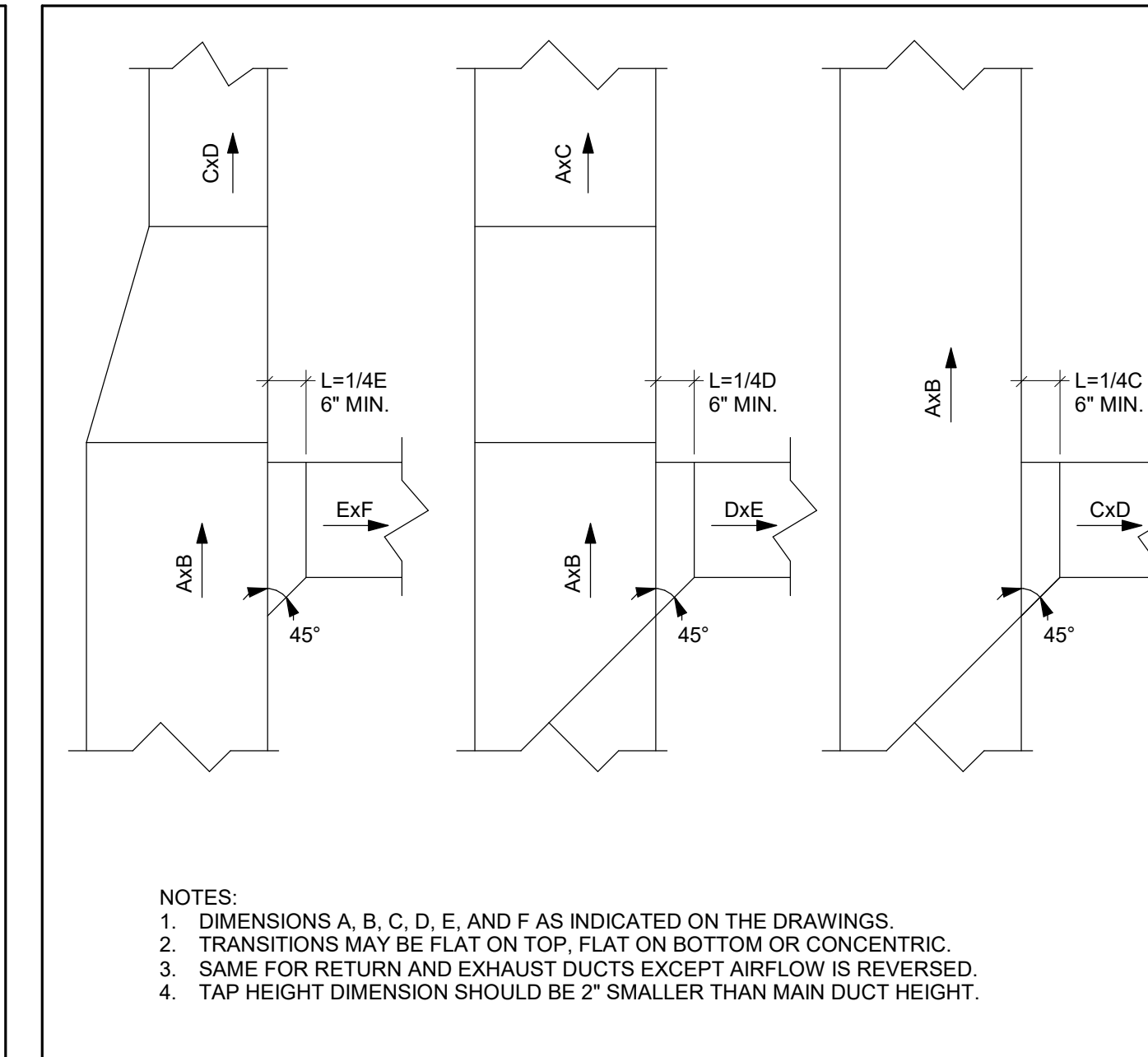
**2 FIRE DAMPERS DETAIL**  
N.T.S.



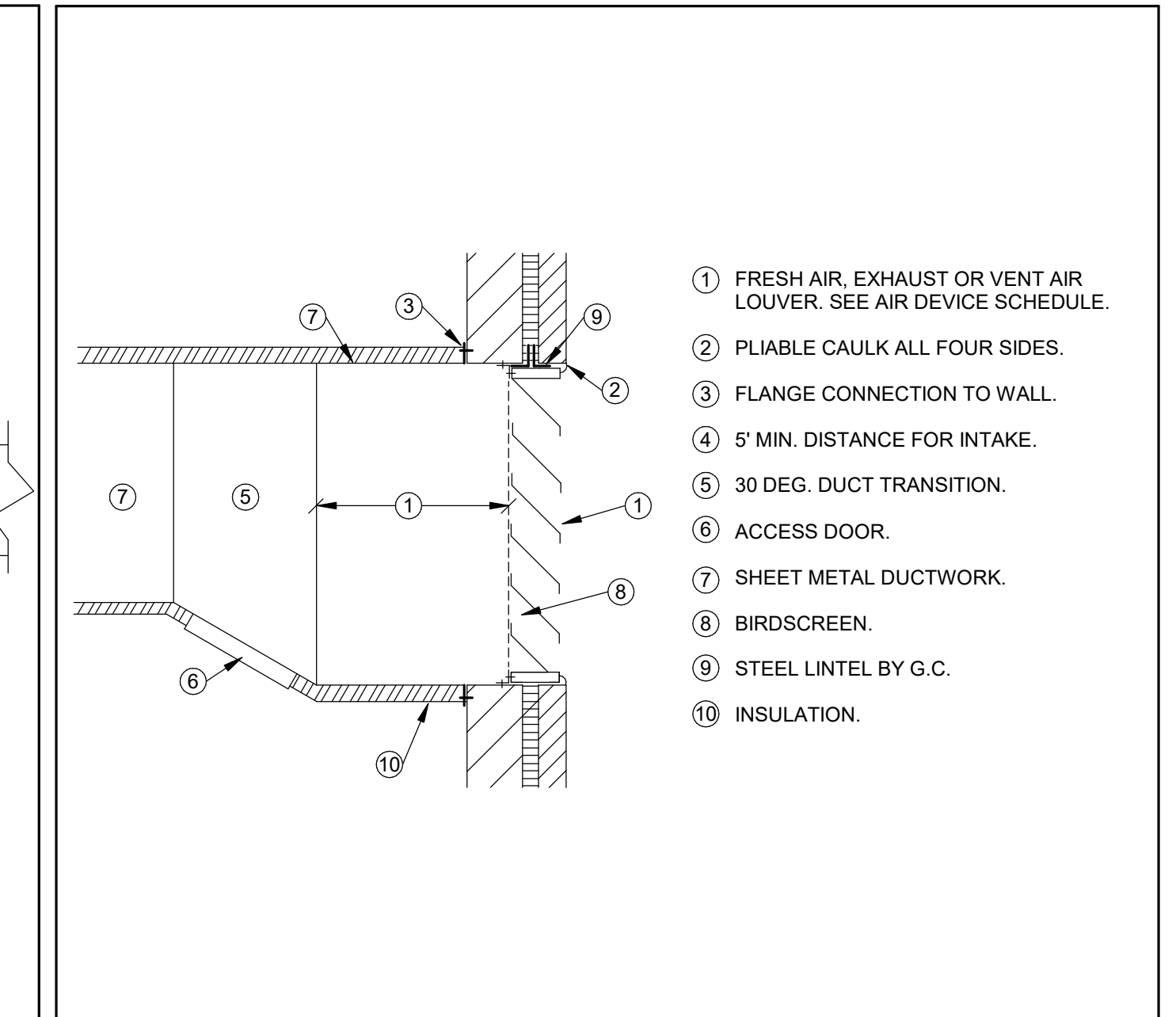
**3 DUCT HANGERS & SUPPORTS**  
N.T.S. METAL STRAP & ROD HANGERS



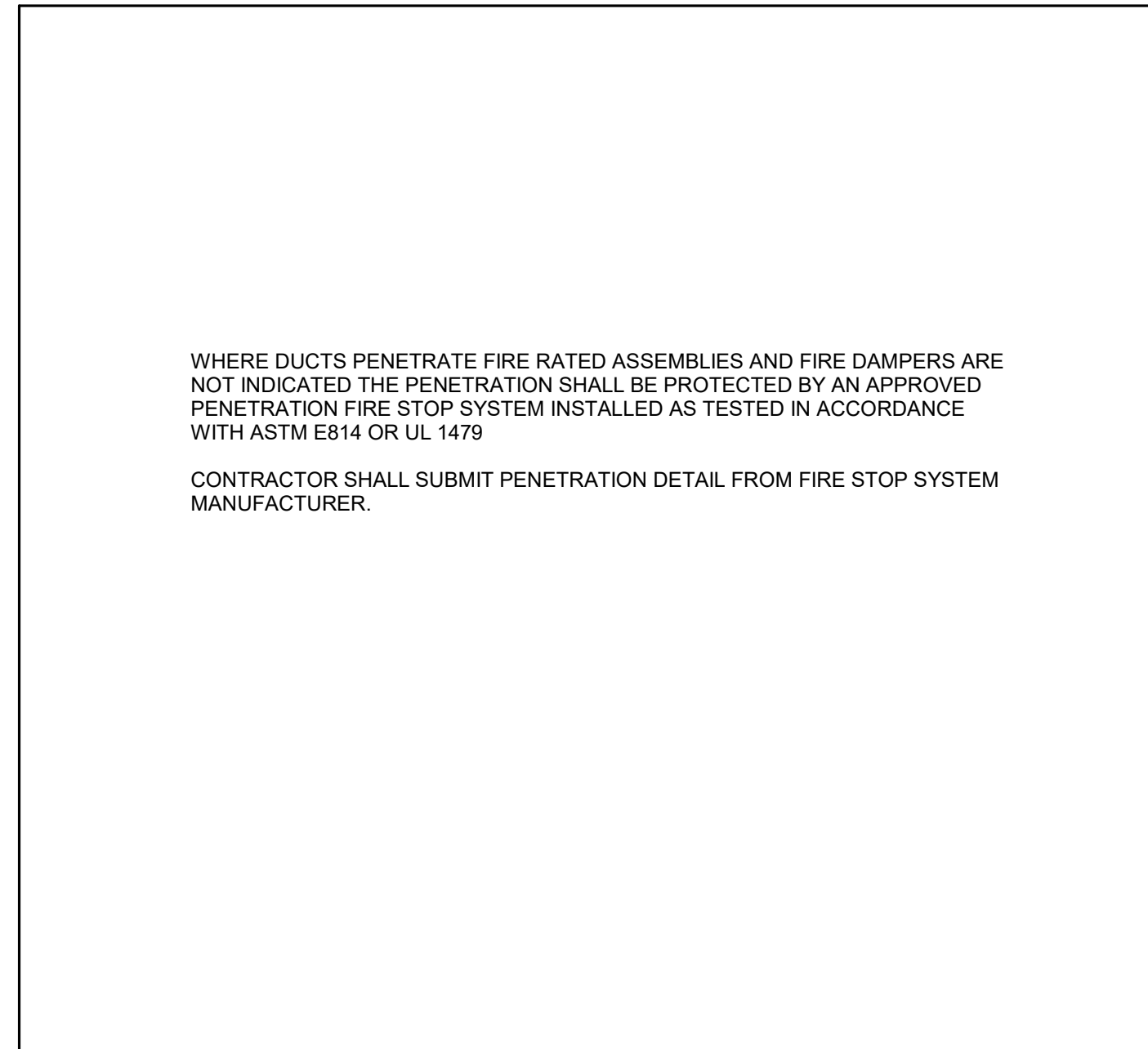
**4 RECTANGULAR 45° & 30° RADIUS ELBOW**  
N.T.S.



