UTAH STATE ARCHIVES BUILDING
HUMIDITY CONTROL SYSTEM IMPROVEMENTS

300 SOUTH 500 WEST
SALT LAKE CITY UTAH

OCTOBER 2, 2007

DFCM PROJECT NUMBER 07187310

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NO.	DATE	REVISIONS:	DESC.

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STATE ARCHIVES BUILDING-DEHUMIDIFICATION
300 SOUTH 500 WEST
SALT LAKE CITY UTAH

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SHEET TITLE
MECHANICAL LEGEND ABBREVIATIONS & NOTES

SHEET NO.
G001

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DESICCANT DEHUMIDIFIER NOTES

A. APPROVED MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:

1. BRY-AIR
2. MUNTERS
3. SEIBU-GIKEN

B. GENERAL DESCRIPTION: FACTORY ASSEMBLED DESICCANT DEHUMIDIFIER PACKAGE, CONSISTING OF FANS, MOTOR AND DRIVE ASSEMBLIES, SILICA GEL DESICCANT WHEEL WITH DRIVE ASSEMBLIES, ELECTRIC REACTIVATION COILS WITH MODULATING HEAT OUTPUT, DAMPERS, PLENUMS, FILTERS, DRIP PANS, AND CONTROLS, AND STARTERS, FOR UNATTENDED AUTOMATIC OPERATION. UNITS TO FLOW PROCESS AND REACTIVATION AIR STREAMS ACROSS DESICCANT WHEEL IN A COUNTER-FLOW ARRANGEMENT. UNITS MUST BE CAPABLE OF PROVIDING CONTINUOUS DEHUMIDIFICATION WITH CONSTANT OUTLET TEMPERATURE AND HUMIDITY FOR A GIVEN INLET CONDITION. UNIT SHALL BE CAPABLE OF SUSTAINED OPERATION OF EITHER PROCESS OR REACT FAN WITHOUT ENERGIZED REACTIVATION HEAT FOR PROLONGED PERIODS OF OPERATION WITHOUT DAMAGE TO THE SILICA GEL DESICCANT MEDIA. PROVIDE FACTORY-FABRICATED AND FACTORY-TESTED UNITS OF SIZES AND CAPACITIES AS SCHEDULED, AND AS SPECIFIED HEREIN.

C. UNIT CASING: CONSTRUCT OF CONTINUOUSLY WELDED ALUMINUM PANELS FOR AIR AND VAPOR TIGHT CONSTRUCTION. PROVIDE HINGED ACCESS PANELS AT FILTERS, AND REMOVABLE PANELS WHERE REQUIRED FOR SERVICE AND MAINTENANCE. INCLUDE VAPOR PROOF GASKETS ON ALL OPENINGS INTO THE CASING. HOUSING TO BE FACTORY PAINTED WITH ENAMEL OF FACTORY STANDARD COLOR. PROVIDE AN OBSERVATION WINDOW AT THE DESICCANT WHEEL PLENUM TO ALLOW FOR VISUAL INSPECTION OF THE MEDIA, AND TO VERIFY WHEEL ROTATION. AT A MINIMUM, THE REACTIVATION AIRSTREAM PLENUMS SHALL BE INSULATED WITH 3LB DENSITY INSULATION.

D. DESICCANT WHEEL SHALL BE MOUNTED ON A HORIZONTAL FIXED SHAFT. WHEEL DRIVE ASSEMBLY TO INCLUDE LONG LIFE SEALED BEARINGS. SHAFT/WHEEL/DRIVE ASSEMBLY SHALL ALLOW FOR SIMPLIFIED REMOVAL/REPLACEMENT OF THE DESICCANT WHEEL.

E. FANS:

1. FANS SHALL BE SWSI, DWDI, OR PLUG TYPE.
2. ALL FANS SHALL BE TESTED IN ACCORDANCE WITH AMCA STANDARD 210-70 TEST CODE FOR AIR MOVING DEVICES.
3. BACKWARD INCLINED FANS SHALL BEAR THE AMCA STICKER. BACKWARD INCLINED WHEELS OVER 22 INCHES DIAMETER SHALL HAVE DOUBLE THICKNESS AIRFOIL SHAPED FAN BLADES.
4. FAN HOUSING SHALL BE CONSTRUCTED OF STEEL, ADEQUATELY BRACED WITH STRUCTURAL STEEL FOR RIGIDITY.
5. FAN SHAFTS ARE TO BE SOLID, GROUND AND POLISHED, CARBON STEEL, SAE 1045 MATERIALS, MACHINED TO CLOSE TOLERANCES, KEYED TO THE FAN WHEEL. COAT THE FAN SHAFT WITH A RUST INHIBITOR AFTER MACHINING. HOLLOW SHAFTS WILL NOT BE ACCEPTABLE.
6. FAN BEARINGS SHALL BE IN SELF ALIGNING PILLOW BLOCK, GREASE LUBRICATED, EXTRA HEAVY DUTY ANTIFRICTION BALL OR SPHERICAL ROLLER TYPE, SELECTED FOR AN AFBMA L-50 AVERAGE LIFE OF 400,000 HOURS AT THE MAXIMUM RPM OF THE FAN CLASS. BEARINGS ARE TO BE MOUNTED ON THE FAN STRUCTURAL BRACING. ON UNITS WITH CASINGS LESS THAN 54" HIGH, PROVIDE EXTENDED LUBRICATION LINES TO PERMIT LUBRICATION FOR BOTH BEARINGS TO BE PERFORMED FROM THE ACCESS DOOR SIDE OF THE AIR HANDLING UNIT.
7. FAN MOTORS SHALL BE IN ACCORDANCE WITH SECTION 15050.
8. FAN AND MOTOR ARE TO BE MOUNTED ON ALL WELDED, STRUCTURAL STEEL, PRIME COATED, INTERNAL ISOLATION BASE WITH SPRINGS. THE OUTLET OF THE FAN SHALL BE SEPARATED FROM THE UNIT CASING BY MEANS OF A FACTORY INSTALLED FLEXIBLE FABRIC CONNECTION. THE INTERNALLY MOUNTED MOTOR SHALL BE MOUNTED ON A SLIDE RAIL BASE TO ALLOW PROPER ADJUSTMENT OF BELT TENSION.
9. DRIVE SHEAVES ARE TO BE MACHINED CAST IRON. PROVIDE AN ADJUSTABLE MOTOR SHEAVE ON MOTORS OF 10 HP AND LESS. SHEAVE SELECTIONS AND BELT LENGTHS ARE TO BE IN ACCORDANCE WITH THE DRIVE MANUFACTURER'S RECOMMENDATIONS BASED ON THE SPECIFIC MOTOR NAMEPLATE HP INCLUDING A 1.5 SERVICE FACTOR FOR CONSTANT VOLUME FANS.
10. PROVIDE AN OSHA-APPROVED METAL BELT GUARD HAVING SIDES OF GALVANIZED STEEL AND EXPANDED METAL FACE WITH OPENINGS FOR FAN TACHOMETER READINGS. BELT GUARD SHALL BE SIZED TO ALLOW EITHER SHEAVE TO BE INCREASED BY TWO SIZES.
11. AN INTEGRAL ALL WELDED STEEL VIBRATION ISOLATION BASE SHALL BE PROVIDED FOR THE FAN AND MOTOR. SEISMIC CERTIFIED SPRING ISOLATORS SHALL BE FREE STANDING WITH SOUND DEADENING PADS AND LEVELING BOLTS. SPRING DIAMETER TO COMPRESSED OPERATING HEIGHT RATIO SHALL BE 1 TO 1. SPRING DEFLECTION SHALL BE PER SECTION 15240 REQUIREMENTS. ISOLATORS SHALL HAVE INTEGRAL SEISMIC RESTRAINTS. IF ISOLATORS ARE NOT A SEISMIC RATED ASSEMBLY, THEN THE RESTRAINT DEVICE MUST BE APPROVED AND STAMPED BY A LICENSED ENGINEER DULY REGISTERED IN THE STATE OF THE PROJECT SITE FOR THIS SPECIFIC JOB. NOTE THAT THE ENTIRE DEHUMIDIFIER ASSEMBLY IS FACTORY ASSEMBLED ON A RAIL THAT IS BOLTED DIRECTLY TO THE FLOOR, AND SEISMIC ISOLATION OCCURS AT THE FANS WHERE THEY MOUNT TO THE FACTORY BASE.

F. THE PROCESS AND REACTIVATION SECTIONS SHALL BE DIVIDED BY SEALS DESIGNED FOR LONG LIFE. SEALS SHALL PERMIT INDEPENDENT FLOW OF THE TWO AIRSTREAMS WITHOUT REQUIRING BALANCING OF PROCESS AND REACTIVATION AIRSTREAMS WITHIN THE UNIT. TOP QUALITY SILICONE RUBBER BULB SEALS SHALL BE USED TO POSITIVELY SEAL AIRSTREAMS AT DIFFERENTIAL PRESSURES UP TO 8" W.C. SEALS SHALL BE HIGH TEMPERATURE SILICONE RUBBER EXTRUSIONS WITH PTFE COMPOSITION COATED FACE FOR LOW FRICTION, AND DURABILITY. SEALS SHALL BE REMOVABLE/REPLACEABLE. PERIMETER SEALS SHALL NOT COME INTO CONTACT WITH THE FACE OF THE DESICCANT MEDIA.

G. REACTIVATION HEAT FOR UNIT IS BY MEANS OF ELECTRIC HEATING COILS WITH A FACTORY MOUNTED SCR CONTROLLER, OR OTHER SOLID STATE METHOD OF FULLY MODULATING HEAT OUTPUT FROM THE ELECTRIC HEATING COILS. INCLUDE AIRFLOW PROVING SWITCH, HIGH TEMPERATURE LIMIT SAFETY, AN ALL WIRING TO SINGLE POINT CONNECTION AT DEHUMIDIFIER CONTROL/STARTER PANEL. DEHUMIDIFIER IS TO ACCEPT A VARIABLE VOLTAGE INPUT FROM THE EXISTING DDC CONTROL SYSTEM TO MODULATE HEAT OUTPUT FROM THE COIL.

H. FILTERS: UNITS TO INCLUDE 2" DEEP, 30% EFFICIENT, DISPOSABLE PANEL FILTERS IN CARDBOARD FRAMES. PROVIDE FILTERS IN THE PROCESS AIR INLET AND REACTIVATION AIR INLET TO THE UNIT. INCLUDE DIRECT READING DIAL FILTER GAUGES MOUNTED TO UNIT HOUSING: 4?3/4 INCH OD DIAPHRAGM ACTUATED DIAL IN METAL CASE, VENT VALVES, BLACK FIGURES ON WHITE BACKGROUND, FRONT RECALIBRATION ADJUSTMENT, RANGE 0?2.0 INCH WG, 2 PERCENT OF FULL SCALE ACCURACY; MAGNEHELIC SERIES 2000 MANUFACTURED BY DWYER.

I. MANUAL VOLUME CONTROL DAMPERS: AIRFOIL MULTIBLADE DESIGN, OPPOSED BLADE, WITH LOCKING QUADRANTS AND POSITION INDICATING PLATE, RUSKIN CD-60 OR EQUAL. PROVIDE DAMPERS AT THE OUTLETS OF BOTH PROCESS AND REACTIVATION AIR FANS.

J. ELECTRICAL: UNITS TO REQUIRE A SINGLE ELECTRICAL CONNECTION TO BE MADE IN THE FIELD. CONNECTION TO BE OF THE VOLTAGE/PHASE/HZ INDICATED ON THE UNIT SCHEDULE. INCLUDE ALL CONTACTORS, STARTERS, LOCKING DISCONNECTS, TRANSFORMERS, OVERLOAD PROTECTION, AND ANY OTHER COMPONENTS REQUIRED FOR CONTINUOUS AUTOMATIC OPERATION. ALL WIRING FROM THE POWERED EQUIPMENT TO THE SINGLE ELECTRICAL CONNECTION POINT TO BE PERFORMED AT THE FACTORY, AND SHALL COMPLY WITH ALL ELECTRICAL CODE REQUIREMENTS.

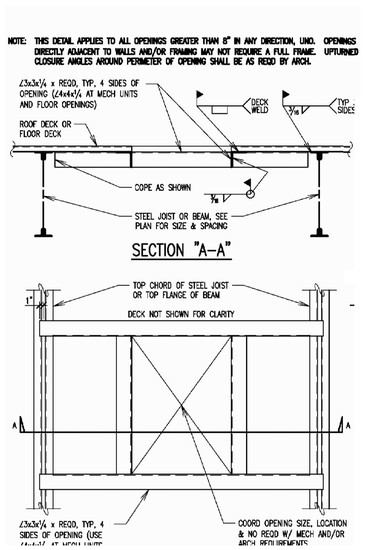
K. CONTROLS: STARTING AND STOPPING OF THE UNIT AND MODULATION OF THE REACTIVATION ELECTRIC HEATING COILS IS TO BE PERFORMED BY THE AUTOMATIC TEMPERATURE CONTROL SYSTEM FOR THE BUILDING DESCRIBED ON THE DRAWINGS. PROVIDE A CONTROL PANEL ON THE UNIT THAT INDICATES THE STATUS OF THE PROCESS AND REACTIVATION AIRSTREAM FANS AND DESICCANT WHEEL DRIVE. ALSO MOUNT THE FILTER PRESSURE DROP GAUGES ON THE PANEL, AND INCLUDE PRESSURE GAUGES TO MEASURE REACTIVATION AIRFLOW RATES ACROSS THE WHEEL.

