MECHANICAL SPECIFICATIONS

PART I – GENERAL

A. CONDITIONS

1. GENERAL CONDITIONS, SUPPLEMENTARY CONDITIONS, SPECIAL CONDITIONS, AND OTHER RELATED PORTIONS OF DIVISION 1, APPLY TO THIS SECTION.

B. SUMMARY OF WORK

1. THE WORK INCLUDED CONSISTS OF FURNISHING LABOR, MATERIALS AND EQUIPMENT FOR THE INSTALLATION. IT ALSO INCLUDES PLACING INTO OPERATION A COMPLETE AND OPERABLE HEATING, VENTILATING AND AIR CONDITIONING SYSTEM AS SPECIFIED AND SHOWN. THIS INCLUDES, BUT IS NOT LIMITED TO: HVAC UNITS, EXHAUST FANS, DUCTLESS SPLIT-SYSTEMS, DUCTWORK, AIR DISTRIBUTION, CONTROLS AND ACCESSORIES, EXCEPT AS OTHERWISE NOTED.

C. REGULATIONS, CODES, PERMITS AND INSPECTIONS

1. COMPLY WITH NATIONAL, STATE, COUNTY, AND CITY CODES, ORDINANCES, ETC., HAVING JURISDICTION. THIS INCLUDES RULES AND REQUIREMENTS OF UTILITY SERVING AGENCIES.
2. INCORPORATE CODES, ORDINANCES, ETC., INTO THE BASE BID AND INSTALLATION OF WORK. NO ADDITIONAL FUNDS WILL BE ALLOCATED FOR WORK REQUIRED TO CONFORM TO REGULATIONS AND REQUIREMENTS OR TO OBTAIN APPROVAL OF WORK.
3. OBTAIN AND PAY FOR REQUIRED PERMITS AND LICENSES. WHEN REQUIRED BY CODE, WORK MUST BE INSPECTED AND APPROVED BY LOCAL AUTHORITIES. PRIOR TO FINAL APPROVAL, FURNISH ARCHITECT WITH CERTIFICATES OF INSPECTION AND APPROVALS BY LOCAL AUTHORITIES.
4. IN ADDITION, THE LATEST ADOPTED EDITION OF THE FOLLOWING CODES AND PUBLISHED STANDARDS SHALL BE ADHERED TO:
   - A. 2016 CALIFORNIA BUILDING CODE (CBC)
   - B. 2016 CALIFORNIA MECHANICAL CODE (CMC)
   - C. NFPA STANDARDS
   - D. ASHRAE HANDBOOKS
   - E. SMACNA DUCT CONSTRUCTION STANDARDS
   - F. 2016 CALIFORNIA PLUMBING CODE (CPC)
   - G. 2016 CALIFORNIA ELECTRICAL CODE (CEC)
   - H. 2016 CALIFORNIA ENERGY CODE (TITLE 24, PART 6)
   - I. 2016 CALIFORNIA GREEN BUILDING STANDARDS CODE

D. DESIGN DRAWINGS

1. DESIGN DRAWINGS ARE DIAGRAMMATIC AND ARE INTENDED ONLY TO DEFINE THE BASIC FUNCTIONS REQUIRED. PROVIDE LABOR, MATERIAL, ETC., NECESSARY TO ACCOMPLISH THESE REQUIREMENTS. MINOR DEVIATIONS FROM THE DESIGN LAYOUT ARE ANTICIPATED AND SHALL BE CONSIDERED A PART OF THE WORK INCLUDED. NO CHANGES THAT ALTER THE CHARACTER OF THE WORK WILL BE PERMITTED. DO NOT SCALE THE DESIGN DRAWINGS. SEE ARCHITECTURAL DRAWINGS FOR DIMENSIONS.
2. IF A CONFLICT OCCURS BETWEEN THE DESIGN DRAWINGS AND SPECIFICATIONS, PROMPTLY NOTIFY THE ARCHITECT AND/OR ENGINEER. AT THAT POINT, AN INTERPRETATION WILL BE MADE BY THE ARCHITECT AND/OR ENGINEER AND SAID DECISION SHALL BE CONSIDERED PART OF THE CONTRACT DOCUMENTS.

E. QUALIFICATIONS OF CONTRACTOR AND WORKMEN

1. CONTRACTOR SHALL BE PROPERLY LICENSED TO PERFORM THE WORK.

F. BASE BID

1. BASE BID SHALL INCLUDE MATERIALS AND EQUIPMENT SPECIFIED OR SCHEDULED ON THE DRAWINGS. REQUESTS FOR SUBSTITUTION OF MATERIALS AND EQUIPMENT SHALL BE BY ADDITIVE OR DEDUCTIVE ALTERNATE BID ONLY. THE FOLLOWING DATA MUST BE CLEARLY WRITTEN AT THE BEGINNING OF THE ALTERNATE PROPOSAL:
   - A. ADDITIVE OR DEDUCTIVE AMOUNT CLEARLY WRITTEN IN WORDS AND NUMERALS.
   - B. INCREASED OR REDUCED CONSTRUCTION TIME IN DAYS.
   - C. OTHER DEMONSTRABLE BENEFIT, FOR WHICH THE SUBSTITUTION OF SUCH ITEM WILL BE IN THE OWNER'S INTEREST.
2. ONLY THOSE MATERIALS AND EQUIPMENT WHICH ARE SUBMITTED AS AN ALTERNATE BID, WHICH ARE ACCOMPANIED BY THE SUPPORTING DATA INDICATED BELOW WILL BE REVIEWED AND CONSIDERED.

G. SUBSTITUTIONS

1. MATERIALS AND EQUIPMENT THAT ARE A SUBSTITUTE FROM THE LISTED MANUFACTURER MAY BE CONSIDERED. PRIOR TO PROPOSING ANY SUBSTITUTE ITEM, CONTRACTOR SHALL SATISFY HIMSELF THAT THE ITEM PROPOSED IS, IN FACT, EQUAL TO THAT SPECIFIED, THAT SUCH ITEM WILL FIT INTO THE SPACE ALLOCATED, THAT SUCH ITEM AFFORDS COMPARABLE EASE FOR OPERATION, MAINTENANCE AND SERVICE, THAT THE APPEARANCE, LONGEVITY, CAPACITY, SUITABILITY, AND ELECTRICAL CHARACTERISTICS ARE COMPARABLE, THAT BY REASON OF COST SAVINGS, REDUCED CONSTRUCTION TIME, OR SIMILAR DEMONSTRABLE BENEFIT, THE SUBSTITUTION OF SUCH ITEM WILL BE IN THE OWNER'S INTEREST.
2. THE BURDEN OF PROOF OF EQUALITY OF A PROPOSED SUBSTITUTION FOR A SPECIFIED ITEM SHALL BE UPON THE CONTRACTOR. CONTRACTOR SHALL SUPPORT HIS REQUEST WITH SUFFICIENT TEST DATA AND OTHER MEANS TO PERMIT THE ENGINEER TO MAKE A FAIR AND EQUITABLE DECISION ON THE MERITS OF THE PROPOSED SUBSTITUTION. INSUFFICIENT SUBMITTAL DATA WILL RESULT IN REJECTION OF THE PROPOSED SUBSTITUTION. ANY ITEM BY A MANUFACTURER OTHER THAN THOSE SPECIFIED, OR OF BRAND NAME, MODEL NUMBER, OR OF GENERIC SPECIES OTHER THAN THOSE SPECIFIED, WILL BE CONSIDERED A SUBSTITUTION. ENGINEER WILL BE THE SOLE JUDGE OF WHETHER OR NOT THE SUBSTITUTION IS EQUAL IN QUALITY, UTILITY AND ECONOMY TO THAT SPECIFIED.
3. APPROVAL OF A SUBSTITUTION SHALL NOT RELIEVE CONTRACTOR FROM RESPONSIBILITY FOR COMPLIANCE WITH ALL REQUIREMENTS OF THE CONTRACT. CONTRACTOR SHALL BEAR THE EXPENSE FOR ANY CHANGES IN OTHER PARTS OF THIS WORK OR OTHER WORK CAUSED BY THE PROPOSED SUBSTITUTION, INCLUDING BUT NOT LIMITED TO STRUCTURAL, ELECTRICAL, PLUMBING, AND ACCESS REQUIREMENTS.
4. IF ENGINEER REJECTS CONTRACTOR'S SUBSTITUTE ITEM ON THE FIRST SUBMITTAL, CONTRACTOR MAY MAKE ONLY ONE ADDITIONAL REQUEST FOR SUBSTITUTION IN THE SAME CATEGORY.
5. ANY EQUIPMENT SUBSTITUTED WITHOUT THE ENGINEER'S WRITTEN APPROVAL WILL BE REMOVED AND REPLACED WITH THE SPECIFIED EQUIPMENT AT THE CONTRACTOR'S EXPENSE AND AT NO ADDITIONAL COST TO THE OWNER.

H. SUBMITTALS

1. EQUIPMENT AND MATERIALS:
   - A. CONTRACTOR SHALL HAVE APPROVED SUBMITTALS PRIOR TO FABRICATION OR DELIVERY OF ANY MATERIAL AND/OR EQUIPMENT TO THE JOB SITE. SUBMIT A <u>MINIMUM</u> OF 8 (EIGHT) COPIES, COMPREHENSIVELY INDEXED SUBMITTALS IN A 3-RING BINDER, COMPLETELY DESCRIBING EACH MAJOR SYSTEM, MATERIAL AND EQUIPMENT PROPOSED TO BE USED. ANY PIECE OF EQUIPMENT PLACED ON THE JOB WITHOUT PRIOR APPROVAL WILL BE SUBJECT TO REMOVAL AT THE SOLE EXPENSE OF THE CONTRACTOR.
   - B. SUBMITTALS ARE FOR INFORMATION AND COORDINATION ONLY. REVIEW OF MATERIAL AND/OR EQUIPMENT SUBMITTALS SHALL IN NO WAY RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY TO COMPLY WITH PLANS AND SPECIFICATIONS REQUIREMENTS. POINTS OF NON-COMPLIANCE WHICH ARE NOT NOTED SHALL NOT BE CONSTRUED TO BE AN APPROVAL OF THE NON-COMPLIANCE. <u>SUBMITTALS SHALL CLEARLY STATE WHERE EQUIPMENT DOES NOT AGREE WITH THE CONTRACT DOCUMENTS.</u>
   - C. SUBMITTALS SHALL INCLUDE MANUFACTURER'S SPECIFICATIONS, PHYSICAL DIMENSIONS, WEIGHTS AND RATINGS OF EQUIPMENT SUBMITTED. INDICATE EQUIPMENT LAYOUTS, ELECTRICAL CHARACTERISTICS, WIRING AND CONTROL DIAGRAMS, SIZES AND LOCATIONS OF PIPING, DUCT, CONDUITS, AND OTHER CONNECTION SIZES AND LOCATIONS.
2. SHOP DRAWINGS:
   CONTRACTOR SHALL PREPARE AND SUBMIT DETAILED 1/4"=1'-0" SCALE DRAWINGS THAT HAVE BEEN PROPERLY COORDINATED WITH OTHER TRADES. INDICATE LOCATION AND SIZES OF ACCESS PANELS IN HARD CEILINGS FOR EQUIPMENT AND DAMPER ACCESS.
3. AS BUILT DRAWINGS:
   MAINTAIN ACCURATE RECORDS OF ANY CHANGES FROM THE CONTRACT DOCUMENTS AND SHOP DRAWINGS. UPON COMPLETION OF THE PROJECT, DELIVER TO THE ENGINEER ONE (1) SET OF LEGIBLE REPRODUCIBLES AND (3) BLUELINE SETS OF THESE RECORD DRAWINGS.
4. WARRANTY:
   UNLESS SPECIFIED OTHERWISE BY ARCHITECT, ENGINEER, OWNER OR OWNER'S REPRESENTATIVE, UPON COMPLETION OF THE PROJECT, DELIVER TO THE OWNER A WRITTEN ONE (1) YEAR WARRANTY ON THE SYSTEMS, MATERIALS AND ALL WORK PERFORMED. THIS INCLUDES THE ENTIRE COST, INCLUDING MATERIALS AND/OR LABOR, OF CORRECTIVE WORK REQUIRED AND NECESSITATED BY DEFECTS IN MATERIALS AND/OR WORKMANSHIP. CONTRACTOR SHALL ALSO PRESENT THE OWNER WITH A COPY OF ALL MANUFACTURER'S WARRANTIES THAT EXCEED THE WARRANTY PERIOD, SUCH AS AC UNIT COMPRESSORS.
5. OPERATION AND MAINTENANCE INSTRUCTIONS:
   UPON THE COMPLETION OF THE PROJECT, DELIVER TO THE OWNER THE REQUIRED NUMBER OF COPIES OF HARD BOUND O & M MANUALS. INCLUDE IN THE MANUAL INSTRUCTIONS PREPARED SPECIFICALLY FOR THE SYSTEMS PROVIDED, ALONG WITH DESCRIPTIONS, PARTS LIST, INSTRUCTIONS, AND WARRANTIES. START-UP REPORTS FOR ALL EQUIPMENT WILL BE DELIVERED WITH THE MATERIALS AND EQUIPMENT UTILIZED IN THE PROJECT. IDENTIFY EACH ITEM BY THE DESIGNATION APPEARING ON THE DRAWINGS.
6. OWNER TRAINING:
   AT A TIME DESIGNATED BY THE OWNER, PROVIDE A SUITABLE TECHNICIAN, MECHANIC OR ENGINEER TO REVIEW THE SYSTEMS WITH OWNER'S REPRESENTATIVE TO THOROUGHLY FAMILIARIZE HIM WITH THE OPERATIONS AND MAINTENANCE OF THE SYSTEMS. UP TO (8) EIGHT HOURS TOTAL TRAINING TIME SHALL BE REQUIRED WITHOUT ADDITIONAL COST TO THE OWNER. PRIOR TO TRAINING THE OWNER SHALL HAVE TAKEN POSSESSION OF THE O & M MANUALS, AND SHALL HAVE HAD A REASONABLE AMOUNT OF TIME FOR THE PERSONNEL TO FAMILIARIZE THEMSELVES WITH THE CONTENTS OF THE MANUALS.

PART II – PRODUCTS

A. GENERAL PRODUCTS

1. SEISMIC RESTRAINTS:
   - A. WHERE REQUIRED BY THE BUILDING OFFICIALS/BUILDING CODES, FURNISH AND INSTALL SEISMIC RESTRAINTS FOR DUCTWORK, PIPING, AND EQUIPMENT. SEISMIC RESTRAINTS SHALL BE DESIGNED TO RESIST SEISMIC FORCES PRESCRIBED IN THE BUILDING CODES FOR THE PROJECT LOCATION.
   - B. WHERE REQUIRED BY THE BUILDING OFFICIAL, PROVIDE STRUCTURAL CALCULATIONS SEALED AND SIGNED BY A LICENSED STRUCTURAL ENGINEER.
   - C. REFERENCE THE LATEST EDITION OF THE SMACNA SEISMIC RESTRAINT MANUAL FOR GUIDELINES.
2. FURNISH AND INSTALL NEW PRODUCTS OF ESTABLISHED AND REPUTABLE MANUFACTURERS. SEE LIST OF ACCEPTABLE MANUFACTURERS ELSEWHERE IN THESE SPECIFICATIONS. MAKE NO EQUIPMENT SUBSTITUTIONS THAT WOULD LEAVE INADEQUATE OPERATING OR SERVICING SPACE. REFER TO 'SUBSTITUTIONS' SECTION OF THE SPECIFICATION.
3. ACCESSORIES REQUIRED FOR PROPER OPERATION OF THE SYSTEMS, EVEN THOUGH NOT SPECIFICALLY INDICATED, SHALL BE INCLUDED AND INSTALLED. SUCH ACCESSORIES MAY INCLUDE, BUT ARE NOT LIMITED TO, FILTERS, CONDENSATE DRAINS, RELIEF VALVES, SERVICE VALVES, THERMOSTATS, VIBRATION ISOLATORS, ETC. MOTOR STARTERS FOR PREWIRED EQUIPMENT AND OTHER PROTECTION AND CONTROL DEVICES ARE TO BE FURNISHED UNDER THE MECHANICAL CONTRACTOR'S SCOPE OF WORK. STARTERS FOR NON-PREWIRED EQUIPMENT, I.E., FANS, PUMPS ETC., ARE UNDER THE ELECTRICAL CONTRACTOR'S SCOPE OF WORK, UNLESS NOTED OTHERWISE.
4. SPECIFIC REFERENCE TO A MANUFACTURER'S PRODUCT IS ONLY TO ESTABLISH TYPE, QUALITY, AND PERFORMANCE REQUIRED. THESE QUALIFICATIONS ARE IN ADDITION TO THE REQUIREMENTS SHOWN ON THE PLANS AND ELSEWHERE IN THESE SPECIFICATIONS. LISTING OF ALTERNATE EQUIPMENT MANUFACTURERS SHALL NOT BE CONSTRUED AS AN UNCONDITIONAL APPROVAL OF THE PRODUCTS OF THOSE MANUFACTURERS.

B. AIR CONDITIONING UNITS

1. FURNISH AND INSTALL HEATING/COOLING UNITS WITH CAPACITIES AS SCHEDULED. UNITS SHALL BE COMPLETE WITH HERMETICALLY SEALED COMPRESSOR WITH HIGH AND LOW PRESSURE CUT-OFFS, COILS, HEATING SECTION, BLOWERS, NECESSARY REFRIGERANT PIPING, INSULATED COMPRESSOR COMPARTMENT, AIR COOLED CONDENSER, CONDENSER BLOWER OR FAN, AUTOMATIC CONTROLS, CONTROL PANEL WITH STARTERS, RELAYS, ETC. FOR SINGLE POINT POWER CONNECTION, WITHIN A WEATHERPROOF, INSULATED DECORATIVE CASING. UNITS SHALL BE FURNISHED WITH (1) ONE CONSTRUCTION SET OF FILTERS, INSTALLED PRIOR TO START-UP. REPLACE FILTERS AT SUBSTANTIAL COMPLETION BEFORE TEST AND BALANCE ACTIVITIES COMMENCE. FURNISH ONE COMPLETE SET OF SPARE FILTERS TO OWNER. FURNISH ONE COMPLETE SET OF BELTS.
2. UNITS SHALL BE COMPLETELY FACTORY WIRED FOR TERMINAL CONNECTIONS OF THERMOSTAT WITH A FAN-AUTO/MANUAL SWITCH AND A SYSTEM HEAT/OFF/COOL/AUTO SWITCH. UNITS SHALL BE INSTALLED IN STRICT ACCORDANCE WITH MANUFACTURER'S WRITTEN RECOMMENDATIONS, COMPLETE WITH ALL SCHEDULED AND NECESSARY ACCESSORIES FOR EFFICIENT AND PROPER OPERATION.

C. EXHAUST FAN AND VENT UNITS

1. FURNISH AND INSTALL DIRECT DRIVE CENTRIFUGAL ROOF EXHAUST FANS WITH CAPACITIES AS SCHEDULED. UNITS SHALL BE COMPLETE WITH ALUMINUM HOUSING, BACKWARD INCLINED WHEEL, ALUMINUM CURB CAP WITH PREPUNCHED MOUNTING HOLES, BIRDSCREEN, BALL BEARING MOTORS, SLEEVE BEARING MOTORS, MOTOR ISOLATED ON SHOCK MOUNTS, CORROSION RESISTANT FASTENERS, ETC.
2. FURNISH AND INSTALL BELT DRIVE UPBLAST CENTRIFUGAL ROOF EXHAUST FANS WITH CAPACITIES AS SCHEDULED. UNITS SHALL BE COMPLETE WITH ALUMINUM HOUSING, BACKWARD INCLINED ALUMINUM WHEEL, MOTOR AND DRIVES ISOLATED ON SHOCK MOUNTS, DRAIN TROUGH, ADJUSTABLE MOTOR PULLEY, ADJUSTABLE MOTOR PLATE, FAN SHAFT MOUNTED IN BALL BEARING PILLOW BLOCKS, BEARINGS THAT MEET OR EXCEED TEMPERATURE RATING OF FAN, STATIC RESISTANT BELTS, CURB CAP WITH PREPUNCHED MOUNTING HOLES, BALL BEARING MOTORS, CORROSION RESISTANT FASTENERS, ETC.
3. UNITS SHALL BE COMPLETELY FACTORY WIRED AND INSTALLED IN STRICT ACCORDANCE WITH MANUFACTURER'S WRITTEN RECOMMENDATIONS, COMPLETE WITH ALL SCHEDULED AND NESESSARY ACCESSORIES FOR EFFICIENT AND PROPER OPERATION.

D. DUCTWORK

1. PROVIDE A COMPLETE SYSTEM OF DUCTWORK FABRICATED AND INSTALLED IN STRICT ACCORDANCE WITH LATEST VERSIONS OF THE ASHRAE FUNDAMENTALS HANDBOOK AND SMACNA DUCT CONSTRUCTION STANDARDS. DUCT SYSTEM SHALL BE CONSTRUCTED AS REPRESENTED ON THESE DRAWINGS AND AS COORDINATED IN DETAIL ON THE APPROVED DUCTWORK SHOP DRAWINGS. IF ADDITIONAL CHANGES IN DUCT ARRANGEMENT OR IN DUCT SIZES ARE REQUIRED, THEY SHALL BE MADE ONLY AFTER WRITTEN APPROVAL IS OBTAINED FROM THE ENGINEER.
2. MAIN AND BRANCH DUCTS SHALL BE RECTANGULAR, ROUND, OR FLAT-OVAL, AND SHALL BE CONSTRUCTED OF GALVANIZED SHEET METAL UNLESS NOTED OTHERWISE. DUCT SIZES SHOWN ON THE DRAWINGS ARE NET OPENINGS AND SHALL BE INCREASED TO ACCOMMODATE DUCT LINING WHERE APPLICABLE.
3. FLEXIBLE DUCT SHOWN AT CONNECTION TO AIR DISTRIBUTION DEVICES SHALL BE A FABRICATED ASSEMBLY WITH AN ACOUSTICALLY-RATED CORE CONSISTING OF AN INNER SLEEVE, 2-INCH THICK FIBERGLASS INSULATION, WITH AN R-6.0 MINIMUM AND AN OUTER VAPOR BARRIER COVERING EQUAL TO THERMAFLEX M-KE.
4. WHETHER SHOWN ON PLANS OR NOT, PROVIDE MANUAL VOLUME DAMPERS IN EACH RUNOUT TO EACH SUPPLY DIFFUSER OR REGISTER, RETURN AND EXHAUST GRILLE AND ALSO AS REQUIRED FOR A PROPERLY BALANCED SYSTEM. PROVIDE ACCESS PANELS TO DAMPERS LOCATED ABOVE HARD CEILINGS.
5. VOLUME DAMPERS FOR RECTANGULAR DUCTS SHALL BE CONSTRUCTED OF 16 GAUGE GALVANIZED STEEL, BE OF THE OPPOSED BLADE TYPE AND BE FURNISHED WITH LOCKING AND INDICATING QUADRANTS. DAMPERS FOR ROUND DUCTS SHALL BE SINGLE-BLADE TYPE UP TO 30"ø. USE CONTINUOUS ROD ON 2" W.G. CLASS DAMPERS FROM 12"ø-28"ø, AND RECTANGULAR DUCTS FROM 18"-48" WIDE.
6. ROUND TAPS FOR FACTORY-MADE AIR DUCTS IN SECTIONS OF ROUND SHEET METAL DUCTS SHALL BE MADE WITH ANY OF THE FITTINGS LISTED BELOW:
   - A. CONICAL TEE.
   - B. CONICAL SADDLE TAP.
   - C. ELBOW (IF LAST FITTING).
   - D. 45° TEE OR SADDLE TAP.
7. ROUND TAPS FOR FACTORY-MADE AIR DUCTS IN SECTIONS OF RECTANGULAR SHEET METAL DUCTS SHALL BE MADE WITH ANY OF THE FITTINGS LISTED BELOW:
   - A. COLLAR (CONICAL).
   - B. COLLAR (STRAIGHT, ONLY WHEN SHOWN ON DRAWINGS).
8. DOVETAILED CUTOFFS ARE NOT ACCEPTABLE. DUCT TAPE OR OTHER PRESSURE SENSITIVE TAPES ARE NOT ACCEPTABLE.
9. TAPS IN SECTIONS OF ROUND FACTORY-MADE FLEXIBLE AIR DUCTS (WHEN ALLOWED) SHALL BE MADE BY INSERTING, IN THE FLEXIBLE DUCT SECTION, ANY OF THE SHEET METAL FITTINGS LISTED BELOW:
   - A. 90 DEGREE CONICAL STRAIGHT TEE.
   - B. 45 DEGREE STRAIGHT LATERAL.
   - C. 45 DEGREE STRAIGHT LATERAL WITH 45 DEGREE ELBOW.
   - D. 45 DEGREE STRAIGHT LATERAL CROSS.
   - E. Y BRANCH WITH 45 DEGREE ELBOW.

