

# MECHANICAL LEGEND AND ABBREVIATIONS

EQUIPMENT ABBREVIATIONS	
AC	AIR CONDITIONING UNIT
CC	COOLING COIL
CU	CONDENSING UNIT
ECH	ELECTRIC CABINET HEATER
EF	EXHAUST FAN
EHC	ELECTRIC HEATING COIL
EUH	ELECTRIC UNIT HEATER
F	FILTER
FSD	FIRE AND SMOKE DAMPER
P	PUMP
RTU	ROOFTOP UNIT (PACKAGED)
SD	SMOKE DAMPER
SF	SUPPLY FAN
TF	TRANSFER FAN
UH	UNIT HEATER

EQUIPMENT TAG LEGEND			
	EQUIPMENT DESIGNATION		EQUIPMENT TYPE
	CEILING DIFFUSER DEVICE DESIGNATION		TYPE
	LINEAR DIFFUSER DEVICE DESIGNATION		TYPE
	SIDEWALL REGISTER DEVICE DESIGNATION		TYPE
			FACE SIZE
			CFM

GENERAL ABBREVIATIONS	
ABV	ABOVE
ACD	AUTOMATIC CONTROL DAMPER
AD	ACCESS DOOR
AL	ACOUSTICAL LINING
ARCH	ARCHITECTURAL
BD	BALANCING DAMPER
BDD	BACK DRAFT DAMPER
BHP	BRAKE HORSE POWER
BTU	BRITISH THERMAL UNIT
BTUH	BRITISH THERMAL UNIT PER HOUR
CD	CEILING DIFFUSER
CFM	CUBIC FEET PER MINUTE
CG	CEILING GRILLE
CO	CLEAN OUT
CR	CEILING REGISTER

GENERAL ABBREVIATIONS	
DB	DRY BULB
DIA	DIAMETER
DN	DOWN
DX	DIRECT EXPANSION
(E)	EXISTING TO REMAIN
EA	EXHAUST AIR
EAT	ENTERING AIR TEMPERATURE
EFF	EFFICIENCY
ELEV	ELEVATOR
*F	DEGREES FAHRENHEIT
FC	FLEXIBLE CONNECTION (DUCT OR PIPE)
FD	FUSIBLE LINK FIRE DAMPER W/ DUCT ACCESS DOOR
FLR	FLOOR
FLA	FULL LOAD AMPS
FPI	FINS PER INCH
FRE	FIRE RATED ENCLOSURE
FT	FEET
GPM	GALLONS PER MINUTE
HP	HORSE POWER
ID	INSIDE DIMENSION
IN	INCHES
KW	KILOWATT
KWH	KILOWATT HOURS
KX	KITCHEN EXHAUST
LAT	LEAVING AIR TEMPERATURE
LBS	POUNDS
LD	LINEAR DIFFUSER
MAT	MIXED AIR TEMPERATURE
MAX	MAXIMUM
MBH	THOUSAND BTU PER HOUR
MFG	MANUFACTURER
MFS	MAXIMUM FUSE SIZE
MIN	MINIMUM
MOC	MAXIMUM OVERCURRENT PROTECTION
NC	NORMALLY CLOSED
NFA	NET FREE AREA
NIC	NOT IN THIS CONTRACT
NO	NORMALLY OPEN
NTS	NOT TO SCALE
OAI	OUTSIDE AIR INTAKE
OBD	OPPOSED BLADE DAMPER
OD	OUTSIDE DIMENSION
PD	PRESSURE DROP
PSI	POUNDS PER SQUARE INCH (GAUGE)
(R)	EXISTING TO BE RELOCATED
RA	RETURN AIR
RH	RELATIVE HUMIDITY
RPM	REVOLUTIONS PER MINUTE
SA	SUPPLY AIR
SENS	SENSIBLE
SM	SHEET METAL
SP	STATIC PRESSURE
SOFT	SQUARE FEET
TRD	TRANSFER DUCT
TRG	TRANSFER GRILLE
TX	TOILET EXHAUST
TYP	TYPICAL
VFD	VARIABLE FREQUENCY DRIVE
W/	WITH
W/O	WITHOUT
WB	WET BULB
WMS	WIRE MESH SCREEN
(X)	EXISTING TO BE DEMOLISHED

DUCTWORK LEGEND	
	RECTANGULAR DUCT SIZE (CLEAR INSIDE DIMENSION) FIRST DIMENSION INDICATES VISIBLE SIDE
	ROUND DUCT DIAMETER SIZE (CLEAR INSIDE DIMENSION)
	FLAT-OVAL DUCT SIZE FIRST DIMENSION INDICATES VISIBLE SIDE
	DUCT SPLIT WITH SPLIT SIZE
	RADIUS ELBOW
	ELBOW WITH TURNING VANES
	RECTANGULAR BRANCH TAKEOFF WITH BALANCING DAMPER
	SUPPLY DUCT UP
	SUPPLY DUCT DOWN
	RETURN DUCT UP
	RETURN DUCT DOWN
	EXHAUST DUCT UP
	EXHAUST DUCT DOWN
	BEAM PENETRATION

DUCTWORK LEGEND	
	FLEXIBLE CONNECTION
	DUCT ENDCAP
	VOLUME DAMPER IN DUCT
	AUTOMATIC CONTROL DAMPER
	FUSIBLE LINK FIRE DAMPER WITH DUCT ACCESS DOOR
	SMOKE DAMPER WITH DUCT ACCESS DOOR
	COMBINATION FIRE AND SMOKE DAMPER WITH DUCT ACCESS DOOR
	BACK DRAFT DAMPER WITH DUCT ACCESS DOOR
	CEILING DIFFUSER WITH AND WITHOUT FLEXIBLE DUCT CONNECTION
	EXHAUST REGISTER OR GRILLE WITH AND WITHOUT FLEXIBLE DUCT CONNECTION
	ROUND CEILING DIFFUSER WITH AND WITHOUT FLEXIBLE DUCT CONNECTION
	TRANSFER GRILLES ON BOTH SIDES OF PARTITION OR WALL (SIZE)
	WALL OPENING ABOVE CEILING (SIZE)
	SUPPLY REGISTER WITH AIR OUTLET DEVICE DESIGNATION
	RETURN OR EXHAUST REGISTER OR GRILLE WITH AIR INLET DEVICE DESIGNATION
	LINEAR DIFFUSER
	LINEAR DIFFUSER WITH PLENUM

HVAC GENERAL NOTES	
1.	GENERAL NOTES, SYMBOLS LIST AND DETAILS ARE APPLICABLE TO ALL HVAC DRAWINGS.
2.	DRAWINGS ARE DIAGRAMMATIC, THEREFORE DETERMINE EXACT LOCATIONS OF SYSTEMS AND COMPONENTS IN FIELD.
3.	COORDINATE WORK OF THIS SECTION WITH THAT OF OTHER SECTIONS.
4.	SHEETMETAL FITTINGS SHOWN ARE TO BE PROVIDED. NO SUBSTITUTES SHALL BE ALLOWED WITHOUT PRIOR CONSENT FROM ARCHITECT/ENGINEER.
5.	RUN DUCTS CONCEALED, UNLESS SPECIFIED OTHERWISE, AND CLEAR OF CEILING INSERTS. ALL DUCTWORK SHALL BE INSTALLED AS CLOSE AS POSSIBLE TO WALL AND UNDERSIDE OF BEAMS AND JOISTS.
6.	ALL WORK SHALL BE COORDINATED WITH ALL TRADES INVOLVED. OFFSETS IN DUCTS (INCLUDING DIVIDED DUCTS) AND TRANSITIONS AROUND OBSTRUCTIONS SHALL BE PROVIDED AT NO ADDITIONAL COST TO THE OWNER.
7.	VERIFY ALL EQUIPMENT CONNECTIONS WITH MANUFACTURER'S CERTIFIED DRAWINGS. VERIFY AND PROVIDE DUCT TRANSITIONS TO FURNISHED EQUIPMENT. FIELD VERIFY AND COORDINATE ALL DIMENSIONS BEFORE FABRICATION.
8.	SUPPORT ALL EQUIPMENT AND DUCTWORK FROM BUILDING STRUCTURE TO PROVIDE A VIBRATION FREE INSTALLATION. NOTIFY ARCHITECT AND STRUCTURAL ENGINEER OF ALL WEIGHTS AND METHODS OF SUPPORT.
9.	PROVIDE VOLUME DAMPERS ON RUN-OUTS TO ALL NEW DIFFUSERS, AS WELL AS BRANCH TAKEOFF, WHETHER SHOWN ON DRAWINGS OR NOT.
10.	FURNISH AND INSTALL ALL WIRING, CONDUIT, TRANSFORMERS, AND OTHER COMPONENTS REQUIRED FOR OPERATION OF HVAC CONTROLS INCLUDING LINE AND LOW VOLTAGE SYSTEMS.
11.	ALL CONTROL WIRE AND CONDUIT SHALL COMPLY WITH NEC, HVAC AND ELECTRICAL SPECIFICATIONS.
12.	REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR EXACT LOCATIONS OF AIR OUTLETS.
13.	INTERNAL AIR FLOW DIMENSIONS ARE SHOWN FOR DUCTS.
14.	ALL MATERIALS AND EQUIPMENT SHALL BE NEW, UNLESS NOTED OTHERWISE.
15.	THE INSIDE OF ALL UNLINED DUCTWORK VISIBLE THROUGH A GRILLE OR DIFFUSER SHALL BE PAINTED FLAT BLACK.
16.	FURNISH ELECTRONIC "AS-BUILT" DRAWINGS CONSISTING OF A COMPLETE SET OF PLANS INDICATING IN A NEAT AND ACCURATE MANNER, A COMPLETE RECORD OF ALL CHANGES TO THE ORIGINAL DESIGN OF THE WORK.
17.	ALL WORK SHALL BE GUARANTEED AGAINST DEFECTS FOR A PERIOD OF ONE YEAR FROM DATE OF FINAL ACCEPTANCE OF THE INSTALLATION AND ANY PORTIONS OF THE WORK WHICH DEVELOP DEFECTS DURING THAT TIME SHALL BE REPLACED OR REPAIRED IN A MANNER SATISFACTORY TO THE OWNER. ALL MANUFACTURER'S WARRANTIES FOR EQUIPMENT EXTENDING BEYOND THE GUARANTEE PERIOD SHALL BE TURNED OVER TO THE OWNER.
18.	ALL POST INSTALLED ANCHORS MUST BE ICC-ES APPROVED.
19.	ALL WIRING INCLUDED LOW VOLTAGE WIRING SHALL BE ROUTED IN CONDUIT.

MECHANICAL SHEET LIST	
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M-001	MECHANICAL LEGENDS AND ABBREVIATION
M-002	MECHANICAL SPECIFICATIONS SHEET #1
M-003	MECHANICAL SPECIFICATIONS SHEET #2
M-004	MECHANICAL SPECIFICATIONS SHEET #3
M-005	MECHANICAL SPECIFICATIONS SHEET #4
M-006	MECHANICAL SPECIFICATIONS SHEET #5
M-007	MECHANICAL COMECHECK SHEET #1
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M-131	MECHANICAL DUCTWORK PLAN
M-132	ROOF MECHANICAL PLAN
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M-701	MECHANICAL SCHEDULES

MISCELLANEOUS	
	TEMPERATURE SENSOR
	TEMPERATURE SENSOR/THERMOSTAT WITH ZONE OR EQUIPMENT DESIGNATION
	DUCT SMOKE DETECTOR SUPPLIED BY ELECTRICAL TRADE, INSTALLED BY MECHANICAL TRADE
	NEW WORK
	EXISTING WORK TO BE REMOVED
	POINT OF NEW CONNECTION TO EXISTING WORK
	DIAMETER
	UNDERCUT DOOR



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STAMP:  
**CONSTRUCTION**  
**ISSUE SET**  
9/25/2024

PROJECT INFORMATION:  
**NEW HAVEN**  
PROJECT INFORMATION:  
**1 BROADWAY**  
**NEW HAVEN, CT 06511**

DRAWN BY: DCT Author  
CHECKED BY: NAM Checker  
PROJECT MANAGER:  
SG DESIGN MANAGER:  
SG DM CHECKED BY:  
SG CONSTR. MANAGER:  
PROJECT NO: XXXXXX  
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REVISIONS		
REV.	DATE	DESCRIPTION
	8/23/2024	80% CHECK SET
	9/13/2024	CD DELIVERY
	9/25/2024	LL REVIEW
1	2/12/2025	ISSUE FOR CONSTRUCTION

**MECHANICAL**  
**LEGENDS AND**  
**ABBREVIATION**

**M-001**

SECTION 23 00 00  
HEATING, VENTILATING AND AIR CONDITIONING SYSTEMS

23 05 01 - HVAC GENERAL PROVISIONS

- A. THE GENERAL, SUPPLEMENTARY CONDITIONS AND ANY ARCHITECTURAL SPECIFICATIONS ARE A PART OF THE REQUIREMENTS FOR THE WORK UNDER THIS DIVISION OF THE SPECIFICATION.
- B. PROVIDE LABOR AND MATERIALS REQUIRED TO INSTALL, TEST AND PLACE INTO OPERATION THE HEATING, VENTILATING, AND AIR CONDITIONING, AS CALLED FOR IN THE CONTRACT DOCUMENTS, AND ACCORDING TO THE INTERNATIONAL BUILDING CODE AS AMENDED BY THE STATE OF CONNECTICUT.
- C. PROVIDE LABOR, MATERIALS, AND ACCESSORIES REQUIRED TO PROVIDE COMPLETE OPERATING MECHANICAL SYSTEMS AS DESCRIBED OR WHICH MAY BE REASONABLY IMPLIED AS ESSENTIAL FOR A COMPLETE OPERATING SYSTEM.
- D. DRAWINGS, SPECIFICATIONS, CODES, AND STANDARDS ARE MINIMUM REQUIREMENTS. WHERE REQUIREMENTS DIFFER, APPLY THE MORE STRINGENT.
- E. SHOULD ANY CHANGE IN DRAWINGS OR SPECIFICATIONS BE REQUIRED TO COMPLY WITH GOVERNING REGULATIONS, NOTIFY THE ARCHITECT PRIOR TO SUBMITTING BID.
- F. EXECUTE WORK IN STRICT ACCORDANCE WITH THE BEST PRACTICES OF THE TRADES IN A THOROUGH, SUBSTANTIAL, SKILLFUL AND WELL-EXECUTED MANNER BY COMPETENT WORKERS. PROVIDE A COMPETENT, EXPERIENCED FULL-TIME SUPERINTENDENT WHO IS AUTHORIZED TO MAKE DECISIONS ON BEHALF OF THE CONTRACTOR.
- G. APPLICABLE EQUIPMENT AND MATERIALS TO BE LISTED BY UNDERWRITERS LABORATORIES AND MANUFACTURED IN ACCORDANCE WITH ASME, AWMA, OR ANSI STANDARDS, AND AS APPROVED BY AUTHORITIES HAVING JURISDICTION. THE ENERGY USING PRODUCTS SHALL BE IN ACCORDANCE WITH THE CONNECTICUT STATE ADOPTION OF THE 2021 INTERNATIONAL ENERGY CONSERVATION CODE.
- H. SUBMIT SHOP DRAWINGS, MANUFACTURER'S DATA, SAMPLES, AND TEST REPORTS (THREE COPIES MINIMUM), CONTRACTOR SHALL ALLOW FIVE WORKING DAYS MINIMUM REVIEW FROM THE TIME IT IS RECEIVED BY THE ENGINEER.
- I. THE CONTRACT DOCUMENTS SHOW THE GENERAL ARRANGEMENT OF EQUIPMENT, DUCTWORK, PIPING, AND ACCESSORIES. FOLLOW THESE DRAWINGS AS CLOSELY AS THE ACTUAL CONSTRUCTION AND THE WORK OF OTHER TRADES WILL PERMIT. PROVIDE OFFSETS, FITTINGS, AND ACCESSORIES WHICH MAY BE REQUIRED BUT NOT SHOWN ON THE DRAWINGS. INVESTIGATE THE SITE AND REVIEW DRAWINGS OF OTHER TRADES TO DETERMINE CONDITIONS AFFECTING THE WORK AND PROVIDE SUCH WORK AND ACCESSORIES AS MAY BE REQUIRED TO ACCOMMODATE SUCH CONDITIONS.
- J. PROVIDE FIRESTOPPING AROUND ALL PIPES, CONDUITS, DUCTS, ETC. WHICH PASS THROUGH RATED WALLS, PARTITIONS, AND FLOORS IN STRICT ACCORDANCE WITH THE MANUFACTURER'S PUBLISHED APPROVAL LISTING AND RATING.
- K. BEFORE COMMENCING WORK, EXAMINE ADJOINING WORK ON WHICH THIS WORK IS IN ANY WAY DEPENDENT AND REPORT CONDITIONS WHICH PREVENT PERFORMANCE OF THE WORK. BECOME THOROUGHLY FAMILIAR WITH ACTUAL EXISTING CONDITIONS TO WHICH CONNECTIONS MUST BE MADE OR WHICH MUST BE CHANGED OR ALTERED.
- L. DEFINITIONS:
  - 1. "PROVIDE" MEANS TO "FURNISH" AND "INSTALL."
  - 2. "INSTALL" MEANS TO JOIN, UNITE, FASTEN, LINK, ATTACH, SET UP OR OTHERWISE CONNECT TOGETHER BEFORE TESTING AND TURNING OVER TO OWNER, COMPLETE AND READY FOR REGULAR OPERATION.
  - 3. "FURNISH" MEANS TO SUPPLY ALL MATERIALS, LABOR, EQUIPMENT, TESTING APPARATUS, CONTROLS, TESTS, ACCESSORIES, AND ALL OTHER ITEMS CUSTOMARILY REQUIRED FOR THE PROPER AND COMPLETE APPLICATION.
  - 4. "AS DIRECTED" MEANS AS DIRECTED BY THE ARCHITECT OR THE ARCHITECT'S REPRESENTATIVE.
  - 5. "CONCEALED" MEANS EMBEDDED IN MASONRY OR OTHER CONSTRUCTION, INSTALLED BEHIND WALL FURRING OR WITHIN DOUBLE PARTITIONS, OR INSTALLED WITHIN HUNG CEILINGS.
  - 6. "SUBMIT" MEANS SUBMIT TO THE ARCHITECT FOR REVIEW.
- M. EVALUATE EXISTING CONDITIONS WHICH MAY AFFECT METHODS OR COST OF PERFORMING THE WORK, BASED ON EXAMINATION OF THE SITE OR OTHER INFORMATION. FAILURE TO EXAMINE THE DRAWINGS, THIS DOCUMENT OR OTHER INFORMATION DOES NOT RELIEVE THE CONTRACTOR OF RESPONSIBILITY FOR SATISFACTORY COMPLETION OF THE WORK.
- N. PROVIDE TWO (2) COPIES OF OPERATING INSTRUCTIONS AND MAINTENANCE MANUALS FOR ALL EQUIPMENT AND MATERIALS FURNISHED UNDER THIS DIVISION UPON TWO (2) WEEKS AFTER COMPLETION OF PROJECT.
- O. MAINTAIN ON A DAILY BASIS AT THE PROJECT SITE A COMPLETE SET OF RECORD DRAWINGS, REFLECTING AN ACCURATE DIMENSIONAL RECORD OF ALL DEVIATIONS BETWEEN WORK SHOWN ON DRAWINGS AND THAT ACTUALLY INSTALLED.
- P. COORDINATE, WITH BUILDING MANAGEMENT, THE REQUIREMENTS FOR AFTER-HOURS WORK NEEDED FOR TENANT TIE-INS TO BASE BUILDING SYSTEMS.
- Q. LOCATE ALL EQUIPMENT NEEDING SERVICE IN ACCESSIBLE LOCATIONS AND ON ONE SIDE OF THE UNIT WHEN POSSIBLE. COORDINATE WITH GENERAL CONTRACTORS TO PROVIDE ACCESS PANELS IN INACCESSIBLE CEILINGS. MINOR DEVIATIONS FROM DRAWINGS CAN BE MADE IN ORDER TO PROVIDE BETTER ACCESSIBILITY.
- R. ALL HVAC SYSTEMS SHALL BE IN ACCORDANCE WITH THE CONNECTICUT STATE BUILDING CODES AND REGULATIONS AND CONSTRUCTED IN ACCORDANCE WITH THE BEST GENERAL PRACTICE.
- S. CONTRACTOR SHALL ALLOW FOR TESTING AND REBALANCING OF ALL EXISTING TO BE REUSED EQUIPMENT AS WELL AS NEW.
- T. COORDINATE ALL WORK WITH EXISTING STRUCTURE, PIPING, AND CONDUITS.
- U. OBTAIN AND PAY FOR ALL REQUIRED FEES, PERMITS, AND INSPECTIONS.
- V. OBTAIN WRITTEN PERMISSION OF OWNER BEFORE CUTTING OR PATCHING OF STRUCTURAL SYSTEMS.
- W. GUARANTEE WORK FOR ONE (1) YEAR FROM DATE OF FILING NOTICE OF COMPLETION.
- X. REMOVE ALL ABANDONED MECHANICAL EQUIPMENT AND ASSOCIATED DUCTWORK, PIPING, ETC., UNLESS OTHERWISE SPECIFIED BY OWNER.
- Y. PRESSURE TEST EACH SYSTEM OF PIPING AND DUCTWORK AS SPECIFIED.

Z. SUBMITTALS AND REVIEWS:

- 1. SUBMITTALS: PRIOR TO CONSTRUCTION SUBMIT FOR APPROVAL THE FOLLOWING MATERIALS AND EQUIPMENT. SUBMITTAL SHOULD BE SUBMITTED SEPARATELY BY NUMBERED SPECIFICATION SECTION AND SHOULD INCLUDE EQUIPMENT CUT SHEETS, DIMENSIONS, CAPACITIES, WIRING DIAGRAM AND ELECTRICAL LOADS, SPECIAL INSTALLATION DETAILS, ETC.
  - a. ELECTRIC MOTORS FOR HVAC EQUIPMENT
  - b. METERS, GAUGES, AND THERMOMETERS
  - c. GENERAL-DUTY VALVES
  - d. HANGERS AND SUPPORTS
  - e. VIBRATION ISOLATION
  - f. ACCESS DOORS
  - g. SYSTEMS IDENTIFICATION
  - h. TESTING, ADJUSTING, AND BALANCING
  - i. THERMAL INSULATION
  - j. BUILDING CONTROLS
  - k. SEQUENCE OF OPERATIONS

- I. HYDRONIC PIPING
- m. PUMPS
- n. REFRIGERANT PIPING
- o. HVAC DUCTS AND CASINGS
- p. DAMPERS
- q. ACOUSTICS
- r. FANS
- s. AIR OUTLETS AND INLETS
- t. OTHER MISCELLANEOUS EQUIPMENT AS SPECIFIED AND OR SCHEDULED ON DRAWINGS.

2. ELECTRONIC SUBMITTALS:

- a. ELECTRONIC SUBMITTALS WHERE ACCEPTABLE TO THE ARCHITECT WILL BE SUBMITTED IN PDF FORMAT THROUGH A PROJECT FILE SHARING WEBSITE.
- b. IDENTIFY AND INCORPORATE INFORMATION IN EACH ELECTRONIC SUBMITTAL FILE AS FOLLOWS:
  - (1) ASSEMBLE COMPLETE SUBMITTAL PACKAGE INTO A SINGLE INDEXED FILE INCORPORATING SUBMITTAL REQUIREMENTS OF A SINGLE SPECIFICATION SECTION AND TRANSMITTAL FORM WITH LINKS ENABLING NAVIGATION TO EACH ITEM.
  - (2) NAME FILE WITH SUBMITTAL NUMBER OR OTHER UNIQUE IDENTIFIER, INCLUDING REVISION IDENTIFIER.
  - (3) FILE NAME SHALL USE PROJECT IDENTIFIER AND SPECIFICATION SECTION NUMBER FOLLOWED BY A DECIMAL POINT AND THEN A SEQUENTIAL NUMBER (E.G., BV-230923.01). RESUBMITTALS SHALL INCLUDE AN ALPHABETIC SUFFIX AFTER ANOTHER DECIMAL POINT (E.G., BV-230923.01A).
  - (4) PROVIDE MEANS FOR INSERTION TO PERMANENTLY RECORD CONTRACTORS REVIEW AND APPROVAL MARKINGS AND ACTION TAKEN BY ARCHITECT.

c. TRANSMITTAL FORM FOR ELECTRONIC SUBMITTALS: USE ELECTRONIC FORM ACCEPTABLE TO ARCHITECT, CONTAINING THE FOLLOWING INFORMATION:

- (1) PROJECT NAME
  - (2) DATE
  - (3) NAME AND ADDRESS OF ARCHITECT AND ENGINEER
  - (4) NAME OF OWNER
  - (5) NAME OF CONTRACTOR
  - (6) NAME OF FIRM OR ENTITY THAT PREPARED SUBMITTAL
  - (7) NAMES OF SUBCONTRACTOR, MANUFACTURER, AND SUPPLIER
  - (8) CATEGORY AND TYPE OF SUBMITTAL
  - (9) SPECIFICATION SECTION NUMBER AND TITLE
  - (10) DRAWING NUMBER AND DETAIL REFERENCES, AS APPROPRIATE
  - (11) RELATED PHYSICAL SAMPLES SUBMITTED DIRECTLY
  - (12) INDICATION OF FULL OR PARTIAL SUBMITTAL
  - (13) TRANSMITTAL NUMBER (NUMBERED CONSECUTIVELY)
  - (14) SUBMITTAL AND TRANSMITTAL DISTRIBUTION RECORD
  - (15) REMARKS
- d. METADATA: INCLUDE THE FOLLOWING INFORMATION AS KEYWORDS IN THE ELECTRONIC SUBMITTAL FILE METADATA:
- (1) PROJECT NAME
  - (2) NUMBER AND TITLE OF APPROPRIATE SPECIFICATION SECTION.
  - (3) MANUFACTURER NAME
  - (4) PRODUCT NAME

- 3. PREPARE AND SUBMIT DETAILED SHOP DRAWINGS FOR DUCTWORK, PIPING WORK AND OTHER DISTRIBUTION SERVICES IN MINIMUM 1/4 INCH TO 1 FOOT SCALE, INCLUDING ELEVATIONS AND LOCATIONS AND SIZES OF OPENINGS IN FLOOR DECKS, WALLS AND ROOFS.
- 4. HVAC DESIGN DRAWINGS SHALL NOT BE SUBMITTED AS SHEET METAL SHOP DRAWINGS.
- 5. THE WORK DESCRIBED IN SHOP DRAWING AND PRODUCT DATA SUBMITTALS SHALL BE CAREFULLY CHECKED BY ALL TRADES FOR CLEARANCES (INCLUDING THOSE REQUIRED FOR CODE COMPLIANCE, MAINTENANCE, AND SERVICING), FIELD CONDITIONS, MAINTENANCE OF ARCHITECTURAL CONDITIONS, AND PROPER COORDINATION WITH OTHER TRADES ON THE JOB. EACH SUBMITTED SHOP DRAWING TO INCLUDE A CERTIFICATION THAT RELATED FIELD CONDITIONS AND REQUIREMENTS HAVE BEEN CHECKED BY ALL CONTRACTORS AND SUBCONTRACTORS AND THAT CONFLICTS DO NOT EXIST.
- 6. NO PART OF THE WORK SHALL BE ORDERED, PROCURED, STARTED IN THE SHOP OR IN THE FIELD UNTIL THE SHOP DRAWINGS AND SAMPLES FOR THAT PORTION OF THE WORK HAVE BEEN SUBMITTED, REVIEWED AND RETURNED WITH EITHER "NO EXCEPTIONS NOTED" OR "EXCEPTIONS NOTED" MARKED ON THE SUBMISSION.
- 7. REVIEW OF SUBMITTALS IS FOR GENERAL COMPLIANCE WITH THE DESIGN CONCEPT AND CONTRACT DOCUMENTS. COMMENTS OR ABSENCE OF COMMENTS DOES NOT RELIEVE THE CONTRACTOR FROM COMPLIANCE WITH THE CONTRACT DOCUMENTS. THE CONTRACTOR REMAINS SOLELY RESPONSIBLE FOR DETAILS AND ACCURACY, FOR CONFIRMING AND CORRELATING ALL QUANTITIES AND DIMENSIONS, FOR SELECTING FABRICATION PROCESSES, FOR TECHNIQUES OF CONSTRUCTION, FOR PERFORMING THE WORK IN A SAFE MANNER, AND FOR COORDINATING THE WORK WITH THAT OF OTHER TRADES.

