

MECHANICAL SHEET INDEX

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RESPONSIBILITY MATRIX

DESCRIPTION	FURNISHED			INSTALLED			REMARKS
	GC	OWNER	LL	GC	OWNER	LL	
DIVISION 23: HEATING, VENTILATING, AND AIR CONDITIONING							
23.1 HVAC DUCTWORK AND PIPING IDENTIFICATION							
HVAC DUCTWORK SYSTEM IDENTIFICATION	*			*			
PIPING SYSTEM IDENTIFICATION	*			*			
UTILITY SHUT OFF IDENTIFICATION IN KITCHEN	*			*			
VALVE TAGS AND CHART	*			*			
HVAC DAMPER IDENTIFICATION	*			*			
23.2 ROOF CURBS							
EXHAUST FAN CURBS	*			*			
ROOFTOP UNIT CURBS	*			*			
CONDENSING UNIT CURBS	*			*			
KITCHEN EXHAUST FAN CURBS	*			*			
23.3 HVAC DUCTWORK SYSTEM COMPONENTS							
HVAC DUCTWORK	*			*			
GREASE DUCTWORK	*			*			
OUTSIDE AIR DUCTWORK	*			*			
SUPPLY AND RETURN AIR DUCTWORK	*			*			
RESTROOM EXHAUST AIR DUCTWORK	*			*			
INSULATION AND FIRE WRAP	*			*			
SMOKE DETECTORS	*			*			
SUPPLY, RETURN, AND EXHAUST GRILLS AND REGISTERS	*			*			
23.4 MECHANICAL PIPING SYSTEM COMPONENTS							
WALK-IN COOLER AND FREEZER CONDENSER REFRIGERANT LINE...	*			*			
REFRIGERANT PIPING FOR HVAC EQUIPMENT	*			*			
VALVES AND ACCESSORIES (E.G. AIR VENTS)	*			*			
23.5 HVAC EQUIPMENT							
RESTROOM EXHAUST FAN	*			*			
KITCHEN EXHAUST FAN WITH CURB EXTENSION	*			*			
DUCTED AND NON-DUCTED HEATING AND COOLING UNITS	*			*			
WALK-IN COOLER AND FREEZER CONDENSING UNITS	*			*			
23.6 KITCHEN EXHAUST WITH FIRE SUPPRESSION SYSTEM							
HOOD CONTROL PANEL	*			*			
REMOTE HOOD SWITCHES IN OFFICE	*			*			
KITCHEN EXHAUST HOOD	*			*			
STRUCTURAL SUPPORT	*			*			
ELECTRICAL AND CONTROL WIRING	*			*			
TANK SYSTEM	*			*			
TANK SYSTEM WIRING AND UTILITIES CONNECTION	*			*			
TANK SYSTEM GAS VALVE	*			*			
23.7 MECHANICAL SAFETY SENSORS							
PULL STATION	*			*			
CO MONITOR	*			*			
CO2 MONITOR	*			*			
23.8 COMMISSIONING ACTIVITIES							
GREASE EXHAUST WATER LEAKAGE TEST	*			*			
TEST AND BALANCE (TAB) REPORT	*			*			
GENERAL NOTES:							
1. INFORMATION CONTAINED WITHIN IS BASED ON OUR INTERPRETATION OF THE FINAL EXECUTED WORK LETTER.							
2. CONTRACTOR TO CONFIRM ALL SCOPE WITH FINAL WORK LETTER PRIOR TO PROCUREMENT OF EQUIPMENT.							
REMARKS:							
1. WALK-IN COOLER AND FREEZER CONDENSING UNITS FURNISHED AND INSTALLED BY OWNER VENDOR.							
2. GENERAL CONTRACTOR TO COORDINATE TANK INSTALLATION TIME WITH OWNER VENDOR AND FACILITATE SYSTEM SIGN-OFF.							

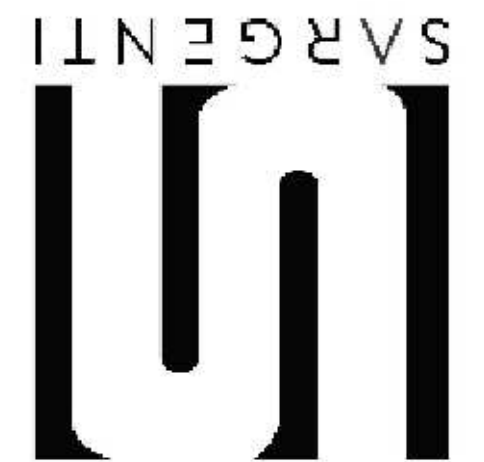
GENERAL NEW NOTES:

- PRIOR TO SUBMITTING BID, VISIT THE JOB SITE AND BECOME FULLY ACQUAINTED WITH THE EXISTING CONDITIONS OF THE PROJECT. REVIEW THE GENERAL NOTES SPECIFICATIONS AND OTHER DRAWINGS FOR ADDITIONAL REQUIREMENTS WHICH MAY NOT BE SPECIFICALLY CALLED OUT IN THIS PORTION OF THE CONSTRUCTION DOCUMENTS. NOTIFY ARCHITECT, ENGINEER AND/OR OWNER OF CONFLICTS OR DISCREPANCIES PRIOR TO SUBMISSION OF BID.
- COORDINATE THE INSTALLATION OF THE MECHANICAL SYSTEMS WITH OTHER TRADES TO ENSURE A NEAT AND ORDERLY INSTALLATION. INSTALL DUCTWORK AND PIPING AS TIGHT TO STRUCTURE AS POSSIBLE. COORDINATE WITH OTHER TRADES TO AVOID CONFLICTS. COORDINATE INSTALLATION OF DUCTWORK AND PIPING TO AVOID CONFLICTS WITH ELECTRICAL PANELS, LIGHTING FIXTURES, ETC. ANY MODIFICATIONS REQUIRED DUE TO LACK OF COORDINATION WILL BE THE RESPONSIBILITY OF THE CONTRACTOR AT NO EXTRA COST TO THE OWNER.
- WHERE SHUTDOWN OF EXISTING SYSTEMS IS REQUIRED DURING NEW WORK, COORDINATE SHUTDOWN TIME AND DURATION WITH THE OWNER TO MINIMIZE DOWNTIME. NOTIFY OWNER SEVEN (7) DAYS PRIOR TO INTERRUPTION OF SERVICE.
- PROVIDE TEMPORARY BARRIERS TO CONTAIN DUST AND DEBRIS RESULTING FROM THE PERFORMANCE OF THE WORK TO THE AREA WHERE WORK IS BEING PERFORMED.
- ALL MECHANICAL EQUIPMENT SHOWN ON THE MECHANICAL PLANS SHALL BE PROVIDED BY DIVISION 23 UNLESS OTHERWISE NOTED.
- NEW MECHANICAL EQUIPMENT, DUCTWORK AND PIPING ARE SHOWN AT APPROXIMATE LOCATIONS. FIELD MEASURE FINAL DUCTWORK AND PIPING LOCATIONS PRIOR TO FABRICATION AND MAKE ADJUSTMENTS AS REQUIRED TO FIT THE DUCTWORK AND PIPING WITHIN THE AVAILABLE SPACE. VERIFY THAT FINAL EQUIPMENT LOCATIONS MEET MANUFACTURER'S RECOMMENDATIONS REGARDING SERVICE CLEARANCE AND PROPER AIRFLOW CLEARANCE AROUND EQUIPMENT.
- REFER TO ARCHITECTURAL DRAWINGS FOR RELATED CONSTRUCTION DETAILS AS APPLICABLE TO THE HVAC SYSTEM. VERIFY CHASES AND PENETRATIONS SHOWN ON ARCHITECTURAL DRAWINGS THAT ARE INTENDED FOR DUCTWORK AND PIPING MEET REQUIREMENTS.
- COORDINATE LOCATION OF ROOF MOUNTED HVAC EQUIPMENT AND ROOF PENETRATIONS WITH THE ARCHITECTURAL AND STRUCTURAL DRAWINGS.
- INDOOR AIR QUALITY MEASURES: PROTECT INSIDE OF (INSTALLED AND DELIVERED) DUCTWORK AND HVAC UNITS FROM EXPOSURE TO DUST, DIRT, PAINT AND MOISTURE. REPLACE INSULATION THAT HAS BECOME WET AT ANY TIME DURING CONSTRUCTION. DRYING THE INSULATION IS NOT ACCEPTABLE. SEAL ANY TEARS OR JOINTS OF INTERNAL FIBERGLASS INSULATION. REMOVE DEBRIS FROM CEILING/RETURN AIR PLENUM INCLUDING DUST. AN INDEPENDENT PROFESSIONAL DUCT CLEANING COMPANY SHALL VACUUM CLEAN ANY DUCTWORK CONNECTED TO HVAC UNITS THAT WERE OPERATED DURING THE CONSTRUCTION PERIOD AFTER NEW FILTERS ARE INSTALLED AND PRIOR TO TURNING SYSTEM OVER TO THE OWNER. THE INTERNAL SURFACES AND ASSOCIATED COILS OF ANY HVAC UNITS THAT WERE OPERATED SHALL ALSO BE CLEANED.
- INSTALL DUCTWORK AND PIPING PARALLEL TO BUILDING COLUMN LINES UNLESS OTHERWISE SHOWN OR NOTED.
- OVERHEAD HANGERS AND SUPPORTS FOR EQUIPMENT, DUCTWORK AND PIPING SHALL BE FASTENED TO BUILDING JOISTS OR BEAMS. DO NOT FASTEN HANGERS AND SUPPORTS TO THE ABOVE FLOOR SLAB OR ROOF EXCEPT WHERE CONCRETE INSERTS IN CONCRETE SLABS ARE ALLOWED BY THE SPECIFICATIONS.
- COORDINATE LOCATION OF EQUIPMENT SUPPORTS WITH LOCATION OF EQUIPMENT ACCESS PANELS/DOORS TO ENABLE SERVICE OF EQUIPMENT AND/OR FILTER REPLACEMENT.
- SEAL PENETRATIONS THROUGH THE BUILDING COMPONENTS IN ACCORDANCE WITH THE CONTRACT SPECIFICATIONS. FIREPROOF PENETRATIONS THROUGH FIRE-RATED COMPONENTS IN ACCORDANCE WITH U.L. REQUIREMENTS.
- COORDINATE THE EXACT MOUNTING SIZE AND FRAME TYPE OF DIFFUSERS, REGISTERS AND GRILLES WITH THE SUPPLIER TO MEET THE CEILING, WALL AND DUCT INSTALLATION REQUIREMENTS.
- ADJUST LOCATION OF CEILING DIFFUSERS, REGISTERS AND GRILLES AS REQUIRED TO ACCOMMODATE FINAL CEILING GRID AND LIGHTING LOCATIONS.
- PAINT PORTIONS OF DUCTWORK AND INSULATION THAT ARE EXPOSED TO VIEW BY THE INSTALLATION OF DIFFUSERS, REGISTERS, AND GRILLES IN CEILINGS OR WALLS FLAT BLACK. PORTIONS INCLUDE BOTH THE INTERIOR OF UNLINED DUCTWORK AND THE EXTERIOR OF DUCTWORK AND INSULATION.
- LOCATE AND SET THERMOSTATS AND HUMIDISTATS AT LOCATIONS SHOWN ON PLANS. VERIFY EXACT LOCATIONS WITH ARCHITECT PRIOR TO INSTALLATION. INSTALL DEVICES WITH TOP OF DEVICE AT MAXIMUM 48" AFF TO MEET ADA REQUIREMENTS UNLESS NOTED OTHERWISE ON PLANS. PROVIDE INSULATED BACKING FOR THERMOSTATS MOUNTED ON EXTERIOR BUILDING WALLS. INSTALL WIRING IN CONDUIT PROVIDED BY DIVISION 26. AT A MINIMUM, PROVIDE CONDUIT IN THE WALL FROM THE JUNCTION BOX TO 6" ABOVE THE CEILING.
- COORDINATE THE LOCATION AND ELEVATION OF WALL-MOUNTED DEVICES WITH PRESENTATION BOARDS, DISPLAY CABINETS, SHELVES OR OTHER COMPONENTS SHOWN ON THE ARCHITECTURAL DRAWINGS THAT ARE TO BE INSTALLED UNDER OTHER DIVISIONS. CONTRACTOR WILL NOT BE REIMBURSED FOR RELOCATION OF WALL-MOUNTED DEVICES CAUSED BY A LACK OF COORDINATION.
- PROVIDE A MANUAL BALANCING DAMPER IN EACH DUCT TAKEOFF FROM SUPPLY, RETURN, OUTDOOR AND EXHAUST AIR DUCTS.
- PROVIDE A PREFABRICATED 45 DEGREE, HIGH EFFICIENCY, RECTANGULAR/ROUND BRANCH DUCT TAKEOFF FITTING FOR BRANCH DUCT CONNECTIONS AND TAKE-OFFS TO INDIVIDUAL DIFFUSERS, REGISTERS AND GRILLES. PROVIDE WITH INTEGRAL MANUAL BALANCING DAMPER AND LOCKING QUADRANT WHERE INDICATED ON PLANS.
- BRANCH DUCTWORK TO AIR OUTLETS SHALL BE SAME SIZE AS OUTLET NECK SIZE UNLESS OTHERWISE NOTED.
- REFER TO SPECIFICATIONS FOR DUCTWORK AND PIPING INSULATION REQUIREMENTS. DUCT SIZES ON MECHANICAL PLANS INDICATE CLEAR INSIDE AIRFLOW DIMENSIONS. INCREASE SHEET METAL SIZES ACCORDINGLY TO ACCOUNT FOR THICKNESS OF DUCT LINER.
- FLEXIBLE DUCTWORK SHALL NOT EXCEED 5'-0" IN LENGTH AND SHALL BE INSTALLED AND SUPPORTED TO AVOID SHARP BENDS AND SAGGING. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
- PROVIDE EQUIPMENT VENTS AND FLUES PER EQUIPMENT MANUFACTURERS' RECOMMENDATIONS AND EQUIPMENT SPECIFICATIONS. KEEP PENETRATIONS THROUGH ROOF A MINIMUM OF 10'-0" FROM HVAC EQUIPMENT FRESH AIR INLETS AND 2'-0" FROM ROOF PARAPETS.
- PROVIDE TYPE I GREASE HOOD EXHAUST DUCTWORK OF MINIMUM 16 GAUGE BLACK IRON WITH LIQUID TIGHT WELDS, WITH ACCESS PANELS FOR GREASE CLEANING AS REQUIRED BY NFPA 96 AND LOCAL CODES. SLOPE DUCT BACK TOWARDS HOOD AT MINIMUM OF 1/4" PER LINEAL FOOT MAINTAINING 18" CLEARANCE TO COMBUSTIBLE MATERIALS. INSTALL GREASE DUCTS IN AN APPROVED FIRE-RATED ENCLOSURE SEPARATED FROM THE EXHAUST DUCT BY A MINIMUM OF 6" AND MAXIMUM OF 12". VENTILATE ENCLOSURE TO THE OUTSIDE AIR IF REQUIRED BY CODE. AS AN OPTION, IF APPROVED BY LOCAL CODES, PROVIDE AN APPROVED WRAP SYSTEM IN LIEU OF THE RATED DUCT ENCLOSURE SYSTEM. DUCT WRAP SYSTEM SHALL MEET UL REQUIREMENTS FOR GREASE DUCT ENCLOSURES.
- PROVIDE A NEW SET OF AIR FILTERS IN UNITS PRIOR TO TESTING, ADJUSTING AND BALANCING AND BEFORE TURNING SYSTEM(S) OVER TO OWNER.
- TEMPORARY INSTALLATIONS OF INFECTION CONTROL MEASURES DURING CONSTRUCTION SHALL BE COORDINATED WITH THE FACILITY'S INFECTION CONTROL STAFF. PRIOR TO CONSTRUCTION PROVIDE ALL REQUIRED TEMPORARY INSTALLATIONS, INCLUDING DETAILS OF THE INFECTION CONTROL MEASURES SUCH AS TEMPORARY BARRIERS AND MEMBRANES, PORTABLE EXHAUST FANS AND TEMPORARY DUCTWORK. TEMPORARY INSTALLATIONS MUST NOT HAVE A NEGATIVE IMPACT ON EXISTING SYSTEMS NOR CAUSE UNSAFE CONDITIONS. TEMPORARY INSTALLATIONS SHALL MAINTAIN ADEQUATE EGRESS AND SHALL NOT OBSTRUCT EXISTING EXITS. CREATE A FIRE HAZARD OR REDUCE REQUIRED FIRE RESISTANCE. TEMPORARY VENTILATION SYSTEMS SHALL NOT CAUSE THE AIR BALANCE OF ADJACENT ROOMS OR SPACES TO BE IMPACTED OR ALTER THE PERFORMANCE OF PERMANENT BUILDING VENTILATION SYSTEMS. AIRFLOW MEASUREMENTS SHALL BE TAKEN TO VERIFY ADJACENT ROOMS OR SPACES ARE NOT IMPACTED.

MECHANICAL SYMBOLS

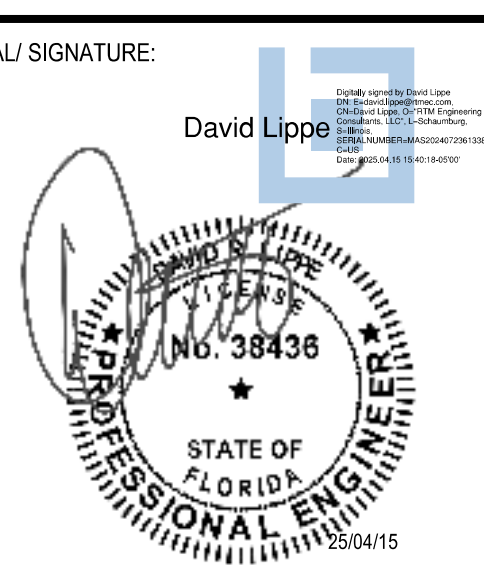
THIS IS A MASTER LEGEND AND NOT ALL SYMBOLS OR ABBREVIATIONS ARE USED.		V2.06	
STANDARD MOUNTING HEIGHT		HVAC DUCTWORK AND ACCESSORIES	
<p>THERMOSTATS (USER ADJUSTABLE) (TOP OF DEVICE) 48"</p> <p>CONTROLS (TOP OF DEVICE) 48"</p> <p>INSTALL DEVICES AT THE MOUNTING HEIGHTS SHOWN ABOVE UNO IN THE CONSTRUCTION DOCUMENTS. MOUNTING HEIGHTS LISTED ABOVE OR ELSEWHERE IN THE CONSTRUCTION DOCUMENTS ARE AFF OR AFG TO BOTTOM OF DEVICE UNO. ALL DEVICES SHALL BE INSTALLED IN COMPLIANCE WITH CURRENT ADA AND LOCAL REQUIREMENTS.</p>	<p>LINEAR SLOT DIFFUSER</p> <p>INSULATED FLEXIBLE DUCT (MAX. 5'-0" LONG)</p> <p>BRANCH DUCT WITH 45° RECTANGLE-ROUND BRANCH FITTING AND MANUAL VOLUME DAMPER</p> <p>ELBOW WITH TURNING VANES</p> <p>BRANCH DUCT WITH BELL-MOUTH FITTING & MANUAL VOLUME CONTROL DAMPER</p> <p>RETURN, EXHAUST, OR OUTSIDE AIR DUCT UP</p> <p>RETURN, EXHAUST, OR OUTSIDE AIR DUCT DOWN</p> <p>SUPPLY AIR DUCT UP</p> <p>SUPPLY AIR DUCT DOWN</p> <p>EQUIPMENT WITH FLEXIBLE DUCT CONNECTION</p> <p>10" (NECK SIZE) CSD-1 (TYPE) 300 CFM (CFM OF SUPPLY DIFFUSER OR REGISTER)</p> <p>24x24 (NECK SIZE) CEG-1 (TYPE) 800 CFM (CFM OF EXHAUST GRILLE)</p> <p>MANUAL VOLUME DAMPER</p> <p>SQUARE TO ROUND TRANSITION</p> <p>DUCT MOUNTED SMOKE DETECTOR (SD=SUPPLY/RD=RETURN)</p> <p>ROUND DUCT TAG INDICATING DIAMETER</p> <p>RECTANGULAR DUCT TAG INDICATING INTERNAL DUCT DIMENSIONS.</p> <p>FLAT OVAL DUCT TAG INDICATING INTERNAL DUCT DIMENSIONS</p> <p>RISER DESIGNATION</p> <p>FIRE DAMPER</p> <p>FIRE SMOKE DAMPER</p> <p>SMOKE DAMPER</p> <p>VOLUME DAMPER</p> <p>MOTORIZED DAMPER</p> <p>BACKDRAFT DAMPER</p>	<p>DIRECTION OF FLOW</p> <p>CONTROL VALVE</p> <p>THREE-WAY CONTROL VALVE</p> <p>SHUTOFF VALVE</p> <p>CHECK VALVE</p> <p>BALANCING VALVE WITH PRESSURE PORTS</p> <p>TRIPLE DUTY VALVE WITH PRESSURE PORTS</p> <p>STRAINER</p> <p>STRAINER WITH BLOWDOWN VALVE</p> <p>RELIEF / SAFETY VALVE</p> <p>SOLENOID VALVE</p> <p>PRESSURE REDUCING VALVE</p> <p>GAS PRESSURE REGULATOR</p> <p>THERMOSTATIC MIXING VALVE</p> <p>PIPE ANCHOR</p> <p>EXPANSION JOINT</p> <p>PIPE GUIDE</p> <p>PIPING SUPPORT</p> <p>F & T TRAP</p> <p>BUCKET TRAP</p> <p>THERMOSTATIC TRAP</p> <p>BACKFLOW PREVENTER</p> <p>PRESSURE GAUGE</p> <p>THERMOMETER</p> <p>PRESSURE AND TEMPERATURE TEST PLUG</p> <p>UNION</p> <p>FLANGE CONNECTION</p> <p>VACUUM RELIEF VALVE</p> <p>AUTOMATIC AIR VENT</p> <p>MANUAL AIR VENT</p> <p>PRESSURE / VACUUM SWITCH</p> <p>CLEANOUT</p> <p>CAP</p> <p>ELBOW UP</p> <p>ELBOW DOWN</p> <p>TEE UP</p> <p>TEE DOWN</p> <p>ELBOW UP WITH SHUT-OFF VALVE (SOV)</p> <p>ELBOW DOWN WITH SHUT-OFF VALVE (SOV)</p> <p>TEE UP WITH SHUT-OFF VALVE (SOV)</p> <p>TEE DOWN WITH SHUT-OFF VALVE (SOV)</p> <p>REDUCER</p> <p>RECIRCULATION PUMP</p> <p>P-TRAP</p> <p>GAS COCK</p> <p>TOP BEAM CLAMP</p> <p>TRAPEZE HANGER</p> <p>FLEXIBLE CONNECTION</p>	
ANNOTATION		HVAC CONTROL DEVICES	
<p>MECHANICAL PLAN NOTE CALLOUT</p> <p>MECHANICAL EQUIPMENT DESIGNATION (CONTRACTOR FURNISHED AND INSTALLED UNLESS NOTED OTHERWISE)</p> <p>CONNECTION POINT OF NEW WORK TO EXISTING</p> <p>DETAIL REFERENCE. UPPER NUMBER INDICATES DETAIL NUMBER LOWER NUMBER INDICATES SHEET NUMBER</p> <p>SECTION CUT DESIGNATION</p>	<p>HUMIDISTAT</p> <p>THERMOSTAT</p> <p>CARBON MONOXIDE SENSOR</p> <p>CARBON DIOXIDE SENSOR</p> <p>DIFFERENTIAL PRESSURE SENSOR</p> <p>FLOW SWITCH</p> <p>HUMIDITY SENSOR</p> <p>PULL STATION</p> <p>REMOTE TESTING STATION WITH INDICATING LIGHT</p> <p>STATIC PRESSURE</p> <p>SWITCH</p> <p>TEMPERATURE SENSOR</p>	<p>ALL DUCT DIMENSIONS SHOWN ON DRAWINGS ARE INSIDE DIMENSIONS. REFER TO DUCTWORK SPECIFICATIONS FOR DUCTWORK INSULATION AND LINER INFORMATION.</p>	
ABBREVIATIONS			
<p>AC AIR CONDITIONING</p> <p>ACC AIR COOLED CHILLER</p> <p>ACCU AIR COOLED CONDENSING UNIT</p> <p>AFC ABOVE FINISHED CEILING</p> <p>AFB ABOVE FINISHED FLOOR</p> <p>AFG ABOVE FINISHED GRADE</p> <p>AHJ AUTHORITY HAVING JURISDICTION</p> <p>AHU AIR HANDLING UNIT</p> <p>AI ANALOG INPUT</p> <p>AD ANALOG OUTPUT</p> <p>AP ACCESS PANEL</p> <p>APD AIR PRESSURE DROP</p> <p>AWG AMERICAN WIRE GAUGE</p> <p>B BOILER</p> <p>BAS BUILDING AUTOMATION SYSTEM</p> <p>BB BACKBONE</p> <p>BD BACKDRAFT DAMPER</p> <p>BDL BLOWDOWN</p> <p>BFC BELOW FINISHED CEILING</p> <p>BFF BELOW FINISHED FLOOR</p> <p>BFG BELOW FINISHED GRADE</p> <p>BFP BOILER FEED PUMP</p> <p>BHP BRAKE HORSEPOWER</p> <p>BIT BINARY INPUT</p> <p>BO BINARY OUTPUT</p> <p>BOD BOTTOM OF DUCT</p> <p>BOS BOTTOM OF STRUCTURE</p> <p>BTU BRITISH THERMAL UNIT</p> <p>CFM CUBIC FEET PER MINUTE</p> <p>CH CHILLER</p> <p>CLG COOLING</p> <p>CO CLEANOUT</p> <p>CP CONDENSATE PUMP</p> <p>CPT CONTROL POWER</p> <p>CRAC TRANSFORMER</p> <p>CRU COMPUTER ROOM UNIT</p> <p>CT COOLING TOWER</p> <p>CV CONTROL VALVE</p> <p>CWP CONDENSER</p> <p>WATER PUMP</p> <p>CJ CONDENSING UNIT</p> <p>CHWWP CHILLED WATER PUMP</p> <p>DB DECIBELS</p> <p>DBA DECIBEL AVERAGE</p> <p>DDC DIRECT DIGITAL CONTROL</p> <p>DI DIGITAL INPUT</p> <p>DISC DISCONNECT</p> <p>DN DOWN</p> <p>DS DUCT SILENCER</p> <p>DX DIRECT EXPANSION</p> <p>(E) EXISTING</p> <p>EA EXHAUST AIR</p> <p>EAT ENTERING AIR</p> <p>ED AIR TEMPERATURE</p> <p>EDB EXHAUST DUCT ENTERING DRY BULB</p> <p>EF EXHAUST FAN EFFICIENCY</p> <p>EMS ENERGY MANAGEMENT SYSTEM</p> <p>ESP EXTERNAL STATIC PRESSURE</p> <p>ETR EXISTING TO REMAIN</p> <p>EWB ENTERING WET BULB</p> <p>EWIT ENTERING WATER TEMPERATURE</p> <p>FCU FAN COIL UNIT</p> <p>FFA FROM FLOOR ABOVE</p> <p>FFB FROM FLOOR BELOW</p> <p>FF FINISHED FLOOR</p> <p>FPI FINS PER INCH</p> <p>FFM FEET PER MINUTE</p> <p>GC GENERAL CONTRACTOR</p> <p>GPM GALLONS PER MINUTE</p> <p>HDA HAND-OFF-AUTOMATIC HORSEPOWER</p> <p>HTG HEATING</p> <p>HWP HEATING WATER PUMP</p> <p>IN WC INCHES OF WATER</p> <p>L LOUVER</p> <p>LAT LEAVING AIR TEMPERATURE</p> <p>LDB LEAVING DRY BULB</p> <p>LP LOW PRESSURE</p> <p>LWB LEAVING WET BULB</p> <p>LWT LEAVING WATER TEMPERATURE</p> <p>MAU MAKE-UP AIR UNIT</p> <p>MAX MAXIMUM</p> <p>MBH 1000 BTU PER HOUR</p> <p>MD MOTORIZED DAMPER</p> <p>MFR MANUFACTURER</p> <p>MIN MINIMUM</p> <p>N/A NOT APPLICABLE</p> <p>NC NORMALLY CLOSED</p> <p>N/O NORMALLY OPEN</p> <p>NOM NOMINAL</p> <p>NO NOISE CRITERIA</p> <p>NF NON-FUSED</p> <p>NOT IN CONTRACT</p> <p>OA OUTSIDE AIR</p> <p>PICV PRESSURE INDEP. CONTROL VALVE</p> <p>PROVIDE FURNISH AND INSTALL</p> <p>QTY QUANTITY</p> <p>RA RETURN AIR</p> <p>RC ROOM CRITERIA</p> <p>RD RETURN DUCT</p> <p>REA RELIEF AIR</p> <p>RF RETURN FAN</p> <p>RFR REFRIGERANT</p> <p>RH RELATIVE HUMIDITY</p> <p>RH ROOF HOOD</p> <p>RPM REVOLUTIONS PER MINUTE</p> <p>RTU ROOFTOP UNIT</p> <p>SA SUPPLY AIR</p> <p>SCP STEAM CONDENSATE PUMP</p> <p>SD SMOKE DETECTOR</p> <p>SD SUPPLY DUCT</p> <p>SH SUPPLY FAN</p> <p>SH SENSIBLE HEAT CAPACITY</p> <p>SOV SCOPE OF WORK</p> <p>SP STATIC PRESSURE</p> <p>STEAM TRAP</p> <p>STM STEAM</p> <p>TBD TO BE DETERMINED</p> <p>TCG TEMPERATURE CONTROLS</p> <p>CONTRACTOR</p> <p>TEMPERATURE CONTROL PANEL</p> <p>TF TRANSFER FAN</p> <p>TFA TO FLOOR ABOVE</p> <p>TFB TO FLOOR BELOW</p> <p>TH TOTAL HEAT CAPACITY</p> <p>TSP TOTAL STATIC PRESSURE</p> <p>TEMPERATURE</p> <p>TT TRANSMITTAL</p> <p>TYP TYPICAL</p> <p>UH UNDERFLOOR</p> <p>UG UNDERGROUND</p> <p>UIS UNDERSLAB</p> <p>UH UNIT HEATER</p> <p>UNO UNLESS NOTED OTHERWISE</p> <p>VAV VARIABLE AIR VOLUME</p> <p>VEL VELOCITY</p> <p>VFD VARIABLE FREQUENCY DRIVE</p> <p>VRF VARIABLE REFRIGERANT FLOW</p> <p>VRV VARIABLE REFRIGERANT VOLUME</p> <p>W/ WITH</p> <p>W/O WITHOUT</p> <p>WB WET BULB</p> <p>WC WATER COLUMN</p> <p>WPD WATER PRESSURE DROP</p> <p>XP EXPLOSION PROOF</p>			

5310 E HIGH STREET SUITE 350
PHOENIX, AZ 85054
TJ 480.448.6250
WWW.SARGARCH.COM



CONSULTANTS:

 14001 Quorum Street | Suite 900 | Dallas, TX 75244
 P: 972.952.0000 | www.rtm.com



NO.	BY	DATE	DESCRIPTION
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SHAKE SHACK JUPITER

6230 INDIANTOWN RD. SUITE 11,
JUPITER, FL 33409
SHACK #1715

100% SET

MECHANICAL GENERAL INFORMATION

DRAWN BY: RTM
 CHECKED BY: RTM
 PROJECT NO: 12427-25

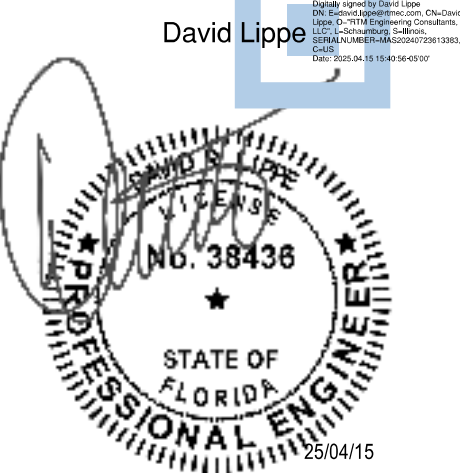
M001



CONSULTANTS:



SEAL SIGNATURE:



NO.	BY	DATE	DESCRIPTION
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SHAKE SHACK JUPITER

6230 INDIANTOWN RD. SUITE 11,
 JUPITER, FL 33409
 SHACK #1715

100% SET

MECHANICAL ROOF PLAN

DRAWN BY: RTM

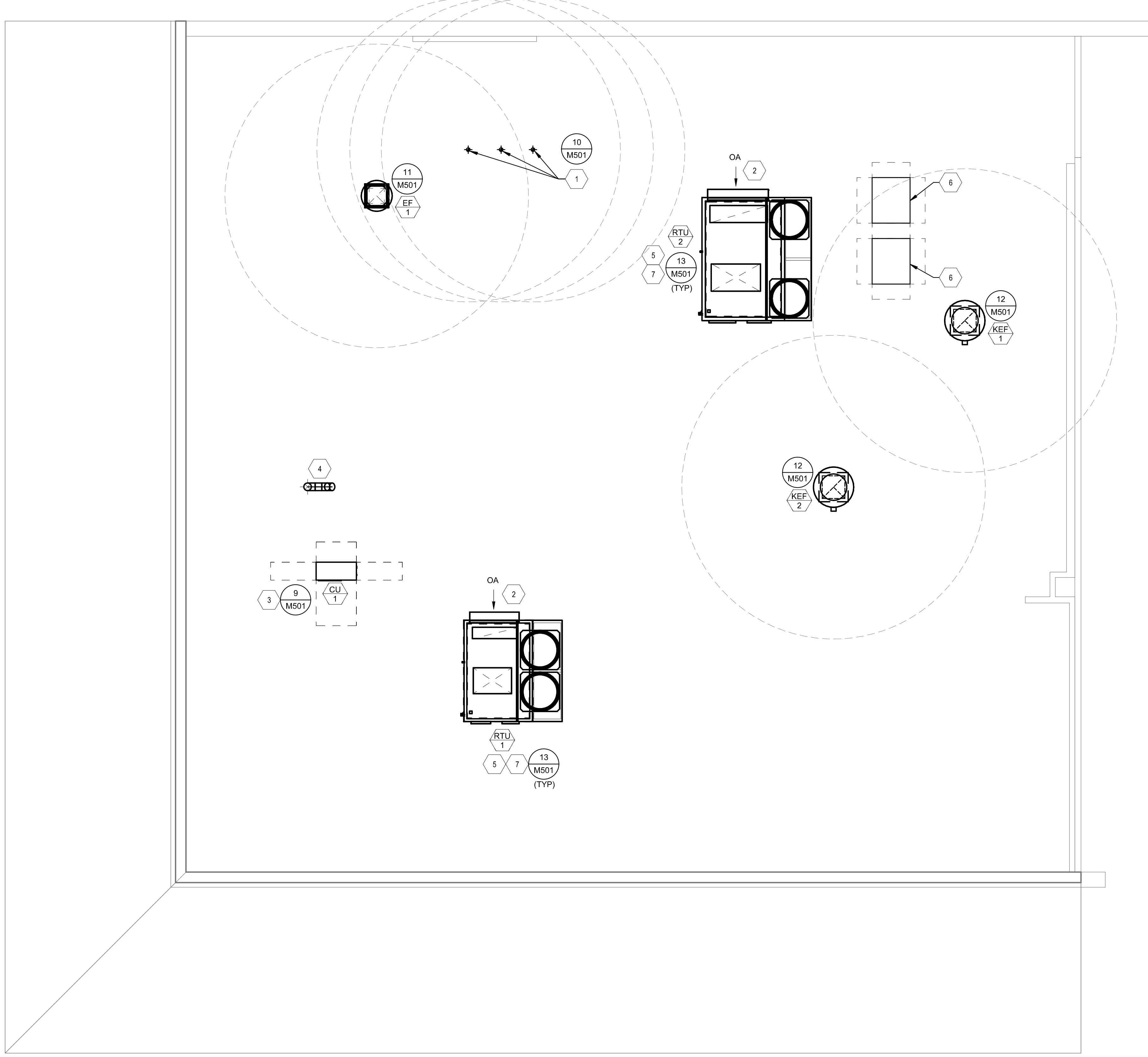
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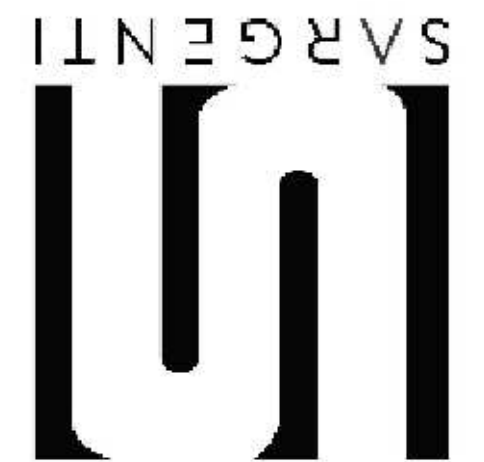
PROJECT NO: 12427-25

M150

MECHANICAL ROOF PLAN NOTES:

- PROVIDE CONCENTRIC VENT MODEL NUMBER PVC-3CT.
- MAINTAIN ALL OUTSIDE AIR INTAKES A MINIMUM OF 10'-0" RADIUS FROM EXHAUST, TYPICAL.
- CONTRACTOR SHALL VERIFY WITH EQUIPMENT SUPPLIER EXACT ROUTING AND SIZE OF INSULATED REFRIGERANT PIPING. SINGLE LINESET SHOWN FOR CLARITY. INSTALL PER MANUFACTURERS RECOMMENDATIONS.
- TURN DOWN 6"Ø INTAKE AND END OPEN OVER ROOF (MIN. 24") WITH INSECT SCREEN.
- CONTRACTOR SHALL COORDINATE WITH NATIONAL TAB TO PROVIDE UV-PI INDOOR AIR PURIFICATION SYSTEM, MODEL PHI-PKG-24V. INSTALL IN UNIT BLOWER COMPARTMENT PER MANUFACTURERS INSTRUCTIONS.
- AREA RESERVED FOR REFRIGERATION CONDENSER(S) PROVIDED BY KITCHEN EQUIPMENT CONTRACTOR. COORDINATE EQUIPMENT LOCATION AND CONDENSER INSTALLATION WITH KITCHEN EQUIPMENT CONTRACTOR.
- REFERENCE PLUMBING DRAWINGS FOR CONDENSATE DRAIN ROUTING AND TERMINATION REQUIREMENTS.



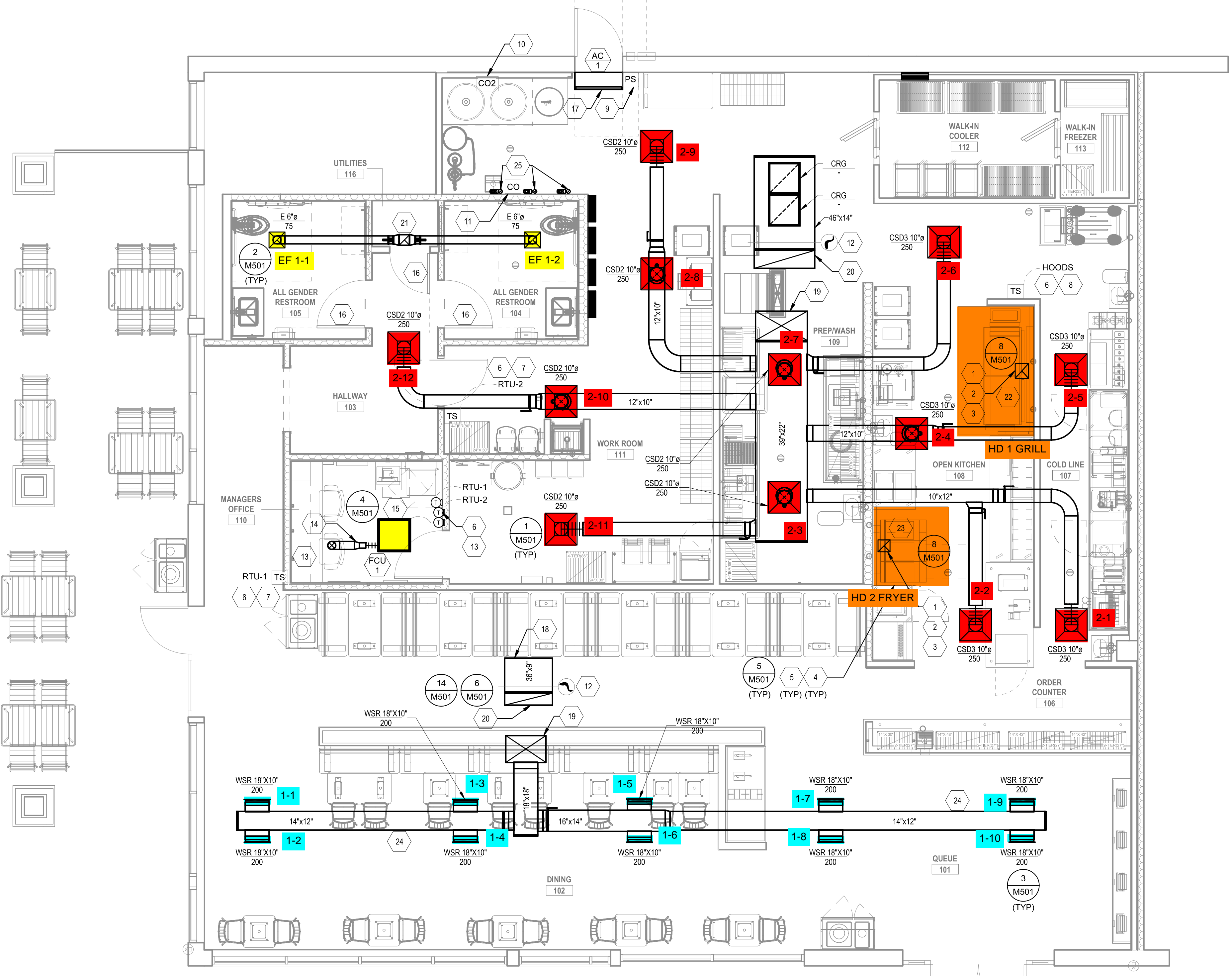


CONSULTANTS:
rtm
engineering consultants
14001 Quince Street, Suite 900, Dallas, TX 75244
T: 972.387.5000

SEAL/ SIGNATURE:



MECHANICAL PLAN NOTES:	
1	TYPE I GREASE HOOD EXHAUST DUCTWORK SHALL BE MINIMUM 16 GAUGE STEEL OR MINIMUM 18 GAUGE STAINLESS STEEL WITH LIQUID TIGHT WELDS.
2	INSTALL ACCESS PANELS FOR CLEANING AS REQUIRED BY NFPA 96 AND LOCAL CODES. TRANSITION GREASE DUCTWORK AS REQUIRED TO HOOD AND FAN CONNECTIONS. PROVIDE 45° MAX OFFSETS AS REQUIRED TO COORDINATE WITH STRUCTURE. PROVIDE RADIUS ELBOWS WITHOUT TURNING VANES. SLOPE HORIZONTAL GREASE DUCT BACK TOWARDS HOOD AT MINIMUM OF 1/4" PER LINEAL FOOT. GREASE DUCTS SHALL BE CONTAINED IN A UL APPROVED GREASE DUCT WRAP SYSTEM.
3	INSTALL "DUCTMATE ULTIMATE DOOR" ON DUCTS 12" OR LARGER AND INSTALL "DUCTMATE F2 SANDWICH ACCESS DOOR" FOR DUCTS LESS THAN 12" ON GREASE DUCT FOR CLEANING IN LOCATION SHOWN AT A MINIMUM AND AS REQUIRED BY NFPA 96 AND LOCAL CODES.
4	TYPE I HOODS SHALL BE FURNISHED COMPLETE WITH INTERNALLY PIPED FIRE SUPPRESSION SYSTEM AND EXTERNAL FOAM SUPPLY BOTTLES WITH REMOTE PULL CONTROLS AND IN COMPLIANCE WITH NFPA 96. DIVISION 23 SHALL COORDINATE COMPLETE INSTALLATION WITH FIRE PROTECTION CONTRACTOR TO MEET APPROVAL OF LOCAL INSPECTOR AND CODE COMPLIANCE INCLUDING TESTING.
5	HOOD SHALL OVERHANG THE COOKING SURFACE BY AT LEAST 6" ON BOTH SIDES.
6	MOUNT THERMOSTATS, HUMIDITY SENSORS, AND TEMPERATURE SENSOR(S) ON WALL. THERMOSTATS AND SENSOR(S) SHALL BE LABELED TO MATCH THE UNIT TAG AND CORRESPOND TO THE ELECTRICAL LEGEND IN THE ELECTRICAL PANELBOARD SERVING THE EQUIPMENT. COORDINATE COLOR WITH ARCHITECT. TEMPERATURE SENSOR SHALL BE CAPABLE OF DEMAND RESPONSE.
7	COMBINATION TEMPERATURE SENSOR AND HUMIDITY SENSOR.
8	MOUNT TEMPERATURE SENSOR PROVIDED WITH KITCHEN EXHAUST HOODS ON WALL.
9	INSTALL HOOD FIRE SUPPRESSION MANUAL PULL STATION. COORDINATE EXACT LOCATION AND REQUIREMENTS WITH FIRE SUPPRESSION SYSTEM INSTALLER AND THE AUTHORITY HAVING JURISDICTION.
10	PROVIDE ANALOX AX60 OR APPROVED EQUAL CARBON DIOXIDE SENSOR WITH REMOTE ALARM REPEATER TO BE MOUNTED AT 12" AFF. PROVIDE CARBON DIOXIDE SENSOR WITH RELAY. RELAY SHALL BE INTERLOCKED WITH THE BUILDING FIRE ALARM SYSTEM. THE SENSOR SHALL BE EQUIPPED WITH A LOCAL AUDIBLE AND VISUAL ALARM. THE LOW LEVEL ALARM SHALL ACTIVATE THE LOCAL AUDIBLE AND VISUAL ALARM. THE HIGH LEVEL ALARM SHALL ACTIVATE RELAY. INSTALL SENSOR PER MANUFACTURER'S INSTALLATION INSTRUCTIONS. LOW LEVEL ALARM - 0.5% = 5,000 PPM HIGH LEVEL ALARM - 3.0% = 30,000 PPM
11	CARBON MONOXIDE DETECTOR FURNISHED BY OWNER. INSTALL AT 5'-0" AFF. COORDINATE FINAL LOCATION WITH OWNER REPRESENTATIVE.
12	INSTALL DUCT SMOKE DETECTOR IN RETURN AIR PLENUM.
13	INSTALL EMERGENCY ALARM IN MANAGER'S OFFICE TO INDICATE CARBON MONOXIDE AND CARBON DIOXIDE DETECTION IN MECHANICAL ROOM. PROVIDE LIGHT IN OFFICE WITH TAG FOR EACH ALARM.
14	TRANSITION 6" OUTDOOR AIR DUCT TO 4" FLEXIBLE DUCTWORK AND CONNECT TO UNIT.
15	REFRIGERANT PIPING UP TO CU-1 ON ROOF. REF 1/M150.
16	CONTRACTOR TO COORDINATE 1" UNDERCUT ON DOOR FOR EXHAUST AIR PATH.
17	AIR CURTAIN MOUNTED ABOVE DOOR. INSTALL PER MANUFACTURER'S RECOMMENDATIONS.
18	PROVIDE 1/4" GALVANIZED CONSTRUCTION HARDWARE CLOTH SCREEN OVER OPEN END OF RETURN DUCT. PROVIDE DUCT LINER IN BOOT. RETURN AIR DUCT SHALL BE MINIMUM 36" HORIZONTAL EXTENSION FOR SOUND ATTENUATION.
19	PROVIDE SA DUCT THROUGH ROOF. FULL SIZE OF UNIT OPENING. AND CONNECT TO UNIT WITH FLEXIBLE CONNECTOR. TRANSITION 45 DEGREES THROUGH ROOF CURB.
20	PROVIDE RA DUCT THROUGH ROOF. FULL SIZE OF UNIT OPENING. AND CONNECT TO UNIT WITH FLEXIBLE CONNECTOR. TRANSITION 45 DEGREES THROUGH ROOF CURB.
21	PROVIDE EA DUCT THROUGH ROOF. FULL SIZE OF UNIT OPENING. AND CONNECT TO UNIT WITH FLEXIBLE CONNECTOR. TRANSITION 45 DEGREES THROUGH ROOF CURB.
22	10"x11" GREASE EXHAUST DUCT UP TO KEF-1 ON ROOF.
23	9"x9" GREASE EXHAUST DUCT UP TO KEF-2 ON ROOF.
24	ROUTE DUCTWORK LEVEL, TIGHT TO STRUCTURE, AND ABOVE LIGHTS. COORDINATE WITH STORM DRAINAGE, STRUCTURAL, AND ELECTRICAL.
25	PROVIDE COMBUSTION AIR AND EXHAUST PIPE AND ROUTE TO CONCENTRIC VENT THROUGH ROOF.



