FOR CONSTRUCTION - APRIL 11, 2025

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PROJECT LOCATION MAP

NOT TO SCALE

GENERAL

COVER	COVER SHEET
G1	CEILING REPLACEMENT PLAN

MECHANICAL

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E1.2	SPECIFICATIONS
E2.1	POWER DEMOLITION PLAN
E2.2	POWER PLAN

PROJECT CONTACTS

MECHANICAL CONTACT:
CHRIS SELE
INNOVATIVE GROUPS
PHONE: 316.833.0253
EMAIL: SELE@INNOVATIVE-GROUPS.COM

ELECTRICAL ENGINEER:
LAURA ENGELLAND, PE
ENGINEERING CONSULTANTS
PHONE: 620.665.6394
EMAIL: LAURA@ECHUTCH.COM

WASHBURN CONTACT:
MATT HARDEN
ASSISTANT DIRECTOR OF MAINTENANCE
EMAIL: MATT.HARDEN@WASHBURN.EDU

DANE S. PLETCHER
LICENSED
23121
4/11/2025
KANSAS
PROFESSIONAL ENGINEER

INNOVATIVE GROUPS
801 E. DOUGLAS
2ND FLOOR
WICHITA, KS 67202
INNOVATIVE-GROUPS.COM

ENGINEERING EC P.A. CONSULTANTS
EC PROJECT #18-143
Engineering Consultants, P.A.
1227 N Main Street
Hutchinson, KS 67501
www.echutch.com

INNOVATIVE GROUPS
1520 E DOUGLAS AVE
SUITE 200
WICHITA, KS 67214
INNOVATIVEGROUPS.COM

ART GALLERY HVAC REPLACEMENT
WASHBURN UNIVERSITY
1700 COLLEGE AVE
TOPEKA, KS 66621

JOB NO.: 25029

REVISIONS

ART GALLERY HVAC REPLACEMENT
WASHBURN UNIVERSITY

DATE: 04-11-2025
DRAWN BY: CRS
CHECKED BY: CRS

COVER

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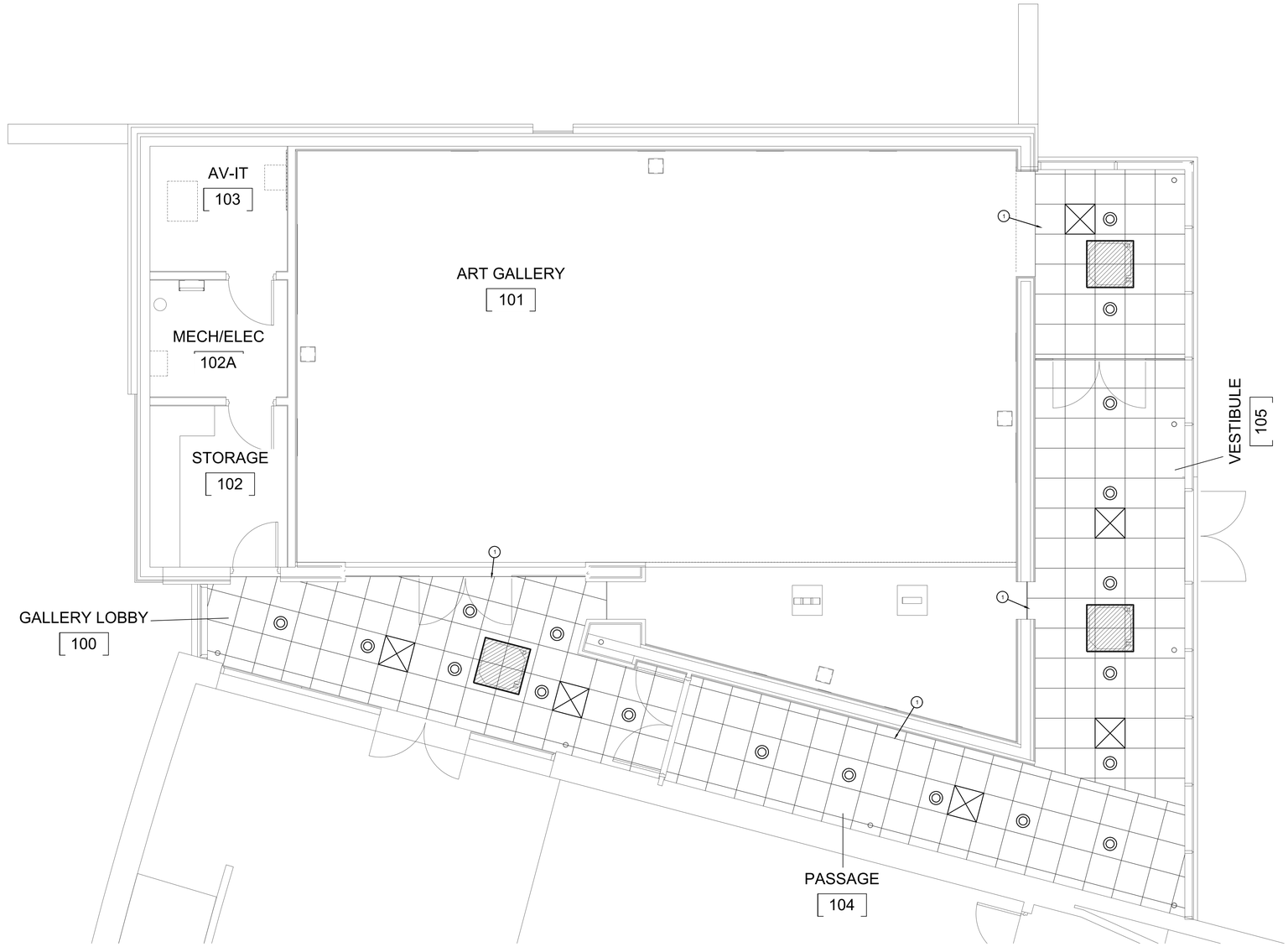

PLAN NOTES:

1. CONTRACTOR SHALL REMOVE HARD LID CEILING WHERE NEW GRID SHOWN FOR INSTALLATION OF NEW HVAC SYSTEMS. THIS SHALL INCLUDE REMOVAL OF LIGHTS. UPON COMPLETION OF HVAC SYSTEM INSTALLATION, CONTRACTOR SHALL INSTALL 2X2 CEILING GRID AND TILES TO MATCH EXISTING FACILITY STANDARDS (SEE SPECIFICATIONS BELOW). FIRE ALARM DEVICES, FIRE SPRINKLER HEADS, EMERGENCY LIGHTS, & SPEAKERS SHALL BE RELOCATED INTO NEW LAY-IN CEILING AND PROVIDED WITH LAY-IN CEILING ADAPTER, FLANGE, ESCUTCHEON, ETC. WHERE REQUIRED. GC SHALL COORDINATE WORK TO ENSURE ALL ITEMS THAT REMAIN ARE PROTECTED AND NOT DAMAGED DURING INSTALLATION. ANY DEVICE DAMAGED DURING CONSTRUCTION SHALL BE REPORTED TO OWNER IMMEDIATELY. LIGHTING LAYOUT TO BE PROVIDED BY OWNER.

CEILING SPECIFICATIONS:
- 12 GA ACOUSTICAL CEILING PRODUCTS HANGER WIRE (431 LBS PER PC)
- USG DONN BRAND DXL ACOUSTICAL SUSPENSION SYSTEM (FLAT WHITE).
- USG HALCYON 2'x2'x¾" ACOUSTICAL PANELS (FLAT WHITE).

CEILING NOTES:
- EAST / WEST CEILING ANGLE SHALL MATCH RECITAL HALL GRID ORIENTATION.
- EAST / WEST CEILING GRID SHALL BE INSTALLED UP TO BULKHEAD CONSTRUCTED TO RECITAL HALL.
- ELEVATION SHALL MATCH EXISTING (+/- 10'-0 ½" A.F.F.

LIGHTING SPECIFICATIONS:
- MANUFACTURER = COOPER
- CATALOG = LD6B20D010 EU6B10208035 6LBW1LI
- CAN LIGHT FIXTURE SHALL MATCH RECITAL HALL. CONFIRM SELECTION WITH OWNER PRIOR TO PURCHASE.
- RECESSED
- SPECULAR FINISH
- LED
- 2,110 LUMENS
- 120V (MATCH EXISTING VOLTAGE)

LIGHTING NOTES:
- EXISTING CIRCUITRY AND SWITCHING SHALL BE RE-USED. REPLACE SWITCHES IF NECESSARY FOR LIGHT FIXTURES.
- ALL CIRCUITS / CONDUITS NOT RE-USED SHALL BE DEMOLISHED.

A CEILING REPLACEMENT PLAN

SCALE - 1/4"=1'-0"

NORTH

DANE S. PLETCHER
LICENSED
23121
11/1/2015
KANSAS
PROFESSIONAL ENGINEER

1520 E DOUGLAS AVE
SUITE 200
WICHITA, KS 67214
INNOVATIVEGROUPS.COM

INNOVATIVE GROUPS

ART GALLERY HVAC REPLACEMENT
WASHBURN UNIVERSITY
1700 COLLEGE AVE
TOPEKA, KS 66621

JOB NO.: 25029

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G1
CEILING REPLACEMENT PLAN

PROJECT GENERAL NOTES

1. ALL WORK PERFORMED SHALL COMPLY WITH CURRENT FEDERAL, STATE AND LOCAL CODES AND ORDINANCES.
2. CONTRACTOR SHALL REPORT ANY CONFLICTS TO THE ENGINEER IMMEDIATELY.
3. CONTRACTOR SHALL REVIEW THE DRAWINGS AND SPECIFICATIONS PRIOR TO BIDDING JOB AND DURING CONSTRUCTION. DRAWINGS ARE DIAGRAMMATIC IN NATURE AND SHOW THE GENERAL INSTALLATION OF EQUIPMENT & MATERIALS IN RELATIONSHIP TO STRUCTURE & OTHER TRADES. DRAWINGS MAY NOT INDICATE EVERY REQUIRED OFFSET, FITTING, ETC. FIELD VERIFY ACTUAL JOB CONDITIONS AND COORDINATE WORK WITH OTHER TRADES PRIOR TO BIDDING JOB, ORDERING EQUIPMENT, FABRICATION OF MATERIALS, OR STARTING WORK.
4. PROVIDE EQUIPMENT, MATERIALS, & LABOR FOR A COMPLETE PROJECT AS SHOWN IN THE DRAWINGS AND SPECIFICATIONS. CHANGE ORDERS WILL NOT BE GRANTED DUE TO LACK OF COORDINATION WITH OTHER TRADES & JOB CONDITIONS.
5. IF EQUIPMENT, MATERIALS, ETC. OTHER THAN THOSE SCHEDULED & SPECIFIED ARE FURNISHED, IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE ALL ITEMS THAT AFFECT OTHER DISCIPLINES WITH THE CORRESPONDING CONTRACTOR AND THE GENERAL CONTRACTOR. ADDITIONAL FUNDING FOR DEVIATIONS WILL NOT BE ALLOWED.
6. MAINTAIN ALL REQUIRED CLEARANCES FOR NEW AND EXISTING EQUIPMENT, OUTDOOR AIR INTAKES, EXHAUST DISCHARGES, RELIEF DISCHARGES, FLUE DISCHARGES, AND COMBUSTION AIR INTAKES.
7. THE MC SHALL CUT/PATCH WALLS, CEILINGS, & ROOFS AS REQUIRED FOR INSTALLATION/DEMOLITION OF MECHANICAL SYSTEMS CONVEYED IN THESE DRAWINGS. COORDINATE WITH OWNER.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR STORAGE OF EQUIPMENT AND MATERIALS DURING CONSTRUCTION. ITEMS DAMAGED DURING CONSTRUCTION SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE.
9. UPON COMPLETION OF THE PROJECT THE CONTRACTOR SHALL PROVIDE AS-BUILT DRAWINGS TO THE OWNER, ARCHITECT, AND ENGINEER SHOWING EQUIPMENT, DUCTWORK, PIPING, ETC. THAT DIFFERS FROM CONSTRUCTION DOCUMENTS AS THEY ARE ACTUALLY INSTALLED. AS-BUILT DRAWINGS ARE TO BE READILY AVAILABLE ON SITE AND ALL CHANGES ARE TO BE DOCUMENTED IMMEDIATELY.
10. THE RESPONSIBILITY OF EACH CONTRACTOR IS NOT LIMITED TO THEIR SPECIFIC DISCIPLINE'S DRAWING SHEETS. REFER TO OTHER DISCIPLINES' DRAWING SHEETS AS REQUIRED FOR ADDITIONAL INFORMATION/INSTRUCTIONS.
11. FIRE SEAL ALL PENETRATIONS THRU RATED ASSEMBLIES WITH APPROPRIATE SLEEVE / PROTECTION MATERIAL.
12. UNLESS NOTED OTHERWISE, SCHEDULED OR INDICATED AIRFLOWS ARE CUBIC FEET PER MINUTE (CFM). WATER FLOWS ARE GALLONS PER MINUTE (GPM). AIR PRESSURE DROPS AND STATIC PRESSURES ARE INCHES OF WATER COLUMN ("W.C.). AIR VELOCITIES ARE FEET PER MINUTE (FPM). WATER PRESSURE DROPS AND PUMP HEADS ARE FEET OF WATER COLUMN (FT. HD.). WATER VELOCITIES ARE FEET PER SECOND (FPS). CAPACITIES ARE THOUSANDS BTU/H (MBH). TEMPERATURES ARE °F. WEIGHTS ARE POUNDS (LB.). AREAS ARE SQUARE FEET (SQ. FT.). VOLUMES ARE GALLONS (GAL.). SOUND POWER LEVELS ARE DECIBELS (DB).
13. REMOVE ALL SUPPORTS, HANGERS, ACCESSORIES, ETC. ASSOCIATED WITH PIPING, DUCTWORK, EQUIPMENT, ETC. INDICATED TO BE DEMOLISHED UNLESS NOTED OTHERWISE.
14. DO NOT ROUTE DUCTWORK OR PIPING ABOVE ELECTRICAL PANELS OR ELECTRICAL GEAR.
15. ALL EXTERIOR WALL AND/OR ROOF PENETRATIONS ARE TO BE SEALED WEATHERTIGHT.
16. PROVIDE AND INSTALL SUPPLEMENTAL STEEL FRAMING AS REQUIRED FOR SUPPORT OF SYSTEM COMPONENTS.
17. SUPPORT ALL PIPING AND DUCTWORK INDEPENDENTLY FROM ASSOCIATED EQUIPMENT, SO NO GRAVITY LOAD IS ON UNIT CONNECTIONS.

PROJECT MECHANICAL NOTES

1. COORDINATE INSTALLATION OF MECHANICAL SYSTEMS WITH OTHER TRADES TO ENSURE NEAT AND ORDERLY INSTALLATION.
2. FIELD MEASURE FINAL DUCTWORK AND PIPING LOCATIONS PRIOR TO FABRICATION AND MAKE ADJUSTMENTS AS REQUIRED.
3. ADJUST LOCATION OF CEILING DIFFUSERS, REGISTERS AND GRILLES AS REQUIRED TO ACCOMMODATE FINAL CEILING GRID, STRUCTURE, AND LIGHTING LOCATIONS.
4. COORDINATE ACCESS TO EQUIPMENT, VALVES, AND DAMPERS INSTALLED ABOVE 'INACCESSIBLE' CEILINGS AND IN CHASES, ETC. WITH GC. GC SHALL PROVIDE AND INSTALL ACCESS DOORS FOR EQUIPMENT SERVICE, DAMPERS AND / OR VALVES.
5. A MAXIMUM LENGTH OF 5'-0" FLEX DUCT MAY BE USED AT EACH RUNOUT TO SUPPLY DIFFUSERS. FLEX DUCT SHALL ONLY BE USED ABOVE LAY-IN CEILINGS AND IN CONCEALED LOCATIONS, AND SHALL NOT BE USED IN RETURN OR EXHAUST SYSTEMS
6. PROVIDE TURNING VANES IN ALL RECTANGULAR MITERED ELBOWS.
7. DUCT SIZES INDICATED ARE INSIDE CLEAR DIMENSIONS.
8. THERMOSTATS SHALL BE PLACED AT 4'-0" MAXIMUM ABOVE FINISHED FLOOR TO MEET ADA REQUIREMENTS.
9. PROVIDE FLEXIBLE CONNECTION AT ALL DUCT CONNECTIONS TO EQUIPMENT.
10. ALL FILTERS SHALL BE NEW AT PROJECT TURNOVER, AND ONE (1) SET OF SPARE FILTERS FOR ALL EQUIPMENT SHALL BE PROVIDED TO THE OWNER.

SYMBOLS

HVAC DUCTWORK & ACCESSORIES

SYMBOL	ABBR	DESCRIPTION
		NEW DUCTWORK
		EXISTING DUCTWORK
		EXISTING DUCTWORK TO BE REMOVED
		RECTANGLE DUCT UP
		RECTANGLE DUCT DOWN
		RECTANGULAR VANED ELBOW
		ROUND DUCT UP
		ROUND DUCT DOWN
		ROUND ELBOW
		CONCENTRIC TRANSITION
		ECCENTRIC TRANSITION
		SQUARE TO ROUND TRANSITION
DN/UP		DUCT DROP/RISE IN DIRECTION OF ARROW
	SAG	DIFFUSER
	RAG EAG	RETURN / EXHAUST AIR GRILLE
		ARROW INDICATES THROW DIRECTION

SYMBOL	ABBR	DESCRIPTION
		45° TAKEOFF FITTING WITH MANUAL VOLUME DAMPER
		MANUAL VOLUME DAMPER
M	M	MOTORIZED DAMPER
FD	FD	FIRE DAMPER
FS	FS	COMBINATION FIRE/SMOKE DAMPER
S	S	SMOKE DAMPER

PIPING

SYMBOL	ABBR	DESCRIPTION
W	W	SANITARY WASTE BELOW FLOOR
GW	GW	GREASE WASTE
MUD/OIL		MUD OR OIL
V	V	SANITARY VENT
CD	CD	CONDENSATE DRAIN
RD	RD	ROOF DRAIN
ORD	ORD	ROOF OVERFLOW
CW	CW	DOMESTIC COLD WATER
HW	HW	DOMESTIC HOT WATER
140°	140°	DOMESTIC 140° HOT WATER
HWC	HWC	DOMESTIC HOT WATER CIRCULATING
FW	FW	FILTERED WATER
SW	SW	SOFTENED WATER
FP	FP	FIRE PROTECTION
G	G	NATURAL GAS
R	R	REFRIGERATION
CWS	CWS	CHILLED WATER SUPPLY
CWR	CWR	CHILLED WATER RETURN
HWS	HWS	HEATING WATER SUPPLY
HWR	HWR	HEATING WATER RETURN
CTS	CTS	COOLING TOWER SUPPLY
CTR	CTR	COOLING TOWER RETURN
HPS	HPS	HEAT PUMP SUPPLY
HPR	HPR	HEAT PUMP RETURN
S	S	STEAM SUPPLY
CR	CR	STEAM CONDENSATE RETURN
BD	BD	BOILER BLOWDOWN
BFW	BFW	BOILER FEEDWATER
A	CA	COMPRESSED AIR
N	N	NITROGEN
VAC	VAC	VACUUM