E. DUCT INSULATION

1. THERMAL INSULATION:
   - A. CONCEALED SUPPLY DUCTS AND RETURN DUCTS ABOVE CEILING OR IN FURRED SPACES SHALL BE THERMALLY INSULATED.
   - B. THERMAL INSULATION SHALL BE FLEXIBLE BLANKET GLASS FIBER INSULATION WITH FACTORY APPLIED FLAME RETARDANT, FOIL-SCRIM-KRAFT VAPOR BARRIER (FSK), MAXIMUM K OF 0.30 AT 75 DEGREES F MEAN TEMPERATURE MINIMUM .75 POUND DENSITY. INSULATION SHALL BE 2" THICK.
   - C. INSULATION SHALL BE APPLIED OVER SURFACES WHICH HAVE BEEN WIPED CLEAN AND DRY AND SHALL HAVE 3-INCH MINIMUM OVERLAP ON BOTH LONGITUDINAL AND TRANSVERSE SEAMS.
   - D. SUPPLY AND RETURN DUCTS LOCATED OUTSIDE SHALL BE LINED WITH 2" ACOUSTICAL LINER AND SEALED WATER TIGHT, OR INSULATED EXTERNALLY WITH 2" RIGID BOARD AND ALUMINUM LAGGING SEALED WATER TIGHT.

F. AIR FILTERS

1. REPLACEABLE (THROWAWAY) PANEL FILTERS:
   - A. PROVIDE FACTORY-FABRICATED, VISCOUS-COATED, FLAT PANEL TYPE REPLACEABLE AIR FILTERS WITH HOLDING FRAMES AS INDICATED, IN SIZES I INDICATED, WITH 2" THICK UL CLASS 2 THROWAWAY MEDIA MATERIAL, CONSTRUCT MEDIA OF INTERLACED GLASS FIBERS, SPRAY WITH NON-FLAMMABLE ADHESIVE, FRAME IN THROWAWAY FIBERBOARD CASINGS, AND SANDWICH BETWEEN PERFORATED METAL GRILLES.
   - B. CONSTRUCT DUCTWORK-HOLDING FRAMES OF 20-GA. GALVANIZED STEEL, CAPABLE OF HOLDING MEDIA AND MEDIA FRAME IN PLACE, AND GASKETED TO PREVENT UNFILTERED AIR BY-PASSING BETWEEN MEDIA FRAMES AND HOLDING MEMBERS.
   - C. PROVIDE FILTERS WITH RATED FACE VELOCITY OF 500 FPM, INITIAL RESISTANCE OF OT GREATER THAN 0.30" W.G., FINAL RATED RESISTANCE OF 0.50" W.G., AND AVERAGE ARRESTANCE OF 80%.

F. LIST OF ACCEPTABLE MANUFACTURERS

1. FOLLOWING IS A LIST OF MANUFACTURES WHOSE EQUIPMENT IS ACCEPTABLE AS TO MANUFACTURE, SUBJECT TO CONFORMANCE WITH THE DRAWINGS AND SPECIFICATIONS. CAREFUL CHECKING MUST BE MADE TO VERIFY THAT EQUIPMENT WILL MEET CAPACITIES, REQUIREMENTS, SPACE AND WEIGHT ALLOCATIONS.
   - A. HVAC PACKAGED EQUIPMENT: CARRIER OR APPROVED EQUAL BY ARCHITECT/ENGINEER
   - B. FANS: GREENHECK, COOK, ACME, PENN, PRICE
   - C. AIR DEVICES: TITUS, KREUGER, METAL-AIRE, PRICE
   - D. INSULATION: CERTAINTEED, OWENS-CORNING, MANVILLE, KNAUF
   - E. UNIT HEATERS: CHROMOLOX, REZNOR, Q-MARK, MARKEL
   - F. DUCT SEALANT: DESIGN POLYMERICS, MCGILL AIRFLOW, CANVAS TAPE AND ARABOL
   - G. VARIABLE FREQUENCY DRIVE: ALLEN-BRADLEY, ASEA BROWN BOVERI (ABB), CUTLER-HAMMER, SQUARE D, TOSHIBA.
   - H. SPRING ISOLATION RAILS: MICRO-METAL.
   - I. SPLIT SYSTEM HEAT PUMP UNITS: CARRIER, TRANE, SANYO
   - J. AIR FILTERS: AFF, FARR OR FLANDERS.
2. APPROVAL FOR SUBSTITUTIONS MUST BE MADE IN ACCORDANCE WITH PART 1, SECTION G "SUBSTITUTIONS" OF THESE SPECIFICATIONS.

PART III – EXECUTION

A. GENERAL

1. INSTALL MATERIALS AND EQUIPMENT IN AN ARRANGEMENT THAT WILL GIVE THE GREATEST PRACTICAL EASE OF OPERATION AND SERVICE TO THE OWNER.
2. INSTALL EQUIPMENT IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDED INSTALLATION PROCEDURES.
3. PERFORM WORK IN ACCORDANCE WITH THE BEST TRADE PRACTICES. INSTALL MATERIALS AND EQUIPMENT SQUARELY WITH THE BUILDING LINES. PROVIDE RIGID PERMANENT BASES AND SUPPORTS FOR WORK.
4. CONSTRUCT AND BRACE EQUIPMENT, PIPING, ETC., SO THAT THERE WILL BE NO VIBRATION AND/OR RATTLING WHEN THE SYSTEM IS IN OPERATION.
5. COVER AND PROTECT EQUIPMENT AND MATERIALS FROM WEATHER, THEFT, ETC., UNTIL DATE OF COMPLETION. PLUG AND/OR CAP OPEN ENDS OF INSTALLED PIPING AND/OR DUCTWORK PENDING EXTENSION OR FINAL CONNECTION.

B. DUCTWORK

1. CONSTRUCT DUCTWORK WITH MATERIAL, GAUGES, JOINTS, BRACING AND SUPPORTS IN ACCORDANCE WITH LATEST SMACNA STANDARDS.
2. DUCTWORK SHALL BE RIGIDLY CONSTRUCTED AND SUBSTANTIALLY AIR-TIGHT. SEAL ALL DUCTWORK WITH A WATER BASED DUCT SEALANT (DESIGN POLYMERICS DP-1010 OR EQUAL) OR ARABOL AND CANVAS TAPE. DO NOT UTILIZE PRESSURE SENSITIVE TAPES. SEAL DUCTWORK IN ACCORDANCE WITH TABLE 4-1 "APPLICABLE LEAKAGE CLASSES" OF THE LATEST SMACNA HVAC LEAKAGE TEST MANUAL.
3. MAKE CONNECTIONS BETWEEN FLEXIBLE DUCTS AND RIGID TRUNK DUCTS WITH FACTORY FABRICATED FITTINGS WITH DAMPER. SECURE FLEX DUCT TO FITTING WITH CLAMPS OR PANDUIT STRAPS INSTALLED TO FACTORY RECOMMENDED TENSION. INSTALL CLAMPS ON LINER AND SECOND CLAMP OVER JACKET. JOB INSPECTION MAY REQUIRE REMOVAL AND REPLACEMENT OF A RANDOM SAMPLING OF CONNECTIONS.
4. ELBOWS SHALL HAVE A THROAT RADIUS EQUAL TO 1-1/2 TIMES THE DUCT WIDTH. SQUARE ELBOWS SHALL HAVE TURNING VANES OR SPLITTER. TRANSITIONS SHALL NOT EXCEED 4 TO 1 ASPECT RATIO.

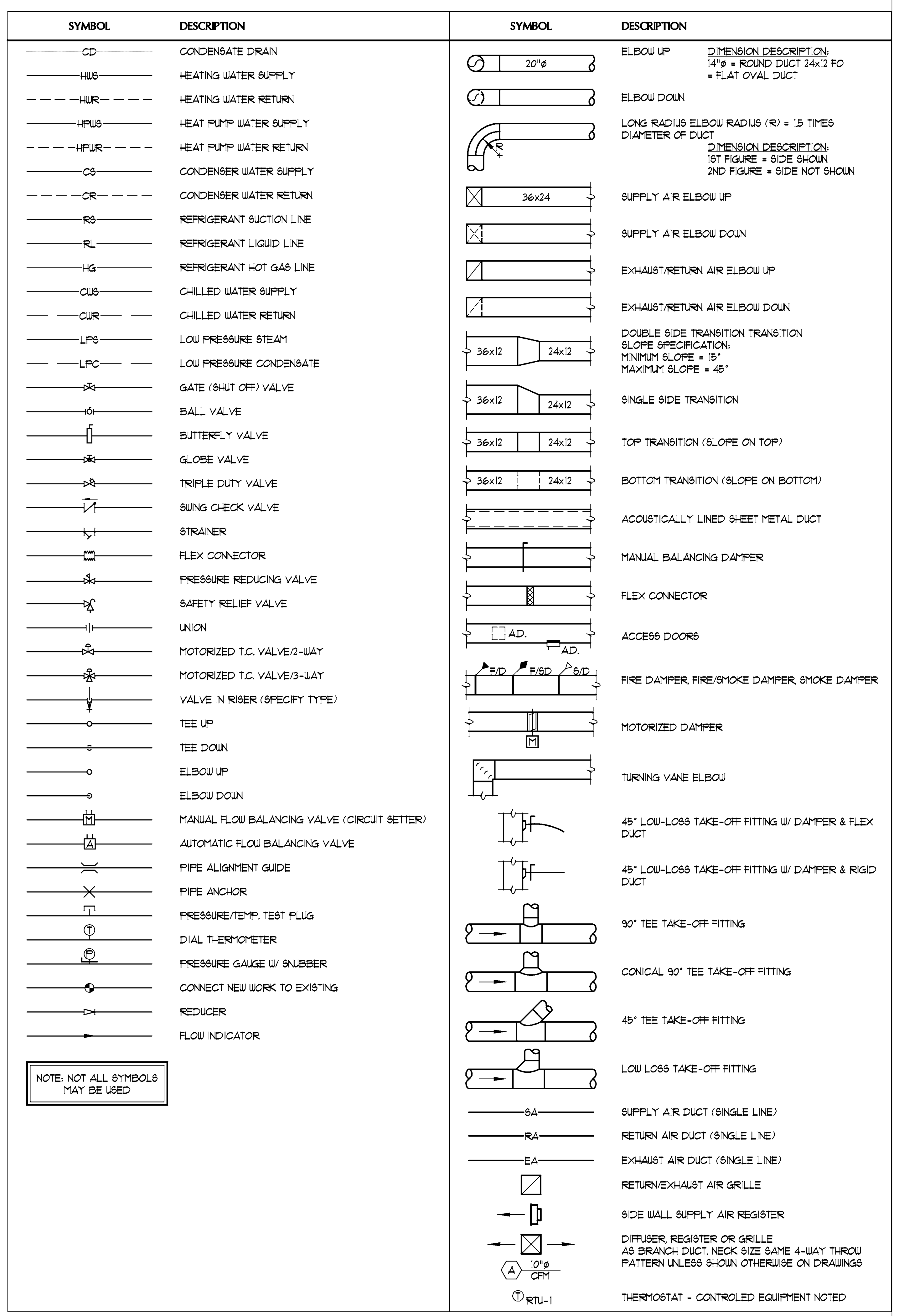
C. AUTOMATIC TEMPERATURE CONTROLS & AUTOMATIC SHUT–OFF

1. ROOFTOP AC UNITS SHALL BE TURNED ON/OFF WITH PROGRAMMABLE 7-DAY THERMOSTATS. THERMOSTATS SHALL BE SET FOR CONTINUOUS FAN OPERATION.
2. EXHAUST FANS ARE CONTROLLED AS SPECIFIED IN THE EXHAUST FAN SCHEDULE.
3. AIR CONDITIONING UNITS SHALL BE EQUIPPED WITH IONIZATION TYPE DUCT DETECTOR, UNLESS INDICATED OTHERWISE.
4. DUCT SMOKE DETECTOR SHALL BE LOCATED IN THE MAIN SUPPLY AND RETURN - AIR DUCT AHEAD OF ANY BRANCH TAKE-OFFS, AND INSTALLED PER MANUFACTURER'S WRITTEN INSTALLATION INSTRUCTIONS.
5. WHERE REQUIRED BY BUILDING OFFICIALS, ACTIVATION OF ANY SMOKE DETECTOR SHALL CAUSE THE AIR-MOVING EQUIPMENT TO AUTOMATICALLY SHUT DOWN. WHERE A SYSTEM CONSISTS OF MORE THAN ONE AIR CONDITIONER, ACTIVATION OF ANY OF THE SMOKE DETECTORS IN ANY OF THE AIR CONDITIONERS SERVING THE COMMON AREA SHALL CAUSE ALL AIR-MOVING EQUIPMENT SERVING THAT COMMON AREA TO SHUT DOWN.
6. WIRING OF THE SMOKE DETECTORS SHALL BE THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR AND SHALL BE DONE IN ACCORDANCE WITH THE REQUIREMENTS OF THE NEC AND ELECTRICAL SECTIONS OF THE SPECIFICATION.
7. FIRE ALARM CONTRACTOR SHALL CONNECT ALL FIRE/SMOKE DAMPERS TO THE FIRE CONTROL SYSTEM, AS REQUIRED BY LOCAL BUILDING AUTHORITY. THE FIRE ALARM CONTRACTOR SHALL PROVIDE AND INSTALL THE CEILING MOUNTED SMOKE DETECTOR STATUS LIGHTS.

D. TESTING AND BALANCING

1. THE HVAC SYSTEM AND COMPONENTS SHALL BE TESTED, ADJUSTED AND BALANCED IN ACCORDANCE WITH ONE OF THE FOLLOWING STANDARDS.
   - A. TABB CONSTRUCTION SPECIFICATION INSTITUTE MASTER FORMAT (23 05 93 AND 15990)
   - B. NEBB STANDARDS FOR TESTING, ADJUSTMENT AND BALANCING OF ENVIRONMENTAL SYSTEM (7TH EDITION)
   - C. AABC NATIONAL STANDARD FOR TOTAL SYSTEM BALANCING (6TH EDITION).
2. A COMPLETE BALANCING REPORT SHALL BE SUBMITTED TO THE ENGINEER UPON COMPLETION. THE BALANCING REPORT SHALL INCLUDE DESIGN QUANTITIES AND ACTUAL (MEASURED) QUANTITIES FOLLOWING BALANCING. BALANCING SHALL BE COMPLETED TO THE SATISFACTION OF THE ENGINEER. T.A.B. CONTRACTOR SHALL BE A.A.B.C. OR N.E.E.B. CERTIFIED, OR COMPANY APPROVED BY ENGINEER.
3. INCLUDE IN BID, AS PART OF THE WORK IN THIS CONTRACT, ANY ADJUSTMENTS TO OR REPLACEMENT OF PULLEYS, BELTS, MOTORS, DAMPERS, ETC., REQUIRED FOR CORRECT BALANCING OF SYSTEMS. CONTRACTOR OR EQUIPMENT SUPPLIER TO FURNISH THE ABOVE LISTED ITEMS TO T.A.B. CONTRACTOR TO INSTALL.
4. TEST AND ADJUST AIR DEVICES TO WITHIN PLUS OR MINUS 5 PERCENT OF DESIGN REQUIREMENTS.
5. T.A.B. CONTRACTOR SHALL ADJUST THE DEFLECTION OF ALL APPLICABLE SUPPLY AIR DISTRIBUTION FOR PROPER AIR FLOW DIRECTION AND CHARACTERISTICS AS RECOMMENDED BY THE MANUFACTURER AND/OR TO THE SATISFACTION OF THE ENGINEER AND OWNER.

HVAC LEGEND



SYMBOL	DESCRIPTION
CD	CONDENSATE DRAIN
HWS	HEATING WATER SUPPLY
HWR	HEATING WATER RETURN
HPWS	HEAT PUMP WATER SUPPLY
HPWR	HEAT PUMP WATER RETURN
CS	CONDENSER WATER SUPPLY
CR	CONDENSER WATER RETURN
RS	REFRIGERANT SUCTION LINE
RL	REFRIGERANT LIQUID LINE
HG	REFRIGERANT HOT GAS LINE
CWS	CHILLED WATER SUPPLY
CWR	CHILLED WATER RETURN
LPS	LOW PRESSURE STEAM
LPC	LOW PRESSURE CONDENSATE
	GATE (SHUT OFF) VALVE
	BALL VALVE
	BUTTERFLY VALVE
	GLOBE VALVE
	TRIPLE DUTY VALVE
	SWING CHECK VALVE
	STRAINER
	FLEX CONNECTOR
	PRESSURE REDUCING VALVE
	SAFETY RELIEF VALVE
	UNION
	MOTORIZED T.C. VALVE/2-WAY
	MOTORIZED T.C. VALVE/3-WAY
	VALVE IN RISER (SPECIFY TYPE)
	TEE UP
	TEE DOWN
	ELBOW UP
	ELBOW DOWN
M	MANUAL FLOW BALANCING VALVE (CIRCUIT SETTER)
A	AUTOMATIC FLOW BALANCING VALVE
	PIPE ALIGNMENT GUIDE
	PIPE ANCHOR
	PRESSURE/TEMP. TEST PLUG
T	DIAL THERMOMETER
P	PRESSURE GAUGE W/ SNUBBER
	CONNECT NEW WORK TO EXISTING
	REDUCER
	FLOW INDICATOR

NOTE: NOT ALL SYMBOLS MAY BE USED

SYMBOL	DESCRIPTION
20"ø	ELBOW UP — <u>DIMENSION DESCRIPTION:</u> 14"ø = ROUND DUCT 24x12 FO = FLAT OVAL DUCT
	ELBOW DOWN
R	LONG RADIUS ELBOW RADIUS (R) = 1.5 TIMES DIAMETER OF DUCT <u>DIMENSION DESCRIPTION:</u> 1ST FIGURE = SIDE SHOWN 2ND FIGURE = SIDE NOT SHOWN
36x24	SUPPLY AIR ELBOW UP
	SUPPLY AIR ELBOW DOWN
	EXHAUST/RETURN AIR ELBOW UP
	EXHAUST/RETURN AIR ELBOW DOWN
36x12 24x12	DOUBLE SIDE TRANSITION TRANSITION SLOPE SPECIFICATION: MINIMUM SLOPE = 15° MAXIMUM SLOPE = 45°
36x12 24x12	SINGLE SIDE TRANSITION
36x12 24x12	TOP TRANSITION (SLOPE ON TOP)
36x12 24x12	BOTTOM TRANSITION (SLOPE ON BOTTOM)
	ACOUSTICALLY LINED SHEET METAL DUCT
	MANUAL BALANCING DAMPER
	FLEX CONNECTOR
A.D. A.D.	ACCESS DOORS
F/D F/SD S/D	FIRE DAMPER, FIRE/SMOKE DAMPER, SMOKE DAMPER
M	MOTORIZED DAMPER
	TURNING VANE ELBOW
	45° LOW-LOSS TAKE-OFF FITTING W/ DAMPER & FLEX DUCT
	45° LOW-LOSS TAKE-OFF FITTING W/ DAMPER & RIGID DUCT
	90° TEE TAKE-OFF FITTING
	CONICAL 90° TEE TAKE-OFF FITTING
	45° TEE TAKE-OFF FITTING
	LOW LOSS TAKE-OFF FITTING
SA	SUPPLY AIR DUCT (SINGLE LINE)
RA	RETURN AIR DUCT (SINGLE LINE)
EA	EXHAUST AIR DUCT (SINGLE LINE)
	RETURN/EXHAUST AIR GRILLE
	SIDE WALL SUPPLY AIR REGISTER
A 10"ø CFM	DIFFUSER, REGISTER OR GRILLE AS BRANCH DUCT. NECK SIZE SAME 4-WAY THROW PATTERN UNLESS SHOWN OTHERWISE ON DRAWINGS
T RTU-1	THERMOSTAT - CONTROLED EQUIPMENT NOTED

STANDARD ABBREVIATIONS

AC	AIR CONDITIONING UNIT	EWT	ENTERING WATER TEMPERATURE	OBD	OPPOSED BLADE DAMPER
AD	ACCESS DOOR	EXH	EXHAUST	PD	PRESSURE DROP
AFF	ABOVE FINISHED FLOOR	FPM	FEET PER MINUTE	PSI	POUNDS/SQUARE INCH
AHU	AIR HANDLING UNIT	FT	FEET OR FOOT	RA	RETURN AIR
AMB	AMBIENT	GPM	GALLONS PER MINUTE	RH	RELATIVE HUMIDITY
APD	AIR PRESSURE DROP	HC	HEATING COIL	RT	ROOFTOP UNIT
APPROX	APPROXIMATE	HP	HORSEPOWER	SA	SUPPLY AIR
AVG	AVERAGE	HWR	HOT WATER RETURN	FSD	FIRE/SMOKE DAMPER
BDD	BACK DRAFT DAMPER	HWS	HOT WATER SUPPLY	SP	STATIC PRESSURE
BHP	BRAKE HORSE POWER	HX	HEAT EXCHANGER	SPEC	SPECIFICATIONS
BOD	BOTTOM OF DUCT	IN	INCHES	SL	SEA LEVEL
BTU/H	BRITISH THERMAL UNIT/HOUR	INWG	INCHES IN WATER GAUGE	SQ	SQUARE
CAP	CAPACITY	INWC	INCHES IN WATER COLUMN	SS	STAINLESS STEEL
CFM	CUBIC FEET PER MINUTE	LAT	LEAVING AIR TEMPERATURE	T.A.B.	TEST AND BALANCING
CU	CONDENSING UNIT	LWT	LEAVING WATER TEMPERATURE	TCP	TEMPERATURE CONTROL PANEL
CP	CONDENSATE PUMP	MAU	MAKEUP AIR UNIT	TEMP	TEMPERATURE
CUH	CABINET UNIT HEATER	MAX	MAXIMUM	TSP	TOTAL STATIC PRESSURE
CC	COOLING COIL	MBH	BTU'S PER HOUR (THOUSAND)	T-STAT	THERMOSTAT
D/DIA	DIAMETER	MD	MOTORIZED DAMPER	TYP	TYPICAL
DB	DRY BULB TEMPERATURE	MFR	MANUFACTURER	UH	UNIT HEATER
DEG.	DEGREES	MIN	MINIMUM	VAV	VARIABLE AIR VOLUME
D.L.	DUCT LINER	MVD	MANUAL VOLUME DAMPER	VEL	VELOCITY
(E)	EXISTING	(N)	NEW	VFD	VARIABLE FREQUENCY DRIVE
EAT	ENTERING AIR TEMPERATURE	NA	NOT APPLICABLE	W/	WITH
EDB	ENTERING DRY BULB	NIC	NOT IN CONTRACT	WB	WET BULB
EFF	EFFICIENCY	NC	NORMALLY CLOSED	WPD	WATER PRESSURE DROP
ELECT	ELECTRICAL	NO	NORMALLY OPENED	WMS	WIRE MESH SCREEN
ELEV	ELEVATION	NOM	NOMINAL		
ESP	EXTERNAL STATIC PRESSURE	NTS	NOT TO SCALE		
ET	EXPANSION TANK	OA	OUTSIDE AIR		
EWB	ENTERING WET BULB				

SHEET INDEX

- INDICATES PREVIOUSLY / CURRENTLY ISSUED SHEETS

	PLANCHECK SUBMITTAL	Sheet Title
	●	M100 Mechanical Specifications and Legend
	●	M101 Mechanical Schedules
	●	M102 Title 24
	●	M103 Title 24
	●	M104 Mechanical Floor Plan
	●	M105 Mechanical Roof Plan
	●	M106 Mechanical Details
	●	M107 Hood Drawings
	●	M108 Exhaust Fan Drawings
	●	M109 MUA Drawings
	●	M110 Hood Drawings

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engineers

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Stamp:

No. M14269
MECHANICAL
STATE OF CALIFORNIA
9/24/2018

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Revisions:

NO.	REASON	DATE

PRINCIPAL IN CHARGE:
WE
PROJECT MANAGER:
SE
DRAWN BY:
STAFF

Project Address:

THE 908
LBX - LONG BEACH EXCHANGE
3850 WORSHAM BOULEVARD
SUITE 410, BUILING R-4

Project Number:

Sheet Title:

MECHANICAL SPECIFICATIONS AND LEGEND

Sheet Number:

M100

AIR DEVICE SCHEDULE

MARK	MANUFACTURER	MODEL	TYPE	PANEL SIZE	NOTES
A	TITUS	ML-39	CONT. SLOT DIFFUSER	SEE PLAN	2 - 1" SLOT WITH LINED BOOT PLENUM
B	TITUS	TDC	LAY-IN CEILING DIFFUSER	24x24 18x18	WITH OPPOSED BLADE
C	TITUS	272FS	DUCT MOUNTED REGISTER	SEE PLAN	DOUBLE DEFLECTION WITH OPPOSED BLADE DAMPER
D	TITUS	TMR	ROUND DIFFUSER	SEE PLAN	-
1	TITUS	355RL	RETURN AIR / EXHAUST GRILLE	24x24 12x12	INSTALL WITH BLADES FACING UPWARD OR FACING THE WALL

AIR DEVICE CALLOUT TAG

NOTES:

