

# MECHANICAL SPECIFICATIONS

## EQUIPMENT INSTALLATION – COMMON REQUIREMENTS

1. INSTALL EQUIPMENT LEVEL AND PLUMB, PARALLEL AND PERPENDICULAR TO BUILDING SYSTEMS.
2. INSTALL MECHANICAL EQUIPMENT TO FACILITATE SERVICE, MAINTENANCE, AND REPAIR OR REPLACEMENT COMPONENTS. CONNECT EQUIPMENT FOR EASE OF DISCONNECTING, WITH MINIMUM INTERFERENCE TO OTHER INSTALLATIONS. EXTEND GREASE FITTINGS TO ACCESSIBLE LOCATIONS.

## MOTORS

1. THIS CONTRACTOR SHALL FURNISH ALL STARTERS REQUIRED FOR THE HVAC SYSTEMS. STARTERS WILL BE INSTALLED BY THE ELECTRICAL CONTRACTOR.
2. MOTOR EFFICIENCY: CONFORM TO IEEE-112 AND NEMA MG1, TABLE 12-10.

## VIBRATION ISOLATION

1. ALL MOTOR DRIVEN EQUIPMENT SHALL BE INSTALLED WITH VIBRATION ISOLATORS. UNLESS NOTED OTHERWISE, SUSPENDED EQUIPMENT SHALL HAVE SPRING ISOLATOR HANGERS AND BASE MOUNTED EQUIPMENT SHALL HAVE DOUBLE DEFLECTION NEOPRENE ISOLATORS.

## METAL DUCTS

1. METAL AND GAUGE: GALVANIZED IRON TO BE USED THROUGHOUT, FABRICATED AND INSTALLED SO THAT NO VIBRATION OR NOISE RESULTS. FABRICATE FROM THE BEST GRADE OF MILD STEEL SHEETS OF THE U.S. STANDARD GAUGE JOINT AND SEAL RECOMMENDED IN THE LATEST EDITION OF THE SMACNA MANUAL.
2. DUCTWORK SHALL BE OF 2-INCH PRESSURE CLASS FOR LOW PRESSURE DUCT AND CAULKED AT JOINTS AND CONNECTIONS WITH "IRON GRIP".
3. DUCT SIZES SHOWN ARE CLEAR INSIDE DIMENSIONS.
4. FLEXIBLE DUCT SHALL NOT EXCEED 6'-0" IN LENGTH
5. ALL SUPPLY AIR DUCT SHALL BE INSULATED WITH 1-1/2" THICK FIBERGLASS INSULATION WITH A CONTINUOUS VAPOR BARRIER AND RETURN AIR DUCTS SHALL BE LINED.
6. DUCT LINER SHALL BE FIBROUS-GLASS LINER, COMPLY WITH NFPA 90A OR NFPA 90B AND NAIMA AH124 ASTM C 1071 WITH COATED SURFACE EXPOSED TO AIRSTREAM TO PREVENT EROSION OF GLASS FIBERS. 1" THICK UNLESS NOTED OTHERWISE, THERMAL CONDUCTIVITY (K-VALUE) OF 0.26 AT 75 DEG F MEAN TEMPERATURE, FIRE-HAZARD CLASSIFICATION; MAXIMUM FLAME-SPREAD RATING OF 25 AND SMOKE-DEVELOPED RATING OF 50, WHEN TESTED ACCORDING TO ASTM E 84. LINER ADHESIVE SHALL COMPLY WITH NFPA 90A OR NFPA 90B AND ASTM C 916. MECHANICAL FASTENERS SHALL BE GALVANIZED STEEL, SUITABLE FOR ADHESIVE ATTACHMENT, MECHANICAL ATTACHMENT, OR WELDING ATTACHMENT TO DUCT WITHOUT DAMAGING LINER.
7. FOR ALL EXTERIOR SUPPLY AND RETURN DUCT USE SMACNA JOINT T-24, FORMED FLANGE ON ALL EXTERIOR DUCT JOINTS, INSULATE WITH 2 INCH THICK MINERAL FIBER BOARD AND WRAP WITH ALUMINUM JACKET.

## HANGERS

1. HANGER MATERIALS FOR DUCTS SHALL BE GALVANIZED, SHEET STEEL OR ROUND, THREADED STEEL ROD. STRAPS AND ROD SIZES SHALL COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS" FOR SHEET STEEL WIDTH AND THICKNESS FOR STEEL ROD DIAMETERS.
2. COORDINATE MOTOR SUPPORT WITH REQUIREMENTS FOR DRIVEN LOAD; ACCESS FOR MAINTENANCE AND MOTOR REPLACEMENT; INSTALLATION OF ACCESSORIES, BELTS, BELT GUARDS; AND ADJUSTMENT OF SLIDING RAILS FOR BELT TENSIONING.
3. HANGER INSTALLATION SHALL BE IN ACCORDANCE WITH SMACNA SEISMIC RESTRAINT MANUAL.

## COLD WATER AND CONDENSATE DRAIN PIPING

1. COLD WATER AND CONDENSATE DRAIN PIPING SHALL BE TYPE L COPPER WITH SOLDERED JOINTS. MINIMUM SLOPE OF CONDENSATE DRAIN PIPE SHALL BE 1-INCH IN 8 FEET. PROVIDE A CONDENSATE DRAIN TRAP AS PER THE MANUFACTURER.

## QUALITY ASSURANCE

1. WELDING: QUALIFY PROCESSES AND OPERATORS ACCORDING TO THE ASME BOILER AND PRESSURE VESSEL CODE: SECTION IX, "WELDING AND BRAZING QUALIFICATIONS." PROVIDE COPIES OF WELDING CERTIFICATES FOR WELDING PROCEDURES AND PERSONNEL.
2. ASME COMPLIANCE: COMPLY WITH ASME B31.9, "BUILDING SERVICES PIPING," FOR MATERIALS, PRODUCTS, AND INSTALLATION.

## TEST AND BALANCE

1. CONTRACTOR SHALL BALANCE AIR AND WATER SYSTEMS IN THEIR ENTIRETY INCLUDING OWNER FURNISHED DATA CENTER EQUIPMENT. COORDINATE WITH DATA CENTER EQUIPMENT VENDOR FOR STARTUP SERVICES.
2. TEST AND BALANCE SERVICES SHALL BE PERFORMED BY AN APPROVED TEST AND BALANCING FIRM WHO HAS BEEN IN THE BUSINESS FOR AT LEAST 5 YEARS AND IS CERTIFIED BY AABC, NEBB OR TABB.
3. TAB CONTRACTOR IS TO COORDINATE WITH THE HVAC CONTRACTOR TO ENSURE THAT THE SYSTEM IS COMPLETE AND OPERATIONAL AND THAT NEW FILTERS ARE INSTALLED PRIOR TO PERFORMING TEST AND BALANCE SERVICES.
4. ADJUST DAMPERS, FANS, AND SHEAVES UNTIL EVEN DISTRIBUTION AND REQUIRED CFM OF AIR IS OBTAINED THROUGHOUT.
5. SUBMIT (6) TEST AND BALANCE REPORTS TO THE OWNER UPON COMPLETION OF WORK. TEST AND BALANCE REPORT IS TO INCLUDE ALL PERTINENT OPERATING DATA: CFM AND FPM AT EACH OUTLET, FAN RPM, FAN TSP, MOTOR CURRENT, ETC. INCLUDE CERTIFICATION SHEET IN FRONT OF REPORT SIGNED AND SEALED BY THE CERTIFIED TEST AND BALANCE CONTRACTOR. INCLUDE A LIST OF THE INSTRUMENTS USED FOR PROCEDURES ALONG WITH PROOF OF CALIBRATION.

