IMPROVEMENTS TO HVAC/CHILLER
TROOP C SERVICE CENTER BUILDING
PARK HILLS, MO

KLINGNER
& ASSOCIATES, P. C.
Engineers • Architects • Surveyors

OWNER: STATE OF MISSOURI
MIKE KEHOE,
GOVERNOR
MISSOURI STATE HIGHWAY PATROL

PROJECT MANAGEMENT: OFFICE OF ADMINISTRATION
DIVISION OF FACILITIES MANAGEMENT,
DESIGN AND CONSTRUCTION

DESIGNER: KLINGNER & ASSOCIATES, P.C.

PROJECT NUMBER: R2515-01

SITE NUMBER: 6013 - TROOP C SERVICE CENTER

ASSET NUMBER: 8136013002

SHEET INDEX

SHEET NUMBER:

G001

MARCH 20, 2026

GENERAL HVAC NOTES:

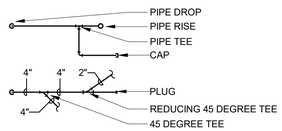
1. ALL MECHANICAL INSTALLATIONS SHALL CONFORM TO NFPA 90A, SMACNA, ASHRAE AND ALL OTHER STATE AND LOCAL CODES.
2. UPON COMPLETION OF CONSTRUCTION, REPLACE ALL FILTERS.
3. ALL 90 DEGREE BENDS IN AIR DUCTS SHALL HAVE TURNING VANES. VANES SHALL BE SINGLE THICKNESS WITH RADIUS = 4.5" AND SPACING = 2.25".
4. ALL MAIN AND BRANCH DUCTS SHALL BE RECTANGULAR GALV. STEEL SIZED AS NOTED ON THE PLANS. SIZE SHALL REFER TO UNOBSTRUCTED INTERNAL AIRFLOW AREA. DUCTWORK SHALL BE MOUNTED TIGHT TO JOISTS ABOVE OR RUN IN SPACE BETWEEN JOISTS, U.N.O. CLEARANCES FROM FINISH FLOOR SHALL BE MAXIMIZED WHERE POSSIBLE.
5. ALL RUNOUTS TO DIFFUSERS SHALL HAVE A VOLUME CONTROL DAMPER AT THE CONNECTION TO THE BRANCH OR MAIN DUCT.
6. FLEXIBLE DUCT SHALL BE A MAXIMUM OF FIVE (5) FEET IN LENGTH AND SHALL BE ROUTED TO MINIMIZE LENGTH WITH NO KINKS OR SHARP BENDS.
7. CONTRACTOR SHALL CONNECT RUNOUT TO CONTRACTOR FABRICATED BOOT AS NECESSARY TO ACCOMMODATE DIFFUSER.
8. A FLEXIBLE CONNECTION BETWEEN MECHANICAL UNITS AND BOTH THE SUPPLY AND RETURN AIR DUCTWORK IS REQUIRED FOR VIBRATION ISOLATION AND NOISE REDUCTION.
9. BALANCE ALL MECHANICAL EXHAUST, MAKE-UP AIR, HEATING AND AIR CONDITIONING SYSTEMS AS SPECIFIED IN THE PROJECT MANUAL.
10. INSULATE DUCTWORK AS REQUIRED IN THE SPECIFICATIONS.
11. SERVICE OPENINGS SHALL BE LOCATED IN THE DUCTWORK BEFORE AND AFTER EACH TURNING VANE. SEE SPECIFICATIONS AND NFPA 90A FOR LOCATIONS OF ADDITIONAL ACCESS DOORS AND PANEL REQUIRED THROUGHOUT THE AIR DISTRIBUTION SYSTEM.
12. ROUTE DUCTWORK BETWEEN JOISTS WHERE POSSIBLE TO INCREASE CLEARANCES BELOW.
13. LEAVE ADEQUATE SPACE FOR INSTALLATION OF PLUMBING PIPES.

GENERAL ELECTRICAL NOTES:

1. APPLICABLE STANDARDS: NFPA-70, NFPA-101, STATE BUILDING CODES, AND THE OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA) OF 1971 AND ALL AMENDMENTS THERETO; EQUIPMENT, DEVICES, APPARATUS, SYSTEMS, AND INSTALLATIONS SHALL BE ENTIRELY SUITABLE AND SAFE FOR EACH INTENDED APPLICATION AND BE IN FULL COMPLIANCE WITH APPLICABLE STANDARDS, REQUIREMENTS, RULES, REGULATIONS, CODES, STATUTES, ORDINANCES, ETC., OF MUNICIPAL, COUNTY, AND STATE GOVERNMENTS, OWNER'S INSURANCE COMPANY, LOCAL UTILITIES, AND LABOR REGULATIONS. NOTHING CONTAINED IN THESE PLANS AND SPECIFICATIONS SHALL BE CONSTRUED TO CONFLICT WITH THESE LAWS, CODES, AND ORDINANCES.
2. DRAWINGS ARE SCHEMATIC AND SHOW APPROXIMATE LOCATIONS OF ELECTRICAL EQUIPMENT. EXACT LOCATIONS SHALL BE COORDINATED BY THE CONTRACTOR AND VERIFIED IN THE FIELD PRIOR TO ROUGH-IN.
3. INSTALLATIONS WHICH INCLUDE ELECTRICAL FIXTURES, DEVICES, CONDUIT, SWITCHES, PANELS, HANGERS, WIRE, CABLE, STANDARDS, ETC., MUST BE ENTIRELY SUITABLE FOR TEMPERATURES, HUMIDITY, DAMP AREAS, VOLTAGE, FREQUENCY, AND ALL INSTALLATION CONDITIONS ENCOUNTERED.
4. INSTALLATION MUST BE ENTIRELY SAFE IN EVERY RESPECT, AND MUST NOT CREATE ANY CONDITIONS OF ANY KIND WHICH WILL BE HARMFUL TO ANY OCCUPANT OF THE BUILDING. IF CONTRACTOR BELIEVES THAT INSTALLATION WILL NOT BE SAFE FOR ALL PEOPLE, HE/SHE SHALL SO REPORT IN WRITING TO ENGINEER BEFORE ANY EQUIPMENT IS PURCHASED OR WORK IS INSTALLED, GIVING EXACT RECOMMENDATIONS, AND REASONS FOR THEM.
5. GROUNDING: ALL GROUNDING SHALL BE IN STRICT ACCORDANCE WITH THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE (NEC).
6. INSTALLATION OF ELECTRICAL DEVICES SHALL BE COORDINATED WITH OTHER TRADES AS NECESSARY TO PREVENT ANY CONFLICTS DURING CONSTRUCTION.
7. LOW VOLTAGE CONDUIT AND JUNCTION BOXES SHALL BE INSTALLED BY THE CONTRACTOR.
8. WHERE PHONE/DATA OUTLET LOCATIONS ARE INDICATED INSTALL 1" EMT FROM OUTLET BOX (4"X4"X11/2"MIN.) TO TOP OF FINISHED WALL (ABOVE ACT CEILING). FOR OUTLETS LOCATED IN SURFACE MOUNTED RACEWAY, PROVIDE (2) 1" EMT FROM SURFACE RACEWAY BACK BOX TO ABOVE ACT CEILING.
9. WHERE THERMOSTAT LOCATIONS ARE SHOWN, THE CONTRACTOR SHALL PROVIDE A RECESSED WALL BOX WITH CONDUIT TO AN ACCESSIBLE LOCATION. IN AREAS WHERE SURFACE MOUNTED BOXES ARE REQUIRED, A SURFACE MOUNTED BOX AND CONDUIT TO 10' AFF SHALL BE PROVIDED (OR TO THE EQUIPMENT LOCATION, WHICHEVER IS CLOSER). THERMOSTAT INSTALLATION AND THE CORRESPONDING LOW VOLTAGE THERMOSTAT WIRING SHALL BE COORDINATED WITH OTHER TRADES AS NECESSARY.
10. LIGHTING: FURNISH AND INSTALL ALL LIGHTING FIXTURES COMPLETE WITH LAMPS IN ACCORDANCE WITH THE LIGHTING FIXTURE SCHEDULE SHOWN ON THE DRAWINGS. ALL UNITS SHALL BE COMPLETE WITH SUSPENSION ACCESSORIES, CANOPIES, SOCKETS, LOUVERS, FRAMES, AND ROUGH-IN BOXES, WIRED AND ASSEMBLED TO FURNISH A COMPLETE WORKABLE SYSTEM.
11. EQUIPMENT GROUNDING CONDUCTORS SHALL BE PULLED WITH ALL BRANCH CIRCUITS. CONDUIT SHALL NOT BE USED AS A GROUND U.N.O.
12. CONTRACTOR SHALL FURNISH AND INSTALL ALL MATERIALS, ACCESSORIES, TOOLS, EQUIPMENT, TRANSPORTATION, LABOR, SERVICES AND OPERATIONS NECESSARY FOR A COMPLETE ELECTRICAL SYSTEM.
13. CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS AND ARRANGE FOR ALL INSPECTIONS REQUIRED BY STATE OR LOCAL AUTHORITIES.
14. MATERIALS MUST BE NEW, IN FIRST CLASS CONDITION.
15. CONDUIT SHALL BE SEPARATELY HUNG AND ANCHORED, FREE TO EXPAND AND CONTRACT QUIETLY, WITHOUT IMPOSING STRAINS ON STRUCTURE, DEVICES, AND EQUIPMENT. CONDUIT SHALL BE RUN PARALLEL OR PERPENDICULAR TO BUILDING LINES.
16. ALL ELECTRICAL PENETRATIONS IN FIRE RATED CONSTRUCTION SHALL BE UL LISTED OF EQUAL OR GREATER HOUR RATING.
17. ALL SPACES AROUND ELECTRICAL PENETRATIONS THOUGH A SMOKE PARTITION SHALL BE FILLED WITH AN APPROVED MATERIAL TO LIMIT THE FREE PASSAGE OF SMOKE.

PLUMBING AND PIPING SYMBOLS

- 2" — PIPE SIZE TAG (DIAMETER)
- ABOVE GROUND PIPING
- 1/8" / 12" SLOPE — PIPE SLOPE TAG
- BELOW GROUND PIPING
- INV. ELEV:-5' - 0 127/128" — PIPE INVERT ELEVATION TAG
- (E) — EXISTING PIPE TAG
- PIPING BEING DEMOLISHED
- G — NATURAL GAS
- CA — COMPRESSED AIR
- CD — CONDENSATE DRAINAGE
- CW — DOMESTIC COLD WATER
- HW — DOMESTIC HOT WATER
- HWC — DOMESTIC HOT WATER-CIRCULATING
- GV — GREASE VENT
- GW — GREASE WASTE
- V — SANITARY VENT
- SS — SANITARY SEWER
- SD — STORM DRAINAGE
- OSD — STORM DRAINAGE-OVERFLOW



- M — DOMESTIC WATER METER
- FLOW MEASURING AND BALANCING DEVICE
- BALL VALVE
- CHECK VALVE
- THREE WAY VALVE
- MOTORIZED CONTROL VALVE
- THREE WAY MOTORIZED CONTROL VALVE
- PRESSURE REDUCING VALVE
- BUTTERFLY VALVE
- CONNECT TO EXISTING

HVAC SYMBOLS

- 16"x8" — SQUARE DUCT SIZE TAG (WIDTH x HEIGHT)
- (E) — EXISTING DUCT TAG
- DUCT BEING DEMOLISHED
- SA — SUPPLY AIR
- OA — OUTSIDE AIR
- RA — RETURN AIR
- EA — EXHAUST AIR
- AIR INLET/OUTLET
- 500 — TYPE (SEE SCHEDULE) GRILLES, REGISTERS, AND DIFFUSERS TAG; CFM
- AHU-8 — MECHANICAL EQUIPMENT
- CARBON DIOXIDE SENSOR — CO2 — TH — TEMPERATURE & HUMIDITY SENSOR
- CARBON MONOXIDE SENSOR — CO — TS — TEMPERATURE SENSOR
- NITROGEN DIOXIDE SENSOR — NO2 — T — THERMOSTAT
- HUMIDITY SENSOR — HS — SW — MANUAL SWITCH
- HUMIDISTAT — H — S — SENSOR
- MANUAL BALANCING DAMPER
- BAROMETRIC DAMPER (BACKDRAFT)
- M — MOTORIZED CONTROL DAMPER (OPPOSED BLADE)
- M — MOTORIZED CONTROL DAMPER (PARALLEL BLADE)
- F — FIRE DAMPER (FUSIBLE LINK)
- F / S — SMOKE DAMPER (FIRE ALARM CONNECTION)
- F / C — COMBINATION FIRE/SMOKE DAMPER (FUSIBLE LINK AND FIRE ALARM CONNECTION)
- CONNECT TO EXISTING

