

### DUCTWORK NOTES

1. ALL DUCTWORK SIZES SHOWN ON THE DRAWINGS ARE INSIDE DIMENSIONS.
2. ALL DUCTWORK CONNECTIONS TO AIR MOVING EQUIPMENT SHALL BE MADE WITH FLEXIBLE DUCT CONNECTIONS ON THE INLET AND DISCHARGE OF ALL SUPPLY, RETURN AND EXHAUST FANS (EXCEPT ROOF MOUNTED EXHAUST FANS).
3. INSTALL TURNING VANES IN ALL SQUARE DUCT ELBOWS. INSTALL MANUAL VOLUME DAMPERS IN EACH BRANCH DUCT AT CONNECTION TO MAIN DUCT AND IN EACH DUCT AFTER A BRANCH DUCT SPLIT.
4. THE LOCATIONS SHOWN FOR ALL DIFFUSERS, REGISTERS AND GRILLES, ETC. ARE DIAGRAMMATIC. EXACT LOCATION SHALL BE DETERMINED FROM THE REFLECTED CEILING PLANS AND/OR ON THE JOB SITE BY THE CONSTRUCTION MANAGER REPRESENTATIVES.
5. INSTALL A MINIMUM 12"x12" ACCESS DOOR (INLET SIDE) AT EACH MOTORIZED DAMPER, FIRE DAMPER, SMOKE DAMPER, INTAKE AND EXHAUST PLENUMS AND AN ACCESS DOOR AT AIR SUPPLY UNIT FILTER SECTION.
6. INSTALL AMCA APPROVED FUSIBLE LINK FIRE DAMPERS IN ALL DUCTS WHICH PASS THROUGH FIRE RATED WALLS AND FLOORS AND AS INDICATED ON DRAWINGS. WHERE FIRE DAMPERS CANNOT BE CHECKED FROM A REGISTER OR GRILLE, INSTALL AN ACCESS DOOR IN THE DUCT NEXT TO THE DAMPER AND ACCESS PANEL IN ALL NEW ACCESSIBLE CEILING.
7. ALL DUCTS JOINTS SEALED WITH DUCT MASTIC OR APPROVED TAPE.
8. ALL DUCTWORK SHALL BE CONSTRUCTED TO SMACNA SEAL CLASS "A" STANDARDS.

### CITY OF CHICAGO NOTES

1. ALL OUTSIDE AIR INTAKE OPENINGS SHALL BE LOCATED A MINIMUM OF 15'-0" AWAY FROM ANY EXHAUST, FLUES, VENTS AND ETC. AND A MINIMUM OF 10'-0" ABOVE PUBLIC WAY.
2. SEE REFRIGERANT SCHEDULE FOR PROJECT REFRIGERATION SCOPE AND NOTES.
3. ALL REFRIGERANT PIPING SHALL BE TYPE K COPPER. ALL JOINTS SHALL BE BRAZED.
4. COMBUSTION AIR, GAS PIPING, AND FLUES SHALL BE IN FULL COMPLIANCE WITH ARTICLES 7, 8 & 14 OF THE CITY OF CHICAGO MECHANICAL CODE (APPROVED 2015) AND THE LATEST VERSION OF THE INTERNATIONAL FUEL GAS CODE (IFGC) AS REFERENCED BY THE CITY OF CHICAGO CODE.
5. AIR PLENUMS; NO FLOOR DRAINS, SANITARY WASTE, AND VENT PIPING OR OTHER MATERIAL WITH POTENTIAL OF CONTAMINATING THE VENTILATION AIR SUPPLY SHALL BE LOCATED IN THE AIR PLENUMS.
6. DUCT SMOKE DETECTORS SHALL BE ACCESSIBLE FOR SERVICE.
7. ALL WORK PERFORMED AND EQUIPMENT INSTALLED UNDER THIS CONTRACT SHALL BE IN ACCORDANCE WITH ALL APPLICABLE CITY OF CHICAGO CODES.
8. ALL NEW DUCTWORK SHALL BE FABRICATED FROM PRIME FIRST QUALITY GALVANIZED SHEET METAL, UNLESS OTHERWISE NOTED. GAUGES OF METAL, HANGER SPACING, ETC. SHALL CONFORM TO THE LATEST EDITION OF SMACNA HVAC DUCT CONSTRUCTION STANDARDS FOR DUCT CONSTRUCTION (19-28-603.3). SEE SPECIFICATIONS FOR MORE DETAILS.
9. ALL FLEXIBLE LOW-PRESSURE DUCTWORK SHALL BE INSULATED, CHICAGO APPROVED AND NOT EXCEED 5'-0" IN LENGTH. MANUFACTURER TO BE WIREMOLD, TYPE WK UL-181, CLASS 1.
10. THE CONTRACTOR SHALL GUARANTEE THAT THE PLENUM CHAMBER USED FOR RECIRCULATION OF AIR WILL BE OF TIGHT CONSTRUCTION AND THAT ALL SOURCES OF AIR CONTAMINATION FROM TRAPS, SOIL STACKS, DOWN SPOUTS, VENTS, EXHAUST DISCHARGES AND OTHER SOURCES WILL BE ENCLOSED SO THAT NO CONTAMINATED AIR WILL BE RECIRCULATED.
11. ALL EXPANSION VALVES, DEVICES AND CONNECTIONS SHALL BE REMOVED FROM THE AIRSTREAM OF ALL MECHANICAL EQUIPMENT AS PER CITY OF CHICAGO CODE. (13-192-380)

### PIPING NOTES

1. ALL PIPING SHALL BE SUSPENDED WITH CLEVIS AND/OR TRAPEZE PIPE HANGERS. INSULATED PIPING SHALL REST ON STEEL OR WOOD PIPE COVERING PROTECTION SADDLES OR SHEET METAL INSULATION SHIELDS AS CALLED FOR IN THE SPECIFICATIONS AND/OR DETAILED ON THE DRAWINGS.
2. ALL PIPING PASSING THRU FLOOR CONSTRUCTION SHALL HAVE A SCHEDULE 40 STEEL PIPE SLEEVE INSTALLED AROUND PIPE ONLY. ALL PIPE PASSING THRU WALLS SHALL HAVE A GALVANIZED SHEET METAL OR SCHEDULE 40 STEEL PIPE SLEEVE INSTALLED AROUND THE PIPE AND PIPE INSULATION. SEE SLEEVE DETAILS THESE DRAWINGS.
3. SEE LARGE SCALE DRAWINGS (DETAILS) FOR ALL REQUIRED VALVES, FITTINGS, GAUGES, VENTS, THERMOMETERS WHICH ARE CONNECTED TO MECHANICAL EQUIPMENT. ALL WORK SHOWN ON DETAILS SHALL BE BY INSTALLING CONTRACTOR UNLESS OTHERWISE NOTED.
4. INSTALL A MANUAL SHUT OFF COCK AND DIRT LEG ON EACH BRANCH GAS LINE CONNECTED TO GAS FIRED EQUIPMENT.
5. MECHANICAL CONTRACTOR TO FURNISH AND INSTALL ALL GAS REGULATORS ON THE LEAVING SIDE OF THE GAS METER. ALL GAS REGULATORS WILL HAVE A VENT PIPE RUNNING TO A COMMON VENT HEADER WHICH TERMINATES 18" ABOVE THE ROOF WITH A GOOSENECK.
6. GAS PIPES MUST BE SLOPED AT 1/4 INCH IN EVERY 15 FEET. FUEL GAS PIPING CONTROLS MUST CONFORM TO THE IFGC, CHAPTER 4 (WITH MODIFICATIONS AS NOTED IN CHAPTER 14). GAS PIPING MATERIALS MUST CONFORM TO THE GAS PIPING & TUBING MATERIAL MATRIX (IFGC 403 REQUIREMENTS). PIPING IN CONCEALED LOCATIONS MUST CONFORM TO THIS IFGC 404.3. [IFGC 404.3]
7. MECHANICAL CONTRACTOR SHALL RUN INSULATED DRAIN PIPES FROM ALL HEATING/COOLING FAN COIL UNITS. SEE DRAWINGS AND DETAILS FOR LOCATION OF TERMINATION OF DRAIN PIPING. ALL CONDENSATE DRAIN PIPES MUST BE PITCHED AWAY FROM THE DRAIN PAN. ALL CONDENSATE DRAIN PIPES WILL BE INSULATED FROM UNIT TO TERMINATION POINT.

### GENERAL NOTES

1. DRAWINGS ARE GENERALLY DIAGRAMMATIC. ROUTING OF PIPING AND DUCTWORK AS SHOWN DOES NOT INTEND TO SHOW EVERY RISE, DROP, OFFSET, FITTING NOR EVERY STRUCTURAL ELEMENT THAT MAY BE ENCOUNTERED DURING THE INSTALLATION OF THIS WORK. EACH CONTRACTOR SHALL MAKE ANY REQUIRED CHANGES FROM THE GENERAL ROUTING SHOWN ON THESE DRAWINGS, SUCH AS OFFSETS, BENDS OR CHANGES IN ELEVATION DUE TO COORDINATION WITH THE WORK OF OTHER TRADES AND BUILDING CONSTRUCTION. ALL CHANGES SHALL BE MADE WITHOUT ADDITIONAL COST TO THE OWNER OR DELAY IN COMPLETION DATE OF THE PROJECT.
2. IT IS INTENDED THAT EQUIPMENT SHALL BE LOCATED SYMMETRICALLY WITH THE ARCHITECTURAL ELEMENTS OF THE BUILDING, NOTWITHSTANDING THE FACT THAT LOCATIONS INDICATED BY THESE DRAWINGS MAY BE DISTORTED FOR CLARITY OF PRESENTATION.
3. CONTRACTOR SHALL CHECK DRAWINGS OF OTHER TRADES TO VERIFY THAT SPACES IN WHICH THEIR WORK WILL BE INSTALLED ARE CLEAR OF OBSTRUCTIONS. WORK SHALL BE INSTALLED TO MAINTAIN MAXIMUM HEADROOM AND SPACE CONDITION AT ALL POINTS IN THE BUILDING. WHERE HEADROOM OR SPACE CONDITIONS APPEAR INADEQUATE, CONTRACTOR SHALL NOTIFY ARCHITECT/ENGINEER BEFORE PROCEEDING WITH THE INSTALLATION OF THEIR WORK. DUCT TO BE INSTALLED AS TIGHT TO THE UNDERSIDE OF THE DECK AS CLEARANCES ALLOW TO MAXIMIZE CEILING HEIGHT.
4. CONTRACTOR SHALL FURNISH OTHER TRADES ADVANCE INFORMATION AND/OR SHOP DRAWINGS ON LOCATIONS AND SIZE OF PIPING, DUCTWORK, CONDUIT, RACEWAYS, EQUIPMENT, FRAMES, BOXES, SLEEVES AND OPENINGS, ETC. NEEDED FOR THEIR WORK TO PERMIT OTHER TRADES AFFECTED TO INSTALL THEIR WORK PROPERLY AND WITHOUT DELAY.
5. WHERE THERE IS EVIDENCE THAT WORK OF ONE TRADE WILL INTERFERE WITH WORK OF OTHER TRADES, ALL TRADES SHALL MEET ON JOB SITE TO WORK OUT SPACE CONDITIONS AND MAKE SATISFACTORY ADJUSTMENTS TO INSTALLATION OF THE NEW WORK. CONTRACTORS SHALL VERIFY EXACT LOCATIONS OF ALL DEVICES AND EQUIPMENT WITH FIELD CONDITIONS, SHOP DRAWINGS, AND WORK OF OTHER TRADES PRIOR TO ROUGH-IN. CONTRACTOR SHALL BE RESPONSIBLE, AT THEIR OWN EXPENSE, FOR THE REMOVAL AND REINSTALLATION OF ANY PART OF THEIR WORK IF SAME WAS INSTALLED WITHOUT CONSULTING WITH OTHER TRADES BEFORE INSTALLING THEIR WORK.
6. CONTRACTOR SHALL PROVIDE SLEEVES IN BEAMS, FLOORS, COLUMNS AND WALLS AS SHOWN ON THE DRAWINGS, AS REQUIRED BY JOB SITE CONDITIONS, AND/OR AS SPECIFIED. WHEN INSTALLING THEIR WORK, ALL BEAMS AND COLUMNS WHICH ARE REQUIRED TO BE SLEEVED SHALL BE CUT AND REINFORCED AS REQUIRED BY FIELD CONDITIONS AND LOCATIONS AND SIZES SHALL BE CHECKED AND APPROVED BY STRUCTURAL ENGINEERS BEFORE CONTRACTOR CUTS ANY STRUCTURAL BUILDING MEMBER.
7. THE SEQUENCE FOR THE INSTALLATION OF ALL WORK SHALL BE COORDINATED BETWEEN ALL CONTRACTORS ON THE PROJECT AND IN STRICT ACCORDANCE WITH CONSTRUCTION MANAGER AND OWNERS STIPULATION AS CALLED FOR IN THE SPECIFICATION AND/OR AS DIRECTED.
8. CONTRACTOR SHALL REFER TO THE ARCHITECTURAL AND STRUCTURAL CONTRACT DRAWINGS (BEFORE SUBMITTING THEIR BIDS) TO FAMILIARIZE THEMSELVES WITH THE EXTENT OF THE OTHER TRADES CONTRACTORS WORK, CEILING HEIGHTS AND CLEARANCE FOR INSTALLING THEIR WORK.
9. CONTRACTOR SHALL BE RESPONSIBLE FOR THEIR OWN CLEAN-UP DURING CONSTRUCTION. IF CONTRACTOR FAILS TO PROVIDE SUCH CLEAN-UP, THE ARCHITECT/ENGINEER WILL DIRECT ANOTHER CONTRACTOR TO PERFORM THE CLEAN-UP AND THE NEGLIGENT CONTRACTOR SHALL PAY THE ASSOCIATED BACK-CHARGES AS DEEMED APPROPRIATE BY THE CONSTRUCTION MANAGER.
10. CONTRACTOR SHALL STORE ALL MATERIALS AND EQUIPMENT SHIPPED TO THE SITE IN A PROTECTED AREA. IF MATERIAL IS STORED OUTSIDE OF THE BUILDING, IT MUST BE STORED OFF THE GROUND A MINIMUM OF SIX INCHES (6") SET ON 6"x6" PLANKS AND/OR WOOD PALLET. ALL MATERIAL AND EQUIPMENT MUST BE COMPLETELY COVERED WITH WATERPROOF TARP OR VISQUIN. ALL PIPING AND DUCTWORK WILL HAVE THE ENDS CLOSED TO KEEP OUT DIRT AND OTHER DEBRIS. NO EQUIPMENT WILL BE ALLOWED TO BE STORED ON THE SITE UNLESS IT IS SITTING ON WOOD PLANKS AND COMPLETELY PROTECTED WITH WEATHERPROOF COVERS.
11. THE DRAWINGS, SCHEDULES AND SPECIFICATIONS HAVE BEEN PREPARED USING ONE MANUFACTURER FOR EACH PIECE OF EQUIPMENT AS THE BASIS FOR DIMENSIONAL DESIGN. IF THE CONTRACTOR PURCHASES EQUIPMENT LISTED AS A SPECIFIED ACCEPTABLE MANUFACTURER BUT IS NOT THE SCHEDULED MANUFACTURER USED FOR THE BASE DESIGN, THE CONTRACTOR SHALL BE RESPONSIBLE FOR CHECKING ALL THE DIMENSIONS OF THE EQUIPMENT TO VERIFY THAT IT WILL FIT IN THE SPACE SHOWN ON THE DRAWINGS. MINOR DEVIATIONS IN DIMENSIONS WILL BE PERMITTED, PROVIDED THE RATINGS MEET THOSE SHOWN ON THE DRAWINGS AND EQUIPMENT WILL PHYSICALLY FIT INTO THE SPACE ALLOCATED WITH SUITABLE ACCESS AROUND EQUIPMENT FOR OPERATION AND MAINTENANCE ON THE EQUIPMENT.
12. CONTRACTOR AND/OR MANUFACTURER SHALL VERIFY THAT THE CHARACTERISTICS OF THE EQUIPMENT THEY SUBMIT FOR REVIEW MEETS THE CAPACITY AND DUTY SPECIFIED. WHEN EQUIPMENT IS SUBMITTED FOR REVIEW AND DOES NOT MEET THE PHYSICAL SIZE OR ARRANGEMENT OF THAT SCHEDULED AND SPECIFIED, CONTRACTOR SHALL PAY FOR ALL ALTERATIONS REQUIRED TO ACCOMMODATE SUCH EQUIPMENT AT NO ADDITIONAL COST TO OWNER. CONTRACTOR WILL ALSO PAY ALL COSTS FOR ADDITIONAL WORK REQUIRED BY OTHER CONTRACTORS, OWNER, ARCHITECT OR ENGINEER TO MAKE CHANGES WHICH WOULD ALLOW THE EQUIPMENT TO FIT IN THE SPACE AND FUNCTION AS INTENDED.
13. MECHANICAL CONTRACTOR SHALL PROVIDE ON SITE TRAINING OF OWNERS OPERATING PERSONNEL FOR ALL SYSTEMS AND EQUIPMENT INSTALLED UNDER THEIR CONTRACT.
14. BEFORE STARTING ANY SYSTEM INSTALLING CONTRACTOR SHALL CONTACT EQUIPMENT MANUFACTURER TO VERIFY THAT EACH PIECE OF EQUIPMENT OR SYSTEM HAS BEEN CHECKED FOR PROPER LUBRICATION, DRIVE ROTATION, BELT TENSION, CONTROL SEQUENCE OR OTHER CONDITIONS WHICH MAY CAUSE DAMAGE TO THE EQUIPMENT.
15. CONTRACTOR AND/OR MANUFACTURER SHALL VERIFY THAT THE CHARACTERISTICS OF THE EQUIPMENT THEY SUBMIT FOR REVIEW MEETS THE CAPACITY AND DUTY SPECIFIED.
16. THE MECHANICAL CONTRACTOR TO PROVIDE 1/4 INCH SCALE PIPING AND DUCTWORK DRAWINGS FOR COORDINATION WITH OTHER TRADES. DRAWINGS TO INDICATE DIMENSIONS AND ELEVATIONS OF ALL PIPING AND DUCTWORK. DRAWINGS TO ALSO INCLUDE ALL WALL/FLOOR/ROOF OPENINGS.

### MECHANICAL GENERAL NOTES

1. CONTRACTOR SHALL ABIDE BY CONDITIONS OF CONTRACT AGREEMENT AND DIVISION 01 SPECIFICATIONS
2. ALL WORK SHALL BE IN ACCORDANCE WITH DIVISION 23 SPECIFICATIONS.
3. ALL AIR MOVING EQUIPMENT SHALL BE INSTALLED WITH VIBRATION ISOLATORS AND PROVIDED WITH FLEXIBLE DUCT CONNECTIONS.
4. ALL EQUIPMENT SHALL HAVE TOTALLY ENCLOSED MOTORS AND BE RATED TO OPERATE IN PLENUM CEILING, INCLUDING ALL SUPPLY AIR AND RETURN AIR FAN MOTORS EXPOSED TO THE AIR STREAM.
5. ALL DUCT SIZES INDICATED ON PLANS AND RISERS ARE CLEAR INTERNAL DIMENSIONS. DUCT SIZES NOT SHOWN SHALL BE SIZED TO VELOCITIES NO GREATER THAN UPSTREAM SECTIONS USING SIMILAR ASPECT RATIOS.
6. ALL SUPPLY AIR TAKEOFFS FROM MAIN TRUNK DUCTS ARE TO BE INSTALLED WITH BELLMOUTH FITTINGS OR 45 DEGREE ENTRY TO PROVIDE THE SMOOTHEST AIR FLOW POSSIBLE.
7. PROVIDE GUIDES, HANGERS, EXPANSION LOOPS AND SUPPLEMENTARY STEEL SUPPORT WHERE REQUIRED FOR ALL PIPING.

### ABBREVIATIONS:

AFF	ABOVE FINISHED FLOOR
BOD	BOTTOM OF DUCT
BTU	BRITISH THERMAL UNIT
CFM	CUBIC FEET PER MINUTE
DB	DRY BULB
EAT	ENTERING AIR TEMPERATURE
ESP	EXTERNAL STATIC PRESSURE
FOB	FLAT ON BOTTOM
HZ	FREQUENCY
NC	NOISE CRITERIA
PSI	POUNDS PER SQUARE INCH
RTU	ROOFTOP UNIT
TYP	TYPICAL
WC	WATER COLUMN
WB	WET BULB

### GRILLES/DIFFUSERS:

	SUPPLY DIFFUSER
	SUPPLY DIFFUSER WITH 3-WAY THROW
	SUPPLY DIFFUSER WITH 2-WAY THROW
	SIDEWALL MOUNTED SUPPLY REGISTER
	RETURN GRILLE
	EXHAUST GRILLE
	LINEAR DIFFUSER

### MECHANICAL GENERAL NOTES (CONTINUED)

8. ANY DISCREPANCY BETWEEN DRAWINGS, SPECIFICATIONS AND NOTES SHALL BE CLEARED WITH ENGINEER BEFORE THE BIDDING. NO EXTRAS SHALL BE ALLOWED FOR CLARIFICATIONS DURING CONSTRUCTION.
9. MECHANICAL CONTRACTOR SHALL SEAL ALL MECHANICAL PENETRATIONS THRU FIRE RATED FLOORS AND PARTITIONS WITH FIRE RATED MATERIAL INSTALLED PER MANUFACTURERS GUIDELINES AND U.L. REQUIREMENTS. MATERIAL SELECTION SHALL BE BASED ON RATING OF PARTITION PENETRATED. SEE ARCHITECTURAL DRAWINGS FOR FIRE RATINGS OF WALLS AND FLOORS
10. ALL GAS FIRED APPLIANCES SHALL BE VENTED IN ACCORDANCE WITH CHICAGO BUILDING CODE ARTICLE 8 - CHIMNEYS AND VENTS, THE 2012 INTERNATIONAL FUEL GAS CODE AND NFPA 31.
11. NOISE LEVEL AT LOT LINE SHALL NOT EXCEED 55 DBA.
12. ALL NATURAL GAS PIPEWORK SHALL BE SCHEDULE 40 STEEL PIPE WITH THREADED FITTINGS BELOW 2" AND WELDED FITTINGS ABOVE 2".

### DEMOLITION NOTES

1. ALL DEMOLITION WORK SHALL BE PERFORMED WITH DUE CARE AND DILIGENCE SO AS TO PREVENT THE UNNECESSARY DESTRUCTION AND/OR DAMAGE TO SYSTEMS THAT SHALL REMAIN IN OPERATION AT THE CONCLUSION OF THIS WORK. DETERMINE THE EXACT LOCATION OF ALL EXISTING EQUIPMENT, DEVICES AND WIRING BEFORE COMMENCING WORK.
2. LOCATE AND PRESERVE ALL PORTIONS OF THE EXISTING HVAC SYSTEMS WHICH SHALL REMAIN.
3. CONTROLS DEVICES AND WIRING ARE NOT SHOWN ON THE DEMOLITION PLAN AND SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
4. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING HVAC DEVICES, EQUIPMENT, AND WIRING BEFORE COMMENCING WORK. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGE THAT MIGHT OCCUR BECAUSE OF THE CONTRACTORS FAILURE TO ACCURATELY DISCOVER, LOCATE, AND PROTECT ANY AND ALL PORTION OF THE EXISTING HVAC SYSTEM.
5. REMOVE AND REINSTALL (OR PROTECT IN PLACE) ALL EXISTING EQUIPMENT AND DEVICES TO REMAIN ON OR IN WALLS, CEILING AND FLOORS WHICH SHALL BE EXPOSED TO DEMOLITION AND CONSTRUCTION ACTIVITIES AND WHICH MAY BE DAMAGED BY DUST, DEBRIS, ETC.
6. WHERE EXISTING EQUIPMENT AND DEVICES SHALL BE REMOVED, THE CONTRACTOR SHALL REMOVE ALL THE ASSOCIATED DUCTWORK, PIPING, AND CONTROLS THAT SHALL NOT REMAIN IN OPERATION BACK TO THEIR RESPECTIVE SOURCE OR TO THE POINT ON A SHARED SYSTEM FROM WHERE THE EQUIPMENT OR DEVICE IS SERVED.
7. RELOCATE AS NECESSARY ALL EXISTING DUCTWORK, PIPING AND CONTROLS FOUND PASSING THROUGH THE AREA OF CONSTRUCTION, AND WHICH ARE PRESENTLY IN USE TO THE OTHER PORTIONS OF THE BUILDING UNAFFECTED BY THIS PROJECT PHASE. MAINTAIN THE CONTINUITY OF SERVICES AND GROUNDING, AND CONCEAL THEM ABOVE NEW CEILINGS.
8. ALL EXISTING DAMAGED DUCTWORK, GRILLES AND DEVICES WITHIN THE AREA OF CONSTRUCTION AND SHOWN TO REMAIN IN OPERATION SHALL BE REPLACED WITH NEW MATERIALS CONFORMING TO THESE CONTRACT DOCUMENTS.
9. ALL EQUIPMENT, DEVICES AND MATERIALS REMOVED DURING DEMOLITION WORK AND NOT INDICATED TO BE REUSED OR TURNED OVER TO THE USING AGENCY SHALL BECOME THE RESPONSIBILITY OF THE CONTRACTOR FOR DISPOSAL.
10. THE CONTRACTOR SHALL PROVIDE ALL CUTTING AND PATCHING NECESSARY TO REPAIR ANY DAMAGE CAUSED BY CONSTRUCTION ACTIVITIES PERFORMED BY THE CONTRACTOR. THIS WORK INCLUDES AREAS OUTSIDE ANY LIMITS OF CONSTRUCTION LINES SHOWN ON THE DRAWINGS.

### MECHANICAL SYMBOLS LEGEND

#### EQUIPMENT:

	ROOF MOUNTED EXHAUST FAN
	CEILING MOUNTED EXHAUST FAN
	FAN COIL UNIT
	MAKE-UP AIR UNIT
	TEMPERATURE SENSOR - ELECTRIC
	THERMOSTAT
	CARBON DIOXIDE SENSOR
	DUCT SMOKE DETECTOR
	AUDIO/VISUAL REMOTE SMOKE DETECTOR ANNUNCIATOR
	HUMIDITY SENSOR

#### DOUBLE LINE DUCT SYMBOLS:

	NEW SHEET METAL DUCTWORK
	SUPPLY OR OUTSIDE AIR DUCT
	RETURN AIR DUCT
	EXHAUST AIR DUCT
	DUCTWORK TRANSITION
	DUCTWORK TRANSITION - RECTANGULAR TO ROUND
	SUPPLY DUCT ELBOW UP OR DOWN
	RETURN DUCT ELBOW UP OR DOWN

	EXHAUST DUCT ELBOW UP OR DOWN
	DUCT ELBOW WITH FIXED TURNING VANES
	DUCT BRANCH TAKE-OFF
	ROUND SPIN-IN WITH DAMPER
	SQUARE TO ROUND TAP WITH DAMPER
	FLEXIBLE DUCT CONNECTION
	VOLUME DAMPER
	BACKDRAFT DAMPER
	FLEXIBLE DUCTWORK

#### GENERAL REFERENCES/NOTATIONS:

	CONNECT TO EXISTING
	NOTE DESIGNATION
	REVISION DESIGNATION
	MECHANICAL EQUIPMENT DESIGNATION
	DIFFUSER DESIGNATION AND CFM

#### SYMBOLS LEGEND NOTES:

1. REFER TO SPECIFICATIONS AND PLAN NOTES FOR DETAILED DESCRIPTION OF ALL DEVICES SHOWN IN THIS SCHEDULE.
2. PROJECT MAY NOT USE EVERY SYMBOL OR DEVICE INDICATED ON THIS LEGEND.

### ENERGY NOTES

1. MOTORIZED DAMPERS SHALL BE INSTALLED ON ALL INTAKES AND EXHAUST OPENINGS UNLESS NOTED OTHERWISE.
2. MAXIMUM FAN NAMEPLATE HORSEPOWER SHALL NOT EXCEED 1.1 HP/1000CFM.
3. LOAD CALCULATIONS WERE BASED ON ASHRAE 2021 FUNDAMENTALS
4. ALL PROGRAMMABLE THERMOSTATS SHALL HAVE 5 DEGREE DEADBAND AND SHALL HAVE 7-DAY CLOCK, 2-HOUR MANUAL OVERRIDE, 10 HOUR BACKUP AND SETBACK CAPABLE OF 55 DEGREES HEATING AND 85 DEGREES COOLING. (EXCEPT CONTINUOUS OPERATING ZONES)
6. ALL DUCTWORK SHALL BE SEALED PRESSURE SENSITIVE TAPE IS NOT USED AS THE PRIMARY SEALANT. LONGITUDINAL AND TRANSVERSE SEAMS FOR DUCTS IN UNCONDITIONED SPACES AND WALL PENETRATIONS. TRANSVERSE SEAMS ON BURIED DUCTS.
7. ALL MOTORS SHALL MEET THE REQUIREMENTS OF 2021 IECC.
8. PROVIDE COMMISSIONING PER 2021 IECC.

### OWNER'S REQUIREMENTS

1. ALL CONTROL WORK SHALL BE CONTRACTED WITH JOHNSON CONTROLS.
2. CONTRACTOR SHALL BE REQUIRED TO REVIEW ANY NEW OR DEMOLISHED FIRE DAMPERS WITH NM FACILITIES TEAM. DEMOLISHED FIRE DAMPERS SHALL BE REMOVED FROM THE MASTER BUILDING LOG AND NEW DAMPERS ADDED. CONTRACTOR SHALL INSTALL NM PROVIDED BAR CODES ON ALL NEW FIRE DAMPERS.
3. CONTRACTOR SHALL BE REQUIRED TO TEST THE FIRE DAMPER AND CERTIFY ON IDPH MATRIX 4E THAT THE DAMPER OPERATES PROPERLY AND IS ACCESSIBLE. CONTRACTOR SHALL ALSO TEST AND INCLUDE IN IDPH MATRIX 4E ANY EXISTING FIRE DAMPERS IN THE AREA OF WORK THAT ARE EXISTING TO REMAIN.
4. CONTRACTOR SHALL CONTRACT THE TEST AND BALANCING SERVICES TO NM APPROVED VENDOR ONLY.
5. ALL TEST AND BALANCING ACTIVITIES SHALL BE COORDINATED WITH NM FACILITIES PRIOR TO THE START OF WORK.

### DESIGN CRITERIA

BASED ON ASHRAE HANDBOOK - 2021 FUNDAMENTALS
CHICAGO, IL
OUTDOOR DESIGN CONDITION (WITH AMENDMENTS)
0.4% COOLING: 95°/75°F DB/WB
99.6% HEATING: -10°F DB
INDOOR DESIGN CONDITION (ADJUSTABLE)
SUMMER: 75°F DB/50% RH
WINTER: 70°F DB

### RENOVATION LEGEND

<E>	EXISTING TO REMAIN
<ED>	EXISTING LOCATION (NEW DEVICE OR EQUIPMENT TO BE INSTALLED IN PLACE)
<ER>	EXISTING TO BE RELOCATED
<X>	EXISTING TO BE REMOVED
<N>	EXISTING IN NEW LOCATION
<N>	NEW

### APPLICABLE CODES / STANDARDS

- CITY OF CHICAGO MECHANICAL CODE
- 2021 INTERNATIONAL ENERGY CONSERVATION CODE
- SMACNA DUCT CONSTRUCTION STANDARDS

ferris+sloane

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CAVA

CAVA #00000  
270 E ONTARIO STREET  
STREETERVILLE, ILLINOIS, 60611  
FOR CAVA  
14 Ridge Square NW #500, WASHINGTON, DC 20016

AOR PROJECT NUMBER:  
CAV061

ISSUE	DATE
PERMIT SET	10/09/2024
LANDLORD/BID	11/08/2024
CONSTRUCTION SET	01/29/2025

MECHANICAL GENERAL NOTES, SYMBOLS & LEGEND

SHEET:

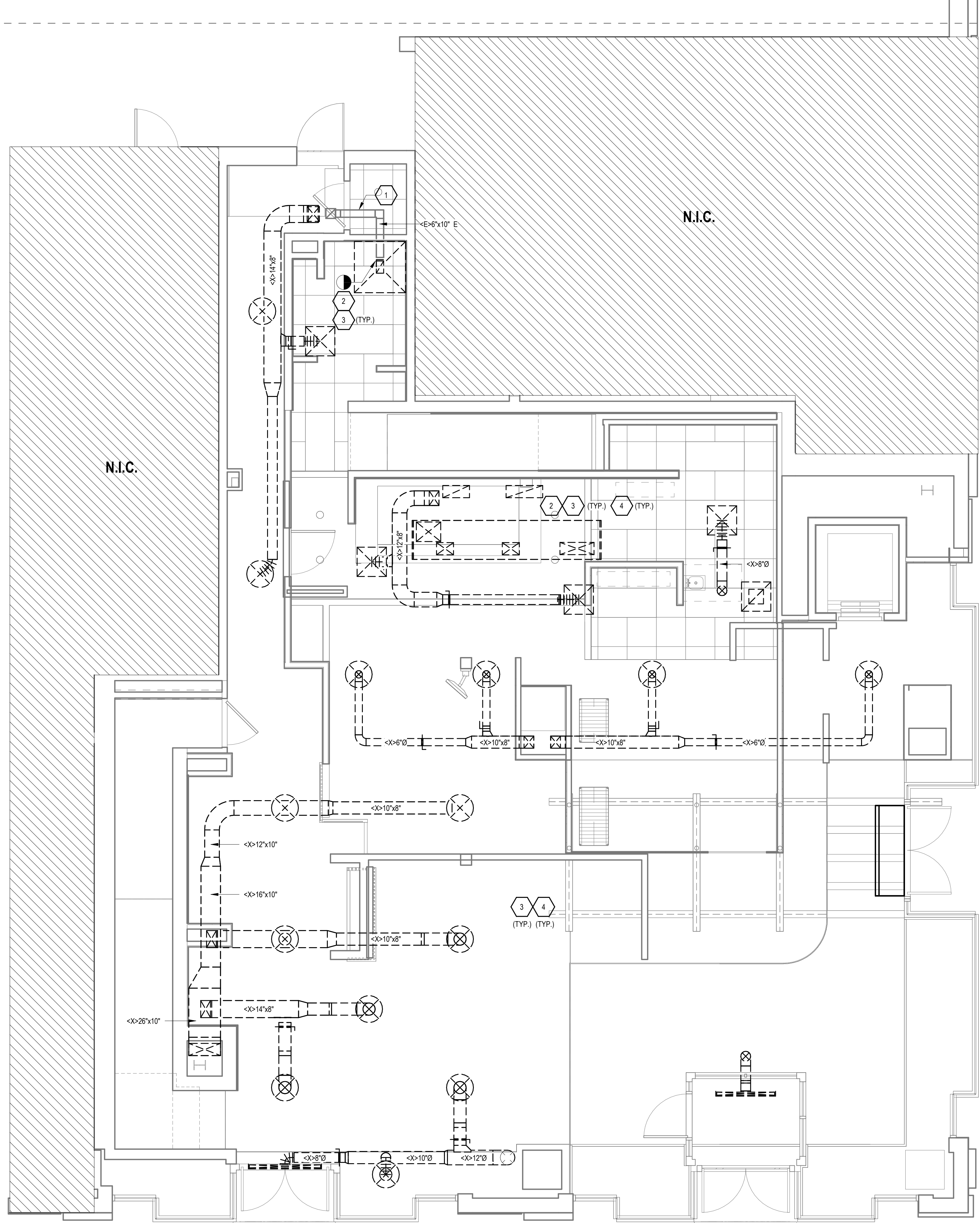
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**KEYNOTES**

- EXISTING DUCTWORK TO REMAIN FOR NEW CONNECTION TO JANITOR'S CLOSET EXHAUST.
- EXISTING KITCHEN EXHAUST HOOD TO BE DEMOLISHED.
- EXISTING MECHANICAL SYSTEM SHALL BE COMPLETELY DEMOLISHED UNLESS NOTED OTHERWISE. ALL MATERIALS AND EQUIPMENT ALONG WITH ITS ASSOCIATED SUPPORTS ARE TO BE DISCONNECTED AND PROPERLY DISPOSED.
- DEMOLISH EXISTING THERMOSTATS AND TEMPERATURE SENSORS. WIRING TO BE REMOVED ENTIRELY BACK TO SOURCE.

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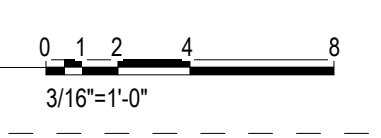
AOR PROJECT NUMBER:  
CAV061

ISSUE	DATE
PERMIT SET	10/09/2024
LANDLORD/BID	11/08/2024
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LEVEL 1 MECHANICAL DEMOLITION PLAN

SHEET:  
**M101**

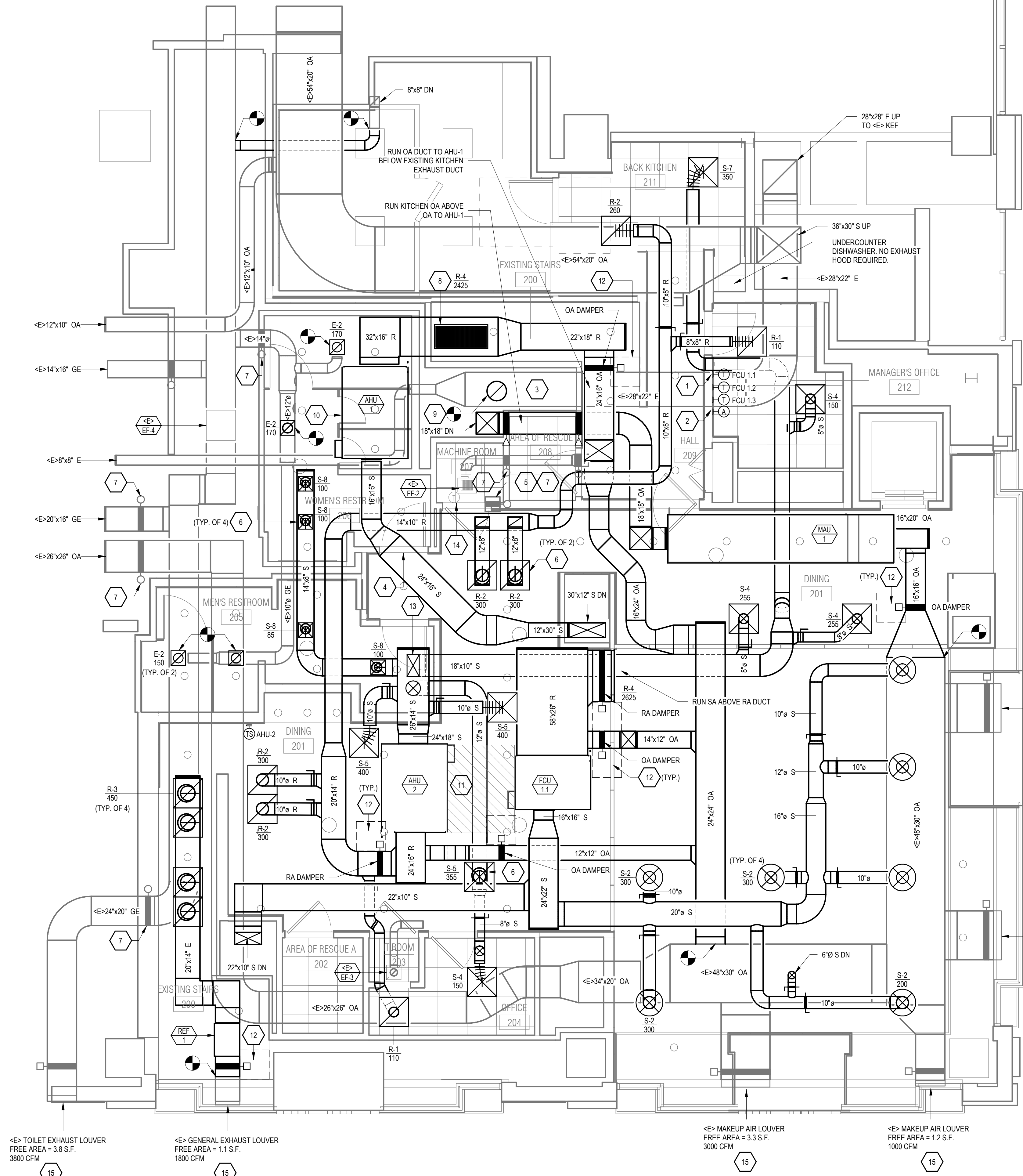
**MECHANICAL LEVEL 1 DEMO PLAN**  
SCALE: 1/4" = 1'-0"







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<E> TOILET EXHAUST LOUVER  
FREE AREA = 3.8 S.F.  
3800 CFM

<E> GENERAL EXHAUST LOUVER  
FREE AREA = 1.1 S.F.  
1800 CFM

<E> MAKEUP AIR LOUVER  
FREE AREA = 3.3 S.F.  
3000 CFM

<E> MAKEUP AIR LOUVER  
FREE AREA = 1.2 S.F.  
1000 CFM

**MECHANICAL LEVEL 1.5 REFLECTED CEILING PLAN**  
SCALE: 1/4" = 1'-0"

0 1 2 4 8  
3/16"=1'-0"

**KEYNOTES**

- 1 PROVIDE HONEYWELL WI-FI VISION PRO 8000 TOUCHSCREEN 7-DAY PROGRAMMABLE THERMOSTAT WITH AUTO-CHANGEOVER AND AUTOMATIC START CAPABILITY. MOUNT THERMOSTAT 48" ABOVE FINISHED FLOOR.
- 2 PROVIDE AUDIOVISUAL REMOTE SMOKE DETECTOR ANNUNCIATOR WITH REMOTE KEY OPERATED RESET FOR SMOKE DETECTOR MOUNTED AT 48" AFF. ALIGN ANNUNCIATOR WITH THERMOSTAT SENSOR WHERE APPLICABLE.
- 3 PROVIDE UL-221 LISTED DOUBLE-WALL GREASE DUCT EQUAL TO CAPTIVEAIRE SYSTEMS MODEL DW-3R OR 32 ROUND 20 GAUGE 430 STAINLESS OUTER SHELL, FROM HOOD COLLAR UP TO EXISTING EXHAUST FAN ON LEVEL 10. INSTALL EXHAUST DUCT PER MANUFACTURER'S INSTRUCTIONS. PROVIDE CLEANOUTS AT EVERY CHANGE OF DIRECTION IN THE DUCT AND/OR EVERY 10 FEET WITH A MINIMUM OF 3 FEET OF CLEARANCE IN FRONT OF CLEANOUT. COORDINATE ROUTING OF DUCTWORK WITH OWNER'S CAPTIVEAIRE REPRESENTATIVE.
- 4 UNDERCUT RESTROOM DOOR 1" FOR TRANSFER AIR (TYP.)
- 5 EXISTING TRANSFER DUCT TO REMAIN.
- 6 INSTALL BALANCING DAMPERS ON TAKE-OFF TO DIFFUSER.
- 7 EXISTING FIRE/SMOKE DAMPER TO REMAIN.
- 8 INSTALL RA MODULATING DAMPER ON DUCT CONNECTION TO R-4 GRILLE.
- 9 16"Ø DN TO KITCHEN HOOD.
- 10 PROVIDE MIN. (2) 36"x36" ACCESS PANELS IN CEILING OF TOILET TO PROVIDE ACCESS TO THE COIL SIDE OF THE AHU
- 11 SHARED ACCESS SPACE FOR AHU COILS. PROVIDE (2) 36"x26" ACCESS PANELS TO ACCESS COILS.
- 12 PROVIDE 24"x24" ACCESS PANELS FOR AIR DAMPERS (TYP.)
- 13 TAKE-OFFS AT TOP OF SA MAIN. INSTALL SA DUCT HIGH AND TIGHT TO CEILING DECK TO ALLOW CLEAR ACCESS TO FCU-1.1 AND AHU-2.
- 14 DEMOLISH EXISTING THERMOSTATS AND TEMPERATURE SENSORS. WIRING TO BE REMOVED ENTIRELY BACK TO SOURCE.
- 15 ENSURE ALL EXISTING LOUVERS ARE CLEANED FOR DEBRIS AND OTHER OBSTRUCTIONS TO ENSURE PROPER AIRFLOW.

