SHEET NUMBER	SHEET NAME
M001	MECHANICAL ABBREVIATIONS AND SYMBOLS
M101	MECHANICAL FLOOR PLAN
M102	MECHANICAL REFRIGERANT PIPING LAYOUT PLAN
M150	MECHANICAL ROOF PLAN
M501	MECHANICAL DETAILS
M502	MECHANICAL DETAILS
M590	MECHANICAL SPECIFICATIONS
M591	MECHANICAL SPECIFICATIONS
M592	MECHANICAL SPECIFICATIONS
M601	MECHANICAL SCHEDULE
M701	HALTON DRAWINGS
M702	HALTON DRAWINGS
M703	HALTON DRAWINGS
M704	HALTON DRAWINGS
M705	HALTON DRAWINGS
M706	HALTON DRAWINGS
M707	HALTON DRAWINGS
M708	HALTON DRAWINGS

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			GENERAL CONTRACTOR SCOPE OF WORK TO INCLUDE RIGGING, CURBS, AND ACCESSORIES
23.2.2 ROOFTOP UNIT CURBS	X			X			GENERAL CONTRACTOR 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 AND DOAS UNIT CURBS		X		X			GENERAL CONTRACTOR SCOPE OF WORK TO INCLUDE RIGGING, CURBS, AND ACCESSORIES
23.2.5 KITCHEN EXHAUST FAN CURBS		X		X			GENERAL CONTRACTOR 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 CONTACTOR 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. 27 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			
23.5 HVAC EQUIPMENT							GENERAL CONTRACTOR SCOPE OF WORK TO INCLUDE RIGGING FOR ALL ROOFTOP 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. 26
23.5.4 DUCTED AND NON-DUCTED HEATING AND COOLING UNITS	X			X			
23.5.5 MAKE UP AIR AND DOAS UNITS		X		X			SUPPLIED BY VENDOR NO. 26
23.5.6 ELECTRIC PATIO HEATERS	X			X			
23.5.7 HVAC CONDENSING UNITS	X			X			
23.5.8 REFRIGERATION CONDENSING UNITS		X		X			
23.5.9 RGF PHI SYSTEM	X			X			GENERAL CONTRACTOR TO PURCHASE FROM VENDOR NO. 12 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. 26
23.6.2 KITCHEN EXHAUST HOOD		X		X			SUPPLIED BY VENDOR NO. 26
23.6.3 STRUCTURAL SUPPORT	X			X			
23.6.4 ELECTRICAL AND CONTROL WIRING	X			X			
23.6.5 ANSUL SYSTEM		X		X			SUPPLIED BY VENDOR NO. 26 GENERAL CONTRACTOR TO COORDINATE AND FACILITATE SYSTEM SIGN-OFF
23.6.6 ANSUAL WIRING AND UTILITIES CONNECTION	X			X			
23.6.7 ANSUAL GAS VALVE		X		X			SUPPLIED BY VENDOR NO. 26
23.7 COMMISSIONING ACTIVITIES							
23.7.1 GREASE EXHAUST WATER LEAKAGE TEST	X			X			GENERAL CONTRACTOR TO PURCHASE FROM VENDOR NO. 10 VENDOR SUBSTITUTION IS NOT PERMITTED
23.7.2 TESTING AIR BALANCE (TAB) REPORT	X			X			GENERAL CONTRACTOR TO PURCHASE FROM VENDOR NO. 12 VENDOR SUBSTITUTION IS NOT PERMITTED

LANDLORD REQUIREMENTS – APPLICABLE TO ALL SHEETS

- ANY CHANGES AND/ OR UPGRADES TO TENANT'S EXISTING MECHANICAL SYSTEMS SHALL COMPLY WITH ALL CODES AND MALL CRITERIA. EXISTING SYSTEMS SHALL POSSESS THE CAPACITY TO HANDLE ANY AND ALL CHANGES IN LOAD.
- NO PITCH POCKETS ARE PERMITTED ON THE ROOF FOR ANY CONDENSATE DRAINS, REFRIGERANT PIPING, POWER OR CONTROL WIRING. ALL CONNECTIONS ARE TO BE MADE INSIDE THE EQUIPMENT CURB OR THROUGH PRE-MANUFACTURED PIPING CURB.
- NOTHING IS PERMITTED TO BE ATTACHED TO, SUSPENDED FROM, OR PENETRATE LANDLORD'S STRUCTURE, FLOOR DECK, OR ROOF DECK. YOU MAY ATTACH, NON-DESTRUCTIVELY, TO OR SUSPEND FROM THE TOP CHORD OF THE JOIST OR THE STRUCTURAL STEEL WHICH EXISTS ABOVE THE TENANT SPACE. WHEN ATTACHING TO LANDLORD'S STRUCTURE, DO NOT DRILL, WELD, SCREW, OR SHOOT INTO STRUCTURE. ALTERNATIVE METHODS OF ATTACHMENT ONLY, NOTHING TO DAMAGE LANDLORD'S BASE BUILDING STRUCTURE. TENANT SHALL PROVIDE SIGNED AND SEALED STRUCTURAL DRAWINGS, BY A STRUCTURAL ENGINEER WITH LEGALLY ACTIVE REGISTRATION AS INDICATED BY ALL JURISDICTIONAL REQUIREMENTS, FOR ALL STRUCTURAL MODIFICATIONS FOR LANDLORD RECORDS.
- ALL PENETRATIONS TO ROOF MUST BE APPROVED BY LANDLORD. ALL RELATED ROOF WORK MUST BE DONE BY MALL'S DESIGNATED ROOFING CONTRACTOR, AT TENANT'S EXPENSE. COORDINATE ALL WORK WITH PROPERTY MANAGEMENT ON SITE.
- TENANT MUST REMOVE ALL ABANDONED ROOFTOP AND/ OR MECHANICAL EQUIPMENT ABOVE THE LEASED PREMISES AND WITHIN THE LEASED PREMISES, AT TENANT EXPENSE. PATCH AND REPAIR ROOF AS NEEDED.
- TENANT'S GC TO LABEL ALL ROOF TOP EQUIPMENT WITH TENANT NAME SPACE NUMBER AND EQUIPMENT IDENTIFICATION (RTU-1, EF-1), PER MALL SPECIFICATIONS/ STANDARDS.
- ALL PIPING ON ROOF SHALL BE SUPPORTED ON PRE-MANUFACTURED PIPE SUPPORTS INSTALLED ON CARRY TREAD, SPACED PROPERLY TO SUPPORT PIPING. TREATED WOOD SUPPORTS ARE NOT PERMITTED.
- ALL UNEXPOSED SUPPLY AIR AND OUTSIDE AIR DUCTWORK SHALL BE EXTERNALLY INSULATED WITH 1 1/2" THICK FOIL FACE INSULATION. INTERNALLY LINED DUCTWORK MAY BE USED FOR ACOUSTIC PURPOSES ONLY, NOT AS A SUBSTITUTE FOR EXTERNAL INSULATION.
- ALL DUCTWORK SHALL BE SHEET METAL. FLEX DUCT MAY ONLY BE USED IN RUNS OF 5'-0" OR LESS.
- AT CONCLUSION OF PROJECT, HVAC SYSTEM MUST BE TESTED AND BALANCED BY A LICENSED CONTRACTOR. COPY OF BALANCE REPORT MUST BE PROVIDED TO PROPERTY MANAGEMENT OFFICE ON-SITE.
- LANDLORD STRONGLY PREFERS USE OF ENERGY STAR PRODUCTS AND/OR EQUIPMENT WHENEVER POSSIBLE DURING TENANT BUILD OUT, WHICH CAN REDUCE ENERGY CONSUMPTION.

SUBMITTAL MATRIX

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

SUBMITTAL DECRIPTION	Required Review Time (Business Days)	Architect of Record	Shake Shack	Physical Sample Required	Submittal for Record	Submittal for Record Only
Anchor Bolts Shops	5	X			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 signifcant 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
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	
MEP 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				

SYMBOLS

HEATING–VENTILATING–AIR CONDITIONING

SYMBOL	DESCRIPTION
(T)	THERMOSTAT
(S)	REMOTE SENSOR
	SUPPLY DIFFUSER
	RETURN OR EXHAUST GRILLE
	SUPPLY OR FRESH AIR DUCT (SA OR FA)
	RETURN OR EXHAUST AIR DUCT (RA OR EA)
10/6	RECTANGULAR DUCT FIRST FIGURE IS SIDE SHOWN
SIZE 12"ø	ROUND DUCT
ELEV PLAN	VOLUME DAMPER (ELEV AND PLAN)
	TURNING VANES
CFM SIZE	SUPPLY REGISTER OR GRILLE (R OR G)
CFM SIZE	RETURN REGISTER OR GRILLE (R OR G)
CFM SIZE	FRESH AIR INTAKE (FA)
	SQUARE CEILING DIFFUSER (SUPPLY)
FC–1	FAN COIL UNIT AND MARK
MD	MOTORIZED DAMPER
CWS	CHILLED WATER SUPPLY
CWR	CHILLED WATER RETURN
RL	REFRIGERANT LIQUID LINE
RS	REFRIGERANT SUCTION LINE
D	CONDENSATE OR VACUUM PUMP DISCHARGE
G	GAS LINE
RL	REFRIGERANT LIQUID LINE
RS	REFRIGERANT SUCTION LINE
MD	MOTORIZED DAMPER

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830 North Blvd.
Oak Park, Illinois
60301

708-445-8400
ariainc.com

ARIA GROUP ARCHITECTS, INC.

SHAKE SHACK

3393 Peachtree Road NE, Space 1014A, Atlanta, GA 30326

LENOX SQUARE

FIELD VERIFICATION
Contractor shall verify all figured dimensions and conditions at the job site and notify Aria Group Architects, Inc. of any dimensional errors, omissions or discrepancies before beginning or fabricating any work. Do not scale these drawings.

NO.	DATE	REMARKS
3	02/02/22	ISSUE FOR CONSTRUCTION
2	01/11/22	ISSUE FOR CONSTRUCTION
1	12/03/21	ISSUE FOR CONSTRUCTION
	11/08/21	ISSUE FOR CONSTRUCTION
	10/25/21	ISSUE FOR LL REVIEW

REVISIONS

GEORGIA REGISTERED 026421 PROFESSIONAL ENGINEER GREGORY ROY SCHNACKEL

Date: 02/02/22
COA #: PEF003790

Drawing Title
MECHANCIAL ABBREVIATIONS & SYMBOLS

Job No. 214746 | Drawn RAS

Scale N.T.S. | Date 09/17/2021

Sheet No.
M001

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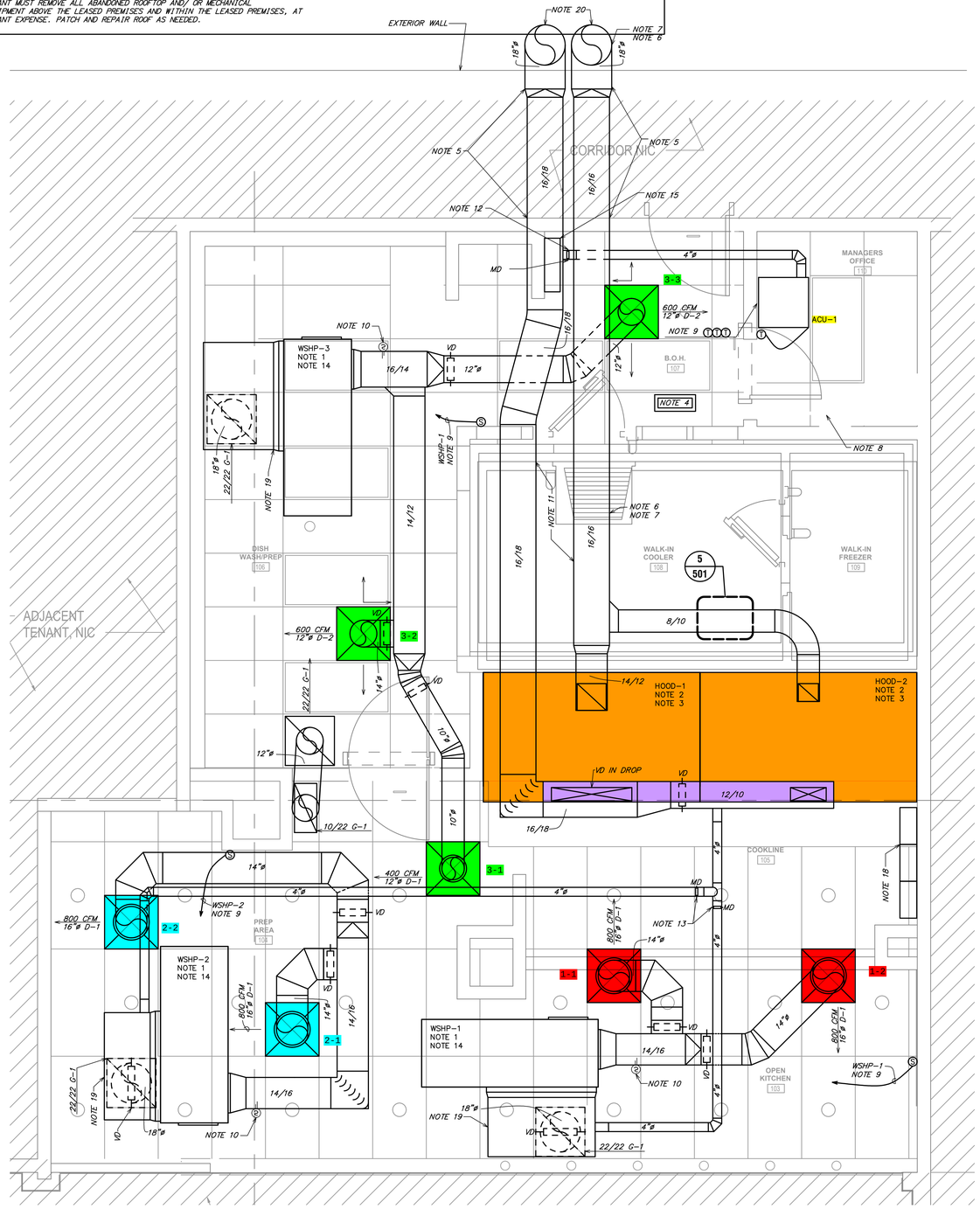
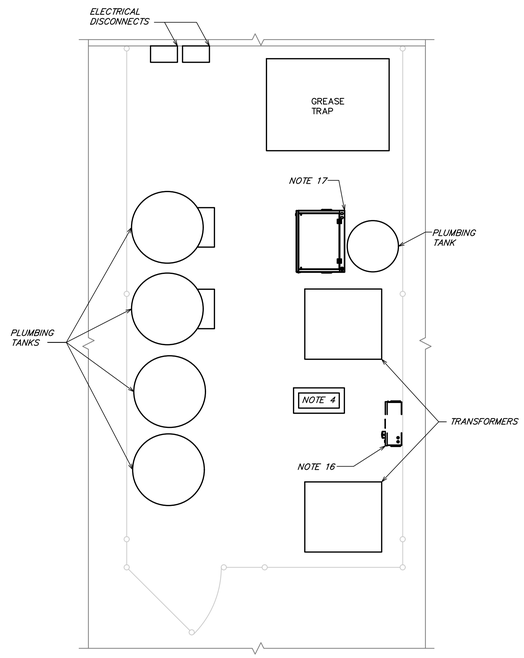


1 MECHANICAL FLOOR PLAN
SCALE: 1/2" = 1'-0"

N



2 MECHANICAL BASEMENT PLAN
SCALE: 1/2" = 1'-0"

N

HVAC NOTES:

1. PROVIDE NEW WSHP AS NOTED ON PLANS AND AS SCHEDULED ON SHEET M601.
2. NEW HALTON GREASE EXHAUST HOOD TO BE FURNISHED BY OWNER FOR INSTALLATION BY THE MECHANICAL CONTRACTOR. SEE HALTON SHEETS M701 THROUGH M708 FOR ADDITIONAL INFORMATION. BALANCE HOOD MAKE-UP AIR AND EXHAUST COLLARS AS NOTED ON THE HOOD SCHEDULE. PROVIDE FULL SIZE TRANSITION MAKE-UP AIR DUCT FROM COLLAR TO MAKE-UP AIR MAIN DUCT AS INDICATED ON PLANS.
3. TRANSITION FROM HOOD EXHAUST COLLAR AND EXTEND KITCHEN HOOD GREASE EXHAUST DUCTWORK TO HALTON POLLUTION CONTROL UNIT ON ROOF (PST-1) AS NOTED ON PLANS. GREASE DUCT NOT VISIBLE TO THE PUBLIC SHALL BE WRAPPED WITH TWO (2) LAYERS OF THERMAL CERAMICS 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 M501, DETAIL 5, FOR ADDITIONAL INFORMATION.
4. FIELD VERIFY LINE LENGTH FOR CONTROLS FROM SUPPORT EQUIPMENT IN SPACE AND IN THE BASEMENT LEVEL TO PST-1 ON ROOF. CONNECTIONS FROM ANCILLARY EQUIPMENT TO PST-1 ARE TO BE RUN THROUGH ABANDONED CHASE IN SPACE TO ROOF.
5. REFER TO ARCHITECTURAL DRAWINGS FOR MAKE-UP AIR AND EXHAUST AIR DUCTWORK PENETRATIONS/OPENINGS AND ROUTING. FIELD VERIFY AND CONSULT WITH ARCHITECT AND LANDLORD AS REQUIRED.
6. PROVIDE ACCESS OPENINGS FOR CLEANING, MAINTENANCE, AND INSPECTION FOR THE GREASE EXHAUST DUCTS AS REQUIRED BY CODE. TYPICAL OF GREASE EXHAUST DUCTWORK. REFERENCE SHEET M501, DETAIL 5 FOR ADDITIONAL INFORMATION.
7. PROVIDE GREASE EXHAUST AIR DUCT THROUGH SPACE AND UP EXTERIOR WALL AS INDICATED ON THE PLANS. SEE SHEET M150 FOR CONTINUATION. FIELD VERIFY EXACT LOCATION. GREASE DUCT NOT VISIBLE TO THE PUBLIC SHALL BE WRAPPED WITH TWO (2) LAYERS OF THERMAL CERAMICS 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 M501, DETAIL 5 AND DETAIL 11, FOR ADDITIONAL INFORMATION.
8. CONTRACTOR SHALL UNDERCUT DOOR 1/4".
9. 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 WALL GRAPHICS LAYOUT.
10. DUCT SMOKE DETECTOR ON 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.
11. ROUTE AND TRANSITION MAKE-UP AIR DUCT AND GREASE EXHAUST DUCTWORK AS REQUIRED TO AVOID CONFLICT WITH STRUCTURAL COMPONENTS. NOTIFY ARCHITECT OF ANY CONFLICTS OR OBSTRUCTIONS. COORDINATE WITH LANDLORD AS REQUIRED.
12. PROVIDE LOW LEAKAGE MOTORIZED OUTDOOR AIR DAMPER. INTERLOCK THE DAMPER WITH THE SUPPLY FAN FOR ACU-1. BALANCE THE DAMPER TO PROVIDE A MAXIMUM OF 10 CFM OF OUTDOOR AIR.
13. PROVIDE LOW LEAKAGE MOTORIZED OUTDOOR AIR DAMPER. INTERLOCK THE DAMPER WITH THE SUPPLY FAN FOR THE WSHP. BALANCE THE DAMPER TO PROVIDE A MAXIMUM OF 20 CFM OF OUTDOOR AIR.
14. RGF REME HALO 24V AIR PURIFICATION SYSTEM TO BE PROVIDED AND INSTALLED BY HVAC. REFER TO RESPONSIBILITY MATRIX ON SHEET M-701 FOR ADDITIONAL INFORMATION, SHEET M601 FOR SCHEDULE, AND SHEET M592 FOR SPECIFICATIONS.
15. ACCESSORY CONTROL PANEL FOR HALTON HOOD SYSTEM. INSTALL AS SPECIFIED BY THE MANUFACTURER. SEE HALTON SHEETS M701 THROUGH M708 FOR ADDITIONAL INFORMATION. UNIT TO BE INSTALLED ON WALL IN KITCHEN SPACE AS NOTED ON THE PLANS. NOTIFY CONSTRUCTION MANAGER AND ARCHITECT REGARDING ANY INSTALLATION ISSUES.
16. POWER PACK ENCLOSURE FOR HALTON PST. INSTALL AS SPECIFIED BY THE MANUFACTURER. SEE HALTON SHEETS M701 THROUGH M708 FOR ADDITIONAL INFORMATION. TO BE INSTALLED IN BASEMENT SPACE.
17. DETERGENT DISPENSER FOR HALTON PST. INSTALL AS SPECIFIED BY THE MANUFACTURER. SEE HALTON SHEETS M701 THROUGH M708 FOR ADDITIONAL INFORMATION. TO BE INSTALLED IN BASEMENT SPACE. MOUNT/SECURE AS SPECIFIED BY MANUFACTURER. NOTIFY CONSTRUCTION MANAGER AND ARCHITECT REGARDING ANY INSTALLATION ISSUES.
18. REMOTE MIXING CABINET FOR HALTON HOOD SYSTEM. INSTALL AS SPECIFIED BY THE MANUFACTURER. SEE HALTON SHEETS M701 THROUGH M708 FOR ADDITIONAL INFORMATION. UNIT TO BE INSTALLED ON WALL ADJACENT TO THE HOODS AS INDICATED ON THE PLANS. NOTIFY CONSTRUCTION MANAGER AND ARCHITECT REGARDING ANY INSTALLATION ISSUES.
19. PROVIDE FULL SIZE PLENUM BOX.
20. COORDINATE WITH MALL FOR FINAL LOCATION AND MOUNTING OF DUCT ON THE OUTSIDE OF THE BUILDING. DUCTWORK IS TO BE PREPARED AND PAINTED TO MATCH WALL SURFACE. COORDINATE COLOR WITH ARCHITECT AND LANDLORD. OUTDOOR DUCTWORK SHALL BE FACTORY-BUILT HALTON DOUBLE-WALL REDUCED CLEARANCE DUCTWORK. VERIFY CLEARANCE REQUIREMENTS WITH LANDLORD AND ARCHITECT. FIELD VERIFY REQUIRED LENGTHS AND EQUIPMENT REQUIRED FOR ROUTING AND MOUNTING. CONTACT DAVID HARPING [DAVID.HARPING@HALTON.COM / 502-445-6239] OR REBEKAH GUNTER [REBEKAH.GUNTER@HALTON.COM / 270-239-6325] TO COORDINATE ORDERING.

GENERAL NOTES:

A. 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.
B. CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD VERIFICATION OF ALL EXISTING CONDITIONS PRIOR TO SUBMITTING THE BID. NO ADDITIONAL COMPENSATION WILL BE PROVIDED FOR ANY EXTRAS DUE TO THE CONTRACTOR'S FAILURE TO VISIT THE PROJECT SITE PRIOR TO SUBMITTING THE BID. ANY DISCREPANCIES SHALL BE IMMEDIATELY REPORTED TO THE ENGINEER FOR RESOLUTION.
C. ALL CONTRACTORS SHALL REVIEW A COMPLETE SET OF CONSTRUCTION DOCUMENTS.
D. 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.
E. ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH ALL APPLICABLE GOVERNMENT AND LOCAL CODES.
F. MECHANICAL CONTRACTOR SHALL FIELD COORDINATE WITH ELECTRICAL CONTRACTOR FOR ALL POWER REQUIREMENTS.
G. ALL CONTRACTORS SHALL REVIEW A COMPLETE SET OF CONSTRUCTION DOCUMENTS AND COOPERATE WITH THE OTHER TRADES SO THAT THE INSTALLATION OF ALL EQUIPMENT MAY BE PROPERLY COORDINATED.
H. ALL EQUIPMENT FURNISHED SHALL FIT THE SPACE AVAILABLE WITH CONNECTIONS IN THE REQUIRED LOCATIONS AND WITH ADEQUATE SPACE FOR OPERATING AND SERVICING. THE DRAWINGS ARE GENERALLY DIAGRAMMATIC AND INDICATE THE INTENT OF THE INSTALLATION WHILE THE SPECIFICATIONS AND EQUIPMENT LIST DENOTE THE TYPE AND QUALITY OF MATERIAL AND WORKMANSHIP TO BE USED. THE DRAWINGS SHALL NOT BE SCALED FOR EXACT MEASUREMENTS. WHERE A CONFLICT EXISTS BETWEEN THE DRAWINGS AND THE SPECIFICATIONS, THE HIGHER AND/OR MORE COSTLY STANDARD WILL APPLY. THE CONTRACTOR SHALL PROMPTLY NOTIFY THE ENGINEER WHOSE DECISION SHALL BE FINAL. NO ALLOWANCE WILL BE MADE SUBSEQUENTLY IN THIS REGARD ON BEHALF OF THE CONTRACTOR AFTER AWARD OF THE CONTRACT.
I. COORDINATE DUCT ROUTING AND HEIGHTS WITH GENERAL CONTRACTOR. VERIFY ALL CLEARANCES BEFORE STARTING WORK.
J. 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.
K. ALL DUCT CONNECTIONS TO HVAC EQUIPMENT MUST BE MADE WITH FLEXIBLE CONNECTORS.
L. DO NOT ATTACH ANYTHING TO DECK ABOVE. ATTACH TO STRUCTURE (I.e. BEAMS, JOISTS) ONLY. DUCT HANGERS SHALL BE INSTALLED IN ACCORDANCE WITH LOCAL CODE. ALL CONNECTIONS TO JOISTS SHALL BE MADE AT THE TOP CORD.
M. 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.
N. 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.
O. 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.
P. ALL ROOFING WORK SHALL BE PERFORMED BY LANDLORD'S APPROVED ROOFING CONTRACTOR AT TENANT'S EXPENSE, IF REQUIRED IN LEASE OR TENANT CRITERIA MANUAL.
Q. ROOF MOUNTED EQUIPMENT SHALL BE LABELED WITH THE TENANT NAME AND SPACE NUMBER WITH 3" HIGH WEATHER PROOF LETTERS.
R. ALL GREASE EXHAUST DUCTWORK SHALL BE PROVIDED WITH 3" FOIL FACED THERMAL-CERAMIC INSULATION FOR GREASE DUCTS. INSULATION SHALL MEET NFPA 96 AND ASTM E 2336 REQUIREMENTS.
S. GREASE DUCT LEAKAGE TESTING MUST BE PERFORMED PRIOR TO CONCEALMENT OF THE DUCTWORK.
T. 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.
U. AT THE COMPLETION OF CONSTRUCTION AN NEBB, AABC OR TABB CERTIFIED AIR BALANCE REPORT SHALL BE SUBMITTED TO THE ENGINEER AND THREE COPIES TO THE LANDLORD. THE BALANCING SHALL BE COMPLETED BY NATION TAB. CONTACT WILL TURNBOURN AT WILL@NATIONALTAB.COM OR 314-954-6344.
V. THE CONTRACTOR SHALL OBTAIN A 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.
W. PARTS OF THE BASE BUILDING SYSTEMS THAT FALL INTO LEASE LINE SHALL REMAIN UNDISTURBED UNLESS NOTED OTHERWISE.
X. PROVIDE ALL NECESSARY WIRING, RELAYS, DETECTORS, COMPONENTS, ETC., FOR FIRE ALARM OR CONTROL SYSTEM INTERLOCK IF APPLICABLE. VERIFY WITH MALL PERSONNEL BEFORE BID.
Y. DISPOSE OF ALL EQUIPMENT NOT REUSED AS A PART OF THE NEW WORK AS DIRECTED BY THE OWNER. THE OWNER RESERVES THE FIRST RIGHT OF SALVAGE ON ALL EQUIPMENT AND MATERIALS.

aria GROUP
830 North Blvd.
Oak Park, Illinois
60301
708-445-8400
ariainc.com
ARIA GROUP ARCHITECTS, INC.

SHAKE SHACK
3393 Peachtree Road NE, Space 1014A, Atlanta, GA 30326
LENOX SQUARE

FIELD VERIFICATION
Contractor shall verify all figured dimensions and conditions at the job site and notify Aria Group Architects, Inc. of any dimensional errors, omissions or discrepancies before beginning or fabricating any work. Do not scale these drawings.

NO.	DATE	REMARKS
3	02/02/22	ISSUE FOR CONSTRUCTION
2	01/11/22	ISSUE FOR CONSTRUCTION
1	12/03/21	ISSUE FOR CONSTRUCTION
	11/08/21	ISSUE FOR CONSTRUCTION
	10/25/21	ISSUE FOR LL REVIEW

REVISIONS

GEORGIA REGISTERED 026421 PROFESSIONAL ENGINEER
Date: 02/02/22
COA # PEF003790

Drawing Title
MECHANICAL FLOOR PLAN

Job No.	Drawn
214746	RAS
Scale	Date
N.T.S.	09/17/2021

Sheet No.
M101

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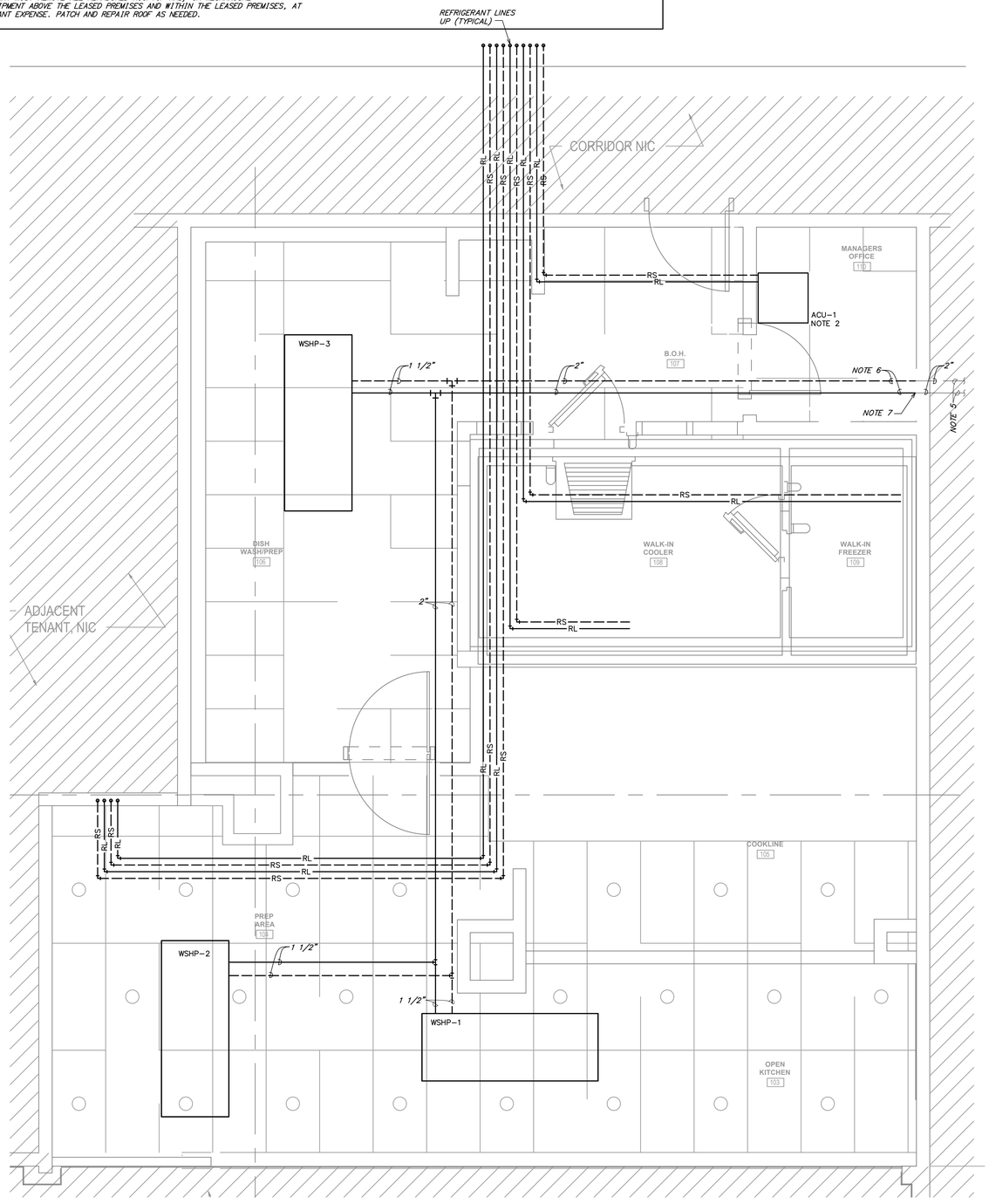
LANDLORD REQUIREMENTS – APPLICABLE TO ALL SHEETS

- ANY CHANGES AND/ OR UPGRADES TO TENANT'S EXISTING MECHANICAL SYSTEMS SHALL COMPLY WITH ALL CODES AND MALL CRITERIA. EXISTING SYSTEMS SHALL POSSESS THE CAPACITY TO HANDLE ANY AND ALL CHANGES IN LOAD.
- NO PITCH POCKETS ARE PERMITTED ON THE ROOF FOR ANY CONDENSATE DRAINS, REFRIGERANT PIPING, POWER OR CONTROL WIRING. ALL CONNECTIONS ARE TO BE MADE INSIDE THE EQUIPMENT CURB OR THROUGH PRE-MANUFACTURED PIPING CURB.
- NOTHING IS PERMITTED TO BE ATTACHED TO, SUSPENDED FROM, OR PENETRATE LANDLORD'S STRUCTURE, FLOOR DECK, OR ROOF DECK. YOU MAY ATTACH, NON-DESTRUCTIVELY, TO OR SUSPEND FROM THE TOP CHORD OF THE JOIST OR THE STRUCTURAL STEEL WHICH EXISTS ABOVE THE TENANT SPACE. WHEN ATTACHING TO LANDLORD'S STRUCTURE, DO NOT DRILL, WELD, SCREW, OR SHOOT INTO STRUCTURE. ALTERNATIVE METHODS OF ATTACHMENT ONLY, NOTHING TO DAMAGE LANDLORD'S BASE BUILDING STRUCTURE. TENANT SHALL PROVIDE SIGNED AND SEALED STRUCTURAL DRAWINGS, BY A STRUCTURAL ENGINEER WITH LEGALLY ACTIVE REGISTRATION AS INDICATED BY ALL JURISDICTIONAL REQUIREMENTS, FOR ALL STRUCTURAL MODIFICATIONS FOR LANDLORD RECORDS.
- ALL PENETRATIONS TO ROOF MUST BE APPROVED BY LANDLORD. ALL RELATED ROOF WORK MUST BE DONE BY MALL'S DESIGNATED ROOFING CONTRACTOR, AT TENANT'S EXPENSE. COORDINATE ALL WORK WITH PROPERTY MANAGEMENT ON SITE.
- TENANT MUST REMOVE ALL ABANDONED ROOFTOP AND/ OR MECHANICAL EQUIPMENT ABOVE THE LEASED PREMISES AND WITHIN THE LEASED PREMISES, AT TENANT EXPENSE. PATCH AND REPAIR ROOF AS NEEDED.
- TENANT'S GC TO LABEL ALL ROOF TOP EQUIPMENT WITH TENANT NAME SPACE NUMBER AND EQUIPMENT IDENTIFICATION (RTU-1, EF-1), PER MALL SPECIFICATIONS/ STANDARDS.
- ALL PIPING ON ROOF SHALL BE SUPPORTED ON PRE-MANUFACTURED PIPE SUPPORTS INSTALLED ON CARRY TREAD, SPACED PROPERLY TO SUPPORT PIPING. TREATED WOOD SUPPORTS ARE NOT PERMITTED.
- ALL UNEXPOSED SUPPLY AIR AND OUTSIDE AIR DUCTWORK SHALL BE EXTERNALLY INSULATED WITH 1 1/2" THICK FOIL FACE INSULATION. INTERNALLY LINED DUCTWORK MAY BE USED FOR ACOUSTIC PURPOSES ONLY, NOT AS A SUBSTITUTE FOR EXTERNAL INSULATION.
- ALL DUCTWORK SHALL BE SHEET METAL. FLEX DUCT MAY ONLY BE USED IN RUNS OF 5'-0" OR LESS.
- AT CONCLUSION OF PROJECT, HVAC SYSTEM MUST BE TESTED AND BALANCED BY A LICENSED CONTRACTOR. COPY OF BALANCE REPORT MUST BE PROVIDED TO PROPERTY MANAGEMENT OFFICE ON-SITE.
- LANDLORD STRONGLY PREFERS USE OF ENERGY STAR PRODUCTS AND/OR EQUIPMENT WHENEVER POSSIBLE DURING TENANT BUILD OUT, WHICH CAN REDUCE ENERGY CONSUMPTION.



1 MECHANICAL REFRIGERANT PIPING LAYOUT PLAN
SCALE: 1/2" = 1'-0"

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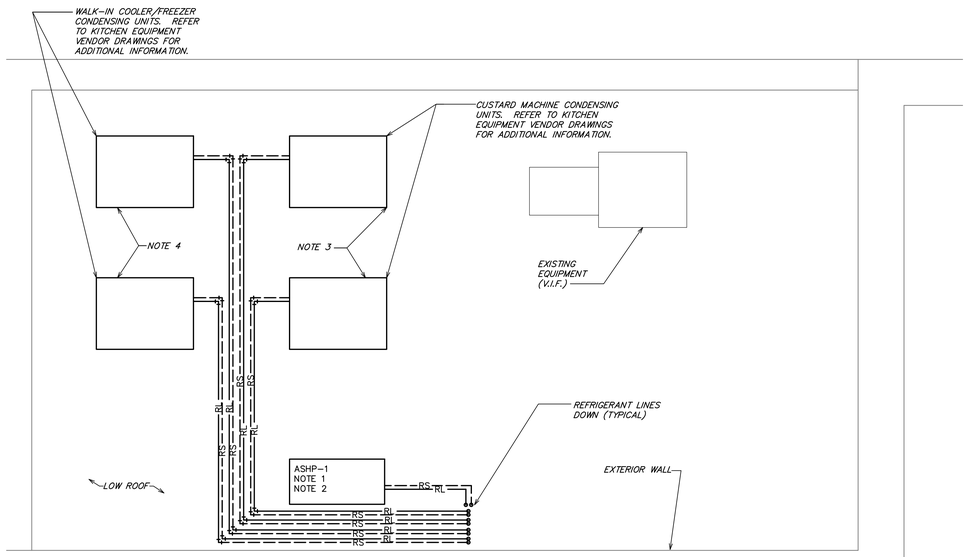
HVAC NOTES:

1. INSTALL ASHP CONDENSING UNIT PER MANUFACTURERS INSTRUCTIONS AND AS INDICATED ON PLANS. COORDINATE WITH ARCHITECT AND LANDLORD FOR EXACT LOCATION.
2. PROVIDE REFRIGERANT LINES FROM ASHP-1 ON LOW ROOF TO ACU-1 ABOVE KITCHEN OFFICE SPACE 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 ARCHITECT AND LANDLORD.
3. INSTALL CUSTARD MACHINE CONDENSING UNIT PER MANUFACTURERS INSTRUCTIONS. COORDINATE WITH ARCHITECT AND LANDLORD FOR EXACT LOCATION. PROVIDE REFRIGERANT LINES FROM KITCHEN EQUIPMENT CONDENSING UNIT ON LOW ROOF TO KITCHEN EQUIPMENT IN SPACE 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. REFER TO KITCHEN EQUIPMENT VENDOR DRAWINGS FOR ADDITIONAL INFORMATION. ADJUST ROUTING AS NECESSARY IN FIELD FOR ANY OBSTACLES. COORDINATE EXACT LOCATION AND ROUTING WITH ARCHITECT AND LANDLORD. MAINTAIN ANY CLEARANCES AS REQUIRED BY THE MANUFACTURER.
4. INSTALL WALK IN COOLER CONDENSING UNIT PER MANUFACTURERS INSTRUCTIONS. COORDINATE WITH ARCHITECT AND LANDLORD FOR EXACT LOCATION. PROVIDE REFRIGERANT LINES FROM KITCHEN EQUIPMENT CONDENSING UNIT ON LOW ROOF TO KITCHEN EQUIPMENT IN SPACE 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. REFER TO KITCHEN EQUIPMENT VENDOR DRAWINGS FOR ADDITIONAL INFORMATION. ADJUST ROUTING AS NECESSARY IN FIELD FOR ANY OBSTACLES. COORDINATE EXACT LOCATION AND ROUTING WITH ARCHITECT AND LANDLORD. MAINTAIN ANY CLEARANCES AS REQUIRED BY THE MANUFACTURER.
5. EXISTING LANDLORD CONDENSER WATER PIPING TO REMAIN. FIELD VERIFY EXACT LOCATION.
6. 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.
7. PROVIDE BOOSTER PUMP ON SUPPLY LINE AS SCHEDULED ON SHEET M601. COORDINATE WITH BUILDING PERSONNEL REGARDING ANY OTHER SYSTEM REQUIREMENTS. CONTRACTOR SHALL PROVIDE AS DIRECTED. FIELD VERIFY CONNECTION POINT.

- THE MALL OPERATIONS DIRECTOR MUST APPROVE THE LOCATION OF THE UNITS AND REFRIGERANT PIPE ROUTING.
- ALL PIPING THROUGH THE ROOF MUST USE A PRE- MANUFACTURED PORTALSPLUS PIP PORTAL (NO PITCH POCKETS ARE PERMITTED)
- UNITS MUST BE ON A FULL PERIMETER CURBS WITH PORTALSPLUS OR PATE TYPE RAILS (NO WOOD BLOCKING PERMITTED.
- ALL PIPING ON THE ROOF SHALL BE SUPPORTED WITH PRE-MANUFACTURED PIPE SUPPORTS ON CARRY TREAD, SPACED PROPERLY TO SUPPORT PIPING. USE PORTALSPLUS OR MIRIO SUPPORTS. THE USE OF WOOD FOR SUPPORTS IS PROHIBITED.
- ALL ROOF WORK TO BE PERFORMED BY LANDLORD'S ROOFING CONTRACTOR AT TENANT'S EXPENSE.
- ALL STEEL MODIFICATIONS FROM CONDENSING UNIT INSTALLATIONS TO BE DONE BY A LANDLORD APPROVED STEEL CONTRACTOR AT TENANT'S EXPENSE.
- ALL ROOF TOP LOCATIONS SHALL BE LOCATED IN AREAS DESIGNATED BY A LANDLORD APPROVED STRUCTURAL ENGINEER.
- ALL UNITS SHALL BE SET ON A FACTORY SUPPLIED CURB AND MUST EXTEND A MINIMUM OF 12" ABOVE THE HIGH POINT OF ROOFING MATERIAL. CURB ADAPTORS ARE NOT ALLOWED.
- POWER CONNECTIONS AND DUCTWORK TO UNIT SHALL BE WITHIN THE PERIMETER OF THE ROOF CURB AND NOT THROUGH THE ROOF.
- CONTRACTOR TO ENSURE THAT ALL ROOFING WARRANTIES REMAIN INTACT WITH TENANT ROOFING WORK.
- CONTRACTOR TO PROVIDE WALK PADS AROUND ALL UNITS TO PROTECT THE ROOF FOR SERVICING OF EQUIPMENT.

