PROJECT GENERAL NOTES

* REMOVE ALL UNUSED PIPING, DUCTWORK AND ACCESSORIES.
* THE MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD VERIFYING, PRIOR TO FINAL BID, ALL EXISTING CONDITIONS FOR PLUMBING AND MECHANICAL SYSTEMS WITHIN TENANT SPACE AND WITHIN CLOSE PROXIMITY OF TENANT SPACE.
* WHERE FLOOR DRAINS OCCUR WITHIN THE LIMITS OF CONSTRUCTION, PREVENT CONSTRUCTION DEBRIS FROM ENTERING DRAIN BODY BY SEALING DRAIN OPENING PRIOR TO START OF WORK. UNSEAL DRAINS AT COMPLETION OF CONSTRUCTION.
* COORDINATE INSTALLATION OF PIPING, DUCTWORK, CONDUIT, LIGHTS, CABLE TRAY, STRUCTURE, AND EQUIPMENT TO PREVENT CONFLICTS.
* THE CONTRACTOR SHALL BE FAMILIAR WITH ALL THE CONDITIONS BOTH EXISTING AND THOSE ILLUSTRATED BY THESE DOCUMENTS AS WELL AS THOSE WHICH CAN BE REASONABLY ANTICIPATED INCLUDING, BUT NOT LIMITED TO ARCHITECTURAL, ELECTRICAL, VENTILATION, PLUMBING, AND OTHER SYSTEMS INVOLVED ON THIS PROJECT.
* FINAL PRODUCT SHALL BE A COMPLETE AND FUNCTIONING SYSTEM, AND SHALL CONFORM TO ALL REQUIREMENTS OF APPLICABLE FEDERAL, STATE, AND LOCAL CODES, INCLUDING BUT NOT LIMITED TO THE INTERNATIONAL BUILDING CODE AND INTERNATIONAL MECHANICAL CODE.
* ALL ROOF MOUNTED EQUIPMENT SHALL BE A MINIMUM 10'-0" FROM EDGE OF ROOF.
* LOCATE DUCTWORK, PIPING AND MECHANICAL EQUIPMENT AWAY FROM THE SPACE ABOVE ELECTRICAL PANELS. TRANSFORMERS AND OTHER ELECTRICAL EQUIPMENT.
* FIRE SEAL AROUND DUCT AND PIPING PENETRATIONS OF FIRE RATED WALLS. REFER TO SPECIFICATION.
* PROVIDE SLEEVES AND/OR OPENINGS TO RUN PIPES AND DUCTS THROUGH FOUNDATIONS, FLOORS, WALLS, AND ROOF.
* ADJUST PIPING AND DUCTWORK SIZES TO PROPERLY CONNECT TO MECHANICAL EQUIPMENT.
* REFER TO PLUMBING SERIES DRAWINGS FOR GAS AND A.C. CONDENSATE DRAIN PIPING.
* PIPE SIZES SHOWN SHALL BE CONTINUED IN THE DIRECTION OF FLOW UNTIL ANOTHER SIZE IS SHOWN.
* FOR DETAILS, EQUIPMENT CONNECTIONS, AND PIPE SIZES NOT SHOWN ON THE SEGMENTS, REFER TO DETAILS, SCHEDULES, AND SPECIFICATIONS.
* INSTALL ALL EQUIPMENT IN ACCORDANCE WITH THE RESPECTIVE MANUFACTURER'S WRITTEN INSTALLATION INSTRUCTIONS, AT A LEVEL OF QUALITY AND WORKMANSHIP CONSISTENT WITH THE SPECIFICATIONS.
* LOCATIONS OF PIPING, DUCTWORK AND EQUIPMENT AS INDICATED ON THE DRAWING, ARE APPROXIMATE AND SUBJECT TO MINOR ADJUSTMENTS IN THE FIELD. WORK SHALL BE COORDINATED WITH ALL OTHER TRADES TO AVOID INTERFERENCE IN THE FIELD.
* INSTALL EXPOSED PIPING AND DUCTWORK AS HIGH AS PRACTICAL IN ROOMS WITHOUT CEILINGS U.N.O.

HVAC GENERAL NOTES

* CONTRACTOR SHALL LOCATE THERMOSTATS AND TEMPERATURE SENSORS AT 4'-0" AFF, A MAXIMUM OF 8" FROM LIGHT SWITCH.
* PROVIDE A 4" HOUSEKEEPING PAD FOR EACH PIECE OF MECHANICAL EQUIPMENT. COORDINATE SIZES WITH MECHANICAL EQUIPMENT SELECTED.
* ALL SUPPLY, RETURN, AND EXHAUST DUCTWORK SHALL BE RATED FOR PRESSURE CLASS OF 2" W.G. UNLESS NOTED OTHERWISE.
* THIS CONTRACTOR SHALL BE REQUIRED TO REPLACE FILTERS ON HVAC EQUIPMENT AFTER ALL DUST PRODUCING CONSTRUCTION HAS BEEN COMPLETED AND PRIOR TO THE FINAL PUNCH.

