

Revised on Addendum #6 Drawings: July 10, 2009

## 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 CALKED 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.

## 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 DETAILS.
    - 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. PRE-APPROVAL 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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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.  
**08074**  
DRAWING NO.  
**M001**

### SEISMIC CODE BLOCK

LISTING OF EQUIPMENT AND SYSTEM COMPONENTS	ANCHORAGE TO FLOORS, ROOFS, ETC.		SWAY BRACING		LOCATION OF PROFESSIONALLY SEALED ANCHORAGE AND SWAY BRACING DETAILS			COMMENTS
	NOT PROVIDED	PROVIDED	NOT PROVIDED	PROVIDED	ON CONSTRUCTION DOCUMENTS			
					DRAWING NO. OR SPEC. SECTION	SUBSEQUENT SUBMITTAL		
				SHOP DRAWINGS	SEPARATE PERMIT & PLANS			
FIRE PROTECTION, DETECTION, & ALARM EQUIPMENT AND SYSTEM COMPONENTS. 1p=1.5 FIRE SPRINKLER PIPING		x		x				①
EMERGENCY OR STANDBY EQUIPMENT AND SYSTEM COMPONENTS	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
OTHER EQUIPMENT AND SYSTEM COMPONENTS NEEDED FOR CONTINUED OPERATION OF SEISMIC USE GROUP II FACILITIES OR WHOSE FAILURE COULD IMPAIR THEIR CONTINUED OPERATION.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
OTHER GENERAL EQUIPMENT AND SYSTEM COMPONENTS 1p=1.0 ROOF TOP : RTU-1 & RTU-2 > 400 LBS GRADE MOUNTED: N/A SUSPENDED FROM STRUCTURE: N/A WALL MOUNTED: N/A		x				x		①
		x				x		①②③
FIRE DAMPERS, LOUVERS	N/A		N/A					
DUCTWORK	x		x					④
PIPING <= 3"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
AIR DEVICES	x		x					⑤

NOTES: ① CONTRACTOR SHALL PROVIDE SHOP DRAWINGS TO THE ENGINEER OF RECORD FOR REVIEW AND APPROVAL PRIOR TO SUBMITTAL TO THE PLAN REVIEWER.  
 ② TABLE 500, EXCEPTION 4 - 3 FT. MINIMUM FLEX CONNECTION BETWEEN COMPONENTS SHALL BE PROVIDED.  
 ③ TYPICAL SEISMIC ANCHORAGE (OR SWAY BRACING) IS PROVIDED ON THE DRAWINGS FOR REFERENCE ONLY. SHOP DRAWINGS ARE REQUIRED.  
 ④ TABLE 600 EXCEPTION B FOR DUCT A CROSS SECTIONAL AREA LESS THAN 6 SQUARE FEET.  
 ⑤ COMPONENTS SHALL BE POSITIVELY ATTACHED WITH MECHANICAL FASTENERS.

### MECHANICAL LEGEND & ABBREVIATIONS

SYMBOLS	DESCRIPTION	ABBREVIATIONS
	LIGHT TEXT/LINEWEIGHT INDICATES EXISTING DARK TEXT/LINEWEIGHT INDICATES NEW	⊕ POINT OF CONNECTION
	NEW SUPPLY DUCT TURNING UP	(E) EXISTING
	NEW SUPPLY DUCT TURNING DOWN	(N) NEW
	NEW RETURN / EXHAUST DUCT TURNING UP	ALT ALTERNATE
	NEW RETURN / EXHAUST DUCT TURNING DOWN	G.C. GENERAL CONTRACTOR
	NEW MANUAL VOLUME DAMPER	M.C. MECHANICAL CONTRACTOR
	NEW CONICAL SPIN-IN FITTING WITH MANUAL VOLUME DAMPER	E.C. ELECTRICAL CONTRACTOR
	NEW 90° ELBOW WITH TURNING VANES	U.N.O. UNLESS NOTED OTHERWISE
	NEW FLEX DUCT	S.A. SUPPLY AIR
	NEW SUPPLY AIR DIFFUSER	R.A. RETURN AIR
	NEW RETURN AIR GRILLE	F.A. FRESH AIR
	NEW FIRE-SMOKE DAMPER	NO NORMALLY OPEN
	NEW FIRE DAMPER	NC NORMALLY CLOSED
	NEW ZONE COIL	C COMMON
	MOTORIZED DAMPER	
	THERMOSTAT / TEMPERATURE SENSOR	
	ACCESS DOOR	

EQUIPMENT DESIGNATIONS			
GRILLES, REGISTERS & DIFFUSERS	 CODE A 150 CFM	HMWP-1	EQUIPMENT DESIGNATIONS WHICH ARE UNDERLINED INDICATES THAT SUCH EQUIPMENT IS SCHEDULED IN THE MECHANICAL EQUIPMENT SCHEDULES
DETAIL DESIGNATION	 DETAIL NUMBER SHEET DETAIL IS DRAWN ON	SECTION DESIGNATION	 SECTION IS DRAWN ON SECTION NUMBER

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

PROJECT NO. <b>08074</b>
DRAWING NO. <b>M002</b>

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1	7/6/2009	REVISION #1	KLA
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### 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.	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 ACR100	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 PCW600-KAEO-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 30% 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-LOADING 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. (°F)	L.W.T. (°F)	GPM	MAX. W.P.D. (FT.)	GLYCOL PERCENTAGE	NUMBER PASSES	AMBIENT AIR TEMP. (F)	NUMBER OF FANS	FAN F.L.A. (EACH)	VOLTS/??			KW	MCA
CH-1 & 2	APC ACCH200	60	R-410A	CKT A 40.5 LBS CKT B 89.5 LBS			110	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	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 BSO-120	RESTROOMS	INLINE CENTRIFUGAL	900	0.75	1/4	1725	120/1	150	①
EF-2	GREENHECK BSO-180	GARAGE	INLINE CENTRIFUGAL	3,150	0.75	3/4	1725	480/3	400	②
EF-3	GREENHECK BSO-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 PDR	RETURN	LAY-IN	12"x24"	10"x20"	NO	WHITE	STEEL	
Ⓒ	PRICE PDR	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	INDECO 933U04000C	160	4.0	208/1	-	WALL MOUNTED	24	① ②
EUH	INDECO 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	GAS PRESSURE RANGE	ELECTRICAL DATA			TYPE	WEIGHT (LBS)	ACCESSORIES AND REMARKS
									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

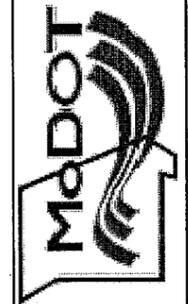
CODE	MANUFACTURER AND MODEL NO.	TANK VOLUME (GAL)	DIAMETER	OVERHEADS	DRAIN	VENT	WEIGHT	ACCESSORIES AND REMARKS
ST-1	APC JBTR-24-040	1040	60"	96"	1-1/4"	3/4"	2450	