GENERAL NOTES:

A. 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.
B. CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD VERIFICATION OF ALL EXISTING CONDITIONS PRIOR TO SUBMITTING THE BID. NO ADDITIONAL COMPENSATION WILL BE PROVIDED FOR ANY EXTRAS DUE TO THE CONTRACTOR'S FAILURE TO VISIT THE PROJECT SITE PRIOR TO SUBMITTING THE BID. ANY DISCREPANCIES SHALL BE IMMEDIATELY REPORTED TO THE ENGINEER FOR RESOLUTION.
C. ALL CONTRACTORS SHALL REVIEW A COMPLETE SET OF CONSTRUCTION DOCUMENTS.
D. 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.
E. ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH ALL APPLICABLE GOVERNMENT AND LOCAL CODES.
F. MECHANICAL CONTRACTOR SHALL FIELD COORDINATE WITH ELECTRICAL CONTRACTOR FOR ALL POWER REQUIREMENTS.
G. ALL CONTRACTORS SHALL REVIEW A COMPLETE SET OF CONSTRUCTION DOCUMENTS AND COOPERATE WITH THE OTHER TRADES SO THAT THE INSTALLATION OF ALL EQUIPMENT MAY BE PROPERLY COORDINATED.
H. ALL EQUIPMENT FURNISHED SHALL FIT THE SPACE AVAILABLE WITH CONNECTIONS IN THE REQUIRED LOCATIONS AND WITH ADEQUATE SPACE FOR OPERATING AND SERVICING. THE DRAWINGS ARE GENERALLY DIAGRAMMATIC AND INDICATE THE INTENT OF THE INSTALLATION WHILE THE SPECIFICATIONS AND EQUIPMENT LIST DENOTE THE TYPE AND QUALITY OF MATERIAL AND WORKMANSHIP TO BE USED. THE DRAWINGS SHALL NOT BE SCALED FOR EXACT MEASUREMENTS. WHERE A CONFLICT EXISTS BETWEEN THE DRAWINGS AND THE SPECIFICATIONS, THE HIGHER AND/OR MORE COSTLY STANDARD WILL APPLY. THE CONTRACTOR SHALL PROMPTLY NOTIFY THE ENGINEER WHOSE DECISION SHALL BE FINAL. NO ALLOWANCE WILL BE MADE SUBSEQUENTLY IN THIS REGARD ON BEHALF OF THE CONTRACTOR AFTER AWARD OF THE CONTRACT.
I. COORDINATE DUCT ROUTING AND HEIGHTS WITH GENERAL CONTRACTOR. VERIFY ALL CLEARANCES BEFORE STARTING WORK.
J. 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.
K. ALL DUCT CONNECTIONS TO HVAC EQUIPMENT MUST BE MADE WITH FLEXIBLE CONNECTORS.
L. DO NOT ATTACH ANYTHING TO DECK ABOVE. ATTACH TO STRUCTURE (I.e. BEAMS, JOISTS) ONLY. DUCT HANGERS SHALL BE INSTALLED IN ACCORDANCE WITH LOCAL CODE. ALL CONNECTIONS TO JOISTS SHALL BE MADE AT THE TOP CORD.
M. 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.
N. 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.
O. 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.
P. ALL ROOFING WORK SHALL BE PERFORMED BY LANDLORD'S APPROVED ROOFING CONTRACTOR AT TENANT'S EXPENSE, IF REQUIRED IN LEASE OR TENANT CRITERIA MANUAL.
Q. ROOF MOUNTED EQUIPMENT SHALL BE LABELED WITH THE TENANT NAME AND SPACE NUMBER WITH 3" HIGH WEATHER PROOF LETTERS.
R. ALL GREASE EXHAUST DUCTWORK SHALL BE PROVIDED WITH 3" FOIL FACED THERMAL-CERAMIC INSULATION FOR GREASE DUCTS. INSULATION SHALL MEET NFPA 96 AND ASTM E 2336 REQUIREMENTS.
S. GREASE DUCT LEAKAGE TESTING MUST BE PERFORMED PRIOR TO CONCEALMENT OF THE DUCTWORK.
T. 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.
U. AT THE COMPLETION OF CONSTRUCTION AN NEBB, AABC OR TABB CERTIFIED AIR BALANCE REPORT SHALL BE SUBMITTED TO THE ENGINEER AND THREE COPIES TO THE LANDLORD. THE BALANCING SHALL BE COMPLETED BY NATION TAB. CONTACT WILL TURNBOURN AT WILL@NATIONALTAB.COM OR 314-954-6344.
V. THE CONTRACTOR SHALL OBTAIN A 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.
W. PARTS OF THE BASE BUILDING SYSTEMS THAT FALL INTO LEASE LINE SHALL REMAIN UNDISTURBED UNLESS NOTED OTHERWISE.
X. PROVIDE ALL NECESSARY WIRING, RELAYS, DETECTORS, COMPONENTS, ETC., FOR FIRE ALARM OR CONTROL SYSTEM INTERLOCK IF APPLICABLE. VERIFY WITH MALL PERSONNEL BEFORE BID.
Y. DISPOSE OF ALL EQUIPMENT NOT REUSED AS A PART OF THE NEW WORK AS DIRECTED BY THE OWNER. THE OWNER RESERVES THE FIRST RIGHT OF SALVAGE ON ALL EQUIPMENT AND MATERIALS.



2 MECHANICAL REFRIGERANT PIPING LAYOUT PLAN (LOW ROOF)
SCALE: 1/4" = 1'-0"

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REVISIONS

GEORGIA REGISTERED 026421 PROFESSIONAL GARY ROY SCHNACKEL
Date: 02/02/22
COA # PEPO03790

Drawing Title
MECHANICAL REFRIGERANT PIPING LAYOUT PLAN

Job No.	Drawn
214746	RAS
Scale	Date
N.T.S.	09/17/2021

Sheet No.
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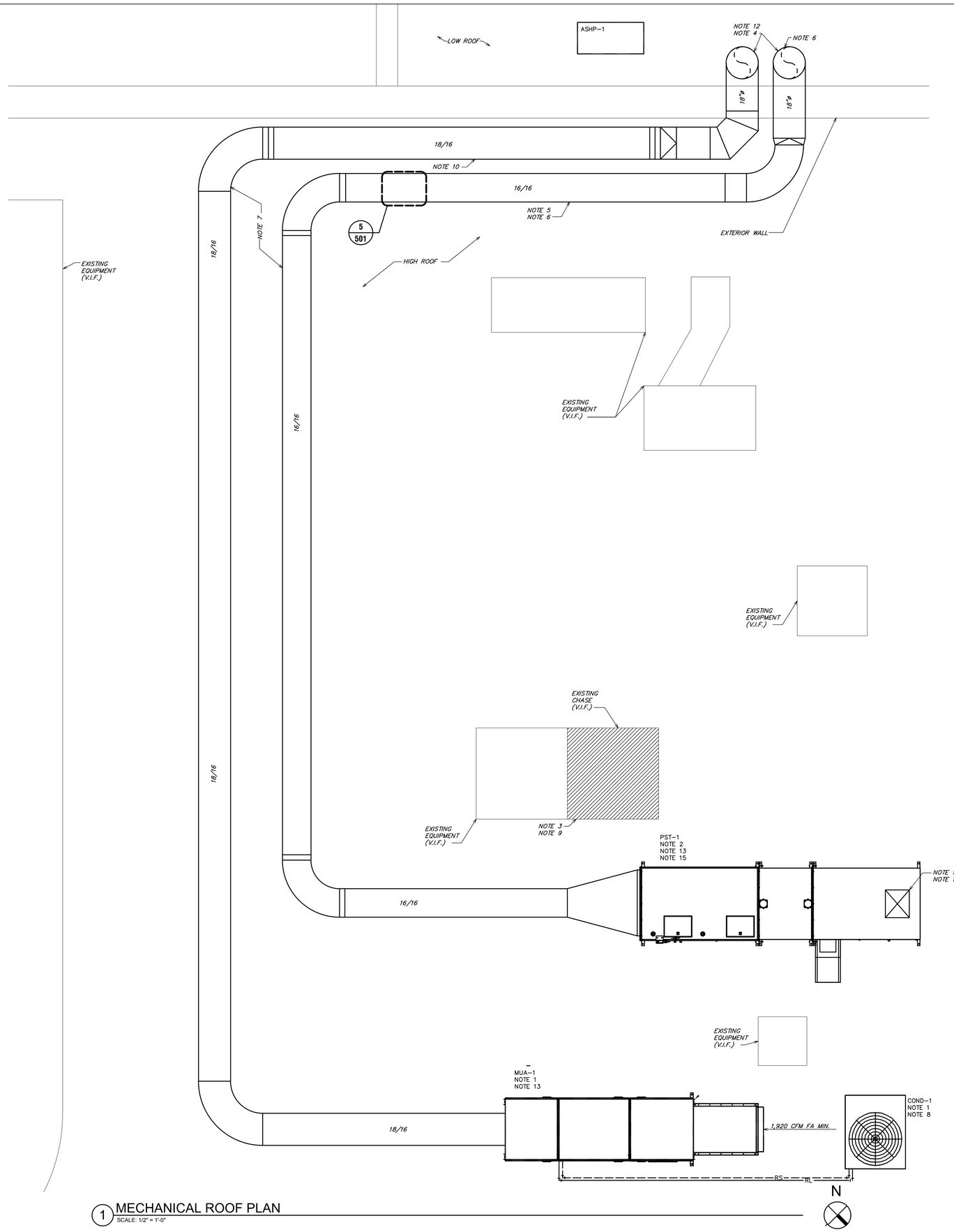

1 MECHANICAL ROOF PLAN
SCALE: 1/2" = 1'-0"

HVAC NOTES:

1. NEW HALTON MAKE-UP AIR UNIT AND ASSOCIATED CONDENSING UNIT TO BE PROVIDED BY OWNER FOR INSTALLATION BY THE MECHANICAL CONTRACTOR. SEE HALTON SHEETS M701 THROUGH M708 FOR ADDITIONAL INFORMATION. MAINTAIN ANY MANUFACTURED REQUIRED CLEARANCES. FIELD VERIFY AND COORDINATE EXACT INSTALLATION LOCATION. NOTIFY CONSTRUCTION MANAGER AND ARCHITECT REGARDING ANY INSTALLATION ISSUES.
2. NEW HALTON POLLUTION CONTROL UNIT (PST-1) AND ASSOCIATED CONTROLS TO BE PROVIDED BY OWNER FOR INSTALLATION BY THE MECHANICAL CONTRACTOR. SEE HALTON SHEETS M701 THROUGH M708 FOR ADDITIONAL INFORMATION. CONTRACTOR SHALL FIELD VERIFY THAT THE EXHAUST DISCHARGE IS A MINIMUM OF 10'-0" FROM ANY OUTDOOR AIR INTAKE. MAINTAIN ANY MANUFACTURED REQUIRED CLEARANCES. FIELD VERIFY AND COORDINATE EXACT INSTALLATION LOCATION. NOTIFY CONSTRUCTION MANAGER AND ARCHITECT REGARDING ANY INSTALLATION ISSUES.
3. FIELD VERIFY LINE LENGTH FOR CONTROLS AND PIPING FROM HALTON EQUIPMENT IN BASEMENT LEVEL AND IN SPACE TO PST-1 ON ROOF. SEE HALTON SHEETS M701 THROUGH M708 FOR ADDITIONAL INFORMATION. CONNECTIONS FROM ANCILLARY HALTON EQUIPMENT TO PST-1 ARE TO BE RUN THROUGH ABANDONED CHASE TO ROOF.
4. REFER TO ARCHITECTURAL DRAWINGS FOR MAKE-UP AIR AND EXHAUST AIR DUCTWORK PENETRATIONS/OPENINGS. FIELD VERIFY AND CONSULT WITH ARCHITECT AND LANDLORD AS REQUIRED.
5. PROVIDE ACCESS OPENINGS FOR CLEANING, MAINTENANCE, AND INSPECTION FOR THE GREASE EXHAUST DUCTS AS REQUIRED BY CODE. TYPICAL OF GREASE EXHAUST DUCTWORK. REFERENCE SHEET M501, DETAIL 5 FOR ADDITIONAL INFORMATION.
6. PROVIDE GREASE EXHAUST AIR DUCT CT EXTERIOR WALL AND ON ROOF AS INDICATED ON THE PLANS. FIELD VERIFY EXACT LOCATION. GREASE DUCT NOT VISIBLE TO THE PUBLIC SHALL BE WRAPPED WITH TWO (2) LAYERS OF THERMAL CERAMICS 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 M501, DETAIL 5 AND DETAIL 11, FOR ADDITIONAL INFORMATION.
7. ROUTE AND TRANSITION MAKE-UP AIR DUCT AND GREASE EXHAUST DUCTWORK AS REQUIRED TO AVOID CONFLICT WITH STRUCTURAL ITEMS OR EXISTING EQUIPMENT. NOTIFY ARCHITECT OF ANY CONFLICTS OR OBSTRUCTIONS. COORDINATE WITH LANDLORD AS REQUIRED.
8. PROVIDE REFRIGERANT LINES FROM CONDENSING UNIT ON HIGH ROOF TO MUA-1 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. REFER TO HALTON SHEETS M701 THROUGH M708 FOR ADDITIONAL INFORMATION. ADJUST ROUTING AS NECESSARY IN FIELD FOR ANY OBSTACLES. COORDINATE EXACT LOCATION AND ROUTING WITH ARCHITECT AND LANDLORD. MAINTAIN ANY CLEARANCES AS REQUIRED BY THE MANUFACTURER.
9. EXISTING EXHAUST FAN, CHASE, AND CONTROLS TO BE REMOVED. CHASE TO BE REUSED FOR MUA-1 AND PST-1 WIRING AND PIPING.
10. PROVIDE MAKE-UP AIR DUCT UP EXTERIOR WALL AND ON ROOF AS INDICATED ON THE PLANS. FIELD VERIFY EXACT LOCATION. DUCT NOT VISIBLE TO THE PUBLIC SHALL BE INSTALLED AS REQUIRED BY CODE AND AS INDICATED ON SHEET M502, DETAIL 3.
11. CONTRACTOR SHALL PROVIDE GREASE EXHAUST TERMINATION AS PERMITTED BY CODE. TERMINATION POINT SHALL DISCHARGE NOT LESS THAN 40" ABOVE THE ROOF SURFACE. CONTRACTOR SHALL FIELD VERIFY THAT LOCATION SHOWN IS A MINIMUM OF 10'-0" FROM ANY OUTDOOR AIR INTAKE.
12. COORDINATE WITH MALL FOR FINAL LOCATION AND MOUNTING OF DUCT ON THE OUTSIDE OF THE BUILDING. DUCTWORK IS TO BE PREPARED AND PAINTED TO MATCH WALL SURFACE. COORDINATE COLOR WITH ARCHITECT AND LANDLORD. OUTDOOR DUCTWORK SHALL BE FACTORY-BUILT HALTON DOUBLE-WALL REDUCED CLEARANCE DUCTWORK. VERIFY CLEARANCE REQUIREMENTS WITH LANDLORD AND ARCHITECT. FIELD VERIFY REQUIRED LENGTHS AND EQUIPMENT REQUIRED FOR ROUTING AND MOUNTING. CONTACT DAVID HARPRING [DAVID.HARPRING@HALTON.COM / 502-445-6239] OR REBEKAH GUNTER [REBEKAH.GUNTER@HALTON.COM / 270-239-6328] TO COORDINATE ORDERING.
13. PRIOR TO BID, CONTRACTOR TO DO A SITE SURVEY TO VERIFY LOCATIONS AND HEIGHTS CAN BE OBTAINED. MEET WITH MALL OPERATIONS TO DETERMINE AN APPROVED LINE OF SIGHT AND CANNOT BE SEEN FROM GROUND LEVEL OUTSIDE ENTERING THE MALL.
14. CONTRACTOR SHALL LOCATE EXHAUST FAN DISCHARGE SO THAT ODORS DO NOT PENETRATE ADJACENT OUTSIDE AIR INTAKES. TENANT WILL BE REQUIRED TO REMEDY ANY FUTURE ISSUES WITH FOOD ODORS ON THE ROOF.
15. THE ROOF AREA AROUND ANY GREASE EXHAUSTS SHALL BE PROTECTED WITH A GREASE GUARD C-2 GREASE COLLECTION SYSTEM IN A METHOD AND LOCATION APPROVED BY LANDLORD'S ARCHITECT AND SUBJECT TO ALL LOCAL CODES AND ORDINANCES.

LANDLORD REQUIREMENTS – APPLICABLE TO ALL SHEETS

- ANY CHANGES AND/ OR UPGRADES TO TENANT'S EXISTING MECHANICAL SYSTEMS SHALL COMPLY WITH ALL CODES AND MALL CRITERIA. EXISTING SYSTEMS SHALL POSSESS THE CAPACITY TO HANDLE ANY AND ALL CHANGES IN LOAD.
- NO PITCH POCKETS ARE PERMITTED ON THE ROOF FOR ANY CONDENSATE DRAINS, REFRIGERANT PIPING, POWER OR CONTROL WIRING. ALL CONNECTIONS ARE TO BE MADE INSIDE THE EQUIPMENT CURB OR THROUGH PRE-MANUFACTURED PIPING CURB.
- NOTHING IS PERMITTED TO BE ATTACHED TO, SUSPENDED FROM, OR PENETRATE LANDLORD'S STRUCTURE, FLOOR DECK, OR ROOF DECK. YOU MAY ATTACH, NON-DESTRUCTIVELY, TO OR SUSPEND FROM THE TOP CHORD OF THE JOIST OR THE STRUCTURAL STEEL WHICH EXISTS ABOVE THE TENANT SPACE. WHEN ATTACHING TO LANDLORD'S STRUCTURE, DO NOT DRILL, WELD, SCREW, OR SHOOT INTO STRUCTURE. ALTERNATIVE METHODS OF ATTACHMENT ONLY, NOTHING TO DAMAGE LANDLORD'S BASE BUILDING STRUCTURE. TENANT SHALL PROVIDE SIGNED AND SEALED STRUCTURAL DRAWINGS, BY A STRUCTURAL ENGINEER WITH LEGALLY ACTIVE REGISTRATION AS INDICATED BY ALL JURISDICTIONAL REQUIREMENTS, FOR ALL STRUCTURAL MODIFICATIONS FOR LANDLORD RECORDS.
- ALL PENETRATIONS TO ROOF MUST BE APPROVED BY LANDLORD. ALL RELATED ROOF WORK MUST BE DONE BY MALL'S DESIGNATED ROOFING CONTRACTOR, AT TENANT'S EXPENSE. COORDINATE ALL WORK WITH PROPERTY MANAGEMENT ON SITE.
- TENANT MUST REMOVE ALL ABANDONED ROOFTOP AND/ OR MECHANICAL EQUIPMENT ABOVE THE LEASED PREMISES AND WITHIN THE LEASED PREMISES, AT TENANT EXPENSE. PATCH AND REPAIR ROOF AS NEEDED.
- TENANT'S GC TO LABEL ALL ROOF TOP EQUIPMENT WITH TENANT NAME SPACE NUMBER AND EQUIPMENT IDENTIFICATION (RTU-1, EF-1), PER MALL SPECIFICATIONS/ STANDARDS.
- ALL PIPING ON ROOF SHALL BE SUPPORTED ON PRE-MANUFACTURED PIPE SUPPORTS INSTALLED ON CARRY TREAD, SPACED PROPERLY TO SUPPORT PIPING. TREATED WOOD SUPPORTS ARE NOT PERMITTED.
- ALL UNEXPOSED SUPPLY AIR AND OUTSIDE AIR DUCTWORK SHALL BE EXTERNALLY INSULATED WITH 1 1/2" THICK FOIL FACE INSULATION. INTERNALLY LINED DUCTWORK MAY BE USED FOR ACOUSTIC PURPOSES ONLY, NOT AS A SUBSTITUTE FOR EXTERNAL INSULATION.
- ALL DUCTWORK SHALL BE SHEET METAL. FLEX DUCT MAY ONLY BE USED IN RUNS OF 5'-0" OR LESS.
- AT CONCLUSION OF PROJECT, HVAC SYSTEM MUST BE TESTED AND BALANCED BY A LICENSED CONTRACTOR. COPY OF BALANCE REPORT MUST BE PROVIDED TO PROPERTY MANAGEMENT OFFICE ON-SITE.
- LANDLORD STRONGLY PREFERS USE OF ENERGY STAR PRODUCTS AND/OR EQUIPMENT WHENEVER POSSIBLE DURING TENANT BUILD OUT, WHICH CAN REDUCE ENERGY CONSUMPTION.

GENERAL NOTES:

A. 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.
B. CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD VERIFICATION OF ALL EXISTING CONDITIONS PRIOR TO SUBMITTING THE BID. NO ADDITIONAL COMPENSATION WILL BE PROVIDED FOR ANY EXTRAS DUE TO THE CONTRACTOR'S FAILURE TO VISIT THE PROJECT SITE PRIOR TO SUBMITTING THE BID. ANY DISCREPANCIES SHALL BE IMMEDIATELY REPORTED TO THE ENGINEER FOR RESOLUTION.
C. ALL CONTRACTORS SHALL REVIEW A COMPLETE SET OF CONSTRUCTION DOCUMENTS.
D. 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.
E. ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH ALL APPLICABLE GOVERNMENT AND LOCAL CODES.
F. MECHANICAL CONTRACTOR SHALL FIELD COORDINATE WITH ELECTRICAL CONTRACTOR FOR ALL POWER REQUIREMENTS.
G. ALL CONTRACTORS SHALL REVIEW A COMPLETE SET OF CONSTRUCTION DOCUMENTS AND COOPERATE WITH THE OTHER TRADES SO THAT THE INSTALLATION OF ALL EQUIPMENT MAY BE PROPERLY COORDINATED.
H. ALL EQUIPMENT FURNISHED SHALL FIT THE SPACE AVAILABLE WITH CONNECTIONS IN THE REQUIRED LOCATIONS AND WITH ADEQUATE SPACE FOR OPERATING AND SERVICING. THE DRAWINGS ARE GENERALLY DIAGRAMMATIC AND INDICATE THE INTENT OF THE INSTALLATION WHILE THE SPECIFICATIONS AND EQUIPMENT LIST DENOTE THE TYPE AND QUALITY OF MATERIAL AND WORKMANSHIP TO BE USED. THE DRAWINGS SHALL NOT BE SCALED FOR EXACT MEASUREMENTS. WHERE A CONFLICT EXISTS BETWEEN THE DRAWINGS AND THE SPECIFICATIONS, THE HIGHER AND/OR MORE COSTLY STANDARD WILL APPLY. THE CONTRACTOR SHALL PROMPTLY NOTIFY THE ENGINEER WHOSE DECISION SHALL BE FINAL. NO ALLOWANCE WILL BE MADE SUBSEQUENTLY IN THIS REGARD ON BEHALF OF THE CONTRACTOR AFTER AWARD OF THE CONTRACT.
I. COORDINATE DUCT ROUTING AND HEIGHTS WITH GENERAL CONTRACTOR. VERIFY ALL CLEARANCES BEFORE STARTING WORK.
J. 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.
K. ALL DUCT CONNECTIONS TO HVAC EQUIPMENT MUST BE MADE WITH FLEXIBLE CONNECTORS.
L. DO NOT ATTACH ANYTHING TO DECK ABOVE. ATTACH TO STRUCTURE (I.e. BEAMS, JOISTS) ONLY. DUCT HANGERS SHALL BE INSTALLED IN ACCORDANCE WITH LOCAL CODE. ALL CONNECTIONS TO JOISTS SHALL BE MADE AT THE TOP CORD.
M. 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.
N. 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.
O. 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.
P. ALL ROOFING WORK SHALL BE PERFORMED BY LANDLORD'S APPROVED ROOFING CONTRACTOR AT TENANT'S EXPENSE, IF REQUIRED IN LEASE OR TENANT CRITERIA MANUAL.
Q. ROOF MOUNTED EQUIPMENT SHALL BE LABELED WITH THE TENANT NAME AND SPACE NUMBER WITH 3" HIGH WEATHER PROOF LETTERS.
R. ALL GREASE EXHAUST DUCTWORK SHALL BE PROVIDED WITH 3" FOIL FACED THERMAL-CERAMIC INSULATION FOR GREASE DUCTS. INSULATION SHALL MEET NFPA 96 AND ASTM E 2336 REQUIREMENTS.
S. GREASE DUCT LEAKAGE TESTING MUST BE PERFORMED PRIOR TO CONCEALMENT OF THE DUCTWORK.
T. 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.
U. AT THE COMPLETION OF CONSTRUCTION AN NEBB, AABC OR TABB CERTIFIED AIR BALANCE REPORT SHALL BE SUBMITTED TO THE ENGINEER AND THREE COPIES TO THE LANDLORD. THE BALANCING SHALL BE COMPLETED BY NATION TAB. CONTACT WILL TURNBOURN AT WILL@NATIONALTAB.COM OR 314-954-6244.
V. THE CONTRACTOR SHALL OBTAIN A 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.
W. PARTS OF THE BASE BUILDING SYSTEMS THAT FALL INTO LEASE LINE SHALL REMAIN UNDISTURBED UNLESS NOTED OTHERWISE.
X. PROVIDE ALL NECESSARY WIRING, RELAYS, DETECTORS, COMPONENTS, ETC., FOR FIRE ALARM OR CONTROL SYSTEM INTERLOCK IF APPLICABLE. VERIFY WITH MALL PERSONNEL BEFORE BID.
Y. DISPOSE OF ALL EQUIPMENT NOT REUSED AS A PART OF THE NEW WORK AS DIRECTED BY THE OWNER. THE OWNER RESERVES THE FIRST RIGHT OF SALVAGE ON ALL EQUIPMENT AND MATERIALS.

- THE MALL OPERATIONS DIRECTOR MUST APPROVE THE LOCATION OF THE UNITS AND REFRIGERANT PIPE ROUTING.
- ALL PIPING THROUGH THE ROOF MUST USE A PRE-MANUFACTURED PORTALSPLUS PIP PORTAL (NO PITCH POCKETS ARE PERMITTED)
- UNITS MUST BE ON A FULL PERIMETER CURBS WITH PORTALSPLUS OR PATE TYPE RAILS (NO WOOD BLOCKING PERMITTED.
- ALL PIPING ON THE ROOF SHALL BE SUPPORTED WITH PRE-MANUFACTURED PIPE SUPPORTS ON CARRY TREAD, SPACED PROPERLY TO SUPPORT PIPING. USE PORTALSPLUS OR MIRIO SUPPORTS. THE USE OF WOOD FOR SUPPORTS IS PROHIBITED.
- ALL ROOF WORK TO BE PERFORMED BY LANDLORD'S ROOFING CONTRACTOR AT TENANT'S EXPENSE.
- ALL STEEL MODIFICATIONS FROM CONDENSING UNIT INSTALLATIONS TO BE DONE BY A LANDLORD APPROVED STEEL CONTRACTOR AT TENANT'S EXPENSE.
- ALL ROOF TOP LOCATIONS SHALL BE LOCATED IN AREAS DESIGNATED BY A LANDLORD APPROVED STRUCTURAL ENGINEER.
- ALL UNITS SHALL BE SET ON A FACTORY SUPPLIED CURB AND MUST EXTEND A MINIMUM OF 12" ABOVE THE HIGH POINT OF ROOFING MATERIAL. CURB ADAPTORS ARE NOT ALLOWED.
- POWER CONNECTIONS AND DUCTWORK TO UNIT SHALL BE WITHIN THE PERIMETER OF THE ROOF CURB AND NOT THROUGH THE ROOF.
- CONTRACTOR TO ENSURE THAT ALL ROOFING WARRANTIES REMAIN INTACT WITH TENANT ROOFING WORK.
- CONTRACTOR TO PROVIDE WALK PADS AROUND ALL UNITS TO PROTECT THE ROOF FOR SERVICING OF EQUIPMENT.

aria GROUP
830 North Blvd.
Oak Park, Illinois
60301
708-445-8400
ariainc.com
ARIA GROUP ARCHITECTS, INC.

SHAKE SHACK
3393 Peachtree Road NE, Space 1014A, Atlanta, GA 30326
LENOX SQUARE

FIELD VERIFICATION
Contractor shall verify all figured dimensions and conditions at the job site and notify Aria Group Architects, Inc. of any dimensional errors, omissions or discrepancies before beginning or fabricating any work. Do not scale these drawings.

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	10/25/21	ISSUE FOR LL REVIEW

REVISIONS

REGISTERED PROFESSIONAL ENGINEER 026421 GEORGIA
Date: 02/02/22
COA # PER003790

Drawing Title
MECHANICAL ROOF PLAN

Job No.	Drawn
214746	RAS
Scale	Date
N.T.S.	09/17/2021

Sheet No.
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2

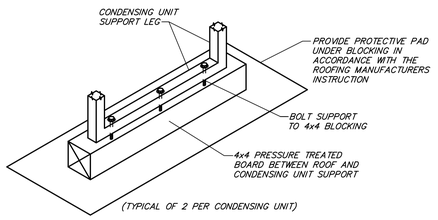
MAXIMUM HALF OF DUCT PERIMETER	PAIR AT 10 FT. SPACING		PAIR AT 8 FT. SPACING		PAIR AT 5 FT. SPACING		PAIR AT 4 FT. SPACING	
	STRAP	WIRE/ ROD	STRAP	WIRE/ ROD	STRAP	WIRE/ ROD	STRAP	WIRE/ ROD
P/2 = 30"	1" x 22 GA.	10 GA. (.135")	1" x 22 GA.	10 GA. (.135")	1" x 22 GA.	12 GA. (.106")	1" x 22 GA.	12 GA. (.106")
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 16 GA. – TWO 1/4" DIA. 1" x 16 GA. – TWO 3/8" DIA. PLACE FASTENERS IN SERIES, NOT SIDE BY SIDE.	1" x 22 GA. – 260 LBS. 1" x 20 GA. – 320 LBS. 1" x 18 GA. – 420 LBS. 1" x 16 GA. – 700 LBS. 1 1/2" x 16 GA. – 1100 LBS.	0.106" – 80 LBS. 0.135" – 120 LBS. 0.162" – 160 LBS. 1/4" – 270 LBS. 3/8" – 680 LBS. 1/2" – 1250 LBS. 5/8" – 2000 LBS. 3/4" – 3000 LBS.

NOTES:
1. DIMENSIONS OTHER THAN GAUGE ARE IN INCHES.
2. TABLES ALLOW FOR DUCT WEIGHT, 1 LB./SF INSULATION WEIGHT AND NORMAL REINFORCEMENT AND TRAPEZE WEIGHT, BUT NO EXTERNAL LOADS.
3. STRAPS ARE GALVANIZED STEEL; OTHER MATERIALS ARE UNCOATED STEEL.
4. ALLOWABLE LOADS FOR P/2 ASSUME THAT DUCTS ARE 16 GA. MAXIMUM, EXCEPT THAT WHEN MAXIMUM DUCT DIMENSION (W) IS OVER 60" THEN P/2 MAXIMUM IS 1.25 W.
5. 12, 10 OR 8 GA. WIRE IS STEEL OF BLACK ANNEALED, BRIGHT BASIC OR GALVANIZED TYPE.
6. DUCTS SHALL BE SUPPORTED AT INTERVALS NOT EXCEEDING 10 FEET.

7 RECTANGULAR DUCT HANGER TABLE

NOT TO SCALE



8 CONDENSING UNIT SUPPORT DETAIL

NOT TO SCALE

LANDLORD REQUIREMENTS – APPLICABLE TO ALL SHEETS

- ANY CHANGES AND/ OR UPGRADES TO TENANT'S EXISTING MECHANICAL SYSTEMS SHALL COMPLY WITH ALL CODES AND MALL CRITERIA. EXISTING SYSTEMS SHALL POSSESS THE CAPACITY TO HANDLE ANY AND ALL CHANGES IN LOAD.
- NO PITCH POCKETS ARE PERMITTED ON THE ROOF FOR ANY CONDENSATE DRAINS, REFRIGERANT PIPING, POWER OR CONTROL WIRING. ALL CONNECTIONS ARE TO BE MADE INSIDE THE EQUIPMENT CURB OR THROUGH PRE-MANUFACTURED PIPING CURB.
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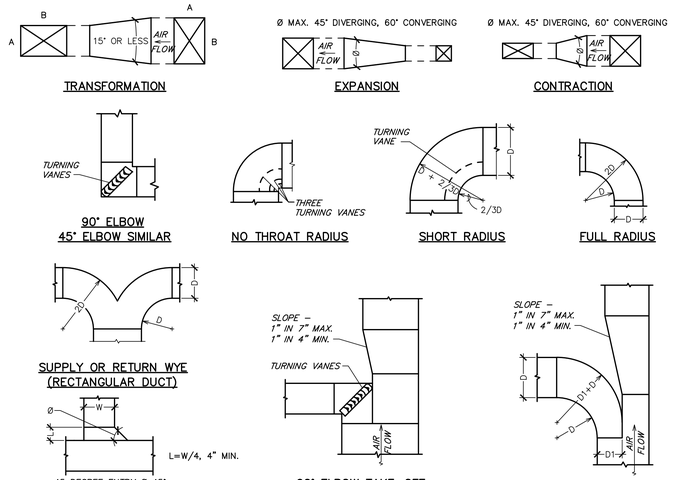
- LANDLORD STRONGLY PREFERS USE OF ENERGY STAR PRODUCTS AND/OR EQUIPMENT WHENEVER POSSIBLE DURING TENANT BUILD OUT, WHICH CAN REDUCE ENERGY CONSUMPTION.

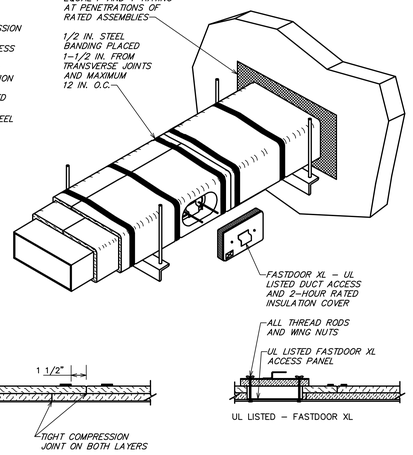


4 DUCTWORK DETAILS

NOT TO SCALE

NOTES:

1. *THERMAL CERAMICS FIREMASTER FASTWRAP XL IS TESTED TO ASTM E2336 AND UL LISTED PER HWKT.018 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 814 (UL 1479). ICC–ES APPROVAL PER REPORT ESR 2213 OR EST 2832.*
2. *COMPLIANT TO THE FOLLOWING CODES:*
   NFPA 96
   INTERNATIONAL MECHANICAL CODES
   UNIFORM MECHANICAL CODE
   CALIFORNIA MECHANICAL CODE
3. *INSULATION APPLIED IN TWO LAYERS WITH TIGHT COMPRESSION JOINT ON BOTH LAYERS AT ALL JOINTS.*
4. *MINIMUM 16 GAUGE CARBON STEEL (OR 18 GAUGE STAINLESS STEEL) RECTANGULAR OR ROUND GREASE EXHAUST DUCT.*
5. *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.*
6. *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 2 X 1/8 IN. STEEL ANGLE OR SMACNA EQUIVALENT SUPPORT SYSTEM.*
7. *THERMAL CERAMICS DUCT WRAP SHALL BE INSTALLED DIRECTLY ONTO THE DUCT AND APPLIED FROM THE HOOD CONNECTION TO THE CONNECTION OF THE FAN.*
8. *THERMAL CERAMICS DUCT ENCLOSURE SYSTEM SHALL BE INSTALLED IN STRICT ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS AND UL LISTINGS.*



** DETAIL COURTESY OF MORGAN THERMAL CERAMICS.

5 FIREMASTER FASTWRAP XL DETAIL

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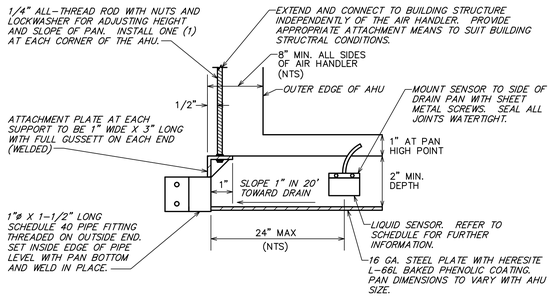
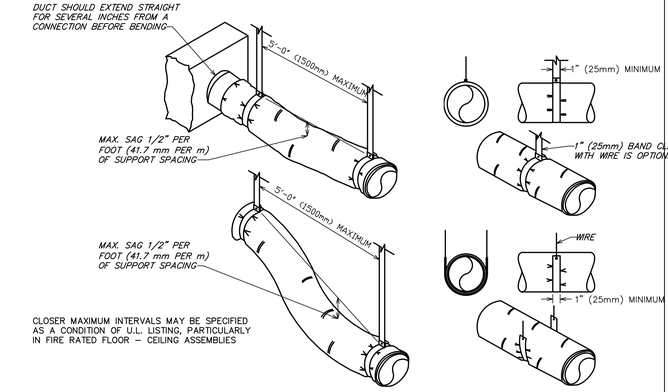


NOTE:
1. *AHU DRAIN PAN SHALL EXTEND 6" BEYOND THE ENTIRE AHU ON ALL SIDES.*

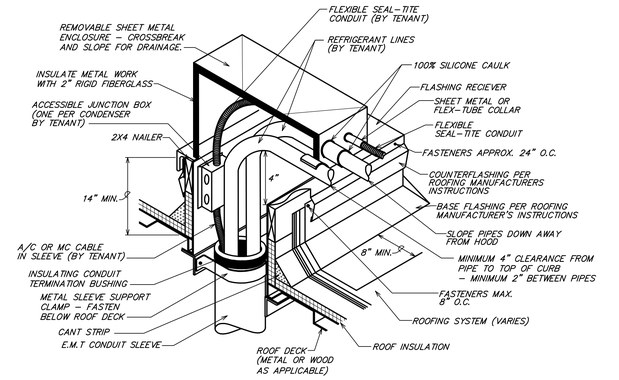
6 AHU DRAIN PAN DETAIL

NOT TO SCALE



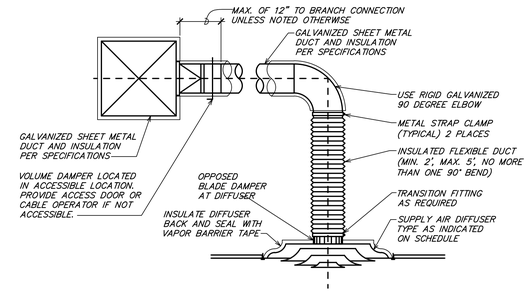
1 FLEXIBLE DUCT SUPPORTS

NOT TO SCALE



2 CONDENSER REFRIGERANT LINE PIPING AND POWER THROUGH ROOF DECK

NOT TO SCALE



3 TYPICAL DIFFUSER CONNECTION

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Oak Park, Illinois
60301
708-445-8400
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REVISIONS

GEORGIA REGISTERED 026421 PROFESSIONAL ENGINEER
Date: 02/02/22
COA # PEF003790

Drawing Title
MECHANICAL DETAILS

Job No.	Drawn
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Scale	Date
N.T.S.	09/17/2021

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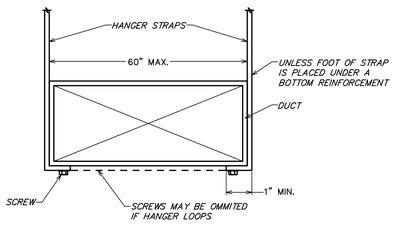
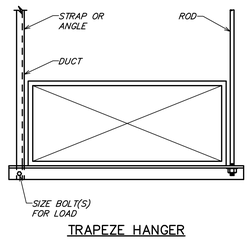
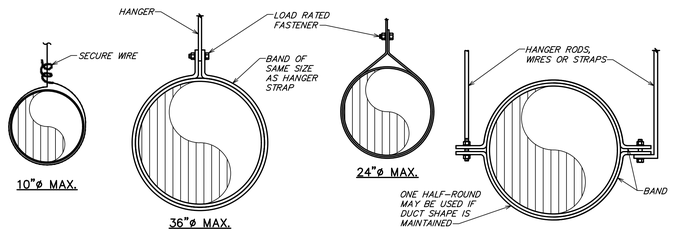


STRAP HANGER



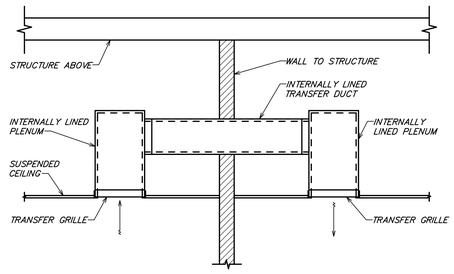
TRAPEZE HANGER



NOTE: HANGERS MUST NOT DEFORM DUCT SHAPE

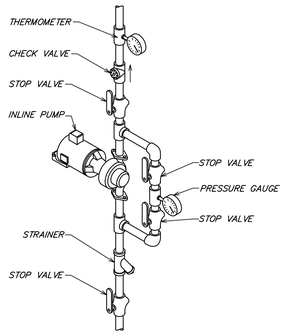
11 DUCT HANGER DETAIL

NOT TO SCALE



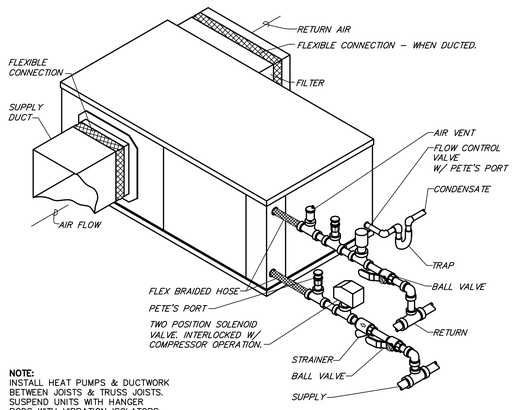
8 RETURN AIR TRANSFER

NOT TO SCALE



9 TYPICAL PUMP DETAIL

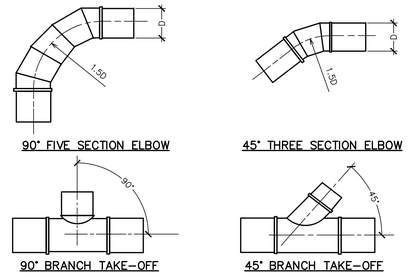
NOT TO SCALE



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

10 HEAT PUMP CONNECTION DETAIL

NOT TO SCALE



4 TYPICAL ROUND DUCT FITTINGS

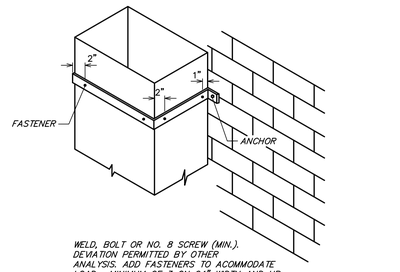
NOT TO SCALE

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

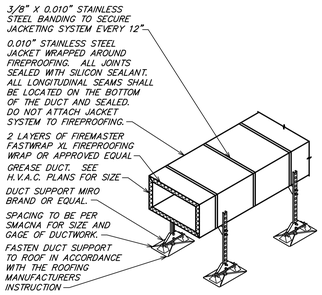
NOT TO SCALE



WELD, BOLT OR NO. 8 SCREW (MIN.). DEVIATION PERMITTED BY OTHER ANALYSIS. ADD FASTENERS TO ACCOMMODATE LOAD. MINIMUM OF 3 ON 24" WIDTH AND UP. ADD ALONG SIDES NEAREST ANCHORS.

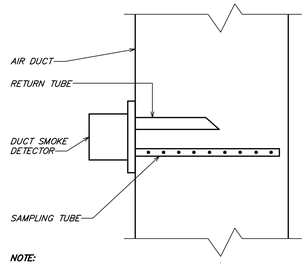
6 DUCT SUPPORT FROM WALL

NOT TO SCALE



7 TYPICAL EXTERIOR GREASE DUCT SECTION

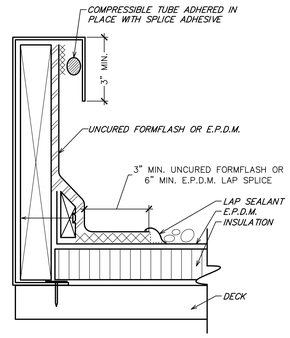
NOT TO SCALE



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.

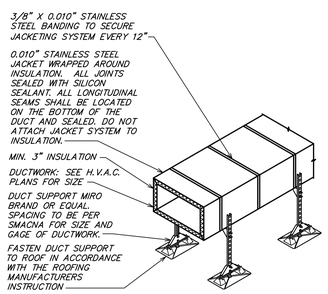
1 DUCT SMOKE DETECTOR DETAIL

NOT TO SCALE



2 CURB FLASHING DETAIL

NOT TO SCALE



3 EXTERIOR DUCT SECTION

NOT TO SCALE

LANDLORD REQUIREMENTS – APPLICABLE TO ALL SHEETS

- *ANY CHANGES AND/ OR UPGRADES TO TENANT'S EXISTING MECHANICAL SYSTEMS SHALL COMPLY WITH ALL CODES AND MALL CRITERIA. EXISTING SYSTEMS SHALL POSSESS THE CAPACITY TO HANDLE ANY AND ALL CHANGES IN LOAD.*
- *NO PITCH POCKETS ARE PERMITTED ON THE ROOF FOR ANY CONDENSATE DRAINS, REFRIGERANT PIPING, POWER OR CONTROL WIRING. ALL CONNECTIONS ARE TO BE MADE INSIDE THE EQUIPMENT CURB OR THROUGH PRE-MANUFACTURED PIPING CURB.*
- *NOTHING IS PERMITTED TO BE ATTACHED TO, SUSPENDED FROM, OR PENETRATE LANDLORD'S STRUCTURE, FLOOR DECK, OR ROOF DECK. YOU MAY ATTACH, NON-DESTRUCTIVELY, TO OR SUSPEND FROM THE TOP CHORD OF THE JOIST OR THE STRUCTURAL STEEL WHICH EXISTS ABOVE THE TENANT SPACE. WHEN ATTACHING TO LANDLORD'S STRUCTURE, DO NOT DRILL, WELD, SCREW, OR SHOOT INTO STRUCTURE. ALTERNATIVE METHODS OF ATTACHMENT ONLY, NOTHING TO DAMAGE LANDLORD'S BASE BUILDING STRUCTURE. TENANT SHALL PROVIDE SIGNED AND SEALED STRUCTURAL DRAWINGS, BY A STRUCTURAL ENGINEER WITH LEGALLY ACTIVE REGISTRATION AS INDICATED BY ALL JURISDICTIONAL REQUIREMENTS, FOR ALL STRUCTURAL MODIFICATIONS FOR LANDLORD RECORDS.*
- *ALL PENETRATIONS TO ROOF MUST BE APPROVED BY LANDLORD. ALL RELATED ROOF WORK MUST BE DONE BY MALL'S DESIGNATED ROOFING CONTRACTOR, AT TENANT'S EXPENSE. COORDINATE ALL WORK WITH PROPERTY MANAGEMENT ON SITE.*
- *TENANT MUST REMOVE ALL ABANDONED ROOFTOP AND/ OR MECHANICAL EQUIPMENT ABOVE THE LEASED PREMISES AND WITHIN THE LEASED PREMISES, AT TENANT EXPENSE. PATCH AND REPAIR ROOF AS NEEDED.*
- *TENANT'S GC TO LABEL ALL ROOF TOP EQUIPMENT WITH TENANT NAME SPACE NUMBER AND EQUIPMENT IDENTIFICATION (RTU-1, EF-1), PER MALL SPECIFICATIONS/ STANDARDS.*
- *ALL PIPING ON ROOF SHALL BE SUPPORTED ON PRE-MANUFACTURED PIPE SUPPORTS INSTALLED ON CARRY TREAD, SPACED PROPERLY TO SUPPORT PIPING. TREATED WOOD SUPPORTS ARE NOT PERMITTED.*
- *ALL UNEXPOSED SUPPLY AIR AND OUTSIDE AIR DUCTWORK SHALL BE EXTERNALLY INSULATED WITH 1 1/2" THICK FOIL FACE INSULATION. INTERNALLY LINED DUCTWORK MAY BE USED FOR ACOUSTIC PURPOSES ONLY, NOT AS A SUBSTITUTE FOR EXTERNAL INSULATION.*
- *ALL DUCTWORK SHALL BE SHEET METAL. FLEX DUCT MAY ONLY BE USED IN RUNS OF 5'-0" OR LESS.*
- *AT CONCLUSION OF PROJECT, HVAC SYSTEM MUST BE TESTED AND BALANCED BY A LICENSED CONTRACTOR. COPY OF BALANCE REPORT MUST BE PROVIDED TO PROPERTY MANAGEMENT OFFICE ON-SITE.*
- *LANDLORD STRONGLY PREFERS USE OF ENERGY STAR PRODUCTS AND/OR EQUIPMENT WHENEVER POSSIBLE DURING TENANT BUILD OUT, WHICH CAN REDUCE ENERGY CONSUMPTION.*

aria GROUP

830 North Blvd.
Oak Park, Illinois
60301

708-445-8400
ariainc.com

ARIA GROUP ARCHITECTS, INC.