GENERAL MECHANICAL NOTES

1. INSTALLATION OF THE MECHANICAL SYSTEM SHALL BE BY A LICENSED CONTRACTOR PER THE STATE BUILDING, MECHANICAL ENERGY, FIRE, PLUMBING AND HEALTH CODES, AND REGULATIONS AS ADOPTED BY LOCAL JURISDICTIONS.
2. ALL EQUIPMENT SHALL BE THE CAPACITY AND TYPE AS SHOWN ON THE EQUIPMENT SCHEDULE AND SHALL BE THE LISTED MANUFACTURER AND MODEL NUMBER OR SHALL BE AN EQUAL APPROVED BY THE OWNER/ENGINEER.
3. CONTRACTOR IS TO BRING UP THE DISCREPANCIES AND ITEMS WHICH ARE NOT SPECIFICALLY CALLED FOR OR SHOWN BUT ARE REQUIRED FOR A COMPLETE MECHANICAL SYSTEM. ALL SUCH ITEMS REQUIRED FOR A COMPLETE SYSTEM READY FOR THE OWNER'S BENEFICIAL USE SHALL BE FURNISHED AND INSTALLED INCLUDING ALL SUCH DISCREPANCY ITEMS MENTIONED ABOVE, AT NO ADDITIONAL COST TO THE OWNER AND PER LOCAL CODES, MANUFACTURER'S RECOMMENDATIONS AND APPLICABLE STANDARDS WITH THE ARCHITECT/ENGINEER'S APPROVAL.
4. ALL EQUIPMENT SUPPLIED FOR THESE SPECIFICATIONS SHALL BE FREE FROM DEFECTS IN MATERIAL, WORKMANSHIP, AND TITLE, AND SHALL BE OF THE KIND AND QUALITY DESCRIBED HEREIN. IF IT APPEARS WITHIN ONE YEAR FROM DATE OF FINAL ACCEPTANCE THAT EQUIPMENT DOES NOT MEET THE WARRANTIES ABOVE, THE CONTRACTOR SHALL IMMEDIATELY CORRECT ANY DEFECT AND SHALL RESTORE THE SYSTEM TO THE ORIGINAL SATISFACTORY CONDITIONS AT HIS EXPENSE. THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF OTHER WARRANTIES, WHETHER WRITTEN, ORAL, IMPLIED, OR STATUTORY. NO WARRANTY OR MERCHANT ABILITY OF FITNESS FOR PURPOSE SHALL APPLY (THE WARRANTY SHALL START FROM THE TIME OF ARCHITECT/ENGINEER'S FINAL ACCEPTANCE).
5. COORDINATE THE CONSTRUCTION SCHEDULE WITH THE GC AND PERFORM ALL REQUIRED WORK IN STRICT ACCORDANCE WITH THE OWNER'S SCHEDULE.
6. MECHANICAL CONTRACTOR SHALL PAY FOR AND OBTAIN ALL REQUIRED PERMITS AND CERTIFICATES REQUIRED BY THE AUTHORITIES HAVING JURISDICTION.
7. HVAC NOTES:
   A. PROVIDE FLEXIBLE CONNECTION IN ALL DUCTS CONNECTING TO AIR MOVING EQUIPMENT AS CLOSE TO FAN AS POSSIBLE. FLEXIBLE CONNECTION SHALL CONSIST OF 6" OR MORE OF AIR TIGHT, FIRE PROOF FLEXIBLE NEOPRENE COATED WOVEN FIBROUS GLASS MATERIAL. VENT FABRICS, INC. OR APPROVED EQUAL.
   B. ALL MAIN TRUNK AND BRANCH TAKEOFF DUCTWORK SHALL BE SHEET METAL. FLEXIBLE DUCT IS ALLOWED ON LAST 6' SERVING GRDs. FIBERGLASS DUCTWORK SHALL NOT BE USED.
   C. ALL SUPPLY & RETURN FLEXIBLE DUCTS CONNECTING TO GRILLES, REGISTERS AND DIFFUSERS SHALL BE CONSTRUCTED OF DOUBLE LAMINATION OF POLYESTER ENCAPSULATED STEEL WIRE HELIX FOR INNER CORE HIGH DENSITY FIBERGLASS INSULATION AND GRAY POLYESTER FILM WITH SPIRAL REINFORCEMENTS, EQUAL TO ATCO-70 SERIES (MIN. POS. PRESS. = 6' W.C. NEG. PRESS. = 0.75" W.C. & R=5.79).
   D. SEAL ALL DUCTWORK JOINTS PER SMACNA CLASS C FOR SYSTEMS UP TO 2 IN W.G. AND SEAL ALL JOINTS AND SEAMS PER SMACNA CLASS B FOR SYSTEMS GREATER THAN 2 IN W.G.
   E. ALL EQUIPMENT, DUCTWORK AND PIPING SHALL BE STRUCTURALLY SUPPORTED AND SECURELY FASTENED TO BUILDING STRUCTURE IN AN ACCEPTABLE MANNER TO OWNER, ARCHITECT, ENGINEER AND LOCAL JURISDICTION AND SHALL BE SEISMICALLY BRACED PER THE SMACNA AND/OR REQUIRED BY LOCAL JURISDICTIONS.
   F. PROVIDE LOCKABLE VOLUME DAMPERS IN ALL TAKEOFFS.
   G. DUCT HANGERS, SUPPORTS AND METHODS OF INSTALLATION SHALL CONFORM TO ASHRAE & SMACNA RECOMMENDATIONS.
   H. DUCT SIZES SHOWN ON PLANS INDICATE INSIDE FREE AREA.
   I. ALL DUCTWORK SHALL BE CLASS-1 AIR DUCT AS APPROVED BY U.L.-181.
   J. ALL SQUARE ELBOWS SHALL HAVE TURNING VANES.
   K. DUCT INSULATION SHALL BE PROVIDED PER DUCT INSULATION SCHEDULE ON M0.00.
8. ALL FIRE RATED STRUCTURE SHALL BE FIRE DAMPERED AS REQUIRED BY THE JURISDICTION.
9. FLEXIBLE DUCTS SHALL HAVE MAXIMUM 6 FEET LENGTH UNLESS SHOWN OTHERWISE AND SHALL NOT PENETRATE THROUGH ANY FIRE RATED WALLS. DO NOT INSTALL FLEXIBLE DUCTS WITHIN 6 FEET OF HEATING ELEMENT.
10. HVAC SYSTEM SHALL BE STARTED UP AND FUNCTIONALLY TESTED BY MECHANICAL CONTRACTOR. MECHANICAL CONTRACTOR SHALL CONFIRM THAT ALL HVAC SYSTEMS ARE READY FOR TESTING, ADJUSTING, AND BALANCING. HVAC SYSTEMS SHALL BE TESTED, ADJUSTED, AND BALANCED (TAB) BY CONTRACTOR CERTIFIED BY THE AABC, NEBB, OR OTHER APPROVED AGENCY. REFRIGERATION PIPING SHALL BE TESTED UNDER PRESSURE AND PROVEN TO BE LEAK FREE. REFRIGERATION SYSTEM SHALL BE STARTED UP AND BROUGHT DOWN TO DESIGN TEMPERATURE.
11. MECHANICAL, HVAC, AND PLUMBING ELEMENTS SHALL AT NO TIME COME IN CONTACT WITH CEILING CONSTRUCTION EXCEPT AS NECESSARY PENETRATIONS MAY REQUIRE. ESCUTCHEONS SHALL BE USED ON ALL VISIBLE PENETRATIONS
12. ACCESS SHALL BE PROVIDED BY GC AS REQUIRED FOR INSTALLATION AND MAINTENANCE OF MECHANICAL,ELECTRICAL, AND OTHER ELEMENTS WITHIN CEILING SPACE AND AS REQUIRED BY CODE. LOCATIONS FOR SPECIAL ACCESS DOORS, HATCHES, ETC. SHALL BE COORDINATED WITH OTHER TRADES.
13. INSPECTIONS, AS REQUIRED BY LOCAL AUTHORITIES, SHALL BE COORDINATED BY GC PRIOR TO CLOSING OF CEILING.
14. SHOP DRAWINGS FOR ALL RELATED TRADES (PLUMBING, HVAC) SHALL BE SUBMITTED FOR REVIEW/APPROVAL PRIOR TO MANUFACTURING AND INSTALLATION.
15. ALL HVAC ELEMENTS SHALL MATCH ADJACENT WALL OR CEILING FINISH COLOR, INSTALLED FLUSH AND TRUE AND CENTERED WITHIN THE CEILING GRID. LOCATIONS SHALL BE PER APPROVED MECHANICAL PLANS.
16. INSULATION OF COLD WATER LINES SHALL BY PROVIDED TO PREVENT CONDENSATION DAMAGE AND IN OBSERVANCE OF ENERGY CONSERVATION PRACTICES, HOT WATER HEATING LINES SHALL BE INSULATED - SEE SPECIFICATIONS.
17. CONTRACTOR SHALL LOCATE THERMOSTATS AND TEMPERATURE SENSORS IN ACCESSIBLE SPACES AT 4'-0" AND UNITS IN ALL OTHER SPACES AT 5'-0". UNITS AT 5' SHALL BE MOUNTED ALIGNED VERTICALLY WITH LIGHT SWITCHES WHERE APPLICABLE. LOCATIONS PER MECHANICAL PLAN AND TO BE COORDINATED BY GC WITH OTHER TRADES.
18. ALL BROCHURES, OPERATING MANUALS, CATALOGS, SHOP DRAWINGS, ETC. SHALL BE TURNED OVER TO THE OWNER AT JOB COMPLETION. ALL PRODUCT WARRANTY REGISTRATION CARDS, APPLICATIONS, AND CERTIFICATES SHALL BE COMPLETED AND TURNED OVER TO THE OWNER.
19. THIS CONTRACTOR SHALL BE REQUIRED TO REPLACE FILTERS ON HVAC EQUIPMENT AFTER ALL DUST PRODUCING CONSTRUCTION HAS BEEN COMPLETED AND PRIOR TO THE FINAL PUNCH.