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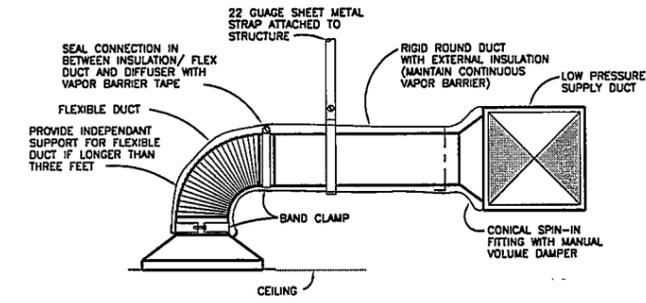
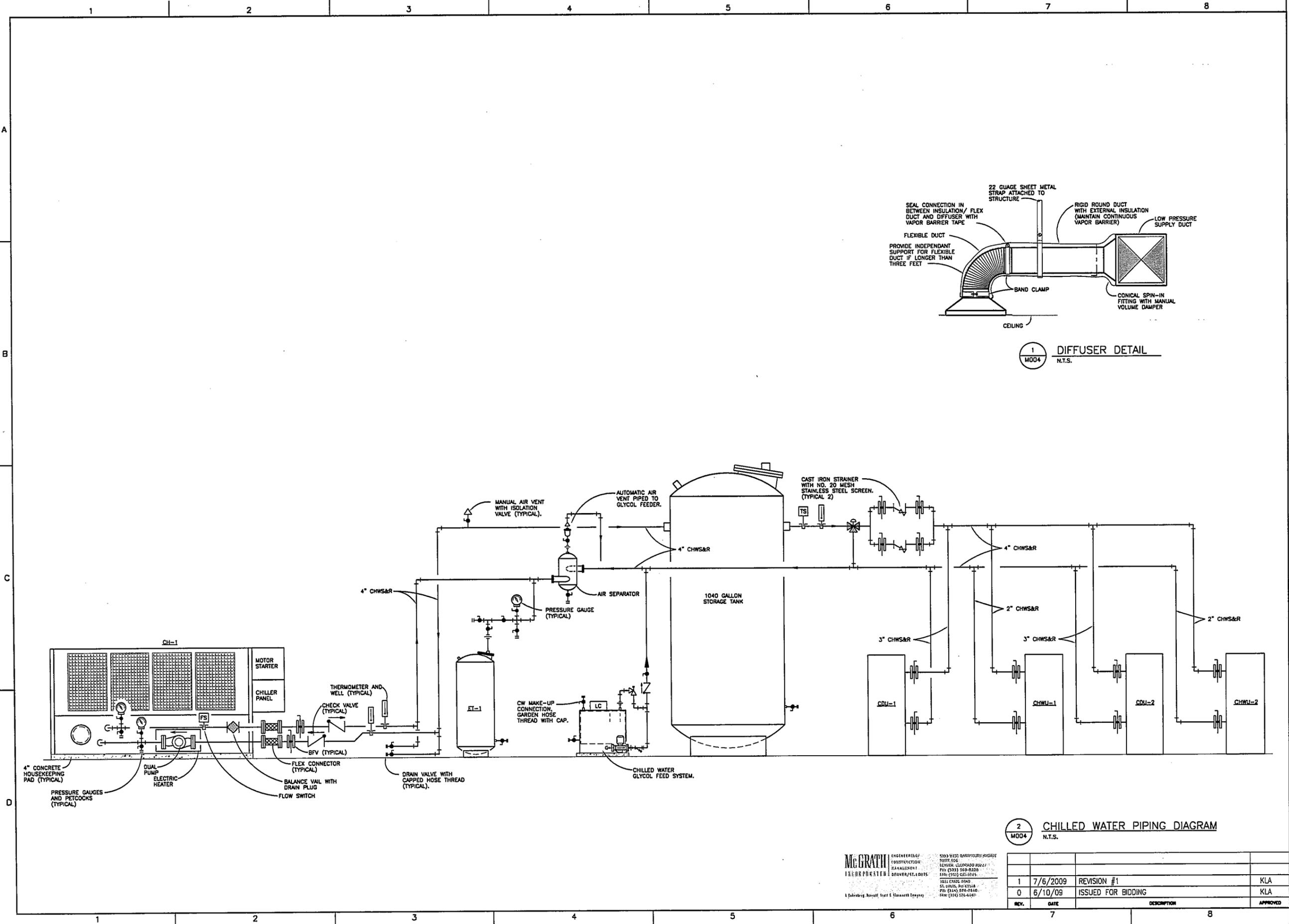
REV.	DATE	DESCRIPTION	APPROVED
1	7/6/2009	REVISION #1	KLA
0	6/10/09	ISSUED FOR BIDDING	KLA



DRAWN BY KLA  
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 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



1 DIFFUSER DETAIL  
M004 N.T.S.

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

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1	7/6/2009	REVISION #1	KLA
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**MODOT**  
 MISSOURI DEPARTMENT OF TRANSPORTATION