SHAKE SHACK

3393 Peachtree Road NE, Space 1014A, Atlanta, GA 30326

LENOX SQUARE

FIELD VERIFICATION
Contractor shall verify all figured dimensions and conditions at the job site and notify Aria Group Architects, Inc. of any dimensional errors, omissions or discrepancies before beginning or fabricating any work. Do not scale these drawings.

NO.	DATE	REMARKS
3	02/02/22	ISSUE FOR CONSTRUCTION
2	01/11/22	ISSUE FOR CONSTRUCTION
1	12/03/21	ISSUE FOR CONSTRUCTION
	11/08/21	ISSUE FOR CONSTRUCTION
	10/25/21	ISSUE FOR LL REVIEW

REVISIONS

GEORGIA REGISTERED 026421 PROFESSIONAL ENGINEER BOY

Date: 02/02/22
COA # PEF003790

Drawing Title
MECHANICAL DETAILS

Job No.	Drawn
214746	RAS

Scale	Date
N.T.S.	09/17/2021

Sheet No.
M502

Schnackel engineers

New York ■ Miami ■ Omaha ■ Los Angeles ■ Seattle ■ Honolulu

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SPECIFICATIONS TABLE OF CONTENTS

SECTION 230000 – HVAC GENERAL CONDITIONS

PART 1 GENERAL

1.01 APPLICABILITY
A. This section supplements all sections of the Specifications for Division 23 and shall apply to all phases of work hereinafter specified, shown on the Drawings, or required to provide a complete installation of approved HVAC systems.
1.02 DEFINITIONS
A. "Work" is hereby defined as, "The construction and services required by the Contract Documents whether completed or partially completed and includes all labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The work may constitute the whole or a part of the project."
B. "Furnish" is hereby defined as, "To supply and deliver, unload, and inspect for damage."
C. "Install" is hereby defined as, "To unpack, assemble, erect, apply, place, finish, cure, protect, clean, connect, and place into operation into the work."
D. "Provide" is hereby defined as, "To furnish and install."
E. "Connect" is hereby defined as, "To bring service to the equipment and make final attachment including necessary ductwork, piping, wiring, etc."
F. "Concealed" is hereby defined as, "Hidden from sight in chases, furred spaces, shafts, hung ceilings, embedded in construction, in crawl spaces, or buried."
G. "Exposed" is hereby defined as, "Not installed underground nor concealed as defined by the Specifications."
H. "Drawings" is hereby defined as, "All plans, details, equipment schedules, diagrams, sketches, etc. issued for the construction of the work."
1.03 CODES AND STANDARDS
A. Perform work in accordance with the applicable Building Code, Electrical Code, Fire Code, Mechanical Code, Plumbing Code, Energy Code, and all other applicable codes, amendments, and ordinances. Also perform all work in accordance with the Americans with Disabilities Act (ADA) and the Authority Having Jurisdiction (AHJ) including Fire Marshal(s).
B. Perform work in accordance with Landlord requirements, including any Tenant Criteria Manuals and Lease Exhibits, where applicable.
C. Perform work in accordance with the applicable utility companies serving the project. Make all arrangements with the utility companies for proper coordination of the work.
D. Recognized Standards: Design, manufacture, testing and method of installation of all apparatus and materials furnished under the requirements of these Specifications shall conform to the latest publications or standard rules of Underwriters Laboratories, Inc. (U.L.), American Society for Testing and Materials (ASTM), American National Standards Institute (ANSI), and National Electrical Code (NEC), National Fire Protection Association (NFPA), American Society of Heating, Refrigerating and Air–Conditioning Engineers (ASHRAE), and the Sheet Metal and Air Conditioning Contractors' National Association (SMACNA).
E. The Contract Documents shall take precedence where the Contract Documents exceed code, Landlord, utility, or recognized standards requirements.
1.04 PERMITS AND FEES
A. Permits, licenses, fees, inspections and arrangements required for the work under this Contract shall be obtained by the Contractor at his expense, unless otherwise indicated.
1.05 CONTRACT DRAWINGS
A. The Contractor is responsible to obtain, fully understand, and coordinate the work with the complete set of Contract Documents. Any required corrections, including all associated costs, arising from issues caused by the Contractor's failure to understand and/or coordinate the work with the complete set of Contract Documents are the Contractor's sole responsibility.
B. Work under these sections is diagrammatic unless indicated otherwise and is intended to convey the scope of work and indicate the general arrangement of ductwork, piping, equipment, and accessories. Follow these drawings in laying out the work and verify spaces for the installation of these materials and equipment. Wherever a question exists as to the exact intended location of ductwork, piping, or equipment, obtain instructions from the Architect before proceeding with the work.
C. Notify the Architect for resolution if a discrepancy is discovered within the Contract Documents. Failure of the Contractor to notify the Architect of discrepancies shall result in the resolution becoming the Contractor's responsibility and subject to the Architect's review and possible rejection. Should the Architect reject a discrepancy resolution of which they were not notified, the Contractor is fully responsible to correct the installation, including all associated costs, until approval of the installation is given by the Architect.
1.06 EXISTING CONDITIONS
A. Verify all existing conditions prior to beginning work.
B. Any existing conditions indicated in the Contract Documents are based on information drawings provided by others and possibly limited field verification. The Contractor shall adjust for actual field conditions at no additional expense to the Owner.
C. The Contractor shall visit the project site, review existing conditions against the Contract Documents, and familiarize himself with the work prior to bidding and start of the work. By signing the Contract, the Contractor acknowledges the site visit has been completed and the existing conditions are accepted.
D. The Contractor shall notify the Architect of major discrepancies in writing so the appropriate modifications to the design can be made without delay to the project. The Contractor assumes full responsibility of adjusting for discrepancies of which the Architect is not informed.
1.07 SUBMITTALS
A. Shop Drawings:
1. Furnish the following submittals to the Architect for review by the Engineer:
a. Provide product data and shop drawings for vibration isolation.
b. Provide balancing firm qualifications and final test report for Testing, Adjusting, and Balancing.
c. Provide product data for duct insulation.
d. Provide product data for grease duct fireproofing (if specified).
e. Provide product data for HVAC piping insulation.
f. Provide product data for hydronic piping.
g. Provide product data and shop drawings for HVAC ductwork.
h. Provide product data for air duct accessories.
i. Provide product data and shop drawings for HVAC power ventilators.
j. Provide product data and shop drawings for air outlets and inlets.
k. Provide product data and shop drawings for self–contained air conditioners.
2. Submittals other than those listed above will not be reviewed and will be returned stating as such.
3. Shop drawings shall be prepared by a manufacturer's representative, and shall contain names of the manufacturer and cut sheets of equipment to be used on the project. Use manufacturer's specification sheets identified by number indicated on drawings or schedules. Indicate catalog number on the cut sheets. As applicable, provide construction data, weight and dimensional data, voltage ratings, performance data, listing data, pump curves, fan curves and sound data as part of the shop drawing submittal.
4. Submittals are reviewed only for general compliance with the Contract Documents. 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 coordination of substituted materials and equipment lies solely with the substituting Contractor.
5. Electrical Characteristics: Verify that proper power supply is available prior to ordering equipment. Verify proper voltage, phase and current rating of power supply and inform Engineer of any deviations prior to order, connection of equipment or start–up. Responsibility for verification of proper power supply voltage and any product returns or damage resulting from incorrect connections shall rest with this Contractor.
B. Test Reports: Provide Testing, Adjusting, and Balancing (TAB) and Commissioning reports to the Architect for review by the Engineer. All other reports shall be provided to the Owner.
1.08 QUALITY ASSURANCE
A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum five years experience.
B. Installer Qualifications: Company specializing in performing the work of this section, with minimum five years experience.
C. Products:
1. Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.
D. All equipment and components shall be free of all rust/corrosion or any visible damage. All items not complying with this requirement shall be replaced without any change in the Contract amount.
E. Equipment performance 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 and accessories specified in either location shall be included in the Contract. Provide all necessary accessories and connections as required for a complete, functional system, including all required components reasonably inferred to as necessary although such components may or may not be specifically indicated in the Contract Documents.
F. Code or utility company requirements shall supersede any conflicting requirements of this section.
1.09 DELIVERY, STORAGE, AND HANDLING
A. Rooftop Equipment: Protect units from physical damage by storing off site until roof mounting curbs are in place, ready for immediate installation of units.
B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.
C. Protect dampers and accessories from damage to operating linkages, blades and finishes.
D. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
E. Protect motors stored on site from weather and moisture by maintaining factory covers and suitable weather–proof covering. For extended outdoor storage, remove motors from equipment and store separately.
1.10 WARRANTY AND GUARANTEE
A. Submit manufacturer's warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.
B. Provide one year manufacturer warranty for pumps.
C. Provide three year manufacturers warranty for solid state ignition modules.
D. Provide five year manufacturers warranty for compressors, heat exchangers, condensing units, and electronic air cleaners.

PART 2 PRODUCTS

2.01 SUBSTITUTIONS
A. The manufacturers listed are listed to set minimum standards for quality, design, and functionality. The products of other manufacturers may be submitted, at the Contractor's option, during shop drawing review unless indicated otherwise. The products of other manufacturers shall meet or exceed all requirements of the Contract Documents. The Contractor accepts all responsibility for costs and coordination issues arising out of the substitution of materials or equipment, and the coordination of such substitutions with all other contractors and subcontractors.
B. The Contractor may use any of the following ductwork, piping or insulation materials at his option, provided the selected material meets with the approval of all State, local authorities and any utility company requirements. Verification of compliance of the selected material is the sole responsibility of the installing Contractor.

PART 3 EXECUTION

3.01 COORDINATION OF WORK
A. Examine the Contract Documents as a whole for the work of other trades. Coordinate all work accordingly.
B. Promptly report to the Architect any delay or difficulties encountered in the installation of the work, which might prevent prompt and proper installation, or make it unsuitable to connect with or receive the work of others. Failure to so report shall constitute an acceptance of the work of other trades as being fit and proper for the execution of this work.
C. Plan, lay out, and coordinate the work with all trades well enough in advance so that it proceeds with a minimum of interference to work that has not been completed and work that is in progress. Inform all trades of openings required for the work and provide all special frames, sleeves, and anchor bolts required. The HVAC system layout may be altered to suit the conditions with engineer approval, prior to the installation of any work and without additional cost to the Owner. Conflicts arising from lack of coordination shall be this Contractor's responsibility.
D. Perform all work in conformity with the Contract Documents and afford other trades reasonable opportunity for the execution of their work. Properly connect and coordinate this work with the work of other trades at such time and in such a manner as not to delay or interfere with their work.
E. All roofing penetrations shall be flashed and weather sealed by the roofing manufacturer's authorized roofing contractor at this Contractor's expense. This Contractor shall contract with the factory authorized roofing contractor for the specific roofing system applicable to this Project. The use of an unauthorized roofing contractor may result in removal and replacement of the penetration systems at this Contractor's expense.
F. All temperature control wiring, thermostat wiring, damper interlock wiring, control panel interlock wiring and miscellaneous low voltage wiring associated with the equipment furnished or installed under this contract shall be furnished and installed by the mechanical contractor or his sub–contractor. All wiring installed under this contract shall be in full compliance with the National Electrical Code, all State and local codes and requirements of the Electrical Specifications for this project.
3.02 EXAMINATION
A. Verify field measurements are as indicated on the Drawings.
B. Verify all equipment locations prior to rough–in. Maintain adequate equipment service clearance per manufacturer and code.
C. Verify routing of all ductwork and piping in field prior to fabrication or installation. Verify adequate clearance with structure, light fixtures, and ceiling heights.
D. Verify that proper fuel and power supply is available for connection.
3.03 INTERFACE WITH OTHER PRODUCTS
A. Install all ductwork, pipe, equipment, and accessories to preserve fire resistance rating of partitions and other elements, using materials and methods specified.
3.04 FIELD QUALITY CONTROL
A. Provide tests as necessary to establish the adequacy, quality, safety, completed status, and suitable operation of each system. Tests shall be conducted under the supervision of the Architect.
3.05 CLEANING AND REPAIR
A. Clean fire suppression parts to remove harmful materials.
B. Clean exposed surfaces of all ductwork pipe, equipment, and accessories of all dirt, debris, splatter, and other deleterious materials. Follow the manufacturer's recommendations for cleaning as applicable.
C. Repair or replace damaged ductwork, pipe, equipment, and accessories, as directed by and to the satisfaction of the Architect, where marring or disfigurement has occurred. All pipe, equipment, and accessories shall be new.
3.06 PROJECT CLOSEOUT
A. Project Record Documents: At project closeout, provide one printed copy and one electronic copy of the project record documents to the Owner. Record documents will not be reviewed by the Engineer.
B. Record Drawings: Information contained on project record drawings shall include, as a minimum:
1. Actual locations of all equipment, ductwork, air inlets/outlets, accessories, etc.
2. Actual routing of ductwork with sizes and elevations.
3. Actual locations of control devices including valves and volume dampers.
C. Operation and Maintenance Data: Provide descriptive literature, maintenance and operation data for all hvac equipment, control systems, accessories, and materials used. Include maintenance procedures, intervals, and parts list of each item installed under this contract. Include all manufacturer's guarantees and warranties.
D. Maintenance Materials: At project closeout, furnish to the Owner the following:
1. One set of replacement filters for all hvac equipment.
2. The maintenance contract for the hvac system, if applicable.
E. Test Reports: Submit to the Owner all testing reports.

END OF SECTION

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

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Vibration isolators.
B. Equipment:
1. Water cooled packaged units
2. Fans, axial and centrifugal
1.02 SUBMITTALS
A. Product Data: Provide schedule of vibration isolator type with location and load on each.

PART 2 PRODUCTS

2.01 MANUFACTURERS
A. Isolation Technology, Inc.; Kinetics Noise Control, Inc.; Mason Industries.
2.02 VIBRATION ISOLATORS
A. Spring Hanger:
1. Springs: Minimum horizontal stiffness equal to 75 percent vertical stiffness, with working deflection between 0.3 and 0.6 of maximum deflection. Color code springs for load carrying capacity.
2. Housings: Incorporate neoprene isolation pad meeting requirements for neoprene pad isolators or rubber hanger with threaded insert.
3. Misalignment: Capable of 20 degree hanger rod misalignment.
B. Rubber Mount or Hanger: Molded rubber designed for 0.4 inch deflection with threaded insert.

PART 3 EXECUTION

3.01 INSTALLATION
A. Install in accordance with manufacturer's instructions.
B. Provide flexible connections on all piping and ductwork connections to equipment. Refer to other sections of this Specification for the acceptable types of flexible connectors to be used.
C. Selection of type, thickness and deflection of vibration isolation shall be by the vibration control manufacturer based on the specific equipment type and size, as scheduled on the Drawings and indicated below.
3.02 SCHEDULES
A. Equipment Isolation Schedule: (Minimum deflection as sized by the isolation equipment manufacturer.)
1. Water cooled packaged units.
a. Floor mounted (all locations):
1. Base: Concrete Housekeeping Pad.
2. Isolation: Spring: Open or Closed.
b. Suspended 3 ton capacity and smaller:
1. Isolation: Rubber Hanger.
c. Suspended 3.5 ton capacity and larger:
1. Isolation: Spring Hanger, Open or Closed.
2. Fans, axial and centrifugal.
a. Small fans up to 22" diameter wheel:
1. Rubber Mount or Hanger

END OF SECTION

SECTION 230593 – TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Testing, adjustment, and balancing of air systems.
1. Air handling units; Packaged heating and/or cooling equipment; Fans. (Exhaust and supply); Coils; Terminal equipment; Air inlets and outlets. (Diffusers, grilles, louvers, etc.)
B. Testing, adjustment, and balancing of hydronic systems.
1. Pumps; Boilers; Coils; Heat exchangers; Terminal equipment.
C. Measurement of final operating condition of HVAC systems.
D. Independent agency requirements.
1.02 SUBMITTALS
A. Qualifications: Submit name of adjusting and balancing agency and TAB supervisor for approval within 30 days after award of Contract. Provide TAB Agency qualifications.
B. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
1. Submit to the Construction Manager within two weeks after completion of testing, adjusting, and balancing.
2. Provide reports in bound manuals, complete with index page and indexing tabs, with cover identification at front and side. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat and equipment locations.
3. Include actual instrument list, with manufacturer name, serial number, and date of calibration.
4. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
5. Include the following on the title page of each report:
a. Name, address and telephone number of Testing, Adjusting, and Balancing Agency.
b. Project: Name; location; Engineer; Contractor, Report date.
1.03 WARRANTY
A. The Balancing Contractor shall be prepared to return to the site at no additional cost to re–adjust air quantities as required to provide uniform temperatures, eliminate drafts and objectionable noises during the first year of occupancy, including one full heating and one full cooling season, after the acceptance of the final balancing report.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS
A. Perform total system balance in accordance with one of the following:
1. AABC MN–1, AABC National Standards for Total System Balance.
2. ASHRAE Std 111, Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air–Conditioning, and Refrigeration Systems.
3. NEBB Procedural Standards for Testing Adjusting Balancing of Environmental Systems.
4. SMACNA HVAC Systems Testing, Adjusting, and Balancing.
B. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the Project.
C. Where HVAC systems and/or components interface with life safety systems, including fire and smoke detection, alarm, and control, coordinate scheduling and testing and inspection procedures with the authorities having jurisdiction.
D. TAB Agency Qualifications:
1. Company specializing in the testing, adjusting, and balancing of systems specified in this Section with a minimum of five years experience.
2. Certified by one of the following:
a. AABC, Associated Air Balance Council; upon completion submit AABC National Performance Guaranty.
b. NEBB, National Environmental Balancing Bureau.
c. TABB, The Testing, Adjusting, and Balancing Bureau of National Energy Management Institute.
3. The TAB Agency must be a completely independent, third party balancing contractor with no financial, common owners or other ties to the installing contractors.
E. TAB Supervisor and Technician Qualifications: Certified by same organization as TAB agency.
3.02 ADJUSTMENT TOLERANCES
A. Air Handling Systems; Air Outlets and Inlets; Hydronic Systems: Adjust to within plus or minus 15 percent of design.
3.03 RECORDING AND ADJUSTING
A. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
B. Mark on the Drawings the locations where traverse and other critical measurements were taken and cross reference the location in the final report.
3.04 AIR SYSTEM PROCEDURE
A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities.
B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.
C. Measure air quantities at air inlets and outlets.
D. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.
E. Use volume control devices to regulate air quantities only to extend that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters. Do not use diffuser, grille or register integral dampers for balancing adjustments unless the plans do not indicate duct mounted devices.
F. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required at no additional expense to the Owner. Vary branch air quantities by damper regulation.
G. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.
H. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions in all operating modes as indicated in the sequence of control.
I. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.
J. Where modulating dampers are provided, take measurements and balance at extreme conditions and at all intermediate operating conditions specified in the sequence of control. Balance variable volume systems at maximum air flow rate, full cooling, and at minimum air flow rate, full heating.
3.05 WATER SYSTEM PROCEDURE
A. Adjust water systems to provide required or design quantities.
B. Use calibrated Venturi tubes, orifices, or other metered fittings and pressure gauges to determine flow rates for system balance. Where flow metering devices are not installed, base flow balance on temperature difference across various heat transfer elements in the system.
C. Adjust systems to provide specified pressure drops and flows through heat transfer elements prior to thermal testing. Perform balancing by measurement of temperature differential in conjunction with air balancing.
D. Effect system balance with automatic control valves fully open to heat transfer elements.
E. Effect adjustment of water distribution systems by means of balancing cocks, valves, and fittings. Do not use service or shut–off valves for balancing unless indexed for balance point.
F. Where available pump capacity is less than total flow requirements or individual system parts, full flow in one part may be simulated by temporary restriction of flow to other parts.
3.06 SCOPE
A. Equipment Requiring Testing, Adjusting, and Balancing (if present on the project):
1. HVAC Pumps; Boilers; All Air Handling Equipment; All Packaged Heating and/or Cooling Equipment; All Coil; All Heat Exchangers; Terminal Heat Transfer Units; Air Terminal Units; Air Inlets and Outlets
3.07 MINIMUM DATA TO BE REPORTED
A. Report (as applicable to the project):
1. Summary Comments:
a. Design versus final performance
b. Notable characteristics of system
c. Summary of outdoor and exhaust flows to indicate amount of building pressurization
d. Nomenclature used throughout report and test conditions.
B. Electric Motors and drives:
1. Manufacturer; Model/Frame; HP/BHP; Phase, voltage, amperage; nameplate, actual, no load; RPM; Service factor; Sheave Make/Size/Bore.
2. V–Belt Drives: Identification/location; Required driven RPM; Driven sheave, diameter and RPM; Belt, size and quantity;
C. Cooling and Heating Coils:
1. Identification/number; Manufacturer
2. Air flow, design and actual
3. Air pressure drop, design and actual
4. Entering and leaving air DB and WB temperature, design and actual
5. Water flow, design and actual (if applicable)
6. Water pressure drop, design and actual (if applicable)
7. Entering and leaving water temperature, design and actual (if applicable)
D. Air Moving Equipment:
1. Manufacturer; Model number; Serial number; Arrangement/Class/Discharge
2. Air flow, specified and actual
3. Inlet; Discharge; Total static pressure (total external), specified and actual
E. Air Distribution Tests:
1. Air terminal number
2. Room number/location
3. Terminal type
4. Terminal size
5. Area factor
6. Design velocity
7. Design air flow
8. Test (final) velocity
9. Test (final) air flow
10. Percent of design air flow
F. Terminal Unit Data:
1. Manufacturer
2. Type, constant, variable, single, dual duct
3. Identification/number
4. Model number
5. Size
6. Minimum static pressure
7. Minimum design air flow
8. Maximum design air flow
9. Maximum actual air flow
10. Inlet static pressure
G. Pumps:
1. Identification/number; Manufacturer; Size/model; Impeller; Service; Design flow rate, pressure drop, BHP; Actual flow rate, pressure drop, BHP; Discharge pressure; Suction pressure; Total operating head pressure

END OF SECTION

SECTION 230595 – FIRE STOPPING FOR HVAC SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Firestopping materials. Firestopping of all penetrations and interruptions to fire rated assemblies, whether indicated on drawings or not, and other openings indicated.
1.02 QUALITY ASSURANCE
A. Fire Testing: Provide firestopping assemblies of designs which provide the scheduled or specified fire ratings when tested in accordance with ASTM E 814 and ASTM E 119.
1. Listing in the current classification or certification books of UL or FM will be considered as constituting an acceptable test report.
2. Current evaluation reports published by CABO, ICBO, or BOCA will be considered as constituting an acceptable test report.
3. Submission of actual test reports is required for assemblies for which none of the above substantiation exists.
B. Installer Qualifications: Company specializing in performing the work of this section and:
1. Approved by Factory Mutual Research under FM Standard 4991, Approval of Firestop Contractors, or meeting any two of the following requirements:
a. With minimum five years documented experience installing work of this type.
b. Where required, licensed by authority having jurisdiction.
c. Approved by firestopping manufacturer.
C. Code requirements shall supersede any conflicting requirements of this section.
D. The Contractor shall examine the Drawings for the architectural work to identify all fire rated, partitions, floors and assemblies and apply the appropriate fire stopping materials and systems to maintain the fire rating of the partition, floor or assembly penetrated based on the construction conditions depicted.

PART 2 PRODUCTS

2.01 MANUFACTURERS
A. A/D Fire Protection Systems Inc.; 3M Fire Protection Products; Specified Technologies, Inc.; USG; Pecora Corporation; Grace Construction Products; Nelson Firestop Products.
2.02 FIRESTOPPING ASSEMBLIES
A. Firestopping: Any material meeting requirements.
1. Fire Ratings: Use any system listed by UL or FM or tested in accordance with ASTM E 814 or ASTM E 119 that has F Rating equal to fire rating of penetrated assembly and minimum T Rating Equal to F Rating and that meets all other specified requirements.
2.03 MATERIALS
A. Elastomeric Silicone Firestopping: Single or multiple component silicone elastomeric compound and compatible silicone sealant; conforming to the following:
1. Durability and Longevity: Permanent.
2. Color: Manufacturer's standard color.
B. Foam Firestoppping: Single or multiple component foam compound; conforming to the following:
1. Durability and Longevity: Permanent.
2. Color: Manufacturer's standard color.
C. Fibered Compound Firestopping: Formulated compound mixed with incombustible non–asbestos fibers; conforming to the following:
1. Durability and Longevity: Permanent.
2. Color: Manufacturer's standard color.
D. Fiber Packing Material: Mineral or ceramic fiber packing insulation; conforming to the following:
1. Durability and Longevity: Permanent.
E. Firestop Devices: Mechanical device with incombustible or silicone elastomer filler and sheet stainless steel jacket, collar, and flanged stops; conforming to the following:
1. Durability and Longevity: Permanent; suitable for pedestrian traffic or vehicular traffic where necessary.
F. Intumescent Putty: Compound which expands on exposure to surface heat gain; conforming to the following:
1. Potential Expansion: Minimum 1000 percent.
2. Durability and Longevity: Permanent.
3. Color: Manufacturer's standard color.
G. Firestop Pillows: Formed mineral fiber pillows; conforming to the following:
1. Durability and Longevity: Permanent.
H. Primers, Sleeves, Forms, and Accessories: Type required for tested assembly design.

PART 3 EXECUTION

3.01 INSTALLATION
A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.
B. Do not cover installed firestopping until inspected by authority having jurisdiction.
C. Install labeling required by code.
D. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation. Maintain minimum temperature before, during, and for 3 days after installation of materials.
E. Provide ventilation in areas where solvent–cured materials are being installed.

END OF SECTION

SECTION 230713 – DUCT INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Duct insulation.
B. Duct liner.
C. Insulation jackets.
D. Supply, return or exhaust ducts in ceiling spaces.
E. Supply, return or exhaust ducts in interior unconditioned areas.
F. Supply, return or exhaust ducts in exposed locations.
G. Outside air intake ducts.
H. Exterior ductwork insulation.
1.02 FIELD CONDITIONS
A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.
B. Maintain temperature during and after installation for minimum period of 24 hours.

PART 2 PRODUCTS

2.01 REQUIREMENTS FOR ALL PRODUCTS OF THIS SECTION
A. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E 84, NFPA 255, or UL 723.
B. Manufacturer: Knauf Fiber Glass; Johns Manville Corporation; Owens Corning Corp.; CertainTeed Corporation.
2.02 GLASS FIBER, FLEXIBLE
A. Insulation: ASTM C 553; flexible, noncombustible blanket.
1. 'K' value: 0.31 at 75 degrees F, when tested in accordance with ASTM C 518.
2. Maximum Service Temperature: 450 degrees F.
3. Maximum Water Vapor Sorption: 5.0 percent by weight.
B. Vapor Barrier Jacket:
1. Kraft paper with glass fiber yarn and bonded to aluminized film.
2. Moisture Vapor Permeability: 0.029 ng/Pa s m (0.02 perm inch), when tested in accordance with ASTM E 96/E 96M.
3. Secure with pressure sensitive tape.
C. Vapor Barrier Tape:
1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.
D. Outdoor Vapor Barrier Mastic:
1. Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.
E. Tie Wire: Annealed steel, 16 gage.
2.03 DUCT LINER
A. Insulation: Incombustible glass fiber complying with ASTM C 1071; flexible blanket, rigid board, and preformed round liner board; impregnated surface and edges coated with acrylic polymer shown to be fungus and bacteria resistant by testing to ASTM G 21.
1. Apparent Thermal Conductivity: Maximum of 0.31 at 75 degrees F.
2. Service Temperature: Up to 250 degrees F.
3. Rated Velocity on Coated Air Side for Air Erosion: 5,000 fpm, minimum.
4. Minimum Noise Reduction Coefficients:
a. 1/2 inch Thickness: 0.30.
b. 1 inch Thickness: 0.45.
c. 1–1/2 inches Thickness: 0.60.
d. 2 inch Thickness: 0.70.
B. Adhesive: Waterproof, fire–retardant type.
C. Liner Fasteners: Galvanized steel, self–adhesive pad or impact applied with integral, or press–on head.

PART 3 EXECUTION

3.01 INSTALLATION
A. Install in accordance with manufacturer's instructions and NAIMA National Insulation Standards.
B. Insulated ducts conveying air below ambient temperature:
1. Provide insulation with vapor barrier jackets.
2. Finish with tape and vapor barrier jacket.
3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
4. Insulate entire system including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.
C. Insulated ducts conveying air above ambient temperature:
1. Provide with or without standard vapor barrier jacket.
2. Insulate fittings and joints. Where service access is required, bevel and seal ends of insulation.
D. External Duct Insulation Application:
1. Secure insulation with vapor barrier with wires and seal jacket joints with vapor barrier adhesive or tape to match jacket.
2. Secure insulation without vapor barrier with staples, tape, or wires.
3. Install without sag on underside of duct. Use adhesive or mechanical fasteners where necessary to prevent sagging. Lift duct off trapeze hangers and insert spacers.
4. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive.
5. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.
E. Duct and Plenum Liner Application:
1. Adhere insulation with adhesive for 90 percent coverage.
2. Secure insulation with mechanical liner fasteners. Refer to SMACNA HVAC Duct Construction Standards – Metal and Flexible for spacing.
3. Seal and smooth joints. Seal and coat transverse joints.
4. Seal liner surface penetrations with adhesive.
5. Duct dimensions indicated are net inside dimensions required for air flow. Increase duct size to allow for insulation thickness.
F. Exterior Applications: See drawings for details.
3.02 SCHEDULES
A. The Contractor may use any of the following insulating 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 insulating material and thickness with all State and local codes and utility company requirements is the sole responsibility of the installing Contractor.
B. Supply air ducts in ceiling spaces:
1. Flexible Glass Fiber Duct Insulation: 1–1/2 inches thick.
2. Flexible Glass Fiber Duct Liner Insulation: 1 inches thick.
C. Supply, return or exhaust air ducts in crawl spaces, attics or other unconditioned areas:
1. Flexible Glass Fiber Duct Insulation: 3 inches thick.
D. Supply air ducts exposed in finished areas:
1. Flexible Glass Fiber Duct Liner Insulation: 1 inches thick.
E. Return or exhaust air ducts exposed in finished areas: None.
F. Outside air intake ducts (untempered):
1. Flexible Glass Fiber Duct Insulation: 1–1/2 inches thick.
2. Rigid Glass Fiber Duct Insulation: 1–1/2 inches thick.
3. Flexible Glass Fiber Duct Liner Insulation: 1 inches thick.
4. Rigid Glass Fiber Duct Liner Insulation: 1 inches thick.
G. Outside air intake ducts (tempered): None.
H. Ducts exposed to outdoors: (Include all of the following components from exterior to interior.)
1. Two coats of exterior oil–base enamel, color as selected by the Architect.
2. Galvanized sheet metal jacket, gauge or aluminum jacket.
3. Rigid Glass Fiber Duct Insulation: 3 inches thick.
4. Galvanized sheet metal duct, gauge.
5. Flexible Glass Fiber Duct Liner Insulation: 1 inches thick

END OF SECTION

SECTION 230713.13 – GREASE DUCT FIREPROOFING

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Fire resistant duct wrap for kitchen hood exhaust ventilation ducts (grease ducts).
B. Firestopping at duct penetrations through fire rated walls and floors.

PART 2 PRODUCTS

2.01 MANUFACTURERS
A. Acceptable Manufacturer: 3M Fire Protection Products, Inc.; Unifrax FyreWrap; Morgan Thermal Ceramics.
2.02 MATERIALS
A. Grease Duct Fireproofing: Material applied directly to metal ducts and achieving two–hour fire rated separation when tested in accordance with UL 2221 or ASTM E2336 by independent testing agency.
1. Surface Burning Characteristics: Flame spread index of 0 and smoke developed index of 0, when tested in accordance with ASTM E 84, both blanket and foil.
2. Combustibility: Non–combustible, when tested in accordance with ASTM E 136.
3. Flexibility: Capable of being formed around corners and shapes by hand.
4. Surface: Foil or other damage resistant surface; fiber not exposed after installation.
5. Accommodation For Duct Access Doors and Panels: Capable of being installed to achieve fire rating without impeding access.
6. Acceptable Product: 3M Fire Barrier Duct Wrap; fire resistant inorganic blanket encapsulated with scrim–reinforced foil facing.
B. Fasteners: Non–combustible; use one or both of the following to attach fireproofing to ducts:
1. Banding: Steel or stainless steel, 1/2 inch wide, minimum, and 0.015 inch thick, minimum; with steel banding clips.
2. Insulation Pins: Copper–coated steel impalement pins, minimum 12 gage, for welded attachment, with galvanized steel self–locking washers, 1–1/2 inch square or diameter; or equivalent sized cup–head pins.
C. Access Panel Hardware: Galvanized threaded rods, sleeves, washers, and wing nuts as specified in manufacturer's instructions.
D. Tape: Aluminum foil tape for sealing exposed fiber edges and repairing tears in facing.
E. Firestopping: Material tested in conjunction with fireproofing, in accordance with ASTM E 814, to achieve fire rated penetration seal at duct penetrations through fire rated assemblies.
1. Fire Rating: Same or greater than rating of penetrated assembly.
2. Acceptable Products: 3M Fire Barrier 1000 N/S, 1003 S/L, and 2000+ Silicone Sealants, as required by tested assembly.

PART 3 EXECUTION

3.01 EXAMINATION
A. Do not begin installation until substrates have been properly prepared.
B. If substrate preparation is the responsibility of another installer, notify Engineer of unsatisfactory preparation before proceeding.
3.02 PREPARATION
A. Clean surfaces thoroughly prior to installation.
B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
3.03 INSTALLATION
A. Install in strict accordance with manufacturer's instructions and as indicated on the Drawings.
B. 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.
C. Install fireproofing on entire surface of ducts indicated, except where Contract Documents explicitly indicate 3–sided or 2–sided installation.
D. At penetrations of ducts through fire rated assemblies (walls, floors, roofs), extend fireproofing through the opening and seal annular space between fireproofing and edge of opening with firestopping.
E. Fasten fireproofing to ducts using either banding or insulation pins welded directly to surface of duct; do not use adhesives.
F. Install fireproofing on supports and hangers unless hanger rods are at least 3/8 inch in diameter, spaced not more than 60 inches on center along length of duct, and horizontal supports are at least 2 by 2 by 1/4 inch steel angle or equivalent SMACNA support system.
G. Access Panels: Do not block access; install fireproofing so that panel can be removed and reinstalled without damaging fireproofing.
H. Seal all cut edges and ends and repair tears in facing using aluminum foil tape.

END OF SECTION

SECTION 230719 – HVAC PIPING INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Cooling condensate drain piping insulation.

PART 2 PRODUCTS

2.01 REQUIREMENTS FOR ALL PRODUCTS OF THIS SECTION
A. Surface Burning Characteristics: Flame spread/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/jacketing 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 insulating/jacketing material is the sole responsibility of the installing Contractor.
2.02 GLASS FIBER
A. Manufacturers: 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, end grain adhered to jacket.
1. 'K' value: ASTM C 177, 0.24 at 75 degrees F.
2. Maximum service temperature: 650 degrees F.
3. Maximum moisture absorption: 0.2 percent by volume.
D. Vapor Barrier Jacket: White kraft paper with glass fiber yarn, bonded to aluminized 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, compatible with insulation, black color.
I. Insulating Cement: ASTM C 449/C 449M.
2.03 FLEXIBLE ELASTOMERIC CELLULAR INSULATION
A. Manufacturer: Armacell International.
B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C 534 Grade 3; use molded tubular material wherever possible.
1. Minimum Service Temperature: –40 degrees F.
2. Maximum Service Temperature: 220 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. Manufacturers: Knauf Fiber Glass; 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: 0.002 perm inch, maximum, when tested in accordance with ASTM E 96/E 96M.
d. Thickness: 10 mil.
e. Connections: Brush on welding adhesive.
3. Covering Adhesive Mastic: Compatible with insulation.
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 of 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 NAIMA National Insulation 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. Insert material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.
D. Continue insulation through walls, sleeves, pipe hangers, 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. Cold Condensate Drains:
a. Glass Fiber Insulation:
1. Pipe Size Range: All Sizes.
a. Thickness: 1/2 inch.
b. Flexible Elastomeric Cellular Foam Insulation:
1. Pipe Size Range: All Sizes.
a. Thickness: 1/2 inch.

END OF SECTION

SECTION 230800 – COMMISSIONING OF HVAC

PART 1 GENERAL
1.01 SUMMARY
A. See Section 01 9113 – General Commissioning Requirements for overall objectives; comply with the requirements of Section 01 9113.
B. This section covers the Contractor's responsibilities for commissioning; each subcontractor or installer 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 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 Ventilation: Hoods, pressurization, exhaust, etc.
10. Other equipment and systems explicitly identified elsewhere in Contract Documents as requiring commissioning.
11. Indoor Air Quality Procedures: The Commissioning Authority will coordinate; Contractor will execute; see Section 01 5719.
E. The 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. Section 23 0993 – Sequence of Operations for HVAC Controls.
B. Section 23 0593 – Testing, Adjusting, and Balancing for HVAC.
1.03 REFERENCE 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 substantial changes are made.
B. DRAFT Functional Test Procedures for Control System: Detailed written plan indicating the procedures to be followed to test, checkout 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 addressed correctly.
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 checkout 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. Indicate what tests on what systems should be completed prior to TAB using the control system for TAB work. Coordinate with the Commissioning Authority and TAB contractor for this determination.
C. Startup Reports and Trend Logs.
D. HVAC Control System O&M Manual Requirements. In addition to documentation specified elsewhere, compile and organize at minimum the following data on the control system:
1. Specific step–by–step instructions on how to perform and apply all functions, features, modes, etc. mentioned in the controls training 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 customizing control loops and algorithms.
2. Full as–built set of control drawings.
3. Full as–built sequence of operations for each piece of equipment.
4. Full points list; in addition to the information on the original points list submittal, include a listing of all rooms with the following information for each room:
a. Floor.
b. Room number.
c. Room name.
d. Air handler unit ID.
e. Reference drawing number.
f. Air terminal unit tag ID.
g. Heating and/or cooling valve tag ID.
h. Minimum air flow rate.
i. Maximum air flow rate.
5. Full print out of all schedules and set points after testing and acceptance of the system.
6. Full as–built print out of software program.
7. Electronic copy on disk of the entire program for this facility.
8. 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 checkout tests and calibrations performed by the Contractor (not commissioning tests).
13. Organize and subdivide the manual with permanently labeled tabs for each of the following data in the given order:
a. Sequences of operation.
b. Control drawings.
c. Points lists.
d. Controller and/or module data.
e. Thermostats and timers.
f. Sensors and DP switches.
g. Valves and valve actuators.
h. Dampers and damper actuators.
i. Program setups (software program printouts).
E. Project Record Documents:
1. Submit updated version of control system documentation, for inclusion with operation and maintenance data.
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 function and overrides of any local packaged controls not controlled by the HVAC control system.
G. Training Manuals:
1. Provide three extra copies of the controls training manuals in a separate manual from the O&M manuals.
H. Submittals are reviewed only for general compliance with the Contract Documents. 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 coordination of substituted 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 checkout and required functional performance testing; unless otherwise noted such testing equipment will NOT become the property of Owner.

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Oak Park, Illinois
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FIELD VERIFICATION
Contractor shall verify all figured dimensions and conditions at the job site and notify Aria Group Architects, Inc. of any dimensional errors, omissions or discrepancies before beginning or fabricating any work. Do not scale these drawings.

NO.	DATE	REMARKS
3	02/02/22	ISSUE FOR CONSTRUCTION
2	01/11/22	ISSUE FOR CONSTRUCTION
1	12/03/21	ISSUE FOR CONSTRUCTION
	11/08/21	ISSUE FOR CONSTRUCTION
	10/25/21	ISSUE FOR LL REVIEW

REVISIONS

026421
GREGORY ROY SCHNACKEL
Date: 02/02/22
COA #: PEF003790

Drawing Title
MECHANICAL SPECIFICATIONS

Job No. 214746
Drawn RAS
Scale N.T.S.
Date 09/17/2021
Sheet No. M590

B. Equipment-Specific Tools: Where special testing equipment, tools and instruments are specific to a piece of equipment, are only available from the vendor, and are required in order to accomplish startup or Functional Testing, provide such 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.

PART 3 EXECUTION

3.01 PREPARATION

A. Cooperate with the Commissioning Authority in development of the Functional Test Procedures.
B. Furnish additional information requested by the Commissioning Authority.
C. 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.
D. 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; when commissioning activities not yet performed or not yet scheduled will delay construction notify ahead of time and be proactive in seeing that the Commissioning Authority has the scheduling information needed to efficiently execute the commissioning process.
E. Put all HVAC equipment and systems into operation and continue operation during each working day of testing, adjusting, and balancing and commissioning, as required.
1. Include cost of sheaves and belts that may be required for testing, adjusting, and balancing.
F. Provide test holes in ducts and plenums where directed to allow air measurements and air balancing; close with an approved plug.
G. Provide temperature and pressure taps in accordance with the Contract Documents.

3.02 INSPECTING AND TESTING – GENERAL

A. Submit startup plans and startup reports for each item of equipment or other assembly to be commissioned.
B. Perform the Functional Tests directed by the Commissioning Authority for each item of equipment or other assembly to be commissioned.
C. Provide two-way radios for use during the testing.
D. Valve/Damper Stroke Setup and Check:
1. For all valve/damper actuator positions checked, verify the actual position against the control system readout.
2. Set pump/fan to normal operating mode.
3. Command valve/damper closed; visually verify that valve/damper is closed and adjust output zero signal as required.
4. Command valve/damper open; verify position is full open and adjust output signal as required.
5. Command valve/damper to a few intermediate positions.
6. Verify proper operational of Normally Open or Normally closed positions of all valves/dampers by means of normal operating mode tests plus removal of power to confirm proper closure or opening upon failure of power or control signal.
7. Perform valve/damper leakage testing on all dampers by applying normal operating pressure with the valve/damper in the closed position and measure either the delta T across coils or airflow through dampers to confirm compliance with specification requirements for dampers and zero leakage for valves.
8. If actual valve/damper position does not reasonably correspond, replace actuator.
9. Closure for Heating Coil Valves – Normally Open:
a. Set heating setpoint 20 degrees F (11 degrees C) above room temperature.
b. Observe valve open.
c. Remove control air or power from the valve and verify that the valve stem and actuator position do not change.
d. Restore to normal.
e. Set heating setpoint to 20 degrees F (11 degrees C) below room temperature.
f. Observe the valve close.
g. For pneumatics, by override in the control system, increase pressure to valve by 3 psi (20 kPa) (do not exceed actuator pressure rating) and verify valve stem and actuator position does not change.
h. Restore to normal.
10. Closure for Cooling Coil Valves – Normally Closed:
a. Set cooling setpoint 20 degrees F (11 degrees C) above room temperature.
b. Observe the valve close.
c. Remove control air or power from the valve and verify that the valve stem and actuator position do not change.
d. Restore to normal.
e. Set cooling setpoint to 20 degrees F (11 degrees C) below room temperature.
f. Observe valve open.
g. For pneumatics, by override in the control system, increase pressure to valve by 3 psi (20 kPa) (do not exceed actuator pressure rating) and verify valve stem and actuator position does not change.
h. Restore to normal.
E. Isolation Valve or System Valve Leak Check: For valves not by coils.
1. With full pressure in the system, command or move valve closed.
2. Use an ultra-sonic flow meter to detect flow or leakage.
G. Deficiencies: Correct deficiencies and re-inspect or re-test, as applicable, at no extra cost to Owner.