ABBREVIATIONS

Ø	ROUND
ABV	ABOVE
AC	AIR CONDITIONING
AD	AREA DRAIN
ADD	ADDENDUM
AFF	ABOVE FINISHED FLOOR
AFUE	ANNUAL FUEL UTILIZATION EFFICIENCY
ALT	ALTERNATE
AP	ACCESS PANEL
ARCH	ARCHITECT/ARCHITECTURAL
BFF	BELOW FINISHED FLOOR
BLW	BELOW
BTU	BRITISH THERMAL UNITS
BTUH	BRITISH THERMAL UNITS PER HOUR
CAP	CAPACITY
CB	CATCH BASIN
CFM	CUBIC FEET PER MINUTE
CLG	CEILING
CO	CLEAN OUT
CW	COLD WATER
D	DEGREE
DB	DRY BULB
DIA	DIAMETER
DN	DOWN
DW	DISTILLED WATER
EA	EACH
EAT	ENTERING AIR TEMPERATURE
ELEC	ELECTRICAL
EQUIP	EQUIPMENT
EWC	ELECTRIC WATER COOLER
EWT	ENTERING WATER TEMPERATURE
E/A	EXHAUST AIR
EXIST	EXISTING
F	DEGREES FAHRENHEIT
FCO	FLOOR CLEAN OUT
FD	FLOOR DRAIN
FD	FIRE DAMPER
FDV	FIRE DEPARTMENT VALVE
FL	FLOOR
FO	FUEL OIL
FOV	FUEL OIL VENT
FOR	FUEL OIL RETURN
FOS	FUEL OIL SUPPLY
FPM	FEET PER MINUTE
FS	FLOOR SINK
FT	FOOT/FEET
FTR	FIN TUBE RADIATION
GAL	GALLON
GC	GENERAL CONTRACTOR
GPM	GALLONS PER MINUTE
GW	GREASE WASTE
HB	HOSE BIB
HP	HORSE POWER
HTG	HEATING
HTR	HEATER
HW	HOT WATER
HYD	HYDRANT
ID	INDIRECT
IN	INCH
INV	INVERT
LB	POUND
LB/HR	POUNDS PER HOUR
LAT	LEAVING AIR TEMPERATURE
LP	LOW PRESSURE
LPG	LIQUEFIED PETROLEUM GAS
LVR	LOUVER
LWT	LEAVING WATER TEMPERATURE
M/A	MIXED AIR
MAX	MAXIMUM
MBH	ONE THOUSAND BTU PER HOUR
MCF	ONE THOUSAND CUBIC FEET
MD	MOTORIZED DAMPER
MECH	MECHANICAL
MFR	MANUFACTURER
MIN	MINIMUM
MISC	MISCELLANEOUS
MTR	MOTOR
MU/A	MAKE-UP/AIR
NC	NOISE CRITERIA
NC	NORMALLY CLOSED
NIC	NOT IN CONTRACT
NO	NUMBER
NO	NORMALLY OPEN
NTS	NOT TO SCALE
O	OXYGEN
O/A	OUTSIDE AIR
ORD	OVERFLOW ROOF DRAIN
PD	PRESSURE DROP
PIV	POST INDICATOR VALVE
PLBG	PLUMBING
PRESS	PRESSURE
PRV	PRESSURE REDUCING VALVE
PSI	POUNDS PER SQUARE INCH
PSIG	POUNDS PER SQUARE INCH GAUGE
PWR	POWER
R	DUCT RISER
R/A	RETURN AIR
RCP	RADIANT CEILING PANEL
RD	ROOF DRAIN
REC	RECESSED
RED	REDUCER
RH	RELATIVE HUMIDITY
RL/A	RELIEF AIR
RM	ROOM
RPM	REVOLUTIONS PER MINUTE
RW	RAIN WATER
SF	SQUARE FOOT
S/A	SUPPLY AIR
SAN	SANITARY
SF	SQUARE FOOT
SD	SMOKE DAMPER
SM	SURFACE MOUNT
SP	STANDPIPE
SP	STATIC PRESSURE
STM	STEAM
T	THERMOSTAT
TD	TEMPERATURE DROP
TDR	TRENCH DRAIN
TEMP	TEMPERATURE
TYP	TYPICAL
UG	UNDERGROUND
VAC	VACUUM
V	VENT
VAV	VARIABLE AIR VOLUME
VENT	VENTILATION
VTR	VENT THROUGH ROOF
W	WASTE
WB	WET BULB
WCO	WALL CLEAN OUT
WH	WALL HYDRANT