1. SEE PLANS FOR NECK SIZES NOT SHOWN. DUCT RUNOUT TO BE THE SAME SIZE AS DIFFUSER NECK, UNLESS NOTED OTHERWISE.
2. DUCT RUNOUT MAY USE UP TO 8 FEET OF FLEXIBLE DUCTWORK, SAME SIZE AS CONNECTED RIGID DUCTWORK.
3. WHERE VISIBLE, PAINT THE INSIDE OF DIFFUSER CANS FLAT BLACK.
4. FRAME STYLES TO MATCH CEILING TYPE, SEE ARCHITECTURAL DRAWINGS FOR CEILING TYPES, COLORS AND EXACT LOCATIONS.
5. USE BLANK-OFF PANELS FOR INACTIVE SECTIONS OF LINEAR SLOT DIFFUSERS

EXHAUST FAN SCHEDULE

MARK	MANUFACTURER & MODEL No.	CFM	DRIVE	S.P.	FAN RPM	HP	ELECTRICAL VOLTS/PH/HZ	SONES (MAX)	OPER. WT. (LB)	NOTES:
EF 3	GREENHECK GB-081	450	BELT	0.25	1140	1/6	115/1Ø/60	6.1	60	1, 2, 3, 4

EXHAUST FANS:

1. GRAVITY OPERATED BACKDRAFT DAMPER
2. SOLID STATE SPEED CONTROL (FACTORY MOUNTED AND WIRED).
3. FACTORY ROOF CURB
4. INTERLOCKED WITH LIGHTSWITCH

AIR CURTAIN SCHEDULE

MARK	MANUFACTURER & MODEL No.	DIMENSION (LxDxH)	CFM	HP	FLA	ELECTRICAL VOLTS/PH/HZ	OPER. WT. (LB.)	ACCESSORIES
ACUR 1	MARS LPV236-1U-OB	36x13x11	900	⅙	5.1	120/1/60	60	1, 2

ACCESSORIES:

1. PROVIDE DOOR MICROSWITCH AND CONTROL PANEL.
2. PROVIDE WALL MOUNTING BRACKETS.

ROOFTOP PACKAGED HEAT PUMP SCHEDULE

GENERAL							FAN							COOLING				HEATING COIL		
MARK	MANUFACTURER & MODEL No.	TONS	EER	TOTAL WEIGHT W/ ACCESSORIES (LBS)	BASE DIMENSIONS (IN, WxDxH)	MIN OSA CFM	CFM	DRIVE	E.S.P.	HP	ELECTRICAL VOLTS/PH/HZ	MCA	MOCP	TEMP	EAT DB/WB	SENS. CAP. MBH	TOT. CAP. MBH	AMB.	TOT. CAP. MBH	NOTES
RTU 1,2	LENNOX KHB150S	12.5	10.6	1600	124x60x47	1050	5000	BELT	0.8	2	460/3/60	58	70	95	80/67	114.5	148.7	47	138	SEE NOTES BELOW

NOTES AND ACCESSORIES:

1. THERMOSTAT AND CO2 SENSOR
2. SUPPLY DUCT SMOKE DETECTORS PROVIDED AND INSTALLED BY MECHANICAL CONTRACTOR, WIRED BY ELECTRICAL CONTRACTOR.
3. PROVIDE 14" FACTORY ROOF CURB DESIGNED FOR IBC SEISMIC CATEGORY D. INSTALL LEVEL (MAX. +/- 1/2" LONGEST SIDE) RTU MOUNTING SURFACE.
4. PROVIDE UNPOWERED CONVENIENCE OUTLET, ECONOMIZER WITH BAROMETRIC RELIEF DAMPER AND FAULT DETECTION AND DIAGNOSTIC SYSTEM (FDD).
5. MEDIUM STATIC PRESSURE MOTOR
6. MERV 8 FILTERS

BUILDING AIR BALANCE (CFM)

TAG	OUTSIDE AIR	EXHAUST AIR	MAKE UP AIR	PRESSURE
(E)RTU-60A	100			+100
(E)RTU-60B	100			+100
RTU-1	1050			+1050
RTU-2	1050			+1050
EF-1		2000		-2000
EF-2		2700		-2700
EF-3		450		-450
MUA-1			3700	+3700
TOTAL	2300	5150	3700	+850

KITCHEN AIR BALANCE (CFM)

TAG	OUTSIDE AIR	EXHAUST AIR	MAKE UP AIR	PRESSURE
(N)RTU-60A	100			+100
(E)RTU-60B	100			+100
EF-1		-2000		-2000
EF-2		-2700		-2700
MUA-1			3700	+3700
TOTAL	200	12800	11000	-800

M101-181746-S

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WRIGHT engineers

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MECHANICAL SCHEDULES

Sheet Number:
M101

STATE OF CALIFORNIA

ENVELOPE COMPONENT APPROACH

CEC-NRCC-ENV-01-E (Revised 01/16) CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE	NRCC-ENV-01-E
Envelope Component Approach	(Page 1 of 4)
Project Name: 908 Restaurant	Date Prepared: 9/17/2018

A. GENERAL INFORMATION

01	Project Location:	410 Long Beach Exchange	06	Compliance Method:	☑ Component ☐ Unconditioned (file Affidavit)
02	CA City and Zip Code:	Long Beach,	07	Building Front Orientation (deg or cardinal):	0 deg
03	Climate Zone:	8	08	Phase of Construction:	☐ New Construction ☐ Addition ☑ Alteration
04	Total Conditioned Floor Area:	3,538	09	Building Occupancy:	☑ Nonresidential ☐ High-Rise Residential ☐ Hotel/Motel Guest Room
05	Building Type:	☐ Schools (Public School) ☐ Relocatable Public School Bldg. ☑ Conditioned Spaces ☐ Unconditioned Spaces ☐ Skylight Area for Large Enclosed Space > 5000 ft^2 (If checked include the NRCC-ENV-04-E with submittal)			

B. ENVELOPE DETAILS – FRAMED

01	02	03	04	05	06	07	08		09	10	11
							Appendix JA 4 Reference		Proposed	Required	
Tag/ID	Assembly Type	Frame Material	Frame Depth	Frame Spacing	Cavity R-value	Continuous Insulation R-value	Table	Cell	U-Factor	U-Factor from Tables 140.3-B, C or D	Field Inspection Comments
1	Wall	Wood	2x6 @ 16		19	0.0	4.3.	-A5	0.074	0.074	R-19 Wall

C. ENVELOPE DETAILS – NON-FRAMED

01	02	03	04	05	06	07		08	09	10
						Appendix JA4 Reference		Proposed	Required	
Tag/ID	Assembly Type	Assembly Materials	Thickness (inches)	Interior or Core Insulation R-value	Continuous Insulation R-value	Table	Cell	U-Factor	U-Factor from Tables 140.3-B, C or D	Field Inspection Comments

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STATE OF CALIFORNIA

ENVELOPE COMPONENT APPROACH

CEC-NRCC-ENV-01-E (Revised 01/16) CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE	NRCC-ENV-01-E
Envelope Component Approach	(Page 2 of 4)
Project Name: 908 Restaurant	Date Prepared: 9/17/2018

D. ENVELOPE DETAILS – MASS

01	02	03	04	05	06	07	08		09	10	11
							Appendix JA4 Reference		Proposed	Required	
Tag/ID	Mass Type	Density (lb/ft^3)	Mass Thickness (inches)	Furring Strip Thickness (inches)	Interior Insulation R-value	Exterior Insulation R-value	Table	Cell	U-factor	U-Factor from Tables 140.3-B, C or D	Field Inspection Comments

E. ROOFING PRODUCTS (COOL ROOF)

01	02	03	04	05	06	07	08	09	10	11
				Proposed			Minimum Required			
Mass Roof 25 lb/ft^2 or Greater	Roof Pitch	CRRC Product ID Number	Product Type	Aged Solar Reflectance	Thermal Emittance	SRI[2] (Optional)	Aged Solar Reflectance	Thermal Emittance	SRI (optional)	Comments
☐				☐[1]						
☐				☐[1]						
☐				☐[1]						

☐ An aged solar reflectance less than 0.63 is allowed provided the maximum roof / ceiling U-factor in TABLE 140.3 is not exceeded

☐ High-rise residential buildings and Hotels and Motels with low-sloped roofs in Climate Zones 1 through 8, 12 and 16 are exempted from aged Solar Reflectance and thermal emittance requirements.

☐ High-rise residential buildings and Hotels/Motels with steep-sloped roofs in Climate Zones 1 and 16 are exempt from aged Solar Reflectance and thermal emittance requirements.

☐ The roof area covered by building integrated photovoltaic panels and building integrated solar thermal panels are exempt from aged Solar Reflectance and thermal emittance requirements

To apply Liquid Field Applied Coatings, the coating must be applied across the entire roof surface and meet the dry mil thickness or coverage recommended by the coatings manufacturer and meet minimum performance requirements listed in §110.8(i)4. Select the applicable coating:

☐ Aluminum-Pigmented Asphalt Roof Coating ☐ Cement-Based Roof Coating ☐ Other ____________________

NOTES:

1. *Check the box if the aged Solar reflectance was not available in the Cool Roof Rating Council's Rated Product Directory, Then use the equation in Section 110.8(i)2 where the Initial Reflectance value from the same directory and use the equation (0.2+B($\rho_{initial}$ – 0.2) to obtain a calculated aged solar reflectance value. Where **ρ** is the Initial Solar Reflectance and **B** is either set to 0.65 for Field-Applied Coatings or it is set to 0.70 for all other roofing products other than Field-Applied Coating.*
2. *Calculate the SRI Value by using the SRI Calculator Worksheet at (http://energy.ca.gov/title24/2016standards/documents/solar_reflectance/) and enter the resulting value in the SRI column above and attach a copy of the SRI-Worksheet (NRCC-ENV-03-E) to the to this compliance document.*

STATE OF CALIFORNIA

ENVELOPE COMPONENT APPROACH

CEC-NRCC-ENV-01-E (Revised 01/16) CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE	NRCC-ENV-01-E
Envelope Component Approach	(Page 3 of 4)
Project Name: 908 Restaurant	Date Prepared: 9/17/2018

F. AIR BARRIER

01	02	03	04	05
Name	Air Barrier Material Type	Air Barrier Assembly Type	Whole Building Air Leakage Testing	Comments

G. FENESTRATION PROPOSED AREAS AND EFFICIENCIES

01	02	03	04	05	06	07	08	09	10	11	12
					Proposed						
Tag/ID	Fenestration Type	Surface Area	Orientation N, S, W, E or Roof	# of Panes	Max U-Factor	Max (R) SHGC	Min VT	Label	Overhang	Condition Status	Comments
1	Double Metal Clear	210	W	2	0.32	0.25	0.50	NFRC	No	New	

H. ENVELOPE MANDATORY MEASURES

Indicate location on building plans of Mandatory Envelope Measures Note Block: ENV-MM

INSTRUCTIONS TO APPLICANT ENVELOPE COMPLIANCE & WORKSHEETS (check box if worksheet are included)

For detailed instructions on the use of this and all Energy Efficiency Standards compliance documents, please refer to theEnergy Commission website.

☑	NRCC-ENV-01-E	Certificate of Compliance. Required on plans for all submittals.
☐	NRCC-ENV-04-E	Use when minimum skylight requirements for large enclosed spaces are required in climate zones 2 through 15. Optional on plans.

STATE OF CALIFORNIA

ENVELOPE COMPONENT APPROACH

CEC-NRCC-ENV-01-E (Revised MM/YY) CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE	NRCC-ENV-01-E
Envelope Component Approach	(Page 4 of 4)
Project Name: 908 Restaurant	Date Prepared: 9/17/2018

DOCUMENTATION AUTHOR'S DECLARATION STATEMENT

1. I certify that this Certificate of Compliance documentation is accurate and complete.

Documentation Author Name: Sergio Mangahis	Documentation Author Signature:
Company: Wright Engineers	Signature Date: 9/17/2018
Address: 2 Venture, Suite 200	CEA/ HERS Certification Identification (if applicable):
City/State/Zip: Irvine, CA 92618	Phone: 949-477-4001

RESPONSIBLE PERSON'S DECLARATION STATEMENT

I certify the following under penalty of perjury, under the laws of the State of California:

1. The information provided on this Certificate of Compliance is true and correct.
2. I am eligible under Division 3 of the Business and Professions Code to accept responsibility for the building design or system design identified on this Certificate of Compliance (responsible designer).
3. The energy features and performance specifications, materials, components, and manufactured devices for the building design or system design identified on this Certificate of Compliance conform to the requirements of Title 24, Part 1 and Part 6 of the California Code of Regulations.
4. The building design features or system design features identified on this Certificate of Compliance are consistent with the information provided on other applicable compliance documents, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application.
5. I will ensure that a completed signed copy of this Certificate of Compliance shall be made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a completed signed copy of this Certificate of Compliance is required to be included with the documentation the builder provides to the building owner at occupancy.

Responsible Designer Name:	Responsible Designer Signature:
Company : Innovative and Design in Architecture, Inc	Date Signed:
Address: 218 The Promonade North	License:
City/State/Zip: Long Beach, CA 90802	Phone:

STATE OF CALIFORNIA

MECHANICAL SYSTEMS

CEC-NRCC-MCH-01-E (Revised 01/16) CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE	NRCC-MCH-01-E
Mechanical Systems	(Page 1 of 4)
Project Name: 908 Restaurant	Date Prepared: 9/17/2018

A. MECHANICAL COMPLIANCE DOCUMENTS & WORKSHEETS (check box if worksheet is included)

For detailed instructions on the use of this and all Energy Efficiency Standards compliance forms, refer to the 2016 Nonresidential Manual

Note: The Enforcement Agency may require all forms to be incorporated onto the building plans.

YES	NO	Comp. Doc./Worksheet #	Title
☑	☐	NRCC-MCH-01-E (Part 1 of 3)	Certificate of Compliance, Declaration. Required on plans for all submittals.
☑	☐	NRCC-MCH-01-E (Part 2 of 3)	Certificate of Compliance, Required Acceptance Tests (MCH-02-A to 11-A). Required on plans for all submittals.
☑	☐	NRCC-MCH-01-E (Part 3 of 3)	Certificate of Compliance, Required Acceptance Tests (MCH-12-A to 18-A). Required on plans where applicable.
☑	☐	NRCC-MCH-02-E (Part 1 of 2)	Mechanical Dry Equipment Summary is required for all submittals with Central Air Systems. It is optional on plans.
☑	☐	NRCC-MCH-02-E (Part 2 of 2)	Mechanical Wet Equipment Summary is required for all submittals with chilled water, hot water or condenser water systems. It is optional on plans.
☑	☐	NRCC-MCH-03-E	Mechanical Ventilation and Reheat is required for all submittals with multiple zone heating and cooling systems. It is optional on plans.
☐	☑	NRCC-MCH-07-E (Part 1 of 2)	Power Consumption of Fans. Required on plans where applicable
☐	☑	NRCC-MCH-07-E (Part 2 of 2)	Power Consumption of Fans, Declaration. Required on plans where applicable

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STATE OF CALIFORNIA

MECHANICAL SYSTEMS

CEC-NRCC-MCH-01-E (Revised 01/16) CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE	NRCC-MCH-01-E
Mechanical Systems	(Page 2 of 4)
Project Name: 908 Restaurant	Date Prepared: 9/17/2018

B. MECHANICAL HVAC ACCEPTANCE FORMS (check box for required compliance documents)

Test Performed By:

Designer:
This compliance document is to be used by the designer and attached to the plans. Listed below are all the acceptance tests for HVAC systems. The designer is required to check the applicable boxes for all acceptance tests that apply and list all equipment that requires an acceptance test. All equipment of the same type that requires a test, list the equipment description and the number of systems.

Installing Contractor:
The contractor who installed the equipment is responsible to either conduct the acceptance test themselves or have a qualified entity run the test for them. If more than one person has responsibility for the acceptance testing, each person shall sign and submit the Certificate of Acceptance applicable to the portion of the construction or installation for which they are responsible.

Enforcement Agency:
Plancheck – The NRCC-MCH-01-E compliance document is not considered a completed document and is not to be accepted by the building department unless the correct boxes are checked.
Inspector - Before occupancy permit is granted all newly installed process systems must be tested to ensure proper operations.

Test Description		MCH-02-A	MCH-03-A	MCH-04-A	MCH-05-A	MCH-06-A	MCH-07-A	MCH-08-A	MCH-09-A	MCH-10-A	MCH-11-A
Equipment Requiring Testing or Verification	# of Units	Outdoor Air	Single Zone Unitary	Air Distribution Ducts	Economizer Controls	Demand Control Ventilation (DCV)	Supply Fan VAV	Valve Leakage Test	Supply Water Temp. Reset	Hydronic System Variable Flow Control	Automatic Demand Shed Control
Lennox KHB50	1	☑	☑	☐	☑	☑	☐	☐	☐	☐	☐
		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
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STATE OF CALIFORNIA

MECHANICAL SYSTEMS

CEC-NRCC-MCH-01-E (Revised 01/16) CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE	NRCC-MCH-01-E
Mechanical Systems	(Page 3 of 4)
Project Name: 908 Restaurant	Date Prepared: 9/17/2018

C. MECHANICAL HVAC ACCEPTANCE FORMS (check box for required compliance documents)

Test Performed By:

Designer:
This compliance document is to be used by the designer and attached to the plans. Listed below are all the acceptance tests for HVAC systems. The designer is required to check the applicable boxes for all acceptance tests that apply and list all equipment that requires an acceptance test. All equipment of the same type that requires a test, list the equipment description and the number of systems.

Installing Contractor:
The contractor who installed the equipment is responsible to either conduct the acceptance test themselves or have a qualified entity run the test for them. If more than one person has responsibility for the acceptance testing, each person shall sign and submit the Certificate of Acceptance applicable to the portion of the construction or installation for which they are responsible.

Enforcement Agency:
Plancheck – The NRCC-MCH-01-E compliance document is not considered a completed document and is not to be accepted by the building department unless the correct boxes are checked.
Inspector - Before occupancy permit is granted all newly installed process systems must be tested to ensure proper operations.

Test Description		MCH-12-A	MCH-13-A	MCH-14-A	MCH-15-A	MCH-16-A	MCH-17-A	MCH-18-A
Equipment Requiring Testing or Verification	# of Units	Fault Detection & Diagnostics for DX Units	Automatic Fault Detection & Diagnostics for Air & Zone	Distributed Energy Storage DX AC Systems	Thermal Energy Storage (TES) Systems	Supply Air Temperature Reset Controls	Condenser Water Reset Controls	ECMS
Lennox KHB50	1	☑	☐	☐	☐	☐	☐	☐
		☐	☐	☐	☐	☐	☐	☐
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STATE OF CALIFORNIA

MECHANICAL SYSTEMS

CEC-NRCC-MCH-01-E (Revised 01/16) CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE	NRCC-MCH-01-E
Mechanical Systems	(Page 4 of 4)
Project Name: 908 Restaurant	Date Prepared: 9/17/2018

DOCUMENTATION AUTHOR'S DECLARATION STATEMENT

1. I certify that this Certificate of Compliance documentation is accurate and complete.

Documentation Author Name: Sergio Mangahis	Documentation Author Signature:
Company: Wright Engineers	Signature Date: 9/17/2018
Address: 2 Venture, Suite 200	CEA/ HERS Certification Identification (if applicable):
City/State/Zip: Irvine, CA 92618	Phone: 949-477-4001

RESPONSIBLE PERSON'S DECLARATION STATEMENT

I certify the following under penalty of perjury, under the laws of the State of California:

1. The information provided on this Certificate of Compliance is true and correct.
2. I am eligible under Division 3 of the Business and Professions Code to accept responsibility for the building design or system design identified on this Certificate of Compliance (responsible designer).
3. The energy features and performance specifications, materials, components, and manufactured devices for the building design or system design identified on this Certificate of Compliance conform to the requirements of Title 24, Part 1 and Part 6 of the California Code of Regulations.
4. The building design features or system design features identified on this Certificate of Compliance are consistent with the information provided on other applicable compliance documents, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application.
5. I will ensure that a completed signed copy of this Certificate of Compliance shall be made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a completed signed copy of this Certificate of Compliance is required to be included with the documentation the builder provides to the building owner at occupancy.

Responsible Designer Name: Stephen Heath	Responsible Designer Signature:
Company : Wright Engineers	Date Signed: 9/18/2018
Address: 2 Venture, Suite 200	License: M 14269
City/State/Zip: Irvine, CA 90620	Phone: 949.477.4001

Architect:

ARCHITECTURE

Innovation and Design in Architecture, Inc.

218 The Promenade North
Long Beach, CA 90802
www.idaexperience.net

GEOFFREY B. LIM
AIA, NCARB, LEED AP

Plans, maps, specifications, studies, and reports not containing a red ink seal imprint accompanied by an original signature by the licensed professional may have been fraudulently altered and shall not be considered an original copy. All information should be disregarded unless verified by the professional whose signature appears above.

Engineering Consultant:

2 Venture Suite 200
Irvine, CA 92618
949.477.4001 wrighte.com

WRIGHT engineers

Project Owner:

LBX · CA · USA 908 DINE+DRINK

Stamp:

No. M14269
MECHANICAL
9/24/2018

Issue For: Project Status

Issue Date: 9/24/2018

Revisions:

NO.	REASON	DATE

PRINCIPAL IN CHARGE: WE
PROJECT MANAGER: SE
DRAWN BY: STAFF

Project Address:

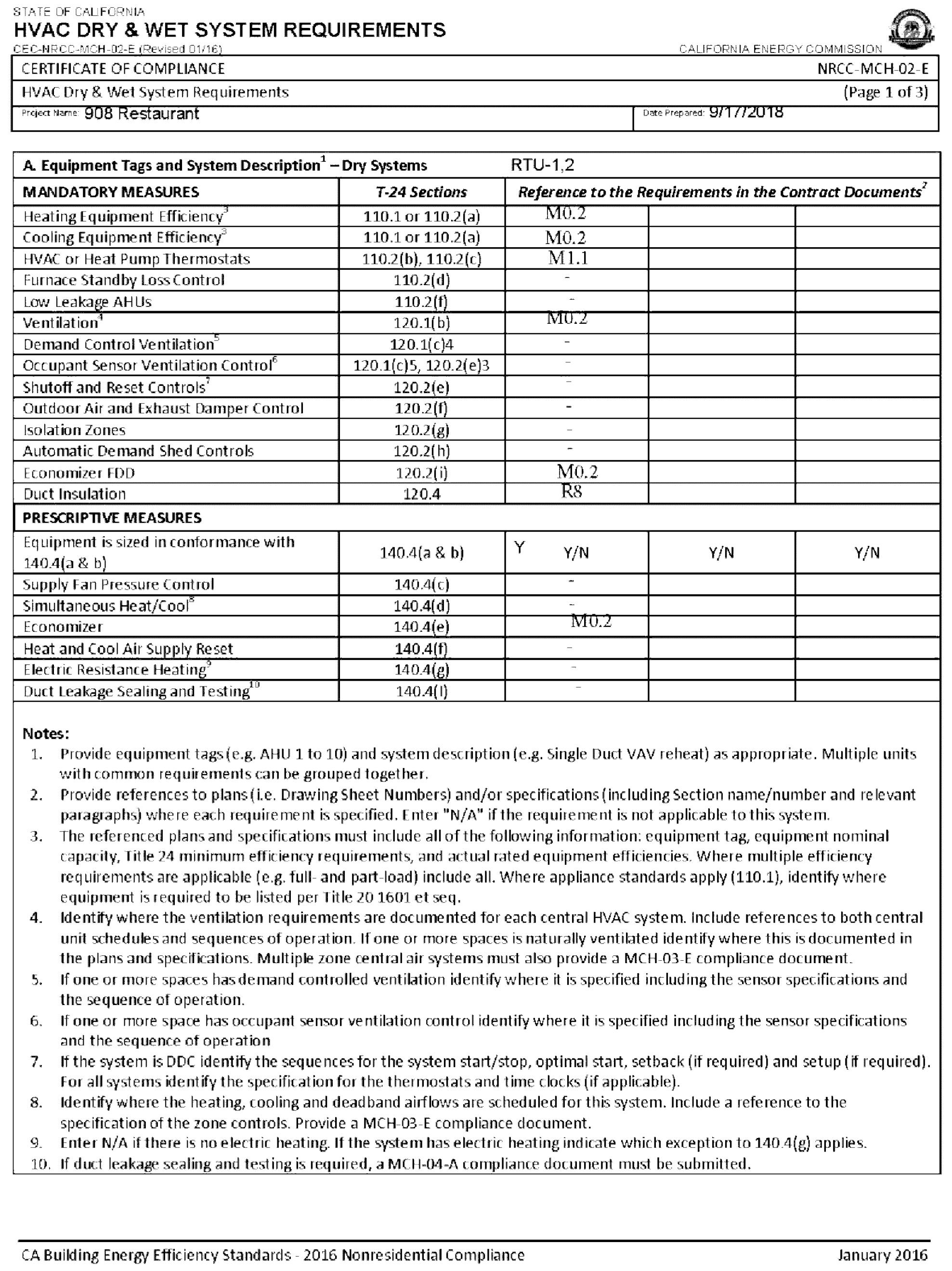
THE 908
LBX - LONG BEACH EXCHANGE
3850 WORSHAM BOULEVARD
SUITE 410, BUILING R-4

Project Number:

Sheet Title: TITLE 24

Sheet Number: M102

M102-18746-T24



STATE OF CALIFORNIA

HVAC DRY & WET SYSTEM REQUIREMENTS

CEC-NRCC-MCH-02-E (Revised 01/16) CALIFORNIA ENERGY COMMISSION

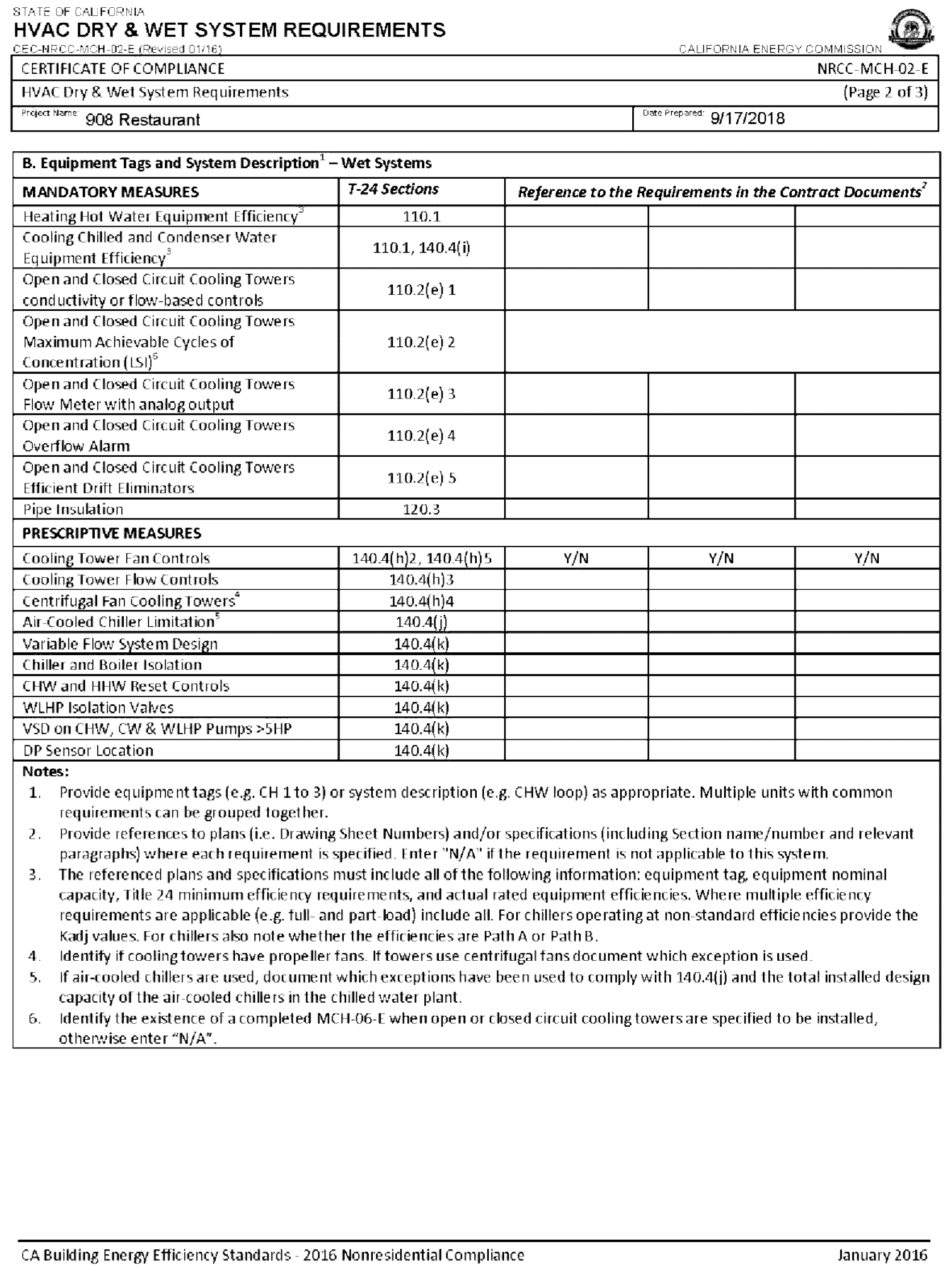
CERTIFICATE OF COMPLIANCE	NRCC-MCH-02-E
HVAC Dry & Wet System Requirements	(Page 1 of 3)
Project Name: 908 Restaurant	Date Prepared: 9/17/2018

A. Equipment Tags and System Description[1] – Dry Systems	RTU-1,2			
MANDATORY MEASURES	*T-24 Sections*	*Reference to the Requirements in the Contract Documents*[2]		
Heating Equipment Efficiency[3]	110.1 or 110.2(a)	M0.2		
Cooling Equipment Efficiency[3]	110.1 or 110.2(a)	M0.2		
HVAC or Heat Pump Thermostats	110.2(b), 110.2(c)	M1.1		
Furnace Standby Loss Control	110.2(d)	-		
Low Leakage AHUs	110.2(f)	-		
Ventilation[4]	120.1(b)	M0.2		
Demand Control Ventilation[5]	120.1(c)4	-		
Occupant Sensor Ventilation Control[6]	120.1(c)5, 120.2(e)3	-		
Shutoff and Reset Controls[7]	120.2(e)	-		
Outdoor Air and Exhaust Damper Control	120.2(f)	-		
Isolation Zones	120.2(g)	-		
Automatic Demand Shed Controls	120.2(h)	-		
Economizer FDD	120.2(i)	M0.2		
Duct Insulation	120.4	R8		
PRESCRIPTIVE MEASURES				
Equipment is sized in conformance with 140.4(a & b)	140.4(a & b)	Y Y/N	Y/N	Y/N
Supply Fan Pressure Control	140.4(c)	-		
Simultaneous Heat/Cool[8]	140.4(d)	-		
Economizer	140.4(e)	M0.2		
Heat and Cool Air Supply Reset	140.4(f)	-		
Electric Resistance Heating[9]	140.4(g)	-		
Duct Leakage Sealing and Testing[10]	140.4(l)	-		

Notes:

1. Provide equipment tags (e.g. AHU 1 to 10) and system description (e.g. Single Duct VAV reheat) as appropriate. Multiple units with common requirements can be grouped together.
2. Provide references to plans (i.e. Drawing Sheet Numbers) and/or specifications (including Section name/number and relevant paragraphs) where each requirement is specified. Enter "N/A" if the requirement is not applicable to this system.
3. The referenced plans and specifications must include all of the following information: equipment tag, equipment nominal capacity, Title 24 minimum efficiency requirements, and actual rated equipment efficiencies. Where multiple efficiency requirements are applicable (e.g. full- and part-load) include all. Where appliance standards apply (110.1), identify where equipment is required to be listed per Title 20 1601 et seq.
4. Identify where the ventilation requirements are documented for each central HVAC system. Include references to both central unit schedules and sequences of operation. If one or more spaces is naturally ventilated identify where this is documented in the plans and specifications. Multiple zone central air systems must also provide a MCH-03-E compliance document.
5. If one or more spaces has demand controlled ventilation identify where it is specified including the sensor specifications and the sequence of operation.
6. If one or more space has occupant sensor ventilation control identify where it is specified including the sensor specifications and the sequence of operation
7. If the system is DDC identify the sequences for the system start/stop, optimal start, setback (if required) and setup (if required). For all systems identify the specification for the thermostats and time clocks (if applicable).
8. Identify where the heating, cooling and deadband airflows are scheduled for this system. Include a reference to the specification of the zone controls. Provide a MCH-03-E compliance document.
9. Enter N/A if there is no electric heating. If the system has electric heating indicate which exception to 140.4(g) applies.
10. If duct leakage sealing and testing is required, a MCH-04-A compliance document must be submitted.

CA Building Energy Efficiency Standards - 2016 Nonresidential Compliance January 2016



STATE OF CALIFORNIA

HVAC DRY & WET SYSTEM REQUIREMENTS

CEC-NRCC-MCH-02-E (Revised 01/16) CALIFORNIA ENERGY COMMISSION

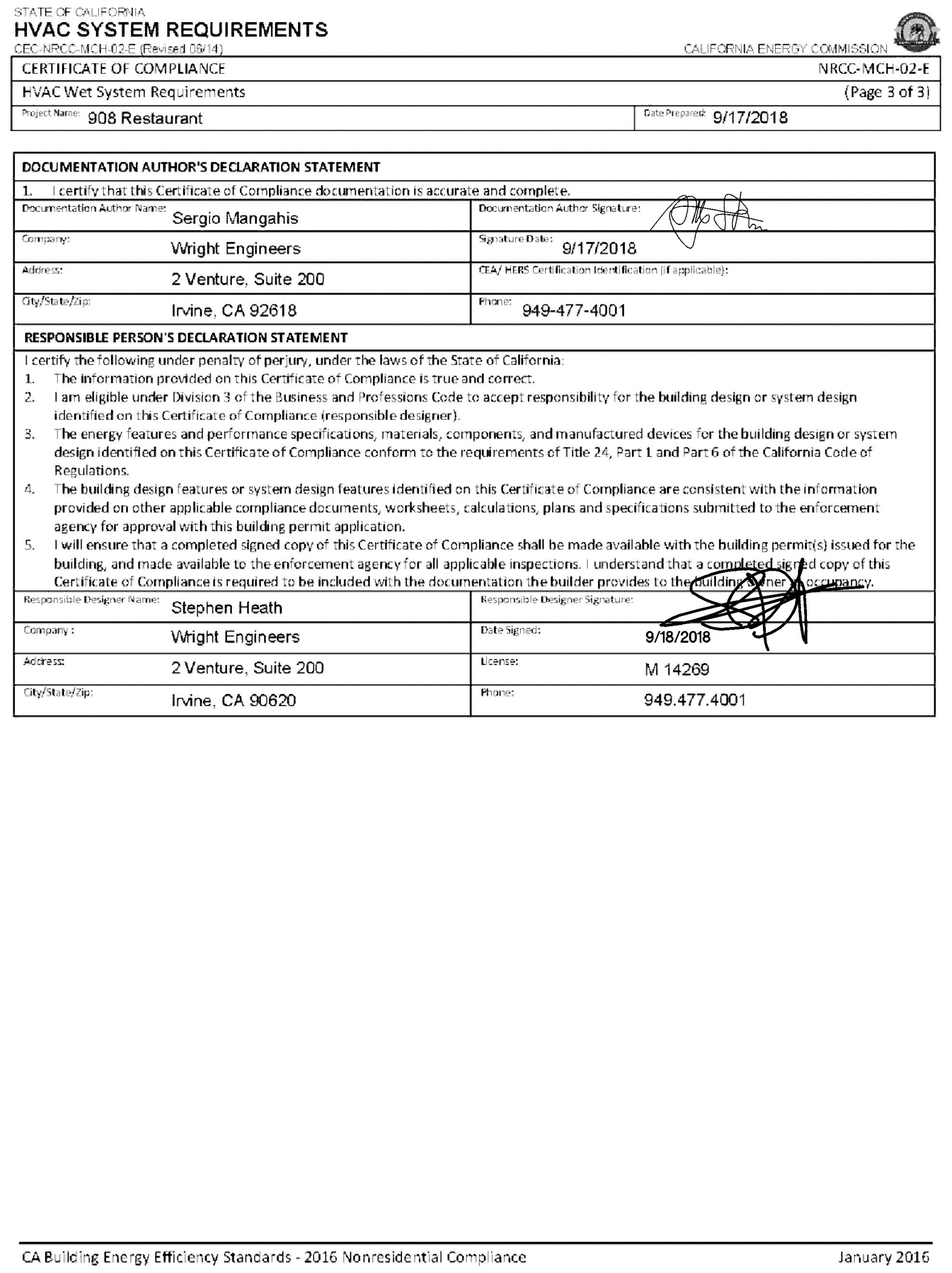
CERTIFICATE OF COMPLIANCE	NRCC-MCH-02-E
HVAC Dry & Wet System Requirements	(Page 2 of 3)
Project Name: 908 Restaurant	Date Prepared: 9/17/2018

B. Equipment Tags and System Description[1] – Wet Systems				
MANDATORY MEASURES	*T-24 Sections*	*Reference to the Requirements in the Contract Documents*[2]		
Heating Hot Water Equipment Efficiency[3]	110.1			
Cooling Chilled and Condenser Water Equipment Efficiency[3]	110.1, 140.4(i)			
Open and Closed Circuit Cooling Towers conductivity or flow-based controls	110.2(e) 1			
Open and Closed Circuit Cooling Towers Maximum Achievable Cycles of Concentration (LSI)[6]	110.2(e) 2			
Open and Closed Circuit Cooling Towers Flow Meter with analog output	110.2(e) 3			
Open and Closed Circuit Cooling Towers Overflow Alarm	110.2(e) 4			
Open and Closed Circuit Cooling Towers Efficient Drift Eliminators	110.2(e) 5			
Pipe Insulation	120.3			
PRESCRIPTIVE MEASURES				
Cooling Tower Fan Controls	140.4(h)2, 140.4(h)5	Y/N	Y/N	Y/N
Cooling Tower Flow Controls	140.4(h)3			
Centrifugal Fan Cooling Towers[4]	140.4(h)4			
Air-Cooled Chiller Limitation[5]	140.4(j)			
Variable Flow System Design	140.4(k)			
Chiller and Boiler Isolation	140.4(k)			
CHW and HHW Reset Controls	140.4(k)			
WLHP Isolation Valves	140.4(k)			
VSD on CHW, CW & WLHP Pumps >5HP	140.4(k)			
DP Sensor Location	140.4(k)			

Notes:

1. Provide equipment tags (e.g. CH 1 to 3) or system description (e.g. CHW loop) as appropriate. Multiple units with common requirements can be grouped together.
2. Provide references to plans (i.e. Drawing Sheet Numbers) and/or specifications (including Section name/number and relevant paragraphs) where each requirement is specified. Enter "N/A" if the requirement is not applicable to this system.
3. The referenced plans and specifications must include all of the following information: equipment tag, equipment nominal capacity, Title 24 minimum efficiency requirements, and actual rated equipment efficiencies. Where multiple efficiency requirements are applicable (e.g. full- and part-load) include all. For chillers operating at non-standard efficiencies provide the Kadj values. For chillers also note whether the efficiencies are Path A or Path B.
4. Identify if cooling towers have propeller fans. If towers use centrifugal fans document which exception is used.
5. If air-cooled chillers are used, document which exceptions have been used to comply with 140.4(j) and the total installed design capacity of the air-cooled chillers in the chilled water plant.
6. Identify the existence of a completed MCH-06-E when open or closed circuit cooling towers are specified to be installed, otherwise enter "N/A".

CA Building Energy Efficiency Standards - 2016 Nonresidential Compliance January 2016



STATE OF CALIFORNIA

HVAC SYSTEM REQUIREMENTS

CEC-NRCC-MCH-02-E (Revised 06/14) CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE	NRCC-MCH-02-E
HVAC Wet System Requirements	(Page 3 of 3)
Project Name: 908 Restaurant	Date Prepared: 9/17/2018

DOCUMENTATION AUTHOR'S DECLARATION STATEMENT

1. I certify that this Certificate of Compliance documentation is accurate and complete.

Documentation Author Name: Sergio Mangahis	Documentation Author Signature:
Company: Wright Engineers	Signature Date: 9/17/2018
Address: 2 Venture, Suite 200	CEA/ HERS Certification Identification (if applicable):
City/State/Zip: Irvine, CA 92618	Phone: 949-477-4001

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I certify the following under penalty of perjury, under the laws of the State of California:

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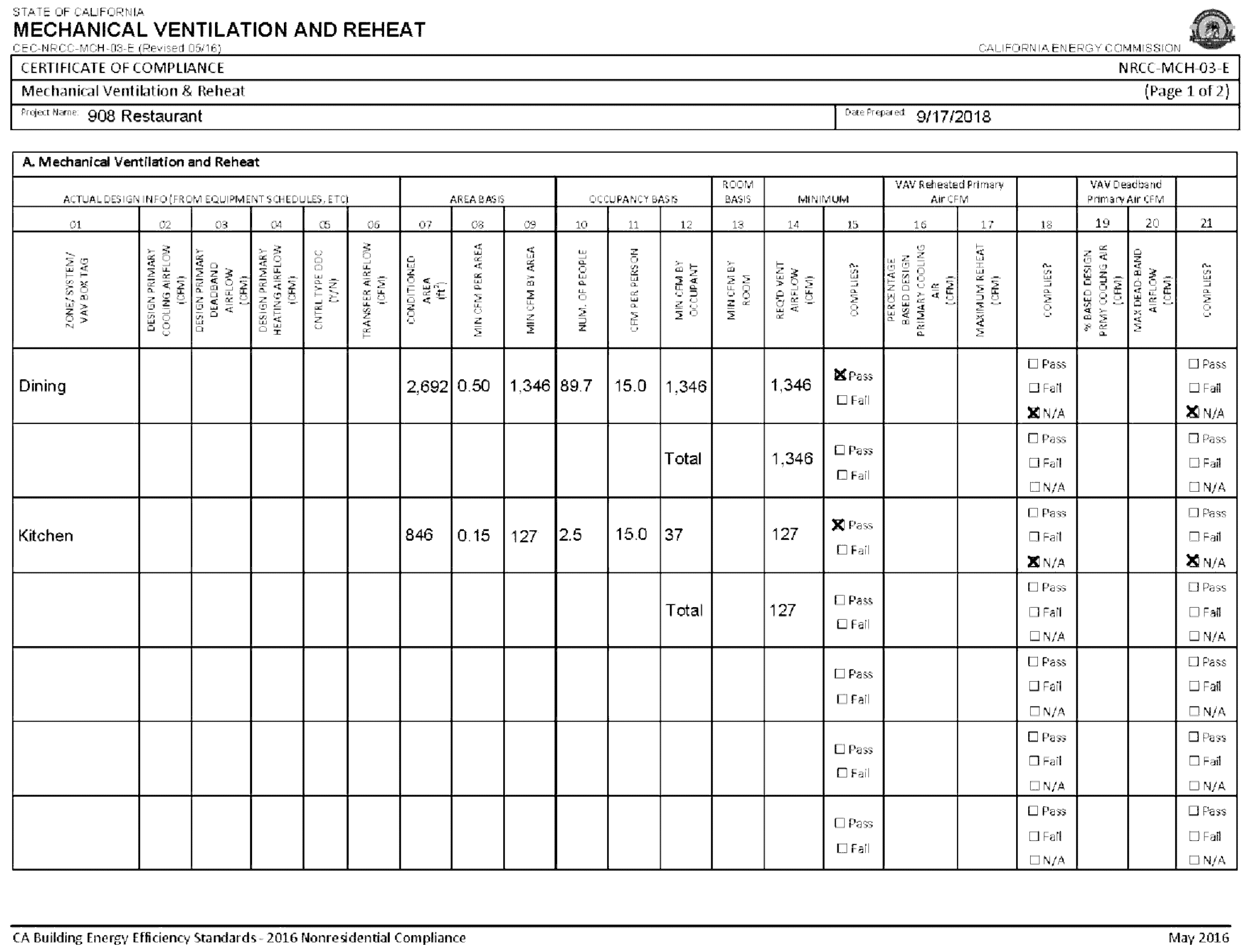
Responsible Designer Name: Stephen Heath	Responsible Designer Signature:
Company : Wright Engineers	Date Signed: 9/18/2018
Address: 2 Venture, Suite 200	License: M 14269
City/State/Zip: Irvine, CA 90620	Phone: 949.477.4001

CA Building Energy Efficiency Standards - 2016 Nonresidential Compliance January 2016



STATE OF CALIFORNIA

MECHANICAL VENTILATION AND REHEAT

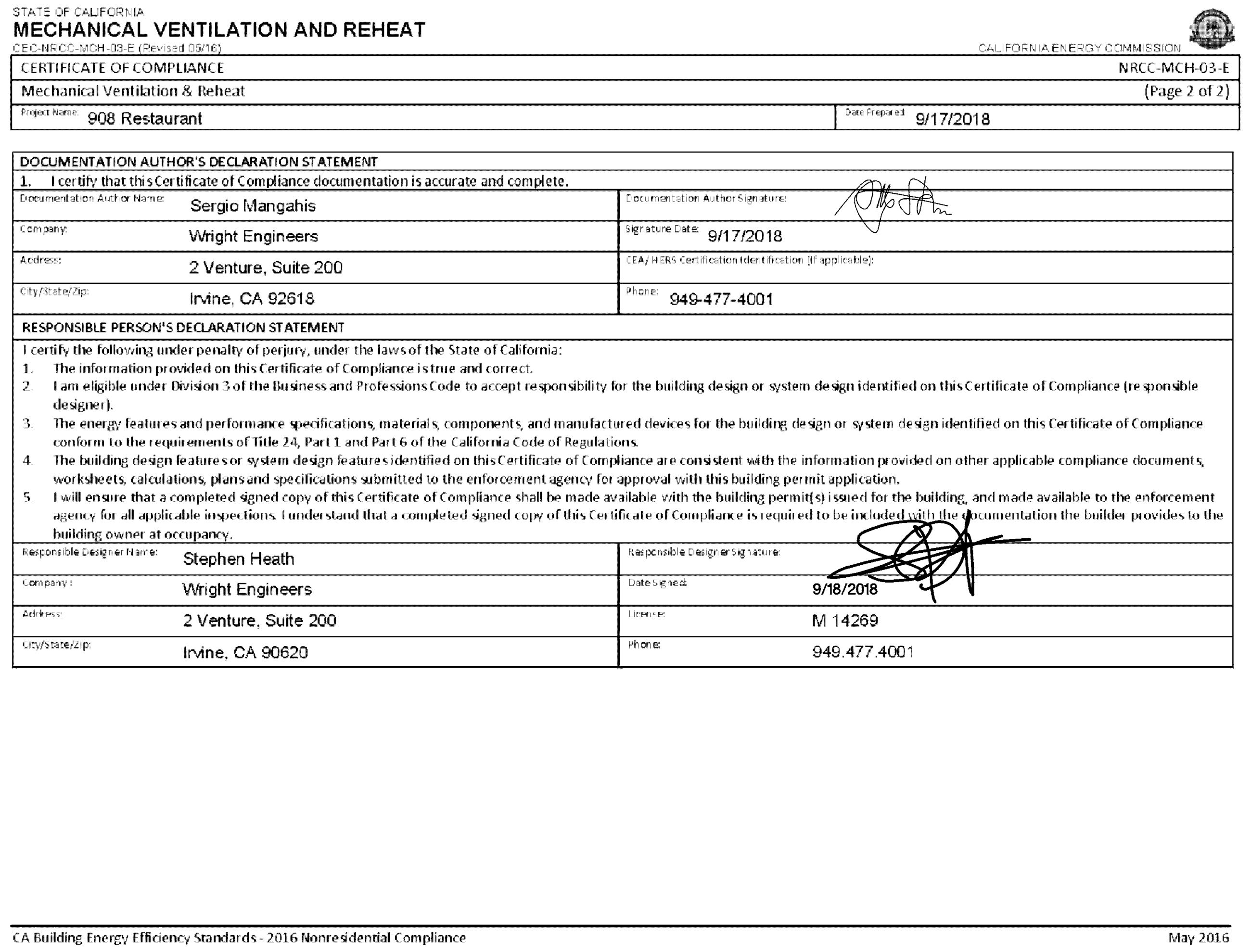
CEC-NRCC-MCH-03-E (Revised 05/16) CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE	NRCC-MCH-03-E
Mechanical Ventilation & Reheat	(Page 1 of 2)
Project Name: 908 Restaurant	Date Prepared: 9/17/2018

A. Mechanical Ventilation and Reheat

ACTUAL DESIGN INFO (FROM EQUIPMENT SCHEDULES, ETC)						AREA BASIS			OCCUPANCY BASIS			ROOM BASIS	MINIMUM		VAV Reheated Primary Air CFM			VAV Deadband Primary Air CFM		
01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21
ZONE/ SYSTEM/ VAV BOX TAG	DESIGN PRIMARY COOLING AIRFLOW (CFM)	DESIGN PRIMARY DEADBAND AIRFLOW (CFM)	DESIGN PRIMARY HEATING AIRFLOW (CFM)	CNTRL TYPE DDC (Y/N)	TRANSFER AIRFLOW (CFM)	CONDITIONED AREA (ft^2)	MIN CFM PER AREA	MIN CFM BY AREA	NUM. OF PEOPLE	CFM PER PERSON	MIN CFM BY OCCUPANT	MIN CFM BY ROOM	REQ'D VENT AIRFLOW (CFM)	COMPLIES?	PERCENTAGE BASED DESIGN PRIMARY COOLING AIR (CFM)	MAXIMUM REHEAT (CFM)	COMPLIES?	% BASED DESIGN PRMY COOLING AIR (CFM)	MAX DEAD-BAND AIRFLOW (CFM)	COMPLIES?
Dining						2,692	0.50	1,346	89.7	15.0	1,346		1,346	☒ Pass ☐ Fail			☐ Pass ☐ Fail ☒ N/A			☐ Pass ☐ Fail ☒ N/A
											Total		1,346	☐ Pass ☐ Fail			☐ Pass ☐ Fail ☐ N/A			☐ Pass ☐ Fail ☐ N/A
Kitchen						846	0.15	127	2.5	15.0	37		127	☒ Pass ☐ Fail			☐ Pass ☐ Fail ☒ N/A			☐ Pass ☐ Fail ☒ N/A
											Total		127	☐ Pass ☐ Fail			☐ Pass ☐ Fail ☐ N/A			☐ Pass ☐ Fail ☐ N/A
														☐ Pass ☐ Fail			☐ Pass ☐ Fail ☐ N/A			☐ Pass ☐ Fail ☐ N/A
														☐ Pass ☐ Fail			☐ Pass ☐ Fail ☐ N/A			☐ Pass ☐ Fail ☐ N/A
														☐ Pass ☐ Fail			☐ Pass ☐ Fail ☐ N/A			☐ Pass ☐ Fail ☐ N/A

CA Building Energy Efficiency Standards - 2016 Nonresidential Compliance May 2016



STATE OF CALIFORNIA

MECHANICAL VENTILATION AND REHEAT

CEC-NRCC-MCH-03-E (Revised 05/16) CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE	NRCC-MCH-03-E
Mechanical Ventilation & Reheat	(Page 2 of 2)
Project Name: 908 Restaurant	Date Prepared: 9/17/2018

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Company : Wright Engineers	Date Signed: 9/18/2018
Address: 2 Venture, Suite 200	License: M 14269
City/State/Zip: Irvine, CA 90620	Phone: 949.477.4001

CA Building Energy Efficiency Standards - 2016 Nonresidential Compliance May 2016

Architect:

ARCHITECTURE

Innovation and Design in Architecture, Inc.