**5 RECTANGULAR 90° SIDE TAP**  
N.T.S.



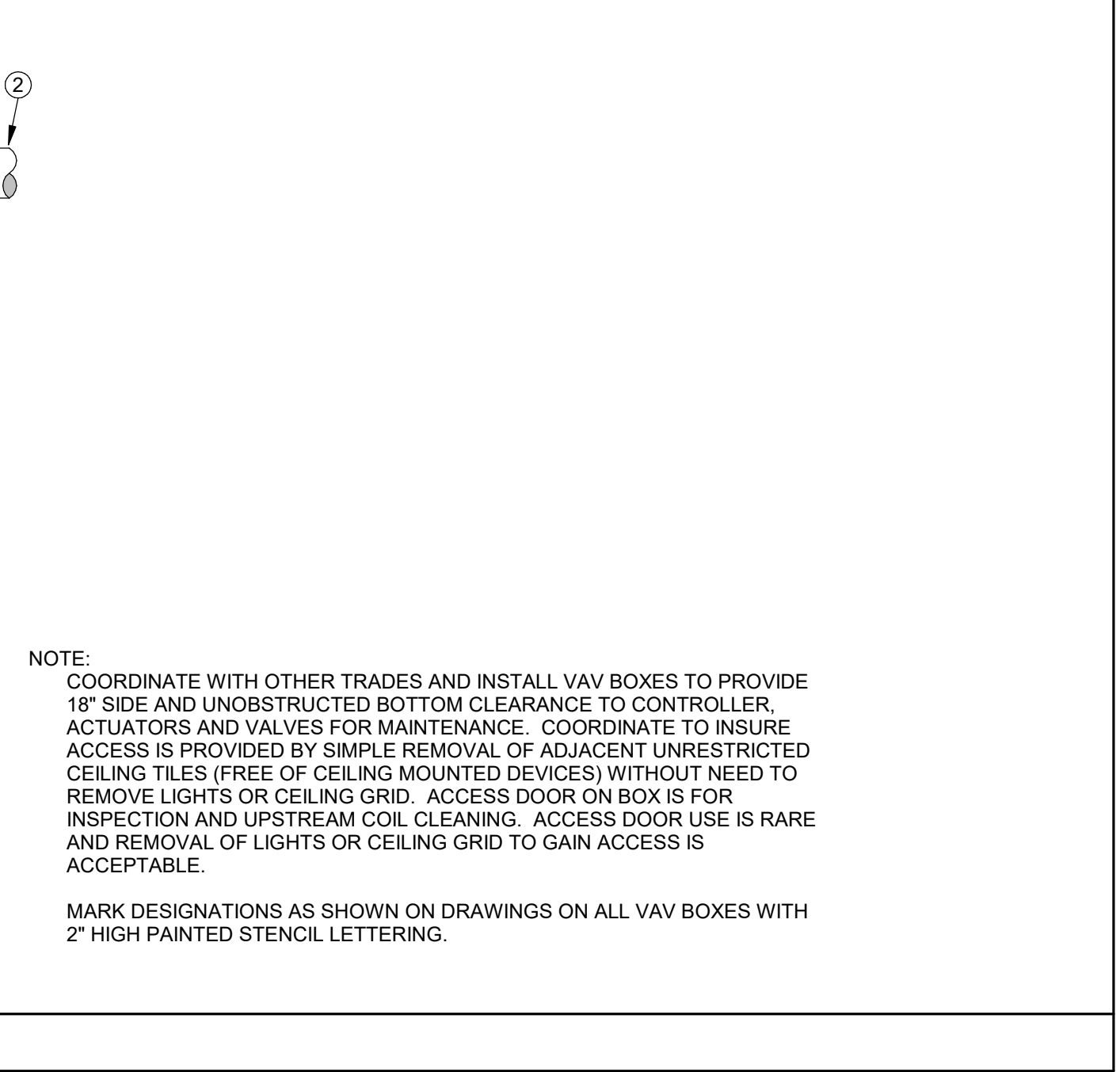
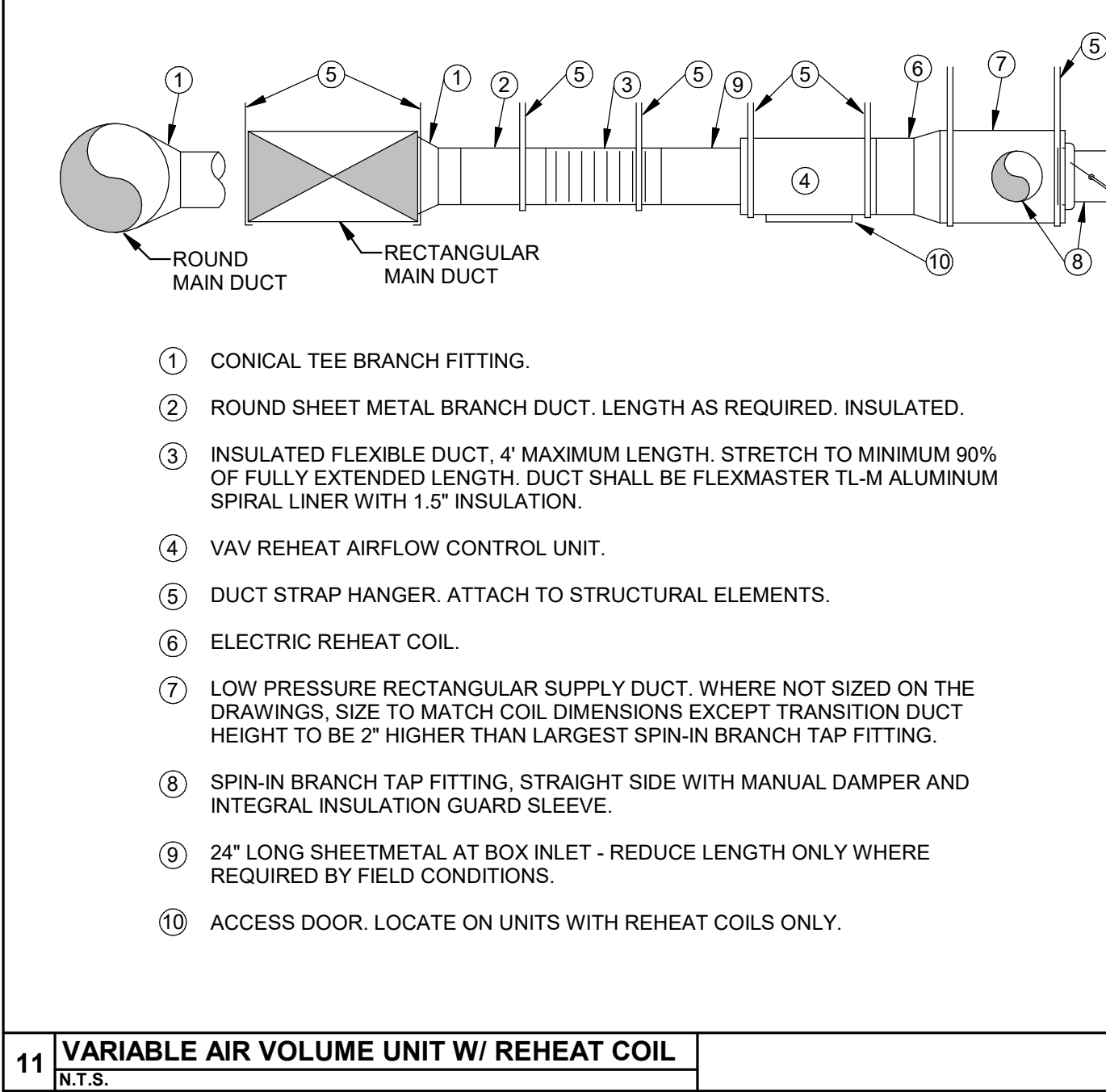
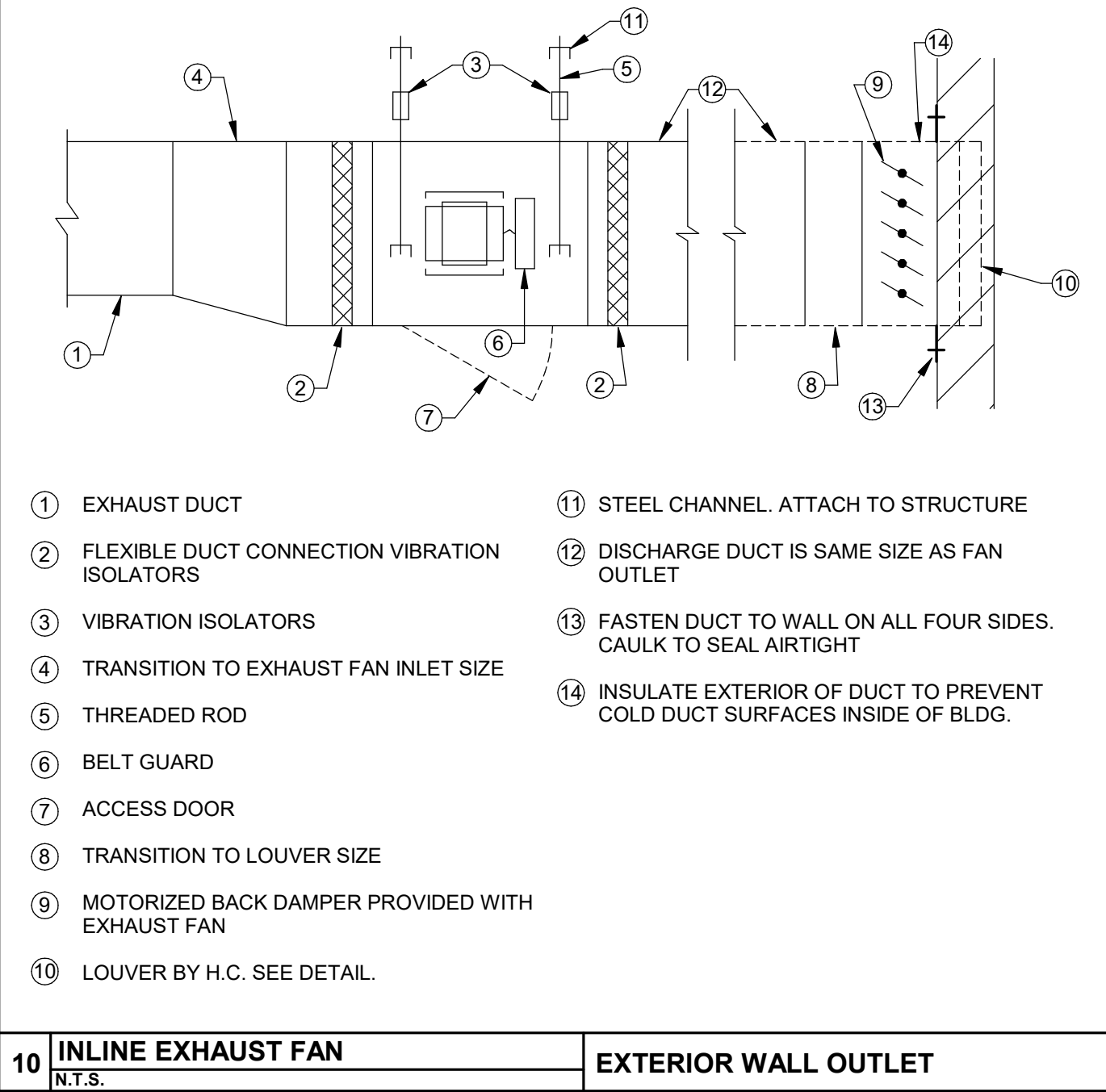
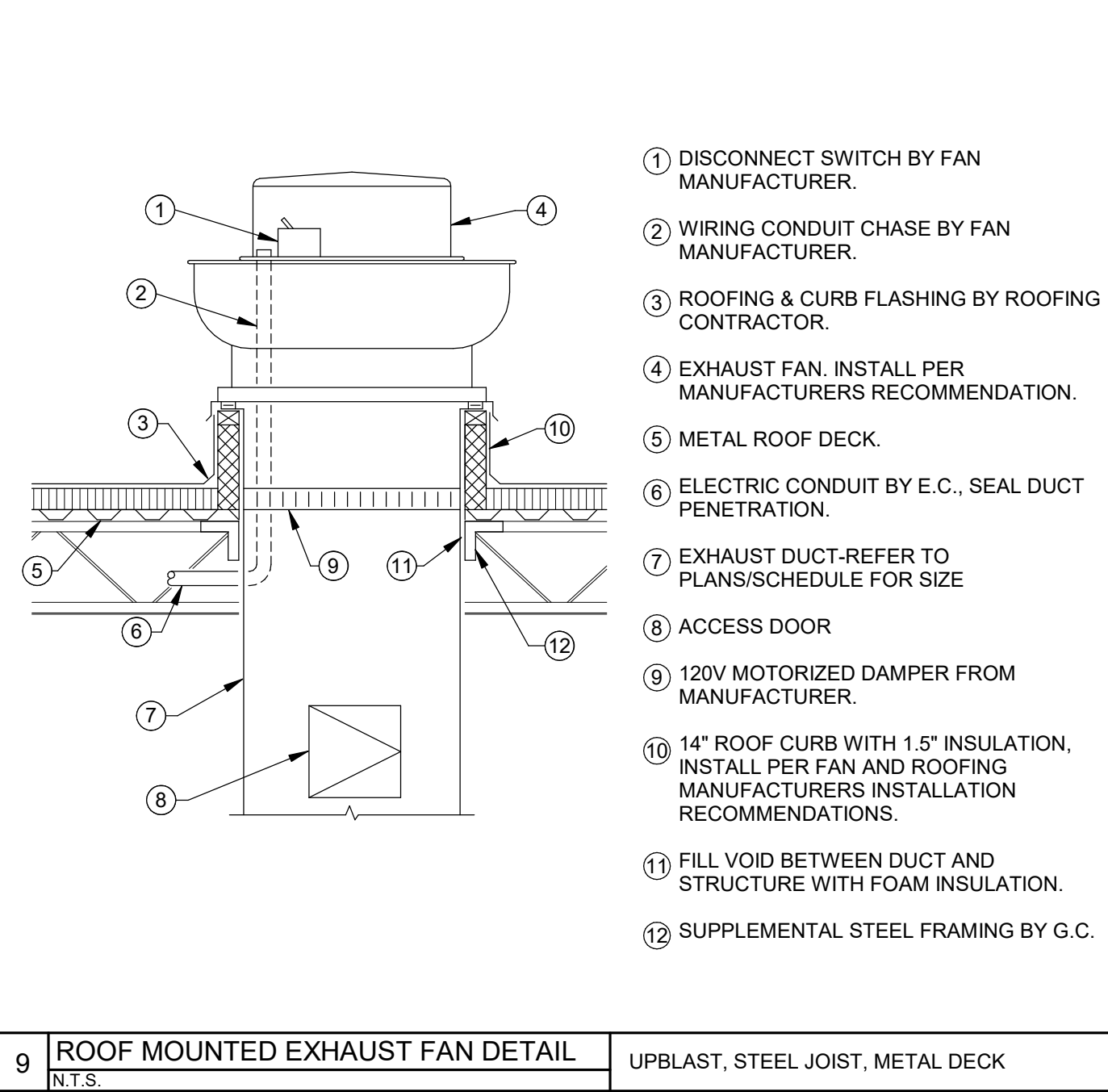
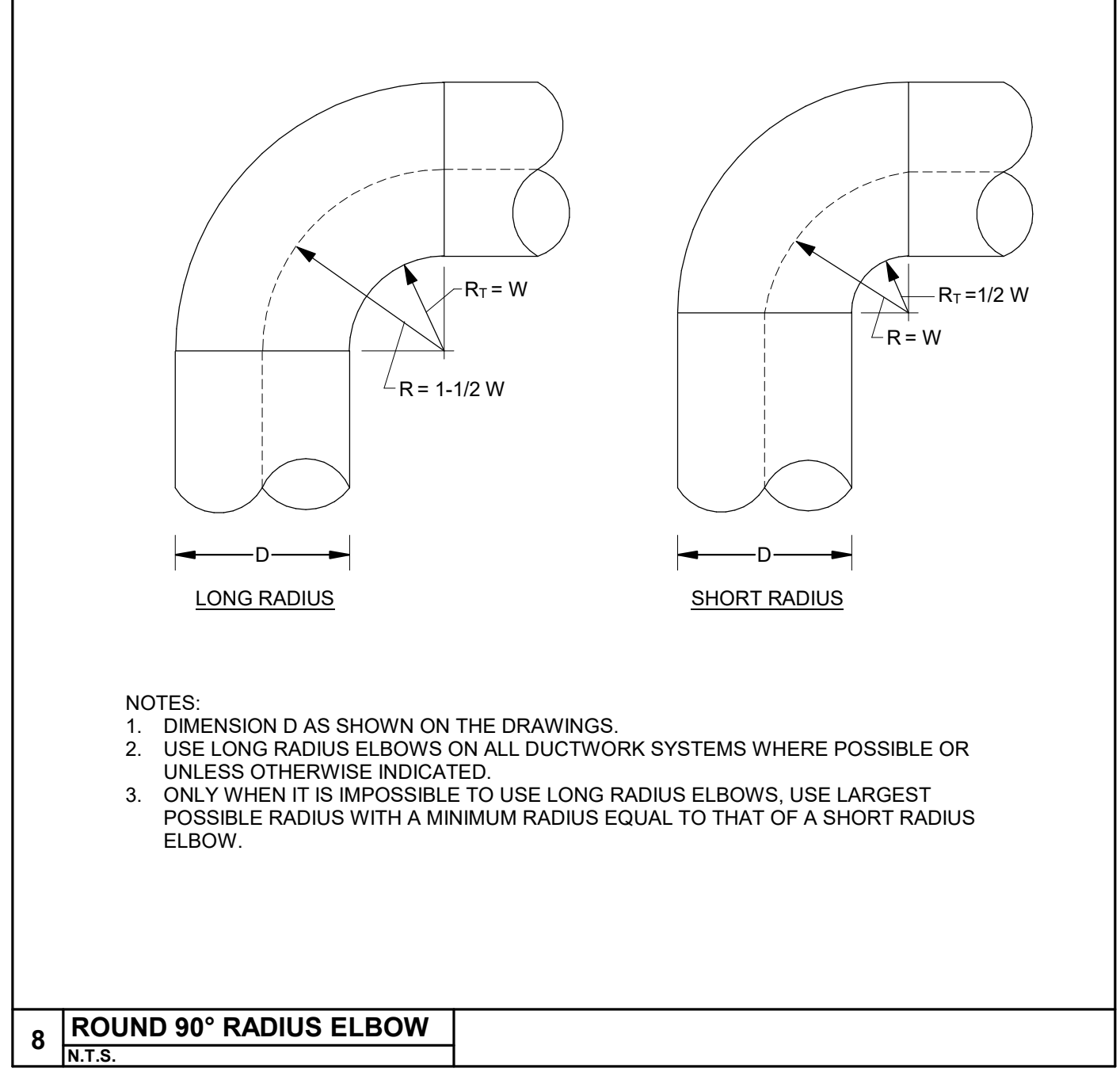
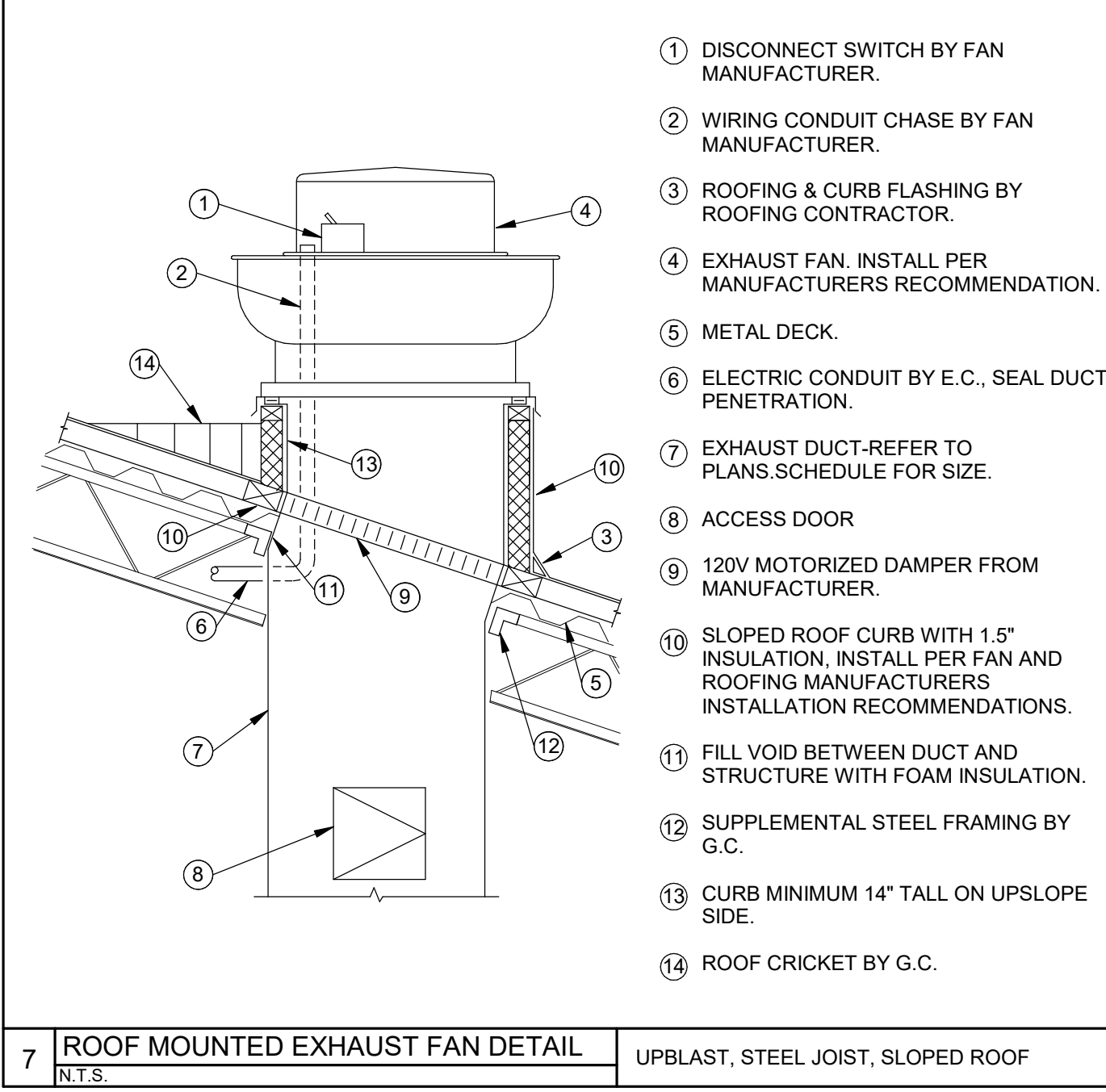
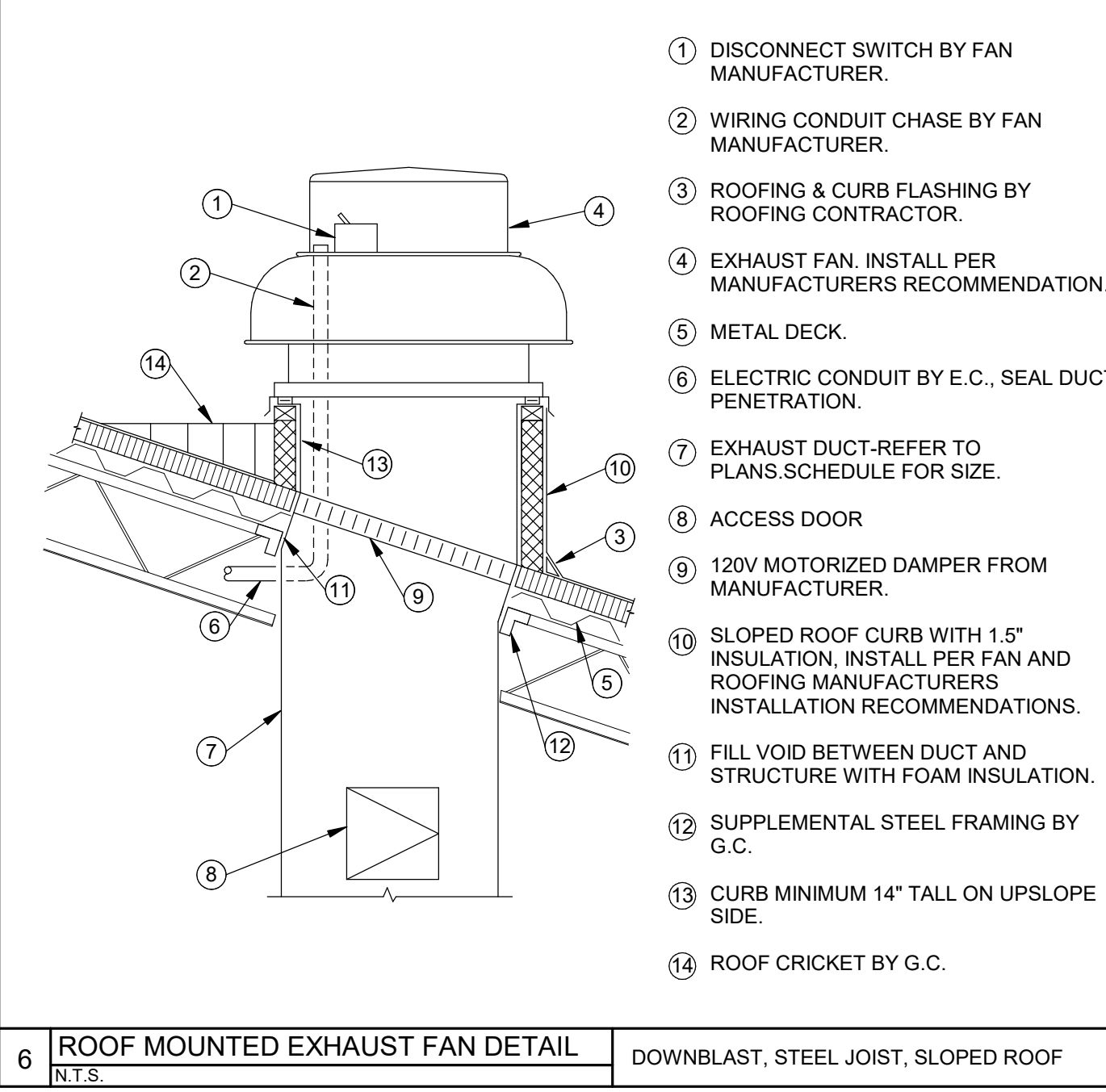
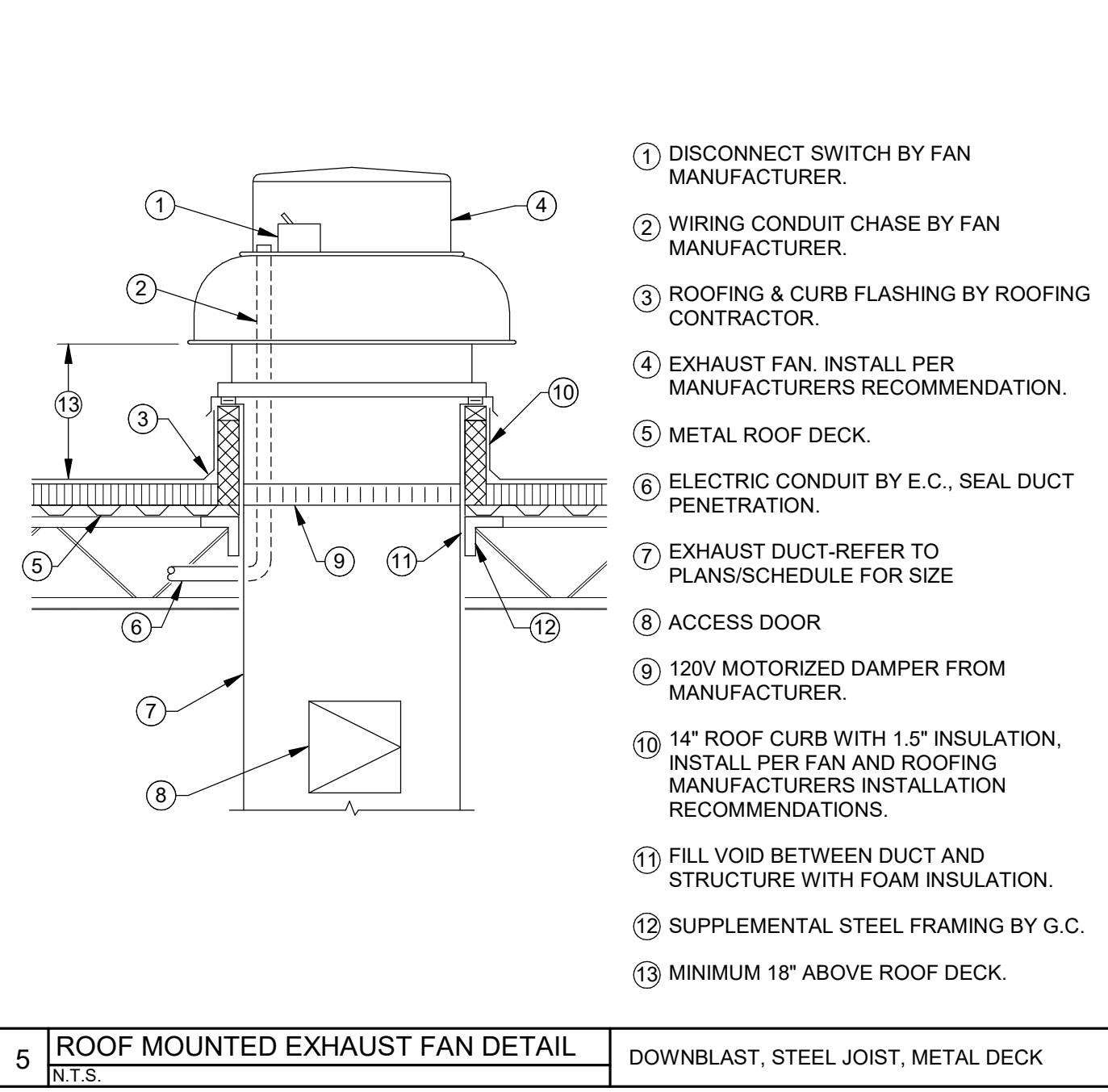
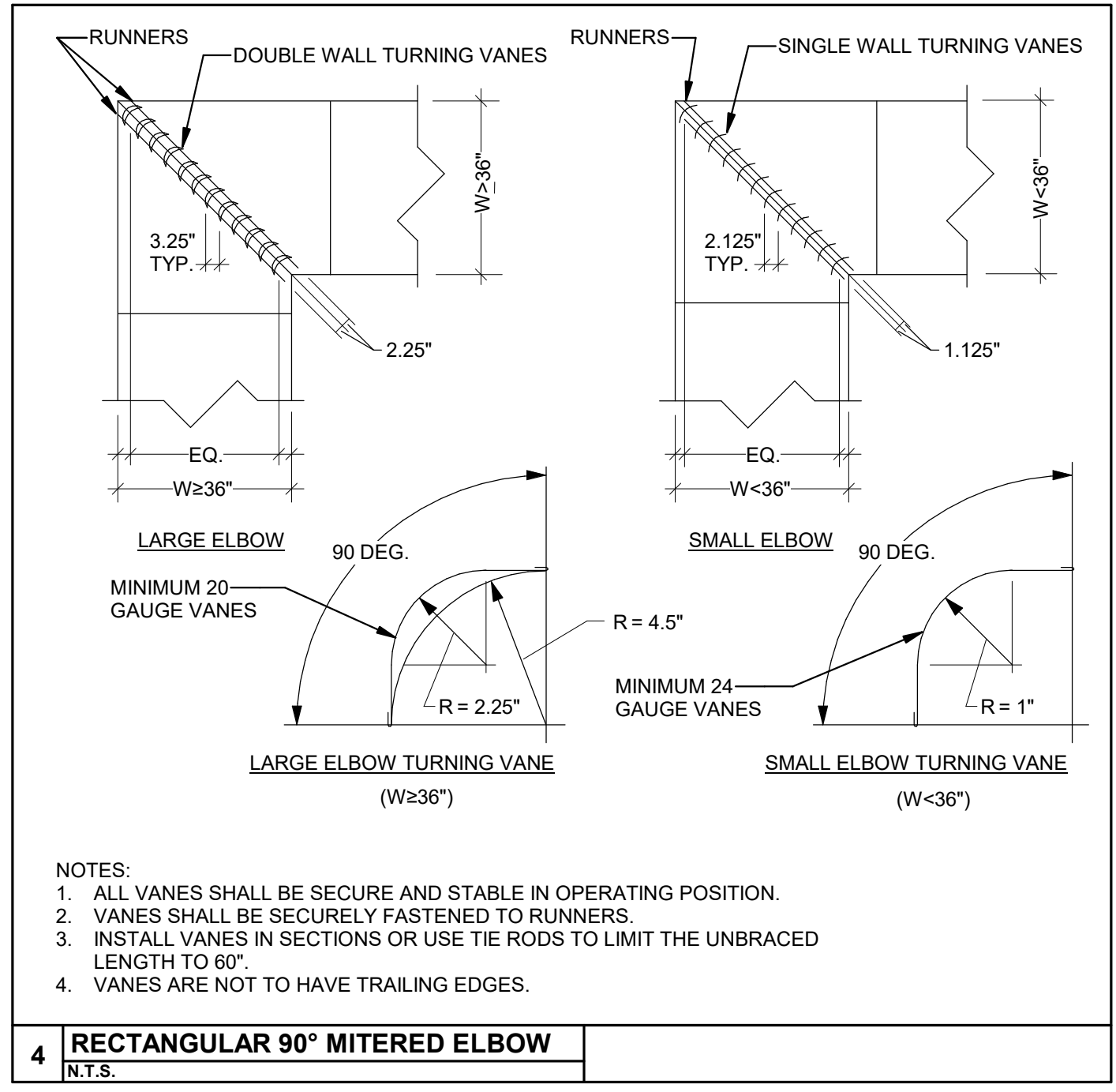
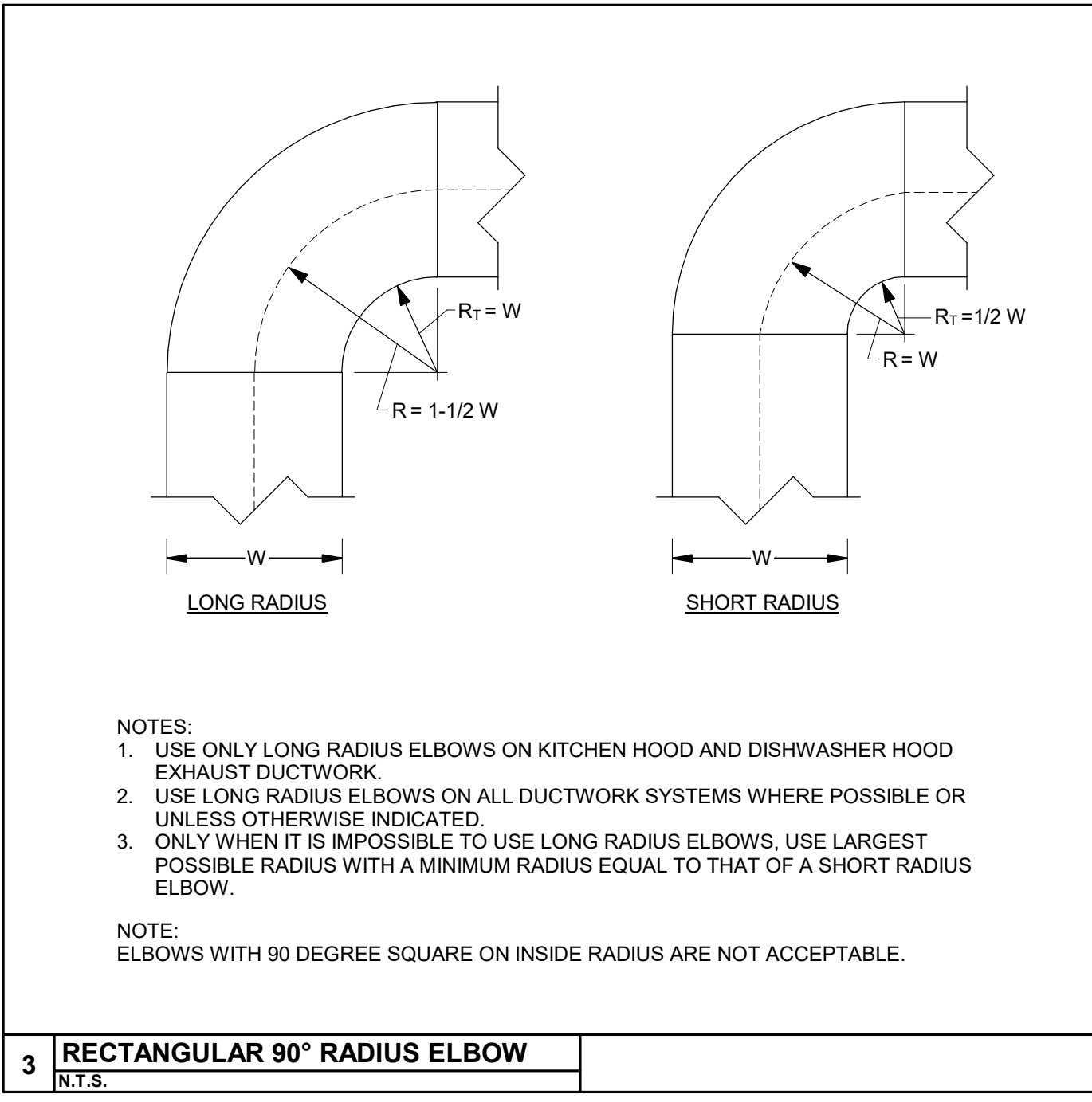
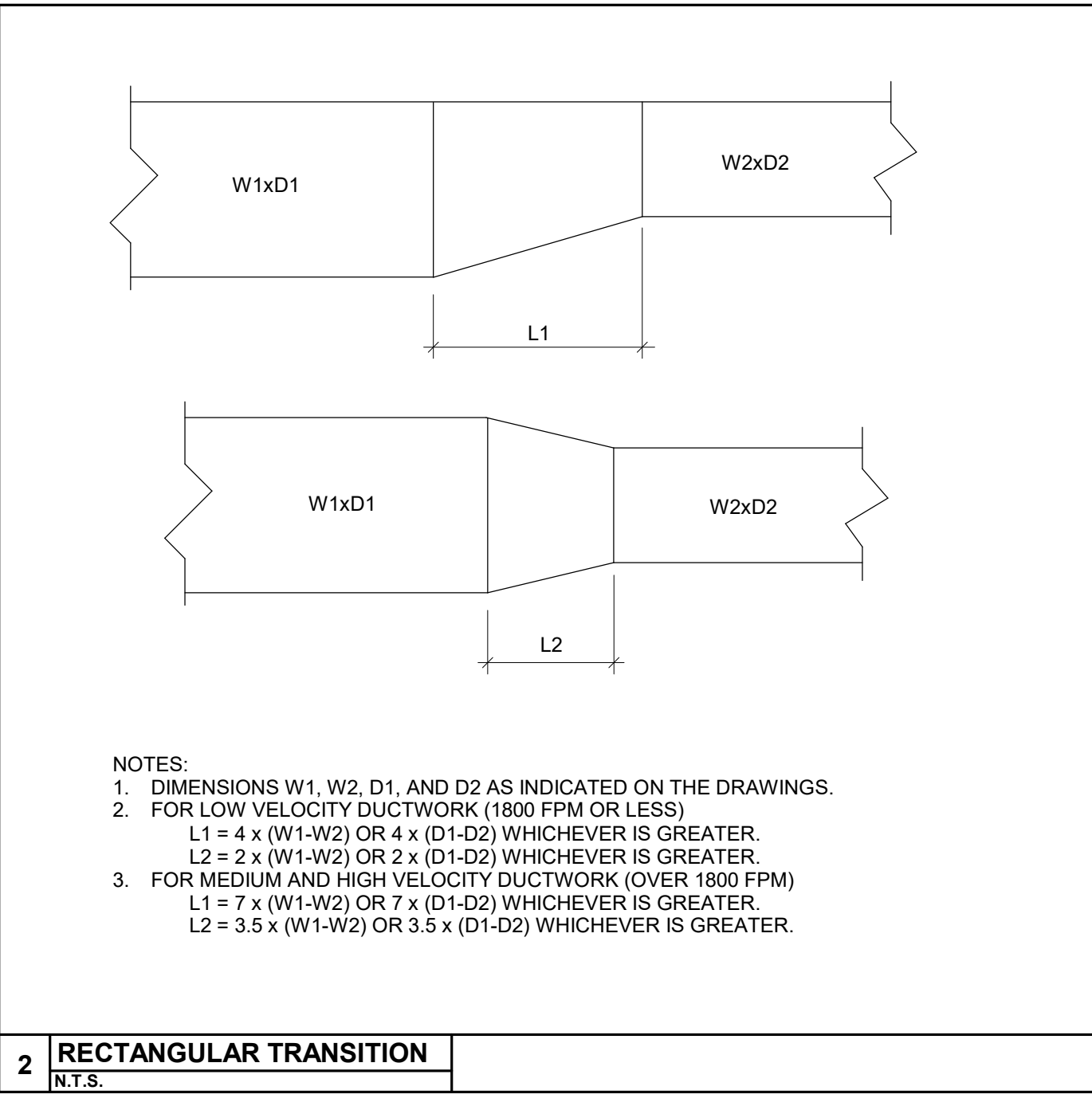
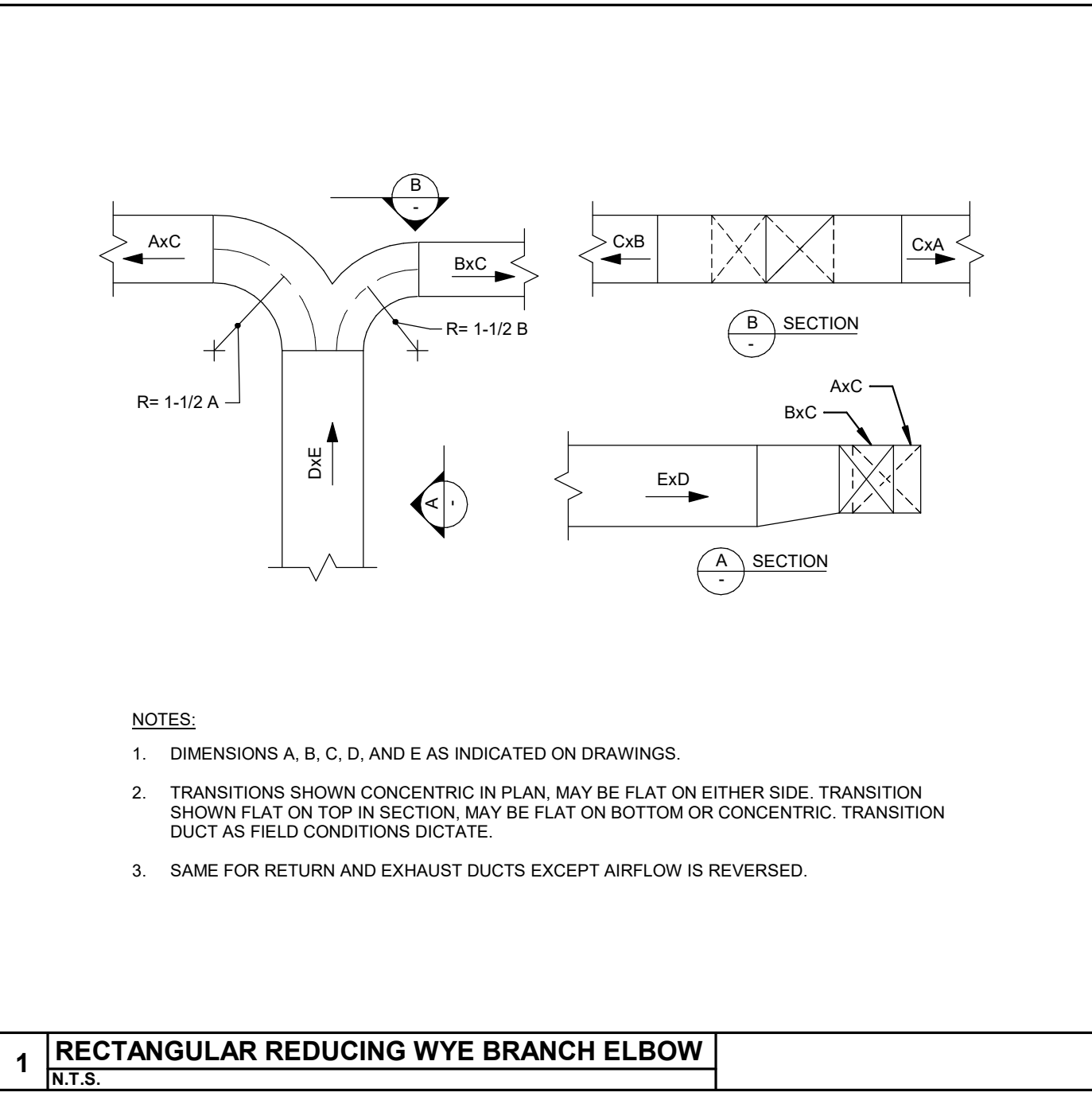
**6 WALL LOUVER**  
N.T.S.