## PIPING AND EQUIPMENT INSULATION

1. INSULATION SHALL BE TESTED ACCORDING TO ASTM E 84 FOR A FLAME-SPREAD RATING OF 25 OR LESS AND SMOKE-DEVELOPED RATING OF 50 OR LESS. ALL ACCESSORY ITEMS SUCH AS PVC JACKETING AND FITTINGS, ADHESIVE, MASTIC, CEMENT, TAPE, AND CLOTH SHALL ALSO HAVE THIS RATING.
2. ALL CHILLED WATER PIPING SHALL BE INSULATED WITH FIBERGLASS PIPE INSULATION WITH A CONTINUOUS VAPOR BARRIER. INSULATION THICKNESS SHALL BE AS FOLLOWS:  
 PIPING 1-1/2" DIAMETER AND SMALLER - 1" THICK  
 PIPING LARGER THAN 1-1/2" - 1-1/2" THICK
3. OUTDOOR, EXPOSED PIPE INSULATION SHALL HAVE ALUMINUM JACKET.
4. INSULATE COLD WATER AND CONDENSATE PIPING WITH 1/2" THICK FIBERGLASS PIPE INSULATION WITH A CONTINUOUS VAPOR BARRIER.
5. INSULATE THE CHILLED WATER STORAGE TANK AND AIR SEPARATOR WITH 2" THICK MINERAL FIBER BOARD INSULATION WITH CONTINUOUS VAPOR BARRIER AND FIELD APPLIED ALUMINUM JACKET.

## HYDRONIC PIPE, VALVES AND FITTINGS

1. ALL PIPING 3" AND GREATER TO BE STEEL PIPE, ASTM A 53, TYPE E, GRADE B, SCHEDULE 40, BLACK STEEL PLAIN ENDS.
2. CAST-IRON PIPE FLANGES AND FLANGED FITTINGS TO BE ASME B16.1, CLASS 125, RAISED GROUND FACE AND BOLT HOLES SPOT FACED.
3. WROUGHT STEEL FITTINGS TO BE ASTM A 234/ASTM 234M, WALL THICKNESS TO MATCH ADJOINING PIPE.
4. ALL PIPING 2-1/2" AND SMALLER TO BE DRAWN-TEMPER COPPER TUBING, ASTM B 88, TYPE L.
5. WROUGHT COPPER FITTINGS AND UNIONS TO BE ASME B16.22.
6. WELDING MATERIALS: COMPLY WITH SECTION II, PART C, OF THE ASME BOILER AND PRESSURE VESSEL CODE FOR WELDING MATERIALS APPROPRIATE FOR WALL THICKNESS AND FOR CHEMICAL ANALYSIS OF PIPE BEING WELDED.
7. PIPE HANGERS, SUPPORTS AND COMPONENTS SHALL BE MSS SP-69 FABRICATED COMPONENTS. HANGERS SHALL HAVE A MAXIMUM SPAN OF 20 FEET WITH A MINIMUM ROD SIZE OF 3/4 INCH.
8. BUTTERFLY VALVES TO BE MANUFACTURED BY KEYSTONE. GENERAL: MSS SP-67, TYPE I, FOR TIGHT SHUTOFF, WITH DISC AND LINING SUITABLE FOR POTABLE WATER, FLANGED, 175-PSIG CWP RATING