CODE COMPLIANCE

BUILDING MECHANICAL SYSTEMS ARE DESIGNED IN ACCORDANCE WITH THE FOLLOWING CODES:

- 2021 INTERNATIONAL MECHANICAL CODE
- 2021 INTERNATIONAL PLUMBING CODE
- 2021 IECC INTERNATIONAL ENERGY CONSERVATION CODE
- ANSI/ASHRAE/IESNA STANDARD 90.1-2019 ENERGY STANDARD FOR BUILDINGS EXCEPT FOR LOW-RISE RESIDENTIAL BUILDINGS
- ANSI/ASHRAE STANDARD 62.1-2019 VENTILATION FOR ACCEPTABLE INDOOR AIR QUALITY

HVAC DESIGN CRITERIA

BILLINGS, MONTANA

ANNUAL DESIGN CONDITIONS: ASHRAE FUNDAMENTALS 2017

WEATHER STATION - BILLINGS LOGAN INT'L ARPT, MT WMO# 726770
ELEVATION: 3570' LAT: 45.81N LONG: 108.54W
WINTER: -11.6 (99.6%)
SUMMER: 94.9 DRY BULB (0.4%)
63.0 WET BULB (0.4%)

INDOOR DESIGN CONDITIONS:
WINTER: 70 ± 2º F
SUMMER: 75 ± 2º F

EQUIPMENT ABBREVIATIONS

AC	AIR CONDITIONING UNIT	FC	FAN COIL
AHU	AIR HANDLING UNIT	FP	FIRE PUMP
AS	AIR SEPARATOR	GI	GREASE INTERCEPTOR
B	BOILER	GRV	GRAVITY ROOF VENTILATOR
BP	BOILER PUMP	HP	HEAT PUMP
CC	COOLING COIL	HS	HYDRAULIC SEPARATOR
CH	CHILLER	HWP	HEATING WATER PUMP
CT	COOLING TOWER	HX	HEAT EXCHANGER
CU	CONDENSING UNIT	HRV	HEAT RECOVERY VENTILATOR
CWP	CONDENSER WATER PUMP	MAU	MAKE-UP AIR UNIT
CHWP	CHILLED WATER PUMP	P	PUMP
DBP	DOMESTIC WATER BOOSTER PUMP	RF	RETURN FAN
DCP	DOMESTIC WATER CIRCULATING PUMP	RTU	ROOF TOP UNIT
DF	DUCT FURNACE	SD	SLIM DUCT
DH	DUCT HEATER	SEP	SEWAGE EJECTOR PUMP
EF	EXHAUST FAN	SF	SUPPLY FAN
EH	ELECTRIC HEATER	SP	SUMP PUMP
ERV	ENERGY RECOVERY VENTILATOR	UH	UNIT HEATER
ET	EXPANSION TANK	VAV	VARIABLE AIR VOLUME BOX
F	FURNACE	WH	WATER HEATER
		WM	WALL MOUNT

PIPING INSULATION SCHEDULE - INTERNATIONAL ENERGY CONSERVATION CODE

FLUID OPERATING TEMPERATURE RANGE AND USAGE [°F]	INSULATION CONDUCTIVITY		NOMINAL PIPE OR TUBE SIZE [INCHES]				
	CONDUCTIVITY [BTU-IN/HR-FT²-°F]	MEAN RATING TEMPERATURE [°F]	< 1	1 TO < 1-1/2	1-1/2 TO < 4	4 TO < 8	>=8
141 - 200	0.25 - 0.29	125	1.5	1.5	2.0	2.0	2.0
105 - 140	0.21 - 0.28	100	1.0	1.0	1.5	1.5	1.5
40 - 60	0.21 - 0.27	75	0.5	0.5	1.0	1.0	1.0

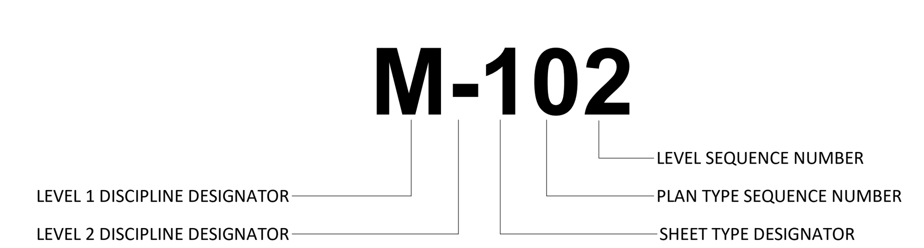
DUCT INSULATION SCHEDULE

DUCT SYSTEM	OUTSIDE BUILDING ENVELOPE, EXPOSED TO ENVIRONMENT	OUTSIDE BUILDING ENVELOPE, WITHIN BUILDING	WITHIN THE BUILDING ENVELOPE
SUPPLY AIR OUTSIDE AIR FRESH AIR	MIN. R-12 INSULATION & VAPOR BARRIER. PRE-ENGINEERED Q-DUCT OR SIMILAR	MIN. R-6 INSULATION & VAPOR BARRIER	MIN. R-6 INSULATION & VAPOR BARRIER WHERE UNCONDITIONED
RETURN AIR RELIEF AIR TRANSFER AIR GENERAL EXHAUST AIR	MIN. R-12 INSULATION & VAPOR BARRIER. PRE-ENGINEERED Q-DUCT OR SIMILAR	MIN. R-6 INSULATION & VAPOR BARRIER	MIN. R-6 INSULATION WHERE UNCONDITIONED
RETURN AIR PLENUMS @ GRILLES	N/A	LINE GRILLE PLENUM AND FIRST 6 FT OF DUCT MIN. R-6 INSULATED	LINE GRILLE PLENUM AND FIRST 6 FT OF DUCT MIN. R-6 INSULATED
GREASE EXHAUST AIR	N/A	N/A	MIN. R-6 GREASE DUCT FIRE INSULATION. FYREWRAP ELITE OR SIMILAR