AA. ALTERNATIVE EQUIPMENT AND MATERIALS

- 1. CONTRACT DOCUMENTS ARE BASED ON MATERIALS SPECIFIED AND ON EQUIPMENT MANUFACTURERS INDICATED. ACCEPTANCE OF ALTERNATIVE EQUIPMENT MANUFACTURERS DOES NOT RELIEVE CONTRACTOR OF THE RESPONSIBILITY TO PROVIDE EQUIPMENT AND MATERIALS THAT MEET THE QUALITY AND PERFORMANCE AS STATED OR IMPLIED IN THE CONTRACT DOCUMENTS.
- 2. EQUIPMENT MANUFACTURERS LISTED IN INDIVIDUAL SECTIONS ARE ACCEPTABLE FOR THIS PROJECT, SUBJECT TO REQUIREMENTS OF CONTRACT DOCUMENTS.
- 3. SUBMIT PROPOSALS TO SUPPLY ALTERNATE MATERIALS OR EQUIPMENT, IN WRITING, WITH SUFFICIENT LEAD TIME FOR REVIEW PRIOR TO THE DATE EQUIPMENT MUST BE ORDERED TO MAINTAIN PROJECT SCHEDULE. REIMBURSE OWNER FOR COSTS ASSOCIATED WITH THE REVIEW OF THE PROPOSED ALTERNATIVE WHETHER ALTERNATIVE IS ACCEPTED OR REJECTED.
- 4. INCLUDE REVISIONS REQUIRED TO ADAPT ALTERNATIVES IN SUCH PROPOSALS, INCLUDING REVISIONS BY OTHER TRADES. NO INCREASE IN THE CONTRACT PRICE WILL BE CONSIDERED TO ACCOMMODATE THE USE OF ALTERNATIVE EQUIPMENT.
- 5. WHEREVER QUALITY STANDARDS (SUCH AS SERVICEABILITY, ENERGY EFFICIENCY, LONGEVITY, OR DURABILITY) AND OPERATING RESULTS (SUCH AS NOISE LEVELS, QUANTITY DELIVERED, OR PRESSURE OBTAINED) ARE SPECIFIED OR SCHEDULED, OR WHEN THE MANUFACTURER AND SIZE OF EQUIPMENT, FOR WHICH SUCH OPERATING RESULTS ARE PUBLISHED OR DETERMINABLE, IS SPECIFIED, THE SUBSTITUTION BEING PROPOSED MUST CONFORM SUBSTANTIALLY TO THE QUALITY AND QUANTITIES SPECIFIED OR IMPLIED. THE SUBSTITUTION MUST FIT INTO AVAILABLE SPACE CONDITIONS AND MUST FUNCTION PROPERLY IN COORDINATION WITH THE REST OF THE SYSTEM.
- 6. PROPOSED CHANGES AND SUBSTITUTIONS OF SYSTEMS, EQUIPMENT, AND MANUFACTURERS SHALL BE SUBMITTED AND INCLUDE THE FOLLOWING INFORMATION WITH THE PROPOSAL:
  - a. A DESCRIPTION OF THE DIFFERENCE BETWEEN THE EXISTING CONTRACT REQUIREMENTS AND THAT PROPOSED, THE COMPARATIVE FEATURES OF EACH, AND THE EFFECT OF THE CHANGE ON THE END RESULT PERFORMANCE. INCLUDE THE IMPACT OF ALL CHANGES ON OTHER CONTRACTORS AND ACKNOWLEDGE THE INCLUSION OF ADDITIONAL COSTS TO OTHER TRADES.

- b. SCHEMATIC DRAWINGS AND DETAILS TO SUPPLEMENT THE DESCRIPTION.
- c. A LIST OF THE CONTRACT REQUIREMENTS THAT MUST BE REVISED IF THE CHANGE IS ACCEPTED, INCLUDING ANY SPECIFICATION REVISIONS.
- d. COMPLETE LIST OF MATERIALS AND EQUIPMENT PROPOSED FOR USE IN THE CHANGE.
- e. INCLUDE A DESCRIPTION AND ESTIMATE OF COSTS THE OWNER MAY INCUR IN IMPLEMENTING THE CHANGE, SUCH AS ADDITIONAL SPACE REQUIREMENTS, PERMITS, ARCHITECTURAL AND AESTHETIC IMPACT, DESIGN COSTS, TESTS, PERMITS EVALUATION, OPERATING AND SUPPORT COSTS.
- f. A PROJECTION OF ANY EFFECTS THE PROPOSED CHANGE WOULD HAVE ON COLLATERAL COSTS TO THE OWNER.
- g. A STATEMENT OF THE TIME BY WHICH A CONTRACT MODIFICATION ACCEPTING THE CHANGE MUST BE ISSUED, NOTING ANY EFFECT ON THE CONTRACT COMPLETION TIME OR THE DELIVERY SCHEDULE.
- h. A STATEMENT INDICATING THE REDUCTION TO THE CONTRACT PRICE IF THE OWNER ACCEPTS THE CHANGE. BE RESPONSIBLE FOR APPROPRIATE MODIFICATIONS TO ALL TRADES.

BB. RECORD DRAWINGS:

- 1. THE CONTRACTOR SHALL MAINTAIN ON A DAILY BASIS AT THE PROJECT SITE A COMPLETE SET OF RECORD DRAWINGS. THE RECORD DRAWINGS SHALL INITIALLY CONSIST OF A SET OF BOND PAPER PRINTS OR AUTOCAD FILES OF THE CONTRACTOR'S COORDINATION DRAWINGS. THE PRINTS SHALL BE MARKED OR AUTOCAD FILES ELECTRONICALLY UPDATED TO SHOW THE PRECISE LOCATION OF ALL BURIED OR CONCEALED WORK AND EQUIPMENT, INCLUDING EMBEDDED PIPING AND VALVES, AND ALL CHANGES AND DEVIATIONS IN THE MECHANICAL WORK FROM THAT SHOWN ON THE CONTRACT DOCUMENTS. THIS REQUIREMENT SHALL NOT BE CONSTRUED AS AUTHORIZATION FOR THE CONTRACTOR TO MAKE CHANGES IN THE LAYOUT OR WORK WITHOUT DEFINITE WRITTEN INSTRUCTIONS FROM THE ARCHITECT OR ENGINEER. THE UPDATED COORDINATION DRAWINGS SHALL BE USED TO PRODUCE THE FINAL RECORD DRAWINGS THAT SHALL BE DELIVERED TO THE OWNER IN AUTOCAD ELECTRONIC FORMAT MEDIA UPON PROJECT COMPLETION.
- 2. UPON COMPLETION OF THE WORK, THE CONTRACTOR AND SUBCONTRACTORS SHALL CERTIFY ALL RECORD DRAWINGS ON THE FRONT LOWER RIGHT HAND CORNER ADJACENT TO THE ABOVE MARKING WITH A RUBBER STAMP IMPRESSION OR AN AUTOCAD IMAGE.
- 3. PRIOR TO FINAL ACCEPTANCE OF THE WORK OF THIS DIVISION, THE CONTRACTOR SHALL SUBMIT PROPERLY CERTIFIED RECORD DRAWINGS TO THE ARCHITECT AND ENGINEER FOR REVIEW AND SHALL MAKE CHANGES, CORRECTIONS, OR ADDITIONS AS THE ARCHITECT AND/OR ENGINEER MAY REQUIRE TO THE RECORD DRAWINGS. SUBMITTED RECORD DRAWINGS SHALL BE ON ELECTRONIC MEDIA IN AUTOCAD 2010 OR LATER FORMAT AND ONE SET OF FULL-SIZE PRINTS, AFTER THE ARCHITECT'S AND ENGINEER'S REVIEW, AND ANY REQUIRED CONTRACTOR REVISIONS, THE RECORD DRAWINGS SHALL BE DELIVERED TO THE OWNER ON ELECTRONIC MEDIA IN AUTOCAD 2010 OR LATER FORMAT. THE ARCHITECT AND ENGINEER DO NOT ASSUME ANY RESPONSIBILITY FOR THE ACCURACY OR COMPLETENESS OF THE RECORD DRAWINGS.

23 05 29 - HANGERS AND SUPPORTS

A. ACCEPTABLE MANUFACTURERS:

- 1. PIPE HANGERS, ANVIL, FEE & MASON, ELCEN, TUBE-TURN, F&S, PIPE SHIELDS, B-LINE KMDORF, MICHIGAN HANGER, POWER STRUT, UNISTRUT, OR APPROVED EQUAL. ANVIL FIGURE NUMBERS ARE LISTED BELOW, EQUIVALENT MATERIAL BY SPECIFIED MANUFACTURERS IS ACCEPTABLE
- 2. SLEEVES: PIPE SHIELDS, INSUL, RK INDUSTRIES
- 3. PIPE WRAP TAPE: POLYGEN, NASSUA, 3M
- 4. FIRESTOP: NELSON, DOW, 3M, HILTI
- 5. ESCUTCHEON PLATES: BEATON & CORBIN MANUFACTURING
- 6. MECHANICAL SLEEVE SEALS: PIPELINE SEAL AND INSULATOR, THUNDERLINE LINKSEAL, CALPICO PIPE LINX, METRAFLEX METRASEAL

B. SLEEVES:

- 1. CONSTRUCT SLEEVES FOR PIPES PASSING THROUGH WALLS (OTHER THAN FOUNDATION WALLS), FLOORS, PARTITIONS, HUNG OR FURRED CEILINGS, ETC., OF MINIMUM 18 GAUGE GALVANIZED STEEL, FLANGED ON EACH SIDE OF WALL, PARTITION, HUNG OR FURRED CEILING, ETC.
- 2. PROVIDE STANDARD WEIGHT GALVANIZED STEEL PIPE SLEEVES WITH WELDED ANCHOR FLANGES AT FOUNDATION WALLS AND REINFORCED CONCRETE OR MASONRY WALLS.
- 3. PROVIDE 20 GAUGE GALVANIZED SHEET METAL SLEEVES, THE FULL DEPTH OF FLOOR OR WALL, FOR ROUND DUCTWORK PASSING THROUGH MASONRY OR CONCRETE AND/OR STEEL CELLULAR FLOOR CONSTRUCTION. RECTANGULAR DUCTWORK SHALL BE PROVIDED WITH FRAMED OPENINGS THROUGH FLOOR AND WALL CONSTRUCTION.
- 4. PROVIDE CAST IRON OR FABRICATED "WALL PIPE" EQUIVALENT TO DUCTILE-IRON PRESSURE PIPE, WITH PLAIN ENDS AND INTEGRAL WATERSTOP, UNLESS OTHERWISE INDICATED.
- 5. STACK SLEEVE FITTINGS: PROVIDE MANUFACTURED, CAST-IRON SLEEVE WITH INTEGRAL CLAMPING FLANGE, INCLUDE CLAMPING RING, BOLTS, AND NUTS FOR MEMBRANE FLASHING AND UNDERDECK CLAMPING RING WITH SETSCREWS.
- 6. PROVIDE MECHANICAL SLEEVE SEALS AT EXTERIOR WALL AND TANK WALL PENETRATIONS. SEAL SHALL BE OF THE MODULAR SEALING ELEMENT UNIT TYPE, DESIGNED FOR FIELD ASSEMBLY, TO FILL ANNULAR SPACE BETWEEN PIPE AND SLEEVE.
- 7. SEALING ELEMENTS: EPDM INTERLOCKING LINKS SHAPED TO FIT SURFACE OF PIPE. INCLUDE TYPE AND NUMBER REQUIRED FOR PIPE MATERIAL AND SIZE OF PIPE.
- 8. PRESSURE PLATES: PLASTIC. INCLUDE TWO FOR EACH SEALING ELEMENT.
- 9. CONNECTING BOLTS AND NUTS: CARBON STEEL WITH CORROSION-RESISTANT COATING OF LENGTH REQUIRED TO SECURE PRESSURE PLATES TO SEALING ELEMENTS. INCLUDE ONE FOR EACH SEALING ELEMENT.

C. PENETRATION FIRESTOP:

- 1. FIRE-RATED CONSTRUCTION: MAINTAIN BARRIER AND STRUCTURAL FLOOR FIRE RESISTANCE RATINGS INCLUDING RESISTANCE TO COLD SMOKE AT ALL PENETRATIONS, CONNECTIONS WITH OTHER SURFACES OR TYPES OF CONSTRUCTION, AND SOUND OR VIBRATION ABSORPTION, AND AT OTHER CONSTRUCTION GAPS.
- 2. SMOKE BARRIER CONSTRUCTION: MAINTAIN BARRIER AND STRUCTURAL FLOOR RESISTANCE TO COLD SMOKE AT ALL PENETRATIONS, CONNECTIONS WITH OTHER SURFACES AND TYPES OF CONSTRUCTION AND AT ALL SEPARATIONS REQUIRED TO PERMIT BUILDING MOVEMENT AND SOUND OR VIBRATION ABSORPTION, AND AT OTHER CONSTRUCTION GAPS.
- 3. SYSTEMS OR DEVICES LISTED IN THE UL FIRE RESISTANCE DIRECTORY UNDER CATEGORIES X4CR AND X4CZ MAY BE USED, PROVIDING THAT IT CONFORMS TO THE CONSTRUCTION TYPE, PENETRANT TYPE, ANNULAR SPACE REQUIREMENTS AND FIRE RATING INVOLVED IN EACH SEPARATE INSTANCE, AND THAT THE SYSTEM BE SYMMETRICAL FOR WALL APPLICATIONS. SYSTEMS OR DEVICES MUST BE ASBESTOS-FREE. MORTAR SYSTEMS MUST BE WARNOCK HERSEY APPROVED.
- 4. WITHSTAND THE PASSAGE OF COLD SMOKE EITHER AS AN INHERENT PROPERTY OF THE SYSTEM OR BY THE USE OF A SEPARATE PRODUCT INCLUDED AS A PART OF THE UL SYSTEM OR DEVICE, AND DESIGNED TO PERFORM THIS FUNCTION.
- 5. ALL FIRESTOPPING PRODUCTS MUST BE FROM A SINGLE MANUFACTURER.
- 6. THROUGH-PENETRATION SMOKESTOPPING AT SMOKE PARTITIONS: ANY SYSTEM COMPLYING WITH THE REQUIREMENTS FOR THROUGH-PENETRATION FIRESTOPPING IN FIRE-RATED CONSTRUCTION, AS SPECIFIED, IS ACCEPTABLE. PROVIDED THAT THE SYSTEM INCLUDES THE SPECIFIED SMOKE SEAL OR WILL PROVIDE A SMOKE SEAL. THE LENGTH OF TIME OF THE FIRE RESISTANCE MAY BE DISREGARDED IN A NON-FIRE RATED SMOKE BARRIER.
- 7. SEAL ALL PIPE AND DUCT PENETRATIONS THROUGH FIRE-RATED CONSTRUCTION WITH FACTORY-BUILT DEVICES OR WITH MANUFACTURED FILL, VOID, OR CAVITY MATERIALS "CLASSIFIED" BY UNDERWRITERS LABORATORIES INC. FOR USE AS A THROUGH-PENETRATION FIRESTOP. ALL FIRESTOP DEVICES AND SYSTEMS SHALL BE APPROVED FOR SUCH USE BY THE AUTHORITY HAVING JURISDICTION. THE FIRESAFING SYSTEM USED SHALL MAINTAIN THE FIRE-RESISTANCE RATING OF THE BUILDING COMPONENT THAT IS PENETRATED.
- 8. ALL MATERIALS SHALL BE NON-HARDENING AND NON-TOXIC. THE FIRESAFING SYSTEM USED

SHALL ACCOMMODATE EXPANSION AND CONTRACTION OF THE FLOATING MECHANICAL PIPING SYSTEMS WITHOUT DAMAGING THE FIRESTOP OR REDUCING ITS EFFECTIVENESS AS A SMOKE BARRIER OR WATER SEAL.

D. HANGERS AND SUPPORTS:

- 1. SUPPORT HORIZONTAL PIPING IN ACCORDANCE WITH THE FOLLOWING SCHEDULE:

PIPE SIZE(IN)	MAXIMUM HANGER SPACING (FT)	ROD SIZE (IN)
1 AND SMALLER	6	3/8
1.25 TO 2	9	3/8
2.5 TO 3	10	1/2
4 TO 5	12	5/8
- 2. DO NOT HANG PIPING FROM OTHER PIPING. SUPPORT OF HANGERS BY MEANS OF VERTICAL EXPANSION BOLTS IS NOT PERMITTED.
- 3. HANGERS FOR INSULATED PIPING SHALL SUPPORT THE PIPE WITHOUT PIERCING THE INSULATION.
- 4. USE HANGERS WHICH ARE VERTICALLY ADJUSTABLE 1/4" INCH MINIMUM AFTER PIPING IS ERECTED. INSTALL HANGERS SO THAT 1/2" INCH MINIMUM CLEARANCE IS MAINTAINED BETWEEN FINISHED COVERING OF PIPE AND ADJACENT WORK.

23 05 48 - VIBRATION AND SEISMIC CONTROLS

- A. ACCEPTABLE MANUFACTURERS:
  - 1. VIBRATION ISOLATION: MASON INDUSTRIES (MI), VIBRATION MOUNTINGS & CONTROL (VMC), VIBRATION ELIMINATOR (VEC), VIBREX VIBRATION CONTROL SYSTEMS (VVC)
- B. ISOLATE MECHANICAL EQUIPMENT FROM THE BUILDING STRUCTURE BY MEANS OF VIBRATION ISOLATORS AS SPECIFIED OR AS RECOMMENDED BY EQUIPMENT MANUFACTURER. ISOLATOR MODEL NUMBERS REFERRED TO IN THE SPECIFICATION ARE BY MASON INDUSTRIES.
- C. DO NOT MAKE RIGID CONNECTIONS BETWEEN EQUIPMENT AND BUILDING STRUCTURE THAT DEGRADES OR SHORT CIRCUITS THE VIBRATION ISOLATION SYSTEM SPECIFIED HEREIN.
- D. PROVIDE FLEXIBLE CONNECTORS TO ALL OTHER CONNECTIONS TO VIBRATION ISOLATED EQUIPMENT SUCH AS CONDENSATE DRAINS, AND OTHER PIPING AS ALLOWED BY CODES AND/OR LOCAL AUTHORITIES.
- E. LOOP ELECTRICAL CIRCUIT CONNECTIONS TO ISOLATED EQUIPMENT TO ALLOW FREE MOTION. INCLUDE AT LEAST ONE SLACK 90° BEND.
- F. INSTALL ISOLATORS WITH THE ISOLATOR HANGER BOX ATTACHED TO, OR HUNG AS CLOSE AS POSSIBLE TO, THE STRUCTURE. PROVIDE OUTRIGGER SUPPORTS WHERE REQUIRED FOR CLEARANCE TO EQUIPMENT AND TO MAINTAIN MINIMUM CLEARANCE OF EQUIPMENT TO STRUCTURE ABOVE.
- G. SUSPEND ISOLATORS FROM SUBSTANTIAL STRUCTURAL MEMBERS, NOT FROM SLAB UNLESS SPECIFICALLY PERMITTED. ATTACHMENTS TO FIREPROOF STRUCTURAL MEMBERS SHALL BE RE-FIREPROOFED AS REQUIRED.
- H. ALIGN HANGER RODS TO CLEAR THE HANGER BOX. REPLACE BENT RODS.

23 05 50 - ACCESS DOORS IN GENERAL CONSTRUCTION

- A. ACCEPTABLE MANUFACTURERS:
  - 1. ACCESS DOORS: MILCOR INC., KARP ASSOCIATES, INC., J.L. INDUSTRIES, ACUDOR, WILLIAMS BROTHERS
  - 2. COLOR-CODED IDENTIFICATION BUTTONS: BRADY/SETON, STRANCO
- B. FURNISH ACCESS DOORS OF PROPER SIZE FOR ACCESS TO CONCEALED EQUIPMENT, UNLESS OTHERWISE INDICATED, MINIMUM SIZE TO BE 12 INCHES X 12 INCHES FOR HAND ACCESS; MINIMUM 18 INCHES X 18 INCHES FOR VALVE AND ACTUATOR ACCESS; AND 24 INCH BY 24 INCH FOR EQUIPMENT ACCESS.
- C. PROVIDE ACCESS DOORS FOR MAINTENANCE OR ADJUSTMENT PURPOSES FOR MECHANICAL SYSTEM COMPONENTS, INCLUDING BUT NOT LIMITED TO THE FOLLOWING:
  - 1. VALVES
  - 2. DAMPERS
  - 3. CONCEALED EQUIPMENT
  - 4. CONTROLS, SENSORS, AND DEVICES
- D. FURNISH COLOR CODED BUTTONS OR TABS TO INDICATE LOCATION OF VALVES, DAMPERS OR OTHER EQUIPMENT LOCATED ABOVE REMOVABLE TYPE CEILINGS WHERE ACCESS DOORS ARE NOT REQUIRED. PROVIDE COLOR CODED DOTS ON ACCESS DOORS OR CEILING TILES TO INDICATE TYPE OF SERVICE AS FOLLOWS:
  - 1. HVAC: BLUE
  - 2. FIRE PROTECTION: RED
  - 3. PLUMBING: SILVER

23 05 53 - SYSTEMS IDENTIFICATION FOR HVAC

- A. IDENTIFY ALL EQUIPMENT WITH IDENTICAL LETTERS AND/OR NUMBERS AS USED ON DRAWINGS, WHERE SPACE IS AVAILABLE USE FULL NAME OF EQUIPMENT. ATTACH NAMEPLATES IN A PERMANENT MANNER IN A LOCATION THAT WILL BE CLEARLY VISIBLE AFTER INSTALLATION IS COMPLETE.
- B. IDENTIFY PIPING SYSTEMS WITH COLOR CODED BANDS, SHARPLY CONTRASTING WITH BACKGROUND. LOCATE BANDS NEAR STRATEGIC POINTS, SUCH AS VALVES, ITEMS OF EQUIPMENT, CHANGES IN DIRECTION, WALL PENETRATIONS, CAPPED STUB OUT FOR FUTURE CONNECTION AND EVERY 40 FEET OF STRAIGHT RUNS. IF NECESSARY, PAINT A STRIP BACKGROUND OF BLACK OR WHITE TO OBTAIN CONTRAST.
- C. MECHANICAL EQUIPMENT SHALL BE IDENTIFIED BY MEANS OF NAMEPLATES PERMANENTLY SCREW-FASTENED TO THE EQUIPMENT. NAMEPLATES SHALL BE BLACK SURFACE, WHITE CORE LAMINATED BAKELITE WITH ENGRAVED LETTERS. PLATES SHALL BE A MINIMUM OF 3 INCH LONG BY 1 INCH WIDE WITH WHITE LETTERS 3/8 INCH HIGH.
- D. TERMINAL EQUIPMENT INSTALLED IN CEILING SPACES SUCH AS VARIABLE VOLUME TERMINALS, FAN COIL UNITS, HEAT PUMPS, ETC., SHALL HAVE IDENTIFYING NUMBER STENOLED ON BOTTOM OF UNIT SO THAT IT IS VISIBLE FROM BELOW.
- E. FOR VALVES, SMOKE AND COMBINATION FIRE/SMOKE DAMPERS AND AUTOMATIC CONTROL DAMPERS, USE METAL TAGS 2 INCH MINIMUM DIAMETER, FABRICATED OF 19 GAUGE POLISHED BRASS, STAINLESS STEEL OR ALUMINUM.

- 1. ATTACH TAGS WITH JACK CHAIN "S"-HOOK OR SPLIT RING OF SAME MATERIALS.
- 2. PROVIDE ENGRAVED/STAMPED TAGS WITH BLACK INK-FILLED 1/4 INCH HIGH LETTERS AND 1/2 INCH HIGH NUMBERS.
- 3. PROVIDE MINIMUM 5/32 INCH HOLE FOR FASTENER.

23 05 93 - TESTING, ADJUSTING, AND BALANCING

- A. GENERAL PROCEDURE:
  - 1. BALANCE TO MAXIMUM MEASURED FLOW DEVIATION FROM SPECIFIED VALUES OF 10% AT TERMINAL DEVICE AND 5% AT EQUIPMENT OR MEAN SOUND LEVEL DEVIATION OF 15 DECIBELS.
  - 2. PERMANENTLY MARK SETTINGS ON VALVES, SPLITTERS, DAMPERS AND OTHER ADJUSTMENT DEVICES.
  - 3. TEST AND BALANCING CONTRACTOR SHALL BE AABC CERTIFIED.
  - 4. TEST AND BALANCE AGENCY SHALL INCLUDE AN EXTENDED WARRANTY OF 90 DAYS, AFTER COMPLETION EACH PHASE OF THE TEST AND BALANCE WORK, DURING WHICH TIME THE ENGINEER MAY REQUEST READJUSTMENT OF THE SYSTEM TO COMPLY WITH COMFORT, SOUND CONDITIONS OR RELATIVE SPACE PRESSURE REQUIREMENTS.



sweetgreen

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STAMP:

CONSTRUCTION  
ISSUE SET

9/25/2024

PROJECT INFORMATION:  
**NEW HAVEN**  
PROJECT INFORMATION:  
**1 BROADWAY**  
**NEW HAVEN, CT 06511**

DRAWN BY: DCT Author  
CHECKED BY: NAM Checker  
PROJECT MANAGER:  
SG DESIGN MANAGER:  
SG DM CHECKED BY:  
SG CONSTR. MANAGER:  
PROJECT NO: XXXXXX  
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MECHANICAL  
SPECIFICATIONS  
SHEET #1

M-002



sweetgreen

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9/25/2024

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CHECKED BY: NAM Checker  
PROJECT MANAGER:  
SG DESIGN MANAGER:  
SG DM CHECKED BY:  
SG CONSTR. MANAGER:  
PROJECT NO: XXXXXX  
TEMPLATE VERSION: 2401

Table with 2 columns: REV., DATE, DESCRIPTION. Row 1: 1, 8/23/2024, 80% CHECK SET. Row 2: 1, 9/13/2024, CD DELIVERY. Row 3: 1, 9/25/2024, LL REVIEW. Row 4: 1, 2/12/2025, ISSUE FOR CONSTRUCTION.

MECHANICAL  
SPECIFICATIONS  
SHEET #2

M-003

5. TESTING AND BALANCING AGENCY, AS PART OF ITS CONTRACT, SHALL ACT AS AUTHORIZED INSPECTION AGENCY RESPONSIBLE TO CONSULTING ENGINEER AND OWNER, AND SHALL DURING THE TEST AND BALANCE LIST ALL ITEMS THAT ARE INSTALLED INCORRECTLY, REQUIRE CORRECTION, OR HAVE NOT BEEN INSTALLED IN ACCORDANCE WITH CONTRACT DRAWINGS AND/OR SPECIFICATIONS, PERTAINING TO THE AIR DISTRIBUTION, COOLING AND HEATING SYSTEMS.

B. BALANCING REPORT AND DRAWINGS:  
1. SUBMIT A DRAFT COPY OF REPORTS PRIOR TO FINAL ACCEPTANCE OF PROJECT. PROVIDE 4 COPIES OF FINAL REPORT FOR INCLUSION IN OPERATING AND MAINTENANCE MANUALS.

C. AIR SYSTEM PROCEDURE:  
1. EXECUTE AIR SYSTEMS BALANCING FOR EACH AIR SYSTEM IN ACCORDANCE WITH AABC SPECIFICATIONS AND AS DESCRIBED HEREIN.

2. MAKE TESTS WITH SUPPLY, RETURN AND EXHAUST SYSTEMS OPERATING AND DOORS, WINDOWS, CLOSED, OR IN THEIR NORMAL OPERATION CONDITION.