**7 DUCT PENETRATIONS - FIRE RATED WALLS**  
N.T.S. -NEW AND EXISTING CONSTRUCTION

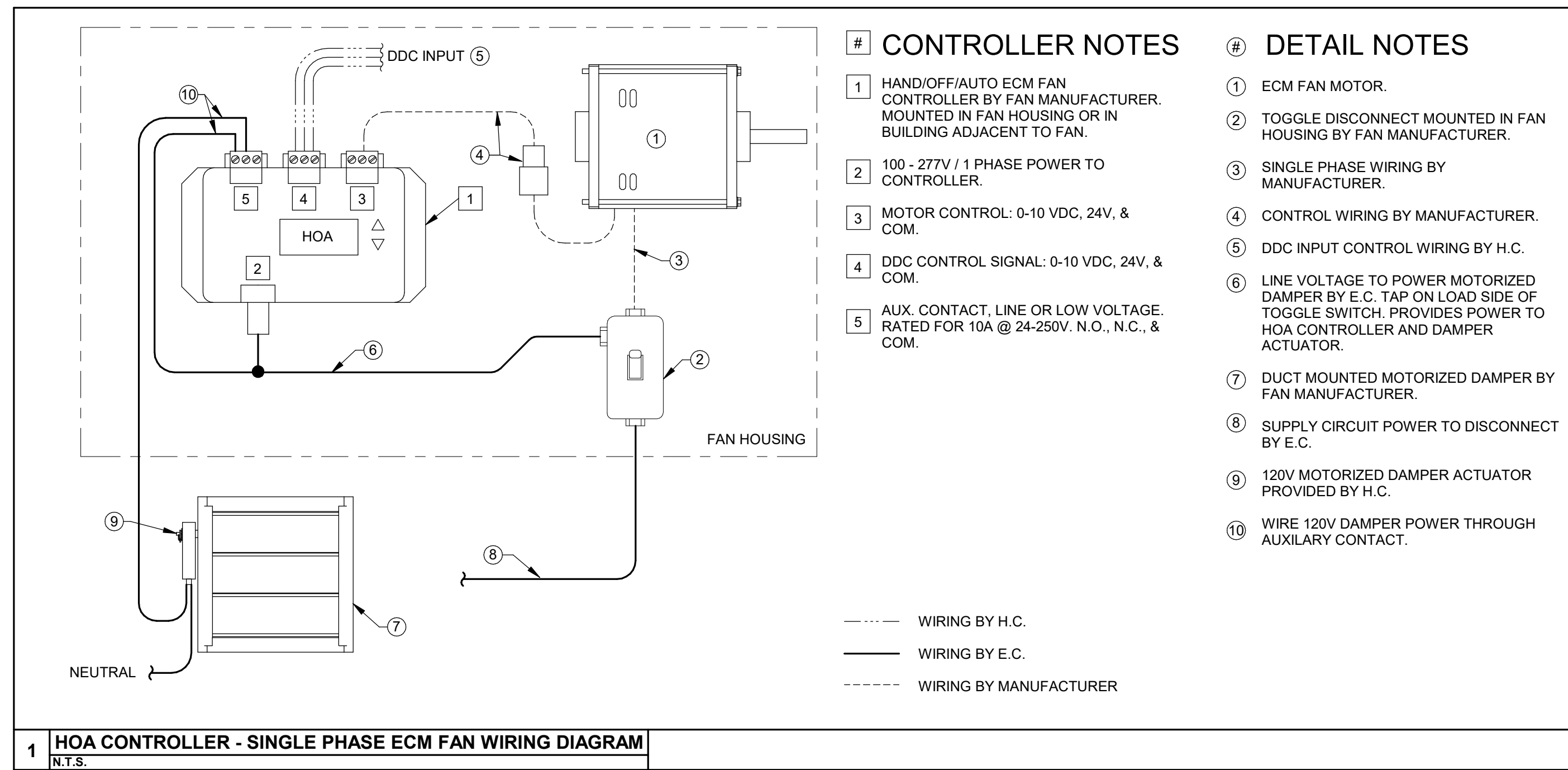
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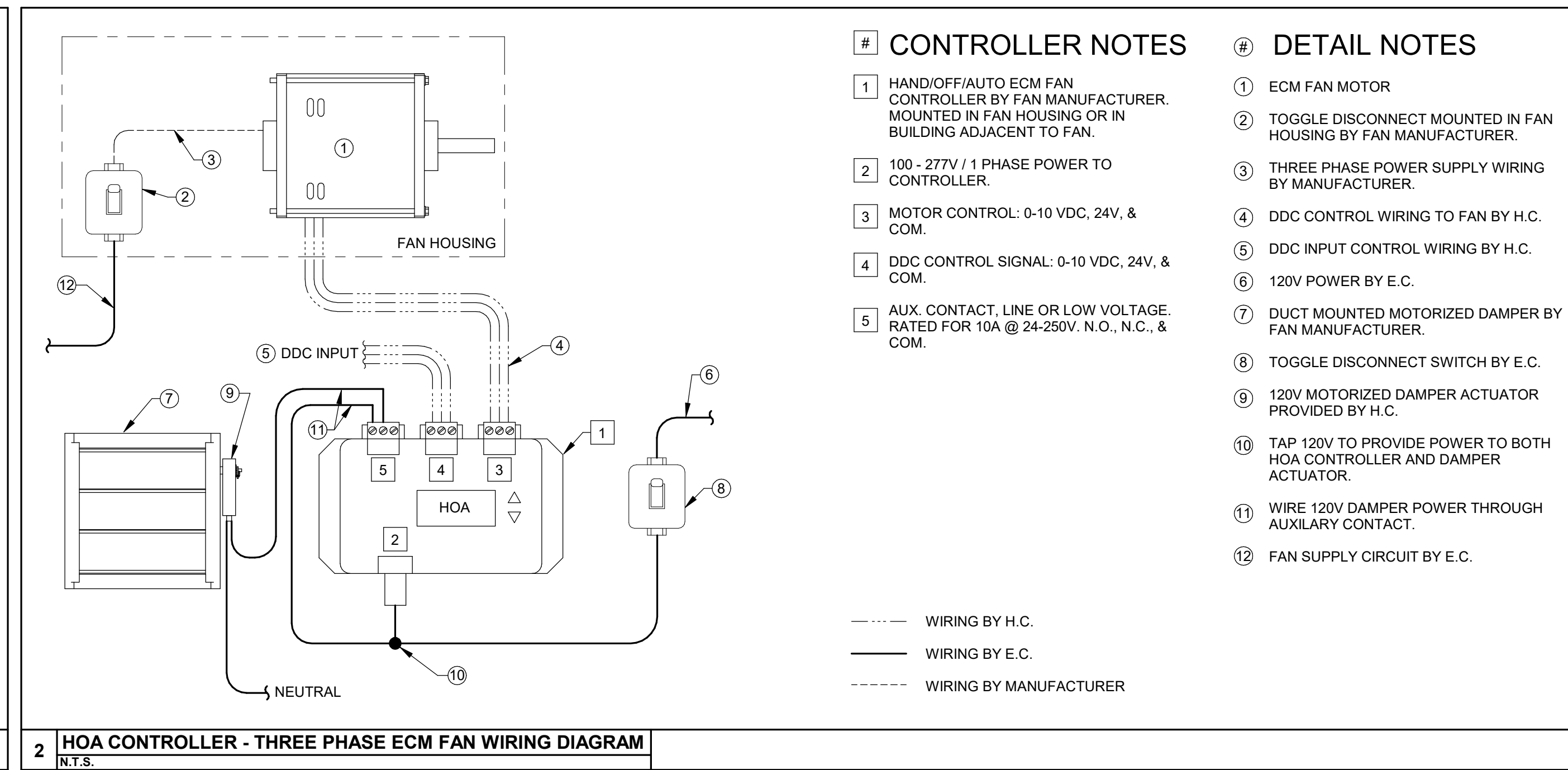


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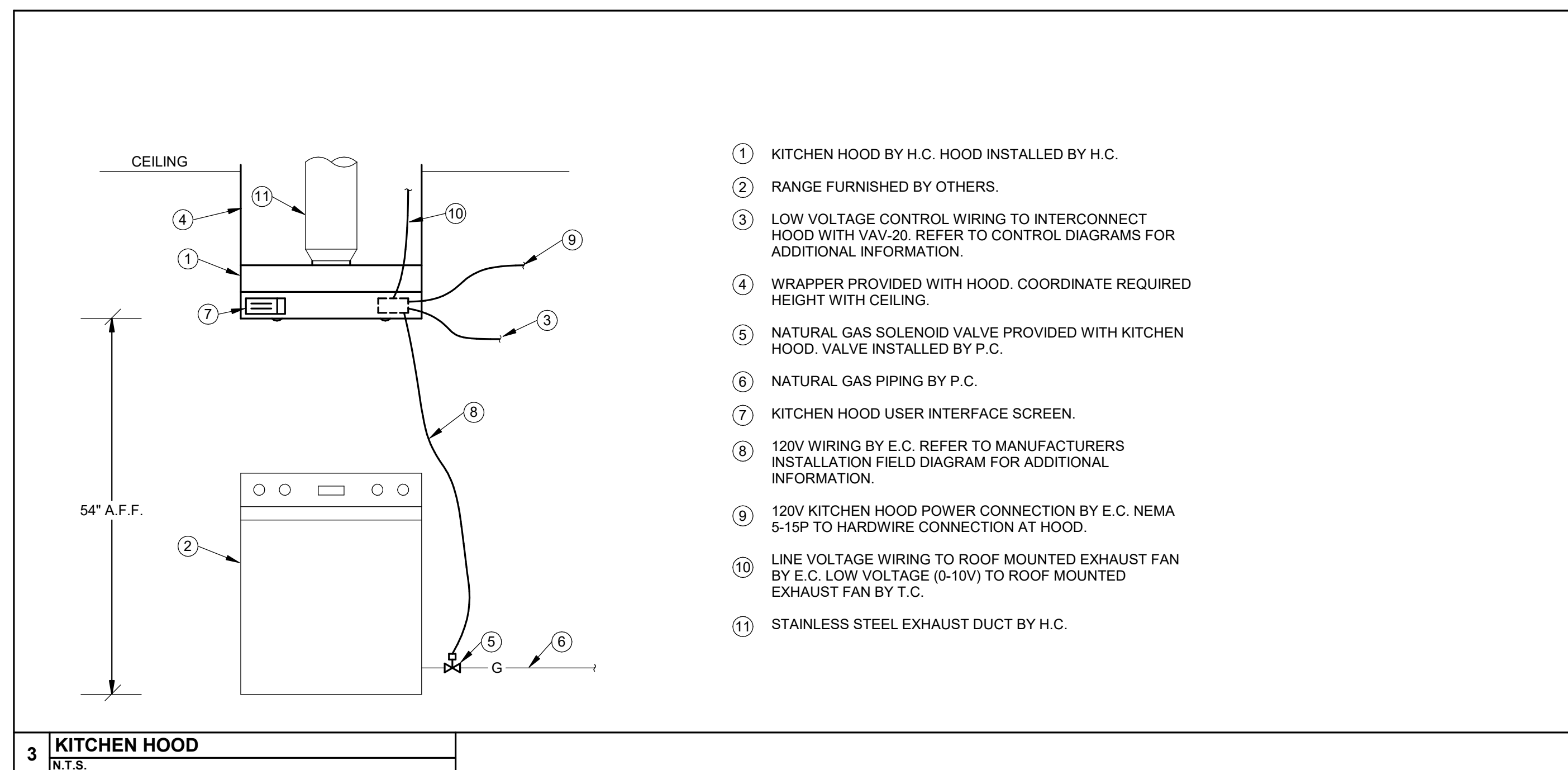
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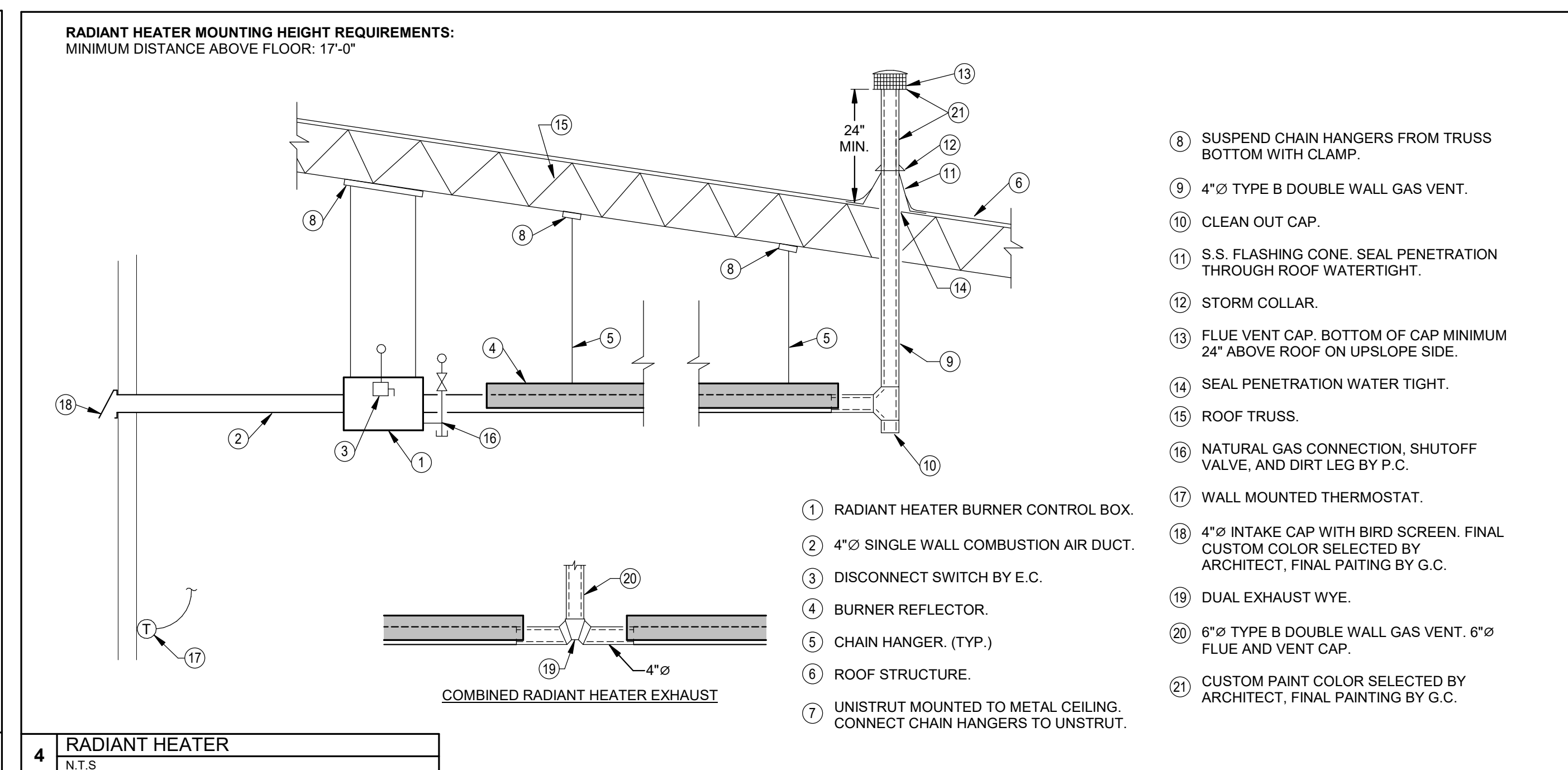
**1 HOA CONTROLLER - SINGLE PHASE ECM FAN WIRING DIAGRAM**  
N.T.S.



