MECHANICAL SYMBOLS

THIS IS A MASTER LEGEND AND NOT ALL SYMBOLS OR ABBREVIATIONS ARE USED. V3.02

STANDARD MOUNTING HEIGHT

THERMOSTATS (USER ADJUSTABLE) (TOP OF DEVICE)	46"
CONTROLS (TOP OF DEVICE)	46"

INSTALL DEVICES AT THE MOUNTING HEIGHTS SHOWN ABOVE UNO IN THE CONSTRUCTION DOCUMENTS. MOUNTING HEIGHTS LISTED ABOVE OR ELSEWHERE IN THE CONSTRUCTION DOCUMENTS ARE AFF OR AFG TO TOP OF THE DEVICE UNO. ALL DEVICES SHALL BE INSTALLED IN COMPLIANCE WITH CURRENT ADA AND LOCAL REQUIREMENTS.

ANNOTATION

- 1 — MECHANICAL PLAN NOTE CALLOUT
- CU / 1 — MECHANICAL EQUIPMENT DESIGNATION (CONTRACTOR FURNISHED AND INSTALLED UNLESS NOTED OTHERWISE)
- CONNECTION POINT OF NEW WORK TO EXISTING
- 1 / M1 — DETAIL REFERENCE. UPPER NUMBER INDICATES DETAIL NUMBER LOWER NUMBER INDICATES SHEET NUMBER
- 1 / M1 — SECTION CUT DESIGNATION
- DEDICATED EQUIPMENT ACCESS TILE
- ACCESS PANEL

ABBREVIATIONS

A/C	AIR CONDITIONING
ACC	AIR COOLED CHILLER
ACCU	AIR COOLED CONDENSING UNIT
AFC	ABOVE FINISHED CEILING
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AHJ	AUTHORITY HAVING JURISDICTION
AHU	AIR HANDLING UNIT
AI	ANALOG INPUT
AO	ANALOG OUTPUT
AP	ACCESS PANEL
APD	AIR PRESSURE DROP
AWG	AMERICAN WIRE GAUGE
B	BOILER
BAS	BUILDING AUTOMATION SYSTEM
BB	BACKBONE
BD	BACKDRAFT DAMPER
BD	BLOWDOWN
BFC	BELOW FINISHED CEILING
BFF	BELOW FINISHED FLOOR
BFG	BELOW FINISHED GRADE
BFP	BOILER FEED PUMP
BHP	BRAKE HORSEPOWER
BI	BINARY INPUT
BO	BINARY OUTPUT
BOD	BOTTOM OF DUCT
BOS	BOTTOM OF STRUCTURE
BTU	BRITISH THERMAL UNIT
CFM	CUBIC FEET PER MINUTE
CH	CHILLER
CLG	COOLING
CP	CONDENSATE PUMP
CPT	CONTROL POWER TRANSFORMER
CRAC	COMPUTER ROOM AIR CONDITIONING UNIT
CRU	COMPUTER ROOM UNIT
CT	COOLING TOWER
CV	CONTROL VALVE
CWP	CONDENSER WATER PUMP
CU	CONDENSING UNIT
CHWP	CHILLED WATER PUMP
DB	DECIBELS
DBA	DECIBEL AVERAGE
DDC	DIRECT DIGITAL CONTROL
DI	DIGITAL INPUT
DISC	DISCONNECT
DN	DOWN
DS	DUCT SILENCER
DX	DIRECT EXPANSION
(E)	EXISTING
EA	EXHAUST AIR
EAT	ENTERING AIR TEMPERATURE
ED	EXHAUST DUCT
EDB	ENTERING DRY BULB
EF	EXHAUST FAN
EFF	EFFICIENCY
EMS	ENERGY MANAGEMENT SYSTEM
ESP	EXTERNAL STATIC PRESSURE
ETR	EXISTING TO REMAIN
EWB	ENTERING WET BULB
EWT	ENTERING WATER TEMPERATURE
FCU	FAN COIL UNIT
FFA	FROM FLOOR ABOVE
FFB	FROM FLOOR BELOW
FF	FINISHED FLOOR
FPI	FINS PER INCH
FPM	FEET PER MINUTE
GC	GENERAL CONTRACTOR
GPM	GALLONS PER MINUTE
HOA	HAND-OFF-AUTOMATIC
HP	HORSEPOWER
HTG	HEATING
HWP	HEATING WATER PUMP
IN WC	INCHES OF WATER COLUMN
L	LOUVER
LAT	LEAVING AIR TEMPERATURE
LDB	LEAVING DRY BULB
LP	LOW PRESSURE
LWB	LEAVING WET BULB
LWT	LEAVING WATER TEMPERATURE
MAU	MAKE-UP AIR UNIT
MAX	MAXIMUM
MBH	1000 BTU PER HOUR
MD	MOTORIZED DAMPER
MFR	MANUFACTURER
MIN	MINIMUM
N/A	NOT APPLICABLE
N/C	NORMALLY CLOSED
N/O	NORMALLY OPEN
NOM	NOMINAL
NC	NOISE CRITERIA
NF	NON-FUSED
NIC	NOT IN CONTRACT
OA	OUTSIDE AIR
PICV	PRESSURE INDEP. CONTROL VALVE
PROVIDE	FURNISH AND INSTALL
QTY	QUANTITY
RA	RETURN AIR
RC	ROOM CRITERIA
RD	RETURN DUCT
REA	RELIEF AIR
RF	RETURN FAN
RFR	REFRIGERANT
RH	RELATIVE HUMIDITY
RH	ROOF HOOD
RPM	REVOLUTIONS PER MINUTE
RTU	ROOFTOP UNIT
SA	SUPPLY AIR
SCP	STEAM CONDENSATE PUMP
SD	SMOKE DUCT DETECTOR
SD	SUPPLY DUCT
SF	SUPPLY FAN
SH	SENSIBLE HEAT CAPACITY
SOW	SCOPE OF WORK
SP	STATIC PRESSURE
ST	STEAM TRAP
STM	STEAM
TBD	TO BE DETERMINED
TC/C	TEMPERATURE CONTROLS CONTRACTOR
TCP	TEMPERATURE CONTROL PANEL
TF	TRANSFER FAN
TFA	TO FLOOR ABOVE
TFB	TO FLOOR BELOW
TH	TOTAL HEAT CAPACITY
TSP	TOTAL STATIC PRESSURE
TT	TEMPERATURE TRANSMITTAL
TYP	TYPICAL
U/F	UNDERFLOOR
U/G	UNDERGROUND
U/S	UNDERSLAB
UH	UNIT HEATER
UNO	UNLESS NOTED OTHERWISE
VAV	VARIABLE AIR VOLUME
VEL	VELOCITY
VFD	VARIABLE FREQUENCY DRIVE
VRF	VARIABLE REFRIGERANT FLOW
VRV	VARIABLE REFRIGERANT VOLUME
W/	WITH
W/O	WITHOUT
WB	WET BULB
WC	WATER COLUMN
WPD	WATER PRESSURE DROP
XP	EXPLOSION PROOF

HVAC DUCTWORK AND ACCESSORIES

- DUCTWORK/EQUIPMENT TO BE REMOVED OR RELOCATED
- EXISTING DUCTWORK/EQUIPMENT TO REMAIN
- LINEAR SLOT DIFFUSER
- INSULATED FLEXIBLE DUCT (MAX. 5'-0" LONG)
- BRANCH DUCT WITH 45° RECTANGLE-ROUND BRANCH FITTING AND MANUAL VOLUME DAMPER
- ELBOW WITH TURNING VANES
- BRANCH DUCT WITH BELL-MOUTH FITTING & MANUAL VOLUME CONTROL DAMPER
- DUCT UP
- DUCT DOWN
- EA — EXHAUST AIR
- GEA — EXHAUST AIR - GREASE
- OA — OUTSIDE AIR
- REA — RELIEF AIR
- RA — RETURN AIR
- XEA — SPECIAL EXHAUST
- SA — SUPPLY AIR
- EQUIPMENT WITH FLEXIBLE DUCT CONNECTION
- 10" (NECK SIZE) CSD-1 (TYPE) 300 CFM (CFM OF SUPPLY DIFFUSER OR REGISTER)
- 24x24 (NECK SIZE) CEG-1 (TYPE) 800 CFM (CFM OF EXHAUST GRILLE)
- EQUIPMENT ACCESS TILE (IN ACT CEILINGS)
- ACCESS PANEL (IN GYPSUM)
- MANUAL VOLUME DAMPER
- SQUARE TO ROUND TRANSITION
- RD / 7 — DUCT MOUNTED SMOKE DETECTOR (SD=SUPPLY/RD=RETURN)
- XX" Ø — ROUND DUCT TAG INDICATING DIAMETER
- XX" x XX" — RECTANGULAR DUCT TAG INDICATING INTERNAL DUCT DIMENSIONS.
- XX" / XX" θ — FLAT OVAL DUCT TAG INDICATING INTERNAL DUCT DIMENSIONS
- # — RISER DESIGNATION
- FD — FIRE DAMPER
- FSD — FIRE SMOKE DAMPER
- SD — SMOKE DAMPER
- VD — VOLUME DAMPER
- MD — MOTORIZED DAMPER
- BD — BACKDRAFT DAMPER

ALL DUCT DIMENSIONS SHOWN ON DRAWINGS ARE INSIDE DIMENSIONS. REFER TO DUCTWORK SPECIFICATIONS FOR DUCTWORK INSULATION AND LINER INFORMATION.

HVAC CONTROL DEVICES

- H — HUMIDISTAT
- T — THERMOSTAT
- CO — CARBON MONOXIDE SENSOR
- CO2 — CARBON DIOXIDE SENSOR
- DP — DIFFERENTIAL PRESSURE SENSOR
- FS — FLOW SWITCH
- HS — HUMIDITY SENSOR
- PS — PULL STATION
- RT — REMOTE TESTING STATION WITH INDICATING LIGHT
- SP — STATIC PRESSURE
- TS — TEMPERATURE SENSOR
- TH — TEMPERATURE AND HUMIDITY SENSOR

PIPING SYMBOLS

- DIRECTION OF FLOW
- CONTROL VALVE
- THREE-WAY CONTROL VALVE
- SHUTOFF VALVE
- CHECK VALVE
- BALANCING VALVE WITH PRESSURE PORTS
- TRIPLE DUTY VALVE WITH PRESSURE PORTS
- STRAINER
- STRAINER WITH BLOWOFF
- RELIEF / SAFETY VALVE
- SOLENOID VALVE
- PRESSURE REDUCING VALVE
- GAS PRESSURE REGULATOR
- THERMOSTATIC MIXING VALVE
- PA — PIPE ANCHOR
- EXPANSION JOINT
- PIPE GUIDE
- PIPING SUPPORT
- F & T TRAP
- BUCKET TRAP
- THERMOSTATIC TRAP
- BACKFLOW PREVENTER
- PRESSURE GAUGE
- THERMOMETER
- PRESSURE AND TEMPERATURE TEST PLUG
- UNION
- FLANGE CONNECTION
- VACUUM RELIEF VALVE
- AV — AUTOMATIC AIR VENT
- MV — MANUAL AIR VENT
- PRESSURE / VACUUM SWITCH
- CLEANOUT
- CAP
- ELBOW UP
- ELBOW DOWN
- TEE UP
- TEE DOWN
- ELBOW UP WITH SHUT-OFF VALVE (SOV)
- ELBOW DOWN WITH SHUT-OFF VALVE (SOV)
- TEE UP WITH SHUT-OFF VALVE (SOV)
- TEE DOWN WITH SHUT-OFF VALVE (SOV)
- REDUCER
- RECIRCULATION PUMP
- P-TRAP
- GAS COCK
- TOP BEAM CLAMP
- TRAPEZE HANGER
- FLEXIBLE CONNECTION

PIPING LINETYPES

- EXISTING PIPING TO BE REMOVED OR RELOCATED
- EXISTING PIPING TO REMAIN
- CD — CONDENSATE DRAIN (CD)
- ACD — AUXILIARY CONDENSATE DRAIN (ACD)
- NPW — NON-POTABLE WATER (NPW)
- G — NATURAL GAS (G)
- G — NATURAL GAS ON ROOF (G)
- MPG — MEDIUM PRESSURE NATURAL GAS (MPG)
- MPG — MEDIUM PRESSURE NATURAL GAS ON ROOF (MGP)
- FOS — FUEL OIL SUPPLY (FOS)
- FOR — FUEL OIL RETURN (FOR)
- FOV — FUEL OIL VENT (FOV)
- LPG — LIQUEFIED PETROLEUM GAS (LPG)
- BFW — BOILER FEED WATER (BFW)
- HPS — HIGH PRESSURE STEAM SUPPLY (HPS)
- HPC — HIGH PRESSURE STEAM CONDENSATE (HPC)
- LPS — LOW PRESSURE STEAM SUPPLY (LPS)
- LPC — LOW PRESSURE STEAM CONDENSATE (LPC)
- CPD — CONDENSATE PUMP DISCHARGE (CPD)
- HWS — HEATING HOT WATER SUPPLY (HWS)
- HWR — HEATING HOT WATER RETURN (HWR)
- CHWS — CHILLED WATER SUPPLY (CHWS)
- CHWR — CHILLED WATER RETURN (CHWR)
- HCS — HOT / CHILLED WATER SUPPLY (HCS)
- HCR — HOT / CHILLED WATER RETURN (HCR)
- CWS — CONDENSER WATER SUPPLY (CWS)
- CWR — CONDENSER WATER RETURN (CWR)
- RL — REFRIGERANT LIQUID (RL)
- RD — REFRIGERANT DISCHARGE (HOT GAS) (RD)
- RS — REFRIGERANT SUCTION (RS)
- RDB — REFRIGERANT DISCHARGE BYPASS (RDB)
- RV — REFRIGERANT VENT (RV)

HATCHING LEGEND

- ENLARGED PLAN
- NOT IN SCOPE (NIS)

LINETYPE LEGEND

THROUGHOUT THE DRAWINGS DIFFERENT LINETYPES ARE USED IN COMBINATION WITH THE SYMBOLS TO INDICATE THE STATUS OF ITEMS AS EXISTING, TO BE DEMOLISHED, TO BE INCLUDED AS PART OF NEW WORK AND/OR ITEMS WHICH ARE ANTICIPATED TO BE PROVIDED IN THE FUTURE. THE STATUS OF ITEMS USING THESE LINETYPES ARE RELATIVE TO THE VIEW IN WHICH THEY APPEAR. PHASING SHOWN IN DRAWINGS IS NOT INTENDED TO FULLY DESCRIBE ALL NECESSARY CONSTRUCTION PHASING, WHICH IS DETERMINED BY THE CONTRACTOR AS PART OF THEIR RESPONSIBILITIES. ANY SUCH PHASES DESCRIBED IN THE CONSTRUCTION DOCUMENTS ARE GENERAL AND ONLY INTENDED TO INDICATE A BROAD ORDER FOR THE SAKE OF DESCRIBING THE PROJECT. THE FOLLOWING LINETYPES MAY BE USED ON ANY DEVICE, EQUIPMENT, NOTE, LINE, SHAPE, ETC.

EXISTING	NEW
DEMOLISH	FUTURE

FORMGROUP

PROGRESS SET OF REVISION 4.2.1

07/24/2025

FOR COORDINATION PURPOSES ONLY
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REVISIONS:

2	REV #2	03/20/24
3.1	REV #3.1	07/26/24

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MECHANICAL SYMBOLS (v2.12)

NOTE: THIS IS A MASTER LEGEND AND NOT ALL SYMBOLS, ABBREVIATIONS, ETC. ARE NECESSARILY USED ON THE DRAWINGS.

CONTROLS SYMBOLS AND NOMENCLATURE

- FLUE DAMPER (BOILERS)
- BOILER (CONTROL PANEL)
- COOLING TOWER
- CONDENSING UNIT
- FLUID COOLER
- WATER-COOLED CHILLER (CONDENSER / EVAPORATOR / CONTROL PANEL)
- AIR-COOLED CHILLER (AIR-COOLED)
- GENERIC HEAT EXCHANGER (HX)
- SHELL AND TUBE HEAT EXCHANGER (HEAT EXCHANGER)
- BASIN HEATER (BHTR)
- GROUND HEAT EXCHANGER
- HEAT RECOVERY WHEEL
- HOT GAS REHEAT COIL (H/G)
- COOLING COIL (C/C)
- FURNACE
- HEATING COIL (H/C)
- DAMPER - GENERIC BLADE TYPE
- DAMPER - OPPOSED BLADE TYPE
- DAMPER - PARALLEL BLADE TYPE
- FLEXIBLE SENSING ELEMENT
- AIRFLOW STATION
- PUMP
- FAN
- HUMIDIFIER
- AIR FILTER
- 3-WAY CONTROL VALVE
- 2-WAY CONTROL VALVE
- AIR BYPASS DAMPER
- AFS — AIRFLOW MEASURING STATION
- DX — DIRECT EXPANSION COOLING UNIT CONTROLLER
- GAS — FURNACE BURNER CONTROLLER
- SCR — SILICON-CONTROLLED RECTIFIER ELECTRIC HEATER CONTROL (MODULATING)
- ELEC — ELECTRIC HEATER CONTROLLER (ON/OFF)
- ECM — ELECTRONIC COMMUTATED MOTOR
- VFD — VARIABLE FREQUENCY DRIVE
- STARTER — MOTOR STARTER
- LTC — LOW LIMIT TEMPERATURE CONTROLLER (FREEZESTAT)
- EMERGENCY PUSH BUTTON

(#)	RISER DESIGNATION
(FD)	FIRE DAMPER
(FSD)	FIRE SMOKE DAMPER
(SD)	SMOKE DAMPER
	SMOKE DETECTOR SD (SD=SUPPLY / RD=RETURN)
(MD)	MOTORIZED DAMPER
(BD)	BACKDRAFT DAMPER
(VD)	VOLUME DAMPER
(H)	HUMIDISTAT
(T)	THERMOSTAT
BTU	BTU METER
CO	CARBON MONOXIDE SENSOR
CO2	CARBON DIOXIDE SENSOR
CP	CONTROL PANEL
CT	CURRENT CIRCUIT RELAY
DP	DIFFERENTIAL PRESSURE SENSOR
EM	ELECTRIC METER
FM	FLOW METER; FUEL METER
FS	FLOW SWITCH
HS	HUMIDITY SENSOR
P	PRESSURE SENSOR
PA	POLLUTANT ALARM
PS	PULL STATION
R	RELAY
RL	REFRIGERANT LEAK SENSOR
S	SENSOR - GENERIC
SP	STATIC PRESSURE PORT
SW	SWITCH
TS	TEMPERATURE SENSOR
WM	WATER METER

POINT TYPE

AI	ANALOG INPUT (MODULATING)
AO	ANALOG OUTPUT (MODULATING)
AV	ANALOG VALUE (VIRTUAL)
BI	BINARY INPUT (ON/OFF, OPEN/CLOSED, ETC)
BO	BINARY OUTPUT (ON/OFF, OPEN/CLOSED, ETC)
BV	BINARY VALUE (VIRTUAL)
COM	COMMUNICATION LINK
MI	MULTI-STATE INPUT
MO	MULTI-STATE OUTPUT
MV	MULTI-STATE VALUE (VIRTUAL)

ABBREVIATIONS

-X	GENERIC INDICATOR OF PLAN MARK NUMBER OR QTY
<>	NOT EQUAL TO
BAS	BUILDING AUTOMATION SYSTEM
CHWS	CHILLED WATER SUPPLY
CHWR	CHILLED WATER RETURN
CMD	COMMAND
CP	CONTROL PANEL
CV	CONTROL VALVE
CWS	CONDENSER WATER SUPPLY
CWR	CONDENSER WATER RETURN
DCW	DOMESTIC COLD WATER
DDC	DIRECT DIGITAL CONTROL
E/C	ELECTRICAL CONTRACTOR
EOA	ECONOMIZER OUTSIDE AIR
EQ	EQUALIZER
E/M	EQUIPMENT MANUFACTURER
FA/C	FIRE ALARM CONTRACTOR
FIP	FAIL IN POSITION
G	NATURAL GAS
HWS	HEATING WATER SUPPLY
HWR	HEATING WATER RETURN
HPWS	HEAT PUMP WATER SUPPLY
HPWR	HEAT PUMP WATER RETURN
LPS	LOW PRESSURE STEAM SUPPLY
LPC	LOW PRESSURE STEAM CONDENSATE
M/C	MECHANICAL CONTRACTOR
MIN	MINIMUM; MINUTES
MOA	MINIMUM OUTSIDE AIR
NC	NORMALLY CLOSED
NIA	NOT IN AUTO (IN HAND)
NO	NORMALLY OPEN
PID	PROPORTIONAL INTEGRAL DERIVATIVE
RA	RETURN AIR
REA	RELIEF/EXHAUST AIR
RH	RELATIVE HUMIDITY
SA	SUPPLY AIR
SCHED	AS SCHEDULED ON DRAWINGS
SPEC	SPECIFIED
SPT	SETPOINT
TBD	TO BE DETERMINED
TC/C	TEMPERATURE CONTROLS CONTRACTOR

WIRING TYPES

- POWER WIRING
- SYSTEM CONTROL WIRING
- BUILDING AUTOMATION WIRING

GENERAL NEW NOTES:

1. PRIOR TO SUBMITTING BID, VISIT THE JOB SITE AND BECOME FULLY ACQUAINTED WITH THE EXISTING CONDITIONS OF THE PROJECT. REVIEW THE GENERAL NOTES, SPECIFICATIONS AND OTHER DRAWINGS FOR ADDITIONAL REQUIREMENTS WHICH MAY NOT BE SPECIFICALLY CALLED OUT IN THIS PORTION OF THE CONSTRUCTION DOCUMENTS. NOTIFY ARCHITECT, ENGINEER AND/OR OWNER OF CONFLICTS OR DISCREPANCIES PRIOR TO SUBMISSION OF BID.
2. EXISTING CONDITIONS WERE TAKEN FROM ORIGINAL DRAWINGS AND SITE VISITS AND MAY NOT REFLECT EXACT "AS-BUILT" CONDITIONS. FIELD VERIFY EXISTING CONDITIONS PRIOR TO SUBMITTING FINAL BIDS. COORDINATE NEW WORK AND DEMOLITION WITH OTHER DISCIPLINES AND EXISTING CONDITIONS PRIOR TO CONSTRUCTION.
3. COORDINATE THE INSTALLATION OF THE MECHANICAL SYSTEMS WITH OTHER TRADES TO ENSURE A NEAT AND ORDERLY INSTALLATION. INSTALL DUCTWORK AND PIPING AS TIGHT TO STRUCTURE AS POSSIBLE. COORDINATE WITH OTHER TRADES TO AVOID CONFLICTS. COORDINATE INSTALLATION OF DUCTWORK AND PIPING TO AVOID CONFLICTS WITH ELECTRICAL PANELS, LIGHTING FIXTURES, ETC. ANY MODIFICATIONS REQUIRED DUE TO LACK OF COORDINATION WILL BE THE RESPONSIBILITY OF THE CONTRACTOR AT NO EXTRA COST TO THE OWNER.
4. WHERE SHUTDOWN OF EXISTING SYSTEMS IS REQUIRED DURING NEW WORK, COORDINATE SHUTDOWN TIME AND DURATION WITH THE OWNER TO MINIMIZE DOWNTIME. NOTIFY OWNER SEVEN (7) DAYS PRIOR TO INTERRUPTION OF SERVICE.
5. DURING INSTALLATION OF NEW WORK, AVOID DAMAGING EXISTING SURFACES AND EQUIPMENT TO REMAIN. REPAIR DAMAGE CAUSED DURING CONSTRUCTION AT NO EXTRA COST TO THE OWNER.
6. PROVIDE TEMPORARY BARRIERS TO CONTAIN DUST AND DEBRIS RESULTING FROM THE PERFORMANCE OF THE WORK TO THE AREA WHERE WORK IS BEING PERFORMED.
7. ALL MECHANICAL EQUIPMENT SHOWN ON THE MECHANICAL PLANS SHALL BE PROVIDED BY DIVISION 23 UNLESS OTHERWISE NOTED.
8. NEW MECHANICAL EQUIPMENT, DUCTWORK AND PIPING ARE SHOWN AT APPROXIMATE LOCATIONS. FIELD MEASURE FINAL DUCTWORK AND PIPING LOCATIONS PRIOR TO FABRICATION AND MAKE ADJUSTMENTS AS REQUIRED TO FIT THE DUCTWORK AND PIPING WITHIN THE AVAILABLE SPACE. VERIFY THAT FINAL EQUIPMENT LOCATIONS MEET MANUFACTURER'S RECOMMENDATIONS REGARDING SERVICE CLEARANCE AND PROPER AIRFLOW CLEARANCE AROUND EQUIPMENT.
9. REFER TO ARCHITECTURAL DRAWINGS FOR RELATED CONSTRUCTION DETAILS AS APPLICABLE TO THE HVAC SYSTEM. VERIFY CHASES AND PENETRATIONS SHOWN ON ARCHITECTURAL DRAWINGS THAT ARE INTENDED FOR DUCTWORK AND PIPING MEET REQUIREMENTS.
10. INDOOR AIR QUALITY MEASURES: PROTECT INSIDE OF (INSTALLED AND DELIVERED) DUCTWORK AND HVAC UNITS FROM EXPOSURE TO DUST, DIRT, PAINT AND MOISTURE. REPLACE INSULATION THAT HAS BECOME WET AT ANY TIME DURING CONSTRUCTION. DRYING THE INSULATION IS NOT ACCEPTABLE. SEAL ANY TEARS OR JOINTS OF INTERNAL FIBERGLASS INSULATION. REMOVE DEBRIS FROM CEILING/RETURN AIR PLENUM INCLUDING DUST. AN INDEPENDENT, PROFESSIONAL DUCT CLEANING COMPANY SHALL VACUUM CLEAN ANY DUCTWORK CONNECTED TO HVAC UNITS THAT WERE OPERATED DURING THE CONSTRUCTION PERIOD AFTER NEW FILTERS ARE INSTALLED AND PRIOR TO TURNING SYSTEM OVER TO THE OWNER. THE INTERNAL SURFACES AND ASSOCIATED COILS OF ANY HVAC UNITS THAT WERE OPERATED SHALL ALSO BE CLEANED.
11. INSTALL DUCTWORK AND PIPING PARALLEL TO BUILDING COLUMN LINES UNLESS OTHERWISE SHOWN OR NOTED.
12. OVERHEAD HANGERS AND SUPPORTS FOR EQUIPMENT, DUCTWORK AND PIPING SHALL BE FASTENED TO BUILDING JOISTS OR BEAMS. DO NOT ATTACH HANGERS AND SUPPORTS TO THE ABOVE FLOOR SLAB OR ROOF EXCEPT WHERE CONCRETE INSERTS IN CONCRETE SLABS ARE ALLOWED BY THE SPECIFICATIONS.
13. COORDINATE LOCATION OF EQUIPMENT SUPPORTS WITH LOCATION OF EQUIPMENT ACCESS PANELS/DOORS TO ENABLE SERVICE OF EQUIPMENT AND/OR FILTER REPLACEMENT.
14. SEAL PENETRATIONS THROUGH THE BUILDING COMPONENTS IN ACCORDANCE WITH THE CONTRACT SPECIFICATIONS. FIREPROOF PENETRATIONS THROUGH FIRE RATED COMPONENTS IN ACCORDANCE WITH U.L. REQUIREMENTS.
15. FOR HYDRONIC, STEAM AND STEAM CONDENSATE PIPING TO EQUIPMENT, MINIMUM ACCEPTABLE SIZE FOR STEEL AND COPPER PIPE IS 3/4 INCH. USE THIS CRITERIA WHERE PIPE SIZES ARE NOT SHOWN ON PLAN.
16. DRAIN, FLUSH, AND REFILL ALL PIPING SYSTEMS NECESSARY TO PERFORM THE WORK. REFERENCE SPECIFICATIONS FOR FLUSHING PERFORMANCE REQUIREMENTS AND SUBMIT FLUSHING PLAN TO ENGINEER FOR REVIEW. PROVIDE CHEMICAL TREATMENT FOR ALL PIPING SYSTEMS AFTER FLUSHING AND REFILLING THE SYSTEM.
17. COORDINATE THE EXACT MOUNTING SIZE AND FRAME TYPE OF DIFFUSERS, REGISTERS AND GRILLES WITH THE SUPPLIER TO MEET THE CEILING, WALL AND DUCT INSTALLATION REQUIREMENTS.
18. ADJUST LOCATION OF CEILING DIFFUSERS, REGISTERS AND GRILLES AS REQUIRED TO ACCOMMODATE FINAL CEILING GRID AND LIGHTING LOCATIONS.
19. PAINT PORTIONS OF DUCTWORK AND INSULATION THAT ARE EXPOSED TO VIEW BY THE INSTALLATION OF DIFFUSERS, REGISTERS, AND GRILLES IN CEILINGS OR WALLS FLAT BLACK. PORTIONS INCLUDE BOTH THE INTERIOR OF UNLINED DUCTWORK AND THE EXTERIOR OF DUCTWORK AND INSULATION.
20. DUCTWORK CROSSING FIRE RATED WALLS OR OTHER FIRE RATED ASSEMBLIES SHALL BE MINIMUM 26 GAUGE SHEET METAL.
21. PROVIDE FIRE OR FIRE/SMOKE DAMPERS, AS APPLICABLE, IN DUCTWORK AT CEILINGS AND WALLS AT LOCATIONS SHOWN ON THE PLANS. FIRE AND FIRE/SMOKE DAMPERS SHALL CONFORM TO NFPA AS APPLICABLE. COORDINATE SLEEVE LENGTH WITH REQUIREMENTS OF INSTALLED LOCATION.

GENERAL NEW NOTES:

22. PROVIDE WALL OR DUCT ACCESS PANELS OR DOORS FOR ACCESS TO FIRE AND FIRE/SMOKE DAMPERS. ACCESS PANEL OR DOOR SHALL BE MINIMUM SIZE OF 10" BY 10" AND SHALL BE INSTALLED WITHIN 12" OF DAMPER. PROVIDE A REMOVABLE DUCT SECTION WHERE DUCT SIZE IS TOO SMALL FOR A 10" BY 10" ACCESS DOOR.
23. LOCATE AND SET THERMOSTATS AND HUMIDISTATS AT LOCATIONS SHOWN ON PLANS. VERIFY EXACT LOCATIONS WITH ARCHITECT PRIOR TO INSTALLATION. DEVICE MOUNTING HEIGHT SHALL MEET ADA REQUIREMENTS UNLESS OTHERWISE NOTED ON PLANS. PROVIDE INSULATED BACKING FOR THERMOSTATS MOUNTED ON EXTERIOR BUILDING WALLS. INSTALL WIRING IN CONDUIT PROVIDED BY DIVISION 26. AT A MINIMUM, PROVIDE CONDUIT IN THE WALL FROM THE JUNCTION BOX TO 6" ABOVE THE CEILING.
24. COORDINATE THE LOCATION AND ELEVATION OF WALL-MOUNTED DEVICES WITH PRESENTATION BOARDS, DISPLAY CABINETS, SHELVES OR OTHER COMPONENTS SHOWN ON THE ARCHITECTURAL DRAWINGS THAT ARE TO BE INSTALLED UNDER OTHER DIVISIONS. CONTRACTOR WILL NOT BE REIMBURSED FOR RELOCATION OF WALL-MOUNTED DEVICES CAUSED BY A LACK OF COORDINATION.
25. PROVIDE A MANUAL BALANCING DAMPER IN EACH DUCT TAKEOFF FROM SUPPLY, RETURN, OUTDOOR AND EXHAUST AIR DUCTS.
26. PROVIDE A PREFABRICATED 45 DEGREE, HIGH EFFICIENCY, RECTANGULAR/ROUND BRANCH DUCT TAKEOFF FITTING FOR BRANCH DUCT CONNECTIONS AND TAKE-OFFS TO INDIVIDUAL DIFFUSERS, REGISTERS AND GRILLES. PROVIDE WITH INTEGRAL MANUAL BALANCING DAMPER AND LOCKING QUADRANT WHERE INDICATED ON PLANS.
27. BRANCH DUCTWORK TO AIR OUTLETS SHALL BE SAME SIZE AS OUTLET NECK SIZE UNLESS OTHERWISE NOTED.
28. REFER TO SPECIFICATIONS FOR DUCTWORK AND PIPING INSULATION REQUIREMENTS. DUCT SIZES ON MECHANICAL PLANS INDICATE CLEAR INSIDE AIRFLOW DIMENSIONS, INCREASE SHEET METAL SIZES ACCORDINGLY TO ACCOUNT FOR THICKNESS OF DUCT LINER.
29. FLEXIBLE DUCTWORK SHALL NOT EXCEED 5'-0" IN LENGTH AND SHALL BE INSTALLED AND SUPPORTED TO AVOID SHARP BENDS AND SAGGING. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
30. PROVIDE EQUIPMENT VENTS AND FLUES PER EQUIPMENT MANUFACTURERS RECOMMENDATIONS AND EQUIPMENT SPECIFICATIONS. KEEP PENETRATIONS THROUGH WALL A MINIMUM OF 10'-0" FROM HVAC EQUIPMENT FRESH AIR INLETS.
31. PROVIDE WALL MOUNTED LOUVERS AND DAMPERS WITH SUITABLE MOUNTING FRAME TO MATCH WALL CONSTRUCTION. COORDINATE WITH ARCHITECTURAL DRAWINGS.
32. PROVIDE A NEW SET OF AIR FILTERS IN UNITS PRIOR TO TESTING, ADJUSTING AND BALANCING AND BEFORE TURNING SYSTEM(S) OVER TO OWNER.

PROJECT DESIGN CONDITIONS

CLIMATE CONDITONS

WEATHER STATION:		MIAMI OPA LOCKA, FL USA				
CLIMATE ZONE:		1A				
HEATING (DB):	99.6%	47.5	°F			
DESIGN HEATING CONDITIONS (DB):		47.5	°F			
COOLING (DB/MCWB):	0.4%	92.2	°F	78.1	°F	
DESIGN COOLING CONDITIONS (DB/ MCWB):		92.2	°F	78.1	°F	
DEHUMIDIFICATION (DP/ HR/ MCDB):	0.4%	79.5	°F	153.1	gr/lb	83.2 °F

BUILDING OPERATING HOURS:

MONDAY - FRIDAY	TBD BY OWNER
SATURDAY	TBD BY OWNER
SUNDAY	TBD BY OWNER
HOLIDAY	TBD BY OWNER

SPACE / UNIT DESCRIPTION	SET POINTS				SPACE OPERATING HOURS OCCUPIED / UNOCCUPIED					NOTES
	COOLING / DE-HUMIDIFICATION			HEATING						
	OCC °F	UNOCC °F	MAX RH %	MIN RH %	OCC °F	UNOCC °F	M-F	SAT	SUN	
DINING/BAR	72	85	50%	NA	67	55	TBD	TBD	TBD	A-C
BACK OF HOUSE	75	85	NA	NA	67	55	TBD	TBD	TBD	A-C

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

POINTS LIST - GLOBAL BUILDING MONITORING

POINT ID	DESCRIPTION	POINT TYPE	UNITS	ACCURACY	TRENDING INTERVAL	ENERGY DASHBOARD DISPLAY	STATUS ALARM	ALARM RANGE	NOTES
GENERAL									
DATE	DATE	AV	MM/DD/YYYY			X			
TIME	TIME	AV	HH:MM			X			
BUILDING SENSORS									
OAT	OUTSIDE AIR DRY BULB TEMPERATURE	AI	°F	SPEC	15 MIN.	X			
OAWB	OUTSIDE AIR WET BULB TEMPERATURE	AV	°F	SPEC	15 MIN.				C
OAH	OUTSIDE AIR RELATIVE HUMIDITY	AI	%	SPEC	15 MIN.	X			
LIFE SAFETY									
FA-SD	FIRE ALARM CONTROL PANEL SHUTDOWN	BI					X	ON ACTIVATION	

NOTES:
C. PERFORM PSYCHROMETRIC CALCULATION TO OBTAIN VALUE BASED ON OUTSIDE AIR DRY BULB TEMPERATURE (OAT) AND OUTSIDE AIR RELATIVE HUMIDITY (OAH).

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07/24/2025

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INTERIOR TENANT BUILD-OUT FOR:

CACTUS CLUB MIAMI

AT CITYGROUP CENTER
201 SOUTH BISCAYNE BLVD, SUITE No. 150
MIAMI, FL 33131

REVISIONS:

2	REV #2	03/20/24
3.1	REV #3.1	07/26/24

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EXPIRES 2/28/2026

PROJECT NO. 23-1222
TITLE: MECHANICAL GENERAL NOTES AND LEGEND
DATE: 1/29/2024
SCALE: AS INDICATED
DRAWING NO.: M-001

7/21/2025 10:59:55 AM
COY M. MACY

COM*check* Software Version COMcheckWeb

Mechanical Compliance Certificate

Project Information

Energy Code:	2021 IECC
Project Title:	Cactus Club Cafe Biscayne - Mechanical
Location:	Miami, Florida
Climate Zone:	1a
Project Type:	Alteration

Construction Site: Owner/Agent: Designer/Contractor:

Mechanical Systems List

Quantity	System Type & Description
1	WSHP-1 (Single Zone): Water Source Heat Pump Heating Mode: Capacity = 74 kBtu/h, Proposed Efficiency = 4.60 COP, Required Efficiency = 4.30 COP Cooling Mode: Capacity = 54 kBtu/h, Proposed Efficiency = 14.50 EER, Required Efficiency = 13.00 EER Proposed Part Load Efficiency = 0.00 , Required Part Load Efficiency = 0.00 Fan System: WSHP-1	Entry -- Compliance (Motor nameplate HP and fan efficiency method) : Fails: FAN 1 : FAILS: Fan energy index must be 1.00 or higher Fans: FAN 1 Supply, Constant Volume, 1920 CFM, 1.0 motor nameplate hp, 0.00 fan energy index , fan exception: Single fan <= 5HP
1	WSHP-2 (Single Zone): Water Source Heat Pump Heating Mode: Capacity = 74 kBtu/h, Proposed Efficiency = 4.60 COP, Required Efficiency = 4.30 COP Cooling Mode: Capacity = 54 kBtu/h, Proposed Efficiency = 14.50 EER, Required Efficiency = 13.00 EER Proposed Part Load Efficiency = 0.00 , Required Part Load Efficiency = 0.00 Fan System: WSHP-2	East Entry -- Compliance (Motor nameplate HP and fan efficiency method) : Fails: FAN 2 : FAILS: Fan energy index must be 1.00 or higher Fans: FAN 2 Supply, Constant Volume, 2000 CFM, 1.0 motor nameplate hp, 0.00 fan energy index , fan exception: Single fan <= 5HP
1	WSHP-3 (Single Zone): Water Source Heat Pump Heating Mode: Capacity = 86 kBtu/h, Proposed Efficiency = 4.64 COP, Required Efficiency = 4.30 COP Cooling Mode: Capacity = 75 kBtu/h, Proposed Efficiency = 15.24 EER, Required Efficiency = 13.00 EER Proposed Part Load Efficiency = 0.00 , Required Part Load Efficiency = 0.00 Fan System: WSHP-3	West Entry -- Compliance (Motor nameplate HP and fan efficiency method) : Fails: FAN 3 : FAILS: Fan energy index must be 1.00 or higher Fans: FAN 3 Supply, Constant Volume, 2600 CFM, 1.0 motor nameplate hp, 0.00 fan energy index , fan exception: Single fan <= 5HP
1	WSHP-4 (Single Zone): Water Source Heat Pump Heating Mode: Capacity = 102 kBtu/h, Proposed Efficiency = 4.50 COP, Required Efficiency = 4.30 COP Cooling Mode: Capacity = 91 kBtu/h,	

Quantity	System Type & Description
	Proposed Efficiency = 15.10 EER, Required Efficiency = 13.00 EER Proposed Part Load Efficiency = 0.00 , Required Part Load Efficiency = 0.00 Fan System: WSHP-4	Main Dining -- Compliance (Motor nameplate HP and fan efficiency method) : Fails: FAN 5 : FAILS: Fan energy index must be 1.00 or higher Fans: FAN 5 Supply, Constant Volume, 3200 CFM, 1.5 motor nameplate hp, 0.00 fan energy index , fan exception: Single fan <= 5HP
1	WSHP-5 (Single Zone): Water Source Heat Pump Heating Mode: Capacity = 132 kBtu/h, Proposed Efficiency = 4.50 COP, Required Efficiency = 4.30 COP Cooling Mode: Capacity = 117 kBtu/h, Proposed Efficiency = 14.54 EER, Required Efficiency = 13.00 EER Proposed Part Load Efficiency = 0.00 , Required Part Load Efficiency = 0.00 Fan System: WSHP-5	Bar / Restrooms -- Compliance (Motor nameplate HP and fan efficiency method) : Fails: FAN 5 : FAILS: Fan energy index must be 1.00 or higher Fans: FAN 5 Supply, Constant Volume, 3200 CFM, 1.5 motor nameplate hp, 0.00 fan energy index , fan exception: Single fan <= 5HP
1	WSHP-6 (Single Zone): Water Source Heat Pump Heating Mode: Capacity = 103 kBtu/h, Proposed Efficiency = 4.68 COP, Required Efficiency = 4.30 COP Cooling Mode: Capacity = 86 kBtu/h, Proposed Efficiency = 14.10 EER, Required Efficiency = 13.00 EER Proposed Part Load Efficiency = 0.00 , Required Part Load Efficiency = 0.00 Fan System: WSHP-6	Main Kitchen -- Compliance (Motor nameplate HP and fan efficiency method) : Fails: FAN 6 : FAILS: Fan energy index must be 1.00 or higher Fans: FAN 6 Supply, Constant Volume, 2500 CFM, 1.5 motor nameplate hp, 0.00 fan energy index , fan exception: Single fan <= 5HP
1	WSHP-7 (Single Zone): Water Source Heat Pump Heating Mode: Capacity = 36 kBtu/h, Proposed Efficiency = 5.10 COP, Required Efficiency = 4.30 COP Cooling Mode: Capacity = 29 kBtu/h, Proposed Efficiency = 15.40 EER, Required Efficiency = 13.00 EER Proposed Part Load Efficiency = 0.00 , Required Part Load Efficiency = 0.00 Fan System: WSHP-7	Main Scullery -- Compliance (Motor nameplate HP and fan efficiency method) : Fails: FAN 7 : FAILS: Fan energy index must be 1.00 or higher Fans: FAN 7 Supply, Constant Volume, 1100 CFM, 0.8 motor nameplate hp, 0.00 fan energy index , fan exception: Single fan <= 5HP
1	WSHP-8 (Single Zone): Water Source Heat Pump Heating Mode: Capacity = 22 kBtu/h, Proposed Efficiency = 5.00 COP, Required Efficiency = 4.30 COP Cooling Mode: Capacity = 18 kBtu/h, Proposed Efficiency = 15.60 EER, Required Efficiency = 13.00 EER Proposed Part Load Efficiency = 0.00 , Required Part Load Efficiency = 0.00 Fan System: WSHP-8	Mezz Prep -- Compliance (Motor nameplate HP and fan efficiency method) : Fails: FAN 8 : FAILS: Fan energy index must be 1.00 or higher Fans: FAN 8 Supply, Constant Volume, 680 CFM, 0.3 motor nameplate hp, 0.00 fan energy index , fan exception: Single fan <= 5HP
1	WSHP-9 (Single Zone): Water Source Heat Pump Heating Mode: Capacity = 106 kBtu/h, Proposed Efficiency = 4.68 COP, Required Efficiency = 4.30 COP Cooling Mode: Capacity = 90 kBtu/h, Proposed Efficiency = 14.10 EER, Required Efficiency = 13.00 EER	

Quantity	System Type & Description
	Proposed Part Load Efficiency = 0.00 , Required Part Load Efficiency = 0.00 Fan System: WSHP-9	Mezz Scullery -- Compliance (Motor nameplate HP and fan efficiency method) : Fails: FAN 9 : FAILS: Fan energy index must be 1.00 or higher Fans: FAN 9 Supply, Constant Volume, 3200 CFM, 2.0 motor nameplate hp, 0.00 fan energy index , fan exception: Single fan <= 5HP
1	WSHP-10 (Single Zone): Water Source Heat Pump Heating Mode: Capacity = 44 kBtu/h, Proposed Efficiency = 5.00 COP, Required Efficiency = 4.30 COP Cooling Mode: Capacity = 34 kBtu/h, Proposed Efficiency = 15.40 EER, Required Efficiency = 13.00 EER Proposed Part Load Efficiency = 0.00 , Required Part Load Efficiency = 0.00 Fan System: WSHP-10	IT -- Compliance (Motor nameplate HP and fan efficiency method) : Fails: FAN 10 : FAILS: Fan energy index must be 1.00 or higher Fans: FAN 10 Supply, Constant Volume, 1250 CFM, 0.8 motor nameplate hp, 0.00 fan energy index , fan exception: Single fan <= 5HP
1	WSHP-11 (Single Zone): Water Source Heat Pump Heating Mode: Capacity = 18 kBtu/h, Proposed Efficiency = 5.10 COP, Required Efficiency = 4.30 COP Cooling Mode: Capacity = 15 kBtu/h, Proposed Efficiency = 15.30 EER, Required Efficiency = 12.20 EER Proposed Part Load Efficiency = 0.00 , Required Part Load Efficiency = 0.00 Fan System: WSHP-11	Office / Break -- Compliance (Motor nameplate HP and fan efficiency method) : Fails: FAN 11 : FAILS: Fan energy index must be 1.00 or higher Fans: FAN 11 Supply, Constant Volume, 570 CFM, 0.3 motor nameplate hp, 0.00 fan energy index , fan exception: Single fan <= 5HP
1	WSHP-12 (Single Zone): Water Source Heat Pump Heating Mode: Capacity = 73 kBtu/h, Proposed Efficiency = 4.60 COP, Required Efficiency = 4.30 COP Cooling Mode: Capacity = 52 kBtu/h, Proposed Efficiency = 14.50 EER, Required Efficiency = 13.00 EER Proposed Part Load Efficiency = 0.00 , Required Part Load Efficiency = 0.00 Fan System: WSHP-12	Mech Room -- Compliance (Motor nameplate HP and fan efficiency method) : Fails: FAN 12 : FAILS: Fan energy index must be 1.00 or higher Fans: FAN 12 Supply, Constant Volume, 1600 CFM, 1.0 motor nameplate hp, 0.00 fan energy index , fan exception: Single fan <= 5HP
1	DOAS-1 (Single Zone): Water Source Heat Pump Heating Mode: Capacity = 442 kBtu/h, No minimum efficiency requirement applies Cooling Mode: Capacity = 362 kBtu/h, No minimum efficiency requirement applies Fan System: DOAS-1	Staff Break -- Compliance (Motor nameplate HP and fan efficiency method) : Passes Fans: FAN 14 Supply, Constant Volume, 4300 CFM, 3.0 motor nameplate hp, 1.06 fan energy index
1	DOAS-3 (Single Zone): Water Source Heat Pump Heating Mode: Capacity = 258 kBtu/h, No minimum efficiency requirement applies Cooling Mode: Capacity = 230 kBtu/h, No minimum efficiency requirement applies Fan System: DOAS-3	Mech Room -- Compliance (Motor nameplate HP and fan efficiency method) : Passes Fans: FAN 15 Supply, Constant Volume, 3100 CFM, 5.0 motor nameplate hp, 1.00 fan energy index , fan exception: Single

Quantity	System Type & Description
	fan <= 5HP
1	DOAS-2 (Single Zone): Water Source Heat Pump Heating Mode: Capacity = 258 kBtu/h, No minimum efficiency requirement applies Cooling Mode: Capacity = 230 kBtu/h, No minimum efficiency requirement applies Fan System: DOAS-2	Mech Room -- Compliance (Motor nameplate HP and fan efficiency method) : Passes Fans: FAN 16 Supply, Constant Volume, 3100 CFM, 5.0 motor nameplate hp, 1.00 fan energy index , fan exception: Single fan <= 5HP
1	WH1: Gas Storage Water Heater, Capacity: 100 gallons, Input Rating: 199 kBtu/h w/ Circulation Pump Proposed Efficiency: 97.00 % Et, Required Efficiency: 80.00 % Et	
1	WH2: Gas Storage Water Heater, Capacity: 100 gallons, Input Rating: 199 kBtu/h w/ Circulation Pump Proposed Efficiency: 97.00 % Et, Required Efficiency: 80.00 % Et	

Mechanical Compliance Statement

Compliance Statement: The proposed mechanical alteration project represented in this document is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed mechanical systems have been designed to meet the 2021 IECC requirements in COMcheck Version COMcheckWeb and to comply with any applicable mandatory requirements listed in the Inspection Checklist.

