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Physics and Nanotechnology Building

U of M Project # 01-155-08-1718

UNIVERSITY OF MINNESOTA
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g0.03

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e1.03D	Electrical Lighting Level 3 - Zone D		FC	FC
e1.03E	Electrical Lighting Level 3 - Zone E		FC	FC
e1.04A	Electrical Lighting Level 4 - Zone A		FC	FC
e1.04B	Electrical Lighting Level 4 - Zone B		FC	FC
e1.04C	Electrical Lighting Level 4 - Zone C		FC	FC
e1.04D	Electrical Lighting Level 4 - Zone D		FC	FC
e1.04E	Electrical Lighting Level 4 - Zone E		FC	FC
e1.05A	Electrical Lighting Penthouse - Zone A		FC	FC
e1.05B	Electrical Lighting Penthouse - Zone B		FC	FC
e1.05C	Electrical Lighting Penthouse - Zone C		FC	FC
e1.05D	Electrical Lighting Penthouse - Zone D		FC	FC
e1.05E	Electrical Lighting Penthouse - Zone E		FC	FC
e2.00	Electrical Basement Ductbank Entry Plan	FC		FC
e2.00C	Electrical Power Basement-Zone C		FC	FC
e2.00D	Electrical Power Basement-Zone D		FC	FC
e2.00E	Electrical Power Basement-Zone E		FC	FC
e2.01C	Electrical Power Level 1 - Zone C		FC	FC
e2.01D	Electrical Power Level 1 - Zone D		FC	FC
e2.01E	Electrical Power Level 1 - Zone E		FC	FC
e2.02C	Electrical Power Level 2 - Zone C		FC	FC
e2.02D	Electrical Power Level 2 - Zone D		FC	FC
e2.02E	Electrical Power Level 2 - Zone E		FC	FC
e2.03A	Electrical Power Level 3 - Zone A		FC	FC
e2.03B	Electrical Power Level 3 - Zone B		FC	FC
e2.03C	Electrical Power Level 3 - Zone C		FC	FC
e2.03D	Electrical Power Level 3 - Zone D		FC	FC
e2.03E	Electrical Power Level 3 - Zone E		FC	FC
e2.04A	Electrical Power Level 4 - Zone A		FC	FC
e2.04B	Electrical Power Level 4 - Zone B		FC	FC
e2.04C	Electrical Power Level 4 - Zone C		FC	FC
e2.04D	Electrical Power Level 4 - Zone D		FC	FC
e2.04E	Electrical Power Level 4 - Zone E		FC	FC
e2.05A	Electrical Power Penthouse - Zone A		FC	FC
e2.05B	Electrical Power Penthouse - Zone B		FC	FC
e2.05C	Electrical Power Penthouse - Zone C		FC	FC
e2.05D	Electrical Power Penthouse - Zone D		FC	FC
e2.06A	Electrical Power Roof - Zone A		FC	FC
e2.06B	Electrical Power Roof - Zone B		FC	FC
e2.06C	Electrical Power Roof - Zone C		FC	FC
e2.06D	Electrical Power Roof - Zone D		FC	FC
e3.00C	Electrical Systems Basement-Zone C		FC	FC
e3.00D	Electrical Systems Basement-Zone D		FC	FC
e3.00E	Electrical Systems Basement-Zone E		FC	FC
e3.01C	Electrical Systems Level 1 - Zone C		FC	FC
e3.01D	Electrical Systems Level 1 - Zone D		FC	FC
e3.01E	Electrical Systems Level 1 - Zone E		FC	FC
e3.02C	Electrical Systems Level 2 - Zone C		FC	FC
e3.02D	Electrical Systems Level 2 - Zone D		FC	FC
e3.02E	Electrical Systems Level 2 - Zone E		FC	FC
e3.03A	Electrical Systems Level 3 - Zone A		FC	FC
e3.03B	Electrical Systems Level 3 - Zone B		FC	FC
e3.03C	Electrical Systems Level 3 - Zone C		FC	FC
e3.03D	Electrical Systems Level 3 - Zone D		FC	FC
e3.03E	Electrical Systems Level 3 - Zone E		FC	FC
e3.04A	Electrical Systems Level 4 - Zone A		FC	FC
e3.04B	Electrical Systems Level 4 - Zone B		FC	FC
e3.04C	Electrical Systems Level 4 - Zone C		FC	FC
e3.04D	Electrical Systems Level 4 - Zone D		FC	FC
e3.04E	Electrical Systems Level 4 - Zone E		FC	FC
e3.05A	Electrical Systems Penthouse - Zone A		FC	FC
e3.05B	Electrical Systems Penthouse - Zone B		FC	FC
e3.05C	Electrical Systems Penthouse - Zone C		FC	FC
e3.05D	Electrical Systems Penthouse - Zone D		FC	FC
e4.00C	Electrical Telecom Basement-Zone C		FC	FC
e4.00D	Electrical Telecom Basement-Zone D		FC	FC
e4.00E	Electrical Telecom Basement-Zone E		FC	FC
e4.01C	Electrical Telecom Level 1 - Zone C		FC	FC
e4.01D	Electrical Telecom Level 1 - Zone D		FC	FC
e4.01E	Electrical Telecom Level 1 - Zone E		FC	FC
e4.02C	Electrical Telecom Level 2 - Zone C		FC	FC
e4.02D	Electrical Telecom Level 2 - Zone D		FC	FC
e4.02E	Electrical Telecom Level 2 - Zone E		FC	FC
e4.03A	Electrical Telecom Level 3 - Zone A		FC	FC
e4.03B	Electrical Telecom Level 3 - Zone B		FC	FC
e4.03C	Electrical Telecom Level 3 - Zone C		FC	FC
e4.03D	Electrical Telecom Level 3 - Zone D		FC	FC
e4.03E	Electrical Telecom Level 3 - Zone E		FC	FC
e4.04A	Electrical Telecom Level 4 - Zone A		FC	FC
e4.04B	Electrical Telecom Level 4 - Zone B		FC	FC
e4.04C	Electrical Telecom Level 4 - Zone C		FC	FC
e4.04D	Electrical Telecom Level 4 - Zone D		FC	FC
e4.04E	Electrical Telecom Level 4 - Zone E		FC	FC
e4.05C	Electrical Telecom Penthouse - Zone C		FC	FC
e4.05D	Electrical Telecom Penthouse - Zone D		FC	FC
e5.01	Electrical One-Line Diagram		FC	FC
e5.02	Electrical One-Line Diagram		FC	FC
e5.03	Electrical One-Line Diagram		FC	FC
e5.04	Electrical One-Line Diagram		FC	FC
e5.05	Electrical One-Line Diagram		FC	FC
e5.06	Electrical One-Line Diagram		FC	FC
e5.07	Electrical One-Line Diagram		FC	FC
e5.08	Electrical One-Line Diagram		FC	FC
e5.09	Grounding One-Line Diagram		FC	FC
e5.10	Fire Alarm One-Line Diagram		FC	FC
e5.11	Rescue Assistance Intercom One-Line Diagram		FC	FC
e7.04	Steam Tunnel Electrical Lighting Power and Systems Plan		FC	FC
e8.01	Electrical Site Work Details	FC		FC
e8.02	Electrical Site Work Details	FC		FC
e8.03	Electrical Details		FC	FC
e8.04	Electrical Details		FC	FC
e9.01	Luminaire Schedule		FC	FC
e9.02	Electrical Feeder Schedule		FC	FC
e9.03	Electrical Panel Schedules		FC	FC
e9.04	Electrical Panel Schedules		FC	FC
e9.05	Electrical Panel Schedules		FC	FC
e9.06	Electrical Panel Schedules		FC	FC
e9.07	Electrical Panel Schedules		FC	FC
e9.08	Electrical Panel Schedules		FC	FC
e9.09	Electrical Panel Schedules		FC	FC
e9.10	Electrical Panel Schedules		FC	FC
e9.11	Electrical Panel Schedules		FC	FC
e9.12	Electrical Panel Schedules		FC	FC
e9.13	Electrical Panel Schedules		FC	FC
e9.14	Electrical Panel Schedules		FC	FC
e9.15	Electrical Panel Schedules		FC	FC
e9.16	Electrical Panel Schedules		FC	FC
e9.17	Electrical Motor Schedule		FC	FC

VOLUME 3 (CONT.)

COMMUNICATIONS				
Sheet Number	Sheet Name	BP-1	BP-2	PD3
T100	Title/ Index		FC	FC
T200	Basement Level Floor

ELECTRICAL SYMBOLS AND ABBREVIATIONS

NOTES: 1. SYMBOLS INDICATED HERE AND NOT USED IN THE CONTRACT DOCUMENTS DO NOT APPLY TO THIS PROJECT. ADDITIONAL SYMBOLS MAY BE INDICATED IN THE CONTRACT DOCUMENTS.
2. EXISTING TO REMAIN IS SHOWN WITH DASHED LIGHT LINES.
3. NEW WORK IS SHOWN WITH SOLID HEAVY LINES.

LIGHTING

TYPE
CIRCUIT/SWITCH

TYPE	DESCRIPTION	TYPE	DESCRIPTION
A	LINE VOLTAGE INCANDESCENT/HALOGEN	G	ELECTRODELESS INDUCTION FLUORESCENT
B	LOW VOLTAGE INCANDESCENT/HALOGEN	H	STANDARD HID
C	COMPACT FLUORESCENT	L	LIGHT PIPE/GUIDE/TUBE, FIBER OPTICS
D	DOUBLE ENDED/PIN, SINGLE ENDED	N	NEON/COLD CATHODE
	COMPACT HID	S	SPECIAL PURPOSE
F	STANDARD LINEAR FLUORESCENT	T	TRACK
		X	EXIT LIGHT

SUFFIX	DESCRIPTION
E	BATTERY PACK/INVERTER

SURFACE MOUNTED LINEAR FLUORESCENT MOUNTING LOCATION: CEILING
SURFACE MOUNTED LINEAR FLUORESCENT MOUNTING LOCATION: WALL
PENDANT/SUSPENDED LINEAR FLUORESCENT
PENDANT/SUSPENDED FLUORESCENT
RECESSED GRID MOUNTED FLUORESCENT MOUNTING LOCATION: CEILING
RECESSED FLANGE MOUNTED FLUORESCENT MOUNTING LOCATION: CEILING
SURFACE MOUNTED FLUORESCENT MOUNTING LOCATION: CEILING
RECESSED MOUNTED EMERGENCY/LIFE SAFETY INCANDESCENT/COMPACT FLUORESCENT/HID MOUNTING LOCATION: CEILING
SURFACE MOUNTED EMERGENCY/LIFE SAFETY LINEAR FLUORESCENT MOUNTING LOCATION: CEILING
SURFACE MOUNTED EMERGENCY/LIFE SAFETY LINEAR FLUORESCENT MOUNTING LOCATION: WALL
RECESSED MOUNTED EMERGENCY/LIFE SAFETY INCANDESCENT/COMPACT FLUORESCENT/HID MOUNTING LOCATION: WALL
PENDANT/SUSPENDED EMERGENCY/LIFE SAFETY
PENDANT/SUSPENDED EMERGENCY FLUORESCENT LIFE SAFETY
RECESSED GRID MOUNTED EMERGENCY/LIFE SAFETY FLUORESCENT. MOUNTING LOCATION: CEILING
PENDANT/SUSPENDED EMERGENCY/LIFE SAFETY INCANDESCENT/COMPACT FLUORESCENT/HID MOUNTING LOCATION: CEILING
RECESSED MOUNTED STANDBY EMERGENCY INCANDESCENT/COMPACT FLUORESCENT/HID MOUNTING LOCATION: CEILING
RECESSED FLANGE MOUNTED EMERGENCY/LIFE SAFETY FLUORESCENT. MOUNTING LOCATION: CEILING
SURFACE MOUNTED EMERGENCY/LIFE SAFETY FLUORESCENT. MOUNTING LOCATION: CEILING
SURFACE MOUNTED STANDBY LINEAR FLUORESCENT MOUNTING LOCATION: CEILING
RECESSED MOUNTED STANDBY EMERGENCY INCANDESCENT/COMPACT FLUORESCENT/HID MOUNTING LOCATION: WALL
SURFACE MOUNTED STANDBY EMERGENCY INCANDESCENT/COMPACT FLUORESCENT/HID MOUNTING LOCATION: WALL
SURFACE MOUNTED STANDBY LINEAR FLUORESCENT MOUNTING LOCATION: WALL
PENDANT/SUSPENDED STANDBY EMERGENCY INCANDESCENT/COMPACT FLUORESCENT/HID
PENDANT/SUSPENDED STANDBY LINEAR FLUORESCENT
PENDANT/SUSPENDED STANDBY FLUORESCENT.
DIRECTIONAL INDICATOR ADDED TO FIXTURE SYMBOL TO DESIGNATE AIMING DIRECTION
RECESSED GRID MOUNTED STANDBY FLUORESCENT. MOUNTING LOCATION: CEILING
EXIT DIRECTIONAL ARROW
RECESSED FLANGE MOUNTED STANDBY FLUORESCENT. MOUNTING LOCATION: CEILING
SINGLE FACE EXIT FIXTURE MOUNTING LOCATION: CEILING
SURFACE MOUNTED STANDBY FLUORESCENT. MOUNTING LOCATION: CEILING
DOUBLE FACE EXIT FIXTURE MOUNTING LOCATION: CEILING
RECESSED GRID MOUNT DIRECT/INDIRECT FLUORESCENT; MID LINE INDICATES REFLECTOR ORIENTATION. MOUNTING LOCATION: CEILING
SINGLE FACE EXIT FIXTURE MOUNTING LOCATION: WALL
RECESSED GRID MOUNT DIRECT/INDIRECT EMERGENCY FLUORESCENT; MID LINE INDICATES REFLECTOR ORIENTATION. MOUNTING LOCATION: CEILING
DOUBLE FACE EXIT FIXTURE MOUNTING LOCATION: WALL
POST TOP LUMINAIRE WITH REFLECTIVE SHADE MOUNTING LOCATION: AS SPECIFIED
SINGLE HEAD EMERGENCY FIXTURE WITH BATTERY PACK
COVE LUMINAIRE MOUNTING LOCATION: AS SPECIFIED
DOUBLE HEAD EMERGENCY FIXTURE WITH BATTERY PACK
PILOT LIGHT MOUNTING LOCATION: AS NOTED
TRACK MOUNTING LOCATION: AS NOTED

SWITCHES

LIGHTING CONTACTOR MOUNTING LOCATION:WALL MOUNTING HEIGHT: AS NOTED
WALL BOX DIMMER MOUNTING LOCATION:WALL MOUNTING HEIGHT: 3'-6"
PRE-SET DIMMING SYSTEM CONTROL UNIT MOUNTING LOCATION:WALL MOUNTING HEIGHT: 3'-6"
PRE-SET DIMMING SYSTEM 2 BUTTON PRE-SET SCENE SELECTION SWITCH MOUNTING LOCATION:WALL MOUNTING HEIGHT: 3'-6"
TIME SWITCH (WATTSTOPPER TS-400) MOUNTING LOCATION:WALL MOUNTING HEIGHT: 3'-6"
PHOTO CELL MOUNTING LOCATION:WALL MOUNTING HEIGHT: AS NOTED
AMBIENT LIGHT SENSOR MOUNTING LOCATION:CEILING AL-S - PHOTO DIODE DIMMING CONTROL SENSOR AL-O - DAYLIGHTING PHOTO SENSOR s# - DENOTES DEVICE NUMBER
OCCUPANCY SENSOR FOR LIGHTING CONTROL, DUAL TECHNOLOGY DT = CEILING MOUNTED SENSOR (360°) DT-A = CEILING MOUNTED SENSOR 1 WAY (180°) DT-B = CEILING MOUNTED SENSOR 1 WAY (120°) DT-E = CEILING MOUNTED SENSOR (WET LOCATION) (360°)
OCCUPANCY SENSOR FOR LIGHTING CONTROL, DUAL TECHNOLOGY, DT-D =WALL MOUNTED SENSOR MOUNTING LOCATION:WALL MOUNTING HEIGHT: 3'-6" (OR AS NOTED)
LOW VOLTAGE SWITCH LV-A = DEVICE LABEL (REFER TO CONTROL DIAGRAMS) a = SINGLE BUTTON CONFIGURATION b = TWO BUTTON CONFIGURATION c = THREE BUTTON CONFIGURATION MOUNTING LOCATION: WALL MOUNTING HEIGHT: 3'-6"
THREE WAY SWITCH MOUNTING LOCATION:WALL MOUNTING HEIGHT: 3'-6"
FOUR WAY SWITCH MOUNTING LOCATION:WALL MOUNTING HEIGHT: 3'-6"
SINGLE POLE SWITCH MOUNTING LOCATION:WALL MOUNTING HEIGHT: 3'-6" a = SWITCH DESIGNATION
KEY SWITCH MOUNTING LOCATION:WALL MOUNTING HEIGHT: 3'-6"
SWITCH WITH PILOT LIGHT MOUNTING LOCATION: WALL MOUNTING HEIGHT: 3'-6"
REMOTE CONTROL FOR MOTORIZED DAMPER MOUNTING LOCATION:WALL MOUNTING HEIGHT: 3'-6"
SWITCH FOR PROJECTION SCREEN, BACKBOX AND CONDUIT ONLY. MOUNTING LOCATION:WALL MOUNTING HEIGHT: 3'-6"
PROGRAM OVERRIDE SWITCH AT ANIMAL HOLDING MOUNTING LOCATION: WALL MOUNTING HEIGHT: 3'-6"
EMERGENCY LIGHTING SWITCH WITH BODINE GTS-DI MOUNTING LOCATION: WALL MOUNTING HEIGHT: 3'-6"

EQUIPMENT AND WIRING

TRANSFORMER
GROUNDING BUS
GROUND CONNECTION
NON FUSED DISCONNECT SWITCH
FUSED DISCONNECT SWITCH
BREAKER DISCONNECT SWITCH
MAGNETIC MOTOR STARTER
COMBINATION MOTOR STARTER
MANUAL STARTER W/OVERLOAD PROTECTION
SURFACE JUNCTION BOX
SURFACE JUNCTION BOX - WALL
FLUSH JUNCTION BOX - CEILING
FLUSH JUNCTION BOX - WALL
FLUSH JUNCTION BOX - FLOOR
HAIR OR HAND DRYER OUTLET
MOTOR
ELECTRIC HEATER
RELAY - TYPE AS NOTED
TIMING RELAY
RELAY PANEL - MOUNTING LOCATION: SURFACE
PANEL BOARD - MOUNTING LOCATION: SURFACE
PANEL BOARD - MOUNTING LOCATION: FLUSH
DISTRIBUTION PANELBOARD
MOTOR CONTROL CENTER
VARIABLE FREQUENCY DRIVE PROVIDED AND INSTALLED BY MC, EC TO MAKE LINE AND LOAD CONNECTIONS.
REMOTE GENERATOR ANNUNCIATOR
PUSH BUTTON
KIRK KEY INTERLOCK
TELEPHONE TERMINAL CABINET
PANEL DIVISION ARROW
LINE VOLTAGE THERMOSTAT
BUZZER
GROUND CONNECTION - PLUG-IN

ENGINE GENERATOR SET
TRANSFORMER - ONE LINE DIAGRAM
POTENTIAL TRANSFORMER
CABLE TAP BOX
BUSWAY PLUG-IN UNIT
VOLTMETER & SELECTOR SWITCH
AMMETER, SELECTOR SWITCH, & CT'S
GROUND FAULT RELAY
REVENUE METER, kWh/D
METER WITH CURRENT TRANSFORMER
MOLDED CASE CIRCUIT BREAKER
LOW VOLTAGE DRAW-OUT AIR CIRCUIT BREAKER
SWITCH - ONE LINE DIAGRAM
FUSE
GROUNDED "Y" SYSTEM
RAISED FLOOR SERVICE MODULE P = POWER, D = DATA, T = TEL
AUTOMATIC TRANSFER SWITCH
PANEL DIVISION LINE
CONTACTOR
WIRING CONCEALED IN FLOOR
WIRING IN CEILING/WALLS
HOMERUN
PNL, A1– INDICATES PANEL AND CIRCUIT
INDICATES NUMBER OF CONDUCTORS
INDICATES NEUTRAL
INDICATES GROUND CONDUCTOR
A-1,3,5 PANEL AND CIRCUITS; PANEL A, CIRCUITS 1,3,5
9(11) 2-POLE, SINGLE PHASE CIRCUIT SPACES 9 AND 11
9(11,13) 3-POLE, THREE PHASE CIRCUIT SPACES 9, 11, AND 13

COMMUNICATION

AUDIO VISUAL, FLUSH J-BOX MOUNTING LOCATION: WALL MOUNTING HEIGHT: 1'-6"
AUDIO VISUAL, FLUSH J-BOX MOUNTING LOCATION: CEILING
TELE/DATA WALL TELEPHONE OUTLET MOUNTING LOCATION: FLUSH WALL MOUNTING HEIGHT: 4'-0"
TELE/DATA OUTLET MOUNTING LOCATION: FLUSH WALL MOUNTING HEIGHT: 1'-6"
TELE/DATA OUTLET MOUNTING LOCATION: CASEWORK OR 2" ABOVE BACKSPLASH TO BOTTOM OF BOX MOUNTING HEIGHT: FIELD VERIFY
BUILDING AUTOMATION SYSTEM OUTLETS MOUNTING LOCATION: FLUSH WALL MOUNTING HEIGHT: AS NOTED
CABLE TRAY DEPTH: 4" EXCEPT WHERE AS NOTED WIDTH: AS MEASURED ON PLANS MOUNTING HEIGHT: ABOVE CEILINGS OR AS NOTED ON PLANS
WORKSTATION OUTLETS - FLOOR MOUNTED MOUNTING LOCATION: FLUSH FLOOR MOUNTING HEIGHT: F/FF
WORKSTATION OUTLETS - CEILING MOUNTED MOUNTING LOCATION: FLUSH CEILING MOUNTING HEIGHT: F/FC
AREA OF RESCUE ASSISTANCE STATION MOUNTING LOCATION: WALL MOUNTING HEIGHT: 42" AFF TO CENTER.
AREA OF RESCUE MASTER STATION MOUNTING LOCATION: WALL MOUNTING HEIGHT: 42" AFF TO CENTER.
WIRELESS ACCESS POINT OUTLETS - CEILING MOUNTED MOUNTING LOCATION: FLUSH CEILING MOUNTING HEIGHT: F/FC
TELE/DATA OUTLET IN SURFACE MOUNTED RACEWAY

NOTES:
1. MAXIMUM (2) 90 DEGREE BENDS BETWEEN BOX AND CABLE TRAY WITH CONDUIT RUN IN STRAIGHTEST LINE POSSIBLE
2. PROVIDE 4"X4"X2-1/8" BOX WITH SINGLE GANG PLASTER RING FOR EACH OUTLET. WALL PHONE SHALL BE SINGLE GANG RING.
3. REFER TO SPECIFICATIONS ON USE, LOCATION, AND ROUTING.
4. MINIMUM CONDUIT SIZE (1) 1".

RECEPTACLES

SWITCH/RECEPTACLE MOUNTING LOCATION: WALL MOUNTING HEIGHT: 3'-6"
DUPLEX RECEPTACLE MOUNTING LOCATION: WALL MOUNTING HEIGHT: 1'-6"
DUPLEX RECEPTACLE MOUNTING LOCATION: WALL MOUNTING HEIGHT: 1'-6" D = DEDICATED CIRCUIT IG = ISOLATED GROUND
HOUSEKEEPING SPLIT WIRED (SEPARATE CIRCUIT FOR TOP AND BOTTOM) #10AWG CONDUCTORS AND EQUIPMENT GROUND WIRE MOUNTING LOCATION: WALL MOUNTING HEIGHT: 1'-6"
EMERGENCY DUPLEX RECEPTACLE MOUNTING LOCATION: WALL MOUNTING HEIGHT: 1'-6"
SINGLE RECEPTACLE MOUNTING LOCATION: WALL MOUNTING HEIGHT: 1'-6" (OR AS SHOWN)
SINGLE RECEPTACLE - ABOVE CASEWORK OR 2" ABOVE COUNTERTOP BACKSPLASH TO BOTTOM OF BOX MOUNTING LOCATION: WALL MOUNTING HEIGHT: FIELD VERIFY
EMERGENCY SINGLE RECEPTACLE MOUNTING LOCATION: WALL MOUNTING HEIGHT: 1'-6" (OR AS SHOWN)
EMERGENCY SINGLE RECEPTACLE - ABOVE CASEWORK OR 2" ABOVE COUNTERTOP BACKSPLASH TO BOTTOM OF BOX MOUNTING LOCATION: WALL MOUNTING HEIGHT: FIELD VERIFY
DOUBLE DUPLEX RECEPTACLE MOUNTING LOCATION: WALL MOUNTING HEIGHT: 1'-6"
EMERGENCY DOUBLE DUPLEX RECEPTACLE MOUNTING LOCATION: WALL MOUNTING HEIGHT: 1'-6"
DUPLEX RECEPTACLE - ABOVE CASEWORK OR 2" ABOVE COUNTERTOP BACKSPLASH TO BOTTOM OF BOX MOUNTING LOCATION: WALL MOUNTING HEIGHT: FIELD VERIFY
EMERGENCY DUPLEX RECEPTACLE - ABOVE CASEWORK OR 2" ABOVE COUNTERTOP BACKSPLASH TO BOTTOM OF BOX MOUNTING LOCATION: WALL MOUNTING HEIGHT: FIELD VERIFY
LOCKING RECEPTACLE (FILLED IN - EMERGENCY) MOUNTING LOCATION: WALL OR CEILING MOUNTING HEIGHT: 1'-6"
DOUBLE DUPLEX RECEPTACLE - ABOVE CASEWORK OR 2" ABOVE COUNTERTOP BACKSPLASH TO BOTTOM OF BOX MOUNTING LOCATION: WALL MOUNTING HEIGHT: FIELD VERIFY
EMERGENCY DOUBLE DUPLEX RECEPTACLE - ABOVE CASEWORK OR 2" ABOVE COUNTERTOP BACKSPLASH TO BOTTOM OF BOX MOUNTING LOCATION: WALL MOUNTING HEIGHT: FIELD VERIFY

EMERGENCY DUPLEX RECEPTACLE LOCATED IN SURFACE MOUNTED RACEWAY
EMERGENCY POWER OUTLET IN SURFACE MOUNTED RACEWAY VOLTAGE AND AMPERAGE AS INDICATED
OUTLETS INSTALLED IN SURFACE MOUNTED RACEWAY WITH CUSTOM COVERS EVEN SPACING WITH CUSTOM COVERS TO ACCOMMODATE DEVICES INDICATED
DUPLEX RECEPTACLE LOCATED IN SURFACE MOUNTED RACEWAY
DUPLEX RECEPTACLE LOCATED IN SURFACE MOUNTED RACEWAY MOUNTING LOCATION: WALL MOUNTING HEIGHT: 1'-6" IG = ISOLATED GROUND DUPLEX RECEPTACLE SERVED FROM CLEAN POWER (CP) PANEL
DUPLEX RECEPTACLE ON DEDICATED CIRCUIT LOCATED IN SURFACE MOUNTED RACEWAY
SPECIAL POWER OR GROUNDING OUTLET IN SURFACE MOUNTED RACEWAY VOLTAGE AND AMPERAGE AS INDICATED A = NEMA L6-20R (#10AWG CONDUCTORS AND GROUND) B = NEMA L6-30R (#10AWG CONDUCTORS AND GROUND) C = NEMA L15-30R (#10AWG CONDUCTORS AND GROUND) GP = ISOLATED ROOM INSTRUMENT GROUND POINT IG = ISOLATED GROUND DUPLEX RECEPTACLE SERVED FROM CLEAN POWER (CP) PANEL
DUPLEX RECEPTACLE MOUNTING LOCATION: CEILING
EMERGENCY DUPLEX RECEPTACLE MOUNTING LOCATION: CEILING
FLOOR BOX - FLOOR MOUNTED MOUNTING LOCATION: FLOOR
FIXED EQUIPMENT CONNECTION MOUNTING LOCATION COORDINATE WITH EQUIPMENT SUPPLIER
FIXED EQUIPMENT CONNECTION - WALL MOUNTING LOCATION: WALL MOUNTING HEIGHT: 1'-6"
POWER OUTLET MOUNTING LOCATION: WALL MOUNTING HEIGHT: 1'-6" (OR AS SHOWN)
POWER OUTLET MOUNTING LOCATION: WALL MOUNTING HEIGHT: 1'-6" (OR AS SHOWN) A = NEMA L6-20R (#10AWG CONDUCTORS AND GROUND) B = NEMA L6-30R (#10AWG CONDUCTORS AND GROUND) C = NEMA L15-30R (#10AWG CONDUCTORS AND GROUND) GP = ISOLATED ROOM INSTRUMENT GROUND POINT
POWER OUTLET, EMERGENCY CIRCUIT MOUNTING LOCATION: WALL MOUNTING HEIGHT: 1'-6" (OR AS SHOWN)
DUPLEX RECEPTACLE, UPPER HALF SWITCHED, LOWER HALF HOT MOUNTING LOCATION: WALL MOUNTING HEIGHT: 1'-6"
ISOLATED GROUND DUPLEX RECEPTACLE SERVED FROM CLEAN POWER (CP) PANEL (UNO) MOUNTING LOCATION: WALL MOUNTING HEIGHT: 1'-6"

FIRE

FIRE ALARM COMBINATION VOICE/STROBE MOUNTING LOCATION: WALL MOUNTING HEIGHT: SEE NOTE 1
FIRE ALARM COMBINATION VOICE/STROBE MOUNTING LOCATION: CEILING
FIRE ALARM STROBE ONLY MOUNTING LOCATION: WALL MOUNTING HEIGHT: SEE NOTE 1
FIRE ALARM LOUDSPEAKER MOUNTING LOCATION: SURFACE MOUNTING HEIGHT: SEE NOTE 1
FIRE ALARM PULL STATION MOUNTING LOCATION: WALL MOUNTING HEIGHT: 4'-0"
FIRE ALARM SMOKE DETECTOR MOUNTING LOCATION: CEILING
FIRE ALARM DUCT SMOKE DETECTOR MOUNTING LOCATION: DUCT
FIRE ALARM HEAT DETECTOR MOUNTING LOCATION: CEILING
FIRE ALARM DOOR HOLDER MOUNTING LOCATION: WALL MOUNTING HEIGHT: FIELD VERIFY
FIRE ALARM DATA GATHERING PANEL MOUNTING LOCATION: WALL MOUNTING HEIGHT: AS NOTED
FIRE ALARM NAC PANEL MOUNTING LOCATION: WALL MOUNTING HEIGHT: AS NOTED
FIRE ALARM PRESSURE SWITCH MOUNTING LOCATION: FIELD VERIFY
FIRE ALARM DOOR HOLDER WITH SMOKE DETECTOR MOUNTING LOCATION WALL MOUNTING HEIGHT: FIELD VERIFY
FIRE ALARM WATERFLOW SWITCH MOUNTING LOCATION: SPRINKLER PIPE MOUNTING HEIGHT: FIELD VERIFY
FIRE ALARM TAMPER SWITCH MOUNTING LOCATION: SPRINKLER PIPE MOUNTING HEIGHT: FIELD VERIFY
FIRE ALARM CONTROL PANEL MOUNTING LOCATION:WALL MOUNTING HEIGHT: AS NOTED
FIRE ALARM ANNUNCIATOR PANEL MOUNTING LOCATION:WALL MOUNTING HEIGHT: AS NOTED
REMOTE INDICATOR TEST SWITCH FOR AHU'S MOUNTING LOCATION: WALL MOUNTING HEIGHT: AS NOTED
FIRE ALARM CONTROL MODULE (1) N.O. & (1) N.C. RELAY CONTACT ADDRESSABLE / INTELLIGENT
FIRE ALARM MONITOR MODULE ADDRESSABLE / INTELLIGENT

NOTES:
1. 80" AFF TO BOTTOM OF FACEPLATE OR 6" FROM TOP OF FACEPLATE TO CEILING, WHICH EVER IS LOWER
2. NUMBER ADJACENT TO VISUAL FIRE ALARM DEVICES IS STROBE CANDELA. DEVICES SHALL BE 15CD OR HIGHER LEVELS AS NOTED.

SECURITY

SECURITY DEVICE MOUNTING LOCATION: WALL MOUNTING HEIGHT: AS NOTED
SECURITY BIOMETRIC DEVICE MOUNTING LOCATION: WALL MOUNTING HEIGHT: VERIFY W/OWNER
SECURITY KEYPAD DEVICE MOUNTING LOCATION: WALL MOUNTING HEIGHT: VERIFY W/OWNER
SECURITY CARD READER MOUNTING LOCATION: WALL OR DOOR MOUNTING HEIGHT36"AFF TO CENTER
SECURITY SYSTEM CONTROL PANEL MOUNTING LOCATION: WALL MOUNTING HEIGHT: AS NOTED
CLOSED CIRCUIT CAMERA MOUNTING LOCATION: WALL MOUNTING HEIGHT: CEILING
SECURITY WATCHMAN'S STATION MOUNTING LOCATION: WALL MOUNTING HEIGHT: AS NOTED
SECURITY MOTION DETECTOR MOUNTING LOCATION: WALL MOUNTING HEIGHT: AS NOTED
SECURITY ELECTRIC STRIKE MOUNTING LOCATION: WALL MOUNTING HEIGHT: AS NOTED
SECURITY DOOR PUSH BUTTON MOUNTING LOCATION: WALL MOUNTING HEIGHT: AS NOTED
DOOR POSITION SWITCH MOUNTING LOCATION: DOOR FRAME MOUNTING HEIGHT: AS NOTED

ELECTRICAL ABBREVIATIONS

A	-	AMPERES	JB	-	JUNCTION BOX
AC	-	ABOVE CEILING/ALTERNATING CURRENT	KO	-	KNOCK-OUT
ADO	-	AUTOMATIC DOOR OPENER	KV	-	KILOVOLT
AF	-	AMPERE FRAME	KVA	-	KILOVOLT-AMPERES
AFF	-	ABOVE FINISHED FLOOR	KW	-	KILOWATTS
AIC	-	AMP INTERRUPTING CAPACITY	KWH	-	KILOWATT HOURS
ALT	-	ALTERNATE	LAN	-	LOCAL AREA NETWORK
ARCH	-	ARCHITECTURAL	LGB	-	LAB GROUNDING BUSBAR
ASC	-	ABOVE SUSPENDED CEILING	LGT	-	LIGHT
AT	-	AMPERE TRIP	LTCP	-	LOCAL TEMPERATURE CONTROL PANEL
ATS	-	AUTOMATIC TRANSFER SWITCH	LTG	-	LIGHTING
AUTO	-	AUTOMATIC	LTS	-	LIGHTS
BATS	-	BYPASS AUTOMATIC TRANSFER SWITCH	LV	-	LOW VOLTAGE
BC	-	BARE COPPER	LVS	-	LOW VOLTAGE SWITCH
BFC	-	BELOW FINISH CEILING	MATV	-	MASTER ANTENNA TELEVISION
BFL	-	BELOW FLOOR LEVEL	MC	-	MECHANICAL CONTRACTOR
BLDG	-	BUILDING	MCB	-	MAIN CIRCUIT BREAKER
BOL	-	BOTTOM OF LUMINAIRE	MCC	-	MOTOR CONTROL CENTER
BPIP	-	BOILER PLANT INSTRUMENTATION PANEL	MCP	-	MOTOR CIRCUIT PROTECTOR
BRKR	-	BREAKER	MDP	-	MAIN DISTRIBUTION PANEL
C	-	CONDUIT	MER	-	MECHANICAL EQUIPMENT ROOM
CB	-	CIRCUIT BREAKER	MGB	-	MAIN GROUNDING BUSBAR
CCTV	-	CLOSED CIRCUIT TELEVISION	MLO	-	MAIN LUGS ONLY
CCT	-	CIRCUIT	MH	-	MANHOLE
CCT BKR	-	CIRCUIT BREAKER	MPTB	-	MUSIC & PAGE TERMINAL BOX
CFCI	-	CONTRACTOR FURNISHED, CONTRACTOR INSTALLED	MTD	-	MOUNTED
			MTG	-	MOUNTING
CLG	-	CEILING	MTG HGT	-	MOUNTING HEIGHT
CO	-	CONDUIT ONLY	MTR	-	MOTOR/METER
CONTR	-	CONTRACTOR	NA	-	NOT APPLICABLE
CORR	-	CORRIDOR	NC	-	NEW CONNECTION/NORMALLY CLOSED
CR	-	CONTROL RELAY	NFD	-	NON-FUSED DISCONNECT
CT	-	CURRENT TRANSFORMER	NFSS	-	NON-FUSED SAFETY SWITCH
DACT	-	DIGITAL ALARM COMMUNICATOR TRANSMITTER	NIC	-	NOT IN CONTRACT
DB	-	DIRECT BURIAL	NO	-	NORMALLY OPEN
DC	-	DIRECT CURRENT	NTS	-	NOT TO SCALE
DED	-	DEDICATED	OC	-	ON CENTER
DET	-	DETAIL	OFCI	-	OWNER FURNISHED CONTRACTOR INSTALLED
DIA	-	DIAMETER	OFOI	-	OWNER FURNISHED OWNER INSTALLED
DISC	-	DISCONNECT	OHSC	-	OVERHEAD SERVICE CARRIER
DN	-	DOWN	P	-	POLE
DP	-	DISTRIBUTION PANEL	PA	-	PUBLIC ADDRESS
DS	-	DISCONNECT SWITCH	PB	-	PULL BOX/PUSHBUTTON
EC	-	EMPTY CONDUIT/ELECTRICAL CONTRACTOR	PBPU	-	PREFABRICATED BEDSIDE PATIENT POWER UNIT
ECL	-	EMERGENCY CRITICAL LIGHTING	PCP	-	EMERGENCY CRITICAL POWER
ECP	-	EMERGENCY CRITICAL POWER	PC	-	PLUMBING CONTRACTOR/PHOTOCELL
EDB	-	ELECTRIC DUCT BANK	PDU	-	POWER DISTRIBUTION UNIT
EG	-	EQUIPMENT GROUND	PF	-	POWER FACTOR
EGS	-	ENGINE GENERATOR SET	PH	-	PHASE
EJ	-	EXPANSION JOINT	PLBG	-	PLUMBING
ELEC	-	ELECTRIC/ELECTRICAL	PNL	-	PANEL
ELL	-	EMERGENCY LIFE SAFETY LIGHTING	POD	-	POWER OPERATED DAMPER
ELP	-	EMERGENCY LIFE SAFETY POWER	PT	-	POTENTIAL TRANSFORMER
EMER	-	EMERGENCY	PTRV	-	POWER TYPE ROOF VENTILATOR
EMI	-	ELECTROMAGNETIC INTERFERENCE	PWR	-	POWER
EMT	-	ELECTRICAL METALLIC TUBING	REC	-	RECESSED
EQUIP	-	EQUIPMENT	RECEP	-	RECEPTACLE
ESM	-	ELECTRIC STRIP MOLD	REL	-	RELOCATE
ETR	-	EXISTING TO REMAIN	REQD	-	REQUIRED
EWC	-	ELECTRIC WATER COOLER	RGIP	-	REMOTE GROUND INDICATOR PANEL
EXST	-	EXISTING	RVAT	-	REDUCED VOLTAGE AUTO TRANSFORMER
F/FC	-	FLUSH WITH FINISHED CEILING	SHT	-	SHEET
F/FF	-	FLUSH WITH FINISHED FLOOR	SIG	-	SIGNAL
F/FW	-	FLUSH WITH FINISHED WALL	SIM	-	SIMILAR
FA	-	FIRE ALARM	SPEC	-	SPECIFICATION
FAAP	-	FIRE ALARM ANNUNCIATOR PANEL	SS	-	SAFETY SWITCH
FACP	-	FIRE ALARM CONTROL PANEL	STA	-	STATION
FCU	-	FAN COIL UNIT	STR	-	STARTER
FDR	-	FEEDER	SW	-	SWITCH
FDS	-	FUSED DISCONNECT SWITCH	SWBD	-	SWITCHBOARD
FI	-	FILM ILLUMINATOR	SWGR	-	SWITCHGEAR
FIXT	-	FIXTURE	TEL	-	TELEPHONE
FL	-	AT FLOOR LINE	TFA	-	TO FLOOR ABOVE
FLA	-	FULL LOAD AMPERES	TFB	-	TO FLOOR BELOW
FLEX	-	FLEXIBLE	TGB	-	TELEPHONE GROUNDING BUSBARBAR
FLR	-	FLOOR	TMGB	-	TELEPHONE MAIN GROUNDING BUSBAR
FLUOR	-	FLUORESCENT	TS	-	TAMPER SWITCH/TIME SWITCH
FS	-	FLOW SWITCH	TV	-	TELEVISION
FSS	-	FUSED SAFETY SWITCH	TVSS	-	TRANSIENT VOLTAGE SURGE SUPPRESSION
FSCP	-	FLAME SAFEGUARD CONTROL PANEL	TVTC	-	TELEVISION TERMINAL CABINET
FVNR	-	FULL VOLTAGE NON-REVERSING	TYP	-	TYPICAL
GB	-	GROUNDING BUSBAR	UC	-	UNDER COUNTER
GC	-	GENERAL CONTRACTOR	UG	-	UNDERGROUND
GFCI	-	GROUND FAULT CIRCUIT INTERRUPTER	UH	-	UNIT HEATER
GFP	-	GROUND FAULT PROTECTION	UNO	-	UNLESS NOTED OTHERWISE
GND	-	GROUND	UPS	-	UNINTERRUPTED POWER SUPPLY
GEN	-	GENERATOR	V	-	VOLTAGE
GFI	-	GROUND FAULT INTERRUPTER	VFD	-	VARIABLE FREQUENCY DRIVE
GRS/GRC	-	GALVANIZED RIGID STEEL CONDUIT	VP	-	VAPOR PROOF
GTB	-	GROUND TERMINAL BOX	W	-	WIRE
HG	-	HOSPITAL GRADE	W/	-	WITH
HH	-	HANDHOLE	WP	-	WEATHERPROOF
HOA	-	HAND OFF AUTOMATIC	WS	-	WALL SURFACE
HP	-	HORSE POWER	WT	-	WATER TIGHT
HT	-	HEIGHT/HEAT TRACE	X	-	EXISTING
HV	-	HEATING/VENTILATION CONTRACTOR	XFMR	-	TRANSFORMER
IG	-	ISOLATED GROUND	XP	-	EXPLOSION PROOF
IMC	-	INTERMEDIATE METAL CONDUIT			
INCAND	-	INCANDESCENT			

SITE SYMBOLS

TYPE CIRCUIT
SWITCH
BOLLARD OR GROUND MOUNTED FIXTURE
EXTERIOR WALL MOUNTED FIXTURE
POLE FIXTURE, ONE HEAD
E = ELECTRIC POWER T = TELEPHONE UG = UNDERGROUND OH = OVERHEAD D = DATA
POLE FIXTURE, TWO HEAD
POLE FIXTURE, FOUR HEAD
MH = MANHOLE HH = HANDHOLE
POST TOP LUMINAIRE MOUNTING LOCATION: AS SPECIFIED
POST TOP LUMINAIRE WITH REFLECTIVE SHADE MOUNTING LOCATION: AS SPECIFIED

SHEET SYMBOLS

LINE CONTINUE BREAK
ELEVATION DESIGNATION
DETAILS AND SECTIONS DESIGNATION
EQUIPMENT DESIGNATION TOP DESIGNATES EQUIPMENT ABBREVIATION BOTTOM DESIGNATES EQUIPMENT NUMBER
NEW WORK CONNECTION TO EXISTING WORK DESIGNATION
PLAN CONTINUATION DESIGNATION
DETAIL REFERENCE TOP DESIGNATES DETAIL NUMBER BOTTOM DESIGNATES ON WHICH SHEET DETAIL APPEARS
REVISION NUMBER DESIGNATION
NOTE DESIGNATION
ROOM NUMBER DESIGNATION
SECTION REFERENCE TOP DESIGNATES SECTION NUMBER BOTTOM DESIGNATES ON WHICH SHEET SECTION APPEARS

THIS SHEET SUPERCEDES SHEET e0.01 PREVIOUSLY ISSUED IN BID PACKAGE 1.