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KLA

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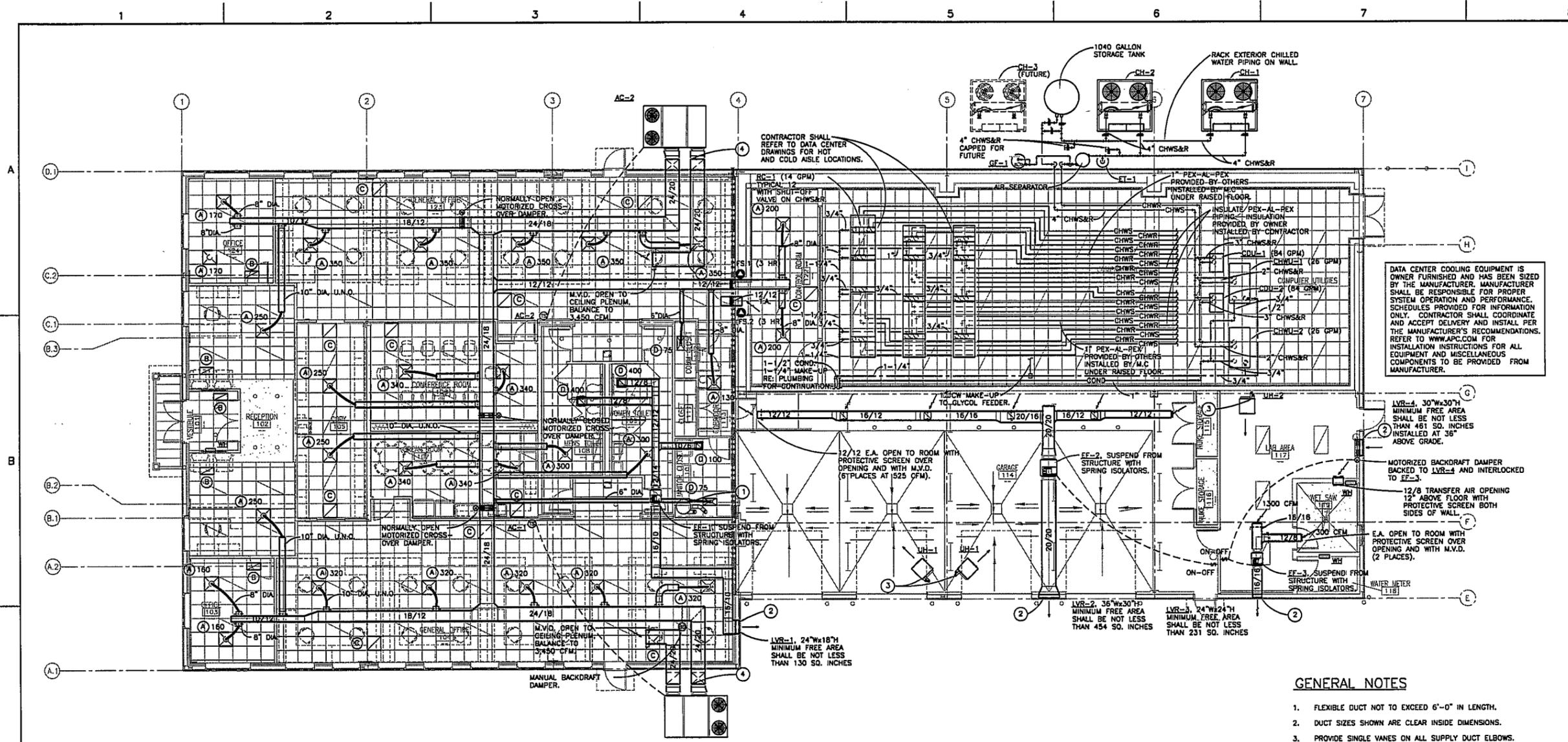
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AS SHOWN

DATE  
6/10/09

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

PROJECT NO.  
**08074**

DRAWING NO.  
**M004**



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.APCOM.COM FOR INSTALLATION INSTRUCTIONS FOR ALL EQUIPMENT AND MISCELLANEOUS COMPONENTS TO BE PROVIDED FROM MANUFACTURER.

**M100 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.

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www.mcgrath-engineering.com

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

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KLA  
SCALE  
AS SHOWN  
DATE  
6/10/09

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

PROJECT NO.  
**08074**  
DRAWING NO.  
**M100**

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


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 INNOVATIVE CONSTRUCTION CONCEPTS  
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PROJECT NO. **08074**  
 DRAWING NO. **E-003**

**ELECTRICAL ONE LINE**  
**NEW RESIDENT ENGINEERS OFFICE & DATA CENTER**  
**MODOT DISTRICT 4**  
**LEE'S SUMMIT, MISSOURI**

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

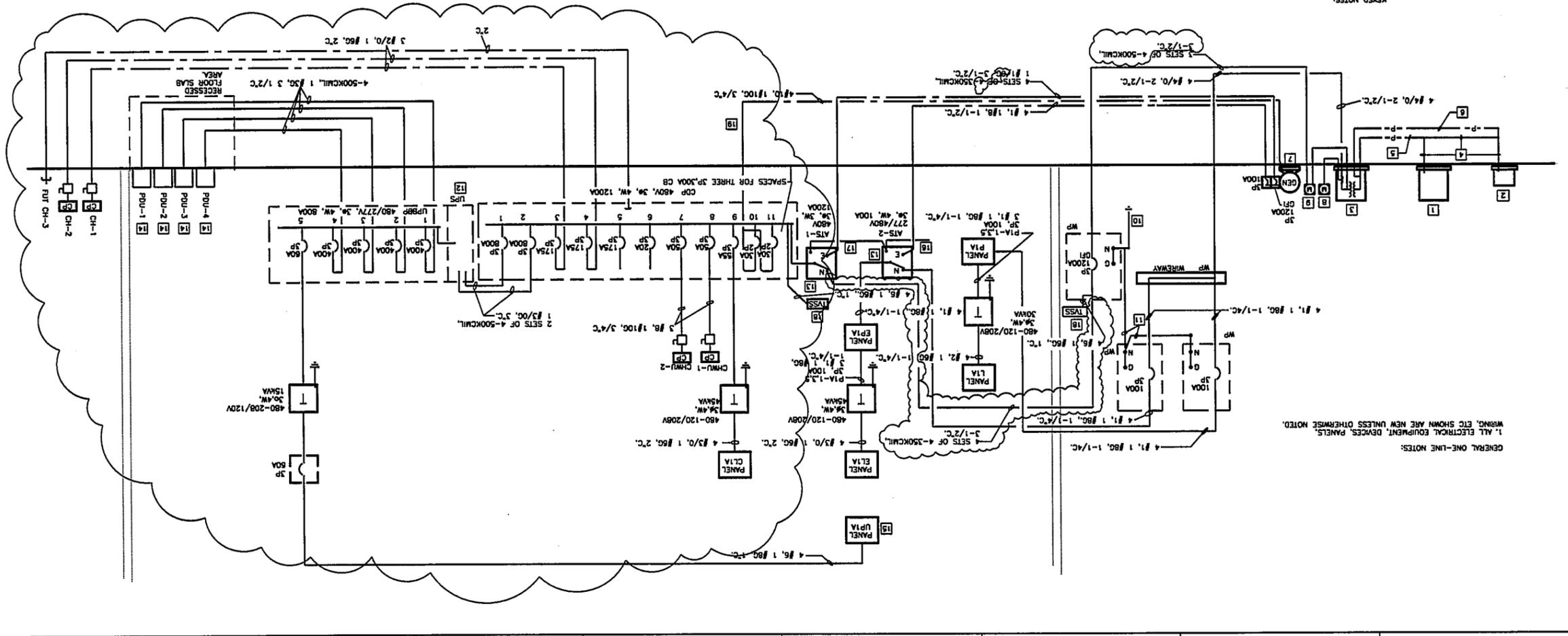



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PANEL SCHEDULES

PANEL	VOLTS	BUS	AMPS	TOTAL	POLES
ELIA	120/208, 3P, 4W	225	150A MCB	2-2P, 25A	2-2P, 20A 33-1P, 15A
UMA	120/208, 3P, 4W	100	100A MCB	1-2P, 50A	1-2P, 20A 16-1P, 20A
UPA	120/208, 3P, 4W	100	100A MLO	20-1P, 20A	
EP1A	277/480, 3P, 4W	100	100A MLO	1-3P, 100A	1-3P, 35A 14-1P, 20A
P1A	277/480, 3P, 4W	100	100A MLO	1-3P, 80A	1-3P, 35A 1-3P, 20A 11-1P, 20A
CL1A	120/208, 3P, 4W	100	100A MCB	1-2P, 20A	12-1P, 20A 6-1P, 5SPACES

ELECTRICAL ONE LINE  
SCALE: N.T.S.



