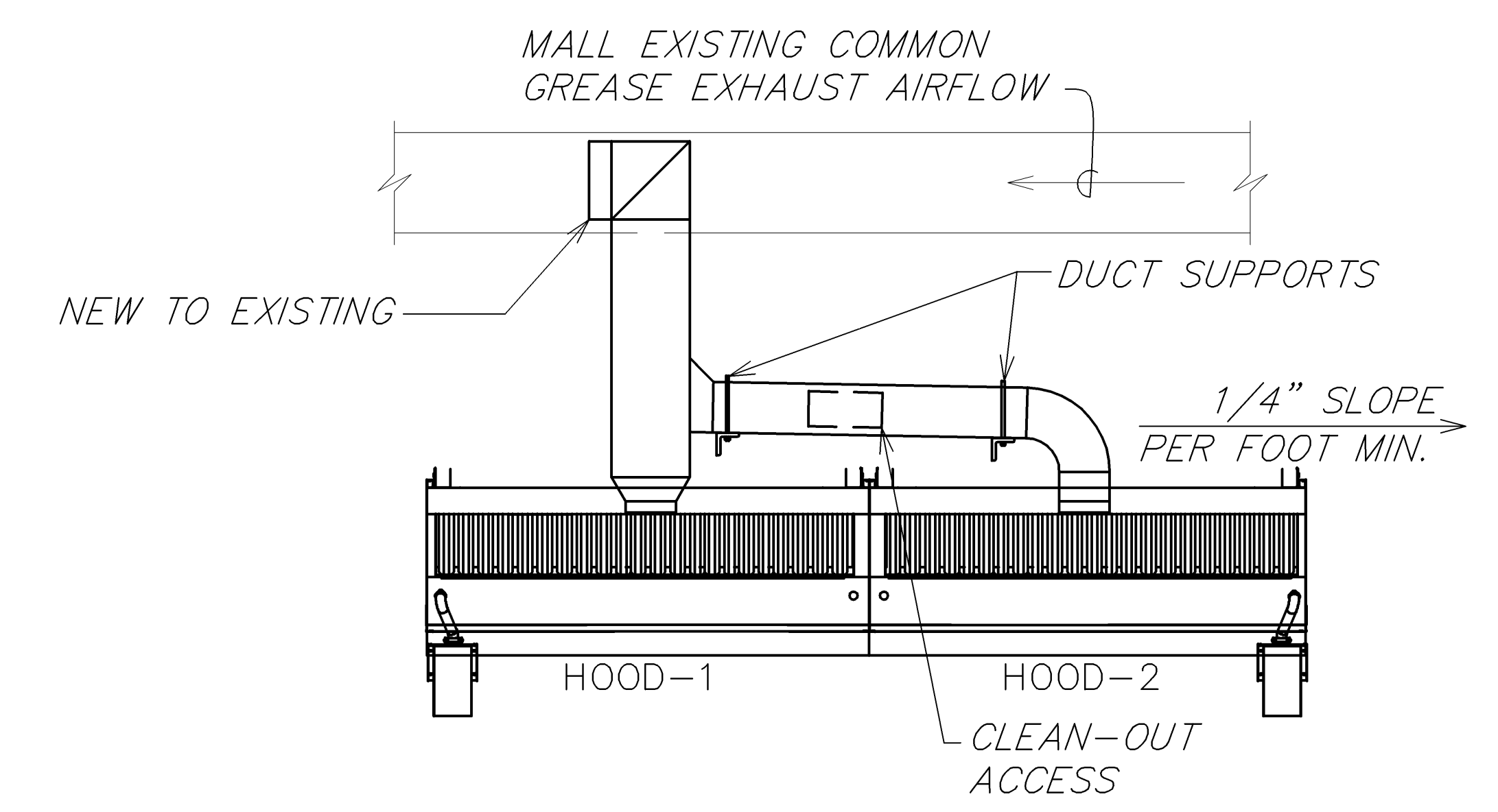
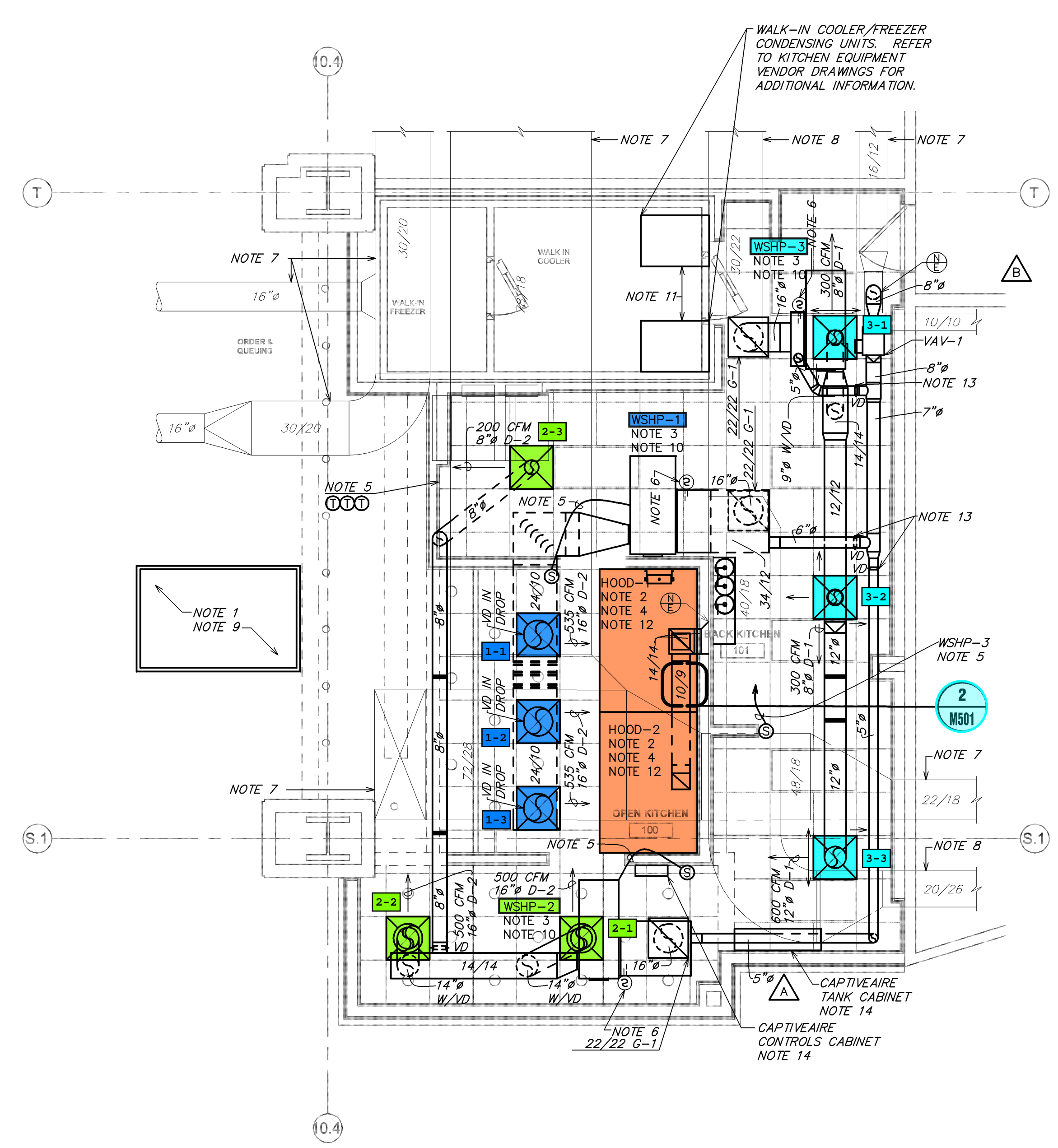


- GENERAL NOTES:**
- EXISTING CONDITIONS ARE BASED ON RECORD DRAWINGS PROVIDED BY THE OWNER AND/OR LIMITED FIELD VERIFICATION BY OTHERS. CONTRACTOR SHALL ADJUST TO ACTUAL FIELD CONDITIONS AT NO ADDITIONAL EXPENSE TO THE PROJECT.
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 - ALL CONTRACTORS SHALL REVIEW A COMPLETE SET OF CONSTRUCTION DOCUMENTS. CONTRACTORS SHALL FAMILIARIZE THEMSELVES WITH DEMOLITION WORK PRIOR TO BIDDING AND START OF WORK. CONTRACTOR IS RESPONSIBLE TO DEMOLISH ALL EXISTING AS REQUIRED FOR INSTALLATION/CONSTRUCTION OF NEW WORK.
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 - MECHANICAL CONTRACTOR SHALL FIELD COORDINATE WITH ELECTRICAL CONTRACTOR FOR ALL POWER REQUIREMENTS.
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 - COORDINATE DUCT ROUTING AND HEIGHTS WITH GENERAL CONTRACTOR. VERIFY ALL CLEARANCES BEFORE STARTING WORK.
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 - REFRIGERANT PIPING SHALL BE SIZED PER MANUFACTURER'S RECOMMENDATIONS. PROVIDE ALL ACCESSORIES AS REQUIRED BY MANUFACTURER FOR COMPLETE WORKING SYSTEM, INCLUDING ANY ACCESSORIES ASSOCIATED WITH LONG LENGTH APPLICATIONS WHERE APPLICABLE.
 - TENANT'S CONTRACTOR SHALL BE RESPONSIBLE FOR THE FIELD VERIFICATION OF ALL UTILITY RUNS AND/OR OTHER IMPROVEMENTS LOCATED ON THE PREMISES PRIOR TO BIDDING. TENANT'S CONTRACTOR SHALL ALSO BE RESPONSIBLE FOR ALL COSTS RELATING TO THE RELOCATION OF, DAMAGE TO, REPAIR OF ANY EXISTING UTILITY RUNS AND/OR IMPROVEMENTS WHICH ARE DAMAGED AS A RESULT OF TENANT'S WORK OR PREVIOUS WORK.
 - ALL GREASE EXHAUST DUCTWORK SHALL BE PROVIDED WITH 3" FOIL FACED THERMAL-CERAMIC INSULATION FOR GREASE DUCTS. INSULATION SHALL MEET NFPA 98 AND ASTM E 2336 REQUIREMENTS.
 - GREASE DUCT LEAKAGE TESTING MUST BE PERFORMED PRIOR TO CONCEALMENT OF THE DUCTWORK.
 - MECHANICAL CONTRACTOR SHALL PROVIDE TENANT WITH A WRITTEN ONE (1) YEAR MANUFACTURER'S WARRANTY ON ALL HVAC EQUIPMENT PROVIDED AND / OR INSTALLED. THE WARRANTY SHALL INCLUDE ALL LABOR, MATERIALS AND THREE (3) ROUTINE SERVICES INCLUDING FILTER CHANGES DURING A ONE (1) YEAR PERIOD.
 - AT THE COMPLETION OF CONSTRUCTION AN NEBB, AABC OR TABB CERTIFIED AIR BALANCE REPORT SHALL BE SUBMITTED TO THE ENGINEER AND LANDLORD. PRIOR TO SCHEDULING BALANCING COORDINATE WITH LANDLORD'S FIELD REPRESENTATIVE FOR COORDINATING WITH THE VENDOR LISTED BELOW. IF APPROVED, THE BALANCING SHALL BE COMPLETED BY NATIONAL TAB TO ALSO PERFORM COMMISSIONING FOR ALL SHAKE SHACK PROVIDED UNITS.
 - THE CONTRACTOR SHALL OBTAIN AN APPROVED LANDLORD SYSTEM CRITERIA MANUAL. TENANT CRITERIA MANUAL IS AN INTEGRAL PART OF THIS CONTRACT. CONTRACTOR SHALL BE RESPONSIBLE FOR COMPLYING WITH LANDLORD REQUIREMENTS AT NO ADDITIONAL COST TO THE TENANT.
 - PARTS OF THE BASE BUILDING SYSTEMS THAT FALL INTO LEASE LINE SHALL REMAIN UNDISTURBED UNLESS NOTED OTHERWISE.
 - PROVIDE ALL NECESSARY WIRING, RELAYS, DETECTORS, COMPONENTS, ETC., FOR FIRE ALARM OR CONTROL SYSTEM INTERLOCK IF APPLICABLE. VERIFY WITH MALL PERSONNEL BEFORE BID.

- HVAC NOTES:**
- ROUTE DUCTWORK AS REQUIRED TO AVOID CONFLICTS. TYPICAL THROUGHOUT SPACE.
 - NEW CAPTIVE GREASE EXHAUST HOOD TO BE FURNISHED BY OWNER FOR INSTALLATION BY THE MECHANICAL CONTRACTOR. SEE CAPTIVE SHEETS FOR ADDITIONAL INFORMATION. VERIFY ALL MANUFACTURER AND CODE REQUIRED CLEARANCES ARE MAINTAINED. NOTIFY ARCHITECT IF ANY CONFLICTS OCCUR.
 - PROVIDE WSHF AS INDICATED ON PLANS AND AS SCHEDULED ON SHEET M001.
 - HOOD MANUFACTURER TO PROVIDE A "KIT" TO FASTEN THE BOTTOM FLANGE OF THE HOOD TO THE WALL, WITH ONE FASTENER PER STUD WALL. SIL-BOND RTV 4500 ALUMINUM SILICONE SEALANT OR APPROVED SIMILAR, TO BE APPLIED BY GENERAL CONTRACTOR/HOOD INSTALLER FOR ANY REMAINING SMALL GAPS. HOOD FASTENING "KIT" DETAIL TO BE INCLUDED IN MANUFACTURER DRAWINGS. REFERENCE SHEET M001, DETAIL 9, FOR ADDITIONAL INFORMATION.
 - PROVIDE NEW FULLY DIGITAL 7 DAY PROGRAMMABLE TYPE THERMOSTAT WITH REMOTE SENSING CAPABILITIES, AUTO CHANGE OVER AND AUTO SET BACK. MOUNT THERMOSTAT AT 48" ABOVE FINISHED FLOOR. THERMOSTATS SERVING THE SAME TEMPERATURE ZONE SHALL BE INTERLOCKED TO PREVENT SIMULTANEOUS HEATING AND COOLING. PROVIDE REMOTE TEMPERATURE SENSORS AS INDICATED ON PLAN. COORDINATE LOCATION WITH MALL GRAPHICS LAYOUT. VERIFY WITH OWNER IF CLEAN LOOKING COVER IS REQUIRED. IF SO, THE CONTRACTOR SHALL PROVIDE.
 - DUCT SMOKE DETECTOR ON RETURN SIDE DUCT AND SHUTDOWN RELAY SHALL BE FURNISHED BY THE ELECTRICAL CONTRACTOR FOR INSTALLATION BY THE MECHANICAL CONTRACTOR. ALL WIRING SHALL BE BY THE ELECTRICAL CONTRACTOR.
 - EXISTING MALL DUCTWORK TO REMAIN.
 - EXISTING MALL GREASE EXHAUST DUCTWORK TO REMAIN.
 - EXISTING MALL UTILITIES AND PIPING TO REMAIN. NOT SHOWN FOR CLARITY.
 - PROVIDE FULL SIZE RETURN AIR DUCT.
 - KITCHEN EQUIPMENT CONDENSING UNITS TO BE INSTALLED ABOVE WALK IN COOLER. COORDINATE EXACT INSTALLATION LOCATION WITH ARCHITECT, STRUCTURAL ENGINEER, AND KITCHEN EQUIPMENT PROVIDER.
 - TRANSITION FROM HOOD EXHAUST COLLAR AS INDICATED ON PLANS AND EXTEND KITCHEN HOOD GREASE EXHAUST DUCTWORK TO EXISTING MALL GREASE EXHAUST DUCTWORK AS INDICATED ON THE PLANS. GREASE DUCT SHALL BE WRAPPED WITH TWO (2) LAYERS OF THERMAL CERAMIC FAST WRAP XL 1 1/2" THICK WITH 3" PERIMETER AND LONGITUDINAL OVERLAPS OR EQUIVALENT U.L. LISTED GREASE DUCT WRAP FOR ZERO CLEARANCE TO COMBUSTIBLES. REFER TO SHEET M001, DETAIL 2, FOR ADDITIONAL INFORMATION. TYPICAL OF ALL GREASE EXHAUST DUCTWORK. PROVIDE CLEANOUTS ON GREASE DUCTWORK AS REQUIRED BY CODE.
 - BALANCE VOLUME DAMPER TO AIRFLOW INDICATED ON AIR BALANCE SCHEDULE, SHEET M001.
 - COORDINATE INSTALLATION LOCATION OF CAPTIVE SYSTEMS WITH CONSTRUCTION MANAGER.



2 GREASE DUCT DETAIL
SCALE: NONE

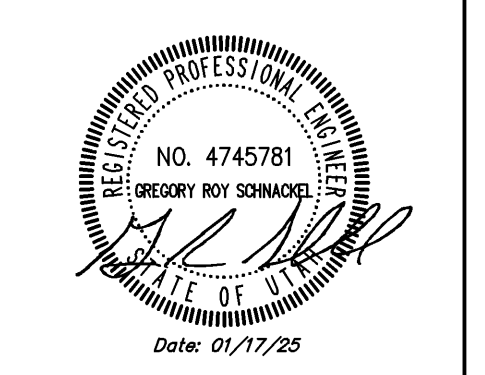


1 MECHANICAL FLOOR PLAN
SCALE: 1/4" = 1'-0"

REVISIONS

NO.	DATE	REVISION
1	2024-06-06	REVISION A
2	2024-05-07	REVISION B
3	2024-02-02	REVISION C
4	2024-02-08	REVISION D
5	2025-01-17	REVISION 1

STATUS: IFC SET



FIELD VERIFICATION:
The Contractor shall verify all field dimensions and conditions of the project site and verify Zebra Architecture, PLLC of any dimensional errors, omissions or discrepancies before beginning or resuming any work. Do not scale these drawings.
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SHEET NAME:
MECHANICAL FLOOR PLAN

DATE: 07/28/2024 PROJECT NO.: 38541
DRAWN: RAS SCALE:

SHEET NO.:
M101

SHEET NUMBER	SHEET NAME
M001	MECHANICAL ABBREVIATIONS & SYMBOLS
M101	MECHANICAL FLOOR PLAN
M102	MECHANICAL REFRIGERATION PIPING AND LAYOUT PLAN
M501	MECHANICAL DETAILS
M502	MECHANICAL DETAILS
M590	MECHANICAL SPECIFICATIONS
M591	MECHANICAL SPECIFICATIONS
M592	MECHANICAL SPECIFICATIONS
M601	MECHANICAL SCHEDULES
M701	CAPTIVEAIRE DRAWINGS
M702	CAPTIVEAIRE DRAWINGS
M703	CAPTIVEAIRE DRAWINGS
M704	CAPTIVEAIRE DRAWINGS
M705	CAPTIVEAIRE DRAWINGS

LANDLORD NOTES:

- EQUIPMENT SHALL BE LABELED AS REQUIRED BY LANDLORD TENANT CONSTRUCTION RULES AND REGULATIONS MANUAL.
- UPON COMPLETION OF TENANT BUILD OUT, THE TENANT SHALL PROVIDE ONE (1) SET OF PDF AS-BUILT PLANS FOR ALL MECHANICAL WORK TO THE LANDLORD.
- TENANT SHALL NOT MODIFY THE LANDLORD'S (BASE BUILDING) SYSTEMS.
- EXISTING SYSTEMS FROM PREVIOUS TENANT CANNOT BE ABANDONED IN PLACE AND MUST BE DEMOLISHED ENTIRELY IF NOT BEING RE-USED.
- AIR BALANCE SHALL BE DONE PER THE DESIGN AIR QUANTITIES INDICATED ON THE TENANT'S DESIGN DRAWINGS, BUT NOT IN EXCESS OF AIRFLOW CAPACITY DESIGNATED BY THE LANDLORD. ALSO, BALANCE CONDENSER WATER FLOW RATES TO DESIGN QUANTITIES.
- A CERTIFIED BALANCING REPORT MUST BE SUBMITTED TO THE LANDLORD FOR REVIEW AND APPROVAL AT LEAST TWO WEEKS PRIOR TO OPENING OF THE LEASED PREMISES OR AS DIRECTED BY LANDLORD.
- MAKE-UP AIR TO BE PROVIDED BY MALL COMMONS. REFERENCE SHEET M601, AIR BALANCE SCHEDULE FOR ADDITIONAL INFORMATION.
- GREASE DUCTWORK SHALL BE CONSTRUCTED, INSTALLED, AND TESTED AS REQUIRED BY GOVERNING CODES.

RESPONSIBILITY MATRIX

THIS SCHEDULE IS PROVIDED FOR QUICK REFERENCE ONLY. THE GENERAL CONTRACTOR IS RESPONSIBLE FOR ALL WORK DESCRIBED IN THE CONSTRUCTION DOCUMENTS. CONFLICTS BETWEEN THIS SCHEDULE AND THE REST OF THE CONTRACT DOCUMENTS SHALL BE BROUGHT TO THE ARCHITECT'S ATTENTION PRIOR TO BEGINNING WORK.

DESCRIPTION	FURNISHED			INSTALLED			REMARKS
	GENERAL CONTRACTOR	OWNER	LANDLORD	GENERAL CONTRACTOR	OWNER	LANDLORD	
DIVISION 23: HEATING, VENTILATING, AND AIR CONDITIONING							
23.1 HVAC DUCTWORK AND PIPING IDENTIFICATION							
23.1.1 HVAC DUCTWORK SYSTEM IDENTIFICATION	X			X			
23.1.2 PIPING SYSTEM IDENTIFICATION	X			X			
23.1.3 UTILITY SHUT OFF IDENTIFICATION IN KITCHEN	X			X			
23.1.4 VALVE TAGS AND CHART	X			X			
23.1.5 HVAC DAMPER IDENTIFICATION	X			X			
23.2 ROOF CURBS							
23.2.1 EXHAUST FAN CURBS	X			X			SCOPE OF WORK TO INCLUDE RIGGING, CURBS, AND ACCESSORIES
23.2.2 ROOFTOP UNIT CURBS	X	X		X			SCOPE OF WORK TO INCLUDE RIGGING, CURBS, AND ACCESSORIES
23.2.3 CONDENSING UNIT CURBS	X			X			GENERAL CONTRACTOR SCOPE OF WORK TO INCLUDE RIGGING, CURBS, AND ACCESSORIES
23.2.4 MAKE UP AIR UNIT CURBS		X		X			SCOPE OF WORK TO INCLUDE RIGGING, CURBS, AND ACCESSORIES
23.2.5 KITCHEN EXHAUST FAN CURBS		X		X			SCOPE OF WORK TO INCLUDE RIGGING, CURBS, AND ACCESSORIES
23.3 HVAC DUCTWORK SYSTEM COMPONENTS							
23.3.1 HVAC DUCTWORK	X			X			
23.3.2 INSULATION AND FIRE WRAP	X			X			GENERAL CONTRACTOR SCOPE OF WORK TO INCLUDE TENANT FIT OUT FROM LANDLORD POINT OF CONNECTION
23.3.3 DAMPERS	X			X			
23.3.4 SMOKE DETECTORS	X			X			
23.3.5 SUPPLY, RETURN, AND EXHAUST GRILLS AND REGISTERS	X			X			
23.4 MECHANICAL PIPING SYSTEM COMPONENTS							
23.4.1 WALK-IN COOLER AND FREEZER REFRIGERATION		X			X		WALK-IN COOLER AND FREEZER SUPPLIED BY VENDOR NO. 103. GENERAL CONTRACTOR SCOPE OF WORK TO INCLUDE PIPING INSTALLATION AND FINAL CONNECTION
23.4.2 REFRIGERATION FOR OTHER HVAC EQUIPMENT	X			X			
23.4.3 CHILLED WATER	X			X			
23.4.4 CONDENSER WATER			X			X	
23.4.5 HEATING HOT WATER			X			X	
23.4.6 VALVES AND ACCESSORIES (E.G. AIR VENTS)	X		X	X			
23.5 HVAC EQUIPMENT							
23.5.1 SUPPLY FAN		X		X			
23.5.2 TOILET EXHAUST FAN	X			X			
23.5.3 KITCHEN EXHAUST FAN		X		X			SUPPLIED BY VENDOR NO. 102
23.5.4 DUCTED AND NON-DUCTED HEATING AND COOLING UNITS		X		X			
23.5.5 MAKE UP AIR UNITS		X		X			SUPPLIED BY VENDOR NO. 102
23.5.6 ELECTRIC PATIO HEATERS	X	X		X			
23.5.7 CONDENSING UNITS	X	X		X			
23.5.8 RGF PHI SYSTEM	X			X			GENERAL CONTRACTOR TO PURCHASE FROM VENDOR NO. 7. VENDOR SUBSTITUTION IS NOT PERMITTED
23.6 KITCHEN EXHAUST WITH FIRE SUPPRESSION SYSTEM							
23.6.1 HOOD CONTROL PANEL		X		X			SUPPLIED BY VENDOR NO. 102
23.6.2 KITCHEN EXHAUST HOOD		X		X			SUPPLIED BY VENDOR NO. 102
23.6.3 STRUCTURAL SUPPORT	X			X			
23.6.4 ELECTRICAL AND CONTROL WIRING	X			X			
23.6.5 TANK SYSTEM		X		X			SUPPLIED BY VENDOR NO. 102. GENERAL CONTRACTOR TO COORDINATE AND FACILITATE SYSTEM SIGN-OFF
23.6.6 TANK WIRING AND UTILITIES CONNECTION	X			X			
23.6.7 TANK GAS VALVE		X		X			SUPPLIED BY VENDOR NO. 102
23.7 COMMISSIONING ACTIVITIES							
23.7.1 GREASE EXHAUST WATER LEAKAGE TEST	X			X			GENERAL CONTRACTOR TO PURCHASE FROM VENDOR NO. 6. VENDOR SUBSTITUTION IS NOT PERMITTED
23.7.2 TESTING AIR BALANCE (TAB) REPORT	X			X			GENERAL CONTRACTOR TO PURCHASE FROM VENDOR NO. 7. VENDOR SUBSTITUTION IS NOT PERMITTED

HEATING - VENTILATING - AIR CONDITIONING					
SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	AUTOMATIC CONTROL VALVE		SUPPLY OF FRESH AIR DUCT (SA OR FA)		RETURN OR EXHAUST DUCT (RE OR EX)
	PRESSURE REGULATING VALVE (PRV)		SAFETY RELIEF VALVE		SOUND TRAP
	BLOW OFF VALVE		F AND T TRAP (CAP. #/AIR)		SUPPLY REGISTER OR GRILLE (R OR G)
	HOT WATER SUPPLY (HEATING)		THERMOSTATIC TRAP		RETURN REGISTER OR GRILLE (R OR G)
	HOT WATER RETURN (HEATING)		STATIC PRESSURE		FRESH AIR INTAKE (FA)
	CONDENSATE (LOW PRESSURE)		CIRCUIT SETTER FLOW CONTROL VALVE		ROUND CEILING DIFFUSER (SUPPLY)
	CONDENSATE (HIGH PRESSURE)		AIR BLEEDER VALVE (RADIANT PANEL)		ROUND CEILING DIFFUSER (SUPPLY AND RETURN)
	ETHYLENE GLYCOL SUPPLY		AIR ELIMINATOR		SQUARE CEILING DIFFUSER (SUPPLY)
	ETHYLENE GLYCOL RETURN		AUTOMATIC BALANCING VALVE		SQUARE CEILING DIFFUSER (SUPPLY AND RETURN)
	CHILLED WATER SUPPLY		SOLENOID VALVE (REFRIGERANT)		SIGHT GLASS
	CHILLED WATER RETURN		THERMOSTATIC EXPANSION VALVE (REFR.)		ROUND DUCT RISER
	HUMIDIFICATION LINE		BACK PRESSURE VALVE		FAN COIL UNIT AND MARK
	FUEL OIL SUPPLY		ROUND CEILING DIFFUSER (SUPPLY)		UNIT HEATER - PROPELLER TYPE & MARK
	FUEL OIL RETURN		ROUND CEILING DIFFUSER (SUPPLY AND RETURN)		CABINET UNIT HEATER & MARK
	REFRIGERANT LIQUID LINE		SQUARE CEILING DIFFUSER (SUPPLY)		FIN TUBE, MARK, AND CAPACITY
	REFRIGERANT HOT GAS DISCHARGE LINE		SQUARE CEILING DIFFUSER (SUPPLY AND RETURN)		CONVECTOR AND MARK
	CONDENSER WATER		SQUARE CEILING DIFFUSER TWO WAY THRU		UNIT VENTILATOR AND MARK
	CONDENSER WATER RETURN		BASEBOARD DIFFUSER		RECTANGULAR DUCT WITH SIDE SHOWN
	BOILER BLOW OFF		HEATING RISER NUMBER		ROUND DUCT
	EXHAUST STEAM		EXHAUST FAN RISER NUMBER		CANVAS CONNECTION
	CONCENTRIC REDUCER		BASEBOARD RADIATION		UNIT VENTILATOR AND MARK (PLAN)
	ECCENTRIC REDUCER		TURNING VANES		PRESSURE GAGE
	UNION		REMOTE SENSOR		EXTRACTOR
	STRAINER		THERMOSTAT		
	EXPANSION JOINT				
	THERMOMETER				
	PRESSURE GAGE				

NOT ALL ITEMS SHOWN WITHIN THE SYMBOLS LEGENDS ARE USED WITHIN THE DRAWINGS.

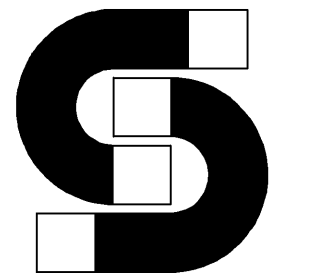
SUBMITTAL MATRIX

GENERAL CONTRACTORS TO ALSO REVIEW ARCHITECTURAL SPECIFICATIONS AS NOTED IN PLANS IN PLAN SECTION 700 OF THE ARCHITECTURAL PACKAGE FOR REQUIRED SUBMITTALS THAT MIGHT NOT BE LISTED BELOW.