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By

Name RONALD M. PARSLEY

Date 02-24-2012 Reg. No. 25163

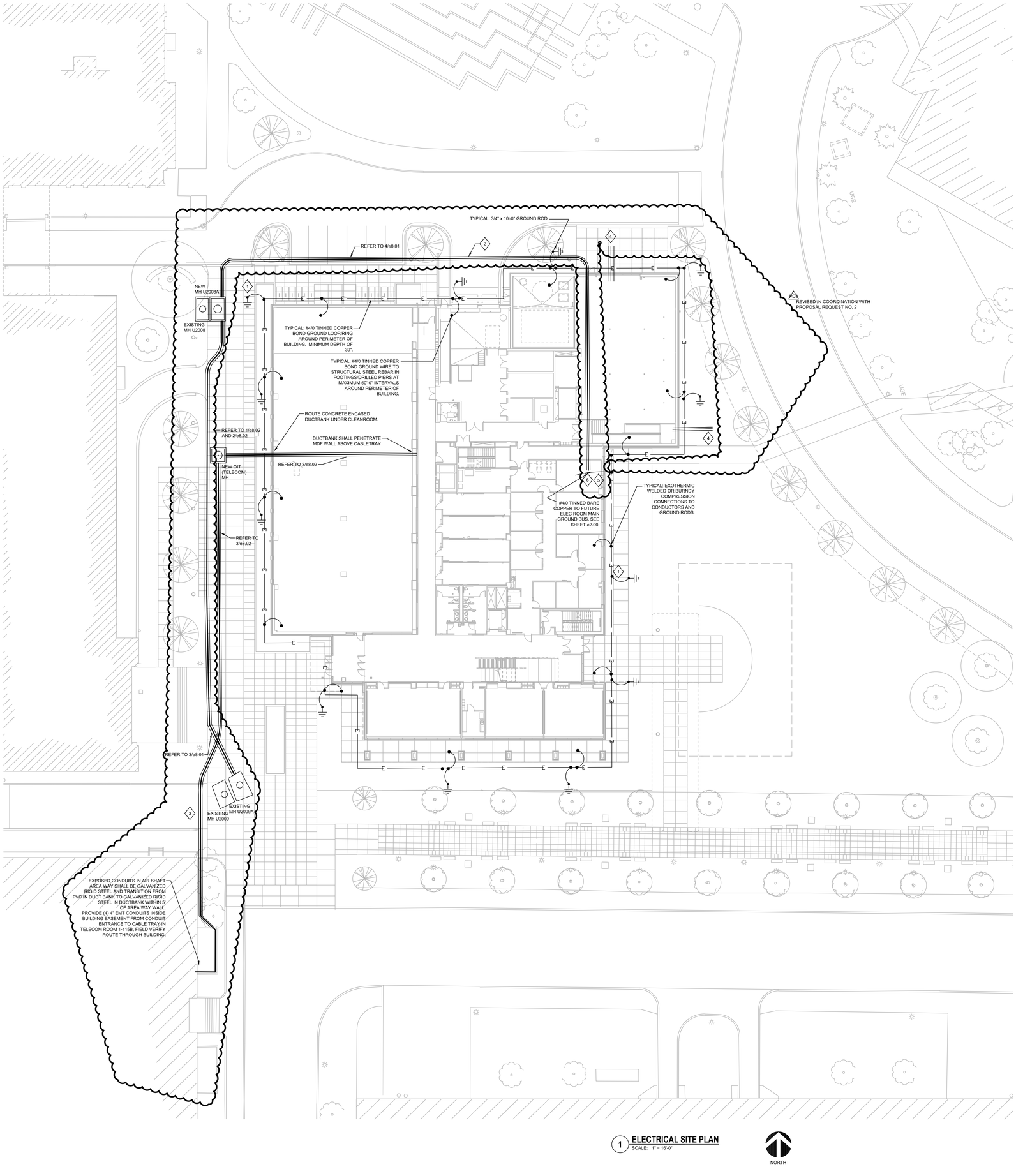
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Physics and Nanotechnology Building
U of M Project # 01-155-08-1718

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1 **ELECTRICAL SITE PLAN**
SCALE: 1" = 16'-0"

NORTH

GENERAL NOTES

1. REFER TO SHEET e6.01 AND e8.02 FOR MANHOLE GENERAL NOTES, MANHOLE DETAILS, AND DUCTBANK DETAILS.
2. REFER TO SITE/CIVIL c-SERIES DRAWINGS FOR FURTHER INFORMATION ON SITE UTILITIES. COORDINATE ALL ROUTING OF UTILITIES WITH EXISTING CONDITIONS AND OTHER UTILITIES.
3. DUCTBANK SHALL BE BURIED AT A MINIMUM ELEVATION OF 30" BELOW GRADE ALONG THE ENTIRE LENGTH AND ADJUSTED AS REQUIRED BY OBSTRUCTIONS OR ENTRANCES TO MANHOLES OR BUILDLINGS. SHALLOWER DEPTHS SHALL NOT BE ALLOWED. REFER TO SHEET C6.06 AND C6.07 AND INSTALL DUCTBANK PER PROFILES INDICATED ON THOSE SHEETS.
4. BENDS, KICKS, OFFSETS, AND ENTRANCE TO MANHOLES OR STRUCTURES SHALL BE MADE WITH RIGID GALVANIZED STEEL CONDUIT. PVC CONDUIT IS ACCEPTABLE WHERE DUCTBANK CONTINUES THROUGH WINDOW OPENING.
5. ALL DUCTBANK ANGLE BENDS SHALL BE 5° RADIUS BENDS.

SHEET KEYNOTES

1. PROVIDE GROUND TEST WELL AT THIS LOCATION.
2. MEDIUM VOLTAGE SERVICE ENTRANCE DUCTBANK.
3. EXISTING ELECTRICAL LINE IN THIS AREA. FIELD VERIFY DEPTH PRIOR TO INSTALLATION OF NEW DUCTBANK.
4. PROVIDE (3) - 1-1/2" GRC CONDUITS THROUGH FOUNDATION WALL FOR EXTENSION TO FUTURE SITE LIGHTING. BURY MINIMUM 30" BELOW GRADE. EXTEND CONDUITS 15' PAST FOUNDATION WALL. SEE SHEET e2.00.
5. PROVIDE (1) - 1-1/2" GRC CONDUIT THROUGH FOUNDATION WALL FOR CONNECTION TO #4/0 GROUND RING. SEE SHEET e2.00.
6. SEE SHEET e2.00 AND SHEET e2.00D IN BID PACKAGE NO. 2 FOR CONTINUATION OF DUCTBANK BELOW SLAB AND STUB-UP OF CONDUITS IN ELECTRICAL VAULT.

2 REVISED IN ACCORDANCE WITH PROPOSAL REQUEST NO. 2.

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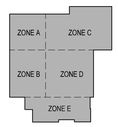
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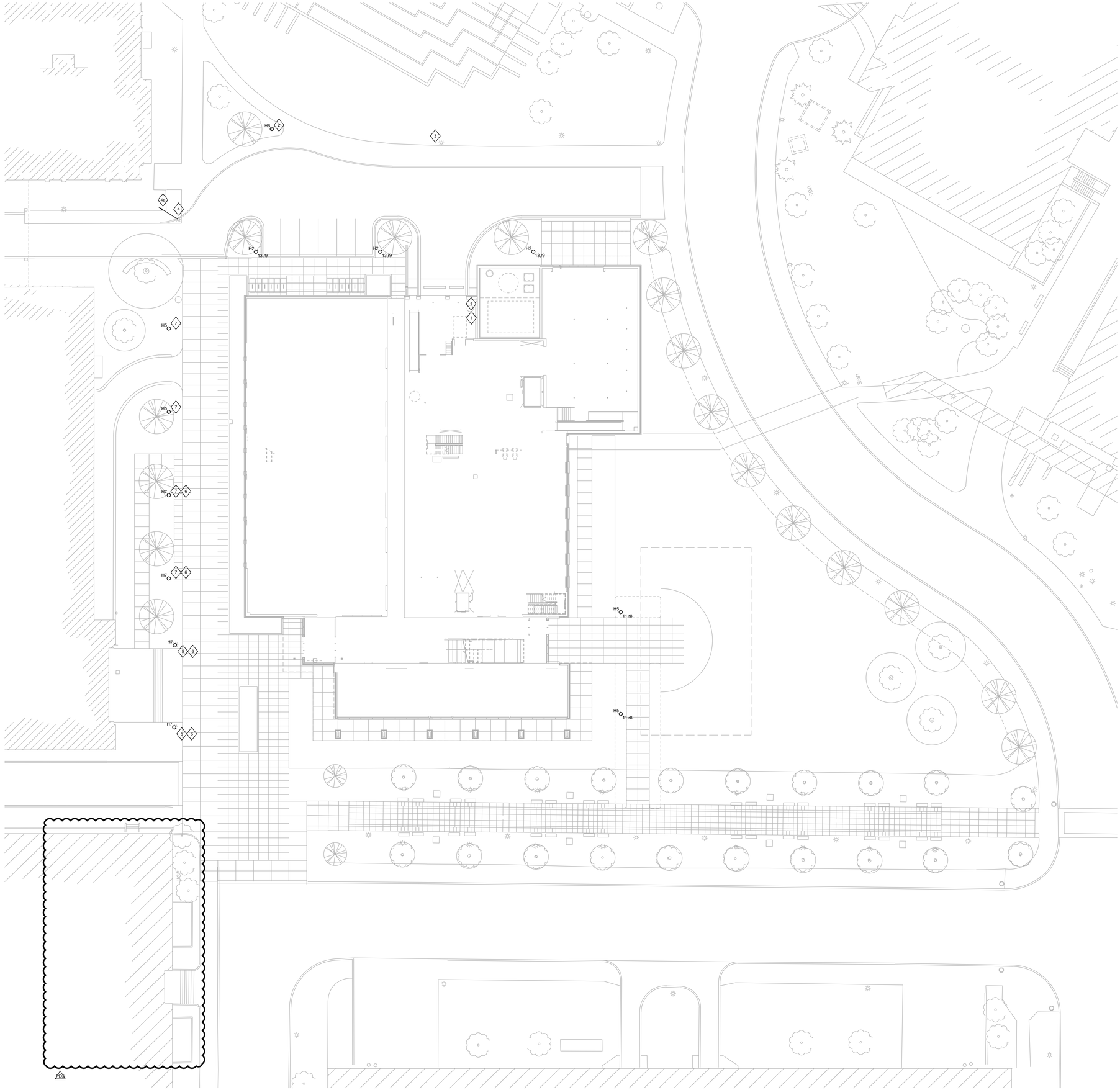
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ELECTRICAL SITE PLAN

e0.02



1 **ELECTRICAL SITE LIGHTING AND RECEPTACLE PLAN**
SCALE: 1" = 16'-0"

NORTH

GENERAL NOTES

1. REFER TO BID PACKAGE 1 (BP-1) SHEET e0.02 AND e8.01 FOR ADDITIONAL INFORMATION ON SITE WORK MANHOLE GENERAL NOTES, MANHOLE DETAILS, AND DUCTBANK DETAILS.
2. REFER TO SITE/CIVIL c-SERIES DRAWINGS FOR FURTHER INFORMATION ON SITE UTILITIES. COORDINATE ALL ROUTING OF UTILITIES WITH EXISTING CONDITIONS AND OTHER UTILITIES.
3. ALL SITE LIGHTING AND RECEPTACLE CONDUITS SHALL BE A MINIMUM 1" DIAMETER PVC SCHEDULE 40. REFER TO SPECIFICATIONS ON SITE WIRING CONDUCTORS AND CONDUITS.
4. ALL RELAYS THIS SHEET ARE FED FROM RELAY PANEL BRP.
5. ALL NORMAL POWER THIS SHEET FED FROM PANEL LPBA.

SHEET KEYNOTES

1. PROVIDE 30A FIXED CONNECTION TO (2) LOCATIONS OF HEAT TRACE CONTROLLERS FROM PANEL RP1A, CIRCUIT 77. PROVIDE 30MA GFCI BREAKER IN PANEL RP1A TO SERVE EQUIPMENT. COORDINATE EXACT LOCATION WITH HEAT TRACE INSTALLER. REFER TO SHEET e6.00.
2. EXISTING U MN STREET LIGHTING EAST BANK - NON HISTORIC AREA CAMPUS ROADS, TYPE H6 LUMINAIRE, POLE AND BASE SHALL BE RELOCATED TO THIS LOCATION. TIE INTO EXISTING CIRCUIT SERVING EXISTING SITE LUMINAIRE AS INDICATED IN NOTE 3.
3. EXISTING U MN STREET LIGHTING EAST BANK - NON HISTORIC AREA PEDESTRIAN WALKWAY LUMINAIRE. TIE NEW LUMINAIRE IN NOTE 2 INTO EXISTING CIRCUIT SERVING THIS LUMINAIRE.
4. EXISTING U MN STREET LIGHTING EAST BANK - NON HISTORIC AREA PEDESTRIAN WALKWAY LUMINAIRE. RELOCATE LUMINAIRE TO LOCATION SHOWN IN NOTE 4a.
4a. EXISTING U MN STREET LIGHTING EAST BANK - NON HISTORIC AREA PEDESTRIAN WALKWAY LUMINAIRE. APPROXIMATE LOCATION OF RELOCATED LUMINAIRE. REFER TO ARCHITECTURAL DRAWING FOR DIMENSIONS. RECONNECT EXISTING CIRCUIT WHICH WAS SERVING THIS LUMINAIRE IN THE OLD LOCATION.
5. EXISTING CIRCUIT SHALL BE REUSED AND EXTENDED TO NEW LUMINAIRES TO THE NORTH.
6. EXISTING U MN STREET LIGHTING EAST BANK - HISTORIC AREA PEDESTRIAN WALKWAY LUMINAIRE TO BE INSTALLED ON NEW POLE BASE.
7. EXISTING CIRCUIT SHALL BE EXTENDED TO NEW LUMINAIRES FROM TWO LUMINAIRES ON EITHER SIDE OF STAIRS INTO AKERMAN HALL TO THE SOUTH.

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By

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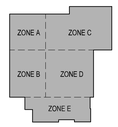
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ELECTRICAL SITE LIGHTING AND RECEPTACLE PLAN

e0.03



1 **ELECTRICAL LIGHTING BASEMENT - ZONE C**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. ALL PUBLIC AREA LIGHTING SHALL BE CONTROLLED BY LIGHTING CONTROL SYSTEM, UNLESS OTHERWISE NOTED. RELAY CABINETS, OCCUPANCY/VACANCY SENSORS, AUTOMATED SYSTEM CONTROL INTERFACES.
2. LIGHTING LOADS NOT DESIGNATED FOR 24 HOUR OPERATION SHALL BE SUBJECT TO AUTOMATED AFTER HOURS SWEEP TO OFF.
3. OCCUPANCY SENSORS SHALL CONTROL ALL LUMINAIRES IN ROOM WHICH THEY ARE INSTALLED. PROVIDE ADDITIONAL RELAY TO CONTROL 120V LUMINAIRES.
4. ALL WALL MOUNTED EXIT LIGHTS SHOWN ABOVE DOORS SHALL BE 1'-0" ABOVE DOOR FRAME TO BOTTOM OF EXIT LIGHT.
5. MOUNT LUMINAIRE TYPE F5 ON THIS SHEET AT 10"-0" AFF TO BOL.
7. ALL RELAYS THIS SHEET ARE FED FROM RELAY PANEL BRP.
8. ALL NORMAL POWER THIS SHEET FED FROM PANEL LPBA.
9. ALL EMERGENCY LIFE SAFETY POWER THIS SHEET FED FROM PANEL EHBA.
10. REFER TO ARCHITECTURAL DRAWING REFLECTED CEILING PLANS FOR COORDINATION AND PLACEMENT OF LIGHTS WITHIN CEILING SPACE, CEILING STRUCTURE AND CEILING GRID.

SHEET KEYNOTES

1. ELEVATOR PIT LIGHT AND SWITCH. ALL BOXES AND DEVICES SHALL BE NEMA 4 AND WEATHERPROOF. COORDINATE LOCATION WITH ELEVATOR SHOP DRAWINGS. LIGHT SWITCH SHALL BE LOCATED SO AS TO BE READILY ACCESSIBLE FROM PIT ACCESS DOOR. PROVIDE CIRCUITING FROM SAME CIRCUIT AS RECEPTACLE IN ELEVATOR PIT. MOUNT LUMINAIRE VERTICALLY. PROVIDE ADDITIONAL LUMINAIRES TO PROVIDE 10 FOOTCANDLES AT PIT FLOOR.
1a. ADDITIONAL TYPE F15 LUMINAIRES TO BE MOUNTED VERTICALLY IN CONTINUOUS RUN FROM 5' ABOVE FLOOR OF FIRST LEVEL TO FLOOR OF ROOF LEVEL. CONTRACTOR TO COORDINATE AND PROVIDE QUANTITY OF LUMINAIRES AS REQUIRED. SEE SHEET e1.05C FOR OTHER SWITCH LOCATION. LOCATE SWITCH ADJACENT TO LADDER.
2. OCCUPANCY SENSOR IN THIS ROOM SHALL BE MOUNTED 10'-0" AFF TO BOTTOM OF DEVICE. PROVIDE THREADED ROD FROM BACKBOX TO STRUCTURE FOR SUPPORT OF BACKBOX AND CONDUIT.
3. PROVIDE UNISTRUT TO MOUNT LUMINAIRES IN A CONTINUOUS RUN.
4. NOT USED.
5. TIMER SWITCH SHALL BE WATTSTOPPER TS-400.

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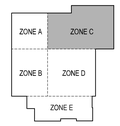
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Project

Physics and Nanotechnology Building

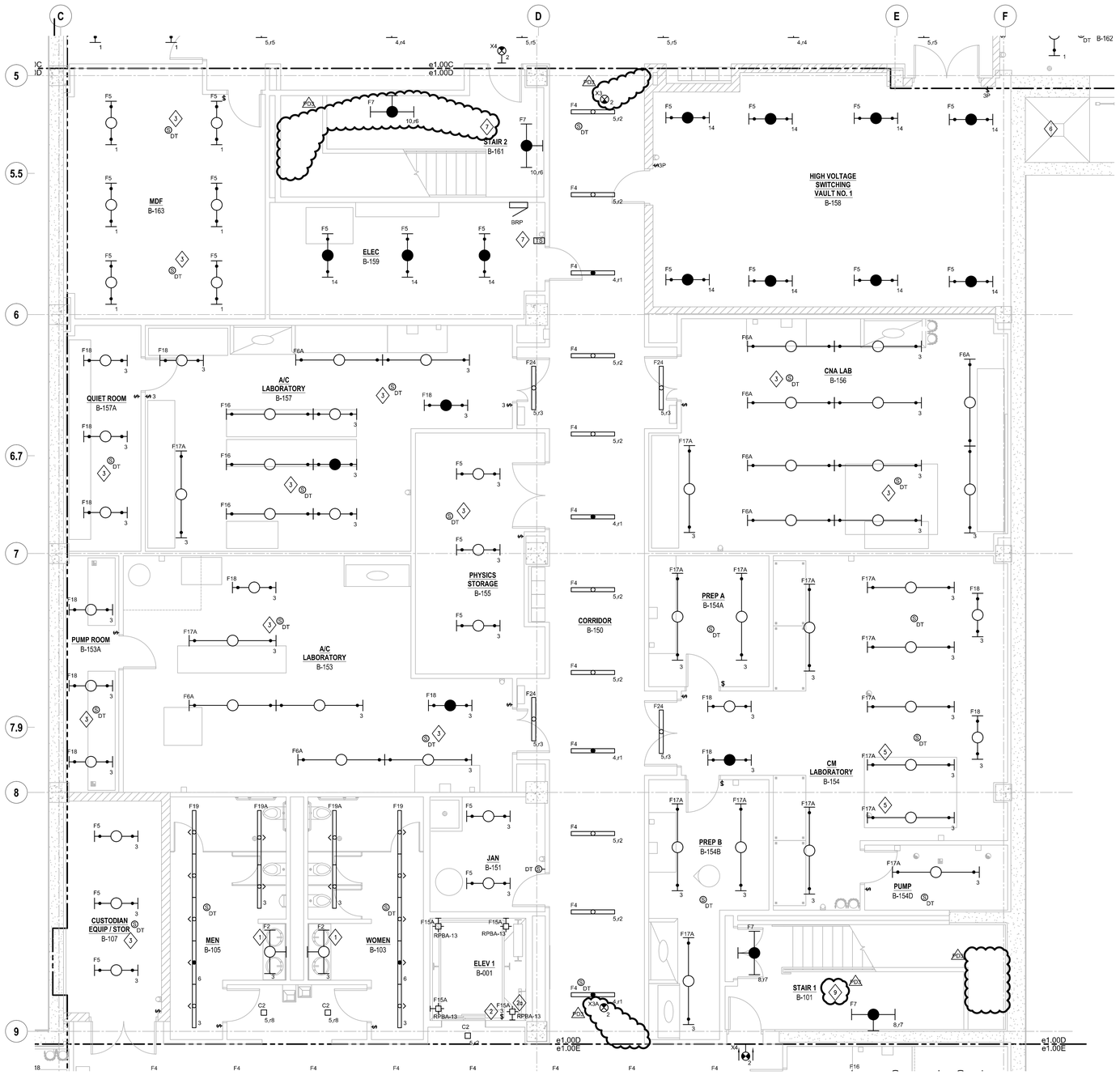
U of M Project # 01-155-08-1718



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ELECTRICAL LIGHTING
BASEMENT - ZONE C

e1.00C



1 **ELECTRICAL LIGHTING BASEMENT - ZONE D**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. ALL PUBLIC AREA LIGHTING SHALL BE CONTROLLED BY LIGHTING CONTROL SYSTEM, UNLESS OTHERWISE NOTED. RELAY CABINETS, OCCUPANCY/VACANCY SENSORS, AUTOMATED SYSTEM CONTROL INTERFACES.
2. LIGHTING LOADS NOT DESIGNATED FOR 24 HOUR OPERATION SHALL BE SUBJECT TO AUTOMATED AFTER HOURS SWEEP TO OFF.
3. OCCUPANCY SENSORS SHALL CONTROL ALL LUMINAIRES IN ROOM WHICH THEY ARE INSTALLED. PROVIDE ADDITIONAL RELAY TO CONTROL 120V LUMINAIRES.
4. ALL WALL MOUNTED EXIT LIGHTS SHOWN ABOVE DOORS SHALL BE 1'-0" ABOVE DOOR FRAME TO BOTTOM OF EXIT LIGHT.
5. MOUNT LUMINAIRE TYPE F5 ON THIS SHEET AT 10'-0" AFF TO BOL.
7. ALL RELAYS THIS SHEET ARE FED FROM RELAY PANEL BRP.
8. ALL NORMAL POWER THIS SHEET FED FROM PANEL LPBA.
9. ALL EMERGENCY LIFE SAFETY POWER THIS SHEET FED FROM PANEL EHBA.
10. REFER TO ARCHITECTURAL DRAWING REFLECTED CEILING PLANS FOR COORDINATION AND PLACEMENT OF LIGHTS WITHIN CEILING SPACE, CEILING STRUCTURE AND CEILING GRID.

SHEET KEYNOTES

1. MOUNT LUMINAIRE HORIZONTALLY OVER TOP OF MIRROR. REFER TO ARCHITECTURAL ELEVATION FOR MOUNTING HEIGHT.
2. ELEVATOR PIT LIGHT AND SWITCH. ALL BOXES AND DEVICES SHALL BE NEMA 4 AND WEATHERPROOF. COORDINATE LOCATION WITH ELEVATOR SHOP DRAWINGS. LIGHT SWITCH SHALL BE LOCATED SO AS TO BE READILY ACCESSIBLE FROM PIT ACCESS DOOR. PROVIDE CIRCUITING FROM SAME CIRCUIT AS RECEPTACLE IN ELEVATOR PIT. MOUNT LUMINAIRE VERTICALLY. PROVIDE ADDITIONAL LUMINAIRES TO PROVIDE 10 FOOTCANDLES AT PIT FLOOR.

2a ADDITIONAL TYPE F15 LUMINAIRES TO BE MOUNTED VERTICALLY IN CONTINUOUS RUN FROM 5' ABOVE FLOOR OF FIRST LEVEL TO FLOOR OF ROOF LEVEL. CONTRACTOR TO COORDINATE AND PROVIDE QUANTITY OF LUMINAIRES AS REQUIRED. SEE SHEET e1.04D FOR OTHER SWITCH LOCATION, LOCATE SWITCH ADJACENT TO LADDER.

3. OCCUPANCY SENSOR IN THIS ROOM SHALL BE MOUNTED 10'-0" AFF TO BOTTOM OF DEVICE. PROVIDE THREADED ROD FROM BACKBOX TO STRUCTURE FOR SUPPORT OF BACKBOX AND CONDUIT.
4. NOT USED.
5. LUMINAIRE IN THIS ROOM SHALL BE MOUNTED AT 13'-1" AFF TO BOTTOM OF LUMINAIRE.
6. REFER TO SHEET e7.04 FOR CONTINUATION OF STEAM TUNNEL.
7. TIMER SWITCH SHALL BE WATTSTOPPER TS-400.

PDA MOUNT LUMINAIRE TYPE F7 7'-6" AFF TO BOL.

8. MOUNT LUMINAIRE TYPE F7 10'-0" AFF TO BOL.
9. MOUNT LUMINAIRE TYPE F7 12'-6" AFF TO BOL.

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For AFFILIATED ENGINEERS, INC.

By

Name RONALD M. PARSLEY

Date 02-24-2012 Reg. No. 25163

Issued for	Date
100% CD set	12-16-2011
Bid Package No. 2	02-24-2012
Project Directive No. 3	05-15-2012

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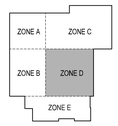
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Date 12/16/11

Project

Physics and Nanotechnology Building

U of M Project # 01-155-08-1718



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ELECTRICAL LIGHTING
BASEMENT - ZONE D

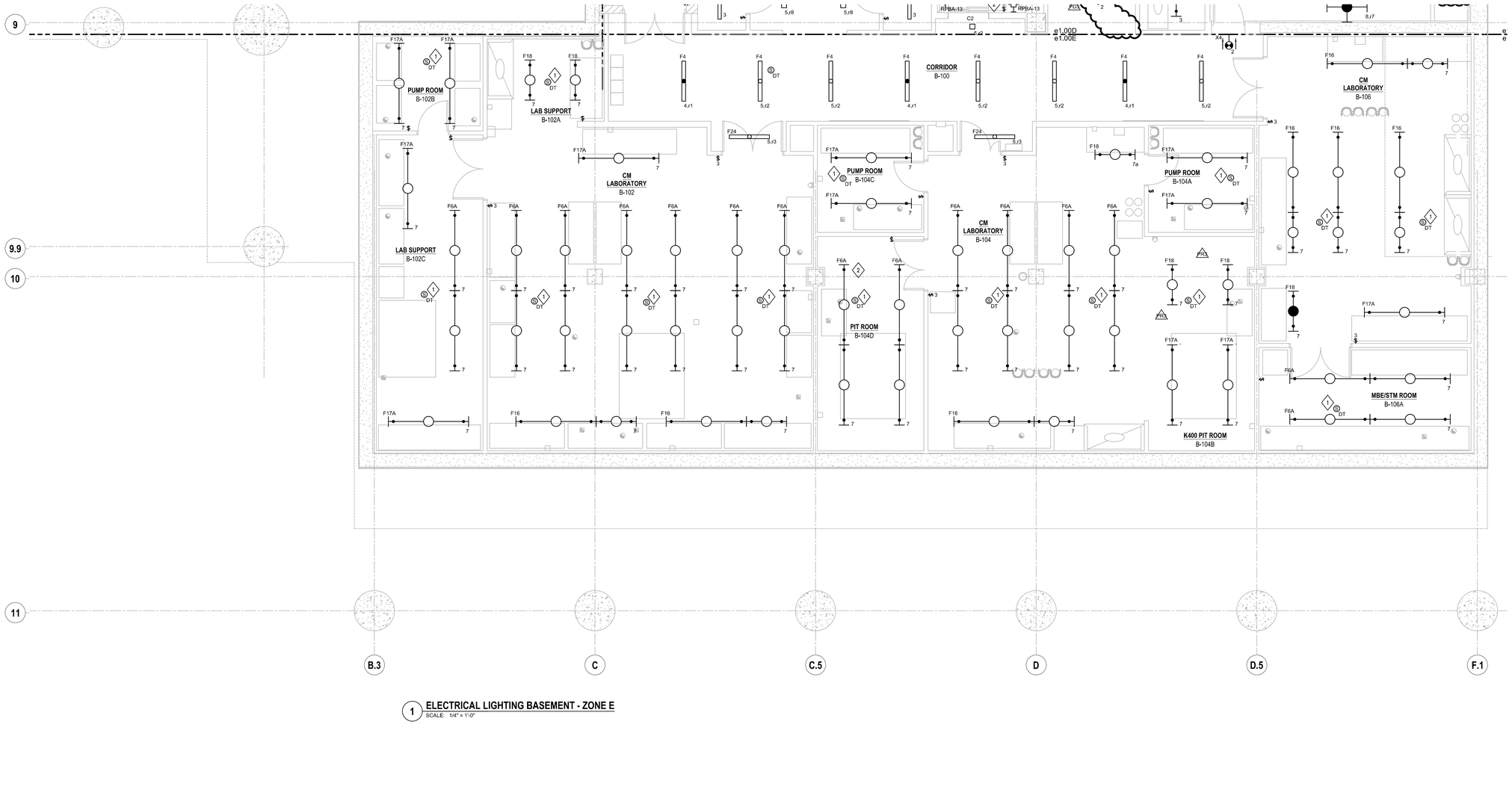
e1.00D

GENERAL NOTES

1. ALL PUBLIC AREA LIGHTING SHALL BE CONTROLLED BY LIGHTING CONTROL SYSTEM, UNLESS OTHERWISE NOTED. RELAY CABINETS, OCCUPANCY/VACANCY SENSORS, AUTOMATED SYSTEM CONTROL INTERFACES.
2. LIGHTING LOADS NOT DESIGNATED FOR 24 HOUR OPERATION SHALL BE SUBJECT TO AUTOMATED AFTER HOURS SWEEP TO OFF.
3. OCCUPANCY SENSORS SHALL CONTROL ALL LUMINAIRES IN ROOM WHICH THEY ARE INSTALLED. PROVIDE ADDITIONAL RELAY TO CONTROL 120V LUMINAIRES.
4. ALL WALL MOUNTED EXIT LIGHTS SHOWN ABOVE DOORS SHALL BE 1'-0" ABOVE DOOR FRAME TO BOTTOM OF EXIT LIGHT.
5. MOUNT LUMINAIRE TYPE F5 ON THIS SHEET AT 10"-0" AFF TO BOL.
7. ALL RELAYS THIS SHEET ARE FED FROM RELAY PANEL BRP.
8. ALL NORMAL POWER THIS SHEET FED FROM PANEL LPBA.
9. ALL EMERGENCY LIFE SAFETY POWER THIS SHEET FED FROM PANEL EHBA.
10. REFER TO ARCHITECTURAL DRAWING REFLECTED CEILING PLANS FOR COORDINATION AND PLACEMENT OF LIGHTS WITHIN CEILING SPACE, CEILING STRUCTURE AND CEILING GRID.

SHEET KEYNOTES

1. OCCUPANCY SENSOR IN THIS ROOM SHALL BE MOUNTED 10'-0" AFF TO BOTTOM OF DEVICE. PROVIDE THREADED ROD FROM BACKBOX TO STRUCTURE FOR SUPPORT OF BACKBOX AND CONDUIT.
2. LUMINAIRE IN THIS ROOM SHALL BE MOUNTED AT 13'-1" AFF TO BOTTOM OF LUMINAIRE.
3. NOT USED.



1 **ELECTRICAL LIGHTING BASEMENT - ZONE E**
SCALE: 1/4" = 1'-0"

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For AFFILIATED ENGINEERS, INC.

By

Name RONALD M. PARSLEY

Date 02-24-2012 Reg. No. 25163

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Bid Package No. 2	02-24-2012
Proposal Request No. 3	04-05-2012

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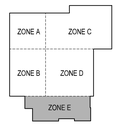
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Project

Physics and Nanotechnology Building

U of M Project # 01-155-08-1718



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ELECTRICAL LIGHTING
BASEMENT - ZONE E

e1.00E

GENERAL NOTES

1. ALL PUBLIC AREA NORMAL POWER LIGHTING SHALL BE CONTROLLED BY LIGHTING CONTROL SYSTEM, UNLESS OTHERWISE NOTED. RELAY CABINETS, OCCUPANCY/VACANCY SENSORS, AUTOMATED SYSTEM CONTROL INTERFACES.
2. LIGHTING LOADS NOT DESIGNATED FOR 24 HOUR OPERATION SHALL BE SUBJECT TO AUTOMATED AFTER HOURS SWEEP TO OFF.
3. OCCUPANCY SENSORS SHALL CONTROL ALL LUMINAIRES IN ROOM WHICH THEY ARE INSTALLED. PROVIDE ADDITIONAL RELAY TO CONTROL 120V LUMINAIRES.
4. ALL WALL MOUNTED EXIT LIGHTS SHOWN ABOVE DOORS SHALL BE 1'-0" ABOVE DOOR FRAME TO BOTTOM OF EXIT LIGHT.
5. MOUNT LUMINAIRE TYPE F5 ON THIS SHEET AT 10'-0" AFF TO BOL.
6. ALL RELAYS THIS SHEET ARE FED FROM RELAY PANEL 1RP.
7. ALL NORMAL POWER THIS SHEET FED FROM PANEL LP1A.
8. ALL EMERGENCY LIFE SAFETY POWER THIS SHEET FED FROM PANEL EH1A.
9. REFER TO ARCHITECTURAL DRAWING REFLECTED CEILING PLANS FOR COORDINATION AND PLACEMENT OF LIGHTS WITHIN CEILING SPACE, CEILING STRUCTURE AND CEILING GRID.

SHEET KEYNOTES

1. ALL LIGHTING ON EMERGENCY POWER IS SWITCHED. PROVIDE TRANSFER DEVICE, BODINE GTD 20A FOR EACH SWITCHED CIRCUIT. PROVIDE UNSWITCHED EMERGENCY POWER AND UNSWITCHED NORMAL POWER TO TRANSFER DEVICE. REFER TO SWITCHED EMERGENCY LIGHTING TRANSFER DEVICE DETAIL 3/e6.03.
2. ADDITIONAL TYPE F15 LUMINAIRES TO BE MOUNTED VERTICALLY IN CONTINUOUS RUN FROM 5' ABOVE FLOOR OF FIRST LEVEL TO FLOOR OF ROOF LEVEL. CONTRACTOR TO COORDINATE AND PROVIDE QUANTITY OF LUMINAIRES AS REQUIRED.
3. ALL WIRING MATERIALS AND METHODS SHALL BE CLASS 1, DIVISION 2 IN ACCORDANCE WITH NATIONAL ELECTRICAL CODE ARTICLE 501.
4. REFER TO ARCHITECTURAL ELEVATION FOR MOUNTING LOCATION.

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For AFFILIATED ENGINEERS, INC.

By

Name RONALD M. PARSLEY

Date 02-24-2012 Reg. No. 25163

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Bid Package No. 2	02-24-2012
Project Directive No. 3	05-15-2012

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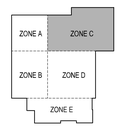
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Project

Physics and Nanotechnology Building

U of M Project # 01-155-08-1718

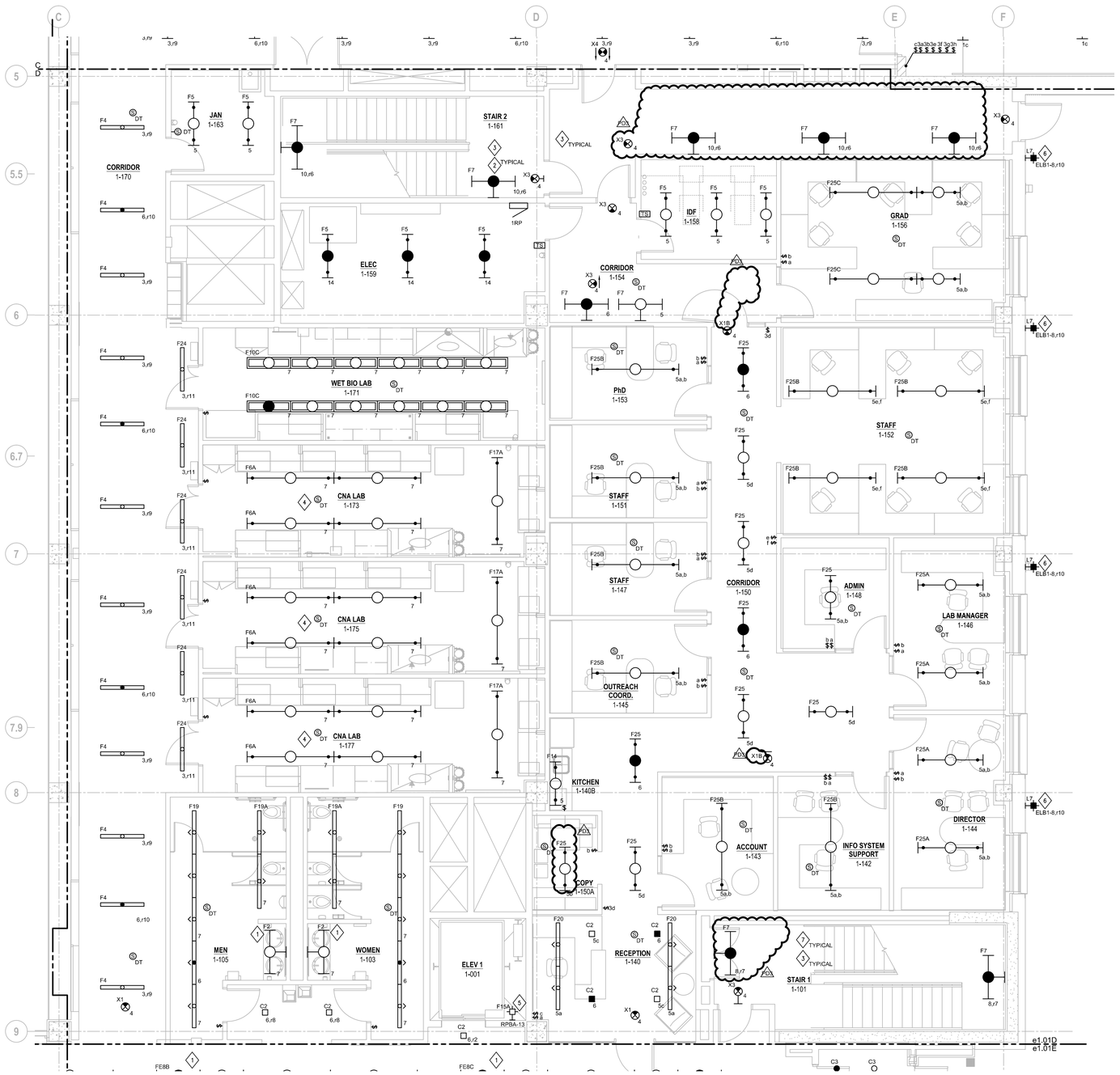


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ELECTRICAL LIGHTING
LEVEL 1 - ZONE C

e1.01C

1 ELECTRICAL LIGHTING LEVEL 1 - ZONE C
SCALE: 1/4" = 1'-0"



1 ELECTRICAL LIGHTING LEVEL 1 - ZONE D

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

GENERAL NOTES

1. ALL PUBLIC AREA NORMAL POWER LIGHTING SHALL BE CONTROLLED BY LIGHTING CONTROL SYSTEM, UNLESS OTHERWISE NOTED. RELAY CABINETS, OCCUPANCY/VACANCY SENSORS, AUTOMATED SYSTEM CONTROL INTERFACES.
2. LIGHTING LOADS NOT DESIGNATED FOR 24 HOUR OPERATION SHALL BE SUBJECT TO AUTOMATED AFTER HOURS SWEEP TO OFF.
3. OCCUPANCY SENSORS SHALL CONTROL ALL LUMINAIRES IN ROOM WHICH THEY ARE INSTALLED. PROVIDE ADDITIONAL RELAY TO CONTROL 120V LUMINAIRES.
4. ALL WALL MOUNTED EXIT LIGHTS SHOWN ABOVE DOORS SHALL BE 1'-0" ABOVE DOOR FRAME TO BOTTOM OF EXIT LIGHT.
5. MOUNT LUMINAIRE TYPE F5 ON THIS SHEET AT 10'-0" AFF TO BOL.
6. PENDANT MOUNTED LUMINAIRES IN LABS ON THIS SHEET SHALL BE MOUNTED 10'-0" AFF TO BOL.
7. ALL RELAYS THIS SHEET ARE FED FROM RELAY PANEL 1RP.
8. ALL NORMAL POWER THIS SHEET FED FROM PANEL LP1A.
9. ALL EMERGENCY LIFE SAFETY POWER THIS SHEET FED FROM PANEL EH1A.
10. REFER TO ARCHITECTURAL DRAWING REFLECTED CEILING PLANS FOR COORDINATION AND PLACEMENT OF LIGHTS WITHIN CEILING SPACE, CEILING STRUCTURE AND CEILING GRID.

SHEET KEYNOTES

1. MOUNT LUMINAIRE HORIZONTALLY OVER TOP OF MIRROR. REFER TO ARCHITECTURAL ELEVATION FOR MOUNTING HEIGHT.
2. MOUNT LUMINAIRE TYPE F7 7'-6" AFF TO BOL.
3. LUMINAIRE IN STAIRWELL ARE FED THROUGH RELAY PANEL 8RP IN BASEMENT.
4. OCCUPANCY SENSOR IN THIS ROOM SHALL BE MOUNTED 10'-0" AFF TO BOTTOM OF DEVICE. PROVIDE THREADED ROD FROM BACKBOX TO STRUCTURE FOR SUPPORT OF BACKBOX AND CONDUIT.
5. ADDITIONAL TYPE F15 LUMINAIRES TO BE MOUNTED VERTICALLY IN CONTINUOUS RUN FROM 5' ABOVE FLOOR OF FIRST LEVEL TO FLOOR OF ROOF LEVEL. CONTRACTOR TO COORDINATE AND PROVIDE QUANTITY OF LUMINAIRES AS REQUIRED. SEE SHEET e1.04D FOR OTHER SWITCH LOCATION. LOCATE SWITCH ADJACENT TO LADDER.
6. REFER TO ARCHITECTURAL ELEVATION FOR MOUNTING LOCATION.
7. MOUNT LUMINAIRE TYPE F7 10'-0" AFF TO BOL.