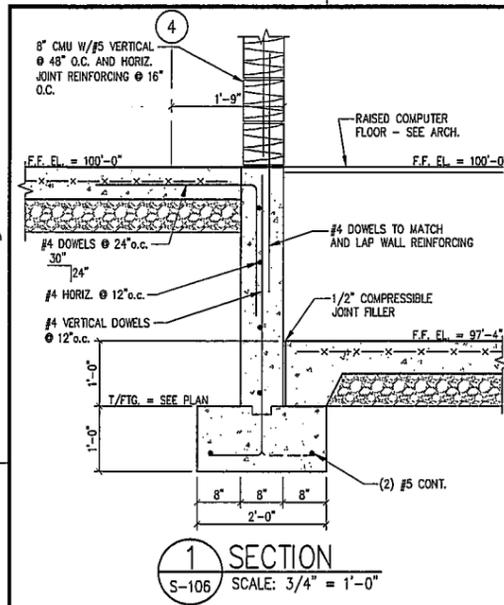
- KEYED NOTES:**
- EXISTING LOW-VOLTAGE MEDIUM VOLTAGE PAD MOUNT SWITCHES, UTILITY TO REPLACE FUSES AS REQUIRED FOR NEW LOADS.
  - EXISTING TRANSFORMER FOR FOUNTAIN, SPRAY PUMP TO REMAIN.
  - NEW PAD MOUNT TRANSFORMER BY UTILITY, CONCRETE PAD AND WHEAR SURFACE SHALL FURNISH AND INSTALL GROUND RODS AND GROUND CONDUCTORS PER UTILITY'S REQUIREMENTS.
  - RETRACT EXISTING PRIMARY UNDERGROUND FEEDER FOR FOUNTAIN SPRAY AND REMOVE PRIMARY CABLES, E.C. SHALL INTERCEPT CONDUIT AND EXTEND CONDUIT TO NEW PAD MOUNT TRANSFORMER. SEE SHEET E101.
  - RETRACT FEEDER BETWEEN PRIMARY SWITCH AND PAD MOUNT TRANSFORMER, PRIMARY CABLES BY UTILITY, FOR ROUTING, SEE SHEET E101.
  - RETRACT UNDERGROUND FEEDER CONDUIT BETWEEN PAD MOUNT TRANSFORMER AND FOUNTAIN SPRAY PUMP, PRIMARY CABLES BY UTILITY, FOR ROUTING SEE SHEET E101.
  - NEW STAND-BY GENERATOR WITH BASE MOUNTED FUEL TANK AND WEATHERPROOF ENCLOSURE FURNISHED BY OWNER, RECEIVED, UNLOAD, INSTALL AND WHEAR BY E.C. CONCRETE BASE BY G.C.
  - NEW METER FOR 277/480V, 3P, 4W 225A SERVICE METER BASE BY E.C., METER BY UTILITY, COORDINATE LOCATION AND MOUNTING WITH UTILITY.
  - NEW METER FOR 277/480V, 3P, 4W 1200A SERVICE METER CONDUIT AND METERING CTS, ON TRANSFORMER, METER WIRING AND METER BY UTILITY.
  - GROUNDING ELECTRODE CONDUCTOR SIZES AS REQUIRED (1/2" CU MINIMUM) BY E.C. TO GROUNDING SYSTEM, BOND NEUTRAL TO GROUND BUS PER THE PROVISIONS OF THE NATIONAL ELECTRICAL CODE (NEC).
  - GROUNDING ELECTRODE CONDUCTOR SIZES AS REQUIRED (1/2" CU MINIMUM) BY E.C. TO GROUNDING SYSTEM, BOND NEUTRAL TO GROUND BUS PER THE PROVISIONS OF THE NATIONAL ELECTRICAL CODE (NEC).
  - SOOKVA UNINTERRUPTIBLE POWER SUPPLY (UPS) WITH BATTERIES AND OUTPUT DISTRIBUTION PANEL (UPSP) FURNISHED AND INSTALLED BY OWNER'S VENDOR SHEET E-104. COORDINATE WORK WITH UPS REQUIREMENTS, FOR LOCATION SEE SHEET E-104.

- AUTOMATIC TRANSFORMER SWITCH FURNISHED BY OWNER, RECEIVED, INSTALLED AND WHEAR BY E.C. FOR LOCATION SEE SHEET E-104.
- EXISTING TRANSFORMER UNIT FURNISHED BY OWNERS, VENDOR RECEIVED AND WHEAR BY E.C. FOR LOCATION SEE SHEET E-104.
- BRANCH CIRCUIT BREAKERS.
- TO GENERATOR ENGINE START CIRCUIT ON GENERATOR, FOR ENGINE START AND SWITCH POSITION INDICATION, FOR ROUTING SEE SHEETS E-101 AND E-104.
- 1/2" FOR GENERATOR ENGINE START CIRCUIT AND SWITCH POSITION INDICATION, FOR ROUTING SEE SHEET E-104.
- SURGE SUPPRESSION DEVICE (SSD) AND ASSOCIATED WIRING FOR DESCRIPTION SEE EQUIPMENT SPECIFICATION SHEET E-201. WIRING SHALL BE IN ACCORDANCE WITH THE NEC TAP RULES. FOR LOCATIONS SEE SHEET E-104.
- FOR GENERATOR BLOCK HEATERS, SEE SHEET E-103 FOR LOCATION.

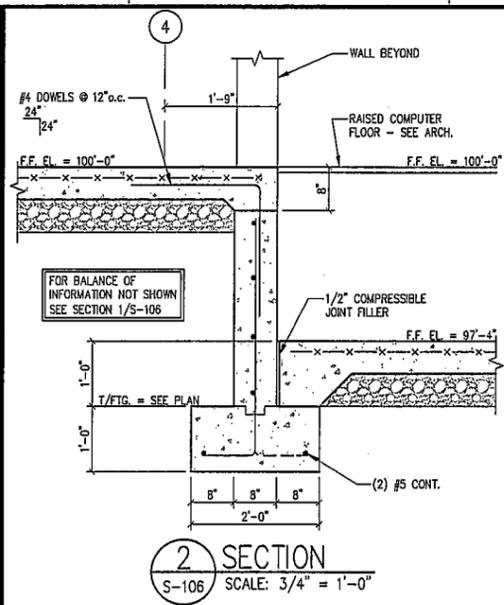
1. ALL ELECTRICAL EQUIPMENT, DEVICES, PANELS, WIRING, ETC SHOWN ARE NEW UNLESS OTHERWISE NOTED.