SUBMITTAL DESCRIPTION	Required Review Time (Business Days)	Shake Shack	Physical Sample Required	Submitted for Submittal	Submitted for Record Only
Anchor Bolts Shop	5	X			
ATAS-Detailed Shop DWGS(Submitted by Owner Vendor to Owner/AOR prior to const.)	5	X			X
Concrete Mix Design	5	X		X	
Construction Prefunctional Checklists	5	X			X
Decorative Metal Shop Drawings	5	X			
Diffusers, Grills & Registers	5	X		X	
Doors, Frames & Hardware	7	X			X
Ductwork Layout (if there are significant changes in field)	5	X			X
Electrical Distribution Equipment	5	X			
Elevator & Vertical Transportation Shop Drawings	5	X			X
Epoxy Floor	5	X			X
Fire Alarm Shop Drawings & Device Cut Sheets	5	X		X	
Fire Sprinkler Shop Drawings, Hydraulic Calculations & Device Cut Sheets	5	X		X	X
HVAC Equipment(if Carrier - Submitted by Owner Vendor to Owner/AOR prior to const.)	5	X		X	
Light Fixtures(Submitted by Owner Vendor to Owner/AOR prior to construction)	5	X		X	
M&P Tests, Start-Up, and Programming Reports	5	X		X	
Millwork - Material Submittals (if differs from spec)	5	X	X	X	
Millwork - Shop Drawings (custom items & design features only)	5	X			
Restroom Partitions	5	X		X	
Plumbing Fixtures	5	X		X	
Railing Shop Drawings	5	X		X	
Rebar	5	X		X	
Stair Shop Drawings	5	X		X	
Structural Steel Shop Drawings	7	X		X	
Storefront - product data Submittal (if different from specified)	5	X			
Storefront - Shop Drawings	5	X			
Tile (if differs from spec)	5	X		X	
Window Film	5	X			



ZEBRA ARCHITECTURE, PLLC
1464 N KIERLAND BLVD., SUITE N300
SCOTTSDALE, ARIZONA 85254
PHONE: 480.912.1169 zbrglobal



Schnackel
engineers
100-581-0963 www.schnackel.com

STORE NO:
UT #1614

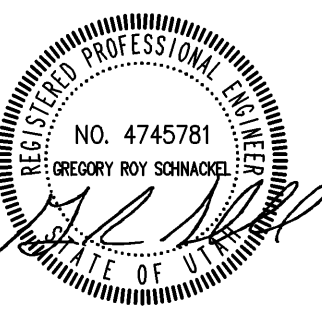


SHAKE SHACK
CITY CREEK CENTER
28 S. STATE STREET-SUITE FC113
SALT LAKE CITY, UT 84111

REVISIONS

NO.	DATE	REVISION
1	2024-08-06	REVISION A
2	2024-10-27	REVISION B
3	2024-12-02	REVISION C
4	2024-12-18	REVISION D
5	2025-01-17	REVISION E

STATUS: IFC SET

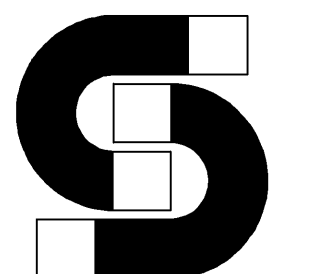


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SHEET NAME: MECHANICAL ABBREVIATIONS AND SYMBOL LEGEND

DATE: 07/28/2024 PROJECT NO: 3854
DRAWN: RAS SCALE:

SHEET NO.: **M001**

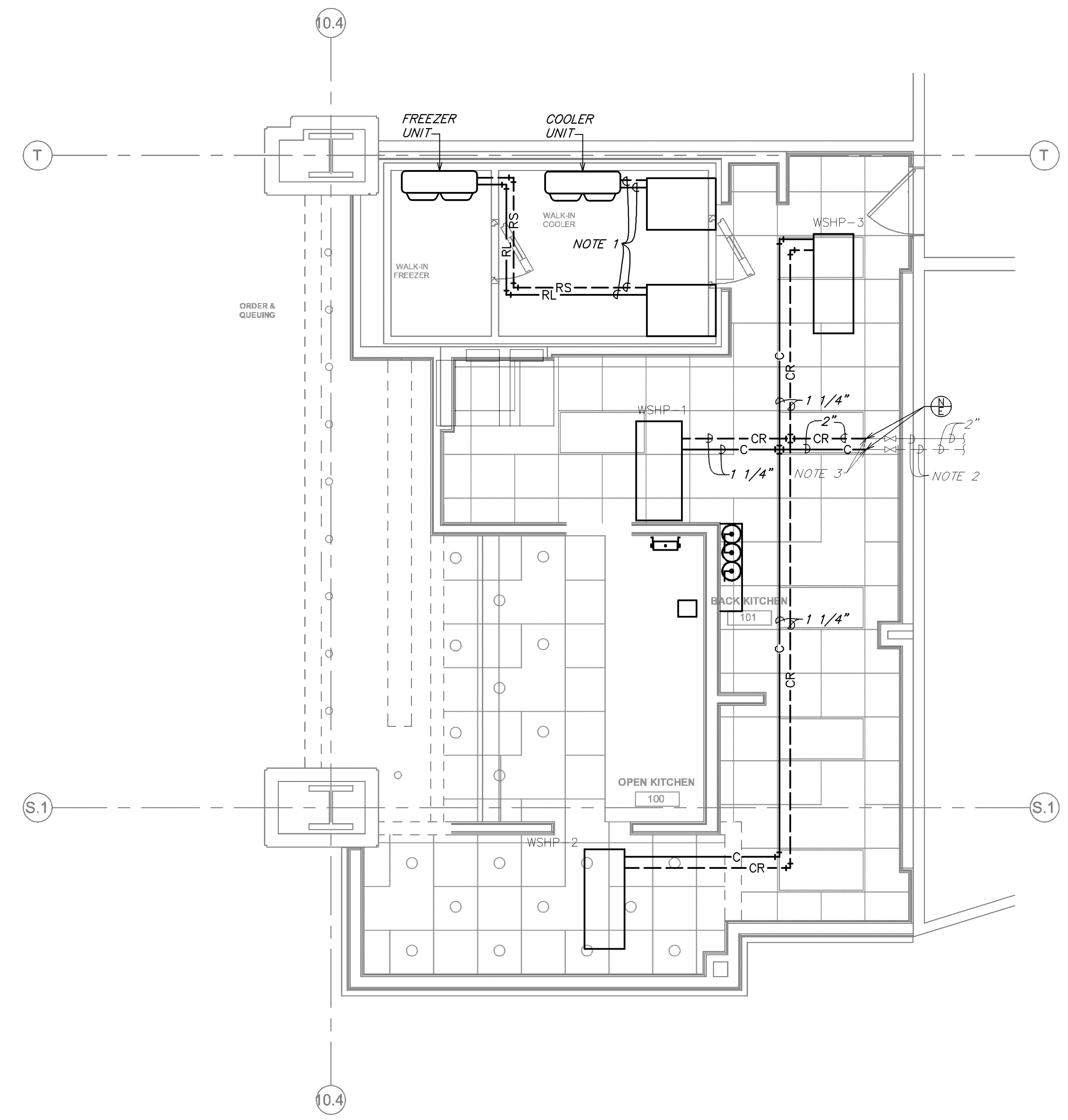


STORE NO:
UT #1614

SHAKE SHACK
CITY CREEK CENTER
28 S. STATE STREET SUITE FC113
SALT LAKE CITY, UT 84111

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 - COORDINATE DUCT ROUTING AND HEIGHTS WITH GENERAL CONTRACTOR. VERIFY ALL CLEARANCES BEFORE STARTING WORK.
 - THE CONTRACTOR SHALL INSTALL ALL PIPING, DUCTWORK AND EQUIPMENT AS REQUIRED TO CONFORM TO THE STRUCTURE, AVOID OBSTRUCTIONS, PRESERVE CEILING HEIGHTS AND HEADROOM AND MAKE ALL EQUIPMENT REQUIRING MAINTENANCE OR REPAIR ACCESSIBLE.
 - ALL DUCT CONNECTIONS TO HVAC EQUIPMENT MUST BE MADE WITH FLEXIBLE CONNECTORS.
 - DO NOT ATTACH ANYTHING TO DECK ABOVE. ATTACH TO STRUCTURE (i.e. BEAMS, JOISTS) ONLY. DUCT HANDERS SHALL BE INSTALLED IN ACCORDANCE WITH LOCAL CODE. ALL CONNECTIONS TO JOISTS SHALL BE MADE AT THE TOP CORNER.
 - ALL DUCT DIMENSIONS INDICATED ARE CLEAR INSIDE DIMENSIONS. ALL SUPPLY AND UNTEMPERED OUTDOOR AIR DUCTWORK SHALL BE LINED WITH 1" ACOUSTICAL DUCT LINER OR WRAPPED WITH 1-1/2" THICK FIRE RETARDANT FIBERGLASS WITH A REINFORCED ALUMINUM FOIL JACKET AND SHALL BE APPROVED FOR USE BY SMACNA AND NAIMA. RETURN AIR TRANSFER DUCTS AND RETURN DUCTWORK WITHIN 10 FEET OF THE UNIT FAN SHALL BE LINED WITH 1" ACOUSTICAL DUCT LINER. AT THE START OF CONSTRUCTION, THE MECHANICAL CONTRACTOR SHALL INSPECT AND RUN TEST ALL EXISTING HVAC UNITS DESIGNATED FOR REUSE. CONTRACTOR SHALL INFORM THE ENGINEER OF ANY NECESSARY REPAIRS FOR APPROVAL IN A TIMELY MANNER, AS TO NOT DELAY THE PROJECT OPENING DATE.
 - RETROFITTING PIPING SHALL BE SIZED PER MANUFACTURER'S RECOMMENDATIONS. PROVIDE ALL ACCESSORIES AS REQUIRED BY MANUFACTURER FOR COMPLETE WORKING SYSTEM, INCLUDING ANY ACCESSORIES ASSOCIATED WITH LONG LENGTH APPLICATIONS WHERE APPLICABLE.
 - TENANT'S CONTRACTOR SHALL BE RESPONSIBLE FOR THE FIELD VERIFICATION OF ALL UTILITY RUNS AND/OR OTHER IMPROVEMENTS LOCATED ON THE PREMISES PRIOR TO BIDDING. TENANT'S CONTRACTOR SHALL ALSO BE RESPONSIBLE FOR ALL COSTS RELATING TO THE RELOCATION OF, DAMAGE TO, REPAIR OF ANY EXISTING UTILITY RUNS AND/OR IMPROVEMENTS WHICH ARE DAMAGED AS A RESULT OF TENANT'S WORK IN OR AROUND THE PREMISES.
 - ALL GREASE EXHAUST DUCTWORK SHALL BE PROVIDED WITH 3" FOIL FACED THERMAL-CERAMIC INSULATION FOR GREASE DUCTS. INSULATION SHALL MEET NFPA 98 AND ASTM E 2336 REQUIREMENTS.
 - GREASE DUCT LEAKAGE TESTING MUST BE PERFORMED PRIOR TO CONCEALMENT OF THE DUCTWORK.
 - MECHANICAL CONTRACTOR SHALL PROVIDE TENANT WITH A WRITTEN ONE (1) YEAR MANUFACTURER'S WARRANTY ON ALL HVAC EQUIPMENT PROVIDED AND / OR INSTALLED. THE WARRANTY SHALL INCLUDE ALL LABOR, MATERIALS AND THREE (3) ROUTINE SERVICES INCLUDING FILTER CHANGES DURING A ONE (1) YEAR PERIOD.
 - AT THE COMPLETION OF CONSTRUCTION AN NEBB, AABC OR TABB CERTIFIED AIR BALANCE REPORT SHALL BE SUBMITTED TO THE ENGINEER AND LANDLORD. PRIOR TO SCHEDULING BALANCING, COORDINATE WITH LANDLORD'S FIELD REPRESENTATIVE FOR COORDINATING WITH THE VENDOR LISTED BELOW. IF APPROVED, THE BALANCING SHALL BE COMPLETED BY NATIONAL TAB TO ALSO PERFORM COMMISSIONING FOR ALL SHAKE SHACK PROVIDED UNITS.
 - THE CONTRACTOR SHALL OBTAIN AN COPY OF THE LANDLORD'S TENANT CRITERIA MANUAL. TENANT CRITERIA MANUAL IS AN INTEGRAL PART OF THIS CONTRACT. CONTRACTOR SHALL BE RESPONSIBLE FOR COMPLYING WITH LANDLORD REQUIREMENTS AT NO ADDITIONAL COST TO THE TENANT.
 - PARTS OF THE BASE BUILDING SYSTEMS THAT FALL INTO LEASE LINE SHALL REMAIN UNDISTURBED UNLESS NOTED OTHERWISE.
 - PROVIDE ALL NECESSARY WIRING, RELAYS, DETECTORS, COMPONENTS, ETC., FOR FIRE ALARM OR CONTROL SYSTEM INTERLOCK IF APPLICABLE. VERIFY WITH MALL PERSONNEL BEFORE BID.

- HVAC NOTES:**
- KITCHEN EQUIPMENT CONTRACTOR TO PROVIDE REFRIGERANT LINES FROM CONDENSING UNIT ABOVE COOLER TO KITCHEN REFRIGERANT AS NOTED ON PLANS. LINES SHALL BE SIZED ACCORDING TO MANUFACTURER'S SPECIFICATIONS. PROVIDE ALL ACCESSORIES AS REQUIRED BY MANUFACTURER FOR COMPLETE WORKING SYSTEM, INCLUDING ANY ACCESSORIES ASSOCIATED WITH LONG LENGTH APPLICATIONS WHERE APPLICABLE. ADJUST ROUTING AS NECESSARY IN FIELD FOR ANY OBSTACLES. COORDINATE EXACT LOCATION AND ROUTING WITH CONSTRUCTION MANAGER AND LANDLORD.
 - EXISTING LANDLORD CONDENSER WATER PIPING TO REMAIN. FIELD VERIFY EXACT LOCATION.
 - CONNECT NEW CONDENSER WATER SUPPLY AND RETURN LINES TO EXISTING CONDENSER WATER SUPPLY AND RETURN LINES AS INDICATED ON PLANS. TYPICAL OF NEW TO EXISTING CONNECTIONS. CONTRACTOR SHALL FIELD VERIFY SIZE AND LOCATION OF CONNECTION POINT PRIOR TO BID. COORDINATE WITH LANDLORD.

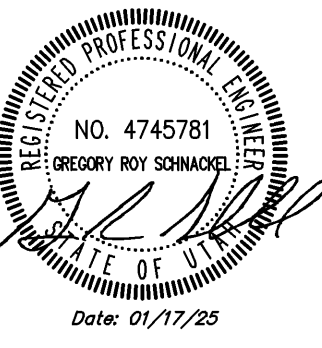


1 MECHANICAL REFRIGERANT PIPING LAYOUT PLAN
SCALE: 1/4" = 1'-0"

REVISIONS

NO.	DATE	REVISION
A	2024-08-06	REVISION A
B	2024-08-07	REVISION B
C	2024-08-08	REVISION C
D	2024-02-18	REVISION D
E	2025-01-17	REVISION E

STATUS:
IFC SET

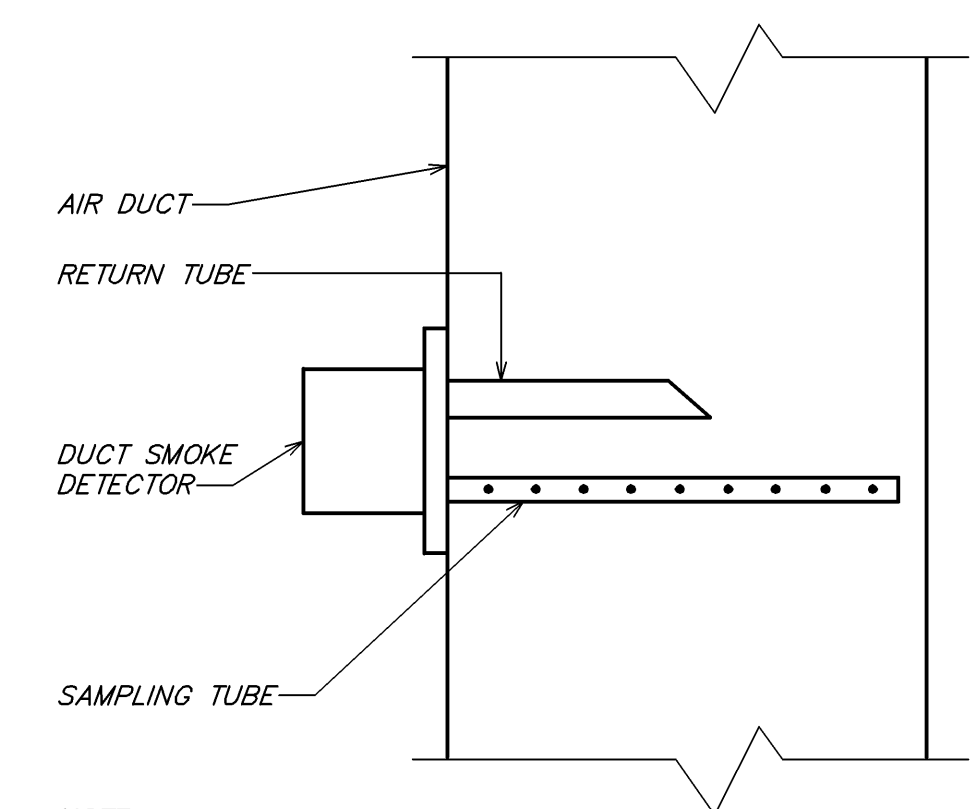


FIELD VERIFICATION:
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SHEET NAME:
MECHANICAL REFRIGERATION PIPING AND LAYOUT PLAN

DATE: 07/28/2024 **PROJECT NO.:** 3854
DRAWN: RAS **SCALE:**

SHEET NO.:
M102

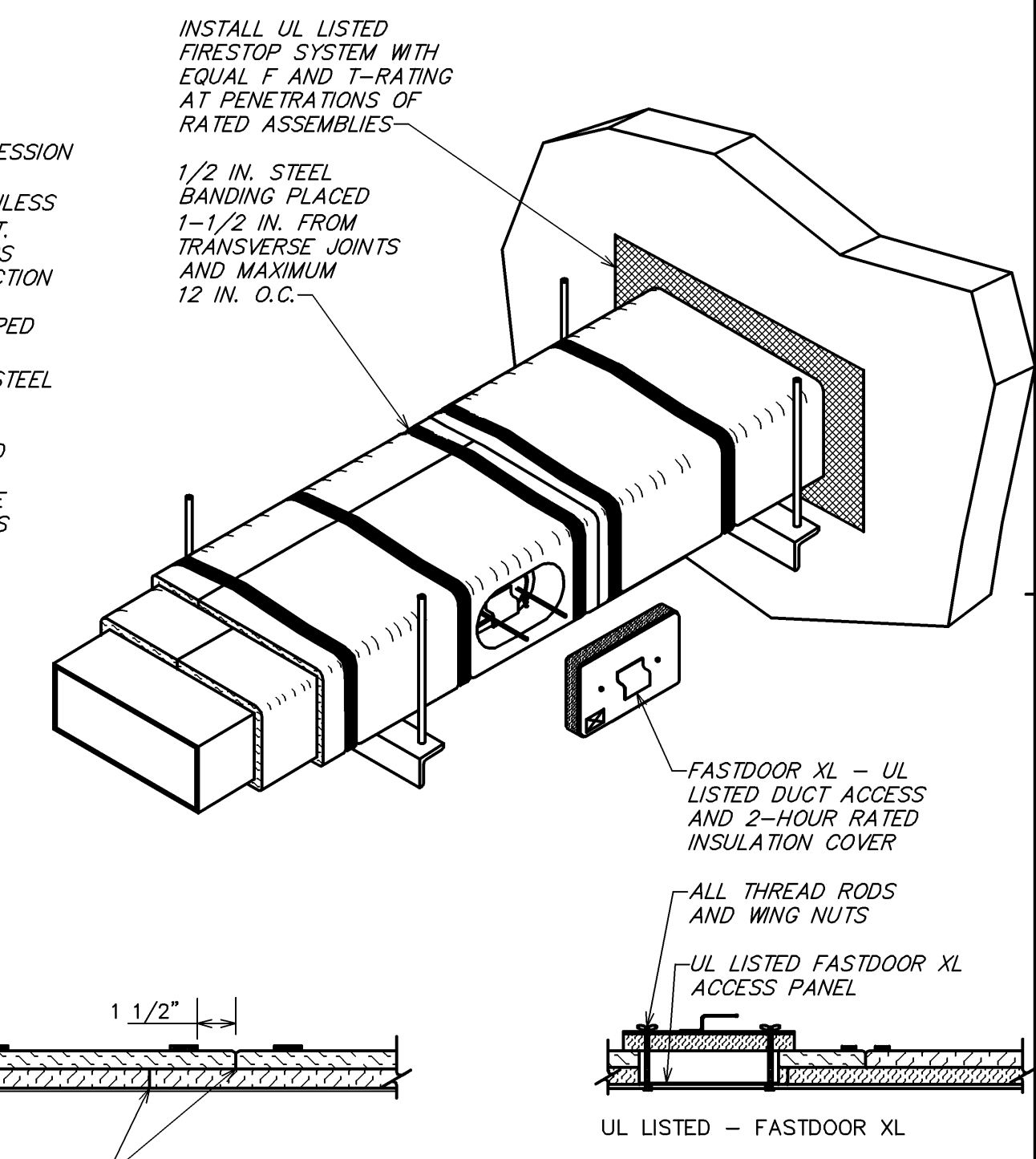


DUCT SMOKE DETECTOR DETAIL

NOT TO SCALE

NOTE:
1. DUCT SMOKE DETECTOR ON RETURN AND/OR SUPPLY SIDE DUCT AND SHUTDOWN RELAY SHALL BE FURNISHED BY THE ELECTRICAL CONTRACTOR FOR INSTALLATION BY THE MECHANICAL CONTRACTOR. ALL WIRING SHALL BE BY THE ELECTRICAL CONTRACTOR.

- NOTES:
- THERMAL CERAMICS FIREMASTER FASTWRAP XL IS TESTED TO ASTM E2336 AND UL LISTED PER HNK1.G18 TO PROVIDE ZERO CLEARANCE TO COMBUSTIBLES AND TO PROVIDE A 1 OR 2 HOUR EXPOSURE. THROUGH PENETRATIONS FIRESTOP SYSTEMS ARE TESTED IN ACCORDANCE WITH ASTM E 914 (UL 1479). ICC-ES APPROVAL PER REPORT ESR 2213 OR EST 2832.
 - COMPLIANT TO THE FOLLOWING CODES:
NFPA 96
INTERNATIONAL MECHANICAL CODES
UNIFORM MECHANICAL CODE
CALIFORNIA MECHANICAL CODE
 - INSULATION APPLIED IN TWO LAYERS WITH TIGHT COMPRESSION JOINT ON BOTH LAYERS AT ALL JOINTS.
 - MINIMUM 16 GAUGE CARBON STEEL (OR 18 GAUGE STAINLESS STEEL) RECTANGULAR OR ROUND GREASE EXHAUST DUCT.
 - INSTALL UL LISTED AND LIQUID TIGHT THERMAL CERAMICS FASTDOOR XL ACCESS DOORS AT ALL CHANGES IN DIRECTION AND AT MINIMUM EVERY 20 FT ON HORIZONTAL RUNS.
 - SUPPORT HANGER SYSTEMS DO NOT NEED TO BE WRAPPED PROVIDED THE HANGER RODS ARE MINIMUM OF 3/8" IN DIAMETER AND SUPPORTS ARE MINIMUM 2" x 1/8" IN STEEL ANGLE OR SMACTA EQUIVALENT SUPPORT SYSTEM.
 - THERMAL CERAMICS DUCT WRAP SHALL BE INSTALLED DIRECTLY ONTO THE DUCT AND APPLIED FROM THE HOOD CONNECTION TO THE CONNECTION OF THE FAN.
 - THERMAL CERAMICS DUCT ENCLOSURE SYSTEM SHALL BE INSTALLED IN STRICT ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS AND UL LISTINGS.

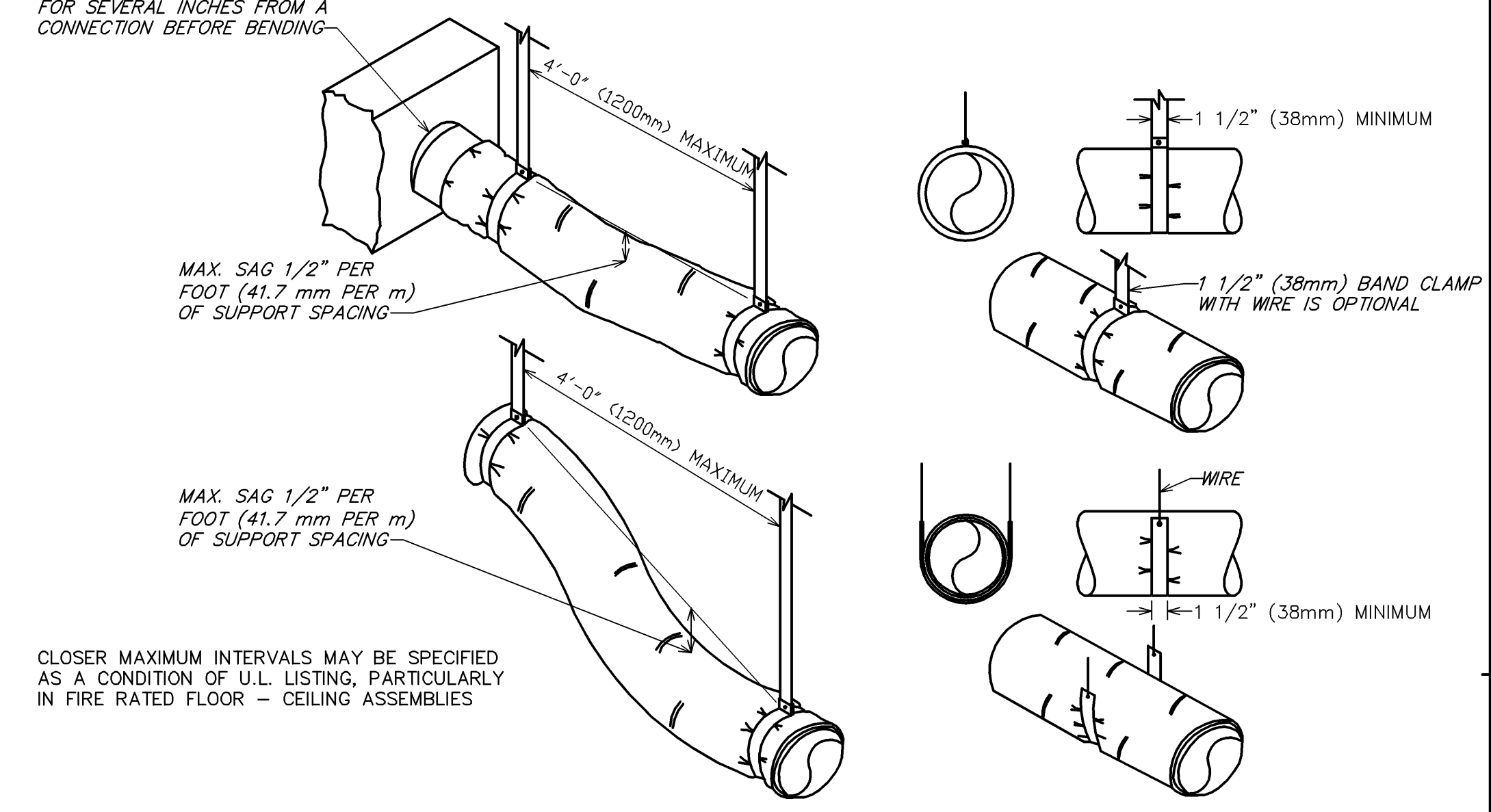


FIREMASTER FASTWRAP XL DETAIL

NOT TO SCALE

** DETAIL COURTESY OF MORGAN THERMAL CERAMICS.

DUCT SHOULD EXTEND STRAIGHT FOR SEVERAL INCHES FROM A CONNECTION BEFORE BENDING.



FLEXIBLE DUCT SUPPORTS

NOT TO SCALE

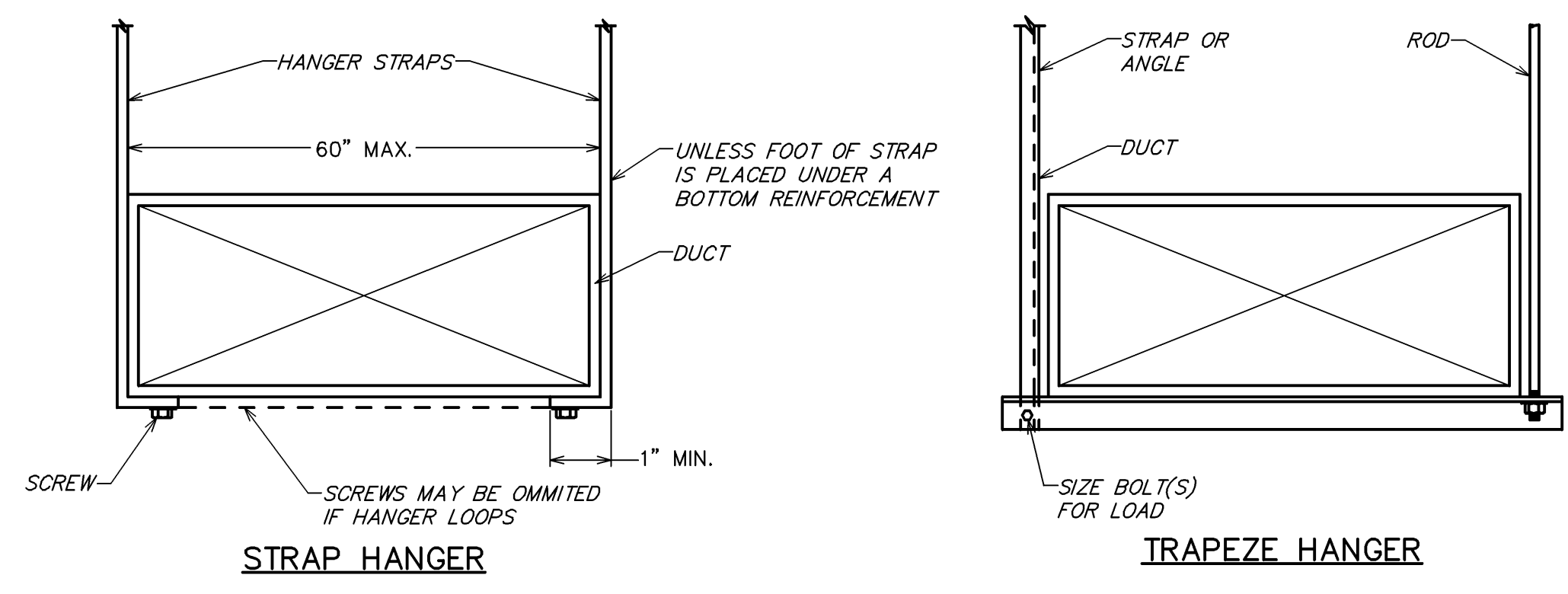
CLOSER MAXIMUM INTERVALS MAY BE SPECIFIED AS A CONDITION OF U.L. LISTING, PARTICULARLY IN FIRE RATED FLOOR - CEILING ASSEMBLIES

MAXIMUM HALF OF DUCT PERIMETER	PAIR AT 10 FT. SPACING		PAIR AT 8 FT. SPACING		PAIR AT 5 FT. SPACING		PAIR AT 4 FT. SPACING	
	STRAP	WIRE/ROD	STRAP	WIRE/ROD	STRAP	WIRE/ROD	STRAP	WIRE/ROD
P/2 = 30"	1" x 22 GA.	10 GA. (.135")	1" x 22 GA.	10 GA. (.135")	1" x 22 GA.	12 GA. (.106")	1" x 22 GA.	12 GA. (.106")
P/2 = 72"	1" x 18 GA.	3/8"	1" x 20 GA.	1/4"	1" x 22 GA.	1/4"	1" x 22 GA.	1/4"
P/2 = 96"	1" x 16 GA.	3/8"	1" x 18 GA.	3/8"	1" x 20 GA.	3/8"	1" x 22 GA.	1/4"
P/2 = 120"	1 1/2" x 16 GA.	1/2"	1" x 16 GA.	3/8"	1" x 18 GA.	3/8"	1" x 20 GA.	1/4"
P/2 = 168"	1 1/2" x 16 GA.	1/2"	1 1/2" x 16 GA.	1/2"	1" x 16 GA.	3/8"	1" x 18 GA.	3/8"
P/2 = 192"	---	1/2"	1 1/2" x 16 GA.	1/2"	1" x 16 GA.	3/8"	1" x 16 GA.	3/8"
P/2 = 193" UP	SPECIAL ANALYSIS REQUIRED							

WHEN STRAPS ARE LAP JOINED USE THESE MINIMUM FASTENERS:	SINGLE HANGER MAXIMUM ALLOWABLE LOAD	
	STRAP	WIRE OR ROD (DIA.)
1" x 18, 20, 22 GA. - TWO #10 OR ONE 1/4" BOLT	1" x 22 GA. - 260 LBS.	0.106" - 80 LBS.
1" x 16 GA. - TWO 1/4" DIA.	1" x 20 GA. - 320 LBS.	0.135" - 120 LBS.
1" x 16 GA. - TWO 3/8" DIA. PLACE FASTENERS IN SERIES, NOT SIDE BY SIDE.	1" x 18 GA. - 420 LBS.	0.162" - 160 LBS.
	1" x 16 GA. - 700 LBS.	1/4" - 270 LBS.
	1 1/2" x 16 GA. - 1100 LBS.	3/8" - 680 LBS.
		1/2" - 1250 LBS.
		5/8" - 2000 LBS.
		3/4" - 3000 LBS.