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By

Name RONALD M. PARSLEY

Date 02-24-2012 Reg. No. 25163

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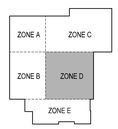
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Checked	SDM
Date	12/16/11

Project

Physics and Nanotechnology Building

U of M Project # 01-155-08-1718



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ELECTRICAL LIGHTING
LEVEL 1 - ZONE D

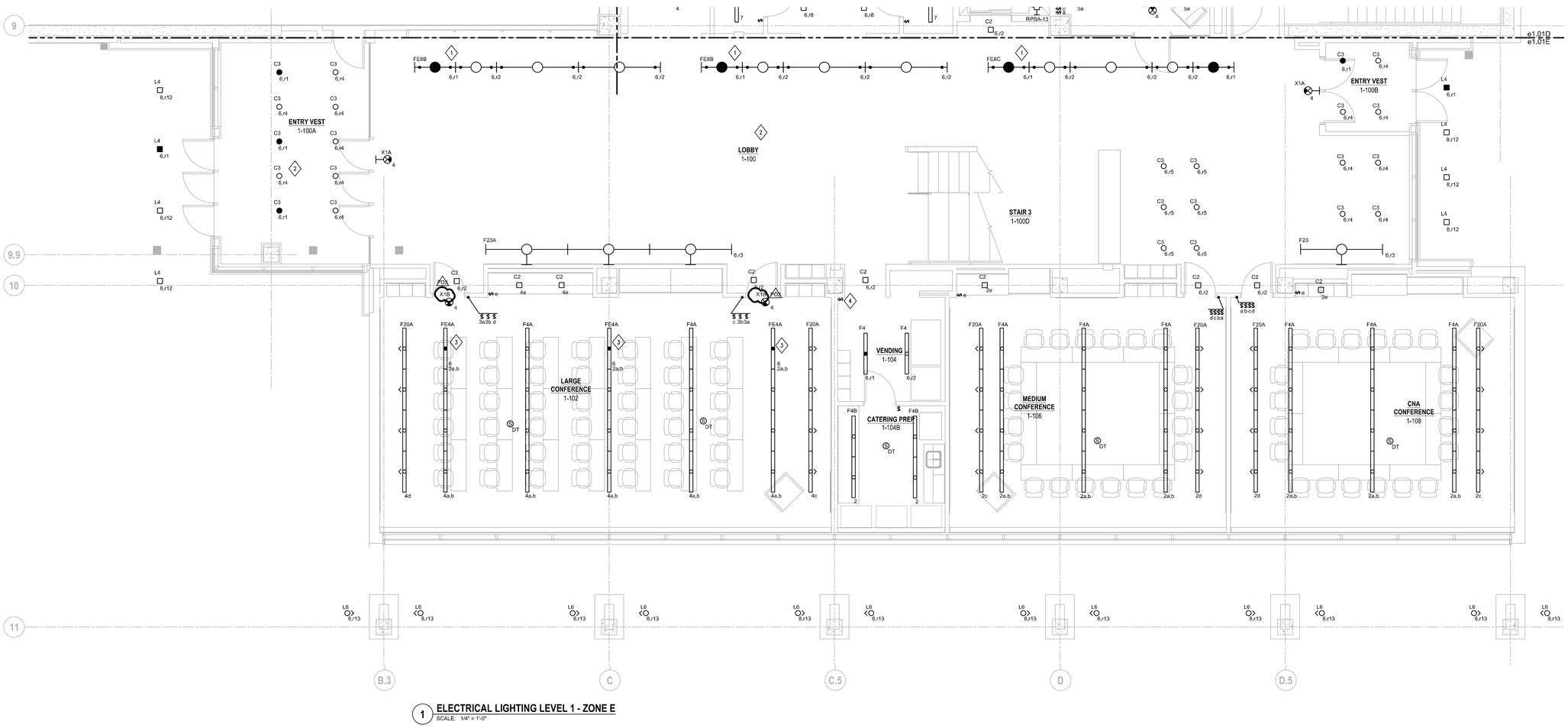
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GENERAL NOTES

1. ALL PUBLIC AREA NORMAL POWER LIGHTING SHALL BE CONTROLLED BY LIGHTING CONTROL SYSTEM, UNLESS OTHERWISE NOTED. RELAY CABINETS, OCCUPANCY/VACANCY SENSORS, AUTOMATED SYSTEM CONTROL INTERFACES.
2. LIGHTING LOADS NOT DESIGNATED FOR 24 HOUR OPERATION SHALL BE SUBJECT TO AUTOMATED AFTER HOURS SWEEP TO OFF.
3. OCCUPANCY SENSORS SHALL CONTROL ALL LUMINAIRES IN ROOM WHICH THEY ARE INSTALLED. PROVIDE ADDITIONAL RELAY TO CONTROL 120V LUMINAIRES.
4. ALL WALL MOUNTED EXIT LIGHTS SHOWN ABOVE DOORS SHALL BE 1'-0" ABOVE DOOR FRAME TO BOTTOM OF EXIT LIGHT.
5. ALL PENDANT MOUNTED LUMINAIRES ON THIS SHEET SHALL BE MOUNTED AT 8'-6" AFF TO BOL.
6. ALL RELAYS THIS SHEET ARE FED FROM RELAY PANEL 1RP.
7. ALL NORMAL POWER THIS SHEET FED FROM PANEL LP1A.
8. ALL EMERGENCY LIFE SAFETY POWER THIS SHEET FED FROM PANEL EH1A.
10. REFER TO ARCHITECTURAL DRAWING REFLECTED CEILING PLANS FOR COORDINATION AND PLACEMENT OF LIGHTS WITHIN CEILING SPACE, CEILING STRUCTURE AND CEILING GRID.

SHEET KEYNOTES

1. MOUNT LUMINAIRE AT 9'-0" AFF TO BOL.
2. PHOTOCELL SENSOR LOCATED ON ROOF SHALL CONTROL (OPEN LOOP) ALL LUMINAIRES (NORMAL AND LIFE SAFETY POWER) ON RELAYS IN THIS AREA.
3. ALL LIGHTING ON EMERGENCY POWER IS SWITCHED. PROVIDE TRANSFER DEVICE, BODINE GTD 20A FOR EACH SWITCHED CIRCUIT. PROVIDE UNSWITCHED EMERGENCY POWER AND UNSWITCHED NORMAL POWER TO TRANSFER DEVICE. REFER TO SWITCHED EMERGENCY LIGHTING TRANSFER DEVICE DETAIL 3/e8.03.
4. SWITCH TO CONTROL TYPE H2 LUMINAIRES ON SECOND FLOOR. PROVIDE LABEL TO INDICATES LIGHTS CONTROLLED.



1 **ELECTRICAL LIGHTING LEVEL 1 - ZONE E**
SCALE: 1/4" = 1'-0"

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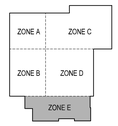
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Project

Physics and Nanotechnology Building

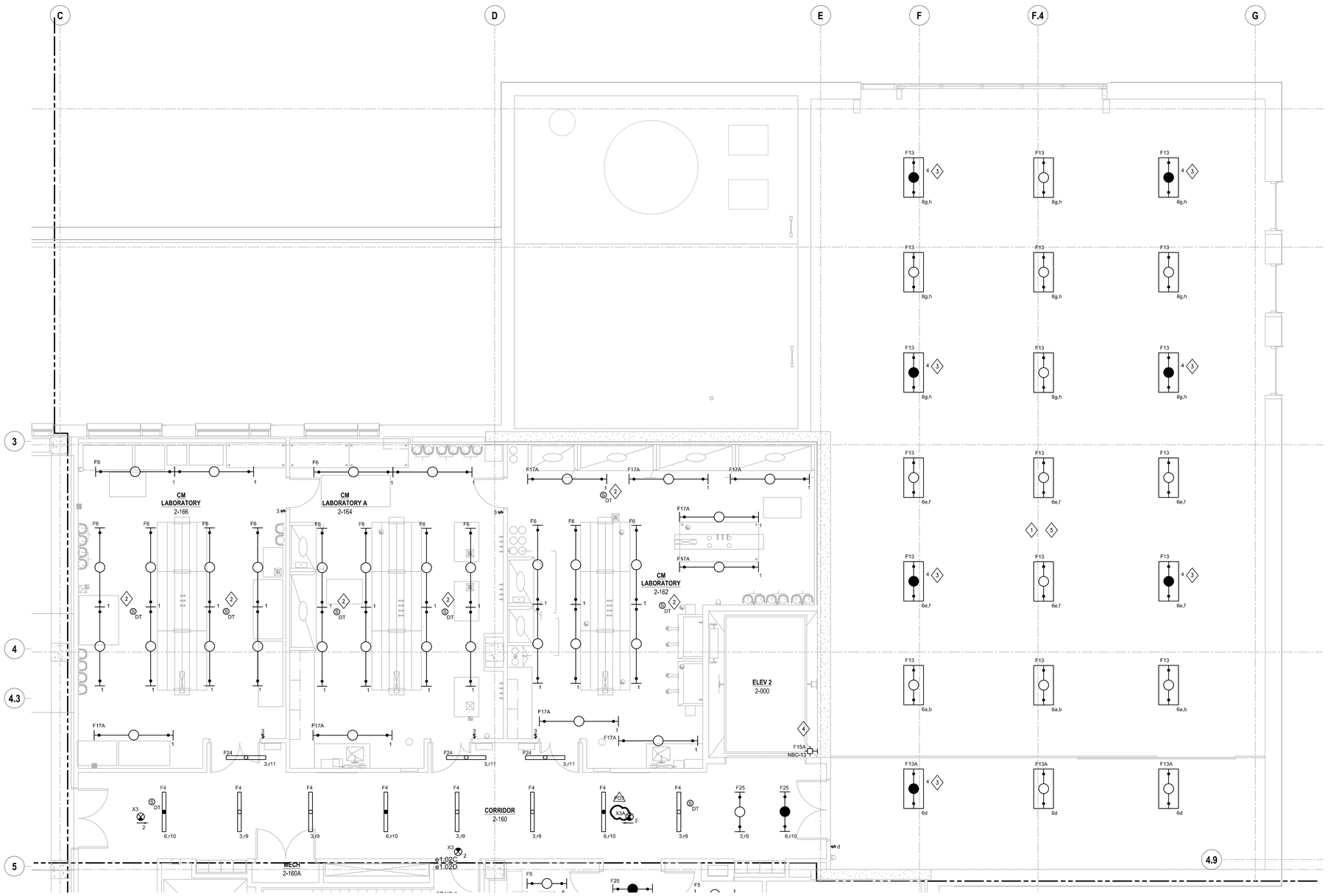
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ELECTRICAL LIGHTING
LEVEL 1 - ZONE E

e1.01E



1 **ELECTRICAL LIGHTING LEVEL 2 - ZONE C**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. ALL PUBLIC AREA NORMAL POWER LIGHTING SHALL BE CONTROLLED BY LIGHTING CONTROL SYSTEM, UNLESS OTHERWISE NOTED. RELAY CABINETS, OCCUPANCY/VACANCY SENSORS, AUTOMATED SYSTEM CONTROL INTERFACES.
2. LIGHTING LOADS NOT DESIGNATED FOR 24 HOUR OPERATION SHALL BE SUBJECT TO AUTOMATED AFTER HOURS SWEEP TO OFF.
3. OCCUPANCY SENSORS SHALL CONTROL ALL LUMINAIRES IN ROOM WHICH THEY ARE INSTALLED. PROVIDE ADDITIONAL RELAY TO CONTROL 120V LUMINAIRES.
4. ALL WALL MOUNTED EXIT LIGHTS SHOWN ABOVE DOORS SHALL BE 1'-0" ABOVE DOOR FRAME TO BOTTOM OF EXIT LIGHT.
5. PENDANT MOUNTED LUMINAIRES IN LABS ON THIS SHEET SHALL BE MOUNTED 10"-0" AFF TO BOL.
6. PENDANT MOUNTED LUMINAIRE TYPE F8 IN CORRIDOR ON THIS SHEET SHALL BE MOUNTED SO THAT BOL ALIGNS WITH THE BOTTOM OF CLOUD CEILING.
7. ALL RELAYS THIS SHEET ARE FED FROM RELAY PANEL 2RP.
8. ALL NORMAL POWER THIS SHEET FED FROM PANEL LP2A.
9. ALL EMERGENCY LIFE SAFETY POWER THIS SHEET FED FROM PANEL EH2A.
10. REFER TO ARCHITECTURAL DRAWING REFLECTED CEILING PLANS FOR COORDINATION AND PLACEMENT OF LIGHTS WITHIN CEILING SPACE, CEILING STRUCTURE AND CEILING GRID.

SHEET KEYNOTES

1. MOUNT LUMINAIRE TYPE F13 3" ABOVE BOTTOM OF JOIST. COORDINATE SO AS TO NOT INTERFERE WITH MOVEMENT OF THE OVERHEAD CRANE.
2. OCCUPANCY SENSOR IN THIS ROOM SHALL BE MOUNTED 10'-0" AFF TO BOTTOM OF DEVICE. PROVIDE THREADED ROD FROM BACKBOX TO STRUCTURE FOR SUPPORT OF BACKBOX AND CONDUIT.
3. ALL LIGHTING ON EMERGENCY POWER IS SWITCHED, PROVIDE TRANSFER DEVICE, BODINE GTD 20A FOR EACH SWITCHED CIRCUIT. PROVIDE UNSWITCHED EMERGENCY POWER AND UNSWITCHED NORMAL POWER TO TRANSFER DEVICE. REFER TO SWITCHED EMERGENCY LIGHTING TRANSFER DEVICE DETAIL 3/e8.03.
4. ADDITIONAL TYPE F15 LUMINAIRES TO BE MOUNTED VERTICALLY IN CONTINUOUS RUN FROM 5' ABOVE FLOOR OF FIRST LEVEL TO FLOOR OF ROOF LEVEL. CONTRACTOR TO COORDINATE AND PROVIDE QUANTITY OF LUMINAIRES AS REQUIRED.
5. FIXTURES IN THIS ROOM CONTROLLED BY SWITCHES ON SHEET e1.01C.

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For AFFILIATED ENGINEERS, INC.

By

Name RONALD M. PARSLEY

Date 02-24-2012 Reg. No. 25163

Issued for	Date
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Bid Package No. 2	02-24-2012
Project Directive No. 3	05-15-2012

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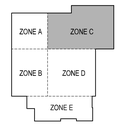
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Project

Physics and Nanotechnology Building

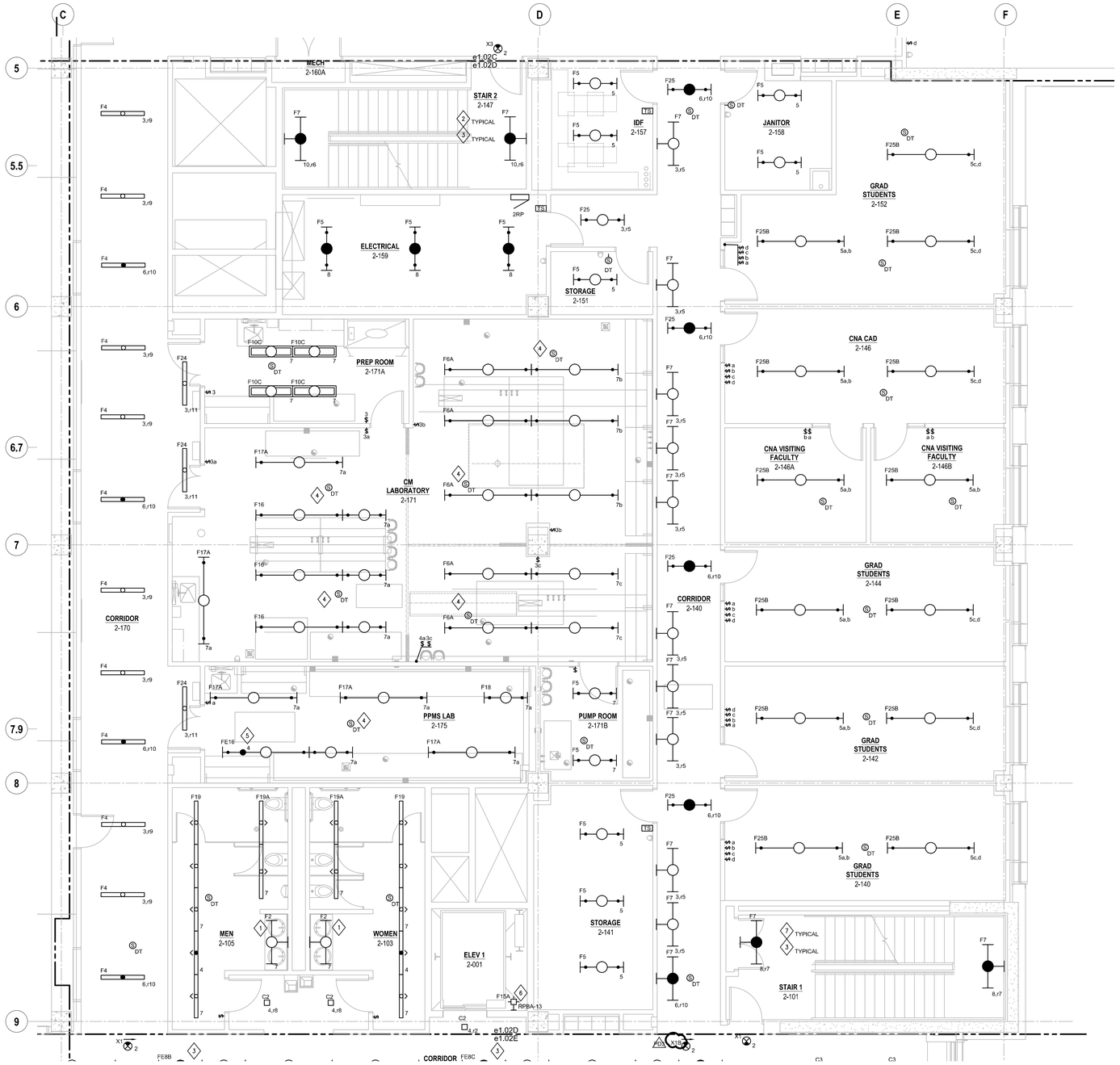
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ELECTRICAL LIGHTING
LEVEL 2 - ZONE C

e1.02C



1 **ELECTRICAL LIGHTING LEVEL 2 - ZONE D**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. ALL PUBLIC AREA NORMAL POWER LIGHTING SHALL BE CONTROLLED BY LIGHTING CONTROL SYSTEM, UNLESS OTHERWISE NOTED.
   RELAY CABINETS, OCCUPANCY/VACANCY SENSORS, AUTOMATED SYSTEM CONTROL INTERFACES.
2. LIGHTING LOADS NOT DESIGNATED FOR 24 HOUR OPERATION SHALL BE SUBJECT TO AUTOMATED AFTER HOURS SWEEP TO OFF.
3. OCCUPANCY SENSORS SHALL CONTROL ALL LUMINAIRES IN ROOM WHICH THEY ARE INSTALLED. PROVIDE ADDITIONAL RELAY TO CONTROL 120V LUMINAIRES.
4. ALL WALL MOUNTED EXIT LIGHTS SHOWN ABOVE DOORS SHALL BE 1'-0" ABOVE DOOR FRAME TO BOTTOM OF EXIT LIGHT.
5. MOUNT LUMINAIRE TYPE F5 ON THIS SHEET AT 10'-0" AFF TO BOL.
6. PENDANT MOUNTED LUMINAIRES IN LABS ON THIS SHEET SHALL BE MOUNTED 10'-0" AFF TO BOL.
7. ALL RELAYS THIS SHEET ARE FED FROM RELAY PANEL 2RP.
8. ALL NORMAL POWER THIS SHEET FED FROM PANEL LP2A.
9. ALL EMERGENCY LIFE SAFETY POWER THIS SHEET FED FROM PANEL EH2A.
10. REFER TO ARCHITECTURAL DRAWING REFLECTED CEILING PLANS FOR COORDINATION AND PLACEMENT OF LIGHTS WITHIN CEILING SPACE, CEILING STRUCTURE AND CEILING GRID.

SHEET KEYNOTES

1. MOUNT LUMINAIRE HORIZONTALLY OVER TOP OF MIRROR. REFER TO ARCHITECTURAL ELEVATION FOR MOUNTING HEIGHT.
2. MOUNT LUMINAIRE TYPE F7 7'-6" AFF TO BOL.
3. LUMINAIRE IN STAIRWELL ARE FED THROUGH RELAY PANEL 8RP IN BASEMENT.
4. OCCUPANCY SENSOR IN THIS ROOM SHALL BE MOUNTED 10'-0" AFF TO BOTTOM OF DEVICE. PROVIDE THREADED ROD FROM BACKBOX TO STRUCTURE FOR SUPPORT OF BACKBOX AND CONDUIT.
5. NOT USED.
6. ADDITIONAL TYPE F15 LUMINAIRES TO BE MOUNTED VERTICALLY IN CONTINUOUS RUN FROM 9' ABOVE FLOOR OF FIRST LEVEL TO FLOOR OF ROOF LEVEL. CONTRACTOR TO COORDINATE AND PROVIDE QUANTITY OF LUMINAIRES AS REQUIRED.
7. MOUNT LUMINAIRE TYPE F7 10'-0" AFF TO BOL.

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By

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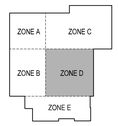
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Physics and Nanotechnology Building

U of M Project # 01-155-08-1718



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ELECTRICAL LIGHTING
LEVEL 2 - ZONE D

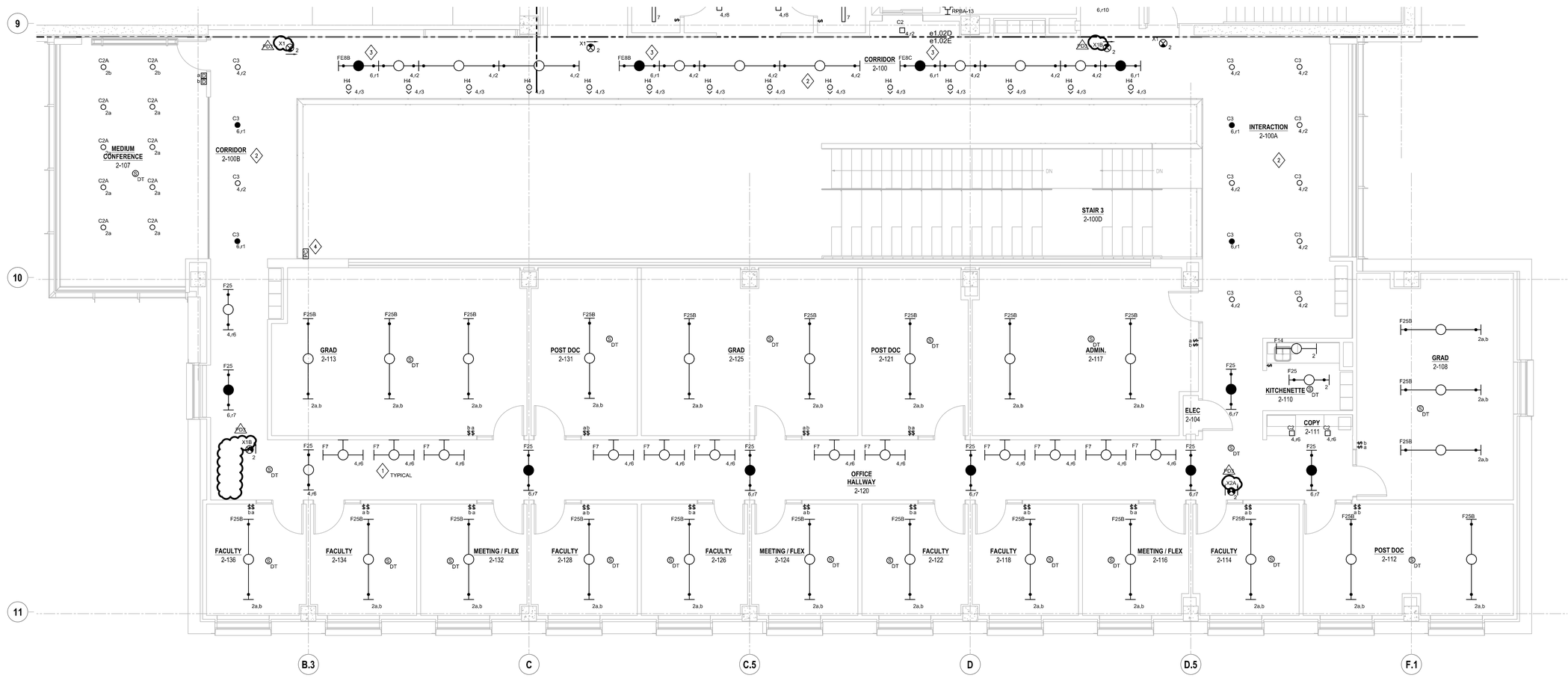
e1.02D

GENERAL NOTES

1. ALL PUBLIC AREA NORMAL POWER LIGHTING SHALL BE CONTROLLED BY LIGHTING CONTROL SYSTEM, UNLESS OTHERWISE NOTED. RELAY CABINETS, OCCUPANCY/VACANCY SENSORS, AUTOMATED SYSTEM CONTROL INTERFACES.
2. LIGHTING LOADS NOT DESIGNATED FOR 24 HOUR OPERATION SHALL BE SUBJECT TO AUTOMATED AFTER HOURS SWEEP TO OFF.
3. OCCUPANCY SENSORS SHALL CONTROL ALL LUMINAIRES IN ROOM WHICH THEY ARE INSTALLED. PROVIDE ADDITIONAL RELAY TO CONTROL 120V LUMINAIRES.
4. ALL WALL MOUNTED EXIT LIGHTS SHOWN ABOVE DOORS SHALL BE 1'-0" ABOVE DOOR FRAME TO BOTTOM OF EXIT LIGHT.
5. ALL PENDANT MOUNTED LUMINAIRES ON THIS SHEET SHALL BE MOUNTED 6"- 6" AFF TO BOL.
6. ALL RELAYS THIS SHEET ARE FED FROM RELAY PANEL 2RP.
7. ALL NORMAL POWER THIS SHEET FED FROM PANEL LP2A.
8. ALL EMERGENCY LIFE SAFETY POWER THIS SHEET FED FROM PANEL EH2A.
9. REFER TO ARCHITECTURAL DRAWING REFLECTED CEILING PLANS FOR COORDINATION AND PLACEMENT OF LIGHTS WITHIN CEILING SPACE, CEILING STRUCTURE AND CEILING GRID.

SHEET KEYNOTES

1. MOUNT LUMINAIRE TYPE F7 7'-6" AFF TO BOL.
2. PHOTOCELL SENSOR LOCATED ON ROOF SHALL CONTROL (OPEN LOOP) ALL LUMINAIRES (NORMAL AND LIFE SAFETY POWER) ON RELAYS IN THIS AREA.
3. MOUNT LUMINAIRE TYPE F7 9'-0" AFF TO BOL.
4. PROVIDE PHOTOCELL, DOUGLAS MODEL #WPS-552TK, WHICH IS COMPATIBLE WITH RELAY CABINET FOR CONTROL OF INTERIOR ATRIUM LOBBY AND CORRIDOR LIGHTING. MOUNT 9' AFF.



1 **ELECTRICAL LIGHTING LEVEL 2 - ZONE E**
SCALE: 1/4" = 1'-0"

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For AFFILIATED ENGINEERS, INC.

By

Name RONALD M. PARSLEY

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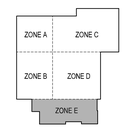
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Project

Physics and Nanotechnology Building

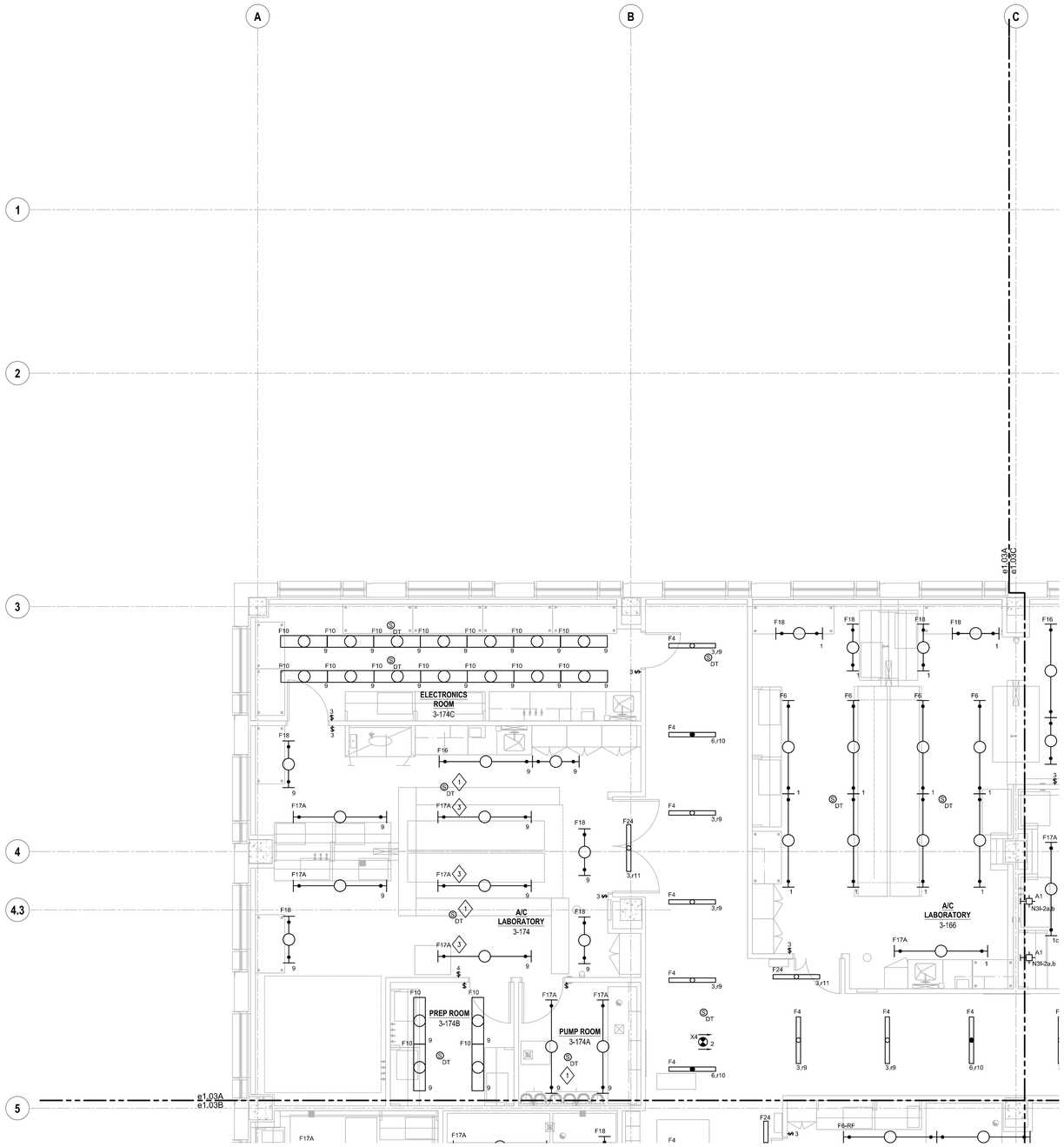
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ELECTRICAL LIGHTING
LEVEL 2 - ZONE E

e1.02E



1 **ELECTRICAL LIGHTING LEVEL 3 - ZONE A**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. ALL PUBLIC AREA NORMAL POWER LIGHTING SHALL BE CONTROLLED BY LIGHTING CONTROL SYSTEM, UNLESS OTHERWISE NOTED. RELAY CABINETS, OCCUPANCY/VACANCY SENSORS, AUTOMATED SYSTEM CONTROL INTERFACES.
2. LIGHTING LOADS NOT DESIGNATED FOR 24 HOUR OPERATION SHALL BE SUBJECT TO AUTOMATED AFTER HOURS SWEEP TO OFF.
3. OCCUPANCY SENSORS SHALL CONTROL ALL LUMINAIRES IN ROOM WHICH THEY ARE INSTALLED. PROVIDE ADDITIONAL RELAY TO CONTROL 120V LUMINAIRES.
4. ALL WALL MOUNTED EXIT LIGHTS SHOWN ABOVE DOORS SHALL BE 1'-0" ABOVE DOOR FRAME TO BOTTOM OF EXIT LIGHT.
5. PENDANT MOUNTED LUMINAIRES IN LABS ON THIS SHEET SHALL BE MOUNTED 10'-0" AFF TO BOL.
6. ALL RELAYS THIS SHEET ARE FED FROM RELAY PANEL 3RP.
7. ALL NORMAL POWER THIS SHEET FED FROM PANEL LP3A.
8. ALL EMERGENCY LIFE SAFETY POWER THIS SHEET FED FROM PANEL EHSA.
9. REFER TO ARCHITECTURAL DRAWING REFLECTED CEILING PLANS FOR COORDINATION AND PLACEMENT OF LIGHTS WITHIN CEILING SPACE, CEILING STRUCTURE AND CEILING GRID.

SHEET KEYNOTES

1. OCCUPANCY SENSOR IN THIS ROOM SHALL BE MOUNTED 10'-0" AFF TO BOTTOM OF DEVICE. PROVIDE THREADED ROD FROM BACKBOX TO STRUCTURE FOR SUPPORT OF BACKBOX AND CONDUIT.
2. NOT USED.
3. MOUNT LUMINAIRE TYPE F17A 6" UP FROM BOTTOM OF CRANE.

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For AFFILIATED ENGINEERS, INC.

By

Name RONALD M. PARSLEY

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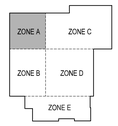
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Project

Physics and Nanotechnology Building

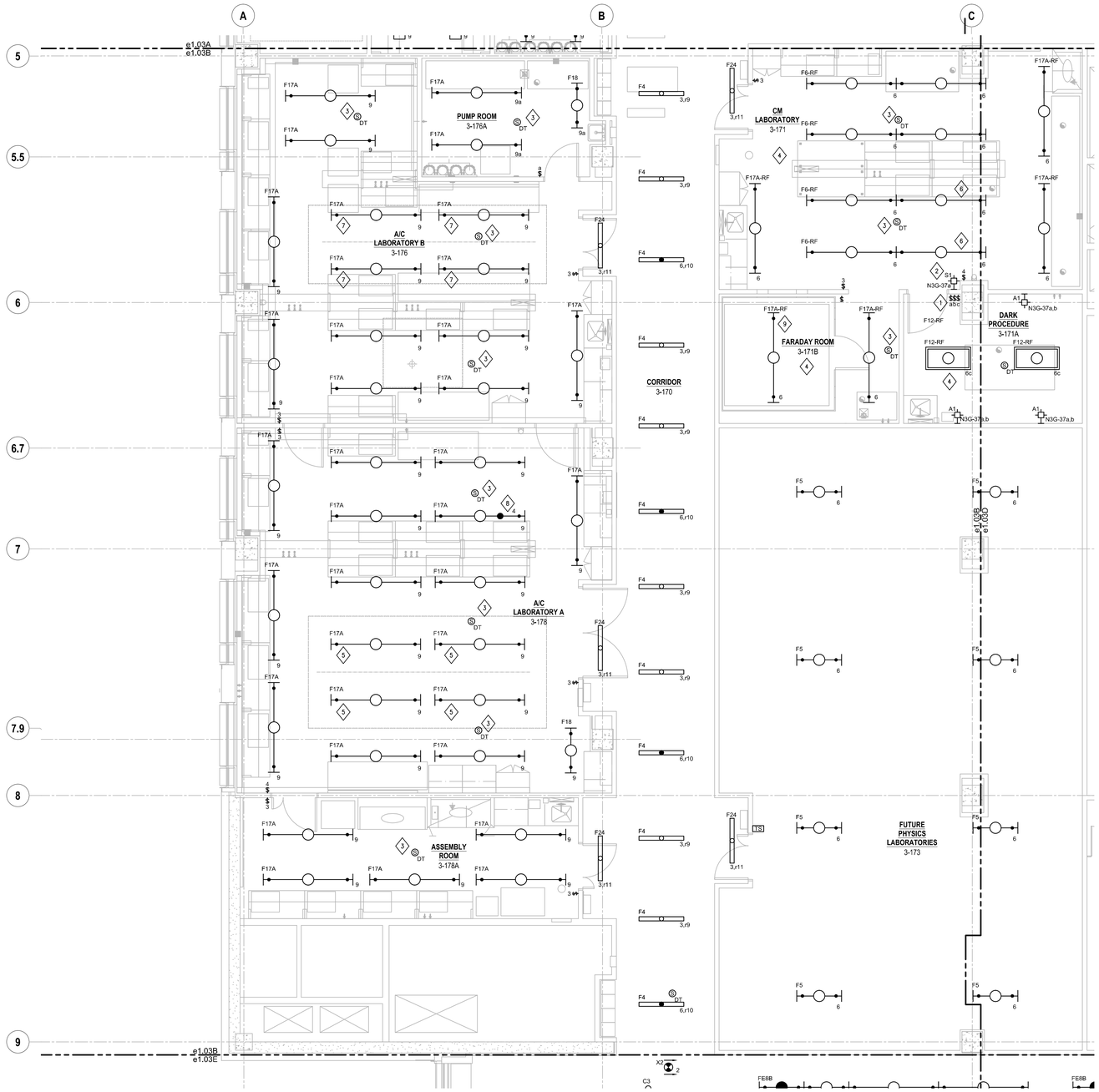
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ELECTRICAL LIGHTING
LEVEL 3 - ZONE A

e1.03A



1 **ELECTRICAL LIGHTING LEVEL 3 - ZONE B**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. ALL PUBLIC AREA NORMAL POWER LIGHTING SHALL BE CONTROLLED BY LIGHTING CONTROL SYSTEM, UNLESS OTHERWISE NOTED. RELAY CABINETS, OCCUPANCY/VACANCY SENSORS, AUTOMATED SYSTEM CONTROL INTERFACES.
2. LIGHTING LOADS NOT DESIGNATED FOR 24 HOUR OPERATION SHALL BE SUBJECT TO AUTOMATED AFTER HOURS SWEEP TO OFF.
3. OCCUPANCY SENSORS SHALL CONTROL ALL LUMINAIRES IN ROOM WHICH THEY ARE INSTALLED. PROVIDE ADDITIONAL RELAY TO CONTROL 120V LUMINAIRES.
4. ALL WALL MOUNTED EXIT LIGHTS SHOWN ABOVE DOORS SHALL BE 1'-0" ABOVE DOOR FRAME TO BOTTOM OF EXIT LIGHT.
5. MOUNT LUMINAIRE TYPE F5 ON THIS SHEET AT 10'-0" AFF TO BOL.
6. PENDANT MOUNTED LUMINAIRES IN LABS ON THIS SHEET SHALL BE MOUNTED 10'-0" AFF TO BOL.
7. ALL RELAYS THIS SHEET ARE FED FROM RELAY PANEL 3RP.
8. ALL NORMAL POWER THIS SHEET FED FROM PANEL LP3A.
9. ALL EMERGENCY LIFE SAFETY POWER THIS SHEET FED FROM PANEL EH3A.
10. REFER TO ARCHITECTURAL DRAWING REFLECTED CEILING PLANS FOR COORDINATION AND PLACEMENT OF LIGHTS WITHIN CEILING SPACE, CEILING STRUCTURE AND CEILING GRID.

SHEET KEYNOTES

1. SWITCH CLOSEST TO DOOR CONTROLS SAFELIGHT AND "DARKROOM IN USE" SIGN, SHALL BE MOUNTED AT 48" AFF. SWITCH FOR WORK LIGHT SHALL BE MOUNTED AT 48" AFF AND SHALL BE PROVIDED WITH COVER, HUBBELL HBL96061, OVER SWITCH. REFER TO DETAIL 4/e8.03.
2. PROVIDE "DARKROOM IN USE" LIGHT ABOVE DOOR. INTERLOCK "DARKROOM IN USE" LIGHT WITH SAFELIGHT.
3. OCCUPANCY SENSOR IN THIS ROOM SHALL BE MOUNTED 10'-0" AFF TO BOTTOM OF DEVICE. PROVIDE THREADED ROD FROM BACKBOX TO STRUCTURE FOR SUPPORT OF BACKBOX AND CONDUIT.
4. PROVIDE RF SHIELDING FOR ALL LUMINAIRES IN THIS ROOM.
5. MOUNT LUMINAIRE TYPE F17A 6" UP FROM BOTTOM OF CRANE.
6. PROVIDE UNISTRUT TO MOUNT LUMINAIRE BELOW MECHANICAL DUCTWORK.
7. LUMINAIRE IN THIS ROOM SHALL BE MOUNTED AT 13'-1" AFF TO BOTTOM OF LUMINAIRE.
8. NOT USED.
9. PROVIDE AIRCRAFT CABLE AND POWER FEED TO MOUNT LUMINAIRE AT 10'-0" AFF. LUMINAIRE SHALL BE MOUNTED AT 12'-0" AFF TO BOTTOM OF LUMINAIRE TO AVOID RF ROOM.

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For AFFILIATED ENGINEERS, INC.

By

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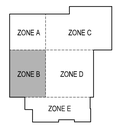
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Project

Physics and Nanotechnology Building

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ELECTRICAL LIGHTING
LEVEL 3 - ZONE B

e1.03B



1 **ELECTRICAL LIGHTING LEVEL 3 - ZONE C**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. ALL PUBLIC AREA NORMAL POWER LIGHTING SHALL BE CONTROLLED BY LIGHTING CONTROL SYSTEM, UNLESS OTHERWISE NOTED. RELAY CABINETS, OCCUPANCY/VACANCY SENSORS, AUTOMATED SYSTEM CONTROL INTERFACES.
2. LIGHTING LOADS NOT DESIGNATED FOR 24 HOUR OPERATION SHALL BE SUBJECT TO AUTOMATED AFTER HOURS SWEEP TO OFF.
3. OCCUPANCY SENSORS SHALL CONTROL ALL LUMINAIRES IN ROOM WHICH THEY ARE INSTALLED. PROVIDE ADDITIONAL RELAY TO CONTROL 120V LUMINAIRES.
4. ALL WALL MOUNTED EXIT LIGHTS SHOWN ABOVE DOORS SHALL BE 1'-0" ABOVE DOOR FRAME TO BOTTOM OF EXIT LIGHT.
5. MOUNT LUMINAIRE TYPE F5 ON THIS SHEET AT 10'-0" AFF TO BOL.
6. PENDANT MOUNTED LUMINAIRES IN LABS ON THIS SHEET SHALL BE MOUNTED 10'-0" AFF TO BOL.
7. PENDANT MOUNTED LUMINAIRE TYPE F8 IN CORRIDOR ON THIS SHEET SHALL BE MOUNTED SO THAT BOL ALIGNS WITH THE BOTTOM OF CLOUD CEILING.
8. ALL RELAYS THIS SHEET ARE FED FROM RELAY PANEL 3RP.
9. ALL NORMAL POWER THIS SHEET FED FROM PANEL LP3A.
10. ALL EMERGENCY LIFE SAFETY POWER THIS SHEET FED FROM PANEL EHSA.
11. REFER TO ARCHITECTURAL DRAWING REFLECTED CEILING PLANS FOR COORDINATION AND PLACEMENT OF LIGHTS WITHIN CEILING SPACE, CEILING STRUCTURE AND CEILING GRID.