218 The Promenade North
Long Beach, CA 90802
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GEOFFREY B. LIM
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Engineering Consultant:

2 Venture Suite 200
Irvine, CA 92618
949.477.4001 wrighte.com

WRIGHT engineers

Project Owner:

LBX · CA · USA
908
DINE + DRINK

Stamp:

STEPHEN D. HEATH
No. M14269
MECHANICAL
9/24/2018

Issue For:
Project Status

Issue Date:
9/24/2018

Revisions:

NO.	REASON	DATE

PRINCIPAL IN CHARGE:
WE

PROJECT MANAGER:
SE

DRAWN BY:
STAFF

Project Address:

THE 908
LBX - LONG BEACH EXCHANGE
3850 WORSHAM BOULEVARD
SUITE 410, BUILING R-4

Project Number:

Sheet Title:
TITLE 24

Sheet Number:
M103

M103-181746-T24

O.A. CALCULATION – 2016 CMC & CA ENERGY CODE

AREA DESIGNATION	PEOPLE (NUMBER)	CFM/PERSON (CMC)	CFM/SF (CMC)	CFM/PERSON (T24)	REQ'D. O.A CFM	O.A. CFM PROVIDED
DINING AREA	140	7.5 X 140 = 300	0.18 X 3881 = 698	15 X 140 = 2100	2100	2100
KITCHEN, MEZZ	5	7.5 X 5 = 38	0.12 X 844 = 101	15 X 5 = 75	75	75

NOTES:
1. O.A. REQUIRED = (PEOPLE * (CFM/PERSON) + AREA * (CFM/FT2))/Ez
2. SEE ARCHITECTURAL PLANS FOR OCCUPANCE LOADS

GENERAL NOTES

A. THE MECHANICAL CONTRACTOR SHALL COORDINATE WITH ALL OTHER TRADES PRIOR TO COMMENCING HIS WORK.

B. COORDINATE DUCT ROUTING INSTALLATION HEIGHTS AND CLEARANCES WITH GENERAL CONTRACTOR.

C. ALL DUCT DIMENSIONS SHOWN ON PLANS ARE CLEAR INSIDE DIMENSIONS.

D. ALL PIPING, DUCTS, VENTS, ETC. EXITING THROUGH THE ROOF SHALL BE FLASHED AND COUNTERFLASHED IN A WATERPROOF MANNER.

E. ALL PIPING INSULATION SHALL RUN CONTINUOUSLY THROUGH ROOF, FLOORS, WALLS, AND PARTITIONS.

F. ALL EQUIPMENT, DUCTWORK, AND PIPING SHALL BE SEISMICALLY RESTRAINED IN ACCORDANCE WITH THE LATEST APPLICABLE CODES.

G. DO NOT ATTACH ANYTHING TO DECK ABOVE. HANGERS AND SUPPORTS SHALL ONLY BE ATTACHED TO STRUCTURAL MEMBERS.

H. HVAC CONTRACTOR SHALL REPLACE ALL FILTERS WITH NEW ONES PRIOR TO TURNOVER OF PROJECT TO THE OWNER.

MECHANICAL PLAN KEYNOTES

① EXTEND AND CONNECT TO (E)RTU-60A RETURN AIR PLENUM. FIELD VERIFY.

② EXTEND AND CONNECT TO (E)RTU-60A SUPPLY AIR PLENUM. FIELD VERIFY.

③ "CAPTIVE AIRE" DOUBLE WALL GREASE EXHAUST SYSTEM, UP TO GREASE EXHAUST FAN.

④ 12"ø EXHAUST DUCT UP TO EF-3.

⑤ PROVIDE 1/2"x1/2" WIRE MESH SCREEN ON RETURN AIR DUCT OPENING.

⑥ PATIO ELECTRIC UNIT HEATER. SEE ELECTRICAL DRAWINGS FOR INFORMATION.

⑦ DIRECT POWER FLUE VENT FROM WATER HEATER WITH 3" PRIMARY VENT PIPE UP THUR ROOF.

CA GREEN BLDG. NOTES

ALL CONSTRUCTION TO COMPLY WITH THE 2013 CALIFORNIA MODEL CODES AS BASED ON 2013 UNIFORM MECHANICAL AND PLUMBING CODES, 2013 CALIFORNIA ENERGY AND 2013 CALIFORNIA GREEN BUILDING STANDARDS CODE.

NO PIPING, DUCTS OR EQUIPMENT FOREIGN TO ELECTRICAL EQUIPMENT SHALL BE PERMITTED TO BE LOCATED WITHIN THE DEDICATED SPACE ABOVE THE ELECTRICAL EQUIPMENT.

AT THE TIME OF ROUGH INSTALLATION OR DURING STORAGE ON THE CONSTRUCTION SITE AND UNTIL THE START-UP OF THE HEATING, COOLING AND VENTILATING EQUIPMENT, ALL DUCT AND OTHER RELATED AIR DISTRIBUTION COMPONENT OPENINGS SHALL BE COVERED WITH TAPE, PLASTIC, SHEET METAL OR OTHER ACCEPTABLE METHODS TO RESUCE THE AMOUNT OF DUST, WATER AND DEBRIS WHICH MAY COLLECT IN THE SYSTEM (5.504.13).

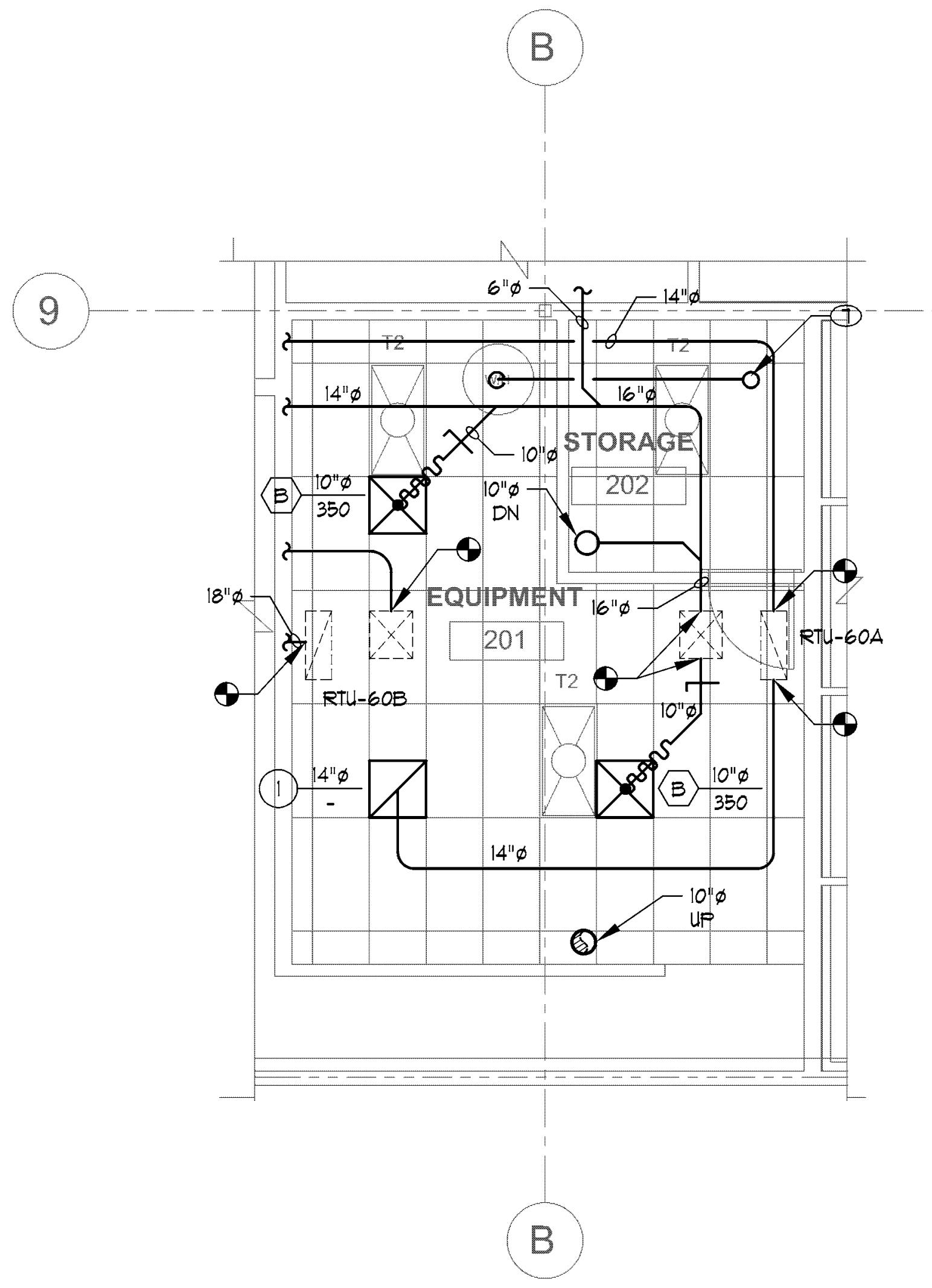
IF THE HVAC SYSTEM IS USED DURING CONSTRUCTION, PROVIDE AIR FILTERS WITH A MINIMUM EFFICIENCY REPORTING VALUE (MERV) OF 8, BASED ON ASHRAE 522-199 OR AN AVERAGE EFFICIENCY OF 30 PERCENT, BASED ON ASHRAE 52.1-1992. REPLACE ALL FILTERS PRIOR TO OCCUPANCY OR AT THE CONCLUSION OF CONSTRUCTION (5.504.1.3).

THE VOC CONTENT VERIFICATION CHECKLIST, FORM GRN 2, SHALL BE COMPLETED AND VERIFIED PRIOR TO FINAL INSPECTION APPROVAL. THE MANUFACTURERS SPECIFICATIONS SHOWING VOC CONTENT FOR ALL APPLICABLE PRODUCTS SHALL BE READILY AVAILABLE AT THE JOB SITE AND BE PROVIDED TO THE FIELD INSPECTOR FOR VERIFICATION. (5.504.4.3.2)

AN AIR FILTER WITH A MINIMUM EFFICIENCY REPORTING VALUE (MERV) OF 8 OR HIGHER SHALL BE INSTALLED IN THE MECHANICAL SYSTEM FOR OUTSIDE AND RETURN AIR PRIOR TO OCCUPANCY. (5.504.5.3)

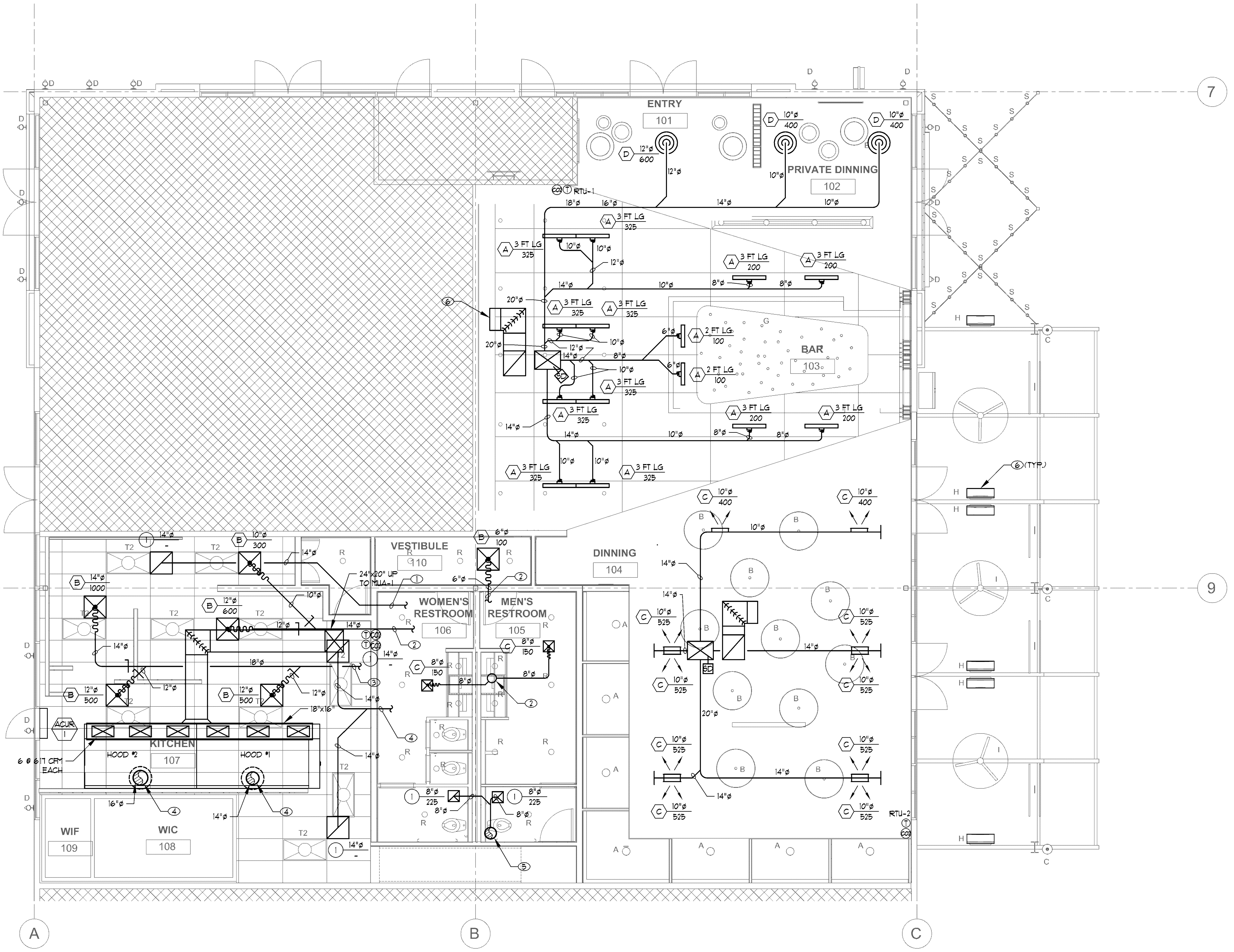
THE BUILDING SHALL MEET OR EXCEED THE PROVISIONS FOR MECHANICAL VENTILATION OF SECTION 1203 OF THE 2013 EDITION OF CALIFORNIA BUILDING CODE. (5.501.1)

THE HVAC REFRIGERATION AND FIRE SUPPRESSION EQUIPMENT SHALL NOT CONTAIN CFC OR HALONS.



MECHANICAL FLOOR PLAN – EQUIPMENT PLATFORM

SCALE: 3/16" = 1'-0"



MECHANICAL FLOOR PLAN

SCALE: 3/16" = 1'-0"

NORTH

M104-181746-P1

Architect:

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engineers

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DINE+DRINK

Stamp:

STEPHEN D. HEATH
No. M14269
MECHANICAL
9/24/2018

Issue For:
Project Status

Issue Date:
9/24/2018

Revisions:

NO.	REASON	DATE

PRINCIPAL IN CHARGE:
WE

PROJECT MANAGER:
SE

DRAWN BY:
STAFF

Project Address:

THE 908
LBX - LONG BEACH EXCHANGE
3850 WORSHAM BOULEVARD
SUITE 410, BUILING R-4

Project Number:

Sheet Title:

MECHANICAL
FLOOR PLAN

Sheet Number:

M104

MECHANICAL PLAN KEYNOTES

① EXISTING ROOF TOP UNIT TO BE RECONDITIONED AND REUSED. CONTRACTOR SHALL FIELD VERIFY THE CONDITION OF THE UNIT, INSURE GOOD WORKING CONDITION AND INSPECT, CLEAN, LUBRICATE, ADJUST AND BALANCE THE UNIT. IF ANY MAJOR COMPONENT IN THE SYSTEM IS FOUND TO BE DEFECTIVE TO THE EXTENT THAT REPLACEMENT IS NECESSARY, NOTIFY THE ARCHITECT IMMEDIATELY.

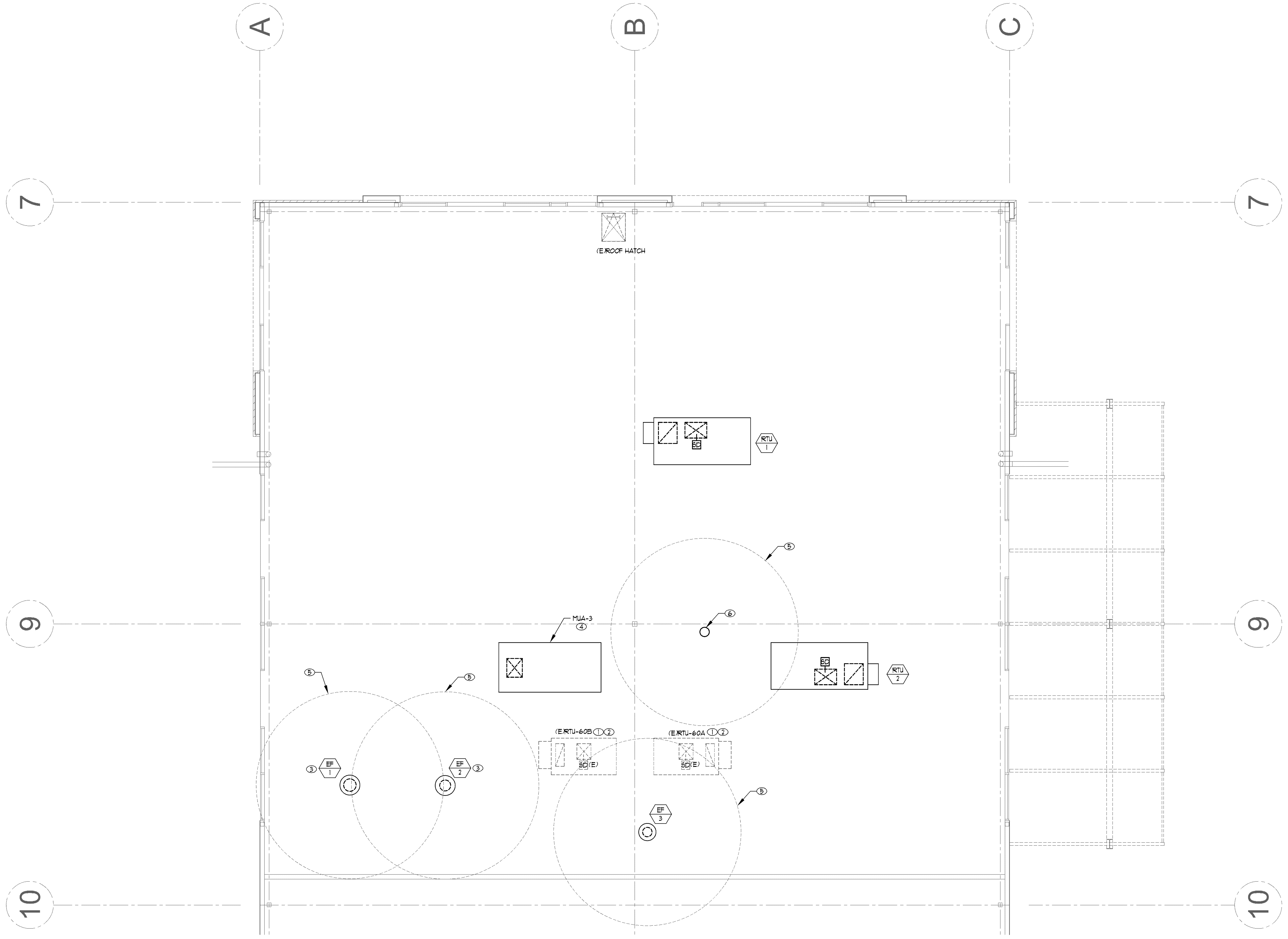
② REBALANCE (E)RTU-60A AND 60B TO 2000 CFM SUPPLY AIR WITH 100 CFM OUTSIDE AIR MINIMUM SETTING.

③ SEE SHEET M3.2 FOR INFORMATION.

④ SEE SHEET M3.3 FOR INFORMATION.

⑤ LINE OF A MINIMUM 10 FEET AWAY DISTANCE FORM ANY AIR INTAKE EQUIPMENT.

⑥ WATER HEATER FLUE VENT WITH TYPE B CAP.



MECHANICAL ROOF PLAN

SCALE: 3/16" = 1'-0"

NORTH

M105-181746-PR

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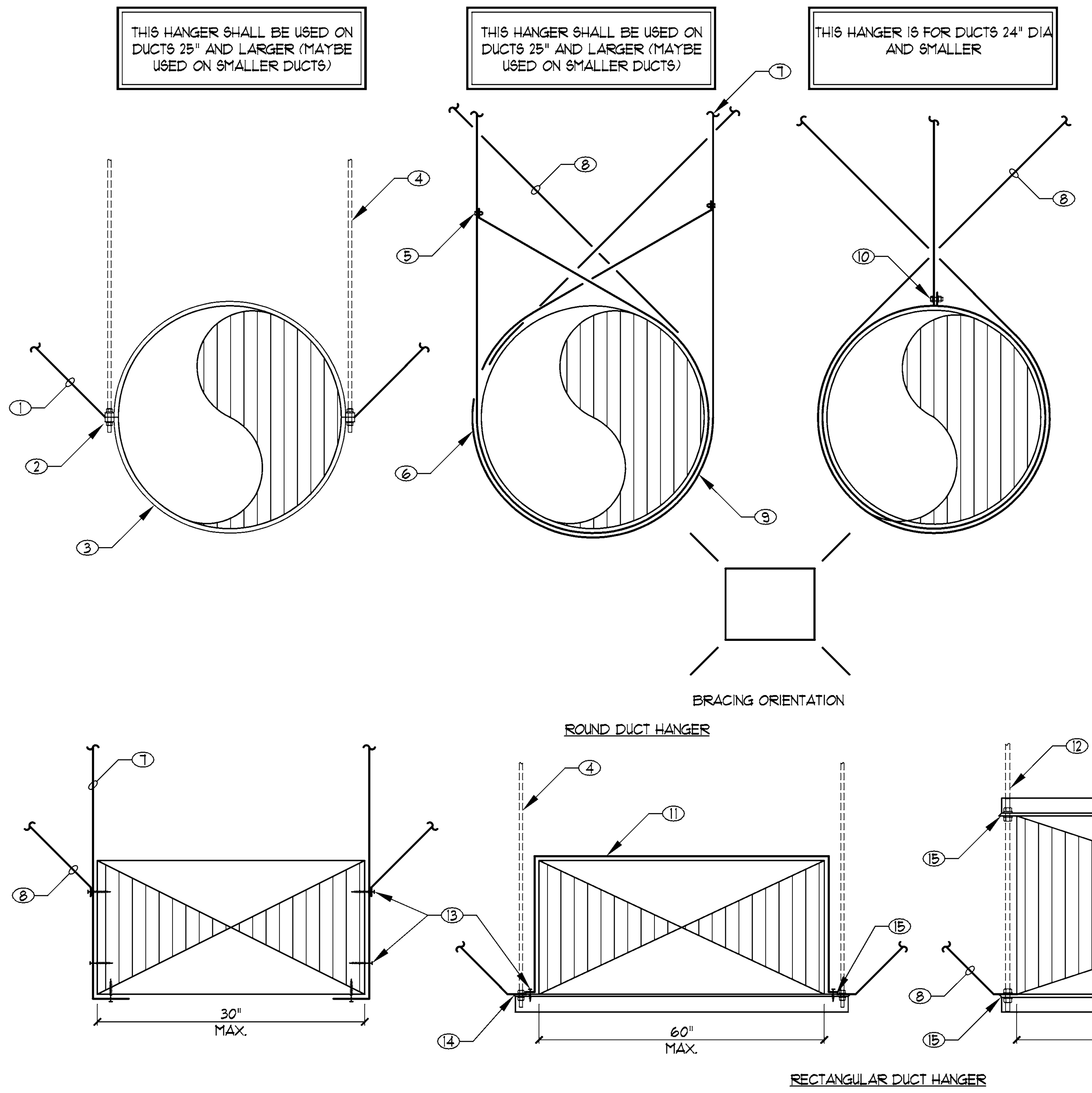
MECHANICAL
ROOF PLAN

Sheet Number:

M105



A. R REFER TO LATEST EDITION OF SMACNA FOR HANGER DISTANCES

B. ATTACHMENTS TO OVERHAED STRUCTURE SHALL BE MADE IN ACCORDANCE WITH STRUCTURAL ENGINEERS REQUIREMENTS AND WEIGHT LIMITATIONS. ALL ATTACHMENT METHODS TO STRUCTURE SHALL BE SUBMITTED TO ARCHITECT AND STRUCTURAL ENGINEER FOR REVIEW

C. PROVIDE SWAY AND SEISMIC BRACING PER SMACNA SEISMIC GUIDELINES AND LATEST EDITION OF CALIFORNIA BUILDING CODE. INDICATE LOCATIONS OF SEISMIC BRACING ON THE SHOP DRAWING SUBMITTALS.