# GENERAL SPECIFICATIONS

1. THE GENERAL CONDITIONS, SUPPLEMENTARY CONDITIONS AND GENERAL REQUIREMENTS APPLY TO THIS CONTRACT. CONTRACTOR SHALL REVIEW AND ADHERE TO ALL REQUIREMENTS OF THESE DOCUMENTS.
2. MANUFACTURERS' NAMES ARE SCHEDULED FOR EQUIPMENT AS A BASIS OF DESIGN, IT IS NOT THE INTENT TO LIMIT THE COMPETITION. EQUIVALENT EQUIPMENT OF OTHER MANUFACTURERS WILL BE CONSIDERED FOR ACCEPTANCE AND INSTALLATION.
3. ALL MECHANICAL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE LATEST EDITION OF APPLICABLE CODES AND STANDARDS AS REQUIRED BY THE STATE OF MISSOURI AND LOCAL JURISDICTIONS.
4. BEFORE FABRICATING/RUNNING ANY DUCTWORK OR PIPING, THIS CONTRACTOR SHALL ASSURE HIMSELF THAT THEY CAN BE RUN AS CONTEMPLATED IN COOPERATION WITH CONTRACTORS OF OTHER DIVISIONS OF THE WORK AND THE PHYSICAL CONSTRAINTS OF THE STRUCTURAL AND ARCHITECTURAL WORK.
5. THIS CONTRACTOR SHALL FURNISH AND INSTALL ALL LABOR, MATERIALS, TOOLS, SUPERVISION AND EQUIPMENT REQUIRED TO COMPLETE THE MECHANICAL WORK AS SHOWN ON THE MECHANICAL DRAWINGS. PROVIDE ALL MINOR INCIDENTAL ITEMS SUCH AS OFFSETS, FITTINGS, AND ACCESSORIES REQUIRED AS PART OF THE WORK EVEN THOUGH NOT INDICATED. MECHANICAL DRAWINGS ARE SCHEMATIC AND NOT TO BE SCALED. REFER TO ARCHITECTURAL OR CERTIFIED DRAWINGS FOR DIMENSIONS.
6. THIS CONTRACTOR SHALL MAINTAIN AT THE SITE (1) COPY OF ALL DRAWINGS IN GOOD ORDER AND MARKED TO RECORD ALL CHANGES MADE DURING CONSTRUCTION.
7. CONTRACTOR SHALL BE RESPONSIBLE FOR PREPARING SHOP DRAWINGS AND PRODUCT SUBMITTALS FOR COMPLIANCE WITH CONTRACT DOCUMENTS. SUBMIT (4) COPIES TO ARCHITECT / ENGINEER FOR APPROVAL PRIOR TO ORDERING.
8. UPON COMPLETION OF WORK PROVIDE (2) COPIES OF OPERATING AND MAINTENANCE MANUAL TO OWNER FOR ALL SYSTEMS AND EQUIPMENT. INCLUDE ALL FAN LUBRICATION SCHEDULE, FILTER TYPES AND SIZES ALONG WITH RECOMMENDED FILTER CHANGE SCHEDULE AND STARTING AND STOPPING PROCEDURES. PROVIDE DETAILED INFORMATION ON PROGRAMMABLE THERMOSTAT TO INCLUDE HOW TO PROGRAM DESIRED SETBACK SCHEDULES. LIST HVAC AND PLUMBING CONTRACTOR CONTACTS AND PHONE NUMBERS.
9. PROVIDE PROPER CURBS, SUPPORTS, AND ANCHORS FOR ALL MECHANICAL WORK. CHAINS, TAPE, AND/OR WIRE WILL NOT BE ALLOWED.
10. PROVIDE SLEEVES AND COLLARS FOR ALL DUCTWORK THROUGH WALLS, FLOORS, AND CEILINGS. WHERE REQUIRED TO CONNECT TO EQUIPMENT IN FINISHED AREAS.
11. THIS CONTRACTOR SHALL NOT CUT THROUGH STRUCTURAL MEMBERS WITHOUT WRITTEN CONSENT FROM THE STRUCTURAL ENGINEER.
12. THIS CONTRACTOR SHALL SECURE AND MAINTAIN, FOR THE LIFE OF THIS CONTRACT ALL INSURANCE POLICIES OR COVERAGE AS REQUIRED BY LAW.
13. THIS CONTRACTOR SHALL COORDINATE HIS WORK WITH THE WORK OF OTHER TRADES TO INSURE THAT ALL WORK CAN BE INSTALLED IN AN EXPEDIENT AND WORKMANLIKE MANNER. THIS CONTRACTOR WILL BE EXPECTED TO COOPERATE WITH OTHER CONTRACTORS IN THE PLACEMENT OF WORK TO AVOID CONFLICTS AND TO MAINTAIN JOB PROGRESS. THE ARCHITECT SHALL BE ADVISED IN THE EVENT THAT CONFLICTS ARISE.
14. THIS CONTRACTOR SHALL OBTAIN PERMITS AND PAY FEES ASSOCIATED WITH HIS PORTION OF THE MECHANICAL SYSTEM INSTALLATION. THIS CONTRACTOR SHALL BE RESPONSIBLE FOR ARRANGING INSPECTIONS WITH THE APPROPRIATE BUILDING OFFICIALS.
15. ALL MATERIALS, EQUIPMENT AND DEVICES FURNISHED BY THIS CONTRACTOR SHALL BE GUARANTEED TO BE FREE FROM MECHANICAL DEFECTS OR FAULTY WORKMANSHIP FOR A PERIOD OF ONE YEAR FROM DATE OF ACCEPTANCE BY THE OWNER.
16. THIS CONTRACTOR SHALL CONFIRM VOLTAGE AND AMPACITY WITH ELECTRICAL CONTRACTOR PRIOR TO ORDERING EQUIPMENT. ALL CONTROL AND INTERLOCK WIRING FOR MECHANICAL EQUIPMENT SHALL BE BY DIVISION 15 CONTRACTOR. CONTROL SETPOINTS AND HEATING/COOLING EQUIPMENT SHALL BE WIRED TO AUTOMATICALLY RESTART AFTER POWER FAILURE. ALL WIRE SHALL BE INSTALLED IN CONDUIT PER NEC LATEST EDITION.
17. THIS CONTRACTOR SHALL BE RESPONSIBLE FOR FIRE STOPPING OF ALL PENETRATIONS ASSOCIATED WITH THEIR WORK. REFERENCE ARCHITECTURAL SPECIFICATIONS AND PLANS FOR REQUIRED RATINGS AND MATERIALS.

# SEISMIC SPECIFICATIONS

1. DELEGATED-DESIGN SUBMITTAL: FOR VIBRATION ISOLATION AND SEISMIC-RESTRAINT DETAILS INDICATED TO COMPLY WITH PERFORMANCE REQUIREMENTS AND DESIGN CRITERIA, INCLUDING ANALYSIS DATA SIGNED AND SEALED BY THE QUALIFIED PROFESSIONAL ENGINEER RESPONSIBLE FOR THEIR PREPARATION.
  - A. DESIGN CALCULATIONS: CALCULATE STATIC AND DYNAMIC LOADING DUE TO EQUIPMENT WEIGHT AND OPERATION, SEISMIC AND WIND FORCES REQUIRED TO SELECT VIBRATION ISOLATORS, SEISMIC AND WIND RESTRAINTS, AND FOR DESIGNING VIBRATION ISOLATION BASES.
    - a. COORDINATE DESIGN CALCULATIONS WITH WIND LOAD CALCULATIONS REQUIRED FOR EQUIPMENT MOUNTED OUTDOORS. COMPLY WITH REQUIREMENTS IN OTHER DIVISION SECTIONS FOR EQUIPMENT MOUNTED OUTDOORS.
  - B. RISER SUPPORTS: INCLUDE RISER DIAGRAMS AND CALCULATIONS SHOWING ANTICIPATED EXPANSION AND CONTRACTION AT EACH SUPPORT POINT, INITIAL AND FINAL LOADS ON BUILDING STRUCTURE, SPRING DEFLECTION CHANGES, AND SEISMIC LOADS. INCLUDE CERTIFICATION THAT RISER SYSTEM HAS BEEN EXAMINED FOR EXCESSIVE STRESS AND THAT NONE WILL EXIST.
  - C. VIBRATION ISOLATION BASE DETAILS: DETAIL OVERALL DIMENSIONS, INCLUDING ANCHORAGES AND ATTACHMENTS TO STRUCTURE AND TO SUPPORTED EQUIPMENT. INCLUDE AUXILIARY MOTOR SLIDES AND RAILS, BASE WEIGHTS, EQUIPMENT STATIC LOADS, POWER TRANSMISSION, COMPONENT MISALIGNMENT, AND CANTILEVER LOADS.
  - D. SEISMIC AND WIND RESTRAINT DETAILS:
    - a. DESIGN ANALYSIS: TO SUPPORT SELECTION AND ARRANGEMENT OF SEISMIC AND WIND RESTRAINTS. INCLUDE CALCULATIONS OF COMBINED TENSILE AND SHEAR LOADS.
    - b. DETAILS: INDICATE FABRICATION AND ARRANGEMENT. DETAIL ATTACHMENTS OF RESTRAINTS TO THE RESTRAINED ITEMS AND TO THE STRUCTURE. SHOW ATTACHMENT LOCATIONS, METHODS, AND SPACINGS. IDENTIFY COMPONENTS, LIST THEIR STRENGTHS, AND INDICATE DIRECTIONS AND VALUES OF FORCES TRANSMITTED TO THE STRUCTURE DURING SEISMIC EVENTS. INDICATE ASSOCIATION WITH VIBRATION ISOLATION DEVICES.
    - c. COORDINATE SEISMIC-RESTRAINT AND VIBRATION ISOLATION DETAILS WITH WIND-RESTRAINT DETAILS REQUIRED FOR EQUIPMENT MOUNTED OUTDOORS. COMPLY WITH REQUIREMENTS IN OTHER DIVISION 22 SECTIONS FOR EQUIPMENT MOUNTED OUTDOORS.
    - d. PREAPPROVAL AND EVALUATION DOCUMENTATION: BY AN EVALUATION SERVICE MEMBER OF ICC-ES OR OSHPD OR AN AGENCY ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION, SHOWING MAXIMUM RATINGS OF RESTRAINT ITEMS AND THE BASIS FOR APPROVAL (TESTS OR CALCULATIONS).