SYMBOL	ABBR	DESCRIPTION
		ELBOW UP
		ELBOW DOWN
		TEE UP
		TEE DOWN
		PIPE CAP OR PLUG
		BALL VALVE
		BUTTERFLY VALVE
		GATE VALVE
		MANUAL BALANCING VALVE
		CHECK VALVE
		STRAINER
		GAS COCK
		PIPING UNION
		PIPE REDUCER
		VALVE IN RISER
		2-WAY CONTROL VALVE
		3-WAY CONTROL VALVE
	HB	HOSE BIBB
	FPWH	FREEZE PROOF WALL HYDRANT
	FD	FLOOR DRAIN
	FS	FLOOR SINK
	RD/ORD	ROOF DRAIN
	WCO	WALL CLEANOUT
	FCO	FLOOR CLEANOUT
	VTR	VENT THRU ROOF
	CO	CLEANOUT

ABBREVIATIONS

SYMBOL	ABBR	DESCRIPTION
	P1.1	PLUMBING FIXTURE TAG
	D1.1	DRAINAGE FIXTURE TAG
	F-1	EQUIPMENT TAG
1		PLAN NOTE
	POC	POINT OF CONNECTION (CONNECT NEW TO EXISTING)
	(E)	EXISTING
	ABV	ABOVE
	BLW	BELOW
	DN	DOWN
	BTWN	BETWEEN
	BOD	BOTTOM OF DUCT (ABOVE FINISHED FLOOR)
	BOP	BOTTOM OF PIPE
	NTS	NOT TO SCALE
	AFF	ABOVE FINISHED FLOOR
	CA	COMBUSTION AIR
	OA	OUTDOOR AIR
	EA	EXHAUST AIR
	SA	SUPPLY AIR
	RA	RETURN AIR
	TA	TRANSFER AIR
	EAT	ENTERING AIR TEMPERATURE
	LAT	LEAVING AIR TEMPERATURE
	EWT	ENTERING WATER TEMPERATURE
	LWT	LEAVING WATER TEMPERATURE
	DB	DRY BULB TEMPERATURE
	WB	WET BULB TEMPERATURE
	CLNG	COOLING
	HTNG	HEATING
	SAG	SUPPLY AIR GRILLE
	RAG	RETURN AIR GRILLE
	TAG	TRANSFER AIR GRILLE
	OBD	OPPOSED BLADE DAMPER
	PBD	PARALLEL BLADE DAMPER
	WPL	WEATHER PROOF LOUVER
	WT	WEIGHT
	ESP	EXTERNAL STATIC PRESSURE
	APD	AIR PRESSURE DROP
	WPD	WATER PRESSURE DROP
	PD	PRESSURE DROP
	CM	CONSTRUCTION MANAGER
	GC	GENERAL CONTRACTOR
	MC	MECHANICAL CONTRACTOR
	PC	PLUMBING CONTRACTOR
	EC	ELECTRICAL CONTRACTOR
	TCC	TEMPERATURE CONTROLS CONTRACTOR
	UNO	UNLESS NOTED OTHERWISE
	RPZ	REDUCED PRESSURE ZONE ASSEMBLY
	PRV	PRESSURE REDUCING VALVE
T		THERMOSTAT/SENSOR
H		HUMIDISTAT/SENSOR
S		WALL SWITCH / SENSOR
CO2		CARBON DIOXIDE SENSOR

PROJECT DESIGN CRITERIA

LOCATION	COOLING DESIGN	HEATING DESIGN	ENERGY DESIGN	GOVERNING CODES
PROJECT CITY: TOPEKA, KANSAS PROJECT ELEVATION: 1,066 FT. ABOVE SEA LEVEL ASHRAE CLIMATE DATA LOCATION: FORBES FIELD TOPEKA, KS	DESIGN WEATHER BASIS: ASHRAE 0.4% DESIGN DRY BULB: 99.0° F MEAN COINC. WET BULB: 76.0° F DESIGN WET BULB: 77.7° F MEAN COINC. DRY BULB: 90.4° F	DESIGN WEATHER BASIS: ASHRAE 99.6% DESIGN DRY BULB: 3.5° F	ASHRAE CLIMATE ZONE: 4A COOLING DEGREE DAYS(65): 1422 HEATING DEGREE DAYS(50): 2170	BUILDING CODE: 2021 INTERNATIONAL BUILDING CODE MECHANICAL CODE: 2015 UNIFORM MECHANICAL CODE PLUMBING CODE: 2018 UNIFORM PLUMBING CODE ELECTRICAL CODE: 2023 NATIONAL ELECTRIC CODE ENERGY CODE: 2010 ASHRAE 90.1 FIRE CODE: 2021 INTERNATIONAL FIRE CODE

DANE S. PLETCHER
LICENSED
11/1/2016
23121
KANSAS
PROFESSIONAL ENGINEER

1520 E DOUGLAS AVE
SUITE 200
WICHITA, KS 67214
INNOVATIVEGROUPS.COM

INNOVATIVE GROUPS

ART GALLERY HVAC REPLACEMENT
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MPO
MECHANICAL DESIGN CRITERIA

AIR TERMINAL SCHEDULE

TAG	MODEL	STYLE	DUTY	LOCATION	MOUNTING	MATERIAL	FINISH	OBD	FD	RD	NOTES
A	TDC	LOUVERED	SUPPLY	CEILING	LAY-IN	STEEL	WHITE PAINT	--	--	--	--

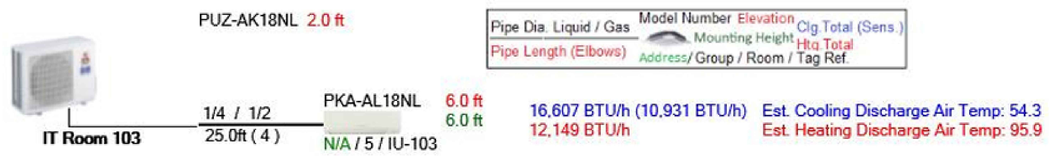
GENERAL NOTES:
A. AIR TERMINALS ARE BASED ON TITUS.
B. BRANCH DUCT SIZE SHALL BE SAME AS NECK SIZE UNLESS OTHERWISE SHOWN ON PLANS.
C. PROVIDE RECTANGULAR TO ROUND ADAPTERS AS REQUIRED.
D. ALL SURFACES VISIBLE THROUGH THE FACE OF THE AIR TERMINAL SHALL BE PAINTED FLAT BLACK.

NOTES:
1. PROVIDE WITH 24x24 LAY-IN PANEL AS INDICATED ON PLANS

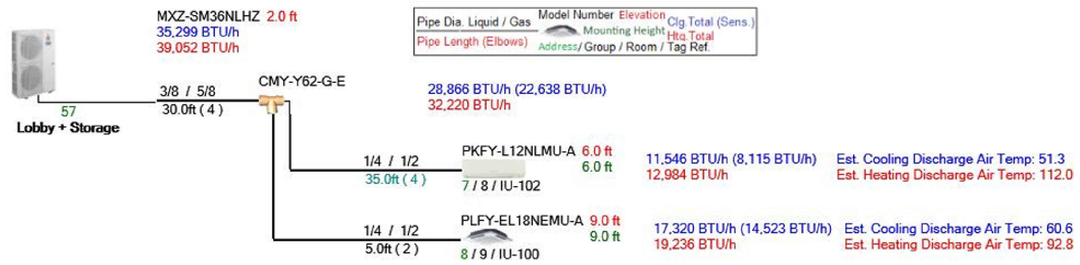
LEGEND

OBD = OPPOSED BLADE DAMPER
FD = FIRE DAMPER
RD = RADIATION DAMPER

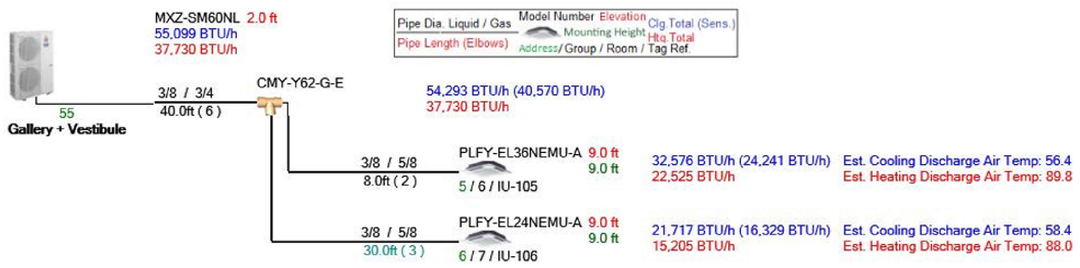
(TAG) (NECK/FACE SIZE)
A-8x8
100
(CFM)
IF NECK SIZE IS NOT INDICATED, SIZE SHALL MATCH BRANCH DUCT SIZE



1 MSS-1 - PIPING DIAGRAM
NO SCALE



2 MSS-2 - PIPING DIAGRAM
NO SCALE



3 MSS-3 - PIPING DIAGRAM
NO SCALE

AIR HANDLER SCHEDULE

TAG	PAIR WITH	MODEL	UPFLOW	DOWNFLOW	HORZ FLOW	FAN FLOW	FAN ESP	FAN MTR. HP	DX COIL COOLING CAP. TOT.	DX COIL COOLING CAP. SENS.	DX COIL HEATING CAP.	DX COIL APD (WET)	DX COIL AREA	ELEC. HEATER CAP. (KW)	ELEC. HEATER STGS.	ELECTRICAL MCA	ELECTRICAL MOCP	ELECTRICAL VOLT. / PHASE	WT.	NOTES
AHU-1	CU-1	BCVE090	X	-	-	2500	.5	3	93.3	69.9	--	.66	--	--	--	14	25	208/3Ø	475	--

GENERAL NOTES:
A. AIR HANDLERS ARE BASED ON TRANE. ALTERNATE MANUFACTURERS SHALL NOT BE ACCEPTED.
B. UNITS SHALL HAVE SINGLE POINT POWER CONNECTION.
C. DX COIL CAPACITIES ARE BASED ON 78°F DB / 65°F WB COOLING ENTERING AIR TEMPERATURE.
D. SCHEDULED ESP INCLUDES CLEAN FILTER.
E. SCHEDULED WEIGHTS INCLUDE EVAPORATOR COIL.

NOTES:
1. UNIT SHALL BE UL LISTED.
2. PROVIDE WITH DOUBLE WALL PANELS WITH R4.2 (MIN) INSULATION, FACTORY DISCONNECT SWITCH, ECM FAN MOTOR, STAINLESS STEEL DRAIN PAN, TERMINAL CONTROLS FOR TRANE BAS INTEGRATION AND 6" TALL (MIN) SUPPORT LEGS.
3. TERMINAL CONTROLS SHALL ALLOW RELAY TO INTEGRATE REMOTE ELECTRIC DUCT HEATER.

CONDENSING UNIT SCHEDULE

TAG	PAIR WITH	MODEL	NOM. CAP. (TONS)	DESIGN AMBIENT TEMP.	STAGES/ TURN-DOWN	NOM. EER	COMPRESSOR QTY.	COMPRESSOR RLA (EA.)	FANS QTY.	FANS HP (EA.)	FANS FLA (EA.)	ELECTRICAL MCA	ELECTRICAL MOCP	ELECTRICAL VOLT / PHASE	WT.	NOTES
CU-1	AHU-1	TTA090K3DAA	7.5	100	2	11.5	2	13.8	1	1/2	2.3	35	45	208/3	370	1,2

GENERAL NOTES:
A. CONDENSING UNITS ARE BASED ON TRANE. ALTERNATE MANUFACTURERS SHALL NOT BE ACCEPTED.
B. NOMINAL EERS ARE AT AHRI CONDITIONS.
C. REFRIGERANT PIPING SHALL BE SIZED BY UNIT MANUFACTURER ACCOUNTING FOR LENGTH, ELBOWS, ELEVATION DIFFERENCE, ETC.

NOTES:
1. PROVIDE WITH FACTORY INSTALLED HAIL GUARDS, PHASE MONITOR PROTECTION, SYMBIO 700 CONTROLLER. CONTROLLER SHALL INTEGRATE TO TRANE BAS SYSTEM.
2. CONDENSING UNIT SHALL HAVE QTY 2 REFRIGERANT CIRCUITS (1-1/2" LIQUID / 1-1/8" SUCTION).

ELECTRIC HEATER SCHEDULE

TAG	MODEL/ SERIES	TYPE	KW	SIZE/ LENGTH	FAN TYPE	FAN FLOW	FAN ESP	FAN HP	VOLTAGE/ PHASE	FLA	MOCP	NOTES
DH-1	EDH	DUCT MOUNT	15	18X18	--	--	--	--	208/3Ø	41.6	60	--

GENERAL NOTES:
A. ELECTRIC DUCT HEATERS ARE BASED ON TUTCO. ALTERNATE MANUFACTURERS SHALL NOT BE ACCEPTED.

NOTES:
1. DH SHALL BE PROVIDED WITH DISCONNECTING CONTACTORS, SCR CONTROL, MANUAL BACKUP LIMITS, POWER FUSING, AIRFLOW SWITCH, CONTROL TRANSFORMER, DISCONNECT SWITCH.
2. CONTROL TRANSFORMER SHALL INCLUDE DRY CONTACTS THAT ALLOW CONTROLS THROUGH TRANE BAS SYSTEM.

HUMIDIFIER SCHEDULE

TAG	GENERATOR MODEL	DISPERSION TYPE	SOURCE	WTR. TYPE	CAP. (LB/H)	AIRFLOW	ENT. AIR DB	ENT. AIR RH	LVG. AIR DB	LVG. AIR RH	NON-WETTING DIST. (INCHES)	DUCT SIZE (INCHES) W	DUCT SIZE (INCHES) H	TUBE SPACING (C-C, INCHES)	GNR. WT.	ELECTRICAL AMPS	ELECTRICAL MOCP	ELECTRICAL VOLT. / PHASE	NOTES
HUM-1	VAPORMIST 8	SINGLE 1.5" TUBE	E	S	24.0	2500	54	48	55	70	9	18	18	9	122	38.5	50	208/1	--

GENERAL NOTES:
A. HUMIDIFIERS ARE BASED ON DRISTEEM. ALTERNATE MANUFACTURERS SHALL NOT BE ACCEPTED.
B. DUCT DIMENSIONS ARE INSIDE CLEAR. PROVIDE DISPERSION TUBES WITH DRAIN.
C. HEADER TUBE MATERIAL SHAL BE 304 STAINLESS STEEL.
D. GENERATOR SHALL BE INTEGRATED INTO EXISTING VAPOR-LOGIC CONTROLLER. EXISTING COMPONENTS ARE AS FOLLOWS: DUCT HIGH-LIMIT HUMIDISTAT, AIRFLOW PROVING SWITCH, SPACE WALL-MOUNTED HUMIDISTAT / SENSOR, SCR FULLY MODULATING OUTPUT. ALL COMPONENTS SHALL BE TESTED AND VERIFIED FOR PROPER PERFORMANCE. NOTIFY ENGINEER AND/OR OWNER OF ANY DISCREPANCY IDENTIFIED.
E. INCLUDE MSTP BACNET LICENSE CODE FOR TCC INTEGRATION.

LEGEND

SOURCE
E = ELECTRIC

WATER TYPE
S = SOFTENED

MINISPLIT SYSTEM SCHEDULE

OUTDOOR UNIT TAG	INDOOR UNIT TAG	INDOOR UNIT MODEL	INDOOR UNIT TYPE	INDOOR UNIT FAN FLOW	INDOOR UNIT FAN ESP	INDOOR UNIT CLNG. CAPACITY TOTAL	INDOOR UNIT CLNG. CAPACITY SENS.	INDOOR UNIT HTNG. CAP.	INDOOR UNIT WT.	OUTDOOR UNIT MODEL	OUTDOOR UNIT WT.	ELECTRICAL MCA	ELECTRICAL MOCP	NOTES
MSS-1	MSS-1A	PKA-AL18NL	WALL MOUNT	215-375	--	16.6	10.9	12.1	28	PUZ-AK18NL	100	16	20	1,2
MSS-2	MSS-2A	PKFY-L12NLMU	WALL MOUNT	150-300	--	11.5	8.1	12.9	25	MXZ-SM36NLHZ	285	45	60	1
	MSS-2B	PLFY-EL18NEMU	4-WAY CLNG CASS	635-810	--	17.3	14.5	19.2	57	SEE MSS-2A	--	--	--	--
MSS-3	MSS-3A	PLFY-EL36NEMU	4-WAY CLNG CASS	775-1095	--	32.5	24.2	22.5	57	MXZ-SM60NL	285	45	60	1
	MSS-3B	PLFY-EL24NEMU	4-WAY CLNG CASS	635-810	--	21.7	16.3	15.2	57	SEE MSS-3A	--	--	--	--

GENERAL NOTES:
A. MINISPLIT SYSTEMS ARE BASED ON MITSUBISHI.
B. COOLING CAPACITIES BASED ON 78°F DB/65°F WB INDOOR UNIT ENTERING AIR TEMPERATURE, 100°F DB OUTDOOR UNIT AMBIENT TEMPERATURE. HEATING CAPACITIES BASED ON 70°F DB INDOOR UNIT, 0°F WB OUTDOOR UNIT.
C. MSS-1 INDOOR UNITS ARE POWERED FROM OUTDOOR UNITS.
D. MSS-2 & MSS-3 INDOOR UNITS SHALL BE PROVIDED WITH INDIVIDUAL POWER CIRCUIT.
E. ALL SYSTEMS 208-230V/1Ø UNLESS NOTED OTHERWISE.
F. FAN FLOW FOR DUCTLESS TYPE UNITS SHOWN FOR REFERENCE ONLY. TAB CONTRACTOR SHALL NOT ATTEMPT TO BALANCE UNIT FAN.
G. PROVIDE PROGRAMMABLE WIRED CONTROLLER FOR EACH INDOOR UNIT UNLESS NOTED OTHERWISE.
H. ALL CEILING CASSETTE & WALL MOUNTED UNITS SHALL BE PROVIDED WITH WASHABLE FILTER. PROVIDE ONE (1) EXTRA SET FOR EACH INDOOR UNIT.
I. PROVIDE HAIL GUARDS ON ALL OUTDOOR UNITS.
J. REFRIGERANT PIPING SHALL BE SIZED BY UNIT MANUFACTURER ACCOUNTING FOR LENGTH, ELBOWS, ELEVATION DIFFERENCE, ETC

NOTES:
1. PROVIDE OUTDOOR UNIT WITH MSTP BACNET INTEGRATION CARDS.
2. PROVIDE LOW AMBIENT COOLING TO 0°F, INCLUDE WIND BAFFLES.

DANE S. PLETCHER
LICENSED
23121
KANSAS
PROFESSIONAL ENGINEER

1520 E DOUGLAS AVE
SUITE 200
WICHITA, KS 67214
INNOVATIVEGROUPS.COM

INNOVATIVE GROUPS

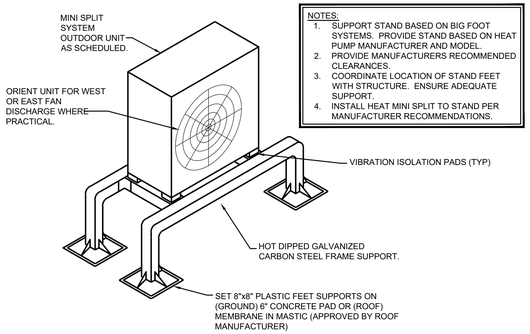
ART GALLERY HVAC REPLACEMENT
WASHBURN UNIVERSITY
1700 COLLEGE AVE
TOPEKA, KS 66621

JOB NO.: 25029

REVISIONS

DATE: 04-11-2025
DRAWN BY: CRS
CHECKED BY: CRS

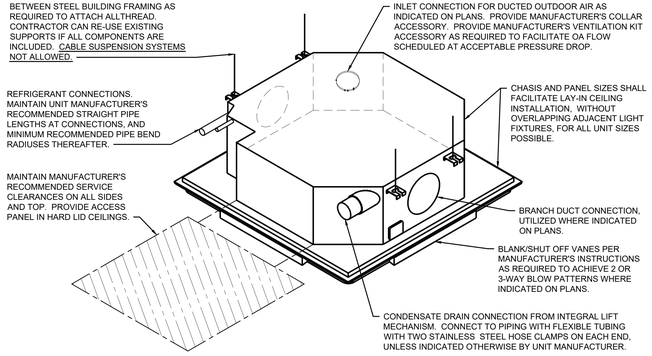
MP1
MECHANICAL SCHEDULES



NOTES:
1. SUPPORT STAND BASED ON BIG FOOT SYSTEMS. PROVIDE STAND BASED ON HEAT PUMP MANUFACTURER AND MODEL.
2. PROVIDE MANUFACTURERS RECOMMENDED CLEARANCES.
3. COORDINATE LOCATION OF STAND FEET WITH STRUCTURE. ENSURE ADEQUATE SUPPORT.
4. INSTALL HEAT MINI SPLIT TO STAND PER MANUFACTURER RECOMMENDATIONS.