D. HANGER MATERIAL SUPPORTING FLEXIBLE DUCT SHALL IN NO CASE BE LESS THAN 1 1/2 INCHES WIDE. FLEXIBLE DUCT SHALL BE SUPPORTED PER MANUFACTURER'S RECOMMENDED MATERIALS, BUT AT NO GREATER DISTANCE THAN 4 FEET MAX. PERMISSIBLE SAG IS MAX. 1/2" INCHES PER FOOT OF SPACING BETWEEN SUPPORTS.

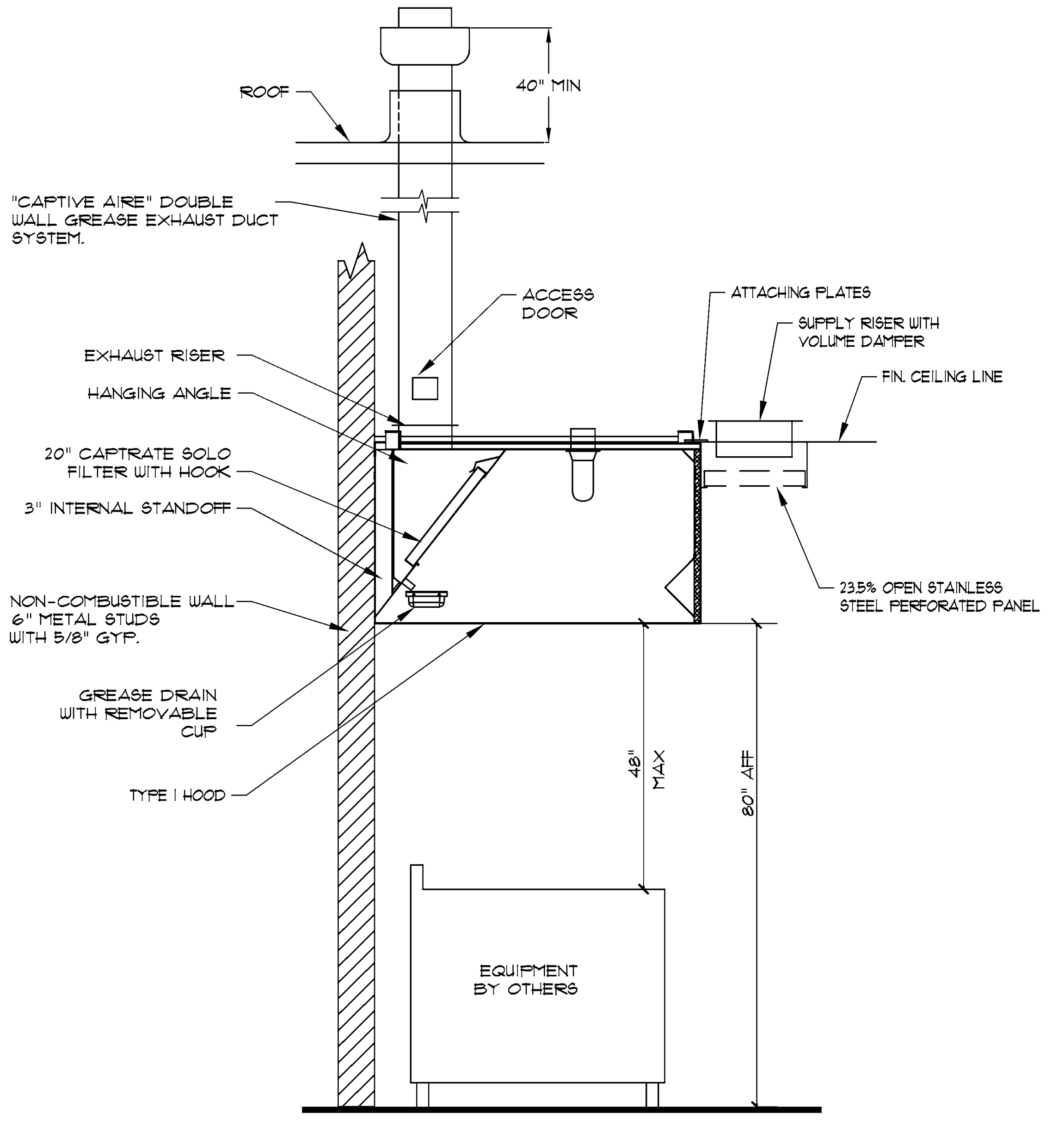
E. A COPY OF SMACNA GUIDELINES SHOULD BE KEPT ON SITE

① SWAY BRACING, ONE EACH SIDE. SIZE AND SPACING PER NOTE C. TYPICAL
② NUT AND LOCKNUT
③ 1 1/8"x12 GA. SPLIT RING COLLAR AROUND DUCT
④ 3/8" DIA. ROD OR 1"x16 GA. HANGER STRAP. (TYPICAL)
⑤ 1/4" BOLT, NUT AND STAR WASHER (TYP)
⑥ 1"x16 GA. CONTINUOUS COLLAR DRAWN TIGHT AROUND DUCT
⑦ 1"x16 GA. HANGER STRAP
⑧ SWAY BRACING, ONE EACH SIDE. SIZE AND SPACING PER NOTE C. TYPICAL
⑨ EACH STRAP ADJACENT TO ONE ANOTHER AT HANGER LOCATION. (TYPICAL)
⑩ 3/8" BOLT, NUT AND STAR WASHER
⑪ 1"x16 GA. STRAP OVER DUCT (TYP.)
⑫ 1/2" DIA. ROD. (TYPICAL)
⑬ SHEET METAL SCREWS (TYPICAL)
⑭ TRIM AT 45° ANGLE (TYP.)
⑮ 2"x2"x1/8" ANGLE TOP AND BOTTOM

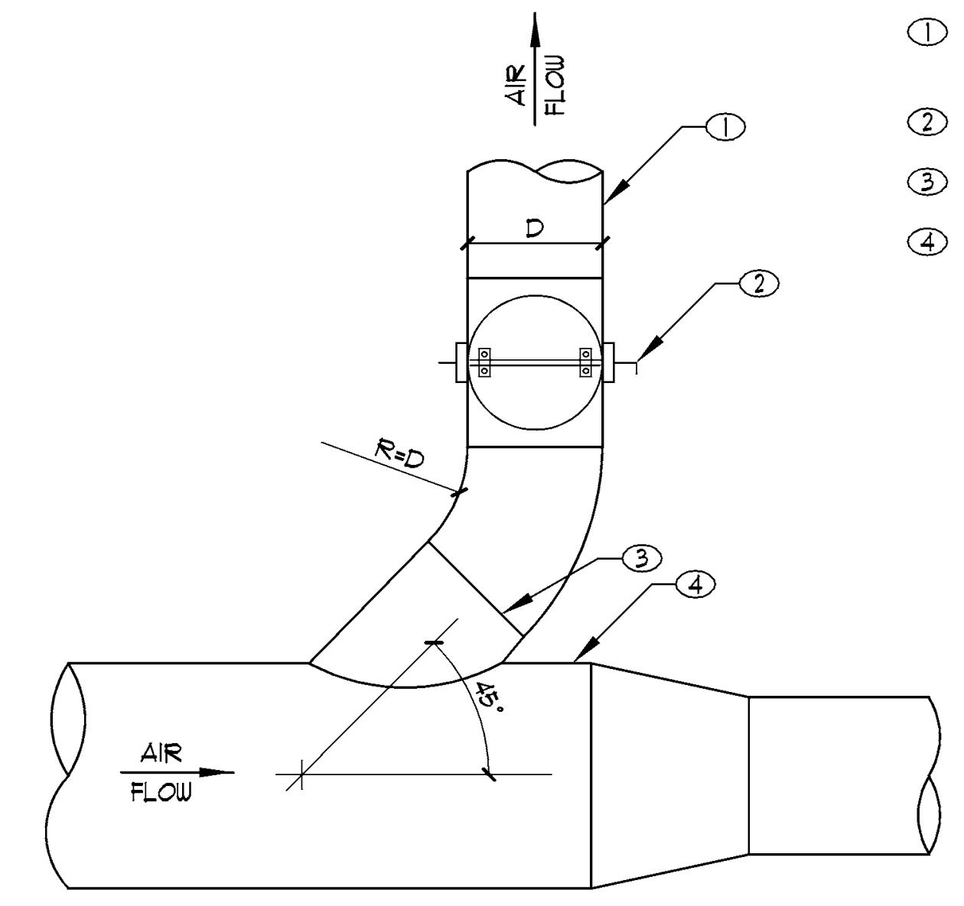
06 DUCT SUPPORT DETAIL

DU01-16 160803

NO SCALE



07 HOOD SECTION

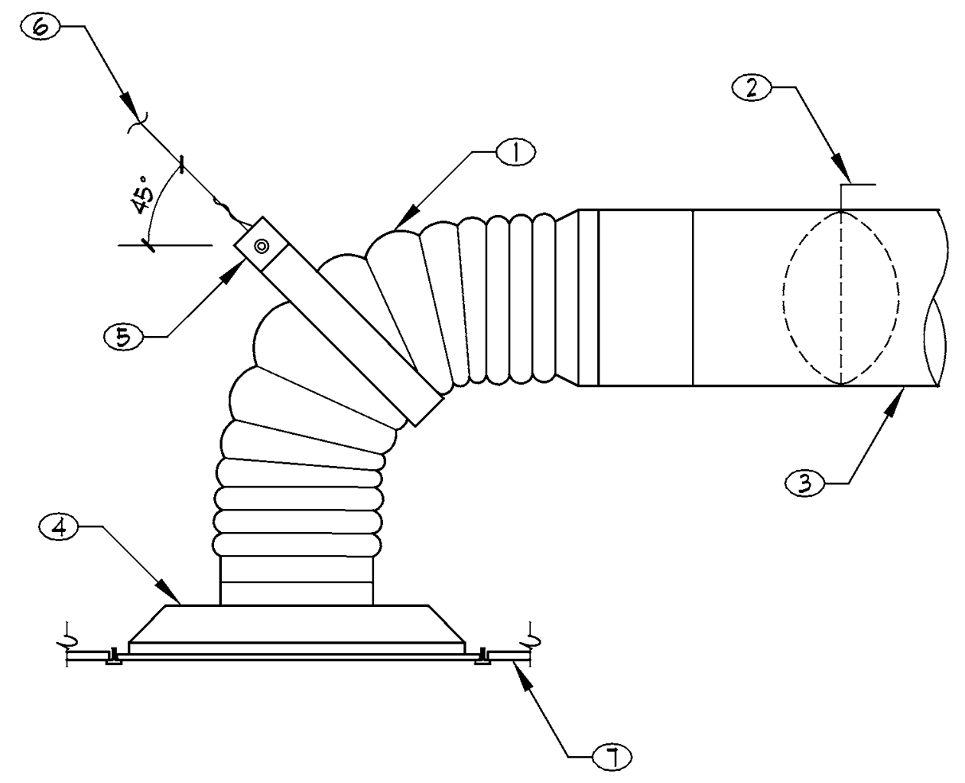


① SHEET METAL OR FLEXIBLE DUCT AS SPECIFIED
② ROUND VOLUME DAMPER
③ LATERAL TAP
④ MAIN DUCT

01 CIRCULAR DUCT BRANCH w/ VOLUME DAMPER

DU01-03 091110

NO SCALE

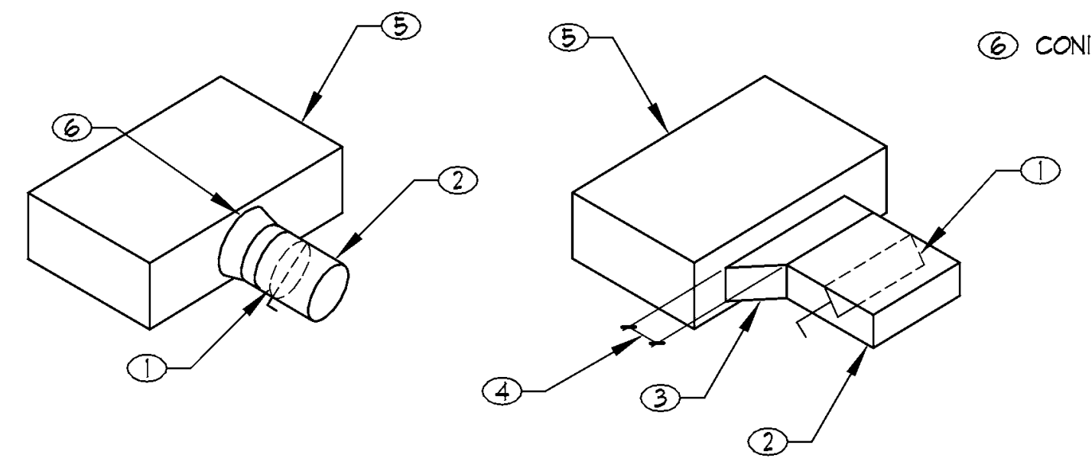


① ACOUSTICAL FLEX. DUCT 8'-0" MAX. LENGTH
② MANUAL VOLUME DAMPER WITH LOCKING QUADRANT AT BRANCH TAKE OFF
③ INSULATED PRE-FAB, SPIRAL ROUND DUCT. REFER TO FLOOR PLANS FOR SIZES
④ DIFFUSER, SEE PLANS FOR TYPE
⑤ 1-1/2" WIDE SHEET METAL STRAP
⑥ SECURE WIRE TO STRUCTURE ABOVE
⑦ CEILING

02 CEILING DIFFUSER

DF01-01 091110

NO SCALE



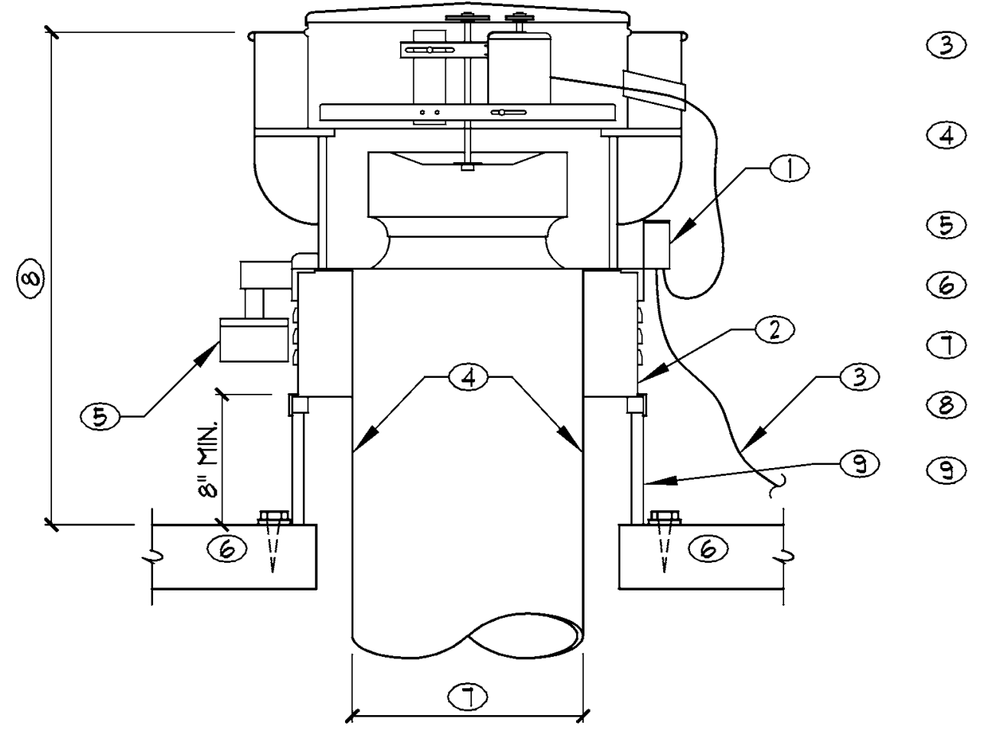
① MANUAL DAMPER
② BRANCH DUCT SEE FLOOR PLANS FOR SIZE AND ROUTING
③ TAPERED TAP-IN
④ 0.25 x W.(4" MIN.)
⑤ MAIN S.A. DUCT
⑥ CONICAL OR BELLMOUTH FITTING

A. SEE SPECIFICATIONS FOR INSULATION REQUIREMENTS.

03 BRANCH DUCT TAKE-OFF

DU01-01 091110

NO SCALE

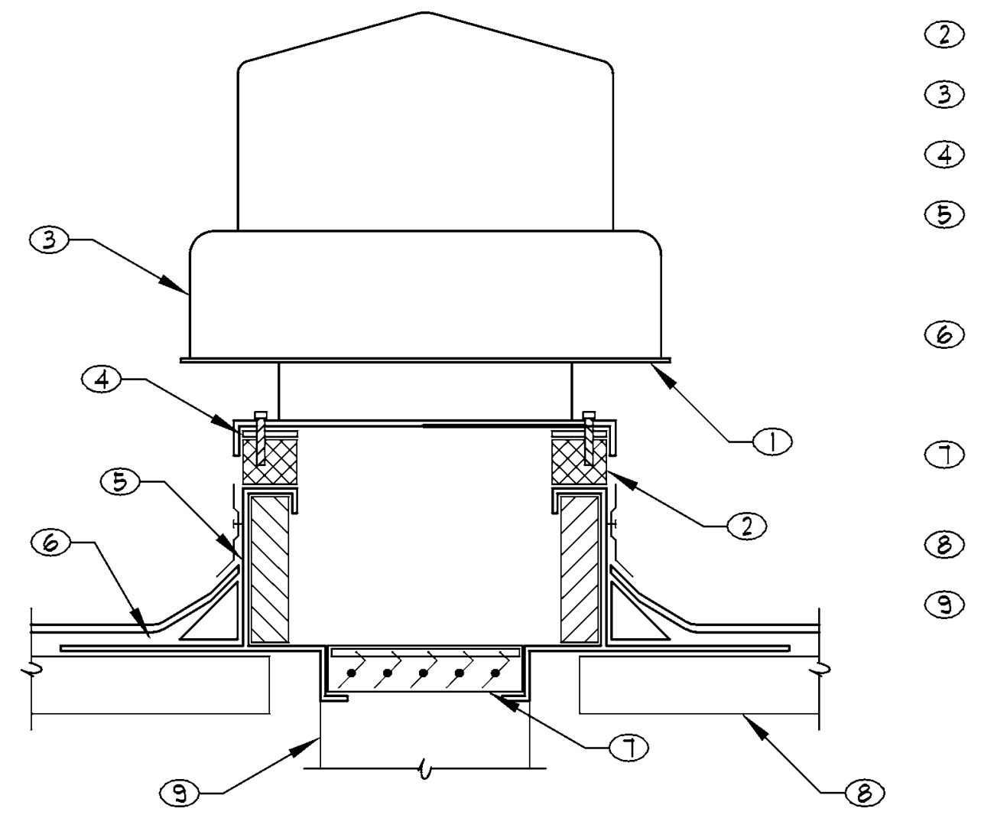


① DISCONNECT FACTORY WIRED FROM MOTOR TO DISCONNECT THROUGH THE BREATHER TUBE
② VENTED CURB EXTENTION
③ EXTERNAL WIRING LIQUID TIGHT FLEXIBLE CONDUIT BY OTHERS
④ WELD DUCT MIN. OF 18" ABOVE ROOF DECK
⑤ GREASE TRAP
⑥ ROOF DECK
⑦ RECOMMENDED ROOF OPENING
⑧ MINIMUM 40" DISCHARGE HEIGHT
⑨ ROOF CURB ANCHORED ON ROOF STRUCTURE

04 TYPE I HOOD EXHAUST FAN DETAIL

F01-03 091110

NO SCALE



① BIRDSCREEN
② WOOD NAILER
③ EXHAUST FAN
④ GASKET
⑤ FACTORY ROOF CURB WITH DAMPER TRAY AND 2" RIGID INSULATION. INSTALL CURB LEVEL
⑥ ROOFING, CANT STRIP, AND FLASHING BY ROOFING CONTRACTOR.
⑦ COUNTERBALANCED GRAVITY BACKDRAFT DAMPER
⑧ ROOF, TYP.
⑨ DUCT

05 ROOF EXHAUST FAN

RU01-03 091110

NO SCALE

M106-181746-D

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SUITE 410, BUILING R-4

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Sheet Title:

MECHANICAL DETAILS

Sheet Number:

M106

HOOD INFORMATION – Job#3533621

HOOD NO.	TAG	MODEL	LENGTH	MAX. COOKING TEMP.	EXHAUST PLENUM								TOTAL SUPPLY CFM	HOOD CONSTRUCTION	HOOD CONFIG.	
					TOTAL EXH. CFM	RISER(S)									END TO END	ROW
						WIDTH	LENG.	HEIGHT	DIA.	CFM	VEL.	S.P.				
1		5424 ND-2-PSP-F	10' 2"	450 Deg.	2000			4"	14"	2000	1871	-0.801"	1900	430 SS Where Exposed	LEFT	ALONE
2		5424 ND-2-PSP-F	10' 2"	600 Deg.	2700			4"	16"	2700	1934	-1.061"	1800	430 SS Where Exposed	RIGHT	ALONE

PATENT NUMBERS

AC-PSP (United States) – US Patent 7963830 B2
AC-PSP Wall (Canada) – CA Patent 2820509
AC-PSP Island (Canada) – CA Patent 2520330

HOOD INFORMATION

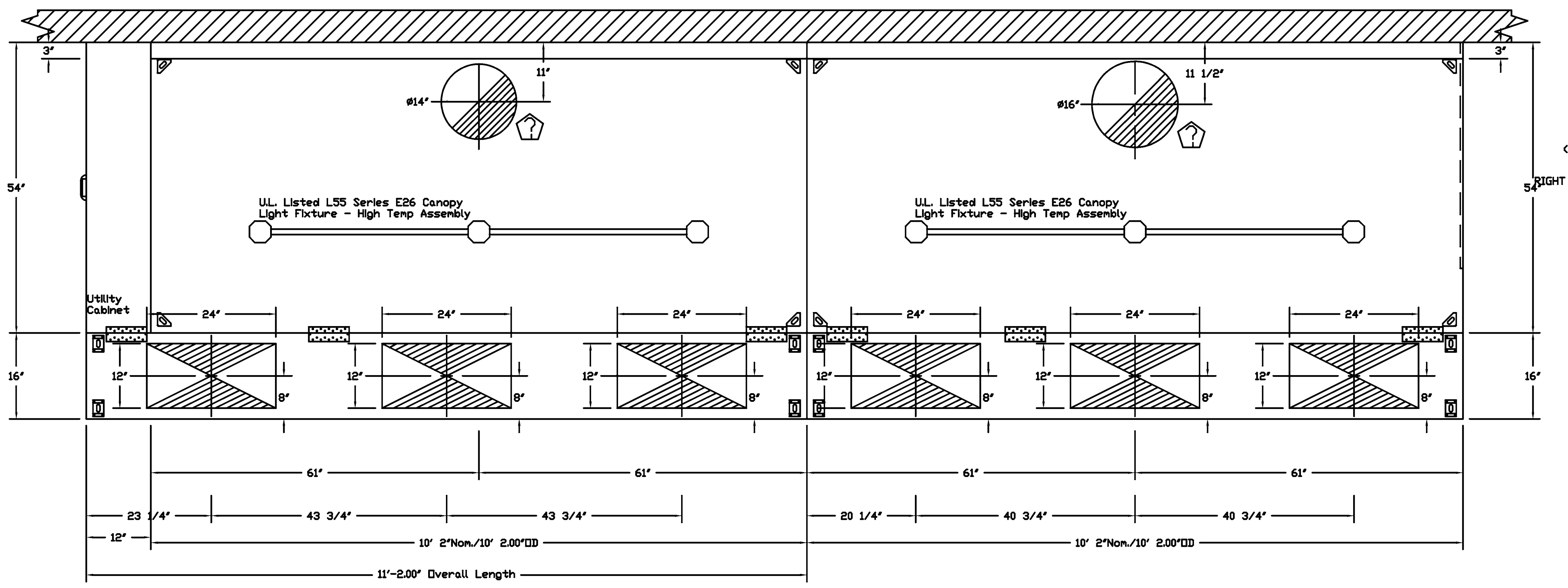
HOOD NO.	TAG	FILTER(S)					LIGHT(S)			UTILITY CABINET(S)						FIRE SYSTEM PIPING	HOOD HANGING WGHT
		TYPE	QTY.	HEIGHT	LENGTH	EFFICIENCY @ 7 MICRONS	QTY.	TYPE	WIRE GUARD	LOCATION	SIZE	FIRE SYSTEM		ELECTRICAL	SWITCHES		
												TYPE	SIZE	MODEL #	QUANTITY		
1		Captrate Solo Filter	7	20"	16"	85% See Filter Spec.	3	L55 Series E26	NO	Left	12"x54"x24"	Ansul R102	3.0/3.0/3.0	DCV-2111	1 Light 1 Fan	YES	689 LBS
2		Captrate Solo Filter	7	20"	16"	85% See Filter Spec.	3	L55 Series E26	NO							YES	588 LBS

