

**MECHANICAL SHEET INDEX**

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**RESPONSIBILITY MATRIX**

DESCRIPTION	FURNISHED			INSTALLED			REMARKS
	GC	OWNER	LL	GC	OWNER	LL	
<b>DIVISION 23: HEATING, VENTILATING, AND AIR CONDITIONING</b>							
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	•			•			
<b>23.2 ROOF CURBS</b>							
23.2 HVAC DUCTWORK SYSTEM COMPONENTS							
HVAC DUCTWORK	•			•			
GREASE DUCTWORK INSIDE TENANT SPACE	•			•			
MAKEUP AIR DUCTWORK INSIDE TENANT SPACE	•			•			
OUTSIDE AIR DUCTWORK INSIDE TENANT SPACE	•			•			
RESTROOM EXHAUST AIR DUCTWORK INSIDE TENANT SPACE	•			•			
INSULATION AND FIRE WRAP	•			•			
DAMPERS	•			•			
SMOKE DETECTORS	•			•			
SUPPLY, RETURN, AND EXHAUST GRILLS AND REGISTERS	•			•			
<b>23.3 HVAC EQUIPMENT</b>							
GENERAL EXHAUST FAN	•			•			
KITCHEN EXHAUST PRECIPITATOR	•			•			
DUCTED AND NON-DUCTED HEATING AND COOLING UNITS	•			•			
MAKEUP AIR UNIT	•			•			
<b>23.6 KITCHEN EXHAUST WITH FIRE SUPPRESSION SYSTEM</b>							
HOOD CONTROL PANEL	•			•			
KITCHEN EXHAUST HOOD	•			•			
STRUCTURAL SUPPORT	•			•			
ELECTRICAL AND CONTROL WIRING	•			•			
ANSUL SYSTEM	•			•			B
ANSUL WIRING AND UTILITIES CONNECTION	•			•			
ANSUL GAS VALVE	•			•			
<b>23.7 COMMISSIONING ACTIVITIES</b>							
GREASE EXHAUST WATER LEAKAGE TEST	•			•			
TEST AND BALANCE (TAB) REPORT	•			•			

GENERAL NOTES:  
 1. INFORMATION CONTAINED WITHIN IS BASED ON THE EXECUTED WORK LETTER DATE...  
 2. REFER TO FINAL WORK LETTER FOR ALL LANDLORD / TENANT SCOPE OF WORK...

REMARKS:  
 A. WALK-IN COOLER AND FREEZER SUPPLIED BY VENDOR NO. 27. GENERAL CONTRACTOR SCOPE OF WORK TO INCLUDE PIPING INSTALLATION AND FINAL CONNECTION.  
 B. GENERAL CONTRACTOR TO COORDINATE AND FACILITATE SYSTEM SIGN-OFF.

**SUBMITTAL MATRIX**

SUBMITTAL DESCRIPTION	Required Review Time (Business Days)		Shake Shack	Physical Sample Required	Submit for Record	Submit for Record Only
	Architect of Record	Shake Shack				
Diffusers, Grills & Registers	5	X		X		
Ductwork Layout (if there are significant changes in field)	5	X		X		
HVAC Equipment (if Carrier - Submitted by Owner Vendor directly to Owner/AOR prior to construction))	5	X		X		
M&P Tests, Start-Up, and Programming Reports	5	X		X		

**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.
- EXISTING CONDITIONS WERE TAKEN FROM ORIGINAL DRAWINGS AND SITE VISITS AND MAY NOT REFLECT EXACT "AS-BUILT" CONDITIONS. FIELD VERIFY EXISTING CONDITIONS PRIOR TO SUBMITTING FINAL BIDS. COORDINATE NEW WORK AND DEMOLITION WITH OTHER DISCIPLINES AND EXISTING CONDITIONS PRIOR TO CONSTRUCTION.
- COORDINATE THE INSTALLATION OF THE MECHANICAL SYSTEMS WITH OTHER TRADES TO ENSURE A NEAT AND ORDERLY INSTALLATION. INSTALL DUCTWORK AND FITTINGS 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.
- DURING INSTALLATION OF NEW WORK, AVOID DAMAGING EXISTING SURFACES AND EQUIPMENT TO REMAIN. REPAIR DAMAGE CAUSED DURING CONSTRUCTION AT NO EXTRA COST TO THE OWNER.
- 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 ATTACH 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 REBURSED 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 U.L. 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.
- FIELD VERIFY THAT THE EXISTING EQUIPMENT INCLUDING ACCESSORIES BEING REUSED FOR THIS PROJECT IS NOT DAMAGED AND IS IN GOOD WORKING ORDER. REPORT ANY DEFICIENCIES TO THE OWNER OR ARCHITECT. SUBMIT TO THE OWNER AND ARCHITECT A WRITTEN REPORT DESCRIBING TESTS PERFORMED TO VERIFY OPERATION AND RESULTS OF THE TESTS.
- 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**

STANDARD MOUNTING HEIGHT		HVAC DUCTWORK AND ACCESSORIES		PIPING SYMBOLS																																																																																																																																																																																																																																																																																														
<p>THIS IS A MASTER LEGEND AND NOT ALL SYMBOLS OR ABBREVIATIONS ARE USED. V2.06</p> <p>THERMOSTATS USER ADJUSTABLE(TOP OF DEVICE) 48"            CONTROLS (TOP OF DEVICE) 48"</p> <p>INSTALL DEVICES AT THE MOUNTING HEIGHTS SHOWN ABOVE UNLESS OTHERWISE NOTED IN THE CONSTRUCTION DOCUMENTS. MOUNTING HEIGHTS LISTED ABOVE OR ELSEWHERE IN THE CONSTRUCTION DOCUMENTS ARE AFF OR AFF TO BOTTOM OF DEVICE UNLESS NOTED OTHERWISE. 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 &amp; 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) LP 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/RET-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>ALL DUCT DIMENSIONS SHOWN ON DRAWINGS ARE INSIDE DIMENSIONS. REFER TO DUCTWORK SPECIFICATIONS FOR DUCTWORK INSULATION AND LINER INFORMATION.</p>	<p>DIRECTION OF FLOW</p> <p>CONTROL VALVE</p> <p>THREE-WAY CONTROL VALVE</p> <p>SHUT OFF 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 &amp; 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>																																																																																																																																																																																																																																																																																																
<p><b>ANNOTATION</b></p> <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><b>ABBREVIATIONS</b></p> <table border="0"> <tr><td>A/C</td><td>AIR CONDITIONING</td><td>HWP</td><td>HEATING WATER PUMP</td></tr> <tr><td>ACC</td><td>AIR COOLED CHILLER</td><td>IN WC</td><td>INCHES OF WATER COLUMN</td></tr> <tr><td>ACCU</td><td>AIR COOLED CONDENSING UNIT</td><td>LAT</td><td>LEAVING AIR TEMPERATURE</td></tr> <tr><td>AFC</td><td>ABOVE FINISHED CEILING</td><td>LDB</td><td>LEAVING DRY BULB</td></tr> <tr><td>AFF</td><td>ABOVE FINISHED FLOOR</td><td>LFP</td><td>LEAVING WET BULB</td></tr> <tr><td>AFG</td><td>ABOVE FINISHED GRADE</td><td>LWT</td><td>LEAVING WATER TEMPERATURE</td></tr> <tr><td>AHU</td><td>AUTHORITY HAVING JURISDICTION</td><td>MAU</td><td>MAKE-UP AIR UNIT</td></tr> <tr><td>AHU</td><td>AIR HANDLING UNIT</td><td>MAX</td><td>MAXIMUM</td></tr> <tr><td>AI</td><td>ANALOG INPUT</td><td>MB</td><td>MINIMUM BTU PER HOUR</td></tr> <tr><td>AO</td><td>ANALOG OUTPUT</td><td>MD</td><td>MOTORIZED DAMPER</td></tr> <tr><td>AP</td><td>ACCESS PANEL</td><td>MFR</td><td>MANUFACTURER</td></tr> <tr><td>APD</td><td>AIR PRESSURE DROP</td><td>MIN</td><td>MINIMUM</td></tr> <tr><td>AWG</td><td>AMERICAN WIRE GAUGE</td><td>N/A</td><td>NOT APPLICABLE</td></tr> <tr><td>B</td><td>BOILER</td><td>N/C</td><td>NORMALLY CLOSED</td></tr> <tr><td>BAS</td><td>BUILDING AUTOMATION SYSTEM</td><td>N/O</td><td>NORMALLY OPEN</td></tr> <tr><td>BB</td><td>BACKBONE</td><td>NOM</td><td>NOMINAL</td></tr> <tr><td>BD</td><td>BACKDRAFT DAMPER</td><td>NC</td><td>NOISE CRITERIA</td></tr> <tr><td>BLOWDOWN</td><td></td><td>NF</td><td>NON-FUSED</td></tr> <tr><td>BFC</td><td>BELOW FINISHED CEILING</td><td>NIC</td><td>NOT IN CONTRACT</td></tr> <tr><td>BFF</td><td>BELOW FINISHED FLOOR</td><td>OA</td><td>OUTSIDE AIR</td></tr> <tr><td>BFG</td><td>BELOW FINISHED GRADE</td><td>OBEP</td><td>OUTSIDE BRINE EXHAUST PUMP</td></tr> <tr><td>BFF</td><td>BOILER FEED PUMP</td><td>OV</td><td>OVERFLOW</td></tr> <tr><td>BHP</td><td>BRAKE HORSEPOWER</td><td>PICV</td><td>PIPING CONTROL VALVE</td></tr> <tr><td>BI</td><td>BINARY INPUT</td><td>PROVIDE</td><td>FURNISH AND INSTALL</td></tr> <tr><td>BO</td><td>BINARY OUTPUT</td><td>QTY</td><td>QUANTITY</td></tr> <tr><td>BOD</td><td>BOTTOM OF DUCT</td><td>RA</td><td>RETURN AIR</td></tr> <tr><td>BOS</td><td>BOTTOM OF STRUCTURE</td><td>RC</td><td>ROOM CRITERIA</td></tr> <tr><td>BTU</td><td>BRITISH THERMAL UNIT</td><td>RFR</td><td>REFRIGERANT</td></tr> <tr><td>CFM</td><td>CUBIC FEET PER MINUTE</td><td>REA</td><td>RELIEF AIR</td></tr> <tr><td>CH</td><td>CHILLER</td><td>RF</td><td>RETURN FAN</td></tr> <tr><td>CLG</td><td>COOLING</td><td>RH</td><td>RELATIVE HUMIDITY</td></tr> <tr><td>CO</td><td>CLEANOUT</td><td>RH</td><td>REFRIGERANT HOOD</td></tr> <tr><td>CP</td><td>CONDENSATE PUMP</td><td>RPM</td><td>REVOLUTIONS PER MINUTE</td></tr> <tr><td>CPT</td><td>CONTROL POWER</td><td>RTU</td><td>ROOFTOP UNIT</td></tr> <tr><td>CRAC</td><td>TRANSFORMER</td><td>SA</td><td>SUPPLY AIR</td></tr> <tr><td>CRU</td><td>COMPUTER ROOM AIR CONDITIONING UNIT</td><td>SCP</td><td>STEAM CONDENSATE PUMP</td></tr> <tr><td>CU</td><td>COMPUTER ROOM UNIT COOLING TOWER</td><td>SD</td><td>SMOKE DUCT DETECTOR</td></tr> <tr><td>CV</td><td>CONTROL VALVE</td><td>SD</td><td>SUPPLY DUCT</td></tr> <tr><td>CWP</td><td>CONDENSATE WATER PUMP</td><td>SE</td><td>SUPPLY FAN</td></tr> <tr><td>CU</td><td>CONDENSING UNIT</td><td>SH</td><td>SENSIBLE HEAT CAPACITY</td></tr> <tr><td>CHWP</td><td>CHILLED WATER PUMP</td><td>SOV</td><td>SCOPE OF WORK STATIC PRESSURE</td></tr> <tr><td>DB</td><td>DECEBELS</td><td>SP</td><td>STEAM TRAP</td></tr> <tr><td>DBA</td><td>DECEBEL AVERAGE</td><td>STM</td><td>STEAM</td></tr> <tr><td>DDC</td><td>DIRECT DIGITAL CONTROL</td><td>TD</td><td>TO BE DETERMINED</td></tr> <tr><td>DI</td><td>DIGITAL INPUT</td><td>TC/C</td><td>TEMPERATURE CONTROLS CONTRACTOR</td></tr> <tr><td>DISC</td><td>DISCONNECT</td><td>TEMPERATURE CONTROL</td><td></td></tr> <tr><td>DN</td><td>DOWN</td><td>TF</td><td>TRANSFER FAN</td></tr> <tr><td>DS</td><td>DUCT SILENCER</td><td>TFA</td><td>TO FLOOR ABOVE</td></tr> <tr><td>DX</td><td>DIRECT EXPANSION</td><td>TFB</td><td>TO FLOOR BELOW</td></tr> <tr><td>EA</td><td>EXISTING</td><td>TH</td><td>TOTAL HEAT CAPACITY</td></tr> <tr><td>EA</td><td>EXHAUST AIR</td><td>TSP</td><td>TOTAL STATIC PRESSURE</td></tr> <tr><td>EAT</td><td>ENTERING AIR TEMPERATURE</td><td>TT</td><td>TEMPERATURE</td></tr> <tr><td>ED</td><td>EXHAUST DUCT</td><td>TTYP</td><td>TRANSMITTAL TYPICAL</td></tr> <tr><td>EDB</td><td>ENTERING DRY BULB</td><td>U/F</td><td>UNDERFLOOR</td></tr> <tr><td>EF</td><td>EXHAUST FAN</td><td>UG</td><td>UNDERGROUND</td></tr> <tr><td>EFF</td><td>EFFICIENCY</td><td>US</td><td>SYSTEM</td></tr> <tr><td>EMS</td><td>ENERGY MANAGEMENT SYSTEM</td><td>UH</td><td>UNIT HEATER</td></tr> <tr><td>ESP</td><td>EXTERNAL STATIC 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<tr><td>HOA</td><td>HAND-OFF-AUTOMATIC</td><td></td><td></td></tr> <tr><td>HP</td><td>HORSEPOWER</td><td></td><td></td></tr> <tr><td>HTG</td><td>HEATING</td><td></td><td></td></tr> </table>	A/C	AIR CONDITIONING	HWP	HEATING WATER PUMP	ACC	AIR COOLED CHILLER	IN WC	INCHES OF WATER COLUMN	ACCU	AIR COOLED CONDENSING UNIT	LAT	LEAVING AIR TEMPERATURE	AFC	ABOVE FINISHED CEILING	LDB	LEAVING DRY BULB	AFF	ABOVE FINISHED FLOOR	LFP	LEAVING WET BULB	AFG	ABOVE FINISHED GRADE	LWT	LEAVING WATER TEMPERATURE	AHU	AUTHORITY HAVING JURISDICTION	MAU	MAKE-UP AIR UNIT	AHU	AIR HANDLING UNIT	MAX	MAXIMUM	AI	ANALOG INPUT	MB	MINIMUM BTU PER HOUR	AO	ANALOG OUTPUT	MD	MOTORIZED DAMPER	AP	ACCESS PANEL	MFR	MANUFACTURER	APD	AIR PRESSURE DROP	MIN	MINIMUM	AWG	AMERICAN WIRE GAUGE	N/A	NOT APPLICABLE	B	BOILER	N/C	NORMALLY CLOSED	BAS	BUILDING AUTOMATION SYSTEM	N/O	NORMALLY OPEN	BB	BACKBONE	NOM	NOMINAL	BD	BACKDRAFT DAMPER	NC	NOISE CRITERIA	BLOWDOWN		NF	NON-FUSED	BFC	BELOW FINISHED CEILING	NIC	NOT IN CONTRACT	BFF	BELOW FINISHED FLOOR	OA	OUTSIDE AIR	BFG	BELOW FINISHED GRADE	OBEP	OUTSIDE BRINE EXHAUST PUMP	BFF	BOILER FEED PUMP	OV	OVERFLOW	BHP	BRAKE HORSEPOWER	PICV	PIPING CONTROL VALVE	BI	BINARY INPUT	PROVIDE	FURNISH AND INSTALL	BO	BINARY OUTPUT	QTY	QUANTITY	BOD	BOTTOM OF DUCT	RA	RETURN AIR	BOS	BOTTOM OF STRUCTURE	RC	ROOM CRITERIA	BTU	BRITISH THERMAL UNIT	RFR	REFRIGERANT	CFM	CUBIC FEET PER MINUTE	REA	RELIEF AIR	CH	CHILLER	RF	RETURN FAN	CLG	COOLING	RH	RELATIVE HUMIDITY	CO	CLEANOUT	RH	REFRIGERANT HOOD	CP	CONDENSATE PUMP	RPM	REVOLUTIONS PER MINUTE	CPT	CONTROL POWER	RTU	ROOFTOP UNIT	CRAC	TRANSFORMER	SA	SUPPLY AIR	CRU	COMPUTER ROOM AIR CONDITIONING UNIT	SCP	STEAM CONDENSATE PUMP	CU	COMPUTER ROOM UNIT COOLING TOWER	SD	SMOKE DUCT DETECTOR	CV	CONTROL VALVE	SD	SUPPLY DUCT	CWP	CONDENSATE WATER PUMP	SE	SUPPLY FAN	CU	CONDENSING UNIT	SH	SENSIBLE HEAT CAPACITY	CHWP	CHILLED WATER PUMP	SOV	SCOPE OF WORK STATIC PRESSURE	DB	DECEBELS	SP	STEAM TRAP	DBA	DECEBEL AVERAGE	STM	STEAM	DDC	DIRECT DIGITAL CONTROL	TD	TO BE DETERMINED	DI	DIGITAL INPUT	TC/C	TEMPERATURE CONTROLS CONTRACTOR	DISC	DISCONNECT	TEMPERATURE CONTROL		DN	DOWN	TF	TRANSFER FAN	DS	DUCT SILENCER	TFA	TO FLOOR ABOVE	DX	DIRECT EXPANSION	TFB	TO FLOOR BELOW	EA	EXISTING	TH	TOTAL HEAT CAPACITY	EA	EXHAUST AIR	TSP	TOTAL STATIC PRESSURE	EAT	ENTERING AIR TEMPERATURE	TT	TEMPERATURE	ED	EXHAUST DUCT	TTYP	TRANSMITTAL TYPICAL	EDB	ENTERING DRY BULB	U/F	UNDERFLOOR	EF	EXHAUST FAN	UG	UNDERGROUND	EFF	EFFICIENCY	US	SYSTEM	EMS	ENERGY MANAGEMENT SYSTEM	UH	UNIT HEATER	ESP	EXTERNAL STATIC PRESSURE	UNO	UNLESS NOTED OTHERWISE	ETR	EXISTING TO REMAIN	VAV	VARIABLE AIR VOLUME	EWB	ENTERING WET BULB	VEL	VELOCITY	EWT	ENTERING WATER TEMPERATURE	VFD	VARIABLE FREQUENCY DRIVE	FCU	FAN COIL UNIT	VR	VARIABLE REFRIGERANT	FFA	FROM FLOOR ABOVE	VRV	VARIABLE REFRIGERANT VOLUME	FFB	FROM FLOOR BELOW	W	WITH	FF	FINISHED FLOOR	WO	WITHOUT	FFI	FEET PER INCH	WB	WET BULB	FFM	FEET PER MINUTE	WC	WATER COLUMN	GC	GENERAL CONTRACTOR	WPD	WATER PRESSURE DROP	GPM	GALLONS PER MINUTE	XP	EXPLOSION PROOF	HOA	HAND-OFF-AUTOMATIC			HP	HORSEPOWER			HTG	HEATING			<p><b>HVAC CONTROL DEVICES</b></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>TEMPERATURE SENSOR</p>
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**GENERAL DEMOLITION NOTES:**

- COORDINATE ALL DEMOLITION WITH WHAT IS SHOWN ON ARCHITECTURAL PLANS. NOTIFY ARCHITECT OF ANY DISCREPANCIES.
- PRIOR TO SUBMITTING BID, VISIT THE JOB SITE AND BECOME FULLY ACQUAINTED WITH THE EXISTING CONDITIONS OF THE PROJECT. REVIEW GENERAL NOTES, SPECIFICATIONS AND OTHER DRAWINGS FOR ADDITIONAL REQUIREMENTS THAT MAY NOT BE SPECIFICALLY CALLED OUT IN THIS PORTION OF THE CONSTRUCTION DOCUMENTS. NOTIFY ARCHITECT, ENGINEER OR OWNER, AS DEFINED IN BID DOCUMENTS, OF CONFLICTS OR DISCREPANCIES PRIOR TO SUBMISSION OF BID.
- OWNER RETAINS RIGHTS OF SALVAGE FOR EQUIPMENT AND FIXTURES TO BE REMOVED. COORDINATE WITH OWNER THE EQUIPMENT AND FIXTURES TO BE SALVAGED AND THE LOCATION FOR STORAGE. AVOID DAMAGE TO SALVAGED EQUIPMENT, FIXTURES AND DEVICES DURING DEMOLITION WORK AND DURING TRANSPORT TO OWNER'S DESIGNATED STORAGE LOCATION.
- REMOVE ITEMS SHOWN HEAVY-LINED DASHED, AND/OR NOTED TO BE REMOVED.
- AVOID DAMAGING EXISTING SURFACES AND EQUIPMENT TO REMAIN FOR NEW INSTALLATION. REPAIR DAMAGE CAUSED DURING WORK AT NO EXTRA COST TO THE OWNER.
- SEAL PENETRATIONS THROUGH FLOORS, WALLS, CEILINGS AND ROOFS WHERE MECHANICAL COMPONENTS ARE REMOVED AND WHERE THE EXISTING PENETRATION IS NOT USED FOR THE NEW INSTALLATION. REPAIR DAMAGED SURFACES TO MATCH ADJACENT AREAS OR AS INDICATED ON THE ARCHITECTURAL DRAWINGS.
- REMOVE HANGERS AND SUPPORTS WHERE DUCTWORK, PIPING AND/OR EQUIPMENT ARE REMOVED AND THE EXISTING HANGERS AND SUPPORTS ARE NOT USED FOR THE NEW INSTALLATION.
- INSTALL PERMANENT CAPS WHERE DUCTWORK AND PIPING IS REMOVED AND THE EXISTING TAPS ARE NOT USED FOR THE NEW INSTALLATION. WHERE DUCTWORK AND PIPING ARE REMOVED AND THE EXISTING TAPS WILL BE USED FOR THE NEW INSTALLATION, INSTALL TEMPORARY CAPS TO PROTECT THE INTERIOR SURFACES UNTIL NEW DUCTWORK AND PIPING ARE INSTALLED.
- INSPECT EXISTING EQUIPMENT TO REMAIN TO VERIFY THAT EQUIPMENT IS OPERATING PROPERLY. NOTIFY OWNER OF DAMAGED AND/OR MALFUNCTIONING COMPONENTS.
- WHERE SHUTDOWN OF EXISTING SYSTEMS IS REQUIRED DURING DEMOLITION, COORDINATE SHUTDOWN TIME AND DURATION WITH OWNER TO MINIMIZE DOWNTIME. NOTIFY OWNER SEVEN (7) DAYS PRIOR TO INTERRUPTION OF SERVICE.
- CEASE WORK AND IMMEDIATELY NOTIFY THE OWNER SHOULD ANY HAZARDOUS MATERIALS BE ENCOUNTERED DURING THE PERFORMANCE OF THE WORK.
- REMOVAL, RECOVERY, RECYCLING, AND DISPOSAL OF REFRIGERANT, CONTAINED IN ANY EQUIPMENT TO BE REMOVED, SHALL BE PERFORMED IN STRICT ACCORDANCE WITH CURRENT EPA GUIDELINES.



STORE NO:  
**TX #1432**



REVISION		
NO.	DATE	DESCRIPTION
A	04/25/22	REVISION A
1	07/19/22	Revision 1

STATUS:  
**PERMIT / BID SET**



FIELD VERIFICATION:  
 The contractor shall verify all signed dimensions and location at the project site and notify Zebra Projects, ARCH. of any dimensional errors, or omissions or discrepancies before beginning or resuming any work. Do not proceed until notified.

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SHEET NAME:  
**MECHANICAL GENERAL INFORMATION**

DATE: 02/18/22 PROJECT NO: 34666

DRAWN: AJP SCALE:

SHEET NO:  
**M001**

**MECHANICAL LANDLORD GENERAL NOTES:**

- ANCHORS TO HANG DUCT AND OTHER EQUIPMENT INDOORS MUST SUSPEND FROM STRUCTURAL JOISTS, DO NOT SUSPEND OR ATTACH FROM ROOF DECK.