MECHANICAL PLAN

1/4" = 1'-0" 1

NO.	BY	DATE	DESCRIPTION



SHAKE SHACK JUPITER

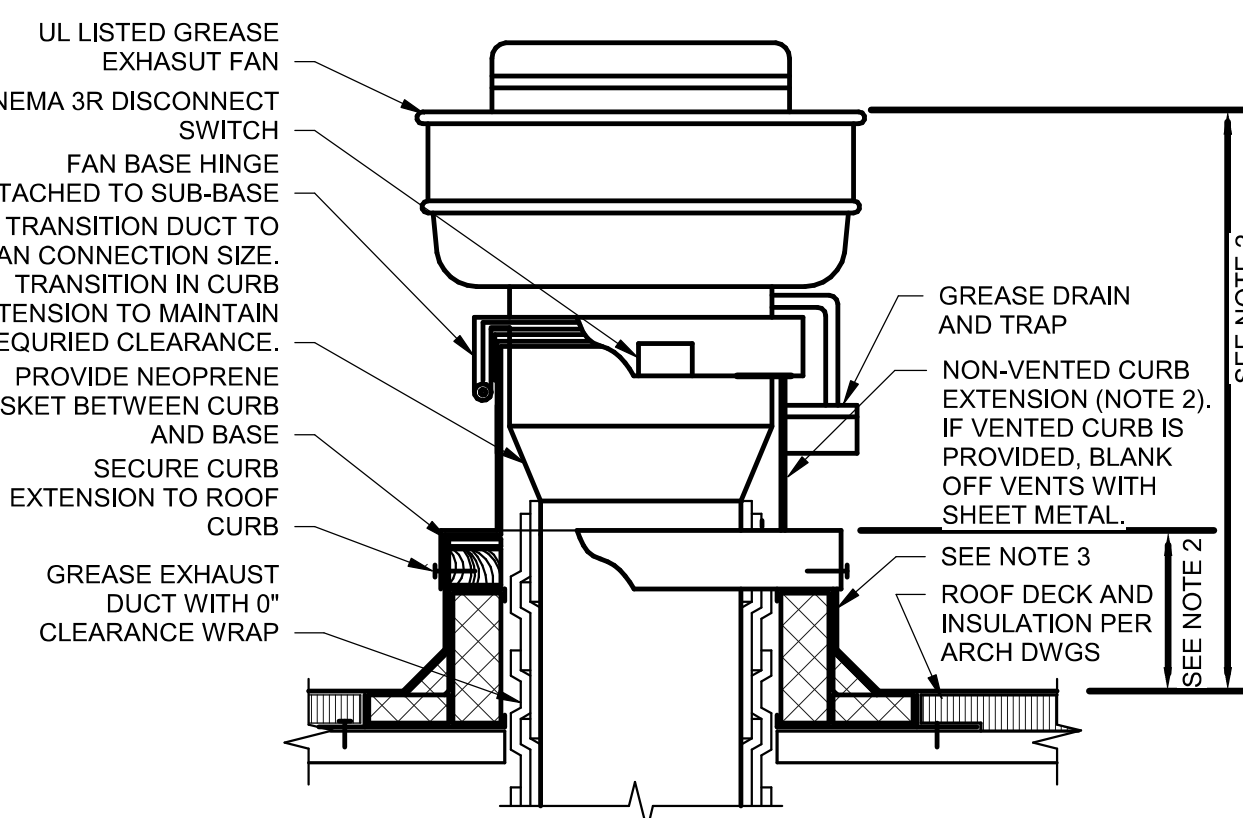
6230 INDIANTOWN RD. SUITE 11,
JUPITER, FL 33409
SHACK #1715

100% SET

MECHANICAL FLOOR PLAN

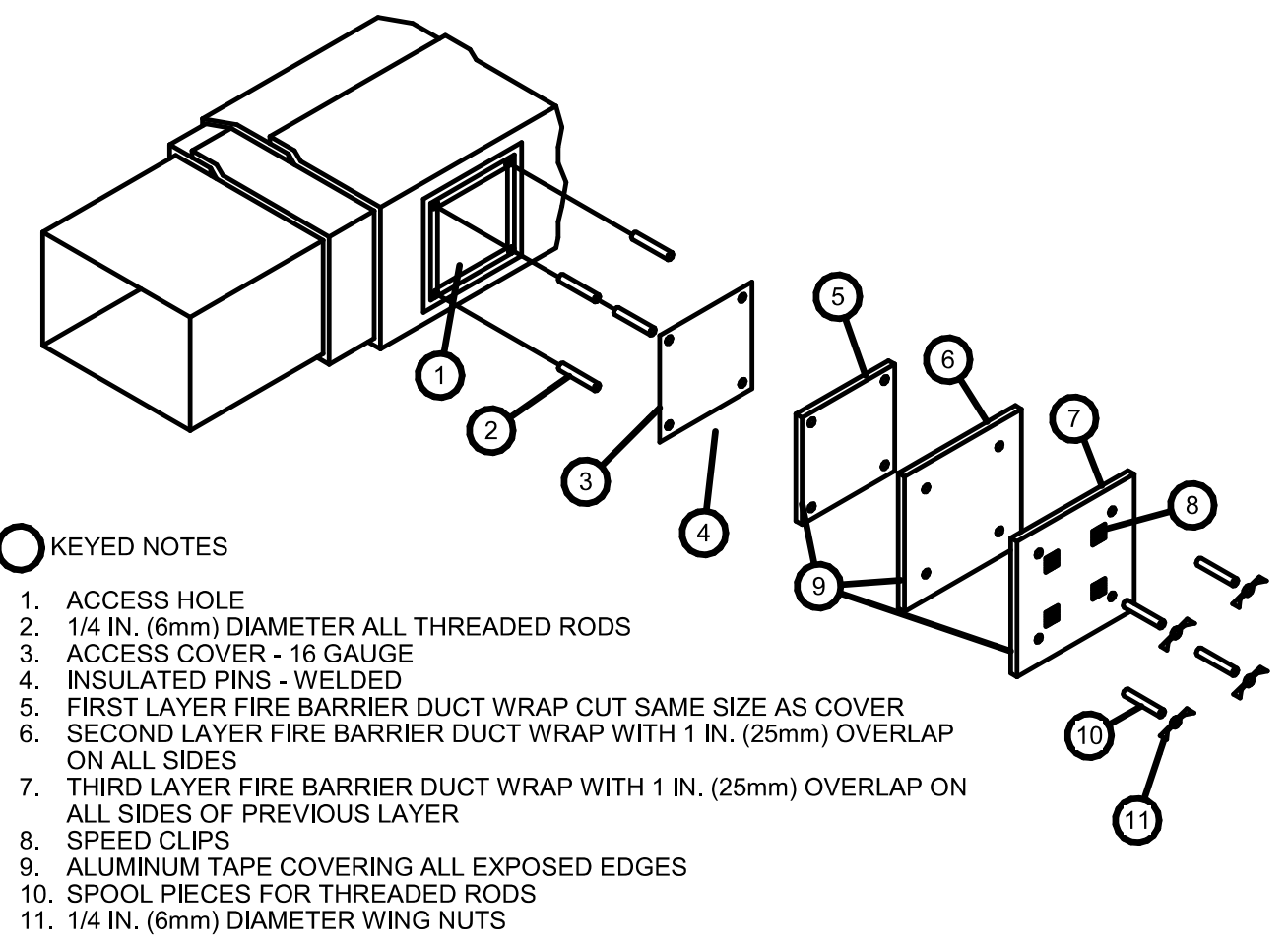
DRAWN BY: RTM
CHECKED BY: RTM
PROJECT NO: 12427-25

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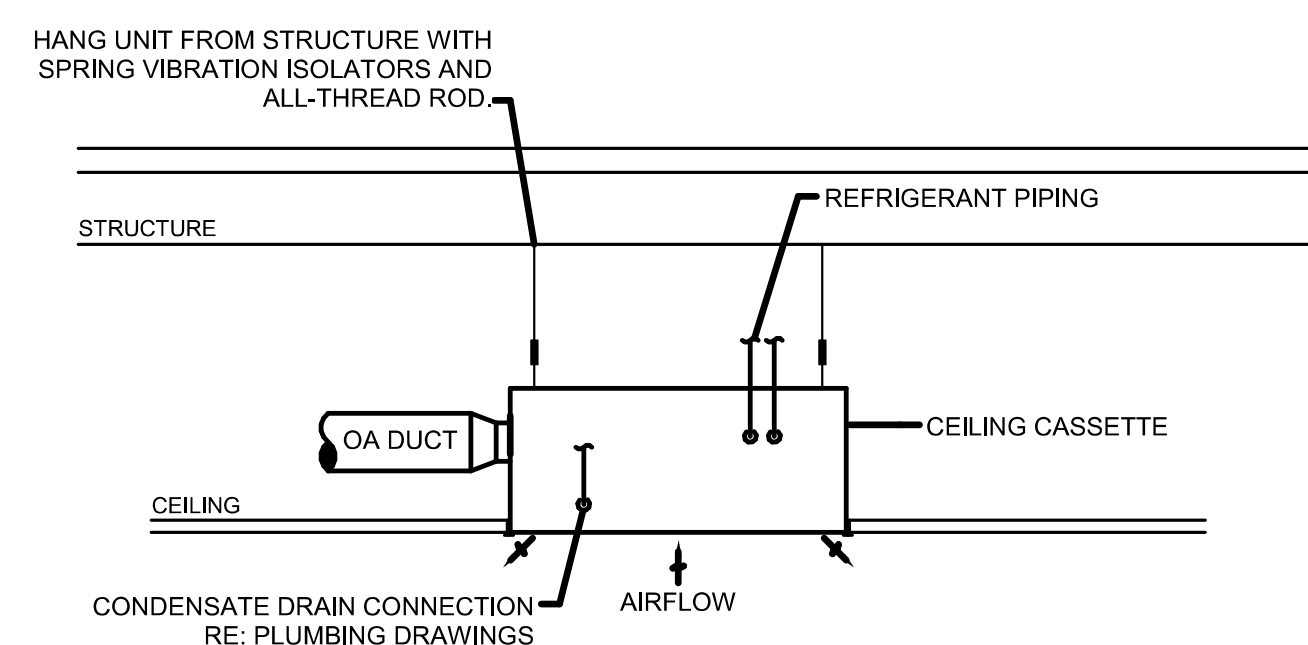
- NOTES:
- ARRANGEMENT SHOWN IS SCHEMATIC, ADJUST TO SUIT FIELD CONDITIONS AND MEET LOCAL CODE.
 - PROVIDE CURB EXTENSION MADE FROM NON-COMBUSTIBLE MATERIAL OF HEIGHT REQUIRED TO MOUNT FAN BASE A MINIMUM 18 INCHES ABOVE COMBUSTIBLE CURB MATERIAL AND DISCHARGE GREASE OUTLET A MINIMUM OF 40 INCHES ABOVE ROOF SURFACE OR ANY ADJACENT BUILDING STRUCTURE WITHIN 10 FEET OF OUTLET, WHICHEVER IS HIGHER.
 - PREFABRICATED INSULATED ROOF CURB WITH TREATED WOOD NAILED, CANT, AND STEP AS REQUIRED TO ACCOMMODATE ROOF INSULATION, FRAME AND SECURE CURB TO ROOF WITH METHOD CONSISTENT WITH ROOF CONSTRUCTION. ROOF CURB SHALL BEAR ON ROOF STRUCTURE. FOR SLOPED ROOFS, PROVIDE CURB WITH DIMENSIONS CAPABLE OF COMPENSATING ROOF SLOPE TO ENSURE FAN IS INSTALLED LEVEL. REFER TO ARCHITECTURAL DRAWINGS AND CURB MANUFACTURER'S DETAILS FOR MORE INFORMATION.
- HIGH WIND STRAPPING: PROVIDE STAINLESS STEEL STRAPS OF LENGTH, WIDTH, THICKNESS, AND SPACING SUFFICIENT TO SECURE FAN TO CURB TO WITHSTAND WIND SPEED REQUIREMENTS PER LOCAL CODE. WRAP STRAPS OVER FAN AND SECURELY ATTACH TO OPPOSITE SIDE OF THE CURB.

12 UPBLAST GREASE EXHAUST FAN DETAIL
SCALE: N.T.S.



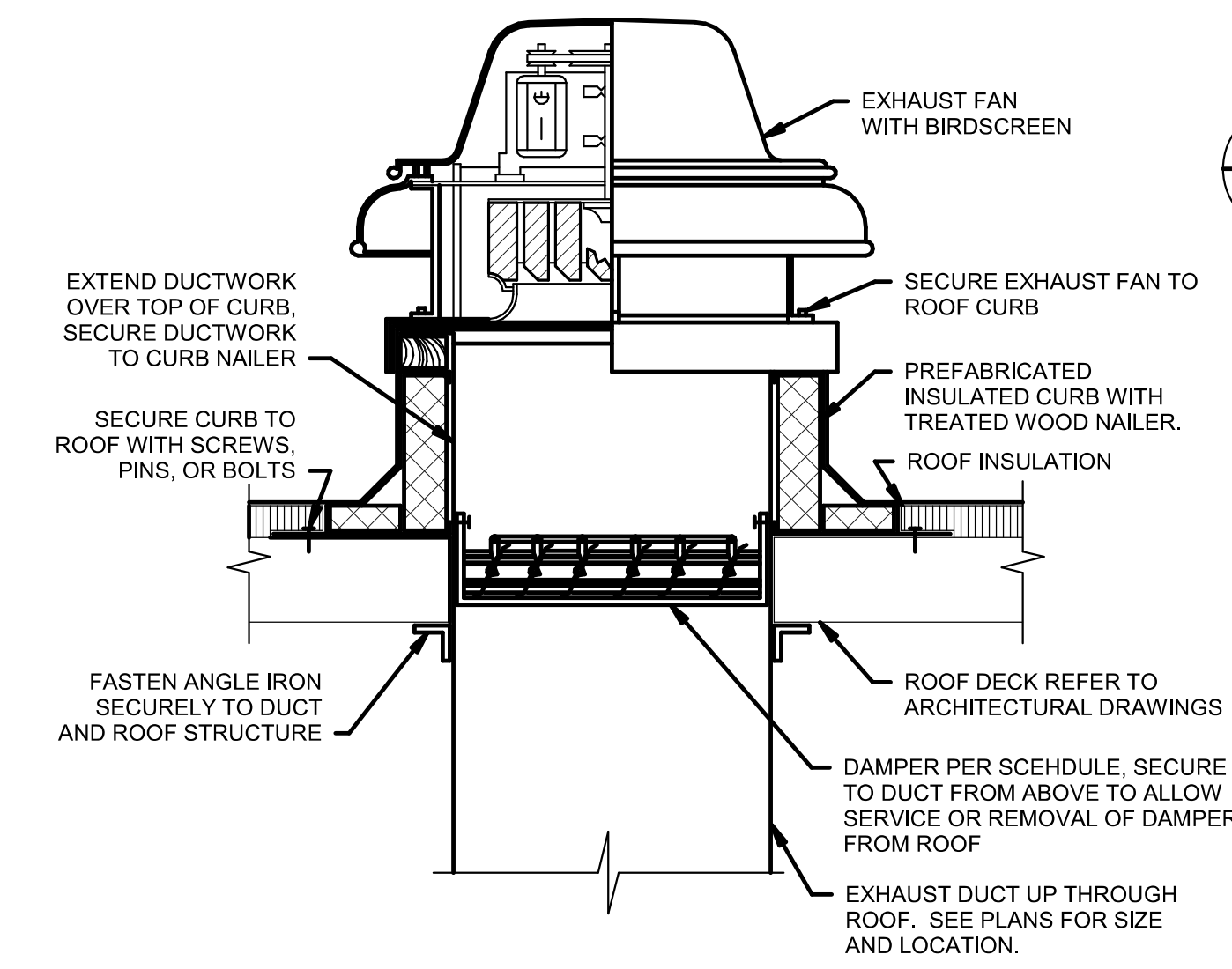
- NOTES:
- FOR REFERENCE ONLY. INSTALL PER MANUFACTURER'S RECOMMENDATIONS.
 - AT CONTRACTOR'S OPTION, A LISTED UL 1976 GREASE ACCESS DOOR PRODUCT MAY BE SUBSTITUTED FOR THE ACCESS DOOR PICTURED IN THIS DETAIL. DOOR SHALL BE RATED FOR UP TO 2,300F AND MEET NFPA STANDARDS. BOLTS SHALL BE LONG ENOUGH FOR DUCT WRAP SYSTEM (WHEN USED). INSTALL IN ACCORDANCE WITH MANUFACTURER'S LITERATURE.

8 GREASE DUCT CLEANOUT ACCESS DOOR DETAIL
SCALE: N.T.S.

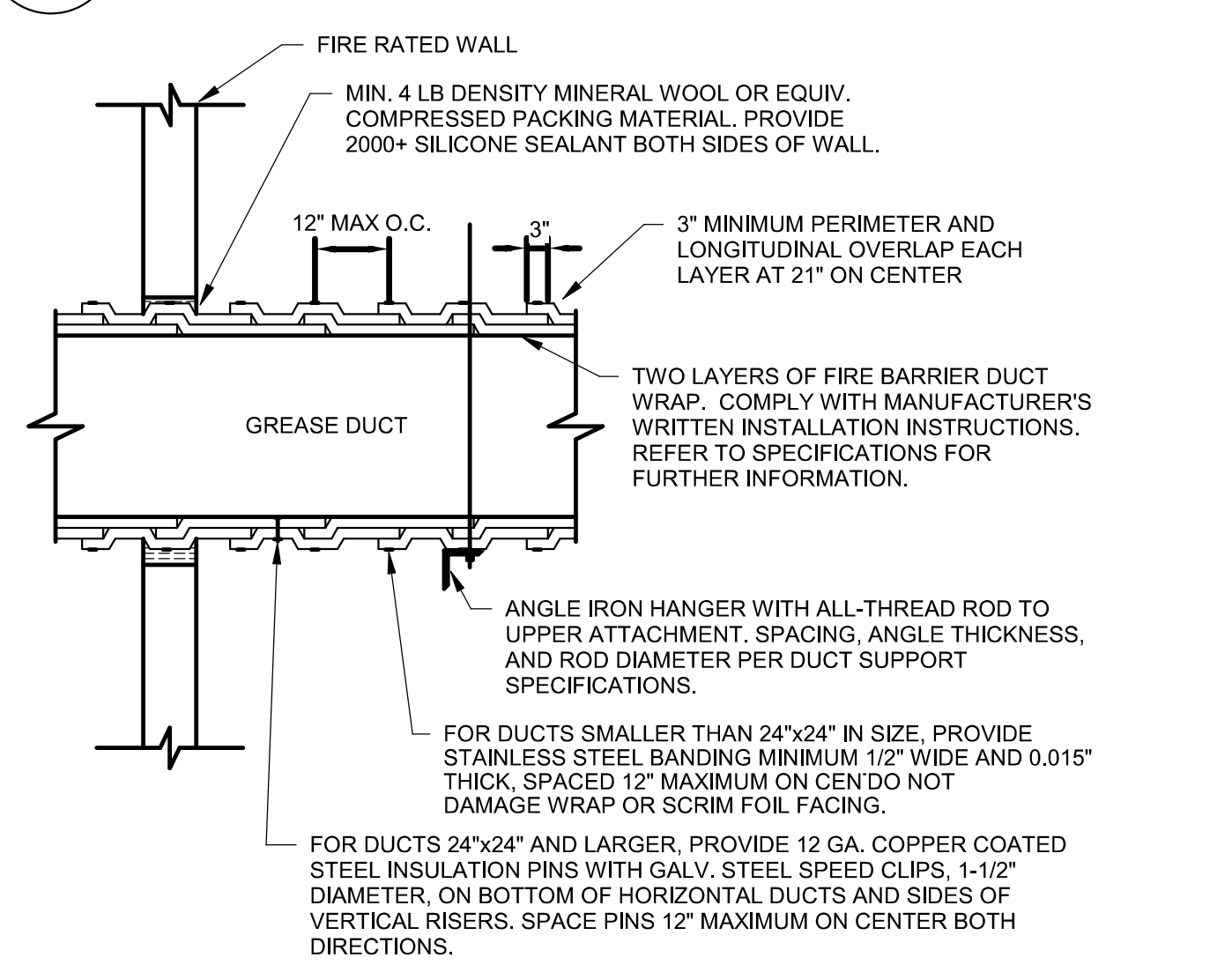


- NOTES:
- ARRANGEMENT SHOWN IS SCHEMATIC, ADJUST TO SUIT FIELD CONDITIONS AND MEET LOCAL CODE REQUIREMENTS.
 - SET DAMPER TO DELIVER SCHEDULED OUTSIDE AIR FLOW.
 - REFER TO MANUFACTURER'S RECOMMENDATIONS FOR MAXIMUM CONDENSATE DRAIN LIFT HEIGHT.
 - REFER TO MANUFACTURER'S RECOMMENDATIONS FOR HORIZONTAL CONDENSATE DRAIN LIFT CONNECTION FROM THE UNIT.

4 CEILING CASSETTE DETAIL
SCALE: N.T.S.

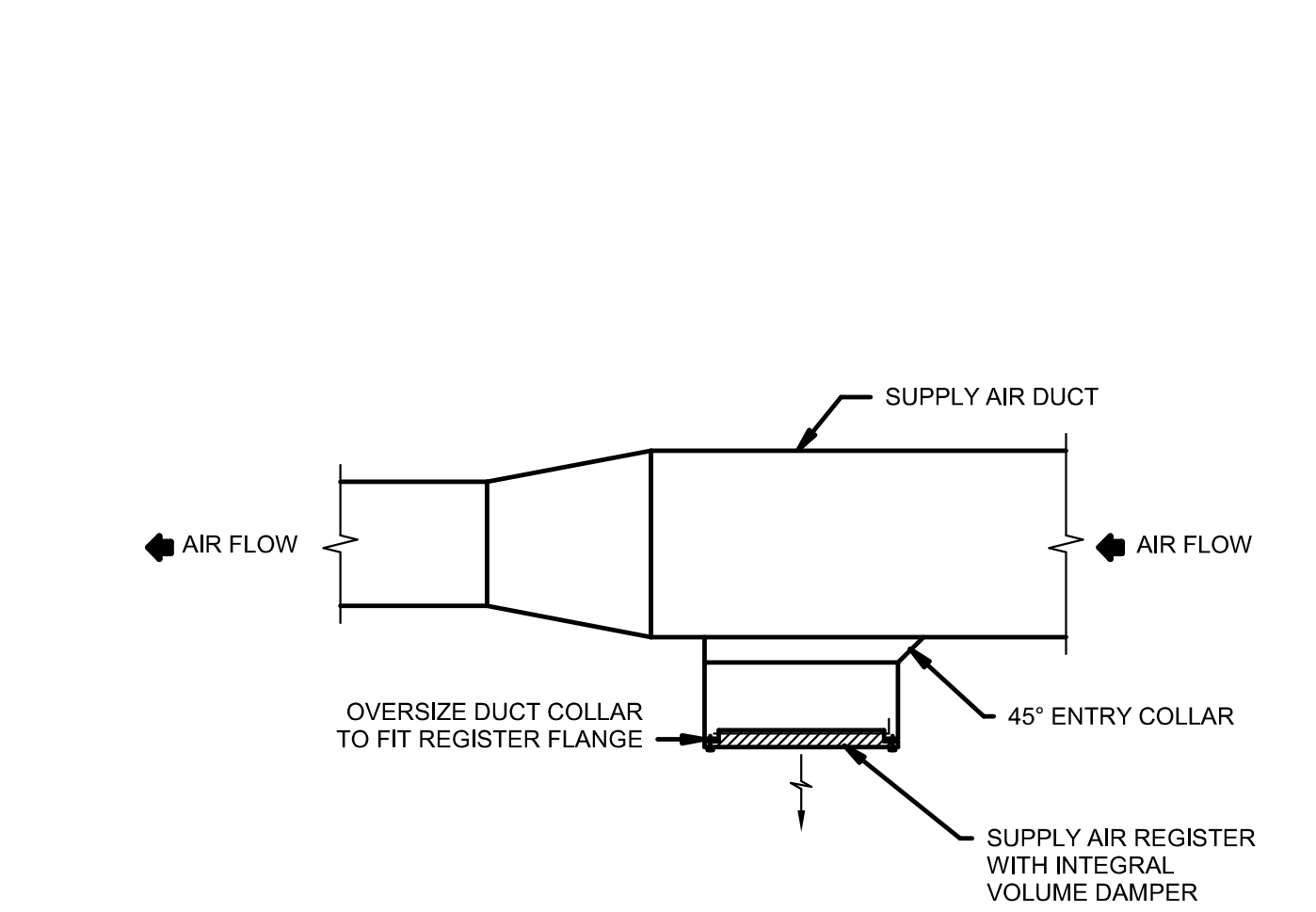


11 DOWNBLAST EXHAUST FAN DETAIL
SCALE: N.T.S.

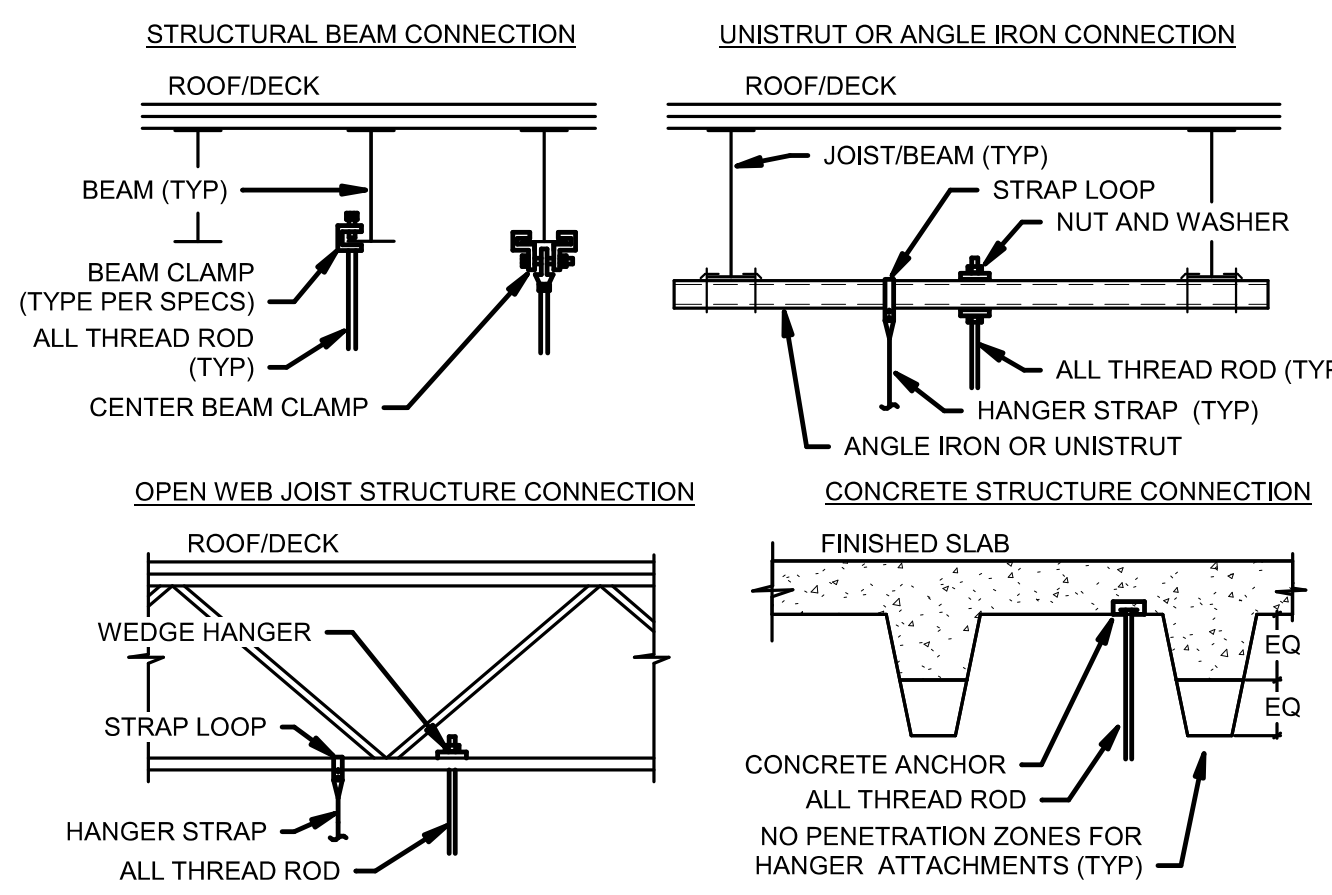


- NOTES:
- INSTALL GREASE EXHAUST AND FIRE RATED DUCT WRAP IN ACCORDANCE WITH THE MANUFACTURER'S APPROVED INSTRUCTIONS AND UL LISTED INSTALLATION DETAILS. TECHNIQUES THAT DIFFER FROM THE ABOVE METHOD ARE ACCEPTABLE IF THEY ARE UL TESTED AND APPROVED.

7 GREASE DUCT FIRE WRAP INSULATION INSTALLATION DETAIL
SCALE: N.T.S.

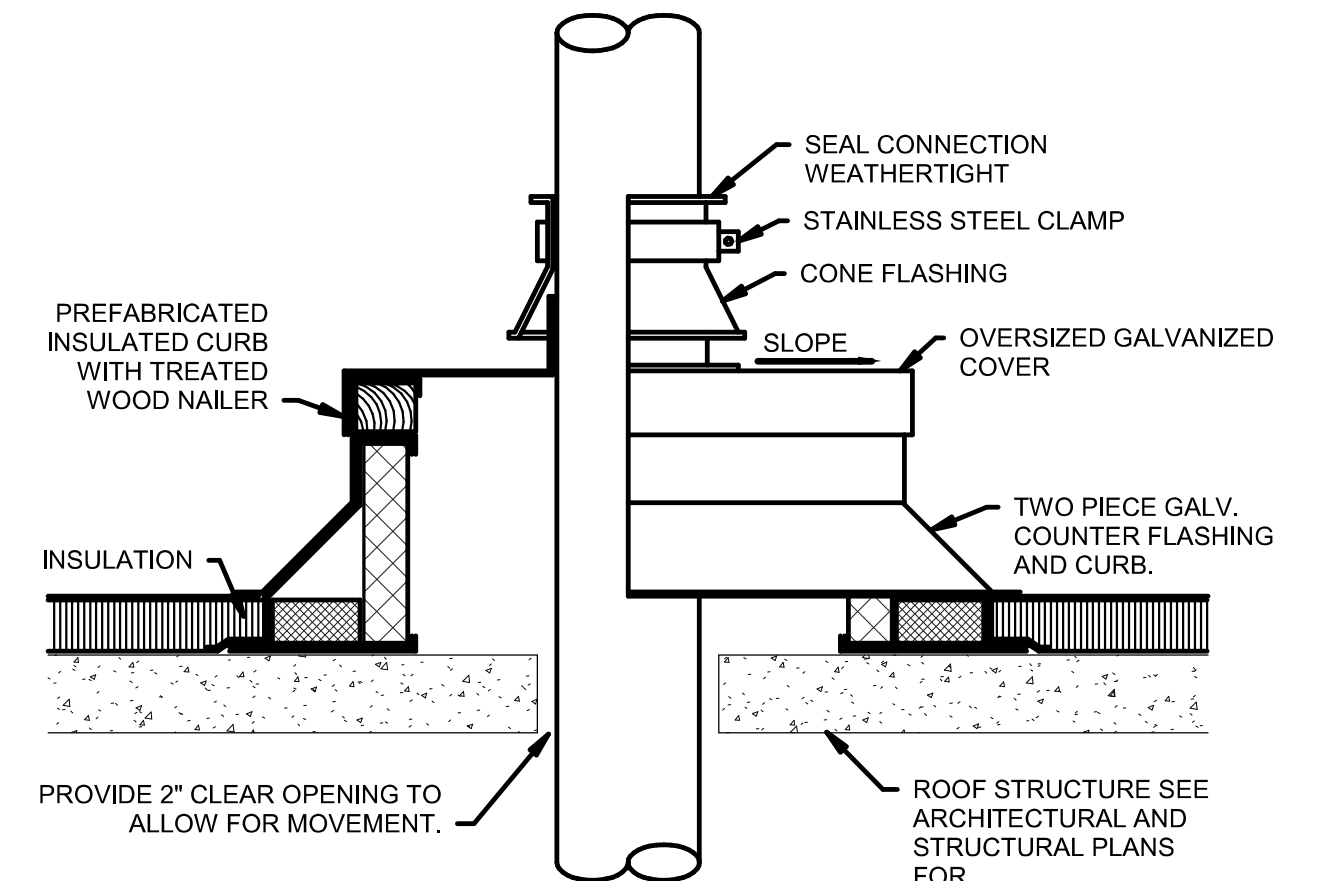


3 DUCT MOUNTED REGISTER DETAIL
SCALE: N.T.S.

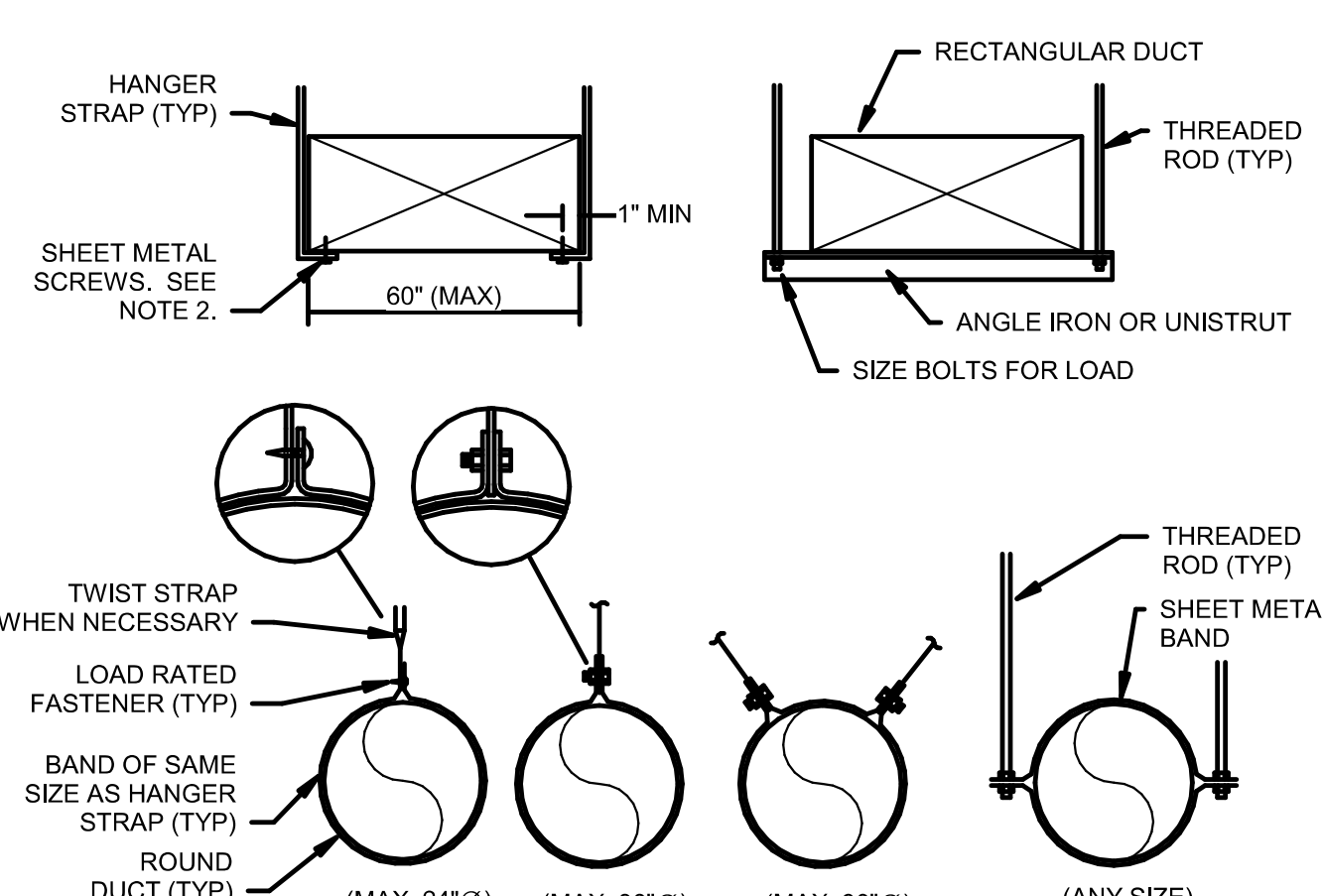


- NOTES:
- ALL ATTACHMENTS SHALL BE INSTALLED PER MANUFACTURER'S REQUIREMENTS AND SHALL BE APPROVED FOR THE SPECIFIC APPLICATION.
 - COORDINATE ALL ATTACHMENTS WITH ARCHITECT AND STRUCTURAL ENGINEER.
 - REFER TO SPECIFICATIONS FOR MORE INFORMATION ON APPROVED ATTACHMENT METHODS.
 - REFER TO SPECIFICATIONS FOR REQUIREMENTS RELATING TO SEISMIC INSTALLATIONS.
 - FOR OPEN WEB JOIST STRUCTURE, CONTRACTOR MAY HANG FROM TOP CHORD AND RUN DUCT AND PIPING THROUGH WEB JOIST WHEN APPROPRIATE. ANY CONCENTRATED LOADS NOT OCCURRING AT JOIST PANEL POINTS MUST BE REVIEWED BY A STRUCTURAL ENGINEER FOR FIELD INSTALLED PANEL BRACE REQUIREMENTS.

14 HANGER UPPER ATTACHMENT DETAILS
SCALE: N.T.S.

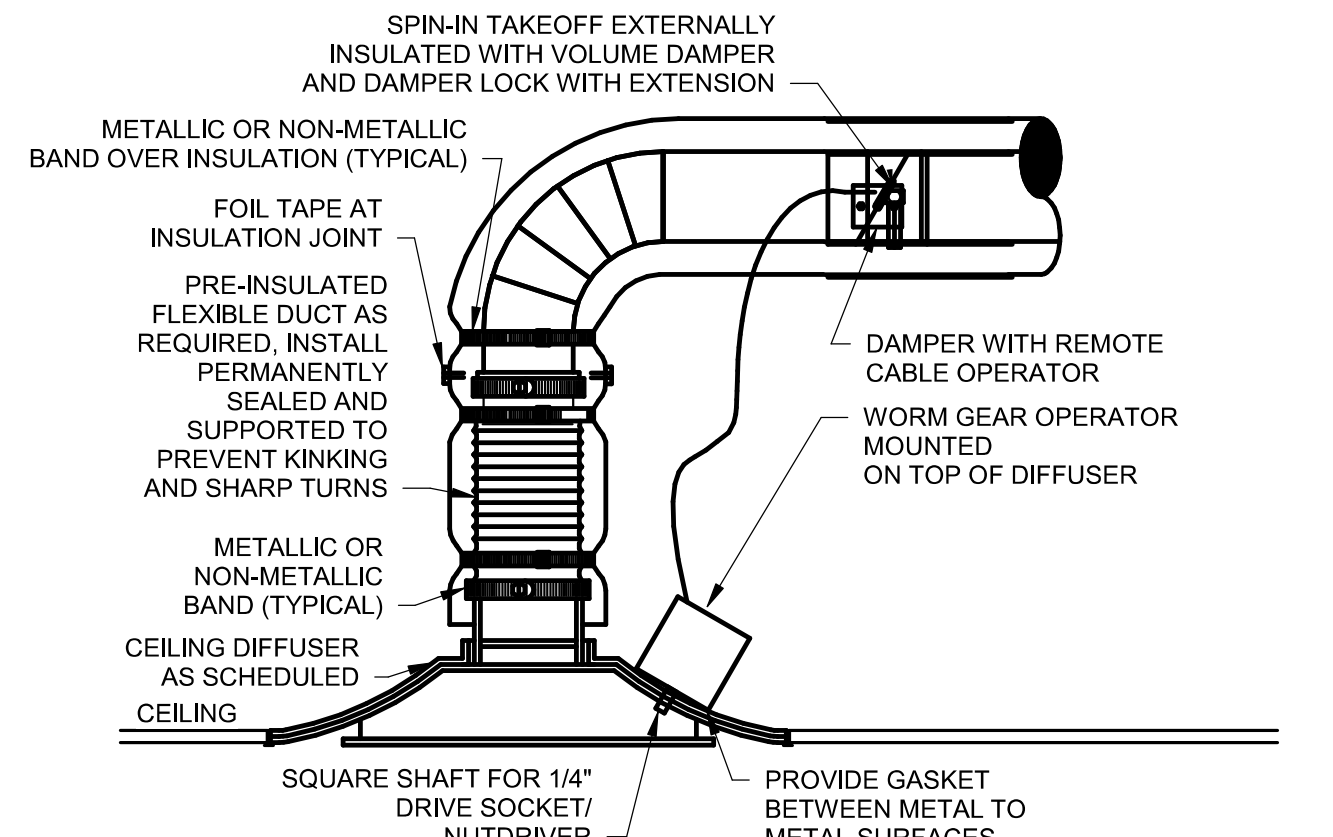


10 ROUND AIR DUCT OR PIPE PENETRATION THROUGH ROOF DETAIL
SCALE: N.T.S.



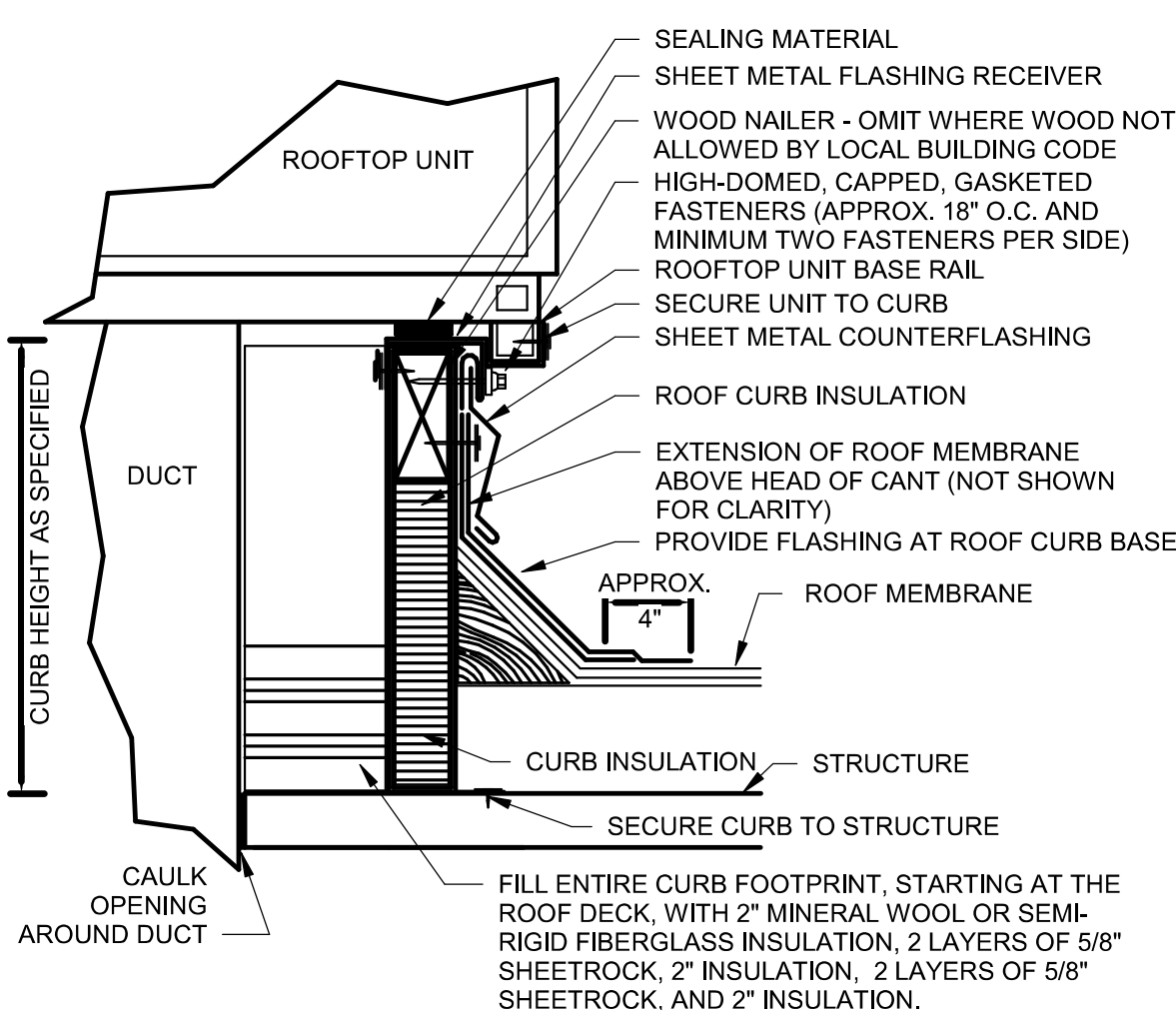
- NOTES:
- USE THREADED ROD FOR RECTANGULAR DUCTS LARGER THAN 60" DIA.
 - OMIT SHEET METAL SCREWS IF HANGER STRAP IS CONTINUOUS AND LOOPS UNDER ENTIRE RECTANGULAR DUCT.
 - FOR ROUND DUCTS LARGER THAN 36" DIA. USE TWO HANGER RODS TO SUPPORT DUCT FROM EACH SIDE.
 - HANGERS MUST NOT DEFORM DUCT SHAPE.