ELECTRICAL SYMBOLS

- SINGLE RECEPTACLE
- STANDARD DUPLEX RECEPTACLE
- SAFETY DISCONNECT SWITCH (FUSED)
- SAFETY DISCONNECT SWITCH (NON-FUSED)
- CIRCUIT BREAKER PANEL
- MOTOR (SEE SCHEDULE)
- HAND OR HAIR DRYER (TYPE NOTED)
- LOW VOLTAGE POWER CIRCUIT
- LINE VOLTAGE POWER CIRCUIT
- 2"ø EMT — CONDUIT SIZE AND TYPE
- SR — SURFACE MOUNTED RACEWAY
- CONDUIT TRANSITION UP
- CONDUIT TRANSITION DOWN
- BRANCH CIRCUIT HOME RUN
- UE — UNDERGROUND ELECTRICAL
- UHVE — UNDERGROUND HIGH VOLTAGE ELECTRICAL
- DATA RACK
- CABLE TRAY
- DATA RECEPTACLE
- PHONE RECEPTACLE
- DUAL DATA/PHONE RECEPTACLE
- MULTIPLE DATA/PHONE RECEPTACLE
- WIRELESS ACCESS POINT
- CABLE TELEVISION OUTLET
- T — THERMOSTAT
- RS — REMOTE TEMPERATURE SENSOR
- H — HUMIDISTAT
- CO2 — CARBON DIOXIDE SENSOR
- CO — CARBON MONOXIDE SENSOR
- CONNECT TO EXISTING

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IMPROVEMENTS TO HVAC/CHILLER TROOP C SERVICE CENTER BUILDING

5268 FLAT RIVER ROAD
PARK HILLS, MISSOURI

PROJECT # R2515-01
SITE # 6013
ASSET # 8136013002

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CHECKED BY: MHB
DESIGNED BY: GCS

SHEET TITLE:

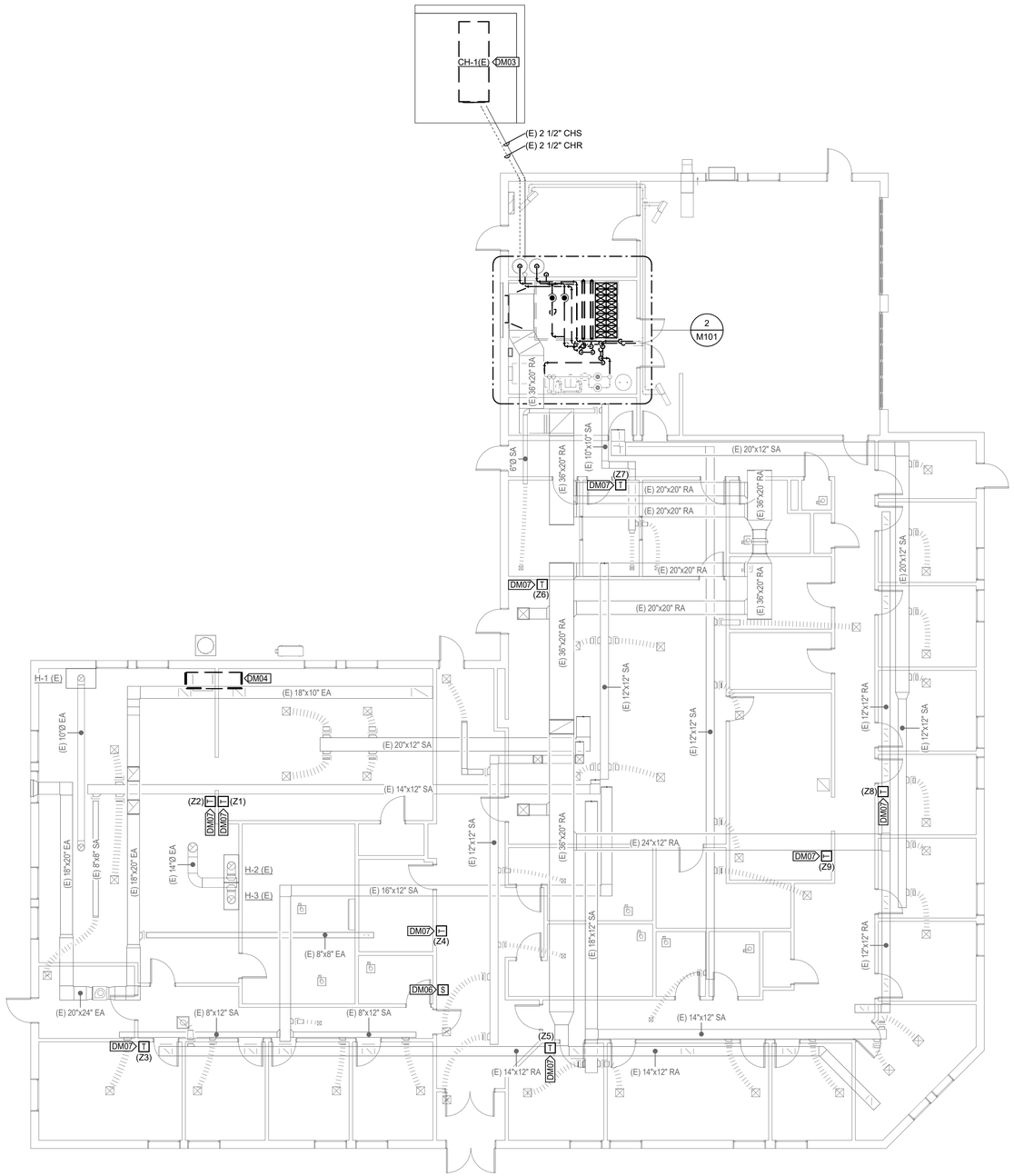
GENERAL NOTES

SHEET NUMBER:

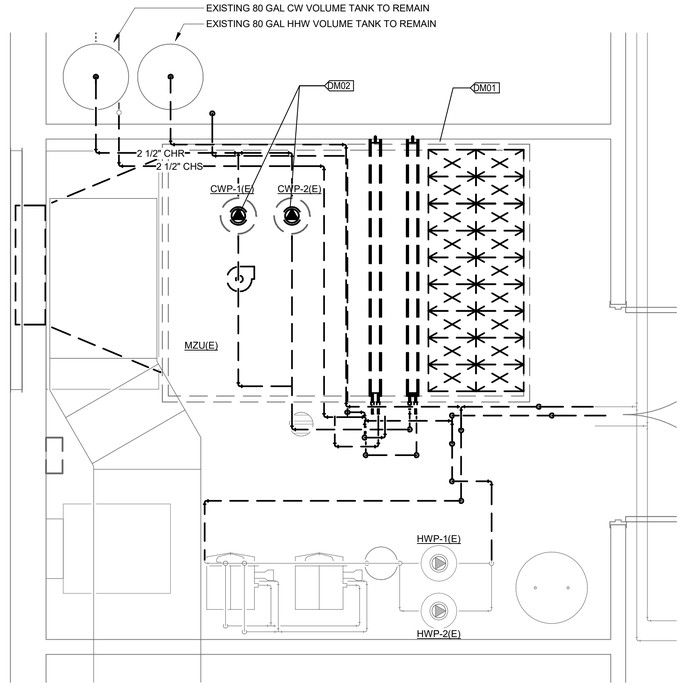
MEP101

SHEET 2 of 12
MARCH 20, 2026

KEYNOTE LEGEND	
VALUE	DESCRIPTION
DM01	DEMOLISH MULTI-ZONE AIR HANDLING UNIT. DEMOLISH EXISTING RETURN, OUTSIDE AIR, AND ZONE CONTROL DAMPERS. PROTECT FIRE ALARM DEVICES AND OVERHEAD DUCTWORK AND PREPARE FOR NEW WORK.
DM02	DEMOLISH CHILLED WATER PUMPS, AIR SEPARATOR, CHILLED WATER EXPANSION TANK, AND CHILLED WATER PIPING AND PREPARE FOR NEW WORK. EXISTING CW VOLUME TANK TO REMAIN, SPRINKLER PIPING, AND RPZ BACKFLOW PREVENTER TO REMAIN. PROTECT ALL EQUIPMENT TO REMAIN THROUGHOUT CONSTRUCTION.
DM03	DEMOLISH CHILLER AND ASSOCIATED PIPING AND ACCESSORIES BACK TO STUB OUTS, DISCONNECT ELECTRICAL FEEDERS AND PREPARE AREA FOR NEW WORK.
DM04	DEMOLISH SUPPLY DUCT BACK TO FLEX CONNECTION AT AIR HANDLER.
DM06	SALVAGE EXISTING DIFFERENTIAL PRESSURE SENSING PLATE FOR RELOCATION.
DM07	EXISTING THERMOSTAT/TEMPERATURE SENSOR TO BE REPLACED, DEMOLISH EXISTING THERMOSTAT/TEMPERATURE SENSOR AND PREPARE EXISTING WIRING FOR REUSE.



1 FIRST FLOOR MECHANICAL DEMO PLAN
1/8" = 1'-0"



2 ENLARGED FIRST FLOOR MECHANICAL DEMO PLAN - MECHANICAL ROOM
1/2" = 1'-0"

SCALE: 1/2" = 1'-0"
SCALE: 1/8" = 1'-0"

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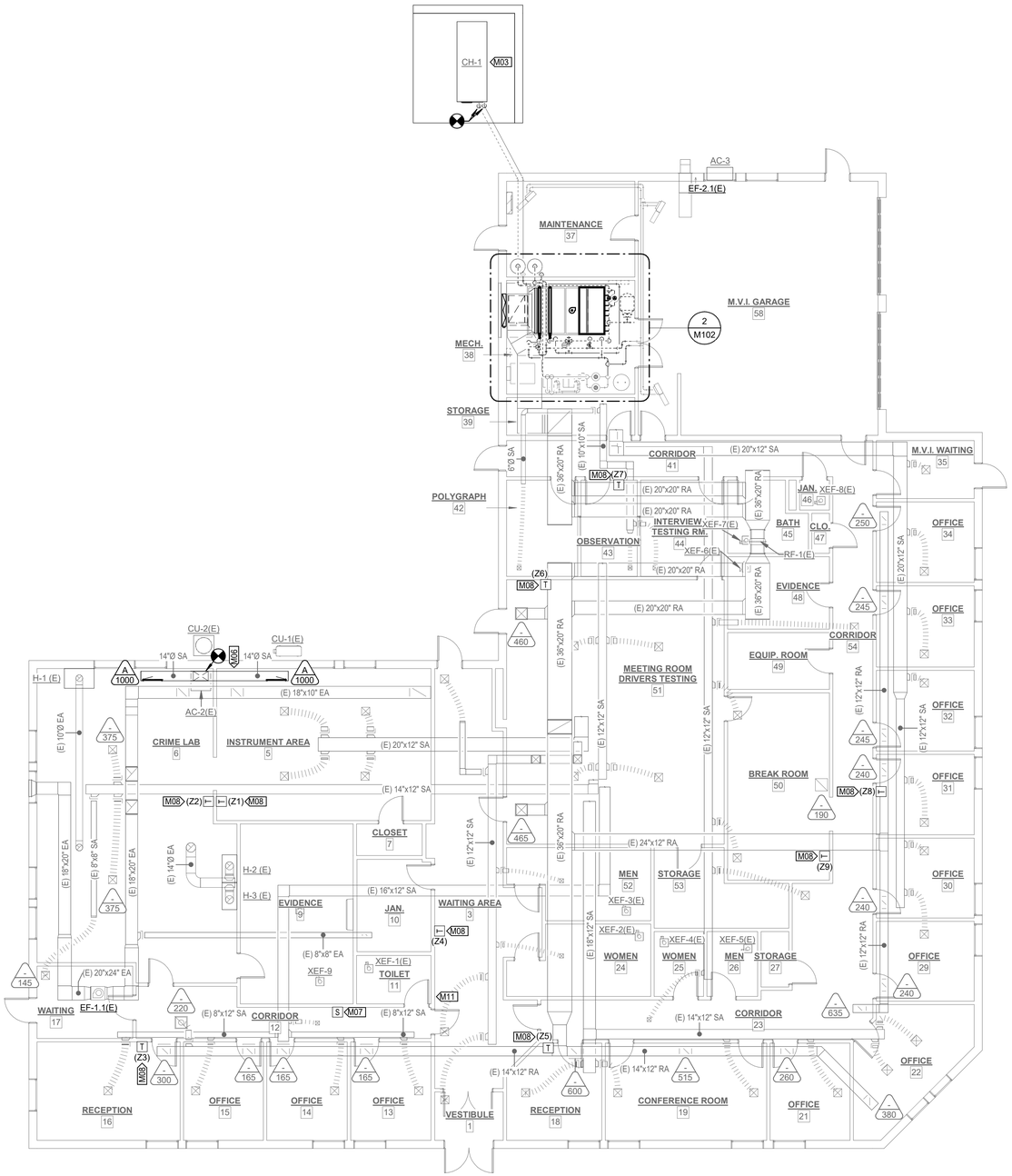
FIRST FLOOR MECHANICAL PLAN - DEMO

SHEET NUMBER:

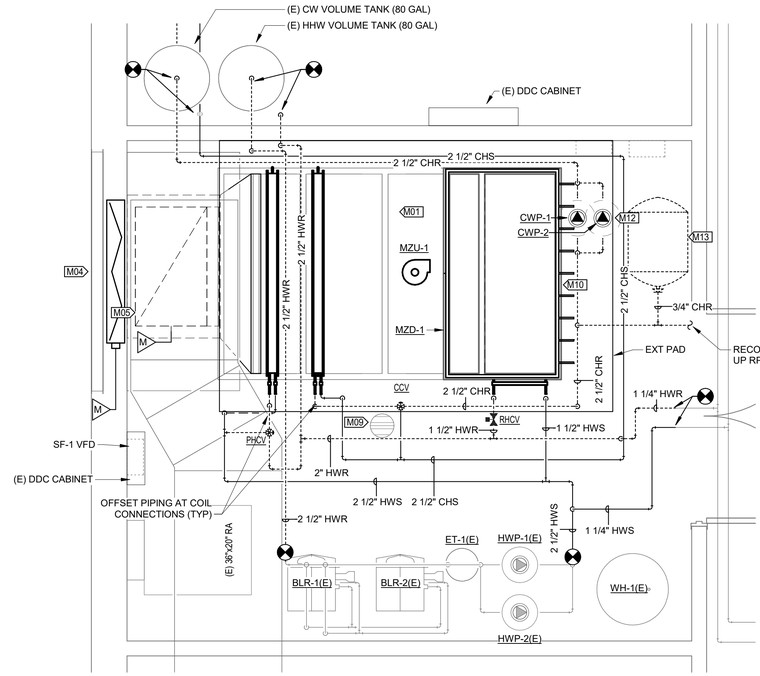
M101

SHEET 3 of 12
MARCH 20, 2026

KEYNOTE LEGEND	
VALUE	DESCRIPTION
M01	INSTALL NEW MULTI-ZONE AIR HANDLING UNIT AND WITH NEW 48"X48" OUTSIDE AIR CONTROL DAMPER AND 40"X24" RETURN AIR CONTROL DAMPER. CONNECT TO EXISTING DUCTWORK. INSTALL UNIT AS TIGHT TO THE NORTH-MOST CORNER OF THE EXISTING PAD AS IS PRACTICAL IN ORDER TO FACILITATE MAINTENANCE ACCESS TO SOUTHWEST AND SOUTHEAST FACES OF THE UNIT. REINSTALL EXISTING FIRE ALARM DEVICES. REFER TO COIL PIPING DETAILS ON M501.
M03	INSTALL CHILLER ON EXISTING CONCRETE PAD AND CONNECT TO EXISTING STUBOUTS IN ACCORDANCE WITH MANUFACTURER'S WRITTEN INSTRUCTIONS AND CLEARANCE REQUIREMENTS.
M04	ENLARGE EXISTING OUTSIDE AIR OPENING TO 48"X48" WITHIN FACE AREA OF EXISTING 80"X54" LOUVER TO REMAIN. SEAL AIRTIGHT.
M05	PROVIDE NEW TRANSITION/MIXING BOX WITH 12"X24" ACCESS DOOR. OUTDOOR AIR INTAKE SHALL BE 48"X48" AND RETURN AIR OPENING SHALL BE SIZED TO MATCH EXISTING 40"X24" RA DUCT. OUTLET SHALL BE SIZED TO MATCH UNIT INTAKE (BASIS OF DESIGN: 67"X67").
M06	INSTALL NEW SPIRAL DUCT. INFILL WALL WITH GYP. BOARD AND PAINT TO MATCH EXISTING CONSTRUCTION.
M07	INSTALL SALVAGED DP SENSING PLATE IN CEILING AT THIS LOCATION. RE-ROUTE NEW TUBING TO CONNECT TO DP-1 AND DP-3 HIGH SIDE SENSING PORTS.
M08	INSTALL NEW ZONE TEMPERATURE SENSOR.
M09	ROUTE CONDENSATE LINE FROM NEW AIR HANDLING UNIT, MZU-1, TO EXISTING FLOOR DRAIN.
M10	IDENTIFY LOCATIONS AND PROVIDE IDENTIFICATION LABELS FOR BALANCE DAMPERS IN EACH OF NINE ZONE SUPPLY DUCTS IN ATTIC SPACE ABOVE. PROVIDE AND INSTALL NEW BALANCE DAMPER FOR ANY ZONE THAT DOES NOT CURRENTLY HAVE ONE. BASE BID TO INCLUDE FOUR (4) NEW 14"X12" BALANCE DAMPERS. FIELD VERIFY DUCT SIZES BEFORE PURCHASE. CLEARLY MARK FINAL LOCATION OF ALL BALANCE DEVICES UPON COMPLETION OF TEST AND BALANCE.
M11	PATCH GYP CEILING AND PAINT TO MATCH EXISTING.
M12	CW PUMPS SHOWN SIDE-BY-SIDE FOR CLARITY. CWP-1 SHALL BE STACKED ABOVE CWP-2 TO FACILITATE ACCESS.
M13	MOUNT CHILLED WATER EXPANSION TANK TIGHT TO STRUCTURE ABOVE



1 FIRST FLOOR MECHANICAL PLAN
1/8" = 1'-0"



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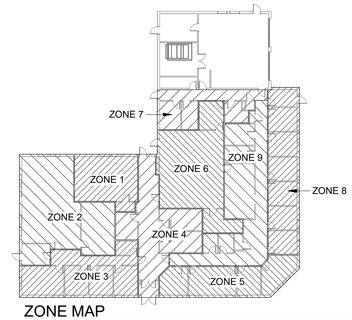

ZONE MAP

0 1' 2' 4'
SCALE: 1/2" = 1'-0"
0 4' 8' 16'
SCALE: 1/8" = 1'-0"

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FIRST FLOOR MECHANICAL PLAN - NEW WORK

SHEET NUMBER:

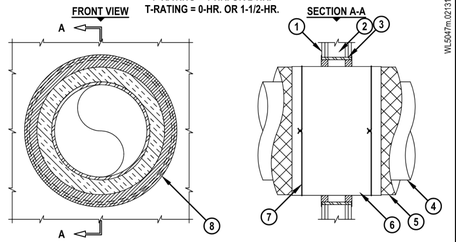
M102

SHEET 4 of 12
MARCH 20, 2026

UL/cUL SYSTEM NO. W-L-5047

INSULATED METALLIC PIPE IN GYPSUM WALL ASSEMBLY

F-RATING = 1-HR. OR 2-HR.
T-RATING = 0-HR. OR 1-1/2-HR.



WL504Tm.02/1317

1. GYPSUM WALL ASSEMBLY (UL CLASSIFIED U300 OR U400 SERIES) (1-HR. OR 2-HR. FIRE-RATING) (2-HR. SHOWN).
2. [NOT SHOWN] WOOD STUDS TO CONSIST OF NOMINAL 2" x 4" LUMBER. STEEL STUDS TO BE MINIMUM 2-1/2" WIDE.
3. [OPTIONAL] MAXIMUM 30" NOMINAL DIAMETER STEEL PIPE SLEEVE (SCHEDULE 40 OR THINNER).
4. PENETRATING ITEM TO BE ONE OF THE FOLLOWING :
   A. MAXIMUM 20" DIAMETER STEEL PIPE (SCHEDULE 10 OR HEAVIER).
   B. MAXIMUM 6" DIAMETER COPPER PIPE.
5. NOMINAL 1" TO 3" THICK GLASS-FIBER PIPE INSULATION.
6. NOMINAL 1" TO 3" THICK MINERAL FIBER PIPE INSULATION (SEE NOTE NO. 3 BELOW).
7. PIPE INSULATION SECURED WITH 18 AWG STEEL WIRE, 3" BEYOND EACH SURFACE OF WALL.
8. HILTI FS-ONE MAX OR FS-ONE INTUMESCENT FIRESTOP SEALANT :
   A. MINIMUM 5/8" DEPTH OF SEALANT FOR A 1-HR. FIRE-RATING.
   B. MINIMUM 1-1/4" DEPTH OF SEALANT FOR A 2-HR. FIRE-RATING.

NOTES : 1. MAXIMUM DIAMETER OF OPENING :
A. 30" FOR STEEL STUD WALLS.
B. 14-1/2" FOR WOOD STUD WALLS.
2. WHEN STEEL PIPE SLEEVE IS USED, ANNULAR SPACE = MINIMUM 1", MAXIMUM 2-1/4". WHEN STEEL PIPE SLEEVE IS NOT USED, ANNULAR SPACE = MINIMUM 1/4", MAXIMUM 3".
3. OWENS CORNING MINERAL FIBER PIPE INSULATION TO EXTEND 6" OUT FROM EACH SIDE OF THE WALL. SECURE WITH TIE WIRE AS SHOWN. COVER WITH A UL CLASSIFIED ALL SERVICE JACKET AND PROPERLY JOIN WITH EXISTING INSULATION.

HILTI
Hilti Firestop Systems

HILTI, Inc.
Plano, Texas USA (800) 879-8000

Sheet	1 of 1	Drawing No.
Scale	5/64" = 1"	WL
Date	Feb. 13, 2017	5047m

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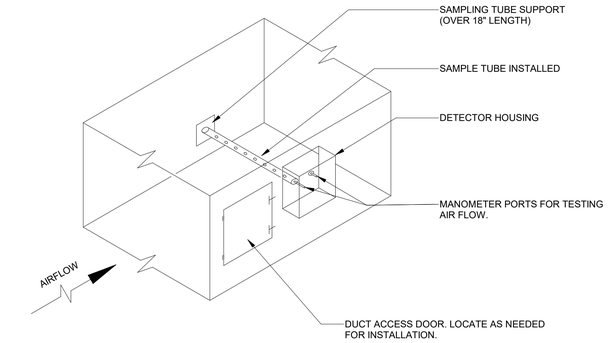
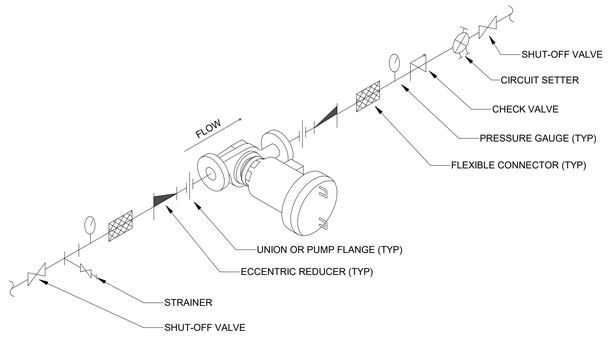
13 MECHANICAL ROOM PENETRATION FIRESTOPPING
NTS



INSTALLATION REQUIREMENTS:
IN ADDITION TO THE MANUFACTURERS INSTRUCTIONS THE FOLLOWING GUIDELINES WILL BE ENFORCED:

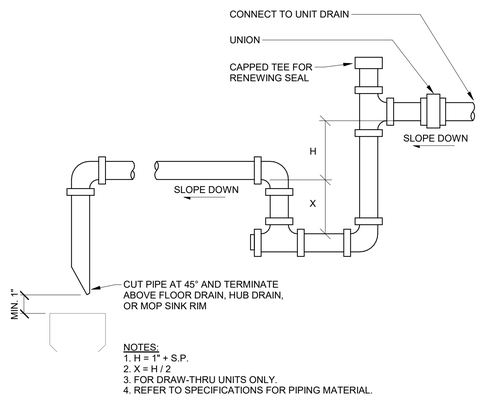
1. DUCT DETECTOR MAY BE INSTALLED IN ANY WALL OF THE DUCT UNLESS OTHERWISE RESTRICTED BY THE MANUFACTURERS INSTRUCTIONS.
2. CUT INLET SAMPLING TUBE TO SUIT DIMENSION OF DUCT. PROVIDE SAMPLING TUBE MOUNTING SUPPORT.
3. CONTRACTOR TO NOTE THAT AIR INLET SAMPLING TUBES ARE DESIGNED FOR DIFFERING DUCT WIDTHS EMPLOYING AIR INLET HOLES IN A QUANTITY MATCHING THE DUCT WIDTH. VERIFY EACH INLET TUBE IS APPROPRIATELY SIZED FOR THE DUCT WIDTH (TYPICALLY 10 TO 12 HOLES, EACH 0.193" DIAMETER HOLES [#11 DRILL BIT]).
4. ANGLE CUT RETURN TUBE AT A LENGTH AS RECOMMENDED BY MANUFACTURER IF REQUIRED. SUPPORT IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS.
5. POSITION INLET HOLES FACING UPSTREAM OR INTO AIRFLOW. THIS INITIAL INSTALLATION POSITION SHALL BE USED AS THE STARTING POINT FOR DIFFERENTIAL PRESSURE TESTING. IF REQUIRED ADJUST AS STATED IN THE TESTING/ADJUSTING PROCEDURE ABOVE. ANGLE CUT OF RETURN TUBE SHALL BE ORIENTATED DOWNSTREAM OF AIR FLOW.
6. ONCE ACCEPTABLE DIFFERENTIAL PRESSURE READINGS ARE OBTAINED, TUBES SHALL BE LOCKED IN PLACE IN ACCORDANCE WITH THE MANUFACTURERS INSTALLATION INSTRUCTIONS.
7. DUCT DETECTOR ASSEMBLY AND SAMPLING TUBES SHALL BE MOUNTED RIGIDLY TO PREVENT NOISE, CHATTER, AND MECHANICAL FATIGUE. ANY INSTALLATION FOUND UNACCEPTABLE WILL BE CORRECTED AT THE INSTALLING CONTRACTORS EXPENSE.
8. AIR LEAKS ARE UNACCEPTABLE, THIS INSTALLING CONTRACTOR SHALL PROVIDE GASKETS, OR DUCT SEALANT AROUND INLET AND OUTLET AIR TUBES. SEALING AROUND DETECTOR HOUSING PERIMETER IS NOT ACCEPTABLE.
9. ONCE THE DETECTOR IS INSTALLED, VERIFY CORRECT DIFFERENTIAL PRESSURE READINGS ACROSS SAMPLING TUBES AND RECORD. INSTALL MANUFACTURER FURNISHED SAMPLING TUBE FILTERS.
10. IF DUCT IS INSTALLED, PROVIDE DETECTOR STANDOFFS EQUIVALENT IN DEPTH OF THE DUCT WALL INSULATION TO RIGIDLY SUPPORT DETECTOR ASSEMBLY. SEAL ANY AIR HOLES THAT ARE NOT INSIDE DUCT WALL WITH DUCT SEALANT AND TAPE.
11. AT EACH DUCT DETECTOR INSTALLATION LOCATION PROVIDE A SERVICE OPENING INCLUDE A MINIMUM 12"X12" ACCESS DOOR OR AS SPECIFIED.