3. TEST AND ADJUST FAN SPEED TO DESIGN REQUIREMENTS.

4. TEST AND RECORD MOTOR FULL LOAD AMPS. RECORD EACH INSTALLED MOTOR MANUFACTURER.

5. TRANSVERSE MAIN SUPPLY AIR DUCTS, USING A PITOT TUBE AND MANOMETER, CALIBRATE THE MANOMETER TO READ TWO SIGNIFICANT FIGURES IN VELOCITY PRESSURE RANGES. TAKE A MINIMUM 16 READINGS PER TRAVERSE. THE INTENT OF THIS OPERATION IS TO MEASURE BY TRAVERSE THE TOTAL AIR QUALITY SUPPLIED BY THE FAN AND TO VERIFY THE DISTRIBUTION OF AIR TO THE FLOOR AND/OR ZONES. A MAIN DUCT IS DEFINED AS ANY OF THE FOLLOWING:

a. TYPICAL FLOOR DUCT LOOP.  
b. A DUCT SERVING FOUR (4) OR MORE OUTLETS.  
c. A DUCT SERVING A HYDRONIC OR ELECTRIC COIL.  
d. A DUCT EMANATING FROM A FAN DISCHARGE OR PLENUM AND TERMINATING AT ONE OR MORE OUTLETS.

e. MEASURE AND RECORD RA OPENING SIZE AT THE MAIN RA PLENUMS. USING TRAPEZE MEASURE THE TOTAL VOLUME OF RA FROM THAT FLOOR. INSPECT OPERATION OF RETURN AIR DAMPER (RAD) AND ACTUATOR.

6. SUBMIT DATA IN SUPPORT OF FAN CAPACITY DELIVERIES BY THE FOLLOWING FOUR METHODS, FOR RETURN, RELIEF AND EXHAUST FANS, METHODS 1 AND 4 ARE SUFFICIENT:  
a. BY SUMMATION OF THE AIR QUANTITY READINGS AT INLETS OR OUTLETS.  
b. BY DUCT TRAVERSES OF MAIN SUPPLY DUCTS.  
c. BY ROTATING VANE TRAVERSE ACROSS THE FILTER OR COIL BANK.  
d. BY PLOTTING REVOLUTIONS PER MINUTE AND STATIC PRESSURE READINGS ON THE FAN CURVE. AIR DENSITY CORRECTIONS MUST BE INDICATED.

7. TEST AND RECORD REQUIRED AND MEASURED SYSTEM STATIC PRESSURES; FILTER DIFFERENTIAL, COIL DIFFERENTIAL AND FAN TOTAL STATIC PRESSURE.

8. ADJUST MAIN SUPPLY AND RETURN DUCTS TO PROPER DESIGN FLOW RATES.

9. INSPECT AND CONFIRM ALL FIRE DAMPERS ARE OPEN, ALL SMOKE DAMPERS AND FIRE/SMOKE DAMPERS ARE IN THEIR CORRECT POSITION, ALL DUCT ACCESS DOORS ARE CLOSED AND FIRE DAMPER FUSIBLE LINKS ARE ACCESSIBLE.

10. ADJUST ZONES TO PROPER DESIGN, SUPPLY AND RETURN FLOW RATES.

11. TEST AND ADJUST EACH AIR INLET AND AIR OUTLET AND TRANSFER DUCT TO WITHIN 10% OF DESIGN REQUIREMENTS.

12. IDENTIFY EACH AIR INLET, AIR OUTLET, TRANSFER DUCT AND TRANSFER WALL OPENING AS TO LOCATION AND AREA ON AS-BUILT DRAWING.

13. IDENTIFY AND LIST SIZE, TYPE AND MANUFACTURER OF DIFFUSERS, GRILLES, REGISTERS AND TESTING EQUIPMENT. USE MANUFACTURER'S RATINGS ON EQUIPMENT TO MAKE REQUIRED CALCULATIONS.

14. IN READINGS AND TESTS OF DIFFUSERS, GRILLES AND REGISTERS, REPORT THE REQUIRED FACE AND NECK VELOCITY, TEST FACE AND NECK VELOCITY, AND REQUIRED AIR PRESSURE DROP AND FLOW RATE. TEST AFTER ADJUSTMENTS.

15. ADJUST DIFFUSERS, GRILLES, AND REGISTERS TO MINIMIZE DRAFTS, DUMPING, AND TO PREVENT "SHORT CIRCUITING" BETWEEN SUPPLY AND RETURN OUTLETS.

16. USE VOLUME CONTROL DEVICES TO REGULATE AIR QUANTITIES ONLY TO EXTENT THAT ADJUSTMENTS DO NOT CREATE OBJECTIONABLE AIR MOTION OR SOUND LEVELS. EFFECT VOLUME CONTROL BY DUCT INTERNAL DEVICES SUCH AS DAMPERS AND SPLITTERS.

17. RECORD INSTALLED FAN DRIVE ASSEMBLIES; FAN SHEAVES, MOTOR SHEAVES, BELTS, AND MOTORS.

18. CHECK ZONE TEMPERATURE SET POINTS. ENSURE ZONE SENSOR IS OPERATING PROPERLY AND RESPONDS TO CHANGING ROOM TEMPERATURES.

D. BALANCING DATA:  
1. AIR HANDLING EQUIPMENT INSTALLATION DATA:  
a. MANUFACTURER, MODEL AND SIZE  
b. ARRANGEMENT, DISCHARGE AND CLASS  
c. MOTOR TYPE, HORSEPOWER, SPEED, VOLTAGE, PHASE, CYCLES AND FULL LOAD AMPERES  
d. LOCATION AND FINAL IDENTIFICATION  
2. AIR HANDLING EQUIPMENT DESIGN DATA:  
a. TOTAL AIR FLOW RATE  
b. STATIC PRESSURE  
c. MOTOR HORSEPOWER, SPEED, VOLTAGE AND AMPERES  
d. FAN SPEED AND BRAKE HORSEPOWER  
e. HYDRONIC COIL, INLET AND OUTLET DRY BULB TEMPERATURES  
f. INITIAL FILTER AIR PRESSURE DROP

3. AIR HANDLING EQUIPMENT RECORD DATA:  
a. TOTAL AIR FLOW RATE  
b. STATIC PRESSURE  
c. FAN SPEED AND BRAKE HORSEPOWER  
d. MOTOR OPERATING AMPERES  
e. INLET AND OUTLET, DRY BULB TEMPERATURES  
f. FILTER AIR PRESSURE DROP

4. DUCT AIR QUANTITIES: MAINS, BRANCHES, OUTSIDE AIR, AND EXHAUSTS (MAXIMUM AND MINIMUM):  
a. DUCT SIZES  
b. NUMBER OF PRESSURE READINGS  
c. SUM OF VELOCITY MEASUREMENTS  
d. AVERAGE VELOCITY  
e. DUCT RECORDED AIR FLOW RATE  
f. DUCT DESIGN AIR FLOW RATES

5. AIR INLETS AND OUTLETS:  
a. INLET/OUTLET IDENTIFICATION LOCATION AND DESIGNATION  
b. MANUFACTURER'S CATALOGUE IDENTIFICATION AND TYPE  
c. APPLICATION FACTORS  
d. DESIGN AND RECORDED VELOCITIES  
e. DESIGN AND RECORDED AIR FLOW RATES  
f. DEFLECTOR VANE OR DIFFUSER CONE SETTINGS

23.07.00 - THERMAL INSULATION FOR HVAC

A. ACCEPTABLE MANUFACTURERS:  
1. FIBERGLASS: JOHNS MANVILLE; KNAUF; OWENS CORNING  
2. ELASTOMERIC: ARMACELL; AEROFLEX  
3. MASTICS, ADHESIVES AND SEALERS: DUCTMATE; FOSTER; IC; CHILDERS  
4. JACKETS:  
a. METAL: CHILDERS; RPR PRODUCTS  
b. PVC: CEEL-CC; PC PLASTICS  
c. OTHER: VENTURE TAPE; POLYGUARD; FOSTER VAPOR FAS 62-05

5. PRE-MOLDED FITTINGS, VALVES, STRAINERS AND EQUIPMENT INSULATION: INSUL-THERM INTERNATIONAL; EXTOL OF OHIO, INC.; OR APPROVED EQUAL  
6. FIRE BARRIER DUCT WRAP: 3M DUCT WRAP 615+; UNIFRAX FVREWRAP; OR APPROVED EQUAL

B. PIPE INSULATION:

1. MATERIALS:  
a. GLASS FIBER: ASTM C547; RIGID-MOLDED, NONCOMBUSTIBLE.  
(1) "K" VALUE: 0.23 AT 75°F.  
(2) MAXIMUM SERVICE TEMPERATURE: 850°F.  
(3) VAPOR BARRIER JACKET: WHITE KRAFT PAPER, VINYL COATED, EMBOSSED AND REINFORCED WITH GLASS FIBER YARN AND BONDED TO ALUMINUM FOIL. SECURE WITH SELF-SEALING LONGITUDINAL LAPS AND BUTT STRIPS.  
b. ELASTOMERIC FOAM: ASTM C534; FLEXIBLE, CELLULAR ELASTOMERIC, MOLDED OR SHEET.  
(1) "K" VALUE: 0.27 AT 75°F.  
(2) MAXIMUM SERVICE TEMPERATURE OF 220°F.  
c. FIELD-APPLIED JACKETS:  
(1) ALUMINUM JACKET (AL): 0.016 INCH THICK SHEET, STIPPLED FINISH, WITH LONGITUDINAL SLIP JOINTS AND 2 INCH LAPS, DIE-SHAPED FITTING COVERS WITH FACTORY-ATTACHED PROTECTIVE LINER.  
(2) VAPOR BARRIER JACKET (VBJ): FIVE PLY, NON-BITUMINOUS, EMBOSSED, ALUMINUM FOIL/POLYMER LAMINATED FILM WITH PERMEANCE RATING OF 0.0 AS TESTED IN ACCORDANCE WITH ASTM F1249. VENTURE CLAD PLUS (1579CW) BY VENTURE TAPE, POLYGUARD ZERO-PERM (INDOORS ONLY), FOSTER VAPOR FAS 62-05 OR APPROVED EQUAL.  
(3) ALL SERVICE JACKET (ASJ): DOUBLE ADHESIVE CLOSURE WITH LONGITUDINAL SEAM. OWENS-CORNING SSL II-ASJ OR APPROVED EQUAL.

C. PIPE INSULATION SCHEDULE:

1. REFRIGERANT PIPING:  
(1) MATERIAL: ELASTOMERIC FOAM, GLASS FIBER  
(2) THICKNESS:  
a. 1" AND LESS: 1" INSULATION  
b. GREATER THAN 1": 1.5" INSULATION

2. CONDENSATE DRAINS:

(1) MATERIAL: GLASS FIBER  
(2) THICKNESS:  
a. 1" INSULATION

D. FITTINGS, VALVES AND FLANGES:

1. USE FACTORY PRE-MOLDED FITTINGS OF THE SAME MATERIALS AND THICKNESS AS THE ADJACENT PIPE INSULATION. SUCH FITTINGS SHALL BE APPLIED TO ALL 90°S, 45°S, TEES, FLANGES, AND

2. WHERE PRE-MOLDED INSULATION FITTINGS ARE NOT MANUFACTURED, INSULATE FITTINGS, FLANGES, STRAINERS AND VALVES WITH MITERED SEGMENTS OF THE SAME DENSITY AS THE ADJOINING PIPE COVERING. VAPORSEAL FOR COLD (BELOW DEW POINT) APPLICATIONS USING VAPOR BARRIER MASTIC WITH OPEN WEAVE GLASS OR POLYESTER MESH LAY IN WHILE WET. PROVIDE A FINAL COAT OF VAPOR BARRIER MASTIC. OVERLAP GLASS MESH AND OUTER COAT ADJACENT COVERING BY A MINIMUM OF 2 INCHES. VAPOR BARRIER MASTIC SHALL BE IC 501, CHILDERS CP-34 OR FOSTER 30-65. PERMEANCE OF MASTIC SHALL BE 0.03 PERMS OR LESS AT 45 MILS AS TESTED BY ASTM E96. REINFORCING MESH SHALL BE FOSTER MAST A FAB, CHILDERS CHIL GLAS #10 OR APPROVED EQUAL.

3. PROVIDE INSULATION FOR THE REMOVABLE COVERS AND FLANGES OF PIPE STRAINERS ON COLD SERVICES WITH BUILT-UP SECTIONS OF GLASS FIBER PIPE COVERING, ARRANGED TO FACILITATE SERVICING OF THE STRAINERS. COMPLETE APPLICATIONS WITH VAPORSEALS AS SPECIFIED ABOVE. VAPOR BARRIERS SHALL BE SEALED AND CONTINUOUS THROUGH GUIDES, HANGERS, WALLS, SLEEVES, ETC. ADHESIVES AND COATINGS SHALL BE AS NOTED HEREIN.

E. JACKETING SCHEDULE:  
SERVICE LOCATION JACKET TYPE  
REFRIGERANT PIPING: INTERIOR LOCATIONS ASJ OR PAINTED FINISH; EXTERIOR LOCATIONS AL OR VBJ  
CONDENSATE: ALL LOCATIONS ASJ OR PAINTED FINISH

F. DUCTWORK INSULATION:

1. MATERIALS:  
a. FLEXIBLE GLASS FIBER: ASTM C553, FLEXIBLE BLANKET.  
(1) "K" VALUE: 0.27 AT 75°F INSTALLED.  
(2) DENSITY: 0.75 POUNDS PER CUBIC FOOT.  
(3) VAPOR BARRIER JACKET: ALUMINUM FOIL REINFORCED WITH FIBER GLASS YARN AND LAMINATED TO FIRE-RESISTANT KRAFT, SECURED WITH UL LISTED PRESSURE SENSITIVE TAPE AND OUTWARD CLINCHED EXPANDED STAPLES AND VAPOR BARRIER MASTIC AS NEEDED. MAXIMUM VAPOR BARRIER PERM RATING SHALL NOT EXCEED 0.02 PERM.  
b. RIGID GLASS FIBER: ASTM C612; RIGID BOARD.  
(1) "K" VALUE: 0.23 AT 75°F.  
(2) DENSITY: 6.0 POUNDS PER CUBIC FOOT.  
(3) VAPOR BARRIER JACKET: ALUMINUM FOIL REINFORCED WITH FIBER GLASS YARN AND LAMINATED TO FIRE-RESISTANT KRAFT, SECURED WITH UL LISTED PRESSURE SENSITIVE TAPE AND OUTWARD CLINCHED STAPLES AND VAPOR BARRIER MASTIC AS NEEDED.

G. DUCTWORK INSULATION SCHEDULE:

(1) EXHAUST DUCTS WITHIN 10 FEET OF EXTERIOR OPENINGS: FLEXIBLE GLASS FIBER, 1" INSULATION  
(2) SUPPLY DUCTS IN CONDITIONED SPACES (COOLING AND HEATING SYSTEMS): FLEXIBLE GLASS FIBER, 1" INSULATION (MINIMUM R VALUE OF 4.2)  
(3) SUPPLY AND RETURN DUCTS IN UNCONDITIONED SPACES: RIGID GLASS FIBER, 2" INSULATION (MINIMUM R VALUE OF 8.0)  
(4) OUTSIDE AIR AND EXHAUST PLENUMS: RIGID GLASS FIBER, 2" INSULATION (MINIMUM R VALUE OF 8.0)  
(5) OUTSIDE AIR INTAKE DUCTS: RIGID GLASS FIBER, 2" INSULATION

H. WHEREVER EXTERNAL DUCT INSULATION IS SPECIFIED AND INTERNAL ACOUSTIC TREATMENT OF EQUIVALENT INSULATING EFFECT IS ALSO REQUIRED (BY DRAWINGS OR SPECIFICATIONS) FOR THE SAME LOCATION, THE EXTERNAL INSULATION MAY BE OMITTED.

I. ALL EXPOSED DUCTWORK IS TO BE PROVIDED WITH INTERNAL LINING OF EQUAL THERMAL INSULATION PERFORMANCE AS ABOVE FOR EXTERNAL INSULATION.

23.09.93 - TEMPERATURE CONTROLS

A. SUPPLY AND INSTALL NECESSARY SOFTWARE, PROGRAMMING, SENSING, CONTROLLING AND CONTROLLED DEVICES, PIPING, WIRING AND COMMISSIONING OF AUTOMATIC CONTROL SYSTEMS, SO AS TO PROVIDE A COMPLETE CONTROL SYSTEM, MEET REQUIREMENTS OF CONTROL SEQUENCES SPECIFIED.

B. GENERAL:

1. ALL HVAC SYSTEM CONTROLS SHALL BE STANDALONE CONTROLS AND PROVIDED FROM THE MANUFACTURER AS APPLICABLE.  
2. SAFETY DEVICES SHALL BE HARDWARE INTERLOCKED WITH "HAND" AND "AUTOMATIC" POSITIONS IN SERIES WITH MOTOR CONTROLLER HOLDING CIRCUIT.  
3. SMOKE CONTROL, FIRE AND LIFE SAFETY SEQUENCES SHALL OVERRIDE OTHER AUTOMATIC CONTROL SEQUENCES INCLUDING HARDWIRED SAFETY DEVICES.  
4. RESET SCHEDULES AND SETPOINTS SHOWN IN SEQUENCES ARE FOR INITIAL PROGRAMMING AND START UP, DURING SYSTEM COMMISSIONING THE RESET SCHEDULES AND SETPOINTS SHALL BE FINE-TUNED TO OBTAIN DESIRED COMFORT, ENERGY AND LIFE SAFETY SYSTEM RESULTS.  
5. THE OUTPUT OF THE RESET SCHEDULES SHOULD BE LIMITED BETWEEN MAXIMUM AND MINIMUM VALUES. THE INTENT OF THE RESET SCHEDULES INDICATED IS THAT THE RANGE OF THE OUTPUT BE LIMITED BETWEEN THE MINIMUM AND MAXIMUM VALUES INDICATED IN THE RESET SCHEDULES.  
6. ALL FUNCTIONS WHICH USE ANALOG POINTS TO SWITCH EQUIPMENT ON AND OFF (E.G., FANS, PUMPS) MUST BE PROGRAMMED WITH DEAD BANDS, AND IF NECESSARY, TIME DELAYS TO PREVENT SHORT CYCLING OF EQUIPMENT.  
7. THERMOSTATS SHALL BE PROVIDED WITH PROGRAMMABLE SCHEDULE AND REMOTE MONITORING CAPABILITIES, AS APPLICABLE.  
8. SPACE TEMPERATURE SENSORS SHALL BE PROVIDED FOR REMOTE THERMOSTAT MOUNTING.  
9. ALL THERMOSTATS ARE TO BE PERMANENTLY LABELED WITH THE NAMEPLATE INFORMATION OF THE ASSOCIATED MECHANICAL EQUIPMENT AND IN A LOCATION THAT WILL BE CLEARLY VISIBLE AFTER INSTALLATION IS COMPLETE.  
10. ALL HVAC EQUIPMENT SHALL BE INTERLOCKED TO A 7-DAY PROGRAMMABLE SCHEDULE VIA THE MAIN UNIT PROGRAMMABLE THERMOSTAT. THE OCCUPIED OPERATION SCHEDULE SHALL BE PRE-ADJUSTED TO BEGIN AT 7:30AM AND END AT 9:00PM. COORDINATE FINAL OPERATION SCHEDULES WITH OWNERSHIP PRIOR TO TURNOUT.

C. ROOF MOUNTED AC UNITS:

1. THE FAN SHALL RUN CONTINUOUSLY DURING OCCUPIED HOURS.  
2. THE FACTORY PACKAGED CONTROLLER SHALL INITIATE THE HEATING CYCLE OR THE COOLING CYCLE TO OPERATE TO MAINTAIN SETPOINT OF THE SPACE THERMOSTAT.  
3. UPON THE ACTIVATION OF THE ASSOCIATED DUCT MOUNTED SMOKE DETECTOR AND/OR CARBON MONOXIDE DETECTOR, THE UNIT SHALL IMMEDIATELY SHUT DOWN AND THE FIRE ALARM SYSTEM SHALL BE NOTIFIED.  
4. DURING UNOCCUPIED AND SETBACK OPERATIONS, THE FACTORY PACKAGED CONTROLLER SHALL MODULATE THE HEATING AND COOLING CYCLES TO MAINTAIN A MINIMUM SPACE TEMPERATURE OF 60F (ADJUSTABLE) AND MAXIMUM SPACE TEMPERATURE OF 85F (ADJUSTABLE).

D. GENERAL AND TOILET EXHAUST FANS:

1. START STOP CONTROL:  
a. FANS SHALL BE INTERLOCKED TO THE AC UNIT THERMOSTAT PROGRAMMABLE SCHEDULE. IF NOT COMPATIBLE, PROVIDE TIME CLOCK FOR FAN INTERLOCK.  
2. OCCUPIED OPERATION:  
a. THE FAN SHALL BE ON AND THE EXHAUST AIR DAMPER SHALL BE OPEN.  
3. UNOCCUPIED:  
a. THE FAN SHALL BE OFF, THE EXHAUST AIR DAMPER SHALL BE CLOSED.  
4. WARM UP/COOL DOWN:  
a. DURING THE WARM UP PERIOD, THE FAN SHALL BE OFF AND THE EXHAUST AIR DAMPER SHALL BE CLOSED. DURING COOL DOWN PERIOD, THE FAN SHALL BE ON AND THE EXHAUST DAMPER AIR SHALL BE OPEN.

23.31.00 - HVAC DUCTS AND CASINGS

A. ACCEPTABLE MANUFACTURERS:

1. SPIRAL OVAL AND ROUND DUCTS: UNITED MCGILL "UNI-FORM", SEMCO, METCO, DUCTMATE INDUSTRIES "SPIRALMATE" AND "OVALMATE"  
2. DUCT CONNECTION SYSTEMS: DUCTMATE INDUSTRIES "DUCTMATE 35" AND "DUCTMATE 45", NEXUS, WARD  
3. FLEXIBLE CONNECTIONS: VENTFABRICS "VENTGLAS" AND "VENTLON", DURO DYNE "INSULFAB", ADVANCE ELASTOMERIC SYSTEMS, DUCTMATE INDUSTRIES "PROFLEX"  
4. FLEXIBLE DUCTS: AUTOMATIC INDUSTRIES "THERMAFLEX M-KE", UNITED MCGILL, GENFLEX "L"  
5. SPRING FASTENERS: DZUS, SIMMONS "QUICK-LOCK"  
6. DUCT SEALANTS: MINNESOTA MINING AND MANUFACTURING, BENJAMIN FOSTER, CHILDERS, MIRACLE ADHESIVE, UNITED MCGILL, HARDCAST, DUCTMATE INDUSTRIES "PROSEAL"  
7. SPIN-IN FITTINGS: YOUNG REGULATOR, MODULAR METALS  
8. FLEXIBLE DUCT CLAMPS: AEROQUIP IDEAL, TRIDON, YOUNG REGULATOR  
9. ACOUSTICAL PANEL PLENUMS: IAC, RINK, VIBRO-ACOUSTICS, UNITED MCGILL  
10. ACCESS DOORS, DUCTS: VENTFABRICS, DURO DYNE, RUSKIN. USE "VENTLOK" NO. 140 LATCHES, DUCTMATE INDUSTRIES, HINGED TYPE ONLY  
11. ACCESS DOORS, PLENUMS: VENTFABRICS, DURO DYNE, ELGEN  
12. DUCT JOINT TAPE: HARDCAST

B. PUBLISHED SPECIFICATIONS STANDARDS, TESTS OR RECOMMENDED METHODS OF TRADE, INDUSTRY OR GOVERNMENTAL ORGANIZATIONS APPLY TO WORK IN THIS SECTION WHERE CITED BELOW:

1. ASHRAE - AMERICAN SOCIETY OF HEATING, REFRIGERATION AND AIR CONDITIONING ENGINEERS HANDBOOKS (LATEST EDITIONS).  
2. SMACNA - SHEET METAL AND AIR CONDITIONING CONTRACTORS NATIONAL ASSOCIATION, INC.  
a. HVAC DUCT CONSTRUCTION STANDARDS, METAL AND FLEXIBLE, SECOND EDITION, 2005.  
b. FIRE, SMOKE AND RADIATION DAMPER INSTALLATION GUIDE FOR HVAC SYSTEMS, FOURTH EDITION, 2002.  
c. HVAC SYSTEMS TESTING ADJUSTING AND BALANCING, 3RD EDITION, 2002  
d. SEISMIC RESTRAINT MANUAL, GUIDELINES FOR MECHANICAL SYSTEMS, 1998  
e. HVAC AIR DUCT LEAKAGE TEST MANUAL 1ST EDITION, 1985

C. SUBMITTALS

1. SUBMIT DUCTWORK SHOP FABRICATION AND SHOP CONSTRUCTION STANDARDS PRIOR TO SUBMITTAL OF DUCTWORK SHOP DRAWINGS.  
2. DUCTWORK SHOP FABRICATION AND SHOP CONSTRUCTION STANDARDS SHALL INCLUDE ALL APPLICABLE SHOP DETAILS AND PRODUCT DATA. INCLUDE THE FOLLOWING:  
a. DUCT REINFORCEMENT TABLES FOR ALL PRESSURE CLASSES, DUCT MATERIALS [GALVANIZED STEEL, ALUMINUM, STAINLESS STEEL, BLACK IRON] AND DUCTWORK SHAPES [RECTANGULAR, ROUND, SPIRAL, FLAT OVAL] TO BE USED ON THIS PROJECT  
b. DUCT REINFORCEMENT TABLES SHALL INCLUDE MATERIAL GAUGES, TRANSVERSE JOINT REINFORCEMENT TYPE AND STANDARD SHOP JOINT SPACING  
c. TRANSFER DUCT CONSTRUCTION DETAIL  
d. ACOUSTICAL LINING, PERFORATED METAL LINER, ADHESIVE, NOSING AND FASTENING CUTS AND DETAILS  
e. INSTALLATION DETAILS FOR VOLUME DAMPERS, REMOTE- AND CORD-OPERATED REMOTE VOLUME DAMPERS, CONTROL DAMPERS, FIRE DAMPERS, AND COMBINATION FIRE/SMOKE DAMPERS.  
f. DUCT ACCESS DOORS  
g. DUCT FITTING CONSTRUCTION DETAILS SUCH AS RECTANGULAR AND RADIUS ELBOWS, TURNING VANES, OFFSETS, BRANCH CONNECTIONS, ETC.  
h. DUCT SUPPORT AND ATTACHMENT DETAILS  
i. FLANGED DUCT CONNECTION DETAILS FOR ALL SYSTEMS AND EACH MANUFACTURER USED ON PROJECT. MINIMUM DUCT CONSTRUCTION GAUGES SHALL BE AS PER SMACNA DUCT REINFORCEMENT TABLES. DUCT GAUGES MAY NOT BE REDUCED BASED ON ALTERNATIVE JOINTING MANUFACTURER'S RECOMMENDATIONS  
j. DUCTWORK SEALANT  
k. DIFFUSER DUCTWORK CONNECTION DETAILS  
l. DUCT PENETRATING FULL HEIGHT PARTITION DETAILS  
m. FLEXIBLE CONNECTION DETAILS  
n. DUCT AND PLENUM CONSTRUCTION DETAILS  
o. VOC CONTENT OF ANY ADHESIVES OR SEALANTS MUST BE LESS THAN THE CURRENT VOC CONTENT LIMITS OF THE SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD) RULE #1168. AND ALL SEALANTS USED AS FILLERS SHALL MEET OR EXCEED THE REQUIREMENTS OF THE BAY AREA AIR QUALITY MANAGEMENT DISTRICT (BAAQMD) REGULATION 8, RULE 51.