3.03 TAB COORDINATION

A. TAB: Testing, adjusting, and balancing of HVAC.
B. Coordinate commissioning schedule with TAB schedule.
C. Review the TAB plan to determine the capabilities of the control system toward completing TAB.
D. Provide all necessary unique instruments and instruct the TAB technicians in their use; such as handheld control system interface for setting terminal unit boxes, etc.
E. Have all required calibrations, startup and component Functional Tests of the system completed and approved by the Commissioning Authority prior to starting TAB.
F. Provide a qualified control system technician to operate the controls to assist the TAB technicians or provide sufficient training for the TAB technicians to operate the system without assistance.

3.04 CONTROL SYSTEM FUNCTIONAL TESTING

A. Checklists for control system components will require a signed and dated certification that all system programming is complete as required to accomplish the requirements of the Contract Documents and the detailed Sequences of Operation documentation submittal.
B. Do not start Functional Testing until all controlled components have themselves been successfully Functionally Tested in accordance with the Contract Documents.
C. Using a skilled technician who is familiar with this building, execute the Functional Testing of the control system as required by the Commissioning Authority.
D. Functional Testing of the control system constitutes demonstration and trend logging of control points monitored by the control system.
1. The scope of trend logging is partially specified; trend log up to 50 percent more points than specified at no extra cost to Owner.
2. Perform all trend logging specified in Functional Test procedures.
E. Functionally Test integral or stand-alone controls in conjunction with the Functional Tests of the equipment they are attached to, including any interlocks with other equipment or systems; further testing during control system Functional Test is not required unless specifically indicated below.
F. Demonstrate the following to the Commissioning Authority during testing of controlled equipment; coordinate with commissioning of equipment.
1. Setpoint changing features and functions.
2. Sensor calibrations.
G. Demonstrate to the Commissioning Authority:
1. That all specified functions and features are set up, debugged and fully operable.
2. That scheduling features are fully functional and setup, including holidays.
3. That all graphic screens and value readouts are completed.
4. Correct date and time setting in central computer.
5. That field panels read the same time as the central computer; sample 10 percent of field panels; if any of those fail, sample another 10 percent; 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 (plug-ins) using portable computer/keypad; 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.
10. Occupant over-rides (manual, telephone, key, keypad, etc.).
11. O&M schedules and alarms.
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. All 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. Optimum start-stop 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 at no additional cost to Owner.

3.05 OPERATION AND MAINTENANCE MANUALS

A. Add design intent documentation furnished by Engineer to manuals prior to submission to Owner.
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' personnel; if during any demonstration, the system 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. 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.
C. Provide professional digital video recording of all instruction sessions and deliver two copies on DVD's to the Owner for future reference.
D. TAB Review: Instruct Owner's personnel for minimum eight hours, after completion of TAB, on the following:
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 finished.
5. Other salient information that may be useful for facility operations, relative to TAB.
E. 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. Upon completion of training, each attendee, using appropriate documentation, should be able to perform elementary operations and describe general hardware architecture and functionality of the system.
a. This training may be held on-site or at the manufacturer's facility.
b. If held off-site, the training may occur prior to final completion of the system installation.
c. For off-site training, Contractor shall pay expenses of up to two attendees.
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 instruction for operating the installed system, including interfaces with other systems, if any.
b. Security levels, alarms, 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 if 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, executing, 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 an air terminal unit controller.
h. Graphics generation.
i. Point database entry and modifications.
j. Understanding DDC field panel operating programming, when applicable.
3. Phase 3 – Post-Occupancy: Six months after occupancy conduct minimum of 16 hours of training. Tailor training session to questions and topics solicited beforehand from Owner. Also be prepared to address topics brought up and answer questions concerning operation of the system.
F. Provide the services of manufacturer representatives to assist instructors where necessary.
G. 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 230993 – 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. Air terminal units.
1) Cooling only variable volume.
2) Automatic heating/cooling changeover variable volume.
b. Single duct variable volume.
1) Cooling only.
2) Cooling with reheat.
(a) Electric reheat.
2. Cabinet heaters.
a. Electric.
b. Freeze protection.
3. Central station air handling units.
a. Freeze protection.
b. Over-pressure shutdown control.
c. Face and bypass preheat coil.
d. Outside air damper, non-economizer systems.
e. Humidifier.
f. Outside, return and relief dampers, economizer systems.
g. Demand controlled ventilation.
h. Electric heating.
i. Direct expansion cooling.
j. Multi-zone systems.
k. Induction systems.
l. Supply air fan static pressure control.
m. Return air fan static pressure control.
4. Combustion air dampers.
5. Combustion air heaters.
c. Electric.
d. Gas.
e. Freeze protection.
6. Electrical rooms and telephone rooms.
a. Exhaust ventilation.
b. Air conditioning.
7. Emergency generators.
a. Indoor unit ventilation dampers.
b. Status monitoring and load control.
8. Fan coil units.
a. Electric heating.
b. Direct expansion cooling.
c. Heat pump heating/cooling.
d. Automatic changeover.
e. Variable speed supply fan.
f. Outside air damper, non-economizer systems.
g. Outside, return and relief dampers, economizer systems.
h. Demand controlled ventilation.
i. Freeze protection.
9. Heating coils.
c. Electric.
d. Freeze protection.
10. Induction units.
11. Radiant panels.
12. Radiation and convectors.
a. Electric.
13. Refrigeration systems.
14. Unit heaters.
a. Electric.
b. Gas.
15. Exhaust fans.
a. General duty building exhaust fans
b. Specific duty exhaust fans.
16. Make-up air fans.
a. Electric.
b. Gas.
c. Direct expansion cooling.
d. Evaporative cooling.
e. Freeze protection.
f. Variable speed control.
g. Building pressure control.
17. Fresh air fans.
a. Electric.
b. Gas.
c. Direct expansion cooling.
d. Evaporative cooling.
e. Freeze protection.
f. Variable speed control.
g. Building pressure control.
18. Control of package HVAC equipment containing factory mounted controls.
a. Single Zone Systems.
19. Heat pump systems.
a. Heat exchanger.
b. Heat pump loop pump.
c. Heat pump unit controls.
d. Heat pump unit controls – Economizer and demand control ventilation.
20. Smoke evacuation and smoke control systems.
21. Stairway pressurization systems.
22. Water metering and billing software.
23. Natural gas metering and billing software.

1.02 RELATED REQUIREMENTS

A. Section 23 0913 – Instrumentation and Control Devices for HVAC.

1.03 SYSTEM DESCRIPTION

A. Equipment performance, 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. All wiring of control systems including connections to controlled devices external to the control systems shall be included in the temperature controls contract as a part of the Mechanical Contract. The Electrical Contractor will only furnish power connections to devices at the locations indicated on the Electrical Drawings. Review the Electrical Drawings for locations where power connections will be provided. This Contractor shall provide all additional necessary power and control wiring for a complete and functional system.
C. Provide all conduit 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 required by applicable local and national codes. Other locations may be installed utilizing plenum rated cabling without conduit, provided that all cabling is neatly and adequately supported independent of all other systems, equipment, ductwork, etc. Where cable trays exist, all wiring shall utilize the cable tray path, except at direct run outs to equipment or control connections.
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 and may 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 purpose, components and function.
2. State each sequence in small segments and give each segment a unique number for referencing in Functional Test procedures; provide a complete description regardless of the completeness and clarity of the sequences specified in the Contract Documents.
3. Include at least the following sequences:
a. Start-up.
b. Warm-up mode.
c. Normal operating mode.
d. Unoccupied mode.
e. Shutdown.
f. Capacity control sequences and equipment staging.
g. Temperature and pressure control, such as setbacks, setups, resets, etc.
h. Detailed sequences for all control strategies, such as economizer control, optimum start/stop, staging, optimization, demand limiting, etc.
i. Effects of power or equipment failure with all standby component functions.
j. Sequences for all alarms and emergency shut downs.
k. Seasonal operational differences and recommendations.
l. Interactions and interlocks with other systems.
4. Include initial and recommended values for all adjustable settings, setpoints and parameters that are typically set or adjusted by operating staff; and any other control settings or fixed values, delays, etc. that will be useful during testing and operating the equipment.
5. For packaged controlled equipment, include manufacturer's furnished sequence of operation amplified as required to describe the relationship between the packaged controls and the control system, indicating which points are adjustable control points and which points are only monitored.
B. Control System Diagrams: Submit graphic schematic of the control system showing each control component and each component controlled, monitored, or enabled.
1. Label with settings, adjustable range of control and limits.
2. Include flow diagrams for each control system, graphically depicting control logic.
3. Include the system and component layout of all equipment that the control system monitors, enables or controls, even if the equipment is primarily controlled by packaged or integral controls.
4. Include draft copies of graphic displays indicating mechanical system components, control system components, and controlled function status and value.
5. Include all monitoring, control and virtual points specified in elsewhere.
6. Include a key to all abbreviations.
C. Points List: Submit list of all control points indicating at least the following for each point.
1. Name of controlled system.
2. Point abbreviation.
3. Point description; such as dry bulb temperature, airflow, etc.
4. Display unit.
5. Control point or setpoint (Yes / No); i.e. a point that controls equipment and can have its setpoint changed.
6. Monitoring point (Yes / No); i.e. a point that does not control or contribute to the control of equipment but is used for operation, maintenance, or performance verification.
7. Intermediate point (Yes / No); i.e. a point whose value is used to make a calculation which then controls equipment, such as space temperatures that are averaged to a virtual point to control reset.
8. Calculated point (Yes / No); i.e. a "virtual" point generated from calculations of other point values.
D. Project Record Documents: Record actual locations of components and setpoints of controls, including changes to sequences made after submission of shop drawings.

1.05 QUALITY ASSURANCE

A. Design system under direct supervision of a Professional Engineer experienced in design of this work and licensed at the State in which the Project is located.
B. Code or utility company requirements shall supersede any conflicting requirements of this Section.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.01 AIR TERMINAL UNITS

A. Time Schedule: Control terminal air units based on the programmed time and temperature schedule as determined by the Owner's operating personnel. Provide occupied/unoccupied mode control with night setback of temperatures based on programming.
B. Single-duct Bypass:
1. Cooling Mode Only:
a. Central air system supplies cool air.
b. On a rise in space temperature above the set-point, the bypass damper modulates open, increasing airflow to the space while simultaneously closing the bypass damper.
c. On a fall in space temperature below the set-point, the bypass damper modulates closed, reducing the airflow to the space while simultaneously opening the bypass damper.
d. Provide minimum airflow with field set, minimum stop.
2. Automatic Heating/Cooling Changeover:
a. Cooling Mode (Supply air system in cooling mode below 75 degrees F (24 degrees C)).
1) On a rise in space temperature above set-point, the bypass damper modulates open, increasing the flow of cool air to the space while simultaneously closing the bypass damper.
2) On a fall in space temperature below the set-point, the bypass damper modulates closed, reducing the airflow to the space while simultaneously opening the bypass damper.
b. Heating Mode (Supply air system in heating mode above 78 degrees F (26 degrees C)).
1) On a rise in space temperature above set-point, the bypass damper modulates closed, reducing the flow of warm air to the space while simultaneously opening the bypass damper.
2) On a fall in space temperature below the set-point, the bypass damper modulates open, increasing the flow of warm air to the space while simultaneously closing the bypass damper.
C. Single-duct Variable Volume:
1. Cooling Only:
a. On a rise in space temperature, the damper will modulate to provide maximum airflow.
b. As space temperature decreases, the damper will modulate down to its minimum airflow.
2. Cooling with Reheat:
a. On a rise in space temperature above the cooling set-point, the unit modulates to its maximum airflow.
b. As the space temperature falls below the cooling set-point, the unit modulates to its minimum airflow.
c. As the space temperature continues to fall to the heating set-point, the terminal modulates to its heating minimum airflow. At this point, the heat will be staged on as follows:
1) Stage electric heating coil in increments provided by the coil manufacturer.
D. Dual-Duct:
1. As the space temperature rises above the cooling set-point, the primary airflow is modulated from the cooling minimum airflow to the cooling maximum airflow.
2. As the space temperature falls below the heating set-point, the secondary airflow is modulated from the heating minimum airflow to the heating maximum airflow.
3. Between the heating and cooling set-points, both the primary airflow and secondary airflow are modulated to maintain dual mixing minimum.
E. Fan-powered:
1. Series Units:
a. Series-fan runs continuously via control interlock with the AHU supply fan.
b. The air valve modulates the primary airflow in response to space temperature with the reheat de-energized.
c. Reheat is activated to increase discharge temperature when further decrease in primary airflow will not maintain space temperature.
2. Parallel Units:
a. The primary air valve delivers cooled air to the unit outlet.
b. Upon decrease in space temperature beyond control of the primary air valve, the fan is simultaneously energized along with the first stage of heat.
c. Parallel fan delivers warm plenum air from the controlled space to the unit outlet, mixing with the primary air before entering the space.

3.02 CABINET HEATERS

A. Time Schedule: Control cabinet heaters based on the programmed time schedule as determined by the Owner's operating personnel. Provide occupied/unoccupied mode control with night setback of temperatures, where applicable.
B. Single temperature room thermostat with night set back or EMS sensor/controller, set at 68 degrees F (20 degrees C) during the occupied mode and 15 degrees F (8 degrees C) cooler during the unoccupied mode. Maintain constant space temperature by cycling unit fan motor. Close two way valve when fan motor is not operating.
C. Single temperature thermostat or EMS sensor/controller on return heating line de-energizes unit on temperatures below 95 degrees F (35 degrees C).
D. Single temperature thermostat or EMS sensor/controller on steam supply line de-energizes unit on temperatures below 200 degrees F. (93 degrees C).
E. Single temperature room thermostat or EMS sensor/controller set at 68 degrees F (20 degrees C) during the occupied mode and 15 degrees F (8 degrees C) cooler during the unoccupied mode maintains constant space temperature by cycling unit fan motor and electric heating elements. Integral thermostat continues fan operation until element temperature falls below 100 degrees F (38 degrees C) .
F. Freeze Protection: Stop fans and close outside air dampers and open heating coil valves to 100% open if temperature ahead of coils is below 37 degrees F (3 degrees C); signal alarm. (Except pre-heat coils.)

3.03 CENTRAL STATION AIR HANDLING UNITS

A. Time Schedule: Start and stop supply and return fans. Determine fan status by pressure differential switches. If the fan fails to start as commanded, signal an alarm. Whenever the supply fan is de-energized, as sensed by the status switch, the outside and exhaust air dampers shall be closed and the return air damper shall be open, the heating and cooling valves shall be closed or positioned as described below and the humidifier (if any) shall be locked out.
1. Control central fan systems based on the programmed time schedule as determined by the Owner's operating personnel. Provide occupied/unoccupied mode control with adjustable night setback of temperatures, where applicable.
B. Safety Devices:
1. Freeze Protection: Stop fans and close outside air dampers and open heating coil valves (if any) to 100% open if temperature ahead of coils is below 37 degrees F (3 degrees C); signal alarm. (Except pre-heat coils.)
2. Smoke Detector: Stop fans, close outside dampers, and close smoke dampers if smoke is detected; signal alarm.
3. Provide an over limit differential pressure sensor between the supply and return duct at each fan to shut the fan down in the event of a high static pressure condition and signal an alarm. Over limit static pressure setting shall be 0.5 inches (adjustable) above design static pressure for the fan. This shutdown shall allow manual or automatic reset after a predetermined time period (30 minutes, adjustable).
C. Face and Bypass Preheat Coil:
1. When outside air temperature is below 40 degrees F (5 degrees C), fully open preheat coil valve to heating regardless of the operating mode of the fan.
2. When fan is running and the outside temperature is below 40 degrees F (5 degrees C), maintain the mixed air temperature set point by modulating the face and bypass dampers, leaving the preheat coil valve fully open.
3. When fan is running and the outside air temperature is above 40 degrees F (5 degrees C), maintain the mixed air temperature setpoint by modulating preheat coil valve.
4. When the fan is running and the outside air temperature is above 55 degrees F (12 degrees C) heating coil valve shall be closed and the face and bypass dampers shall be indexed to full bypass.
D. Outside Air Damper, Non-Economizer Systems: When supply fan is running, open outside air damper to supply quantity of outside air indicated on the Drawings. Close outside air damper in unoccupied mode.
E. Humidifier: When supply fan is running, humidistat (located in return air or wall if indicated on the Drawings) reset from outdoor air temperature modulates normally closed humidifier valve. Set outdoor reset to 50 percent relative humidity at 70 degrees F (21 degrees C) and 15 percent relative humidity at -30 degrees F (-35 degrees C).
F. Outside, Return, and Relief Dampers:
1. When supply fan is not running, outside and relief dampers are closed and return damper is open.
2. When supply fan is running, dampers are controlled and operate with outside and relief dampers opening, and return damper closing.
3. For cooling, and outside air temperatures below 55 degrees F (12 degrees C), modulate dampers to maintain mixed air temperature of 55 degrees F (12 degrees C) .
4. For cooling and outside air temperatures above 55 degrees F (12 degrees C) compare return and outside air temperatures. If return air temperature is lower, drive outside damper to minimum, close relief damper, and open return damper.
5. For outside air temperatures above 79 degrees F (26 degrees C), drive outside damper to minimum, close relief damper, and open return damper.
6. For heating, drive outside damper to minimum, close relief damper, and open return damper.
7. Minimum outside air position shall be as determined by the demand controlled ventilation control specified below (if any), or outside air quantity indicated on the Drawings.
8. Close outside air damper in unoccupied mode unless there is a call for cooling and the outside air enthalpy is below the return air enthalpy.
G. Demand Controlled Ventilation: The minimum outdoor air flow rate is established by the required outdoor air flow with no occupants and the required outdoor air flow at design occupancy. The damper positions corresponding to these two airflow rates shall be set in conjunction with the balance contractor. The outdoor air damper shall modulate between the no occupants position and the design occupancy position as the space CO2 concentration varies from 400 ppm (ambient) to 1,500 ppm (adjustable). If CO2 concentration exceeds 1,500 ppm (adjustable), signal an alarm. Close outside air damper in unoccupied mode.
H. Dual temperature thermostat or EMS sensor/controller set at 55 degrees F (12 degrees C) maintains constant duct temperature by modulating two-way heating control valve.
I. Dual temperature thermostat or EMS sensor/controller set at 55 degrees F (22 degrees C) maintains constant duct temperature by staging the electric heating elements.
J. Dual temperature thermostat or EMS sensor/controller set at 55 degrees F (12 degrees C) maintains constant duct temperature during the occupied mode and 10 degrees F (6 degrees C) warmer during the unoccupied mode by staging the available refrigeration compressors, unloaders and hot gas bypass on the condensing unit(s).
K. Multizone System:
1. Space sensor set at 75 degrees F (24 degrees C), maintains constant space temperature during the day and 15 degrees F (8 degrees C) cooler at night by modulating zone dampers.
2. Room calling for heating modulates reheat coil valve.
3. Discharge air temperature prior to zone reheat coil shall be maintained in accordance with outdoor reset schedule by modulating the cooling coil valve in conjunction with the outdoor air system.
L. Dual Duct System:
1. Control hot deck temperature in accordance with outdoor reset schedule by modulating reheat coil valve.
2. Control hot deck at maximum 135 degrees F (57 degrees C) at outdoor temperature of minus 30 degrees F (minus 35 degrees C), and minimum 75 degrees F (24 degrees C) at outdoor temperature of 75 degrees F (24 degrees C), with straight line relationship between.
3. Maintain cold deck temperature of 55 degrees F (12 degrees C) by modulating cooling coil valve.
4. Reset hot and cold deck temperatures. Room calling for greatest heating resets hot deck control temperature.
5. Room thermostat or EMS sensor/controller calling for greatest cooling resets cold deck temperature.
M. Induction System:
1. Control deck temperature in accordance with outdoor reset schedule by modulating heating and coiling coil valves and outdoor air economizer if present.
2. Control deck temperature at maximum 75 degrees F (24 degrees C) at outdoor temperature of -30 degrees F (-35 degrees C) , and minimum 55 degrees F (12 degrees C) at outdoor solar compensated temperature of 75 degrees F (24 degrees C) and above, with straight line relationship between.
N. Maintain constant supply air static pressure to the setpoint indicated on the equipment schedule on the Drawings by modulating the supply fan variable frequency drive speed control. Locate three averaging sensors upstream of the three most remote supply air branch duct take offs to control static pressure.
O. Maintain constant building pressure of 0.05 inches wg (12 Pa) measured at the grade level lobby by modulating the return air fan variable frequency drive speed control.

3.04 COMBUSTION AIR DAMPERS.

A. The Temperature Control Contractor shall furnish the "fail-open" dampers and actuators for the combustion air system. Interlock damper actuators with the respective water heater and boiler control panels so that the combustion air dampers open when the water heaters or boilers are firing.
B. Single temperature room thermostat or EMS sensor/controller set at 85 degrees F (29 degrees C) shall open the combustion air dampers if the boiler room temperature exceeds setpoint.

3.05 COMBUSTION AIR HEATERS

A. Single temperature room thermostat or EMS sensor/controller set at 68 degrees F (20 degrees C) maintains constant room temperature by modulating two-way heating control valve as follows:
1. When outside air temperature is below 40 degrees F (5 degrees C), fully open coil valve to heating regardless of the operating mode of the fan.
2. When fan is running and the outside temperature is below 40 degrees F (5 degrees C), maintain the mixed air temperature set point by modulating the face and bypass dampers, leaving the heating coil valve fully open.
3. When fan is running and the outside air temperature is above 40 degrees F (5 degrees C), maintain the mixed air temperature setpoint by modulating heating coil valve.
4. When the fan is running and the outside air temperature is above 55 degrees F (12 degrees C) heating coil valve shall be closed and the face and bypass dampers shall be indexed to full bypass.
B. Single temperature room thermostat or EMS sensor/controller set at 68 degrees F (20 degrees C) maintains constant space temperature by cycling unit fan motor and electric heating elements. Integral thermostat continues fan operation until element temperature falls below 100 degrees F (38 degrees C) .
C. Single temperature room thermostat or EMS sensor/controller set at 68 degrees F (20 degrees C) maintains constant space temperature by cycling unit fan motor and modulating gas burner.
D. Freeze Protection: Stop fans and close outside air dampers and open heating coil valves (if any) to 100% open if temperature downstream of coils is below 37 degrees F (3 degrees C); signal alarm and stop all combustion equipment in the room(s) served.

3.06 ELECTRICAL ROOMS AND TELEPHONE ROOMS

A. On room temperatures above 85 degrees F (29 degrees C) open intake damper and start exhaust fan. Interlock damper with exhaust fan operation.
B. On room temperatures above 85 degrees F (29 degrees C) activate air conditioning equipment.
C. On room temperatures above 90 degrees F (32 degrees C), signal alarm.

3.07 EMERGENCY GENERATORS

A. When the generator is not running, outside and exhaust dampers are closed and recirculation damper is open.
B. When generator is running, dampers are controlled and operate with outside and exhaust dampers opening, and recirculating dampers closing, to maintain room temperature of 85 degrees F (30 degrees C).
C. Provide solenoid valve to shut off fuel supply when generator is not operating.
D. Digital control system shall monitor the generator to determine normal vs. emergency power conditions to control any necessary load shed or lockouts required while on emergency power operation as indicated on the Drawings or specified herein.

3.08 FAN COIL UNITS

A. Time Schedule: Control fan coil units based on the programmed time schedule as determined by the Owner's operating personnel. Provide occupied/unoccupied mode control with night setback of temperatures, where applicable.
B. Supply fan shall run continuously during the occupied period and cycle during the unoccupied period based on a demand for heating or cooling.
C. Dual temperature thermostat or EMS sensor/controller set at 72 degrees F (22 degrees C) maintains constant space temperature during the day and 15 degrees F (8 degrees C) cooler at night by modulating two-way control heating valve .
D. Dual temperature thermostat or EMS sensor/controller set at 72 degrees F (22 degrees C) maintains constant space temperature during the occupied mode and 15 degrees F (8 degrees C) cooler during the unoccupied mode by energizing electric heaters.
E. Dual temperature thermostat or EMS sensor/controller set at 75 degrees F (24 degrees C) maintains constant space temperature during the occupied mode and 10 degrees F (6 degrees C) warmer during the unoccupied mode by cycling refrigeration compressors.
F. Dual temperature thermostat or EMS sensor/controller set at 75 degrees F (24 degrees C) maintains constant space temperature during the occupied mode and 10 degrees F (6 degrees C) warmer/cooler during the unoccupied mode by cycling refrigeration compressors and operating reversing valve on a call for heating.
G. Provide automatic change over from heating to cooling based on room demand.
H. Automatic Start Capabilities: Controls shall be capable of automatically adjusting the daily start time of the HVAC system in order to bring each space to the desired occupied temperature immediately prior to scheduled occupancy.
I. Outside Air Damper, Non-Economizer Systems: When supply fan is running, open outside air damper to supply quantity of outside air indicated on the Drawings. Close outside air damper in unoccupied mode.
J. Outside, Return, and Relief Dampers:
1. When supply fan is not running, outside and relief dampers are closed and return damper is open.
2. When supply fan is running, dampers are controlled and operate with outside and relief dampers opening, and return damper closing.
3. For cooling, and outside air temperatures below 55 degrees F (12 degrees C), modulate dampers to maintain mixed air temperature of 55 degrees F (12 degrees C) .
4. For cooling and outside air temperatures above 55 degrees F (12 degrees C) compare return and outside air enthalpies. If return air enthalpy is lower, drive outside damper to minimum, close relief damper, and open return damper.
5. For outside air temperatures above 79 degrees F (26 degrees C), drive outside damper to minimum, close relief damper, and open return damper.
6. For heating, drive outside damper to minimum, close relief damper, and open return damper.
7. Minimum outside air position shall be as determined by the demand controlled ventilation control specified below (if any), or outside air quantity indicated on the Drawings.
8. Close outside air damper in unoccupied mode, unless there is a call for cooling and the outside air enthalpy is below the return air enthalpy.
K. Humidifier: When supply fan is running, humidistat (located in return air or on wall if indicated on the Drawings) reset from outdoors modulates normally closed humidifier valve. Set outdoor reset to 50 percent relative humidity at 70 degrees F (21 degrees C) and 15 percent relative humidity at -30 degrees F (-35 degrees C).
L. Demand Controlled Ventilation: The minimum outdoor air flow rate is established by the required outdoor air flow with no occupants and the required outdoor air flow at design occupancy. The damper positions corresponding to these two airflow rates shall be set in conjunction with the balance contractor. The outdoor damper shall modulate between the no occupants position and the design occupancy position as the space CO2 concentration varies from 400 ppm (ambient) to 1,500 ppm (adjustable). If CO2 concentration exceeds 1,500 ppm (adjustable), signal an alarm. Close outside air damper in unoccupied mode.
M. Freeze Protection: Stop fans and close outside air dampers and open heating coil valves (if any) to 100% open if temperature ahead of coils is below 37 degrees F (3 degrees C); signal alarm. (Except pre-heat coils.)

3.09 HEATING COILS

A. Time Schedule: Control heating coils based on the programmed time schedule as determined by the Owner's operating personnel. Provide occupied/unoccupied mode control with night setback of temperatures, where applicable.
B. Single temperature thermostat or EMS sensor/controller set at 75 degrees F (24 degrees C) maintains constant space temperature during the day and 15 degrees F (8 degrees C) cooler at night by modulating two-way control heating valve .
C. Single temperature thermostat or EMS sensor/controller on steam heating line de-energizes unit on temperatures below 200 degrees F. (93 degrees C.)
D. Single temperature room thermostat or EMS sensor/controller set at 75 degrees F (24 degrees C) maintains constant space temperature by energizing electric heaters.
E. Automatic Start Capabilities: Controls shall be capable of automatically adjusting the daily start time of the HVAC system in order to bring each space to the desired occupied temperature immediately prior to scheduled occupancy.

3.10 INDUCTION UNITS

A. Time Schedule: Control induction units based on the programmed time schedule as determined by the Owner's operating personnel. Provide occupied/unoccupied mode control with night setback of temperatures, where applicable.
B. Dual temperature thermostat or EMS sensor/controller maintains constant space temperature at 75 degrees F (24 degrees C) during the occupied mode and 10 degrees F (6 degrees C) reset during the unoccupied mode by modulating two-way heating and cooling valve(s).
C. Automatic Start Capabilities: Controls shall be capable of automatically adjusting the daily start time of the HVAC system in order to bring each space to the desired occupied temperature immediately prior to scheduled occupancy.

3.11 RADIANT PANELS

A. Time Schedule: Control radiant panels based on the programmed time schedule as determined by the Owner's operating personnel. Provide occupied/unoccupied mode control with night setback of temperatures, where applicable.
B. Single temperature thermostat or EMS sensor/controller maintains constant space temperature set at 75 degrees F (24 degrees C) during the day and 15 degrees F (8 degrees C) cooler at night by modulating two-way control heating valve .
C. Automatic Start Capabilities: Controls shall be capable of automatically adjusting the daily start time of the HVAC system in order to bring each space to the desired occupied temperature immediately prior to scheduled occupancy.

3.12 RADIATION AND CONVECTORS

A. Time Schedule: Control radiation and convectors based on the programmed time schedule as determined by the Owner's operating personnel. Provide occupied/unoccupied mode control with night setback of temperatures, where applicable..
B. Single temperature thermostat or EMS sensor/controller set at 75 degrees F (24 degrees C) maintains constant space temperature during the day and 15 degrees F (8 degrees C) cooler at night by modulating two-way control heating valve .
C. Single temperature room thermostat or EMS sensor/controller set at 75 degrees F (24 degrees C) maintains constant space temperature by energizing electric heaters.
D. Automatic Start Capabilities: Controls shall be capable of automatically adjusting the daily start time of the HVAC system in order to bring each space to the desired occupied temperature immediately prior to scheduled occupancy.

3.13 REFRIGERATION SYSTEMS

A. Time Schedule: Control refrigeration systems based on the programmed time schedule as determined by the Owner's operating personnel. Provide occupied/unoccupied mode control with night setback of temperatures, where applicable.
B. Maintain temperatures of the refrigerated areas at setpoints to be determined by the Owner's operating personnel by cycling refrigeration systems and signaling stepped capacity controls.

3.14 UNIT HEATERS

A. Time Schedule: Control unit heaters based on the programmed time schedule as determined by the Owner's operating personnel. Provide occupied/unoccupied mode control with night setback of temperatures, where applicable.
B. Single temperature room thermostat or EMS sensor/controller with night set back, set at 68 degrees F (20 degrees C) during the occupied mode and 15 degrees F (8 degrees C) cooler during the unoccupied mode maintains constant space temperature by cycling unit fan motor. Close two way valve when fan motor is not operating.
C. Single temperature thermostat or EMS sensor/controller on steam heating line de-energizes unit on temperatures below 200 degrees F. (93 degrees C.)
D. Single temperature room thermostat or EMS sensor/controller set at 68 degrees F (20 degrees C) maintains constant space temperature by cycling unit fan motor and energizing electric heating elements. Integral thermostat continues fan operation until element temperature falls below 100 degrees F (38 degrees C).
E. Single temperature room thermostat or EMS sensor/controller set at 68 degrees F (20 degrees C) maintains constant space temperature by cycling unit fan motor and firing gas burner.
F. Automatic Start Capabilities: Controls shall be capable of automatically adjusting the daily start time of the HVAC system in order to bring each space to the desired occupied temperature immediately prior to scheduled occupancy.

3.15 EXHAUST FANS

A. General building exhaust fans
1. Time Schedule: Start and stop exhaust fan based on the programmed time schedule as determined by the Owner's operating personnel.
B. Specific purpose exhaust fans shall be interlocked with the respective equipment as indicated on the Drawings. Provide necessary sensors and relays to allow control system to accurately sense equipment operation and activate fan systems accordingly. Interlock make up air units/fans and air handling systems providing make up air for exhaust systems as required to provide 100% make up air to all operating exhaust fans.

3.16 MAKE UP AIR UNITS/FANS

A. Time Schedule: Start and stop make up air fans based on the programmed time schedule as determined by the Owner's operating personnel.
B. Maintain the integrity of the packaged control equipment and sequences. The packaged unit controls shall operate such functions as the burner modulation, high limit and low limit safeties, etc. All set point, occupancy, staging and shutdown capabilities shall be controlled by the temperature control system.
C. The control system shall monitor and indicate at the operators console the status of the unit including:
1. System on/off status.
2. System operating mode (heating/cooling/ventilation).
3. Discharge air temperature.
4. Discharge air temperature setpoint (where applicable).
D. Control system shall be able to control any of the following functions:
1. Turn the system on or off.
2. Control the number of stages of heating or cooling (if any) to be utilized based on room or duct temperature conditions.
3. Change occupied or unoccupied temperature setpoints.
4. Change equipment operating mode (heating/cooling/off).
5. Modify occupancy schedules by unit.
E. Single temperature duct thermostat or EMS sensor/controller, set at 60 degrees F (15 degrees C), maintains constant discharge temperature by modulating two-way heating coil valve as follows:
1. When outside air temperature is below 40 degrees F (5 degrees C), fully open coil valve to heating regardless of the operating mode of the fan.
2. When fan is running and the outside temperature is below 40 degrees F (5 degrees C), maintain the supply air temperature set point by modulating the face and bypass dampers, leaving the heating coil valve fully open.
3. When fan is running and the outside air temperature is above 40 degrees F (5 degrees C), maintain the supply air temperature setpoint by modulating heating coil valve.
4. When the fan is running and the outside air temperature is above 55 degrees F (12 degrees C) heating coil valve shall be closed and the face and bypass dampers shall be indexed to full bypass.
F. Single temperature duct thermostat or EMS sensor/controller set at 60 degrees F (15 degrees C) maintains constant discharge temperature by staged energizing electric heating elements. Integral thermostat continues fan operation until element temperature falls below 100 degrees F (38 degrees C).
G. Single temperature duct thermostat or EMS sensor/controller set at 60 degrees F (15 degrees C) maintains constant discharge temperature by firing modulating gas burner.
H. Single temperature duct thermostat or EMS sensor/controller set at 80 degrees F (27 degrees C) maintains discharge air temperature by staging refrigeration compressors. Provide unloaders and hot gas bypass on first stage of refrigeration compressors.
I. Freeze Protection: Stop fan and close outside air damper and open heating coil valves (if any) to 100% open if temperature after heating coil is below 37 degrees F (3 degrees C); signal alarm.
J. Maintain constant fresh air duct static pressure to the set point as determined by the fresh air system balancing to maintain the air flows indicated on the drawings. Maintain constant static pressure regardless of the fresh air damper positions by modulating the fresh air fan variable frequency drive speed control. Locate three averaging sensors upstream of the three most remote supply air branch duct take offs to control static pressure. Stage, unload and/or cycle heating/cooling sequences (if any) accordingly.
K. Maintain constant building pressure of 0.05 inches wg (12 Pa) measured at the grade level lobby by modulating the fresh air fan variable frequency drive speed control as required. Provide sufficient time dampening to avoid control system hunting due to the normal opening and closing of doors. Stage, unload and/or cycle heating/cooling sequences (if any) accordingly.

3.17 FRESH AIR FANS

A. Time Schedule: Start and stop fresh air fans based on the programmed time schedule as determined by the Owner's operating personnel.
B. Maintain the integrity of the packaged control equipment and sequences. The packaged unit controls shall operate such functions as the burner modulation, high limit and low limit safeties, etc. All set point, occupancy, staging and shutdown capabilities shall be controlled by the temperature control system.
C. The control system shall monitor and indicate at the operators console the status of the unit including:
1. System on/off status.
2. System operating mode (heating/cooling/ventilation).
3. Discharge air temperature.
4. Discharge air temperature setpoint (where applicable).
D. Control system shall be able to control any of the following functions:
1. Turn the system on or off.
2. Control the number of stages of heating or cooling (if any) to be utilized based on room or duct temperature conditions.
3. Change occupied or unoccupied temperature setpoints.
4. Change equipment operating mode (heating/cooling/off).
5. Modify occupancy schedules by unit.
E. Single temperature duct or room thermostat as indicated, or EMS sensor/controller, set at 68 degrees F (20 degrees C), maintains constant setpoint temperature by modulating two-way heating coil valve as follows:
1. When outside air temperature is below 40 degrees F (5 degrees C), fully open coil valve to heating regardless of the operating mode of the fan.
2. When fan is running and the outside temperature is below 40 degrees F (5 degrees C), maintain the air temperature set point by modulating the face and bypass dampers, leaving the heating coil valve fully open.
3. When fan is running and the outside air temperature is above 40 degrees F (5 degrees C), maintain the air temperature setpoint by modulating heating coil valve.
4. When the fan is running and the outside air temperature is above 55 degrees F (12 degrees C) heating coil valve shall be closed and the face and bypass dampers shall be indexed to full bypass.
F. Single temperature duct or room thermostat as indicated, or EMS sensor/controller set at 68 degrees F (20 degrees C) maintains constant setpoint temperature by cycling unit fan motor and energizing electric heating elements. Integral thermostat continues fan operation until element temperature falls below 100 degrees F (38 degrees C).
G. Single temperature duct or room thermostat as indicated, or EMS sensor/controller set at 68 degrees F (20 degrees C) maintains constant setpoint temperature by cycling unit fan motor and firing gas burner.
H. Single temperature duct or room thermostat as indicated, or EMS sensor/controller set at 80 degrees F (27 degrees C) maintains constant setpoint air temperature by staging refrigeration compressors. Provide unloaders and hot gas bypass on first stage of refrigeration compressors.
I. Freeze Protection: Stop fan and close outside air damper and open heating coil valves (if any) to 100% open if temperature after heating coil is below 37 degrees F (3 degrees C); signal alarm.
J. Maintain constant fresh air duct static pressure to the set point as determined by the fresh air system balancing to maintain the air flows indicated on the drawings. Maintain constant static pressure regardless of the fresh air damper positions by modulating the fresh air fan variable frequency drive speed control. Locate three averaging sensors upstream of the three most remote supply air branch duct take offs to control static pressure. Stage, unload and/or cycle heating/cooling sequences (if any) accordingly.
K. Maintain constant building pressure of 0.05 inches wg (12 Pa) measured at the grade level lobby by modulating the fresh air fan variable frequency drive speed control as required. Provide sufficient time dampening to avoid control system hunting due to the normal opening and closing of doors. Stage, unload and/or cycle heating/cooling sequences (if any) accordingly.

3.18 CONTROL OF PACKAGED HVAC EQUIPMENT CONTAINING FACTORY MOUNTED CONTROLS.

A. Single Zone Systems
1. Time Schedule: Control HVAC equipment based on the programmed time schedule as determined by the Owner's operating personnel. Provide occupied/unoccupied mode control with adjustable night setback of temperatures, where applicable.
2. Maintain the integrity of the packaged control equipment and sequences. The packaged unit controls shall operate such functions as the economizer operations, burner modulation, high limit and low limit safeties, etc. All set point, occupancy, staging and shut-down capabilities shall be controlled by the temperature control system.
3. The control system shall monitor and indicate at the operators console the status of the unit including:
a. System on/off status.
b. System on/off command status.
c. Supply fan status.
d. Return fan status (if present).
e. Exhaust fan status (if present).
f. System operating mode (heating/cooling/ventilation).
g. Discharge air temperature.
h. Discharge air temperature setpoint (where applicable).
i. Mixed air temperature.
j. Outdoor air temperature and humidity.
k. Return air temperature and humidity.
l. Space temperature (where applicable).
m. Space temperature setpoint (where applicable).
n. Compressor status, individually by compressor.
4. Control system shall be able to control any of the following functions:
a. Turn the system on or off.
b. Control the number of stages of heating or cooling to be utilized based on room or duct temperature conditions.
c. Change occupied or unoccupied temperature setpoints.
d. Change equipment operating mode (heating/cooling/off).
e. Modify occupancy schedules by unit.

3.19 HEAT PUMP SYSTEMS

A. Heat Exchanger: When the heat pump return water temperature rises above 90 degrees F (32 degrees C), the two position diverter valve shall position to divert heat pump return water through the heat exchanger and the condenser water pump shall start. Upon a shut down signal from the program clock or EMS controller, or a reduction in the heat pump return water temperature to below 85 degrees F (29 degrees C) all equipment (condensing water pump, cooling tower) shall stop and the diverter valve shall bypass the heat exchanger. Water temperatures above 105 degrees F (40 degrees C) or below 45 degrees F (7 degrees C) shall signal an alarm.
B. Condensing Water Pumps: Allow start on proof of water in cooling tower sump and on outdoor temperature above 32 degrees F (0 degrees C). A temperature controller sensing condenser supply water temperature to the building shall modulate the variable speed pump from 10% to 100% speed as required to maintain a condenser water supply temperature of 82 degrees F (28 degrees C) adjustable as first stage cooling. Second stage cooling shall modulate the cooling tower fan as indicated below. Alternate duty between condensing water pumps and log hours of operation separately for each pump. Upon failure of one pump, the system shall report an alarm condition and automatically start the alternate pump.
C. Heat Pump Loop Pumps: Heat pump loop variable speed pumps shall be controlled by system differential pressure. Alternate duty between heat pump loop water pumps and log hours of operation separately for each pump. Upon failure of one pump, the system shall report an alarm condition and automatically start the alternate pump. Refer to "Hydronic Pressure Control" sequence for variable speed operation of the Heat Pump Loop Pumps.
D. Cooling Tower: A temperature controller sensing condenser supply water temperature to the building shall control the cooling tower fan. Controller shall modulate the variable speed fan to maintain 82 degrees F (28 degrees C) condenser water supply temperature. The cooling tower fan shall not run unless the condenser water pump is running.
E. Heating Water Supply System: The boilers shall be provided with multi-stage controllers to individually fire the boilers as required to maintain a supply water temperature of 180 degrees F (82 degrees C) in the HWS loop during the heating season. One of the HWS pump shall run continuously during the heating season and be shut down at outdoor temperatures above 50 degrees F (10 degrees C). The boilers shall be locked out when the HWS pump is not operating. The two HWS pumps shall be arranged for alternating duty by the EMS computer. The run time of each pump shall be individually logged and reported at the operator's console.
F. Heat Pump Return Temperature: Controller in heat pump return water shall modulate the three-way diverter valve in the heating water supply system to maintain minimum 70 degrees F (21 degrees C) heat pump supply water temperature. Upon a shut down signal from the DDC controller the control valve shall bypass the heat pump loop water.
G. Heat Pump Unit Controls: Control system for the individual heat pump units shall be furnished by the equipment manufacturer. The program clock or energy management functions listed below must be integrated with the packaged controls furnished by the heat pump manufacturer. During the occupied mode as indicated by the program clock or EMS controller, the unit shall provide heating and cooling functions as specified by the unit manufacturer. During the unoccupied mode, the unit shall provide heating only at the night setback temperature as set by the room set/back thermostat or EMS sensor/controller. Heat pump control (heat, cool, occupied or unoccupied) shall be individually addressable for each heat pump unit. Heat pump supply fans shall run continuously during the occupied mode. This feature shall be individually programmable for each heat pump.
H. Heat Pump Unit Controls – Economizer and Demand Control Ventilation: Unit control shall be as specified in the Heat pump Unit specification. In addition to the standard unit controls, the Temperature Control Contractor shall provide control of a modulating, enthalpy controlled outdoor air economizer. During the occupied mode as indicated by the from the program clock or EMS controller, the return air, relief air and fresh air dampers shall be modulated in sequence in response to the cooling requirements of the space and the outdoor air enthalpy as compared to the return air enthalpy (differential enthalpy control). Fresh air damper shall modulate from the minimum position as indicated on the drawings to 100% outdoor air during economizer mode. The fresh air damper shall also modulate based on input from the carbon dioxide sensor located in the return duct. The minimum outdoor airflow rate is established by the required outdoor airflow with no occupants and the required outdoor airflow at design occupancy. The damper positions corresponding to these two airflow rates shall be set in conjunction with the balance contractor. The outdoor air damper shall modulate between the no occupants position and the design occupancy position as the space CO2 concentration varies from 400 ppm (ambient) to 1,500 ppm (adjustable). If CO2 concentration exceeds 1,500 ppm (adjustable), signal an alarm. Damper position shall not exceed 15% during heating mode unless the unit is equipped with a pre-heat coil upstream of the heat pump unit inlet. During the unoccupied mode, the fresh air and relief air dampers shall close and the unit shall provide heating only duty as controlled from the program clock or DDC sensor and controller. The Temperature Control Contractor shall coordinate with the Fire Alarm Contractor for proper connection of smoke shutdown detectors and relays.
I. Geothermal Well Field Monitoring: Provide BTU meters at inlet and outlet of Geothermal well field piping in mechanical room and log information to EMS system.
J. Automatic Start Capabilities: Controls shall be capable of automatically adjusting the daily start time of the HVAC system in order to bring each space to the desired occupied temperature immediately prior to scheduled occupancy.