6 DUCT HANGER LOWER ATTACHMENT DETAILS
SCALE: N.T.S.



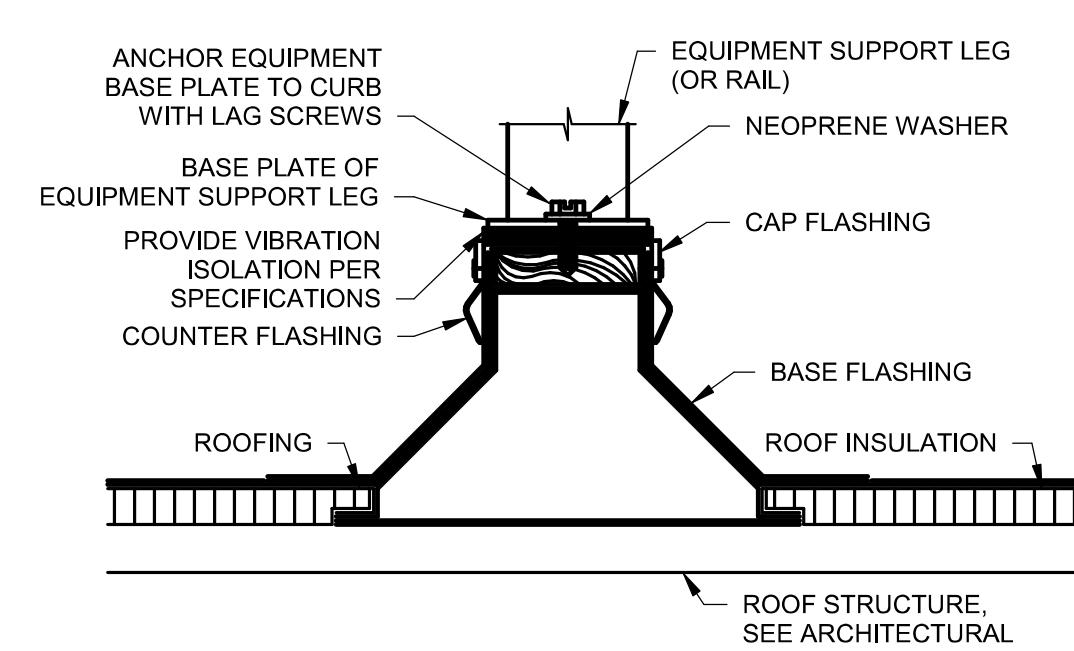
- NOTES:
- FLEXIBLE DUCT LENGTH MAY NOT EXCEED 5'-0". EXTEND RIGID DUCT AS REQUIRED.
 - REFER TO SPECIFICATIONS FOR FLEXIBLE DUCTWORK INSTALLATION REQUIREMENTS.

2 HARD CEILING DIFFUSER DETAIL
SCALE: N.T.S.



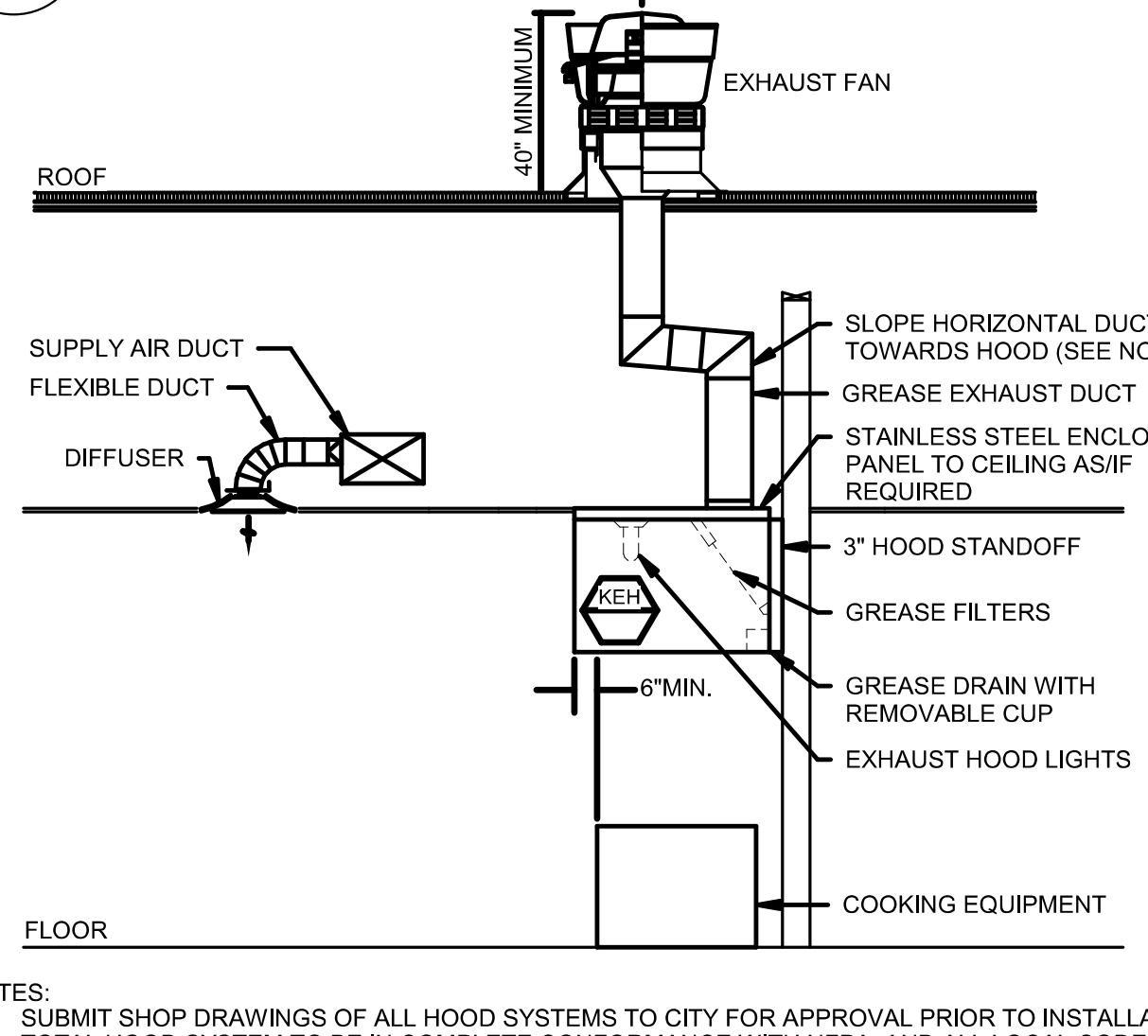
- NOTES:
- CUT METAL DECKING TO ALLOW CURB INSTALLATION ON STEEL FRAMING. AFTER CURB IS SET IN PLACE, TRIM REMAINING METAL DECKING AND INSTALL WITHIN CURB. TACK WELD DECKING TO SUPPORT STEEL. DO NOT WELD INTERIOR DECKING TO ROOF CURB. PROVIDE ADDITIONAL CROSS FRAMING TO SUPPORT INTERIOR DECKING AND FILL MATERIAL AS REQUIRED.
 - REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS FOR ROOF CURBS, ANCHORING AND SEISMIC/WIND RESISTANCE.

13 ROOF CURB DETAIL
SCALE: N.T.S.



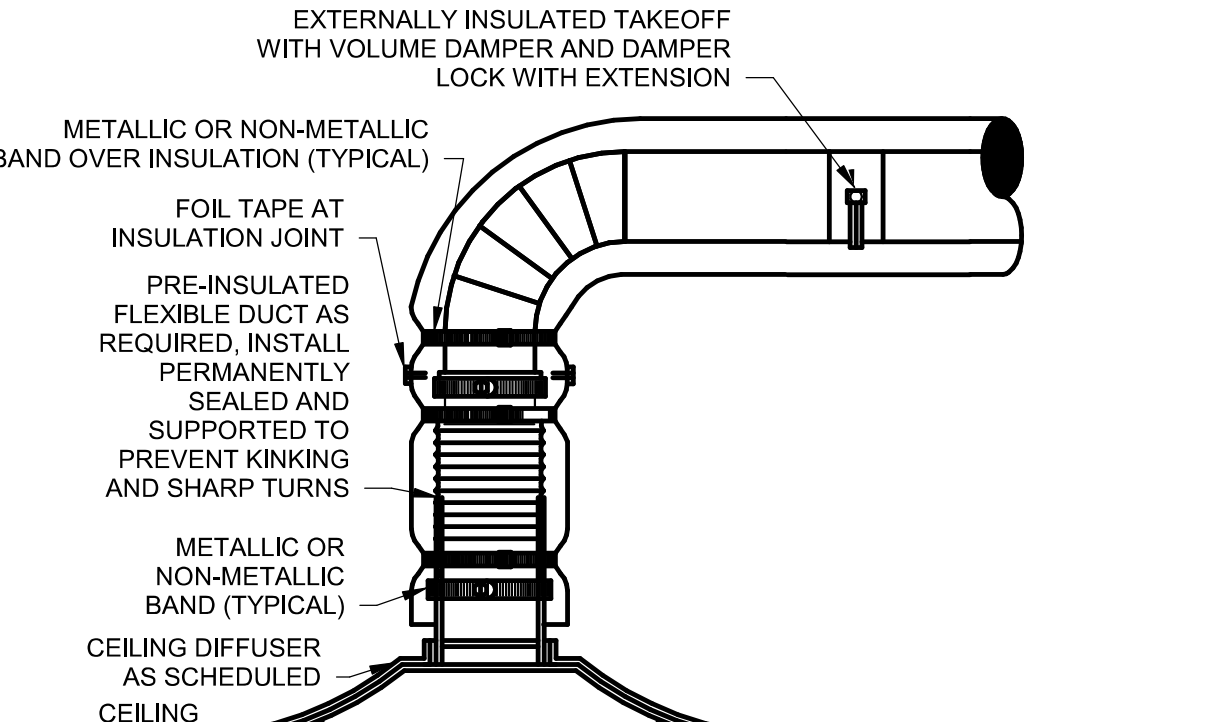
- NOTES:
- REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS FOR EQUIPMENT SUPPORTS, ANCHORING AND SEISMIC/WIND RESISTANCE.

9 ROOF EQUIPMENT SUPPORT RAIL DETAIL
SCALE: N.T.S.



- NOTES:
- SUBMIT SHOP DRAWINGS OF ALL HOOD SYSTEMS TO CITY FOR APPROVAL PRIOR TO INSTALLATION.
 - TOTAL HOOD SYSTEM TO BE IN COMPLETE CONFORMANCE WITH NFPA, AND ALL LOCAL CODES AND REGULATIONS.
 - COORDINATE ALL FIRE PROTECTION SYSTEMS WITH FIRE PROTECTION CONTRACTOR WHO SHALL ALSO BE RESPONSIBLE FOR ALL PERMITS AND TESTING REQUIRED.
 - PROVIDE WRAP SYSTEM WHERE APPROVED BY LOCAL CODES IN LIEU OF RATED ENCLOSURE.
 - PROVIDE ACCESS PANELS AS REQUIRED BY LOCAL CODE AND PER PLAN.
 - HOODS SHALL EXTEND MINIMUM 6\"/>

5 KITCHEN EXHAUST HOOD ELEVATION DETAIL
SCALE: N.T.S.



- NOTES:
- FLEXIBLE DUCT LENGTH MAY NOT EXCEED 5'-0". EXTEND RIGID DUCT AS REQUIRED.
 - REFER TO SPECIFICATIONS FOR FLEXIBLE DUCTWORK INSTALLATION REQUIREMENTS.

1 LAY-IN CEILING DIFFUSER DETAIL
SCALE: N.T.S.

NO.	BY	DATE	DESCRIPTION
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SHAKE SHACK

SHAKE SHACK JUPITER

6230 INDIANTOWN RD. SUITE 11,
JUPITER, FL 33409
SHACK #1715

100% SET

MECHANICAL DETAILS

DRAWN BY: RTM
CHECKED BY: XX
PROJECT NO: 12427-25

M501

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Division 23: HEATING, VENTILATING, AND AIR CONDITIONING

1. GENERAL INSTRUCTIONS

A. GENERAL REQUIREMENTS

All requirements under Division 01 and the general and supplementary conditions of these specifications apply to this section and divisions 23 through 26 of this section and division exceed those of Division 01, this section and division take precedence. Become thoroughly familiar with all its contents as to requirements that affect this division, section, or both. Work required under this division includes all material, equipment, appliances, transportation, services, and labor required to complete the entire system as required by the drawings and specifications, or reasonably inferred to be necessary to fabricate the function of each system as implied by the design and the equipment specified.

The specifications and drawings for the project are complementary, and any portion of work described in one shall be provided as if described in both. In the event of discrepancies, notify the Engineer and request clarification prior to proceeding with the work involved. Drawings are graphic representations of the work upon which the contract is based. They show the materials and their relationship to one another, including sizes, shapes, locations, and connections. They convey the scope of work, indicating the intended general arrangement of the systems without showing all of the exact details as to elevations, offsets, control lines, and other installation requirements. Use the drawings as a guide when laying out the work and to verify that materials and equipment will fit into the designated spaces, and which when installed per manufacturers' requirements, will ensure a complete, coordinated, satisfactory, and properly operating system.

B. DEFINITIONS

Division: References contained in this specification follow the numbering system defined in the Construction Specifications Institute (CSI) MasterFormat 2004 Edition. Specification Divisions 01 through 13 provided with this project may reference the CSI MasterFormat 1995 Edition. The corresponding division references between the 2004 Edition and 1995 Edition are as follows: 2004 Edition 1995 Edition 1. Division 21 - Fire Suppression Division 15 2. Division 22 - Plumbing Division 15 3. Division 23 - HVAC Division 15 4. Division 26 - Electrical Division 16 5. Division 27 - Communications Division 16 6. Division 28 - Electronic Safety and Security Division 16

Furnish: "to supply and deliver to the project site, ready for unloading, unpacking, assembly, installation and similar operations." Install: "to perform all operations at the project site including, but not limited to, the actual unloading, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, testing, commissioning, starting up and similar operations, complete, and ready for the intended use." Provide: "to furnish and install."

Furnished by Owner (or Owner-Furnished) or Furnished by Others: "an item furnished by the Owner or under other divisions or contracts, and installed under the requirements of this division, complete and ready for intended use, including all items and services necessary to the work necessary for proper installation and operation. Include the installation under the warranty required by this division."

Engineer: Where referenced in this division, "Engineer" is the Engineer of Record and the Design Professional for the work under this division, and is a consultant to, and an authorized representative of the Architect, as defined in the General and/or Supplementary Conditions. When used in this division, Engineer means increased involvement by and obligations to the Engineer, in addition to involvement by and obligations to the Architect.

AHJ: The local code and/or inspection agency (Authority) Having Jurisdiction over the work. NRTL: Nationally recognized testing laboratory, as defined and listed by OSHA in 29 CFR 1910.7 (e.g., UL, ETL, CSA), and acceptable to the AHJ over this project. Nationally recognized testing laboratories and standards listed are used only to represent the characteristics required and are not intended to restrict the use of other NRTLs that are acceptable to the AHJ and standards that meet the specified criteria.

Substitution: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor. Substitutions include Value Engineering proposals. 1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory or unavailability of required warranty terms. 2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

The terms "approved equal," "equivalent," or "equal" are used synonymously and shall mean "accepted by or acceptable to the Engineer as equivalent to the item or manufacturer specified." The term "approved" shall mean labeled, listed, or both, by an NRTL, and acceptable to the AHJ over this project.

Prior to submitting bid, visit the site of the proposed work and become fully informed as to the conditions under which the work is to be done. Failure to comply with this requirement shall not be considered sufficient justification to request or obtain extra compensation over and above the contract price.

MATERIAL AND WORKMANSHIP Pipe, pipe fittings, pipe specialties and valves shall be manufactured in plants located in the United States or certified to meet the specified ASTM and ANSI standards. Work performed under this contract shall provide a neat and "workmanlike" appearance when completed, to the satisfaction of the Architect and Engineer. Workmanship shall be the finest possible by experienced mechanics. Installations shall comply with applicable codes and laws.

The complete installation shall function as designed and intended with respect to efficiency, capacity, noise level, etc. Abnormal noise caused by rattling equipment, piping, ducts, air devices, and squeaks in rotating components shall not be acceptable. Materials and equipment shall be of commercial specification grade in quality. Light duty residential grade equipment shall not be accepted unless otherwise indicated.

Remove from the premises waste material present as a result of work, including cartons, crating, paper, stickers, and/or excavation material not used in backfilling, etc. Clean equipment installed under this contract to present a neat and clean installation at the termination of the work.

Repair or replace public and private property damaged as a result of work performed under this contract to the satisfaction of authorities and regulations having jurisdiction. Provide all safety lights, guards, and warning signs required for the performance of the work and for the safety of the public.

MANUFACTURERS In other articles where lists of manufacturers are introduced, subject to compliance with requirements, provide products by one of the manufacturers specified. Where a list is provided, manufacturers are listed alphabetically and not in accordance with any ranking or preference.

Where manufacturers are not listed, provide products subject to compliance with requirements from manufacturers that have been actively involved in manufacturing the specified product for no less than 5 years.

COORDINATION Coordinate work with that of other trades so that the various components of the systems are installed at the proper time, will fit the available space, and will allow proper service access to those items requiring maintenance. Components which are installed without regard to the above shall be relocated at no additional cost to the Owner.

Unless otherwise indicated, the General Contractor shall provide chases and openings in building construction required for installation of the systems specified herein. Contractor shall furnish the General Contractor with information where chases and openings are required. Contractor shall keep informed as to the work of other trades engaged in the construction of the project and shall execute work in a manner as to not interfere with or delay the work of other trades.

Figured dimensions shall be taken in preference to scale dimensions. Contractor shall take his own measurements at the building, as variations may occur. Contractor shall be held responsible for errors that could have been avoided by proper checking and inspection.

Provides materials with trim that will properly fit the types of ceiling, wall, or floor finishes actually installed. Model numbers listed in the specifications or shown on the drawings are not intended to designate the required trim.

ORDINANCES AND CODES Work performed under this contract shall, at a minimum, be in conformance with applicable national, state and local codes having jurisdiction. Equipment furnished and associated installation work performed under this contract shall be in strict compliance with current applicable codes adopted by the local AHJ, including any amendments and standards as set forth by the following: 1. National Electrical Code (NEC) 2. National Fire Protection Association (NFPA) 3. Underwriters Laboratories (UL) 4. Occupational Safety and Health Administration (OSHA) 5. American Society of Mechanical Engineers (ASME) 6. American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) 7. American National Standards Institute (ANSI) 8. American Society of Testing and Materials (ASTM) 9. Other national standards and codes where applicable.

Where the contract documents exceed the requirements of the referenced codes, standards, etc., the contract documents shall take precedence. Where conflicts between various codes, ordinances, rules, and regulations exist, comply with the most stringent.

Promptly bring all conflicts observed between codes, ordinances, rules, regulations, referenced standards, and these documents to the attention of the Architect and Engineer for final resolution. Contractor will be held responsible for any violation of the law.

Procure and pay for permits and licenses required for the accomplishment of the work herein described. Where required, obtain, pay for, and furnish certificates of inspection to Owner.

PROTECTION OF EQUIPMENT AND MATERIALS Store and protect from damage equipment and materials delivered to job site. For materials and equipment susceptible to changing weather conditions, dampness, or temperature variations, store inside in conditioned spaces. For materials and equipment not susceptible to these conditions, cover with waterproof, tear-resistant, heavy tarp or polyethylene plastic as required to protect from plaster, dust, dirt, paint, water, or physical damage. Replace insulation that has become wet at any time during construction. Drying the insulation is not acceptable. Seal any tears or joints of internal fireproof insulation. Equipment and material damaged by construction activities shall be rejected and Contractor shall furnish new equipment and material of a like kind at his own expense.

Keep premises broom clean of foreign material created during work performed under this contract. Piping, equipment, etc. shall have a neat and clean appearance at the termination of the work. Remove debris from ceiling/return air plenum, including dust.

Plug, seal, or cap open ends of ductwork and piping systems while stored and installed during construction when not in use to prevent the entrance of debris into the systems. Remove temporary protection prior to starting equipment and turning the system over to the owner.

SUBSTITUTIONS Materials, products, equipment, and systems described in the Bidding Documents establish a standard of required function, dimension, appearance and quality to be met by the proposed substitution. The base bid shall include only the products from manufacturers specifically named in the drawings and specifications. To request a substitution, request the Substitution Request Form from the Architect or Engineer. Complete and send the Substitution Request Form for each material, product, equipment, or system that is proposed to be substituted. The burden of proof of the merit of the proposed substitution is upon the proposer.

Unless stated otherwise in writing to the Engineer by the Contractor, Contractor warrants to the Engineer, Architect, and Owner the following:

- 1. Proposed substitution has been fully investigated and determined to meet or exceed the specified Work in all respects unless stated otherwise in the substitution request. 2. Proposed substitution is consistent with the Contract Documents and will produce indicated results, including functional clearances, maintenance service, and sourcing of replacement parts. 3. Proposed substitution has received necessary approvals of authorities having jurisdiction. 4. Same warranty will be furnished for the substitution as for the specified work. 5. If accepted substitution fails to perform as required, Contractor shall replace substitute material or system with that originally specified and bear costs incurred thereby. 6. Coordination, installation and changes in the Work as necessary for accepted substitution will be complete in all respects.

No substitutions will be considered unless the Substitution Request Form is completed and attached with the appropriate substitution documentation. No substitution will be considered prior to receipt of bids unless written request for approval to bid has been received by the Engineer at least ten (10) calendar days prior to the date for receipt of bids.

If the proposed substitution is approved prior to receipt of bids, such approval will be stated in an addendum. Bidders shall not rely upon approvals made in any other way. Verbal approval will not be given. No substitutions will be considered after the contract is awarded unless specifically provided in the contract documents.

SUBMITTALS Assemble and submit for review shop drawings, material lists, manufacturer product literature for equipment to be furnished, and items requiring coordination between contractors under this contract. Provide submittals in sufficient detail so as to demonstrate compliance with these contract documents and the design concept. Prior to transmitting submittals, verify that the equipment submitted is mutually compatible and suitable for the intended use, will fit the available space, and maintain manufacturer recommended service clearances. If the size of equipment furnished makes necessary any change in location or configuration, submit a shop drawing showing the proposed layout.

Transmit submittals as early as required to support the project schedule. Allow for two weeks Engineer review time, plus to/from mailing time via the Architect, plus a duplication of this time for resubmittal, if required. Only resubmit those sections requested for resubmittal. Submittals shall contain the project name, applicable identification section, submittal date, equipment identification acronym as used on the drawings, and the Contractor's stamp. The stamp shall certify that the submittal has been checked by the Contractor, complies with the drawings and specifications, and is coordinated with other trades. Manufacturer product literature shall include shop drawings, product data, performance sheets, samples and other submittals required by this division. Highlight, mark, list, or indicate the materials, performance criteria, and accessories that are being proposed. General product catalog data not specifically noted to be part of the specified product will not be reviewed.

Submittals and shop drawings shall not contain the firm name, logo, seal, or signature of the Engineer. They shall not be copies of the work product of the Engineer. If the Contractor desires to use elements of such product, refer to paragraph "Electronic Drawing Files" for procedures to be used.

Separate submittals according to individual specification sections. Illegible submittals will be rejected and returned without review. Catalog data shall be properly bound, identified, indexed and tabbed in a 3-ring binder. Each item or model number shall be clearly marked and accessories indicated. Label the catalog data with the equipment identification acronym or number as used on the drawings and include performance curves, capacities, sizes, weights, materials, finishes, wiring diagrams, electrical requirements and deviations from specified equipment or materials. For equipment with motor starters or VFDs, include short circuit current ratings. Mark out inapplicable items. Shop drawings will be returned without review if the above mentioned requirements are not met.

Provide the quantity of submittals required by Division 01. If not indicated and hard-copy sets are provided, submit a minimum of six (6) copies. Refer to Division 01 for acceptance of electronic submittals for this project. For electronic submittals, Contractor shall submit the documents in accordance with the procedures specified in Division 01. Contractor shall notify the Architect and Engineer that the submittals have been posted. If electronic submittal procedures are not defined in Division 01, Contractor shall include the website, user name, and password information needed to access the submittals. For submittals sent by e-mail, Contractor shall copy the designated representatives of the Architect and Engineer. Contractor shall allow for the Engineer review time as specified above in the construction schedule. Contractor shall submit only the documents required to purchase the materials and/or equipment in the electronic submittal.

The checking and subsequent acceptance of submittals by the Engineer and/or Architect shall not relieve the Contractor from responsibility for deviations from the drawings and specifications, errors in dimensions, details, size of members, or quantities, omissions of components or fittings, coordination of electrical requirements, and not actual building conditions and adjacent work. Proceed with the procurement and installation of equipment only after receiving approved shop drawings relative to each item.

ELECTRONIC DRAWING FILES In preparation of shop drawings or record drawings, Contractor may, at his option, obtain electronic drawing files in AutoCAD or DXF format on CD-ROM disk, DVD disk, flash drive or direct download, as desired, from the Engineer for a shipping and handling fee of \$200 for a drawing set up to 12 sheets and \$15 per sheet for each additional sheet. Contact the Architect for written authorization and Engineer for the necessary release agreement form and to specify shipping method and drawing format. In addition to payment, the written authorization from the Architect and release agreement form from the Engineer must be received before electronic drawing files will be sent.

RECORD DRAWINGS (AS-BUILT DRAWINGS) During progress of the work in this division, Contractor shall maintain an accurate record of all changes made during the installation of the system. Upon completion of the work, accurately transfer all record information to three identical sets of the approved shop drawings. Insert one set into each copy of the manual described below.

See Division 01 and General Conditions for additional information.

OPERATION AND MAINTENANCE INSTRUCTIONS During the course of construction, collect and compile a complete brochure of equipment furnished and installed on this project. Include operational and maintenance instructions, manufacturer's catalog sheets, wiring diagrams, parts lists, approved submittals and shop drawings, warranties, and descriptive literature as furnished by the equipment manufacturer. Include an inside cover sheet that lists the project name, date, Owner, Architect, Engineer, General Contractor, Sub-Contractor, and an index of contents.

Submit three copies of literature bound in approved binders with index and tabs separating equipment types to the Architect, for Engineer's review, at the termination of the work. Paper clips, staples, rubber bands, loose leaf binding, and mailing envelopes are not considered approved binders. Final approval of systems installed under this contract shall be withheld until this equipment brochure is received and deemed complete by the Architect and Engineer. Instruct workmen to save required literature shipped with the equipment itself for inclusion in this brochure.

Include Record Drawings as described above. Refer to Division 01 for acceptance of electronic manuals for this project. For electronic manuals, refer to paragraph "Submittals" for requirements.

SPARE PARTS Furnish to Owner, with receipt, the following spare parts for the equipment furnished for this project: 1. One set of spare filters of each type required for each unit. In addition to the spare set of filters, install new filters prior to testing, adjusting, and balancing work and before turning system over to Owner. 2. Furnish one complete set of belts for each fan. 3. Furnish three operating keys for each type of air outlet and inlet that requires them.

TRAINING At a time mutually agreed upon between the Owner and Contractor, provide the services of a factory trained and authorized representative to train Owner's designated personnel on the operation and maintenance of the equipment provided for this project. Provide training to include, but not be limited to, an overview of the system and/or equipment as it relates to the facility as a whole; operation and maintenance procedures and schedules related to startup and shutdown; troubleshooting, servicing, preventive maintenance and appropriate operator intervention; and review of data included in the operation and maintenance manuals.

Submit a certification letter to the Architect stating that the Owner's designated representative has been trained as specified herein. Letter shall include date, time, attendees and subject of training. The Contractor and the Owner's representative shall sign the certification letter indicating agreement that the training has been provided.

Schedule training with Owner with at least 7 days advance notice.

WARRANTIES Warrant each system and each element thereof against all defects due to faulty workmanship, design, or material for a period of 12 months from date of Substantial Completion, unless specific items are noted to carry a longer warranty in the construction documents or manufacturer's standard warranty exceeds 12 months. Remedy all defects, occurring within the warranty period(s), as stated in the General Conditions and Division 01.

Warranties shall include labor and material, including travel expenses. Make repairs or replacements without any additional costs to the Owner, and to the satisfaction of the Owner, Architect, and Engineer.

Perform the remedial work promptly, upon written notice from the Engineer or Owner. At the time of Substantial Completion, deliver to the Owner all warranties, in writing and properly executed, including term limits for warranties extending beyond the one year period and any actions the Owner must take in order to maintain warranty status. Each warranty instrument shall be addressed to the Owner and state the commencement date and term.

GENERAL MATERIALS AND INSTALLATION A. BUILDING OPERATION Comply with the schedule of operations as outlined in the architectural portions of this specification. Accomplish work requiring interruption of building operation at a time when the building is not in operation and only with written approval of building Owner and tenant. Coordinate interruption of building operation with the Owner and/or tenant a minimum of seven (7) days in advance of work.

EXISTING EQUIPMENT REUSE AND REMOVAL Remove all unused equipment, ductwork, piping, and associated supports. Cap ductwork and piping at mains and seal air and water tight.

Provide items of HVAC systems modification required because of building remodeling, as noted on the drawings or necessary for proper operation. Match existing materials and construction techniques when modifying existing systems unless specified otherwise. Coordinate additional requirements with General Contractor and Architect.

Seal air tight existing ductwork required to be abandoned in place or not in use at the termination of the work. Cap and seal weathertight existing roof curbs and roof openings to be abandoned in place as a result of equipment removal.

Clean and rebalance existing ductwork, diffusers, registers, and grilles intended for reuse as required or as indicated on drawings. Clean and refurbish existing HVAC equipment intended for reuse as required for proper operation including replacement of filters, belts, motors, remote controls, and safety interlocks.

EXCAVATION AND BACKFILLING Perform excavation and backfill required for installation of underground work under this contract. Trenches shall be of sufficient width to fit and brace trenches to prevent cave-in or settlement. Do not excavate trenches close to columns and walls of new building without prior consultation with the Architect. Use pumping equipment if required to keep trenches free of water. Backfill trenches in maximum 6 inch layers of well-graded dry earth in a manner to prevent future settlement.

Excavation as specified herein shall be classified as common excavation. Common excavation shall comprise the satisfactory removal and disposition of material of whatever substances and of every description encountered, including rock, if any, within the limits of the work as specified and shown on the drawings. Excavation shall be performed to the lines and grades indicated on the drawings. Dispose of excavated materials that are considered unsuitable for backfill and surplus of excavated material which is not required for backfill to the satisfaction of the Architect.

INCIDENTAL DAMAGE Repair streets, sidewalks, drives, paving, walls, finishes, and other facilities damaged in the course of the work. Repair materials shall match existing construction. Repair work shall meet all requirements of the Owner, local authorities having jurisdiction, and meet the satisfaction of the Architect.

CUTTING AND PATCHING

Conform to the requirements in Division 01. Cut walls, floors, ceilings, and other portions of the facility as required to install work under this division. Obtain permission from the Architect prior to cutting. Do not cut or disturb structural members without prior approval from the Architect and Structural Engineer. For patching of concrete slabs, pre-cast concrete slabs and closely coordinate all core drill locations with Architect and Structural Engineer prior to performing any work. Obtain approval from Architect and Structural Engineer for all core drills and penetrations at least four days prior to performing work. Penetrations shall be made as small as possible while maintaining required clearances between the building elements and penetrations. Each area of the opening shall be protected with a minimum of 1/2 inch thick construction including fire ratings, if applicable. Repair and refresh areas disturbed by work to the condition of adjoining surfaces in a manner satisfactory to the Architect.

ROUGH-IN

Coordinate without delay all roughing-in with other divisions. Conceal piping, conduit, and rough-in except in unfinished areas and where otherwise shown.

STRUCTURALSUPPORT SYSTEMS Structural steel used for support of equipment, ductwork and piping shall be new, clean, and conform to ASTM Designation A-36. Support mechanical components from the building structure. Do not support mechanical components from ceilings, other mechanical or electrical components, and other non-structural elements.

PRE-ENGINEERED ROOF EQUIPMENT SUPPORTS AND CURBS Provide prefabricated equipment support rails and roof curbs manufactured by AES Industries, Custom Curb, Inc., Pate Company, Thybar or approved equal. Provide with fully mitered raised cant and step to match roof insulation thickness, welded, minimum 18 gauge galvanized steel shell, internally reinforced to load bearing factors of equipment being supported, minimum 1-1/2 inch thick, 3 pound rigid insulation interval to shell to maintain continuous roof insulation where required, factory installed wood nailer, and minimum 18 gauge jacket with counterflashing where equipment does not fully cover the equipment support. Provide sloped roof equipment supports to enable level installation. Provide rigid backing material behind cant to maintain cant slope. Provide multiple support rails to uniformly support the equipment. Attach to roof structure according to manufacturer's installation instructions.

Attach equipment directly to pre-engineered roof equipment support using one of the following methods: 1. Rail Equipment Supports: Secure each equipment support leg to the rail with a minimum of 4 points of connection per leg. 2. Roof Curbs: Secure each corner of the equipment to the curb nailer using a minimum of 4 lag screws, located along the length of the equipment. Alternatively, secure equipment to the curb using hold-down brackets. Provide minimum 6 inch long, 14 gauge galvanized steel brackets sized to wrap around top of curb and under equipment base with sufficient horizontal offset to cover overlap gap between the equipment rail and curb. Secure bracket to equipment and curb nailer using a minimum of 8 points of connection per bracket. Provide one bracket at each corner along the length of the unit.

Hold-Down Brackets: Coordinate with the curb manufacturer to determine the quantity and size of hold-down brackets and fasteners, with installation instructions for each unit to meet a Building Design Risk Category (I/II/III or IV) and a Design Wind Speed of [XXX] mph.

Submit signed and sealed drawings that indicate the design and installation requirements of pre-engineered roof supports can withstand the design criteria listed. Include installation requirements for anchoring to the roof structure. The Engineer is not responsible and will not provide the seal and signature. Deliver submittal to the local AHJ for approval prior to installation of the contractor proposed pre-engineered roof supports.

Provide seismic restraints in accordance with Article "Seismic Controls for MEFP Systems."

ACCESS PANELS AND DOORS Refer to Architectural documents for specification of access panels and doors. Provide access doors for all concealed equipment and duct and piping assemblies that require service where indicated or as required, except where above lay-in ceilings. Access doors shall be adequately sized for the devices served with a minimum size of 18 inches x 6 inches. Access doors must be of the proper construction for type of construction in which it is installed. Obtain Architect's approval of type, size, location and color before ordering. Provide factory-fabricated and assembled units, complete with attachment devices and fasteners ready for installation, concealed hinges, flush screwdriver-operated cam lock, and anchor straps. Provide access doors manufactured by Greenheck, Milcor, Tisa, Zum, or equal.

PENETRATIONS Provide sleeves for pipes passing through above grade concrete or masonry walls, concrete floor or roof slabs. Sleeves are not required for core drilled holes in existing masonry walls, concrete floors or roofs. Provide 10 gauge galvanized steel sleeves for sleeves 6 inches and smaller. Provide galvanized metal sleeves for larger than 6 inches. Schedule 40 PVC sleeves are acceptable for installation in areas without return air plenums.

Seal elevated floor, exterior wall and roof penetrations weathertight and weatherlight with non-shrink, non-hardening commercial sealant. Pack with mineral wool and seal both ends with minimum of 1/2 inch of sealant.

Seal around penetrations of fire rated assemblies. Coordinate fire ratings and locations with the architectural drawings. Refer to architectural specifications for fire stoppings. Provide a product schedule for UL listing, location, wall or floor rating and installation drawing for each penetration fire stop system.

Extend pipe insulation for insulated pipe through floor, wall and roof penetrations, including fire rated walls and floors. The vapor barrier shall be maintained. Size sleeve for a minimum of 1 inch annular clear space between inside of sleeve and outside of insulation.

Provide prefabricated roof curbs where pipes and/or ductwork penetrate elevated slabs or the roof to the exterior. Provide cover over curb of weather-resistant material and seal duct or pipe penetrations through the cover. Provide pipe collar of weather-resistant material with stainless steel pipe clamps for piping penetrations.

Provide box frames for rectangular openings welded 12 gauge galvanized steel attached to forms and of a maximum dimension established by the Architect. Notify the General Contractor or Architect before installing any openings not shown on the Architectural or Structural drawings.

Seal concrete or masonry exterior wall penetrations below grade with "wall pipes" and mechanical seal seals. Provide cast iron "wall pipes" with integral waterstop ring manufactured by Jay R. Smith, Josam, Wade, Watts or Zum. Provide modular mechanical seal seals, manufactured by Galpico, Metraflex, or Thunderline / Link Seal.

Seal elevated concrete slab with water proof membrane penetrations with "wall pipes" and water proof sealant. Secure waterproof membrane flashing between "wall pipe" clamping flange and clamping ring. Provide cast iron "wall pipes" with integral waterstop ring manufactured by Jay R. Smith, Josam, Wade, Watts or Zum.

Provide sleeves for horizontal pipe passing through or under foundation. Sleeves shall be cast iron soil pipe two nominal pipe sizes larger than the pipe served.

Provide Schedule 40 PVC pipe sleeves for vertical pressure pipe passing through concrete slab on grade. Sleeves shall be one nominal pipe size larger than the pipe served and two pipe sizes larger than pipe served for ductile iron pipes with restraining rods. Seal water-tight with silicone caulk.

Provide 1/2 inch thick cellular foam insulation around perimeter of non-pressure pipe passing thru concrete slab on grade. Insulation shall extend to 2 inches above and below the concrete slab.

FIRESTOPPING Sealants and accessories shall have fire-resistance ratings indicated, as established by testing identical assemblies in accordance with UL 2079 or ASTM E 814, or other NRTL acceptable to AHJ.

Manufacturers: Hilli, RectorSeal, Specified Technologies Inc., United States Gypsum Company, or 3M corp. Through and Membrane Penetration Firestopping Systems Product Schedule: Provide UL listing, location, wall or floor rating, and installation drawing for each penetration fire stop system.

Where project conditions require modification to qualified testing and inspecting agency's illustrations for a particular firestopping condition, submit illustration, with modifications and schedules, related to startup and shutdown, to an independent mechanical engineering or an engineering judgment or equivalent fire-resistance-rated assembly. Include qualifications data for testing agency.

MOTORS AND STARTERS Provide motors and starting equipment where not furnished with the equipment package. Motors shall have copper windings, Class B insulation, and standard terminal caps with starting characteristics suitable for the equipment served. Motors controlled by variable frequency drives shall be rated for voltage peaks and minimum rise times in accordance with NEMA MG 1, Part 31. Motors 5 horsepower and larger controlled by variable frequency drives shall be provided with a shaft grounding system equal to Aegis SGR requiring Protection Ring, Ingress Seal Current Diverting Ring, or approved equal. Motors for all handling equipment shall be selected for quiet operation. Each motor shall be checked for proper rotation after electrical connection has been completed. Provide drip-proof enclosure for locations protected from weather and not in air stream of fan, and totally enclosed fan cooled enclosure for motors exposed to weather. Motors shall be manufactured by Century, General Electric, Louis Allen, Westinghouse, or approved equal.

Provide every motor, except fractional horsepower single phase motors with an approved type of "built-in" thermal overload protection, with a motor starter. Each starter shall be providing overload heaters sized to the motor rating, and every three phase motor starter shall have overload heaters in each phase. Ambient compensated heaters shall be installed wherever necessary. Unless noted otherwise, motor starters shall be furnished by the Division 23 Contractor for installation and connection by the Division 26 Contractor. Starters shall be Allen-Bradley, Clark, Furnas, Square D, or approved equal.

VARIABLE FREQUENCY DRIVES Provide PWM variable frequency drives (VFD) to control fan or pump motors as indicated on the drawings. Provide VFD as manufactured by AC Technology, Asea Brown Boveri, Danfoss, Reliance Electric, or Yaskawa. Include an integral, door-interlocked input circuit breaker or fused disconnect which may be padlocked in the "OFF" position.

Provide a magnetic contactor manual bypass integral to each drive. Provide two magnetic contactors, mechanically and electrically interlocked, to isolate the inverter output from line voltage. The inverter input shall be isolated by either a third magnetic contactor or a second disconnect switch to allow removal of power to the inverter for service while still operating the motor across the line. Bypass shall include a 120/180 control transformer, fused on both the primary and secondary, and bi-metallic thermal motor overload relays with adjustable trip settings.

Provide input AC line reactors without exception. Reactors shall be minimum 3 percent impedance, and "K" rated per IEEE C57.1-10 for harmonic current content. Reactors shall be integral to the drive enclosure without need for field wiring.

The VFD shall have an RS-485 port per standard. The standard protocols shall be Johnson Controls NZ bus, Modbus, and Siemens Building Technologies FLN. Optional protocols include LonWorks, and Profibus shall be available, but shall be available by individual drive shall have the protocol in the base VFD. The use of third party gateways and multiplexers is not acceptable. All protocols shall be "certified" by the governing authority. Use of non-certified protocols is not allowed. The VFD shall allow the DDC system to control the digital and analog outputs and the drive via the serial interface. This control shall be independent of any VFD function. In addition, all the digital and analog inputs of the drive shall be capable of being monitored by the DDC system.

Drive supplier shall provide jobsite start-up, Owner training, and one-year parts and on-site labor warranty. Multiple visits shall be included to allow for tuning and troubleshooting of the controls system as required.

ELECTRICAL WIRING High voltage wiring is defined as 50 Volts or higher. Low voltage wiring is defined as less than 50 Volts. Low voltage wiring shall be provided by Division 26. Line voltage control and interlock wiring for mechanical systems shall also be provided by Division 26. Low voltage control wiring shall be provided by Division 23. Furnish wiring diagrams to Division 26 as required for proper equipment hookup. Coordinate with Division 26 the actual wire sizing amps for mechanical equipment (from the equipment nameplate) to ensure proper installation. Provide power and communication wiring with transient protection in accordance with IEEE C62.41.2. All control and interlock wiring shall be in conduit or raceway to prevent cave-in or settlement. Do not excavate trenches close to columns and walls of new building without prior consultation with the Architect. Use pumping equipment if required to keep trenches free of water. Backfill trenches in maximum 6 inch layers of well-graded dry earth in a manner to prevent future settlement.

Excavation as specified herein shall be classified as common excavation. Common excavation shall comprise the satisfactory removal and disposition of material of whatever substances and of every description encountered, including rock, if any, within the limits of the work as specified and shown on the drawings. Excavation shall be performed to the lines and grades indicated on the drawings. Dispose of excavated materials that are considered unsuitable for backfill and surplus of excavated material which is not required for backfill to the satisfaction of the Architect.

INCIDENTAL DAMAGE Repair streets, sidewalks, drives, paving, walls, finishes, and other facilities damaged in the course of the work. Repair materials shall match existing construction. Repair work shall meet all requirements of the Owner, local authorities having jurisdiction, and meet the satisfaction of the Architect.

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Install wiring parallel to building lines wherever possible. Conceal all control wiring in finished rooms. Do not install Class 2 wiring in raceway containing Class 1 wiring. Boxes and panels containing high voltage wiring and equipment may not be used for low-voltage wiring except for the purpose of interfacing the two wires (e.g., relays and transformers). All wire-to-device and wire-to-wire connectors shall be made at a terminal block or terminal strip. All runs of communication wiring shall be unspliced length when that length is commercially available. Verify the integrity of the entire network following the cable installation. Use appropriate test measures for each particular cable. Label all wiring and cabling at each end within 2 inches of termination with the controller termination number. Label control devices used in the system with permanent labels using the identifiers that match the record documents.

O. EQUIPMENT FURNISHED BY OTHERS

Provide necessary equipment and accessories that are not provided by the equipment supplier or Owner to complete installation of equipment furnished by others in locations as indicated on the drawings, specified herein, or both. Equipment and accessories not provided by the equipment supplier may include, but not be limited to, fuses, vents, intakes, associated roof jacks and caps to outdoors, dampers, in-line fans, roof fans, and control interlocks, etc. as required for proper operation of the complete system in accordance with the manufacturer's instructions.

Contractor shall be responsible for correct rough-in dimensions and shall verify them with Architect and/or equipment supplier prior to service installations.

P. SYSTEM TESTING, ADJUSTING, AND BALANCING

Upon completion of each phase of the installation, test each system in conformance with local code requirements and as noted below. Furnish labor and equipment required to test each system installed under this contract. Assume all costs involved in making the tests and repairing and/or replacing any damages resulting therefrom.

The final test and balance of the building HVAC systems shall be completed by National TAB (no exceptions) and contracted by the General Contractor. The representative from National TAB shall be certified by the National Environmental Balancing Bureau (NEBB), Associated Air Balance Council (AABC), or Testing, Adjusting and Balancing Bureau (TABB). TAB shall be performed in accordance with the most current standard testing and balancing procedures, adjusting and balancing and shall comply with the strictest interpretation of that standard for execution and reporting of all TAB work.

Work shall include but not be limited to: Perform test readings on fans, units, coils, pumps, etc., and adjust equipment to deliver specified amounts of air. Prepare testing and balancing report log showing air supply quantities, air entering and leaving temperatures and pressures at design flow, fan and unit test readings, motor voltage and amp draws, etc., and submit six copies of the final compilation of data for testing and approval before final equipment start-up. Test readings shall be taken at each supply and return plus or minus 10 percent for terminal devices and branch lines and plus or minus 5 percent for main ducts and air handling equipment of the amount of air shown on the drawings. TAB Contractor shall record space temperatures and make adjustments in airflow to each diffuser to obtain uniform temperatures (no greater than +/- F) in spaces. Document temperatures and adjustments in tab report. Adjust equipment to operate as intended by the specification. TAB report shall include a "report summary/remarks" section in accordance with the procedural standard that provides both system set up and a summary of deficiencies as defined by the procedural standard.