3. PRODUCT DATA INCLUDING MANUFACTURER'S INSTALLATION INSTRUCTIONS, APPLICATION, MATERIALS OF CONSTRUCTION, GAUGES, DESCRIPTIVE LITERATURE, AND MAINTENANCE DATA FOR:

a. DUCTWORK AND FITTINGS  
b. PLENUMS  
c. FASTENERS AND SEALANTS  
d. ACCESS DOORS

4. SHOP DRAWINGS:

a. 1/2 INCH SCALE DIMENSIONED DUCT LAYOUT DRAWINGS OF ALL MECHANICAL ROOMS, RISER ELEVATIONS, AND FLOOR PLANS, GIVING COMPLETE DIMENSIONS FOR LOCATION, ELEVATION, AND CLEARANCE, SHOWING WORK OF OTHER SECTIONS AND DIVISIONS WHEREVER NECESSARY TO SHOW COORDINATION  
b. ACCESS DOOR DETAILS  
c. FLEXIBLE CONNECTION DETAILS  
d. DUCT AND PLENUM CONSTRUCTION DETAILS  
e. PROVIDE A SEPARATE SET OF DIMENSIONED DRAWINGS OR A PARTIAL SET AT ENLARGED SCALE SHOWING ALL PENETRATIONS REQUIRED FOR DUCTWORK THROUGH STRUCTURAL MEMBERS, FLOOR AND ROOF SLABS, CONCRETE WALLS AND PRECAST WALLS  
f. DUCT MATERIALS, REINFORCEMENT AND CONSTRUCTION SCHEDULES  
g. DUCT SUPPORT AND ATTACHMENT DETAILS



sweetgreen

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STAMP:

CONSTRUCTION  
ISSUE SET

9/25/2024

PROJECT INFORMATION:  
**NEW HAVEN**  
PROJECT INFORMATION:  
**1 BROADWAY**  
**NEW HAVEN, CT 06511**

DRAWN BY: DCT Author  
CHECKED BY: NAM Checker  
PROJECT MANAGER:  
SG DESIGN MANAGER:  
SG DM CHECKED BY:  
SG CONST. MANAGER:  
PROJECT NO: XXXXXX  
TEMPLATE VERSION: 2401

REV.	DATE	DESCRIPTION
	8/23/2024	80% CHECK SET
	9/13/2024	CD DELIVERY
	9/25/2024	LL REVIEW
1	2/12/2025	ISSUE FOR CONSTRUCTION

MECHANICAL  
SPECIFICATIONS  
SHEET #3

M-004

4. ROUND AND OVAL DUCTWORK:
- a. JOINTS BETWEEN DUCTS:
    - (1) MADE WITH BEADED SLEEVE JOINTS.
    - (2) DUCT SEALER APPLIED TO MALE END.
    - (3) MECHANICALLY FASTENED WITH SHEET METAL SCREWS OR POP RIVETS.
    - (4) OVER JOINT AND SCREW OR RIVET HEADS, APPLY COATING OF DUCT SEALER.
      - (a) SEAL AND TAPE AS SPECIFIED FOR RECTANGULAR DUCTWORK.
  - b. JOINTS, DUCT AND FITTING:
    - (1) SLIP PROJECTING COLLAR OF FITTINGS INTO DUCT WITH A MINIMUM INSERTION LENGTH OF 2 INCHES.
    - (2) APPLY DUCT SEALER. SEAL AND TAPE AS SPECIFIED FOR RECTANGULAR DUCTWORK.
  - c. JUNCTIONS BETWEEN DUCTS:
    - (1) BRANCH TAKE-OFF: 45 DEGREES OR
    - (2) BRANCH TAKE-OFF: CONICAL 90 DEGREES
  - d. HORIZONTAL SUPPORTS SHALL BE ONE-PIECE CLAMP BAND STRAP, MINIMUM ONE STRAP PER SECTION. SUPPORT FITTINGS AS REQUIRED BY SMACNA.
  - e. VERTICAL SUPPORTS SHALL BE ONE OF THE FOLLOWING:
    - (1) CLAMP BANDS WITH EXTENDED ENDS SUPPORTED AT EACH FLOOR.
    - (2) CLAMP BANDS WITH KNEE BRACING.
      - (a) e. USE ANGLE IRON BRACES FOR DUCT REINFORCING. REFER TO THE SMACNA HVAC DUCT CONSTRUCTION STANDARDS, METAL AND FLEXIBLE, 3RD EDITION, 2005, FIGURE NUMBERS 1-9 THROUGH 1-12.

5. FLEXIBLE DUCT:
- a. PROVIDE CONTINUOUS, SINGLE PIECES.
  - b. MAXIMUM LENGTH:
    - (1) ABOVE 1 INCH WATER GAUGE STATIC PRESSURE: 12 INCHES OR AS SPECIFIED.
    - (2) UNDER 1 INCH WATER GAUGE STATIC PRESSURE: 6 FEET.
    - (3) LOCAL CODES OR UNION RULES TAKE PRECEDENCE AND MAY REDUCE THE MAXIMUM LENGTHS SPECIFIED.
  - c. END CONNECTIONS:
    - (1) CONNECT TO DUCT COLLARS, TERMINAL UNIT CONNECTIONS AND ROUND AIR OUTLETS PER MANUFACTURER'S INSTRUCTIONS.
    - (2) SECURE WITH STRAP CLAMPS SPECIFIED ABOVE.
  - d. INSTALLATION:
    - (1) SUPPORT PER SMACNA.
    - (2) FLEXIBLE DUCT IS NOT ALLOWED IN LENGTHS GREATER THAN THAT SPECIFIED. BENDS, TWISTS OR SAGGING OF FLEXIBLE DUCT IS NOT ACCEPTABLE.
    - (3) MINIMUM INSIDE BENDING RADIUS SHALL BE A MINIMUM OF TWO DUCT DIAMETERS. IF MINIMUM RADIUS CANNOT BE MAINTAINED, PROVIDE SHEET METAL PLENUM OVER AIR OUTLET AND CONNECT FLEXIBLE DUCT TO SIDE OF PLENUM. PAINT INTERIOR FLAT BACK.
    - (4) MAXIMUM - ONE 90 DEGREE TURN.
    - (5) INSTALL AS STRAIGHT AS POSSIBLE.
  - e. FLEXIBLE DUCT IS ONLY ALLOWED ABOVE LAY-IN TYPE ACCESSIBLE CEILING ONLY.

23.33.13 - DAMPERS

- A. ACCEPTABLE MANUFACTURERS:
- 1. STATIC AND DYNAMIC FIRE DAMPERS: RUSKIN DIBD2 STYLE B, IBD2 STYLE B, OR APPROVED EQUAL BY AIR BALANCE, AWW, POTTORFF, GREENHECK.
  - 2. COMBINATION FIRE/SMOKE DAMPERS: RUSKIN FSD69, FSD69-3 (3 HOUR), FSD 37, FSDR25 (ROUND) OR APPROVED EQUAL BY AIR BALANCE OR POTTORFF.
  - 3. ACTUATORS: BELIMO FSNF120, FSNF24, HONEYWELL ML4115, ML8115, OR EQUAL.
  - 4. REMOTELY ADJUSTABLE OPERATORS WITH BALANCING DAMPERS:
    - a. REMOTE ADJUSTABLE OPERATOR SHALL BE YOUNG REGULATOR MODEL NUMBER 270-896 WITH 'C' BRACKET.
    - b. RECTANGULAR BALANCING DAMPER SHALL BE YOUNG REGULATOR MODEL NUMBER 830ACC FOR EXTERNAL CONTROL OR MODEL NUMBER 830ACC-2 FOR INTERNALLY CONTROLLED APPLICATIONS.
    - c. ROUND BALANCING DAMPER SHALL BE YOUNG REGULATOR MODEL NUMBER 5020CC FOR EXTERNAL CONTROL OR MODEL NUMBER 5020CC-2 FOR INTERNALLY CONTROLLED APPLICATIONS.
- B. FIRE DAMPERS:
- 1. PROVIDE STATIC AND DYNAMIC FIRE DAMPERS IN DUCTS PENETRATING FIRE RATED WALLS, FLOORS, AND CEILING AS REQUIRED BY NFPA, LOCAL CODES AND AUTHORITIES REGARDLESS IF SHOWN OR NOT SHOWN ON THE DRAWINGS. DAMPERS SHALL BE FACTORY MARKED FOR STATIC OR DYNAMIC USE.
  - 2. PROVIDE CONVENIENTLY LOCATED ACCESS DOORS, OR AMPLE SIZE FOR RESETTING THE DAMPERS. DUCT MOUNTED GRILLES, REGISTERS OR DIFFUSERS CAN BE USED FOR ACCESS AS LONG AS SUCH ACCESS IS READILY AVAILABLE AS DETERMINED BY THE ARCHITECT.
  - 3. INTEGRAL SLEEVE FRAME SHALL BE MINIMUM 20 GAUGE ROLL FORMED, GALVANIZED STEEL, COMPLY WITH MANUFACTURER'S INSTALLATION INSTRUCTIONS AND SHEET METAL AND AIR CONDITIONING CONTRACTORS NATIONAL ASSOCIATION (SMACNA) DETAILS.
  - 4. DAMPERS SHALL BE SPRING-LOADED WITH SHUTTER STORED OUT OF THE AIRSTREAM TO PROVIDE MINIMUM 95 PERCENT FREE AREA.
  - 5. DYNAMIC RATED FIRE DAMPERS SHALL BE LABELED IN ACCORDANCE WITH UL 555. STATIC FIRE DAMPERS SHALL BE LABELED IN ACCORD WITH UL 555.
  - 6. DAMPERS SHALL BE ACTUATED BY UL-APPROVED FUSIBLE LINK. UPON OPERATION OF THE LINK, THE DAMPERS SHALL CLOSE AUTOMATICALLY AND REMAIN TIGHTLY CLOSED. FUSIBLE LINKS SHALL OPERATE APPROXIMATELY 50 DEGREES F ABOVE THE MAXIMUM TEMPERATURE THE DUCT SYSTEM WILL ENCOUNTER UNDER NORMAL OPERATION, BUT NOT LESS THAN 165 DEGREES F.
  - 7. DAMPERS SHALL BE OF TYPES ACCEPTABLE TO THE LOCAL AUTHORITIES, OWNER AND ARCHITECT.
- C. COMBINATION FIRE/SMOKE DAMPERS:
- 1. PROVIDE DAMPERS OF SIZE AND LOCATION AS INDICATED ON THE DRAWINGS AND AS SPECIFIED.
  - 2. EACH DAMPER SHALL BE CLASSIFIED BY UNDERWRITERS LABORATORIES AS A LEAKAGE RATED DAMPER FOR USE IN SMOKE CONTROL SYSTEMS UNDER THE LATEST VERSION OF UL555S, AND BEAR A UL LABEL ATTESTING TO SAME. THE DAMPER LEAKAGE RATING UNDER UL555S SHALL BE LEAKAGE CLASS 1 (4 CUBIC FEET PER MINUTE PER SQUARE FOOT AT 1 INCH WATER GAUGE).
  - 3. IN ADDITION TO THE LEAKAGE RATINGS ALREADY SPECIFIED HEREIN, THE DAMPERS AND THEIR ACTUATORS SHALL BE QUALIFIED UNDER UL555S TO AN ELEVATED TEMPERATURE OF 250°F, 350°F, OR 450°F DEPENDING UPON THE ACTUATOR. APPROPRIATE LISTED ELECTRONIC ACTUATORS SHALL BE INSTALLED BY THE DAMPER MANUFACTURER AT TIME OF DAMPER FABRICATION.

- G. FLEXIBLE DUCTS:
- 1. GENERAL:
    - a. USE ONLY WHERE INDICATED
    - b. UL 181, CLASS 1 AIR DUCT
    - c. LABELED FOR COMPLIANCE WITH UMC
    - d. WITH POLYMERIC LINER
    - e. DO NOT USE ON EXHAUST SYSTEMS
  - 2. STATIC PRESSURE CLASS UP TO 1 INCH W.G.:
    - a. INSULATED FLEXIBLE DUCT:
      - (1) MAXIMUM WORKING PRESSURE 1.0 INCHES W.G.
      - (2) NOMINAL 1 INCH INSULATION WITH VAPOR BARRIER.
      - (3) MAXIMUM THERMAL CONDUCTIVITY 0.27 BTU/HSQ. FT. °FIN AT 75°F.
      - (4) SIMILAR TO THERMAFLEX M-KE.
    - b. USE DOWNSTREAM OF VAV BOXES OR AT DISTRIBUTION DEVICES IN A CONSTANT VOLUME SYSTEM.
    - c. MAXIMUM LENGTH 6 FEET.
  - 3. FACTORY INSTALLED COLLAR.
  - 4. FLEXIBLE DUCTWORK CLAMPS:
    - a. STRAPS APPROVED FOR USE WITH FLEXIBLE DUCTWORK.
    - b. STAINLESS STEEL STRAP.
    - c. ADJUSTABLE SCREW TYPE.
    - d. SIMILAR TO IDEAL.

- H. ACCESS DOORS:
- 1. IN ACCORDANCE WITH SMACNA - DUCT CONSTRUCTION STANDARDS, METAL AND FLEXIBLE, 3RD EDITION, 2005, EXCEPT AS NOTED.
  - 2. IN DUCTWORK:
    - a. INSULATED OR NON-INSULATED, SAME AS DUCT.
    - b. HINGED, EXCEPT WHERE SLIDING OR REMOVABLE TYPE REQUIRED. LATCH, EQUAL TO VENTLOK NO. 100.
    - c. SIZE:
      - (1) 20 INCHES X 14 INCHES.
      - (2) DUCTS LESS THAN 16 INCHES: ONE DIMENSION 20 INCHES, OTHER DIMENSION 2 INCHES LESS THAN DUCT WIDTH.
      - (3) LARGER SIZES WHERE REQUIRED FOR ACCESS.
    - d. PROVIDE IN FOLLOWING LOCATIONS:
      - (1) COILS IN DUCTS: ENTERING AND LEAVING SIDE.
      - (2) AUTOMATIC DAMPERS: LINKAGE SIDE.
      - (3) BALANCING DAMPERS AND BACKDRAFT DAMPERS
      - (4) FIRE DAMPERS, SMOKE DAMPERS AND COMBINATION FIRE SMOKE DAMPERS.
      - (5) DUCT-MOUNTED SMOKE DETECTORS, SPRINKLER HEADS, HEAT DETECTORS.
      - (6) INLET AND OUTLET SIDES OF EACH IN-LINE CENTRIFUGAL AND AXIAL FAN.
      - (7) ALL CONTROLS, SENSING, PROCESSING, TRANSMITTING AND ACTUATING DEVICES
    - e. MAKE COMPLETELY ACCESSIBLE. PROVIDE PERMANENT LABEL ON ALL ACCESS DOORS IDENTIFYING THE CONCEALED COMPONENTS AS SPECIFIED ABOVE.

- I. DUCTWORK INSTALLATION:
- 1. GENERAL:
    - a. DUCT DIMENSIONS INDICATED ARE NET, INSIDE, CLEAR, DIMENSIONS:
      - (1) FOR INTERNALLY LINED DUCTS, ADD LINING THICKNESS TO DETERMINE METAL DUCT FOR DIMENSIONS.
    - b. AT EXPOSED DUCT PENETRATIONS OF WALLS, FLOORS AND CEILING, PROVIDE SHEET METAL ANGLE TYPE ESCUTCHEONS.
    - c. TRANSITIONS:
      - (1) PITCH SIDES OF DUCT IN "DIVERGING" OR "CONVERGING" AIRFLOW MAXIMUM OF 15 INCLUDING ANGLE.
    - d. DUCT OPENINGS:
      - (1) PROVIDE OPENINGS WHERE REQUIRED TO ACCOMMODATE THERMOMETERS, SMOKE DETECTORS, CONTROLLERS, ETC.
        - (a) INSERT THROUGH AIRTIGHT RUBBER GROMMETS.
      - (2) AT FIRE DAMPERS ALLOW ADEQUATE LENGTH OF DUCT TO INSTALL ACCESS DOOR.
    - e. FLEXIBLE DUCT CONNECTIONS:
      - (1) INSTALL AT:
        - (a) AT CONNECTIONS TO FANS, SOUND ATTENUATORS, FAN COILS, HEAT PUMPS, AIR CONDITIONING UNITS AND ALL AIR HANDLING EQUIPMENT AS INDICATED ON DRAWINGS.
    - f. VOLUME DAMPERS:
      - (1) INSTALL DAMPERS WHERE SPECIFIED.
      - (2) INSTALL DAMPER IN BRANCH DUCT FOR EVERY DIFFUSER AT ACCESSIBLE LOCATION MOST REMOTE FROM DIFFUSER.
      - (3) INSTALL CABLE OPERATED VOLUME DAMPERS FOR ALL INACCESSIBLE LOCATIONS.
  - 2. RECTANGULAR DUCT JOINTS:
    - a. STANDING SEAMS, EXCEPT WHERE FLUSH DRIVE SLIP SEAM CALLED FOR.
    - b. USE FLUSH, DRIVE-SLIP, FOR:
      - (1) EXPOSED DUCTS.
      - (2) WHERE REQUIRED FOR CLEARANCE.
    - c. "DUCTMATE" SYSTEM JOINTS, MAY BE USED IN LIEU OF STANDING SEAMS. PLASTIC CLIPS ARE NOT ALLOWED.
  - 3. JOINT SEALING:
    - a. SEAL ALL TRANSVERSE, LONGITUDINAL AND SPIRAL JOINTS OF ALL SHEET METAL DUCTS BY ONE OF FOLLOWING METHODS:
      - (1) SIX OUNCE CANVAS STRIP, SIX INCHES WIDE.
        - (a) ADHERE WITH LAGGING ADHESIVE. HARDCAST TWO PART II DUCT SEALING SYSTEM: DT-5400 TAPE WITH RTA-90 SEALANT. DUCT TAPE NOT ALLOWED.
      - b. SEAL PUNCHED HOLES AND CORNER CRACKS. DUCT TAPE ATTESTING TO SAME.
      - c. AFTER INSTALLATION AND TESTING RESEAL JOINTS FOUND TO BE LEAKING.

3. FLEXIBLE CONNECTIONS:
- a. FLEXIBLE CONNECTIONS SHALL BE USED WHERE DUCTWORK CONNECTS TO ROTATING, VIBRATING OR NOISE PRODUCING MACHINERY. CONNECTORS SHALL BE ATTACHED IN SUCH A MANNER TO PROVIDE AN AIRTIGHT AND WATERPROOF SEAL.
  - b. WITH METAL EDGES AT EACH END:
    - (1) NO. 24 USSG GALVANIZED STEEL.
  - c. 2 INCH SLACK IN FABRIC.
  - d. INSTALL TO ALLOW MINIMUM MOVEMENT OF 1 INCH.
  - e. LENGTH OF FABRIC CONNECTIONS:
    - (1) MINIMUM: 4 INCHES.
    - (2) MAXIMUM: 10 INCHES.
  - f. MATERIALS:
    - (1) INDOOR INSTALLATIONS SHALL BE A UL LISTED, FIRE RETARDANT NEOPRENE OR VINYL COATED WOVEN FIBERGLASS FABRIC. MINIMUM DENSITY 30 OUNCES PER SQUARE YARD AND RATED TO 200°F.
    - (2) OUTDOOR INSTALLATIONS SHALL BE A UL LISTED ULTRA VIOLET LIGHT RESISTANT HYPALON COATED WOVEN FIBERGLASS FABRIC. MINIMUM DENSITY 24 OUNCES PER SQUARE YARD AND RATED TO 250°F.
    - (3) FLAME SPREAD RATING: 25 MAXIMUM, SMOKE DEVELOPED RATING: 50 MAXIMUM
    - (4) INSULATED CONNECTIONS:
      - (a) TWO LAYERS OF FABRIC WITH 1/4 INCH THICK FIBERGLASS, 1.5 POUND DENSITY.
      - (b) PERFORMANCE AS PREVIOUSLY SPECIFIED IN 3-F-(2).
    - (5) PROVIDE WIRE EMBEDDED UNCOATED GLASS FABRIC WITH SEWN SEAMS FOR AIR TEMPERATURE OVER 150°F.

4. TURNING VANES:
- a. GALVANIZED STEEL DUCTWORK: GALVANIZED STEEL OR PAINTED BLACK STEEL, EXCEPT AS NOTED.
  - b. OTHER DUCTWORK: SAME MATERIAL AS DUCTWORK.
  - c. CONSTRUCTION SHALL MEET OR EXCEED SMACNA "HVAC DUCT CONSTRUCTION STANDARDS".
    - (1) USE OF SINGLE WALL VANES WITH 1/4 INCH TRAILING EDGE SHALL BE LIMITED TO MAXIMUM AIR VELOCITY OF 2,000 FEET PER MINUTE AND A MAXIMUM DUCT DIMENSION OF 18 INCHES.
    - (2) DOUBLE WALL VANES SHALL BE USED IN DUCTS WHERE AIR VELOCITY EXCEEDS 2,000 FEET PER MINUTE, OR ANY DUCT WITH A DIMENSION OVER 18 INCHES.
    - (3) VANE LENGTH: PROVIDE SEPARATE EQUAL-SIZE SECTIONS FOR VANE LENGTH GREATER THAN THOSE PREVIOUSLY INDICATED IN PARAGRAPH 1.03. REFERENCED STANDARDS.
    - (4) VANE RUNNERS: SMACNA TYPE 1 OR 2 ACCEPTABLE.
    - (5) TAB SPACING SHALL BE AS SPECIFIED IN FIGURE 2-3 OF THE SMACNA MANUAL, HVAC DUCT CONSTRUCTION STANDARDS, METAL AND FLEXIBLE, 3RD EDITION, 2005. RAIL SYSTEMS WITH NON-STANDARD TAB SPACING SHALL NOT BE ACCEPTED.

5. ROUND DUCT TAKE-OFF FITTINGS:
- a. FACTORY-FABRICATED SPIN-IN FITTING.
  - b. DIE-FORMED GALVANIZED STEEL.
  - c. PRESSURE RATINGS:
    - (1) STANDARD CONSTRUCTION - UP TO 1/2 INCH STATIC PRESSURE.
  - d. BALANCING DAMPER:
    - (1) LOCKING REGULATOR.
- F. ROUND AND OVAL DUCTWORK:
- 1. GENERAL:
    - a. FACTORY-FABRICATED SPIRAL LOCKSEAM DUCT, EXCEPT AS OTHERWISE INDICATED.
    - b. FACTORY-FABRICATED LONGITUDINAL SEAM ACCEPTABLE FOR DUCTS LARGER THAN STANDARD FACTORY SIZES.
    - c. FACTORY-FABRICATED FITTINGS:
      - (1) SAME MANUFACTURER AS DUCT AND AS DETAILED.
      - (2) SAME MATERIAL AND CONSTRUCTION AS DUCT IN WHICH INSTALLED.
      - (3) TEES: VAV BOX CONNECTION TO DUCT LOOP.
        - (a) CONICAL SADDLE TAP OR CONICAL TEE FITTING.
        - (b) CENTER-LINE TAKE-OFF, UNLESS OTHERWISE INDICATED.
        - (c) CONTINUOUSLY WELDED SEAMS.
      - (4) ELBOWS:
        - (a) STANDING SEAMS.
        - (b) MITERED ELBOWS WITH CONTINUOUSLY WELDED SEAMS:
          - (i) 2 GORES - LESS THAN 35°
          - (ii) 3 GORES - 36°F THROUGH 71°
          - (iii) 5 GORES - OVER 71°
        - (c) ADJUSTABLE ELBOWS ALLOWED DOWNSTREAM OF VARIABLE VOLUME BOXES, RETURN/EXHAUST FANS AND FAN COIL UNITS PROVIDED EACH JOINT IS SEALED.
      - (5) ALSO ACCEPTABLE:
        - (a) DIE-STAMPED RADIUS ELBOWS FOR DUCTS 8 INCHES OR SMALLER.
        - (b) MITERED ELBOWS AS SPECIFIED ABOVE FOR DUCTS LARGER THAN 8 INCHES.
    - d. NOT ACCEPTABLE:
      - (1) CORRUGATED OR FLEXIBLE METAL DUCT.
      - (2) PLEATED ELBOWS.
      - (3) ACOUSTIFLEX.
  - 2. SINGLE-WALL DUCTS:
    - a. MATERIALS OF CONSTRUCTION:
      - (1) GALVANIZED STEEL: SUPPLY AND RETURN, GENERAL AND TOILET EXHAUST DUCTS.
    - b. METAL GAUGES:
      - (1) COMPLY WITH SMACNA STANDARDS.
      - (2) COMPLY WITH NFPA 90A WHEN DUCTS TRANSVERSE THROUGH SMOKE ZONES.
    - c. SIMILAR TO UNITED MCGILL "UNI-FORM".

5. ALL SHEET METAL SHOP DRAWINGS SHALL BE DRAWN IN DOUBLE LINE INDICATING ACTUAL DIMENSIONS OF DUCTWORK, FITTINGS AND EQUIPMENT. SHOP DRAWINGS SUBMITTED WITH DUCTWORK DRAWN IN SINGLE LINE SHALL BE RETURNED WITHOUT REVIEW.
6. SHEET METAL SHOP DRAWING SHALL INDICATE, AS A MINIMUM, THE FOLLOWING DATA:
- a. DUCTWORK SIZES AND SECTION BREAKS
  - b. LOCATION OF ACOUSTICAL LINING
  - c. BOTTOM OF DUCT ELEVATIONS FOR ALL DUCTS OR OTHER SERVICES IN CONFLICT WITH DUCTWORK
  - d. DIFFUSER FACE SIZE, NECK SIZE AND AIR QUANTITY
  - e. ALL VOLUME DAMPERS
  - f. ALL AIR CONDITIONING UNITS
  - g. ALL TERMINAL UNITS
  - h. DIMENSIONED DRAWINGS SHOWING PENETRATIONS REQUIRED FOR DUCTWORK THROUGH STRUCTURAL MEMBERS, FLOOR AND ROOF SLABS, CONCRETE WALLS AND PRECAST WALLS
  - i. DUCT SUPPORT AND ATTACHMENT DETAILS
7. HVAC DESIGN DRAWINGS SHALL NOT BE SUBMITTED AS SHEET METAL SHOP DRAWINGS.
8. PRIOR TO MOUNTING OR HANGING OF MECHANICAL EQUIPMENT OR DUCTWORK, OBTAIN APPROVAL FROM ARCHITECT FOR PROPOSED METHOD OF MOUNTING PARTICULARLY IN EXISTING BUILDINGS. SUBMIT WEIGHTS AND LOCATION OF ALL MECHANICAL EQUIPMENT AND DUCTWORK TO THE ARCHITECT FOR APPROVAL WELL IN ADVANCE OF GENERAL CONSTRUCTION WORK TO ALLOW SUFFICIENT TIME FOR ANY STRUCTURAL EVALUATION, CRITIQUE AND NECESSARY REDESIGN TO ACCOMMODATE THE INSTALLATION
- D. DUCT CLASSIFICATION:
- 1. DUCT CLASSIFICATION IS BASED ON PRESSURE CLASSIFICATION AS SCHEDULED IN TABLE 1-1 AND AS DESCRIBED IN THE 2005 SMACNA HVAC DUCT CONSTRUCTION STANDARDS (METAL AND FLEXIBLE), COMPLY WITH NFPA 90A WHEN DUCTS TRAVERSE THROUGH SMOKE ZONES. COMPLY WITH UBCLUMC WHEN MORE STRINGENT THAN NFPA 90A OR SMACNA STANDARDS.
  - 2. LONGITUDINAL SEAMS: PITTSBURGH LOCK SHALL BE USED ON ALL LONGITUDINAL SEAMS. SNAP-LOCK OR BUTTON PUNCH SEAMS ARE NOT ACCEPTABLE. IF SMACNA SEAL CLASS A OR B IS SPECIFIED, THE LONGITUDINAL SEAM SHALL BE SEALED FROM THE INSIDE.
  - 3. MINIMUM OPERATING PRESSURE FOR EACH DUCT SYSTEM:
    - a. SCHEDULED EXTERNAL STATIC PRESSURE FOR EACH FAN OR HVAC UNIT, POSITIVE OR NEGATIVE.
    - b. ADJUST UPWARD TO NEAREST PRESSURE CLASS TABULATED IN SMACNA HVAC DUCT CONSTRUCTION STANDARDS.
  - 4. DUCT CLASSIFICATION IS APPLICABLE TO ALL DUCTWORK, INCLUDING BUT NOT LIMITED TO THE FOLLOWING:
    - a. CONSTANT VOLUME SUPPLY AIR SYSTEMS COMPLETE FROM FAN DISCHARGE TO AIR OUTLETS (+1" W.G.).
    - b. OUTSIDE AIR SUPPLY SYSTEMS (+1" W.G.).
    - c. FLEXIBLE DUCTS (+1" W.G.).
    - d. RELIEF, RETURN AND EXHAUST SYSTEMS (-2" W.G.).
- E. MATERIALS:
- 1. SHEET METAL:
    - a. STEEL SHEETS:
      - (1) COLD ROLLED STEEL SHEETS, LOCK FORMING QUALITY.
      - (2) MEETING ASTM A653 AND A-653M.
      - (3) BLACK OR GALVANIZED AS SPECIFIED.
      - (4) GALVANIZING: 0.9 OUNCES PER SQUARE FOOT BOTH SIDES.
    - b. STAINLESS STEEL SHEETS:
      - (1) ANSI TYPE 316 AS SPECIFIED.
      - (2) CONCEALED: FINISH NO. 2B OR NO. 3.
      - (3) EXPOSED: FINISH NO. 4.
  - 2. MISCELLANEOUS PRODUCTS:
    - a. DUCT SEALANTS:
      - (1) SEALING COMPOUND: SHALL BE FLEXIBLE WATER BASED ADHESIVE FOR USE IN ALL PRESSURES. SEALANT SHALL BE UV-RESISTANT, CONFORM TO ASTM E84, BE UL 723 LISTED AND MEET NFPA REQUIREMENTS FOR CLASS 1 DUCTWORK.
      - (2) GASKETS:
        - (a) CONTINUOUS, REINFORCED, INERT SELF-CONFORMING TYPE.
        - (b) 1/4" INCH THICK.
        - (c) WIDTH: TO MATCH ANGLE CONNECTION.
        - (d) DUCTMATE INDUSTRIES MODEL 440, OR EQUAL.
    - b. HARD-SETTING JOINT TAPE:
      - (1) TWO-PART TAPE:
        - (a) MINERAL IMPREGNATED WOVEN FIBER TAPE.
        - (b) IMPREGNATED WITH ACTIVATOR/ADHESIVE OF POLYVINYL ACETATE TYPE.
      - (2) UL LISTED:
        - (a) FLAME SPREAD: 10.
        - (b) SMOKE DEVELOPED: 0.
      - (3) SIMILAR TO HARDCAST.
    - c. SPRING FASTENERS: SELF-EJECTING OVAL HEAD STUD AND RECEPTACLE WITH SCREWDRIVER SLOT.
- SLIDE-ON TRANSVERSE JOINT CONNECTORS:
- (1) PREFABRICATED SLIDE-ON TRANSVERSE DUCT CONNECTORS AND COMPONENTS SHALL BE ACCEPTED. DUCTS CONSTRUCTED USING PREFABRICATED SYSTEMS SHALL REFER TO THE MANUFACTURER GUIDELINES FOR SHEET GAUGE, INTERMEDIATE REINFORCEMENT SIZE AND SPACING, AND PROPER JOINT REINFORCEMENT. DUCTMATE INDUSTRIES, WARD, NEXUS, OR APPROVED EQUAL.
  - (2) FORMED-ON FLANGES SHALL BE CONSTRUCTED AS T-25 A/B FLANGES, OF WHICH THE CONSTRUCTION GUIDELINES ARE GIVEN IN FIGURE 1-4 OF THE 1995 SMACNA HVAC DUCT CONSTRUCTION STANDARDS, METAL AND FLEXIBLE, SECOND EDITION. NO OTHER CONSTRUCTION STANDARDS PERTAINING TO FORMED-ON FLANGES SHALL BE ACCEPTED.
  - (3) FORMED-ON FLANGES SHALL INCLUDE THE USE OF CORNERS, BOLTS, CLEAT AND GASKET.
  - (4) ALL COMPONENTS SHALL BE METAL UNLESS OTHER MATERIALS ARE REQUIRED BY CODE OR SPECIFIED.