3.20 SMOKE EVACUATION AND CONTROL SYSTEMS

A. The Mechanical Contractor shall furnish and install all air handling equipment and dampers required by the system. The Electrical Contractor will furnish and install power supply circuits and motor starting units for all motors in the system and power to all panels and control systems. The Fire Alarm Contractor will be responsible for all detection, initiation and control circuits from the smoke or water flow detection devices to the control circuits of the motor starting units and damper operators for all system components. All sequence and logic components shall be furnished and installed by the Fire Alarm Contractor. The Temperature Control Contractor shall coordinate with the mechanical contractor to ensure interlock of all dampers with their respective exhaust and supply fans.

3.21 STAIRWAY PRESSURIZATION SYSTEMS

A. The Mechanical Contractor shall furnish and install all air handling equipment and dampers required by the system. The Electrical Contractor will furnish and install power supply circuits and motor starting units for all motors in the system and power to all panels and control systems. The Fire Alarm Contractor will be responsible for all detection, initiation and control circuits from the smoke or water flow detection devices to the control circuits of the motor starting units and damper operators for all system components. All sequence and logic components shall be furnished and installed by the Fire Alarm Contractor.

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New York ■ Miami ■ Omaha ■ Los Angeles ■ Seattle ■ Honolulu
800-581-0963
www.schnackel.com

aria
GROUP

830 North Blvd.
Oak Park, Illinois
60301

708-445-8400
ariainc.com

ARIA GROUP ARCHITECTS, INC.

SHAKE SHACK
3393 Peachtree Road NE, Space 1014A, Atlanta, GA 30326

LENOX SQUARE

FIELD VERIFICATION
Contractor shall verify all figured dimensions and conditions at the job site and notify Aria Group Architects, Inc. of any dimensional errors, omissions or discrepancies before beginning or fabricating any work. Do not scale these drawings.

NO.	DATE	REMARKS
3	02/02/22	ISSUE FOR CONSTRUCTION
2	01/11/22	ISSUE FOR CONSTRUCTION
1	12/03/21	ISSUE FOR CONSTRUCTION
	11/08/21	ISSUE FOR CONSTRUCTION
	10/25/21	ISSUE FOR LL REVIEW

REVISIONS

026421
GREGORY ROY SCHNACKEL

Date: 02/02/22
COA #: PEF003790

Drawing Title
MECHANICAL SPECIFICATIONS

Job No. 214746
Drawn RAS
Scale N.T.S.
Date 09/17/2021

Sheet No.
M591

The Temperature Control Contractor shall coordinate with the mechanical contractor to ensure interlock of all dampers with their respective exhaust and supply fans.

3.22 WATER METERING AND BILLING SOFTWARE
A. Provide a complete software package to electronically monitor the water usage of each Tenant water meter and all Landlord water meters as indicated on the drawings or required for the number of Tenant bays indicated on the leasing drawings. The system shall provide the following minimum functions:
1. Real-time device metering information, event information and historical profile data. The software shall support the number of devices required to service all Tenant spaces and all Landlord/House water meters, plus the capacity to add at least 20% additional devices.
2. The software shall allow users to be granted privileges based on their user ID and password, to perform various functions in the system including configuration and billing functions.
3. The software shall create graphical load profiles from historical data. Data shall be able to be displayed from individual meters, or user defined groups of meters.
4. The software shall provide tools to manage the historical database files by providing a means to archive and restor historical data.
5. The software shall include the capability to create user selected name tags for each meter in the system.
6. Provide automated billing software that allows the user to allocate the water consumption costs. Cost allocation shall be based on cubic feet of usage. In addition, the water billing system shall provide the following minimum features:
a. The water billing system shall allow the generation of individual water bills by distributing utility costs for the water usage to user defined "customers" including the ability to add capital cost or other allocated additional costs in either fixed monthly charges or percentage mark-ups within the system, based on a user configured customer billing parameters table.
b. The billing system shall produce professional quality, accurate bills and/or reports using the information collected from the water usage meters automatically, once all billing parameters and meter assignments have been set in the system.
c. The billing system shall support multiple utility rate structures, individually assignable by customer.
d. The billing system shall allow optional utility charges such as sewer use fees, taxes, adjustments, etc. to be allocated to the customers.
e. The billing system shall save data in an industry standard database system for future use and processing.
f. The billing system shall provide an export feature to export customer bills and or reports to Microsoft Excel and Word program formats.

3.23 NATURAL GAS METERING AND BILLING SOFTWARE
A. Provide a complete software package to electronically monitor the natural gas usage of each Tenant gas meter and all Landlord gas meters as indicated on the drawings or required for the number of Tenant bays indicated on the leasing drawings. The system shall provide the following minimum functions:
1. Real-time device metering information, event information and historical profile data. The software shall support the number of devices required to service all Tenant spaces and all Landlord/House natural gas meters, plus the capacity to add at least 20% additional devices.
2. The software shall allow users to be granted privileges based on their user ID and password, to perform various functions in the system including configuration and billing functions.
3. The software shall provide tools to manage the historical database files by providing a means to archive and restore historical data.
4. The software shall create graphical load profiles from historical data. Data shall be able to be displayed from individual meters, or user defined groups of meters.
5. The software shall include the capability to create user selected name tags for each meter in the system.
6. Provide automated billing software that allows the user to allocate the natural gas consumption costs. Cost allocation shall be based on a per 1000 cubic feet or per MBH of usage, depending on the rate schedules selected. In addition, the natural gas billing system shall provide the following minimum features:
a. The natural gas billing system shall allow the generation of individual natural gas bills by distributing utility costs for the natural gas usage to user defined "customers" including the ability to add capital cost or other allocated additional costs in either fixed monthly charges or percentage mark-ups within the system, based on a user configured customer billing parameters table.
b. The billing system shall produce professional quality, accurate bills and/or reports using the information collected from the natural gas consumption meters automatically, once all billing parameters and meter assignments have been set in the system.
c. The billing system shall support multiple utility rate structures, individually assignable by customer.
d. The billing system shall allow optional utility charges such as capital facility fees, taxes, adjustments, etc. to be allocated to the customers.
e. The billing system shall save data in an industry standard database system for future use and processing.
f. The billing system shall provide an export feature to export customer bills and or reports to Microsoft Excel and Word program formats.

END OF SECTION

SECTION 232113 – HYDRONIC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Pipe and pipe fittings for:
1. Condenser water piping system.
2. Equipment drains 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, and as follows:
1. Where more than one piping system material is specified, provide joining fittings that are compatible with piping materials and ensure that the integrity of the system is not jeopardized.
2. Use non-conducting dielectric connections whenever jointing dissimilar metals.
3. Grooved mechanical joints may be used in any location.
a. Accessible locations include those exposed on interior of building, in pipe chases, and in mechanical rooms, aboveground outdoors, and as approved by Engineer.
b. Grooved joints apply to metal piping only.
c. Use rigid joints unless otherwise indicated.
d. Three flexible joints may be used in lieu of a flexible connector.
4. Provide pipe hangers and supports in accordance with ASME B31.9 or 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 in piping, provide grooved valve/equipment connections if available; if not available, provide flanged ends and grooved flange adapters.
D. Valves: Provide valves where indicated and as follows:
1. Provide drain valves where indicated, and if not indicated provide at least at main shut-off, low points of piping, bases of vertical risers, and at equipment. Use 3/4 inch gate valves with cap; pipe to nearest floor drain.
2. For throttling, bypass, or manual flow control services, 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 MATERIALS
A. The Contractor may use any of the following piping 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.
2.03 CONDENSER WATER PIPING, ABOVE GROUND
A. Steel Pipe: ASTM A 53/A 53M, Schedule 40, black.
1. Welded Joints: ASTM A 234/A 234M, wrought steel welding type fittings with finish matching piping; AWS D1.1 welded.
2. Threaded Joints: ASTM B 16.3, malleable iron fittings with finish matching piping.
3. Grooved Joints: AWWA C606 grooved pipe, fittings of same material, and mechanical couplings.
B. Steel Pipe Sizes 12 Inch and Over: ASTM A 53/A 53M, 0.375 inch wall, black; using one of the following joint types:
1. Welded Joints: ASTM A 234/A 234M, wrought steel welding type fittings; AWS D1.1 welded.
2. Grooved Joints: AWWA C606 grooved pipe, fittings of same material, and mechanical couplings.
C. Copper Tube: ASTM B 88 (ASTM B 88M), Type K (A), 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.
a. Solder: ASTM B 32 lead-free solder, HB alloy (95-5 tin-antimony) or tin and silver.
b. Braze: AWS A5.8/A5.8M BCuP copper/silver alloy.
2. Grooved Joints: AWWA C606 grooved tube, fittings of same material, and copper-tube-dimension mechanical couplings.
3. Tee Connections: Mechanically extracted collars with notched and dimpled branch tube.
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: AWWA 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, HB alloy (95-5 tin-antimony) or tin and silver.
2. Grooved Joints: AWWA 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 2680 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 Piping: Bronze.
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 C-profile gasket, and bolts to secure and compress gasket.
1. Dimensions and Testing: In accordance with AWWA 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; Nibco, 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. Slope piping and arrange to drain at low points.
D. 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 232300 – REFRIGERANT PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Piping.
B. Refrigerant.
C. Moisture and liquid indicators.
D. Filter-driers.
E. Expansion valves.
1.02 SYSTEM DESCRIPTION
A. Where more than one piping system material is specified ensure system components are compatible and joined to ensure the integrity of the system is not jeopardized. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.
B. Provide pipe hangers and supports in accordance with ASME B31.5 unless indicated otherwise.
C. Liquid Indicators:
1. Use line size liquid indicators in main liquid line leaving condenser.
2. If receiver is provided, install in liquid line leaving receiver.
3. Use line size on leaving side of liquid solenoid valves.
D. Refrigerant Charging (Packed Angle) Valve: Use in liquid line between receiver shut-off valve and expansion valve.
E. Filter-Driers:
1. Use a filter-drier immediately ahead of liquid-line controls, such as thermostatic expansion valves, solenoid valves, and moisture indicators.
2. Use a filter-drier on suction line just ahead of compressor.
1.03 REGULATORY REQUIREMENTS
A. Conform to ASME B31.9 for installation of piping system.
B. Welding Materials and Procedures: Conform to ASME (BPV IX) and applicable state labor regulations.
C. Welders Certification: In accordance with ASME (BPV IX).

PART 2 PRODUCTS

2.01 PIPING
A. Copper Tube: ASTM B 280, H58 hard drawn or O60 soft annealed.
1. Fittings: ASME B16.22 wrought copper.
2. Joints: Braze, AWS A5.8 BCuP silver/phosphorus/copper alloy.
B. Copper Tube to 7/8 inch OD: ASTM B 88 (ASTM B 88M), Type K (A), annealed.
1. Fittings: ASME B16.26 cast copper.
2. Joints: Flared.
C. Pipe Supports and Anchors:
1. Conform to ASME B31.5, ASTM F 708, MSS SP-58, MSS SP-69, and MSS SP-89.
2.02 REFRIGERANT
A. Provide refrigerant as specified by the manufacturer of the refrigeration equipment.
2.03 MOISTURE AND LIQUID INDICATORS
A. Manufacturers:
1. Henry Technologies; Parker Hannifin/Refrigeration and Air Conditioning; Sporlan Valve Company.
B. Indicators: Single port type, UL listed, with copper or brass body, flared or solder ends, sight glass, color coded paper moisture indicator with removable element cartridge and plastic cap; for maximum temperature of 200 degrees F and maximum working pressure of 500 psi.
2.04 FILTER-DRIERS
A. Manufacturers:
1. Flow Controls Division of Emerson Electric; Parker Hannifin/Refrigeration and Air Conditioning; Sporlan Valve Company.
B. Performance:
1. Flow Capacity - Liquid Line: As required by capacities indicated on the Drawings, minimum, rated in accordance with ARI 710.
2. Flow Capacity - Suction Line: As required by capacities indicated on the Drawings, minimum, rated in accordance with ARI 730.
3. Pressure Drop: 2 psi, maximum, when operating at full connected evaporator capacity.
4. Design Working Pressure: 350 psi, minimum.
C. Cores: Molded or loose-fill molecular sieve desiccant compatible with refrigerant, activated alumina, activated charcoal, and filtration to 40 microns, with secondary filtration to 20 microns; of construction that will not pass into refrigerant lines.
D. Construction: UL listed.
1. Replaceable Core Type: Steel shell with removable cap.
2. Sealed Type: Copper shell.
3. Connections: As specified for applicable pipe type.
2.05 EXPANSION VALVES
A. Manufacturers:
1. Flow Controls Division of Emerson Electric; Parker Hannifin/Refrigeration and Air Conditioning; Sporlan Valve Company.
B. Angle or Straight Through Type: ARI 750; design suitable for refrigerant, brass body, internal or external equalizer, bleed hole, adjustable superheat setting, replaceable inlet strainer, with non-replaceable capillary tube and remote sensing bulb.
C. Selection: Evaluate refrigerant pressure drop through system to determine available pressure drop across valve. Select valve for maximum load at design operating pressure and minimum 10 degrees F superheat. Select to avoid being undersized at full load and excessively oversized at part load.

PART 3 EXECUTION

3.01 INSTALLATION
A. Install refrigeration specialties in accordance with manufacturer's instructions.
B. All roofing penetrations shall be flashed and weather sealed by the roofing manufacturer's authorized roofing contractor at this Contractor's expense. This Contractor shall contract with the factory authorized roofing contractor for the specific roofing system applicable to this Project. The use of an unauthorized roofing contractor may result in removal and replacement of the penetration systems at this Contractor's expense.
C. Follow ASHRAE Std 15 procedures for charging and purging of systems and for disposal of refrigerant.
D. Fully charge completed system with refrigerant after testing.
3.02 FIELD QUALITY CONTROL
A. Test refrigeration system in accordance with ASME B31.5.

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. Exterior above grade ductwork.
F. Duct cleaning.
1.02 PERFORMANCE REQUIREMENTS
A. No variation of duct configuration or sizes permitted except by written permission. Size round ducts installed in place of rectangular ducts in accordance with ASHRAE table of equivalent rectangular 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.
B. 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 96 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 manufacturers.
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 1008/A 1008M, Designation CS, cold-rolled commercial steel.
C. Aluminum Ducts: ASTM B 209 (ASTM B 209M); aluminum sheet, alloy 3003-H14. Aluminum Connectors and Bar Stock: Alloy 6061-T651 or of equivalent strength.
D. 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; aluminized 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; aluminized 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; aluminized 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; aluminized 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; aluminized vapor barrier film.
a. Pressure Rating: 8 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. Ductwork Exposed to the Weather: Hard cast VersaGrip 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's, 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 acoustical lining is indicated, provide turning vanes of perforated metal with glass fiber insulation.
C. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees 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 wye 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 louver area around duct. Use same material as duct, painted black on exterior side; seal to louver frame and duct.
G. Exterior above grade ductwork:
1. All supply and return ductwork installed on the exterior of the building (roofs, slab on grade, on exterior walls, etc.) shall be constructed as a water-tight, multi-layer assembly consisting of the following layers starting from the interior of the ductwork out:
a. 2" minimum thickness internal duct liner.
b. Galvanized steel metal duct, constructed and sealed per SMACNA requirements for the service class specified.
c. 3" minimum thickness fiberglass duct insulation with vapor barrier jacket.
d. Stainless steel outer jacket duct constructed in accordance with SMACNA requirements for low pressure duct. Seal all joints water tight utilizing approved caulking or welded joints. Cross break all top surfaces to facilitate drainage.
2. Provide insulation blocking spacers between the galvanized sheet metal inner duct and the stainless steel outer jacket to prevent crushing of the insulation jacket. Locate spacers a maximum of 5-0" on centers. Hydrous calcium silicate insulation or other heavy density insulating material shall be used for all spacers.
3. Alternative construction methods for exterior mounted ductwork, which achieve a similar level of insulation protection and weather protection, maybe submitted by the contractor prior to bidding. Acceptance of alternate construction methods for exterior mounted ductwork shall be at the sole discretion of the Engineer.
2.03 DUCT MANUFACTURERS
A. Metal-Fab, Inc.; SEMCO Incorporated; United McGill Corporation.
2.04 MANUFACTURED METAL DUCTWORK AND FITTINGS
A. Manufacture 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 solid 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 NFPA 96.
B. Construct of 16 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 can with spring device or screw to ensure against air 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 operating 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 open 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 locationsKitchen 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.
P. All roofing penetrations shall be flashed and weather sealed by the roofing manufacturer's authorized roofing contractor at this Contractor's expense. This Contractor shall contract with the factory authorized roofing contractor for the specific roofing system applicable to this Project. The use of an unauthorized roofing contractor may result in removal and replacement of the penetration systems at this Contractor's expense.
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, clean 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:
B. 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.
1. Low Velocity Supply (Heating Systems): Galvanized Steel, Aluminum.
2. Low Velocity Supply (System with Cooling Coils): 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: 1 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 short dimension; steel or aluminum construction; with individually adjustable blades, mounting straps.
2.02 VOLUME CONTROL DAMPERS
A. Manufacturers: Louvers & Dampers, Inc.; Nailor 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 Dampers: 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 hardware.
E. End Bearings: Except in round ducts 12 inches and smaller, provide end bearings. On multiple blade dampers, provide oil-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 Enertech Corporation, "Power Balance" system including motor operated damper, RJ-11 plenum rated cabling and flush ceiling or wall mounted RJ-11 jack in remote plate. Include one hand held battery pack operator pack 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.
a. Net Fabric Width: Approximately 2 inches wide.
2. Metal: 3 inches wide, 24 gage thick galvanized steel.
2.04 DUCT ACCESS DOORS
A. Manufacturers: Acudor Products Inc.; Nailor 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, at fire dampers, combination fire and smoke dampers, and elsewhere as indicated. Provide minimum 8 x 8 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 all dampers and control elements located above inaccessible 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 at 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.

Model: REME HALO 24V Specifications

LISTING: UL 1598:2008 (3rd Edition)
FACTORY UV-PHI CELL
INSTALLATION: FAN COIL SUPPLY DUCTWORK

PART 1 GENERAL

1.1 SUMMARY

E. This section includes hydro-peroxide, Super-Oxide Ions, & Hydroxide Ion's delivered via PHI technology through packaged heating and cooling units capable of supplying 3,000 to 8,000 CFM of supply air to the indoor space.

1.2 QUALITY ASSURANCE

A. All models shall be UL listed and comply with safety standards UL 1598:2008 (3rd Edition) and CSA Standard C22.2 No. 250.0:2008.

1.3 WARRANTY

A. All units shall be provided with the following standard warranties:

1. 2-year or 18,000 hours from initial startup. National TAB provided service plan. The phi cell & UV light replacement 18,000 hour replacements are provide/installed at no cost if National TAB is providing Renew-Cx Service after initial installation.

F. 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

2.1 GENERAL

A. MULTI-ZONE one piece packaged PHI Unit-Air Purification System

2.2 HOUSING

A. Unit(s) shall be constructed of aluminum structural pop-rivets. All metal shall be CNC bend for precise assembly.
1. Quad Metalic Target
2. UV-C bulb
3. Electronic Enclousre (24VAC input power Jack)
4. Magnetic mounting feet for easy placement and installation in the Blower Cabinet

END OF SECTION

SECTION 233423 – HVAC POWER VENTILATORS

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Kitchen range hood exhausters.

PART 2 PRODUCTS

2.01 MANUFACTURERS
A. Greenheck; Loren Cook Company; PennBarry; CaptiveAire.
2.02 POWER VENTILATORS - GENERAL
A. Performance Ratings: Determined in accordance with AMCA 210 and bearing the AMCA Certified Rating Seal.
B. Sound Ratings: AMCA 301, tested to AMCA 300, and bearing AMCA Certified Sound Rating Seal.
C. Fabrication: Conform to AMCA 99.
D. UL Compliance: UL listed and labeled, designed, manufactured, and tested as suitable for the purpose specified and indicated.
E. Kitchen hood exhausters shall be upblast with grease tray, ventilated double wall curb and hinged curb adapter base for cleaning. Hood exhausters shall comply with requirements of NFPA 96

PART 3 EXECUTION

3.01 INSTALLATION
A. Install in accordance with manufacturer's instructions.
B. Provide sheaves required for final air balance at no additional expense to the project.
C. Secure roof and wall exhausters with cadmium plated steel lag screws to roof curb or structure.
D. Extend ducts to roof and wall exhausters into roof curb or wall structure. Counterflash duct to roof or wall opening.
E. Install backdraft dampers (gravity or motorized as depicted on design drawings) on inlet to roof and wall exhausters.
F. All roofing penetrations shall be flashed and weather sealed by the roofing manufacturer's authorized roofing contractor at this Contractor's expense. This Contractor shall contract with the factory authorized roofing contractor for the specific roofing system applicable to this project. The use of an unauthorized roofing contractor may result in removal and replacement of the penetration systems at this Contractor's expense.

END OF SECTION

SECTION 233700 – AIR OUTLETS AND INLETS

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Rectangular ceiling diffusers.
B. 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 louver performance in accordance with AMCA 500-L.
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; Nailor Industries Inc.; Hart & Cooley; Ruskin, Greenheck.
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 sectorizing 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 GRID CORE EXHAUST AND RETURN GRILLES
A. Type: Fixed grilles of 1/2 x 1/2 x 1 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.
2.04 LOUVERS

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 to ductwork with air tight connection.
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 and 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.; Climatemaster; Daikin Applied; Florida Heatpump; Waterfurnace.
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 1/2 inch thick acoustic duct liner for lining cabinet interior.
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 at mid-position as recommended by manufacturer or minimum 1.5 times nameplate rating of the motor.
2.05 COMPRESSOR
A. Hermetically sealed, 3600 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. Refrigeration 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 tinned copper tubes in steel shell with water temperature actuated 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 at mid-position as recommended by manufacturer or minimum 1.5 times nameplate rating of the motor.
2.08 AIR FILTERS
A. Easily removed 2 inch thick disposable panel filters.
2.09 CONTROLS
A. Factory wired controls shall include contactor, 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 daily start 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 Interlocked with Compressor Operation, Petes Port, Flex Braided Hose.
2. On outlet provide: Flex Braided Hose, Air Vent, Petes 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

SECTION 238127 – SMALL SPLIT-SYSTEM HEATING AND COOLING

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Air-source heat pumps.
B. Air cooled condensing units.
C. Indoor ductless fan & coil units.
D. Controls.
1. Room thermostats.

PART 2 PRODUCTS

2.01 MANUFACTURERS
A. Carrier Corporation - No Exceptions.
2.02 SYSTEM DESIGN
A. Split-System Heating and Cooling Units: Self-contained, packaged, matched factory-engineered and assembled, pre-wired indoor and outdoor units; UL listed.
1. Provide refrigerant lines internal to units and between indoor and outdoor units, factory cleaned, dried, pressurized and sealed, with insulated suction line. Size as recommended by the manufacturer. All refrigerant line sizes indicated on the Drawings are approximate and shall be adjusted as required based on the actual equipment provided to meet the manufacturer's recommended line sizing at no additional expense.
B. Performance Requirements:.
1. Equipment performance, efficiency 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 and accessories specified in either location shall be included in the Contract. Provide all necessary accessories and connections as required for a complete, functional system. Efficiency shall not be less than requirements of the units specified or indicated on the drawings, or the applicable local energy code.

2.03 INDOOR UNITS FOR DUCTLESS SYSTEMS
A. Indoor Units: Self-contained, packaged, factory assembled, pre-wired unit consisting of cabinet, supply fan, evaporator coil, and controls; wired for single power connection with control transformer.
B. Evaporator Coils: Copper tube aluminum fin assembly, galvanized or polymer drain pan sloped in all directions to drain, drain connection, refrigerant piping connections, restricted distributor or thermostatic expansion valve.
1. Construction and Ratings: In accordance with ARI 210/240 and UL listed.
2.04 OUTDOOR UNITS
A. Outdoor Units: Self-contained, packaged, factory assembled, pre-wired unit consisting of cabinet, with compressor and condenser.
1. Cabinet: Steel with baked enamel finish, easily removed and secured access doors with safety interlock switches, glass fiber insulation with reflective liner.
2. Construction and Ratings: In accordance with ARI 210/240 with testing in accordance with ASHRAE Std 23 and UL listed.
B. Compressor: ARI 520; hermetic, 3600 rpm, (multi-speed when indicated on the Drawings) resiliently mounted integral with condenser, with positive lubrication, crankcase heater, high pressure control, motor overload protection, service valves and drier. Provide time delay control to prevent short cycling.
C. Air Cooled Condenser: ARI 520; Aluminum fin and copper tube coil, with direct drive axial propeller fan resiliently mounted, galvanized fan guard.
D. Accessories: Filter drier, high pressure switch (manual reset), low pressure switch (automatic reset), service valves and gage ports, thermometer well (in liquid line).
1. Provide thermostatic expansion valves.
2. Provide heat pump reversing valves on all heat pump units.
E. Operating Controls:
1. Control by room thermostat to maintain room temperature setting.
2. Low Ambient Kit: On all systems not provided with economizer controls, provide refrigerant pressure switch to cycle condenser fan on when condenser refrigerant pressure is above 285 psig and off when pressure drops below 140 psig for operation to 0 degrees F.
F. Mounting Pad: Poured in place concrete, precast concrete or resin composite pad, minimum 4 inches thick, square.
2.05 ACCESSORY EQUIPMENT
A. Room Thermostat: Wall-mounted, electric solid state microcomputer based room thermostat with remote sensor to maintain temperature setting; low-voltage; with following features:
1. System selector switch (heat-off-cool) and fan control switch (auto-on).
2. Automatic switching from heating to cooling.
3. Preferential rate control to minimize overshoot and deviation from setpoint.
4. Automatic Start Capabilities: Controls shall be capable of automatically adjusting the daily start time of the HVAC system in order to bring each space to the desired occupied temperature immediately prior to scheduled occupancy.
5. Set-up for four separate temperatures per day.
6. Instant override of setpoint for continuous or timed period from one hour to 31 days.
7. Short cycle protection.
8. Programming based on every day of the week.
9. Selection features including degree F or degree C display, 12 or 24 hour clock, keyboard disable, remote sensor, fan on-auto.
10. Battery replacement without program loss.
11. Thermostat display:
a. Time of day.
b. Actual room temperature.
c. Programmed temperature.
d. Day of week.
e. System mode indication: heating, cooling, fan auto, off, and on, auto or on, off.

PART 3 EXECUTION

3.01 INSTALLATION
A. Install in accordance with manufacturer's instructions and requirements of local authorities having jurisdiction.
B. Install in accordance with NFPA 90A and NFPA 90B as applicable.
C. Provide cooling condensate drain piping (and overflow piping if required) to approved location. Condensate piping shall be Schedule 40 galvanized steel pipe, Type L copper tube, or PVC pipe (non-plenum applications). Contractor shall verify 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. Only metallic piping systems will be allowed in return air plenum ceiling space.
D. Install refrigeration systems in accordance with ASHRAE Std 15. Provide filter dryer, sight glass and solenoid valve on outdoor units and sight glass and expansion valve on indoor units.
E. All thermostat, humidistat (if required), damper interlock and other low voltage control wiring shall be installed by the Mechanical Contractor. The Electrical Contractor will furnish only the power system connections shown on the Electrical Drawings. All other control and interlock wiring is the responsibility of the Mechanical Contractor.

END OF SECTION

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New York ■ Miami ■ Omaha ■ Los Angeles ■ Seattle ■ Honolulu
800-581-0963 www.schnackel.com

aria GROUP
830 North Blvd.
Oak Park, Illinois
60301
708-445-8400
ariainc.com
ARIA GROUP ARCHITECTS, INC.

SHAKE SHACK
3393 Peachtree Road NE, Space 1014A, Atlanta, GA 30326

LENOX SQUARE

FIELD VERIFICATION
Contractor shall verify all figured dimensions and conditions at the job site and notify Aria Group Architects, Inc. of any dimensional errors, omissions or discrepancies before beginning or fabricating any work. Do not scale these drawings.

NO.	DATE	REMARKS
3	02/02/22	ISSUE FOR CONSTRUCTION
2	01/11/22	ISSUE FOR CONSTRUCTION
1	12/03/21	ISSUE FOR CONSTRUCTION
	11/08/21	ISSUE FOR CONSTRUCTION
	10/25/21	ISSUE FOR LL REVIEW

REVISIONS

026421 PROFESSIONAL
Date: 02/02/22
COA # PEF003790

Drawing Title
MECHANICAL SPECIFICATIONS

Job No. 214746
Drawn RAS
Scale N.T.S.
Date 09/17/2021
Sheet No. M592

CODE: 2018 INTERNATIONAL MECHANICAL CODE

SYSTEM 1

ROOM #	NAME	Az AREA (FT2)	TABLE 403.3.1.1 OCCUPANCY CATEGORY	TABLE 403.3.1.1 Rp PEOPLE OA (CFM/PER)	TABLE 403.3.1.1 Ra AREA OA (CFM/FT2)	TABLE 403.3.1.1 OCCUPANT DENSITY (#/1000 FT2)	Pz (#)	Rp*Pz	Ra*Az	Vbz (CFM)	TABLE 403.3.1.1.1.2 Ez	Voz (CFM)	Vpz MAX SUPPLY (CFM)	Vpzm MIN SUPPLY (CFM)	Zp	INTERPOLATED TABLE 403.3.1.1.2.3.2 Ev
103	OPEN KITCHEN	122	SALES	7.5	0.12	15	2	15	15	30	0.80	37	865	865	0.043	1.00
104	PREP AREA	213	NO LISTING	0.0	0.00	0	3	0	0	0	0.80	0	1510	1510	0.000	1.00
105	COOKLINE	172	NO LISTING	0.0	0.00	0	2	0	0	0	0.80	0	1225	1225	0.000	1.00
106	DISH WASH_PREP	192	NO LISTING	0.0	0.00	0	2	0	0	0	0.80	0	600	600	0.000	1.00
107	B.O.H.	211	NO LISTING	0.0	0.00	0	2	0	0	0	0.80	0	600	600	0.000	1.00
		910					11	15	15	30		37	4800	4800	0.043	1.00

OUTDOOR AIR CALCULATIONS PER EQUATION 4-1:

SYMBOL	VALUE	DESCRIPTION
Ps =	11	SYSTEM POPULATION
SPz =	11	ZONE POPULATION
D =	1.00	OCCUPANT DIVERSITY
Vou =	30	UNCORRECTED OUTDOOR AIR INTAKE
Zp (max) =	0.043	ZONE PRIMARY OUTDOOR AIR FRACTION (MAXIMUM)
Ev =	1.00	SYSTEM VENTILATION EFFICIENCY
SVpz =	4800	ZONE PRIMARY AIRFLOW
Vot =	30	CODE REQUIRED OUTDOOR AIRFLOW RATE, CFM
Vot =	30	DESIGN OUTDOOR AIRFLOW RATE, CFM

SYSTEM 2

ROOM #	NAME	Az AREA (FT2)	TABLE 403.3.1.1 OCCUPANCY CATEGORY	TABLE 403.3.1.1 Rp PEOPLE OA (CFM/PER)	TABLE 403.3.1.1 Ra AREA OA (CFM/FT2)	TABLE 403.3.1.1 OCCUPANT DENSITY (#/1000 FT2)	Pz (#)	Rp*Pz	Ra*Az	Vbz (CFM)	TABLE 403.3.1.1.1.2 Ez	Voz (CFM)	Vpz MAX SUPPLY (CFM)	Vpzm MIN SUPPLY (CFM)	Zp	INTERPOLATED TABLE 403.3.1.1.2.3.2 Ev
110	MANAGERS OFFICE	43	OFFICE SPACES	5.0	0.06	5	1	5	3	8	0.80	9	350	350	0.027	1.00
		43					1	5	3	8		9	350	350	0.027	1.00

OUTDOOR AIR CALCULATIONS PER EQUATION 4-1:

SYMBOL	VALUE	DESCRIPTION
Ps =	1	SYSTEM POPULATION
SPz =	1	ZONE POPULATION
D =	1.00	OCCUPANT DIVERSITY
Vou =	8	UNCORRECTED OUTDOOR AIR INTAKE
Zp (max) =	0.027	ZONE PRIMARY OUTDOOR AIR FRACTION (MAXIMUM)
Ev =	1.00	SYSTEM VENTILATION EFFICIENCY
SVpz =	350	ZONE PRIMARY AIRFLOW
Vot =	8	CODE REQUIRED OUTDOOR AIRFLOW RATE, CFM
Vot =	10	DESIGN OUTDOOR AIRFLOW RATE, CFM

1 OUTSIDE AIR CALCULATIONS

AHU/ACU CONTROL MATRIX

SETPOINT/CONTROL	WSHP 1-3 KITCHEN	ACU-1 OFFICE
SETPOINTS		
COOLING - OCCUPIED SETPOINT	75 F	75 F
COOLING - UNOCCUPIED SETPOINT	80 F	80 F
HEATING - OCCUPIED SETPOINT	70 F	70 F
HEATING - UNOCCUPIED SETPOINT	60 F	60 F
ECONOMIZER UPPER LIMIT SETPOINT	NA	NA

ACCESSORIES		
HVAC SYSTEM OCCUPIED/UNOCCUPIED MODE - PROGRAMMABLE THERMOSTAT	YES	YES
REMOTE TEMPERATURE SENSOR	YES	NO
MOTORIZED OUTDOOR AIR DAMPER	YES	YES
INTEGRATED ECONOMIZER	NA	NA
ECONOMIZER FAULT DETECTION	NA	NA
BAROMETRIC RELIEF	NA	NA
POWERED EXHAUST RELIEF	NA	NA
DEHUMIDIFICATION (HOT GAS REHEAT)	NA	NO

SUPPLY FAN		
ON DURING OCCUPIED MODE	YES	YES
VARIALBE VOLUME - MODULATE FAN SPEED	NO	YES

SAFETIES AND INTERLOCKS		
RETURN AIR SMOKE DETECTOR	YES	NO
LOW LIMIT FREEZESTAT	NA	YES
FIRE ALARM CONTOL PANEL INTERLOCK	YES	YES
KITCHEN EXHAUST SYSTEM INTERLOCK	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	20	1,580		1%	FOH
WSHP-2	1,600	20	1,580		1%	FOH
WSHP-3	1,600	0	1,600		0%	BOH
ACU-1	350	10	340		3%	
MUA-1	1,870	1,870	0		100%	
ESP-1				2,620		
TOTAL =	7,020	1,920	5,100	2,620		
RESULTING BUILDING PRESSURIZATION =				-700 CFM*		
PRESSURIZATION PERCENTAGE =				-10.0 %		

***REMAINING AIR REQUIRED FOR EXHAUST IS TO BE PROVIDED BY THE MALL SYSTEM**

CARRIER EQUIPMENT SHALL BE OBTAINED THROUGH SHAKE SHACK NATIONAL ACCOUNT. CONTACT CARRIER CORPORATION FOR PROPOSALS:
BOB ECKWEILER
CARRIER RETAIL STRATEGIC ACCOUNTS
EMAIL: BOB.ECKWEILER@CARRIER.UTC.COM
PHONE: (973) 222-6742

WATER SOURCE HEAT PUMPS

MARK	COOLING SEN (MBH)	COOLING TOT (MBH)	HEAT TOT (MBH)	FLUID FLOW (GPM)	FLUID P.D. (FT H20)	SUPPLY AIR (CFM)	EXT. S.P. (IN)	FAN HP	ELECTRICAL VOLT	PH	MCA	MOCP	EER	COP	CARRIER MODEL NUMBER	REMARKS
WSHP-1	37.6	47.0	N/A	13.6	9.8	1,600	0.70	0.75	208	3	24.0	35	15.8	5.4	50PSH048	[1-7]
WSHP-2	37.6	47.0	N/A	13.6	9.8	1,600	0.70	0.75	208	3	24.0	35	15.8	5.4	50PSH048	[1-7]
WSHP-3	37.6	47.0	N/A	13.6	9.8	1,600	0.70	0.75	208	3	24.0	35	15.8	5.4	50PSH048	[1-7]

CARRIER IS THE BASIS OF DESIGN. NO EXCPETIONS.

REMARKS:
1. PROVIDE EQUIPMENT WITH SCCR 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, 87°F DB ENTERING WATER.
4. NOT USED.
5. PROVIDE RUBBER VIBRATION ISOLATORS FOR MOUNTING FROM STRUCTURE AND 1 INCH FILTERS.
6. PROVIDE TWO POSITION SOLENOID VALVE.
7. PROVIDE AUXILLARY DRAIN PAN AND WATER LEVEL MONITORING DEVICE IN DRAIN PAN TO SHUT OFF UNIT IF THE DRAIN LINE BECOMES RESTRICTED.

DIFFUSERS, GRILLES AND REGISTERS

MARK	SERVICE	LOCATION	CEILING TYPE	MOUNTING TYPE	MANUFACTURER	MODEL NUMBER	REMARKS
D-1	SUPPLY	CEILING	AC TILE	LAY-IN	TITUS	PAR XX 24x24 3 26	[1,2,5]
D-2	SUPPLY	CEILING	AC TILE	LAY-IN	TITUS	TMS XX 24x24 3 26	[1,2,5]
G-1	VARIES	CEILING	AC TILE	LAY-IN	TITUS	50F 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. COORDINATE FINAL COLOR/FINSIH WITH ARCHITECT.

AIR SOURCE HEAT PUMPS

MARK	LOCATION	SERVES	NOMINAL COOL (TONS)	HEATING AT 47F (MBH)	ELECTRICAL VOLT	PH	MCA	MOCP	SEER /EER	HSPF /COP	MANUFACTURER	MODEL NUMBER	REMARKS
ASHP-1	LOW ROOF	ACU-1	0.75	14.6	208	1	9.0	15	20.0/13.0	10.8/3.30	CARRIER	38MAQB09	[1]

REMARKS:
1. PROVIDE EQUIPMENT WITH SCCR 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.

DUCTLESS SPLIT SYSTEMS

MARK	COOLING NOMINAL (TONS)	COOLING TOT (MBH)	COOLING SEN (MBH)	HEATING OUT (MBH)	SUPPLY AIR (CFM)	FAN (WATT)	ELECTRICAL VOLT	PH	MCA	MOCP	SEER /EER	CARRIER MODEL NUMBER	REMARKS
ACU-1	0.8	11.85	8.29	14.60	350	45	208	1	0.2	NA	25/14.5	40MBCQ09	[1,2]

REMARKS:
1. PROVIDE CONDENSATE PUMP.
2. INDOOR UNIT POWER PROVIDED FROM OUTDOOR UNIT.

PUMPS

MARK	LOCATION	SERVICE	FLOW (GPM)	HEAD (FT H20)	MOTOR DATA HP	MOTOR DATA VOLT	MOTOR DATA PH	RPM	TYPE	MANUFACTURER	MODEL NUMBER	REMARKS
P-1	CEILING SPACE	WSHP 1,2,3	30	10	1/6	115	1	3,300	INLINE	BELL & GOSSETT	PL-36	1

REMARKS:
1. PUMP TO OPERATE CONTINUOUSLY.

AIR PURIFICATION SYSTEMS

UNIT NO.	PLACEMENT	RFG CELL MODEL #	UV/CELL SIZE	RANGE	INDOOR PPM TARGET	SIZE	TRANSFORMER	POWER	IN-VOLT	OUT-VOLT	MCA	WEIGHT (LBS.)
WSHP 1-3	SUPPLY AIR DUCT	REME HALO 24V	11"	250-6,500 CFM	< 0.02 PPM	13.8" x 6.5" x 7.4"	SHIP LOOSE	17W	110 VAC	24 VAC	0.7A	6 LBS

2

LANDLORD REQUIREMENTS - APPLICABLE TO ALL SHEETS

- ANY CHANGES AND/ OR UPGRADES TO TENANT'S EXISTING MECHANICAL SYSTEMS SHALL COMPLY WITH ALL CODES AND MALL CRITERIA. EXISTING SYSTEMS SHALL POSSESS THE CAPACITY TO HANDLE ANY AND ALL CHANGES IN LOAD.
- NO PITCH POCKETS ARE PERMITTED ON THE ROOF FOR ANY CONDENSATE DRAINS, REFRIGERANT PIPING, POWER OR CONTROL WIRING. ALL CONNECTIONS ARE TO BE MADE INSIDE THE EQUIPMENT CURB OR THROUGH PRE-MANUFACTURED PIPING CURB.
- NOTHING IS PERMITTED TO BE ATTACHED TO, SUSPENDED FROM, OR PENETRATE LANDLORD'S STRUCTURE, FLOOR DECK, OR ROOF DECK. YOU MAY ATTACH, NON-DESTRUCTIVELY, TO OR SUSPEND FROM THE TOP CHORD OF THE JOIST OR THE STRUCTURAL STEEL WHICH EXISTS ABOVE THE TENANT SPACE. WHEN ATTACHING TO LANDLORD'S STRUCTURE, DO NOT DRILL, WELD, SCREW, OR SHOOT INTO STRUCTURE. ALTERNATIVE METHODS OF ATTACHMENT ONLY. NOTHING TO DAMAGE LANDLORD'S BASE BUILDING STRUCTURE. TENANT SHALL PROVIDE SIGNED AND SEALED STRUCTURAL DRAWINGS, BY A STRUCTURAL ENGINEER WITH LEGALLY ACTIVE REGISTRATION AS INDICATED BY ALL JURISDICTIONAL REQUIREMENTS, FOR ALL STRUCTURAL MODIFICATIONS FOR LANDLORD RECORDS.
- ALL PENETRATIONS TO ROOF MUST BE APPROVED BY LANDLORD. ALL RELATED ROOF WORK MUST BE DONE BY MALL'S DESIGNATED ROOFING CONTRACTOR, AT TENANT'S EXPENSE. COORDINATE ALL WORK WITH PROPERTY MANAGEMENT ON SITE.
- TENANT MUST REMOVE ALL ABANDONED ROOFTOP AND/ OR MECHANICAL EQUIPMENT ABOVE THE LEASED PREMISES AND WITHIN THE LEASED PREMISES, AT TENANT EXPENSE. PATCH AND REPAIR ROOF AS NEEDED.
- TENANT'S GC TO LABEL ALL ROOF TOP EQUIPMENT WITH TENANT NAME SPACE NUMBER AND EQUIPMENT IDENTIFICATION (RTU-1, EF-1), PER MALL SPECIFICATIONS/ STANDARDS.
- ALL PIPING ON ROOF SHALL BE SUPPORTED ON PRE-MANUFACTURED PIPE SUPPORTS INSTALLED ON CARRY TREAD, SPACED PROPERLY TO SUPPORT PIPING. TREATED WOOD SUPPORTS ARE NOT PERMITTED.
- ALL UNEXPOSED SUPPLY AIR AND OUTSIDE AIR DUCTWORK SHALL BE EXTERNALLY INSULATED WITH 1 1/2" THICK FOIL FACE INSULATION. INTERNALLY LINED DUCTWORK MAY BE USED FOR ACOUSTIC PURPOSES ONLY, NOT AS A SUBSTITUTE FOR EXTERNAL INSULATION.
- ALL DUCTWORK SHALL BE SHEET METAL. FLEX DUCT MAY ONLY BE USED IN RUNS OF 5'-0" OR LESS.
- AT CONCLUSION OF PROJECT, HVAC SYSTEM MUST BE TESTED AND BALANCED BY A LICENSED CONTRACTOR. COPY OF BALANCE REPORT MUST BE PROVIDED TO PROPERTY MANAGEMENT OFFICE ON-SITE.
- LANDLORD STRONGLY PREFERS USE OF ENERGY STAR PRODUCTS AND/OR EQUIPMENT WHENEVER POSSIBLE DURING TENANT BUILD OUT, WHICH CAN REDUCE ENERGY CONSUMPTION.

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aria GROUP
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ARIA GROUP ARCHITECTS, INC.