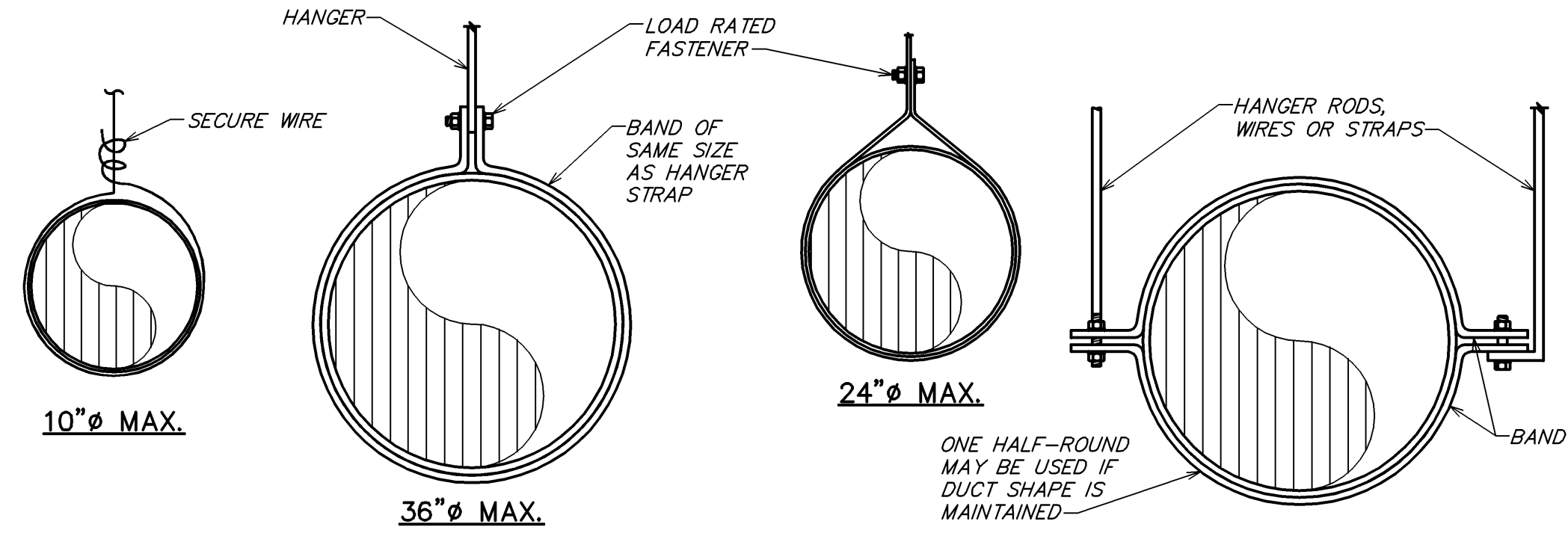
RECTANGULAR DUCT HANGER TABLE

NOT TO SCALE



STRAP HANGER

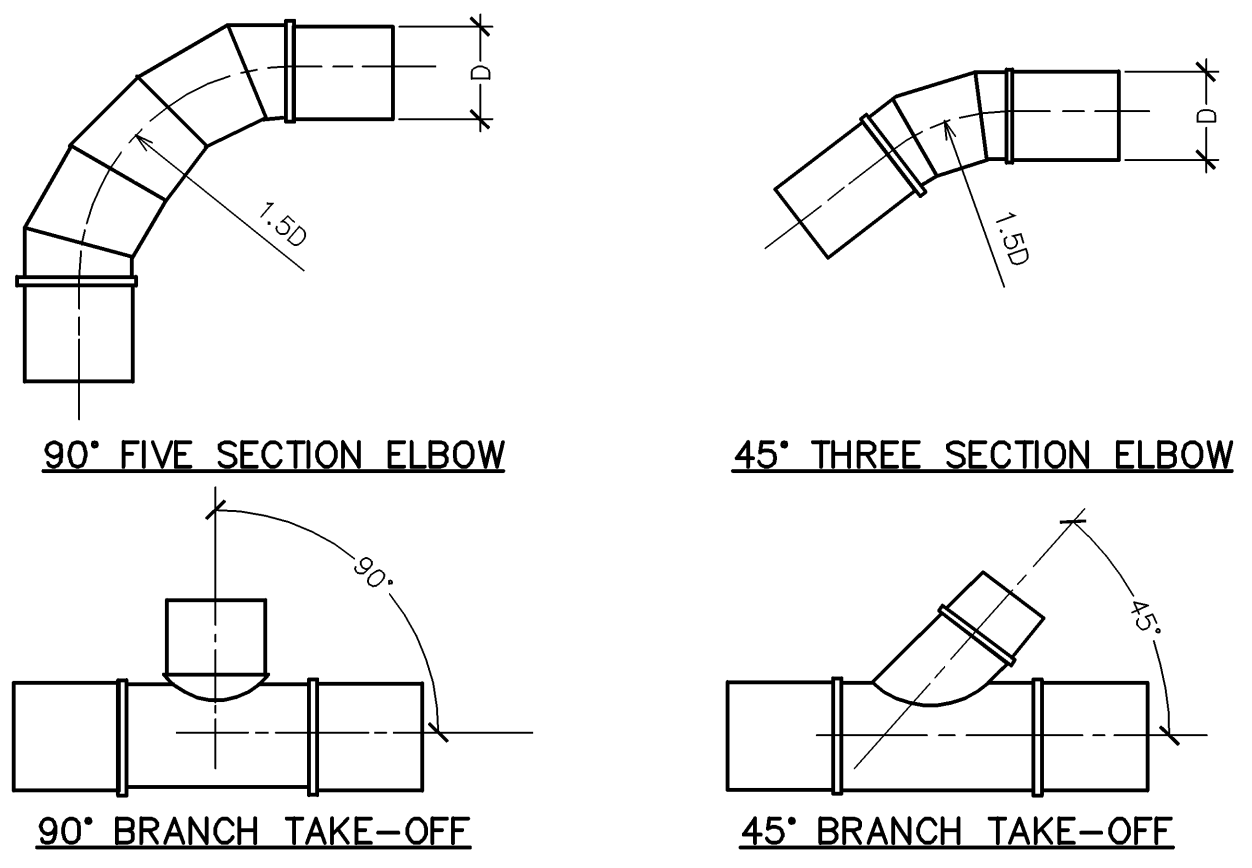
TRAPEZE HANGER



DUCT HANGER DETAIL

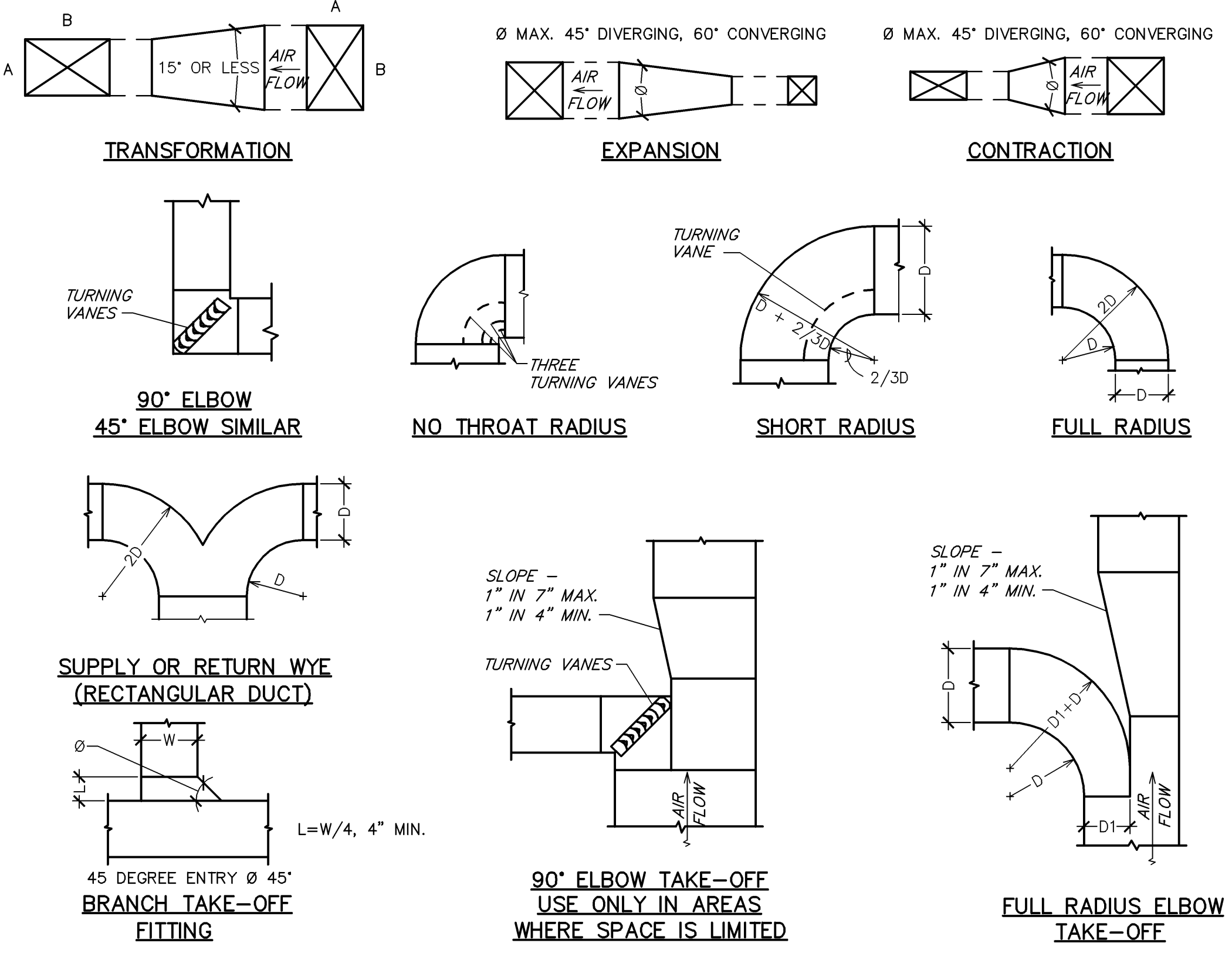
NOT TO SCALE

NOTE: HANGERS MUST NOT DEFORM DUCT SHAPE



TYPICAL ROUND DUCT FITTINGS

NOT TO SCALE



DUCTWORK DETAILS

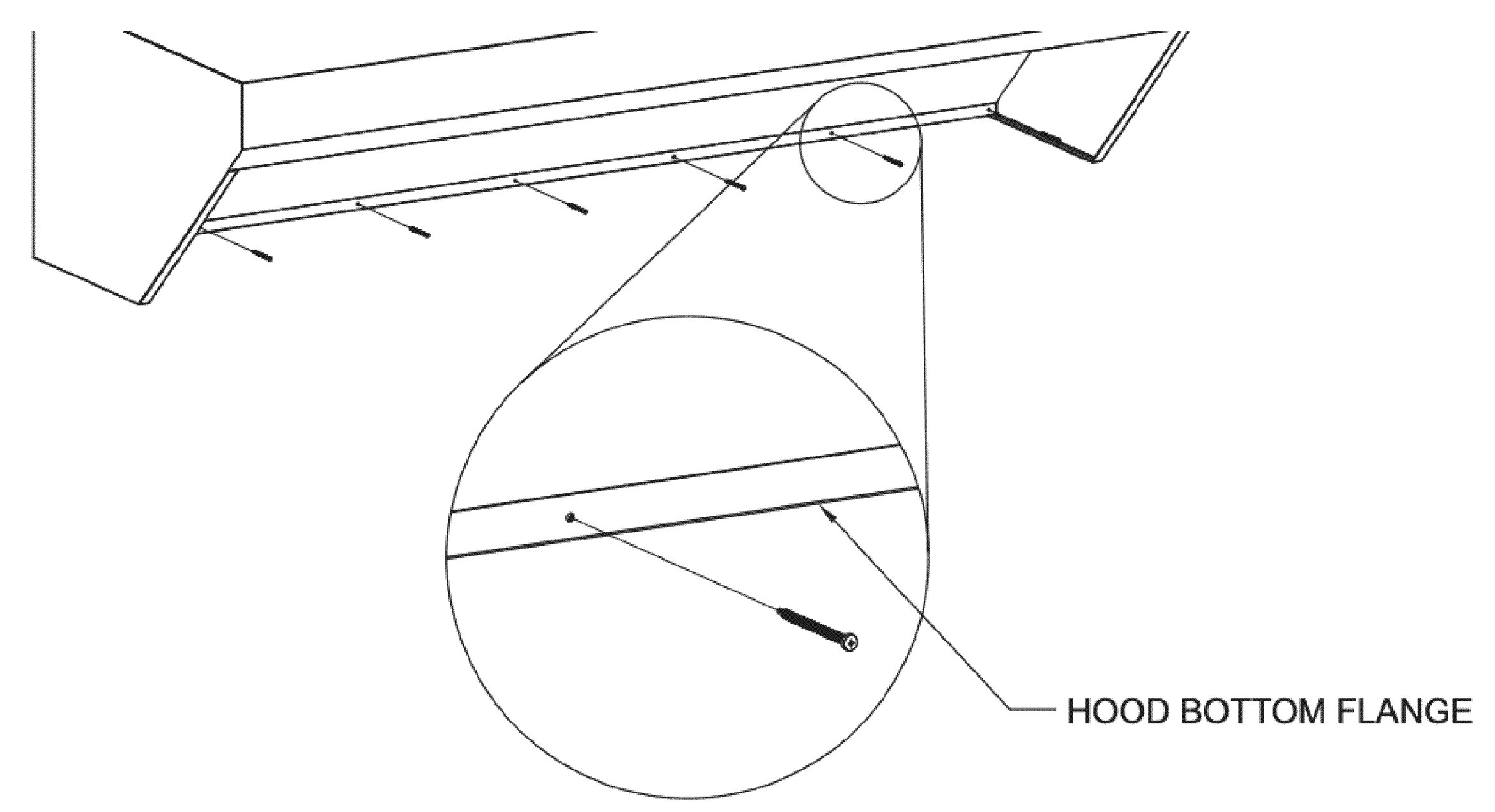
NOT TO SCALE

SEISMIC BRACING AND SIZING				
BRACE SIZING		BRACING SPACING		
BRACE SIZE	MAXIMUM LENGTH	PIPE SIZE	MAXIMUM HANGER SPACING	MAXIMUM BRACE SPACING* (SEE NOTE B)
2" x 2" x 3/16" ANGLE	6'-0"	UP TO 1 1/2"	7'-0"	NOT REQUIRED
2 1/8" x 2 1/8" x 3/16" ANGLE	8'-0"	2"	10'-0"	NOT REQUIRED
3" x 3" x 3/16" ANGLE	10'-0"	2 1/2" TO 3"	10'-0"	7'-0"
3 1/2" x 3 1/2" x 1/4" ANGLE	11'-6"	4" AND UP	10'-0"	10'-0"
4" x 4" x 1/4" ANGLE	13'-0"			
3" DIAM. PIPE	13'-0" TO 18'-0"			

NOTES:
A. DUCTS WHICH ARE LARGER THAN 8 SQUARE FEET IN CROSS SECTION AREA SHALL BE BRACED LATERALLY 7'-0" ON CENTERS WITH 2" x 2" x 3/16" ANGLE.
B. BRACING CAN BE OMITTED ON ALL PIPING SUSPENDED BY INDIVIDUAL HANGERS 12" OR LESS IN LENGTH FROM THE TOP OF PIPE TO THE BOTTOM OF THE SUPPORT FOR THE HANGER.

SEISMIC BRACE SCHEDULE

NOT TO SCALE

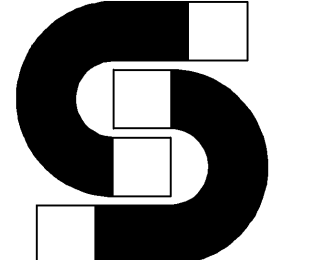


HOOD FASTENING DETAIL

NOT TO SCALE

E
D
C
B
A

BE 2008 2/12/23

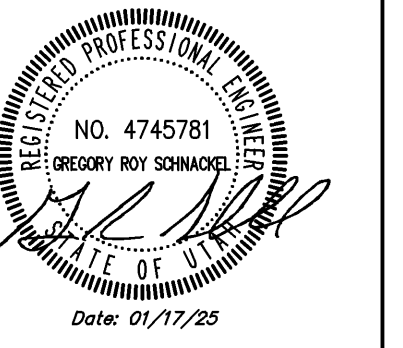


STORE NO:
UT #1614

SHAKE SHACK
CITY CREEK CENTER
28 S. STATE STREET-SUITE FC113
SALT LAKE CITY, UT 84111

REVISIONS	
▲ 2024-08-06	REVISION A
▲ 2024-05-07	REVISION B
▲ 2024-02-02	REVISION C
▲ 2024-12-18	REVISION D
▲ 2025-01-17	REVISION E

STATUS:
IFC SET

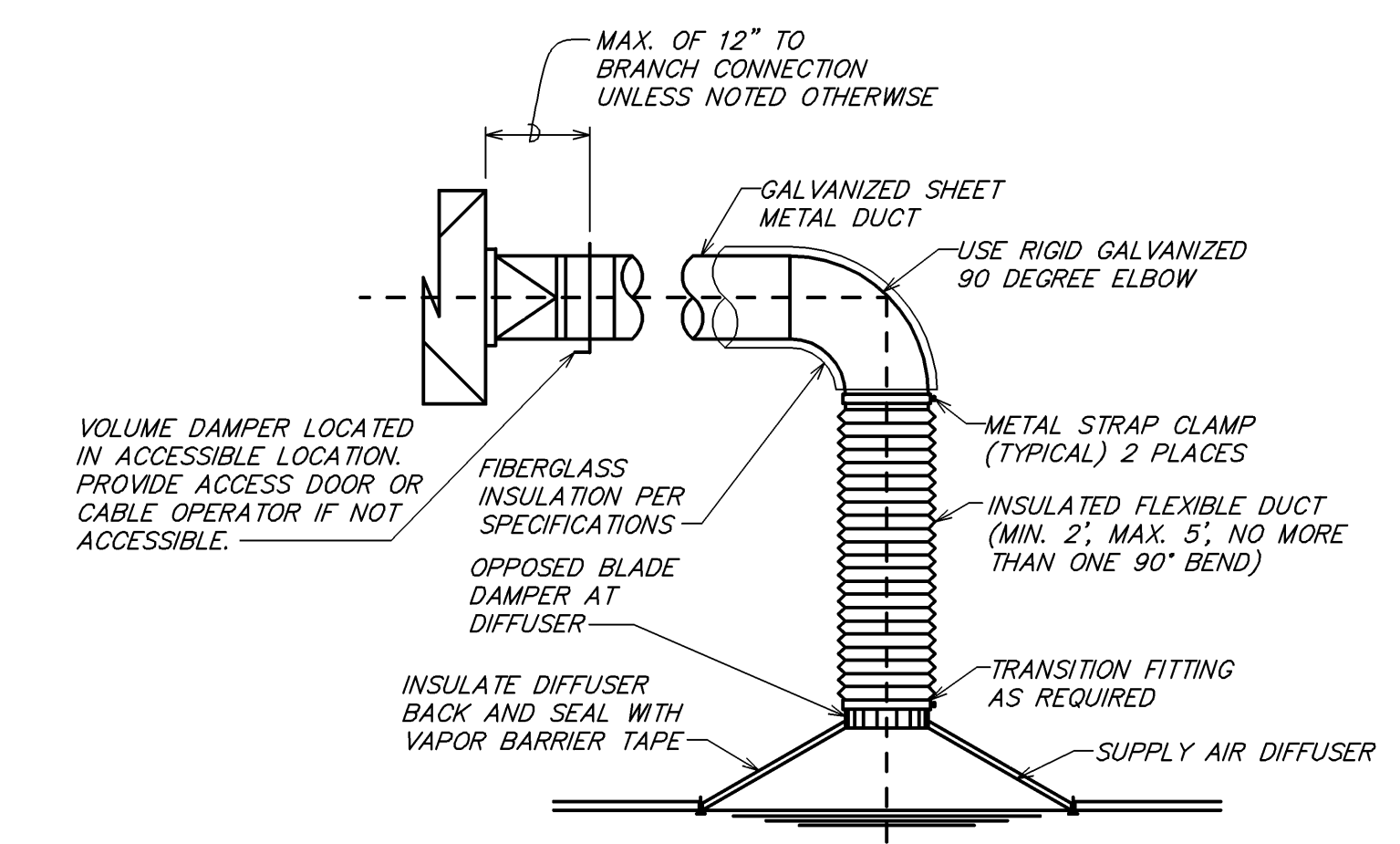


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SHEET NAME:
MECHANICAL DETAILS

DATE: 07/28/2024 PROJECT NO: 38541
DRAWN: RAS SCALE:

SHEET NO.:
M502



- SEISMIC REQUIREMENT NOTES:**
- AIR TERMINALS WEIGHING LESS THAN 20 POUNDS SHALL BE POSITIVELY ATTACHED TO THE MAIN RUNNER.
 - AIR TERMINALS WEIGHING BETWEEN 20 POUNDS AND 56 POUNDS SHALL HAVE TWO 12 GAUGE HANGER WIRES CONNECTED FROM THE TERMINAL TO THE STRUCTURE ABOVE AND SHALL BE POSITIVELY ATTACHED TO THE MAIN RUNNER. THE HANGER WIRES MAY BE SLACK.
 - AIR TERMINALS WEIGHING MORE THAN 56 POUNDS SHALL HAVE INDEPENDENT SUPPORT FROM THE STRUCTURE ABOVE.
 - HANGER WIRES SHALL MEET THE SAME INSTALLATION REQUIREMENTS AS VERTICAL SUSPENSION WIRES.

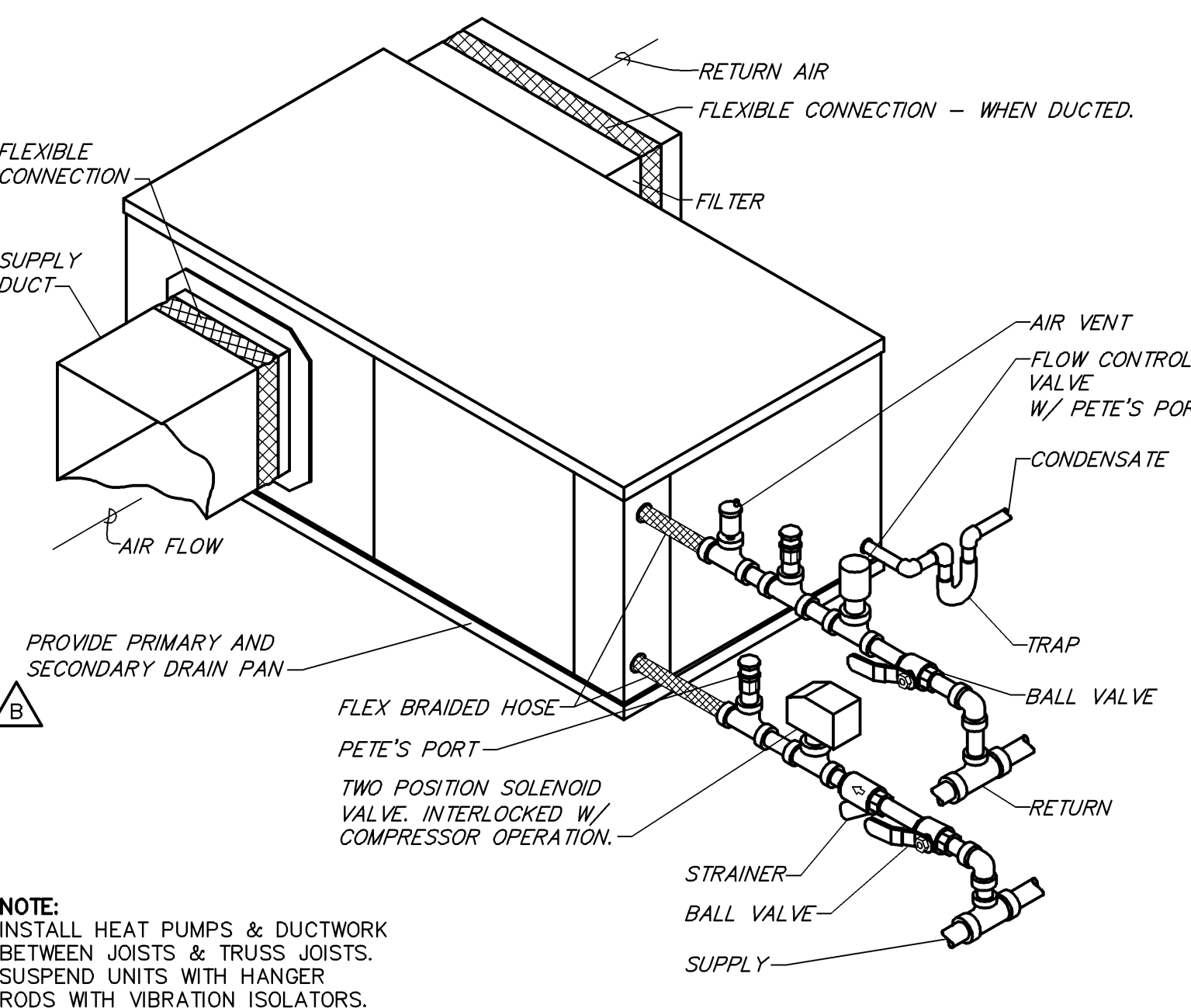
1 TYPICAL DIFFUSER CONNECTION - SEISMIC
NOT TO SCALE

SEISMIC BRACING AND SIZING				
BRACE SIZING		BRACING SPACING		
BRACE SIZE	MAXIMUM LENGTH	PIPE SIZE	HANGER SPACING	MAXIMUM BRACE SPACING* (SEE NOTE B)
2" x 2" x 3/16" ANGLE	6'-0"	UP TO 1 1/2"	7'-0"	NOT REQUIRED
2 1/8" x 2 1/8" x 3/16" ANGLE	8'-0"	2"	10'-0"	NOT REQUIRED
3" x 3" x 3/16" ANGLE	10'-0"	2 1/2" TO 3"	10'-0"	7'-0"
3 1/2" x 3 1/2" x 1/4" ANGLE	11'-6"	4" AND UP	10'-0"	10'-0"
4" x 4" x 1/4" ANGLE	13'-0"			
3" DIAM. PIPE	13'-0" TO 18'-0"			

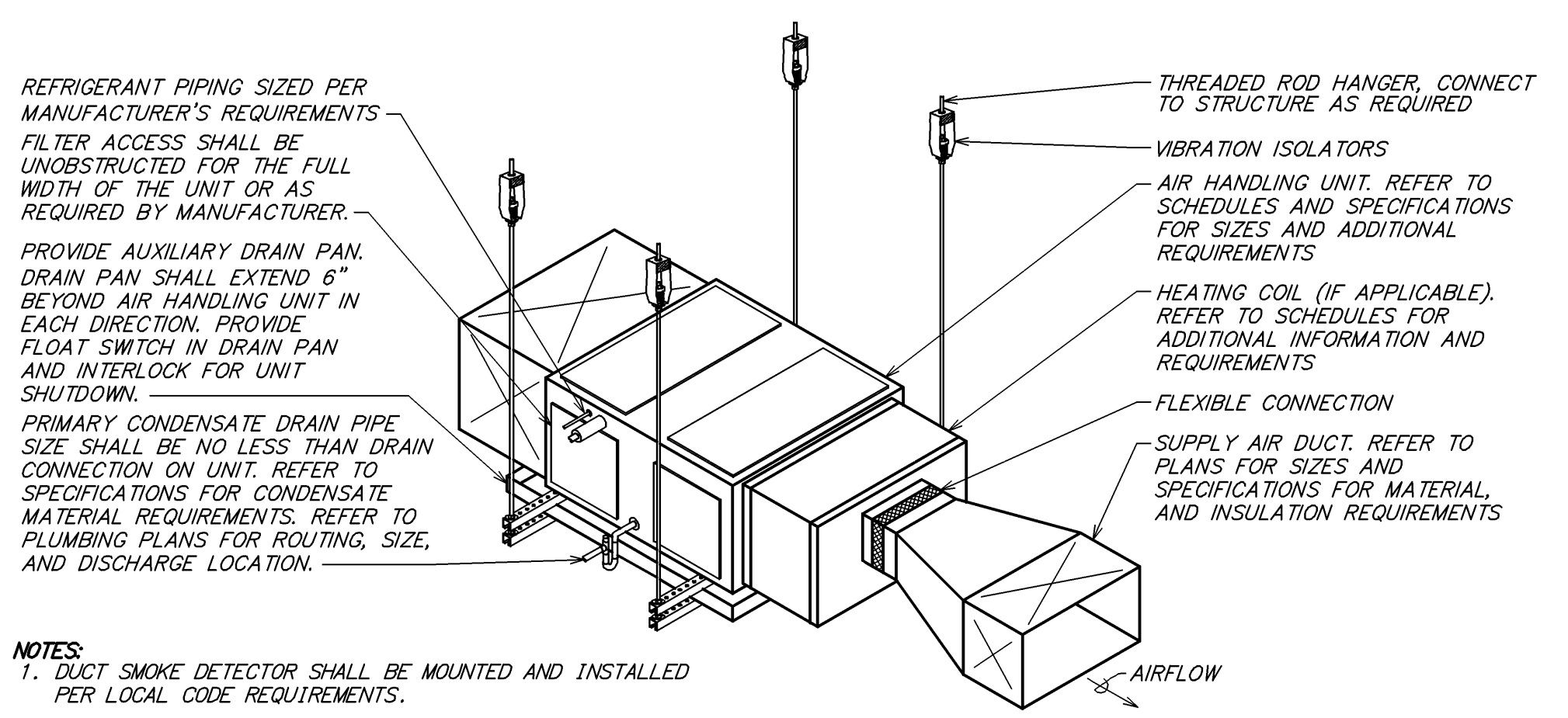
NOTES:

- DUCTS WHICH ARE LARGER THAN 6 SQUARE FEET IN CROSS SECTION AREA SHALL BE BRACED Laterally 7'-0" ON CENTERS WITH 2" x 2" x 3/16" ANGLE BRACING CAN BE OMITTED ON ALL PIPING SUSPENDED BY INDIVIDUAL HANGERS 12" OR LESS IN LENGTH FROM THE TOP OF PIPE TO THE BOTTOM OF THE SUPPORT FOR THE HANGER.
-

2 SEISMIC BRACE SCHEDULE
NOT TO SCALE



3 HEAT PUMP CONNECTION DETAIL
NOT TO SCALE



4 TYPICAL DX HORIZONTAL UNIT SUSPENSION DETAIL
NOT TO SCALE

DIA.	WIRE DIA.	ROD	STRAP
10" DN	ONE 12 GA.	1/4"	1" x 22 GA.
11-18"	TWO 12 GA. OR ONE 8 GA.	1/4"	1" x 22 GA.
19-24"	TWO 10 GA.	1/4"	1" x 22 GA.
25-36"	TWO 8 GA.	3/8"	1" x 20 GA.
37-50"	-	TWO 3/8"	TWO 1" x 20 GA.
51-60"	-	TWO 3/8"	TWO 1" x 18 GA.
61-84"	-	TWO 3/8"	TWO 1" x 16 GA.
85-96"	-	TWO 1/2"	TWO 1 1/2" x 16 GA.

NOTES:

- STRAPS ARE GALVANIZED STEEL; RODS ARE UNCOATED OR GALVANIZED STEEL; WIRE IS BLACK ANNEALED, BRIGHT BASIC OR GALVANIZED STEEL. ALL ARE ALTERNATIVES.
- TABLE ALLOWS FOR CONVENTIONAL WALL THICKNESS, AND JOINT SYSTEMS PLUS ONE LB/SF OF INSULATION WEIGHT. IF HEAVIER DUCTS ARE TO BE INSTALLED, ADJUST HANGER SIZES TO BE WITHIN THEIR LOAD LIMITS.

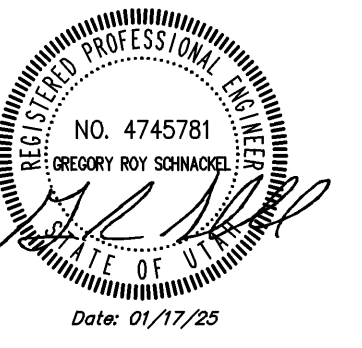
5 ROUND DUCT HANGER TABLE
NOT TO SCALE

E
D
C
B
A

REVISIONS

2024-08-06	REVISION A
2024-05-07	REVISION B
2024-02-02	REVISION C
2024-02-18	REVISION D
2025-01-17	REVISION E

STATUS:
IFC SET

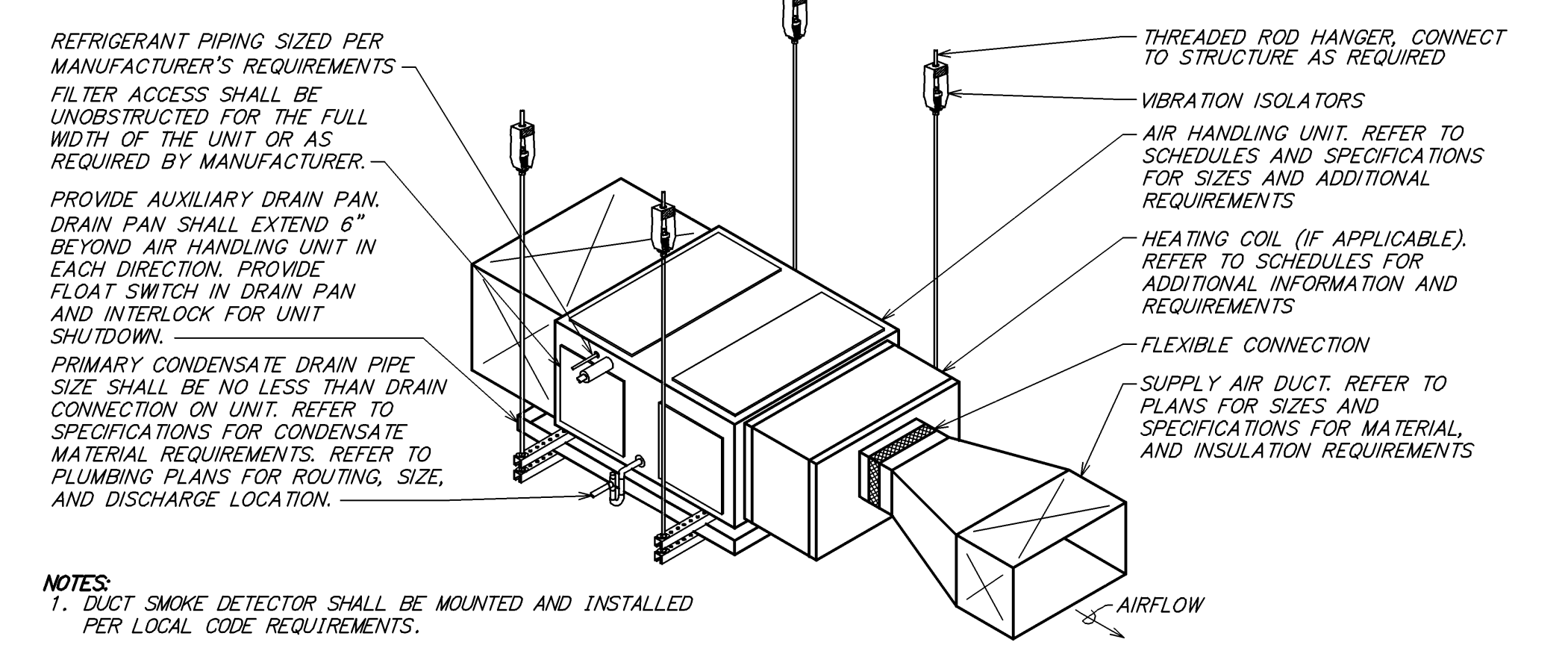


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SHEET NAME:
MECHANICAL DETAILS

DATE: 07/28/2024 PROJECT NO: 38541
DRAWN: RAS SCALE:

SHEET NO.:
M502

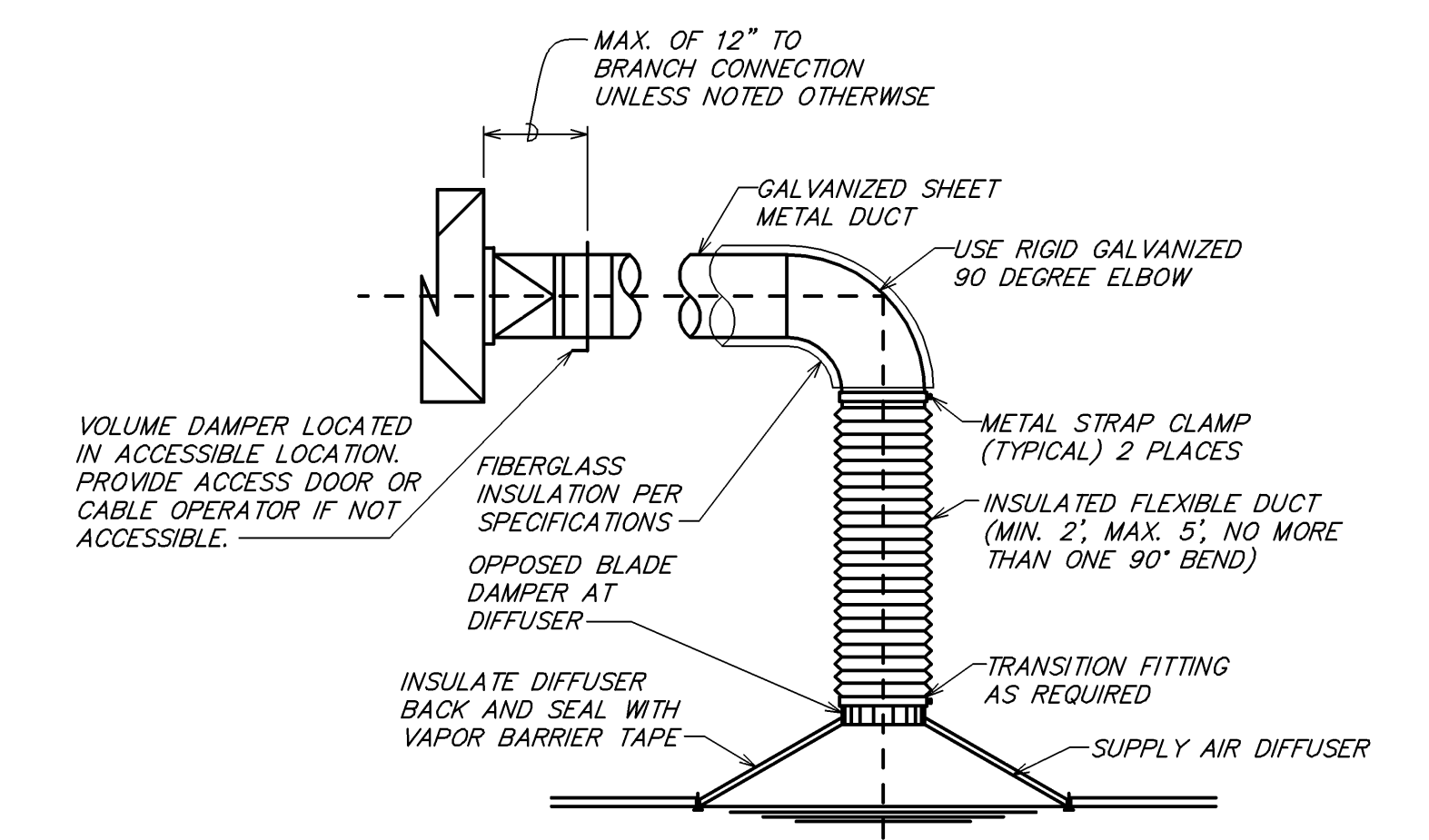


4 TYPICAL DX HORIZONTAL UNIT SUSPENSION DETAIL
NOT TO SCALE

DIA.	WIRE DIA.	ROD	STRAP
10" DN	ONE 12 GA.	1/4"	1" x 22 GA.
11-18"	TWO 12 GA. OR ONE 8 GA.	1/4"	1" x 22 GA.
19-24"	TWO 10 GA.	1/4"	1" x 22 GA.
25-36"	TWO 8 GA.	3/8"	1" x 20 GA.
37-50"	-	TWO 3/8"	TWO 1" x 20 GA.
51-60"	-	TWO 3/8"	TWO 1" x 18 GA.
61-84"	-	TWO 3/8"	TWO 1" x 16 GA.
85-96"	-	TWO 1/2"	TWO 1 1/2" x 16 GA.