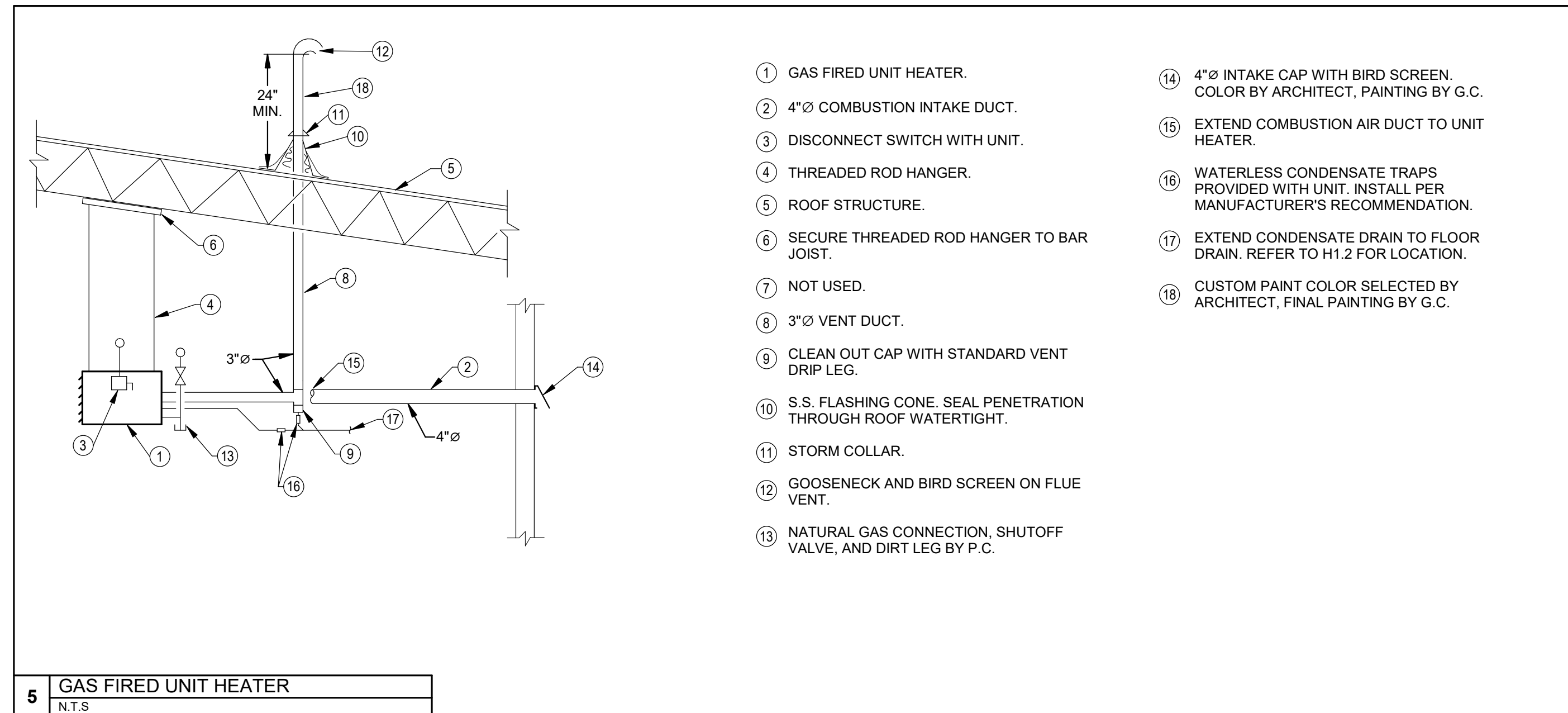
**2 HOA CONTROLLER - THREE PHASE ECM FAN WIRING DIAGRAM**  
N.T.S.



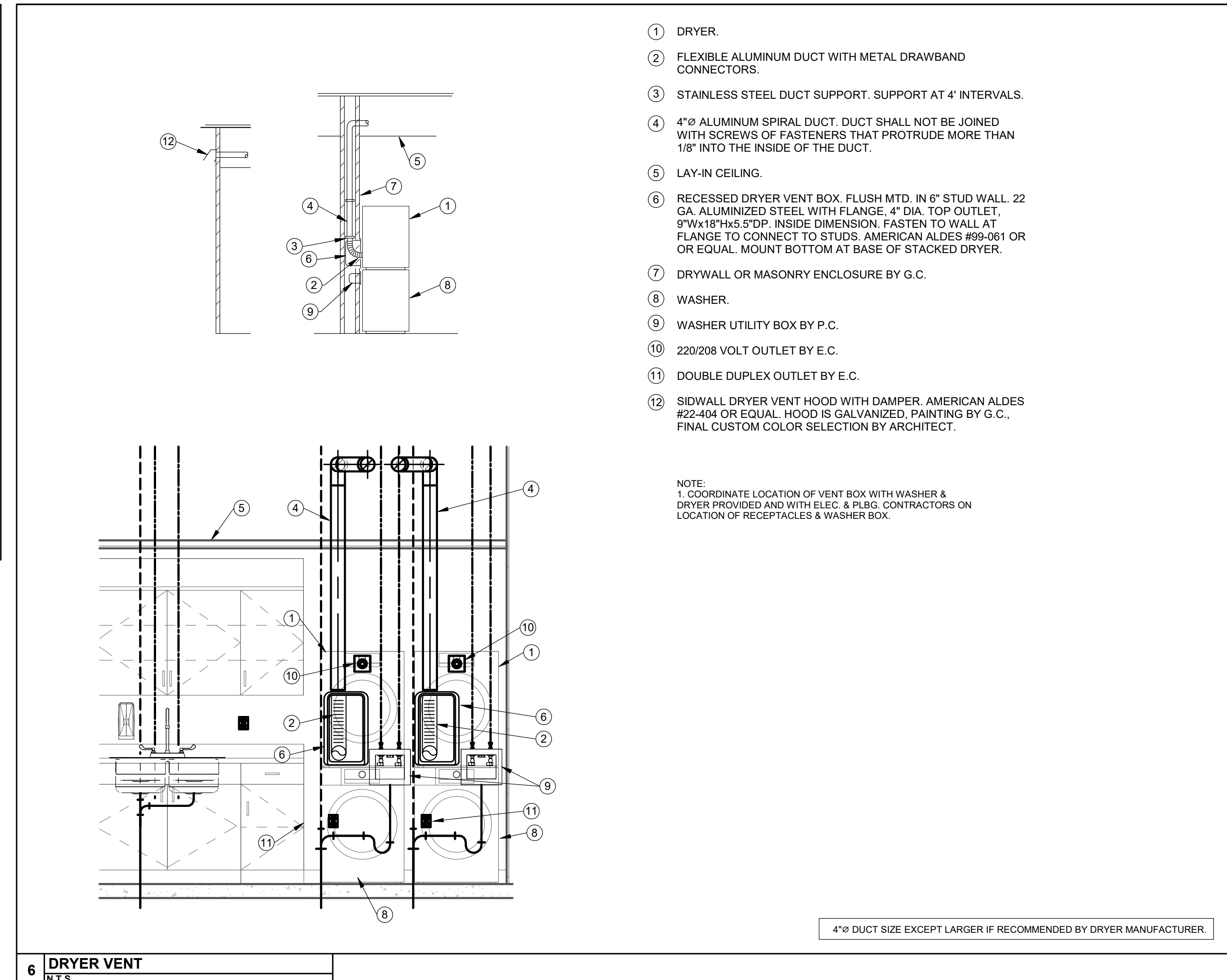
**3 KITCHEN HOOD**  
N.T.S.



**4 RADIANT HEATER**  
N.T.S.



**5 GAS FIRED UNIT HEATER**  
N.T.S.



**6 DRYER VENT**  
N.T.S.

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STATE OF OHIO  
 JEFFREY D. ZELINSKI  
 63822  
 JEFFREY D. ZELINSKI, LICENSE #63822  
 EXPIRATION DATE 12/21/2023

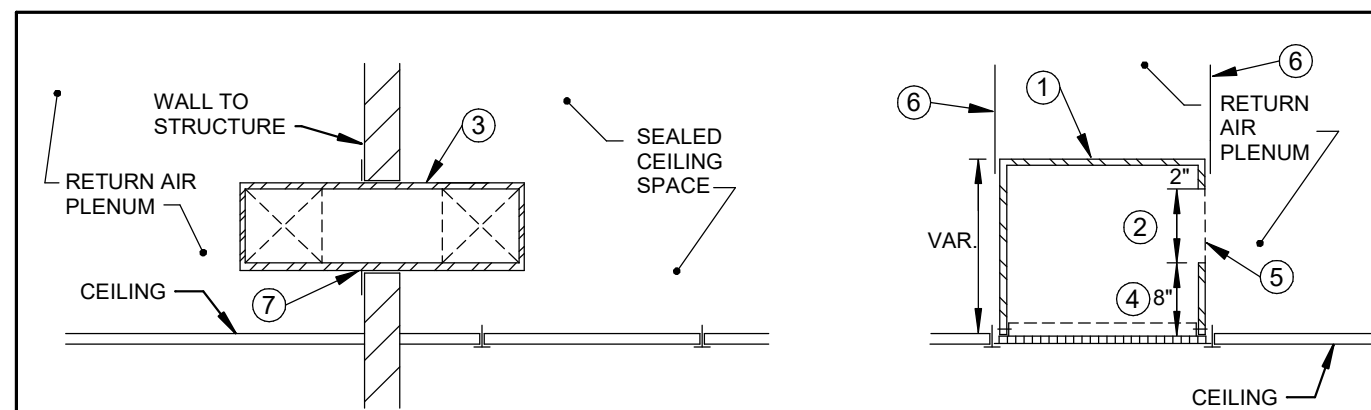
**NAUMAN & ZELINSKI LLC.**  
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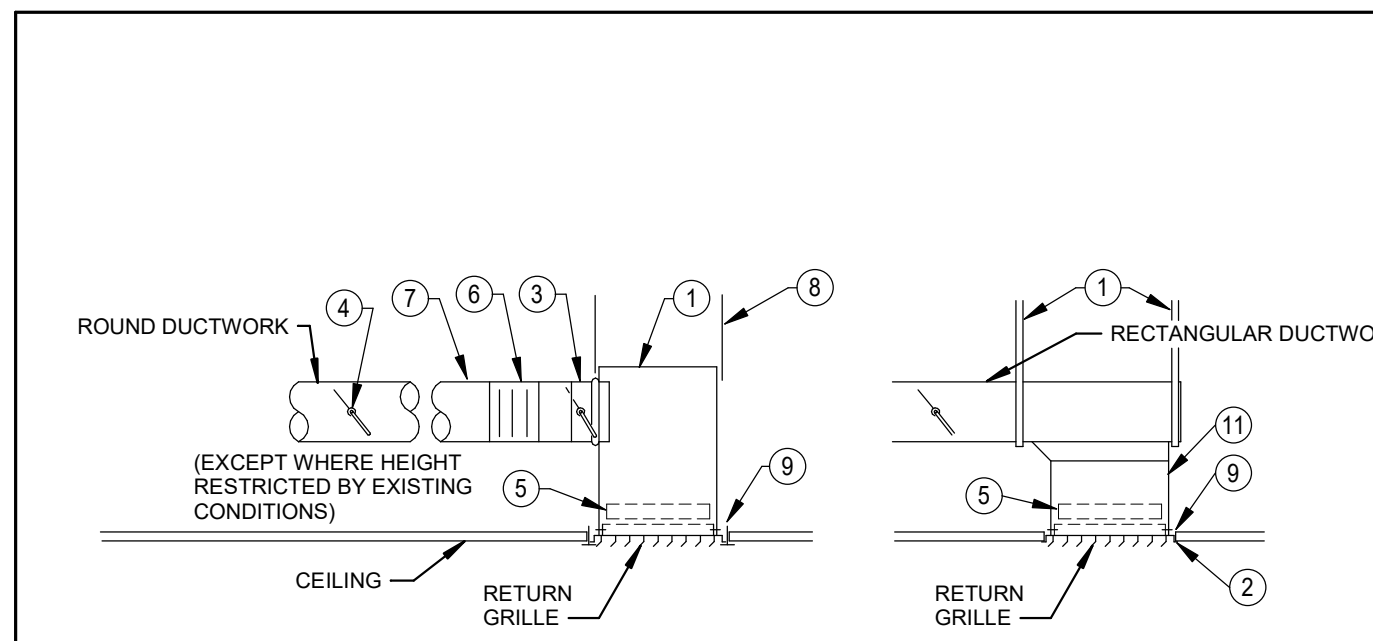
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SHEET NO.  
**H3.4**



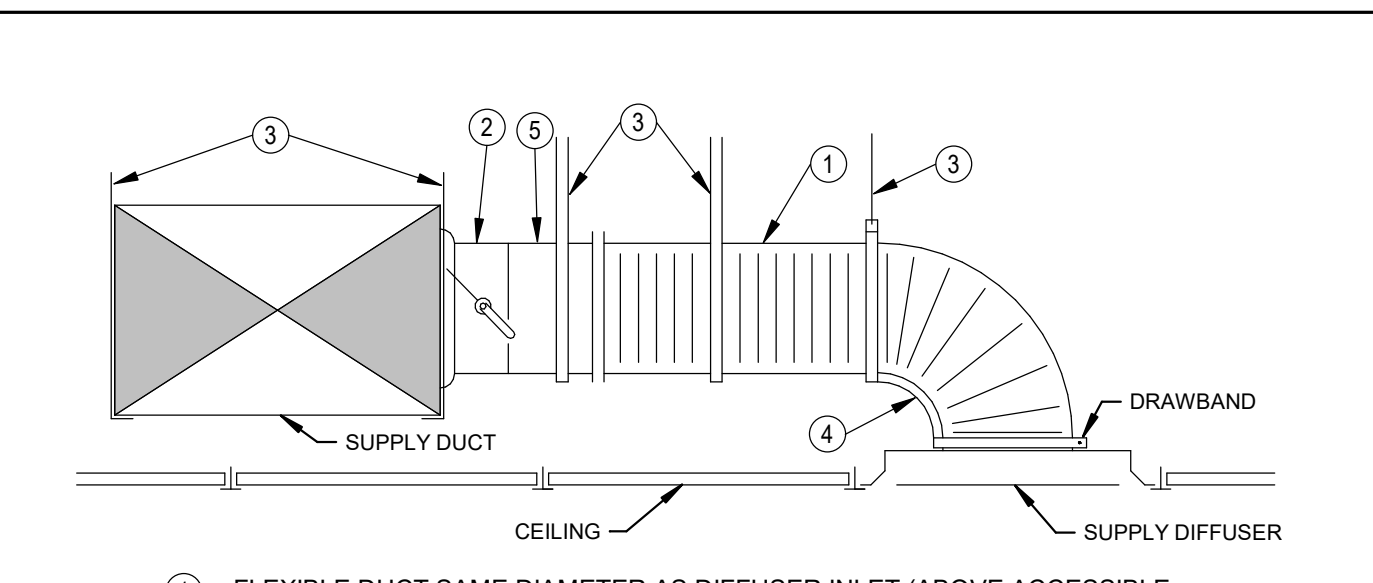
- 1 24"x24" OR 24"x12" NOMINAL SHEET METAL PLENUM LINED WITH 1/2" BLACK FIBERGLASS DUCT LINER.
- 2 24"x12" GRILLE SIZE - 6" HIGH x FULL WIDTH  
24"x24" GRILLE SIZE - 12" HIGH x FULL WIDTH
- 3 TRANSFER AIR DUCT THROUGH FULL HEIGHT WALL. PROVIDE 1/2" INTERNAL DUCT LINER. REFER TO FLOOR PLAN FOR DUCT SIZE.
- 4 MINIMUM HEIGHT, EXCEPT WHERE HEIGHT IS RESTRICTED BY EXISTING CONDITIONS.
- 5 OPEN TO PLENUM ABOVE CEILING.
- 6 SUPPORT PLENUM FROM STRUCTURE WITH DUCT STRAP HANGERS.
- 7 FRAME OPENING THROUGH WALL AS REQUIRED AND SEAL WALL PENETRATION SMOKE TIGHT.
- 8 24"x12" GRILLE SIZE - 10" HIGH x 14" WIDTH  
24"x24" GRILLE SIZE - 20" HIGH x 14" WIDTH

**1 TRANSFER AIR GRILLE/PLENUM**  
N.T.S.



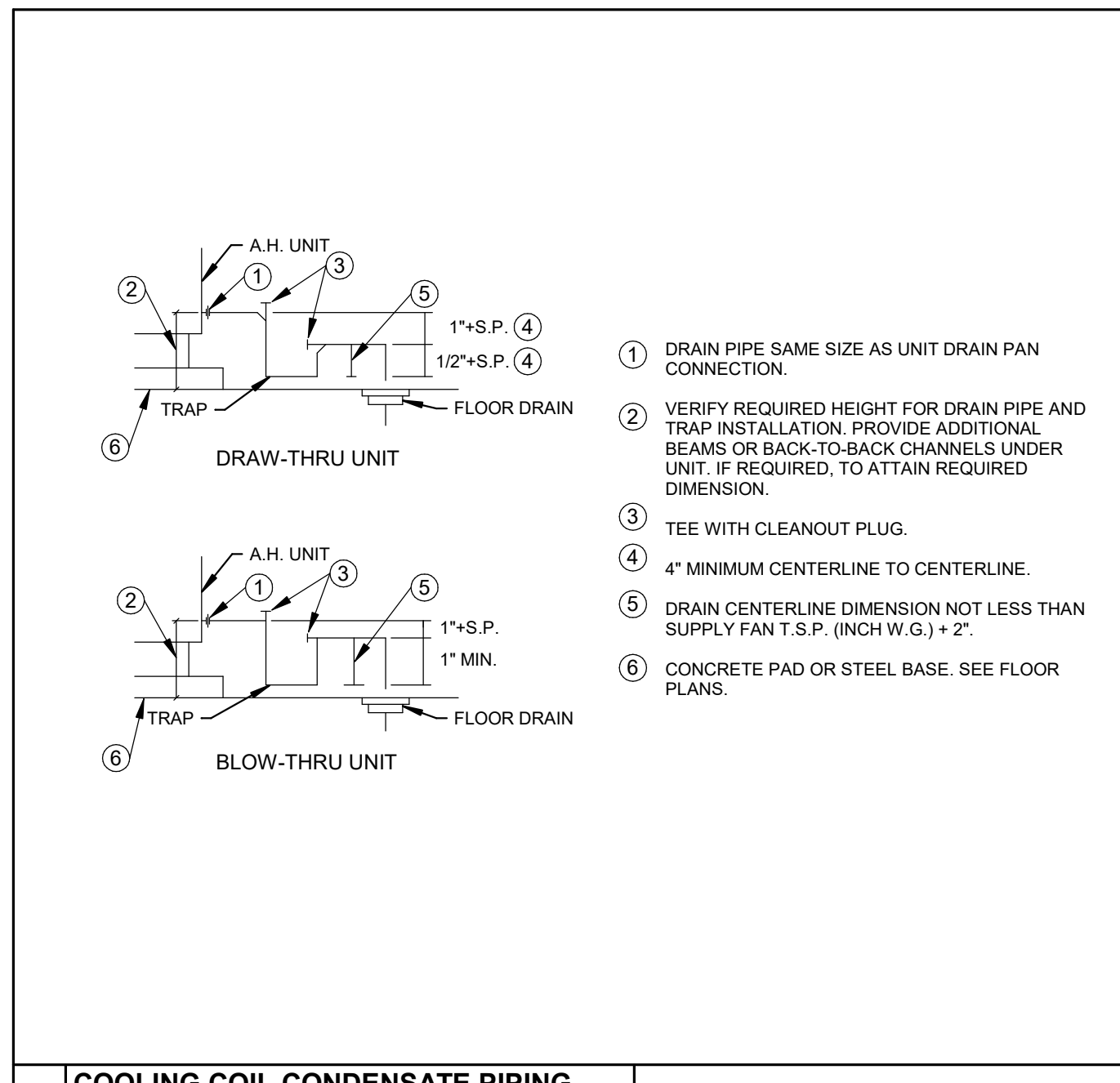
- 1 PLENUM - SIZE TO MATCH GRILLE. PAINT INTERIOR OF PLENUM FLAT BLACK.
- 2 EXHAUST/RETURN GRILLE FRAME TO MATCH CEILING CONDITION.
- 3 SPIN-IN FITTING WITH BALANCING DAMPER. USE FOR ALL ACCESSIBLE CEILINGS.
- 4 PROVIDE REMOTE BALANCING DAMPER IN BRANCH DUCT ABOVE ACCESSIBLE CEILING FOR EACH GRILLE WHERE GRILLE IS INSTALLED ABOVE INACCESSIBLE CEILING.
- 5 PROVIDE BALANCING DAMPER AT DEVICE ONLY WHERE DUCT MOUNTED DAMPER CANNOT BE PROVIDED DUE TO INACCESSIBLE CEILING.
- 6 FLEXIBLE DUCT ACCEPTABLE ABOVE ACCESSIBLE CEILING ONLY. MAX. 3 FT. REFER TO CEILING DIFFUSER DETAIL FOR INSTALLATION REQUIREMENTS.
- 7 SHEETMETAL DUCT.
- 8 SUPPORT PLENUM FROM STRUCTURE WITH DUCT STRAP HANGERS.
- 9 FASTEN SHEETMETAL PLENUM OR DUCT TO AIR DEVICE, EACH SIDE.
- 10 DUCT STRAP HANGER.
- 11 VIEWABLE PORTION OF DUCT INTERIOR TO BE PAINTED FLAT BLACK.