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CONSTRUCTION  
ISSUE SET

9/25/2024

PROJECT INFORMATION:  
**NEW HAVEN**  
PROJECT INFORMATION:  
**1 BROADWAY**  
**NEW HAVEN, CT 06511**

DRAWN BY: DCT Author  
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SG DM CHECKED BY:  
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PROJECT NO: XXXXXX  
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Table with 3 columns: REV., DATE, DESCRIPTION. Row 1: 1, 8/23/2024, 80% CHECK SET. Row 2: 1, 9/13/2024, CD DELIVERY. Row 3: 1, 9/25/2024, LL REVIEW. Row 4: 1, 2/12/2025, ISSUE FOR CONSTRUCTION.

MECHANICAL  
SPECIFICATIONS  
SHEET #4

M-005

- 4. EACH DAMPER SHALL BE EQUIPPED WITH INDICATION POSITION SWITCHES CONSISTING OF TWO-POSITION INDICATOR SWITCHES LINKED DIRECTLY TO THE DAMPER BLADE TO PROVIDE THE CAPABILITY OF REMOTELY INDICATING DAMPER BLADE POSITION.
5. HEAT-ACTUATED TEMPERATURE RELEASE DEVICE:
a. CONTROL CLOSE AND LOCK DAMPER DURING TEST, SMOKE DETECTION, POWER FAILURE, OR FIRE CONDITIONS THROUGH ACTUATOR CLOSURE SPRING. AT NO TIME SHALL ACTUATOR DISENGAGE FROM DAMPER BLADES.
b. ALLOW DAMPER TO BE AUTOMATICALLY AND REMOTELY RESETTABLE AFTER TEST, SMOKE DETECTION, OR POWER FAILURE CONDITIONS. AFTER EXPOSURE TO HIGH TEMPERATURE OR FIRE, INSPECT DAMPER BEFORE RESET TO ENSURE PROPER OPERATION.
c. CONTROLLED CLOSURE AND LOCKING OF DAMPER SHALL OCCUR IN 5 TO 15 SECONDS TO ALLOW DUCT PRESSURE TO EQUALIZE. INSTANTANEOUS CLOSURE IS NOT ACCEPTABLE.
d. ELECTRIC FUSE LINK (EFL) WITH ELECTRIC ACTUATORS.
e. RELEASE TEMPERATURES: 165 DEGREES F.
6. COMBINATION FIRE/SMOKE DAMPER ACTUATORS SHALL BE POWERED BY A 24 VOLT AC SIGNAL FROM DIVISION 26.
D. ACTUATORS:
1. ACTUATOR MOTOR SHALL BE SILENT MICROPROCESSOR-CONTROLLED PROVIDING ELECTRONIC CUT-OFF.
2. MOTOR SHALL BE DIRECT-COUPLED AND INCAPABLE OF BURNING OUT IF STALLED BEFORE FULL ROTATION IS REACHED.
3. HOUSING, GEARS AND TOOTHED COLD-WELD CLAMP SHALL BE STEEL.
4. OPERATION TIME: 5 TO 15 SECONDS AT 32 TO 350 DEGREES F.
E. ACCESSORIES FOR DAMPERS:
1. INTERLOCK SWITCH: ELECTRICALLY AND MECHANICALLY LOCK DAMPER IN CLOSED POSITION WHEN DUCT TEMPERATURES EXCEED 165 DEGREES F AND STILL ALLOW APPROPRIATE AUTHORITY TO OVERRIDE INTERLOCK SWITCH AND OPERATE DAMPER AS MAY BE REQUIRED FOR SMOKE MANAGEMENT FUNCTIONS. ALLOW DAMPER TO REMAIN OPERABLE WHILE TEMPERATURE IS BELOW 350 DEGREES F. SWITCH SHALL COMPLY WITH NFPA 92A AND BE UL CLASSIFIED.
2. INTERFACE WITH SMOKE DETECTORS, BUILDING FIRE ALARM SYSTEMS OR REMOTE INDICATING AND CONTROL STATIONS.
3. HIGH-LIMIT TEMPERATURE SENSOR:
a. RETURNS DAMPER TO FIRE PROTECTION MODE WHEN TEMPERATURES REACH OPERATIONAL LIMIT OF DAMPER AND ACTUATOR ASSEMBLY OF 350 DEGREES F.
b. CONFORMS TO NFPA 92A.
c. REPLACES CONTROLLED CLOSURE DEVICES ON STANDARD DAMPERS.
4. BLADE POSITION INDICATOR SWITCHES: TWO POSITION-INDICATOR SWITCHES LINKED DIRECTLY TO DAMPER BLADE TO REMOTELY INDICATE DAMPER BLADE POSITION.
5. PICTURE FRAME MOUNTING ANGLES:
a. ONE-PIECE ROLL FORMED RETAINING ANGLES, 1.5 BY 1.5 INCHES. REQUIRES FACTORY SLEEVE.
b. FACTORY-MATCHED AND SHIPPED ON INDIVIDUAL DAMPER WITH FACTORY-PREPUNCHED SCREW HOLES.
6. STEEL MULLIONS: FOR DAMPERS IN OVERSIZED MASONRY WALL OPENINGS.
7. PROVIDE BREAKAWAY CONNECTION: DRIVEMATE, DUCTMATE OR EQUAL.
F. BALANCING DAMPERS - SINGLE BLADE:
1. PROVIDE VOLUME DAMPERS AS SPECIFIED AND/OR SHOWN ON THE DRAWINGS FOR PROPER BALANCING AND DISTRIBUTION OF AIR. IN THE VARIOUS BRANCHES OF THE DUCTWORK FOR USE IN TESTING AND BALANCING THE SYSTEM. DAMPERS SHALL BE INSTALLED SEPARATE AND INDEPENDENT FROM THE DAMPER SPECIFIED TO BE SET BEHIND SUPPLY, RETURN AND EXHAUST AIR GRILLES. PROVIDE SINGLE BLADE DAMPERS IN DUCTS 24 INCHES IN WIDTH OR LESS, OR 12 INCHES IN HEIGHT OR LESS. PROVIDE MULTIPLE BLADE DAMPERS FOR ALL OTHER DUCT SIZES. COORDINATE WITH THE AIR BALANCING CONTRACTOR AND PROVIDE ADDITIONAL DAMPERS REQUIRED FOR PROPER AIR BALANCE.
G. REMOTE CABLE CONTROLS FOR BALANCING DAMPERS:
1. MANUFACTURER SHALL SUPPLY ALL NECESSARY HARDWARE FOR SIMPLE INSTALLATION OF REMOTE CABLE CONTROLS SYSTEM INCLUDING THE BOWDEN ALUMINUM ALLOY BRACKET AND THE BOWDEN CONTROL HUB TO ACCOMMODATE THE CABLE CONTROL SYSTEM MOUNTED ON THE DAMPER.
2. CABLE CONTROL SYSTEM SHALL CONSIST OF BOWDEN CABLE 0.054 INCH STAINLESS STEEL CONTROL WIRE ENCAPSULATED IN 3/16 INCH FLEXIBLE GALVANIZED SPIRAL WIRE SHEATH TO INSURE POSITIVE OPERATION FOR UP TO 50 FEET (CAN BE REDUCED IF THERE ARE MULTIPLE TURNS OR BENDS).
3. CONTROL KIT SHALL BE DESIGNED FOR USE WITH INTERNALLY OR EXTERNALLY CONTROLLED ROUND OR RECTANGULAR DAMPERS AND SHALL CONSIST OF 14 GAUGE STEEL RACK AND PINION GEAR DRIVE TO CONVERT ROTARY MOTION TO PUSH-PULL MOTION. CONTROL SHAFT SHALL BE D-STYLE FLATTENED WITH 265 DEGREE ROTATION PROVIDING GRADUATIONS FOR POSITIVE LOCKING CONTROL AND LINEAR TRAVEL.
4. CONTROL MOUNTING OPTIONS INCLUDE CEILING FRAMEWORK, BEHIND GRILLES, ON OR INSIDE PLENUM SLOT DIFFUSERS AND OTHER VARIOUS TYPES OF DIFFUSERS OR THROUGH CEILING VIA 1 INCH DIAMETER INCONSPICUOUS ACCESS PORT. TWISTING TYPE CABLES ARE NOT ACCEPTABLE.
5. MANUAL QUADRANT SHALL BE COMMERCIAL QUALITY, LOCKING TYPE FOR 1/2-INCH SQUARE SHAFT. PROVIDE EXTENDED BASE FOR EXTERNALLY INSULATED DUCTWORK.
23 33 19 - ACoustics
A. GENERAL:
1. NOISE LEVELS, GENERATED BY EQUIPMENT AND DUCTWORK, SHALL BE ATTENUATED TO PERMIT ATTAINMENT OF SOUND PRESSURE LEVELS IN ALL 8 OCTAVE BANDS IN OCCUPIED SPACES THAT CONFORM TO THE FOLLOWING NOISE CRITERIA (NC) CURVES:
a. ALL SPACES: NC 25-30
B. ACCEPTABLE MANUFACTURERS:
1. SOUND LININGS: CERTAINTEED TOUGHGUARD, SCHULLER, OWENS-CORNING FIBERGLAS
C. DUCT LINING:
1. FIBER GLASS DUCT LINER DOWNSTREAM OF TERMINAL UNITS AND FAN COILS SHALL BE FINISHED WITH A NEOPRENE COATED FACING, STENOLED NFPA 90.
2. 1.5 IN. W.G. PRESSURE DUCT LINER SHALL BE FINISHED WITH PERFORATED 24 GAUGE GALVANIZED SHEET METAL, 28% MINIMUM OPEN AREA OR FOIL FACING.
3. THICKNESS:
a. IN DUCTWORK: MINIMUM 1 INCH, 1 1/2 POUNDS PER CUBIC FOOT DENSITY MATTE-FACED UNLESS OTHERWISE NOTED ON DRAWINGS OR SPECIFICATIONS.
b. LINEAR DIFFUSER SUPPLY PLENUMS: MINIMUM 1/2 INCH, 1 1/2 POUND DENSITY.
4. FLAMESPREAD SHALL BE MAXIMUM 25 FUEL CONTRIBUTED AND SMOKE DEVELOPED SHALL BE MAXIMUM 50.
5. WHERE DUCT LINER IS APPLIED, INSULATION IS NOT REQUIRED.
6. MINIMUM SOUND-ABSORPTION COEFFICIENTS (ASTM C423 MOUNTING TYPE A) FOR SOUND-ABSORBING DUCT LINING MATERIAL WHEN TESTED WHILE MOUNTED PER ASTM E795:

- a. 1/2" THICKNESS: 0.45 NRC
b. 1" THICKNESS: 0.70 NRC
c. 1.5" THICKNESS: 0.85 NRC
d. 2" THICKNESS: 0.95 NRC
7. DYNAMIC LOSS COEFFICIENT: MAXIMUM 1.2.
8. K FACTOR: MAXIMUM 0.23 BTU/INCH-HOUR - DEGREE FAHRENHEIT - SQUARE FOOT, R VALUE MINIMUM 4.2 AT 1" THICKNESS.
D. INSTALLATION OF SOUND-LININGS:
7. ADHERE WITH 6 INCH WIDE STRIPS OF ADHESIVE AT 12 INCH CENTERS AT ALL JOINTS IN LINING.
8. IN ADDITION, SECURE WITH WELD PINS AND 2 INCH DIAMETER WASHERS ON MAXIMUM 16 INCH CENTERS AND IN COMPLIANCE WITH SMACNA STANDARDS.
9. COAT ALL EDGES WITH SEALER.
10. PROVIDE CONTINUOUS SHEETMETAL EDGE PROTECTION NOSINGS AT ENTERING EDGES OF LINED DUCT SECTIONS AND ALL JOINTS.
11. DIMENSIONS OF LINED DUCTWORK ARE CLEAR INSIDE DIMENSIONS AFTER LINING HAS BEEN INSTALLED.
12. EXTENT OF DUCTWORK SOUND-LININGS:
a. EXHAUST SYSTEMS: UPSTREAM AND DOWNSTREAM OF EXHAUST FANS: MINIMUM TEN (10) FEET.
b. DUCTWORK DOWNSTREAM OF HEAT PUMPS, AC UNITS OR FAN-POWERED TERMINAL UNITS: MINIMUM TEN (10) FEET. BRANCH TAKEOFFS TO DIFFUSERS ARE NOT ALLOWED WITHIN FIVE (5) FEET FROM DISCHARGE OUTLET.
7. ALL TRANSFER DUCTS.
8. ALL LINEAR DIFFUSER SUPPLY PLENUMS.
23 34 00 - FANS
A. ACCEPTABLE MANUFACTURERS:
1. CENTRIFUGAL FANS: TWIN CITY, CHICAGO, HOWDEN, LOREN COOK, GREENHECK
2. CABINET FANS: PENN, PANASONIC, GREENHECK
B. GENERAL - ALL FANS:
1. PROVIDE FANS THAT ARE QUIET OPERATING AND NON-OVERLOADING THE ENTIRE RANGE OF OPERATION.
2. STATICALLY AND DYNAMICALLY BALANCE FAN WHEELS/IMPELLERS AT THE FACTORY AND CERTIFY BALANCE.
3. PROVIDE PRECISION SELF-ALIGNING BEARINGS DESIGNED TO PREVENT LEAKAGE OF OIL OR GREASE. PROVIDE CUPS, OIL CHAMBERS, ZERK OR ALEMITIC LUBRICATION FITTINGS IN ACCESSIBLE LOCATIONS FOR EASE OF LUBRICATION.
4. PROVIDE COPPER LUBRICATION LEADS, FOR LUBRICATION OF INTERNAL MOTORS AND BEARINGS, EXTENDING TO A CAPPED TERMINATION POINT EXTERNAL TO THE FAN CASING OR AIR HANDLING UNIT.
5. EXTEND WIRE LEADS ON FANS DRIVEN BY DIRECT MOTOR DRIVE FROM THE MOTOR JUNCTION BOX IN AIR TIGHT RIGID WALLED CONDUIT, TO A JUNCTION BOX MOUNTED EXTERNAL TO THE FAN CASING.
6. ON FANS DRIVEN BY BELT DRIVE PROVIDE STANDARD "V-GROOVE" TYPE BELTS AND SHEAVES SUITABLE FOR THE SERVICE INTENDED. FAN SHEAVES ARE NON-ADJUSTABLE TYPE WITH REMOVABLE MACHINED BUSHINGS. PROVIDE ADJUSTABLE PITCH TYPE WITH REMOVABLE MACHINED BUSHINGS. PROVIDE ADJUSTABLE PITCH TYPE MOTOR SHEAVES WITH DOUBLE LOCKING FEATURE, TO 10% ABOVE AND BELOW THE RATED FAN SPEED. DYNAMICALLY BALANCE SHEAVES WITH OVER THREE GROOVES. PROVIDE AT LEAST TWO BELTS AND SHEAVES EACH CAPABLE OF CARRYING THE ENTIRE LOAD WITH ONE BELT BROKEN.
7. PROVIDE PERFORMED EXPANDED METAL OR SHEET METAL BELT GUARDS, WITH GROMMETTED TACHOMETER PORTS AT THE FAN AND MOTOR SHAFTS, FOR ALL EXPOSED SHEAVES AND BELTS. BELT GUARD SHALL COMPLY WITH OSHA REQUIREMENTS AND BE EASILY REMOVABLE.
8. CONSTRUCT WHEELS/IMPELLERS EXPOSED TO NORMAL ATMOSPHERES OF CAST ALUMINUM OR HOT DIP GALVANIZED STEEL AND FINISHED WITH TWO LAYERS OF FACTORY APPLIED NON-SCALING PAINT.
9. ELECTRICALLY GROUND ALL FANS AND DRIVES TO PREVENT ACCUMULATION OF STATIC CHARGE. INDICATE GROUNDING METHOD IN FAN SUBMITTALS.
10. PROVIDED THREADED DRAIN PLUGS AT FAN HOUSING LOW POINTS.
11. FAN WHEELS/IMPELLERS AND HOUSINGS SHALL BE RELIEVED OF RESIDUAL STRESSES PRODUCED IN THE FORMING PROCESS.
12. PROVIDE HOUSINGS WITH INTEGRAL INLET AND DISCHARGE FLANGES, COMPLETE WITH BOLT HOLES FOR FLEXIBLE OR HARD DUCT CONNECTIONS. SHOP FABRICATE ANY COMPANION FLANGES REQUIRED FOR CONNECTIONS TO SOUND ATTENUATORS. COMPANION FLANGES SHALL BE ROLLED ANGLES MATCHED TO BOTH FAN HOUSING AND SOUND ATTENUATORS.
C. ROOF EXHAUST FANS:
1. PROVIDE ROOF EXHAUST FANS OF THE CENTRIFUGAL, BELT-DRIVEN TYPE. CONSTRUCT FAN HOUSING OF HEAVY-GAUGE ALUMINUM.
2. CONSTRUCT ALL SPUN PARTS WITH A ROLLED BEAD FOR ADDED RIGIDITY AND SPUN SO AS TO SEAL THE PORES OF THE ALUMINUM PROVIDING GREATER RESISTANCE AGAINST OXIDATION AND DETERIORATION.
3. PROVIDE ALL-ALUMINUM FAN WHEEL OF THE CENTRIFUGAL BLOWER TYPE WITH BACKWARD INCLINED BLADES AND A TAPERED INLET SHROUD. STATICALLY AND DYNAMICALLY BALANCE WHEELS.
4. PROVIDE INLET CONE OF ALUMINUM CENTRIFUGAL BLOWER TYPE.
5. ENCLOSE MOTOR AND DRIVES IN A WEATHER-TIGHT COMPARTMENT SEPARATE FROM AIRSTREAM AND EXTEND MOTOR LEADS IN METAL CONDUIT DOWN THROUGH SUPPORT BASE TO FACILITATE WIRING FROM BELOW ROOF. AIR-COOL THE MOTOR USING AIR UNCONTAMINATED BY EXHAUST Fumes.
6. PROVIDE MOTORS OF THE HEAVY DUTY, PERMANENTLY LUBRICATED, SEALED BALL BEARING TYPE. SIZE DRIVES FOR 150 PERCENT OF MOTOR HORSEPOWER CAPABILITIES AND OF THE CAST IRON TYPE, KEYS TO THE FAN AND MOTOR SHAFTS. PROVIDE VARIABLE PITCH DRIVES, WITH A MINIMUM OF 2 BELTS.
7. CONSTRUCT FAN SHAFT OF STEEL CONSTRUCTION, TURNED, GROUND AND POLISHED TO PRECISE TOLERANCES IN RELATIONSHIP TO THE HUB AND BEARINGS.
8. PROVIDE DRIVE BELTS OF THE OIL-RESISTANT, NON-STATIC, NON-SPARKING TYPE WITH AN ABMA L10 LIFE EXPECTANCY OF MINIMUM 24,000 HOURS.
9. PROVIDE FLANGED, PERMANENTLY LUBRICATED AND SEALED BALL OR ROLLER TYPE BEARINGS.
10. THE ENTIRE DRIVE AND WHEEL ASSEMBLY SHALL BE REMOVABLE AS A COMPLETE UNIT FROM THE SUPPORT STRUCTURE WITHOUT DISASSEMBLING THE EXTERNAL FAN HOUSING, THE ASSEMBLY SHALL BE HINGED ON ONE SIDE WITH FULL-LENGTH WEATHER-PROOF PIANO HINGES. MOUNT THE COMPLETE DRIVE ASSEMBLY ON RUBBER VIBRATION ISOLATION.
11. PROVIDE DIRECT DRIVE FANS OF IDENTICAL CONSTRUCTION AS BELT DRIVE FANS, EXCEPT FOR DRIVES, BELTS, AND FAN SHAFT BEARINGS.
12. CONSTRUCT ALL BELT-DRIVE FAN INTERIOR AND EXTERIOR PARTS, INCLUDING WHEEL, WHEEL HUB, SUPPORTING POSTS, FAN SHAFT, DRIVE ASSEMBLY, AND ALL OUTSIDE FASTENERS, OF ALUMINUM OR NON-FERROUS MATERIAL. INCLUDE A FIVE-YEAR WARRANTY.
D. HOUSINGS:
1. HOUSINGS SHALL BE HEAVY GAUGE ALUMINUM WITH RIGID INTERNAL SUPPORT STRUCTURE.
2. DRIVE FRAME ASSEMBLY SHALL BE OF HEAVY GAUGE STEEL AND MOUNTED ON VIBRATION ISOLATORS.
E. MOTORS:
1. MOTOR SHALL BE OPEN DRIPROOF, AC INDUCTION MOTOR WITH DISCONNECT SWITCH.