NOTES:
1. STRAPS ARE GALVANIZED STEEL; RODS ARE UNCOATED OR GALVANIZED STEEL; WIRE IS BLACK ANNEALED, BRIGHT BASIC OR GALVANIZED STEEL. ALL ARE ALTERNATIVES.
2. TABLE ALLOWS FOR CONVENTIONAL WALL THICKNESS, AND JOINT SYSTEMS PLUS ONE LB/SF OF INSULATION WEIGHT. IF HEAVIER DUCTS ARE TO BE INSTALLED, ADJUST HANGER SIZES TO BE WITHIN THEIR LOAD LIMITS.

5 ROUND DUCT HANGER TABLE
NOT TO SCALE



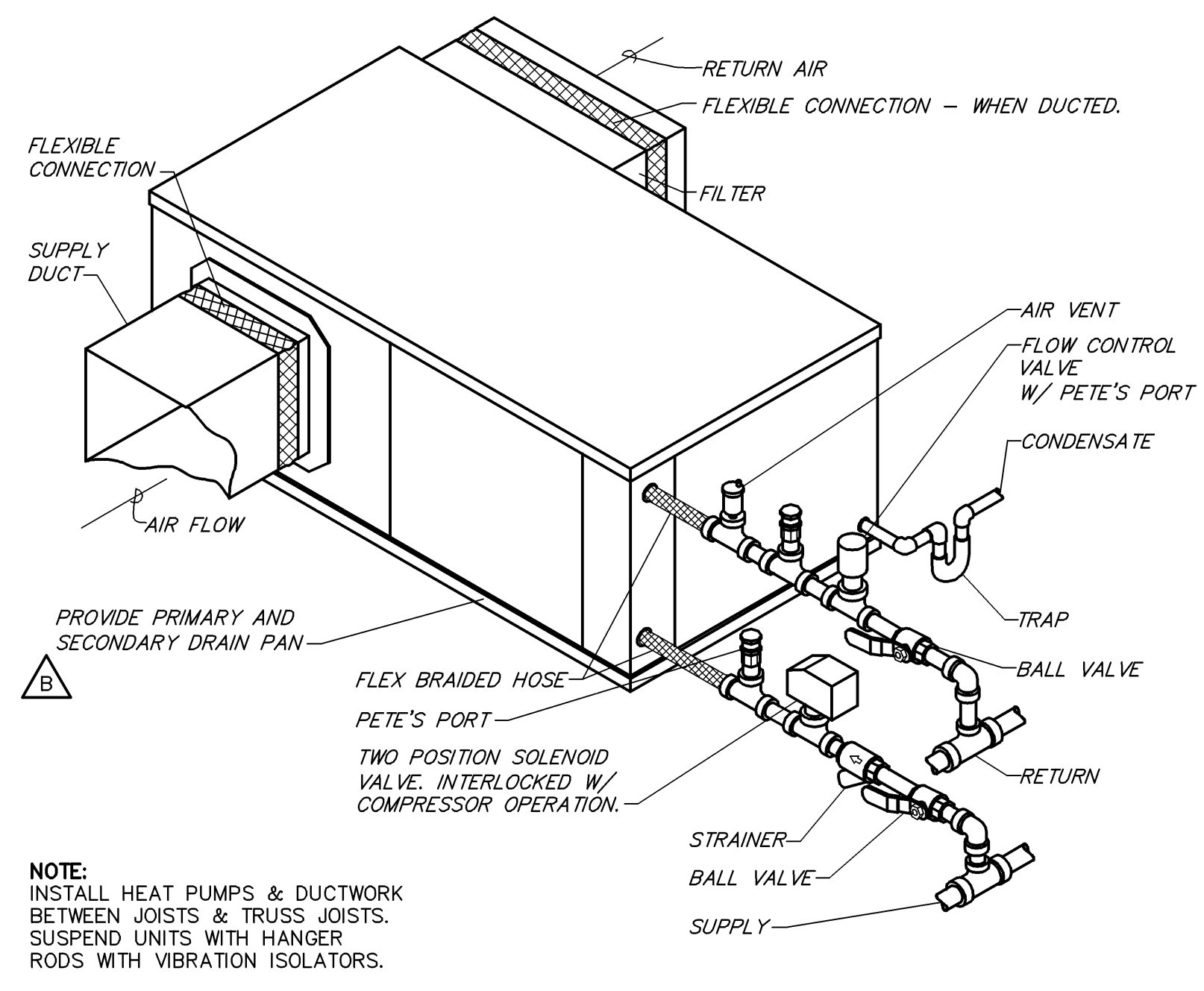
SEISMIC REQUIREMENT NOTES:
A. AIR TERMINALS WEIGHING LESS THAN 20 POUNDS SHALL BE POSITIVELY ATTACHED TO THE MAIN RUNNER.
B. AIR TERMINALS WEIGHING BETWEEN 20 POUNDS AND 56 POUNDS SHALL HAVE TWO 12 GAUGE HANGER WIRES CONNECTED FROM THE TERMINAL TO THE STRUCTURE ABOVE AND SHALL BE POSITIVELY ATTACHED TO THE MAIN RUNNER. THE HANGER WIRES MAY BE SLACK.
C. AIR TERMINALS WEIGHING MORE THAN 56 POUNDS SHALL HAVE INDEPENDENT SUPPORT FROM THE STRUCTURE ABOVE.
D. HANGER WIRES SHALL MEET THE SAME INSTALLATION REQUIREMENTS AS VERTICAL SUSPENSION WIRES.

1 TYPICAL DIFFUSER CONNECTION - SEISMIC
NOT TO SCALE

BRACE SIZING		BRACING SPACING		
BRACE SIZE	MAXIMUM LENGTH	PIPE SIZE	HANGER SPACING	MAXIMUM BRACE SPACING* (SEE NOTE B)
2" x 2" x 3/16" ANGLE	6'-0"	UP TO 1 1/2"	7'-0"	NOT REQUIRED
2 1/8" x 2 1/8" x 3/16" ANGLE	8'-0"	2"	10'-0"	NOT REQUIRED
3" x 3" x 3/16" ANGLE	10'-0"	2 1/2" TO 3"	10'-0"	7'-0"
3 1/2" x 3 1/2" x 1/4" ANGLE	11'-6"	4" AND UP	10'-0"	10'-0"
4" x 4" x 1/4" ANGLE	13'-0"			
3" DIAM. PIPE	13'-0" TO 18'-0"			

NOTES:
A. DUCTS WHICH ARE LARGER THAN 6 SQUARE FEET IN CROSS SECTION AREA SHALL BE BRACED Laterally 7'-0" ON CENTERS WITH 2" x 2" x 3/16" ANGLE BRACING CAN BE OMITTED ON ALL PIPING SUSPENDED BY INDIVIDUAL HANGERS 12" OR LESS IN LENGTH FROM THE TOP OF PIPE TO THE BOTTOM OF THE SUPPORT FOR THE HANGER.
B.

2 SEISMIC BRACE SCHEDULE
NOT TO SCALE



3 HEAT PUMP CONNECTION DETAIL
NOT TO SCALE

NOTE:
INSTALL HEAT PUMPS & DUCTWORK BETWEEN JOISTS & TRUSS JOISTS. SUSPEND UNITS WITH HANGER RODS WITH VIBRATION ISOLATORS.

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SECTION 230440 - VIBRATION AND SEISMIC CONTROLS FOR HVAC PIPING AND EQUIPMENT
SECTION 230593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC
SECTION 230698 - FIRE STOPPING FOR HVAC SYSTEMS (FOR REFERENCE ONLY)
SECTION 230713 - DUCT INSULATION
SECTION 230713.13 - GREASE DUCT FIREPROOFING
SECTION 232718 - HVAC PIPING INSULATION
SECTION 232800 - COMMISSIONING OF HVAC
SECTION 232993 - SELECTION OF OPERATIONS FOR HVAC CONTROLS
SECTION 233113 - HYDRONIC PIPING
SECTION 233300 - HVAC DUCTS AND CASINGS
SECTION 233300 - AIR DUCT ACCESSORIES
SECTION 233423 - AIR PURIFICATION DEVICES
SECTION 233423 - HVAC POWER VENTILATORS
SECTION 233700 - AIR OUTLETS AND INLETS
SECTION 238119 - SELF-CONTAINED AIR-CONDITIONERS

SECTION 230000 - HVAC GENERAL CONDITIONS

PART 1 GENERAL

- 1.01 APPLICABILITY
1.02 DEFINITIONS
1.03 CODES AND STANDARDS
1.04 PERMITS AND FEES
1.05 CONTRACT DRAWINGS
1.06 EXISTING CONDITIONS
1.07 SUBMITTALS

PART 3 EXECUTION

- 3.01 COORDINATION OF WORK
3.02 ADJUSTING TOLERANCES
3.03 RECORDING AND ADJUSTING
3.04 AIR SYSTEM PROCEDURE
3.05 WATER SYSTEM PROCEDURE
3.06 SCOPE
3.07 MINIMUM DATA TO BE REPORTED
3.08 REPORTS
3.09 EXAMINATION
3.10 FIELD QUALITY CONTROL
3.11 CLEANING AND REPAIR
3.12 PROTECT CLOSEOUT

END OF SECTION

SECTION 230548 - VIBRATION AND SEISMIC CONTROLS FOR HVAC PIPING AND EQUIPMENT

- PART 1 GENERAL
1.01 SECTION INCLUDES
1.02 SUBMITTALS
PART 2 PRODUCTS
2.01 MANUFACTURERS
2.02 VIBRATION ISOLATORS

END OF SECTION

SECTION 230593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

- PART 1 GENERAL
1.01 SECTION INCLUDES
1.02 QUALITY ASSURANCE
PART 2 PRODUCTS
2.01 MANUFACTURERS
2.02 FIRESTOPPING ASSEMBLIES
2.03 MATERIALS

END OF SECTION

SECTION 230698 - FIRE STOPPING FOR HVAC SYSTEMS (FOR REFERENCE ONLY)

- PART 1 GENERAL
1.01 SECTION INCLUDES
1.02 QUALITY ASSURANCE
PART 2 PRODUCTS
2.01 MANUFACTURERS
2.02 FIRESTOPPING ASSEMBLIES
2.03 MATERIALS

END OF SECTION

SECTION 230713 - GREASE DUCT FIREPROOFING

- PART 1 GENERAL
1.01 SECTION INCLUDES
1.02 QUALITY ASSURANCE
PART 2 PRODUCTS
2.01 MANUFACTURERS
2.02 FIRESTOPPING ASSEMBLIES
2.03 MATERIALS

END OF SECTION

SECTION 230713 - DUCT INSULATION

- PART 1 GENERAL
1.01 SECTION INCLUDES
1.02 FIELD CONDITIONS
PART 2 PRODUCTS
2.01 REQUIREMENTS FOR ALL PRODUCTS OF THIS SECTION
2.02 CLASSIFICATION
2.03 DUCT LINER
3.02 SCHEDULES

END OF SECTION

SECTION 230713.13 - GREASE DUCT FIREPROOFING

- PART 1 GENERAL
1.01 SECTION INCLUDES
1.02 QUALITY ASSURANCE
PART 2 PRODUCTS
2.01 MANUFACTURERS
2.02 FIRESTOPPING ASSEMBLIES
2.03 MATERIALS

END OF SECTION

SECTION 230713.13 - GREASE DUCT FIREPROOFING

- PART 1 GENERAL
1.01 SECTION INCLUDES
1.02 QUALITY ASSURANCE
PART 2 PRODUCTS
2.01 MANUFACTURERS
2.02 FIRESTOPPING ASSEMBLIES
2.03 MATERIALS

END OF SECTION

SECTION 230713.13 - GREASE DUCT FIREPROOFING

- PART 1 GENERAL
1.01 SECTION INCLUDES
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PART 2 PRODUCTS
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2.02 FIRESTOPPING ASSEMBLIES
2.03 MATERIALS

END OF SECTION

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END OF SECTION

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END OF SECTION

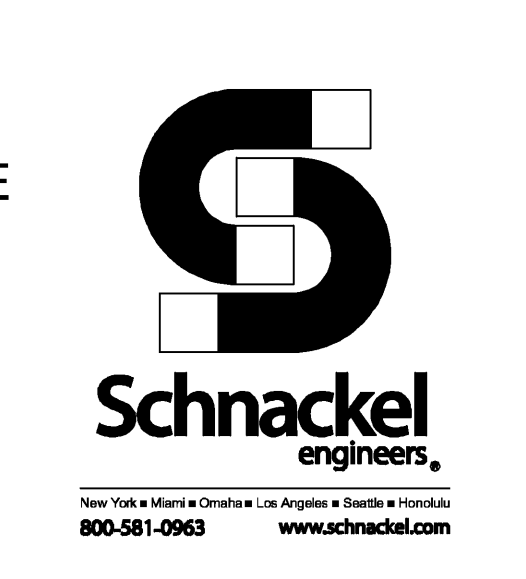
SECTION 230713.13 - GREASE DUCT FIREPROOFING

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2.01 MANUFACTURERS
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2.03 MATERIALS

END OF SECTION



ZEBRA ARCHITECTURE, PLLC
1454 N KIERNLAND BLVD., SUITE N300
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STORE NO:
UT #1614

SHAKE SHACK
CITY CREEK SUITE FC113
28 S. STATE STREET SUITE 104
SALT LAKE CITY, UT 84111

Table with 2 columns: Revision Number, Description. Includes revisions for 2024-06-06, 2024-02-27, 2024-02-02, 2024-02-18, 2025-01-17.

STATUS:
IFC SET

FIELD VERIFICATION:
The Contractor shall verify all signed dimensions and conditions on the project site with the Zebra Architect, PLLC...

SHEET NAME:
MECHANICAL SPECIFICATIONS

DATE: 07/26/2024 PROJECT NO: 38541
DRAWN: RAS SCALE:
RWS

SHEET NO:
M590

SECTION 230719 - HVAC PIPING INSULATION

- 1.01 SECTION INCLUDES
A. Cooling condenser drain piping insulation.
2.01 REQUIREMENTS FOR ALL PRODUCTS OF THIS SECTION
A. Manufacturer: Knauf Fiberglass/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E 84, NFPA 255, or UL 723.
B. The Contractor may use any of the following insulating/packaging materials, at his option, provided the selected material meets with the approval of the State, local authorities and utility company requirements. Verification of compliance of the selected insulating/packaging material is the sole responsibility of the installing Contractor.
2.02 CLASS FIBER
A. Manufacturer: Knauf Insulation; Johns Manville Corporation; Owens Corning Corp.; CertainTeed Corporation.
B. Insulation: ASTM C 547 and ASTM C 795; rigid molded, noncombustible.
1. 'K' value: ASTM C 177, 0.24 at 75 degrees F.
2. Maximum service temperature: 850 degrees F.
3. Maximum moisture absorption: 0.2 percent by volume.
C. Insulation: ASTM C 547 and ASTM C 795; semi-rigid, noncombustible, and grain adhered to jacket.
1. 'K' value: ASTM C 177, 0.24 at 75 degrees F.
2. Maximum service temperature: 850 degrees F.
3. Maximum moisture absorption: 0.2 percent by volume.
D. Vapor Barrier Jacket: White kraft paper with glass fiber yarn, bonded to gummed film; moisture vapor transmission when tested in accordance with ASTM E 96/E 96M of 0.02 perm-inches.
E. Vapor Barrier Lap Adhesive: Compatible with insulation.
F. Insulating Cement/Mastic: ASTM C 195; hydraulic setting on mineral wool.
G. Fibrous Glass Fabric:
1. Cloth: Untreated; 9 oz/sq yd weight.
2. Blanket: 1.0 lb/cu ft density.
3. Weave: 5x5.
H. Indoor Vapor Barrier Finish:
1. Cloth: Untreated; 9 oz/sq yd weight.
2. Vinyl emulsion type acrylic with insulation, black color.
I. Insulating Cement: ASTM C 449/C 449M.
2.03 FLEXIBLE ELASTOMERIC CELLULAR INSULATION
A. Manufacturer: ArmoCell International.
B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C 534 Grade 5; when specific testing is required, unless otherwise specified.
1. Minimum Service Temperature: -40 degrees F.
2. Maximum Service Temperature: 180 degrees F.
3. Connection: Waterproof vapor barrier adhesive.
C. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.
2.04 JACKETS
A. PVC Plastic:
1. Manufacturer: Knuff Fiberglass; Johns Manville Corporation; Owens Corning Corp.; CertainTeed Corporation.
2. Jacket: One piece molded type fitting covers and sheet material, off-white color.
a. Minimum Service Temperature: 0 degrees F.
b. Maximum Service Temperature: 150 degrees F.
c. Moisture Vapor Permeability: 0.02 perm inch, maximum, when tested in accordance with ASTM E 96/E 96M.
d. Thickness: 30 mil.
e. Connections: Brush on welding adhesive.
B. ABS Plastic:
1. Jacket: One piece molded type fitting covers and sheet material, off-white color.
a. Minimum Service Temperature: -40 degrees F.
b. Maximum Service Temperature: 180 degrees F.
c. Moisture Vapor Permeability: 0.012 perm inch, when tested in accordance with ASTM E 96/E 96M.
d. Thickness: 30 mil.
e. Connections: Brush on welding adhesive.
PART 3 EXECUTION
3.01 INSTALLATION
A. Install in accordance with manufacturer's instructions.
B. Install in accordance with NAMA National Installation Standards.
C. Inserts and Shields:
1. Application: Piping 2 inches diameter or larger.
2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
3. Insert location: Between support shield and piping and under the finish jacket.
4. Insert configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation, may be factory fabricated.
5. Insulating material: Insulation or other heavy density insulating material suitable for the planned temperature range.
D. Continue insulation installation on existing piping and other pipe penetrations. Finish at supports, protrusions, and interruptions.
E. Exposed Piping: Locate insulation and cover seams in least visible locations.
3.02 SCHEDULE
A. Cooling Systems:
1. Condensate Drains:
a. Glass Fiber Insulation:
i. Color Range: All Sizes.
ii. Thickness: 1/2 inch.
b. Flexible Elastomeric Insulation:
i. Pipe Size Range: All Sizes.
ii. Thickness: 1/2 inch.
END OF SECTION

SECTION 230800 - COMMISSIONING OF HVAC

- PART 1 GENERAL
1.01 SUMMARY
A. Commissioning to be Completed by National Test and Balance. Coordinate with Will Turnbough at 314-954-6244 or will@nationaltest.com.
B. The contractor shall be responsible for the installation of a particular system or equipment item to be commissioned is responsible for the commissioning activities relating to that system or equipment item.
C. The Commissioning Authority (CA) directs and coordinates all commissioning activities and provides Pre-functional Checklists and Functional Test Procedures for Contractor's use.
D. The entire HVAC system is to be commissioned, including commissioning activities for the following specific items:
1. Control system.
2. Major and minor equipment items.
3. Piping systems and equipment.
4. Ductwork and accessories.
5. Terminal units.
6. Sound control devices.
7. Vibration control devices.
8. Variable frequency drives.
9. Special Ventilations, Hoods, pressurization, exhaust, etc.
10. Other equipment and systems explicitly identified elsewhere in Contract Documents as requiring commissioning.
E. The Pre-functional Checklist and Functional Test requirements specified in this section are in addition to, not a substitute for, inspection or testing specified in other sections.
1.02 RELATED REQUIREMENTS
A. ASHRAE 170 - Sequences of Operations for HVAC Controls.
1.03 REFERENCES AND STANDARDS
A. ASHRAE Guideline 1.1 - The HVAC Commissioning Process, 2012.
1.04 SUBMITTALS
A. Updated Submittals: Keep the Commissioning Authority informed of all changes to control system documentation made during programming and setup; revise and resubmit when indicated.
B. DRAFT Pre-functional Checklists and Functional Test Procedures for Control System: Detailed written plan indicating the procedures to be followed to test, check-out and adjust the control system prior to full system Functional Testing; include at least the following for each type of equipment controlled:
1. System name.
2. List of devices.
3. Step-by-step procedures for testing each controller after installation, including:
a. Process of verifying proper hardware and wiring installation.
b. Process of downloading programs to local controllers and verifying that they are downloading correctly into controllers.
c. Process of performing operational checks of each controlled component.
d. Plan and process for calibrating valve and damper actuators and all sensors.
e. Description of the expected field adjustments for transmitters, controllers and control actuators should control responses fall outside of expected values.
4. Copy of proposed log and field check-out sheets to be used to document the process; include space for initial and final read values during calibration of each point and space to specifically indicate when a sensor or controller has 'passed' and is operating within the contract parameters.
5. Description of the instrumentation required for testing.
6. Initial and final control system programming and testing sections of this specification and other features of this system. Provide an index and clear table of contents. Include the detailed technical manual for programming and downloading control logic and algorithms.
7. Full as-built set of control drawings.
8. Full as-built set of control drawings for each piece of equipment.
9. Full points list; in addition to the information on the original points list submitted, include a listing of all rooms with the following information for each room:
a. Floor.
b. Room number.
c. Room name.
d. AS/B handler unit ID.
e. Reference drawing number.
f. Control points monitored by the control system.
g. Heating and/or cooling valve tag ID.
h. Minimum or flow rate.
i. Maximum or flow rate.
j. Full print out of all schedules and set points after testing and acceptance of the system.
10. Full as-built print out of software program.
11. Full as-built print out of control system programming for this facility.
12. Marking of all system sensors and thermostats on the as-built floor plan and HVAC drawings with their control system designations.
9. Maintenance instructions, including sensor calibration requirements and methods by sensor type, etc.
10. Control equipment component submittals, parts lists, etc.
11. Warranty requirements.
12. Copies of all check-out tests and calibrations performed by the Contractor (not commissioning tests or calibrations performed by other systems).
13. Organize and subdivide the manual with permanently labeled tabs for each of the following data in the given order:
a. Sequence of operation.
b. Control drawings.
c. Points lists.
d. Controller and/or module data.
e. Thermostat and/or module data.
f. Sensors and DP switches.
g. Valves and valve actuators.
h. Dampers and damper actuators.
i. Program setups (software program printouts).
E. Project:
1. Submit updated version of control system documentation, for inclusion with operating and maintenance data, to the Commissioning Authority.
2. Show actual locations of all static and differential pressure sensors (air, water and building pressure) and air-flow stations on project record drawings.
F. Draft Training Plan:
1. Follow the recommendations of ASHRAE Guideline 1.1.
2. Control system manufacturer's recommended training.
3. Demonstration and instruction on operation and overrides of any local packaged controls not controlled by the HVAC control system.
G. Training Manuals:
1. Provide three extra copies of the control training manuals in a separate manual from the O&M manuals.
2. Dimensions, quantities and details are not checked during submittal review. Review of the submittals does not relieve the Contractor of the responsibility for providing all materials, equipment and accessories necessary for a complete and operational system meeting the requirements of the project and the intent of the Contract Documents. The responsibility for coordinating and substituting materials and equipment lies solely with the substituting Contractor.
PART 2 PRODUCTS
2.01 TEST EQUIPMENT
A. Provide all standard testing equipment required to perform startup and initial check-out and functional performance testing; unless otherwise noted such testing equipment will NOT become the property of Owner.
B. Prepare a preliminary schedule for HVAC pipe and duct system testing, flushing and cleaning, equipment start-up and testing, adjusting, and balancing start and completion for use by the Commissioning Authority; update the schedule as appropriate.
C. Notify the Commissioning Authority when pipe and duct system testing, flushing, cleaning, startup of each piece of equipment and testing, adjusting, and balancing will occur; commissioning activities set performed or not performed will delay construction notify by e-mail of time and date in writing to the Commissioning Authority has the scheduling information needed to efficiently execute the commissioning process.
D. Put all HVAC equipment and systems into operation and continue operation during each testing, adjusting, and balancing and commissioning, as required.
E. TAB Review: Instruct Owner's personnel for minimum eight hours, after completion of TAB, on the DVD's:
1. Review final TAB report, explaining the layout and meanings of each data type.
2. Discuss any outstanding deficient items in control, ducting or design that may affect the proper delivery of air or water.
3. Identify and discuss any terminal units, duct runs, diffusers, coils, fans and pumps that are close to or are not meeting their design capacity.
4. Discuss any temporary settings and steps to finalize them for any areas that are not finalized.
F. HVAC Control System Training: Perform training in at least three phases:
1. Phase 1 - Basic Control System: Provide minimum of 16 hours of actual training on the control system itself.
2. Phase 2 - Integrating with HVAC Systems: Provide minimum of 16 hours of on-site, hands-on training after completion of Functional Testing. Include instruction on:
a. The specific hardware configuration of installed systems in this facility and specific instructions for operating the installed system, including interfaces with other systems, if any.
b. Security levels, system start-up, shut-down, power outage and restart routines, changing setpoints and alarms and other typical changed parameters, overrides, freeze protection, manual operation of equipment, optional control strategies that can be considered, energy savings strategies and set points that changed will adversely affect energy consumption, energy accounting, procedures for obtaining vendor assistance, etc.
c. Trend logging and monitoring features (values, change of state, totalization, etc.), including setting up, recording, downloading, viewing both tabular and graphically and printing trends; provide practice in setting up trend logging and monitoring during training session.
d. Every display screen, allowing time for questions.
e. Use of keypad or plug-in laptop computer at the zone level.
f. Use of remote access to the system via phone lines or networks.
g. Setting up and changing air terminal unit controller.
h. Graphical interface and modifications.
i. Trending and downloading of data.
3. Phase 3 - Post-Occupancy: Six months after occupancy conduct minimum of 16 hours of training. Tailor training session to questions and topics applied beforehand from Owner. Also be prepared to address topics brought up and answer questions concerning operation of the system.
G. Provide the services of manufacturer representatives to assist installers where necessary.
H. Provide the services of the HVAC controls instructor at other training sessions, when requested, to discuss the interaction of the controls system as it relates to the equipment being discussed.
END OF SECTION
SECTION 230903 - SEQUENCE OF OPERATIONS FOR HVAC CONTROLS
PART 1 GENERAL
1.01 SECTION INCLUDES
A. This Section defines the manner and method by which controls function. Requirements for each type of control system operation are specified. Equipment, devices, and system components required for control systems are specified in other sections.
B. This Section provides the intended sequence of operation for each piece of controlled equipment. Other Sections of this Specification indicate the requirements for direct digital control systems, energy management systems, packaged factory controls or conventional analog control systems. Equipment, devices, and system components required for control systems are specified in other sections. Wherever the sequences contained herein indicate control by a thermostat or EMS sensor/controller, the Temperature Control Contractor shall furnish EMS sensor/controllers for digital control systems or a thermostat for conventional analog control systems as specified in other sections of this Specification.
C. Sequence of operation for:
1. Fan coil units:
a. Heat pump heating/cooling.
b. Automatic changeover.
c. Variable speed supply fan.
d. Outside air damper, non-economizer systems.
2. Fresh air fans.
3. Building pressure control.
4. Heat pump systems.
a. Condensing water pump.
b. Heat pump unit controls.
1.02 RELATED REQUIREMENTS
A. Section 23 0913 - Instrumentation and Control Devices for HVAC SYSTEM DESCRIPTION
A. Equipment, components, controls and accessories shall be as scheduled on the Drawings and specified herein. Inclusion in both locations is not a prerequisite to inclusion in the Contract. Equipment, controls and accessories specified in either location shall be included in the Contract. Provide all necessary controls, accessories and connections as required for a complete, functional system for all systems indicated on the Drawings.
B. Connections including connections to controlled devices external to the control systems shall be included in the temperature controls contract as a part of the Mechanical Contractor or other systems, equipment, ductwork, connections to devices at the locations indicated on the Electrical Drawings. Review the Electrical Drawings for locations where power connections will be made and obtain a complete schedule of all other systems, equipment and control wiring for a complete and functional system.
C. Provide all control and electrical wiring where required. Wiring shall be installed in conduit wherever wiring is concealed in inaccessible areas of ceilings, walls, attics and floors. Conduit shall be installed in all locations wherever by applicable local and national codes. Other locations may be installed utilizing plenum rated conduit without conduit, provided that all cabling is neatly bundled and protected from all other systems, equipment, ductwork, etc. Where cable trays exist, all wiring shall utilize the cable tray, except for direct run outs to equipment or control systems.
D. All control settings and set points shall be individually adjustable. Set points specified in this section shall be used as a guide for initial setup only and require subsequent adjustment to achieve the desired system functionality and performance.
1.04 SUBMITTALS
A. Sequence of Operation Documentation: Submit written sequence of operation for entire HVAC system and each piece of equipment.
1. Preface: 1 or 2 paragraph overview narrative of the system describing its function.
2. State each sequence in small segments and give each segment a unique number for reference in Functional Test procedures; provide a complete description regardless of the completeness and clarity of the sequences specified in the Contract Documents.
B. Include at least the following sequences:
a. Start-up.
b. Normal operating mode.
c. Inoperable mode.
d. Shutdown.
e. Capacity control sequences and equipment staging.
f. Temperature and pressure control, such as setbacks, setpoints, resets, etc.
C. Demonstrate to the Commissioning Authority:
1. That all specified functions and features are set up, debugged and fully operable.
2. That all graphic screens are fully functional and setup, including holidays.
3. That all graphic screens and views readouts are completed.
4. Correct date and time settings in control computer.
5. That field panels read the same time as the control computer; sample 10 second period of field panels; if any of those fail, sample another 10 second period; if any of those fail, test all remaining units at no extra cost to Owner.
6. Functionality of field panels using local operator keypads and local ports (DIN-5) using portable computer/keypads; demonstrate 100 percent of panels and 10 percent of ports; if any ports fail, sample another 10 percent; if any of those fail, test all remaining units at no extra cost to Owner.
7. Power failure and battery backup and power-up/restart functions.
8. Global commands features.
9. Security and access codes for equipment.
10. Occupant overrides (manual, telephone, key, keypad, etc.).
11. O&M schedules and alarm settings.
12. Occupancy sensors and controls.
13. After hours' use tracking and billing.
14. Communications to remote sites.
15. Fire alarm interlocks and response.
16. Fire protection and suppression systems interfaces.
17. Security system interlocks.
18. That points that are monitored only, having no control function, are reporting properly to the control system.
19. That control strategies and sequences not tested during controlled equipment testing.
20. Trend logging and graphing features that are specified.
21. Other integrated tests specified in the Contract Documents.
22. That control system features that are included but not specified to be setup are actually installed.
H. Perform and submit trend logging on the following using the control system, for minimum period of 5 days including one weekend, if the control points are monitored by the control system:
1. Duty cycling, if specified.
2. Demand limiting, including over-ride of limiting.
3. Sequential staging ON of equipment; optionally demonstrate manually.
4. Callout start-up functions.
5. Miscellaneous equipment current or status for duty cycling and demand limiting.
6. Equipment or building kW or current for demand limiting.
7. Equipment optimum start/stop functions.
I. If the control system, integral control components, or related equipment do not respond to changing conditions and parameters appropriately as expected, as specified and according to acceptable operating practice, under any of the conditions, sequences, or modes tested, correct all systems, equipment, components, and software required to accomplish start-up or Functional Testing, at no extra cost to Owner; equipment, tools, and instruments as part of the work at no extra cost to Owner; such equipment, tools, and instruments are to become the property of Owner.
3.05 OPERATION AND MAINTENANCE MANUALS
A. Add design intent documentation furnished by Engineer to manuals prior to submission to Owner.
B. Submit manuals related to items that were commissioned to Commissioning Authority for review; make changes recommended by Commissioning Authority.
C. Commissioning Authority will add commissioning records to manuals after submission to Owner.
3.06 DEMONSTRATION AND TRAINING
A. Demonstrate operation and maintenance of HVAC system to Owner's personnel; if during any demonstration or system maintenance fails to perform in accordance with the information included in the O&M manual, stop demonstration, repair or adjust, and repeat demonstration. Demonstrations may be combined with training sessions, if appropriate.
B. These demonstrations are in addition to, and not a substitute for, Pre-functional Checklists and demonstrations to the Commissioning Authority during Functional Testing.
C. Provide classroom and hands-on training of Owner's designated personnel on operation and maintenance of the HVAC system, control system, and all equipment. Items indicated to be commissioned. Return for follow up training not less than 30 days after initial training and not more than 6 months after initial training.
D. Provide professional digital video recording of instruction sessions; equipment deliver two copies on DVD's to the Owner for future reference.
E. TAB Review: Instruct Owner's personnel for minimum eight hours, after completion of TAB, on the DVD's:
1. Review final TAB report, explaining the layout and meanings of each data type.
2. Discuss any outstanding deficient items in control, ducting or design that may affect the proper delivery of air or water.
3. Identify and discuss any terminal units, duct runs, diffusers, coils, fans and pumps that are close to or are not meeting their design capacity.
4. Discuss any temporary settings and steps to finalize them for any areas that are not finalized.
F. HVAC Control System Training: Perform training in at least three phases:
1. Phase 1 - Basic Control System: Provide minimum of 16 hours of actual training on the control system itself.
2. Phase 2 - Integrating with HVAC Systems: Provide minimum of 16 hours of on-site, hands-on training after completion of Functional Testing. Include instruction on:
a. The specific hardware configuration of installed systems in this facility and specific instructions for operating the installed system, including interfaces with other systems, if any.
b. Security levels, system start-up, shut-down, power outage and restart routines, changing setpoints and alarms and other typical changed parameters, overrides, freeze protection, manual operation of equipment, optional control strategies that can be considered, energy savings strategies and set points that changed will adversely affect energy consumption, energy accounting, procedures for obtaining vendor assistance, etc.
c. Trend logging and monitoring features (values, change of state, totalization, etc.), including setting up, recording, downloading, viewing both tabular and graphically and printing trends; provide practice in setting up trend logging and monitoring during training session.
d. Every display screen, allowing time for questions.
e. Use of keypad or plug-in laptop computer at the zone level.
f. Use of remote access to the system via phone lines or networks.
g. Setting up and changing air terminal unit controller.
h. Graphical interface and modifications.
i. Trending and downloading of data.
3. Phase 3 - Post-Occupancy: Six months after occupancy conduct minimum of 16 hours of training. Tailor training session to questions and topics applied beforehand from Owner. Also be prepared to address topics brought up and answer questions concerning operation of the system.
G. Provide the services of manufacturer representatives to assist installers where necessary.
H. Provide the services of the HVAC controls instructor at other training sessions, when requested, to discuss the interaction of the controls system as it relates to the equipment being discussed.
END OF SECTION