**2 EXHAUST/RETURN GRILLE - DUCTED**  
N.T.S.



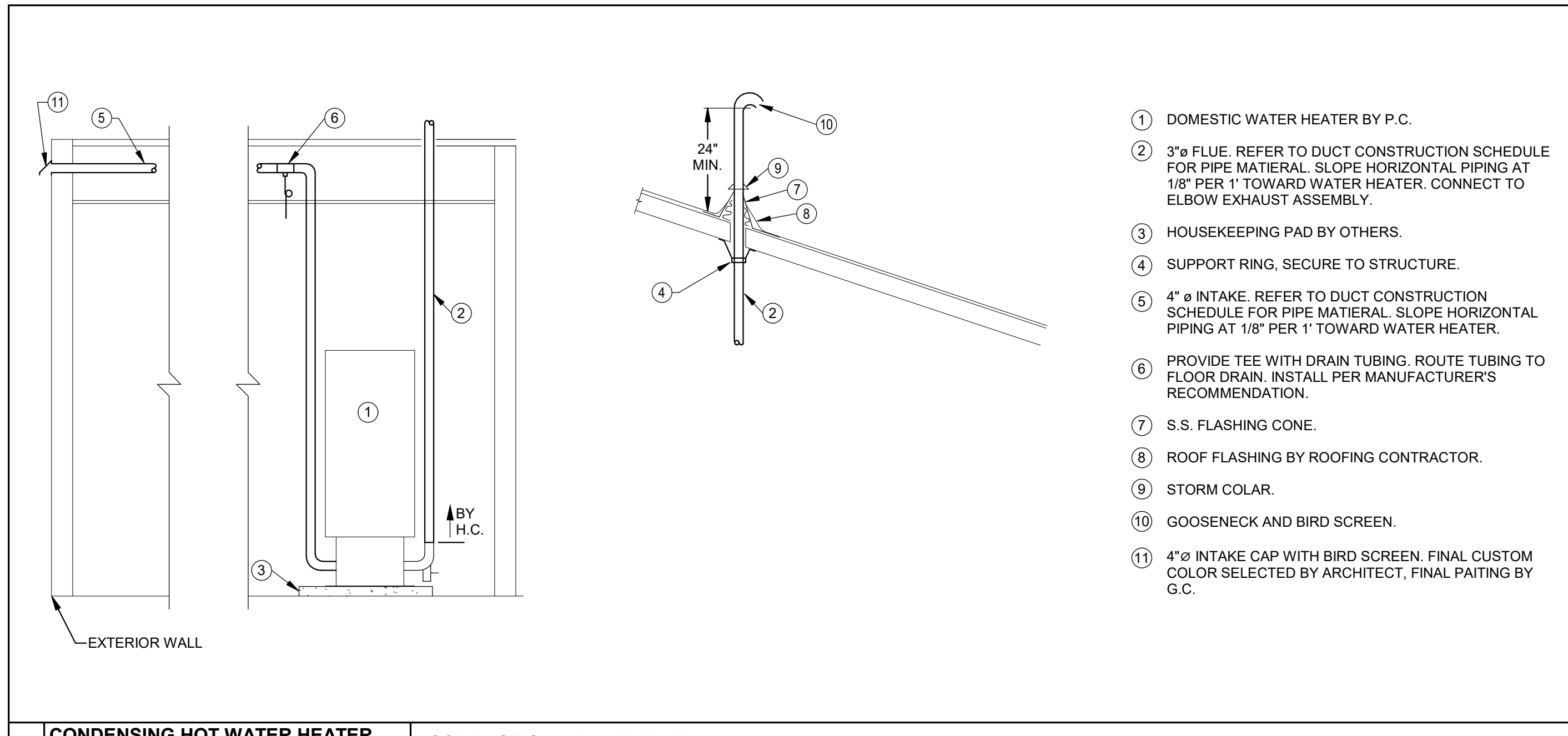
- 1 FLEXIBLE DUCT SAME DIAMETER AS DIFFUSER INLET (ABOVE ACCESSIBLE CEILING ONLY USE SHEETMETAL ONLY ABOVE INACCESSIBLE CEILING). 5 FT. MAXIMUM LENGTH. STRETCH TO MINIMUM 90% OF FULLY EXTENDED LENGTH. ADDITIONAL HANGER REQUIRED IF DUCT LENGTH EXCEEDS 4 FT.
- 2 SPIN-IN BRANCH TAP FITTING, STRAIGHT SIDE, WITH MANUAL DAMPER. DAMPER SHAFT IN HORIZONTAL, INTEGRAL INSULATION GUARD SLEEVE REQUIRED FOR TAP FITTING TO MAIN DUCT WITH INTERNAL INSULATION.
- 3 DUCT STRAP HANGER. ATTACH TO STRUCTURE. PER SMACNA.
- 4 90 DEGREE FLEXIBLE ELBOW SUPPORT BY FLEXRIGHT, FLEXFLOW OR SMARTFLOW. PROVIDE WITH DRAWBANDS, UL-2043 RATING.
- 5 SHEETMETAL DUCT, SAME DIAMETER AS DIFFUSER INLET. LONGITUDINAL OR SPIRAL LOCK SEAM, 0.50" S.P. CONSTRUCTION. PROVIDE EXTERIOR INSULATION, 1.5" THICKNESS, 0.75" DENSITY FIBERGLASS WITH FOIL/KRAFT PAPER JACKET.

**3 CEILING DIFFUSER**  
N.T.S.



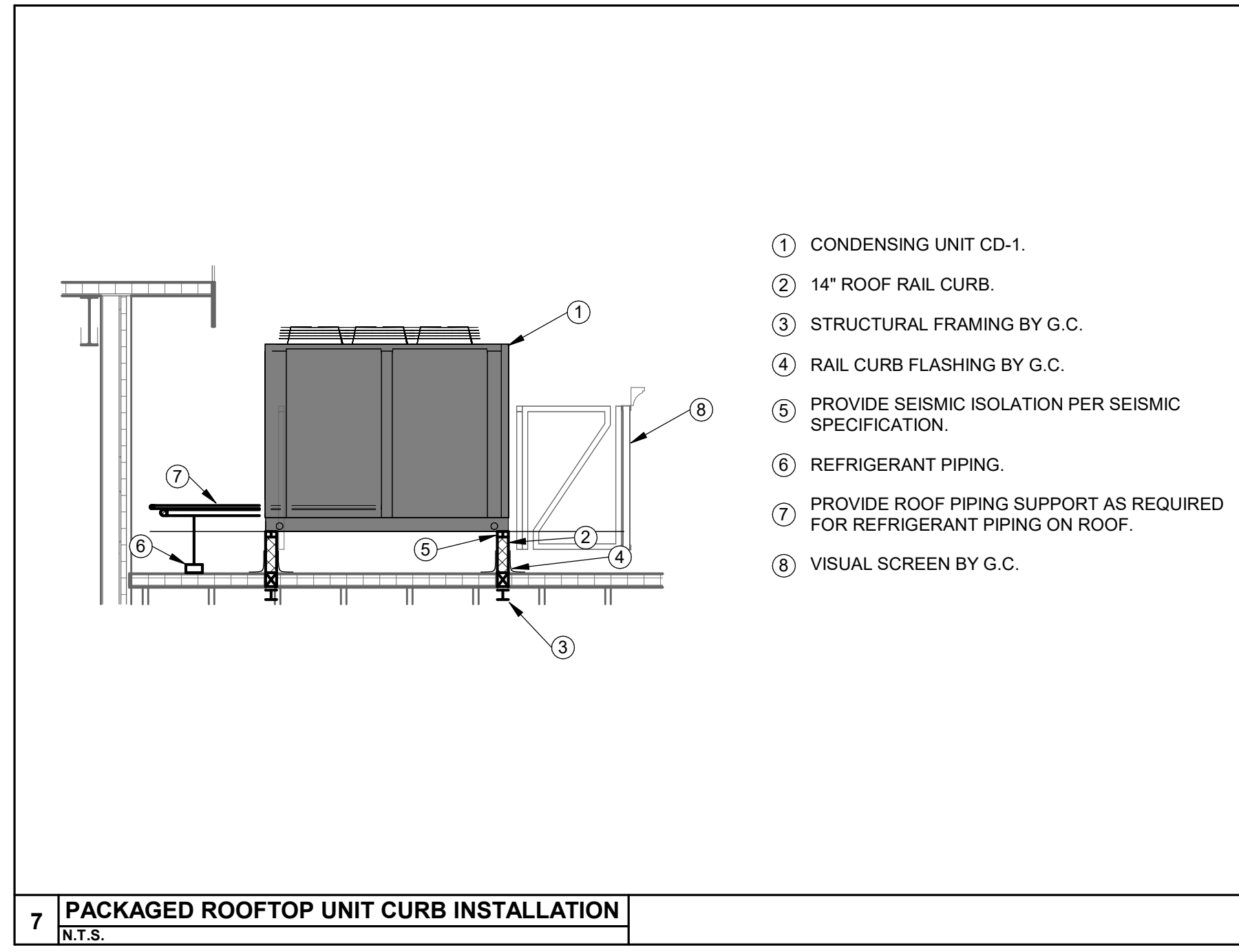
- 1 DRAIN PIPE SAME SIZE AS UNIT DRAIN PAN CONNECTION.
- 2 VERIFY REQUIRED HEIGHT FOR DRAIN PIPE AND TRAP INSTALLATION. PROVIDE ADDITIONAL BEAMS OR BACK-TO-BACK CHANNELS UNDER UNIT. IF REQUIRED, TO ATTAIN REQUIRED DIMENSION.
- 3 TEE WITH CLEANOUT PLUG.
- 4 4" MINIMUM CENTERLINE TO CENTERLINE.
- 5 DRAIN CENTERLINE DIMENSION NOT LESS THAN SUPPLY FAN T.S.P. (INCH W.G.) + 2".
- 6 CONCRETE PAD OR STEEL BASE. SEE FLOOR PLANS.

**4 COOLING COIL CONDENSATE PIPING**  
N.T.S.



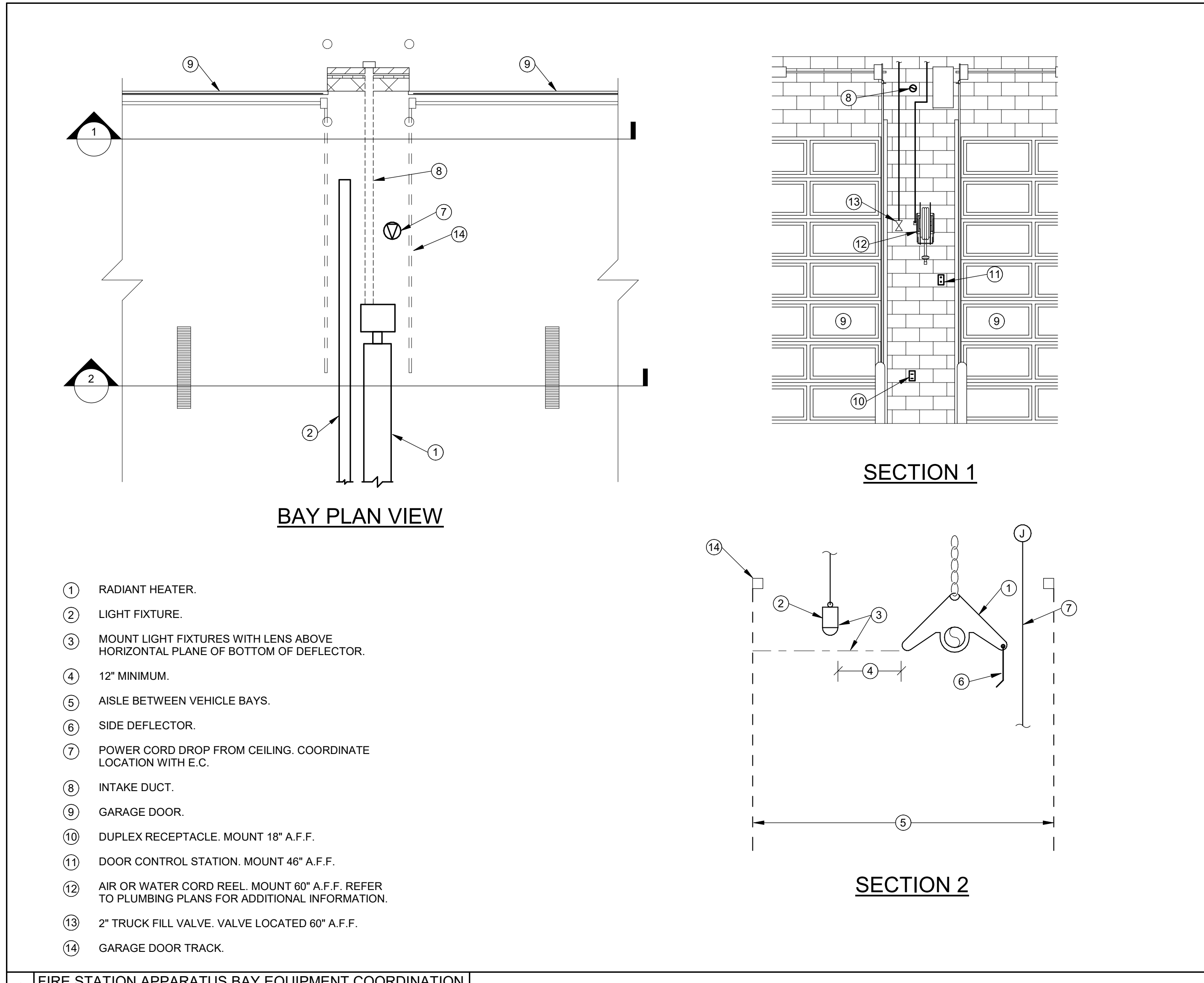
- 1 DOMESTIC WATER HEATER BY P.C.
- 2 3"ø FLUE. REFER TO DUCT CONSTRUCTION SCHEDULE FOR PIPE MATERIAL. SLOPE HORIZONTAL PIPING AT 1/8" PER 1' TOWARD WATER HEATER. CONNECT TO ELBOW EXHAUST ASSEMBLY.
- 3 HOUSEKEEPING PAD BY OTHERS.
- 4 SUPPORT RING. SECURE TO STRUCTURE.
- 5 4"ø INTAKE. REFER TO DUCT CONSTRUCTION SCHEDULE FOR PIPE MATERIAL. SLOPE HORIZONTAL PIPING AT 1/8" PER 1' TOWARD WATER HEATER.
- 6 PROVIDE TEE WITH DRAIN TUBING. ROUTE TUBING TO FLOOR DRAIN. INSTALL PER MANUFACTURER'S RECOMMENDATION.
- 7 S.S. FLASHING CONE.
- 8 ROOF FLASHING BY ROOFING CONTRACTOR.
- 9 STORM COLAR.
- 10 GOOSENECK AND BIRD SCREEN.
- 11 4"ø INTAKE CAP WITH BIRD SCREEN. FINAL CUSTOM COLOR SELECTED BY ARCHITECT, FINAL PAINTING BY G.C.

**5 CONDENSING HOT WATER HEATER**  
N.T.S. COMBUSTION AIR AND FLUE



- 1 CONDENSING UNIT CD-1.
- 2 14" ROOF RAIL CURB.
- 3 STRUCTURAL FRAMING BY G.C.
- 4 RAIL CURB FLASHING BY G.C.
- 5 PROVIDE SEISMIC ISOLATION PER SEISMIC SPECIFICATION.
- 6 REFRIGERANT PIPING.
- 7 PROVIDE ROOF PIPING SUPPORT AS REQUIRED FOR REFRIGERANT PIPING ON ROOF.
- 8 VISUAL SCREEN BY G.C.

**7 PACKAGED ROOFTOP UNIT CURB INSTALLATION**  
N.T.S.

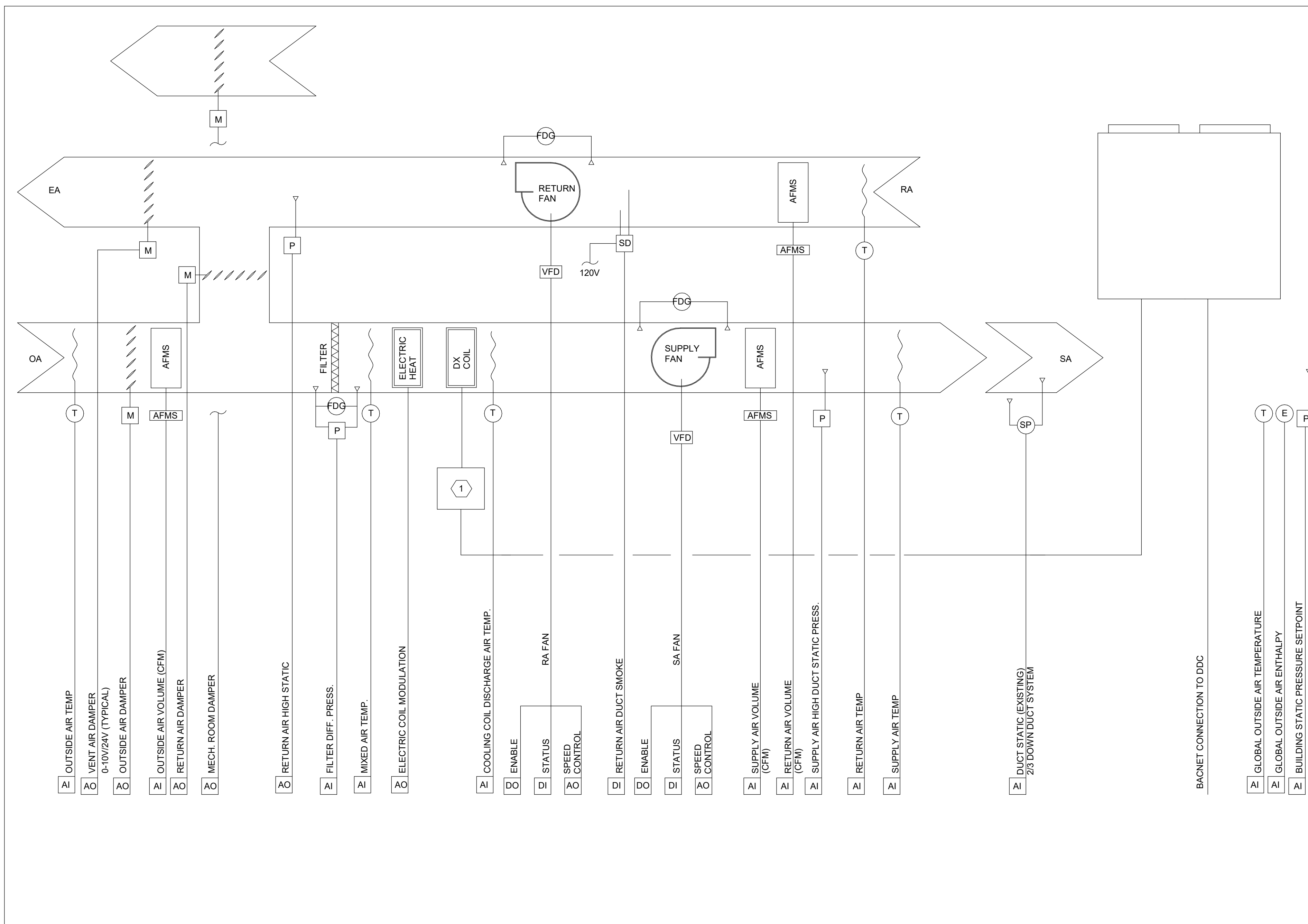


- 1 RADIANT HEATER.
- 2 LIGHT FIXTURE.
- 3 MOUNT LIGHT FIXTURES WITH LENS ABOVE HORIZONTAL PLANE OF BOTTOM OF DEFLECTOR.
- 4 12" MINIMUM.
- 5 AISLE BETWEEN VEHICLE BAYS.
- 6 SIDE DEFLECTOR.
- 7 POWER CORD DROP FROM CEILING. COORDINATE LOCATION WITH E.C.
- 8 INTAKE DUCT.
- 9 GARAGE DOOR.
- 10 DUPLEX RECEPTACLE. MOUNT 18" A.F.F.
- 11 DOOR CONTROL STATION. MOUNT 46" A.F.F.
- 12 AIR OR WATER CORD REEL. MOUNT 60" A.F.F. REFER TO PLUMBING PLANS FOR ADDITIONAL INFORMATION.
- 13 2" TRUCK FILL VALVE. VALVE LOCATED 60" A.F.F.
- 14 GARAGE DOOR TRACK.

**6 FIRE STATION APPARATUS BAY EQUIPMENT COORDINATION**  
N.T.S.

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### SEQUENCE OF OPERATION

**OPERATION**  
THE AIR HANDLING SYSTEM SHALL OPERATE IN OCCUPIED MODE OF OPERATION, AT ALL TIMES, 24/7/365.

**OCCUPIED MODE**  
WHEN INDEXED TO THE OCCUPIED MODE THE OUTSIDE AND RETURN AIR DAMPERS SHALL MODULATE TO THEIR OCCUPIED POSITION. THE OUTSIDE AIR DAMPERS SHALL BE SET TO PROVIDE THE MINIMUM OUTDOOR VENTILATION AS PER THE AIR HANDLING UNIT SCHEDULE AND AS BALANCED BY THE BALANCING CONTRACTOR.

THE OUTSIDE AIR DAMPER AND DX COOLING COIL SHALL MODULATE IN SEQUENCE, WITHOUT OVERLAP, TO MAINTAIN THE SUPPLY AIR TEMPERATURE (SAT) SET POINT. THE SUPPLY TEMPERATURE SHALL BE RESET ACCORDING TO THE FOLLOWING SCHEDULE:  
OAT = 20 DEG F      SAT SET POINT = 62 DEG F  
OAT = 72 DEG F      SAT SET POINT = 55 DEG F

**OUTSIDE AIR CONTROL & ECONOMIZER**  
THE OUTSIDE AIR, RETURN AIR, AND RELIEF AIR DAMPERS SHALL MODULATE TO MAINTAIN THE OUTSIDE AIR FLOW VOLUME SET POINT. REFER TO SHEET H5.1 FOR OUTSIDE AIR BALANCING SETPOINTS.

UPON ACTIVATION OF THE KITCHEN HOOD, THE OUTSIDE AIR DAMPER SHALL MODULATE OPEN TO PROVIDE THE REQUIRED MAKE-UP AIR (+75 CFM) FOR THE KITCHEN HOOD.