Emma Allred - Mech Designer	*Emma Allred*	7/16/2024
Name - Title	Signature	Date

COM*check* Software Version COMcheckWeb

Inspection Checklist

Energy Code: 2021 IECC

Requirements: 87.0% were addressed directly in the COM*check* software

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

Section # & Req.ID	Plan Review	Complies?	Comments/Assumptions
C103.2 [PR2][1]	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the mechanical and service water heating systems and document where exceptions to the standard are claimed. Load calculations per acceptable engineering standards and handbooks. Hot water system sized per manufacturer's sizing guide.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.

Additional Comments/Assumptions:

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

Section # & Req.ID	Footing / Foundation Inspection	Complies?	Comments/Assumptions
C403.13.2, C403.13.3 [FO9][1]	Snow/ice melting system and freeze protection systems have sensors and controls configured to limit service for pavement temperature above 50F and outdoor temperature above 40F.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.

Additional Comments/Assumptions:

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

Section # & Req.ID	Plumbing Rough-In Inspection	Complies?	Comments/Assumptions
C404.5, C404.5.1, C404.5.2 [PL6][1]	Heated water supply piping conforms to pipe length and volume requirements. Refer to section details.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C404.6.1, C404.6.2 [PL3][1]	Automatic time switches installed to automatically switch off the recirculating hot-water system or heat trace.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C404.6.3 [PL7][1]	Pumps that circulate water between a heater and storage tank have controls that limit operation from startup to <= 5 minutes after end of heating cycle.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C404.6.1, C404.6.1.1 [PL8][1]	Demand recirculation water systems have controls that start the pump upon receiving a signal from the action of a user of a fixture or appliance and limits the temperature of the water entering the cold-water piping to 104°F.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.

Additional Comments/Assumptions:

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

Section # & Req.ID	Mechanical Rough-In Inspection	Complies?	Comments/Assumptions
C402.2.6 [ME41][1]	Thermally ineffective panel surfaces of sensible heating panels have insulation >= R-3.5.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.8.4 [ME142][1]	Motors for fans that are not less than 1/12 hp and less than 1 hp are electronically commutated motors or have a minimum motor efficiency of 70 percent. These motors have the means to adjust motor speed.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.8.6 [ME143][1]	Each DX cooling system > 65 kBtu and chiller water/evaporative cooling system with fans > 1/4 hp are designed to vary the indoor fan airflow as a function of load and comply with detailed requirements of this section.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.9 [ME144][1]	Large diameter fans where installed shall be tested and labeled in accordance with AMCA 230.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.3 [ME55][1]	HVAC equipment efficiency verified.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Mechanical Systems list for values.*
C403.2.2 [ME59][1]	Natural or mechanical ventilation is provided in accordance with International Mechanical Code Chapter 4. Mechanical ventilation has capability to reduce outdoor air supply to minimum per IMC Chapter 4.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.7.1 [ME59][1]	Demand control ventilation provided for spaces >500 ft2 and >15 people/1000 ft2 occupant density and served by systems with air side economizer, auto modulating outside air damper control, or design airflow >3,000 cfm.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.7.2 [ME115][1]	Enclosed parking garage ventilation has automatic contaminant detection and capacity to stage or modulate fans to 50% or less of design capacity	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C403.7.6 [ME141][1]	HVAC systems serving guestrooms in Group R-1 buildings with > 50 guestrooms: Each guestroom is provided with controls that automatically manage temperature setpoint and ventilation (see sections C403.7.6.1 and C403.7.6.2).	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.7.4 [ME57][1]	Exhaust air energy recovery on systems meeting Table C403.7.4(1) and C403.7.4(2).	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C403.7.5 [ME116][1]	Kitchen exhaust systems comply with replacement air and conditioned supply air limitations, and satisfy hood rating requirements and maximum exhaust rate criteria.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.

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

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PROGRESS SET OF REVISION 4.2.1

07/24/2025

FOR COORDINATION PURPOSES ONLY
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CACTUS CLUB MIAMI

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INTERIOR TENANT BUILD-OUT FOR:

CACTUS CLUB MIAMI

AT CITYGROUP CENTER

201 SOUTH BISCAYNE BLVD, SUITE No. 150
MIAMI, FL 33131

REVISIONS:

2	REV #2	03/20/24
3.1	REV #3.1	07/26/24

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PROJECT NO.
23-1222

TITLE:
ENERGY COMPLIANCE FORMS

DATE:
1/29/2024

SCALE:
AS INDICATED

DRAWING NO.:
M-002

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EXPIRES 2/28/2026

7/21/2025 11:00:01 AM
COY M. MACY

Section # & Req.ID	Mechanical Rough-In Inspection	Complies?	Comments/Assumptions
C403.4.1.4 [ME63][3]	Heating for vestibules and air curtains with integral heating include automatic controls that shut off the heating system when outdoor air temperatures > 45F. Vestibule heating and cooling systems controlled by a thermostat in the vestibule with heating setpoint <= 60F and cooling setpoint >= 80F.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C404.2.1 [ME111][3]	Gas-fired water-heating equipment installed in new buildings: where a singular piece of water-heating equipment >= 1,000 kBtu/h serves the entire building, thermal efficiency >= 92 Et. Where multiple pieces of water-heating equipment serve the building with combined rating >= 1,000 kBtu/h, the combined input-capacity-weighted-average thermal efficiency >= 90 Et. Exclude input rating of equipment in individual dwelling units and equipment <= 100 kBtu/h.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C408.2.2.1 [ME53][3]	Air outlets and zone terminal devices have means for air balancing.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.11.3.1, C403.11.3.2 [ME123][3]	Refrigerated display cases, walk-in coolers or walk-in freezers served by remote compressors and remote condensers not located in a condensing unit, have fan-powered condensers that comply with Sections C403.11.3.1 and refrigeration compressor systems that comply with C403.11.3.2...	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.

Additional Comments/Assumptions:

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

Section # & Req.ID	Rough-In Electrical Inspection	Complies?	Comments/Assumptions
C405.7 [EL26][2]	Low-voltage dry-type distribution electric transformers meet the minimum efficiency requirements of Table C405.6.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C405.8 [EL27][2]	Electric motors meet the minimum efficiency requirements of Tables C405.7(1) through C405.7(4). Efficiency verified through certification under an approved certification program or the equipment efficiency ratings shall be provided by motor manufacturer (where certification programs do not exist).	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C405.9.1, C405.9.2 [EL28][2]	Escalators and moving walks comply with ASME A17.1/CSA B44 and have automatic controls configured to reduce speed to the minimum permitted speed in accordance with ASME A17.1/CSA B44 or applicable local code when not conveying passengers.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C405.10 [EL29][2]	Total voltage drop across the combination of feeders and branch circuits <= 5%.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C405.11.1 [EL30][2]	At least 90% of dwelling unit permanently installed lighting shall have lamp efficacy >= 65 lm/W or luminaires with efficacy >= 45 lm/W or comply with C405.2.4 or C405.3.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C405.11.2, C405.11.3 [EL31][2]	50% of 15/20 amp receptacles installed in enclosed offices, conference rooms, copy rooms, break rooms, classrooms and workstations and > 25% of branch circuit feeders for modular furniture will have automatic receptacle control in accordance with C405.11.1.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	

Additional Comments/Assumptions:

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

Section # & Req.ID	Final Inspection	Complies?	Comments/Assumptions
C303.3, C408.2.5.3 [FI8][3]	Furnished O&M manuals for HVAC systems within 90 days of system acceptance.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.3.1 [FI27][3]	HVAC systems and equipment capacity does not exceed calculated loads.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.4.1 [FI47][3]	Heating and cooling to each zone is controlled by a thermostat control. Minimum one humidity control device per installed humidification/dehumidification system.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.4.1.1 [FI42][3]	Heat pump controls prevent supplemental electric resistance heat from coming on when not needed.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.4.1.2 [FI38][3]	Thermostatic controls have a 5 °F deadband.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.4.1.3 [FI20][3]	Temperature controls have setpoint overlap restrictions.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.4.2 [FI39][3]	Each zone equipped with setback controls using automatic time clock or programmable control system.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.4.2.1, C403.4.2.2 [FI40][3]	Automatic Controls: Setback to 55°F (heat) and 85°F (cool); 7-day clock, 2-hour occupant override, 10-hour backup	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.4.2.3 [FI41][3]	Systems include optimum start controls.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C404.3 [FI11][3]	Heat traps installed on supply and discharge piping of non-circulating systems.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C404.4 [FI25][2]	All piping insulated in accordance with section details and Table C403.12.3.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C404.6.1 [FI12][3]	Controls are installed that limit the operation of a recirculation pump installed to maintain temperature of a storage tank. System return pipe is a dedicated return pipe or a cold water supply pipe.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.

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

Section # & Req.ID	Final Inspection	Complies?	Comments/Assumptions
C408.1.1 [FI57][3]	Building operations and maintenance documents will be provided to the owner. Documents will cover manufacturers' information, specifications, programming procedures and means of illustrating to owner how building, equipment and systems are intended to be installed, maintained, and operated.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C408.2.1 [FI28][3]	Commissioning plan developed by registered design professional or approved agency.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C408.2.3.1 [FI31][3]	HVAC equipment, systems and system-to-system relationships have been tested to ensure proper operation.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C408.2.3.2 [FI10][3]	HVAC and service water heating control systems have been tested to ensure proper operation, calibration and adjustment of controls.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C408.2.4 [FI29][2]	Preliminary commissioning report completed and certified by registered design professional or approved agency.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C408.2.5 [FI7][3]	Furnished HVAC as-built drawings submitted within 90 days of system acceptance.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C408.2.5.1 [FI43][3]	An air and/or hydronic system balancing report is provided for HVAC systems.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C408.2.5.2 [FI30][3]	Final commissioning report due to building owner within 90 days of receipt of certificate of occupancy.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.

Additional Comments/Assumptions:

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

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07/24/2025

PROGRESS SET OF REVISION 4.2.1

FOR COORDINATION PURPOSES ONLY
MASTER PERMIT REVISION PENDING

CACTUS CLUB MIAMI

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INTERIOR TENANT BUILD-OUT FOR:

CACTUS CLUB MIAMI

AT CITYGROUP CENTER

201 SOUTH BISCAYNE BLVD,
SUITE No. 150
MIAMI, FL 33131

REVISIONS:

2	REV #2	03/20/24
3.1	REV #3.1	07/26/24

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LICENSE # 86060

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COY M. MACY
LICENSE # 86060

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FL. REGISTRY NO. EB 7606
EXPIRES 2/28/2026

PROJECT NO.
23-1222

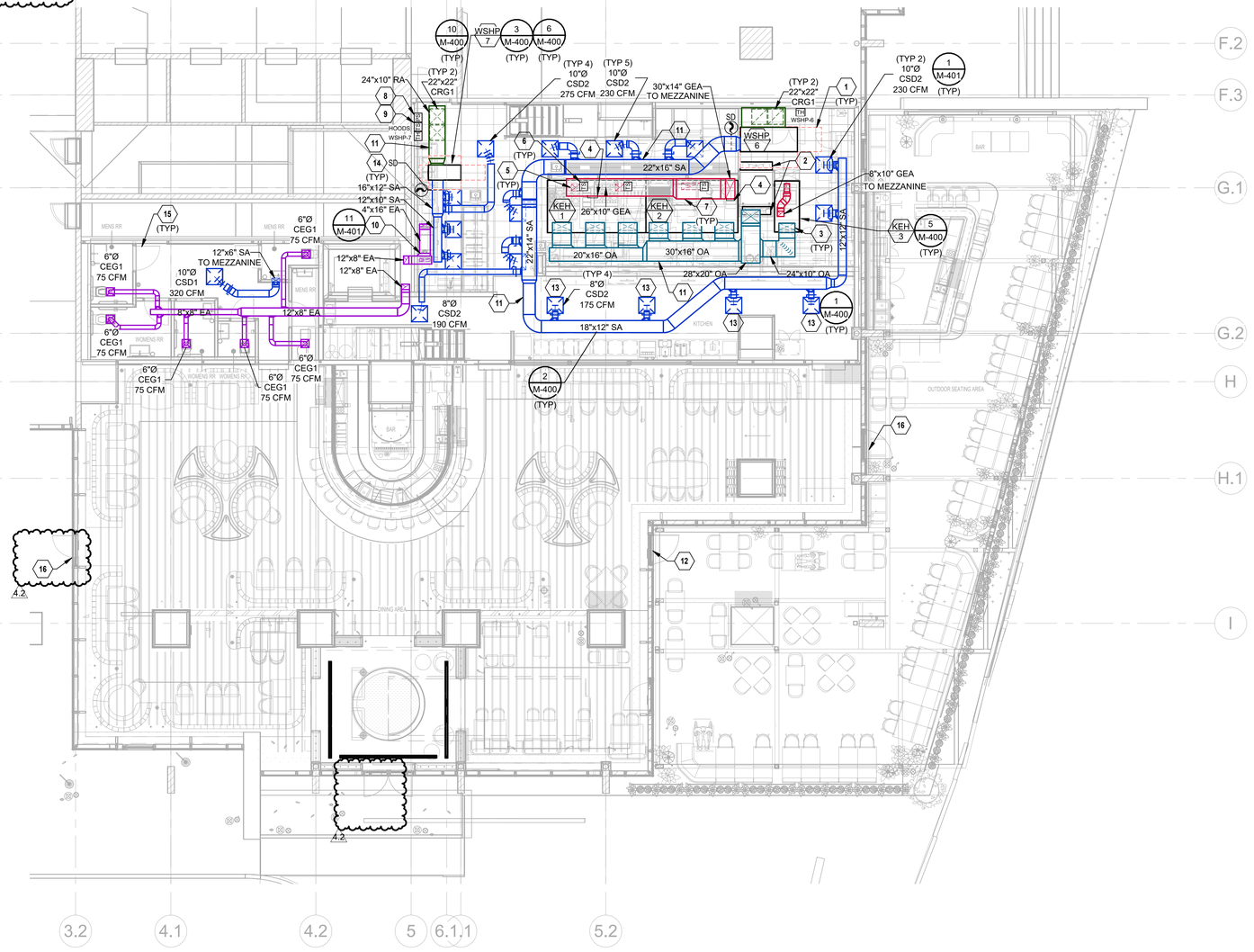
TITLE:
ENERGY COMPLIANCE FORMS

DATE:
1/29/2024

SCALE:
AS INDICATED

DRAWING NO.:
M-003

7/21/2025 11:00:06 AM
COY M. MACY



1 MECHANICAL PLAN LEVEL 1
1/8" = 1'-0"

MECHANICAL GENERAL NOTES

1. DO NOT ROUTE ANY DUCTWORK OR PIPING ABOVE ELECTRICAL PANELS.
2. REFER TO SHEET M-001 FOR ADDITIONAL GENERAL NOTES AND REQUIREMENTS.
3. REFER TO DETAILS AND SCHEDULES SHEETS FOR FURTHER INFORMATION.
4. MOUNT ALL THERMOSTATS AND SENSORS CONTROLLING HVAC EQUIPMENT AT 48" AFF UNLESS OTHERWISE NOTED.

MECHANICAL PLAN NOTES:

1 BOXED REGION INDICATES CEILING TILE REQUIRED FOR ACCESS TO MECHANICAL UNIT ABOVE CEILING. NO DUCTWORK, PIPING, CONDUIT, CABLING, SUPPORT STRUCTURE, ETC. SHALL BE INSTALLED THAT IMPEDES ACCESS TO SERVICE CLEARANCE ZONE BELOW UNIT.

2 EXHAUST HOOD FIRE EXTINGUISHING SYSTEM AND CONTROLS SHALL BE FURNISHED AND INSTALLED BY FOOD SERVICE EQUIPMENT CONTRACTOR (MECHANICAL CONTRACTOR TO COORDINATE) IN COMPLETE CONFORMANCE WITH NFPA 96, LOCAL CODES, AND SIZED TO SERVE ASSOCIATED HOODS. SEE CAPTIVEAIRE PLANS AND FOOD SERVICE PLANS FOR MORE INFORMATION. SYSTEM SHALL WALL MOUNTED WITH BOTTOM OF PANEL AT 6'-6".

3 PROVIDE MAKEUP AIR CONNECTIONS TO HOOD. DUCT SIZE TO MATCH HOOD CONNECTION SIZE. BALANCE MAKEUP AIR TO MATCH CAPTIVE AIR PLANS.

4 PROVIDE GREASE DUCT CLEANOUT ACCESS DOOR AT LOCATIONS INDICATED AND AS REQUIRED TO MEET AHJ REQUIREMENTS. PROVIDE PROPER CLEARANCE IN FRONT OF CLEANOUT FOR ACCESS.

5 PROVIDE GREASE EXHAUST CONNECTION TO HOOD. TRANSITION AS NECESSARY. BALANCE EXHAUST TO MATCH CAPTIVEAIRE PLANS.

6 DUCT MOUNTED HEAT DETECTOR MOUNTED IN EXHAUST HOOD DUCT RISER, FURNISHED WITH HOOD, INSTALLED AND WIRED BY ELECTRICAL CONTRACTOR.

7 KITCHEN HOOD EXHAUST GREASE DUCT. DUCT SHALL BE UL LISTED SINGLE WALL STAINLESS STEEL GREASE DUCT AND WRAPPED WITH A UL LISTED GREASE DUCT WRAP AS REQUIRED. SLOPE DUCTWORK AS REQUIRED TO MEET UL LISTING OF DUCTWORK.

8 INSTALL MANUAL PULL STATION FOR HOOD FIRE SUPPRESSION SYSTEM PER NFPA 96 REQUIREMENTS. PRIOR TO INSTALLATION, VERIFY LOCATION AND QUANTITY OF PULL STATIONS WITH AHJ.

9 INSTALL WALL TEMPERATURE SENSOR. TEMPERATURE SENSOR IS PART OF CAPTIVEAIRE HOOD SYSTEM. MOUNT HIGH ON WALL. COORDINATE WITH FOOD SERVICE EQUIPMENT CONTRACTOR.

10 COORDINATE DISHWASHER EXHAUST DUCT WITH FSEC. SLOPE EXHAUST DUCT 1/4" PER FOOT TOWARD DISHWASHER HOOD. PROVIDE TRANSITIONS AS REQUIRED TO RIGIDLY CONNECT TO EXHAUST FAN.

11 COORDINATE INSTALLATION OF DUCTWORK AND SEWER PIPING IN GENERAL VICINITY.

12 MAINTAIN EXISTING DOOR OPERATOR AND SMOKE EVAC INTEGRATION.

13 RELOCATE DUCT ACCESS DOOR FOR FIRES SMOKE DAMPER TO BE ON SIDE OF DUCT, SO IT IS ACCESSIBLE FROM CEILING ACCESS PANEL.

14 DUCT SMOKE DETECTOR PROVIDED BY DIVISION 28.

15 PROVIDE 1" DOOR UNDERCUT FOR TRANSFER AIR ON RESTROOM DOORS. MECHANICAL CONTRACTOR TO COORDINATE EXECUTION OF THIS WORK WITH GENERAL CONTRACTOR.

16 PROVIDE NEW SMOKE EVAC DOOR OPERATOR AND INTEGRATE INTO SMOKE EVAC SYSTEM.

4.2 ADJUST DIFFUSER BLADES NEAR PROJECTION SCREENS TO AVOID BLOWING AIR ONTO SCREENS.

THIS ITEM HAS BEEN ELECTRONICALLY SIGNED AND SEALED BY COY M. MACY ON THE DATE LISTED BELOW USING A DIGITAL SIGNATURE.

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EXPIRES 2/28/2026

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PROGRESS SET OF REVISION 4.2.1

08/26/2025

FOR COORDINATION PURPOSES ONLY
MASTER PERMIT REVISION PENDING

CACTUS CLUB MIAMI

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INTERIOR TENANT BUILD-OUT FOR:

CACTUS CLUB MIAMI

AT CITYGROUP CENTER

201 SOUTH BISCAYNE BLVD, SUITE No. 150
MIAMI, FL 33131

REVISIONS:

2	REV #2	03/20/24
2.1	REV #2.1	06/10/24
3.1	REV #3.1	07/26/24
4.1	REV#4.1	02/25/25
4.2	REV#4.2	05/08/25

COY M. MACY LICENSE No 86060 STATE OF FLORIDA PROFESSIONAL ENGINEER

COY M. MACY
LICENSE # 86060
8/25/2025

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PROJECT NO.
23-1222

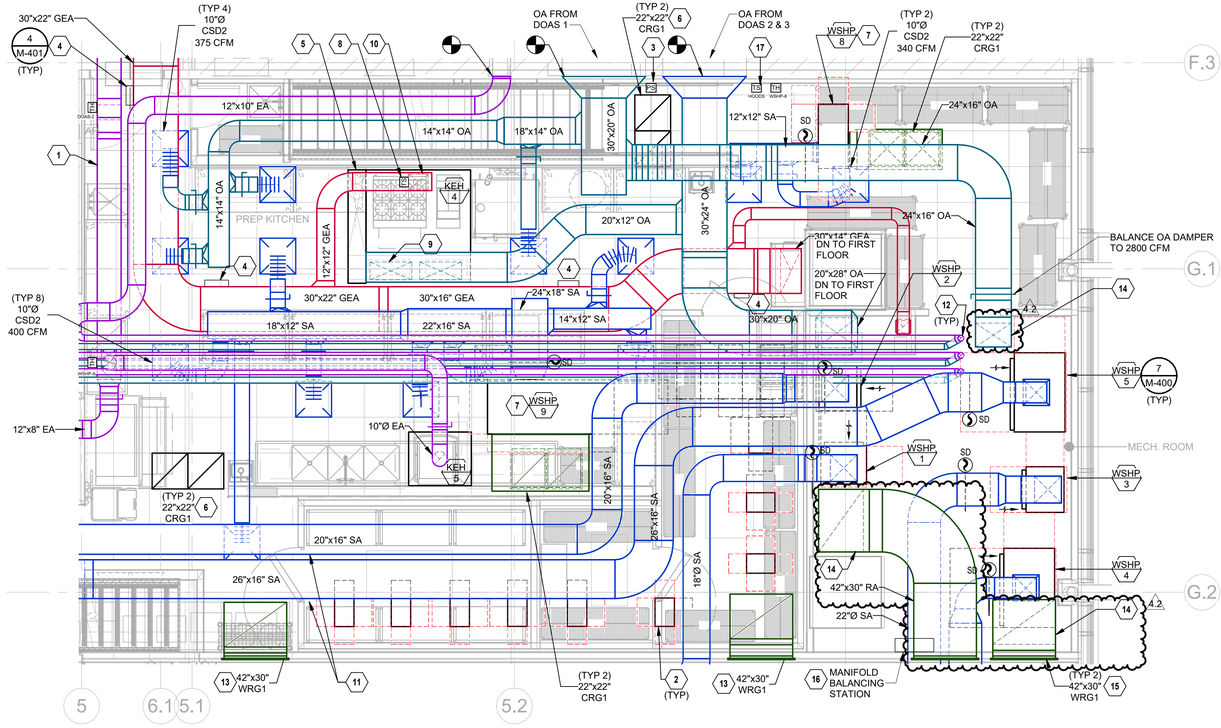
TITLE:
MECHANICAL PLAN LEVEL 1

DATE:
1/29/2024

SCALE:
AS INDICATED

DRAWING NO.:
M-100

8/25/2025 1:42:44 PM
COY M. MACY



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

MECHANICAL GENERAL NOTES

1. DO NOT ROUTE ANY DUCTWORK OR PIPING ABOVE ELECTRICAL PANELS.
2. REFER TO SHEET M-001 FOR ADDITIONAL GENERAL NOTES AND REQUIREMENTS.
3. REFER TO DETAILS AND SCHEDULES SHEETS FOR FURTHER INFORMATION.
4. MOUNT ALL THERMOSTATS AND SENSORS CONTROLLING HVAC EQUIPMENT AT 48" AFF UNLESS OTHERWISE NOTED.

MECHANICAL PLAN NOTES:

1 DUCTWORK SHALL SLOPE TOWARDS FAN, DISHWASHER OR DISCHARGE. DO NOT SLOPE DUCT TO ANY OTHER POINT THAT WOULD CREATE A SPOT FOR MOISTURE TO COLLECT.

2 REFRIGERATION UNIT FURNISHED AND INSTALLED BY REFRIGERATION CONTRACTOR, MOUNTED ON TOP OF WALK-INS. GC TO OBTAIN SHOP DRAWING FROM FOOD SERVICE AND FULLY COORDINATE ALL REQUIREMENTS.

3 INSTALL MANUAL PULL STATION FOR HOOD FIRE SUPPRESSION SYSTEM PER NFPA 96 REQUIREMENTS. PRIOR TO INSTALLATION, VERIFY LOCATION AND QUANTITY OF PULL STATIONS WITH AHJ.

4 PROVIDE GREASE DUCT CLEANOUT ACCESS DOOR AT LOCATIONS INDICATED AND AS REQUIRED TO MEET AHJ REQUIREMENTS. PROVIDE PROPER CLEARANCE IN FRONT OF CLEANOUT FOR ACCESS.

5 EXHAUST HOOD FIRE EXTINGUISHING SYSTEM AND CONTROLS SHALL BE PROVIDED BY MECHANICAL CONTRACTOR IN COMPLETE CONFORMANCE WITH NFPA 96, LOCAL CODES, AND SIZED TO SERVE ASSOCIATED HOODS. SEE CAPTIVEAIRE PLANS AND FOOD SERVICE PLANS FOR MORE INFORMATION. SYSTEM SHALL BE MOUNTED TO END OF HOOD.

6 PROVIDE RETURN GRILLES FOR SMOKE EVAC.

7 PROVIDE RETURN DUCT FULL SIZE OF UNIT RETURN AIR CONNECTION IF RETURN DUCT SIZE IS NOT PROVIDED.

8 DUCT MOUNTED HEAT DETECTOR MOUNTED IN EXHAUST HOOD DUCT RISER, FURNISHED WITH HOOD, INSTALLED AND WIRED BY ELECTRICAL CONTRACTOR.

9 PROVIDE MAKEUP AIR CONNECTIONS TO HOOD. DUCT SIZE TO MATCH HOOD CONNECTION SIZE. BALANCE MAKEUP AIR TO MATCH CAPTIVE AIR PLANS.

10 PROVIDE GREASE EXHAUST CONNECTION TO HOOD. TRANSITION AS NECESSARY. BALANCE EXHAUST TO MATCH CAPTIVEAIRE PLANS.

11 ROUTE DUCTWORK TIGHT TO STRUCTURE. DUCTWORK SHALL BE UNIFORM HEIGHT UNLESS OFFSETTING FOR STRUCTURE, EQUIPMENT AND OTHER DUCTWORK. BOTTOM OF DUCTWORK SHALL NOT BE BELOW 13'-0" A.F.F.

12 TERMINATE 3" FLUE VENT AND COMBUSTION AIR DUCTS WITH CONCENTRIC VENT KIT THRU ROOF PER MANUFACTURER'S RECOMMENDATIONS. REFER TO SPECIFICATIONS, DETAILS, AND PLUMBING PLANS FOR FURTHER INFORMATION. MAINTAIN A MINIMUM OF 3'-0" FROM PARAPET, AND 10'-0" FROM ALL OUTDOOR AIR INTAKES.

13 PROVIDE TRANSFER GRILLES IN WALL WITH RETURN BOOT FOR SMOKE EVAC. INSTALL ABOVE BAFFLE CEILING.

4.2 14 STUB DUCT THROUGH CEILING. DUCT SHALL EXTEND NO MORE THAN 2 INCHES BELOW FINISHED CEILING. PROVIDE BIRD SCREEN OVER DUCT OPENING.

15 PROVIDE RETURN GRILLE WITH RETURN AIR BOOT. INSTALL ABOVE BAFFLE CEILING.

16 CEILING DIFFUSERS INSTALLED IN INACCESSIBLE BAFFLE CEILING IN DINING SHALL HAVE MANIFOLD BALANCING STATION WITH ELECTRONICALLY OPERATED DAMPER FOR AIR BALANCING. PROVIDE YOUNG REGULATOR ELECTRONIC BALANCING DAMPER MODEL EBD WITH EBDP CONTROLLER. MANIFOLD BALANCING STATION SHALL BE MOUNTED ON WALL.

17 INSTALL WALL TEMPERATURE SENSOR. TEMPERATURE SENSOR IS PART OF CAPTIVEAIRE HOOD SYSTEM. MOUNT HIGH ON WALL. COORDINATE WITH FOOD SERVICE EQUIPMENT CONTRACTOR.

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PROGRESS SET OF REVISION 4.2.1

07/24/2025

FOR COORDINATION PURPOSES ONLY
MASTER PERMIT REVISION PENDING

CACTUS CLUB MIAMI

OWNER:
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OWNERS REPRESENTATIVE:
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KITCHEN CONSULTANT:
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Ph: 604-216-2566
Email: stanley.t@foundrykitchens.com

INTERIOR TENANT BUILD-OUT FOR:

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AT CITYGROUP CENTER

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MIAMI, FL 33131

REVISIONS:

2	REV #2	03/20/24
2.1	REV #2.1	06/10/24
3.1	REV #3.1	07/26/24
2.3	REV#2.3	09/27/24
4.1	REV#4.1	02/25/25
4.2	REV#4.2	05/08/25

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COY M. MACY
LICENSE # 86060

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FL. REGISTRY NO. EB 7606
EXPIRES 2/28/2026

PROJECT NO.
23-1222

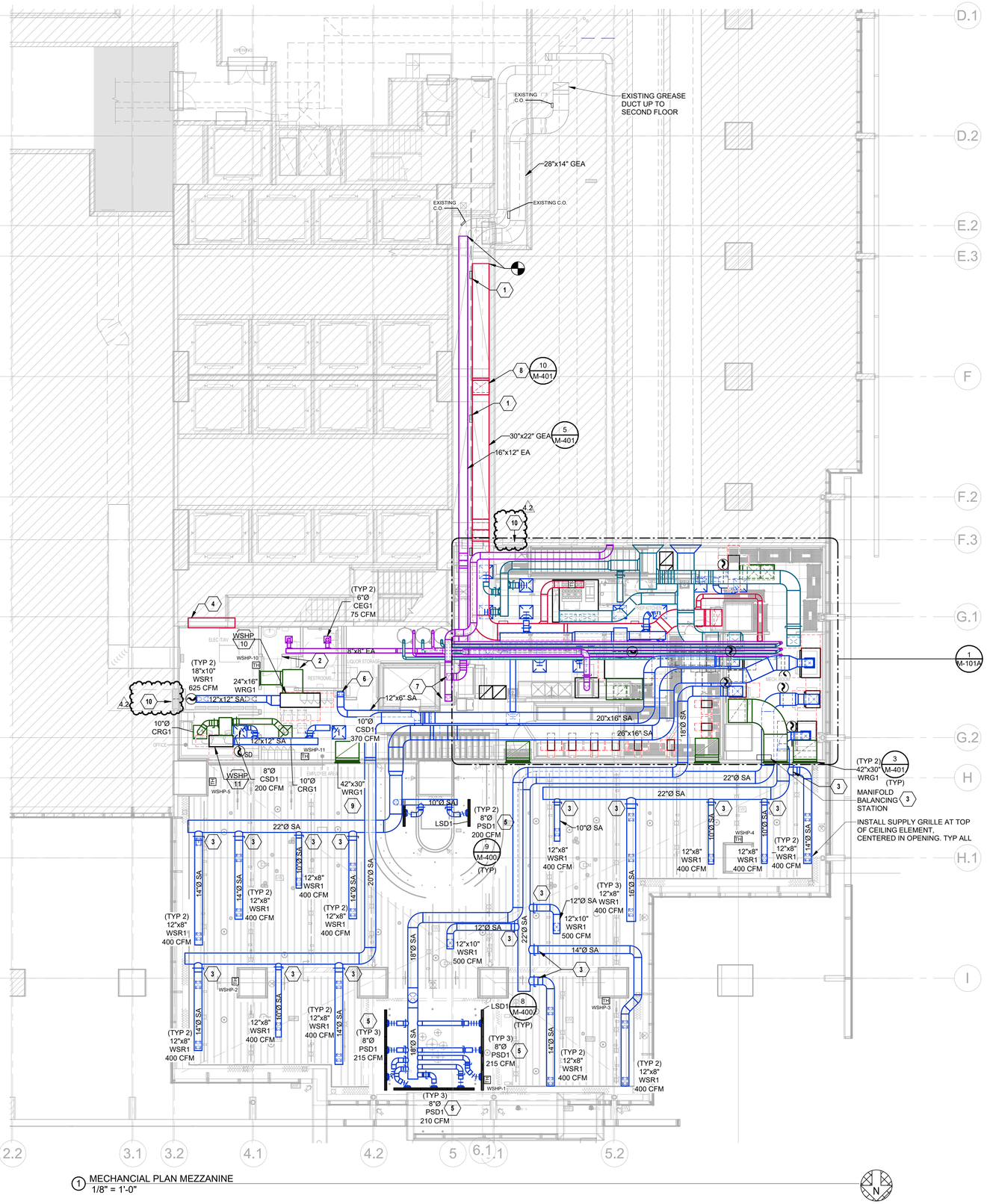
DATE:
1/29/2024

TITLE:
ENLARGED MECHANICAL PLAN

SCALE:
AS INDICATED

DRAWING NO.:
M-101A

7/21/2025 11:00:39 AM
COY M. MACY



1 MECHANICAL PLAN MEZZANINE
1/8" = 1'-0"

MECHANICAL GENERAL NOTES

1. DO NOT ROUTE ANY DUCTWORK OR PIPING ABOVE ELECTRICAL PANELS.
2. REFER TO SHEET M-001 FOR ADDITIONAL GENERAL NOTES AND REQUIREMENTS.
3. REFER TO DETAILS AND SCHEDULES SHEETS FOR FURTHER INFORMATION.
4. MOUNT ALL THERMOSTATS AND SENSORS CONTROLLING HVAC EQUIPMENT AT 48" AFF UNLESS OTHERWISE NOTED.

MECHANICAL PLAN NOTES:

1 PROVIDE GREASE DUCT CLEANOUT ACCESS DOOR AT LOCATIONS INDICATED AND AS REQUIRED TO MEET AHJ REQUIREMENTS. PROVIDE PROPER CLEARANCE IN FRONT OF CLEANOUT FOR ACCESS.

2 PROVIDE 1" DOOR UNDERCUT FOR TRANSFER AIR ON RESTROOM DOORS. MECHANICAL CONTRACTOR TO COORDINATE EXECUTION OF THIS WORK WITH GENERAL CONTRACTOR.

3 CEILING DIFFUSERS INSTALLED IN INACCESSIBLE BAFFLE CEILING IN DINING SHALL HAVE MANIFOLD BALANCING STATION WITH ELECTRONICALLY OPERATED DAMPER FOR AIR BALANCING. PROVIDE YOUNG REGULATOR ELECTRONIC BALANCING DAMPER MODEL EBD WITH EBDP CONTROLLER. MANIFOLD BALANCING STATION SHALL BE MOUNTED ON WALL.

4 EXISTING 84" X 24" SMOKE EVAC SYSTEM. CONTRACTOR TO COORDINATE OPERATION SEQUENCE WITH BUILDING. CONTRACTOR TO MAINTAIN OPEN PATH FROM SPACES TO EXHAUST LOUVER. DINING ROOM SHALL EXHAUST THROUGH WALL GRILLES ABOVE CEILING FEATURE. KITCHEN TO EXHAUST THROUGH 2' X 2' GRILLES OPEN TO PLENUM THROUGHOUT MEZZANINE KITCHEN.

5 CEILING DIFFUSER INSTALLED IN INACCESSIBLE CEILING SHALL HAVE CABLE OPERATED DAMPER FOR AIR BALANCING. PROVIDE CABLE OPERATED VOLUME DAMPER BY METROPOLITAN AIR TECHNOLOGIES MODEL RT-250 WITH EXTERNAL WORM GEAR OR YOUNG REGULATOR EQUIVALENT BUTTERFLY DAMPER WITH 270-275 CONTROLLER. DAMPER CABLE ACTUATOR SHALL BE ACCESSIBLE FOR BALANCING FROM THE FLANGE OF A SLOT DIFFUSER OR THE TOP OF A SQUARE OR ROUND FACE DIFFUSER AS DETAILED. INSTALL VOLUME DAMPER AT LOCATION INDICATED ON PLAN.

6 6" X 12" DN TO FIRST FLOOR

7 12" X 8" DN TO FIRST FLOOR

8 INSTALL LOW POINT DRAIN IN GREASE EXHAUST DUCT.

9 PROVIDE TRANSFER GRILLES IN WALL WITH RETURN BOOT FOR SMOKE EVAC SYSTEM SEQUENCE

10 EXISTING 36X24 AIR TRANSFER OPENING WITH EXISTING FIRE SMOKE DAMPER. OPENING IS PART OF BASE BUILDING SMOKE EVAC SYSTEM. REFER TO SEQUENCE ON M200 FOR DAMPER OPERATION. 4.2

4.2 ADJUST DIFFUSER BLADES NEAR PROJECTION SCREENS TO AVOID BLOWING AIR ONTO SCREENS.

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08/26/2025

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OWNERS REPRESENTATIVE:
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Contact: Brian Stys
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INTERIOR TENANT BUILD-OUT FOR:

CACTUS CLUB MIAMI

AT CITYGROUP CENTER
201 SOUTH BISCAYNE BLVD, SUITE No. 150
MIAMI, FL 33131

REVISIONS:

2	REV #2	03/20/24
2.1	REV #2.1	06/10/24
3.1	REV #3.1	07/26/24
2.3	REV#2.3	09/27/24
4.2	REV#4.2	05/08/25

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PROJECT NO.
23-1222

TITLE:
MECHANICAL PLAN MEZZANINE

DATE:
1/29/2024

SCALE:
AS INDICATED

DRAWING NO.:
M-101

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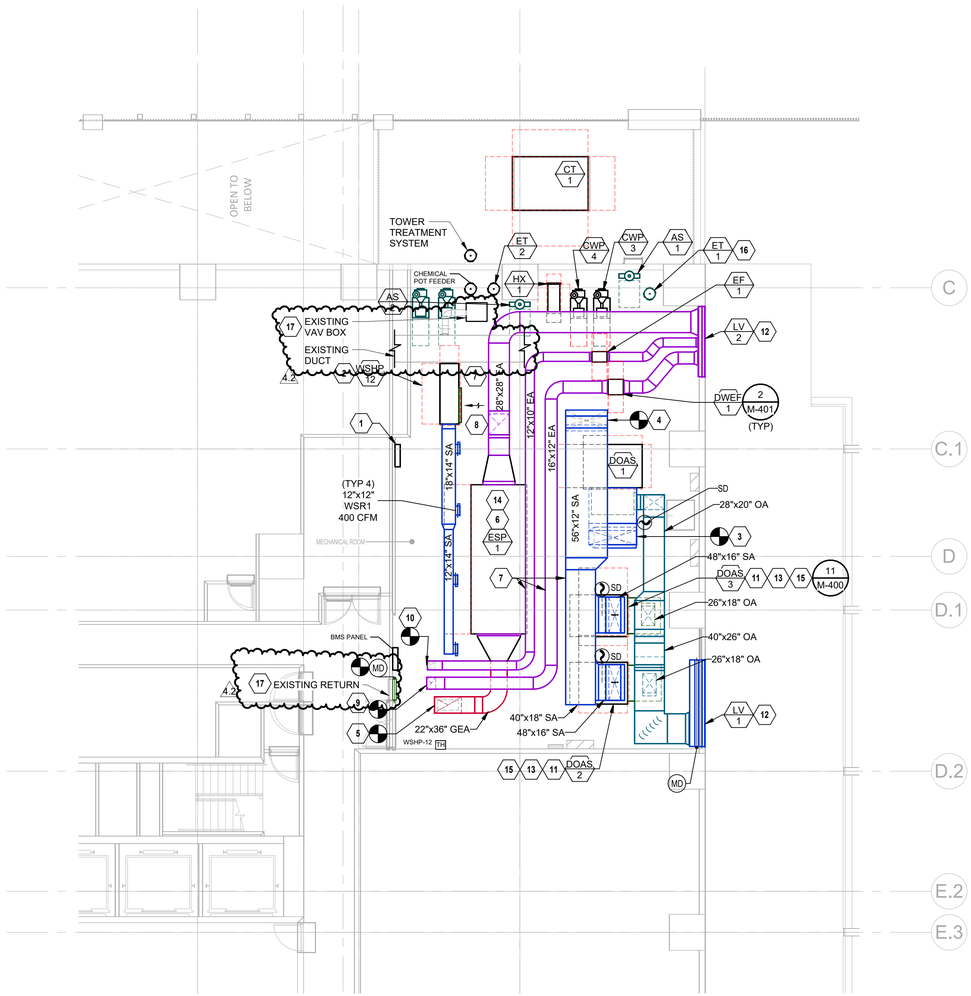


MECHANICAL GENERAL NOTES

1. DO NOT ROUTE ANY DUCTWORK OR PIPING ABOVE ELECTRICAL PANELS.
2. REFER TO SHEET M-001 FOR ADDITIONAL GENERAL NOTES AND REQUIREMENTS.
3. REFER TO DETAILS AND SCHEDULES SHEETS FOR FURTHER INFORMATION.
4. MOUNT ALL THERMOSTATS AND SENSORS CONTROLLING HVAC EQUIPMENT AT 48" AFF UNLESS OTHERWISE NOTED.