MECHANICAL GENERAL NOTES

1. DO NOT SCALE DRAWINGS. CLOSELY COORDINATE NEW MECHANICAL WITH ALL NEW AND EXISTING MECHANICAL, ELECTRICAL, ARCHITECTURAL AND STRUCTURAL MEMBERS. DUCTWORK AND PIPE ROUTING IS APPROXIMATE, DIAGRAMMATIC AND IS NOT TO BE SCALED. PROVIDE ALTERNATE ROUTING, OFFSETS AND TRANSITIONS AS REQUIRED FOR COORDINATION OF ALL WORK WITHOUT ADDITIONAL COST TO THE OWNER.
2. FIELD VERIFY ALL MECHANICAL AND PLUMBING ITEMS PRIOR TO COMMENCING NEW WORK. NO ADDITIONAL PAYMENT WILL BE ALLOWED FOR CONTRACTOR'S FAILURE TO BECOME FAMILIAR WITH EXISTING CONDITIONS.
3. ALL MECHANICAL WORK SHALL BE COORDINATED WITH THE WORK PERFORMED UNDER OTHER DIVISIONS TO AVOID INTERFERENCE.
4. HVAC CONTRACTOR SHALL REPAIR, REPLACE AND REPAINT TO MATCH EXISTING SURFACES DAMAGED BY THE HVAC CONTRACTOR DURING INSTALLATION OF MECHANICAL EQUIPMENT.
5. DO NOT SHUT-OFF/PUT OUT SERVICE ANY SYSTEMS/SERVICES WITHOUT FIRST COORDINATING ALL DOWNTIME WITH THE OWNER'S PERSONNEL.
6. INSTALL ALL EQUIPMENT PER MANUFACTURERS RECOMMENDATIONS AND INSTRUCTIONS.
7. DUCT DIMENSIONS SHOWN ARE INSIDE CLEAR DIMENSIONS.
8. INSTRUMENT TEST HOLES SHALL BE LOCATED IN ALL NEW SUPPLY, EXHAUST AND RETURN DUCTS.
9. HVAC CONTRACTOR SHALL PROVIDE AND INSTALL MANUAL BALANCING DAMPERS IN DUCTWORK. INSTALL ALL DAMPERS NECESSARY TO BALANCE THE SYSTEM TO AIR FLOW VALUES SHOWN ON PLANS.
10. USE SMACNA STANDARDS FOR MEDIUM PRESSURE DUCT CONSTRUCTION OF SUPPLY DUCTWORK UPSTREAM OF VAV BOX – 6 INWG PRESSURE CLASS, SEAL CLASS "A". CONSTRUCT ALL OTHER DUCTWORK ACCORDING TO SMACNA STANDARDS FOR LOW PRESSURE DUCT CONSTRUCTION – 2 INWG PRESSURE CLASS, SEAL CLASS "A". FIBERGLASS DUCTWORK IS UNACCEPTABLE. ALL DUCTWORK TO BE GALVANIZED.
11. ALL EQUIPMENT, DUCTWORK AND PIPING SHALL BE SEISMICALLY RESTRAINED IN ACCORDANCE WITH THE LOCAL CODE. ALL DETAILS AND DRAWINGS REQUIRED BY LOCAL AUTHORITY WILL BE PRODUCED BY LICENSED SEISMIC ENGINEER HIRED BY CONTRACTOR.
12. ALL PIPING, DUCTS, VENTS, ETC. EXTENDING THROUGH THE WALL AND/OR ROOF SHALL BE FLASHED AND COUNTERFLASHED TO BE WATERPROOF AND TO NOT LEAK.
13. HVAC CONTRACTOR SHALL CHANGE OUT THE EQUIPMENT FILTERS AT THE TIME OF POSSESSION OF THE PROJECT BY THE OWNER, USING ONLY NEW FILTERS OF THE PROPER SIZE AND TYPE.
14. THE HVAC CONTRACTOR SHALL LEAVE HIS WORK IN PERFECT WORKING CONDITION AND SHALL GUARANTEE SAME FOR A PERIOD OF TWELVE (12) MONTHS FROM DATE OF FINAL ACCEPTANCE.
15. INSTALL ALL MECHANICAL SYSTEMS IN ACCORDANCE WITH THE 2006 INTERNATIONAL BUILDING CODE, 2006 INTERNATIONAL MECHANICAL CODE, 2006 INTERNATIONAL FIRE CODE AND 2006 INTERNATIONAL PLUMBING CODE.
16. PROVIDE IDENTIFICATION LABELS ON ALL EQUIPMENT, PIPING, VALVES, CONTROLS, ETC. TO MATCH EXISTING BUILDING LABELING STANDARD AND INCLUDING TENANT NAME AND SPACE NUMBER.
17. PROVIDE ASBUILT DRAWINGS AND SUBMIT TO OWNER.
18. PROVIDE SUBMITTALS ON ITEMS LISTED IN MECHANICAL AND PLUMBING EQUIPMENT SCHEDULES TO THE ENGINEER FOR REVIEW PRIOR TO ORDER, PURCHASE OR INSTALLATION.
19. THE MECHANICAL CONTRACTOR SHALL INCLUDE THESE CONTRACT AMOUNTS IN HIS BID PRICE AND SHALL BE RESPONSIBLE FOR THE COORDINATION OF THESE TRADES AT COMPLETION OF TENANT'S INSTALLATION: TESTING AND BALANCING. THE MECHANICAL SYSTEMS SHALL BE ADJUSTED AND BALANCED BY AN INDEPENDENT BALANCING FIRM SPECIALIZING IN THIS WORK. BALANCING CONTRACTOR SHALL BE AABC CERTIFIED. ALL WORK SHALL BE DONE UNDER DIRECT SUPERVISION OF A STATE OF UTAH REGISTERED PROFESSIONAL ENGINEER. CONTRACTOR SHALL SUBMIT TWO COPIES OF BALANCING REPORT TO ENGINEER FOR REVIEW, APPROVAL AND RECORD. IN ADDITION TO BALANCING AIRFLOWS, BALANCING CONTRACTOR SHALL MEASURE DRY-BULB TEMPERATURE AND SPACE % RELATIVE HUMIDITY TO VERIFY PROPER SYSTEM OPERATION.

ABBREVIATIONS

ø	ROUND OR DIAMETER	LWT	LEAVING WATER TEMPERATURE
AD	ACCESS DOOR	MAX	MAXIMUM
AF	AIRFOIL	MBH	THOUSAND BRITISH THERMAL UNITS/HOUR
AFF	ABOVE FINISHED FLOOR	MECH	MECHANICAL
ALT	ALTERNATE	MIN	MINIMUM
BI	BACKWARD INCLINED	NC	NOISE CRITERIA OR NORMALLY CLOSED
BOD	BOTTOM OF DUCT	NIC	NOT IN CONTRACT
BOP	BOTTOM OF PIPE	NO	NUMBER
BTU/H	BRITISH THERMAL UNITS PER HOUR	NOM	NOMINAL
CAP	CAPACITY	NTS	NOT TO SCALE
CFM	CUBIC FEET PER MINUTE	OA	OUTSIDE AIR
CV	CONSTANT VOLUME	OBD	OPPOSED BLADE DAMPER
DB	DRY BULB	OD	OVERFLOW DRAIN
DIA	DIAMETER	OFCI	OWNER FURNISHED, CONTRACTOR INSTALLED
DN	DOWN	OFOI	OWNER FURNISHED, OWNER INSTALLED
DSN	DOWN SPOUT NOZZLE	PD	PRESSURE DROP
DW	DISHWASHER	POC	POINT OF CONNECTION
(E)	EXISTING	PRV	PRESSURE REDUCING VALVE
EA	EXHAUST AIR	PSI	POUNDS PER SQUARE INCH
EAT	ENTERING AIR TEMPERATURE	PSIG	POUNDS PER SQUARE INCH GAUGE
EFF	EFFICIENCY	RA	RETURN AIR
ELEV	ELEVATION	RAD	RADIUS
ENCL	ENCLOSURE	RD	ROOF DRAIN
ESP	EXTERNAL STATIC PRESSURE	RPBP	REDUCED PRESSURE BACKFLOW PREVENTER
ET	EXPANSION TANK	SA	SUPPLY AIR
EWC	ELECTRIC WATER COOLER	SEN	SENSIBLE
EWT	ENTERING WATER TEMPERATURE	SIM	SIMILAR
FCO	FLOOR CLEANOUT	SL	SEA LEVEL
FD	FLOOR DRAIN	SP	STATIC PRESSURE
FO	FLAT OVAL	SQ FT	SQUARE FEET
FPM	FEET PER MINUTE	SS	SERVICE SINK OR STAINLESS STEEL
FS	FLOOR SINK	TOD	TOP OF DUCT
FT	FEET	TSP	TOTAL STATIC PRESSURE
FV	FACE VELOCITY	U	URINAL
GA	GAUGE	VAV	VARIABLE AIR VOLUME
GAL	GALLON	VD	VOLUME DAMPER
GD	GARAGE DRAIN	VFD	VARIABLE FREQUENCY DRIVE
GPM	GALLONS PER MINUTE	VOL	VOLUME
HP	HORSEPOWER	VTR	VENT THROUGH ROOF
HR	HOUR	W/	WITH
HT	HEIGHT	W/O	WITHOUT
IN	INCH	WB	WET BULB
INWC	INCHES OF WATER COLUMN	WC	WATER CLOSET
INWG	INCHES OF WATER GAUGE	MVD	MANUAL VOLUME DAMPER
IPG	INHIBITED PROPYLENE GLYCOL	WCO	WALL CLEANOUT
L	LAVATORY OR LOUVER	WPD	WATER PRESSURE DROP
LAT	LEAVING AIR TEMPERATURE	WT	WEIGHT
LBS	POUNDS		