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STREETERVILLE, ILLINOIS, 60611  
FOR CAVA  
14 Ridge Square NW #500, WASHINGTON, DC 20016

ADR PROJECT NUMBER:  
CAV061

ISSUE	DATE
PERMIT SET	10/09/2024
LANDLORD/BID	11/08/2024
CONSTRUCTION SET	01/29/2025

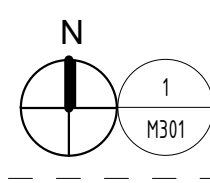
MECHANICAL LEVEL 1.5 PLAN

SHEET:

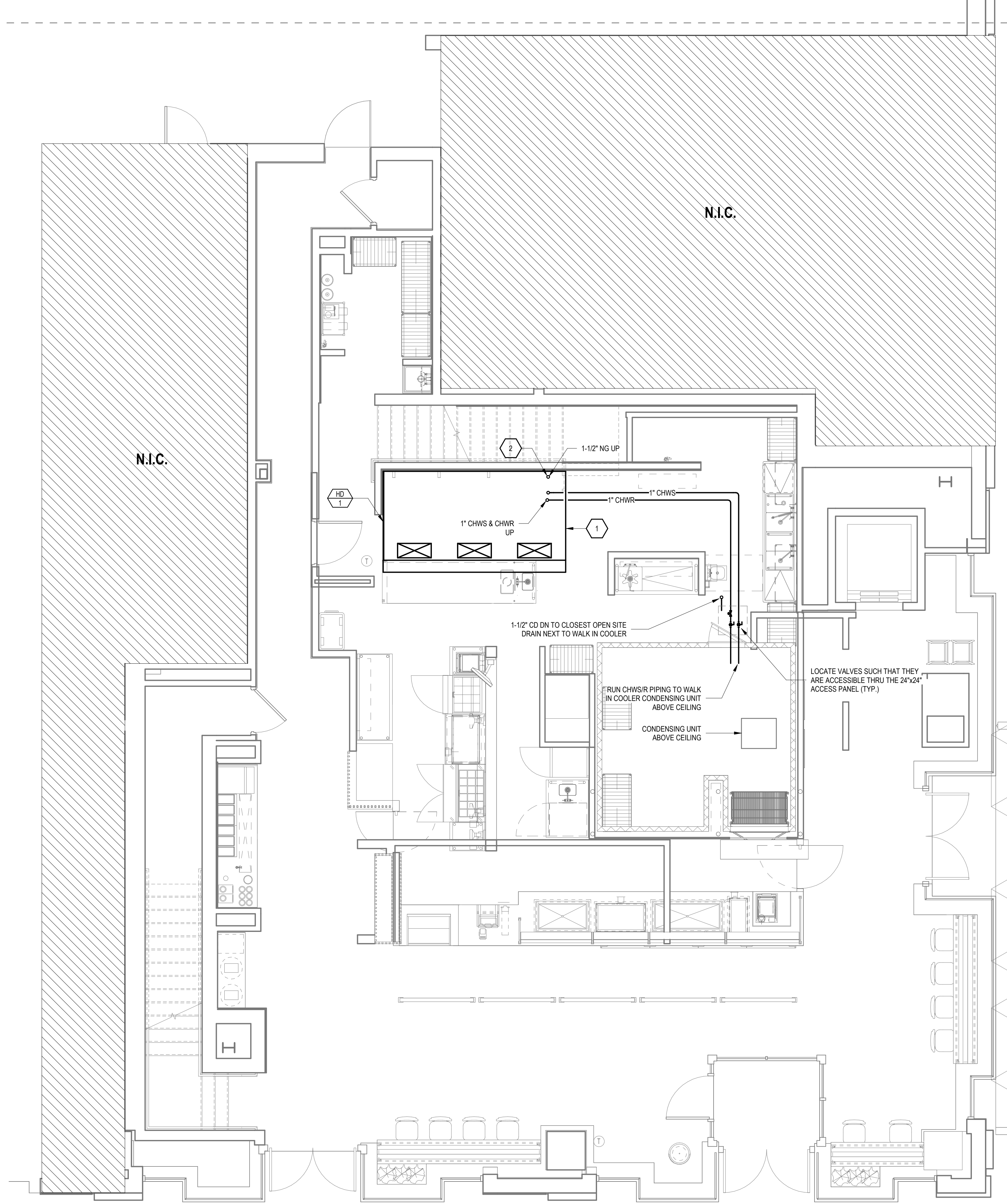
**M202**



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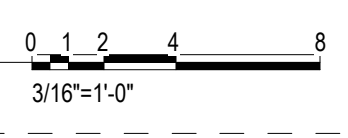


**MECHANICAL PIPING LEVEL 1 PLAN**  
SCALE: 1/4" = 1'-0"



**KEYNOTES**

- 1 PROVIDE SHUTOFF VALVE, AND EMERGENCY SOLENOID SHUTOFF FOR NATURAL GAS PIPING SERVING APPLIANCES UNDER HOOD. COORDINATE EMERGENCY SHUTOFF CONNECTION WITH ELECTRICAL CONTRACTOR.
- 2 1-1/2" NG CONTINUATION TO KITCHEN EQUIPMENT. REFER TO KITCHEN PLANS FOR EQUIPMENT CONNECTION SIZES.



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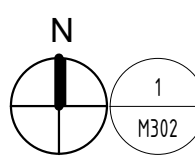
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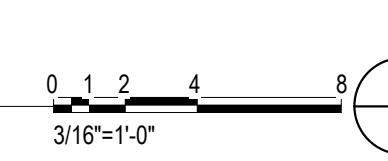
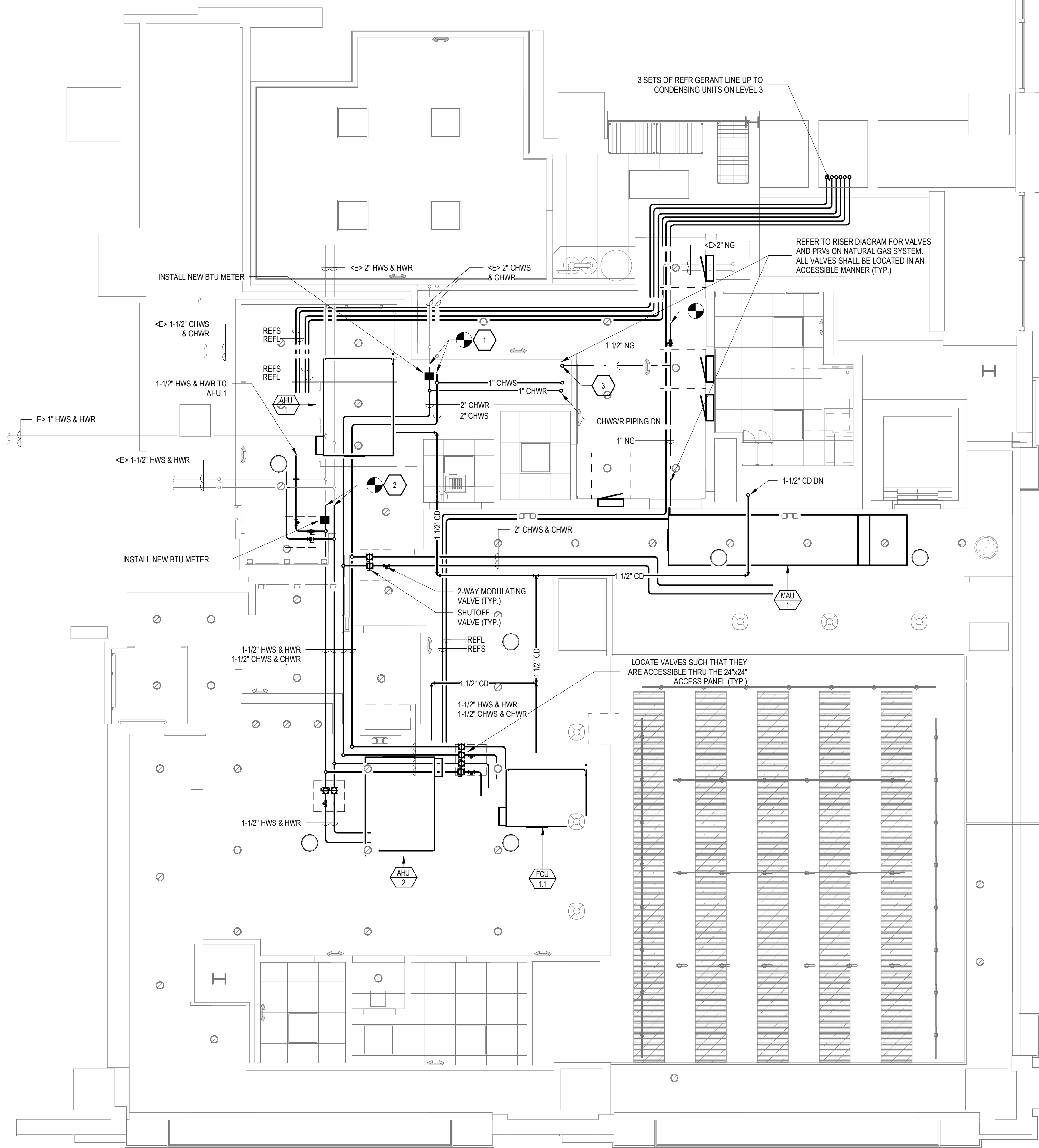
LEVEL 1 MECHANICAL PIPING PLAN

SHEET:  
**M301**

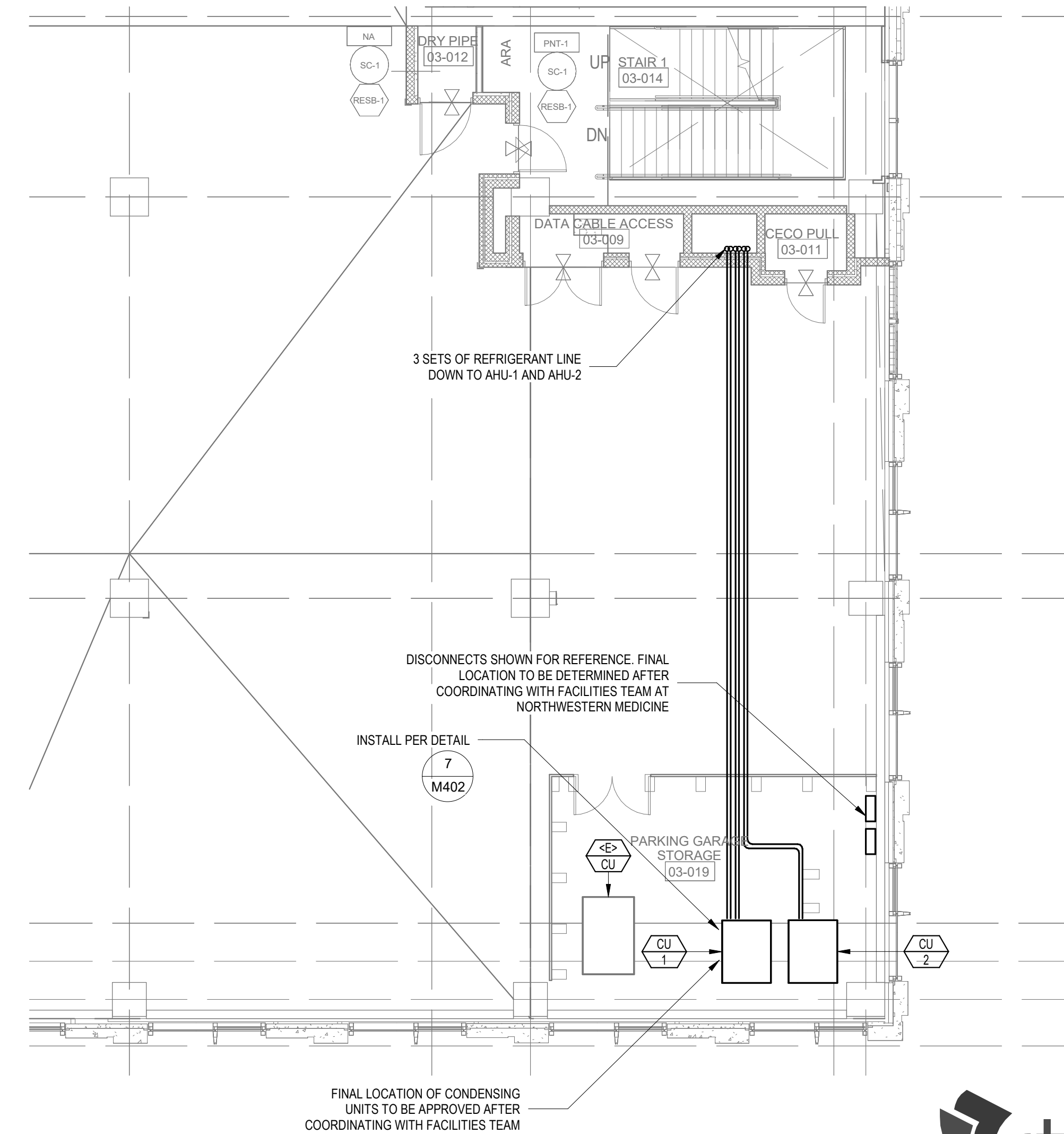
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**MECHANICAL PIPING LEVEL 1.5 PLAN**  
SCALE: 1/4" = 1'-0"

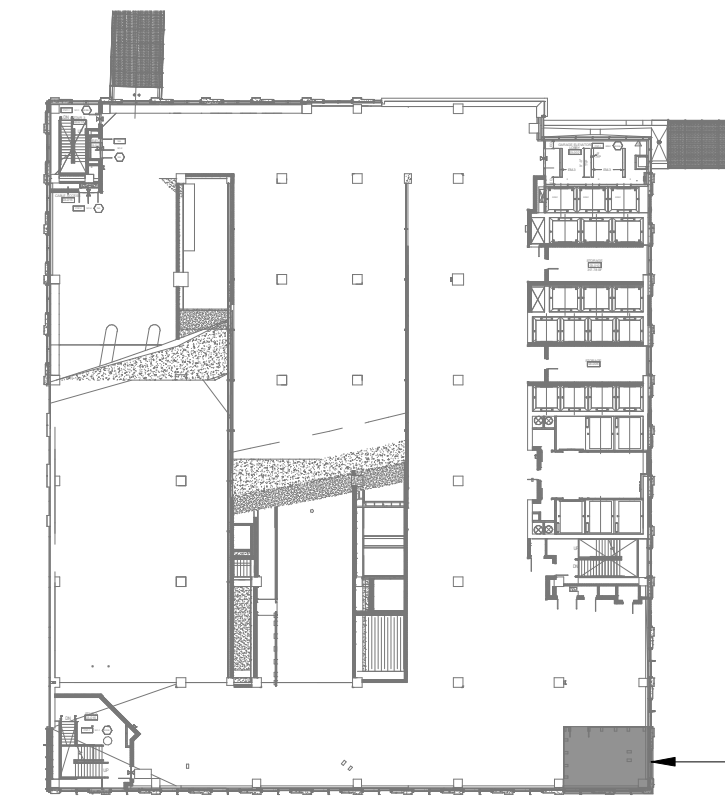


**MECHANICAL PIPING LEVEL 3 PLAN**  
SCALE: 1/8" = 1'-0"



**KEYNOTES**

- CONNECT NEW 2" CHWS & CHWR PIPING FROM EXISTING PIPING. VERIFY THAT SHUT-OFF VALVES ARE INSTALLED.
- CONNECT NEW 1-1/2" HWS & HWR PIPING FROM EXISTING PIPING. VERIFY THAT SHUT-OFF VALVES ARE INSTALLED.
- 1-1/2" NG DN TO KITCHEN EQUIPMENT



KEYPLAN



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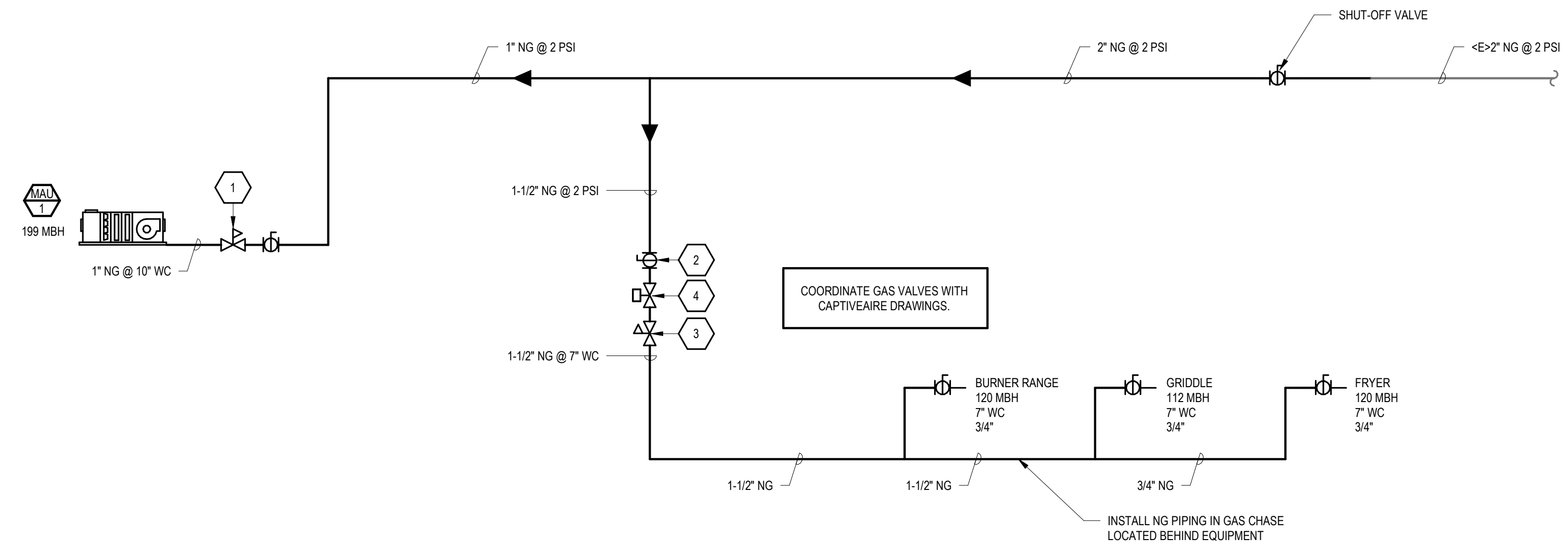
ISSUE	DATE
PERMIT SET	10/09/2024
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CONSTRUCTION SET	01/29/2025

LEVEL 1.5 MECHANICAL PIPING PLAN

SHEET:

**M302**

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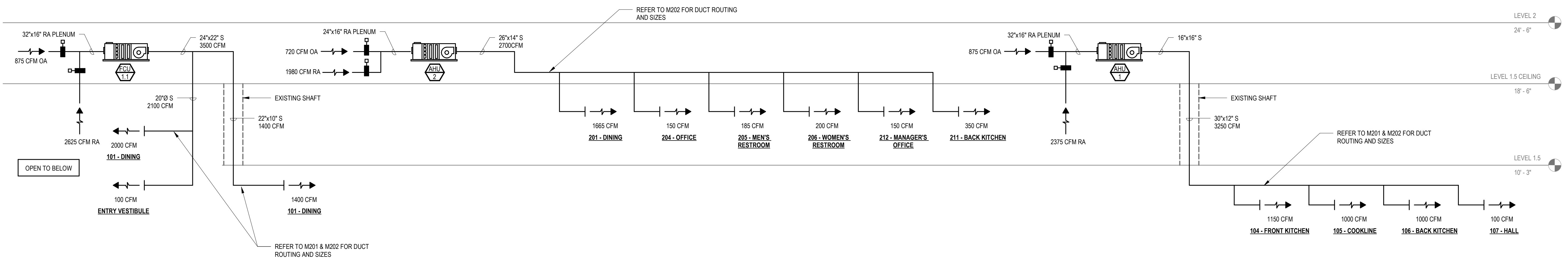


**KEYNOTES**

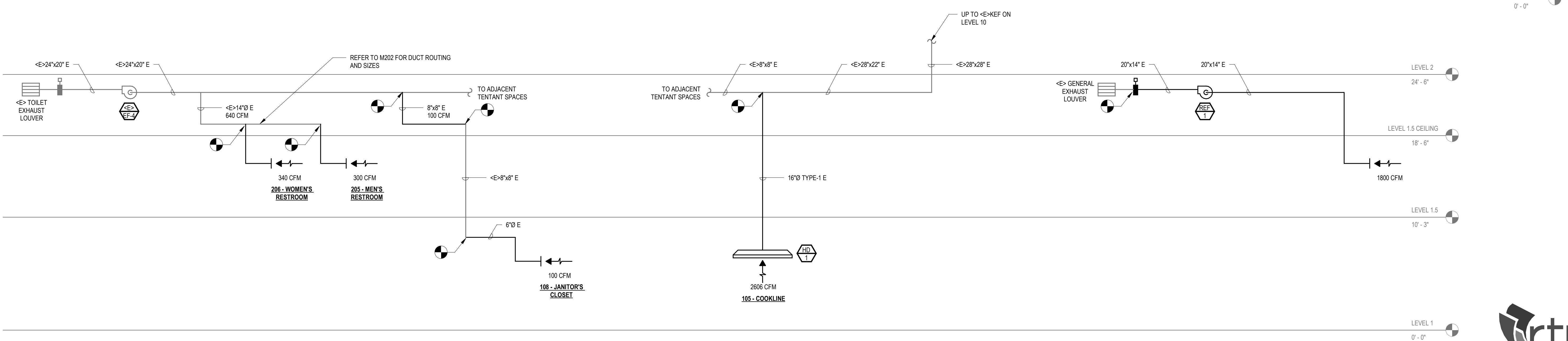
1. INSTALL PRESSURE REDUCING VALVE SIMILAR TO ACTARIS B34SR 5/8" X 3/4" ORIFICE FOR KMAU-1. OUTLET PRESSURE TO BE SET AT 10" WC. PRV ASSEMBLY TO BE EQUIPPED WITH A SHUTOFF VALVE.
2. 1-1/2" NG DN TO MANIFOLD BOX. SHUTOFF VALVE TO ISOLATE GAS EQUIPMENT TO BE INSTALLED IN MANIFOLD BOX AND SHALL BE LOCATED IN AN ACCESSIBLE MANNER.
3. INSTALL VENT-LESS PRESSURE REDUCING VALVE. TURN DOWN 2 PSI NG TO 7" W.C. INSTALL BALL VALVE UPSTREAM OF PRV TO ISOLATE GAS EQUIPMENT.
4. INSTALL EMERGENCY SOLENOID VALVE FOR EMERGENCY CUTOFF.

NATURAL GAS LOADS				
EQUIPMENT / TAG	INDIVIDUAL LOAD (CFH)	QTY.	PRESSURE	PIPE SIZE
FRYER	120 MBH	1	7" WC	3/4"
GRIDDLE	112 MBH	1	7" WC	3/4"
BURNER RANGE	120 MBH	1	7" WC	3/4"
MAU-1	199 MBH	1	10" WC	1"
TOTAL GAS LOAD = 551 CFH @ 2 PSI				

1 MECHANICAL RISERS - NATURAL GAS  
SCALE: N.T.S.



REFER TO M201 & M202 FOR DUCT ROUTING AND SIZES



2 MECHANICAL RISERS - AIR SIDE  
SCALE: N.T.S.

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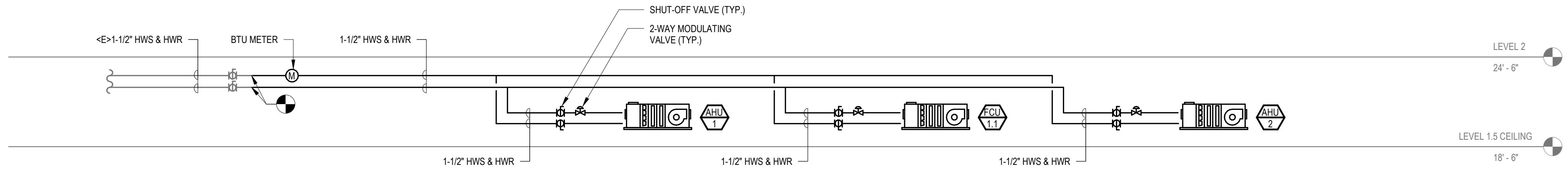
MECHANICAL RISERS

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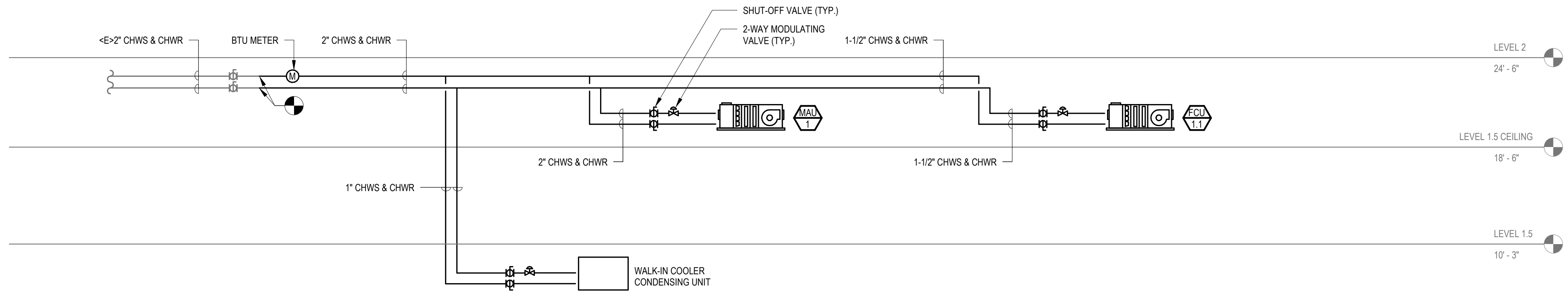
**M400**



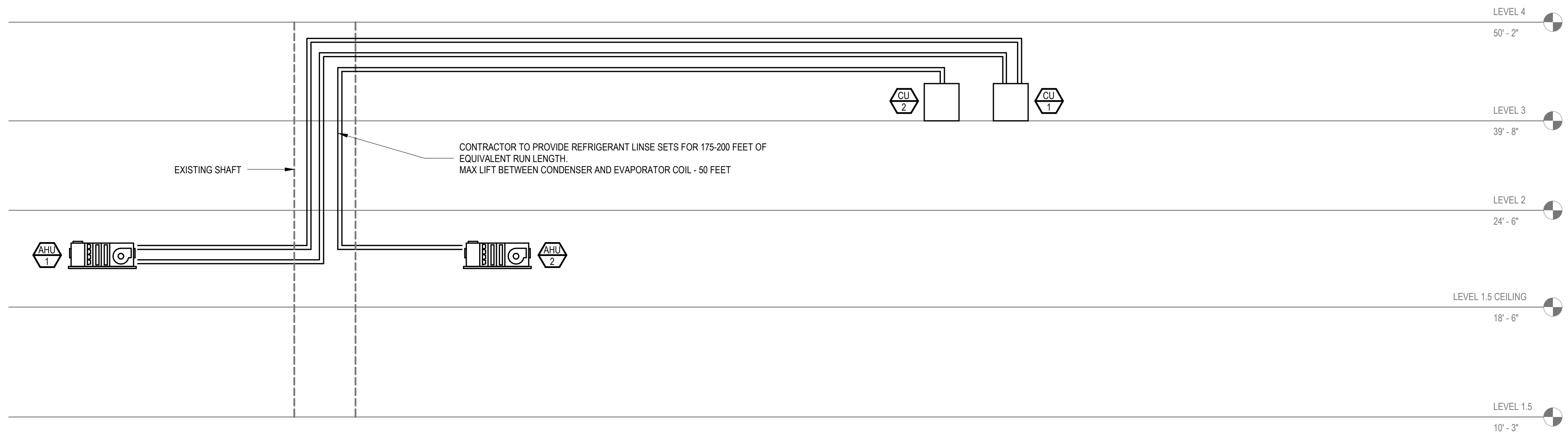
2800 156th Ave SE | Suite 115 Bellevue, WA 98007  
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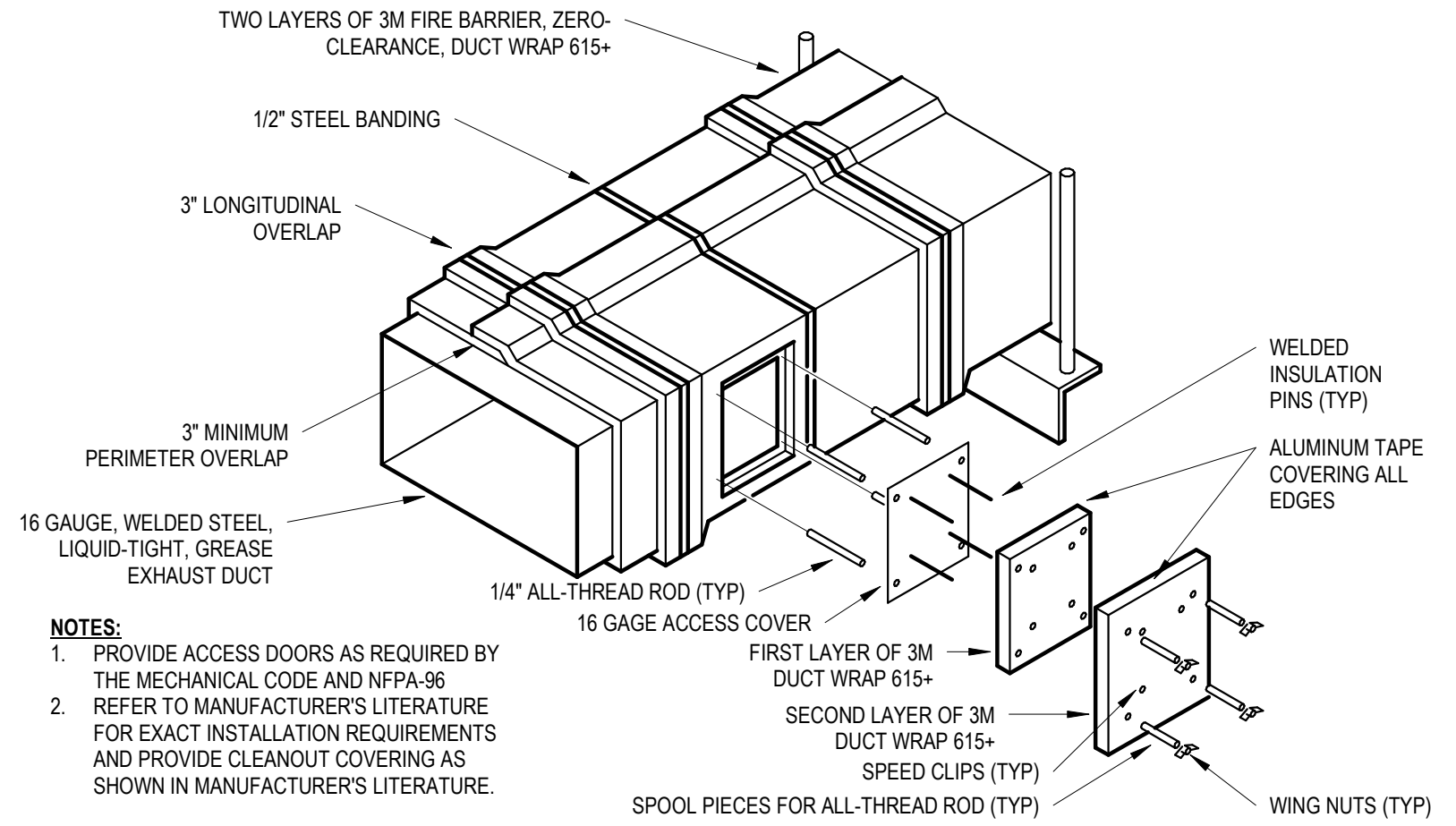
① MECHANICAL RISERS - HEATING HOT WATER  
SCALE: N.T.S.



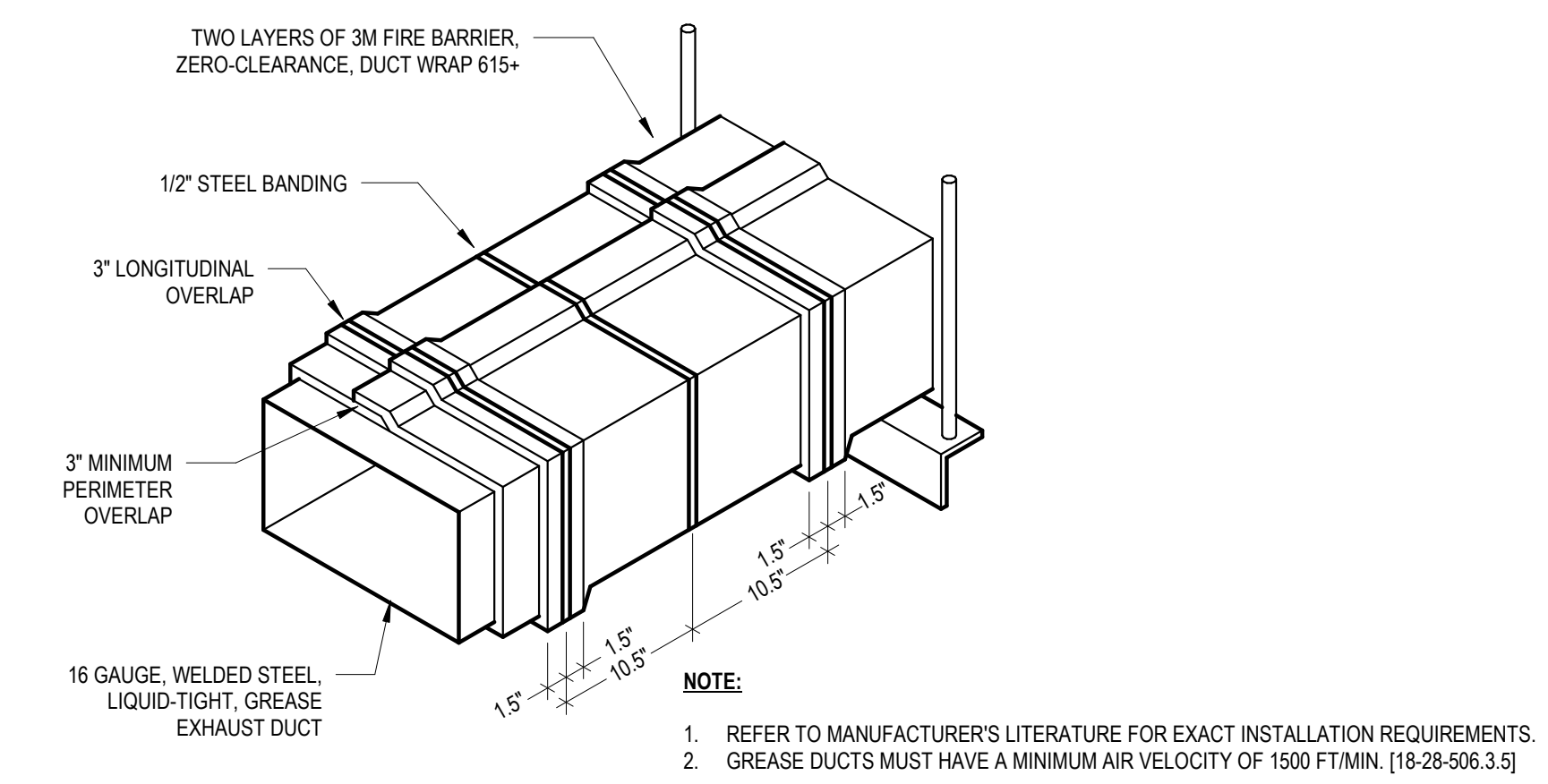
② MECHANICAL RISERS - CHILLED WATER  
SCALE: N.T.S.



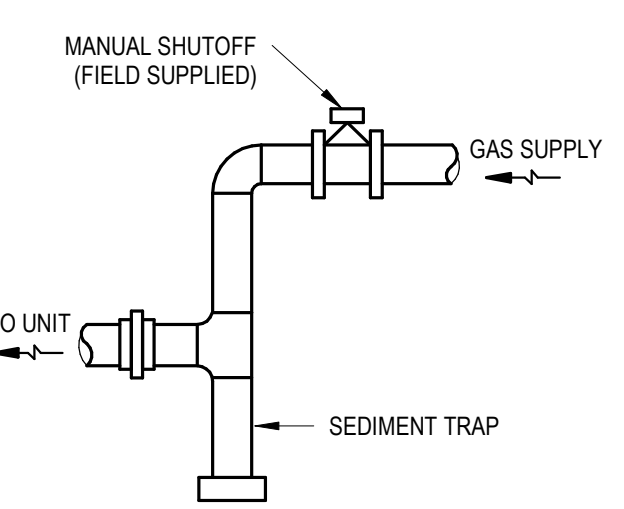
③ MECHANICAL RISERS - REFRIGERANT PIPING  
SCALE: N.T.S.