12 DUCT SMOKE DETECTOR INSTALLATION
NTS



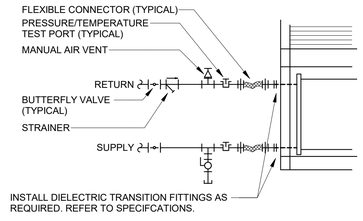
IN-LINE PUMP NOTES:
1. SUPPORT PUMP FROM STRUCTURE ABOVE AND INDEPENDENTLY FROM PIPING.

11 IN-LINE PUMP DETAIL
NTS



NOTES:
1. H = 1" + S.P.
2. X = H / 2
3. FOR DRAW-THRU UNITS ONLY.
4. REFER TO SPECIFICATIONS FOR PIPING MATERIAL.

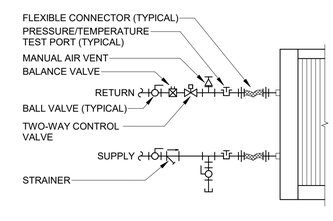
4 COOLING COIL CONDENSATION DRAIN DETAIL
NTS



INSTALL DIELECTRIC TRANSITION FITTINGS AS REQUIRED. REFER TO SPECIFCATIONS.

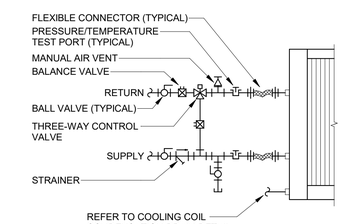
NOTES:
1. REFER TO SPECIFCATIONS FOR PIPE MATERIAL, VALVES, AND ACCESSORIES REQUIREMENTS.
2. REFER TO CHILLER MANUFACTURER'S WRITTEN INSTALLATION INSTRUCTIONS FOR ADDITIONAL REQUIREMENTS.

10 CHILLER CONNECTION DETAIL
NTS



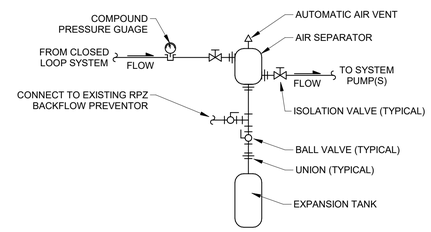
NOTES:
1. REFER TO SPECIFCATIONS FOR PIPE MATERIAL AND VALVE AND ACCESSORIES REQUIREMENTS.

9 COIL CONNECTION DETAIL (2-WAY CONTROL VALVE)
NTS

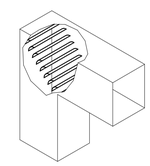


NOTES:
1. REFER TO SPECIFCATIONS FOR PIPE MATERIAL AND VALVE AND ACCESSORIES REQUIREMENTS.

8 COIL CONNECTION DETAIL (3-WAY CONTROL VALVE)
NTS

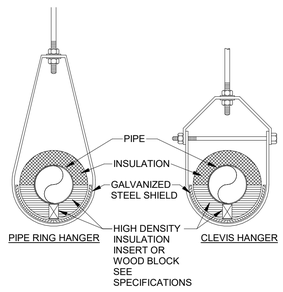


7 MAKE-UP CONNECTION DETAIL
NTS



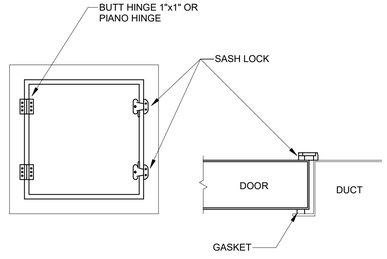
NOTE:
1. ALL DUCT 90° ELBOWS SHALL BE RADIUS ELBOWS (1.5 * DEPTH) UNLESS CLEARANCES REQUIRE A SQUARE RADIUS.
2. ALL SQUARE RADIUS ELBOWS SHALL INCLUDE TURNING VANES PER SPECIFICATIONS.

6 TURNING VANE DETAIL
NTS

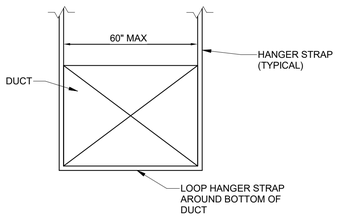


5 INSULATED PIPE AT HANGER DETAIL
NTS

3 DUCT WRAP DETAIL
NTS



2 DUCT ACCESS DOOR DETAIL
NTS



NOTE:
CONTRACTOR SHALL VERIFY ALL LOAD LIMITS ON HANGER AND WEIGHTS OF DUCT TO ASSURE ALLOWABLE LOAD LIMITS ARE NOT EXCEEDED.

1 STRAP HANGER DETAIL
NTS

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DIVISION OF FACILITIES MANAGEMENT, DESIGN AND CONSTRUCTION

MISSOURI STATE HIGHWAY PATROL

IMPROVEMENTS TO HVAC/CHILLER
TROOP C SERVICE CENTER BUILDING

5268 FLAT RIVER ROAD
PARK HILLS, MISSOURI

PROJECT # R2515-01
SITE # 6013
ASSET # 8136013002

REVISION:
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MECHANICAL DETAILS

SHEET NUMBER:
M501

SHEET 5 of 12
MARCH 20, 2026

AIR HANDLING UNIT SCHEDULE

MARK	DESCRIPTION	BASIS OF DESIGN		SUPPLY FAN			COOLING COIL							PREHEAT COIL						REHEAT COIL					ELECTRICAL					NOTES
		MANUF	MODEL	TOTAL AIR FLOW (CFM)	OCCUPIED/UNOCCUPIED OUTSIDE AIR (CFM)	E.S.P. (IN. WG.)	CAPACITY (BTU/HR)	SENS. CAP. (BTU/HR)	EWT (DEG. F)	LWT (DEG. F)	FLOWRATE (GPM)	EAT (DEG. F)	LAT (DEG. F)	CAPACITY (BTU/HR)	EWT (DEG. F)	LWT (DEG. F)	FLOWRATE (GPM)	EAT (DEG. F)	LAT (DEG. F)	CAPACITY (BTU/HR)	EWT (DEG. F)	LWT (DEG. F)	FLOWRATE (GPM)	EAT (DEG. F)	VOLTAGE	PHASE	HZ	MCA	MOCP	
MZU-1	MULTIZONE AIR HANDLING UNIT	KLIMOR	EVO-S	10,000	4,200/3,525	2.0	464,200	313,400	44	56	82	84 DB/69 WB	55 DB/55WB	115,400	140	120	12	44	55	247,800	140	120	25	55	208	3	60	48	60	1, 2

1. 2" PLEATED, MERV 8 FILTERS.
2. PROVIDE SUPPLY FAN VFD WITH INTEGRAL DISCONNECT.

AIR-COOLED CHILLER SCHEDULE

MARK	BASIS OF DESIGN			CAPACITY (TONS)	MINIMUM CAPACITY (%)	MAXIMUM NPLV (BTU/(W*HR))	EVAPORATOR				ELECTRICAL					NOTES
	MANUFACTURER	MODEL	DESCRIPTION				DESIGN FLOW (GPM)	DESIGN EWT (DEG. F)	DESIGN LWT (DEG. F)	DESIGN PD (FT W.G.)	VOLTAGE	PHASE	HZ	MCA	MOCP	
CH-1	CARRIER	30RC-0405610-0623	AIR COOLED SCROLL CHILLER	38.4	8.8	14.79	81.7	54	44	4.67	208	3	60	188.3	225	1, 2, 3

1. DIGITAL SCROLL COMPRESSOR WITH SOUND BLANKETS
2. 30% PROPYLENE GLYCOL SOLUTION
3. PROVIDE UNIT-MOUNTED NON-FUSED DISCONNECT

CHILLED WATER PUMP SCHEDULE

MARK	DESCRIPTION	FLOW	HEAD	ELECTRICAL							MAKE	MODEL	WEIGHT
				POWER	VOLT	FREQ	PHASE	FLA	MCA	MOCP			
CWP-1	ECM HIGH EFFICIENCY CIRCULATOR	82 GPM	30 ftH2O	2.1 HP	208 V	60 Hz	1	7.5	10	20	TACO	VR25H	53
CWP-2	ECM HIGH EFFICIENCY CIRCULATOR	82 GPM	30 ftH2O	2.1 HP	208 V	60 Hz	1	7.5	10	20	TACO	VR25H	53

GRILLES, REGISTERS, AND DIFFUSERS SCHEDULE

TAG	TYPE	DESCRIPTION	FACE SIZE		CONNECTION SIZE RECTANGULAR		MATERIAL	FINISH	FRAME/BORDER	DAMPER	BASIS OF DESIGN	
			WIDTH	HEIGHT	WIDTH	HEIGHT					MAKE	MODEL
A	SUPPLY REGISTER	DOUBLE DEFLECTION , 1/2" BLADE SPACE, FRONT BLADES PARALLELS WITH LONG DIMENSION	29 1/2"	12"	28"	10"	ALUMINUM	WHITE	DUCT	OPPOSED BLADE	PRICE	SDGE

MULTIZONE DAMPER SCHEDULE

MARK	DESCRIPTION	LENGTH (IN.)			WIDTH (IN.)									MAKE	MODEL	REMARKS
		OVERALL LENGTH	HOT DECK LENGTH	COLD DECK LENGTH	OVERALL WIDTH	Z1	Z2	Z3	Z4	Z5	Z6	Z7	Z8	Z9			
MZD-1	DUAL DUCT MIXING DAMPER, TRIPLE V BLADES, 9 ZONES	37"	12"	24"	67"	12"	6"	6"	6"	10"	5"	5"	10"	6"	POTTORFF	MX-40	1

1. DIMENSIONS SHOWN REFER TO INNER DIMENSION OF DAMPER.

EXPANSION TANK SCHEDULE

MARK	DESCRIPTION	MAX. PRES.	MAX. TEMP.	TANK VOLUME	ACCEPTANCE VOLUME	BASIS OF DESIGN			REMARKS
						MAKE	MODEL	WEIGHT	
ET-2	CW EXPANSION TANK	125 PSI	240°F	23 GAL	23 GAL	TACO	CA90-125	312 LB	

CONTROL VALVE SCHEDULE

MARK	DESCRIPTION	CONTROL	VALVE FAIL POSITION	COIL WATER PRESSURE DROP (FT)	FLOW RATE (GPM)	TYPE	CV
CCV	CHILLED WATER CONTROL VALVE	2-10 VDC	CLOSED	7.3	82	3-WAY (MIXING)	62
PHCV	PRE-HEAT CONTROL VALVE	2-10 VDC	OPEN	6.3	12	3-WAY (MIXING)	42
RHCV	RE-HEAT CONTROL VALVE	2-10 VDC	OPEN	1.7	25	2-WAY	11

CONTROL DAMPER SCHEDULE

MARK	DESCRIPTION	SIZE	TYPE	FAIL POSITION
OAD	OUTSIDE AIR DAMPER	48" X 48"	OPPOSED BLADE	CLOSED
RAD	RETURN AIR DAMPER	24" X 40"	OPPOSED BLADE	OPEN

ZONE SCHEDULE		
TAG	DESCRIPTION	AIRFLOW (CFM)
Z1	INSTRUMENT LAB	1,800
Z2	CRIME LAB	1,000
Z3	SW OFFICES	1,090
Z4	LOBBY	725
Z5	SE OFFICES	1,440
Z6	DRIVER TESTING	800
Z7	INTERROGATION	450
Z8	EAST OFFICES	1,630
Z9	KITCHENETTE AND COORIDOR	775

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MISSOURI STATE HIGHWAY PATROL