SHAKE SHACK
3393 Peachtree Road NE, Space 1014A, Atlanta, GA 30326
LENOX SQUARE

NO.	DATE	REMARKS
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	10/25/21	ISSUE FOR LL REVIEW

REVISIONS

GEORGIA REGISTERED 026421 PROFESSIONAL GARY R. SCHNACKEL ENGINEER
Date: 02/02/22
COA #: PEF003790

Drawing Title
MECHANICAL SCHEDULES

Job No.	Drawn
214746	RAS
Scale	Date
N.T.S.	09/17/2021

Sheet No.
M601

RESERVED FOR DOCUMENT BINDING

HOOD INFORMATION TABLE

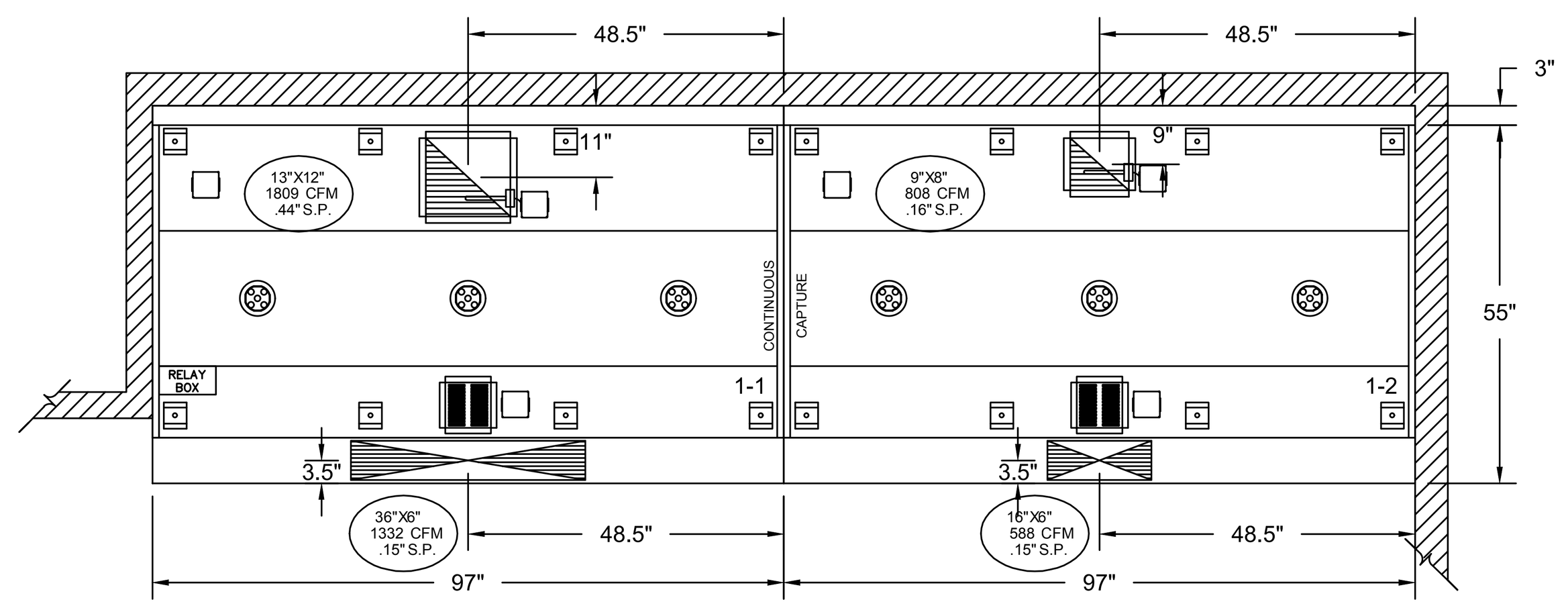
HOOD NUMBER	HOOD MODEL	EXHAUST AIR FLOW REQUIREMENTS: EXHAUST CFM	T.A.B. PORT STATIC PRESSURE	TOTAL HOOD STATIC PRESSURE	EXHAUST COLLAR QTY.	EXHAUST COLLAR LENGTH	EXHAUST COLLAR WIDTH	GREASE EXTRACTOR QTY.	SIZE L	SIZE H	TYPE	HOOD CONSTRUCTION	HOOD WEIGHT (LBS)	SUPPLY AIR REQUIREMENTS: SUPPLY CFM	SUPPLY STATIC PRESSURE	SUPPLY COLLAR QTY.	SUPPLY COLLAR LENGTH	SUPPLY COLLAR WIDTH
1-1	KVC	1809	0.33"	0.44"	1	13"	12"	4 1	20" 11"	13" 13"	KSA	EXPO 18 GA. 430 S.S.	714	1332	0.15"	1	36"	6"
1-2	KVC	808	0.07"	0.16"	1	9"	8"	4 1	20" 11"	13" 13"	KSA	EXPO 18 GA. 430 S.S.	714	588	0.15"	1	16"	6"

TOTAL EXH. CFM = 2617

TOTAL SUPPLY CFM = 1920

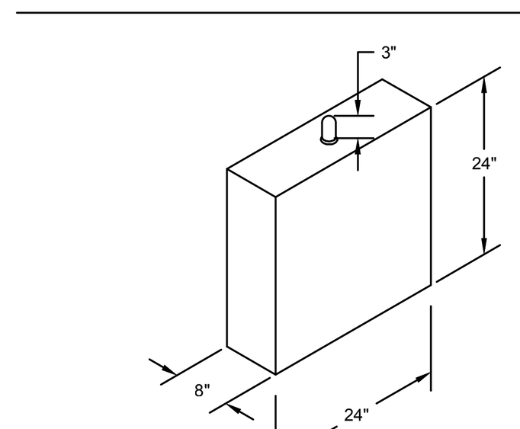
NOTE

HOOD IS LISTED AND LABELED FOR 0" CLEARANCE.



1 ITEM # 1-1/1-2
PLAN VIEW

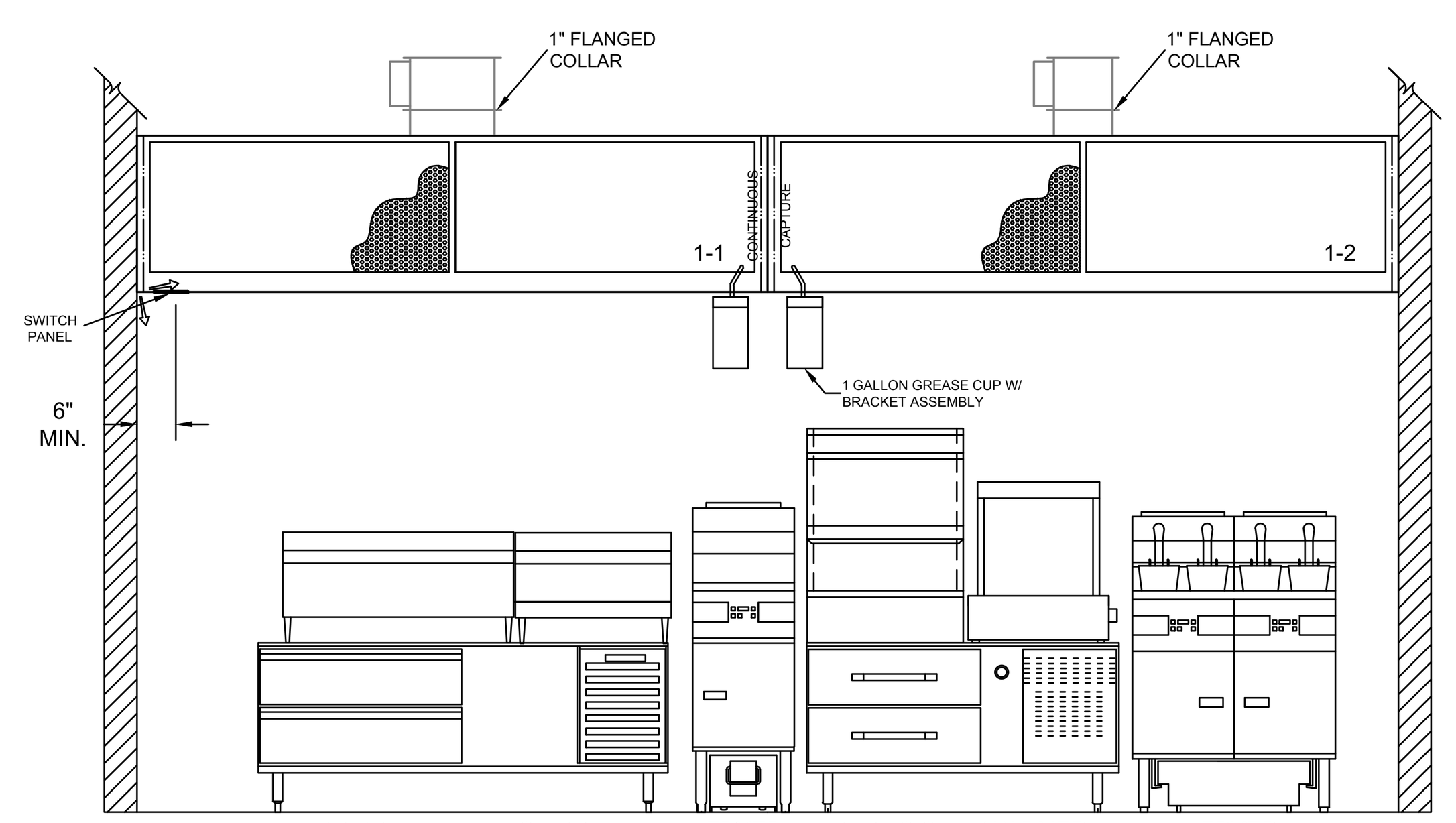
REMOTE MOUNTED HOOD MONITORING PANEL



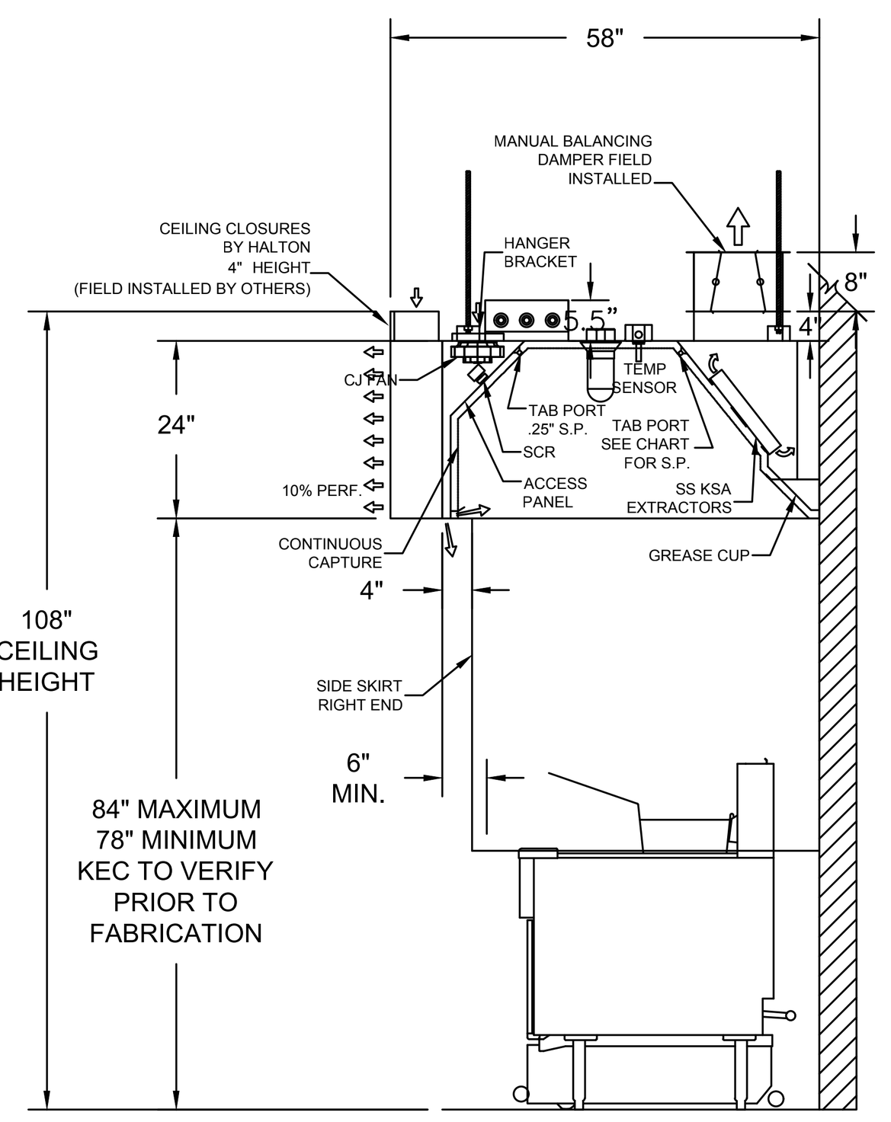
NOTE
T-STAT IS FACTORY PRE-SET FOR 95 DEGREES, IF SPACE CONDITIONS EXCEED 95 DEGREES WITHOUT COOKING TAKING PLACE, THEN A FIELD ADJUSTMENT OF THE T-STAT WILL BE REQUIRED BY PERSONNEL OTHER THAN HALTON. T-STAT IS A SAFETY INTERLOCK ONLY. IT IS NOT INTENDED AS A PRIMARY MEANS OF ENGAGING THE EXHAUST FAN.

NOTE

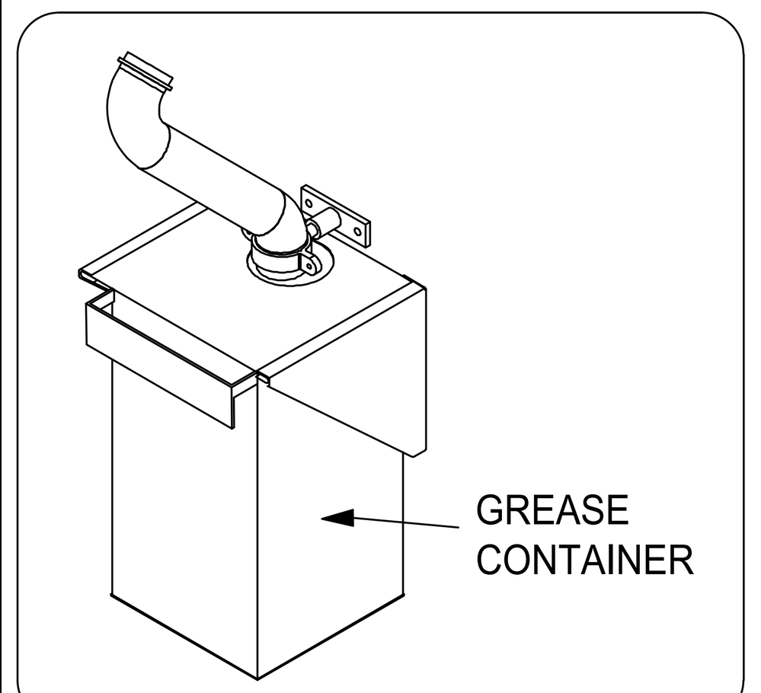
THE HOODS SHOWN ON THIS DRAWING IS DESIGNED AS THOUGH A SINGLE EXHAUST FAN WILL BE USED FOR HOOD 1-1 & HOOD 1-2. ONE TIMER PANEL IS REQUIRED PER EXHAUST FAN. IT IS THE RESPONSIBILITY OF THE F.S.E.C. TO INFORM HALTON OF THE NUMBER OF EXHAUST FANS BEING UTILIZED ON THIS PROJECT.



2 ITEM # 1-1/1-2
ELEVATION VIEW



3 ITEM # 1-1/1-2
SECTION VIEW



GENERAL SPECIFICATIONS

1- HOOD CONSTRUCTION AND DESIGN MEETS NFPA 96 AND UL 710 STANDARD.

2- HOOD IS NSF AND ETL LISTED UNDER THE FOLLOWING FILE NUMBER: ETL #103143204PRT-001

3- ALL INSTALLATION WORK IS TO BE PERFORMED BY QUALIFIED PERSONS AND IN ACCORDANCE WITH STATE AND LOCAL BUILDING CODE REQUIREMENTS.

4- THE INSTALLATION SHALL BE IN ACCORDANCE WITH NFPA 96, REMOVAL OF SMOKE AND GREASE LADEN VAPORS FROM COMMERCIAL COOKING EQUIPMENT.

5- ALL EXHAUST DUCTWORK AND TRANSITIONS ARE TO BE PROVIDED BY THE HVAC CONTRACTOR.

6- CLEARANCE FROM HOOD AND DUCTS TO COMBUSTIBLE MATERIAL SHALL BE PER APPLICABLE BUILDING CODES.

7- FOR PROPER OPERATION OF THE HOOD SYSTEM, IT IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO HAVE THE HOOD BALANCED AND TESTED TO ENSURE THAT THE EXHAUST AND SUPPLY REQUIREMENTS OF THE HOOD ARE MET.

INSTALLATION REQUIREMENTS

KITCHEN EQUIPMENT CONTRACTOR'S REQUIREMENTS

1- PROVIDE DRAWINGS TO APPROPRIATE TRADES REFERENCING UTILITY SERVICE AND COORDINATE FINAL CONNECTION.

2- DELIVER, ASSEMBLE AND INSTALL HALTON SYSTEM PER DRAWING.

3- FURNISH WIRING AND PLUMBING DIAGRAMS TO END USER.

4- THE K.E.C MUST INFORM HALTON OF ANY CHANGES IN EQUIPMENT OR BUILDING STRUCTURE. FIELD MODIFICATIONS ARE THE RESPONSIBILITY OF THE K.E.C.

5- IF HALTON MANUAL EXHAUST VOLUME DAMPERS ARE PROVIDED, THE K.E.C. IS RESPONSIBLE FOR THEIR INSTALLATION OR TO MAKE ARRANGEMENTS WITH OTHER TRADES FOR THEIR INSTALLATION.

6- IF HALTON MODEL KVL BACKSHELF STYLE HOODS ARE PROVIDED, THE K.E.C. IS RESPONSIBLE FOR THE INSTALLATION OF THE CAPTURE-JET FAN.

ELECTRICAL CONTRACTOR'S REQUIREMENTS

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

ELECTRICAL EQUIPMENT REQUIREMENTS

FLUORESCENT LIGHT FIXTURE
40 WATT MAX BULB= .67 AMP EA.

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

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

LED LIGHT FIXTURES= .30 AMP EA.

CAPTURE JET FAN= .72 AMP EA

ALL HOOD CIRCUITS ARE NOT TO EXCEED 15 AMP

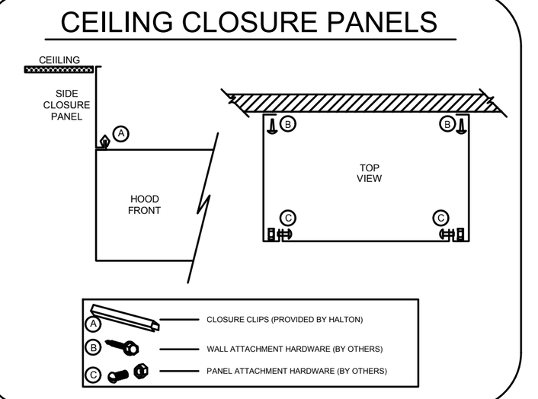
LIGHT BULBS, IF REQUIRED, ARE TO BE PROVIDED BY OTHERS

CEILING HEIGHT NOTE

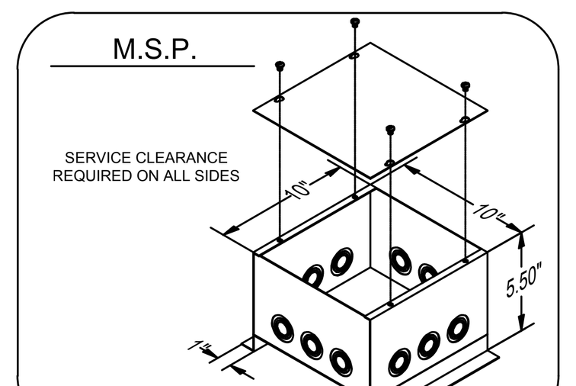
IF HALTON COMPANY IS TO PROVIDE CEILING CLOSURE PANELS, THE EXACT DIMENSION OF THE FINISHED CEILING HEIGHT MUST BE PROVIDED PRIOR TO RELEASE.

FINISHED CEILING HEIGHT A.F.F.: ____________

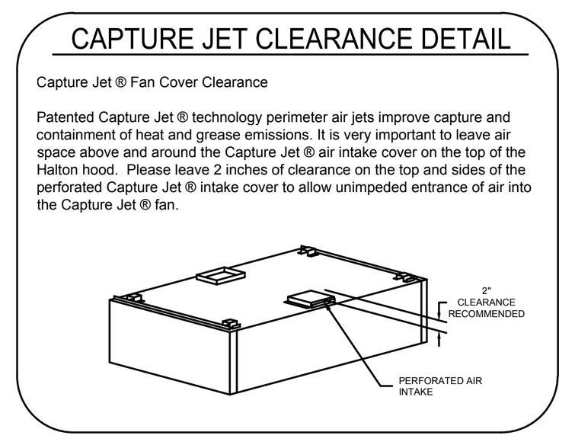
CEILING CLOSURE PANELS



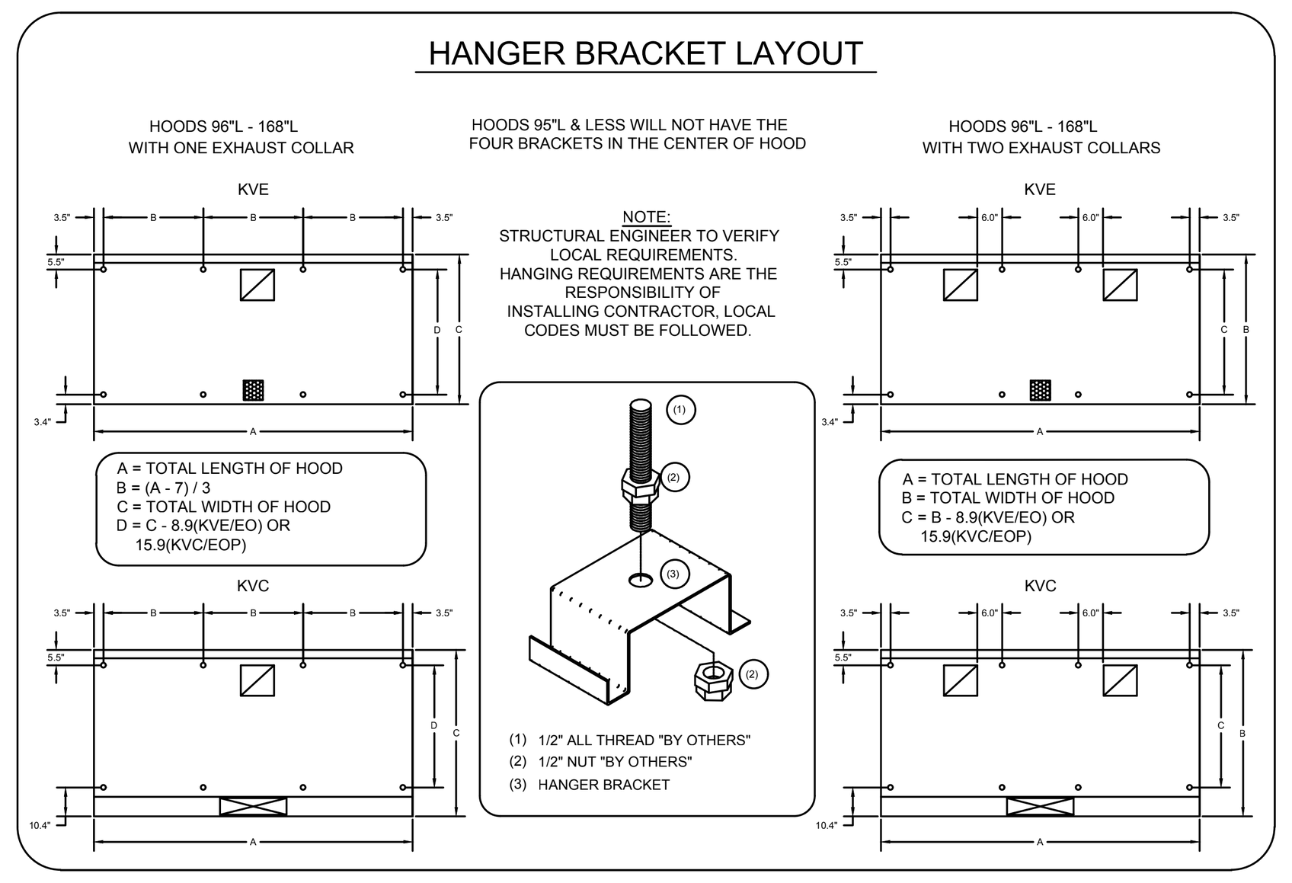
M.S.P.



CAPTURE JET CLEARANCE DETAIL

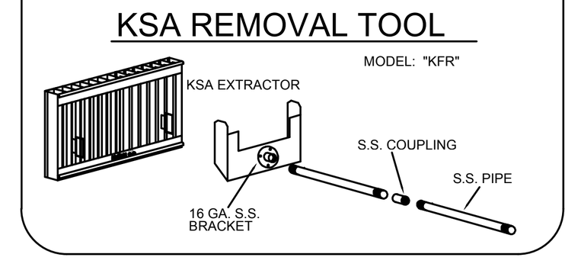


HANGER BRACKET LAYOUT



KSA GREASE EXTRACTOR

KSA REMOVAL TOOL



PERFORMANCE CRITERIA

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

REQUESTS FOR APPROVAL MUST INCLUDE GREASE FILTRATION PERFORMANCE DATA (MICRON SIZE VS. EXTRACTION EFFICIENCY) AND MANUFACTURERS OWN EXHAUST AIR FLOW CALCULATIONS BASED ON THE CONVECTIVE HEAT LOAD OF COOKING EQUIPMENT BENEATH THE HOOD.

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

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

MANUFACTURER MUST PROVIDE A WRITTEN GUARANTEE OF PERFORMANCE, ENSURING THE SPECIFYING ENGINEER THAT THE SYSTEM WILL PERFORM TO THE ENGINEER'S SATISFACTION WHEN INSTALLED AND BALANCED ACCORDING TO DESIGN AIR FLOWS AND RESULTS OF ASTM STANDARD F1704 TEST. (AS DETERMINED BY TAB PORTS AND PRESSURE VS. AIR FLOW CURVES.) CONSULTANT RESERVES THE RIGHT TO REJECT ANY SYSTEM WHICH, WHEN INSTALLED, DOES NOT PROVIDE CAPTURE AND CONTAINMENT AT THE THRESHOLD FLOW RATE DETERMINED IN ASTM F1704. REJECTED SYSTEM MUST BE REPLACED WITH SPECIFIED SYSTEM, WITH ALL REPLACEMENT COSTS PAID BY MANUFACTURER OF REJECTED SYSTEM.

ANY CHANGES IN THE SPECIFIED SIZING OF POWER WIRING, FAN SIZE, HORSEPOWER REQUIREMENTS, OR GAS LINES DUE TO THE USE OF ANY SYSTEM OTHER THAN THAT WHICH IS SPECIFIED IS THE RESPONSIBILITY OF THE ALTERNATE HOOD MANUFACTURER, AND MUST BE COORDINATED BY THE HOOD MANUFACTURER AND CONTRACTORS INVOLVED.

MAIL APPROVED DRAWINGS TO APPROPRIATE FACTORY BELOW:

WEBSITE: www.halton.com

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

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

REV.	REVISION DESCRIPTION	BY	DATE
1	CHANGED TO REMOTE MTD PANEL, INCREASED MUA CFM	SKM	10.22.21
2	DECREASED MUA CFM	SKM	11.04.21
3	NO CHANGE	SKM	11.10.21
4	NO CHANGE	SKM	11.24.21

PROJECT: SHAKE SHACK LENOX SQUARE
LOCATION: ATLANTA, GA
DRAWN BY: SKM DATE: 10.06.21
SCALE: NOT TO SCALE
CONSULTANT:

Halton

DRAWING TITLE: HOOD DETAILS
DRAWING No.: U21-684
REV. NO.: 4 SHEET NO.: 1 of 8

aria GROUP
830 North Blvd.
Oak Park, Illinois
60301
708-445-8400
ariainc.com
ARIA GROUP ARCHITECTS, INC.

SHAKE SHACK
3393 Peachtree Road NE, Space 1014A, Atlanta, GA 30326

LENOX SQUARE

FIELD VERIFICATION
Contractor shall verify all figured dimensions and conditions at the job site and notify Aria Group Architects, Inc. of any dimensional errors, omissions or discrepancies before beginning or fabricating any work. Do not scale these drawings.

NO.	DATE	REMARKS
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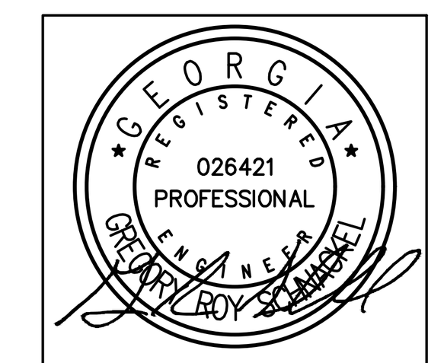
2	01/11/22	ISSUE FOR CONSTRUCTION
1	12/03/21	ISSUE FOR CONSTRUCTION
	11/08/21	ISSUE FOR CONSTRUCTION
	10/25/21	ISSUE FOR LL REVIEW

REVISIONS



Date: 02/02/22
COA #: PEF003790

Drawing Title: HALTON DRAWINGS

Job No.: 214746
Drawn: RAS
Scale: N.T.S.
Date: 09/17/2021

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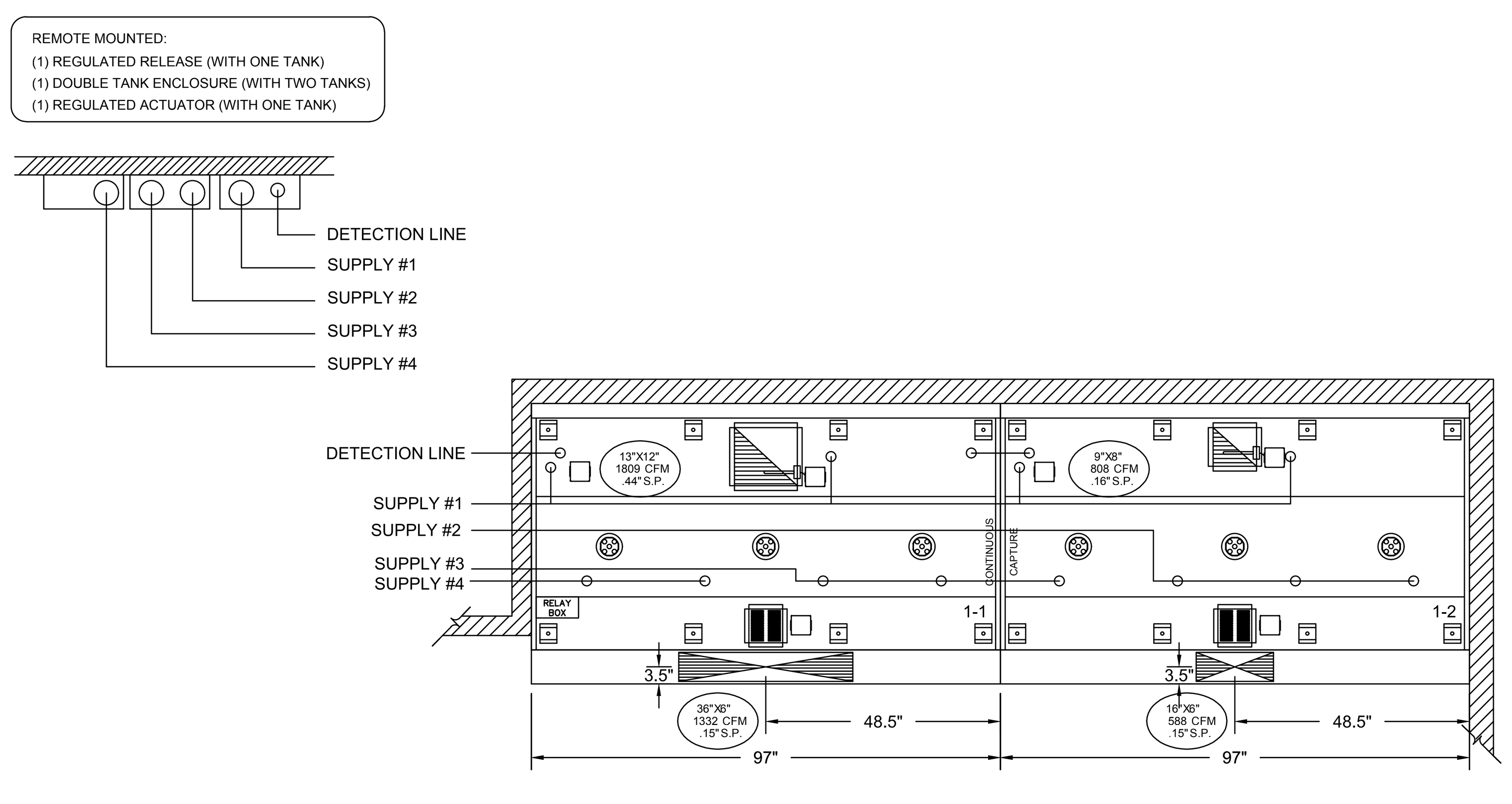
Sheet No. M701

ANSUL R-102 FIRE SUPPRESSION SYSTEM
FIRE SYSTEM IS INTEGRAL WITH FACTORY DESIGN/PIPING/FIELD CERTIFICATION

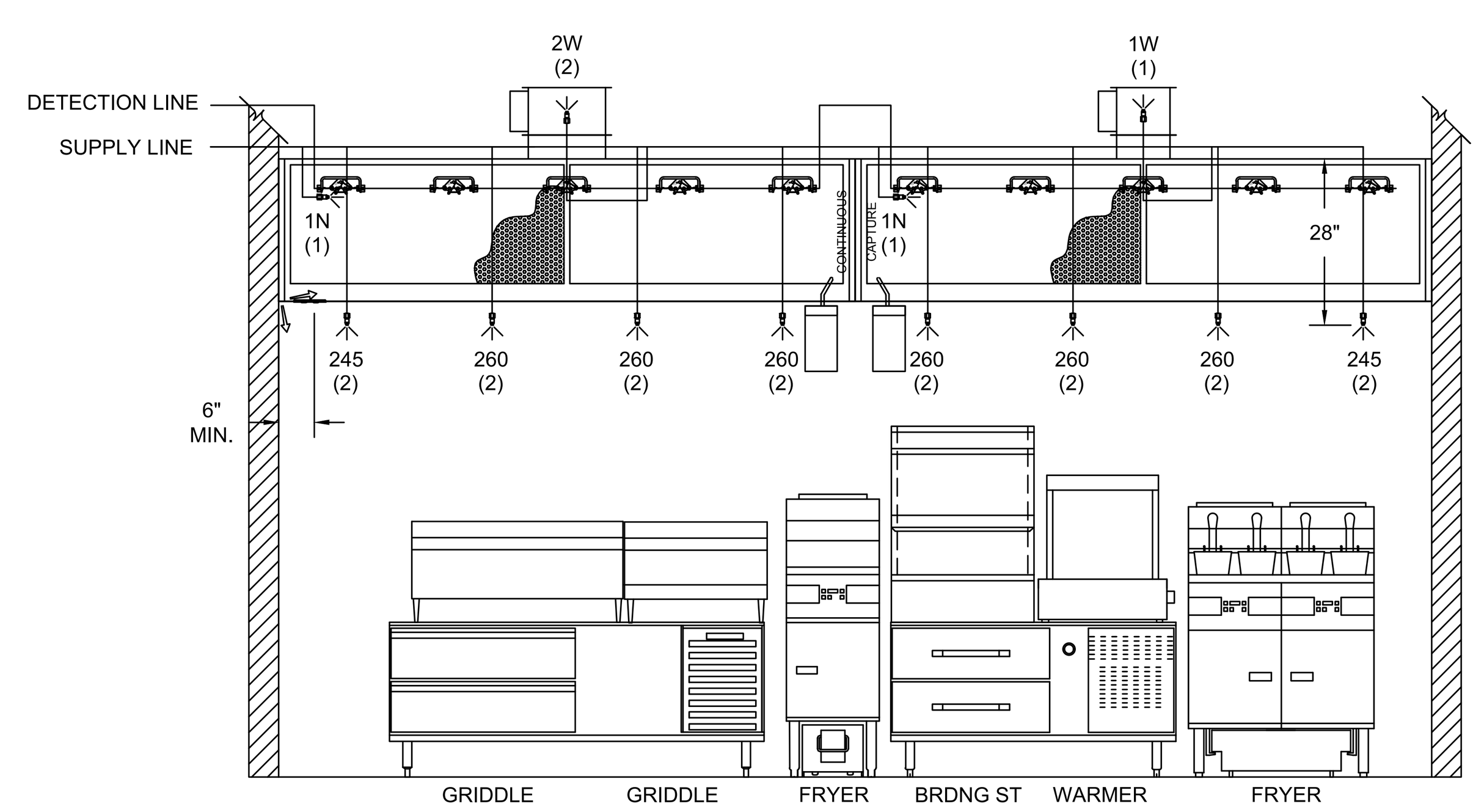
RESERVED FOR DOCUMENT BINDING



ITEM # 1-1/1-2
PLAN VIEW

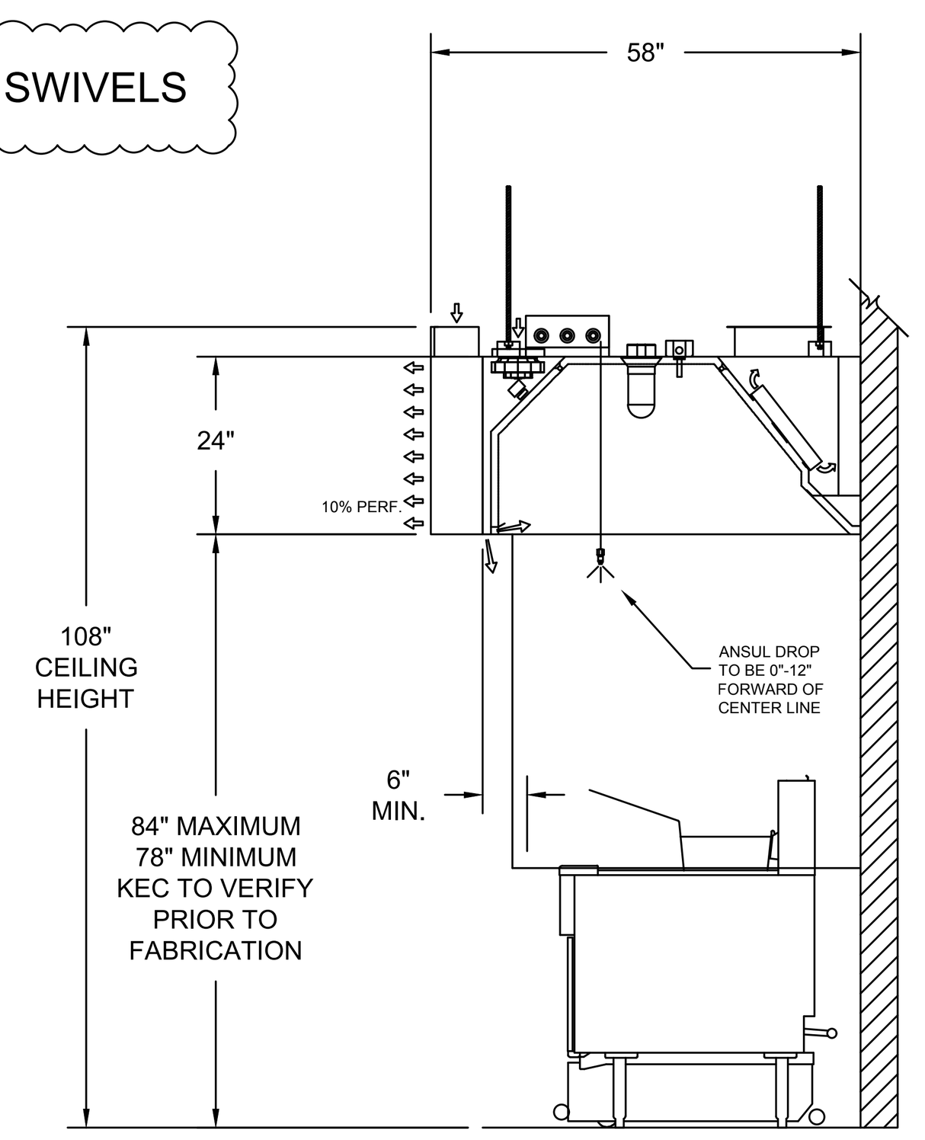
NOTE
ANSUL R-102
OVERLAPPING SYSTEM

ALL APPLIANCE DROPS TO HAVE SWIVELS

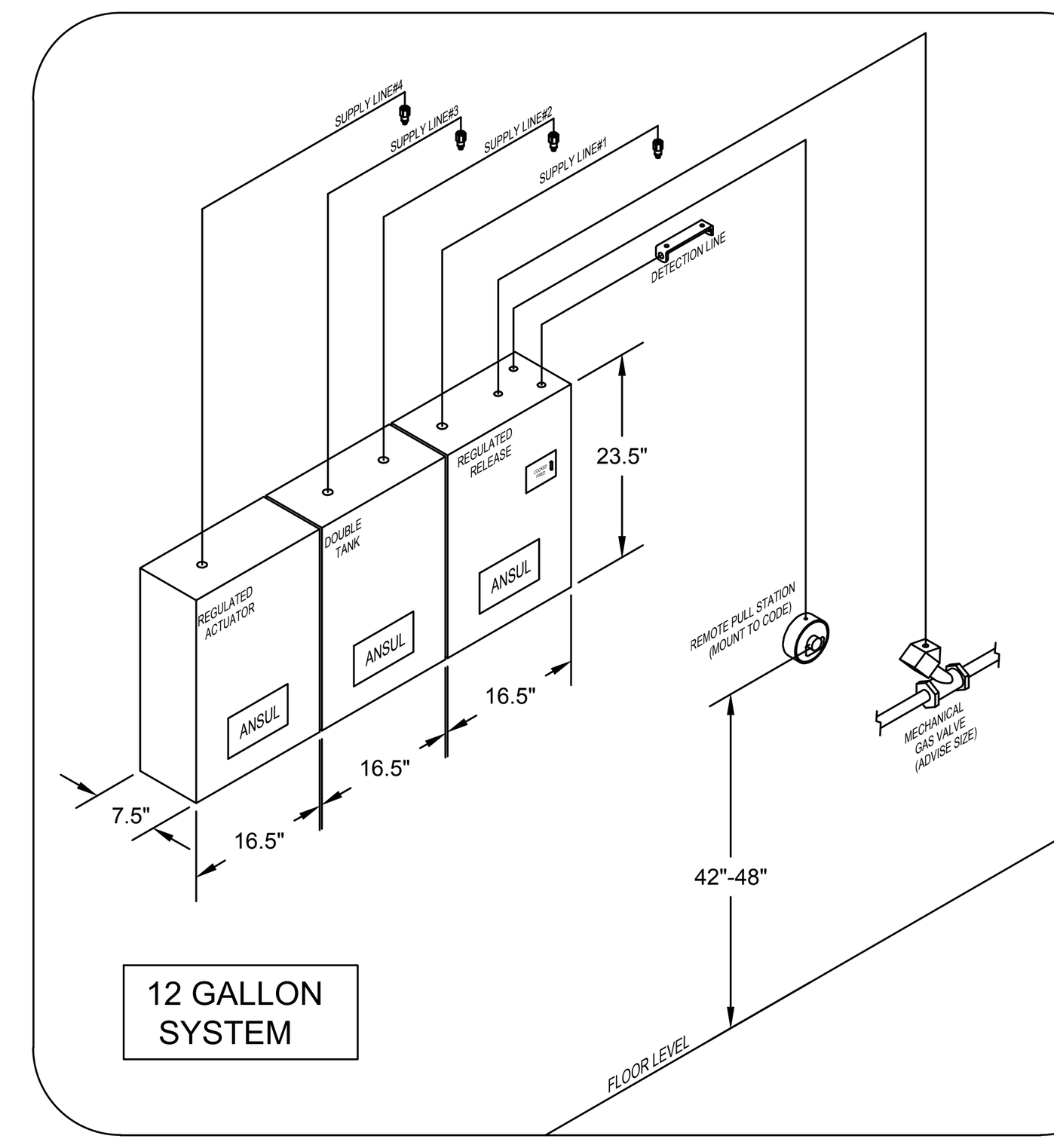


ITEM # 1-1/1-2
ELEVATION VIEW

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



ITEM # 1-1/1-2
SECTION VIEW



12 GALLON SYSTEM

FLOW POINT CHART

ANSUL R-102 FLOW POINT CALCULATION			
NOZZLE TYPE	NOZZLE FLOW PT.	NOZZLE QUANTITY	TOTAL FLOW PT.
3N	3	0	0
290	2	0	0
260	2	6	12
245	2	2	4
230	2	0	0
2W	2	1	2
2120	2	0	0
1W	1	1	1
1N	1	2	2
1F	1	0	0
1/2N	1/2	0	0
TOTAL FLOW POINTS USED			21
MAX. SYSTEM FLOW POINTS:			24(12GALLON)

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

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

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

ANSUL NOTES

GENERAL NOTES:
1. THIS INSTALLATION IS TO BE MADE IN ACCORDANCE WITH THE ANSUL R-102 OVERLAPPING SYSTEM MANUAL AND IN ACCORDANCE WITH ALL STATE AND LOCAL CODES.

2. THE STAINLESS STEEL CABLE FOR THE DETECTOR AND REMOTE PULL STATION IS TO BE INSTALLED BY AN AUTHORIZED AND FACTORY TRAINED DISTRIBUTOR OR SERVICE REPRESENTATIVE.

3. FIRE SUPPRESSION CONTRACTOR SHALL HAVE AN ADDITIONAL TRIP FOR AN ONSITE PRETEST WITH GENERAL CONTRACTOR, MECHANICAL, PLUMBING, BUILDING ALARM AND ELECTRICAL CONTRACTORS PRIOR TO FINAL SUPPRESSION WITH LOCAL AH. DEFICIENCIES SHALL BE RESOLVED BY RESPONSIBLE TRADE BEFORE THE FINAL CAN BE SCHEDULE. TEST SHOULD BE CONDUCTED AT 3 DAYS (MINIMUM) PRIOR TO SCHEDULED FINAL.

4. THIS INSTALLATION IS TO BE INSPECTED, PUT INTO OPERATION AND CERTIFIED BY AN AUTHORIZED AND FACTORY TRAINED DISTRIBUTOR OR SERVICE REPRESENTATIVE.