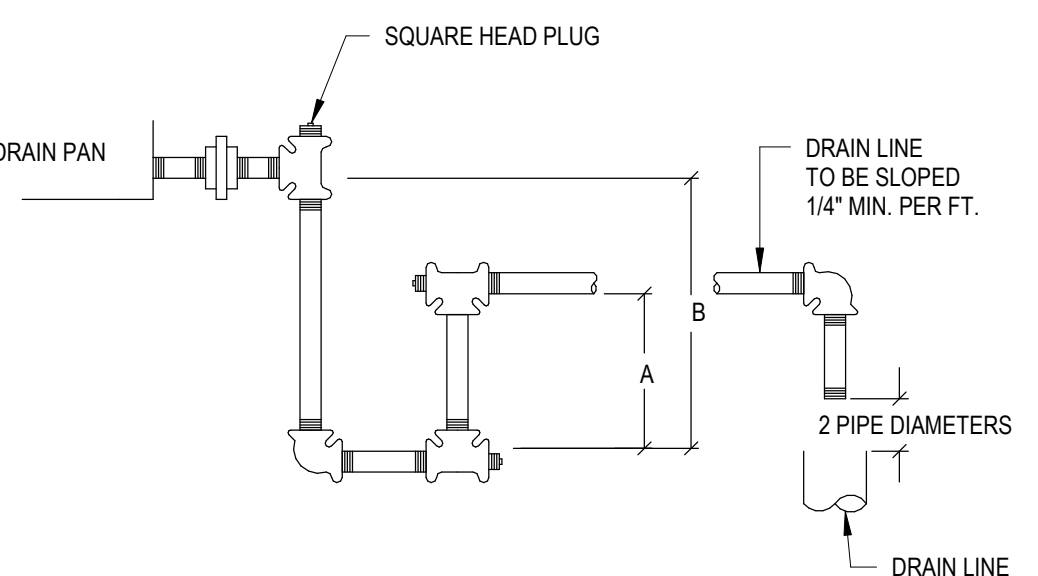
1 GREASE DUCT AND WRTAP DETAILS  
NOT TO SCALE



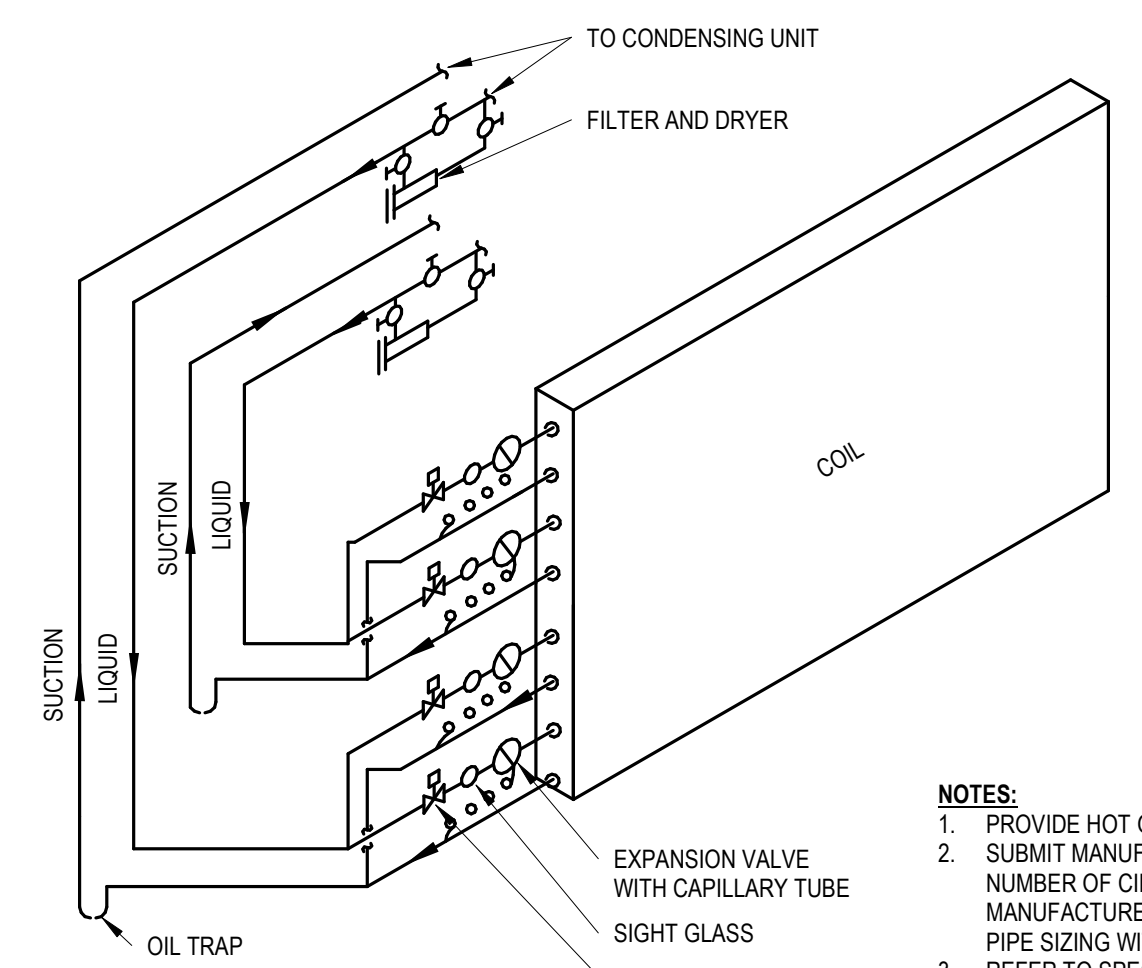
2 CHICAGO SPLIT SYSTEMDX PIPING DETAIL  
NOT TO SCALE



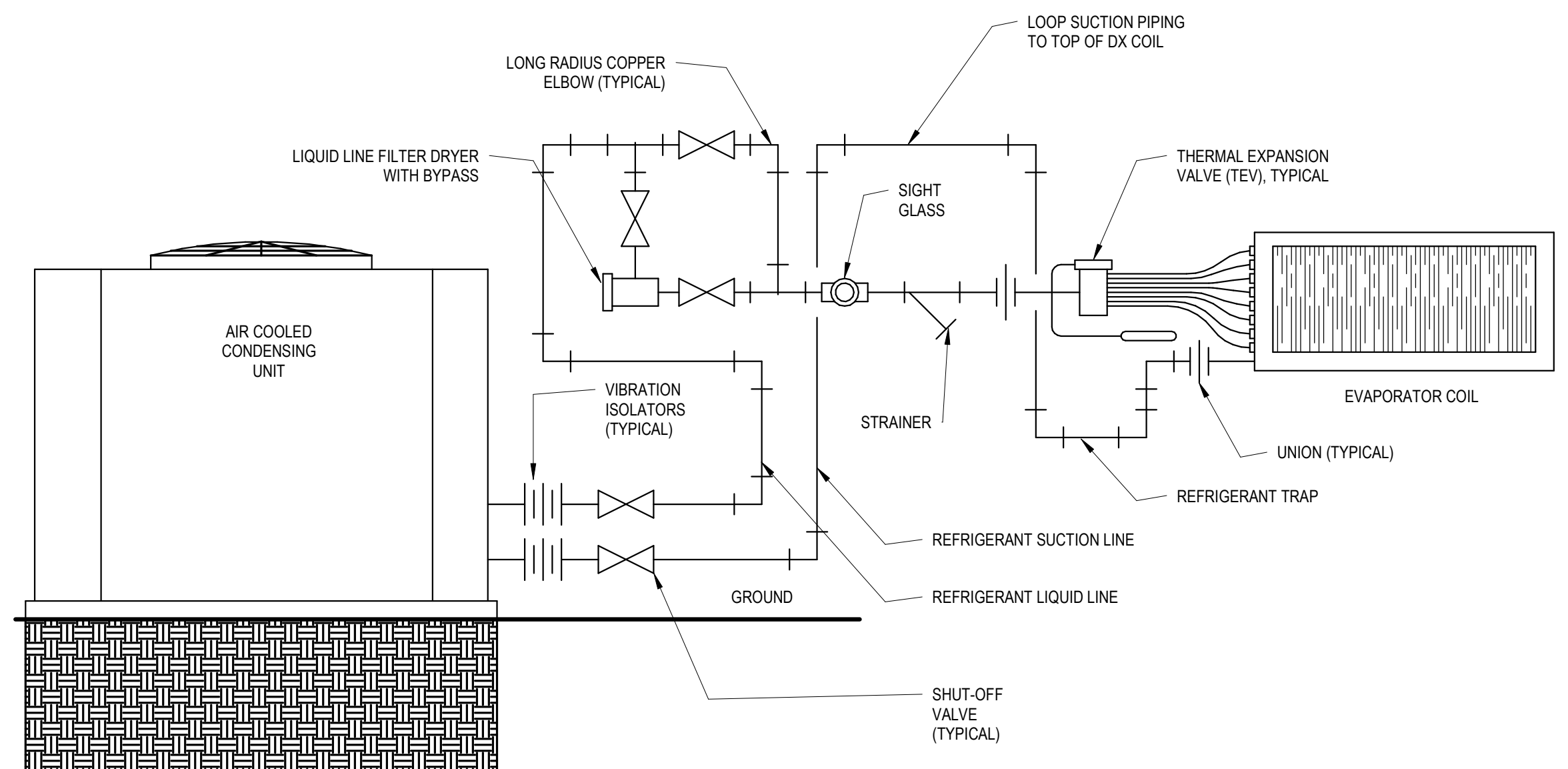
3 CONDENSATE DRAIN TRAP PIPING DETAIL  
NOT TO SCALE



4 CEILING SUSPENDED EQUIPMENT DETAIL  
NOT TO SCALE



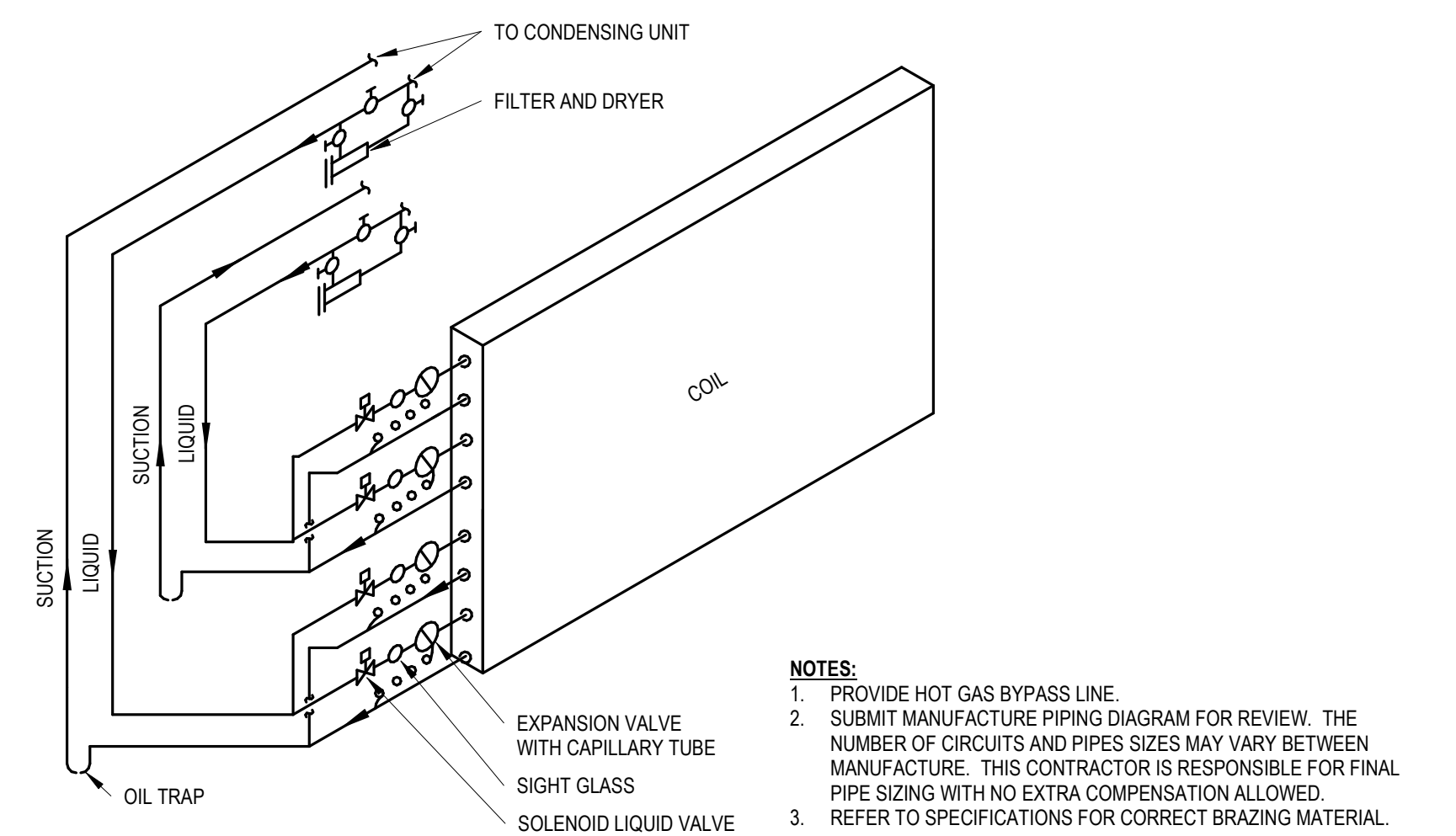
5 EXHAUST OR RETURN BRANCH DUCTWORK DETAIL  
NOT TO SCALE



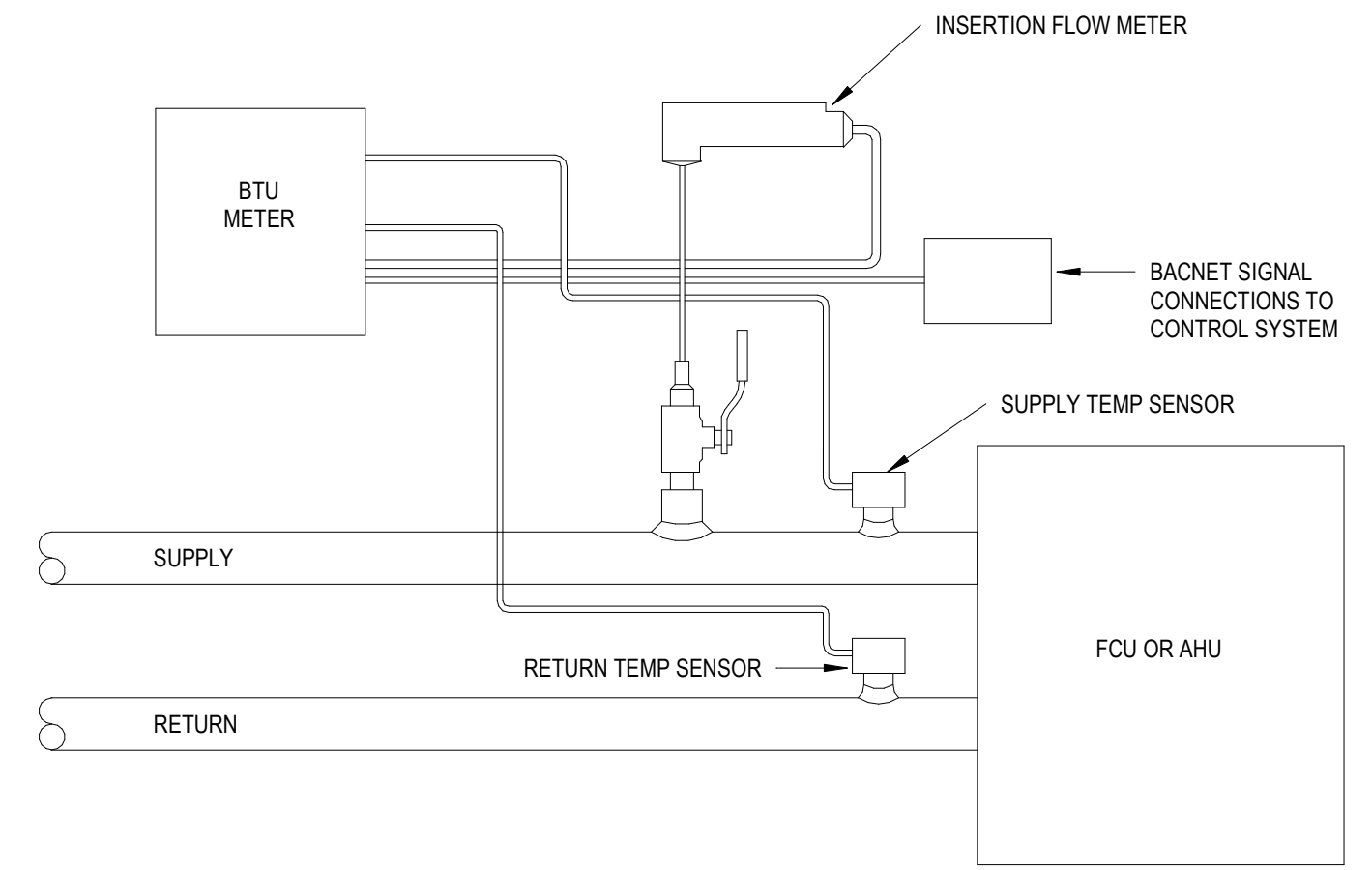
6 HORIZONTAL AHU INSTALLATION DETAIL  
NOT TO SCALE

- NOTES:
1. SUCTION LINE TRAP TO BE EXTENDED ABOVE EVAPORATOR.
  2. CONTRACTOR TO VERIFY PIPE SIZES REQUIRED WITH EQUIPMENT SUPPLIER.
  3. PITCH SUCTION LINE TOWARD CONDENSING UNITS.
  4. SIGHT GLASS TO BE FULL LINE SIZE AND INSTALLED IN THE MAIN LIQUID LINE.
  5. LOCATE TEV BULB 45° ABOVE BOTTOM OF PIPE.

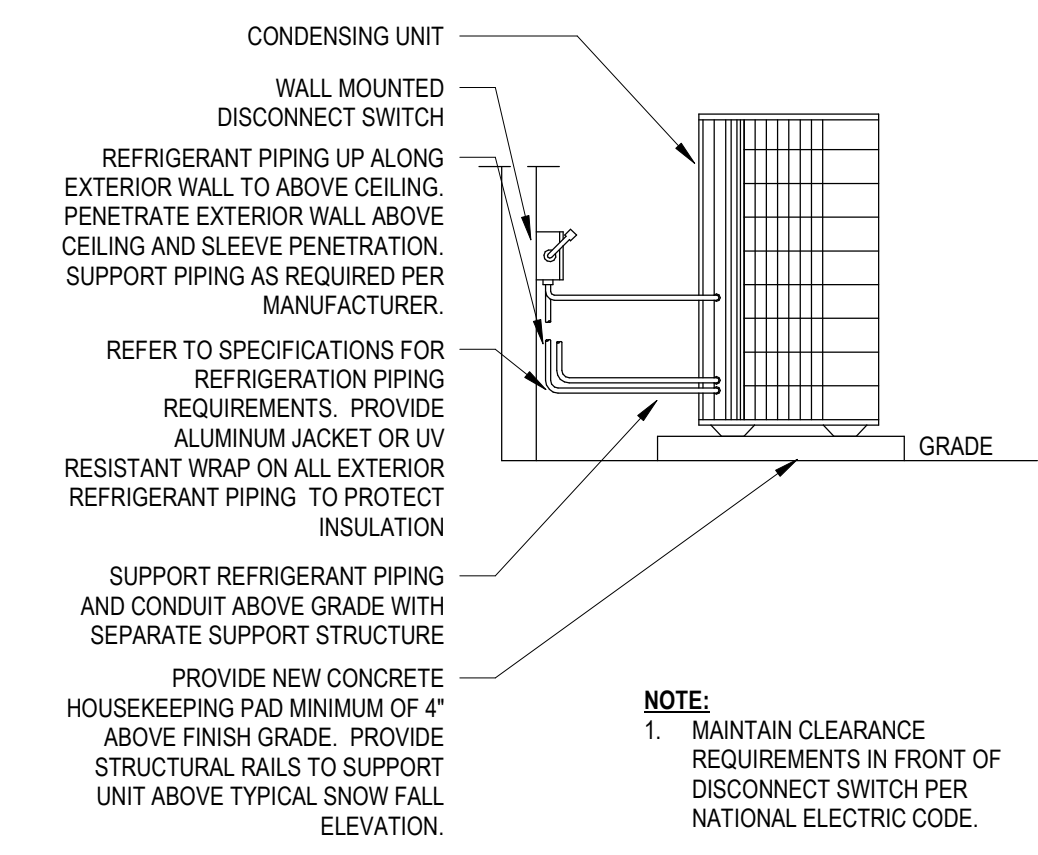
10 DX SINGLE COIL DUAL CIRCUIT CONNECTION DETAIL  
NOT TO SCALE



- NOTES:
1. PROVIDE HOT GAS BYPASS LINE.
  2. SUBMIT MANUFACTURE PIPING DIAGRAM FOR REVIEW. THE NUMBER OF CIRCUITS AND PIPES SIZES MAY VARY BETWEEN MANUFACTURE. THIS CONTRACTOR IS RESPONSIBLE FOR FINAL PIPE SIZING WITH NO EXTRA COMPENSATION ALLOWED.
  3. REFER TO SPECIFICATIONS FOR CORRECT BRAZING MATERIAL.

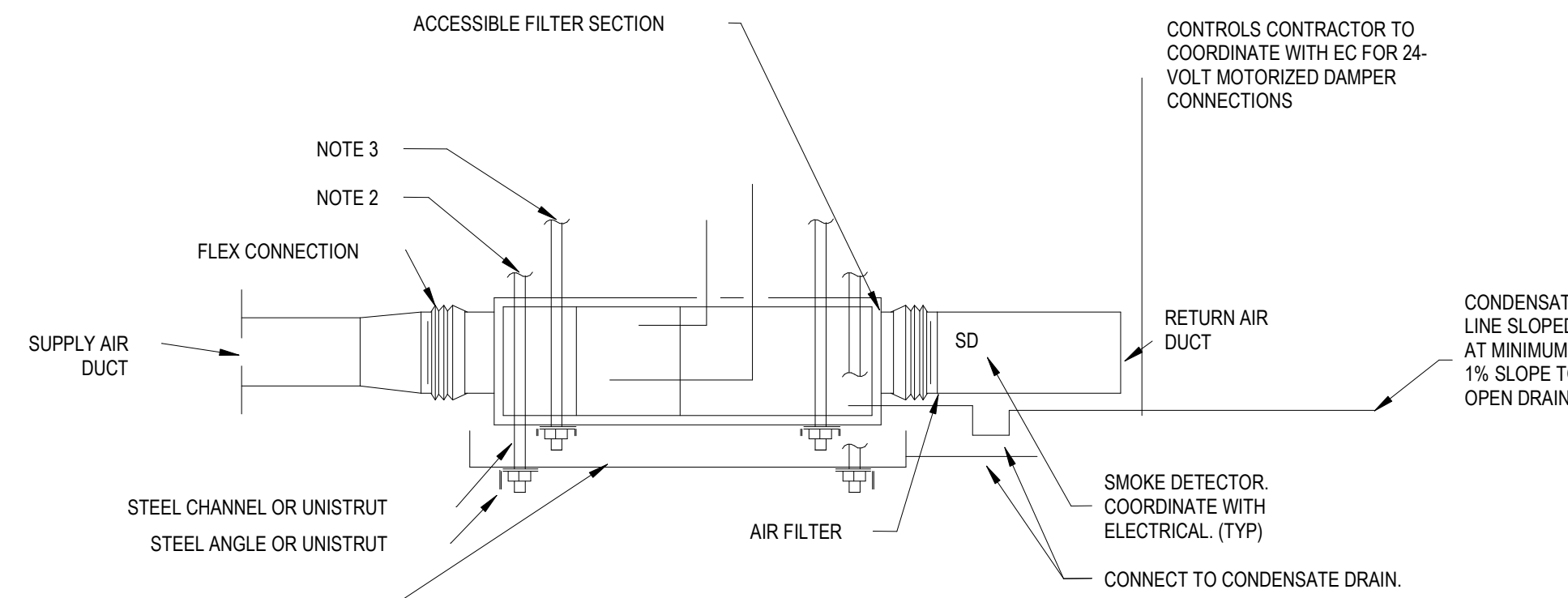


8 BTU METER DETAIL  
NOT TO SCALE



7 CONDENSING UNIT DETAIL  
NOT TO SCALE

- NOTE:
1. MAINTAIN CLEARANCE REQUIREMENTS IN FRONT OF DISCONNECT SWITCH PER NATIONAL ELECTRIC CODE.



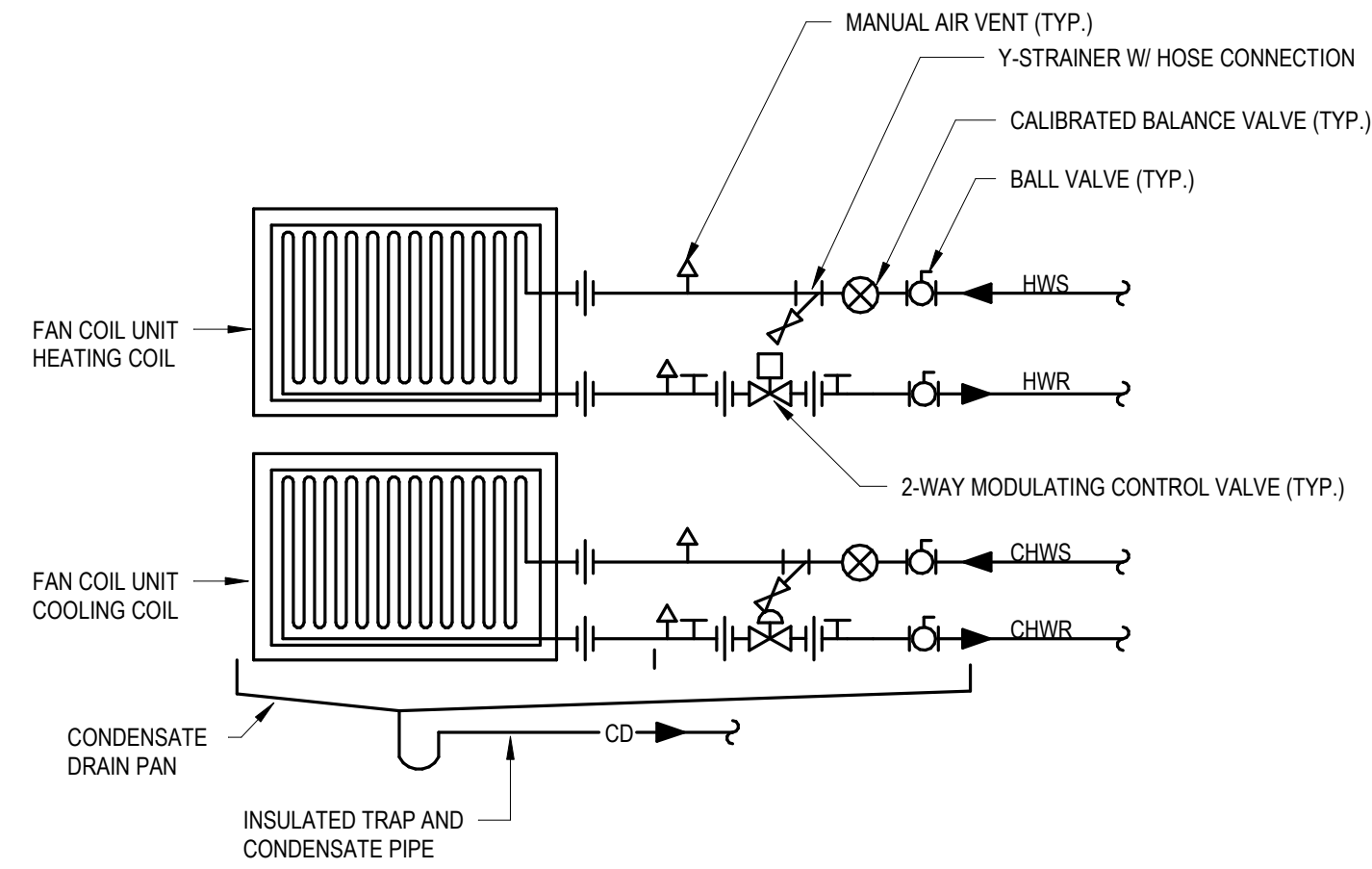
- NOTES:
1. PROVIDE MISCELLANEOUS GALVANIZED SUPPORT ANGLE OR CHANNEL AS REQUIRED TO BRIDGE STRUCTURE.
  2. SUSPEND DRAIN PAN WITH SUPPORT RODS WHEN ATTACHED TO BUILDING STRUCTURE.
  3. ATTACH TO STRUCTURE WITH VIBRATION ISOLATION.

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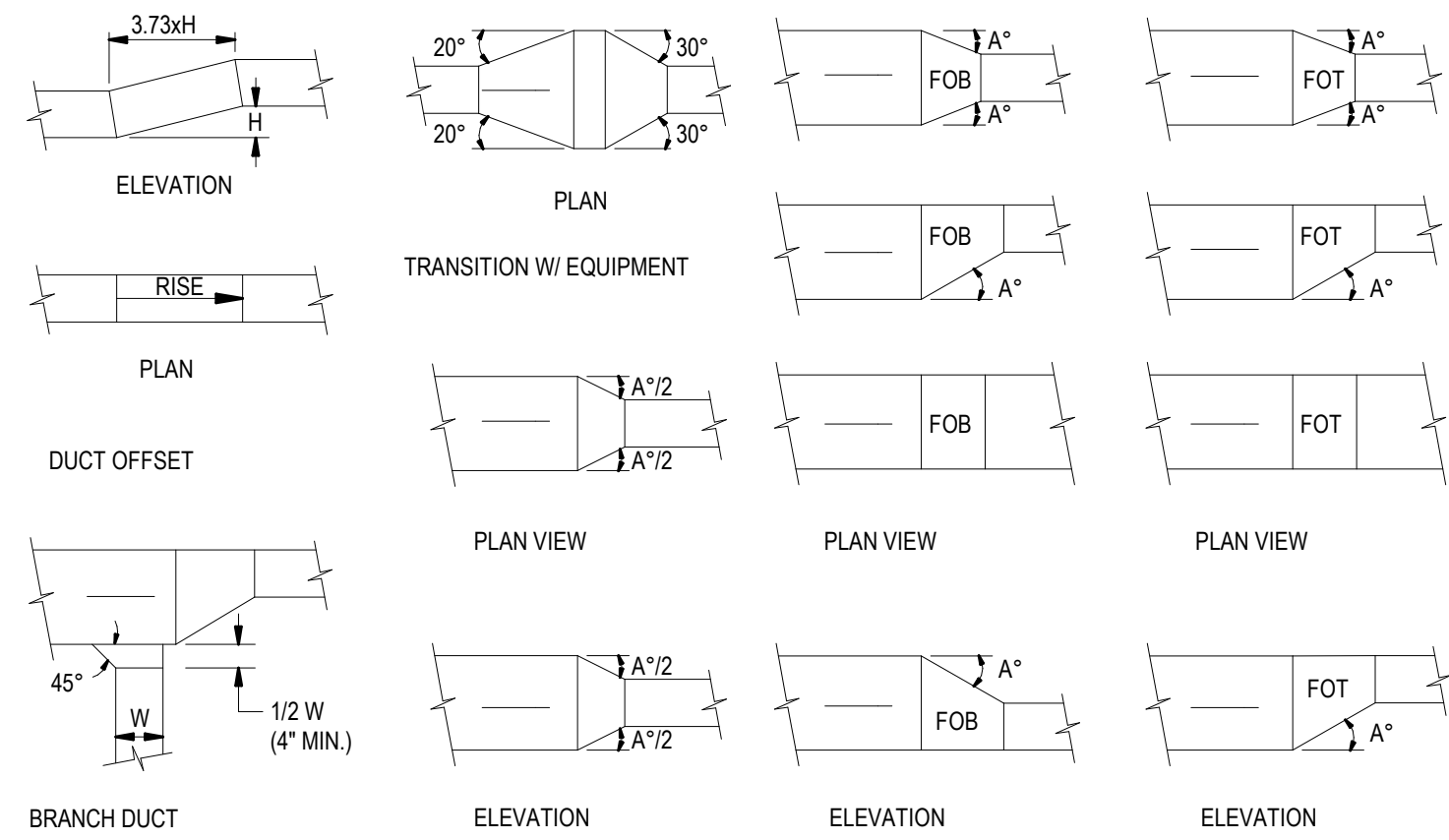
ISSUE	DATE
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MECHANICAL DETAILS

SHEET:

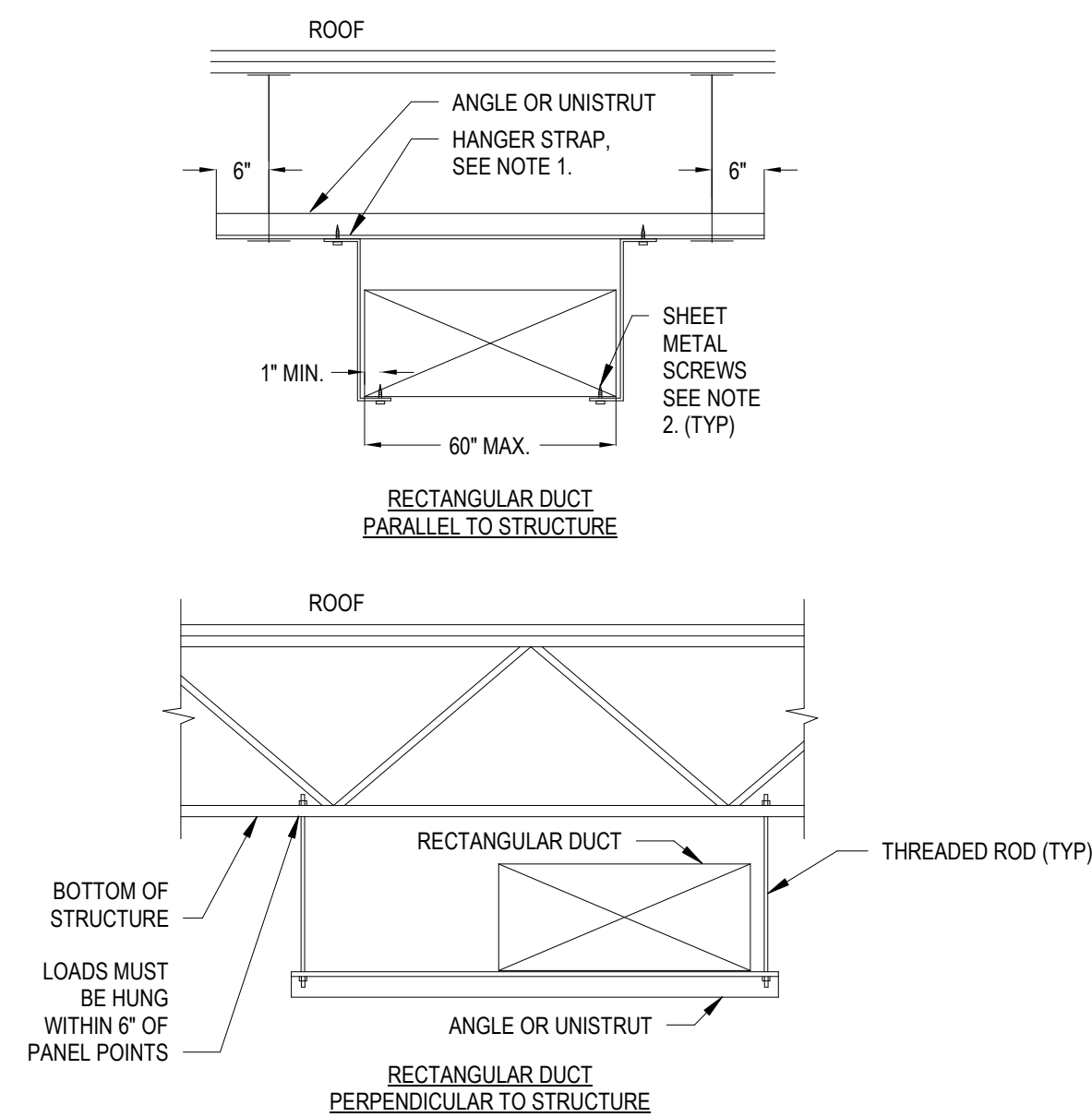


1 4-PIPE FAN COIL PIPING DETAIL  
SCALE: N.T.S.



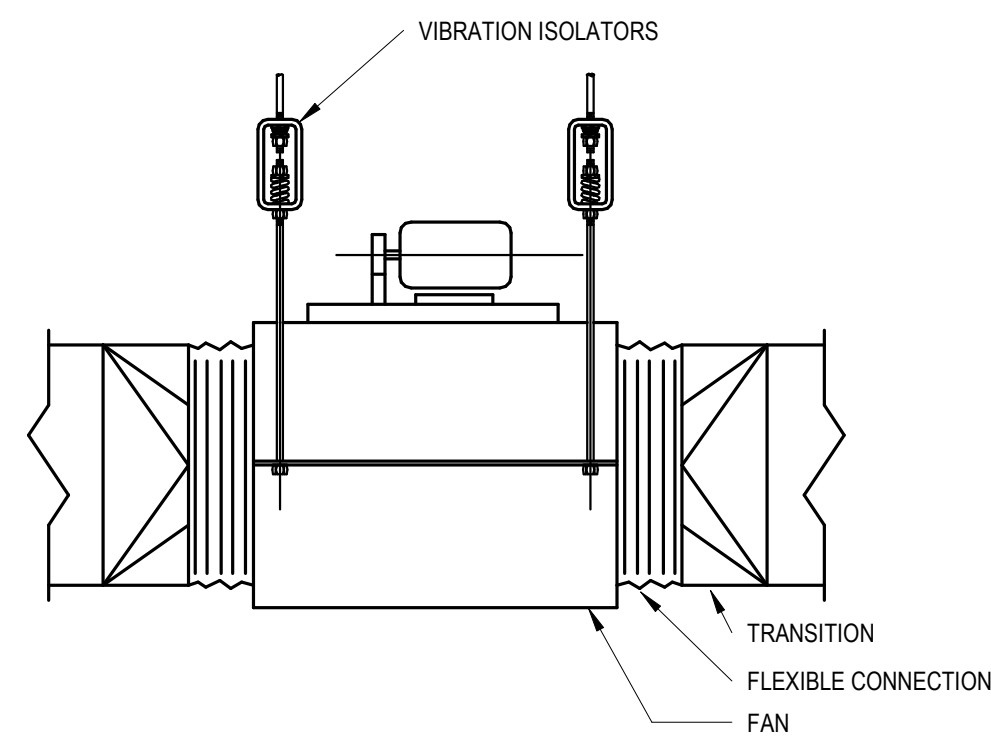
NOTES: 1) ANGLE A = 30° WHEN AIR FLOWS IN DIRECTION OF ARROW (SUPPLY AIR).  
2) ANGLE A = 20° WHEN AIR FLOWS IN OPPOSITE DIRECTION OF ARROW (RETURN OR EXHAUST).