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REV.	DATE	DESCRIPTION	APPROVED
2	7/9/2009	REVISION #3	KLA
1	7/6/2009	REVISION #1	KLA
0	6/10/09	ISSUED FOR BIDDING	KLA

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MECHANICAL SPECIFICATIONS  
NEW RESIDENT ENGINEERS OFFICE AND DATA CENTER  
MODOT - DISTRICT 4  
LEE'S SUMMIT, MO

PROJECT NO. <b>08074</b>
DRAWING NO. <b>M001</b>

## COMPUTER ROOM AIR CONDITIONING EQUIPMENT SCHEDULE (OWNER FURNISHED)

CODE	MANUFACTURER AND MODEL NO.	SERVICE	SUPPLY FAN DATA			COOLING COIL DATA						HUMIDIFIER (LBS./HR)	REHEAT (KW)	FILTERS		ELECTRICAL			UNIT OPERATING WEIGHT (LBS.)	ACCESSORIES AND REMARKS					
			CFM AT ALTITUDE	E.S.P. (IN. W.C.) AT SL	HP	MAX FACE VEL. (FPM)	A.P.D. (IN. W.C.)	ENTERING AIR TEMP (°F) DB	LEAVING AIR TEMP (°F) WB	ENTERING AIR TEMP (°F) DB	LEAVING AIR TEMP (°F) WB			CAPACITY TOTAL (MBH)	E.W.T. (F)	L.W.T. (F)	G.P.M. (1)	W.P.D. (FT.)			TYPE	EFFICIENCY	VOLTAGE/PHASE	M.C.A.	M.O.C.P.
CDU-1 & 2	APC ACFD12	COMPUTER ROOM #121	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	700			
RC-1	APC ACRC100	COMPUTER UTILITIES #121	2900	0.3	1.5	550	0.5	72.0	60.0	55.0	52.0	87.0	44.0	54.0	14	7.0	N/A	N/A	4" PLEATED	4" - MERV 8			250	① ②	
CHWU-1 & 2	APC PCW660D-KAEE0-XX3XX	COMPUTER UTILITIES #120	-	0.3	7.5	550	0.5	72.0	60.0	55.0	52.0	118.0	44.0	54.0	26	7.0	N/A	N/A	4" PLEATED	4" - MERV 8	460/3	46.5	50	400	① ② ③ ④

- NOTES: 1. UNIT CAPACITIES BASED ON 25% GLYCOL  
 2. CAPACITY RATING AT 791' ASL, 100 F AMBIENT, 72F EAT, 50% RH  
 3. UNITS TO INCLUDE 4" MERV 8 FILTERS, ELECTRIC REHEAT, SMOKE DETECTORS, NON-LOCKING ELECTRICAL DISCONNECTS, 12" FLOOR STAND WITH TURNING VANE, DUAL FLOAT CONDENSATE PUMP, PREMIUM EFFICIENCY MOTOR AND 2 LEAK DETECTORS PER UNIT.  
 4. UNITS ARE DOWNFLOW.

## CHILLER SCHEDULE (OWNER FURNISHED)

CODE	MANUFACTURER AND MODEL NO.	COMPRESSOR DATA			EVAPORATOR DATA				CONDENSER DATA			ELECTRICAL DATA			WEIGHT OPERATING (LBS.)	ACCESSORIES AND REMARKS		
		CAPACITY ACTUAL (TONS)	REFRIGERANT	NUMBER CIRCUITS/CHARGE	E.W.T. (DEG F)	L.W.T. (DEG F)	GPM	MAX. W.P.D. (FT.)	GLYCOL PERCENTAGE	NUMBER PASSES	AMBIENT AIR TEMP. (F)	NUMBER OF FANS	FAN F.L.A. (EACH)	VOLTS/PH			KW	MCA
CH-1 & 2	APC ACH200N	60	R-410A	CKT A 40.5 LBS CKT B 89.5 LBS	54.0	44.0	152	15.0	25		95	4		460/60/3	70.4	163.1	5,000	① ②

- NOTES: ① PROVIDE WITH MANUFACTURER'S WIND BAFFLE. ② PROVIDE WITH MANUFACTURER'S JBTR-24-040 ASME CHILLED WATER BUFFER TANK.  
 ③ CHILLER IS OWNER FURNISHED AND HAS BEEN SIZED BY THE MANUFACTURER. MANUFACTURER SHALL BE RESPONSIBLE FOR PROPER SYSTEM OPERATION AND PERFORMANCE. SCHEDULES PROVIDED FOR INFORMATION ONLY. CONTRACTOR SHALL COORDINATE AND ACCEPT DELIVERY AND INSTALL PER THE MANUFACTURER'S RECOMMENDATIONS. REFER TO WWW.APC.COM FOR INSTALLATION INSTRUCTIONS FOR ALL EQUIPMENT AND MISCELLANEOUS COMPONENTS TO BE PROVIDED FROM MANUFACTURER.

## AIR CONDITIONING UNIT SCHEDULE

CODE	MANUFACTURER AND MODEL NO.	SERVICE	SUPPLY FAN DATA				DX COOLING COIL DATA						HEATING SECTION				ELECTRICAL DATA			OPERATING WEIGHT (LBS.)	ACCESSORIES AND REMARKS					
			CFM AT ALTITUDE	MINIMUM O.A. CFM	E.S.P. (IN. W.C.) AT S.L.	HP	MAXIMUM FACE VEL. (FPM)	MAXIMUM A.P.D. (IN. W.C.)	ENTERING AIR TEMP (DEG F) DB	LEAVING AIR TEMP (DEG F) WB	ENTERING AIR TEMP (DEG F) DB	LEAVING AIR TEMP (DEG F) WB	CAPACITY TOTAL (MBH)	TYPE	GAS PRESS. RANGE	ENTERING AIR TEMP (DEG F) DB	LEAVING AIR TEMP (DEG F) WB	INPUT (MBH) AT S.L.	VOLTAGE/PHASE			M.C.A.	M.O.C.P.			
AC-1	TRANE YCH150	OFFICE AREA WEST	3,800	400	0.75"	2	500	0.2	81.2	60	55	52.5	138.5	100.0	NATURAL GAS	2.5" - 14.0	65.0	-	92.0	-	150.0	460/3	31.8	35	1,200	① ③
AC-2	TRANE YCH150	OFFICE AREA EAST	3,800	400	0.75"	2	500	0.2	81.2	60	55	52.5	138.5	100.0	NATURAL GAS	2.5" - 14.0	65.0	-	92.0	-	150.0	460/3	31.8	35	1,200	① ② ③

- NOTES: ① PROVIDE WITH 2" (30%) T.A. FILTERS, ECONOMIZER CYCLE, LOW LEAK ECONOMIZER DAMPER, AND HAIL GUARD. ② ON EMERGENCY GENERATOR POWER, RE: ELECTRICAL. ③ PROVIDE WITH A 24/7 PROGRAMMABLE THERMOSTAT.