REMARKS:
1. ALL DUCT DIMENSIONS INDICATE INSIDE FREE DIMENSIONS AND DO NOT INCLUDE INSULATION THICKNESS.
2. THE 6' OF EXHAUST DUCT NEAREST TO THE EXTERIOR TO BE INSULATED WITH MIN. R-6 INSULATION (1 1/2" THICKNESS, 0.24 K VALUE).

2021 INTERNATIONAL ENERGY CONSERVATION CODE NOTES

1. PROVIDE COMMISSIONING PLAN IN ACCORDANCE WITH INTERNATIONAL ENERGY CONSERVATION CODE SECTION C408.2.1.
2. PROVIDE COMMISSIONING COMPLIANCE REPORT IN ACCORDANCE WITH INTERNATIONAL ENERGY CONSERVATION CODE SECTION C407.3.1 & C407.3.2.
3. PROVIDE SYSTEMS TESTING AND BALANCING IN ACCORDANCE WITH INTERNATIONAL ENERGY CONSERVATION CODE SECTION C408.2.2.
   A. PROVIDE TAB REPORT FOR ALL AIR MOVING EQUIPMENT TO ENGINEER OF RECORD. ALL AIRFLOWS INDICATED ON PLANS ARE UNDER NORMAL OPERATING CONDITIONS WITH ALL SYSTEMS RUNNING IN OCCUPIED MODE AT MINIMUM OUTSIDE AIR.
4. PROVIDE SYSTEMS, EQUIPMENT, AND CONTROLS FUNCTIONAL TESTING IN ACCORDANCE WITH INTERNATIONAL ENERGY CONSERVATION CODE SECTION C408.2.3.
5. PROVIDE SUPPORTING DOCUMENTATION IN ACCORDANCE WITH INTERNATIONAL ENERGY CONSERVATION CODE CHAPTER 1 CHECKLIST, INCLUDING OPERATION AND MAINTENANCE MANUALS, HVAC CONTROL SYSTEM MAINTENANCE AND CALIBRATION INFORMATION, HVAC CONTROL SEQUENCE OF OPERATIONS, COMMISSIONING REPORT, AND RECORD DRAWINGS.
6. PROVIDE OWNER SYSTEMS OPERATION TRAINING IN ACCORDANCE WITH INTERNATIONAL ENERGY CONSERVATION CODE SECTION C103.6.
7. MOTORS SHALL COMPLY WITH SECTION C403.8 OF THE INTERNATIONAL ENERGY CONSERVATION CODE. FOR ADDITIONAL DETAILS, SEE EQUIPMENT SCHEDULES CONTAINED WITHIN THIS DRAWING SET.
8. SYSTEMS SHALL BE INSULATED AS PRESCRIBED IN SECTION C403.12. FOR ADDITIONAL DETAILS, SEE DUCTWORK AND PIPING SPECIFICATION MATRICES CONTAINED WITHIN THIS DRAWING SET.

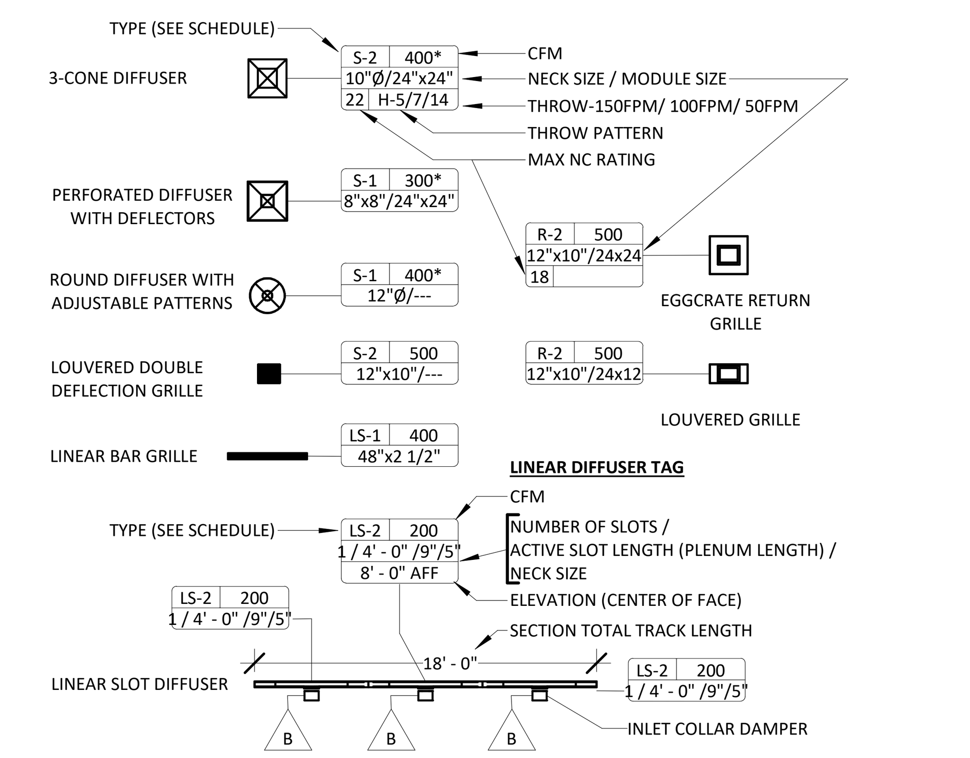


* NOTE *
THE SYMBOLS AND ABBREVIATIONS SHOWN ON THIS SHEET MAY OR MAY NOT BE USED IN THIS SET OF DRAWINGS.