4 LOW VELOCITY DUCT FITTINGS DETAIL  
SCALE: N.T.S.

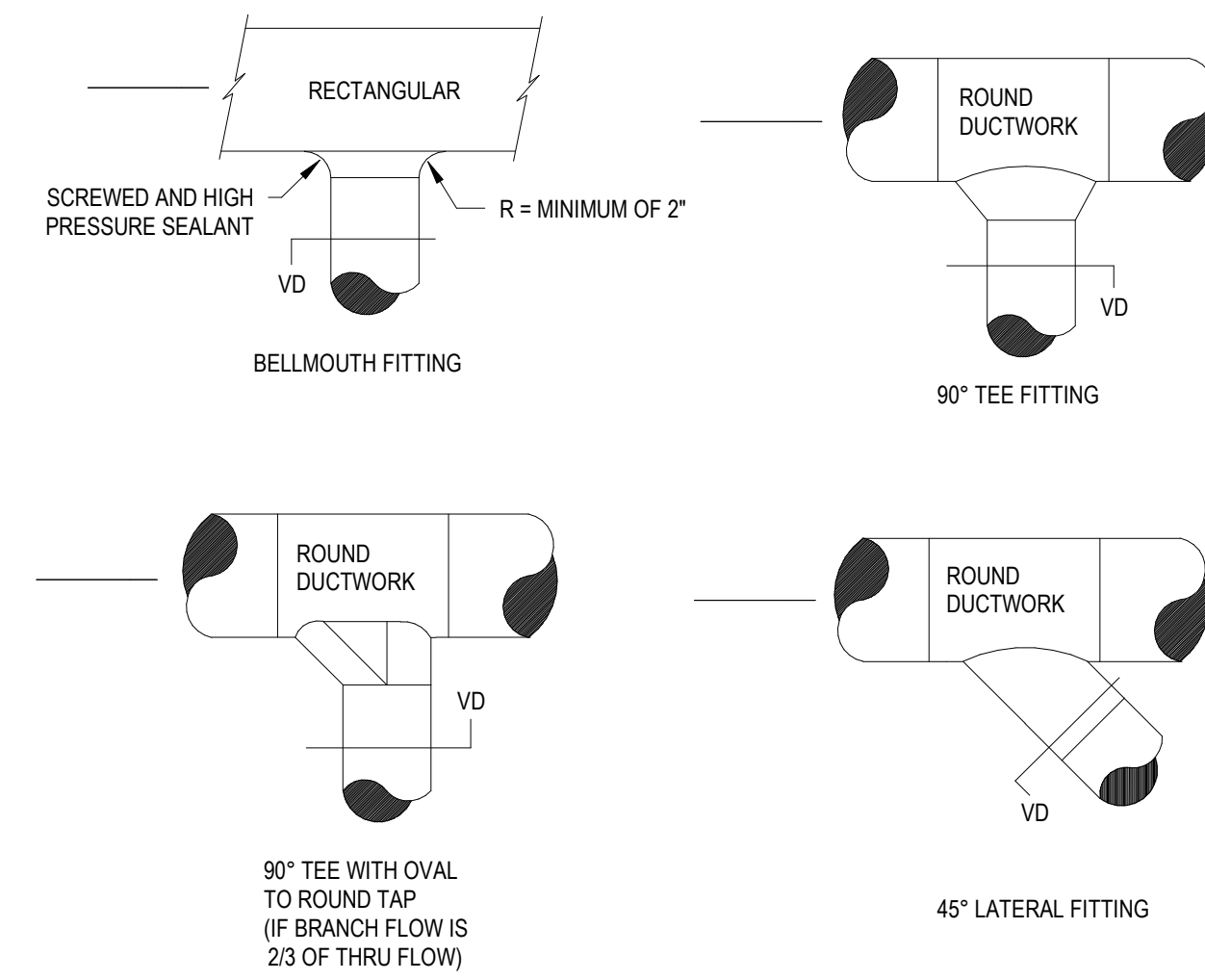


NOTE:  
1. USE THREADED ROD FOR ALL DUCTS LARGER THAN 60" WIDE.  
2. SHEET METAL SCREWS MAY BE OMITTED IF HANGER STRAP IS CONTINUOUS AND LOOPS UNDER ENTIRE DUCT.

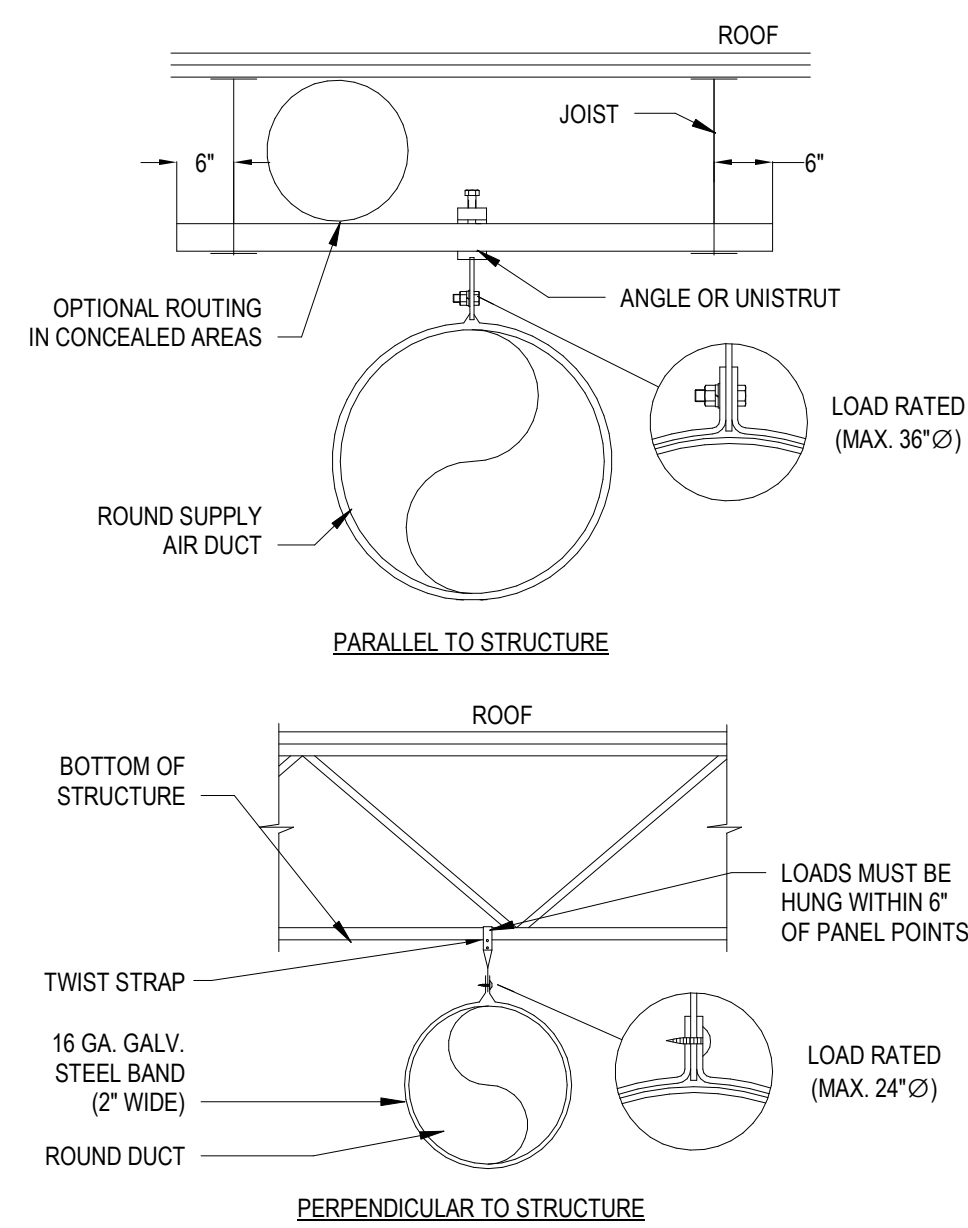
6 RECTANGULAR DUCT SUPPORT FROM CEILING STRUCTURE/JOISTS DETAIL  
SCALE: N.T.S.



9 INLINE EXHAUST FAN DETAIL  
SCALE: N.T.S.

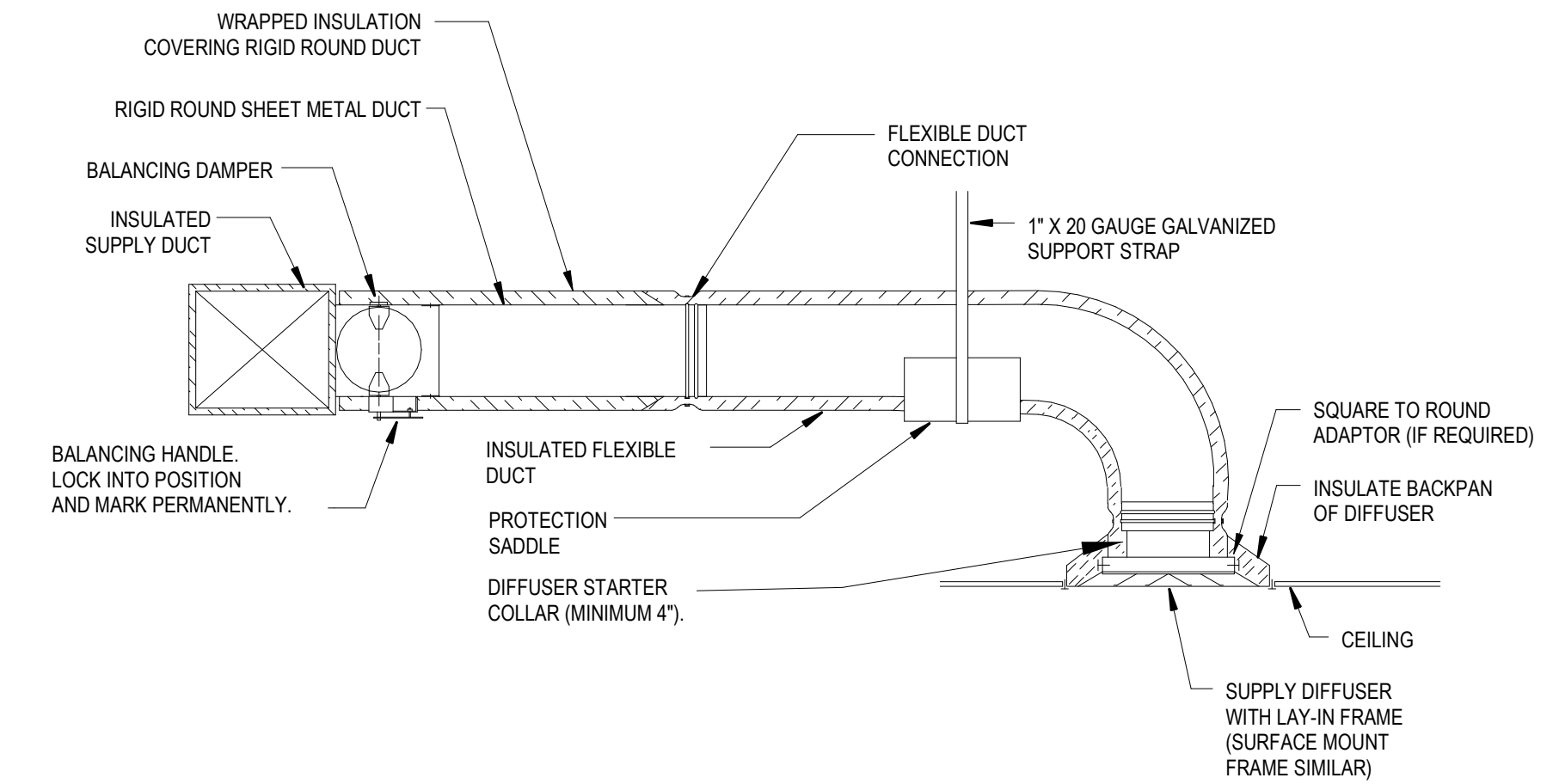


5 ROUND DUCTWORK FITTINGS  
SCALE: N.T.S.



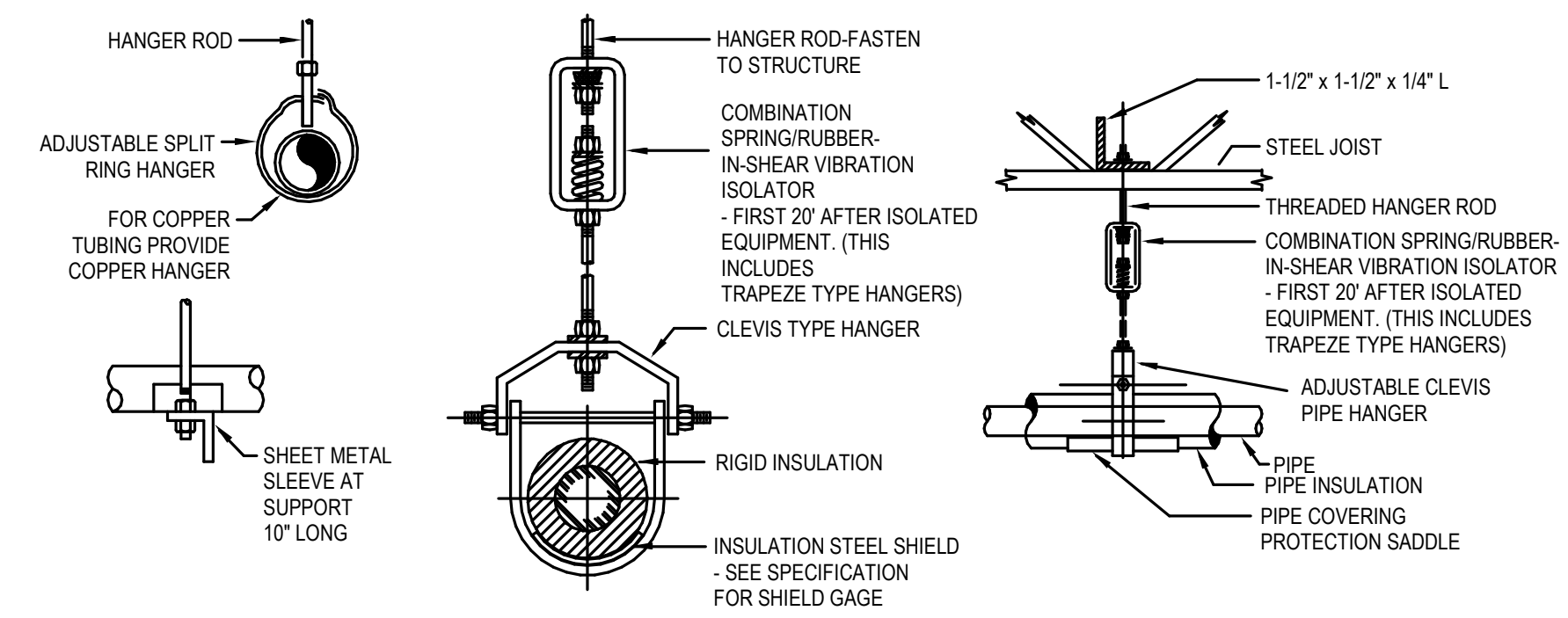
NOTE:  
1. FOR DUCTS LARGER THAN 36", USE TWO HANGER RODS, WIRES OR STRAPS TO SUPPORT DUCT FROM EACH SIDE.

7 ROUND DUCT SUPPORT DETAIL  
SCALE: N.T.S.



NOTES: 1) PROVIDE AT FLEXIBLE DUCT CONNECTION METAL OR "PANDUIT" DRAWBAND ON THE INTERIOR FLEXIBLE DUCT HELIX. SECURE THE INSULATION OVER THE DRAW BAND WITH AN ADDITIONAL DRAWBAND.  
2) PROVIDE BEADING ON ROUND METAL DUCT 12" OR LARGER IN DIAMETER.  
3) PROVIDE MINIMUM 4" COLLARS FOR ATTACHMENT OF THE FLEXIBLE DUCT TO ROUND DUCT, DAMPERS AND DIFFUSERS.  
4) BAND RIGID ROUND DUCT INSULATION TO DUCT AND PROVIDE TAPE FOR INSULATION OVERLAP.

3 DIFFUSER CONNECTION DETAIL  
SCALE: N.T.S.



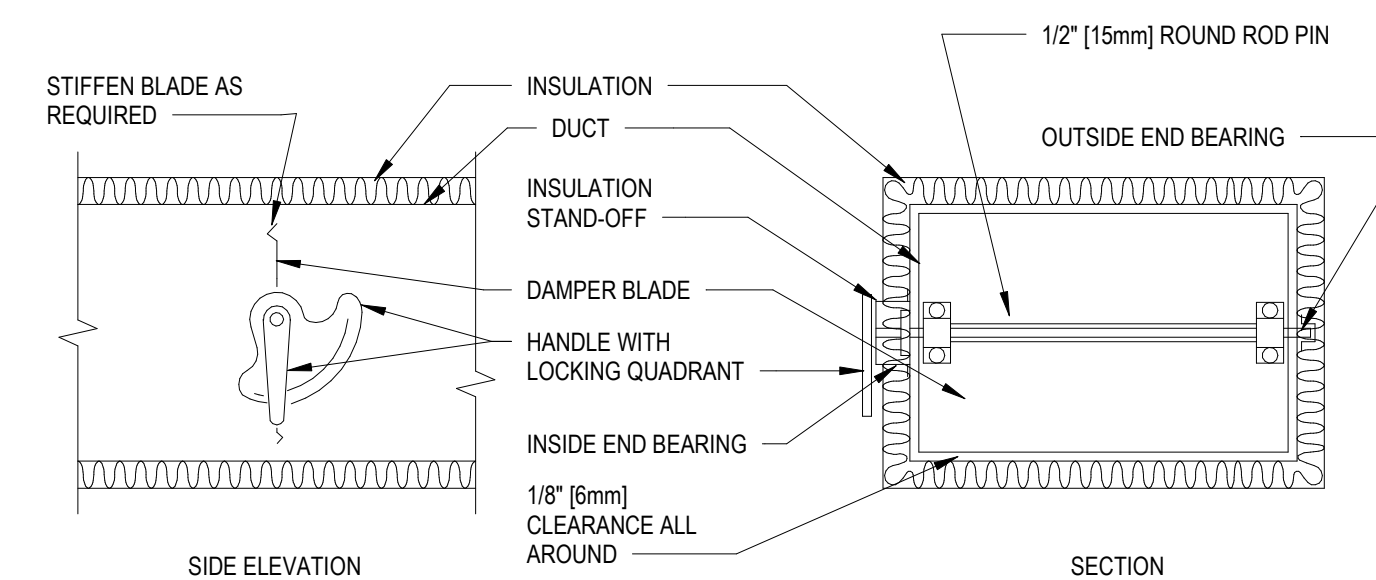
TYPICAL PIPING SUPPORT FOR ALL NON-INSULATED PIPING

TYPICAL PIPING SUPPORT FOR ALL INSULATED PIPING

		PIPE SUPPORT SCHEDULE										
PIPE SIZE (INCHES)		1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4	5	6-8
SPACING (FEET)	STEEL	5	6	7	8	9	10	11	12	12	12	12
	COPPER	6	6	6	6	10	10	10	10	10	10	10

NOTE: HANGER ROD SIZE - 3/8 INCH

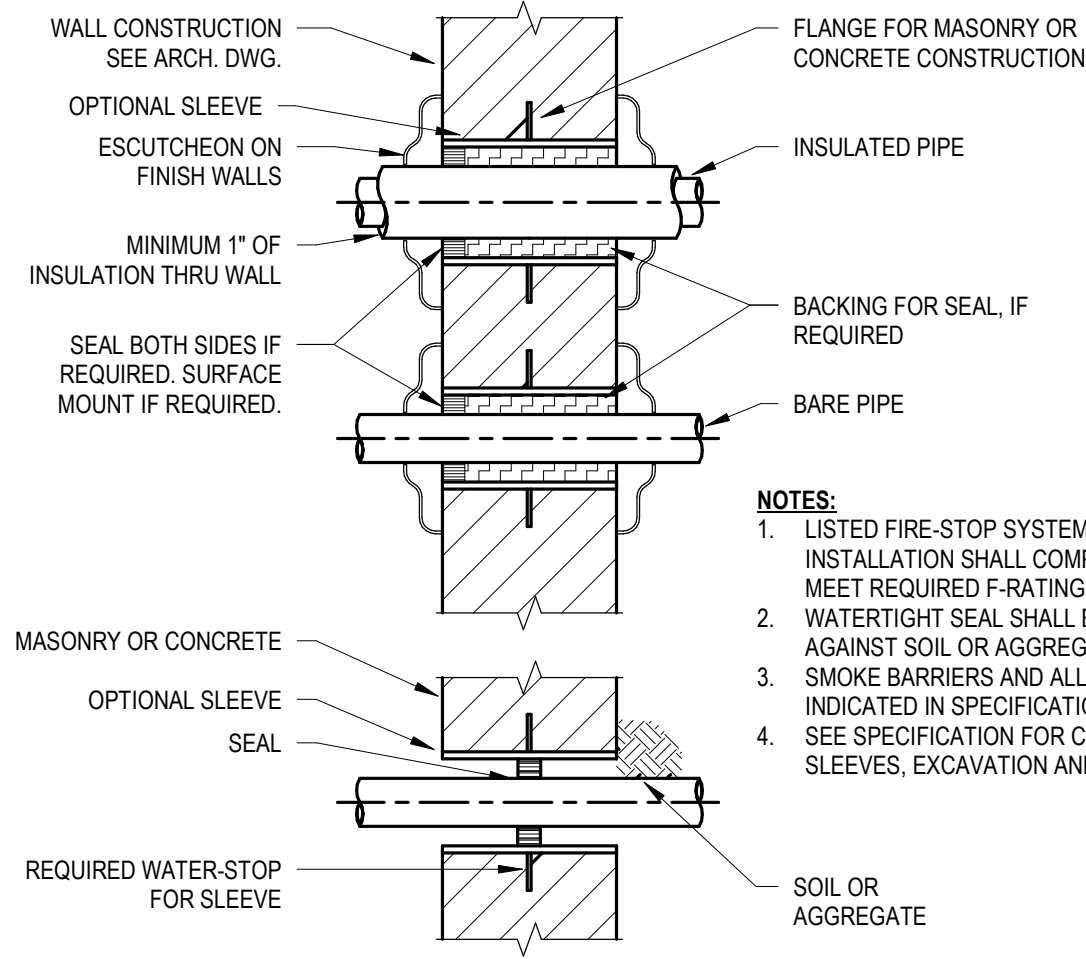
2 TYPICAL HVAC PIPING SUPPORT DETAIL  
SCALE: N.T.S.



NOTE:

1. REMOVE INSULATION STAND-OFF ON DUCTWORK WITHOUT EXTERIOR INSULATION.  
2. DETAIL SHOWS SINGLE BLADE DAMPER. DAMPER INSTALLATION SHALL BE SIMILAR FOR MULTI-BLADE DAMPERS & ROUND DAMPERS.

8 VOLUME DAMPER DETAIL  
SCALE: N.T.S.



**NOTES:**

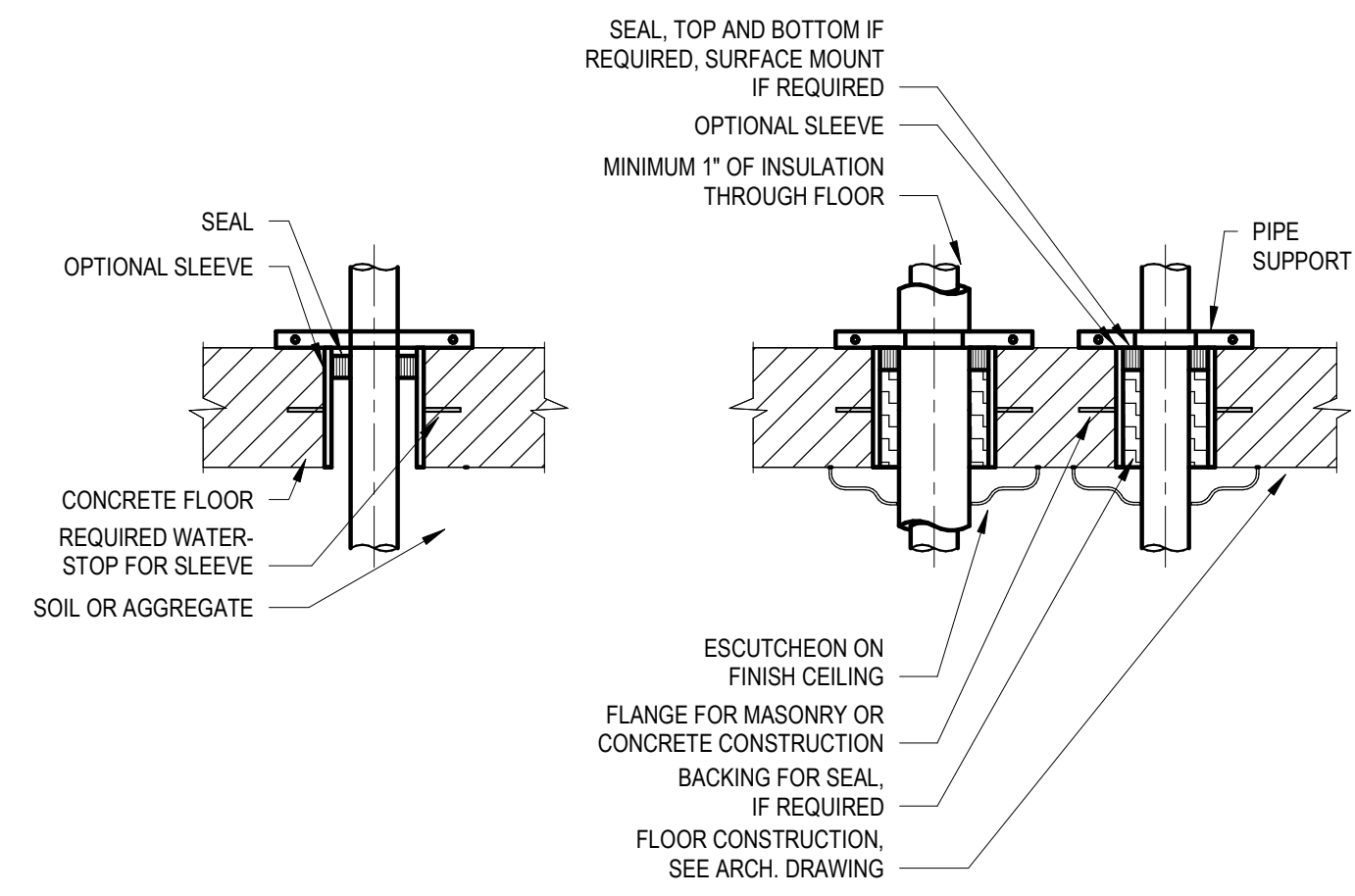
1. LISTED FIRE-STOP SYSTEM SHALL BE ON FIRE RESISTIVE CONSTRUCTION. INSTALLATION SHALL COMPLY WITHIN THE LIMITATIONS OF THE LISTING AND MEET REQUIRED F-RATING AND T-RATING.
2. WATERTIGHT SEAL SHALL BE REQUIRED FOR PENETRATION THRU WALL AGAINST SOIL OR AGGREGATE.
3. SMOKE BARRIERS AND ALL OTHER PENETRATIONS, PROVIDE SEAL AS INDICATED IN SPECIFICATION.
4. SEE SPECIFICATION FOR CUTTING, PATCHING, PENETRATION SEAL, SLEEVES, EXCAVATION AND BACKFILLING.

LISTED FIRE-STOP SYSTEM SHALL BE ON FIRE-RESISTIVE CONSTRUCTION. INSTALLATION SHALL COMPLY WITHIN THE LIMITATION OF THE LISTING AND MEET REQUIRED F-RATING AND T-RATING.

WATERTIGHT SEAL SHALL BE REQUIRED FOR PENETRATION THROUGH FLOOR AGAINST SOIL OR AGGREGATE.

SMOKE BARRIERS AND ALL OTHER PENETRATIONS, PROVIDE SEAL AS INDICATED IN SPEC.

SEE SPEC. FOR CUTTING, PATCHING, PENETRATION SEAL, SLEEVES, EXCAVATION AND BACKFILLING.



① PIPING PENETRATION THRU WALL DETAIL  
SCALE: N.T.S.

② FLOOR PENETRATION  
SCALE: N.T.S.

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MECHANICAL DETAILS

SHEET:  
**M404**

EXISTING KITCHEN EXHAUST FAN SCHEDULE - FOR REFERENCE ONLY					
ITEM TAG	TYPE	AIR FLOW (CFM)	EXTERNAL STATIC (IN W.C.)	V/PH/Hz	SERVICE LOCATION
KEF	MIXED FLOW INLINE	7500	-	480/3/60	LEVEL 10 / KITCHEN EXHAUST
REMARKS: 1. CONTROLS CONTRACTOR SHALL PROVIDE INTERFACE BETWEEN KITCHEN EXHAUST FAN AND HOOD AND NEW KITCHEN MAKEUP AIR UNIT					

KITCHEN HOOD SCHEDULE - TENANT FURNISHED										
ITEM TAG	MANUFACTURER	MODEL	HOOD LENGTH	MAX COOKING TEMP (°F)	TOTAL EXHAUST CFM	LIGHTS		MISC.		REMARKS
						QTY.	TYPE	FIRE SUPP. SYSTEM	HANGING WEIGHT (LB)	
HD-1	CAPTIVEAIRE	6030 ND-2-ACPS-P	11'-7"	600	2606	6	L55 SERIES E26	YES	1224	ALL
REMARKS: 1. REFER TO KES AND CAPTIVEAIRE DRAWINGS FOR ACCESSORY INFORMATION.										

EXISTING EXHAUST FAN SCHEDULE - FOR REFERENCE ONLY							
ITEM TAG	TYPE	DRIVE	PERFORMANCE		ELECTRICAL	APPROX. WEIGHT (LBS)	LOCATION / SERVICE
			AIR FLOW (CFM)	EXT. STATIC (IN W.C.)			
EF-2	INLINE	DIRECT	200	0.2	120/1/60	30	MEZZ / ELEVATOR MACHINE ROOM
EF-3	CEILING MOUNTED	DIRECT	100	0.2	120/1/60	10	MEZZ / IT CLOSET
EF-4	INLINE CENTRIFUGAL	DIRECT	3800	1.5	480/3/60		MEZZ / TOILET EXHAUST

MAKE-UP AIR UNIT SCHEDULE - TENANT FURNISHED																			
ITEM TAG	MANUFACTURER	MODEL	CONFIGURATION	DRIVE	AIR FLOW (CFM)	EXTERNAL STATIC (IN W.C.)	FAN SPEED (RPM)	FLUID FLOW RATE (GPM)	COOLING			GAS HEATING			ELECTRICAL			WEIGHT (LB)	REMARKS
									TOTAL (MBH)	SENSIBLE (MBH)	INPUT (MBH)	OUTPUT (MBH)	BURNER EFF.	FAN					
									V/PH/Hz	HP	MCA	MOCP	V/PH/Hz	HP	MCA	MOCP			
MAU-1	CAPTIVEAIRE	A1-D.500-16Z	CEILING MOUNTED	DIRECT	2170	0.75	2441	9.1	40.9	33.9	198.5	182.6	92%	208/3/60	2.5	8.3	15	1050	ALL
REMARKS: 1. REFER TO CAPTIVEAIRE DRAWINGS FOR ADDITIONAL INFORMATION. 2. COOLING COIL SIZED FOR 40% PG. 3. INCLUDE VFD AND NEMA 1 DISCONNECTS AND PROVIDE ELECTRICAL CONNECTIONS. 4. INCLUDE STAINLESS STEEL DRIP PAN BELOW UNIT WITH A 3/4" DRAIN LINE TO CLOSEST FLOOR DRAIN.																			

AIR CURTAIN SCHEDULE - ELECTRIC HEAT													
MARK	AREA SERVED	MANUFACTURER	MODEL	UNIT SPECS					ELECTRICAL			WEIGHT (LBS)	NOTES
				LENGTH (IN)	MAX AIR FLOW (CFM)	HEATING CAPACITY (KW)	FAN QUANTITY	MOTOR HP	V/PH	MCA	MOCP		
AC-1.1	ENTRY	BERNER	AE08-E-1036EX	38	904	10	2.0	1@1/5	208/3/60	30.3	40	57	ALL
AC-1.2	ENTRY	BERNER	AE08-E-1072EX	74	1978	15	2.0	1@1/5	208/3/60	44.1	60	100	ALL
AC-1.3	ENTRY	BERNER	AE08-E-1072EX	74	1978	15	2.0	1@1/5	208/3/60	44.1	60	100	ALL
REMARKS: 1. EQUIPMENT PROVIDED BY MC. 2. PROVIDE UNITS WITH MOUNTING BRACKET, FILTER, INTEGRAL STARTER AND DISCONNECT SWITCH. 3. MOUNT UNIT PER MANUFACTURER'S RECOMMENDATIONS. 4. INTERLOCK AIR CURTAIN WITH DOOR/WINDOW LIMIT SWITCH TO ENERGIZE WHEN THE DOOR/WINDOW OPENS. 5. PROVIDE AIR CURTAIN WITH MAGNETIC NORMALLY CLOSED DOOR LIMIT SWITCH FOR INSTALLATION ON DOOR. 6. PROVIDE WITH INTEGRAL THERMOSTAT AND CONTROLLER. ADJUST CONTROL SET-UP WITH AIR CURTAIN USER MANUAL. 7. PROVIDE WITH TIME DELAY MICROSWITCH WITH ADJUSTABLE DELAY TIMERS PRE MOUNTED IN THE AIR CURTAIN CONTROL PANEL. 8. PROVIDE WITH POWDER COATED FINISH COLOR AS SELECTED BY THE ARCHITECT. 9. AIR CURTAIN WITH INTEGRAL HEATING SHALL BE PROVIDED WITH CONTROLS CONFIGURED TO SHUT OFF THE SOURCE OF HEATING WHEN THE OA TEMPERATURE IS GREATER THAN 45°F.													

FAN COIL UNIT SCHEDULE - TENANT FURNISHED																																					
TAG	MANUFACTURER	MODEL #	AREA SERVED	FAN/MOTOR DATA					FILTERS				COOLING CAPACITY								HEATING CAPACITY						ELECTRICAL DATA					WEIGHT (LBS)					
				AIRFLOW CFM	OA CFM	ESP (IN. W.C.)	RPM	HP	PRE		FINAL		GROSS (MBH)	SENSIBLE (MBH)	EAT (DB°F)	EAT (WB°F)	LAT (DB°F)	LAT (WB°F)	EWT (°F)	LWT (°F)	GPM	ROWS	WPD (FT)	CAPACITY (MBH)	EAT (DB°F)	LAT (DB°F)	EWT (°F)	LWT (°F)	GPM	ROWS	WPD (FT)		MCA	MOCP	V	PH	HZ
									TYPE	WIDTH (IN.)	TYPE	WIDTH (IN.)																									
FCU-1.1	CARRIER	42BHE40QD5L63515HH	FIRST FLOOR DINING	3500	875	1.50	1032	3	MERV 8	2	MERV 11	2	112.9	87.5	80	67	57.3	56.8	45	61	15.3	6	7.2	121.7	60	91.6	145	110	7.6	2	2	10.25	20	208	3	60	674
REMARKS: 1. SIZED FOR 40% PROPYLENE GLYCOL ON BOTH CHILLED AND HOT WATER COILS 2. COORDINATE UNIT CONTROL AND ACCESS DOOR SIDE ON SITE PRIOR TO PROCUREMENT 3. COIL CONNECTIONS SHALL BE SAME END 4. REAR RETURN AND FRONT SUPPLY 5. MERV 11 WITH 2" MERV 8 PLEATED PRE-FILTER 6. NO MIXING BOX - MECHANICAL CONTRACTOR TO FABRICATE PLENUM BOX AS SHOWN IN DRAWINGS WITH MOTORIZED OA AND RA DAMPERS 7. PROVIDE CONDENSATE OVERFLOW WITH OVERFLOW SWITCH 8. COILS SHALL BE RATED FOR 350 PSI 9. MOTOR CONTROL INFUSED DISCONNECT 10. THERMOSTAT AND SENSOR AND ALL ASSOCIATED WIRING TO BE INCLUDED 11. PROVIDE CEILING SUSPENDED HANGING SUPPORTS AND VIBRATION ISOLATORS 12. PROVIDE WITH COMPANION FLANGES BOLTED TO FAN AND FLEXIBLE SLEEVE ON THE INLET AND OUTLET CONNECTIONS. 13. ALL COILS SHALL BE ARI CERTIFIED AND PRESSURE TESTED 14. COIL TUBE SHALL BE COPPER AND HAVE 5/8" DIAMETER, 0.035" TUBE THICKNESS, AND 0.095" ALUMINIUM FINN. 15. FACE VELOCITY OF THE CHILLED WATER COILS SHALL NOT EXCEED 450 FPM.																																					

CHICAGO VENTILATION SCHEDULE													
ROOM NUMBER	ROOM NAME	ROOM TYPE	FLOOR AREA (SF)	CODE REQUIRED MECHANICAL VENTILATION					ACTUAL			EQUIPMENT	
				SUPPLY (CFM/SF)	EXHAUST (CFM/SF)	SUPPLY (CFM)	OA (CFM)	EXHAUST (CFM)	SUPPLY (CFM)	OA (CFM)	EXHAUST (CFM)	SUPPLY FAN	EXHAUST FAN
1ST FLOOR LEVEL													
101	DINING	PUBLIC DINING ROOMS - NO COOKING EQUIPMENT	1170	1.50	1.50	1754	584	1754	3500	875	3500	FCU-1.1	FCU-1.1
104	FRONT KITCHEN	PUBLIC DINING ROOMS - NO COOKING EQUIPMENT	425	1.50	1.50	638	212	638	1150	290	1150	AHU-1	AHU-1
105	COOKLINE	PUBLIC KITCHEN	106	1.20	4.00	128	43	425	1000	250	1000	AHU-1	AHU-1/ EXISTING KITCHENE XHAUST
106	BACK KITCHEN	PUBLIC KITCHEN	383	1.20	4.00	460	153	1533	1000	250	1620	AHU-1	AHU-1
107	HALL	CORRIDORS	154	0.00	0.00	0	0	0	100	25	100	AHU-1	AHU-1
108	JANITOR'S CLOSET	JANITOR'S CLOSET	8	0.00	2.00	0	0	0	16	0	100	AHU-1	AHU-1 / <E> EXHAUST FAN
200	EXISTING STAIRS	CORRIDORS	220	0.00	0.00	0	0	0	0	0	0	-	-
2ND FLOOR LEVEL													
200	EXISTING STAIRS	CORRIDORS	142	0.00	0.00	0	0	0	0	0	0	-	-
201	DINING	PUBLIC DINING ROOMS - NO COOKING EQUIPMENT	833	1.50	1.50	1250	416	1250	1515	416	1515	AHU-2	AHU-2
202	AREA OF RESCUE A	STORAGE INACTIVE	36	0.00	0.00	0	0	0	0	0	0	-	-
204	OFFICE	OFFICES AND COMPUTER ROOMS	63	0.60	0.30	38	13	19	150	38	150	AHU-2	AHU-2
205	MEN'S RESTROOM	TOILET ROOMS	140	0.00	2.00	0	0	281	185	46	300	AHU-2	AHU-2
206	WOMEN'S RESTROOM	TOILET ROOMS	168	0.00	2.00	0	0	336	200	50	340	AHU-2	AHU-2
208	AREA OF RESCUE B	STORAGE INACTIVE	26	0.00	0.00	0	0	0	0	0	0	-	-
209	HALL	CORRIDORS	103	0.00	0.00	0	0	0	0	0	0	-	-
211	BACK KITCHEN	PUBLIC KITCHEN	109	1.20	4.00	130	43	435	350	88	350	AHU-2	AHU-2
212	MANAGER'S OFFICE	OFFICES AND COMPUTER ROOMS	87	0.60	0.30	52	17	26	150	38	150	AHU-2	AHU-2
				4174		4450	1482	6713	9300	2366	10275		
REMARKS: 1. NEW MAU-1 IS PROVIDING CONDITIONED KITCHEN MAKEUP AIR 2. EXISTING KITCHEN EXHAUST FAN KEF LOCATED ON LEVEL 10 IS PROVIDING THE KITCHEN EXHAUST FROM HOOD 3. TOILET AND JANITORS EXHAUST PROVIDED BY EXISTING EF-4 4. REFER TO SCHEDULES FOR AIRFLOW 5. NEW RELIEF EXHAUST FAN OPERATES DURING BOTH NORMAL AND ECONOMIZER MODES FOR SPACE PRESSURIZATION 6. FCU-1 IS CONNECTED TO THE BASE BUILDING CHILLED WATER SYSTEM AND HAS WATER SIDE ECONOMIZER 7. AHU-1 WILL BE PROVIDED WITH AIRSIDE ECONOMIZER CONTROLS 8. AHU-2 IS LESS THAN 54 MBH AND DOES NOT NEED ECONOMIZER													

GRILLE, REGISTERS, AND DIFFUSER SCHEDULE										
TAG	TYPE	MAKE / MODEL	AIR STREAM	INLET SIZE (IN.)			FACE DIMENSIONS	MAX NC	MAX PD (IN WC)	REMARKS
				DIA.	HEIGHT	WIDTH				
S-1	LINEAR SLOT DIFFUSER	TITUS / FL 20-22	SUPPLY	8			48"x4-3/4"	25	0.10	ALL
S-2	CIRCULAR DIFFUSER	TITUS / R 300F	SUPPLY	10			22" DIA	25	0.10	ALL
S-3	SQUARE PLAQUE DIFFUSER	TITUS / OMNI	SUPPLY	6			24"x24"	25	0.10	ALL
S-4	SQUARE PLAQUE DIFFUSER	TITUS / OMNI	SUPPLY	8			24"x24"	25	0.10	ALL
S-5	SQUARE PLAQUE DIFFUSER	TITUS / OMNI	SUPPLY	10			24"x24"	25	0.10	ALL
S-6	SQUARE PLAQUE DIFFUSER	TITUS / PAS	SUPPLY	6			24"x24"	25	0.10	ALL
S-7	SQUARE PLAQUE DIFFUSER	TITUS / PAS	SUPPLY	10			24"x24"	25	0.10	ALL
S-8	SQUARE PLAQUE DIFFUSER	TITUS / OMNI	SUPPLY	6			12"x12"	25	0.10	ALL
E-1	SQUARE PLAQUE DIFFUSER	TITUS / PAR	EXHAUST	6			12"x12"	25	0.10	ALL
E-2	SQUARE PLAQUE DIFFUSER	TITUS / PAR	EXHAUST	8			12"x12"	25	0.10	ALL
R-1	SQUARE PLAQUE DIFFUSER	TITUS / PAR	RETURN	8			24"x24"	25	0.10	ALL
R-2	SQUARE PLAQUE DIFFUSER	TITUS / PAR	RETURN	10			24"x24"	25	0.10	ALL
R-3	SQUARE PLAQUE DIFFUSER	TITUS / PAR	RETURN	12			24"x24"	25	0.10	ALL
R-4	STEEL RETURN GRILLE	TITUS / 350RL	RETURN		18	42	19-1/2"x43-1/2"	25	0.10	ALL
REMARKS: 1. PROVIDE WITH MANUAL VOLUME DAMPERS FOR ALL DIFFUSERS. OPPOSED BLADE DAMPERS SHALL NOT BE USED. 2. PROVIDE WITH SURFACE MOUNTING FRAME WHERE APPLICABLE. 3. COORDINATE FINISH AND LOCATION WITH ARCHITECT. 4. PROVIDE WITH REMOTE OPERATED DAMPERS FOR ALL DIFFUSERS LOCATED ABOVE GYPSUM CEILINGS TO ALLOW BALANCING WITHOUT ACCESS PANELS.										