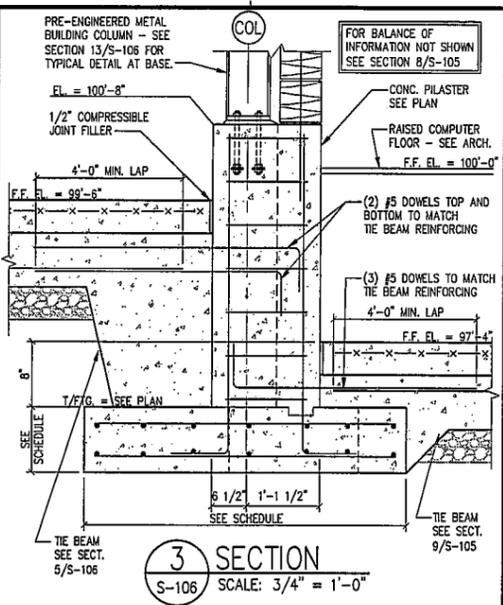
<b>PANELBOARD: <u>CL1A</u> SECTION: <u>1</u></b>												
VOLTS (L-L): <u>208</u> VOLTS (L-N): <u>120</u> PHASE: <u>3</u> WIRE: <u>4</u> MLO: <u>100</u> MCB: <u>50</u> SOURCE: <u>CDP</u>			MOUNTING: <u>SURFACE</u> TYPE: <u>NEMA 1</u> FEED THRU LUGS (Y/N): <u>NO</u> SERIES RATED (Y/N): <u>NO</u> SHUNT TRIP MAIN (Y/N): <u>NO</u> MINIMUM AIC RATING: <u>10,000</u> SOURCE FEEDER AMPS: <u>60</u>			BUS MATERIAL: <u>ALUMINUM</u> TOP OR BOTTOM FEED?: <u>BOTTOM</u> GROUND BUS: <u>YES</u> BRANCH BKRS.: <u>BOLT-ON</u> S. E. RATED (Y/N): <u>NO</u> NEUTRAL RATING (%): <u>100</u> LOCATION: <u>120</u>						
CIRCUIT BREAKER			PHASE LOADS						CIRCUIT BREAKER			
CKT #	AMP	POLES	LOAD SERVED	VA	∅A	∅B	∅C	VA	LOAD SERVED	POLES	AMP	CKT #
1	20	1	BATTERY CHARGER	1000	1540			540	RECEPT	1	20	2
3	20	1	FACP	300		840		540	RECEPT	1	20	4
5	20	2	HUMIDIFIER	1380			1740	360	RECEPT	1	20	6
7	-	-	-	-	980			980	LTS	1	20	8
9	20	1	CW STORAGE TANK	300		1280		980	LTS	1	20	10
11	20	1	GLYCOL PUMP	1000			1000	0	SPARE	1	20	12
13	20	1	SPARE	0	0			0	SPARE	1	20	14
15	-	1	SPACE	0		0		0	SPACE	1	-	16
17	-	1	SPACE	0			0	0	SPACE	1	-	18
19	-	1	SPACE	0	0			0	SPACE	1	-	20
CONNECTED VA:					∅A	∅B	∅C					
CONNECTED AMPS:					2520	2120	2740					
					21.0	17.7	22.8					
DEMAND VA <u>7380</u>												
DEMAND CURRENT <u>20.5</u>												



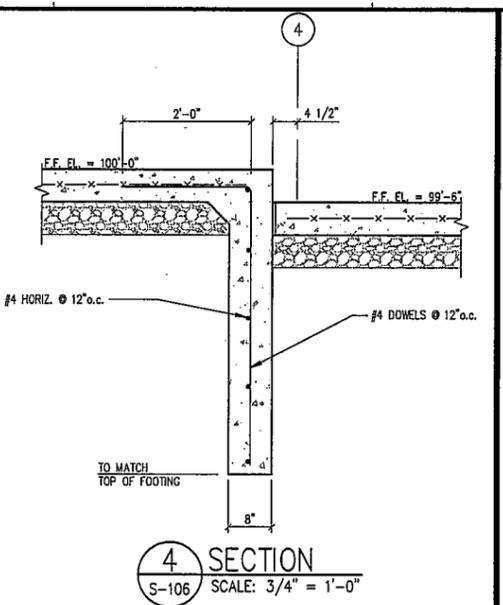
1 SECTION  
S-106 SCALE: 3/4" = 1'-0"



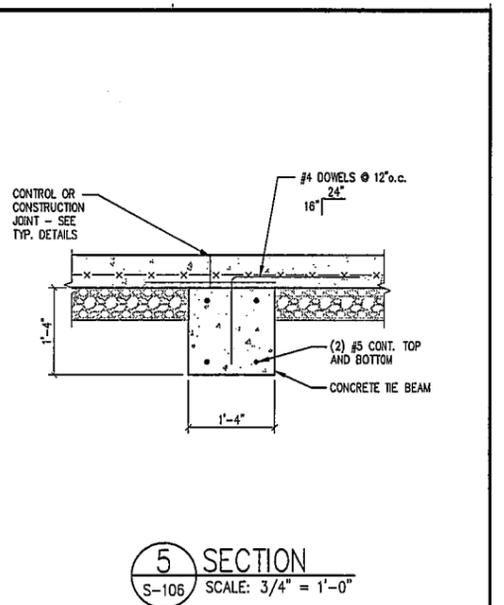
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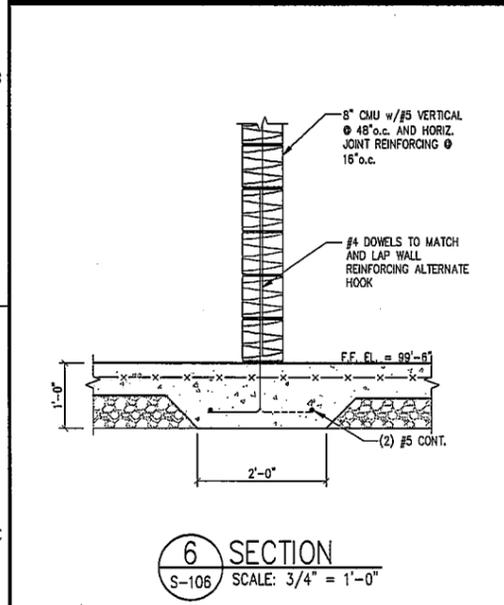
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S-106 SCALE: 3/4" = 1'-0"