IMPROVEMENTS TO HVAC/CHILLER TROOP C SERVICE CENTER BUILDING

5268 FLAT RIVER ROAD
PARK HILLS, MISSOURI

PROJECT # R2515-01
SITE # 6013
ASSET # 8136013002

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ISSUE DATE: 03/20/2026

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DESIGNED BY: GCS

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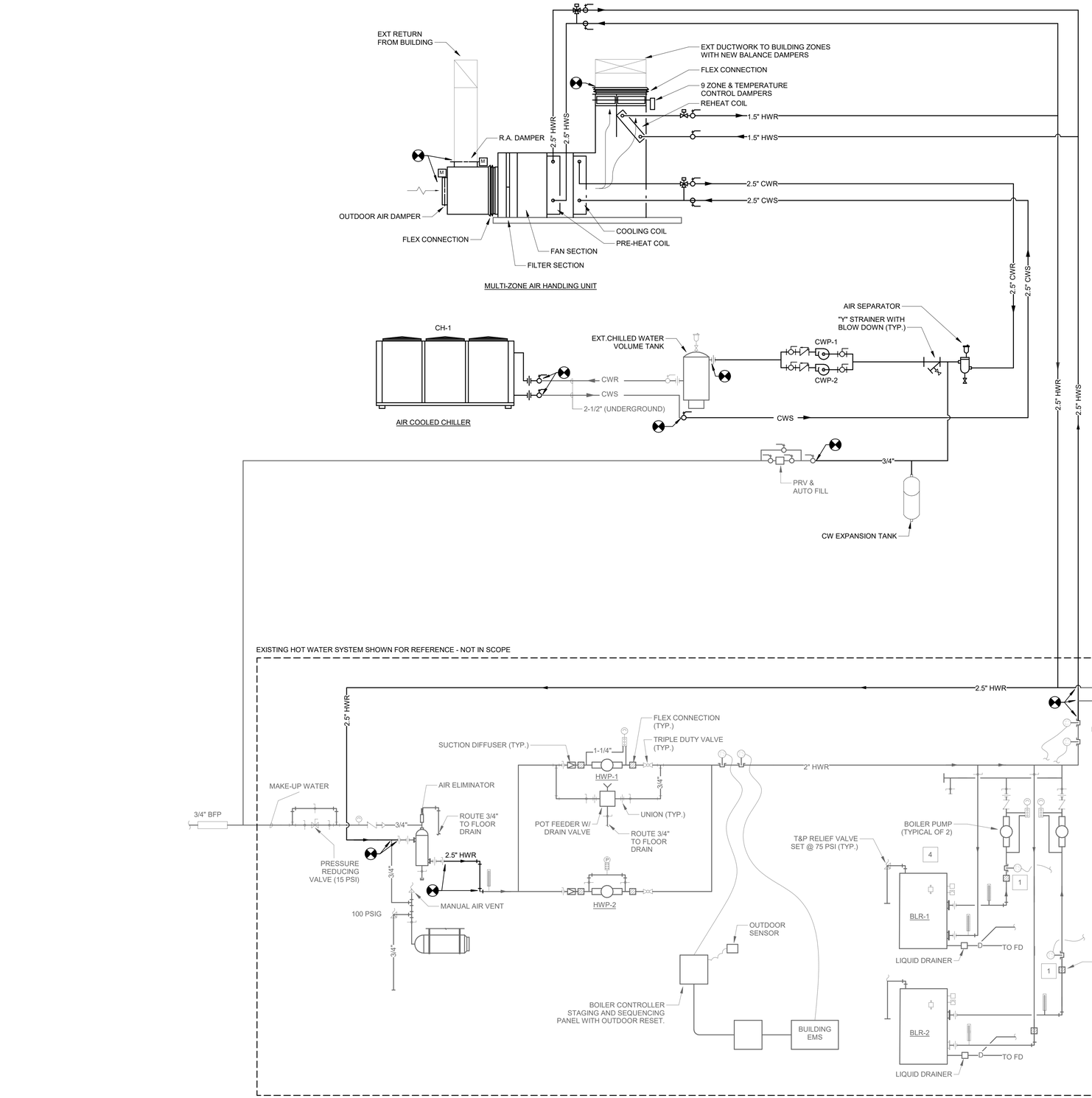
MECHANICAL SCHEDULES

SHEET NUMBER:

M601

SHEET 6 of 12
MARCH 20, 2026



1 SYSTEM ONE LINE DIAGRAM
NTS

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PARK HILLS, MISSOURI

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SYSTEM ONE-LINE DIAGRAM

SHEET NUMBER:

M701

SHEET 7 of 12
MARCH 20, 2026

LABORATORY AREA:

EF1.1 IS CONTROLLED TO MAINTAIN THE LAB AT A DIFFERENTIAL PRESSURE OF -0.05" WG RELATIVE TO THE LOBBY (DP-1).

IN ORDER TO MAINTAIN THE DP-1 SP:
EA = SA + TA
EA = 1,800 + 1,000 + 150 = 2,950 CFM

EF1.1 = 2,950 CFM - LEF-1 - LEF-2 - EF-9
EF1.1 = ~1,840 CFM (57% SPEED)

OFFICE AREA:

SINCE ALL RETURN AIR TO MZU-1 COMES FROM THIS SPACE, THE AVAILABLE RETURN AIR TO MZU-1 CAN BE CALCULATED AS FOLLOWS:

RA = SA - EA - TA - EXFIL
WHERE:
SA = 1,090 + 725 + 1,440 + 800 + 450 + 1,630 + 775 = 6,910 CFM
EA = 75 + 300 + 425 = 800 CFM
TA = 150 + 100 = 250 CFM
EXFIL = 400 CFM

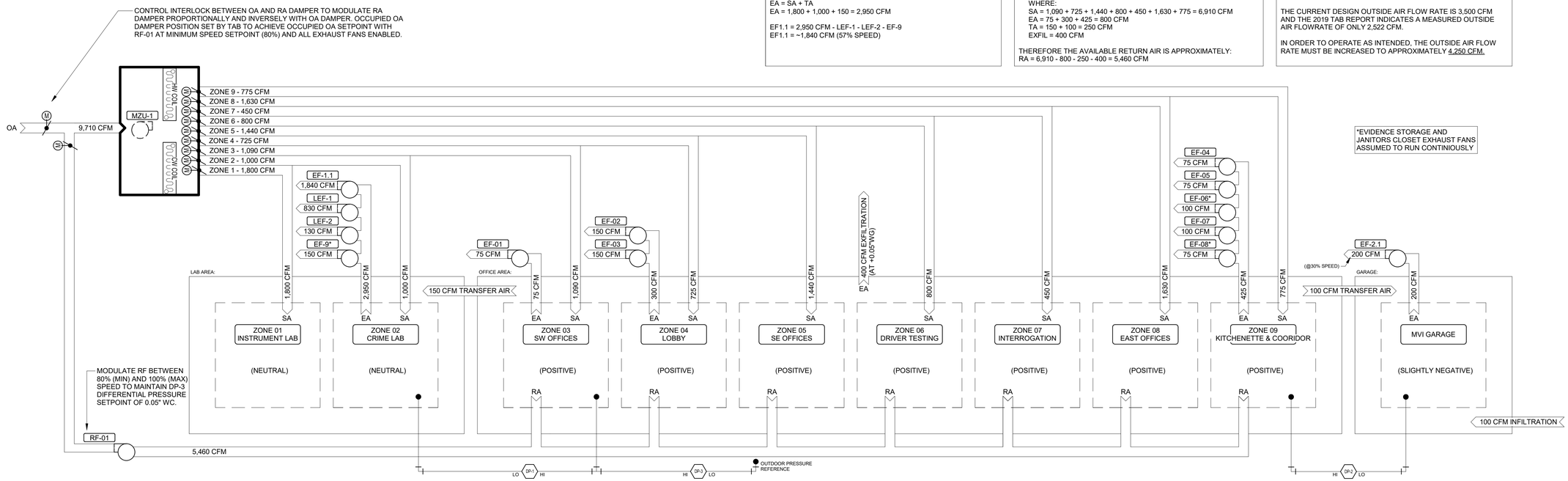
THEREFORE THE AVAILABLE RETURN AIR IS APPROXIMATELY:
RA = 6,910 - 800 - 250 - 400 = 5,460 CFM

SUMMARY:

AT THE CURRENTLY SCHEDULED FLOW RATES AND SEQUENCE OF OPERATION, THERE IS 5,460 CFM AVAILABLE FOR RETURN AIR AFTER ACCOUNTING FOR EXHAUST AND BUILDING EXFILTRATION.

THE CURRENT DESIGN OUTSIDE AIR FLOW RATE IS 3,500 CFM AND THE 2019 TAB REPORT INDICATES A MEASURED OUTSIDE AIR FLOWRATE OF ONLY 2,522 CFM.

IN ORDER TO OPERATE AS INTENDED, THE OUTSIDE AIR FLOW RATE MUST BE INCREASED TO APPROXIMATELY 4,250 CFM.



1 BUILDING AIR BALANCE - OCCUPIED/RESTROOM FANS ON
NTS

NOTE: THIS IS A CHANGE TO THE SEQUENCE OF OPERATION. RECORD DRAWINGS CALL FOR EF-1.1 TO BE DISABLED IN THE UNOCCUPIED MODE.

LABORATORY AREA:

EF1.1 SHALL REMAIN IN OPERATION DURING THE UNOCCUPIED MODE TO MAINTAIN THE LAB AT A DIFFERENTIAL PRESSURE OF -0.05" WG RELATIVE TO THE LOBBY (DP-1).

IN ORDER TO MAINTAIN THE DP-1 SP:
EA = SA + TA
EA = 1,800 + 1,000 + 150 = 2,950 CFM

EF1.1 = 2,950 CFM - LEF-1 - LEF-2 - EF-9
EF1.1 = ~1,840 CFM (57% SPEED)

OFFICE AREA:

SINCE ALL RETURN AIR TO MZU-1 COMES FROM THIS SPACE, THE AVAILABLE RETURN AIR TO MZU-1 CAN BE CALCULATED AS FOLLOWS:

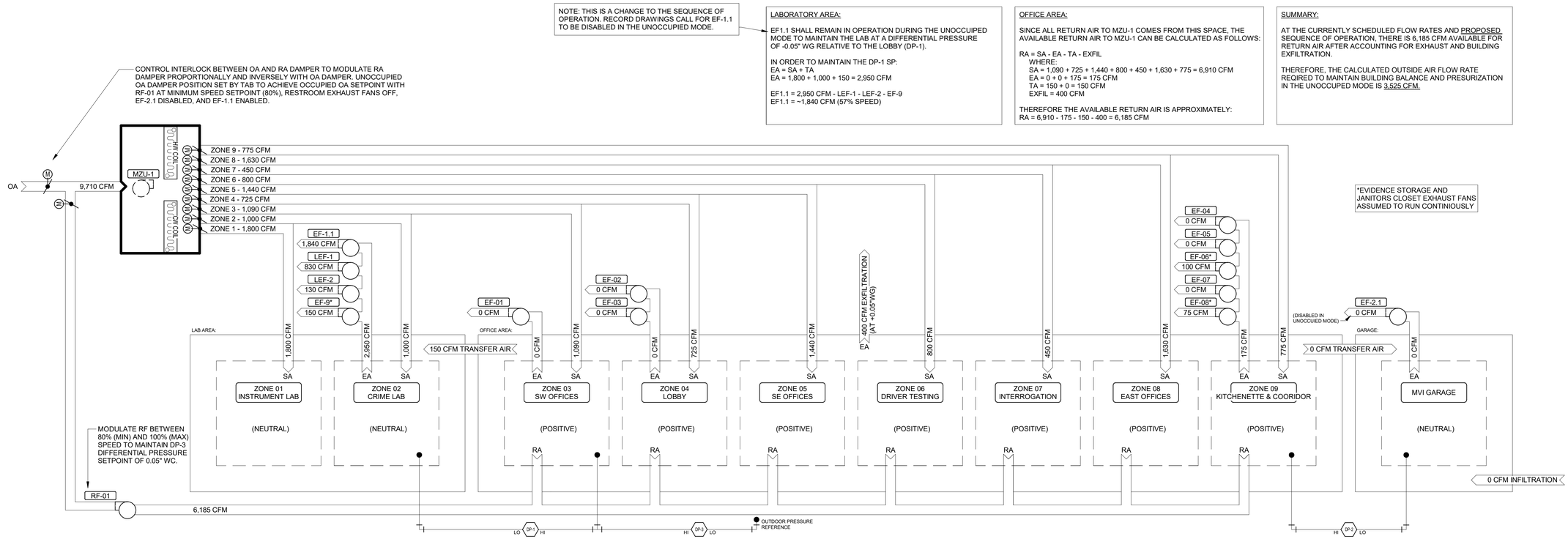
RA = SA - EA - TA - EXFIL
WHERE:
SA = 1,090 + 725 + 1,440 + 800 + 450 + 1,630 + 775 = 6,910 CFM
EA = 0 + 0 + 175 = 175 CFM
TA = 150 + 0 = 150 CFM
EXFIL = 400 CFM

THEREFORE THE AVAILABLE RETURN AIR IS APPROXIMATELY:
RA = 6,910 - 175 - 150 - 400 = 6,185 CFM

SUMMARY:

AT THE CURRENTLY SCHEDULED FLOW RATES AND PROPOSED SEQUENCE OF OPERATION, THERE IS 6,185 CFM AVAILABLE FOR RETURN AIR AFTER ACCOUNTING FOR EXHAUST AND BUILDING EXFILTRATION.