## FAN SCHEDULE

CODE	MANUFACTURER AND MODEL NO.	SERVICE	TYPE	CFM AT ALTITUDE	T.S.P. (IN. W.C.)	ELECTRICAL DATA			OPERATING WEIGHT (LBS.)	ACCESSORIES AND REMARKS
						HP	R.P.M.	VOLTS/PH		
EF-1	GREENHECK BSQ-120	RESTROOMS	INLINE CENTRIFUGAL	900	0.75	1/4	1725	120/1	150	①
EF-2	GREENHECK BSQ-180	GARAGE	INLINE CENTRIFUGAL	3,150	0.75	3/4	1725	480/3	400	②
EF-3	GREENHECK BSQ-120	LAB / WET SAW	INLINE CENTRIFUGAL	1,600	0.75	1/2	1725	120/1	150	②

- NOTES: ① INTERLOCK WITH LIGHT SWITCH ② LOCAL ON/OFF CONTROL

## GRILLES, REGISTERS & DIFFUSER SCHEDULE

CODE	MANUFACTURER AND MODEL NO.	SERVICE	INSTALLATION TYPE	FACE SIZE	NECK SIZE	VOLUME DAMPER	FINISH	MATERIAL	ACCESSORIES AND REMARKS
Ⓐ	PRICE SPD	SUPPLY	LAY-IN	24"x24"	SEE PLANS	NO	WHITE	STEEL	
Ⓑ	PRICE PDDR	RETURN	LAY-IN	12"x24"	10"x20"	NO	WHITE	STEEL	
Ⓒ	PRICE PDDR	RETURN	LAY-IN	24"x24"	20"x20"	NO	WHITE	STEEL	
Ⓓ	PRICE SPD	SUPPLY	LAY-IN	12"x24"	SEE PLANS	NO	WHITE	STEEL	

## ELECTRIC UNIT HEATER SCHEDULE

CODE	MANUFACTURER AND MODEL NO.	CFM	ELECTRICAL DATA			TYPE	OPERATING WEIGHT (LBS)	ACCESSORIES AND REMARKS
			KW	VOLTS/PH	AMPS			
WH	INDEECO 933U04000C	160	4.0	208/1	-	WALL MOUNTED	24	① ②
EUH	INDEECO 926U03000DA	700	3.0	208/1	-	CEILING HUNG	45	①

- NOTES: ① PROVIDE WITH TAMPER PROOF THERMOSTAT AND SINGLE POINT DISCONNECT SWITCH.  
 ② COLOR AS PER THE ARCHITECT.

## FIRE & FIRE SMOKE DAMPER SCHEDULE

CODE	MANUFACTURER	DAMPER TYPE	RATING	INSTALLATION H or V	SIZE	REMARKS
FS.1	RUSKIN	FIRE-SMOKE	3 HR	V	12/12	①
FS.2	RUSKIN	FIRE-SMOKE	3 HR	V	12/12	①

- NOTE: ① 120V ACTUATOR BY M.C., CONNECTION BY E.C., RELAY TO CUT POWER TO DAMPER BY FIRE ALARM CONTRACTOR.

## NATURAL GAS UNIT HEATER SCHEDULE

CODE	MANUFACTURER AND MODEL NO.	CFM	CAPACITY (MBH)	OUTPUT (MBH)	E.A.T. (DEG F)	L.A.T. (DEG F)	TYPE	ELECTRICAL DATA			TYPE	WEIGHT (LBS)	ACCESSORIES AND REMARKS	
								GAS PRESSURE RANGE	VOLTS/PH	FLA				MOCP
UH-1	REZNOR MODEL UDAP	629	45.0	37.35	60	115.0	NATURAL GAS	5.0" - 14.0"	120/1	2.4	15	CEILING HUNG	150	①
UH-2	REZNOR MODEL UDAP	456	30.0	24.6	60	109.9	NATURAL GAS	5.0" - 14.0"	120/1	1.9	15	CEILING HUNG	150	①

- NOTES: ① PROVIDE WITH UNIT MOUNTED THERMOSTAT AND DISCONNECT SWITCH.  
 ② PROVIDE MANUFACTURER'S CONCENTRIC COMBUSTION AIR INLET/FLUE SYSTEM ADAPTER.

## STORAGE TANK SCHEDULE

CODE	MANUFACTURER AND MODEL NO.	TANK VOLUME (GAL)	DIAMETER	OVERHEADS	DRAIN	VENT	WEIGHT	ACCESSORIES AND REMARKS
ST-1	APC JBTR-24-040	1040	60"	96"	1-1/4"	3/4"	2450	①

- NOTE: ① OWNER FURNISHED

## EXPANSION TANK SCHEDULE

CODE	MANUFACTURER AND MODEL NO.	TANK VOLUME (GAL)	ACCEPTANCE VOLUME (GAL)	FILL PRESSURE (PSI)	MAX TEMP. (F)	SERVICE	ACCESSORIES AND REMARKS
ET-1	B&G B-200	53	53	12	75	CHILLED WATER	

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REV.	DATE	DESCRIPTION	APPROVED
2	7/9/2009	REVISION #3	KLA
1	7/6/2009	REVISION #1	KLA
0	6/10/09	ISSUED FOR BIDDING	KLA



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KLA  
 CHECKED BY  
KLA  
 SCALE  
AS SHOWN  
 DATE  
6/10/09

MECHANICAL SCHEDULES  
 NEW RESIDENT ENGINEERS OFFICE AND DATA CENTER  
 MODOT - DISTRICT 4  
 LEE'S SUMMIT, MO

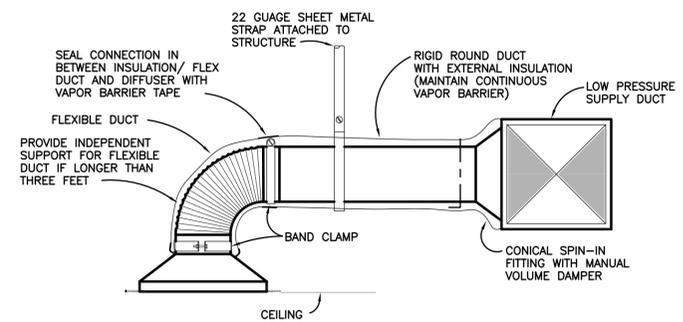
PROJECT NO.  
**08074**  
 DRAWING NO.  
**M003**