MECHANICAL PLAN NOTES:

1 CORE FIRE SUPPRESSION PANEL FOR ESP UNIT SHALL BE PROVIDED BY MECHANICAL CONTRACTOR IN COMPLETE CONFORMANCE WITH NFPA 96, LOCAL CODES, AND SIZED TO SERVE ASSOCIATED EQUIPMENT. SEE CAPTIVEAIRE PLANS FOR SCOPE OF WORK BY DISCIPLINE. SYSTEM SHALL BE WALL MOUNTED WITH BOTTOM OF PANEL AT 6'-0".

2 INSTALL BOTTOM OF UNIT AT 8'-2" ABOVE FINISHED FLOOR.

3 CONNECT NEW DOAS-1 SUPPLY DUCT TO EXISTING CAPPED DUCT UP FROM MEZZANINE. TRANSITION AS REQUIRED.

4 CONNECT NEW 56" X 12" SUPPLY DUCT TO EXISTING CAPPED DUCT UP FROM MEZZANINE. TRANSITION AS REQUIRED. CONTRACTOR TO VERIFY EXISTING DUCT IS INSULATED BETWEEN 2ND FLOOR MECHANICAL ROOM AND MEZZANINE.

5 CONNECT NEW 22" X 36" GREASE EXHAUST DUCT TO EXISTING CAPPED DUCT UP FROM MEZZANINE. TRANSITION AS REQUIRED.

6 MOUNT ESP ON SLAB ON RAILS.

7 INSTALL DUCTWORK TIGHT TO STRUCTURE. BOTTOM OF DUCTWORK SHALL NOT BE BELOW 8'-0" A.F.F.

8 INSTALL DUCT RISER AND WATER HEATER ENSURING THERE IS AT LEAST 8' OF CLEARANCE FOR WALKWAY.

9 CONNECT NEW 16" X 12" EXHAUST AIR DUCT TO EXISTING DUCT UP FROM MEZZANINE. TRANSITION AS REQUIRED.

10 CONNECT NEW 12" X 10" EXHAUST AIR DUCT TO EXISTING DUCT UP FROM MEZZANINE. TRANSITION AS REQUIRED.

11 PROVIDE RETURN DUCT FULL SIZE OF UNIT RETURN AIR CONNECTION IF RETURN DUCT SIZE IS NOT PROVIDED.

12 CONTRACTOR MAY PROPOSE ALTERNATIVE LOUVER SIZE. SUBMIT TO ENGINEER FOR APPROVAL. COORDINATE WITH FIELD CONDITIONS.

13 EQUIPMENT SHALL BE BROUGHT UP TO MECHANICAL ROOM THROUGH ELEVATORS.

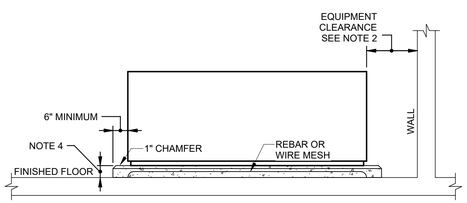
14 ESP FAN SECTION SHALL BE BROUGHT INTO MECHANICAL ROOM THROUGH THE COOLING TOWER PLATFORM. ALL OTHER ESP SECTIONS MAY BE BROUGHT IN BY ELEVATOR.

15 PROVIDE BACKDRAFT DAMPER IN DOAS SUPPLY AIR RISERS BEFORE CONNECTING TO MAIN SUPPLY DUCT.

16 INSTALL EXPANSION TANK SUSPENDED TIGHT TO WALL UNDER AIR SEPARATOR. SUBJECT TO FINAL CLEARANCE.

17 SMOKE EVACUATION FOR 2ND FLOOR MECHANICAL ROOM SHALL BE EXISTING TO REMAIN, INCLUDING EXISTING VAV BOX SERVED BY BASE BUILDING AHU AND EXISTING RETURN. PROVIDE NEW MOTORIZED DAMPER ON RETURN OPENING. MOTORIZED DAMPER SHALL BE NORMALLY CLOSED, FAIL OPEN. WIRE MOTORIZED DAMPER TO OPEN WHEN EXISTING MECHANICAL ROOM VAV BOX IS ACTIVATED. REFER TO SEQUENCE ON M-201 FOR MORE INFORMATION.

4.2



NOTES:
1. POUR SLAB FLAT WITH NO VALLEYS.
2. MINIMUM CLEARANCE AROUND EQUIPMENT, ALL SIDES, PER MANUFACTURER.
3. DIMENSIONS SHOWN ARE MINIMUM ACCEPTABLE; REVISE AS REQUIRED FOR EQUIPMENT BEING PROVIDED.
4. COORDINATE PAD HEIGHT WITH SPECIFICATIONS. WHEN APPLICABLE, COORDINATE PAD HEIGHT WITH CONDENSATE DRAIN TRAP DEPTH +1" CLEARANCE. ABSOLUTE MINIMUM PAD HEIGHT IS 3-1/2" WHEN NOT OTHERWISE SPECIFIED.

② INTERIOR EQUIPMENT PAD DETAIL
NTS

① MECHANICAL PLAN LEVEL 2
1/8" = 1'-0"

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REVISIONS:

2	REV #2	03/20/24
2.1	REV #2.1	06/10/24
3.1	REV #3.1	07/26/24
4	REV#4	11/25/24
4.1	REV#4.1	02/25/25
4.2	REV#4.2	05/08/25

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TITLE: MECHANICAL PLAN LEVEL 2
DATE: 1/29/2024
SCALE: AS INDICATED
DRAWING NO.: M-102

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3. REFER TO DETAILS AND SCHEDULES SHEETS FOR FURTHER INFORMATION.
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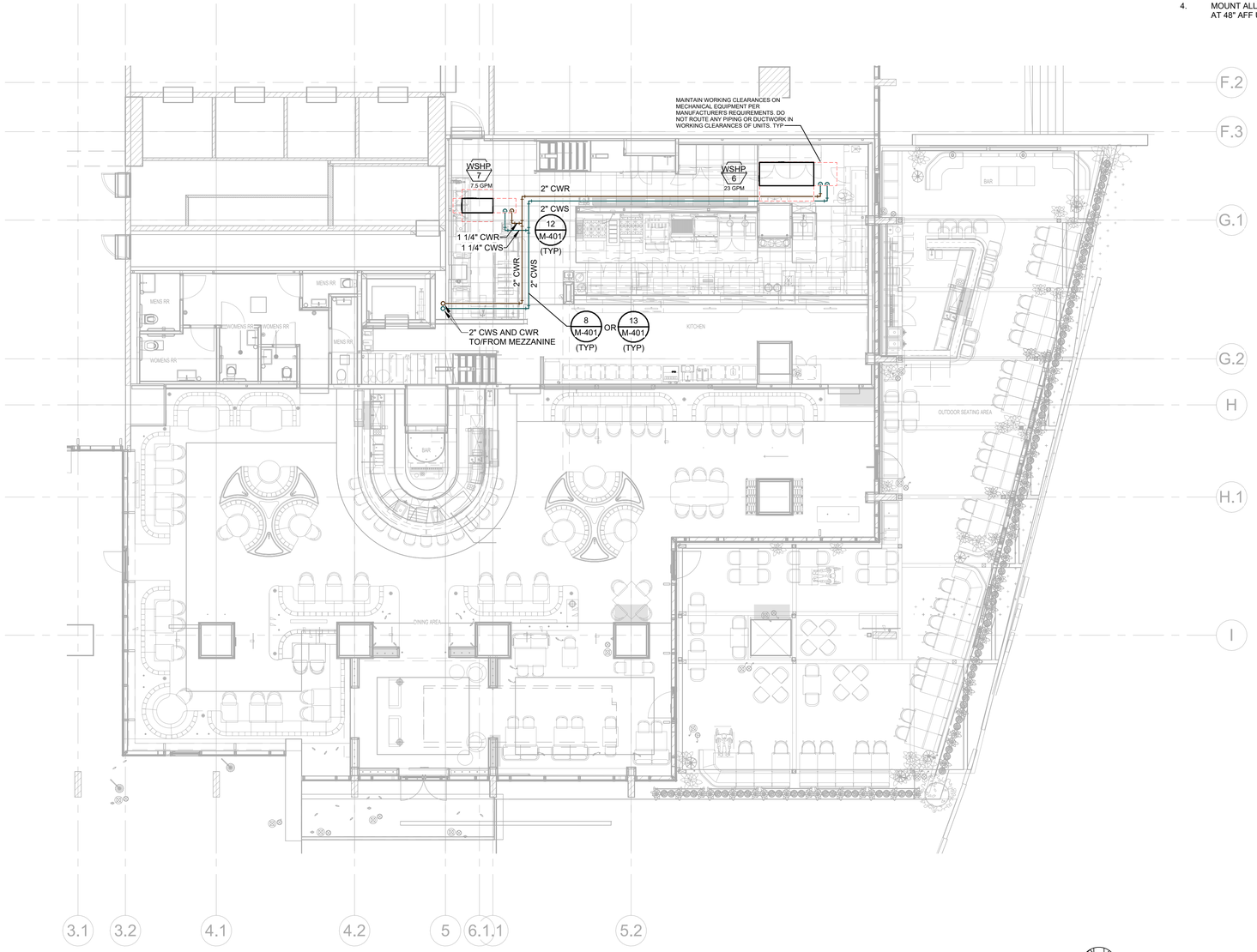

1 MECHANICAL PIPING PLAN LEVEL 1
1/8" = 1'-0"

N

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OWNERS REPRESENTATIVE:

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INTERIOR DESIGNER:

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2.1	REV #2.1	06/10/24
3.1	REV #3.1	07/26/24

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PROJECT NO.
23-1222

TITLE:
MECHANICAL PIPING PLAN LEVEL 1

DATE:
1/29/2024

SCALE:
AS INDICATED

DRAWING NO.:
M-110

7/21/2025 11:00:50 AM
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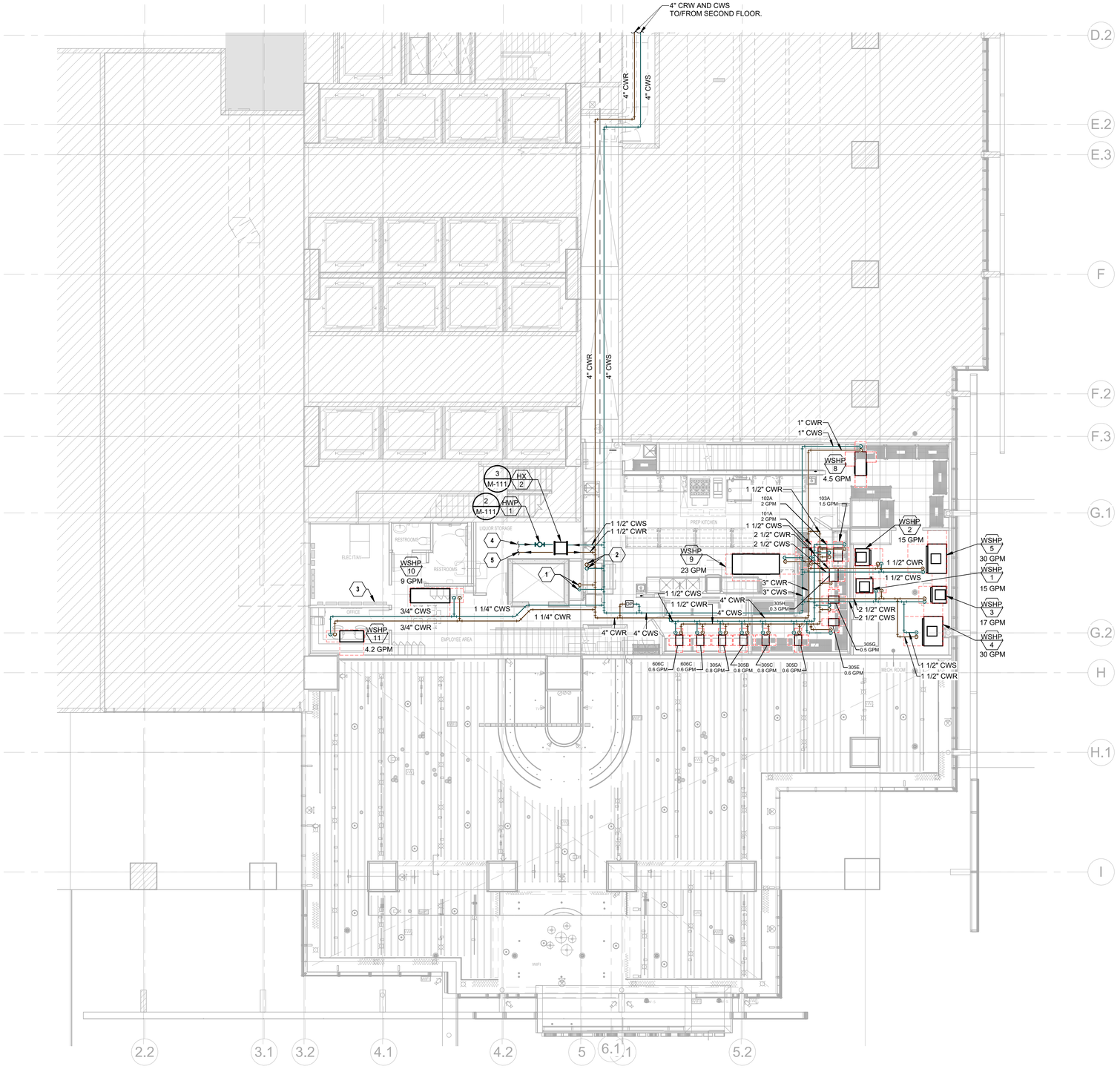


1 MECHANICAL PIPING PLAN MEZZANINE
1/8" = 1'-0"

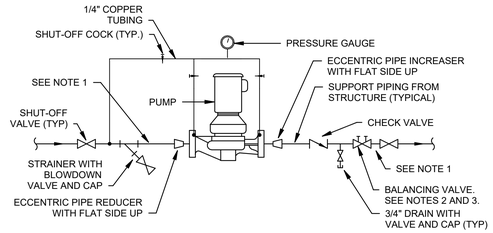
MECHANICAL GENERAL NOTES

1. DO NOT ROUTE ANY DUCTWORK OR PIPING ABOVE ELECTRICAL PANELS.
2. REFER TO SHEET M-001 FOR ADDITIONAL GENERAL NOTES AND REQUIREMENTS.
3. REFER TO DETAILS AND SCHEDULES SHEETS FOR FURTHER INFORMATION.
4. MOUNT ALL THERMOSTATS AND SENSORS CONTROLLING HVAC EQUIPMENT AT 48" AFF UNLESS OTHERWISE NOTED.

MECHANICAL PLAN NOTES:

1 2" CONDENSER WATER SUPPLY AND RETURN TO/FROM FIRST FLOOR.
2 1 1/4" CONDENSER WATER SUPPLY AND RETURN TO ICE MACHINE 620C WITH 11.28 GPM.
3 PROVIDE CONDENSER WATER BTUH METERS. METER SHALL BE ONICON SYSTEM 10 OR EQUIVALENT. LOCATE MANUAL INTERFACES IN MANAGER'S OFFICE
4 1 1/4" PIPE TO HWP-1 AND HX-2 FROM 2" DOMESTIC HW PIPE.
5 1 1/4" PIPE TO COLD WATER LINE AT WATER HEATERS, UPSTREAM OF WATER HEATERS AND DOWNSTREAM OF RECIRCULATION LINE CONNECTION. REFER TO PLUMBING DETAIL FOR MORE INFORMATION.

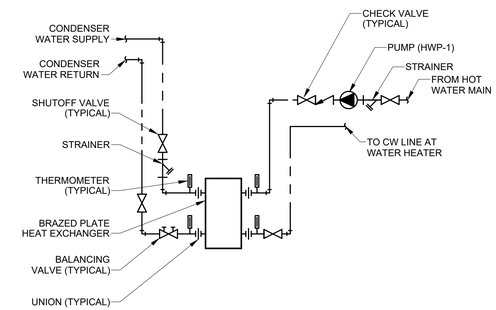
MOUNT CONDENSER WATER PIPES TIGHT TO STRUCTURE AND INSTALL VALVING IN ACCESSIBLE LOCATION CLOSE TO CEILING



NOTES:

1. PROVIDE MINIMUM OF FIVE PIPE DIAMETERS STRAIGHT LENGTH OF PIPE ON EACH SIDE OF PUMP CONNECTIONS.
2. INSTALL BALANCING VALVE WITH UNRESTRICTED UPSTREAM AND DOWNSTREAM PIPING LENGTHS IN ACCORDANCE WITH MANUFACTURERS INSTALLATION INSTRUCTIONS.
3. BALANCING VALVE SHALL BE LINE-SIZE AND VALVE SHALL REMAIN FULLY OPEN ON VARIABLE FLOW SYSTEMS.
4. PROVIDE VIBRATION ISOLATION PER SPECIFICATIONS.
5. CONTRACTOR HAS OPTION OF PROVIDING A TRIPLE DUTY VALVE IN THE PUMP DISCHARGE LINE IN LIEU OF THE CHECK AND BALANCE VALVES. SHUTOFF VALVE IS STILL REQUIRED EVEN IF TRIPLE DUTY VALVE IS USED.

2 SUSPENDED IN-LINE PUMP DETAIL
NTS



REFER TO FLOOR PLANS FOR PIPE SIZES. FIELD VERIFY EXISTING VALVE AND PIPING ARRANGEMENT AND LOCATIONS. PIPING ARRANGEMENT SHOWN IS SCHEMATIC. ADJUST TO SUIT FIELD CONDITIONS. INSTALL EQUIPMENT AND VALVES PER MANUFACTURER'S PUBLISHED INSTALLATION INSTRUCTIONS. LOCATE BRAZED PLATE HEAT EXCHANGER PER PLANS IN ACCESSIBLE LOCATION.

3 HEAT EXCHANGER FOR DOMESTIC HOT WATER RE-HEAT
NTS

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PROJECT NO. 23-1222
TITLE: MECHANICAL PIPING PLAN MEZZANINE
DATE: 1/29/2024
SCALE: AS INDICATED
DRAWING NO.: M-111

7/21/2025 11:01:02 AM
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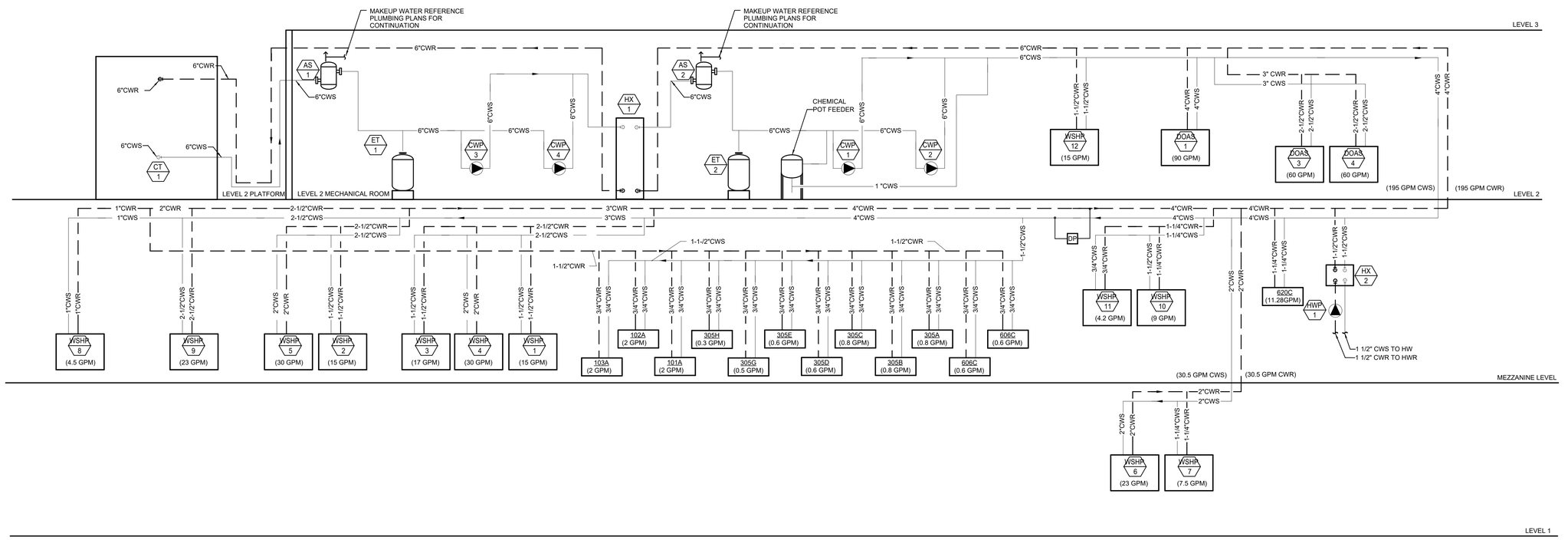
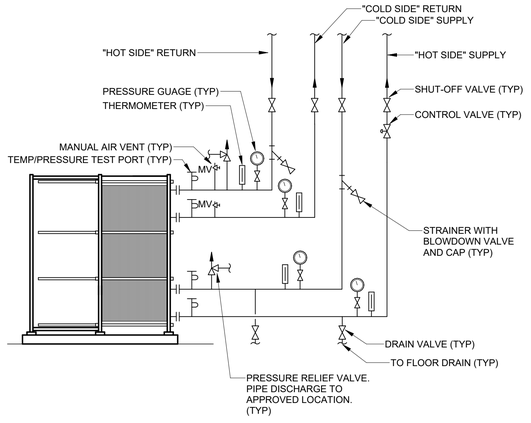
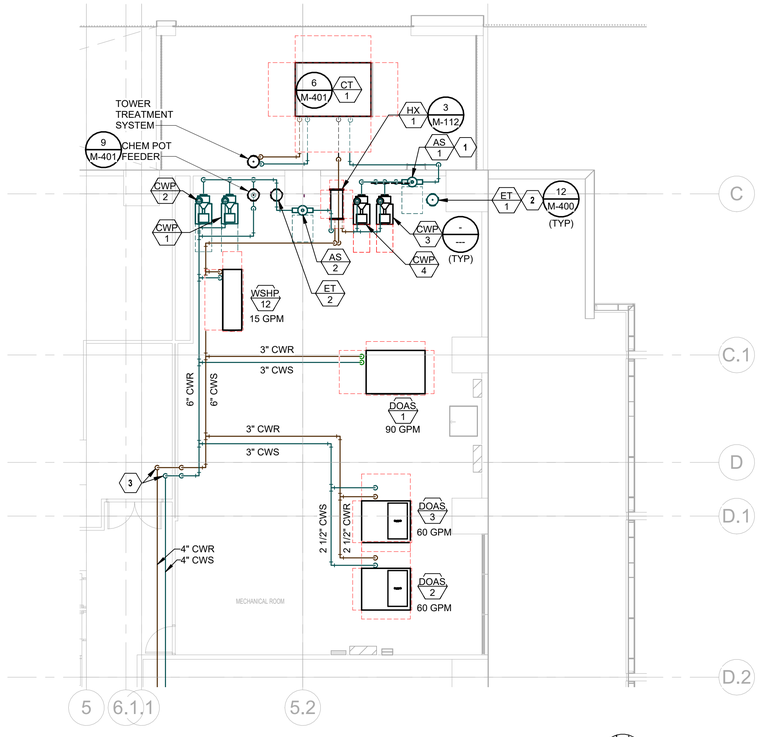


2 CONDENSER WATER PIPE FLOW DIAGRAM
NTS



3 PLATE AND FRAME HEAT EXCHANGER PIPING DETAIL
NTS



1 MECHANICAL PIPING PLAN LEVEL 2
1/8" = 1'-0"

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MECHANICAL PLAN NOTES:

1 INSTALL AIR SEPARATOR AS HIGH AS POSSIBLE TIGHT TO WALL. ENSURE CLEARANCE OVER DOOR.
2 INSTALL EXPANSION TANK SUSPENDED TIGHT TO WALL UNDER AIR SEPARATOR. SHOWN OFFSET FOR CLARITY.
3 4" CWS AND CWR PIPING TO DROP IN MEZZANINE LEVEL LANDLORD MECHANICAL SPACE.

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201 SOUTH BISCAYNE BLVD, SUITE No. 150
MIAMI, FL 33131

REVISIONS:

2	REV #2	03/20/24
2.1	REV #2.1	06/10/24
3.1	REV #3.1	07/26/24
4.1	REV#4.1	02/25/25

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COY M. MACY
LICENSE # 86060

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LICENSE # 86060

FORMGROUP architecture + planning
FORM GROUP, INC.
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ARCHITECT OF RECORD:
OMAR MORALES, AIA
AA-0014851

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2350003063
FL. REGISTRY NO. EB 7606
EXPIRES 2/28/2026

PROJECT NO. 23-1222
TITLE: MECHANICAL PIPING PLAN LEVEL 2
DATE: 1/29/2024
SCALE: AS INDICATED
DRAWING NO.: M-112

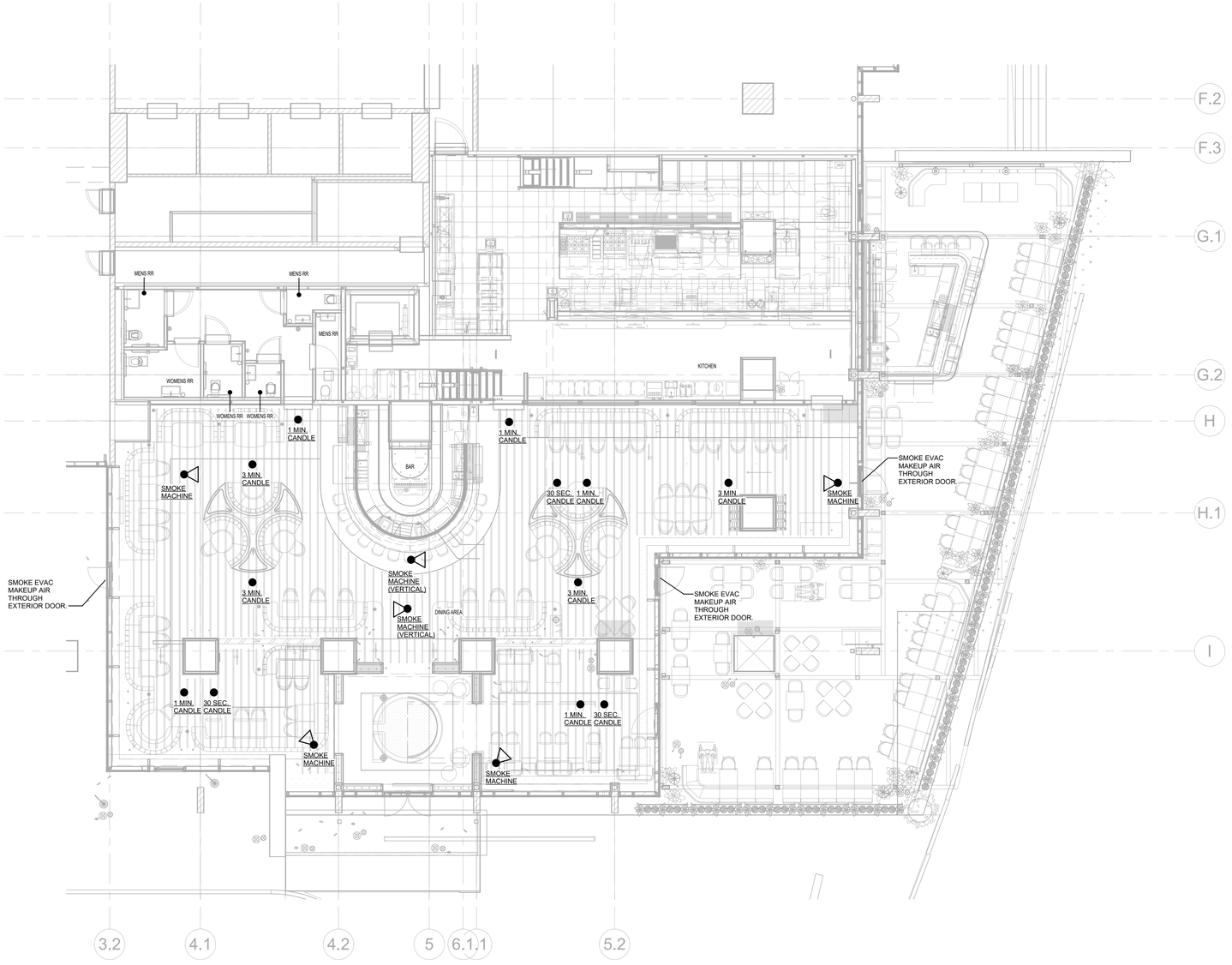
7/21/2025 11:01:07 AM
COY M. MACY

EXISTING LANDLORD SMOKE EVACUATION SEQUENCE OF OPERATION

UPON A SIGNAL FROM FIRE ALARM PANEL, THE FOLLOWING OCCURS ON THE FLOOR OF INCIDENCE.
GENERAL
A. AHU'S SHALL SHUT OFF FOR 10 TO 20 SECONDS, AS REQUIRED FOR DAMPERS TO MODULATE TO SMOKE EXHAUST POSITIONS AND THEN TURN ON.
B. ALL DAMPERS SHALL MODULATE TO THE SMOKE EXHAUST POSITION WITHIN 20 SECONDS.
C. SMOKE EXHAUST FANS START (PROVIDE MINIMUM TIME DELAY)
E. MAKE-UP FANS START (PROVIDE MINIMUM TIME DELAY)
F. CENTRAL TOILET EXHAUST FANS REMAIN ON.
G. STAIRWELL PRESSURIZATION AND VESTIBULE FANS START.

FIRE ZONE
A. DAMPERS MODULATE TO SMOKE EVACUATION POSITION, AS FOLLOWS:
1. RETURN TRANSFER DAMPERS INTO MECHANICAL ROOMS CLOSE.
2. OUTSIDE AIR DAMPERS INTO MECHANICAL ROOMS OPEN 100%.
3. SMOKE EVACUATION EXHAUST DAMPERS INTO SHAFTS OPEN.
4. STAIR PRESSURIZATION DAMPERS OPEN.
5. STAIR VESTIBULE PRESSURIZATION DAMPERS OPEN.
B. SMOKE EVACUATION DAMPERS OPEN AND FANS EF-1 AND EF-6 START.
C. VAV BOXES FAIL OPEN, OUTSIDE AIR FANS S-4 AND S-5 START, OUTSIDE AIR TO DAMPERS IN MECAHNICAL ROOM OPEN AND BOTH AHU'S ON THE FLOOR SUPPLY 100% OUTSIDE AIR.
E. STAIR 1 PRESSURIZATION FANS S-1 AND S-2 AND VESTIBULE FANS EF-7 AND S-3 START.

FLOORS ABOVE AND BELOW THE FIRE ZONE (TYPICAL FOR GROUND, 3RD AND 4TH FLOORS).
A. DAMPERS MODULATE TO SMOKE EVACUATION POSITION, AS FOLLOWS.
1. RETURN TRANSFER DAMPERS INTO MECHANICAL ROOM CLOSE.
2. OUTSIDE AIR DAMPERS INTO MECHANICAL ROOMS OPEN 100%.
3. SMOKE EVACUATION EXHAUST DAMPERS INTO SHAFTS REMAIN CLOSED.
4. STAIR PRESSURIZATION DAMPERS OPEN.
5. STAIR VESTIBULE PRESSURIZTION DAMPERS OPEN.
B. VAV BOXES FAIL OPEN, BOTH AHU'S ON EACH FLOOR SUPPLY 100% OUTSIDE AIR.



1 MECHANICAL PLAN LEVEL 1
1/8" = 1'-0"

RESTAURANT SMOKE EVACUATION SEQUENCE OF OPERATION FOR RESTAURANT SPACE ON 1ST FLOOR AND MEZZANINE.

UPON A SIGNAL FROM THE LANDLORD FIRE ALARM PANEL, THE FOLLOWING OCCURS IN THE TENANT SPACE.

IF EVENT IS ON TENANT FLOOR
A. LANDLORDS SMOKE EVACUATION EXHAUST DAMPERS AT COLUMNS E.1/4.1 AND E.2/8 OPEN INTO SHAFT AND LANDLORDS SMOKE EVAC FANS EF-1 (NORTH SIDE) AND EF-6 (SOUTH SIDE) START. EXHAUST FROM FLOOR TO ALIGN WITH BASE BUILDING DRAWINGS AND BE MINIMUM 19,225 CFM. 5
B. MAKEUP AIR IS PROVIDED.
1. ALL WSHPS AND DOAS UNITS TO DE-ENERGIZE.
2. EXTERIOR DOORS INDICATED ON MECHANICAL PLAN TO HAVE SMOKE EVAC DOOR OPERATORS SHALL OPEN FOR MAKEUP AIR.

IF EVENT IS ON FLOORS ABOVE THE RESTAURANT.
A. LANDLORDS SMOKE EVACUATION DAMPERS INTO SHAFT REMAIN CLOSED.
B. (2) TRANSFER DAMPERS BETWEEN RESTAURANT SPACE AND LANDLORD SPACE TO OPEN.

SPACE VOLUME (FT3)	MIN. REQUIRED SMOKE EVAC. (CFM)	REQUIRED MAKEUP AIR (CFM)
6,170sf(A)x27'(H) 166,590	19,225 (CFM MATCHES EXISTING VALUES. INTENT IS TO ALIGN WITH PREVIOUS BASE BUILDING PLANS. APPROXIMATLEY HALF OF CFM FROM EF-1 AND HALF OF CFM FROM EF-6) 5	12,815 VIA EXTERIOR DOORS (CFM MATCHES EXISTING VALUES. INTENT IS TO ALIGN WITH PREVIOUS BASE BUILDING PLANS.)

SMOKE DENSITY CALCULATIONS:

Level GROUND / 1ST
Area: 6,170 sq.ft.
Height: 27ft
Volume: 166,590 cu.ft.

SMOKE CANDLE SELECTION:
1ST FLOOR Smoke Volume Req: 249,885 cu.ft

Total Volume of Smoke Provided:
3 x 30-Second Candles
5 x 1-Minute Candles
5 x 3-Minute Candles

TOTAL CUBIC FEET:
1st FL: 252,000 cu.ft.*

More than required amount

SMOKE MACHINE CALCULATIONS

Total Volume of Smoke from Machine per Minute:
SG1300=30,000 cfm = 500/sec_4
SG1700=50,000 cfm = 833/sec_2

Total Volume of Smoke to be Provided:
1st FL: 252,000 cu.ft.

Total Run Time on Smoke Machine to Provide Required Volume:

Level Ground: Minimum **68 Seconds Each (6-Machines)**

CACTUS CLUB MIAMI

OWNER:
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INTERIOR TENANT BUILD-OUT FOR:

CACTUS CLUB MIAMI

AT CITYGROUP CENTER

201 SOUTH BISCAYNE BLVD, SUITE No. 150
MIAMI, FL 33131

REVISIONS:

2	REV #2	03/20/24
2.1	REV #2.1	06/10/24
3.1	REV #3.1	07/26/24
4.1	REV#4.1	02/25/25
4.2	REV#4.2	05/08/25
5	SK	11/11/25

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2350003063
FL. REGISTRY NO. EB 7606
EXPIRES 2/28/2026

PROJECT NO. 23-1222
DATE: 1/29/2024
SCALE: AS INDICATED
TITLE: MECHANICAL SMOKE EVAC LEVEL 1
DRAWING NO.: M-200

11/11/2025 8:29:32 AM
COY M. MACY

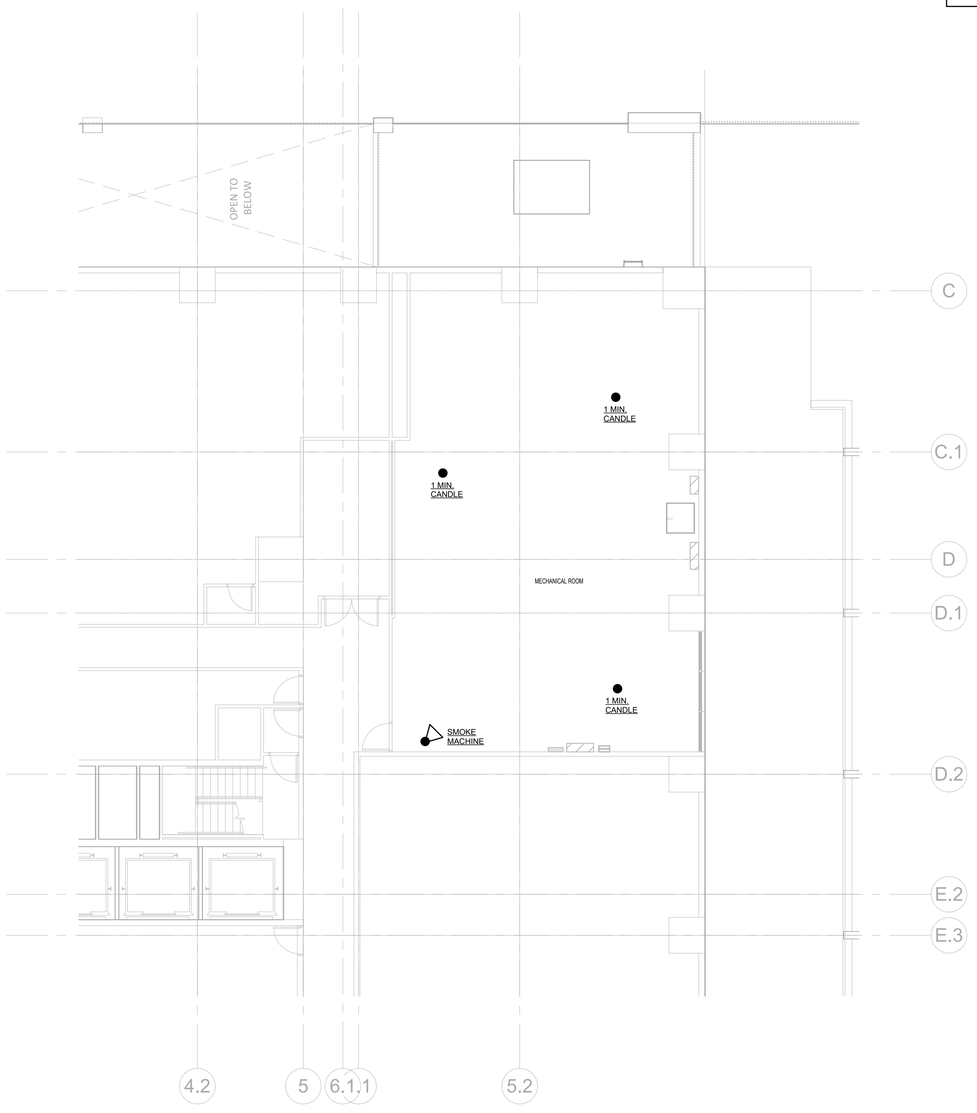
TENANT SMOKE EVACUATION SEQUENCE OF OPERATION FOR TENANT SPACE ON 2ND FLOOR.

UPON A SIGNAL FROM THE LANDLORD FIRE ALARM PANEL, THE FOLLOWING OCCURS IN THE TENANT SPACE.

IF EVENT IS ON 2ND FLOOR
A. LANDLORDS SMOKE EVACUATION EXHAUST DAMPERS AT COLUMNS E.1/4.1 AND E.2/8 OPEN INTO SHAFT AND LANDLORDS SMOKE EVAC FANS EF-1 (NORTH SIDE) AND EF-6 (SOUTH SIDE) START.
B. MECHANICAL ROOM RETURN AIR DAMPER TO OPEN.
C. MAKEUP AIR IS PROVIDED.
1. EXISTING VAV TO OPEN TO ALLOW 2,100 CFM INTO SPACE.
2. WSHP-12 TO DE-ENERGIZE.

IF EVENT IS ON FLOORS ABOVE OR BELOW 2ND FLOOR.
A. LANDLORDS SMOKE EVACUATION DAMPERS INTO SHAFT REMAIN CLOSED.
B. MECHANICAL ROOM RETURN AIR DAMPER TO OPEN.
C. MAKEUP AIR IS PROVIDED.
1. EXISTING VAV TO OPEN TO ALLOW 2,100 CFM INTO SPACE.

SPACE VOLUME (FT3)	MIN. REQUIRED SMOKE EVAC. (CFM)	REQUIRED MAKEUP AIR (CFM)
1,750sf(A)x12'(H) 21,000	2,100	2,100



1 MECHANICAL SMOKE EVAC LEVEL 2
1/8" = 1'-0"

SMOKE DENSITY CALCULATIONS:

Level 2 Mech
Area: 1,774 sq.ft.
Height: 12ft
Volume: 21,288 cu.ft.

SMOKE CANDLE SELECTION:
2nd Floor Mech Rm
Smoke Volume Req: 31,932 cu.ft

Total Volume of Smoke Provided:
0 x 30-Second Candles
3 x 1-Minute Candles
0 x 3-Minute Candles

TOTAL CUBIC FEET:
2nd Floor Mech Room: 32,000 cu.ft.*

More than required amount

SMOKE MACHINE CALCULATIONS

Total Volume of Smoke from Machine per Minute:
SG1300=30,000 cfm = 500/sec_1
SG1700=50,000 cfm = 833/sec_0

Total Volume of Smoke to be Provided:
Ground FL: 32,000 cu.ft.

Total Run Time on Smoke Machine to Provide Required Volume:

Level 2 Mech: Minimum **32 Seconds Each (1-Machine)**

THIS ITEM HAS BEEN ELECTRONICALLY SIGNED AND SEALED BY COY M. MACY ON THE DATE LISTED BELOW USING A DIGITAL SIGNATURE.