1 TYPICAL ROOF OPENING DETAIL

NO SCALE

MECHANICAL LEGEND

NOTE: ALL ITEMS MAY NOT APPEAR ON DRAWINGS

GATE VALVE		DEIONIZED WATER	—DI—
OS & Y PATTERN GATE VALVE		DEIONIZED WATER RETURN	—DIR—
BALL VALVE		HEAT TRACING	
BUTTERFLY VALVE		CHILLED WATER SUPPLY	—CHS—
MOTORIZED VALVE OPERATOR	M	CHILLED WATER RETURN	—CHR—
GAS COCK		CONDENSER WATER SUPPLY	—CS—
PLUG VALVE		CONDENSER WATER RETURN	—CR—
CHECK VALVE (SWING OR LIFT AS REQ'D)		HEATING WATER SUPPLY	—HWS—
SOLENOID VALVE		HEATING WATER RETURN	—HWR—
AUTOMATIC CONTROL VALVE (2-WAY)		RADIANT FLOOR SUPPLY	—RFS—
AUTOMATIC CONTROL VALVE (3-WAY)		RADIANT FLOOR RETURN	—RFR—
PRESSURE REDUCING VALVE		STEAM	—S—
P & T RELIEF VALVE		STEAM CONDENSATE RETURN	—SCR—
AIR VENT (AUTOMATIC)		WATER TREATMENT	—WT—
CURB COCK		FUEL OIL SUPPLY	—FOS—
THERMAL EXPANSION VALVE		FUEL OIL RETURN	—FOR—
STRAINER		REFRIGERANT LIQUID	—RL—
CALIBRATED BALANCE VALVE		REFRIGERANT SUCTION	—RS—
VENTURI FLOW METER		HOT GAS	—HG—
REDUCER		HOT GAS BYPASS	—HGBP—
PET COCK OR GAUGE COCK		SOFT WATER	—SW—
PRESSURE GAUGE W/GAUGE COCK		REVERSE OSMOSIS	—RO—
THERMOMETER		OXYGEN	—O2—
TEMPERATURE & PRESSURE TEST PLUG	T	NITROUS OXIDE	—N2O—
IN-LINE PUMP		NITROGEN	—N—
FLOW SWITCH	F	HYDROGEN	—H—
AQUASTAT	A	HELIUM	—HE—
TEMPERATURE SENSING WELL		CARBON DIOXIDE	—CO2—
HOSE BIBB OR SILLCOCK		ARGON	—AR—
YARD HYDRANT		DUCT SIZE (IN), FIRST FIGURE IS SIDE SHOWN	18/12
FLOOR DRAIN		BURIED OR UNDERFLOOR DUCT	
FLOOR SINK		DUCT W/ ACOUSTICAL LINING	
MANHOLE		FLEXIBLE DUCT (HELICAL)	
WALL CLEANOUT		SPIN-IN FITTING W/ MVD	=
FLOOR OR GRADE CLEANOUT		FLEXIBLE DUCT CONNECTION	
GRADE CLEANOUT W/ CONCRETE PAD		SUPPLY SLOT DIFFUSER	
VENT THROUGH ROOF		SUPPLY DIFFUSER	
POST TYPE FDC CONNECTION		RETURN GRILLE	
WALL TYPE FDC CONNECTION		RADIAL SUPPLY DIFFUSERS	
FIRE HOSE CABINET		RETURN AIR DUCT SECTION	
FIRE DEPT. HORN & LIGHT		RETURN AIR DUCT UP	
EXPANSION JOINT		RETURN AIR DUCT DOWN	
FLEXIBLE PIPE CONNECTION		SUPPLY AIR DUCT SECTION	
REDUCED PRESSURE BACKFLOW PREVENTER	RPBP	SUPPLY AIR DUCT UP	
DIRECTION OF FLOW		SUPPLY AIR DUCT DOWN	
ELBOW DOWN		EXHAUST AIR DUCT SECTION	
ELBOW UP		EXHAUST AIR DUCT UP	
PIPE CAP		EXHAUST AIR DUCT DOWN	
TEE DOWN		ACCESS PANEL	
UNION		MANUAL VOLUME DAMPER	
DOMESTIC COLD WATER		GRAVITY BACKDRAFT DAMPER	G
DOMESTIC HOT WATER		MOTORIZED DAMPER	M
HOT WATER CIRC.		AIR FLOW STATION	F
TEMPERED WATER	—T—	FIRE DAMPER	F
SANITARY (PLBG) VENT		SMOKE DAMPER	S
SANITARY SEWER ABOVE GRADE		COMBINATION FIRE/SMOKE DAMPER	S
SANITARY SEWER BELOW GRADE		DUCT TRANSITION	
GREASE WASTE ABOVE GRADE	—GW—	ELBOW W/ TURNING VANES	
GREASE WASTE BELOW GRADE	—GW—	TEE W/ 45° ENTRY	=
DRAIN	—D—	WYE W/ 45° ENTRY	=
ROOF DRAIN	—RD—	THERMOSTAT OR TEMP SENSOR	T
OVERFLOW DRAIN	—OD—	HUMIDISTAT OR HUMIDITY SENSOR	H
STORM DRAIN ABOVE GRADE	—SD—	POINT OF REMOVAL FROM EXISTING	
STORM DRAIN BELOW GRADE	—SD—	POINT OF CONNECTION TO EXISTING	
FIRE SERVICE	—F—	DETAIL TAG	DETAIL NO. / DRAWING NO.
NATURAL GAS	—G—		
PROPANE	—P—	KEYED NOTE	NOTE NO.
COMPRESSED AIR	—CA—		
INDUSTRIAL WATER (NON-POTABLE)	—IW—	SECTION CUT LINE	SECTION NO. / DRAWING NO.

NO.	DATE	REVISIONS: DESC.

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300 SOUTH 500 WEST
SALT LAKE CITY UTAH

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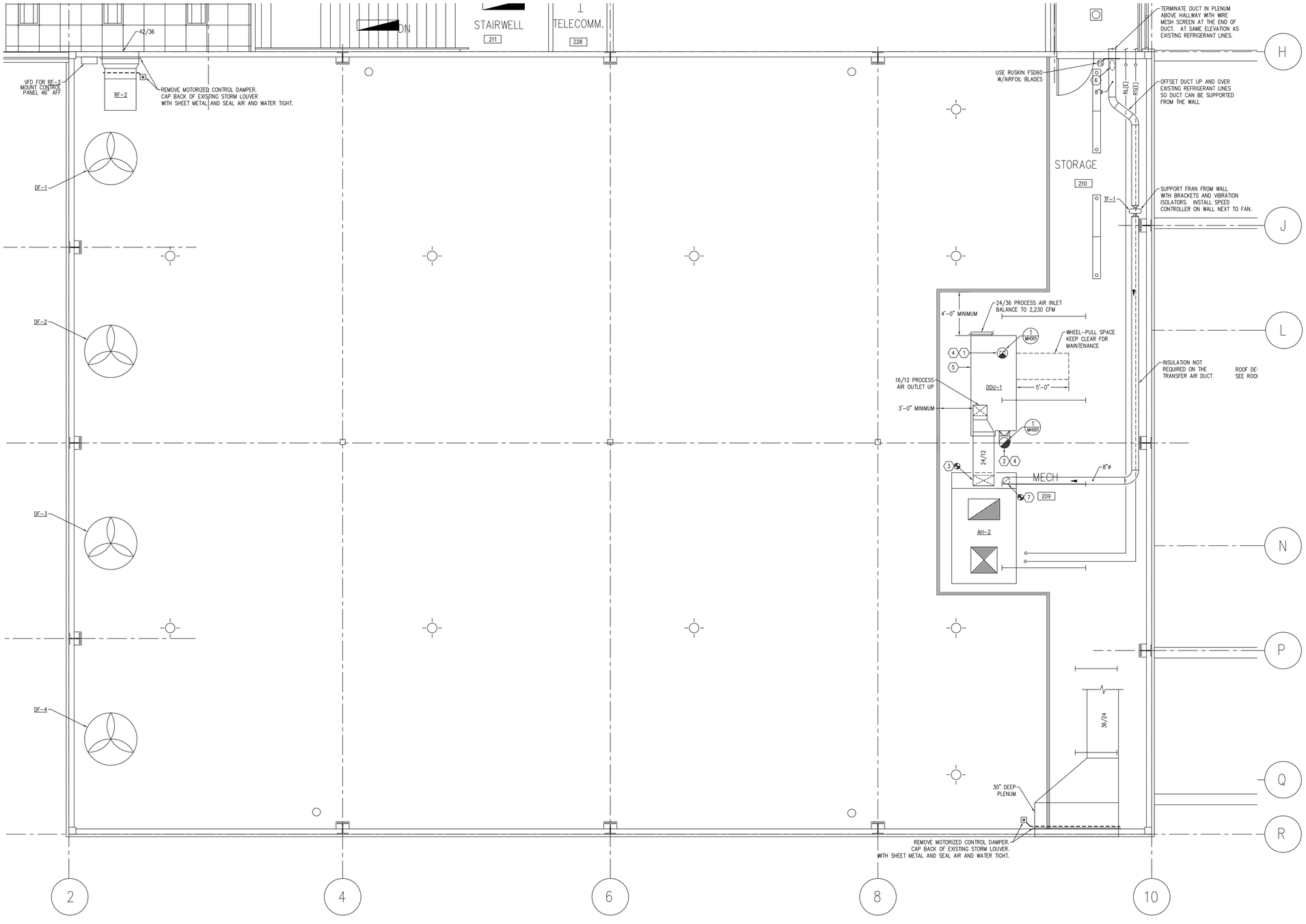
SHEET TITLE
MECHANICAL LEGEND
ABBREVIATIONS
& NOTES

SHEET NO.
MH001



1 MEZZANINE MECHANICAL PLAN

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

3' 0 2' 4' 6' 8'

KEYED NOTES

1. 12"ø REACTIVATION AIR EXHAUST UP THROUGH ROOF. CONNECT TO DDU-1 WITH 6/4 DUCT. TRANSITION FROM 12"ø TO 6/4 WITH RECTANGULAR-TO-ROUND FITTING. WRAP WITH 4" INSULATION. EXHAUST AIRSTREAM TEMPERATURE CAN BE AS HIGH AS 240°F.
2. 12"ø REACTIVATION AIR INLET UP THROUGH ROOF. TRANSITION TO 12/24 AT DDU-1 CONNECTION WITH RECTANGULAR-TO-ROUND FITTING. WRAP WITH 1 1/2" INSULATION. BALANCE TO 740 CFM.
3. CONNECT 24/12 PROCESS AIR DUCT TO AH-2. OFFSET AS NECESSARY TO CONNECT TO EXISTING MIXING BOX ABOVE RETURN AIR INLET OPENINGS.
4. INSTALL COUNTERBALANCED GRAVITY BACKDRAFT DAMPER IN DUCT TO THE ROOF.
5. SET DEHUMIDIFIER ON NEOPRENE PADS AND BOLT UNIT RAILS TO THE FLOOR.
6. PROVIDE ACCESS DOOR IN BOTTOM OF DUCT AT COBINATION FIRE/SMOKE DAMPER.
7. CONNECT 8"ø TRANSFER AIR DUCT TO EXISTING PLENUM AT END OF AIR HANDLER.

GENERAL NOTES

A. REFER TO SHEET MH001 FOR GENERAL NOTES.

SEQUENCE OF OPERATION

A. UTAH CONTROLS IS THE ONLY APPROVED CONTROLS CONTRACTOR.

B. AIR HANDLER AH-2 OPERATES AT ALL TIMES IN ORDER TO THOROUGHLY MIX THE AIR INSIDE THE ASARS SPACE AND PROVIDE EVEN TEMPERATURES THROUGHOUT THE WIDTH AND HEIGHT OF THE 3-STORY ROOM. MONITOR THE FAN MOTOR WITH AN ADJUSTABLE SET POINT CURRENT SWITCH, AND GENERATE AN ALARM WHEN THE MOTOR FAILS.

C. MAINTAIN THE ASARS SPACE AT 60°F AND 35% RELATIVE HUMIDITY. THE CONTROL SYSTEM IS TO USE DISCHARGE AIR TEMPERATURE AND HUMIDITY RESET SCHEDULES TO MAINTAIN SPACE TEMPERATURE AND HUMIDITY.

D. IF THE SPACE TEMPERATURE RISES ABOVE SET POINT, CALCULATE THE DIFFERENCE BETWEEN SET POINT AND MEASURED ROOM TEMPERATURE. COMPARE THE DIFFERENCE TO THE PROGRAMMED DISCHARGE AIR TEMPERATURE RESET SCHEDULE, AND MODULATE THE HOT GAS BYPASS VALVE TO MAINTAIN THE SCHEDULED DISCHARGE AIR TEMPERATURE SET POINT. A GREATER DIFFERENCE BETWEEN SPACE TEMPERATURE AND SPACE SET POINT MEANS THE SUPPLY AIR TEMPERATURE SET POINT WILL BE COLDER.

E. IF THE SPACE TEMPERATURE DROPS BELOW SET POINT, CALCULATE THE DIFFERENCE BETWEEN SET POINT AND MEASURED ROOM TEMPERATURE. COMPARE THE DIFFERENCE TO THE PROGRAMMED DISCHARGE AIR TEMPERATURE RESET SCHEDULE AND MODULATE THE TWO-WAY HEATING WATER INJECTION VALVE TO MAINTAIN THE SCHEDULE DISCHARGE AIR TEMPERATURE SET POINT. A GREATER DIFFERENCE BETWEEN SPACE TEMPERATURE AND SPACE SET POINT MEANS THE SUPPLY AIR TEMPERATURE SET POINT WILL BE WARMER.

F. IF THE SPACE RELATIVE HUMIDITY RISES ABOVE SET POINT, CALCULATE THE DIFFERENCE BETWEEN SPACE RELATIVE HUMIDITY SET POINT AND MEASURED ROOM RELATIVE HUMIDITY. COMPARE THE DIFFERENCE TO THE PROGRAMMED DISCHARGE AIR RELATIVE HUMIDITY RESET SCHEDULE, START DEHUMIDIFIER DDU-1 AND MODULATE THE ELECTRIC HEATING ELEMENT WITH AN SCR CONTROLLER TO MAINTAIN THE SCHEDULED DISCHARGE AIR RELATIVE HUMIDITY SET POINT. A GREATER DIFFERENCE BETWEEN MEASURED SPACE RELATIVE HUMIDITY AND SPACE RELATIVE HUMIDITY SET POINT MEANS THE SUPPLY AIR RELATIVE HUMIDITY SET POINT WILL BE LOWER. REVERSE THE SEQUENCE WHEN SPACE RELATIVE HUMIDITY DROPS BELOW SET POINT EVENTUALLY SHUTTING OFF DDU-1 AFTER THE DESICCANT DEHUMIDIFIER HAS BEEN DISABLE. MONITOR TWO FANS AND THE DESICCANT WHEEL MOTOR WITH ADJUSTABLE SET POINT CURRENT SWITCHES, AND GENERATE AN ALARM AND PAGER/EMAIL NOTIFICATION ON THE BAS WHEN A MOTOR FAILS.