- 2. MOTOR SHALL BE ELECTRONICALLY COMMUTATED TYPE (ECM) WITH MANUAL DIAL TYPE POTENTIOMETER MOUNTED AT THE MOTOR TO CONTROL FAN MOTOR SPEED.
3. PROVIDE DISCONNECT SWITCH FOR POSITIVE SHUTOFF.
337 00 - AIR OUTLETS AND INLETS
A. ACCEPTABLE MANUFACTURERS:
1. AIR INLETS AND OUTLETS: TITUS, KRUEGER, E.H. PRICE, AIR FACTORS, AIR CONCEPTS.
2. ACCESSORIES: DAMPERS, EQUALIZING GRIDS, TURNING VANES, EXTRACTORS, PLENUMS, HARDWARE AND FRAMES SHALL BE PROVIDED BY THE SAME MANUFACTURERS AS THE AIR INLETS AND AIR OUTLETS PROVIDED.
B. GENERAL:
1. REFER TO ARCHITECTURAL DRAWINGS AND SPECIFICATIONS FOR REFLECTED CEILING PLANS, ELEVATIONS, WALL AND CEILING TYPES AND CONSTRUCTION. AIR OUTLETS AND INLETS IN FIRE RATED CEILING OR WALLS MUST BE ALL STEEL CONSTRUCTION. COORDINATE FRAME AND BORDER TYPES TO ACCOMMODATE THE WALL OR CEILING SPECIFIED OR SHOWN ON THE ARCHITECTURAL DRAWINGS.
2. ALL DAMPERS PROVIDED SHALL BE OPERABLE FROM THE FACE OF THE AIR INLET OR AIR OUTLET.
3. OUTLET TYPES:
a. SQUARE CEILING DIFFUSER, PLAQUE FACE:
(1) PROVIDE ARCHITECTURAL SQUARE PANEL CEILING DIFFUSERS, ALL-STEEL CONSTRUCTION WITH AG-75 OPPOSED BLADE VOLUME DAMPER.
(2) DIFFUSER SHALL HAVE AN 22-GAUGE STEEL FACE PANEL THAT CAPTURES A SECONDARY 22-GAUGE PANEL. THE FACE PANEL SHALL BE REMOVABLE BY MEANS OF FOUR HANGER BRACKETS. THE EXPOSED SURFACE OF THE FACE PANEL SHALL BE SMOOTH, FLAT, AND FREE OF VISIBLE FASTENERS.
(3) THE BACKPAN SHALL BE ONE PIECE PRECISION DIE-STAMPED AND SHALL INCLUDE AN INTEGRALLY DRAWN INLET. THE DIFFUSER BACKPAN SHALL BE CONSTRUCTED OF 22-GAUGE STEEL.
(4) SIZES INDICATED ON THE DRAWINGS ARE NECK SIZES.
(5) BAKED WHITE ENAMEL FINISH.
(6) TYPE CD-B, 24-INCH BY 24-INCH FACE SIZE. TITUS MODEL OMNI OR APPROVED EQUAL.
(7) TYPE CD-A, 12-INCH BY 12-INCH FACE SIZE. TITUS MODEL OMNI OR APPROVED EQUAL.
c. DOUBLE DEFLECTION SUPPLY REGISTER:
(1) ALL ALUMINUM REGISTER WITH REAR VERTICAL AND FRONT HORIZONTAL ADJUSTABLE AIR FOIL TYPE BLADES.
(2) PROVIDE MODEL AG-35-AA ALUMINUM OPPOSED BLADE VOLUME CONTROL DAMPER, MODEL AG-45 EXTRACTOR, AND TYPE PF MOUNTING FRAME.
(3) FRAMES SHALL BE 1.25 INCHES WIDE BY 0.05 INCH THICK ALUMINUM, INTERLOCKED AT THE CORNERS AND MECHANICALLY STAKED TO FORM A RIGID FRAME WITH FLUSH JOINTS AND COUNTERSUNK SCREW HOLES.
(4) ALUMINUM BLADES SHALL BE SPACED ON 0.75 INCH CENTERS AND EXTEND COMPLETELY THROUGH THE SIDE FRAME ON EACH SIDE. BLADES SHALL BE INDIVIDUALLY ADJUSTABLE WITHOUT LOOSENING OR RATTLING AND SHALL BE SECURELY HELD IN PLACE WITH PERMANENTLY SPRING TENSIONED WIRE.
(5) BAKED WHITE ENAMEL FINISH.
(6) TYPE SG-A, SG-B, TITUS MODEL 300RL OR APPROVED EQUAL.
a. COMBINATION PLENUM AND LINEAR SLOT:
(1) CONTINUOUS LINEAR SLOT DIFFUSERS SHALL FULLY INTEGRATE WITH THE CEILING SYSTEM AND BE CONSTRUCTED OF 1/16 INCH MINIMUM EXTRUDED ALUMINUM WITH CONTINUOUS BAR VOLUME AND DEFLECTION CONTROL DAMPER FOR EACH SLOT. PROVIDE CONTINUOUS 26 GAUGE STEEL PLENUMS WITH 1/2 INCH ACOUSTICAL LINING SIZED AS PER MANUFACTURER'S RECOMMENDATION ABOVE DIFFUSERS WITH SUPPLY AIR CONNECTIONS AS INDICATED ON DRAWINGS.
(2) THE SLOT DIFFUSERS SHALL HAVE PATTERN CONTROLLERS SUPPORTED WITH SPACER CHANNELS IN 48 INCH (NOMINAL) INCREMENTS THE ENTIRE LENGTH OF THE SLOT. THE PATTERN CONTROLLERS SHALL ALLOW INFINITE ADJUSTMENTS TO THE AIR STREAM AT 24 INCH INTERVALS RELATIVE TO THE DIRECTION OF THE AIR STREAM AS WELL AS EXTENDING OR REDUCING THE AIR THROW AS MAY BE REQUIRED TO SATISFY JOB CONDITIONS AND TO PROVIDE DRAFT-FREE AIR DISTRIBUTION. THE SLOT DIFFUSER SHALL MAINTAIN AIR FLOW ACROSS THE CEILING AND SHALL NOT 'DUMP' EVEN WHEN AIRFLOW IS REDUCED TO 10% OF DESIGN AIR QUANTITIES. FIXED OR BLADE TYPE PATTERN CONTROLLERS ARE NOT ACCEPTABLE.
(3) TYPE LD-A, TITUS MODEL FL20 OR APPROVED EQUAL.
4. INLET TYPES:
a. SQUARE CEILING DIFFUSER, LOUVER FACE:
(1) PROVIDE LOUVER FACE SUPPLY DIFFUSERS. ALL-STEEL CONSTRUCTION WITH AG-65 STEEL OPPOSED BLADE VOLUME CONTROL DAMPER AND ADJUSTABLE DISCHARGE PATTERN CONTROL VANES.
(2) DIFFUSER SHALL CONSIST OF AN OUTER FRAME ASSEMBLY WITH A SQUARE, RECTANGULAR OR ROUND INLET (USING A TRANSITION DUCT FITTING).
(3) PROVIDE ADJUSTABLE SINGLE ADJUSTABLE PATTERN VANES FOR FULL VERTICAL AND HORIZONTAL PROJECTIONS.
(4) SIZES INDICATED ON THE DRAWINGS ARE NECK SIZES.
(5) AIR PATTERN AS INDICATED ON THE DRAWINGS.
(6) BAKED WHITE ENAMEL FINISH.
(7) TYPE EG-A, 12-INCH BY 12-INCH FACE SIZE. TITUS MODEL 350RL OR APPROVED EQUAL.
b. SINGLE DEFLECTION RETURN REGISTER:
(1) ALL ALUMINUM REGISTER WITH FRONT HORIZONTAL ADJUSTABLE AIR FOIL TYPE BLADES.
(2) PROVIDE MODEL AG-35-AA ALUMINUM OPPOSED BLADE VOLUME CONTROL DAMPER, MODEL AG-45 EXTRACTOR, AND TYPE PF MOUNTING FRAME.
(3) FRAMES SHALL BE 1.25 INCHES WIDE BY 0.05 INCH THICK ALUMINUM, INTERLOCKED AT THE CORNERS AND MECHANICALLY STAKED TO FORM A RIGID FRAME WITH FLUSH JOINTS AND COUNTERSUNK SCREW HOLES.
(4) ALUMINUM BLADES SHALL BE SPACED ON 0.75 INCH CENTERS AND EXTEND COMPLETELY THROUGH THE SIDE FRAME ON EACH SIDE. BLADES SHALL BE INDIVIDUALLY ADJUSTABLE WITHOUT LOOSENING OR RATTLING AND SHALL BE SECURELY HELD IN PLACE WITH PERMANENTLY SPRING TENSIONED WIRE.
(5) BAKED WHITE ENAMEL FINISH.
(6) TYPE RG-A, EG-A, TITUS MODEL 350RL OR APPROVED EQUAL.
SECTION 23 51 00
BREECHINGS, CHIMNEY, AND STACKS
1.01 QUALITY ASSURANCE
A. UNITS SHALL BE UL LISTED FOR USE WITH HEATING EQUIPMENT BURNING GASEOUS, SOLID OR LIQUID FUELS THAT DO NOT EXCEED CONTINUOUS OPERATING FLUE GAS TEMPERATURE ABOVE 1,000 DEGREES F AND NOT EXCEEDING 1,400 DEGREES F UNDER INTERMITTENT CONDITIONS AS DEFINED IN NFPA 211.

- B. UNITS SHALL BE UL LISTED FOR USE WITH HEATING EQUIPMENT BURNING GASEOUS FUELS THAT DO NOT EXCEED THE REQUIREMENTS FOR TYPE B VENT AS DEFINED IN NFPA 211.
C. UNITS SHALL BE UL LISTED FOR USE WITH HEATING EQUIPMENT BURNING GASEOUS FUELS THAT DO NOT EXCEED CONTINUOUS OPERATING FLUE GAS TEMPERATURE ABOVE 550 DEGREES F AS DEFINED IN NFPA 211.
D. THE VENTING SYSTEM SHALL DEVELOP A POSITIVE FLOW ADEQUATE TO EXHAUST FLUE GASES TO THE ATMOSPHERE WITHOUT CONDENSATION WITHIN THE VENT OR FLUE GAS SPILLAGE. THE DESIGN SHALL COMPENSATE FOR THERMAL EXPANSION.
PART 2 - PRODUCTS
2.01 TYPE B GAS VENT
A. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
1. HART & COOLEY, INC.
2. DURAVENT
3. METAL-FAB, INC.
4. SELKIRK INC.
B. GENERAL: PROVIDE FACTORY-BUILT MODULAR STACK AND BREECHING SYSTEM THAT IS TESTED AND LISTED BY THE UNDERWRITERS' LABORATORIES, INC. FOR USE WITH BUILDING HEATING EQUIPMENT AND APPLIANCES.
1. STACK & BREECHING SYSTEM SHALL BE UL-441 AND NFPA-211 FOR NEUTRAL/NEGATIVE PRESSURE TESTED AND LISTED.
2. STACK & BREECHING SYSTEM DESIGN FOR HEATING EQUIPMENT AND APPLIANCES WHICH PRODUCE EXHAUSTED FLUE GASES AT A TEMPERATURE NOT EXCEEDING 480°F UNDER CONTINUOUS OPERATING CONDITIONS FOR TYPE B VENT AND A TEMPERATURE NOT EXCEEDING 550°F UNDER CONTINUOUS OPERATING CONDITIONS FOR TYPE BW VENT.
3. COMPLIANCE WITH STANDARD/SPECIFICATION SHALL BE CONFIRMED BY A STATEMENT ON THE SAFETY CERTIFICATION LABEL ATTACHED TO THE PRODUCT.
4. MANUFACTURER OF THE STACK & BREECHING SYSTEM SHALL ALSO MANUFACTURE A COMPLETE LINE OF STACK & BREECHING COMPONENTS AND ACCESSORIES REQUIRED FOR A COMPLETE AND OPERATIONAL SYSTEM.
C. CONSTRUCTION
1. DOUBLE WALL AIR SPACE INSULATED STACK AND BREECHING SECTIONS DESIGNED FOR NEUTRAL/NEGATIVE PRESSURE APPLICATIONS WITH NATURAL GAS, LP GAS & PROPANE
2. GAS VENT JOINT DESIGN FOR ASSEMBLY (INNER AND OUTER PIPES)
a. SLIP-IN SNAP-LOCK FOR VENTS 3 TO 8 INCHES
b. SLIP-IN WITH SHEET METAL SCREWS FOR VENTS 10 INCH AND LARGER. NUMBER OF SCREWS AS PER MANUFACTURER'S RECOMMENDATION EVENLY SPACED AROUND PERIMETER BUT NOT LESS THAN 6 SCREWS.
3. INNER PIPE: ASTM B 209 TYPE 1100 ALUMINUM ALLOY. INNER PIPE MATERIAL THICKNESS SHALL BE AS REQUIRED FOR THE DIAMETER OF THE STACK AND BREECHING AND THE VERTICAL STACK HEIGHT BUT IN NO CASE LESS THAN:
a. MANUFACTURER'S STANDARD MATERIAL THICKNESS SIZES 3 THRU 8 INCHES.
b. 0.016 INCHES VENT SIZES 10 THRU 14 INCHES
c. 0.020 INCHES VENT SIZES 16 THRU 24 INCHES
d. 0.025 INCHES VENT SIZES 26 INCHES AND LARGER
4. OUTER PIPE: G90 GALVANIZED STEEL WITH PIPE GROOVES JOINT CONNECTIONS. OUTER PIPE THICKNESS SHALL BE AS REQUIRED FOR THE DIAMETER OF THE STACK AND BREECHING AND THE VERTICAL STACK HEIGHT BUT IN NO CASE LESS THAN:
a. MANUFACTURER'S STANDARD MATERIAL THICKNESS SIZES 3 THRU 8 INCHES.
b. 0.021 INCHES VENT SIZES 10 THRU 16 INCHES
c. 0.027 INCHES VENT SIZES 18 INCHES AND LARGER
5. INSULATION: 1 INCH AIR SPACE FOR VENT SIZES 3 THROUGH 8 INCHES; 1/2 INCH AIR SPACE FOR SIZES 10 INCH AND GREATER.
6. HORIZONTAL BREECHING SHALL BE PROVIDED WITH CLEANOUTS AS REQUIRED BY STATE AND LOCAL CODES HAVING JURISDICTION FOR THE PROJECT.
7. MANUFACTURER SHALL PROVIDE LATERAL AND VERTICAL SUPPORT SYSTEMS AND GUIDES FOR FULL LENGTH OF STACK AND BREECHING (HORIZONTAL AND VERTICAL). SUPPORT SYSTEM INSTALLATION SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATION.
D. ACCESSORIES COMPONENTS, EACH BEARING FACTORY APPLIED UL LABEL FOR A FULLY OPERATIONAL STACK AND BREECHING SYSTEM SHALL BE MANUFACTURED BY THE STACK AND BREECHING MANUFACTURER AND SHALL INCLUDE BUT NOT BE LIMITED TO:
1. EXPANSION DEVICE AND ASSOCIATED ANCHORS AND GUIDES
2. FITTINGS FOR DIRECTIONAL CHANGE
3. RAIN CAP
4. DRAFT HOOD ADAPTER KIT
5. 90° MANIFOLD TEE SECTION
6. ROOF FLASHING ASSEMBLY, STORM COLLAR AND INSULATED THIMBLE WHERE REQUIRED
7. GUY SECTION AND GUY TENSIONER
8. FLOOR AND WALL SUPPORT AND GUIDE ASSEMBLIES
9. MONITORING AND TEST PORTS AS REQUIRED BY STATE AND LOCAL AUTHORITIES HAVING JURISDICTION.
10. BAROMETRIC DAMPER, AS NECESSARY
E. FOR MULTIPLE HEATING APPLIANCE INSTALLATIONS, 45° LATERAL TEE SECTION SHALL BE UTILIZED TO CONNECT INDIVIDUAL HEATING APPLIANCES TO BREECHINGS.
F. CONNECTION OF BREECHING TO VERTICAL STACK SHALL BE MADE WITH A 90° MANIFOLD TEE SECTION.
G. MANUFACTURER SHALL REVIEW AND APPROVE STACK AND BREECHING SIZE BASED ON APPROVED EQUIPMENT AND FINAL SYSTEM ROUTINGS THROUGH BUILDING. IF BASED ON MANUFACTURER'S REVIEW STACK AND BREECHING SIZE REQUIRES ADJUSTMENT, INSTALLATION SHALL BE BASED ON MANUFACTURER'S RECOMMENDED SIZE AT NO ADDITIONAL COST TO OWNER. MANUFACTURER SHALL OBTAIN FROM HEATING APPLIANCE MANUFACTURER THROUGH HVAC CONTRACTOR OPERATING CHARACTERISTICS OF THE HEATING APPLIANCE FOR DEVELOPING SYSTEM CONFIGURATION AND PARAMETERS. OPERATING CHARACTERISTICS SHALL INCLUDE FLUE GAS FLOW RATE, TEMPERATURE, PRESSURE CAPABILITIES, VELOCITY AND AVAILABLE EXTERNAL STATIC PRESSURE AT HEATING APPLIANCE OUTLET, AT MAXIMUM AND MINIMUM LEVELS OF BURNER TURNDOWN RANGE. THE INNER DIAMETER FOR STACK & BREECHING SHALL BE CALCULATED BY THE MANUFACTURER BASED ON THE OPERATING CHARACTERISTICS OF FINAL APPROVED HEATING APPLIANCE AND THE COORDINATED SHOP DRAWINGS OF THE FINAL ROUTING OF THE STACK AND BREECHING SYSTEM. MANUFACTURER SHALL SUBMIT DETAILED BREECHING DESIGN DIAGRAMS TO ARCHITECT, AND SHALL PROVIDE SUPERVISION OF THE INSTALLATION TO THE HVAC CONTRACTOR. CALCULATIONS SHALL BE SUBMITTED AS PART OF THE SHOP DRAWINGS.
H. THE STACK AND BREECHING SYSTEM SHALL BE WARRANTED AGAINST FUNCTIONAL FAILURE DUE TO DEFECTS IN MATERIAL AND WORKMANSHIP FOR A PERIOD OF TEN (10) YEARS FROM DATE OF ACTIVATION OF HEATING APPLIANCE. FUNCTIONAL FAILURE IS DEFINED AS ANY FAILURE OF THE SYSTEM OR A COMPONENT TO PERFORM ITS INTENDED FUNCTION WITHOUT ADVERSE LEAKAGE. DURING THIS PERIOD ANY DEFECTIVE SYSTEM OR COMPONENT SHALL BE REPAIRED OR REPLACED.

2.02 SPECIAL GAS VENT

A. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:

1. ENERVEK, INC.
2. HEATFAB
3. JEREMIAS INC.
4. METAL-FAB INC.
5. SECURITY CHIMNEYS

B. GENERAL: THE MANUFACTURER SHALL PROVIDE FACTORY-BUILT MODULAR SPECIAL GAS VENT SYSTEM TESTED AND LISTED BY UNDERWRITERS LABORATORIES INC. (UL) TO UL 1738 STANDARD, VENTING SYSTEMS FOR GAS-BURNING APPLIANCES, CATEGORIES II, III, AND IV.

C. CONSTRUCTION

1. THE SPECIAL GAS VENT SYSTEM SHALL BE CONSTRUCTED OF STAINLESS STEEL. THE MATERIALS AND CONSTRUCTION OF MODULAR SECTIONS AND ACCESSORIES SHALL BE AS SPECIFIED BY THE TERMS OF THE PRODUCTS UL LISTING.
2. THE INNER WALL MATERIAL SHALL BE AL 29-4C, TYPE 316L-PCM, OR TYPE 444 STAINLESS STEEL. OTHER STAINLESS STEELS ARE PROHIBITED.
3. THE OUTER JACKET MATERIAL SHALL BE STAINLESS STEEL.
4. THE AIR SPACE BETWEEN THE INNER WALL AND OUTER JACKET SHALL BE A MINIMUM OF TWO-INCH (2") THICK CERAMIC FIBER INSULATION.
5. THE ENTIRE SYSTEM, INCLUDING ALL ACCESSORIES (CONNECTORS, HARDWARE, ANCHOR PLATE SUPPORTS, GUIDES, DRAINS, AND TERMINALS), SHALL BE STAINLESS STEEL.
6. THE COMPLETE SPECIAL GAS VENT SYSTEM, FROM APPLIANCE OUTLET TO TERMINATION, SHALL BE DESIGNED TO ELIMINATE ON-SITE WELDING THROUGH THE USE OF A SLIP FIT, RIGID CONNECTION WITH REINFORCING RIBS, BUILT-IN MECHANICAL LOCKING CLIPS AND A VITON® O-RING. FOR 26 TO 36" ID, V-BANDS AND VITON® SEALANT SHALL BE ACCEPTED IN LIEU OF BUILT-IN MECHANICAL LOCKING CLIPS AND VITON® O-RING. SILICONE GASKETS AND SILICONE SEALANT AT SECTION JOINTS ARE NOT ACCEPTABLE DUE TO ADVERSE REACTIONS WITH CARBONIC ACID.
7. SYSTEM SHALL BE DESIGNED TO COMPENSATE FOR ALL TEMPERATURE INDUCED THERMAL EXPANSION, INSTALLED TO BE GASTIGHT, AND THUS PREVENT LEAKAGE OF COMBUSTION PRODUCTS INTO A BUILDING.
8. DETAILED MANUFACTURER'S SUBMITTAL DRAWINGS SHALL BE PROVIDED FOR APPROVAL PRIOR TO INSTALLATION OF THE VENT SYSTEM.
9. ALL TEES SHALL 45-DEGREE (LATERAL) TEES; BOOT TEES AND 90-DEGREE TEES ARE NOT ACCEPTABLE. IN THE EVENT THAT PHYSICAL CONSTRAINTS DO NOT PERMIT, CONNECTION TO STACK SHALL BE MADE UTILIZING 90° MANIFOLD TEE SECTION.
10. PROVIDE AUTOMATIC ISOLATION DAMPER IN EACH APPLIANCE'S CONNECTOR. ACCEPTABLE ISOLATION DAMPERS INCLUDE US DRAFT CO. MODEL SB (UP TO 14"ID) OR US DRAFT CO. MODEL OBD (16"ID OR LARGER).

D. EXECUTION

1. INSTALLATION
  - a. WHEN INSTALLED ACCORDING TO THE MANUFACTURER'S INSTALLATION INSTRUCTIONS, THE VENT SYSTEM AND ITS SUPPORTING SYSTEM SHALL RESIST SIDE LOADS AT LEAST 1.5 TIMES GREATER THAN THE WEIGHT PER FOOT OF THE PIPING FOR BOTH HORIZONTAL AND VERTICAL PORTIONS OF THE SYSTEM.
  - b. THE VENT SYSTEM SHALL BE INSTALLED ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS AND SHALL CONFORM TO ALL APPLICABLE STATE AND LOCAL CODES.
  - c. PROVIDE ALL MODULAR STRAIGHT SECTIONS, FITTINGS, SUPPORTS, GUIDES, EXPANSION JOINTS, DRAIN LENGTHS, DRAINS, GUY SECTIONS, GUY TENSIONERS, ROOF THIMBLES, ROOF FLASHINGS, STORM COLLARS AND CODE-COMPLIANT TERMINATIONS AS REQUIRED TO PROVIDE A COMPLETE SYSTEM PER THE MANUFACTURER'S INSTRUCTIONS.
  - d. THE ENTIRE VENT SYSTEM FROM THE APPLIANCE OUTLET TO THE TERMINATION POINT, INCLUDING ALL ACCESSORIES, EXCEPT AS NOTED, SHALL BE FROM ONE MANUFACTURER.
  - e. THE VERTICAL TERMINATION SHALL BE NO LESS THAN THREE FEET ABOVE ANY PORTION OF THE BUILDING WITHIN TEN FEET OF THE STACK PENETRATION. FOLLOW ALL PERTINENT NATIONAL, STATE, AND/OR LOCAL CODES WHERE APPLICABLE.
  - f. ROOF PENETRATIONS SHALL BE SUITABLE FOR THE SPECIFIED ROOF CONSTRUCTION AND SHALL COMPLY WITH THE MANUFACTURER'S INSTRUCTIONS.
2. TECHNICAL SERVICES:
  - a. PROVIDE A FACTORY TRAINED REPRESENTATIVE FOR ON-SITE TRAINING OF HVAC CONTRACTOR PERSONNEL ON THE RECOMMENDED INSTALLATION PROCEDURES FOR THE SYSTEM. DURATION OF TRAINING SECTION SHALL BE DETERMINED BY MANUFACTURER AND HVAC CONTRACTOR. FACTORY TRAINED REPRESENTATIVE SHALL PROVIDE PERIODIC SITE VISITS TO INSPECT EXHAUST SYSTEM THROUGHOUT THE INSTALLATION PERIOD. AN INSPECTION REPORT SHALL BE SUBMITTED TO THE ARCHITECT/OWNER/ENGINEER FOR EACH VISIT. DEFECTS DISCOVERED DURING THE SITE VISIT SHALL BE REPORTED TO THE HVAC CONTRACTOR/OWNER/ARCHITECT ALONG WITH RECOMMENDATIONS TO CORRECT DEFECTS.
  - b. AT THE CONCLUSION OF THE INSTALLATION AND PRIOR TO HEATING APPLIANCE START-UP, MANUFACTURER'S REPRESENTATIVE SHALL PROVIDE A FINAL INSPECTION REPORT AND A SIGNED LETTER CERTIFYING PROPER INSTALLATION AND CONDITION OF THE SYSTEM TO THE HVAC CONTRACTOR/OWNER/ARCHITECT.

E. WARRANTY

1. THE VENT SYSTEM SHALL BE WARRANTED AGAINST FUNCTIONAL FAILURE DUE TO DEFECTS IN MATERIAL AND MANUFACTURER'S WORKMANSHIP FOR A PERIOD OF 15 YEARS FROM DATE OF INSTALLATION.
2. THE INNER DIAMETER OF THE VENT SYSTEM SHALL BE VERIFIED BY THE MANUFACTURER'S VENTING COMPUTATIONS. THE COMPUTATIONS SUBMITTED SHALL FOLLOW ASHRAE CALCULATION METHODS AND SHALL INCORPORATE THE SPECIFIC FLOW CHARACTERISTICS OF THE INNER PIPE. THE CONTRACTOR SHALL FURNISH THE EXACT OPERATING CHARACTERISTICS OF ALL APPLIANCES TO THE FACTORY REPRESENTATIVE.
3. THE MANUFACTURER SHALL PROVIDE "TO SCALE" DRAWINGS DEPICTING THE ACTUAL LAYOUT. THE CHIMNEY SYSTEM SHALL BE INSTALLED AS DESIGNED BY THE MANUFACTURER AND IN ACCORDANCE WITH THE TERMS OF THE MANUFACTURER'S WARRANTY.
4. THE VENT SYSTEM SHALL BE FURNISHED BY A VENDOR ORGANIZATION THAT ASSURES DESIGN, INSTALLATION AND SERVICES COORDINATION AS WELL AS, PROVIDING "IN-WARRANTY" AND "POST-WARRANTY" UNIFIED RESPONSIBILITY FOR OWNER, ARCHITECT, CONSULTING ENGINEER AND CONTRACTOR.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. COMPLY WITH LOCAL CODES, UL LISTING, NFPA 211 AND FACTORY INSTALLATION REQUIREMENTS. COORDINATE CHIMNEY AND VENT REQUIREMENTS WITH BOILER OR APPLIANCE LISTING.
- B. SUPPORT BREECHING FROM STRUCTURE. BREECHING SHALL NOT IMPOSE LOAD ON APPLIANCE OR CHIMNEY.
- C. INSTALL BREECHING AND CHIMNEY WITH POSITIVE SLOPE BACK TO THE APPLIANCE. PROVIDE EASILY ACCESSIBLE CONDENSATE DRAINAGE CONNECTION, CONFIGURED TO PREVENT CONDENSATION FROM ENTERING THE BOILER.
- D. ALL BRANCH FITTINGS SHALL BE 45 DEGREE LONG RADIUS SWEEP ELBOW CONNECTIONS IN THE DIRECTION OF FLUE GAS FLOW. ALL 90 DEGREE ELBOWS SHALL BE LONG RADIUS.

- E. TRANSITIONS TO INCREASE BREECHING DIAMETER SHALL BE WITH AN INCREASER FITTING ANGLE OF 10 DEGREES MAXIMUM. INCREASE COMMON BREECHING MANIFOLDS AT EACH BRANCH, AND LOCATE THE CONNECTION WITHIN THE 10 DEGREE FITTING AS A "WYE" CONNECTION.
- F. COORDINATE EXACT DIMENSIONS AND OTHER REQUIREMENTS OF FLOOR, ROOF, WALL AND PARTITION PENETRATIONS WITH ALL OTHER SUBCONTRACTORS.
- G. ROOF PENETRATIONS SHALL BE SUITABLE FOR THE ROOF CONSTRUCTION SHOWN AND SHALL FOLLOW MANUFACTURER'S INSTALLATION INSTRUCTIONS AND LOCAL CODES.
- H. MAINTAIN CLEARANCE TO COMBUSTIBLE OR NON-COMBUSTIBLE CONSTRUCTION IN COMPLIANCE WITH THE VENT LISTING.
- I. FOR CONDENSING GAS VENTS, INSTALL VENT WITH 1/4" INCH PER FOOT SLOPE BACK TO THE APPLIANCE FROM THE VERTICAL RISER. IF THE VENT IS A HORIZONTAL VENT TO A WALL, TERMINATION, SLOPE FROM THE BOILER OR APPLIANCE DOWN TO THE WALL, TERMINATION. PROVIDE MANUFACTURER'S CONDENSATE DRAINAGE CONNECTION, CONFIGURED TO PREVENT CONDENSATION FROM ENTERING THE BOILER UNLESS BOILER IS PROVIDED WITH INTERNAL CONDENSATE DRAINAGE AS PART OF ITS CONSTRUCTION AND LISTING.
- J. WHENEVER EXCESSIVE PRESSURE RELIEF VALVES ARE REQUIRED, INSTALL WHERE INDICATED ON THE DRAWINGS AND WHERE HUMAN CONTACT IS AVOIDED AND AWAY FROM FLAMMABLE OR COMBUSTIBLE MATERIALS. PROVIDE A SHROUD SPECIFICALLY DESIGNED FOR THE SYSTEM AS NECESSARY OR AS IDENTIFIED ON THE DRAWINGS.

END OF SECTION



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ISSUE SET

9/25/2024

PROJECT INFORMATION:  
NEW HAVEN

PROJECT INFORMATION:  
1 BROADWAY

NEW HAVEN, CT 06511

DRAWN BY: DCT Author  
CHECKED BY: NAM Checker  
PROJECT MANAGER:  
SG DESIGN MANAGER:  
SG DM CHECKED BY:  
SG CONSTR. MANAGER:  
PROJECT NO: XXXXXX  
TEMPLATE VERSION: 2401

REV.	DATE	DESCRIPTION
	8/23/2024	80% CHECK SET
	9/13/2024	CD DELIVERY
	9/25/2024	LL REVIEW
1	2/12/2025	ISSUE FOR CONSTRUCTION

MECHANICAL  
SPECIFICATIONS  
SHEET #5

M-006

COMcheck Software Version COMcheckWeb  
**Mechanical Compliance Certificate**

**Project Information**

Energy Code: 2021 IECC  
 Project Title: Sweetgreen New Haven  
 Location: New Haven, Connecticut  
 Climate Zone: 5a  
 Project Type: Alteration

Construction Site: 1 Broadway  
 Owner/Agent: New Haven, Connecticut 06511  
 Designer/Contractor:

**Mechanical Systems List**

**Quantity System Type & Description**

- Water Heater:  
 Gas Storage Water Heater, Capacity: 100 gallons, Input Rating: 250 kBtu/h  
 Proposed Efficiency: 95.00 % EI, Required Efficiency: 80.00 % EI

**Mechanical Compliance Statement**

**Compliance Statement:** The proposed mechanical alteration project represented in this document is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed mechanical systems have been designed to meet the 2021 IECC requirements in COMcheck Version COMcheckWeb and to comply with any applicable mandatory requirements listed in the Inspection Checklist.