A

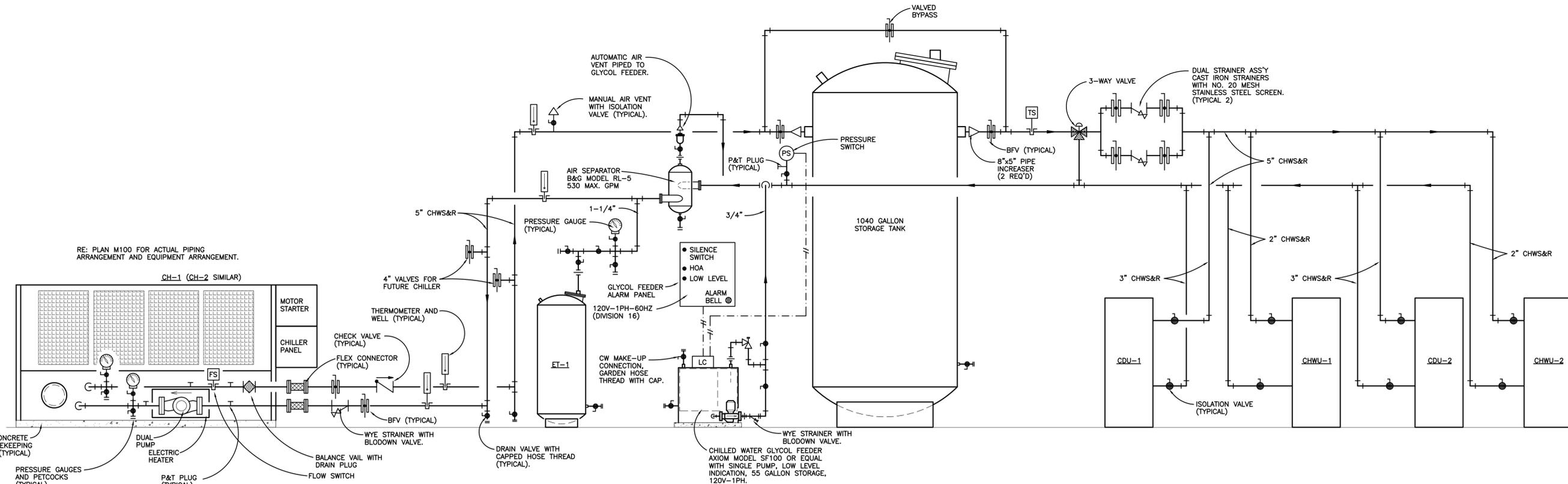
B

C

D



1  
M004  
DIFFUSER DETAIL  
N.T.S.



2  
M004  
CHILLED WATER PIPING DIAGRAM  
N.T.S.

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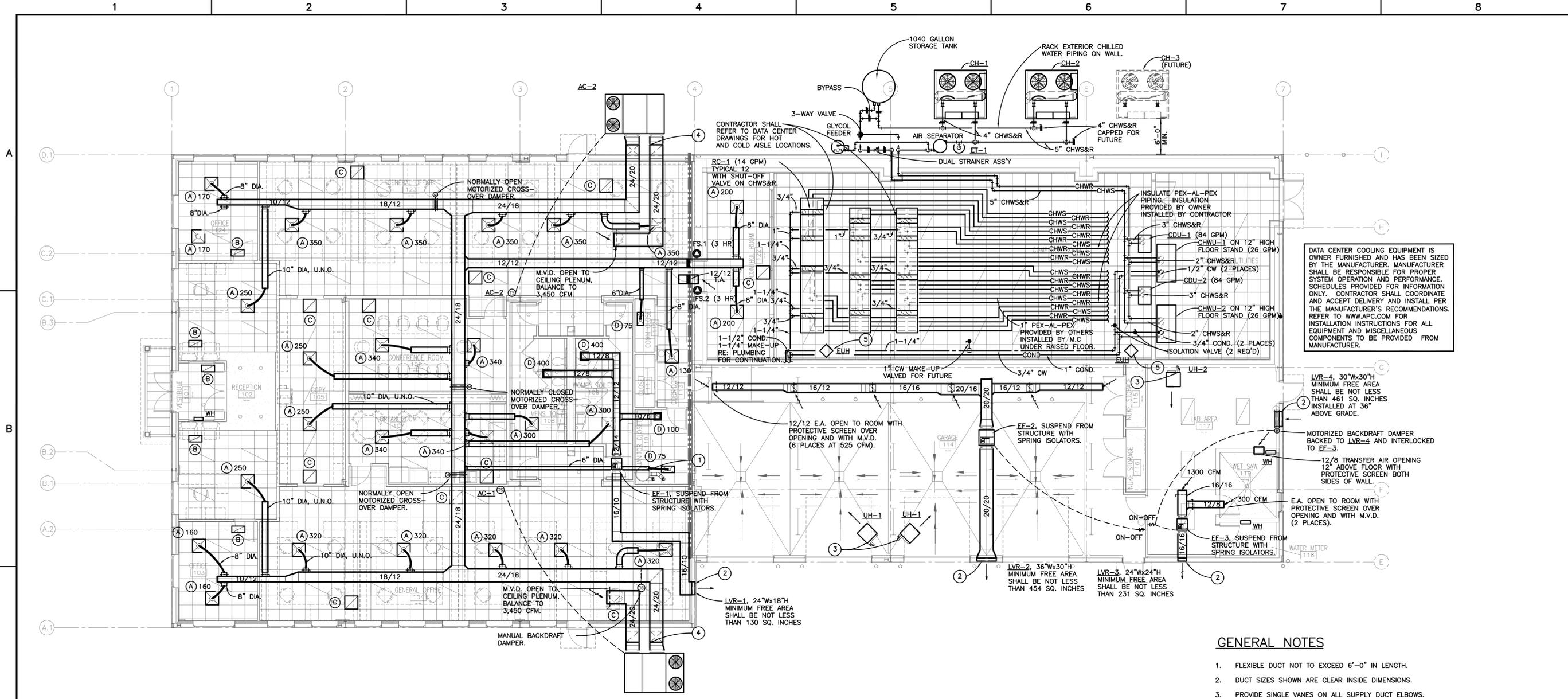
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MECHANICAL DETAILS  
NEW RESIDENT ENGINEERS OFFICE AND DATA CENTER  
MODOT - DISTRICT 4  
LEE'S SUMMIT, MO

PROJECT NO.  
**08074**  
DRAWING NO.  
**M004**



**MECHANICAL CONSTRUCTION PLAN**  
SCALE: 1/8"=1'-0"

**GENERAL NOTES**

1. FLEXIBLE DUCT NOT TO EXCEED 6'-0" IN LENGTH.
2. DUCT SIZES SHOWN ARE CLEAR INSIDE DIMENSIONS.
3. PROVIDE SINGLE VANES ON ALL SUPPLY DUCT ELBOWS.
4. SLOPE CONDENSATE PIPING AT 1/8" PER FOOT TO DRAIN.
5. TEMPERATURE CONTROL WIRING BY E.C.
6. COORDINATE ALL ROOF PENETRATIONS WITH METAL BUILDING MANUFACTURER. NO CUTTING OF RIBS ALLOWED.
7. USE "DEK-TITE" OR AN APPROVED EQUAL FOR ALL ROOF JACKS/ ROOF PENETRATIONS AND COORDINATE WITH METAL BUILDING MANUFACTURER.
8. DATA CENTER HUMIDITY CONTROL BY OWNER.