HOOD OPTIONS

HOOD NO.	TAG	OPTION
2		RIGHT WIDE VERTICAL END PANEL 42" Top Width, 36" Bottom Width, 80" High Insulated 430 SS

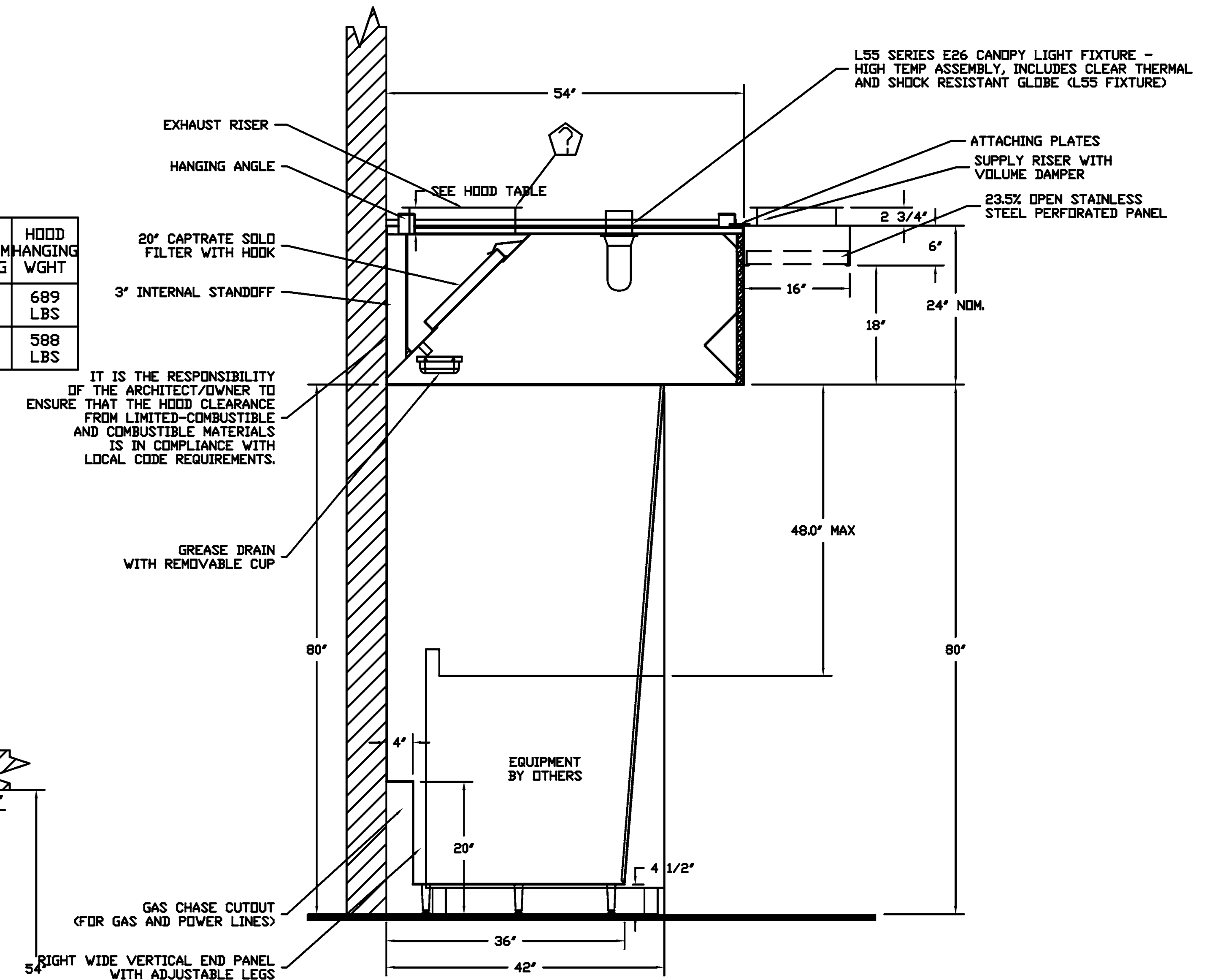
PERFORATED SUPPLY PLENUM(S)

HOOD NO.	TAG	POS.	LENGTH	WIDTH	HEIGHT	TYPE	RISER(S)				
							WIDTH	LENG.	DIA.	CFM	S.P.
1		Front	134"	16"	6"	MUA	12"	24"		633	0.179"
						MUA	12"	24"		633	0.179"
						MUA	12"	24"		633	0.179"
2		Front	122"	16"	6"	MUA	12"	24"		600	0.162"
						MUA	12"	24"		600	0.162"
						MUA	12"	24"		600	0.162"

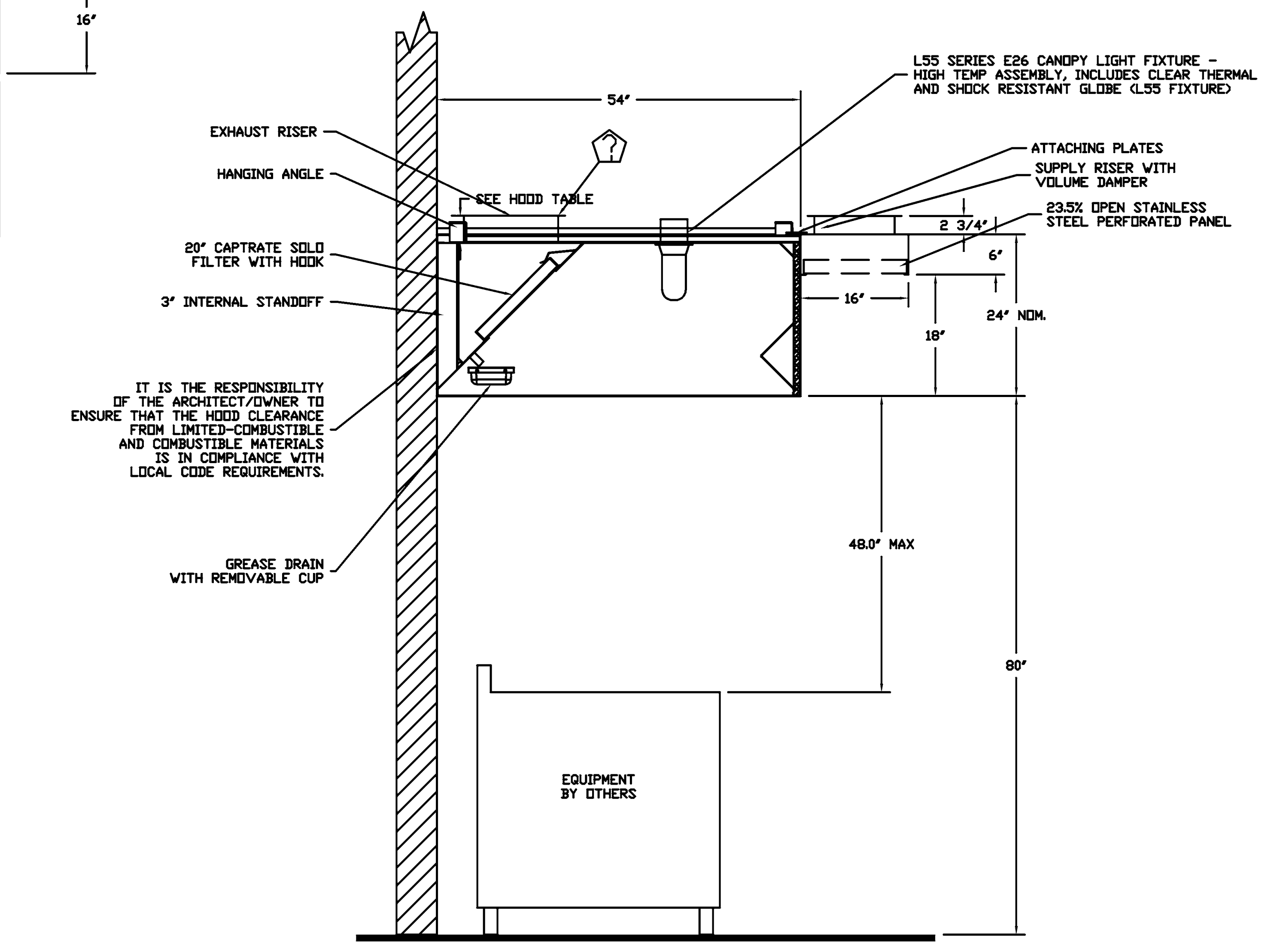


PLAN VIEW – Hood #1
10' 2.00" LONG 5424ND-2-PSP-F

PLAN VIEW – Hood #2
10' 2.00" LONG 5424ND-2-PSP-F



SECTION VIEW – MODEL 5424ND-2-PSP-F
HOOD – #2



SECTION VIEW – MODEL 5424ND-2-PSP-F
HOOD – #1

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DATE: 8/31/2018
DWG.#: 3533621
DRAWN BY: AHJ-86
SCALE: 3/4" = 1'-0"
MASTER DRAWING
SHEET NO. 1

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SUITE 410, BUILING R-4

Project Number:

Sheet Title:
HOOD DRAWINGS

Sheet Number:
M107

EXHAUST FAN INFORMATION – Job#3533621

FAN UNIT NO.	TAG	FAN UNIT MODEL #	CFM	ESP.	RPM	H.P.	B.H.P.	ø	VOLT	FLA	DISCHARGE VELOCITY	WEIGHT (LBS.)	SONES
1		DU180HFA	2000	1.000	993	1.000	0.5150	3	208	3.8	462 FPM	148	11.6
2		DU180HFA	2700	1.250	1190	1.500	0.9020	3	208	6.6	624 FPM	174	15.1

MUA FAN INFORMATION – Job#3533621

FAN UNIT NO.	TAG	FAN UNIT MODEL #	BLOWER	HOUSING	MIN CFM	DESIGN CFM	ESP.	RPM	H.P.	B.H.P.	ø	VOLT	FLA	EVAP COOLER ENTERING DB TEMP.	EVAP COOLER ENTERING WB TEMP.	EVAP COOLER LEAVING DB TEMP.	EVAP COOLER LEAVING WB TEMP.	WEIGHT (LBS.)	SONES
3		A2-20D	20MF-2-MOD	A2	–	3700	0.400	1362	2.000	1.4440	3	208	8.3	90.0lF	67.0lF	72.0lF	67.0lF	681	16.2

FAN OPTIONS

FAN UNIT NO.	TAG	OPTION (Qty. - Descr.)
1		1 - Grease Box
2		1 - Grease Box
3		1 - Evaporative Cooler Wiring Harness 1 - Separate 120V Wiring Package (Required and used only for DCV or Prewire with VFD) - Three Phase Only

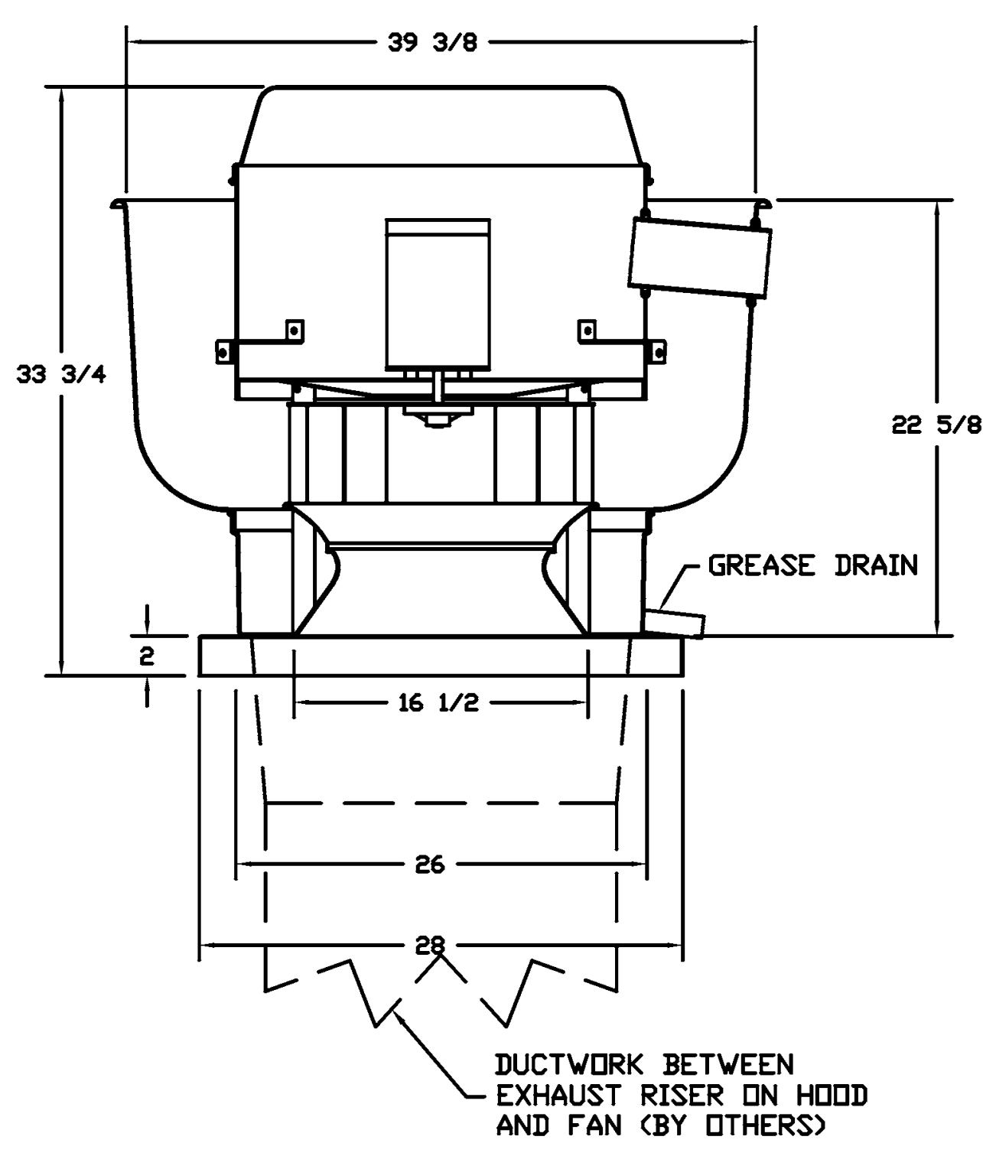
FAN ACCESSORIES

FAN UNIT NO.	TAG	EXHAUST			SUPPLY			
		GREASE CUP	GRAVITY DAMPER	WALL MOUNT	SIDE DISCHARGE	GRAVITY DAMPER	MOTORIZED DAMPER	WALL MOUNT
1		YES						
2		YES						

CURB ASSEMBLIES

NO.	ON FAN	WEIGHT	ITEM	SIZE
1	# 1	41 LBS	Curb	26.500"W x 26.500"L x 20.000"H Vented Hinged
2	# 2	41 LBS	Curb	26.500"W x 26.500"L x 20.000"H Vented Hinged
3	# 3	42 LBS	Curb	31.000"W x 31.000"L x 12.000"H
	# 3		Rail	4.000"W x 4.000"L x 36.000"H

FANS #1, #2 - DU180HFA EXHAUST FAN



FEATURES:

- DIRECT DRIVE CONSTRUCTION (NO BELTS/PULLEYS)
- ROOF MOUNTED FANS
- RESTAURANT MODEL
- UL705 AND UL762 AND ULC-S645
- VARIABLE SPEED CONTROL
- INTERNAL WIRING
- WEATHERPROOF DISCONNECT
- THERMAL OVERLOAD PROTECTION (SINGLE PHASE)
- HIGH HEAT OPERATION 300°F (149°C)
- GREASE CLASSIFICATION TESTING

NORMAL TEMPERATURE TEST

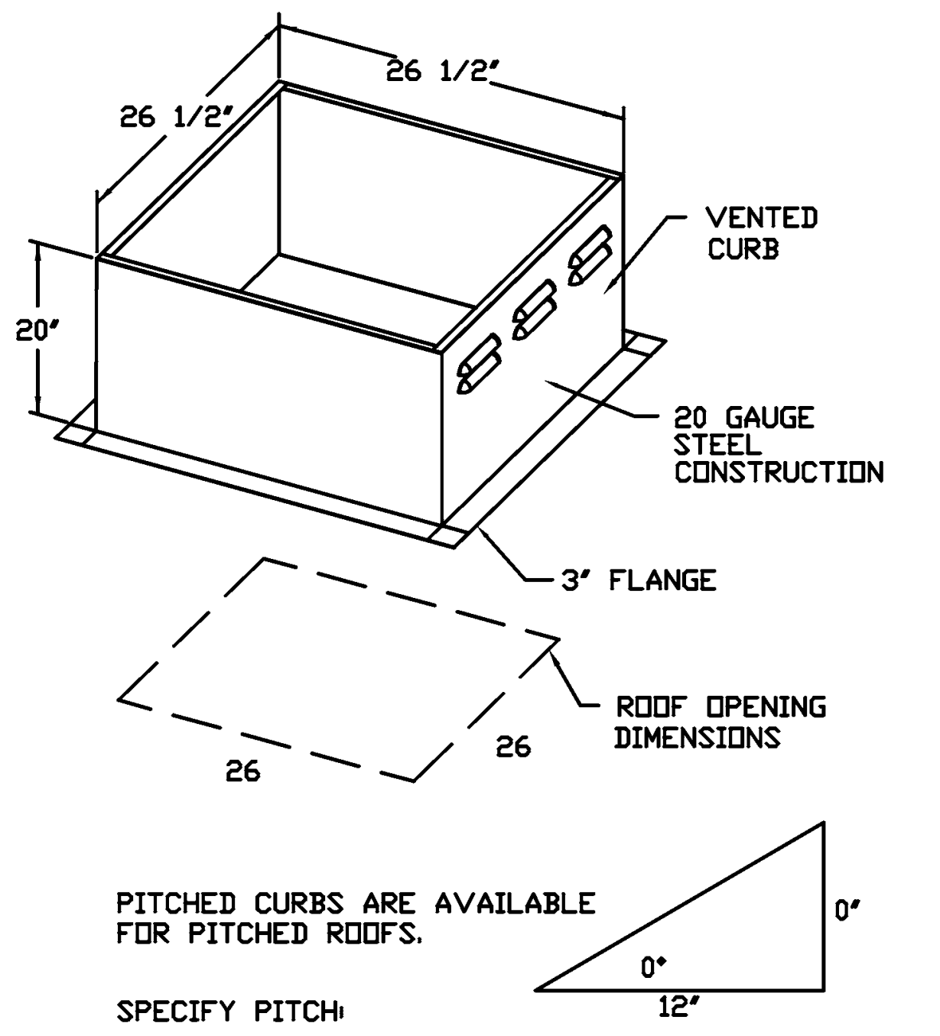
EXHAUST FAN MUST OPERATE CONTINUOUSLY WHILE EXHAUSTING AIR AT 300°F (149°C) UNTIL ALL FAN PARTS HAVE REACHED THERMAL EQUILIBRIUM, AND WITHOUT ANY DETERIORATING EFFECTS TO THE FAN WHICH WOULD CAUSE UNSAFE OPERATION.

ABNORMAL FLARE-UP TEST

EXHAUST FAN MUST OPERATE CONTINUOUSLY WHILE EXHAUSTING BURNING GREASE VAPORS AT 600°F (316°C) FOR A PERIOD OF 15 MINUTES WITHOUT THE FAN BECOMING DAMAGED TO ANY EXTENT THAT COULD CAUSE AN UNSAFE CONDITION.

OPTIONS

GREASE BOX.



PITCHED CURBS ARE AVAILABLE FOR PITCHED ROOFS.

SPECIFY PITCH:
EXAMPLE: 7/12 PITCH = 30° SLOPE

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DRAWN BY: AHJ-86

SCALE: 3/4" = 1'-0"

MASTER DRAWING

SHEET NO. 2

M108-181746-EF

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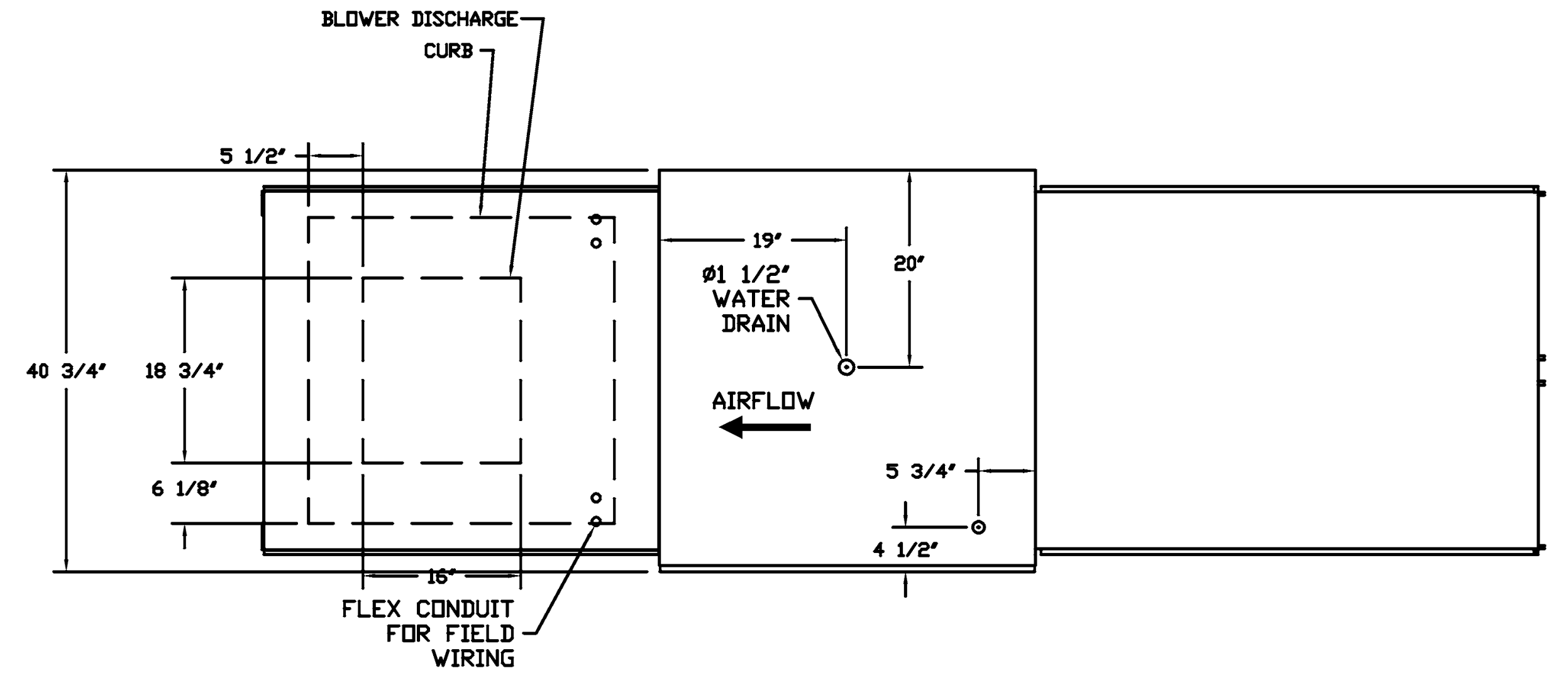
EXHAUST FAN DRAWINGS

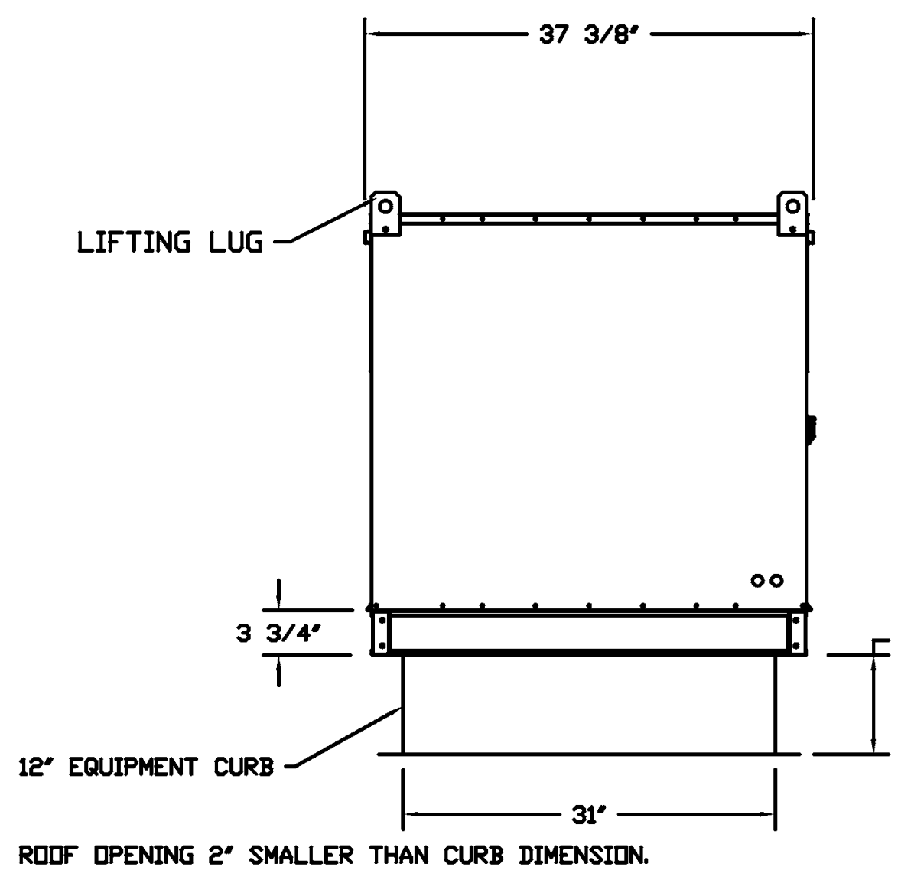
Sheet Number:

M108

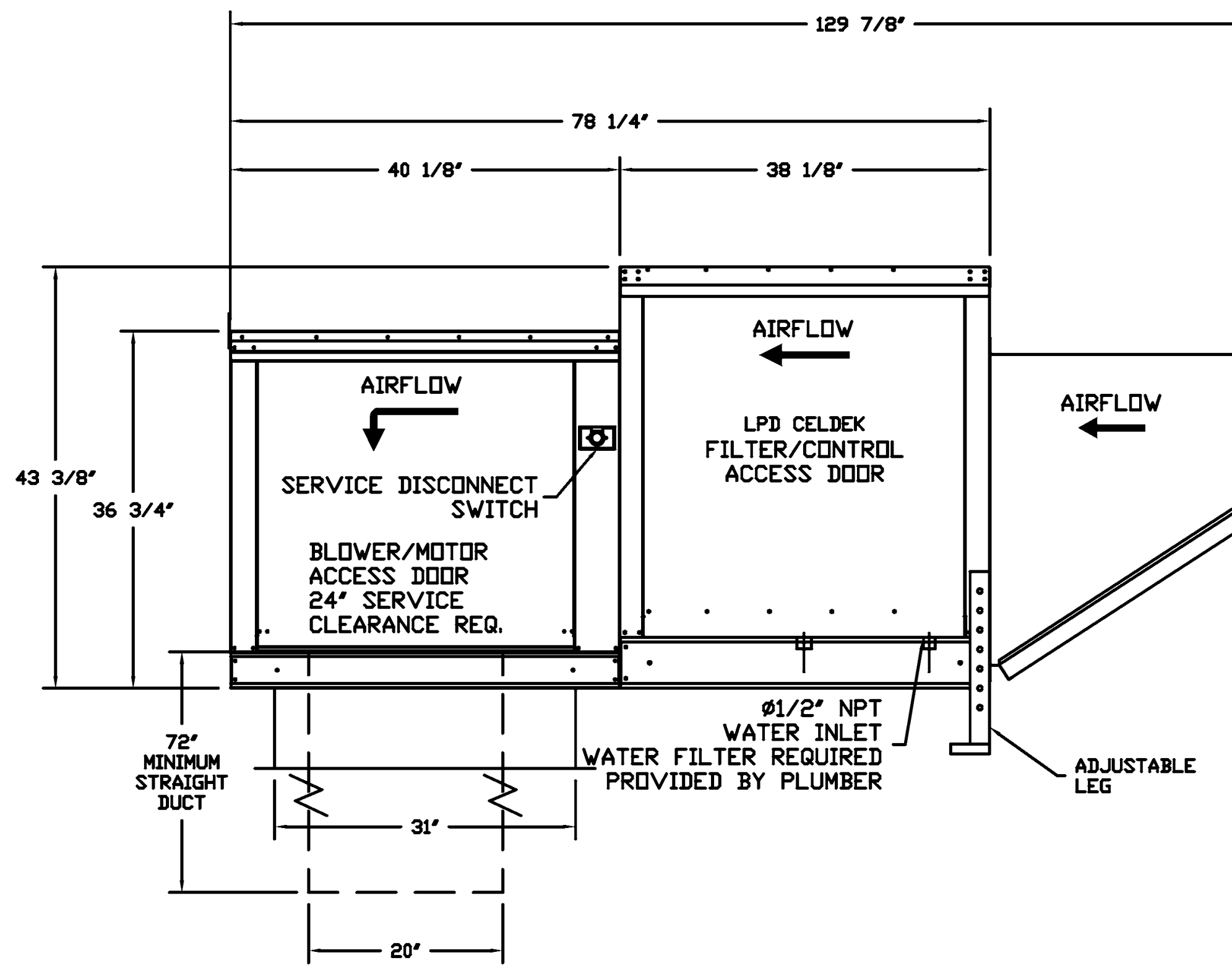
FAN #3 A2-20D - SUPPLY FAN
1. UNTEMPERED SUPPLY UNIT WITH 20" DIRECT DRIVE FAN IN SIZE #2 HOUSING
2. EVAP COOLER (LPD CELDEK) Ð W/INTAKE HOOD W/EZ FILTERS
3. DOWN DISCHARGE - AIR FLOW RIGHT -> LEFT
4. 120V WIRING CONNECTION TO ENERGIZE EVAPORATIVE COOLERS FROM UNTEMPERED SUPPLY FANS.
5. SEPARATE 120VAC WIRING PACKAGE FOR MAKE-UP AIR UNITS. OPTION MUST BE SELECTED WHEN MOUNTING VFD IN PREWIRE PANEL OR WITH DCV PACKAGE. PROVIDES SEPARATE 120VAC INPUT TO SUPPLY FAN. THIS 120V SIGNAL MUST BE RUN BY ELECTRICIAN FROM DCV TO MUA SWITCH.

NOTE: SUPPLY DUCT MUST BE INSTALLED TO MEET SMACNA STANDARDS. A MINIMUM STRAIGHT DUCT LENGTH MUST BE MAINTAINED DOWNSTREAM OF UNIT DISCHARGE UNLESS OTHERWISE SPECIFIED. DO NOT RELY ON UNIT TO SUPPORT DUCT IN ANY WAY. FAILURE TO PROPERLY SIZE DUCTWORK MAY CAUSE SYSTEM EFFECTS AND REDUCE PERFORMANCE OF THE EQUIPMENT. SUGGESTED STRAIGHT DUCT SIZE IS 20" x 20" x 72" LONG.

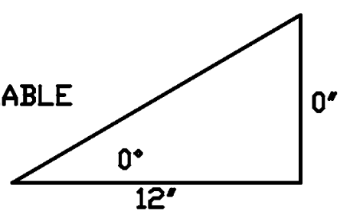




ROOF OPENING 2" SMALLER THAN CURB DIMENSION.



PITCHED CURBS ARE AVAILABLE FOR PITCHED ROOFS.



SPECIFY PITCH:
EXAMPLE: 7/12 PITCH = 30° SLOPE

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DATE: 8/31/2018

DWG.#:
3533621

DRAWN BY: AHJ-86

SCALE:
3/4" = 1'-0"

MASTER DRAWING

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3

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No. M14269
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Project Number:

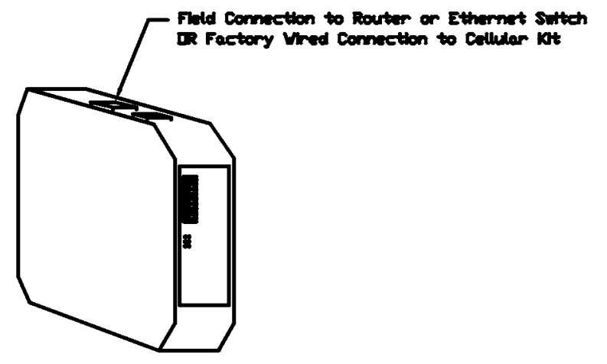
Sheet Title:
MUA
DRAWINGS

Sheet Number:
M109

M109-181746-MUA

ELECTRICAL PACKAGE – Job#3533621

NO.	TAG	PACKAGE #	LOCATION	SWITCHES		OPTION	FANS CONTROLLED				
				LOCATION	QUANTITY		TYPE	Φ	H.P.	VOLT	FLA
1		DCV-2111	Utility Cabinet Left	03 – Utility Cabinet Left	1 Light	Smart Controls DCV	Exhaust	3	1.000	208	3.8
				Hood # 1	1 Fan		Exhaust	3	1.500	208	6.6
							Supply	3	2.000	208	8.3



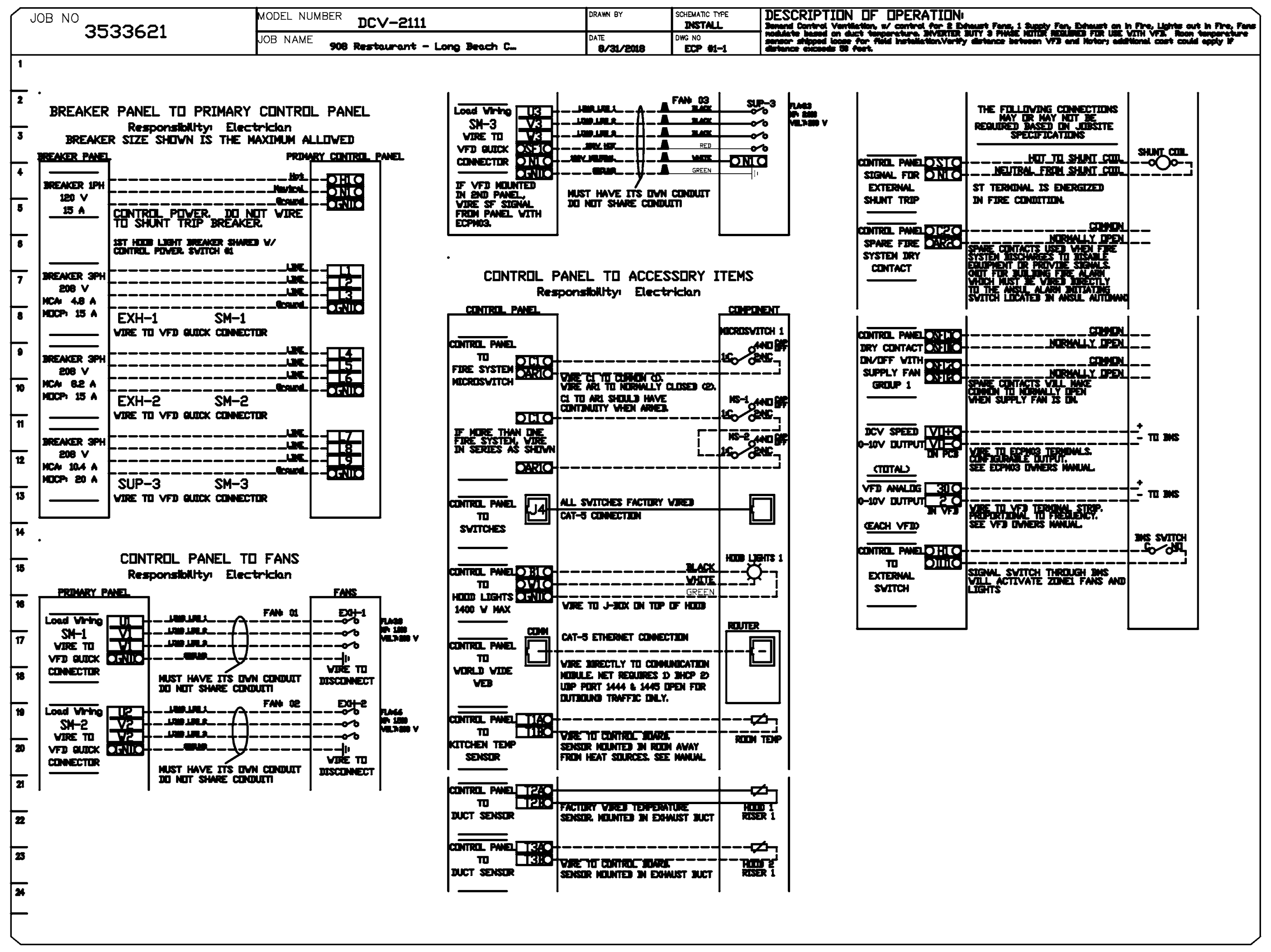
CASlink Monitor and Control

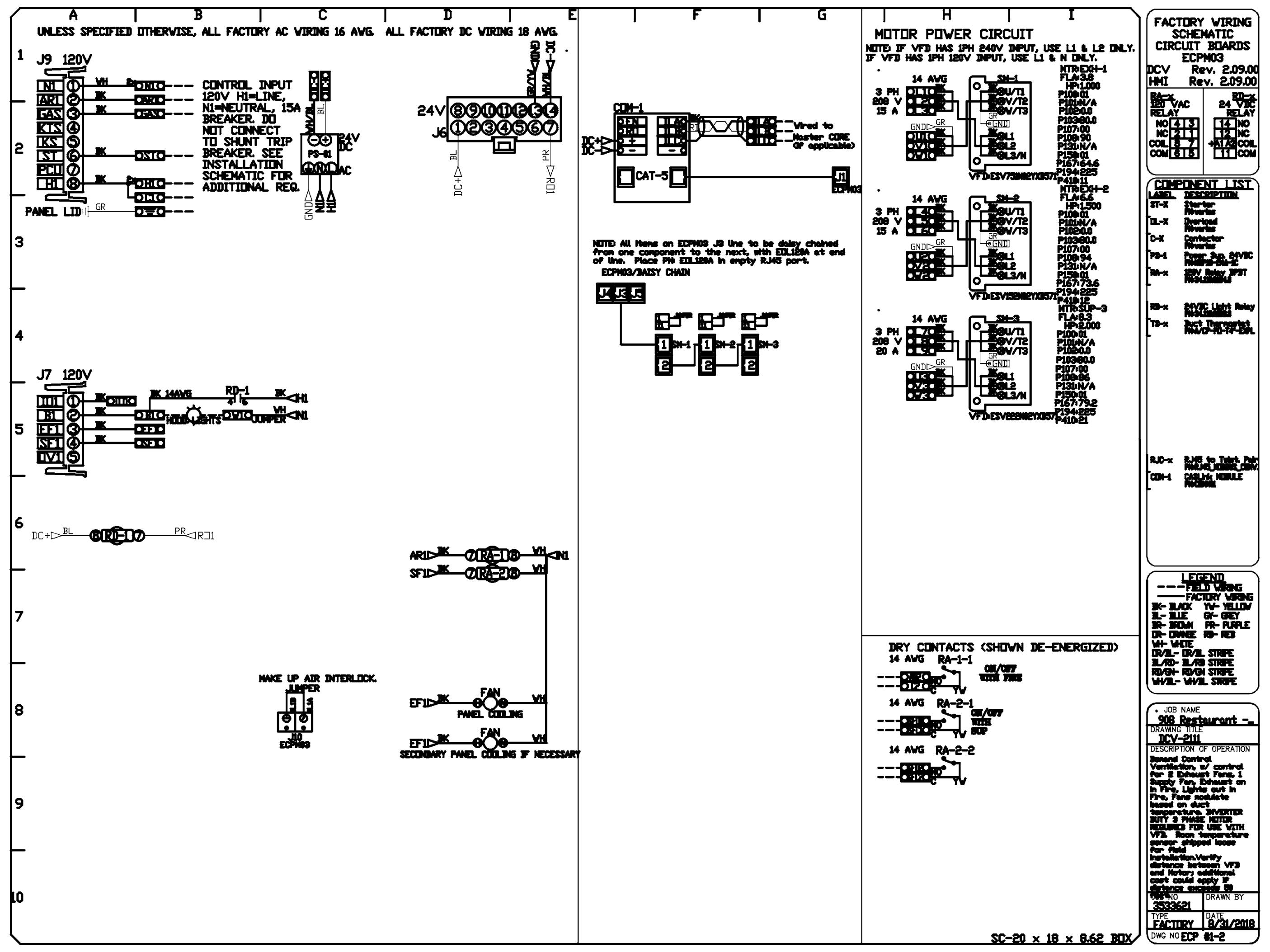
- Hood control panel to support communications to cloud-based Building Management System.
- Hood Control Panel to allow cloud-based Building Management System to monitor real time parameters outlined as MONITOR in the points list.
- Hood Control Panel to allow cloud-based Building Management System to control parameters outlined as CONTROL in the points list.
- Hood control panel to allow remote changes to system setting such as: VFD Frequencies, ECM speeds, temperature set points, fan and wash schedules, etc.

MONITORING AND CONTROL POINTS LIST

DCV Packages	Function
Room Temperature	MONITOR
Duct Temperature(s)	MONITOR
MUA Discharge Temperature	MONITOR
Kitchen RTU Discharge Temperature	MONITOR
Fan Speed	MONITOR
Fan Amperage	MONITOR
Fan Power	MONITOR
VFD Faults	MONITOR
Controller Faults	MONITOR
Fan Faults	MONITOR
Fan Status	MONITOR
PCU Faults	MONITOR
PCU Filter Clog Percentages	MONITOR
Fire Condition	MONITOR
CORE Fire System	MONITOR
Building Pressures	MONITOR
Prep Time Button	MONITOR & CONTROL
Fans Button	MONITOR & CONTROL
Lights Button	MONITOR & CONTROL
Wash Button	MONITOR & CONTROL

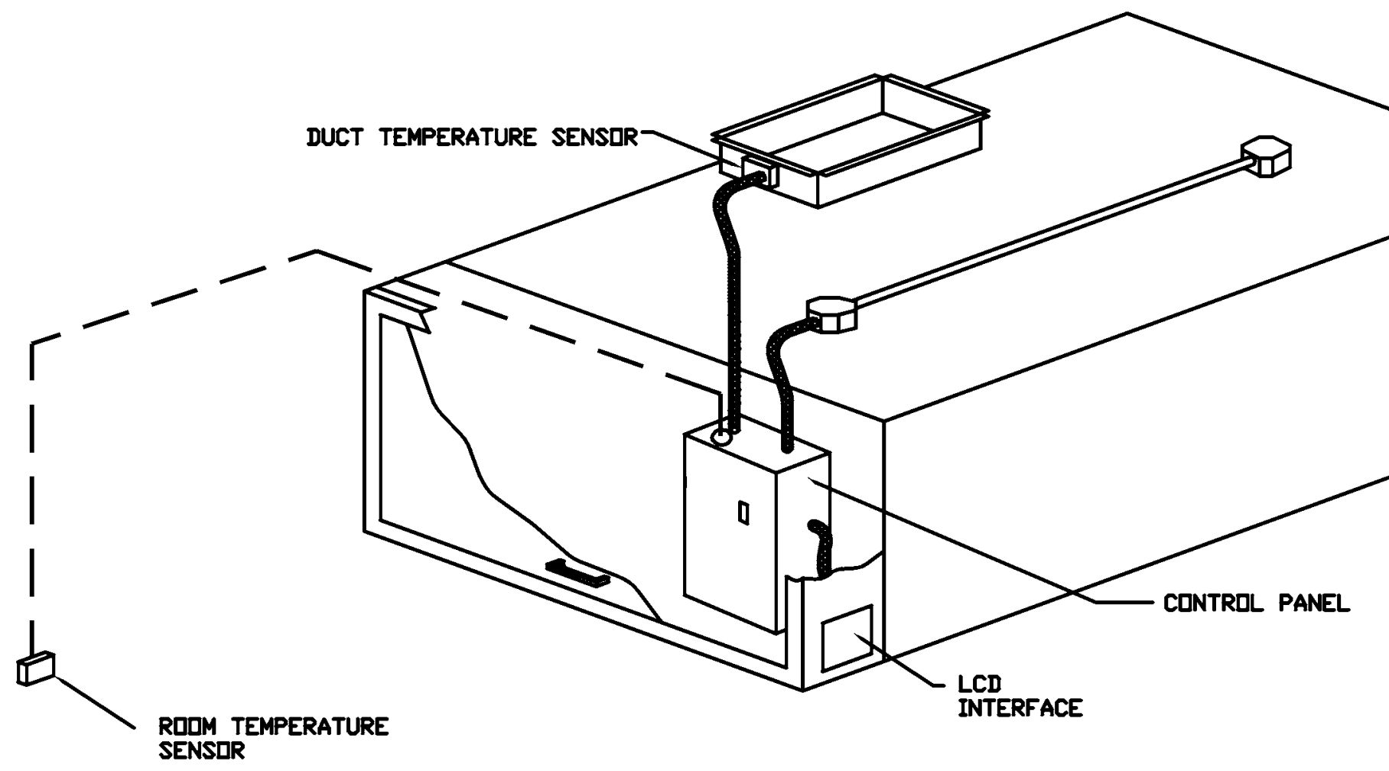
SC Packages	Function
Room Temperature(s)	MONITOR
Duct Temperature(s)	MONITOR
MUA Discharge Temperature	MONITOR
Kitchen RTU Discharge Temperature	MONITOR
Controller Faults	MONITOR
Fan Faults	MONITOR
Fan Status	MONITOR
PCU Faults	MONITOR
PCU Filter Clog Percentages	MONITOR
Fire Condition	MONITOR
CORE Fire System	MONITOR
Building Pressures	MONITOR
Fans Button(s)	MONITOR & CONTROL
Lights Button(s)	MONITOR & CONTROL
Wash Button	MONITOR & CONTROL





Demand Control Ventilation Hood Control Panel Specifications:

- Controls shall be listed by ETL (UL 508A) and shall comply with demand ventilation system turndown requirements outlined in IECC 403.2.8 (2015).
- The control enclosure shall be NEMA 1 rated and listed for installation inside of the exhaust hood utility cabinet. The control enclosure may be constructed of stainless steel or painted steel.
- Temperature probe(s) located in the exhaust duct riser(s) shall be constructed of stainless steel.
- A digital controller shall be provided to activate the hood exhaust fans dynamically based on a fixed differential between the ambient and duct temperatures sensors. This function shall meet the requirements of IMC 507.1.1.
- A digital controller shall provide adjustable hysteresis settings to prevent cycling of the fans after the cooking appliances have been turned off and/or the heat in the exhaust system is reduced.
- A digital controller shall provide an adjustable minimum fan run-time setting to prevent fan cycling.
- Variable Frequency Drives (VFDs) shall be provided for fans as required. The digital controller shall modulate the VFDs between a minimum setpoint and a maximum setpoint on demand. The duct temperature sensor input(s) to the digital controller shall be used to calculate the speed reference signal.
- The VFD speed range of operation shall be from 0% to 100% for the system, with the actual minimum speed set as required to meet minimum ventilation requirements.
- An internal algorithm to the digital controller shall modulate supply fan VFD speed proportional to all exhaust fans that are located in the same fan group as the supply fan.
- The system shall operate in PREP MODE during light cooking load or COOL DOWN MODE when sufficient heat remains underneath the hood system after cooking operations have completed. Operation during either of these periods will disable the supply fans and provide an exhaust fan speed that is equal to the minimum ventilation requirement.
- A digital controller shall disable the supply fan(s), activate the exhaust fan(s), activate the appliance shunt trip, and disable an electric gas valve automatically when fire condition is detected on a covered hood.
- A digital controller shall allow for external BMS fan control via Dry Contact (external control shall not override fan operation logic as required by code).
- An LCD interface shall be provided with the following features:
  a. On/Off push button fan & light switch activation
  b. Integrated gas valve reset for electronic gas valves (no reset relay required)
  c. VFD Fault display with audible & visual alarm notification
  d. Duct temperature sensor failure detection with audible & visual alarm notification
  e. Mis-wired duct temperature sensor detection with audible & visual alarm notification
  f. A single low voltage Cat-5 RJ45 wiring connection
  g. An energy savings indicator that utilizes measured kWh from the VFDs



TYPICAL HOOD CONTROL PANEL INSTALLATION

Sequence of Operations:

The hood control panel is capable of operating in one or more of the following states at any given time:

- Automatic: The system operates based on the differential between room temperature and the temperature at the hood cavity or exhaust duct collar. Fans activate at a configurable temperature differential threshold. Depending on the job configuration each fan zone can be configured as static or dynamic. These terms refer to whether a variable motor (such as EC Motors or VFD driven motors) modulate with temperature. If the panel is equipped with variable speed fans and the zone is defined as 'dynamic', these will modulate within a user-defined range based on the temperature differential. Panels equipped with variable speed fans and a fan zone defined as 'static', fans will run at a set speed calculated for the drive. Demand control ventilation systems are capable of modulating exhaust and make up air fan speeds per the requirements outlined in IECC 403.2.8.
- Manual: The system operates based on human input from an HMI.
- Schedule: A weekly schedule can be set to run fans for a specified period throughout the day. There are three occupied times per day to allow for the user to set up a time that is suitable to their needs. Any time that is within the defined occupied time, the system will run at modulation mode and follow the fan procedure algorithm based on temperature during this time. During unoccupied time, the system will have an extra offset to prevent unintended activation of the system during a time where the system is not being occupied.
- Other: The system operates based on the input from an external source (DDC, BMS or hard-wired interlock)

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HOOD DRAWINGS

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M110

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