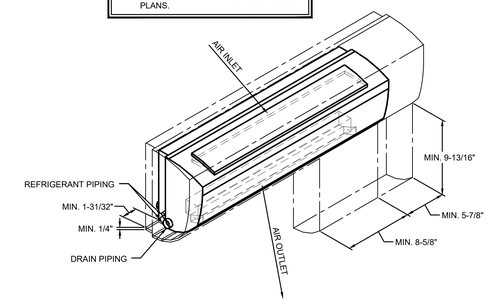
1 MINISPLIT OUTDOOR UNIT MOUNTING DETAIL
NO SCALE

NOTES:
1. COORDINATE REFRIGERANT / CD PIPE ROUTING WITH WHAT IS INDICATED ON PLANS.

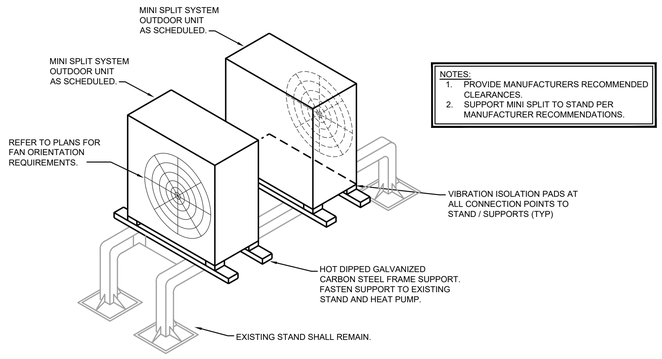


2 INDOOR UNIT DETAIL - 4-WAY CASSETTE
NO SCALE

NOTES:
1. COORDINATE REFRIGERANT / CD PIPE ROUTING WITH WHAT IS INDICATED ON PLANS.

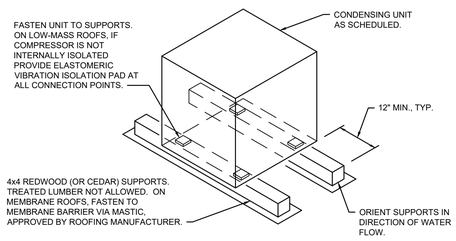


3 INDOOR UNIT DETAIL - WALL MOUNT
NO SCALE

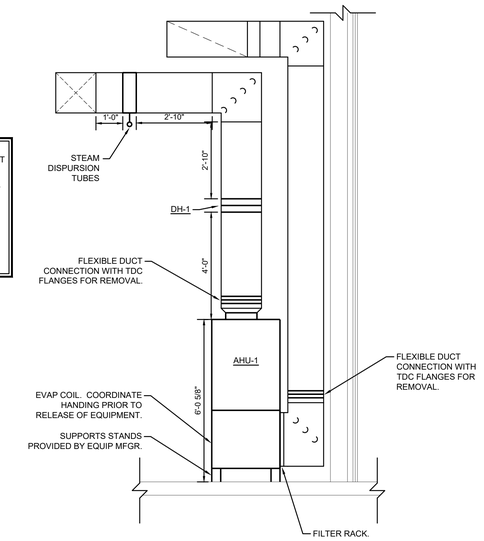


NOTES:
1. PROVIDE MANUFACTURERS RECOMMENDED CLEARANCES.
2. SUPPORT MINI SPLIT TO STAND PER MANUFACTURER RECOMMENDATIONS.

4 MINISPLIT OUTDOOR UNIT MOUNTING DETAIL
NO SCALE



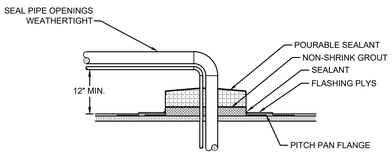
5 ROOF MOUNTED CONDENSING UNIT DETAIL
NO SCALE



NOTES:
1. DIMENSIONS INDICATED REPRESENT CLEARANCE REQUIREMENTS FOR EQUIPMENT. CONFIRM WITH MANUFACTURER REQUIREMENTS IF DEVIATIONS OCCUR.
2. REFRIGERANT PIPING SHALL CONNECT ON ROOM SIDE OF AIR HANDLER.
3. COORDINATE LOCATION OF UNIT WITH WALL MOUNTED CONDUITS, SWITCHES, ETC. THAT REMAIN.

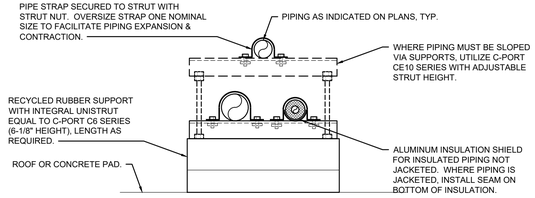
6 AHU-1 DETAIL
NO SCALE

NOTES:
1. DETAIL FOR REFERENCE ONLY. ROOFING CONTRACTOR SHALL INSTALL PITCH PANS ON NEW PIPING PENETRATIONS TO MATCH EXISTING INSTALLATIONS.



7 REFRIGERANT PIPING PITCH PAN DETAIL
NO SCALE

NOTES:
1. SUPPORT SPACING SHALL BE EQUAL TO THAT FOR INDOOR PIPING.
2. APPLY UV-RESISTANT COATING TO REFRIGERANT PIPING INSULATION IF NOT INDICATED TO BE JACKETED IN PIPING SYSTEMS SCHEDULE.



8 OUTDOOR PIPING SUPPORT DETAIL
NO SCALE

DANE S. PLETCHER
LICENSED
11/1/2015
23121
KANSAS
PROFESSIONAL ENGINEER

1520 E DOUGLAS AVE
SUITE 200
WICHITA, KS 67214
INNOVATIVEGROUPS.COM

INNOVATIVE GROUPS

ART GALLERY HVAC REPLACEMENT
WASHBURN UNIVERSITY
1700 COLLEGE AVE
TOPEKA, KS 66621

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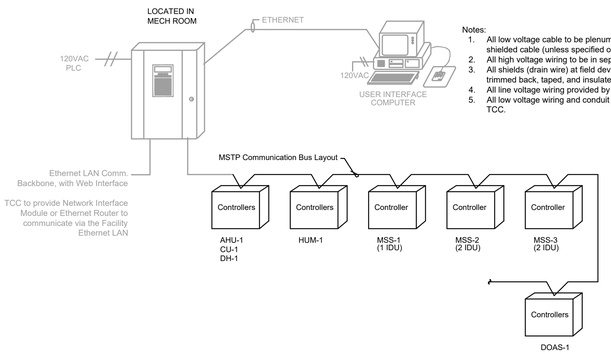
MP2
MECHANICAL DETAILS

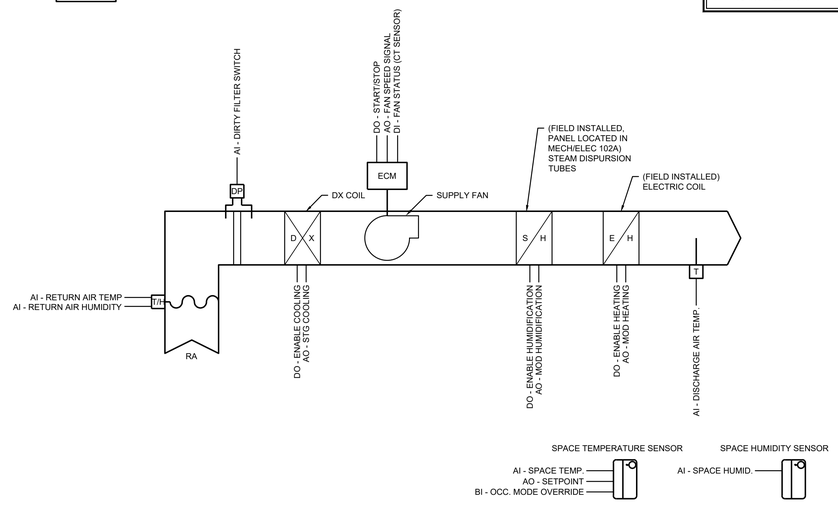


Notes:
1. All low voltage cable to be plenum rated 18ga. shielded cable (unless specified otherwise).
2. All high voltage wiring to be in separate conduit.
3. All shields (drain wire) at field devices must be trimmed back, taped, and insulated from ground.
4. All line voltage wiring provided by E.C.
5. All low voltage wiring and conduit provided by TCC.

NOTES:
1. TRANE CONTROLS (CHAD SCHLITTENHARD - LENEXA, KANSAS - PH 913-608-1758) HAS BEEN SELECTED BY THE OWNER TO PROVIDE TCC SCOPE. MC SHALL COORDINATE WITH TCC.
2. TCC TO COORDINATE AND IMPLEMENT ALL EXISTING OCCUPIED / UNOCCUPIED SCHEDULES & SETPOINTS WITH OWNER PRIOR TO COMPLETION. REFER TO EQUIPMENT SEQUENCES FOR OCCUPIED / UNOCCUPIED REQUIREMENTS.
3. TCC SHALL PROVIDE 8 HOURS (MIN.) OF OWNER TRAINING TO FACILITY MAINTENANCE STAFF MEMBERS PRIOR TO COMPLETION. TRAINING SHALL BE ALLOTTED AT SUBSTANTIAL COMPLETION, 30 DAYS AFTER SUBSTANTIAL COMPLETION AND OFF-SEASON SYSTEM CHANGEOVER.
4. EXISTING DIRECT DIGITAL CONTROLS SHALL BE REMOVED. TCC MAY CHOOSE TO UTILIZE EXISTING BUS, SENSORS, ETC. THAT OPERATE WITHIN THEIR CORRESPONDING SYSTEM. UTILIZING THESE ITEMS WILL NOT RELIEVE TCC OF PROVIDING A FULLY FUNCTIONAL SYSTEM THAT MEETS THE DESIGN AND/OR CURRENT OPERATION OF THE FACILITY. MC IS RESPONSIBLE FOR THE COORDINATION AND SCHEDULING OF THE TCC WORK SHOWN HEREIN. COORDINATE ALL REQUIRED CONDUIT ROUGH-IN AND DEVICE INSTALLATION WITH THE TCC CONTRACTOR AND INCLUDE IN BID. EXISTING CONDUITS SHALL BE RE-USED. WHERE NEW CONDUITS ARE REQUIRED, TCC SHALL INSTALL CONDUIT THAT MATCHES EXISTING CONSTRUCTION.
5. UPDATE ALL TCC USER INTERFACE GRAPHICS AND/OR FLOOR PLANS PRIOR TO COMPLETION.
6. PROVIDE ALL LOW-VOLTAGE WIRING AS REQUIRED FOR CONTROLLERS AND CONTROL PANEL.
7. USER OCCUPIED MODE OVERRIDE PROVIDED ON ZONE CONTROLLERS SHALL ALLOW 1-HOUR (MIN) OVERRIDE CONTROL.
8. TCC SHALL COORDINATE EXISTING SEQUENCES WITH PROPOSED SEQUENCES WITH OWNER PRIOR TO COMMENCING WORK. ALL DEVIATIONS SHALL BE APPROVED BY OWNER/ENGINEER AND SHALL BE UPDATED IN AS-BUILT DOCUMENTATION.
9. TCC SHALL VERIFY QUANTITIES INDICATED PRIOR TO INSTALLATION.

1 TEMPERATURE CONTROL COMMUNICATION LAYOUT

NO SCALE



2 AHU-1 CONTROL DIAGRAM

NO SCALE

AHU-1 VARIABLE AIR VOLUME (VAV) SEQUENCE OF OPERATION

UNOCCUPIED MODE:
DURING THE UNOCCUPIED MODE THE SUPPLY FAN WILL REMAIN OFF AND COOLING / HEATING MODE WILL REMAIN OFF. WHEN UNOCCUPIED SET-POINT(S) ARE NOT SATISFIED, OCCUPIED MODE SHALL BE INITIALIZED AND HEATING OR COOLING SEQUENCES BELOW SHALL BE FOLLOWED TO MAINTAIN UNOCCUPIED SETPOINT. WHEN SETPOINT IS SATISFIED, UNOCCUPIED MODE SHALL RESUME.

OCCUPIED MODE:
DURING OCCUPIED HOURS OF OPERATION, A START COMMAND SHALL BE SENT TO INITIATE THE SUPPLY FAN.

AT END OF OCCUPIED HOURS OF OPERATION, A STOP COMMAND SHALL BE SENT TO STOP THE SUPPLY FAN.

MORNING WARM-UP/COOL-DOWN MODE:
MORNING WARM-UP / COOL-DOWN WILL BE INITIATED PRIOR TO TRANSITIONING TO OCCUPIED MODE. THE TEMPERATURE CONTROL SYSTEM WILL INITIATE COOLING MODE OR HEATING MODE SEQUENCE AS REQUIRED TO ENSURE SPACE SETPOINTS ARE MET WHEN BUILDING TRANSITIONS TO OCCUPIED MODE. THE TEMPERATURE CONTROLS SYSTEM WILL LEARN THE REQUIRED TRANSITION DURATION BASED UPON THE OA AIR TEMPERATURE AND WILL INITIATE THE MORNING SEQUENCE AT THE APPROPRIATE TIME.

COOLING MODE:
WHEN SPACE TEMPERATURE IS 2°F(ADJ) ABOVE SETPOINT (70°F), THE UNIT SHALL STAGE COOLING COMPRESSORS AND ADJUST FAN SPEED TO MAINTAIN 55°F (ADJ) UNIT DISCHARGE AIR TEMPERATURE (DAT). WHEN THE SPACE TEMPERATURE SENSOR IS 2°F BELOW SETPOINT, OCCUPIED MODE SHALL RESUME.

HEATING MODE:
WHEN SPACE TEMPERATURE IS 2°F(ADJ) BELOW SETPOINT (70°F), THE BAS SYSTEM SHALL MODULATE THE ELECTRIC DUCT HEATER AND ADJUST FAN SPEED TO MAINTAIN 90°F(ADJ) UNIT DISCHARGE AIR TEMPERATURE (DAT). WHEN THE SPACE TEMPERATURE SENSOR IS 2°F ABOVE SETPOINT, OCCUPIED MODE SHALL RESUME.

HUMIDIFICATION MODE:
WHEN SPACE RELATIVE HUMIDITY (RH) IS 5%(ADJ) BELOW SETPOINT (45%RH) AND THERE IS NOT A CALL FOR COOLING, BAS SYSTEM SHALL INITIATE HUMIDIFIER GENERATOR TO INCREASE SPACE RH. WHEN THE SPACE RH SENSOR IS 5% ABOVE SETPOINT, GENERATOR SHALL BE DE-ENERGIZED.

IF THERE IS A CALL FOR HUMIDIFICATION AND COOLING SIMULTANEOUSLY, COOLING SHALL TAKE PRECEDENCE AND HUMIDIFICATION SEQUENCE SHALL BE DISABLED UNTIL COOLING MODE IS COMPLETE.

DEHUMIDIFICATION MODE:
WHEN SPACE RELATIVE HUMIDITY (RH) IS 5%(ADJ) ABOVE SETPOINT (45%RH) AND COOLING MODE IS SATISFIED, BAS SYSTEM SHALL INITIATE COOLING MODE AND ELECTRIC DUCT HEATER TO INCREASE DAT TO 72°F(ADJ) TO DECREASE SPACE RH. WHEN THE SPACE RH SENSOR IS 5% BELOW SETPOINT, COOLING MODE AND ELECTRIC DUCT HEATER SHALL BE DE-ENERGIZED, UNIT SHALL RETURN TO OCCUPIED MODE.

IF THERE IS A CALL FOR DEHUMIDIFICATION AND COOLING SIMULTANEOUSLY, COOLING SHALL TAKE PRECEDENCE AND DEHUMIDIFICATION SEQUENCE SHALL BE DISABLED UNTIL COOLING MODE IS COMPLETE.

ALARMS:
SUPPLY FAN STATUS, RAH LOW/HIGH LIMIT, DAT LOW/HIGH LIMIT, DAH LOW/HIGH LIMIT, COOLING FAILURE, HEATING FAILURE, FILTER

DOAS-1 (EXISTING) VARIABLE AIR VOLUME (VAV) SEQUENCE OF OPERATION

**** NOTE: SEQUENCES BELOW ARE INTENDED TO WORK IN CONJUCTION WITH EXISTING SEQUENCES. TCC SHALL VERIFY EXISTING SEQUENCES MEET THE INTENT OF PROPOSED MODES BELOW.

UNOCCUPIED MODE:
DURING THE UNOCCUPIED MODE THE SUPPLY / EXHAUST FANS AND WHEEL WILL REMAIN OFF, THE OUTDOOR AIR DAMPER WILL REMAIN CLOSED AND COOLING / HEATING / ECONOMIZER MODE WILL REMAIN OFF. WHEN SPACE TEMPERATURE SENSOR UNOCCUPIED SET-POINT(S) ARE NOT SATISFIED, OCCUPIED MODE SHALL BE INITIALIZED AND HEATING, COOLING OR ECONOMIZER SEQUENCES BELOW SHALL BE FOLLOWED TO MAINTAIN UNOCCUPIED SETPOINT. WHEN SETPOINT IS SATISFIED, UNOCCUPIED MODE SHALL RESUME.

OCCUPIED MODE:
DURING OCCUPIED HOURS OF OPERATION, A START COMMAND SHALL BE SENT TO OPEN THE OA / RA DAMPERS. ONCE STATUS IS PROVEN, THE SA / EA FANS SHALL BE INITIATED AND RECOVERY WHEEL SHALL BE ENABLED.

AT END OF OCCUPIED HOURS OF OPERATION, A STOP COMMAND SHALL BE SENT TO THE RECOVERY WHEEL, SA / EA FANS AND THE RA / OA DAMPERS SHALL MODULATE TO CLOSED POSITION.

MORNING WARM-UP/COOL-DOWN MODE:
MORNING WARM-UP / COOL-DOWN WILL BE INITIATED PRIOR TO TRANSITIONING TO OCCUPIED MODE. THE TEMPERATURE CONTROL SYSTEM WILL INITIATE COOLING MODE, HEATING MODE OR ECONOMIZER SEQUENCE AS REQUIRED TO ENSURE SPACE SETPOINTS ARE MET WHEN BUILDING TRANSITIONS TO OCCUPIED MODE. THE TEMPERATURE CONTROLS SYSTEM WILL LEARN THE REQUIRED TRANSITION DURATION BASED UPON THE OA AIR TEMPERATURE AND WILL INITIATE THE MORNING SEQUENCE AT THE APPROPRIATE TIME.