TAB Contractor shall be responsible to calibrate, set, and adjust automatic temperature control sensors, actuators and control devices. Check proper sequencing of interlock systems, and operation of safety controls, adjust thermostats, and control setpoints, limits and time based adjustments with the performance requirements of the Construction Documents, Adjust pumps, fans, etc. for proper and efficient operation. Certify to Architect that adjustments have been made and that system is operating satisfactorily. Calibrate, set, and adjust automatic temperature controls. Check proper sequencing of interlock systems, and operation of safety controls.

Division 23 contractor shall align bearings and replace bearings that have dirt or foreign material in them with new bearings without additional cost to the Owner.

Q. VIBRATION ISOLATION

Provide vibration isolation equipment and materials by a single manufacturer. If type and deflection for specific equipment is not specified within the contract documents, reference ASHRAE Handbook "HVAC Applications" or provide per manufacturer's recommendations. Air, Mason Industries, Inc., Kinetics Noise Control, Inc., Vibration Isolator, Inc., Vibration Eliminator Co., Inc., Vibration Mounting and Controls, or Vibro-Acoustics, provided their systems are in compliance with the specified design and performance requirements.

General Requirements: Select vibration isolators by the weight distribution to produce uniform deflection. Vibration isolators shall have either known un-deflected heights or calibration markings so that, after adjustment, the static deflection can be verified, thus determining that the load is within the range of the isolator. Isolators shall operate in the linear portion of their load versus deflection curves. Spring isolators shall have 50 percent excess capacity without becoming coil bound. Coit vibration isolators with factory-applied paint. Coit vibration isolators exposed to weather and other corrosive environments with factory-applied corrosion resistance protection. Install and adjust vibration isolators in accordance with manufacturers written instructions.

Pipe connections. Provide flexible connectors for piping system connections on equipment side of shutoff valves for all pumps, mechanical equipment supported or sprung isolators, and where indicated on drawings. Fabricate flexible piping connectors from stainless steel or rubber materials as suitable for the application. Flexible piping connectors shall be bellows, spherical or braided hose type as recommended by the manufacturer for the system fluid.

Isolator Types:

1. Type WP (Waffle Pads): Provide 5/16 inch thick neoprene pads ribbed or waffled on both sides. Manufacture pads with bridge bearing quality neoprene and select for a maximum diameter of 50 and designed for 15 percent strain, with a static deflection of 0.05 inches. Incorporate steel load-spreading plates when determined between the equipment and the neoprene pad to provide selected deflection. If the isolator is bolted to the structure, install a neoprene mounting sleeve under the both head between the steel washer and the base plate to prevent metal to metal contact. Provide Mason Industries Type W or equal.
2. Type SPNH (Spring and Neoprene Hangers): Provide a steel hanger box containing a laterally stable, double-deflecting neoprene isolator in series with a steel spring. Design springs as the ratio of the horizontal to vertical spring constant is between one and two. The spring diameter shall be not less than 80 percent of the compressed height of the spring at rated load. Loaded springs shall operate within the range of their design curve over a deflection range of not less than 50 percent above design deflection. Spring diameter and hanger box hole size shall be large enough to permit the hanger box to swing through a 30 degree arc. Include a neoprene bushing to prevent contact between the lower hanger rod and hanger box and short-circuiting the isolating function. The neoprene element shall have a maximum diameter of 50 and designed for 15 percent strain, with a static deflection of not less than 0.4 inches. Unless otherwise specified, the static deflection of SPNH hangers shall be 2 inches. Provide SPNH hangers with 1 inch static deflection for water source heat pumps and fan-powered VAV terminal units. When installed, do not exceed the spring element and do not allow the hanger box to rotate through a full 360 degree arc without encountering obstructions. Provide Mason Industries Type 30N or equal.
3. Type NR (Neoprene Bushing): Provide neoprene, inner-bush bearing bushings for lightweight (less than 100 pounds), suspended equipment supported from structure with all thread rod and angle iron or Unistrut. Select for a maximum diameter of 50 and designed for 15 percent strain, with a static deflection of 0.15 inches. Provide Mason Industries Type HMB or equal.

R. SEISMIC CONTROLS FOR MEFP SYSTEMS

Seismic Protection Criteria:
Risk/Occupancy Category: I, II or III/IV
Site Soil Category: Contractor's Seismic Engineer to Determine.
Seismic Design Category: Contractor's Seismic Engineer to Determine.
Component Importance Factor: Determined from ASCE 7, most recent version.

The Contractor shall be responsible for determining the requirements for seismic bracing of mechanical, electrical, and plumbing systems. Seismic protection criteria used to determine seismic bracing requirements of all mechanical, electrical, and plumbing systems shall be determined by the applicable code adopted in the project jurisdiction. Where not already determined within the contract documents, the Contractor shall be responsible for contracting a licensed professional engineer to establish building site class, seismic design category, seismic zone, or any other criteria necessary to determine the requirements for seismic bracing on mechanical, electrical, and/or plumbing systems.

Seismic bracing of fire protection systems shall be installed in strict accordance with the provisions of NFPA 13 (2010 or later edition). The Contractor shall determine the type and location of seismic bracing required for the mechanical, electrical, and plumbing elements shown on the drawings based on the established seismic criteria, the size and weight of the supported element, and the distance from structure to the supported element.

The Contractor shall submit the following shop drawing information to the AHJ and the Engineer for review and approval:
1. Seismic analysis listing all applicable seismic criteria.
2. Descriptive bracing materials.
3. Shop drawings showing bracing type and location.
4. Installation details of all bracing used.
5. Calculations showing that the seismic restraints meet the seismic requirements.
Shop drawings and calculations shall be signed and sealed by a registered professional engineer, licensed in the state of the project and employed by the manufacturer of the seismic bracing products. Calculations shall include dead loads, static seismic loads, and capacity of materials utilized for connections.

Seismic bracing, restraints, isolators, and isolation materials shall be of the same manufacturer and shall be certified by the manufacturer. Acceptable manufacturers are: Amberboth Company, Inc., B-Line/Talos, ISAT, Kinetics Noise Control, Inc., Loos & Company, Inc., Mason Industries, Inc., Uni-Strut, or Vibro-Acoustics. Each device shall have a pre-approval number from California OSHPD or other recognized government agency showing maximum restraint ratings.

Seismic bracing measures to be applied to mechanical, electrical, and plumbing equipment/systems shall be installed in strict accordance with all applicable local, state, and/or federal codes as well as manufacturer's requirements. The most stringent criteria shall apply. All anchor connections for support of mechanical and electrical equipment, regardless of the need for seismic restraints, shall be shown on shop drawings.

S. AIR FILTERS

Provide AAF/Flanders Perfect Pleat HC M8, Camfil Farr 3030, pleated, throwaway type filters, minimum MERV 8, or similar as manufactured by Air Filter, Inc., Biodimatic, Columbus, Koch, or approved equal, unless otherwise indicated.

Temporary filters used to protect openings in ductwork and inside equipment when permanent HVAC equipment is used during the construction period shall be pleated, throwaway type filters, minimum MERV 6.

T. REFRIGERANT AND OIL

Provide full refrigerant and oil charge in new air conditioning refrigeration systems, and maintain it for full term of the guarantee.

U. IDENTIFICATION

Provide manufacturer's standard pre-printed, semi-rigid snap-on or permanent adhesive, pressure-sensitive vinyl pipe markers. Color code pipe markers to comply with ANSI A13.1.

Install pipe markers on each HVAC piping system and include arrows to show normal direction of flow.

Locate pipe markers and color bands wherever piping is exposed to view in occupied spaces, machine rooms, accessible maintenance spaces (shafts, tunnels, plenums) and exterior non-concealed locations.

Provide plastic laminate or brass valve tag on every valve, cock and control device in each HVAC piping system; exclude check valves, valves within factory-fabricated equipment units, and shut-off valves at HVAC terminal devices and similar rough-in connections of end-use fixtures and units.

Provide manufacturer's standard laminated plastic, color coded equipment markers. Conform to the following color code: Green for Cooling, Yellow for combination Cooling and Heating, Yellow/Green for combination Cooling and Heating, Brown for Energy Reclamation, Blue for other equipment types. Conform to ANSI A13.1 for Hazardous Operations.

Provide stenciled signs for equipment identification at Contractor's option or where distance of required identification requires lettering larger than 1 inch height. Stencil paint shall be exterior type, oil-based, alkyl enamel, minimum 1/16 inch height or greater as required for long distance identification, white or black color for best contrast.

Provide duct markers or provide stenciled signs and arrows indicating ductwork service and flow direction in black or white lettering best contrast with duct or insulation color. Locate markers maximum 50 feet along each duct side and within 5 feet of all control and balancing dampers on branch ducts more than 25 feet length and within 5 feet on each side of walk, floor, and ceiling penetrations. Provide additional markers in congested areas or at multiple duct runs as required for clarity.

3. DUCT INSULATION, DUCTWORK, ACCESSORIES, FLUES AND FANS

A. DUCT INSULATION

Provide fiberglass duct liner with fibers firmly bonded together with a thermosetting resin. Liner surface shall serve as a barrier against infiltration of dust and dirt, shall meet ASTM C1338 for flange resistance, and shall be cleanable using duct cleaning methods and equipment outlined by North American Insulation Manufacturers Association (NAIMA) duct cleaning guide. Install with liner adhesive and mechanical fasteners in accordance with manufacturer's instructions and recommendations. Ductwork sizes shown on drawings are inside clear dimensions. Increase sheet metal by liner thickness in both directions where liner is installed.

Provide rectangular liner conforming to ASTM C1071, Type I or II that is 1/2 inch thick, 1-1/2 pound density, minimum R-6.0 Certainted Corp., Toughguard® or equivalent, Johns Manville, Owens-Corning, or Knaf.

Provide round liner that is 1-1/2 inch thick, 4 pound density, minimum R-6.0 Johns Manville "Spiracoustic Plus" or equivalent, Certainted or Owens-Corning.

Provide liner on the following interior air ducts and where specified on the drawings:

1. Exposed round and rectangular supply ductwork.
2. Exposed round and rectangular return ductwork.

At interface of lined and wrapped ductwork, overlap lined ductwork at least 2 feet beyond wrapped insulation.

Cover concealed, rigid ductwork with ASTM C535, Type II flexible fiberglass insulation. Installed insulation shall be 2 inch thick, 3/4 pound density, minimum R-6.0duct wrap, Certainted or equivalent Johns Manville, Owens-Corning, or Knaf with heavy-duty foil non-skin-kraft facing, and with joints taped with 3 inch wide foil tape as follows:

1. Round and rectangular supply and return air ductwork.
2. Unlined Round and rectangular outside air ductwork.
3. Round and rectangular exhaust and relief air ductwork within 10 feet of exterior discharge.

Cover Outdoor air, Exhaust air and Relief air plenums connected to exterior louvers with 1-1/2 inch thick, 1.5 pound density, rigid fiberglass insulation conforming to ASTM C612, Class 2.

Insulating materials, adhesives, coatings, etc., shall not exceed flame spread rating of 25 and smoke developed rating of 50 per ASTM E84. Containers for mastics and adhesives shall have U.L. Label.

For supply and return ductwork located exterior to the building, insulation shall be minimum R-8.0. Provide Insulation and jacket in accordance with one of the following three options:

1. Exterior insulation and jacket consisting of 2 inch thickness of Armaflex flexible elastomeric insulation or equivalent meeting ASTM C534 with integral 12 mils thick UV resistant dadding laminated at factory. Cover all seams with Armaflex seal tape.
2. Exterior insulation consisting of 2 inch thickness of flexible elastomeric insulation meeting ASTM C534 or 3 lb density rigid fiberglass meeting ASTM C612, and jacket consisting of 20 gauge corrugated aluminum jacket with aluminum fitting covers and minimum three aluminum attachment bands per section.
3. Exterior insulation consisting of 2 inch thickness of flexible elastomeric insulation meeting ASTM C534 or 3 lb density rigid fiberglass meeting ASTM C612, and jacket consisting of 15.5 mils thick Venturedad Plus UV resistant cladding.

Install exterior ductwork with sufficient slope to ensure that water cannot pond anywhere on the duct. Drainage must be achieved by duct hangers - not by duct thickness. Locate longitudinal seams of outer shell (aluminum, flexible elastomeric, or cladding as applicable) at bottom of duct. Install cladding in strict conformance with cladding manufacturer's instructions.

B. DUCTWORK

Provide galvanized steel ductwork and housings as shown on drawings. Construct ductwork including fittings and transitions in conformance with current SMACNA gauge, thickness, etc. Minimum thickness of duct shall be 26-gauge sheet metal. Reinforce housings and ductwork over 30 inches with 1-1/4 inch angles not less than 5-6" per center, and closer if required for sufficient rigidity to prevent vibration. Support horizontal runs of duct from strap iron hangers on centers not to exceed 8'-0". Do not support ceiling ductwork with hangers. Provide rectangular type supports with minimum 1/8 inch diameter, or equivalent, steel pipe. Provide transformer for damper motors of different voltages as required that piping, electrical conduit, and associated supports are not routed through the ductwork.

Provide pre-engineered roof duct supports by Cooper B-Line, Elite Components, ERICO, FNW, Miro, PHD Manufacturing, PHP Systems, Roof Top Box, Unistrut (Atkore), Zsi Foster, or approved equal. Support ductwork on the roof with pre-engineered roof duct supports that rest on top of the roofing membrane, not requiring any attachment to the roof structure and not penetrating the roofing assembly, with the exception of the following: 1. Provide rectangular type supports with minimum 1/8 inch diameter, or equivalent, steel pipe. Provide transformer for damper motors of different voltages as required. 2. Provide transformer for damper motors of different voltages as required. 3. Provide transformer for damper motors of different voltages as required.

Coordinate with the pre-engineered roof duct support manufacturer to anchor the duct supports directly to the roof structure in accordance with the manufacturer's installation instructions or provide intermediate duct supports engineered to meet the wind resistance and seismic design criteria. Reference Section, "PRE-ENGINEERED ROOF EQUIPMENT SUPPORTS".

Construct non-VAV supply ducts to meet SMACNA positive pressure of 2 inches w.g. Construct Return, Outdoor and Exhaust ductwork in accordance with SMACNA negative pressure of 1 inch w.g. Construct exhaust ductwork downstream of fans to meet SMACNA positive pressure of 1 inch w.g.

Provide mill phosphatized and galvanized finish for exposed ductwork to be field painted. Shop treated steel metal shall have galvanized metal primer applied in the shop after fabrication and prior to shipping.

Seal ductwork with heavy liquid sealant. Hardcoater Ibrongrip 601, Design Polymers DP 1010, United McGill duct sealant or approved equal applied according to sealant manufacturer's instructions. Seal all longitudinal and transverse ductwork joints airtight to meet SMACNA Seal Class A. Tapes and mastics shall be listed and labeled in accordance with UL 181A.

Provide radius elbows, turns, and offsets with a minimum centerline radius of 1-1/2 times the duct width. Where space does not permit full radius elbows, provide short radius elbows with a minimum of two continuous splitter vans. Vans shall be the entire length of the bend. Provide mirrored elbows where space does not permit radius elbows, where shown on the drawings, or at the option of the contractor with the engineer's approval. Mirrored elbows less than 45 degrees shall not require turning vans. Mirrored elbows 45 degrees and greater shall have single thickness turning vans of same gauge as ductwork, rigidly fastened with guide strips in ductwork. Vanes for mirrored elbows shall be provided for supply and exhaust ductwork and in return and outside air ductwork that has an air velocity exceeding 1000 fpm. Do not install vans in grease ductwork. The use of square throat, radius head elbows is prohibited. Remove and replace all installed elbows of this type with an approved elbow or an additional coat to the owner.

Connect ducts to vibrating equipment and when transitioning between two different metallic duct materials (e.g., aluminum to galvanized steel) by means of flexible connectors. Flexible connectors shall be neoprene coated glass cloth canvas connections, Duro-Dyne, Egan, Ventibac or equal. Flexible connectors shall have a flame spread rating of 25 or less and smoke developed rating not higher than 50. Make airtight joints and install with minimum 1-1/2 inches slack.

Provide balancing dampers, manufactured by Cesco, Greenheck, Louvers & Dampers, Nair Industries, Potliff, Ruskin, Tamco, or approved equal, where shown on drawings and wherever necessary for complete control of air flow. Splitter dampers shall be controlled by locking quadrants; provide Yaw Regulator or Ventlok and bearings for the damper rod. Rectangular volume dampers shall be opposed blade interlocking type. Round volume dampers shall be single-plate type consisting of circular blade mounted to a shaft. Provide Flexmaster model STO or equal 45 degree rectangular/round takeoff fitting with model B03 damper with locking quadrant and insulation built out for round ductwork branch takeoffs to individual air devices. Omit damper at B03 fitting when damper is located downstream of takeoff.

Where access to dampers through a hard ceiling is required, provide a concealed, remote cable-operated, butterfly-type volume damper assembly with external wall gear operator. Damper assembly shall include duct casing with rolled lead stiffeners, reinforced blade, self-lubricating bearing, and remote operator mounting plate. External operator shall attach to damper as a single piece with no linkage adjustment required. Damper shall be adjustable through the diffuser frame with standard 1/4 inch nutdriver or flat screwdriver. Provide positive, direct, two-way damper control with no sleeves, springs or screw adjustments to come loose after installation. Provide cable length to span the distance from the damper to the remote operator location. Install damper in branch duct. Do not install in diffuser neck. Install remote operator on the back of the diffuser frame or side of a slot diffuser plenum. Support cable assembly to avoid bends and kinks in cable at manufacturer recommended intervals. Where approved by architect, a ceiling cup with cover plate may be used for access to cable operator. Provide round dampers by Metropolitan Air Technology model RT-250, Young's Regulator model 5020-1200, or approved equal. Provide rectangular dampers by Metropolitan Air Technology model RT-200, Young's Regulator model 600-1200, or approved equal. Provide remote cable control by Metropolitan Air Technology model RT-WGA, Young's Regulator model 270-275, or approved equal.

Round or oval ductwork shall be FlaktGroup Semco, United, Hercules Industries or equal, sheetmetal, with smooth interior surface, with low pressure (duct pressure class up to and including 2 inches w.g.) Round ductwork gauges per the following table (reference SMACNA HVAC duct construction standards for including when pressures exceed 2 inches w.g.):

Size	Duct Gauge	Fitting Gauge
14" & under	26	24
15" thru 20"	24	22
28" thru 36"	22	20
38" thru 50"	20	20
52" thru 60"	18	18

Lewis & Lambert, Linx Industries Lindab Safe, or approved equal factory-manufactured round ductwork and fittings may be substituted for specified round branch ductwork, at Contractors option. Heavy liquid sealant may be omitted on factory-manufactured round ductwork.

Low pressure (duct pressure class up to and including 2 inches w.g.) Fittings 24 inches in diameter and less shall be prefabricated, spot-welded and internally sealed. Continuously weld fittings larger than 24 inches in diameter. Fitting gauge shall be 22 gauge for 36 inch fittings and under, 20 gauge for larger sizes. 30 degree tees shall be conical type. Seal longitudinal and transverse ductwork joints airtight with heavy liquid sealant applied according to manufacturer's instructions. Provide gauge thickness in medium pressure (duct pressure class 3 inches to 6 inches w.g.) ductwork as recommended by SMACNA.

C. FLEXIBLE DUCT

Low pressure (duct pressure class up to and including 2 inches w.g.) and medium pressure (duct pressure class 2.1 inch to 6 inches w.g.) flexible duct shall be Flexmaster type R8, Thermo type Silver, MKG, JPI, type Silver Jacket, or equal (fire resistant polyethylene) protective vapor barrier, UL181 Class 1, acoustical insulated duct, R-6.0 fiberglass insulation. Provide CPE liner with steel wire helix mechanically locked or permanently bonded to the liner.

Flexible duct runs shall not exceed 5 feet in length, and shall be installed fully extended and straight as possible avoiding tight turns. Install flexible duct in accordance with manufacturer's instructions. Support flexible duct at maximum 5 feet per center and within 6 inches of bends. Bends shall not exceed a centerline radius of one duct diameter. Duct sag shall not exceed 1/2 inch. Supporting material in direct contact with the duct shall not be less than 1-1/2 inches in width.

Connect flexible duct to rigid metal duct or air devices as recommended by the manufacturer. At a minimum, install two wraps of duct tape around the inner core connection and a metallic or non-metallic clamp over the tape and two wraps of duct tape or a clamp over the outer jacket. Duct clamps shall be labeled in accordance with UL-181B and marked 181B-C. Duct tape shall be labeled in accordance with UL 181B and marked 181B-FX.

D. PLASTIC FLUE GAS VENTS

Provide UL 1738 listed plastic flue gas vents, with positive or negative flue pressures complying with NFPA 211 and suitable for use with a vent cap and grill, shall meet ASTM C1338 for flange resistance, and shall be cleanable using duct cleaning methods and equipment outlined by North American Insulation Manufacturers Association (NAIMA) duct cleaning guide. Install with liner adhesive and mechanical fasteners in accordance with manufacturer's instructions and recommendations. Ductwork sizes shown on drawings are inside clear dimensions. Increase sheet metal by liner thickness in both directions where liner is installed.

Vents and combustion air ducts for condensing type appliances shall be Schedule 40 PVC pipe and socket fittings meeting ASTM D2685 and UL 1738, manufactured by IPLEX. Use solvent cement meeting ASTM D2584 and make joints in accordance with ASTM D2855.

Where plastic gas vents are installed in a return air plenum, wrap the vent with fire rated plenum insulation. Reference Article "Plenum Insulation" for plenum-rated fire wrap. Coordinate vent material compatibility with the appliance manufacturer's installation instructions prior to purchasing and installation.

E. AIR DEVICES

Provide air devices as scheduled on drawings, manufactured by Carnes, Krueger, Metallaire, Nalor Industries, Price, Titus, or Tuttle & Bailey. Select air devices to limit room noise level to no higher than NC-30 unless otherwise shown. Provide devices with a soft plastic gasket to make an airtight seal against the mounting surface. Coordinate final location, frame, and mounting type of air devices with Architectural reflected ceiling plans.

Submit complete shop drawings including information on noise level, pressure drop, CFM for each air device, styles, borders, etc. Clearly mark with specified equipment number. Submit sample of each air device as requested by the Engineer.

Provide wall return air grilles and exhaust air registers with horizontal 35 or 45 degree angle vision-proof fans. Provide concealed fasteners for wall mounted registers and grilles. Provide floor supply air registers of aluminum heavy duty type with 0 degree deflection. Provide opposed blade dampers for supply air registers and exhaust air registers unless indicated otherwise.

Provide ceiling mounted air devices of lay-in or surface mounted type as required to be compatible with ceiling construction. Provide ceiling diffusers and grilles with white enamel finish unless noted otherwise.

Provide linear slot diffusers of standard one-piece lengths up to 6-feet and furnish in multiple sections greater than 6-feet. Join multiple sections together end-to-end with alignment pins to form a continuous slot appearance. For installations in a hard ceiling, install diffuser per manufacturer's installation instructions prior to installation of drywall. Contractor shall use manufacturer's hard ceiling clips for mounting to ceiling framing. Screws through face of linear slot diffuser are not acceptable. Provide alignment components by the manufacturer. Provide plenums by the slot diffuser manufacturer. Plenums shall be internally insulated by the manufacturer with minimum 1/4 inch thick, fiberglass insulation.

F. CONTROL DAMPERS

Provide factory fabricated, parallel blade control dampers sized as shown on the drawings and as specified. Individual damper sections shall not be larger than 48 inches x 60 inches with maximum blade width of 6 inches. Frame construction shall be minimum 16 gauge galvanized steel for rectangular dampers, 20 gauge for round, 1/8 inch thick for aluminum, with flanges for duct mounting. Provide elastomeric or neoprene seals, mechanically attached and field replaceable. Provide a minimum of one damper actuator per section. Test damper performance in accordance with AMCA 500-D.

Provide modulating dampers with linear flow characteristics. Size modulating dampers based on the smaller of 1,500 FPM through the damper or full open air pressure drop of 0.1 inches W.G. Size two-position dampers full duct size and select to minimize pressure drop.

Motorized dampers used for ventilation air intake, exhaust air, or relief air shall have leakage rate not to exceed 0.0 CFM/square foot in full closed position at 1 inch W.G. pressure differential across the damper.

Provide dampers as manufactured by Greenheck, Cesco, Potliff, Nalor, or Ruskin. Reference manufacturer with model number for outside air dampers is Ruskin CD-50 constructed of aluminum, and all other applications is Ruskin CD-35 constructed of galvanized steel.

Provide damper operator for each automatic damper with sufficient capacity to operate the damper under all conditions and to guarantee tight close-off of dampers against system pressure encountered. Each operator shall be provided with spring-return for normally closed or normally open position for fail safe operation to account for fire, low temperatures, or power interruption as required by the control systems specified on the drawings. Damper operators shall be manufactured by Belimo, Johnson Controls or approved equal. Provide transformer for damper motors of different voltages as required.

G. LOUVERS, PLENUMS, SCREENS

Provide intake and exhaust air louvers by Ruskin model ELF375X or equal American Warming & Ventilating, Cesco, Greenheck, Industrial Louvers or Louvers & Dampers as scheduled on the drawings. Coordinate exact size and location with architectural drawings. Louvers shall be stationary, with mill finish. Louvers shall have extruded aluminum blades, 0.80 inch wall thickness, 45 degree blade angle, blades on 5 inch centers; frame shall be extruded aluminum, 0.80 inch wall thickness, with expanded flattened aluminum birdscreen. Provide louvers with a minimum free area of 45 percent, with a maximum air pressure drop of 0.1 inch at scheduled airflow rate.

Construct plenums with galvanized steel framing members and galvanized steel metal, braced with galvanized angles. Gauges and tracing shall conform to SMACNA recommendations for ductwork of like sizes. Where access doors are shown, provide hinged doors with RZK Ventlok kits. Make watertight connections to louvers, sloping bottom of plenum to drain water to weepholes in bottom of louver.

Provide screens on louvers, ducts, hoods, fans, and openings to the outside as scheduled and/or noted on the drawings. Insect screens shall be 0.012-inch thickness, 1/4 inch mesh, aluminum wire. Bird screens shall be 0.041-inch, 1/2 inch mesh galvanized steel wire. Provide motorized control dampers or backdraft dampers where shown on the drawings.

Wind Driven Rain Performance: Louvers shall comply with ANSI/AMCA 500 for wind driven rain performance. Louvers shall have not less than 90 percent effectiveness when subjected to wind velocities of 20 and 50 mph with rainfall rates of 3 in/hr and 5 in/hr respectively and a core intake velocity not less than what is scheduled on the plans.

Windborne-Debris Impact Resistance: Louvers located within 30 feet of grade shall comply with AMCA 540.

H. EXHAUST AIR SYSTEMS

Provide roof mounted exhaust fans as scheduled on the drawings, or equal AQME, Carnes, Cook, Greenheck, Pennbary, or Twin City Fans complete with aluminum housing, aluminum centrifugal wheel, motor with integral thermal overload protection, disconnect switch installed inside the housing, birdscreen, backdraft damper, and patte prefabricated roof curb. Three phase fans shall be furnished with magnetic starters with push button station.

I. KITCHEN EXHAUST AIR SYSTEMS

Install kitchen grease exhaust package furnished by the owner. System includes kitchen hood, grease exhaust fan/pollution control unit, filtered makeup air unit and a mechanical or electrical gas shutoff valve provided with the kitchen exhaust system to shutoff fuel or power source to cooking equipment upon detection of fire. Valve shall have a clearly marked open/closed indicator.

Provide ducts connecting Type 1 exhaust hoods to exhaust fans made of #16 gauge black iron with continuously welded joints and clean-out doors. Provide transition at connection to fan with opening size equal to or greater than the venturi opening of the fan inlet.

Provide gasket at flanged connection in fan rated for 1500 degrees Fahrenheit and grease applications. Enclose duct in fireproof enclosure per locally adopted mechanical code or, if approved by the local code official, in fire rated wrap insulation. Insulation shall be minimum two-hour rated duct wrap insulation for Type I hood grease exhaust duct applications and shall conform to ASTM E2336 where required to comply with Washington Mechanical Code. Insulation shall be flexible wrap enclosure rated for minimum 2000 degrees Fahrenheit and for zero clearance to combustibles. Insulation shall be non-mineral wool, passive, low bio-persistent fiber totally encapsulated on all sides with aluminum foil. Insulation shall be as manufactured by Certainted, Thermal Ceramics, Unifrax or 3M.

Slope duct back towards hood at minimum of 1/4 inch per lineal foot. At Contractor's option, a UL listed concentric ductwork package that complies with UL 1978 standard for grease ducts may be used in lieu of the welded black iron duct for connecting hood to exhaust fan. Ductwork package shall be as manufactured by Metal-Fab, Schelber, Selkir, or approved equal. Provide manufacturers UL listing number and verification certificate as a part of the shop drawing submittal. Install duct package in strict conformance with manufacturer's instructions and recommendations.

All portions of grease duct systems shall be tested for leakage in accordance with the "Grease Duct Test" paragraph of the Washington Mechanical Code. Leakage tests shall be by water leakage type or equivalent test methods as approved by the local code official to determine that all joints are liquid tight. Water leakage test shall be performed by Environmental Corporation of America or owner approved testing contractor. Tests shall be performed in the presence of the local code official. Any joints found defective shall be repaired and retested until satisfactory results are obtained. The contractor shall submit a copy of the grease duct leakage test report to the architect/engineer complete with the approval signature of the local code official.

4. HVAC EQUIPMENT

A. ROOFTOP UNITS (GAS FIRED HEAT) 3-25 TONS

Install electric cooling, gas heating rooftop units as scheduled on the drawings furnished by owner, manufactured by Captive Air with features as noted in the RTU schedule and in the RTU Control Matrix, and complete with factory installed direct-drive hermetic compressors with internal spring vibration isolation, built-in motor thermal overload protection, crankcase heater, and low pressure switches; direct expansion cooling and condensing coils with 1 inch factory installed flexible elastomeric insulation around the suction and liquid lines not directly located above a condensate drain pan and protective UV coating on any insulation exposed to sunlight, minimum SEER or EER rating (cooling) as specified on the applicable energy code or greater if scheduled on the drawings, centrifugal evaporator blower; air filter rack, propeller type condenser fan; aluminum steel heat exchanger, minimum AFUE rating (heating) as required by the applicable energy code or greater if scheduled on the drawings, forced combustion air blower; complete factory installed micro-processor controls including anti-short cycle times, time delay relays and minimum "on" time controls; 100 percent safety gas shutoff; direct spark ignition system; built-in thermal overload protection on motors and compressors; outdoor air damper; relief; weathertight housing constructed of zinc coated, heavy gauge, galvanized steel with weather-resistant baked enamel finish; pre-engineered roof curb with minimum height as scheduled on the drawings if unit is equipped with internal vibration isolators; Type CMB if unit is not equipped with internal vibration isolators; single point electrical power connection. Provide guards or louvers panels to protect the condenser coil from hail or other damage. Provide a 125 VAC, 20 amp duplex convenience receptacle mounted to unit ready for field wiring with a cover UL listed for wet and damp locations when in use. Provide electronic programmable type thermostat. Provide unit complete with manufacturer's one year guarantee on components plus an additional four year guarantee on the compressors and heat exchangers. For units equipped with an economizer assembly, the assembly shall be covered with minimum 5 year manufacturer warranty, certified to operate through 60,000 damper opening and closing cycles, and certified to meet leakage requirements specified under the section, "Control Dampers."

B. ELECTRIC UNIT HEATERS

Provide electric unit heaters as scheduled on the drawings, manufactured by Berko, Brasco, Indecon, Markel, QMark, or Raywalk. Standard type propeller unit heaters with scroll mounting brackets and hardware for horizontal airflow. Furnish heater fan motors complete with a manual motor starter with automatic thermal cutouts sized to the motor load, disconnect switch, and other code required safety devices. Provide unit mounted thermostat and manual summer/winter changeover switch.

C. SPLIT DUCTLESS AIR-CONDITIONING SYSTEMS

Provide split ductless system consisting of evaporator section for wall or ceiling mounting as indicated and remote condensing section similar to Carrier, Comfort Star, Dalkin, Friedrich, Fujitsu, Lennox, LG, Mitsubishi, Samsung, Sanyo, Trane, or York. Evaporator cabinet shall be factory assembled pre-wired consisting of furniture-grade steel with baked-enamel finish. Condensing coils, with direct-drive centrifugal fans, 2-speed motor, and cleanable floor drain. Evaporator coil shall be direct-expansion cooling coil of seamless copper tubes expanded into aluminum fins, with thermal-expansion valve with external equalizer. Air-cooled condenser shall be of corrosion-resistant cabinet containing compressor, copper-tube aluminum-fin coils, direct-drive propeller fans with motors with internal overload protection, capacity control to 0 degrees Fahrenheit.

Provide concrete bases for units located on grade. Provide pre-engineered roof equipment support rails for units located on roof. Securely attach units to rail.

Provide refrigerant piping sized as

Provide remote sensors where indicated on the drawings and integrate them with the thermostat control equipment. Remote sensors shall have the following features:

1. Wired connection.
2. Temperature sensor.
3. Humidity sensor.
4. Blank faceplate.
5. Where multiple remote sensors are shown for a single unit, the sensors shall be provided in a single device.

Dry-bulb temperature sensors at a minimum shall be accurate to +/- 2 degrees Fahrenheit over the range of 40 to 80 degrees Fahrenheit. Wet-bulb temperature shall be calculated using dry-bulb temperature and humidity and shall be accurate to +/- 2 degrees Fahrenheit. Enthalpy shall be calculated using dry-bulb temperature and humidity and shall be accurate to +/- 3 BTU/lb over the range of 20 to 36 BTU/lb. Humidity sensors at a minimum shall be accurate within +/- 3 percent full range between 20 and 95 percent, with drift less than 1 percent full scale per year. Pressure transmitters at a minimum shall be accurate to +/- 1 percent full scale with drift less than 1 percent full scale per year.

Smoke detectors furnished and installed as indicated in this section or as scheduled on the plans (or heat detectors, if permitted by code) shall shut down each associated unit supply fan upon activation where required by code. Provide remote visual and audible alarm device in an approved location if smoke detectors are not connected to a fire alarm panel and label device as "Air Duct Detector Trouble".

Provide 24 Volt or 120 Volt timeswitches Intermatic Series FMD20 or equal programmable type with 7-day programming with up to two "ons" and "offs" per day. Battery backup shall provide 48 hours of memory retention. Override timer switches shall be spring wound, 6-hour, normally open type. Coordinate 120 V wiring of timeswitch with electrical contractor if 120 V model is provided.

Provide relays with contact rating, configuration, and coil voltage that is suitable for the application. Relay shall be general purpose, enclosed plug-in type and protected by a heat and shock resistant dust cover. Number of contacts and operational function shall be as required. Transient suppression shall be provided as an integral part of the relay. Contactors shall be single coil, electrically operated, mechanically held, double-break, silver-to-silver type protected by arcing contacts. Positive locking shall be obtained without the use of hooks, latches, or semi-permanent magnets. Operating and release times shall be 100 milliseconds or less.

7. SEQUENCE OF OPERATION

A. FAN COIL UNIT CONTROL

During occupied hours, operate fan coil unit supply fan continuously and open outdoor air damper to maintain minimum ventilation. Cycle stage(s) of DX cooling and electric heating to maintain room thermostat set point (75 degrees Fahrenheit cooling, 70 degrees Fahrenheit heating). Duct mounted smoke detectors shall shutdown unit upon alarm.

During unoccupied hours, cycle the fan coil unit supply fan and cooling or heating system to maintain unoccupied setback temperature set points. Outdoor motorized air damper shall be closed during unoccupied hours.

Connect the Outdoor motorized air damper to the same time clock as the restroom exhaust.

B. KITCHEN EXHAUST FAN CONTROL

Kitchen exhaust fan shall be energized through on-off switches at the associated exhaust hoods or cooking equipment or through a master kitchen ventilation control panel as indicated on the drawings. Kitchen fans shall be interlocked to operate with cooking appliances, make-up air and other air-handling equipment providing fresh air to the kitchen area as noted or scheduled on the drawings.

C. ROOFTOP UNIT CONTROL

Refer to RTU CONTROL MATRIX on Sheet M601 for required rooftop unit control options.

D. RESTROOM EXHAUST FAN (EF-1) CONTROL

Operate exhaust fans continuously during occupied hours and shut down during unoccupied hours. Provide a 7-day timedock to switch each system between occupied and unoccupied operation.

E. AIR CURTAIN CONTROL

Interlock air curtain with door limit switch to energize when the door opens. Units scheduled with heating coils shall cycle the stages of heat to maintain room temperature setpoint of 70 F (adj).

F. ELECTRIC UNIT HEATER CONTROL

Unit heater shall be activated by unit mounted thermostat to maintain room temperature setpoint (60 deg F).

8. ALTERNATES

A. DESCRIPTION

Refer to the architectural portion of the specification for list of alternates. Applicable sections of the base specifications shall apply to all work required by the alternate unless otherwise specified. Determine whether or not and how each alternate affects work. Include labor, materials, equipment, and transportation services necessary for and incidental to the completion of work under each particular alternate. Furnish separate bid for each alternate applicable to work, stating the amount to be added or deducted from the base bid.

9. COMMISSIONING OF MECHANICAL SYSTEMS

Commissioning of HVAC System

A. PART 1 GENERAL

1.1 SUMMARY

a. Section includes Cx process requirements for the following HVAC systems, assemblies, and equipment:

1. Air handling units (Supply fans, return fan, packaged units, roof top units, specialized fans)
 2. Exhaust fans
 3. Fan coil units and terminal units
 4. Condensing units
 5. Make-Up air units
 6. Ductwork and piping
- b. Related Requirements:
1. Section 019113 "General Commissioning Requirements" for general Cx process requirement and CxA responsibilities.

1.2 INFORMATIONAL SUBMITTALS

a. Construction Checklists: Draft construction checklists will be created by CxA for Contractor review.

b. Construction Checklists: Installation and Performance test checklists for systems, assemblies, subsystems, equipment, and components to be part of the Cx process and according to requirement in Section 019113 "General Commissioning Requirement."

1. Refrigerant piping, including the following:
 - a. Refrigerant piping, fittings, and specialties.
 - b. Refrigerant charge.
 - c. General duty and specialty valves.
 - d. Meters and gauges.
2. Air distribution systems, including the following:
 - a. Supply, return, and exhaust systems.
 - b. Metal ducts, liners, and fittings.
 - c. Nonmetal ducts and fittings.
 - d. Air-duct accessories, including volume dampers, fire and smoke dampers, turning vanes, sound attenuators, and flexible connectors.
 - e. Duct-mounted access doors and panels.
3. Kitchen exhaust system, including the following:
 - a. Exhaust and makeup air system.
 - b. Metal ducts, liners, and fittings.
 - c. Air-duct accessories, including volume dampers, fire and smoke dampers, turning vanes, sound attenuators, and flexible connectors.
 - d. Duct-mounted access doors and panels.
 - e. Exhaust fans.
 - f. Make-Up air unit
4. Air-handling equipment, including the following:
 - a. Fans and motors.
 - b. Indoor air-handling units with and without coils, dampers, and filters.
 - c. Outdoor air-handling units with and without coils, dampers, and filters.

B. PART 3 EXECUTION

3.1 CONSTRUCTION CHECKLISTS

- a. Complete detailed construction checklists (prefunctional checklists) prepared by the CxA for HVAC systems, assemblies, subsystems, equipment, and components.
1. Air and hydronic distribution systems, including the following:
 - a. Supply, return, outdoor-air, and exhaust-air distribution systems.
 - b. Automatic dampers.
 - c. Control valves.
 2. Heating and cooling terminal and unitary equipment, including the following:
 - a. Unit heaters.
 - b. Fan coil units.
 - c. Electric heating.
 3. TAB verification.

3.2 CONSTRUCTION CHECKLIST REVIEW

- a. Review and provide written comments on draft construction checklists. CxA will create required draft construction checklists and provide item to Contractor.
- b. Return draft construction checklist review comments within 5 days of receipt.
- c. When review comments have been resolved, the CxA will provide final construction checklists marked "Approved for Use, (date)."
- d. Use only construction checklists marked "Approved for Use, (date)."

3.3 Cx TESTING PREPARATION

- a. Certify that HVAC systems, subsystems, and equipment have been installed, calibrated, and started and that they are operating according to the Contract Documents and approved submittals.
- b. Set systems, subsystems, and equipment into operating mode to be tested according to approved test procedures (for example, normal shutdown, normal auto position, normal manual position, unoccupied cycle, and alarm conditions).

3.4 Cx TESTS COMMON TO HVAC SYSTEMS

- a. Comply with construction checklist requirements, including installation checks, startup, and performance tests requirements for HVAC systems and equipment.
- b. Measure capacities and effectiveness of systems, assemblies, subsystems, equipment and components, including operational and control functions, to verify compliance with acceptance criteria.
- c. Coordinate schedule with, and perform Cx activities at the direction of CxA.
- d. Provide technicians, instrumentation, tools, and equipment to perform and document the following:
 1. Construction checklist verification tests.
 2. Construction checklist verification tests demonstrations
 3. Cx test demonstrations.

3.5 START-UP DOCUMENTATION COMMON TO ALL SYSTEMS

- a. The following Start-Up Documentation (Checklists and Tests) shall be considered common to all systems:
1. Checkout shall proceed from lower level devices to larger components to the entire system operation.
 2. Verify labeling is affixed per specification and visible.
 3. Verify prerequisite procedures are done.
 4. Inspect for damage and ensure none is present.
 5. Verify system is installed per the manufacturer's recommendations.
 6. Verify system has undergone Start-Up per the manufacturer's recommendations.
 7. Verify that access is provided for inspection, operation and repair.
 8. Verify that access is provided for eventual replacement of the equipment.
 9. Verify that record drawings, submittal data and O&M documentation accurately reflect the installed systems.
 10. Verify all gauges and test ports are provided as required by contract documents and manufacturer's recommendations.
 11. Verify all recorded nameplate data is accurate.
 12. Verify that the installation ensures safe operation and maintenance.
 13. Verify all rotating and moving parts are properly lubricated.
 14. Verify specified replacement material/stock has been provided as required by the Contract Documents.
 15. Verify all monitoring and ensure all alarms are active and set per requirements.

3.6 MECHANICAL IDENTIFICATION

- a. Include all applicable "Start-Up Checks Common to All Systems".
- b. Start-Up Checks: Perform the following checks:
 1. Verify all valve tags, piping, duct, and equipment labeling corresponds with drawings and indexes and meets requirements specified. Correct any deficiencies for all piping and duct system.
 2. Adjusting: Relocate any mechanical identification device which has become visually blocked by work of this division or other divisions.
 3. Cleaning: Clean face of identification devices, and glass frames of valve charts.

3.7 MECHANICAL INSULATION

- a. Include all applicable "Start-Up Checks Common to All Systems".
- b. Start-Up Checks: Examine all piping, systems and equipment specified to be insulated.
 1. Ensure quality of insulation. Patch and repair all insulation damaged after installation.
 2. Ensure the integrity of vapor barrier around all cold surfaces.

3.8 PIPING GENERAL

- a. Include all applicable "Start-Up Checks Common to All Systems".
- b. Start-Up Checks: These procedures apply to all installed piping systems, including underground site utilities.
 1. Inspect all piping for proper installation, adequate support (with appropriate vibration isolation where applicable) and adequate isolation valves for required service.
 2. Provide notifications of pipe cleaning and flushing activities.
 3. Flush and clean all piping and clean all strainers. Provide documentation of all related procedures.
 4. Ensure adequate drainage is provided at low points and venting is provided at high points.
 5. Ensure facilities to effectively drain and fill the system are in place.
 6. Ensure air is thoroughly removed from the system as applicable.
 7. Provide notification of pressure testing.
 8. Pressure and/or leak test all applicable systems in accordance with the requirements in the applicable Division 23 specification.
 9. Sterilize applicable piping systems as specified in the individual sections and as required by regulatory authorities.
 10. Submit pressure test reports that document the pressure testing results with certification of the results. Include drawings/diagrams indicating sections of pipe that are tested with the corresponding report.
 11. Set and adjust fill, pressure, or level controls to the required setting.

3.9 AC MOTORS

- a. Include all applicable "Start-Up Checks Common to All Systems".
- b. Start-Up Checks: Perform the following checks during start-up and as specified in manufacturer's instructions:
 1. Verify proper alignment, installation, and rotation.
 2. Verify properly sized overloads are in place.
- c. Start-Up Tests: Perform the following tests, measurements, or procedures during start-up and as specified in the manufacturer's instructions:
 1. Measure voltage available to all phases. Measure amps and RPM after motor has been placed in operation and is under load.
 2. Record all motor nameplate data.

3.10 PACKAGED HEATING AND COOLING UNITS

- a. Include all applicable "Start-Up Checks Common to All Systems".
- b. Refer to AC Motors in this section.
- c. General: Provide the services of a factory-authorized service representative to test and inspect unit installation, provide startup service, and to demonstrate and train Owner's maintenance personnel is required by the Owner.
- d. Start-Up Checks: Perform the following inspections/checks during start-up:
 1. Test controls and demonstrate compliance with requirements. Replace damaged or malfunctioning controls and equipment.
 2. Install new filters after start-up.

3.11 TERMINAL UNITS

- a. Include all applicable "Start-Up Checks Common to All Systems".
- b. Start-Up Checks: Perform the following inspections/checks during start-up:
 1. After construction is completed, including painting if applicable, clean unit exposed surfaces.
 2. Clean factory-finished surfaces. Repair any marred or scratches surfaces with manufacturer's touch-up paint.
 3. Verify adequate access for maintenance.
 4. Check power and control voltages.
 5. Check rotation of fan where applicable.
 6. Check operation of water leak sensors.
 7. Check calibration and operation of the controlling elements.
 8. Check control valves for required close-off and fail position.
 9. Install new filter units for terminals requiring same.