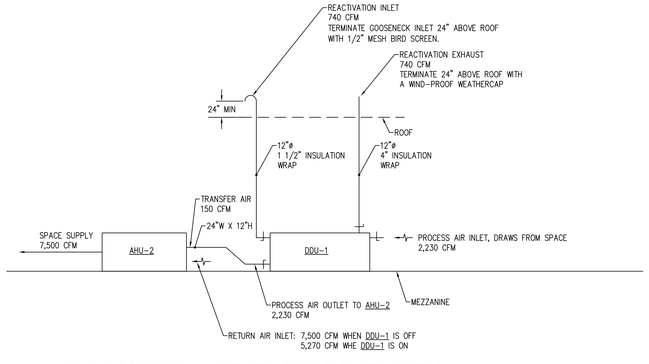
G. ALLOWABLE SPACE CONDITIONS

SPACE TEMPERATURE:
55°F TO 60°F, DO NOT EXCEED 60°F.
INITIAL SPACE TEMPERATURE SETPOINT TO BE 58°F (COOLING MODULATED ON AT 59°F SPACE TEMPERATURE, OFF AT 58°F), WITH SPACE TEMPERATURE SENSOR ACCURACY ±1°F OR LESS. REPLACE ALL SENSORS AS NECESSARY.

SPACE RELATIVE HUMIDITY:
MAXIMUM 40%, WITH VARIATIONS NO GREATER THAN 2% OVER 48 HOURS. DO NOT EXCEED 40%.
INITIAL SPACE RELATIVE HUMIDITY SETPOINT TO BE 38% (DESICCANT DEHUMIDIFIER ON AT 39%, OFF AT 38%), WITH SPACE RH SENSOR ACCURACY ±1% OR LESS. REPLACE SENSORS AS NECESSARY.

H. PROVIDE A DIFFERENTIAL PRESSURE SENSOR AT THE REACTIVATION AIR FILTER AND AT THE PROCESS AIR FILTER IN DDU-1 AND MONITOR ON DDC SYSTEM. GENERATE AN ALARM WHEN THE PRESSURE DIFFERENTIAL REACHES 1-INCH WATER COLUMN.

J. THE EXISTING AIR HANDLER AH-2, EXISTING AIR COOLED CONDENSING UNIT SERVING AH-2, AND ALL SPACE TEMPERATURE AND %RH SENSORS IN THE AUTOMATIC STORAGE AND RETRIEVAL SPACE (ASARS) ARE CONTROLLED BY THE EXISTING TAC LON SYSTEM. ALL THESE DEVICES AND THE NEW DEHUMIDIFIER AND TRANSFER FAN ARE TO BE CONTROLLED BY CSI INET CONTROLLERS AND DATA BUS, SO ALL CONTROL FUNCTIONS FOR SPACE CONDITIONS INSIDE THE ASARS ARE HANDLED BY A CSI INET SYSTEM/CONTROLLERS THAT INTERFACES WITH THE EXISTING TAC LON SYSTEM FOR USER INTERFACE/REMOTE ACCESS, AND CENTRALLY PROGRAMMED INFORMATION (TIME OF DAY, TREND LOGS, ETC.).



2 AHU-2/ DDU-1 AIR FLOW SCHEMATIC

SCALE: NONE

TRANSFER FAN SCHEDULE (TF)

PLAN CODE	AREA SERVED	TYPE	CFM @ ELEV	ESP (IN WC) @ ELEV	FAN RPM MAXIMUM	MOTOR HP	MOTOR EFFICIENCY %	MOTOR VOLTAGE/ PHASE	DAMPER (GRAVITY OR MOTOR)	METHOD OF CONTROL	INLET & OUTLET SIZE (IN)	MAXIMUM OPERATING WT (LBS)	MANUFACTURER & MODEL NUMBER	REMARKS
TF-1	ASARS	IN-LINE CENTRIFUGAL DIRECT-DRIVE	150	0.2	2,700	100 W	PREMIUM	120/1	SPRING OR GRAVITY BACKDRAFT	ATC	6	30	FANTECH FG 6	STEEL FAN WHEEL AND HOUSING. PROVIDE WITH SOLID-STATE SPEED CONTROLLER, FC NEOPRENE-LINED MOUNTING CLAMPS

DESICCANT DEHUMIDIFIER SCHEDULE (DDU)

PLAN CODE	DEHUMIDIFICATION CAPACITY EAT DB/GRAINS	DEHUMIDIFICATION CAPACITY LAT DB/GRAINS	AIRFLOW (CFM) PROCESS AIR	AIRFLOW (CFM) REACTIVATION AIR	ESP (INWC) PROCESS AIR	ESP (INWC) REACTIVATION AIR	REGEN AIR ENTERING COIL (DB/GRAINS)	REACTIVATION AIR TEMP IN/OUT AT WHEEL (°F)	ELECTRIC REGEN COIL HEAT (MBH)	MAX DEHUMIDIFICATION CAPACITY (LBS/HR)	ELECTRICAL FLA	ELECTRICAL MCA	ELECTRICAL VOLTAGE/ PHASE	MAXIMUM DIMENSIONS L X W X H (IN)	MAXIMUM DIMENSIONS MAX WEIGHT	BRY-AIR MODEL NO
DDU-1	61/37	96/9	2,230	740	0.2	0.5	96/99	285/182	173	81	72	89	460/3	115 x 52 x 77	1,100 LBS	VFB-24

JOB SITE ELEVATION = 4,400 FT
ATMOSPHERIC PRESSURE = 12.50 PSI
SELECT ALL EQUIPMENT FOR OPERATION AT JOB SITE ELEVATION

ALL MOTORS TO BE PREMIUM EFFICIENCY

REVISIONS:

NO.	DATE	DESC.

Colvin Engineering Associates, Inc.
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STATE ARCHIVES BUILDING-DEHUMIDIFICATION
300 SOUTH 500 WEST
SALT LAKE CITY UTAH

DATE 10-02-2007
SCALE 1/4" = 1'-0"
DRAWN JMN
CHECKED RLH
JOB NO. 2003.039.08
FILE NAME MH102

SHEET TITLE
MEZZANINE MECHANICIAL PLAN

SHEET NO.
MH102

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SPECIFICATIONS

BASIC ELECTRICAL MATERIALS AND METHODS16050 –

<u>SECTION 16050 – BASIC ELECTRICAL MATERIALS AND METHODS</u>

<u>GENERAL</u>

MATERIALS AND INSTALLATION SHALL COMPLY WITH THE LATEST ADOPTED EDITION OF THE NATIONAL ELECTRICAL CODE, OTHER APPLICABLE NFPA SECTIONS, STATE AND LOCAL CODES, AND RECOGNIZED INDUSTRY STANDARDS AND PRACTICES.

LISTING AND LABELING: PROVIDE PRODUCTS THAT ARE UL LISTED AND LABELED.

NEMA COMPLIANCE: COMPLY WITH CONSTRUCTION AND INSTALLATION REQUIREMENTS OF APPLICABLE NEMA STANDARDS.

SUBMITTALS: SUBMIT PRODUCT DATA AND SHOP DRAWING ON THE FOLLOWING EQUIPMENT FOR APPROVAL:

1. DISCONNECTS.

PRIOR TO SUBMITTING BID, VISIT SITE TO VERIFY ALL EXISTING CONDITIONS AND ANY ITEMS THAT WILL AFFECT WORK OF THIS PROJECT. INCLUDE ALL COSTS IN BID.

MAINTAIN A SET OF REDLINED AS–BUILT DRAWINGS AND DELIVER TO OWNER UPON COMPLETION OF PROJECT.

PROTECT ADJACENT MATERIALS INDICATED TO REMAIN. INSTALL AND MAINTAIN DUST AND NOISE BARRIERS TO KEEP DIRT, DUST, AND NOISE FROM BEING TRANSMITTED TO ADJACENT AREAS. REMOVE PROTECTION AND BARRIERS AFTER DEMOLITION OPERATIONS ARE COMPLETE.

LOCATE, IDENTIFY, AND PROTECT ELECTRICAL SERVICES WITHIN OR PASSING THROUGH DEMOLITION AREA AND SERVING OTHER AREAS OUTSIDE THE DEMOLITION LIMITS. MAINTAIN SERVICES TO AREAS OUTSIDE DEMOLITION LIMITS. WHEN SERVICES MUST BE INTERRUPTED, INSTALL TEMPORARY SERVICES FOR AFFECTED AREAS. COORDINATE POWER INTERRUPTIONS ONE WEEK IN ADVANCE WITH OWNER. IF POWER INTERRUPTIONS DISTURB NORMAL OPERATIONS, THEN POWER INTERRUPTIONS ARE ONLY ALLOWED DURING NON–BUSINESS OR NON–OPERATION HOURS.

SELECTIVE DEMOLITION: DEMOLISH, REMOVE, DEMOUNT, AND DISCONNECT ABANDONED ELECTRICAL MATERIALS AND EQUIPMENT INDICATED TO BE REMOVED. SALVAGE AND DELIVER TO OWNER ITEMS INDICATED TO BE SALVAGED, OTHERWISE, REMOVE FROM SITE AND LEGALLY DISPOSE OF ALL DEMOLISHED ITEMS.

PATCH AND REPAIR SURFACES THAT ARE DISTURBED OR DAMAGED AS A RESULT OF ELECTRICAL INSTALLATION. RESTORE SURFACES TO ORIGINAL CONDITION.

INSTALLATION OF FIRE–STOPPING SEALANT: INSTALL UL–LISTED SEALANT, INCLUDING FORMING, PACKING, AND OTHER ACCESSORY MATERIALS, TO FILL OPENINGS AROUND ELECTRICAL SERVICES PENETRATING FLOORS AND WALLS, TO PROVIDE FIRE–STOPS WITH FIRE–RESISTANCE RATINGS INDICATED FOR FLOOR OR WALL ASSEMBLY IN WHICH PENETRATION OCCURS. COMPLY WITH INSTALLATION REQUIREMENTS ESTABLISHED BY TESTING AND INSPECTING AGENCY.

END OF SECTION 16050

<u>SECTION 16100 – RACEWAYS, BOXES, AND CABINETS</u>

<u>PRODUCTS</u>

RIGID STEEL CONDUIT: ANSI C80.1.

ELECTRICAL METALLIC TUBING AND FITTINGS: ANSI C80.3 WITH SET–SCREW OR COMPRESSION–TYPE FITTINGS. CAST FITTINGS ARE NOT ALLOWED.

FLEXIBLE METAL CONDUIT: ZINC–COATED STEEL.

LIQUIDTIGHT FLEXIBLE METAL CONDUIT: FLEXIBLE STEEL CONDUIT WITH PVC JACKET.

FITTINGS: NEMA FB 1, COMPATIBLE WITH CONDUIT/TUBING MATERIALS AND SUITABLE FOR USE AND LOCATION.

RIGID NONMETALLIC CONDUIT (RNC): NEMA TC 2, SCHEDULE 40 OR 80 PVC.

PVC CONDUIT AND TUBING FITTINGS: NEMA TC 3; MATCH TO CONDUIT OR CONDUIT/TUBING TYPE AND MATERIAL. OUTLET AND DEVICE BOXES: USE ONE OF THE FOLLOWING:

1. SHEET METAL BOXES: NEMA OS 1.
2. CAST METAL BOXES: NEMA FB 1, TYPE FD, CAST FERALLOY BOX WITH GASKETED COVER.

<u>EXECUTION</u>

OUTDOORS WIRING METHODS: USE THE FOLLOWING WIRING METHODS:

1. EXPOSED: RIGID METAL CONDUIT.
2. CONCEALED: RIGID METAL CONDUIT.
3. UNDERGROUND: RIGID NONMETALLIC CONDUIT, EXCEPT THAT WRAPPED RIGID METAL SHALL BE USED FOR BENDS GREATER THAN 22 DEGREES.
4. PENETRATING CONCRETE FLOORS AND FOUNDATIONS: WRAPPED RIGID METAL CONDUIT.
5. CONNECTION TO VIBRATING EQUIPMENT (INCLUDING TRANSFORMERS AND HYDRAULIC, PNEUMATIC, OR ELECTRIC SOLENOID OR MOTOR–DRIVEN EQUIPMENT): LIQUIDTIGHT FLEXIBLE METAL CONDUIT.
6. BOXES AND ENCLOSURES: NEMA TYPE 3R OR TYPE 4.

INDOORS WIRING METHODS: USE THE FOLLOWING WIRING METHODS:

1. CONNECTION TO VIBRATING EQUIPMENT, INCLUDING TRANSFORMERS AND HYDRAULIC, PNEUMATIC, OR ELECTRIC SOLENOID OR MOTOR–DRIVEN EQUIPMENT: FLEXIBLE METAL CONDUIT (MAXIMUM OF 6 FEET), EXCEPT IN WET OR DAMP LOCATIONS USE LIQUIDTIGHT FLEXIBLE METAL CONDUIT.
2. DAMP OR WET LOCATIONS: RIGID STEEL CONDUIT.
3. EXPOSED: ELECTRICAL METALLIC TUBING OR RIGID METAL CONDUIT WHERE SUBJECT TO PHYSICAL DAMAGE.
4. CONCEALED: ELECTRICAL METALLIC TUBING.