SHEET KEYNOTES

1. SWITCH CLOSEST TO DOOR CONTROLS SAFELIGHT AND "DARKROOM IN USE" SIGN, SHALL BE MOUNTED AT 48" AFF. SWITCH FOR WORK LIGHT SHALL BE MOUNTED AT 48" AFF AND SHALL BE PROVIDED WITH COVER, HUBBELL PBL96061, OVER SWITCH. REFER TO DETAIL 4/e8.03.
2. PROVIDE "DARKROOM IN USE" LIGHT ABOVE DOOR. INTERLOCK "DARKROOM IN USE" LIGHT WITH SAFELIGHT.
3. OCCUPANCY SENSOR IN THIS ROOM SHALL BE MOUNTED 10'-0" AFF TO BOTTOM OF DEVICE. PROVIDE THREADED ROD FROM BACKBOX TO STRUCTURE FOR SUPPORT OF BACKBOX AND CONDUIT.
4. NOT USED.
5. ADDITIONAL TYPE F15 LUMINAIRES TO BE MOUNTED VERTICALLY IN CONTINUOUS RUN FROM 5' ABOVE FLOOR OF FIRST LEVEL TO FLOOR OF ROOF LEVEL. CONTRACTOR TO COORDINATE AND PROVIDE QUANTITY OF LUMINAIRES AS REQUIRED.

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For AFFILIATED ENGINEERS, INC.

By

Name RONALD M. PARSLEY

Date 02-24-2012 Reg. No. 25163

Issued for	Date
100% CD set	12-16-2011
Bid Package No. 2	02-24-2012
Project Directive No. 3	05-15-2012

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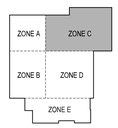
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Date 12/16/11

Project

Physics and Nanotechnology Building

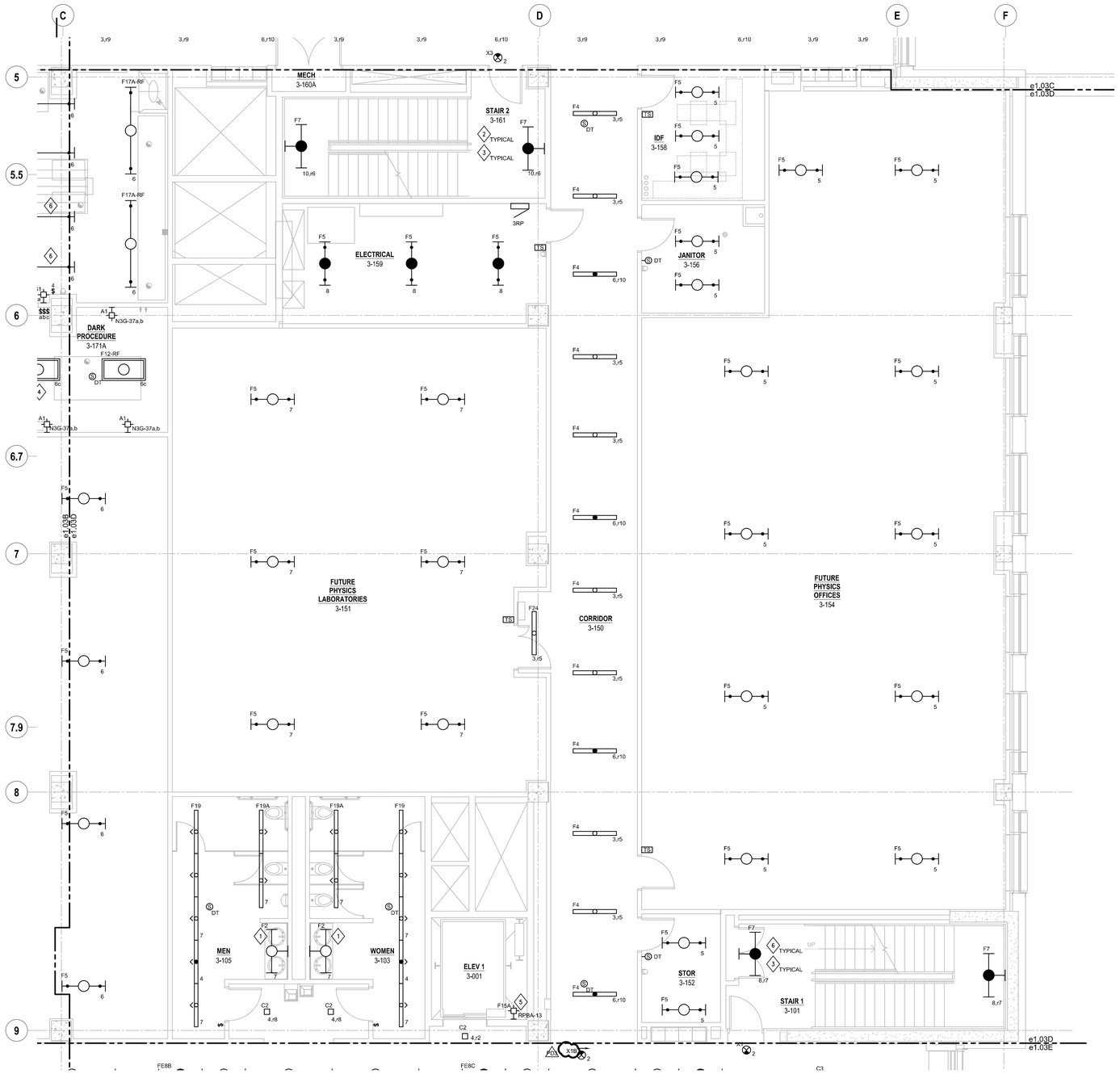
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ELECTRICAL LIGHTING
LEVEL 3 - ZONE C

e1.03C



1 **ELECTRICAL LIGHTING LEVEL 3 - ZONE D**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. ALL PUBLIC AREA NORMAL POWER LIGHTING SHALL BE CONTROLLED BY LIGHTING CONTROL SYSTEM, UNLESS OTHERWISE NOTED. RELAY CABINETS, OCCUPANCY/VACANCY SENSORS, AUTOMATED SYSTEM CONTROL INTERFACES.
2. LIGHTING LOADS NOT DESIGNATED FOR 24 HOUR OPERATION SHALL BE SUBJECT TO AUTOMATED AFTER HOURS SWEEP TO OFF.
3. OCCUPANCY SENSORS SHALL CONTROL ALL LUMINAIRES IN ROOM WHICH THEY ARE INSTALLED. PROVIDE ADDITIONAL RELAY TO CONTROL 120V LUMINAIRES.
4. ALL WALL MOUNTED EXIT LIGHTS SHOWN ABOVE DOORS SHALL BE 1'-0" ABOVE DOOR FRAME TO BOTTOM OF EXIT LIGHT.
5. MOUNT LUMINAIRE TYPE F5 ON THIS SHEET AT 10'-0" AFF TO BOL.
6. PENDANT MOUNTED LUMINAIRES IN LABS ON THIS SHEET SHALL BE MOUNTED 10'-0" AFF TO BOL.
7. ALL RELAYS THIS SHEET ARE FED FROM RELAY PANEL 3RP.
8. ALL NORMAL POWER THIS SHEET FED FROM PANEL LP3A.
9. ALL EMERGENCY LIFE SAFETY POWER THIS SHEET FED FROM PANEL EH3A.
10. REFER TO ARCHITECTURAL DRAWING REFLECTED CEILING PLANS FOR COORDINATION AND PLACEMENT OF LIGHTS WITHIN CEILING SPACE, CEILING STRUCTURE AND CEILING GRID.

SHEET KEYNOTES

1. MOUNT LUMINAIRE HORIZONTALLY OVER TOP OF MIRROR. REFER TO ARCHITECTURAL ELEVATION FOR MOUNTING HEIGHT.
2. MOUNT LUMINAIRE TYPE F7 7'-6" AFF TO BOL.
3. LUMINAIRE IN STAIRWELL ARE FED THROUGH RELAY PANEL 8RP IN BASEMENT.
4. OCCUPANCY SENSOR IN THIS ROOM SHALL BE MOUNTED 10'-0" AFF TO BOTTOM OF DEVICE. PROVIDE THREADED ROD FROM BACKBOX TO STRUCTURE FOR SUPPORT OF BACKBOX AND CONDUIT.
5. ADDITIONAL TYPE F15 LUMINAIRES TO BE MOUNTED VERTICALLY IN CONTINUOUS RUN FROM 9' ABOVE FLOOR OF FIRST LEVEL TO FLOOR OF ROOF LEVEL. CONTRACTOR TO COORDINATE AND PROVIDE QUANTITY OF LUMINAIRES AS REQUIRED. SEE SHEET e1.04D FOR OTHER SWITCH LOCATION. LOCATE SWITCH ADJACENT TO LADDER.
6. MOUNT LUMINAIRE TYPE F7 10'-0" AFF TO BOL.

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For AFFILIATED ENGINEERS, INC.

By

Name RONALD M. PARSLEY

Date 02-24-2012 Reg. No. 25163

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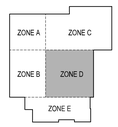
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Date 12/16/11

Project

Physics and Nanotechnology Building

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ELECTRICAL LIGHTING
LEVEL 3 - ZONE D

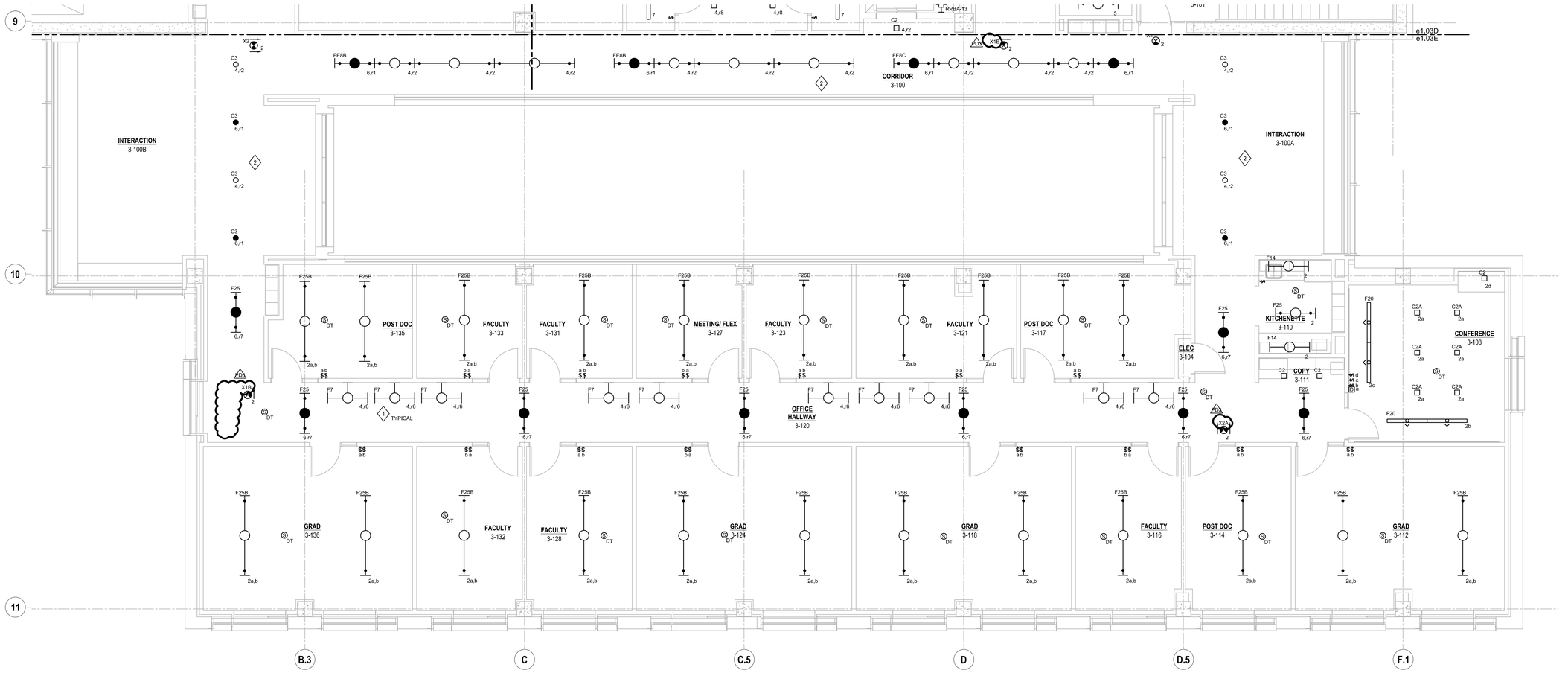
e1.03D

GENERAL NOTES

1. ALL PUBLIC AREA NORMAL POWER LIGHTING SHALL BE CONTROLLED BY LIGHTING CONTROL SYSTEM, UNLESS OTHERWISE NOTED. RELAY CABINETS, OCCUPANCY/VACANCY SENSORS, AUTOMATED SYSTEM CONTROL INTERFACES.
2. LIGHTING LOADS NOT DESIGNATED FOR 24 HOUR OPERATION SHALL BE SUBJECT TO AUTOMATED AFTER HOURS SWEEP TO OFF.
3. OCCUPANCY SENSORS SHALL CONTROL ALL LUMINAIRES IN ROOM WHICH THEY ARE INSTALLED. PROVIDE ADDITIONAL RELAY TO CONTROL 120V LUMINAIRES.
4. ALL WALL MOUNTED EXIT LIGHTS SHOWN ABOVE DOORS SHALL BE 1'-0" ABOVE DOOR FRAME TO BOTTOM OF EXIT LIGHT.
5. ALL PENDANT MOUNTED LUMINAIRES ON THIS SHEET SHALL BE MOUNTED 8'-6" AFF TO BOL.
6. ALL RELAYS THIS SHEET ARE FED FROM RELAY PANEL 3RP.
7. ALL NORMAL POWER THIS SHEET FED FROM PANEL LP3A.
8. ALL EMERGENCY LIFE SAFETY POWER THIS SHEET FED FROM PANEL EHSA.
9. REFER TO ARCHITECTURAL DRAWING REFLECTED CEILING PLANS FOR COORDINATION AND PLACEMENT OF LIGHTS WITHIN CEILING SPACE, CEILING STRUCTURE AND CEILING GRID.

SHEET KEYNOTES

1. MOUNT LUMINAIRE TYPE F7 7'-6" AFF TO BOL.
2. PHOTOCELL SENSOR LOCATED ON ROOF SHALL CONTROL (OPEN LOOP) ALL LUMINAIRES (NORMAL AND LIFE SAFETY POWER) ON RELAYS IN THIS AREA.



1 **ELECTRICAL LIGHTING LEVEL 3 - ZONE E**
SCALE: 1/4" = 1'-0"

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For AFFILIATED ENGINEERS, INC.

By

Name RONALD M. PARSLEY

Date 02-24-2012 Reg. No. 25163

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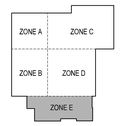
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Date 12/16/11

Project

Physics and Nanotechnology Building

U of M Project # 01-155-08-1718



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ELECTRICAL LIGHTING
LEVEL 3 - ZONE E

e1.03E

GENERAL NOTES

1. ALL PUBLIC AREA NORMAL POWER LIGHTING SHALL BE CONTROLLED BY LIGHTING CONTROL SYSTEM, UNLESS OTHERWISE NOTED. RELAY CABINETS, OCCUPANCY/VACANCY SENSORS, AUTOMATED SYSTEM CONTROL INTERFACES.
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4. ALL WALL MOUNTED EXIT LIGHTS SHOWN ABOVE DOORS SHALL BE 1'-0" ABOVE DOOR FRAME TO BOTTOM OF EXIT LIGHT.
5. MOUNT LUMINAIRE TYPE F5 ON THIS SHEET AT 10'-0" AFF TO BOL.
6. PENDANT MOUNTED LUMINAIRES IN LABS ON THIS SHEET SHALL BE MOUNTED 10'-0" AFF TO BOL.
7. PENDANT MOUNTED LUMINAIRE TYPE F8 IN CORRIDOR ON THIS SHEET SHALL BE MOUNTED SO THAT BOL ALIGNS WITH THE BOTTOM OF CLOUD CEILING.
8. ALL RELAYS THIS SHEET ARE FED FROM RELAY PANEL 4RP.
9. ALL NORMAL POWER THIS SHEET FED FROM PANEL LP4A.
10. ALL EMERGENCY LIFE SAFETY POWER THIS SHEET FED FROM PANEL EH4A.
11. REFER TO ARCHITECTURAL DRAWING REFLECTED CEILING PLANS FOR COORDINATION AND PLACEMENT OF LIGHTS WITHIN CEILING SPACE, CEILING STRUCTURE AND CEILING GRID.

SHEET KEYNOTES

1. OCCUPANCY SENSOR IN THIS ROOM SHALL BE MOUNTED 10'-0" AFF TO BOTTOM OF DEVICE. PROVIDE THREADED ROD FROM BACKBOX TO STRUCTURE FOR SUPPORT OF BACKBOX AND CONDUIT.
2. NOT USED.



1 **ELECTRICAL LIGHTING LEVEL 4 - ZONE A**
SCALE: 1/4" = 1'-0"

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For AFFILIATED ENGINEERS, INC.

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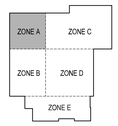
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Project

Physics and Nanotechnology Building

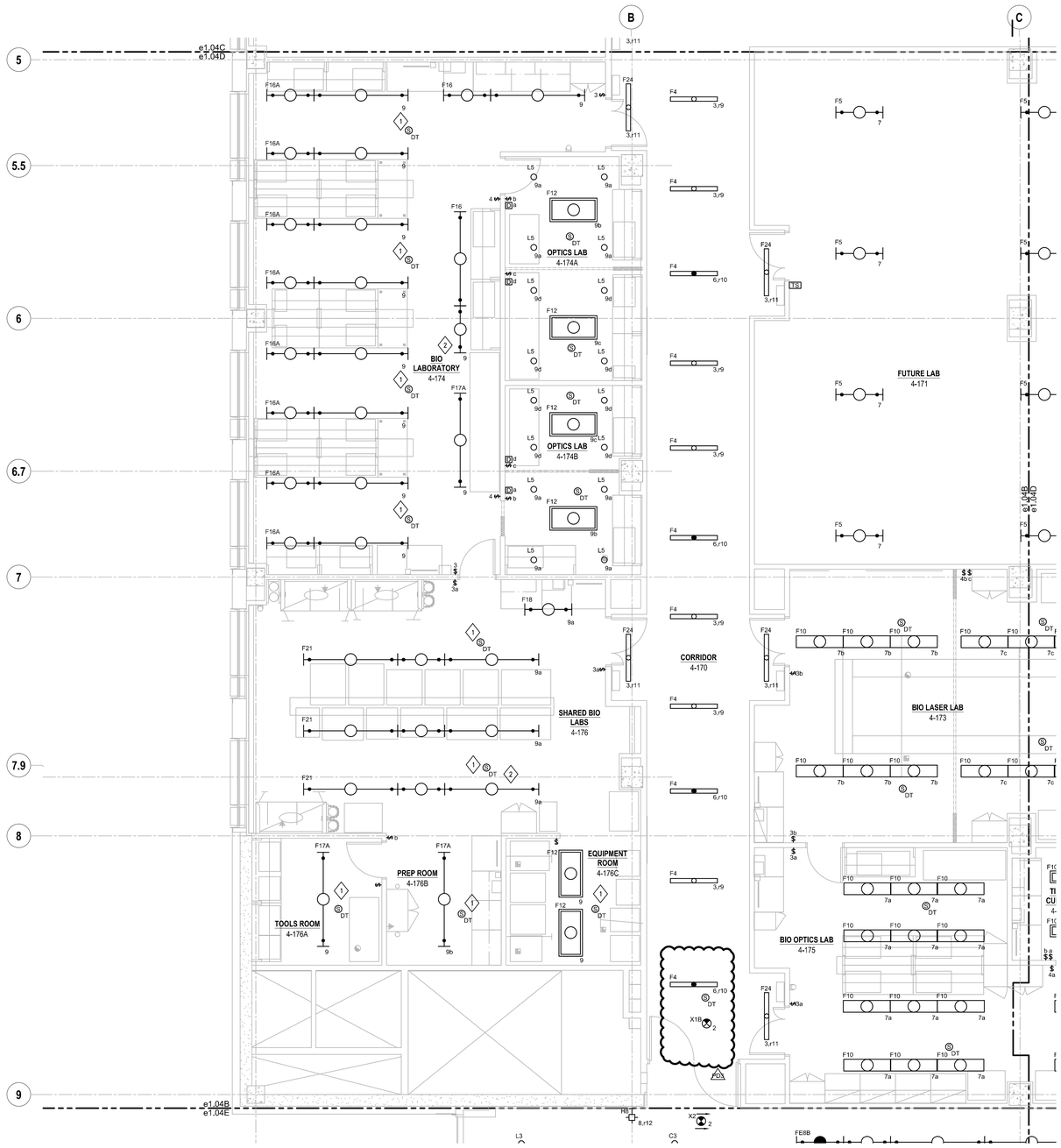
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ELECTRICAL LIGHTING
LEVEL 4 - ZONE A

e1.04A



1 **ELECTRICAL LIGHTING LEVEL 4 - ZONE B**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. ALL PUBLIC AREA NORMAL POWER LIGHTING SHALL BE CONTROLLED BY LIGHTING CONTROL SYSTEM, UNLESS OTHERWISE NOTED.
   RELAY CABINETS, OCCUPANCY/VACANCY SENSORS, AUTOMATED SYSTEM CONTROL INTERFACES.
2. LIGHTING LOADS NOT DESIGNATED FOR 24 HOUR OPERATION SHALL BE SUBJECT TO AUTOMATED AFTER HOURS SWEEP TO OFF.
3. OCCUPANCY SENSORS SHALL CONTROL ALL LUMINAIRES IN ROOM WHICH THEY ARE INSTALLED. PROVIDE ADDITIONAL RELAY TO CONTROL 120V LUMINAIRES.
4. ALL WALL MOUNTED EXIT LIGHTS SHOWN ABOVE DOORS SHALL BE 1'-0" ABOVE DOOR FRAME TO BOTTOM OF EXIT LIGHT.
5. MOUNT LUMINAIRE TYPE F5 ON THIS SHEET AT 10'-0" AFF TO BOL.
6. PENDANT MOUNTED LUMINAIRES IN LABS ON THIS SHEET SHALL BE MOUNTED 10'-0" AFF TO BOL.
7. ALL RELAYS THIS SHEET ARE FED FROM RELAY PANEL 4RP.
8. ALL NORMAL POWER THIS SHEET FED FROM PANEL LP4A.
9. ALL EMERGENCY LIFE SAFETY POWER THIS SHEET FED FROM PANEL EH4A.
10. REFER TO ARCHITECTURAL DRAWING REFLECTED CEILING PLANS FOR COORDINATION AND PLACEMENT OF LIGHTS WITHIN CEILING SPACE, CEILING STRUCTURE AND CEILING GRID.

SHEET KEYNOTES

1. OCCUPANCY SENSOR IN THIS ROOM SHALL BE MOUNTED 10'-0" AFF TO BOTTOM OF DEVICE. PROVIDE THREADED ROD FROM BACKBOX TO STRUCTURE FOR SUPPORT OF BACKBOX AND CONDUIT.
2. NOT USED.

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For AFFILIATED ENGINEERS, INC.

By

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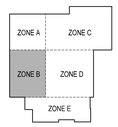
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Project

Physics and Nanotechnology Building

U of M Project # 01-155-08-1718



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ELECTRICAL LIGHTING
LEVEL 4 - ZONE B

e1.04B



1 **ELECTRICAL LIGHTING LEVEL 4 - ZONE C**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. ALL PUBLIC AREA NORMAL POWER LIGHTING SHALL BE CONTROLLED BY LIGHTING CONTROL SYSTEM, UNLESS OTHERWISE NOTED. RELAY CABINETS, OCCUPANCY/VACANCY SENSORS, AUTOMATED SYSTEM CONTROL INTERFACES.
2. LIGHTING LOADS NOT DESIGNATED FOR 24 HOUR OPERATION SHALL BE SUBJECT TO AUTOMATED AFTER HOURS SWEEP TO OFF.
3. OCCUPANCY SENSORS SHALL CONTROL ALL LUMINAIRES IN ROOM WHICH THEY ARE INSTALLED. PROVIDE ADDITIONAL RELAY TO CONTROL 120V LUMINAIRES.
4. ALL WALL MOUNTED EXIT LIGHTS SHOWN ABOVE DOORS SHALL BE 1'-0" ABOVE DOOR FRAME TO BOTTOM OF EXIT LIGHT.
5. MOUNT LUMINAIRE TYPE F5 ON THIS SHEET AT 10'-0" AFF TO BOL.
6. PENDANT MOUNTED LUMINAIRES IN LABS ON THIS SHEET SHALL BE MOUNTED 10'-0" AFF TO BOL.
7. PENDANT MOUNTED LUMINAIRE TYPE F8 IN CORRIDOR ON THIS SHEET SHALL BE MOUNTED SO THAT BOL ALIGNS WITH THE BOTTOM OF CLOUD CEILING.
8. ALL RELAYS THIS SHEET ARE FED FROM RELAY PANEL 4RP.
9. ALL NORMAL POWER THIS SHEET FED FROM PANEL LP4A.
10. ALL EMERGENCY LIFE SAFETY POWER THIS SHEET FED FROM PANEL EH4A.
11. REFER TO ARCHITECTURAL DRAWING REFLECTED CEILING PLANS FOR COORDINATION AND PLACEMENT OF LIGHTS WITHIN CEILING SPACE, CEILING STRUCTURE AND CEILING GRID.

SHEET KEYNOTES

1. SWITCH CLOSEST TO DOOR CONTROLS SAFELIGHT AND "DARKROOM IN USE" SIGN, SHALL BE MOUNTED AT 48" AFF. SWITCH FOR WORK LIGHT SHALL BE MOUNTED AT 48" AFF AND SHALL BE PROVIDED WITH COVER, HUBBELL HBL96061, OVER SWITCH. REFER TO DETAIL 4/e8.03.
2. PROVIDE "DARKROOM IN USE" LIGHT ABOVE DOOR. INTERLOCK "DARKROOM IN USE" LIGHT WITH SAFELIGHT.
3. OCCUPANCY SENSOR IN THIS ROOM SHALL BE MOUNTED 10'-0" AFF TO BOTTOM OF DEVICE. PROVIDE THREADED ROD FROM BACKBOX TO STRUCTURE FOR SUPPORT OF BACKBOX AND CONDUIT.
4. NOT USED.
5. ADDITIONAL TYPE F15 LUMINAIRES TO BE MOUNTED VERTICALLY IN CONTINUOUS RUN FROM 5' ABOVE FLOOR OF FIRST LEVEL TO FLOOR OF ROOF LEVEL. CONTRACTOR TO COORDINATE AND PROVIDE QUANTITY OF LUMINAIRES AS REQUIRED.
6. PROVIDE AIRCRAFT CABLE AND POWER FEED TO MOUNT LUMINAIRE AT 10'-0" AFF. LUMINAIRE SHALL BE MOUNTED AT 12'-0" AFF TO BOTTOM OF LUMINAIRE TO AVOID RF ROOM.

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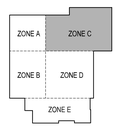
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Project

Physics and Nanotechnology Building

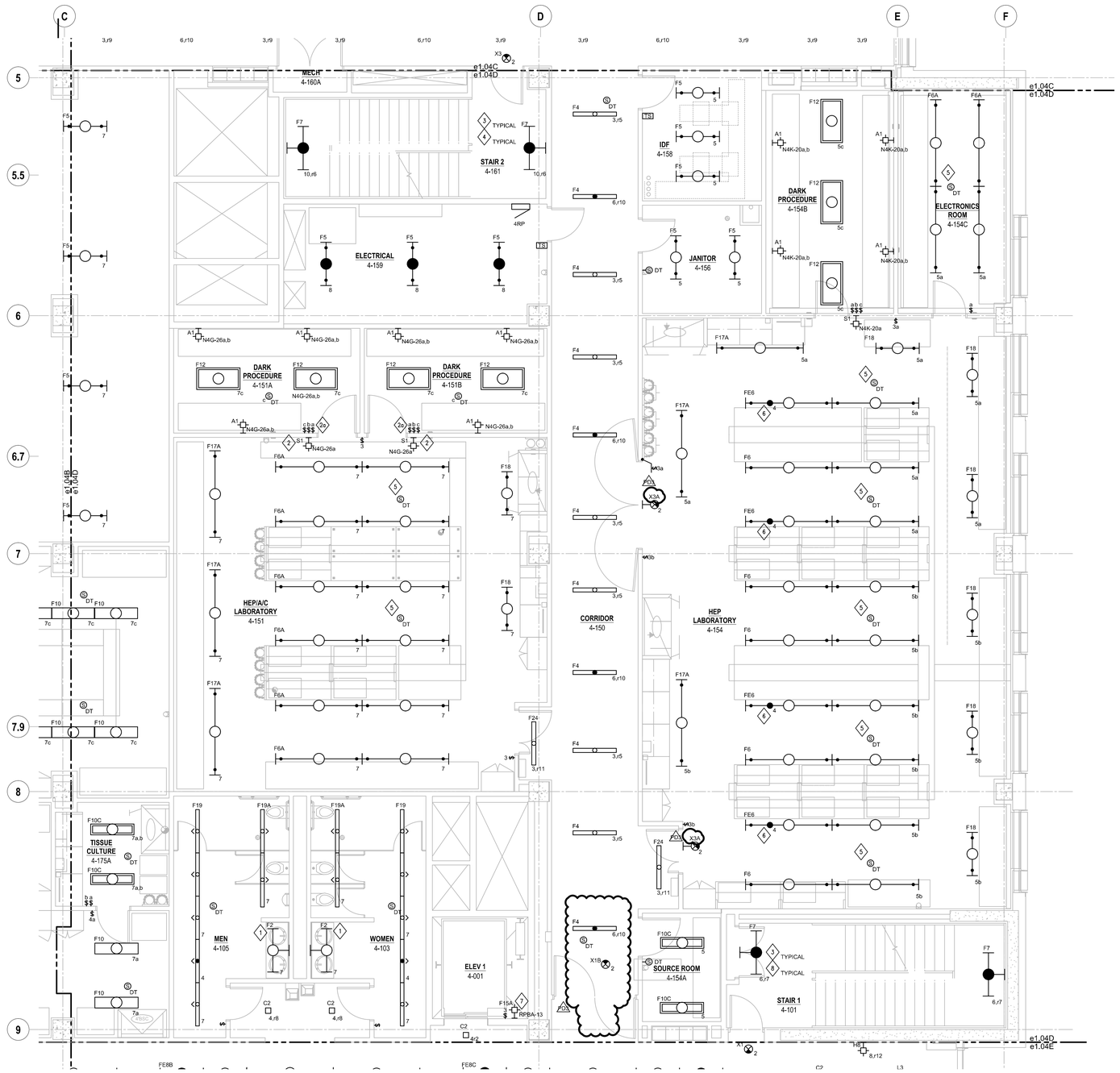
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ELECTRICAL LIGHTING
LEVEL 4 - ZONE C

e1.04C



1 **ELECTRICAL LIGHTING LEVEL 4 - ZONE D**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. ALL PUBLIC AREA NORMAL POWER LIGHTING SHALL BE CONTROLLED BY LIGHTING CONTROL SYSTEM, UNLESS OTHERWISE NOTED. RELAY CABINETS, OCCUPANCY/VACANCY SENSORS, AUTOMATED SYSTEM CONTROL INTERFACES.
2. LIGHTING LOADS NOT DESIGNATED FOR 24 HOUR OPERATION SHALL BE SUBJECT TO AUTOMATED AFTER HOURS SWEEP TO OFF.
3. OCCUPANCY SENSORS SHALL CONTROL ALL LUMINAIRES IN ROOM WHICH THEY ARE INSTALLED. PROVIDE ADDITIONAL RELAY TO CONTROL 120V LUMINAIRES.
4. ALL WALL MOUNTED EXIT LIGHTS SHOWN ABOVE DOORS SHALL BE 1'-0" ABOVE DOOR FRAME TO BOTTOM OF EXIT LIGHT.
5. MOUNT LUMINAIRE TYPE F5 ON THIS SHEET AT 10'-0" AFF TO BOL.
6. PENDANT MOUNTED LUMINAIRES IN LABS ON THIS SHEET SHALL BE MOUNTED 10'-0" AFF TO BOL.
7. ALL RELAYS THIS SHEET ARE FED FROM RELAY PANEL 4RP.
8. ALL NORMAL POWER THIS SHEET FED FROM PANEL LP4A.
9. ALL EMERGENCY LIFE SAFETY POWER THIS SHEET FED FROM PANEL EH4A.
10. REFER TO ARCHITECTURAL DRAWING REFLECTED CEILING PLANS FOR COORDINATION AND PLACEMENT OF LIGHTS WITHIN CEILING SPACE, CEILING STRUCTURE AND CEILING GRID.

SHEET KEYNOTES

1. MOUNT LUMINAIRE HORIZONTALLY OVER TOP OF MIRROR, REFER TO ARCHITECTURAL ELEVATION FOR MOUNTING HEIGHT.
2. PROVIDE "DARKROOM IN USE" LIGHT ABOVE DOOR. INTERLOCK "DARKROOM IN USE" LIGHT WITH SAFELIGHT.
2a. SWITCH CLOSEST TO DOOR CONTROLS SAFELIGHT AND "DARKROOM IN USE" SIGN. SHALL BE MOUNTED AT 48" AFF. SWITCH FOR WORK LIGHT SHALL BE MOUNTED AT 48" AFF AND SHALL BE PROVIDED WITH COVER, HUBBELL HBL96061, OVER SWITCH. REFER TO DETAIL 4/e8.03.
3. LUMINAIRE IN STAIRWELL ARE FED THROUGH RELAY PANEL 8RP IN BASEMENT.
4. MOUNT LUMINAIRE TYPE F7 7'-6" AFF TO BOL.
5. OCCUPANCY SENSOR IN THIS ROOM SHALL BE MOUNTED 10'-0" AFF TO BOTTOM OF DEVICE. PROVIDE THREADED ROD FROM BACKBOX TO STRUCTURE FOR SUPPORT OF BACKBOX AND CONDUIT.
6. ALL LIGHTING ON EMERGENCY POWER IS SWITCHED. PROVIDE TRANSFER DEVICE, BODINE GTD 20A FOR EACH SWITCHED CIRCUIT, PROVIDE UNSWITCHED EMERGENCY POWER AND UNSWITCHED NORMAL POWER TO TRANSFER DEVICE. REFER TO SWITCHED EMERGENCY LIGHTING TRANSFER DEVICE DETAIL 3/e8.03.
7. ADDITIONAL TYPE F15 LUMINAIRES TO BE MOUNTED VERTICALLY IN CONTINUOUS RUN FROM 5' ABOVE FLOOR OF FIRST LEVEL TO FLOOR OF ROOF LEVEL. CONTRACTOR TO COORDINATE AND PROVIDE QUANTITY OF LUMINAIRES AS REQUIRED. SEE SHEET e1.00D FOR OTHER SWITCH LOCATION. LOCATE SWITCH ADJACENT TO LADDER.
8. MOUNT LUMINAIRE TYPE F7 10'-0" AFF TO BOL.

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For AFFILIATED ENGINEERS, INC.

By

Name RONALD M. PARSLEY

Date 02-24-2012 Reg. No. 25163

Issued for	Date
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Bid Package No. 2	02-24-2012
Project Directive No. 3	05-15-2012

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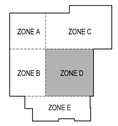
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Physics and Nanotechnology Building

U of M Project # 01-155-08-1718



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ELECTRICAL LIGHTING
LEVEL 4 - ZONE D

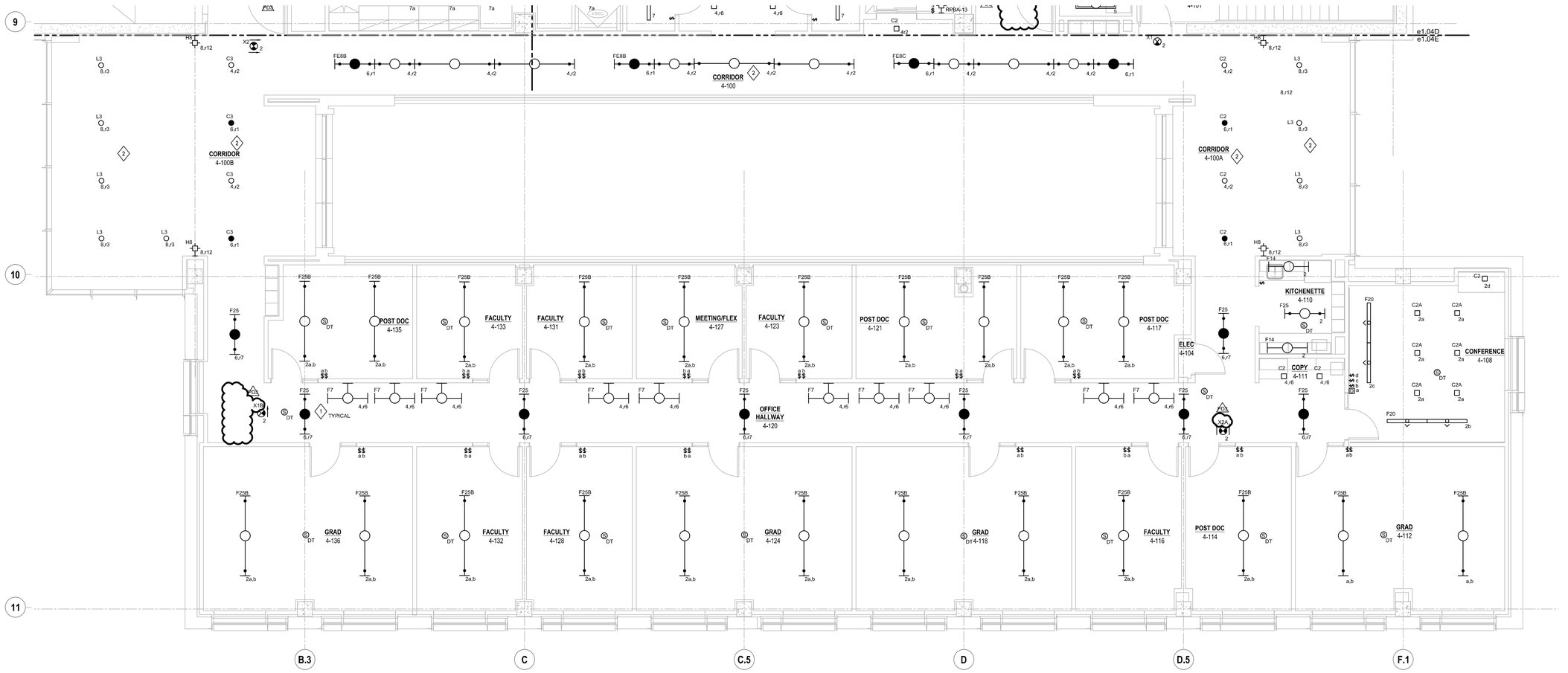
e1.04D

GENERAL NOTES

1. ALL PUBLIC AREA NORMAL POWER LIGHTING SHALL BE CONTROLLED BY LIGHTING CONTROL SYSTEM, UNLESS OTHERWISE NOTED. RELAY CABINETS, OCCUPANCY/VACANCY SENSORS, AUTOMATED SYSTEM CONTROL INTERFACES.
2. LIGHTING LOADS NOT DESIGNATED FOR 24 HOUR OPERATION SHALL BE SUBJECT TO AUTOMATED AFTER HOURS SWEEP TO OFF.
3. OCCUPANCY SENSORS SHALL CONTROL ALL LUMINAIRES IN ROOM WHICH THEY ARE INSTALLED. PROVIDE ADDITIONAL RELAY TO CONTROL 120V LUMINAIRES.
4. ALL WALL MOUNTED EXIT LIGHTS SHOWN ABOVE DOORS SHALL BE 1'-0" ABOVE DOOR FRAME TO BOTTOM OF EXIT LIGHT.
5. PENDANT MOUNTED LUMINAIRES ON THIS SHEET SHALL BE MOUNTED 8"- 6" AFF TO BOL.
6. ALL RELAYS THIS SHEET ARE FED FROM RELAY PANEL 4RP.
7. ALL NORMAL POWER THIS SHEET FED FROM PANEL LP4A.
8. ALL EMERGENCY LIFE SAFETY POWER THIS SHEET FED FROM PANEL EH4A.
9. REFER TO ARCHITECTURAL DRAWING REFLECTED CEILING PLANS FOR COORDINATION AND PLACEMENT OF LIGHTS WITHIN CEILING SPACE, CEILING STRUCTURE AND CEILING GRID.

SHEET KEYNOTES

1. MOUNT LUMINAIRE TYPE F7 7'-6" AFF TO BOL.
2. PHOTOCELL SENSOR LOCATED ON ROOF SHALL CONTROL (OPEN LOOP) ALL LUMINAIRES (NORMAL AND LIFE SAFETY POWER) ON RELAYS IN THIS AREA.



1 **ELECTRICAL LIGHTING LEVEL 4 - ZONE E**
SCALE: 1/4" = 1'-0"

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For AFFILIATED ENGINEERS, INC.

By

Name RONALD M. PARSLEY

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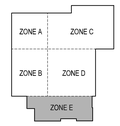
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ELECTRICAL LIGHTING
LEVEL 4 - ZONE E

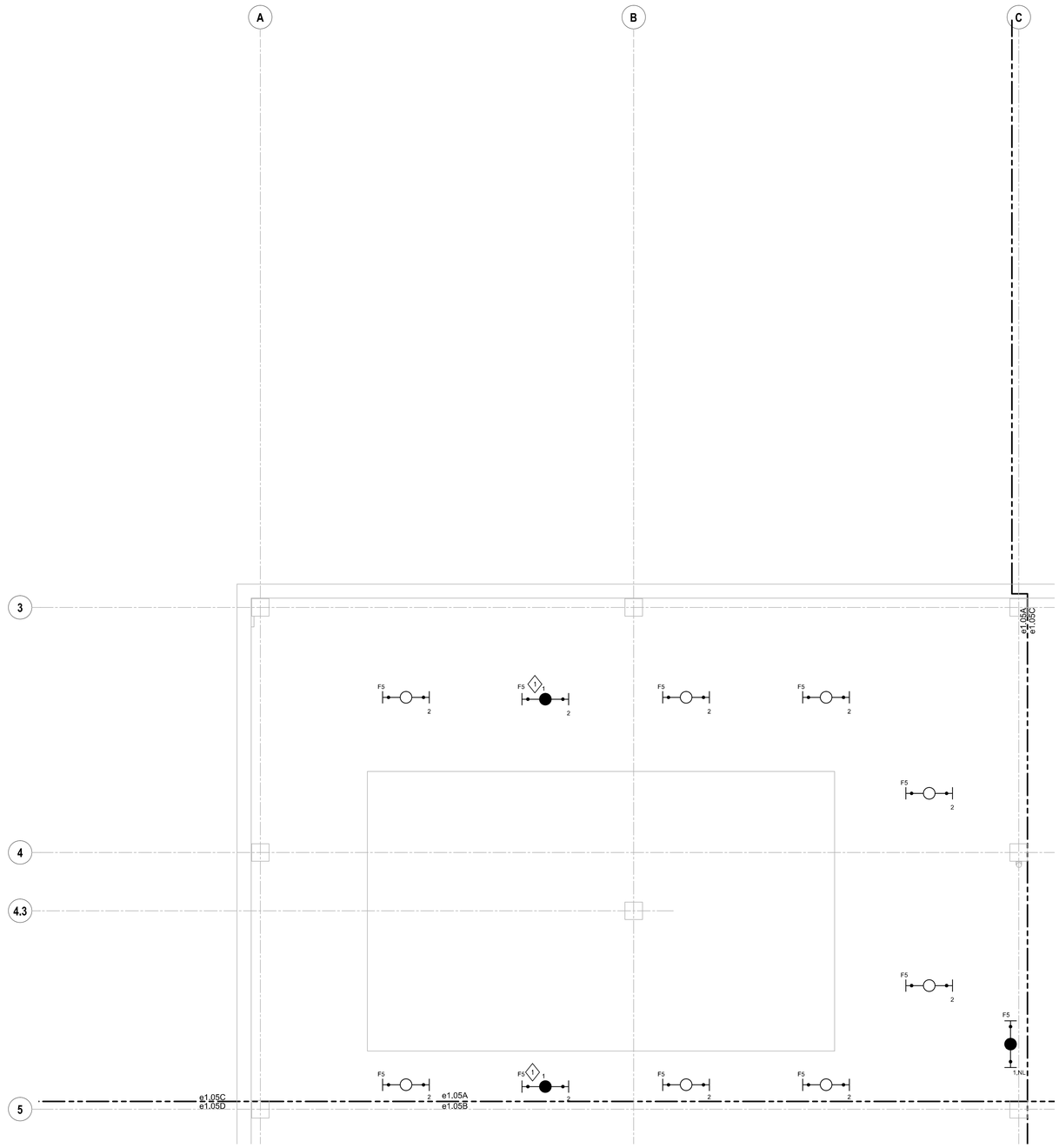
e1.04E

GENERAL NOTES

1. ALL WALL MOUNTED EXIT LIGHTS SHOWN ABOVE DOORS SHALL BE 1'-0" ABOVE DOOR FRAME TO BOTTOM OF EXIT LIGHT.
2. MOUNT LUMINAIRE TYPE F5 ON THIS SHEET AT 10'-0" AFF TO BOL.
3. INDUSTRIAL TYPE LUMINAIRES IN UNFINISHED AREAS, WHICH ARE NEAR OBSTRUCTIONS SUCH AS DUCTS AND PIPES, SHALL BE:
   A. SUSPENDED SO THAT BOTTOM OF LUMINAIRE IS NO HIGHER THAN BOTTOM OF OBSTRUCTION.
   B. LOCATED AT HEIGHT OF LOWEST LUMINAIRE.
   C. MINIMUM HEIGHT: 8'-0".
   D. SHALL NOT BE LOCATED UNTIL LOCATIONS OF OBSTRUCTIONS ARE DETERMINED.
   E. PLACED FOR BEST ILLUMINATION OF SPACE.
4. ALL NORMAL POWER THIS SHEET FED FROM PANEL LP5A.
5. ALL EMERGENCY LIFE SAFETY POWER THIS SHEET FED FROM PANEL EH5A.
6. REFER TO ARCHITECTURAL DRAWING REFLECTED CEILING PLANS FOR COORDINATION AND PLACEMENT OF LIGHTS WITHIN CEILING SPACE, CEILING STRUCTURE AND CEILING GRID.