AIRFLOW PRESSURIZATION MATRIX	
KITCHEN EXHAUST (CFM)	2606
TOILET AND GENERAL EXHAUST (CFM)	740
TOTAL EXHAUST (CFM)	3346
KITCHEN MAKEUP AIRFLOW (CFM)	2163
FCU AND AHU OUTDOOR AIRFLOW (CFM)	2376
TOTAL OUTDOOR AIRFLOW (CFM)	4539
NET AIRFLOW (CFM)	1193
REMARKS: 1. RELIEF FAN SHALL OPERATE DURING NORMAL MODE TO EXHAUST 800 CFM AND MAINTAIN POSITIVE PRESSURIZATION 2. DURING ECONOMIZER MODE, RELIEF FAN SHALL EXHAUST 1800 CFM AND MAINTAIN POSITIVE PRESSURIZATION. 3. FCU-1 AND AHU-2 DO NOT HAVE ECONOMIZER MODE. 4. AHU-1 WILL OPERATE IN ECONOMIZER MODE.	

ferris+sloane

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CAVA

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STREETERVILLE, ILLINOIS, 60611  
FOR CAVA  
14 Ridge Square NW #500, WASHINGTON, DC 20016

ADR PROJECT NUMBER:  
CAV061

ISSUE	DATE
PERMIT SET	10/09/2024
LANDLORD/BID	11/08/2024
CONSTRUCTION SET	01/29/2025

MECHANICAL SCHEDULES

SHEET:

M501



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SEQUENCE OF OPERATION	
A.	PROVIDE STAND ALONE OR APPLICATION SPECIFIC CONTROLLERS AS REQUIRED TO PERFORM THE FOLLOWING SEQUENCES OF OPERATIONS.
B.	CONTROLS CONTRACTOR SHALL COORDINATE STANDARDS AND BAS REQUIREMENTS WITH NORTHWESTERN FACILITIES TEAM
C.	4 PIPE CHILLED WATER AND HOT WATER FAN COIL UNIT: <ul style="list-style-type: none"> <li>a. UNIT CONSISTS OF SUPPLY AIR FAN, CHILLED AND HOT WATER COILS, FAN FILTERS AND 7-DAY PROGRAMMABLE THERMOSTAT. 2-WAY CONTROL VALVES FOR THE CHILLED AND HOT WATER PIPING SHALL BE PROVIDED WITH ACTUATORS INTERFACED WITH BAS. SEPARATE OA AND RA DAMPERS TO BE FIELD INSTALLED AND WIRED TO BAS BY TC AND EC.</li> <li>b. PROVIDE AN OVERRIDE SWITCH TO OPERATE THE UNIT DURING UNOCCUPIED HOURS. THIS SWITCH SHALL BE PART OF THE PROGRAMMABLE THERMOSTAT. OVERRIDE SWITCH ALLOWS THE UNIT TO OPERATE FOR TWO HOURS (ADJUSTABLE).</li> <li>c. OCCUPIED MODE:                             <ul style="list-style-type: none"> <li>UNIT TO BE PROVIDED WITH FACTORY INSTALLED, WIRED AND PROGRAMMED CONTROLS. THE BAS INTEGRATES TO THE ON BOARD CONTROLLERS VIA BACNET MS/TP. UNIT TO RUN BASED ON USER DEFINED SCHEDULE. UNIT CONTROLS ITS STAGES TO MAINTAIN TEMPERATURE SETPOINT 75°F COOLING AND 70°F HEATING.</li> </ul> </li> <li>d. OA/RA DAMPER OPERATION:                             <ul style="list-style-type: none"> <li>BOTH DAMPERS OPERATE IN UNISON. OAD IS LINKED NORMALLY CLOSED AND RAD IS LINKED NORMALLY OPEN. WHEN FAN SYSTEM IS NOT ACTIVE, THE DAMPERS ARE TO BE COMMANDED TO THE NORMAL POSITION. DURING SHUT DOWN, EACH DAMPER WILL BE COMMANDED TO THEIR NORMAL POSITIONS.</li> <li>DAMPERS ARE CONTROLLED BY EITHER THE MIN OUTDOOR SETPOINT OF 20% OR DURING ECONOMIZER MODE, PROVIDE MIXED AIR TEMP SENSOR BY FACTORY CONTROLS TO DETECT RA TEMP FROM SPACE.</li> </ul> </li> <li>e. UPON DETECTION OF SMOKE BY UNIT SMOKE DETECTOR, THE UNIT SHALL SHUT DOWN AND AN ALARM SHALL BE SENT TO THE FIRE ALARM CONTROL PANEL (WHERE APPLICABLE). LOCAL REMOTE ANNUNCIATORS SHALL ALSO BE ACTIVATED.</li> </ul>
D.	AHU DX COOLING COIL AND HOT WATER WITH AND WITHOUT ECONOMIZER <ul style="list-style-type: none"> <li>1. UNIT CONSISTS OF SUPPLY AIR FAN, DX COIL AND CONDENSING UNIT, AND HOT WATER COILS WITH ECONOMIZER CONTROLS. FAN FILTERS AND 7-DAY PROGRAMMABLE THERMOSTAT. SEPARATE OA AND RA DAMPERS TO BE FIELD INSTALLED AND WIRED TO BAS BY TC AND EC. PROVIDE CONNECTIONS AND WIRING FOR 2-WAY CONTROL VALVE</li> <li>2. REFER TO ABOVE FOR OCCUPIED MODE AND OA/RA DAMPER OPERATION</li> <li>3. ECONOMIZER MODE:                             <ul style="list-style-type: none"> <li>THE DISCHARGE AIR TEMPERATURE SENSOR SHALL MEASURE THE DRY BULB TEMPERATURE OF THE AIR LEAVING THE COOLING COIL WHILE ECONOMIZING. WHEN ECONOMIZING IS ENABLED AND THE UNIT IS OPERATING IN THE COOLING MODE, THE ECONOMIZER DAMPERS SHALL BE MODULATED BETWEEN ITS MINIMUM POSITION AND 100% TO MAINTAIN THE DISCHARGE AIR TEMPERATURE SETPOINT. THE ECONOMIZER DAMPERS SHALL MODULATE TOWARD MINIMUM POSITION IN THE EVENT THE MIXED AIR TEMPERATURE FALLS BELOW THE LOW TEMPERATURE LIMIT SETTING.</li> <li>REFERENCE DRY BULB - OUTSIDE AIR (OA) TEMPERATURE SHALL BE COMPARED WITH A REFERENCE DRY BULB SETPOINT. THE ECONOMIZER SHALL ENABLE WHEN THE OA TEMPERATURE IS LESS THAN THE REFERENCE DRY BULB SETPOINT. THE ECONOMIZER SHALL BE DISABLED WHEN OA TEMPERATURE IS GREATER THAN THE REFERENCE DRY BULB SETPOINT + 2.0 DEG. F.</li> </ul> </li> <li>4. WHENEVER THE UNIT CALLS FOR COOLING AND THE ECONOMIZER IS DISABLED OR LOCKED OUT DUE TO OUTDOOR AIR CONDITIONS, THE FAN COIL USES MECHANICAL COOLING. THE UNIT STAGES ITS FACTORY CONTROLS TO MAINTAIN SPACE TEMPERATURE SETPOINT.</li> <li>5. UPON DETECTION OF SMOKE BY UNIT SMOKE DETECTOR, THE UNIT SHALL SHUT DOWN AND AN ALARM SHALL BE SENT TO THE FIRE ALARM CONTROL PANEL (WHERE APPLICABLE). LOCAL REMOTE ANNUNCIATORS SHALL ALSO BE ACTIVATED.</li> </ul>
A.	KITCHEN HOOD EXHAUST <ul style="list-style-type: none"> <li>a. BASE BUILDING EXISTING EXHAUST FAN</li> <li>b. GENERAL:                             <ul style="list-style-type: none"> <li>THE KITCHEN HOOD SHALL OPERATE BASED ON MANUFACTURER SUPPLIED CONTROLS.</li> </ul> </li> <li>c. SYSTEM OFF:                             <ul style="list-style-type: none"> <li>THE KITCHEN HOOD SHALL BE STOPPED AND STARTED LOCALLY BY THE USER.</li> </ul> </li> <li>d. SYSTEM ON:                             <ul style="list-style-type: none"> <li>WHEN THE KITCHEN HOOD IS OPERATING, THE BAS SHALL MONITOR THE EXHAUST FAN SPEED OUTPUT.</li> <li>WHEN THE KITCHEN HOOD IS OPERATING, THE BAS SHALL MONITOR THE SUPPLY FAN SPEED OUTPUT.</li> </ul> </li> <li>e. LIFE SAFETY OPERATION:                             <ul style="list-style-type: none"> <li>WHEN THE FIRE SUPPRESSION SYSTEM IS MANUALLY OR AUTOMATICALLY ACTIVATED AT THE TYPE I HOOD VIA HARDWIRED INTERLOCK</li> <li>THE ASSOCIATED HOOD EXHAUST FAN SHALL BE DE-ENERGIZED BY HARDWIRED INTERLOCK.</li> <li>THE ASSOCIATED CONDITIONED MAKE-UP AIR UNIT SHALL BE DE-ENERGIZED.</li> </ul> </li> <li>f. SAFETIES AND ALARMS:                             <ul style="list-style-type: none"> <li>COMMUNICATE FAILURE: IF THE BAS LOSES COMMUNICATION WITH THE KITCHEN HOOD, THE FAN COILS TO OPERATE OR STATUS CHANGES TO OFF WHEN THE KITCHEN HOOD IS OPERATING, AN ALARM SHALL BE PRESENTED AT THE BAS WORKSTATION.</li> <li>POWER FAILURE: UPON RESTORATION OF POWER, THE EXHAUST FAN SHALL RESTART AND OPERATE AT THE SPEED DETERMINED BY THE HOOD SIGNAL.</li> </ul> </li> <li>g. FAILURE MODES:                             <ul style="list-style-type: none"> <li>COMMUNICATION FAILURE: IF THE BAS LOSES COMMUNICATION WITH THE KITCHEN HOOD, THE SUPPLY BOXES AND EXHAUST FAN SHALL OPERATE AT LAST OPERATING POINTS AND AN ALARM SHALL BE PRESENTED AT THE BAS WORKSTATION.</li> </ul> </li> </ul>
B.	MAKE UP AIR UNIT: <ul style="list-style-type: none"> <li>a. THE MAKE UP AIR UNIT SHALL BE ENABLED WHEN THE KITCHEN HOOD EXHAUST FAN (KF-1) IS ENERGIZED. THE INTERNAL MOTORIZED DAMPER WITHIN MAU-1 SHALL OPEN AND THE FAN SHALL RUN. IF OA IS LESS THAN 65° (ADJ.), THE MAU-1 GAS-FIRED HEAT SECTION SHALL BE ENABLED TO MAINTAIN A MINIMUM OF 65°</li> <li>b. WHEN KF-1 IS OFF, MAU-1 SHALL BE DE-ENERGIZED AND THE INTERNAL MOTORIZED DAMPER SHALL CLOSE.</li> <li>c. ECONOMIZER MODE:                             <ul style="list-style-type: none"> <li>MAKEUP AIR UNIT SHALL RAMP DOWN TO LOWEST POSSIBLE AIRFLOW SETTING (30%)</li> </ul> </li> </ul>

NEW EXHAUST FAN SCHEDULE							
ITEM TAG	TYPE	SERVICE	AIRFLOW (CFM)	ESP (IN.WC.)	ELECTRICAL	APPROX WEIGHT (LBS)	MANUFACTURER / MODEL
					HPV/PHHZ		
REF-1	INLINE CENTRIFUGAL	RELIEF EXHAUST	1600	1.5	1/208/3/60	120	GREENHECK / SQ-160HP-VG
REMARKS: 1. PROVIDE WITH MOTORIZED DAMPER WITH ACTUATOR 2. SHALL OPERATE IN VARIABLE SPEED DURING BOTH NORMAL AND ECONOMIZER MODES TO MAINTAIN SPACE PRESSURIZATION 3. PROVIDE FAN MOUNTED SPEED CONTROLLER FOR BALANCING 4. PROVIDE START STOP STATUS VIA EXISTING BAS 5. PROVIDE EC MOTOR, STARTER AND ALL WIRING AS REQUIRED 6. PROVIDE NEMA 1 DISCONNECT SWITCH							

STANDARD CITY OF CHICAGO REFRIGERATION SCHEDULE						
ITEM TAG	MANUFACTURER / MODEL	TYPE OF REFRIGERANT	# OF COMPRESSORS	NOMINAL TONS	WEIGHT OF REFRIGERANT (LBS)	REMOTE / SELF CONTAINED
CU-1	CARRIER / 38AU	R410A	1	6	145	REMOTE
CU-2	CARRIER / 38AU	R410A	2	10	90	REMOTE
REMARKS: 1. COPPER TUBING MAY BE TYPE ACR OR TYPE 'K' REFRIGERANT LINES UNLESS PRESSURE EXCEEDS THE RATED CAPACITY OF ACR TUBING [18-28-1107.4.3] 2. ALL JOINTS SHALL BE BRAZED. 3. INSTALL SAFETY RELIEF VALVE ON HIGH SIDE, UPSTREAM OF ANY INTERVENING DEVICES. SET AT 450 PSI. 4. REFRIGERANT PIPING TO BE SIZED PER MANUFACTURER'S RECOMMENDATIONS. 5. LOCATE ALL REFRIGERATION EXPANSION VALVES, DEVICES AND CONNECTION OUT OF THE AIRSTREAM 6. REFRIGERANT LINES MAY NOT BE LOCATED IN ANY ELEVATOR, DUMBWAITER OR SHAFT CONTAINING MOVING OBJECTS OR IN STAIRWELLS OR OTHER MEANS OF EXIT. NOT PERMITTED UNDER STAIRS, FIRE ESCAPES OR HALLWAYS. [18-28-11107.2.1 & 1101.11]						

DUCT SPECIFICATIONS		
CONDITION / LOCATION	TYPE	INSULATION
LOW PRESSURE SUPPLY	3" STATIC PRESSURE CLASS, GALVANIZED STEEL, CLASS A SEALING	1-1/2" FLEXIBLE FIBERGLASS INSULATION W/ ALUMINUM FOIL JACKET
MEDIUM PRESSURE SUPPLY	4" STATIC PRESSURE CLASS, GALVANIZED STEEL, CLASS A SEALING	1-1/2" FLEXIBLE FIBERGLASS INSULATION W/ ALUMINUM FOIL JACKET
EXHAUST AIR	2" STATIC PRESSURE CLASS, GALVANIZED STEEL, CLASS A SEALING	N/A
RETURN AIR	2" STATIC PRESSURE CLASS, GALVANIZED STEEL, CLASS A SEALING	N/A

DX SPLIT CONDENSING UNIT SCHEDULE - TENANT FURNISHED										
ITEM TAG	DESCRIPTION	INDOOR UNIT	MANUFACTURER / MODEL	TYPE OF REFRIGERANT / CHARGE LBS	EER	COOLING CAPACITY (TONS)	MCA / MOC/P / V / PH / HZ	WEIGHT (LBS)	REMARKS	
CU-1	DUAL CIRCUIT 3 STAGE COOLING ONLY AC SCROLL COMPRESSOR	AHU-1	CARRIER / 38AUD	R410A / 145	11.2	10	44 / 60 / 208 / 3 / 60	516	ALL	
CU-2	SINGLE CIRCUIT 3 STAGE COOLING ONLY AC SCROLL COMPRESSOR	AHU-2	CARRIER / 38AUD	R410A / 90	12	6	30 / 45 / 208 / 3 / 60	389	ALL	
REMARKS: 1. MAINTAIN REQUIRED CLEARANCES FOR PROPER AIR FLOW AND MAINTENANCE. INSTALL AS PER MANUF. RECOMMENDATIONS 2. FINAL ROUTING AND SIZING OF THE REFRIGERANT LINES TO BE COORDINATED WITH MANUFACTURER BASED ON ACTUAL SITE CONDITIONS 3. PROVIDE CONVENIENCE OUTLET AND FIELD MOUNTED NEMA 3R DISCONNECT SWITCH (BY ELECTRICAL CONTRACTOR) 1-PER UNIT 4. CONTRACTOR SHALL PROVIDE LONG LINE ACCESSORIES AS REQUIRED PER MANUFACTURERS INSTRUCTIONS										

DX COOLING AND HOT WATER AIR HANDLING UNIT SCHEDULE - TENANT FURNISHED																																	
TAG	MANUFACTURER	MODEL #	AREA SERVED	FAN/MOTOR DATA				COOLING CAPACITY								HEATING CAPACITY								ELECTRICAL DATA				WEIGHT (LBS)					
				AIRFLOW CFM	OA CFM	ESP (IN. W.C.)	RPM	HP	GROSS (MBH)	SENSIBLE (MBH)	EAT (DB°F)	EAT (WB°F)	LAT (DB°F)	LAT (WB°F)	ROWS	FPI	APD (IN. WG)	CAPACITY (MBH)	EAT (DB°F)	LAT (DB°F)	EWT (°F)	LWT (°F)	GPM	ROWS	FPI	APD (IN. WG)	WPD (FT. WG)		MCA	MOC/P	V	PH	HZ
AHU-1	CARRIER	39LC SIZE 08	FIRST FLOOR KITCHEN	3250	875	1.12	1800	5	100	80	80	67	57.6	57.3	8	11	1.12	94.2	60	86	145	120	8	2	14	0.27	0.9	17.9	30	208	3	60	674
AHU-2	CARRIER	39LC SIZE 06	MEZZANINE FLOOR	2700	676	1.30	1800	3	50	58	80	67	60	60	8	11	1.30	75.5	60	85	145	122	7	2	14	0.35	1.0	10.8	15	208	3	60	479
REMARKS: 1. SIZED FOR R410A REFRIGERANT 2. SIZED FOR 40% PROPYLENE GLYCOL HOT WATER COILS 3. COORDINATE UNIT CONTROL AND ACCESS DOOR SIDE ON SITE PRIOR TO PROCUREMENT 4. COIL CONNECTIONS SHALL BE SAME END 5. PROVIDE FACTORY INSTALLED AND PROGRAMMED CONTROLS WITH USER OVERRIDE 6. PROVIDE ALL BAS INTEGRATION REQUIREMENTS 7. MERV 11 WITH 2" MERV 8 PLEATED PRE-FILTER 8. NO MIXING BOX - MECHANICAL CONTRACTOR TO FABRICATE PLENUM BOX AS SHOWN IN DRAWINGS WITH MOTORIZED OA AND RA DAMPERS 9. FRONT SUPPLY AND REAR RETURN 10. ALL COILS SHALL BE RATED FOR MIN. 350 PSI 11. PROVIDE COMBINATION STARTER AND DISCONNECT (NEMA 1) 12. PROVIDE FACTORY MOUNTED VARIABLE FREQUENCY DRIVE 13. COIL TUBE SHALL BE COPPER AND HAVE 5/8" DIAMETER, 0.035" TUBE THICKNESS, AND 0.095" ALUMINIUM FIN. S 14. CASING PANELS SHALL BE 1" MIN. THICKNESS 15. PROVIDE CONDENSATE DRAIN PANS 16. PROVIDE CONDENSATE PUMP 17. COILS SHALL BE AHR1 RATED AND ADHERE TO ASHRAE 15 REQUIREMENTS 18. PROVIDE CEILING SUSPENDED HANGING SUPPORTS AND VIBRATION ISOLATORS 19. THERMOSTAT AND SENSOR AND ALL ASSOCIATED WIRING TO BE INCLUDED																																	

DUCT MATERIAL SCHEDULE			
DUCT SYSTEM	COMPONENT	EXTERIOR	INTERIOR
DUCTWORK	DUCTWORK	HVAC GALV	HVAC GALV
	INSULATION	MINERAL FIBER BOARD	MINERAL FIBER BOARD
	INSULATION THICKNESS	2.0-INCH	1.5-INCH
	VAPOR RETARDER	FSK	FSK
	FIELD-APPLIED JACKET	ALUM	N/A
MATERIAL ABBREVIATIONS HVAC GALV G90 GALVANIZED STEEL COMMERCIAL DUCT CONSTRUCTION PER SMACNA "HVAC DUCT CONSTRUCTION STANDARDS" GREASE DUCT INSULATION: A. KITCHEN GREASE DUCT WRAP" a. HIGH TEMPERATURE FLEXIBLE FIBER BLANKET ENCAPSULATED IN FIBERGLASS FOIL FACING SHALL BE SUITABLE FOR KITCHEN GREASE DUCT WRAP. WRAP SHALL BE TWO LAYERS, EACH 1-1/2" THICK, RATED AS 2 HR SHAFT ALTERNATIVE. • ASTM STANDARD: E2336 AND RELATED ICC ESR (2 HR GREASE DUCT ENCLOSURE) • CODES/STANDARDS: IMC, UMC, NFPA 96. • DENSITY: NOMINAL 6 LB/FT <sup>3</sup> • SERVICE TEMPERATURE: CONTINUOUS 1832°F. b. MANUFACTURERS/PRODUCTS: • THERMAL CERAMICS, FIREMASTER FASTWRAP XL • 3M, FIRE BARRIER DUCT WRAP 615+ • UNIFRAX, FVREWRAP ELITE 1.5 DUCT INSULATION c. DUCT ACCESS DOORS SHALL BE FURNISHED BY DUCT WRAP MANUFACTURE AS PART OF DUCT WRAP SYSTEM. ACCESS DOORS SHALL PASS ASTM E2336 TEST STANDARD.			

COPPER PIPE SUPPORT SCHEDULE				
PIPE SIZE (IN)	HANGER ROD SIZE (IN)	MAX SPAN (FT)	SADDLE GAGE	SADDLE LENGTH (IN)
1/2" & SMALLER	3/8"	5	16	8
3/4"	3/8"	7	16	8
1"	3/8"	7	16	8
1 1/4"	3/8"	9	16	8
1 1/2"	3/8"	9	16	8
2"	3/8"	10	16	8
2 1/2"	1/2"	11	14	10
3"	1/2"	12	14	10
REMARKS 1. ALL HANGERS AND SUPPORTS MUST COMPLY WITH MATERIAL AND FINISH SCHEDULE.				

PIPE SPECIFICATIONS			
CONDITION / LOCATION	TYPE	JOINTS	INSULATION
CONDENSATE DRAIN	TYPE L COPPER	SOLDERED	1-1/2" FIBERGLASS WITH A FOIL SCRIM JACKET
	TYPE L COPPER	SOLDERED JOINTS	2" RIGID FIBERGLASS INSULATION, W/ FULL PVC JACKET

HEATING TABLE	
BUILDING LOAD (MBH)	2606
VENTILATION LOAD (MBH)	740
TOTAL HEATING LOAD (MBH)	3346
HEATING SYSTEM OUTPUT CAPACITY (MBH)	2163
HEATING SYSTEM EQUIPMENT INCLUDED IN THIS TABLE:	2338
FAN COIL AND AIR HANDLING UNITS WITH HEATING HOT WATER SYSTEM	
HEATING CERTIFICATION STATEMENT	
I HEREBY CERTIFY THAT THE HEATING SYSTEM WILL HEAT ALL ROOMS REGULARLY OCCUPIED BY HUMANS TO AN INSIDE TEMPERATURE OF 68°F WHEN THE OUTSIDE TEMPERATURE IS MINUS 10°F (AS REQUIRED BY THE SECTIONS 34(13-196-410) AND 4(5-4-270) OF THE 2018 CHICAGO BUILDING CODE AND BY PARAGRAPH 1204.1 OF CHAPTER 18-12 (INTERIOR ENVIRONMENT) OF THE PROPOSED BUILDING PLANNING AND LIFE SAFETY PORTION OF THE CODE).	
OWNER, CONTRACTOR OR OWNER'S LICENSED ENGINEER REPRESENTATIVE	

COPPER PIPE HANGER SPACING	
PIPE SIZE	MAX HANGER SPACING
3/4" TO 1"	5"
1-1/4" TO 1-1/2"	7"
2" TO 2-1/2"	8"
3" AND ABOVE	10"

**ferris+sloane**  
 100 N. Howard Street, Suite 450, Spokane, WA 99201

**CAVA**  
 270 E ONTARIO STREET  
 STREETERVILLE, ILLINOIS, 60611  
 FOR CAVA  
 14 Ridge Square NW #500, WASHINGTON, DC 20016

**CAVA #00000**  
 270 E ONTARIO STREET  
 STREETERVILLE, ILLINOIS, 60611  
 FOR CAVA  
 14 Ridge Square NW #500, WASHINGTON, DC 20016

ADR PROJECT NUMBER:	CAV061
ISSUE	DATE
PERMIT SET	10/09/2024
LANDLORD/BID	11/08/2024
CONSTRUCTION SET	01/29/2025

MECHANICAL SCHEDULES

SHEET:  
**M502**



FOR QUESTIONS, CALL THE  
Maryland Office  
REGION 32  
PHONE: (800) 988 - 0881  
EMAIL: reg32@captiveaire.com

**PATENT NUMBERS**

AC-PSP (UNITED STATES) - US PATENT 7963830 B2.  
AC-PSP WALL (CANADA) - CA PATENT 2820509.  
AC-PSP ISLAND (CANADA) - CA PATENT 2520330.

**HOOD INFORMATION - JOB#7020062**

HOOD NO	TAG	MODEL	MANUFACTURER	LENGTH	MAX COOKING TEMP	TYPE	APPLIANCE DUTY	DESIGN CFM/FT	TOTAL EXH CFM	EXHAUST PLENUM RISER(S)				MUA CFM	AC CFM	HOOD CONSTRUCTION	HOOD CONFIG				
										WIDTH	LENG	HEIGHT	DIA				CFM	VEL	SP	END TO END	RDW
1	33	6030 ND-2-ACSP-F	CAPTIVEAIRE	11' 7"	600 DEG	1	HEAVY	225	2606			4'	16'	2606	1866	-0.968"	2163	600	430 SS WHERE EXPOSED	ALONE	ALONE

**HOOD INFORMATION**

HOOD NO	TAG	FILTER(S)				LIGHT(S)				UTILITY CABINET(S)				FIRE SYSTEM	HOOD HANGING PIPING WEIGHT		
		TYPE	QTY	HEIGHT	LENGTH	EFFICIENCY @ 7 MICRONS	QTY	TYPE	WIRE GUARD	LOCATION	SIZE	TYPE	SIZE			MODEL #	QUANTITY
1	33	CAPRATE SOLID FILTER	8	20"	16"	85% SEE FILTER SPEC	6	L55 SERIES E26	ND	RIGHT	12"x60"x30"	TANK FS	4.0/4.0	SC-311110MA	1 LIGHT 1 FAN	YES	1224 LBS

**HOOD OPTIONS**

HOOD NO	TAG	OPTION
1	33	FIELD WRAPPER 10.00" HIGH FRONT, LEFT, RIGHT. LEFT END STANDOFF (FINISHED) 1' WIDE 60" LONG INSULATED. RIGHT VERTICAL END PANEL 27" TOP WIDTH, 21" BOTTOM WIDTH, 80" HIGH INSULATED 430 SS.

**PERFORATED SUPPLY PLENUM(S)**

HOOD NO	TAG	POS	LENGTH	WIDTH	HEIGHT	TYPE	RISER(S)			
							WIDTH	LENG	DIA	CFM
1	33	Front	152"	24"	6"	MUA	12"	28"	721	0.196"
						MUA	12"	28"	721	0.196"
						MUA	12"	28"	721	0.196"
						AC	8"	16"	300	0.082"
						AC	8"	16"	300	0.082"

**GREASE DUCT & CHIMNEY SPECIFICATIONS:**  
PROVIDE GREASE DUCT EQUAL TO CAPTIVEAIRE SYSTEMS MODEL "DW" ROUND 20 GAUGE 430 STAINLESS STEEL DUCTWORK. MODEL "DW" IS LISTED TO UL-1978 AND IS INSTALLED USING "V" CLAMP LOCKING CONNECTIONS SEALED WITH 3M FIRE BARRIER 2000 PLUS. MODEL "DW" DOES NOT REQUIRE WELDING PROVIDING IT HAS BEEN INSTALLED PER THE MANUFACTURERS INSTALLATION GUIDE.  
PROVIDE RATED ACCESS DOORS AT EVERY CHANGE IN DIRECTION AND EVERY 12' ON CENTER. PER MANUFACTURERS LISTING MODEL "DW" HORIZONTAL RUNS LESS THAN 75 FT. CAN BE SLOPED 1/16" PER 12", HORIZONTAL RUNS MORE THAN 75 FT. CAN BE SLOPED 3/16" PER 12". DUCT SHOULD BE SLOPED AS MUCH AS POSSIBLE TO REDUCE THE CHANCE OF GREASE ACCUMULATION IN HORIZONTAL RUNS.

IF THE DUCT OR CHIMNEY IS WITHIN 18 INCHES OF COMBUSTIBLE MATERIAL, PROVIDE UL-2221 OR UL-103 HT LISTED DOUBLE WALL GREASE DUCT OR DOUBLE WALL CHIMNEY EQUAL TO CAPTIVEAIRE SYSTEMS MODEL "DW- 2R, 2R TYPE HT, 3R, OR 3Z" ROUND 20 GAUGE 430 STAINLESS INNER DUCT INSULATED WITH A 24 GAUGE 430 STAINLESS OUTER SHELL.

CAPTIVEAIRE SYSTEMS RECOMMENDS THE USE OF LISTED, PRE-FABRICATED ROUND GREASE EXHAUST DUCT TO REDUCE STATIC PRESSURE IN THE SYSTEM, MINIMIZE INSTALLATION AND INSPECTION TIMES, AND ENSURE DUCT IS LIQUID TIGHT

**VERIFY CEILING HEIGHT**

\_\_\_\_' - \_\_\_\_"

HEIGHT REQUIRED TO VERIFY THAT HOOD FITS SPACE AND TO SIZE THE ENCLOSURE PANELS

**HVAC DISTRIBUTION NOTE**

HIGH VELOCITY DIFFUSERS OR HVAC RETURNS SHOULD NOT BE PLACED WITHIN TEN (10) FEET OF THE EXHAUST HOOD. PERFORATED DIFFUSERS ARE RECOMMENDED.

**CUSTOMER APPROVAL TO MANUFACTURE:**

APPROVED AS NOTED

APPROVED WITH NO EXCEPTION TAKEN

REVISE AND RESUBMIT

SIGNATURE \_\_\_\_\_

YOUR TITLE \_\_\_\_\_ DATE \_\_\_\_\_

GAS VALVES AND STRAINERS															
TYPE	SIZE	VOLTAGE	GAS VALVE SIZING			GAS VALVE DIMENSIONS					INSTALLATION	PART NUMBERS			
			MIN. INLET PRESSURE	MAX. INLET PRESSURE	FLOW AT 1 IN.W.C. DROP NATURAL GAS	DIM "A"	DIM "B"	DIM "C"	DIM "D"	DIM "E"		DIM "F"	MOUNTING ORIENTATION	GAS VALVE PART NUMBER	STRAINER PART NUMBER
ELECTRICAL	1"	120 VAC	0 PSI (0 IN.W.C.)	5 PSI (138 IN.W.C.)	1,132,300 BTU/HR	6-15/16"	5-15/16"	4-7/8"	5-3/16"	12-13/16"	10-11/16"	HORIZONTAL	8214250	4417665	(SC)E0VA1

**ELECTRIC GAS VALVES ONLY:**

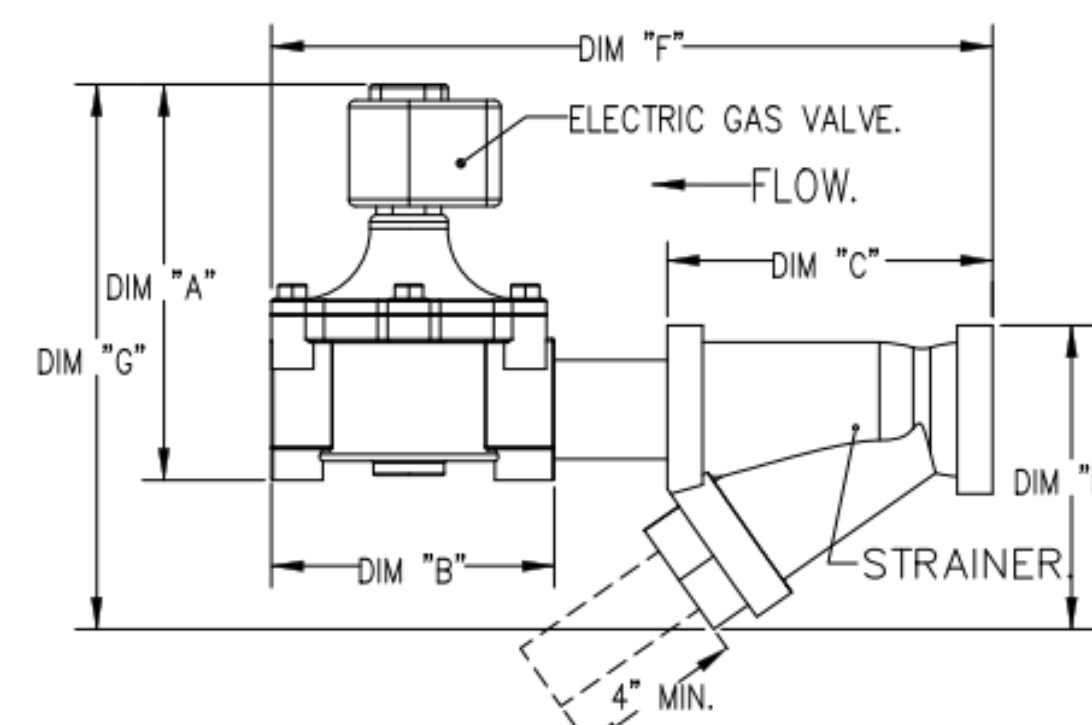
3/4"-2" 120VAC GAS VALVES CAN BE MOUNTED WITH THE SOLENOID IN ANY POSITION ABOVE HORIZONTAL.  
2 1/2"-3" 120VAC GAS VALVES MUST BE MOUNTED WITH THE SOLENOID VERTICAL AND UPRIGHT.  
24VDC GAS VALVES MUST BE MOUNTED WITH THE SOLENOID VERTICAL AND UPRIGHT.

**ALL GAS VALVES/STRAINERS**

PROPER CLEARANCE MUST BE PROVIDED IN ORDER TO SERVICE THE STRAINERS A MINIMUM OF 4" CLEARANCE DISTANCE MUST BE PROVIDED AT THE BASE OF THE STRAINER CUSTOMER MUST VERIFY BTU CONSUMPTION AS WELL AS PRESSURE RATING SPECIFIC GRAVITY OF NATURAL GAS = 0.64, SPECIFIC GRAVITY OF LP = 1.52.

**CALCULATIONS**

TO CALCULATE GAS FLOW FOR OTHER THAN 1 IN.W.C. PRESSURE DROP  
NEW BTU/HR = (BTU/HR AT 1 IN.W.C. PRESSURE DROP) X NEW PRESSURE DROP<sup>0.5</sup>  
TO CALCULATE GAS FLOW FOR OTHER THAN 0.64 SPECIFIC GRAVITY  
NEW BTU/HR = (BTU/HR AT 0.64) X (0.64 / NEW SPECIFIC GRAVITY)<sup>0.5</sup>



**SPECIFICATION: CAPRATE® GREASE-STOP® SOLID FILTER**

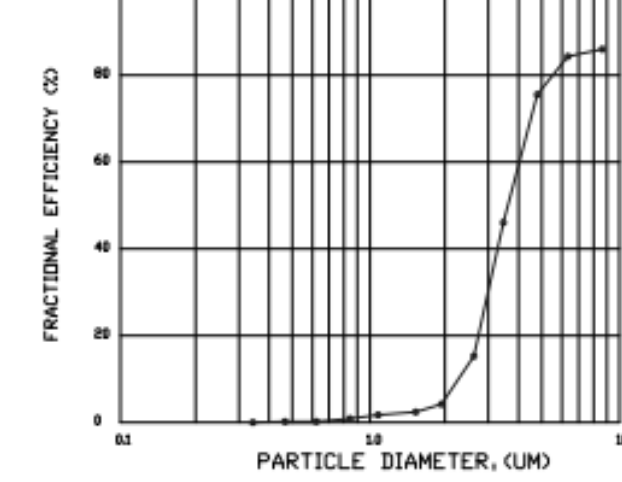
THE CAPRATE GREASE-STOP SOLID FILTER IS A SINGLE-STAGE FILTER FEATURING A UNIQUE S-BAFFLE DESIGN IN CONJUNCTION WITH A SLOTTED REAR BAFFLE DESIGN, TO DELIVER EXCEPTIONAL FILTRATION EFFICIENCY.

FILTER IS STAINLESS STEEL CONSTRUCTION, AND SIZED TO FIT INTO STANDARD 2-INCH DEEP HOOD CHANNEL(S).

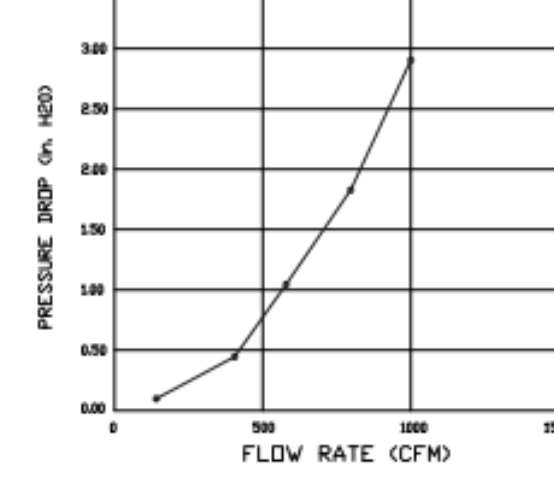
UNITS SHALL INCLUDE STAINLESS STEEL HANDLES AND A FASTENING DEVICE TO SECURE THE TWO COMPONENTS WHEN ASSEMBLED.

GREASE EXTRACTION EFFICIENCY PERFORMANCE SHALL REMOVE AT LEAST 75% OF GREASE PARTICLES FIVE MICRONS IN SIZE, AND 85% GREASE PARTICLES SEVEN MICRONS IN SIZE AND LARGER, WITH A CORRESPONDING PRESSURE DROP NOT TO EXCEED 1.0 INCHES OF WATER GAUGE. THE CAPRATE GREASE-STOP SOLID WAS TESTED TO ASTM STANDARD ASTM F2519-05. MANUFACTURER APPROVED FOR USE IN SOLID FUEL APPLICATIONS AS A SPARK ARRESTER.

**EFFICIENCY VS. PARTICLE DIAMETER**



**PRESSURE DROP VS. FLOW RATE**



CAPRATE FILTERS ARE BUILT IN COMPLIANCE WITH:  
NFPA #96  
NSF STANDARD #2  
UL STANDARD #1046  
INT. MECH. CODE (IMC).  
ULC-S649.