COOLING MODE:
WHEN SPACE TEMPERATURE IS 2°F(ADJ) ABOVE SETPOINT (70°F), THE UNIT SHALL STAGE COOLING COMPRESSORS AND ADJUST FAN SPEED TO MAINTAIN 55°F (ADJ) UNIT DISCHARGE AIR TEMPERATURE (DAT). WHEN THE SPACE TEMPERATURE SENSOR IS 2°F BELOW SETPOINT, OCCUPIED MODE SHALL RESUME.

ECONOMIZER MODE:
WHEN OA ENTHALPY IS BELOW 27.6 BTU/LB AND OA TEMPERATURE IS ABOVE 52°F (ADJ), THE DX TXV VALVES SHALL BE STAGED OPEN TO MAINTAIN 55°F (ADJ) DISCHARGE TEMPERATURE. WHEN OA ENTHALPY IS BELOW 27.6 BTU/LB AND OA TEMPERATURE IS BELOW 52°F, FREE COOLING SHALL BE UTILIZED.

HEATING MODE:
WHEN SPACE TEMPERATURE IS 2°F(ADJ) BELOW SETPOINT (70°F), THE BAS SYSTEM SHALL STAGE THE ELECTRIC HEATER AND ADJUST FAN SPEED TO MAINTAIN 88°F(ADJ) UNIT DISCHARGE AIR TEMPERATURE (DAT). WHEN THE SPACE TEMPERATURE SENSOR IS 2°F ABOVE SETPOINT, OCCUPIED MODE SHALL RESUME.

DEHUMIDIFICATION MODE:
WHEN SPACE RELATIVE HUMIDITY (RH) IS 5%(ADJ) ABOVE SETPOINT (45%RH) AND COOLING MODE IS SATISFIED, BAS SYSTEM SHALL INITIATE COOLING MODE AND HOT-GAS REHEAT COIL TO INCREASE DAT TO 72°F(ADJ) TO DECREASE SPACE RH. WHEN THE SPACE RH SENSOR IS 5% BELOW SETPOINT, COOLING MODE AND HOT-GAS REHEAT COIL SHALL BE DE-ENERGIZED, UNIT SHALL RETURN TO OCCUPIED MODE.

IF THERE IS A CALL FOR DEHUMIDIFICATION AND COOLING SIMULTANEOUSLY, COOLING SHALL TAKE PRECEDENCE AND DEHUMIDIFICATION SEQUENCE SHALL BE DISABLED UNTIL COOLING MODE IS COMPLETE.

FREEZESTAT :
IF AT ANYTIME THE MA TEMP IS LESS THAN 35 F (ADJ.) INDICATING A FREEZE CONDITION, THE FAN WILL STOP, THE RA / OA DAMPERS WILL CLOSE.

ALARMS:
EXISTING ALARMS TO REMAIN. IN ADDITION, PROVIDE ALARM FOR VFD FAILURE AND VFD RESET OPTION.

MINI SPLIT SYSTEMS SEQUENCE OF OPERATION

UNOCCUPIED MODE:
DURING THE UNOCCUPIED MODE THE SUPPLY FAN WILL REMAIN OFF AND COOLING / HEATING MODE WILL REMAIN OFF. WHEN UNOCCUPIED SET-POINT(S) ARE NOT SATISFIED, OCCUPIED MODE SHALL BE INITIALIZED AND HEATING OR COOLING SEQUENCES BELOW SHALL BE FOLLOWED TO MAINTAIN UNOCCUPIED SETPOINT. WHEN SETPOINT IS SATISFIED, UNOCCUPIED MODE SHALL RESUME.

OCCUPIED MODE:
DURING OCCUPIED HOURS OF OPERATION, A START COMMAND SHALL BE SENT TO INITIATE THE SUPPLY FAN.

AT END OF OCCUPIED HOURS OF OPERATION, A STOP COMMAND SHALL BE SENT TO STOP THE SUPPLY FAN.

MORNING WARM-UP/COOL-DOWN MODE:
MORNING WARM-UP / COOL-DOWN WILL BE INITIATED PRIOR TO TRANSITIONING TO OCCUPIED MODE. THE TEMPERATURE CONTROL SYSTEM WILL INITIATE COOLING MODE OR HEATING MODE SEQUENCE AS REQUIRED TO ENSURE SPACE SETPOINTS ARE MET WHEN BUILDING TRANSITIONS TO OCCUPIED MODE. THE TEMPERATURE CONTROLS SYSTEM WILL LEARN THE REQUIRED TRANSITION DURATION BASED UPON THE OA AIR TEMPERATURE AND WILL INITIATE THE MORNING SEQUENCE AT THE APPROPRIATE TIME.

COOLING MODE:
WHEN SPACE TEMPERATURE IS 2°F(ADJ) ABOVE SETPOINT (70°F), COOLING SHALL BE ENABLED. WHEN THE SPACE TEMPERATURE SENSOR IS 2°F BELOW SETPOINT, OCCUPIED MODE SHALL RESUME.

HEATING MODE:
WHEN SPACE TEMPERATURE IS 2°F(ADJ) BELOW SETPOINT (70°F), HEATING SHALL BE ENABLED. WHEN THE SPACE TEMPERATURE SENSOR IS 2°F ABOVE SETPOINT, OCCUPIED MODE SHALL RESUME.

ALARMS:
SUPPLY FAN STATUS, DAT LOW/HIGH LIMIT, FILTER

DANE S. PLETCHER
LICENSED
23121
KANSAS
PROFESSIONAL ENGINEER

1520 E DOUGLAS AVE
SUITE 200
WICHITA, KS 67214
INNOVATIVEGROUPS.COM

INNOVATIVE GROUPS

ART GALLERY HVAC REPLACEMENT
WASHBURN UNIVERSITY
1700 COLLEGE AVE
TOPEKA, KS 66621

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DRAWN BY: CRS
CHECKED BY: CRS

MP3
MECHANICAL CONTROLS

GENERAL PROVISIONS 15010

1.01 Related Requirements
- Included in this section:
  - Prime and protective painting.
- Temperature controls including 24v (or less) low-voltage wiring and components.
- Duct mounted access doors.
- Miscellaneous fittings, brackets, supports, etc.
- Flashings, counter flashings, caulking, sealants, etc. as required for weatherproofing mechanical penetrations through walls, floors, and roofs.
- Not included in this section:
  - Finish painting.
- 120v (or greater) line voltage power.
- Access doors in gyp board walls, ceilings, etc.
- Concrete mounting slabs and structural steel reinforcement.

1.02 Permits and Inspections
- Obtain all permits and inspections and pay all fees for completion of this work.

1.03 Codes and Standards
- Comply with the latest adopted version of the Mechanical and Plumbing Codes, applicable sections of the NFPA, and other applicable current laws, codes, ordinances, etc. of all Federal, State, and Local authorities whether included or not in the contract documents.
- All mechanical equipment shall be labeled by UL, ETL, AGA, or other approved independent testing authority. Air conditioning equipment shall be ARI certified.

1.04 Submittals
- Provide submittals for the following items:
  - Air Handler
- Condensing Unit
- Mini Split Systems
- Humidifier Generator
- Grilles, Registers, Diffusers
- Test and Balance Contractor
- Direct Digital Controls (DDC)

Submittal shall be provided with cover sheet indicating project name & location, contractor providing the submittal, submittal name and submitting contractor signature indicating submittal meets or exceeds design intent. If any of these items are not provided, submittals will be returned without review.
Identify each piece of equipment in submittal with designation matching contract documents.
Submittals shall be provided in electronic .pdf form. Submit shop drawings showing any proposed deviation from the contract documents required for interface with the building.

1.05 Operations and Maintenance Manuals
- Provide operation and maintenance data manual for all equipment and/or subcontractors submitted on and approved for this project. Manual shall be provided with cover sheet indicating project name, contractor providing manual and table of contents clearly identifying each item. Each section of manual shall be provided with cover page clearly identifying each item. Information shall include but is not limited to warranties, filter schedule, completed startup sheets, shut down requirements, service and lubrication procedures, test and balance report and Point-Verification Tests. Manuals shall be provided in electronic .pdf form.

1.06 Guarantees and Warranties
- Provide a one (1) year warranty starting at the date of acceptance by the owner for all systems and equipment installed under this contract. Contractor shall clearly identify additional factory parts and labor warranties in Operation and Maintenance Manuals.

1.07 Temporary Services
- Provide temporary services and utilities as required. New or existing HVAC systems shall not be utilized during construction.

1.08 Return Plenum Requirements
- All materials exposed in return air plenum to comply with NFPA 90A flame spread under 25 smoke developed and under 50 fuel contributed for return air plenums.

1.09 Access Doors
- Provide access doors where indicated on drawings and/or as required to properly operate, adjust and maintain all equipment. Coordinate exact location with architect prior to installation.

1.10 Caulking and Flashing
- Seal all floor, wall and roof penetrations water tight with suitable sealant. Seal penetrations through fire rated assemblies with minimum 1" thickness 3M brand fire barrier caulk CP-25 (or other approved manner) to maintain rating of assembly.

1.11 Openings, Cutting and Patching
- Coordinate all openings in floor, wall(s) and roof with General Contractor. General contractor shall cut and patch all openings to match adjacent surfaces.

1.12 System Clearances
- Field verify exact location, size, routing, and availability of HVAC systems. Verify sufficient space is available to install equipment and systems as indicated on drawings. If changes are necessary, notify engineer as soon as possible and modify systems as instructed.

1.13 Cleaning and Sterilization
- Contractor shall remove all construction debris from their associated work by the end of each day. Upon completion of project, contractor shall clean and disinfect all mechanical equipment, ductwork, piping, insulation.

1.14 Testing of Piping
- All piping shall be tested with hydrostatic or pneumatic pressure, or other means as directed, and shall be proved tight as hereinafter specified in the presence of the local building inspector before it is concealed or covered in any way.
- This Contractor shall make all temporary connections necessary to perform these tests.
- Duration of tests shall be sufficient time to permit inspection of all joints by the local building inspector, and generally holding test pressure for a period of not less than 12 hours continuously without loss of any pressure.

Individual System Tests:
1. Refrigerant Piping - 300 PSI nitrogen gas pressure (or as required by manufacturer)

1.15 Mounting Heights
- Unless noted otherwise, minimum mounting height for exposed equipment and piping is 7'-0" above finished floor. Conceal piping and equipment unless indicated otherwise.
- Install equipment, valves, dampers, etc. within 2'-0" above ceilings where possible. Ensure ceiling grid or access panels allow adequate clearance for service requirements.

1.16 Freeze Protection
- Piping and equipment located in areas subject to freezing shall be installed in a manner to prevent freezing.
- Install all piping on warm side of building insulation to prevent freezing.

1.17 Start-up Instructions
- Start-up equipment and provide completed start-up documentation in accordance with manufacturer's instructions.

1.18 Equipment and Systems Installation
- Install equipment and systems in accordance with manufacturer's printed installation instructions and in accordance with accepted industry standards and all applicable codes. Meet all required clearances and provide all necessary equipment accessories, bases, supports, shields, etc. for a complete installation.

1.19 Equipment Identification
- All mechanical equipment shall be labeled with the equipment identification number indicated on Construction Documents. Identification shall be with laminated three-layer plastic nameplates, with engraved black letters on white background. Lettering size shall be 0.75-inches high.

1.20 Pipe Identification
- Install pipe identification markers and direction arrows on all piping that is exposed and above ceilings. Markers to be color coded and identified per ANSI specifications. Install at valves and no further than thirty (30) feet apart along any run of pipe, except equipment rooms where spacing will be twenty (20) feet.

1.21 Balancing and Adjusting
- The mechanical contractor shall engage Energy Management and Control Corporation (EMC^2) to adjust and balance the mechanical systems and check every operational piece of equipment. System shall be balanced to airflow quantities as indicated on drawings. Check, adjust and balance to provide a complete and operational system. A type written final balance report shall be provided to the engineer for record purposes.

END OF SECTION 15010

PIPING SYSTEMS 15060

1.01 Condensate Drain Piping
- -- Roof Location -- Schedule 40 PVC ASTM D1784 pipe. Drainage pattern ASTM D2729 fittings. Solvent weld ASTM D2564 joints. Install deep seal traps and cleanout plugs at all equipment connections.
- -- Interior Locations -- Type "L" hard drawn copper ASTM B88 pipe. Wrought copper ASTM B16.22 fittings. Sweat 95-5 tin antimony solder joints, or Viega ProPress press fittings conforming to ASME B16.51. Sealing elements for press fittings shall be EPDM.
- Piping in return air plenums shall be copper piping (the same as domestic water piping, except use drainage pattern fittings).

1.02 Refrigerant Piping
- ASTM B 280, Type ACR, manufactured in straight length hard tube. Plugged and charged with nitrogen. B-280/B-819 cleanliness requirement.
- Commercial grade refrigeration tubing (ASTM B743 and ASTM B88), No. C122200 DHP (phosphorous deoxidized, high residual phosphorus).
- Wrought copper ASTM B16.22 fittings. Elbows shall be long radius.
- Brazing filler metals shall be AWS A5.8, Type BCuP-5, 15% silver content, 5% phosphorus content. No flux or soldering allowed.
- Refrigerant piping shall be purged with dry nitrogen while brazing.
- Evacuate system for 12 hours minimum prior to charging with refrigerant.
- Refrigerant pipe sizing and pipe accessories shall be sized and selected by the equipment manufacturer providing the equipment.
- Install piping with adequate slope to prevent oil trapping.
- Furnish all suction accumulators, solenoid valves, traps, double suction risers, etc., as required by equipment manufacturer's installation instructions.
- Selection and sizing shall provide the necessary scheduled capacities per actual job conditions.

1.03 Low Pressure Steam and Condensate Return Piping:

Type "L" hard copper ASTM B88 pipe with wrought copper ANSI B16.22 fittings. AWS A5.8, BCuP-5 brazed joints with 15% silver composition equal to Sil-Fos.

Pitch down in direction of flow not less than 1" in 40' for mains, and 1" in 5' in runouts. Pitch connections to equipment so condensate flows back to main to prevent condensate accumulation behind a closed valve. All piping shall be installed for expansion and contraction whether shown or not shown on the drawings.

1.04 Pipe Hangers and Supports
- Provide pipe hangers and supports designed to carry the load with a safety factor of 5 or larger.
- Hangers are to be over-sized to fit pipe and insulation (where applicable).
- Copper hangers shall be used for support of copper piping.
- Hangers of malleable iron split ring, clevis or roller type.
- Rods and adjustable turnbuckles suspended from inserts or supporting members in construction for overhead suspension. Heavy welded steel brackets for wall suspension. Furnish and install hangers, rollers, insulation saddles, stands, anchor chairs and all required attachments. Wall supports bolt through wall with suitable back plate on back side of wall.

1.05 Pipe Hanger Spacing
5'-0" for cast iron soil pipe, ABS & PVC plastic pipe.
8'-0" for copper, iron and steel piping up to 1" size.
10'-0" for copper, iron and steel piping above 1" size.

1.06 Equipment Supports
- All new suspended fan coil units shall be isolated from the structure with rubber in-shear hangers equal to Amber Booth Type BR or BRD.

1.07 Valves & Cocks
- All valves of a given type shall be of one manufacturer.
- Provide all valves where required for operation, service and maintenance of systems and equipment.
- All valves shall be of a suitable type for intended service.
- Protect sweat joint valves in copper piping from heat during installation.
- All valves in insulated piping system will be installed with operating handles above insulation through use of extension stems, extended necks or rising stems.
- Valve connection shall be equivalent to pipe joint requirements.
- Ball Valves: Bronze, swing-away design, full port, chrome plated bronze ball with teflon seats
- Drain Valves: Bronze, compression stop with nipple and cap or hose thread.

1.08 Piping Installation
- Piping shall be ran harmoniously with the building walls and ceilings.
- Piping not sized on drawings shall be sized by the Engineer.
- Provide unions and isolation valves at all equipment to facilitate removal.
- Use non-conducting fittings where jointing dissimilar metals.
- Slope all drainage piping 1/4" per foot (1/8" per foot for DWV piping 4" and larger). Arrange piping in a manner to allow for expansion and contraction.
- Thoroughly clean before installing - no sand, dirt, filings, etc.

END OF SECTION 15060

INSULATION 15250

1.01 Acceptable Manufacturers

Fiberglass Insulation
1. Owens Corning
2. Johns-Manville
3. Knauf
4. Certainteed

Foamed Plastic Insulation
1. Armstrong Armaflex
2. Rubatex

1.02 Refrigerant Suction
- ½" thick foamed plastic closed-cell type.
- Where exposed to weather paint with ultraviolet protective coating.

1.03 Condensate Drain Piping
- ½" thick foamed plastic closed-cell type.

1.04 Steam Piping
- Fiberglass SSK-11 ASJ pipe insulation with self-sealing lap.
- All insulation shall be continuous through wall and ceiling openings and sleeves.
- Insulation on all cold surfaces where vapor barrier jackets are used, will be applied with a continuous, unbroken vapor seal.
- Hangers, supports, anchors, etc., which are secured directly to cold surfaces must be adequately insulated and vapor-sealed to prevent condensation.
- Provide galvanized sheet metal shields, saddles, or high-density foam glass inserts at hangars to prevent crushing of insulation at hangers.
- Shields shall protect bottom half of insulation and shall match outer diameter of pipe insulation.
- Pipe saddles shall be insulated as required to complete a continuous unbroken insulation of pipe as specified for the piping being supported.
- Specified adhesives mastics and coatings shall be applied at the manufacturer's recommended minimum coverage per gallon.
- All fittings, valves, flanges, shall be covered with PVC pre-molded one-piece fitting covers utilizing factory supplied hi-lo temperature insulation insert. Insulation insert shall be applied to the fitting with ends of insert tucked snugly into throat of fitting and edges adjacent to pipe. No gaps shall occur between fitting insulation and pipe insulation.
- Secure PVC pre-molded cover to insulated fitting by stapling and taping edges of cover with Zeston color matching Z-tape.
- Fittings, valves, flanges, PVC pre-molded fitting cover shall be secured with Zeston Vapor Barrier Adhesive or Equal (Fosters 85-20).
- Circumferential edges of cover shall be wrapped with Zeston color matching Z-tape.
- The tape shall extend over adjacent pipe insulation and overlap itself at least 2" on the downward side.
- All testing of piping shall be completed, and all leaks repaired prior to application of insulation.
- All insulation shall have composite (insulation, jacket or facing, and adhesive used to adhere the facing or jacket to the insulation) fire and smoke hazard ratings as tested by procedure ASTM E-84, NFPA 255 and Underwriters' Laboratories, Inc. Standard #723, not to exceed:

Flame Spread	25
Smoke Developed	50
Fuel Contributed	50

- Accessories, such as adhesives, mastics, cements, tapes, and glass cloth for fitting shall have the same component ratings as listed above.
- All products or their shipping cartons shall bear a label indicating flame and smoke ratings in compliance with the listed ratings maximum.
- Any treatment of jackets or facings to impart flame and smoke-safety shall be permanent.
- The use of water-soluble treatments is prohibited.
- The Insulation Contractor shall certify, in writing, prior to installation, that all products to be used will meet the above criteria.
- Edges of insulation and butt joints shall be taped with joint sealing tape. The vapor barrier for cold or dual temperature equipment and piping shall be secure at all times; no staples shall be used to close or secure jacket in these systems.
- Adhesives, Sealers, Facings, and Vapor Barrier Coatings shall be compatible with materials to which applied, and shall not corrode, soften, or otherwise attack the pipe or insulation materials in either the wet or dry state. Use only adhesives, sealers, facings, and vapor barrier coatings recommended by the approval manufacturers of insulation materials.