SECTION 231113 - HYDRONIC PIPING

- PART 1 GENERAL
1.01 SECTION INCLUDES
A. Pipe and pipe fittings for:
1. Condenser water piping system.
2. Heating and cooling water mains, risers and overflows.
B. Valves:
1. Ball valves.
2. Flow controls.
1.02 REGULATORY REQUIREMENTS
A. Conform to ASME B31.9 code for installation of piping system.
B. Welding Materials and Procedures: Conform to ASME (BPV IX) and applicable state labor regulations.
PART 2 PRODUCTS
2.01 HYDRONIC SYSTEM REQUIREMENTS
A. Comply with ASME B31.9 and applicable federal, state, and local regulations.
B. Piping: Provide piping, fittings, hangers and supports as required, as indicated, including:
1. Where grooved joints are used, provide grooved pipe and fittings, grooved pipe hangers and supports in accordance with ASME B31.9 and MSS SP-69 unless indicated otherwise.
2. Three flexible joints may be used in lieu of a flexible connector, provided the joints are used in accordance with ASME B31.9 and MSS SP-69 unless indicated otherwise.
3. Provide pipe hangers and supports in accordance with ASME B31.9 and MSS SP-69 unless indicated otherwise.
C. Pipe-to-Valve and Pipe-to-Equipment Connections: Use flanges, unions, or grooved couplings to allow disconnection of components for servicing; do not use direct welded, soldered, or threaded connections.
1. Where grooved joints are used, provide grooved pipe and fittings, grooved pipe hangers and supports in accordance with ASME B31.9 and MSS SP-69 unless indicated otherwise.
2. Provide pipe hangers and supports in accordance with ASME B31.9 and MSS SP-69 unless indicated otherwise.
D. Valves: Provide valves where indicated and as follows:
1. Provide drain valves where indicated, and if not indicated provide at least one drain valve per piping assembly.
2. Provide ball valves, gate valves, globe valves, and manual flow control devices, use globe or ball valves.
3. For shut-off and to isolate parts of systems or vertical risers, use ball valves.
E. WELDING MATERIALS AND PROCEDURES: Conform to ASME (BPV IX).
2.02 FIELD VERIFICATION
A. The Contractor may use any of the following piping materials, at his option, provided the selected material meets with the approval of the State, local authorities and utility company requirements. Verification of compliance of the selected piping material is the sole responsibility of the installing Contractor.
2.03 CONDENSER WATER PIPING, ABOVE GROUND
A. Steel Pipe: ASTM A 53/A 53M, Schedule 40, black.
1. Flange ends shall be beveled and finished with steel welding type fittings with finish matching piping; AWS D1.1 welded.
2. Threaded joints: ASTM B 88 (ASTM B 88M), type K (A), drawn; using one of the following joint types:
a. Grooved joints: AWWA C506 grooved pipe, fittings of same material, and mechanical couplings.
b. Grooved joints: AWWA C506 grooved pipe, fittings of same material, and copper-tube-dimension mechanical couplings.
c. Grooved joints: AWWA C506 grooved pipe, fittings of same material, and copper-tube-dimension mechanical couplings.
d. Grooved joints: AWWA C506 grooved pipe, fittings of same material, and copper-tube-dimension mechanical couplings.
e. Grooved joints: AWWA C506 grooved pipe, fittings of same material, and copper-tube-dimension mechanical couplings.
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i. Grooved joints: AWWA C506 grooved pipe, fittings of same material, and copper-tube-dimension mechanical couplings.
j. Grooved joints: AWWA C506 grooved pipe, fittings of same material, and copper-tube-dimension mechanical couplings.
k. Grooved joints: AWWA C506 grooved pipe, fittings of same material, and copper-tube-dimension mechanical couplings.
l. Grooved joints: AWWA C506 grooved pipe, fittings of same material, and copper-tube-dimension mechanical couplings.
m. Grooved joints: AWWA C506 grooved pipe, fittings of same material, and copper-tube-dimension mechanical couplings.
n. Grooved joints: AWWA C506 grooved pipe, fittings of same material, and copper-tube-dimension mechanical couplings.
o. Grooved joints: AWWA C506 grooved pipe, fittings of same material, and copper-tube-dimension mechanical couplings.
p. Grooved joints: AWWA C506 grooved pipe, fittings of same material, and copper-tube-dimension mechanical couplings.
q. Grooved joints: AWWA C506 grooved pipe, fittings of same material, and copper-tube-dimension mechanical couplings.
r. Grooved joints: AWWA C506 grooved pipe, fittings of same material, and copper-tube-dimension mechanical couplings.
s. Grooved joints: AWWA C506 grooved pipe, fittings of same material, and copper-tube-dimension mechanical couplings.
t. Grooved joints: AWWA C506 grooved pipe, fittings of same material, and copper-tube-dimension mechanical couplings.
u. Grooved joints: AWWA C506 grooved pipe, fittings of same material, and copper-tube-dimension mechanical couplings.
v. Grooved joints: AWWA C506 grooved pipe, fittings of same material, and copper-tube-dimension mechanical couplings.
w. Grooved joints: AWWA C506 grooved pipe, fittings of same material, and copper-tube-dimension mechanical couplings.
x. Grooved joints: AWWA C506 grooved pipe, fittings of same material, and copper-tube-dimension mechanical couplings.
y. Grooved joints: AWWA C506 grooved pipe, fittings of same material, and copper-tube-dimension mechanical couplings.
z. Grooved joints: AWWA C506 grooved pipe, fittings of same material, and copper-tube-dimension mechanical couplings.
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150. Grooved joints: AWWA C506 grooved pipe, fittings of same material, and copper-tube-dimension mechanical couplings.
151. Grooved joints: AWWA C506 grooved pipe, fittings of same material, and copper-tube-dimension mechanical couplings.
152. Grooved joints: AWWA C506 grooved

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2.04 EQUIPMENT DRAINS AND OVERFLOWS
 A. Steel Pipe: ASTM A 53/A 53M, Schedule 40 galvanized; using one of the following joint types:
 1. Threaded joints: Galvanized cast iron, or ASME B16.3 malleable iron fittings.
 2. Grooved joints: AWMA C606 grooved pipe, fittings of same material, and mechanical couplings.
 B. Copper Tube: ASTM B 88 (ASTM B 88M), Type L (B), drawn; using one of the following joint types:
 1. Solder joints: ASME B16.18 cast brass/bronze or ASME B16.22 solder wrought copper fittings; ASTM B 32 lead-free solder; 1/8 alloy (95-5 tin-antimony) or tin and silver.
 2. Grooved joints: AWMA C606 grooved pipe, fittings of same material, and mechanical couplings.
 C. PVC Pipe: ASTM D 1785, Schedule 40, or ASTM D 2241, SDR 21 or 26. (Not permitted in plenum return ceilings.)
 1. Fittings: ASTM D 2466 or D2467, PVC.
 2. Joints: Solvent welded.
 D. PVC Pipe Sizes 8 inch and Larger: ASTM D 1785, Schedule 80, or ASTM D 2241, SDR 21 or 26. (Not permitted in plenum return ceilings.)
 1. Fittings: ASTM D 2466 or D2467, PVC.
 2. Joints: Solvent welded.
 E. ABS Pipe: ASTM D 2850 or D2751. (Not permitted in plenum return ceilings.)
 1. Fittings: ASTM D 2751.
 2. Joints: Solvent welded with ASTM D 2235 cement.
 2.05 PIPE HANGERS AND SUPPORTS
 A. Conform to ASME B31.9 or MSS SP-58, 69 & 89.
 2.06 UNIONS, FLANGES, AND COUPLINGS
 A. Unions for Pipe 2 Inches and Under:
 1. Ferrous Piping: 150 psig malleable iron, threaded.
 2. Copper Pipe: Bronze, soldered joints.
 B. Flanges for Pipe Over 2 inches:
 1. Ferrous Piping: 150 psig forged steel, slip-on.
 2. Copper Pipe: Cast bronze, soldered joints.
 3. Gaskets: 1/16 inch thick preformed neoprene.
 C. Mechanical Couplings for Grooved and Shouldered Joints: Two or more curved housing segments with continuous key to engage pipe groove, circular Com-rite gasket, and bolts to secure and compress gasket.
 1. Dimensions and design in accordance with AWMA C606.
 2. Housing Material: Malleable iron or ductile iron, galvanized.
 3. Gasket Material: EPDM suitable for operating temperature range from -30 degrees F to 230 degrees F.
 4. Bolts and Nuts: Hot dipped galvanized or zinc-electroplated steel.
 5. When pipe is field grooved, provide coupling manufacturer's grooving tools.
 6. Manufacturers: Victaulic Company, Shurjoint.
 D. Dielectric Connections: Union or waterway fitting with water impervious isolation barrier and one galvanized or plated steel end and one copper tube end, end types to match pipe joint types used.
 2.07 BALL VALVES
 A. Manufacturers: Conbraco Industries; Nilco, Inc.; Milwaukee Valve Company.
 B. Up to and Including 2 inches:
 1. Bronze one piece body, stainless steel ball, teflon seats and stuffing box ring, lever handle, solder or threaded ends.
 C. Over 2 inches:
 1. Cast steel body, chrome plated steel ball, teflon seat and stuffing box seals, lever handle, flanged.
 2.08 FLOW CONTROLS
 A. Manufacturers: ITT Bell & Gossett; Griswold Controls; Taco, Inc.
 B. Construction: Class 125, Brass or bronze body with union on inlet, temperature and pressure test plug on inlet and outlet.
 C. Calibration: Control flow within 5 percent of selected rating, over operating pressure range of 10 times minimum pressure required for control.
 PART 3 EXECUTION
 3.01 INSTALLATION
 A. Install in accordance with manufacturer's instructions.
 B. Install piping to ASME B31.5 or B31.9 requirements, as applicable.
 C. Size piping and arrange to drain at low points.
 D. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
 E. Provide sleeves when penetrating footings, masonry walls and floors. Seal and fire stop pipe and sleeve penetrations to achieve fire resistance equivalent to fire separation required. All penetrations through footings and floors shall be sealed water tight.
 F. Pipe Hangers and Supports: Install in accordance with ASME B31.9, ASTM F 708, or MSS SP-89.
 G. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
 END OF SECTION
 SECTION 233100 - HVAC DUCTS AND CASINGS
 PART 1 GENERAL
 1.01 SECTION INCLUDES
 A. Metal ductwork.
 B. Nonmetal ductwork.
 C. Round spiral ductwork.
 D. Kitchen hood ductwork, Type 1 grease hoods.
 E. Duct cleaning.
 1.02 PERFORMANCE REQUIREMENTS
 A. No varnish duct coat configuration or sizes permitted except by written permission.
 B. Size round ducts installed in place of rectangular ducts in accordance with ASHRAE table of equivalent rectangular ducts and round ducts, only after approval of the Engineer. Sizes shown on design drawings are air dimensions. Contractor may increase duct size without engineer approval, provided all ceiling and shaft clearances can be maintained. Additional charges for increased duct size will not be accepted by the owner.
 C. Report all conflicts with structure or other obstructions, prior to fabrication of any ductwork. Suitable adjustments in the sizes of ducts shall be accommodated without any additional expense to the Owner.
 1.03 SUBMITTALS
 A. Shop Drawings: Indicate duct fittings, particulars such as gages, sizes, welds, and configuration prior to start of work for all systems. No ductwork shall be fabricated until engineer approved shop drawings have been received by the Contractor. Identify on ductwork shop drawings any deviations in sizes or shapes made necessary by the obstructions of other trades.
 B. Test Reports: Indicate pressure tests performed. Include date, section tested, test pressure, and leakage rate, following SMACNA (LEAK) - HVAC Air Duct Leakage Test Manual.
 1.04 REGULATORY REQUIREMENTS
 A. Construct ductwork to NFPA 90A, NFPA 90B, and NFPA 98 standards.
 B. Code or utility company requirements shall supersede any conflicting requirements of this Section.
 1.05 FIELD CONDITIONS
 A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturer.
 B. Maintain temperatures within acceptable range during and after installation of duct sealants.
 PART 2 PRODUCTS
 2.01 MATERIALS
 A. Galvanized Steel Ducts: Hot-dipped galvanized steel sheet, ASTM A 653/A 653M FS Type B, with G90/Z275 coating.
 B. Steel Ducts: ASTM A 108/A 108M, Designation CS, cold-rolled commercial steel.
 C. Aluminum Ducts: ASTM B 209 (ASTM B 209M), aluminum sheet, alloy 3003-H14.
 D. Aluminum Connectors and Bar Stock: Alloy 6061-T651 or of equivalent strength.
 E. Insulated Flexible Ducts:
 1. The Contractor may use any of the following ductwork materials, at his option, provided the selected material meets with the approval of all State, local authorities and utility company requirements. Verification of compliance of the selected ductwork material is the sole responsibility of the installing Contractor.
 2. Two ply vinyl film supported by helically wound spring steel wire; fiberglass insulation; aluminum vapor barrier film.
 a. Pressure Rating: 10 inches WG positive and 1.0 inches WG negative.
 b. Maximum Velocity: 4000 fpm.
 c. Temperature Range: -10 degrees F to 160 degrees F.
 d. Minimum R-Value: 4.2 or greater as required by the applicable energy codes.
 3. Black polymer film supported by helically wound spring steel wire; fiberglass insulation; aluminum vapor barrier film.
 a. Pressure Rating: 4 inches WG positive and 0.5 inches WG negative.
 b. Maximum Velocity: 4000 fpm.
 c. Temperature Range: -20 degrees F to 175 degrees F.
 d. Minimum R-Value: 4.2 or greater as required by the applicable energy codes.
 4. Multiple layers of aluminum laminate supported by helically wound spring steel wire; fiberglass insulation; aluminum vapor barrier film.
 a. Pressure Rating: 10 inches WG positive and 1.0 inches negative.
 b. Maximum Velocity: 4000 fpm.
 c. Temperature Range: -20 degrees F to 210 degrees F.
 d. Minimum R-Value: 4.2 or greater as required by the applicable energy codes.
 5. UL 181, Class 1, aluminum laminate and polyester film with latex adhesive supported by helically wound spring steel wire; fiberglass insulation; aluminum vapor barrier film.
 a. Pressure Rating: 10 inches WG positive and 1.0 inches WG negative.
 b. Maximum Velocity: 4000 fpm.
 c. Temperature Range: -20 degrees F to 210 degrees F.
 d. Minimum R-Value: 4.2 or greater as required by the applicable energy codes.
 6. UL 181, Class 0, interlocking spiral of aluminum foil; fiberglass insulation; aluminum vapor barrier film.
 a. Pressure Rating: 10 inches WG positive or negative.
 b. Maximum Velocity: 5000 fpm.
 c. Temperature Range: -20 degrees F to 250 degrees F.
 d. Minimum R-Value: 4.2 or greater as required by the applicable energy codes.
 E. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.
 1. Type: Heavy mastic or liquid used alone or with tape, suitable for joint configuration and compatible with substrates, and recommended by manufacturer for pressure class of ducts.
 2. VOC Content: Not more than 250 g/L, excluding water.
 3. Surface Burning Characteristics: Flame spread of zero, smoke developed of zero, when tested in accordance with ASTM E 84.
 4. For Use With Flexible Ducts: UL labeled.
 5. Flexible Exposed: Cast VersaDrip 102, (VG-102), UL 181-AM compliant duct joint sealer, as manufactured by Carlisle, with fiberglass scrim tape reinforcement on all seams and joints, lateral and longitudinal.
 F. Hanger Rod: ASTM A 36/A 36M; steel, threaded both ends, threaded one end, or continuously threaded.
 2.02 DUCTWORK FABRICATION
 A. Fabricate, support and seal in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
 B. Construct T, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows must be used, provide turning vanes. Where acceptable lining is indicated, provide turning vanes of perforated metal with glass fiber insulation.
 C. Increase duct sizes gradually, not exceeding 15 degree divergence wherever possible; maximum 30 degree divergence upstream of equipment and 45 degree convergence downstream.
 D. Fabricate continuously welded round and oval duct fittings two gages heavier than duct gages indicated in SMACNA Standard. Joints shall be minimum 4 inch cemented slip joint, brazed or electric welded. Prime coat welded joints.
 E. Provide standard 45 degree lateral vee takeoffs unless otherwise indicated where 90 degree conical tee connections may be used.
 F. Where ducts are connected to exterior wall louvers and duct outlet is smaller than louver frame, provide blank-out panels sealing lower area around duct. Use some material as duct, painted black on exterior side; seal to louver frame and duct.
 2.03 DUCT MANUFACTURERS
 A. Metal-Fab, Inc.; SEMCO Incorporated; United McGill Corporation.
 2.04 MANUFACTURED METAL DUCTWORK AND FITTINGS
 A. Manufacturers: In accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
 B. Round Spiral Ducts: Machine made from round spiral lockseam duct with light reinforcing corrugations; fittings manufactured of at least two gages heavier metal than duct.
 C. Double Wall Insulated Round Ducts: Round spiral lockseam duct with galvanized steel outer wall, 1 inch thick fiberglass insulation, perforated galvanized steel inner wall; fitting with solder inner wall.
 D. Transverse Duct Connection System: SMACNA "E" rated rigidly class connection, interlocking angle and duct edge connection system with sealant, gasket, cleats, and corner clips.
 2.05 KITCHEN HOOD EXHAUST DUCTWORK, TYPE 1
 A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.
 B. Construct of 18 gage carbon steel or 18 gage stainless steel, using continuous external welded joints.
 PART 3 EXECUTION
 3.01 EXAMINATION
 A. Examine drawings for the Architectural, Structural, Electrical and all other trades prior to preparation of ductwork shop drawings and prior to the fabrication of any ductwork.
 B. Resolve any conflicts encountered with the Engineer prior to fabrication.
 C. Identify on ductwork shop drawings any deviations in sizes or shapes made necessary by the obstructions of other trades.
 3.02 INSTALLATION
 A. Install in accordance with manufacturer's instructions.
 B. Duct sizes indicated are inside clear dimensions. For lined ducts, maintain sizes inside lining.
 C. Install and seal metal and flexible ducts in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.
 D. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pilot tube openings where required for testing of systems, complete with metal cap with spring device or screw to ensure against oil leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.
 E. Locate ducts with sufficient space around equipment to allow normal operation and maintenance activities.
 F. Use crimp joints with or without bead for joining round duct sizes 8 inch and smaller with crimp in direction of air flow.
 G. Use double nuts and lock washers on threaded rod supports.
 H. Connect flexible ducts to metal ducts with draw bands.
 I. Support flexible duct runs every five feet in the horizontal direction to avoid dips and sags.
 J. Connect terminal units to supply ducts with one foot maximum length of flexible duct. Do not use flexible duct to change direction.
 K. Connect diffusers to low pressure ducts directly or with 5 feet maximum length of flexible duct held in place with strap or clamp. Longer duct lengths are acceptable if depicted on the design drawings and allowed per local code. A maximum of one 90 degree bend, or equivalent, will be allowed in flexible duct runs.
 L. During construction provide temporary closures of metal or taped polyethylene on ductwork to prevent construction dust from entering ductwork system.
 M. All exposed ducts in finished areas must be completely free from all dents or imperfections in the galvanized coating and shall be sealed CAREFULLY AND NEATLY with duct sealer completely contained within the joint. Duct wrap will not be permitted in exposed locations, kitchen hood exhaust, Type 1. Use stainless steel for ductwork exposed to view and stainless steel or carbon steel for ducts where concealed.
 N. For all hood systems, perform all required regulatory duct leakage and weld tests in the presence of the code official, including but not limited to light tests and smoke tests, to demonstrate the integrity of the duct construction prior to the installation of any insulation that prevents visual inspection of the ductwork on all sides.
 O. Provide residue traps in kitchen hood exhaust ducts at base of vertical risers with provisions for clean out.
 3.03 CLEANING
 A. Clean duct system and force air at high velocity through duct to remove accumulated dust or clean with high power vacuum machines. To obtain sufficient air, connect half the system at a time. Protect equipment which may be harmed by excessive dirt with temporary filters, or bypass during cleaning.
 3.04 SCHEDULES
 A. Ductwork Material:
 1. The Contractor may use any of the following ductwork materials, at his option, provided the selected material meets with the approval of all State, local authorities and utility company requirements. Verification of compliance of the selected piping material is the sole responsibility of the installing Contractor.
 2. Low Velocity Supply (Heating Systems): Galvanized Steel, Aluminum.
 3. Return and Relief: Galvanized Steel, Aluminum.
 4. General Exhaust: Galvanized Steel, Aluminum.
 5. Outside Air Intake: Galvanized Steel.
 6. Kitchen Hood Exhaust, Type 1: Carbon Steel, Stainless Steel, Constructed per NFPA 96.
 C. Ductwork Pressure Class:
 1. Low Velocity Supply (Heating Systems): Scheduled System ESP+0.25", round up to next higher pressure class.
 2. Low Velocity Supply (Systems with Cooling): Scheduled System ESP +0.5", round up to next higher pressure class.
 3. Return and Relief: Inch.
 4. General Exhaust: Scheduled System ESP +1.0", round up to next higher pressure class.
 5. Outside Air Intake: 1 inch.
 6. Kitchen Hood Exhaust: See drawings for maximum fan static pressure plus 50% additional.
 END OF SECTION
 SECTION 233300 - AIR DUCT ACCESSORIES
 PART 1 GENERAL
 1.01 SECTION INCLUDES
 A. Air turning devices/extractors.
 B. Volume control dampers.
 C. Flexible duct connections.
 D. Duct access doors.
 PART 2 PRODUCTS
 2.01 AIR TURNING DEVICES/EXTRACTORS
 A. Manufacturers: Krueger; Ruskin Company; Titus.
 B. Multi-blade device with blades aligned in start dimension; steel or aluminum construction; with individually adjustable blades, mounting straps.
 2.02 VOLUME CONTROL DAMPERS
 A. Manufacturers: Louvers & Dampers, Inc.; Nalor Industries Inc.; Ruskin Company; Prefco Inc.
 B. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.
 C. Single Blade Damper: Fabricate for duct sizes up to 6 x 30 inch.
 D. Multi-Blade Damper: Fabricate of opposed blade pattern with maximum blade sizes 8 x 72 inch. Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable fasteners.
 E. End Bearings: Except in round ducts 12 inches and smaller, provide end bearings. On multiple blade dampers, provide all-impregnated nylon or sintered bronze bearings.
 F. The contractor shall provide either a mechanical or electrical cable operated system wherever dampers are located in non-accessible areas.
 1. Mechanical cable operator system shall be similar and equal to Young Regulator Company, "Bowden Cable Control" system including damper, flexible cable with casing and concealed ceiling regulator control.
 2. Electrically operated damper control system shall be similar and equal to United Erectech Corporation, "Power Balance" system including motor operated damper, R#-11 plenum rated casing and flush ceiling or wall mounted R#-11 jack in remote plate. Include one hand held battery pack operator knob to be delivered to the Owner upon completion of the balancing.
 2.03 FLEXIBLE DUCT CONNECTIONS
 A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.
 B. Flexible Duct Connections: Fabric crimped into metal edging strip.
 1. Fabric: UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 30 oz per sq yd.
 2. Metal: 3 inches wide, 24 gage thick galvanized steel.
 2.04 DUCT ACCESS DOORS
 A. Manufacturers: Acudar Products Inc.; Nalor Industries Inc.; Ruskin Company; SEMCO Incorporated.
 B. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.
 C. Fabrication: Rigid and close-fitting of galvanized steel with sealing gaskets and quick fastening locking devices. For insulated ducts, install minimum 1 inch thick insulation with sheet metal cover.
 1. Less Than 12 inches Square: Secure with sash locks.
 2. Up to 18 inches Square: Provide two hinges and two sash locks.
 D. Access doors with sheet metal screw fasteners are not acceptable.
 PART 3 EXECUTION
 3.01 INSTALLATION
 A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA HVAC Duct Construction Standards - Metal and Flexible. Duct construction and pressure class.
 B. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, air fire dampers, combination fire and smoke dampers, and elsewhere indicated. Provide minimum 6 x 6 inch size for hand access, 18 x 18 inch size for shoulder access, and as indicated. Provide 4 x 4 inch for balancing dampers only. Review locations prior to fabrication.
 C. Locate all dampers and control elements in accessible areas wherever possible to avoid access doors. Provide ceiling access doors for access to oil dampers and control elements located above accessible ceiling areas. Provide minimum 12 x 12 inch size for hand access, 18 x 18 inch size for shoulder access, and as indicated. Provide 4 x 4 inch for balancing dampers only. Review locations prior to fabrication.
 D. Provide balancing dampers of points on supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Install minimum 2 duct widths from duct take-off.
 E. Provide balancing dampers on duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly. Do not locate dampers closer than 5 feet or 10 duct diameters from the air terminal device, whichever is greater.
 F. At fans and motorized equipment associated with ducts, provide flexible duct connections immediately adjacent to the equipment.
 G. At equipment supported by vibration isolators, provide flexible duct connections immediately adjacent to the equipment.
 AIR PURIFICATION DEVICES
 Model: REME HALO Specifications
 LISTING: UL 1598-2008 (3rd Edition)
 FACTORY UV-PH CELL
 INSTALLATION: FAN COIL / BLOWER CABINET
 PART 1 GENERAL
 1.01 SUMMARY
 A. This section includes hydro-peroxide, Super-Oxide Ions, and Hydroxide Ion's delivered via PHI technology through packaged heating and cooling units capable of supplying 800 to 2,400 CFM of supply air to the indoor space.
 1.02 QUALITY ASSURANCE
 A. All models shall be UL listed and comply with safety standards UL 159B:2008 (3rd Edition) and CSA Standard C22.2 No. 250.0:2008.
 1.03 WARRANTY
 A. All units shall be provided with the following standard warranties:
 1. 2-year or 18,000 hours from initial startup. Notation TAD provided service life. The pH cell & UV light replacement 18,000 hour replacements are provided/installed at no cost if National TAD is providing Renew-Cx Service.
 2. This warranty shall not apply if:
 1. The equipment is not installed by a qualified installer per the manufacturer's installation instructions shipped with the product.
 2. The equipment is misused or neglected, or not maintained per the manufacturer's maintenance instructions.
 3. The equipment is not operated within its published capacity.
 4. The invoice is not paid within the terms of the sales agreement.
 PART 2 PRODUCTS
 2.01 GENERAL
 A. MULTI-ZONE one piece packaged PHI Unit-Air Purification System.
 2.02 HOUSING
 A. Unit(s) shall be constructed of aluminum structural pop-rievts. All metal shall be CNC bent for precise assembly.
 2. Duct Metallic Target
 3. UV-C bulb
 4. Electronic Enclosure (24VAC input power Jack)
 5. Magnetic mounting feet for easy placement and installation in the Blower Cabinet.
 END OF SECTION
 SECTION 233700 - AIR OUTLETS AND INLETS
 PART 1 GENERAL
 1.01 SECTION INCLUDES
 A. Rectangular ceiling diffusers.
 B. Perforated face ceiling diffusers.
 C. Grid core exhaust and return grilles.
 1.02 SUBMITTALS
 A. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Submit schedule of outlets and inlets showing type, size, location, application, accessories, and noise level.
 1.03 QUALITY ASSURANCE
 A. Test and rate air outlet and inlet performance in accordance with ASHRAE Std. 70.
 B. Test and rate lower performance in accordance with AMCA 500-1.
 C. Code requirements shall supersede any conflicting requirements of this Section.
 1.04 QUALIFICATIONS
 A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this Section, with minimum five years of documented experience.
 PART 2 PRODUCTS
 2.01 MANUFACTURERS
 A. Titus; Krueger; Price Industries; Nalor Industries Inc.; Hart & Cooley, Ruskin, Greenleaf.
 2.02 RECTANGULAR CEILING DIFFUSERS
 A. Type: Square, adjustable pattern, stamped, multi-core, or architectural plaque diffuser to discharge air in 360 degree pattern with sectoring baffles where indicated.
 B. Frame: Inverted T-bar type, in plaster ceilings, provide plaster frame and ceiling frame. (To allow lift-out removal of the diffuser without removal of the plaster frame.)
 C. Fabrication: Steel with baked enamel off-white finish.
 D. Accessories: Opposed blade damper and multi-louvered equalizing grid with damper adjustable from diffuser face.
 2.03 PERFORATED FACE CEILING DIFFUSERS
 A. Type: Perforated face with removable face.
 B. Frame: Inverted T-bar type. In plaster ceilings, provide plaster frame and ceiling frame. (To allow lift-out removal of the diffuser without removal of the plaster frame.)
 C. Fabrication: Steel with steel frame and baked enamel off-white finish.
 D. Accessories: Opposed blade damper and multi-louvered equalizing grid with damper adjustable from diffuser face.
 2.04 GRID CORE EXHAUST AND RETURN GRILLES
 A. Type: Fixed grilles of 1/2 x 1/2 x 1/2 inch louvers.
 B. Fabrication: Aluminum with factory off-white enamel finish.
 C. Frame: 1-1/4 inch margin with countersunk screw mounting.
 D. Frame: Channel lay-in frame for suspended grid ceilings where face size exceeds 18 x 18 inch.
 E. Damper (if specified on drawings): Integral, gang-operated, opposed blade type with removable key operator, operable from face.
 PART 3 EXECUTION
 3.01 INSTALLATION
 A. Install in accordance with manufacturer's instructions.
 B. Check location of outlets and inlets and make necessary adjustments in position to conform with architectural features, symmetry, and lighting arrangement.
 C. Install diffusers with air control devices.
 D. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, despite whether dampers are specified as part of the diffuser, or grille or register assembly.
 E. Paint ductwork visible behind air outlets and inlets matte black.
 END OF SECTION
 SECTION 238119 - SELF-CONTAINED AIR-CONDITIONERS
 PART 1 GENERAL
 1.01 SECTION INCLUDES
 A. Water cooled unitary packaged heat pumps.
 B. Controls.
 PART 2 PRODUCTS
 2.01 MANUFACTURERS
 A. Carrier Corporation; Trane Inc.; Climatmaster; Dakin Applied; Florida Heatpump; Waterfurner.
 2.02 AIR CONDITIONING UNITS
 A. Description: Packaged, self-contained, factory assembled, prewired unit, consisting of cabinet, compressor, condensing coil, evaporator fan, evaporator coil, air filters, and controls; fully charged with refrigerant and filled with oil.
 B. Assembly: Horizontal flow or up flow air delivery as indicated on the Drawings, in draw-through configuration as indicated.
 C. Energy Efficiency: Equal or greater than the efficiency of the equipment scheduled on the Drawings.
 2.03 CABINET
 A. Frame and Panels: Galvanized steel with baked enamel finish, easily removed access doors or panels with quick fasteners.
 B. Insulation: Minimum 1 1/2 inch thick acoustic duct liner for lining cabinet.
 C. Drain Pan: Galvanized steel with corrosion-resistant coating.
 2.04 EVAPORATOR FAN
 A. Fan: Direct or V-Belt driven, with permanently lubricated bearings, double width, double inlet, forward curved centrifugal fan, statically and dynamically balanced, resiliently mounted.
 1. Fans for units with a mechanical cooling capacity greater than or equal to 65,000 Btu/h shall have not fewer than two stages of fan control.
 B. V-Belt Drive: Cast iron or steel sheaves, dynamically balanced, bored to fit shafts and keyed. Variable and adjustable pitch motor sheave selected so required rpm is obtained with sheaves set of mid-position as recommended by manufacturer or minimum 1.5 times nonplateau rating of the motor.
 2.05 COMPRESSOR
 A. Hermetically sealed, 3500 rpm maximum, resiliently mounted with positive lubrication and internal motor protection.
 2.06 EVAPORATOR COIL
 A. Direct expansion cooling coil of seamless copper or aluminum tubes expanded into aluminum fins.
 B. Refrigerant circuit with externally equalized thermal expansion valve, filter-drier, and charging valves.
 2.07 CONDENSER
 A. Co-Axial, copper tube in copper tube or shell and tube with lined copper tubes in steel shell with water temperature controlled water regulating valve.
 B. Heat pump reversing valve.
 C. Fan: Double width, double inlet, forward curved centrifugal fan, statically and dynamically balanced, with permanently lubricated bearings.
 D. V-Belt Drive: Cast iron or steel sheaves, dynamically balanced, bored to fit shafts and keyed. Variable and adjustable pitch motor sheave selected so required rpm is obtained with sheaves set of mid-position as recommended by manufacturer or minimum 1.5 times nonplateau rating of the motor.
 2.08 AIR FILTERS
 A. Easily removed 2 inch thick disposable panel filters.
 2.09 AIR CONTROLS
 A. Factory wired controls shall include contractor, high and low pressure cutouts, internal winding thermostat for compressor, control circuit transformer, non-cycling reset relay.
 B. Provide low voltage, adjustable room thermostat to control compressor, condenser, heating coil if any and supply fan to maintain temperature setting. Include system selector switch (off-heat-auto-cool), and fan control switch (auto-on) and automatic start capabilities capable of automatically adjusting the duty cycle time of the HVAC system in order to bring each space to the desired occupied temperature immediately prior to scheduled occupancy.
 C. Provide two-position solenoid valve on the inlet water to each unit. This valve shall be interlocked with the compressor operation by the Mechanical Contractor.
 PART 3 EXECUTION
 3.01 INSTALLATION
 A. Install in accordance with manufacturer's instructions and in accordance with requirements of NFPA 90A.
 B. Provide for water cooled air conditioning equipment:
 1. On inlet provide: Ball or Butterfly Valve, Strainer, Two Position Solenoid Valve Interlocks on Compressor Operation, Pates Port, Flex Braided Hose.
 2. On outlet provide: Flex Braided Hose, Air Vent, Pates Port, Automatic Flow Control Valve, Ball or Butterfly Valve.
 C. Pipe condensate from drain pan to condensate drainage system or nearest floor drain.
 D. Replace all air filters immediately prior to turnover to the Owner and provide one set of spare filters for the Owner's use.
 END OF SECTION
 MECHANICAL SPECIFICATIONS
 SHEET NO.: M592
 DATE: 07/28/2024
 PROJECT NO.: 38541
 DRAWN: RAS
 SCALE:
 SHEET NO.:
 STORE NO.: UT #1614
 REVISIONS
 STATUS: IFC SET
 FIELD VERIFICATION:
 The Contractor shall verify all listed dimensions and conditions on the ground, site and under strict supervision, P.L.L.C. of any dimensional errors, omissions or discrepancies before beginning or resuming any work. Do not scale these drawings.
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 SHAKESHACK
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 SALT LAKE CITY, UT 84111



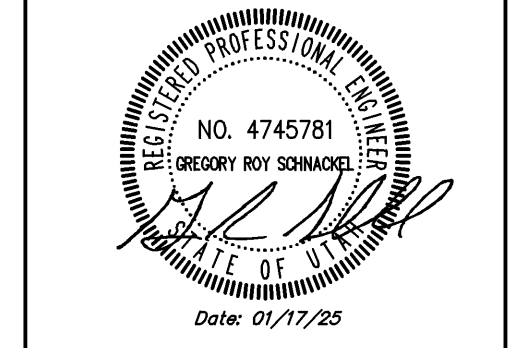
STORE NO.: UT #1614

SHAKESHACK CITY STATE STREET SUITE FC113 SALT LAKE CITY, UT 84111

REVISIONS

2024-08-06	REVISION A
2024-05-07	REVISION B
2024-02-02	REVISION C
2024-02-18	REVISION D
2025-01-17	REVISION 1

STATUS: IFC SET



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SHEET NAME: MECHANICAL SPECIFICATIONS

DATE: 07/28/2024 PROJECT NO.: 38541

DRAWN: RAS SCALE:

SHEET NO.: M592

REVISION 1

CODE: 2021 INTERNATIONAL MECHANICAL CODE

SYSTEM 1 BLOCK LOAD

ROOM #	NAME	Az AREA (FT ²)	TABLE 403.3.1.1 OCCUPANCY CATEGORY	TABLE 403.3.1.1 R _p PEOPLE OA (CFM/PERSON)	TABLE 403.3.1.1 R _a AREA OA (CFM/FT ²)	TABLE 403.3.1.1 OCCUPANT DENSITY (PERSONS/FT ²)	Pz	R ₂ 2 ₁	R ₂ 2 ₂	Vz ₁ (CFM)	TABLE 403.3.1.1.1.2 V _z (CFM)	V _z MAX SUPPLY (CFM)	V _z MIN SUPPLY (CFM)	Z _p	Calculated TABLE 403.3.1.1.2.2 E _v	
101	Cook Kitchen	98	KITCHEN (COOKING)	7.5	0.12	20	2	15	12	27	0.80	33	200	200	0.167	0.98
102	OPEN KITCHEN	159	KITCHEN (COOKING)	7.5	0.12	20	4	30	19	49	0.80	61	1600	1600	0.038	1.00
103	BACK KITCHEN	92	KITCHEN (COOKING)	7.5	0.12	20	2	15	11	26	0.80	33	1000	1000	0.033	1.00
104	FRESH KITCHEN	88	KITCHEN (COOKING)	7.5	0.12	20	2	15	11	26	0.80	32	600	600	0.083	1.00
105	DISH AREA	207	KITCHEN (COOKING)	7.5	0.12	20	5	38	25	62	0.80	78	600	600	0.130	1.00
		644						15	113	77	190	287	4000	4000	0.167	0.98

OUTDOOR AIR CALCULATIONS PER EQUATION 4-1:

SYMBOL	VALUE	DESCRIPTION
P _s	15	SYSTEM POPULATION
SP _z	15	ZONE POPULATION
D	1,000	OCCUPANT DIVERSITY
V _o	180	UNCORRECTED OUTDOOR AIR INTAKE
Z _p (max)	0.167	ZONE PRIMARY OUTDOOR AIR FRACTION (MAXIMUM)
E _v	0.98	SYSTEM VENTILATION EFFICIENCY
SV _z	4000	ZONE PRIMARY AIRFLOW
V _o	193	CODE REQUIRED OUTDOOR AIRFLOW RATE, CFM
V _o	196	DESIGN OUTDOOR AIRFLOW RATE, CFM

1 OUTSIDE AIR CALCULATIONS

Air System Sizing Summary for Block Load

Project Name: 240123hvac_HAP47_20240701154035
Prepared by: Schnackel Engineers

12/19/2024
01:07PM

Air System Information

Air System Name **Block Load**
Equipment Class **PKG ROOF**
Air System Type **SZCAV**

Number of zones **1**
Floor Area **644.0 ft²**
Location **Salt Lake City, Utah**

Sizing Calculation Information
Zone and Space Sizing Method:

Zone CFM **Peak zone sensible load**
Space CFM **Individual peak space loads**

Calculation Months **Jan to Dec**
Sizing Data **Calculated**

Central Cooling Coil Sizing Data

Total coil load **8.9 Tons**
Total coil load **107.3 MBH**
Sensible coil load **93.7 MBH**
Coil CFM at Jul 1300 **4818 CFM**
Max block CFM **4818 CFM**
Sum of peak zone CFM **4818 CFM**
Sensible heat ratio **0.873**
ft³/Ton **72.0**
BTU/(hr-ft³) **166.6**
Water flow @ 10.0 °F rise **N/A**

Load occurs at **Jul 1300**
OA DB / WB **92.0 / 75.0 °F**
Entering DB / WB **76.6 / 62.4 °F**
Leaving DB / WB **55.5 / 54.2 °F**
Coil ADP **53.2 °F**
Bypass Factor **0.100**
Resulting RH **47 %**
Design supply temp. **55.0 °F**
Zone T-stat Check **1 of 1 OK**
Max zone temperature deviation **0.0 °F**

Central Heating Coil Sizing Data

Max coil load **8.7 MBH**
Coil CFM at Des Htg **4818 CFM**
Max coil CFM **4818 CFM**
Water flow @ 20.0 °F drop **N/A**

Load occurs at **Des Htg**
BTU/(hr-ft³) **13.6**
Ent. DB / Lvg DB **70.0 / 70.0 °F**

Supply Fan Sizing Data

Actual max CFM **4818 CFM**
Standard CFM **4126 CFM**
Actual max CFM/ft² **7.48 CFM/ft²**

Fan motor BHP **0.79 BHP**
Fan motor kW **0.63 kW**
Fan static **0.60 in w/g**

2 LOAD CALCULATIONS

WSHP CONTROL MATRIX

SETPOINT/CONTROL	WSHP-1	WSHP-2	WSHP-3
SETPOINTS			
COOLING - UNOCCUPIED SETPOINT	75 F	75 F	75 F
COOLING - OCCUPIED SETPOINT	80 F	80 F	80 F
HEATING - UNOCCUPIED SETPOINT	70 F	70 F	70 F
HEATING - OCCUPIED SETPOINT	60 F	60 F	60 F
ECONOMIZER UPPER LIMIT SETPOINT	NA	NA	NA
ACCESSORIES			
HVAC SYSTEM OCCUPIED/UNOCCUPIED MODE - PROGRAMMABLE THERMOSTAT	YES	YES	YES
REMOTE TEMPERATURE SENSOR	YES	YES	YES
MOTORIZED OUTDOOR AIR DAMPER	NO	NO	NO
INTEGRATED ECONOMIZER	NO	NO	NO
ECONOMIZER FAULT DETECTION	NO	NO	NO
BAROMETRIC RELIEF	NO	NO	NO
POWERED EXHAUST RELIEF	NO	NO	NO
DEHUMIDIFICATION (HOT GAS REHEAT)	NO	NO	NO
SUPPLY FAN			
ON DURING OCCUPIED MODE	YES	YES	YES
VARIABLE VOLUME - MODULATE FAN SPEED	YES	YES	YES
SAFETIES AND INTERLOCKS			
RETURN AIR SMOKE DETECTOR	YES	YES	YES
FIRE ALARM CONTROL PANEL INTERLOCK	YES	YES	YES
KITCHEN EXHAUST SYSTEM INTERLOCK	YES	YES	YES

AIR BALANCE SCHEDULE

EQUIPMENT TAG	SUPPLY AIRFLOW (CFM)	OUTDOOR AIRFLOW (CFM)	RETURN AIRFLOW (CFM)	EXHAUST AIRFLOW (CFM)	OA/SA (%)	REMARKS
WSHP-1	1,600	75	1,525		5%	DINING
WSHP-2	1,200	60	1,140		5%	KITCHEN
WSHP-3	1,200	60	1,140		5%	REMOTE BOH
EX. EF-1*				1,940		MALL GREASE EXHAUST
TOTAL	4,000	195	3,805	1,940		
RESULTING BUILDING PRESSURIZATION = -1,745 CFM						
PRESSURIZATION PERCENTAGE = -43.6 %						

*MAKE UP AIR FOR MALL EXHAUST FAN TO BE PROVIDED BY MALL COMMONS AIR.

CARRIER EQUIPMENT SHALL BE OBTAINED THROUGH SHAKE SHACK NATIONAL ACCOUNT. CONTACT CARRIER CORPORATION FOR PROPOSALS:
KEN REVILLA
CARRIER RETAIL STRATEGIC ACCOUNTS
EMAIL: KEN.REVILLA@CARRIER.COM
PHONE: (954) 218-0070

CONDENSER WATER SUPPLY TEMPERATURE RANGE:

- o SUMMER CONDENSER WATER TEMPERATURE: 80°F TO 80°F
- o WINTER CONDENSER WATER TEMPERATURE: 60°F TO 70°F.

DESIGN TEMPERATURE CONDITIONS:

- o OUTDOOR SUMMER: 92°F WB
- o INDOOR SUMMER: 75°F DB
- o OUTDOOR WINTER: 31°F DB
- o INDOOR WINTER: 70°F DB

UV SYSTEMS

UNIT NO.	PLACEMENT	PHI CELL MODEL #	UV/CELL SIZE	RANGE	INDOOR PPM TARGET	SIZE	TRANSFORMER	POWER	IN-VOLT	OUT-VOLT	MCA	WEIGHT (LBS.)
WSHP-1	SUPPLY AIR DUCT	REME HALD	11"	800-2,400 CFM	< 0.02 PPM	13.8"W X 6.5L X 7.4"D	SHIP LOOSE	17W	110 VAC	24 VAC	0.70A	6 LBS
WSHP-2	SUPPLY AIR DUCT	REME HALD	11"	800-2,400 CFM	< 0.02 PPM	13.8"W X 6.5L X 7.4"D	SHIP LOOSE	17W	110 VAC	24 VAC	0.70A	6 LBS
WSHP-3	SUPPLY AIR DUCT	REME HALD	11"	800-2,400 CFM	< 0.02 PPM	13.8"W X 6.5L X 7.4"D	SHIP LOOSE	17W	110 VAC	24 VAC	0.70A	6 LBS

DIFFUSERS, GRILLES AND REGISTERS

MARK	SERVICE	LOCATION	CEILING TYPE	MOUNTING TYPE	MANUFACTURER	MODEL NUMBER	REMARKS
D-1	SUPPLY	CEILING	AC TILE	LAY-IN	TITUS	TMS XX 24x24 3 26	1,2,5
D-2	SUPPLY	CEILING	AC TILE	LAY-IN	TITUS	PAR XX 24x24 3 26	1,2,5
G-1	RETURN	CEILING	AC TILE	LAY-IN	TITUS	SOF X X 3 26	1,3-5

REMARKS:
1. TITUS IS THE BASE OF DESIGN. KRUEGER, PRICE, NAILOR, CARNES ARE EQUAL. NO EXCEPTIONS.
2. SEE PLAN FOR NECK SIZE.
3. PROVIDE 1/2" X 1/2" X 1" CORE.
4. SEE PLAN FOR SIZE.
5. DIFFUSERS SHALL BE FINISHED TO MATCH CEILING/WALL/EXPOSED DUCT COLOR. COORDINATE WITH ARCHITECT.

WATER SOURCE HEAT PUMPS

MARK	COOLING		HEAT		FLUID		SUPPLY AIR		ELECTRICAL		EER	COP	CARRIER MODEL NUMBER	REMARKS	
	SEN (MBH)	TOT (MBH)	TOT (MBH)	FLOW (GPM)	F.D. (FT H2O)	AIR (CFM)	S.P. (IN)	FAN kW	VOLT	PH					MCA
WSHP-1	34.9	48.0	58.3	12.0	6.6	1,600	0.70	759	460	3	11.0	13.95	4.65	50PCH049	1-8
WSHP-2	27.4	36.6	39.6	9.0	12.7	1,200	0.60	476	460	3	9.0	14.30	4.65	50PCH036	1-8
WSHP-3	27.4	36.6	39.6	9.0	12.7	1,200	0.60	476	3	9.0	15	14.30	4.65	50PCH036	1-8

CARRIER IS THE BASIS OF DESIGN. NO EXCEPTIONS.
- SUMMER CONDENSER WATER TEMPERATURE: 80°F TO 90°F
- WINTER CONDENSER WATER TEMPERATURE: 60°F TO 70°F.

REMARKS:
1. PROVIDE EQUIPMENT WITH SCOR GREATER THAN THE AVAILABLE FAULT CURRENT AT THE EQUIPMENT OR UPSTREAM PANELBOARD. REFER TO THE ELECTRICAL ONE LINE DIAGRAM AND PANEL SCHEDULES FOR AVAILABLE FAULT CURRENT AT UPSTREAM PANELBOARD.
2. SEE PLAN FOR AIRFLOW CONFIGURATION.
3. COOLING CAPACITY BASED ON: 80.6°F DB / 66.2°F WB INDOOR ENTERING AIR, 85°F DB ENTERING WATER.
4. HEATING CAPACITY BASED ON: 68°F DB / 59°F WB INDOOR ENTERING AIR, 65°F DB ENTERING WATER.
5. PROVIDE RUBBER VIBRATION ISOLATORS FOR MOUNTING FROM STRUCTURE AND 1 INCH FILTERS.
6. PROVIDE TWO POSITION SOLENOID VALVE.
7. PROVIDE WATER LEVEL MONITORING DEVICE IN DRAIN PAN TO SHUT OFF UNIT IF THE DRAIN LINE BECOMES RESTRICTED.
8. PROVIDE WITH PRIMARY AND AUXILIARY CONDENSATE DRAIN PAN.

VARIABLE AIR VOLUME TERMINALS

MARK	SERVES	COOL COOL (CFM)	HEAT COOL (CFM)	HEAT MAX (CFM)	RAD SOUND (NC)	DIS SOUND (NC)	HEATING COIL			MANUFACTURER	MODEL NUMBER	REMARKS	
							KW	STEP	VOLT				PH
VAV-1	WSHP-1,-2,-3	200	200	200	22	26	NA	NA	NA	NA	CARRIER	35E	1-3

REMARKS:
1. PROVIDE 24 VOLT CONTROL TRANSFORMER.
2. PROVIDE WITH AUTOMATIC THERMAL CUTOFF, MANUAL RESET, AIRFLOW SWITCH, MAGNETIC CONTACTOR, AND DISCONNECT SWITCH.
3. PROVIDE UNIT WITH DDC CONTROLS AS REQUIRED FOR INTERFERENCE WITH MALL BUILDING MANAGEMENT SYSTEM. FIELD VERIFY.



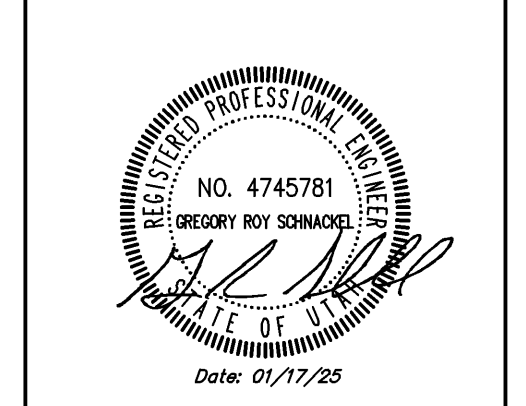
STORE NO:
UT #1614

SHAKE SHACK
CITY CREEK CENTER
28 S. STATE STREET, SUITE FC113
SALT LAKE CITY, UT 84111

REVISIONS

NO.	DATE	REVISION
Δ	2024-08-06	REVISION A
Δ	2024-05-07	REVISION B
Δ	2024-02-02	REVISION C
Δ	2024-02-18	REVISION D
Δ	2025-01-17	REVISION E

STATUS:
IFC SET

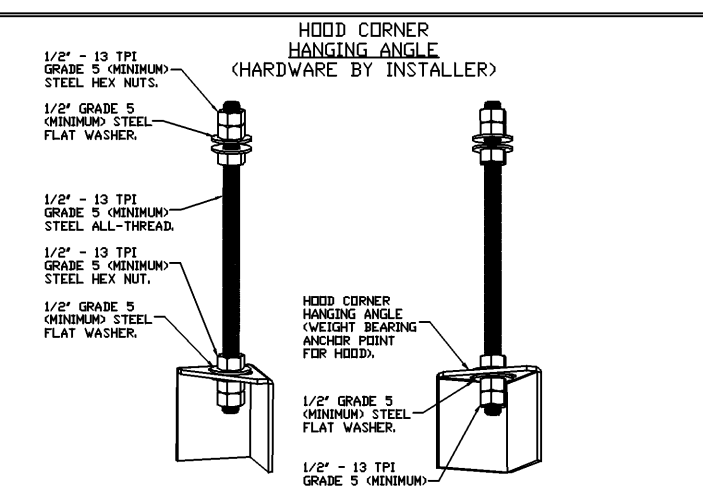


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SHEET NAME:
MECHANICAL SCHEDULES

DATE: 07/28/2024 PROJECT NO: 38541
DRAWN: RAS SCALE:

SHEET NO.:
M601



HOOD STYLE / MODEL	450 DEGREES cfm/ft.	600 DEGREES cfm/ft.	700 DEGREES cfm/ft.
CANOPY ND-2	150	200	250
CANOPY ND-2 W/ END PANELS	105	140	175
SLOPED SND-2	228	294	-
ISLAND ND-2WI	269	300	350
ISLAND ND-2I	346	422	475

ETL HOOD LISTING DETAIL	
EXHAUST CFM = LENGTH OF HOOD X CFM/LIN.FT. (LOAD)	
SUPPLY CFM = EXHAUST CFM X PERCENTAGE REQUIRED	
TOTAL DUCT AREA (sq. in.) = 144 X (CFM) ² / (FPM) ³	
DUCT LENGTH = TOTAL DUCT AREA / DUCT WIDTH	

CALCULATIONS UTILIZED
CAPTIVE-AIRE HOODS BUILT IN COMPLIANCE WITH:

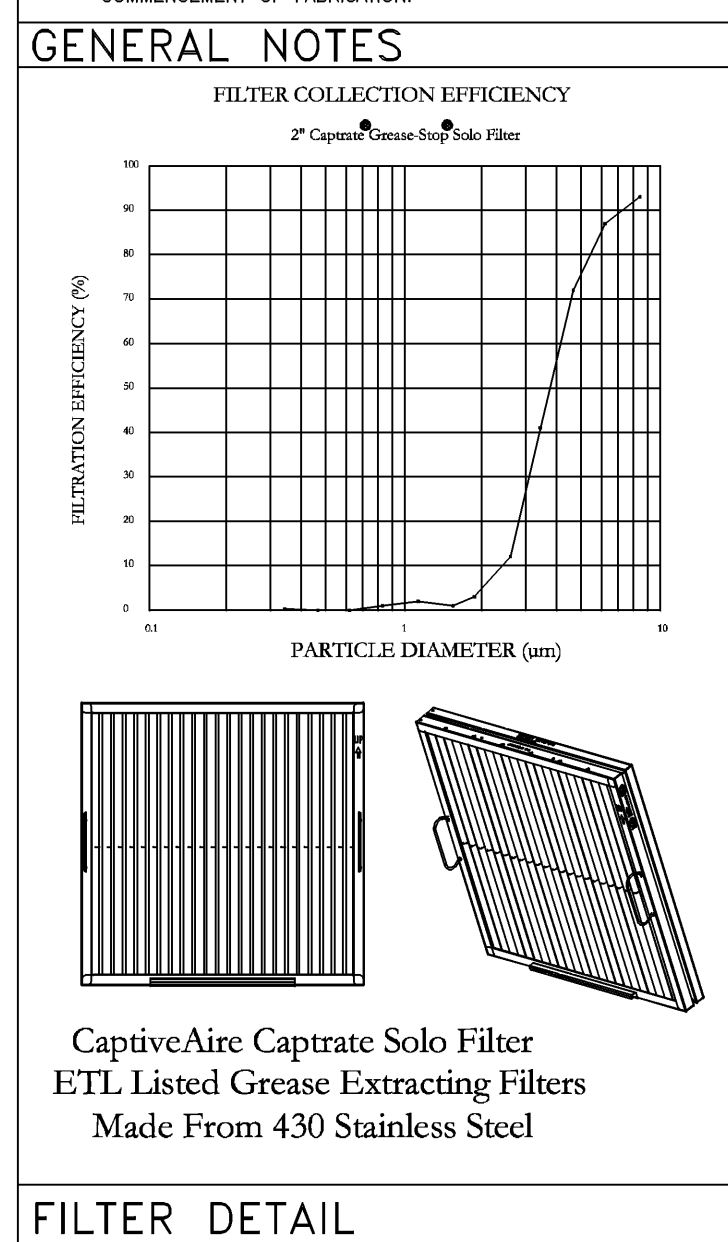
3054804-001
3054804-002
Listed under ETL File number 3054804-001/002

BUILDING CODES

CAPTIVE-AIRE HOODS HAVE OPTIONAL CLEARANCE REDUCTION SYSTEMS AVAILABLE AS FOLLOWS:

MATERIAL	CLEARANCE REDUCTION SYSTEM
NON-COMBUSTIBLE	NONE REQUIRED
LIMITED-COMBUSTIBLE	3" UNINSULATED STANDOFF
COMBUSTIBLE	1" INSULATED STANDOFF

- CLEARANCE TO COMBUSTIBLES**
- INSTALLATION**
- ALL ELECTRICAL "FIELD" CONNECTIONS AND RELATED INTERCONNECTIONS BY ELECTRICAL CONTRACTORS
 - ALL PLUMBING "FIELD" CONNECTIONS AND RELATED INTERCONNECTIONS BY PLUMBING CONTRACTORS
 - HANGING BRACKETS LOCATED AND WELDED AS SHOWN ON PLANS. ALL OTHER HANGER MATERIALS PROVIDED BY INSTALLING CONTRACTORS
 - ALL CONNECTIONS FROM CAPTIVEAIRE HOOD PER MECHANICAL CONTRACTOR'S PLANS
 - COOKING EQUIPMENT TO SHUT OFF IN EVENT OF FIRE
 - EXHAUST FANS TO TURN ON IN EVENT OF FIRE
 - ALL LIGHT FIXTURES SHOWN INSTALLED BY CAPTIVEAIRE ARE FACTORY PROVIDED. INTERCONNECTIONS BETWEEN HOODS AND TO SWITCHES ARE BY ELECTRICAL CONTRACTOR
 - LAMPS FOR LIGHT FIXTURES BY INSTALLING CONTRACTORS
 - SEISMIC RESTRAINTS ARE RESPONSIBILITY OF INSTALLING CONTRACTOR
 - INSTALLING CONTRACTORS ASSUME ALL RELATED RESPONSIBILITY FOR VERIFICATION OF DIMENSIONAL DATA CONTAINED ON THESE DOCUMENTS FOR ACCURACY, INTEGRATION, AND ADMINISTRATION OF CODE REQUIREMENTS IN EFFECT PRIOR TO ANY RELEASE FOR PRODUCTION OF EQUIPMENT SHOWN.
- BALANCE**
- KITCHEN HOODS MUST BE BALANCED WITH KITCHEN
 - KITCHEN SHALL BE NEGATIVE WITH RESPECT TO DINING AREA
 - RESTAURANT SHALL BE POSITIVE WITH RESPECT TO AMBIENT PRESSURE
- ADDITIONAL**
- WRITTEN HOOD DIMENSIONS HAVE PRECEDENCE OVER SCALE
 - SIGNED AND "APPROVED" COPIES OF THIS DOCUMENT MUST BE RECEIVED BY THE FACTORY PRIOR TO COMMENCEMENT OF FABRICATION



FILTER DETAIL

FOR QUESTIONS, CALL THE
Eastern PA Mechanical
REGION 108
PHONE: (267) 504 - 4126
EMAIL: reg108@captiveaire.com

HOOD INFORMATION - JOB#6940111

HOOD NO	TAG	MODEL	MANUFACTURER	LENGTH	MAX COOKING TEMP	TYPE	APPLIANCE DUTY	DESIGN CFM/FT	TOTAL EXH CFM	EXHAUST PLENUM RISER(S)				HOOD CONSTRUCTION	HOOD CONFIG			
										WIDTH	LENG	HEIGHT	DIA		CFM	VEL	SP	END TO END
1	Hood Left	5430 ND-2	CAPTIVEAIRE	6' 6"	450 DEG	I	MEDIUM	150	975	10"	9"	4"	975	1560	-0.413'	430 SS WHERE EXPOSED	LEFT	ALONE
2	Hood Right	5430 ND-2	CAPTIVEAIRE	6' 5"	450 DEG	I	MEDIUM	150	962	10"	9"	4"	962	1539	-0.402'	430 SS WHERE EXPOSED	RIGHT	ALONE

HOOD INFORMATION

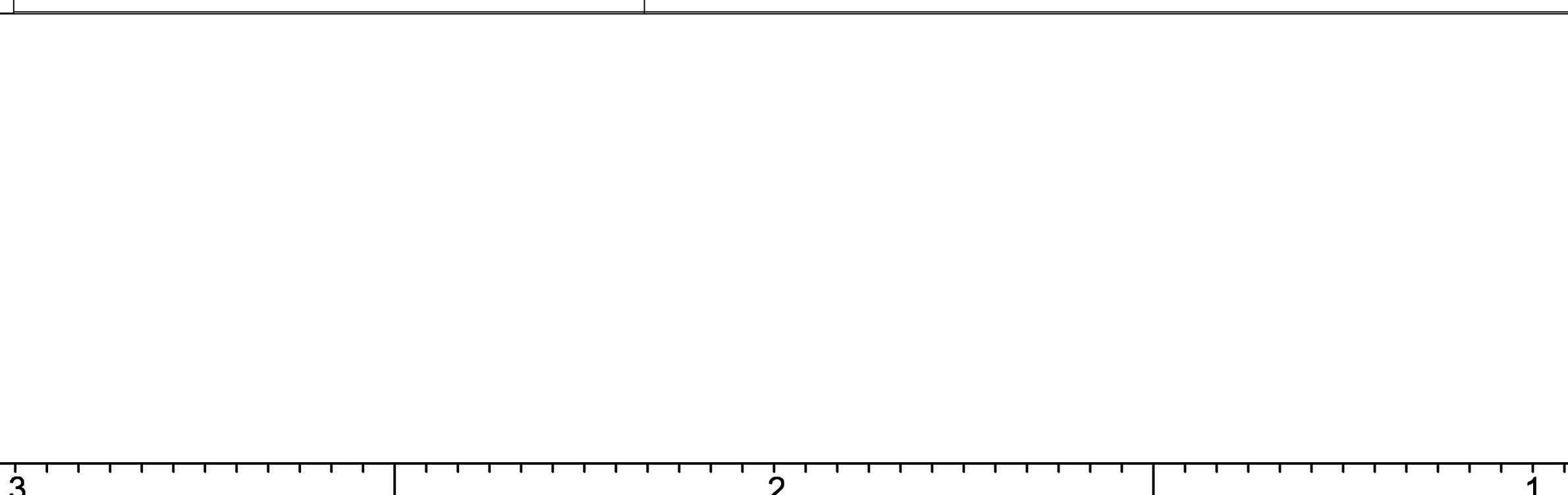
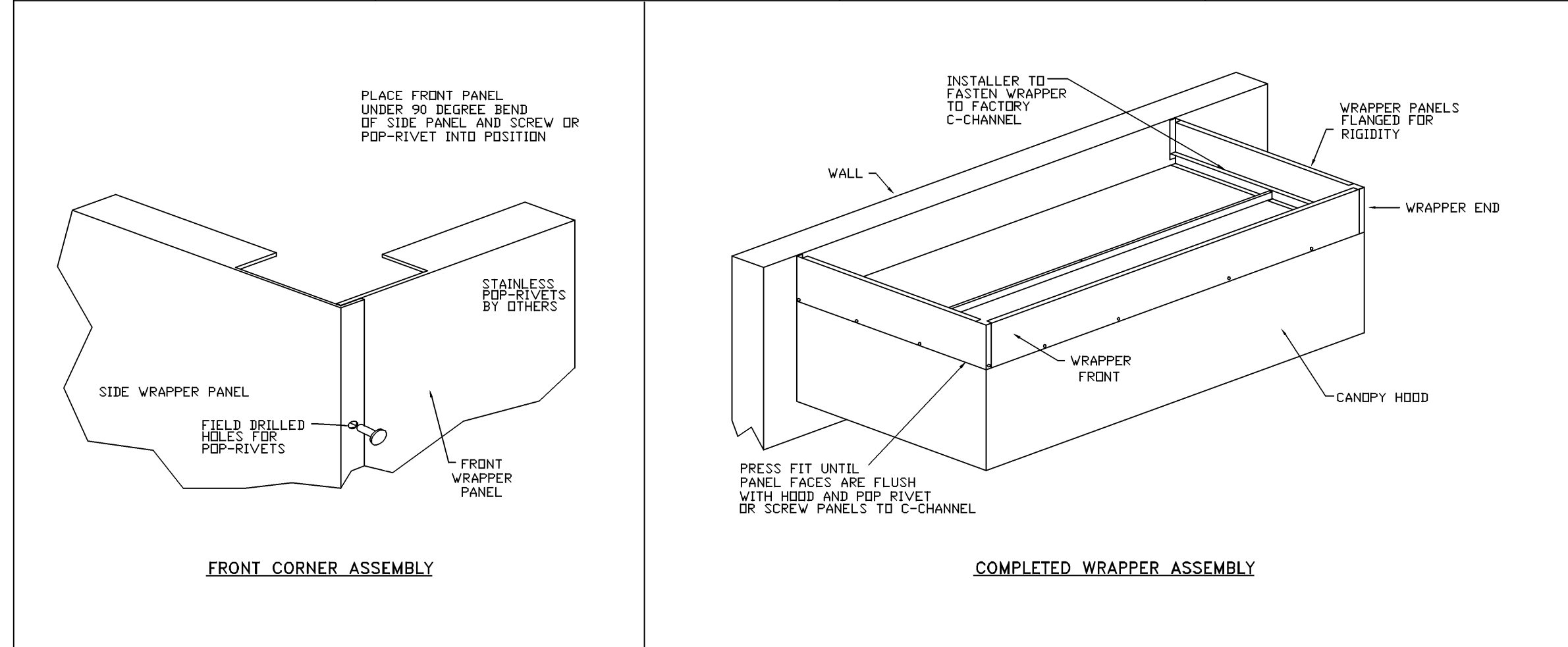
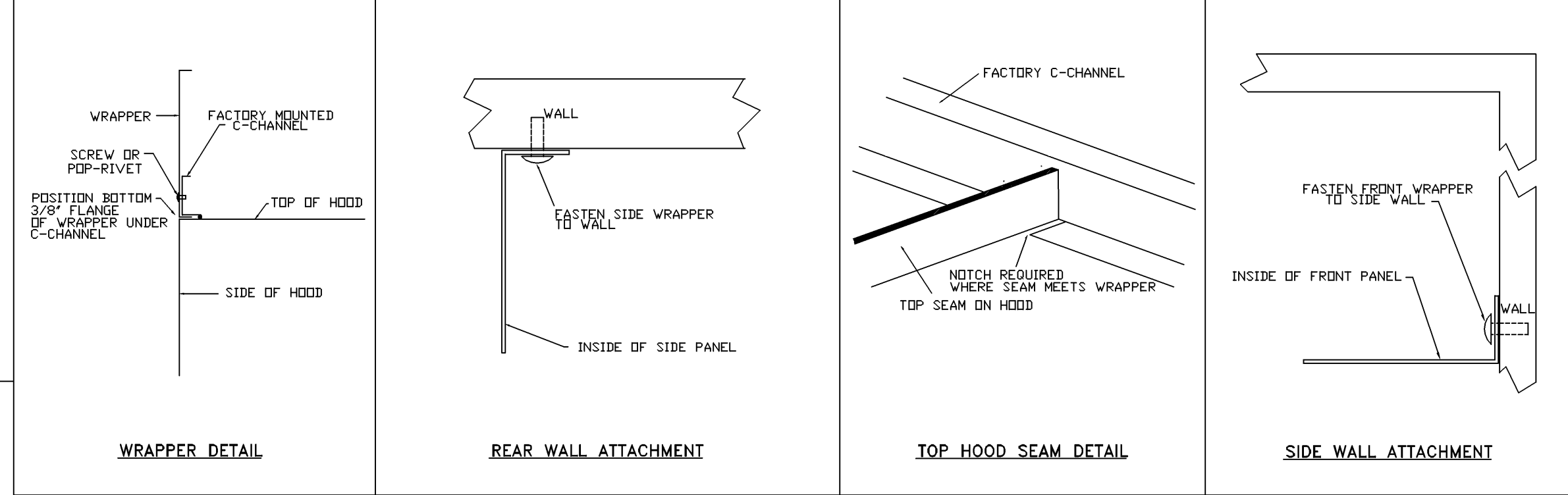
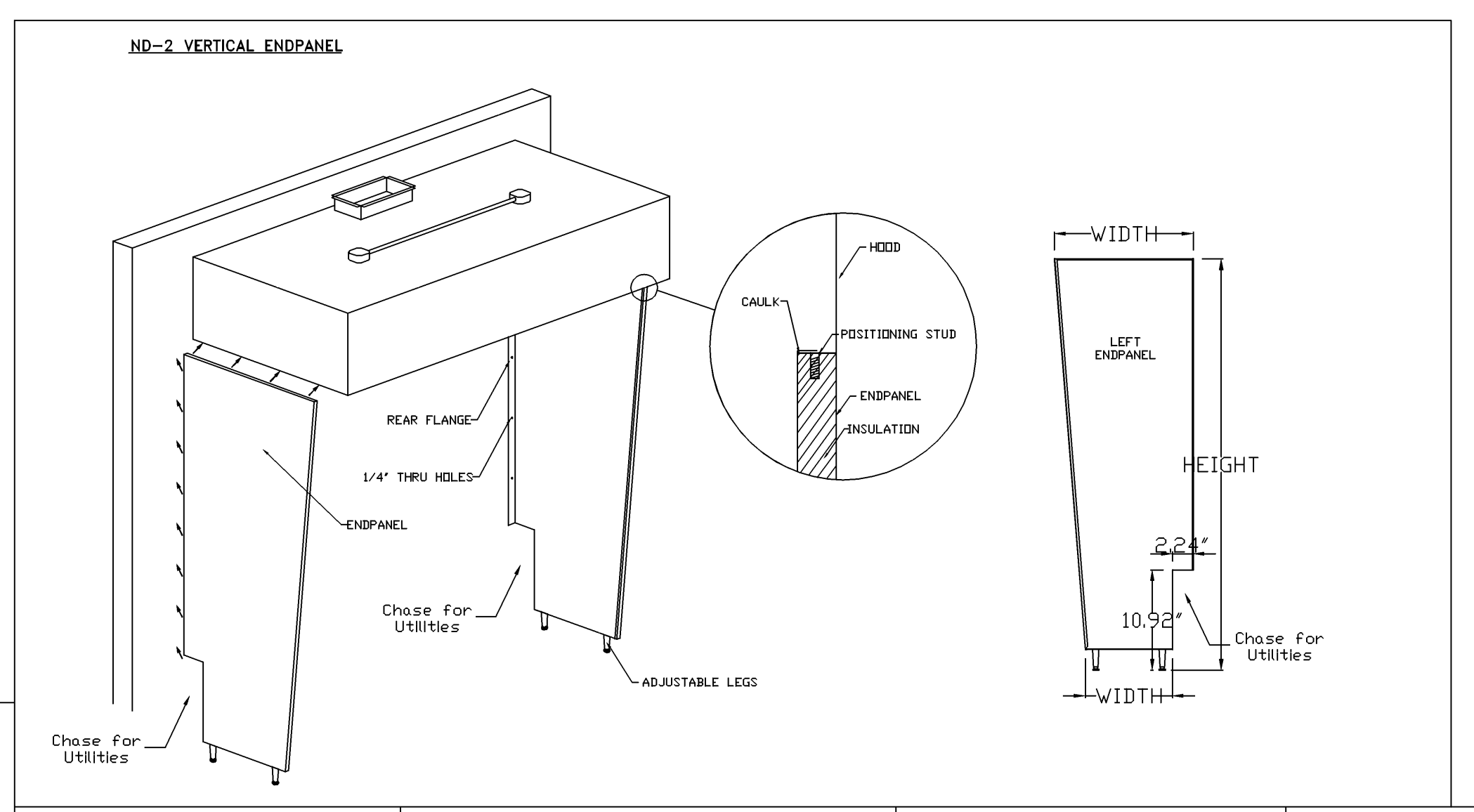
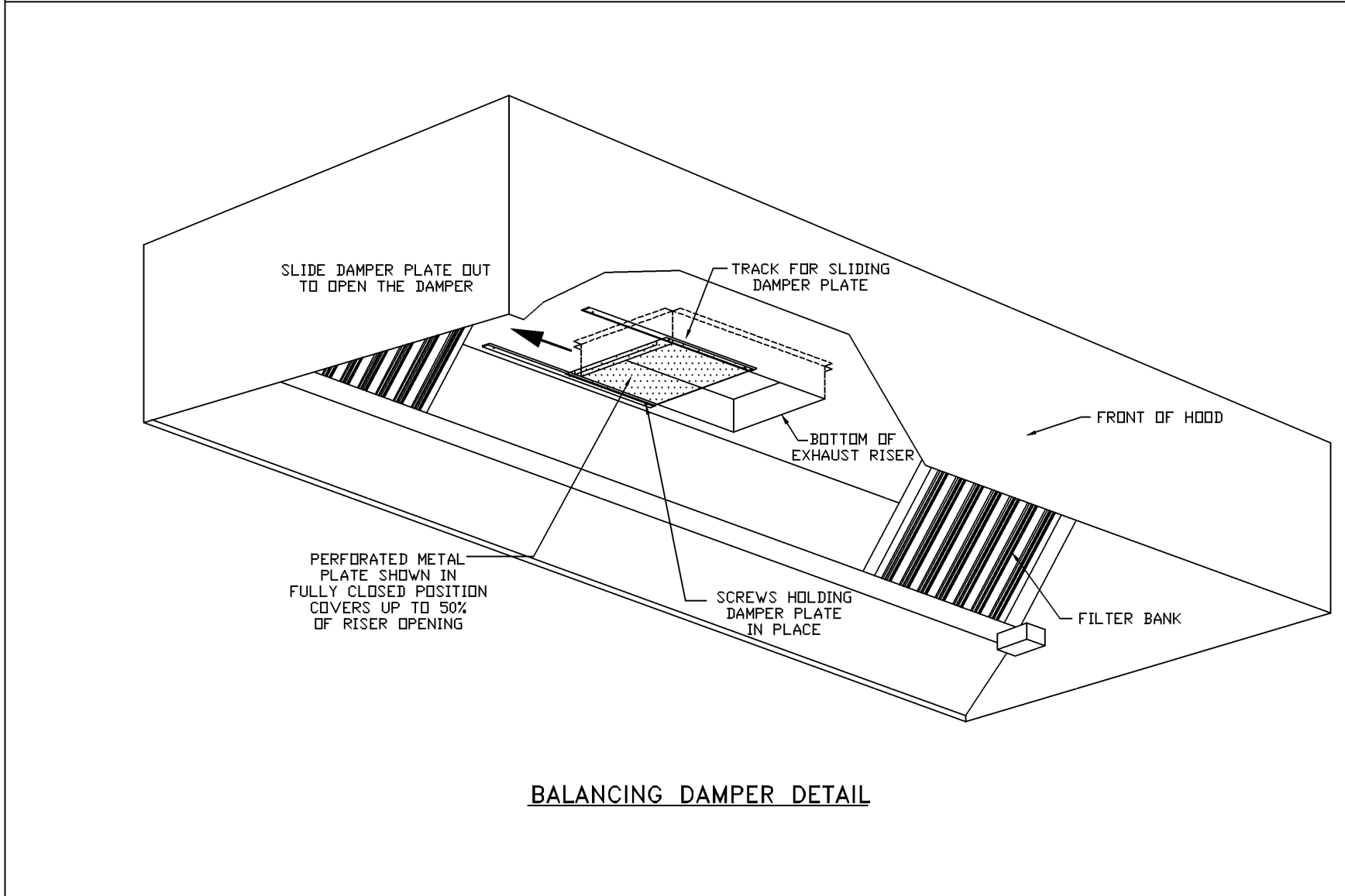
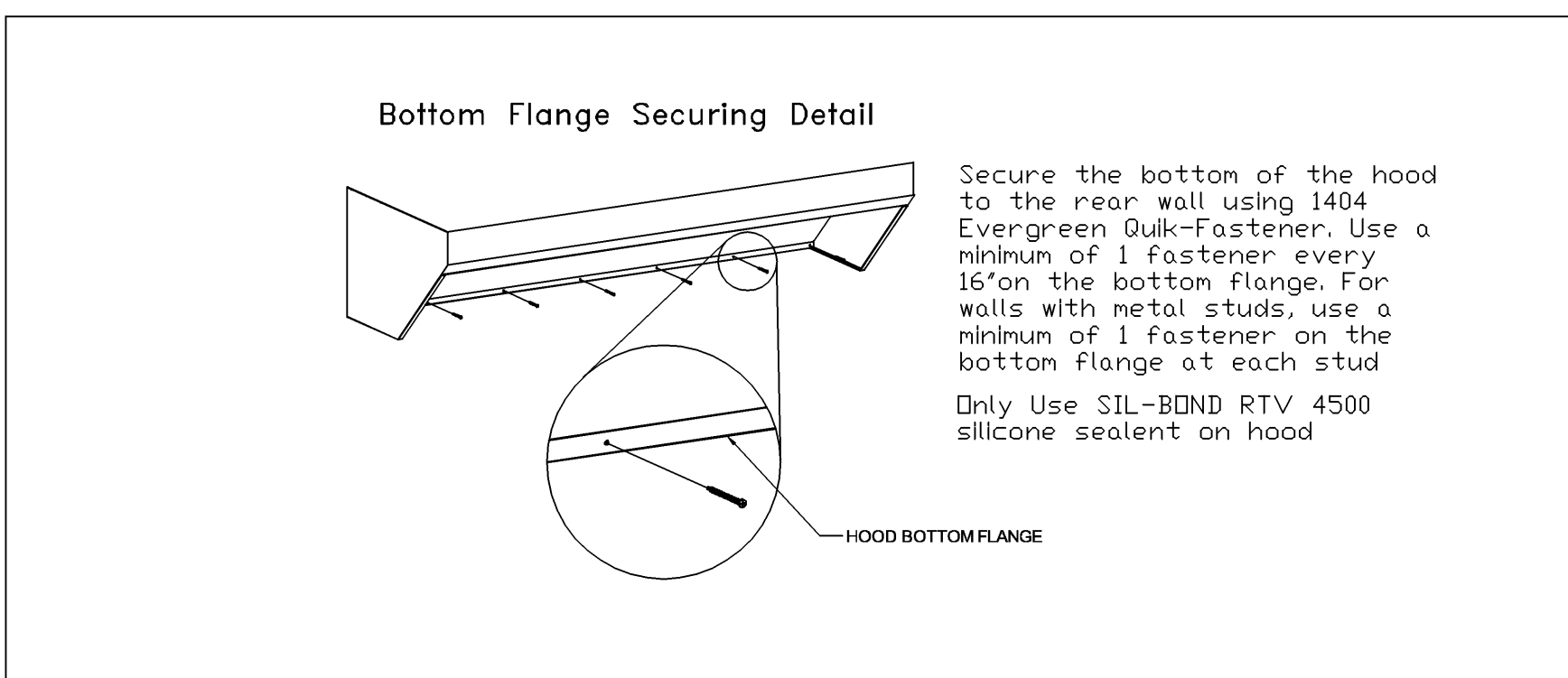
HOOD NO	TAG	TYPE	FILTER(S)			EFFICIENCY @ 7 MICRONS	QTY	LIGHT(S)		WIRE GUARD	LOCATION	SIZE	UTILITY CABINET(S)			FIRE SYSTEM PIPING	HOOD HANGING WEIGHT
			QTY	HEIGHT	LENGTH			TYPE	SIZE				FIRE SYSTEM	ELECTRICAL	SWITCHES		
1	Hood Left	CAPTRATE SOLD FILTER	4	20"	16"	85% SEE FILTER SPEC	2	RECESSED ROUND	NO						YES	377 LBS	
2	Hood Right	CAPTRATE SOLD FILTER	4	20"	16"	85% SEE FILTER SPEC	2	RECESSED ROUND	NO						YES	374 LBS	