REVISIONS	
DESCRIPTION	DATE



www.captiveaire.com  
Maryland Office  
8120 Woodmont Avenue, Suite 720, Bethesda, MD, 20814  
PHONE: (800) 988-0881  
FAX: (301) 922-9531  
EMAIL: reg32@captiveaire.com

Cava - Chicago, IL (STREETERVILLE)  
270 East Ontario Street,  
Chicago, IL, 60611

DATE: 9/24/2024

DWG.#: 7020062

DRAWN BY: ABS-76

SCALE: NTS

MASTER DRAWING

SHEET NO. 1

ferris+sloane  
100 N. Howard Street, Suite 4585 Spokane, WA 99201



**CAVA**

CAVA #00000  
270 E ONTARIO STREET  
STREETERVILLE, ILLINOIS, 60611  
FOR CAVA  
14 Ridge Square NW #500, WASHINGTON, DC 20016

AOR PROJECT NUMBER: CAV061

ISSUE	DATE
PERMIT SET	10/09/2024
LANDLORD/BID	11/08/2024
CONSTRUCTION SET	01/29/2025

MECHANICAL SCHEDULES

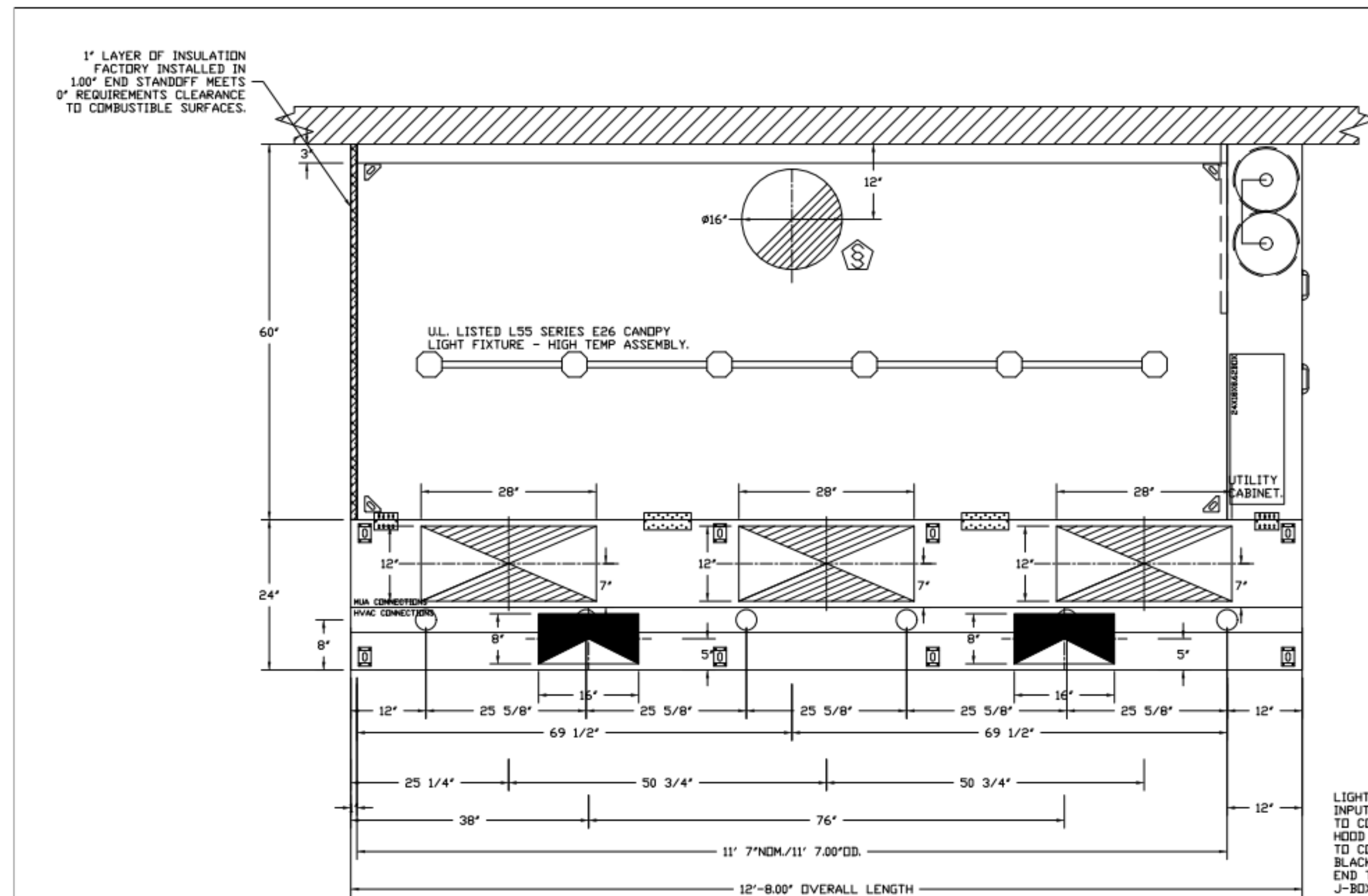
SHEET:

**M601**



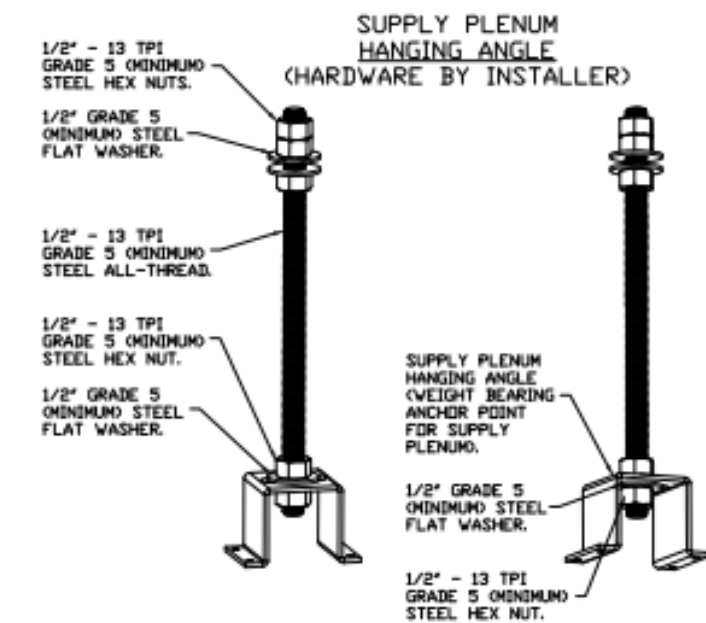
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PLAN VIEW - HOOD #1 (33)  
11' 7.00\"/>

ACPSP SHIPS LOOSE FOR FIELD INSTALLATION



**ASSEMBLY INSTRUCTIONS**

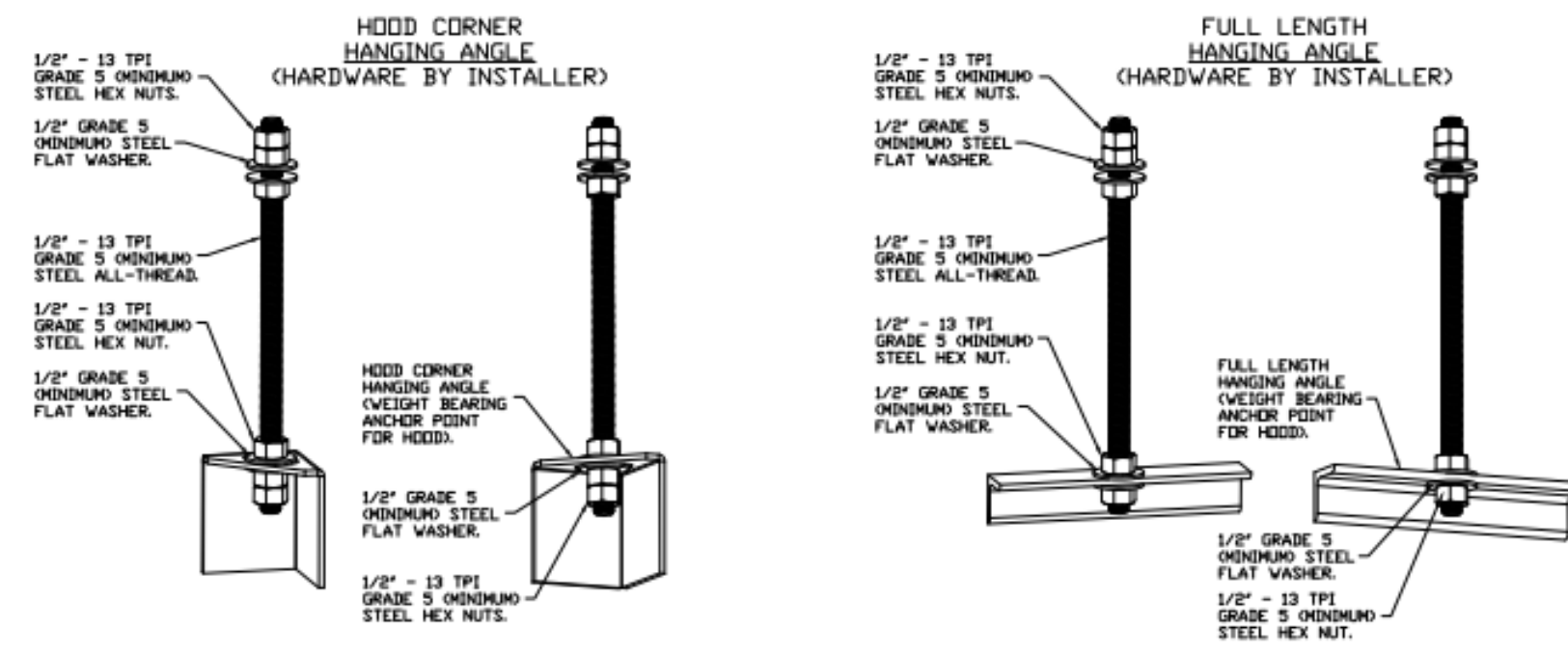
HANGING ANGLE MUST BE SUPPORTED WITH 1/2\"/>

**CLEARANCE TO COMBUSTIBLES**

HOODS #	SURFACE	*CLEARANCE
1	TOP	18"
	FRONT	0"
	BACK	18"
	LEFT	0"
	RIGHT	0"

- \*0\"/>

LIGHTING FOR ACPSP JOB # 7020062 - HOOD #1  
INPUT: 120V AC, 1 PHASE, 50/60HZ, 35 WATTS PER LIGHT.  
TO CONTROL LIGHTS WITH HOOD LIGHT SWITCH, WIRE PER  
HOOD ELECTRICAL CONTROL PANEL SCHEMATIC.  
TO CONTROL LIGHTS WITH BUILDING LIGHT SWITCH, WIRE  
BLACK AND WHITE WIRE TO A 120VAC SERVICE.  
END TO END ACPSPS REQUIRE 120VAC FIELD WIRING FROM  
J-BOX TO J-BOX. REPLACE LIGHTS WITH LED LIGHTS ONLY.

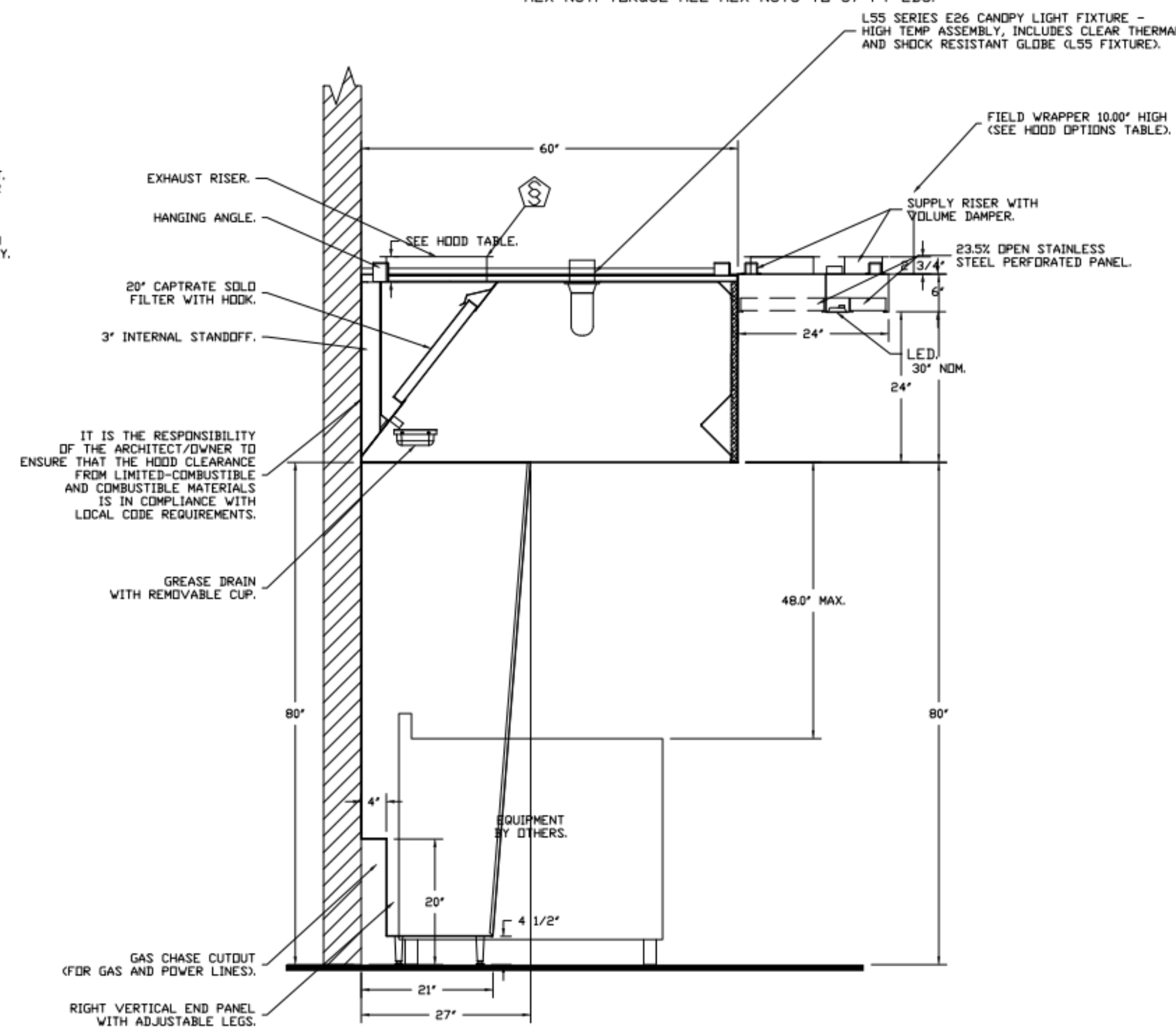


**ASSEMBLY INSTRUCTIONS**

HANGING ANGLE MUST BE SUPPORTED WITH 1/2\"/>

**ASSEMBLY INSTRUCTIONS**

HANGING ANGLE MUST BE SUPPORTED WITH 1/2\"/>



SECTION VIEW - MODEL 6030ND-2-ACPSP-F  
HOOD - #1 (33)

**REVISIONS**

DESCRIPTION	DATE

**CAPTIVE**  
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Maryland Office  
8120 Woodmont Avenue, Suite 720, Bethesda, MD, 20814  
PHONE: (800) 988-0881 FAX: 301-927-5931 EMAIL: reg32@captiveair.com

Cava - Chicago, IL [STREETVILLE]  
270 East Ontario Street,  
Chicago, IL, 60611

DATE: 9/24/2024

DWG.#:  
7020062

DRAWN BY: ABS-76

SCALE:  
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SHEET NO.  
2

ferris+sloane  
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CAVA #00000

**CAVA**

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STREETVILLE, ILLINOIS, 60611  
FOR CAVA  
14 Ridge Square NW #500, WASHINGTON, DC 20016

AOR PROJECT NUMBER:  
CAV061

ISSUE DATE

PERMIT SET 10/09/2024  
LANDLORD/BID 11/08/2024  
CONSTRUCTION 01/29/2025  
SET

MECHANICAL SCHEDULES

SHEET:

**M602**

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**rtm**  
engineering consultants  
2800 156th Ave SE | Suite 115 Bellevue, WA 98007  
T: 847.756.4100 | www.rtmec.com

1/29/2025 12:19:43 PM

FIRE SYSTEM INFORMATION - JOB#7020062

Table with columns: FIRE SYSTEM NO, TAG, TYPE, SIZE, MAX FP, DESIGN FP, INSTALLATION SYSTEM, LOCATION ON HOOD. Row 1: 1, TANK FS, 4.0/4.0, 40, 37, FIRE CABINET RIGHT, RIGHT, HOOD 1

GAS VALVE(S)

Table with columns: FIRE SYSTEM NO, TAG, TYPE, SIZE, SUPPLIED BY. Row 1: 1, SC ELECTRICAL, 1.000, CAPTIVEAIR SYSTEMS

FIRE SYSTEM PARTS LIST KEY

Table with columns: FIRE SYSTEM NO, TAG, KEY NUMBER - PART DESCRIPTION, QTY BY FACTORY, QTY BY DIST. Lists various fire suppression components like tanks, actuators, hoses, and piping.

NOTES

- FIELD PIPE DROPS AS SHOWN
- PIPING, ELBOWS, TEES, AND NOZZLES SUPPLIED BY CAS.
- FIELD INSTALLED DROP: FACTORY WILL PROVIDE QTY 2 60IN LONG PIECES OF CHROME PLATED PIPING SHIPPED LOOSE TO BE FIELD-INSTALLED.

JOB #: 7020062
JOB NAME: CAVA - CHICAGO, IL [STREETERVILLE].

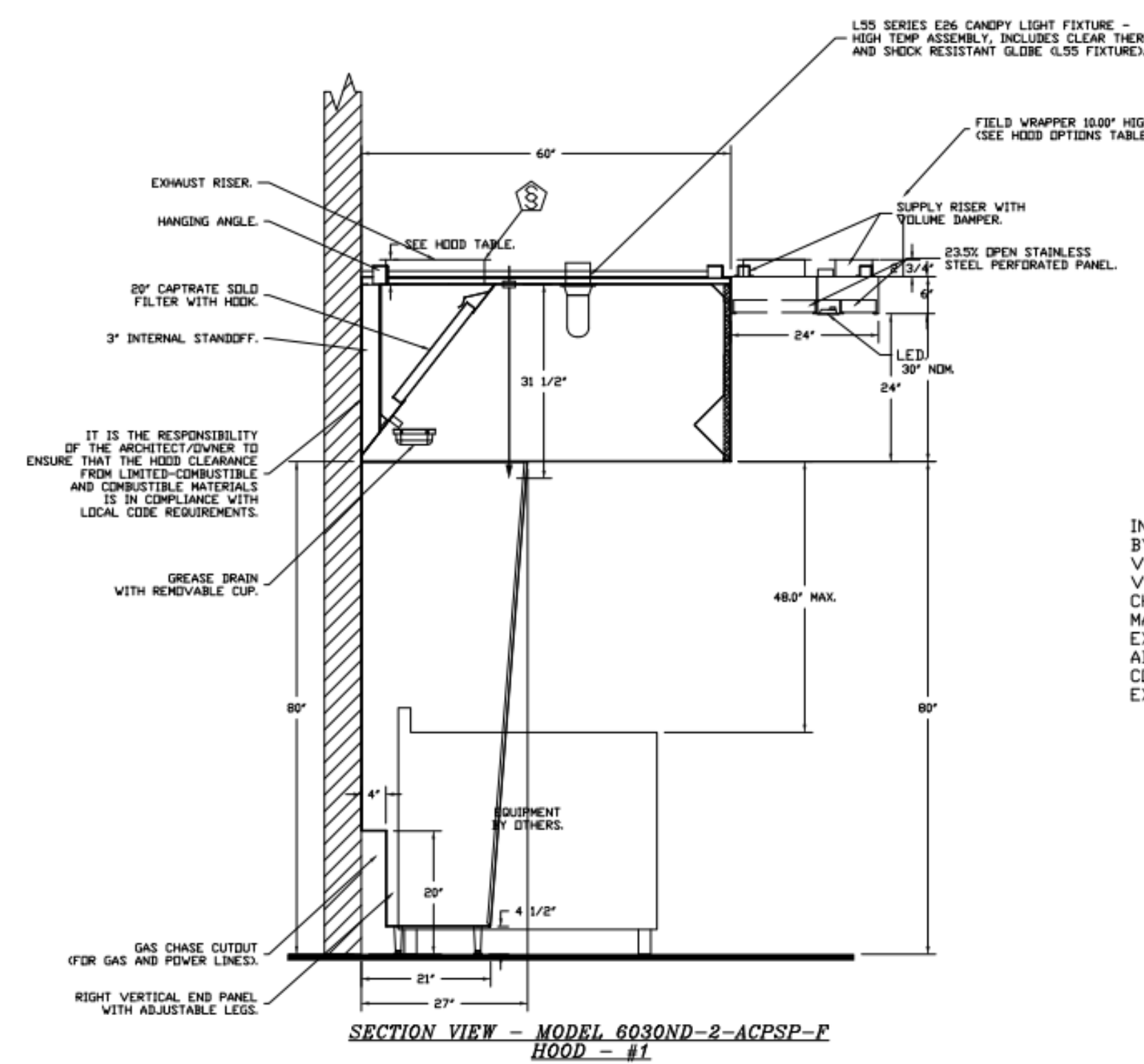
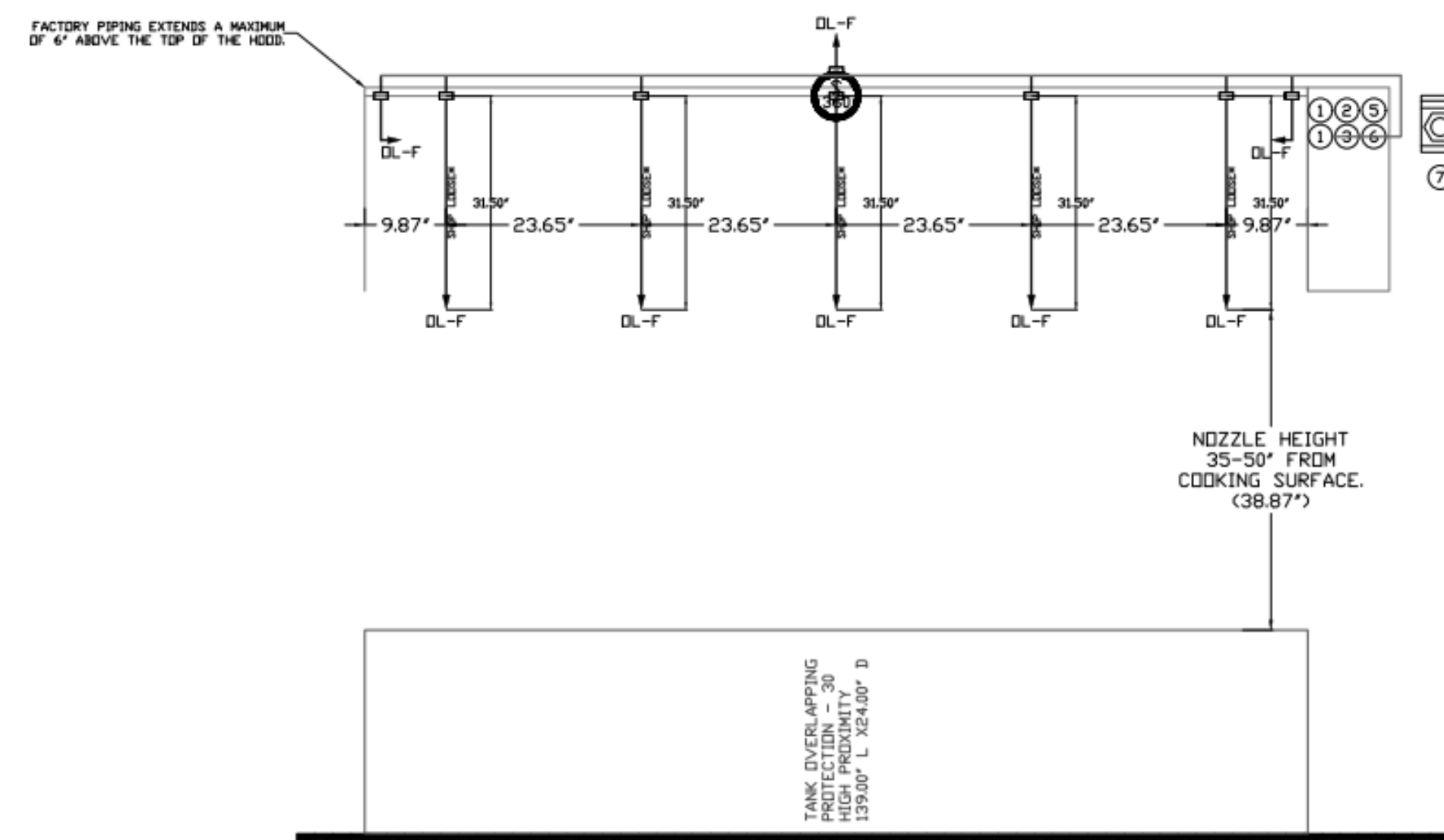
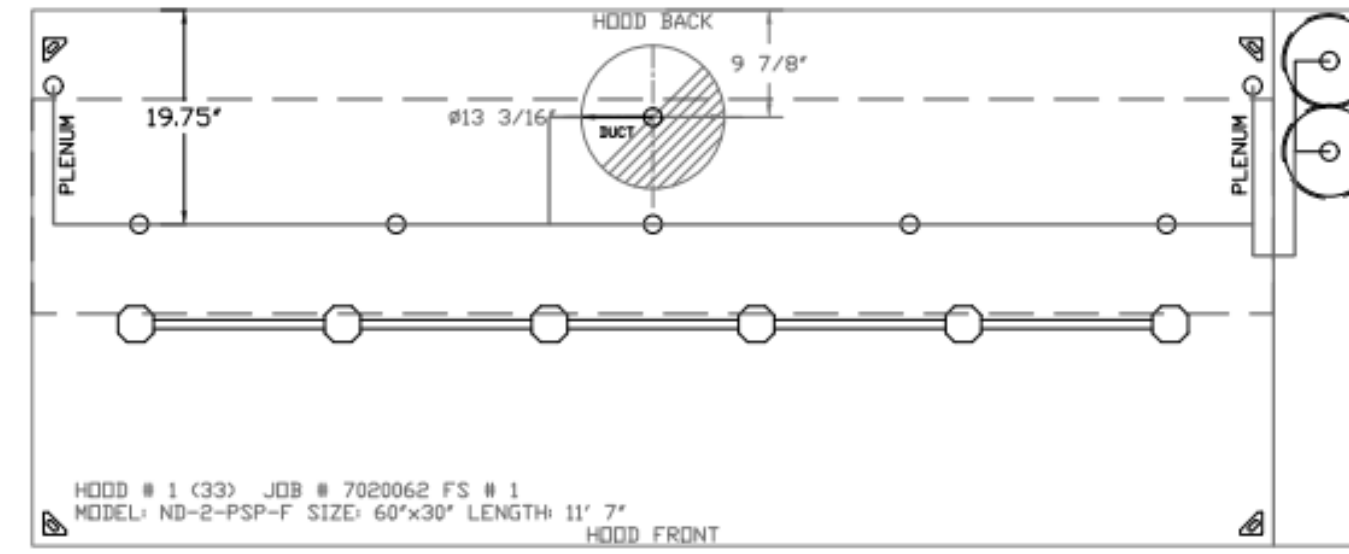
SYSTEM SIZE: TANK-SP-2 DESIGN FP: 37, MAXIMUM FP: 40.
HOOD # 1 11' 7.00" LONG x 60" WIDE x 30" HIGH.
RISER # 1 SIZE: 16" DIA.
HOOD # 1 METAL BLOW-OFF CAPS INCLUDED.

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

Table: AGENT DISTRIBUTION PIPING LIMITATIONS. Columns: PIPE SECTION, MAX PIPE LENGTH (FT). Rows: MAX SUPPLY LINE TO FIRST OVERLAPPING NOZZLE (42), OVERLAPPING NOZZLE APPLIANCE BRANCH (10), DEDICATED NOZZLE APPLIANCE BRANCH (10)

LEGEND - FIRE CABINET TANK SYSTEM

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



SYSTEM REQUIRES A MINIMUM OF 7 FT OF EQUIVALENT PIPE LENGTH BETWEEN TANK AND NEAREST APPLIANCE NOZZLE FOR MOST APPLIANCES. EACH 90 DEGREE ELBOW ADDS 1.3 FT OF EQUIVALENT LENGTH. SEE MANUAL FOR DETAILS.

REVISIONS table with columns: DESCRIPTION, DATE. Contains three revision entries.



Cava - Chicago, IL [STREETERVILLE]
270 East Ontario Street,
Chicago, IL, 60611

DATE: 9/24/2024
DWG.#: 7020062
DRAWN BY: ABS-76
SCALE: NTS
MASTER DRAWING
SHEET NO. 3

ferris+sloane
100 N. Howard Street, Suite 450, Spokane, WA 99201

CAVA #00000

270 E ONTARIO STREET
STREETERVILLE, ILLINOIS, 60611

FOR CAVA
14 Ridge Square NW #500, WASHINGTON, DC 20016

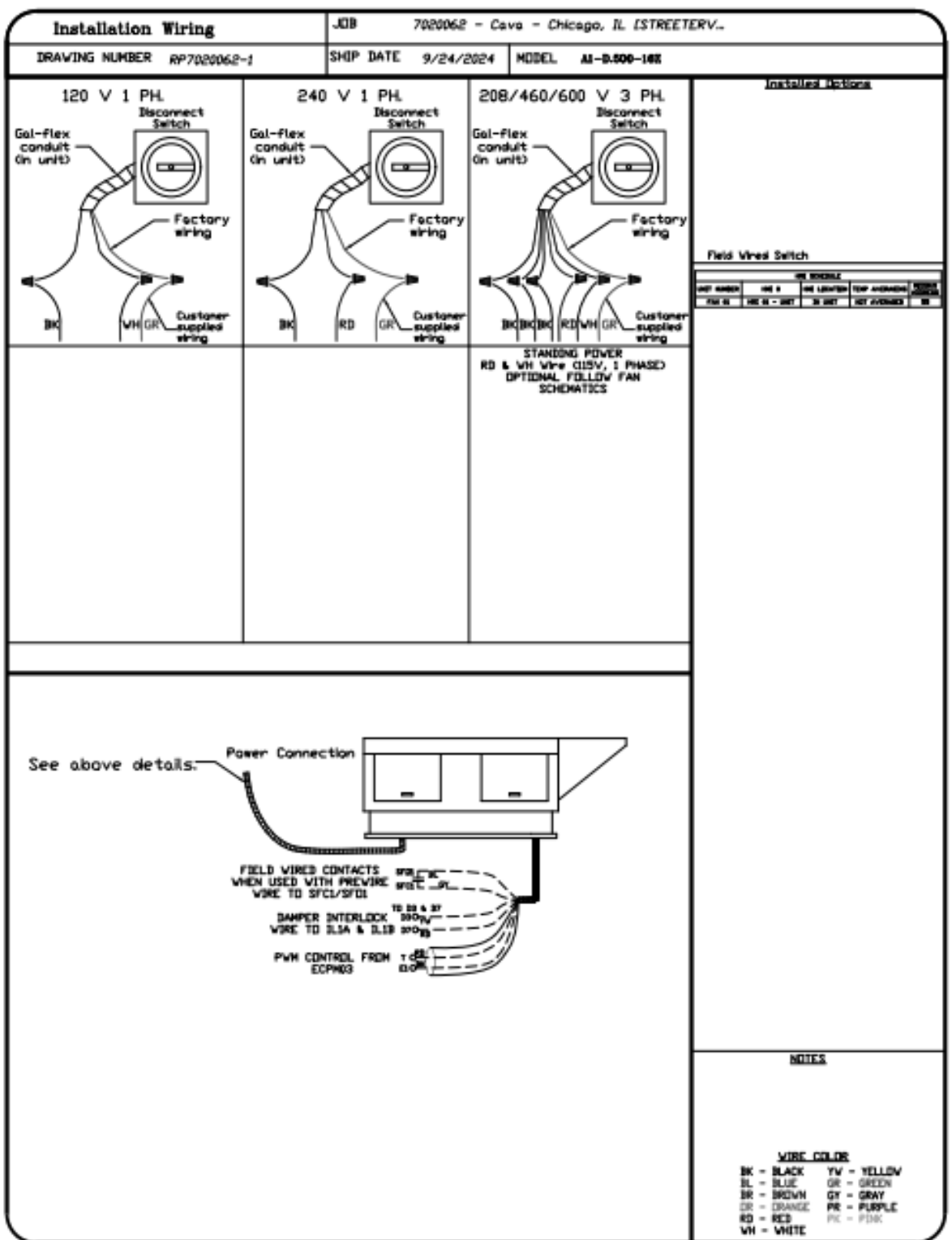
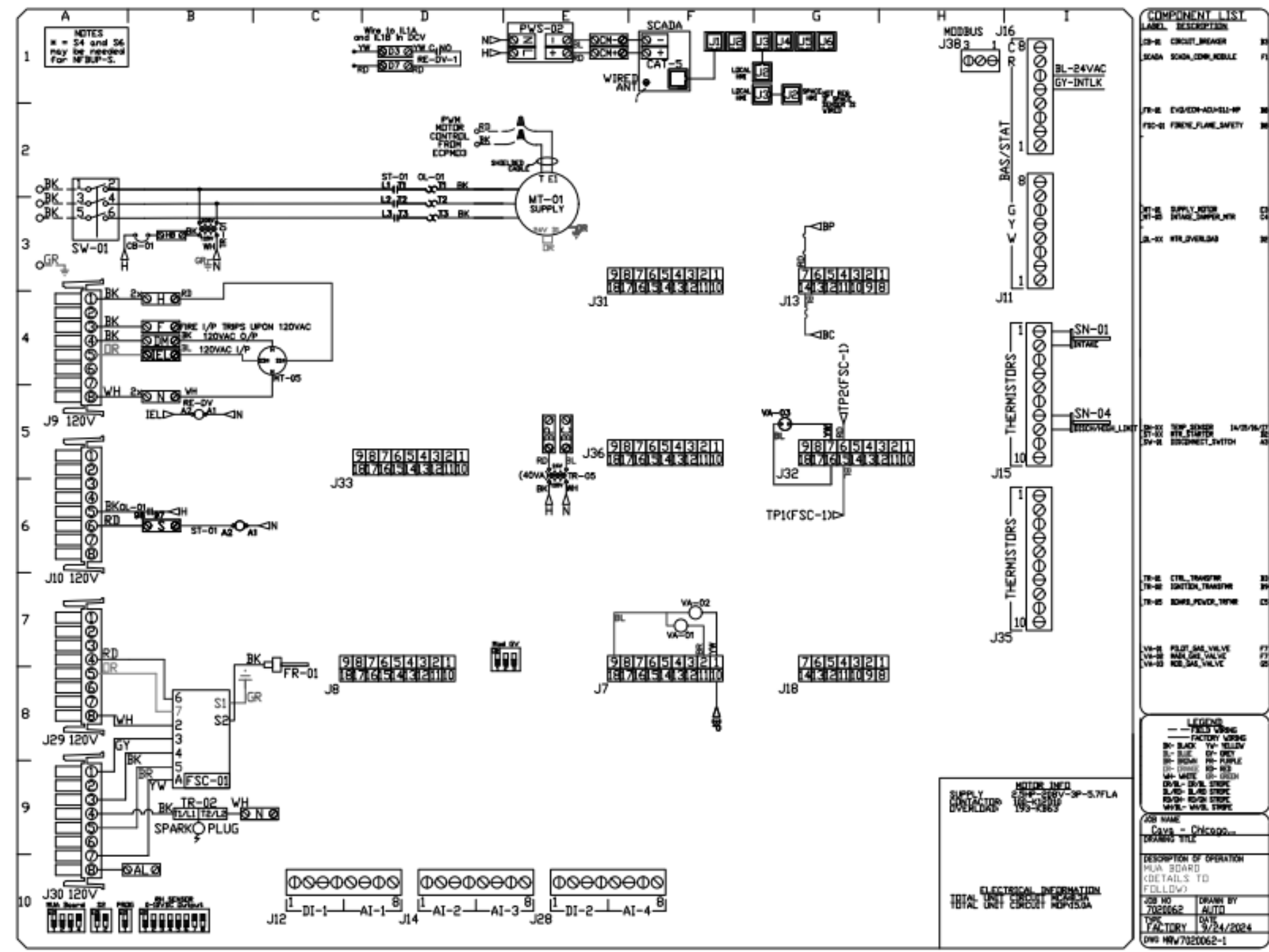
Table with columns: ADR PROJECT NUMBER (CAV061), ISSUE, DATE. Includes permit set and construction dates.