THE ECONOMIZER SHALL BE ENABLED/ DISABLED FROM THE GLOBAL OUTSIDE AIR TEMPERATURE SENSOR AND ENTHALPHY SENSOR. WHEN THE OUTSIDE AIR TEMPERATURE IS BELOW 70 DEG F, AND THE ENTHALPHY IS BELOW 88 BTU/LB, THE ECONOMIZER SHALL BE ENABLED. ABOVE EITHER VALUE AND THE ECONOMIZER SHALL BE DISABLED.

DURING ECONOMIZER CYCLE THE OUTSIDE AIR DAMPER SHALL MODULATE OPEN AS REQUIRED TO MAINTAIN THE UNIT DISCHARGE AIR SET POINT. THE RETURN DAMPERS SHALL INVERSELY TRACK THE OUTSIDE AIR DAMPERS.

PROVIDE A MIXED AIR TEMPERATURE SENSOR FOR LOW LIMIT CONTROL SET AT 50 DEG. F. TO PREVENT OVER - OPENING THE OUTSIDE AIR DAMPER.

**RELIEF AIR DAMPER**  
THE RELIEF AIR AND MECH. ROOM DAMPER SHALL BE CLOSED UNTIL THE UNIT ENTERS THE ECONOMIZER MODE. AT WHICH TIME THE DAMPERS SHALL MODULATE TO MAINTAIN A BUILDING POSITIVE PRESSURE SETPOINT, STARTING AT 0.05" W.C. (ADJ.).

**FAN VOLUME CONTROL**  
SUPPLY FANS  
THE FAN SPEED SHALL BE MODULATED TO MAINTAIN A DUCT STATIC PRESSURE SETPOINT (LOCATION SHOWN ON THE DRAWINGS). INITIAL SET POINT SHALL BE 1.5 INCH STATIC BUT SHALL BE ADJUSTED TO THE LOWEST POSSIBLE READING BY THE BALANCING CONTRACTOR.

THE DUCT STATIC PRESSURE SHALL BE RESET BASED VAV TERMINAL UNIT DAMPER POSITIONS. IF ANY ONE VAV TERMINAL DAMPER EXCEEDS 95%, OPEN THE STATIC PRESSURE SETPOINT SHALL INCREASE BY 0.1" W.C. IF ALL DAMPER POSITIONS ARE LESS THAN 90% OPEN THEN THE SETPOINT SHALL BE REDUCED BY 0.1". DAMPER POSITIONS SHALL BE POLLED AND SETPOINT RESET SHALL OCCUR EVERY 5 MINUTES. STATIC PRESSURE SETPOINT RESET SHALL HAVE A MINIMUM AND MAXIMUM RESET RANGE INITIALLY SET AT 0.5" MINIMUM AND 1.75" MAXIMUM. THE RESET RANGE LIMITS SHALL BE DISPLAYED ON THE DDC AHU GRAPHIC AND ADJUSTABLE BY THE SYSTEM OPERATOR. THE SYSTEM OPERATION SHALL ALSO BE ABLE TO REMOVE SPECIFIC VAV UNITS FROM THE RESET SEQUENCE VIA THE SYSTEM GRAPHICS.

RETURN FANS  
THE FAN SPEED SHALL BE MODULATED TO MAINTAIN THE BUILDING STATIC PRESSURE SETPOINT, INITIALLY SET AT 0.1" W.C. (ADJ.).

### SEQUENCE OF OPERATION CONT'D.

**SAFETIES**  
THE FOLLOWING SAFETIES SHALL BE PROVIDED TO STOP THE AIR HANDLING UNIT SUPPLY AND RETURN FANS AND POSITION CONTROL DEVICES TO THEIR "FAIL SAFE" POSITION, I.E. OUTSIDE AND RELIEF DAMPERS CLOSED, RETURN DAMPERS OPEN.

SUPPLY DUCT AIR HIGH DUCT STATIC - SETPOINT 4" (ADJ.)  
RETURN AIR SMOKE DETECTOR.

### CONTROLS GENERAL NOTES

**MONITORING AND ALARMS**

A. THE FOLLOWING POINTS SHALL BE MONITORED AND ALARMED AT THE MONITORING CONSOLE AND AS OTHERWISE SPECIFIED HEREINAFTER. THESE ARE IN ADDITION TO POINTS REQUIRED FOR OPERATIONAL CONTROL.

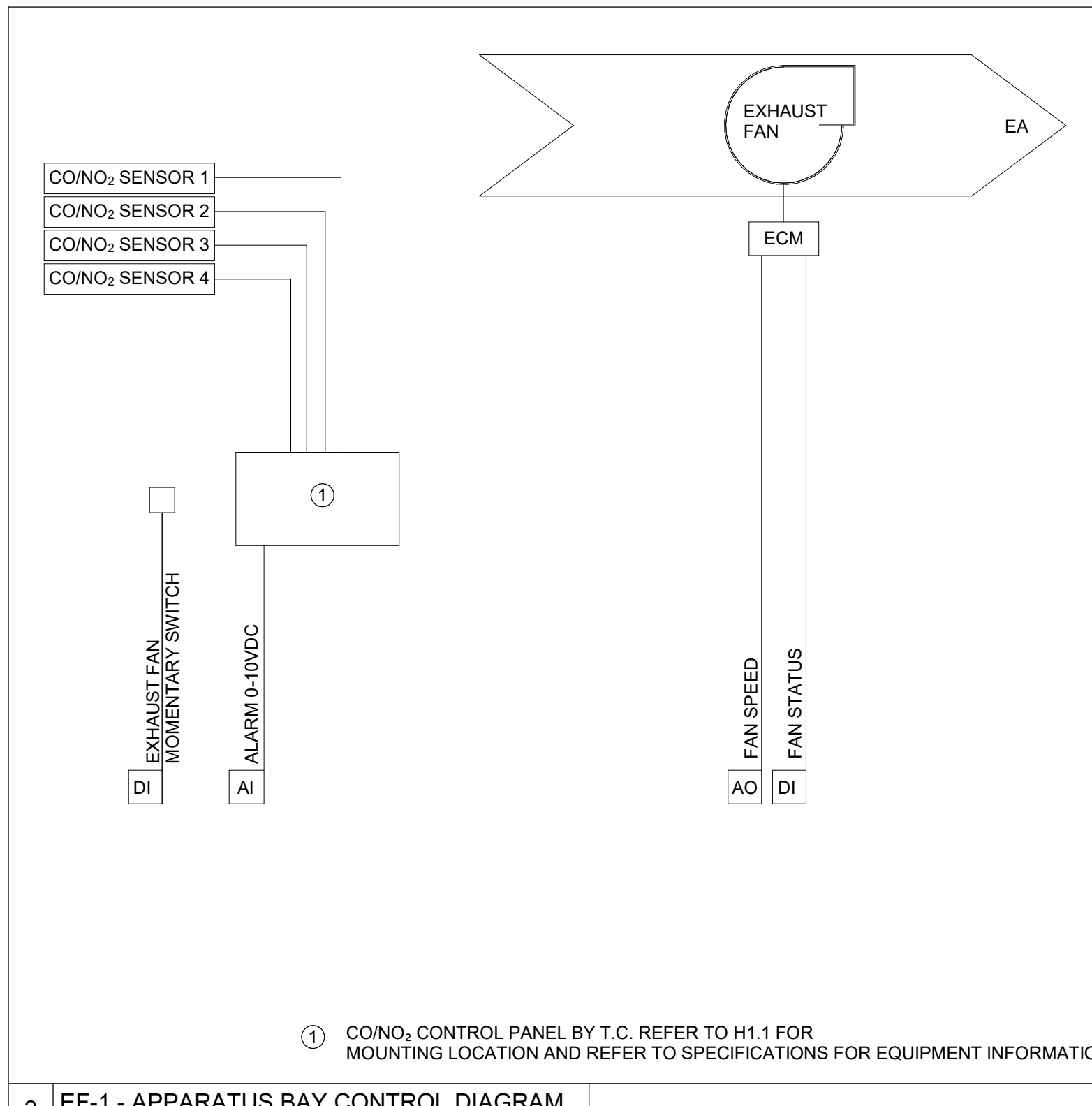
- CURRENT SENSING RELAYS - PROVIDE FOR:
  - AHU-1 SUPPLY AND RETURN AIR FANS
  - CD-1 CONDENSING UNIT
  - EXHAUST FANS
- HIGH/LOW TEMPERATURE ALARMS ON ALL DDC TEMPERATURE SENSORS WITH OFF-NORMAL MESSAGES.
- GENERATOR TROUBLE.
- TECHNOLOGY COMPUTER ROOM TEMPERATURE SENSOR, ALARM AT 80 DEG. F. (ADJ.).
- OUTSIDE AIR HUMIDITY (ANALOG, NO ALARM).

B. WHEN INTERFACING WITH EQUIPMENT PROVIDING REMOTE ANALOG INPUT OR RECEIVING ANALOG OUTPUTS TO THE DDC SYSTEM OR WHEN MONITORING REQUIRES THE INSTALLATION OF EXTERNAL RELAYS AT THE EQUIPMENT BEING MONITORED, COORDINATE ALL REQUIREMENTS SUCH AS RANGE, SIGNAL CONDITION, GROUNDING, WIRING AND INPUT IMPEDANCE WITH THE SUPPLIER OF THE EQUIPMENT BEING MONITORED.

C. DIAL OUT ALARMS - DDC SYSTEM SHALL BE CAPABLE OF INITIATING DIAL OUT ALARM MESSAGE TO PAGERS, TELEPHONE OR INTERNET WHENEVER THE SYSTEM DETECTS AN ALARM. COORDINATE LIST OF DESIRED ALARMS AND INTERFACE WITH OWNERS' NOTIFICATION EQUIPMENT WITH THE SCHOOL DISTRICT.

D. PROVIDE ALL REQUIRED CONTROL WIRING TO CONNECT CD-1 TO AHU-1.

1 AHU-1 CONTROL DIAGRAM  
N.T.S.



### SEQUENCE OF OPERATION

**FAN OPERATION**  
THE FAN SHALL BE NORMALLY OFF.  
THE DDC SYSTEM SHALL MODULATE THE FAN SPEED UPON RECEIVING AN ALARM FROM THE CO/NO2 MONITORING SYSTEM OR A LOCAL MANUAL, MOMENTARY, OVER-RIDE WALL PUSH BUTTON.  
EF-1: 6.650 CFM  
WHEN THE FAN IS INDEXED TO EITHER THE 50% OR MAXIMUM AIRFLOW, THE FAN SHALL RUN FOR A MINIMUM OF 30 MINUTES AT THE RESPECTIVE AIRFLOW.

**CO/NO2 SENSOR CONTROL**  
THE APPARATUS BAY'S CO/NO2 SHALL BE PROGRAMMED TO THE FOLLOWING ALARM LEVELS.

**ALARM LEVELS:**

- NO ALARM: CO (<34 PPM) AND NO2 (<2.5 PPM)
- ALARM LEVEL 1: CO (35 - 50 PPM) OR NO2 (2.5 - 2.8 PPM)
- ALARM LEVEL 2: CO (>50 PPM) OR NO2 (>2.8 PPM)

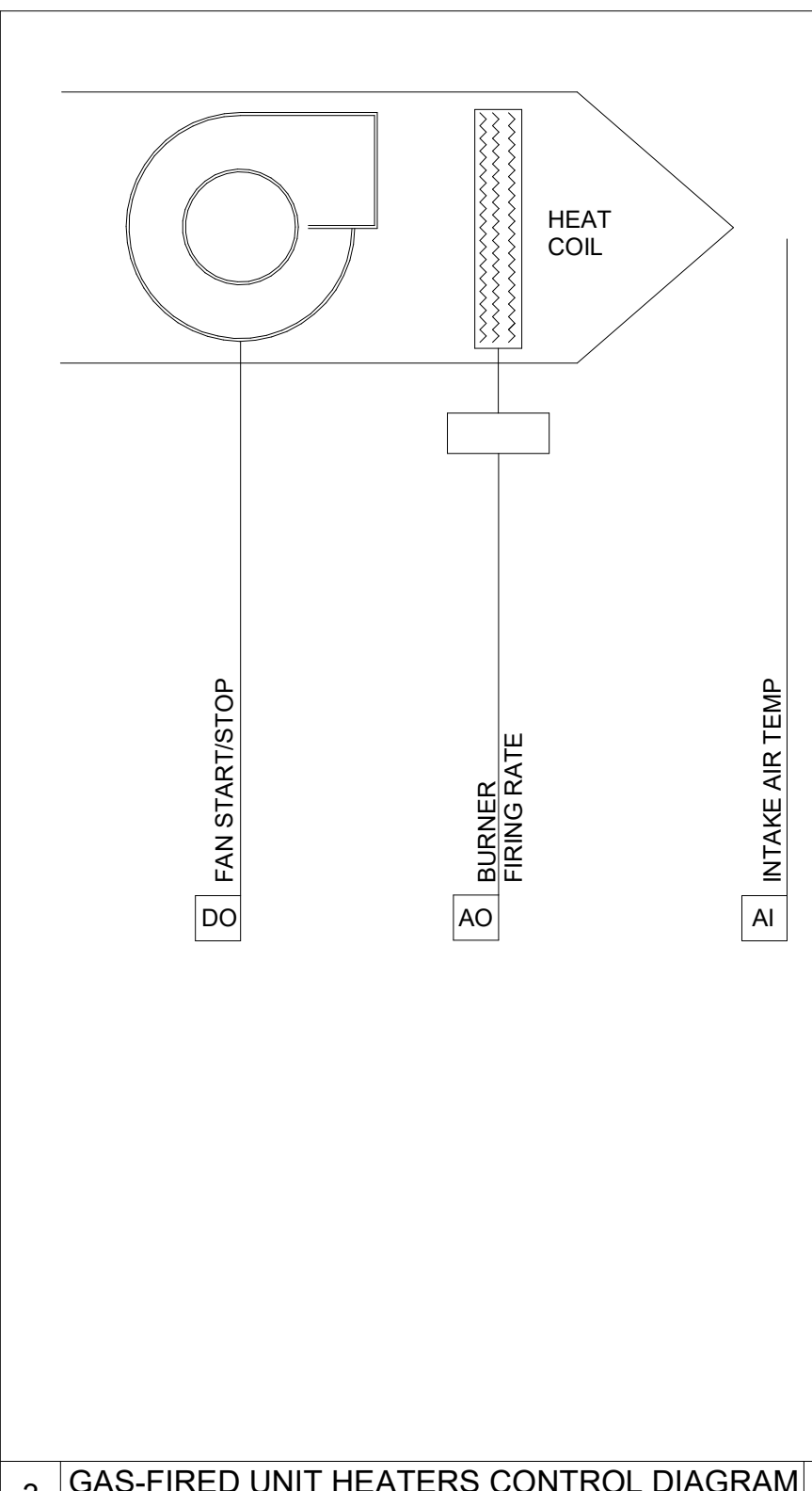
**FAN AIRFLOW:**

- NO ALARM: OFF.
- ALARM LEVEL 1: 50% OF MAXIMUM AIRFLOW
- ALARM LEVEL 2: MAXIMUM AIRFLOW

**MANUAL MOMENTARY WALL SWITCH**  
THE MANUAL MOMENTARY OVER-RIDE SWITCH SHALL COMMAND THE FAN TO 50% OF MAXIMUM AIRFLOW FOR 30 MINUTES (ADJ.).

**FAN SPEED CONTROL PRIORITY**  
THE CO/NO2 SENSOR SHALL HAVE PRIORITY TO CHANGE THE FAN SPEED AT ANY TIME. IF THE MOMENTARY WALL SWITCH IS ACTIVATED TO RAISE THE FAN TO 50% AIRFLOW AND THE CO/NO2 SENSOR ALARMS, THE FAN SHALL BE INDEXED TO RUN AT THE RESPECTIVE ALARM LEVEL AND RESET ITS RUN TIMER.  
THE MOMENTARY FAN SWITCH SHALL ONLY START THE FAN SPEED IF THERE IS NO ALARM LEVEL FROM THE CO/NO2 SENSOR AND THE FAN IS OFF. THE MOMENTARY WALL SWITCH SHALL NOT OVERRIDE THE CO/NO2 CONTROLLER.

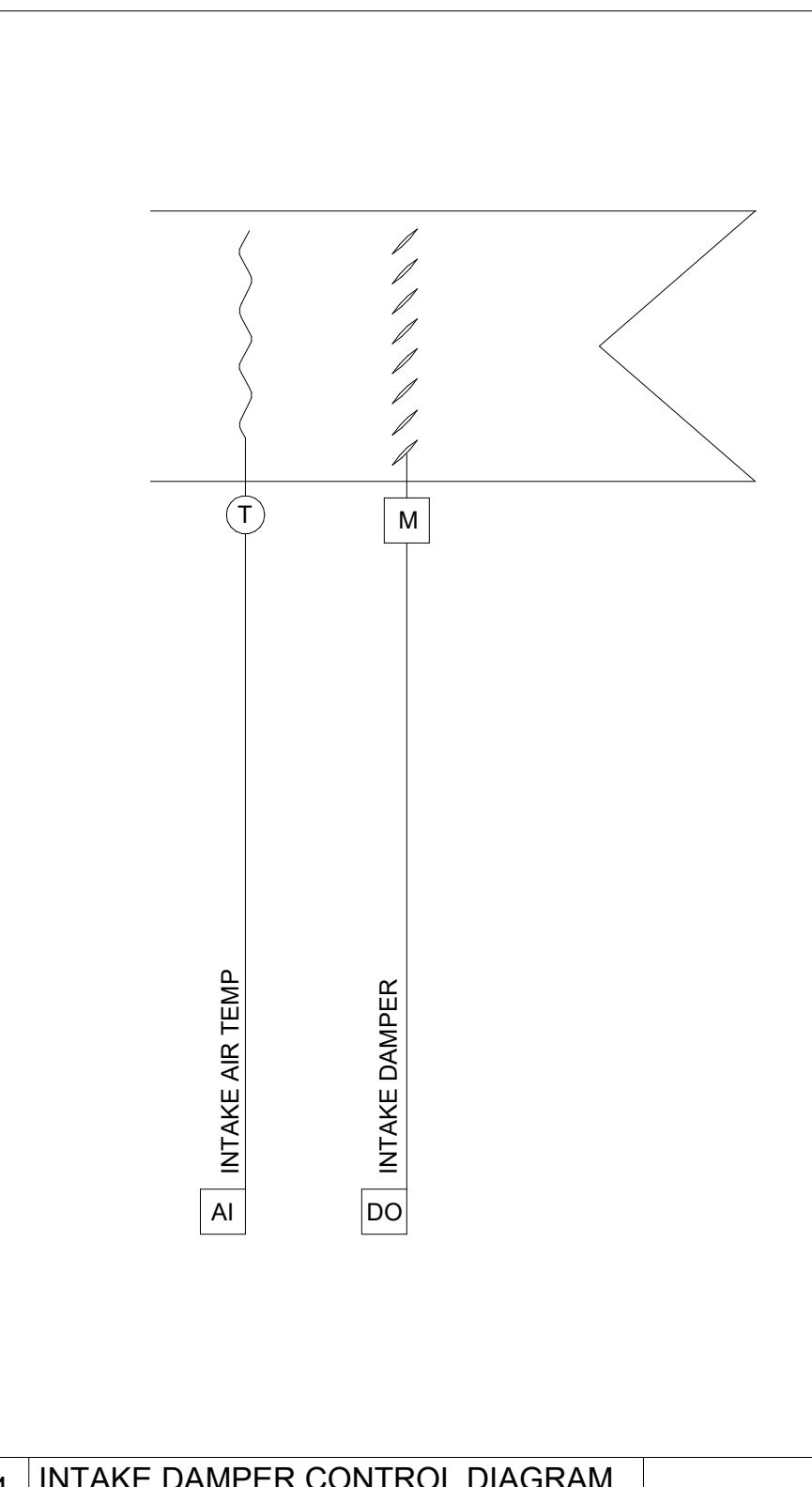
2 EF-1 - APPARATUS BAY CONTROL DIAGRAM



### SEQUENCE OF OPERATION

- THE GAS-FIRED MODULATING UNIT HEATER SHALL OPERATE IN CONJUNCTION WITH THE INTAKE DAMPER TO PREHEAT INDUCED MAKE-UP AIR.
- THE GAS FIRED UNIT HEATER SHALL BE OFF WHEN THE INTAKE DAMPER IS CLOSED.
- WHEN THE INTAKE DAMPER IS OPEN, THE MODULATING GAS BURNER SHALL FIRE INVERSELY BASED ON AN INTAKE AIR TEMPERATURE AT OR BELOW 40 DEG. F. (ADJ.).
  - INTAKE AIR TEMP. = 0 DEG. F. FIRING RATE = 100%
  - INTAKE AIR TEMP. = 40 DEG. F. FIRING RATE = MIN. TURNDOWN

3 GAS-FIRED UNIT HEATERS CONTROL DIAGRAM



### SEQUENCE OF OPERATION

- THE INTAKE DAMPER SHALL OPEN TO 100% WHEN EF-1 IS OPERATING ABOVE THE MINIMUM AIRFLOW LEVEL. (CO/NO2, OR MANUAL OVER-RIDE MODES)
- THE INTAKE AIR TEMPERATURE SENSOR SHALL CONTROL THE GAS-FIRED UNIT HEATER GUH-1.