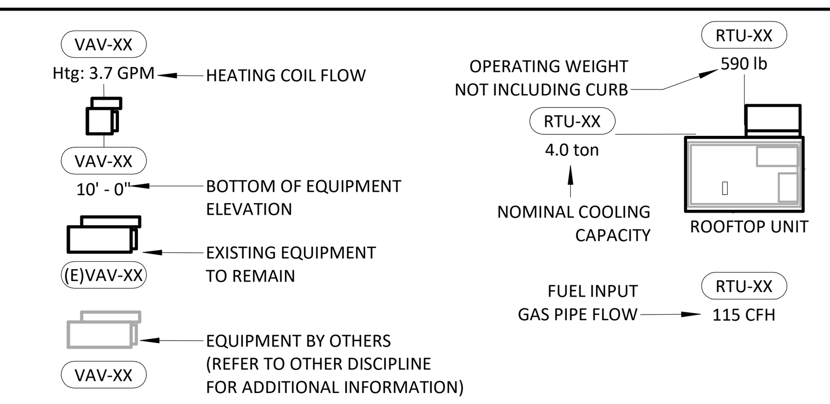
PLUMBING AND PIPING SYMBOLS

CHWR	CHILLED WATER RETURN
CHWS	CHILLED WATER SUPPLY
CWR	CONDENSER WATER RETURN
CWS	CONDENSER WATER SUPPLY
BWR	GEOTHERMAL WATER RETURN
BWS	GEOTHERMAL WATER SUPPLY
HWR	HEATING WATER RETURN
HWS	HEATING WATER SUPPLY
REF-L	REFRIGERANT-LIQUID
REF-S	REFRIGERANT-SUCTION
REF-HG	REFRIGERANT-HOT GAS
EQ	DIRECT VENT - INTAKE
DV-E	DIRECT VENT - EXHAUST
CD	CONDENSATE DRAINAGE
NG	NATURAL GAS

GRILLES, REGISTERS & DIFFUSERS TAG



MECHANICAL EQUIPMENT TAGS



HVAC SYMBOLS

16"x8"	SQUARE DUCT SIZE TAG (WIDTH x HEIGHT)
16"/8"	OVAL DUCT SIZE TAG (WIDTH / HEIGHT)
16"Ø	ROUND DUCT SIZE TAG (DIAMETER)
(E)	EXISTING DUCT TAG
	DUCT BEING DEMOLISHED
DROP	RECTANGULAR SUPPLY/OUTSIDE AIR DUCT RISE
DROP	ROUND SUPPLY/OUTSIDE AIR DUCT RISE
DROP	RECTANGULAR RETURN/TRANSFER AIR DUCT RISE
DROP	ROUND RETURN/TRANSFER AIR DUCT RISE
DROP	RECTANGULAR EXHAUST/RELIEF AIR DUCT RISE
DROP	ROUND EXHAUST/RELIEF AIR DUCT RISE

S/A	SUPPLY AIR
S-O/A	CONDITIONED OUTSIDE AIR
O/A	OUTSIDE AIR
R/A	RETURN AIR
T/A	TRANSFER AIR
L/A	RELIEF AIR
E/A	EXHAUST AIR
V-E/A	VENTILATION EXHAUST AIR
D-E/A	DRYER EXHAUST AIR
G-E/A	GREASE EXHAUST AIR
S-E/A	SMOKE EXHAUST AIR
FLUE	EXHAUST GAS FLUE
C/A	COMBUSTION AIR

PIPE ACCESSORY TAGS

- 2" BALANCING — BALANCING VALVE
- 2" SHUTOFF — 1/4 TURN BALL VALVE
- 2" CHECK — CHECK VALVE
- 2" TMV — 3-WAY MIXING VALVE
- 2" M-CNTRL — MOTORIZED CONTROL VALVE
- 2" 3-WAY CNTRL — 3 WAY MOTORIZED CONTROL VALVE
- 2" PRV — PRESSURE REDUCING VALVE
- 3/8" SOLENOID — REFRIGERANT SOLENOID VALVE
- 2" BUTTERFLY — BUTTERFLY VALVE

PIPE SYMBOLS

- PIPE DROP
- PIPE RISE
- PIPE TEE
- CAP

GENERAL DRAWING SYMBOLS

- REVISION NUMBER - SHOWN ON PLANS
- POINT WHERE NEW CONNECTS TO EXISTING
- NUMBER OF DETAIL ON SHEET
- NUMBER OF SHEET WHERE DETAIL APPEARS
- 1 — KEYNOTE
- CONTINUATION SYMBOL
- Room 1 — ROOM NAME AND NUMBER
- ITEM TO BE DEMOLISHED
- AREA NOT IN CONTRACT

DAMPER TAGS

- B — MANUAL BALANCING DAMPER
- D — BACKDRAFT DAMPER
- C — COMBINATION FIRE/SMOKE DAMPER
- F — FIRE DAMPER
- S — SMOKE DAMPER
- M — MOTORIZED DAMPER

MECHANICAL CONTROL DEVICE TAGS

SYMBOL
EQUIPMENT ID

TH	RTU-XX	TEMPERATURE & HUMIDITY SENSOR
TS	VAV-XX	TEMPERATURE SENSOR
T		THERMOSTAT
C		CONTROLLER
LT		LOW VOLT TIMER
MS		MANUAL SWITCH
S		SENSOR
CO2		CARBON DIOXIDE SENSOR
CO		CARBON MONOXIDE SENSOR
NO2		NITROGEN DIOXIDE SENSOR
HS		HUMIDITY SENSOR
H		HUMIDISTAT

MECHANICAL SHEET INDEX

M-001	MECHANICAL TITLE SHEET
M-115	LEVEL 5 PENTHOUSE HVAC PLAN

* NOTE *
THE SYMBOLS AND ABBREVIATIONS SHOWN ON THIS SHEET MAY OR MAY NOT BE USED IN THIS SET OF DRAWINGS.