MINIMUM RACEWAY SIZE:

1. METALLIC CONDUITS: 3/4–INCH TRADE SIZE EXCEPT ½" C TRADE SIZE FOR LOW VOLTAGE AUTOMATIC TEMPERATURE CONTROL OR MOTOR CONTROL WIRING.
2. NONMETALLIC CONDUITS: 3/4–INCH TRADE SIZE.

CONCEAL CONDUIT AND EMT, UNLESS OTHERWISE INDICATED, WITHIN FINISHED WALLS, CEILINGS, AND FLOORS.

INSTALL RACEWAYS LEVEL AND SQUARE AND AT PROPER ELEVATIONS. RUN PERPENDICULAR AND AT RIGHT ANGLES TO BUILDING AND STRUCTURAL ELEMENTS. RUN PARALLEL OR BANKED RACEWAYS TOGETHER, ON COMMON SUPPORTS WHERE PRACTICAL. MAKE BENDS IN PARALLEL OR BANKED RUNS FROM SAME CENTER LINE TO MAKE BENDS PARALLEL.

SUPPORT RACEWAYS AS FOLLOWS, IN COMPLIANCE WITH DIVISION 16 SECTION "SUPPORTING DEVICES": TWO SUPPORTS PER 10' RUN, WITHIN 12" OF A COUPLING, FITTING OR BEND GREATER THAN 45 DEGREES, AND WITHIN 12" OF EVERY BOX TO WHICH THE RACEWAY IS ENTERING OR EXITING.

EXISTING BOXES: INSTALL NEW PLASTER RINGS OR EXTENSION RINGS FOR EXISTING BOXES NOT FLUSH WITH SURFACE

RUN CONCEALED RACEWAYS WITH A MINIMUM OF BENDS IN THE SHORTEST PRACTICAL DISTANCE CONSIDERING THE TYPE OF BUILDING CONSTRUCTION AND OBSTRUCTIONS, EXCEPT AS OTHERWISE INDICATED.

RACEWAYS EMBEDDED IN SLABS: INSTALL IN MIDDLE THIRD OF THE SLAB THICKNESS WHERE PRACTICAL, AND LEAVE AT LEAST 1 INCH (25 MM) CONCRETE COVER.

JOINTS AND TERMINATIONS: JOIN RACEWAYS WITH FITTINGS DESIGNED AND APPROVED FOR THE PURPOSE AND MAKE JOINTS AND TERMINATIONS TIGHT.

1. MAKE RACEWAY TERMINATIONS TIGHT. USE BONDING BUSHINGS OR WEDGES AT CONNECTIONS SUBJECT TO VIBRATION.
2. USE BONDING JUMPERS WHERE JOINTS CANNOT BE MADE TIGHT.
3. USE INSULATING BUSHINGS TO PROTECT CONDUCTORS.

INSTALL PULL WIRES IN EMPTY RACEWAYS.

PROVIDE GROUNDING CONNECTIONS FOR RACEWAY, BOXES, AND COMPONENTS AS INDICATED AND INSTRUCTED BY MANUFACTURER. TIGHTEN CONNECTORS AND TERMINALS, INCLUDING SCREWS AND BOLTS, ACCORDING TO EQUIPMENT MANUFACTURER'S PUBLISHED TORQUE–TIGHTENING VALUES FOR EQUIPMENT CONNECTORS. WHERE MANUFACTURER'S TORQUING REQUIREMENTS ARE NOT INDICATED, TIGHTEN CONNECTORS AND TERMINALS ACCORDING TO TIGHTENING TORQUES SPECIFIED IN UL STANDARD 486A.

END OF SECTION 16100

<u>SECTION 16120 – WIRES AND CABLES</u>

<u>PRODUCTS</u>

WIRES AND CABLES: TYPE THHN/THWN COPPER CONDUCTOR.

SOLID OR STRANDED CONDUCTOR FOR 10 AWG AND SMALLER; STRANDED CONDUCTOR FOR LARGER THAN 10 AWG.

MULTICONDUCTOR CABLE: METAL–CLAD CABLE (TYPE MC), WITH GROUND WIRE.

CONNECTORS AND SPLICES: UL–LISTED FACTORY–FABRICATED WIRING CONNECTORS OF SIZE, AMPACITY RATING, MATERIAL, AND TYPE AND CLASS FOR APPLICATION AND FOR SERVICE INDICATED. SELECT TO COMPLY WITH PROJECT'S INSTALLATION REQUIREMENTS AND AS SPECIFIED IN THE "EXECUTION" ARTICLE.

COLOR–CODING OF SECONDARY PHASE CONDUCTORS: COLOR CODE SWITCH LEGS, TRAVELERS AND OTHER WIRING FOR BRANCH CIRCUITS OTHER THAN THOSE LISTED BELOW. PERMANENTLY POST COLOR CODE AT EACH BRANCH PANELBOARD. USE THE FOLLOWING COLORS FOR SERVICE, FEEDER AND BRANCH–CIRCUIT PHASE CONDUCTORS:

1. 208/120–V CONDUCTORS:
   a. PHASE A: BLACK.
   b. PHASE B: RED.
   c. PHASE C: BLUE.
2. 277/480–V CONDUCTORS:
   a. PHASE A: BROWN.
   b. PHASE B: ORANGE.
   c. PHASE C: YELLOW.

<u>EXECUTION</u>

INSTALL WIRES AND CABLES IN RACEWAYS, ACCORDING TO MANUFACTURER'S WRITTEN INSTRUCTIONS AND THE NECA "STANDARD OF INSTALLATION."

PULL CONDUCTORS INTO RACEWAY SIMULTANEOUSLY WHERE MORE THAN ONE IS BEING INSTALLED IN SAME RACEWAY.

BRANCH CIRCUITS CONCEALED IN CEILINGS, WALLS, AND PARTITIONS: TYPE THHN/THWN, SINGLE CONDUCTORS IN RACEWAY OR METAL–CLAD CABLE, TYPE MC, IN LENGTHS BETWEEN OUTLETS 30' OR LESS AND NOT AS HOME RUNS.

CONDUCTOR SPLICES: KEEP TO MINIMUM.

INSTALL SPLICES AND TAPES THAT POSSESS EQUIVALENT OR BETTER MECHANICAL STRENGTH AND INSULATION RATINGS THAN CONDUCTORS BEING SPLICED.

USE SPLICE AND TAP CONNECTORS THAT ARE COMPATIBLE WITH CONDUCTOR MATERIAL.

WIRING AT OUTLETS: INSTALL WITH AT LEAST 12 INCHES (300 MM) OF SLACK CONDUCTOR AT EACH OUTLET.

CONNECT OUTLETS AND COMPONENTS TO WIRING AND TO GROUND AS INDICATED AND INSTRUCTED BY MANUFACTURER. TIGHTEN CONNECTORS AND TERMINALS, INCLUDING SCREWS AND BOLTS, ACCORDING TO EQUIPMENT MANUFACTURER'S PUBLISHED TORQUE–TIGHTENING VALUES FOR EQUIPMENT CONNECTORS. WHERE MANUFACTURER'S TORQUING REQUIREMENTS ARE NOT INDICATED, TIGHTEN CONNECTORS AND TERMINALS ACCORDING TO TIGHTENING TORQUES SPECIFIED IN UL STANDARD 486A.

END OF SECTION 16120

<u>SECTION 16190 – SUPPORTING DEVICES</u>

<u>PRODUCTS</u>

MANUFACTURED SUPPORTING DEVICES:

1. RACEWAY SUPPORTS: CLEVIS HANGERS, RISER CLAMPS, CONDUIT STRAPS, THREADED C–CLAMPS WITH RETAINERS, CEILING TRAPEZE HANGERS, WALL BRACKETS, AND SPRING STEEL CLAMPS.
2. FASTENERS: TYPES, MATERIALS, AND CONSTRUCTION FEATURES AS FOLLOWS:
   a. EXPANSION ANCHORS: CARBON STEEL WEDGE OR SLEEVE TYPE.
   b. TOGGLE BOLTS: ALL STEEL SPRINGHEAD TYPE.
   c. POWDER–DRIVEN THREADED STUDS: HEAT–TREATED STEEL, DESIGNED SPECIFICALLY FOR THE INTENDED SERVICE.
3. U–CHANNEL SYSTEMS: 16–GAGE STEEL CHANNELS, WITH 9/16–INCH–DIAMETER HOLES, AT A MINIMUM OF 8 INCHES ON CENTER, IN TOP SURFACE. PROVIDE FITTINGS AND ACCESSORIES THAT MATE AND MATCH WITH U–CHANNEL AND ARE OF THE SAME MANUFACTURER.

FABRICATED SUPPORTING DEVICES: SHOP–OR FIELD–FABRICATED SUPPORTS OR MANUFACTURED SUPPORTS ASSEMBLED FROM U–CHANNEL COMPONENTS.

1. STEEL BRACKETS: FABRICATED OF ANGLES, CHANNELS, AND OTHER STANDARD STRUCTURAL SHAPES. CONNECT WITH WELDS AND MACHINE BOLTS TO FORM RIGID SUPPORTS.

<u>EXECUTION</u>

INSTALL SUPPORTING DEVICES TO FASTEN ELECTRICAL COMPONENTS SECURELY AND PERMANENTLY IN ACCORDANCE WITH NEC REQUIREMENTS. COORDINATE WITH THE BUILDING STRUCTURAL SYSTEM AND WITH OTHER ELECTRICAL INSTALLATION.

RACEWAY SUPPORTS: COMPLY WITH THE NEC AND THE FOLLOWING REQUIREMENTS:

1. CONFORM TO MANUFACTURER'S RECOMMENDATIONS FOR SELECTION AND INSTALLATION OF SUPPORTS.
2. STRENGTH OF EACH SUPPORT SHALL BE ADEQUATE TO CARRY PRESENT AND FUTURE LOAD MULTIPLIED BY A SAFETY FACTOR OF AT LEAST FOUR, BUT IN NO CASES SHALL BE LESS THAN 200 LBS IN THE STRENGTH OF EACH SUPPORT.
3. INSTALL INDIVIDUAL AND MULTIPLE (TRAPEZE) RACEWAY HANGERS AND RISER CLAMPS AS NECESSARY TO SUPPORT RACEWAYS. PROVIDE U–BOLTS, CLAMPS, ATTACHMENTS, AND OTHER HARDWARE NECESSARY FOR HANGER ASSEMBLY AND FOR SECURING HANGER RODS AND CONDUITS.

MISCELLANEOUS SUPPORTS: SUPPORT MISCELLANEOUS ELECTRICAL COMPONENTS AS REQUIRED TO PRODUCE THE SAME STRUCTURAL SAFETY FACTORS AS SPECIFIED FOR RACEWAY SUPPORTS. INSTALL METAL CHANNEL RACKS FOR MOUNTING CABINETS, PANELBOARDS, DISCONNECTS, CONTROL ENCLOSURES, PULL BOXES, JUNCTION BOXES, TRANSFORMERS, AND OTHER DEVICES.

IN OPEN OVERHEAD SPACES, CAST BOXES THREADED TO RACEWAYS NEED NOT BE SUPPORTED SEPARATELY EXCEPT WHERE USED FOR FIXTURE SUPPORT; SUPPORT SHEET METAL BOXES DIRECTLY FROM THE BUILDING STRUCTURE OR BY BAR HANGERS. WHERE BAR HANGERS ARE USED, ATTACH THE BAR TO RACEWAYS ON OPPOSITE SIDES OF THE BOX AND SUPPORT THE RACEWAY WITH AN APPROVED TYPE OF FASTENER NOT MORE THAN 24 INCHES FROM THE BOX.