HOOD OPTIONS

HOOD NO	TAG	OPTION
1	Hood Left	FIELD WRAPPER 18.00' HIGH FRONT, LEFT. LEFT END STANDOFF (FINISHED) 1' WIDE 54" LONG INSULATED. BALANCE DAMPERS. INSULATION FOR BACK OF HOOD. RISER SENSOR INSTALL 6IN PLEN. LEFT WALL AS END PANEL.
2	Hood Right	FIELD WRAPPER 18.00' HIGH FRONT, RIGHT. RIGHT END STANDOFF (FINISHED) 1' WIDE 54" LONG INSULATED. BALANCE DAMPERS. INSULATION FOR BACK OF HOOD. RISER SENSOR INSTALL 6IN PLEN. RIGHT WALL AS END PANEL.

WALL-MOUNT UTILITY CABINET

HOOD NO	LOCATION	SIZE	UTILITY CABINET(S)			WEIGHT
			TYPE	SIZE	ELECTRICAL	
1	WALL MNT	12"x48"x24"	TANK FS	4.0/4.0/4.0		400.00 LBS



REVISIONS

NO.	DESCRIPTION	DATE
1		
2		
3		
4		

CAPTIVEAIRE

Eastern PA Mechanical
225 E City Line Avenue, Suite #103, Balls Blompyd, PA, 19004 PHONE: (267) 504 - 4126 EMAIL: reg108@captiveaire.com

Shake Shack-1614-City Creek-UT(Kitchen)-RI
SALT LAKE CITY, UT, 84111

DATE: 7/25/2024
DWG.#: 6940111
DRAWN BY: Joe.shiloo
SCALE: 3/4" = 1'-0"
MASTER DRAWING

SHEET NO. 1

zebra
ZEBRA ARCHITECTURE, PLLC
14614 N KIERLAND BLVD., SUITE N300
SCOTTSDALE, ARIZONA 85254
PHONE: 480.912.1169 zbrglobal

Schnackel engineers
100-581-0963 www.schnackel.com

STORE NO: **UT #1614**

SHAKE SHACK
CITY CREEK CENTER
28 S. STATE STREET SUITE FC113
SALT LAKE CITY, UT 84111

REVISIONS

NO.	REVISION A	REVISION B	REVISION C	REVISION D	REVISION E
1					
2					
3					
4					

STATUS: IFC SET

PROFESSIONAL SEAL
NO. 4745781
DATE: 01/17/25

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SHEET NAME: **CAPTIVEAIRE DRAWINGS**

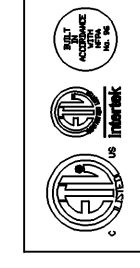
DATE: 07/28/2024 PROJECT NO: 38541

DRAWN: RAS SCALE:

SHEET NO: **M701**

REVISIONS	
DESCRIPTION	DATE

CAPTIVE



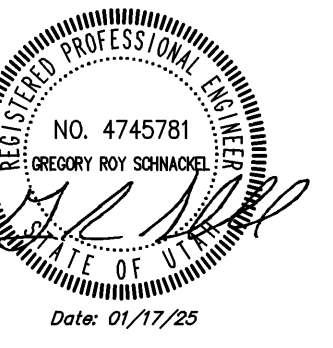
Eastern, PA Mechanical
225 E City Line Avenue, Suite #103, Balls Blwyd, PA, 19004 PHONE: (287) 504-4128 EMAIL: reg.08@captheatre.com

Shake Shack-1614-City Creek, UT(Kitchen)-RI
SALT LAKE CITY, UT, 84111

DATE: 7/25/2024
DWG.#: 6940111
DRAWN BY: Joe.shiloo
SCALE: 3/4" = 1'-0"
MASTER DRAWING
SHEET NO. 2

REVISIONS	
NO.	DESCRIPTION

STATUS: IFC SET

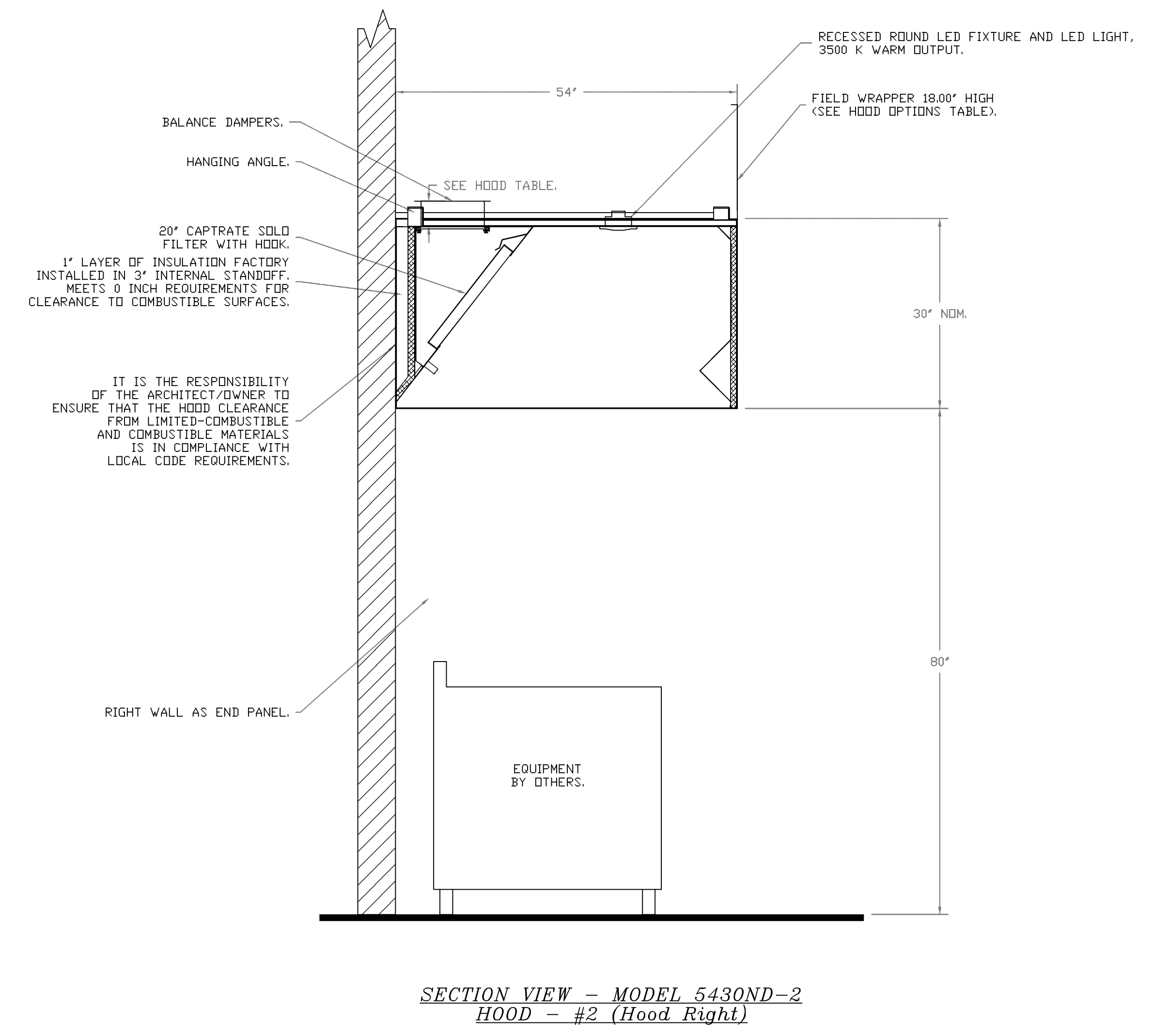
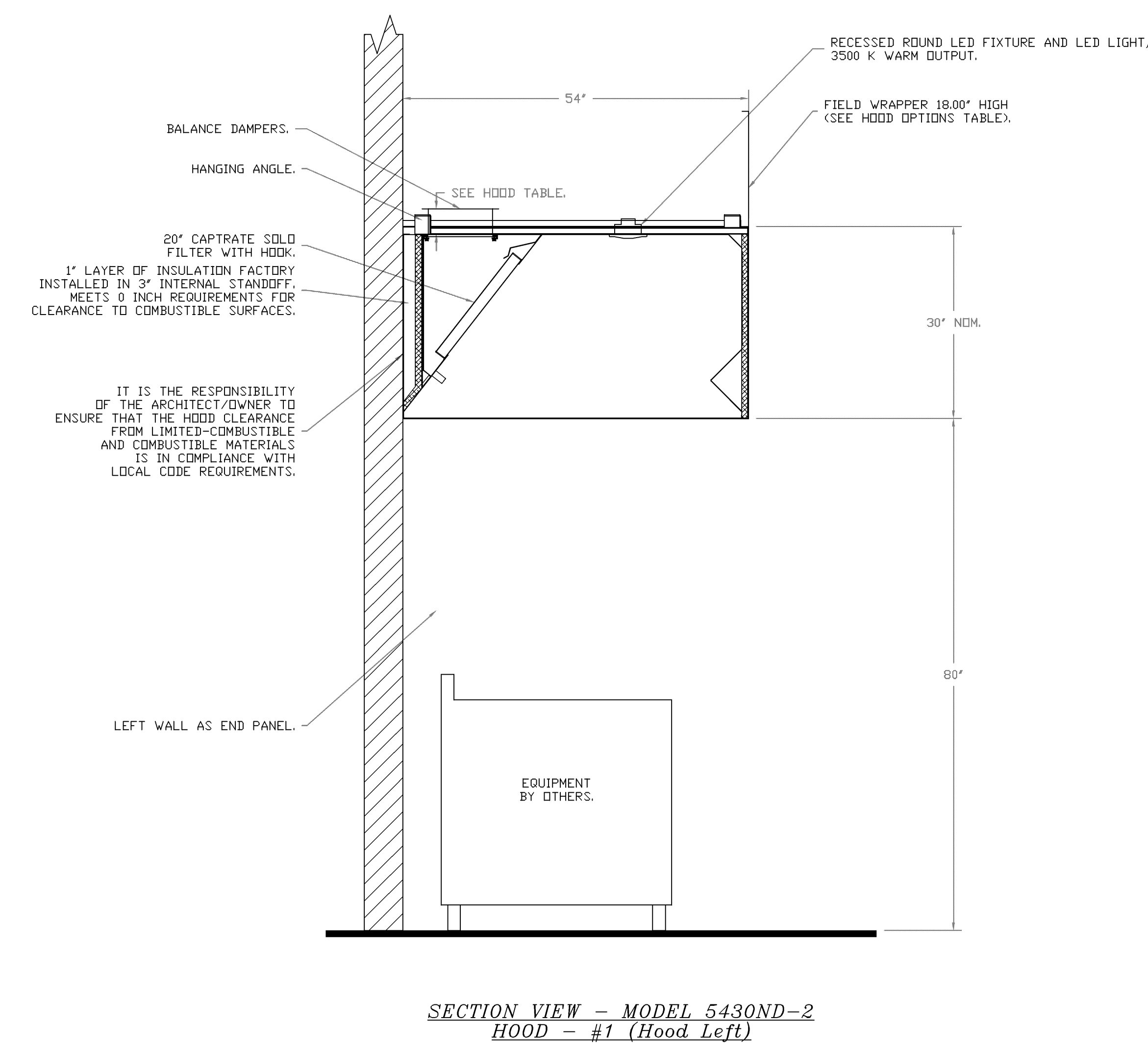
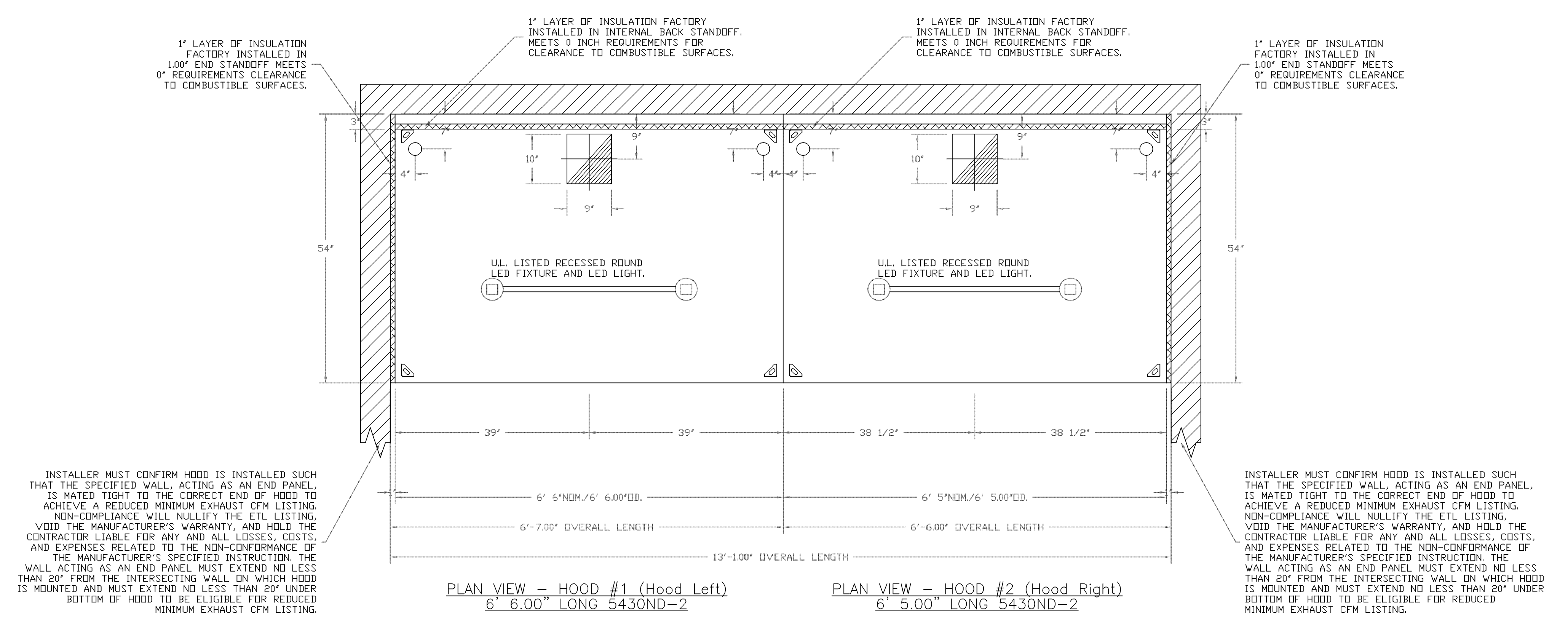


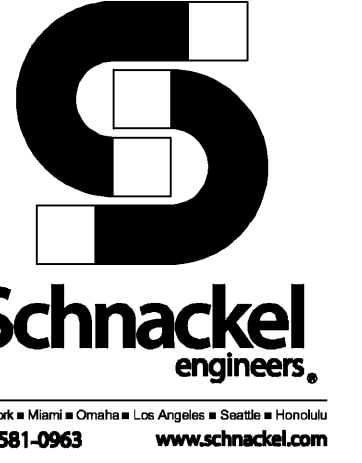
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SHEET NAME: CAPTIVEAIRE DRAWINGS

DATE: 07/28/2024 PROJECT NO.: 38541
DRAWN: RAS SCALE:

SHEET NO.: M702



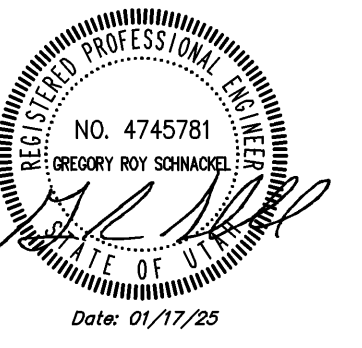


STORE NO:
UT #1614

SHAKE SHACK
CITY CREEK CENTER
28 S. STATE STREET SUITE FC113
SALT LAKE CITY, UT 84111

REVISIONS	
NO.	DESCRIPTION
1	2024-08-01 REVISION A
2	2024-05-07 REVISION B
3	2024-02-02 REVISION C
4	2024-12-18 REVISION D
5	2025-01-17 REVISION E

STATUS:
IFC SET



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SHEET NAME:
CAPTIVEAIRE DRAWINGS

DATE: 07/28/2024 PROJECT NO: 38541
DRAWN: RAS SCALE:

SHEET NO.:
M703

REVISIONS	
DESCRIPTION	DATE

CAPTIVEAIRE
Eastern, PA Mechanical
225 E City Line Avenue, Suite #103, Balls Blwyd, PA, 19004 PHONE: (287) 504-4128 EMAIL: reg.08@captheaire.com

Shake Shack-1614-City Creek, UT(Kitchen)-RI
SALT LAKE CITY, UT, 84111

DATE: 7/25/2024

DWG.#: 6940111

DRAWN BY: Joe.shiloo

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

SHEET NO.
3

FIRE SYSTEM INFORMATION - JOB#6940111

FIRE SYSTEM NO	TAG	TYPE	SIZE	MAX FP	DESIGN FP	INSTALLATION	
						SYSTEM	LOCATION ON HOOD
1		TANK FS	4.0/4.0/4.0	60	46	WALL UTILITY CABINET LEFT	N/A

GAS VALVE(S)

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

NOTES

- FIELD PIPE DROPS AS SHOWN
- PIPING, ELBOWS, TEES, AND NOZZLES SUPPLIED BY CAS.
- FIELD INSTALLED DROP: FACTORY WILL PROVIDE QTY 2 60IN LONG PIECES OF CHROME PLATED PIPING SHIPPED LOOSE TO BE FIELD-INSTALLED.
- SHIP LOOSE DROP: FACTORY WILL PROVIDE THE EXACT CHROME PIPE LENGTH NEEDED SHIPPED LOOSE TO BE FIELD-INSTALLED.
- RELOCATE NOZZLES IF FLOW PATTERN IS BLOCKED BY SHELVEING, SALAMANDERS, ETC.
- OVERLAPPING COVERAGE SHALL NOT BE USED ON ANY APPLIANCE WITH AN OBSTRUCTION.
- IF APPLICABLE, EXTENDED PRE-PIPED DROPS ARE SHIPPED LOOSE.
- FACTORY PIPING EXTENDS A MAXIMUM OF 6' ABOVE THE TOP OF THE HOOD.
- APPLIANCE DIMENSIONS LISTED REPRESENT THE COOKING SURFACE SIZE, NOT THE OVERALL APPLIANCE SIZE.
- THIS FIRE SYSTEM COMPLIES WITH U.L. 300 REQUIREMENTS.
- DL-F NOZZLE PART NUMBER REPLACES 3070-3/8H-10-SS
- JOB #: 6940111.
- JOB NAME: SHAKE SHACK-1614-CITY CREEK,UT(KITCHEN)-RI.

SYSTEM SIZE: TANK-SP-3-WC DESIGN FP: 46. MAXIMUM FP: 60.
HOOD # 1 6' 6.00" LONG x 54" WIDE x 30" HIGH.
RISER # 1 SIZE: 10" x 9".
HOOD # 1 METAL BLOW-OFF CAPS INCLUDED.
HOOD # 2 6' 5.00" LONG x 54" WIDE x 30" HIGH.
RISER # 1 SIZE: 10" x 9".
HOOD # 2 METAL BLOW-OFF CAPS INCLUDED.

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

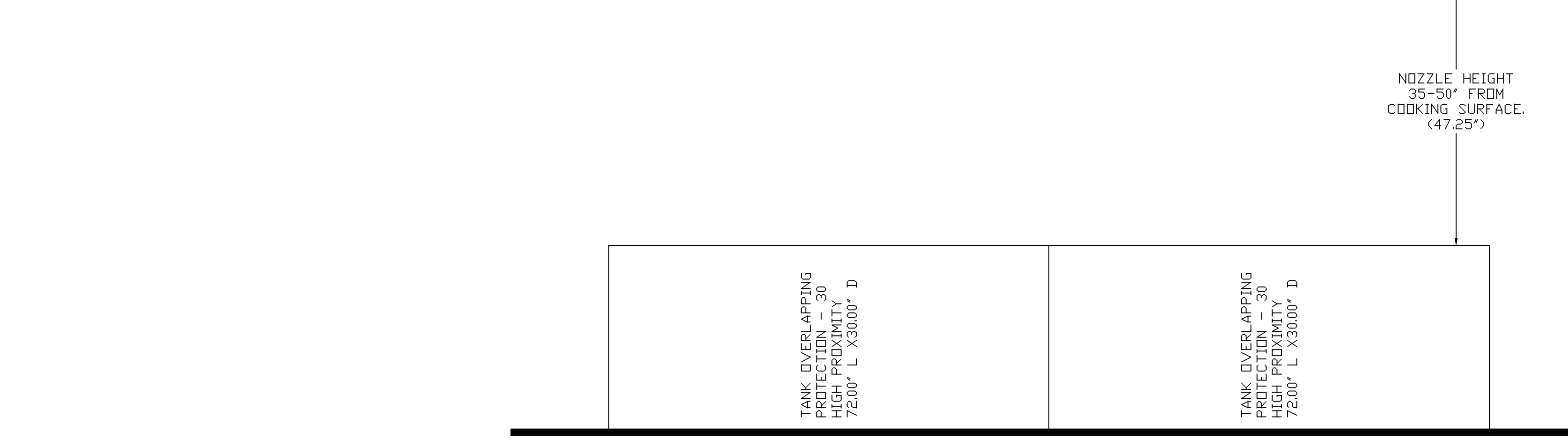
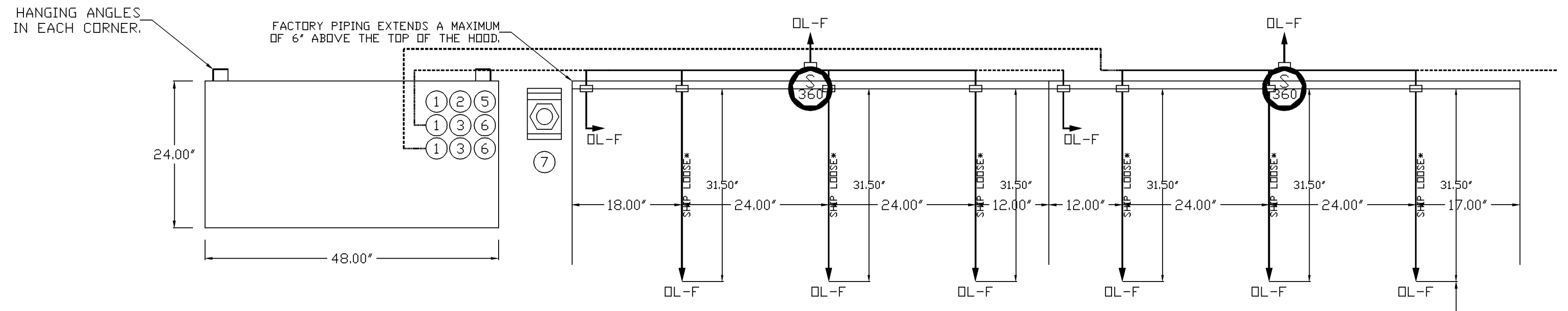
AGENT DISTRIBUTION PIPING LIMITATIONS

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

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

LEGEND - FIRE CABINET TANK SYSTEM

- 4 GALLON TANK.
- PRIMARY ACTUATOR RELEASE.
- SECONDARY ACTUATOR RELEASE.
- PRESSURE SUPERVISION SWITCH.
- PRIMARY HOSE ASSEMBLY.
- SECONDARY HOSE ASSEMBLY.
- REMOTE MANUAL ACTUATION DEVICE.



TANK OVERLAPPING PROTECTION - 30 HIGH PROXIMITY 72.00' L X 30.00" D

TANK OVERLAPPING PROTECTION - 30 HIGH PROXIMITY 72.00' L X 30.00" D

E
D
C
B
A

REVISIONS table with columns for DESCRIPTION and DATE.

CAPTIVE logo and vertical text.

Shake Shack-1614-City Creek UT(Kitchen)-RI
SALT LAKE CITY, UT, 84111

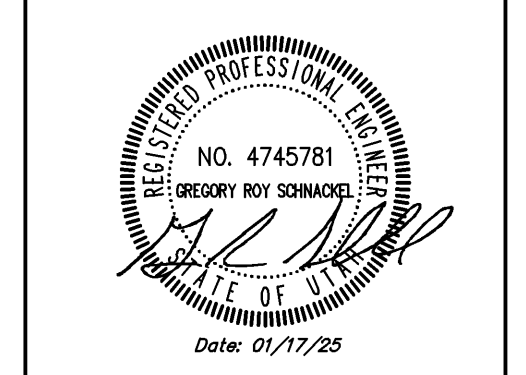
DATE: 7/25/2024
DWG.#: 6940111
DRAWN BY: Joe.s.hilloa

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

SHEET NO. 4

REVISIONS table with columns for REVISION A through E, including dates and descriptions.