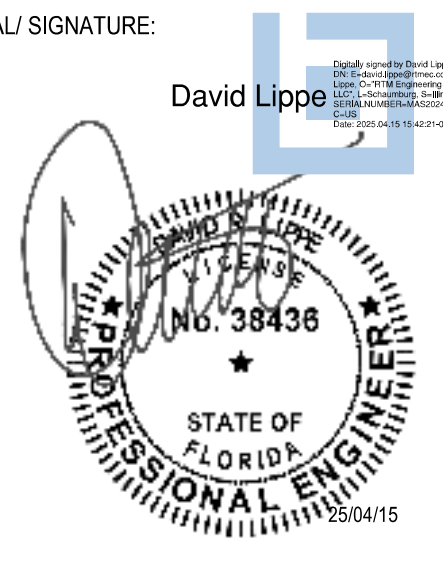
3.12 FANS

- a. Include all applicable "Start-Up Checks Common to All Systems".
- b. General: Provide the services of a factory-authorized service representative to test and inspect exhaust fan installation, provide startup service, and to demonstrate and train Owner's maintenance personnel is required by the Owner.
- c. Start-Up Checks: Perform the following inspections/checks during start-up:
 1. Inspect the field assembly of components and installation of the units, piping, ductwork, and electrical connections.
 2. Clean unit cabinet interiors to remove foreign material and construction dirt and dust. Vacuum clean fan wheel, fan cabinet, coils entering air face. Ensure volatile irritants are contained and kept out of occupied spaces.
 3. Adjust and lubricate dampers and linkages for proper damper operation.
 4. Verify the unit is secure on mountings and supporting devices and connections for ductwork, and electrical are complete. Verify proper thermal overload protection is installed in motors, starters, and disconnects.
 5. Ensure vibration isolation integrity is maintained with the fan installation and associated connections.
 6. Lubricate bearings, pulleys, belts, and other moving parts with factory-recommended lubricants.
 7. Stroke all dampers to ensure free and full travel.

3.13 DUCTWORK ACCESSORIES

- a. Include all applicable "Start-Up Checks Common to All Systems".
- b. Start-Up Checks: Perform the following checks during start-up and as specified:
 1. Cleaning: Clean factory-finished surfaces. Repair any marred or scratches surfaces with manufacturer's touch-up paint.
- c. Start-Up Tests: In addition to specifications, perform the following as a minimum:
 1. Operate installed ductwork accessories to demonstrate compliance with requirements. Test for air leakage while system is operating. Repair or replace faulty accessories, as required to obtain proper operation and leak proof performance.
 2. Label access doors in accordance with Division 21 Section "Mechanical Identification"
 3. Adjusting: Adjust ductwork accessories for proper settings, install fusible links in fire dampers and adjust for proper action.

END OF SECTION 23



NO.	BY	DATE	DESCRIPTION
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SHAKE SHACK JUPITER

6230 INDIANTOWN RD. SUITE 11,
JUPITER, FL 33409
SHACK #1715

100% SET

MECHANICAL
SPECIFICATIONS

DRAWN BY: RTM
CHECKED BY: RTM
PROJECT NO: 12427-25

M592

ROOFTOP UNIT CONTROL MATRIX

CONTROL FEATURE	UNITS	RTU-1 SETPOINT...	RTU-2 SETPOINT...	NOTES
CONTROL STRATEGY				
SPACE TEMPERATURE CONTROL		Y	Y	
HEATING AND COOLING SET POINTS				
COOLING MODE ENABLE - SPACE TEMPERATURE - OCCUPIED SETPOINT	"F DB	75	75	
COOLING MODE ENABLE - SPACE TEMPERATURE - UNOCCUPIED SETPOINT	"F DB	80	80	
COOLING - SUPPLY AIR TEMPERATURE SETPOINT	"F DB	55	55	
HEATING MODE ENABLE - SPACE TEMPERATURE - OCCUPIED SETPOINT	"F DB	70	70	
HEATING MODE ENABLE - SPACE TEMPERATURE - UNOCCUPIED SETPOINT	"F DB	60	60	
HEATING - SUPPLY AIR TEMPERATURE SETPOINT	"F DB	85	85	
DEAD BAND - MINIMUM HEATING AND COOLING TEMPERATURE SETPOINT DIFFERENCE	"F DB	5	5	
VENTILATION ONLY MODE ENABLE - OUTSIDE AIR TEMPERATURE	"F DB	55 < X < 75	55 < X < 75	
VENTILATION ONLY MODE - SUPPLY AIR TEMPERATURE SETPOINT	"F DB	N/A	N/A	Q
VENTILATION AIR HEATING/REHEAT CONTROL RESET - SUPPLY AIR TEMPERATURE SETPOINT	"F DB	65	65	N
DEHUMIDIFICATION MODE ENABLE - OUTSIDE AIR DEW POINT	"F DP	55	55	F
DEHUMIDIFICATION - COOLING COIL LEAVING AIR TEMPERATURE SETPOINT	"F DB	DYNAMIC	DYNAMIC	F
DEHUMIDIFICATION - REHEAT CONTROL - SUPPLY AIR TEMPERATURE SETPOINT	"F DB	70	70	F
PROGRAMMED CONTROL FEATURES				
HVAC SYSTEM OCCUPIED/UNOCCUPIED MODE - PROGRAMMABLE THERMOSTAT		Y	Y	B
OPTIMUM START SEQUENCE		Y	Y	
EQUIPMENT COMPONENTS, ACCESSORIES AND CONTROL FEATURES				
COOLING COIL (DX - MODULATING CAPACITY)		Y	Y	K
DEHUMIDIFICATION - MODULATING HOT GAS REHEAT		Y	Y	
HEATING - NATURAL GAS - MODULATING		Y	Y	K
RETURN AIR PATH WITH MOTORIZED RETURN AIR DAMPER FOR UNOCCUPIED OPERATION		Y	Y	D, T
OUTSIDE AIR DAMPER - MOTOR OPERATED		Y	Y	J, T
RELIEF EXHAUST AIR DAMPER - BAROMETRIC		Y	Y	N
RELIEF EXHAUST AIR DAMPER - MOTOR OPERATED		N	Y	J
OUTSIDE/SUPPLY AIR AIRFLOW MONITORING		Y	Y	F
REMOTE TEMPERATURE SENSOR		N	Y	B
REMOTE COMBINATION TEMPERATURE AND HUMIDITY SENSOR		Y	N	B
INTEGRATED ECONOMIZER - DIFFERENTIAL ENTHALPY ENABLE (OA ENTHALPY < RA ENTHALPY)	BTU/LB	Y	Y	U
SUPPLY FAN CONTROL METHODS				
ON DURING OCCUPIED MODE		Y	Y	
CYCLE WITH LOADS DURING UNOCCUPIED HOURS		Y	Y	
VARIABLE VOLUME - STAGED FAN CONTROL IN RESPONSE TO ACTIVE COOLING COIL STAGES		Y	Y	K, V
SAFETIES, INTERLOCKS, AND ALARMS				
GAS VALVE SAFETY		Y	Y	F
RETURN AIR SMOKE DETECTOR - SAFETY SHUTDOWN		Y	Y	E
LOW LIMIT FREEZE/STAT - FREEZE PROTECTION SAFETY SHUTDOWN		Y	Y	F
DIFFERENTIAL PRESSURE SWITCH - FILTER CHANGE ALARM		Y	Y	F
FIRE ALARM CONTROL PANEL - SAFETY SHUTDOWN INTERLOCK		Y	Y	S
OUTSIDE AIR DAMPER END SWITCH - SAFETY SHUTDOWN		Y	Y	S
KITCHEN EXHAUST SYSTEM INTERLOCK		Y	Y	L
DIV. 23 CONTRACTOR SHALL PROVIDE CONTROL PANEL(S), WIRING, THERMOSTAT(S), TEMPERATURE SENSOR(S), HUMIDISTAT(S), AND/OR CO2 SENSOR(S) WHERE SHOWN ON THE DRAWINGS AND AS REQUIRED TO FACILITATE THE SCHEDULED CONTROL MODULES AND SEQUENCES OF OPERATION. EACH UNIT SHALL CONTROL, BASED ON ITS OWN INTERNAL SAFETIES, TIME DELAYS, AND SEQUENCES UNLESS NOTED OTHERWISE. COORDINATE WITH OWNER FINAL BUILDING AND EQUIPMENT SCHEDULES DURING STARTUP. REFERENCE DIVISION SPECIFICATIONS FOR INDIVIDUAL DEVICE REQUIREMENTS.				

NOTES:
 B. DIVISION 23 CONTRACTOR SHALL PROVIDE DEVICE.
 D. DURING UNOCCUPIED OPERATION, EXHAUST AND OUTSIDE AIR DAMPERS SHALL CLOSE. THE RETURN AIR DAMPER SHALL OPEN TO PERMIT RECIRCULATION OF INDOOR AIR THROUGH UNIT.
 E. DIVISION 23 CONTRACTOR SHALL PROVIDE DEVICE.
 F. DEVICE SHALL BE FACTORY MOUNTED AND PRE-WIRED FOR OPERATION SUBJECT TO THE ONBOARD CONTROLLER.
 J. DAMPER SHALL BE CLOSED DURING UNOCCUPIED MODE.
 K. UNITARY CONTROLLER SHALL MODULATE AND/OR CYCLE SUPPLY FAN SPEED AND COIL CAPACITY SUBJECT TO THE INTERNAL SAFETIES AND SEQUENCES TO MAINTAIN SCHEDULED SETPOINTS.
 L. INTERLOCK RTU WITH KITCHEN EXHAUST HOOD SYSTEM(S) TO SHUT DOWN UPON SIGNAL FROM HOOD FIRE EXTINGUISHING SYSTEM. INTERLOCK RTU WITH KITCHEN EXHAUST FAN TO ENERGIZE WHEN HOOD SYSTEM IS ENERGIZED FOR PRESSURIZATION.
 N. UNITS THAT PROVIDE VENTILATION AIR TO MULTIPLE ZONES AND OPERATE IN CONJUNCTION WITH ZONE HEATING AND COOLING SYSTEMS SHALL NOT USE HEATING OR HEAT RECOVERY TO WARM SUPPLY AIR TO A TEMPERATURE GREATER THAN VALUE INDICATED WHEN THE OUTSIDE AIR TEMPERATURE EXCEEDS 75F.
 Q. VENTILATION ONLY MODE PROVIDES OUTSIDE AIR DIRECTLY TO SPACE WITHOUT HEATING OR COOLING WHEN OUTDOOR... ARE FAVORABLE. VENTILATION ONLY MODE CAN BE INTERRUPTED ON A CALL FOR DEHUMIDIFICATION.
 S. PROVIDE END SWITCH ON THE OUTSIDE AIR DAMPER AND INTERLOCK THE SWITCH WITH THE SUPPLY FAN TO KEEP IT FROM STARTING IF END SWITCH IS NOT MADE.
 T. DURING UNOCCUPIED OPERATION, OUTSIDE AIR DAMPERS SHALL CLOSE AND RETURN AIR DAMPER SHALL MODULATE...
 U. IF SETPOINT VALUE IS LISTED, IT INDICATES ECONOMIZER HIGH-LIMIT SHUTOFF. UNIT SHALL BE IN ECONOMIZER IF CONDITIONS ARE LESS THAN SETPOINT. THE UNIT SHALL DETERMINE ECONOMIZER ON POINT.
 V. OUTSIDE AIR TEMPERATURE; DIVISION 23 PROVIDED AS PART OF ECONOMIZER CONTROL MODULE. RETURN AIR TEMPERATURE; DIVISION 23 PROVIDED AS PART OF ECONOMIZER CONTROL MODULE. OUTSIDE AIR HUMIDITY; DIVISION 23 PROVIDED AS PART OF ECONOMIZER CONTROL MODULE. RETURN AIR HUMIDITY; DIVISION 23 PROVIDED AS PART OF ECONOMIZER CONTROL MODULE.
 W. PROVIDE STAGED FAN CONTROL WITH MINIMUM 2 FAN SPEEDS. LOW SPEED SHALL NOT EXCEED 66% OF FULL SPEED AND SHALL DRAW NO MORE THAN 40% OF FAN POWER AT FULL SPEED.

AIR CURTAIN SCHEDULE

MARK	SERVICE AREA	MANUFACTURER	MODEL	UNIT SPECS				V/PH/Hz	NOTES
				LENGTH (IN)	MAX. AIRFLOW	HEATING CAPACITY (KW)	MOTOR		
AC-1	SERVICE ENTRY	MARS	STD2	36	1379	N/A	1/2	115/1	A-F

MODEL NUMBERS SHALL NOT BE CONSIDERED COMPLETE AND MATERIAL SHALL NOT BE ORDERED BY MANUFACTURER AND MODEL NUMBERS ONLY. REVIEW THE COMPLETE DESCRIPTION, NOTES AND SPECIFICATIONS TO DETERMINE THE EXACT MATERIAL AND ACCESSORIES TO BE ORDERED. THE MANUFACTURERS LISTED ARE THE BASIS FOR THE DESIGN.

NOTES:
 A. EQUIPMENT FURNISHED AND INSTALLED PER THE RESPONSIBILITY SCHEDULE. REF ARCHITECTURAL DRAWINGS.
 B. MOUNT UNIT PER MANUFACTURER'S RECOMMENDATIONS TO FACE OF WALL AND SUPPORT VERTICALLY.
 C. PROVIDE INTEGRAL STARTER AND DISCONNECT SWITCH.
 D. REFER TO SEQUENCE OF OPERATION FOR UNIT CONTROLS.
 E. PROVIDE AIR CURTAIN WITH NORMALLY CLOSED DOOR LIMIT SWITCH FOR INSTALLATION ON DOOR. THE AIR CURTAIN SHALL ENERGIZE WHEN DOOR OPENS.
 F. PROVIDE WITH DELAY MICROSWITCH WITH ADJUSTABLE DELAY TIMERS PRE MOUNTED IN THE AIR CURTAIN CONTROL PANEL.
 G. PROVIDE WITH INTEGRAL THERMOSTAT.

Project Design Conditions

CLIMATE CONDITIONS				BUILDING OPERATING HOURS:			
WEATHER STATION: JUPITER, FL, USA				MONDAY-FRIDAY: TBD BY OWNER			
CLIMATE ZONE: 1A				SATURDAY: TBD BY OWNER			
HEATING (DB): 99.6% 44.6 °F				SUNDAY: TBD BY OWNER			
COOLING (DB/MCW/B): 0.4% 91.8 °F/ 77.8 °F				HOLIDAY: TBD BY OWNER			

SPACE/UNIT DESCRIPTION	SET POINTS										SPACE OPERATING HOURS			NOTES
	COOLING/DE-HUMIDIFICATION			HEATING		HUMIDIFICATION		ZONE VENTILATION RESET			OCCUPIED/UNOCCUPIED			
	OCC	UNOCC	MAX RH %	OCC	UNOCC	MIN RH %	MAX RH %	CONTROL METHOD	BASE PPM	MAXIMUM PPM	M-F	SAT	SUN	
DINING AREAS	75	80	50%	NA	70	60	NA	NA	NA	NA	TBD	TBD	TBD	A, B, C
OFFICES	75	80	50%	NA	70	60	NA	NA	NA	NA	TBD	TBD	TBD	A, B, C
MECHANICAL ROOM	NA	NA	NA	NA	70	60	NA	NA	NA	NA	TBD	TBD	TBD	A, B, C
KITCHEN/BOH	75	80	50%	NA	70	60	NA	NA	NA	NA	TBD	TBD	TBD	A, B, C

NOTES:
 A. ZONE LEVEL SET POINT CONDITIONS SHALL BE AS SCHEDULED UNLESS OTHERWISE SCHEDULED OR NOTED ON THE DRAWINGS FOR ROOM SPECIFIC SPACE CONDITIONS.
 B. ZONE LEVEL OCCUPANCY HOUR SCHEDULE SHALL BE PER BUILDING OPERATING HOURS UNLESS OTHERWISE SCHEDULED.
 C. ZONE LEVEL CONTROLS SHALL BE CAPABLE OF OPERATING WITH INDEPENDENT OTHERWISE SCHEDULES.

FAN SCHEDULE

MARK	SERVICE	MANUFACTURER	MOUNTING	MODEL	CFM	ESP (IN)	DRIVE	MIN HP	FAN RPM	VFD (Y/N)	ELECTRICAL			NOTES
											V/PH	DISC.	STARTER	
EF-1	TOILETS	GREENHECK	ROOF	G-097-VG	150	0.5	DIRECT	1/4	1236	N	120/1	NF	COMBI	A-E

MODEL NUMBERS SHALL NOT BE CONSIDERED COMPLETE AND MATERIAL SHALL NOT BE ORDERED BY MANUFACTURER AND MODEL NUMBERS ONLY. REVIEW THE COMPLETE DESCRIPTION, NOTES AND SPECIFICATIONS TO DETERMINE THE EXACT MATERIAL AND ACCESSORIES TO BE ORDERED. THE MANUFACTURERS LISTED ARE THE BASIS FOR THE DESIGN.

NOTES:
 A. EQUIPMENT FURNISHED AND INSTALLED PER THE RESPONSIBILITY SCHEDULE. REF ARCHITECTURAL DRAWINGS.
 B. PROVIDE WITH MINIMUM 12" HIGH ROOF CURB, BIRDSGREEN AND BACKDRAFT DAMPER.
 C. PROVIDE FACTORY MOUNTED DISCONNECT SWITCH.
 D. INTERLOCK FAN OPERATION WITH TIME CLOCK.
 E. PROVIDE WITH MANUFACTURER'S FAN SPEED CONTROLLER FOR BALANCING PURPOSES.

OUTSIDE AIR REQUIREMENTS, IMC-2018 (IP)

SYSTEM DESIGNATION	SYSTEM TAB NAME OR LIST SINGLE	SINGLE-ZONE SYSTEM ASSOCIATED VENTILATION ZONE	SINGLE ZONE WORST CASE ZONE AIR DISTRIBUTION EFFECTIVENESS [Ez]	SYSTEM VENTILATION EFFICIENCY [Ev]	FLOOR AREA SERVED BY SYSTEM [As] (SF)	SYSTEM AVERAGED AREA-BASED OUTDOOR AIR RATE (CFM/SF)	SYSTEM POPULATION [Ps] (PEOPLE)	SYSTEM AVERAGED PEOPLE-BASED OUTDOOR AIR RATE (CFM/PP)	REQUIRED OA INTAKE FLOW [Vot] (CFM)	REQUIRED DCV OA INTAKE FLOW [Vot] (CFM)	DESIGN OA INTAKE FLOW [Vot] (CFM)	NOTES
RTU 1	MULTIZONE (RTU 1)	-	-	0.94	1,235	0.153	58	7.50	661	N/A	900	ALL
RTU 2	MULTIZONE (RTU 2)	-	-	0.99	1,395	0.120	12	7.50	261	N/A	2,000	ALL
FCU 1	SINGLE ZONE	OFFICE	0.80	-	75	0.060	2	5.00	18	N/A	40	ALL
TOTALS									941	0	2,940	

GENERAL NOTES:
 1. VENTILATION CALCULATIONS BASED ON IMC-2018.
 2. SYSTEM POPULATIONS BASED ON MAX SEATING AND/OR CODE MAXIMUM VALUES.
 3. SINGLE ZONE SYSTEMS (Vot = Voz): SYSTEM VENTILATION EFFICIENCY CALCULATION IS NOT REQUIRED FOR SINGLE ZONE SYSTEMS. WORST CASE AIR DISTRIBUTION EFFECTIVENESS BETWEEN HEATING AND COOLING MODES OF OPERATION IS SHOWN IN TABLE.
 4. 100% OA SYSTEMS (Vot = 2.0x zones Voz): WHEN ONE AIR HANDLER SUPPLIES ONLY OUTDOOR AIR TO ONE OR MORE ZONES, EACH ZONE IS INDIVIDUALLY CALCULATED WITH ITS WORST CASE ZONE AIR DISTRIBUTION EFFECTIVENESS (HEATING/COOLING).
 5. MULTI-ZONE RECIRCULATING SYSTEMS: CALCULATOR USED TO DETERMINE VENTILATION AIRFLOW IN COMPLIANCE WITH IMC-2018 VRP AND ASHRAE 62.1-2016 APPENDIX A. VENTILATION RATE SHOWN IS ACTUAL CALCULATED WITH CORRECTION FACTORS INCLUDED. EACH ZONE IS CALCULATED WITH ITS WORST CASE ZONE AIR DISTRIBUTION EFFECTIVENESS (HEATING/COOLING) AS PART OF CALCULATIONS TO FIND EV.

FAN COIL UNIT SCHEDULE (HEAT PUMP)

MARK	MFR	MODEL	SUPPLY FAN				COOLING COIL				HEAT PUMP HEATING COIL				MIN O/A (CFM)	ELECTRICAL			WEIGHT (LBS)	NOTES			
			CFM	ESP (IN)	NOM HP	TH (MBH)	SH (MBH)	EAT (°F DB)	LAT (°F WB)	REFR TYPE	MIN OUT (MBH)	AMBIENT (DB)	EAT (°F DB)	LAT (°F DB)		V/PH	MCA	MOCP			DISC TYPE		
																						REFR TYPE	MIN OUT (MBH)
FCU-1	CARRIER	40MBCQ18	420	0.025	0.061	10.6	9.1	76.8	63.9	57.0	55.5	R410A	9.2	13.8	64.6	85	40	208/1	N/A	N/A	NF	45	A - J

*EQUIPMENT SHALL BE OBTAINED THROUGH SHAKE SHACK NATIONAL ACCOUNT. REFER TO T002 / VENDOR LIST FOR MORE INFORMATION. MODEL NUMBERS SHALL NOT BE CONSIDERED COMPLETE AND MATERIAL SHALL NOT BE ORDERED BY MANUFACTURER AND MODEL NUMBERS ONLY. REVIEW THE COMPLETE DESCRIPTION, NOTES AND SPECIFICATIONS TO DETERMINE THE EXACT MATERIAL AND ACCESSORIES TO BE ORDERED. THE MANUFACTURERS LISTED ARE THE BASIS FOR THE DESIGN.

NOTES:
 A. EQUIPMENT FURNISHED AND INSTALLED PER THE RESPONSIBILITY SCHEDULE. REF ARCHITECTURAL DRAWINGS.
 B. ASSOCIATED CONDENSING UNIT SHALL BE BY THE SAME MANUFACTURER.
 C. FOR COOLING, EQUIPMENT SIZED FOR 95°F AMBIENT TEMPERATURE. HEAT PUMP HEATING CAPACITY BASED ON AMBIENT TEMPERATURE LISTED.
 D. PROVIDE UNIT WITH CLEANABLE AIR FILTERS.
 E. PROVIDE WITH 7-DAY PROGRAMMABLE THERMOSTAT WITH STAGED HEATING AND COOLING CAPABILITY AS REQUIRED FOR OPERATION OF HEATING AND COOLING CONTROLS.
 F. PROVIDE FACTORY MOUNTED STARTER AND DISCONNECT SWITCH INSTALLED ON SERVICE SIDE OF UNIT.
 G. PROVIDE SINGLE POINT POWER CONNECTION.
 H. PROVIDE WITH SPRING VIBRATION ISOLATION AND ALL-TYPING HANGING RODS.
 J. REFERENCE PLUMBING PLANS FOR CONDENSATE DRAIN PIPING FROM UNIT.

BUILDING AIR BALANCE SUMMARY NORMAL OPERATION

UNIT NO.	SUPPLY (CFM)	OUTDOOR (CFM)	EXHAUST (CFM)	PERCENT O/A/S/A
RTU-1	2000	800	--	40%
RTU-2	3000	1500	--	50%
FCU-1	420	40	--	10%
KEF-1	--	--	1,188	--
KEF-2	--	--	860	--
EF-1	--	--	150	--
TOTALS	5420	2340	2,198	--
TOTAL AIRFLOW AVAILABLE FOR PRESSURIZATION (CFM)				142
PERCENT POSITIVE PRESSURIZATION				6%

BUILDING AIR BALANCE SUMMARY ECONOMIZER MODE

UNIT NO.	SUPPLY (CFM)	OUTDOOR (CFM)	EXHAUST (CFM)	PERCENT O/A/S/A
RTU-1	2,830	2,830	--	100%
RTU-2	4,050	4,050	--	100%
FCU-1	420	40	--	10%
KEF-1	--	--	1,188	--
KEF-2	--	--	860	--
EF-1	--	--	150	--
RELIEF RTU-1	--	--	1,800	--
RELIEF RTU-2	--	--	2,490	--
TOTALS	7,300	6,920	7,023	--
TOTAL AIRFLOW AVAILABLE FOR PRESSURIZATION (CFM)				430
PERCENT POSITIVE PRESSURIZATION				6.2%

ROOFTOP UNIT SCHEDULE (DX COOLING, HEAT PUMP)

MARK	MANUFACTURER	MODEL	NOMINAL TONS	UNIT TYPE	SUPPLY FAN				COOLING COIL				GAS HEAT				ELECTRICAL			WEIGHT (LBS)	NOTES									
					CFM	ESP (IN)	HP	VFD (Y/N)	TH (MBH)	SH (MBH)	EAT		REFR TYPE	MIN EFF (IEER)	MIN NO STAGES	GAS TYPE	INPUT (MBH)	OUTPUT (MBH)	TEMP RISE (°F)			GAS PRESSURE (IN. W.C.)	LAT (°F DB)	MAX TEMP RISE	COP	MIN O/A CFM	V/PH	MCA	MOCP	DISC TYPE
											(°F DB)	(°F WB)																		
RTU-1	CAPTIVEAIRE	CAS-HVAC14-100-18-10T	10	SINGLE ZONE	2000	1.0	2.0	Y	118.0	68.2	81.7	69.5	50.4	49.9	R454B	14.8	3	NATURAL	70.67	57.24	26	7-14		800	208/3	55.1	60	FUSED	1490	A-O
RTU-2	CAPTIVEAIRE	CAS-HVAC34-150-24-15T	15	SINGLE ZONE	3000	1.0	5.0	Y	204.1	113.8	83.4	71.0	48.5	48.4	R454B	18.8	3	NATURAL	118.81	96.23	29	7-14		1500	208/3	74.2	80	FUSED	2558	A-O

*EQUIPMENT FURNISHED AND INSTALLED PER THE RESPONSIBILITY SCHEDULE. REF ARCHITECTURAL DRAWINGS. EQUIPMENT SHALL BE OBTAINED THROUGH SHAKE SHACK NATIONAL ACCOUNT. REFER TO T.12 / VENDOR LIST FOR MORE INFORMATION. MODEL NUMBERS AND NOMINAL TONS LISTED SHALL NOT BE CONSIDERED COMPLETE AND MATERIAL SHALL NOT BE ORDERED BY MANUFACTURER, MODEL NUMBERS, OR NOMINAL TONS ONLY. REVIEW THE COMPLETE DESCRIPTION, NOTES AND SPECIFICATIONS TO DETERMINE THE EXACT MATERIAL AND ACCESSORIES TO BE ORDERED. THE MANUFACTURERS LISTED ARE THE BASIS FOR THE DESIGN.

NOTES:
 A. REFER TO ROOFTOP UNIT CONTROL MATRIX FOR CONTROL FEATURES, MODULES, AND ACCESSORIES THAT SHALL BE PROVIDED WITH THE EQUIPMENT.
 B. EQUIPMENT SIZED FOR 100°F AMBIENT TEMPERATURE.
 C. PROVIDE 2" MERV 8, EFFICIENT PLEATED THROWAWAY AIR FILTERS.
 D. PROVIDE FACTORY MOUNTED DISCONNECT INSTALLED ON SERVICE SIDE OF UNIT.
 E. STARTERS FOR ALL MOTORS SHALL BE FURNISHED INTEGRAL WITH UNIT.
 F. PROVIDE SINGLE POINT POWER CONNECTION.
 G. COORDINATE SIZE OF CONDUCTOR TERMINATION LUGS WITH CONDUCTOR SIZES SHOWN ON ELECTRICAL DRAWINGS.
 H. PROVIDE 125 VAC, 20 AMP DUPLEX CONVENIENCE RECEPTACLE MOUNTED TO UNIT READY FOR FIELD WIRING WITH A COVER UL LISTED FOR WET AND DAMPER LOCATIONS WHEN IN USE.
 I. SPECIFIED FAN ESP ACCOUNTS FOR DUCT LOSSES EXTERNAL TO UNIT.
 J. PROVIDE MOTOR HORSEPOWER TO OVERCOME INTERNAL UNIT STATIC PRESSURE DROP PLUS SPECIFIED EXTERNAL STATIC PRESSURE DROP. NOMINAL MOTOR HP SHALL BE NO LARGER THAN THE FIRST AVAILABLE NOMINAL MOTOR SIZE GREATER THAN THE REQUIRED BHP.
 K. PROVIDE INSULATED ROOF CURB WITH MINIMUM HEIGHT REQUIRED TO MAINTAIN BOTTOM OF EQUIPMENT A MINIMUM OF 14 INCHES ABOVE FINISHED ROOF SLOPE. PROVIDE SLOPED CURB IF NEEDED TO MATCH ROOF SLOPE. COORDINATE WITH ROOF INSULATION THICKNESS AND ROOF TAPER AT INSTALLED LOCATION. COORDINATE CURB TYPE WITH DRAWINGS.
 L. SCHEDULED WEIGHT IS THE MAXIMUM ALLOWABLE OPERATING WEIGHT OF THE EQUIPMENT ONLY.
 M. COOLING COIL LAT IS LEAVING AIR TEMPERATURE OF COIL.
 N. PROVIDE GUARDS TO PROTECT CONDENSER COIL FROM HAIL OR OTHER DAMAGE.
 O. PROVIDE HEATER TO MEET OR EXCEED SCHEDULED MINIMUM MBH OUTPUT. NOMINAL INPUT IS BASED ON LISTED MANUFACTURER'S STANDARD PRODUCT. COORDINATE EQUIPMENT GAS LOAD WITH PLUMBING CONTRACTOR IF DIFFERENT FROM THAT SCHEDULED. MEET MINIMUM EFFICIENCY SCHEDULED.

5310 E HIGH STREET SUITE 350
 PHOENIX, AZ 85054
 T 480.448.6250
 WWW.SARGARCH.COM

CONSULTANTS:

14001 Quorum Drive | Suite 900 | Dallas, TX 75244
 P 972.967.0000 | www.rtm.com

SEAL SIGNATURE: David Lippe

SHAKE SHACK

SHAKE SHACK JUPITER
 6230 INDIANTOWN RD. SUITE 11,
 JUPITER, FL 33409
 SHACK #1715
 100% SET

MECHANICAL SCHEDULES

DRAWN BY: RTM
 CHECKED BY: RTM
 PROJECT NO: 12427-25

M601

COMcheck Software Version COMcheckWeb
Mechanical Compliance Certificate

Project Information

Energy Code: 2021 IECC
 Project Title: Shake Shack Jupiter, FL
 Location: Jupiter, Florida
 Climate Zone: 1a
 Project Type: Alteration

Construction Site:
 6230 W. Indiantown Road, Suite 11
 Jupiter, Florida 33458
 Owner/Agent: Design/Contractor

Mechanical Systems List

Quantity System Type & Description

- HVAC System (Single Zone)**
 Heating: 1 each - Central Furnace, Gas, Capacity = 71 kBtu/h
 Proposed Efficiency = 80.00% CL, Required Efficiency = 80.00% CL or 80% AFUE
 Cooling: 1 each - Single Package DX Unit, Capacity = 118 units, air-cooled condenser, unknown economizer
 Proposed EER = 11.00 EER, Required EER = 11.00 EER
 Proposed Part Load Efficiency = 14.00 IEER, Required Part Load Efficiency = 14.00 IEER
 ESP System: HVAC SYSTEM 1 - Compliance (Motor nameplate HP and fan efficiency method): Passes
 Fans: FAN 1 Supply, 1 each - Volume, 3000 CFM, 2.0 motor hp replace hp, 0.00 fan energy index, for exception: Part of code listed equipment
- HVAC System (Single Zone)**
 Heating: 1 each - Central Furnace, Gas, Capacity = 115 kBtu/h
 Proposed Efficiency = 80.00% CL, Required Efficiency = 80.00% CL or 80% AFUE
 Cooling: 1 each - Single Package DX Unit, Capacity = 104 units, air-cooled condenser, unknown economizer
 Proposed EER = 10.80 EER, Required EER = 10.80 EER
 Proposed Part Load Efficiency = 14.00 IEER, Required Part Load Efficiency = 14.00 IEER
 ESP System: HVAC SYSTEM 2 - Compliance (Motor nameplate HP and fan efficiency method): Passes
 Fans: FAN 2 Supply, 1 each - Volume, 3000 CFM, 5.0 motor hp replace hp, 0.00 fan energy index, for exception: Part of code listed equipment
- HVAC System (Single Zone)**
 Split System Heat Pump
 Heating: 1 each - Capacity = 9 kBtu/h
 Proposed Efficiency = 7.50 EER2
 Cooling: 1 each - Capacity = 10 kBtu/h
 Proposed Efficiency = 14.30 SEER2, Required Efficiency = 14.30 SEER2
 Proposed Part Load Efficiency = 6.00, Required Part Load Efficiency = 6.00
 ESP System: FAN SYSTEM 3 - Compliance (Motor nameplate HP and fan efficiency method): Passes
 Fans: FAN 3 Supply, 1 each - Volume, 420 CFM, 0.1 motor hp replace hp, 0.00 fan energy index, for exception: Part of code listed equipment
- Water Heater:**
 Gas Water Heater, Capacity: 1 gallons, Input Rating: 199 kBtu/h
 No minimum efficiency requirements apply.

Project Title: Shake Shack Jupiter, FL
 Report Date: 04/15/25
 Data Filename: Page 2 of 9

Section # & ReqID	Plumbing Rough-in Inspection	Complies?	Comments/Assumptions
C404.3, C404.5.1, C404.7, PLU.1	Heated water supply piping conforms to applicable code requirements. Refer to section details.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Applicable	

Additional Comments/Assumptions:

Project Title: Shake Shack Jupiter, FL
 Report Date: 04/15/25
 Data Filename: Page 4 of 9

Mechanical Compliance Statement

Compliance Statement: The proposed mechanical alterations project represents in this document is consistent with the building code requirements, and other calculations submitted with this permit application. The proposed mechanical systems have been designed to meet the 2021 IECC requirements in COMcheckWeb and to comply with any applicable mandatory requirements listed in the inspection checklist.

Name: David R. Lippe, P.E.
 Date: 04/15/2025

Project Title: Shake Shack Jupiter, FL
 Report Date: 04/15/25
 Data Filename: Page 2 of 9

Section # & ReqID	Mechanical Rough-in Inspection	Complies?	Comments/Assumptions
C402.2.6 (MEC11)	Thermally ineffective panel surfaces of walls and ceilings shall have a minimum R-value of 5.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Applicable	
C403.12.3 (MEC51)	HVAC duct insulation shall be installed in accordance with Table C403.12.3. Insulation exposed to weather is protected from damage and is provided with a minimum thermal resistance.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Applicable	
C403.8.4 (ME142)	Motors for fans that are not less than 1/2 hp and less than 1 hp are electronically commutated motors or have a minimum motor efficiency of 70 percent. Transformers have the minimum efficiency listed.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Applicable	
C403.8.6 (ME143)	Each DX cooling system > 65 kBtu/h shall be a refrigerant direct cooling system with fan > 1/4 hp are designed to vary the fan fan airflow or fan speed and shall comply with detailed requirements of this section.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Applicable	
C403.9 (ME144)	Large diameter fans where installed shall be tested and labeled in accordance with ASHRAE 250.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Applicable	
C403.13.3 (ME711)	Systems that heat outside the building envelope are radiant heat systems controlled by an occupancy sensing device or smart switch.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Applicable	
C403.3 (ME55)	HVAC equipment efficiency verified.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Applicable	Site has approved system for the values
C403.2.2 (ME50)	Natural or mechanical ventilation is provided in accordance with International Mechanical Code Chapter 4. Mechanical ventilation has a minimum outdoor air supply to the room per IMC Chapter 4.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Applicable	
C403.7.1 (ME50)	Demand control ventilation provided for spaces > 100 sq ft and > 10 people/1000 ft ³ occupant density and served by systems with air side economizers. Demand control ventilation air damper control, or design airflow > 3,000 cfm.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Applicable	
C403.7.2 (ME11)	Outdoor parking garage ventilation has a minimum volumetric flow rate and capacity to serve its available area is 50% or less of design capacity.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Applicable	
C403.7.6 (ME141)	HVAC systems serving guestrooms in hotels and inns shall be designed to provide outdoor air to guestrooms. Outdoor air systems shall be provided with controls that automatically maintain temperature setpoint and ventilation flow sections C403.7.6.1 and C403.7.6.2.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Applicable	

Project Title: Shake Shack Jupiter, FL
 Report Date: 04/15/25
 Data Filename: Page 5 of 9

COMcheck Software Version COMcheckWeb
Inspection Checklist
 Energy Code: 2021 IECC

Requirements: 0.0% 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 licensed in a separate table, a reference to that table is provided.

Section # & ReqID	Plan Review	Complies?	Comments/Assumptions
C403.2 (PR1)	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the mechanical and service water heating systems and document any exceptions to the standard are claimed, including calculations per applicable engineering standards and handbooks. Not water system design per manufacturer's design guide.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Applicable	

Additional Comments/Assumptions:

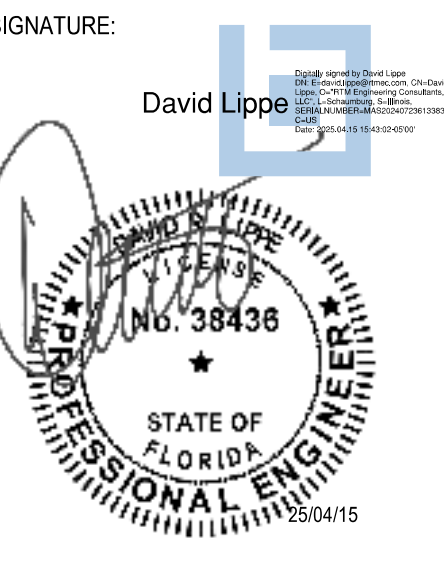
Project Title: Shake Shack Jupiter, FL
 Report Date: 04/15/25
 Data Filename: Page 3 of 9

Section # & ReqID	Mechanical Rough-in Inspection	Complies?	Comments/Assumptions
C403.7.4 (ME57)	Exhaust air energy recovery on systems meeting Table C403.7.4(1) and C403.7.4(2).	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Applicable	
C403.7.5 (ME136)	Kitchen exhaust systems comply with requirements for air and water supply air limitations, and supply hood duct requirements and maintain mechanical clearances.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Applicable	
C403.12.3 (ME60)	HVAC ducts and plenums installed in accordance with Table C403.12.3 and C403.12.2. Verification may need to include testing for leakage, ingress, or.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Applicable	
C403.4.1 (ME59)	Heating for vestibules and air curtains with integral heating be with automatic controls that shut off the heating system when outdoor air temperatures are 45F. Variable heating and cooling systems controlled by a thermostat in the vestibule with temperature setpoint = 45F and cooling setpoint = 80F.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Applicable	
C403.3.3 (ME70)	Hot gas bypass limited to less than 340 kBtu/h (30% > 340 kBtu/h, 20%.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Applicable	
C403.2.2 (ME59)	Air circulation control devices have means for air balancing.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Applicable	
C403.11.3 (ME59)	Refrigerated display cases, walk-in coolers or walk-in freezers, served by remote compressors and remote condensers shall have fan powered condensers that comply with sections C403.11.3.1 and refrigeration compressors systems that comply with C403.11.3.2.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Applicable	

Additional Comments/Assumptions:

Project Title: Shake Shack Jupiter, FL
 Report Date: 04/15/25
 Data Filename: Page 6 of 9

5310 E HIGH STREET SUITE 350
 PHOENIX, AZ 85054
 T: 480.448.6250
 WWW.SARGARCH.COM



NO.	BY	DATE	DESCRIPTION
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SHAKE SHACK JUPITER

6230 INDIANTOWN RD. SUITE 11,
 JUPITER, FL 33409
 SHACK #1715

100% SET

MECHANICAL ENERGY
 CODE COMPLIANCE

DRAWN BY: RTM
 CHECKED BY: RTM
 PROJECT NO: 12427-25

M630

Section # & Req.ID	Rough-in Electrical Inspection	Complies?	Comments/Assumptions
C405.7 (L124)	Low-voltage drive-type motor branch circuit breakers 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	
C405.8 (L127)	Electric motors meet the minimum efficiency requirements of Tables C405.7(a) through (c). VFDs are efficiently vented through a certified program or the equipment efficiency ratings shall be provided by motor manufacturer. Where an efficiency program does not exist.	<input type="checkbox"/> Complies <input type="checkbox"/> Does not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
C405.9.1 (L128)	Escalator and moving walkway comply with ASME A17.1-2014 and have automatic controls configured to reduce speed to the minimum permitted speed in accordance with ASME A17.1-2014 and stop the 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	
C405.10 (F129)	Total voltage drop across the conductors of feeders and branch circuits ≤ 3%.	<input type="checkbox"/> Complies <input type="checkbox"/> Does not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
C405.1.1 (F110)	All heat, 90% of cooling unit permanently installed lighting shall have lamp efficacy ≥ 60 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	
C405.11 (L111)	90% of 120V and receptacles installed in enclosed offices, conference rooms, copy rooms, break rooms, classrooms and restrooms and ≥ 25% of branch circuit receptacles for ready-to-use areas will have automatic receptacle controls 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	

Additional Comments/Assumptions:

1 | High Impact (Tier 1) | 2 | Medium Impact (Tier 2) | 3 | Low Impact (Tier 3)

Project Title: Shake Shack - Jupiter, FL
 Date of Issue: Report Date: 04/15/25
 Page: 7 of 9

Section # & Req.ID	Final Inspection	Complies?	Comments/Assumptions
C406.2.5 (F18)	Final 90-day manuals for HVAC systems, within 90 days of system acceptance.	<input type="checkbox"/> Complies <input type="checkbox"/> Does not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
C403.1.1 (F20)	HVAC systems and equipment design loads, calculated in accordance with ASHRAE 90.1 CA Standard 188 or by an approved equivalent computer program.	<input type="checkbox"/> Complies <input type="checkbox"/> Does not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
C403.1.1 (F21)	HVAC systems and equipment, especially those with oversized calculated loads.	<input type="checkbox"/> Complies <input type="checkbox"/> Does not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
C403.4.1 (F12)	Heating and cooling to each zone is controlled by a thermostat control minimum zone humidity control device per local code.	<input type="checkbox"/> Complies <input type="checkbox"/> Does not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
C403.4.1 (F12)	Thermostats controls prevent equipment electrical shutdown heat from turning on when not needed.	<input type="checkbox"/> Complies <input type="checkbox"/> Does not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
C403.4.1 (F12)	Thermostatic controls have a 5°F deadband.	<input type="checkbox"/> Complies <input type="checkbox"/> Does not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
C403.4.1 (F12)	Temperature controls have separate controls for cooling.	<input type="checkbox"/> Complies <input type="checkbox"/> Does not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
C403.4.2 (F19)	Each zone equipped with setback controls using a timer or time clock or programmable control system.	<input type="checkbox"/> Complies <input type="checkbox"/> Does not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
C403.4.2 (F19)	Automatic controls setback to 55°F thermal and 51°F thermal 7 day clock > hour occupancy over 10-hour.	<input type="checkbox"/> Complies <input type="checkbox"/> Does not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
C403.4.2 (F19)	Systems include optimum start controls.	<input type="checkbox"/> Complies <input type="checkbox"/> Does not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
C404.3 (F111)	Heat traps installed on supply and discharge piping of non-refrigerating systems.	<input type="checkbox"/> Complies <input type="checkbox"/> Does not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	

1 | High Impact (Tier 1) | 2 | Medium Impact (Tier 2) | 3 | Low Impact (Tier 3)

Project Title: Shake Shack - Jupiter, FL
 Date of Issue: Report Date: 04/15/25
 Page: 8 of 9

Section # & Req.ID	Final Inspection	Complies?	Comments/Assumptions
C406.1.1 (F15)	Building operations and maintenance documents will be provided to the owner. Documents will cover manufacturer's instruction, specifications, programming procedures and means of installation, maintenance, and operation.	<input type="checkbox"/> Complies <input type="checkbox"/> Does not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
C406.2.1 (F20)	Commissioning plan developed by registered design professional or approved agency.	<input type="checkbox"/> Complies <input type="checkbox"/> Does not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
C406.2.3 (F15)	HVAC equipment, systems and systems to systems, including have been tested to ensure proper operation.	<input type="checkbox"/> Complies <input type="checkbox"/> Does not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
C406.2.3 (F16)	HVAC and service water heating systems have been tested to ensure proper operation, calibration and adjustment of controls.	<input type="checkbox"/> Complies <input type="checkbox"/> Does not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
C406.2.4 (F20)	Final commissioning report completed and certified by registered design professional or approved agency.	<input type="checkbox"/> Complies <input type="checkbox"/> Does not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
C406.2.5 (F17)	Furnished HVAC as-built drawings within 90 days of system acceptance.	<input type="checkbox"/> Complies <input type="checkbox"/> Does not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
C406.2.5 (F17)	All air and/or hydronic system balancing report provided for HVAC systems.	<input type="checkbox"/> Complies <input type="checkbox"/> Does not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
C406.2.5 (F19)	Final commissioning report, due to building owner within 90 days of receipt of certificate of occupancy.	<input type="checkbox"/> Complies <input type="checkbox"/> Does not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	

Additional Comments/Assumptions:

1 | High Impact (Tier 1) | 2 | Medium Impact (Tier 2) | 3 | Low Impact (Tier 3)

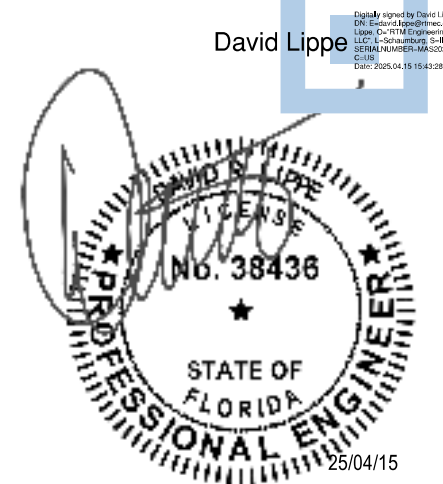
Project Title: Shake Shack - Jupiter, FL
 Date of Issue: Report Date: 04/15/25
 Page: 9 of 9



CONSULTANTS:



SEAL SIGNATURE:



NO. BY DATE DESCRIPTION



SHAKE SHACK JUPITER

6230 INDIANTOWN RD. SUITE 11,
 JUPITER, FL 33409
 SHACK #1715

100% SET

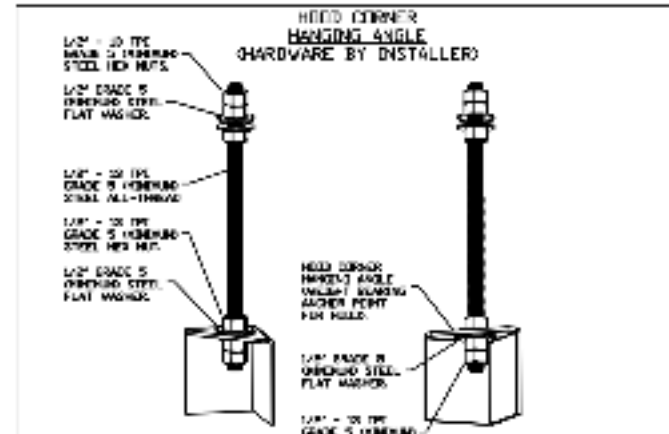
MECHANICAL ENERGY
 CODE COMPLIANCE

DRAWN BY: RTM

CHECKED BY: RTM

PROJECT NO: 12427-25

M631



HANGING ANGLE DETAILS

HOOD STYLE / MODEL	450 DEGREES CFM/FT.	600 DEGREES CFM/FT.	750 DEGREES CFM/FT.
CANOPY NO-2	150	200	250
CANOPY NO-2 W/ ISO PANELS	105	140	175
SLOPED SIND-3	228	294	-
ISLAND NO-7W	289	300	350
ISLAND NO-2	346	422	475

ETL HOOD LISTING DETAIL

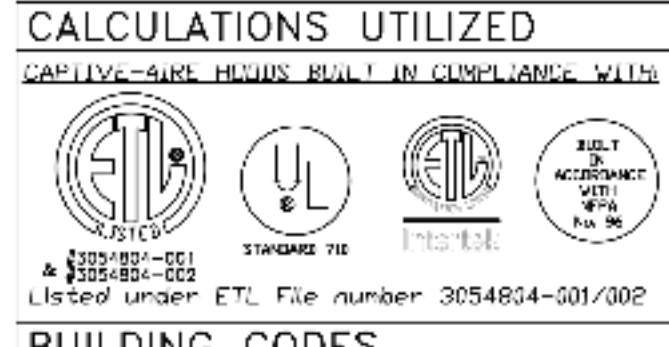
EXHAUST CFM = LENGTH OF HOOD X CAPACITY (3000)
 SUPPLY CFM = EXHAUST CFM X PERCENTAGE REQUIRED
 TOTAL DUCT AREA (SQ. IN.) = 144 X (CFM/CAPACITY)
 DUCT LENGTH = TOTAL DUCT AREA

VENTILATION: VENTILATE INTO OUTSIDE AIR OR EXHAUST TO OUTSIDE AIR AT A VELOCITY OF 3000-3500 FPM AND A SUPPLY VELOCITY OF 2000 FPM.