4 INTAKE DAMPER CONTROL DIAGRAM

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EXPIRATION DATE 12/21/2023

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PROJECT # 2021

City of Middletown

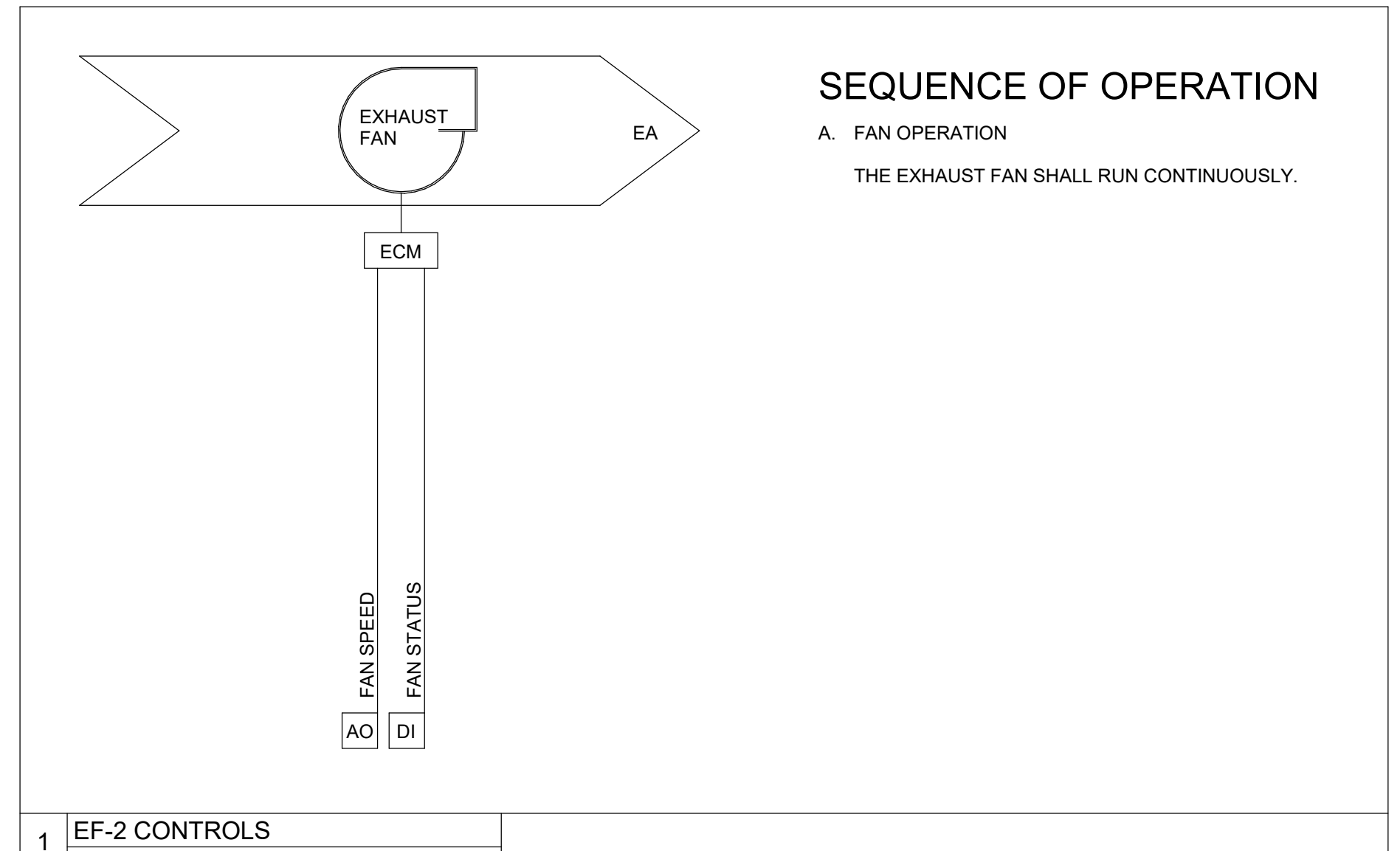
**Fire Station No. 83 & Headquarters**

1630 Yankee Road, Middletown, Ohio 45044

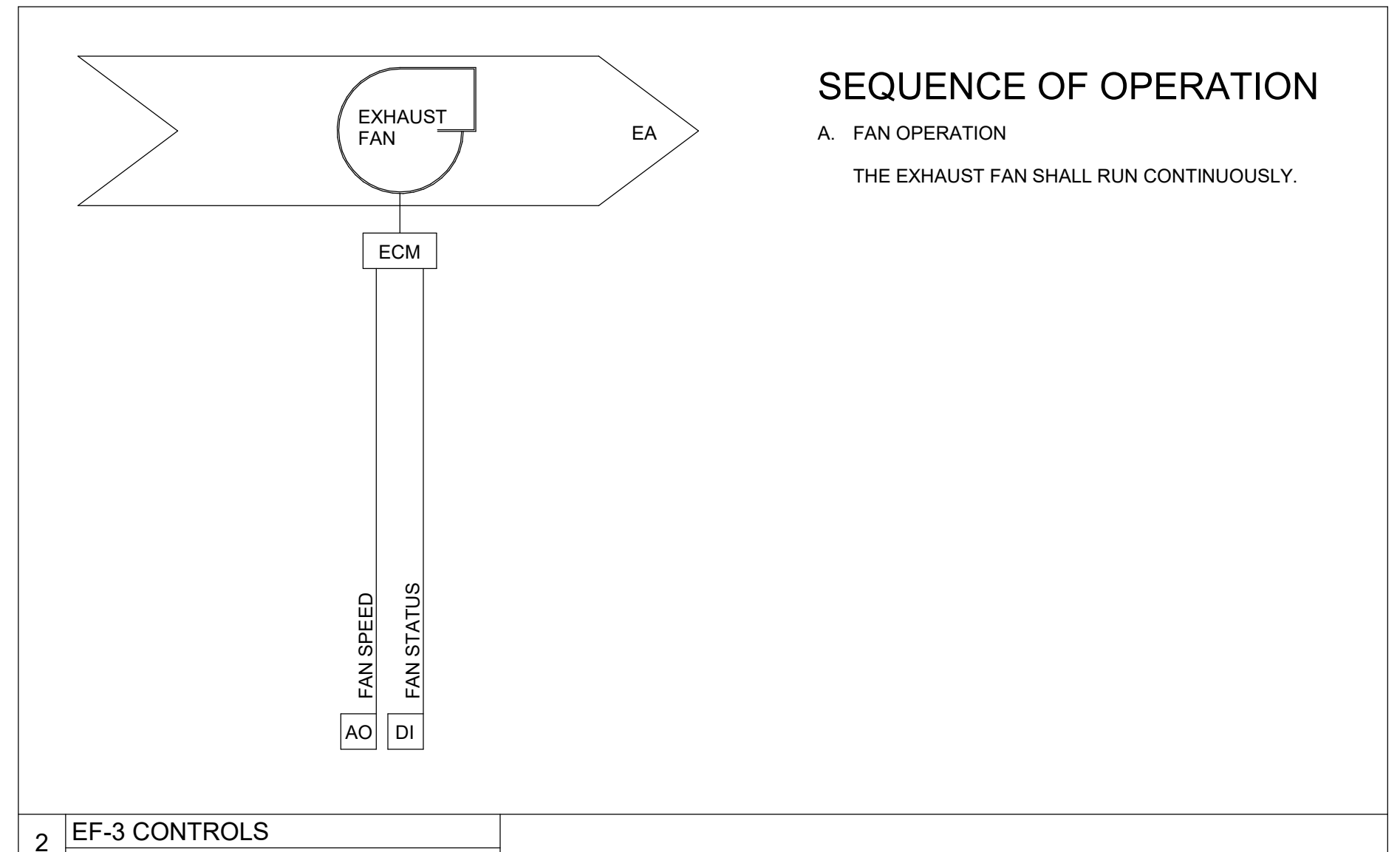
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TITLE	CONTROLS