THEREFORE, THE CALCULATED OUTSIDE AIR FLOW RATE REQIRED TO MAINTAIN BUILDING BALANCE AND PRESURIZATION IN THE UNOCCUPED MODE IS 3,525 CFM.



2 BUILDING AIR BALANCE - UNOCCUPIED/RESTROOM EXHAUST FANS OFF
NTS

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5268 FLAT RIVER ROAD
PARK HILLS, MISSOURI

PROJECT # R2515-01
SITE # 6013
ASSET # 8136013002

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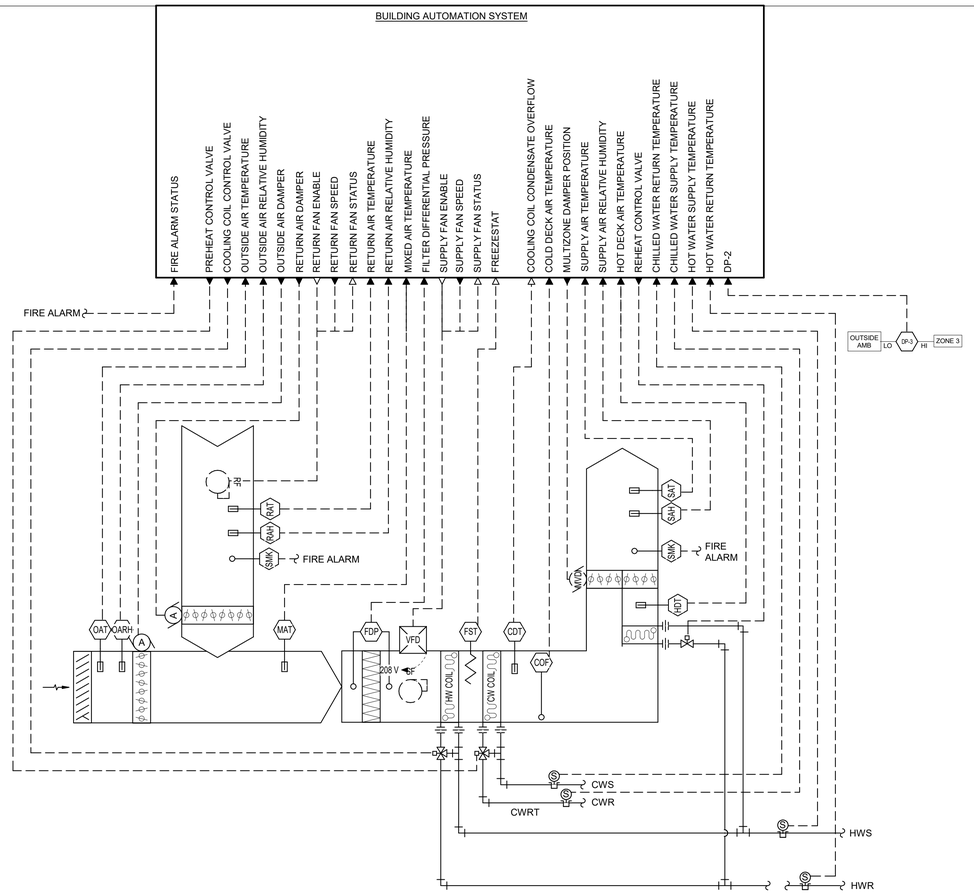
SHEET TITLE:

BUILDING AIR BALANCE REFERENCE ONLY

SHEET NUMBER:

M702

SHEET 8 of 12
MARCH 20, 2026



AIR HANDLING UNIT DDC CONTROL SUMMARY								
#	TAG	CONTROL POINT	BAS DISPLAY	TREND	ALARM			REMARKS
1	FA STATUS	FIRE ALARM STATUS	●	●	●			1
2	FST	FREEZESTAT	●	●	●			
3	OAT	OUTSIDE AIR TEMPERATURE	●	●				
4	OARH	OUTSIDE AIR RELATIVE HUMIDITY	●	●				
5	HWST	HOT WATER SUPPLY TEMPERATURE	●	●				
6	HWRT	HOT WATER RETURN TEMPERATURE	●	●				
7	CCV	COOLING COIL CONTROL VALVE	●	●				
8	CWRT	CHILLED WATER RETURN TEMPERATURE	●	●				
9	CWST	CHILLED WATER SUPPLY TEMPERATURE	●	●				
10	OA DMPR	OUTSIDE AIR DAMPER	●	●				
11	RA DMPR	RETURN AIR DAMPER	●	●				
12	RF ENABLE	RETURN FAN ENABLE	●	●				
13	RF SPEED	RETURN FAN SPEED	●	●				
14	RF STATUS	RETURN FAN STATUS	●	●	●			
15	RAT	RETURN AIR TEMPERATURE	●	●				
16	RARH	RETURN AIR RELATIVE HUMIDITY	●	●				
17	MAT	MIXED AIR TEMPERATURE	●	●				
18	SF ENABLE	SUPPLY FAN ENABLE	●	●				
19	SF SPEED	SUPPLY FAN SPEED	●	●				
20	SF STATUS	SUPPLY FAN STATUS	●	●				
21	MZD	MULTIZONE DAMPER POSITION	●	●				2
22	SAT	SUPPLY AIR TEMPERATURE	●	●	●			2
23	SARH	SUPPLY AIR RELATIVE HUMIDITY	●	●				2
24	COF	COOLING COIL CONDENSATE OVERFLOW	●		●			
25	CD TEMP	COLD DECK AIR TEMPERATURE	●	●	●			
26	HD TEMP	HOT DECK AIR TEMPERATURE	●	●	●			
27	FLT DP	FILTER DIFFERENTIAL PRESSURE	●	●				
28	PHCV	PREHEAT CONTROL VALVE	●	●				
29	RHCV	REHEAT CONTROL VALVE	●	●				
30	DP-3	DIFF. PRESSURE: Z3 RELATIVE TO OUTSIDE	●	●				

1. COORDINATE WITH FIRE ALARM CONTRACTOR.
2. SENSOR TO BE PROVIDED AND INSTALLED TYPICAL PER ZONE.

1 MULTI-ZONE UNIT SEQUENCE OF OPERATIONS
NTS

MULTIZONE UNIT SEQUENCE OF OPERATIONS

A. OCCUPIED MODE
1. RETURN FAN: RF-1 SHALL MODULATE BETWEEN "RF-MIN" AND "RF-MAX" (ADJUSTABLE - INITIALLY SET TO 80% AND 100% RESPECTIVELY)TO MAINTAIN DP-3 (ZONE 3 AREA RELATIVE TO OUTDOOR AMBIENT) SETPOINT OF +0.05" WG (ADJ).
2. SUPPLY FAN: BAS SHALL COMMAND SF-1 TO RUN CONTINIOUSLY AT "SF-SPEED" SETPOINT (ADJ). FINAL SETPOINT DETERMINED BY TAB. FINAL SETPOINT VALUE SHALL BE NOTED ON THE BAS USER INTERFACE AS "DEFAULT" SETPOINT.
3. OUTSIDE AIR AND RETURN AIR DAMPERS: RA DAMPER POSITION SHALL BE INTERLOCKED WITH OA DAMPER (VIA BAS) TO MODULATE RA DAMPER PROPORTIONALLY AND INVERSELY TO THE OA DAMPER. OA DAMPER POSITION SHALL BE SET BY TAB TO ACHIEVE THE SCHEDULED OCCUPIED OA FLOW SETPOINT WITH RF-1 AT "RF-MIN" (80%/48HZ), EXHAUST FANS XEF1-XEF9 RUNNING, AND EF-1.1 AND EF-2.1 OPERATING IN ACCORDANCE WITH THE OCCUPIED SEQUENCE OF OPERATIONS.
4. PREHEAT COIL CONTROL VALVE: PHCV SHALL BE ENABLED WHEN MAT IS BELOW 50°F (ADJ) AND SHALL MODULATE TO MAINTAIN A COLD DECK TEMPERATURE SETPOINT OF 55°F (ADJ).
5. COOLING COIL CONTROL VALVE: CCV SHALL BE ENABLED WHEN MAT IS ABOVE 60°F (ADJ) AND SHALL MODULATE TO MAINTAIN A COLD DECK TEMPERATURE SETPOINT OF 55°F (ADJ).
6. REHEAT COIL CONTROL VALVE: RHCV SHALL MODULATE TO MAINTAIN HOT DECK TEMPERATURE SETPOINT. HOT DECK TEMPERATURE SETPOINT SHALL RESET FROM 75°F (ADJ) TO 85°F (ADJ) AS OUTSIDE AIR TEMPERATURE (OAT) FALLS FROM 65°F (ADJ) TO 40°F (ADJ)
7. MULTIZONE DAMPERS: SHALL MODULATE SA TEMP FOR EACH ZONE TO ACHIEVE ZONE TEMPERATURE SETPOINT AS SENSED BY THE ZONE THERMOSTAT.

B. UNOCCUPIED MODE
1. SAME AS OCCUPIED MODE UNLESS NOTED OTHERWISE
2. OUTSIDE AIR AND RETURN AIR DAMPERS: OA DAMPER POSITION SHALL BE SET BY TAB TO ACHIEVE THE SCHEDULED UNOCCUPIED OA FLOW SETPOINT WITH RF-1 AT "RF-MIN" (80%/48HZ); EXHAUST FANS XEF1, XEF2, XEF3, XEF4, XEF5, AND XEF7 OFF; EXHAUST FANS XEF6 AND XEF9 RUNNING, AND EF-1.1 AND EF-2.1 OPERATING IN ACCORDANCE WITH THE UNOCCUPIED SEQUENCE OF OPERATIONS.

C. WARNINGS: NOTIFY THE OPERATOR
1. FILTER DP
2. FAN STATUS

D. ALARMS: DISBALE SF-1 AND RF-1, OA DAMPERS TO FULL CLOSED POSITION AND RA DAMPER TO FULL OPEN POSITION.
1. FIRE ALARM ACTIVATION
2. FREEZESTAT
3. CONDENSATE OVERFLOW

HEATING HOT WATER SYSTEM

A. HEATING HOT WATER SUPPLY TEMPERATURE SETPOINT SHALL BE REVISED AS FOLLOWS:
1. HEATING HOT WATER SETPOINT SHALL RESET FROM 110°F (ADJ) TO 140°F (ADJ) AS THE OUTSIDE AIR TEMPERATURE FALLS FROM 45°F (ADJ) TO 30°F (ADJ).

GENERAL SEQUENCE OF OPERATIONS NOTES

A. OCCUPANCY MODE:
1. THE OCCUPANCY MODE (OCCUPIED OR UNOCCUPIED) SHALL BE DETERMINED THROUGH A USER-ADJUSTABLE, GRAPHICAL, SCHEDULING PROGRAM. SCHEDULING PROGRAM SHALL SUPPORT SEVEN-DAY SCHEDULING, CALENDAR SCHEDULING, AND HOLIDAY SCHEDULE OVERRIDE.

B. ZONE TEMPERATURE SETPOINTS

1. INITIAL OCCUPIED PERIOD ROOM SETPOINTS (REGULARLY SCHEDULED WORK DAYS FROM 7:00 AM- 6:00 PM, MONDAY-FRIDAY)
a. COOLING
1. 72°F (ADJUSTABLE BETWEEN 65°F AND 80°F)
2. USERS SHALL BE ABLE TO OVERRIDE ZONE SETPOINTS AT THE LOCAL THERMOSTATS. USER SELECTED RANGE SHALL BE LIMITED TO +/-3°F (ADJUSTABLE FROM 0°F-5°F) AND WITHIN THE COOLING SETPOINT RANGE DESCRIBED ABOVE. USER OVERRIDES SHALL RESET FOLLOWING SYSTEM SWITCHOVER TO UN-OCCUPIED CONDITION.
b. HEATING
1. 68°F (ADJUSTABLE BETWEEN 60°F AND 75°F)
2. USERS SHALL BE ABLE TO OVERRIDE ZONE SETPOINTS AT THE LOCAL THERMOSTATS. USER SELECTED RANGE SHALL BE LIMITED TO +/-3°F (ADJUSTABLE FROM 0°F-5°F) AND WITHIN THE HEATING SETPOINT RANGE DESCRIBED ABOVE. USER OVERRIDES SHALL RESET FOLLOWING SYSTEM SWITCHOVER TO UN-OCCUPIED CONDITION.