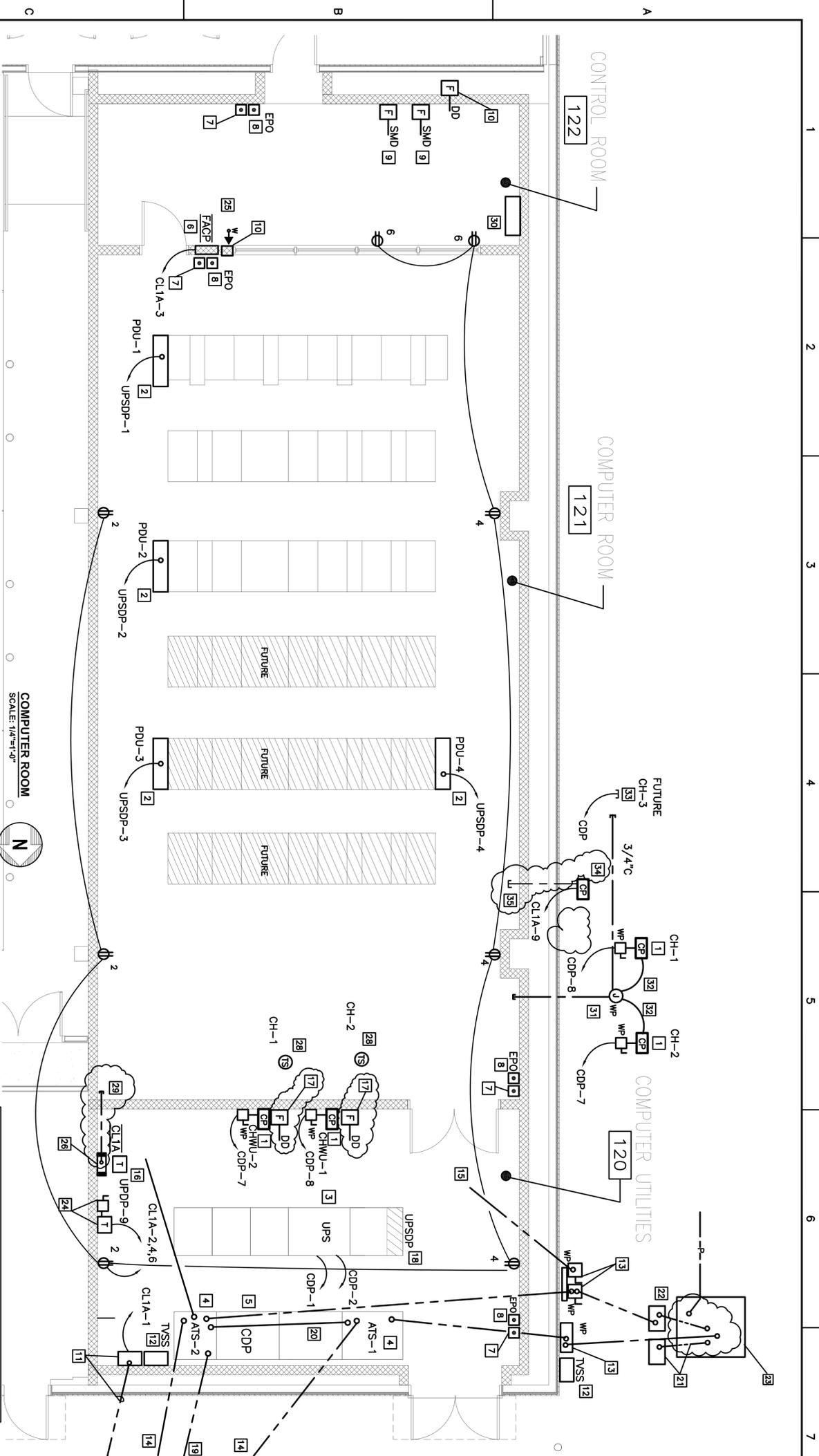
**KEY NOTES**

- ① ONE 4" DIA. INTAKE VENT TERMINAL AND ONE 4" DIA. EXHAUST VENT TERMINAL CONNECTED TO GAS FIRED WATER HEATER AND UP THROUGH THE ROOF. ABOVE THE ROOF, PROVIDE A 4" DIA. INTAKE VENT WITH 45 DEGREE ELBOW, DIVERTER PLATE AND ADAPTER SCREEN, A 4" DIA. EXHAUST VENT TERMINAL WITH 45 DEGREE ELBOW WITH A MESH PROTECTIVE SCREEN INSIDE THE EXHAUST VENT TERMINAL. INSTALL BOTH VENT AND INTAKE TERMINALS AS PER THE MANUFACTURER, AT MINIMUM 36" ABOVE ROOF, ORIENTED IN THE SAME DIRECTION AND A MINIMUM 24" APART.
- ② RE: ARCHITECTURAL PLANS FOR ALL LOUVER LOCATIONS, HEIGHTS ABOVE GRADE, ETC.
- ③ ONE 3" DIA. COMBUSTION AIR INTAKE AND ONE 3" DIA. EXHAUST VENT UP THROUGH THE ROOF. PROVIDE WITH CONCENTRIC VENT TERMINATION KIT PROVIDED BY THE MANUFACTURER.
- ④ COORDINATE WALL OPENINGS AND DUCT PENETRATIONS WITH ARCHITECTURAL PLANS.
- ⑤ INSTALL CEILING HUNG ELECTRIC UNIT HEATER EUH, IN THE CEILING SPACE ABOVE THE DATA CENTER AND BELOW THE ROOF. PROVIDE WITH INTEGRAL THERMOSTAT SET AT 45 DEGREE F.

DATA CENTER COOLING EQUIPMENT IS OWNER FURNISHED AND HAS BEEN SIZED BY THE MANUFACTURER. MANUFACTURER SHALL BE RESPONSIBLE FOR PROPER SYSTEM OPERATION AND PERFORMANCE. SCHEDULES PROVIDED FOR INFORMATION ONLY. CONTRACTOR SHALL COORDINATE AND ACCEPT DELIVERY AND INSTALL PER THE MANUFACTURER'S RECOMMENDATIONS. REFER TO WWW.APC.COM FOR INSTALLATION INSTRUCTIONS FOR ALL EQUIPMENT AND MISCELLANEOUS COMPONENTS TO BE PROVIDED FROM MANUFACTURER.