Insulation Thickness	System
1-1/2"	Steam (1-1/4" to 3") --- Match Existing Piping

1.05 Duct Insulation Wrap
- Supply air, return air and outside air ducts = 1½" thick R-5 minimum.
- Faced duct wrap fiberglass insulation (seal and tape all joints and seams).

END OF SECTION 15250

AIR DISTRIBUTION 15840

1.01 Reference Standards
- Installation and fabrication of all ductwork shall conform with the latest edition SMACNA duct manuals, ASHRAE handbooks and local codes.
- Construct ductwork to NFPA 90A Standard for Air Conditioning and Ventilating Systems, and NFPA 90B Standard for the Installation of Warm Air Heating and Air Conditioning.
- Fans shall bear the AMCA Certified Ratings Seal and UL Label.

1.02 Acceptable Manufacturers:

Flexible Ductwork
- Thermaflex Type M-KE
- Atco

Grilles, Registers, & Diffusers
- Titus
- Krueger
- Carnes
- Price

Dampers & Duct Accessories
- Ruskin
- Price

1.03 Ductwork
- Duct Sizes: All duct sizes indicated are inside clear dimensions. Overall duct sizes shall be increased to accommodate duct liner (where specified). Where structural conditions deem it necessary to change the size or shape of any duct, the equivalent free area shall be maintained.
- Duct Pressure Class: Low pressure class - static pressure in duct less than 2" W.G. and velocities less than 2400 fpm.
- Duct Material: Galvanized steel lock-forming quality, having a zinc coating of 1.25 ounces per square foot for each side (coating Class G90). Round ductwork shall be spiral construction.
- Joints: Seal all longitudinal and transverse joints on concealed ductwork, with tape equal to Hardcast Foil-Grip 1402 with maximum service temperature of 200°F. Screw or rivet all round duct joint connections. Exterior ductwork shall be sealed water-tight with commercial duty waterproof sealant prior to insulation.
- Exposed Ductwork: Exposed ductwork shall not be sealed. All exposed ductwork shall be mill phosphatized metal. Finish of all exposed ductwork shall be suitable for painting by the General Contractor.
- Flexible Ducts: Flexible round ducts, not to exceed five (5) foot length, may be used at connection to supply air ceiling diffusers and where shown on the drawings. NOTE: Flex duct shall not be used when connection is to a fire damper and shall only be used in accessible, concealed areas. Install with only one turn and support with strap hanger (do not lay on ceiling). Fiberglass insulating blanket with vapor barrier.

1.04 Grilles, Registers, and Diffusers
- Provide in accordance with schedule or notations on drawings.

1.05 Dampers and Duct Accessories
- Balancing Dampers
  - Balancing dampers shall be provided for each supply, return, and exhaust grille and diffuser as indicated on the schedule or as shown on the plans.
- Manual volume balancing dampers shall be locking quadrant type and built-in accordance to SMACNA standards for low pressure duct systems.
- Blades and frames shall be galvanized steel construction with molded synthetic bearings.
- Dampers shall be single or opposed blade type.

Ruskin Model MD25 (rectangular duct - up to 36"W x 12"H).
Ruskin Model MD35 (rectangular duct - up to 48"W x 48" H).
Ruskin Model MDRS25 (round duct - up to 20" dia.).

- Access Doors
  - Access doors shall be double skin, insulated, hinged type with locking latches.
- 22 Ga. galvanized steel double skin door, 1" fiberglass insulation, continuous piano hinge, foam gasketing between door and frame, and between duct connection and frame.
- Maximum leakage of .25 CFM/sq. ft. at 1" W.G. static pressure.
- Built to SMACNA standards.

Ruskin Model ADH22.

END OF SECTION 15840

DANE S. PLETCHER
LICENSED
23121
11/1/2015
KANSAS
PROFESSIONAL ENGINEER

1520 E DOUGLAS AVE
SUITE 200
WICHITA, KS 67214
INNOVATIVEGROUPS.COM

INNOVATIVE GROUPS

ART GALLERY HVAC REPLACEMENT
WASHBURN UNIVERSITY
1700 COLLEGE AVE
TOPEKA, KS 66621

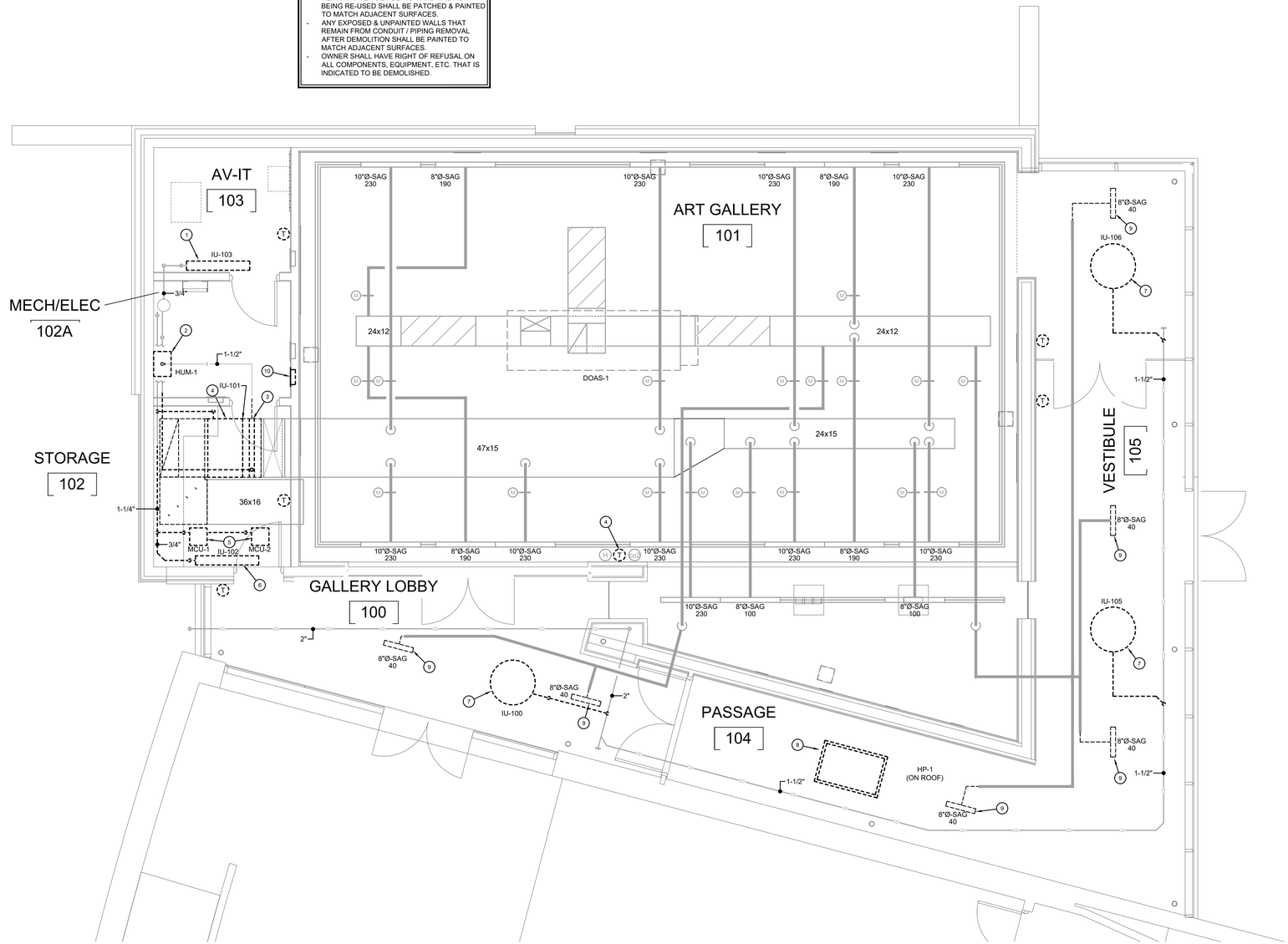
JOB NO.: 25029

REVISIONS

DATE: 04-11-2025
DRAWN BY: CRS
CHECKED BY: CRS

MP4
MECHANICAL SPECIFICATIONS

NOTES:
- ALL WALL PENETRATIONS FROM EXISTING PIPING, CONDUIT, SUPPORTS, ETC. THAT REMAIN AFTER DEMOLITION AND ARE NOT BEING RE-USED SHALL BE PATCHED & PAINTED TO MATCH ADJACENT SURFACES.
- ANY EXPOSED & UNPAINTED WALLS THAT REMAIN FROM CONDUIT / PIPING REMOVAL AFTER DEMOLITION SHALL BE PAINTED TO MATCH ADJACENT SURFACES.
- OWNER SHALL HAVE RIGHT OF REFUSAL ON ALL COMPONENTS, EQUIPMENT, ETC. THAT IS INDICATED TO BE DEMOLISHED.



PLAN NOTES:

1. REMOVE WALL-MOUNT INDOOR CASSETTE & ASSOCIATED THERMOSTAT & CONTROL WIRING. CAP CONDENSATE PIPING FOR RE-USE. REMOVE REFRIGERANT PIPING AND ASSOCIATED SUPPORTS BACK TO MCU IN THEIR ENTIRETY.
2. REMOVE HUMIDIFIER GENERATOR. CONTROL PANEL (ADJACENT TO GENERATOR) & ASSOCIATED SPACE SENSOR TO REMAIN. CAP STEAM PIPING AND DRAIN PIPING FOR RE-USE. REFER TO NEW WORK PLAN FOR ADDITIONAL INFORMATION.
3. REMOVE HUMIDIFIER DISPERSION TUBES AND CAP STEAM PIPING WHERE INDICATED. REMOVE DRAIN PIPING AND CAP WHERE INDICATED.
4. REMOVE IU-101 AND ASSOCIATED THERMOSTAT, CONTROL WIRING AND SA / RA DUCTWORK AS INDICATED DASHED. REMOVE CONDENSATE PIPING BACK TO MAIN AND CAP. REMOVE REFRIGERANT PIPING AND ASSOCIATED SUPPORTS BACK TO MCU IN THEIR ENTIRETY.
5. REMOVE MCU UNIT AND ASSOCIATED REFRIGERANT PIPING, CONDENSATE PIPING, CONTROL WIRING, SUPPORTS, ETC. IN THEIR ENTIRETY.
6. REMOVE WALL-MOUNT INDOOR CASSETTE & ASSOCIATED THERMOSTAT & CONTROL WIRING. CAP CONDENSATE PIPING WHERE INDICATED FOR RE-USE. REMOVE REFRIGERANT PIPING AND ASSOCIATED SUPPORTS BACK TO MCU IN THEIR ENTIRETY.
7. REMOVE CEILING-MOUNT INDOOR CASSETTE & ASSOCIATED THERMOSTAT & CONTROL WIRING. CAP CONDENSATE PIPING WHERE INDICATED FOR RE-USE. REMOVE REFRIGERANT PIPING AND ASSOCIATED SUPPORTS BACK TO MCU IN THEIR ENTIRETY.
8. REMOVE ROOF-MOUNT HEAT PUMP & ASSOCIATED CONTROL WIRING. REMOVE REFRIGERANT PIPING AND ASSOCIATED SUPPORTS BACK TO MCU IN THEIR ENTIRETY. EXISTING STAND SHALL BE RE-USED FOR NEW WORK REQUIREMENTS.
9. REMOVE FRESH AIR GRILLE. PREP DUCTWORK FOR RE-CONNECTION TO NEW GRILLE AS INDICATED ON SHEET M1.
10. REMOVE TRANE BACNET GATEWAY CONTROLLER AND ASSOCIATED CONTROL WIRING.

A HVAC DEMO PLAN
SCALE - 1/4"=1'-0"
0 2' 4' 8'
NORTH

DANE S. PLETCHER
LICENSED
23121
11/1/2015
KANSAS
PROFESSIONAL ENGINEER

1520 E DOUGLAS AVE
SUITE 200
WICHITA, KS 67214
INNOVATIVEGROUPS.COM
INNOVATIVE GROUPS

ART GALLERY HVAC REPLACEMENT
WASHBURN UNIVERSITY
1700 COLLEGE AVE
TOPEKA, KS 66621

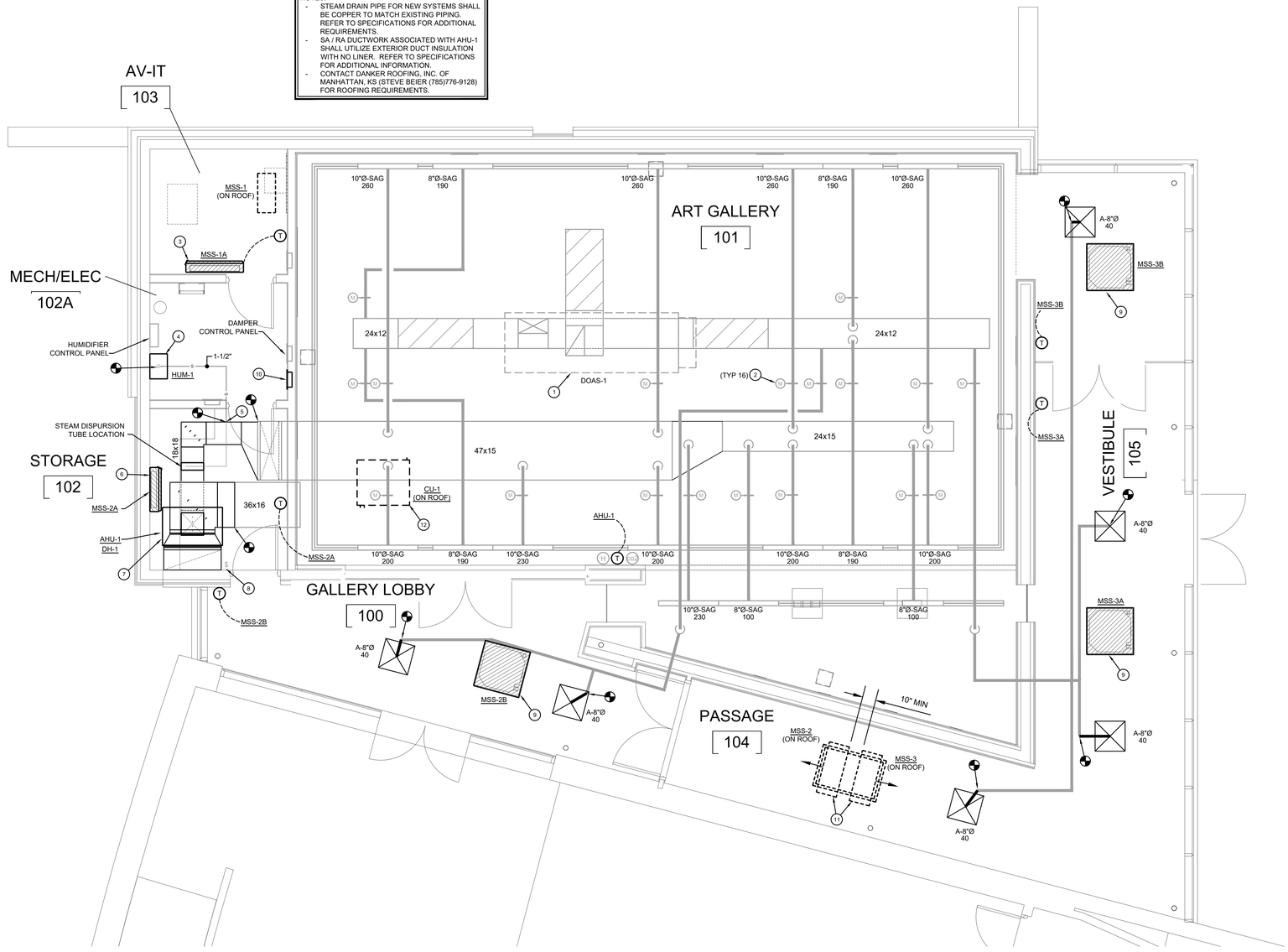
JOB NO.: 25029

REVISIONS

DATE: 04-11-2025
DRAWN BY: CRS
CHECKED BY: CRS

MD1
HVAC DEMO PLANS

NOTES:
- STEAM DRAIN PIPE FOR NEW SYSTEMS SHALL BE COPPER TO MATCH EXISTING PIPING. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
- SA / RA DUCTWORK ASSOCIATED WITH AHU-1 SHALL UTILIZE EXTERIOR DUCT INSULATION WITH NO LINER. REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION.
- CONTACT DANKER ROOFING, INC. OF MANHATTAN, KS (STEVE BEIER (785)776-9128) FOR ROOFING REQUIREMENTS.



PLAN NOTES:

1. TRANE SERVICE TECHNICIAN SHALL SERVICE DOAS-1. ALL REPAIR ITEMS, INCLUDING VFD MALFUNCTION, SHALL BE REPORTED TO OWNER FOR REPAIR COSTS AND REQUIREMENTS.
2. MOTORIZED DAMPERS SHALL BE SET AND FIXED TO CFM INDICATED (TYPICAL 16 LOCATIONS). CONTRACTOR SHALL COORDINATE WITH TAB & TCC CONTRACTOR TO ADJUST DAMPER CONTROL PANEL IN MECH/ELEC 102A TO MATCH CFM'S INDICATED.
3. MOUNT WALL INDOOR CASSETTE IN SAME LOCATION AS UNIT THAT WAS REMOVED ON DEMO PLAN. ROUTE CONTROL WIRING TO NEW THERMOSTAT, LOCATED IN SAME LOCATION AS T-STAT REMOVED ON DEMO PLAN.
4. MOUNT HUMIDIFIER GENERATOR ON EXISTING SUPPORT STAND. ADJUST STAND AS REQUIRED. CONNECT STEAM AND DRAIN PIPING TO EXISTING PIPES RETAINED DURING DEMOLITION.
5. EXTEND 1-1/2" STEAM PIPING TO NEW DISPURSION HEADER FROM PIPING RETAINED DURING DEMOLITION.
6. MOUNT WALL INDOOR CASSETTE ON WALL BELOW CONDUITS AND ABOVE CONDENSATE DRAIN PIPING. ROUTE CONTROL WIRING TO NEW THERMOSTAT, LOCATED IN SAME LOCATION AS T-STAT REMOVED ON DEMO PLAN.
7. INSTALL AHU-1 AND DH-1 THIS LOCATION. ROUTE CONTROL WIRING TO NEW THERMOSTAT, LOCATED IN SAME LOCATION AS T-STAT REMOVED ON DEMO PLAN. REFER TO SECTION DETAIL ON SHEET MP2 FOR ADDITIONAL INFORMATION.
8. RELOCATE LIGHTING CONTROL PANEL AND DIAL TO ABOVE LIGHT SWITCH THIS LOCATION.
9. MOUNT CEILING INDOOR CASSETTE NEAR LOCATION AS UNIT THAT WAS REMOVED ON DEMO PLAN. CENTER CASSETTE IN NEW CEILING GRID TO BE EQUAL DISTANCE FROM WALLS / SOFFITS. ROUTE CONTROL WIRING TO NEW THERMOSTAT, LOCATED IN SAME LOCATION AS T-STAT REMOVED ON DEMO PLAN.
10. MITSUBISHI BACNET INTERFACE PANEL LOCATION. OBTAIN 120V POWER FROM ADJACENT OUTLET & COORDINATE INSTALLATION REQUIREMENTS WITH TCC.
11. MOUNT MSS-2 & MSS-3 HEAT PUMPS ON STAND RETAINED DURING DEMOLITION. CONDENSER FANS SHALL BE FACING AWAY FROM EACH OTHER TO MAINTAIN CLEARANCE REQUIREMENTS. CONTRACTOR SHALL PROVIDE PERPENDICULAR STEEL SUPPORTS THAT ARE FASTENED TO THE STAND AND HEAT PUMPS. INCLUDE ISOLATION GASKETS AT CONNECTION TO HEAT PUMP.
12. PROVIDE ROOFING MEMBRANE, MATERIALS, ETC. BENEATH SUPPORTS AS REQUIRED BY ROOFING CONTRACTOR.