STATUS: IFC SET



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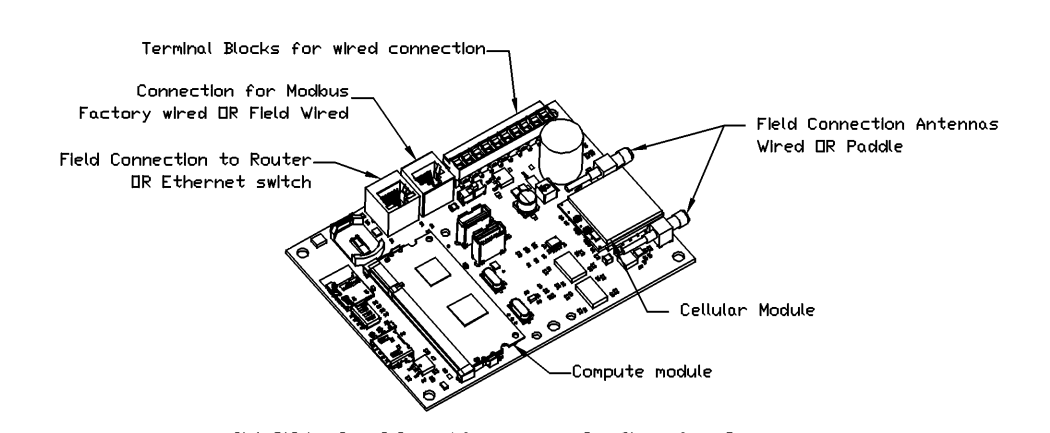
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SHEET NAME: CAPTIVEVAIRE DRAWINGS

DATE: 07/28/2024 PROJECT NO.: 38541
DRAWN: RAS SCALE:

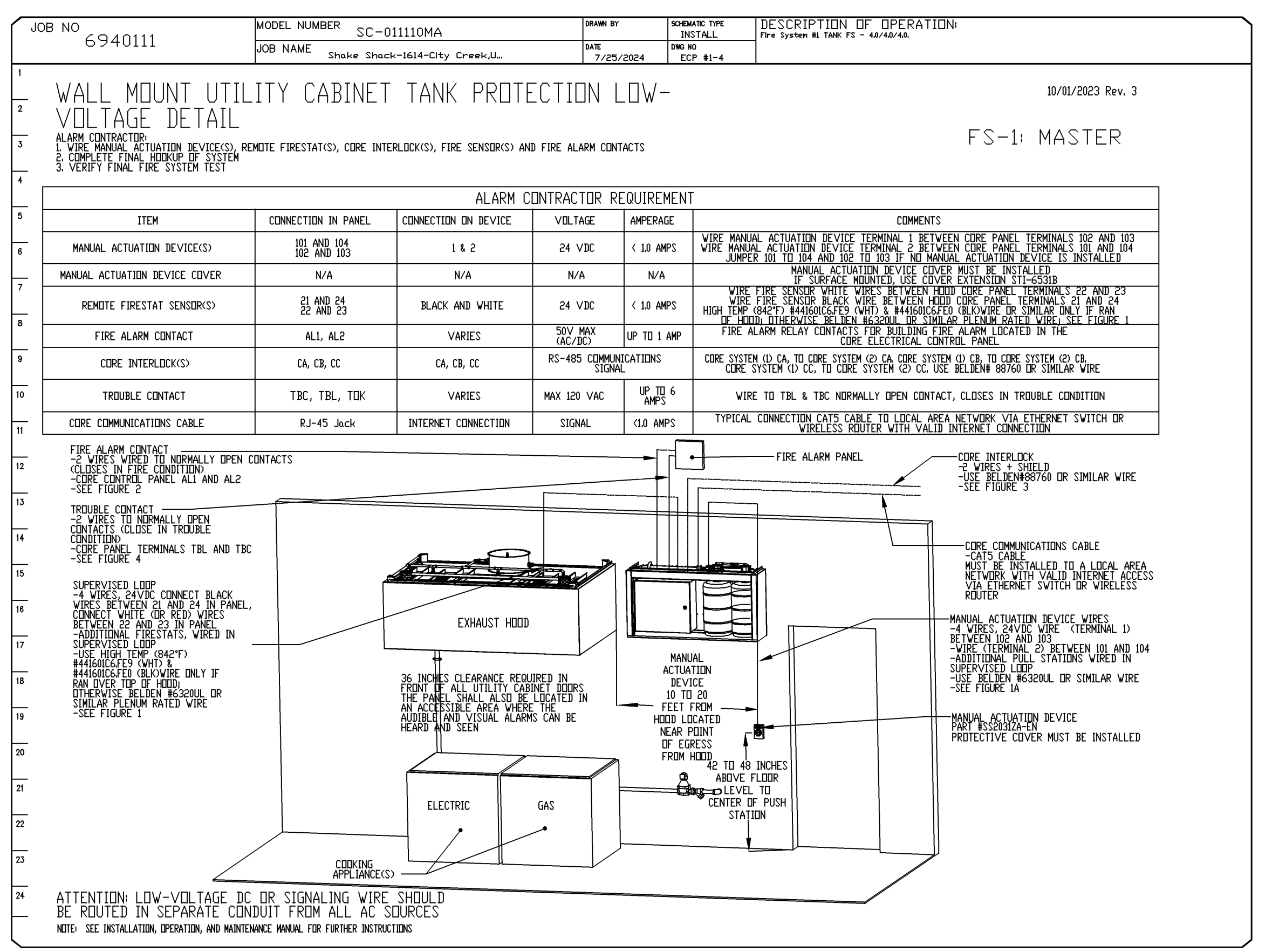
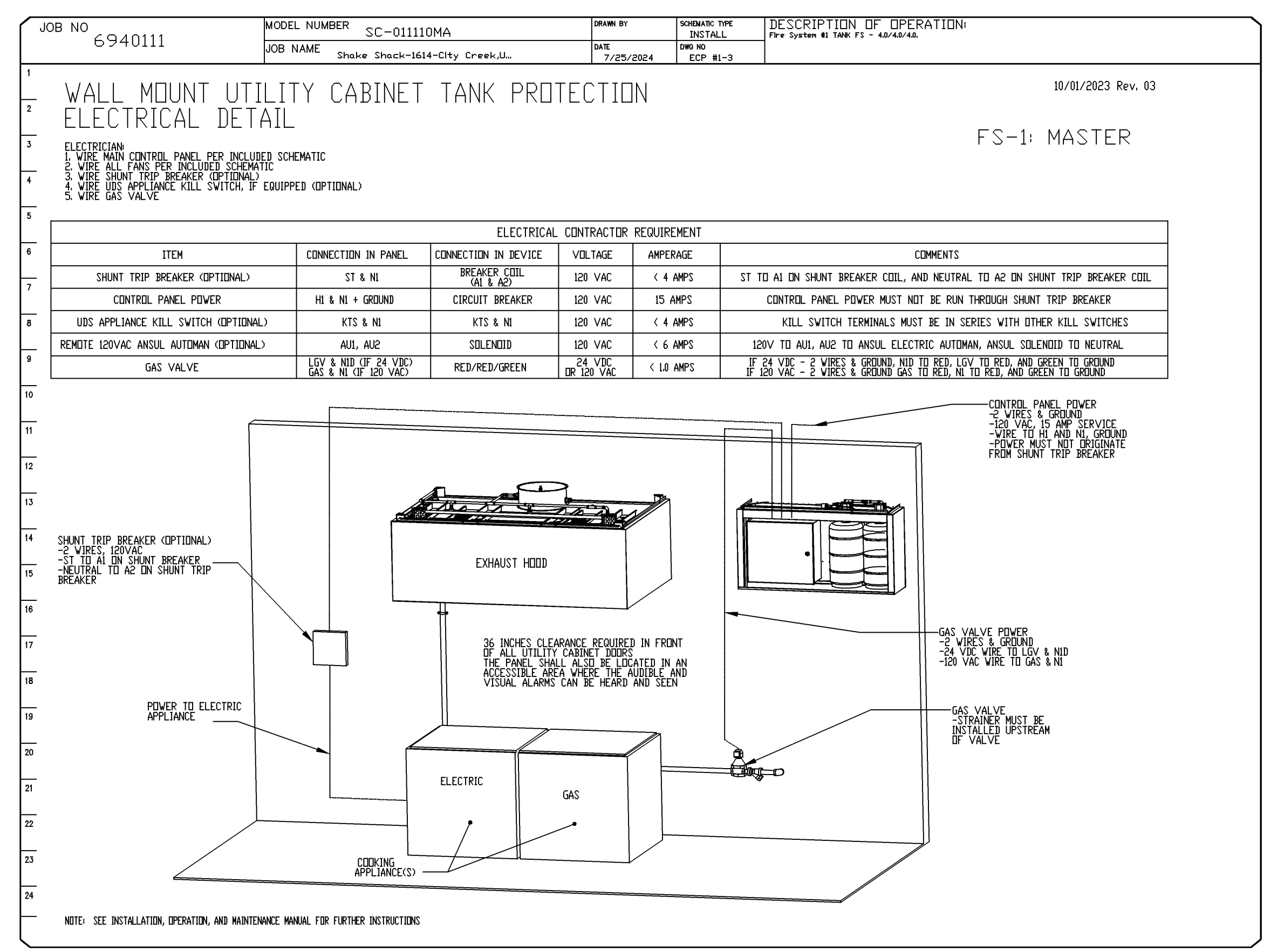
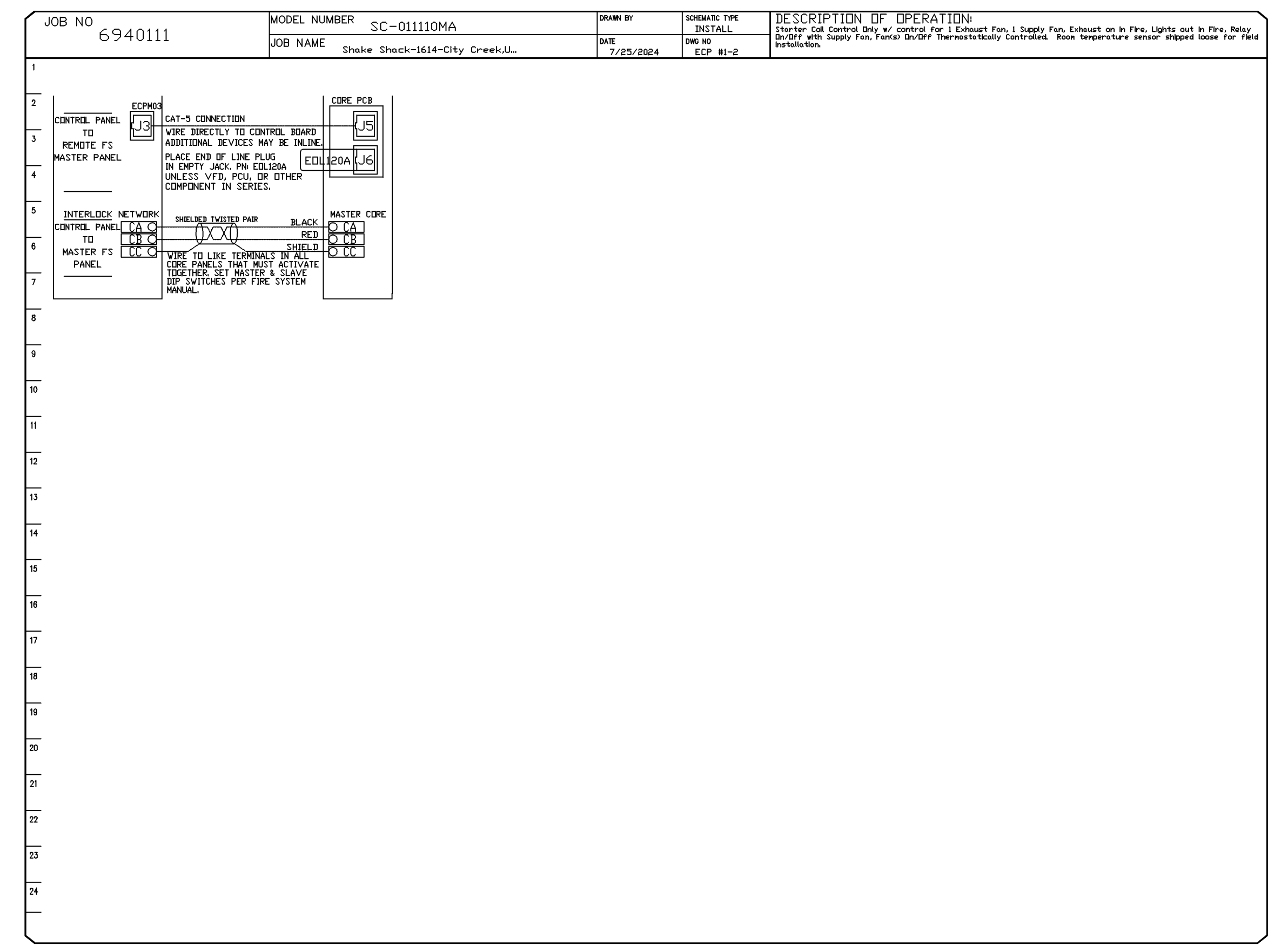
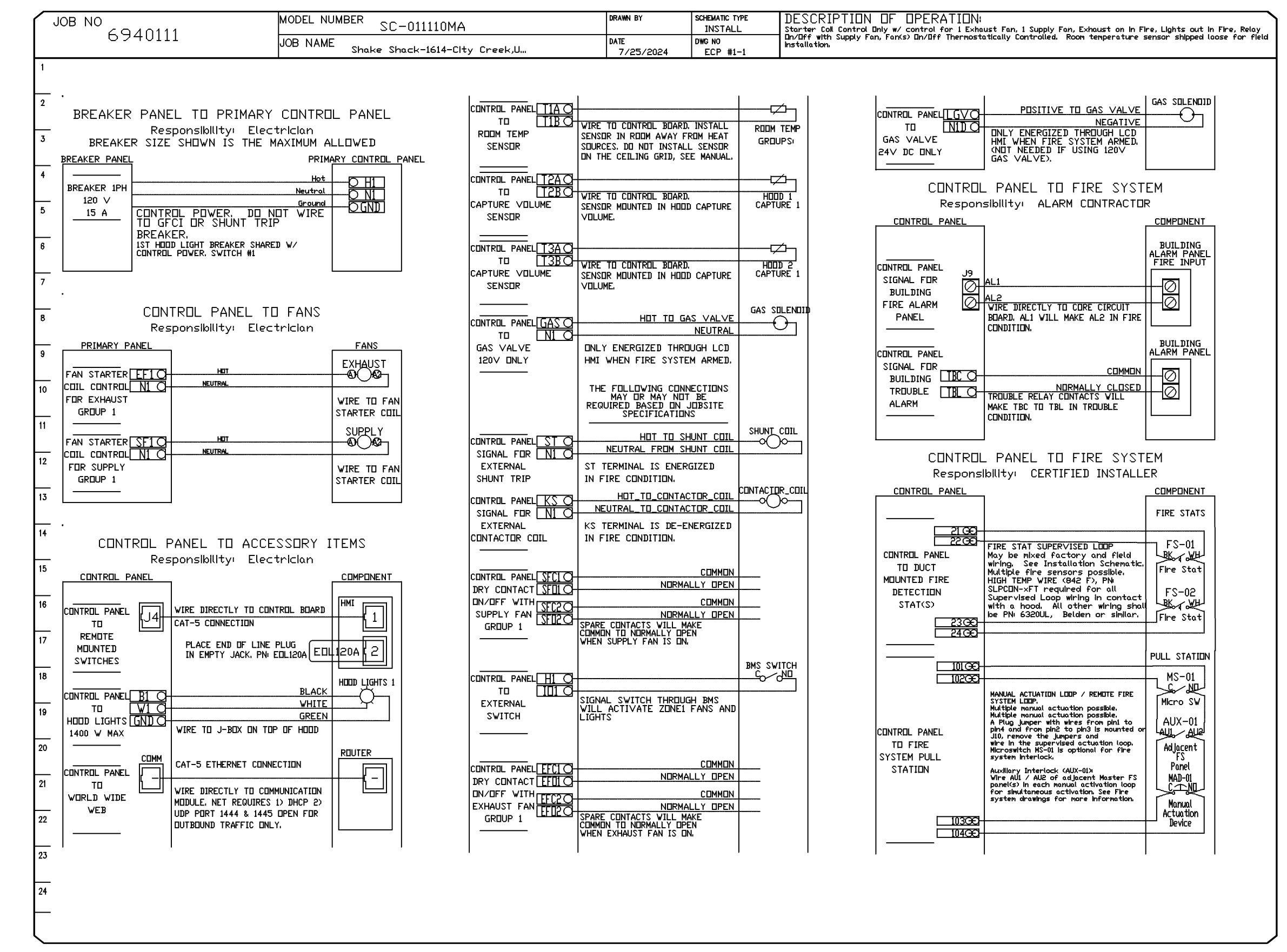
SHEET NO.: M704

ELECTRICAL PACKAGE - JOB#6940111 table with columns for NO, TAG, PACKAGE #, LOCATION, SWITCHES, OPTION, and FANS CONTROLLED.

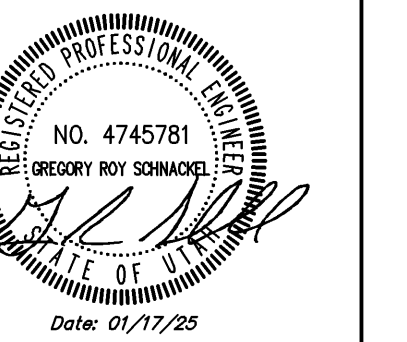


CASlink Monitor and Control - Hood control panel to support communications to cloud-based Building Management System.

MONITORING AND CONTROL POINTS LIST table with columns for DCV Packages, Function, and SC Packages, Function.



NO.	DATE	REVISION
1	2024-08-06	REVISION A
2	2024-05-07	REVISION B
3	2024-02-02	REVISION C
4	2024-02-18	REVISION D
5	2025-01-17	REVISION E



FIELD VERIFICATION:
The Contractor shall verify all figured dimensions and conditions on the project site and notify Zebra Architecture, PLLC of any dimensional errors, omissions or discrepancies before beginning or resuming any work. Do not scale these drawings.
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REVISIONS

NO.	DESCRIPTION	DATE

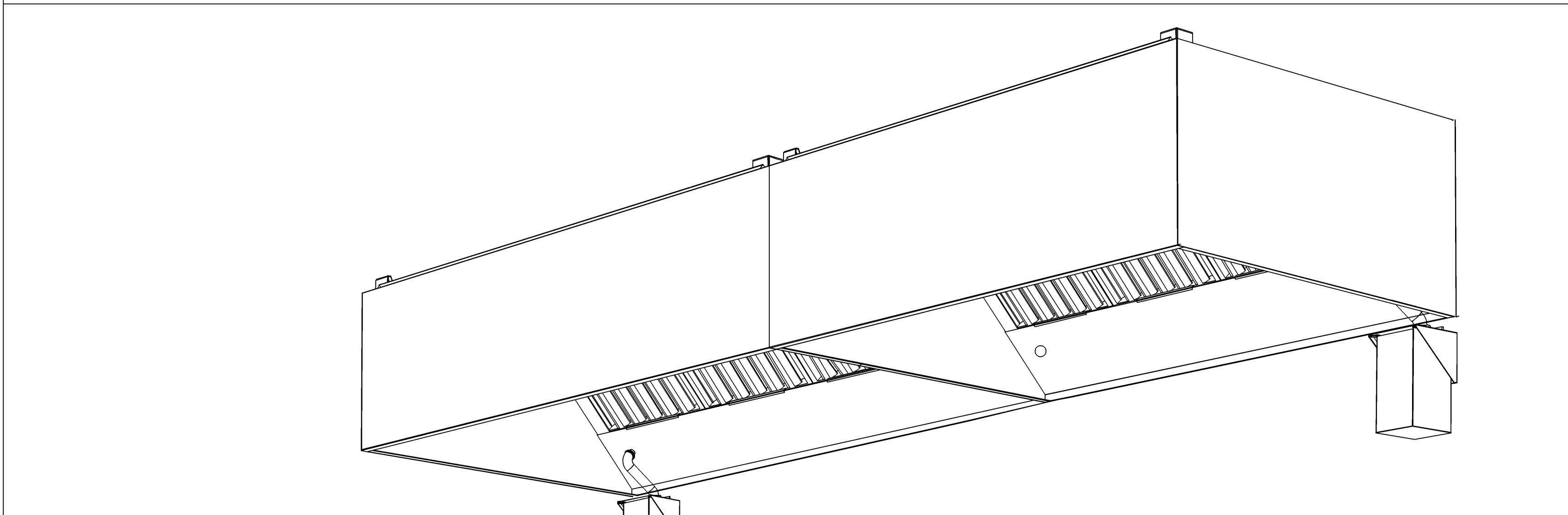
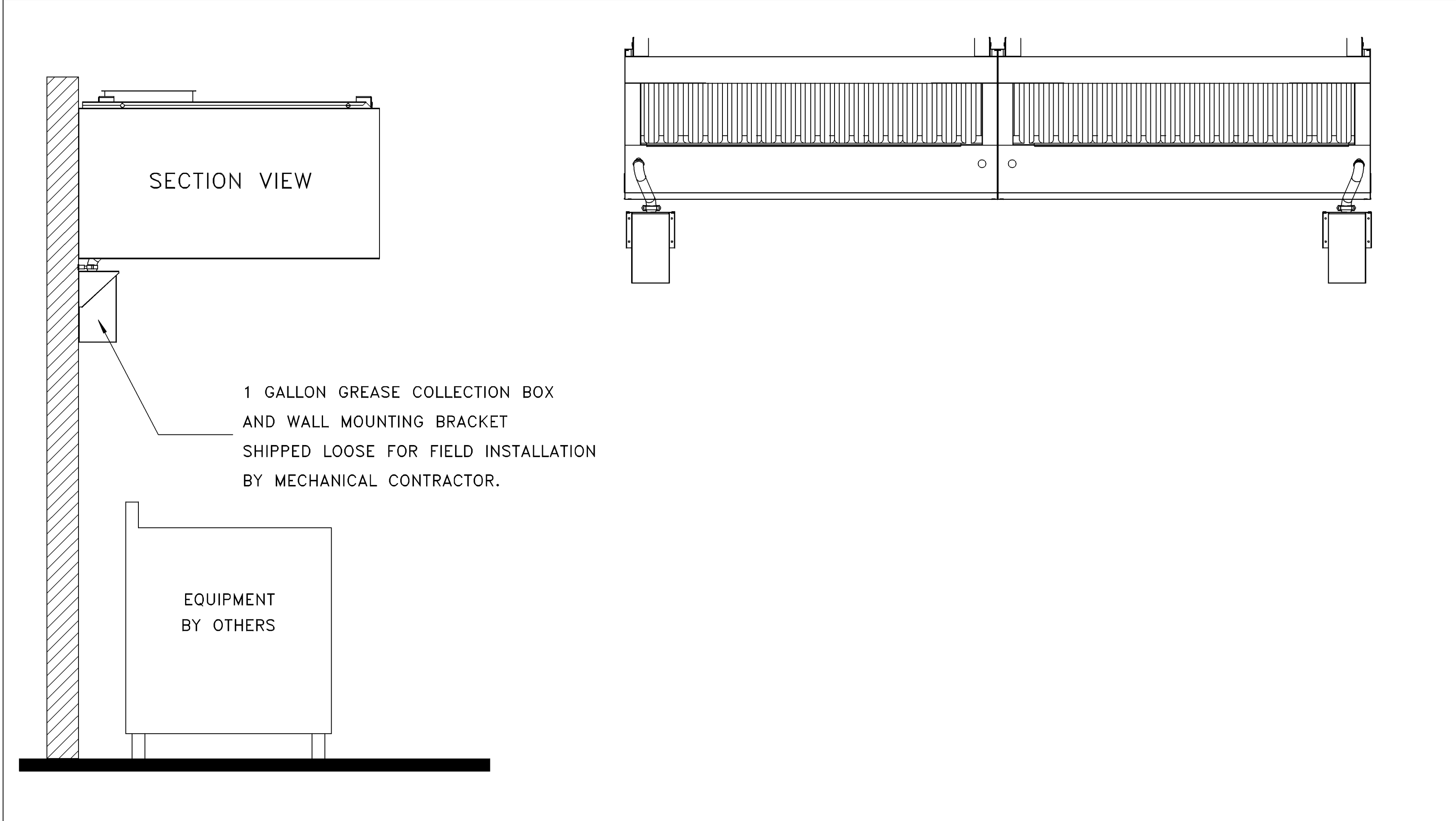
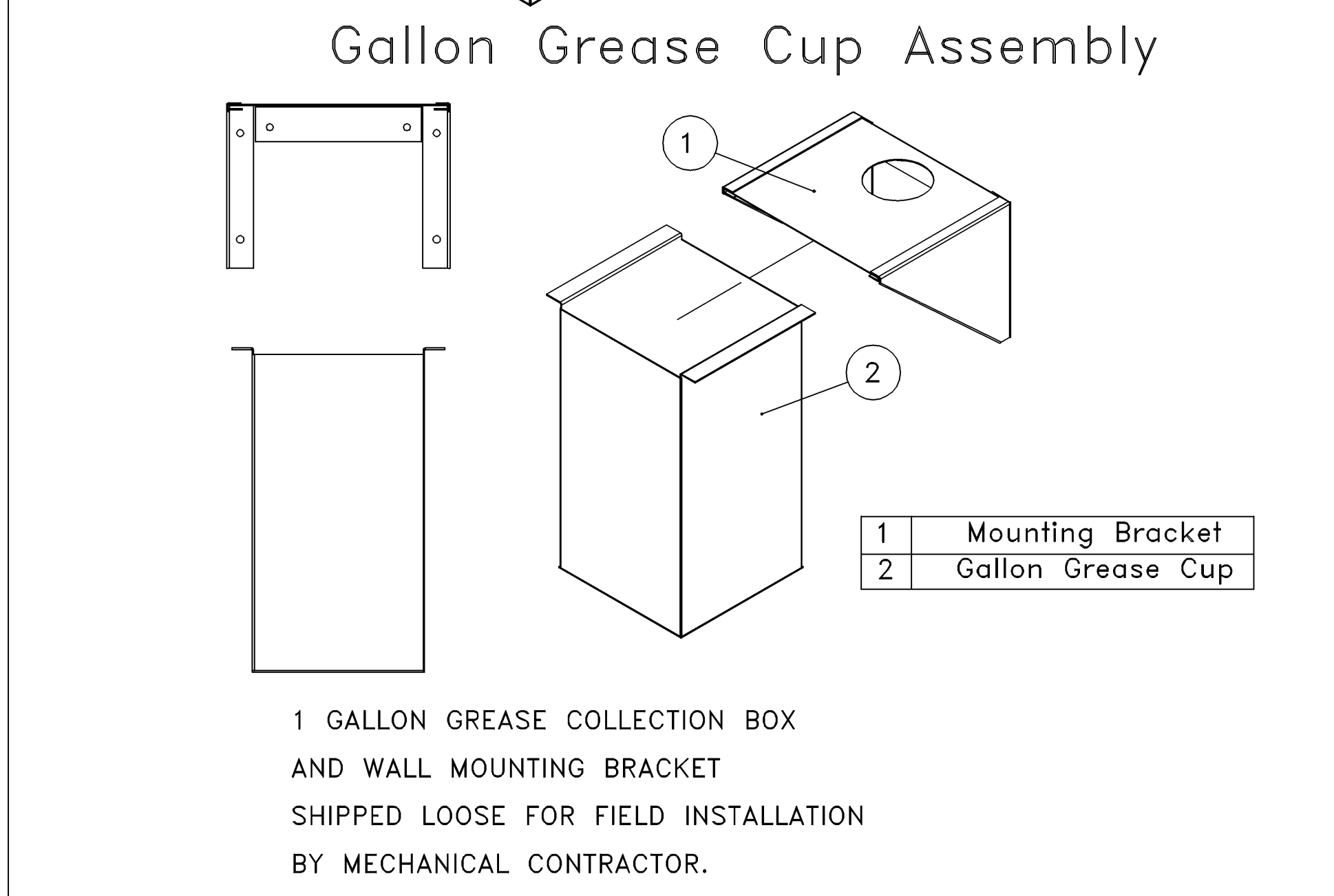
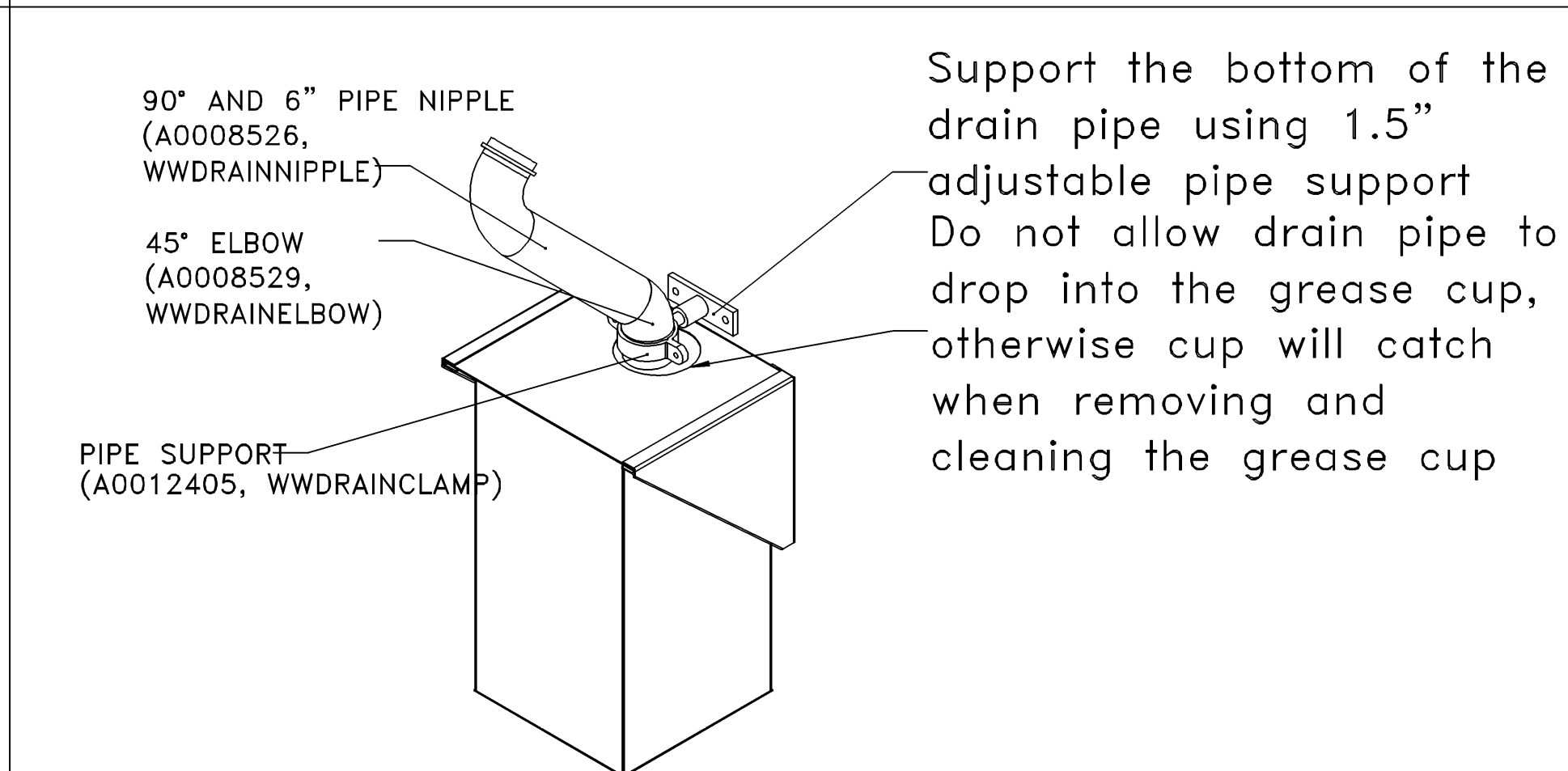
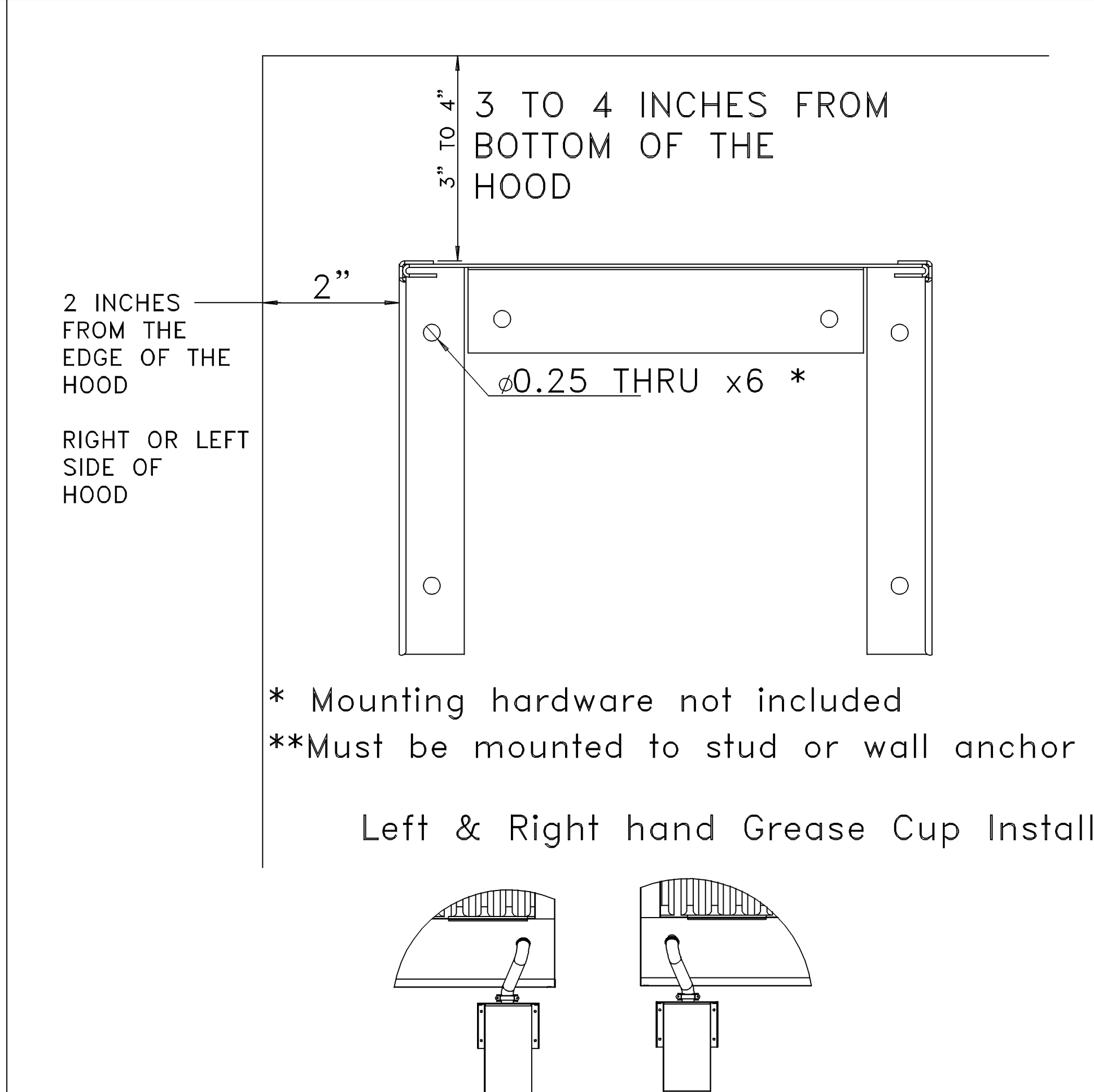
CAPTIVEAIRE

Eastern, P.A. Mechanical
225 E City Line Avenue, Suite #103, Bens Omyard, PA 18004 PHONE: (607) 504-4128 EMAIL: reg108@captivaire.com

Shake Shack-1614-City Creek, UT(Kitchen)-RI
SALT LAKE CITY, UT, 84111

DATE: 7/25/2024
DWG.#: 6940111
DRAWN BY: Joe.shilba
SCALE: 3/4" = 1'-0"
MASTER DRAWING

SHEET NO.
5



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

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

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

E
D
C
B
A

6 5 4 3 2 1

6 5 4 3 2 1