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FL. REGISTRY NO. EB 7606
EXPIRES 2/28/2026

FORMGROUP

PROGRESS SET OF REVISION 4.2.1

08/26/2025

FOR COORDINATION PURPOSES ONLY
MASTER PERMIT REVISION PENDING

CACTUS CLUB MIAMI

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KITCHEN CONSULTANT:
Foundry Commercial Kitchens
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Ph: 604-216-2566
Email: stanley.t@foundrykitchens.com

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4	REV#4	11/25/24
4.1	REV#4.1	02/25/25
4.2	REV#4.2	05/08/25

COY M. MACY
LICENSE
No 86060
STATE OF FLORIDA
PROFESSIONAL ENGINEER

COY M. MACY 8/25/2025
LICENSE # 86060

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PROJECT NO.
23-1222

DATE:
1/29/2024

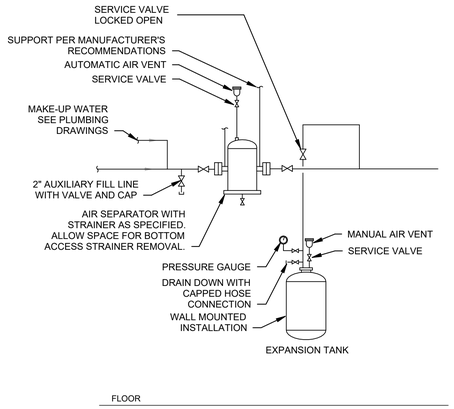
SCALE:
AS INDICATED

TITLE:
MECHANICAL SMOKE EVAC LEVEL 2

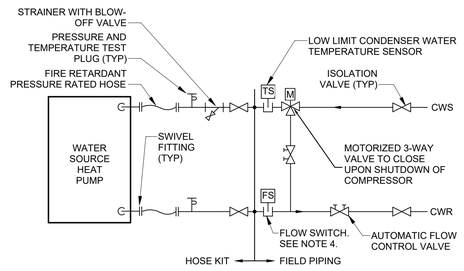
DRAWING NO.:
M-201

4.2

8/25/2025 1:43:01 PM
COY M. MACY

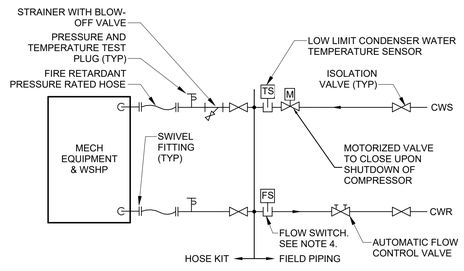


12 EXPANSION TANK WITH AIR SEPARATOR PIPING DETAIL
NTS



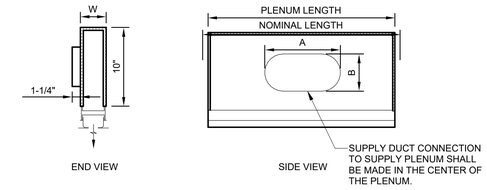
NOTES:
1. PROVIDE DRAIN VALVE W/HOSE BIBB AT LOW POINTS AND AIR VENTS AT HIGH POINTS OF PIPING SYSTEM.
2. PROVIDE PIPING AND ACCESSORIES OF SIZES INDICATED ON PLANS UP TO CONNECTION TO EQUIPMENT.
3. WHERE HOSE KITS ARE USED FLEXIBLE PIPE CONNECTORS SHALL NOT EXCEED 24 INCHES.
4. FLOW SWITCH SHALL PREVENT COMPRESSOR OPERATION WHEN NO WATER FLOW IS DETECTED.

11 WATER SOURCE HEAT PUMP PIPING DETAIL (DOAS-3)
NTS



NOTES:
1. PROVIDE DRAIN VALVE W/HOSE BIBB AT LOW POINTS AND AIR VENTS AT HIGH POINTS OF PIPING SYSTEM.
2. PROVIDE PIPING AND ACCESSORIES OF SIZES INDICATED ON PLANS UP TO CONNECTION TO EQUIPMENT.
3. WHERE HOSE KITS ARE USED FLEXIBLE PIPE CONNECTORS SHALL NOT EXCEED 24 INCHES.
4. FLOW SWITCH SHALL PREVENT COMPRESSOR OPERATION WHEN NO WATER FLOW IS DETECTED.

10 MECH EQUIP & WATER SOURCE HEAT PUMP PIPING DETAIL
NTS



STANDARD SLOT PLENUM DIMENSIONS

SLOT WIDTH	MIN. WIDTH (W)	NOMINAL LENGTH	PLENUM LENGTH
1"	2-3/4"	24, 36, 48, 60	21-3/4", 33-3/4", 45-3/4", 57-3/4"
1-1/2"	3-3/4"	24, 36, 48, 60	21-3/4", 33-3/4", 45-3/4", 57-3/4"
2"	4-3/4"	24, 36, 48, 60	21-3/4", 33-3/4", 45-3/4", 57-3/4"

INLET SIZE	A	B
6" OVAL	6-1/4"	5-1/4"
8" OVAL	8-1/4"	5-1/4"
10" OVAL	10-1/4"	5-1/4"

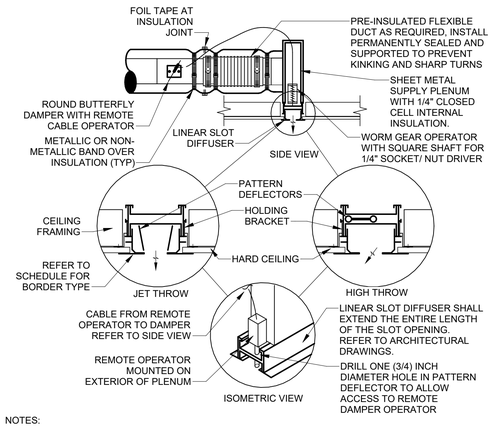
PLENUM DIMENSIONS FOR WHEN PLENUM MUST FIT BETWEEN FRAMING

SLOT WIDTH	MIN. WIDTH (W)	NOMINAL LENGTH	PLENUM LENGTH
1"	2-3/4"	22, 34, 46, 58	19-3/4", 31-3/4", 43-3/4", 55-3/4"
1-1/2"	3-3/4"	22, 34, 46, 58	19-3/4", 31-3/4", 43-3/4", 55-3/4"
2"	4-3/4"	22, 34, 46, 58	19-3/4", 31-3/4", 43-3/4", 55-3/4"

INLET SIZE	A	B
6" OVAL	6-1/4"	5-1/4"
8" OVAL	8-1/4"	5-1/4"
10" OVAL	10-1/4"	5-1/4"

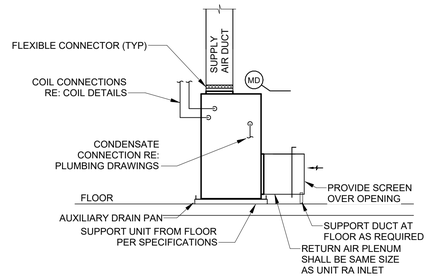
NOTES:
1. PLENUM MAY BE MOUNTED ON LINEAR SLOT DIFFUSER OR ARCHITECTURAL SLOT.
2. PROVIDE 1/4" THICK, INTERNAL, CLOSED CELL INSULATION ON ALL PLENUMS.
3. MINIMUM WIDTH INCLUDES 1/4" CLOSED CELL INTERNAL INSULATION.
4. COVE SLOT PLENUM CONSTRUCTION DIMENSIONS TO BE USED FOR PLENUMS SUPPLYING OUT OF LIGHT COVES ONLY.
5. COVE SLOT PLENUMS SHALL BE CONSTRUCTED TO FIT BETWEEN SLOT FRAMING AT 24", 36", 48" OR 60" ON CENTER.

9 SUPPLY PLENUM CONSTRUCTION DETAIL
NTS



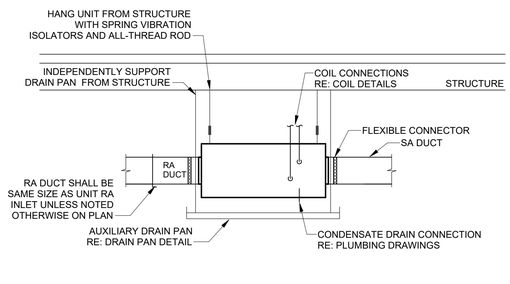
NOTES:
1. EXTEND HARD METAL DUCT SO THAT MAXIMUM FLEXIBLE DUCT LENGTH DOES NOT EXCEED 5'-0". PROVIDE RIGID 90° ELBOW WHERE REQUIRED TO KEEP FLEXIBLE DUCT WITHIN 5'-0" LENGTH LIMITATION.
2. COORDINATE EXACT LENGTH AND LOCATION OF SLOT DIFFUSER WITH ARCHITECT'S REFLECTED CEILING PLAN.
3. REFER TO DIFFUSER MANUFACTURER'S INSTALLATION INSTRUCTIONS FOR EACH SCHEDULED BORDER TYPE.
4. REFER TO SPECIFICATIONS FOR FLEXIBLE DUCTWORK INSTALLATION REQUIREMENTS.

8 LINEAR SLOT DIFFUSER IN GYP CEILING DETAIL
NTS



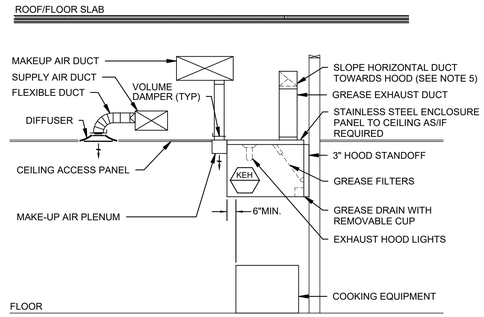
NOTES:
1. ARRANGEMENT SHOWN IS SCHEMATIC, ADJUST TO SUIT FIELD CONDITIONS AND MEET LOCAL CODE REQUIREMENTS.

7 VERTICAL HVAC UNIT DETAIL
NTS



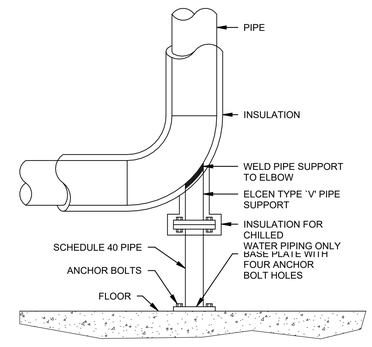
NOTES:
1. ARRANGEMENT SHOWN IS SCHEMATIC, ADJUST TO SUIT FIELD CONDITIONS AND MEET LOCAL CODE REQUIREMENTS.

6 HORIZONTAL HVAC UNIT DETAIL
NTS

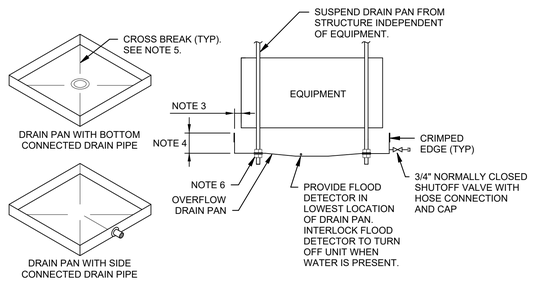


NOTES:
1. SUBMIT SHOP DRAWINGS OF ALL HOOD SYSTEMS TO CITY FOR APPROVAL PRIOR TO INSTALLATION.
2. TOTAL HOOD SYSTEM TO BE IN COMPLETE CONFORMANCE WITH NFPA, AND ALL LOCAL CODES AND REGULATIONS.
3. COORDINATE ALL FIRE PROTECTION SYSTEMS WITH FIRE PROTECTION CONTRACTOR WHO SHALL ALSO BE RESPONSIBLE FOR ALL PERMITS AND TESTING REQUIRED.
4. PROVIDE WRAP SYSTEM WHERE APPROVED BY LOCAL CODES IN LIEU OF RATED ENCLOSURE
5. PROVIDE ACCESS PANELS AS REQUIRED BY LOCAL CODE AND PER PLAN.
6. HOODS SHALL EXTEND MINIMUM 6" BEYOND ALL OPEN SIDES AND FRONT EDGE OF FOOD COOKING EQUIPMENT BEING SERVED.

5 KITCHEN EXHAUST HOOD ELEVATION DETAIL
NTS

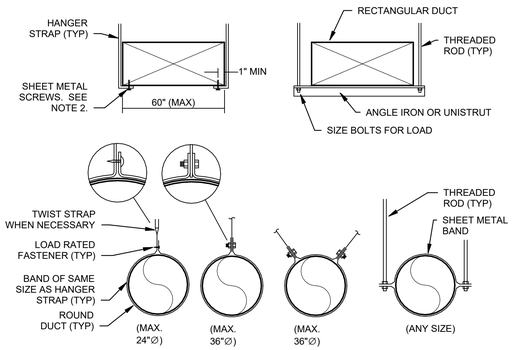


4 ELBOW PIPE SUPPORT DETAIL
12" = 1'-0"



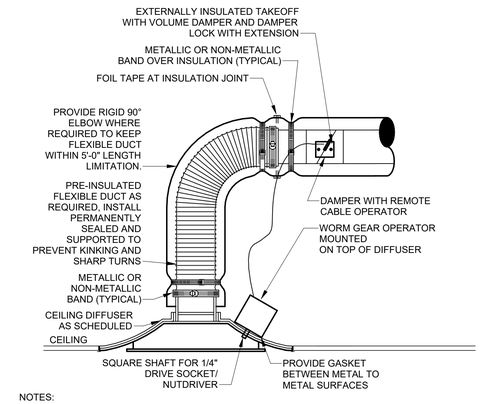
NOTES:
1. SOLDER ALL JOINTS TO MAKE DRAIN PAN LEAK TIGHT.
2. FABRICATE DRAIN PAN FROM 20 GAUGE GALVANIZED SHEET METAL.
3. DRAIN PAN SHALL EXTEND MINIMUM 3" BEYOND EQUIPMENT ON ALL SIDES.
4. HEIGHT OF DRAIN PAN TO BE MINIMUM 1/2" GREATER THAN DIAMETER OF SIDE-CONNECTED DRAIN PIPEFLANGE OR 1-1/2", WHICHEVER IS GREATER.
5. CROSS BREAK BOTTOM OF SHEET METAL DRAIN PAN TO PROVIDE SLOPED DRAINAGE TO OUTLET.
6. SEAL DRAIN PAN WITH NEOPRENE WASHERS AT SUPPORT RODS.

3 CONDENSATE OVERFLOW DRAIN PAN DETAIL
NTS



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

2 DUCT HANGER LOWER ATTACHMENT DETAILS
NTS



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

1 HARD CEILING DIFFUSER DETAIL
NTS

FORMGROUP

PROGRESS SET OF REVISION 4.2.1

07/24/2025

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CACTUS CLUB MIAMI

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INTERIOR TENANT BUILD-OUT FOR:

CACTUS CLUB MIAMI

AT CITYGROUP CENTER
201 SOUTH BISCAYNE BLVD, SUITE No. 150
MIAMI, FL 33131

REVISIONS:

2	REV #2	03/20/24
2.1	REV #2.1	06/10/24
3.1	REV #3.1	07/26/24

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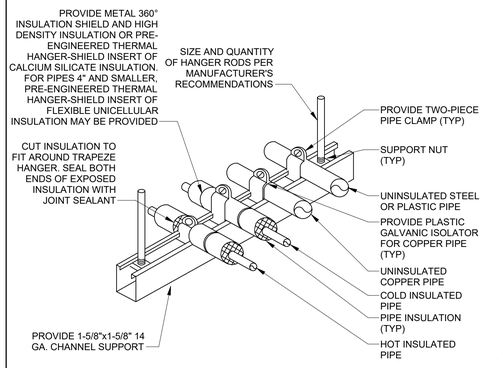
EXPIRES 2/28/2026

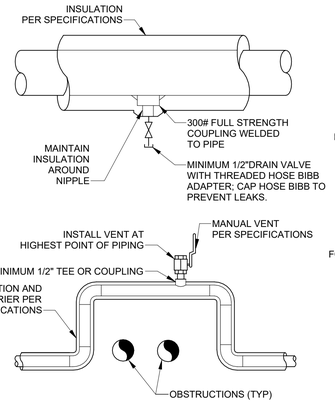
PROJECT NO.: 23-1222
TITLE: MECHANICAL DETAILS
DATE: 1/29/2024
SCALE: AS INDICATED
DRAWING NO.: M-400

7/21/2025 11:01:12 AM
COY M. MACY

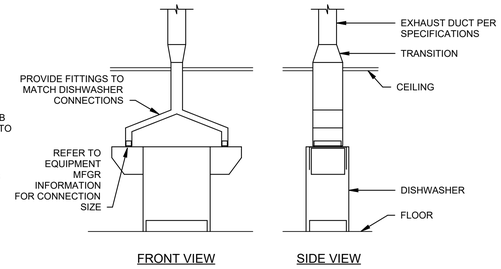


PIPING ARRANGEMENT SHOWN IS SCHEMATIC. ADJUST TO SUIT FIELD CONDITONS. REFER TO SPECIFICATIONS FOR MORE INFORMATION. PIPE AND CONDUIT OF ALL TRADES MAY BE COMBINED ON THE SAME SUPPORT CHANNEL. COORDINATE SUPPORT CHANNEL LENGTH WITH PIPING AND CONDUIT TO BE SUPPORTED. SUPPORT CHANNEL SPACING SHALL BE DETERMINED BY SMALLEST PIPE TO BE SUPPORTED. CHANNEL SUPPORT MAY BE USED AS A WALL BRACKET. ATTACH TO WALL WITH ANCHOR BOLTS PER SPECIFICATIONS. FOR HORIZONTAL INSULATED PIPING, ATTACH CLAMPS AS INDICATED ABOVE, FOR VERTICAL INSULATED PIPING, ATTACH CLAMPS TO THE PIPE AND SEAL INSULATION AT BOTH CLAMP ENDS.

13 TRAPEZE PIPE HANGER
NTS

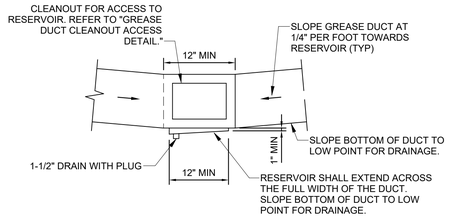


12 HYDRONIC DRAIN VALVE AND MANUAL AIR VENT DETAIL
NTS



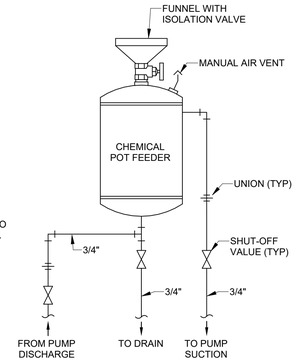
NOTES:
1. COORDINATE EXACT LOCATION OF MECHANICAL CONNECTIONS WITH KITCHEN EQUIPMENT.

11 DISHWASHER EXHAUST DUCT DETAIL
NTS



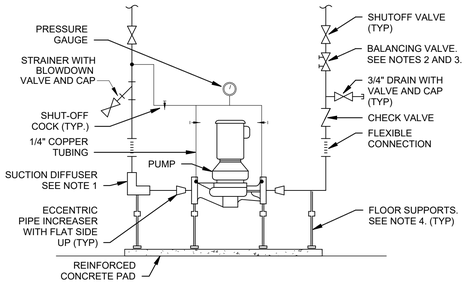
NOTES:
1. INSTALL GREASE DUCT RESERVOIR IN AN ACCESSIBLE LOCATION.

10 GREASE DUCT RESERVOIR DETAIL
NTS



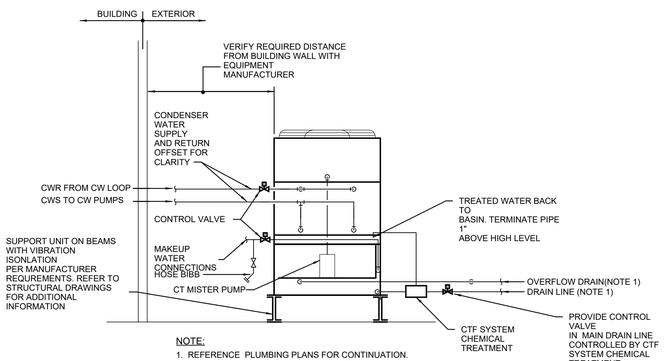
9 CHEMICAL POT FEEDER DETAIL
NTS

8 PIPE HANGER DETAILS
NTS



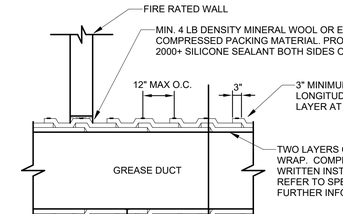
NOTES:
1. MAINTAIN MINIMUM 18" CLEARANCE IN FRONT OF SUCTION DIFFUSER FOR REMOVAL OF STRAINER. IF STRAINER IS PROVIDED WITH SUCTION DIFFUSER.
2. INSTALL BALANCING VALVE WITH UNRESTRICTED UPSTREAM AND DOWNSTREAM PIPING LENGTHS IN ACCORDANCE WITH MANUFACTURERS INSTALLATION INSTRUCTIONS.
3. BALANCING VALVE SHALL BE LINE-SIZE AND VALVE SHALL REMAIN FULLY OPEN ON VARIABLE FLOW SYSTEMS.
4. SUPPORT PUMP, SUCTION DIFFUSER AND ELBOW FROM FLOOR. PROVIDE VIBRATION ISOLATION PER SPECIFICATIONS.
5. CONTRACTOR HAS OPTION OF PROVIDING A TRIPLE DUTY VALVE IN THE PUMP DISCHARGE LINE IN LIEU OF THE CHECK AND BALANCE VALVES. SHUTOFF VALVE IS STILL REQUIRED EVEN IF TRIPLE DUTY VALVE IS USED.

7 FLOOR MOUNTED IN-LINE PUMP DETAIL
NTS



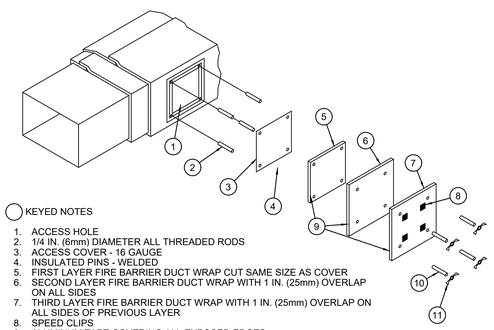
NOTE:
1. REFERENCE PLUMBING PLANS FOR CONTINUATION.

6 COOLING TOWER PIPING DETAIL
NTS



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

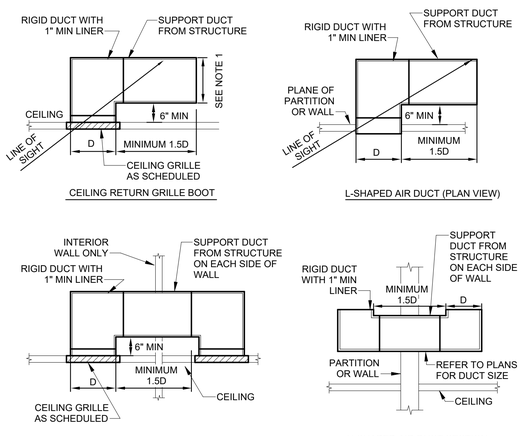
5 GREASE DUCT FIRE WRAP INSULATION INSTALLATION DETAIL
NTS



KEYED NOTES
1. ACCESS HOLE
2. 1/4 IN. (6mm) DIAMETER ALL THREADED RODS
3. ACCESS COVER - 16 GAUGE
4. INSULATED PINS - WELDED
5. FIRST LAYER FIRE BARRIER DUCT WRAP CUT SAME SIZE AS COVER
6. SECOND LAYER FIRE BARRIER DUCT WRAP WITH 1 IN. (25mm) OVERLAP ON ALL SIDES
7. THIRD LAYER FIRE BARRIER DUCT WRAP WITH 1 IN. (25mm) OVERLAP ON ALL SIDES OF PREVIOUS LAYER
8. SPEED CLIPS
9. ALUMINUM TAPE COVERING ALL EXPOSED EDGES
10. SPOOL PIECES FOR THREADED RODS
11. 1/4 IN. (6mm) DIAMETER WING NUTS

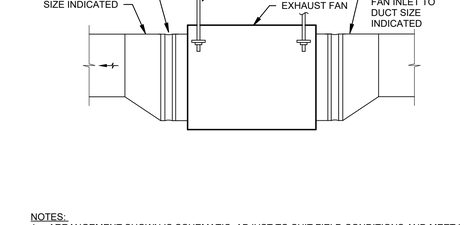
NOTES:
1. FOR REFERENCE ONLY. INSTALL PER MANUFACTURERS RECOMMENDATIONS.
2. AT CONTRACTOR'S OPTION, A LISTED UL 1978 GREASE ACCESS DOOR PRODUCT MAY BE SUBSTITUTED FOR THE ACCESS DOOR PICTURED IN THIS DETAIL. DOOR SHALL BE RATED FOR UP TO 2,300F AND MEET NFPA96 STANDARDS. BOLTS SHALL BE LONG ENOUGH FOR DUCT WRAP SYSTEM (WHEN USED). INSTALL IN ACCORDANCE WITH MANUFACTURER'S LITERATURE.

4 GREASE DUCT CLEANOUT ACCESS DOOR DETAIL
NTS



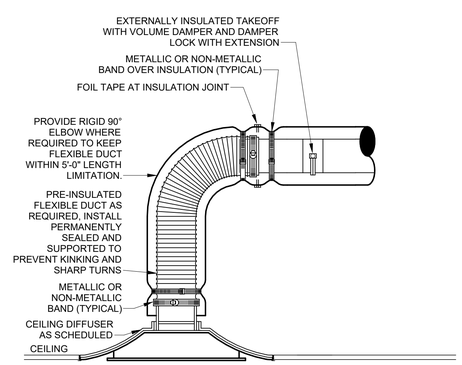
NOTES:
1. REFER TO FLOOR PLAN FOR OUTLET DEPTH. WHEN NO DEPTH IS SHOWN, MINIMUM DEPTH SHALL BE AS REQUIRED TO LIMIT AIR VELOCITY TO 500 FPM WITH A MINIMUM SIZE OF 0.5D.

3 RETURN TRANSFER AIR DUCT DETAILS
NTS



NOTES:
1. ARRANGEMENT SHOWN IS SCHEMATIC, ADJUST TO SUIT FIELD CONDITIONS AND MEET LOCAL CODE REQUIREMENTS.
2. FOR FANS 1 HP AND LESS, PROVIDE NEOPRENE RUBBER MOUNT HANGER (NR). FOR FANS LARGER THAN 1 HP, PROVIDE SPRING VIBRATION ISOLATION HANGER (SPNH).

2 IN-LINE FAN DETAIL
NTS



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

1 CEILING DIFFUSER DETAIL
NTS

FORMGROUP

PROGRESS SET OF REVISION 4.2.1

07/24/2025

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REVISIONS:

2	REV #2	03/20/24
3.1	REV #3.1	07/26/24

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EXPIRES 2/28/2026

PROJECT NO. 23-1222
TITLE: MECHANICAL DETAILS
DATE: 1/29/2024
SCALE: AS INDICATED
DRAWING NO.: M-401

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PROGRESS SET OF REVISION 4.2.1

07/24/2025

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HOOD INFORMATION – 20240912A03

HOOD NO.	TAG	MODEL	MANUFACTURER	LENGTH	TYPE	APPLIANCE SUITE	DESIGN CFM/FT	TOTAL CFM	EXHAUST PLENUM (SIDES) WIDTH	LENGTH	HEIGHT	DIA	QTY	TOTAL SUPPLY CFM	HOOD CONSTRUCTION (TAG TO TAG)	HOOD DUCTS: END	SIDE
1	3068	6004 WHB-10-P-SP-F	ADVANCED HOOD	10' 0"	305	1	HEAVY	225	2756	12"	24"	4"	VEC	0-97"	0295	430 SS WHERE EXPOSED	LEFT
2	3069	6004 WHB-11-P-SP-F	ADVANCED HOOD	11' 0"	305	1	HEAVY	250	2947	12"	24"	4"	2947	0-97"	0326	430 SS WHERE EXPOSED	RIGHT
3	3068	6004 WHB-10-P-SP-F	ADVANCED HOOD	3' 7"	305	1	HEAVY	200	678	9"	9"	4"	678	0-97"	0326	430 SS WHERE EXPOSED	ALONE
4	3069	6004 WHB-10-P-SP-F	ADVANCED HOOD	9' 6"	305	1	HEAVY	235	1370	12"	12"	4"	1370	0-97"	0326	430 SS WHERE EXPOSED	ALONE
5	3067	3636 WH-1448-E	ADVANCED HOOD	3' 6"	305	11	N/A	150	525			4"	525	96.5	0326	430 SS WHERE EXPOSED	ALONE

HOOD NO.	TAG	TYPE	FILTERS(1) SIZE	QTY	EFFICIENCY @ 7" RECIRC	LIGHTS(2) WORK SURFACE	LOCATION	SIZE	FIRE SUPPRESSION SYSTEM(3) TYPE	SIZE	ELECTRICAL MODEL #	QUANTITY	SWITCHES	FIRE / HOOD SYSTEM WIRING PIPING WEIGHT
1	3068	CAPTIVATE SOLO FILTER	9 20" 24"		85% SEE FILTER SPEC.	4	RECESSED ROUND	NO						YES 150 LBS
2	3069	CAPTIVATE SOLO FILTER	8 20" 24"		85% SEE FILTER SPEC.	3	RECESSED ROUND	NO						YES 135 LBS
3	3068	CAPTIVATE SOLO FILTER	2 20" 24"		85% SEE FILTER SPEC.	1	RECESSED ROUND	NO						YES 290 LBS
4	3069	CAPTIVATE SOLO FILTER	4 20" 24"		85% SEE FILTER SPEC.	2	RECESSED ROUND	NO	LEFT	3"-WDP-24"	TANK FS	4.0		YES 430 LBS
5	3067					0								NO 0 LBS

HOOD OPTIONS

HOOD NO.	TAG	OPTION
1	3068	FULL WRAPPER 18.00" HIGH FRONT, LEFT BACKSPLASH 12.00" HIGH X 96.00" LONG +430 SS VERTICAL BALANCE SHEAVES RIGHT WALL #5 END PANEL, 4th PLEN LEFT WOR VERTICAL END PANEL 42" TOP WIDTH, 36" BOTTOM WIDTH, 80" HIGH INSULATED +430 SS
2	3069	FULL WRAPPER 18.00" HIGH FRONT, RIGHT RIGHT SIDESPLASH 12.00" HIGH X 78.00" LONG +430 SS VERTICAL RIGHT END STANDOFF STRONGBACK 3" x 108" 80" LONG INSULATED BACKSPLASH – INSIDE CORNER 80.00" HIGH X 2.00" LEG LENGTH +430 SS VERTICAL BALANCE SHEAVES RIGHT WALL #5 END PANEL
3	3068	FULL WRAPPER 18.00" HIGH FRONT, LEFT, RIGHT BACKSPLASH 12.00" HIGH X 78.00" LONG +430 SS VERTICAL LEFT SIDESPLASH 12.00" HIGH X 78.00" LONG +430 SS VERTICAL LEFT END STANDOFF STRONGBACK 3" x 108" 80" LONG INSULATED BACKSPLASH – INSIDE CORNER 80.00" HIGH X 2.00" LEG LENGTH +430 SS VERTICAL BACKSPLASH – OUTSIDE CORNER 80.00" HIGH X 2.00" LEG LENGTH +430 SS VERTICAL RIGHT SIDESPLASH 12.00" HIGH X 78.00" LONG +430 SS VERTICAL RIGHT WALL #5 END PANEL FULL WRAPPER 18.00" HIGH FRONT, LEFT, RIGHT
4	3069	BACKSPLASH 12.00" HIGH X 78.00" LONG +430 SS VERTICAL LEFT SIDESPLASH 12.00" HIGH X 78.00" LONG +430 SS VERTICAL
5	3067	FULL WRAPPER 18.00" HIGH FRONT, LEFT, RIGHT

PERFORATED SUPPLY PLENUM(S)

HOOD NO.	TAG	SIDES WIDTH	HEIGHT	TYPE	BOARD(S) WIDTH	LENG	DIA	QTY	SP
1	3068	Front 14.7"	18"	4"	#LA	12"	28"	120	0.052"
					#LA	12"	28"	120	0.052"
					#LA	12"	28"	120	0.052"
					#LA	12"	28"	120	0.052"
2	3069	Front 13.7"	18"	4"	#LA	12"	28"	120	0.052"
					#LA	12"	28"	120	0.052"
					#LA	12"	28"	120	0.052"
					#LA	12"	28"	120	0.052"
3	3068	Front 39"	18"	4"	#LA	12"	28"	186	0.052"
					#LA	12"	28"	186	0.052"
4	3069	Front 39"	18"	4"	#LA	12"	28"	186	0.052"
					#LA	12"	28"	186	0.052"

WALL-MOUNT UTILITY CABINET

HOOD NO.	LOCATION	SIZE	FIRE SUPPRESSION SYSTEM(3) TYPE	SIZE	ELECTRICAL MODEL #	SWITCHES QUANTITY	WEIGHT
2	WALL MNT	12"x48"x24"	TANK FS	4.0/4.0			400.00 LBS
2	WALL MNT	12"x48"x24"	TANK FS	4.0/4.0	SCV-005	1 PAN	340.00 LBS

SUPPLY PLENUM HANGING ANGLE BY OTHERS (TYP.)

ASSEMBLY INSTRUCTIONS

HANGING ANGLE MUST BE SUPPORTED WITH 1/2" – 13 TPI GRADE 5 HANGERS ALL THREAD EMBEDDED HANGING ANGLES AND CEILING ANCHOR POINTS WITH 1/2" GRADE 5 HANGER BOLTS AT 4'-0" MAXIMUM SPACING. USE 5/16" GRADE 5 MINIMUM NUTS AS SHOWN. MUST USE DOUBLE HEX NUT CONFIGURATION BENEATH HOOD HANGING ANGLES. SINGLE HEX NUT BENEATH HANGING ANGLE IS NOT ACCEPTABLE. HANGER RODS WITH 1/2" DIA OF EXPOSED THREADS BENEATH BOTTOM HEX NUT TORQUE ALL HEX NUTS TO 37 FT-LBS.

HOOD CORNER HANGING ANGLE BY OTHERS (TYP.)

ASSEMBLY INSTRUCTIONS

HANGING ANGLE MUST BE SUPPORTED WITH 1/2" – 13 TPI GRADE 5 HANGERS ALL THREAD EMBEDDED HANGING ANGLES AND CEILING ANCHOR POINTS WITH 1/2" GRADE 5 HANGER BOLTS AT 4'-0" MAXIMUM SPACING. USE 5/16" GRADE 5 MINIMUM NUTS AS SHOWN. MUST USE DOUBLE HEX NUT CONFIGURATION BENEATH HOOD HANGING ANGLES. SINGLE HEX NUT BENEATH HANGING ANGLE IS NOT ACCEPTABLE. HANGER RODS WITH 1/2" DIA OF EXPOSED THREADS BENEATH BOTTOM HEX NUT TORQUE ALL HEX NUTS TO 37 FT-LBS.

AHG HOODS ARE BUILT IN COMPLIANCE WITH NFPA #96 NOTE UL 710 & UL2703 STANDARDS ETL LISTED 3054804-000

IMC 2021 SECTIONS 507, 508, & 509

VERIFY CEILING HEIGHT

HEIGHT ADJUSTED TO ADAPT THAT HOOD FITS SPACE AND TO SIZE THE ENCLOSURE PANELS

SECTION VIEW – MODEL 6004AH-ND-2-PSP-F
HOOD – #1 (3168)

SECTION VIEW – MODEL 3636AH-VHB-C
HOOD – #5 (3167)

SPECIFICATION: CAPTIVATE® GREASE-STOP® SOLO FILTER

THE CAPTIVATE GREASE-STOP SOLO FILTER IS A SINGLE-STAGE FILTER FEATURING CAPTIVATE® TECHNOLOGY. THE FILTER IS CONSTRUCTED OF STAINLESS STEEL AND SLOTTED WEAR BAFFLE DESIGN TO DELIVER EXCEPTIONAL FILTRATION EFFICIENCY.

FILTER IS STAINLESS STEEL CONSTRUCTION AND SIZED TO FIT INTO STANDARD 20" X 24" FILTER RACK OPENINGS.

HEATH SEALS INCLUDE STAINLESS STEEL HANDLES AND A PATENTED DEVICE TO SECURE THE TWO FILTERS TOGETHER AS A PAIR.

GREASE EXTRACTION EFFICIENCY PERFORMANCE SHALL REMOVE AT LEAST 75% OF GREASE PARTICLES FIVE MICRONS OR LARGER, AND 85% GREASE PARTICLES EIGHTEEN MICRONS OR LARGER AS TESTED IN ACCORDANCE WITH ASTM F2519 STANDARD TEST METHOD FOR GREASE EXTRACTORS. THE CAPTIVATE GREASE-STOP SOLO WAS TESTED TO ASTM STANDARD ASTM-F2519-05 MANUFACTURER APPROVED FOR USE ON SOLID FUEL APPLICATIONS AS A SYNGAS AMBUSTION EFFICIENCY VS. PARTICLE DIAMETER

PRESSURE DROP VS. FLOW RATE

CAPTIVATE FILTERS ARE BUILT IN COMPLIANCE WITH:
NFPA #96
NOT STANDARD #2
UL 710 & UL2703
ETL LISTED CORE CWRU
ELL-15419

PATENT NUMBERS
AU-PEP GANTES STATES – US PATENT 7163838 B2
AU-PEP EUROPE – EP PATENT 1 599 270 B1
AU-PEP CHINA TOWNSHIP – CN PATENT 200510126

PLAN VIEW – HOOD #1 (3168)
9' HOOD – OVERALL LENGTH
9'-WDP OVERALL WIDTH

PLAN VIEW – HOOD #5 (3167)
4' HOOD LONG BACKSPLASH-VHB-C

SECTION VIEW – MODEL 6004AH-ND-2-PSP-F
HOOD – #1 (3168)

SECTION VIEW – MODEL 3636AH-VHB-C
HOOD – #5 (3167)

HOODMASTER HOOD SYSTEMS
Advanced Hoods Systems, LLC
FL PHONE 954.4HOODMASTER (446.6337) www.gohoodmaster.com

REVISIONS

NO.	DESCRIPTION	DATE
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2		
3		
4		
5		

Cactus – Miami REV2
MIAMI, FL. 33176

DATE: 11/20/2024
DWG.#: 6367948
DRAWN BY: SAC-140
SCALE: 3/4" = 1'-0"
MASTER DRAWING
SHEET NO. 1

HOOD MOUNTED ON 4" CURB

PLAN VIEW – HOOD #1 (3168)
11' x 60" LONG BACKWALL-WDP-2-PSP-F

12" HEIGHT WALL MOUNTED UTILITY CABINET

12" HEIGHT WALL MOUNTED UTILITY CABINET

SECTION VIEW – MODEL 6004AH-ND-2-PSP-F
HOOD – #2 (3169)

SECTION VIEW – MODEL 6004AH-ND-2-PSP-F
HOOD – #3 (3068)

SECTION VIEW – MODEL 6004AH-ND-2-PSP-F
HOOD – #4 (3069)

REVISIONS

NO.	DESCRIPTION	DATE
1		
2		
3		
4		
5		

HOODMASTER HOOD SYSTEMS
Advanced Hoods Systems, LLC
FL PHONE 954.4HOODMASTER (446.6337) www.gohoodmaster.com

Cactus – Miami REV2
MIAMI, FL. 33176

DATE: 11/20/2024
DWG.#: 6367948
DRAWN BY: SAC-140
SCALE: 3/4" = 1'-0"
MASTER DRAWING
SHEET NO. 2

POLLUTION CONTROL UNIT FIRE SYSTEM

FIELD PIPING

SECTION VIEW – MODEL 6004AH-ND-2-PSP-F
HOOD – #2 (3169)

SECTION VIEW – MODEL 6004AH-ND-2-PSP-F
HOOD – #3 (3068)

SECTION VIEW – MODEL 6004AH-ND-2-PSP-F
HOOD – #4 (3069)

REVISIONS

NO.	DESCRIPTION	DATE
1		
2		
3		
4		
5		

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Advanced Hoods Systems, LLC
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Cactus – Miami REV2
MIAMI, FL. 33176

DATE: 11/20/2024
DWG.#: 6367948
DRAWN BY: SAC-140
SCALE: 3/8" = 1'-0"
MASTER DRAWING
SHEET NO. 4

CACTUS CLUB MIAMI

OWNER:

Cactus Club Café
Contact: Tim Gilmour
Ph: 604-506-7551
Email: tgilmour@integrity-consulting.ca

OWNERS REPRESENTATIVE:

Stys Hospitality
Contact: Brian Stys
Ph: 617-839-6181
Email: bstys@styshospitality.com

INTERIOR DESIGNER:

iCrave

Ph: 212-929-5657
Email: info@icrave.com

MEP ENGINEER:

Henderson Engineers
Contact: Gary Hornbeck
Ph: 913-742-5579
Email: Gary.hornbeck@hendersonengineers.com

STRUCTURAL ENGINEER:

YHCE
Contact: Youssef H. Hachem
Ph: 786-287-9120
Email: yh@yhce.us

KITCHEN CONSULTANT:

Foundry Commercial Kitchens
Contact: Stanley Tsia
Ph: 604-216-2566
Email: stanley.t@foundrykitchens.com

INTERIOR TENANT BUILD-OUT FOR:

CACTUS CLUB MIAMI

AT CITYGROUP CENTER

201 SOUTH BISCAYNE BLVD,
SUITE No. 150
MIAMI, FL 33131

REVISIONS:

2	REV #2	03/20/24
2.1	REV #2.1	06/10/24
3.1	REV #3.1	07/26/24

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COY M. MACY
LICENSE # 86060

IT IS NOT TO BE USED FOR CONSTRUCTION PURPOSES

COY M. MACY
LICENSE # 86060

FORMGROUP
architecture + planning

FORM GROUP, INC.
6740 SW 64 CT, MIAMI, FL. 33143
TEL. 305.443.4244 FX. 305.443.3338
ARCHITECT OF RECORD:
OMAR MORALES, AIA
AA-0014851

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HENDERSON ENGINEERS
8345 LENEXA DRIVE, SUITE 300
LENEXA, KS 66214
TEL 913.742.5000 **FAX** 913.742.5001
WWW.HENDERSONENGINEERS.COM

2350003063
FL. REGISTRY NO. EB 7606
EXPIRES 2/28/2026

PROJECT NO. 23-1222
TITLE: CAPTIVEAIRE
DATE: 1/29/2024
SCALE: AS INDICATED
DRAWING NO.: M-500

7/21/2025 11:01:27 AM
COY M. MACY

EXHAUST FAN INFORMATION — JOB#6912423

FAN UNIT NO.	TAG	QTY	FAN UNIT MODEL #	MANUFACTURER	CFM	ESP	RPM	MOTOR CALC.	HP	BHP	PHASE	VOLT	FLA	WEIGHT CLASS	SONES
1	KEF-1	1	AH25	ADVANCED HOOD	7750	3.000	1333	TEFC,HIGHTORQ#VARSHEAVE	10.000	8.575	3	460	12.0	4573	29.5
2	EWEF-1	1	AH-SSF1000-SS	ADVANCED HOOD	1225	1.366	1573	TEAO-412A	1.000	0.7105	1	115	13.6	1815	12.2

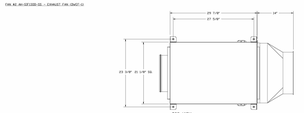
FAN OPTIONS

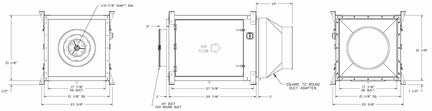
FAN UNIT NO.	TAG	QTY	DESCRIPTION
1	KEF-1	1	POLLUTION CONTROL UNIT WITH PRETUTEK HIGH EFFICIENCY, ESP CELL AND ODOR CONTROL FILTERS WITH PRE-FILTER, ELECTRICAL DETECTION SYSTEM. SIZE 6
		1	OUTLET PLATE FOR KB-2TC-6
		1	MARK 3WD CERTIFICATION
		1	FULL CRATING FOR EXHAUST FANS
		1	2" DISCONNECT SWITCH
		1	12" ID TO 12A 14" STRAIGHT DISCHARGE - SQUARE TO ROUND DISCHARGE ADAPTER
		1	SF12 - INLET - STANDARD 14" DUCT CONNECTION.
		1	12" - HORIZONTAL DISCHARGE HOOD* - PRE-INSTALLED MOUNTS (2)-36"
2	EWEF-1	1	VFD WIRING PACKAGE - EXHAUST - MANUAL OR 0-10VDC REFERENCE SPEED CONTROL *HOOD MOUNTED VFD
		1	HANGING SPRING VIBRATION ISOLATORS (SET OF 4) FOR INDOOR OR OUTDOOR USE WITH CURB MOUNTING PLATE (NOT PICTURED)
		1	10 YEAR PARTS WARRANTY

FAN ACCESSORIES

FAN UNIT NO.	TAG	EXHAUST				SUPPLY			
		DRAIN PAN	GRAVITY DAMPER	WALL SLEEVE	SIDE DISCHARGE	GRAVITY DAMPER	MOTORIZED DAMPER	WALL SLEEVE	ROOF MOUNT
1	KEF-1								
2	EWEF-1								

TOP, AC-44-SSF1000-SS — EXHAUST FAN, EWEF-1

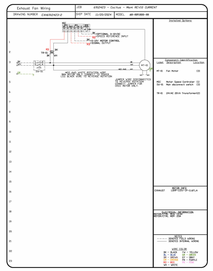


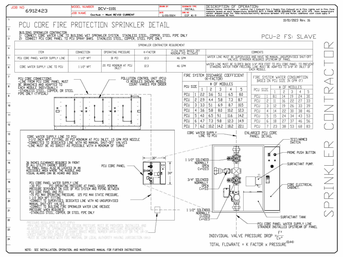


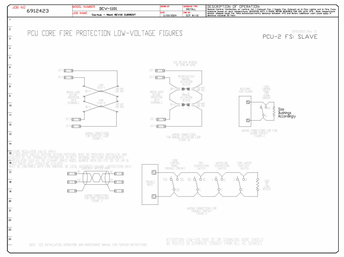
NOTES:
1. SHOWROOM USED WITH CONNECTING TO STANDARD DUCT.
2. SHOWROOMS ARE INSTALLED ON THE OPTIONAL AND/OR DISCHARGE SIDES.