A HVAC PLAN
SCALE - 1/4"=1'-0" (0, 2', 4', 8')
NORTH

DANE S. PLETCHER
LICENSED
23121
KANSAS
PROFESSIONAL ENGINEER
4/11/2025

1520 E DOUGLAS AVE
SUITE 200
WICHITA, KS 67214
INNOVATIVEGROUPS.COM
INNOVATIVE GROUPS

ART GALLERY HVAC REPLACEMENT
WASHBURN UNIVERSITY
1700 COLLEGE AVE
TOPEKA, KS 66621

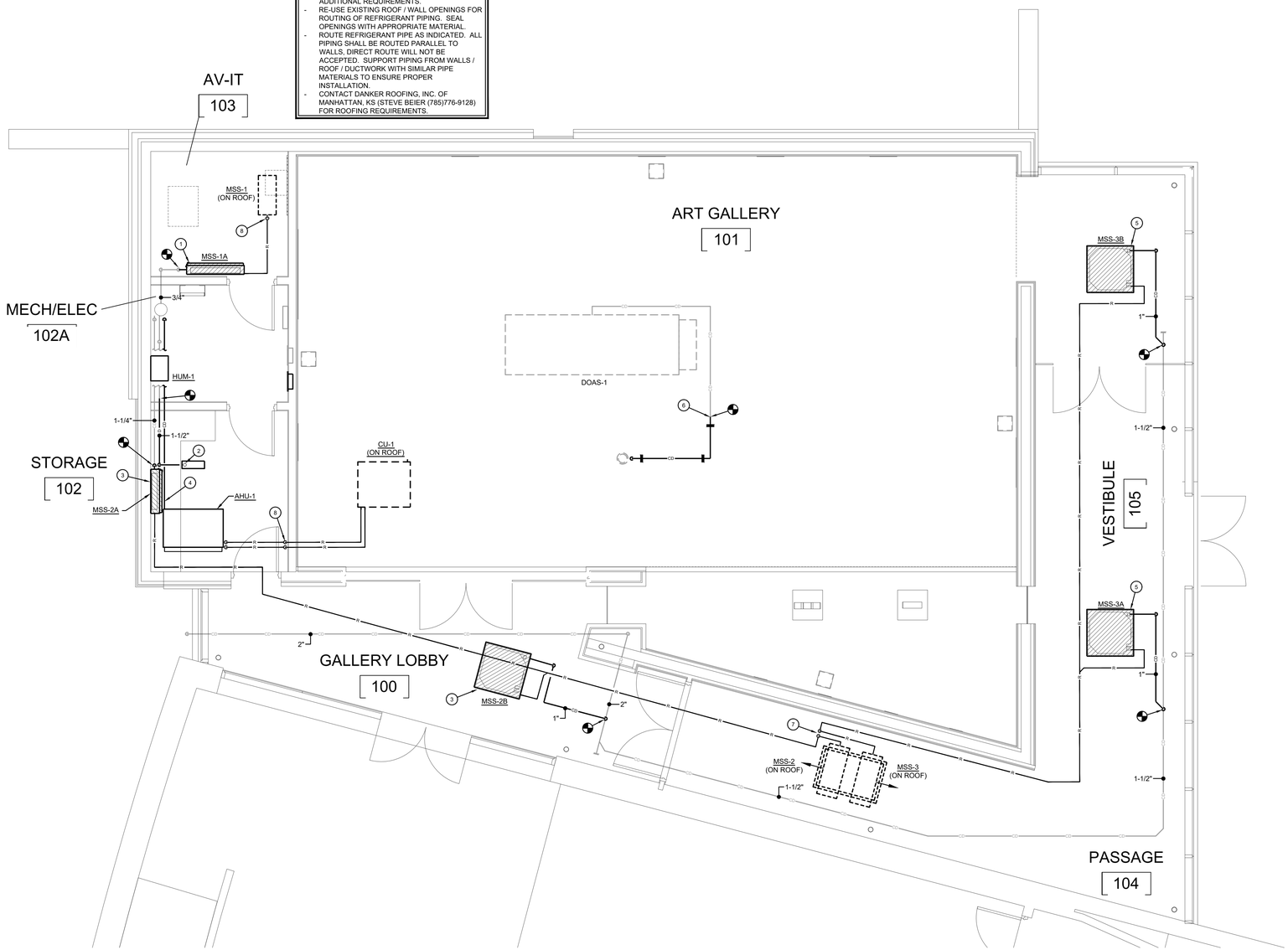
JOB NO.: 25029

REVISIONS

DATE: 04-11-2025
DRAWN BY: CRS
CHECKED BY: CRS

M1
HVAC PLAN

NOTES:
- CONDENSATE PIPING FOR NEW SYSTEMS SHALL BE COPPER TO MATCH EXISTING PIPING. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
- RE-USE EXISTING ROOF / WALL OPENINGS FOR ROUTING OF REFRIGERANT PIPING. SEAL OPENINGS WITH APPROPRIATE MATERIAL.
- ROUTE REFRIGERANT PIPE AS INDICATED. ALL PIPING SHALL BE ROUTED PARALLEL TO WALLS, DIRECT ROUTE WILL NOT BE ACCEPTED. SUPPORT PIPING FROM WALLS / ROOF / DUCTWORK WITH SIMILAR PIPE MATERIALS TO ENSURE PROPER INSTALLATION.
- CONTACT DANKER ROOFING, INC. OF MANHATTAN, KS (STEVE BEIER (785)776-9128) FOR ROOFING REQUIREMENTS.



PLAN NOTES:

1. CONNECT COPPER CONDENSATE PIPING TO EXISTING RETAINED DURING DEMOLITION. EXTEND REFRIGERANT PIPING UP THROUGH ROOF TO MSS-1 HEAT PUMP.
2. ROUTE DRAIN PIPING FROM STEAM HEADER AS INDICATED. REFER TO MANUFACTURER INSTRUCTIONS FOR TRAP REQUIREMENTS.
3. CONNECT COPPER CONDENSATE PIPING TO EXISTING RETAINED DURING DEMOLITION. EXTEND REFRIGERANT PIPING UP THROUGH ROOF TO MSS-2 HEAT PUMP.
4. ROUTE CD PIPING TIGHT TO WALL TO MECH / ELEC 102A FD AS INDICATED (SHOWN AWAY FROM WALL FOR CLARITY). PROVIDE C-PORT PIPE SUPPORTS THAT ALLOW FOR GRADE TO BE MAINTAINED AND PIPING TO BE SECURELY FASTENED. EXTEND REFRIGERATION PIPING UP THROUGH ROOF TO CU-1 CONDENSING UNIT.
5. CONNECT COPPER CONDENSATE PIPING TO EXISTING RETAINED DURING DEMOLITION. EXTEND REFRIGERANT PIPING UP THROUGH ROOF TO MSS-3 HEAT PUMP.
6. EXTEND CD PIPING FROM DOAS-1 TO ROOF DRAIN. PROVIDE UNI-STRUT SUPPORTS TO MATCH EXISTING. TURN DOWN CD PIPING ABOVE ROOF DRAIN.
7. ROUTE REFRIGERANT PIPING DOWN THROUGH EXISTING PITCH PAN ON ROOF. COORDINATE PAN REQUIREMENTS WITH ROOFING CONTRACTOR.
8. PROVIDE NEW PITCH PAN FOR REFRIGERANT PIPING & ELECTRICAL CONDUITS THIS LOCATION. COORDINATE WITH ROOFING CONTRACTOR.

A REFRIGERANT & CONDENSATE PLAN

SCALE - 1/4"=1'-0"

NORTH

DANE S. PLETCHER
LICENSED
23121
4/1/2025
KANSAS
PROFESSIONAL ENGINEER

1520 E DOUGLAS AVE
SUITE 200
WICHITA, KS 67214
INNOVATIVEGROUPS.COM

INNOVATIVE GROUPS

ART GALLERY HVAC REPLACEMENT
WASHBURN UNIVERSITY

1700 COLLEGE AVE
TOPEKA, KS 66621

JOB NO.: 25029

REVISIONS

DATE: 04-11-2025
DRAWN BY: CRS
CHECKED BY: CRS

M2
REFRIGERANT & CONDENSATE PLAN

ELECTRICAL SYMBOLS AND ABBREVIATIONS

NOTES:
1. SYMBOLS INDICATED HERE AND NOT USED IN THE CONTRACT DOCUMENTS DO NOT APPLY TO THIS PROJECT – ADDITIONAL SYMBOLS MAY BE INDICATED IN THE CONTRACT DOCUMENTS
2. MOUNTING HEIGHTS INDICATED ARE TO THE CENTER OF BACK BOX UNO

ELECTRICAL ABBREVIATIONS

A – AMPERES
AC – ALTERNATING CURRENT
AFF – ABOVE FINISHED FLOOR
AIC – AMP INTERRUPTING CAPACITY
ALT – ALTERNATE
ATS – AUTOMATIC TRANSFER SWITCH
A/V – AUDIO/VISUAL
BLDG – BUILDING
BRKR – BREAKER
C – CONDUIT
CB – CIRCUIT BREAKER
CCT – CIRCUIT
CCTV – CLOSED CIRCUIT TELEVISION
CLG – CEILING
CT – CURRENT TRANSFORMER
DISC – DISCONNECT
DP – DISTRIBUTION PANEL
EC – ELECTRICAL CONTRACTOR
EGS – ENGINE GENERATOR SET
ELEC – ELECTRIC/ELECTRICAL
EM – EMERGENCY
EMT – ELECTRICAL METALLIC TUBING
EQUIP – EQUIPMENT
ETR – EXISTING TO REMAIN
EWC – ELECTRIC WATER COOLER
FA – FIRE ALARM
FACP – FIRE ALARM CONTROL PANEL
FDR – FEEDER
FDS – FUSED DISCONNECT SWITCH
FIXT – FIXTURE
FLA – FULL LOAD AMPS
FLR – FLOOR
FS – FLOW SWITCH
FVNR – FULL VOLTAGE NON–REVERSING
GC – GENERAL CONTRACTOR
GEN – GENERATOR
GFCI – GROUND FAULT CIRCUIT INTERUPTER
GFI – GROUND FAULT INTERUPTER
GND – GROUND
GRC – GALVANIZED RIGID CONDUIT
HP – HORSEPOWER
HT – HEIGHT/HEAT TRACE
HV – HIGH VOLTAGE
IMC – INTERMEDIATE METAL CONDUIT
JB – JUNCTION BOX
KV – KILOVOLT
KVA – KILOVOLT–AMPERES
KW – KILOWATTS
KWH – KILOWATT HOURS
LAN – LOCAL AREA NETWORK
LTG – LIGHTING
LV – LOW VOLTAGE
MC – MECHANICAL CONTRACTOR
MCB – MAIN CIRCUIT BREAKER
MCC – MOTOR CONTROL CENTER
MCP – MOTOR CIRCUIT PROTECTOR
MDP – MAIN DISTRIBUTION PANEL
MER – MECHANICAL EQUIPMENT ROOM
MH – MANHOLE
MLO – MAIN LUGS ONLY
MTD – MOUNTED
MTG – MOUNTING
MTR – MOTOR/METER
NA – NOT APPLICABLE
NC – NORMALLY CLOSED
NIC – NOT IN CONTRACT
NO – NORMALLY OPEN
NTS – NOT TO SCALE
OC – ON CENTER
OFCI – OWNER FURNISHED CONTRACTOR INSTALLED
OFOI – OWNER FURNISHED OWNER INSTALLED
P – POLE
PA – PUBLIC ADDRESS
PC – PHOTOCELL
PDU – POWER DISTRIBUTION UNIT
PF – POWER FACTOR
PH – PHASE
PLBG – PLUMBING
PNL – PANEL
PWR – POWER
RE – REMOVE
REC – RECESSED
REL – RELOCATE
REQD – REQUIRED
SCCR – SHORT–CIRCUIT CURRENT RATING
SHT – SHEET
SPD – SURGE PROTECTIVE DEVICE
SPEC – SPECIFICATION
SWBD – SWITCHBOARD
TEL – TELEPHONE
TS – TAMPER SWITCH/TIME SWITCH
TV – TELEVISION
TYP – TYPICAL
UC – UNDER COUNTER
UG – UNDERGROUND
UH – UNIT HEATER
UNO – UNLESS NOTED OTHERWISE
V – VOLTAGE
W/ – WITH
WG – WIREGUARD
WP – WEATHERPROOF
XFMR – TRANSFORMER

EQUIPMENT AND WIRING

(#) MOTOR

PANEL BOARD – SURFACE MOUNTED

RECEPTACLES

DUPLEX RECEPTACLE
MOUNTING LOCATION: WALL
MOUNTING HEIGHT: EXISTING

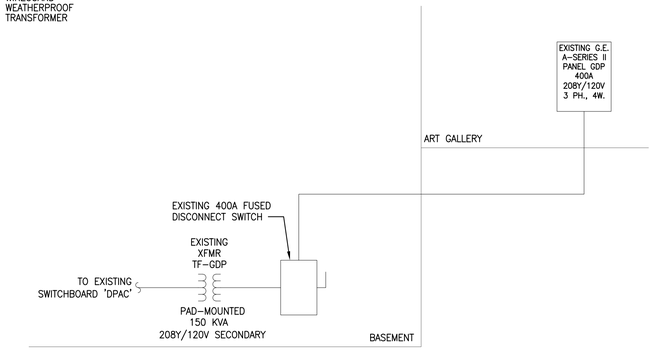
FIXED EQUIPMENT CONNECTION
MOUNTING LOCATION: FIELD VERIFY

SHEET SYMBOLS

(#) NOTE DESIGNATION

(#) FEEDER NUMBER DESIGNATION

ROOM NAME
(###) ROOM NAME / NUMBER DESIGNATION



ELECTRICAL ONE-LINE DIAGRAM

MOTOR SCHEDULE

NO.	EQUIPMENT	LOCATION	VOLTS/ PHASE	HP/KW/ MCA	AMPS	PANEL	CIRCUITS	BRKR. A/P	CONDUIT – WIRE	STARTER SIZE/TYPE	REMARKS
1	CU–1	ROOF	208/3	35 MCA	33.4	EXISTING GDP	2,4,6	NEW 45/3	3/4" C. W/ 3 #8 & 1 #10 GND	W/UNIT	PROVIDE WP DISCONNECT SWITCH AT UNIT. REPLACE EXISTING SPARE BREAKERS IN EXISTING PANEL GDP WITH NEW 45/3 BREAKER TO FEED UNIT.
2	AHU–1	STORAGE 102	208/3	14 MCA	11.2	EXISTING GDP	34,36,38	NEW 25/3	3/4" C. W/ 3 #12 & 1 #12 GND	W/UNIT	PROVIDE DISCONNECT SWITCH AT UNIT. REPLACE EXISTING SPARE BREAKERS IN EXISTING PANEL GDP WITH NEW 25/3 BREAKER TO FEED UNIT.
3	MSS–1	ROOF	208/1	16 MCA	14	EXISTING GDP	51,53	NEW 20/2	3/4" C. W/ 2 #12 & 1 #12 GND	W/UNIT	PROVIDE WP DISCONNECT SWITCH AT UNIT. REUSE EXISTING 20/2 BREAKER IN EXISTING PANEL GDP.
4	MSS–1A	AV–IT 103	208/1	1 MCA	0.36	–	–	–	–	SEE REMARKS	INDOOR UNIT POWERED FROM OUTDOOR UNIT. E.C. TO PROVIDE CONNECTION BETWEEN TWO UNITS. REUSE EXISTING DISCONNECT SWITCH.
5	MSS–2	ROOF	208/1	19.5 MCA	15.9	EXISTING GDP	50,52	NEW 40/2	NEW 2 #8 & 1 #10 GND IN EXISTING HP–1 CONDUIT (WITH MSS–3 CIRCUIT)	W/UNIT	PROVIDE WP DISCONNECT SWITCH AT UNIT. REPLACE EXISTING SPARE BREAKERS IN EXISTING PANEL GDP WITH NEW 40/2 BREAKER TO FEED UNIT.
6	MSS–2A	STORAGE 102	208/1	0.44 MCA	0.35	EXISTING GDP	41,43	EXISTING 20/2	EXISTING	W/UNIT	EXTEND EXISTING CIRCUIT WIRING FROM REMOVED UNIT AND CONNECT TO NEW UNIT. REUSE EXISTING DISCONNECT SWITCH.
7	MSS–2B	GALLERY LOBBY 100	208/1	0.54 MCA	0.43	EXISTING GDP	41,43	EXISTING 20/2	EXISTING	W/UNIT	RECONNECT TO EXISTING CIRCUIT WIRING. REUSE EXISTING DISCONNECT SWITCH.
8	MSS–3	ROOF	208/1	29.8 MCA	24.1	EXISTING GDP	46,48	NEW 40/2	NEW 2 #8 & 1 #10 GND IN EXISTING HP–1 CONDUIT (WITH MSS–2 CIRCUIT)	W/UNIT	PROVIDE WP DISCONNECT SWITCH AT UNIT. REPLACE EXISTING SPARE BREAKERS IN EXISTING PANEL GDP WITH NEW 40/2 BREAKER TO FEED UNIT.
9	MSS–3A	VESTIBULE 105	208/1	0.91 MCA	0.73	EXISTING GDP	41,43	EXISTING 20/2	EXISTING	W/UNIT	RECONNECT TO EXISTING CIRCUIT WIRING. REUSE EXISTING DISCONNECT SWITCH.
10	MSS–3B	ART GALLERY 101	208/1	0.54 MCA	0.43	EXISTING GDP	41,43	EXISTING 20/2	EXISTING	W/UNIT	RECONNECT TO EXISTING CIRCUIT WIRING. REUSE EXISTING DISCONNECT SWITCH.