SHEET KEYNOTES

1. ALL LIGHTING ON EMERGENCY POWER IS SWITCHED, PROVIDE TRANSFER DEVICE, WATTSTOPPER ELCU-200 FOR EACH SWITCHED CIRCUIT. PROVIDE UNSWITCHED EMERGENCY POWER AND UNSWITCHED NORMAL POWER TO TRANSFER DEVICE. REFER TO SWITCHED EMERGENCY LIGHTING TRANSFER DEVICE DETAIL 3/e8.01.



1 **ELECTRICAL LIGHTING PENTHOUSE - ZONE A**
SCALE: 1/4" = 1'-0"

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For AFFILIATED ENGINEERS, INC.

By

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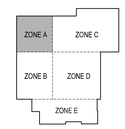
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Project

Physics and Nanotechnology Building

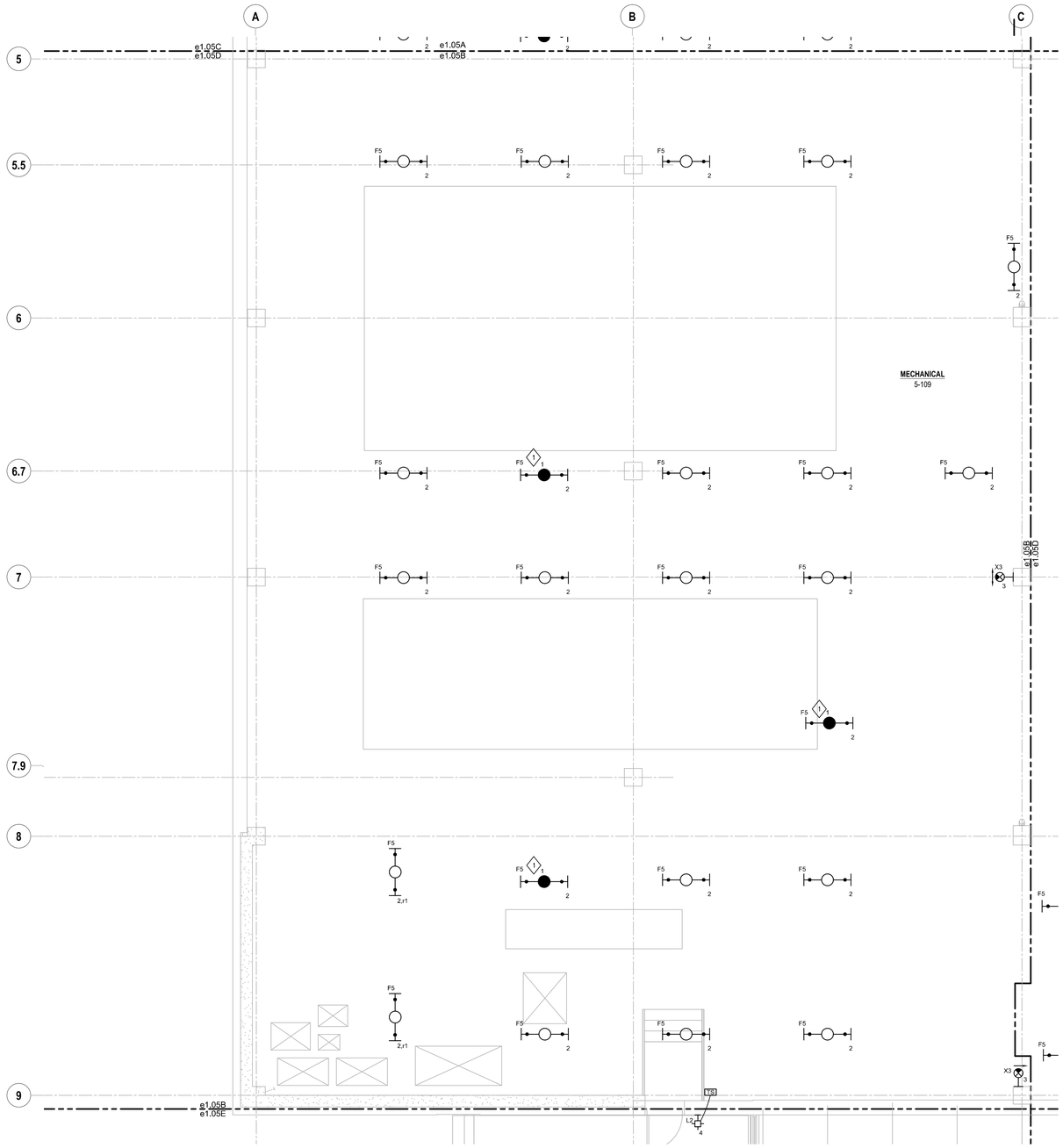
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ELECTRICAL LIGHTING
PENTHOUSE - ZONE A

e1.05A



1 **ELECTRICAL LIGHTING PENTHOUSE - ZONE B**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. ALL WALL MOUNTED EXIT LIGHTS SHOWN ABOVE DOORS SHALL BE 1'-0" ABOVE DOOR FRAME TO BOTTOM OF EXIT LIGHT.
2. MOUNT LUMINAIRE TYPE F5 ON THIS SHEET AT 10'-0" AFF TO BOL.
3. INDUSTRIAL TYPE LUMINAIRES IN UNFINISHED AREAS, WHICH ARE NEAR OBSTRUCTIONS SUCH AS DUCTS AND PIPES, SHALL BE:
   A. SUSPENDED SO THAT BOTTOM OF LUMINAIRE IS NO HIGHER THAN BOTTOM OF OBSTRUCTION.
   B. LOCATED AT HEIGHT OF LOWEST LUMINAIRE.
   C. MINIMUM HEIGHT: 8'-0".
   D. SHALL NOT BE LOCATED UNTIL LOCATIONS OF OBSTRUCTIONS ARE DETERMINED.
   E. PLACED FOR BEST ILLUMINATION OF SPACE.
4. ALL NORMAL POWER THIS SHEET FED FROM PANEL LPSA.
5. ALL EMERGENCY LIFE SAFETY POWER THIS SHEET FED FROM PANEL EHSA.
6. REFER TO ARCHITECTURAL DRAWING REFLECTED CEILING PLANS FOR COORDINATION AND PLACEMENT OF LIGHTS WITHIN CEILING SPACE, CEILING STRUCTURE AND CEILING GRID.

SHEET KEYNOTES

1 ALL LIGHTING ON EMERGENCY POWER IS SWITCHED. PROVIDE TRANSFER DEVICE, WATTSTOPPER ELCU-200 FOR EACH SWITCHED CIRCUIT. PROVIDE UNSWITCHED EMERGENCY POWER AND UNSWITCHED NORMAL POWER TO TRANSFER DEVICE. REFER TO SWITCHED EMERGENCY LIGHTING TRANSFER DEVICE DETAIL 3/e8.01.

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For AFFILIATED ENGINEERS, INC.

By

Name RONALD M. PARSLEY

Date 02-24-2012 Reg. No. 25163

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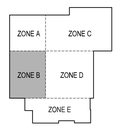
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ELECTRICAL LIGHTING
PENTHOUSE - ZONE B

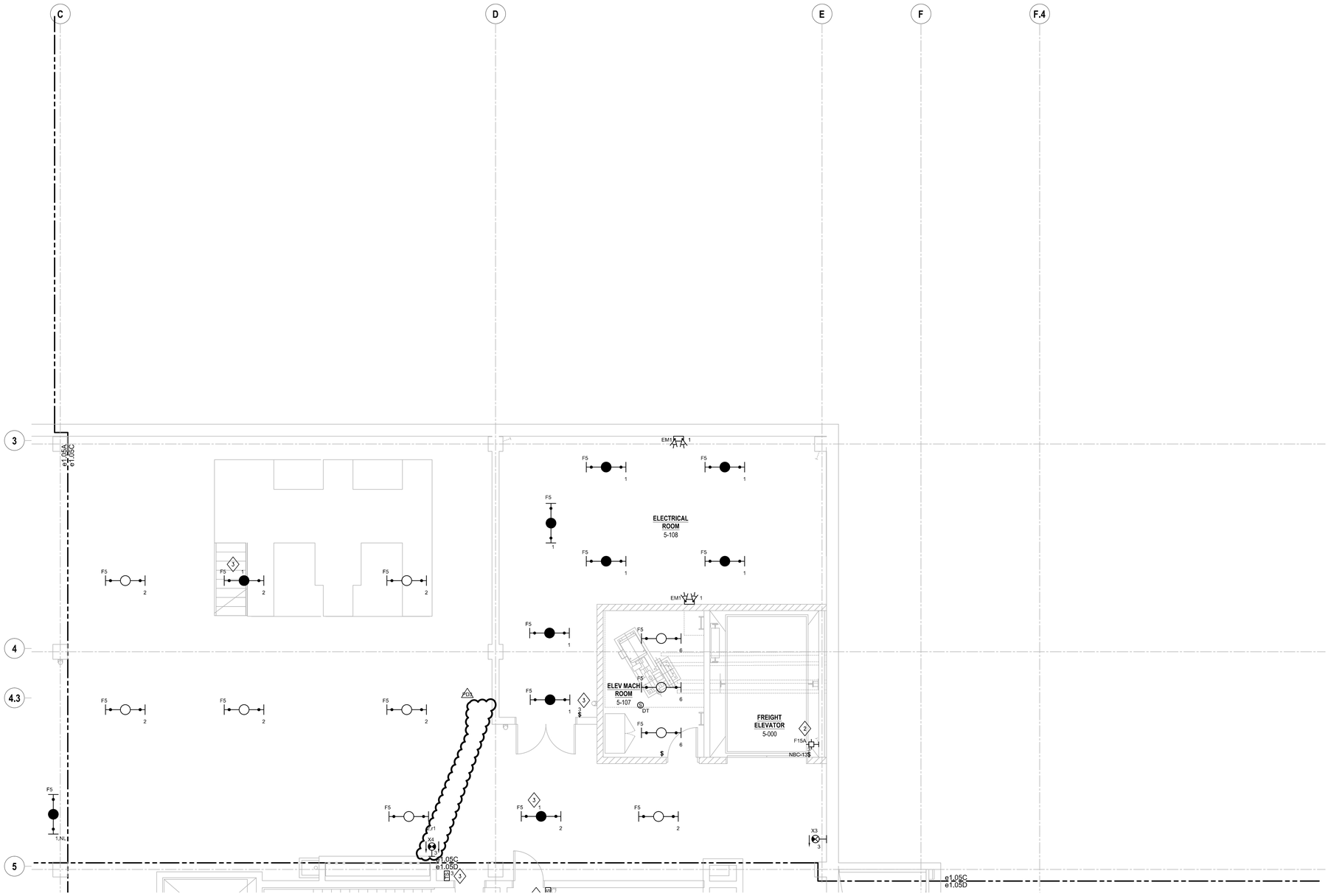
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GENERAL NOTES

1. ALL WALL MOUNTED EXIT LIGHTS SHOWN ABOVE DOORS SHALL BE 1'-0" ABOVE DOOR FRAME TO BOTTOM OF EXIT LIGHT.
2. MOUNT LUMINAIRE TYPE F5 ON THIS SHEET AT 10'-0" AFF TO BO..
3. INDUSTRIAL TYPE LUMINAIRES IN UNFINISHED AREAS, WHICH ARE NEAR OBSTRUCTIONS SUCH AS DUCTS AND PIPES, SHALL BE:
   A. SUSPENDED SO THAT BOTTOM OF LUMINAIRE IS NO HIGHER THAN BOTTOM OF OBSTRUCTION.
   B. LOCATED AT HEIGHT OF LOWEST LUMINAIRE.
   C. MINIMUM HEIGHT: 8'-0".
   D. SHALL NOT BE LOCATED UNTIL LOCATIONS OF OBSTRUCTIONS ARE DETERMINED.
   E. PLACED FOR BEST ILLUMINATION OF SPACE.
4. ALL NORMAL POWER THIS SHEET FED FROM PANEL LP5A.
5. ALL EMERGENCY LIFE SAFETY POWER THIS SHEET FED FROM PANEL EH5A.
6. REFER TO ARCHITECTURAL DRAWING REFLECTED CEILING PLANS FOR COORDINATION AND PLACEMENT OF LIGHTS WITHIN CEILING SPACE, CEILING STRUCTURE AND CEILING GRID.

SHEET KEYNOTES

1. NOT USED
2. ADDITIONAL TYPE F15 LUMINAIRES TO BE MOUNTED VERTICALLY IN CONTINUOUS RUN FROM 5' ABOVE FLOOR OF FIRST LEVEL TO FLOOR OF ROOF LEVEL. CONTRACTOR TO COORDINATE AND PROVIDE QUANTITY OF LUMINAIRES AS REQUIRED. SEE SHEET e1.04D FOR OTHER SWITCH LOCATION, LOCATE SWITCH ADJACENT TO LADDER.
3. ALL LIGHTING ON EMERGENCY POWER IS SWITCHED. PROVIDE TRANSFER DEVICE, WATTSTOPPER ELCU-200 FOR EACH SWITCHED CIRCUIT. PROVIDE UNSWITCHED EMERGENCY POWER AND UNSWITCHED NORMAL POWER TO TRANSFER DEVICE. REFER TO SWITCHED EMERGENCY LIGHTING TRANSFER DEVICE DETAIL 3/e8.01.



1 **ELECTRICAL LIGHTING PENTHOUSE - ZONE C**
SCALE: 1/4" = 1'-0"

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For AFFILIATED ENGINEERS, INC.

By

Name RONALD M. PARSLEY

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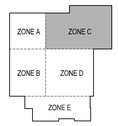
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Project

Physics and Nanotechnology Building

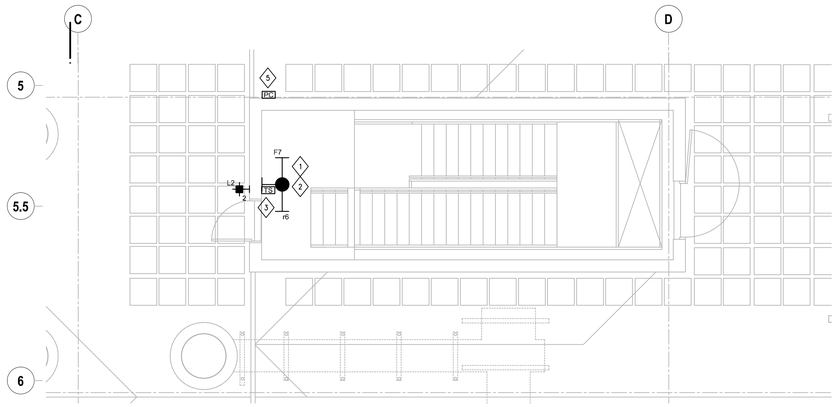
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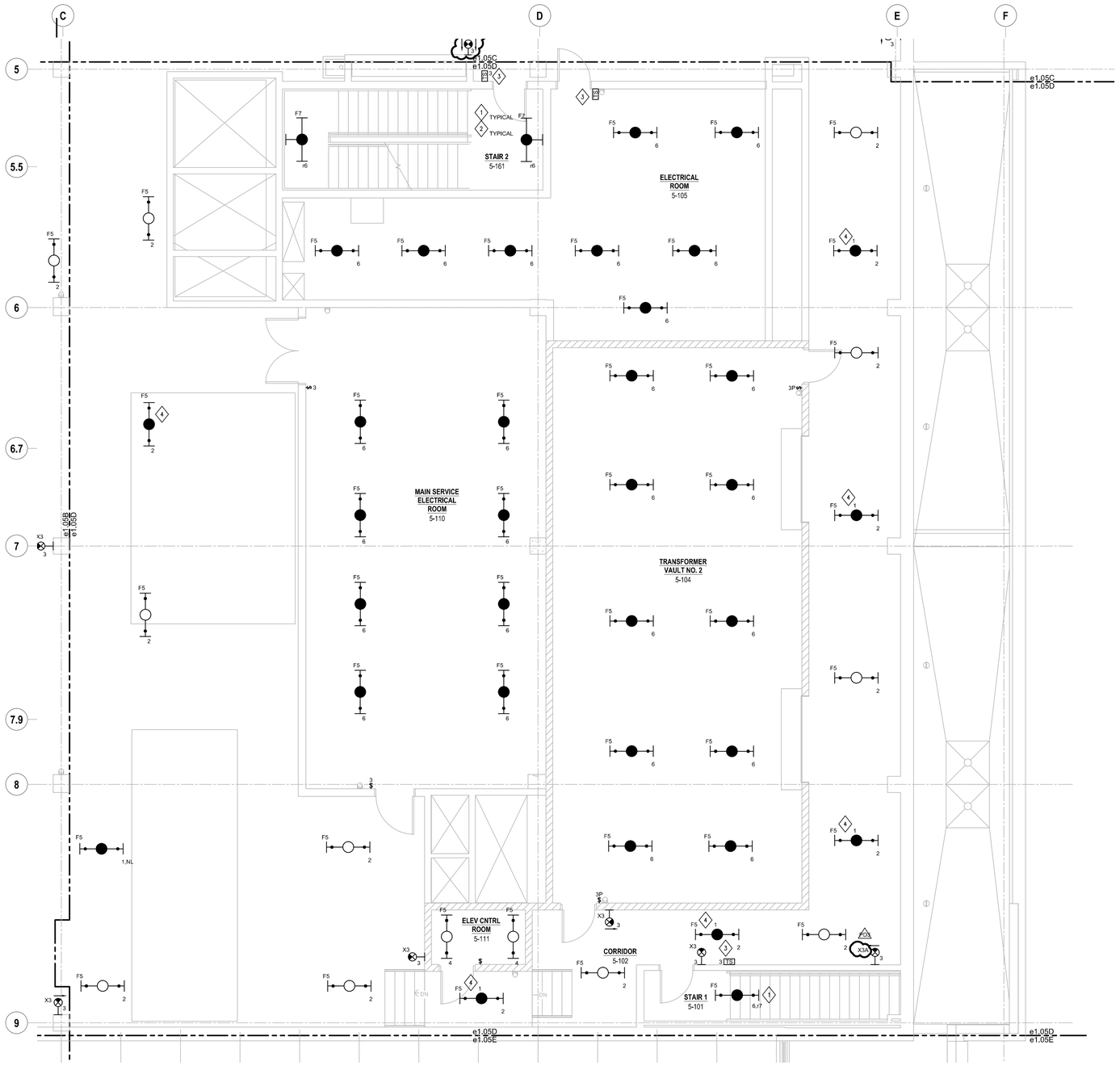
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ELECTRICAL LIGHTING
PENTHOUSE - ZONE C

e1.05C



2 **ELECTRICAL LIGHTING ROOF - ZONE D**
SCALE: 1/4" = 1'-0"



1 **ELECTRICAL LIGHTING PENTHOUSE - ZONE D**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. ALL WALL MOUNTED EXIT LIGHTS SHOWN ABOVE DOORS SHALL BE 1'-0" ABOVE DOOR FRAME TO BOTTOM OF EXIT LIGHT.
2. MOUNT LUMINAIRE TYPE F5 ON THIS SHEET AT 10'-0" AFF TO BOL.
3. INDUSTRIAL TYPE LUMINAIRES IN UNFINISHED AREAS, WHICH ARE NEAR OBSTRUCTIONS SUCH AS DUCTS AND PIPES, SHALL BE:
   A. SUSPENDED SO THAT BOTTOM OF LUMINAIRE IS NO HIGHER THAN BOTTOM OF OBSTRUCTION.
   B. LOCATED AT HEIGHT OF LOWEST LUMINAIRE.
   C. MINIMUM HEIGHT: 8'-0".
   D. SHALL NOT BE LOCATED UNTIL LOCATIONS OF OBSTRUCTIONS ARE DETERMINED.
   E. PLACED FOR BEST ILLUMINATION OF SPACE.
4. ALL NORMAL POWER THIS SHEET FED FROM PANEL LPSA.
5. ALL EMERGENCY LIFE SAFETY POWER THIS SHEET FED FROM PANEL EHSA.
6. REFER TO ARCHITECTURAL DRAWING REFLECTED CEILING PLANS FOR COORDINATION AND PLACEMENT OF LIGHTS WITHIN CEILING SPACE, CEILING STRUCTURE AND CEILING GRID.

SHEET KEYNOTES

1. LUMINAIRE IN STAIRWELL ARE FED THROUGH RELAY PANEL BRP IN BASEMENT.
2. MOUNT LUMINAIRE TYPE F7 7'-6" AFF TO BOL.
3. TIMER SWITCH SHALL BE WATTSTOPPER TS-400.
4. ALL LIGHTING ON EMERGENCY POWER IS SWITCHED, PROVIDE TRANSFER DEVICE, WATTSTOPPER ELCU-200 FOR EACH SWITCHED CIRCUIT, PROVIDE UNSWITCHED EMERGENCY POWER AND UNSWITCHED NORMAL POWER TO TRANSFER DEVICE. REFER TO SWITCHED EMERGENCY LIGHTING TRANSFER DEVICE DETAIL 3/e8.01.
5. PROVIDE PHOTOCELL, DOUGLAS MODEL #WPS-5527K, WHICH IS COMPATIBLE WITH RELAY CABINET FOR CONTROL OF EXTERIOR LIGHTING.

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For AFFILIATED ENGINEERS, INC.

By

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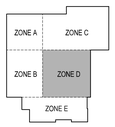
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Physics and Nanotechnology Building

U of M Project # 01-155-08-1718



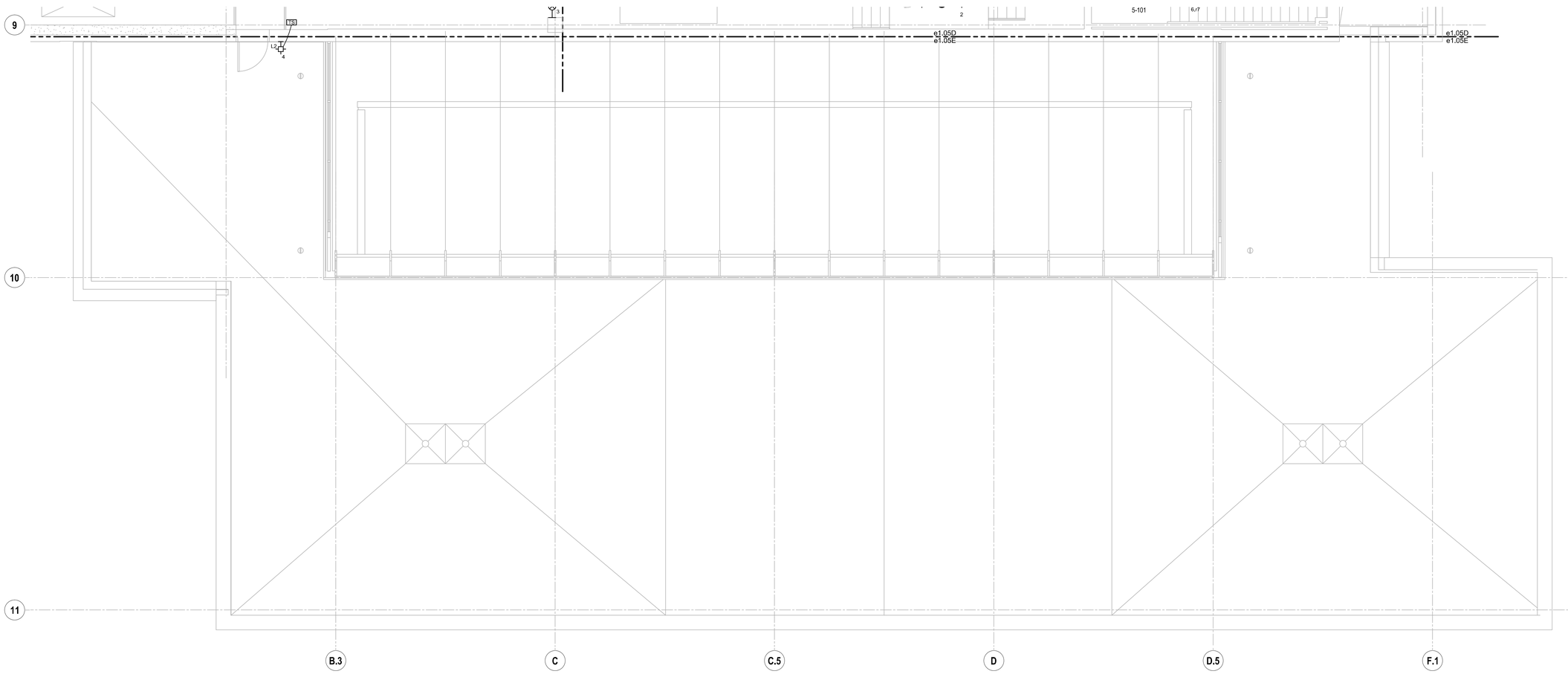
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ELECTRICAL LIGHTING
PENTHOUSE - ZONE D

e1.05D

GENERAL NOTES

1. ALL NORMAL POWER THIS SHEET FED FROM PANEL LPSA.
2. ALL EMERGENCY LIFE SAFETY POWER THIS SHEET FED FROM PANEL EHSA.
3. REFER TO ARCHITECTURAL DRAWING REFLECTED CEILING PLANS FOR COORDINATION AND PLACEMENT OF LIGHTS WITHIN CEILING SPACE, CEILING STRUCTURE AND CEILING GRID.



1 **ELECTRICAL LIGHTING PENTHOUSE - ZONE E**
SCALE: 1/4" = 1'-0"

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I hereby certify that this plan or drawing was prepared by me or under my direct supervision and that I am a duly licensed ELECTRICAL ENGINEER under the laws of the State of Minnesota.

For AFFILIATED ENGINEERS, INC.

By

Name RONALD M. PARSLEY

Date 02-24-2012 Reg. No. 25163

Issued for	Date
100% CD set	12-16-2011
Bid Package No. 2	02-24-2012

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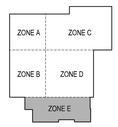
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Physics and Nanotechnology Building

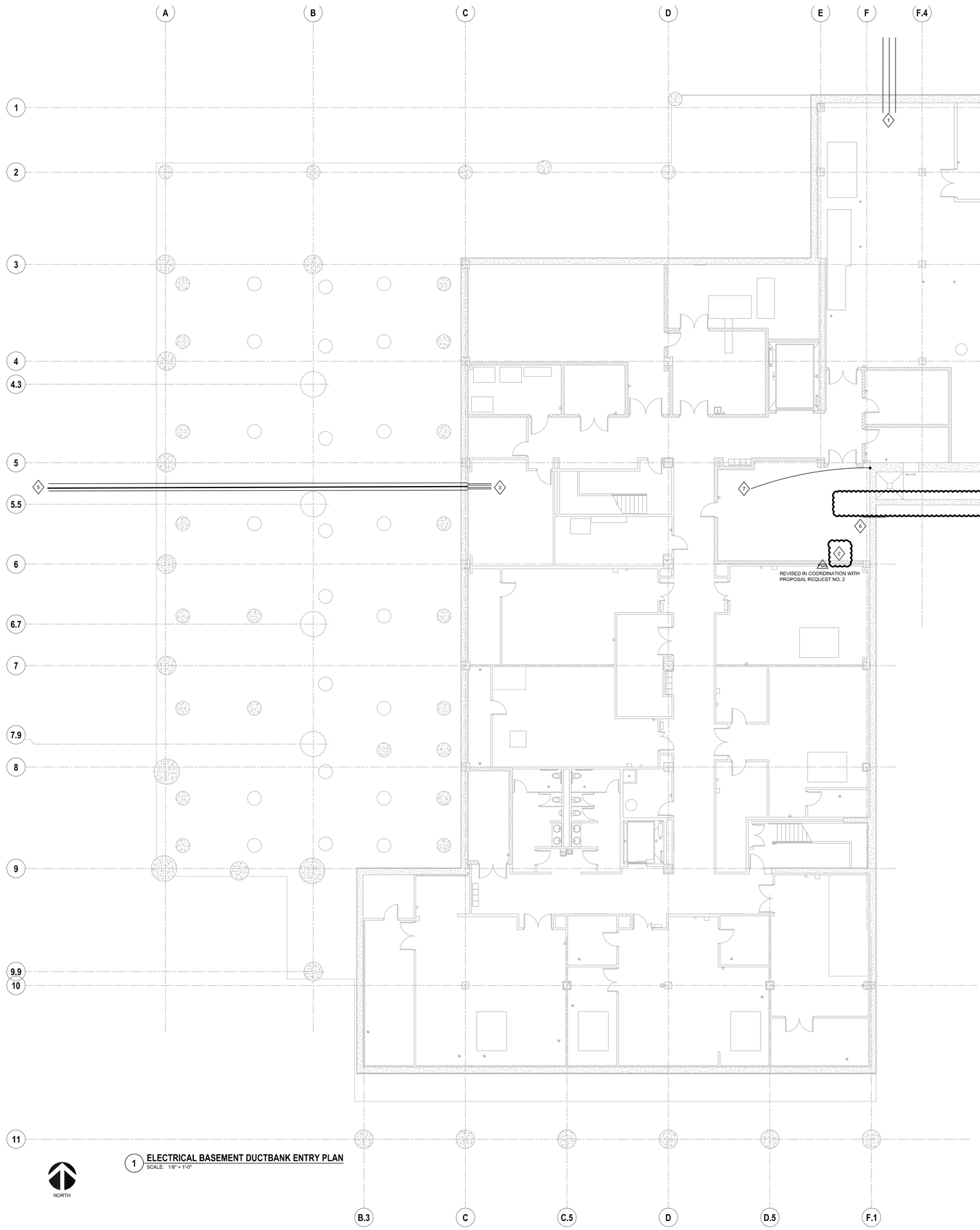
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ELECTRICAL LIGHTING
PENTHOUSE - ZONE E

e1.05E



1 **ELECTRICAL BASEMENT DUCTBANK ENTRY PLAN**
SCALE: 1/8" = 1'-0"

GENERAL NOTES

1. REFER CIVIL "c" SERIES DRAWINGS AND SHEET e0.02 FOR MORE INFORMATION REGARDING SITE WORK.

SHEET KEYNOTES

1. EXTEND CONDUITS FOR FUTURE SITE LIGHTING THROUGH FOUNDATION WALL. CONDUITS SHALL TRANSITION FROM GRC TO EMT ONCE INSIDE BUILDING FOR FUTURE EXTENSION TO PANELBOARD AND SHALL TRANSITION FROM GRC TO PVC 5' BEYOND EXTERIOR FOUNDATION WALL. ENTER BUILDING AT ELEVATION 838.5' ABOVE FLOOR SLAB. SEE SHEET e0.02.
2. CONDUITS FROM MANHOLE U2009A EXTEND BELOW FLOOR SLAB TO ELECTRICAL VAULT. REFER TO BID PACKAGE NO. 2 DRAWING e2.000 FOR EXACT LOCATION OF STUB-UP IN ELECTRICAL VAULT. REFER TO SHEET e0.02 FOR CONTINUATION ON SITE PLAN.
3. EXTEND CONDUITS FOR TELECOM DUCTBANK THROUGH FOUNDATION WALL. EXTEND GRC CONDUITS FROM OUTSIDE FOUNDATION WALL TO 5' INSIDE FOUNDATION WALL FOR FUTURE EXTENSION TO CABLE TRAY. ENTER BUILDING THROUGH FOUNDATION AT ELEVATION 838.5' ABOVE FLOOR SLAB TO BOTTOM OF DUCTBANK. SEE SHEET e0.02. — REVISED IN ACCORDANCE WITH PROPOSAL REQUEST NO. 2.
4. NOT USED.
5. DUCTBANK TO NEW CAT I (TELECOM) MANHOLE. SEE SHEET e0.02. — REVISED IN ACCORDANCE WITH PROPOSAL REQUEST NO. 2.
6. EXTEND CONDUIT FOR #4/0 GROUND RING CONNECTION THROUGH FOUNDATION WALL. EXTEND GRC CONDUIT FROM OUTSIDE FOUNDATION WALL TO 5' INSIDE FOUNDATION WALL FOR FUTURE CONNECTION TO ROOM GROUND BUS. ENTER BUILDING AT ELEVATION 838.5' ABOVE FLOOR SLAB. PROVIDE 50' OF COILED #4/0 TINNED COPPER CONDUCTOR FOR CONNECTION TO BUS BAR IN FUTURE PACKAGE. SEE SHEET e0.02.
7. PROVIDE #4/0 BARE TINNED COPPER GROUND CONDUCTOR OF MINIMUM LENGTH OF 20' EMBEDDED IN NEAREST FOOTING/DRILLED PIER THAT IS IN CONTACT WITH THE EARTH. ELECTRODE SHALL BE ENCASED IN MINIMUM OF 2" CONCRETE INSIDE FOOTING/PIER. BOND TO REBAR IN FOOTING/DRILLED PIER. PROVIDE 50' OF COILED #4/0 TINNED COPPER CONDUCTOR FOR CONNECTION TO BUS BAR IN FUTURE PACKAGE.

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By

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Date 02-24-2012 Reg. No. 25364

Issued for	Date
Bid Package No. 1	10-14-2011
Project Directive No. 3	05-11-2012

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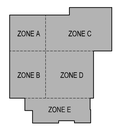
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Physics and Nanotechnology Building

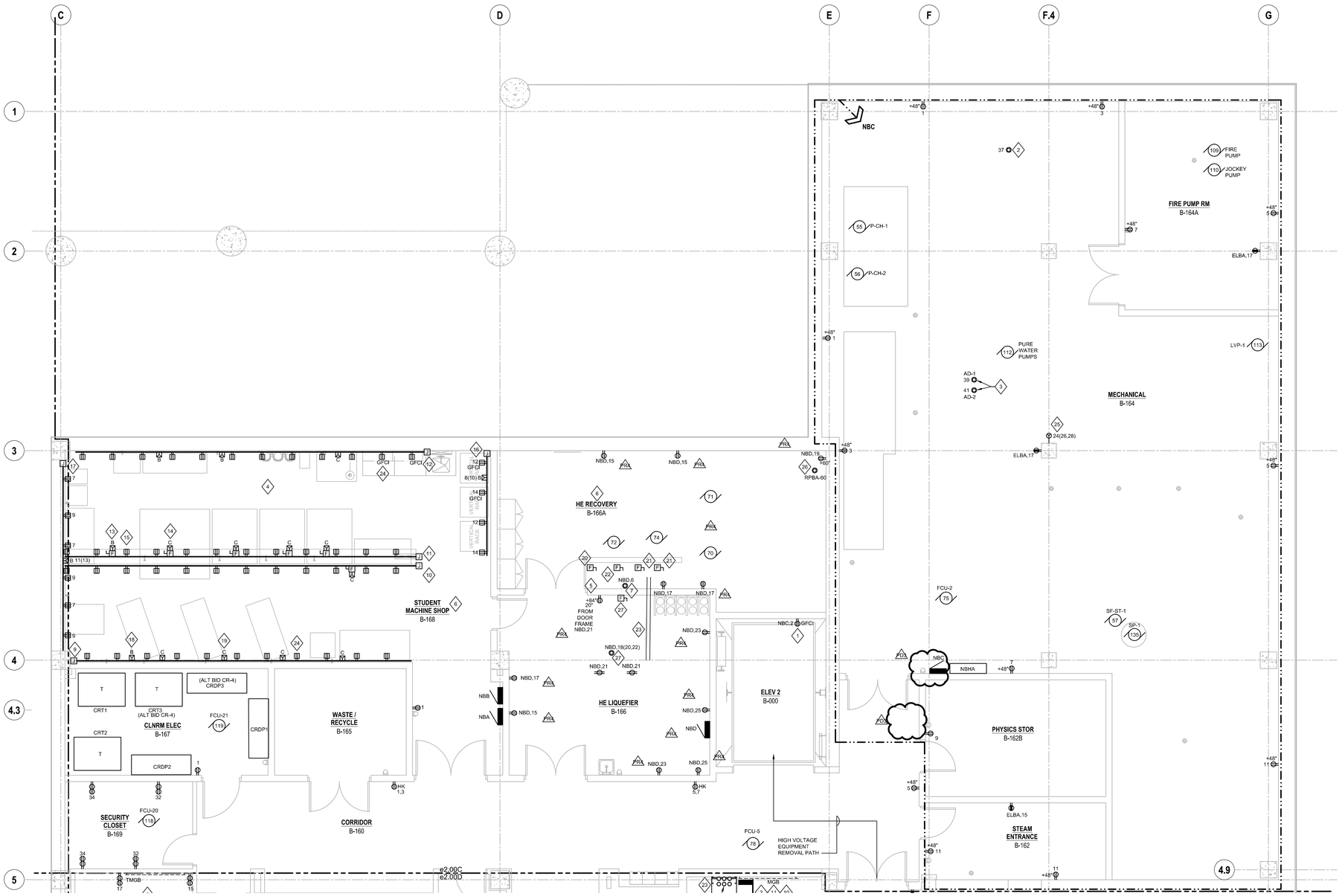
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ELECTRICAL BASEMENT DUCTBANK ENTRY PLAN

e2.00



1 **ELECTRICAL POWER BASEMENT - ZONE C**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. REFER TO ff SERIES OF DRAWINGS FOR DETAILS AND ELEVATIONS OF SPACES INSIDE LABORATORY AREAS.
2. REFER TO m AND p SERIES DRAWINGS FOR EXACT LOCATIONS OF MOTORS AND VFDS.
3. ALL RECEPTACLES AND EQUIPMENT CONNECTIONS ON THIS LEVEL WHICH ARE SHOWN OUTSIDE OF PANEL DIVISION LINES ARE CIRCUITED FROM PANEL NPBA UNLESS OTHERWISE SHOWN.
4. DUE TO EMF INTERFERENCE CONCERNS, ALL FEEDER CONDUITS FROM DISTRIBUTION PANELS IN THE ELECTRICAL ROOMS TO BRANCH CIRCUIT PANELS LOCATED IN LABORATORIES SHALL BE ROUTED IN THE CORRIDOR SPACE AND NOT OVER OTHER LABORATORIES UNTIL THEY ENTER THE LAB ROOM WHERE THE PANEL IS LOCATED.
5. ALL RECEPTACLES OF TYPE "IG" SHALL BE SERVED WITH DEDICATED CIRCUIT WITH DEDICATED ISOLATED GROUND AND EQUIPMENT GROUND FROM CLEAN POWER PANEL "CPXX" INDICATED BY PANEL DIVISION LINES.