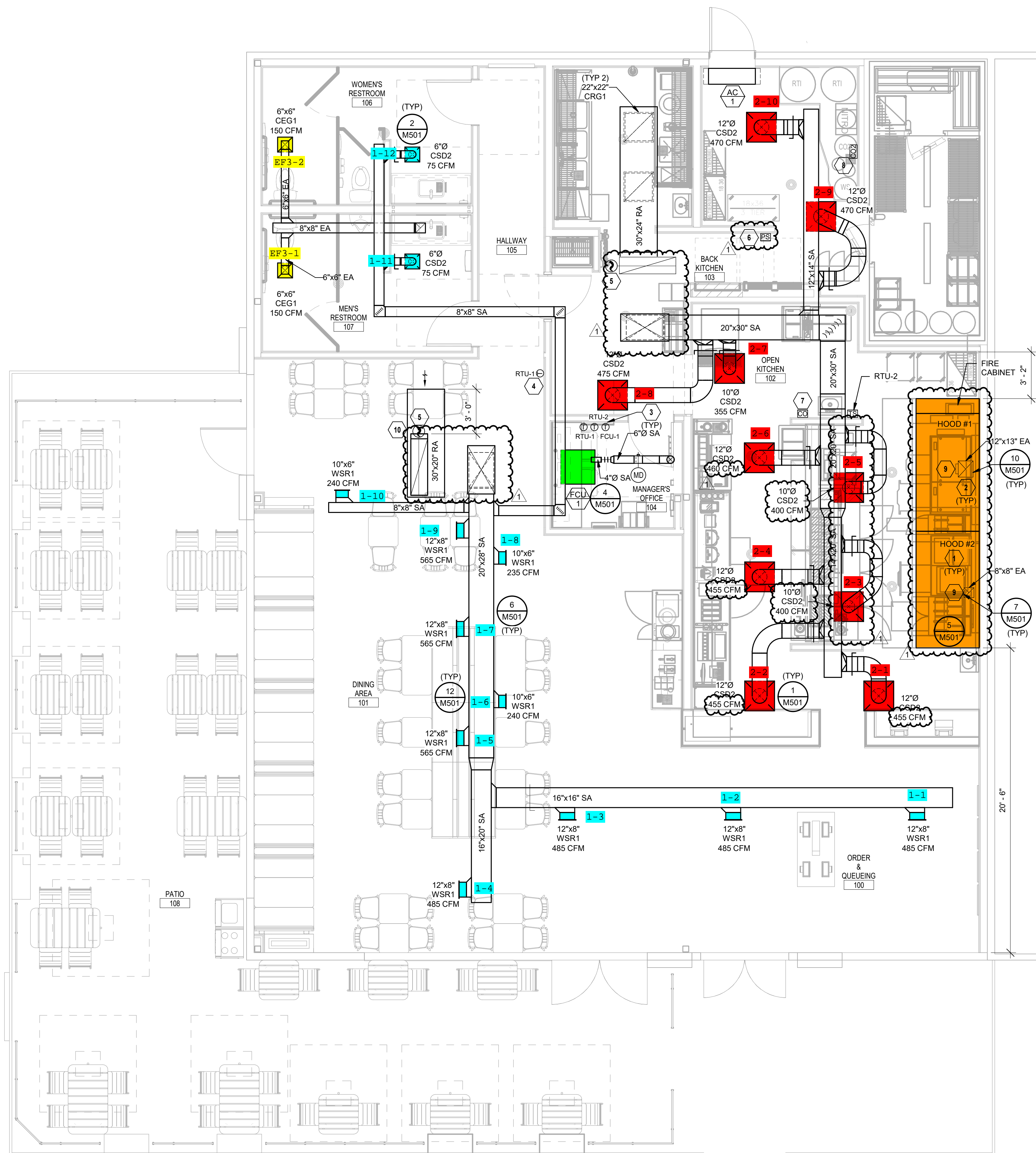
DEMOLITION: GENERAL CONTRACTOR SHALL DEMOLISH EXISTING IMPROVEMENTS IN THE PREMISES SO THAT THE PREMISES IS IN A SHELL CONDITION AND DEMOLISH AND REMOVE ANY EXISTING EQUIPMENT AND DUCTWORK THAT IS BEING ABANDONED BY THE PRIOR TENANT.

**MECHANICAL GENERAL NOTES:**

- DO NOT ROUTE ANY DUCTWORK OR PIPING ABOVE ELECTRICAL PANELS.
- REFER TO SHEET M001 FOR ADDITIONAL GENERAL NOTES AND REQUIREMENTS.
- REFER TO DETAILS AND SCHEDULES SHEETS FOR FURTHER INFORMATION.
- MOUNT ALL THERMOSTATS AND SENSORS CONTROLLING HVAC EQUIPMENT AT 48" AFF UNLESS OTHERWISE NOTED.

**MECHANICAL PLAN NOTES:**

- 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.
- TYPE I GREASE HOOD EXHAUST DUCTWORK SHALL BE MINIMUM 16 GAUGE STEEL OR MINIMUM 18 GAUGE STAINLESS STEEL WITH LIQUID TIGHT WELDS. 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.
- MOUNT THERMOSTATS, TEMPERATURE AND HUMIDITY SENSOR(S) ON WALL. LOCATE THERMOSTAT IN OFFICE AND TEMPERATURE/HUMIDITY SENSOR(S) IN ZONE. 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.
- COMBINATION TEMPERATURE SENSOR AND HUMIDITY SENSOR.
- INSTALL DUCT SMOKE DETECTOR IN RETURN AIR PLENUM.
- INSTALL HOOD FIRE SUPPRESSION MANUAL PULL STATION. COORDINATE EXACT LOCATION AND REQUIREMENTS WITH FIRE SUPPRESSION SYSTEM INSTALLER AND THE AUTHORITY HAVING JURISDICTION.
- CARBON MONOXIDE DETECTOR FURNISHED BY OWNER. INSTALL AT 5'-0" AFF. COORDINATE FINAL LOCATION WITH OWNER REPRESENTATIVE.
- PROVIDE ANALOX AX60 OR APPROVED EQUAL CARBON DIOXIDE SENSOR WITH REMOTE ALARM REPEATER TO BE MOUNTED AT 18" 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 MANUFACTURERS INSTALLATION INSTRUCTIONS.
- INSTALL "DUCTMATE ULTIMATE DOOR" GREASE DUCT ACCESS PANELS FOR CLEANING IN LOCATION SHOWN AT A MINIMUM AND AS REQUIRED BY NFPA 96 AND LOCAL CODES.
- 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.



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

ALL GREASE DUCT TO BE WATER TESTED BY ENVIROMATIC AT MECHANICAL CONTRACTOR'S EXPENSE. CONTACT OWNERS NATIONAL ACCOUNT VENDOR.

ENVIROMATIC  
 DON PFLEDERER  
 1.800.325.8476  
 inspections@enviromatic.com

THE BUILDINGS HVAC SYSTEMS SHALL BE BALANCED BY NATIONAL TAB (NO EXCEPTIONS) AND CONTRACTED BY THE GENERAL CONTRACTOR.

CONTACT:  
 WILL TURNBOUGH  
 will@nationaltab.com  
 855-662-6822 ext1704

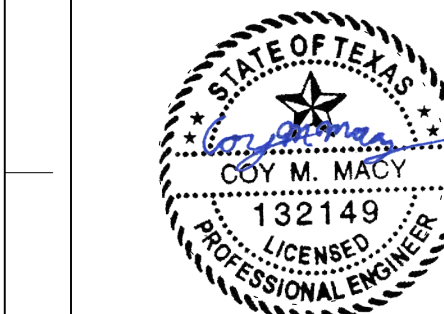
STORE NO:  
 TX #1432



**REVISION**

DATE	DESCRIPTION
04/25/22	REVISION A
07/19/22	Revision 1

STATUS:  
 PERMIT / BID SET



07/18/2022  
 FIELD VERIFICATION:  
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SHEET NAME:  
 MECHANICAL FLOOR PLAN

DATE:  
 02/18/22

PROJECT NO:  
 34666

DRAWN:  
 AJP

SCALE:  
 AS NOTED

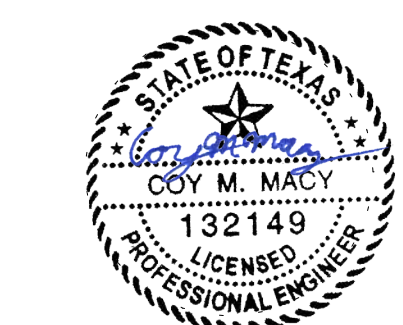
SHEET NO:  
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SCALE:  
 AS NOTED

**REVISION**

NO.	DATE	DESCRIPTION
A	04/25/22	REVISION A
1	07/19/22	Revision 1

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SHEET NAME:  
**MECHANICAL ROOF PLAN**

DATE:  
02/18/22

PROJECT NO:  
34666

DRAWN:  
AJP

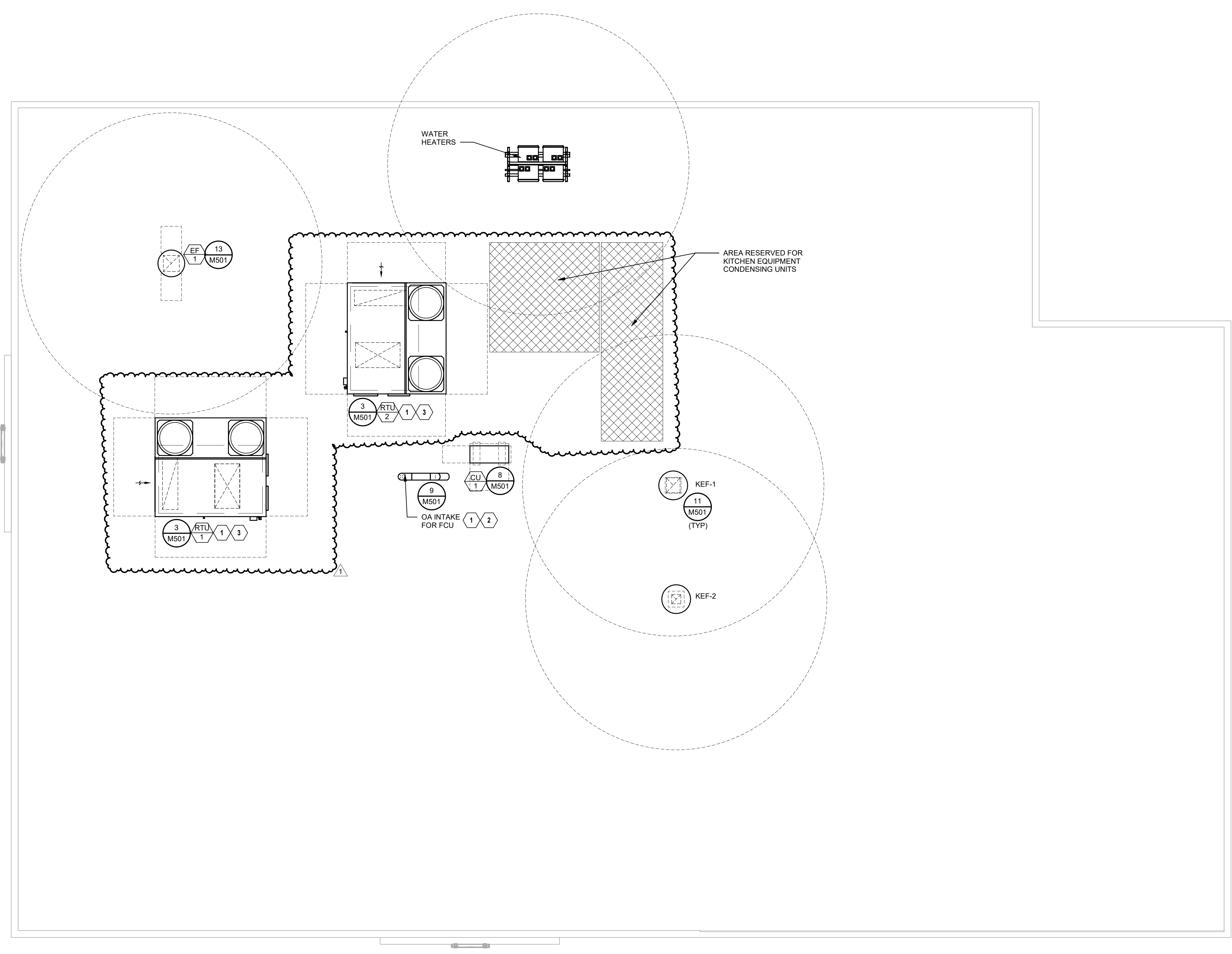
SCALE:  
AS NOTED

SHEET NO:  
**M150**

DEMOLITION: GENERAL CONTRACTOR SHALL DEMOLISH EXISTING IMPROVEMENTS IN THE PREMISES SO THAT THE PREMISES IS IN A SHELL CONDITION AND DEMOLISH AND REMOVE ANY EXISTING EQUIPMENT THAT IS BEING ABANDONED BY THE PRIOR TENANT. GENERAL CONTRACTOR SHALL REMOVE ALL ROOF MOUNTED EQUIPMENT ABOVE THE PREMISES. LANDLORD SHALL REMOVE ROOF CURBS AND PATCH BACK ACCORDINGLY.

- MECHANICAL GENERAL NOTES:**
- ALL VENT STACKS SHALL BE NO LESS THAN 12" FROM PARAPET, AT LEAST 10 FEET FROM OUTSIDE AIR INTAKES, AND ABOVE ROOF SURFACE 8" MINIMUM TO FULL HEIGHT OF PARAPET, WHICHEVER IS GREATER. CONTRACTOR SHALL PROVIDE BRACING AS SPECIFIED.
  - COORDINATE EXACT EQUIPMENT LOCATIONS WITH OTHER TRADES PRIOR TO INSTALLATION.
  - REFER TO SHEET M001 FOR ADDITIONAL GENERAL NOTES.
  - REFER TO DETAILS AND SCHEDULES SHEETS FOR FURTHER INFORMATION.

- MECHANICAL PLAN NOTES:**
- MAINTAIN ALL OUTSIDE AIR INTAKES A MINIMUM OF 10'-0" RADIUS FROM EXHAUST, TYPICAL.
  - TURN DOWN 6"0" INTAKE AND END OPEN OVER ROOF (MIN. 24") WITH INSECT SCREEN.
  - PROVIDE EQUIPMENT WITH NATIONAL TAB UV-FHI INDOOR AIR PURIFICATION SYSTEM, MODEL PHI-PKG-24V. INSTALL IN UNIT BLOWER COMPARTMENT PER MANUFACTURER'S INSTRUCTIONS.