BEFORE → AFTER

(EXISTING CONDITION OF CIRCUIT DIRECTORY)

3 Phase Panelboard Schedule

Panel Designation: Exist. GDP | Floor: First | Project No.: 25-060
208Y/120 Volts | 3 Phase | 4 Wire
Main Breaker: 400A | Fault Current Rating: 10K AIC
Remarks: Existing G.E. A-Series II panel to remain and be reused to feed new HVAC equipment
Fed from existing 400A fused disconnect switch

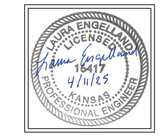
Description	Amp. Pole	Cct. No.	Left Side, KW A	Left Side, KW B	Left Side, KW C	Right Side, KW A	Right Side, KW B	Right Side, KW C	Cct. No.	Amp. Pole	Description
HP-1	90/3	1	8.76						2	20/1	Spare
|	|	3		8.76				4	20/1	Spare
|	|	5			8.76			6	20/1	Spare
Spare	20/1	7				1.00			8	20/1	Existing Ltg
Spare	20/1	9					1.00		10	20/1	Existing EM Ltg
HUM-1	50/2	11			3.46			1.00	12	20/1	Existing Ltg
|	|	13	3.46		1.00			14	20/1	Existing Ltg
Exist. Rooftop Rcp	20/1	15		0.36			1.00		16	20/1	Existing Ltg
Existing Plug Mold	20/2	17			1.70			1.00	18	20/1	Existing Ltg
|	|	19	1.70		1.00			20	20/1	Existing Ltg
Existing Plug Mold	20/2	21		1.70			1.00		22	20/1	Existing Ltg
|	|	23			1.70			24	20/1	Existing Ltg
Existing Plug Mold	20/2	25	1.70			1.00			26	20/1	Existing Ltg
|	|	27		1.70			1.08		28	20/1	Existing Rcpts
Existing Plug Mold	20/2	29			1.70			1.08	30	20/1	Existing Rcpts
|	|	31	1.70			1.08			32	20/1	Existing Rcpts
Existing Plug Mold	20/2	33		1.70					34	20/1	Spare
|	|	35			1.70				36	20/1	Spare
Existing Plug Mold	20/2	37	1.70						38	20/1	Spare
|	|	39		1.70			0.50	40	20/1	Exist. MCU Cntrls
MCU Units	20/2	41			1.66				42	20/1	Spare
|	|	43	1.66						44	20/1	Spare
Existing DOAS-1	50/3	45		4.80					46	20/1	Spare
|	|	47			4.80				48	20/1	Spare
|	|	49	4.80						50	20/1	Spare
Spare	20/1	51							52	20/1	Spare
Spare	20/1	53							54	20/1	Spare
Spare	20/1	55							56	20/1	Spare
Exist. Exterior Ltg	20/1	57		0.50					58	20/1	Spare
Ex. Fire Place Rcp	20/1	59			0.50				60	20/1	Spare
Spare	20/1	61							62	20/1	Spare
Spare	20/1	63							64	20/1	Spare
Spare	20/1	65							66	20/1	Spare
Spare	20/1	67							68	20/1	Spare
Spare	20/1	69							70	20/1	Spare
Spare	20/1	71							72	20/1	Spare
Load Subtotal, Left KW			25.48	21.21	25.98	5.08	4.58	4.08			
Load Subtotal, Right KW			5.08	4.58	4.08	Total Connected Load, KW		86.41			
Total Load, KW			30.56	25.79	30.06	Total Connected Load, Amps		240			

(NEW CONDITION OF CIRCUIT DIRECTORY)

3 Phase Panelboard Schedule

Panel Designation: GDP | Floor: First | Project No.: 25-060
208Y/120 Volts | 3 Phase | 4 Wire
Main Breaker: 400A | Fault Current Rating: 10K AIC
Remarks: Existing G.E. A-Series II panel to remain and be reused to feed new HVAC equipment
Fed from existing 400A fused disconnect switch, *= new breaker provided by E.C.

Description	Amp. Pole	Cct. No.	Left Side, KW A	Left Side, KW B	Left Side, KW C	Right Side, KW A	Right Side, KW B	Right Side, KW C	Cct. No.	Amp. Pole	Description
DH-1	***60/3**	1	4.99			4.01			2	***45/3**	**CU-1**
|	|	3		4.99		4.01		4	|	|
|	|	5			4.99		4.01	6	|	|
Spare	20/1	7				1.00			8	20/1	Existing Ltg
Spare	20/1	9					1.00		10	20/1	Existing EM Ltg
HUM-1	50/2	11			4.00			1.00	12	20/1	Existing Ltg
|	|	13	4.00		1.00			14	20/1	Existing Ltg
Exist. Rooftop Rcp	20/1	15		0.36			1.00		16	20/1	Existing Ltg
Existing Plug Mold	20/2	17			1.70			1.00	18	20/1	Existing Ltg
|	|	19	1.70		1.00			20	20/1	Existing Ltg
Existing Plug Mold	20/2	21		1.70			1.00		22	20/1	Existing Ltg
|	|	23			1.70			24	20/1	Existing Ltg
Existing Plug Mold	20/2	25	1.70			1.00			26	20/1	Existing Ltg
|	|	27		1.70			1.08		28	20/1	Existing Rcpts
Existing Plug Mold	20/2	29			1.70			1.08	30	20/1	Existing Rcpts
|	|	31	1.70			1.08			32	20/1	Existing Rcpts
Existing Plug Mold	20/2	33		1.70					34	***25/3**	**AHU-1**
|	|	35			1.70				36	|	|
Existing Plug Mold	20/2	37	1.70						38	|	|
|	|	39		1.70			0.50	40	20/1	Exist. MCU Cntrls
MSS-2A/2B/3A/3B	20/2	41			0.25				42	20/1	Spare
|	|	43	0.25						44	20/1	Spare
Existing DOAS-1	50/3	45		4.80					46	***40/2**	**MSS-3**
|	|	47			4.80				48	|	|
|	|	49	4.80						50	***40/2**	**MSS-2**
MSS-1/MSS-1A	***20/2**	51			1.46				52	|	|
|	|	53			1.46				54	20/1	Spare
Spare	20/1	55							56	20/1	Spare
Exist. Exterior Ltg	20/1	57		0.50					58	20/1	Spare
Ex. Fire Place Rcp	20/1	59			0.50				60	20/1	Spare
Spare	20/1	61							62	20/1	Spare
Spare	20/1	63							64	20/1	Spare
Spare	20/1	65							66	20/1	Spare
Spare	20/1	67							68	20/1	Spare
Spare	20/1	69							70	20/1	Spare
Spare	20/1	71							72	20/1	Spare
Load Subtotal, Left KW			20.84	18.90	22.80	12.08	14.09	11.94			
Load Subtotal, Right KW			12.08	14.09	11.94	Total Connected Load, KW		100.66			
Total Load, KW			32.93	32.99	34.74	Total Connected Load, Amps		280			



1520 E DOUGLAS AVE
SUITE 200
WICHITA, KS 67214
INNOVATIVEGROUPS.COM

INNOVATIVE GROUPS

ART GALLERY HVAC REPLACEMENT
WASHBURN UNIVERSITY
1700 COLLEGE AVE
TOPEKA, KS 66621

JOB NO.: 25029

REVISIONS

DATE: 04-11-2025
DRAWN BY: HEB
CHECKED BY: LEE

ENGINEERING CONSULTANTS, P.A.
1227 NORTH MAIN STREET
P.O. Box 932
HUTCHINSON, KS 67504-0932
620-665-5394 info@engineering-consultants.com
www.engineering-consultants.com

EC PROJECT#25-060

E1.1
SYMBOLS, SCHEDULES & ONE-LINE DIAGRAM

ELECTRICAL SPECIFICATIONS

SECTION 16000 - GENERAL ELECTRICAL REQUIREMENTS

1. GENERAL
   - A. INTENT OF DRAWINGS AND SPECIFICATIONS IS TO OBTAIN COMPLETE SYSTEMS, TESTED, ADJUSTED AND READY FOR OPERATION.
   - B. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE 2023 NATIONAL ELECTRICAL CODE, NFPA AND APPLICABLE LOCAL CODES.
   - C. THE TERMS "PROVIDE", "FURNISH" AND "INSTALL" SHALL HAVE THE FOLLOWING MEANINGS:
     "PROVIDE" OR "PROVIDED" SHALL MEAN "FURNISH AND INSTALL".
     "FURNISH" OR "FURNISHED" DOES NOT INCLUDE INSTALLATION.
     "INSTALL" OR "INSTALLED" DOES NOT INCLUDED FURNISHING.
   - D. PROVIDE POWER WIRING AND MOTOR CONTROL WIRING, EXCEPT TEMPERATURE CONTROL WIRING, FOR MOTORS AND ELECTRICALLY POWERED OR ELECTRICALLY CONTROLLED EQUIPMENT, AS INDICATED ON ELECTRICAL CONTRACT DOCUMENTS. PROVIDE BACK BOXES AND CONDUIT AS REQUIRED FOR THERMOSTATS SHOWN ON MECHANICAL DRAWINGS.
   - E. CONNECT AND WIRE EQUIPMENT COMPLETE ARE READY TO OPERATE ACCORDING TO WIRING DIAGRAMS FURNISHED BY VARIOUS TRADES.
   - F. STARTERS, DISCONNECTS, RELAYS, WIRE, CONDUIT, PUSHBUTTONS, PILOT LIGHTS AND OTHER DEVICES REQUIRED FOR POWER AND CONTROL OF MOTORS OR ELECTRICAL EQUIPMENT SHALL BE PROVIDED BY ELECTRICAL CONTRACTOR EXCEPT AS SPECIFICALLY NOTED ELSEWHERE IN THESE SPECIFICATIONS.
   - G. WHERE STARTERS OR OTHER DEVICES ARE FURNISHED BY OTHERS THEY SHALL BE CONNECTED AND WIRED BY THIS CONTRACTOR.
   - H. EQUIPMENT AND WIRING SHALL BE SELECTED AND INSTALLED FOR CONDITIONS IN WHICH IT WILL BE REQUIRED TO PERFORM. (I.E. GENERAL PURPOSE, WEATHERPROOF, RAINTIGHT, OR ANY OTHER SPECIAL TYPE AS REQUIRED.)
   - I. PERIODICALLY AS WORK PROGRESSES, REMOVE WASTE MATERIALS FRO BUILDING AND LEAVE AREA OF WORK BROOM CLEAN. UPON COMPLETION OF WORK, REMOVE TOOLS, SCAFFOLDING, BROKEN AND WASTE MATERIALS, ETC. FROM SITE.
   - J. GUARANTEE FOR ONE YEAR AFTER ACCEPTANCE BY OWNER ALL EQUIPMENT, MATERIALS AND WORKMANSHIP TO BE FREE FROM DEFECT. REPAIR, REPLACE OR ALTER SYSTEMS OR PARTS OF SYSTEMS FOUND DEFECTIVE AT NO EXTRA COST TO OWNER.
   - L. IN ANY CASE, WHEREIN FULFILLING REQUIREMENTS OF ANY GUARANTEE, IF CONTRACTOR DISTURBS ANY WORK GUARANTEED UNDER ANOTHER CONTRACT, RESTORE SUCH DISTURBED WORK TO CONDITION SATISFACTORY TO ARCHITECT AND GUARANTEE SUCH RESTORED WORK TO SAME EXTENT AS IT WAS GUARANTEED UNDER SUCH OTHER CONTRACT.
2. PRODUCTS - NOT USED
3. EXECUTION
   - A. WHERE PENETRATIONS OF FIRE-RATED ASSEMBLIES ARE INVOLVED, SEAL PENETRATIONS WITH APPROPRIATE FIRESTOPPING SYSTEMS.
   - B. SEAL NON-RATED WALL OPENINGS WITH URETHANE CAULK.
   - C. PROVIDE SUPPORTING STEEL NOT INDICATED ON DRAWINGS AS REQUIRED FOR INSTALLATION OF EQUIPMENT AND MATERIALS INCLUDING ANGLES, CHANNELS, BEAMS, HANGERS, ETC.
   - D. CONCRETE ANCHORS, USED FOR ATTACHMENT TO CONCRETE, SHALL BE STEEL SHELL WITH PLUG TYPE. PLASTIC, RAWHIDE OR ANCHORS UTILIZING LEAD ARE NOT ALLOWED.
   - E. LOCATE ELECTRICAL OUTLETS AND EQUIPMENT TO FIT DETAILS, PANELS, DECORATING OR FINISH AT SPACE.
   - F. ALL SYSTEMS AND EQUIPMENT SHALL BE STARTED, TESTED, ADJUSTED AND TURNED OVER TO OWNER READY FOR OPERATION.
   - G. AFTER INSTALLATION IS COMPLETE, CONTRACTOR SHALL CLEAN ALL SYSTEMS.
   - H. CLEAN DEBRIS FROM PANELBOARDS, DISCONNECT SWITCH ENCLOSURES, JUNCTION BOXES AND PULL BOXES AND ARRANGE WIRE NEATLY WITH SURPLUS LENGTH CUT OFF PRIOR TO INSTALLATION OF COVERS.
   - I. THOROUGHLY CLEAN EQUIPMENT OF STAINS, PAINT SPOTS, DIRT AND DUST. REMOVE TEMPORARY LABELS NOT USED FOR INSTRUCTION OR OPERATION.

SECTION 16110 - RACEWAYS AND FITTINGS

1. GENERAL
   - A. TYPE NM, NONMETALLIC-SHEATHED CABLE, "ROMEX" IS NOT TO BE USED ON THIS PROJECT.
2. PRODUCTS
   - A. RIGID STEEL CONDUIT SHALL BE HEAVY WALL TUBING WITH HOT DIPPED GALVANIZED COATING.
   - B. IMC CONDUIT SHALL BE INTERMEDIATE GRADE METALLIC TUBING WITH HOT DIPPED GALVANIZED COATING. CONNECTIONS SHALL BE MADE WITH DOUBLE LOCKNUTS AND BUSHINGS. BUSHINGS TO BE STEEL WITH INTEGRAL INSULATOR EXCEPT CONDUITS 2" AND BELOW MAY HAVE HIGH IMPACT THERMOSET PHENOLIC INSULATING BUSHINGS.
   - C. EMT CONDUIT SHALL BE THIN WALL TUBING WITH HOT DIPPED GALVANIZED COATING. COUPLINGS AND CONNECTIONS SHALL BE STEEL, CONCRETE TIGHT SET SCREW TYPE.
   - D. RIGID NONMETALLIC CONDUIT SHALL BE HEAVY WALL RIGID, TYPE 40, LISTED FOR UNDERGROUND ENCASED AND ABOVE GROUND APPLICATIONS.
   - E. FLEXIBLE METAL CONDUIT SHALL BE ELECTRO-GALVANIZED SINGLE STRIP STEEL.
   - F. LIQUID TIGHT FLEXIBLE METAL CONDUIT SHALL BE ELECTRO-GALVANIZED SINGLE STRIP STEEL WITH PVC COATING.
   - G. GALVANIZED STEEL OR CAST TYPE OUTLET BOXES TO ACCOMMODATE DEVICE INDICATED BY SYMBOL, IN CONFORMANCE WITH CODE REQUIREMENTS, NUMBER AND SIZE OF CONDUCTORS AND SPLICES AND CONSISTENT WITH TYPE OF CONSTRUCTION.
   - H. SURFACE MOUNTED BOXES SHALL HAVE THE APPROPRIATE COVER, RAISED DEVICE COVERS ON 4" SQUARE AND 4-11/16" BOXES AND HANDY BOX COVERS ON HANDY BOXES, ETC. USE ROUND DRAWN DEVICE COVERS ON BOXES IN DRYWALL ONLY.
   - I. GANGABLE TYPE BOXES ARE NOT ALLOWED. BOX EARS WITH TAPPED HOLES MUST TURN INTO THE BOX OPENING.
   - J. THE FRONT EDGE OF THE DEVICE BOXES MUST BE SET FLUSH WITH THE FINISHED WALL SURFACES EXCEPT ON WALLS OF NON-COMBUSTIBLE MATERIALS WHERE THE BOXES MAY HAVE MAXIMUM SET BACK OF 1/4".
3. EXECUTION
   - A. PROVIDE MINIMUM OF 5" SEPARATION BETWEEN POWER CONDUIT AND TELECOMMUNICATIONS/SYSTEMS CONDUIT.
   - B. RUN CONDUITS CONCEALED TO AVOID ADVERSE CONDITIONS SUCH AS HEAT AND MOISTURE, TO PERMIT DRAINAGE, AND TO AVOID MATERIALS AND EQUIPMENT OF OTHER TRADES. MAINTAIN MINIMUM CLEARANCE OF 6" FROM HOT WATER PIPES, FLUES AND ANY HIGH TEMPERATURE PIPING OR DUCTWORK.
   - C. AVOID EXPOSED CONDUIT RUNS. CONDUIT MAY BE RUN EXPOSED WHERE IT IS IMPRACTICAL OR IMPOSSIBLE TO CONCEAL OR WHERE SPECIFIC APPROVAL IS OBTAINED. RUN EXPOSED CONDUIT GROUPED AND PARALLEL OR PERPENDICULAR TO CONSTRUCTION.
   - D. REAM CONDUIT SMOOTH AT ENDS, CAP UPON INSTALLATION, RIGIDLY ATTACH TO STRUCTURAL PARTS OF BUILDING AND SECURELY FASTEN TO OUTLET BOXES, PANEL CABINETS, JUNCTION BOXES, PULL BOXES, SAFETY SWITCHES AND OTHER COMPONENTS OF THE RACEWAY SYSTEM.
   - E. INDEPENDENTLY SUPPORT OR ATTACH RACEWAY SYSTEM TO STRUCTURAL PARTS OF CONSTRUCTION IN ACCORDANCE WITH GOOD INDUSTRY PRACTICE. SUSPENDED CEILING SYSTEMS SHALL NOT BE CONSIDERED AS STRUCTURAL PARTS OF THE CONSTRUCTION FOR CONDUIT SUPPORT. CONDUIT, CONDUIT SYSTEMS OR BOXES SHALL NOT BE SUPPORTED BY WIRE, BUT SHALL BE SUPPORTED BY DEVICES MANUFACTURED SPECIFICALLY FOR THIS PURPOSE. PLASTIC TIE-WRAP IS NOT PERMITTED.
   - F. CONDUIT SUPPORTED ON CHANNEL SYSTEMS SHALL BE SECURED ON EACH CHANNEL WITH APPROPRIATE CLAMPS.
   - G. CONDUIT INSTALLED IN METAL STUD WALLS MUST BE SECURED TO PREVENT RATTLING.
   - H. DEVICES IN EXTERIOR OR LOAD-BEARING WALLS MAY BE FED BY HORIZONTAL CONDUIT RUNS. HORIZONTAL BENDS IN CONDUIT AROUND CORNERS IS NOT ALLOWED. OTHER DEVICES SHALL BE FED VERTICALLY FROM ABOVE.
   - I. MINIMUM CONDUIT SIZE: 1/2", EXCEPT AS NOTED.
   - J. HOME RUNS: MINIMUM 3/4" CONDUIT, EXCEPT AS NOTED.
   - K. MINIMUM SIZE FOR FLEXIBLE METAL CONDUIT IS 1/2", EXCEPT 3/8" FOR LIGHTING FIXTURES.
   - L. SET OUTLET BOXES PARALLEL TO CONSTRUCTION AND INDEPENDENTLY ATTACHED TO SAME. ADJUST FLUSH TYPE BOXES TO SET LEVEL WITH FINISHED SURFACE. BACK TO BACK AND THROUGH-THE-WALL BOXES ARE NOT ACCEPTABLE. GANGED SECTIONAL TYPE BOXES ARE NOT ACCEPTABLE.
   - M. RIGID STEEL CONDUIT SHALL BE PERMITTED FOR ALL INSTALLATIONS UNDER GRADE AND IN ALL LOCATIONS.
   - N. EMT CONDUIT SHALL BE PERMITTED IN INTERIOR PARTITIONS, ABOVE SUSPENDED CEILINGS, IN 2" AND SMALLER.
   - O. IMC CONDUIT SHALL BE PERMITTED IN SLABS, INTERIOR PARTITIONS, LOCATIONS EXPOSED TO WEATHER, AND LOCATIONS REQUIRING MECHANICAL PROTECTION.
   - P. NONMETTALIC RIGID CONDUIT SHALL BE PERMITTED FOR DIRECT BURIAL, CONCRETE ENCASED OR IN SAND FILL ON BOTTOM AND TOP.
   - Q. FLEXIBLE METAL CONDUIT, INSTALLED AS REQUIRED IN NEC ARTICLE 348, SHALL BE PERMITTED FOR FINAL CONNECTIONS TO EQUIPMENT IN DRY LOCATIONS AND RECESSED LIGHTING FIXTURES, IN LENGTHS NOT TO EXCEED 6 FEET.
   - R. FLEXIBLE METAL CONDUIT (MC CABLE) SHALL BE PERMITTED WITHIN DRYWALL PARTITION WALLS FOR CONNECTIONS TO RECEPTACLES AND SWITCHES. HOMERUNS TO PANELS SHALL BE IN NON-FLEXIBLE METALLIC CONDUIT SUCH AS RMC, EMT OR IMC CONDUIT.