CAPTIVE-AIRE HOODS LISTED IN COMPLIANCE WITH:

BUILDING CODES

CAPTIVE-AIRE HOODS LISTED UNDER ETL FILE NUMBER 3054854-501/302



BUILDING CODES

CAPTIVE-AIRE HOODS LISTED UNDER ETL FILE NUMBER 3054854-501/302

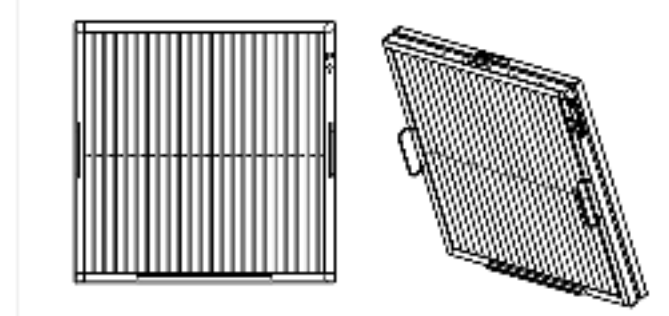
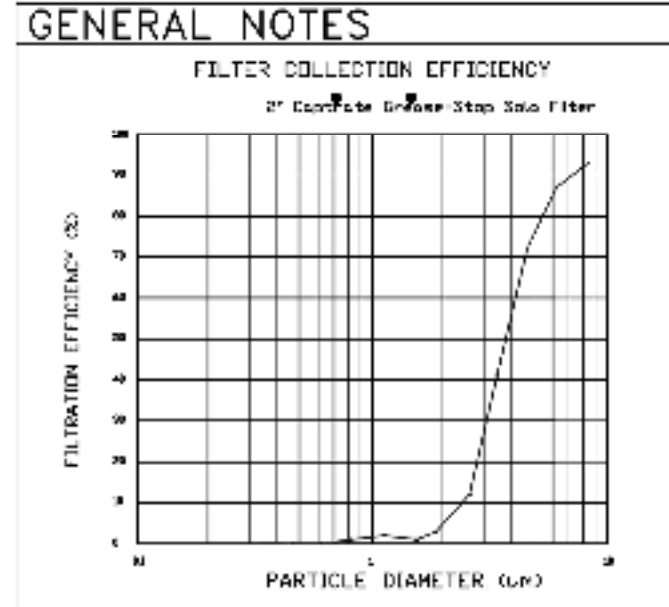
CLEARANCE TO COMBUSTIBLES

REDUCTION SYSTEMS AVAILABLE AS FOLLOWS:

MATERIAL	CLEARANCE REDUCTION SYSTEM
NON-COMBUSTIBLE	NONE REQUIRED
LIMITED-COMBUSTIBLE	6" UNINSULATED STANDOFF
COMBUSTIBLE	1" INSULATED STANDOFF

- INSTALLATION**
- ALL ELECTRICAL "FIELD" CONNECTIONS AND RELATED INTERCONNECTIONS OF ELECTRICAL CONTRACTORS.
 - ALL PLUMBING "FIELD" CONNECTIONS AND RELATED INTERCONNECTIONS OF PLUMBING CONTRACTORS.
 - HANGING BRACKETS LOCKED AND WELDED AS SHOWN ON PLANS. ALL OTHER HARDWARE MATERIALS PROVIDED BY METALLING CONTRACTOR.
 - ALL CONNECTIONS FROM CAPTIVE-AIRE HOOD PER MECHANICAL CONTRACTOR'S PLANS.
 - LOADING EQUIPMENT TO SHUT OFF IN FRONT OF HOOD.
 - EXHAUST FANS TO TURN ON IN FRONT OF HOOD.
 - ALL 2017 TESTS SHOWN NOTIFIED BY CAPTIVE-AIRE ARE FACTORY PROVIDED. INTERCONNECTIONS BETWEEN HOODS AND TO SHOWN ARE BY ELECTRICAL CONTRACTOR.
 - WARRANTY FOR JOINT PROVIDED BY INSTALLING CONTRACTOR.
 - SEALIC REQUIREMENTS ARE RESPONSIBILITY OF INSTALLING CONTRACTOR.
 - INSTALLING CONTRACTORS ASSUME ALL RELATED RESPONSIBILITY FOR VERIFICATION OF DIMENSIONS. BOTH CONTAINED ON THESE DOCUMENTS FOR ACCURACY, INTERSECTION AND IDENTIFICATION OF CODE REQUIREMENTS IN ORDER TO PROCEED TO THE RELEASE FOR PRODUCTION OF EQUIPMENT SIGNAL.

- GENERAL NOTES**
- RESTROOM HOODS MUST BE DIMENSIONED WITH REVISIONS TO THIS AREA.
 - RESTROOM SHALL BE NEGATIVE 10TH RESPECT TO DRAIN AREA.
 - RESTROOM SHALL BE POSITIVE 10TH RESPECT TO AMBIENT PRESSURE.
- ADDITIONAL:**
- WHEN HOOD DIMENSIONS HAVE PRECEDENCE OVER SCALE.
 - SHARP AND "APPROVED" CORNERS OF THIS DOCUMENT MUST BE ROUNDED BY THE CUSTOMER PRIOR TO PROCEEDING TO PRODUCTION.



CaptiveAire Captrate Solo Filter
 ETL Listed Grease Extracting Filters
 Made From 430 Stainless Steel

FILTER DETAIL

FOR QUESTIONS, CALL THE
 Eastern PA Mechanical
 REGION 108
 PHONE: (267) 504 - 4166
 EMAIL: rsg138@captveaire.com

HOOD INFORMATION - JOB#739915R

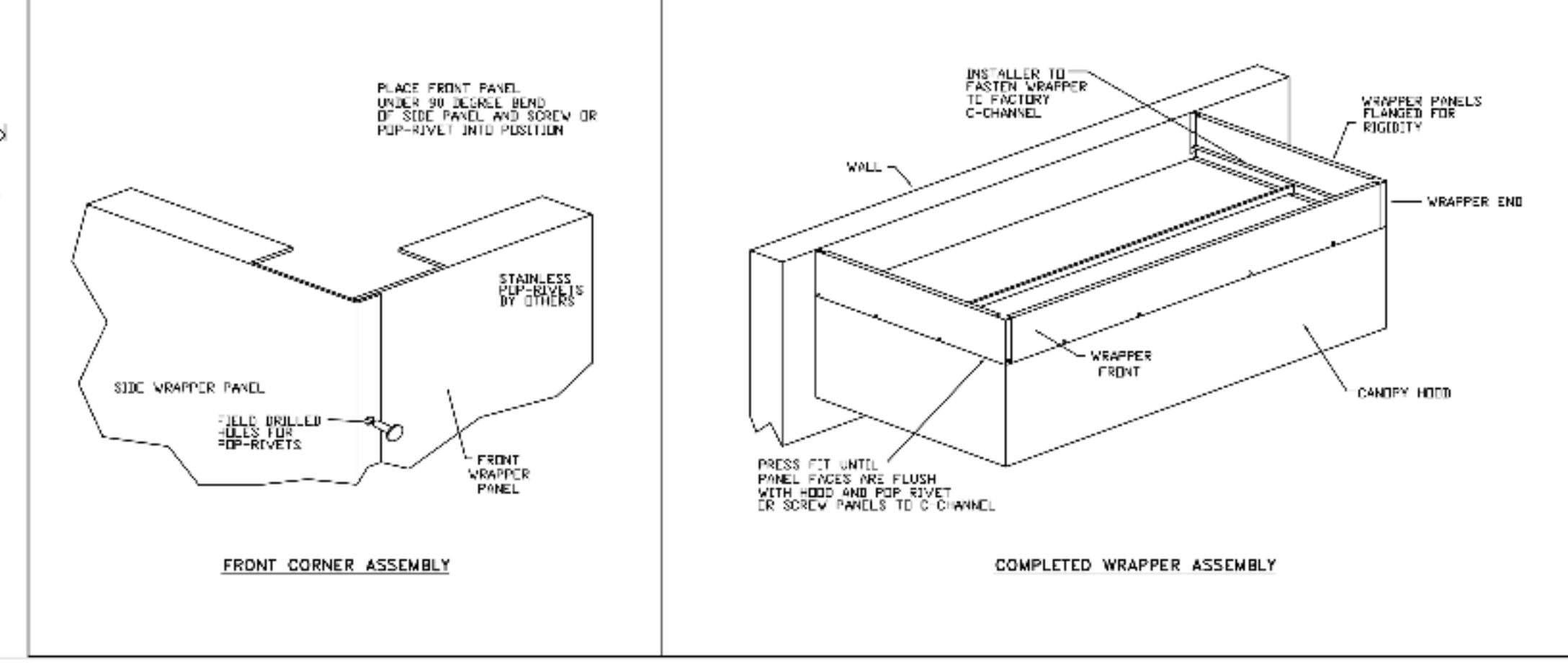
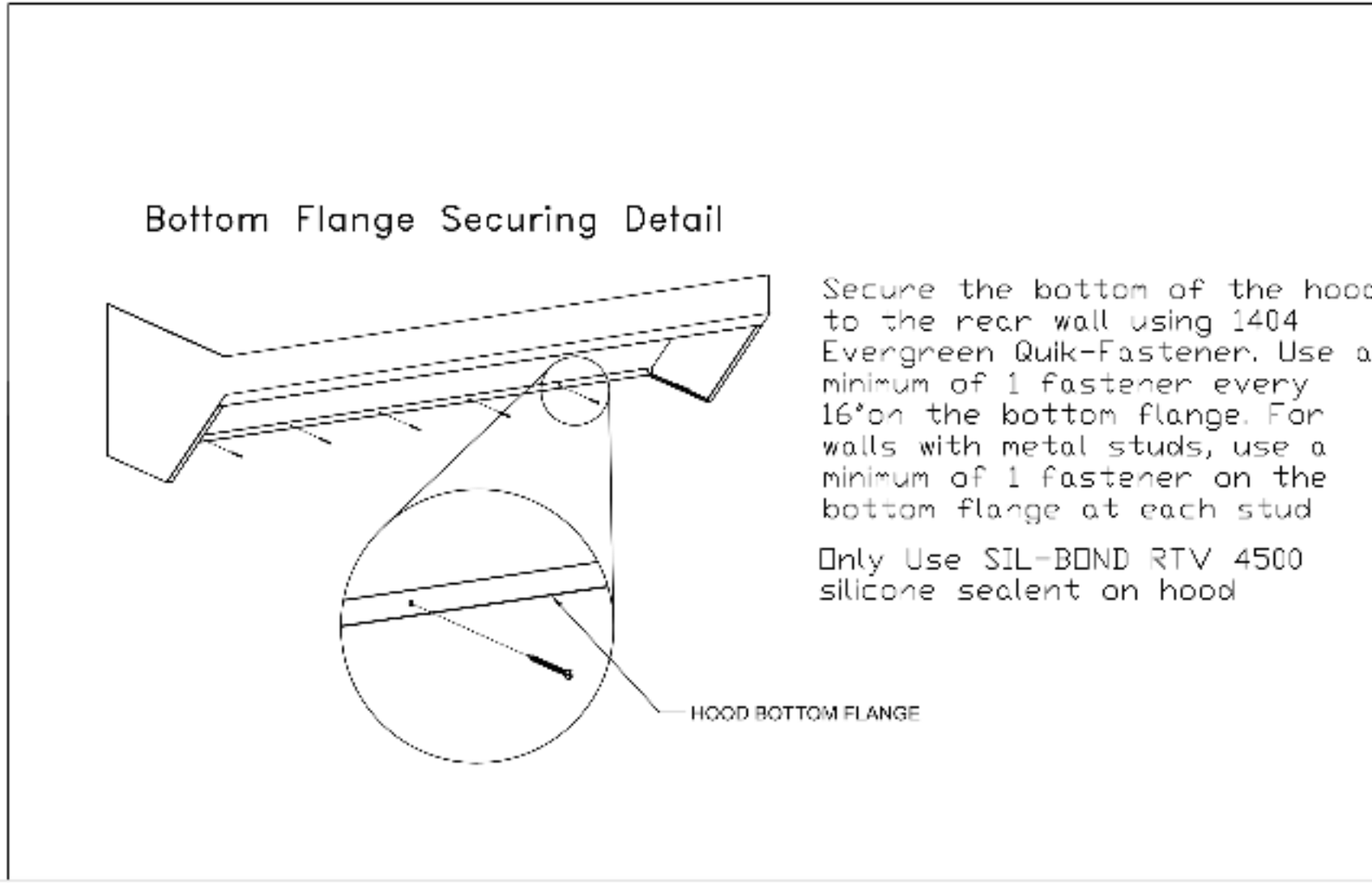
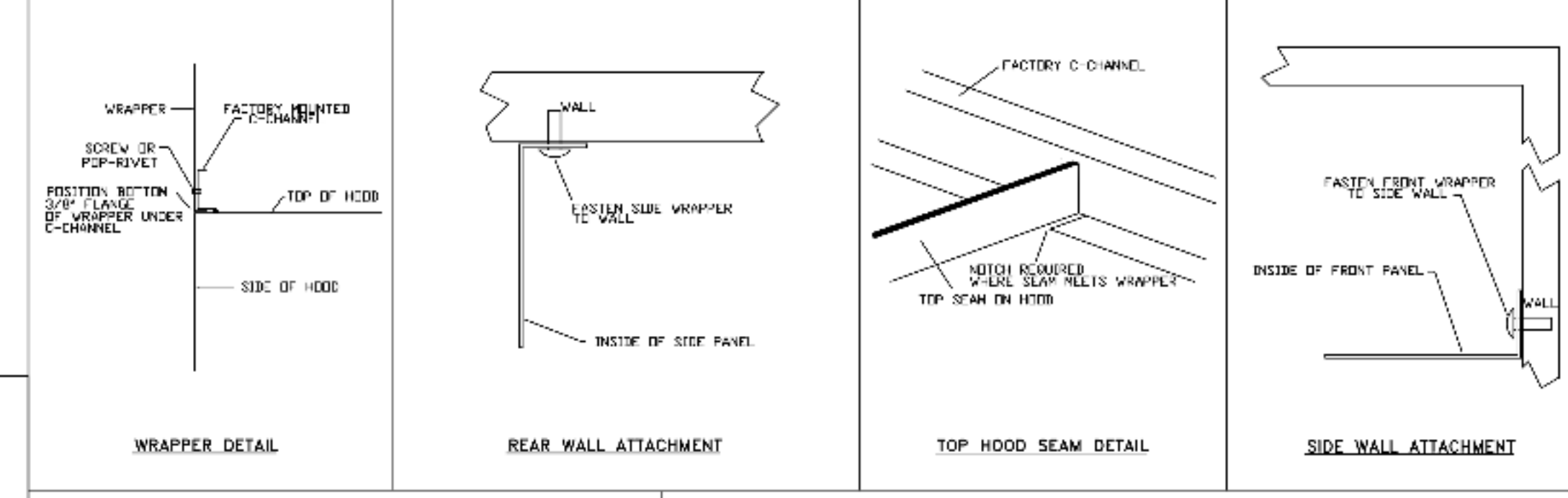
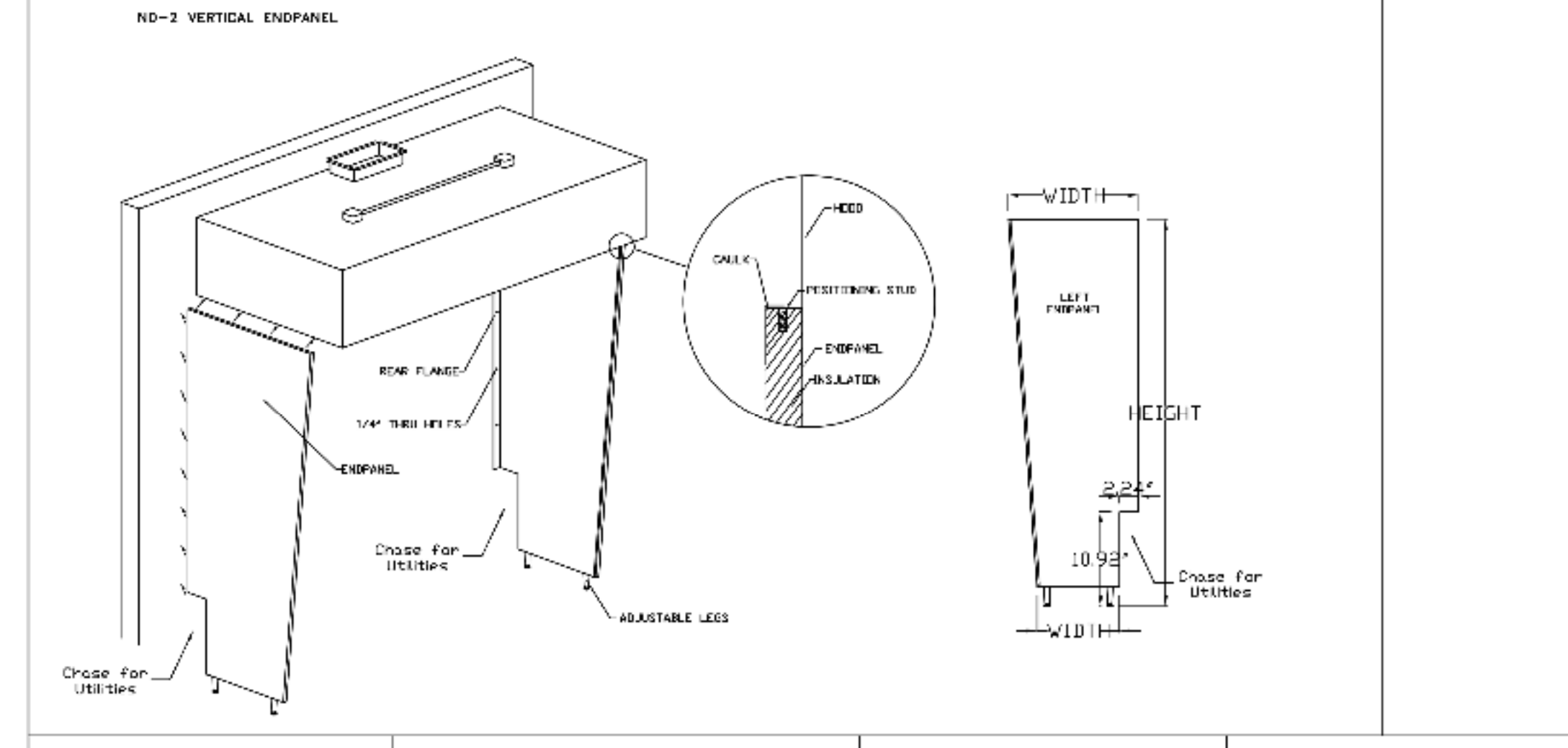
HOOD NO	TAG	MODEL	MANUFACTURER	LENGTH	MAX DUKLING TEMP	TYPE	APPLIANCE DUTY	DESIGN CFM/FT	TOTAL EXH CFM	EXHAUST PLENUM RISER(S)				HOOD CONSTRUCTION	HOOD CONFIG			
										WIDTH	LENG	HEIGHT	DIA		CFM	VEL	SP	END TO END
1	Hood (Grill)	5430 ND-2	CAPTIVEAIRE	7' 11"	450 DEG	I	MEDIUM	150	1188	10'	11'	4'	1188	1555	-0.462"	430 SS WHERE EXPOSED	ALINE	ALINE
2	Hood (Fryer)	5430 ND-2	CAPTIVEAIRE	4' 11"	600 DEG	I	HEAVY	175	860	9'	9'	4'	860	1529	-0.494"	430 SS WHERE EXPOSED	ALINE	ALINE

HOOD INFORMATION

HOOD NO	TAG	FILTER(S)				LIGHT(S)				UTILITY CABINET(S)			FIRE HOOD SYSTEM-HANGING PIPING WEIGHT				
		TYPE	QTY	HEIGHT	LENGTH	EFFICIENCY @ 7 MICRONS	QTY	TYPE	WIRE GUARD	LOCATION	SIZE	FIRE SYSTEM		ELECTRICAL	SWITCHES		
1	Hood (Grill)	CAPTRATE SOLID FILTER	5	20"	16"	85% SEE FILTER SPEC	2	RECESSED ROUND	NO						YES	484 LBS	
2	Hood (Fryer)	CAPTRATE SOLID FILTER	3	20"	16"	85% SEE FILTER SPEC	2	RECESSED ROUND	NO	RIGHT	12"x54"x30"	TANK FS	4.0"/4.0/4.0	SC-3201.0MA	1 LIGHT 1 FAN	YES	748 LBS

HOOD OPTIONS

HOOD NO	TAG	OPTION
1	Hood (Grill)	FIELD WRAPPER 18.00" HIGH FRONT, LEFT, RIGHT. LEFT END STANDOFF (FINISHED) 1" WIDE 54" LONG INSULATED INSULATION FOR BACK OF HOOD. RISER SENSOR INSTALL 6IN PLEN. RIGHT VERTICAL END PANEL 27" TOP WIDTH, 21" BOTTOM WIDTH, 80" HIGH INSULATED 430 SS. GFCI DUPLEX OUTLET, 20A 125V - HOOD FRONT LEFT - HORIZONTAL - DIST FROM END: 3.50' DIST FROM BOTTOM: 4.00'. LEFT WALL AS END PANEL.
2	Hood (Fryer)	FIELD WRAPPER 12.00" HIGH FRONT, LEFT, RIGHT. RIGHT QUARTER END PANEL 23" TOP WIDTH, 0" BOTTOM WIDTH, 23" HIGH 430 SS. LEFT QUARTER END PANEL 23" TOP WIDTH, 0" BOTTOM WIDTH, 23" HIGH 430 SS. INSULATION FOR BACK OF HOOD. RISER SENSOR INSTALL 6IN PLEN.



REVISIONS

NO.	DESCRIPTION	DATE

CAPTIVE-AIRE

Eastern PA Mechanical
 www.captiveaire.com
 226 E City Line Avenue, Suite #103, Bensalem, PA 19006 PHONE: (267) 504 - 4178 EMAIL: rsg138@captveaire.com

Shake Shack-1715-Jupiter, FL (Kitchen)
 PALM BEACH GARDENS, FL, 33410

DATE: 3/17/2025
DWG.#: 739915R
DRAWN BY: Joe Shilba
SCALE: 3/4" = 1'-0"
MASTER DRAWING
SHEET NO. 1

5310 E HIGH STREET SUITE 350
 PHOENIX, AZ 85054
 T: 480.448.6250
 WWW.SARGARCH.COM



CONSULTANTS:

rtm
 engineering consultants
 14001 Canyon Blvd Suite 900 Denver, CO 80202
 T: 303.857.0000 www.rtm.com

SEAL SIGNATURE:

FOR REFERENCE ONLY

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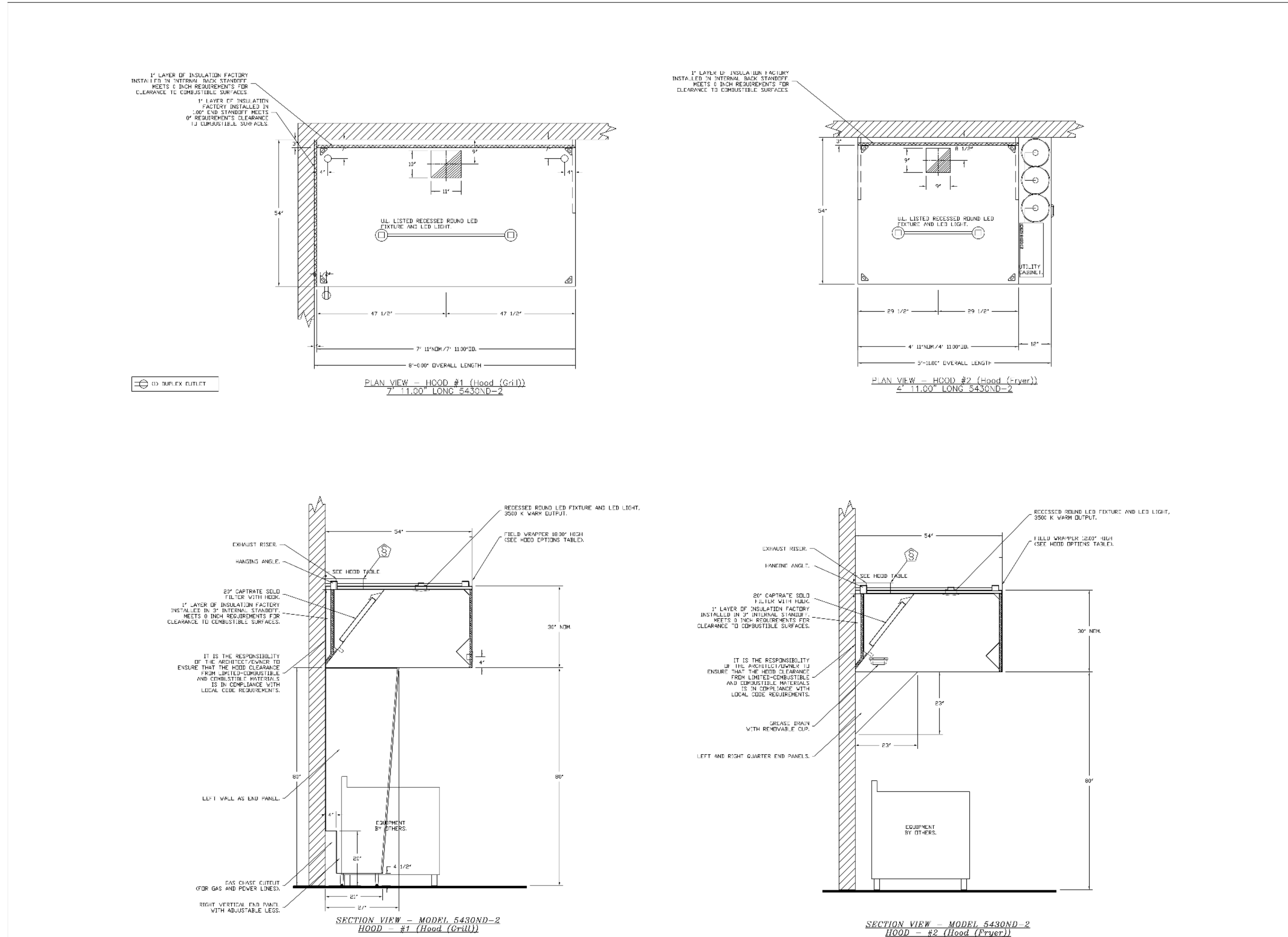
SHAKE SHACK JUPITER
 6230 INDIANTOWN RD. SUITE 11,
 JUPITER, FL 33409
 SHACK #1715

100% SET

CAPTIVE AIRE DRAWINGS

DRAWN BY: XX
 CHECKED BY: XX
 PROJECT NO: 12427-25

M701



REVISIONS	
DESCRIPTION	DATE

CAPTIVE AIRE
 Eastern PA Mechanical
 www.captiveaire.com
 228 E City Line Avenue, Suite #103, Bensalem, PA 19004 PHONE: (267) 504-4178 EMAIL: mg108@captiveaire.com

Shack-1/15-Jupiter, FL (Kitchen)
 PALM BEACH GARDENS, FL, 33410

DATE: 3/17/2025
 DWG.#: 7399158
 DRAWN BY: Joe-shilba
 SCALE: 3/4" = 1'-0"
 MASTER DRAWING

SHEET NO. 2

5310 E HIGH STREET SUITE 350
 PHOENIX, AZ 85054
 T: 480.448.6250
 WWW.SARGARCH.COM

SARGENT & Lundy

CONSULTANTS:

rtm
 engineering consultants
 14001 Quorum Street, Suite 900, Dallas, TX 75244
 T: 972.307.5000

SEAL SIGNATURE:

FOR REFERENCE ONLY

NO.	BY	DATE	DESCRIPTION

SHAKE SHACK

SHAKE SHACK JUPITER

6230 INDIANTOWN RD. SUITE 11,
 JUPITER, FL 33409
 SHACK #1715

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CAPTIVE AIRE DRAWINGS

DRAWN BY: XX
 CHECKED BY: XX
 PROJECT NO: 12427-25

M702

FIRE SYSTEM INFORMATION - JOB#7399158

FIRE SYSTEM NO.	TAG	TYPF	SIZE	MAX FP	DESIGN FP	INSTALLATION	
						SYSTEM	LOCATION ON HOOD
1		TANK FS	4.0/4.0/4.0	60	46	FIRE CABINET RIGHT	RIGHT, HOOD 2

GAS VALVE(S)

FIRE SYSTEM NO.	TAG	TYPE	SIZE	SUPPLIED BY
1		SC ELECTRICAL	1.000	CAPTIVAIRE SYSTEMS

NOTES

- FIELD PIPE DROPS AS SHOWN
- PIPING, ELBOWS, TEES, AND NOZZLES SUPPLIED BY CAS.
- FIELD INSTALLED DROPS: FACTORY WILL PROVIDE CITY 2" 60IN LONG PIECES OF CHROME PLATED PIPING SHIPPED LOOSE TO BE FIELD-INSTALLED.
- SHIP LOOSE DROPS: FACTORY WILL PROVIDE THE EXACT CHROME PIPE LENGTH NEEDED SHIPPED LOOSE TO BE FIELD-INSTALLED.
- RELOCATE NOZZLES IF FLOW PATTERN IS BLOCKED BY SHELVING, SALAMANDERS, ETC.
- OVERLAPPING DIVERGENCE SHALL NOT BE USED ON ANY APPLIANCE WITH AN OBSTRUCTION.
- IF APPLICABLE, EXTENDED PRE-PIPED DROPS ARE SHIPPED LOOSE.
- FACTORY PIPING EXTENDS A MAXIMUM OF 6" ABOVE THE TOP OF THE HOOD.

- APPLIANCE DIMENSIONS LISTED REPRESENT THE COOKING SURFACE SIZE, NOT THE OVERALL APPLIANCE SIZE.
- THIS PRE-ENGINEERED FIRE SYSTEM COMPLIES WITH UL 300 REQUIREMENTS.

- DL-F NOZZLE PART NUMBER REPLACES 3070-3/8H-10-SS

JOB # 7399158
JOB NAME: SHAKE SHACK-1715-JUPITER, FL(KITCHEN).

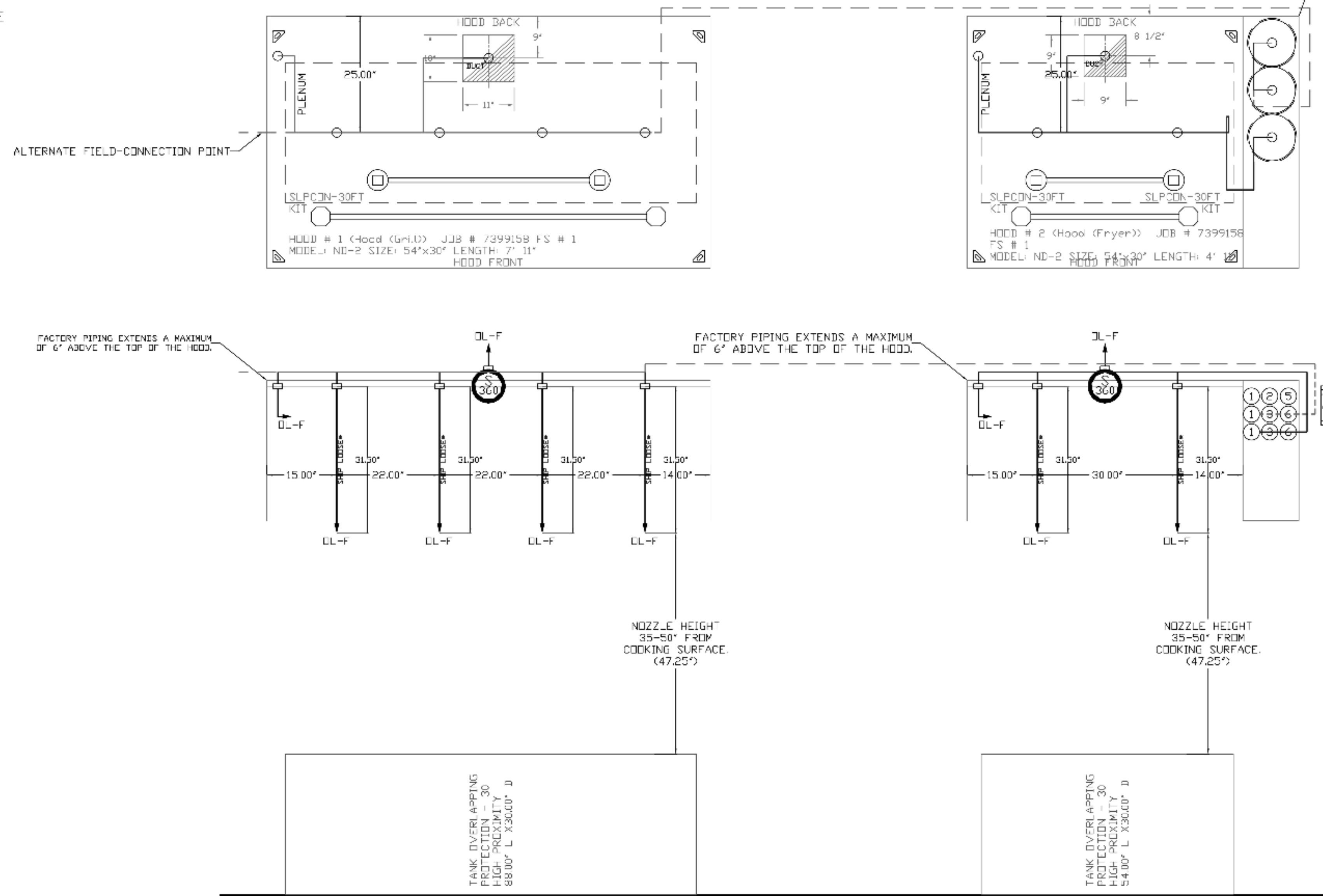
SYSTEM SIZE: TANK-SP-3 DESIGN FP: 46, MAXIMUM FP: 60.
HOOD # 1 7' 11.00" LONG x 54" WIDE x 30" HIGH.
RISER # 1 SIZE: 10" x 11".
HOOD # 1 METAL BLOW-OFF CAPS INCLUDED.
HOOD # 2 4' 11.00" LONG x 54" WIDE x 30" HIGH.
RISER # 1 SIZE: 9" x 9".
HOOD # 2 METAL BLOW-OFF CAPS INCLUDED.

- HEAVY-DUTY APPLIANCES (RATED 600°F) WILL REQUIRE AN ADDITIONAL DOWNSTREAM FIRE STAT IN THE EVENT THAT THE DUCTWORK CONTAINS ANY HORIZONTAL RUNS OVER 25 FT IN LENGTH
- MEDIUM TO LIGHT-DUTY APPLIANCES (RATED 450°F) WILL NOT REQUIRE ANY ADDITIONAL DOWNSTREAM DETECTION.

AGENT DISTRIBUTION PIPING LIMITATIONS	
PIPE SECTION	MAX PIPE LENGTH (FT)
MAX SUPPLY LINE TO FIRST OVERLAPPING NOZZLE	42
OVERLAPPING NOZZLE APPLIANCE BRANCH	10
DEDICATED NOZZLE APPLIANCE BRANCH	10

LEGEND - FIRE CABINET TANK SYSTEM

- | | |
|---|---------------------------------|
| 1 | 4 GALLON TANK. |
| 2 | PRIMARY ACTUATOR RELEASE. |
| 3 | SECONDARY ACTUATOR RELEASE. |
| 4 | PRESSURE SUPERVISION SWITCH. |
| 5 | PRIMARY HOSE ASSEMBLY. |
| 6 | SECONDARY HOSE ASSEMBLY. |
| 7 | REMOTE MANUAL ACTUATION DEVICE. |



SYSTEM REQUIRES A MINIMUM OF 7 FT OF EQUIVALENT PIPE LENGTH BETWEEN TANK AND NEAREST APPLIANCE NOZZLE FOR MEDIUM APPLIANCES. EACH 90 DEGREE ELBOW ADDS 13 FT OF EQUIVALENT LENGTH. SEE MANUAL FOR DETAILS

REVISIONS	
DESCRIPTION	DATE

CAPTIVE AIRE
Eastern PA Mechanical
226 E City Line Avenue, Suite #103, Bensalem, PA 19004
PHONE: (267) 504-4176
EMAIL: mg108@captiveaire.com

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PALM BEACH GARDENS, FL, 33410

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DWG.#: 7399158
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SCALE: 3/4" = 1'-0"
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SHEET NO.
3

5310 E HIGH STREET SUITE 350
PHOENIX, AZ 85054
TJ 480.448.6250
WWW.SARGARCH.COM

SARGENT & Lundy

CONSULTANTS:
rtm
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14000 Canyon Street, Suite 900, Dallas, TX 75244
T 972.387.0000

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SHAKE SHACK

SHAKE SHACK JUPITER

6230 INDIANTOWN RD. SUITE 11,
JUPITER, FL 33409
SHACK #1715

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DRAWN BY: Author
CHECKED BY: Checker
PROJECT NO: 12427-25

M703

EXHAUST FAN INFORMATION - JOB#7399158

FAN UNIT NO.	TAG	QTY	FAN UNIT MODEL #	MANUFACTURER	CFM	ESP	RPM	MOTOR ENCL	HP	BHP	PHASE	VOLTI	FLA	DISCHARGE VELOCITY	WEIGHT (LBS)	SONES
1	KEF(GRILL)	1	DL85HFA	CAPTIVEAIRE	1188	1.500	1424	TEAD-ECM	3.750	0.4970	1	208	5.2	376 FPM	90	12.7
2	KEF(FRYER)	1	DL05HFA	CAPTIVEAIRE	860	1.500	1354	TEAD-ECM	3.750	0.4270	1	208	5.2	272 FPM	90	11.4

FAN OPTIONS

FAN UNIT NO.	TAC	QTY	DESCRIPTION
1	KEF(GRILL)	1	GREASE BOX
		1	FAN BASE CERAMIC SEAL - DU/DR85HFA - INSTALLED AT PLANT - FOR GREASE DUCTS
		1	ECM WIRING PACKAGE - EXHAUST - MODBUS CONTROL -MSC- (TELCD), CCW ROTATION
		1	2 YEAR PARTS WARRANTY
2	KEF(FRYER)	1	GREASE BOX
		1	ECM WIRING PACKAGE - EXHAUST - MODBUS CONTROL -MSC- (TELCD), CCW ROTATION
		1	FAN BASE CERAMIC SEAL - DU/DR85HFA - INSTALLED AT PLANT - FOR GREASE DUCTS
		1	2 YEAR PARTS WARRANTY

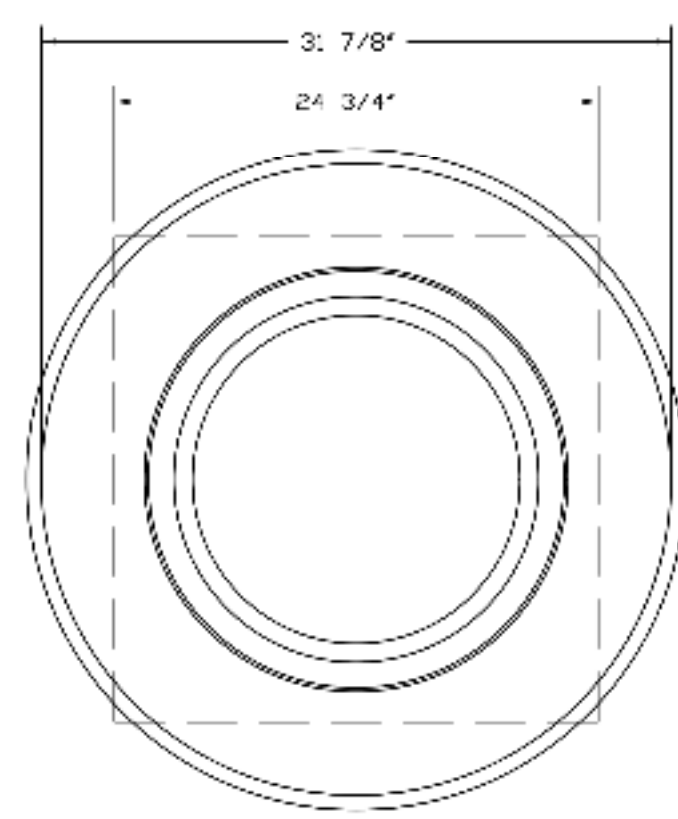
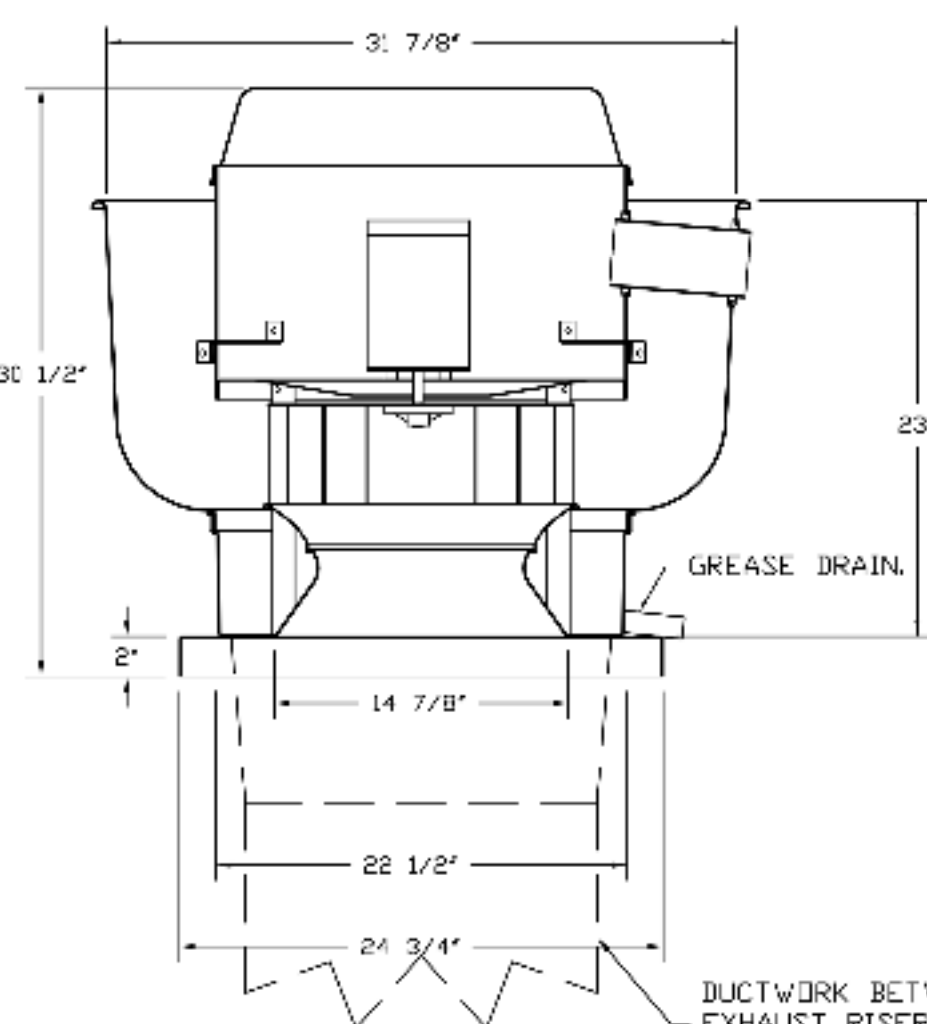
FAN ACCESSORIES

FAN UNIT NO.	TAC	EXHAUST				SUPPLY		
		GREASE CLIP	GRAVITY DAMPER	WALL MOUNT	SIDE DISCHARGE	GRAVITY DAMPER	MOTORIZED DAMPER	WALL MOUNT
1	KEF(GRILL)	YES						
2	KEF(FRYER)	YES						

CURB ASSEMBLIES

NO	LN	FAN	TAG	WEIGHT	ITEM	SIZE
1	# 1	KEF(GRILL)		36 LBS	CURB	23.000"W X 23.000"L X 20.000"H - FINCED.
2	# 2	KEF(FRYER)		36 LBS	CURB	23.000"W X 23.000"L X 20.000"H - FINCED.

FANS #1 (KEF(GRILL)), #2 (KEF(FRYER)) - DL85HFA EXHAUST FAN



TOP VIEW

FEATURES:

- DIRECT DRIVE CONSTRUCTION AND BE-TS/PULLEYS.
- ROOF MOUNTED FANS.
- RESTAURANT MODEL.
- UL725 AND UL762 AND UL3-3645.
- VARIABLE SPEED CONTROL.
- INTERNAL WIRING.
- THERMAL OVERLOAD PROTECTION (SINGLE PHASE).
- HIGH HEAT OPERATION 300°F (149°C).
- GREASE CLASSIFICATION TESTING.
- NEMA 3R SAFETY DISCONNECT SWITCH.