FASTENING: UNLESS OTHERWISE INDICATED, FASTEN ELECTRICAL ITEMS AND THEIR SUPPORTING HARDWARE SECURELY TO THE BUILDING STRUCTURE, INCLUDING BUT NOT LIMITED TO CONDUITS, RACEWAYS, CABLES, CABLE TRAYS, BUSWAYS, CABINETS, PANELBOARDS, TRANSFORMERS, BOXES, DISCONNECT SWITCHES, AND CONTROL COMPONENTS IN ACCORDANCE WITH THE FOLLOWING:

1. FASTEN BY MEANS OF WOOD SCREWS OR SCREW–TYPE NAILS ON WOOD, TOGGLE BOLTS ON HOLLOW MASONRY UNITS, CONCRETE INSERTS OR EXPANSION BOLTS ON CONCRETE OR SOLID MASONRY, AND MACHINE SCREWS, WELDED THREADED STUDS, OR SPRING–TENSION CLAMPS ON STEEL. THREADED STUDS DRIVEN BY A POWDER CHARGE AND PROVIDED WITH LOCK WASHERS AND NUTS MAY BE USED INSTEAD OF EXPANSION BOLTS AND MACHINE OR WOOD SCREWS. DO NOT WELD CONDUIT, PIPE STRAPS, OR ITEMS OTHER THAN THREADED STUDS TO STEEL STRUCTURES. IN PARTITIONS OF LIGHT STEEL CONSTRUCTION, USE SHEET METAL SCREWS.
2. HOLES CUT TO DEPTH OF MORE THAN 1–1/2 INCHES IN REINFORCED CONCRETE BEAMS OR TO DEPTH OF MORE THAN ¾ INCH IN CONCRETE SHALL NOT CUT THE MAIN REINFORCING BARS. FILL HOLES THAT ARE NOT USED.
3. ENSURE THAT THE LOAD APPLIED TO ANY FASTENER DOES NOT EXCEED 25 PERCENT OF THE PROOF TEST LOAD. USE VIBRATION– AND SHOCK–RESISTANT FASTENERS FOR ATTACHMENTS TO CONCRETE SLABS.

END OF SECTION 16190

<u>SECTION 16452 – GROUNDING</u>

<u>PRODUCTS</u>

GROUNDING AND BONDING PRODUCTS: TYPES AS INDICATED. WHERE TYPES, SIZES, RATINGS, AND QUANTITIES INDICATED DIFFER FROM NEC REQUIREMENTS, THE MORE STRINGENT REQUIREMENTS AND THE GREATER SIZE, RATING, AND QUANTITY INDICATIONS GOVERN.

CONDUCTOR MATERIALS: COPPER.

EQUIPMENT GROUNDING CONDUCTOR: GREEN INSULATED.

BARE COPPER CONDUCTORS: CONFORM TO THE FOLLOWING:

1. SOLID CONDUCTORS: ASTM B–3.
2. ASSEMBLY OF STRANDED CONDUCTORS: ASTM B–8.
3. TINNED CONDUCTORS: ASTM B–33.

CONNECTOR PRODUCTS: LISTED AND LABELED AS GROUNDING CONNECTORS FOR THE MATERIALS WITH WHICH USED.

PRESSURE CONNECTORS: HIGH–CONDUCTIVITY PLATED UNITS.

BOLTED CLAMPS: HEAVY–DUTY UNITS LISTED FOR THE APPLICATION.

<u>EXECUTION</u>

EQUIPMENT GROUNDING CONDUCTOR APPLICATION: COMPLY WITH NEC ARTICLE 250 FOR SIZES AND QUANTITIES OF EQUIPMENT GROUNDING CONDUCTORS, EXCEPT WHERE LARGER SIZES OR MORE CONDUCTORS ARE INDICATED. INSTALL EQUIPMENT GROUND CONDUCTORS IN ALL FEEDER AND BRANCH CIRCUIT RACEWAYS.

INSTALLATION, GENERAL: GROUND ELECTRICAL SYSTEMS AND EQUIPMENT IN ACCORDANCE WITH NEC EXCEPT WHERE GROUNDING IN EXCESS OF NEC REQUIREMENTS IS INDICATED.

ROUTE GROUNDING AND BONDING CONDUCTORS USING THE SHORTEST AND STRAIGHTEST PATHS POSSIBLE WITHOUT OBSTRUCTING ACCESS OR PLACING CONDUCTORS WHERE THEY MAY BE SUBJECTED TO STRAIN, IMPACT, OR DAMAGE, EXCEPT AS INDICATED.

CONNECTIONS: MAKE CONNECTIONS IN SUCH A MANNER AS TO MINIMIZE POSSIBILITY OF GALVANIC ACTION OR ELECTROLYSIS. SELECT CONNECTORS, CONNECTION HARDWARE, CONDUCTORS, AND CONNECTION METHODS SO METALS IN DIRECT CONTACT WILL BE GALVANICALLY COMPATIBLE.

TIGHTEN GROUNDING AND BONDING CONNECTORS AND TERMINALS, INCLUDING SCREWS AND BOLTS, IN ACCORDANCE WITH MANUFACTURER'S PUBLISHED TORQUE TIGHTENING VALUES FOR CONNECTORS AND BOLTS. WHERE MANUFACTURER'S TORQUING REQUIREMENTS ARE NOT INDICATED, TIGHTEN CONNECTIONS TO COMPLY WITH TIGHTENING TORQUE VALUES SPECIFIED IN UL 486A AND UL 486B.

COMPRESSION–TYPE CONNECTIONS: USE HYDRAULIC COMPRESSION TOOLS TO PROVIDE THE CORRECT CIRCUMFERENTIAL PRESSURE FOR COMPRESSION CONNECTORS. USE TOOLS AND DIES RECOMMENDED BY THE MANUFACTURER OF THE CONNECTORS. PROVIDE EMBOSSING DIE CODE OR OTHER STANDARD METHOD TO MAKE A VISIBLE INDICATION THAT A CONNECTOR HAS BEEN ADEQUATELY COMPRESSED ON THE CONDUCTOR.

END OF SECTION 16452

<u>SECTION 16476 – DISCONNECTS, CIRCUIT BREAKERS AND FUSES</u>

<u>PRODUCTS</u>

ENCLOSED NONFUSIBLE SWITCH: NEMA KS 1, HEAVY DUTY TYPE, HANDLE LOCKABLE WITH 2 PADLOCKS, ENCLOSURE CONSISTENT WITH ENVIRONMENT WHERE LOCATED, MINIMUM FAULT CURRENT RATING OF 200,000 SYMMETRICAL RMS AMPERES.

ENCLOSED MOLDED–CASE CIRCUIT BREAKER: NEMA AB 1, HANDLE LOCKABLE WITH 2 PADLOCKS.

1. CHARACTERISTICS: FRAME SIZE, TRIP RATING, NUMBER OF POLES, AND AUXILIARY DEVICES AS INDICATED; INTERRUPTING CAPACITY RATING TO MEET AVAILABLE FAULT CURRENT, 10,000 SYMMETRICAL RMS AMPERES MINIMUM; WITH APPROPRIATE APPLICATION LISTING WHEN USED FOR SWITCHING FLUORESCENT LIGHTING LOADS OR HEATING, AIR CONDITIONING, AND REFRIGERATION EQUIPMENT.
2. LUGS: MECHANICAL LUGS AND POWER–DISTRIBUTION CONNECTORS FOR NUMBER, SIZE, AND MATERIAL OF CONDUCTORS INDICATED.
3. ENCLOSURE: NEMA AB 1, TYPE 1, UNLESS SPECIFIED OR REQUIRED OTHERWISE TO MEET ENVIRONMENTAL CONDITIONS OF INSTALLED LOCATION.

FUSES: NEMA FU 1 NONRENEWABLE CARTRIDGE FUSE, CLASS AS SPECIFIED OR INDICATED, CURRENT RATING AS INDICATED, VOLTAGE RATING CONSISTENT WITH CIRCUIT VOLTAGE.

1. MOTOR OVER–CURRENT PROTECTION: RKS TIME DELAY.

<u>EXECUTION</u>

CONNECT ENCLOSED SWITCHES AND CIRCUIT BREAKERS AND COMPONENTS TO WIRING SYSTEM AND TO GROUND AS INDICATED AND INSTRUCTED BY MANUFACTURER. TIGHTEN CONNECTORS AND TERMINALS, INCLUDING SCREWS AND BOLTS ACCORDING TO EQUIPMENT MANUFACTURER'S PUBLISHED TORQUE TIGHTENING VALUES FOR EQUIPMENT CONNECTORS. WHERE MANUFACTURER'S TORQUING REQUIREMENTS ARE NOT INDICATED, TIGHTEN CONNECTORS AND TERMINALS ACCORDING TO TIGHTENING TORQUES SPECIFIED IN UL STANDARD 486A.

END SECTION 16476

SYMBOL LEGEND

SYMBOL	DESCRIPTION
REFERENCE AND LINE SYMBOLS	
A5 / E–501	DETAIL INDICATOR: A5 INDICATES DETAIL NUMBER, E–501 INDICATES DRAWING SHEET WHERE DETAIL IS SHOWN.
A5 / E–201	ELEVATION OR SECTION INDICATOR, EXTERIOR: A5 INDICATES ELEVATION OR SECTION NUMBER, E–201 INDICATES DRAWING SHEET WHERE ELEVATION OR SECTION IS SHOWN.
A5 / E–201	ELEVATION OR SECTION INDICATOR, INTERIOR: A5 INDICATES ELEVATION OR SECTION NUMBER, E–201 INDICATES DRAWING SHEET WHERE ELEVATION OR SECTION IS SHOWN.
100	ROOM OR SPACE NUMBER.
1	KEYNOTE INDICATOR.
1	REVISION INDICATOR.
CU–1	EQUIPMENT INDICATOR.
	BREAK, STRAIGHT: TO BREAK PARTS OF DRAWING.
	BREAK, ROUND.
	NEW LINE: MEDIUM LINE.
-----------	HIDDEN FEATURES LINE: HIDDEN, THIN LINE.
WIRING METHODS	
	WIRING.
A–1,3,5	BRANCH CIRCUIT HOME RUN TO PANELBOARD: NUMBER OF ARROWS INDICATES NUMBER OF CIRCUITS. LETTER AND NUMBER NOTATIONS IDENTIFY PANEL AND CIRCUIT NUMBERS. USE #12 CONDUCTORS, EXCEPT #10 CONDUCTORS SHALL BE INSTALLED IF DISTANCES EXCEED THOSE SPECIFIED IN SECTION 16120.
1 A–1,3,5	BRANCH CIRCUIT HOME RUN TO PANELBOARD: NUMBER OF ARROWS INDICATES NUMBER OF CIRCUITS. LETTER AND NUMBER NOTATIONS IDENTIFY PANEL AND CIRCUIT NUMBERS. NUMBER IN BOX REFERS TO THE CONDUCTOR AND CONDUIT SCHEDULE. FOR BRANCH WIRING USE #12 CONDUCTORS, EXCEPT #10 CONDUCTORS SHALL BE INSTALLED IF DISTANCES EXCEED THOSE SPECIFIED IN SECTION 16120.
	CONDUIT STUB. DIMENSION RECORD DRAWINGS AND MARK.
1	CONDUCTOR & CONDUIT ("CC") SCHEDULE INDICATOR. REFER TO ONE–LINE DIAGRAM.
J	JUNCTION BOX.
LIGHTING (REFER TO FIXTURE SCHEDULE FOR SYMBOLS)	
(W–3)	FIXTURE IDENTIFICATION: (W–3) INDICATES FIXTURE TYPE AS SCHEDULED.
LIGHTING CONTROL	
P	PHOTOCELL.
WIRING DEVICES	
W	RECEPTACLE, DUPLEX WITH GROUND FAULT CIRCUIT INTERRUPTER, WET LABEL, "WEATHERPROOF IN USE": NEMA 5–20R.
	RECEPTACLE, DUPLEX WITH GROUND FAULT CIRCUIT INTERRUPTER: NEMA 5–20R.
	RECEPTACLE, SPECIAL PURPOSE. PROVIDE RECEPTACLE TO MATCH EQUIPMENT PLUG.
X $	SWITCH, SINGLE POLE ("x" INDICATES FIXTURES CONTROLLED).
X $3	SWITCH, THREE–WAY ("x" INDICATES FIXTURES CONTROLLED).
X $4	SWITCH, FOUR–WAY ("x" INDICATES FIXTURES CONTROLLED).
ELECTRICAL POWER AND DISTRIBUTION	
	CIRCUIT BREAKER, MOLDED CASE (ONE–LINE DIAGRAM).
	MOTOR.
	TRANSFORMER (ONE–LINE DIAGRAM).
225/3 "1H"	PANELBOARD WITH MAIN CIRCUIT BREAKER. SIZE AND PHASE AS SHOWN (ONE–LINE DIAGRAM).
225/3 "1H" 60/3	PANELBOARD WITH MAIN AND SUB FEED CIRCUIT BREAKER (ONE–LINE DIAGRAM).
225/3 "1H" "1H"	PANELBOARD WITH CIRCUIT BREAKER AND SUB FEED LUGS (ONE–LINE DIAGRAM).
	DISCONNECT SWITCH, FUSED.
	DISCONNECT SWITCH, UNFUSED.
	STARTER, COMBINATION WITH DISCONNECT SWITCH.
	STARTER OR MOTOR CONTROLLER.
	PUSHBUTTONS, MOTOR CONTROL.
	MOTOR.
$ST	SWITCH, TOGGLE MOTOR STARTER WITH OVERLOAD PROTECTION.

ABBREVIATIONS

NOTE: ALL ABBREVIATIONS MAY NOT BE USED.