MECHANICAL SCHEDULES
SHEET:
M603

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REVISIONS	
DESCRIPTION	DATE



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Cava - Chicago, IL [STREETERVILLE]  
270 East Ontario Street,  
Chicago, IL, 60611

DATE: 9/24/2024  
DWG.#: 7020062  
DRAWN BY: ABS-76  
SCALE: NTS  
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ferris+sloane  
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270 E ONTARIO STREET  
STREETERVILLE, ILLINOIS, 60611  
FOR CAVA  
14 Ridge Square NW #500, WASHINGTON, DC 20016

AOR PROJECT NUMBER: CAV061

ISSUE	DATE
PERMIT SET	10/09/2024
LANDLORD/BID	11/08/2024
CONSTRUCTION SET	01/29/2025

MECHANICAL SCHEDULES

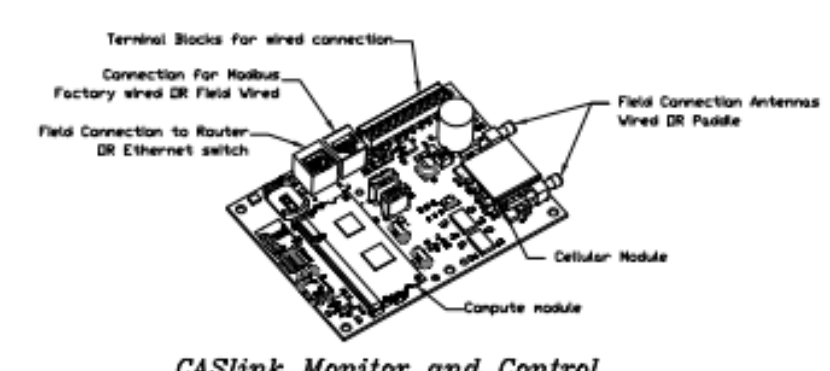
SHEET: M605

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**ELECTRICAL PACKAGE - JOB#7020062**

NO	TAG	PACKAGE #	LOCATION	SWITCHES		OPTION	FANS CONTROLLED				
				LOCATION	QUANTITY		TYPE	#	HP	VOL	FLA
1		SC-31110MA	UTILITY CABINET RIGHT	UTILITY CABINET RIGHT	1 LIGHT	SMART CONTROLS THERMOSTATIC CONTROL V/ RELAY ON/OFF WITH SUPPLY	SUPPLY	3	2.500	208	5.7
				HOOD # 1	1 FAN		EXHAUST	3	0.250	208	1.2

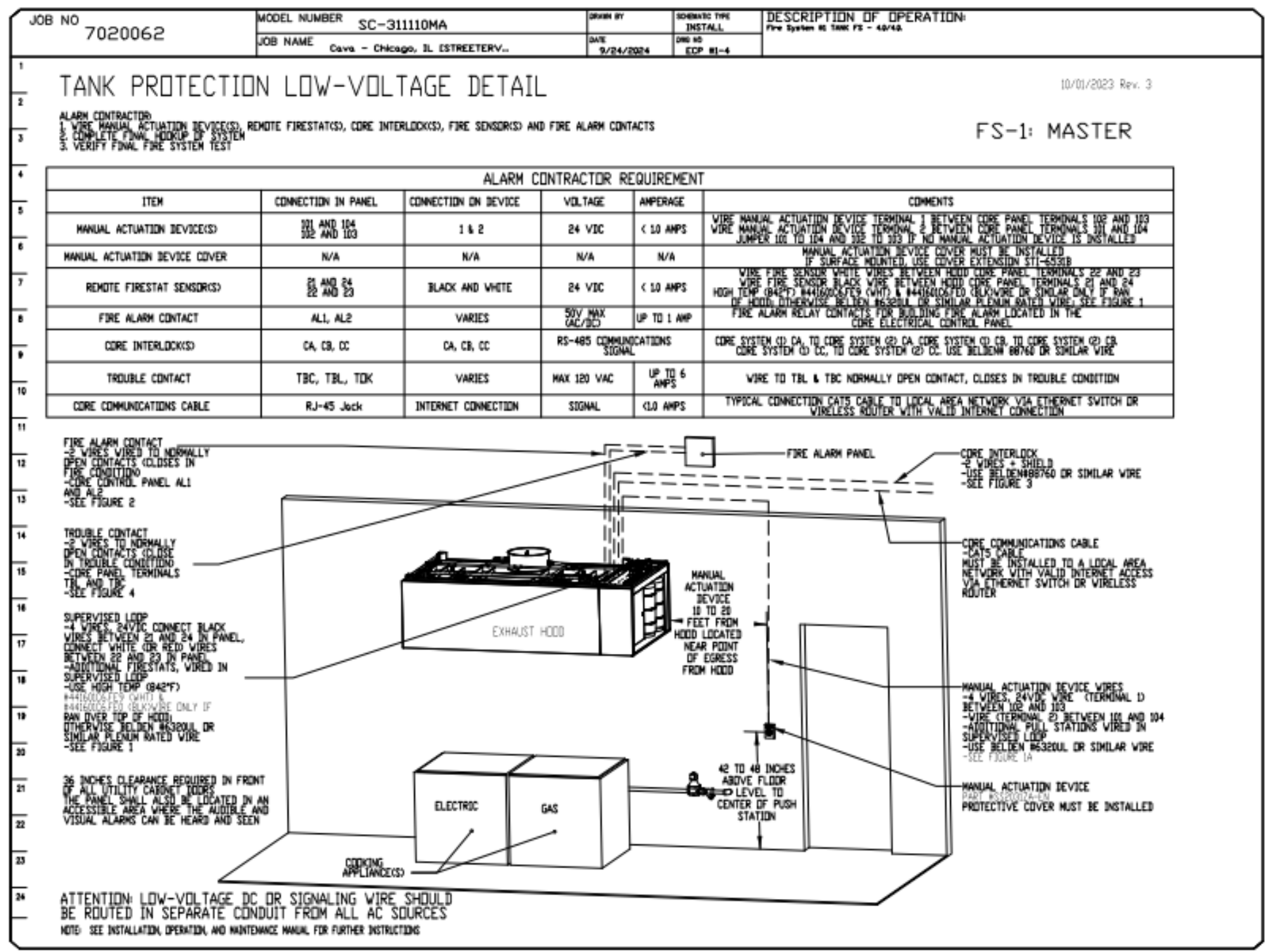
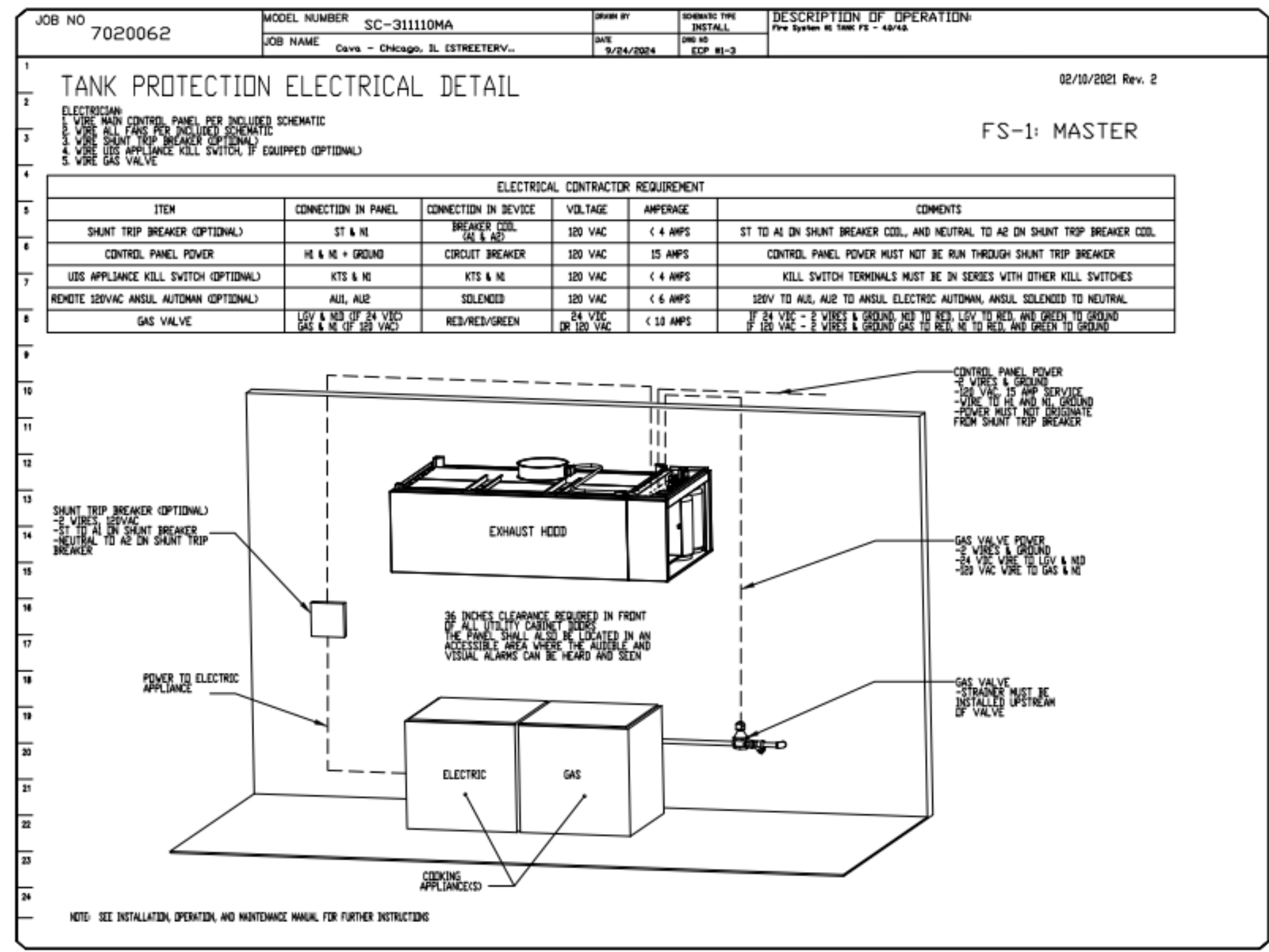
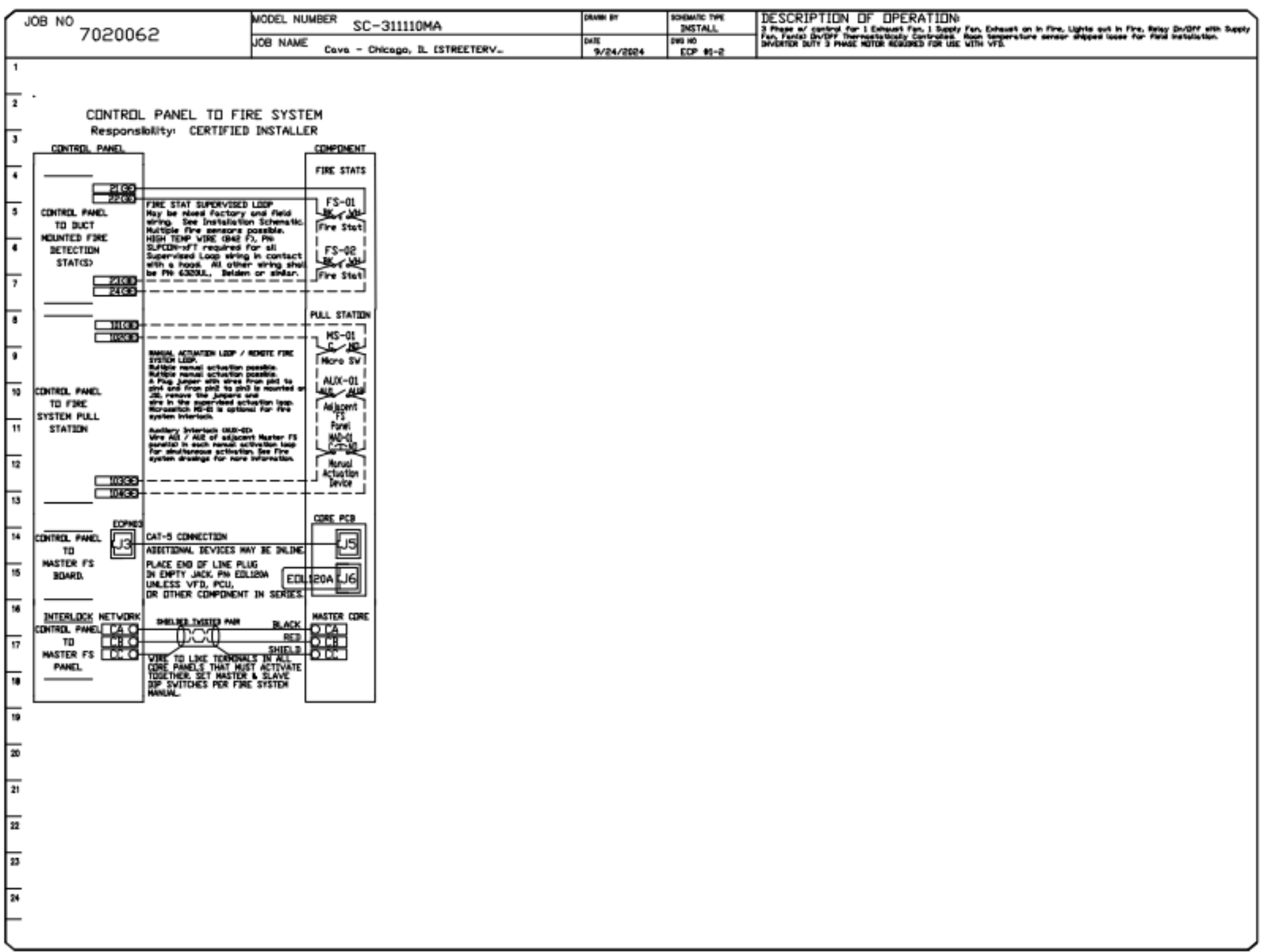
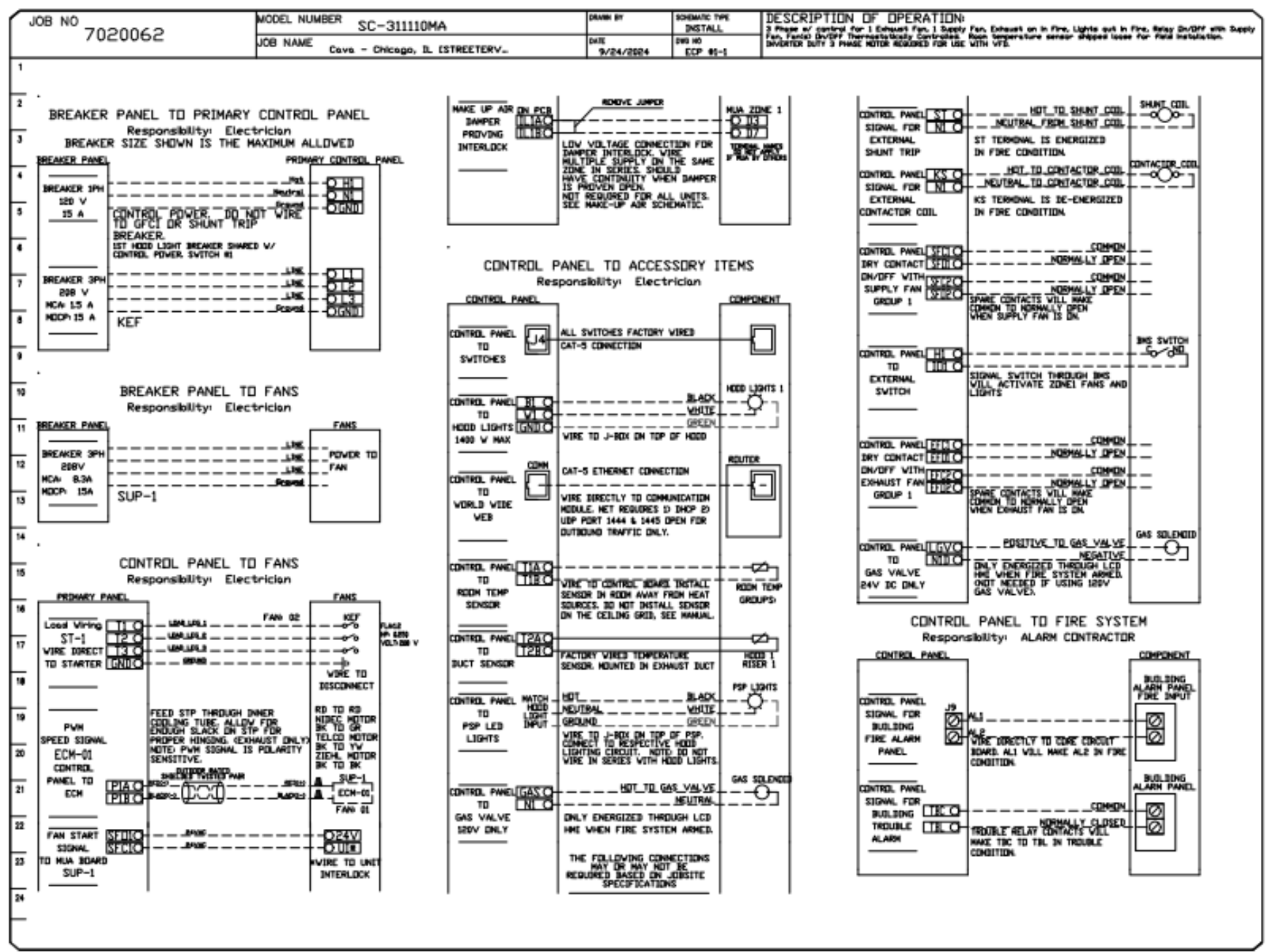


**CASink Monitor and Control**

- Hood control panel to support communications to cloud-based Building Management System.
- Hood Control Panel to allow cloud-based Building Management System to monitor real time parameters outlined as MONITOR in the points list.
- Hood Control Panel to allow cloud-based Building Management System to control parameters outlined as CONTROL in the points list.
- Hood Control Panel to allow cloud-based Building Management System to implement SYSTEM ECONOMIZER control strategies for fully integrated Building Management.

**MONITORING AND CONTROL POINTS LIST**

DCV Packages	Function	AC Packages	Function
Room Temperature	MONITOR	Room Temperature(s)	MONITOR
Roof Temperature(s)	MONITOR	Roof Temperature(s)	MONITOR
Roof Discharge Temperature	MONITOR	Roof Discharge Temperature	MONITOR
Exhaust RTV Discharge Temperature	MONITOR	Exhaust RTV Discharge Temperature	MONITOR
Fan Amperage	MONITOR	Exhauster Fan(s)	MONITOR
Fan Speed	MONITOR	Fan Status	MONITOR
Fan Power	MONITOR	Fan Power	MONITOR
Fan Pressure	MONITOR	PCV Filter Chg Percentage	MONITOR
Control Panel	MONITOR	Fan Condition	MONITOR
Fan Status	MONITOR	Exhaust Fan System	MONITOR
PCV Filter Chg Percentage	MONITOR	Building Pressure	MONITOR
Fan Condition	MONITOR	Fan Status(s)	MONITOR & CONTROL
PCV Filter Chg Percentage	MONITOR	Light(s) Status(s)	MONITOR & CONTROL
Fan Condition	MONITOR	Flash Status	MONITOR & CONTROL
Exhaust Fan System	MONITOR		
Prep Time Button	MONITOR & CONTROL		
Fan Button	MONITOR & CONTROL		
Light Button	MONITOR & CONTROL		
Flash Button	MONITOR & CONTROL		



**REVISIONS**

NO.	DESCRIPTION	DATE
1		
2		
3		
4		

**CAPTIVE**

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8120 Woodmont Avenue, Suite 720, Bethesda, MD, 20814  
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DATE: 9/24/2024  
DWG.#: 7020062  
DRAWN BY: ABS-76  
SCALE: NTS  
MASTER DRAWING

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100 N. Howard Street, Suite 450, Spokane, WA 99201

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AOR PROJECT NUMBER:  
CAV061

ISSUE DATE

PERMIT SET 10/09/2024  
LANDLORD/BID 11/08/2024  
CONSTRUCTION 01/29/2025  
SET

MECHANICAL SCHEDULES

SHEET:

**M606**

FOR REFERENCE ONLY



## SPECIFICATIONS - DIVISION 23 - HVAC

### SECTION 230600 - GENERAL MECHANICAL REQUIREMENTS:

HVAC SUBCONTRACTOR SHALL PROVIDE A BID OF PREVENTATIVE MAINTENANCE SERVICES FOR ONE YEAR AT TIME OF BID.

FURNISH TO THE OWNER ALL OPERATING & MAINTENANCE MANUALS, RECORD DRAWINGS, TEST & BALANCE REPORT, CONTRACTOR SHALL COORDINATE WITH MANUFACTURER REPRESENTATIVES FOR EMPLOYEE TRAINING REQUIREMENTS FOR ALL EQUIPMENT.

MECHANICAL CONTRACTOR SHALL SUBMIT COMPLIANCE CHECKLIST TO BUILDING OFFICIAL UPON SUBSTANTIAL COMPLETION OF PROJECT. PROVIDE EQUIPMENT INDICATED ON THE DRAWINGS, AND AS REQUIRED FOR A COMPLETE FUNCTIONING SYSTEM.

DEFINITIONS:  
FURNISH MEANS TO SUPPLY AND DELIVER TO PROJECT SITE, READY FOR INSTALLATION.  
INSTALL MEANS TO PLACE IN POSITION AND MAKE CONNECTIONS FOR SERVICE OR USE.  
PROVIDE MEANS TO FURNISH AND INSTALL, COMPLETE AND READY FOR INTENDED USE.

WARRANTY:  
PROVIDE LABOR AND MATERIALS TO REPAIR OR REPLACE DEFECTIVE PARTS AND MATERIALS AS REQUIRED FOR ONE YEAR AFTER SUBSTANTIAL COMPLETION OR OWNER ACCEPTANCE OF THE COMPLETED PROJECT. PROVIDE A SEPARATE LINE ITEM DEDUCT AMOUNT ON THE PROPOSAL FORM TO DELETE WARRANTY SERVICE, AT THE OWNER'S OPTION. CONTRACTOR SHALL INCLUDE ONE YEAR WARRANTY ON OWNER FURNISHED EQUIPMENT. CONTRACTOR SHALL INCLUDE COSTS FOR RECEIVING, HANDLING, STORAGE, AND HOISTING OF OWNER FURNISHED EQUIPMENT.

COORDINATION:  
COORDINATE WITH THE WORK OF OTHER SECTIONS, EQUIPMENT FURNISHED BY OTHERS, REQUIREMENTS OF THE OWNER, AND WITH THE CONSTRAINTS OF THE EXISTING CONDITIONS OF THE PROJECT SITE.

DUCT DIMENSIONS:  
UNLESS OTHERWISE NOTED, DUCT DIMENSIONS ON THE DRAWINGS ARE INSIDE CLEAR DIMENSIONS.

MAKE-UP AIR UNIT:  
UNIT SHALL HAVE AN INTEGRAL DISCHARGE THERMOSTAT LINKED TO THE INTERNAL CONTROLS. THE HEATER SHALL BE SET TO MAINTAIN DUCT SUPPLY TEMPERATURE AT NO LESS THAN 65 DEG. F. (ADJ.). HIGH LIMIT SWITCH SET TO 180 DEG. F. INTAKE AIR SENSOR SET TO 10 DEG. F. (ADJ.) LOWER THAN DISCHARGE AIR SENSOR.

TEMPERATURE CONTROLS:  
PROVIDE PROGRAMMABLE THERMOSTATS WITH REMOTE TEMPERATURE SENSORS AND REMOTE HUMIDISTATS COMPATIBLE WITH ROOFTOP UNIT. CONTROL WIRING SHALL BE INSTALLED IN CONDUIT. THERMOSTAT SHALL MEET SETPOINT ADJUSTMENT FOR UNOCCUPIED MODE; HEATING DOWN TO 55 DEGREES AND COOLING UP TO 85 DEGREES. PROVIDE INTERLOCK CONTROL WIRING BETWEEN HOOD EXHAUST FANS AND ROOFTOP UNITS.

END OF SECTION

### SECTION 230593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

#### PART 1 - GENERAL

##### 1.1 SECTION REQUIREMENTS

##### A. SUBMITTALS:

1. CERTIFIED TAB REPORTS.
- B. TAB FIRM QUALIFICATIONS: NBC CERTIFIED.
- C. TAB REPORT FORMS: STANDARD TAB CONTRACTOR'S FORMS APPROVED BY ARCHITECT.

#### PART 2 - PRODUCTS (NOT USED)

#### PART 3 - EXECUTION

##### 3.1 EXAMINATION

- A. EXAMINE THE CONTRACT DOCUMENTS TO BECOME FAMILIAR WITH PROJECT REQUIREMENTS AND TO DISCOVER CONDITIONS IN SYSTEMS' DESIGNS THAT MAY PRECLUDE PROPER TAB OF SYSTEMS AND EQUIPMENT.
- B. EXAMINE THE APPROVED SUBMITTALS FOR HVAC SYSTEMS AND EQUIPMENT.
- C. EXAMINE SYSTEMS FOR INSTALLED BALANCING DEVICES, SUCH AS TEST PORTS, GAGE COCKS, THERMOMETER WELLS, FLOW-CONTROL DEVICES, BALANCING VALVES AND FITTINGS, AND MANUAL VOLUME DAMPERS. VERIFY THAT LOCATIONS OF THESE BALANCING DEVICES ARE ACCESSIBLE.
- D. EXAMINE SYSTEM AND EQUIPMENT INSTALLATIONS AND VERIFY THAT FIELD QUALITY-CONTROL TESTING, CLEANING, AND ADJUSTING SPECIFIED IN INDIVIDUAL SECTIONS HAVE BEEN PERFORMED.
- E. EXAMINE HVAC EQUIPMENT AND FILTERS AND VERIFY THAT BEARINGS ARE GREASED, BELTS ARE ALIGNED AND TIGHT, AND EQUIPMENT WITH FUNCTIONING CONTROLS IS READY FOR OPERATION.
- F. EXAMINE TERMINAL UNITS, SUCH AS VARIABLE-AIR-VOLUME BOXES, AND VERIFY THAT THEY ARE ACCESSIBLE AND THEIR CONTROLS ARE CONNECTED AND FUNCTIONING.

##### G. EXAMINE AUTOMATIC TEMPERATURE SYSTEM COMPONENTS TO VERIFY THE FOLLOWING:

1. DAMPERS, VALVES, AND OTHER CONTROLLED DEVICES ARE OPERATED BY THE INTENDED CONTROLLER.
  2. DAMPERS AND VALVES ARE IN THE POSITION INDICATED BY THE CONTROLLER.
  3. INTEGRITY OF DAMPERS AND VALVES FOR FREE AND FULL OPERATION AND FOR TIGHTNESS OF FULLY CLOSED AND FULLY OPEN POSITIONS. THIS INCLUDES DAMPERS IN MULTIZONE UNITS, MIXING BOXES, AND VARIABLE-AIR-VOLUME TERMINALS.
  4. AUTOMATIC MODULATING AND SHUTOFF VALVES, INCLUDING TWO-WAY VALVES AND THREE-WAY MIXING AND DIVERTING VALVES, ARE PROPERLY CONNECTED.
  5. THERMOSTATS AND HUMIDISTATS ARE LOCATED TO AVOID ADVERSE EFFECTS OF SUNLIGHT, DRAFTS, AND COLD WALLS.
  6. SENSORS ARE LOCATED TO SENSE ONLY THE INTENDED CONDITIONS.
  7. SEQUENCE OF OPERATION FOR CONTROL MODES IS ACCORDING TO THE CONTRACT DOCUMENTS.
  8. CONTROLLER SET POINTS ARE SET AT INDICATED VALUES.
  9. INTERLOCKED SYSTEMS ARE OPERATING.
  10. CHANGEOVER FROM HEATING TO COOLING MODE OCCURS ACCORDING TO INDICATED VALUES.
- H. REPORT DEFICIENCIES DISCOVERED BEFORE AND DURING PERFORMANCE OF TEST AND BALANCE PROCEDURES.

##### 3.2 GENERAL PROCEDURES FOR TESTING AND BALANCING

- A. PERFORM TESTING AND BALANCING PROCEDURES ON EACH SYSTEM ACCORDING TO THE PROCEDURES CONTAINED IN AABC'S "NATIONAL STANDARDS FOR TOTAL SYSTEM BALANCE", NBC, ASHRAE 111, NEBB'S "PROCEDURAL STANDARDS FOR TESTING, ADJUSTING, AND BALANCING OF ENVIRONMENTAL SYSTEMS" OR SMACNA'S "HVAC SYSTEMS - TESTING, ADJUSTING, AND BALANCING" AND IN THIS SECTION.
- B. CUT INSULATION, DUCTS, PIPES, AND EQUIPMENT CABINETS FOR INSTALLATION OF TEST PROBES TO THE MINIMUM EXTENT NECESSARY FOR TAB PROCEDURES. AFTER TESTING AND BALANCING, PATCH PROBE HOLES IN DUCTS WITH SAME MATERIAL AND THICKNESS AS USED TO CONSTRUCT DUCTS. INSTALL AND JOIN NEW INSULATION THAT MATCHES REMOVED MATERIALS. RESTORE INSULATION, COVERINGS, VAPOR BARRIER, AND FINISH.
- C. MARK EQUIPMENT AND BALANCING DEVICES, INCLUDING DAMPER-CONTROL POSITIONS, VALVE POSITION INDICATORS, FAN-SPEED-CONTROL LEVERS, AND SIMILAR CONTROLS AND DEVICES, WITH PAINT OR OTHER SUITABLE, PERMANENT IDENTIFICATION MATERIAL TO SHOW FINAL SETTINGS.

##### 3.3 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

- A. PREPARE SCHEMATIC DIAGRAMS OF SYSTEMS "AS-BUILT" DUCT LAYOUTS.
- B. FOR VARIABLE-AIR-VOLUME SYSTEMS, DEVELOP A PLAN TO SIMULATE DIVERSITY.
- C. DETERMINE THE BEST LOCATIONS IN MAIN AND BRANCH DUCTS FOR ACCURATE DUCT AIRFLOW MEASUREMENTS.
- D. VERIFY THAT MOTOR STARTERS ARE EQUIPPED WITH PROPERLY SIZED THERMAL PROTECTION.
- E. CHECK FOR AIRFLOW BLOCKAGES.

##### F. CHECK CONDENSATE DRAINS FOR PROPER CONNECTIONS AND FUNCTIONING.

##### G. CHECK FOR PROPER SEALING OF AIR-HANDLING UNIT COMPONENTS.

##### H. CHECK FOR PROPER SEALING OF AIR DUCT SYSTEM.

#### 3.4 TOLERANCES

##### A. SET HVAC SYSTEM AIRFLOW AND WATER FLOW RATES WITHIN THE FOLLOWING TOLERANCES:

1. SUPPLY, RETURN, AND EXHAUST FANS AND EQUIPMENT WITH FANS: PLUS OR MINUS 5 PERCENT.
2. AIR OUTLETS AND INLETS: PLUS OR MINUS 10 PERCENT.

END OF SECTION

### SECTION 230700 - HVAC INSULATION

#### PART 1 - GENERAL

##### 1.1 SECTION REQUIREMENTS

- A. QUALITY ASSURANCE: LABELED WITH MAXIMUM FLAME-SPREAD INDEX OF 25 AND MAXIMUM SMOKE-DEVELOPED INDEX OF 50 ACCORDING TO ASTM E 84.

#### PART 2 - PRODUCTS

##### 2.1 PERFORMANCE REQUIREMENTS

##### A. SURFACE-BURNING CHARACTERISTICS:

1. INDOOR INSULATION AND RELATED MATERIALS: TO BE FACTORY LABELED DESIGNATING MAXIMUM FLAME-SPREAD INDEX OF 25 OR LESS, AND SMOKE-DEVELOPED INDEX OF 50 OR LESS ACCORDING TO ASTM E 84.

##### 2.2 INSULATION MATERIALS

- A. FLEXIBLE ELASTOMERIC: CLOSED-CELL, SPONGE- OR EXPANDED-RUBBER MATERIALS. COMPLY WITH ASTM C 534, TYPE I FOR TUBULAR MATERIALS AND TYPE II FOR SHEET MATERIALS.

##### B. MINERAL-FIBER BLANKET INSULATION: COMPLY WITH ASTM C 553, TYPE II AND ASTM C 1290, TYPE I

1. FSK JACKET: ALUMINUM-FOIL, FIBERGLASS-REINFORCED SCRIM WITH KRAFT-PAPER BACKING; COMPLYING WITH ASTM C 1136, TYPE II.

2. FSK TAPE: FOIL-FACE, VAPOR-RETARDER TAPE MATCHING FACTORY-APPLIED JACKET WITH ACRYLIC ADHESIVE; COMPLYING WITH ASTM C 1136.

- C. MINERAL-FIBER PIPE AND TANK INSULATION: COMPLYING WITH ASTM C 1393, TYPE II OR TYPE IIIA, CATEGORY 2, OR WITH PROPERTIES SIMILAR TO ASTM C 612, TYPE IB, AND HAVING FACTORY-APPLIED ASJ JACKET. NOMINAL DENSITY IS 2.5 LB/CU. FT. OR MORE. THERMAL CONDUCTIVITY (K-VALUE) AT 100 DEG F IS 0.29 BTU X IN./H X SQ. FT. X DEG F OR LESS.

1. ASJ: WHITE, KRAFT-PAPER, FIBERGLASS-REINFORCED SCRIM WITH ALUMINUM-FOIL BACKING; COMPLYING WITH ASTM C 1136, TYPE I.

2. ASJ TAPE: WHITE VAPOR-RETARDER TAPE MATCHING FACTORY-APPLIED JACKET WITH ACRYLIC ADHESIVE; COMPLYING WITH ASTM C 1136.

##### D. FLEXIBLE ELASTOMERIC ADHESIVE: COMPLY WITH MIL-A-24179A, TYPE II, CLASS I.

##### E. MINERAL-FIBER ADHESIVE: COMPLY WITH MIL-A-3316C, CLASS 2, GRADE A.

- F. VAPOR-BARRIER MASTIC: WATER BASED; SUITABLE FOR INDOOR AND OUTDOOR USE ON BELOW AMBIENT SERVICES; COMPLY WITH MIL-PRF-19565C, TYPE II.

#### PART 3 - EXECUTION

##### 3.1 INSULATION INSTALLATION

- A. COMPLY WITH REQUIREMENTS OF THE MIDWEST INSULATION CONTRACTORS ASSOCIATION'S "NATIONAL COMMERCIAL & INDUSTRIAL INSULATION STANDARDS" FOR INSULATION INSTALLATION ON PIPES AND EQUIPMENT.

- B. INSULATION INSTALLATION AT INTERIOR WALL AND PARTITION PENETRATIONS (THAT ARE NOT FIRE RATED): INSTALL INSULATION CONTINUOUSLY THROUGH WALLS AND PARTITIONS.

- C. INSULATION INSTALLATION AT FIRE-RATED WALL, PARTITION, AND FLOOR PENETRATIONS: INSTALL INSULATION CONTINUOUSLY THROUGH PENETRATIONS. SEAL PENETRATIONS; COMPLY WITH REQUIREMENTS IN SECTION 078400.

##### D. FLEXIBLE ELASTOMERIC INSULATION INSTALLATION:

1. SEAL LONGITUDINAL SEAMS AND END JOINTS WITH ADHESIVE TO ELIMINATE OPENINGS IN INSULATION THAT ALLOW PASSAGE OF AIR TO SURFACE BEING INSULATED.
2. INSULATION INSTALLATION ON PIPE FITTINGS AND ELBOWS: INSTALL MITERED SECTIONS OF PIPE INSULATION. SECURE INSULATION MATERIALS AND SEAL SEAMS WITH ADHESIVE TO ELIMINATE OPENINGS IN INSULATION THAT ALLOW PASSAGE OF AIR TO SURFACE BEING INSULATED.

##### E. MINERAL-FIBER INSULATION INSTALLATION:

1. INSULATION INSTALLATION ON STRAIGHT PIPES AND TUBES: WHERE VAPOR BARRIERS ARE INDICATED, SEAL LONGITUDINAL SEAMS, END JOINTS, AND PROTRUSIONS WITH VAPOR-BARRIER MASTIC AND JOINT SEALANT.
2. FOR INSULATION WITH FACTORY-APPLIED JACKETS ON ABOVE AMBIENT SURFACES, SECURE LAPS WITH OUTWARD CLINCHED STAPLES AT 6 INCHES O.C.
3. FOR INSULATION WITH FACTORY-APPLIED JACKETS ON BELOW AMBIENT SURFACES, DO NOT STAPLE LONGITUDINAL TABS BUT SECURE TABS WITH ADDITIONAL ADHESIVE AS RECOMMENDED BY INSULATION MATERIAL MANUFACTURER AND SEAL WITH VAPOR-BARRIER MASTIC AND FLASHING SEALANT.
4. BLANKET INSULATION INSTALLATION ON DUCTS AND PLENUMS: SECURE WITH ADHESIVE AND INSULATION PINS.
5. FOR DUCTS AND PLENUMS WITH SURFACE TEMPERATURES BELOW AMBIENT, INSTALL A CONTINUOUS UNBROKEN VAPOR BARRIER.

##### F. PLENUMS AND DUCTS REQUIRING INSULATION:

1. CONCEALED SUPPLY AIR.
2. CONCEALED AND EXPOSED OUTDOOR AIR.
3. CONCEALED AND EXPOSED RETURN AIR LOCATED IN NONCONDITIONED SPACE.

##### 3.2 DUCT AND PLENUM INSULATION SCHEDULE RETAIN " ONE OF " OPTION IN PARAGRAPHS IN THIS ARTICLE TO ALLOW CONTRACTOR TO SELECT PIPING MATERIALS FROM THOSE RETAINED.

- A. CONCEALED DUCT INSULATION SHALL BE 1-1/2" THICK MINERAL-FIBER BLANKET WITH A 1.5-LB/CU. FT. NOMINAL DENSITY.

##### 3.3 HVAC PIPING INSULATION SCHEDULE

##### A. CONDENSATE PIPING: INSULATION SHALL BE 1" THICK FLEXIBLE ELASTOMERIC.

##### B. REFRIGERANT PIPING: INSULATION SHALL BE 1" THICK FLEXIBLE ELASTOMERIC.

END OF SECTION

### SECTION 232300 - REFRIGERANT PIPING

#### PART 2 - PRODUCTS

##### 2.1 TUBES AND FITTINGS

- A. COPPER TUBE: ASTM B 88, TYPE K OR TYPE L, ANNEALED OR DRAWN-TEMPER TUBING AND WROUGHT-COPPER FITTINGS WITH BRAZED OR SOLDERED JOINTS.

- B. WROUGHT-COPPER FITTINGS AND UNIONS: ASME B16.22.
- C. SOLDER FILLER METALS: ASTM B 32. USE 95-5 TIN ANTIMONY OR ALLOY HB SOLDER TO JOIN COPPER SOCKET FITTINGS ON COPPER PIPE.

- D. BRAZING FILLER METALS: AWS A5.8.

##### 2.2 VALVES AND SPECIALTIES

- A. AS REQUIRED BY THE KITCHEN EQUIPMENT MANUFACTURER.

#### PART 3 - EXECUTION

##### 3.1 INSTALLATION

- A. INSTALL REFRIGERANT PIPING AND CHARGE WITH REFRIGERANT ACCORDING TO ASHRAE 15.

- B. INSTALL REFRIGERANT PIPING AS REQUIRED BY THE KITCHEN EQUIPMENT MANUFACTURER.

END OF SECTION

### SECTION 233100 - HVAC DUCTS AND CASINGS

#### PART 2 - PRODUCTS

##### 2.1 PERFORMANCE REQUIREMENTS

- A. COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE."
- B. STRUCTURAL PERFORMANCE: DUCT HANGERS AND SUPPORTS SHALL WITHSTAND THE EFFECTS OF GRAVITY LOADS AND STRESSES WITHIN LIMITS AND UNDER CONDITIONS DESCRIBED IN SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE."
- C. COMPLY WITH NFPA 96 FOR DUCTS CONNECTED TO COMMERCIAL KITCHEN HOODS.

#### 2.2 DUCTS

- A. ELECTROGALVANIZED-STEEL SHEET: ASTM A 879

##### 1. PAINT/LOCK/PAINTLOCK OR EQUAL.

- B. GENERAL DUCTWORK SHALL BE GALVANIZED STEEL, ASTM A663/A635M, AND CONSTRUCTED TO THE GAUGE AND CORRESPONDING REINFORCING SCHEDULE AS SPECIFIED IN THE SMACNA SEAL CLASS "A" STANDARDS.

##### C. TYPE 1 KITCHEN EXHAUST DUCTWORK

1. FACTORY-BUILT COMMERCIAL KITCHEN GREASE DUCT:
  - a. ALL REDUCED CLEARANCE, ROUND, DOUBLE-WALL GREASE DUCT AS SPECIFIED MEETING UL 1978 REQUIREMENTS. REFER TO KITCHEN EQUIPMENT SUPPLIER DRAWINGS FOR REQUIREMENTS.
  - b. DUCTWORKS AND FITTINGS FURNISHED BY OWNER FOR INSTALLATION BY THIS CONTRACTOR.
  - c. NO FIRE WRAP SHALL BE REQUIRED FOR THIS INSTALLATION.

- D. TYPE 2 KITCHEN EXHAUST DUCTWORK: 18 GAUGE ALUMINUM OR STAINLESS STEEL. SEAMS SHALL BE CONTINUOUSLY WELDED LIQUID TIGHT.

- E. JOINT AND SEAM TAPE, AND SEALANT: COMPLY WITH UL 181A. PROVIDE POLYMERIC RUBBER TYPE SEALANT FOR USE ON BOTH INTERIOR LOCATED DUCTWORK AND DUCTWORK EXPOSED TO OUTDOOR CONDITIONS. SEALER SHALL HAVE HIGH BONDING STRENGTH FOR SURE, FIRST TIME SEALING OF JOINTS IN LOW, MEDIUM AND HIGH PRESSURE DUCT SYSTEMS. SEALER SHALL BE HIGH IN SOLID CONTENT; PROVIDE A TWO PART TAPE SEALING SYSTEM, CONSISTING OF WOVEN FIBER TAPE IMPREGNATED WITH A GYPSUM MINERAL COMPOUND, AND A MODIFIED ACRYLIC/SILICONE ACTIVATOR THAT REACTS EXOTHERMICALLY WITH THE TAPE. TWO PART TAPE SEALING SYSTEM MUST BE RATED FOR BOTH INDOOR AND OUTDOOR APPLICATION. TAPE SHALL NOT CONTAIN ASBESTOS.

- F. METAL DUCT FABRICATION: COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE."

#### 2.3 ACCESSORIES

- A. VOLUME DAMPERS AND CONTROL DAMPERS: SINGLE-BLADE AND MULTIPLE OPPOSED-BLADE DAMPERS, STANDARD LEAKAGE RATING, HEAVY DUTY, AND SUITABLE FOR HORIZONTAL OR VERTICAL APPLICATIONS; FACTORY FABRICATED AND COMPLETE WITH REQUIRED HARDWARE AND ACCESSORIES.

2. ROUND VOLUME DAMPERS: PROVIDE MINIMUM 20 GAUGE GALVANIZED STEEL FRAME AND BLADES, MINIMUM 3/8" SQUARE STEEL AXLE, MOLDED SYNTHETIC BEARINGS, WITH LOCKING POSITION REGULATOR. REGULATOR SHALL BE POSITIONED WITH SHEET METAL BRACKET BEYOND DUCT COVERING, WHERE POSITIONING REGULATOR IS NOT ACCESSIBLE, PROVIDE COUPLING AND EXTENSION ROD WITH REGULATOR FOR CEILING OR WALL INSTALLATION, AS REQUIRED.

3. RECTANGULAR VOLUME DAMPERS: PROVIDE MINIMUM 16 GAUGE GALVANIZED STEEL CHANNEL FRAME, 16 GAUGE GALVANIZED STEEL BLADES, MINIMUM 1/2" HEXAGONAL AXLE, BOLDED SYNTHETIC BEARINGS, WITH 3/8" SQUARE PLATED STEEL CONTROL SHAFT. LINKAGES SHALL BE CONCEALED IN THE FRAME. OPERATING SHAFT SHALL EXTEND BEYOND FRAME AND DUCT TO A LOCKING QUADRANT WITH ADJUSTABLE LEVER. MAXIMUM BLADE WIDTH SHALL NOT EXCEED 6".

- B. FLEXIBLE DUCT CONNECTORS: FLAME-RETARDED OR NONCOMBUSTIBLE FABRICS, COATINGS, AND ADHESIVES COMPLYING WITH UL 181, CLASS 1. CONNECTOR TO BE 30 OUNCE, NEOPRENE COATED, FIBERGLASS FABRIC.

- C. FLEXIBLE DUCTS: FACTORY ASSEMBLED, UL 181, CLASS 1, WITH 1-1/2-INCH THICK (R-5 MIN.), 1 PCF FIBERGLASS INSULATION AND REINFORCED OUTER PROTECTIVE COVER/VAPOR BARRIER. FLEXIBLE DUCT SHALL MEET NFPA 90A WITH FLAME SPREAD UNDER 25, SMOKE DEVELOPED UNDER 50, AND SHALL BE RATED FOR MINIMUM 2-INCH WG PRESSURE AND 0 TO 250°F TEMPERATURE. PROVIDE SCREW-OPERATED METAL ADJUSTABLE CLAMPING DEVICES. USE TWIST-LOCK CONICAL PACT COLLARS AT CONNECTIONS INTO SHEET METAL DUCTWORK. MAXIMUM EXTENDED LENGTH OF FLEXIBLE DUCT SHALL NOT EXCEED 5 FEET.