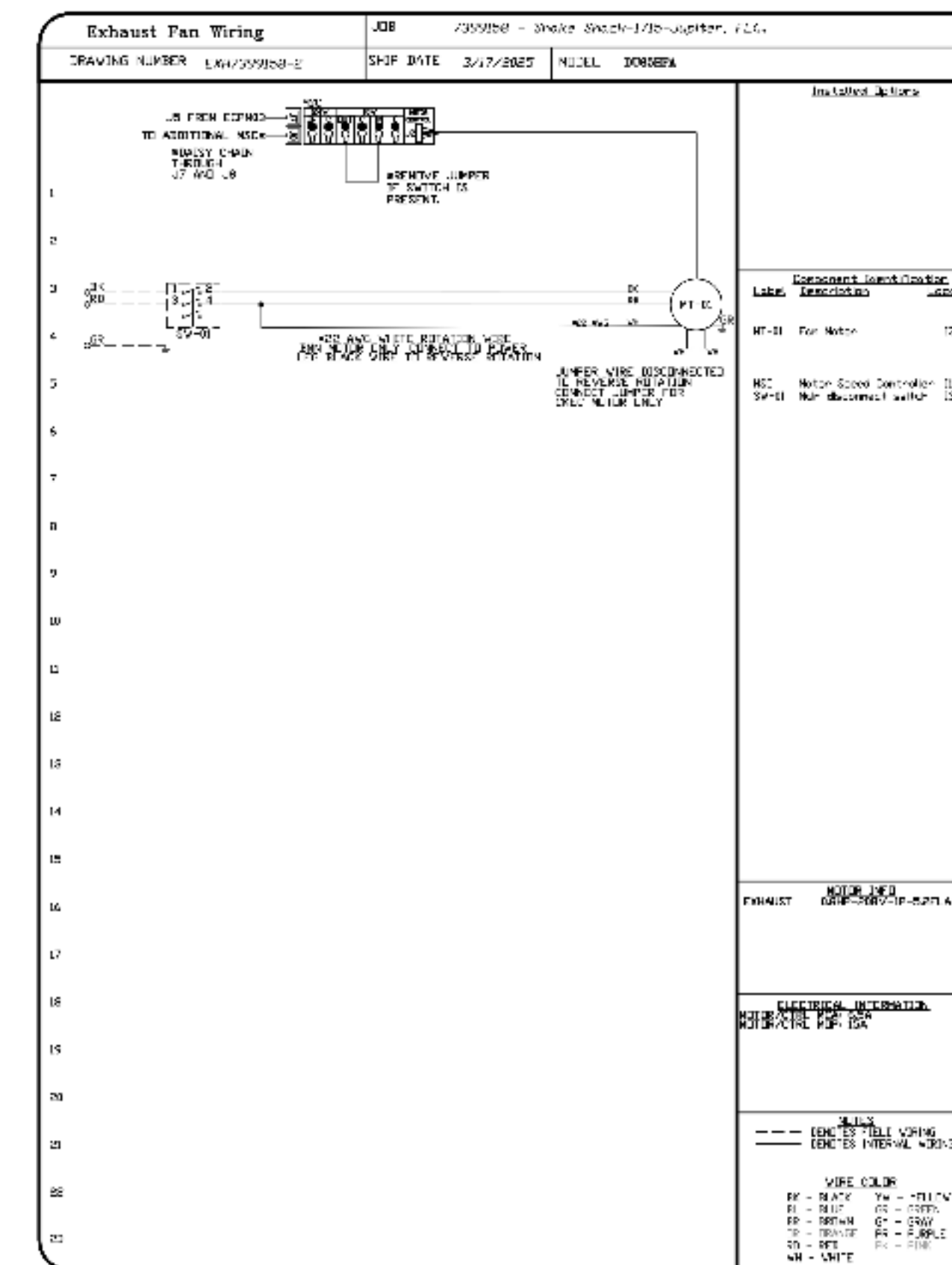
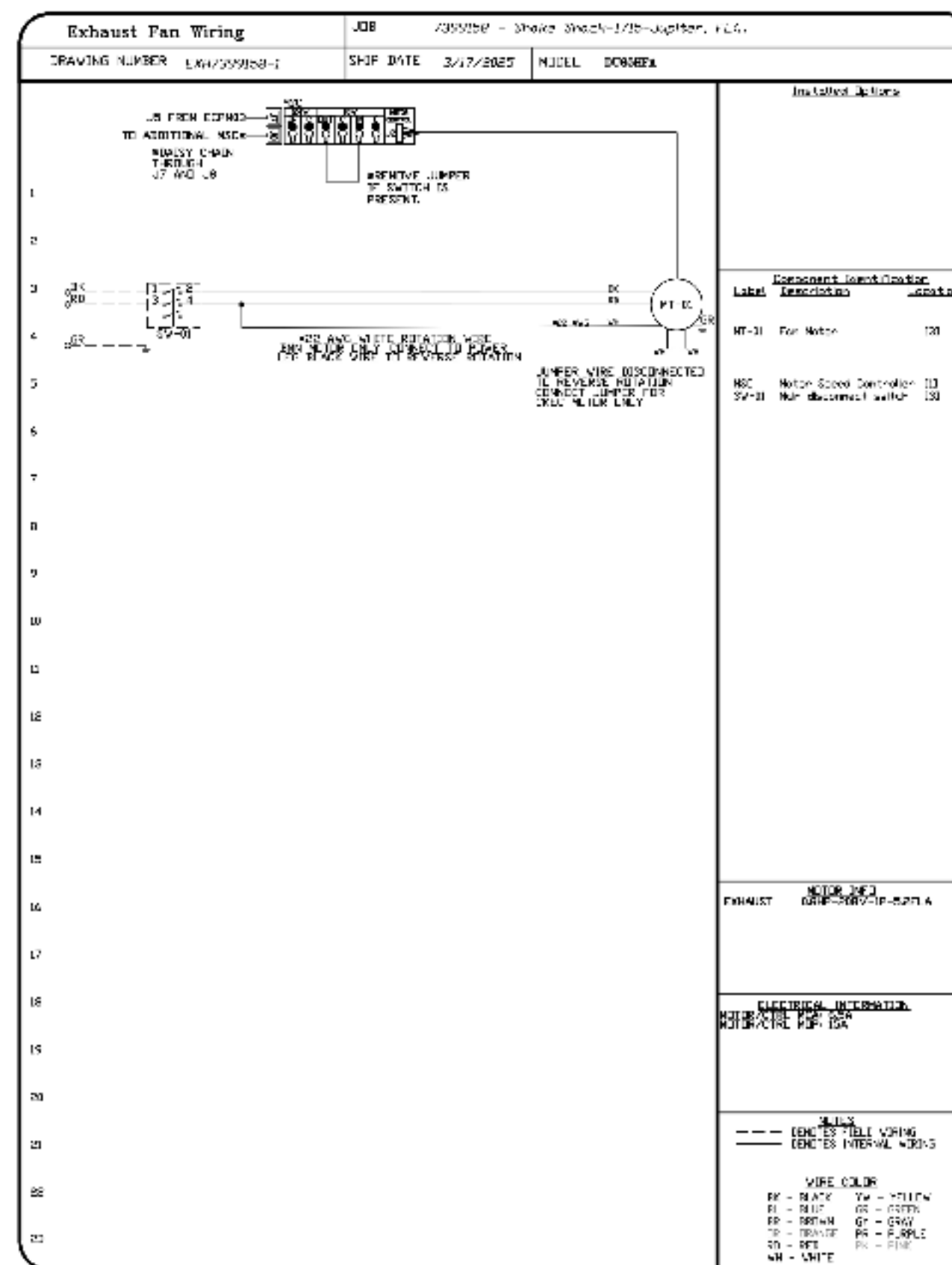
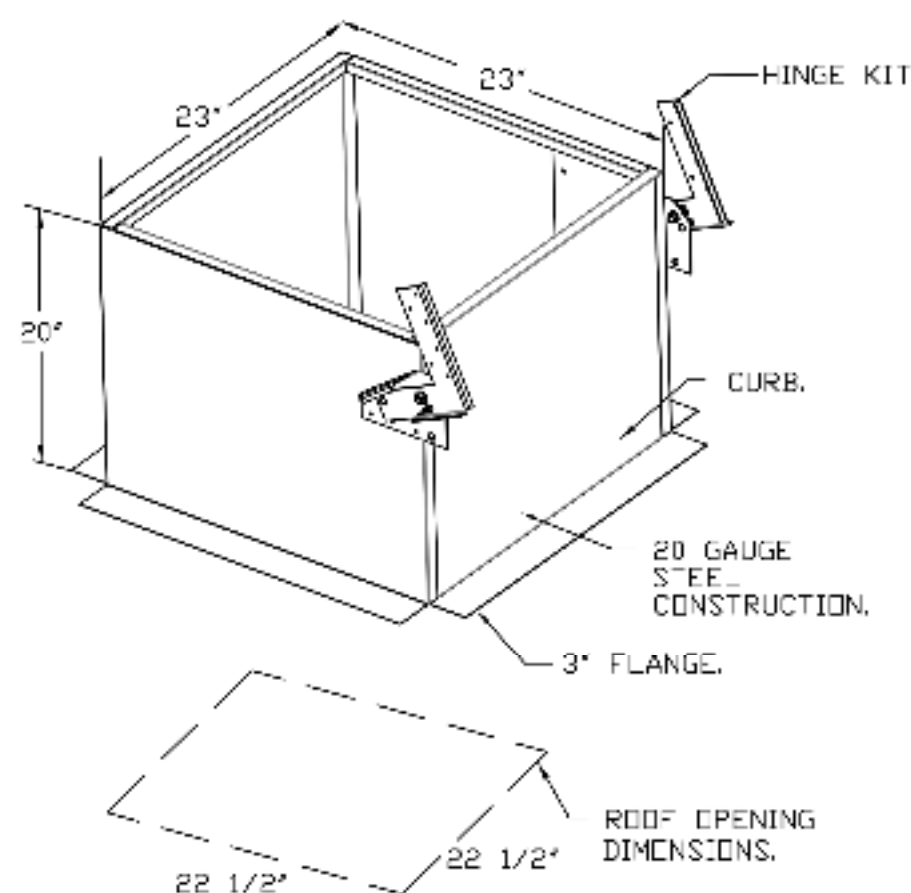
NORMAL TEMPERATURE TEST
EXHAUST FAN MUST OPERATE CONTINUOUSLY WHILE EXHAUSTING AIR AT 300°F (149°C) UNTIL ALL FAN PARTS HAVE REACHED THERMAL EQUILIBRIUM AND WITHOUT ANY DETRIMENTARY EFFECTS TO THE FAN WHICH WOULD CAUSE UNSAFE OPERATION.

ABNORMAL FUSE-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
- FAN BASE CERAMIC SEAL - DU/DR85HFA - INSTALLED AT PLANT - FOR GREASE DUCTS
- ECM WIRING PACKAGE - EXHAUST - MODBUS CONTROL -MSC- (TELCD), CCW ROTATION
- 2 YEAR PARTS WARRANTY.

DUCTWORK BETWEEN EXHAUST RISER ON HOOD AND FAN (BY OTHERS).



REVISIONS	
DESCRIPTION	DATE

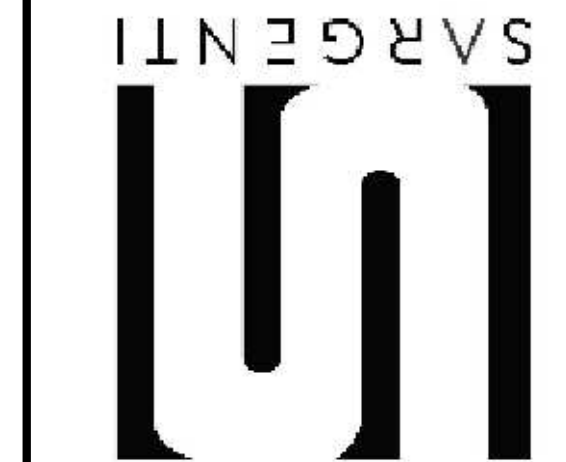


CAPTIVE AIR
Eastern PA Mechanical
228 E City Line Avenue, Suite #103, Bensalem, PA 19004
PHONE: (267) 504-4178
EMAIL: info@captiveaire.com

Shake Shack-1715-Jupiter, FL(Kitchen)
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PHOENIX, AZ 85054
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WWW.SARGARCH.COM



CONSULTANTS:
rtm
engineering consultants
14001 Canyon Blvd, Suite 900, Denver, CO 80202
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SHAKE SHACK JUPITER

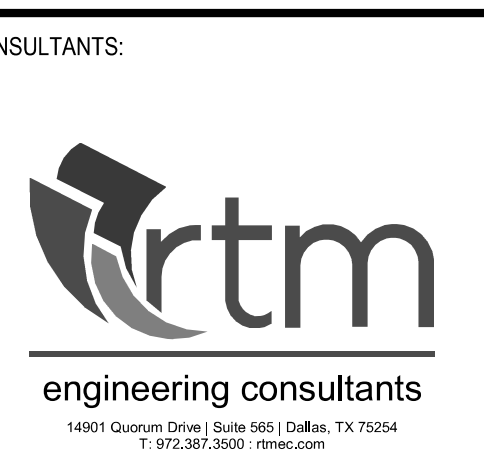
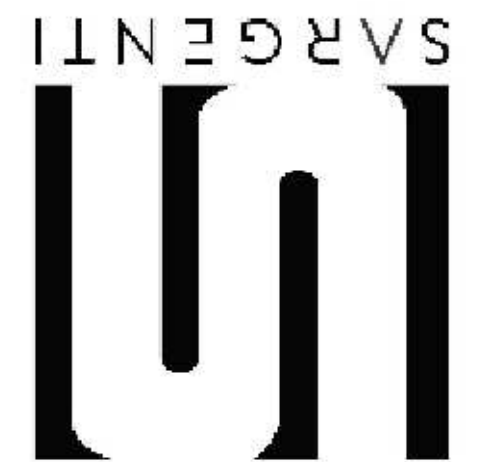
6230 INDIANTOWN RD. SUITE 11,
JUPITER, FL 33409
SHACK #1715

100% SET

CAPTIVE AIRE DRAWINGS

DRAWN BY: Author
CHECKED BY: Checker
PROJECT NO: 12427-25

M704



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ELECTRICAL PACKAGE - JOB#7399158

NO	TAG	PACKAGE #	LOCATION	SWITCHES	OPTION	FANS CONTROLLED
1		SC-380110A	JUPITER CABINETS - KITCHEN	1 LIGHT 1 FAN	SMART CONTROL S / "STATISTICAL" CONTROL W/ RELAY ON/OFF WITH SUPPLY	FAN TAG KEF Fryer EXHAUST 1 (0.75) 200 3/2

REVISIONS

NO.	DESCRIPTION	DATE

REVISIONS

NO.	DESCRIPTION	DATE

CASlink Monitor and Control

— Used control panel to support communications to cloud-based Building Management System.

— Used Control Panel to allow cloud-based Building Management System to monitor real time parameters outlined by MODBUS in the ground list.

— Used Control Panel to allow cloud-based Building Management System to control operations outlined as CONTROL in the ground list.

— Used Control Panel to allow cloud-based Building Management System to implement SYSTEM ACCESSORIES control strategies for fully integrated Building Management.

MONITORING AND CONTROL POINTS LIST

NO	Package	Position	NO	Package	Position
1	Steam Temperature	ADJUSTOR	1	Steam Temperature	ADJUSTOR
2	Water Temperature	ADJUSTOR	2	Water Temperature	ADJUSTOR
3	Hot Water Temperature	ADJUSTOR	3	Hot Water Temperature	ADJUSTOR
4	Hot Water Discharge Temperature	ADJUSTOR	4	Hot Water Discharge Temperature	ADJUSTOR
5	Hot Water Return Temperature	ADJUSTOR	5	Hot Water Return Temperature	ADJUSTOR
6	Hot Water Flow	ADJUSTOR	6	Hot Water Flow	ADJUSTOR
7	Hot Water Pressure	ADJUSTOR	7	Hot Water Pressure	ADJUSTOR
8	Hot Water Valve	ADJUSTOR	8	Hot Water Valve	ADJUSTOR
9	Hot Water Filter	ADJUSTOR	9	Hot Water Filter	ADJUSTOR
10	Hot Water Filter	ADJUSTOR	10	Hot Water Filter	ADJUSTOR
11	Hot Water Filter	ADJUSTOR	11	Hot Water Filter	ADJUSTOR
12	Hot Water Filter	ADJUSTOR	12	Hot Water Filter	ADJUSTOR
13	Hot Water Filter	ADJUSTOR	13	Hot Water Filter	ADJUSTOR
14	Hot Water Filter	ADJUSTOR	14	Hot Water Filter	ADJUSTOR
15	Hot Water Filter	ADJUSTOR	15	Hot Water Filter	ADJUSTOR
16	Hot Water Filter	ADJUSTOR	16	Hot Water Filter	ADJUSTOR
17	Hot Water Filter	ADJUSTOR	17	Hot Water Filter	ADJUSTOR
18	Hot Water Filter	ADJUSTOR	18	Hot Water Filter	ADJUSTOR
19	Hot Water Filter	ADJUSTOR	19	Hot Water Filter	ADJUSTOR
20	Hot Water Filter	ADJUSTOR	20	Hot Water Filter	ADJUSTOR

BREAKER PANEL TO PRIMARY CONTROL PANEL

Responsibility: Electrician

1 BREAKER PANEL TO PRIMARY CONTROL PANEL

2 BREAKER SIZE SHALL BE THE MAXIMUM ALLOWED

3 BREAKER PANEL TO PRIMARY CONTROL PANEL

4 BREAKER PANEL TO PRIMARY CONTROL PANEL

5 BREAKER PANEL TO PRIMARY CONTROL PANEL

6 BREAKER PANEL TO PRIMARY CONTROL PANEL

7 BREAKER PANEL TO PRIMARY CONTROL PANEL

8 BREAKER PANEL TO PRIMARY CONTROL PANEL

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14 BREAKER PANEL TO PRIMARY CONTROL PANEL

15 BREAKER PANEL TO PRIMARY CONTROL PANEL

16 BREAKER PANEL TO PRIMARY CONTROL PANEL

17 BREAKER PANEL TO PRIMARY CONTROL PANEL

18 BREAKER PANEL TO PRIMARY CONTROL PANEL

19 BREAKER PANEL TO PRIMARY CONTROL PANEL

20 BREAKER PANEL TO PRIMARY CONTROL PANEL

BREAKER PANEL TO FANS

Responsibility: Electrician

1 BREAKER PANEL TO FANS

2 BREAKER PANEL TO FANS

3 BREAKER PANEL TO FANS

4 BREAKER PANEL TO FANS

5 BREAKER PANEL TO FANS

6 BREAKER PANEL TO FANS

7 BREAKER PANEL TO FANS

8 BREAKER PANEL TO FANS

9 BREAKER PANEL TO FANS

10 BREAKER PANEL TO FANS

11 BREAKER PANEL TO FANS

12 BREAKER PANEL TO FANS

13 BREAKER PANEL TO FANS

14 BREAKER PANEL TO FANS

15 BREAKER PANEL TO FANS

16 BREAKER PANEL TO FANS

17 BREAKER PANEL TO FANS

18 BREAKER PANEL TO FANS

19 BREAKER PANEL TO FANS

20 BREAKER PANEL TO FANS

CONTROL PANEL TO FIRE SYSTEM

Responsibility: ALARM CONTRACTOR

1 CONTROL PANEL TO FIRE SYSTEM

2 CONTROL PANEL TO FIRE SYSTEM

3 CONTROL PANEL TO FIRE SYSTEM

4 CONTROL PANEL TO FIRE SYSTEM

5 CONTROL PANEL TO FIRE SYSTEM

6 CONTROL PANEL TO FIRE SYSTEM

7 CONTROL PANEL TO FIRE SYSTEM

8 CONTROL PANEL TO FIRE SYSTEM

9 CONTROL PANEL TO FIRE SYSTEM

10 CONTROL PANEL TO FIRE SYSTEM

11 CONTROL PANEL TO FIRE SYSTEM

12 CONTROL PANEL TO FIRE SYSTEM

13 CONTROL PANEL TO FIRE SYSTEM

14 CONTROL PANEL TO FIRE SYSTEM

15 CONTROL PANEL TO FIRE SYSTEM

16 CONTROL PANEL TO FIRE SYSTEM

17 CONTROL PANEL TO FIRE SYSTEM

18 CONTROL PANEL TO FIRE SYSTEM

19 CONTROL PANEL TO FIRE SYSTEM

20 CONTROL PANEL TO FIRE SYSTEM

CONTROL PANEL TO FIRE SYSTEM

Responsibility: CERTIFIED INSTALLER

1 CONTROL PANEL TO FIRE SYSTEM

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CONTROL PANEL TO ACCESSORY ITEMS

Responsibility: Electrician

1 CONTROL PANEL TO ACCESSORY ITEMS

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20 CONTROL PANEL TO ACCESSORY ITEMS

TANK PROTECTION ELECTRICAL DETAIL

FS-1: MASTER

1 TANK PROTECTION ELECTRICAL DETAIL

2 TANK PROTECTION ELECTRICAL DETAIL

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19 TANK PROTECTION ELECTRICAL DETAIL

20 TANK PROTECTION ELECTRICAL DETAIL

TANK PROTECTION LOW-VOLTAGE DETAIL

FS-1: MASTER

1 TANK PROTECTION LOW-VOLTAGE DETAIL

2 TANK PROTECTION LOW-VOLTAGE DETAIL

3 TANK PROTECTION LOW-VOLTAGE DETAIL

4 TANK PROTECTION LOW-VOLTAGE DETAIL

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18 TANK PROTECTION LOW-VOLTAGE DETAIL

19 TANK PROTECTION LOW-VOLTAGE DETAIL

20 TANK PROTECTION LOW-VOLTAGE DETAIL

CAPTIVE

www.captiveaire.com

228 E City Line Avenue, Suite #103, Boca Cuyard, FL 33440

Eastern PA Mechanical

Shake Shack-1715-Jupiter, FL(Kitchen)

PALM BEACH GARDENS, FL, 33440

DATE: 3/17/2025

DWG.#: 7399158

DRAWN BY: Joe Shilka

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

MASTER DRAWING

SHEET NO. 5

SHAKE SHACK

SHAKE SHACK JUPITER

6230 INDIANTOWN RD. SUITE 11,
JUPITER, FL 33409
SHACK #1715

100% SET

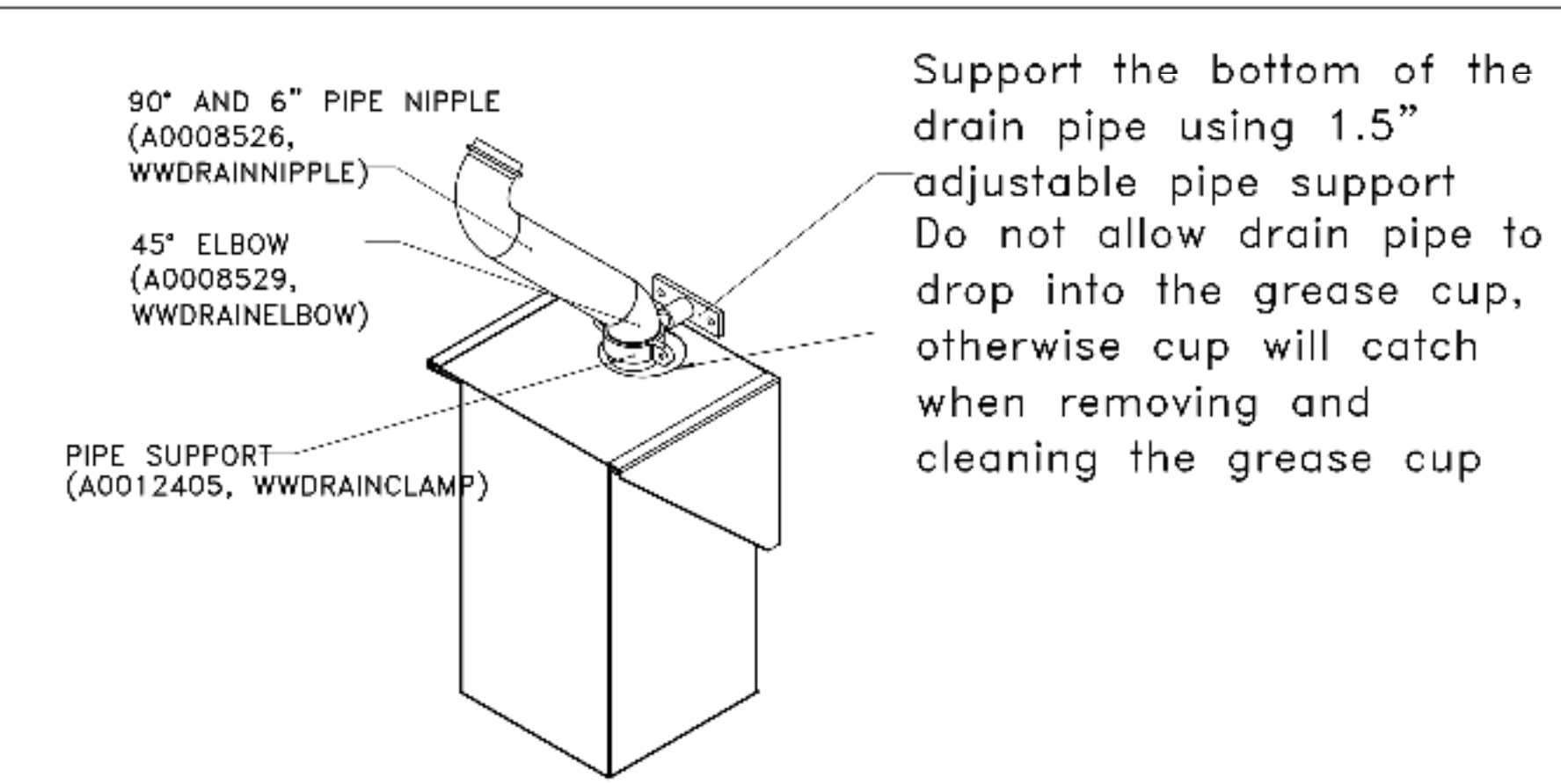
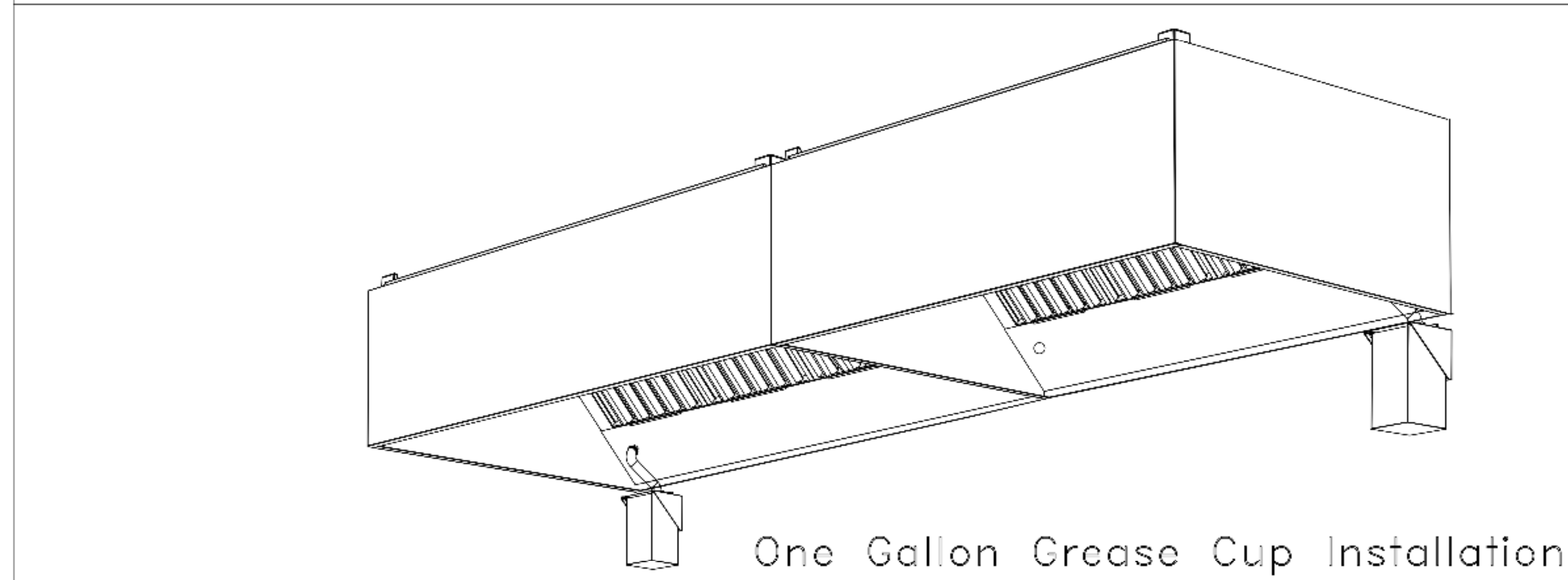
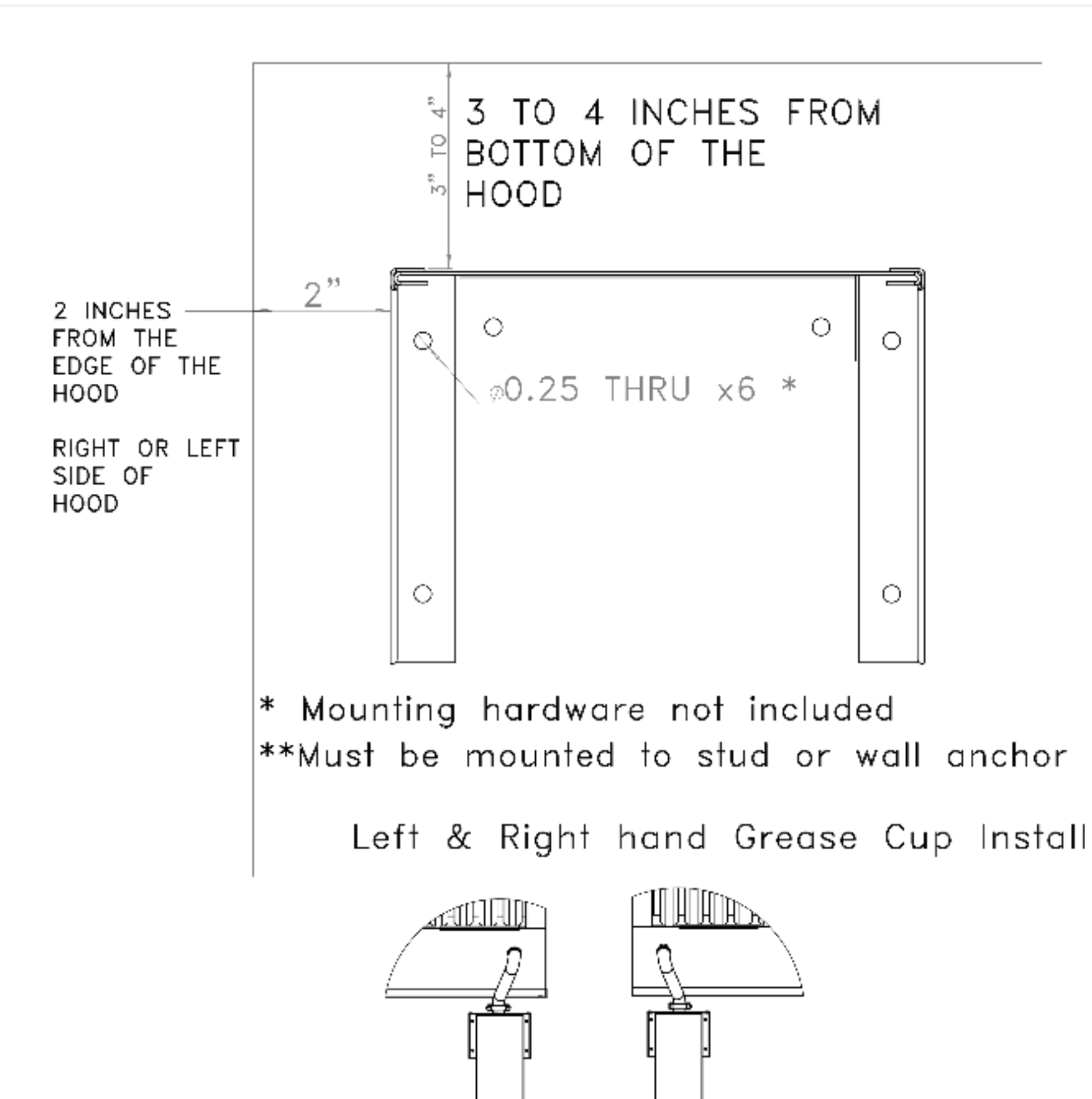
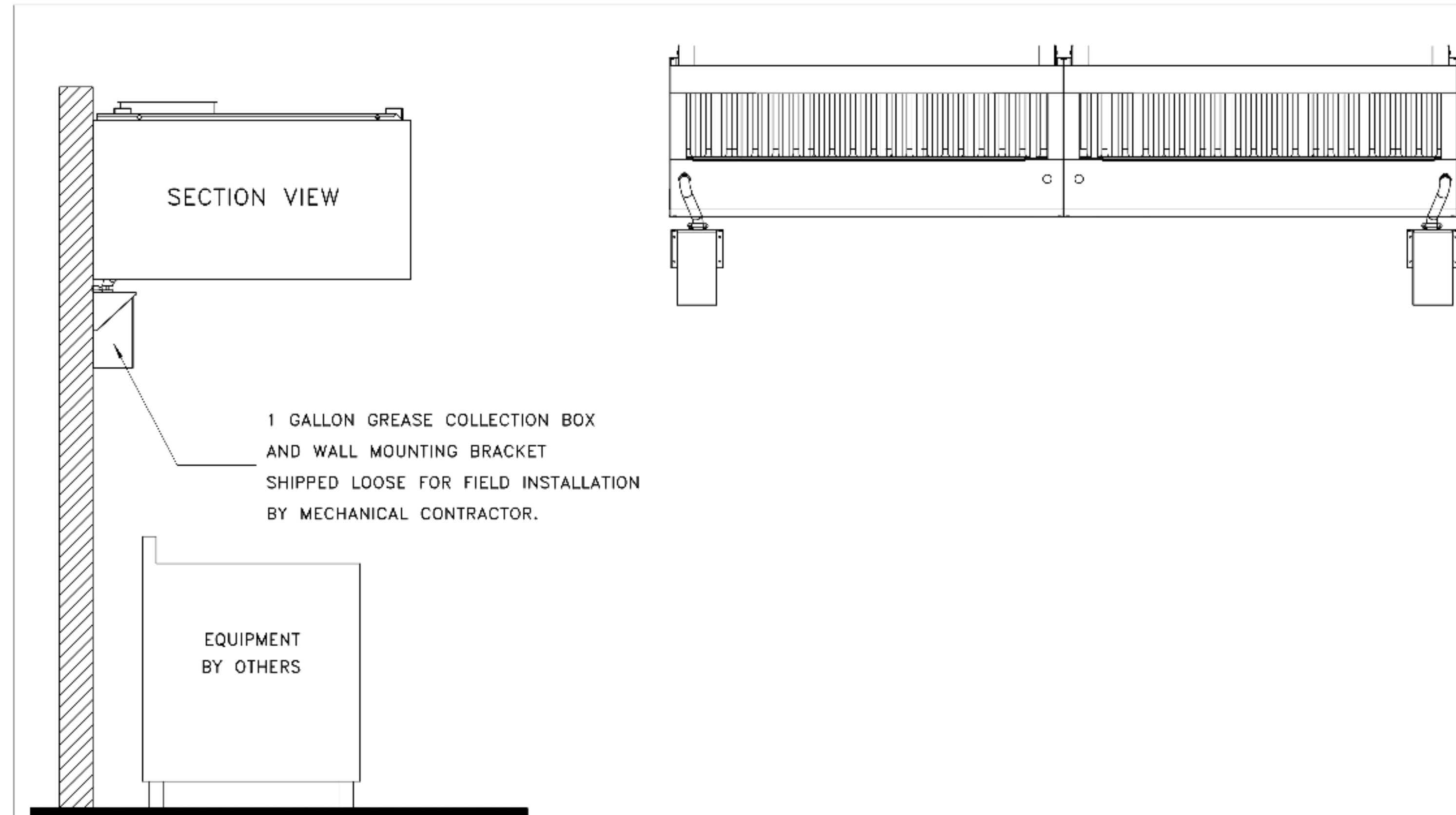
CAPTIVE AIRE DRAWINGS

DRAWN BY: Author

CHECKED BY: Checker

PROJECT NO: 12427-25

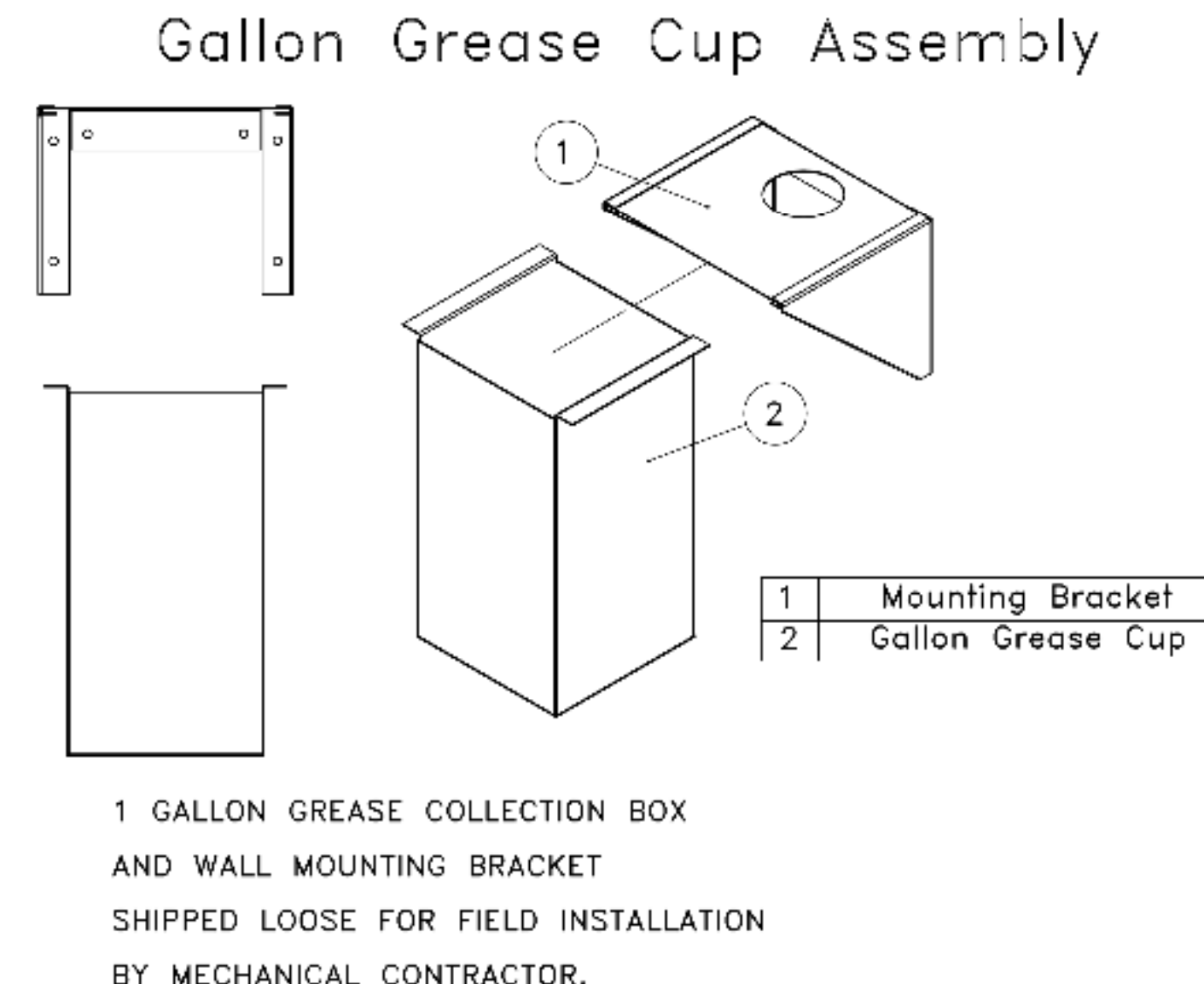
M705



Instructions below outline single, or dual, one gallon grease cup installation for ND-2 hood models.

The one gallon grease cup comes as an assembly of stainless steel wall mounting bracket and one gallon cup. The mounting bracket should be installed 2" from the edge of the containment plenum and 3"-4" below the bottom of the hood.

Piping from the hood grease drain should route to the opening of the grease cup, but not into the cup, otherwise the cup will not be able to be removed and emptied.