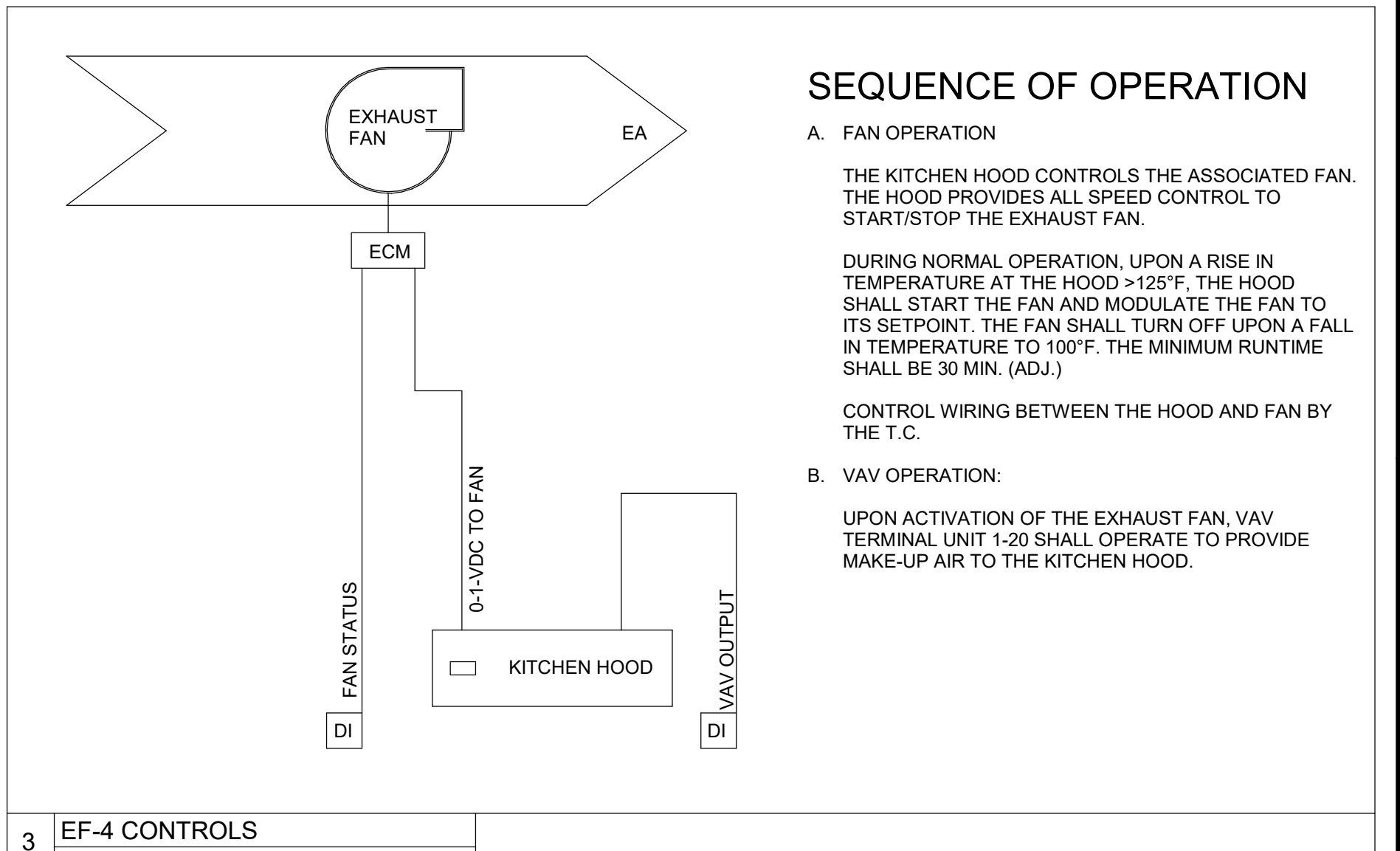
SHEET NO.  
**H4.1**



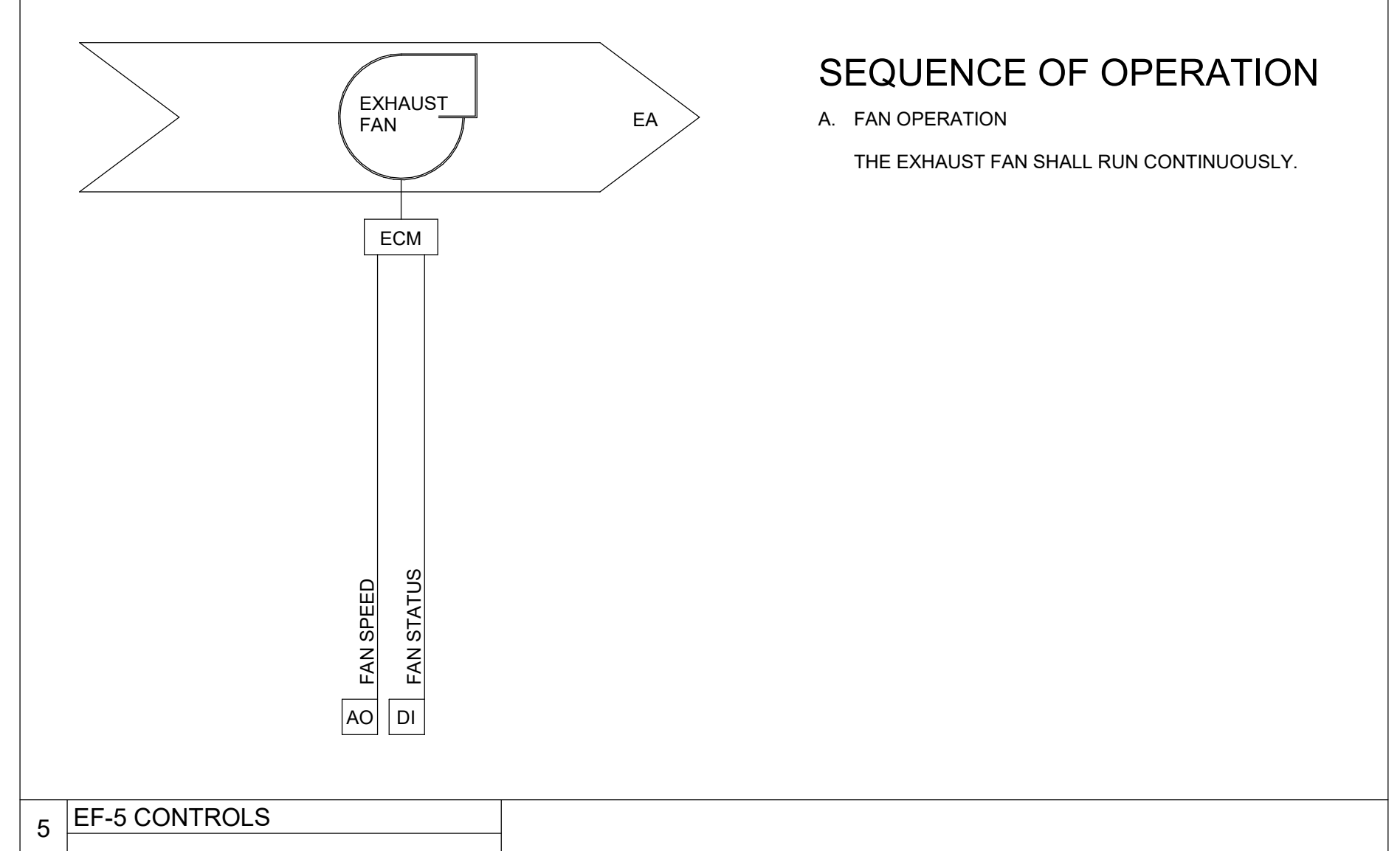
1 EF-2 CONTROLS



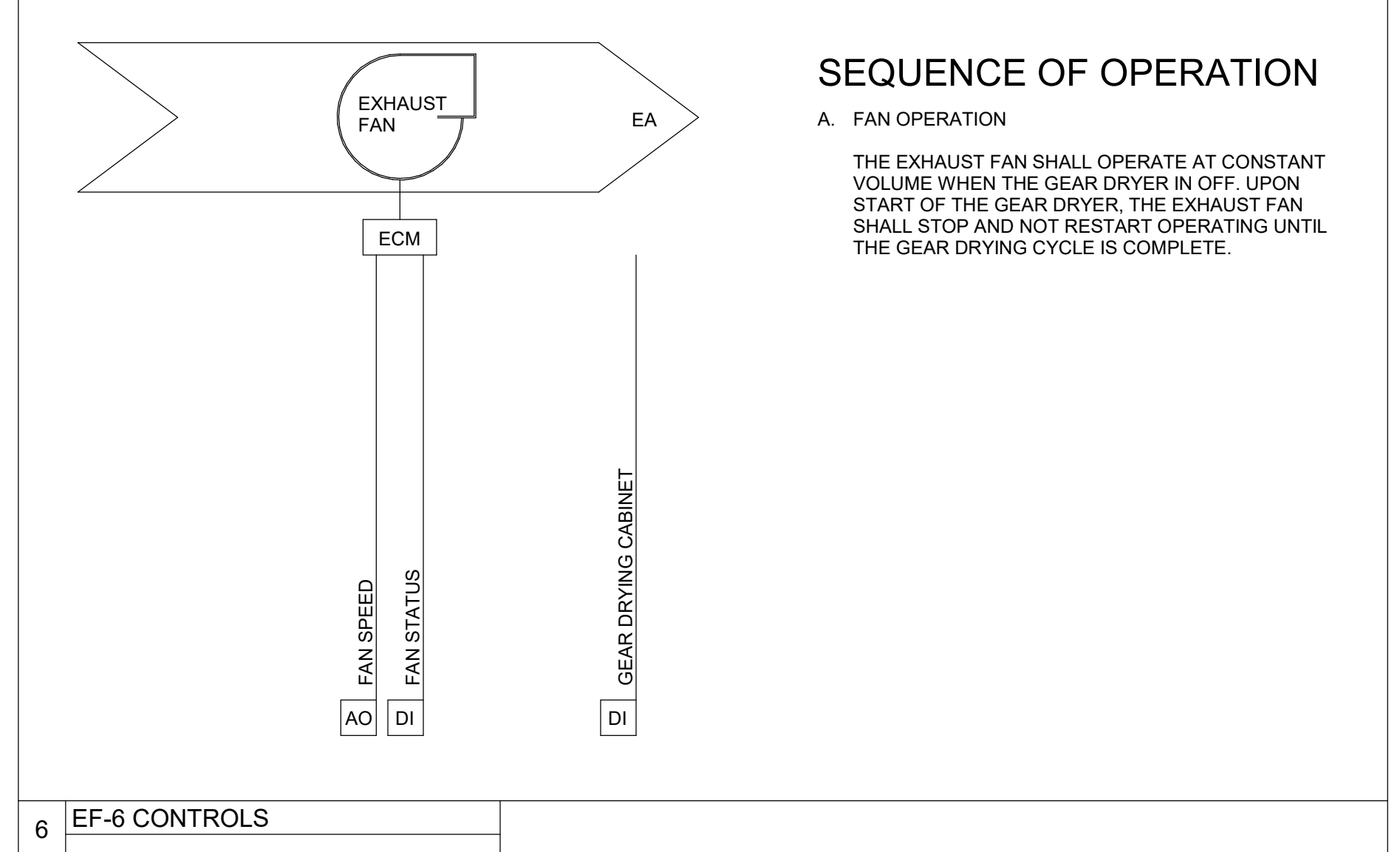
2 EF-3 CONTROLS



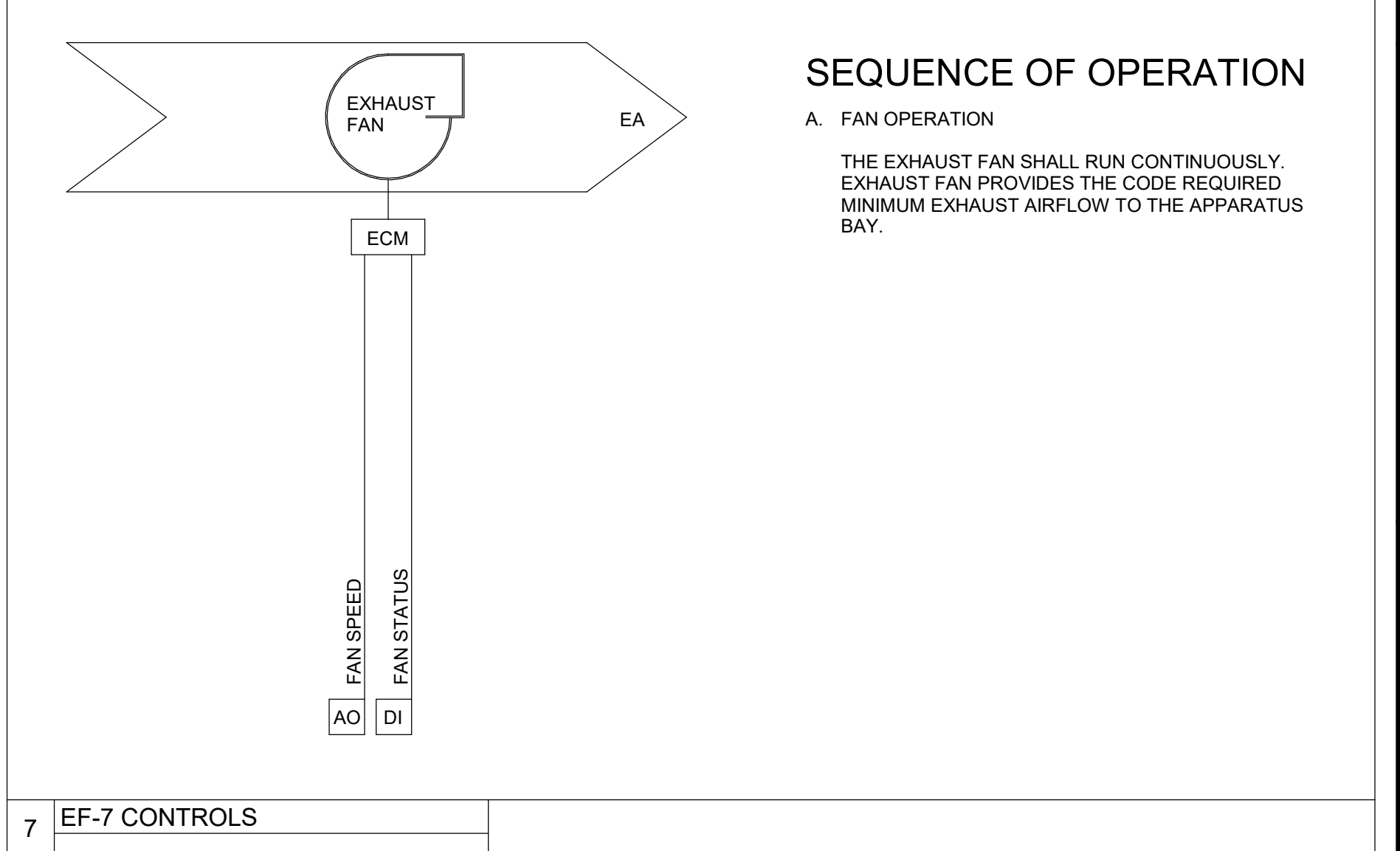
3 EF-4 CONTROLS



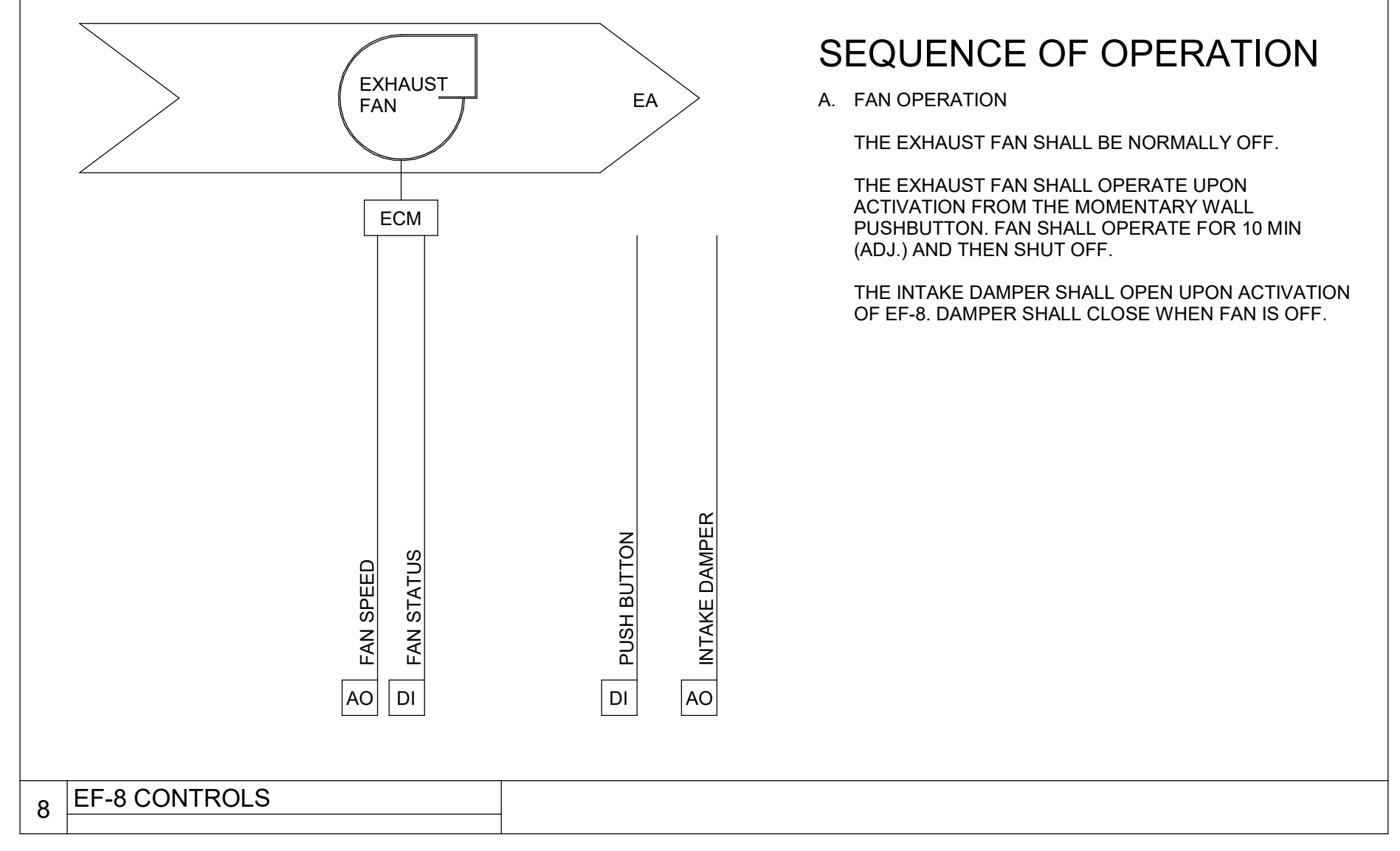
5 EF-5 CONTROLS



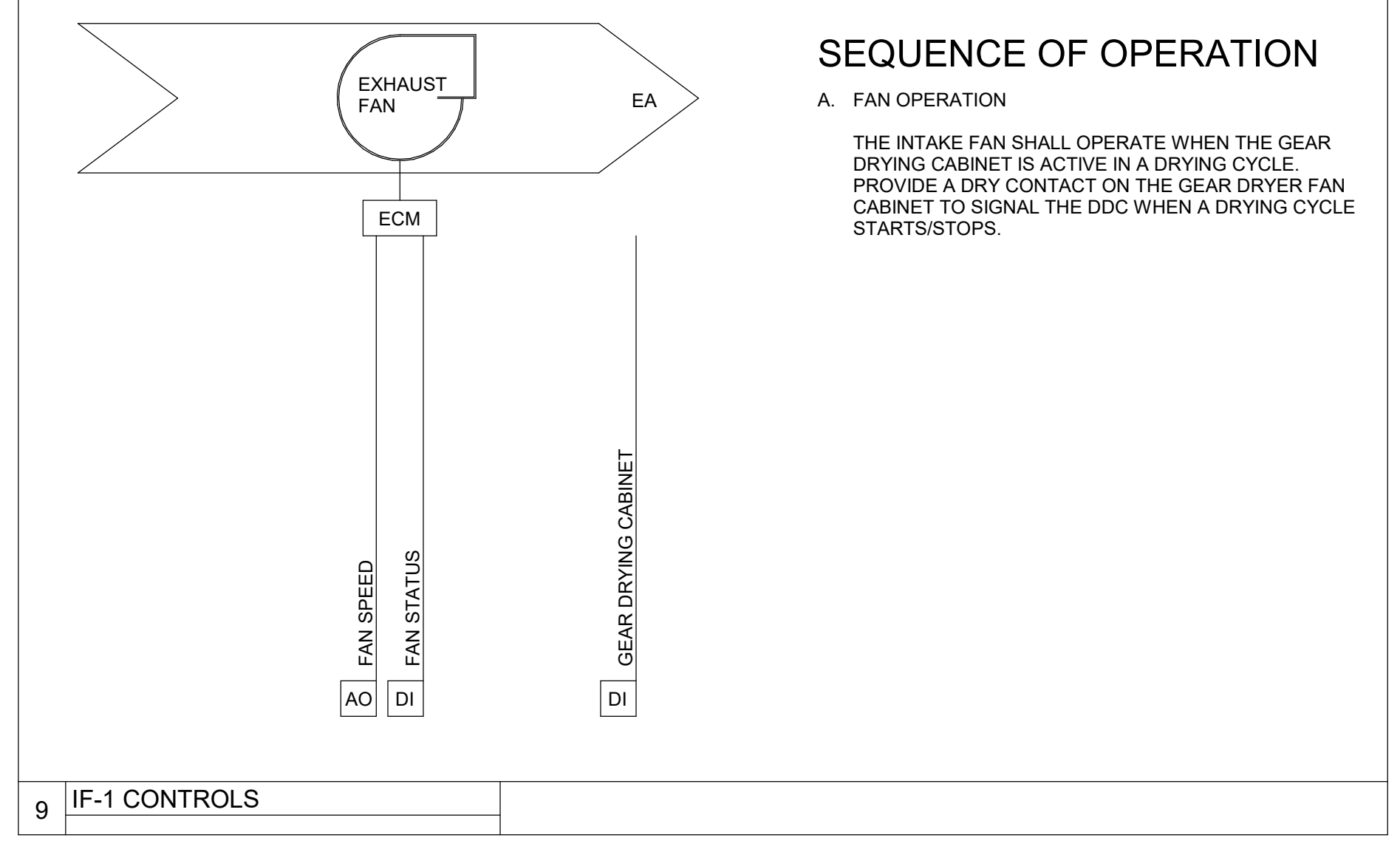
6 EF-6 CONTROLS



7 EF-7 CONTROLS



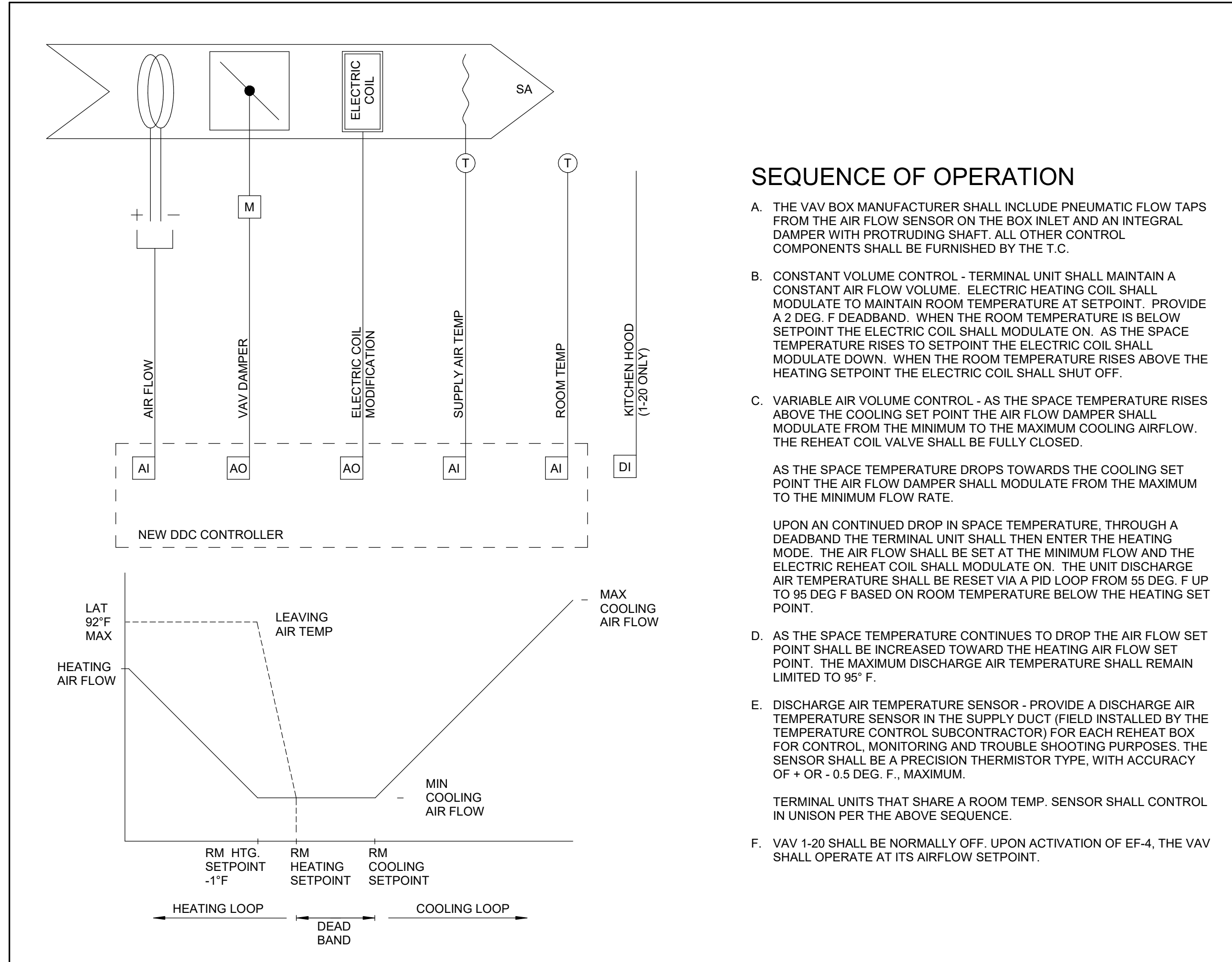
8 EF-8 CONTROLS



9 IF-1 CONTROLS

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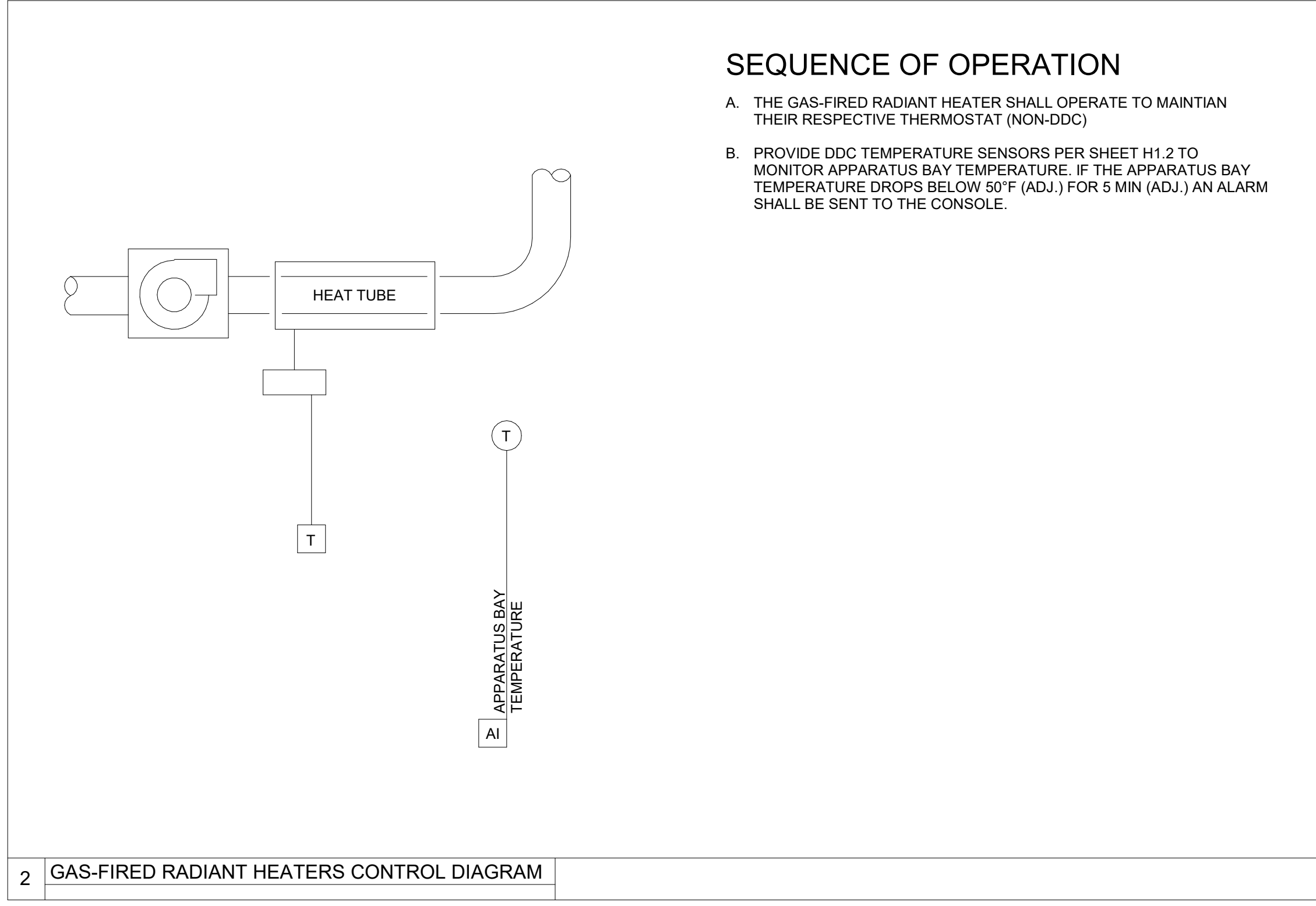
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1 VARIABLE AIR VOLUME UNIT CONTROL DIAGRAM  
N.T.S.

SEQUENCE OF OPERATION

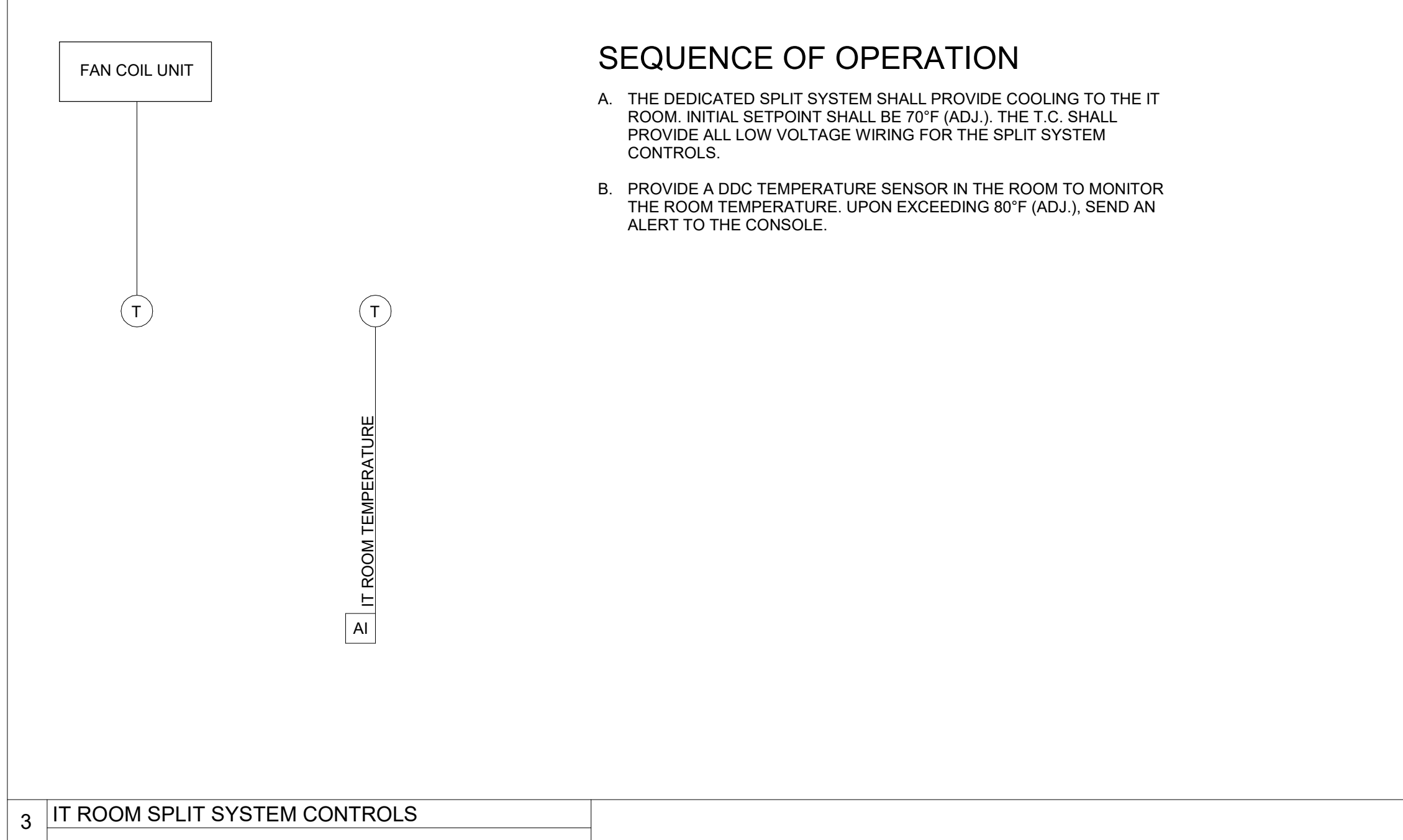
- A. THE VAV BOX MANUFACTURER SHALL INCLUDE PNEUMATIC FLOW TAPS FROM THE AIR FLOW SENSOR ON THE BOX INLET AND AN INTEGRAL DAMPER WITH PROTRUDING SHAFT. ALL OTHER CONTROL COMPONENTS SHALL BE FURNISHED BY THE T.C.
- B. CONSTANT VOLUME CONTROL - TERMINAL UNIT SHALL MAINTAIN A CONSTANT AIR FLOW VOLUME. ELECTRIC HEATING COIL SHALL MODULATE TO MAINTAIN ROOM TEMPERATURE AT SETPOINT. PROVIDE A 2 DEG. F DEADBAND. WHEN THE ROOM TEMPERATURE IS BELOW SETPOINT THE ELECTRIC COIL SHALL MODULATE ON. AS THE SPACE TEMPERATURE RISES TO SETPOINT THE ELECTRIC COIL SHALL MODULATE DOWN. WHEN THE ROOM TEMPERATURE RISES ABOVE THE HEATING SETPOINT THE ELECTRIC COIL SHALL SHUT OFF.
- C. VARIABLE AIR VOLUME CONTROL - AS THE SPACE TEMPERATURE RISES ABOVE THE COOLING SET POINT THE AIR FLOW DAMPER SHALL MODULATE FROM THE MINIMUM TO THE MAXIMUM COOLING AIRFLOW. THE REHEAT COIL VALVE SHALL BE FULLY CLOSED.  
AS THE SPACE TEMPERATURE DROPS TOWARDS THE COOLING SET POINT THE AIR FLOW DAMPER SHALL MODULATE FROM THE MAXIMUM TO THE MINIMUM FLOW RATE.  
UPON AN CONTINUED DROP IN SPACE TEMPERATURE, THROUGH A DEADBAND THE TERMINAL UNIT SHALL THEN ENTER THE HEATING MODE. THE AIR FLOW SHALL BE SET AT THE MINIMUM FLOW AND THE ELECTRIC REHEAT COIL SHALL MODULATE ON. THE UNIT DISCHARGE AIR TEMPERATURE SHALL BE RESET VIA A PID LOOP FROM 55 DEG. F UP TO 95 DEG F BASED ON ROOM TEMPERATURE BELOW THE HEATING SET POINT.
- D. AS THE SPACE TEMPERATURE CONTINUES TO DROP THE AIR FLOW SET POINT SHALL BE INCREASED TOWARD THE HEATING AIR FLOW SET POINT. THE MAXIMUM DISCHARGE AIR TEMPERATURE SHALL REMAIN LIMITED TO 95° F.
- E. DISCHARGE AIR TEMPERATURE SENSOR - PROVIDE A DISCHARGE AIR TEMPERATURE SENSOR IN THE SUPPLY DUCT (FIELD INSTALLED BY THE TEMPERATURE CONTROL SUBCONTRACTOR) FOR EACH REHEAT BOX FOR CONTROL, MONITORING AND TROUBLE SHOOTING PURPOSES. THE SENSOR SHALL BE A PRECISION THERMISTOR TYPE, WITH ACCURACY OF + OR - 0.5 DEG. F, MAXIMUM.  
TERMINAL UNITS THAT SHARE A ROOM TEMP. SENSOR SHALL CONTROL IN UNISON PER THE ABOVE SEQUENCE.
- F. VAV 1.20 SHALL BE NORMALLY OFF. UPON ACTIVATION OF EF-4, THE VAV SHALL OPERATE AT ITS AIRFLOW SETPOINT.



2 GAS-FIRED RADIANT HEATERS CONTROL DIAGRAM

SEQUENCE OF OPERATION

- A. THE GAS-FIRED RADIANT HEATER SHALL OPERATE TO MAINTAIN THEIR RESPECTIVE THERMOSTAT (NON-DDC)
- B. PROVIDE DDC TEMPERATURE SENSORS PER SHEET H1.2 TO MONITOR APPARATUS BAY TEMPERATURE. IF THE APPARATUS BAY TEMPERATURE DROPS BELOW 50°F (ADJ.) FOR 5 MIN (ADJ.) AN ALARM SHALL BE SENT TO THE CONSOLE.



3 IT ROOM SPLIT SYSTEM CONTROLS

SEQUENCE OF OPERATION

- A. THE DEDICATED SPLIT SYSTEM SHALL PROVIDE COOLING TO THE IT ROOM. INITIAL SETPOINT SHALL BE 70° (ADJ.). THE T.C. SHALL PROVIDE ALL LOW VOLTAGE WIRING FOR THE SPLIT SYSTEM CONTROLS.
- B. PROVIDE A DDC TEMPERATURE SENSOR IN THE ROOM TO MONITOR THE ROOM TEMPERATURE. UPON EXCEEDING 80°F (ADJ.), SEND AN ALERT TO THE CONSOLE.

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PROJECT # 2021

City of Middletown  
**Fire Station No. 83 & Headquarters**  
1630 Yankee Road, Middletown, Ohio 45044

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TITLE **CONTROLS**

SHEET NO.  
**H4.3**

Project Name: MIDDLETOWN FIRE STATION

Client: City of Middletown

Design Team: App Architecture

Design Basis: ASHRAE 62.1-2019

Design Basis: ASHRAE 62.1-2019

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Design Basis: ASHRAE 62.1-2019

Table with columns for room names (e.g., DECON, SCBA, WAITING, TRAINING ROOM, JAN, STORAGE, MENS, WOMENS, CONFERENCE, ADMIN COPY, etc.) and rows for various metrics like VENTILATION, SYSTEM EFFICIENCY, etc.

OMC CODE REQUIRED VENTILATION: 1.815 CFM

LIVING QUARTERS NORMAL BUILDING EXHAUST AIRFLOW: 1,750 CFM

THE MINIMUM OUTSIDE AIRFLOW TO AHU-1 SHALL BE 2,115 CFM. A +300 CFM OFFSET SHALL BE PROVIDED TO ENSURE THE LIVING QUARTERS STAYS POSITIVE RELATIVE TO THE APPARATUS BAY.

UPON ACTIVATION OF THE KITCHEN HOOD, THE MINIMUM OUTSIDE AIR VALUE SHALL INCREASE TO 2,885 CFM (+750) TO PROVIDE MAKE-UP AIR TO THE KITCHEN HOOD.

App Architecture creative industrial design



JEFFERY D. ZELINSKI, LICENSE #63822 EXPIRATION DATE 12/21/2023

NAUMAN & ZELINSKI LLC. 204 S. Ludlow Street, Suite 400 Dayton, Ohio 45402

City of Middletown Fire Station No. 83 & Headquarters 1630 Yankee Road, Middletown, Ohio 45044

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DATE: 10/16/2023 JOB NO.: 4069.00 DRAWN: DJZ CHECKED: JDZ

TITLE: VENTILATION

SHEET NO. H5.1