5. ELECTRICAL CONTACTS AND WIRING FOR APPLIANCE SHUT OFF TO BE PROVIDED BY THE ELECTRICAL CONTRACTOR.

6. ANSUL R-102 RESTAURANT FIRE SUPPRESSION SYSTEMS HAVE BEEN TESTED AND ARE LISTED BY UNDERWRITERS' LABORATORIES INC. AS PRE-ENGINEERED SYSTEMS, AND WHEN INSTALLED AS SHOWN ON THIS DRAWING SHALL COMPLY WITH ALL RELEVANT ANSUL INSTALLATION RECHARGE INSPECTION AND MAINTENANCE MANUALS AND SHALL COMPLY WITH NFPA 96 WHEN INSTALLED AND CERTIFIED BY AUTHORIZED TRAINED ANSUL DISTRIBUTORS IN ACCORDANCE WITH THE MANUAL.

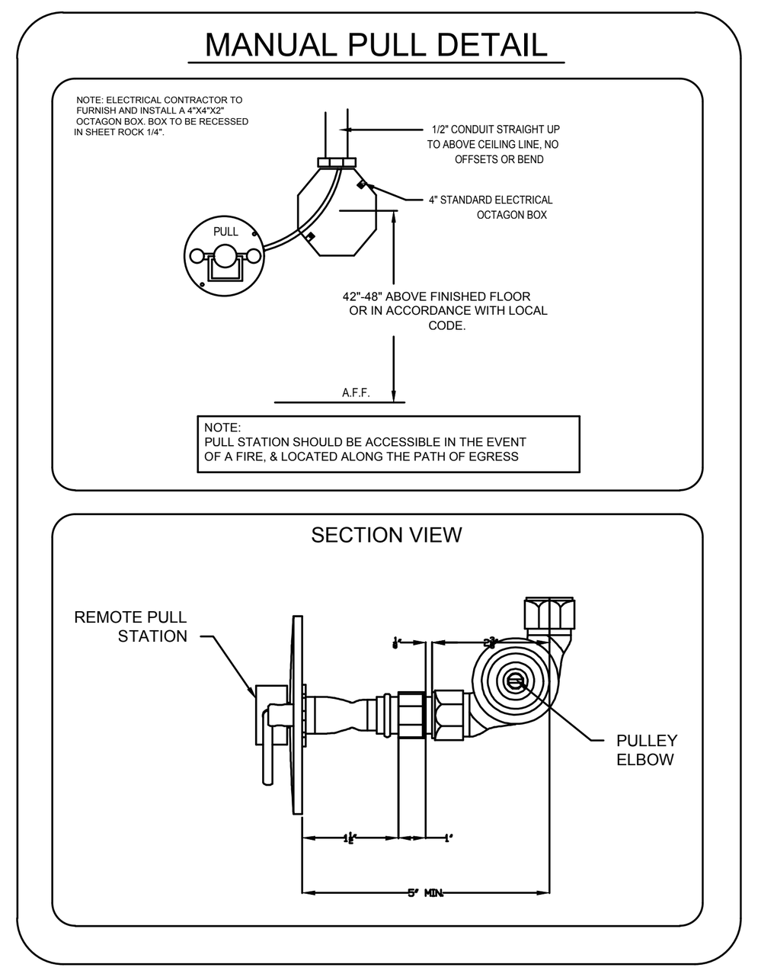
7. ALL AGENT DISTRIBUTION PIPING AND DETECTION CONDUIT HOOD PENETRATIONS MUST BE PROPERLY SEALED IN ACCORDANCE WITH NFPA 96.

8. ALL CONNECTIONS TO THE FIRE SUPPRESSION LOW VOLTAGE AND HIGH VOLTAGE ANSUL MICRO-SWITCHES MUST BE MADE IN A U.L. RATED JUNCTION BOX OUTSIDE OF THE ANSUL AUTOMAN COMPARTMENT TO KEEP FORM VOIDING THE LISTING OF THE ANSUL SYSTEM.

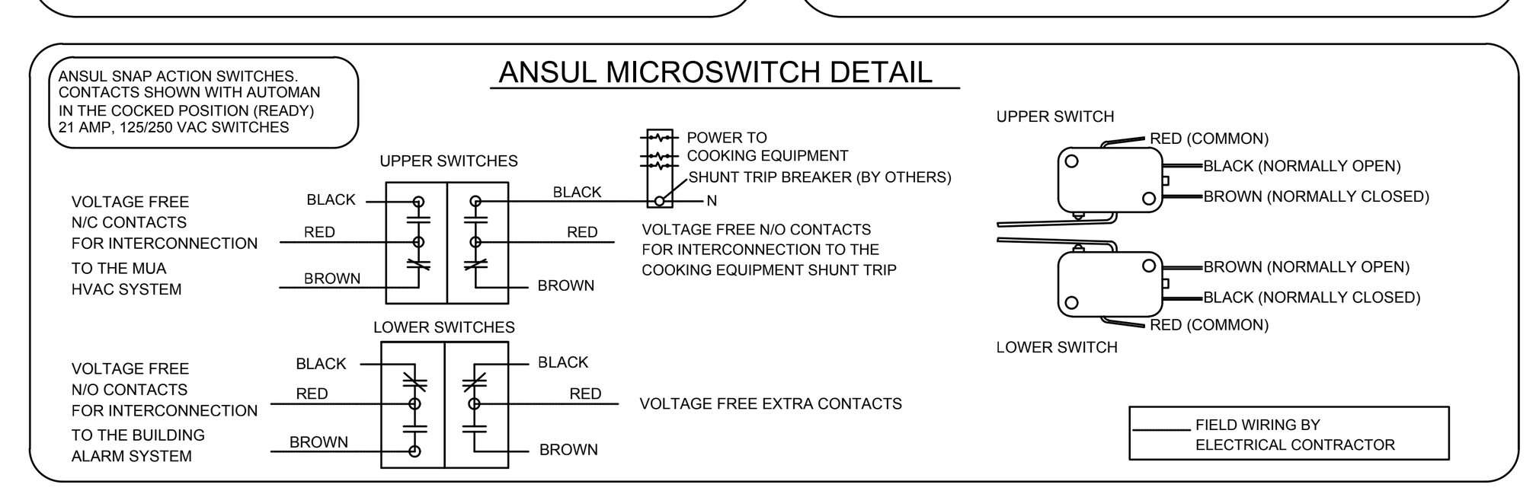
DISTRIBUTION PIPING REQUIREMENT NOTES:
1. PIPE SHALL BE 3/8" SCHEDULE 40 BLACK IRON, AND CHROME PLATED OR STAINLESS STEEL PIPE WHERE EXPOSED UNDER THE HOOD.

2. FINAL NOZZLE LOCATIONS SHALL NOT VARY FROM THE ANSUL R-102 OVERLAPPING SYSTEM PROTECTION PIPING REQUIREMENTS SHOWN.

MANUAL PULL DETAIL



ANSUL MICROSWITCH DETAIL



THIS DRAWING MUST BE CHECKED, SIGNED AND RETURNED TO THE APPROPRIATE FACTORY. PLEASE VERIFY THE FOLLOWING:
1. ALL DIMENSIONAL INFORMATION, MOUNTING POSITIONS AND CLEARANCES.
2. THE LOCATION AND TYPE OF COOKING EQUIPMENT.
NOTE TO APPROVER: ANY CHANGES IN COOKING EQUIPMENT SUCH AS INCREASED ENERGY INPUTS OR EQUIPMENT POSITION MAY AFFECT EXHAUST AIRFLOW. HALTON MUST BE NOTIFIED IF ANY OF THESE CHANGES OCCUR, A RECALCULATION OF EXHAUST AIRFLOW MAY BE REQUIRED.
REVISE AND RESUBMIT
APPROVED FOR FABRICATION
WITH NO CHANGES
WITH CHANGES AS NOTED
APPROVED BY:
DATE

MAIL APPROVED DRAWINGS TO APPROPRIATE FACTORY BELOW:

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

WEBSITE: www.halton.com
HALTON CO. (USA)
101 INDUSTRIAL DRIVE
SCOTTSVILLE, KY 42164
1-270-237-5600

REV.	REVISION DESCRIPTION	BY	DATE
1	REMOTE PANEL, MUA CFM	SKM	10.22.21
2	DECREASED MUA CFM	SKM	11.04.21
3	NO CHANGE	SKM	11.10.21
4	NO CHANGE	SKM	11.24.21

PROJECT: SHAKE SHACK LENOX SQUARE
LOCATION: ATLANTA, GA
DRAWN BY: SKM DATE: 10.07.21
SCALE: NOT TO SCALE
CONSULTANT:

Halton

DRAWING TITLE: FIRE SYSTEM DETAILS
DRAWING No.: U21-684
REV. NO.: 4
SHEET NO.: 2 of 8

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ARIA GROUP ARCHITECTS, INC.

SHAKE SHACK
3393 Peachtree Road NE, Space 1014A, Atlanta, GA 30326
LENOX SQUARE

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	10/25/21	ISSUE FOR LL REVIEW

REVISIONS

GEORGIA REGISTERED 026421 PROFESSIONAL
Date: 02/02/22
COA #: PEF003790

Drawing Title
HALTON DRAWINGS

Job No.	Drawn
214746	RAS
Scale	Date
N.T.S.	09/17/2021

Sheet No.
M702

MUA CHART

DATA	IMPERIAL
Model	MUA-DGX-2800
Max. Supply Air	2800 CFM
Design Supply Air	1920 CFM
Internal S.P.	1.49" W.G.
External S.P.	0.34" W.G.
Total S.P.	1.83" W.G.
Motor	2 hp
Power	0.84 bhp
Full Load AMPS	7.7
Motor RPM	1800
Voltage/Phase/HZ	208/3/60
Fan RPM	2071 @ 55 HZ
Mounting	Exterior
Blower Model	ATLI 9 -9 T2
Material Type	G90 Galv. 20GA.
Paint Color	Unpainted
Weight	2240 lbs

HEATING INFORMATION

Gas Type	Natural
Min. Gas Pressure	8" W.C.
Max. Gas Pressure	14" W.C.
Gas Line Size	1/2"
Discharge Temperature	75°F
Temperature Rise	53.4°F
Heat Input MBH	120.4
Heat Output MBH	110.8

COOLING INFORMATION

Cooling Coil Inlet DB Temp.	93.9
Cooling Coil Inlet WB Temp.	74.1
Cooling Coil Exit DB Temp.	66.0
Cooling Coil Exit WB Temp.	65.4
Cooling Coil Total Capacity	62.5 MBH
Cooling Coil Sensible Capacity	57.9 MBH
Cooling Coil Latent Capacity	4.6 MBH

UNIT FEATURES

Drive Package:
Belt Drive Fan (Comefri ATLI) Direct Drive Plenum Fan (Comefri ANPA)

Insulation:
1" Duct Board No Insulation

Unit Mounted D.A.T. Controls (temperature)

Remote start/stop Controls (fan)

Isolators:
Neoprene
Seismic

Intake Damper:
Motorized
Gravity

Gas Train:
Piloted
Direct Spark

Drive Package:
Constant Volume.
Variable Speed:
Powerflex 523 VFD
Danfoss VFD
Weg VFD

Roof Curb:
w/ Insulation
w/ Wood Nailer

Intake Hood w/ 2" Alum. Mesh Filters & Birdscreen

MERV 8 Filtered Intake (Dust Filter)

Filter Dryer

R-410A DX Cooling Coil

Stainless Drain Pan and Drain

Galvanized Cooling Coil Frame

TVX & Sight Glass:
Remote Condenser (Shipped Loose) Package Unit (Factory Installed)

PLC Compressor Staging Controls by Halton (Programmed Setpoints)

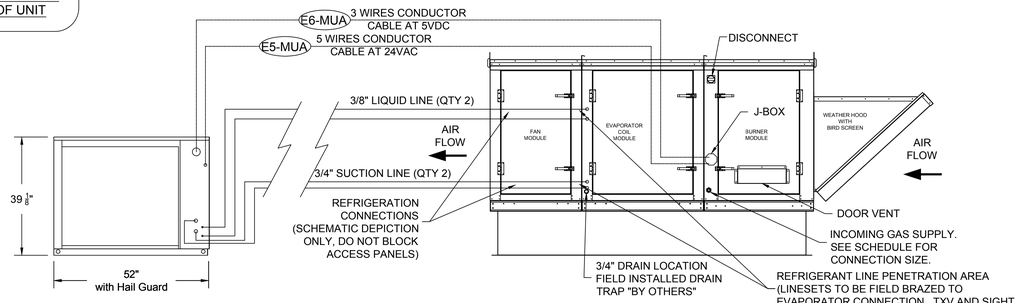
Gas Train Pressure Gauges

Cooling Coil Moisture Eliminator

ITEM #MUA-1

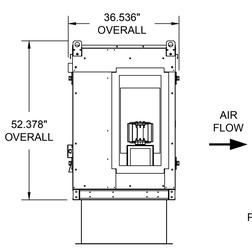
ELECTRICAL CONNECTION WILL COME UP THROUGH CURB INTO BOTTOM OF UNIT

NOTE:
LIFTING POINTS ARE NOT TO BE USED AS ANCHORS FOR SUSPENDED MOUNTING. THEY ARE FOR LIFTING ONLY

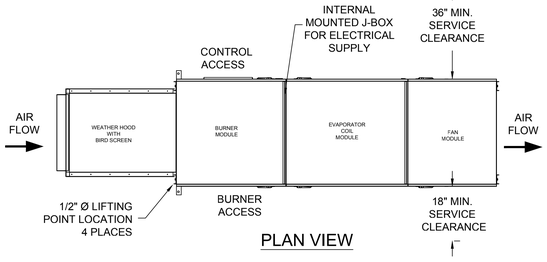


CONDENSER UNIT

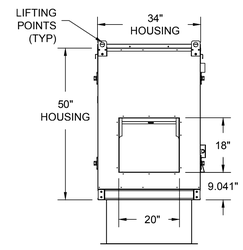
REAR VIEW



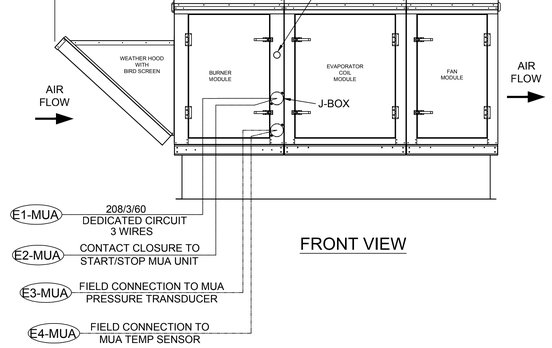
INLET VIEW



PLAN VIEW



OUTLET VIEW

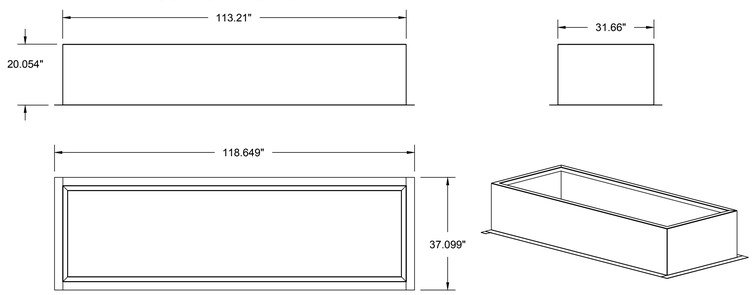


FRONT VIEW

ELECTRICAL SCHEDULE

CONNECTION #	CONNECTION DESCRIPTION	FROM	TO
E1-MUA	208/3/60 - FAN MOTOR POWER - 3 WIRES	BUILDING SOURCE	J-BOX
E2-MUA	CONTACT CLOSURE TO START/STOP MUA UNIT	REMOTE PANEL	MUA UNIT
E3-MUA	FIELD CONNECTION FOR PRESSURE TRANSDUCER - 2 WIRES	REMOTE PANEL	MUA UNIT
E4-MUA	FIELD CONNECTION FOR TEMP SENSOR - 2 WIRES	REMOTE PANEL	MUA UNIT
E5-MUA	5 WIRES CONDUCTOR CABLE - 24VAC	MUA UNIT	CONDENSER UNIT
E6-MUA	3 WIRES CONDUCTOR CABLE - 5VDC	MUA UNIT	CONDENSER UNIT

ROOF CURB DETAIL



SPECIFICATIONS

GAS INFORMATION
MIDCO 6" SS BURNER
PRESSURE REGULATOR SUPPLIED
RTC GAS CONTROLS
DISCHARGE TEMPERATURE DIAL MOUNTED IN UNIT
HIGH TEMP LIMIT SWITCH SET TO 140°F

ELECTRICAL INFORMATION
208V / 3PH / 60Hz SUPPLY
INTEGRAL NON-FUSED DISCONNECT SWITCH
PREMIUM EFFICIENCY MOTOR
INTEGRAL MOTOR STARTER WITH THERMAL OVERLOADS
FIRE PROTECTION INTERLOCK
REMOTE START/STOP
50% MUA TURN DOWN

EQUIPMENT SPECIFICATIONS
ENTERING AIR THERMOSTAT/LOW TEMPERATURE CUTOUT
EXTERNAL PROFILE ADJUSTMENT WITH PRESSURE GAUGE
GALVANIZED FINISH
0" CLEARANCE ON TOP & BOTTOM OF UNIT
UNIT SHIPS ASSEMBLED IN ONE PIECE
1" CLEARANCE TO COMBUSTIBLE ON ENDS
LISTED 18" FROM COMBUSTIBLE ON SIDES

THIS DRAWING MUST BE CHECKED, SIGNED AND RETURNED TO THE APPROPRIATE FACTORY. PLEASE VERIFY THE FOLLOWING:
1. ALL ELECTRICAL INFORMATION, MOUNTING POSITIONS AND CLEARANCE INFORMATION
2. THE LOCATION AND TYPE OF COOKING EQUIPMENT.

NOTE TO APPROVER:
ANY CHANGES TO THE COOKING EQUIPMENT SUCH AS INCREASED ENERGY INPUTS OR EQUIPMENT POSITION MAY AFFECT EXHAUST AIRFLOW. HALTON MUST BE NOTIFIED IF ANY OF THESE CHANGES OCCUR. A HEGA CALCULATION DOMUST AIRFLOW MAY BE REQUIRED.

☐ REVISE AND RESUBMIT

APPROVED FOR FABRICATION ☐ WITH CHANGES AS NOTED
☐ WITH NO CHANGES

APPROVED BY DATE

MAIL APPROVED DRAWINGS TO APPROPRIATE FACTORY BELOW:

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1021 BREVIK PLACE
MISSISSAUGA, ON L4W 3R7
1-905-624-0301

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

WEBSITE: www.halton.com

REV.	REVISION DESCRIPTION	BY	DATE
SP	REPAN FAN SELECTION, HORZ DISCHARGE	SKM	11.22.21
5FM	NEW FAN SELECTION, CHGD TO PACKAGED UNIT	SKM	11.17.21
	CHANGED BACK TO SPLIT UNIT	SKM	11.10.21
	NO CHANGE	SKM	11.24.21

PROJECT: SHAKE SHACK LENNOX SQUARE
LOCATION: ATLANTA, GA
DRAWN BY: SKM DATE: 10.07.21
SCALE: NOT TO SCALE
CONSULTANT:

Halton

DRAWING TITLE: MUA-DG 1800
DRAWING No.: U21-684
REV. NO.: 4 SHEET NO.: 3 of 8

aria GROUP

830 North Blvd.
Oak Park, Illinois
60301

708-445-8400
ariainc.com

ARIA GROUP ARCHITECTS, INC.

SHAKE SHACK

3393 Peachtree Road NE, Space 1014A, Atlanta, GA 30326

LENOX SQUARE

FIELD VERIFICATION
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NO.	DATE	REMARKS
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2	01/11/22	ISSUE FOR CONSTRUCTION
1	12/03/21	ISSUE FOR CONSTRUCTION
	11/08/21	ISSUE FOR CONSTRUCTION
	10/25/21	ISSUE FOR LL REVIEW

REVISIONS

GEORGIA REGISTERED 026421 PROFESSIONAL ENGINEER

Date: 02/02/22
COA # PEF003790

Drawing Title: HALTON DRAWINGS

Job No. 214746 | Drawn RAS
Scale N.T.S. | Date 09/17/2021

Sheet No. M703

Schnackel engineers

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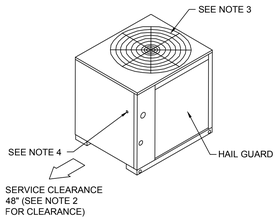
ITEM #CU-1

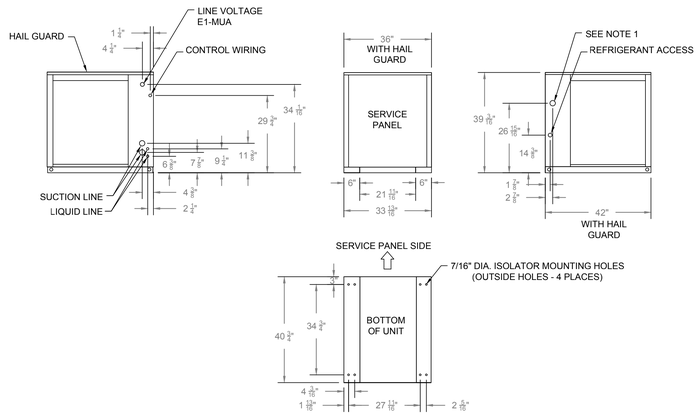
TRANE



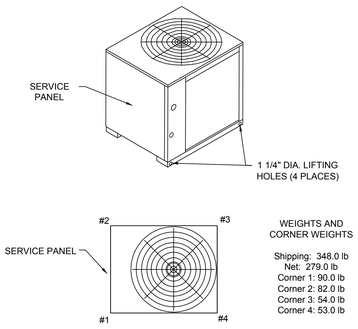
Notes:

1. Acess opening is for field installed Bayloam accessory.
2. Minimum clearance for proper operation is 36" from walls, shrubbery, privacy fences, etc. Minimum clearance between adjacent units is 72". Recommended service clearance is 48".
3. Top discharge area should be unrestricted for 100" minumum. Unit should be placed so roof run-off water does not pour directly on unit.
4. Outdoor Air Temperature Sensor opening (Do Not Block Opening)

Hailguards - TTA
Condenser Coil Protection from Hail, Vandals, Etc. Perforated, Painted Galvanized Steel Factory Installed.
TTA Microchannel - General
Weatherproofed steel mounting/lifting rails Hermetic scroll compressors Microchannel condenser coils on select models Plate fin condenser coils Fans and motors Standard operating range 50-125°F (min. 0°F with low ambient accessory) Nitrogen holding charge Certified and rated in accordance with AHRI and DOE standards Certified to UL 1995
TTA Microchannel - Casing
Zinc coated, heavy gauge, galvanized steel Weather resistant baked enamel finish Meets ASTM B117, 672 hour spray test Removable single side maintenance access panels Lifting handles in maintenance access panels Unit base provisions for forklift and/or crane lifting
Refrigerations System - Dual Compressor
Two (2) separate and independent refrigerant circuits Each refrigeration circuit equiped with integral subcooling circuit Front or rear refrigerant line connections
Two (2) direct drive hermetic scroll compressors Suction gas-cooled motors w/ ± 10% voltage utilization range of unit nameplate voltage Crankcase Heaters Internal temperature and current sensitive motor overloads No compressor suction and/or discharge valves (reduced vibration/sound) Factory installed liquid line filter drier Phase loss/reverse rotation monitor Liquid line service ports Suction line service ports External high pressure cutout devices
TTA Microchannel - Condenser Coil (Microchannel)
Microchannel coils burst tested by the manufacturer Coils shall be leak tested to ensure the pressure integrity Factory pressure and leak tested to 660 psig Perforated steel hail guards factory installed
TTA Microchannel - Condenser Fan
26" or 28" propeller fan(s) Direct drive Statically and dynamically balanced
TTA Microchannel - Condenser Motor(s)
Permanently lubricated totally enclosed or open construction Built-in current and thermal overloads Ball or sleeve bearing type
TTA Microchannel - Controls
Choice of electromechanical or microprocessor Completely internally wired Numbered and colored wires Contactor pressure lugs or terminal block Unit external mounting location for disconnect device Single point power entry
TTA Controls: Electro-Mechanical
24V control circuit Control transformer Thermostat compatible Anti-Short Cycle Timer



6 TON COOLING CONDENSER (DUAL COMPRESSOR)
DIMENSIONAL DRAWING



WEIGHTS AND LOAD POINT LOCATION FOR CONDENSER
WEIGHT AND RIGGING

CONDENSER COIL SPECIFICATIONS

6 Ton Trane TTA 208V

Unit Function	Cooling
Voltage	208-230/60/3
Refrigeration Circuit/Stage	Dual Compressors/Dual Circuit
Unit Tonnage	6 Tons
Refrigerant	R-410A Refrigerant
Controls	Electromechanical

Factory Installed Accessories
Condenser Coil Hail/Vandal Guard Kit

Electrical Data Condenser
Electrical Data

Model:	TTA07243D
Unit Operating Voltage:	187-253
Minimum Circuit Ampacity:	23.0
Maximum Fuse Size:	30.0
Maximum Circuit Breaker:	30.0

Compressor Motor

No.:	2
Volts:	208-230
Phase:	3
Amp-RLA:	9.0/9.0
Amp-LRA:	71.0/71.0

Condenser Fan Motor

No.:	1
Volts:	208-230
Phase:	1
Amp-FLA:	3.1
Amp-LRA:	8.1

Compressor

Number:	Scroll
No. Compressor/Tons:	2/2.4
Cooling Stages per Compressor:	1

System Data (7)

No. Refrigerant Circuits:	2
Suction Line (in.) OD	3/4" Horizontal & Vertical
Liquid Line (in.) OD	3/8"

ELECTRICAL SCHEDULE

CONNECTION #	CONNECTION DESCRIPTION	FROM	TO
E1-MUA	208/3/60 - FAN MOTOR POWER - 3 WIRES	BUILDING SOURCE	CU-1

2

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APPROVED FOR FABRICATION
☐ WITH NO CHANGES ☐ WITH CHANGES AS NOTED
☐ REVISE AND RESUBMIT
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REV.	REVISION DESCRIPTION	BY	DATE
1	NO CHANGE	SKM	10.22.21
2	NO CHANGE	SKM	11.04.21
3	NO CHANGE	SKM	11.10.21
4	NO CHANGE	SKM	11.24.21

PROJECT: SHAKE SHACK LENNOX SQUARE
LOCATION: ATLANTA, GA
DRAWN BY: SKM
DATE: 10.07.21
SCALE: NOT TO SCALE
CONSULTANT:

DRAWING TITLE: MUA-DGX-4600
DRAWING No.: U21-684
REV. NO.: 4
SHEET NO.: 4 of 8

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Oak Park, Illinois
60301
708-445-8400
ariainc.com
ARIA GROUP ARCHITECTS, INC.

SHAKE SHACK
3393 Peachtree Road NE, Space 1014A, Atlanta, GA 30326
LENOX SQUARE

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REVISIONS

GEORGIA REGISTERED 026421 PROFESSIONAL ARCHITECT
Date: 02/02/22
COA #: PEF003790

Drawing Title
HALTON DRAWINGS

Job No.	Drawn
214746	RAS
Scale	Date
N.T.S.	09/17/2021

Sheet No.
M704

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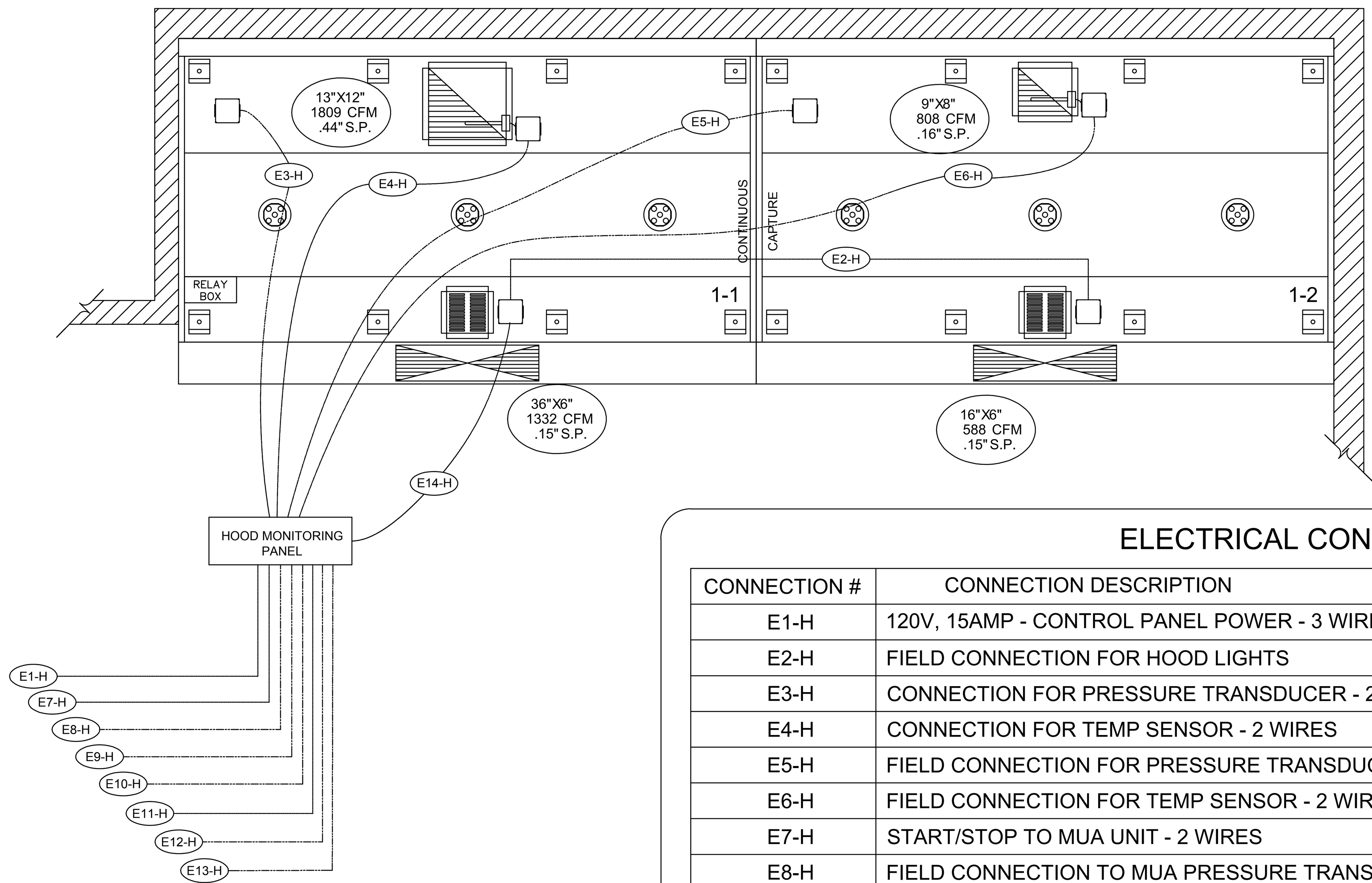
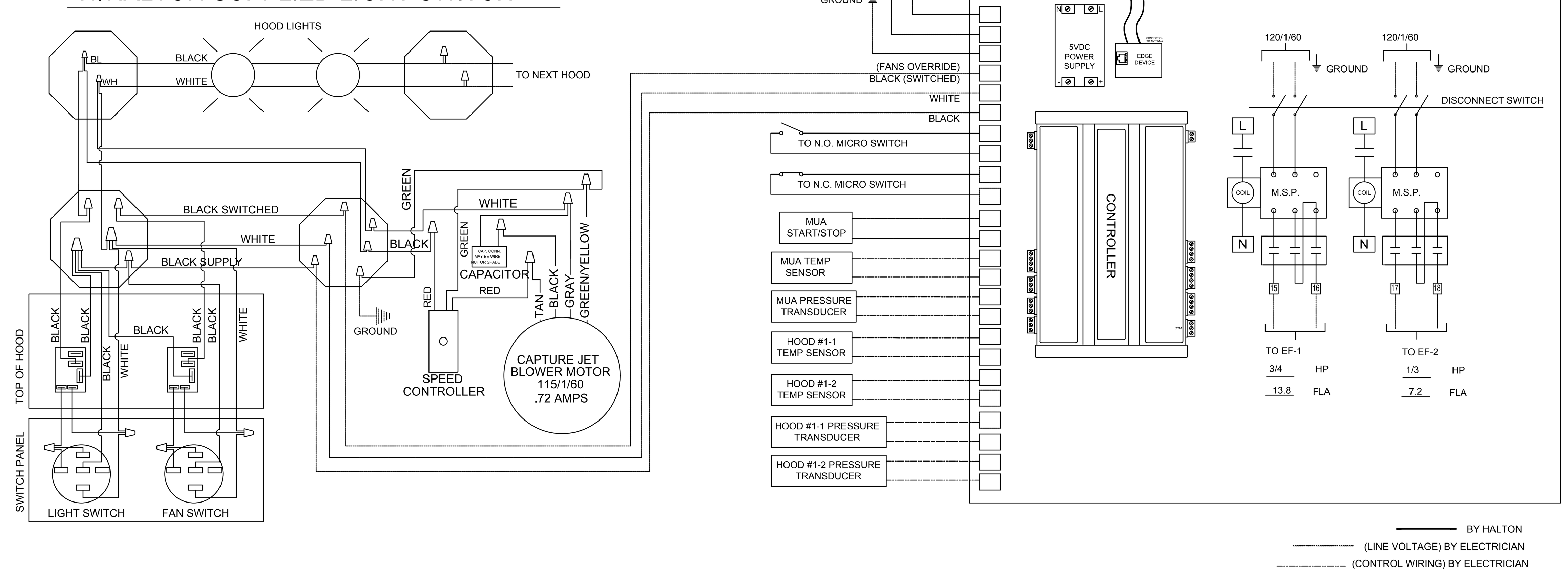


ELECTRICAL CONNECTION SCHEDULE

CONNECTION #	CONNECTION DESCRIPTION	FROM	TO
E1-H	120V, 15AMP - CONTROL PANEL POWER - 3 WIRES	BUILDING SOURCE	HOOD 2-1
E2-H	FIELD CONNECTION FOR HOOD LIGHTS	HOOD 2-1	HOOD 1-1
E3-H	CONNECTION FOR PRESSURE TRANSDUCER - 2 WIRES	CONTROL PANEL	HOOD 1-1
E4-H	CONNECTION FOR TEMP SENSOR - 2 WIRES	CONTROL PANEL	HOOD 1-1
E5-H	FIELD CONNECTION FOR PRESSURE TRANSDUCER - 2 WIRES	CONTROL PANEL	HOOD 1-2
E6-H	FIELD CONNECTION FOR TEMP SENSOR - 2 WIRES	CONTROL PANEL	HOOD 1-2
E7-H	START/STOP TO MUA UNIT - 2 WIRES	CONTROL PANEL	MUA UNIT
E8-H	FIELD CONNECTION TO MUA PRESSURE TRANSDUCER - 2 WIRES	CONTROL PANEL	MUA UNIT
E9-H	FIELD CONNECTION TO MUA TEMP SENSOR - 2 WIRES	CONTROL PANEL	MUA UNIT
E10-H	FIELD CONNECTION TO MUA TEMP SENSOR - 2 WIRES	CONTROL PANEL	MUA UNIT
E11-H	208V/3PH - MOTOR STARTER POWER	BUILDING SOURCE	CONTROL PANEL
E12-H	FIELD CONNECTION TO NORMALLY OPEN MICRO-SWITCH	ANSUL SYSTEM	CONTROL PANEL
E13-H	FIELD CONNECTION TO NORMALLY CLOSED MICRO-SWITCH	ANSUL SYSTEM	CONTROL PANEL
E14-H	FIELD CONNECTION FOR FAN SWITCH - 3 WIRES 120V	HOOD 1-1	CONTROL PANEL

CUSTOM wiring of Capture-Jet fan
W/HALTON SUPPLIED LIGHT SWITCH



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REV.	REVISION DESCRIPTION	BY	DATE
1	REVISED WIRING	SKM	10.22.21
2	DECREASED MUA CFM	SKM	11.04.21
3	NO CHANGE	SKM	11.10.21
4	NO CHANGE	SKM	11.24.21

PROJECT: SHAKE SHACK LENNOX SQUARE
LOCATION: ATLANTA, GA
DRAWN BY: SKM DATE: 10.07.21
SCALE: NOT TO SCALE
CONSULTANT:

Halton

DRAWING TITLE: DEMAND CONTROL DETAILS
DRAWING No.: U21-684
REV. NO.: 4 SHEET NO.: 5 of 8

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830 North Blvd.
Oak Park, Illinois
60301
708-445-8400
ariainc.com
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REVISIONS

GEORGIA REGISTERED PROFESSIONAL 026421
Date: 02/02/22
COA # PEF003790

Drawing Title
HALTON DRAWINGS

Job No.	Drawn
214746	RAS
Scale	Date
N.T.S.	09/17/2021

Sheet No.
M705

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MODEL #
PST-3-ESP-EF-OCC-B

ELECTRICAL							
SYSTEM CONTROL				POWER SUPPLY		FAN CONTROL	BACNET
AMPS	VOLTS/HZ/PH	ENCLOSURE	WEIGHT (LBS)	ENCLOSURE	WEIGHT (LBS)	TYPE (MOTOR STARTER/VFD)	
30		NEMA 1		NEMA 1	35		

PLUMBING							
WATER SUPPLY				DETERGENT			
DRAIN	PSI	TEMP (°F)	WATER LINE SIZE	TANK CAPACITY (GAL)	CONNECTION	AMPS	VOLTS/HZ/PH
2½" FNPT	45	140			1/2" FNPT	3/8	120/60/1

☒ LIGHT & MEDIUM DUTY COOKING
QTY: (1) 6MA POWER SUPPLY – P/N:
POWER SUPPLY ENCLOSURE SIZE: 17.3"L X 6.46"D X 18"H
WATER GPM: 11.7
WATER CONSUMPTION: 23.4 GALLONS
DETERGENT GALLON PER WASH: 0.12

☐ HEAVY & SOLID FUEL DUTY COOKING
QTY: (1) 6MA POWER SUPPLY – P/N:
POWER SUPPLY ENCLOSURE SIZE: 17.3"L X 6.46"D X 18"H
WATER GPM: 11.7
WATER CONSUMPTION: 46.9 GALLONS
DETERGENT GALLON PER WASH: 0.23

NOTE:
COLOR SHALL BE TIGER DRYLAC
RAL 5015 – 049/41477

POLLUSTOP SYSTEMS INSTALLATION CLEARANCES
SERVICE ACCESS SIDE: 42" CLEARANCE (REQUIRED):
ACCESS SIDE MUST BE SPECIFIED AS LEFT or RIGHT FROM THE INLET END OF THE UNIT.
ALLOWS SERVICING (i.e. REMOVAL OF 24"x24" FILTERS, UP TO 36" LONG ESP CELLS AND/OR OPENING ACCESS DOORS).
OPPOSITE SIDE FROM ACCESS (PER CODE):
– OUTER CASING TO NON COMBUSTIBLE CONSTRUCTION = 6 inches.
– OUTER CASING TO COMBUSTIBLE CONSTRUCTION = 18 inches.
– WHEN FIRE SYSTEM IS PRESENT 36" TO CONSTRUCTION IS REQUIRED ON SIDE OF CASING THAT FIRE SYSTEM IS MOUNTED ON.
NOTE: POLLUSTOP UNIT IS CLASSIFIED AS AN "ACCESSORY" TO THE SYSTEM DUCTWORK.
TOP: 26" CLEARANCE (RECOMMENDED):
NOTE: ALLOWS PROPER SERVICING OF PRESSURE/TRANSDUCER PORTS, JUNCTION BOX AND SWITCHES ON TOP OF FILTER SECTION.

NOTE: THE POLLUSTOP SYSTEM MUST CONTROL THE EXHAUST FAN VFD. IT WILL NOT FUNCTION WITH ANY DEMAND CONTROL VENTILATION SYSTEM OTHER THAN HALTON'S MARVEL SYSTEM.

SHOP NOTE: BUILD PER U.L. CONSTRUCTION METHODS

NOTE: CONFIRM DATA CHART
NOTE: CONFIRM RIGHT HAND ACCESS

FILTER MODULE	
COMPONENTS	FINAL W.G.
PRE-FILTER	0.25"
ESP CELLS	0.20"
MIST ELIMINATOR	0.25"
ELF FILTER	2.00"
1" CARBON PANELS	0.15"
TOTAL S.P.	2.85"

3000 CFM MODULES			
	MODULE	WEIGHT LBS	WEIGHT KG
✓	ESP & ELF FILTER	786	357
✓	1" CARBON PANELS	380	172
✓	FAN/BLOWER	895	406
	TOTAL UNIT WEIGHT	2061	935

P3 MODULE CHART

FAN SECTION		
DATA	IMPERIAL	METRIC
Max. Exhaust Air	3000 CFM	l/s
Design Exhaust Air	2617 CFM	l/s
Total Internal S.P.	2.85" W.G.	kpa
+Hood Static	W.G.	kpa
+Duct & other External Static	W.G.	kpa
= Total External S.P.	0.88" W.G.	kpa
Total External S.P. with 10% safety	0.97" W.G.	kpa
Total System S.P. (required for total system balance)	3.82" W.G.	kpa
Motor	3 hp	kw
Power	2.32 bhp	kw
Full Load AMPS	10.6	
Min Circuit AMPS (MCA)	13.25	
Motor Over Current Protection (MOCP)	23.85	
Watts (W)	3814	
Motor RPM	1800	
Voltage	208	
Phase	3	
Fan RPM	2534	
Mounting	EXTERIOR / FLOOR	
Blower Model	ATZAF 12-12-FF-T2 DWDI	

ELECTROSTATIC PRECIPITATOR SECTION		
FILTER TYPE	QTY	DESCRIPTION
METAL MESH FILTER	2	PRE/POST FILTER: METAL MESH (HALF 24X12X2)
	2	PRE/POST FILTER: METAL MESH (FULL 24X24X2)
COLLECTOR CELLS	1	COLLECTOR CELL: (FRONT 2H X 2W)
	0	COLLECTOR CELL: (INTERMEDIATE 2H X 2W)
	0	COLLECTOR CELL: (REAR 2H X 2W)
	1	COLLECTOR CELL: (INTERMEDIATE 2H X 1W)
	0	COLLECTOR CELL: (FRONT 1H X 2W)
	0	COLLECTOR CELL: (REAR 1H X 2W)
	0	COLLECTOR CELL: (FRONT 1H X 3W)
	0	COLLECTOR CELL: (INTERMEDIATE 1H X 3W)

FILTERS		
ELF FILTER	1	ELF BAG FILTER: 4 POCKET (HALF), 95%, UL 900, CLASS 1
	1	ELF BAG FILTER: 8 POCKET (FULL), 95%, UL 900, CLASS 1
FINAL FILTER	0	MERV 16 (HALF 12X24X12)
	0	MERV 16 (FULL 24X24X12)
HEPA FILTER	0	99.99% @ 0.3 MICRON (HALF 24X12X12)
	0	99.99% @ 0.3 MICRON (FULL 24X24X12)
CARBON PANEL	11	CARBON PANEL: ACTIVATED CARBON (HALF 12X24X1)
	11	CARBON PANEL: ACTIVATED CARBON (FULL 24X24X1)
CARBON PANEL	0	CARBON PANEL: ACTIVATED CARBON (HALF 12X24X2)
	0	CARBON PANEL: ACTIVATED CARBON (FULL 24X24X2)

Access to interior components of this module is from the Right Side of the unit (when looking into the First Module of the complete assembly)

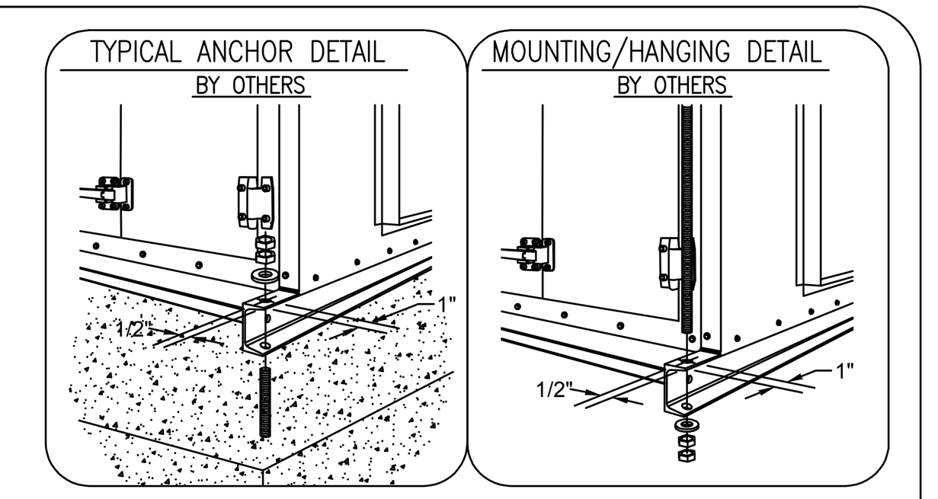
ITEM #PST-1

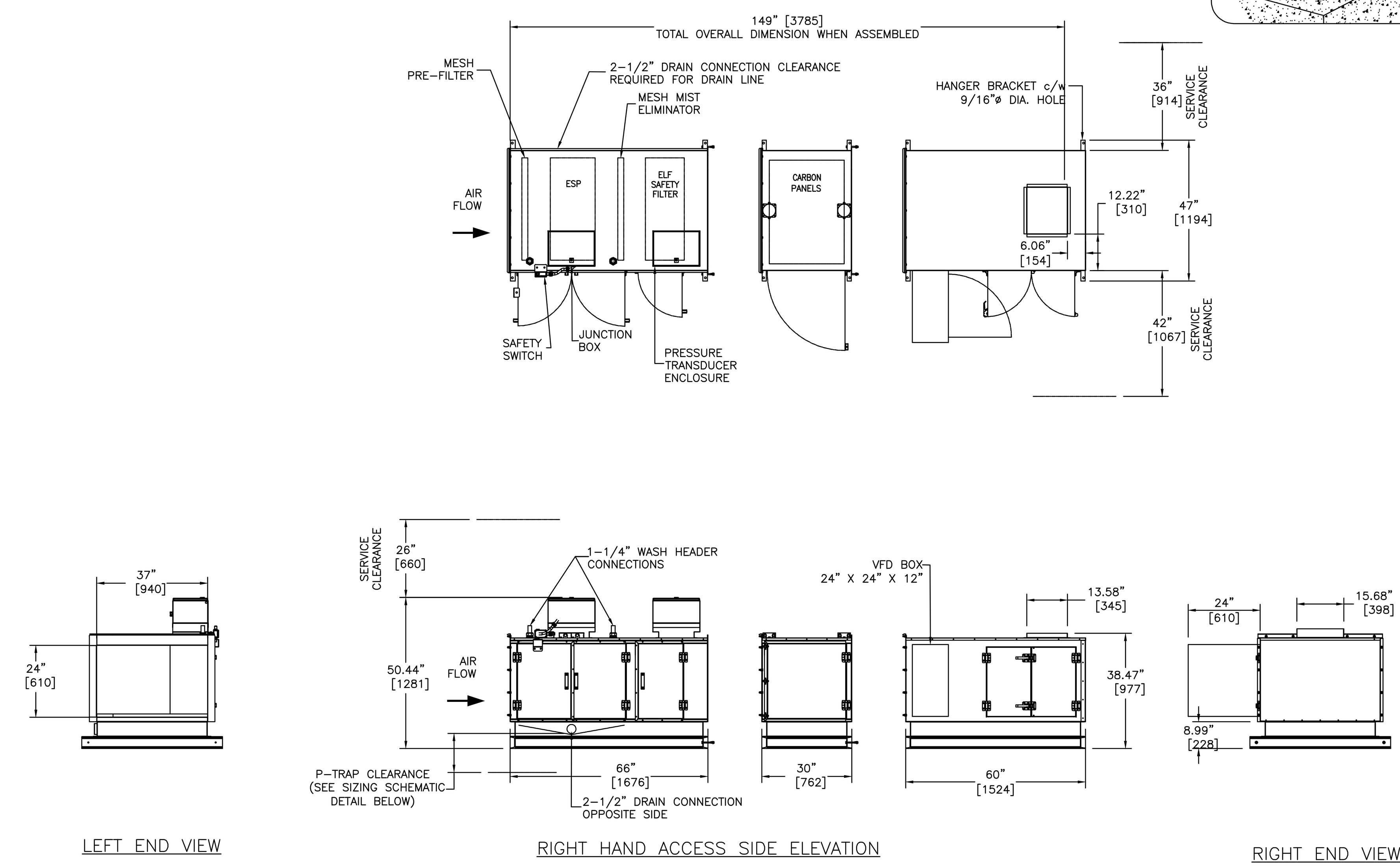
UNIT TO BE CONSTRUCTED TO UL8782 STANDARDS

NOTE:
THE POLLUSTOP UNIT WILL SHIP IN (3) MODULES. REFERENCE THE O&M MANUAL FOR INSTALLATION INSTRUCTIONS.