GENERAL SERVICES ADMINISTRATION
PUBLIC BUILDING SERVICE
ROCKY MOUNTAIN REGION (8)

ACQUISITION DIVISION 8PQ
JAMES F. BATTIN FB/CH
2601 2ND AVENUE NORTH
BILLINGS, MT 59101

OWNER IDENTIFICATION

JACKOLA — Engineering, Architecture, Surveying, Land Use Planning — SINCE 1969
KALISPELL 406-755-3208 | BOZEMAN 406-586-0707 | VANCOUVER 360-852-8746
info@jackola.com jackola.com

DESIGNER IDENTIFICATION

MONTANA — TYLER ARNOLD TONJUM — No. 71046 PE — LICENSED PROFESSIONAL ENGINEER

STAMP OR SEAL

KEY PLAN

GRAPHIC SCALE

Mark	Date	Description

REVISION BLOCK

PRIME CONTR. NO.	47PJ0020D0018
PRIME ORDER NO.	47PJ0024F0332
CONST. CONTR. NO.	
A/E	JACKOLA ENGINEERING AND ARCHITECTURE
SUB A/E	
CONST. CONTR.	

CONTRACTORS

BUILDING NUMBER	MT0050ZZ
BUILDING NAME	JAMES F. BATTIN COURTHOUSE AND FEDERAL BUILDING
ADDRESS	2601 2ND AVE N BILLINGS MT 59101
CITY/ST./ZIP	
BIM FILE NAME	

BUILDING

PROJECT TITLE	COOLING TOWERS
PROJECT DESCRIPTION	
GSA PM	KEVIN SPRUELL
PROJECT NUMBER	200804:22
SUBMISSION STAGE	100% DRAWINGS
SUBMISSION DATE	2/14/2025

PROJECT IDENTIFICATION

DRAWN BY	TLH	DATE DRAWN:	11/27/2024
CHECKED BY	TAT	SHEET SIZE:	24 X 36
FLOOR NUMBER	ROOF		
DISCIPLINE	MECHANICAL		
SHEET TITLE	MECHANICAL TITLE SHEET		
SHEET NUMBER	M-001		

SHEET IDENTIFICATION

2/13/2025 2:47:08 PM

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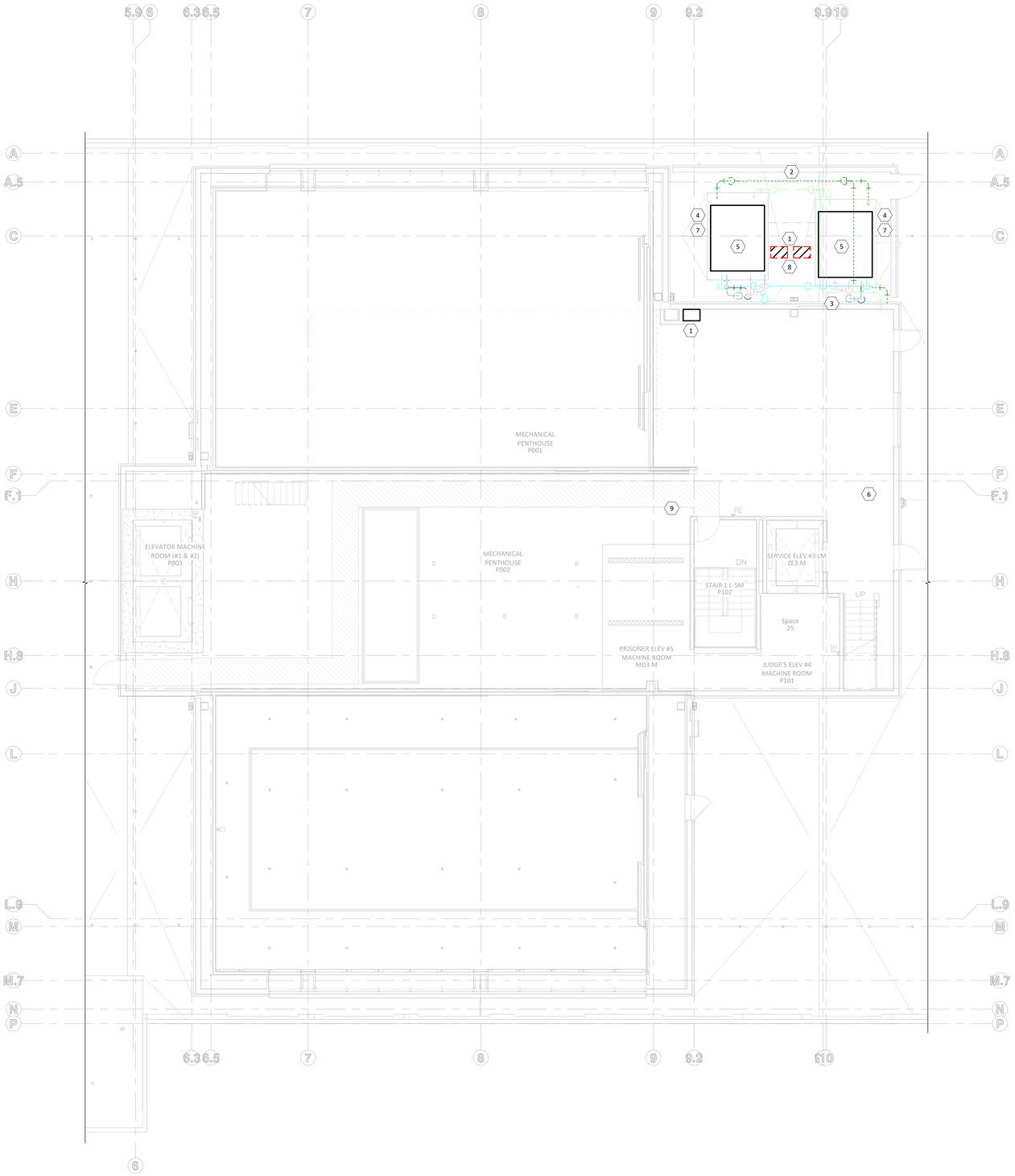
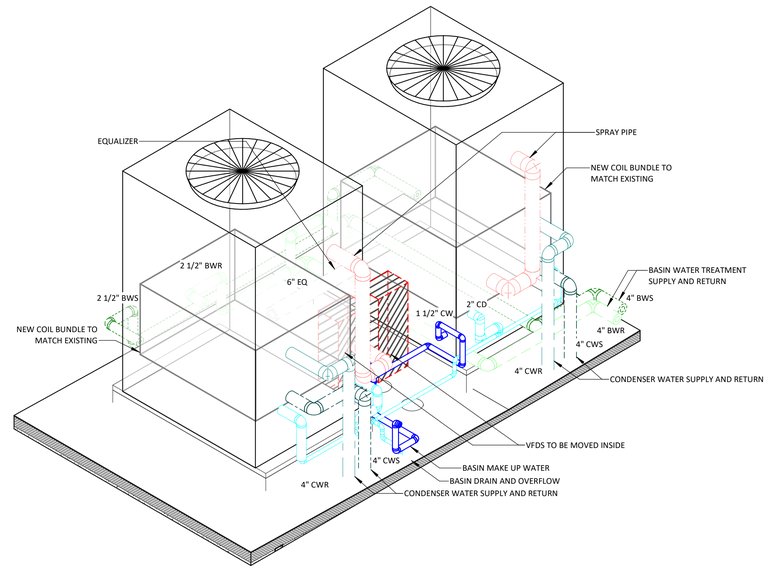