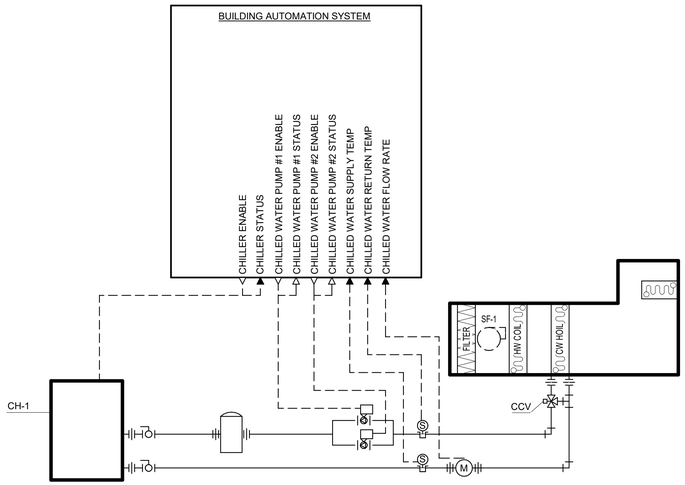
2. INITIAL UN-OCCUPIED PERIOD ZONE SETPOINTS (ALL REMAINING TIME THAT IS NOT DEFINED AS OCCUPIED)
a. COOLING
1. 75°F (ADJUSTABLE BETWEEN 65°F AND 80°F)
2. UNOCCUPIED OVERRIDE SHALL BE ENABLED DURING UNOCCUPIED HOURS VIA LOCAL THERMOSTAT. UNOCCUPIED OVERRIDE SHALL REVERT TO OCCUPIED ZONE TEMPERATURE SETPOINTS FOR 1 HOUR (ADJ) AND THEN RETURN TO THE UNOCCUPIED SETPOINTS.

a. HEATING
1. 65°F (ADJUSTABLE BETWEEN 60°F AND 75°F)
2. UNOCCUPIED OVERRIDE SHALL BE ENABLED DURING UNOCCUPIED HOURS VIA LOCAL THERMOSTAT. UNOCCUPIED OVERRIDE SHALL REVERT TO OCCUPIED ZONE TEMPERATURE SETPOINTS FOR 1 HOUR (ADJ) AND THEN RETURN TO THE UNOCCUPIED SETPOINTS.

C. OUTDOOR AIR TEMPERATURE MONITORING
1. AN OUTDOOR AIR TEMPERATURE SENSOR SHALL BE INSTALLED ON EXTERIOR OF THE BUILDING IN AN OUTDOOR RATED ENCLOSURE. THE SENSOR SHALL PROVIDE OUTDOOR AIR TEMPERATURE TO THE BUILDING AUTOMATION SYSTEM FOR TRENDING.

D. ALL SETPOINTS INDICATED SHALL BE ADJUSTABLE WITHIN THE BAS SYSTEM.

LEGEND
ANALOG INPUT
ANALOG OUTPUT
BINARY INPUT
BINARY OUTPUT



CHILLED WATER SYSTEM SEQUENCE OF OPERATION

A. AIR-COOLED CHILLER SEQUENCING
1. THE AIR-COOLED CHILLER SHALL BE ENABLED WHEN CCV IS ENABLED AND AT LEAST 3 (ADJ) ZONE SPACE TEMPERATURES ARE ABOVE SPACE TEMPERATURE SETPOINT.
2. CHILLER TO MODULATE TO MAINTAIN CHILLED WATER SUPPLY TEMPERATURE OF 44°F.
3. CHILLED WATER LOAD SHALL BE CALCULATED AND TRENDED BY MEASURING THE CHILLED WATER FLOW (CWF), CHILLED WATER SUPPLY TEMPERATURE (CWST), & CHILLED WATER RETURN TEMPERATURE (CWRT). THE CALCULATED CHILLED WATER LOAD SHALL BE DISPLAYED THROUGH BAS USER INTERFACE.

B. CHILLED WATER PUMP SEQUENCING
1. CHILLED WATER PUMPS SHALL BE ENABLED WHENEVER AIR-COOLED CHILLER IS ENABLED.
2. WHEN CHILLED WATER PUMPS ARE ENABLED, LEAD PUMP SHALL BE COMMANDED TO RUN AND LAG PUMP SHALL REMAIN OFF.
3. IF STATUS OF LEAD PUMP IS NOT PROVEN TRUE WITHIN 3 MINUTES OF RUN COMMAND, LAG PUMP SHALL ROTATE TO LEAD AND BE COMMANDED TO RUN.
4. LEAD AND LAG CHILLED WATER PUMP SHALL ROTATE WEEKLY ON TUESDAY MORNING TO KEEP RUN HOURS APPROXIMATELY EQUAL.

CHILLED WATER SYSTEM CONTROL SUMMARY								
#	TAG	CONTROL POINT	BAS DISPLAY	TREND	ALARM			REMARKS
1	CH-EN	CHILLER ENABLE	●	●				
2	CH-ST	CHILLER STATUS	●	●				
3	CWST	CHILLED WATER SUPPLY TEMPERATURE	●	●				
4	CWRT	CHILLED WATER RETURN TEMPERATURE	●	●				
5	CWF	CHILLED WATER FLOW RATE	●	●				
6	CWP-1 ENABLE	CHILLED WATER CIRCULATION PUMP #1 ENABLE	●	●				
7	CWP-1 STATUS	CHILLED WATER CIRCULATION PUMP #1 STATUS	●	●				
8	CWP-2 ENABLE	CHILLED WATER CIRCULATION PUMP #2 ENABLE	●	●				
9	CWP-2 STATUS	CHILLED WATER CIRCULATION PUMP #2 STATUS	●	●				
10								

5 CHILLED WATER SYSTEM SEQUENCE OF OPERATION
NTS

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MISSOURI STATE CERTIFICATE OF AUTHORITY #000866

OFFICE OF ADMINISTRATION
DIVISION OF FACILITIES MANAGEMENT, DESIGN AND CONSTRUCTION

MISSOURI STATE HIGHWAY PATROL

IMPROVEMENTS TO HVAC/CHILLER TROOP C SERVICE CENTER BUILDING

5268 FLAT RIVER ROAD
PARK HILLS, MISSOURI

PROJECT # R2515-01
SITE # 6013
ASSET # 8136013002

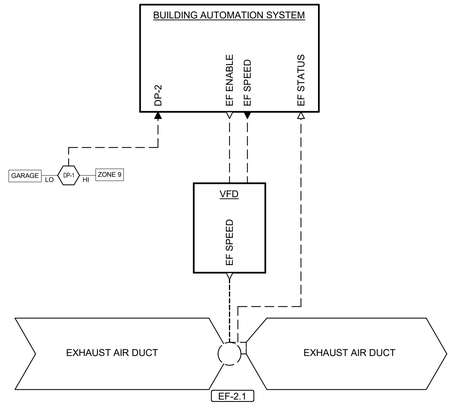
REVISION:
DATE:
REVISION:
DATE:
REVISION:
DATE:
ISSUE DATE: 03/20/2026

CAD DWG FILE:
DRAWING BY: CRB
CHECKED BY: MHB
DESIGNED BY: GCS

SHEET TITLE:
CONTROL DETAILS

SHEET NUMBER:
M703

SHEET 9 of 12
MARCH 20, 2026



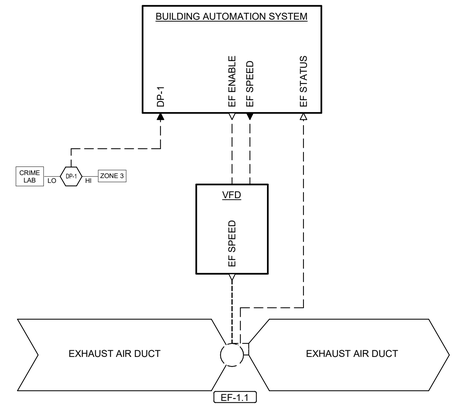
EXHAUST FAN CONTROL SUMMARY: EF-2.1 (EXT)				
CONTROL POINT	BAS DISPLAY	BAS TREND	BAS ALARM	COMMENTS
EF-2.1 ENABLE	●	●		
EF-2.1 SPEED	●	●		
EF-2.1 STATUS	●	●		
DP-2 (ZONE 9 RELATIVE TO GARAGE)	●	●		

EXHAUST SYSTEM: EF-2.1 SEQUENCE OF OPERATION

A. EXHAUST SYSTEM CONTROL

1. EF-2.1 SHALL BE ENABLED IN BOTH THE OCCUPIED MODE.
2. EF-2.1 SHALL BE DISABLED IN THE UNOCCUPIED MODE.
3. EF-2.1 SPEED SHALL MODULATE TO MAINTAIN THE DP-2 (ZONE 9 RELATIVE TO GARAGE) SETPOINT OF +0.05" WC (ADJ).

2 EXHAUST FAN CONROL DIAGRAM - EF-2.1
NTS



EXHAUST FAN CONTROL SUMMARY: EF-1.1 (EXT)				
CONTROL POINT	BAS DISPLAY	BAS TREND	BAS ALARM	COMMENTS
EF-1.1 ENABLE	●	●		
EF-1.1 SPEED	●	●		
EF1.1 STATUS	●	●		
DP-1 (ZONE 3 RELATIVE TO CRIME LAB)	●	●		

EXHAUST SYSTEM: EF-1.1 SEQUENCE OF OPERATION

A. EXHAUST SYSTEM CONTROL

1. EF1.1 SHALL BE ENABLED IN BOTH THE OCCUPIED AND UNOCCUPIED MODE.
2. EF1.1 SPEED SHALL MODULATE TO MAINTAIN THE DP-1 (ZONE 3 RELATIVE TO CRIME LAB) SETPOINT OF +0.05" WC (ADJ).

1 EXHAUST FAN CONTROL DIAGRAM - EXISTING EF-1.1
NTS

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GOVERNOR

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MISSOURI STATE HIGHWAY PATROL

IMPROVEMENTS TO HVAC/CHILLER TROOP C SERVICE CENTER BUILDING

5268 FLAT RIVER ROAD
PARK HILLS, MISSOURI

PROJECT # R2515-01
SITE # 6013
ASSET # 8136013002

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CAD DWG FILE:
DRAWING BY: CRB
CHECKED BY: MHB
DESIGNED BY: GCS

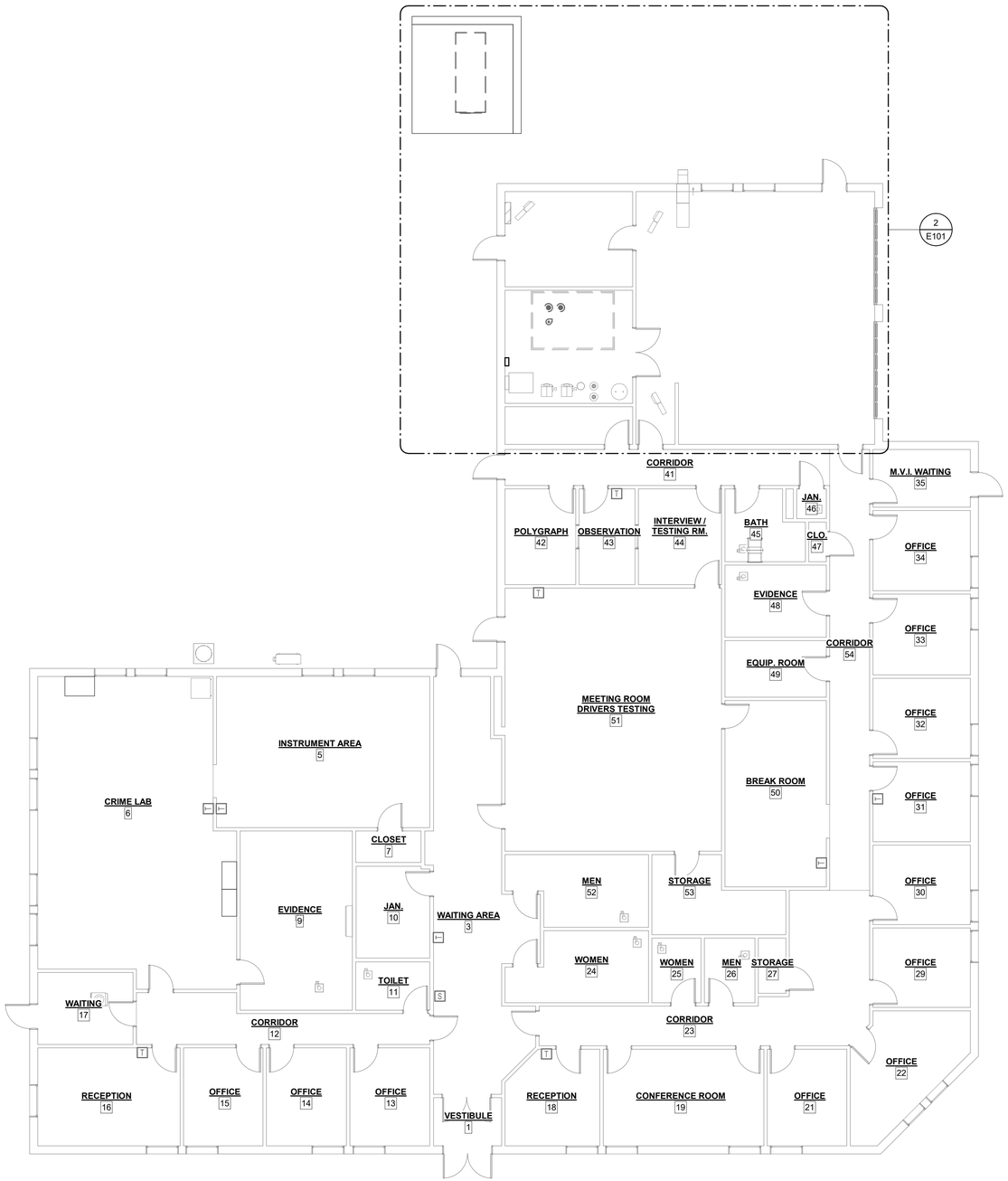
SHEET TITLE:

CONTROL DETAILS

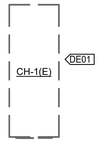
SHEET NUMBER:

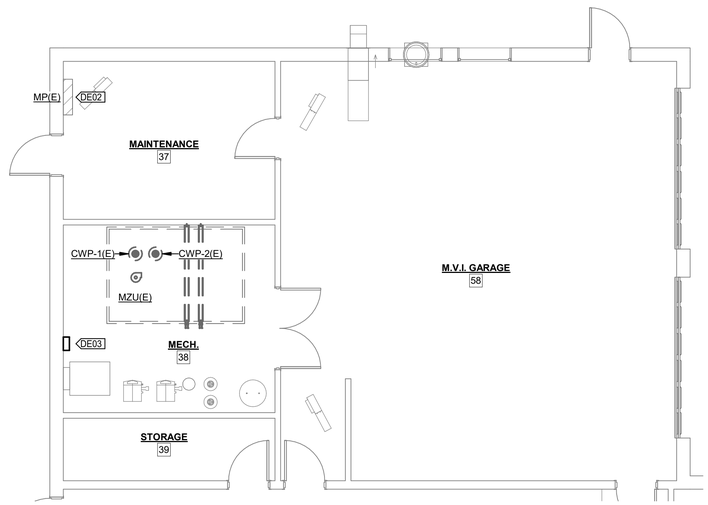
M704

KEYNOTE LEGEND	
VALUE	DESCRIPTION
DE01	CHILLER TO BE DEMOLISHED. DISCONNECT & DEMOLISH CONDUCTORS SERVING EXISTING CHILLER BACK TO PANEL 'MP(E)'.
DE02	DEMOLISH 200A SWITCH SERVING EXISTING CHILLER.
DE03	DEMOLISH SUPPLY FAN VFD.