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

E  
D  
C  
B  
A

REVISION	
DATE	DESCRIPTION
A 04/25/22	REVISION A
1 07/19/22	REVISION 1

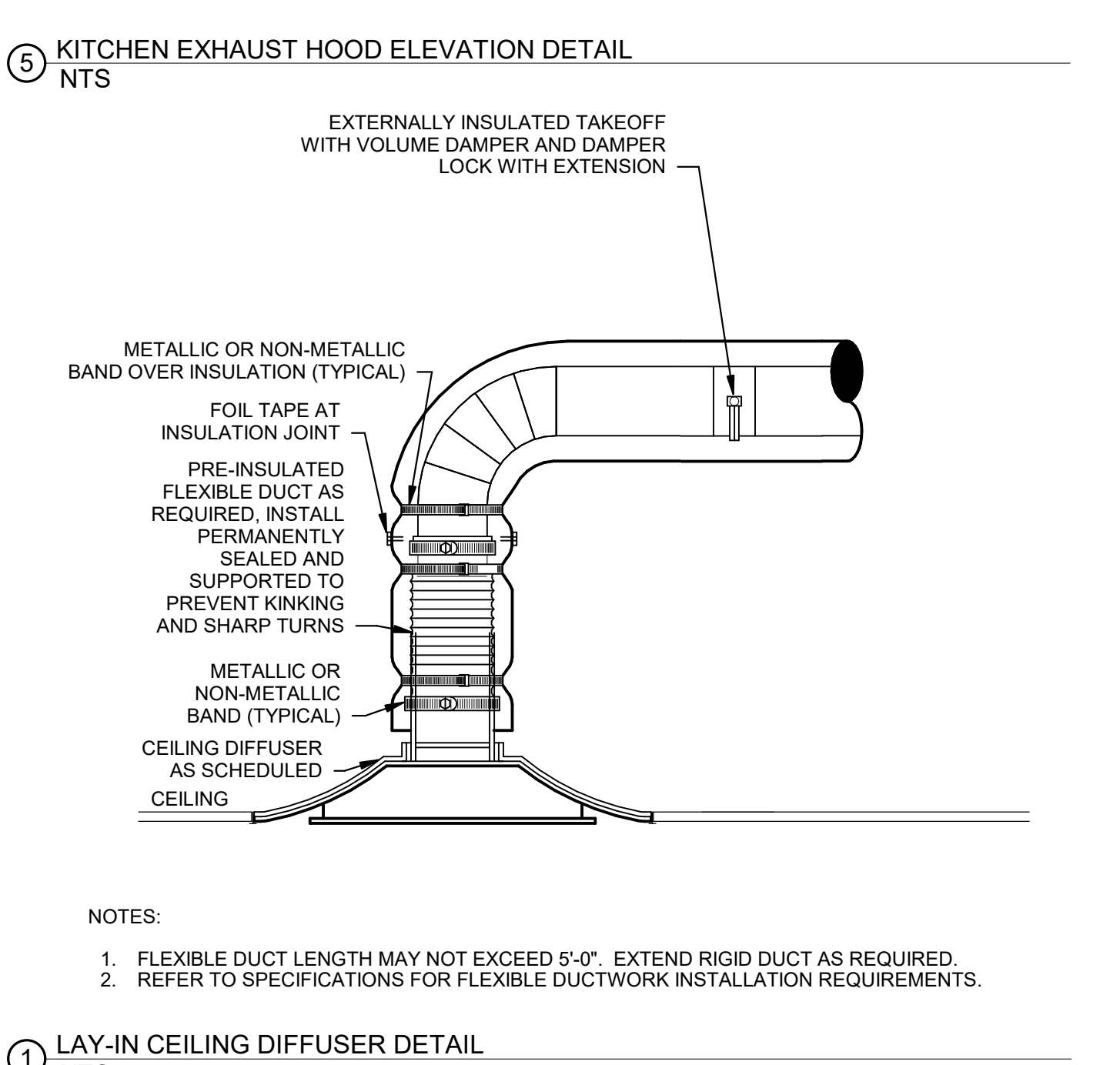
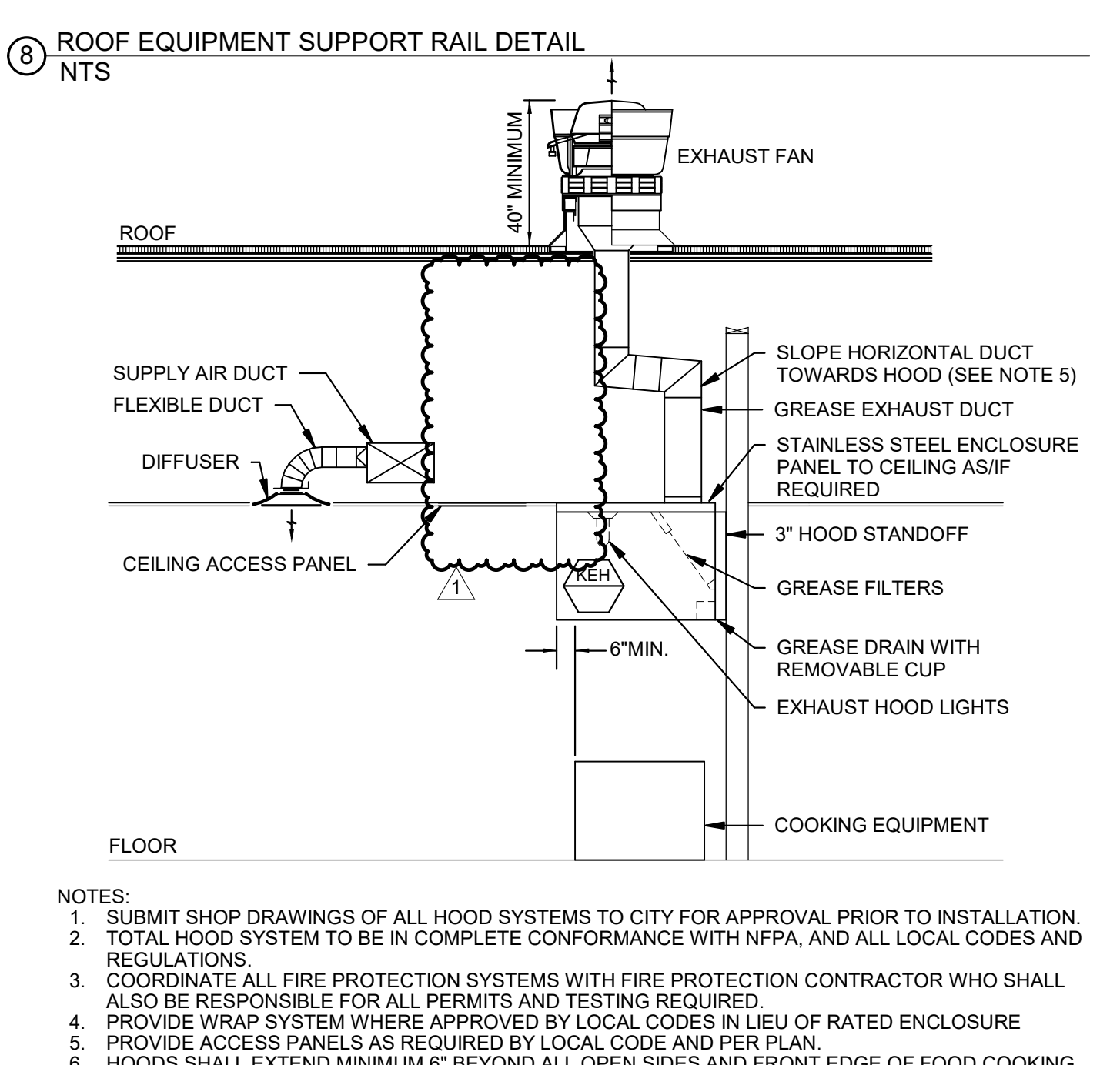
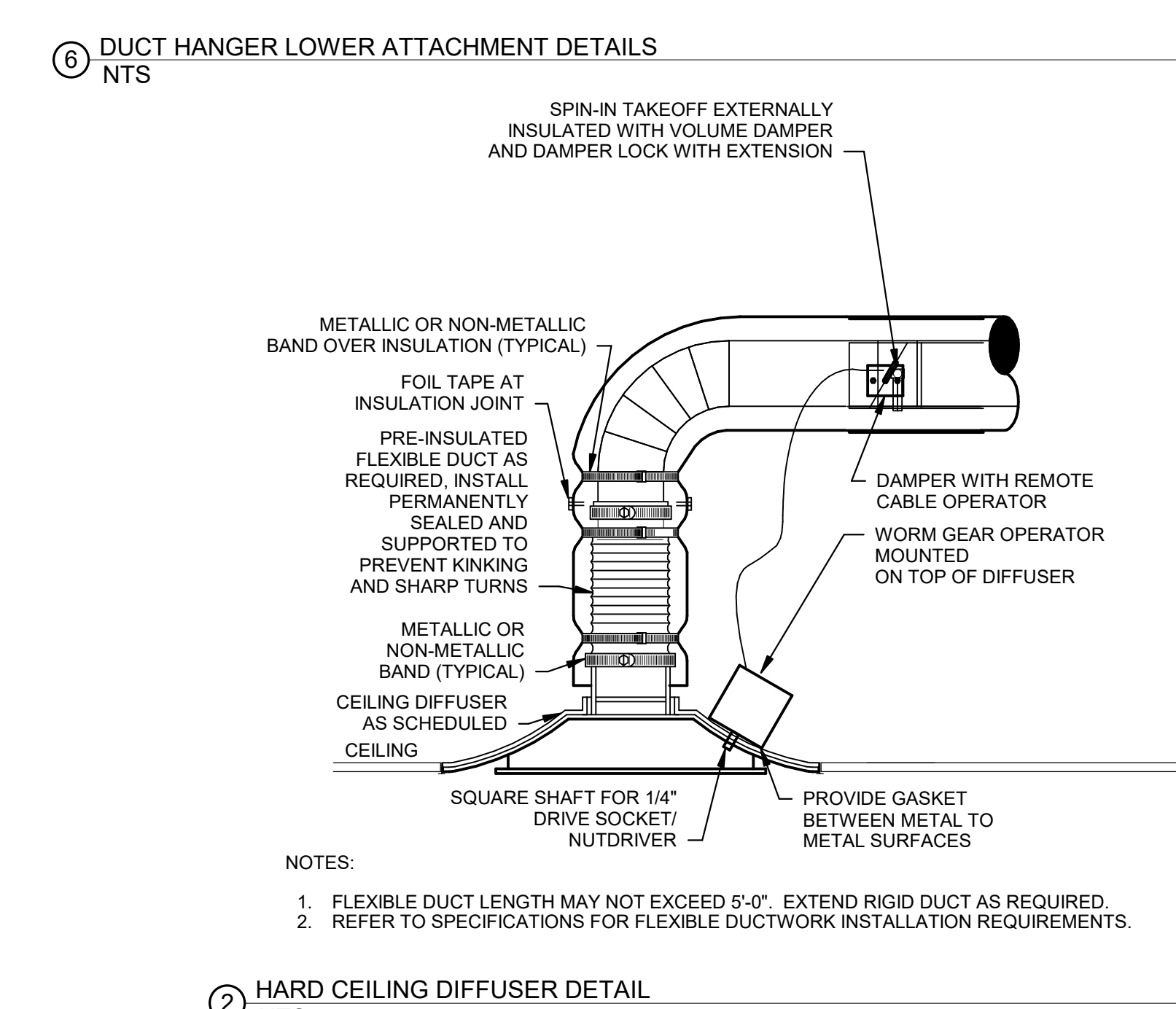
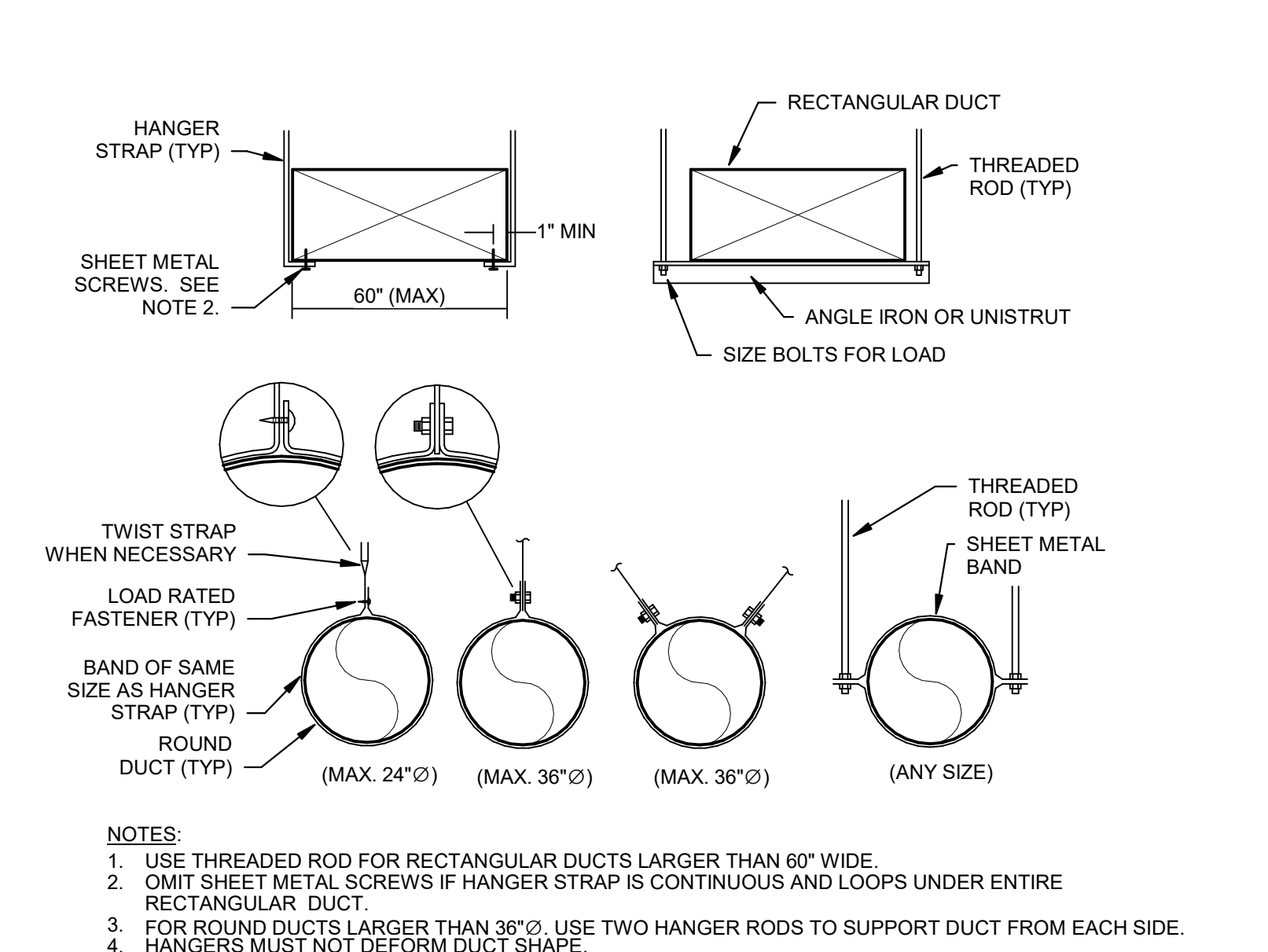
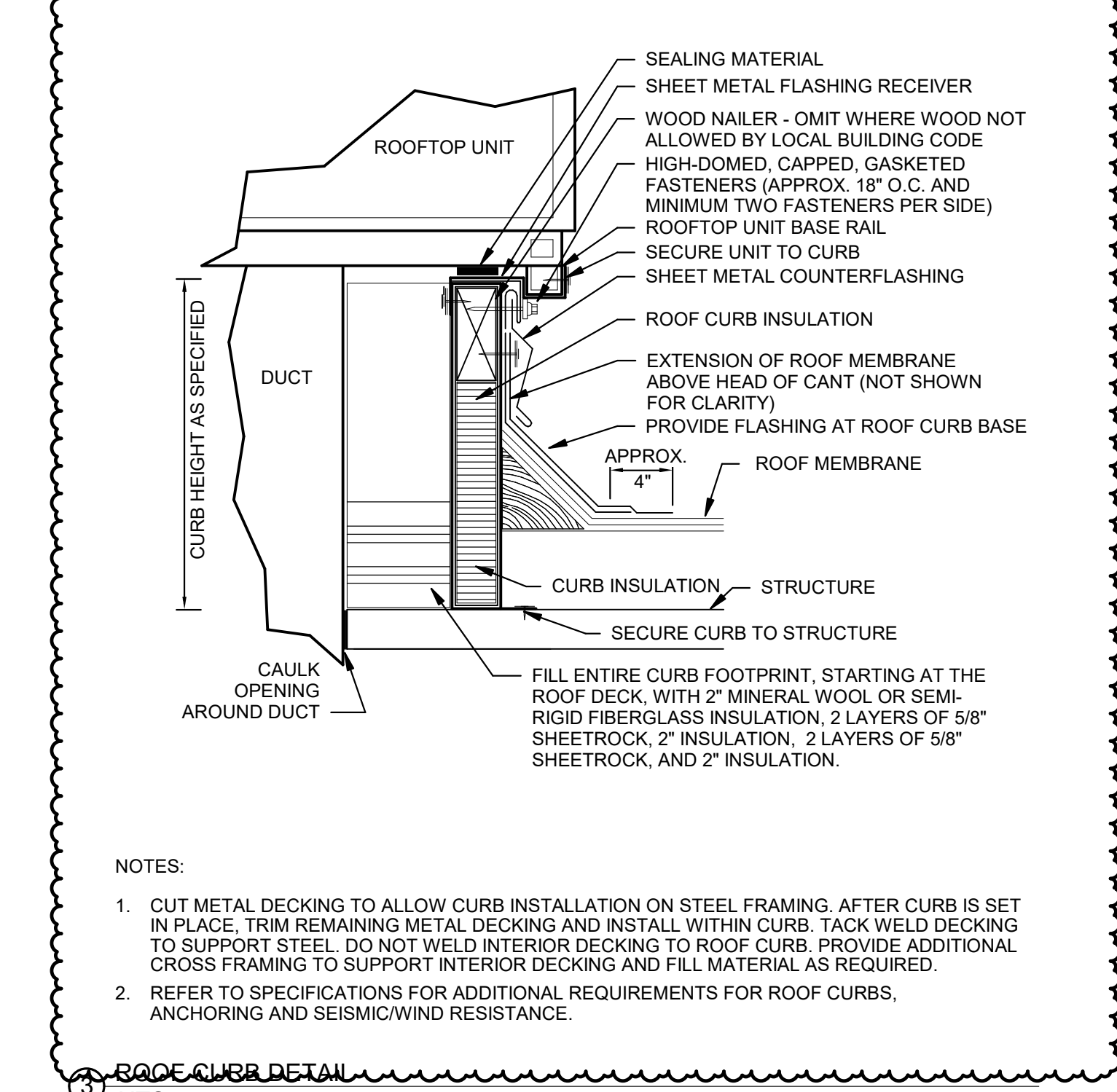
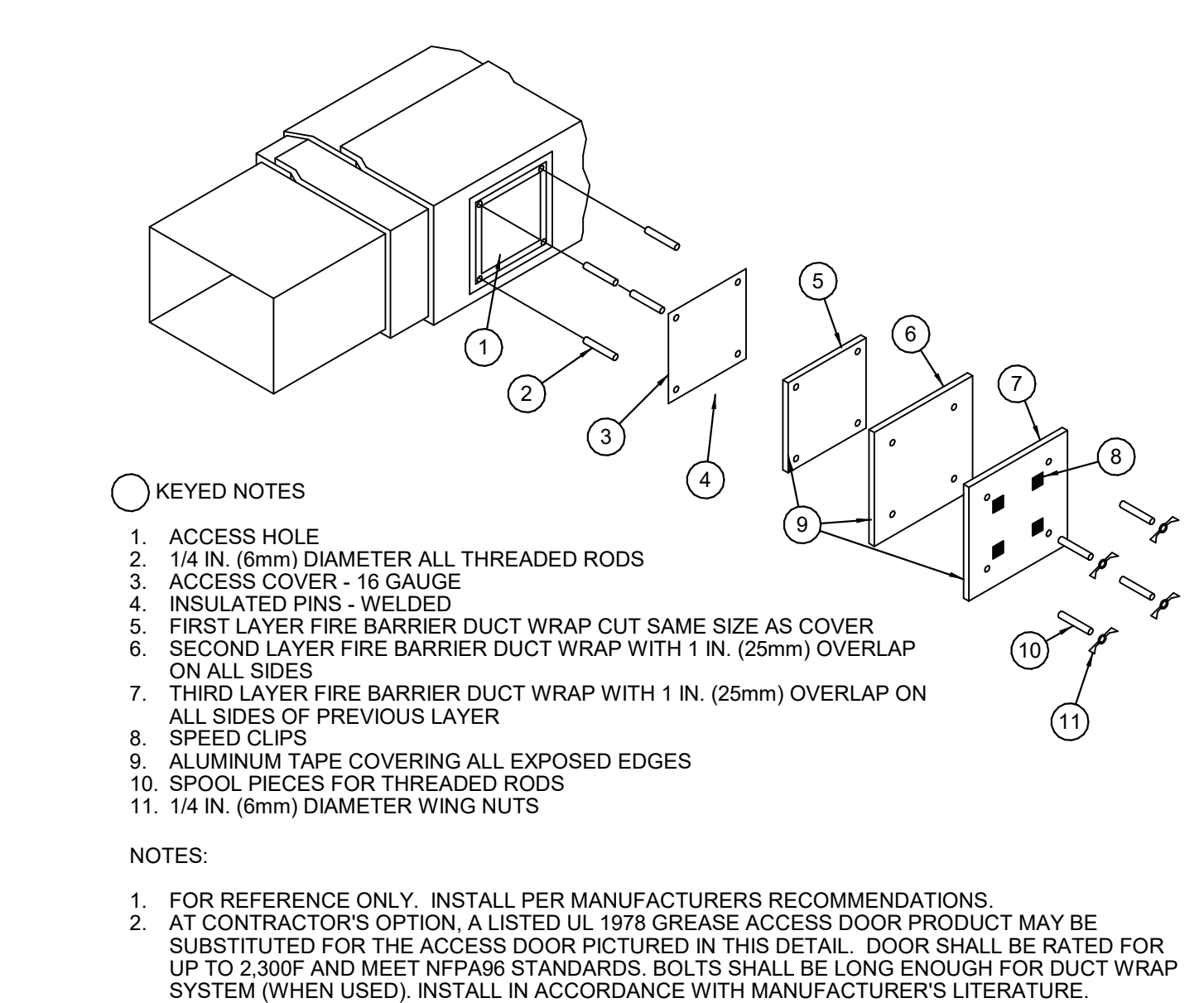
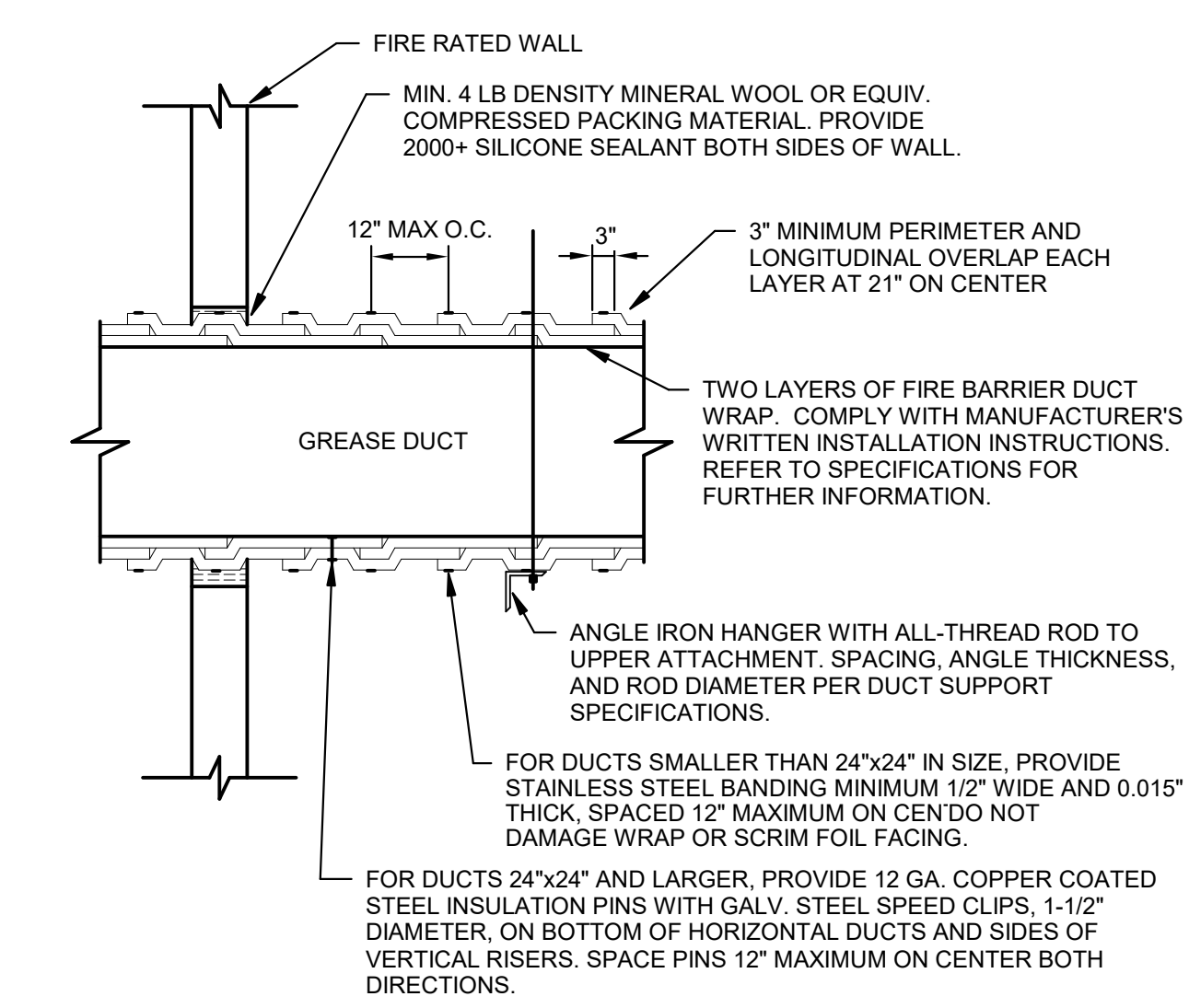
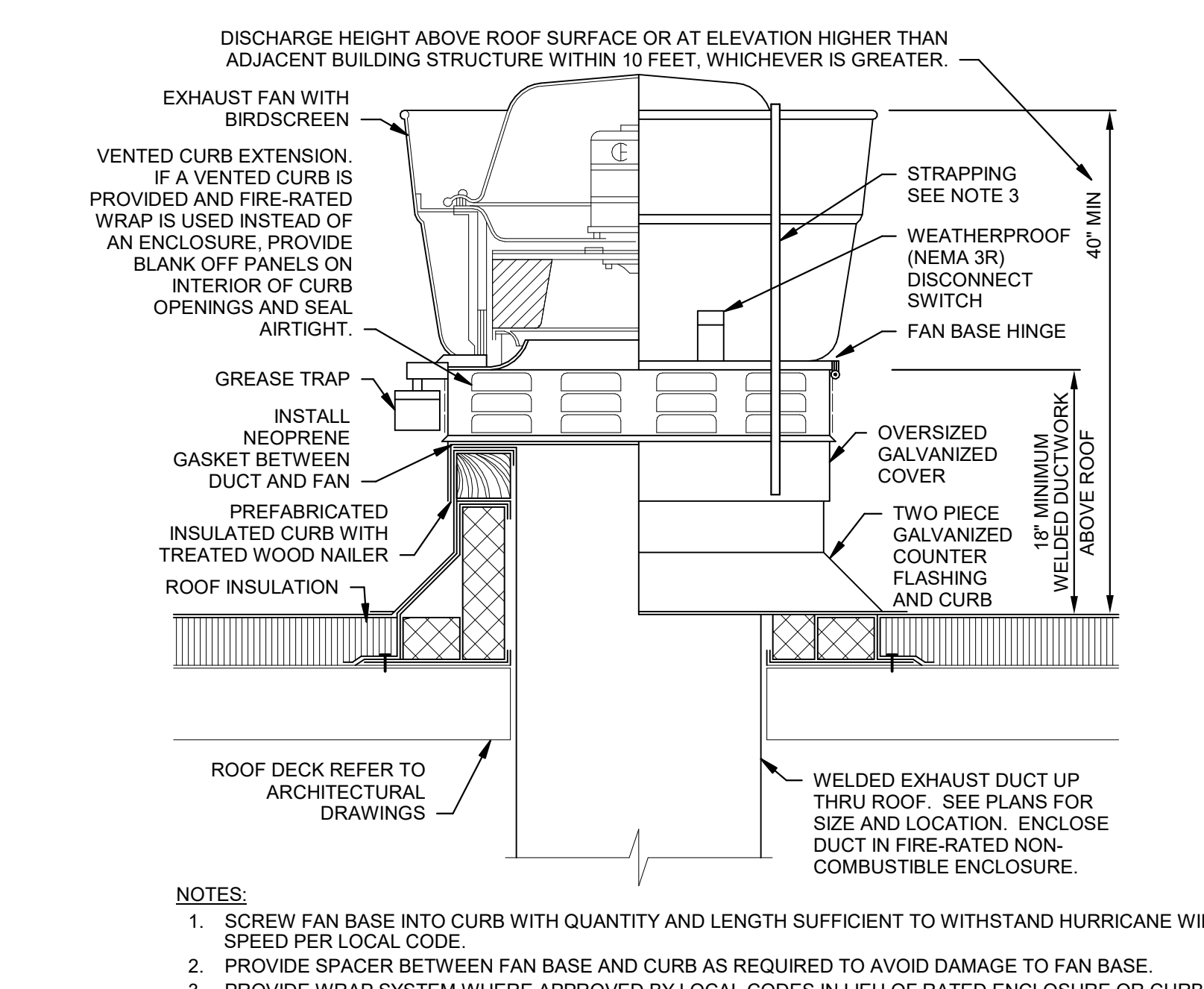
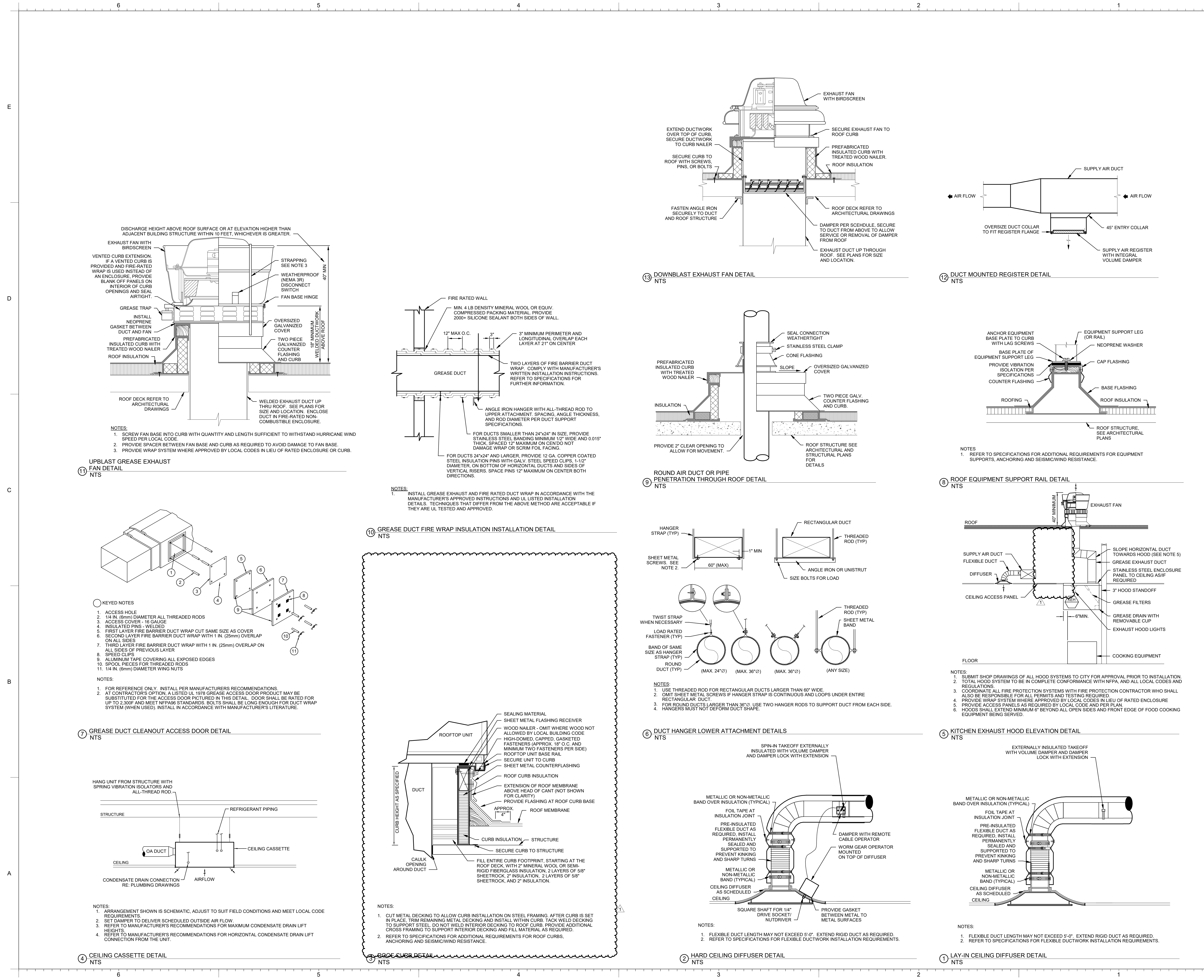
STATUS:  
**PERMIT / BID SET**



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SHEET NAME:  
**MECHANICAL DETAILS**

DATE: 02/18/22 PROJECT NO: 34666  
 DRAWN: AJP SCALE:  
 SHEET NO:  
**M501**

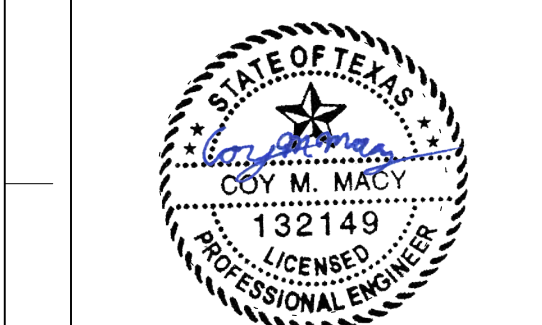


STORE NO:  
**TX #1432**

**SHAKE SHACK**  
 WESTBEND DRIVE  
 FORT WORTH, TEXAS 76107

REVISION	
DATE	DESCRIPTION
04/25/22	REVISION A
07/19/22	Revision 1

STATUS:  
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SHEET NAME:  
**MECHANICAL DETAILS**

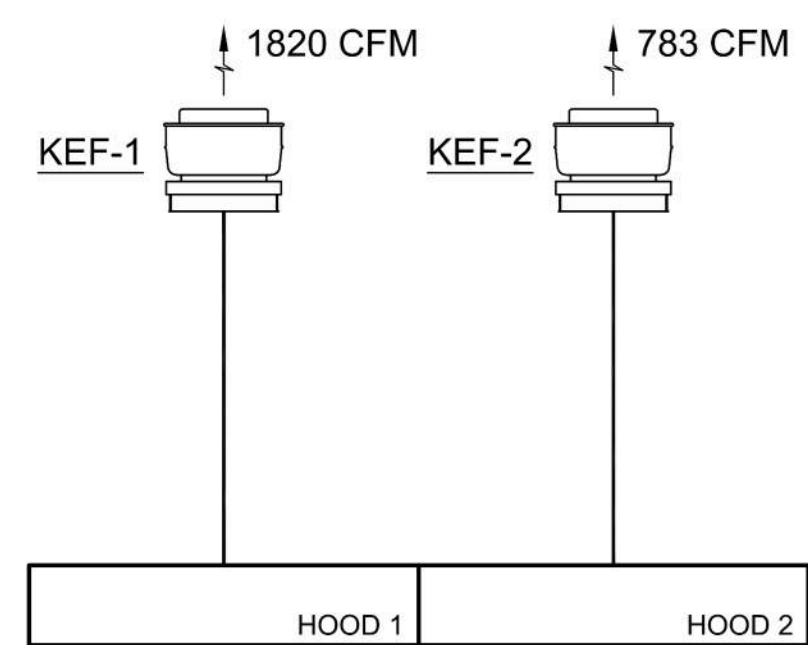
DATE:  
 02/18/22

PROJECT NO:  
 34666

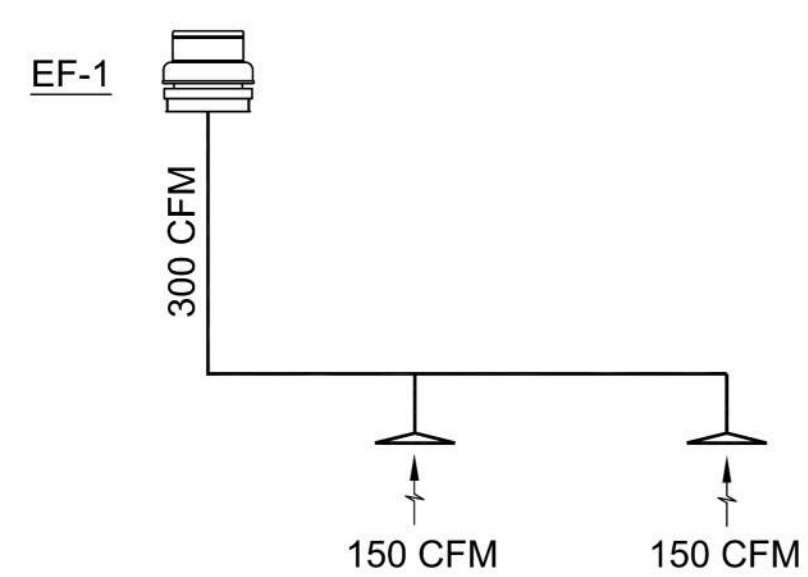
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SCALE:

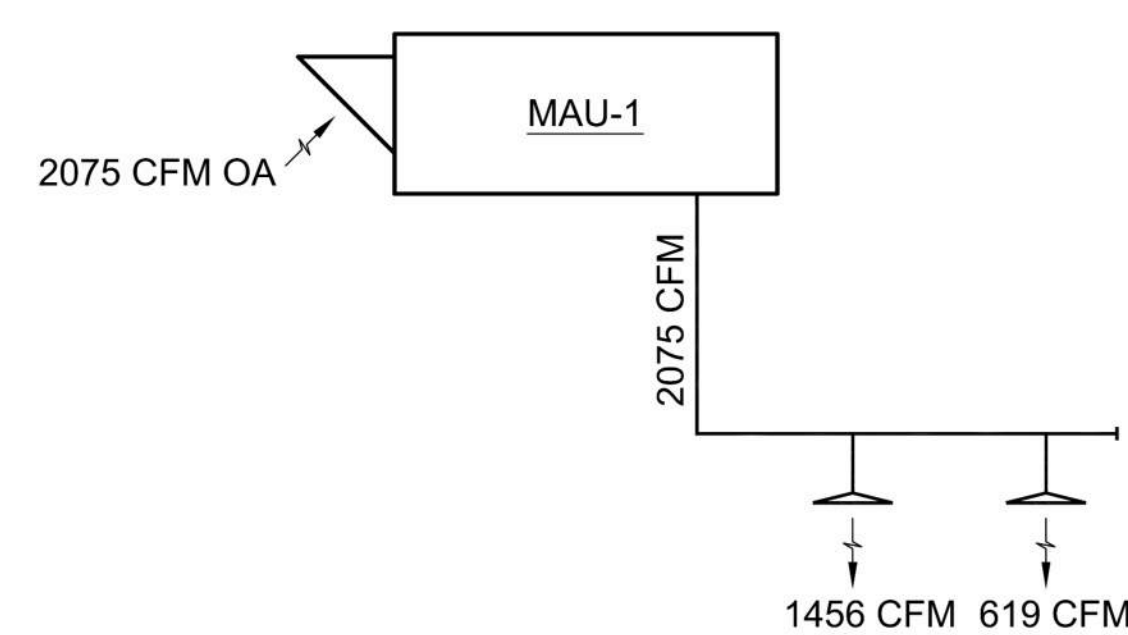
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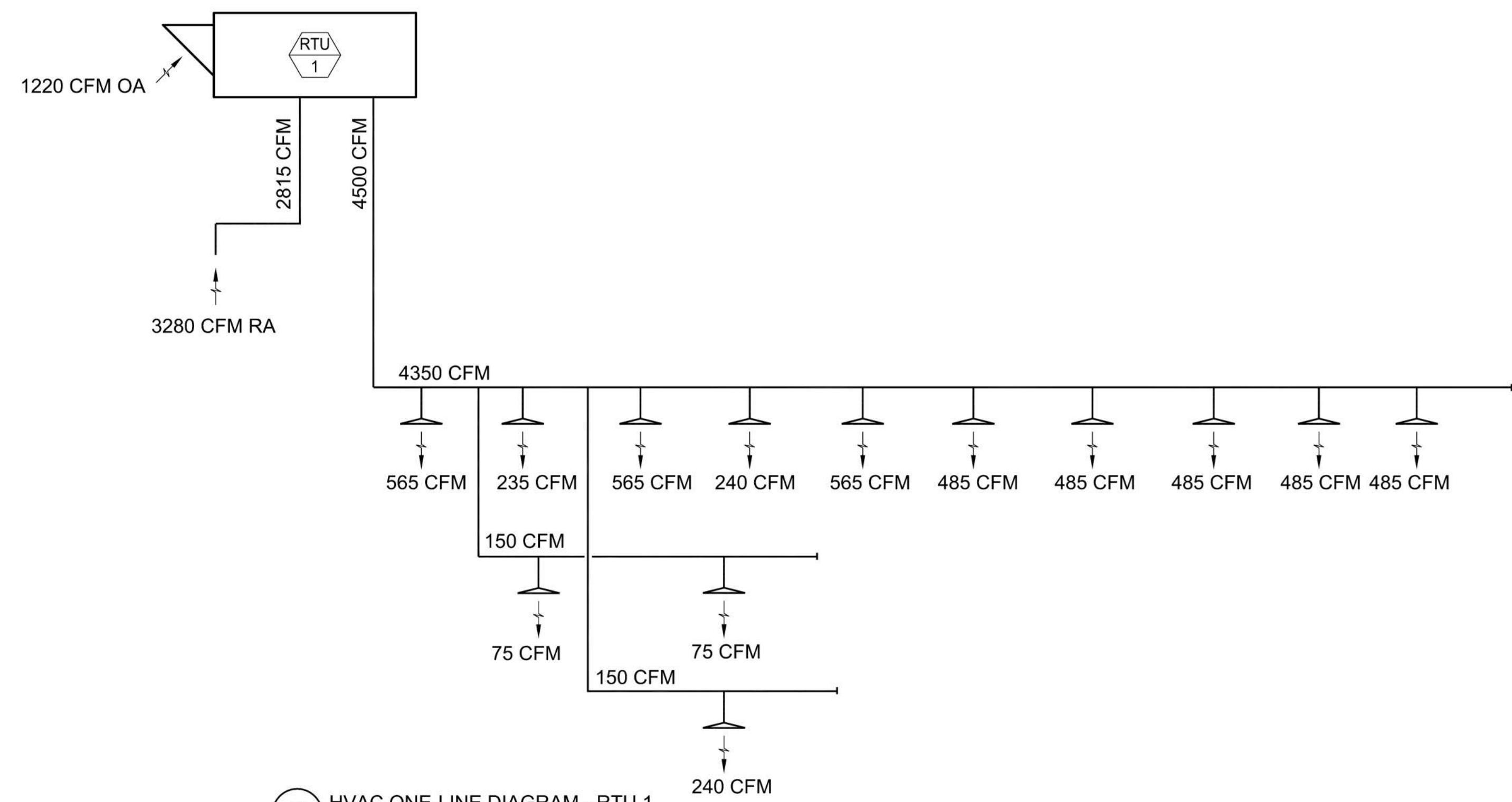
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 SCALE: NTS



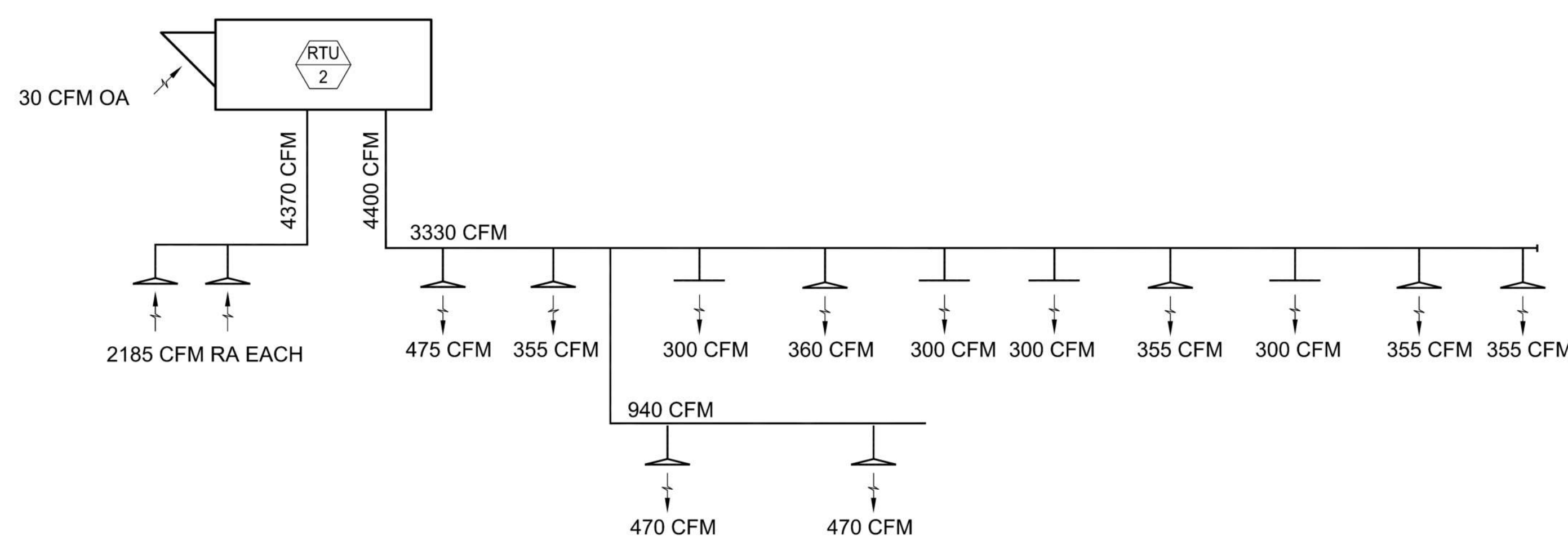
4 HVAC ONE-LINE DIAGRAM - EF-1  
 SCALE: NTS



3 HVAC ONE-LINE DIAGRAM - MAU 1  
 SCALE: NTS



2 HVAC ONE-LINE DIAGRAM - RTU 1  
 SCALE: NTS



1 HVAC ONE-LINE DIAGRAM - RTU 2  
 SCALE: NTS

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**GENERAL MECHANICAL REQUIREMENTS**

**1. GENERAL INSTRUCTIONS**

- A. GENERAL REQUIREMENTS
- B. DEFINITIONS
- C. PRE-BID SITE VISIT
- D. MATERIAL AND WORKMANSHIP
- E. MANUFACTURERS
- F. COORDINATION
- G. ORDINANCES AND CODES
- H. PROTECTION OF EQUIPMENT AND MATERIALS
- I. SUBSTITUTIONS
- J. SUBMITTALS
- K. ELECTRONIC DRAWINGS FILES
- L. RECORD DRAWINGS (AS-BUILT DRAWINGS)
- M. OPERATION AND MAINTENANCE INSTRUCTIONS
- N. SPARE PARTS
- O. TRAINING
- P. WARRANTIES

**2. GENERAL MATERIALS AND INSTALLATION**

- A. BUILDING OPERATION
- B. EXISTING EQUIPMENT REUSE AND REMOVAL
- C. EXCAVATION AND BACKFILLING
- D. COINCIDENTAL DAMAGE
- E. CUTTING AND PATCHING
- F. ROUGH-IN
- G. STRUCTURAL SUPPORT SYSTEMS
- H. PRE-ENGINEERED ROOF EQUIPMENT SUPPORTS AND CURBS
- I. ACCESS PANELS AND DOORS
- J. PENETRATIONS
- K. FIRESTOPPING
- L. MOTORS AND STARTERS
- M. VARIABLE FREQUENCY DRIVES
- N. ELECTRICAL WIRING
- O. EQUIPMENT FURNISHED BY OTHERS
- P. SYSTEM TESTING, ADJUSTING, AND BALANCING
- Q. VIBRATION ISOLATION
- R. ACCESS PANELS FOR MEPP SYSTEMS
- S. AIR FILTERS
- T. REFRIGERANT AND OIL IDENTIFICATION

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

- A. DUCT INSULATION
- B. DUCTWORK
- C. FLEXIBLE DUCT
- D. PLASTIC FLUE GAS VENTS
- E. AIR DEVICES
- F. CONTROL DAMPERS
- G. EXHAUST AIR SYSTEMS
- H. KITCHEN EXHAUST AIR SYSTEMS

**4. HVAC EQUIPMENT**

- A. ROOFTOP UNITS (GAS FIRED HEAT) 3-25 TONS
- B. ELECTRIC UNIT HEATERS
- C. NATURAL GAS RADIANT HEATERS
- D. SPLIT DUCTLESS AIR-CONDITIONING SYSTEMS
- E. AIR CURTAINS

**5. PIPING AND PIPING SPECIFICATIONS**

- A. REFRIGERANT PIPING AND INSULATION
- B. SYSTEM EVACUATION AND CHARGING

**6. TEMPERATURE CONTROLS**

- A. GENERAL REQUIREMENTS
- B. WIRING
- C. THERMOSTAT CONTROL EQUIPMENT
- D. SENSORS AND RELAYS

**7. SEQUENCE OF OPERATION**

- A. FAN COIL UNIT CONTROL
- B. KITCHEN EXHAUST FAN CONTROL
- C. MAKE-UP AIR UNIT CONTROL
- D. ROOFTOP UNIT CONTROL
- E. RESTROOM EXHAUST FAN (EF-1) CONTROL
- F. AIR CURTAIN CONTROL
- G. ELECTRIC UNIT HEATER CONTROL

**8. ALTERNATIVES**

- A. DESCRIPTION

**9. COMMISSIONING OF MECHANICAL SYSTEM**

- A. GENERAL
- B. EXECUTION

**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 division. Where the requirements 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 material, equipment, appliances, transportation, service, and is required to complete the entire system as required by the drawings and specifications, or reasonably inferred to be necessary to facilitate 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 and details on elevations and sections. Details on elevations and sections are not intended to be construed as separate requirements. Use the drawings as a guide when laying out the work 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 22
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 on the project site including, but not limited to, the actual unloading, unpacking, assembling, erecting, placing, anchoring, adjusting, leveling, 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 sections of 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 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 material specified." The term "approved" shall mean labeled, listed, or both, by an NRTL, and acceptable to the AHJ over this project.

**C. PREBID SITE VISIT**

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.

**D. MATERIAL AND WORKMANSHIP**

Provide new material, equipment, and apparatus under this contract unless otherwise stated herein, of best quality normally used for the purpose in good commercial practice, and free from defects. Install material and equipment in accordance with the manufacturer's installation instructions. Model numbers listed in the specifications or shown on the drawings are not necessarily intended to designate the required trim, written descriptions of the trim govern model numbers.

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, vibrating ducts, and similar rotating components shall not be acceptable. Materials and equipment shall be of commercial specification grade in quality. Light duty and residential grade equipment shall not be accepted unless otherwise indicated.

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

**E. 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.

**F. 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.

**G. 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:

- National Electrical Code (NEC)
- National Fire Protection Association (NFPA)
- Underwriters Laboratories (UL)
- Occupational Safety and Health Administration (OSHA)
- American Society of Mechanical Engineers (ASME)
- American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE)
- American National Standards Institute (ANSI)
- American Society of Testing and Materials (ASTM)
- 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.

**H. 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 in job site 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 fiberglass 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 plenums, including dust.

**I. 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:

- 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.
- Proposed substitution is consistent with the Contract Documents and will produce indicated results, including functional clearances, maintenance services, and sourcing of replacement parts.
- Proposed substitution has received necessary approvals of authorities having jurisdiction.
- Same warranty will be furnished for proposed substitution as for 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 of 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.

**J. 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 mail from mailing time via the Architect, plus a duplication of this time for resubmission, if required. Only resubmit those sections requested for resubmission.

Submittals shall contain the project name, applicable specification 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 be rejected and returned without review.

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, 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 coordinating items with actual building conditions and adjacent work. Proceed with the procurement and installation of equipment only after receiving approved shop drawings relative to each item.

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 coordinating items with actual building conditions and adjacent work. Proceed with the procurement and installation of equipment only after receiving approved shop drawings relative to each item.

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**F. 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.

**G. STRUCTURAL SUPPORT 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.

**H. PRE-ENGINEERED ROOF EQUIPMENT SUPPORTS AND CURBS**

Provide prefabricated equipment support rails and roof curbs manufactured by AES Industries, Custom Curb, Inc., Pale Company, 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 mail from mailing time via the Architect, plus a duplication of this time for resubmission, if required. Only resubmit those sections requested for resubmission.

Submittals shall contain the project name, applicable specification 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 be rejected and returned without review.

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, 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 coordinating items with actual building conditions and adjacent work. Proceed with the procurement and installation of equipment only after receiving approved shop drawings relative to each item.

Attach equipment directly to pre-engineered roof equipment support using one of the following methods:

- Rail Equipment Supports: Secure each equipment support leg to the rail with a minimum of 4 points of connection per leg.
- Roof Curbs: Secure each 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 rail 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 6 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 of 1 and a Design Wind Speed of 120 mph.
- Submittal 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 provided, pre-engineered roof supports.

**I. 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 accessories that require service where indicated or as required, except where above lay-in ceilings. Provide access doors for the devices served with a minimum size of 18 inches x 18 inches. Access doors must be of the proper construction 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. Provide access doors for equipment that require service where indicated or as required, except where above lay-in ceilings. Provide access doors for the devices served with a minimum size of 18 inches x 18 inches. Access doors must be of the proper construction 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. Provide access doors for equipment that require service where indicated or as required, except where above lay-in ceilings. Provide access doors for the devices served with a minimum size of 18 inches x 18 inches. Access doors must be of the proper construction 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. Provide access doors for equipment that require service where indicated or as required, except where above lay-in ceilings. Provide access doors for the devices served with a minimum size of 18 inches x 18 inches. Access doors must be of the proper construction 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. Provide access doors for equipment that require service where indicated or as required, except where above lay-in ceilings. Provide access doors for the devices served with a minimum size of 18 inches x 18 inches. Access doors must be of the proper construction 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. Provide access doors for equipment that require service where indicated or as required, except where above lay-in ceilings. Provide access doors for the devices served with a minimum size of 18 inches x 18 inches. Access doors must be of the proper construction 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. Provide access doors for equipment that require service where indicated or as required, except where above lay-in ceilings. Provide access doors for the devices served with a minimum size of 18 inches x 18 inches. Access doors must be of the proper construction 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. Provide access doors for equipment that require service where indicated or as required, except where above lay-in ceilings. Provide access doors for the devices served with a minimum size of 18 inches x 18 inches. Access doors must be of the proper construction 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. Provide access doors for equipment that require service where indicated or as required, except where above lay-in ceilings. Provide access doors for the devices served with a minimum size of 18 inches x 18 inches. Access doors must be of the proper construction type of construction in which it is installed. Obtain Architect's approval of type, size, location and

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 and Balancing (TAB). TAB shall be performed in accordance with the most current edition of the certified agencies procedural standard for testing, 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 to the Architect for evaluation and approval before final inspection of the project. Balance air systems to within 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 +/- 3 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/narrative section in accordance with the procedural standard that provides both systems 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 sequences, limits and time based adjustment to operate in accordance 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 six copies of manufacturer's recommendations. Approved manufacturers include Caldyn, Kinetics Noise Control, Mason Industries, 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 proper 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. Coil vibration isolators shall have factory-applied paint. Coil vibration isolators exposed to weather and other corrosive environments shall have 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 suspended by spring isolators, and where indicated on drawings. Fabricate flexible piping connectors from stainless steel or rubber materials as suitable for system fluid. Flexible piping connectors shall be belows, spherical or loaded hose type as recommended by the manufacturer for the application.

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 where recommended on the equipment and the neoprene pad to prevent localized deflection. If the isolator is bolted to the structure, install a neoprene mounting sleeve under the bolt 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 so 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 linear portion of their load versus deflection 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 rod 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 lock the spring element and do not allow the hanger box to rotate through a full 360 degree without encountering obstructions. Provide Mason Industries Type 30N or equal.
3. Type NR (Neoprene Bushing). Provide neoprene, rubber-in-sheer bushings for lightweight (less than 100 pounds), suspended equipment supported from structure with all threaded 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.

S. AIR FILTERS

Provide AAF/Flanders Perfect Pleat HC M8, Camfil Farr 30/30, pleated, throwaway type filters, minimum MERV 8, or similar as manufactured by Air Filter, Inc., Boscimatic, Columbus, Koch, or equivalent, 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 where piping is exposed in view occupied spaces, machine rooms, accessible maintenance spaces (shafts, tunnels, plenums) and exterior non-enclosed locations.

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

Provide manufacturer's standard laminated plastic, color coded equipment markers. Conform to the following color code: Green for Coding; Yellow/Green for Combining Cooling and Heating; Brown for Energy Reclamation; Blue for Hazardous Equipment.

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 1-1/4 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 for 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 or branch ducts more than 25 feet length and within 5 feet on each side of wall, 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 C1330 for fungi 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 1-1/2 inch, 1-1/2 pound density, minimum R-6.0 Certainteed Corp. "Toughguard" or equivalent, Johns Manville, Owens-Corning, or Krauf.

Provide round liner that is 1-1/2 inch thick, 4 pound density, minimum R-6.0 Johns Manville "Spiroacoustic Plus" or equivalent, Certainteed 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 C553, Type II flexible fiberglass insulation. Installed insulation shall be 2 inch thick, 34-pound density, minimum R-6.0 ductwork, Certainteed or equivalent Johns Manville, Owens-Corning, or Krauf with heavy-duty foil-scrim-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 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, 15 pound density, rigid fiberglass insulation conforming to ASTM C812, 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 mastic and adhesives shall have UL Label.

Install exterior ductwork with sufficient slope to ensure that water cannot pond anywhere on the duct. Drainage must be achieved by sloping ductwork - not by varying the insulation thickness. Locate longitudinal seams of outer shell (aluminum, flexible elastomeric, or closing 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 standards relative to gauge, bracing, joints, etc. Minimum thickness of duct shall be 26-gauge sheet steel. Reinforce housings and ductwork over 30 inches with 1-1/4 inch angles not less than 5-#9 centers, and equivalent 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 grid, conduits, pipes, equipment, etc. from ductwork. Coordinate routing of ductwork with other contractors such 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, PHS Systems, Roof Top Box, or equivalent. Provide ductwork on the roof supported by 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 embedded support features as required to support the duct. Provide steel pedestal type supports with minimum 18x18 inch thermoplastic or rubber bases or 4 inch wide closed-cell polyethylene block with length as required. Maintain minimum 6 inches clearance under duct to finished roof surface.

Coordinate with the pre-engineered roof 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 positive pressure of 1 inch w.g. Construct exhaust ductwork downstream of fans to meet SMACNA positive pressure of 1 inch w.g.

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

Seal ductwork with heavy liquid sealant. Hardcoat Hengstler 601, Design Polymer DP 1010. Utilize Mccull duct sealer or approved equal applied according to sealant manufacturer's instructions. Seal all longitudinal and transverse ductwork joints airtight to meet SMACNA 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 vanes. Vanes shall be the entire length of the bend. Provide minimum 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. Mitered elbows less than 45 degrees shall not require luminae vanes. Mitered elbows 45 degrees and greater shall have single thickness turning vanes of same gauge as ductwork, rigidly fastened with guide strips in accordance with the contractor's design and approved by the engineer and supply and install an outdoor air ductwork that has an air velocity exceeding 1000 fpm. Do not install vanes in grease ductwork. The use of square throat, radius heel elbows is prohibited. Remove and replace all installed elbows of this type with an approved elbow all of additional cost 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 Elgen, Ventiflex or equal. Flexible connectors shall have a flame spread of 25 or less and smoke developed rating no higher than 50. Make airtight joints and install with minimum 1-1/2 inches slack.

Provide balancing dampers, manufactured by Cesco, Greenheck, Louvers & Dampers, Nalor Industries, Pottorff, 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 Young Regulator or Venlok end controls for the damper rod. Rectangular volume dampers shall be controlled by locking quadrants; provide Young Regulator or Venlok end controls for the damper rod. Round volume dampers shall 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 takeoff fitting when proper 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 worm gear operator. Damper assembly shall include duct casing with rolled bead diffusers, reinforced blade, self-lubricating bearing, and remote operator mounting plate. External operator shall attach to damper as a single piece with no linkage adjusting required. Damper shall be adjustable through the diffuser frame with standard 1/4 inch nut/driver or flat screwdriver. Provide damper assembly with external worm gear operator. Damper assembly shall include duct casing with rolled bead diffusers, reinforced blade, self-lubricating bearing, and remote operator mounting plate. External operator shall attach to damper as a single piece with no linkage adjusting required. Damper shall be adjustable through the diffuser frame with standard 1/4 inch nut/driver or flat screwdriver.

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3945 LENEVA DRIVE, SUITE 300  
LENEVA, KS 66214  
TEL 913.742.5000 FAX 913.742.5001  
WWW.HENDERSONENGINEERS.COM  
2150004695  
TX, CORPORATE NO: F-001236  
EXPIRES 9/30/2022

STORE NO:  
**TX #1432**



**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 instruction:
  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.
- b. 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.