Name - Title Signature Date

Project Title: Sweetgreen New Haven Report date: 09/24/24  
 Data filename: Page 4 of 8

Section # & Req.ID	Rough-In Electrical Inspection	Complies?	Comments/Assumptions
C405.7 (EL26)	Low-voltage dry-type distribution electric transformers meet the minimum efficiency requirements of Table C405.6.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	<b>Exception:</b> Requirement does not apply.
C405.8 (EL27)	Electric motors meet the minimum efficiency requirements of Tables C405.7(1) through C405.7(4). Efficiency verified through certification under an approved certification program or the equipment efficiency ratings shall be provided by motor manufacturer (where certification programs do not exist).	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C405.9.1, C405.9.2 (EL28)	Escalators and moving walks comply with ASME A17.1/CSA B44 and have automatic controls configured to reduce speed to the minimum permitted speed in accordance with ASME A17.1/CSA B44 or applicable local code when not conveying passengers.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	<b>Exception:</b> Requirement does not apply.
C405.10 (EL29)	Total voltage drop across the combination of feeders and branch circuits <= 5%.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	<b>Exception:</b> Requirement does not apply.
C405.1.1 (EL30)	At least 90% of dwelling unit permanently installed lighting shall have lamp efficacy >= 65 lm/W or luminaires with efficacy >= 45 lm/W or comply with C405.2.4 or C405.3.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	<b>Exception:</b> Requirement does not apply.
C405.11.1, C405.11.2 (EL31)	50% of 15/20 amp receptacles installed in enclosed offices, conference rooms, copy rooms, break rooms, classrooms and workstations and > 25% of branch circuit feeders for modular furniture will have automatic receptacle control in accordance with C405.11.1.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	<b>Exception:</b> Requirement does not apply.

**Additional Comments/Assumptions:**

Project Title: Sweetgreen New Haven Report date: 09/24/24  
 Data filename: Page 7 of 8

COMcheck Software Version COMcheckWeb  
**Inspection Checklist**  
 Energy Code: 2021 IECC

Requirements: 100.0% were addressed directly in the COMcheck software  
 Text in the "Comments/Assumptions" column is provided by the user in the COMcheck Requirements screen. For each requirement, the user certifies that a code requirement will be met and how that is documented, or that an exception is being claimed. Where compliance is itemized in a separate table, a reference to that table is provided.

Section # & Req.ID	Plumbing Rough-In Inspection	Complies?	Comments/Assumptions
C404.5, C404.5.1, C404.5.2 (PL6)	Heated water supply piping conforms to pipe length and volume requirements. Refer to section details.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.

**Additional Comments/Assumptions:**

Project Title: Sweetgreen New Haven Report date: 09/24/24  
 Data filename: Page 5 of 8

Section # & Req.ID	Final Inspection	Complies?	Comments/Assumptions
C404.3 (FI11)	Heat traps installed on supply and discharge piping of non-circulating systems.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	<b>Exception:</b> Requirement does not apply.
C408.1.1 (FI57)	Building operations and maintenance documents will be provided to the owner. Documents will cover manufacturers' information, specifications, programming procedures and means of illustrating to owner how building, equipment and systems are intended to be installed, maintained, and operated.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.

**Additional Comments/Assumptions:**

Project Title: Sweetgreen New Haven Report date: 09/24/24  
 Data filename: Page 8 of 8

Section # & Req.ID	Mechanical Rough-In Inspection	Complies?	Comments/Assumptions
C402.2.6 (ME41)	Thermally ineffective panel surfaces of sensible heating panels have insulation >= R-3.5.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	<b>Exception:</b> Requirement does not apply.
C403.9 (ME144)	Large diameter fans where installed shall be tested and labeled in accordance with AMCA 230.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	<b>Exception:</b> Requirement does not apply.
C403.7.2 (ME115)	Enclosed parking garage ventilation has automatic contaminant detection and capacity to stage or modulate fans to 50% or less of design capacity.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	<b>Exception:</b> Requirement does not apply.
C403.7.5 (ME116)	Kitchen exhaust systems comply with replacement air and conditioned supply air limitations, and satisfy hood rating requirements and maximum exhaust rate criteria.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	<b>Exception:</b> Requirement does not apply.
C403.4.1, C403.4.2 (ME63)	Heating for vestibules and air curtains with integral heating include automatic controls that shut off the heating system when outdoor air temperatures > 45°. Vestibule heating and cooling systems controlled by a thermostat in the vestibule with heating setpoint <= 60F and cooling setpoint >= 80F.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	<b>Exception:</b> Requirement does not apply.
C404.2.1 (ME111)	Gas-fired water-heating equipment installed in new buildings; where a singular piece of water-heating equipment >= 1,000 kBtu/h serves the entire building, thermal efficiency >= 92 EI. Where multiple pieces of water-heating equipment serve the building with combined rating >= 1,000 kBtu/h, the combined input capacity-weighted-average thermal efficiency >= 90 EI. Exclude input rating of equipment in individual dwelling units and equipment <= 100 kBtu/h.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C408.2.2 (ME53)	Air outlets and zone terminal devices have means for air balancing.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C403.11.3 (ME123)	Refrigerated display cases, walk-in coolers or walk-in freezers served by remote compressors and remote condensers not located in a condensing unit, have fan-powered condensers that comply with Sections C403.11.3.1 and refrigeration compressor systems that comply with C403.11.3.2.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.

**Additional Comments/Assumptions:**

Project Title: Sweetgreen New Haven Report date: 09/24/24  
 Data filename: Page 6 of 8



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**NEW HAVEN**  
 PROJECT INFORMATION:  
**1 BROADWAY**  
**NEW HAVEN, CT 06511**

DRAWN BY: DCT Author  
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 PROJECT MANAGER:  
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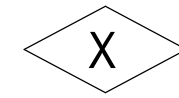
REVISIONS  
 REV. DATE DESCRIPTION  
 1 9/25/2024 LL REVIEW  
 2 2/12/2025 ISSUE FOR CONSTRUCTION

**MECHANICAL  
 COMECCHECK  
 SHEET #1**

**M-007**

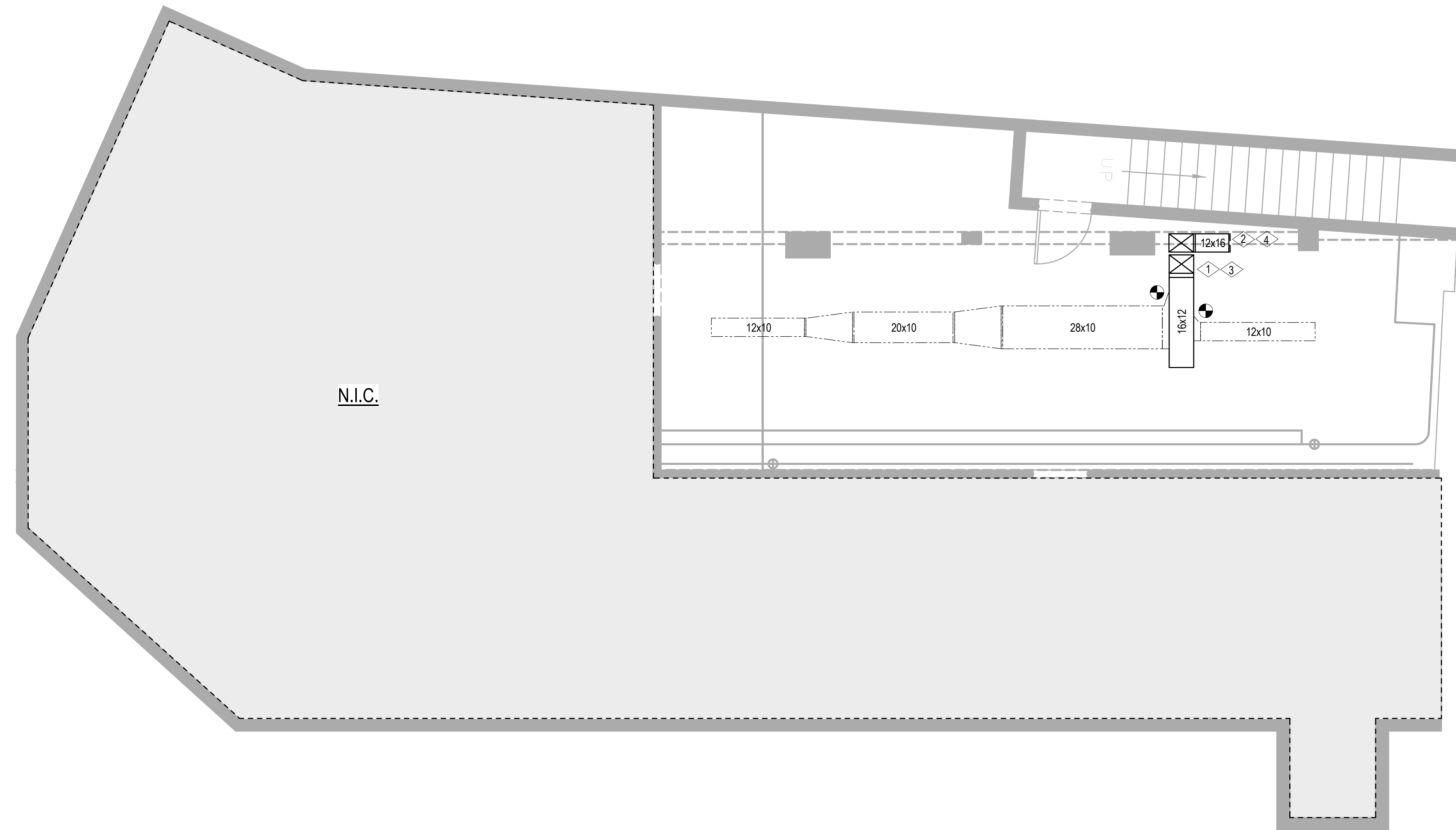
**GENERAL NOTES:**

1. REFER TO MECHANICAL SPECIFICATIONS FOR VIBRATION ISOLATION REQUIREMENTS.
2. COORDINATE ALL SCOPE OF WORK AND SCHEDULING WITH ALL TRADES AND LANDLORD PRIOR TO CONSTRUCTION.
3. COORDINATE ALL SCOPE AND CONSTRUCTION REQUIREMENTS WITH BUILDING RULES AND REGULATIONS.
4. COORDINATE ALL AIR OUTLET LOCATIONS, THERMOSTATS, TEMPERATURE SENSORS AND ACCESS DOORS WITH ARCHITECT. SUBMIT FOR ARCHITECT AND ENGINEER APPROVAL.
5. REFER TO MECHANICAL SPECIFICATIONS FOR ALL TEMPERATURE CONTROL REQUIREMENTS.
6. REFER TO MECHANICAL SPECIFICATIONS FOR INSULATION REQUIREMENTS.
7. DUCT SIZES INDICATED ON PLAN ARE CLEAR OPEN DIMENSIONS. PROVIDE ACOUSTICAL LINING SHALL BE PROVIDED:
  - 10' DOWNSTREAM OF ALL AC UNITS
  - 10' UPSTREAM AND DOWN STREAM OF ALL EXHAUST FANS
  - ALL RETURN DUCTS, TRANSFER DUCTS AND PLENUMS
8. REFER TO ARCHITECTURAL PLANS FOR ACOUSTICAL WALL PENETRATION REQUIREMENTS.
9. FLEXIBLE DUCTWORK IS NOT PERMITTED FOR USE WITHIN EXHAUST SYSTEMS.
10. PROVIDE FLEXIBLE CONNECTIONS FOR ALL SHEET METAL CONNECTIONS TO FAN POWERED EQUIPMENT.
11. NO DUCTWORK OR PIPING SHALL BE RUN WITHIN EQUIPMENT REQUIRED ACCESS SPACE. ACCESS SHOWN WITHIN FLOOR PLAN FOR REFERENCE ONLY. COORDINATE WITH EQUIPMENT MANUFACTURER FOR SPECIFIC ACCESS REQUIREMENTS.
12. PROVIDE WIRE MESH SCREEN ON OPEN RETURNS ABOVE CEILING. REFER TO DRAWING FOR DUCT SIZES.
13. REFER TO MECHANICAL SPECIFICATIONS FOR MATERIAL AND INSULATION REQUIREMENTS.
14. REFER TO MECHANICAL DETAILS AND SPECIFICATIONS FOR ADDITIONAL PIPING SCOPE.
15. GENERAL NOTES APPLY TO ALL HVAC SHEETS.
16. WORK SHALL COMPLY WITH STATE AND LOCAL CODE REQUIREMENTS AS APPROVED AND AMENDED BY THE AUTHORITY HAVING JURISDICTION, INCLUDING APPLICABLE SECTIONS OF NFPA, THE MECHANICAL CODE, AND ANY INTERIM AMENDMENTS AT THE TIME OF THE PROPOSAL. PURCHASE PERMITS ASSOCIATED WITH THE WORK. OBTAIN INSPECTIONS REQUIRED BY CODE. SEE SHEET G-001 FOR THE PREVAILING CODES.
17. CONTRACTOR AND SUBCONTRACTORS SHALL REVIEW A COMPLETE SET OF THE CONSTRUCTION DOCUMENTS.
18. COORDINATE WORK WITH THE WORK OF OTHER TRADES, EQUIPMENT FURNISHED BY OTHERS, REQUIREMENTS OF THE OWNER, AND OF THE EXISTING CONDITIONS AT THE PROJECT SITE.
19. DRAWINGS FOR THE MECHANICAL WORK ARE DIAGRAMATIC, SHOWING THE GENERAL LOCATION, TYPE, LAYOUT, AND EQUIPMENT REQUIRED. THE DRAWING SHALL NOT BE SCALED FOR EXACT MEASUREMENTS. REFER TO ARCHITECTURAL DRAWINGS FOR DIMENSIONS. REFER TO MANUFACTURER'S STANDARD INSTALLATION DRAWINGS FOR EQUIPMENT CONNECTIONS AND INSTALLATION REQUIREMENTS. PROVIDE DUCTWORK, CONNECTIONS, OFFSETS, ACCESSORIES, AND MATERIALS NECESSARY FOR A COMPLETE SYSTEM.
20. DUCT DIMENSIONS ON PLAN INDICATE DIMENSIONS OF INTERNAL FREE AREA.
21. PERFORATED CEILING DIFFUSERS SHALL BE 4-WAY UNLESS NOTED OTHERWISE.
22. UNLESS NOTED OTHERWISE RECTANGULAR DUCT ELBOWS SHALL BE MITERED ELBOWS WITH DOUBLE-THICKNESS TURNING VANES.
23. REPLACE AIR FILTERS WITH NEW, CLEAN MERV 8 FILTERS AT TURNOVER.
24. THE TERM "FURNISH" OR "SUPPLY" MEANS SUPPLY AND DELIVER TO THE PROJECT SITE, READY FOR UNLOADING, UNPACKING, ASSEMBLY, INSTALLATION, AND SIMILAR OPERATIONS. THE TERM "INSTALL" DESCRIBES THE OPERATIONS AT THE PROJECT SITE INCLUDING THE ACTUAL UNLOADING, UNPACKING, ASSEMBLY, ERECTING, PLACING, ANCHORING, APPLYING, WORKING TO DIMENSION, FINISHING, CURING, PROTECTING, CLEANING, AND SIMILAR OPERATIONS. THE TERM "PROVIDE" MEANS TO FURNISH AND INSTALL, COMPLETE AND READY FOR THE INTENDED USE. A FINAL REPORT FOR THE TESTING AND ADJUSTMENTS OF ALL NEW SYSTEMS FROM ALL DISCIPLINES SHALL BE COMPLETED WITH FINAL APPROVAL BY THE FIELD INSPECTOR. THIS REPORT SHALL BE SIGNED BY THE INDIVIDUAL RESPONSIBLE FOR PERFORMING THESE SERVICES.
25. TESTING AND BALANCING OF THE MECHANICAL SYSTEMS TO BE COMPLETED BY NATIONAL TAB AT THE GENERAL CONTRACTOR'S EXPENSE. THE CONTRACTOR SHALL CONTRACT WITH, SCHEDULE AND SUPERVISE/ASSIST NATIONAL TAB AS REQUIRED. REFER TO THE COVER SHEET, OR CONTACT SWEETGREEN'S CONSTRUCTION MANAGER FOR CONTACT INFORMATION.
27. ALL DUCT AND OTHER RELATED AIR DISTRIBUTION COMPONENT OPENINGS SHALL BE COVERED WITH TAPE, PLASTIC, OR SHEET METAL UNTIL THE FINAL START UP OF THE HEATING, COOLING AND VENTILATION EQUIPMENT.
28. PROVIDE LABELING FOR ALL HVAC EQUIPMENT USING ENGRAVED PHENOLIC PLATES OR AS REQUIRED BY THE LANDLORD.



**MECHANICAL KEY NOTES:**

1. NEW SUPPLY AIR RISER UP TO EXISTING RTU.
2. NEW RETURN AIR RISER UP TO EXISTING RTU.
3. REBALANCE EXISTING DIFFUSERS TO BE 1200 CFM TOTAL DISTRIBUTED EQUALLY BETWEEN EACH DIFFUSER.
4. PROVIDE ACOUSTICALLY LINED RETURN ELBOW WITH BELL MOUTH TERMINATION AND WIRE MESH SCREEN ON UNIT RETURN AIR CONNECTION. SIZES INDICATED ARE CLEAR OPEN DIMENSIONS.



1 CELLAR PLAN  
1/4" = 1'-0"



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9/25/2024

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**1 BROADWAY**

**NEW HAVEN, CT 06511**

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**CELLAR  
MECHANICAL PLAN**

**M-130**

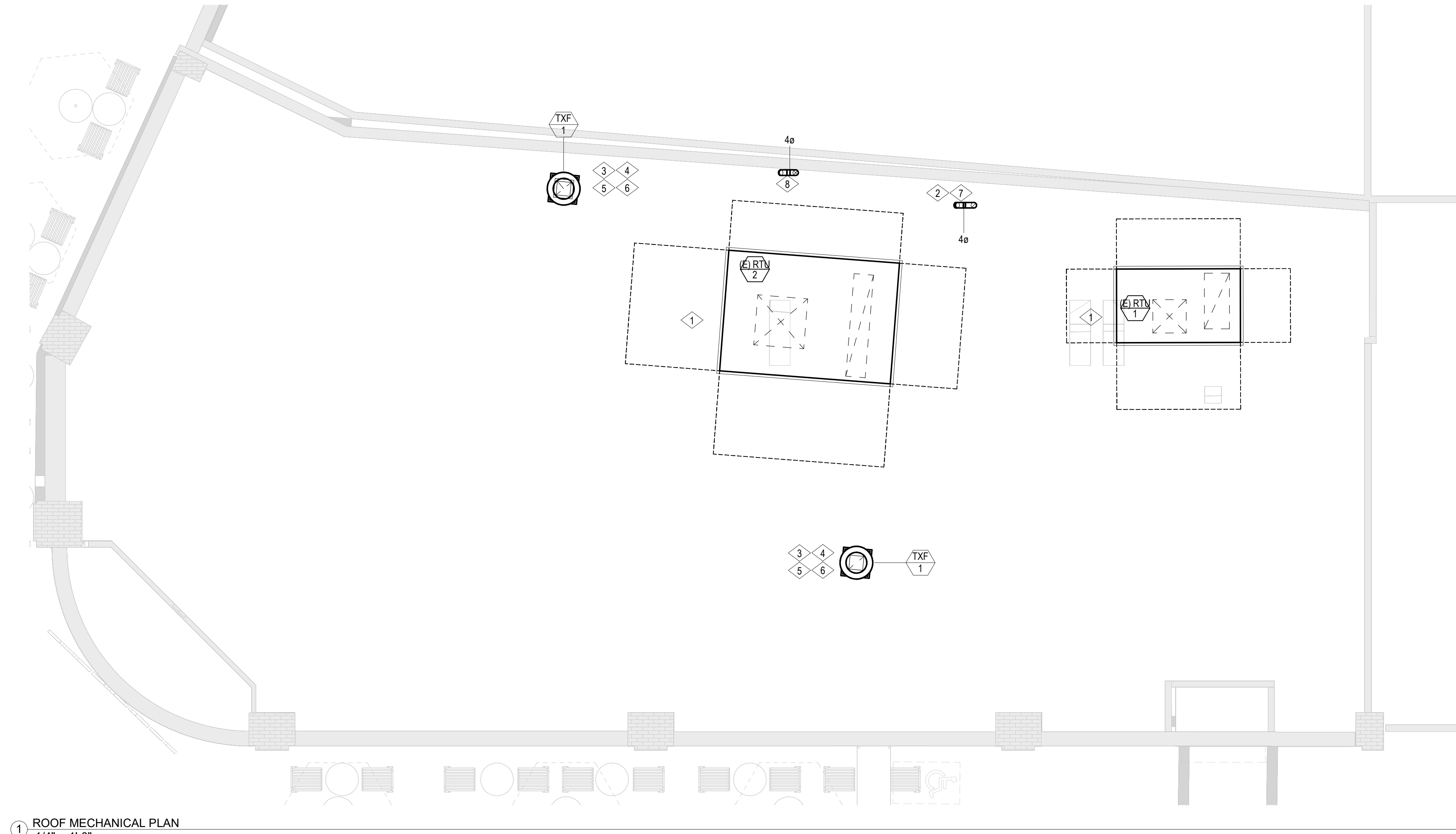


**GENERAL NOTES:**

1. REFER TO MECHANICAL SPECIFICATIONS FOR VIBRATION ISLOATION REQUIREMENTS.
2. REFER TO MECHANICAL SPECIFICATIONS FOR INSULATION REQUIREMENTS.
3. COORDINATE SCOPE OF WORK AND SCHEUDLING WITH ALL TRADES AND LANDLORD PRIOR TO CONSTRUCTION.
4. COORDINATE ALL SCOPE AND CONSTRUCTION REQUIREMENTS WITH BUILDING RULES AND REGULATIONS.
5. COORDINATE ALL SYSTEM SHUTDOWN REQUIREMENTS WITH BUILDING PRIOR TO CONSTRUCTION.
6. COORDINATE ALL EQUIPMENT WEIGHTS AND ROOF OPENINGS WITH STRUCTURAL ENGINEER PRIOR TO INSTALLATION.
7. ALL EXHAUST AND INTAKE TERMINATIONS ARE TO BE LOCATED PER CODE MANDATED DISTANCES AND SEPERATION REQUIREMENTS.
8. ALL UNUSED ROOF OPENINGS ARE TO BE CAPPED, SEALED, AND FLASHED PER BUILDING ROOFING STANDARDS.
9. ALL ROOFING SCOPE SHALL BE PERFORMED PER THE REQUIREMENTS TO MAINTAIN THE EXISTING ROOF INTEGRITY AND WARRANTY.
10. COORDINATE ROOF VENDOR REQUIREMENTS WITH BUILDING.

**MECHANICAL KEY NOTES:**

1. EXISTING LANDLORD PROVIDED ROOFTOP UNIT. MECHANICAL CONTRACTOR TO BALANCE UNITS TO NEW DESIGN SUPPLY AND OUTDOOR AIR REQUIREMENTS. REFER TO MECHANICAL SCHEDULES.
2. 4" FLUE EXHAUST GOOSE NECK TERMINATION. INSULATE ALL EXTERIOR PIPING WITH EXTERIOR INSULATION AND JACKETING. FLASH, SEAL, AND REPAIR ROOF AS REQUIRED. COORDINATE SCOPE RESPONSIBILITY AND TERMINATION LOCATION WITH EQUIPMENT VENDOR PRIOR TO CONSTRUCTION.
3. PROVIDE NEW BACK DRAFT DAMPER FOR EXHUAUST SYSTEM ISOLATION. COORDINATE DAMPER REQUIREMENTS WITH FAN MANUFACTURER PRIOR TO INSTALLATION.
4. FAN TO BE INTERLOCKED TO NEW RTU UNIT PROGRAMMABLE SCHEUDLE. IF RTU TERHMOSTAT IS NOT CAPABLE OF INTERLOCK, PROVIDE NEW TIMECLOCK FOR FAN INTERLOCK. COORDINATE TIMECLOCK LOCATION WITH OWNERSHIP PRIOR TO INSTALLATION. REFER TO MECHANICAL SPECIFICATIONS FOR TEMPERATURE CONTROL REQUIREMENTS. FIELD VERIFY NEW EXHAUST FAN DISCHARGE IS A MINIMUM OF 10' FROM EACH RTU OUTDOOR INTAKE OPENING. PROVIDE DUCTED DISCHARGE EXTENSION AS REQUIRED.
5. INSTALL EQUIPMENT PER MANUFACTURER'S INSTALLATION INSTRUCTION AND AS PER THE STRUCTURAL DETAILS.
6. HOT WATER HEATER EXHAUST FLUE SHALL TERMINATE WITH A GOOSENECK AND BE 10'-0" AWAY FROM ANY AIR INTAKE OPENINGS.
7. HOT WATER HEATER EXHAUST FLUE SHALL TERMINATE WITH A GOOSENECK AND BE 10'-0" AWAY FROM ANY AIR INTAKE OPENINGS.
8. HOT WATER HEATER INTAKE SHALL TERMINATE WITH A GOOSENECK AND BE 10'-0" AWAY FROM ANY AIR EXHAUST OPENINGS.