1P	SINGLE POLE
1PH	SINGLE–PHASE
1WAY	ONE–WAY
2/C	TWO–CONDUCTOR
2WAY	TWO–WAY
3/C	THREE–CONDUCTOR
3PH	THREE–PHASE
3WAY	THREE–WAY
4OUT	QUADRUPLE RECEPTACLE OUTLET
4PDT	FOUR–POLE DOUBLE THROW
4PST	FOUR–POLE SINGLE THROW
4W	FOUR–WIRE
4WAY	FOUR–WAY
A	ABOVE COUNTER
AC	ARMORED CABLE
ADA	AMERICANS WITH DISABILITIES ACT
ADJ	ADJACENT
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AIC	AMPERE INTERRUPTING CAPACITY
ALUM	ALUMINUM
AMP	AMPERE
ANN	ANNUNCIATOR
AP	ACCESS POINT (WIRELESS DATA)
AR	AS REQUIRED
ASC	AMPS SHORT CIRCUIT
ATS	AUTOMATIC TRANSFER SWITCH
AV	AUDIO VISUAL
AWG	AMERICAN WIRE GAGE
BB XFMR	BUCK–BOOST TRANSFORMER
C	CEILING MOUNTED
CATV	COMMUNITY ANTENNA TELEVISION
CB	CIRCUIT BREAKER
CCBA	CUSTOM COLOR AS SELECTED BY ARCHITECT
CCTV	CLOSED CIRCUIT TELEVISION
CFBA	CUSTOM FINISH AS SELECTED BY ARCHITECT
CF/CI	CONTRACTOR FURNISHED/ CONTRACTOR INSTALLED
CF/OI	CONTRACTOR FURNISHED/ OWNER INSTALLED
CKT	CIRCUIT
CM	CONSTRUCTION MANAGER
CND	CONDUIT
CO	CONVENIENCE OUTLET
COR	CONTRACTING OFFICER'S REPRESENTATIVE
CP	CONTROL PANEL
CT	CURRENT TRANSFORMER
CTV	CABLE TELEVISION
CU	COPPER
dBA	UNIT OF SOUND LEVEL
DPDT	DOUBLE POLE DOUBLE THROW
DS	DISCONNECT SWITCH
EA	EACH
EM	EMERGENCY
EMT	ELECTRICAL METALLIC TUBING
ENT	ELECTRICAL NONMETALLIC TUBING
EPO	EMERGENCY POWER OFF
EQUIP	EQUIPMENT
EXIST	EXISTING
F	FURNITURE MOUNTED
FA	FIRE ALARM
FCP	FIRE ALARM CONTROL PANEL
FLA	FULL LOAD AMPS
FMC	FLEXIBLE METALCONDUIT
FOB	FREIGHT ON BOARD
FVNR	FULL VOLTAGE NON–REVERSING
FVR	FULL VOLTAGE REVERSING
G	GROUND
GEN	GENERATOR
GFCI	GROUND FAULT CIRCUIT INTERRUPTER
GFP	GROUND FAULT PROTECTION
HD	HEAVY DUTY
HID	HIGH INTENSITY DISCHARGE
HOA	HAND–OFF–AUTOMATIC
HP	HORSE POWER
HPF	HIGH POWER FACTOR
HPS	HIGH PRESSURE SODIUM
HV	HIGH VOLTAGE
HZ	HERTZ
IG	ISOLATED GROUND
IMC	INTERMEDIATE METAL CONDUIT
IN/IS	INSULATED/ISOLATED
I/O	INPUT/OUTPUT
IR	INFRARED
J–BOX	JUNCTION BOX

KV	KILOVOLT
KVA	KILOVOLT AMPERE
kVAR	KILOVOLT AMPERE REACTIVE
kW	KILOWATT
kWh	KILOWATT HOUR
LED	LIGHT EMITTING DIODE
LFMC	LIQUID TIGHT FLEXIBLE METAL CONDUIT
LFNC	LIQUID TIGHT FLEXIBLE NONMETALLIC CONDUIT
LPS	LOW PRESSURE SODIUM
LRA	LOCKED ROTOR AMPS
LTG	LIGHTING
LV	LOW VOLTAGE
MATV	MASTER ANTENNA TELEVISION SYSTEM
MAX	MAXIMUM
MC	METAL CLAD
MCA	MINIMUM CIRCUIT AMPS
MCB	MAIN CIRCUIT BREAKER
MCC	MOTOR CONTROL CENTER
MCP	MOTOR CIRCUIT PROTECTION
MDP	MAIN DISTRIBUTION PANEL
MG	MOTOR GENERATOR
MH	MANHOLE
MIN	MINIMUM
MLO	MAIN LUGS ONLY
MOCP	MAXIMUM OVERCURRENT PROTECTION
NA	NOT APPLICABLE
NC	NORMALLY CLOSED
NEC	NATIONAL ELECTRICAL CODE
NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
NFC	NATIONAL FIRE CODE
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NIC	NOT IN CONTRACT
NL	NIGHT LIGHT
NO	NORMALLY OPEN
NTS	NOT TO SCALE
OC	ON CENTER
OCP	OVER CURRENT PROTECTION
OF/CI	OWNER FURNISHED/ CONTRACTOR INSTALLED
OF/OI	OWNER FURNISHED/ OWNER INSTALLED
OFP	OBTAIN FROM PLANS
OH DR	OVERHEAD (COILING) DOOR
OL	OVERLOAD
PB	PUSHBUTTON
PF	POWER FACTOR
PH	PHASE
PNL	PANEL
PT	POTENTIAL TRANSFORMER
PTZ	PAN/TILT/ZOOM
QTY	QUANTITY
R	REMOVE
RCP	REFLECTED CEILING PLAN
RMC	RIGID METAL CONDUIT
RNC	RIGID NONMETALLIC CONDUIT
RPM	REVOLUTIONS PER MINUTE
RR	REMOVE AND RELOCATE
SCA	SHORT CIRCUIT AMPS
SCBA	STANDARD COLOR AS SELECTED BY ARCHITECT
SF	SQUARE FOOT (FEET)
SFBA	STANDARD FINISH AS SELECTED BY ARCHITECT
SPDT	SINGLE POLE, DOUBLE THROW
SPEC	SPECIFICATION
SPST	SINGLE POLE, SINGLE THROW
S/S	START/STOP
ST	SINGLE THROW
SWBD	SWITCHBOARD
SWGR	SWITCHGEAR
TL	TWIST LOCK
TP	TELEPHONE POLE
TP	TWISTED PAIR
TTB	TELEPHONE TERMINAL BOARD
TV	TELEVISION
TVSS	TRANSIENT VOLTAGE SURGE SUPPRESSER
TYP	TYPICAL
UF	UNDERFLOOR
UGND	UNDERGROUND
UPS	UNINTERRUPTIBLE POWER SUPPLY
V	VOLTS
VA	VOLT AMPERE
VFC	VARIABLE FREQUENCY CONTROLLER
W/	WITH
W/O	WITHOUT
WP	WEATHERPROOF
XFMR	TRANSFORMER

DEFINITIONS

NOTE: ALL DEFINITIONS MAY NOT BE USED.

INDICATED: THE TERM "INDICATED" REFERS TO GRAPHIC REPRESENTATIONS, NOTES, OR SCHEDULES ON THE DRAWINGS, OTHER PARAGRAPHS OR SCHEDULES IN THE SPECIFICATIONS, AND SIMILAR REQUIREMENTS IN THE CONTRACT DOCUMENTS. WHERE TERMS SUCH AS "SHOWN", "NOTED", "SCHEDULED", AND "SPECIFIED" ARE USED, IT IS TO HELP THE READER LOCATE THE REFERENCE, NO LIMITATION ON LOCATION IS INTENDED.

DIRECTED: TERMS SUCH AS "DIRECTED", "REQUESTED", AUTHORIZED", "SELECTED", "APPROVED", "REQUIRED", AND "PERMITTED" MEAN "DIRECTED BY THE ENGINEER", "REQUESTED BY THE ENGINEER", AND SIMILAR PHRASES.

APPROVED: THE TERM "APPROVED", WHERE USED IN CONJUNCTION WITH THE ENGINEER'S ACTION ON THE CONTRACTOR'S SUBMITTALS, APPLICATIONS, AND REQUESTS, IS LIMITED TO THE ENGINEER'S DUTIES AND RESPONSIBILITIES AS STATED IN GENERAL AND SUPPLEMENTARY CONDITIONS.

FURNISH: THE TERM "FURNISH" IS USED TO MEAN "SUPPLY AND DELIVER TO THE PROJECT SITE, READY FOR UNLOADING, UNPACKING, ASSEMBLY, INSTALLATION, AND SIMILAR OPERATIONS."

INSTALL: THE TERM "INSTALL" IS USED TO DESCRIBE OPERATIONS AT PROJECT SITE INCLUDING THE ACTUAL "UNLOADING, UNPACKING, ASSEMBLY, ERECTION, PLACING, ANCHORING, APPLYING, WORKING TO DIMENSION, FINISHING, CURING, PROTECTING, CLEANING, AND SIMILAR OPERATIONS."

PROVIDE: THE TERM "PROVIDE" MEANS "TO FURNISH AND INSTALL, COMPLETE AND READY FOR THE INTENDED USE."

INSTALLER: AN "INSTALLER" IS THE CONTRACTOR OR AN ENTITY ENGAGED BY THE CONTRACTOR, EITHER AS AN EMPLOYEE, SUBCONTRACTOR, OR SUB–SUBCONTRACTOR, FOR PERFORMANCE OF A PARTICULAR CONSTRUCTION ACTIVITY, INCLUDING INSTALLATION, ERECTION, APPLICATION, AND SIMILAR OPERATIONS. INSTALLERS ARE REQUIRED TO BE EXPERIENCED IN THE OPERATIONS THEY ARE ENGAGED TO PERFORM.

TECHNOLOGY SYSTEMS: THE TERM "TECHNOLOGY SYSTEMS" IS USED TO DESCRIBE ALL LOW VOLTAGE SYSTEMS GENERALLY REFERRED TO AS "SPECIAL SYSTEMS". THESE SYSTEMS INCLUDE BUT ARE NOT NECESSARILY LIMITED TO ALL SYSTEMS WHICH UTILIZE VOLTAGES OF LESS THAN 71 VOLTS SUCH AS SOUND SYSTEMS, VIDEO SYSTEMS, TV SYSTEMS, SECURITY SYSTEMS, VOICE AND DATA CABLING SYSTEMS, ETC...

GENERAL ELECTRICAL NOTES

1. CLARIFICATION METHODS: AT THE TIME OF BIDDING, BIDDERS SHALL FAMILIARIZE THEMSELVES WITH THE DRAWINGS AND SPECIFICATIONS. ANY QUESTIONS, MISUNDERSTANDINGS, CONFLICTS, DELETIONS, DISCONTINUED PRODUCTS, CATALOG NUMBER DISCREPANCIES, DISCREPANCIES BETWEEN THE EQUIPMENT SUPPLIED AND THE INTENT OR FUNCTION OF THE EQUIPMENT, ETC, SHALL BE SUBMITTED TO THE ARCHITECT/ENGINEER IN WRITING FOR CLARIFICATION PRIOR TO ISSUANCE OF THE FINAL ADDENDUM AND BIDDING OF THE PROJECT. WHERE DISCREPANCIES OR MULTIPLE INTERPRETATIONS OCCUR, THE MOST STRINGENT (WHICH IS GENERALLY RECOGNIZED AS THE MOST COSTLY) THAT MEETS THE INTENT OF THE DOCUMENTS SHALL BE ENFORCED.

2. OWNER FURNISHED ITEMS: THE OWNER WILL FURNISH MATERIAL AND EQUIPMENT AS INDICATED IN THE CONTRACT DOCUMENTS TO BE INCORPORATED INTO THE WORK. THESE ITEMS ARE ASSIGNED TO THE INSTALLER AND COSTS FOR RECEIVING, HANDLING, STORAGE, IF REQUIRED, AND INSTALLATION ARE INCLUDED IN THE CONTRACT SUM.

   A. THE INSTALLER'S RESPONSIBILITIES ARE THE SAME AS IF THE INSTALLER FURNISHED THE MATERIALS OR EQUIPMENT.

   B. THE OWNER WILL ARRANGE AND PAY FOR DELIVERY OF OWNER FURNISHED ITEMS FREIGHT ON BOARD JOB SITE AND THE INSTALLER WILL INSPECT DELIVERIES FOR DAMAGE. IF OWNER FURNISHED ITEMS ARE DAMAGED, DEFECTIVE OR MISSING, DOCUMENT DAMAGED ITEMS WITH THE TRANSPORT COMPANY AND THE OWNER WILL ARRANGE FOR REPLACEMENT. THE OWNER WILL ALSO ARRANGE FOR MANUFACTURER'S FIELD SERVICES, AND THE DELIVERY OF MANUFACTURER'S WARRANTIES AND BONDS TO THE INSTALLER.