1 PENTHOUSE HVAC PLAN

1/8" = 1'-0"

0 4' 8' 16'



PIPE ROUTING, SIZING AND INSULATION IS SCHEMATIC IN NATURE AND SHALL BE VERIFIED BY CONTRACTOR PRIOR TO BIDDING.

2 COOLING TOWER ISOMETRIC

GENERAL NOTES - HVAC

* ENSURE ALL EXISTING PIPING AND VALVES ASSOCIATED WITH SCOPE OF WORK ARE REBALANCED.
* COOLING TOWERS TO BE UL LISTED AND FM APPROVED AND NOT REQUIRE FIRE SPRINKLERS.

KEYNOTES

1 (2) VFDS TO BE REMOVED FROM EXTERIOR MOUNTING AND RELOCATED INTO THE MECHANCAL PENTHOUSE. REROUTE CONDUIT AND WIRE AS REQUIRED FOR NEW LOCATION. EXISTING CONDUIT IS ROUTED ABOVE NEW VFD LOCATION. VFDS TO BE STACKED VERTICALLY IN NEW LOCATION TO ALLOW PASSAGE BEHIND DOAS UNIT.

2 EXTERIOR PIPING ASIDE FROM PIPING CONVEYING GLYCOL MIXTURES AND SOME DRAIN PIPING IS INSULATED AND WRAPPED WITH HEAT TRACE TAPE. FILL FLOAT LOCATION IN BASIN ALSO CONTAINS HEAT TRACE TAPE. CONTRACTOR TO VERIFY EXTENT OF HEAT TRACE TAPE AND INSULATION AND REPLACE ALL HEAT TRACE AND INSULATION ON PIPING SERVING COOLING TOWERS. PIPING TO REMAIN IN PLACE WHERE POSSIBLE.

3 SEE ISOMETRIC 2/M-115 FOR SCHEMATIC PIPE ROUTING AND SIZING. ACTUAL LENGTHS AND QUANTITIES TO BE VERIFIED BY CONTRACTOR.

4 ALL EVAPORATIVE MEDIA TO BE REPLACED. CONTRACTOR TO VERIFY EXISTING MEDIA QUANTITY AND TYPE.

5 REPLACE EXISTING COILS WITH NEW GALVANIZED COILS PER SPECIFICATIONS.

6 A CHEMICAL WATER TREATMENT SYSTEM HAS BEEN INSTALLED AFTER THE ENGINEERING SITE VISIT. CONTRACTOR TO NOTIFY ENGINEER IF CHEMICAL WATER TREATMENT INSTALLATION CAUSES CHANGES TO PIPING IDENTIFIED WITHIN THIS SCOPE OF WORK.

7 REPLACE EXISTING SPRAYER NOZZLES WITH NEW SPRAYER NOZZLES.

8 VFD'S ARE 40A, 3Ø CIRCUITS SERVED BY PANEL EQHP-6B. INSPECT CONDITION OF ELECTRICAL MATERIALS AND REUSE TO THE EXTENT POSSIBLE. REUSE BREAKERS 25,27,29 AND 31,33,35.

9 PANEL SERVING VFDS LOCATED IN THIS AREA.

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OWNER IDENTIFICATION

GENERAL SERVICES ADMINISTRATION
PUBLIC BUILDING SERVICE
ROCKY MOUNTAIN REGION (8)

ACQUISITION DIVISION 8PQ
JAMES F. BATTIN FB/CH
2601 2ND AVENUE NORTH
BILLINGS, MT 59101

DESIGNER IDENTIFICATION

JACKOLA ENGINEERING AND ARCHITECTURE
KALISPELL 406-755-3208 | BOZEMAN 406-586-0707 | VANCOUVER 360-852-8746
info@jackola.com jackola.com

STAMP OR SEAL

MONTANA
TYLER ARNOLD TONJUM
No. 71046 PE
LICENSED PROFESSIONAL ENGINEER

KEY PLAN

GRAPHIC SCALE

REVISION BLOCK

Mark	Date	Description

CONTRACTORS

PRIME CONTR. NO.	47PJ0020D0018
PRIME ORDER NO.	47PJ0024F0332
CONST. CONTR. NO.	
A/E	JACKOLA ENGINEERING AND ARCHITECTURE
SUB A/E	
CONST. CONTR.	

BUILDING

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SUBMISSION DATE	2/14/2025

SHEET IDENTIFICATION

DRAWN BY	TAT	DATE DRAWN:	2/12/2025
CHECKED BY	TAT	SHEET SIZE:	24 X 36
FLOOR NUMBER	ROOF		
DISCIPLINE	MECHANICAL		
SHEET TITLE	LEVEL 5 PENTHOUSE HVAC PLAN		

SHEET NUMBER **M-115**

SHEET 2 OF 2 SHEETS

2/13/2025 2:47:09 PM