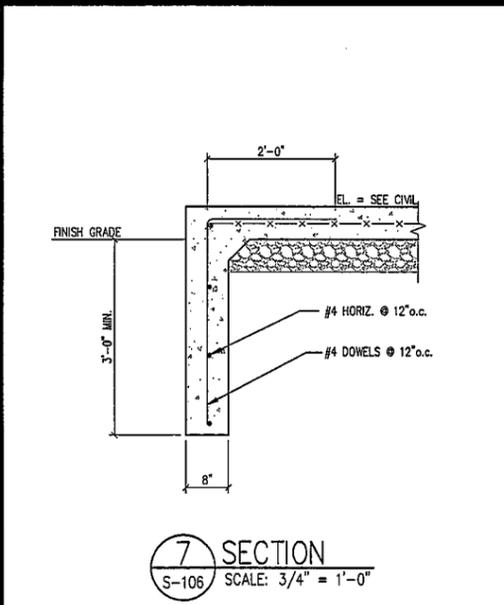
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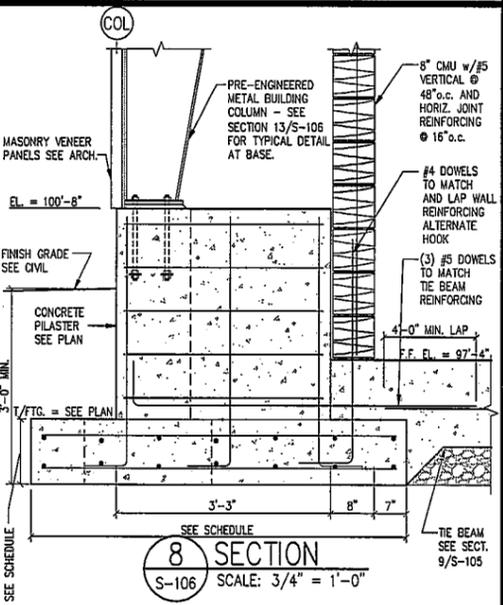
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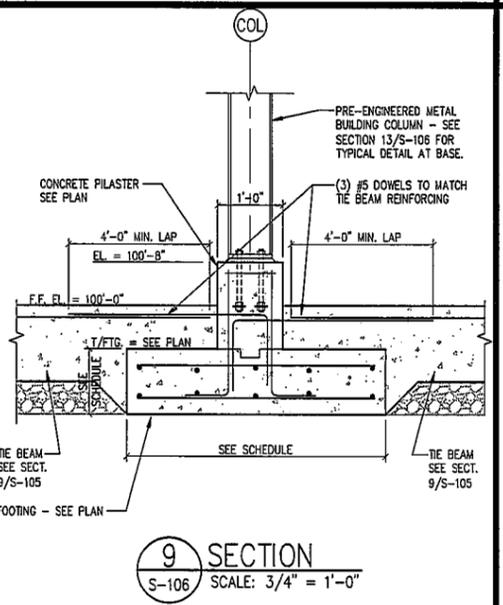
6 SECTION  
S-106 SCALE: 3/4" = 1'-0"



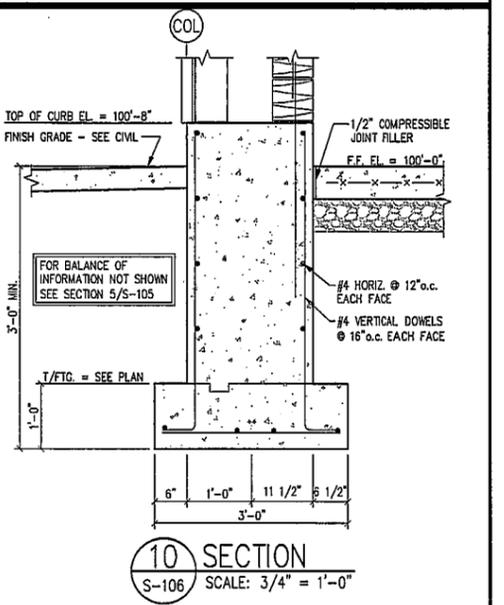
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S-106 SCALE: 3/4" = 1'-0"



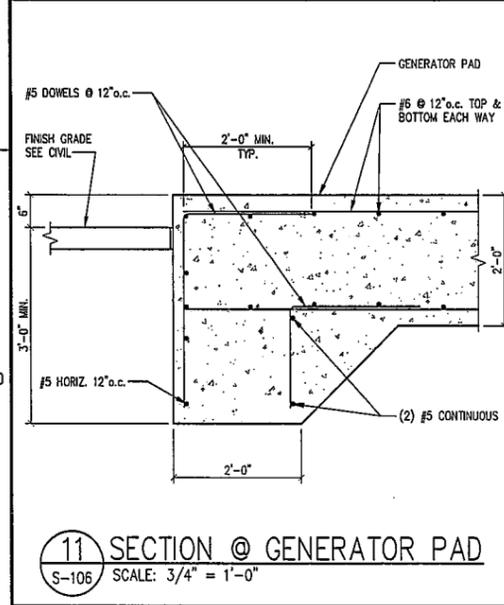
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S-106 SCALE: 3/4" = 1'-0"



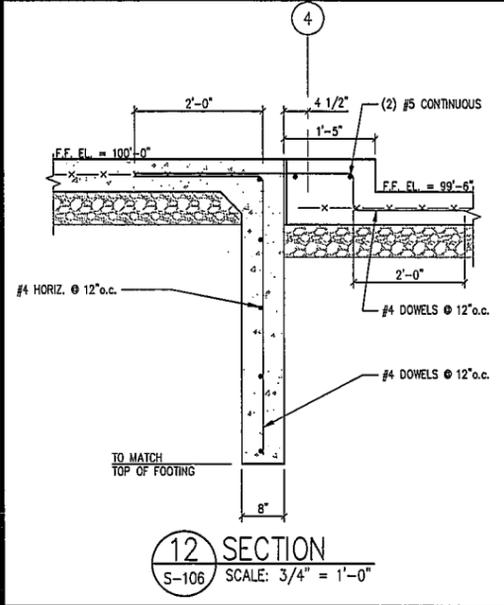
9 SECTION  
S-106 SCALE: 3/4" = 1'-0"