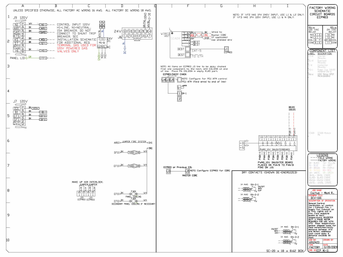
FEATURES:
- DIRECT DRIVE CONSTRUCTION (NO BELTS/PULLEYS).
- TWO ACCESS DOORS FOR EASY ACCESS.
- ALUMINUM HOUSING AND NON-OVERLOADING WHEELS.
- ALUMINUM HOUSING AND NON-OVERLOADING WHEELS.
- AMCA AIR & SOUND CERTIFIED.
- 1" NPT THREADED DRAIN (CENTER) (3 PHASE).
- 2" NPT THREADED DRAIN (CENTER) (1 PHASE).

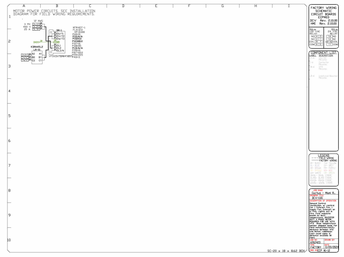
OPTIONS
- 12A 12 GA 14" STRAIGHT DISCHARGE - SQUARE TO ROUND DISCHARGE ADAPTER
- SF12 - INLET - STANDARD 14" DUCT CONNECTION.
- 12" - HORIZONTAL DISCHARGE HOOD* - PRE-INSTALLED MOUNTS (2)-36" - VFD WIRING PACKAGE - EXHAUST - MANUAL OR 0-10VDC REFERENCE SPEED CONTROL *HOOD MOUNTED VFD
- HANGING SPRING VIBRATION ISOLATORS (SET OF 4) FOR INDOOR OR OUTDOOR USE WITH CURB MOUNTING PLATE (NOT PICTURED)
- 10 YEAR PARTS WARRANTY

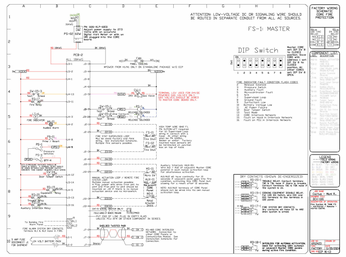

Exhaust Fan Wiring
SOURCE POWER - Independent
JOB
EWEF1 - Vortex - Roof MOUNT EXHAUST
SHT SPC
SCHEDULE POWER
MCA 20.0A
Controller By Others
Factory wired 18 Pole Relay
Fire Control Interface
by Others
Fire Detection Interface
Wire 18 Pole
Exhaust Motor
Controller Enclosure
Disconnect Switch
Fan Motor
Fan Wheel
Fan Housing
Fan Base
Fan Curb
Fan Curb Cap
Exhaust Duct
Roof Deck
Roofing Membrane
Roof Insulation
Roof Flashing
Roof Curb
Roof Curb Cap
Roof Curb Insulation
Roof Curb Liner
Roof Curb Flashing
Roof Curb Membrane

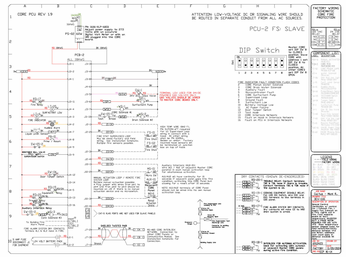


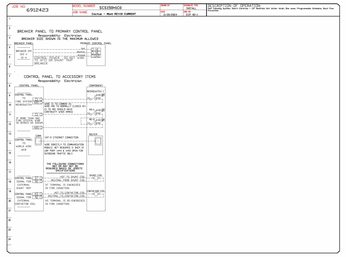


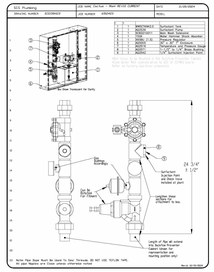


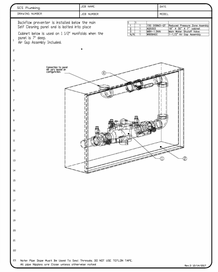


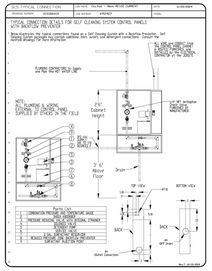


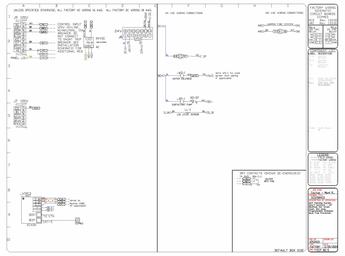


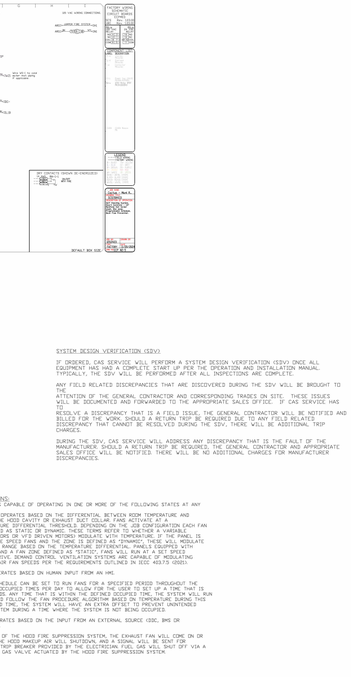












DEMAND CONTROL VENTILATION HOOD CONTROL PANEL SPECIFICATIONS

- CONTROLS SHALL BE LISTED BY ETL UL 508A1 AND SHALL COMPLY WITH DEMAND VENTILATION SYSTEM TURNDOWN REQUIREMENTS OUTLINED IN ICCC 403.7.5 (2021).
- THE CONTROL ENCLOSURE SHALL BE NEMA 1 RATED AND LISTED FOR INSTALLATION INSIDE OF THE EXHAUST HOOD UTILITY CABINET. THE CONTROL ENCLOSURE MAY BE CONSTRUCTED OF STAINLESS STEEL OR PAINTED STEEL.
- TEMPERATURE PROBE(S) LOCATED IN THE EXHAUST DUCT RISER(S) SHALL BE CONSTRUCTED OF STAINLESS STEEL.
- A DIGITAL CONTROLLER SHALL BE PROVIDED TO ACTIVATE THE HOOD EXHAUST FANS DYNAMICALLY BASED ON A FIXED DIFFERENTIAL BETWEEN THE AMBIENT AND DUCT TEMPERATURES SENSORS. THIS FUNCTION SHALL MEET THE REQUIREMENTS OF IMC 507.13.
- A DIGITAL CONTROLLER SHALL PROVIDE ADJUSTABLE HYSTERESIS SETTINGS TO PREVENT CYCLING OF THE EXHAUST FANS WHEN COOKING APPLIANCES HAVE BEEN TURNED OFF AND/OR THE HEAT IN THE EXHAUST SYSTEM IS REDUCED.
- A DIGITAL CONTROLLER SHALL PROVIDE AN ADJUSTABLE MINIMUM FAN RUN-TIME SETTING TO PREVENT FAN CYCLING.
- VARIABLE FREQUENCY DRIVES (VFDS) SHALL BE PROVIDED FOR FANS AS REQUIRED. THE DIGITAL CONTROLLER SHALL MODULATE THE VFDS BETWEEN A MINIMUM SETPOINT AND A MAXIMUM SETPOINT ON THE BASIS OF THE DIFFERENTIAL TEMPERATURE. THE SIGNAL INPUTTED TO THE DIGITAL CONTROLLER SHALL BE USED TO CALCULATE THE SPEED REFERENCE SIGNAL.
- THE VFD SPEED RANGE OF OPERATION SHALL BE FROM 0% TO 100% FOR THE SYSTEM, WITH THE ACTUAL MINIMUM SPEED SET AS REQUIRED TO MEET MINIMUM VENTILATION REQUIREMENTS.
- AN INTERNAL ALGORITHM TO THE DIGITAL CONTROLLER SHALL MODULATE SUPPLY FAN VFD SPEED PROPORTIONAL TO ALL EXHAUST FANS THAT ARE LOCATED IN THE SAME FAN GROUP AS THE SUPPLY FAN.
- THE SYSTEM SHALL OPERATE IN PREP MODE DURING LIGHT COOKING LOAD OR COOL DOWN MODE WHEN SUFFICIENT HEAT REMAINS UNDERNEATH THE HOOD SYSTEM AFTER COOKING OPERATIONS HAVE COMPLETED. OPERATION DURING EITHER OF THESE PERIODS WILL DISABLE THE SUPPLY FANS AND PROVIDE AN EXHAUST FAN SPEED THAT IS EQUAL TO THE MINIMUM VENTILATION REQUIREMENT.
- A DIGITAL CONTROLLER SHALL DISABLE THE SUPPLY FAN(S), ACTIVATE THE EXHAUST FAN(S), ACTIVATE THE APPLIANCE SHUNT TRIP, AND DISABLE AN ELECTRIC GAS VALVE AUTOMATICALLY WHEN FIRE CONDITION IS DETECTED ON A COVERED HOOD.
- A DIGITAL CONTROLLER SHALL ALLOW FOR EXTERNAL BMS FAN CONTROL VIA DRY CONTACT (EXTERNAL CONTROL SHALL NOT OVERRIDE FAN OPERATION LOGIC AS REQUIRED BY CODE).
- AN LCD INTERFACE SHALL BE PROVIDED WITH THE FOLLOWING FEATURES:
  A. ON/OFF PUSH BUTTON FAN & LIGHT SWITCH ACTIVATION.
  B. INTEGRATED GAS VALVE RESET FOR ELECTRONIC GAS VALVES (NO RESET RELAY REQUIRED).
  C. MAKE-UP AIR SYSTEM ON/OFF SWITCH WITH LED STATUS INDICATOR.
  D. DUCT TEMPERATURE SENSOR FAILURE DETECTION WITH AUDIBLE & VISUAL ALARM NOTIFICATION.
  E. MIS-WIRED DUCT TEMPERATURE SENSOR DETECTION WITH AUDIBLE & VISUAL ALARM NOTIFICATION.
  F. A SINGLE LOW VOLTAGE CAT-5 RJ45 WIRING CONNECTION.
  G. AN ENERGY SAVINGS INDICATOR THAT UTILIZES MEASURED KWH FROM THE VFDS.

SYSTEM DESIGN VERIFICATION (SDV)

IF ORDERED, CAS SERVICE WILL PERFORM A SYSTEM DESIGN VERIFICATION (SDV) ONCE ALL EQUIPMENT HAS HAD A COMPLETE START UP PER THE OPERATION AND INSTALLATION MANUAL. TYPICALLY, THE SDV WILL BE PERFORMED AFTER ALL INSPECTIONS ARE COMPLETE.

ANY FIELD RELATED DISCREPANCIES THAT ARE DISCOVERED DURING THE SDV WILL BE BROUGHT TO THE

ATTENTION OF THE GENERAL CONTRACTOR AND CORRESPONDING TRADES ON SITE. THESE ISSUES WILL BE DOCUMENTED AND FORWARDED TO THE APPROPRIATE SALES OFFICE. IF CAS SERVICE HAS TO

RESOLVE A DISCREPANCY THAT IS A FIELD ISSUE, THE GENERAL CONTRACTOR WILL BE NOTIFIED AND BILLED FOR THE TIME AND MATERIALS. IF CAS SERVICE HAS TO RETURN TO SITE TO RESOLVE A DISCREPANCY THAT CANNOT BE RESOLVED DURING THE SDV, THERE WILL BE ADDITIONAL TRIP CHARGES.

DURING THE SDV, CAS SERVICE WILL ADDRESS ANY DISCREPANCY THAT IS THE FAULT OF THE MANUFACTURER. IF CAS SERVICE HAS A RETURN TRIP BE REQUIRED THE GENERAL CONTRACTOR AND APPROPRIATE SALES OFFICE WILL BE NOTIFIED. THERE WILL BE NO ADDITIONAL CHARGES FOR MANUFACTURER DISCREPANCIES.

SEQUENCE OF OPERATIONS

THE VENTILATION CONTROL PANEL IS CAPABLE OF OPERATING IN ONE OR MORE OF THE FOLLOWING STATES AT ANY GIVEN TIME:

- AUTOMATIC: THE SYSTEM OPERATES BASED ON THE DIFFERENTIAL BETWEEN ROOM TEMPERATURE AND THE TEMPERATURE AT THE HOOD CANOPY OR EXHAUST DUCT (CEILING FANS) ACTIVATE AT A CONFIGURABLE TEMPERATURE DIFFERENTIAL THRESHOLD. DEPENDING ON THE JOB CONFIGURATION EACH FAN MAY BE CONTROLLED BY A VFD OR BY A SPEED CONTROLLER. IF THE FANS ARE EC MOTORS (ECM), THE MOTOR CLOCK AS EC MOTORS OR VFD DRIVEN MOTORS MODULATE WITH TEMPERATURE. IF THE PANEL IS EQUIPPED WITH VARIABLE SPEED FANS AND THE ZONE IS DEFINED AS "DYNAMIC", THESE WILL MODULATE BASED ON THE DEMAND CONTROL VENTILATION SYSTEMS ARE CAPABLE OF MODULATING EXHAUST AND MAKE UP AIR FAN SPEEDS PER THE REQUIREMENTS OUTLINED IN ICCC 403.7.5 (2021).
- MANUAL: THE SYSTEM OPERATES BASED ON HUMAN INPUT FROM AN HMI.
- SCHEDULE: A WEEKLY SCHEDULE CAN BE SET TO RUN FANS FOR A SPECIFIED PERIOD THROUGHOUT THE DAY. THERE ARE THREE DEDICATED TIMES EACH DAY TO ALLOW FOR THE USER TO SET THE SYSTEM TO RUN AT MINIMUM, MEDIUM, OR MAXIMUM SPEEDS. THE SYSTEM CAN ALSO BE SET TO RUN AT MINIMUM, MEDIUM, OR MAXIMUM SPEEDS. THE SYSTEM CAN ALSO BE SET TO RUN AT MODULATION MODE AND FOLLOW THE FAN PROCEDURE ALGORITHM BASED ON TEMPERATURE DURING THIS TIME. DURING UNOCCUPIED TIMES, THE SYSTEM WILL HAVE AN EXTRA OFFSET TO PREVENT UNINTENDED ACTIVATION OF THE SYSTEM DURING A TIME WHERE THE SYSTEM IS NOT BEING OCCUPIED.
- OTHER: THE SYSTEM OPERATES BASED ON THE INPUT FROM AN EXTERNAL SOURCE (BSC, BMS OR HARD-WIRED INTERLOCK).

- FIRE: UPON ACTIVATION OF THE HOOD FIRE SUPPRESSION SYSTEM, THE EXHAUST FAN WILL COME ON OR CONTINUE TO TO RUN, THE HOOD MAKEUP AIR WILL SHUTDOWN, AND A SIGNAL WILL BE SENT FOR ACTIVATING THE SHUNT TRIP BREAKER PROVIDED BY THE ELECTRICIAN. FUEL GAS WILL SHUT OFF VIA A MECHANICAL/ELECTRICAL GAS VALVE ACTUATED BY THE HOOD FIRE SUPPRESSION SYSTEM.

REVISIONS

DESCRIPTION	DATE

Advanced Hoods Systems, LLC
FL PHONE: XXX-XXX-XXXX EMAIL: EMAIL@ADVANCEDHOODS.COM

Cactus - Miami REV2
MIAMI, FL, 33176

DATE: 11/20/2024
DWG.#: 6302M08
DRAWN BY: SAC-140
SCALE: 3/4" = 1'-0"
MASTER DRAWING

SHEET NO. 9

REVISIONS

DESCRIPTION	DATE

Advanced Hoods Systems, LLC
FL PHONE: XXX-XXX-XXXX EMAIL: EMAIL@ADVANCEDHOODS.COM

Cactus - Miami REV2
MIAMI, FL, 33176

DATE: 11/20/2024
DWG.#: 6302M08
DRAWN BY: SAC-140
SCALE: 3/4" = 1'-0"
MASTER DRAWING

SHEET NO. 10

REVISIONS

DESCRIPTION	DATE

Advanced Hoods Systems, LLC
FL PHONE: XXX-XXX-XXXX EMAIL: EMAIL@ADVANCEDHOODS.COM

Cactus - Miami REV2 CURRENT
MIAMI, FL, 33176

DATE: 11/20/2024
DWG.#: 6302M08
DRAWN BY: SAC-140
SCALE: 3/4" = 1'-0"
MASTER DRAWING

SHEET NO. 11

FORMGROUP

PROGRESS SET OF REVISION 4.2.1

07/24/2025

FOR COORDINATION PURPOSES ONLY
MASTER PERMIT REVISION PENDING

CACTUS CLUB MIAMI

OWNER:

Cactus Club Café
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Email: tgilmour@integrity-consulting.ca

OWNERS REPRESENTATIVE:

Stys Hospitality
Contact: Brian Stys
Ph: 617-839-6181
Email: bstys@styshospitality.com

INTERIOR DESIGNER:

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MEP ENGINEER:

Henderson Engineers
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STRUCTURAL ENGINEER:

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Email: yh@yhce.us

KITCHEN CONSULTANT:

Foundry Commercial Kitchens
Contact: Stanley Tsia
Ph: 604-216-2566
Email: stanley.t@foundrykitchens.com

INTERIOR TENANT BUILD-OUT FOR:

CACTUS CLUB MIAMI

AT CITYGROUP CENTER

201 SOUTH BISCAYNE BLVD,
SUITE No. 150
MIAMI, FL 33131

REVISIONS:

2	REV #2	03/20/24
2.1	REV #2.1	06/10/24
3.1	REV #3.1	07/26/24

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LICENSE # 86060

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COY M. MACY
LICENSE # 86060

FORMGROUP
architecture + planning

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AA-0014851

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WWW.HENDERSONENGINEERS.COM

2350003063
FL. REGISTRY NO. EB 7606
EXPIRES 2/28/2026

PROJECT NO.: 23-1222
TITLE: CAPTIVEAIRE
DATE: 1/29/2024
SCALE: AS INDICATED
DRAWING NO.: M-502

7/21/2025 11:01:49 AM
COY M. MACY

WATER SOURCE HEAT PUMP CONTROL MATRIX

CONTROL FEATURE	UNITS	WSHP-1,10-12 SETPOINT OR Y/N	WSHP-2,3 SETPOINT OR Y/N	WSHP-4,5 SETPOINT OR Y/N	WSHP-6,9 SETPOINT OR Y/N	WSHP-7,8 SETPOINT OR Y/N	POINT TYPE INTERFACE WITH DDC (READ/WRITE)	NOTES
BUILDING AUTOMATION SYSTEM (BAS)								
BAS MONITORING AND MANAGEMENT INTERFACE		Y	Y	Y	Y	Y	BACNET	A
SETPOINTS								
COOLING - OCCUPIED SETPOINT	°F	72	72	72	75	75	READ/WRITE	
COOLING - UNOCCUPIED SETPOINT	°F	85	85	85	85	85	READ/WRITE	
DEAD BAND - MINIMUM HEATING AND COOLING TEMPERATURE SETPOINT DIFFERENCE	°F	5	5	5	5	5		
HEATING - OCCUPIED SETPOINT	°F	67	67	67	67	67	READ/WRITE	
HEATING - UNOCCUPIED SETPOINT	°F	55	55	55	55	55	READ/WRITE	
DEHUMIDIFICATION SETPOINT - HUMIDITY SENSOR FEEDBACK	% RH	50%	50%	50%	50%	50%	READ/WRITE	B
PROGRAMMED CONTROL FEATURES								
HVAC SYSTEM OCCUPIED/UNOCCUPIED MODE - SCHEDULED THROUGH BAS		Y	Y	Y	Y	Y	READ	B
REMOTE TEMPERATURE AND HUMIDITY SENSOR		Y	Y	Y	Y	Y	READ	B
EQUIPMENT ACCESSORIES AND CONTROL MODULES								
DEHUMIDIFICATION - HOT GAS REHEAT		Y	Y	Y	Y	Y	READ STATUS	M
VARIABLE SPEED HEAT PUMP COIL WITH REVERSING VALVE		Y	Y	Y	Y	Y	READ STATUS	J
SUPPLY FAN CONTROL METHODS								
ON DURING OCCUPIED HOURS		Y	Y	Y	Y	Y		
CYCLE WITH LOADS DURING UNOCCUPIED HOURS		Y	Y	Y	Y	Y		
CONSTANT VOLUME FAN CONTROL		Y	Y	N	N	Y	READ STATUS	
VARIABLE VOLUME - STAGED FAN CONTROL IN RESPONSE TO ACTIVE COOLING COIL STAGES		N	N	Y	Y	N	READ STATUS	J, N
SAFETIES, INTERLOCKS, AND ALARMS								
SUPPLY AIR SMOKE DETECTOR - UNIT SHUTDOWN		N	Y	Y	Y	N	READ	D
WATER FLOW DIFFERENTIAL PRESSURE SWITCH WITH AUTOMATIC RESET AFTER UNIT...		Y	Y	Y	Y	Y	READ	G
MAIN DRAIN PAN CONDENSATE OVERFLOW SWITCH - UNIT SHUTDOWN		Y	Y	Y	Y	Y	READ	G
AUXILIARY DRAIN PAN FLOOD DETECTOR - UNIT SHUTDOWN		Y	Y	Y	Y	Y	READ	B
CONDENSER WATER TEMPERATURE LOW LIMIT ALARM	°F	40	40	40	40	40	READ	G
DOAS SYSTEM INTERLOCK		Y	Y	Y	Y	Y	READ	S
KITCHEN EXHAUST SYSTEM INTERLOCK		N	N	N	Y	Y	READ	Q
2-POSITION CONTROL VALVE INTERLOCK (OPEN WHEN ON, CLOSED WHEN OFF)		Y	Y	Y	Y	Y	READ	B
CONNECT TO LANDLORD SMOKE EVAC SYSTEM		Y	Y	Y	Y	Y	READ	R

4.2

DIV. 23 CONTRACTOR SHALL PROVIDE CONTROL PANEL(S), WIRING, THERMOSTAT(S), TEMPERATURE SENSOR(S), HUMIDISTAT(S), AND/OR CO2 SENSOR(S) WHERE SHOWN ON THE DRAWINGS AND AS REQUIRED TO FACILITATE THE SCHEDULED CONTROL MODULES AND SEQUENCES OF OPERATION. EACH UNIT SHALL CONTROL BASED ON ITS OWN INTERNAL SAFETIES, TIME DELAYS, AND SEQUENCES UNLESS NOTED OTHERWISE. COORDINATE WITH OWNER FINAL BUILDING AND EQUIPMENT SCHEDULES DURING STARTUP. REFERENCE DIVISION SPECIFICATIONS FOR INDIVIDUAL DEVICE REQUIREMENTS.

NOTES:

A. PROVIDE UNIT WITH TERMINAL STRIP TO RECEIVE CONTROL INPUT(S) COMMUNICATED FROM A CENTRAL DDC CONTROLLER. BAS SHALL PROVIDE REMOTE SETPOINT ADJUSTMENT, SCHEDULING, AND MONITORING OF THE POINTS LISTED IN THE SCHEDULE FOR EACH UNIT.
B. DIVISION 23 CONTRACTOR SHALL PROVIDE DEVICE.
D. DIVISION 28 CONTRACTOR SHALL PROVIDE DEVICE.
G. DEVICE SHALL BE FACTORY MOUNTED AND PRE-WIRED FOR OPERATION SUBJECT TO THE ONBOARD CONTROLLER.
J. UNITARY CONTROLLER SHALL MODULATE AND/OR CYCLE SUPPLY FAN SPEED SETTING AND COIL CAPACITY STAGES SUBJECT TO THE INTERNAL SAFETIES AND SEQUENCES TO MAINTAIN SCHEDULED SETPOINTS.
M. PROGRAM DEHUMIDIFICATION SEQUENCE BASED ONZONE AIR HUMIDITY.
N. PROVIDE STAGED FAN CONTROL WITH MINIMUM 2 FAN SPEEDS. LOW SPEED SHALL NOT EXCEED 66% OF FULL SPEED AT MINIMUM SPEED THE FAN SHALL DRAW NO MORE THAN 30% OF FULL SPEED POWER.
Q. INTERLOCK UNIT WITH KITCHEN HOOD SYSTEM(S) TO SHUT UNIT DOWN UPON SIGNAL FROM HOOD FIRE SUPPRESSION SYSTEM. INTERLOCK UNIT WITH KITCHEN EXHAUST FAN TO START UNIT AND OPEN OUTDOOR AIR DAMPER WHEN EXHAUST FAN IS ENERGIZED TO MAINTAIN BUILDING PRESSURIZATION.
R. INTERLOCK UNIT WITH LANDLORD SMOKE EVAC SYSTEM. COORDINATE INTERLOCK REQUIREMENTS WITH LANDLORD. SEE SEQUENCE ON M200 AND M201 FOR MORE INFORMATION.
S. INTERLOCK UNIT WITH DOAS SYSTEM(S) TO KEEP FAN ON WHILE DOAS IS OPERATING.

4.2

WSHP DOAS UNIT CONTROL MATRIX

CONTROL FEATURE	UNITS	DOAS-1 SETPOINT OR Y/N	DOAS-2 SETPOINT OR Y/N	DOAS-3 SETPOINT OR Y/N	POINT TYPE INTERFACE WITH DDC (READ/WRITE)	NOTES
BUILDING AUTOMATION SYSTEM (BAS)						
BAS MONITORING AND MANAGEMENT INTERFACE		Y	Y	Y	BACNET	A
CONTROL STRATEGY						
DOAS SUPPLY AIR TEMPERATURE CONTROL		Y	Y	Y		
HEATING AND COOLING SET POINTS						
COOLING - SUPPLY AIR TEMPERATURE SETPOINT	°F DB	70	60	60	READ/WRITE	X
HEATING - SUPPLY AIR TEMPERATURE SETPOINT	°F DB	65	55	55	READ/WRITE	X
DEHUMIDIFICATION - REHEAT CONTROL - SUPPLY AIR TEMPERATURE SETPOINT	%RH	50%	50%	50%	READ/WRITE	X
PROGRAMMED CONTROL FEATURES						
HVAC SYSTEM OCCUPIED/UNOCCUPIED MODE - SCHEDULED THROUGH BAS		Y	Y	Y	READ	B
REMOTE TEMPERATURE AND HUMIDITY SENSOR		N	Y	Y	READ	B
OPTIMUM START SEQUENCE		N	Y	Y	READ STATUS	
EQUIPMENT COMPONENTS, ACCESSORIES AND CONTROL FEATURES						
COOLING COIL (DX-MODULATING CAPACITY)		Y	Y	Y	READ STATUS	K
DEHUMIDIFICATION - MODULATING HOT GAS REHEAT		Y	Y	Y	READ STATUS	
HEATING - HEAT PUMP - MODULATING HEATING		Y	Y	Y	READ STATUS	K
OUTSIDE AIR DAMPER - MOTOR OPERATED		Y	Y	Y	READ STATUS	J
SUPPLY FAN CONTROL METHODS						
ON DURING OCCUPIED MODE		Y	Y	Y		
VARIABLE VOLUME SUPPLY FAN SET TO CONSTANT SPEED		Y	N	N	READ	K
VARIABLE VOLUME SUPPLY OPERATION - HOOD EXHAUST DCV TURNDOWN		N	Y	Y		W
SAFETIES, INTERLOCKS, AND ALARMS						
SUPPLY AIR SMOKE DETECTOR - SAFETY SHUTDOWN		Y	Y	Y	READ	E
LOW LIMIT FREEZESTAT - FREEZE PROTECTION SAFETY SHUTDOWN		Y	Y	Y	READ	F
FIRE ALARM CONTROL PANEL - SAFETY SHUTDOWN INTERLOCK		Y	Y	Y	READ	
HIGH SUPPLY AIR STATIC PRESSURE SENSOR - SAFETY SHUTDOWN		Y	Y	Y	READ	F
AUXILIARY DRAIN PAN FLOOD DETECTOR - UNIT SHUTDOWN		Y	Y	Y	READ	B
CONDENSER WATER TEMPERATURE LOW LIMIT ALARM	°F	39	40	40	READ	F
2-POSITION CONTROL VALVE INTERLOCK (OPEN WHEN ON, CLOSED WHEN OFF)		Y	Y	N	READ	B
KITCHEN EXHAUST SYSTEM INTERLOCK		Y	Y	Y	READ	L
CONNECT TO LANDLORD SMOKE EVAC SYSTEM		Y	Y	Y	READ	Y

DIV. 23 CONTRACTOR SHALL PROVIDE CONTROL PANEL(S), WIRING, THERMOSTAT(S), TEMPERATURE SENSOR(S), HUMIDISTAT(S), AND/OR CO2 SENSOR(S) WHERE SHOWN ON THE DRAWINGS AND AS REQUIRED TO FACILITATE THE SCHEDULED CONTROL MODULES AND SEQUENCES OF OPERATION. EACH UNIT SHALL CONTROL BASED ON ITS OWN INTERNAL SAFETIES, TIME DELAYS, AND SEQUENCES UNLESS NOTED OTHERWISE. COORDINATE WITH OWNER FINAL BUILDING AND EQUIPMENT SCHEDULES DURING STARTUP. REFERENCE DIVISION SPECIFICATIONS FOR INDIVIDUAL DEVICE REQUIREMENTS.

NOTES:

A. PROVIDE UNIT WITH FACTORY MOUNTED DDC CONTROLS AND INTEGRATE INTO THE BAS. BAS SHALL PROVIDE REMOTE SETPOINT ADJUSTMENT, SCHEDULING, AND MONITORING OF THE POINTS LISTED IN THE SCHEDULE FOR EACH UNIT.
B. DIVISION 23 CONTRACTOR SHALL PROVIDE DEVICE.
E. DIVISION 28 CONTRACTOR SHALL PROVIDE DEVICE.
F. DEVICE SHALL BE FACTORY MOUNTED AND PRE-WIRED FOR OPERATION SUBJECT TO THE ONBOARD CONTROLLER.
J. DAMPER SHALL BE CLOSED DURING UNOCCUPIED MODE.
K. UNITARY CONTROLLER SHALL MODULATE AND/OR CYCLE SUPPLY FAN SPEED AND COIL CAPACITY SUBJECT TO THE INTERNAL SAFETIES AND SEQUENCES TO MAINTAIN SCHEDULED SETPOINTS.
L. INTERLOCK DOAS WITH KITCHEN EXHAUST HOOD SYSTEM(S) TO SHUT DOWN UPON SIGNAL FROM HOOD FIRE EXTINGUISHING SYSTEM. INTERLOCK RTU WITH KITCHEN EXHAUST FAN TO ENERGIZE WHEN HOOD SYSTEM IS ENERGIZED FOR PRESSURIZATION AND MODULATE WITH KITCHEN HOOD DCV CONTROLS.
N. UNITS THAT PROVIDE VENTILATION AIR TO MULTIPLE ZONES AND OPERATE IN CONJUNCTION WITH ZONE HEATING AND COOLING SYSTEMS SHALL NOT USE HEATING OR HEAT RECOVERY TO WARM SUPPLY AIR TO A TEMPERATURE GREATER THAN VALUE INDICATED WHEN THE OUTSIDE AIR TEMPERATURE EXCEEDS 75F.
Q. VENTILATION ONLY MODE PROVIDES OUTSIDE AIR DIRECTLY TO SPACE WITHOUT HEATING OR COOLING WHEN OUTDOOR AIR CONDITIONS ARE FAVORABLE. VENTILATION ONLY MODE CAN BE INTERRUPTED ON A CALL FOR DEHUMIDIFICATION.
W. HOOD CONTROL PANEL SHALL CONTROL THE DOAS UNIT. DOAS UNIT SHALL MODULATE THE OUTSIDE AIR WITH THE EXHAUST FANS FOR KITCHEN EXHAUST TURNDOWN. HOOD TO DELIVER 0-10V SIGNAL TO BMS, FAN SPEED TO BE SET DURING TEST AND BALANCING.
X. UNIT SHALL BE ON WHEN EITHER OCCUPIED OR HOODS ARE ENERGIZED, OFF IF BOTH UNOCCUPIED AND HOODS ARE OFF.
Y. INTERLOCK UNIT WITH LANDLORD SMOKE EVAC SYSTEM. COORDINATE INTERLOCK REQUIRMENTS WITH LANDLORD. SEE SEQUENCE OF OPERATIONS ON M200 AND M201

4.2

GREASE SCRUBBER

MARK	AREA SERVED	MANUFACTURER	MODEL	FAN CFM	FAN ESP (IN)	FAN MIN HP	FILTERS TOTAL APD (IN)	ELECTRICAL V/PH	ELECTRICAL FLA	ELECTRICAL DISC TYPE	WEIGHT (LBS)	NOTES
ESP 1	KITCHEN	ADVANCED HOOD	AH25	7755	3.0	10	1.9	480 V / 3PH	12	FUSED	4900	A - O

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

NOTES:

A. TOTAL STATIC PRESSURE IS AN ESTIMATED VALUE BASED ON INFORMATION OF ONE MANUFACTURER OF GREASE SCRUBBER UNIT. ADJUST TOTAL AS REQUIRED BASED ON ACTUAL UNIT AND SPECIFIED EXTERNAL AND FILTER FINAL PD.
B. FILTER STAGES SHALL BE AS FOLLOWS:
1ST STAGE: (18) 2" DEEP MERV 8 BAFFLE TYPE.
2ND STAGE: (18) 4" DEEP MERV 15 PLEATED TYPE.
3RD STAGE: (6) 15" DEEP MERV 15 ELECTROSTATIC PRECIPITOR TYPE.

4TH STAGE: (18) 4" DEEP CARBON TYPE.
C. UNIT SHALL INCLUDE AN ODOR CONTROL MODULE SIZED AND PROVIDED BY MANUFACTURER.
D. PROVIDE UNIT WITH BACK INLET CONNECTION.
E. PROVIDE WITH FRONT OUTLET CONNECTION. COORDINATE ACCESSIBLE SIDE WITH PLANS, ONLY ONE SIDE SHALL NEED ACCESS.
F. DISCONNECTS SHALL BE FURNISHED BY THE MANUFACTURER INTEGRAL TO THE UNIT.
G. STARTERS SHALL BE FURNISHED BY THE MANUFACTURER INTEGRAL TO THE UNIT.
H. PROVIDE SINGLE POINT POWER CONNECTION.
J. SPECIFIED FAN ESP ACCOUNTS FOR DUCT LOSSES EXTERNAL TO UNIT.
K. PROVIDE FACTORY PRE-PIPED FIRE SUPPRESSION PIPING AND NOZZLES FOR FIELD CONNECTION OF FIRE SUPRESSION SYSTEM. CONTRACTOR TO PROVIDE CABINET, PULL STATION, AND UNIT FUSIBLE LINK.
L. PROVIDE UNIT WITH INTEGRAL FLOAT SWITCH.
M. MOUNT UNIT ON SLAB ON RAILS.
N. EQUIPMENT SHALL BE SHIPPED IN SECTIONS FOR INSTALLATION IN FIELD.
O. REFER TO ADVANCED HOOD DRAWINGS FOR MORE INFORMATION.

KITCHEN EXHAUST HOOD SCHEDULE

MARK	MANUFACTURER	MODEL	HOOD DIMENSIONS (IN) (L)	EXHAUST CFM	MAU CFM	FIRE SYSTEM TYPE	FIRE SYSTEM LOCATION	WEIGHT (LBS)	COOKING TEMP (°F)	CONSTRUCTION	NOTES
KEH 1	ADVANCED HOOD	6024 AH-ND-2-PSP-F	12' - 3"	2756	2205	N/A	WALL MOUNT	791	600	COOKLINE	A - H, J
KEH 2	ADVANCED HOOD	6024 AH-ND-2-PSP-F	11' - 4"	2947	2358	TANK FS	WALL MOUNT	762	600	COOKLINE	A - H, J - K
KEH 3	ADVANCED HOOD	6024 AH-ND-2-PSP-F	3' - 1"	678	542	N/A	WALL MOUNT	272	600	COOKLINE	A - H, J
KEH 4	ADVANCED HOOD	6024 AH-ND-2-PSP-F	5' - 10"	1371	1097	TANK FS	UTILITY CABINET	706	600	COOKLINE	A - I, J - K
KEH 5	ADVANCED HOOD	6024 AH-ND-2-PSP-F	3' - 6"	525	0	N/A	N/A	151	700	COOKLINE	A - H, J

NOTES:

A. HOOD SUPPLIER SHALL PROVIDE HOOD PRE-PIPED FOR WET-TYPE FIRE EXTINGUISHING SYSTEM MEETING REQUIREMENTS OF NFPA-96 AND LOCAL CODES.
B. HOOD SUPPLIER SHALL FURNISH HOOD WITH UL LISTED BAFFLE-TYPE GREASE FILTERS, GREASE DRAIN WITH REMOVABLE CUP, AND UL LISTED VAPORPROOF INCANDESCENT LIGHT FIXTURES.
C. HOOD SUPPLIER SHALL FURNISH STAINLESS STEEL ENCLOSURE PANELS FROM TOP OF HOOD TO FINISH CEILING AND 3 INCH STANDOFF FROM WALL AS REQUIRED.
D. PROVIDE HOOD FIRE SUPPRESSION SYSTEM MEETING NFPA-96 AND LOCAL CODES.
E. PROVIDE INTERLOCK KIT WITH ONE TEMPERATURE SENSOR PER GREASE EXHAUST COLLAR TO MEET IMC REQUIREMENTS.
F. HOOD FIRE SUPPRESSION SYSTEM SUPPLIER SHALL FURNISH AUTOMATIC SOLENOID GAS SHUT-OFF VALVE TO BE INSTALLED BY PLUMBING CONTRACTOR.
G. HOOD SHALL BE FURNISHED AND INSTALLED BY DIVISION 23.
H. MOUNT BOTTOM OF HOOD AT 6'-8" ABOVE FINISHED FLOOR.
I. HOOD SUPPLIER SHALL FACTORY INSTALL THE HOOD CONTROL PACKAGE IN THE HOOD UTILITY CABINET.
J. PROVIDE CONNECTION POINT IN HOOD CONTROL PANEL FOR BMS SYSTEM.
K. PROVIDE HOOD SUPPLIER CO DETECTION SYSTEM PER LANDLORD COMMENT.

FAN SCHEDULE

MARK	SERVICE DESCRIPTION	MANUFACTURER	MOUNTING	MODEL	CFM	ESP (IN)	NOM HP	FAN RPM	DRIVE (BELT/DIRECT)	VFD (Y/N)	ELECTRICAL V/PH	ELECTRICAL DISC TYPE	WEIGHT (LBS)	NOTES
DWE 1	DISHWASHERS	ADVANCED HOOD	INLINE CEILING	AH-SIF13DD-SS	1125	1.3	1.00	1359	DIRECT	No	115 V / 1PH	NF	185	A - F
EF 1	RESTROOM	GREENHECK	INLINE CEILING	SQ-99-VG	600	1.1	0.75	2200	DIRECT	No	120 V / 1PH	NF	65	A - D

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

NOTES:

A. PROVIDE WITH GRAVITY BACKDRAFT DAMPER.
B. PROVIDED WITH FACTORY DISCONNECT SWITCH.
C. PROVIDED WITH ELECTRONICALLY COMMUTATED (EC) MOTOR MANUFACTURER'S FAN SPEED CONTROLLER FOR BALANCING PURPOSES.
D. NOMINAL MOTOR HP SHALL BE NO LARGER THAN THE FIRST AVAILABLE NOMINAL MOTOR SIZE GREATER THAN THE BHP.
E. INTERLOCK FAN OPERATION WITH DISHWASHER.
F. REFER TO CAPTIVEAIRE DRAWINGS FOR ADDITIONAL INFORMATION.

GRILLE, REGISTER AND DIFFUSER SCHEDULE

MARK	MANUFACTURER	MODEL	FACE TYPE	MOUNTING LOCATION	FACE SIZE (IN)	MAX NC	MAX PRESS DROP (IN W.C.)	NOTES
CEG1	TITUS	350RL	FIXED BLADE	CEILING	12"x12"	25	0.08	A, B, E, F, H
CRG1	TITUS	PAR	PERFORATED	CEILING	24"x24"	25	0.05	A, B, E, H, L, N
CSD1	TITUS	OMNI	PLAQUE	CEILING	24"x24"	25	0.08	A, B, E, H
CSD2	TITUS	PAR-AA	PERFORATED	CEILING	24"x24"	25	0.08	A, B, E, H, L, N
LSD1	TITUS	ML-39	1" SLOT SPACING, 2 SLOT	CEILING	4" DUCT WIDTH	25	0.08	E, G, H, J, M, P, Q, R, S
PSD1	FIELD FABRICATED	FIELD FABRICATED	4" WIDE DUCT	CEILING	4'-0" (NOMINAL)	25	0.08	A, J, K
WRG1	TITUS	350RL	FIXED BLADE	WALL	REFER TO PLANS	25	0.08	A, C, D, F, H
WSR1	TITUS	300RL	FIXED BLADE	DUCT	REFER TO PLANS	25	0.08	A, C, D, F, H

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

NOTES:

A. NECK SIZE SHOWN ON DRAWINGS. PROVIDE BRANCH DUCT TO MATCH NECK SIZE UNLESS OTHERWISE SHOWN ON DRAWINGS.
B. BAKED ENAMEL FINISH, COLOR TO MATCH CEILING COLOR. REFER TO ARCHITECTURAL PLANS.
C. FRONT BLADES PARALLEL TO LONG DIMENSION.
D. DOUBLE DEFLECTION BARS SHALL BE ADJUSTABLE.
E. FRAME TYPE TO MATCH CEILING/WALL CONSTRUCTION, COORDINATE WITH ARCHITECTURAL REFLECTED CEILING/WALL PLAN.
F. PROVIDE OPPOSED BLADE DAMPER ADJUSTABLE FROM FACE OF DEVICE.
G. PROVIDE BORDER TYPE 66 EXPOSED FLANGE MODEL. PROVIDE INSULATED PLENUM BOX WITH NECK.
H. PROVIDE DIFFUSERS, LINEAR SLOTS, AND GRILLES WITH NO EXPOSED MOUNTING SCREWS.
J. PAINT ALL INTERIOR SURFACES SLOTS, GRILLES AND PLENUMS FLAT BLACK.
K. SUPPLY PLENUM MAY BE FIELD FABRICATED BASED ON PROVIDED DETAILS TO ACCOMODATE CEILING CONDITIONS, OR PURCHASED FROM THE SLOT DIFFUSER MANUFACTURER. PROVIDE 1/4" CLOSED CELL INSULATION ON THE INTERIOR OF THE SUPPLY PLENUM. PROVIDE CURVED PLENUMN WHEN NEEDED. CUSTOM FABRICATE PLENUM OPENING TO MATCH THE CURVED NATURE OF THE ARCHITECTURAL SLOT OR PROVIDE MANUFACTURER'S CURVED PLENUM TO MATCH CURVE OF LINEAR SLOT.
L. PROVIDE WITH RAPID MOUNT FRAMING OPTION FOR LAY-IN TYPE DIFFUSERS INSTALLED IN A HARD CEILING.
M. PROVIDE LINEAR SLOT DIFFUSER WITH FACTORY-FABRICATED BLANK-OFF PLATES WHERE NOTED ON THE PLANS.
N. PROVIDE WITHOUT DIRECTIONAL PATTERN CONTROLLERS.
P. FLANGED BORDER SHALL BE FIELD PAINTED TO MATCH ADJACENT SURFACE.
Q. FIELD PAINT TO MATCH ADJACENT SURFACE.
R. PROVIDE INLET BLANK OFF OVER PORTIONS NOT BEING USED BY PLENUM BOX.
S. CONTRACTOR SHALL PROVIDE REMOTE CABLE-OPERATED VOLUME DAMPER BY METROPOLITAN AIR TECHNOLOGIES MODEL RT-250 WITH EXTERNAL WORM GEAR OPERATOR OR EQUIVALENT YOUNG REGULATOR BUTTERFLY DAMPER WITH 270-275 CONTROLLER. OPERATOR SHALL HAVE A SQUARE DRIVE FOR 1/4" NUT DRIVER. DAMPER ASSEMBLY SHALL INCLUDE GALVANIZED STEEL DUCT WITH ROLLED BEAD STIFFENERS. REINFORCED BLADE, SELF LUBRICATING BEARING AND WORM GEAR MOUNTING PLATE. DAMPER SHALL BE INSTALLED IN BRANCH DUCT NOT INLET OF PLENUM DIFFUSER.