   C. THE INSTALLER IS RESPONSIBLE FOR DESIGNATING THE DELIVERY DATES OF OWNER FURNISHED ITEMS AND FOR RECEIVING, UNLOADING AND HANDLING OWNER FURNISHED ITEMS AT THE SITE. THE INSTALLER IS RESPONSIBLE FOR PROTECTING OWNER FURNISHED ITEMS FROM DAMAGE, INCLUDING DAMAGE FROM EXPOSURE TO THE ELEMENTS, AND TO REPAIR OR REPLACE ITEMS DAMAGED AS A RESULT OF HIS OPERATIONS.

3. EXPOSED STRUCTURE AREAS (EXCLUDING MECHANICAL, ELECTRICAL, AND COMMUNICATION SPACES): INSTALL RACEWAYS BETWEEN DECK AND STRUCTURE WHEREVER POSSIBLE IN EXPOSED STRUCTURE CEILING AREAS. ROUTE RACEWAYS IN CONCEALED AREAS WHEREVER POSSIBLE. REFER ALL CONDITIONS WHERE RACEWAYS MUST BE INSTALLED WHICH CANNOT COMPLY WITH THESE REQUIREMENTS TO THE ARCHITECT.

4. SUBMITTALS: PROVIDE SUBMITTALS IN THREE RING BINDERS WITH JOB NAME, SUBCONTRACTOR, AND VOLUME ON THE BINDING. PREPARE TABS FOR EACH SPECIFICATION SECTION REQUIRING SUBMITTALS. PREPARE INDEX OF EQUIPMENT SUBMITTED IN EACH TAB.

5. REFLECTED CEILING PLANS: COORDINATE THE LOCATION OF LIGHT FIXTURES WITH THE ARCHITECTURAL REFLECTED CEILING PLANS. REFER ALL DISCREPANCIES TO THE ARCHITECT AND ENGINEER.

ELECTRICAL SHEET INDEX

SHEET NO	SHEET TITLE
EE–001	SYMBOL LEGEND/SHEET INDEX
EP–101	POWER PLAN, ONE–LINE DIAGRAM, AND EQUIPMENT SCHEDULE

REVISIONS: NO.	DATE	DESC.

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STATE ARCHIVES BUILDING–DEHUMIDIFICATION
300 SOUTH 500 WEST
SALT LAKE CITY UTAH

DATE 10–02–2007
SCALE AS NOTED
DRAWN WRT
CHECKED WNF
JOB NO. 2003.039.08
FILE NAME MH102

SHEET TITLE
SYMBOL LEGEND/ SHEET INDEX

SHEET NO.
EE–001

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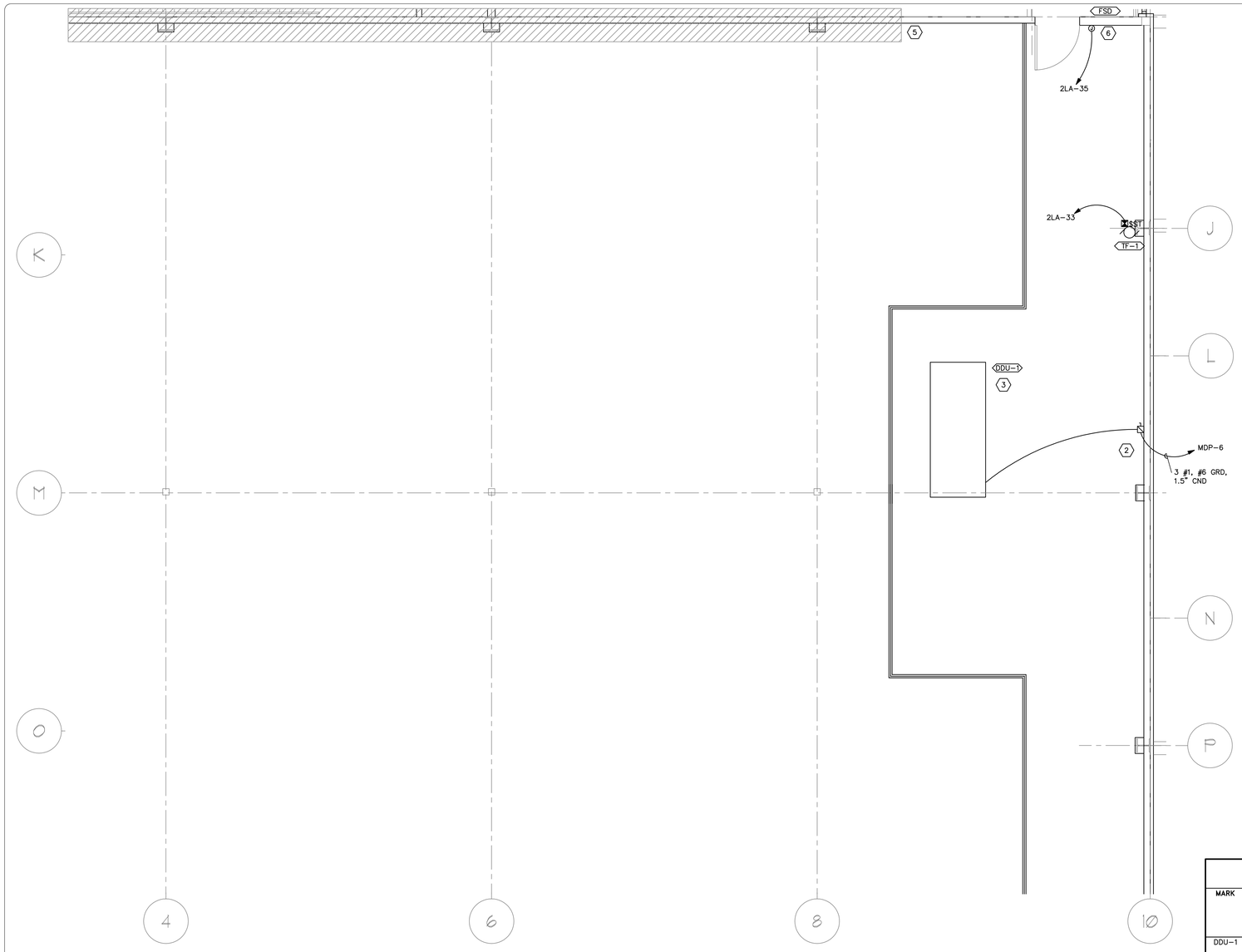


3 FIRST FLOOR POWER PLAN
SCALE: 1/4"=1'-0"

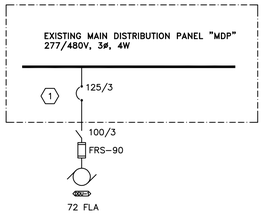
0 2' 4' 8'

GENERAL SHEET NOTES

1. LOCATION OF MECHANICAL EQUIPMENT SHOWN IS APPROXIMATE. SEE MECHANICAL DRAWINGS FOR ACTUAL LOCATION.
2. PROVIDE NEMA 3R ENCLOSURES FOR EQUIPMENT LOCATED OUTDOORS. REFER TO PLANS FOR EQUIPMENT LOCATIONS.
3. REFER TO PLANS FOR CONSTRAINTS ON PHYSICAL DIMENSIONS AND CLEARANCE REQUIREMENTS OF EQUIPMENT. PROVIDE EQUIPMENT DIMENSIONS THAT FALL WITHIN THE CONSTRAINTS OF EACH SPECIFIC LOCATION.
4. ALL EQUIPMENT SHALL BE CONSTRUCTED AND BRACED FOR THE SEISMIC CONDITIONS OF THE PROJECT. REFER TO SPECIFICATIONS SECTION 16071 FOR REQUIREMENTS.

⬡SHEET KEYNOTES

1. NEW CIRCUIT BREAKER IN EXISTING PANEL. CIRCUIT BREAKER MUST MATCH EXISTING AIC RATING OF PANEL.
2. COORDINATE CONDUIT PLACEMENT WITH MECHANICAL PIPING TO DESICCANT DEHUMIDIFIER UNIT. APPROVE CONDUIT PLACEMENT WITH OWNER.
3. COORDINATE ALL CONNECTION REQUIREMENTS TO THE DESICCANT UNIT WITH MECHANICAL CONTRACTOR.
4. USE EXISTING SPACE IN MAIN DISTRIBUTION PANEL AND PROVIDE NEW CIRCUIT BREAKER FOR DESICCANT DEHUMIDIFIER UNIT. CHOOSE THE LEAST INVASIVE CONDUIT PATH FOR CONNECTION. COORDINATE WITH OWNER CONDUIT PATH AND INSTALLATION.
5. DO NOT RUN CONDUIT THROUGH SHADED SECTION OF WALL.
6. COORDINATE EXACT FIRE SMOKE DAMPER LOCATION WITH MECHANICAL PLANS.



4 PARTIAL ONE-LINE DIAGRAM
NTS

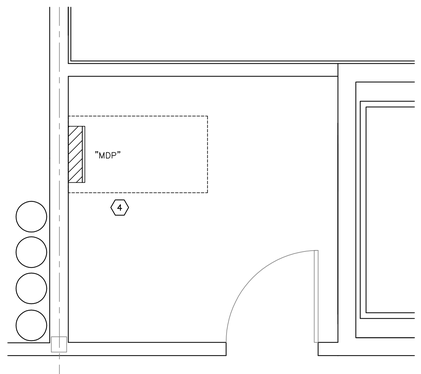
EQUIPMENT SCHEDULE

MARK	QTY	ITEM DESCRIPTION	LOAD DATA							WIRE AND CONDUIT SIZE	OVERCURRENT PROTECTION			DISCONNECT			NOTES	MARK
			HP	kW	MCA	FLA	VOLT	PH	Hz		FURN BY	DEVICE	LOCATION	FURN BY	DEVICE	LOCATION		
DDU-1	1	DESICCANT DEHUMIDIFIER				72	480	3	60	3 #1, #6 GR 1.5" CND	E	125/3 CB	PANEL MDP	E	100A/3P/3F FRS-R-90	ADJ TO EQUIP		DDU-1
TF-1	1	TRANSFER FAN		0.1		1	120	1	60	2 #12, #12 GR 0.75" CND	E	20/1 CB	PANEL 2LA	E	THERMAL SWITCH	ADJ TO EQUIP	1	TF-1
FSD	1	FIRE SMOKE DAMPER					120	1	60	2 #12, #12 GR 0.75" CND	E	20/1 CB	PANEL 2LA	Q				FSD

NOTES:
1 – Provide Starter: Device – FVNR, Size – 00, Control volt – 120, Selector switch – HOA, Pilot Lamp – R,G, Normally open contact – 2, Normally closed contact – 2

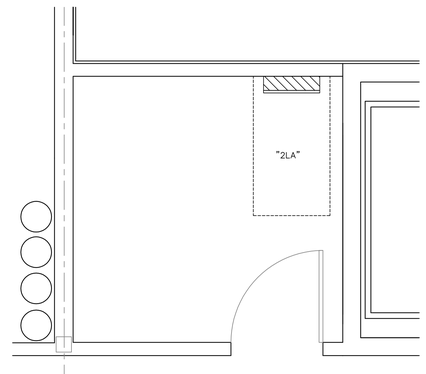
EQUIPMENT SCHEDULE KEY

E	DIVISION 16
Q	FURNISHED WITH THE EQUIPMENT
*	COORDINATE WITH THE DIVISION 15 TEMPERATURE CONTROL INSTALLER
**	AUTOMATIC CONTROL WIRING BY DIVISION 15



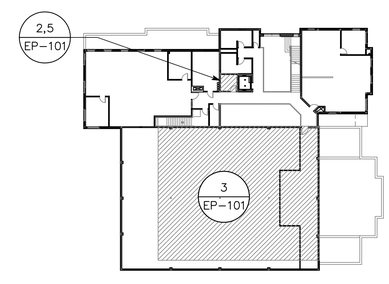
2 ENLARGED ELECTRICAL ROOM 1ST FLOOR
SCALE: 1/2"=1'-0"

0 1' 2' 4'



5 ENLARGED ELECTRICAL ROOM 2ND FLOOR
SCALE: 1/2"=1'-0"

0 1' 2' 4'



1 KEY PLAN
SCALE: 1/32"=1'-0"

0 1' 2' 4'

NO.	DATE	REVISIONS: DESC:

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STATE ARCHIVES BUILDING–DEHUMIDIFICATION
300 SOUTH 500 WEST
SALT LAKE CITY UTAH

DATE: 10-02-2007
SCALE: AS NOTED
DRAWN: WRT
CHECKED: WNF
JOB NO. 2003.039.08
FILE NAME: MH102

SHEET TITLE
POWER PLAN, ONE-LINE DIAGRAM, AND EQUIPMENT SCHEDULE

SHEET NO.
EP-101

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