SHEET KEYNOTES

1. MOUNT ELEVATOR PIT RECEPTACLE AT 48" AFF TO BOTTOM.
2. PROVIDE 120V FIXED POWER CONNECTION TO DWS-1.
3. PROVIDE 120V FIXED POWER CONNECTION TO AIR DRYER.
4. ROOM SERVED BY PANELS NBA AND NBB.
5. PROVIDE 120V FIXED POWER CONNECTION TO LIQUEFIER.
6. ALL RACEWAY INSTALLATION, DISCONNECT LOCATION, RECEPTACLE LOCATIONS, AND DEVICES IN SHOP ROOM SHALL BE VERIFIED WITH OWNER PRIOR TO INSTALLATION DUE TO CONFIGURATION OF EQUIPMENT.
7. PROVIDE 120V FIXED CONNECTION TO OWNER PROVIDED STARTER FOR MOTOR 72. MAKE CONNECTION TO STARTER AT 5' AFF. FRA
8. NOT USED
9. WIREWAY INDICATED SHALL BE STARLINE BUSWAY MODEL SB60 FED FROM PANEL NBA VIA 60A BREAKER IN PANEL WITH 4 #4 AND 1 #10 GND IN 1-1/4" CONDUIT.
10. WIREWAY INDICATED SHALL BE STARLINE BUSWAY MODEL B225-4PG FED FROM PANEL NBA VIA 150A BREAKER IN PANEL WITH 4 #1/0 AND 1 #6 GND IN 2" CONDUIT. MOUNTED TO OVERHEAD SERVICE CARRIER.
11. WIREWAY INDICATED SHALL BE STARLINE BUSWAY MODEL B225-4PG FED FROM PANEL NBB VIA 150A BREAKER IN PANEL WITH 4 #1/0 AND 1 #6 GND IN 2" CONDUIT. MOUNTED TO OVERHEAD SERVICE CARRIER.
12. WIREWAY INDICATED SHALL BE STARLINE BUSWAY MODEL SB60 FED FROM PANEL NBB VIA 60A BREAKER IN PANEL WITH 4 #4 AND 1 #10 GND IN 1-1/4" CONDUIT.
13. TYPICAL (B) TYPE DISCONNECT SHALL BE STARLINE MODEL CBDC225E12-XL630C-4, 208V, 1 PHASE, 30A DISCONNECT. CONTRACTOR SHALL VERIFY FUSE SIZE TO BE INSTALLED WITH OWNER FOR PARTICULAR PIECE OF EQUIPMENT TO BE INSTALLED. PROVIDE BRANCH CIRCUIT WIRING FROM DISCONNECT TO OWNER EQUIPMENT MINIMUM 2 #10 AND 1 #10 GND IN 3/4" CONDUIT. WIRING MAY BE TERMINATED IN NEMA L6-30R OR 6-30R OR MAY BE HARDWIRED DIRECTLY TO EQUIPMENT. VERIFY INSTALLATION AND RECEPTACLE TYPE WITH OWNER.
14. TYPICAL (C) TYPE DISCONNECT SHALL BE STARLINE MODEL CBDC225E12-XL1530C-4, 208V, 3 PHASE, 30A DISCONNECT. CONTRACTOR SHALL VERIFY FUSE SIZE TO BE INSTALLED WITH OWNER FOR PARTICULAR PIECE OF EQUIPMENT TO BE INSTALLED. PROVIDE BRANCH CIRCUIT WIRING FROM DISCONNECT TO OWNER EQUIPMENT MINIMUM 3 #10 AND 1 #10 GND IN 3/4" CONDUIT. WIRING MAY BE TERMINATED IN NEMA L15-30R OR 15-30R OR MAY BE HARDWIRED DIRECTLY TO EQUIPMENT. VERIFY INSTALLATION AND RECEPTACLE TYPE WITH OWNER.
15. TYPICAL DUPLEX RECEPTACLE IN STARLINE BUSWAY SHALL BE STARLINE MODEL CBDC225E12-X-520D-4, 120V, 1 PHASE, 20A CIRCUIT BREAKER.
16. STANDARD (NON-STARLINE) SURFACE MOUNTED WIREWAY. CIRCUIT NUMBERS INDICATED SERVED FROM PANEL NBA.
17. STANDARD (NON-STARLINE) SURFACE MOUNTED WIREWAY. CIRCUIT NUMBERS INDICATED SERVED FROM PANEL NBB.
18. TYPICAL (B) TYPE RECEPTACLE SHALL BE STARLINE MODEL SBCBE32-L630-IS, 208V, 1 PHASE, 30A CIRCUIT BREAKER WITH NEMA L6-30R OR 6-30R. VERIFY INSTALLATION AND RECEPTACLE TYPE WITH OWNER.
19. TYPICAL (C) TYPE RECEPTACLE SHALL BE STARLINE MODEL SBCBE33-L1530-IS, 208V, 3 PHASE, 30A CIRCUIT BREAKER WITH NEMA L15-30R OR 15-30R OR MAY BE HARDWIRED DIRECTLY TO EQUIPMENT. VERIFY INSTALLATION AND RECEPTACLE TYPE WITH OWNER.
20. DUE TO SPECIFIC OWNER REQUIREMENTS, DISC SW FOR MOTOR 72 IS ILLUSTRATED AND SHALL BE MOUNTED TO OVERHEAD SERVICE CARRIER. REFER TO SHEET e9.17.
21. DUE TO SPECIFIC OWNER REQUIREMENTS, DISC SW FOR MOTORS 70 AND 72 ARE ILLUSTRATED AND SHALL BE MOUNTED TO OVERHEAD SERVICE CARRIER. REFER TO SHEET e9.17.
22. DUE TO SPECIFIC OWNER REQUIREMENTS, DISC SW FOR MOTOR 74 IS ILLUSTRATED AND SHALL BE MOUNTED TO OVERHEAD SERVICE CARRIER. REFER TO SHEET e9.17.
23. PROVIDE (2) - 2" GALVANIZED RIGID STEEL CONDUITS IN FLOOR TRENCH. REFER TO ARCHITECTURAL PLANS FOR EXACT FLOOR TRENCH LOCATION. MOUNT ONE CONDUIT TO EACH SIDE OF TRENCH AND EXTEND ENTIRE LENGTH OF TRENCH. CONDUITS SHALL EXTEND UNDER BOTH SIDES OF WALL BETWEEN B-166A AND B-166 AND EXTEND ENTIRE LENGTH OF TRENCH. CONTRACTOR SHALL MAKE FINAL CUT BACK OF TOTAL LENGTH OF CONDUIT ON EACH SIDE OF WALL IF DIRECTED BY OWNER TO SHORTEN BOTH RUNS IN TRENCH. FRA
24. TYPICAL DUPLEX RECEPTACLE IN THIS STYLE OF STARLINE BUSWAY SHALL BE MODEL SBCBE31-520D-IS OR SBCBE31-520GFI-IS.
25. PROVIDE NEMA 15-60R WELDING RECEPTACLE.
26. PROVIDE 120V FIXED POWER CONNECTION TO DAMPER.
27. PROVIDE 60A HEAVY DUTY FUSED DISCONNECT SWITCH, 208V, 3 PHASE, NEUTRAL, GROUND, FUSED AT 40A WITH RK-1 FUSE. PROVIDE CONNECTION FROM DISCONNECT TO OWNER'S CONTROL PANEL "PLC4". MOUNT DISCONNECT 5' OFF FLOOR AND 1' WEST OF FLOOR TRENCH. CIRCUIT NBD, 18(20,22). VERIFY EXACT LOCATION WITH OWNER. FRA

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For AFFILIATED ENGINEERS, INC.

By

Name RONALD M. PARSLEY

Date 02-24-2012 Reg. No. 25163

Issued for	Date
100% CD set	12-16-2011
Bid Package No. 2	02-24-2012
Proposal Request No.4	05-09-2012
Project Directive No. 3	05-15-2012

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Date	12/16/11

Project

Physics and Nanotechnology Building

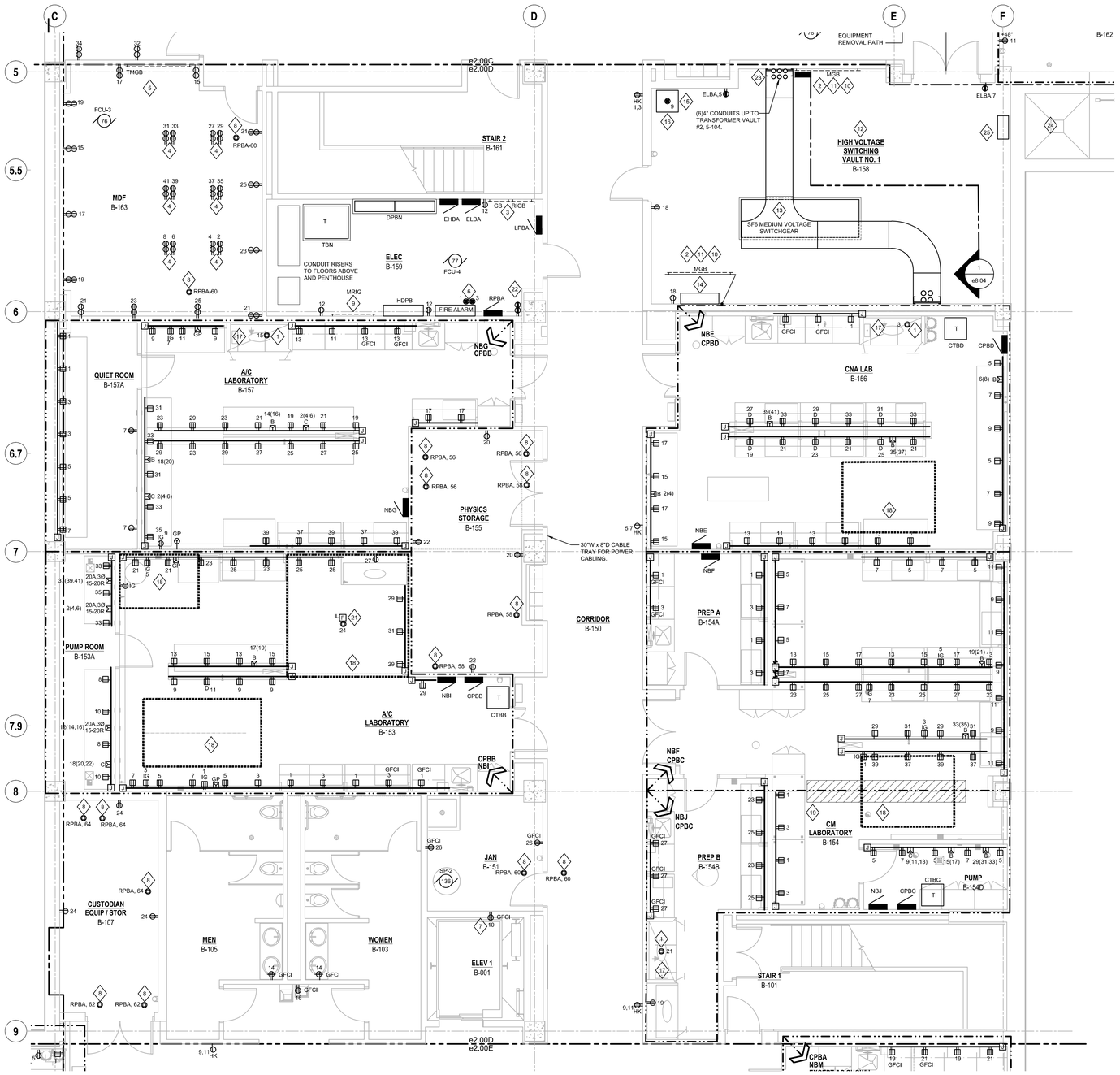
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ZONE A ZONE C ZONE B ZONE D ZONE E

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ELECTRICAL POWER BASEMENT - ZONE C

e2.00C



1 **ELECTRICAL POWER BASEMENT - ZONE D**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. REFER TO ℓ SERIES OF DRAWINGS FOR DETAILS AND ELEVATIONS OF SPACES INSIDE LABORATORY AREAS.
2. REFER TO *m* AND *p* SERIES DRAWINGS FOR EXACT LOCATIONS OF MOTORS AND VFDS.
3. ALL RECEPTACLES AND EQUIPMENT CONNECTIONS ON THIS LEVEL WHICH ARE SHOWN OUTSIDE OF PANEL DIVISION LINES ARE CIRCUITED FROM PANEL RPBA UNLESS OTHERWISE SHOWN.
4. DUE TO EMF INTERFERENCE CONCERNS, ALL FEEDER CONDUITS FROM DISTRIBUTION PANELS IN THE ELECTRICAL ROOMS TO BRANCH CIRCUIT PANELS LOCATED IN LABORATORIES SHALL BE ROUTED IN THE CORRIDOR SPACE AND NOT OVER OTHER LABORATORIES UNTIL THEY ENTER THE LAB ROOM WHERE THE PANEL IS LOCATED.
5. ALL CLEAN POWER TRANSFORMERS "CTXX" SHALL BE MOUNTED AT 11'-6" TO BOTTOM AND SUPPORTED BY UNISTRUT FROM STRUCTURE.
6. ALL RECEPTACLES OF TYPE "IG" SHALL BE SERVED WITH DEDICATED CIRCUIT WITH DEDICATED ISOLATED GROUND AND EQUIPMENT GROUND FROM CLEAN POWER PANEL "CPXX" INDICATED BY PANEL DIVISION LINES.

SHEET KEYNOTES

1. PROVIDE 120V FIXED POWER CONNECTION TO HOOD.
2. MAIN GROUND BUSBAR - REFER TO GROUNDING ONELINE ON SHEET e5.09. MOUNT AT 18" AFF.
3. GROUND BUSBAR AND ROOM INSTRUMENT GROUND BUSBAR - REFER TO GROUNDING ONELINE ON SHEET e5.09. MOUNT AT 18" AFF.
4. MOUNT RECEPTACLES ON BACK OF COMMUNICATIONS RACK AT 18" AND 69" AFF.
5. TELECOM MAIN GROUND BUSBAR REFER TO GROUNDING ONELINE ON SHEET e5.09. MOUNT AT 18" AFF.
6. PROVIDE 120V FIXED POWER CONNECTIONS TO FIRE ALARM NAC PANEL AND FIRE ALARM DATA GATHERING PANEL FROM PANEL ELBA.
7. MOUNT ELEVATOR PIT RECEPTACLE AT 48" AFF TO BOTTOM.
8. PROVIDE 120V FIXED POWER CONNECTION TO DAMPER.
9. MAIN ROOM INSTRUMENT GROUND BUSBAR - REFER TO GROUNDING ONELINE ON SHEET e5.09. MOUNT AT 18" AFF.
10. PROVIDE MINIMUM 25' CONCRETE ENCASED GROUNDING ELECTRODE (UFER) IN BUILDING FOOTING. CONNECT TO MAIN GROUNDING BUSBAR.
11. CONNECT MAIN GROUNDING BUS WITH BUILDING GROUND RING WITH #4/0 BARE COPPER CONDUCTOR. REFER TO e0.02 IN BID PACKAGE 1 FOR BUILDING GROUND GRID.
12. PROVIDE ROOM GROUND GRID CONSISTING OF #4/0 BARE COPPER. CONNECT TO MAIN GROUNDING BUS WITH #4/0 BARE COPPER. REFER TO DETAIL 6/e8.03.
13. PROVIDE (2) #4/0 BARE COPPER MEDIUM VOLTAGE SWITCH GROUNDING ELECTRODE CONDUCTORS BURIED BELOW SLAB AND CONNECTED TO GROUND GRID FROM MAIN GROUND BUSBAR. PROVIDE IN 1" PVC CONDUIT THROUGH FLOOR SLAB. STUB CONDUIT UP 6" ABOVE FINISHED FLOOR FOR EXTENSION OF MEDIUM VOLTAGE SWITCH GROUNDING ELECTRODE CONDUCTOR. CONNECT #4/0 TO EACH END OF EQUIPMENT GROUND BUSBAR.
14. G&W ATC-451 AUTOMATIC TRANSFER SWITCH CONTROLLER. PROVIDE 120V FIXED EMERGENCY POWER CONNECTION FROM DEDICATED CIRCUIT IN PANEL ELBA_2 AND NORMAL POWER PANEL CIRCUIT RPBA_44.
15. OWNER FURNISHED SCADA RACK. PROVIDE 120V FIXED EMERGENCY POWER CONNECTION FROM PANEL ELBA.
16. PROVIDE (2) - 1" CONDUITS FROM SCADA RACK TO PENTHOUSE ROOM CONTAINING SUBSTATION TRANSFORMERS. TERMINATE EACH CONDUIT IN ITS OWN JUNCTION BOX AND LABEL "FOR SCADA USE".
17. PROVIDE JUNCTION BOX BEHIND FLAMMABLE STORAGE CABINET LOCATED BELOW FUME HOOD. PROVIDE #8AWG IN 1/2" GROUND WIRE CONNECTED FROM CABINET TO THE SAME GROUND BUS IN THE PANELBOARD SERVING THE 120V CIRCUITS TO THE HOOD LOCATED ABOVE CABINET. REFER TO ℓ SERIES DRAWINGS FOR EXACT LOCATIONS.
18. ZONE BORDERED BY HEAVY DASHED LINE IS AN AREA WHICH SHALL BE KEPT CLEAR OF ALL CONDUITS FOR ALL ELECTRICAL SYSTEMS EXCEPT FOR SPECIFIC EXEMPTIONS WHICH MAY BE INDICATED ON LIGHTING SHEET. NO ELECTRICAL DEVICES, RACEWAYS, OR EQUIPMENT SHALL BE INSTALLED IN THIS ZONE. REFER TO ARCHITECTURAL AND ℓ SERIES DRAWINGS FOR FURTHER INFORMATION.
19. ZONE INDICATED BY CROSSHATCH IS AN AREA WHICH SHALL BE KEPT CLEAR OF ALL CONDUITS FOR ALL ELECTRICAL SYSTEMS. NO ELECTRICAL DEVICES, RACEWAYS, OR EQUIPMENT SHALL BE INSTALLED IN THIS ZONE. REFER TO ARCHITECTURAL AND ℓ SERIES DRAWINGS FOR FURTHER INFORMATION.
20. NOT USED
21. PROVIDE FIXED POWER CONNECTION TO PORTABLE CLEAR PLASTIC CLEANROOM. PROVIDE 60A, 120V, 1Ø+1N+1GND DISCONNECT SWITCH FUSED AT 35A FOR CONNECTION TO CLEANROOM JUNCTION BOX. LOCATE DISCONNECT ON WALL ADJACENT TO PANEL CPBB.
22. PROVIDE QUADRUPLEX RECEPTACLE AND CONDUIT AND WIRING TO PORTABLE GENERATOR CONNECTION AT LOADING DOCK FROM PANEL EM LOCATED ON LEVEL 1. SEE NOTE 5 ON SHEET E2.01C. EACH RECEPTACLE SHALL BE SERVED WITH AN INDIVIDUAL BRANCH CIRCUIT. DUE TO VOLTAGE DROP, BRANCH CIRCUIT TO EACH RECEPTACLE ON THIS FLOOR SHALL BE 2#6 AND 1#6 GND IN 3/4" ROUTED FROM FIRST FLOOR, THROUGH ELECTRICAL ROOMS, AND TO RECEPTACLES. PIG-TAIL FROM #8 TO #12 WIRE BEFORE TERMINATING ON RECEPTACLES.
23. LOCATION OF 3 HOUR CHASE ON EACH FLOOR FOR MEDIUM VOLTAGE CONDUCTORS AND CONDUITS FROM VAULT NO. 1 TO VAULT NO. 2 IN PENTHOUSE. REFER TO ARCHITECTURAL PLANS AND COORDINATE PENETRATIONS THROUGH EACH FLOOR WITH STRUCTURAL CONTRACTOR.
24. REFER TO SHEET e7.04 FOR CONTINUATION OF STEAM TUNNEL.
25. PROVIDE COOPER BUSSMAN SFC-FUSE-CAB SPARE FUSE CABINET MOUNTED TO WALL 36" AFF TO BOTTOM.

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By

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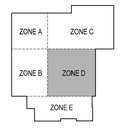
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Date 12/16/11

Project

Physics and Nanotechnology Building

U of M Project # 01-155-08-1718



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ELECTRICAL POWER BASEMENT - ZONE D

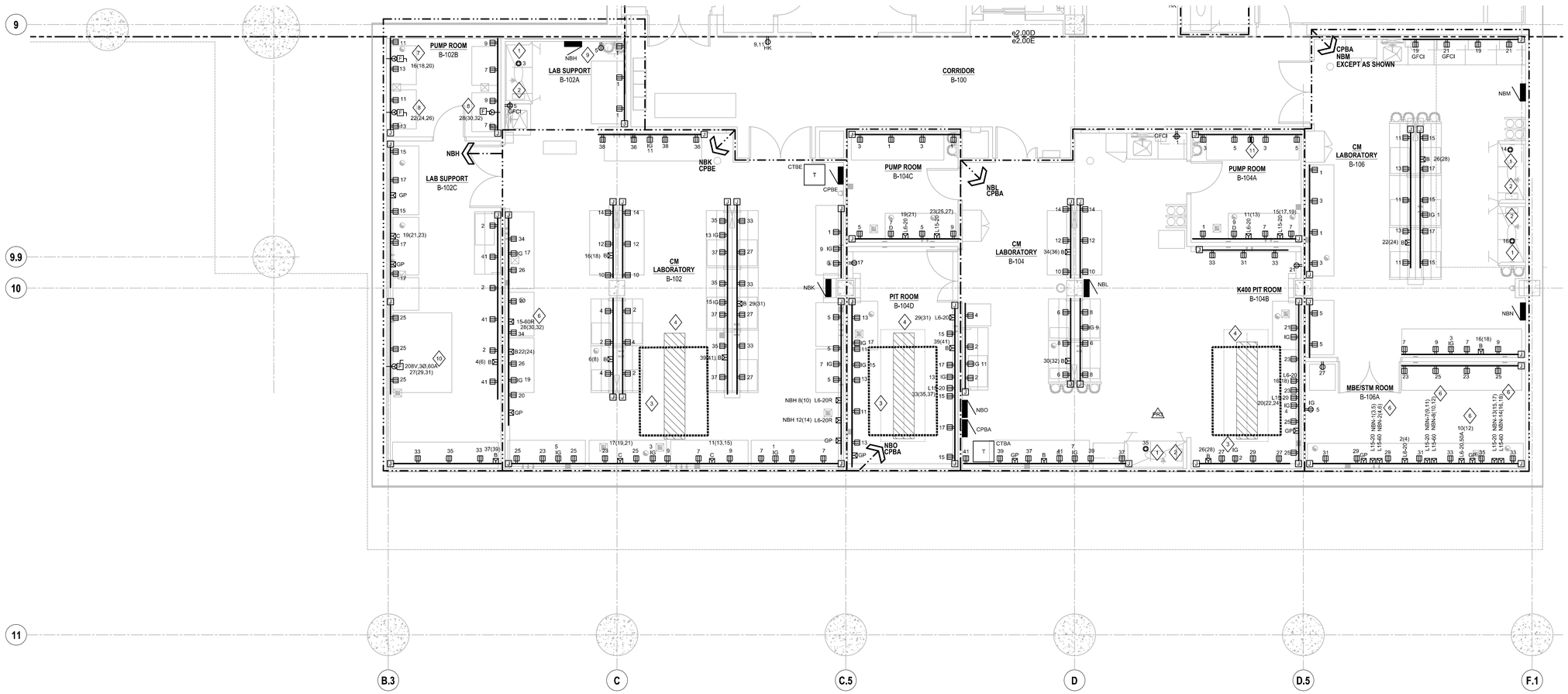
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GENERAL NOTES

1. REFER TO f SERIES OF DRAWINGS FOR DETAILS AND ELEVATIONS OF SPACES INSIDE LABORATORY AREAS.
2. REFER TO m AND p SERIES DRAWINGS FOR EXACT LOCATIONS OF MOTORS AND VFDS.
3. ALL RECEPTACLES AND EQUIPMENT CONNECTIONS ON THIS LEVEL WHICH ARE SHOWN OUTSIDE OF PANEL DIVISION LINES ARE CIRCUITED FROM PANEL RPBA UNLESS OTHERWISE SHOWN.
4. DUE TO EMF INTERFERENCE CONCERNS, ALL FEEDER CONDUITS FROM DISTRIBUTION PANELS IN THE ELECTRICAL ROOMS TO BRANCH CIRCUIT PANELS LOCATED IN LABORATORIES SHALL BE ROUTED IN THE CORRIDOR SPACE AND NOT OVER OTHER LABORATORIES UNTIL THEY ENTER THE LAB ROOM WHERE THE PANEL IS LOCATED.
5. ALL RECEPTACLES OF TYPE "IG" SHALL BE SERVED WITH DEDICATED CIRCUIT WITH DEDICATED ISOLATED GROUND AND EQUIPMENT GROUND FROM CLEAN POWER PANEL "CPXX" INDICATED BY PANEL DIVISION LINES.

SHEET KEYNOTES

1. PROVIDE 120V FIXED POWER CONNECTION TO HOOD.
2. PROVIDE JUNCTION BOX BEHIND FLAMMABLE STORAGE CABINET LOCATED BELOW FUME HOOD. PROVIDE #8AWG IN 1/2" GROUND WIRE CONNECTED FROM CABINET TO THE SAME GROUND BUS IN THE PANELBOARD SERVING THE 120V CIRCUITS TO THE HOOD LOCATED ABOVE CABINET. REFER TO f SERIES DRAWINGS FOR EXACT LOCATIONS.
3. ZONE BORDERED BY HEAVY DASHED LINE IS AN AREA WHICH SHALL BE KEPT CLEAR OF ALL CONDUITS FOR ALL ELECTRICAL SYSTEMS EXCEPT FOR SPECIFIC EXEMPTIONS WHICH MAY BE INDICATED ON LIGHTING SHEET. NO ELECTRICAL DEVICES, RACEWAYS, OR EQUIPMENT SHALL BE INSTALLED IN THIS ZONE. REFER TO ARCHITECTURAL AND f SERIES DRAWINGS FOR FURTHER INFORMATION.
4. ZONE INDICATED BY CROSSHATCH IS AN AREA WHICH SHALL BE KEPT CLEAR OF ALL CONDUITS FOR ALL ELECTRICAL SYSTEMS. NO ELECTRICAL DEVICES, RACEWAYS, OR EQUIPMENT SHALL BE INSTALLED IN THIS ZONE. REFER TO ARCHITECTURAL AND f SERIES DRAWINGS FOR FURTHER INFORMATION.
5. NOT USED
6. RECEPTACLE SHALL BE FED AND INSTALLED SEPARATELY FROM SURFACE MOUNTED RACEWAY AND MOUNTED ABOVE RACEWAY.
7. PROVIDE RECEPTACLE FOR OWNER FURNISHED RELOCATED 3P, 3HP, 208V MOTOR. PROVIDE 30A FUSED DISCONNECT FUSED AT 17.5A UPSTREAM OF RECEPTACLE INDICATED. COORDINATE EXACT RECEPTACLE CONFIGURATION WITH OWNER PRIOR TO INSTALLATION.
8. PROVIDE RECEPTACLE FOR OWNER FURNISHED RELOCATED 3P, 1HP, 208V MOTOR. PROVIDE 30A FUSED DISCONNECT FUSED AT 8A UPSTREAM OF RECEPTACLE INDICATED. COORDINATE EXACT RECEPTACLE CONFIGURATION WITH OWNER PRIOR TO INSTALLATION.
9. PROVIDE RECEPTACLE FOR GAS TANK MANIFOLD SWITCHOVER CONTROLLER. RECEPTACLE MAY BE FIXED CONNECTION DEPENDING ON MODEL SUPPLIED. COORDINATE EXACT LOCATION AND CONNECTION TYPE WITH MANIFOLD SUPPLIER.
10. PROVIDE RECEPTACLE FOR OWNER FURNISHED RELOCATED "SPUTTER" EQUIPMENT. PROVIDE 3 PHASE WITH NEUTRAL AND GROUND. PROVIDE 60A FUSED DISCONNECT FUSED AT 60A UPSTREAM OF RECEPTACLE INDICATED. COORDINATE EXACT RECEPTACLE CONFIGURATION WITH OWNER PRIOR TO INSTALLATION.
11. ONE RECEPTACLE LOCATED IN ROOM B-104A SHALL BE SERVED FROM PANEL EM LOCATED ON LEVEL 1. SEE NOTE 5 ON SHEET e2.01C. RECEPTACLE SHALL BE SERVED WITH AN INDIVIDUAL BRANCH CIRCUIT. DUE TO VOLTAGE DROP, BRANCH CIRCUIT TO EACH RECEPTACLE ON THIS FLOOR SHALL BE 2#6 AND 1#6 GND IN 3/4" ROUTED FROM FIRST FLOOR, THROUGH ELECTRICAL ROOMS, AND TO RECEPTACLES. PIG-TAIL FROM #6 TO #12 WIRE BEFORE TERMINATING ON RECEPTACLES.



1 **ELECTRICAL POWER BASEMENT - ZONE E**
SCALE: 1/4" = 1'-0"

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For AFFILIATED ENGINEERS, INC.

By

Name RONALD M. PARSLEY

Date 02-24-2012 Reg. No. 25163

Issued for	Date
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Bid Package No. 2	02-24-2012
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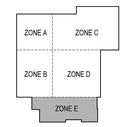
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Project

Physics and Nanotechnology Building

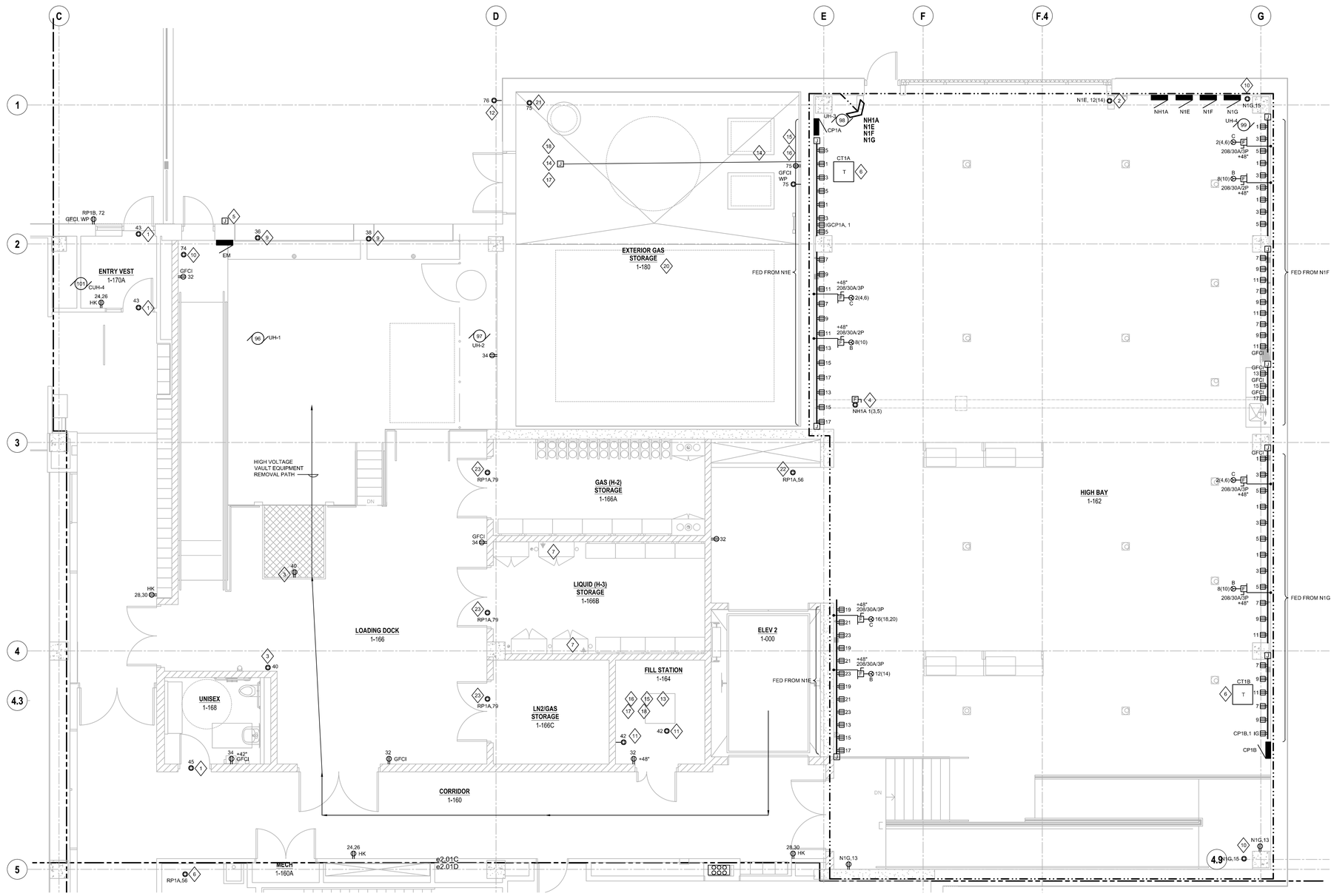
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ELECTRICAL POWER
BASEMENT - ZONE E

e2.00E



1 **ELECTRICAL POWER LEVEL 1 - ZONE C**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. REFER TO tf SERIES OF DRAWINGS FOR DETAILS AND ELEVATIONS OF SPACES INSIDE LABORATORY AREAS.
2. ALL RECEPTACLES AND EQUIPMENT CONNECTIONS ON THIS SHEET WHICH ARE SHOWN OUTSIDE OF PANEL DIVISION LINES ARE CIRCUITED FROM PANEL RP1A UNLESS OTHERWISE SHOWN.
3. DUE TO EMF INTERFERENCE CONCERNS, ALL FEEDER CONDUITS FROM DISTRIBUTION PANELS IN THE ELECTRICAL ROOMS TO BRANCH CIRCUIT PANELS LOCATED IN LABORATORIES SHALL BE ROUTED IN THE CORRIDOR SPACE AND NOT OVER OTHER LABORATORIES UNTIL THEY ENTER THE LAB ROOM WHERE THE PANEL IS LOCATED.
4. ALL CONDUITS INDICATED IN HIGH BAY LAB THIS SHEET SHALL BE SURFACE MOUNTED TO WALL.
5. ALL RECEPTACLES OF TYPE "IG" SHALL BE SERVED WITH DEDICATED CIRCUIT WITH DEDICATED ISOLATED GROUND AND EQUIPMENT GROUND FROM CLEAN POWER PANEL "CPXX" INDICATED BY PANEL DIVISION LINES.

SHEET KEYNOTES

1. PROVIDE 120V FIXED CONNECTIONS TO POWER ASSISTED DOOR OPERATORS. PROVIDE CONDUIT PATHWAY BETWEEN DOOR MOTORS AND PUSH PLATES. REFER TO ARCHITECTURAL DRAWINGS FOR PUSH PLATE LOCATIONS.
2. PROVIDE 208V, SINGLE PHASE, 60A FIXED CONNECTION TO OVERHEAD DOOR. PROVIDE 60A FUSED DISCONNECT AT POWER CONNECTION POINT FUSED AT 60A. PROVIDE CONDUIT AND WIRING FROM DOOR CONTROLS TO MOTOR LOCATION PER MANUFACTURER'S DRAWINGS. COORDINATE EXACT LOCATION WITH ARCHITECT.
3. PROVIDE POWER TO WALL MOUNTED DOCK LEVELER CONTROL BOX AND FROM CONTROL BOX TO RECEPTACLE AT PIT VIA 3/4" C. EMBEDDED INTO SLAB. BASIS OF DESIGN IS KELLEY AFX DOCK LEVELER. MOUNT RECEPTACLE IN DOCK LEVELER PIT AT 12" BELOW TOP OF PIT AND 14" FROM CENTERLINE OF PIT. REFER TO VENDOR SPECIFIC DRAWINGS FOR INSTALLATION DETAILS.
4. PROVIDE 480V 3 PHASE, 60A FIXED CONNECTION TO BRIDGE CRANE OPERATOR. PROVIDE 60A FUSED DISCONNECT ON WALL FUSED AT 50A. PROVIDE WIRING FROM DISCONNECT TO CONTROLLER LOCATION PER MANUFACTURER'S DRAWINGS. COORDINATE EXACT LOCATION WITH ARCHITECT.
5. PROVIDE PORTABLE GENERATOR CONNECTION CONSISTING OF NEMA 4X JUNCTION BOX ON BUILDING EXTERIOR WITH 4#4 AND 1#4 GND IN 1-1/4" C. CONNECTED TO PANEL EM. PANEL EM SHALL BE A SERVICE ENTRANCE RATED, 60A, 208Y/120V PANELBOARD, 10K AIC, WITH (10) 20A SINGLE POLE BRANCH CIRCUIT BREAKERS TO CONNECT TO RECEPTACLES ELECTRICAL ROOMS ON BASEMENT, 1ST, 2ND, 3RD AND 4TH FLOORS AND SELECTED RECEPTACLES ON BASEMENT AND 4TH FLOOR. REFER TO SHEETS e2.00D, e2.00E, e2.01D, e2.02D, e2.03D, e2.04C, AND e2.04D FOR MORE INFORMATION. PROVIDE #6AWG GROUNDING ELECTRODE CONDUCTOR FROM GROUND/NEUTRAL BUS IN PANEL TO GROUND BUS BAR IN ELECTRICAL ROOM 1-159. PROVIDE ENGRAVED LABEL AT EACH RECEPTACLE INDICATING "ACTIVE ONLY WHEN EXTERIOR PORTABLE GENERATOR IS CONNECTED."
6. NOT USED
7. PROVIDE JUNCTION BOX BEHIND FLAMMABLE STORAGE CABINET. PROVIDE #6AWG IN 1/2" GROUND WIRE CONNECTED FROM CABINET TO THE SAME GROUND BUS IN PANELBOARD RP1A. REFER TO tf SERIES DRAWINGS FOR EXACT LOCATIONS.
8. PROVIDE 120V FIXED POWER CONNECTION TO TRAP PRIMER.
9. PROVIDE 120V, SINGLE PHASE, 20A FIXED CONNECTION TO OVERHEAD DOOR. PROVIDE 20A NON-FUSED DISCONNECT AT CONTROLLER POWER CONNECTION. PROVIDE CONDUIT AND WIRING FROM DOOR CONTROLS TO MOTOR LOCATION PER MANUFACTURER'S DRAWINGS. COORDINATE EXACT LOCATION WITH ARCHITECT.
10. PROVIDE 120V FIXED POWER CONNECTION TO SECURITY CAMERA POWER SUPPLY. VERIFY EXACT LOCATION WITH SECURITY DRAWINGS AND POWER SUPPLY PROVIDER.
11. PROVIDE 120V FIXED POWER CONNECTION TO IN-FLOOR SCALE AND SOLENOID SHUT-OFF. COORDINATE EXACT LOCATION WITH SCALE PROVIDER AND SCALE INSTALLATION DRAWINGS.
12. PROVIDE 120V FIXED POWER CONNECTION TO EXTERIOR IRRIGATION CONTROLLER. COORDINATE EXACT LOCATION WITH LANDSCAPE CONTRACTOR.
13. PROVIDE 1" CONDUIT IN FLOOR SLAB FROM SCALE PIT LOCATION TO CONTROL PANEL ON WEST WALL. COORDINATE EXACT LOCATION WITH SCALE INSTALLATION DRAWINGS.
14. PROVIDE 1" CONDUIT BURIED BELOW GRADE WITH PULL STRING FROM TANK PRESSURE TRANSMITTERS TO VAPORIZER CONTROLLER ON EAST WALL OF EXTERIOR GAS STORAGE AREA. COORDINATE EXACT LOCATION WITH LN2 TANK SUPPLIER.
15. PROVIDE 2" CONDUIT WITH PULL STRING FOR FUTURE CONTROL FROM EXTERIOR MANIFOLD ON EAST WALL OF EXTERIOR GAS STORAGE INSIDE TO ROOM 1-164 WITH CONDUIT ROUTED THROUGH LOADING DOCK. REFER TO SHEET a6.15.
16. PROVIDE 1" CONDUIT FOR VAPORIZER SWITCHING CONTROLS WITH PULL STRING FROM EXTERIOR MANIFOLD ON EAST WALL OF EXTERIOR GAS STORAGE INSIDE TO ROOM 1-164 WITH CONDUIT ROUTED THROUGH LOADING DOCK. REFER TO SHEET a6.15.
17. PROVIDE 1" CONDUIT FOR TANK SOLENOID WITH PULL STRING FROM TANK SOLENOID TO ROOM 1-164 CONTROL PANEL WITH CONDUIT ROUTED THROUGH LOADING DOCK. REFER TO SHEET a6.15.
18. PROVIDE 1" CONDUIT FOR FILL PORT LOCATION WITH PULL STRING FROM FILL PORT CONTROLS TO ROOM 1-164 CONTROL PANEL WITH CONDUIT ROUTED THROUGH LOADING DOCK. REFER TO SHEET a6.15.
19. PROVIDE 120V GFCI, WEATHERPROOF RECEPTACLE AND FIXED CONNECTION TO MANIFOLD CONTROLS.
20. COORDINATE ALL CONDUIT RUNS AND LOCATIONS WITH FINAL SITE INSTALLATION DRAWINGS OF LIQUID NITROGEN TANK PROVIDER.
21. PROVIDE 120V FIXED CONNECTION TO POWER SOLENOID VALVES AT APPS TANK.
22. PROVIDE 120V FIXED POWER CONNECTIONS TO DAMPER.
23. PROVIDE 120V FIXED POWER CONNECTION TO LOCAL DOOR SECURITY HARDWARE POWER SUPPLY. COORDINATE EXACT LOCATION WITH SECURITY DEVICE PROVIDER.

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By

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Issued for	Date
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Date 12/16/11

Project

Physics and Nanotechnology Building

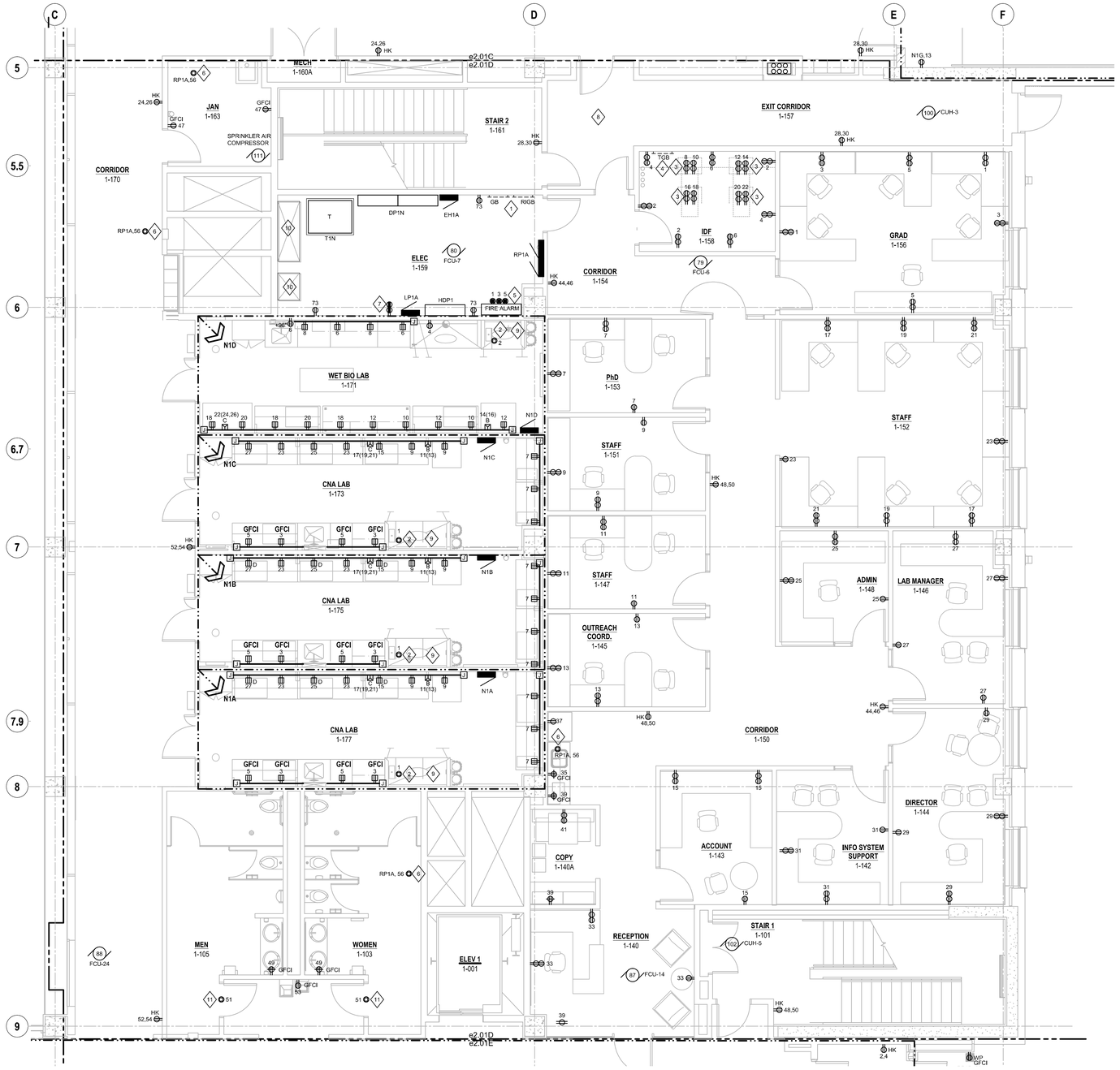
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ZONE A | ZONE C | ZONE B | ZONE D | ZONE E

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ELECTRICAL POWER
LEVEL 1 - ZONE C

e2.01C



1 **ELECTRICAL POWER LEVEL 1 - ZONE D**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. REFER TO tf SERIES OF DRAWINGS FOR DETAILS AND ELEVATIONS OF SPACES INSIDE LABORATORY AREAS.
2. ALL RECEPTACLES AND EQUIPMENT CONNECTIONS ON THIS SHEET WHICH ARE SHOWN OUTSIDE OF PANEL DIVISION LINES ARE CIRCUITED FROM PANEL RP1A UNLESS OTHERWISE SHOWN.
3. IN LIEU OF OVERHEAD CONDUITS AND WIRING, MC CABLE SHALL BE PERMITTED FOR THOSE AREAS COMPRISING OFFICE SPACE SUCH AS STAFF, GRAD, ADMIN, RECEPTION, ETC. ON THIS SHEET WHERE INSTALLED IN ACCORDANCE WITH SPECIFICATION.
4. DUE TO EMF INTERFERENCE CONCERNS, ALL FEEDER CONDUITS FROM DISTRIBUTION PANELS IN THE ELECTRICAL ROOMS TO BRANCH CIRCUIT PANELS LOCATED IN LABORATORIES SHALL BE ROUTED IN THE CORRIDOR SPACE AND NOT OVER OTHER LABORATORIES UNTIL THEY ENTER THE LAB ROOM WHERE THE PANEL IS LOCATED.
5. ALL CLEAN POWER TRANSFORMERS "CTXX" SHALL BE MOUNTED AT 11'-0" TO BOTTOM AND SUPPORTED BY UNISTRUT FROM STRUCTURE.
6. ALL RECEPTACLES OF TYPE "IG" SHALL BE SERVED WITH DEDICATED CIRCUIT WITH DEDICATED ISOLATED GROUND AND EQUIPMENT GROUND FROM CLEAN POWER PANEL "CPXX" INDICATED BY PANEL DIVISION LINES.