THIS ITEM HAS BEEN ELECTRONICALLY SIGNED AND SEALED BY COY M. MACY ON THE DATE LISTED BELOW USING A DIGITAL SIGNATURE.

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EXPIRES 2/28/2026

FORMGROUP

PROGRESS SET OF REVISION 4.2.1

08/26/2025

FOR COORDINATION PURPOSES ONLY
MASTER PERMIT REVISION PENDING

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AT CITYGROUP CENTER
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REVISIONS:

2	REV #2	03/20/24
3.1	REV #3.1	07/26/24
4	REV#4	11/25/24
4.1	REV#4.1	02/25/25
4.2	REV#4.2	05/08/25

COY M. MACY LICENSE No 86060 STATE OF FLORIDA PROFESSIONAL ENGINEER

COY M. MACY 8/25/2025
LICENSE # 86060

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PROJECT NO. 23-1222
TITLE: MECHANICAL SCHEDULES
DATE: 1/29/2024
SCALE: AS INDICATED
DRAWING NO.: M-601

8/25/2025 1:30:30 PM
COY M. MACY

OUTSIDE AIR REQUIREMENTS, FMC-2020 (IP)

SYSTEM DESIGNATION	SYSTEM TAB NAME OR LIST 'SINGLE'	SINGLE-ZONE SYSTEMS ONLY		MULTI-ZONE SYSTEMS ONLY	FLOOR AREA SERVED BY SYSTEM [As] (SF)	SYSTEM AVERAGED AREA-BASED OUTDOOR AIR RATE (CFM/SF)	SYSTEM POPULATION [Ps] (PEOPLE)	SYSTEM AVERAGED PEOPLE-BASED OUTDOOR AIR RATE (CFM/P)	REQUIRED OA INTAKE FLOW [Vot] (CFM)	REQUIRED DCV OA INTAKE FLOW [Vot] (CFM)	DESIGN OA INTAKE FLOW [Vot] (CFM)	NOTES
		SINGLE-ZONE SYSTEM ASSOCIATED VENTILATION ZONE	SINGLE ZONE WORST CASE ZONE AIR DISTRIBUTION EFFECTIVENESS [Ez]	SYSTEM VENTILATION EFFICIENCY [Ev]								
WSHP-1	SINGLE ZONE	ENTRY	0.80	-	310	0.060	10	7.50	117	N/A	160	-
WSHP-2	SINGLE ZONE	NE DINING	0.80	-	441	0.180	21	7.50	296	N/A	300	-
WSHP-3	SINGLE ZONE	NW DINING	0.80	-	425	0.180	24	7.50	321	N/A	330	-
WSHP-4	SINGLE ZONE	MAIN DINING	0.80	-	1,755	0.180	54	7.50	901	N/A	900	-
WSHP-5	SINGLE ZONE	BAR	0.80	-	1,936	0.180	73	7.50	1,120	N/A	1120	-
WSHP-6,7	SINGLE ZONE	KITCHEN	0.80	-	1,671	0.120	33.42	7.50	564	N/A	6200	-
WSHP-8	SINGLE ZONE	MEZZ PREP	0.80	-	551	0.120	11.02	7.50	186	N/A	750	-
WSHP-9	SINGLE ZONE	MEZZ SCULLARY	0.80	-	322	0.120	6.44	7.50	109	N/A	750	-
WSHP-10	SINGLE ZONE	IT	0.80	-	956	0.000	0	0.00	0	N/A		-
WSHP-11	SINGLE ZONE	OFFICE/BREAK	0.80	-	308	0.060	6	5.00	61	N/A		-
WSHP-12	SINGLE ZONE	MECHANICAL ROOM	0.80	-	151	0.000	0	0.00	0	N/A		-
								TOTALS	3,674	0	10,510	

GENERAL NOTES:

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

WATER SOURCE HEAT PUMP SCHEDULE

MARK	LOCATION	MANUFACTURER	MODEL	SUPPLY FAN			COOLING OPERATION								HEATING OPERATION							MIN OA (CFM)	ELECTRICAL				WEIGHT (LBS)	NOTES
									EAT	LAT																		
				CFM	ESP (IN)	NOM HP	TH (MBH)	SH (MBH)	(°F DB)	(°F WB)	(°F DB)	(°F WB)	FLOW (GPM)	EWT (°F)	LWT (°F)	MAX WPD (FT)	CAP (MBH)	EWT (°F)	LWT (°F)	FLOW (GPM)	EAT (°F DB)	LAT (°F DB)	MIN EFF (COP)		V/PH	MCA	MOCP	DISC TYPE		
WSHP 1	ENTRY	CLIMATE MASTER	TS-060	1920	0.50	1.00	58.5	39.8	72.0	63.0	53.1	52.6	15.0	85	94	13.85	31.3	68	60	15.0	70	85	4.6	560	480 V / 3PH	17	25	NF	441	A - H, J - Q
WSHP 2	EAST ENTRY	CLIMATE MASTER	TS-060	2000	0.50	1.00	54.8	43.0	72.0	61.6	52.4	51.9	15.0	85	94	13.85	32.6	68	60	15.0	70	85	4.6	560	480 V / 3PH	17	25	NF	441	A - H, J - Q
WSHP 3	WEST ENTRY	CLIMATE MASTER	TE-072	2600	0.50	1.00	64.9	52.7	72.0	61.5	53.5	52.9	18.0	85	95	13.10	42.3	68	60	18.0	70	85	4.6	560	480 V / 3PH	18	25	NF	475	A - H, J - Q
WSHP 4	MAIN DINING	CLIMATE MASTER	TL-120	3200	0.50	1.50	92.0	64.3	72.0	62.1	54.0	52.4	23.0	85	95	15.10	52.1	68	60	23.0	70	85	4.5	560	480 V / 3PH	25	40	NF	696	A - H, J - Q
WSHP 5	BAR/RESTROOMS	CLIMATE MASTER	TL-120	3200	0.75	1.50	89.6	63.5	72.0	62.1	53.7	52.0	30.0	85	94	15.10	52.1	68	60	30.0	70	85	4.5	560	480 V / 3PH	25	40	NF	696	A - H, J - Q
WSHP 6	MAIN KITCHEN	CLIMATE MASTER	TC-096	2500	0.75	1.50	65.8	54.7	74.0	62.8	54.1	53.8	23.0	85	94	15.50	40.7	68	60	23.0	70	85	4.7	0	460 V / 3PH	17	20	NF	644	A - I, K - P, R
WSHP 7	MAIN SCULLERY	CLIMATE MASTER	TR-030	1100	0.50	0.75	27.6	24.4	74.0	61.7	53.8	53.0	9.0	85	93	12.80	17.9	68	62	9.0	70	85	5.1	0	460 V / 3PH	9	15	NF	192	A - I, K - P, S
WSHP 8	MEZZ PREP	CLIMATE MASTER	TC-018	680	0.50	0.33	15.9	13.4	74.0	63.1	56.1	55.2	4.5	85	95	13.20	11.1	68	60	4.5	70	85	5	0	208 V / 1PH	12	15	NF	158	A - I, K - P, T
WSHP 9	MEZZ SCULLERY	CLIMATE MASTER	TC-096	3200	0.50	2.00	61.3	56.3	74.0	61.7	53.8	53.5	23.0	85	95	15.50	52.1	68	60	23.0	70	85	4.7	0	460 V / 3PH	17	20	NF	644	A - I, K - P, T
WSHP 10	IT	CLIMATE MASTER	TE-038	1250	0.50	0.75	33.0	33.0	75.0	60.0	52.5	51.3	9.0	85	94	13.70	21.2	68	60	9.0	70	85	5	0	460 V / 3PH	10	15	NF	359	A - I, K - P, R
WSHP 11	OFFICE/BREAK	CLIMATE MASTER	TC-018	570	0.00	0.00	14.0	12.6	72.0	60.0	51.8	51.2	3.0	85	97	6.50	9.3	68	58	3.0	70	85	5.1	0	208 V / 1PH	12	15	NF	158	A - I, K - P, U
WSHP 12	MECH ROOM	CLIMATE MASTER	TS-060	1600	0.50	1.00	44.0	44.0	78.0	61.0	50.5	50.0	15.0	85	95	13.85	26.0	68	60	15.0	70	85	4.6	0	460 V / 3PH	17	25	NF	441	A - I, K - P, R

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

NOTES:

A. REFER TO WATER SOURCE HEAT PUMP CONTROL MATRIX FOR CONTROL FEATURES, MODULES, AND ACCESSORIES THAT SHALL BE PROVIDED WITH THE EQUIPMENT.
B. PROVIDE 2" MERV 8 PLEATED THROWAWAY FILTERS.
C. PROVIDE FACTORY MOUNTED DISCONNECT INSTALLED ON SERVICE SIDE OF UNIT.
D. STARTER PROVIDED INTEGRAL WITH THE UNIT.
E. SPECIFIED FAN ESP ACCOUNTS FOR DUCT LOSSES EXTERNAL TO UNIT. FILTER LOSS IS AT A MAXIMUM OF 400 FPM FACE VELOCITY.
F. PROVIDE MOTOR HORSEPOWER TO OVERCOME INTERNAL UNIT STATIC PRESSURE DROP PLUS SPECIFIED EXTERNAL STATIC PRESSURE DROP. NOMINAL MOTOR HP SHALL BE NO LARGER THAN THE FIRST AVAILABLE NOMINAL MOTOR SIZE GREATER THAN THE REQUIRED BHP.
G. DIVISION 28 CONTRACTOR SHALL PROVIDE SMOKE DETECTORS IN SUPPLY AIR DUCT(S).
H. PROVIDE HEAT PUMP WITH FACTORY INSTALLED INSULATION KIT FOR EXTENDED RANGE OPERATION.
I. SUPPORT UNIT HORIZONTALLY PER SPECIFICATIONS.
J. SUPPORT UNIT VERTICALLY PER SPECIFICATIONS.
K. PROVIDE UNIT WITH THIRD-PARTY FLOOD DETECTOR IN PRIMARY DRAIN PAN THAT WILL SHUT OFF UNIT WHEN PRIMARY DRAIN IS BLOCKED.
L. REFER TO THE PLUMBING DRAWINGS FOR ROUTING OF PRIMARY AND AUXILIARY CONDENSATE DRAINS.
N. OUTSIDE AIR IS PRECONDITIONED AND DELIVERED TO THE UNIT AT 70 DEGREES F AND A RELATIVE HUMIDITY BETWEEN 35-65%.
O. PROVIDE HIGH DENSITY COMPRESSOR BLANKET FOR ADDITIONAL SOUND ATTENUATION.
P. PROVIDE UNIT WITH HOT GAS REHEAT AND DEHUMIDIFICATION SEQUENCE CONTROLS.
Q. WSHP ORIENTATION SHALL BE FRONT RETURN TOP SUPPLY. REFER TO PLANS.
R. WSHP ORIENTATION SHALL BE RIGHT RETURN BACK SUPPLY. REFER TO PLANS.
S. WSHP ORIENTATION SHALL BE RIGHT RETURN LEFT SUPPLY. REFER TO PLANS.
T. WSHP ORIENTATION SHALL BE LEFT RETURN RIGHT SUPPLY. REFER TO PLANS.
U. WSHP ORIENTATION SHALL BE LEFT RETURN BACK SUPPLY. REFER TO PLANS.

DOAS WATER SOURCE HEAT PUMP SCHEDULE

MARK	LOCATION	MANUFACTURER	MODEL	SUPPLY FAN			COOLING OPERATION									HEATING OPERATION							MIN OA (CFM)	ELECTRICAL				WEIGHT (LBS)	NOTES
									EAT		LAT																		
				CFM	ESP (IN)	BHP	TH (MBH)	SH (MBH)	(°F DB)	(°F WB)	(°F DB)	(°F WB)	MIN EFF (EER)	FLOW (GPM)	EWT (°F)	LWT (°F)	MAX WPD (FT)	CAP (MBH)	EWT (°F)	LWT (°F)	FLOW (GPM)	EAT (°F DB)	LAT (°F DB)	MIN EFF (COP)		V/PH	MCA	MOCP	DISC TYPE		
DOAS 1	VENTILATION	AAON	SA-030	4300	2.00	2	364.6	120.9	83.1	80.0	58.0	57.6	10.6	90.0	87	97	12.00	220.0	70	63	90.0	40	85	3.7	4300	460 V / 3PH	51	70	NF	2383	A - I, K - R
DOAS 2	HOOD MAKEUP	AAON	SB-018	3100	2.00	2	256.2	82.3	83.1	80.0	59.0	58.0	10.6	60.0	87	96	8.00	151.4	68	61	60.0	40	85	3.7	3100	460 V / 3PH	39	60	NF	1371	A - H, J - Q, S
DOAS 3	HOOD MAKEUP	AAON	SB-018	3100	2.00	2	256.2	82.3	83.1	80.0	59.0	80.0	10.6	60.0	87	69	8.00	151.4	68	61	60.0	40	85	3.7	3100	460 V / 3PH	39	60	NF	1371	A - H, J - Q, S

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

NOTES:

A. REFER TO WATER SOURCE HEAT PUMP CONTROL MATRIX FOR CONTROL FEATURES, MODULES, AND ACCESSORIES THAT SHALL BE PROVIDED WITH THE EQUIPMENT.
B. PROVIDE 2" MERV 13, PLEATED THROWAWAY FILTERS.
C. DISCONNECT PROVIDED BY DIVISION 26 CONTRACTOR.
D. STARTER PROVIDED INTEGRAL WITH THE UNIT.
E. SPECIFIED FAN ESP ACCOUNTS FOR DUCT LOSSES EXTERNAL TO UNIT. FILTER LOSS IS AT A MAXIMUM OF 400 FPM FACE VELOCITY.
F. PROVIDE MOTOR HORSEPOWER TO OVERCOME INTERNAL UNIT STATIC PRESSURE DROP PLUS SPECIFIED EXTERNAL STATIC PRESSURE DROP. NOMINAL MOTOR HP SHALL BE NO LARGER THAN THE FIRST AVAILABLE NOMINAL MOTOR SIZE GREATER THAN THE REQUIRED BHP.
G. DIVISION 28 CONTRACTOR SHALL PROVIDE SMOKE DETECTORS IN SUPPLY AIR DUCT(S).
H. PROVIDE HEAT PUMP WITH FACTORY INSTALLED INSULATION KIT FOR EXTENDED RANGE OPERATION.
I. SUPPORT UNIT HORIZONTALLY PER SPECIFICATIONS.
J. SUPPORT UNIT VERTICALLY PER SPECIFICATIONS.
K. PROVIDE UNIT WITH THIRD-PARTY FLOOD DETECTOR IN PRIMARY DRAIN PAN THAT WILL SHUT OFF UNIT WHEN PRIMARY DRAIN IS BLOCKED.
L. REFER TO THE PLUMBING DRAWINGS FOR ROUTING OF PRIMARY AND AUXILIARY CONDENSATE DRAINS.
M. PROVIDE A FACTORY APPLIED COIL CORROSION COATING TO EVAPORATOR COIL WHICH IS CAPABLE OF WITHSTANDING GREATER THAN 6,000 HOURS OF THE ASTM B117 SALT SPRAY TEST.
N. PROVIDE SINGLE POINT POWER CONNECTION.
O. PROVIDE UNIT WITH HOT GAS REHEAT AND DEHUMIDIFICATION SEQUENCE CONTROLS.
P. PROVIDE HIGH DENSITY COMPRESSOR BLANKET FOR ADDITIONAL SOUND ATTENUATION.
R. WSHP ORIENTATION SHALL BE LEFT RETURN LEFT SUPPLY. REFER TO PLANS.
S. WSHP ORIENTATION SHALL BE FRONT RETURN TOP SUPPLY. REFER TO PLANS.

EXPANSION TANK SCHEDULE

MARK	MANUFACTURER	MODEL	LOCATION	MOUNTING	TANK SIZE (GAL)	ACCEPTANCE (GAL)	MIN TEMP (°F)	MAX TEMP (°F)	MIN PRESS (PSIG)	MAX PRESS (PSIG)	WEIGHT (LBS)	NOTES
ET-1, ET-2	TACO	CA90-150	MECHANICAL ROOM	FLOOR	23	23	40	85	60	150	312	A,B,C,D,E

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

NOTES:

A. PROVIDE ASME RATED, FULL ACCEPTANCE BLADDER TYPE EXPANSION TANK.
B. VERTICAL TANKS SHALL BE INSTALLED TO ACCOMMODATE BOTTOM DRAIN CONNECTION.
C. PROVIDE CONCRETE HOUSEKEEPING PAD PER SPECIFICATIONS FOR FLOOR-MOUNTED UNITS.
D. SCHEDULED WEIGHT INCLUDES WEIGHT OF TANK AND WATER UNDER FULL ACCEPTANCE.
E. REFERENCE SPECIFICATIONS FOR INSULATION REQUIREMENTS.

RESTAURANT AIR BALANCE SCHEDULE

KITCHEN

OUTDOOR AIR SOURCE EQUIPMENT	AREA/EQUIPMENT SERVED	SUPPLY AIR (CFM)	DESIGN OA (CFM)	PERCENT OA/SA
DOAS-1B	KITCHEN SERVED BY DOAS-2	1500	1500	100.0%
DOAS-2,3	KITCHEN MAU	6200	6200	100.0%
TOTAL AIRFLOW		7,700	7,700	100.0%

EXHAUST EQUIPMENT	AREA/EQUIPMENT SERVED	AREA DESCRIPTION	EXHAUST (CFM)
ESP-1	KITCHEN		7752
DWEF-1	KITCHEN		1125
TOTAL EXHAUST			8,877

TOTAL KITCHEN POSITIVE/NEGATIVE AIR FLOW	-1177
PERCENT POSITIVE/NEGATIVE AIR FLOW	-15.3%
TOTAL SPACE EXFILTRATION	1023
PERCENT BUILDING POSITIVE AIR FLOW	9.7%

DINING

OUTDOOR AIR EQUIPMENT	AREA/EQUIPMENT SERVED	SUPPLY AIR (CFM)	DESIGN OA (CFM)	PERCENT OA/SA
DOAS-1A	DINING SERVED BY DOAS-1	2800	2800	100.0%
TOTAL AIRFLOW		2,800	2,800	100.0%

EXHAUST EQUIPMENT	AREA/EQUIPMENT SERVED	AREA DESCRIPTION	EXHAUST (CFM)
EF-1	RESTROOM		600
TOTAL EXHAUST			600

TOTAL DINING POSITIVE/NEGATIVE AIR FLOW	2200
PERCENT POSITIVE/NEGATIVE AIR FLOW	78.6%

NOTES:

1. OUTSIDE AIRFLOW VALUES TAKEN FROM APPLICABLE CODE STANDARDS.
* UNIT SHUTS DOWN WHEN PATIO WINDOWS ARE OPEN.

LOUVER SCHEDULE

MARK	AREA SERVED	SERVICE	MANUFACTURER	MODEL	SIZE (W" x H")	CFM	MIN FREE AREA (SF)	MAX VEL (FPM)	MAX APD (IN W.C.)	NOTES
LV 1	DINING, KITCHEN	INTAKE	RUSKIN	ELF6375DXD	116" x 39"	10500	17.60	600	0.08	A - H
LV 2	KITCHEN	EXHAUST	RUSKIN	ELF6375DXD	94" x 39"	9480	15.90	600	0.10	A - D, G, H

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

NOTES:

A. REFER TO M1.1 FOR CLARIFICATION OF RESPONSIBILITIES. UNITS ARE OWNER FURNISHED, CONTRACTOR INSTALLED.
B. PROVIDE 1/4" MESH STEEL BIRD SCREEN.
C. PROVIDE ANODIZED FINISH. COLOR AS SELECTED BY ARCHITECT.
D. FRAME TYPE SHALL MATCH WALL CONSTRUCTION, COORDINATE WITH ARCHITECT.
E. PROVIDE WITH INTEGRAL LOW-LEAKAGE BACKDRAFT DAMPER.
F. PROVIDE WITH INTEGRAL 120V MOTOR OPERATED DAMPER.
G. PROVIDE LOUVER WITH WIND DRIVEN RAIN PERFORMANCE AS DEFINED IN THE SPECIFICATIONS.
H. PROVIDE FLORIDA PRODUCT APPROVAL FOR PROPOSED MECHANICAL LOUVERS. LOUVERS SHALL BE RATED FOR USE IN MIAMI-DADE.

WATER SPECIALTIES SCHEDULE

MARK	DESCRIPTION	MANUFACTURER	MODEL	SYSTEM TYPE	SYSTEM OPERATING TEMP (°F)	MAX WORKING PRESS (PSIG)	FLOW RATE (GPM)	PRESS DROP (FT)	CONNECTION SIZE (IN)	NOTES
AS-1, AS-2	AIR SEPARATOR	TACO	ACT06F-150AR	CONDENSER WATER	85	150	520	2.83	6	A,B

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NOTES:

A. PROVIDE SUCTION DIFFUSER WITH INTEGRAL STRAINER.
B. REFERENCE SPECIFICATIONS FOR INSULATION REQUIREMENTS.

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FL. REGISTRY NO. EB 7606
EXPIRES 2/28/2026

FORMGROUP

PROGRESS SET OF REVISION 4.2.1

07/24/2025

FOR COORDINATION PURPOSES ONLY
MASTER PERMIT REVISION PENDING

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CACTUS CLUB MIAMI

AT CITYGROUP CENTER

201 SOUTH BISCAYNE BLVD, SUITE No. 150
MIAMI, FL 33131

REVISIONS:

2	REV #2	03/20/24
2.1	REV #2.1	06/10/24
3.1	REV #3.1	07/26/24

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PROJECT NO. 23-1222
TITLE: MECHANICAL SCHEDULES
DATE: 1/29/2024
SCALE: AS INDICATED
DRAWING NO.: M-602

7/21/2025 11:02:08 AM
COY M. MACY

PUMP SCHEDULE

MARK	SERVICE	MANUFACTURER	MODEL	MOUNTING	MIN FLOW (GPM)	DESIGN (GPM)	DESIGN (FT HD)	MAX WORKING PRESS (PSIG)	NPSHA (FT)	PEI RATING	NOM HP	RPM	VFD (Y/N)	V/PH	DISC TYPE	STARTER TYPE	WEIGHT (LBS)	NOTES
CWP-1	CONDENSER WATER	GRUNDFOS	25709 VLS	FLOOR	30.0	210	95	150	8.6	0.93	10	3530	Y	480/3	NF	NA	354	A - H
CWP-2	CONDENSER WATER	GRUNDFOS	25709 VLS	FLOOR	30.0	210	95	150	8.8	0.93	10	3530	Y	480/3	NF	NA	354	A - H
CTP-1	CONDENSER WATER	GRUNDFOS	30957 VLS	FLOOR	30.0	210	75	150	5	0.94	7.5	1760	Y	480/3	NF	NA	627	A - H
CTP-2	CONDENSER WATER	GRUNDFOS	30957 VLS	FLOOR	30.0	210	75	150	5	0.94	7.5	1760	Y	480/3	NF	NA	627	A - H
HWP-1	HW MIN TEMP	GRUNDFOS	MAGNA3 32-120	SUSPENDED	3.0	11	25	150	0	-	0.25	3803	N	230/1	NF	NA	37.6	C - H

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NOTES:

A. PROVIDE WITH AIR SEPARATOR AND COMPRESSION TANK.
B. PROVIDE CONCRETE HOUSEKEEPING PAD PER SPECIFICATIONS.
C. DISCONNECT SWITCH PROVIDED BY DIVISION 26 CONTRACTOR.
E. VFD FURNISHED BY DIVISION 23 CONTRACTOR.
F. PUMP MOTOR SHALL BE NON-OVERLOADING THROUGHOUT THE FULL RANGE OF THE PUMP CURVE.
G. NPSHA IS THE NET POSITIVE SUCTION HEAD AVAILABLE TO THE PUMP. PUMP AT DESIGN CONDITIONS SHALL HAVE NPSH LESS THAN SPECIFIED VALUE.
H. PUMP SHALL MEET OR BE MORE EFFICIENT THAN THE SCHEDULED DEPARTMENT OF ENERGY (DOE) PUMP ENERGY INDEX (PEI) RATING.

OPEN CIRCUIT COOLING TOWER SCHEDULE

MARK	MANUFACTURER	MODEL	CAP (MBH)	FLOW (GPM)	EAT (°F WB)	EWT (°F)	LWT (°F)	WPD (PSI)	MAX WORKING PRESS (PSIG)	FAN MOTOR QTY	FAN MOTOR HP	FAN MOTOR V/PH	FAN MOTOR DISC TYPE	FAN MOTOR STARTER	FAN MOTOR VFD (Y/N)	WEIGHT (LBS)	NOTES
CT-1	EVAPCO	AT 19-4I6	1900	420	79	85	95	2.4	150	1	10	460/3	NF	NA	Y	5670	ALL

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NOTES:

A. PROVIDE VARIABLE FREQUENCY DRIVE FOR TOWER FAN MOTOR. DRIVE TO BE FURNISHED BY DIVISION 23 CONTRACTOR.
B. SUPPORT UNIT ON STRUCTURE AS DETAILED ON THE STRUCTURAL DRAWINGS AND AS INDICATED IN THE MANUFACTURERS INSTALLATION MANUAL.
C. DISCONNECT SWITCHES PROVIDED BY DIVISION 26 CONTRACTOR.
D. STARTERS PROVIDED BY DIVISION 26 CONTRACTOR.
E. COORDINATE SIZE OF CONDUCTOR TERMINATION LUGS WITH CONDUCTOR SIZES SHOWN ON ELECTRICAL DRAWINGS.
F. COOLING TOWER SHALL BE SELECTED FOR 100% WATER (NO GLYCOL SOLUTION).
G. PROVIDE SIDE OUTLET SUMP.
H. PROVIDE ELECTRIC FLOAT SWITCH AND SOLENOID MAKEUP VALVE.
J. PROVIDE A FACTORY APPLIED COIL CORROSION COATING WHICH IS CAPABLE OF WITHSTANDING GREATER THAN 6,000 HOURS OF THE ASTM B117 SALT SPRAY TEST.
K. MAXIMUM OPERATING WEIGHT.
L. PROVIDE WITH ONE ACCESS LADDER FOR EACH FAN SECTION.
M. PROVIDE UNIT WITH VIBRATION SWITCH FOR EACH FAN SECTION.
N. PROVIDE UNIT WITH MANUFACTURER STRUCTURAL PACKAGE TO MEET MIAMI DADE HURRICANE REQUIREMENTS. CONDENSER WATER SUPPLY AND RETURN PIPING SHALL ANCHOR TO COOLING TOWER WALL.

HYDRONIC HEAT EXCHANGER SCHEDULE

MARK	MANUFACTURER	MODEL	LENGTH (IN)	DIA (IN)	MAX WORKING PRESS (PSIG)	COLD SIDE FLUID TYPE	COLD SIDE CAP (MBH)	COLD SIDE FLOW (GPM)	COLD SIDE EWT (°F)	COLD SIDE LWT (°F)	COLD SIDE MAX WPD (FT)	COLD SIDE MAX NO PASSES	HOT SIDE FLUID TYPE	HOT SIDE CAP (MBH)	HOT SIDE FLOW (GPM)	HOT SIDE EWT (°F)	HOT SIDE LWT (°F)	HOT SIDE MAX WPD (FT)	HOT SIDE MAX NO PASSES	WEIGHT (LBS)	NOTES
HX-1	DANFOSS	GHEX	5.18	0.016	150	WATER	2088.1	420	85	95	13.7	263	WATER	2088.1	420	97	87	13.5	263	2221	A, C, D
HX-2	DANFOSS	BHEX		0.016	435	WATER	109.9	11	55	75	10.4	20	WATER	109.9	11	140	120	10.4	20	11	B

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

NOTES:

A. SUPPORT FROM FLOOR WITH ANGLE IRON FRAME.
B. SUPPORT FROM STRUCTURE ABOVE WITH ALL-THREAD ROD AND SPRING VIBRATION ISOLATORS.
C. PROVIDE PLATE AND FRAME TYPE HEAT EXCHANGER.
D. DIVISION 23 TEMPERATURE CONTROLS CONTRACTOR SHALL PROVIDE CONTROL VALVE(S). CONTROL VALVE AUTHORITY FLOW COEFFICIENT (Cv) SHALL BE SELECTED FOR PRESSURE DROP AND AUTHORITY AS REQUIRED BY THE SPECIFICATIONS.

FORMGROUP

PROGRESS SET OF REVISION 4.2.1

07/24/2025

FOR COORDINATION PURPOSES ONLY
MASTER PERMIT REVISION PENDING

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INTERIOR TENANT BUILD-OUT FOR:

CACTUS CLUB MIAMI

AT CITYGROUP CENTER

201 SOUTH BISCAYNE BLVD, SUITE No. 150
MIAMI, FL 33131

REVISIONS:

2	REV #2	03/20/24
2.1	REV #2.1	06/10/24
3.1	REV #3.1	07/26/24

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EXPIRES 2/28/2026

PROJECT NO.
23-1222

TITLE:
MECHANICAL SCHEDULES

DATE:
1/29/2024

SCALE:
AS INDICATED

DRAWING NO.:
M-603

7/21/2025 11:02:16 AM
COY M. MACY

POINTS LIST - CONDENSER WATER PLANT

POINT ID	DESCRIPTION	POINT TYPE	DEFAULT SETPOINT	SET POINT RESET RANGE	FAIL POSITION	STATUS ALARM	ALARM RANGE	NOTES
GLOBAL VALUES								
FA-SD	FIRE ALARM SHUTDOWN AND STATUS	BV						B
OAT	OUTSIDE AIR DRY BULB TEMPERATURE	AV						B
OAWB	OUTSIDE AIR WET BULB TEMPERATURE	AV						B
PSD	PLANT LOSS OF POWER START DELAY	AV	TBD					E, F
CONDENSER WATER TOWER LOOP								
CWTR-T	CONDENSER WATER RETURN TEMPERATURE	AI						A, G
CWTS-T	CONDENSER WATER SUPPLY TEMPERATURE	AI	SCHED	55-90 F		X	CWTS-MIN-T > CWTS-T > 95F	A, E, G
CWTS-MIN-T	CONDENSER WATER MINIMUM OPERATING TEMPERATURE	BV	55					E, F
CONDENSER WATER LOAD LOOP								
CWLR-T	CONDENSER WATER RETURN TEMPERATURE	AI						A, G
CWLS-T	CONDENSER WATER SUPPLY TEMPERATURE	AI	SCHED	75-90 F		X	CWLS-MIN-T > CWLS-T > 95F	A, E, G
CWLS-MIN-T	CONDENSER WATER MINIMUM OPERATING TEMPERATURE	BV	55					E, F
CWL-DP	CONDENSER WATER DIFFERENTIAL PRESSURE	BV	51					E, F
CONDENSER HEAT EXCHANGER								
CWT-HX-DP	CONDENSER TOWER LOOP HEAT EXCHANGER DIFFERENTIAL PRESSURE	AI	TBD			X		A,D,E
CWL-HX-DP	CONDENSER LOAD LOOP HEAT EXCHANGER DIFFERENTIAL PRESSURE	AI	TBD			X		A,D,E
CONDENSER WATER TOWER PUMP (TYPICAL ALL CWTP)								
CWTP-C-X	CONDENSER PUMP COMMAND	BO						
CWTP-CO-X	CONDENSER PUMP CONTROL OUTPUT	AO	TBD	MIN. - 60 Hz		X	CWTP-CO < MINIMUM	E, F
CWTP-COM-X	CONDENSER PUMP VFD COMMUNICATION	COM						
CWTP-FLT-X	CONDENSER PUMP VFD FAULT	BI				X	COMMON ALARM	
CWTP-ST-X	CONDENSER PUMP STATUS	BI				X	CWP-ST <> CWP-C	
CONDENSER WATER LOAD PUMP (TYPICAL ALL CWLP)								
CWLP-C-X	CONDENSER PUMP COMMAND	BO						
CWLP-CO-X	CONDENSER PUMP CONTROL OUTPUT	AO	TBD	MIN. - 60 Hz		X	CWP-CO < MINIMUM	E, F
CWLP-COM-X	CONDENSER PUMP VFD COMMUNICATION	COM						
CWLP-FLT-X	CONDENSER PUMP VFD FAULT	BI				X	COMMON ALARM	
CWP-ST-X	CONDENSER PUMP STATUS	BI				X	CWP-ST <> CWP-C	
HOT WATER PUMP MIN TEMP LOOP								
HWP-C	CONDENSER PUMP COMMAND (START/STOP)	BO						
CWR-T	CONDENSER MIN TEMP LOOP WATER RETURN TEMPERATURE	AI						
HWR-T	HOT WATER MIN TEMP LOOP RETURN TEMPERATURE	AI						
COOLING TOWER SENSORS AND VALVES (TYPICAL ALL CT)								
CT-COM-X	COOLING TOWER CONTROL PANEL COMMUNICATION	COM						
CT-BWT-X	COOLING TOWER BASIN WATER TEMPERATURE	AI	40 F			X	CT-BWT < 38	E
CT-HI-X	COOLING TOWER BASIN HIGH WATER LEVEL ALARM	BI				X	ON ACTIVATION	F
CT-LO-X	COOLING TOWER BASIN LOW WATER LEVEL ALARM	BI				X	ON ACTIVATION	F
CT-CWR-CV-C-X	TOWER CONDENSER WATER RETURN VALVE COMMAND	BO			NO			A
CT-CWR-CV-ST-X	TOWER CONDENSER WATER RETURN VALVE STATUS	BI				X	CT-CWR-CV-ST <> CT-CWR-CV-C	
CT-CWS-CV-C-X	TOWER CWS ISOLATION CONTROL VALVE COMMAND	BO			NO			A
CT-CWS-CV-ST-X	TOWER CWS ISOLATION CONTROL VALVE STATUS	BI				X	CT-CWS-CV-ST <> CT-CWS-CV-C	
CW-MWV-C-X	CONDENSER WATER MAKEUP VALVE COMMAND	BO			NC			A
COOLING TOWER FAN (TYPICAL ALL CTF)								
CTF-C-X	COOLING TOWER FAN COMMAND (START/STOP)	BO						
CTF-CO-X	COOLING TOWER FAN CONTROL OUTPUT - SPEED	AO		MIN.- 60 Hz		X	CTF-CO < MINIMUM	F
CTF-COM-X	COOLING TOWER FAN VFD COMMUNICATION	COM						
CTF-FLT-X	COOLING TOWER FAN VFD FAULT	BI				X	COMMON ALARM	
CTF-ST-X	COOLING TOWER FAN STATUS	BI				X	CTF-ST <> CTF-C	
CTF-VS-X	COOLING TOWER VIBRATION SWITCH STATUS	BI				X	ON ACTIVATION	A
CONDENSER WATER TREATMENT SPRAY PUMP								
CW-SP-C-X	CONDENSER WATER SPRAY PUMP COMMAND	BO						C
CW-SP-ST-X	CONDENSER WATER SPRAY PUMP STATUS	BI				X	FC-SP-ST <> FC-SP-C	C
CONDENSER WATER TREATMENT								
CW-BD-ST-X	CONDENSER WATER VALVE STATUS	BI						B
CW-CC-ALM-X	CONDENSER WATER CONDUCTIVITY CONTROLLER ALARM	BI				X	COMMON ALARM	C,G

ALL POINTS SHOWN SHALL BE PROVIDED BY BAS CONTRACTOR UNLESS NOTED OTHERWISE.

NOTES:
A. BAS CONTRACTOR SHALL PROVIDE DEVICE.
B DISPLAY VALUE WITH CENTRAL PLANT GRAPHIC AT BAS FRONT END. REFERENCE GLOBAL BUILDING MONITORING SCHEDULE FOR CONTROL POINT.
C. DEVICE FURNISHED WITH COOLING TOWER
E. POINT SHALL BE ADJUSTABLE.
F. DETERMINE SETPOINT IN FIELD.
G. INCLUDE POINT IN DAILY LOG REPORT FOR CHILLER AS RECOMMENDED BY ASHRAE STANDARD 147.

SEQUENCE OF OPERATIONS
CENTRAL CONDENSER WATER PLANT

This sequence of operations is organized into the following main categories: operating modes, control setpoint resets, safeties, overrides and interlocks, and component control loops. The operating modes describe the criteria that either enable or disable the various modes of operation. If a mode of operation is not listed within a component control loop section then that mode of operation has no direct influence on the operation of the component. The control setpoint reset section describes the logic and reference variables that will be used to reset control setpoints to a new value within its reset range. The safeties, overrides, and interlocks section outlines the hardwired interlocks that will be required to meet life safety requirements. Safeties and interlocks take precedence over all other control strategies outlined in this document. The control responses of each component for the various modes of operation are described in the component control loop sections.

The sequence of operations, the points list and control diagrams shall be used to provide a complete description of the control philosophy for the controlled equipment. Individual setpoint values, reset ranges, and alarm action levels are listed in the points list. Components and control sensor locations are graphically depicted on the control diagram. The controls contractor shall be responsible for coordinating any necessary time delay setpoints to establish stable system operation.

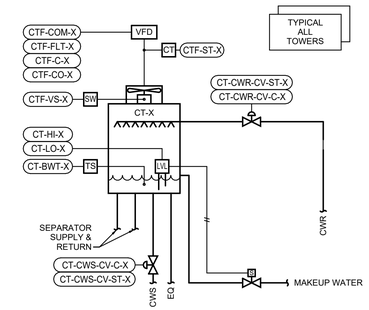
GENERAL DESCRIPTION
The condenser water plant described by this sequence of operations consist(s) of variable speed condenser water pumps on the tower loop side controlled to maintain constant flow through an induced draft open circuit cooling tower, variable speed condenser water pumps on the closed loop side controlled to maintain condenser water flow and loop temperature, and a heat exchanger to remove heat from the closed loop to the tower loop to provide adequate condenser water temperatures for heat transfer from the water-source heat pumps and refrigeration racks.

OPERATING MODES
CONDENSER WATER PLANT DISABLED MODE:
The condenser water plant shall be in disabled mode when the operator has manually disabled the plant at the operator's workstation or when there is no call from the condenser water plant enable mode as defined below.
CONDENSER WATER PLANT ENABLED MODE:
The condenser water plant shall be in enabled mode during occupied hours or when cooling/heating is required during unoccupied hours.
LOSS OF POWER RESTART DELAY MODE:
The plant shall be in loss of power mode upon restoration of power after an unexpected loss of power. The plant shall remain in this mode for the duration as defined by the plant start delay (PSD) setpoint. Once the plant start delay duration has elapsed, the plant shall return to its previous mode prior to loss of power.
PUMP FAILURE MODE:
A pump shall be in failure mode when:
The pump is given a start signal;
And- The pump status indicates it is off.
CONDENSER WATER HEAT INJECTION MODE:
The plant shall be in condenser water heat injection mode when the condenser water temp (CWLR-T) drops below minimum condenser water temperature setpoint (CWLS-MIN-T) and shall return to previous mode once the condenser water temp reaches +5F the minimum condenser water temperature setpoint.

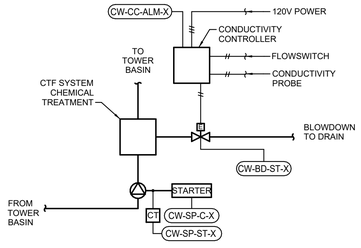
SAFETIES, OVERRIDES AND INTERLOCKS
COOLING TOWER FAN VIBRATION SAFETY SWITCH:
The factory furnished contractor installed vibration switch (CTF-VS-X) wired through the fan motor controller shall stop cooling tower fan when excessive vibration is detected. An alarm signal shall be annunciated on activation of the vibration switch and the lag cooling tower mode shall be activated.
COOLING TOWER FAN(S) INTERLOCK:
Cooling tower fan(s) shall not be allowed to start (CTF-C-X) until the condenser water pump(s) has proven flow.
SMOKE CONTROL FIRE ALARM INTERLOCK:
The condenser plant shall shut down when commanded by the BAS during smoke control mode. All equipment and accessories shall be in disabled mode during smoke control mode.

CONTROL LOOPS
COOLING TOWER ISOLATION VALVES (CT-CWS-CV, CT-CWR-CV)
The cooling tower isolation valve shall be provided by the BAS contractor and controlled through the BAS.
When in condenser water plant disabled mode:
The valve shall be closed.
When in condenser water plant enabled mode:
For a cooling tower that is on, the associated valve(s) shall be open.
For a cooling tower that is off, the associated valve(s) shall be closed.

CONDENSER WATER TOWER - PUMP CONTROL (CWTP-1,2)
The pump(s) shall be controlled by the BAS. The pump(s) shall be provided with variable frequency drive (VFD) operating at fixed speed.
When in condenser water plant disabled mode:
The pump shall be off.
When in condenser water plant enabled mode:
The pump(s) shall energize when condenser water load supply temperature (CWLS-T) reaches the high in its scheduled range and shall shut off when Condenser water supply load temp reaches the low setpoint in the scheduled range.
The pump(s) shall operate subject to lead/lag sequence. Sequence shall be based on equal run time.
A pump that is on shall start on low speed and ramp up to maintain the scheduled water flow. Speed set points shall be determined during system startup.
When in pump failure mode:
The next lag pump shall start.
MINIMUM LOOP TEMP- PUMP CONTROL (HWP-1)
When in condenser water injection mode:
Pump shall be on.
When in any other mode
Pump shall be off.
COOLING TOWER CONTROL (CT-1)
The BAS shall control the cooling tower. Operate each cell subject to a lead/lag sequence. Base the sequence on equal fan run time.
When in condenser water plant disabled mode:
Command the cooling tower off.
When in condenser water plant enabled mode:
Enable the cooling tower.
Stage 1: Start the fan on low speed and ramp up to maintain the condenser water supply maximum temperature.
Stage 1 Stage Down: De-energize fan if the fan is operating at its minimum speed and the condenser water supply temperature (CWTS-T) is 3 degrees F less than the minimum condenser water supply temperature reset, as defined in the "Set Point Reset Range" of the points list.
When in condenser water plant heat injection mode:
Command the cooling tower off.
WATER LEVEL CONTROL (FC-LVL)
The cooling tower makeup valve shall maintain sump water level subject to a common basin water level sensor communicating with each cell of the cooling tower. Upon sensing a drop in water level in any basin, the makeup valve for that tower shall automatically open. The makeup valve shall slowly close when water level is met.
CONDENSER WATER TREATMENT BLOWDOWN CONTROL
The water treatment system controller shall operate the blow-down solenoid valve in response to the conductivity sensor analog output provided by the water treatment system. The conductivity set point and dead band shall be adjustable as determined by the water treatment installer.
The BAS shall sense chemical treatment liquid level and shall alarm upon low liquid level (CT-LO-X).
CONDENSER WATER LOAD - PUMP CONTROL (CWLP-1,2)
The pump(s) shall be controlled by the BAS. The pump(s) shall be provided with variable frequency drive (VFD) operating at fixed speed.
When in condenser water plant disabled mode:
The pump shall be off.
When in condenser water plant enabled mode:
Start the lead pump on low speed and ramp up to maintain the condenser water differential pressure setpoint as measured by the differential pressure sensor (CWL-DP). The pump shall control to the worst case differential pressure sensor.
Pump capacity staging algorithm: Pumps shall energize on and off based on pump speed. If the lead pump(s) is at or above 95% of its maximum speed for a period of 10 minutes (adj.), energize the lag pump. Ramp all operating pumps up together.
If multiple pumps are operating and their speed is less than 40% of their maximum speed for a period of 10 minutes (adj.), de-energize the lag pump.
When in pump failure mode:
The next lag pump shall start.