SECTION 16120 - CONDUCTORS

1. GENERAL
   - A. CONDUCTOR AND CONDUIT SIZES IN THESE CONTRACT DOCUMENTS ARE BASED ON COPPER WIRE, AND ONLY COPPER WIRE SHALL BE USED, UNLESS NOTED OTHERWISE.
2. PRODUCTS
   - A. CONDUCTORS SHALL BE 600 VOLT RATED. WIRE NO. 12 AND SMALLER MAY BE SOLID OR STRANDED AND WIRE NO. 10 AND LARGER SHALL BE STRANDED ONLY.
   - B. CIRCUIT WIRING SHALL BE COPPER THERMOPLASTIC INSULATED TYPE THHN/THWN.
   - C. NONMETALLIC-SHEATHED CABLE (I.E. ROMEX) SHALL NOT BE USED ON THIS PROJECT.
3. EXECUTION
   - A. COLOR CODE 208Y/120 VOLT POWER WIRING AS FOLLOWS: PHASE A - BLACK, PHASE B - RED, PHASE C - BLUE, NEUTRAL - WHITE AND GROUND CONDUCTOR - GREEN.
   - B. PULL WIRE AND CABLES INTO CONDUIT AND RACEWAYS IN SUCH MANNER THAT INSULATION WILL NOT BE DAMAGED OR UNDUE STRAIN PLACED ON CONDUCTORS. LUBRICANTS SHALL BE UL LISTED.
   - C. BRANCH CIRCUIT WIRES IN PANELS SHALL BE NEATLY ARRANGED WITH SURPLUS WIRE CUT OFF AND WIRES TIED WITH NON-METALLIC TIES. METALLIC TIES NOT PERMITTED.
   - D. CONDUCTORS SHALL BE ATTACHED TO TERMINAL SCREW OR LUG PER UL LISTING.
   - E. WIRE AND CABLE BOXES AND REELS SHALL BEAR THE DATE OF MANUFACTURE. DATE OF MANUFACTURE SHALL NOT PRECEDE CONTRACT DATE BY MORE THAN ONE YEAR.
   - F. MINIMUM CONDUCTOR SIZES SHALL BE AS FOLLOWS: NO. 12 FOR BRANCH CIRCUITS OF ANY KIND.
   - G. LIMIT CONDUIT FILL TO A MAXIMUM OF 9 CURRENT CARRYING CONDUCTORS.

SECTION 16440 - DISCONNECT SWITCHES

1. GENERAL - NOT USED
2. PRODUCTS
   - A. ACCEPTABLE MANUFACTURERS - G.E., EATON, SQUARE D OR SIEMENS.
   - B. 208V DISCONNECT SWITCHES SHALL BE NEMA TYPE GD (GENERAL DUTY) AND SHALL BE UL LISTED.
   - C. ENCLOSURE SHALL BE NEMA 1 FOR USE IN DRY INDOOR LOCATIONS AND NEMA 3R FOR USE IN WET INDOOR LOCATIONS AN OUTDOORS.
3. EXECUTION
   - A. PROVIDE NON-FUSED DISCONNECT DEVICE AT MOTORS LOCATED ON GRADE OR OUT OF SIGHT OR MORE THAN 25 FT HORIZONTALLY FROM OVERCURRENT PROTECTIVE DEVICE.
   - B. INSTALL DISCONNECTS AS INDICATED.

SECTION 16450 - GROUNDING SYSTEM

1. GENERAL
   - A. PROVIDE A COMPLETE GROUNDING SYSTEM FOR SERVICES AND EQUIPMENT AS REQUIRED BY NEC, APPLICABLE PORTIONS OF OTHER NFPA CODES, AND AS INDICATED HEREIN.
2. PRODUCTS
   - A. GROUND CONNECTORS MAY BE IRREVERSIBLE COMPRESSION OR EXOTHERMIC WELDED TYPE. GROUNDS IN CONCEALED, OUTDOOR OR IN DAMP/WET LOCATIONS SHALL MEET IEEE 837 REQUIREMENTS AND SHALL BE UL 467 LISTED.
   - B. GROUNDED CONDUCTORS (SYSTEM NEUTRAL) SHALL BE COPPER WITH WHITE OR GRAY INSULATION.
   - C. GROUNDING CONDUCTORS SHALL BE COPPER, EITHER BARE OR WITH GREEN INSULATION.
3. EXECUTION
   - A. BUILDING GROUNDING ELECTRODE SYSTEM SHALL BE IN ACCORDANCE WITH NEC ARTICLE 250-50.
   - B. IN ALL CONDUITS, A GREEN WIRE CONDUCTOR SHALL BE PROVIDED WITH PHASE CONDUCTORS. GREEN WIRE GROUND CONDUCTOR SHALL BE USED TO PROVIDE GROUND CONTINUITY BETWEEN EQUIPMENT OR DEVICE AND CONDUIT-RACEWAY SYSTEM.
   - C. GROUNDING CONDUCTOR IS IN ADDITION TO NEUTRAL CONDUCTOR AND IN NO CASE SHALL NEUTRAL CONDUCTOR SERVE AS GROUNDING MEANS.

SECTION 16480 - MOTORS AND MOTOR CONTROLS

1. GENERAL
   - A. ALL MOTORS WILL BE PROVIDED BY OTHERS, READY FOR CONNECTIONS. THIS CONTRACTOR SHALL BE RESPONSIBLE FOR ELECTRICAL CONNECTIONS FOR POWER AND CONTROL CIRCUIT WIRING, PROPER PHASE RELATIONSHIPS, AND CORRECT MOTOR ROTATION.
2. PRODUCTS
   - A. ACCEPTABLE MANUFACTURERS - G.E., EATON, SQUARE D OR SIEMENS.
   - B. DISCONNECT DEVICES SHALL BE MAGNETIC CIRCUIT BREAKER OR NON-FUSED DISCONNECT SWITCH. NON-FUSED DISCONNECT SWITCHES SHALL BE GENERAL-DUTY SAFETY SWITCH, QUICK-MAKE, QUICK-BREAK, HORSEPOWER RATED.
3. EXECUTION
   - A. INSTALL DISCONNECTS AS INDICATED.

LAURA ENGELAND LICENSED 18417 4/11/25 KANSAS PROFESSIONAL ENGINEER

1520 E DOUGLAS AVE
SUITE 200
WICHITA, KS 67214
INNOVATIVEGROUPS.COM

INNOVATIVE GROUPS

ART GALLERY HVAC REPLACEMENT
WASHBURN UNIVERSITY
1700 COLLEGE AVE
TOPEKA, KS 66621

JOB NO.: 25029

REVISIONS

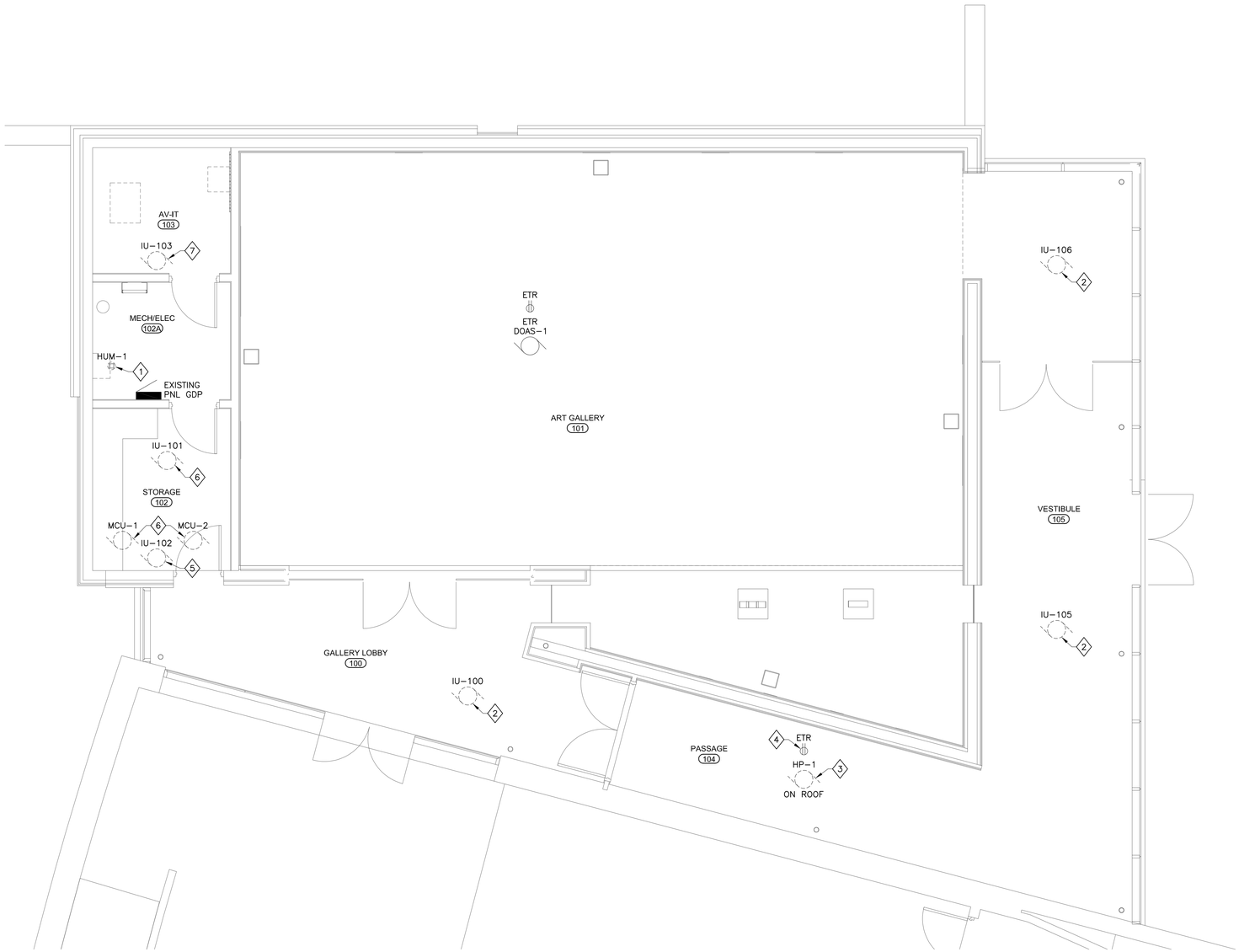
DATE: 04-11-2025
DRAWN BY: HEB
CHECKED BY: LEE

ENGINEERING CONSULTANTS, P.A.
1227 NORTH MAIN STREET
P.O. Box 932
HUTCHINSON, KS 67504-0932
620-665-5394 info@engineering-consultants.com
www.engineering-consultants.com

ENGINEERING CONSULTANTS P.A.
EC PROJECT#25-060

E1.2

SPECIFICATIONS



1 POWER DEMO PLAN
1/4" = 1'-0"

0' 2' 4' 8'

N

GENERAL POWER DEMO PLAN NOTES

A. E.C. TO PERFORM ALL NECESSARY DEMOLITION OF ELECTRICAL SYSTEMS IN AREAS TO BE DEMOLISHED. REFER TO THE MECHANICAL DEMOLITION PLANS FOR FURTHER DEMOLITION INFORMATION.

POWER DEMO PLAN NOTES

1. DISCONNECT EXISTING ELECTRICAL CONNECTION TO EXISTING HUMIDIFIER TO ACCOMMODATE HUMIDIFIER GENERATOR REPLACEMENT. FIELD CONFIRM EXISTING WIRE SIZE AS INDICATED ON POWER PLAN PRIOR TO RECONNECTING.
2. DISCONNECT EXISTING ELECTRICAL CONNECTION TO EXISTING INDOOR UNIT TO ACCOMMODATE UNIT REPLACEMENT. EXISTING DISCONNECT SWITCH AND WIRING TO BE REUSED FOR NEW INDOOR UNIT AS INDICATED ON POWER PLAN.
3. DISCONNECT EXISTING ELECTRICAL CONNECTION TO EXISTING-TO-BE-REMOVED HEAT PUMP UNIT. REMOVE WIRING BACK TO PANEL GDP. REUSE CONDUIT TO FEED NEW MSS UNITS IN SAME LOCATION AS SHOWN ON POWER PLAN.
4. EXISTING ROOF-TOP RECEPTACLE TO REMAIN. PER EXISTING PICTURES, RECEPTACLE APPEARS TO BE INSTALLED ON EXISTING-TO-REMAIN EQUIPMENT SUPPORT FRAME. IF NECESSARY, REMOVE AND REINSTALL RECEPTACLE FOR EQUIPMENT REMOVAL AND NEW EQUIPMENT INSTALLATION.
5. DISCONNECT EXISTING ELECTRICAL CONNECTION TO EXISTING-TO-BE-REMOVED INDOOR UNIT. EXISTING DISCONNECT SWITCH AND WIRING TO BE REUSED AND EXTENDED TO NEW INDOOR UNIT LOCATION AS SHOWN ON POWER PLAN.
6. DISCONNECT EXISTING ELECTRICAL CONNECTION TO EXISTING-TO-BE-REMOVED INDOOR UNIT. REMOVE CONDUIT AND WIRING BACK TO NEAREST JUNCTION BOX.
7. DISCONNECT EXISTING ELECTRICAL CONNECTION TO EXISTING-TO-BE-REMOVED INDOOR UNIT. REMOVE CONDUIT AND WIRING BACK TO NEAREST JUNCTION BOX. REUSE EXISTING DISCONNECT SWITCH FOR NEW UNIT AS SHOWN ON POWER PLAN. NEW UNIT TO BE POWERED FROM NEW OUTDOOR UNIT AS INDICATED ON MOTOR SCHEDULE.

LAURA ENGELAND
LICENSED
15417
4/11/25
KANSAS
PROFESSIONAL ENGINEER

1520 E DOUGLAS AVE
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INNOVATIVEGROUPS.COM

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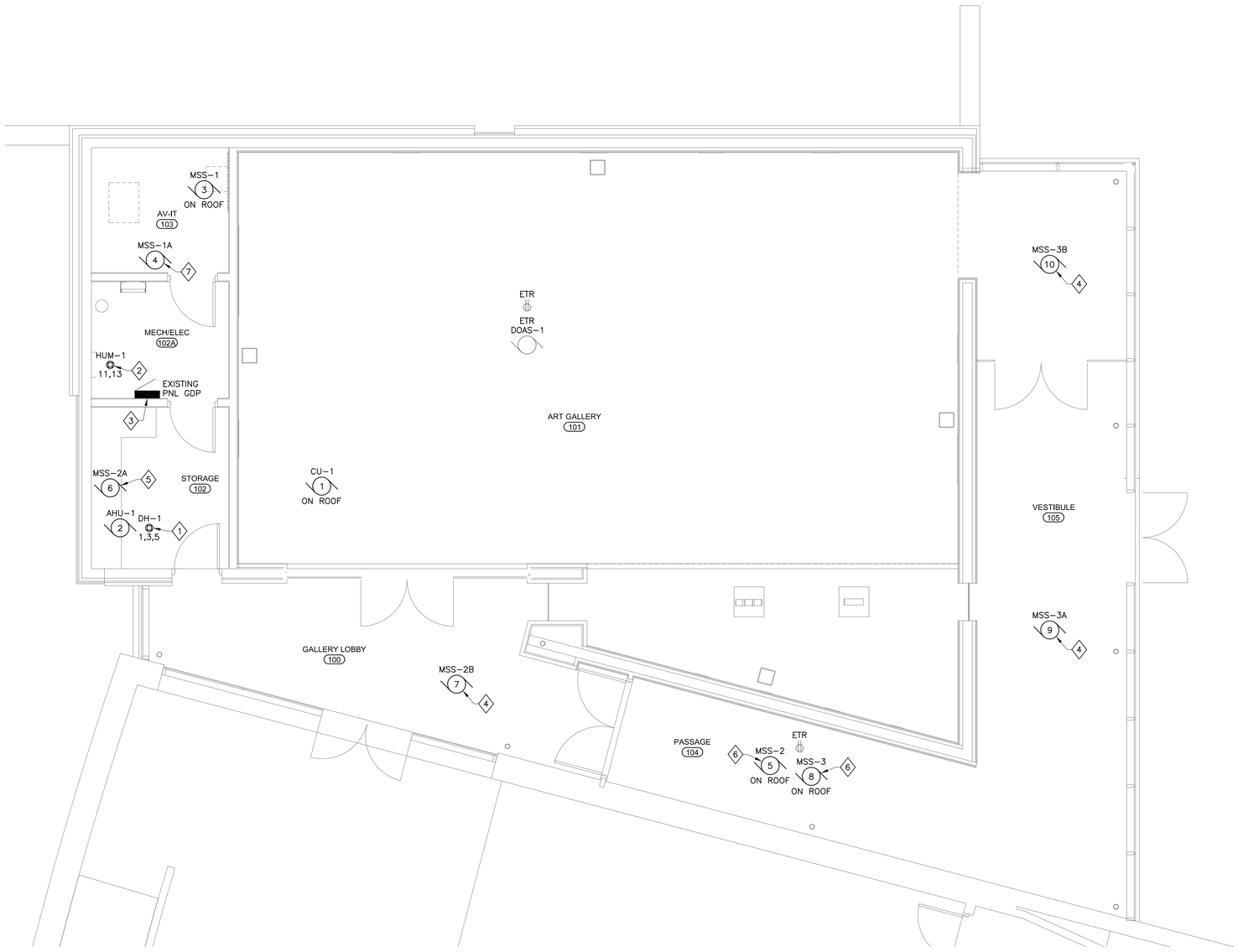
E2.1
POWER DEMO PLAN



1 POWER PLAN
1/4" = 1'-0"

0' 2' 4' 8'

N

GENERAL POWER PLAN NOTES

A. ALL ELECTRICAL DEVICES SHALL BE FED FROM EXISTING PANEL GDP, UNLESS NOTED OTHERWISE. SEE MOTOR SCHEDULE FOR PANEL SOURCE FOR NEW MOTORS.

POWER PLAN NOTES

1. PROVIDE 208V, 60A, 3 PHASE CONNECTION TO 15 KW DUCT HEATER. CONNECT TO CIRCUITS INDICATED AND FEED WITH 3 #6 & 1 #10 GND IN 3/4" CONDUIT.
2. RECONNECT EXISTING HUMIDIFIER CIRCUIT WIRING TO NEW HUMIDIFIER. FIELD CONFIRM THAT WIRING SIZE IS MINIMUM 2 #6 & 1 #10 GND, AND IF NOT, REPLACE WIRING.
3. EXISTING G.E. A-SERIES II PANEL TO REMAIN. ADD OR REPLACE BREAKERS AS NOTED ON PANEL SCHEDULE.
4. RECONNECT EXISTING INDOOR UNIT CIRCUIT WIRING TO NEW INDOOR UNIT. REUSE AND RECONNECT EXISTING DISCONNECT SWITCH.
5. EXTEND EXISTING INDOOR UNIT CIRCUIT WIRING FROM NEARBY REMOVED INDOOR UNIT TO NEW INDOOR UNIT AND RECONNECT. RELOCATE EXISTING DISCONNECT SWITCH AS NECESSARY AND RECONNECT.
6. FEED NEW MSS UNITS BY UTILIZING EXISTING CONDUIT THAT FED REMOVED HEAT PUMP UNIT. DO NOT PENETRATE THE ROOF WITH A NEW CONDUIT.
7. THIS INDOOR UNIT IS POWERED FROM ASSOCIATED OUTDOOR UNIT. REUSE EXISTING DISCONNECT SWITCH. SEE MOTOR SCHEDULE.

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E2.2
POWER PLAN