SHEET KEYNOTES

1. GROUND BUSBAR AND ROOM INSTRUMENT GROUND BUSBAR - REFER TO GROUNDING ONELINE. MOUNT AT 18" AFF.
2. PROVIDE 120V FIXED POWER CONNECTION TO HOOD.
3. MOUNT RECEPTACLES ON BACK OF COMMUNICATIONS RACK AT 18" AND 69" AFF.
4. TELECOM GROUND BUSBAR - REFER TO GROUNDING ONELINE. MOUNT AT 18" AFF.
5. PROVIDE 120V FIXED POWER CONNECTIONS TO FIRE ALARM CP. NAC PANEL AND FIRE ALARM DATA GATHERING PANEL FROM PANEL EL2A.
6. PROVIDE 120V FIXED POWER CONNECTIONS TO DAMPER.
7. PROVIDE QUADRUPLEX RECEPTACLE AND CONDUIT AND WIRING TO PORTABLE GENERATOR CONNECTION AT LOADING DOCK. FROM PANEL EM LOCATED ON LEVEL 1. SEE NOTE 5 ON SHEET e2.01C. EACH RECEPTACLE SHALL BE SERVED WITH AN INDIVIDUAL BRANCH CIRCUIT. DUE TO VOLTAGE DROP, BRANCH CIRCUIT TO EACH RECEPTACLE ON THIS FLOOR SHALL BE #8 AND #8 GND IN 3/4" ROUTED FROM FIRST FLOOR, THROUGH ELECTRICAL ROOMS, AND TO RECEPTACLES. PIG-TAIL FROM #8 TO #12 WIRE BEFORE TERMINATING ON RECEPTACLES.
8. ALL CONDUITS SERVING PANELS AND EQUIPMENT NORTH OF THE ELECTRICAL ROOM 1-159 SHALL BE ROUTED ABOVE CEILING SPACE IN HALLWAY.
9. PROVIDE JUNCTION BOX BEHIND FLAMMABLE STORAGE CABINET LOCATED BELOW FUME HOOD. PROVIDE #8AWG IN 1/2" GROUND WIRE CONNECTED FROM CABINET TO THE SAME GROUND BUS IN THE PANELBOARD SERVING THE 120V CIRCUITS TO THE HOOD LOCATED ABOVE CABINET. REFER TO tf SERIES DRAWINGS FOR EXACT LOCATIONS.
10. PROVIDE OPENINGS IN FLOOR SLAB FOR CONDUITS FROM PENTHOUSE TO BASEMENT IN ELECTRICAL ROOM. PROVIDE EMBEDDED UNISTRUT INTO EAST AND WEST WALLS OF OPENINGS AND PROVIDE CROSSPIECE UNISTRUT TO SUPPORT CENTER ROW OF CONDUITS IN EACH OPENING. PROVIDE STRUCTURAL STEEL PLATE TO BE CAST INTO SLAB IN EACH FLOOR OPENING WITH PENETRATIONS MADE TO INSTALL CONDUITS. OPENING SHALL BE BACKFILLED WITH CONCRETE TO MAINTAIN FLOOR FIRE RATING. COORDINATE EMBEDDING OF STEEL PLATE, UNISTRUT EMBEDS, AND FLOOR OPENING WITH STRUCTURAL CONTRACTOR PRIOR TO POURING OF FLOOR.
11. PROVIDE 120V FIXED CONNECTIONS TO POWER ASSISTED DOOR OPERATORS. PROVIDE CONDUIT PATHWAY BETWEEN DOOR MOTORS AND PUSH PLATES. REFER TO ARCHITECTURAL DRAWINGS FOR PUSH PLATE LOCATIONS.
12. NOT USED
13. PROVIDE CEILING MOUNTED POWER OUTLET FOR DISPLAY MONITOR.

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By

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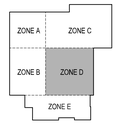
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Project

Physics and Nanotechnology Building

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ELECTRICAL POWER
LEVEL 1 - ZONE D

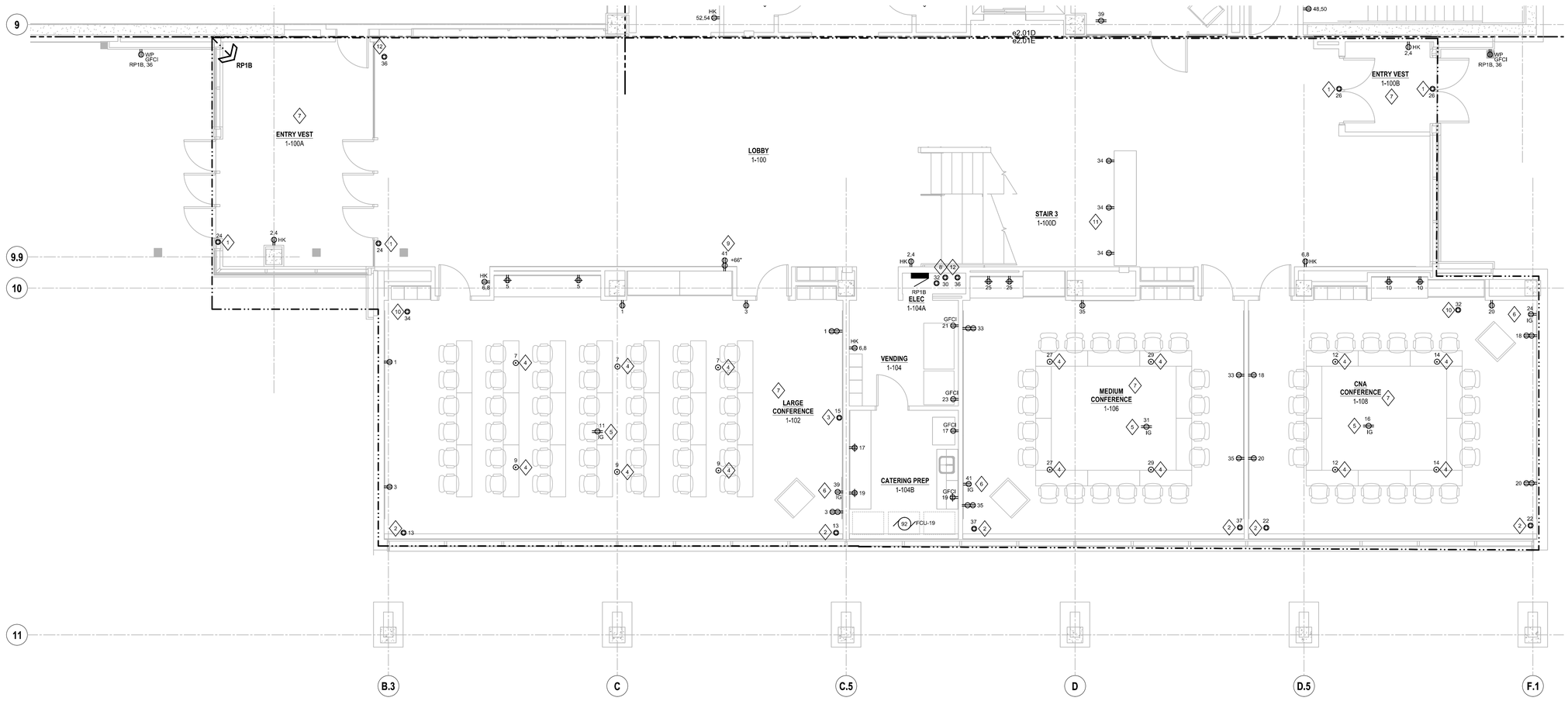
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GENERAL NOTES

1. CONDUIT FOR DEVICES INSTALLED BELOW WINDOWS WALL SHALL BE RUN HORIZONTALLY IN DRYWALL TO THICKENED WALLS NEAR COLUMNS TO TURN VERTICALLY TO CEILING SPACE.
2. IN LIEU OF OVERHEAD CONDUITS AND WIRING, MC CABLE WIRING SHALL BE PERMITTED FOR THOSE AREAS COMPROMISING OFFICE SPACE SUCH AS CONFERENCE ROOMS, COFFEE AREAS, ETC. ON THIS SHEET WHERE INSTALLED IN ACCORDANCE WITH SPECIFICATIONS.
3. DUE TO EMF INTERFERENCE CONCERNS, ALL FEEDER CONDUITS FROM DISTRIBUTION PANELS IN THE ELECTRICAL ROOMS TO BRANCH CIRCUIT PANELS LOCATED IN LABORATORIES SHALL BE ROUTED IN THE CORRIDOR SPACE AND NOT OVER OTHER LABORATORIES UNTIL THEY ENTER THE LAB ROOM WHERE THE PANEL IS LOCATED.

SHEET KEYNOTES

1. PROVIDE 120V FIXED CONNECTIONS TO POWER ASSISTED DOOR OPERATORS. PROVIDE CONDUIT PATHWAY BETWEEN DOOR MOTORS AND PUSH PLATES. REFER TO ARCHITECTURAL DRAWINGS FOR PUSH PLATE LOCATIONS.
2. PROVIDE 120V FIXED POWER CONNECTION TO MOTORIZED MECHO SHADES. INSTALL SHADE CONTROLLER PROVIDED BY SHADE PROVIDER AND PROVIDE ALL WIRING AND CONDUIT BETWEEN CONTROLLERS TO EACH SHADE. COORDINATE EXACT LOCATION OF CONTROLLER AND MOTORS WITH ARCHITECTURAL PLANS.
3. MOUNT PROJECTION SCREEN PROVIDED BY CTS FOLLOWING MANUFACTURER'S INSTRUCTIONS. VERIFY EXACT LOCATIONS WITH ARCHITECT AND CTS. PROVIDE AC SERVICE SWITCH IN ACCESSIBLE LOCATION NEAR MOTOR END OF SCREEN (STAGE RIGHT) WITH AC POWER SUPPLIED TO THE HIGH VOLTAGE SIDE OF THE SCREEN CASE.
4. LEGRAND RC3 SERIES POWER AND DATA POKE-THRU. FOUR DATA OUTLETS AND DUPLEX 120V RECEPTACLE EACH. VERIFY FINAL LOCATIONS WITH ARCHITECT.
5. PROVIDE 120V, 20A DEDICATED ISOLATED GROUND CIRCUIT AND FLUSH CEILING MOUNTED DUPLEX RECEPTACLE IN CEILING TILE NEXT TO AV PULL BOX #3.
6. PROVIDE 120V, 20A DEDICATED ISOLATED GROUND CIRCUIT AND SURFACE MOUNTED DUPLEX RECEPTACLE MOUNTED INSIDE HOFFMAN BOX. REFER TO AV DRAWINGS FOR HOFFMAN BOX DETAIL.
7. ROOM IS A RETURN AIR PLENUM ROOM. ALL WIRING METHODS INSTALLED IN THIS ROOM SHALL BE RATED FOR PLENUM SPACES PER THE NATIONAL ELECTRICAL CODE.
8. PROVIDE 30A FIXED CONNECTION TO HEAT TRACE CONTROLLERS FROM PANEL RP1B. PROVIDE 30MA GFCI BREAKER IN PANEL RP1B TO SERVE EQUIPMENT. COORDINATE EXACT LOCATION WITH HEAT TRACE INSTALLER.
9. POWER OUTLET FOR DISPLAY MONITOR COORDINATE EXACT LOCATION WITH DISPLAY CABINET.
10. APPOXIMATE TRANSITION POINT FROM HEAT TRACE 120V POWER WIRING TO ACTUAL HEAT TRACE LINE. COORDINATE EXACT LOCATION WITH HEAT TRACE PROVIDER.
11. RECEPTACLES SHALL BE MOUNTED TO THE BACK SIDE OF BENCHES. ROUTE CONDUIT IN BENCHES AND PROVIDE BACKBOXES FOR RECEPTACLES AT LOCATIONS INDICATED.
12. PROVIDE 120V FIXED POWER CONNECTION TO SECURITY CAMERA POWER SUPPLY. VERIFY EXACT LOCATION WITH SECURITY DRAWINGS AND POWER SUPPLY PROVIDER.



1 **ELECTRICAL POWER LEVEL 1 - ZONE E**
SCALE: 1/4" = 1'-0"

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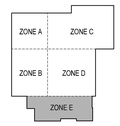
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Project

Physics and Nanotechnology Building

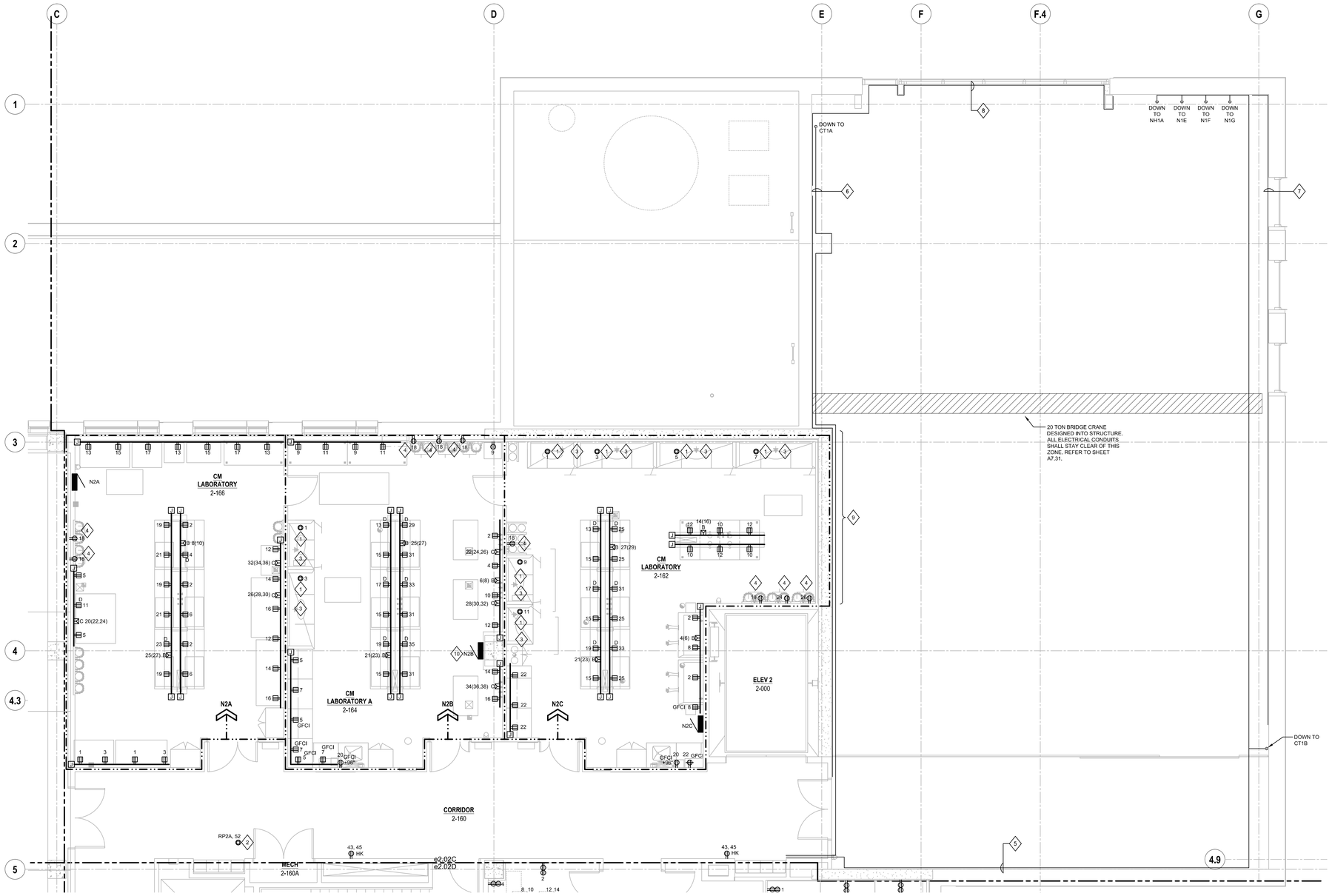
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ELECTRICAL POWER
LEVEL 1 - ZONE E

e2.01E



1 ELECTRICAL POWER LEVEL 2 - ZONE C

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

GENERAL NOTES

1. REFER TO If SERIES OF DRAWINGS FOR DETAILS AND ELEVATIONS OF SPACES INSIDE LABORATORY AREAS.
2. ALL RECEPTACLES AND EQUIPMENT CONNECTIONS ON THIS SHEET WHICH ARE SHOWN OUTSIDE OF PANEL DIVISION LINES ARE CIRCUITED FROM PANEL RP2A UNLESS OTHERWISE SHOWN.
3. DUE TO EMF INTERFERENCE CONCERNS, ALL FEEDER CONDUITS FROM DISTRIBUTION PANELS IN THE ELECTRICAL ROOMS TO BRANCH CIRCUIT PANELS LOCATED IN LABORATORIES SHALL BE ROUTED IN THE CORRIDOR SPACE AND NOT OVER OTHER LABORATORIES UNTIL THEY ENTER THE LAB ROOM WHERE THE PANEL IS LOCATED.
4. ALL CLEAN POWER TRANSFORMERS "CTXX" SHALL BE MOUNTED AT 11'-0" TO BOTTOM AND SUPPORTED BY UNISTRUT FROM STRUCTURE.
5. ALL RECEPTACLES OF TYPE "IG" SHALL BE SERVED WITH DEDICATED CIRCUIT WITH DEDICATED ISOLATED GROUND AND EQUIPMENT GROUND FROM CLEAN POWER PANEL "CPXX" INDICATED BY PANEL DIVISION LINES.

SHEET KEYNOTES

1. PROVIDE 120V FIXED POWER CONNECTION TO HOOD.
2. PROVIDE 120V FIXED POWER CONNECTION TO DAMPER.
3. PROVIDE JUNCTION BOX BEHIND FLAMMABLE STORAGE CABINET LOCATED BELOW FUME HOOD. PROVIDE #8AWG IN 1/2" GROUND WIRE CONNECTED FROM CABINET TO THE SAME GROUND BUS IN THE PANELBOARD SERVING THE 120V CIRCUITS TO THE HOOD LOCATED ABOVE CABINET. REFER TO If SERIES DRAWINGS FOR EXACT LOCATIONS.
4. PROVIDE RECEPTACLE FOR GAS TANK MANIFOLD SWITCHOVER CONTROLLER. RECEPTACLE MAY BE FIXED CONNECTION DEPENDING ON MODEL SUPPLIED. COORDINATE EXACT LOCATION AND CONNECTION TYPE WITH MANIFOLD SUPPLIER. DEDICATED CIRCUIT PER RECEPTACLE.
5. TYPICAL ROUTING OF CONDUITS TO PANELS NH1A, N1E, N1F, N1G AND CT1B. CONDUITS SHALL BE RUN FROM FIRST FLOOR ELECTRICAL THROUGH SECOND FLOOR AND HORIZONTALLY INTO HIGH BAY. CONDUITS SHALL RUN HIGH TO STRUCTURE IN THE JOIST SPACE.
6. TYPICAL ROUTING OF CONDUITS TO TRANSFORMER CT1A. CONDUITS SHALL BE RUN FROM FIRST FLOOR ELECTRICAL THROUGH SECOND FLOOR AND HORIZONTALLY INTO HIGH BAY. CONDUITS SHALL RUN HIGH TO STRUCTURE IN THE JOIST SPACE.
7. THE AREA BETWEEN 8' AFF AND 12' AFF ALONG EAST WALL IS DESIGNATED AS THE ZONE TO RUN BRANCH CIRCUIT CONDUITS FROM BRANCH PANELS NH1A, N1E, N1F, N1G AND CP1B TO WIREMOLD AND OTHER ELECTRICAL DEVICES. CONDUITS SHALL BE RACKED VERTICALLY ALONG WALL AND RUN BEHIND COLUMNS.
8. CONDUITS FROM NH1A, N1E, N1F, N1G AND CP1A SHALL BE ROUTED IN ZONE 8' AFF TO 12' AFF ALONG NORTH AND WEST WALLS EXCEPT WHEN CONFLICTING WITH HANGAR DOOR WHERE CONDUITS SHALL BE RUN OVER HANGAR DOOR.
9. ADJUST ROUTING FOR BRANCH CIRCUIT CONDUITS ABOVE OPENING ON FIRST FLOOR.
10. PROVIDE A SHEET METAL ENCLOSURE WITH SOLID BOTTOM EQUAL TO WIDTH AND DEPTH OF PANEL FROM BOTTOM OF PANEL TO A HEIGHT OF 26" AFF TO BOTTOM FOR CONFORMANCE WITH ADA. COLOR SHALL MATCH PANELBOARD ENCLSURE.

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For AFFILIATED ENGINEERS, INC.

By

Name RONALD M. PARSLEY

Date 02-24-2012 Reg. No. 25163

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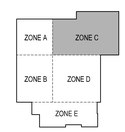
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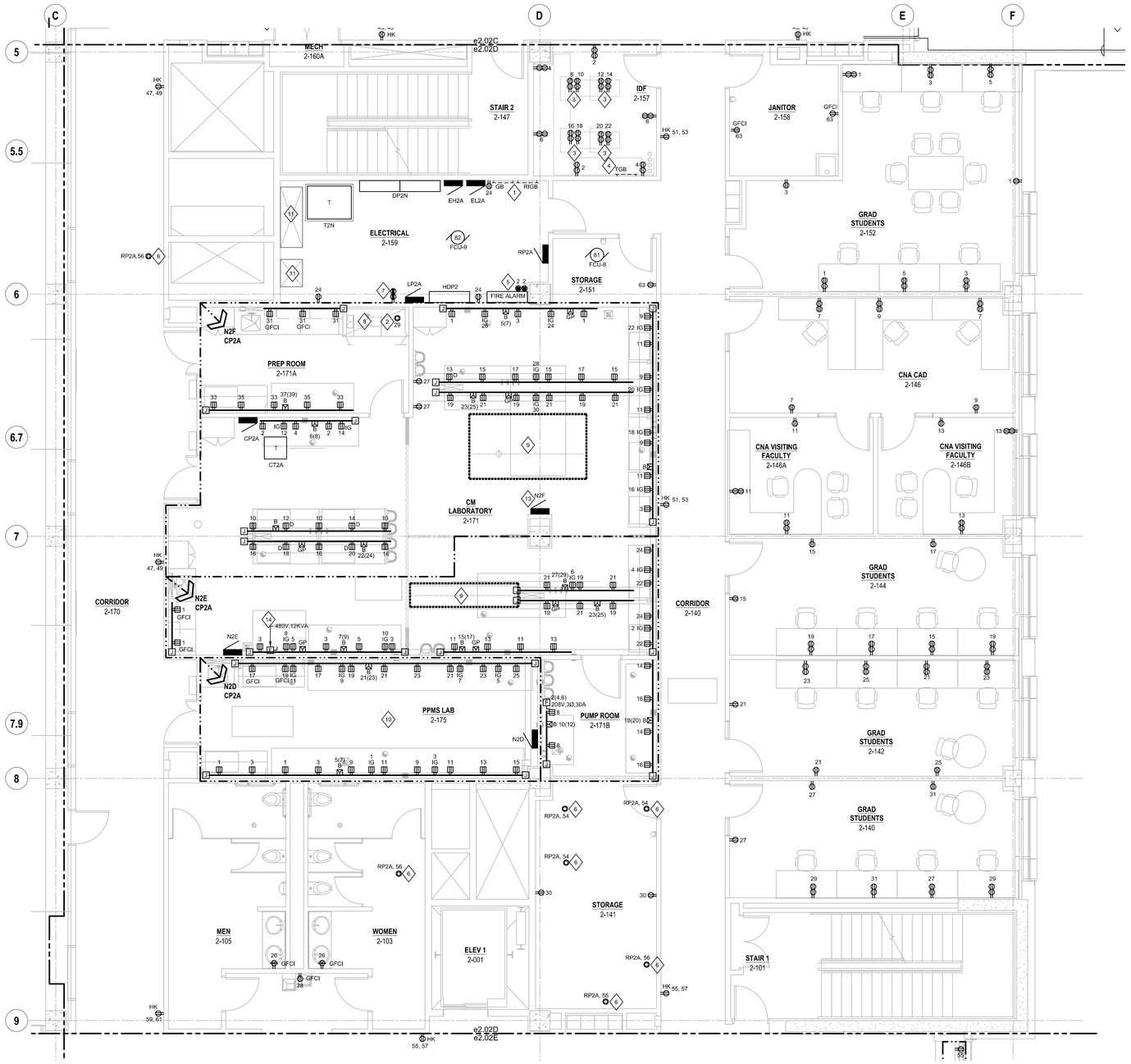
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ELECTRICAL POWER
LEVEL 2 - ZONE C

e2.02C



1 **ELECTRICAL POWER LEVEL 2 - ZONE D**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. REFER TO tf SERIES OF DRAWINGS FOR DETAILS AND ELEVATIONS OF SPACES INSIDE LABORATORY AREAS.
2. ALL RECEPTACLES AND EQUIPMENT CONNECTIONS ON THIS SHEET WHICH ARE SHOWN OUTSIDE OF PANEL DIVISION LINES ARE CIRCUITED FROM PANEL RP2A UNLESS OTHERWISE SHOWN.
3. IN LIEU OF OVERHEAD CONDUITS AND WIRING, MC CABLE WIRING SHALL BE PERMITTED FOR THOSE AREAS COMPROMISING OFFICE SPACE SUCH AS FACULTY, GRAD, POST DOC, ETC. ON THIS SHEET WHERE INSTALLED IN ACCORDANCE WITH SPECIFICATIONS.
4. PROVIDE SEPARATE, ALTERNATE PRICE FOR THE FOLLOWING: IN LIEU OF OVERHEAD CONDUITS AND WIRING, CONTRACTOR MAY INSTALL HOME RUN BRANCH CONDUITS OF SIZE 1" AND SMALLER FROM BRANCH PANELBOARDS TO DEVICES IN FLOOR SLAB IN PVC SCHD 40 CONDUIT. PRIOR TO CONDUIT RISING OUT OF FLOOR SLAB IT SHALL TRANSITION TO INTERMEDIATE METALLIC CONDUIT WHERE EXPOSED OR EMT WHERE BEHIND WALLS TO A MINIMUM HEIGHT OF 24". CONTRACTOR SHALL RUN CONDUITS GROUPED TOGETHER WHERE POSSIBLE AND AT RIGHT ANGLES TO BUILDING CONSTRUCTION AND NOTE LOCATIONS WITH EXACT LOCATIONS ON AS-BUILT DRAWINGS AND PROVIDE GREEN PAINT ON FLOOR OVER CONDUITS WHERE FLOOR COVERINGS WILL COVER PAINT. COORDINATE WITH ALL OTHER UTILITIES.
5. DUE TO EMF INTERFERENCE CONCERNS, ALL FEEDER CONDUITS FROM DISTRIBUTION PANELS IN THE ELECTRICAL ROOMS TO BRANCH CIRCUIT PANELS LOCATED IN LABORATORIES SHALL BE ROUTED IN THE CORRIDOR SPACE AND NOT OVER OTHER LABORATORIES UNTIL THEY ENTER THE LAB ROOM WHERE THE PANEL IS LOCATED.
6. ALL CLEAN POWER TRANSFORMERS "CTXX" SHALL BE MOUNTED AT 11'-0" TO BOTTOM AND SUPPORTED BY UNISTRUT FROM STRUCTURE.
7. ALL RECEPTACLES OF TYPE "IG" SHALL BE SERVED WITH DEDICATED CIRCUIT WITH DEDICATED ISOLATED GROUND AND EQUIPMENT GROUND FROM CLEAN POWER PANEL "CPXX" INDICATED BY PANEL DIVISION LINES.

SHEET KEYNOTES

1. GROUND BUSBAR AND ROOM INSTRUMENT GROUND BUSBAR - REFER TO GROUNDING ONELINE. MOUNT AT 18" AFF.
2. PROVIDE 120V FIXED POWER CONNECTION TO HOOD.
3. MOUNT RECEPTACLES ON BACK OF COMMUNICATIONS RACK AT 18" AND 69" AFF.
4. TELECOM GROUND BUSBAR - REFER TO GROUNDING ONELINE. MOUNT AT 18" AFF.
5. PROVIDE 120V FIXED POWER CONNECTIONS TO FIRE ALARM NAC PANEL AND FIRE ALARM DATA GATHERING PANEL FROM PANEL EL2A.
6. PROVIDE 120V FIXED POWER CONNECTION TO DAMPER.
7. PROVIDE QUADRUPLEX RECEPTACLE AND CONDUIT AND WIRING TO PORTABLE GENERATOR CONNECTION AT LOADING DOCK FROM PANEL EM LOCATED ON LEVEL 1. SEE NOTE 5 ON SHEET e2.01C. EACH RECEPTACLE SHALL BE SERVED WITH AN INDIVIDUAL BRANCH CIRCUIT. DUE TO VOLTAGE DROP, BRANCH CIRCUIT TO EACH RECEPTACLE ON THIS FLOOR SHALL BE 2#8 AND 1#6 GND IN 3/4" ROUTED FROM FIRST FLOOR, THROUGH ELECTRICAL ROOMS, AND TO RECEPTACLES. PIG-TAIL FROM #8 TO #12 WIRE BEFORE TERMINATING ON RECEPTACLES.
8. PROVIDE JUNCTION BOX BEHIND FLAMMABLE STORAGE CABINET LOCATED BELOW FUME HOOD. PROVIDE #8AWG IN 1/2" GROUND WIRE CONNECTED FROM CABINET TO THE SAME GROUND BUS IN THE PANELBOARD SERVING THE 120V CIRCUITS TO THE HOOD LOCATED ABOVE CABINET. REFER TO tf SERIES DRAWINGS FOR EXACT LOCATIONS.
9. ZONE BORDERED BY HEAVY DASHED LINE IS AN AREA WHICH SHALL BE KEPT CLEAR OF ALL CONDUITS FOR ALL ELECTRICAL SYSTEMS EXCEPT FOR SPECIFIC EXEMPTIONS WHICH MAY BE INDICATED ON LIGHTING SHEET. NO ELECTRICAL DEVICES, RACEWAYS, OR EQUIPMENT SHALL BE INSTALLED IN THIS ZONE. REFER TO ARCHITECTURAL AND tf SERIES DRAWINGS FOR FURTHER INFORMATION.
10. ALL CONDUITS FOR ALL ELECTRICAL SYSTEMS IN THIS ROOM SHALL BE RECESSED INTO WALLS. NO OVERHEAD CONDUITS SHALL BE INSTALLED OTHER THAN WHERE THEY ORIGINATE IN PANELBOARD. CONDUITS SHALL THEN IMMEDIATELY BE RECESSED INTO WALLS AND BE INSTALLED IN WALLS TO SERVE DEVICES. ONLY EXCEPTION IS FOR LIGHTING CONDUIT WHERE CONDUIT SHALL BE RUN TIGHT TO STRUCTURE.
11. PROVIDE OPENINGS IN FLOOR SLAB FOR CONDUITS FROM PENTHOUSE TO BASEMENT IN ELECTRICAL ROOM. PROVIDE EMBEDDED UNISTRUT INTO EAST AND WEST WALLS OF OPENINGS AND PROVIDE CROSSPIECE UNISTRUT TO SUPPORT CENTER ROW OF CONDUITS IN EACH OPENING. PROVIDE STRUCTURAL STEEL PLATE TO BE CAST INTO SLAB IN EACH FLOOR OPENING WITH PENETRATIONS MADE TO INSTALL CONDUITS. OPENING SHALL BE BACKFILLED WITH CONCRETE TO MAINTAIN FLOOR FIRE RATING. COORDINATE EMBEDDING OF STEEL PLATE, UNISTRUT EMBEDS, AND FLOOR OPENING WITH STRUCTURAL CONTRACTOR PRIOR TO POURING OF FLOOR.
12. NOT USED
13. PROVIDE A SHEET METAL ENCLOSURE WITH SOLID BOTTOM EQUAL TO WIDTH AND DEPTH OF PANEL FROM BOTTOM OF PANEL TO A HEIGHT OF 26" AFF TO BOTTOM FOR CONFORMANCE WITH ADA. COLOR SHALL MATCH PANELBOARD ENCLSURE.
14. PROVIDE 480V, 3P+NEUTRAL+GND, 60A FUSED DISCONNECT FOR CONNECTION TO OWNER FURNISHED EQUIPMENT. DISCONNECT SHALL BE SERVED FROM PANEL HDP1. PROVIDE FUSES OF SIZE REQUIRED BY OWNER AT TIME OF INSTALLATION.

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For AFFILIATED ENGINEERS, INC.

By

Name RONALD M. PARSLEY

Date 02-24-2012 Reg. No. 25163

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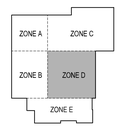
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Project

Physics and Nanotechnology Building

U of M Project # 01-155-08-1718



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ELECTRICAL POWER
LEVEL 2 - ZONE D

e2.02D

GENERAL NOTES

1. CONDUIT FOR DEVICES INSTALLED BELOW WINDOWS WALL SHALL BE RUN HORIZONTALLY IN DRYWALL TO THICKENED WALLS NEAR COLUMNS TO TURN VERTICALLY TO CEILING SPACE.
2. ALL RECEPTACLES AND EQUIPMENT CONNECTIONS ON THIS SHEET WHICH ARE SHOWN OUTSIDE OF PANEL DIVISION LINES ARE CIRCUITED FROM PANEL RP2B UNLESS OTHERWISE SHOWN.
3. IN LIEU OF OVERHEAD CONDUITS AND WIRING, MC CABLE WIRING SHALL BE PERMITTED FOR THOSE AREAS COMPROMISING OFFICE SPACE SUCH AS FACULTY, GRAD, POST DOC, ETC. ON THIS SHEET WHERE INSTALLED IN ACCORDANCE WITH SPECIFICATIONS.
4. PROVIDE SEPARATE, ALTERNATE PRICE FOR THE FOLLOWING: IN LIEU OF OVERHEAD CONDUITS AND WIRING, CONTRACTOR MAY INSTALL HOME RUN BRANCH CONDUITS OF SIZE 1" AND SMALLER FROM BRANCH PANELBOARDS TO DEVICES IN FLOOR SLAB IN PVC SCHD 40 CONDUIT. PRIOR TO CONDUIT RISING OUT OF FLOOR SLAB IT SHALL TRANSITION TO INTERMEDIATE METALLIC CONDUIT WHERE EXPOSED OR EMT WHERE BEHIND WALLS TO A MINIMUM HEIGHT OF 24". CONTRACTOR SHALL RUN CONDUITS GROUPED TOGETHER WHERE POSSIBLE AND AT RIGHT ANGLES TO BUILDING CONSTRUCTION AND NOTE LOCATIONS WITH EXACT LOCATIONS ON AS-BUILT DRAWINGS AND PROVIDE GREEN PAINT ON FLOOR OVER CONDUITS WHERE FLOOR COVERINGS WILL COVER PAINT. COORDINATE WITH ALL OTHER UTILITIES.

SHEET KEYNOTES

5 RECEPTACLES MOUNTED ALONG SOUTH SIDE OF STAIR SHALL BE MOUNTED HORIZONTALLY IN SIDE OF INTERMEDIATE RISER. SERVE RECEPTACLES FROM PANEL RP3B. REFER TO SHEET e6.27 FOR DETAILS OF RECEPTACLE. MC CABLE MAY BE USED BETWEEN RECEPTACLES.

6 PROVIDE 120V, 20A DEDICATED ISOLATED GROUND CIRCUIT AND FLUSH MOUNTED DUPLEX RECEPTACLE NEXT TO AV PULL BOX #1.

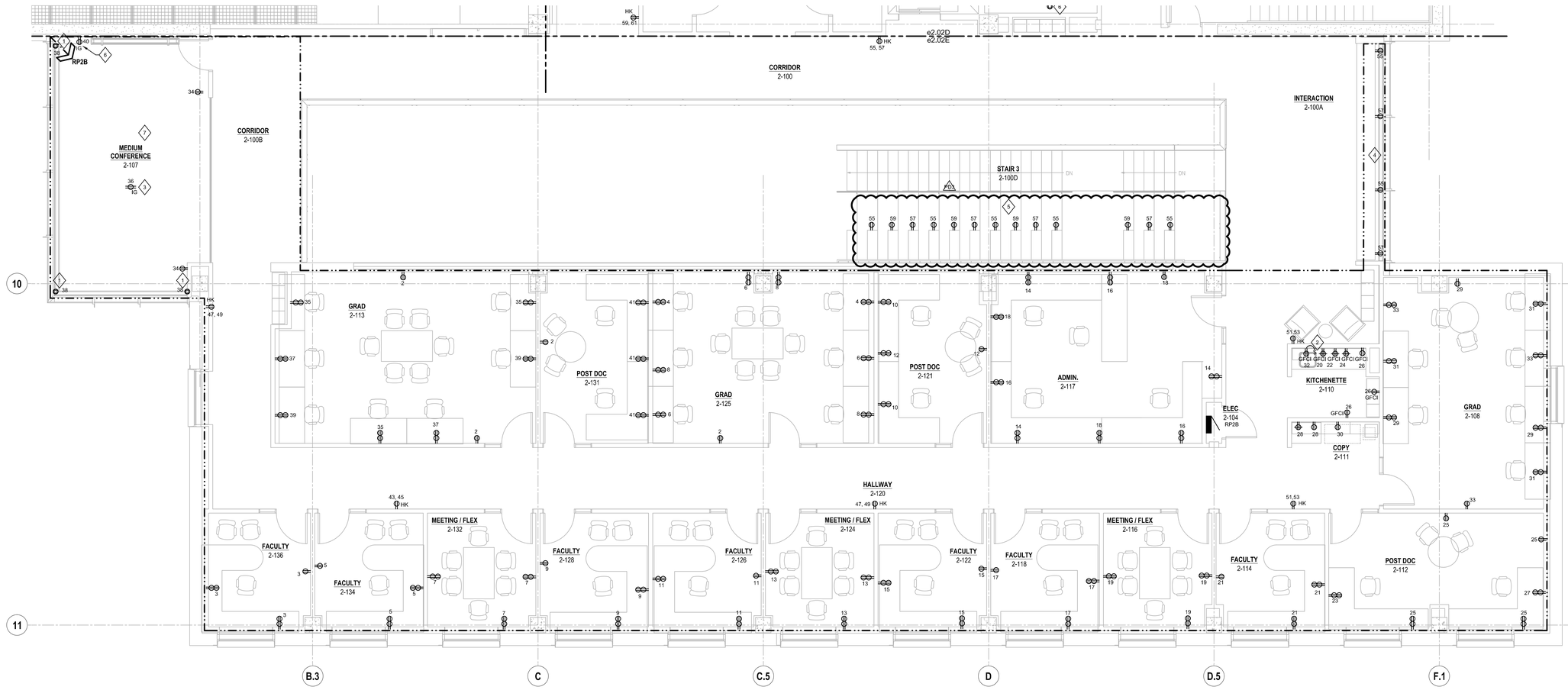
7 ROOM 2-107 IS A RETURN AIR PLENUM ROOM. ALL WIRING METHODS INSTALLED IN THIS ROOM SHALL BE RATED FOR PLENUM SPACES PER THE NATIONAL ELECTRICAL CODE.

1 PROVIDE 120V FIXED POWER CONNECTION TO MOTORIZED SHADES. INSTALL SHADE CONTROLLER FURNISHED BY SHADE PROVIDER AND PROVIDE ALL WIRING AND CONDUIT BETWEEN CONTROLLERS TO EACH SHADE. COORDINATE EXACT LOCATION OF CONTROLLER AND MOTORS WITH ARCHITECTURAL PLANS.

2 PROVIDE MOTOR RATED SWITCH FOR CONTROLLING GARBAGE DISPOSAL.

3 PROVIDE 120V, 20A DEDICATED ISOLATED GROUND CIRCUIT AND FLUSH CEILING MOUNTED DUPLEX RECEPTACLE IN CEILING TILE NEXT TO AV PULL BOX #3.

4 RECEPTACLES IN INTERACTION AREA SHALL BE MOUNTED TO THE BACK SIDE OF BENCHES AND FACING TOWARD WINDOW; ROUTE CONDUIT IN BENCHES AND PROVIDE BACKBOXES FOR RECEPTACLES AT LOCATIONS INDICATED. TWO INTERMEDIATE RECEPTACLES INDICATED ON BENCH SHALL ALIGN CENTERED WITH WINDOW MULLION. REFER TO ARCHITECTURAL DETAILS FOR BENCH CONSTRUCTION.



1 **ELECTRICAL POWER LEVEL 2 - ZONE E**
SCALE: 1/4" = 1'-0"

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For AFFILIATED ENGINEERS, INC.