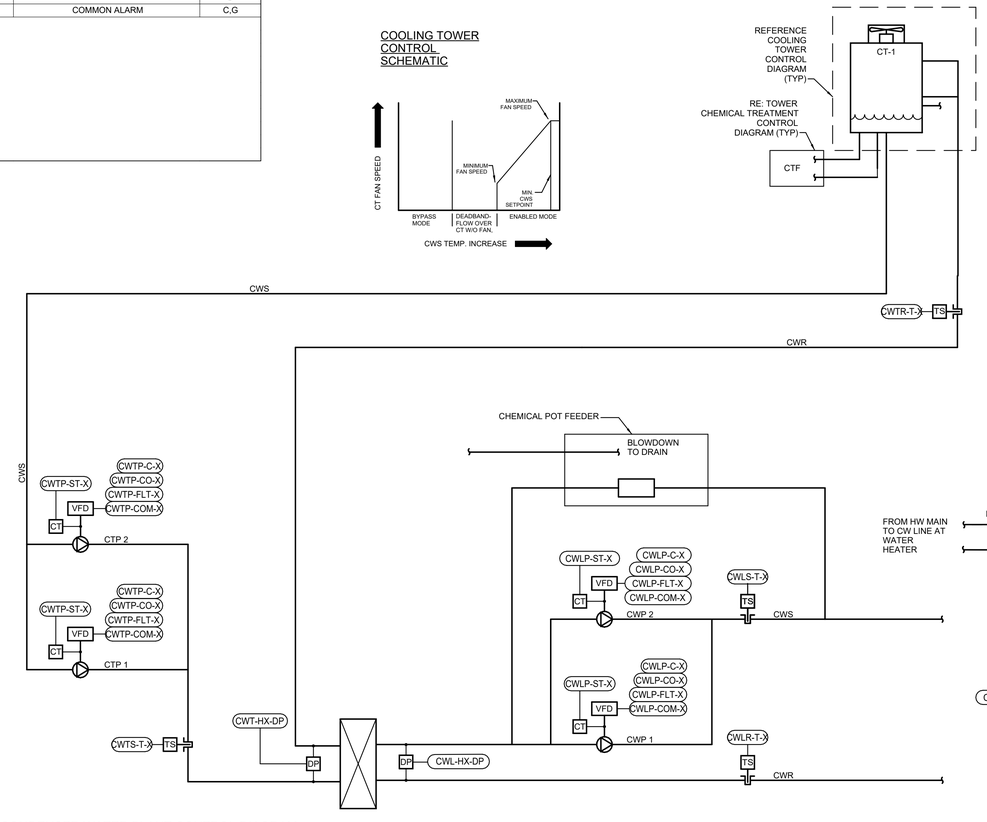


3 COOLING TOWER CONTROL DIAGRAM
NTS



2 TOWER CHEMICAL TREATMENT CONTROL DIAGRAM
NTS

COOLING TOWER CONTROL SCHEMATIC



1 CONDENSER WATER PLANT CONTROL DIAGRAM
NTS

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MECHANICAL CONTROLS
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SCALE:
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DRAWING NO.:
M-700

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Division 23: HEATING, VENTILATING, AND AIR CONDITIONING

1. GENERAL INSTRUCTIONS

A. GENERAL REQUIREMENTS

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

The specifications and drawings for the project are complementary, and any portion of work described in one shall be provided as if described in both. In the event of discrepancies, notify the Engineer and request clarification prior to proceeding with the work involved.

Drawings are graphic representations of the work upon which the contract is based. They show the materials and their relationship to one another, including sizes, shapes, locations, and connections. They convey the scope of work, indicating the intended general arrangement of the systems without showing all of the exact details as to elevations, offsets, control lines, and other installation requirements. Use the drawings as a guide when laying out the work and to verify that materials and equipment will fit into the designated spaces, and which when installed per manufacturers' requirements, will ensure a complete, coordinated, satisfactory, and properly operating system.

B. DEFINITIONS

Division: References contained in this specification follow the numbering system defined in the Construction Specifications Institute (CSI) MasterFormat 2004 Edition. Specification Divisions 01 through 13 provided with this project may reference the CSI MasterFormat 1995 Edition. The corresponding division references between the 2004 Edition and 1995 Edition are as follows:

2004 Edition	1995 Edition
1. Division 21 – Fire Suppression	Division 15
2. Division 22 – Plumbing	Division 15
3. Division 23 – HVAC	Division 15
4. Division 26 – Electrical	Division 16
5. Division 27 – Communications	Division 16
6. Division 28 – Electronic Safety and Security	Division 16

Furnish: "to supply and deliver to the project site, ready for unloading, unpacking, assembly, installation and similar operations."

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

Provide: "to furnish and install."

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

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

AHJ: The local code and/or inspection agency (Authority) Having Jurisdiction over the work.

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

Substitution: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor. Substitutions include Value Engineering proposals.

1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

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

C. PREBID SITE VISIT

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

D. MATERIAL AND WORKMANSHIP

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

Pipe, pipe fittings, pipe specialties and valves shall be manufactured in plants located in the United States or certified to meet the specified ASTM and ANSI standards.

Work performed under this contract shall provide a neat and "workmanlike" appearance when completed, to the satisfaction of the Architect and Engineer. Workmanship shall be the finest possible by experienced mechanics. Installations shall comply with applicable codes and laws.

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

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

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

E. MANUFACTURERS

In other articles where lists of manufacturers are introduced, subject to compliance with requirements, provide products by one of the manufacturers specified.

Where manufacturers are not listed, provide products subject to compliance with requirements from manufacturers that have been actively involved in manufacturing the specified product for no less than 5 years. (20 years of documented experience and ISO 9001 certification for cooling tower manufacturers)

F. COORDINATION

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

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

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

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

G. ORDINANCES AND CODES

Work performed under this contract shall, at a minimum, be in conformance with applicable national, state and local codes having jurisdiction. Equipment furnished and associated installation work performed under this contract shall be in strict compliance with current applicable codes adopted by the local AHJ, including any amendments and standards as set forth by the following:

1. National Electrical Code (NEC)
2. National Fire Protection Association (NFPA)
3. Underwriters Laboratories (UL)
4. Occupational Safety and Health Administration (OSHA)
5. American Society of Mechanical Engineers (ASME)
6. American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE)
7. American National Standards Institute (ANSI)
8. American Society of Testing and Materials (ASTM)
9. Other national standards and codes where applicable.

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

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

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

H. PROTECTION OF EQUIPMENT AND MATERIALS

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

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

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

I. SUBSTITUTIONS

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

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

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

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

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

J. SUBMITTALS

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

Transmit submittals as early as required to support the project schedule. Allow for two weeks Engineer review time, plus to/from mailing time via the Architect, plus a duplication of this time for resubmittal, if required. Only resubmit those sections requested for resubmittal.

Submittals shall contain the project name, applicable specification section, submittal date, equipment identification acronym as used on the drawings, and the Contractor's stamp. The stamp shall certify that the submittal has been checked by the Contractor, complies with the drawings and specifications, and is coordinated with other trades. Manufacturer product literature shall include shop drawings, product data, performance sheets, samples and other submittals required by this division. Highlight, mark, list, or indicate the materials, performance criteria, and accessories that are being proposed. General product catalog data not specifically noted to be part of the specified product will be

rejected and returned without review.

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

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

For electronic submittals, Contractor shall submit the documents in accordance with the procedures specified in Division 01. Contractor shall notify the Architect and Engineer that the submittals have been posted. For submittals sent by e-mail, Contractor shall copy the designated representatives of the Architect and Engineer. Contractor shall allow for the Engineer review time as specified above in the construction schedule. Contractor shall submit only the documents required to purchase the materials and/or equipment in the electronic submittal.

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

K. ELECTRONIC DRAWING FILES

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

L. RECORD DRAWINGS (AS-BUILT DRAWINGS)

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

See Division 01 and General Conditions for additional information.

M. OPERATION AND MAINTENANCE INSTRUCTIONS

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

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

Refer to Division 01 for acceptance of electronic manuals for this project. For electronic manuals, refer to paragraph "Submittals" for requirements.

N. SPARE PARTS

Furnish to Owner, with receipt, the following spare parts for the equipment furnished for this project:

1. One set of spare filters of each type required for each unit. In addition to the spare set of filters, install new filters prior to testing, adjusting, and balancing work and before turning system over to Owner.
2. Furnish one complete set of belts for each fan.
3. Furnish three operating keys for each type of air outlet and inlet that require them.

O. TRAINING

At a time mutually agreed upon between the Owner and Contractor, provide the services of a factory trained and authorized representative to train Owner's designated personnel on the operation and maintenance of the equipment provided for this project.

Provide training to include, but not be limited to, an overview of the system and/or equipment as it relates to the facility as a whole; operation and maintenance procedures and schedules related to startup and shutdown, troubleshooting, servicing, preventive maintenance and appropriate operator intervention; and review of data included in the operation and maintenance manuals.

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

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

P. WARRANTIES

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

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

Perform the remedial work promptly, upon written notice from the Engineer or Owner.

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

Cooling tower fans, fan shafts, bearings, sheaves, gearboxes, drive shafts, couplings, and mechanical equipment support must be warranted against defects in materials and workmanship for a period of five (5) years or seven (7), if motor space heater is properly wired.

2. GENERAL MATERIALS AND INSTALLATION

A. BUILDING OPERATION

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

B. EXISTING EQUIPMENT REUSE AND REMOVAL

Remove all unused equipment, ductwork, piping, and associated supports. Cap ductwork and piping at mains and seal air and water tight.

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

Seal airtight existing ductwork required to be abandoned in place or not in use at the termination of the work.

Cap and seal weathertight existing roof curbs and roof openings to be abandoned in place as a result of equipment removal.

Clean and rebalance existing ductwork, diffusers, registers, and grilles intended for reuse as required or as indicated on drawings.

C. COINCIDENTAL DAMAGE

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

D. CUTTING AND PATCHING

Conform to the requirements in Division 01. Cut walls, floors, ceilings, and other portions of the facility as required to install work under this division. Obtain permission from the Architect prior to cutting. Do not cut or disturb structural members without prior approval from the Architect and Structural Engineer. For post-tension slabs, x-ray slab and closely coordinate all core drill locations with Architect and Structural Engineer prior to performing any work. Obtain approval from Architect and Structural Engineer for all core drills and penetrations at least four days prior to performing work. Penetrations shall be made as small as possible while maintaining required clearances between the building element penetrated and the system component. Patch around openings to match the adjacent construction including fire ratings, if applicable. Repair and refinish areas disturbed by work to the condition of adjoining surfaces in a manner satisfactory to the Architect.

E. ROUGH-IN

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

F. CONCRETE BASES

Provide concrete bases (e.g., housekeeping pads) for equipment where indicated on the drawings and as specified herein. Concrete bases shall have chamfered edges. Size of base shall be a minimum of 4 inches greater than the footprint of the equipment that it is supporting and shall have a minimum height of 3-1/2 inches.

Construct equipment bases of a minimum 28 day, 4000 psi concrete conforming to American Concrete Institute Standard Building Code for Reinforced Concrete (ACI 318-99) and the latest applicable recommendations of the ACI standard practice manual. Concrete shall be composed of cement conforming to ASTM C150 Type I, aggregate conforming to ASTM C33, and potable water. Exposed exterior concrete shall contain 5 to 7 percent air entrainment.

Unless otherwise specified or shown on the structural drawings, reinforce equipment bases and housekeeping pads with No. 4 reinforcing bars conforming to ASTM A615 or 6x6 - W2.9 x W2.9 welded wire mesh conforming to ASTM A185. Place reinforcing bars 24 inches on center with a minimum of two bars each direction

Provide galvanized anchor bolts for equipment placed on concrete equipment bases and housekeeping pads or on concrete slabs. Anchor bolts size, number and placement shall be as recommended by the manufacturer of the equipment.

G. STRUCTURALSUPPORT SYSTEMS

Structural steel used for support of equipment, ductwork and piping shall be new, clean, and conform to ASTM Designation A-36.

Support mechanical components from the building structure. Do not support mechanical components from ceilings, other mechanical or electrical components, and other non-structural elements.

H. ACCESS PANELS AND DOORS

Refer to Architectural documents for specification of access panels and doors.

I. PENETRATIONS

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

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

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

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

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

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

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

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

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

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

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

J. FIRESTOPPING

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

Manufacturers: Hilti, RectorSeal, Specified Technologies Inc., United States Gypsum Company, or 3M corp.

Through and Membrane Penetration Firestopping Systems Product Schedule: Provide UL listing, location, wall or floor rating, and installation drawing for each penetration fire stop system.

Where project conditions require modification to qualified testing and inspecting agency's illustrations for a particular firestopping condition, submit illustration, with modifications marked, approved by penetration firestopping manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly. Include qualifications data for testing agency.

K. MOTORS AND STARTERS

Provide motors and starting equipment where not furnished with the equipment package. Motors shall have copper windings, Class B insulation, and standard squirrel cage with starting torque characteristics suitable for the equipment served. Motors controlled by variable frequency drives shall be rated for voltage peaks and minimum rise times in accordance with NEMA MG1, Part 31. Motors 5 horsepower and larger controlled by variable frequency drives shall be provided with a shaft grounding system equal to Aegis SGR Bearing Protection Ring, Inpro/Seal Current Diverter Ring (CDR) or approved equal. Motors for air handling equipment shall be selected for quiet operation. Each motor shall be checked for proper rotation after electrical connection has been completed. Provide drip-proof enclosure for locations protected from weather and not in air stream of fan; and totally enclosed fan cooled enclosure for motors exposed to weather. Motors shall be manufactured by Century, General Electric, Louis Allis, Westinghouse, or approved equal.

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

L. VARIABLE FREQUENCY DRIVES

Provide PWM variable frequency drives (VFD) to control fan or pump motors as indicated on the drawings. Provide VFD as manufactured by Asea Brown Boveri, Danfoss, Delta Controls, Eaton/Cutler Hammer, Franklin Control Systems, Invertek, Square D,, or Yaskawa. Include an integral, door-interlocked input circuit breaker or fused disconnect which may be padlocked in the "OFF" position.

Provide input AC line reactors without exception. Reactors shall be minimum 3 percent impedance, and "K" rated per IEEE C57-110 for harmonic current content. Reactors shall be integral to the drive enclosure without need for field wiring.

The VFD shall have an RS-485 port as standard. The standard protocols shall be Johnson Controls N2 bus, Modbus, and Siemens Building Technologies FLN. Optional protocols for BACnetc, DeviceNet, Ethernet, LonWorks, and Profibus shall be available. Each individual drive shall have the protocol in the base VFD. The use of third party gateways and multiplexers is not acceptable. All protocols shall be "certified" by the governing authority. Use of non-certified protocols is not allowed. The VFD shall allow the DDC system to control the digital and analog outputs of the drive via the serial interface. This control shall be independent of any VFD function. In addition, all the digital and analog inputs of the drive shall be capable of being monitored by the DDC system.

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

M. ELECTRICAL WIRING

High voltage wiring is defined as 50 Volts or higher. Low voltage wiring is defined as less than 50 Volts. Line voltage wiring shall be provided by Division 26. Line voltage control and interlock wiring for mechanical systems shall also be provided by Division 26. Low voltage control wiring shall be provided by Division 23. Furnish wiring diagrams to Division 26 as required for proper equipment hookup. Coordinate with Division 26 the actual wire sizing amps for mechanical equipment (from the equipment nameplate) to ensure proper installation.

Provide power and communication wiring with transient protection in accordance with IEEE C62.41.2. All control and interlock wiring shall comply with the NEC. Control wiring shall be sized to accommodate the voltage drop associated with the distance between the control device and the controller. Control wiring not installed in conduit shall be UL rated for plenum installation. All NEC Class 1 (line voltage) wiring shall be UL listed in approved raceway according to the NEC and Division 26 requirements. Maximum allowable voltage for control wiring shall be 120 V. All low-voltage wiring shall meet NEC Class 2 requirements. Low-voltage power circuits shall be sub-fused when required to meet Class 2 current limit.

Conduit for Control Wiring: EMT with compression fittings, cold rolled steel, zinc coated or zinc-coated rigid steel with threaded connections.

Pull and Junction Boxes: Size according to number, size, and position of entering raceway as required by National Electrical Codes. Enclosure type shall be suited to location.

Install wiring parallel to building lines wherever possible. Conceal all control wiring in finished rooms. Do not install Class 2 wiring in raceway containing Class 1 wiring. Boxes and panels containing high voltage wiring and equipment may not be used for low-voltage wiring except for the purpose of interfacing the two wires (e.g., relays and transformers). All wire-to device and wire-to-wire connections shall be made at a terminal block or terminal strip. All runs of communication wiring shall be unspliced length when that length is commercially available. Verify the integrity of the entire network following the

cable installation. Use appropriate test measures for each particular cable. Label all wiring and cabling at each end within 2 inches of termination with the controller termination number. Label control devices used in the system with permanent labels using the identifiers that match the record documents.

Install BACnet MS/TP communication wiring in accordance with ASHRAE/ANSI Standard 135. Maximum length of MS/TP communication wiring shall be 4000 ft with AWG 22 or 24 cable. Splices in shielded cables shall consist of terminations and the use of shielded cable couplers that maintain the integrity of the shielding.

N. EQUIPMENT FURNISHED BY OTHERS

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

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

O. SYSTEM TESTING, ADJUSTING, AND BALANCING

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

Final system testing, balancing and adjustments (TAB) shall be performed by a Contractor certified by the National Environmental Balancing Bureau (NEBB), Associated Air Balance Council (AABC), or Testing, Adjusting and Balancing Bureau (TABB. TAB shall be performed in accordance with the most current edition of the certified agencies procedural standard for testing, adjusting and balancing and shall comply with the strictest interpretation of that standard for execution and reporting of all TAB work.

Test, adjust, and balance equipment and systems included in the scope of work. Prepare testing and balancing report log using forms equivalent with the standard forms available from the TAB certification standard being followed. Adjust equipment to deliver specified flow amounts on the drawings. For air systems, include airflow supply quantities, entering and leaving temperatures, and pressures at design flow. For hydronic systems, include entering and leaving temperatures and pressures at design flow. Include fan and unit test readings, motor voltage and amp draws, etc., and submit six copies of the final compilation of data to the Architect for evaluation and approval before final inspection of the project.

Balance air systems to within plus or minus 10 percent for terminal devices and branch lines and plus or minus 5 percent for main ducts and air handling equipment of the amount of air shown on the drawings. TAB Contractor shall record space temperatures and make adjustments in airflow to each diffuser to obtain uniform temperature (no greater than +/- 3 F.) in spaces. Document temperatures and adjustments in tab report. Balance hydronic systems to provide flow rates within plus or minus 5 percent of flow specified on drawings or as required for proper system operation. Adjust equipment to operate as intended by the specification. TAB report shall include a 'report summary/remarks' section in accordance with the procedural standard that provides both system set up and a summary of deficiencies as defined by the procedural standard..

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

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

P. VIBRATION ISOLATION

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

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

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

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EXPIRES 2/28/2026

FORMGROUP

PROGRESS SET OF REVISION 4.2.1

07/24/2025

FOR COORDINATION PURPOSES ONLY
MASTER PERMIT REVISION PENDING

CACTUS CLUB MIAMI

OWNER:
Cactus Club Café
Contact: Tim Gilmour
Ph: 604-506-7551
Email: tgilmour@integrity-consulting.ca

OWNERS REPRESENTATIVE:
Stys Hospitality
Contact: Brian Stys
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Email: bstys@styshospitality.com

INTERIOR DESIGNER:
iCrave
Ph: 212-929-5657
Email: info@icrave.com

MEP ENGINEER:
Henderson Engineers
Contact: Gary Hornbeck
Ph: 913-742-5579
Email: Gary.hornbeck@hendersonengineers.com

STRUCTURAL ENGINEER:
YHCE
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Email: yh@yhce.us

KITCHEN CONSULTANT:
Foundry Commercial Kitchens
Contact: Stanley Tsia
Ph: 604-216-2566
Email: stanley.t@foundrykitchens.com

INTERIOR TENANT BUILD-OUT FOR:

CACTUS CLUB MIAMI

AT CITYGROUP CENTER

201 SOUTH BISCAYNE BLVD, SUITE No. 150
MIAMI, FL 33131

REVISIONS:

2	REV #2	03/20/24
3.1	REV #3.1	07/26/24

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PROJECT NO. 23-1222
TITLE: MECHANICAL SPECIFICATIONS
DATE: 1/29/2024
SCALE: AS INDICATED
DRAWING NO.: M-800

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Isolator Types:

1. Type WP (Waffle Pads): Provide 5/16 inch thick neoprene pads ribbed or waffled on both sides. Manufacture pads with bridge bearing quality neoprene and select for a maximum durometer of 50 and designed for 15 percent strain, with a static deflection of 0.05 inches. Incorporate steel load-spreading plates where required between the equipment and the neoprene pad to provide selected deflection. If the isolator is bolted to the structure, install a neoprene mounting sleeve under the bolt head between the steel washer and the base plate to prevent metal to metal contact. Provide Mason Industries Type W or equal.

2. Type DDNM (Double Deflecting Neoprene Mounts): Provide laterally stable, double deflecting, neoprene encapsulated mount with bolt holes for attachment to supporting structure. Select for a maximum durometer of 50 and design for 15 percent strain, with a static deflection of 0.4 inches. Provide Mason Industries Type ND or equal.

3. Type SPNH (Spring and Neoprene Hangers): Provide a steel hanger box containing a laterally stable, double-deflecting neoprene isolator in series with a steel spring. Design springs so the ratio of the horizontal to vertical spring constant is between one and two. The spring diameter shall be not less than 80 percent of the compressed height of the spring at rated load. Loaded springs shall operate within the linear portion of their load versus deflection curve over a deflection range of not less than 50 percent above design deflection. Spring diameter and hanger box hole size shall be large enough to permit the hanger rod to swing through a 30 degree arc. Include a neoprene bushing to prevent contact between the lower hanger rod and hanger box and short-circuiting the isolating function. The neoprene element shall have a maximum durometer of 50 and designed for 15 percent strain, with a static deflection of not less than 0.4 inches. Unless otherwise specified, the static deflection of SPNH hangers shall be 2 inches. Provide SPNH hangers with 1 inch static deflection for water source heat pumps and fan-powered VAV terminal units. When installed, do not cock the spring element and do not allow the hanger box to rotate through a full 360 degree arc without encountering obstructions. Provide Mason Industries Type 30N or equal.

4. Type SPNM (Spring and Neoprene Mounts): Provide single or multiple free-standing and laterally stable steel spring without a housing. Design springs so the ratio of the horizontal to vertical spring constant is between one and two. The spring diameter shall be not less than 80 percent of the compressed height of the spring at rated load. Loaded springs shall operate within the linear portion of their load versus deflection curve over a deflection range of not less than 50 percent above design deflection. Unless otherwise specified, the minimum static deflection of SPNM isolators for equipment mounted on grade slabs shall be 1 inch, and the minimum static deflection for equipment mounted above grade level shall be 2 inches. Provide a molded elastic neoprene load plate to support lightweight equipment less than 400 lbs. Provide springs welded to the load plate assembly furnished with an integral elastomeric pad for heavy equipment. Provide with a leveling device rigidly connected to the frame. Unless otherwise specified, isolators need not be bolted to the floor for indoor installations. If the base plates are bolted to the structure, install a neoprene mounting sleeve under the bolt head between the steel washer and the base plate to prevent metal to metal contact. Provide Mason Industries Type SLFH or equal.

5. Type NR (Neoprene Bushing): Provide neoprene, rubber-in-shear bushings for lightweight (less than 100 pounds), suspended equipment supported from structure with all thread rod and angle iron or Unistrut. Select for a maximum durometer of 50 and designed for 15 percent strain, with a static deflection of 0.15 inches. Provide Mason Industries Type HMIB or equal.

Q. AIR FILTERS

Provide AAF/Flanders PrePleat 13, Camfil AP-Thirteen, pleated, throwaway type filters, minimum MERV 13, or similar as manufactured by Air Filter, Inc., Bioclimatic, Columbus, Koch, or approved equal, unless otherwise indicated.

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

R. REFRIGERANT AND OIL

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

S. IDENTIFICATION

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

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

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

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

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

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

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

A. DUCT INSULATION

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

Provide rectangular liner conforming to ASTM C1071, Type I or II that is 1 inch thick, 1-1/2 pound density, minimum R-4.2 Certainteed Corp. “Toughgard” or equivalent, Johns Manville, Owens-Corning, or Knauf.

Provide round liner that is 1 inch thick, 4 pound density, minimum R-4.3 Johns Manville “Spiracoustic Plus” or equivalent, Certainteed or Owens-Corning.

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

1. Exposed round and rectangular supply ductwork [and the first 15 feet of duct downstream of equipment outlets or 5 feet past first elbow, whichever is greater.
2. Exposed round and rectangular return ductwork [and the first 15 feet of duct upstream of equipment outlets or 5 feet past first elbow, whichever is greater].
3. Transfer air ducts.

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

Cover concealed, rigid ductwork with ASTM C553, Type II flexible fiberglass insulation. Installed insulation shall be 1-1/2 inchthick, 3/41-1/2 pound density, minimum R-4.2 duct wrap, Certainteed or equivalent Johns Manville, Owens-Corning, or Knauf with heavy-duty foil-scrim-kraft facing, and with joints taped with 3 inch wide foil tape as follows:

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

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

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

B. PLENUM INSULATION

Provide Fyrewrap 0.5 plenum insulation or ETS Schaefer Plenumshield blanket to encapsulate combustible materials located within a fire-rated return air plenum where permitted by AHJ. Plenum insulation shall be 1/2 inch thick, 6 to 8 PCF density, consisting of a high temperature bio-soluble material with aluminum foil encapsulating material and fiberglass reinforcing scrim covering. Plenum insulation shall be rated and certified per UL 1887 (modified), ASTM E136 for non-combustibility and ASTM E84/UL 723 for surface burning characteristics. Provide minimum 1 inch overlap at all seams and joints and secure insulation with stainless steel banding at locations and intervals per manufacturer’s instructions.

C. DUCTWORK

Provide galvanized steel ductwork and housings as shown on drawings. Construct ductwork including fittings and transitions in conformance with current SMACNA standards relative to gauge, bracing, joints, etc. Minimum thickness of duct shall be 26-gauge sheet metal. Reinforce housings and ductwork over 30 inches with 1-1/4 inch angles not less than 5’-6” on centers, and closer if required for sufficient rigidity to prevent vibration. Support horizontal runs of duct from strap iron hangers on centers not to exceed 8’-0”. Do not support ceiling grid, conduits, pipes, equipment, etc. from ductwork. Coordinate routing of ductwork with other contractors such that piping, electrical conduit, and associated supports are not routed through the ductwork.

Construct non-VAV supply ducts to meet SMACNA positive pressure of 2 inches] w.g. Construct Return, Outdoor and Exhaust ductwork upstream of fans to meet SMACNA negative pressure of 1 inchw.g. Construct exhaust ductwork downstream of fans to meet SMACNA positive pressure of 2 inchesw.g.

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

Seal ductwork with heavy liquid sealant, Hardcast Irongrip 601, Design Polymer DP 1010 , United Mcgill duct sealer or approved equal, applied according to sealant manufacturer’s instructions. Seal all longitudinal and transverse ductwork joints airtight to meet SMACNA Seal Class A. Tapes and mastics shall be listed and labeled in accordance with UL 181A.

Provide radius elbows, turns, and offsets with a minimum centerline radius of 1-1/2 times the duct width. Where space does not permit full radius elbows, provide short radius elbows with a minimum of two continuous splitter vanes. Vanes shall be the entire length of the bend. Provide mitered elbows where space does not permit radius elbows, where shown on the drawings, or at the option of the contractor with the engineer’s approval. Mitered elbows less than 45 degrees shall not require turning vanes. Mitered elbows 45 degrees and greater shall have single thickness turning vanes of same gauge as ductwork, rigidly fastened with guide strips in ductwork. Vanes for mitered elbows shall be provided in all supply and exhaust ductwork and in return and outside air ductwork that has an air velocity exceeding 1000 fpm. Do not install vanes in grease ductwork. The use of square throat, radius heel elbows is prohibited. Remove and replace all installed elbows of this type with an approved elbow at no additional cost to the owner.

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

Provide balancing dampers, manufactured by Cesco, Greenheck, Louvers & Dampers, Nailor Industries, Pottorff, Ruskin, Tamco, or approved equal, where shown on drawings and wherever necessary for complete control of air flow. Splitter dampers shall be controlled by locking quadrants; provide Young Regulator or Ventlok end bearings for the damper rod. Rectangular volume dampers shall be opposed blade interlocking type. Round volume dampers shall be single-blade type consisting of circular blade mounted to a shaft. Provide Flexmaster model STO or equal 45 degree rectangular/round side takeoff fitting with model BO3 damper with locking quadrant and insulation build out for round ductwork branch takeoffs to individual air devices. Omit damper at takeoff fitting when damper is located downstream of takeoff.

Where access to dampers through a hard ceiling is required, provide a concealed, remote cable-operated, butterfly-type volume damper assembly with external worm gear operator. Damper assembly shall include duct casing with rolled bead stiffeners, reinforced blade, self-lubricating bearing, and remote operator mounting plate. External operator shall attach to damper as a single piece with no linkage adjustment required. Damper shall be adjustable through the diffuser frame with standard 1/4 inch nutdriver or flat screwdriver. Provide positive, direct, two-way damper control with no sleeves, springs or screw adjustments to come loose after installation. Provide cable length to span the distance from the damper to the remote operator location. Install damper in branch duct. Do not install in diffuser neck. Install remote operator on the back of the diffuser frame or side of a slot diffuser plenum. Support cable assembly to avoid bends and kinks in cable at manufacturer recommended intervals. Where approved by architect, a ceiling cup with cover plate may be used for access to cable operator. Provide round dampers by Metropolitan Air Technology model RT-250, Young’s Regulator model 5020-1200, or approved equal. Provide rectangular dampers by Metropolitan Air Technology model RT-200, Young’s Regulator model 820-1200, or approved equal. Provide remote cable control by Metropolitan Air Technology model RT-WGA, Young’s Regulator model 270-275, or approved equal. Provide electronic damper where shown on plans.

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

Size	Duct Gauge	Fitting Gauge
14” & under	26	24
15” thru 26”	24	22
28” thru 36”	22	20

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

Low pressure (duct pressure class up to and including 2 inches w.g.) Fittings 24 inches in diameter and less shall be prefabricated, spot-welded and internally sealed. Continuously weld fittings larger than 24 inches in diameter. Fitting gauge shall be 22 gauge for 36 inch fittings and under, 20 gauge for larger sizes. 90 degree tees shall be conical type. Seal longitudinal and transverse ductwork joints airtight with heavy liquid sealant applied according to manufacturer’s instructions. Provide gauge thickness in medium pressure (duct pressure class 3 inches to 6 inches w.g.) ductwork as recommended by SMACNA.

If permanent HVAC equipment is used during the construction period, provide temporary filters at all openings in the ductwork and inside equipment to protect the system from dust, dirt, paint, and moisture. Replace and maintain filters when needed, but not less than every month. On the day of Substantial Completion, clean the unit and ductwork and provide a new set of filters in the unit. Refer to section “Air Filters” for filter requirements.

An independent, professional duct cleaning company shall vacuum clean all internal surfaces of equipment, coils, and ductwork connected to permanent HVAC units that are operated during the construction period. Conduct cleaning after new air filters are installed and prior to turning the system over to the owner.

D. FLEXIBLE DUCT

Low pressure (duct pressure class up to and including 2 inches w.g.) and medium pressure (duct pressure class 2.1 inch to 6 inches w.g.) flexible duct shall be Flexmaster type 5B, Thermaflex type G-KM, M-KE, JPL type Silver Jacket, or equal (fire retardant polyethylene) protective vapor barrier, U.L.181 Class 1, acoustical insulated duct, [R-4.2][f-5.0][R-6.0][f-8.0] fiberglass insulation. Provide CPE liner with steel wire helix mechanically locked or permanently bonded to the liner.

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

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

E. PLASTIC FLUE GAS VENTS

Provide UL 1738 listed plastic flue gas vents, with positive or negative flue pressures complying with NFPA 211 and suitable for condensing gas appliances. Provide PVC system by IPEX “System 1738”, or Polypropylene system by Centrotherm “Innoflue” or equal by Nova Flex Group “Z-DENS.”. Where plastic gas vents are installed in a return air plenum, wrap the vent with fire rated plenum insulation. Reference Article “Plenum Insulation” for plenum-rated fire wrap. Coordinate vent material compatibility with the appliance manufacturer’s installation instructions prior to purchasing and installation.

F. AIR DEVICES

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

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

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

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

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

G. CONTROL DAMPERS

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

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

Motorized dampers used for ventilation air intake, exhaust air, or relief air shall be Class I with leakage rates not to exceed 4.0 CFM/square foot in full closed position at 1 inch W.G. pressure differential across the damper. Control dampers for other applications shall be Class II leakage. All smoke control dampers shall conform to UL 555S and shall be provided with end switches for remote indication of damper blade position.

Provide dampers as manufactured by Greenheck, CESCO, Pottorff, Nailor, or Ruskin. Reference manufacturer with model number for outside air, exhaust air and relief air dampers is Ruskin CD-50 constructed of aluminum, fire and smoke control applications is Ruskin FSD-60 constructed of galvanized steel, and all other applications is Ruskin CD-356 constructed of galvanized steel.

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

H. FIRE DAMPERS

Provide fire dampers where shown on drawings, and as required by Code enforcing authority. Damper ratings shall be as required to maintain the fire and/or smoke ratings noted on the Architectural drawings. Provide fire dampers conforming to NFPA-90A and UL 555 with recommended steel sleeves of length as required to meet the installed location, 165 degrees Fahrenheit fusible link, spring catches and non-corrosive bearings. Dampers shall be UL listed, manufactured by Air Balance, Cesco, Greenheck, Nailor Industries, Ruskin, or United Air.

Provide access door, sized per SMACNA with minimum size of 10 inch by 10 inch, in duct for inspection and service to fire damper and fusible link. Provide duct access door(s) within 12 inches of the device to allow for testing and maintenance. Label each door (with minimum 1 inch lettering) indicating which damper type is served. Door should be capable of being fully opened or provide removable door. Provide removable section of duct where duct size is too small for 10 inch by 10 inch access door. Provide access door in ceiling or wall as required to access damper.

I. COMBINATION FIRE/SMOKE DAMPERS

Provide combination fire/smoke dampers where shown on drawings and as required by Code enforcing authority with fire/smoke ratings as required to maintain the fire rating noted on the Architectural drawings. Dampers shall meet UL 555 classification for fire rating and UL 555S classification of leakage class II smoke damper; damper shall bear a UL label attesting to these classifications. Provide fire damper with a 165 degrees Fahrenheit resettable temperature device. Rate fire/smoke dampers for a minimum velocity of 2,000 FPM and pressure of 4 inches W.G. Provide manufacturer recommended steel sleeve of length as required to meet the installed location. Provide a qualified 120 volt electric actuator installed by the manufacturer at time of damper fabrication. Actuators shall be rated for a minimum of 20,000 cycles of operation, shall comply with the locally adopted building code and shall open in 15 seconds or less and close in 15 seconds or less after alarm or smoke detection has occurred. Provide stainless steel spring loaded leakage seals in sides of casing, and [36 inch long wire leads for connecting smoke link to smoke detector Damper shall be manufactured by Air Balance, Cesco, Greenheck, Nailor Industries, Ruskin, or United Air.

Provide access door, sized per SMACNA with minimum size of 10 inch by 10 inch, in duct for inspection and service to fire damper and fusible link. Provide duct access door(s) within 12 inches of the device to allow for testing and maintenance. Label each door (with minimum 1 inch lettering) indicating which damper type is served. Door should be capable of being fully opened or provide removable door. Provide removable section of duct where duct size is too small for 10 inch by 10 inch access door. Provide access door in ceiling or wall as required to access damper.

J. LOUVERS, PLENUMS, SCREENS

Provide intake and exhaust air louvers by Ruskin model ELF375X or equal American Warming & Ventilating, Cesco, Greenheck, Industrial Louvers or Louvers & Dampers as scheduled on the drawings. Coordinate exact size and location with architectural drawings. Louvers shall be stationary, with mill finish. Louvers shall have extruded aluminum blades, 0.080 inch wall thickness, 45 degree blade angle, blades on 5 inch centers; frame shall be extruded aluminum, 0.080 inch wall thickness; with expanded flattened aluminum birdscreen. Provide louvers with a minimum free area of 45 percent, with a maximum air pressure drop of 0.1 inch at scheduled airflow.

Construct plenums with galvanized steel framing members and galvanized sheet metal, braced with galvanized angles. Gauges and bracing shall conform to SMACNA recommendations for ductwork of like sizes. Where access doors are shown, provide hinged doors with #202 Ventlok latch. Make watertight connections to louvers, sloping bottom of plenum to drain water to weepholes in bottom of louver.

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

Hurricane Wind Driven Rain Performance: Louvers installed on buildings located in Hurricane-Prone and Wind-Borne Debris Regions of Florida must comply with AMCA 550, and have a Florida Approval Number. Additionally, louvers installed on buildings located in the Miami-Dade or Broward counties of Florida must comply with Miami-Dade test protocol (TAS-100A) and must have a Miami-Dade Notice of Acceptance.

K. EXHAUST AIR SYSTEMS

Provide in-line (duct) mounted exhaust fans as scheduled on the drawings, ACME, Carnes, Cook, Greenheck, Pennbarry, or Twin City Fans complete with isolated blower unit and ceiling grille. Provide backdraft damper, discharge duct, wall louver, and vibration isolation as scheduled or shown on the drawings.

L. KITCHEN EXHAUST AIR SYSTEMS

Provide ducts connecting Type 1 exhaust hoods to exhaust fans made of #16 gauge black iron with continuously welded joints and clean-out doors. Provide at least one opening that is minimum size of 20 inches by 20 inches for personnel entry. Where an opening of this size is not possible, provide access openings at each change in direction and at 12 foot intervals. Locate openings on sides of duct 1-1/2 inches minimum from bottom and fit with grease-tight covers of same material as duct. Support systems for ducts 24 inch and larger in any dimension shall be designed for the weight of the duct plus 800 pounds at any point in the duct system. Provide transition at connection to fan with opening size equal to or greater than the venturi opening of the fan inlet. Provide gasket at flanged connection to fan rated for 1500 degrees Fahrenheit and grease applications.

Enclose duct in fireproof enclosure per locally adopted mechanical code or, if approved by local code official, in fire rated wrap insulation. Insulation shall be minimum two-hour rated duct wrap insulation for Type I hood grease exhaust duct applications and shall conform to ASTM E2336 where required to comply with IMC. Insulation shall be flexible wrap enclosure rated for minimum 2000 degrees Fahrenheit and for zero clearance to combustibles. Insulation shall be non-mineral wool, passive, low bio-persistent fiber totally encapsulated on all sides with aluminum foil. Insulation shall be as manufactured by Certainteed, Thermal Ceramics, Unifrax or 3M. Slope duct back towards hood at minimum of 1/4 inch per lineal foot. Horizontal ducts that exceed 75 feet in length shall be sloped not less than 1 inch per foot. At Contractor’s option, a UL listed concentric ductwork package that complies with UL 1978 standard for grease ducts may be used in lieu of the welded black iron duct for connecting hood to exhaust fan. Ductwork package shall be as manufactured by CaptiveAire, DuraVent, Enervex, Metal-Fab, Schebler, Selkirk, or approved equal. Provide manufacturers UL listing number and verification certificate as a part of the shop drawing submittal. Install duct package in strict conformance with manufacturer's instructions and recommendations.

All portions of grease duct systems shall be tested for leakage in accordance with the “Grease Duct Test” paragraph of the IMC. Leakage tests shall be by light or other equivalent test methods as approved by the local code official to determine that all joints are liquid tight. Tests shall be performed in the presence of the local code official. Any joints found defective shall be repaired and retested until satisfactory results are obtained. The contractor shall submit a copy of the grease duct leakage test report to the architect/engineer complete with the approval signature of the local code official.

Provide exhaust hoods by Accurex, Advanced Hoods, Captive Aire, LC Systems or approved equal single shell exhaust only stainless steel hood. Hoods shall be ICBO approved and UL certified for air quantities shown on drawings and in conformance with manufacturer’s data. Provide manufacturer UL listing number and verification certificate as a part of the shop drawing submittal. Conform with NFPA Bulletin 96 and UL Standard 710. Construct hood of 18 gauge stainless steel with welds polished. Hood shall contain full length stainless steel filter holder welded to hood with integral drip trap and UL classified, X-Air stainless steel filters installed at 45 degrees from horizontal. Provide vapor proof incandescent lights, and control panel with pilot lights and switches for fan and lights. Hood package shall include 3 inch filler panel at wall, and stainless steel closure panels from top of hood to finished ceiling.

Provide dishwasher duct shall be 18 gauge stainless steel with continuously welded seams and flanged joints with watertight EPDM gaskets. Locate longitudinal seams on top or side of duct. Pitch duct toward the dishwasher. Install dishwasher exhaust duct systems in accordance with SMACNA “HVAC Duct Construction Standards”, 2005 Edition, Figure 10-2. Slope horizontal ductwork back towards the dishwasher a minimum of 1/4 inch per foot.

Provide Amerex, Ansul, Pyrochem, or approved equal wet chemical type fire extinguishing system for each hood as scheduled on drawings complete with hood nozzles, wet chemical cylinders, piping, etc. and accessories to provide an approved, operating system. Provide manual pull station(s) at locations shown on the drawings. System shall be in full conformance with NFPA-96.

Provide mechanical or electrical gas shutoff valve to shutoff fuel or power source to cooking equipment upon detection of fire. Valve shall have a clearly marked open/closed indicator.

Provide a wall mounted thermostat with remote sensing element at the exhaust hood duct collar wired in parallel with the normal fan on-off control to ensure that the hood’s associated exhaust fan is energized when the cooking appliances served by the hood are activated. The thermostat set point shall be 95 degrees Fahrenheit (adjustable). The installation shall be in compliance with the International Mechanical Code.

4. CIRCUIT, INDUCED DRAFT, COUNTERFLOW COOLING TOWER

A. SUBMITTALS

Product Data: Submit manufacturer's technical product data, including rated capacities; coil pressure drop, fan performance data, sump pump performance data, weights (shipping, installed, and operating); installation and start-up instructions, and rating curves with selected points clearly indicated. Provide short circuit current rating of factory mounted starter or variable frequency drive. Include pressure required at cooling tower supply piping connection and basin sweeper supply piping connection.

Shop Drawings: Submit assembly-type shop drawings indicating dimensions, weight loadings, required clearances, size and connection locations for piping and wiring and methods of assembly of all components. Indicate suggested structural steel supports including dimensions, sizes, and locations for mounting bolt holes. Clearly indicate exceptions to basis of design where appropriate. Exceptions requiring additional construction related costs (materials and labor) shall be coordinated and shall be included at no additional cost to the owner.

Wiring Diagrams: Submit manufacturer's electrical requirements for power supply wiring to cooling towers. Submit manufacturer's ladder-type wiring diagrams for interlock and control wiring. Clearly differentiate between portions of wiring that are factory-installed and portions to be field-installed.

Maintenance Data: Submit maintenance data and parts list for each cooling tower, control, and accessory; including "trouble- shooting" maintenance guide. Include this data, product data, shop drawings, and wiring diagrams, in operation and maintenance manual; in accordance with requirements of Division 1.

Certifications: Submit required certifications and written tests results for required testing.

Warranty: One-year warranty after start-up, or eighteen months from date of shipment, whichever occurs first. Warranty to include coverage for defects in material and workmanship.

Fans, fan shafts, bearings, sheaves, gearboxes, drive shafts, couplings, and mechanical equipment support must be warranted against defects in materials and workmanship for a period of five (5) years or seven (7), if motor space heater is properly wired.