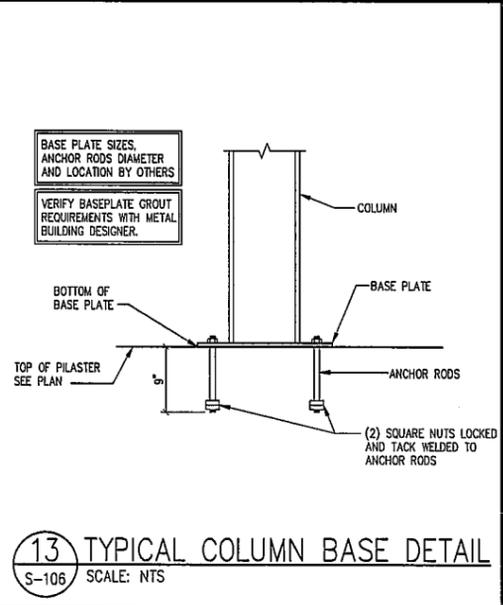
10 SECTION  
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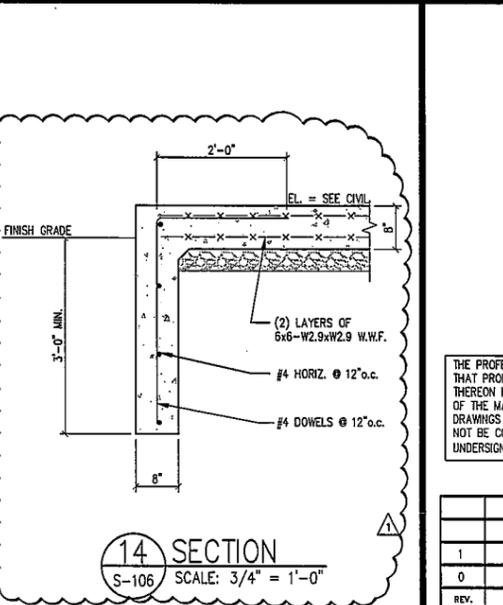
11 SECTION @ GENERATOR PAD  
S-106 SCALE: 3/4" = 1'-0"



12 SECTION  
S-106 SCALE: 3/4" = 1'-0"



13 TYPICAL COLUMN BASE DETAIL  
S-106 SCALE: NTS



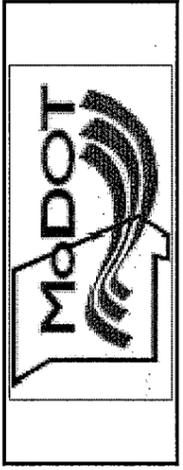
14 SECTION  
S-106 SCALE: 3/4" = 1'-0"

THE PROFESSIONAL SEAL ATTACHED TO THIS SHEET INDICATES THAT PROFESSIONAL ENGINEER WHOSE NAME APPEARS THEREON HAS PREPARED OR HAS DIRECTED THE PREPARATION OF THE MATERIAL SHOWN ONLY ON THIS SHEET. OTHER DRAWINGS AND DOCUMENTS NOT EXHIBITING THIS SEAL SHALL NOT BE CONSIDERED PREPARED OR RESPONSIBILITY OF THE UNDERSIGNED. (PURSUANT TO SECTION 327.411 RSMo)

**PILLAR**  
DESIGN GROUP  
Consulting Structural Engineers  
TWO CAMPBELL PLAZA  
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SAINT LOUIS, MISSOURI, 63139  
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REV.	DATE	DESCRIPTION	APPROVED
1	07/03/09	REVISION 1	IMC
0	06/10/09	ISSUE FOR BIDDING	IMC

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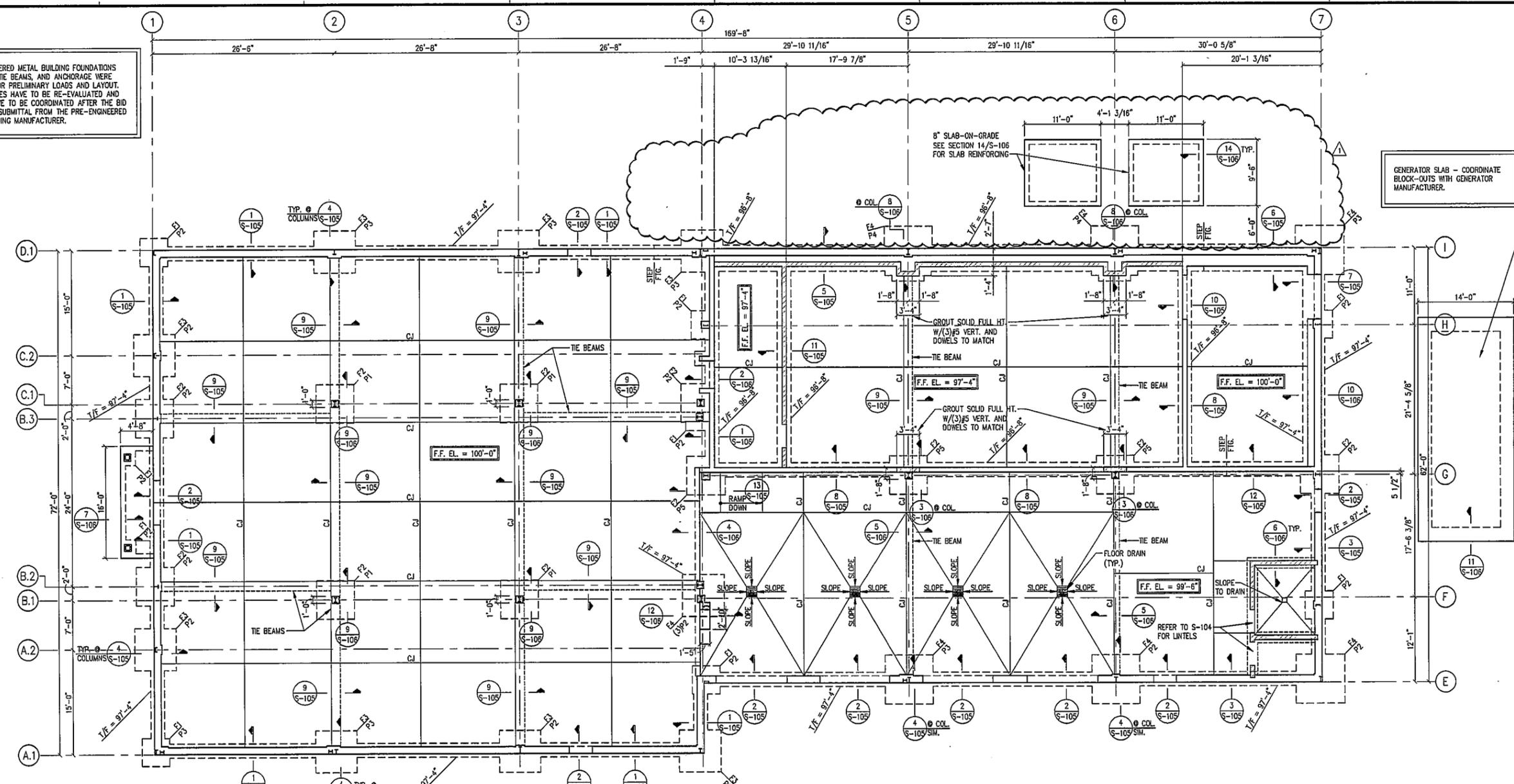
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CHECKED BY  
**IMC**  
SCALE  
DATE  
6/10/09

FOUNDATION SECTIONS & DETAILS  
NEW RESIDENT ENGINEER OFFICE & DATA CENTER  
MoDOT DISTRICT 4  
LEE'S SUMMIT, MISSOURI

PROJECT NO.  
**08074**  
DRAWING NO.  
**S-106**

PRE-ENGINEERED METAL BUILDING FOUNDATIONS, PILASTERS, TIE BEAMS, AND ANCHORAGE WERE DESIGNED FOR PRELIMINARY LOADS AND LAYOUT. ALL THE SIZES HAVE TO BE RE-EVALUATED AND DETAILS HAVE TO BE COORDINATED AFTER THE BID WITH FINAL SUBMITTAL FROM THE PRE-ENGINEERED METAL BUILDING MANUFACTURER.