1 FIRST FLOOR POWER DEMO PLAN
1/8" = 1'-0"





2 FIRST FLOOR ENLARGED POWER DEMO PLAN - MECHANICAL ROOM
3/16" = 1'-0"

0 4' 8' 16'
SCALE: 1/8" = 1'-0"

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MISSOURI STATE HIGHWAY PATROL

IMPROVEMENTS TO HVAC/CHILLER
TROOP C SERVICE CENTER BUILDING

5268 FLAT RIVER ROAD
PARK HILLS, MISSOURI

PROJECT # R2515-01
SITE # 6013
ASSET # 8136013002

REVISION:
DATE:
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DATE:
ISSUE DATE: 03/20/2026

CAD DWG FILE:
DRAWING BY: CRB
CHECKED BY: MHB
DESIGNED BY: GCS

SHEET TITLE:

POWER PLAN - DEMO

SHEET NUMBER:

E101

SHEET 11 of 12
MARCH 20, 2026

KEYNOTE LEGEND

VALUE	DESCRIPTION
E01	FURNISH AND INSTALL NEW SUPPLY FAN VFD BELOW EXISTING CONTROL CABINET.
E02	FURNISH AND INSTALL TWO (2) NEW CHILLED WATER PUMP H.O.A. MOTOR STARTERS.
E03	PULL NEW CONDUCTORS IN EXISTING CONDUIT TERMINATE.
E04	INSTALL NEW 225A SWITCH TO FEED CH-1 IN EXISTING PANEL.
E05	PROVIDE AND INSTALL (2) NEW 20A, 2 POLE BREAKERS TO SERVE NEW CHILLED WATER CIRCULATION PUMPS (LP2-31,33 & LP2-32,34).
E06	PROVIDE AND INSTALL (2) NEW SPARE 20A, SINGLE POLE BREAKERS (LP2-35, LP2-36).

BRANCH PANEL: LP2(E)

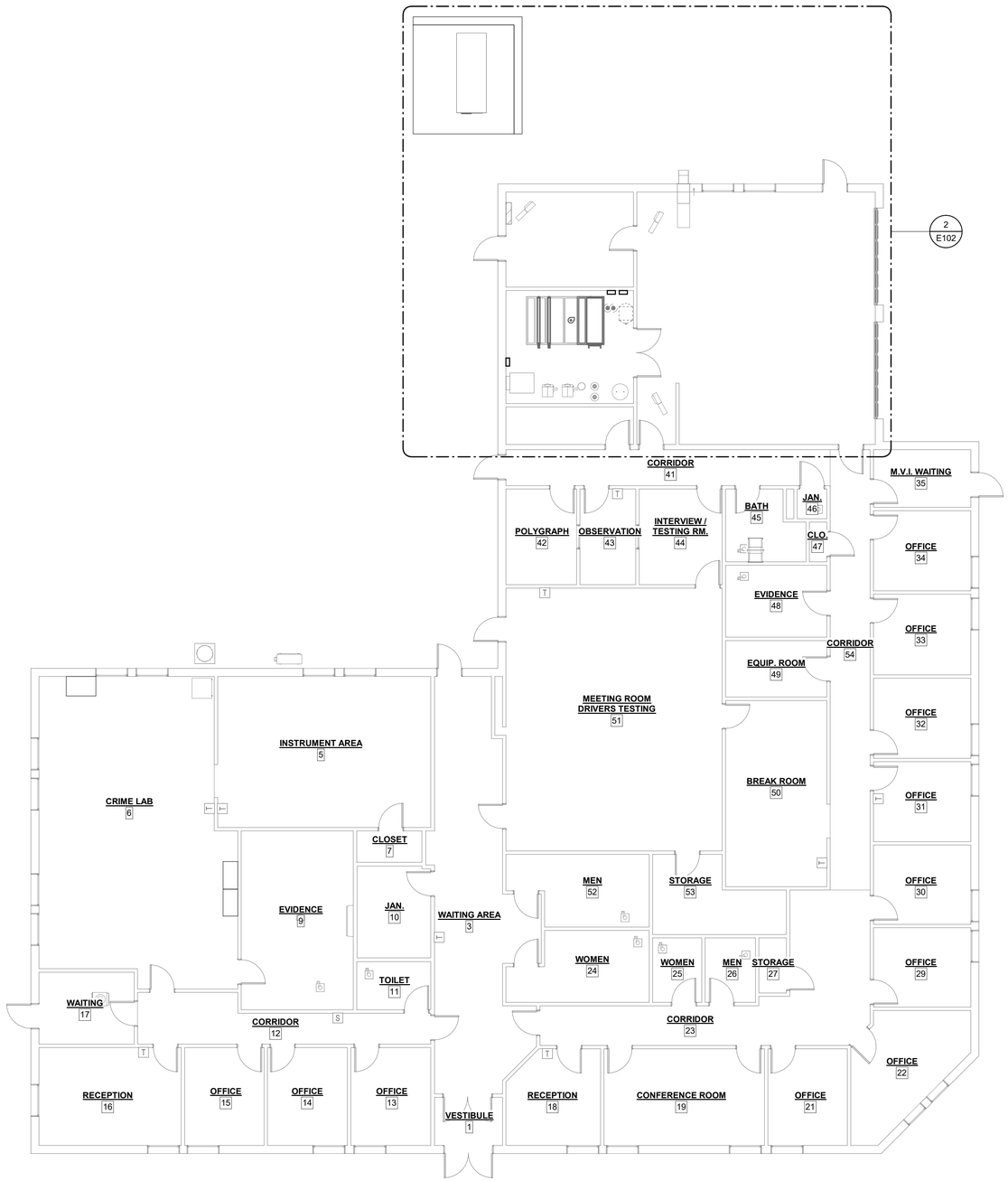
LOCATION: MECH. 38 | **VOLTS:** 120/208 | **A.I.C. RATING:** 10,000 AMPS SYMMETRICAL
SUPPLY FROM: 400, 120 V/208 V, Three Phase... | **PHASES:** 3 | **PANEL TYPE:** MAIN CB
MOUNTING: SURFACE | **WIRES:** 4 | **MAINS RATING:** 200 A
ENCLOSURE: NEMA 1 | **ACCESSORIES:** | **MAIN BREAKER:** 200 A

CKT	CIRCUIT DESCRIPTION	TRIP	POLES	A		B		C		POLES	TRIP	CIRCUIT DESCRIPTION	CKT
1	LIGHTS	20 A	1	1,800 VA	600 VA					2	20 A	POWER	2
3	LIGHTS	20 A	1			1,800 VA	600 VA						4
5	POWER & RELAYS	20 A	1					0 VA	1,200 VA	1	20 A	FLAG POLE LIGHTS	6
7	OVERHEAD DOOR OP	20 A	1	1,200 VA	700 VA					1	20 A	SOFFIT LIGHTS	8
9	OVERHEAD DOOR OP	20 A	1			1,200 VA	900 VA			1	20 A	RCPT RMS. 36-37	10
11	AHU ACCESSORY POWER	20 A	1					1,260 VA	1,260 VA	1	20 A	RCPT RMS. 36-37	12
13	X-FAN	20 A	1	0 VA	0 VA					1	20 A	POWER HVAC CONTROLS	14
15	WHEEL BALANCER	20 A	2			0 VA	0 VA			2	20 A	WINDOW UNIT GARAGE	16
17								0 VA	0 VA				18
19	EXHAUST FAN ON ROOF	20 A	1	0 VA	816 VA					3	15 A	POWER AUTO LIFT	20
21	EXHAUST FAN ON ROOF	20 A	1			0 VA	816 VA						22
23	EXHAUST FAN ON ROOF	20 A	1					0 VA	816 VA				24
25	DOMESTIC HOT WATER PUMP	15 A	1	912 VA	366 VA					1	15 A	POWER UNIT HEATERS	26
27	BOILER #1	20 A	1			1,800 VA	1,800 VA			1	20 A	BOILER #2	28
29	HOT WATER CIRC. PUMP #1	15 A	1					1,372 VA	1,372 VA	1	15 A	HOT WATER CIR. PUMP #2	30
31	**CHILLED WATER CIRC. PUMP #1**	**20 A**	**2**	1,226 VA	1,226 VA					**2**	**20 A**	**CHILLED WATER CIRC. PUMP #2**	32
33						1,226 VA	1,226 VA						34
35	**SPARE**	**20 A**	**1**					0 VA	0 VA	**1**	**20 A**	**SPARE**	**36**
37				4,200 VA	7,452 VA								38
39	SPARE	45 A	3			4,200 VA	7,452 VA			**3**	**80 A**	**MZU BLOWER**	40
41								4,200 VA	7,452 VA				42
		PHASE LOAD:		20,497 VA		23,019 VA		18,932 VA		****TOTAL LOAD:**		**62,448 VA**	
		PHASE AMPS:		173 A		194 A		158 A		****TOTAL AMPS:**		**173 A**	

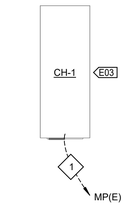
* FIELD VERIFY BREAKER SIZE WITH ACTUAL EQUIPMENT PROVIDED. COORDINATE WITH OTHER CONTRACTORS AS NECESSARY.
**TOTAL LOAD AND TOTAL AMPS DO NOT INCLUDE DEMAND FACTOR CALCULATIONS.
***BOLD TEXT DENOTES NEW EQUIPMENT

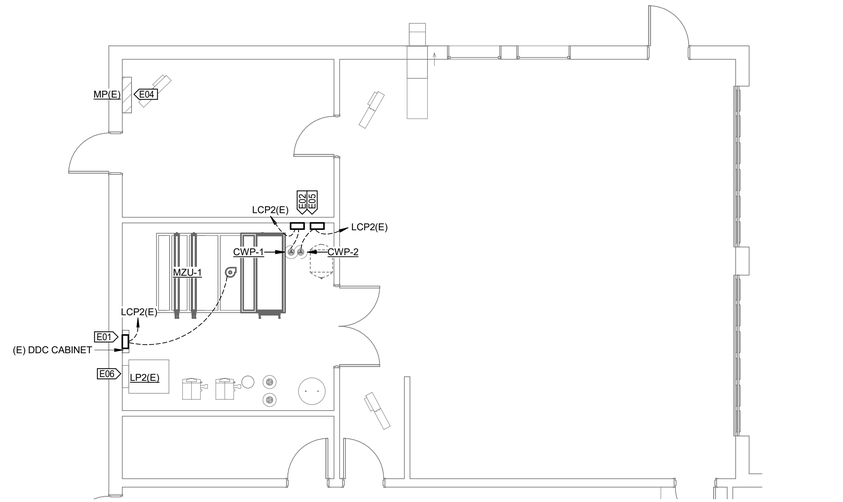
FEEDER SCHEDULE

FEEDER TAG	PHASE CONDUCTORS QUANTITY	PHASE CONDUCTORS SIZE	NEUTRAL SIZE	EGC SIZE
1	3	3/0 AWG	N/A	4 AWG



1 FIRST FLOOR POWER PLAN
1/8" = 1'-0"





2 FIRST FLOOR ENLARGED POWER PLAN - MECHANICAL ROOM
3/16" = 1'-0"

N

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CHECKED BY: MHB
DESIGNED BY: GCS

SHEET TITLE:

POWER PLAN - NEW WORK

SHEET NUMBER:

E102

SHEET 12 of 12
MARCH 20, 2026