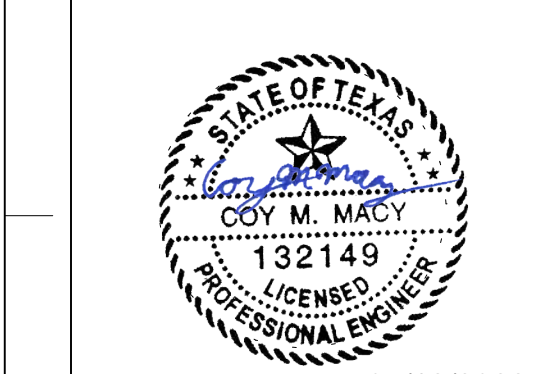
**3.13 DUCTWORK ACCESSORIES**

- 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**

REVISION	
DATE	DESCRIPTION
04/25/22	REVISION A
07/19/22	Revision 1

STATUS:  
**PERMIT / BID SET**



07/18/2022  
FIELD VERIFICATION:  
The contractor shall verify all signed dimensions and location at the project site and notify Zebra Projects, ARCH. of any dimensional errors, or omissions or discrepancies before beginning or discharging any work. Do not claim from Zebra Projects, ARCH.  
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SHEET NAME:  
**MECHANICAL SPECIFICATIONS**

DATE: 02/18/22 PROJECT NO: 34666  
DRAWN: AJP SCALE:

SHEET NO:  
**M592**

**ROOFTOP UNIT CONTROL MATRIX**

CONTROL FEATURE	UNITS	RTU-1	RTU-2	NOTES
		DTNING OR Y/N	KITCHEN SETPOINT OR Y/N	
<b>SETPOINTS</b>				
COOLING - OCCUPIED SETPOINT	'F	75	75	
COOLING - UNOCCUPIED SETPOINT	'F	80	80	
HEATING - OCCUPIED SETPOINT	'F	70	70	
HEATING - UNOCCUPIED SETPOINT	'F	60	60	
DEHUMIDIFICATION SETPOINT - HUMIDITY SENSOR FEEDBACK	% RH	50%	NA	B
<b>PROGRAMMED CONTROL FEATURES</b>				
HVAC SYSTEM OCCUPIED/UNOCCUPIED MODE - PROGRAMMABLE THERMOSTAT		Y	Y	B
REMOTE TEMPERATURE AND HUMIDITY SENSOR		Y	Y	B
<b>EQUIPMENT ACCESSORIES AND CONTROL MODULES</b>				
OUTSIDE AIR DAMPER - MOTOR OPERATED (MODULATING)		Y	Y	L
INTEGRATED ECONOMIZER - DIFFERENTIAL ENTHALPY ENABLE (OA ENTHALPY x RA ENTHALPY)	BTULB	Y	Y	E
ECONOMIZER FAULT DETECTION AND DIAGNOSTICS (FDD) SYSTEM		Y	Y	F, G
RELIEF - BAROMETRIC DAMPER		Y	N	
RELIEF - CONSTANT VOLUME POWERED EXHAUST FAN		N	Y	H
COOLING COIL (DX - STAGED)		Y	Y	M
DEHUMIDIFICATION - HOT GAS REHEAT		Y	N	O
HEATING COIL (NATURAL GAS)		Y	Y	M
<b>SUPPLY FAN CONTROL METHODS</b>				
ON DURING OCCUPIED HOURS		Y	Y	
CYCLE WITH LOADS DURING UNOCCUPIED HOURS		Y	Y	
VARIABLE VOLUME - STAGED FAN CONTROL IN RESPONSE TO ACTIVE COOLING COIL STAGES		Y	Y	M, O
<b>SAFETIES, INTERLOCKS, AND ALARMS</b>				
GAS VALVE SAFETY		Y	Y	F
RETURN AIR SMOKE DETECTOR - SAFETY SHUTDOWN		Y	Y	U
FIRE ALARM CONTROL PANEL - SAFETY SHUTDOWN INTERLOCK		Y	Y	
KITCHEN EXHAUST SYSTEM INTERLOCK		Y	Y	S

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.
  - E. IF SETPOINT VALUE IS LISTED, IT INDICATES ECONOMIZER HIGH-LIMIT SHUTOFF. UNIT SHALL BE IN ECONOMIZER IF CONDITIONS ARE LESS THAN SETPOINT. THE FOLLOWING SENSORS SHALL DETERMINE ECONOMIZER ON POINT: 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.
  - F. DEVICE SHALL BE FACTORY MOUNTED AND PRE-WIRED FOR OPERATION SUBJECT TO THE ONBOARD CONTROLLER.
  - G. PROVIDE UNIT WITH AN FDD SYSTEM CONSISTING OF PERMANENTLY INSTALLED OUTSIDE AIR, SUPPLY AIR, AND RETURN AIR TEMPERATURE SENSORS. THE UNIT CONTROLLER SHALL AT A MINIMUM BE CAPABLE OF PROVIDING SYSTEM STATUS OF ECONOMIZER, COMPRESSOR, HEATING, MIXED AIR LOW LIMIT ALARM, AND SENSOR VALUES. EACH OPERATING MODE SHALL BE CAPABLE OF INDEPENDENTLY OPERATING FOR TESTING. THE SYSTEM SHALL REPORT FAULTS TO AN APPLICATION ACCESSIBLE BY SERVICE PERSONNEL. THE FOLLOWING FAULTS SHALL BE DETECTED: AIR TEMPERATURE SENSOR FAILURE, ECONOMIZER ENABLE/DISABLED WHEN ECONOMIZER SHOULD BE OFF/ON, RESPECTIVELY, DAMPER NOT MODULATING, AND EXCESS OUTSIDE AIR.
  - H. POWERED EXHAUST FAN SHALL STAGE ON AND OFF ACCORDING TO DAMPER POSITION.
  - L. EQUIPMENT MANUFACTURER SHALL PROVIDE MODULATING DAMPER AND CONTROLS CAPABLE OF ADJUSTING THE DAMPER POSITION TO MAINTAIN THE SCHEDULED OUTSIDE AIR ON THE DRAWINGS ACROSS ALL FAN SPEEDS. DIV. 23 CONTRACTOR SHALL PROGRAM MULTIPLE DAMPER POSITION SETPOINTS IN THE FIELD DURING TESTING AND BALANCING TO MAINTAIN MINIMUM VENTILATION WHEN NOT IN ECONOMIZER. DAMPER SHALL BE CLOSED DURING UNOCCUPIED HOURS.
  - M. UNITARY CONTROLLER SHALL MODULATE AND/OR CYCLE SUPPLY FAN SPEED SETTING AND COIL CAPACITY STAGES SUBJECT TO THE INTERNAL SAFETIES AND SEQUENCES TO MAINTAIN SCHEDULED SETPOINTS.
  - Q. PROGRAM DEHUMIDIFICATION SEQUENCE BASED ON ZONE AIR HUMIDITY.
  - O. PROVIDE STAGED FAN CONTROL WITH MINIMUM 2 FAN SPEEDS. LOW SPEED SHALL NOT EXCEED 60% OF FULL SPEED AND SHALL DRAW NO MORE THAN 40% OF FAN POWER AT FULL SPEED.
  - S. 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.
  - U. DIVISION 28 CONTRACTOR SHALL PROVIDE KITCHEN.

**BUILDING AIR BALANCE SUMMARY NORMAL OPERATION**

UNIT NO.	SUPPLY (CFM)	OUTDOOR (CFM)	EXHAUST (CFM)	PERCENT OAS/A
RTU-1	4,400	990	21%	
RTU-2	4,400	990	21%	
FCU-1	4,200	400	9%	
KEF-1	--	--	1,820	--
KEF-2	--	--	783	--
EF-1	--	--	300	--
TOTAL	9,200	3,400	2,903	
<b>DESIGN BUILDING PRESSURIZATION AIRFLOW (CFM)</b>				<b>497</b>
<b>PRESSURIZATION CHECK</b>				<b>15%</b>

**OUTSIDE AIR REQUIREMENTS, IMC-2021 (IP)**

SYSTEM DESIGNATION	SYSTEM TAB NAME OR LIST 'SINGLE'	SINGLE-ZONE SYSTEMS ONLY		MULTI-ZONE SYSTEMS ONLY		FLOOR AREA SERVED BY SYSTEM [sq] (SF)	SYSTEM AVERAGED AREA-BASED OUTDOOR AIR RATE (CFM/SF)	SYSTEM POPULATION [PEOPLE]	PEOPLE-BASED OUTDOOR AIR RATE (CFM/PERSON)	REQUIRED OA INTAKE FLOW [cfm]	REQUIRED DOV OA INTAKE FLOW [cfm]	DESIGN OA INTAKE FLOW [cfm]	NOTES
		SINGLE-ZONE SYSTEM ASSOCIATED VENTILATION ZONE	SINGLE-ZONE WORST CASE ZONE AIR DISTRIBUTION EFFECTIVENESS [Ez]	SYSTEM VENTILATION EFFICIENCY [Ev]	SYSTEM AVERAGED SYSTEM VENTILATION EFFICIENCY [Ev]								
RTU-1	MULTIZONE (RTU-1)	-	-	0.94	-	1,657	0.126	80.84	7.50	869	N/A	2,400	
RTU-2	MULTIZONE (RTU-2)	-	-	1.00	-	930	0.000	0.00001	0.00	0	N/A	40	
FCU-1	SINGLE ZONE	OFFICE	0.80	-	-	62	0.060	0.31	5.00	7	N/A	40	
<b>TOTALS</b>										<b>876</b>	<b>0</b>	<b>3,660</b>	

GENERAL NOTES:

- VENTILATION CALCULATIONS BASED ON IMC-2015.
- SYSTEM POPULATIONS BASED ON MAX SEATING AND/OR CODE MAXIMUM VALUES.
- SINGLE ZONE SYSTEMS (V<sub>z</sub> = V<sub>z2</sub>): 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.
- 100% OA SYSTEMS (V<sub>z</sub> = 2x 20% V<sub>z2</sub>): 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).
- MULTI-ZONE REGULATING SYSTEMS: CALCULATOR USED TO DETERMINE VENTILATION AIRFLOW IN COMPLIANCE WITH IMC-2015 VPP AND ASHRAE 62.1-2015 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.

**PROJECT DESIGN CONDITIONS**

CLIMATE CONDITIONS				BUILDING																		
WEATHER STATION: FORT WORTH NAS, TX, USA				MONDAY - FRIDAY																		
CLIMATE ZONE: 3A				SATURDAY																		
HEATING (DB): 99.6% 24.1 'F				SUNDAY																		
COOLING (DB/MOVB): 0.4% 102.5 'F/ 73.1 'F				HOLIDAY																		
SPACE / UNIT DESCRIPTION				SET POINTS				SPACE OPERATING HOURS OCCUPIED / UNOCCUPIED				NOTES										
				COOLING / DEHUMIDIFICATION				HEATING				HUMIDIFICATION				ZONE VENTILATION RESET						
				OCC		UNOCC		MAX		MIN		OCC		UNOCC		MIN		MAX		CONTROL METHOD		BASE PPM
DINING AREAS				75	80	50%	NA	70	80	NA	NA	NA	NA	NA	NA	NA	NA	TBD	TBD	TBD	TBD	A, B, C
OFFICES				75	80	NA	NA	70	80	NA	NA	NA	NA	NA	NA	NA	NA	TBD	TBD	TBD	TBD	A, B, C
STOCKROOM/STORAGE				75	80	NA	NA	70	80	NA	NA	NA	NA	NA	NA	NA	NA	TBD	TBD	TBD	TBD	A, B, C
FOOD PREP AREAS				75	80	NA	NA	70	80	NA	NA	NA	NA	NA	NA	NA	NA	TBD	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 OCCUPANCY SCHEDULES.

**ROOFTOP UNIT SCHEDULE (DX COOLING, NATURAL GAS HEAT)**

MARK	MANUFACTURER	MODEL	NOMINAL TONS	UNIT TYPE	SUPPLY FAN										COOLING COIL										HEAT EXCHANGER										MIN O/A	ELECTRICAL	DISC	WEIGHT (LBS)	NOTES
					CFM	ESP (IN)	HP	VFD	TH	SH	EAT (°F DB)   (°F WB)	LAT (°F DB)   (°F WB)	REFR TYPE	MIN NO	MIN OUT (MBH)	NOM INPUT (MBH)	MIN EFF (SEER)	EAT (DB)	LAT (DB)	MIN NO	O/A (CFM)	VPH	MCA	MOCP	DISC TYPE														
RTU-1	CAPTIVEAIRE	CASRTU31-300-24-12-ST-DOAS	12.3	SINGLE ZONE	4,500	1.3	3	N	20.0	143.8	116.4	89.9	65.0	57.3	54.4	R410A	21.3	2	144	180	80	60.2	89.7	2	360	208/1	07.2	80	NON-FUSED	2333	A, R								
RTU-2	CAPTIVEAIRE	CASRTU31-300-20-15T-DOAS	15	SINGLE ZONE	4,400	1.3	2.9	N	20.0	166.4	166.4	90.0	68.6	55.8	53.9	R410A	13.9	2	220	275	80	45	91	2	2400	208/3	70.9	80	NON-FUSED	2523	A, R								

\* EQUIPMENT FURNISHED AND INSTALLED PER THE RESPONSIBILITY SCHEDULE. REF ARCHITECTURAL DRAWINGS. EQUIPMENT SHALL BE OBTAINED THROUGH SHAKE SHACK NATIONAL ACCOUNT. REFER TO T12 / 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 FACTORY MOUNTED VARIABLE FREQUENCY DRIVE OR 2-SPEED MOTOR TO FACILITATE STAGED FAN SPEED CONTROL.
- G. PROVIDE SINGLE POINT POWER CONNECTION.
- H. COORDINATE SIZE OF CONDUCTOR TERMINATION LUGS WITH CONDUCTOR SIZES SHOWN ON ELECTRICAL DRAWINGS.
- J. 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.
- K. SPECIFIED FAN ESP ACCOUNTS FOR DUCT LOSSES EXTERNAL TO UNIT.
- L. 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.
- M. PROVIDE INSULATED ROOF CURB WITH MINIMUM HEIGHT REQUIRED TO MAINTAIN BOTTOM OF SPECIFIED A MINIMUM OF 14 INCHES ABOVE FINISHED ROOF SURFACE. 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.
- N. SCHEDULED WEIGHT IS THE MAXIMUM ALLOWABLE OPERATING WEIGHT OF THE EQUIPMENT ONLY.
- O. COOLING COIL LAT IS LEAVING AIR TEMPERATURE OF COIL.
- P. PROVIDE GUARDS TO PROTECT CONDENSER COIL FROM HAIL OR OTHER DAMAGE.
- Q. PROVIDE HEATER TO MEET OR EXCEED SCHEDULED MINIMUM MBH OUTPUT. NOMINAL INPUT IS BASED ON LISTED MANUFACTURERS STANDARD PRODUCT. COORDINATE EQUIPMENT GAS LOAD WITH PLUMBING CONTRACTOR IF DIFFERENT FROM THAT SCHEDULED. MEET MINIMUM EFFICIENCY SCHEDULED.
- R. PROVIDE EQUIPMENT WITH AIRBORNE DISINFECTANT SYSTEM, RFG MODEL PHI-PKG14-24V.

**AIR CURTAIN SCHEDULE**

MARK	SERVICE AREA	MANUFACTURER	MODEL	UNIT SPECS				VPH/Hz	NOTES
				LENGTH (IN)	MAX AIRFLOW (MBH)	HEATING CAPACITY (KW)	MOTOR (HP)		
AC-1	SERVICE ENTRY	MARS	STD2	36	1379	N/A	1/2	115/1	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. MOUNT UNIT PER MANUFACTURERS RECOMMENDATIONS TO FACE OF WALL AND SUPPORT VERTICALLY.
- C. PROVIDE INTEGRAL STARTER AND DISCONNECT SWITCH.
- D. PROVIDE AIR CURTAIN WITH NORMALLY CLOSED DOOR LIMIT SWITCH FOR INSTALLATION ON DOOR. THE AIR CURTAIN SHALL ENERGIZE WHEN DOOR OPENS.
- E. PROVIDE WITH DELAY MICROSWITCH WITH ADJUSTABLE DELAY TIMERS PRE MOUNTED IN THE AIR CURTAIN CONTROL PANEL.
- F. MOUNT UNIT PER MANUFACTURERS RECOMMENDATIONS IN CEILING ASSEMBLY AND SUPPORT VERTICALLY.

**HEAT PUMP CONDENSING UNIT SCHEDULE**

MARK	SERVICE	MANUFACTURER	MODEL	REFR TYPE	COOLING CAPACITY			HEATING CAPACITY			ELECTRICAL		WEIGHT (LBS)	NOTES	
					TH (MBH)	AMBIENT (DB)	MIN EFF (SEER)	CAP (MBH)	AMBIENT (DB)	MIN EFF COP 47°F	MCA	MOCP			VPH
CU-1	FCU-1	CARRIER	38MARBQ18AA3	R410A	9.6	102.5	19.0	12.0	24.1	3.3	18	25	208/1	102.5	A - H

\* EQUIPMENT SHALL BE OBTAINED THROUGH SHAKE SHACK NATIONAL ACCOUNT. REFER TO T02 / 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. EQUIPMENT CAPACITY SCHEDULED IS MINIMUM CAPACITY THAT MUST BE PROVIDED AT AMBIENT TEMPERATURE INDICATED.
- C. CONTRACTOR SHALL VERIFY WITH EQUIPMENT SUPPLIER EXACT QUANTITY AND SIZE OF REFRIGERANT PIPING.
- D. PROVIDE LIQUID LINE FILTER DRYER AND SIGHT GLASS.
- E. PROVIDE PREFABRICATED EQUIPMENT SUPPORT RAILS.
- F. PROVIDE FACTORY MOUNTED DISCONNECT INSTALLED ON SERVICE SIDE OF UNIT.
- G. STARTERS FOR ALL MOTORS SHALL BE FURNISHED INTEGRAL WITH UNIT.
- H. COORDINATE SIZE OF CONDUCTOR TERMINATION LUGS WITH CONDUCTOR SIZES SHOWN ON ELECTRICAL DRAWINGS.

**FAN COIL UNIT SCHEDULE (HEAT PUMP)**

MARK	MFR	MODEL	SUPPLY FAN			COOLING COIL			HEAT PUMP HEATING COIL			MIN O/A	ELECTRICAL	DISC	WEIGHT (LBS)	NOTES							
			CFM	ESP (IN)	NOM (HP)	TH (MBH)	SH (MBH)	EAT (°F DB)   (°F WB)	LAT (°F DB)   (°F WB)	REFR TYPE	MIN OUT (MBH)						AMBIENT (DB)	EAT (°F DB)	LAT (°F DB)				
FCU-1	CARRIER	40MBCO18	420	0.025	0.061	9.6	8.9	75.4	62.8	56.1	55.0	R410A	12	24.1	65.6	92	40	208/1	N/A	N/A	NF	45	A - J

\* EQUIPMENT SHALL BE OBTAINED THROUGH SHAKE SHACK NATIONAL ACCOUNT. REFER TO T02 / 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 100°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-THREAD HANGING RODS.
- J. REFERENCE PLUMBING PLANS FOR CONDENSATE DRAIN PIPING FROM UNIT.

**GRILLE, REGISTER, AND DIFFUSER SCHEDULE**

MARK	MANUFACTURER	SERVICE	MODEL	CONSTRUCTION MATERIAL	FACE TYPE	MOUNTING LOCATION	FACE SIZE (IN)	MAX. NC	NOTES
CEG	E.H. PRICE	EXHAUST GRILLE W/ DAMPER	80D	STEEL	EGGCRATE	SURFACE	12x12	30	A B C F G H
CRG	E.H. PRICE	RETURN GRILLE	80	STEEL	EGGCRATE	LAY-IN	24x24	30	A B C F H
CS01	E.H. PRICE	SUPPLY DIFFUSER	SCD	STEEL	SQUARE CONE	SURFACE	12x12	30	A B C F H J K L
CS02	E.H. PRICE	SUPPLY DIFFUSER	SCD	STEEL	SQUARE CONE	LAY-IN	24x24	30	A B C F H K
CS03	E.H. PRICE	SUPPLY DIFFUSER	PDOR	STEEL	PERFORATED	LAY-IN	24x24	30	A B C F H
WRG	E.H. PRICE	RETURN GRILLE W/DAMPER	530D	STEEL	LOUVERED FACE	WALL OR DUCT	(SEE PLANS)	30	A B C D F H
WSR	E.H. PRICE	SUPPLY REGISTER W/ DAMPER	500D	STEEL	LOUVERED FACE	WALL OR DUCT	(SEE PLANS)	30	A B C D E F G H
LS01	E.H. PRICE	LINEAR SLOT DIFFUSER	500/100	ALUMINUM	LINEAR SLOT	CEILING	(4)-1" SLOTS, 48" LENGTH	30	A B C F H M N
SD01	E.H. PRICE	LINEAR SLOT DIFFUSER	SD8	ALUMINUM	BLOT	TO FACE	48"	30	A B C F H

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 EQUIPMENT RESPONSIBILITY SCHEDULE.
- B. NECK SIZE SHOWN ON DRAWINGS. PROVIDE BRANCH DUCT TO MATCH NECK SIZE UNLESS OTHERWISE SHOWN ON DRAWINGS.
- C. DIFFUSERS SHALL BE PREFINISHED TO MATCH CEILING/WALL/EXPOSED DUCT COLOR (COORDINATE WITH ARCHITECT).
- D. FRONT BLADES PARALLEL TO LONG DIMENSION.
- E. DOUBLE DEFLECTION BARS SHALL BE ADJUSTABLE.
- F. FRAME TYPE TO MATCH CEILING/WALL CONSTRUCTION. COORDINATE WITH ARCHITECTURAL REFLECTED CEILING/WALL PLAN.
- G. PROVIDE OPPOSED BLADE DAMPER ADJUSTABLE FROM FACE OF DEVICE.
- H. PROVIDE DIFFUSERS, LINEAR SLOTS, AND GRILLES WITH NO EXPOSED MOUNTING SCREWS.
- J. CONTRACTOR SHALL PROVIDE REMOTE CABLE-OPERATED VOLUME DAMPER BY METROPOLITAN AIR TECHNOLOGIES MODEL RT-250 WITH EXTERNAL WORM GEAR OPERATOR OR EQUIVALENT YOUNG REGULATOR BUTTERFLY DAMPER WITH 270-275 CONTROLLER. OPERATOR SHALL HAVE A SQUARE DRIVE FOR 1/4" NUT DRIVER. DAMPER ASSEMBLY SHALL INCLUDE GALVANIZED STEEL DUCT WITH ROLLED BEAD STIFFENERS, REINFORCED BLADE, SELF-LUBRICATING BEARING AND WORM GEAR MOUNTING PLATE. DAMPER SHALL BE INSTALLED IN BRANCH DUCT NOT INLET OF PLENUM DIFFUSER. (REF: 2M501)
- K. 4-WAY THROW PATTERN UNLESS OTHERWISE INDICATED BY FLOW ARROWS ON DRAWINGS.
- L. PROVIDE RAPID MOUNT FRAME FOR INSTALLATION IN HARD CEILING.

**FAN SCHEDULE**

MARK	SERVICE DESCRIPTION	MANUFACTURER	MOUNTING	MODEL	CFM	ESP (IN)	BHP	NOM HP	FAN RPM	DRIVE (BELT/DIRECT)	VFD (Y/N)	ELECTRICAL	WEIGHT (LBS)	NOTES		
													DISC TYPE	STARTER TYPE		
EF-1	TOILETS	GREENHECK	ROOF	G-085-D	300	0.5	0.1	1/8	1550	DIRECT	N	120/1	NON-FUSED	N/A	30	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 24" HIGH ROOF CURB, BIRDSCREEN AND BACKDRAFT DAMPER.
- C. PROVIDE FACTORY MOUNTED DISCONNECT SWITCH.
- D. INTERLOCK FAN OPERATION WITH TIME CLOCK.
- E. PROVIDE WITH MANUFACTURERS FAN SPEED CONTROLLER FOR BALANCING PURPOSES.



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SCOTTSDALE, ARIZONA 85254  
PHONE: 480.912.1169 www.zbr.co.uk



COMcheck Software Version 4.1.5.1  
Mechanical Compliance Certificate

Project Information

Energy Code: 2015 IECC  
Project Title: Shake Shack - West Bend  
Location: Fort Worth, Texas  
Climate Zone: 3a  
Project Type: New Construction

Construction Site: 1601 S. University dr Fort Worth, TX, TX  
Owner/Agent: Shake Shack  
Designer/Contractor: Henderson Engineers 8345 Lenexa dr Lenexa, KS

Additional Efficiency Package(s)

Reduced interior lighting power. Requirements are implicitly enforced within interior lighting allowance calculations.

Mechanical Systems List

Quantity	System Type & Description
1	RTU-1 (Single Zone) Heating: 1 each - Other, Gas, Capacity = 146 kBtu/h No minimum efficiency requirement applies Cooling: 1 each - Single Package DX Unit, Capacity = 144 kBtu/h, Air-Cooled Condenser, Air Economizer Proposed Efficiency = 13.00 EER, Required Efficiency: 10.80 EER + 12.2 IEER Fan System: RTU-1 - Compliance (Motor nameplate HP method) - Passes Fans: FAN 1 Supply, Constant Volume, 4500 CFM, 3.7 motor nameplate hp, 0.0 fan efficiency grade
1	RTU-2 (Single Zone) Heating: 1 each - Other, Gas, Capacity = 120 kBtu/h No minimum efficiency requirement applies Cooling: 1 each - Single Package DX Unit, Capacity = 123 kBtu/h, Air-Cooled Condenser, Air Economizer Proposed Efficiency = 13.90 EER, Required Efficiency: 11.00 EER + 12.6 IEER Fan System: RTU-2 - Compliance (Motor nameplate HP method) - Passes Fans: FAN 2 Supply, Constant Volume, 4400 CFM, 2.9 motor nameplate hp, 0.0 fan efficiency grade
1	FCU-1CU-1 (Single Zone) Cooling: 1 each - Split System, Capacity = 10 kBtu/h, Air-Cooled Condenser, No Economizer, Economizer exception: None Proposed Efficiency = 19.00 SEER, Required Efficiency: 13.00 SEER Fan System: FCU-1CU-1 - Compliance (Motor nameplate HP method) - Passes Fans: FAN 3 Supply, Constant Volume, 420 CFM, 0.1 motor nameplate hp, 0.0 fan efficiency grade

Mechanical Compliance Statement

Compliance Statement: The proposed mechanical design represented in this document is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed mechanical systems have been designed to meet the 2015 IECC requirements in COMcheck Version 4.1.5.1 and to comply with any applicable mandatory requirements listed in the Inspection Checklist.

Andrew Pettus - Mechanical Designer  
Name - Title: Andrew Pettus  
Signature: [Signature]  
Date: 02/16/2022

Project Title: Shake Shack - West Bend  
Data filename: J:\Lenexa\Programs\P-T\Shake Shack\2150004696 Shake Shack 1432 - West Bend, TX\0000EnergyComCheck.cck  
Report date: 02/16/22  
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COMcheck Software Version 4.1.5.1  
Inspection Checklist  
Energy Code: 2015 IECC

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

Section # & Req.ID	Plan Review	Complies?	Comments/Assumptions
C103.2 (PR2)	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the mechanical systems and equipment and document where exceptions to the standard are claimed. Load calculations per acceptable engineering standards and handbooks.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C406 (PR9)	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the additional energy efficiency package options.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.

Additional Comments/Assumptions:

1 High Impact (Tier 1) 2 Medium Impact (Tier 2) 3 Low Impact (Tier 3)  
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Section # & Req.ID	Footing / Foundation Inspection	Complies?	Comments/Assumptions
C403.2.4 (FO3)	Snow/melting system sensors for future connection to controls. Freeze protection systems have automatic controls installed.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.

Additional Comments/Assumptions:

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Project Title: Shake Shack - West Bend  
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Section # & Req.ID	Plumbing Rough-In Inspection	Complies?	Comments/Assumptions
C404.5, C404.5.1, C404.5.2 (PL67)	Heated water supply piping conforms to pipe length and volume requirements. Refer to section details.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Exception: Requirement does not apply.
C404.5, C404.5.1, C404.5.2 (PL67)	Heated water supply piping conforms to pipe length and volume requirements. Refer to section details.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Exception: Requirement does not apply.
C404.6.3 (PR7)	Pumps that circulate water between a heater and storage tank have controls that limit operation from startup to <= 5 minutes after end of heating cycle.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Exception: Requirement does not apply.
C404.6.3 (PR7)	Pumps that circulate water between a heater and storage tank have controls that limit operation from startup to <= 5 minutes after end of heating cycle.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Exception: Requirement does not apply.
C404.6.3 (PR7)	Pumps that circulate water between a heater and storage tank have controls that limit operation from startup to <= 5 minutes after end of heating cycle.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Exception: Requirement does not apply.
C404.7 (PL87)	Water distribution system that pumps water from a heated-water supply pipe back to the heated-water source through a cold-water supply pipe is a demand recirculation water system. Pumps within this system have controls that start the pump upon receiving a signal from the action of a user of a fixture or appliance and limits the temperature of the water entering the cold-water piping to 104°F.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Exception: Requirement does not apply.
C404.7 (PL87)	Water distribution system that pumps water from a heated-water supply pipe back to the heated-water source through a cold-water supply pipe is a demand recirculation water system. Pumps within this system have controls that start the pump upon receiving a signal from the action of a user of a fixture or appliance and limits the temperature of the water entering the cold-water piping to 104°F.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Exception: Requirement does not apply.