GENERATOR SLAB - COORDINATE BLOCK-OUTS WITH GENERATOR MANUFACTURER.



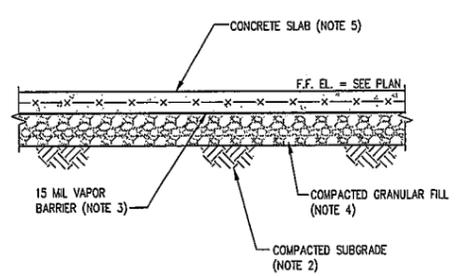
**FOUNDATION PLAN**  
SCALE 1/8" = 1'-0"

**SLAB-ON-GRADE NOTES:**

- SLAB-ON-GRADE CONSTRUCTION REQUIREMENTS ARE BASED ON AMERICAN CONCRETE INSTITUTE STANDARDS OUTLINED IN AC 302R-15 "CONCRETE FLOOR AND SLAB CONSTRUCTION".
- COMPACTED SUBGRADE SHALL BE ENGINEERED FILL CONSISTING OF ON-SITE SOILS PLACED PER THE GEOTECHNICAL REPORT.
- VAPOR BARRIER/RETARDER - 15 MIL VAPOR BARRIER - SEE ARCHITECTURAL SPECIFICATIONS. CARE SHALL BE TAKEN DURING SLAB CURING TO REDUCE DIFFERENTIAL CURING AND CURLING OF THE SLAB DUE TO THE USE OF THE VAPOR BARRIER. OMIT VAPOR BARRIER AT EXTERIOR SLABS.
- INSTALL A MINIMUM 6 IN. COMPACTABLE GRANULAR FILL SUBBASE LAYER CONSISTING OF RELATIVELY CLEAN, WELL-GRADED CRUSHED STONE CONTAINING LESS THAN 6% PASSING THE U.S. NO. 200 SIEVE.
- SLAB-ON-GRADE SHALL BE 6" CONCRETE SLAB REINFORCED WITH 6x6-W2.9xW2.9 W.W.F. (U.N.O.)
- PROVIDE CONTROL JOINTS (C.J.) IN SLAB-ON-GRADE AT 15'-0" O.C. (MAXIMUM) IN EACH DIRECTION.

**FOUNDATION PLAN NOTES:**

- FOR TYPICAL DETAILS AND GENERAL NOTES, SEE SHEETS S101 AND S102.
- TOP OF INTERIOR FOOTING ELEVATION = 99'-0".
- TOP OF ALL PILASTERS = 100'-8"
- CONTRACTOR SHALL COORDINATE TOP OF EXTERIOR FOOTINGS WITH EXTERIOR GRADE.
- FINISHED FLOOR ELEVATION = SEE PLAN, FINISH FLOOR ELEVATION OF 100'-0" REFERENCED ON DRAWINGS CORRESPONDS TO ACTUAL FINISH FLOOR ELEVATION OF 90'-0" ON CIVIL DRAWINGS. VERIFY ACTUAL FINISHED FLOOR ELEVATION WITH CIVIL DRAWINGS.
- JOINT FILLER SHALL BE PLACED IN CLEAN JOINTS, OVERFILLED AND SHAVED FLUSH.
- ALL FOOTINGS TO BE CENTERED UNDER WALLS AND/OR COLUMNS, UNLESS NOTED OTHERWISE.
- NON-LOAD BEARING WALLS NOT SHOWN, SEE ARCHITECTURAL DRAWINGS FOR ADDITIONAL PARTITION WALLS.
- C.J. = SLAB CONSTRUCTION OR CONTROL JOINT. SEE TYPICAL DETAILS.
- REFER TO SECTION 13/S-106 FOR TYPICAL COLUMN BASE.
- REFER TO ARCHITECTURAL DRAWINGS FOR CHAMFER REQUIREMENTS AT



TYPICAL SLAB-ON-GRADE DETAIL  
NTS

**PILASTER SCHEDULE**

MARK	PILASTER SIZE	VERTICAL REINFORCING	HORIZONTAL REINFORCING	TIE TYPE
P1	1'-0"x1'-4"	(4) #5 DOWELS	#3 TIES @ 8" o.c.	A
P2	1'-4"x1'-4"	(4) #6 DOWELS	#3 TIES @ 8" o.c.	A
P3	1'-4"x2'-0"	(6) #6 DOWELS	#3 TIES @ 8" o.c.	B
P4	2'-0"x3'-3"	(8) #6 DOWELS	#3 TIES @ 8" o.c.	C
P5	1'-8"x1'-4"	(6) #6 DOWELS	#3 TIES @ 8" o.c.	B

**FOOTING SCHEDULE**

MARK	FOOTING SIZE	REINFORCING	REMARKS
F1	4'-0"x4'-0"x1'-0"	(4) #5 EACH WAY TOP & BOTTOM	
F2	5'-6"x5'-6"x1'-4"	(6) #5 EACH WAY TOP & BOTTOM	
F3	6'-0"x6'-0"x1'-8"	(6) #6 EACH WAY TOP & BOTTOM	
F4	7'-6"x7'-6"x1'-8"	(7) #6 EACH WAY TOP & BOTTOM	

THE PROFESSIONAL SEAL ATTACHED TO THIS SHEET INDICATES THAT PROFESSIONAL ENGINEER WHOSE NAME APPEARS THEREON HAS PREPARED OR HAS DIRECTED THE PREPARATION OF THE MATERIAL SHOWN ONLY ON THIS SHEET. OTHER DRAWINGS AND DOCUMENTS NOT EXHIBITING THIS SEAL SHALL NOT BE CONSIDERED PREPARED OR RESPONSIBILITY OF THE UNDERSIGNED. (PURSUANT TO SECTION 327.411 RSMo)

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REV.	DATE	DESCRIPTION	APPROVED
1	07/03/09	REVISION 1	IMC
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**MoDOT**

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SCALE  
DATE  
**6/10/09**

**FOUNDATION PLAN**  
NEW RESIDENT ENGINEER OFFICE & DATA CENTER  
MoDOT DISTRICT 4  
LEE'S SUMMIT, MISSOURI

PROJECT NO.  
**08074**  
DRAWING NO.  
**S-103**