TYPICAL ANCHOR DETAIL BY OTHERS

MOUNTING/HANGING DETAIL BY OTHERS





LEFT END VIEW

RIGHT HAND ACCESS SIDE ELEVATION

RIGHT END VIEW

GENERAL NOTES:
1) FURNISHED AS SHOWN EXCEPT CARBON PANELS ARE SHIPPED IN BOXES. DO NOT UNPACK UNTIL READY FOR OPERATION.
2) THIS EQUIPMENT CONFORMS TO NFPA 96 AND IS LISTED TO UL 8782, ULC S647 & ANSI/UL 867.
3) UNIVERSAL LUGS MAY BE USED FOR RIGGING OR ANCHORING TO THE FLOOR, PAD OR MEZZANINE. UNIVERSAL LUGS MAY ALSO BE USED FOR OVERHEAD SUSPENSION.
4) FAILURE TO PROVIDE SAFE AND CONVENIENT ACCESS TO THIS EQUIPMENT, AS SHOWN ON THESE DRAWINGS OR OPERATING THIS EQUIPMENT PRIOR TO COMMISSIONING BY A FACTORY AUTHORIZED TECHNICIAN, VOIDS THE MANUFACTURERS' WARRANTY.
5) A LISTED FIRE SYSTEM SHALL BE FACTORY PRE PIPED USING DETECTORS AND NOZZLES AS INSTRUCTED BY THE MANUFACTURER. FIELD CONNECTIONS, TANKS, CONTROLS, COMMISSIONING BY OTHERS ON SITE. THE AHJ MAY REQUIRE OTHER PROTECTION.

ELECTRICAL WIRING NOTES:
1) ELECTRICAL SHOWN WITH BROKEN LINES (– – –) TO BE FURNISHED AND FIELD INSTALLED BY THE CONTRACTOR.
2) ALL COMPONENTS SHOWN WITH SOLID LINES ARE FACTORY FURNISHED, FOR FIELD INSTALLATION BY THE CONTRACTOR.
3) SYSTEM CONTROL & HIGH VOLTAGE POWER PACK MUST BE LOCATED INDOORS IN A FREEZE PROOF AREA. THESE COMPONENTS MUST ALSO BE LOCATED IN AN AREA CONVENIENT FOR MONITORING/SERVICING.
4) 50' OF HIGH VOLTAGE CABLE PROVIDED FOR BOTH THE IONIZER AND COLLECTOR CELLS.

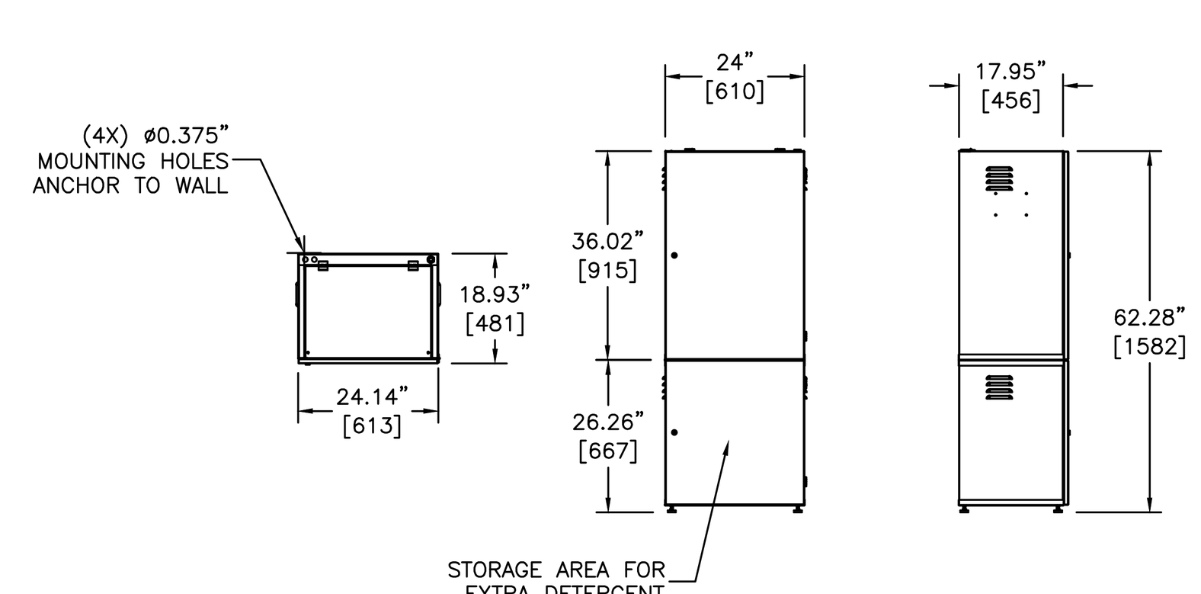
ELECTRICAL EQUIPMENT NOTES:
POWER PACK
1) PANEL SHALL BE FURNISHED ASSEMBLED AND INTERNALLY PRE WIRED, CONSISTING OF HIGH VOLTAGE SOLID STATE REGULATED POWER SUPPLY, CONTAINING ELECTRICAL CURRENT LIMITING, ARC SUPPRESSION CIRCUITRY, INDICATING LIGHTS FOR PRIMARY POWER AND HIGH VOLTAGE.
2) PANEL SHALL CONTAIN HINGED, FRONT ACCESS DOOR WITH ELECTRICAL INTER LOCK TO PREVENT EXPOSURE TO HIGH VOLTAGE.

SYSTEM CONTROL
1) PANEL SHALL BE FURNISHED ASSEMBLED AND INTERNALLY PRE WIRED, CONSISTING OF PLC, RELAYS, CIRCUIT BREAKERS, FUSES, ON-OFF DISCONNECT AND E-STOP SWITCH.
2) PANEL SHALL CONTAIN HINGED, FRONT ACCESS DOOR WITH SINGLE POINT LATCHING SYSTEM.

PLUMBING NOTES:
1) PIPING SHOWN WITH BROKEN LINES (– – –) TO BE FURNISHED AND FIELD INSTALLED BY THE CONTRACTOR.
2) ALL COMPONENTS SHOWN WITH SOLID LINES ARE FACTORY FURNISHED, FOR FIELD INSTALLATION BY THE CONTRACTOR.
3) TRAPPED DRAIN LINE WATER COLUMN TO BE SIZED FOR TOTAL SYSTEM LOSS + 1.0"W.G. DRAIN SHALL BE PLUMBED TO AN APPROVED GREASE INTERCEPTOR.
4) WATER SUPPLY AND DRAIN PIPING EXPOSED TO FREEZING MUST BE TRACE HEATED AND INSULATED.
5) CONTACT FACTORY FOR ALTERNATE PLUMBING DETAILS WHEN DETERGENT STAND TO BE INSTALLED AT HIGHER ELEVATION THAN UNIT.

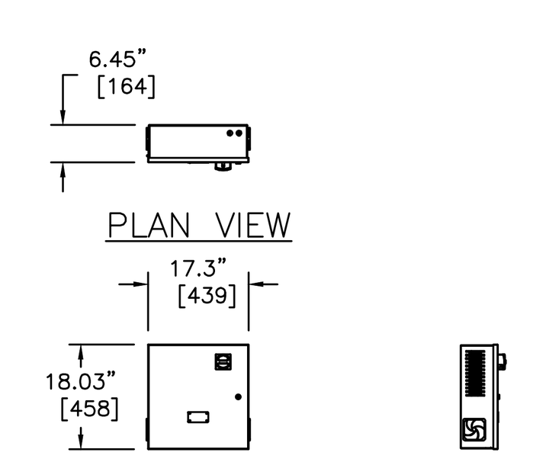
DETERGENT DISPENSER NOTES:
1) DETERGENT DISPENSER MUST BE LOCATED INDOORS IN A FREEZE PROOF AREA. THESE COMPONENTS MUST ALSO BE LOCATED IN AN AREA CONVENIENT FOR MONITORING/SERVICING.
2) CABINET TO BE FABRICATED FROM 18 GA. GALVANIZED STEEL, PRIMED AND PAINTED.
3) PUMP SHALL BE ANTI-CORROSIVE, POSITIVE DISPLACEMENT TYPE.

DETERGENT DISPENSER CABINET
(NOT TO SCALE)



CABINET TO HAVE ADJUSTABLE FEET

POWER PACK ENCLOSURE
(NOT TO SCALE)

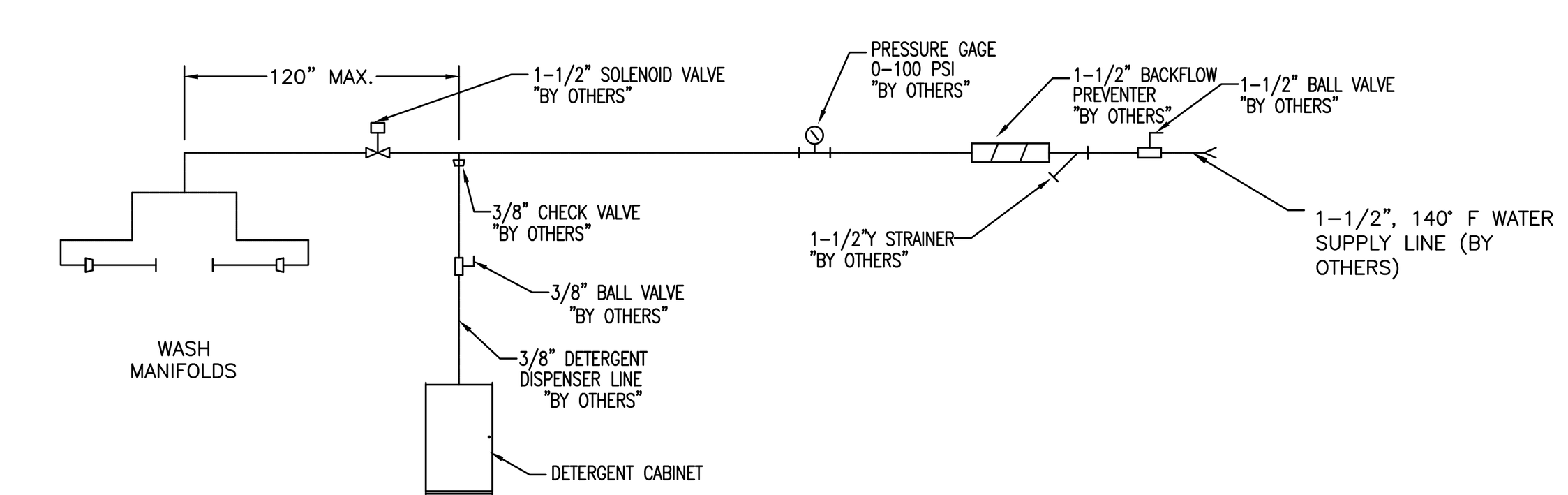


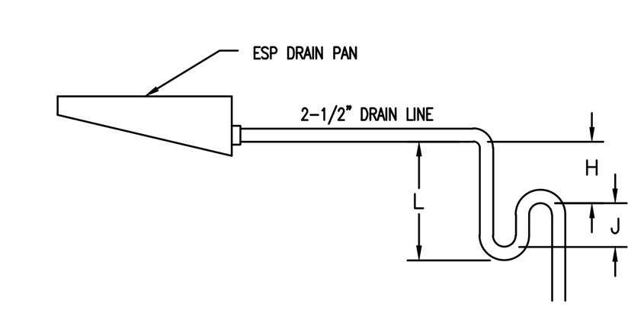
PLAN VIEW

ELEVATION VIEW

SIDE VIEW

WASH WATER PLUMBING SCHEMATIC
(NOT TO SCALE)





DIMENSIONS OF WATER TRAP
(SEE NOTE 3 of PLUMBING NOTES)

H = (1" for each 1" of static pressure – see Filter Module static pressure chart for Total S.P. plus one more inch)

J = ½ of H

L = H + J + Drain Pipe Diameter (2 ½")

DRAIN LINE PLUMBING SCHEMATIC
(NOT TO SCALE)

THIS DRAWING MUST BE CHECKED, SIGNED AND RETURNED TO THE APPROPRIATE FACTORY. PLEASE VERIFY THE FOLLOWING:
1. ALL DIMENSIONAL INFORMATION, MOUNTING POSITIONS AND CLEARANCES.
2. THE LOCATION AND TYPE OF COOKING EQUIPMENT.
NOTE TO APPROVER
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☐ REVISE AND RESUBMIT
APPROVED FOR FABRICATION
☐ WITH NO CHANGES ☐ WITH CHANGES AS NOTED
APPROVED BY
DATE

MAIL APPROVED DRAWINGS TO APPROPRIATE FACTORY BELOW: WEBSITE: www.halton.com

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1021 BREVIK PLACE
MISSISSAUGA, ON L4W 3R7
1-905-624-0301

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

REV.	REVISION DESCRIPTION	BY	DATE
1	TOTAL SP, NEW FAN SELECTION	SKM	10.22.21
2	NO CHANGE	SKM	11.04.21
3	NO CHANGE	SKIM	11.10.21
4	CHANGED TO UPBLAST FAN	SKM	11.24.21
5			
6			
7			

PROJECT:
SHAKE SHAKE LENNOX SQUARE
LOCATION: ATLANTA, GA
DRAWN BY: SKM | DATE: 10.07.21
SCALE: NOT TO SCALE
CONSULTANT:

Halton

DRAWING TITLE:
POLLUSTOP DETAILS
DRAWING No.: U21-684
REV. NO.: 4 | SHEET NO.: 6 of 8

aria GROUP
830 North Blvd.
Oak Park, Illinois
60301
708-445-8400
ariainc.com
ARIA GROUP ARCHITECTS, INC.

SHAKE SHACK
3393 Peachtree Road NE, Space 1014A, Atlanta, GA 30326
LENOX SQUARE

FIELD VERIFICATION
Contractor shall verify all figured dimensions and conditions at the job site and notify Aria Group Architects, Inc. of any dimensional errors, omissions or discrepancies before beginning or fabricating any work. Do not scale these drawings.

NO.	DATE	REMARKS
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1	12/03/21	ISSUE FOR CONSTRUCTION
	11/08/21	ISSUE FOR CONSTRUCTION
	10/25/21	ISSUE FOR LL REVIEW

REVISIONS

GEORGIA REGISTERED 026421 PROFESSIONAL ENGINEER GREGORY ROY SCHNACKEL
Date: 02/02/22
COA #: PEF003790

Drawing Title
HALTON DRAWINGS

Job No.	Drawn
214746	RAS
Scale	**Date**
N.T.S.	09/17/2021

Sheet No.
M706

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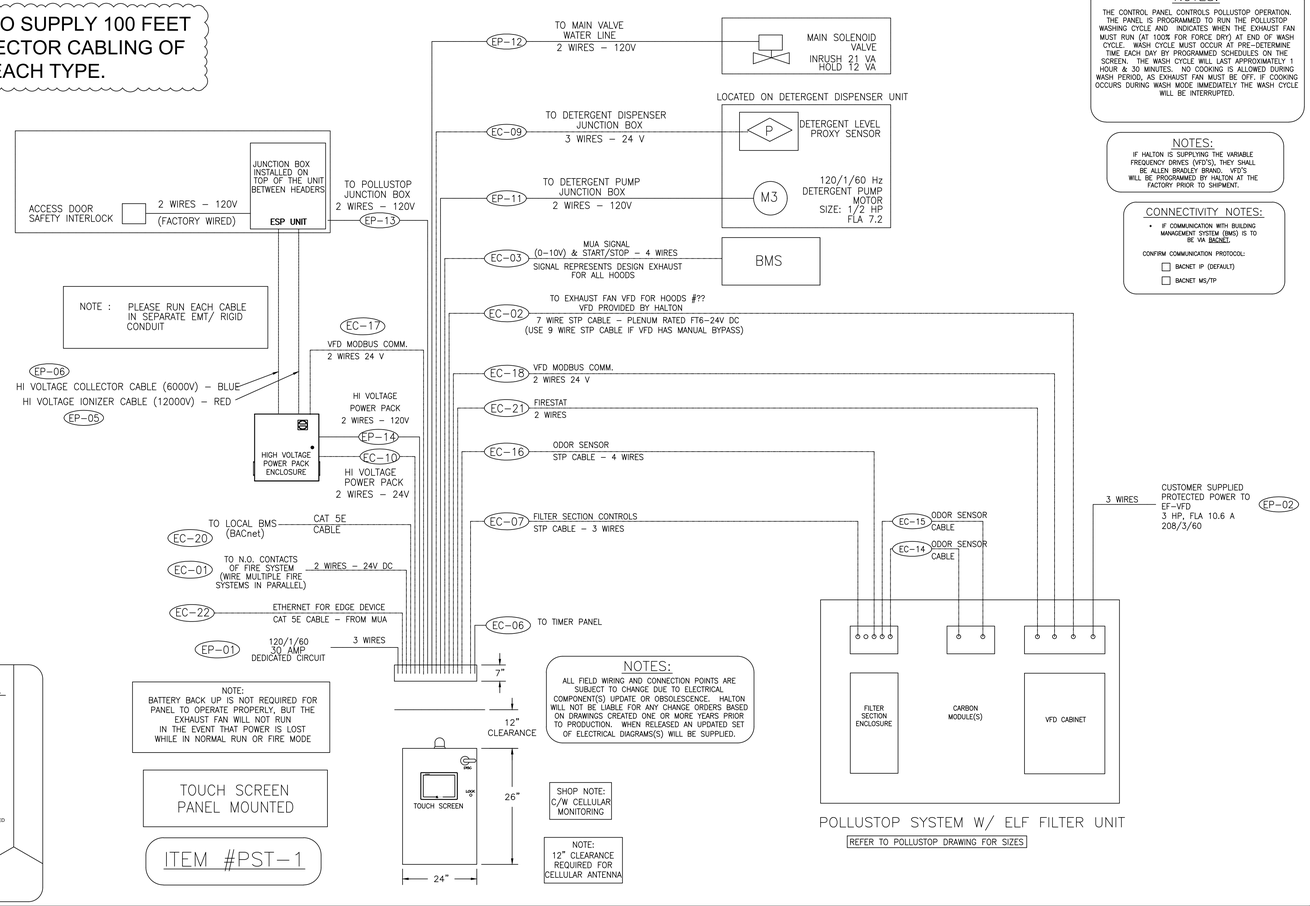
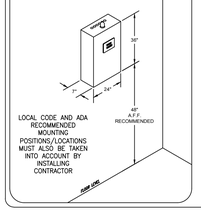
HALTON TO SUPPLY 100 FEET OF COLLECTOR CABLING OF EACH TYPE.



POLLUSTOP SYSTEM W/ ELF FILTER UNIT

REFER TO POLLUSTOP DRAWING FOR SIZES

POLLUSTOP CONTROL PANEL



NOTE:
BATTERY BACK UP IS NOT REQUIRED FOR PANEL TO OPERATE PROPERLY, BUT THE EXHAUST FAN WILL NOT RUN IN THE EVENT THAT POWER IS LOST WHILE IN NORMAL RUN OR FIRE MODE

TOUCH SCREEN PANEL MOUNTED

ITEM #PST–1

NOTES:
ALL FIELD WIRING AND CONNECTION POINTS ARE SUBJECT TO CHANGE DUE TO ELECTRICAL COMPONENT(S) UPDATE OR OBSOLESCENCE. HALTON WILL NOT BE LIABLE FOR ANY CHANGE ORDERS BASED ON DRAWINGS CREATED ONE OR MORE YEARS PRIOR TO PRODUCTION. WHEN RELEASED AN UPDATED SET OF ELECTRICAL DIAGRAMS(S) WILL BE SUPPLIED.

SHOP NOTE:
C/W CELLULAR MONITORING

NOTE:
12" CLEARANCE REQUIRED FOR CELLULAR ANTENNA

NOTES:
THE CONTROL PANEL CONTROLS POLLUSTOP OPERATION. THE PANEL IS PROGRAMMED TO RUN THE POLLUSTOP WASHING CYCLE AND INDICATES WHEN THE EXHAUST FAN MUST RUN (AT 100% FOR FORCE DRY) AT END OF WASH CYCLE. WASH CYCLE MUST OCCUR AT PRE–DETERMINE TIME EACH DAY BY PROGRAMMED SCHEDULES ON THE SCREEN. THE WASH CYCLE WILL LAST APPROXIMATELY 1 HOUR & 30 MINUTES. NO COOKING IS ALLOWED DURING WASH PERIOD, AS EXHAUST FAN MUST BE OFF. IF COOKING OCCURS DURING WASH MODE IMMEDIATELY THE WASH CYCLE WILL BE INTERRUPTED.

NOTES:
IF HALTON IS SUPPLYING THE VARIABLE FREQUENCY DRIVES (VFD'S), THEY SHALL BE ALLEN BRADLEY BRAND. VFD'S WILL BE PROGRAMMED BY HALTON AT THE FACTORY PRIOR TO SHIPMENT.

CONNECTIVITY NOTES:
- IF COMMUNICATION WITH BUILDING MANAGEMENT SYSTEM (BMS) IS TO BE VIA BACNET,

CONFIRM COMMUNICATION PROTOCOL:
- ☐ BACNET IP (DEFAULT)
- ☐ BACNET MS/TP

POLLUSTOP – SYSTEM SCOPE OF WORK

RESPONSIBILITY TO BE SELECTED BY GENERAL CONTRACTOR

DEFINITIONS FOR REFERENCE:

POLLUSTOP SYSTEMS = 1 EXHAUST FAN SERVING MULTIPLE KITCHEN HOODS OR ONE HOOD ONLY
VFD = VARIABLE FREQUENCY DRIVES

CONNECTION LOCATIONS WILL VARY PER SYSTEM, REFER TO HALTON MARVEL DIAGRAMS FOR SPECIFICS

1. APPLICABLE CONTRACTOR IS RESPONSIBLE FOR THE INSTALLATION OF THE POLLUSTOP CONTROL PANEL. LOCATION TO BE DETERMINED BY GC AND SHALL BE WITHIN SAME SPACE AS THE KITCHEN HOODS BEING SERVED BY PANEL.
2. APPLICABLE CONTRACTOR TO SUPPLY AND INSTALL 120V (30A) DEDICATED CIRCUIT AT POLLUSTOP CONTROL PANEL
3. APPLICABLE CONTRACTOR TO SUPPLY AND INSTALL RJ45 CAT5E CABLE CONNECTION AT POLLUSTOP CONTROL PANEL FOR SYSTEMS FOR I.P. ADDRESS IF APPLICABLE
4. APPLICABLE CONTRACTOR TO SUPPLY AND INSTALL 120V (15AMP) DEDICATED CIRCUIT AT ODOR CONTROL UNIT
5. APPLICABLE CONTRACTOR TO SUPPLY AND INSTALL 120V (15AMP) DEDICATED CIRCUIT AT VFD CABINET FOR COOLING FAN POWER FEED
6. APPLICABLE CONTRACTOR TO SUPPLY AND INSTALL THREE PHASE OR SINGLE PHASE POWER FEED FROM CIRCUIT BREAKER(S) TO VFD(S). APPLICABLE CONTRACTOR TO SUPPLY AND INSTALL THREE PHASE OR SINGLE PHASE POWER FROM VFD(S) TO EXHAUST / MUA (IF APPLICABLE) MOTORS, IF POLLUSTOP IS EXTERIOR TYPE. ALL TO BE RAN IN SEPARATE CONDUIT.
7. APPLICABLE CONTRACTOR TO SUPPLY AND RUN 2 WIRE 5 V DC WIRING FROM ANSUL FIRE SYSTEM TO POLLUSTOP CONTROL PANEL .
8. APPLICABLE CONTRACTOR TO SUPPLY AND RUN 4 WIRE STP PLENUM RATED CABLE FOR MUA SIGNAL START/STOP FROM CONTROL PANEL TO BMS OR DDC PANEL.
9. APPLICABLE CONTRACTOR TO SUPPLY AND RUN 8 WIRE STP PLENUM RATED CABLE (OR TWO CABLES 4 WIRE STP FROM POLLUSTOP CONTROL PANEL TO EXHAUST FAN VFD UNIT AND CABINET SUPPLIED BY HALTON UNLESS OTHERWISE NOTED)
10. APPLICABLE CONTRACTOR IS RESPONSIBLE FOR THE INSTALLATION OF THE VFD CABINET, ONLY IF POLLUSTOP IS EXTERIOR TYPE. LOCATION TO BE DETERMINED BY GC AND SHALL BE WITHIN 50 FEET MAX DISTANCE FROM EXHAUST FAN(S) IF VOLTAGE IS 575 V, IF VOLTAGE IS 208 V , MAX. DISTANCE SHELL BE 150 FT
11. APPLICABLE CONTRACTOR TO SUPPLY AND RUN 4 WIRE 24V AC WIRING FROM POLLUSTOP CONTROL PANEL TO VFD CABINET. TWO WIRES ARE FOR COOLING FAN OPERATION CONTROL AND TWO WIRES ARE FOR FIRESTAT CONNECTION.
12. APPLICABLE CONTRACTOR TO SUPPLY AND RUN 6 WIRE STP PLENUM RATED CABLE FROM POLLUSTOP CONTROL PANEL TO ELECTRICAL ENCLOSURE OF THE FILTER SECTION MOUNTED AT POLLUSTOP UNIT
13. APPLICABLE CONTRACTOR TO SUPPLY AND RUN 3 WIRE 24V AC WIRING FROM POLLUSTOP CONTROL PANEL IN ORDER TO SHUT OFF POWER SUPPLY AND GAS IN CASE OF MISSING FILTER AT POLLUSTOP (APPLIES FOR CANADA ONLY)
14. APPLICABLE CONTRACTOR TO SUPPLY AND RUN 4 WIRE 24V AC & DC WIRING FROM POLLUSTOP CONTROL PANEL TO POLLUSTOP ODOR CONTROL CABINET. TWO WIRES 24 VAC ARE FOR COMPRESSOR OPERATION AND TWO WIRES 24 VDC ARE FOR LOW SOLUTION LEVEL ALARM.
15. HALTON REPRESENTATIVE TO PERFORM FINAL FIELD COMMISSIONING ONCE ALL RESPONSIBILITIES ARE COMPLETED ABOVE.

ELECTRICAL CONNECTION SCHEDULE

	POWER CONNECTIONS :
EP–01	120V, 30 AMP – POLLUSTOP CONTROL PANEL POWER – 3 WIRES
EP–02	HIGH VOLTAGE POWER FROM BUILDING SOURCE TO VFD
EP–03	NOT USED
EP–04	NOT USED
EP–05	HIGH VOLTAGE IONIZER CABLE (RED) – PROVIDED BY HALTON
EP–06	HIGH VOLTAGE COLLECTOR CABLE (BLUE) – PROVIDED BY HALTON
EP–07	NOT USED
EP–08	NOT USED
EP–09	NOT USED
EP–10	NOT USED
EP–11	TO DETERGENT PUMP – 2 WIRES @ 120 V
EP–12	TO MAIN WATER VALVE – 2 WIRES 120 V
EP–13	TO POLLUSTOP CONTROL PANEL JUNCTION BOX–2 WIRES 120 V
EP–14	HIGH VOLTAGE POWER PACK – 2 WIRES @ 120V
EP–15	NOT USED
EP–16	NOT USED
EP–17	NOT USED
EP–18	NOT USED
EP–19	NOT USED
EP–20	NOT USED
EP–21	NOT USED
EP–22	NOT USED

	CONTROLS CONNECTIONS :
EC–01	2 WIRES – TO N.O. CONTACT OF FIRE SYSTEM MICROSWITCH
EC–02	7 WIRE STP CABLE – PLENUM RATED FT6 – TO EF VFD
EC–03	4 WIRES – MUA INTERLOCK TO BMS OR DDC
EC–04	NOT USED
EC–05	MAIN DUCT KGS – 3 WIRES (OPTIONAL)
EC–06	2 WIRES REMOTE START – DRY CONTACT CLOSURE
EC–07	3 WIRE STP CABLE – FTG RATED – TO FILTER SECTION
EC–08	SPACE TEMP SENSOR (OPTIONAL)
EC–09	TO DETERGENT DISPENSER PROXY SWITCH–3 WIRES 24 V
EC–10	HIGH VOLTAGE POWER PACK – 2 WIRES @ 24 V
EC–11	NOT USED
EC–12	NOT USED
EC–13	NOT USED
EC–14	3 WIRE OM MAIN SENSOR 1 (BEFORE CARBON FILTER)
EC–15	3 WIRE OM MAIN SENSOR 2 (AFTER CARBON FILTER)
EC–16	4 WIRES FOR ODOR MONITOR
EC–17	VFD MODBUS COMMUNICATION
EC–18	VFD MODBUS COMMUNICATION
EC–19	CAT5E CABLE – COMMUNICATION TO HOODS – IF APPLICABLE
EC–20	CAT5E CABLE –FOR TO BMS (BACNET) (FUTURE)
EC–21	2 WIRES – FIRESTAT SIGNAL
EC–22	CAT5E CABLE – ETHERNET CONNECTION FOR EDGE DEVICE

SEQUENCE OF OPERATION:

TOUCH SCREEN ON/OFF BUTTON – "ON" POSITION (RUN MODE)

- EXHAUST FAN ON ("SET POINT" FLOW RATE)
- DRY CONTACT FOR MAKE UP AIR WILL CLOSE
- EXHAUST FAN WILL MAINTAIN CONSTANT AIRFLOW THROUGH VFD SPEED CHANGE RELATED TO STATIC PRESSURE CHANGE
- EXHAUST FAN WILL SHUT DOWN IN CASE OF MISSING FILTER(S)

FIRE MODE

- EXHAUST FAN IS ON AT 100 % IN A FIRE MODE
- MUA FAN IS OFF

NOTES:
ALL WIRING AND CABLING TO BE PROVIDED BY ELECTRICAL CONTRACTOR UNLESS STATED OTHERWISE

NOTES:
ALL POLLUSTOP FAN MOTORS MUST BE COMPATIBLE TO WORK WITH VFD'S

NOTES:
- _____ FIELD WIRING (BY E.C.) – 120V – 12AWG MIN.–10AWG MAX.
- _____ FIELD WIRING (BY E.C.) – 24V – 22AWG MIN.–16AWG MAX.
- _____ SHIELDED NETWORK CABLES – PROVIDED BY HALTON FIELD INSTALLED BY OTHERS
- _____ HIGH VOLTAGE CABLES – PROVIDED BY HALTON FIELD INSTALLED BY OTHERS

TOUCH SCREEN ALARM CONDITIONS:

1. ELF BAG FILTER CLOGGED
2. ELF BAG FILTER MISSING
3. FINAL FILTER CLOGGED
4. FINAL FILTER MISSING
5. FIRE
6. CHANGE FILTERS
7. LOW ODOR CONTROL LEVEL
8. FAN FAILED

TOUCH SCREEN DISPLAY SCREEN APPLICATIONS:

1. FILTER
   - FAN SPEED
   - ELF FILTER LIFE REMAINING
   - FINAL FILTER LIFE REMAINING
2. ODOR CONTROL
   - OFF/CYCLE/CONTINUOUS
   - ON TIME SETTING
   - OFF TIME SETTING
3. CALIBRATE
4. ALARMS
5. TECH SUPPORT

(refer manual for details)

THIS DRAWING MUST BE CHECKED, SIGNED AND RETURNED TO THE APPROPRIATE FACTORY. PLEASE VERIFY THE FOLLOWING:
1. ALL DIMENSIONAL INFORMATION, MOUNTING POSITIONS
2. THE LOCATION AND TYPE OF COOKING EQUIPMENT.

NOTE TO APPROVER
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☐ REVISE AND RESUBMIT

APPROVED FOR FABRICATION
☐ WITH NO CHANGES ☐ WITH CHANGES AS NOTED

APPROVED BY: DATE

MAIL APPROVED DRAWINGS TO APPROPRIATE FACTORY BELOW:

HALTON CO. (USA) ☐
101 INDUSTRIAL DRIVE
SCOTTSVILLE, KY 42164
1–270–237–5600

HALTON CO. (CANADA) ☐
1021 BREVIK PLACE
MISSISSAUGA, ON L4W 3R7
1–905–624–0301

WEBSITE: www.halton.com

REV.	BY	DATE	REVISION DESCRIPTION
1	SKM	10.22.21	NO CHANGE
2	SKM	11.04.21	NO CHANGE
3	SKM	11.10.21	NO CHANGE
4	SKM	11.24.21	NO CHANGE

PROJECT: SHAKE SHACK LENNOX SQUARE
LOCATION: ATLANTA, GA
DRAWN BY: SKM
DATE: 10.07.21
SCALE: NOT TO SCALE
CONSULTANT:

Halton

DRAWING TITLE: POLLUSTOP DETAILS

DRAWING No.: U21–684

REV. NO.: 4
SHEET NO.: 7 of 8

NO.	DATE	REMARKS
3	02/02/22	ISSUE FOR CONSTRUCTION
2	01/11/22	ISSUE FOR CONSTRUCTION
1	12/03/21	ISSUE FOR CONSTRUCTION
	11/08/21	ISSUE FOR CONSTRUCTION
	10/25/21	ISSUE FOR ILL REVIEW

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708-445-8400
ariainc.com
ARIA GROUP ARCHITECTS, INC.

SHAKE SHACK
3393 Peachtree Road NE, Space 1014A, Atlanta, GA 30326
LENNOX SQUARE

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REVISIONS

GEORGIA REGISTERED 026421 PROFESSIONAL ENGINEER
Date: 02/02/22
COA # PEF003790

Drawing Title: HALTON DRAWINGS

Job No. 214746 | Drawn RAS
Scale N.T.S. | Date 09/17/2021

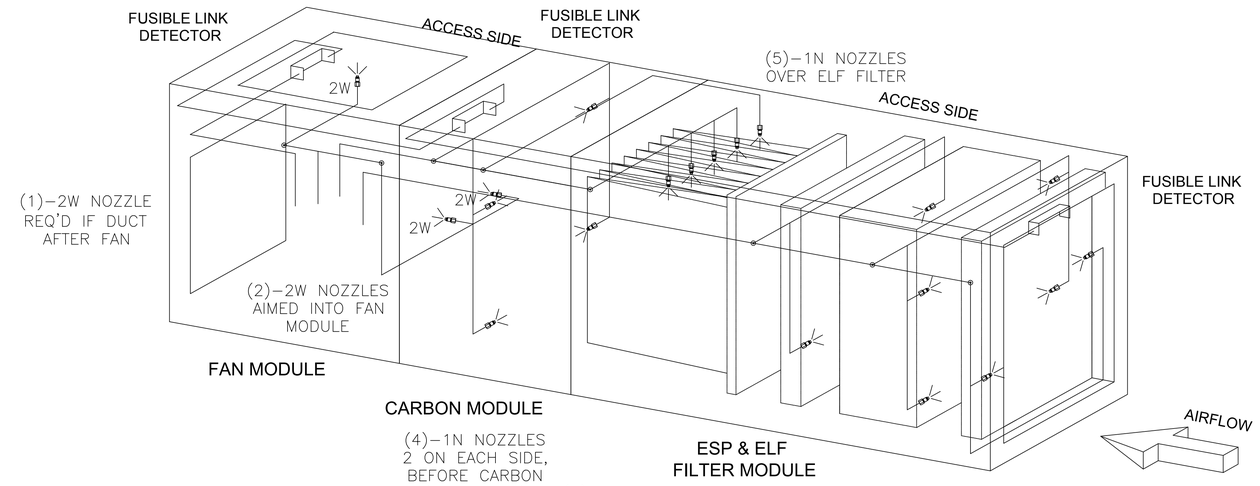
Sheet No. M707

RESERVED FOR DOCUMENT BINDING

FLOW POINT CHART

ANSUL R-102 FLOW POINT CALCULATION			
NOZZLE TYPE	NOZZLE FLOW PT.	NOZZLE QUANTITY	TOTAL FLOW PT.
2W	2	3	6
1N	1	17	17
TOTAL FLOW POINTS USED			23
MAX. SYSTEM FLOW POINTS:			36 (9 GALLON)

ITEM #PST-1



ANSUL NOTES

GENERAL NOTES:

1. THIS INSTALLATION IS TO BE MADE IN ACCORDANCE WITH THE R-102 INSTALLATION MANUAL AND IN ACCORDANCE WITH ALL STATE AND LOCAL CODES.
2. THE WIRE ROPE FOR THE DETECTOR IS TO BE INSTALLED BY AN AUTHORIZED AND FACTORY TRAINED DISTRIBUTOR OR SERVICE REPRESENTATIVE.
3. THIS INSTALLATION IS TO BE INSPECTED, PUT INTO OPERATION AND CERTIFIED BY AN AUTHORIZED AND FACTORY TRAINED DISTRIBUTOR OR SERVICE REPRESENTATIVE.
4. ELECTRICAL CONTACTS AND WIRING FOR APPLIANCE SHUT OFF TO BE PROVIDED BY THE ELECTRICAL CONTRACTOR.
5. ANSUL R-102 RESTAURANT FIRE SUPPRESSION SYSTEMS HAVE BEEN TESTED AND ARE LISTED BY UNDERWRITERS' LABORATORIES INC. AS PRE-ENGINEERED SYSTEMS, AND WHEN INSTALLED AS SHOWN ON THIS DRAWING SHALL COMPLY WITH ALL RELEVANT ANSUL INSTALLATION RECHARGE INSPECTION AND MAINTENANCE MANUALS AND SHALL COMPLY WITH NFPA 96 WHEN INSTALLED AND CERTIFIED BY AUTHORIZED TRAINED ANSUL DISTRIBUTORS IN ACCORDANCE WITH THE MANUAL.
6. ALL AGENT DISTRIBUTION PIPING AND DETECTION CONDUIT HOOD PENETRATIONS MUST BE PROPERLY SEALED IN ACCORDANCE WITH NFPA 96.

DISTRIBUTION PIPING REQUIREMENT NOTES:

1. PIPE SHALL BE 3/8" SCHEDULE 40 BLACK IRON FOR INDOOR APPLICATIONS, AND WILL BE PAINTED FOR OUTDOOR APPLICATIONS UNLESS OTHERWISE NOTED.
2. FINAL NOZZLE LOCATION MAY NOT VARY FROM LOCATION SHOWN.

THIS DRAWING MUST BE CHECKED, SIGNED AND RETURNED TO THE APPROPRIATE FACTORY. PLEASE EXPRESSLY CONFIRM FOLLOWING:
1. ALL DIMENSIONAL INFORMATION, MOUNTING POSITIONS AND CLEARANCES.
2. THE LOCATION AND TYPE OF COOKING EQUIPMENT.
NOTED DEVIATIONS:
ANY CHANGES IN COOKING EQUIPMENT SUCH AS INCREASED ENERGY INPUTS OR EQUIPMENT POSITION MAY AFFECT EXHAUST AIRFLOW. HALTON MUST BE NOTIFIED IF ANY OF THESE CHANGES OCCUR & INSTALLATION DRAWING APPROVAL MAY BE REQUIRED.
☐ REVISE AND RESUBMIT
APPROVED FOR FABRICATION
☐ WITH NO CHANGES ☐ WITH CHANGES AS NOTED
APPROVED BY: DATE

MAIL APPROVED DRAWINGS TO APPROPRIATE FACTORY BELOW:
HALTON CO. (CANADA) ☐ 1021 BREVIK PLACE MISSISSAUGA, ON L4W 3R7 1-905-624-0301
HALTON CO. (USA) ☒ 101 INDUSTRIAL DRIVE SCOTTSVILLE, KY 42164 1-270-237-5600
WEBSITE: www.halton.com

REV.	DESCRIPTION	BY	DATE
4	NO CHANGE	SKM	10.22.21
3	NO CHANGE	SKM	11.04.21
2	NO CHANGE	SKM	11.10.21
1	CHANGED TO UPBLAST FAN	SKM	11.24.21

PROJECT: SHAKE SHACK LENNOX SQUARE
LOCATION: ATLANTA, GA
DRAWN BY: SKM
DATE: 10.07.21
SCALE: NOT TO SCALE
CONSULTANT:
Halton

DRAWING TITLE: ANSUL SYSTEM
DRAWING No.: U21-684
REV. NO.: 4
SHEET NO.: 8 of 8

aria GROUP
830 North Blvd.
Oak Park, Illinois
60301
708-445-8400
ariainc.com
ARIA GROUP ARCHITECTS, INC.

SHAKE SHACK
3393 Peachtree Road NE, Space 1014A, Atlanta, GA 30326
LENOX SQUARE

FIELD VERIFICATION
Contractor shall verify all figured dimensions and conditions at the job site and notify Aria Group Architects, Inc. of any dimensional errors, omissions or discrepancies before beginning or fabricating any work. Do not scale these drawings.

NO.	DATE	REMARKS
3	02/02/22	ISSUE FOR CONSTRUCTION
2	01/11/22	ISSUE FOR CONSTRUCTION
1	12/03/21	ISSUE FOR CONSTRUCTION
	11/08/21	ISSUE FOR CONSTRUCTION
	10/25/21	ISSUE FOR LL REVIEW

REVISIONS

Date: 02/02/22
COA # PEF003790

Drawing Title: HALTON DRAWINGS

Job No.	Drawn
214746	RAS
Scale: N.T.S.	Date: 09/17/2021

Sheet No.: M708

Schnackel engineers
New York ■ Miami ■ Omaha ■ Los Angeles ■ Seattle ■ Honolulu
800-581-0963 www.schnackel.com