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Section # & Req.ID	Plumbing Rough-In Inspection	Complies?	Comments/Assumptions
C404.7 (PL87)	Water distribution system that pumps water from a heated-water supply pipe back to the heated-water source through a cold-water supply pipe is a demand recirculation water system. Pumps within this system have controls that start the pump upon receiving a signal from the action of a user of a fixture or appliance and limits the temperature of the water entering the cold-water piping to 104°F.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Exception: Requirement does not apply.

Additional Comments/Assumptions:

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Section # & Req.ID	Mechanical Rough-In Inspection	Complies?	Comments/Assumptions
C402.2.6 (ME11)	Thermally ineffective panel surfaces of sensible heating panels have insulation >= R-5.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C403.2.13 (ME71)	Unenclosed spaces that are heated use only radiant heat.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C403.2.3 (ME55)	HVAC equipment efficiency verified.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	See the Mechanical Systems list for values.
C403.2.4 (ME113)	Fault detection and diagnostics installed with air-cooled unitary DX units having economizers.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C403.2.4 (ME113)	Fault detection and diagnostics installed with air-cooled unitary DX units having economizers.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C403.2.6 (ME115)	Demand control ventilation provided for spaces >500 ft <sup>2</sup> and >25 people/1000 ft <sup>2</sup> occupant density and served by systems with air side economizer, auto modulating outside air damper control, or design airflow >3,000 cfm.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Exception: Requirement does not apply.
C403.2.6 (ME115)	Enclosed parking garage ventilation has automatic contaminant detection and capacity to stage or modulate fans to 50% or less of design capacity.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Exception: Requirement does not apply.
C403.2.7 (ME57)	Exhaust air energy recovery on systems meeting Table C403.2.7(1) and C403.2.7(2).	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C403.2.8 (ME116)	Kitchen exhaust systems comply with replacement air and conditioned supply air limitations, and satisfy hood sating requirements and maximum exhaust rate criteria.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C403.2.9 (ME60)	HVAC ducts and plenums insulated. Where ducts or plenums are installed in or under a slab, verification may need to occur during Foundation inspection.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C403.2.9 (ME10)	Ducts and plenums sealed based on static pressure and location.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C403.2.9 (ME11)	Ductwork operating >3 in. water column requires air leakage testing.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.

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Section # & Req.ID	Mechanical Rough-In Inspection	Complies?	Comments/Assumptions
C403.2.9.3 (ME11)	Ductwork operating >3 in. water column requires air leakage testing.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C403.2.9.3 (ME11)	Ductwork operating >3 in. water column requires air leakage testing.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C403.3 (ME62)	Air economizers provided where required, meet the requirements for design capacity, control signal, ventilation controls, high-limit shut-off, integrated economizer control, and provide a means to relieve excess outside air during operation.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C403.3 (ME62)	Air economizers provided where required, meet the requirements for design capacity, control signal, ventilation controls, high-limit shut-off, integrated economizer control, and provide a means to relieve excess outside air during operation.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C403.4.4.6 (ME110)	Multiple zone VAV systems with DDC of individual zone boxes have static pressure setpoint reset controls.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met. See the Mechanical Systems list for values.
C403.4.4.6 (ME110)	Multiple zone VAV systems with DDC of individual zone boxes have static pressure setpoint reset controls.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Exception: Requirement does not apply. See the Mechanical Systems list for values.
C403.4.4.6 (ME110)	Multiple zone VAV systems with DDC of individual zone boxes have static pressure setpoint reset controls.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Exception: Requirement does not apply. See the Mechanical Systems list for values.
C408.2.2 (ME53)	Air outlets and zone terminal devices have means for air balancing.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C403.5, C403.5.1, C403.5.2 (ME123)	Refrigerated display cases, walk-in coolers or walk-in freezers served by remote compressors and remote condensers not located in a condensing unit, have fan-powered condensers that comply with Sections C403.5.1 and refrigeration compressor systems that comply with C403.5.2.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.

Additional Comments/Assumptions:

1 High Impact (Tier 1) 2 Medium Impact (Tier 2) 3 Low Impact (Tier 3)  
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Section # & Req.ID	Final Inspection	Complies?	Comments/Assumptions
C303.3 (F18)	Furnished O&M 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	Requirement will be met.
C403.2.2 (F27)	HVAC systems and equipment capacity does not exceed calculated loads.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C403.2.4 (F147)	Heating and cooling to each zone is controlled by a thermostat control. Minimum one humidity control device per installed humidification/dehumidification system.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C403.2.4 (F147)	Heating and cooling to each zone is controlled by a thermostat control. Minimum one humidity control device per installed humidification/dehumidification system.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C403.2.4 (F147)	Heating and cooling to each zone is controlled by a thermostat control. Minimum one humidity control device per installed humidification/dehumidification system.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C403.2.4 (F138)	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	Requirement will be met.
C403.2.4 (F120)	Temperature controls have setpoint overlap restrictions.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C403.2.4 (F139)	Each zone equipped with setback controls using automatic 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	Requirement will be met.
C403.2.4 (F140)	Automatic Controls: Setback to 55°F (heat) and 85°F (cool); 7-day clock; 2-hour occupant override; 10-hour backup.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C403.2.4 (F141)	Systems include optimum start controls.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C403.2.4 (F141)	Systems include optimum start controls.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C403.2.4 (F141)	Systems include optimum start controls.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.

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TEL 913.742.5000 FAX 913.742.5001  
WWW.HENDERSONENGINEERS.COM

STORE NO:  
TX #1432

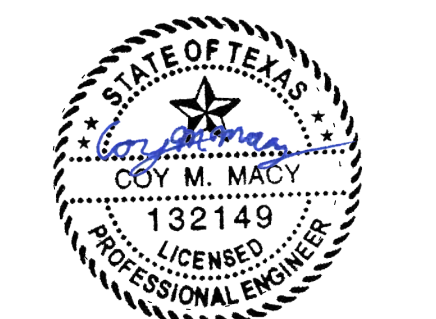


REVISION

DATE	DESCRIPTION
04/25/22 <td>REVISION A</td>	REVISION A
07/19/22 <td>REVISION 1</td>	REVISION 1

STATUS:

PERMIT / BID SET



FIELD VERIFICATION: 07/18/2022

The contractor shall verify all signed dimensions and conditions at the project site and notify Zebra Projects, ARCH. of any dimensional errors, or omissions or discrepancies before beginning or resuming any work. Do not proceed until notified in writing.  
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SHEET NAME:  
MECHANICAL ENERGY CODE COMPLIANCE

DATE: 02/18/22 PROJECT NO: 34666

DRAWN: AJP SCALE:

SHEET NO:  
M630

STORE NO:  
**TX #1432**



Section # & Req.ID	Final Inspection	Complies?	Comments/Assumptions
C408.2.1 [F128]¹	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	Requirement will be met.
C408.2.3.1 [F131]¹	HVAC equipment has 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	Requirement will be met.
C408.2.3.2 [F110]¹	HVAC control 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	Requirement will be met.
C408.2.3.3 [F132]¹	Economizers 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	Requirement will be met.
C408.2.4 [F129]¹	Preliminary 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	Requirement will be met.
C408.2.5.1 [F17]¹	Furnished HVAC as-built drawings submitted 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	Requirement will be met.
C408.2.5.3 [F143]¹	An air and/or hydronic system balancing report is provided for HVAC systems.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C408.2.5.4 [F130]¹	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	Requirement will be met.

Additional Comments/Assumptions:

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

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 Data filename: J:\Lenexa\Programs\PT\Shake Shack\2150004696 Shake Shack 1432 - West Bend, TX\000\Energy\ComCheck.cck Page 9 of 10

Project Title: Shake Shack - West Bend Report date: 02/16/22  
 Data filename: J:\Lenexa\Programs\PT\Shake Shack\2150004696 Shake Shack 1432 - West Bend, TX\000\Energy\ComCheck.cck Page 10 of 10

**REVISION**

DATE	DESCRIPTION
04/25/22	REVISION A
07/18/22	Revision 1

STATUS:  
**PERMIT / BID SET**



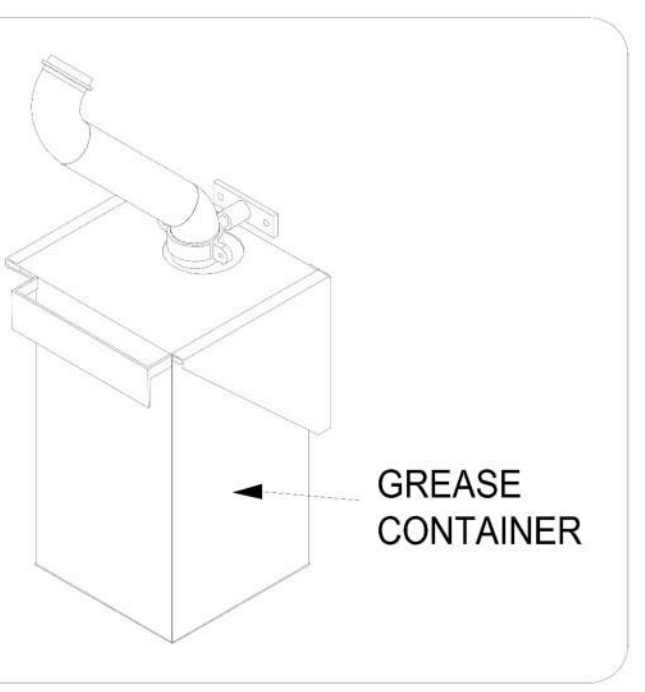
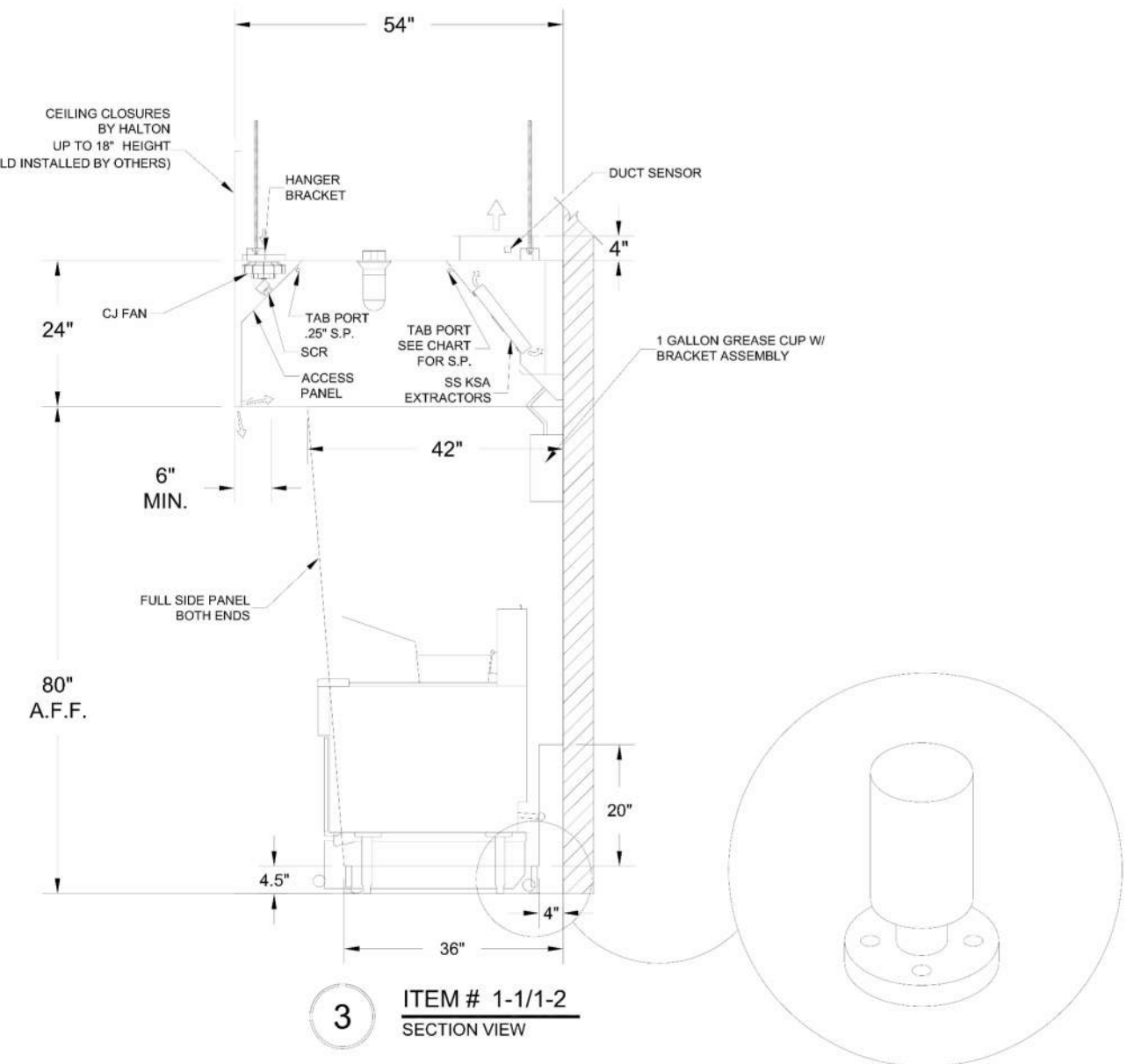
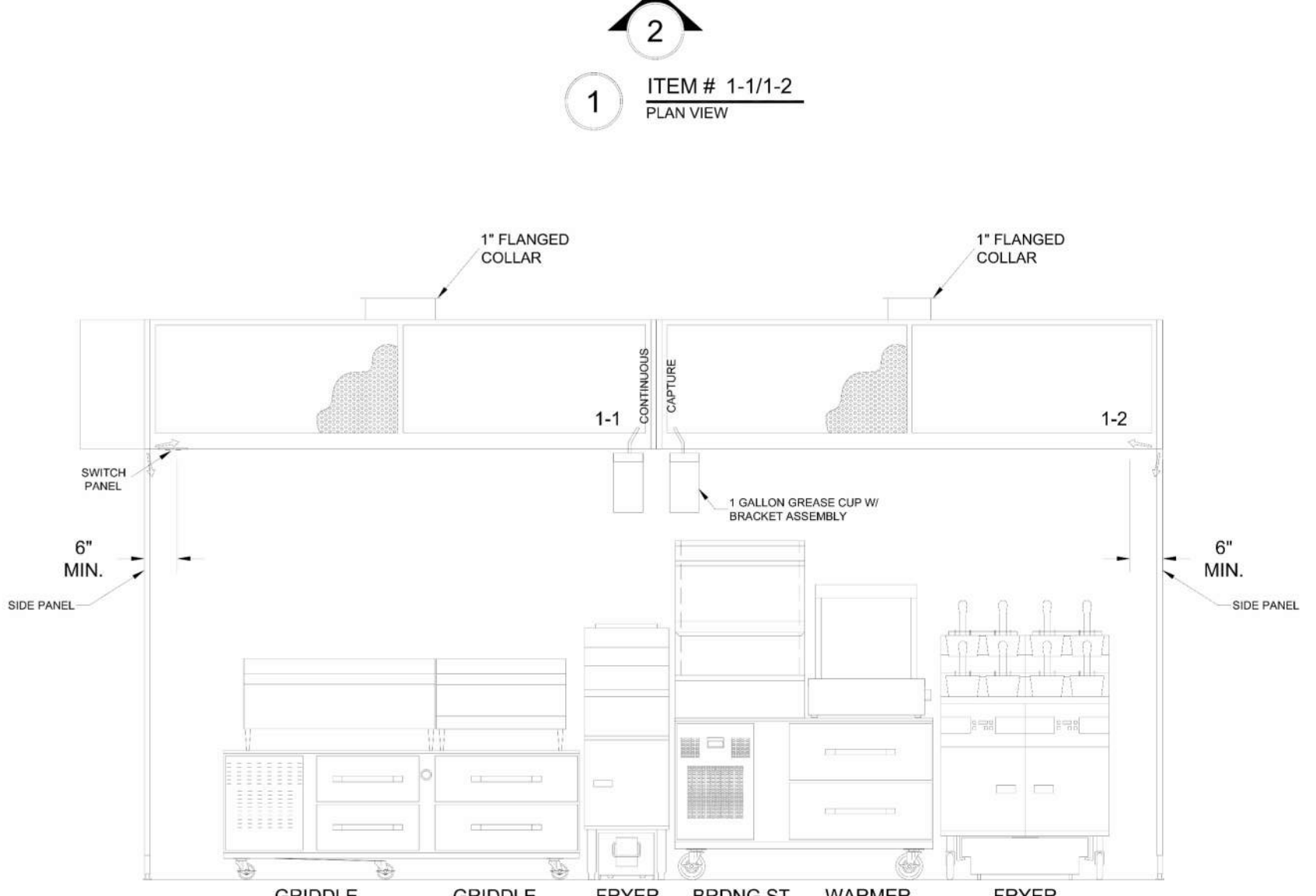
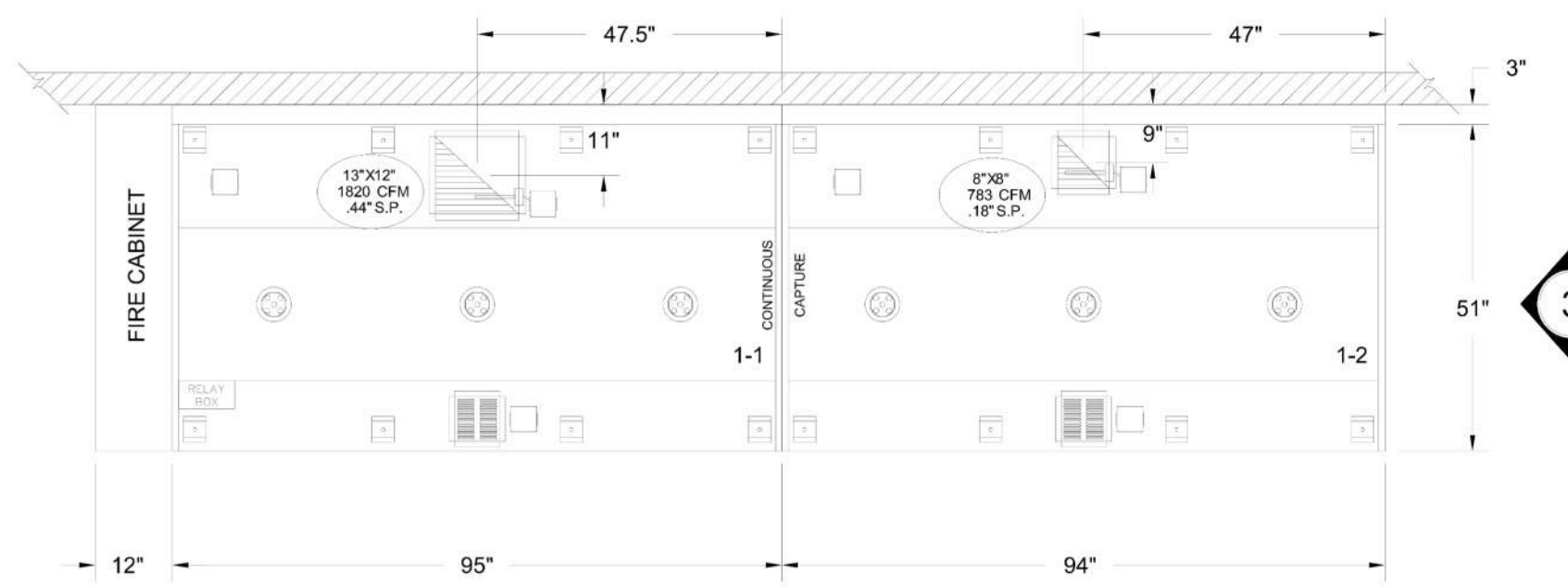
FIELD VERIFICATION: 07/18/2022  
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SHEET NAME:  
**MECHANICAL ENERGY CODE COMPLIANCE**

DATE: 02/18/22 PROJECT NO: 34666  
 DRAWN: AJP SCALE:

SHEET NO:  
**M631**

HOOD NUMBER	HOOD MODEL	EXHAUST AIR FLOW REQUIREMENTS			GREASE EXTRACTOR			HOOD CONSTRUCTION	HOOD WEIGHT (LBS)			
		EXHAUST CFM	T.A.B. PORT STATIC PRESSURE	TOTAL HOOD STATIC PRESSURE	EXHAUST COLLAR QTY.	EXHAUST COLLAR LENGTH	EXHAUST COLLAR WIDTH			QTY.	SIZE L H	TYPE
1-1	KVE	1820	0.34"	0.44"	1	13"	12"	4	20" 13"	KSA	EXPO 18 GA. 430 S.S.	673
1-2	KVE	783	0.06"	0.18"	1	8"	8"	4	20" 13"	KSA	EXPO 18 GA. 430 S.S.	666
TOTAL EXH. CFM =		2603										



**GENERAL SPECIFICATIONS**

- HOOD CONSTRUCTION AND DESIGN MEETS NFPA 96 AND UL 710 STANDARD.
- HOOD IS NSF AND ETL LISTED UNDER THE FOLLOWING FILE NUMBER: ETL P1034320PRT-001.
- ALL INSTALLATION WORK IS TO BE PERFORMED BY QUALIFIED PERSONS AND IN ACCORDANCE WITH STATE AND LOCAL BUILDING CODE REQUIREMENTS.
- THE INSTALLATION SHALL BE IN ACCORDANCE WITH NFPA 96, REMOVAL OF SMOKE AND GREASE LAZAR VAPORS FROM COMMERCIAL COOKING EQUIPMENT.
- ALL EXHAUST DUCTWORK AND TRANSITIONS ARE TO BE PROVIDED BY THE HVAC CONTRACTOR.
- CLEARANCE FROM HOOD AND DUCTS TO COMBUSTIBLE MATERIAL SHALL BE PER APPLICABLE BUILDING CODES.
- FOR PROPER OPERATION OF THE HOOD SYSTEM, IT IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO HAVE THE HOOD BALANCED AND TESTED TO INSURE THAT THE EXHAUST AND SUPPLY REQUIREMENTS OF THE HOOD ARE MET.

**INSTALLATION REQUIREMENTS**

KITCHEN EQUIPMENT CONTRACTOR'S REQUIREMENTS

- PROVIDE DRAWINGS TO APPROPRIATE TRADES, REFERENCING UTILITY SERVICE AND COORDINATE FINAL CONNECTION.
- DELIVER, ASSEMBLE AND INSTALL HALTON SYSTEM PER DRAWING.
- FURNISH WIRING AND FLAMING DIAGRAMS TO END USER.
- THE K.E.C. MUST INFORM HALTON OF ANY CHANGES IN EQUIPMENT OR BUILDING STRUCTURE. FIELD MODIFICATIONS ARE THE RESPONSIBILITY OF THE K.E.C.
- IF HALTON MANUAL EXHAUST VOLUME DAMPERS ARE PROVIDED, THE K.E.C. IS RESPONSIBLE FOR THEIR INSTALLATION OR TO MAKE ARRANGEMENTS WITH OTHER TRADES FOR THEIR INSTALLATION.
- IF HALTON MODEL KVA BACKSHELF STYLE HOODS ARE PROVIDED, THE K.E.C. IS RESPONSIBLE FOR THE INSTALLATION OF THE CAPTURE JET FAN.

ELECTRICAL CONTRACTOR'S REQUIREMENTS

- PROVIDE AND CONNECT ALL REQUIRED VOLTAGES, CONNECTORS, WIRING, CONDUIT, ETC., PER NEC AND ALL APPLICABLE LOCAL CODES.

**ELECTRICAL EQUIPMENT REQUIREMENTS**

FLUORESCENT LIGHT FIXTURE  
 40 WATT MAX BULB- 87 AMP EA.

RECESSED INCANDESCENT LIGHT FIXTURE  
 150 WATT MAX BULB- 1.25 AMP EA.

GLOBE INCANDESCENT LIGHT FIXTURE  
 100 WATT MAX BULB- .83 AMP EA.

LED LIGHT FIXTURES- .30 AMP EA.

CAPTURE JET FAN- .72 AMP EA.

\*ALL HOOD CIRCUITS ARE NOT TO EXCEED 15 AMP\*

\*LIGHT BULBS, IF REQUIRED, ARE TO BE PROVIDED BY OTHERS\*

**CEILING HEIGHT NOTE**

IF HALTON COMPANY IS TO PROVIDE CEILING CLOSURE PANELS, THE EXACT DIMENSION OF THE FINISHED CEILING HEIGHT MUST BE PROVIDED PRIOR TO RELEASE.

FINISHED CEILING HEIGHT A.F.F.:

THE DRAWING MUST BE CHECKED, SIGNED AND RETURNED TO THE APPROPRIATE FACTORY. PLEASE VERIFY THE FOLLOWING:

- ALL INFORMATION, INCLUDING POSITIONS AND DIMENSIONS, IS CORRECT.
- THE LOCATION AND TYPE OF COOKING EQUIPMENT IS CORRECT.
- ANY CHANGES TO COOKING EQUIPMENT MUST BE NOTIFIED IN WRITING TO THE FACTORY PRIOR TO FABRICATION.
- REVISIONS AND RESUBMIT WITH CHANGES AS NOTED.