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0	6/10/09	ISSUED FOR BIDDING	KLA



**GENERAL NOTES**

ALL CONDUITS ENTERING OR LEAVING THE COMPUTER ROOM AREA SHALL BE SEALED AIR TIGHT TO PREVENT THE PASSAGE OF FIRE SUPPRESSION MEDIA INTO THE ROOM OR CONDUIT. PROVIDE THE FOLLOWING FOR TEMPERATURE CONTROL WIRING REQUIREMENTS FOR THE COMPUTER ROOM HVAC SYSTEM (CHILLERS, CHILLED WATER UNITS, ETC.) SEE WWW.OPC.COM.

- KEYED NOTES:**
- EQUIPMENT FURNISHED AND INSTALLED BY M.C. WITH DISCONNECT SWITCH WIRED BY E.C.
  - POWER DISTRIBUTION UNIT (PDU) FOR DESCRIPTION AND WIRING SEE SHEET E-003.
  - UNINTERFERABLE POWER SUPPLY, FOR DESCRIPTION AND WIRING SEE SHEET E-003.
  - AUTOMATIC TRANSFER SWITCH, FOR DESCRIPTION SEE SHEET E-003.
  - DISTRIBUTION PANEL, FOR DESCRIPTION SEE SHEET E-003.
  - DATA AISC FIRE SUPPRESSANT SYSTEM CONTROL PANEL FURNISHED AND INSTALLED BY E.C.
  - ADAPT STATION FURNISHED AND INSTALLED BY FIRE SUPPRESSANT CONTRACTOR.
  - SMOKE MOUNTED PUSH-BUTTON STATION WITH RED EMERGENCY RELEASE FROM UNLOCKED FIRE ALARM TO SHUT DOWN POWER TO COMPUTER ROOM UPON ACTIVATION.
  - 120V/1 SMOKE PUMP FURNISHED AND INSTALLED BY M.C. WIRE BY E.C. VIA CONTACT IN FIRE SUPPRESSION CONTROL PANEL AND CONTACT ON DUCT DETECTORS. COORDINATE WORK WITH THE SUPPRESSANT CONTRACTOR.
  - GENERATOR BATTERY CHARGER FURNISHED BY OWNER VIA 14 #14, 3/4" C. TO GENERATOR CONTROL PANEL MOUNT 66" AFF.
  - GENERATOR BATTERY CHARGER FURNISHED BY OWNER WITH GENERATOR BATTERIES. FOR CONTINUATION SEE SHEET E-103.
  - SURGE SUPPRESSION DEVICE FOR WIRING AND DESCRIPTION SEE SHEET E-003.
  - ELECTRIC SERVICE SWITCH, FOR DESCRIPTION AND WIRING SEE SHEET E-003.
  - UNDERGROUND FEEDER TO GENERATOR, FOR DESCRIPTION SEE SHEET E-003 FOR CONTINUATION TO GENERATOR SEE SHEET E-103.
  - FEEDER TO PANEL, P.N., FOR PANEL LOCATION SEE SHEET E-102, FOR DESCRIPTION SEE SHEET E-003.
  - FEEDER TO PANEL, E.P.A., FOR PANEL LOCATION SEE SHEET E-102, FOR DESCRIPTION SEE SHEET E-003.
  - SMOKE DETECTOR FURNISHED WITH UNIT WIRED BY FIRE SUPPRESSANT CONTRACTOR.
  - UNINTERFERABLE POWER SUPPLY DISTRIBUTION PANEL (UPS/P), FOR DESCRIPTION SEE SHEET E-003.
  - 8 #14, 1/2" TO GENERATOR CONTROL PANEL, FOR DESCRIPTION SEE SHEET E-104, FOR CONTINUATION TO GENERATOR SEE SHEET E-104.
  - 4 #14, 1/2" C. FOR ENGINE START CIRCUIT AND SWITCH INDICATION.
  - 1200A SERVICE METER AND WIRING, FOR DESCRIPTION SEE SHEET E-003.
  - 200A SERVICE METER, FOR DESCRIPTION SEE SHEET E-003.
  - PANMOUNT TRANSFORMER, FOR DESCRIPTION SEE SHEET E-003.
  - CIRCUIT BREAKER WITH FEEDER TO UPFA IN ROOM 106 WITH TRANSFORMER MOUNTED ABOVE, FOR DESCRIPTION SEE SHEET E-003, FOR PANEL LOCATION SEE SHEET E-103.
  - OUTLET FOR WALL PHONE WITH 3/4" C. STUBBED DOWN MOUNT 27" ABOVE RAISED FLOOR.
  - PANEL WITH TRANSFORMER MOUNTED ABOVE, FOR DESCRIPTION SEE SHEET E-003.
  - E.C. SHALL INSTALL CABLES WITH RECEPTACLES IN CABLE TRAY. CABLES FINISHED WITH PDU UNITS. CABLE TRAY BY OWNERS.
  - TEMPERATURE SENSOR FURNISHED AND INSTALLED BY P.C. PROVIDE LOCATION AND WIRE WITH UNIT BEING FURNISHED.
  - PROVIDE 3" CONDUIT FROM CL1A FOR FUTURE HUMIDIFIER, HUMIDIFIER BY OWNER.
  - DUPLEX CHILLER CONTROL PANEL FURNISHED BY P.C. INSTALLED AND WIRED BY E.C. CONTROL WIRING TO BE PROVIDED BY E.C. COORDINATE LOCATION AND WIRING WITH P.C.
  - WEATHERPROOF JUNCTION BY E.C. WITH 3" CONDUIT ROOM FLOOR FOR CHILLER CONTROL WIRING.
  - 3" CONDUIT WITH CONTROL WIRING BY E.C. FOR CHILLER CONTROLS.
  - CONDUIT FROM FUTURE CHILLER, STUB AND CAP CONDUIT. PROVIDE METAL PIPE WARGER AT CONDUIT STOP. FOR CONDUIT SIZE SEE SHEET E-003.
  - GLYCOL PUMP FURNISHED AND INSTALLED BY P.C. WIRE BY E.C. VIA 1/2" 20A W/RAISED CONTROL SWITCH IN LOCKABLE CONTROL THERMOSTAT ON WATER LINE TO UNIT.
  - CONDUIT BY E.C. TO SPACE BELOW RAISED FLOOR FOR SUPPRESSANT SYSTEM CONTRIACTOR TO THE ALARM TO ACTIVATE TROUBLE.



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REV.	DATE	DESCRIPTION	APPROVED
3	7/08/09	REVISION #3	
2	7/06/09	REVISION #2	
1	6/26/09	REVISION #1	
0	6/10/09	ISSUE FOR BIDDING	



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KYLE C  
CHECKED BY  
G.S.  
SCALE  
DATE  
05/08/09

**1/4" SCALE PLAN - COMPUTER ROOM**  
NEW RESIDENT ENGINEERS OFFICE & DATA CENTER  
MODOT DISTRICT 4  
LEE'S SUMMIT, MISSOURI

PROJECT NO.  
**08074**  
DRAWING NO.  
**E-104**