Submit manufacturer's warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

B. CERTIFICATIONS

CTI Certification: CTI ATC-105 Acceptance Test Code for Water Cooling Towers: Provide manufacturer's certification of tower cooling capacity in compliance with CTI ATC-105 ., based on factory-performance tests, and provide performance curve plotting Leaving-Water Temperature (LWT) against Wet-Bulb Temperature (WBT).

CTI ATC-128 Test Code for Measurement of Sound from Water Cooling Towers: Provide manufacturers certification of tower sound output in accordance with CTI ATC-128.

Certify tower wind resistance to withstand pressure indicated, in any direction.

C. MANUFACTURERS

Subject to compliance with requirements, provide products from Baltimore Aircoil Co.Inc., Evapco Inc., Marley Division of SPX Cooling Technology, or Recold Division of SPX Cooling Technology

D. PRODUCT

Design structural system for the following live loading in addition to tower dead-loads and operating-loads:

1. Wind Loading: 30 psf on exposed vertical surfaces.
2. Earthquake Resistance : Withstand 3 g seismic load.
3. Shipping and Hoisting Load: 2g horizontal and 3g vertical.
4. Live Load: Fan deck and hot water basin cover shall be designed for 50 psf live load or 200 lb. concentrated load.

Fabricate structural system including assembly of collecting basin and steel casings by one of the following methods:

1. Bolt connections with fasteners having equal or better corrosion-resistance than materials fastened; seal joints to make watertight enclosure.
2. Weld connections and weld metal seams continuously to make watertight.

Rigging supports: Provide rigging supports on structure for final rigging.

Casings, Frame and Fan Deck: Casing and frame material: Provide galvanized steel, hot-dipped galvanized steel with polymer coating, or stainless steel. Hardware shall be galvanized or stainless matching the casing and frame material. Joints, Seams and Welded Connections shall be sealed watertight.

Collecting basin and sump:

Provide the following materials and types of units, designed and installed to support water and to ensure water tightness:
a. Provide galvanized steel.
b. Provide hot-dipped galvanized steel with polymer coating.
c. Provide stainless steel.
d. Provide integral type collecting basin and sump with lift-out strainer with openings smaller than nozzle orifices.

Provide the drain, overflow and water make-up connections at where shown on the drawings.

Basin Sweeper Piping: The cold water basin of the cooling tower will be equipped with PVC sump sweeper piping with plastic eductor nozzles. The piping must be designed specifically for the size and shape of the basin to ensure full agitation.

Water Level Control: Provide electric/electronic control with NEMA 250, Type 4X enclosure. Provide solid state controls with multiple electric probes and relays factory wired to a terminal strip to control makeup water valve, low and high level alarms and shutoff of pump on low level.

Makeup Water Valve: Provide Factory fabricated, two-way, heavy duty assembly, sized for a water pressure between 15 and 50 psig at valve inlet. Body and trim shall be Brass or Bronze. Provide with replaceable PTFE seats and disc. Provide with NEMA 250, Type 4 solenoid enclosure with spring return, normally closed and designed to operate with 120 volt ac power operator.

Collection Basin Heater: Electric, stainless steel immersion heater suitable to maintain temperature of water in pan at 40 degrees F when outside temperature is 0 degrees F and wind velocity is 15 mph; immersion thermostat and float control operate heaters on low temperature when the pan is filled. Control Panel mounted on side of cooling tower in NEMA 250 Type 3R, 4 or 4X enclosure. Provide with control circuit transformer, Terminal blocks with numbered and color coded wiring and a Factory wired in corrosion resistant raceway.

Fans and Drive Assembly: Factory install fans and drives. Select fan to meet specified sound ratings. Provide cast-aluminum axial-fan of adjustable-pitch type balanced at the factory. Provide with V-belt drive designed for minimum 150 percent motor nameplate power. Fabricate fan and motor sheave(s) from corrosion-resistant materials to minimize maintenance and ensure maximum drive and powerband operating life. Provide bearings with minimum L-10 life of 80,000 hours per ABMA STD 11. Belt tension must be easily adjusted in the field. Provide composite steel epoxy coated for corrosion resistance or typ 304 stainless steel driveshaft. Provide electro-galvanized steel, aluminum, or stainless-steel hub connection. Provide self-aligning ball or roller bearings; include external extended grease lines, and fittings. Provide bronze sleeve bearings with external oil lines, and fittings. Provide totally enclosed, air over, energy efficient type motor. Motors driven by variable frequency drives shall be inverter duty type, rated for use with variable frequency drives. Provide variable frequency drive. Refer to Division 23 Section “Variable Frequency Drives”. Provide welded steel rod and wire guard, hot dipped galvanized after fabrication fan guard.

Distribution Section: Provide water distribution system installed by manufacturer to ensure even distribution of water over heat exchanger coils without the need for balancing valves.
Provide Schedule 40 PVC pipe. Provide removable plastic, brass, or ceramic nozzles.
Provide with corrosion-resistant hangers and supports to resist movement during operation and shipment.

Spray Water Pump(s): The closed circuit cooling tower will include an appropriate number of close coupled, bronze-fitted

centrifugal pump and motor assemblies equipped with mechanical seal, and piped from the suction connection to the water distribution system. The pump motor(s) will be the totally enclosed fan cooled (TEFC) type, premium efficiency suitable for 480 volts, 3 phase, and 60 hertz electrical service. The system will include a metering valve and bleed line to control the bleed rate from the pump discharge to the overflow connection.

Heat Exchanger Coils: Provide copper tube with stainless steel tube sheet, stainless steel tube and tube sheet, or carbon steel tube with outer surface of tube and sheet hot-dip galvanized after fabrication. Heat exchanger arrangement shall be serpentine tube, serpentine tubes with removable cover plate on inlet and outlet headers, or straight tube with removable header cover plate on both ends. Heat exchanger shall be designed, manufactured, and tested according to ASME B31.5 “Refrigeration Piping and Heat Transfer Components”, sloped for complete drainage of fluid by gravity.

Field Piping Connections:Provide with flanged supply and return connections. Threaded drain and vent connections.

Drift Eliminators: Multi-pass configuration to limit drift-loss to specified maximum percentage of circulating-water flow rate. Provide UV treated PVC material, having flame spread rating of 5 per ASTM E 84. Provide with multiple, easily removable sections.

Air Inlet Louvers: Provide removable louvers designed and installed by manufacturer of sufficient thickness and rigidity to prevent visible sagging, to prevent water splashing out of tower and to prevent direct sunlight into the basin. Provide UV treated polyvinyl chloride plastic (PVC), having flame spread rating of 5 per ASTM E 84 or fiberglass reinforced plastic (FRP).

Service Access: Provide access doors, ladders and platforms of the material and type specified herein as required for service of the cooling tower components. Provide hinged access doors for entry into the tower for service of internal components. Provide an external galvanized steel access platform at the access door of the unit(s). Provide an aluminum ladder and 1-1/4 inch galvanized steel pipe safety railing included with the platform. Fan Deck Ladder with Safety Cage, aluminum ladder with steel safety cage and safety gate for access to the fan deck. Provide 1-1/4 inch galvanized steel pipe handrail around the perimeter of the cooling tower cells. Provide handrails with knee and toe rails that conform to OSH

erosion.

E. EXAMINATION

Examine cooling towers before installation. Reject cooling towers that are damaged. Examine areas to receive equipment for compliance with requirements for installation tolerances and other conditions affecting unit performance. Final locations of equipment on the Drawings are approximate, unless dimensioned. Determine exact locations before roughing in piping and electrical work. Examine proposed route of moving equipment into place and verify that it is free of interferences. Verify piping rough in locations. Verify branch circuit wiring suitability. Do not proceed with installation until unsatisfactory conditions have been corrected.

F. INSTALLATION

General: Install cooling towers where indicated, in accordance with equipment manufacturer's written instructions and with recognized industry practices, to ensure that cooling towers comply with requirements and serve intended purposes.

Access: Provide access and service space around and over cooling towers as indicated, but in no case less than that recommended by manufacturer.

Support: Install roof-mounted units on structural steel mechanical equipment stand. Anchor cooling tower to stand with removable fasteners. Coordinate tower structure with tower manufacturer and structural engineer. Account for tower cell location, spacing, etc. Construct mechanical equipment stand as indicated, and in accordance with NRCA Handbook and Accepted Roofing Knowledge Detail "N". Mechanical equipment stand is specified in Division 5; not work of this Section.

Placement: Install vibration isolators according to isolator manufacturer's recommendations. Refer to Division 23 Section "Vibration Isolation for HVAC" for vibration isolation.Install gaskets or sealants between cooling tower cells. Level units to tolerance of 1/8" in 10'-0", in both directions.

Connections: Condenser Water Piping: "Hydronic Piping" section. Provide flanged or union connections to cooling tower, with flexible pipe connections if tower is mounted on vibration isolators. Pitch lines so water will drain into sump. Connect inlets to cooling tower with shutoff valve, and balancing valve (if 2 or more inlets). Connect outlets with shutoff valves.B.

Make-up and Water Piping: Refer to Division 22 section "Water Distribution Piping and Specialties". Provide flanged or union connections to cooling tower, with flexible pipe connections if tower is mounted on vibration isolators. Pitch lines so water will drain into sump.

Connect to automatic fill valve with 3-valve bypass, and backflow preventer. Drain Piping: Refer to Division 22 section "Sanitary Drainage and Vent Piping and Specialties". Connect drain, overflow, and bleed lines to cooling tower as indicated, full size of connection on cooling tower.
Refer to Division 26 Sections for wiring devices, wires and cables, and electrical installation requirements.

G. FIELD QUALITY CONTROL

Provide the services of the manufacturer's field representative to inspect tower after installation and submit report prior to start-up, verifying installation is in accordance with specifications and manufacturer's recommendations.

Test for capacity under actual operating conditions in accordance with CTI ATC-105 and verify specified performance.

All seams on the tower and tower basin shall be properly sealed to avoid leaks. Contractor shall coordinate with manufacturer to correct any leaks prior to commencing water treatment.

H. CLEANING AND TOUCHUP

Cleaning: Clean inside of cooling tower thoroughly before filling for start-up. Clean factory-finished surfaces.

Touchup: For galvanized surfaces apply galvanizing coating over any marred or scratched galvanized surfaces. For coated surfaces, repair any marred or scratched surfaces with manufacturer's touch-up paint or coating.

I. SYSTEM STARTUP

Start-up tower in presence of Owner's operating personnel.

Start-up: Comply with manufacturer's instructions for filling and start-up of operation, but not less than the following:
1. Verify lubrication of rotating parts; lubricate as needed.
2. Verify fan rotation direction.
3. Verify that motor amperage is in accordance with manufacturer's data.
4. Balance condenser water flow to each tower, and to each inlet for multiple inlet towers.
5. Adjust water level control for proper operating level.
6. Adjust bleed valve for percentage of circulated water volume recommended by tower Water Treatment Consultant.
7. Adjust temperature controls and verify operation.
8. Ensure chemical treatment system is installed, tested and operational prior to filling cooling tower.

J. TRAINING

General: At a time mutually agreed upon between the Owner and Contractor, provide the services of a factory trained and

authorized representative to train Owner's designated personnel for a minimum of two four eight hours on the operation and maintenance of the equipment provided under this section.

Content: Training shall include but not be limited to; Overview of the system and/or equipment as it relates to the facility as a whole. Operation and maintenance procedures and schedules related to startup and shutdown, troubleshooting, servicing, preventive maintenance and appropriate operator intervention. Review data included in the operation and maintenance manuals. Refer to Division 1 Section "Operating and Maintenance Data."

Certification: Contractor shall submit to the Engineer a certification letter stating that the Owner's designated representative has been trained as specified herein. Letter shall include date, time, attendees and subject of training. The certification letter shall be signed by the Contractor and the Owner's representative indicating agreement that the training has been provided.

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

5. HVAC EQUIPMENT

A. WATER SOURCE HEAT PUMPS

Provide factory-assembled and tested packaged water-source heat pumps as manufactured by Addison, American Air Filter, Carrier, Climate Master, Daikin, Florida Heat Pump, Johnson Controls, Trane, or Water Furnace consisting of cabinet; sealed refrigerant circuit including compressor, refrigerant to water heat exchanger, refrigerant to air heat exchanger (coil), and reversing valve; evaporator fans; refrigeration and temperature controls; filters; and dampers. Provide capacities and electrical characteristics as scheduled.

Construct cabinet of manufacturer's standard galvanized steel or aluminum casing for ducted models, galvanized steel with baked enamel finish for free delivery models. Provide access panels for inspection and access to internal parts. Insulate cabinet with minimum 1/2 inch thick, 1.5 PCF density fiberglass insulation. Provide knockouts for electrical and piping connections. Provide condensate drain connection. Construct cabinet with compartments so compressor, reversing valve, and water coil are out of air stream.

Provide centrifugal type, direct drive evaporator fans with permanently lubricated motors.

Provide refrigerant to water heat exchangers of coaxial type, with inner copper water tube and outer steel refrigerant tube. Test and rate heat exchanger for 450 PSI refrigerant working pressure. Provide refrigerant to air heat exchangers of copper tube and aluminum fins. Test and rate heat exchanger for 425 PSI working pressure.

Provide 4-way solenoid activated refrigerant reversing valve designed for fail-safe operation in heating position.

Provide hermetic type compressor, installed on spring vibration isolators and enclosed in acoustically treated enclosure. Provide high and low temperature cutouts and compressor motor overload protection. Provide capability to reset compressor lockout circuit at either remote thermostat or circuit breaker. Provide slide out chassis.

Provide internal refrigerant piping of hard-drawn temper Type ACR copper tube with wrought-copper fittings and brazed joints.

Provide factory-mounted and factory-wired controls. Where indicated, provide remote control panel. Include fan control, reversing valve control, compressor relays, random-start control relay, and 24-V control transformer. Reference the Water Source Heat Pump Control Matrix for control features, modules, and accessories that shall be provided with the equipment.

Provide hose kit for connection between field piping and heat pump water coil. Hose kit components shall be same size as piping serving the unit as shown on the drawings. Hose kit shall include ball shut-off valves, inlet strainer, outlet automatic flow control valve, fire retardant pressure rated flexible hoses, swivel fittings, and pressure and temperature test plug on both inlet and outlet.

Suspend horizontal units from structure using all-thread steel rods and spring vibration isolators with 2 inches minimum deflection. Support vertical units with neoprene vibration isolation pads and 3-1/2 inch thick concrete base.

Provide an auxiliary drain pan for suspended units with flood detector switch to shut off unit when water is detected in auxiliary drain pan. Flood detector switch shall be Diversitech wet switch or equivalent. Detector shall shut system down when water comes in contact with the hydrophilic pad of the detector. Place detector in the lowest location in the auxiliary drain pan. Wire detector to remote alarm, Diversitech universal alarm or equivalent.

B. WATER PUMPS

Provide base mounted pumps, manufactured by Armstrong, Aurora, Bell and Gossett, Grundfos, Taco or Thrush, of the type, size and capacity as scheduled on the drawings. Provide pump body of cast iron, rated for 175 PSI working pressure at 225 degrees Fahrenheit continuous water temperature, with gauge ports at nozzles, and with vent and drain ports. Construct impeller of non-ferrous material with enclosed, overhung, single-suction type design, dynamically balanced, keyed to the shaft and secured by a locking capscrew. Pump must be capable of being serviced without disturbing piping connections. Provide replaceable bronze wearing rings, steel shaft with bronze sleeve and mechanical seals consisting of flushed seals with carbon steel rotating ring, stainless steel spring, ceramic seat, flexible bellows and gasket. Close coupled pumps shall have motor direct-mounted to the pump casing with supporting legs as integral part of the motor enclosure. [Provide motor meeting NEMA specifications with the size, voltage and enclosure specified on the drawings. Refer to paragraph "Motors and Starters" for additional requirements. Factory test each pump. Clean and paint each pump with at least one coat of high-grade machinery enamel prior to shipment. Install pumps according to manufacturer's instructions and per the drawings.

C. HEAT EXCHANGERS

Provide plate and frame heat exchanger manufactured by Danfoss, Alfal Laval Thermal, APV Heat Transfer, Armstrong, ITT Fluid Handling, Mueller, Patterson Pump Co., Tranter. Heat exchanger shall be freestanding assembly consisting of frame support, fixed and movable end plates, tie rods, plates, and one-piece gaskets. Heat exchanger shall be rated for a working pressure of 150 PSIG at minimum 250 degrees F design temperature. End plates shall be ASTM A 666, type 316 stainless steel, shall be of sufficient thickness for the design pressure and code requirements and shall have no reinforcement or stiffeners. Plate material shall be ASTM A 666, Type 304 stainless-steel shell. Gasket material shall be nitrile rubber. Piping connections shall be threaded for 2-inch and smaller connections, flanged for connections larger than 2-inches.

Where indicated in schedule provide plate and frame heat exchanger manufactured by Danfoss, Alfal Laval Thermal, APV Heat Transfer, Armstrong, ITT Fluid Handling, Mueller, Patterson Pump Co., Tranter. Heat exchanger shall be suspended. Configuration shall be brazed assembly, consisting of embossed or pressed stainless steel plates brazed together and two end plates, one with threaded or flanged nozzles and one with pattern-embossed plates. Material shall be type 316 stainless steel.

6. PIPING AND PIPING SPECIALTIES

A. HYDRONIC PIPING AND INSULATION

For 2 inches and smaller, provide hydronic piping of ASTM B88, Type L hard-drawn copper tube with ANSI B16.22 wrought copper fittings with soldered joints. Install dielectric unions wherever dissimilar piping is joined. At Contractors option, ASTM A53, Grade B, Schedule 40 black steel with welded or screwed fittings may be used. For 2-1/2 inches and larger, provide ASTM A53, Grade B, Schedule 40, black steel piping with welded joints and fittings.

At contractor's option, install schedule 80 PVC or schedule 80 CPVC plastic pipe with solvent cemented joints for condenser water piping systems. Do not install PVC or CPVC piping in return air plenums.

Install piping parallel to the building lines unless indicated otherwise. Support and anchor piping as required to facilitate expansion and contraction, and to prevent the transmission of noise and vibration.

Install piping concealed except in unfinished areas. Install piping as required to meet construction conditions and allow for the installation of other work including air ducts, electrical conduit and light fixtures. Install the horizontal piping as high as possible to allow for specified slope and coordination with other components. Install vertical piping tight to columns or walls. Provide space to permit insulation applications, with 1 inch clearance outside the insulation. Allow sufficient space above removable ceiling panels to allow for panel removal. Arrange water systems so that the entire building can be drained. Provide a 3/4 inch drain valve with hose end connection at each low point. Install valves where shown and where necessary for cut-off, for balancing and for control. Install reducing fittings at line size changes. Provide eccentric reducers where appropriate for drainage. Provide dielectric fittings with appropriate end connections for the pipe materials in which installed (screwed, soldered, or flanged), which effectively isolate dissimilar metals, prevent galvanic action, and stop corrosion. Branch connections shall be from the top or side of the main piping.

Provide hangers and supports by Armacell, ASC Engineered Solutions, Cooper B-Line, Elite Components, ERICO, FNW, Halfen-DEHA, Hilti, Miro, National Pipe Hanger, PHD Manufacturing, PHP Systems, Power-Strut, Unistrut, Zsi Foster, or approved equal. Connect hangers to the structure with side beam connectors, concrete inserts, or engineered support struts between joists and other structural members as required to provide a rigid hanging installation. Do not hang pipes from other pipes, conduit or ductwork. Provide all-thread hanger rods of the required length and size so that pipes are parallel and evenly spaced. Pipe attachments shall be copper-plated or have nonmetallic coating for electrolytic protection where attachments are in direct contact with copper tubing.

Provide clevis type hangers and space on 6 foot centers for pipe up to 1-1/2 inch and on 10 foot centers for 2 inch pipe and greater. Install a support within one foot of each change of direction. Provide two nuts on threaded supports to securely fasten the support.

Support piping on the roof with pre-engineered roof pipe supports that rest on top of the roofing membrane, not requiring any attachment to the roof structure and not penetrating the roofing assembly, with embedded support fixtures as required to support the pipe. Provide steel pedestal type supports with minimum 18x18 inch thermoplastic or rubber base or 4 inch wide closed-cell polyethylene block with length as required to support pipe. Maintain minimum 6 inches clearance under pipe to finished roof surface.

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

Pressure test the piping system for 15 minutes at 1.5 times the operating pressure or 100 psi, whichever is more, with no observable loss in pressure. Water shall be used for the pressure testing fluid.

After satisfactory pressure test is obtained, flush piping system using a minimum velocity of 4 fps through all portions of the system. Make all provisions required to isolate HVAC equipment, coils, control valves, automatic flow control valves, pressure independent control valves, and balance valves during flushing. temporary valves, connections, and bypasses where required. System pumps may be used for flushing. Where system pumps are not used, provide temporary pumps with temporary connections. Continue flushing until discharge water shows no discoloration and strainers are no longer collecting dirt and other foreign materials. Upon completion of flushing, drain all water from system at low points, and

remove, clean, and replace strainers.

B. HYDRONIC SPECIALTIES

Provide shutoff valves 2 inches and smaller with threaded ends and bronze body construction. Provide valves larger than 2 inches with flanged ends and cast iron body construction. Provide rising or OS&Y stems extended type if insulated, handwheel operators, solid discs, and replaceable Teflon Packing. Provide lug type butterfly valves. Valves shall be Class 125 for gate, check and globe valves, Class 150 for ball valves, and 200 PSI CWP for butterfly valves. Valves shall meet MSS specifications. Install valves where shown and where necessary for cut-off, for balancing and for control. Valves shall be Crane, Hammond, Jenkins, Milwaukee, Nibco, Powell, or Stockham.

For 2 inches and smaller, reference manufacturer with model number for ball valves is Nibco #T-585-70, gate valves is Nibco T-111, check valves is Nibco T-413-Y, and globe valves is Nibco T-211-Y. For larger than 2 inches, reference manufacturer with model number for ball valves is Nibco #T-595-Y, gate valves is Nibco F617-O, for check valves is Nibco F-918-B, for globe valves is Nibco F-718-B, and for butterfly valves is Nibco LD-2000.

Provide control valves conforming to the construction requirements of shutoff valves described above. Size two-position control valves using pipe line size. Size two-position butterfly valves using the 90 degree flow coefficient (Cv). Size modulating control valves to produce the required capacity at a pressure loss not exceeding 5 PSI. Size modulating butterfly valves using the 60 degree flow coefficient (Cv). Control valves shall have equal percentage flow characteristics and shall not be less than 1/2 inch in size. Nominal body rating shall be the larger of 125 PSI or the system static head plus the maximum pump head at the maximum temperature of the control medium (i.e. chilled water, heating water, etc.). Valves shall meet MSS specifications and Class IV leakage requirements per ANSI/FCI 70-2. Provide two-way modulating valves with close-off ratings exceeding the maximum pressure difference, at any load condition, between the outlet and inlet. Equip each valve with proper packing to ensure there will be no leakage at the valve stem. Valves shall be manufactured by Belimo, Bray, Danfoss, Griswold Controls, Honeywell, Johnson Controls, Kele, Schneider Electric, Siemens, and Victaulic.

Provide valve operators for each automatic valve with sufficient capacity to operate the valve under all conditions and to guarantee tight close-off against system pressure encountered. Provide operators with spring-return for normally closed or normally open position for fail safe operation to account for fire, low temperatures, or power interruption as indicated.

Provide circuit balancing valves manufactured by Armstrong, Bell & Gossett ITT, Griswold, Nexus Valve, Nibco, Pro Hydronics, Oventrop, Taco, or Tour & Andersson. Valve shall be rated for 125 psig water working pressure, 250 degrees Fahrenheit maximum operating temperature. Valves 2 inch and smaller shall be bronze or brass body and 2-1/2 inch and larger shall be cast iron, carbon steel or ductile iron body. Valves used for measurement use in variable flow systems shall be quarter turn ball or butterfly style. Valves used for balancing in constant flow systems shall be plug or globe style valve and calibrated orifice or venturi. Provide with connections for portable differential pressure meter with integral check valves and seals. Valve shall have integral pointer and calibrated scale to register degree of valve opening. Valve shall have position indication readout and built-in memory stop for repeatable regulation and control. Valves 2 inch and smaller shall have threaded connections and 2-1/2 inch valves shall have flanged connections.

Provide automatic flow control valves as indicated on drawings by Griswold, Hays Fluid Controls, IMI Hydronics, Nexus, Pro Hydronics, or Victaulic. Valves shall be class 150, with cast iron housing, stainless steel operating parts; threaded connections for 2 inch and smaller, flanged connections for 2-1/2 inch and larger. Factory set to automatically control flow rates within plus or minus 5 percent design, while compensating for system operating pressure differential. Provide quick disconnect valves for flow measuring equipment. Provide a metal identification tag with chain for each valve, factory marked with the zone identification, valve model number, and rate flow in GPM.

Provide Y-type strainers rated for 125 PSIG working pressure and with perforated Type 304 stainless steel basket and bottom drain connection. Screen openings shall be 12 mesh for 4 inches and smaller and 6 mesh perforations for larger than 4 inches. For strainers upstream of automatic flow control valves and brazed plate heat exchangers, screen openings shall be 0.033\" (20 mesh). For strainers upstream of plate and frame heat exchangers, screen openings shall be 0.0787\" (10 mesh). For 2-1/2 inches and larger, provide cast-iron body (ASTM A 126, Class B), flanged ends, and bolted cover. For 2 inches and smaller, provide cast bronze (ASTM B 62) body, threaded ends and screwed cover.

Provide thermometers (general) with accuracy of plus or minus 1 percent of range span or plus or minus one scale division to maximum of 1.5 percent of range span. Temperature range for chilled water service shall be 30 to 240 degrees Fahrenheit with 2-degree scale divisions (0 to 115 degrees Celsius with 1-degree scale divisions); heating water shall be 30 to 300 degrees Fahrenheit with 2-degree scale divisions (0 to 150 degrees Celsius with 1-degree scale divisions).

Provide brass or stainless steel thermowells, pressure rated to match piping system design pressure; with 2-inch extension for insulated piping and threaded cap nut with chain permanently fastened to well and cap. Install in piping tee where thermometers are indicated, in vertical position. Fill well with oil or graphite and secure cap.

Provide general use pressure gauges, ASME B40.1, Grade A, phosphor bronze bourdon-tube type, bottom connection; case of drawn steel or brass, glass lens, 4-1/2-inches diameter; connector of brass, 1/4-inch NPS; scale shall be white coated aluminum, with permanently etched markings; accuracy of plus or minus 1 percent of range span, 2 times operating pressure; syphon of 1/4-inch NPS straight coil constructed of brass tubing with threads on each end; snubber of 1/4-inch NPS brass bushing with corrosion-resistant porous metal disc. Disc material shall be suitable for fluid served and rated pressure.

Provide test plugs manufactured by Flow Design Inc., MG Piping Products Co., Peterson Equipment Co., Sisco, Watts Regulator Co., or equal. Test plugs shall be nickel-plated brass body with neoprene core material, with 1/2-inch NPS fitting and 2 self-sealing valve-type core inserts, suitable for inserting a 1/8-inch O.D. Probe assembly from a dial-type thermometer or pressure gauge. Test plug shall have gasketed and threaded cap with retention chain and body of length to extend beyond insulation. Pressure rating shall be 500 PSIG.

Diaphragm or bladder type expansion tank shall be manufactured by American Wheatley, Amtrol, Armstrong, Bell & Gossett ITT, John Wood Company, Patterson Pump Co, Taco, or Wessels. Unit shall be constructed of welded carbon steel listed for scheduled working pressure, 240 degrees Fahrenheit maximum operating temperature. Separate air charge from system water to maintain design expansion capacity, by means of a flexible diaphragm or bladder securely sealed into tank. Provide taps for pressure gauge, air charge fitting, and drain fitting. Support vertical tanks with steel legs or base; support horizontal tanks with steel saddles. Tanks, with taps and supports, shall be constructed, tested, and labeled in accordance with ASME pressure vessel code. Vent and purge air from hydronic system and charge tank with proper air pressure to suit system design requirements.

Provide air separators, manufactured by American Wheatley, Amtrol Inc, Armstrong Pumps, Bell & Gossett ITT, John Wood Company, Patterson Pump Co, Taco, or Wessels, of the type, size and capacity as scheduled on the drawings. Air separator shall be welded black steel, ASME constructed and labeled for maximum scheduled working pressure and 375 degrees F operating temperature. Provide perforated stainless steel air collector tube designed to direct released air into expansion tank or automatic air vent as indicated on the drawings. Provide inline inlet and outlet connections; screwed connections up to and including 2 inches NPS; flanged connections for 2-1/2 inches NPS and above; threaded blowdown connection; sized as indicated for full system flow capacity. Install isolation valves in the inlet and outlet piping.

Provide chemical feeder, manufactured by American Wheatley, Cleaver Brooks, Culligan USA, John Wood Company, Mogul, Neptune Chemical Pump Co, Vulcan Laboratories, or York-Shipley Inc. Chemical feeder shall be bypass type of 5 gallon capacity, welded steel construction; rated for 125 PSIG working pressure; complete with fill funnel and inlet, outlet, and drain valves. Chemicals shall be specially formulated based on a water analysis of make-up water to prevent accumulation of scale and corrosion in piping system and connected equipment. Install shot-type chemical feeders in each hydronic system where indicated; in upright position with top of funnel not more than 48 inches above the floor. Install feeder in bypass line, off main using globe valves on each side of feeder and in the main between bypass connections. Pipe drain, with ball valve, to nearest equipment drain.

Provide triple duty valves manufactured by American Wheatley, Armstrong, Bell & Gossett ITT, Griswold, Hays, IMI Hydronic, Nexus, Nibco, Pro Hydronic, Taco, or Victaulic. Valve shall be rated for 125 PSIG working pressure, 300 degrees F maximum operating temperature, and shall be cast-iron body with bronze disc and seat, stainless steel stem and spring, and "Teflon" packing. Valves shall have flanged connections and straight or angle pattern as indicated. Features shall include non-slam check valve with spring-loaded weighted disc, and calibrated adjustment feature to permit regulation of pump discharge flow and shutoff.

Provide safety relief valves manufactured by American Wheatley, Armstrong, Bell & Gossett, Keckley, Spence, Spirax Sarco, or Watts. Valve shall be rated for 125 PSIG working pressure and 250 degrees Fahrenheit maximum operating temperature; designed, manufactured, tested, and labeled in accordance with the requirements of section IV of the ASME boiler and pressure vessel code. Valve body shall be cast-iron, with all wetted internal working parts made of brass and rubber. Select valve to suit actual system pressure and BTU capacity.

Provide air vents manufactured by American Wheatley, Amtrol, Armstrong, Bell & Gossett ITT, John Wood, Nexus, Spirax Sarco, or Taco. Manual air vents at heat transfer coils shall be bronze body and nonferrous internal parts, 150 PSIG working pressure, 225 degrees Fahrenheit operating temperature; manually operated with screwdriver or thumbscrew; and having 1/8 inch discharge and inlet connections. Manual air vents in piping mains shall consist of a tee fitting, 1/2 inch ball valve, threaded nipple and cap. Automatic air vents shall be designed to vent automatically with float principle; bronze body and nonferrous internal parts; 150 PSIG working pressure, 240 degrees Fahrenheit operating temperature; and having 1/4 inch discharge connection and 1/2 inch inlet connection.

Provide pump suction diffusers manufactured by American Wheatley, Armstrong, Bell & Gossett ITT, Keckley, Paco, Patterson, or Taco. Diffusers shall have cast-iron body with threaded connections for 2 inch and smaller, flanged connections for 2-1/2 inch and larger; shall be rated for 175 PSIG working pressure, 300 degrees F maximum operating temperature; and shall be complete with the following features: inlet vanes with length 2-1/2 times pump suction diameter or greater. Cylinder strainer with 3/16 inch diameter openings with total free area equal to or greater than 5 times cross-sectional area of pump suction, designed to withstand pressure differential equal to pump shutoff head. Provide stainless steel strainer in condenser water system. Provide disposable fine mesh, stainless steel strainer to fit over cylinder strainer for cleaning during startup procedures. Adjustable foot support, designed to carry weight of suction piping. Blowdown tapping in bottom; gauge tapping in side.

Provide diverting fittings manufactured by Amtrol, Armstrong, Bell & Gossett ITT, or Taco. Diverting fittings shall have cast iron body with threaded ends, or wrought copper with solder ends; and shall be rated for 125 PSIG working pressure, 250 degrees F maximum operating temperature. Indicate flow direction on fitting.

7. TEMPERATURE CONTROLS

A. GENERAL REQUIREMENTS

Provide a complete temperature control system including control panels, controllers, control power transformers, thermostats, sensors, time switches, override timers, actuators, relays, and wiring as required to control the systems as specified on the drawings.

Submit shop drawings of equipment provided for temperature control. Submit operation and maintenance data, including trouble-shooting maintenance guide, step-by-step procedures indexed for each controller and thermostat function, inspection period, cleaning methods and materials, and calibration tolerances.

Provide integrated wiring diagrams showing interconnections between field-installed equipment and package wiring furnished with the HVAC equipment. Control wiring shall be sized to accommodate the voltage drop associated with the distance between the control device and the controller.

Provide supervision and on-job checkout service as required to ensure that installation and operation of the temperature control system meets requirements of the drawings, specifications, and sequences of operation. The system shall be guaranteed for a period of one year following the acceptance of the system by the Architect/Engineer. Correct defects occurring during this period at no additional cost to the Owner.

Install control devices with top of device at 48 inches AFF to meet ADA requirements unless otherwise noted on the plans.

B. BUILDING AUTOMATION CONTROL EQUIPMENT

Building automation system (BAS) manufacturers and model numbers are listed for reference as to quality and features required for the control devices. Provide controllers by Automated Logic, Delta Controls, Honeywell, Johnson Controls, KMC Controls, Schneider Electric, Siemens, or Trane with quality and features as indicated. Control devices other than controllers need not be manufactured by the manufacturers listed above.

Integrate all new equipment specified on this project with the existing control system. Integration of equipment shall provide network communication and visibility of points specified by the sequence of operations and points lists. Provide additional controllers, wiring, and programming as required. Diagnose, troubleshoot, and repair existing communication and control issues on existing equipment being reused to ensure the sequences of operations are met. Incorporate all new and existing equipment being reused into the existing building automation system (BAS) graphical interface. Graphics shall identify locations of all existing and new equipment in relation to building floor plan, equipment status, and user adjustable setpoints from the graphics screen.

Provide BACnet Testing Laboratory (BTL) certified controllers conforming to the advanced application controller (B-AAC) device profile or application specific controller (B-ASC) device profile to facilitate the sequences of operation specified.

Controllers shall have the following features: Microprocessor with sufficient memory to support the controller's operating system, database, and programming requirements; real-time clock for scheduling; self-diagnostics; capability of standalone operation if network communication is lost; logging capability; service communication port for local connection to a portable operator's terminal; local keypad and display for interrogating and editing controller data; diagnostic LEDs for power, communication and processor; non-volatile memory which is capable of maintaining all BIOS and programming information for a minimum of 72 hours; power and noise immunity; and surge and transient protection. Provide a keyed security cover over controller.

Controller software shall support the following applications: System security restricting modification without password; object scheduling with daily, weekly, annual, holiday, and exception events; alarm reporting via text message or email and logging; maintenance management; sequencing; PID control characteristics; staggered starting of equipment; anti-short cycling; on-off control with differential; trending; run-time, pulse, and event totalization;

Network all HVAC controllers together, including controllers furnished with packaged equipment, using a common communication backbone that is capable of central access. Network communication protocol shall be based upon BACnet protocol complying with ASHRAE Standard 135. Physical/Data Link communication bus between controllers shall be EIA 485 twisted cable pair according to Master Slave/Token Passing (MS/TP) protocol or Ethernet according to ISO 8802-2 protocol

Provide password protected web-based or web-accessible interface to the network over the Internet via the Owner's local area network (LAN) connection. Interface shall include system graphics, text-based parameter display, and be compatible with standard web browsers. Interface shall grant the user access to all system data and the ability to view alarms, adjust setpoints, monitor equipment status, adjust schedules, and trend data points.

Provide an independent, standalone controller that provides centralized local interface to the network. Interface shall include system graphics and text-based parameter display. Interface shall grant the user access to all system data and the ability to view alarms, adjust setpoints, monitor equipment status, adjust schedules, and trend data points.

Provide control panels listed according to UL 508A and NEMA rated according to its installation location. Provide common keying for all panels.

C. THERMOSTAT CONTROL EQUIPMENT

Provide thermostat control equipment with sufficient communication, programming, input and output connections, and modulating or staging capability to meet the sequence of operations. Provide thermostats with the features as indicated:
1. LCD or LED display screen.
2. Button or touchscreen interface.
3. Display temperature.
4. Display temperature setpoint.
5. Adjust temperature setpoint.
6. Limit temperature setpoint adjustment within plus or minus 3 degrees F.
7. Display operating mode.
8. Adjust operating mode.
9. Adjust schedule, minimum seven day occupied/unoccupied.
10. Adjust fan switch setting.
11. Security lockout.
12. Security cover.
13. Insulated backing for exterior wall mounting.
14. Recessed mounting with aspirating box.
15. Color: <insert color here>.
16. At contractor's option where multiple sensors are shown, the sensors may be provided with the thermostat in a single device.

Provide thermostat control equipment that shall interface with a BAS by Automated Logic, Delta Controls, Honeywell, Johnson Controls, KMC Controls, Schneider Electric, Siemens, or Trane with quality and features as indicated.

Provide programmable thermostats or controllers with wall module interfaces that shall control non-packaged equipment requiring customized controls per the sequence of operations by Automated Logic, Delta Controls, Honeywell, Johnson Controls, Schneider Electric, Siemens, or Trane with quality and features as indicated. Include additional controllers and sensors as required for economizer operation.

Provide programmable thermostats that shall control packaged equipment by the packaged equipment manufacturer or Honeywell, Johnson Controls, Trane, or equal.

Provide wall or duct-mounted humidistat as indicated on the drawings that is compatible with the thermostat.

Provide economizer controllers for equipment specified to include economizer in its sequence of operation but is not factory furnished with economizer controls included. Economizer controller shall be Honeywell YW7220 Jade Economizer module kit or equal. Economizer module kit shall include the economizer logic module, damper actuator, and sensors of type required to implement the type of economizer scheduled on the drawings.

D. SENSORS AND RELAYS

Manufacturers and model numbers are listed for reference as to quality and features required for the sensors and relays. Provide general-purpose type sensing elements for use in input and output sensors. Provide transmitters or transducers with sensor as required, compatible with the controllers used, with range suitable for the systems encountered. Transmitters and transducers shall have offset and span adjustments, temperature compensation, shock and vibration immunity, and zeroing capability. Accuracy requirements shall include the combined effects of linearity, hysteresis, repeatability, and the transmitter.

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

Provide remote sensors where indicated on the drawings and integrate them with the thermostat control equipment. Remote sensors shall have the following features:
1. Wired connection.
2. Wireless connection.
3. Temperature sensor.
4. Blank faceplate.
5. Temperature setpoint adjust button with plus/minus 3 degree setpoint.
6. Operating mode override button.
7. At contractor's option where multiple remote sensors are shown for a single unit, the sensors may be provided in a single device.

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

Provide 24 Volt or 120 Volt timeswitches Intermatic Series FM1D20 or equal programmable type with 7-day programming with up to two "ons" and "offs" per day. Battery backup shall provide 48 hours of memory retention. Override timer switches shall be spring wound, 6-hour, normally open type. Coordinate 120 V wiring of timeswitch with electrical contractor if 120 V model is provided.

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

Provide magnetic contactors for sensing open doors or windows as required per the drawings with rating and configuration that is suitable for the application by Interlogix or approved equal. Number of contacts and operational function shall be as required to meet the sequence of operation. Contacts shall be UL listed and factory tested. The magnetic contacts shall be designed for easy installation and shall be replaceable without damaging the door or window. Coordinate final sensor type and location with Architect prior to ordering.

E. WIRING

Provide electrical and control wiring as specified under the section "Electrical Wiring."

8. SEQUENCE OF OPERATION

A. WATER SOURCE HEAT PUMP UNIT CONTROL

Reference the Water Source Heat Pump Unit Control Matrix for sequence of operations.

B. WATER SOURCE HEAT PUMP DOAS UNIT CONTROL

Reference the Water Source Heat Pump DOAS unit Control Matrix for sequence of operations.

C. CONDENSER WATER PLANT CONTROL

Reference sheet M-700 for the Condenser Water Plant schedules and sequence of operations.

D. EXHAUST FAN CONTROL

DWEF 1 Dishwasher: Dishwasher exhaust fan shall be interlocked with associated dishwasher.
EF 1 Restroom: Electrical contractor to interlock fan with 7 day time clock. Fan to operate during occupied hours and shut down during unoccupied hours.

E. KITCHEN EXHAUST FAN CONTROL

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

9. COMMISSIONING

Provide commissioning that verifies and documents the commissioned building systems have been designed, installed, and function according to the owner's project requirements, construction documents, and to minimum code requirements. Retain the services of a third-party registered design professional or approved agency that is regularly engaged in conducting commissioning to develop a commissioning plan, supporting documentation, and reports. Refer to the latest adopted edition of the applicable energy code for more information. Complete all related commissioning requirements prior to final inspections. Submit final TAB report and final commissioning report to the Engineer and Owner within 90 days of the date of receipt of the certificate of occupancy.

ASHRAE 90.1 Commissioning Requirements: Test control systems to ensure the control elements are calibrated, adjusted, and in proper working condition. Commission systems according to ASHRAE Guideline 1.1 "HVAC&R Technical Requirements for the Commissioning Process", most current edition.

California Title 24 Commissioning Requirements: Comply with the commissioning requirements according to the Non-Residential Certification of Compliance (NRCC-CXR) on the drawings. Perform commissioning in accordance with the California Energy Code Section 120.8.

IECC Commissioning Requirements: Provide commissioning of all mechanical systems included in the scope of work, except for packaged equipment not equipped with an economizer. Packaged equipment includes unitary air conditioners and condensing units, unitary air-cooled and water-cooled heat pumps, and packaged terminal air conditioning units. Contract the third-party registered design professional or approved agency to develop a commissioning plan, preliminary commissioning report, and final commissioning report.

Commissioning plan shall include the following:
1. Narrative description of activities and personnel required during commissioning.
2. List of equipment and systems to be tested with description of tests to be performed.
3. List of functions to be tested, including calibration and economizer controls.
4. List of conditions under which the tests shall be performed.
5. List of measurable criteria for performance.

Submit a copy of the preliminary commissioning report to the AHJ. Preliminary commissioning report shall include the following:
1. Results of preliminary functional performance tests. Organize equipment and components specified by other Divisions in separate sections for independent review.
2. List of functional performance testing procedures used during commissioning, including measurable criteria for test acceptance.
3. Completed Commissioning Compliance Checklist. Refer to energy code for the form.
4. Itemization of deficiencies found during testing that have not been corrected at the time of preliminary commissioning report preparation.
5. List of deferred tests that cannot be performed at the time of preliminary commissioning report preparation because of climatic conditions.
6. List of climatic conditions required for the performance of the deferred tests.

Final commissioning report shall include the following:
7. Results of final functional performance tests. Organize equipment and components specified by other Divisions in separate sections for independent review.
8. List of functional performance testing procedures used during commissioning, including measurable criteria for test acceptance.
9. Itemization of resolved deficiencies

Conduct functional performance tests on equipment, controls, and economizers. Functional performance tests shall demonstrate the following:

11. The operation, function, and maintenance serviceability for each commissioned equipment, component, and system is confirmed according to the approved plans and specifications.
12. The sequence of operations, including modes, backup modes (if applicable), alarms, and mode of operation upon a loss of power and restoration of power for each control device, equipment, component, and system.
13. Control devices, components, equipment, and systems are calibrated, adjusted, and operate in accordance with the approved plans and specifications.
14. Air economizers operated in accordance with manufacturer's specifications and specified sequence of operation.

10. ALTERNATES

A. DESCRIPTION

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

END OF SECTION 23

FORMGROUP

PROGRESS SET OF REVISION 4.2.1

07/24/2025

FOR COORDINATION PURPOSES ONLY
MASTER PERMIT REVISION PENDING

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AT CITYGROUP CENTER

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REVISIONS:

3.1 REV #3.1 07/26/24

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