APPROVED FOR FABRICATION: \_\_\_\_\_ DATE: \_\_\_\_\_



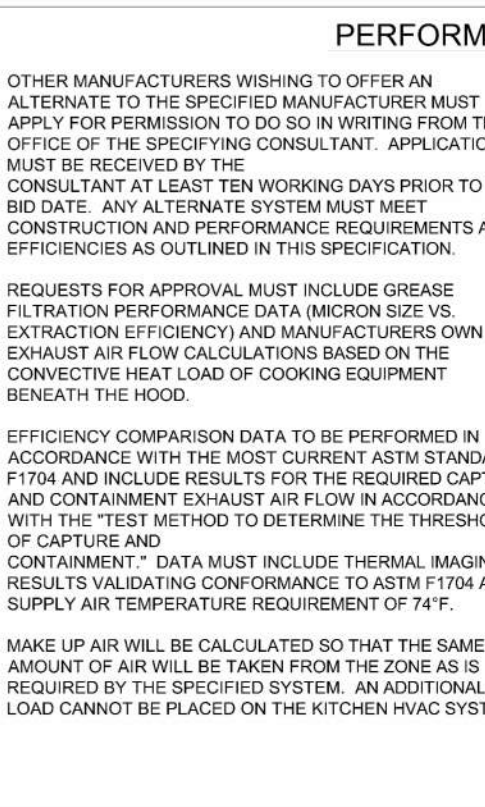
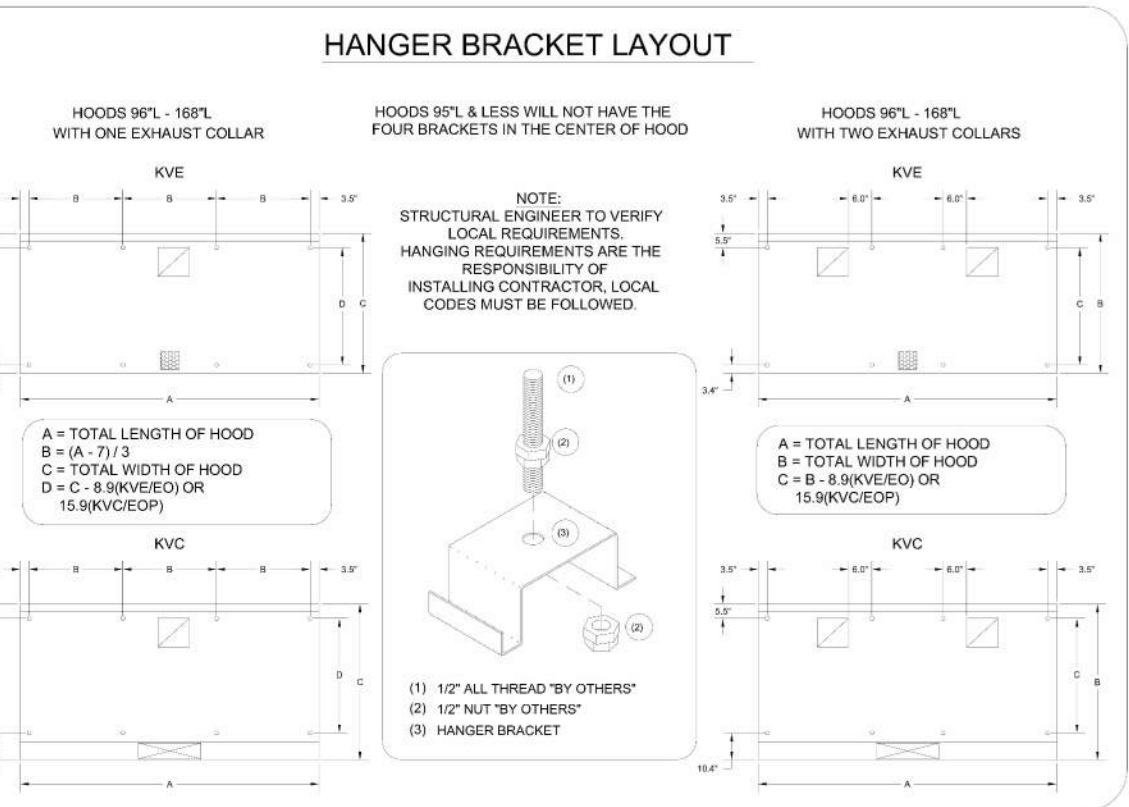
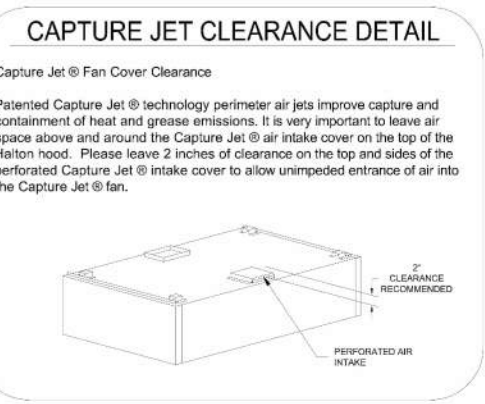
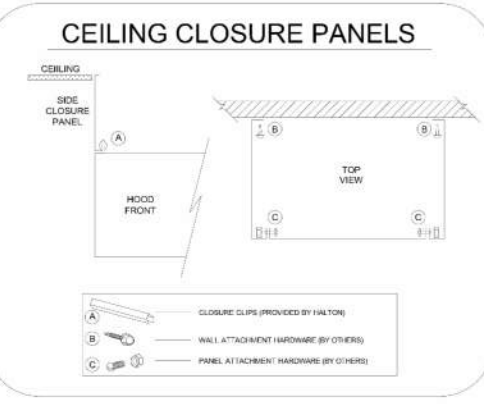
MAIL APPROVED DRAWINGS TO APPROPRIATE FACTORY BELOW:

WEBSITE: www.halton.com

HALTON CO. (USA)  
 101 INDUSTRIAL DRIVE  
 SCOTTSDALE, KY 42164  
 1-270-237-5600

HALTON CO. (CANADA)  
 1021 BREWING PLACE  
 MISSISSAUGA, ON L4W 3R7  
 1-905-624-0301

REV.	REVISION DESCRIPTION	DATE	BY	AF
1	REVISED END PANELS	07.11.22	AF	
2	REVISED TO KVE			
3				
4				
5				
6				
7				



**PERFORMANCE CRITERIA**

OTHER MANUFACTURERS WISHING TO OFFER AN ALTERNATE TO THE SPECIFIED MANUFACTURER MUST APPLY FOR PERMISSION TO DO SO IN WRITING FROM THE OFFICE OF THE SPECIFYING CONSULTANT. APPLICATION MUST BE RECEIVED BY THE CONSULTANT AT LEAST TEN WORKING DAYS PRIOR TO THE BID DATE. ANY ALTERNATE SYSTEM MUST MEET CONTRACTOR AND PERFORMANCE REQUIREMENTS AND EFFICIENCIES AS OUTLINED IN THIS SPECIFICATION.

REQUESTS FOR APPROVAL MUST INCLUDE GREASE FILTRATION PERFORMANCE DATA (MICRON SIZE VS. EXTRACTION EFFICIENCY) AND MANUFACTURER'S OWN EXHAUST AIR FLOW CALCULATIONS BASED ON THE CONNECTIVE HEAT LOAD OF COOKING EQUIPMENT.

EFFICIENCY COMPARISON DATA TO BE PERFORMED IN ACCORDANCE WITH THE MOST CURRENT ASTM STANDARD F1704 AND INCLUDE RESULTS FOR THE REQUIRED CAPTURE AND CONTAINMENT EXHAUST AIR FLOW IN ACCORDANCE WITH THE TEST METHOD TO DETERMINE THE THRESHOLD OF CAPTURE AND CONTAINMENT. DATA MUST INCLUDE THERMAL IMAGING RESULTS VALIDATING CONFORMANCE TO ASTM F1704 AND SUPPLY AIR TEMPERATURE REQUIREMENT OF 74°F.

MAKE UP AIR WILL BE CALCULATED SO THAT THE SAME AMOUNT OF AIR WILL BE TAKEN FROM THE ZONE AS IS REQUIRED BY THE SPECIFIED SYSTEM. AN ADDITIONAL LOAD CANNOT BE PLACED ON THE KITCHEN HVAC SYSTEM.

PROJCT: SHAKE SHACK WEST BEND  
 LOCATION: FORT WORTH, TX  
 DRAWN BY: SKM DATE: 01.18.22  
 SCALE: NOT TO SCALE  
 CONSULTANT: Halton

DRAWING TITLE: HOOD DETAILS  
 DRAWING No.: U22-044  
 REV. NO.: 3 SHEET NO.: 1 of 3

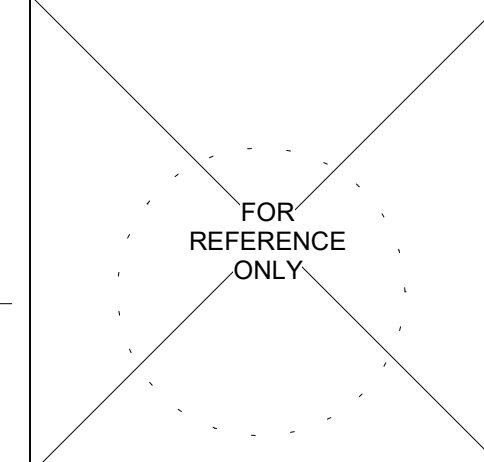
STORE NO: TX #1432



**REVISION**

DATE	DESCRIPTION
04/25/22	REVISION A
07/19/22	Revision 1

STATUS: PERMIT / BID SET

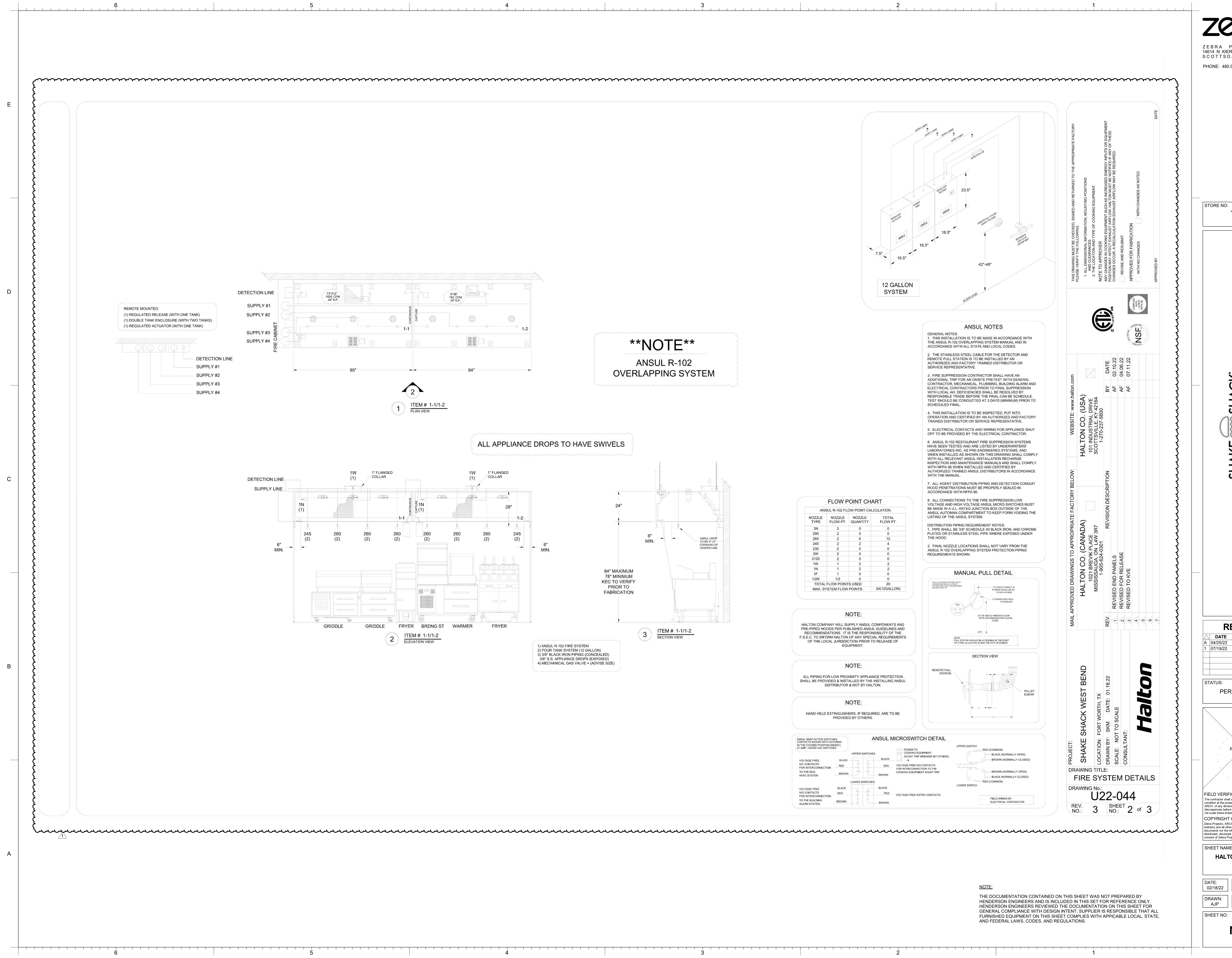


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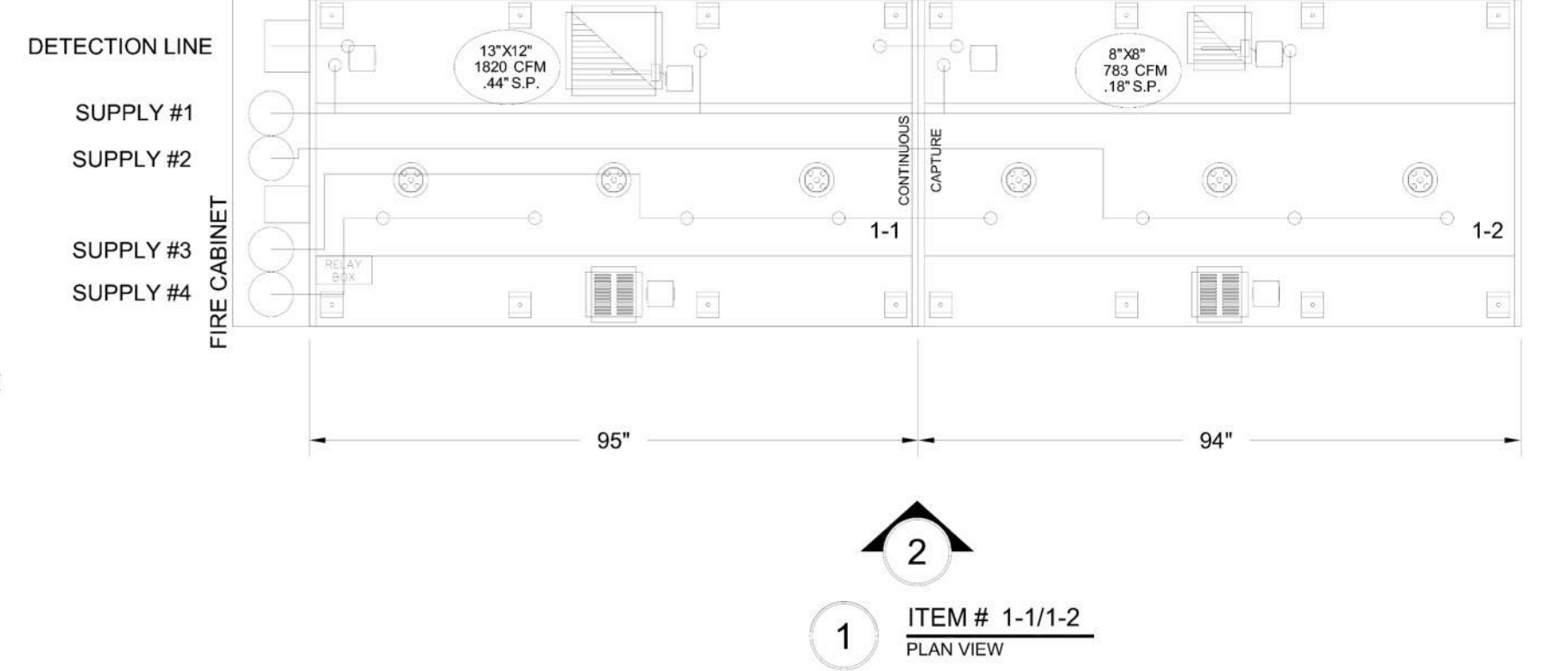
SHEET NAME: HALTON DRAWINGS

DATE: 02/18/22	PROJECT NO: 34666
DRAWN: AJP	SCALE: AS NOTED
SHEET NO: M701	



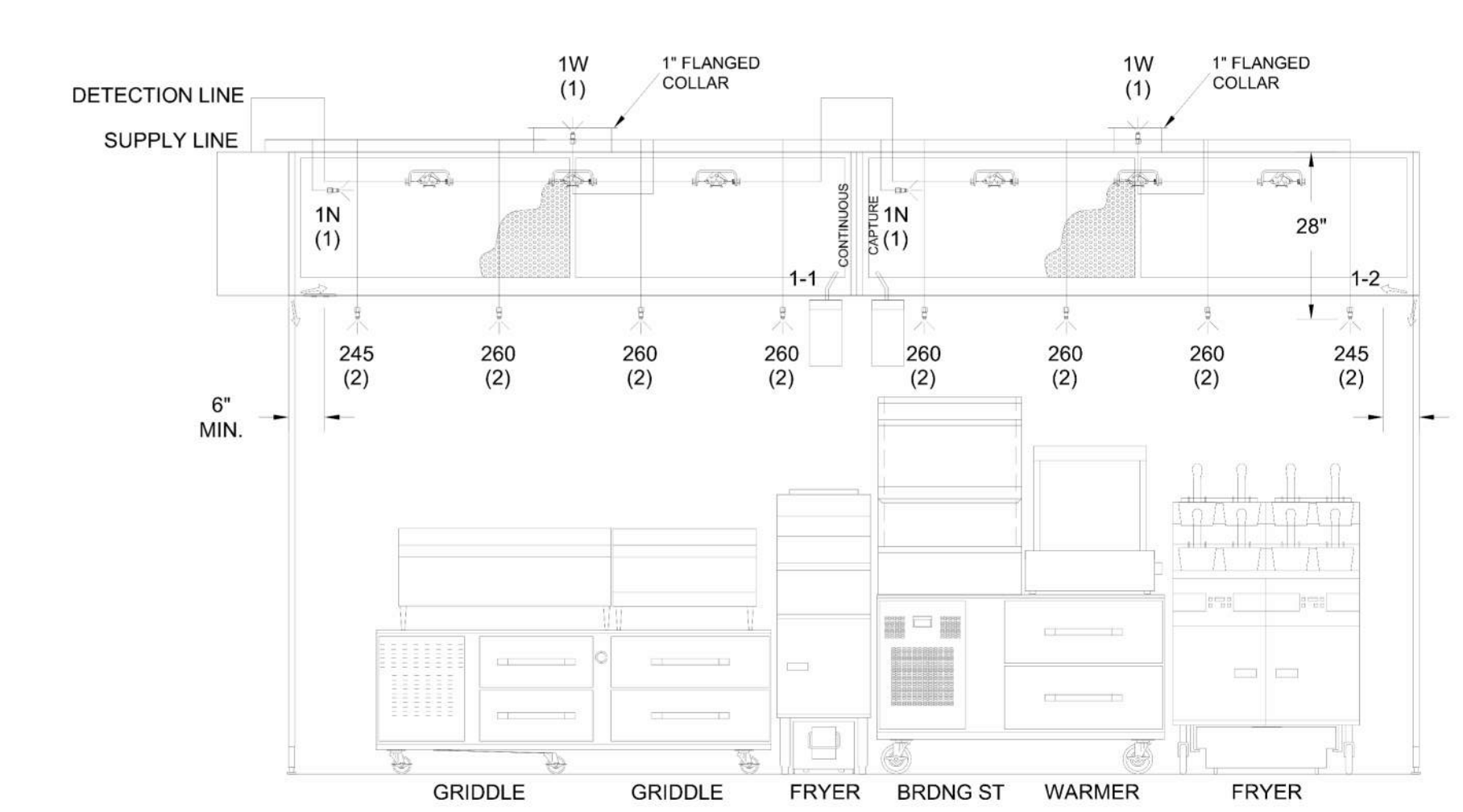
REMOTE MOUNTED:  
 (1) REGULATED RELEASE (WITH ONE TANK)  
 (1) DOUBLE TANK ENCLOSURE (WITH TWO TANKS)  
 (1) REGULATED ACTUATOR (WITH ONE TANK)

DETECTION LINE  
 SUPPLY #1  
 SUPPLY #2  
 SUPPLY #3  
 SUPPLY #4

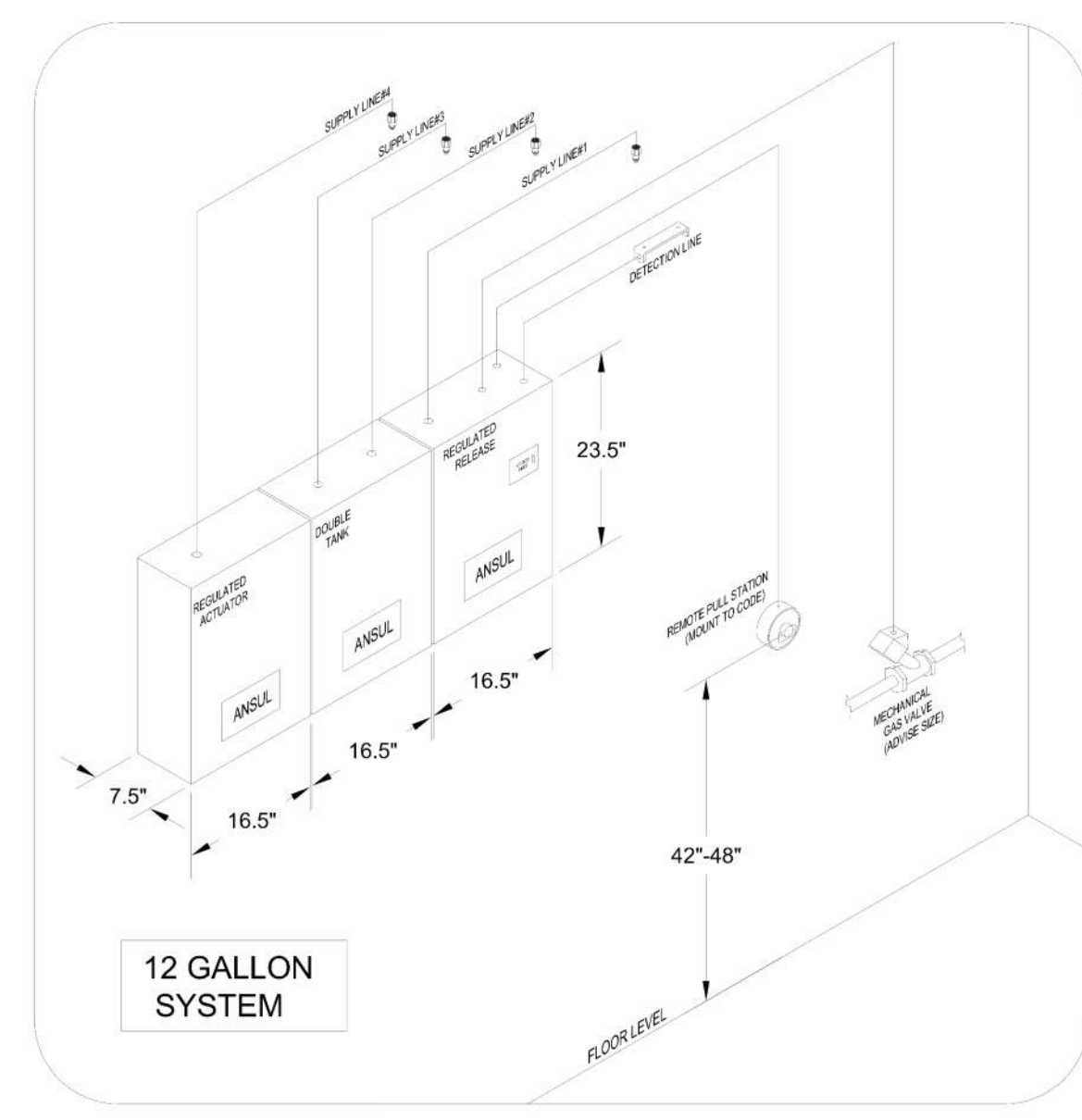
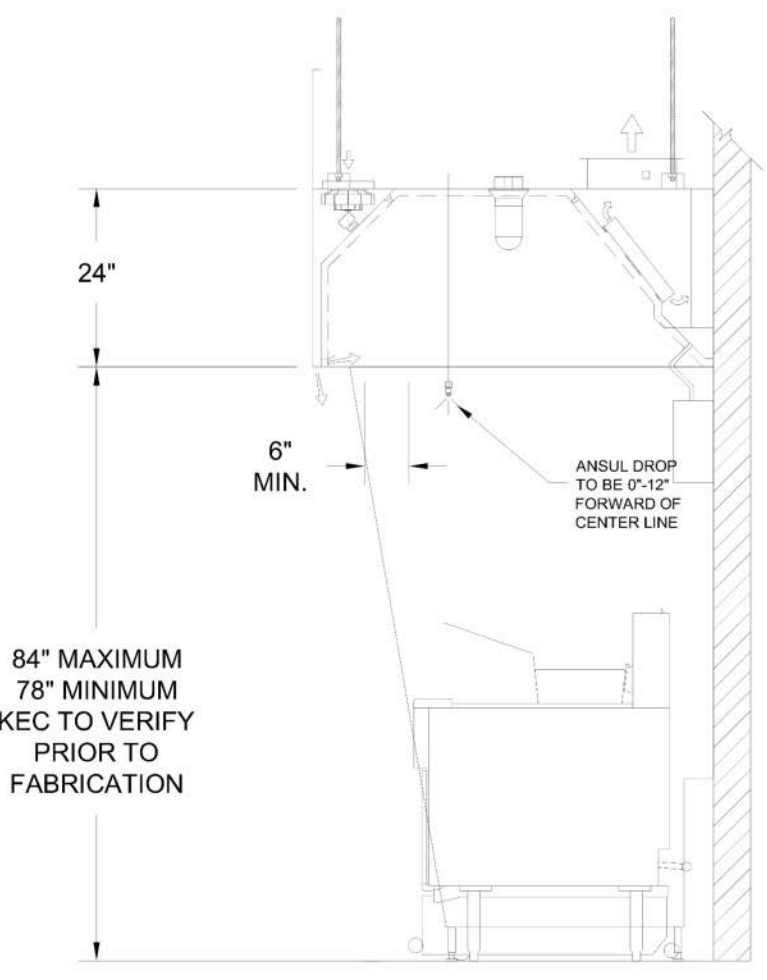