- D. TURNING VANES: PROVIDE FABRICATED TURNING VANES AND VANE RUNNERS, CONSTRUCTED IN ACCORDANCE WITH SMACNA "HVAC DUCT CONSTRUCTION STANDARDS". PROVIDE TURNING VANES CONSTRUCTED OF CURVED BLADES, SUPPORTED WITH BARS PERPENDICULAR TO BLADES, AND SET INTO SIDE STRIPS SUITABLE FOR MOUNTING IN DUCTWORK. FOLLOW SMACNA GUIDELINES FOR SPACING SUPPORT, AND CONSTRUCTION. ALL BLADES SHALL BE DOUBLE THICKNESS AIRFLOW TYPE.

- E. BIRD SCREENS AND FRAMES: PROVIDE BIRD SCREENS THAT CONFORM TO ASTM E 2016, NO. 2 MESH, ALUMINUM OR STAINLESS STEEL. PROVIDE "MEDIUM/LIGHT" RATED ALUMINUM SCREENS. PROVIDE "LIGHT" RATES STAINLESS STEEL SCREENS.

- F. DUCT-MOUNTED ACCESS DOORS: FABRICATE ACCESS PANELS ACCORDING TO SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE"; FIGURES 2-10, "DUCT ACCESS DOORS AND PANELS," AND 2-11, "ACCESS PANELS - ROUND DUCT."

#### PART 3 - EXECUTION

##### 3.1 INSTALLATION

- A. INSTALL DUCTWORK, ACCESSORIES, AND SUPPORTS ACCORDING TO SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE" UNLESS OTHERWISE INDICATED.

- B. SEAL DUCTS TO THE FOLLOWING SEAL CLASSES ACCORDING TO SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE": 1-INCH WG, SEAL CLASS A.

- C. AVOID PASSING THROUGH OR ABOVE ELECTRICAL EQUIPMENT SPACES AND ENCLOSURES.

- D. CLEAN DUCT SYSTEMS BEFORE TESTING, ADJUSTING, AND BALANCING.

##### 3.2 DUCTWORK SCHEDULE

- A. EXPOSED DUCTWORK IN ARCHITECTURALLY FINISHED SPACES: ELECTRO-GALVANIZED STEEL SHEET.

- B. CONCEALED DUCTWORK AND DUCTWORK IN UNFINISHED ARCHITECTURAL SPACES: GALVANIZED STEEL.

END OF SECTION

### SECTION 233423 - HVAC EXHAUST FANS

#### PART 2 - PRODUCTS

##### 2.1 PERFORMANCE REQUIREMENTS

- A. PRODUCTS SHALL BE LICENSED TO USE THE AMCA-CERTIFIED RATINGS SEAL.

- B. EXHAUST FANS SHALL COMPLY WITH UL 705, TYPE 1 FANS SHALL ALSO COMPLY WITH UL 762.

- C. TYPE 1 FANS TO BE DESIGNED FOR HIGH HEAT OPERATION AT 300°F.

- D. ELECTRICAL COMPONENTS, DEVICES, AND ACCESSORIES: LISTED AND LABELED AS DEFINED IN NFPA 70, BY A QUALIFIED TESTING AGENCY, AND MARKED FOR INTENDED LOCATION AND APPLICATION.

##### 2.2 CENTRIFUGAL VENTILATORS

- A. HOUSING: REMOVABLE, SPUN-ALUMINUM, DOME TOP AND OUTLET BAFFLE; SQUARE, ONE-PIECE, ALUMINUM BASE WITH VENTURI INLET CONE.

1. UPBLAST UNITS: ALUMINUM DISCHARGE BAFFLE TO DIRECT DISCHARGE AIR UPWARD, WITH RAIN AND SNOW DRAINS.

- B. FAN WHEELS: ALUMINUM HUB AND WHEEL WITH BACKWARD-INCLINED BLADES.

- C. BELT-DRIVEN DRIVE ASSEMBLY: RESILIENTLY MOUNTED TO HOUSING.

1. FAN SHAFT: TURNED, GROUND, AND POLISHED STEEL; KEYS TO WHEEL HUB.

2. SHAFT BEARINGS: PERMANENTLY LUBRICATED, PERMANENTLY SEALED, SELF-ALIGNING BALL BEARINGS.

3. PULLEYS: CAST-IRON, ADJUSTABLE-PITCH MOTOR PULLEY.

4. FAN AND MOTOR ISOLATED FROM EXHAUST AIRSTREAM.

##### D. ACCESSORIES:

1. DISCONNECT SWITCH: NON-FUSIBLE TYPE, WITH THERMAL-OVERLOAD PROTECTION, FACTORY WIRED THROUGH AN INTERNAL ALUMINUM CONDUIT.

2. BIRD SCREENS: REMOVABLE, 1/2-INCH MESH, ALUMINUM OR BRASS WIRE.

3. DAMPERS: COUNTERBALANCED, PARALLEL-BLADE, BACKDRAFT DAMPERS MOUNTED IN CURB BASE; FACTORY SET TO CLOSE WHEN FAN STOPS.
4. MOTORIZED DAMPERS: PARALLEL-BLADE DAMPERS MOUNTED IN CURB BASE WITH ELECTRIC ACTUATOR; WIRED TO CLOSE WHEN FAN STOPS.

- E. ROOF CURBS: 20 GAUGE GALVANIZED STEEL; MITERED AND WELDED CORNERS; 1-1/2-INCH THICK, RIGID, FIBERGLASS INSULATION ADHERED TO INSIDE WALLS, AND 1-1/2-INCH WOOD MAILER. SIZE AS REQUIRED TO SUIT ROOF OPENING AND FAN BASE.

1. CONFIGURATION: SELF-FLASHING WITHOUT A CANT STRIP, WITH MOUNTING FLANGE.

2. OVERALL HEIGHT: 12 INCHES FOR GENERAL EXHAUST FANS; 20 INCHES FOR KITCHEN EXHAUST FANS.

3. PITCH MOUNTING: MANUFACTURE CURB FOR ROOF SLOPE.

4. MOUNTING PEDESTAL: GALVANIZED STEEL WITH REMOVABLE ACCESS PANEL.

5. TYPE 1 ROOF CURBS TO BE VENTED TYPE.

6. TYPE 1 AND TYPE 2 ROOF CURBS TO BE HINGED TYPE.

##### F. CAPACITIES AND CHARACTERISTICS:

1. SEE SCHEDULE.

##### G. MOTORS

1. COMPLY WITH NEMA DESIGNATION, TEMPERATURE RATING, SERVICE FACTOR, ENCLOSURE TYPE, AND EFFICIENCY REQUIREMENTS FOR MOTORS.

2. MOTOR SIZES: MINIMUM SIZE AS INDICATED. IF NOT INDICATED, LARGE ENOUGH SO DRIVEN LOAD WILL NOT REQUIRE MOTOR TO OPERATE IN SERVICE FACTOR RANGE ABOVE 1.0.

3. ENCLOSURE TYPE: TOTALLY ENCLOSED, FAN COOLED.

#### PART 3 - EXECUTION

##### 3.1 INSTALLATION

- A. INSTALL UNITS WITH CLEARANCES FOR SERVICE AND MAINTENANCE.

- B. ROOF-MOUNTED UNITS: INSTALL ROOF CURB ON ROOF STRUCTURE, ACCORDING TO ARI GUIDELINE B. INSTALL AND SECURE ROOF-MOUNTED FANS ON CURBS, AND COORDINATE ROOF PENETRATIONS AND FLASHING WITH ROOF CONSTRUCTION.

END OF SECTION

### SECTION 233713 - DIFFUSERS, REGISTERS, AND GRILLES

#### PART 1 - GENERAL

#### PART 2 - PRODUCTS

##### 2.1 DIFFUSERS, REGISTERS, AND GRILLES:

- A. REFER TO SCHEDULES FOR FINISH TYPE, COLOR, MATERIAL, AND MOUNTING.

#### PART 3 - EXECUTION

##### 3.1 INSTALLATION

- A. INSTALL DIFFUSERS, REGISTERS, AND GRILLES LEVEL AND PLUMB.

- B. CEILING-MOUNTED OUTLETS AND INLETS: DRAWINGS INDICATE GENERAL ARRANGEMENT OF DUCTS, FITTINGS, AND ACCESSORIES. MAKE FINAL LOCATIONS WHERE INDICATED, AS MUCH AS PRACTICAL. FOR UNITS INSTALLED IN LAY-IN CEILING PANELS, LOCATE UNITS IN THE CENTER OF PANEL UNLESS OTHERWISE INDICATED. WHERE ARCHITECTURAL FEATURES OR OTHER ITEMS CONFLICT WITH INSTALLATION, NOTIFY ARCHITECT FOR A DETERMINATION OF FINAL LOCATION.

- C. AFTER INSTALLATION, ADJUST DIFFUSERS, REGISTERS, AND GRILLES TO AIR PATTERNS INDICATED, OR AS DIRECTED, BEFORE STARTING AIR BALANCING.

**SPECIFICATIONS - DIVISION 23 - HVAC (CONTINUED)**

SECTION 237339 - DIRECT GAS-FIRED MAKE-UP AIR UNIT

PART 2 - PRODUCTS

2.1 PACKAGED UNITS

A. FACTORY-ASSEMBLED, PREWIRED, SELF-CONTAINED UNIT CONSISTING OF CABINET, SUPPLY FAN, CONTROLS, FILTERS, AND DIRECT-FIRED GAS FURNACE TO BE INSTALLED OUTSIDE THE BUILDING.

2.2 CABINET

A. CABINET: GALVANIZED-STEEL PANELS WITH LIFTING LUGS. CABINET SHALL BE FULLY WEATHERIZED FOR OUTDOOR INSTALLATION. HEAT-RESISTANT, BAKED-ENAMEL FINISH. VERTICAL-PATTERN, GALVANIZED-STEEL DISCHARGE PLENUM WITH DIFFUSERS INCORPORATING INDIVIDUALLY ADJUSTABLE VANES.

B. ROOF CURB: FULL-PERIMETER CURB OF SHEET METAL, MINIMUM 20 INCHES HIGH, WITH WOOD NAILER, NEOPRENE SEALING STRIP, AND WELDED Z-BAR FLASHING.

C. OUTDOOR-AIR INTAKE: GALVANIZED-STEEL HOOD WITH RAIN BAFFLES, BIRD SCREEN, AND FINISH TO MATCH CABINET; AND SIZED TO SUPPLY 100 PERCENT OUTDOOR AIR. GALVANIZED-STEEL, OPPOSED-BLADE MOTORIZED DAMPERS WITH VINYL BLADE SEALS AND STAINLESS-STEEL JAMB SEAL.

D. FILTERS: COMPLY WITH NFPA 90A, 1 INCH THICK.

2.3 SUPPLY-AIR FAN

A. FAN: CENTRIFUGAL, RATED ACCORDING TO AMCA 210; STATICALLY AND DYNAMICALLY BALANCED, GALVANIZED STEEL, MOUNTED ON SOLID-STEEL SHAFT.

B. MOTOR: TOTALLY ENCLOSED, SINGLE SPEED MOTOR.

C. DRIVE: V-BELT DRIVE WITH MATCHING FAN PULLEY AND ADJUSTABLE MOTOR SHEAVES AND BELT ASSEMBLY.

D. GAS PRESSURE GAUGE: 2-1/2 INCH DIAMETER AND 1/4 INCH THREAD SIZE.

2.4 DIRECT-FIRED GAS FURNACE

A. DESCRIPTION: FACTORY ASSEMBLED, PIPED, AND WIRED; AND COMPLYING WITH ANSI Z83.4, ANSI Z83.18, AND NFPA 54. CAST-IRON BURNER WITH STAINLESS-STEEL MIXING PLATES. SINGLE-STAGE CONTROL VALVE. FUEL: NATURAL GAS.

B. SAFETY CONTROLS: AIRFLOW PROVING SWITCH; HIGH-TEMPERATURE LIMIT; SAFETY LOCKOUT; REDUNDANT, AUTOMATIC, MAIN GAS VALVES; ELECTRIC PILOT VALVE; MODULATING TEMPERATURE CONTROL VALVE; MAIN AND PILOT GAS REGULATORS; MAIN AND PILOT MANUAL SHUTOFF VALVES; MAIN AND PILOT PRESSURE TAPS; AND HIGH-LOW GAS PRESSURE SWITCHES TO COMPLY WITH ANSI STANDARDS.

2.5 CONTROLS

A. FACTORY-WIRED, FUSE-PROTECTED CONTROL TRANSFORMER, CONNECTION FOR POWER SUPPLY AND FIELD-WIRED UNIT TO REMOTE CONTROL PANEL.

- 1. FAN CONTROL: INTERLOCK FAN TO START WITH EXHAUST FAN(S) AND WITH RTU COOLING CYCLE.
- 2. OUTDOOR-AIR DAMPER CONTROL: OUTDOOR-AIR DAMPER OPENS WHEN SUPPLY FAN STARTS, AND CLOSES WHEN FAN STOPS.
- 3. TEMPERATURE CONTROL: OPERATES GAS VALVE TO MAINTAIN SUPPLY-AIR TEMPERATURE.

2.6 INSTALLATION

A. INSTALL GAS-FIRED UNITS ACCORDING TO NFPA 54.

B. INSTALL ROOF CURB ON ROOF STRUCTURE, ACCORDING TO ARI GUIDELINE B OR NRCA'S "LOW-SLOPE MEMBRANE ROOFING CONSTRUCTION DETAILS MANUAL."

C. CONNECT GAS PIPING WITH SHUTOFF VALVE AND UNION AND WITH SUFFICIENT CLEARANCE FOR BURNER REMOVAL AND SERVICE.

D. DRAWINGS INDICATE THE GENERAL ARRANGEMENT OF DUCTS. CONNECT SUPPLY DUCTS TO DIRECT-FIRED MAU WITH FLEXIBLE DUCT CONNECTORS; FLEXIBLE DUCT CONNECTORS ARE SPECIFIED IN SECTION 233100 "HVAC DUCTS AND CASINGS."

END OF SECTION

SECTION 237413 - PACKAGED ROOFTOP UNITS

1.1 SUMMARY

A. THIS SECTION INCLUDES PACKAGED, ROOFTOP UNITS WITH THE FOLLOWING COMPONENTS AND ACCESSORIES:

- 1. DIRECT-EXPANSION COOLING.
- 2. HUMIDITY CONTROL WITH HOT-GAS REHEAT (OPTIONAL)
- 3. GAS FURNACE.
- 4. ECONOMIZER OUTDOOR-AND RETURN-AIR DAMPER SECTION.
- 5. INTEGRAL SPACE TEMPERATURE CONTROLS.
- 6. ROOF CURBS.

1.2 SECTION REQUIREMENTS

A. SUBMITTALS:

- 1. PRODUCT DATA: INCLUDE MANUFACTURER'S TECHNICAL DATA FOR EACH RTU, INCLUDING RATED CAPACITIES, DIMENSIONS, REQUIRED CLEARANCES, CHARACTERISTICS, FURNISHED SPECIALTIES, AND ACCESSORIES.

PART 2 - PRODUCTS

2.1 CASING

A. GENERAL FABRICATION REQUIREMENTS FOR CASINGS: FORMED AND REINFORCED INSULATED PANELS, FABRICATED TO ALLOW REMOVAL FOR ACCESS TO INTERNAL PARTS AND COMPONENTS, WITH JOINTS BETWEEN SECTIONS SEALED.

B. EXTERIOR CASING MATERIAL: GALVANIZED STEEL WITH FACTORY-PAINTED FINISH, WITH PITCHED ROOF PANELS AND KNOCKOUTS WITH GROMMET SEALS FOR ELECTRICAL AND PIPING CONNECTIONS AND LIFTING LUGS.

1. CASING THICKNESS: 16 GAUGE THICK.

C. CASING INSULATION AND ADHESIVE: COMPLY WITH NFPA 90A.

- 1. MATERIALS: ASTM C 1071, TYPE I.
- 2. THICKNESS: 1/2 INCH
- 3. LINER MATERIALS SHALL HAVE AIR-STREAM SURFACE INSULATED WITH A MINIMUM 1/2-IN. THICK, MINIMUM 1 1/2 LB DENSITY, FLEXIBLE FIBERGLASS INSULATION BONDED WITH A PHENOLIC BINDER, NEOPRENE COATED ON THE AIR SIDE.
- 4. LINER ADHESIVE: COMPLY WITH ASTM C 916, TYPE I.

D. UNIT SHALL HAVE A THRU-THE-BASE GAS AND ELECTRICAL CONNECTIONS.

2.2 FANS

OPTION A OR B:

A. DIRECT-DRIVEN SUPPLY-AIR FANS: DOUBLE WIDTH, BACKWARD INCLINED, CENTRIFUGAL; WITH PERMANENTLY LUBRICATED, MOTOR RESILIENTLY MOUNTED IN THE FAN INLET. ALUMINUM OR PAINTED-STEEL WHEELS, AND GALVANIZED- OR PAINTED-STEEL FAN SCROLLS.

B. BELT-DRIVEN SUPPLY-AIR FANS: DOUBLE WIDTH, FORWARD CURVED, CENTRIFUGAL; WITH PERMANENTLY LUBRICATED, SINGLE-SPEED MOTOR INSTALLED ON AN ADJUSTABLE FAN BASE RESILIENTLY MOUNTED IN THE CASING. ALUMINUM OR PAINTED-STEEL WHEELS, AND GALVANIZED- OR PAINTED-STEEL FAN SCROLLS.

C. CONDENSER-COIL FAN: DIRECT DRIVE, PROPELLER, MOUNTED ON SHAFT OF PERMANENTLY LUBRICATED MOTOR WITH THERMAL OVERLOAD PROTECTION.

D. POWER EXHAUST: FORWARD CURVED, SHAFT MOUNTED ON PERMANENTLY LUBRICATED MOTOR.

2.3 COILS

A. SUPPLY-AIR REFRIGERANT COIL:

- 1. ALUMINUM-PLATE FIN AND SEAMLESS INTERNALLY GROOVED COPPER TUBE IN STEEL CASING WITH EQUALIZING-TYPE VERTICAL DISTRIBUTOR.
- 2. POLYMER STRIP SHALL PREVENT ALL COPPER COIL FROM CONTACTING STEEL COIL FRAME OR CONDENSATE PAN.
- 3. CATHODIC EPOXY COATING.
- 4. CONDENSATE DRAIN PAN: GALVANIZED STEEL WITH CORROSION-RESISTANT COATING FORMED WITH PITCH AND DRAIN CONNECTIONS.

B. OUTDOOR-AIR REFRIGERANT COIL:

- 1. ALUMINUM-PLATE FIN AND SEAMLESS INTERNALLY GROOVED COPPER TUBE IN STEEL CASING WITH EQUALIZING-TYPE VERTICAL DISTRIBUTOR.
- 2. POLYMER STRIP SHALL PREVENT ALL COPPER COIL FROM CONTACTING STEEL COIL FRAME OR CONDENSATE PAN.
- 3. CATHODIC EPOXY COATING.

C. HOT-GAS REHEAT REFRIGERANT COIL (OPTIONAL):

- 1. ALUMINUM-PLATE FIN AND SEAMLESS INTERNALLY GROOVED COPPER TUBE IN STEEL CASING WITH EQUALIZING-TYPE VERTICAL DISTRIBUTOR.
- 2. POLYMER STRIP SHALL PREVENT ALL COPPER COIL FROM CONTACTING STEEL COIL FRAME OR CONDENSATE PAN.
- 3. CATHODIC EPOXY COATING.

2.4 REFRIGERANT CIRCUIT COMPONENTS

A. NUMBER OF REFRIGERANT CIRCUITS: TWO

B. COMPRESSOR: HERMETIC, SCROLL, MOUNTED ON VIBRATION ISOLATORS; WITH INTERNAL OVERCURRENT AND HIGH-TEMPERATURE PROTECTION, INTERNAL PRESSURE RELIEF AND CRANKCASE HEATER.

C. REFRIGERATION SPECIALTIES:

- 1. REFRIGERANT: R-410A
- 2. EXPANSION VALVE WITH REPLACEABLE THERMOSTATIC ELEMENT.
- 3. REFRIGERANT FILTER/DRYER.
- 4. MANUAL-RESET HIGH-PRESSURE SAFETY SWITCH.
- 5. AUTOMATIC-RESET LOW-PRESSURE SAFETY SWITCH.
- 6. MINIMUM OFF-TIME RELAY.
- 7. AUTOMATIC-RESET COMPRESSOR MOTOR THERMAL OVERLOAD.
- 8. BRASS SERVICE VALVES INSTALLED IN COMPRESSOR SUCTION AND LIQUID LINES.
- 9. LOW-AMBIENT KIT HIGH-PRESSURE SENSOR.
- 10. HOT-GAS REHEAT SOLENOID VALVE WITH A REPLACEABLE MAGNETIC COIL.

2.5 AIR FILTRATION

A. PROVIDE 2" THROW-AWAY FIBERGLASS FILTERS.

2.6 GAS FURNACE

A. BURNERS: IN-SHOT TYPE CONSTRUCTED OF ALUMINUM-COATED STEEL.

- 1. FUEL: NATURAL GAS.
- 2. IGNITION: DIRECT SPARK IGNITION (DSI). VERIFY AVAILABILITY OF HIGH-ALTITUDE FEATURE WITH MANUFACTURERS.
- 3. HIGH-ALTITUDE KIT: FOR PROJECT ELEVATIONS MORE THAN 2,000 FEET ABOVE SEA LEVEL.

B. HEAT-EXCHANGER AND DRAIN PAN: STAINLESS STEEL.

C. INDUCED DRAFT COMBUSTION BLOWER.

D. SAFETY CONTROLS:

- 1. GAS CONTROL VALVE: TWO STAGE.
- 2. GAS TRAIN: SINGLE-BODY, REGULATED, REDUNDANT, 24-V AC GAS VALVE ASSEMBLY CONTAINING PILOT SOLENOID VALVE, PILOT FILTER, PRESSURE REGULATOR, PILOT SHUTOFF, AND MANUAL SHUTOFF.

2.7 DAMPERS

A. OUTDOOR AND RETURN AIR MIXING DAMPERS: PARALLEL OR OPPOSED-BLADE GALVANIZED-STEEL DAMPERS MECHANICALLY FASTENED TO CADMIUM PLATED FOR GALVANIZED-STEEL OPERATING ROD IN REINFORCED CABINET. CONNECT OPERATING RODS WITH COMMON LINKAGE AND INTERCONNECT LINKAGES SO DAMPERS OPERATE SIMULTANEOUSLY.

- 1. DAMPER MOTOR: MODULATING WITH ADJUSTABLE MINIMUM POSITION.
- 2. RELIEF AIR DAMPER: GRAVITY ACTUATED, WITH BIRD SCREEN AND HOOD.

2.8 ELECTRICAL POWER CONNECTION

A. PROVIDE FOR SINGLE CONNECTION OF POWER TO UNIT WITH UNIT-MOUNTED DISCONNECT SWITCH ACCESSIBLE FROM OUTSIDE UNIT AND CONTROL-CIRCUIT TRANSFORMER WITH BUILT-IN OVERCURRENT PROTECTION.

2.9 CONTROLS

A. BASIC UNIT CONTROLS:

- 1. CONTROL-VOLTAGE TRANSFORMER.
- 2. WALL-MOUNTED THERMOSTAT OR SENSOR WITH THE FOLLOWING FEATURES:
  - a. HEAT-COOL-OFF SWITCH.
  - b. FAN ON-AUTO SWITCH.
  - c. FAN-SPEED SWITCH.
  - d. AUTOMATIC CHANGEOVER.
  - e. ADJUSTABLE DEADBAND.
  - f. EXPOSED SET POINT.
  - g. EXPOSED INDICATION.
  - h. DEGREE F INDICATION.
  - i. UNOCCUPIED-PERIOD-OVERRIDE PUSH BUTTON.
  - j. DATA ENTRY AND ACCESS PORT TO INPUT TEMPERATURE AND HUMIDITY SET POINTS, OCCUPIED AND UNOCCUPIED PERIODS, AND OUTPUT ROOM TEMPERATURE AND HUMIDITY, SUPPLY-AIR TEMPERATURE, OPERATING MODE, AND STATUS.
- 3. WALL-MOUNTED HUMIDISTAT OR SENSOR WITH THE FOLLOWING FEATURES:
  - a. EXPOSED SET POINT.
  - b. EXPOSED INDICATION.
- 4. REMOTE WALL-MOUNTED ANNUNCIATOR PANEL WITH KEYED ACCESS FOR EACH UNIT:
  - a. LIGHTS TO INDICATE POWER ON, UNIT ALARM OR FAILURE, SMOKE DETECTION.

B. DDC CONTROLLER:

- 1. CONTROLLER SHALL HAVE VOLATILE-MEMORY BACKUP.
- 2. SAFETY CONTROL OPERATION:
  - a. SMOKE DETECTORS: STOP FAN AND CLOSE OUTDOOR-AIR DAMPER IF SMOKE IS DETECTED. PROVIDE ADDITIONAL CONTACTS FOR ALARM INTERFACE TO FIRE ALARM CONTROL PANEL.
  - b. FIRE ALARM CONTROL PANEL INTERFACE WHERE APPLICABLE.
  - c. LOW-DISCHARGE TEMPERATURE: STOP FAN AND CLOSE OUTDOOR-AIR DAMPER IF SUPPLY AIR TEMPERATURE IS LESS THAN 40°F.
  - d. DEFROST CONTROL FOR CONDENSER COIL: PRESSURE DIFFERENTIAL SWITCH TO INITIATE DEFROST SEQUENCE.
- 3. UNIT SHALL BE CAPABLE OF DIRECT COMMUNICATION WITH GENERIC OPEN PROTOCOL SUCH AS BACNET MSTP, LONTALK, OR MODBUS. THIS WILL ALLOW THE UNIT TO INTERACT WITH A FACILITY ENERGY MANAGEMENT SYSTEM.
- 4. SCHEDULED OPERATION: OCCUPIED AND UNOCCUPIED PERIODS ON SEVEN-DAY CLOCK WITH A MINIMUM OF FOUR PROGRAMMABLE PERIODS PER DAY.
- 5. UNOCCUPIED PERIOD:
  - a. HEATING SETBACK: 10°F
  - b. COOLING SETBACK: SYSTEM OFF.
  - c. OVERRIDE OPERATION: TWO HOURS.
- 6. SUPPLY FAN OPERATION:
  - a. OCCUPIED PERIODS: RUN FAN CONTINUOUSLY.
  - b. UNOCCUPIED PERIODS: CYCLE FAN TO MAINTAIN SETBACK TEMPERATURE.
- 7. REFRIGERANT CIRCUIT OPERATION:
  - a. OCCUPIED PERIODS: CYCLE OR STAGE COMPRESSORS, AND OPERATE HOT-GAS BYPASS TO MATCH COMPRESSOR OUTPUT TO COOLING LOAD TO MAINTAIN ROOM TEMPERATURE AND HUMIDITY. CYCLE CONDENSER FANS TO MAINTAIN MAXIMUM HOT-GAS PRESSURE. OPERATE LOW-AMBIENT CONTROL KIT TO MAINTAIN MINIMUM HOT-GAS PRESSURE.
  - b. UNOCCUPIED PERIODS: CYCLE COMPRESSORS AND CONDENSER FANS FOR HEATING TO MAINTAIN SETBACK TEMPERATURE.
- 8. HOT-GAS REHEAT-COIL OPERATION (OPTIONAL):
  - a. OCCUPIED PERIODS: HUMIDISTAT OPENS HOT-GAS VALVE TO PROVIDE HOT-GAS REHEAT, AND CYCLES COMPRESSOR.
  - b. UNOCCUPIED PERIODS: REHEAT NOT REQUIRED.
- 9. GAS FURNACE OPERATION:
  - a. OCCUPIED PERIODS: STAGE BURNER TO MAINTAIN ROOM TEMPERATURE.
  - b. UNOCCUPIED PERIODS: CYCLE BURNER TO MAINTAIN SETBACK TEMPERATURE.
- 10. FIXED MINIMUM OUTDOOR-AIR DAMPER OPERATION:
  - a. OCCUPIED PERIODS: OPEN TO 25 PERCENT.
  - b. UNOCCUPIED PERIODS: CLOSE THE OUTDOOR-AIR DAMPER.
- 11. ECONOMIZER OUTDOOR-AIR DAMPER OPERATION:
  - a. OCCUPIED PERIODS: OPEN TO 25 PERCENT FIXED MINIMUM INTAKE, AND MAXIMUM 100 PERCENT OF THE FAN CAPACITY TO COMPLY WITH ASHRAE CYCLE II. CONTROLLER SHALL PERMIT AIR-SIDE ECONOMIZER OPERATION WHEN OUTDOOR AIR IS LESS THAN 60 °F. USE MIXED-AIR TEMPERATURE AND SELECT BETWEEN OUTDOOR AIR AND RETURN AIR ENTHALPY TO ADJUST MIXING DAMPERS DURING ECONOMIZER CYCLE OPERATION. LOCK OUT COOLING.
  - b. UNOCCUPIED PERIODS: CLOSE OUTDOOR-AIR DAMPER AND OPEN RETURN-AIR DAMPER.

2.10 ACCESSORIES

- A. DUPLEX, 115-V, GROUND-FAULT-INTERRUPTER OUTLET WITH 15-A OVERCURRENT PROTECTION. INCLUDE TRANSFORMER IF REQUIRED.
- B. LOW-AMBIENT KIT STAGED DOWN TO 0°F.
- C. FILTER DIFFERENTIAL PRESSURE SWITCH WITH SENSOR TUBING ON EITHER SIDE OF FILTER. SET FOR FINAL FILTER PRESSURE LOSS.
- D. HAIL GUARDS OF GALVANIZED STEEL, PAINTED TO MATCH CASING.
- E. DUCT MOUNTED SMOKE DETECTOR IN RETURN AIR STREAM CAPABLE OF SHUTTING DOWN THE UNIT IN THE PRESENCE OF SMOKE DETECTION.

2.11 ROOF CURBS

A. MATERIALS: GALVANIZED STEEL WITH CORROSION-PROTECTION COATING, WATERTIGHT GASKETS, AND FACTORY-INSTALLED WOOD NAILER, COMPLYING WITH NRCA STANDARDS.

- 1. CURB INSULATION AND ADHESIVE: COMPLY WITH NFPA 90A OR NFPA 90B.
  - a. MATERIALS: ASTM C 1071, TYPE I OR II.
  - b. THICKNESS: 1-1/2 INCHES.
- 2. APPLICATION: FACTORY APPLIED WITH ADHESIVE AND MECHANICAL FASTENERS TO THE INTERNAL SURFACE OF CURB.
  - a. LINER ADHESIVE: COMPLY WITH ASTM C 916, TYPE I.
  - b. MECHANICAL FASTENERS: GALVANIZED STEEL, SUITABLE FOR ADHESIVE ATTACHMENT, MECHANICAL ATTACHMENT, OR WELDING ATTACHMENT TO DUCT WITHOUT DAMAGING LINER WHEN APPLIED AS RECOMMENDED BY MANUFACTURER AND WITHOUT CAUSING LEAKAGE IN CABINET.
  - c. LINER MATERIALS SHALL HAVE AIR-STREAM SURFACE INSULATED WITH A MINIMUM 1/2-IN. THICK, MINIMUM 1 1/2 LB DENSITY, FLEXIBLE FIBERGLASS INSULATION BONDED WITH A PHENOLIC BINDER, NEOPRENE COATED ON THE AIR SIDE.
  - d. LINER ADHESIVE: COMPLY WITH ASTM C 916, TYPE I.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. EXAMINE SUBSTRATES, AREAS, AND CONDITIONS, WITH INSTALLER PRESENT, FOR COMPLIANCE WITH REQUIREMENTS FOR INSTALLATION TOLERANCES AND OTHER CONDITIONS AFFECTING PERFORMANCE OF RTUS.
- B. EXAMINE ROUGHING-IN FOR RTUS TO VERIFY ACTUAL LOCATIONS OF PIPING AND DUCT CONNECTIONS BEFORE EQUIPMENT INSTALLATION.
- C. EXAMINE ROOFS FOR SUITABLE CONDITIONS WHERE RTUS WILL BE INSTALLED.
- D. PROCEED WITH INSTALLATION ONLY AFTER UNSATISFACTORY CONDITIONS HAVE BEEN CORRECTED.

3.2 INSTALLATION

A. ROOF CURB: INSTALL ON ROOF STRUCTURE, LEVEL AND SECURE. INSTALL RTUS ON CURBS AND COORDINATE ROOF PENETRATIONS AND FLASHING WITH ROOF CONSTRUCTION. RTUS TO UPPER CURB RAIL, AND SECURE CURB BASE TO ROOF FRAMING OR CONCRETE BASE WITH ANCHOR BOLTS.

3.3 CONNECTIONS

- A. THE FOLLOWING ARE SPECIFIC CONNECTION REQUIREMENTS:
  - 1. INSTALL DUCTS TO TERMINATION AT TOP OF ROOF CURB.
  - 2. REMOVE ROOF DECKING ONLY AS REQUIRED FOR PASSAGE OF DUCTS. DO NOT CUT OUT DECKING UNDER ENTIRE ROOF CURB.

3.4 COORDINATION

- A. CONTRACTOR TO COORDINATE WITH KITCHEN EQUIPMENT SUPPLIER TO ENSURE THAT THE RTUS ARE COORDINATED WITH THE KITCHEN EQUIPMENT, PARTICULARLY THE EXHAUST HOODS AND THE MAKE-UP AIR UNIT, TO PROPERLY PRESSURIZE THE BUILDING/SPACE.
- B. CONTRACTOR TO ENSURE THAT ALL THERMOSTATS AND SENSORS ARE COMPATIBLE WITH THE RTU CONTROLS.

3.5 FIELD QUALITY CONTROL

A. MANUFACTURER'S FIELD SERVICE: ENGAGE A FACTORY-AUTHORIZED SERVICE REPRESENTATIVE TO INSPECT, TEST, AND ADJUST COMPONENTS, ASSEMBLIES, AND EQUIPMENT INSTALLATIONS, INCLUDING CONNECTIONS. REPORT RESULTS IN WRITING.

B. PERFORM TESTS AND INSPECTIONS AND PREPARE TEST REPORTS.

- 1. MANUFACTURER'S FIELD SERVICE: ENGAGE A FACTORY-AUTHORIZED SERVICE REPRESENTATIVE TO INSPECT COMPONENTS, ASSEMBLIES, AND EQUIPMENT INSTALLATIONS, INCLUDING CONNECTIONS, AND TO ASSIST IN TESTING. REPORT RESULTS IN WRITING.

C. TESTS AND INSPECTIONS:

- 1. AFTER INSTALLING RTUS AND AFTER ELECTRICAL CIRCUITRY HAS BEEN ENERGIZED, TEST UNITS FOR COMPLIANCE WITH REQUIREMENTS.
- 2. OPERATIONAL TEST: AFTER ELECTRICAL CIRCUITRY HAS BEEN ENERGIZED, START UNITS TO CONFIRM PROPER MOTOR ROTATION AND UNIT OPERATION.
- 3. TEST AND ADJUST CONTROLS AND SAFETIES. REPLACE DAMAGED AND MALFUNCTIONING CONTROLS AND EQUIPMENT.

D. REMOVE AND REPLACE MALFUNCTIONING UNITS AND RETEST AS SPECIFIED ABOVE.

3.6 STARTUP SERVICE

A. ENGAGE A FACTORY-AUTHORIZED SERVICE REPRESENTATIVE TO PERFORM STARTUP SERVICE.

B. COMPLETE INSTALLATION AND STARTUP CHECKS ACCORDING TO MANUFACTURER'S WRITTEN INSTRUCTIONS AND DO THE FOLLOWING:

- 1. INSPECT FOR VISIBLE DAMAGE TO UNIT CASING, FURNACE COMBUSTION CHAMBER, COMPRESSOR, COILS, AND FANS.
- 2. VERIFY THAT LABELS ARE CLEARLY VISIBLE, CLEARANCES HAVE BEEN PROVIDED FOR SERVICING, CONTROLS ARE CONNECTED AND OPERABLE, AND FILTERS ARE INSTALLED.
- 3. CLEAN CONDENSER COIL AND FURNACE AND INSPECT FOR CONSTRUCTION DEBRIS.
- 4. REMOVE PACKING FROM VIBRATION ISOLATORS.
- 5. VERIFY LUBRICATION ON FAN AND MOTOR BEARINGS.
- 6. INSPECT FAN-WHEEL ROTATION FOR MOVEMENT IN CORRECT DIRECTION WITHOUT VIBRATION AND BINDING.
- 7. ADJUST FAN BELTS TO PROPER ALIGNMENT AND TENSION.
- 8. START UNIT ACCORDING TO MANUFACTURER'S WRITTEN INSTRUCTIONS.
  - a. INTERLOCKS AND RECORD PERFORMANCE OF INTERLOCKS AND PROTECTIVE DEVICES; VERIFY SEQUENCES.
- 10. OPERATE UNIT FOR AN INITIAL PERIOD AS RECOMMENDED OR REQUIRED BY MANUFACTURER.
- 11. PERFORM THE FOLLOWING OPERATIONS FOR BOTH MINIMUM AND MAXIMUM FIRING. ADJUST BURNER FOR PEAK EFFICIENCY.
  - a. MEASURE GAS PRESSURE ON MANIFOLD.
  - b. INSPECT OPERATION OF POWER VENTS.
  - c. MEASURE SUPPLY-AIR TEMPERATURE AND VOLUME WHEN BURNER IS AT MAXIMUM FIRING RATE AND WHEN BURNER IS OFF. CALCULATE USEFUL HEAT TO SUPPLY AIR.
- 12. ADJUST AND INSPECT HIGH-TEMPERATURE LIMITS.
- 13. INSPECT OUTDOOR-AIR DAMPERS FOR PROPER STROKE AND INTERLOCK WITH RETURN-AIR DAMPERS.
- 14. INSPECT CONTROLS FOR CORRECT SEQUENCING OF HEATING, MIXING DAMPERS, REFRIGERATION, AND NORMAL AND EMERGENCY SHUTDOWN.
- 15. SIMULATE MAXIMUM COOLING DEMAND AND INSPECT THE FOLLOWING:
  - a. COMPRESSOR REFRIGERANT SUCTION AND HOT-GAS PRESSURES.
  - b. SHORT CIRCUITING OF AIR THROUGH CONDENSER COIL OR FROM CONDENSER FANS TO OUTDOOR-AIR INTAKE.
- 16. VERIFY OPERATION OF REMOTE PANEL INCLUDING PILOT-LIGHT OPERATION AND FAILURE MODES. INSPECT THE FOLLOWING:
  - a. HIGH-TEMPERATURE LIMIT ON GAS-FIRED HEAT EXCHANGER.
  - b. LOW-TEMPERATURE SAFETY OPERATION.
  - c. FILTER HIGH-PRESSURE DIFFERENTIAL ALARM.
  - d. ECONOMIZER TO MINIMUM OUTDOOR-AIR CHANGEOVER.
  - e. RELIEF-AIR FAN OPERATION.
  - f. SMOKE ALARMS.
- 17. AFTER STARTUP AND PERFORMANCE TESTING AND PRIOR TO SUBSTANTIAL COMPLETION, REPLACE EXISTING FILTERS WITH NEW FILTERS.

3.7 CLEANING AND ADJUSTING

A. OCCUPANCY ADJUSTMENTS: WHEN REQUESTED WITHIN 12 MONTHS OF DATE OF SUBSTANTIAL COMPLETION, PROVIDE ON-SITE ASSISTANCE IN ADJUSTING SYSTEM TO SUIT ACTUAL OCCUPIED CONDITIONS. PROVIDE UP TO TWO VISITS TO SITE DURING OTHER-THAN-NORMAL OCCUPANCY HOURS FOR THIS PURPOSE.

B. AFTER COMPLETING SYSTEM INSTALLATION AND TESTING, ADJUSTING, AND BALANCING RTU AND AIR-DISTRIBUTION SYSTEMS, CLEAN FILTER HOUSINGS AND INSTALL NEW FILTERS.

END OF SECTION

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CAVA #00000

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ADR PROJECT NUMBER:  
CAV061

ISSUE	DATE
PERMIT SET	10/09/2024
LANDLORD/BID	11/08/2024
CONSTRUCTION SET	01/29/2025

MECHANICAL SPECIFICATIONS

SHEET:

M702



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