REVISIONS	
NO.	DESCRIPTION

CAPTIVE
 Eastern PA Mechanical
 www.captiveaire.com
 226 E City Line Avenue, Suite #103, Bensalem, PA 19004 PHONE: (267) 504-4178 EMAIL: mg108@captiveaire.com

Shake Shack-1/15-Jupiter, FL(Kitchen)
 PALM BEACH GARDENS, FL, 33410

DATE: 3/17/2025
 DWG.#: 7399158
 DRAWN BY: Joe Shilba
 SCALE: 3/4" = 1'-0"
 MASTER DRAWING

SHEET NO. 6

5310 E HIGH STREET SUITE 350
 PHOENIX, AZ 85054
 T: 480.448.6250
 WWW.SARGARCH.COM



CONSULTANTS:

 14001 Canyon Street, Suite 100, Dallas, TX 75244
 T: 972.387.5500

SEAL SIGNATURE:
 FOR REFERENCE ONLY

NO.	BY	DATE	DESCRIPTION



SHAKE SHACK JUPITER
 6230 INDIANTOWN RD. SUITE 11,
 JUPITER, FL 33409
 SHACK #1715

100% SET

CAPTIVE AIRE DRAWINGS

DRAWN BY: Author
 CHECKED BY: Checker
 PROJECT NO: 12427-25

M706

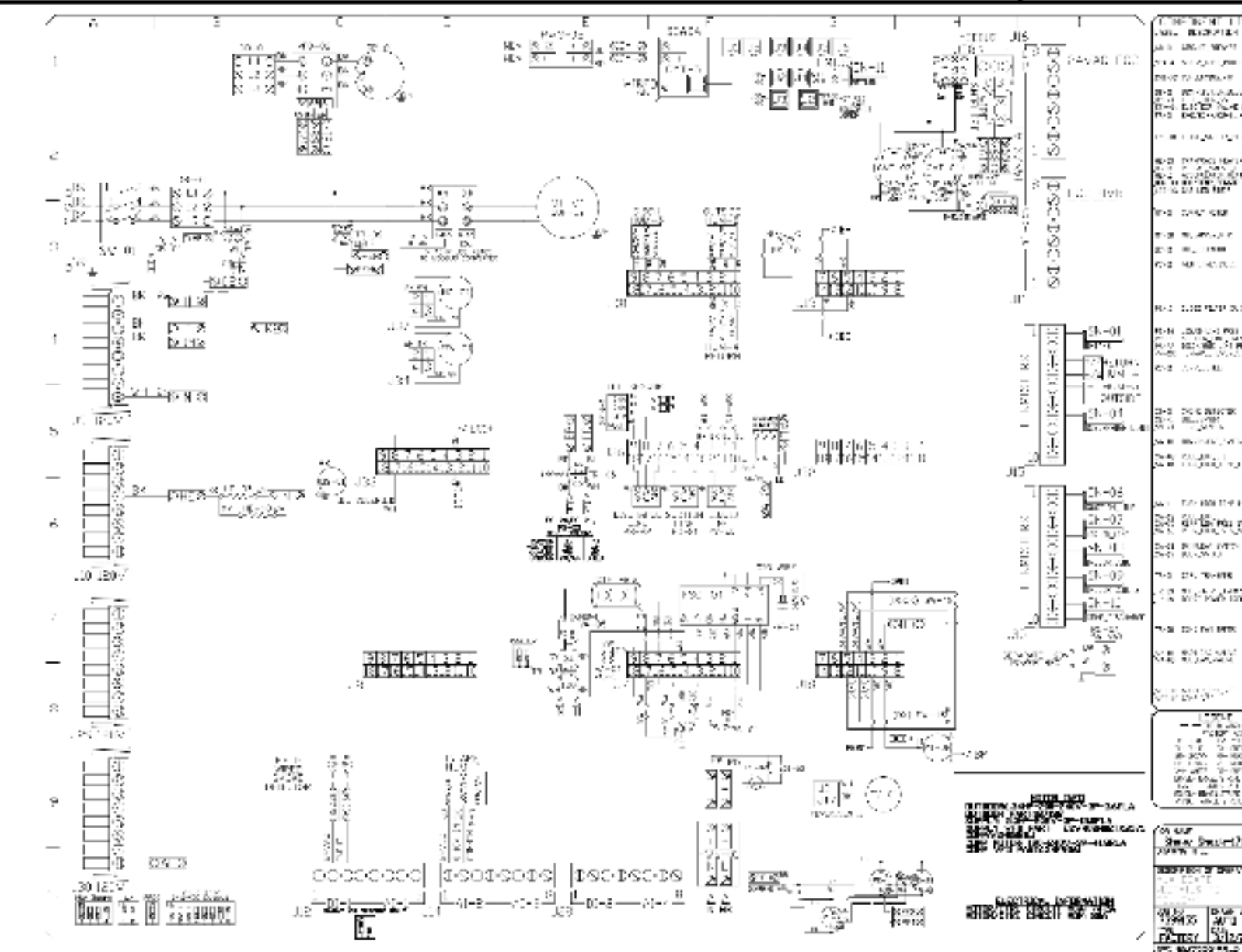
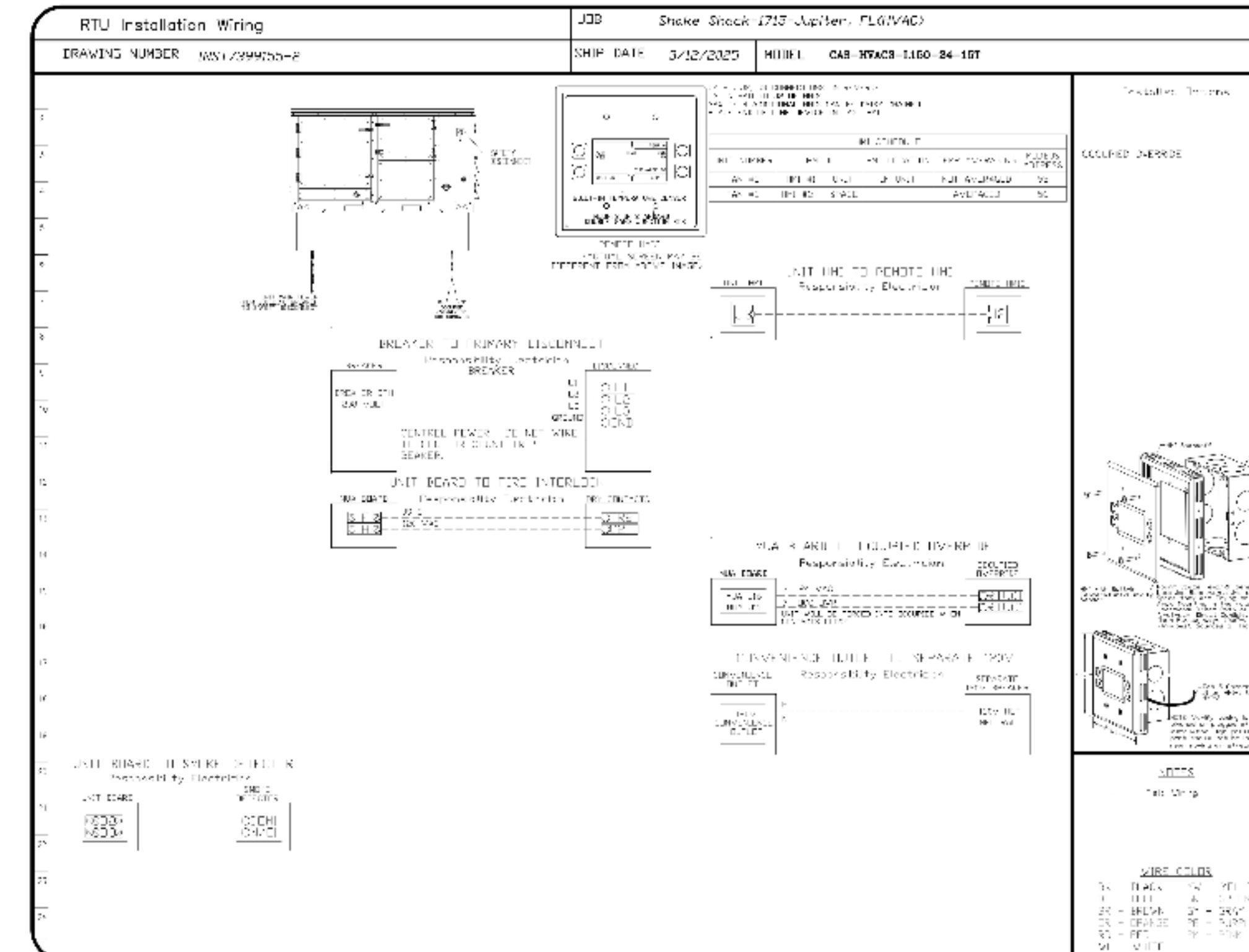
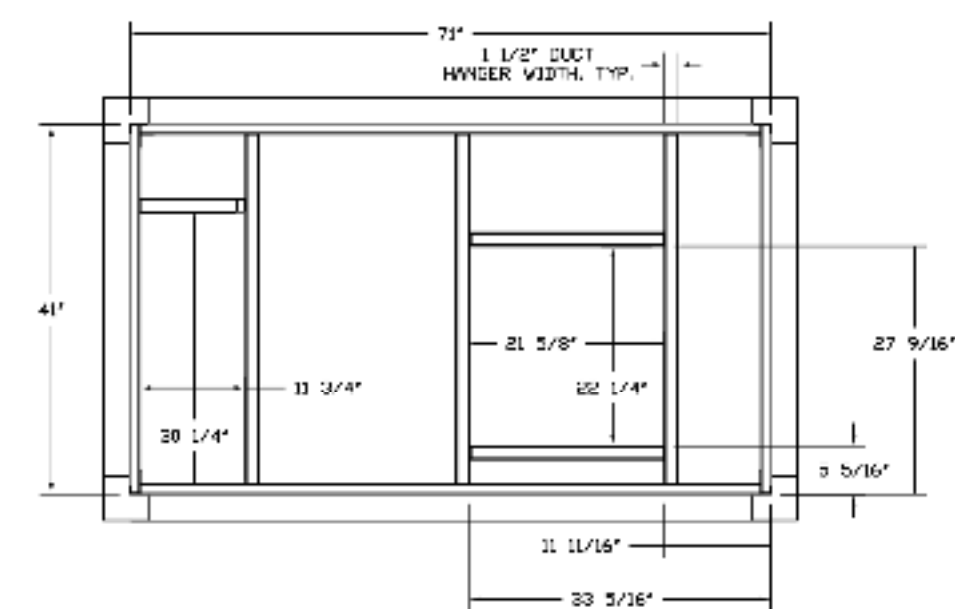
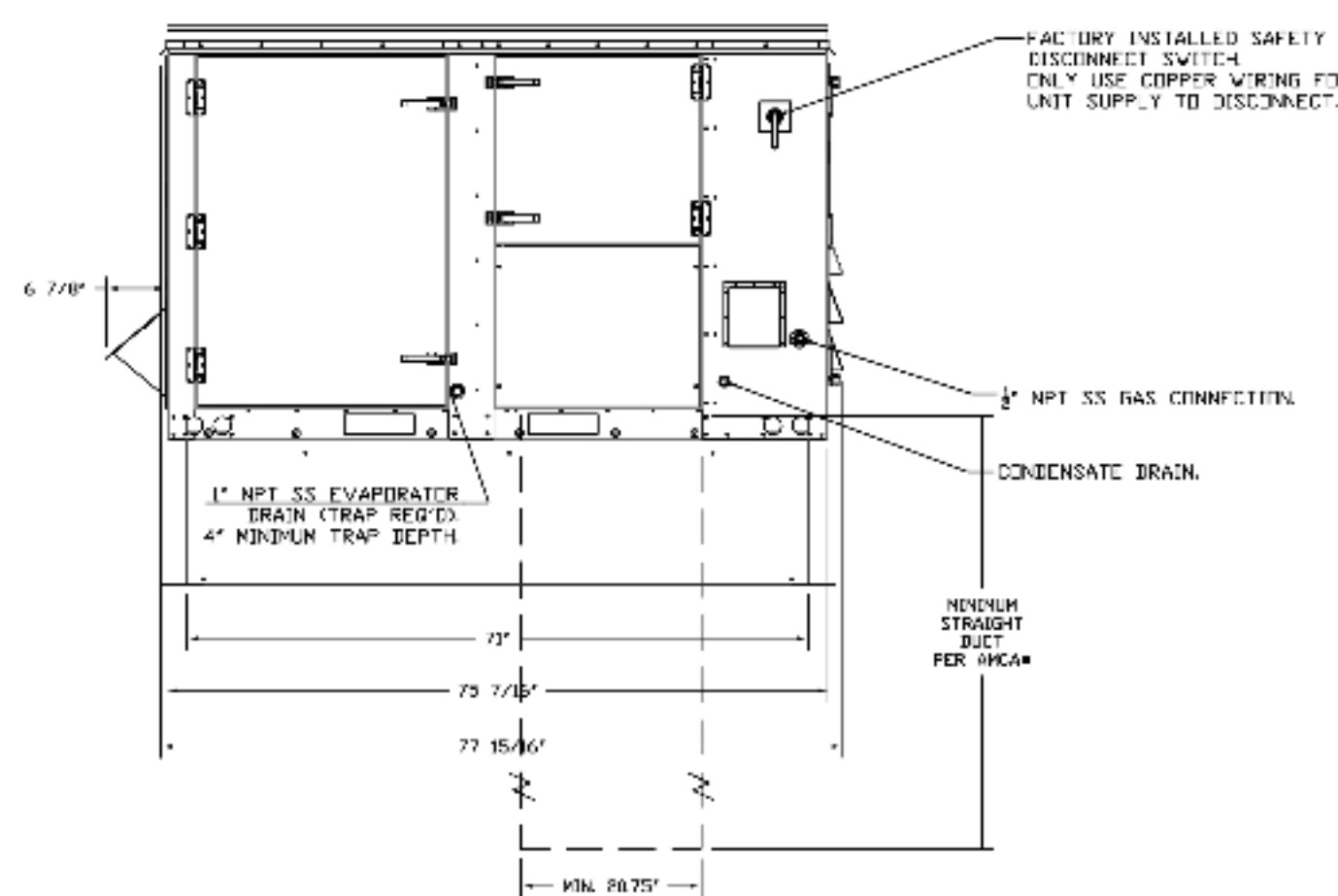
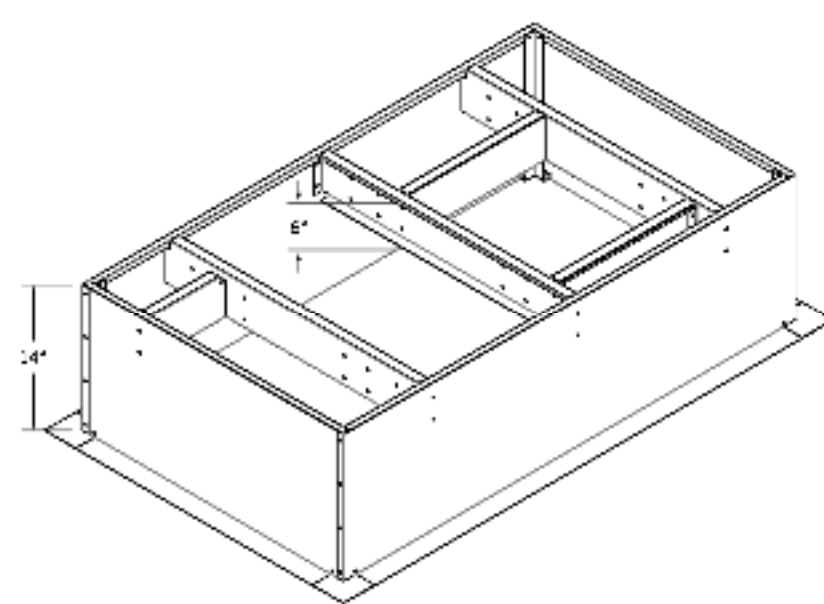
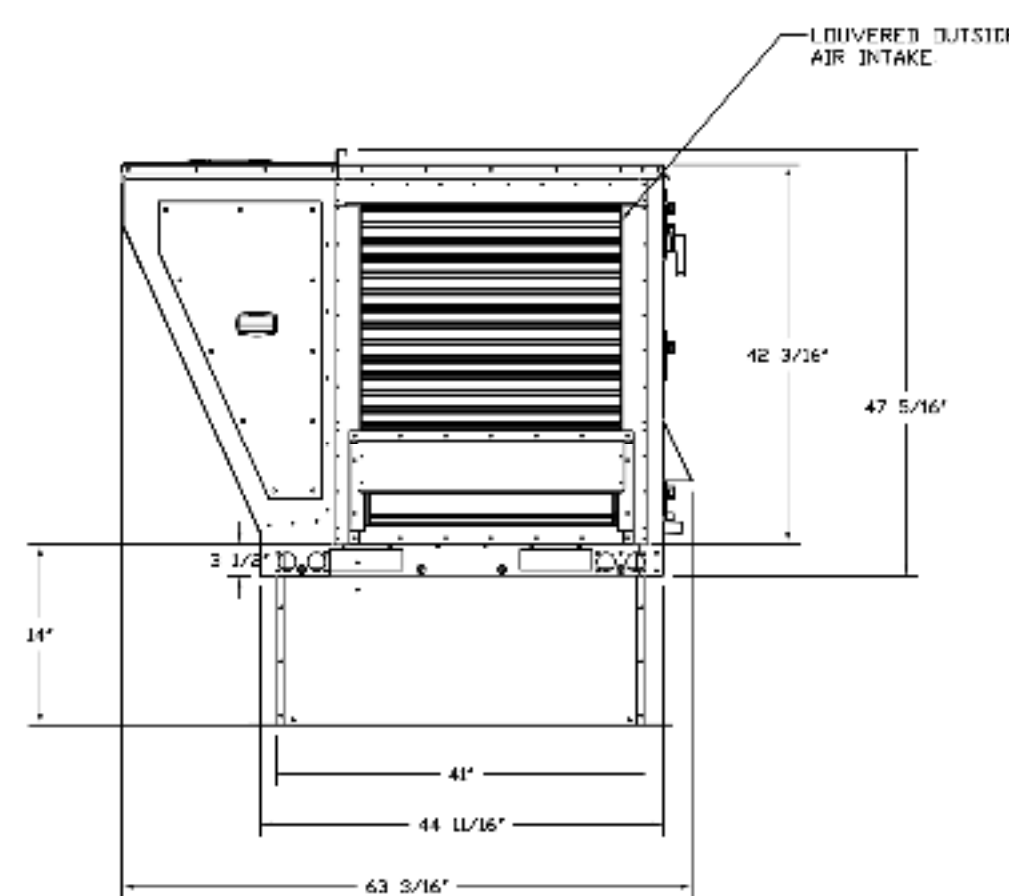
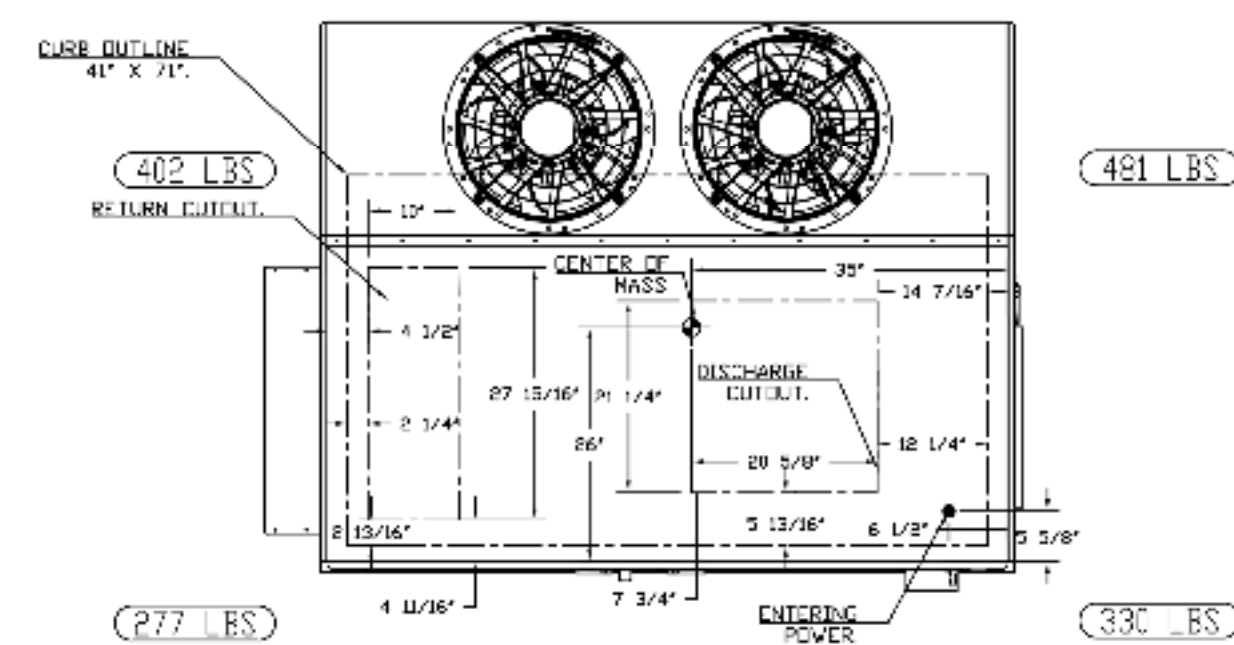
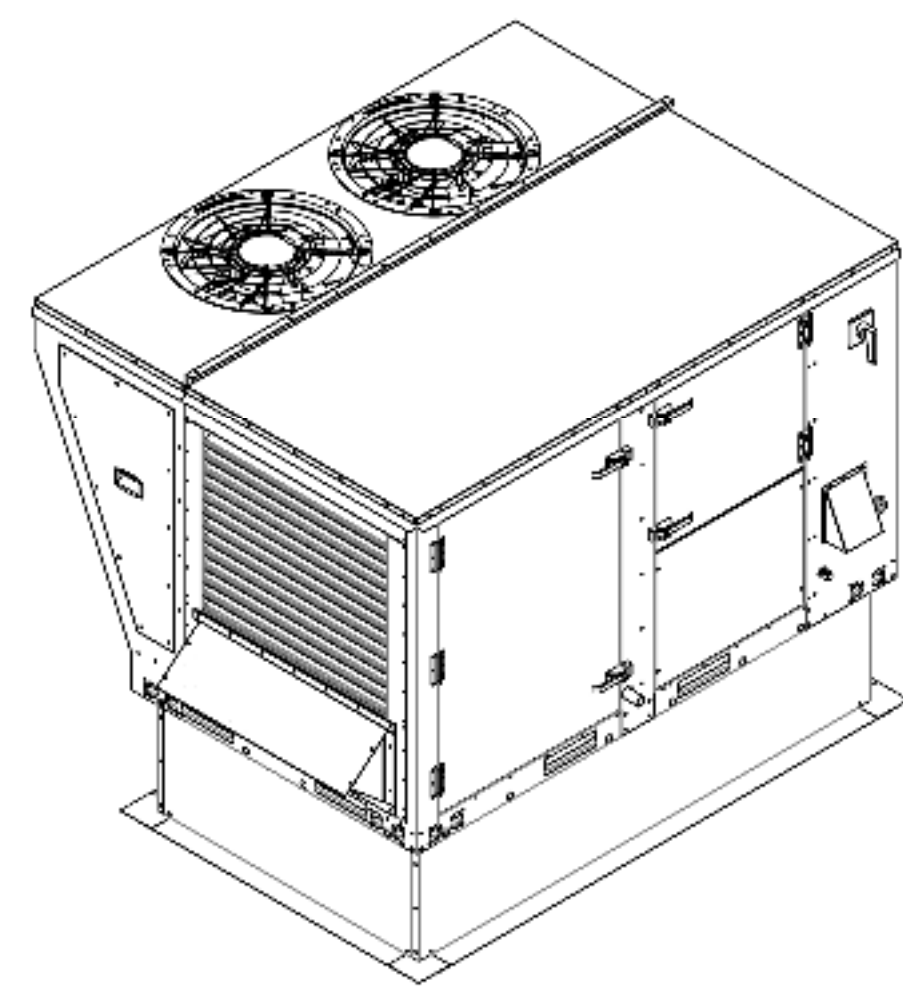
DOAS/RTU FAN SCHEDULE - JOB#7399155

FAN UNIT NO.	TAG	QTY	FAN INFORMATION				ELECTRICAL INFORMATION				COOLING INFORMATION				REHEAT INFORMATION				GAS HEAT INFORMATION				ACL MINIMUM ROOM VOLUME																							
			ELIAS/RTU MODEL #	MANUFACTURER	BLOWER	RETURN AIR CFM (EST.)	TOTAL CFM	WEIGHT (LBS)	ESP	HP	PHASE	VOLT	WIRE	WIRE	WIRE	WIRE	WIRE	WIRE	WIRE	WIRE	WIRE	WIRE	WIRE	WIRE	WIRE	WIRE	WIRE	WIRE																		
1	RTU-1 (COIN)	1	CAS-1VAC1-150-18-1ET	CAPTIVEAIRE	10M-1-RTU	1800	900	2000	1490	1000	2.30	3	008	551A	66A	9.0FT	77.0FT	80.4FT	69.5FT	56.4FT	49.9FT	45.6FT	110.0	100	14.0	5.0	76.0"	59.0"	44.0	30.0	11.9	10.4	44.5	130.0	NATURAL	7670	57243	55"	7	IN. W.C.	14	IN. W.C.	2451	60	7.2	1.2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19
2	RTU-2 (KITCHEN)	1	CAS-1VAC1 150 C-1ST	CAPTIVEAIRE	10M-1-RTU	1800	900	2000	1490	1000	2.30	3	008	742A	06A	9.0FT	77.0FT	80.4FT	71.0FT	48.5FT	40.4FT	46.4FT	104.1	100	14.0	5.0	76.0"	59.0"	44.0	30.0	12.0	10.5	44.5	130.0	NATURAL	18809	56235	59"	7	IN. W.C.	14	IN. W.C.	6021	100	7.2	1.2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,18,19,20

NOTES:
 1. INVERTER SCROLL COMPRESSOR WITH INTEGRATED OIL SENSOR. DIGITAL 2R STAGES SCROLL. NOT AN APPROVED OEM.
 2. DIRECT DRIVE PLENUM BLOWER. BELT DRIVEN BLOWERS ARE NOT ACCEPTABLE.
 3. INTEGRATED MONITORING VIA CELLULAR CONNECTION BY MANUFACTURER.
 4. REFRIGERANT LINE PRESSURE MONITORS IN HIGH AND LOW PRESSURE STAGE. IF SYSTEM INCLUDES 1400MM RECAL INTERLOCK.
 5. CO PETER CONDENSING FAN.
 6. ELECTRONIC EXPANSION VALVE. TXV NOT ACCEPTABLE.
 7. SECTION LINE ACCESSIBLE.
 8. FACTORY COMMISSIONING WITH 5 YEAR PARTS WARRANTY. 25 YEAR WARRANTY ON STAINLESS STEEL HEAT EXCHANGER.
 9. AVERAGE INTAKE EVAP AND DEWPOINT TEMPERATURE SENSORS. DISCHARGE SENSORS TO BE FACTORY MOUNTED WITHIN UNIT.
 10. 80% EFFICIENT FURNACE WITH MODULATING BURNER TO MAINTAIN CONSTANT COMBUSTION EFFICIENCY ACROSS FIRING RANGE. 66 TURNDOWN WITH NG AND 51 TURNDOWN WITH LP.
 11. SUPPLY AIR IN (DURING OPERATION) TO UNIT WITH 13M PASSEY-MIN. INCLUDES 13" HOLLOW DUCT. (INTERFAC)
 12. 2.5" MODULATING REHEAT GAS COIL.
 13. 15 TON SIZE 1" MODULATING REHEAT OPTION - SPACE DEWPOINT CONTROL - R454B
 14. HALL GUARD FOR CONDENSING COIL.
 15. RTU ECONOMIZER WITH DIFFERENTIAL ENTHALPY CONTROL.
 16. BANGOR-PAC RELIEF VALVE.
 17. 1" EXTERIOR DUAL-WALL CONSTRUCTION W/ 2-4.0 INSULATION-MINIMUM 26GA EXTERIOR W/ 18GA BASE

FOR QUESTIONS, CALL THE
 Eastern PA Mechanical
 RECEIVED
 PHONE (267) 534-4196
 EMAIL me@easternpa.com

FAN UNIT NO.	TAG	QTY	DESCRIPTION
1	RTU-1 (COIN)	1	INLET PRESSURE GAUGE, 0-35"
		1	MANIFOLD PRESSURE GAUGE, C TO 16" WC, 1 FURNACE
		1	2.0GPM OVERFLO
		1	SINGLE POINT ELECTRICAL CONNECTION FOR RTU 750VA TRANSFORMER USED IF A NON-DCV REWIRE OPTION IS THIS UNIT. THE 200, 447, 750, OR 900 REWIRE OPTION MUST BE SELECTED. DOES NOT PROVIDE SUPPLY STARTER IN REWIRE.
		1	CASLINK BUILDING MONITORING SYSTEM - INTERNET OR CELLULAR CONNECTION REQUIRED
		1	RTU BLOWER ROOF SWITCH
		1	2" MERV 8 FILTERS FOR RTU1 (QTY: 4)
		1	2" MERV 8 FILTERS FOR RTU1 (QTY: 4)
		1	OVERHEAT STAT
		1	TOTAL OFF MONITORING
		1	VFD FACTORY MOUNTED AND WIRED IN RTU COMMERCIAL CONTROL VESTIBULE
		1	RTU DOWN DISCHARGE
		1	15 TON SIZE 1" MODULATING REHEAT OPTION, 268/230V, R454B REFRIGERANT, VARIABLE SPEED COMPRESSOR, COIL CONDENSING FANS
		1	R454B LEAK DETECTOR OPTION FOR RTU1
		1	1/2" AMBIENT COOLING OPERATION - DOWN TO 38" AMBIENT
		1	ECOPRO 3.0-6.00 INCH
		1	INTAKE FIRESTAT SET TO 125°F
		1	RECESTAT
		1	DISCHARGE FIRESTAT SET TO 240°F
		1	15 TON SIZE 1" MODULATING REHEAT OPTION - SPACE DEWPOINT CONTROL - R454B
		1	RTU1 CURB DUCT HANGER
		1	COMMERCIAL SMOKE DETECTOR/ALARM INTERLOCK - ALARM SUPPLIED BY OTHERS
		1	COATING FOR RTU1 INT EVAP COIL
		1	COATING FOR RTU1 INT REHEAT COIL
		1	2.0GPM FILTER SWITCH - NOTIFICATION ON HMI
1	RTU1 CONVENIENCE DUCTLET (QTY: 15 AMP) - REQUIRES SEPARATE 120V CONNECTION. INCLUDES RECEPTACLE, COVER AND 1 BOX		
1	RTU ECONOMIZER - DIFFERENTIAL ENTHALPY CONTROL		
1	RTU ECONOMIZER BANGOR-PAC RELIEF		
1	RTU INTAKE/RETURN BARRIER - MANUAL CONTROL VIA HMI		
1	RTU INTAKE/RETURN BARRIER - MANUAL CONTROL VIA HMI		
1	RTU FUEL GUARD		
1	RTU DOWN RETURN		
1	2" METAL MESH FILTERS FOR RTU1 OUTDOOR INTAKE		
1	VAV PACKAGE W/ MANUAL/EEC CONTROL (QTY: VFD INCLUDED)		
1	5 YEAR ENTIRE UNIT PARTS WARRANTY, 6 YEAR ENTIRE UNIT PARTS WARRANTY WITH REMOTE MONITORING AND CAPTIVEAIRE SERVICE CONTRACT, 25 YEAR STAINLESS STEEL FURNACE PARTS WARRANTY (SEE ADDITIONAL DETAILS)		
1	EXTERIOR GAS CONNECTION PROVIDED BY FACTORY WITH QUICK SEAL AND ANTI-ROTATION BRACKET		
2	RTU-2 (KITCHEN)	1	INLET PRESSURE GAUGE, 0-35"
		1	MANIFOLD PRESSURE GAUGE, C TO 16" WC, 1 FURNACE
		1	2.0GPM OVERFLO
		1	SINGLE POINT ELECTRICAL CONNECTION FOR RTU 750VA TRANSFORMER USED IF A NON-DCV REWIRE OPTION IS THIS UNIT. THE 200, 447, 750, OR 900 REWIRE OPTION MUST BE SELECTED. DOES NOT PROVIDE SUPPLY STARTER IN REWIRE.
		1	CASLINK BUILDING MONITORING SYSTEM - INTERNET OR CELLULAR CONNECTION REQUIRED
		1	CONSTRUCTION HIDE - REWIRE START-UP SETTINGS TO ALLOW TEMPORING A BUILDING STILL UNDER CONSTRUCTION
		1	RTU BLOWER ROOF SWITCH
		1	RTU1 DOWN DISCHARGE
		1	2" MERV 8 FILTERS FOR RTU2 (QTY: 4)
		1	2" MERV 8 FILTERS FOR RTU2 (QTY: 4)
		1	OVERHEAT STAT
		1	TOTAL OFF MONITORING
		1	VFD FACTORY MOUNTED AND WIRED IN RTU COMMERCIAL CONTROL VESTIBULE
		1	RTU1 DOWN DISCHARGE
		1	15 TON SIZE 1" MODULATING REHEAT OPTION, 268/230V, R454B REFRIGERANT, VARIABLE SPEED COMPRESSOR, COIL CONDENSING FANS
		1	R454B LEAK DETECTOR OPTION FOR RTU2
		1	1/2" AMBIENT COOLING OPERATION - DOWN TO 38" AMBIENT
		1	ECOPRO 3.0-6.00 INCH
		1	INTAKE FIRESTAT SET TO 125°F
		1	RECESTAT
		1	DISCHARGE FIRESTAT SET TO 240°F
		1	RTU2 CURB DUCT HANGER
		1	RTU2 CURB DUCT HANGER
		1	COMMERCIAL SMOKE DETECTOR/ALARM INTERLOCK - ALARM SUPPLIED BY OTHERS
		1	2.0GPM FILTER SWITCH - NOTIFICATION ON HMI
1	RTU2 CONVENIENCE DUCTLET (QTY: 15 AMP) - REQUIRES SEPARATE 120V CONNECTION. INCLUDES RECEPTACLE, COVER AND 1 BOX		
1	15 TON SIZE 1" MODULATING REHEAT OPTION, 268/230V, R454B REFRIGERANT, VARIABLE SPEED COMPRESSOR, COIL CONDENSING FANS		
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1	DISCHARGE FIRESTAT SET TO 240°F		
1	RTU2 CURB DUCT HANGER		
1	RTU2 CURB DUCT HANGER		
1	COMMERCIAL SMOKE DETECTOR/ALARM INTERLOCK - ALARM SUPPLIED BY OTHERS		
1	2.0GPM FILTER SWITCH - NOTIFICATION ON HMI		
1	RTU2 CONVENIENCE DUCTLET (QTY: 15 AMP) - REQUIRES SEPARATE 120V CONNECTION. INCLUDES RECEPTACLE, COVER AND 1 BOX		
1	15 TON SIZE 1" MODULATING REHEAT OPTION, 268/230V, R454B REFRIGERANT, VARIABLE SPEED COMPRESSOR, COIL CONDENSING FANS		
1	R454B LEAK DETECTOR OPTION FOR RTU2		
1	1/2" AMBIENT COOLING OPERATION - DOWN TO 38" AMBIENT		
1	ECOPRO 3.0-6.00 INCH		
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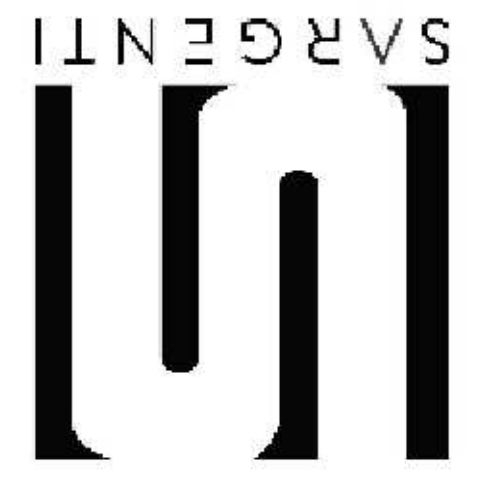
REVISIONS	
NO.	DESCRIPTION

CAPTIVE AIRE
 www.captiveaire.com
 Eastern PA Mechanical
 225 E City Line Avenue, Suite #103, Bala Cynwyd, PA 19004 PHONE: (267) 504-4195 EMAIL: rgr100@captiveaire.com

Shake Shack-1715-Jupiter, FL (HVAC)
 PALM BEACH GARDENS, FL, 33410

DATE: 3/12/2025
DWG.#: 7359155
DRAWN BY: Joe Shilba
SCALE: 1/2" = 1'-0"
MASTER DRAWING
SHEET NO. 2

FAN #1 CAS-HVAC1-1100-18MF-10T - HEATER (RTU-1 (DINING))
NOTES:
 1. DO NOT OBSTRUCT OUTSIDE AIR INLET, OUTSIDE AIR COIL OR OUTSIDE AIR FAN.
 2. () DENOTES CORNER WEIGHT.
 3. ROOF OPENING MUST BE 2" SMALLER THAN CURS DIMENSIONS IN BOTH DIRECTIONS.
 4. CONNECTION FROM BREAKER TO UNITS SAFETY DISCONNECT SWITCH TO BE COPPER WIRE ONLY.
 5. EXTERIOR GAS CONNECTION PROVIDED BY FACTORY WITH QUICK SEAL AND ANTI-ROTATION BRACKET.
 *NOTE: INTEGRAL CO2 MONITORING AND CONTROL CAPABILITIES FOR ALL SPACE MOUNTED THERMOSTATS.



CONSULTANTS:

 14001 Quorum Street Suite 900 Dallas, TX 75244
 T: 972.387.0000

SEAL SIGNATURE:
 FOR REFERENCE ONLY

NO.	BY	DATE	DESCRIPTION



SHAKE SHACK JUPITER

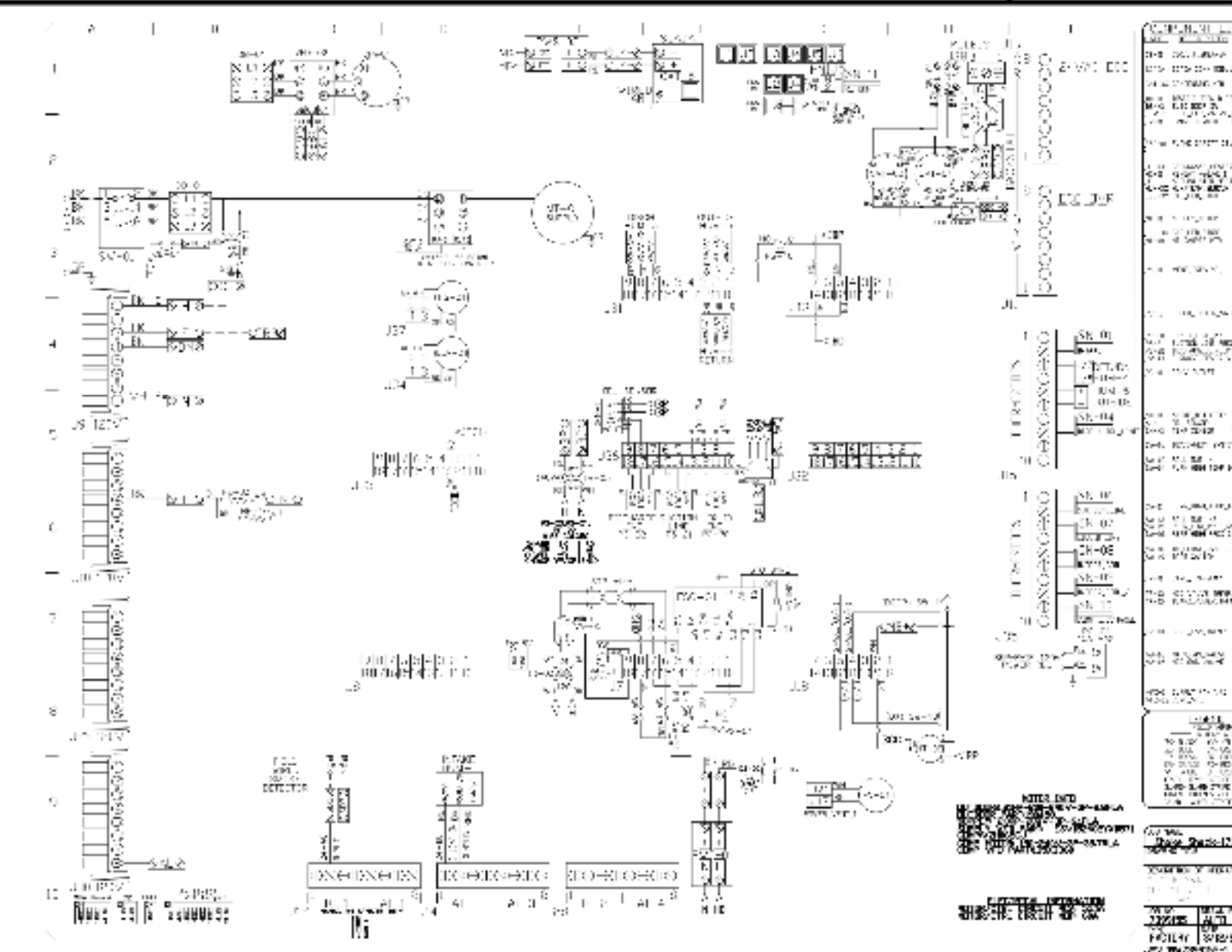
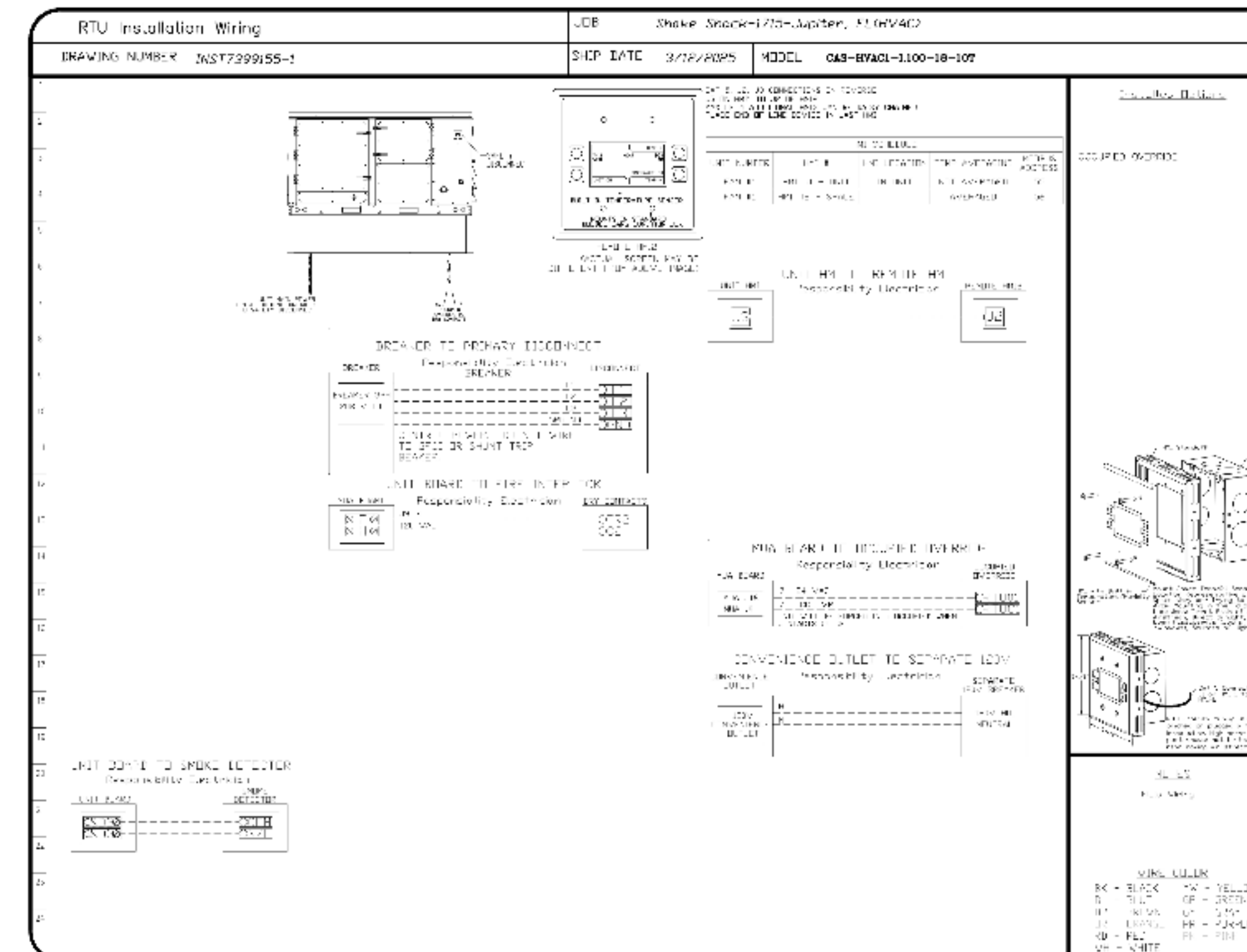
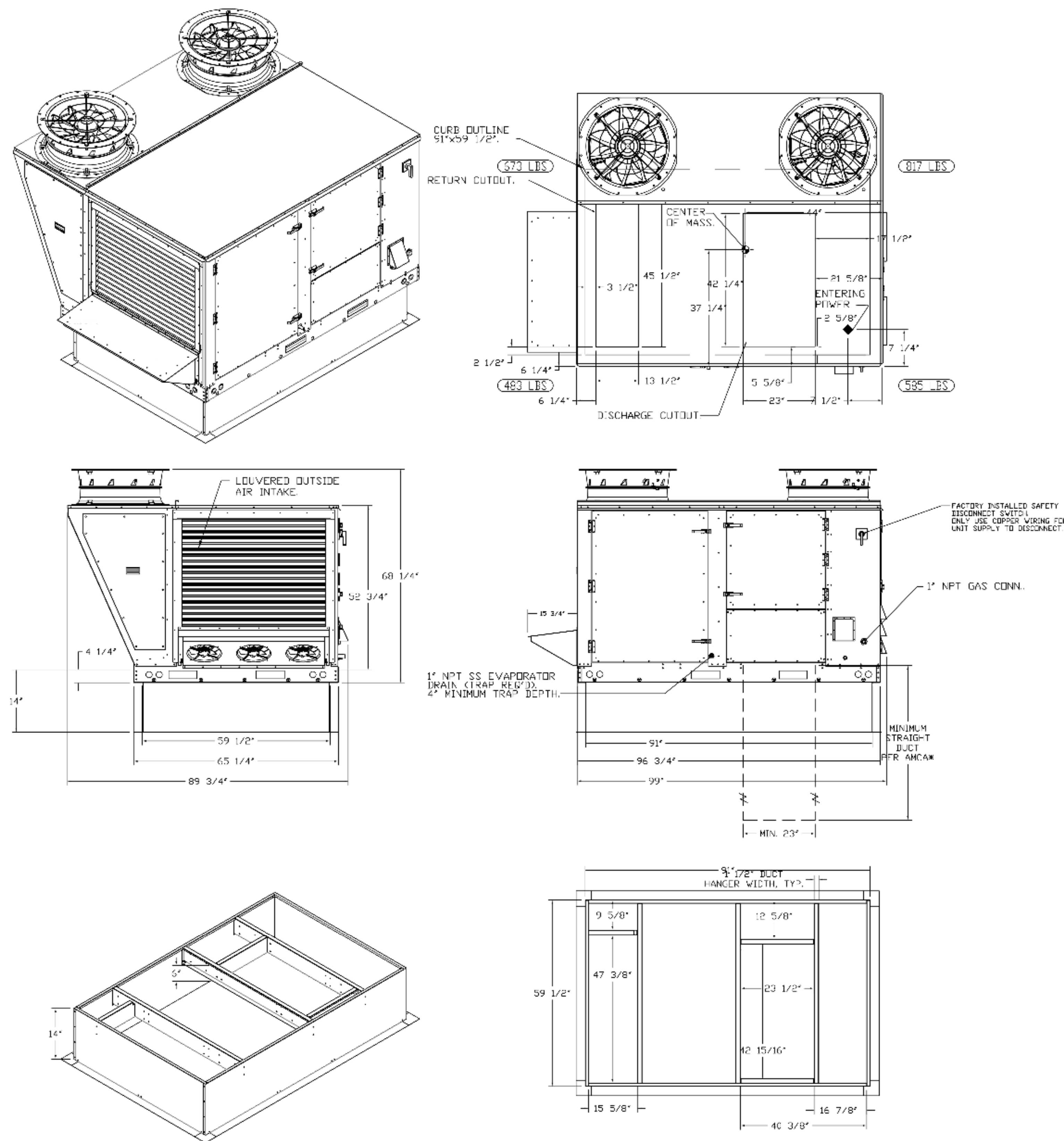
6230 INDIANTOWN RD. SUITE 11, JUPITER, FL 33409 SHACK #1715

100% SET

CAPTIVE AIRE DRAWINGS

DRAWN BY: XX
 CHECKED BY: XX
 PROJECT NO: 12427-25

M708



FAN #2 CAS-HVAC3-I150-24MF-15T - HEATER (RTU-2 (KITCHEN))

- NOTES:
- DO NOT OBSTRUCT OUTSIDE AIR INLET, OUTSIDE AIR COIL OR OUTSIDE AIR FAN.
 - () DENOTES CORNER WEIGHT.
 - ROOF OPENING MUST BE 2" SMALLER THAN CURB DIMENSIONS IN BOTH DIRECTIONS.
 - CONNECTION FROM BREAKER TO UNITS SAFETY DISCONNECT SWITCH TO BE COPPER WIRE ONLY.
 - EXTERIOR GAS CONNECTION PROVIDED BY FACTORY WITH QUICK SEAL AND ANTI-ROTATION BRACKET.

NOTE: IN EQUAL CURB MONITORING AND CONTROL CAPABILITIES FOR ALL SPACE MOUNTED THERMOSTATS.

REVISIONS

NO.	BY	DATE	DESCRIPTION
1	Joe, shilba	3/12/2025	RTU Installation Wiring

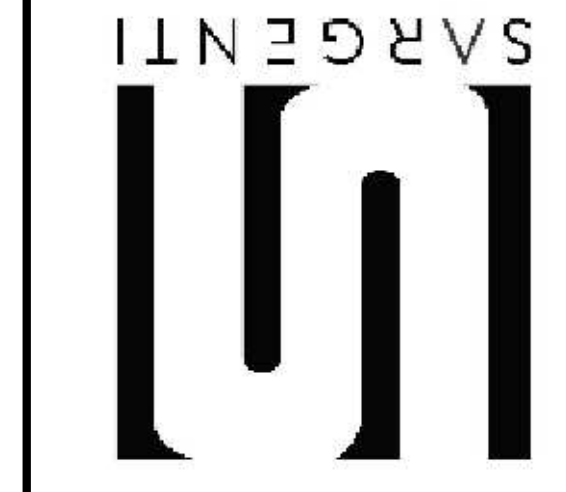
CAPTIVE AIRE
www.captiveaire.com
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Snake Shack-1715-Jupiter, FL (HVAC)
PALM BEACH GARDENS, FL, 33410

DATE: 3/12/2025
DWG.#: 7359155
DRAWN BY: Joe, shilba
SCALE: 1/2" = 1'-0"
MASTER DRAWING

SHEET NO. 3

5310 E HIGH STREET SUITE 350
PHOENIX, AZ 85054
TJ 480.448.6250
WWW.SARGARCH.COM



CONSULTANTS:
rtm
engineering consultants
14000 Canyon Street, Suite 900, Dallas, TX 75244
T 972.387.0000

SEAL SIGNATURE:
FOR REFERENCE ONLY

NO.	BY	DATE	DESCRIPTION
1	Joe, shilba	3/12/2025	RTU Installation Wiring



SHAKE SHACK JUPITER

6230 INDIANTOWN RD. SUITE 11,
JUPITER, FL 33409
SHACK #1715

100% SET

CAPTIVE AIRE DRAWINGS

DRAWN BY: XX
CHECKED BY: XX
PROJECT NO: 12427-25

M709