**\*\*NOTE\*\***  
 ANSUL R-102  
 OVERLAPPING SYSTEM

ALL APPLIANCE DROPS TO HAVE SWIVELS



- 1) ANSUL R-102 FIRE SYSTEM
- 2) FOUR TANK SYSTEM (12 GALLONS)
- 3) 3/8" BLACK IRON PIPING (CONCEALED)
- 3/8" S.S. APPLIANCE DROPS (EXPOSED)
- 4) MECHANICAL GAS VALVE = (ADVISE SIZE)



12 GALLON SYSTEM

**ANSUL NOTES**

- GENERAL NOTES:  
 1. THIS INSTALLATION IS TO BE MADE IN ACCORDANCE WITH THE ANSUL R-102 OVERLAPPING SYSTEM MANUAL AND IN ACCORDANCE WITH ALL STATE AND LOCAL CODES.  
 2. THE STAINLESS STEEL CABLE FOR THE DETECTOR AND REMOTE PULL STATION IS TO BE INSTALLED BY AN AUTHORIZED AND FACTORY TRAINED DISTRIBUTOR OR SERVICE REPRESENTATIVE.  
 3. FIRE SUPPRESSION CONTRACTOR SHALL HAVE AN ADDITIONAL TRIP FOR AN ONSITE PRETEST WITH GENERAL CONTRACTOR, MECHANICAL, PLUMBING, BUILDING ALARM AND ELECTRICAL CONTRACTORS PRIOR TO FINAL SUPPRESSION WITH LOCAL AH. DEFICIENCIES SHALL BE RESOLVED BY RESPONSIBLE TRADE BEFORE THE FINAL CAN BE SCHEDULED. TEST SHOULD BE CONDUCTED AT 3 DAYS (MINIMUM) PRIOR TO SCHEDULED FINAL.  
 4. THIS INSTALLATION IS TO BE INSPECTED, PUT INTO OPERATION AND CERTIFIED BY AN AUTHORIZED AND FACTORY TRAINED DISTRIBUTOR OR SERVICE REPRESENTATIVE.  
 5. ELECTRICAL CONTACTS AND WIRING FOR APPLIANCE SHUT OFF TO BE PROVIDED BY THE ELECTRICAL CONTRACTOR.  
 6. ANSUL R-102 RESTAURANT FIRE SUPPRESSION SYSTEMS HAVE BEEN TESTED AND ARE LISTED BY UNDERWRITERS LABORATORIES INC. AS PRE-ENGINEERED SYSTEMS, AND WHEN INSTALLED AS SHOWN ON THIS DRAWING SHALL COMPLY WITH ALL RELEVANT ANSUL INSTALLATION RECHARGE, INSPECTION AND MAINTENANCE MANUALS AND SHALL COMPLY WITH NFPA 98 WHEN INSTALLED AND CERTIFIED BY AUTHORIZED TRAINED ANSUL DISTRIBUTORS IN ACCORDANCE WITH THE MANUAL.  
 7. ALL AGENT DISTRIBUTION PIPING AND DETECTION CONDUIT HOOD PENETRATIONS MUST BE PROPERLY SEALED IN ACCORDANCE WITH NFPA 98.  
 8. ALL CONNECTIONS TO THE FIRE SUPPRESSION LOW VOLTAGE AND HIGH VOLTAGE ANSUL MICRO-SWITCHES MUST BE MADE IN A UL LISTED JUNCTION BOX OUTSIDE OF THE ANSUL AUTOMAN COMPARTMENT TO KEEP FORM VOIDING THE LISTING OF THE ANSUL SYSTEM.  
 DISTRIBUTION PIPING REQUIREMENT NOTES:  
 1. PIPING SHALL BE 3/8" SCHEDULE 40 BLACK IRON, AND CHROME PLATED OR STAINLESS STEEL PIPE WHERE EXPOSED UNDER THE HOOD.  
 2. FINAL NOZZLE LOCATIONS SHALL NOT VARY FROM THE ANSUL R-102 OVERLAPPING SYSTEM PROTECTION PIPING REQUIREMENTS SHOWN.

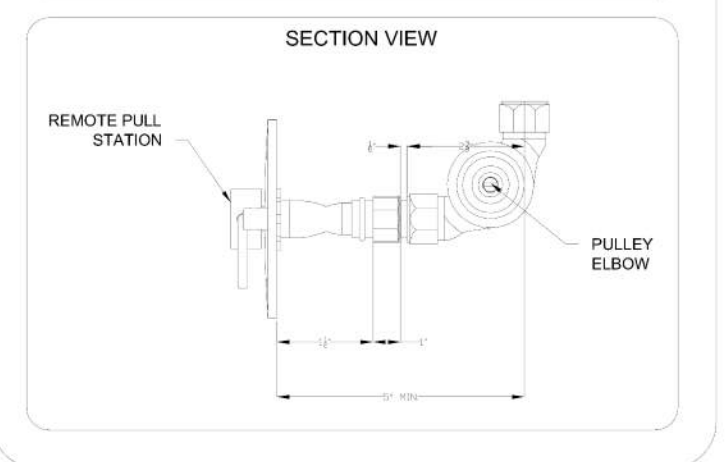
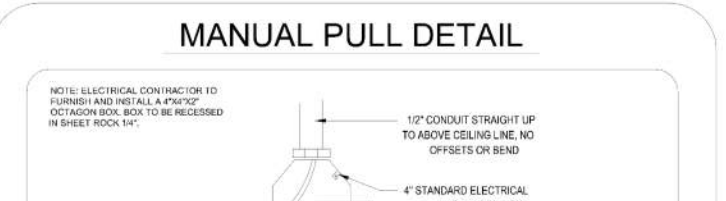
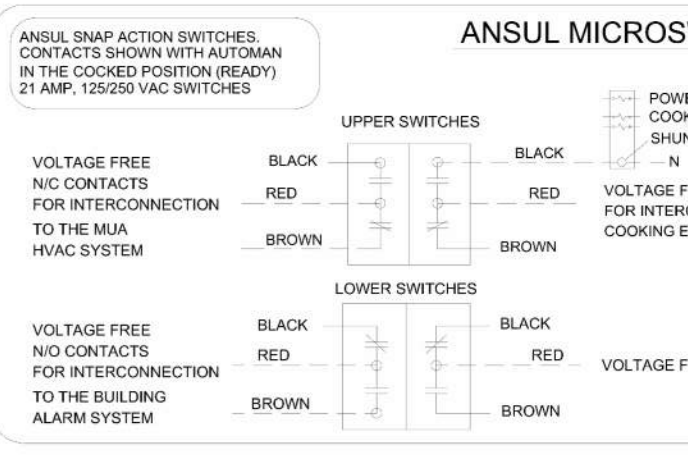
**FLOW POINT CHART**  
 ANSUL R-102 FLOW POINT CALCULATION

NOZZLE TYPE	NOZZLE FLOW P.T.	NOZZLE QUANTITY	TOTAL FLOW P.T.
3N	3	0	0
280	2	0	0
260	2	6	12
245	2	2	4
230	2	0	0
210	2	0	0
2120	2	0	0
1W	1	2	2
1N	1	2	2
1F	1	0	0
1/2N	1/2	0	0
TOTAL FLOW POINTS USED		20	
MAX. SYSTEM FLOW POINTS:		24(12GALLON)	

**NOTE:**  
 HALTON COMPANY WILL SUPPLY ANSUL COMPONENTS AND PRE-PIPED HOODS PER PUBLISHED ANSUL GUIDELINES AND RECOMMENDATIONS. IT IS THE RESPONSIBILITY OF THE F.S.E.C. TO INFORM HALTON OF ANY SPECIAL REQUIREMENTS OF THE LOCAL JURISDICTION PRIOR TO RELEASE OF EQUIPMENT.

**NOTE:**  
 ALL PIPING FOR LOW PROXIMITY APPLIANCE PROTECTION SHALL BE PROVIDED & INSTALLED BY THE INSTALLING ANSUL DISTRIBUTOR & NOT BY HALTON.

**NOTE:**  
 HAND HELD EXTINGUISHERS, IF REQUIRED, ARE TO BE PROVIDED BY OTHERS.



THIS DRAWING MUST BE CHECKED, SIGNED AND RETURNED TO THE APPROPRIATE FACTORY:  
 1. ALL DIMENSIONAL INFORMATION, MOUNTING POSITIONS AND COLOR-CODED INFORMATION, MUST BE VERIFIED.  
 2. THE CONTRACTOR SHALL VERIFY THE TYPE OF COOKING EQUIPMENT.  
 NOTE TO APPROVER:  
 ANY CHANGES IN COOKING EQUIPMENT SUCH AS INCREASED ENERGY INPUTS OR EQUIPMENT CHANGES OCCUR, A RECALCULATION EXHAUST AIR FLOW MAY BE REQUIRED.  
 REVERSE AND RESUBMIT  
 APPROVED FOR FABRICATION  
 WITH NO CHANGES  
 WITH CHANGES AS NOTED  
 APPROVED BY: \_\_\_\_\_ DATE: \_\_\_\_\_



WEBSITE: www.halton.com

REVISION	DATE	DESCRIPTION
1	02.10.22	REVISED END PANELS
2	04.06.22	REVISED FOR RELEASE
3	07.11.22	REVISED TO AVE
4		
5		
6		
7		

MAIL APPROVED DRAWINGS TO APPROPRIATE FACTORY BELOW:

HALTON CO. (USA)	101 INDUSTRIAL DRIVE SCOTTSDALE, AZ 85254
HALTON CO. (CANADA)	1021 BREWERY PLACE MISSISSAUGA, ONTARIO L4V 3R7

PROJECT: SHAKE SHACK WEST BEND  
 LOCATION: FORT WORTH, TX  
 DRAWN BY: SKM DATE: 01.18.22  
 SCALE: NOT TO SCALE  
 CONSULTANT: Halton

DRAWING TITLE:  
**FIRE SYSTEM DETAILS**

DRAWING No.: **U22-044**

REV. NO.: 3 SHEET NO.: 2 of 3

STORE NO:  
**TX #1432**



**REVISION**

DATE	DESCRIPTION
04/25/22	REVISION A
07/19/22	Revision 1

STATUS:  
**PERMIT / BID SET**

FOR REFERENCE ONLY

FIELD VERIFICATION:  
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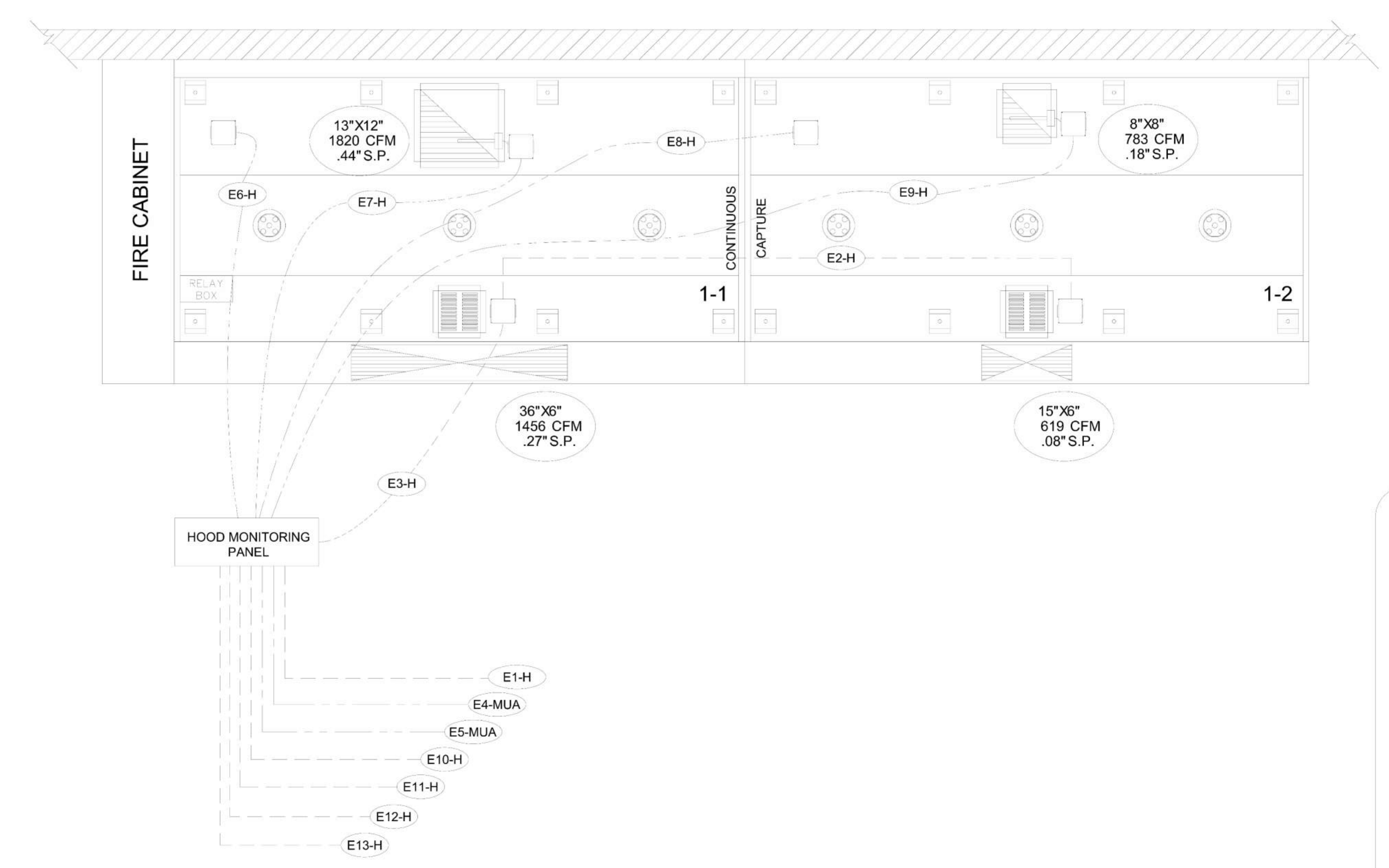
SHEET NAME:  
**HALTON DRAWINGS**

DATE: 02/18/22 PROJECT NO: 34666

DRAWN: AJP SCALE: AS NOTED

SHEET NO:  
**M702**

**NOTE:**  
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**SEQUENCE OF OPERATIONS:**

**FIRE MODE:**

- EXHAUST FAN TO ENERGIZE TO 100% OF DESIGN AIRFLOW
- MUA FAN TO SHUT DOWN

**FAN SWITCH PRESSED:**

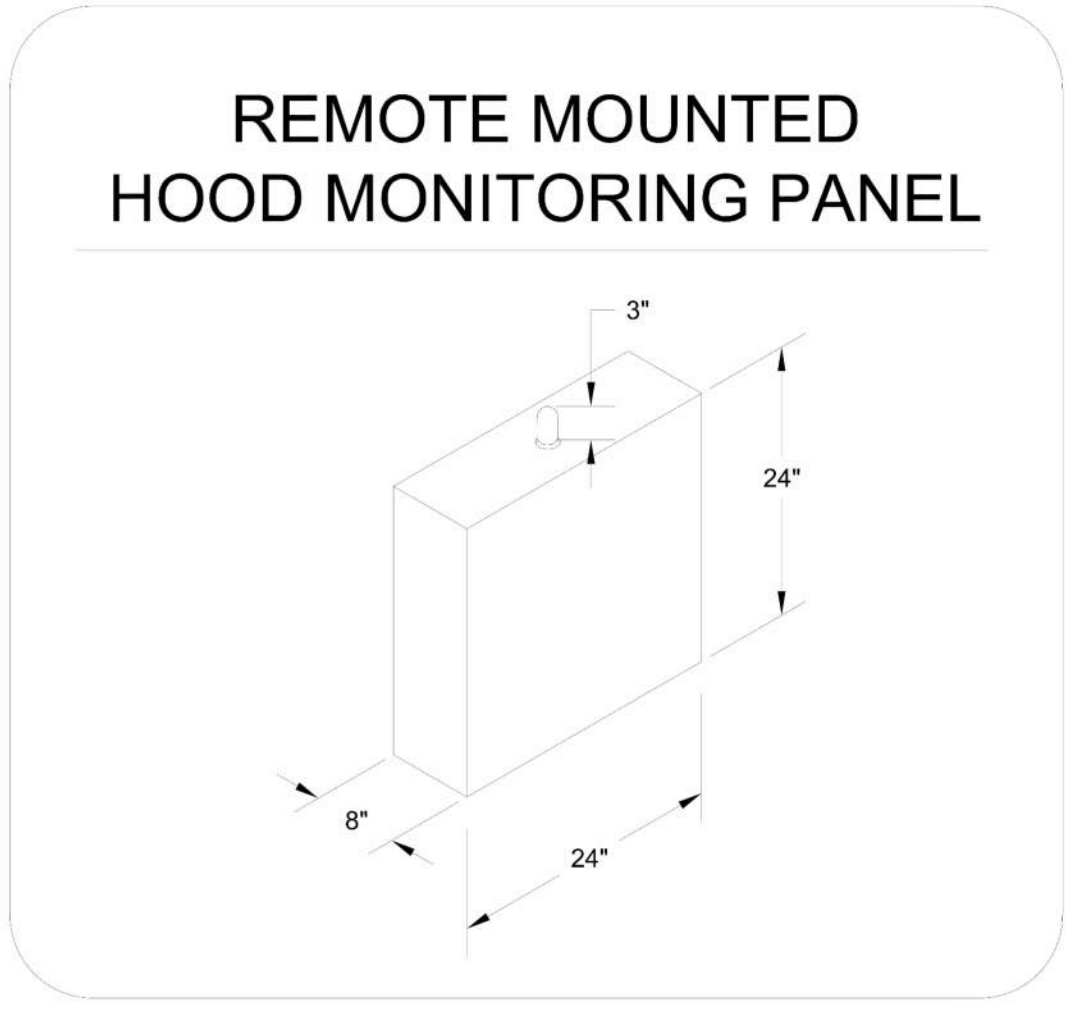
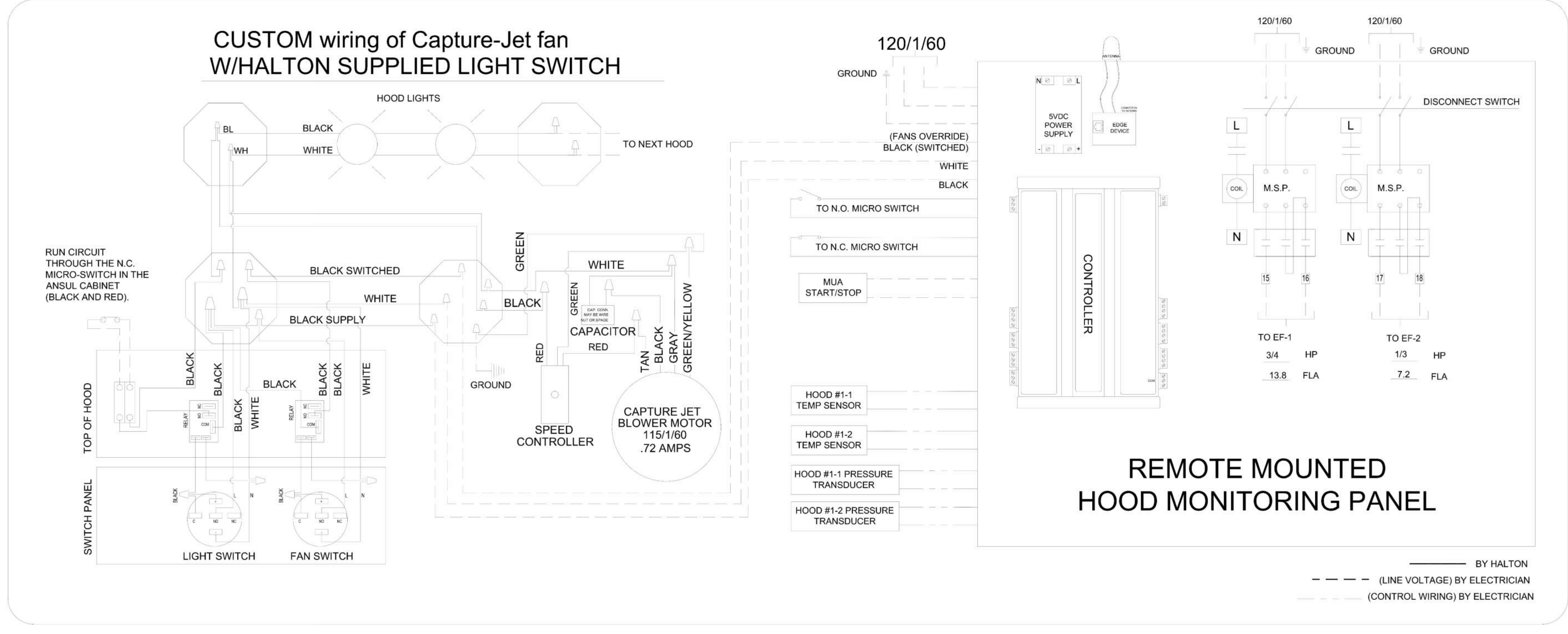
- EXHAUST FAN TO ENERGIZE TO 100% OF DESIGN AIRFLOW
- MUA FAN TO ENERGIZE TO 100% OF DESIGN AIRFLOW

**TEMPERATURE SENSOR ACTIVATION:**

- ONCE TEMP SENSOR INDICATES 95°F, THE EXHAUST FAN WILL ENERGIZE TO 100% OF DESIGN AIRFLOW.
- MUA FAN TO ENERGIZE TO 100% OF DESIGN AIRFLOW

**ELECTRICAL CONNECTION SCHEDULE**

CONNECTION #	CONNECTION DESCRIPTION	FROM	TO
E1-H	120V, 15AMP - CONTROL PANEL POWER - 3 WIRES	BUILDING SOURCE	HOOD 1-1
E2-H	FIELD CONNECTION FOR HOOD LIGHTS	HOOD 1-1	HOOD 1-2
E3-H	FIELD CONNECTION FOR FAN SWITCH - 3 WIRES 120V	HOOD 1-1	CONTROL PANEL
E4-MUA	START/STOP TO MUA UNIT - 2 WIRES	CONTROL PANEL	MUA UNIT
E5-MUA	CAT5 CABLE TO MUA UNIT	REMOTE PANEL	MUA UNIT
E6-H	FIELD CONNECTION FOR PRESSURE TRANSDUCER - 2 WIRES	CONTROL PANEL	HOOD 1-1
E7-H	FIELD CONNECTION FOR TEMP SENSOR - 2 WIRES	CONTROL PANEL	HOOD 1-1
E8-H	FIELD CONNECTION FOR PRESSURE TRANSDUCER - 2 WIRES	CONTROL PANEL	HOOD 1-2
E9-H	FIELD CONNECTION FOR TEMP SENSOR - 2 WIRES	CONTROL PANEL	HOOD 1-2
E10-H	120V/1PH - MOTOR STARTER POWER	BUILDING SOURCE	CONTROL PANEL
E11-H	120V/1PH - MOTOR STARTER POWER	BUILDING SOURCE	CONTROL PANEL
E12-H	FIELD CONNECTION TO NORMALLY OPEN MICRO-SWITCH	ANSUL SYSTEM	CONTROL PANEL
E13-H	FIELD CONNECTION TO NORMALLY CLOSED MICRO-SWITCH	ANSUL SYSTEM	CONTROL PANEL



THIS DRAWING MUST BE CHECKED, SIGNED AND RETURNED TO THE APPROPRIATE FACTORY. PLEASE EMBLEM THE FOLLOWING:

1. ALL DIMENSIONS, INFORMATION, MOUNTING POSITIONS AND TOLERANCES.
2. THE LOCATION AND TYPE OF COOKING EQUIPMENT.

NOTE TO APPROVER: THE LOCATION AND TYPE OF COOKING EQUIPMENT MAY AFFECT EXHAUST AIRFLOW. HALTON MUST BE NOTIFIED OF ANY OF THESE CHANGES PRIOR TO FABRICATION. APPROVED FOR FABRICATION:  WITH NO CHANGES  WITH CHANGES AS NOTED

APPROVED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

WEBSITE: www.halton.com

**HALTON CO. (USA)**  
 101 INDUSTRIAL DRIVE  
 SCOTTSDALE, KY 42164  
 1-270-337-5600

**HALTON CO. (CANADA)**  
 1023 BREVIK PLACE  
 MISSISSAUGA ON, L4W 3R7  
 1-905-664-0301

REV.	REVISION DESCRIPTION	DATE	BY
1	REVISED CONNECTIONS	06/08/22	AF
2	REVISED FOR RELEASE	06/08/22	AF
3	NO CHANGE	07/11/22	AF
4			
5			
6			
7			

PROJECT: **SHAKE SHACK WEST BEND**  
 LOCATION: FORT WORTH, TX  
 DRAWN BY: SKM DATE: 01/19/22  
 SCALE: NOT TO SCALE  
 CONSULTANT: **Halton**

DRAWING TITLE: **DEMAND CONTROL DETAILS**  
 DRAWING No.: **U22-044**  
 REV. NO.: 3 SHEET NO.: 3 of 3

STORE NO:  
**TX #1432**

**SHAKE SHACK**  
 WESTBEND CITY, TEXAS  
 FORT WORTH, TEXAS 76107

**REVISION**

DATE	DESCRIPTION
04/25/22	REVISION A
07/19/22	Revision 1

STATUS:  
**PERMIT / BID SET**

FOR REFERENCE ONLY

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SHEET NAME:  
**HALTON DRAWINGS**

DATE: 02/18/22 PROJECT NO: 34666  
 DRAWN: AJP SCALE: AS NOTED

SHEET NO:  
**M703**

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