1 ROOF MECHANICAL PLAN  
1/4" = 1'-0"



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**NEW HAVEN, CT 06511**

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**ROOF MECHANICAL  
PLAN**

**M-132**



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ISSUE SET**

9/25/2024

PROJECT INFORMATION:  
**NEW HAVEN**

PROJECT INFORMATION:  
**1 BROADWAY**

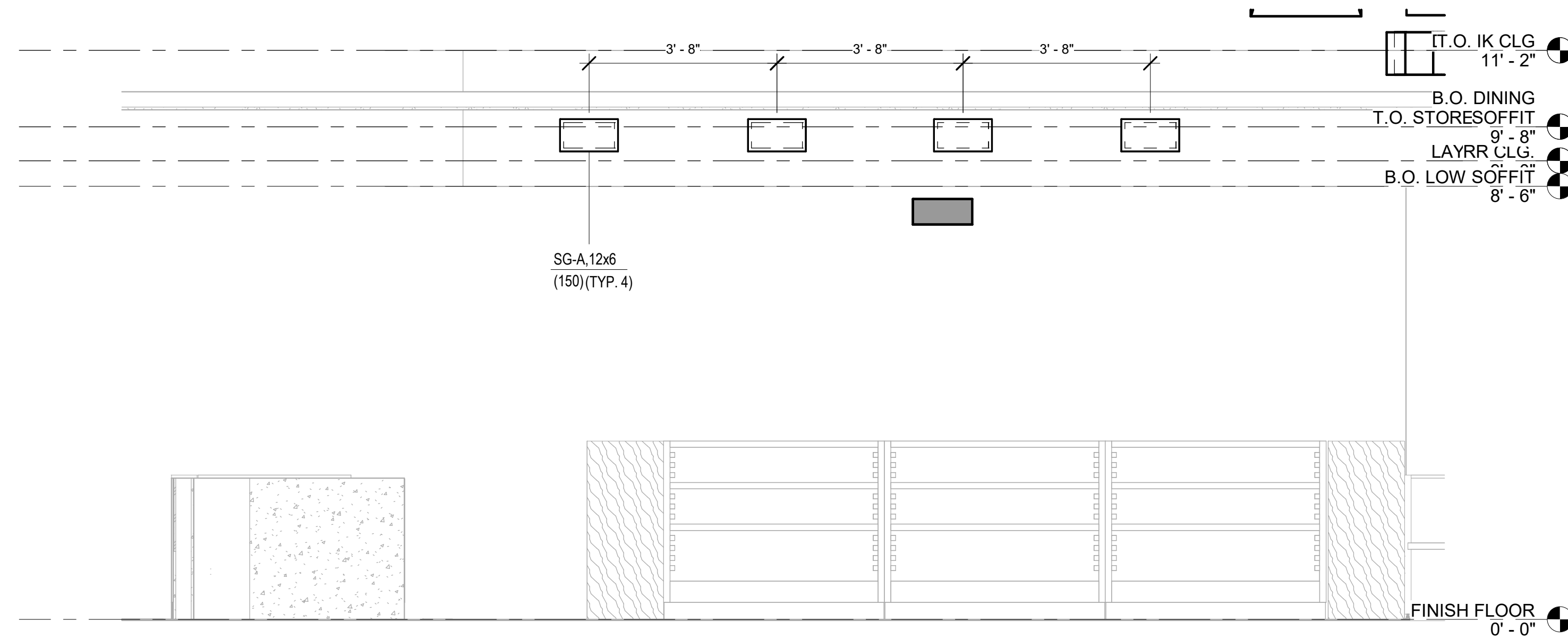
**NEW HAVEN, CT 06511**

DRAWN BY: DCT Author  
CHECKED BY: NAM Checker  
PROJECT MANAGER:  
SG DESIGN MANAGER:  
SG DM CHECKED BY:  
SG CONSTR. MANAGER:  
PROJECT NO: XXXXXX  
TEMPLATE VERSION: 2401

REV.	DATE	DESCRIPTION
	8/23/2024	80% CHECK SET
	9/13/2024	CD DELIVERY
	9/25/2024	LL REVIEW
1	2/12/2025	ISSUE FOR CONSTRUCTION

**HVAC ELEVATION**

**M-401**



① Dining Area Elevation  
1/2" = 1'-0"



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ENGINEER OF RECORD:

**MEYERS+**  
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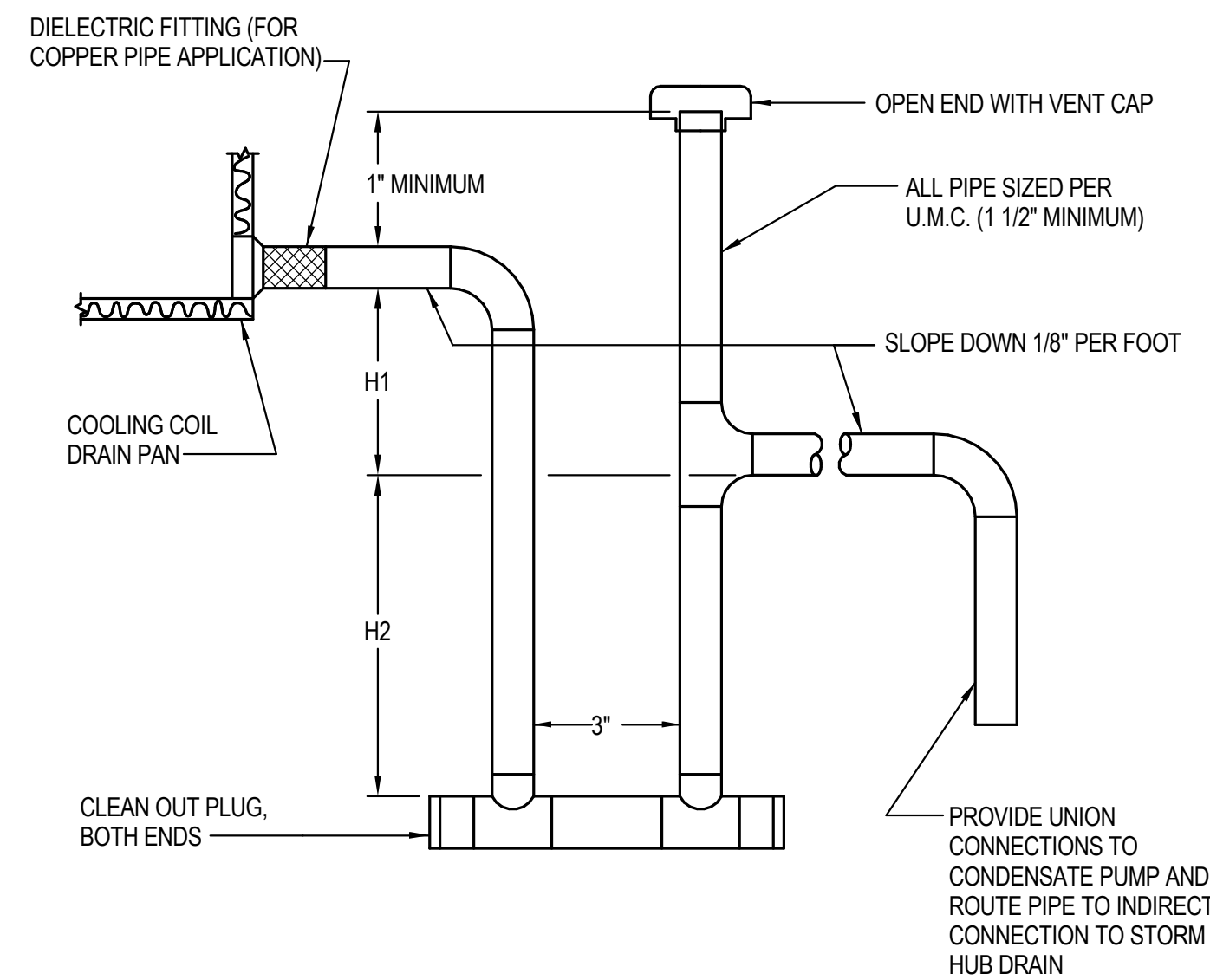
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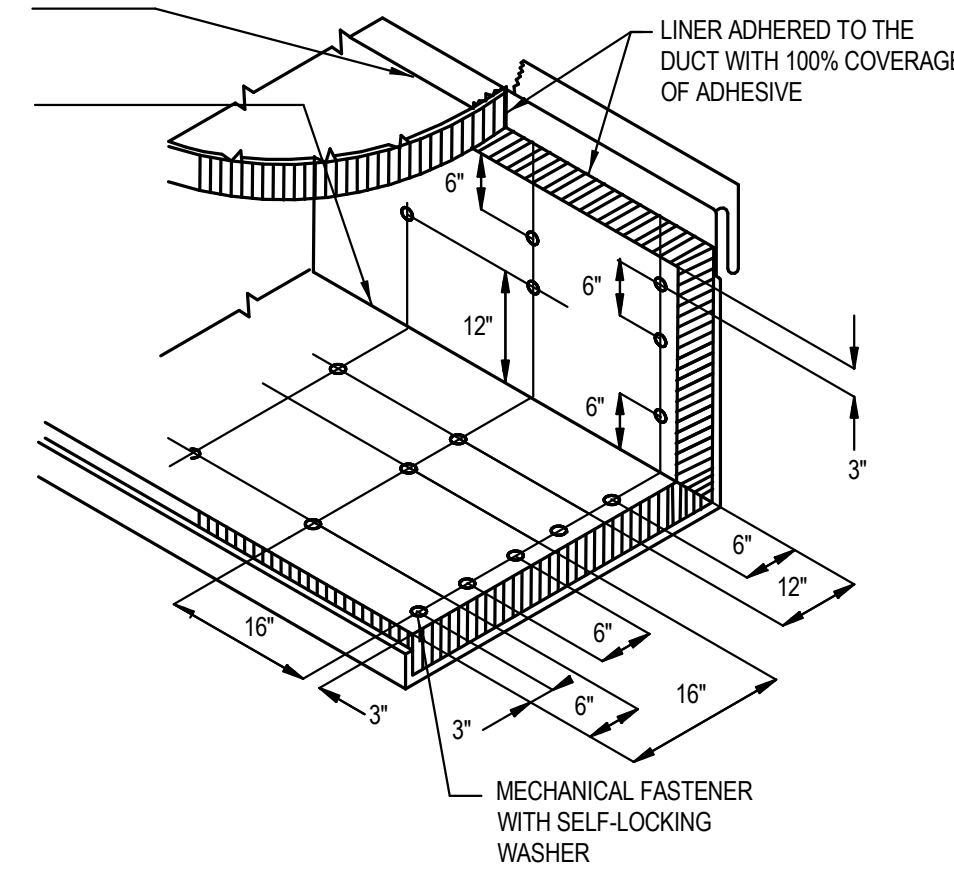
**MECHANICAL  
DETAILS SHEET #2**

**M-602**

COIL TYPE	H1 (HEIGHT)	H2 (HEIGHT)
BLOW-THROUGH (LOCATED ON DISCHARGE SIDE OF FAN)	1" MINIMUM	POSITIVE STATIC PRESSURE AT DRAIN PAN IN INCHES TIMES 2 (2" MINIMUM)
DRAW-THROUGH (LOCATED ON SUCTION SIDE OF FAN)	NEGATIVE STATIC PRESSURE AT DRAIN PAN IN INCHES PLUS 1"	NEGATIVE STATIC PRESSURE AT DRAIN PAN IN INCHES PLUS 1"

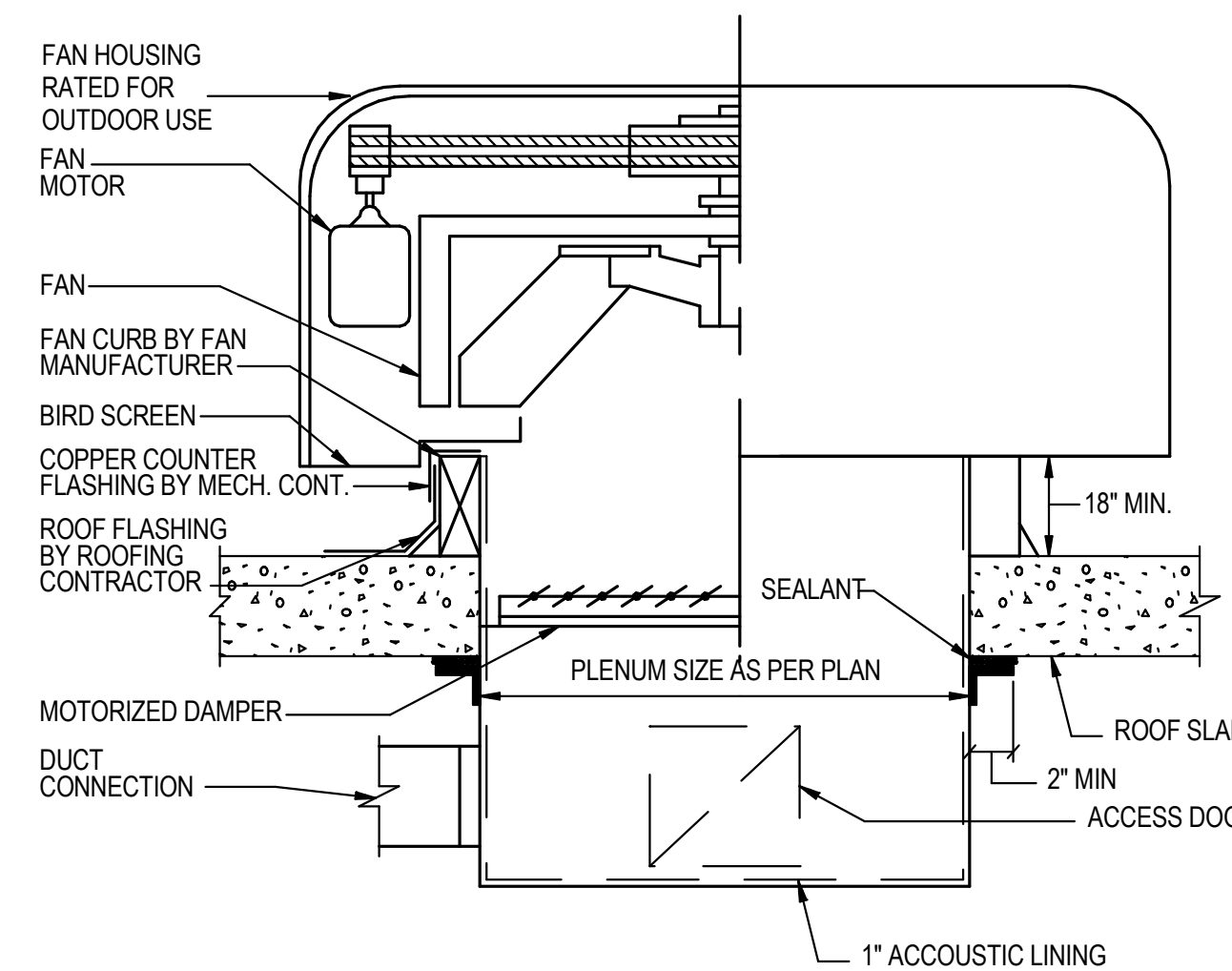


**1 COOLING COIL CONDENSATE TRAP**  
SCALE: NTS

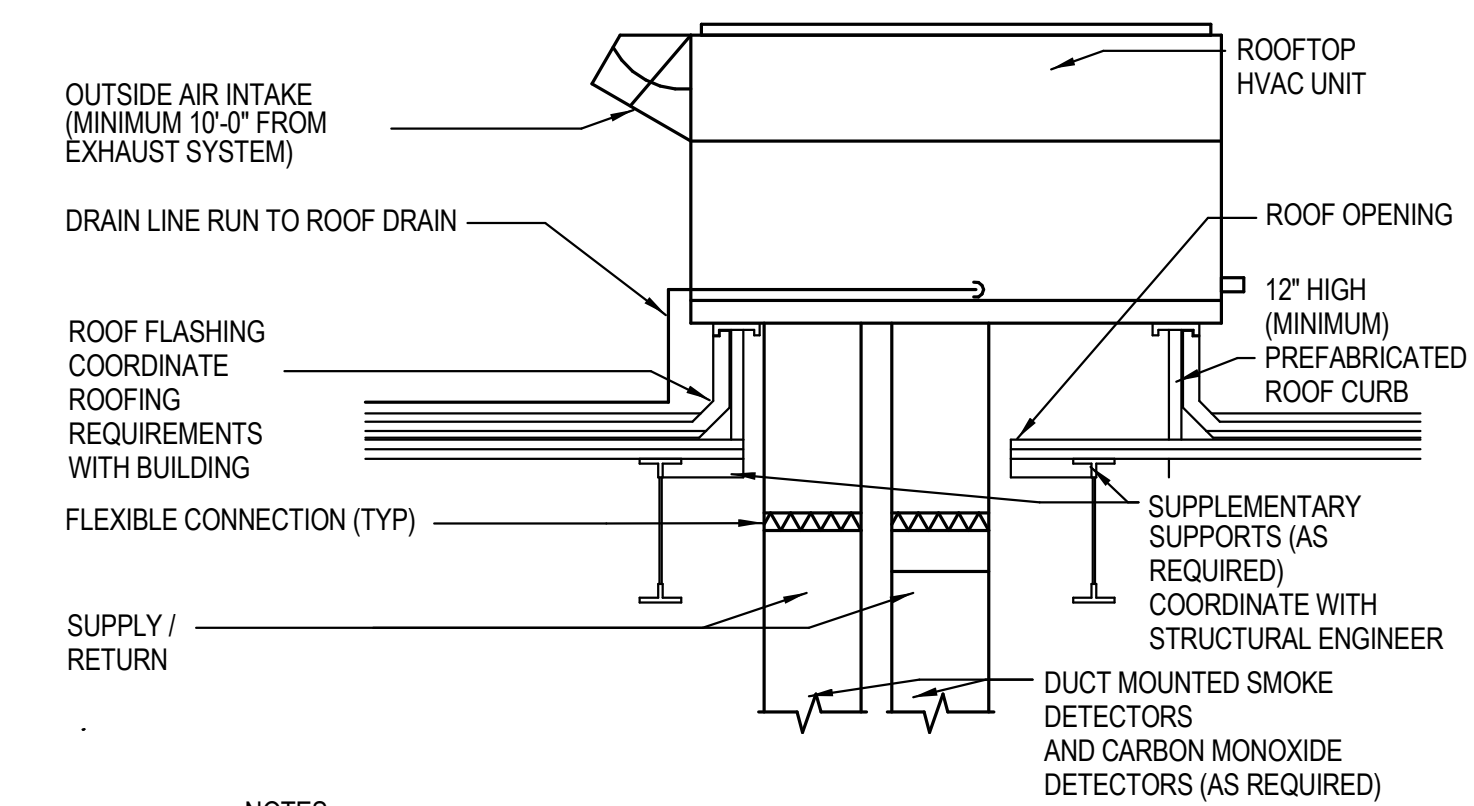


- MECHANICAL FASTENERS ARE TO BE SPOT WELDED TO DUCTWORK.
- PROVIDE SHEET METAL NOSING AS DESCRIBED IN SPECIFICATIONS.

**2 ACOUSTICAL DUCT LINING DETAIL**  
SCALE: NTS



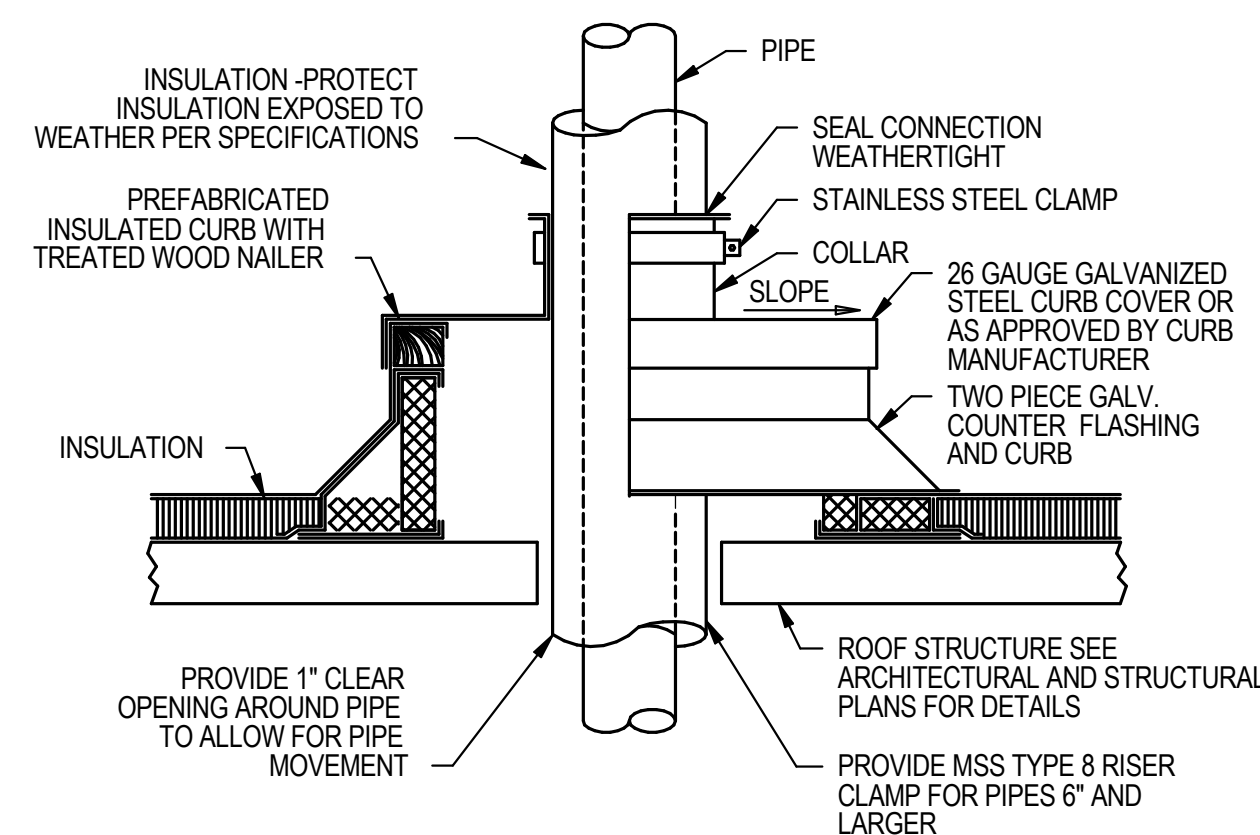
**3 ROOF EXHAUST FAN**  
SCALE: NTS



NOTES:

- CONTRACTOR SHALL FURNISH AND INSTALL ALL ROOF CURBS.
- COORDINATE ALL ROOF OPENINGS AND EQUIPMENT WEIGHTS WITH STRUCTURAL ENGINEER PRIOR TO CONSTRUCTION.
- REFER TO STRUCTURAL ENGINEERING DRAWINGS FOR SUPPLEMENTAL STEEL REQUIREMENTS.
- ALL EXTERIOR PIPING SHALL BE PROPERLY MOUNTED TO THE ROOF PER BUILDING REQUIREMENTS.
- ALL PREFABRICATED ROOF CURBS SHALL BE A MINIMUM OF 12" ABOVE FINISHED ROOF.
- CONTRACTOR SHALL COORDINATE AND RETAIN THE BUILDING APPROVED ROOF CONTRACTOR TO MAINTAIN INTEGRITY OF ROOF AND WARRANTY.

**4 ROOFTOP AC UNIT INSTALLATION**  
SCALE: NTS



**5 PIPE ROOF PENETRATION DETAIL**  
SCALE: NTS



**sweetgreen**

3102 WEST 36TH STREET  
LOS ANGELES, CALIFORNIA 90018

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**MECHANICAL  
SCHEDULES**

**M-701**

**EXISTING ROOFTOP PACKAGED AIR CONDITIONING UNIT**

DESIGNATION	SERVICE	MANUF. MODEL NUMBER	TOTAL AIRFLOW CFM	MINIMUM OUTSIDE AIR CFM	SUPPLY FAN					DX COOLING COIL		AIR FILTER			EER/SEER	ELECTRICAL DATA			VFD (Y/N)	OPERATING WEIGHT (LBS)	NOTES	
					CFM	EXT. S.P. (IN. WG.)	RPM	BHP	MOTOR HP	EAT		PD (IN. WG.)				VOLTAGE/ PHASE	UNIT MCA	UNIT MFS				
										DB (°F)	WB (°F)	SPEC. TYPE	INITIAL	FINAL								MERV RATING
RTU-1	BOH	YSJ102A3SOH	2975	600	2975	0.5	1083	-	3	80	67	-	-	-	-	11.0/14.6	230/3	48	-	Y	1100	SEE NOTES
RTU-2	FOH	YSJ210A3SOH	5500	1200	5500	0.5	1142	-	3	80	67	-	-	-	-	10.8/14.0	230/3	98	-	Y	2250	SEE NOTES

NOTES:  
1. SCHEDULE IS FOR REFERENCE ONLY. UNITS ARE EXISTING AND PROVIDED BY LANDLORD. MECHANICAL CONTRACTOR TO:  
A. BALANCE ALL UNITS TO THE SUPPLY AND MINIMUM OUTSIDE AIR QUANTITIES INDICATED.  
B. PROVIDE FACTORY AUTHORIZED PERSONNEL FOR STARTUP AND COMMISSIONING.  
C. PROVIDE MERV 13 FILTERS UPON COMPLETION OF CONSTRUCTION.  
D. PROVIDE WALL MOUNTED THERMOSTAT AND REMOTE TEMPERATURE SENSORS. THERMOSTAT TO BE WIRED TO WALL MOUNTED TEMPERATURE SENSOR. COORDINATE LOCATIONS WITH ARCHITECT.

**FANS**

DESIGNATION	SERVICE	MANUF. MODEL NUMBER	TYPE	CFM	EXTERNAL STATIC PRESSURE (IN. WG.)	RPM	BHP	MOTOR		MOTOR TYPE	OPERATING WEIGHT (LBS)	MANUFACTURER
								HP	VOLTAGE/ PHASE			
TXF-1	TOILET EXHAUST	101C28DOR60VF	DOWNBLAST	200	0.50	1842	0.192	1/3	115/1	ECM	100	COOK
KXF-1	KITCHEN EXHAUST	101 ACED OR70	DOWNBLAST	415	0.50	1842	0.192	1/2	208/1	ECM	100	COOK

NOTES:  
1. PROVIDE EXTERNAL DISCONNECT RATED FOR OUTDOOR USE. COORDINATE WITH ELECTRICAL CONTRACTOR.  
2. REFER TO MECHANICAL SPECIFICATIONS FOR VIBRATION ISOLATION AND CONTROL REQUIREMENTS. COORDINATE WITH MANUFACTURER RECOMMENDED MOUNTING REQUIREMENTS.  
3. ALL FANS ARE TO BE PROVIDED WITH INTERNAL BACKDRAFT DAMPER.  
4. COORDINATE APPROVED FAN SUBMITTAL WITH SHEET METAL CONTRACTOR PRIOR TO FABRICATION.  
5. MANUFACTURER TO PROVIDE ROOF CURB. COORDINATE CURB DIMENSIONS WITH ROOF OPENING AND FAN REQUIREMENTS. REFER TO MECHANICAL DETAILS AND FLOOR PLANS.  
6. COORDINATE ALL ROOF FLASHING REQUIREMENTS WITH BUILDING. REFER TO MECHANICAL DETAILS.  
7. FAN TO BE PROVIDED WITH MOTOR SPEED DIAL FOR BALANCING.  
8. FAN ENCLOSURE AND ACCESSORIES ARE TO BE RATED FOR OUTDOOR USE.  
9. FAN TO BE TIED INTO AC UNIT PROGRAMMABLE SCHEDULE OR TIME CLOCK IF REQUIRED. PROVIDE ALL REQUIRED CONTACTS AND INTERLOCKS.

**AIR OUTLETS AND INLETS**

DESIGNATION	MANUF. MODEL NUMBER	FACE SIZE (IN)	AIR FLOW (CFM)	NECK SIZE (IN)	NC LEVEL	MANUFACTURER
CD-A	OMNI-AA	12"X12"	0-150	8	12	TITUS
CD-B	OMNI-AA	24"X24"	0-500	12	18	TITUS
LD-A	FL-20HT	2" SLOT /4' LENGTH	0-270	8	16	TITUS
SG-A	300RL	12"X6"	0-270	-	12	TITUS
SG-B	300RL	12"X10"	250-400	-	16	TITUS
RG-A	350RL	24"X24"	0-1200	-	-	TITUS
EG-A	350RL	12"X12"	0-200	8	12	TITUS

NOTES:  
1. CONFIRM BORDER, TRIM AND FINISH DETAILS WITH ARCHITECTURAL DRAWINGS.  
2. ALL EXHAUST/RETURN INLETS SHALL BE PROVIDED WITH OPPOSED BLADE DAMPER (OBD).  
3. ALL NON-DUCTED RETURN INLETS AND SLOTS ARE TO BE PROVIDED WITH LIGHT SHIELDS.  
4. ALL SUPPLY AND EXHAUST AIR OUTLETS SHALL BE PROVIDED WITH A VOLUME DAMPER. OUTLETS LOCATED ABOVE INACCESSIBLE CEILINGS SHALL BE PROVIDED WITH CABLE OPERATED DAMPERS. COORDINATE WITH SHEET METAL CONTRACTOR.  
5. FOR ALL OUTLETS INDICATED WITH BLANKOFFS, PROVIDE NEXT LARGER NECK SIZE. REFER TO FLOOR PLAN.  
6. COORDINATE WITH MANUFACTURER RECOMMENDED NECK SIZING FOR THE SPECIFIC AIRFLOW QUANTITY OF EACH AIR OUTLET. NC LEVELS SHALL NOT EXCEED THE INDICATED VALUES.  
7. COORDINATE APPROVED AIR OUTLET SUBMITTAL AND CONNECTIONS REQUIREMENTS WITH SHEET METAL CONTRACTOR.  
8. ALL SG-A TYPE SUPPLY GRILLES ARE TO BE DOUBLE DEFLECTION AND PRE-ADJUSTED FOR 45 DEGREE DEFLECTION.

**CONDENSING UNIT SCHEDULE**

DESIGNATION	DESCRIPTION	PAIRED WITH	NUMBER OF COMPRESSORS	REFRIGERANT	WEIGHT (LB)	ELECTRICAL DATA			SUPPLIER	INSTALLER	MODEL	MANUFACTURER	REMARKS
						VOLTAGE/ PHASE	UNIT MCA	UNIT FLA					
CU-1	WALK-IN COOLER REMOTE CONDENSING UNIT	NA	1	R448A	260	208/1	25	16.3	KES	KES	BY KES	BY KES	FURNISHED WITH THE WALK-IN COOLER

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