By

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Date 02-24-2012 Reg. No. 25163

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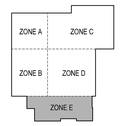
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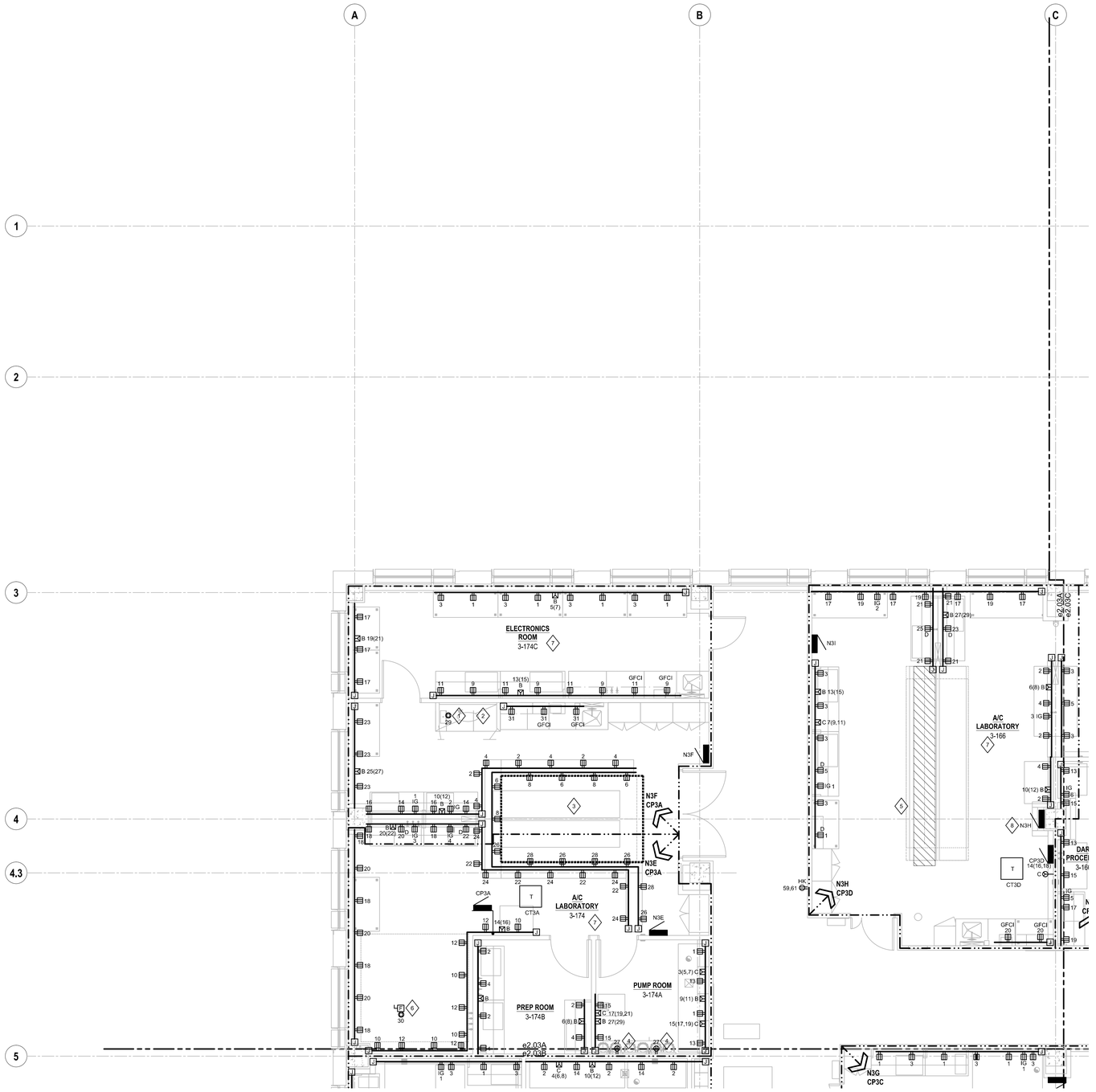
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ELECTRICAL POWER
LEVEL 2 - ZONE E

e2.02E



1 **ELECTRICAL POWER LEVEL 3 - ZONE A**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. REFER TO lf SERIES OF DRAWINGS FOR DETAILS AND ELEVATIONS OF SPACES INSIDE LABORATORY AREAS.
2. ALL RECEPTACLES AND EQUIPMENT CONNECTIONS ON THIS SHEET WHICH ARE SHOWN OUTSIDE OF PANEL DIVISION LINES ARE CIRCUITED FROM PANEL RP3A UNLESS OTHERWISE SHOWN.
3. DUE TO EMF INTERFERENCE CONCERNS, ALL FEEDER CONDUITS FROM DISTRIBUTION PANELS IN THE ELECTRICAL ROOMS TO BRANCH CIRCUIT PANELS LOCATED IN LABORATORIES SHALL BE ROUTED IN THE CORRIDOR SPACE AND NOT OVER OTHER LABORATORIES UNTIL THEY ENTER THE LAB ROOM WHERE THE PANEL IS LOCATED.
4. ALL CLEAN POWER TRANSFORMERS "CTXX" SHALL BE MOUNTED AT 11'-6" TO BOTTOM AND SUPPORTED BY UNISTRUT FROM STRUCTURE.
5. ALL RECEPTACLES OF TYPE "IG" SHALL BE SERVED WITH DEDICATED CIRCUIT WITH DEDICATED ISOLATED GROUND AND EQUIPMENT GROUND FROM CLEAN POWER PANEL "CPXX" INDICATED BY PANEL DIVISION LINES.

SHEET KEYNOTES

1. PROVIDE 120V FIXED POWER CONNECTION TO HOOD.
2. PROVIDE JUNCTION BOX BEHIND FLAMMABLE STORAGE CABINET LOCATED BELOW FUME HOOD. PROVIDE #8AWG IN 1/2" GROUND WIRE CONNECTED FROM CABINET TO THE SAME GROUND BUS IN THE PANELBOARD SERVING THE 120V CIRCUITS TO THE HOOD LOCATED ABOVE CABINET. REFER TO lf SERIES DRAWINGS FOR EXACT LOCATIONS.
3. ZONE BORDERED BY HEAVY DASHED LINE IS AN AREA WHICH SHALL BE KEPT CLEAR OF ALL CONDUITS FOR ALL ELECTRICAL SYSTEM EXCEPT FOR SPECIFIC EXEMPTIONS WHICH MAY BE INDICATED ON LIGHTING SHEET. NO ELECTRICAL DEVICES, RACEWAYS, OR EQUIPMENT SHALL BE INSTALLED IN THIS ZONE. REFER TO ARCHITECTURAL AND lf SERIES DRAWINGS FOR FURTHER INFORMATION.
4. PROVIDE RECEPTACLE FOR GAS TANK MANIFOLD SWITCHOVER CONTROLLER. RECEPTACLE MAY BE FIXED CONNECTION DEPENDING ON MODEL SUPPLIED. COORDINATE EXACT LOCATION AND CONNECTION TYPE WITH MANIFOLD SUPPLIER.
5. ZONE INDICATED BY CROSSHATCH IS AN AREA WHICH SHALL BE KEPT CLEAR OF ALL CONDUITS FOR ALL ELECTRICAL SYSTEMS. NO ELECTRICAL DEVICES, RACEWAYS, OR EQUIPMENT SHALL BE INSTALLED IN THIS ZONE. REFER TO ARCHITECTURAL AND lf SERIES DRAWINGS FOR FURTHER INFORMATION.
6. PROVIDE FIXED POWER CONNECTION TO PORTABLE CLEAR PLASTIC CLEANROOM. PROVIDE 60A, 120V, 1P+1N+1GND DISCONNECT SWITCH FUSED AT 35A FOR CONNECTION TO CLEANROOM JUNCTION BOX. LOCATE DISCONNECT ON WALL ADJACENT TO PANEL CP3A.
7. ROOM 3-174, 3-174C, AND 3-166 ARE BEING PROVIDED WITH ANTI-STATIC FLOORING. CONTRACTOR SHALL PROVIDE #10 AWG GROUND WIRE FROM A HOLE IN THE DRYWALL AT EACH COPPER STRIP AND EXTEND GROUND TO GROUND BUS IN PANELBOARD SERVING THIS ROOM. COORDINATE EXACT LOCATIONS OF STRIPS WITH FLOORING SUPPLIER AND INSTALLER.
8. PROVIDE A SHEET METAL ENCLOSURE WITH SOLID BOTTOM EQUAL TO WIDTH AND DEPTH OF PANEL FROM BOTTOM OF PANEL TO A HEIGHT OF 26" AFF TO BOTTOM FOR CONFORMANCE WITH ADA. COLOR SHALL MATCH PANELBOARD ENCLSURE.

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By

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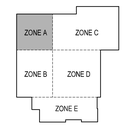
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Project

Physics and Nanotechnology Building

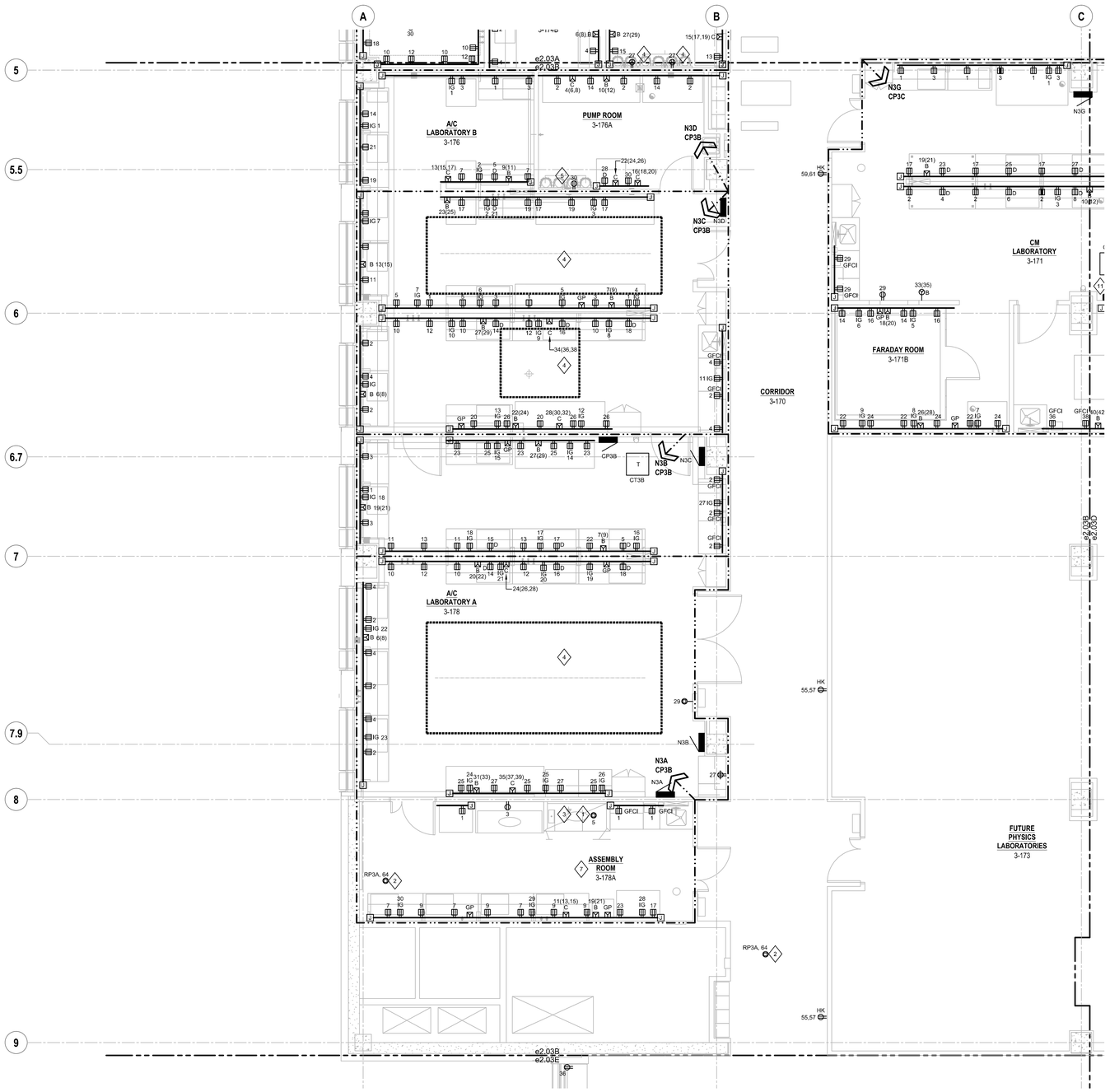
U of M Project # 01-155-08-1718



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ELECTRICAL POWER
LEVEL 3 - ZONE A

e2.03A



1 **ELECTRICAL POWER LEVEL 3 - ZONE B**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. REFER TO f SERIES OF DRAWINGS FOR DETAILS AND ELEVATIONS OF SPACES INSIDE LABORATORY AREAS.
2. ALL RECEPTACLES AND EQUIPMENT CONNECTIONS ON THIS SHEET WHICH ARE SHOWN OUTSIDE OF PANEL DIVISION LINES ARE CIRCUITED FROM PANEL RP3A UNLESS OTHERWISE SHOWN.
3. DUE TO EMF INTERFERENCE CONCERNS, ALL FEEDER CONDUITS FROM DISTRIBUTION PANELS IN THE ELECTRICAL ROOMS TO BRANCH CIRCUIT PANELS LOCATED IN LABORATORIES SHALL BE ROUTED IN THE CORRIDOR SPACE AND NOT OVER OTHER LABORATORIES UNTIL THEY ENTER THE LAB ROOM WHERE THE PANEL IS LOCATED.
4. ALL CLEAN POWER TRANSFORMERS "CTXX" SHALL BE MOUNTED AT 11'-6" TO BOTTOM AND SUPPORTED BY UNISTRUT FROM STRUCTURE.
5. ALL RECEPTACLES OF TYPE "IG" SHALL BE SERVED WITH DEDICATED CIRCUIT WITH DEDICATED ISOLATED GROUND AND EQUIPMENT GROUND FROM CLEAN POWER PANEL "CPXX" INDICATED BY PANEL DIVISION LINES.

SHEET KEYNOTES

1. PROVIDE 120V FIXED POWER CONNECTION TO HOOD.
2. PROVIDE 120V FIXED POWER CONNECTION TO DAMPER.
3. PROVIDE JUNCTION BOX BEHIND FLAMMABLE STORAGE CABINET LOCATED BELOW FUME HOOD. PROVIDE #6AWG IN 1/2" GROUND WIRE CONNECTED FROM CABINET TO THE SAME GROUND BUS IN THE PANELBOARD SERVING THE 120V CIRCUITS TO THE HOOD LOCATED ABOVE CABINET. REFER TO f SERIES DRAWINGS FOR EXACT LOCATIONS.
4. ZONE BORDERED BY HEAVY DASHED LINE IS AN AREA WHICH SHALL BE KEPT CLEAR OF ALL CONDUITS FOR ALL ELECTRICAL SYSTEM EXCEPT FOR SPECIFIC EXEMPTIONS WHICH MAY BE INDICATED ON LIGHTING SHEET. NO ELECTRICAL DEVICES, RACEWAYS, OR EQUIPMENT SHALL BE INSTALLED IN THIS ZONE. REFER TO ARCHITECTURAL AND f SERIES DRAWINGS FOR FURTHER INFORMATION.
5. PROVIDE RECEPTACLE FOR GAS TANK MANIFOLD SWITCHOVER CONTROLLER. RECEPTACLE MAY BE FIXED CONNECTION DEPENDING ON MODEL SUPPLIED. COORDINATE EXACT LOCATION AND CONNECTION TYPE WITH MANIFOLD SUPPLIER.
6. NOT USED
7. ROOM 3-178A IS BEING PROVIDED WITH ANTI-STATIC FLOORING. CONTRACTOR SHALL PROVIDE #10 AWG GROUND WIRE FROM A HOLE IN THE DRYWALL AT EACH COPPER STRIP AND EXTEND GROUND TO GROUND BUS IN PANELBOARD SERVING THIS ROOM. COORDINATE EXACT LOCATIONS OF STRIPS WITH FLOORING SUPPLIER AND INSTALLER.

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I hereby certify that this plan or drawing was prepared by me or under my direct supervision and that I am a duly licensed ELECTRICAL ENGINEER under the laws of the State of Minnesota.

For AFFILIATED ENGINEERS, INC.

By

Name RONALD M. PARSLEY

Date 02-24-2012 Reg. No. 25163

Issued for	Date
100% CD set	12-16-2011
Bid Package No. 2	02-24-2012

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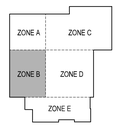
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Project

Physics and Nanotechnology Building

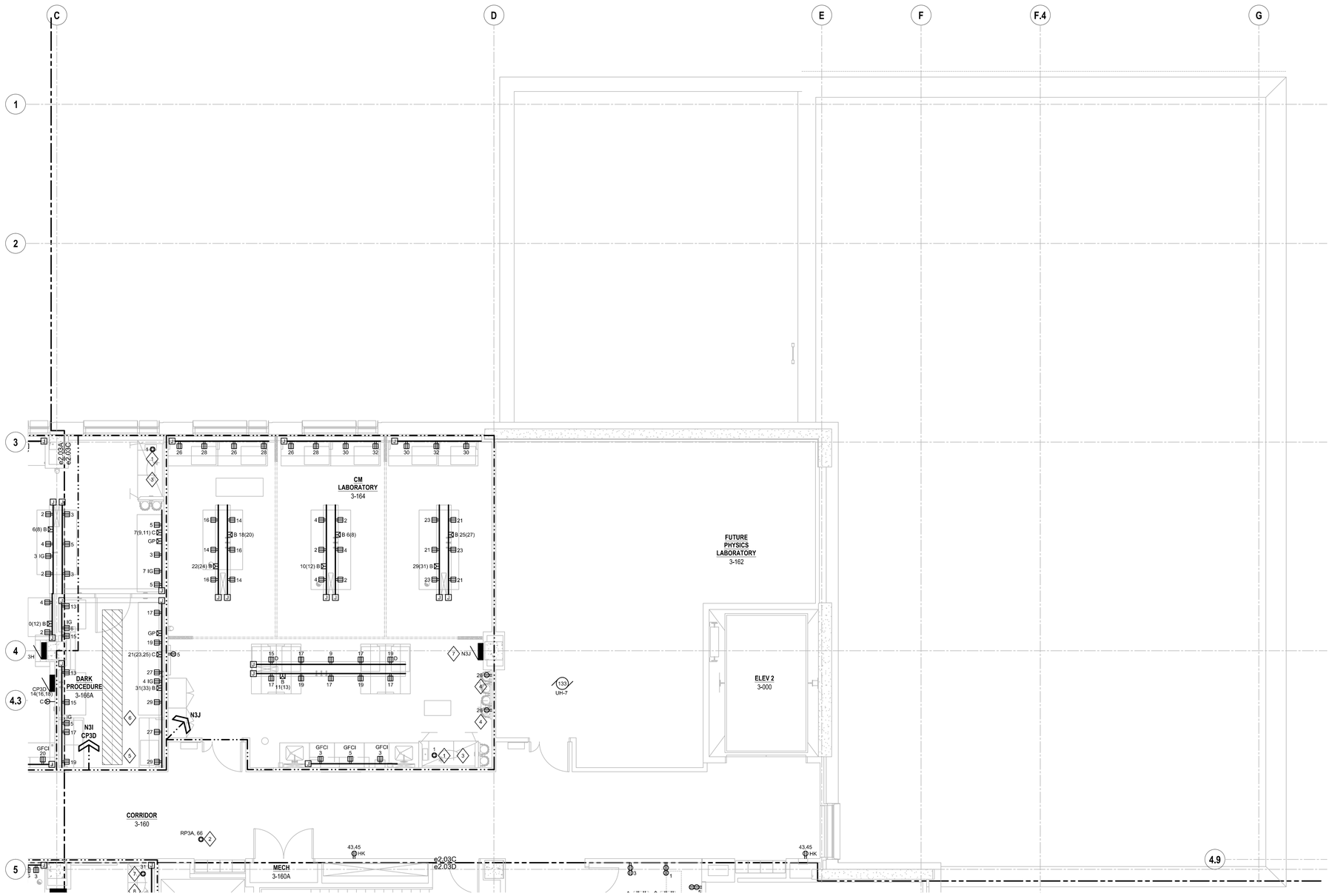
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ELECTRICAL POWER
LEVEL 3 - ZONE B

e2.03B



1 **ELECTRICAL POWER LEVEL 3 - ZONE C**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. REFER TO ℓ SERIES OF DRAWINGS FOR DETAILS AND ELEVATIONS OF SPACES INSIDE LABORATORY AREAS.
2. ALL RECEPTACLES AND EQUIPMENT CONNECTIONS ON THIS SHEET WHICH ARE SHOWN OUTSIDE OF PANEL DIVISION LINES ARE CIRCUITED FROM PANEL RP3A UNLESS OTHERWISE SHOWN.
3. DUE TO EMF INTERFERENCE CONCERNS, ALL FEEDER CONDUITS FROM DISTRIBUTION PANELS IN THE ELECTRICAL ROOMS TO BRANCH CIRCUIT PANELS LOCATED IN LABORATORIES SHALL BE ROUTED IN THE CORRIDOR SPACE AND NOT OVER OTHER LABORATORIES UNTIL THEY ENTER THE LAB ROOM WHERE THE PANEL IS LOCATED.
4. ALL CLEAN POWER TRANSFORMERS "CTXX" SHALL BE MOUNTED AT 11'-6" TO BOTTOM AND SUPPORTED BY UNISTRUT FROM STRUCTURE.
5. ALL RECEPTACLES OF TYPE "IG" SHALL BE SERVED WITH DEDICATED CIRCUIT WITH DEDICATED ISOLATED GROUND AND EQUIPMENT GROUND FROM CLEAN POWER PANEL "CPXX" INDICATED BY PANEL DIVISION LINES.

SHEET KEYNOTES

1. PROVIDE 120V FIXED POWER CONNECTION TO HOOD.
2. PROVIDE 120V FIXED POWER CONNECTION TO DAMPER.
3. PROVIDE JUNCTION BOX BEHIND FLAMMABLE STORAGE CABINET LOCATED BELOW FUME HOOD. PROVIDE #6AWG IN 1/2" GROUND WIRE CONNECTED FROM CABINET TO THE SAME GROUND BUS IN THE PANELBOARD SERVING THE 120V CIRCUITS TO THE HOOD LOCATED ABOVE CABINET. REFER TO ℓ SERIES DRAWINGS FOR EXACT LOCATIONS.
4. PROVIDE RECEPTACLE FOR GAS TANK MANIFOLD SWITCHOVER CONTROLLER. RECEPTACLE MAY BE FIXED CONNECTION DEPENDING ON MODEL SUPPLIED. COORDINATE EXACT LOCATION AND CONNECTION TYPE WITH MANIFOLD SUPPLIER.
5. ZONE INDICATED BY CROSSHATCH IS AN AREA WHICH SHALL BE KEPT CLEAR OF ALL CONDUITS FOR ALL ELECTRICAL SYSTEMS. NO ELECTRICAL DEVICES, RACEWAYS, OR EQUIPMENT SHALL BE INSTALLED IN THIS ZONE. REFER TO ARCHITECTURAL AND ℓ SERIES DRAWINGS FOR FURTHER INFORMATION.
6. ROOM 3-166A IS BEING PROVIDED WITH ANTI-STATIC FLOORING. CONTRACTOR SHALL PROVIDE #10 AWG GROUND WIRE FROM A HOLE IN THE DRYWALL AT EACH COPPER STRIP AND EXTEND GROUND TO GROUND BUS IN PANELBOARD SERVING THIS ROOM. COORDINATE EXACT LOCATIONS OF STRIPS WITH FLOORING SUPPLIER AND INSTALLER.
7. PROVIDE A SHEET METAL ENCLOSURE WITH SOLID BOTTOM EQUAL TO WIDTH AND DEPTH OF PANEL FROM BOTTOM OF PANEL TO A HEIGHT OF 26" AFF TO BOTTOM FOR CONFORMANCE WITH ADA. COLOR SHALL MATCH PANELBOARD ENCLSURE.

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By

Name RONALD M. PARSLEY

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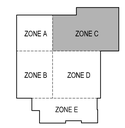
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Drawn DLV
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Date 12/16/11

Project

Physics and Nanotechnology Building

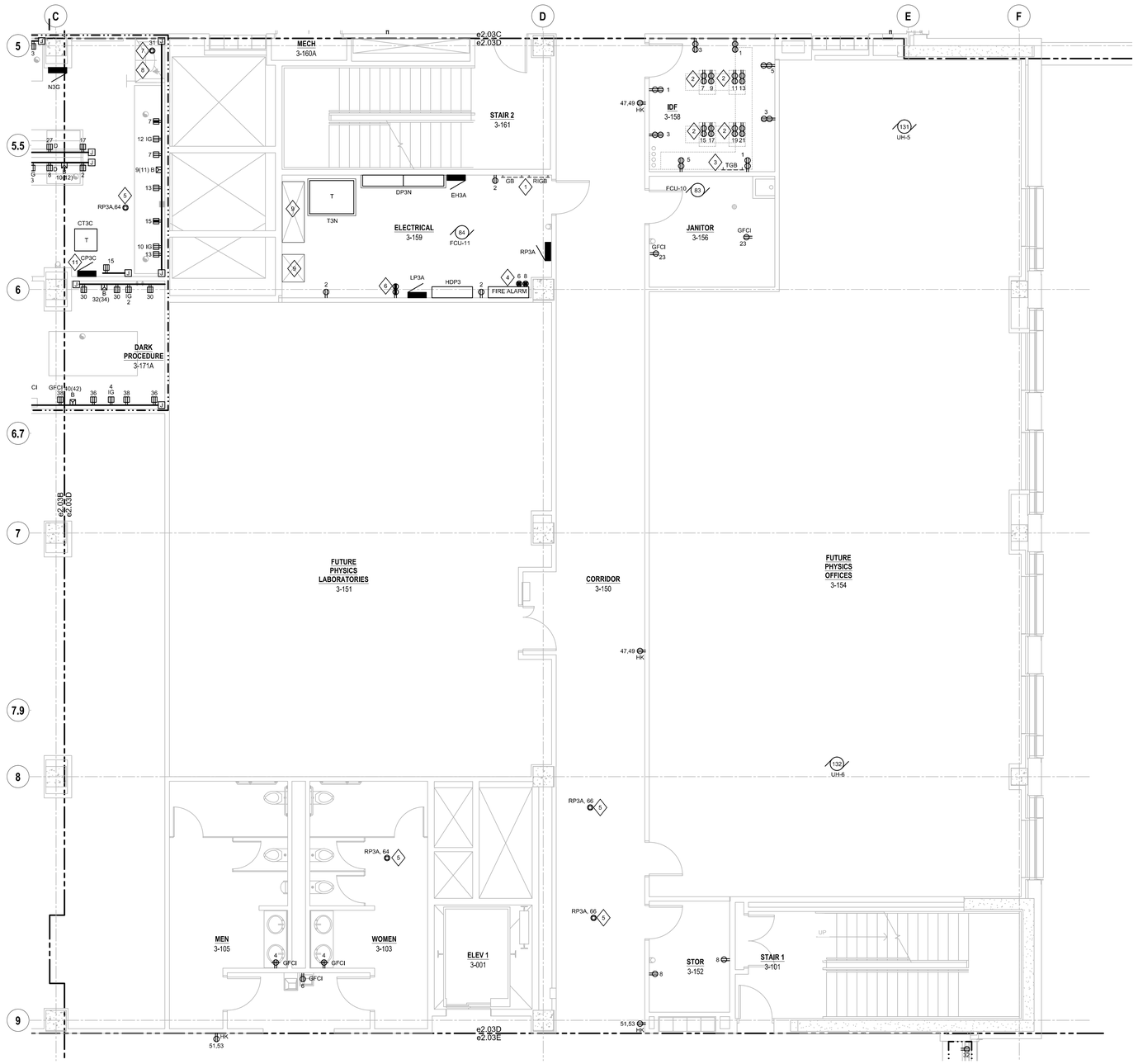
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ELECTRICAL POWER
LEVEL 3 - ZONE C

e2.03C



1 **ELECTRICAL POWER LEVEL 3 - ZONE D**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. REFER TO tf SERIES OF DRAWINGS FOR DETAILS AND ELEVATIONS OF SPACES INSIDE LABORATORY AREAS.
2. ALL RECEPTACLES AND EQUIPMENT CONNECTIONS ON THIS SHEET WHICH ARE SHOWN OUTSIDE OF PANEL DIVISION LINES ARE CIRCUITED FROM PANEL RP3A UNLESS OTHERWISE SHOWN.
3. DUE TO EMF INTERFERENCE CONCERNS, ALL FEEDER CONDUITS FROM DISTRIBUTION PANELS IN THE ELECTRICAL ROOMS TO BRANCH CIRCUIT PANELS LOCATED IN LABORATORIES SHALL BE ROUTED IN THE CORRIDOR SPACE AND NOT OVER OTHER LABORATORIES UNTIL THEY ENTER THE LAB ROOM WHERE THE PANEL IS LOCATED.
4. ALL CLEAN POWER TRANSFORMERS "CTXX" SHALL BE MOUNTED AT 11'-6" TO BOTTOM AND SUPPORTED BY UNISTRUT FROM STRUCTURE.
5. ALL RECEPTACLES OF TYPE "IG" SHALL BE SERVED WITH DEDICATED CIRCUIT WITH DEDICATED ISOLATED GROUND AND EQUIPMENT GROUND FROM CLEAN POWER PANEL "CPXX" INDICATED BY PANEL DIVISION LINES.

SHEET KEYNOTES

1. GROUND BUSBAR AND ROOM INSTRUMENT GROUND BUSBAR - REFER TO GROUNDING ONELINE. MOUNT AT 18" AFF.
2. MOUNT RECEPTACLES ON BACK OF COMMUNICATIONS RACK AT 18" AND 69" AFF.
3. TELECOM GROUND BUSBAR - REFER TO GROUNDING ONELINE. MOUNT AT 18" AFF.
4. PROVIDE 120V FIXED POWER CONNECTIONS TO FIRE ALARM NAC PANEL AND FIRE ALARM DATA GATHERING PANEL FROM PANEL EL2A.
5. PROVIDE 120V FIXED POWER CONNECTION TO DAMPER.
6. PROVIDE QUADRUPLEX RECEPTACLE AND CONDUIT AND WIRING TO PORTABLE GENERATOR CONNECTION AT LOADING DOCK. FROM PANEL EM LOCATED ON LEVEL 1. SEE NOTE 5 ON SHEET e2.01C. EACH RECEPTACLE SHALL BE SERVED WITH AN INDIVIDUAL BRANCH CIRCUIT. DUE TO VOLTAGE DROP, BRANCH CIRCUIT TO EACH RECEPTACLE ON THIS FLOOR SHALL BE 2#8 AND 1#6 GND IN 3/4" ROUTED FROM FIRST FLOOR, THROUGH ELECTRICAL ROOMS, AND TO RECEPTACLES. PIG-TAIL FROM #6 TO #12 WIRE BEFORE TERMINATING ON RECEPTACLES.
7. PROVIDE 120V FIXED POWER CONNECTION TO HOOD.
8. PROVIDE JUNCTION BOX BEHIND FLAMMABLE STORAGE CABINET LOCATED BELOW FUME HOOD. PROVIDE #8AWG IN 1/2" GROUND WIRE CONNECTED FROM CABINET TO THE SAME GROUND BUS IN THE PANELBOARD SERVING THE 120V CIRCUITS TO THE HOOD LOCATED ABOVE CABINET. REFER TO I SERIES DRAWINGS FOR EXACT LOCATIONS.
9. PROVIDE OPENINGS IN FLOOR SLAB FOR CONDUITS FROM PENTHOUSE TO BASEMENT IN ELECTRICAL ROOM. PROVIDE EMBEDDED UNISTRUT INTO EAST AND WEST WALLS OF OPENINGS AND PROVIDE CROSSPIECE UNISTRUT TO SUPPORT CENTER ROW OF CONDUITS IN EACH OPENING. PROVIDE STRUCTURAL STEEL PLATE TO BE CAST INTO SLAB IN EACH FLOOR OPENING WITH PENETRATIONS MADE TO INSTALL CONDUITS. OPENING SHALL BE BACKFILLED WITH CONCRETE TO MAINTAIN FLOOR FIRE RATING. COORDINATE EMBEDDING OF STEEL PLATE, UNISTRUT EMBEDS, AND FLOOR OPENING WITH STRUCTURAL CONTRACTOR PRIOR TO POURING OF FLOOR.
10. NOT USED
11. PROVIDE A SHEET METAL ENCLOSURE WITH SOLID BOTTOM EQUAL TO WIDTH AND DEPTH OF PANEL FROM BOTTOM OF PANEL TO A HEIGHT OF 26" AFF TO BOTTOM FOR CONFORMANCE WITH ADA. COLOR SHALL MATCH PANELBOARD ENCLSURE.

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For AFFILIATED ENGINEERS, INC.

By

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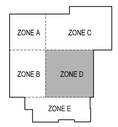
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Project

Physics and Nanotechnology Building

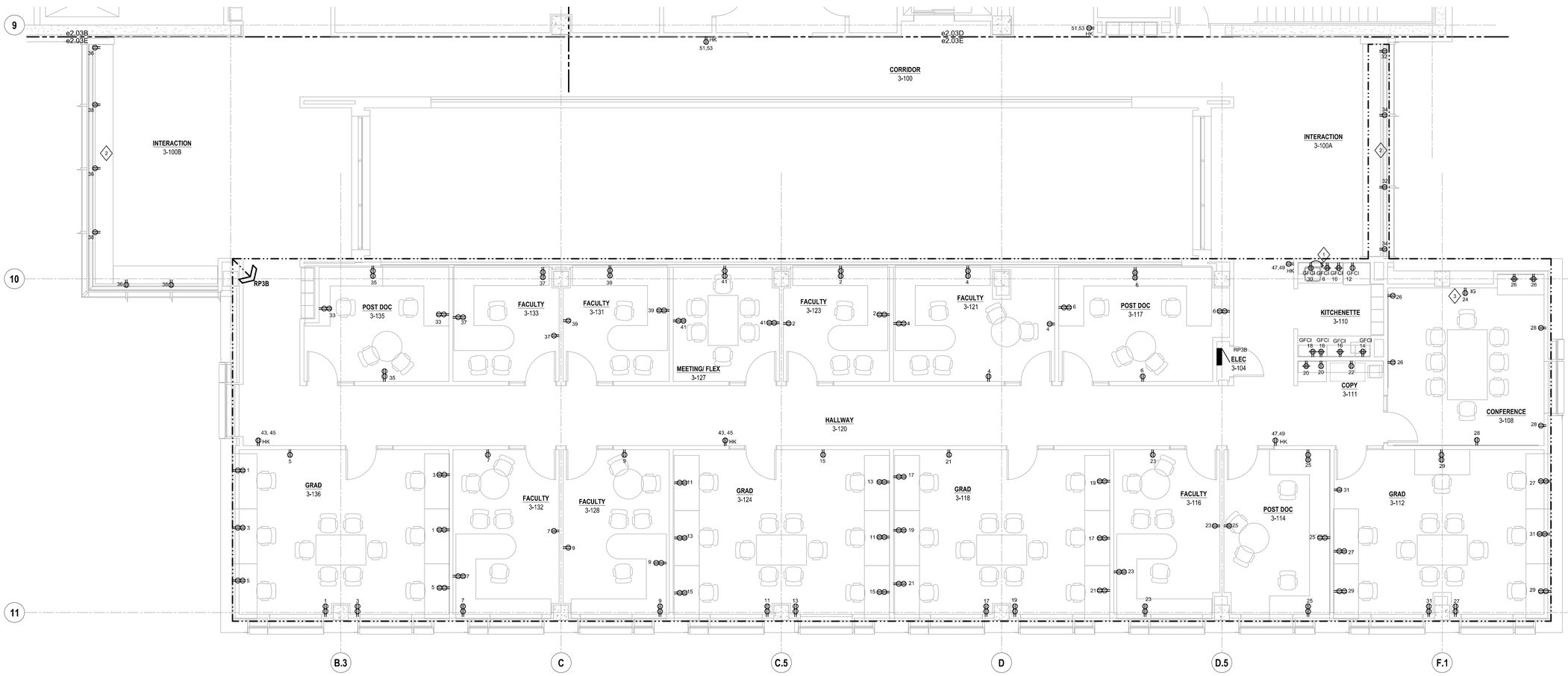
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ELECTRICAL POWER
LEVEL 3 - ZONE D

e2.03D



1 **ELECTRICAL POWER LEVEL 3 - ZONE E**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. CONDUIT FOR DEVICES INSTALLED BELOW WINDOWS WALL SHALL BE RUN HORIZONTALLY IN DRYWALL TO THICKENED WALLS NEAR COLUMNS TO TURN VERTICALLY TO CEILING SPACE.
2. ALL RECEPTACLES AND EQUIPMENT CONNECTIONS ON THIS SHEET WHICH ARE SHOWN OUTSIDE OF PANEL DIVISION LINES ARE CIRCUITED FROM PANEL RP3B UNLESS OTHERWISE SHOWN.
3. IN LIEU OF OVERHEAD CONDUITS AND WIRING, MC CABLE WIRING SHALL BE PERMITTED FOR THOSE AREAS COMPROMISED OF OFFICE SPACE SUCH AS FACULTY, GRAD, POST DOC, ETC. ON THIS SHEET WHERE INSTALLED IN ACCORDANCE WITH SPECIFICATIONS.
4. PROVIDE SEPARATE, ALTERNATE PRICE FOR THE FOLLOWING: IN LIEU OF OVERHEAD CONDUITS AND WIRING, CONTRACTOR MAY INSTALL HOME RUN BRANCH CONDUITS OF SIZE 1" AND SMALLER FROM BRANCH PANELBOARDS TO DEVICES IN FLOOR SLAB IN PVC SCHD 40 CONDUIT. PRIOR TO CONDUIT RISING OUT OF FLOOR SLAB IT SHALL TRANSITION TO INTERMEDIATE METALLIC CONDUIT WHERE EXPOSED OR EMT WHERE BEHIND WALLS TO A MINIMUM HEIGHT OF 24". CONTRACTOR SHALL RUN CONDUITS GROUPED TOGETHER WHERE POSSIBLE AND AT RIGHT ANGLES TO BUILDING CONSTRUCTION AND NOTE LOCATIONS WITH EXACT LOCATIONS ON AS-BUILT DRAWINGS AND PROVIDE GREEN PAINT ON FLOOR OVER CONDUITS WHERE FLOOR COVERINGS WILL COVER PAINT. COORDINATE WITH ALL OTHER UTILITIES.

SHEET KEYNOTES

1. PROVIDE MOTOR RATED SWITCH FOR CONTROLLING GARBAGE DISPOSAL.
2. RECEPTACLES IN INTERACTION AREA SHALL BE MOUNTED TO THE BACK SIDE OF BENCHES AND FACING TOWARD WINDOW. ROUTE CONDUIT IN BENCHES AND PROVIDE BACKBOXES FOR RECEPTACLES AT LOCATIONS INDICATE. INTERMEDIATE RECEPTACLES INDICATED ON BENCH SHALL ALIGN CENTERED WITH WINDOW MULLION. REFER TO ARCHITECTURAL DETAILS FOR BENCH CONSTRUCTION.
3. PROVIDE 120V, 20A DEDICATED ISOLATED GROUND CIRCUIT AND FLUSH MOUNTED DUPLEX RECEPTACLE NEXT TO AV PULL BOX.

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By

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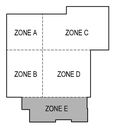
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Project

Physics and Nanotechnology Building

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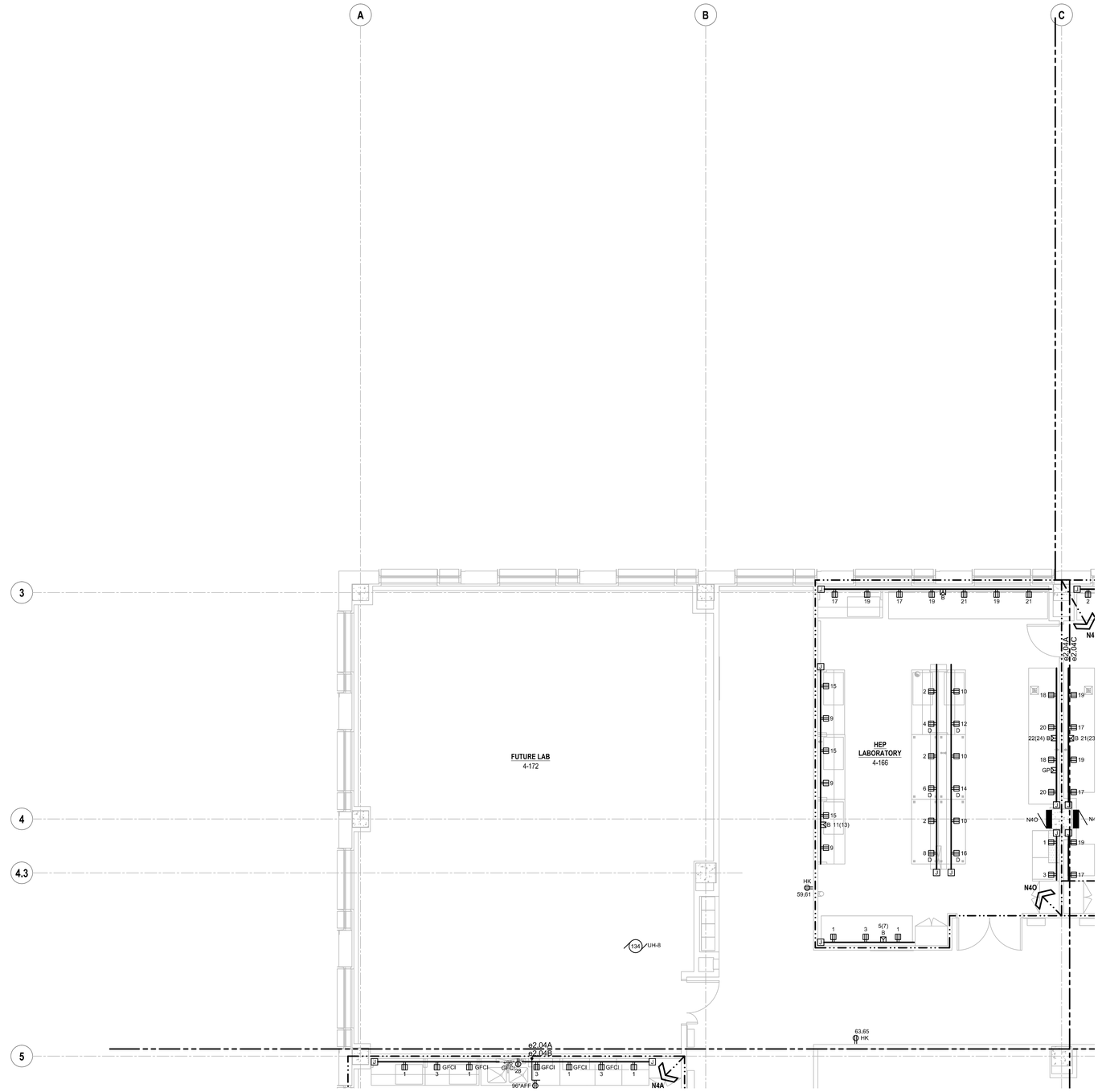
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ELECTRICAL POWER
LEVEL 3 - ZONE E

e2.03E

GENERAL NOTES

1. REFER TO tf SERIES OF DRAWINGS FOR DETAILS AND ELEVATIONS OF SPACES INSIDE LABORATORY AREAS.
2. ALL RECEPTACLES AND EQUIPMENT CONNECTIONS ON THIS SHEET WHICH ARE SHOWN OUTSIDE OF PANEL DIVISION LINES ARE CIRCUITED FROM PANEL RP4A UNLESS OTHERWISE SHOWN.
3. DUE TO EMF INTERFERENCE CONCERNS, ALL FEEDER CONDUITS FROM DISTRIBUTION PANELS IN THE ELECTRICAL ROOMS TO BRANCH CIRCUIT PANELS LOCATED IN LABORATORIES SHALL BE ROUTED IN THE CORRIDOR SPACE AND NOT OVER OTHER LABORATORIES UNTIL THEY ENTER THE LAB ROOM WHERE THE PANEL IS LOCATED.
4. ALL CLEAN POWER TRANSFORMERS "CTXX" SHALL BE MOUNTED AT 11'-6" TO BOTTOM AND SUPPORTED BY UNISTRUT FROM STRUCTURE.
5. ALL RECEPTACLES OF TYPE "IG" SHALL BE SERVED WITH DEDICATED CIRCUIT WITH DEDICATED ISOLATED GROUND AND EQUIPMENT GROUND FROM CLEAN POWER PANEL "CPXX" INDICATED BY PANEL DIVISION LINES.



1 **ELECTRICAL POWER LEVEL 4 - ZONE A**
SCALE: 1/4" = 1'-0"

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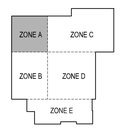
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Project

Physics and Nanotechnology Building

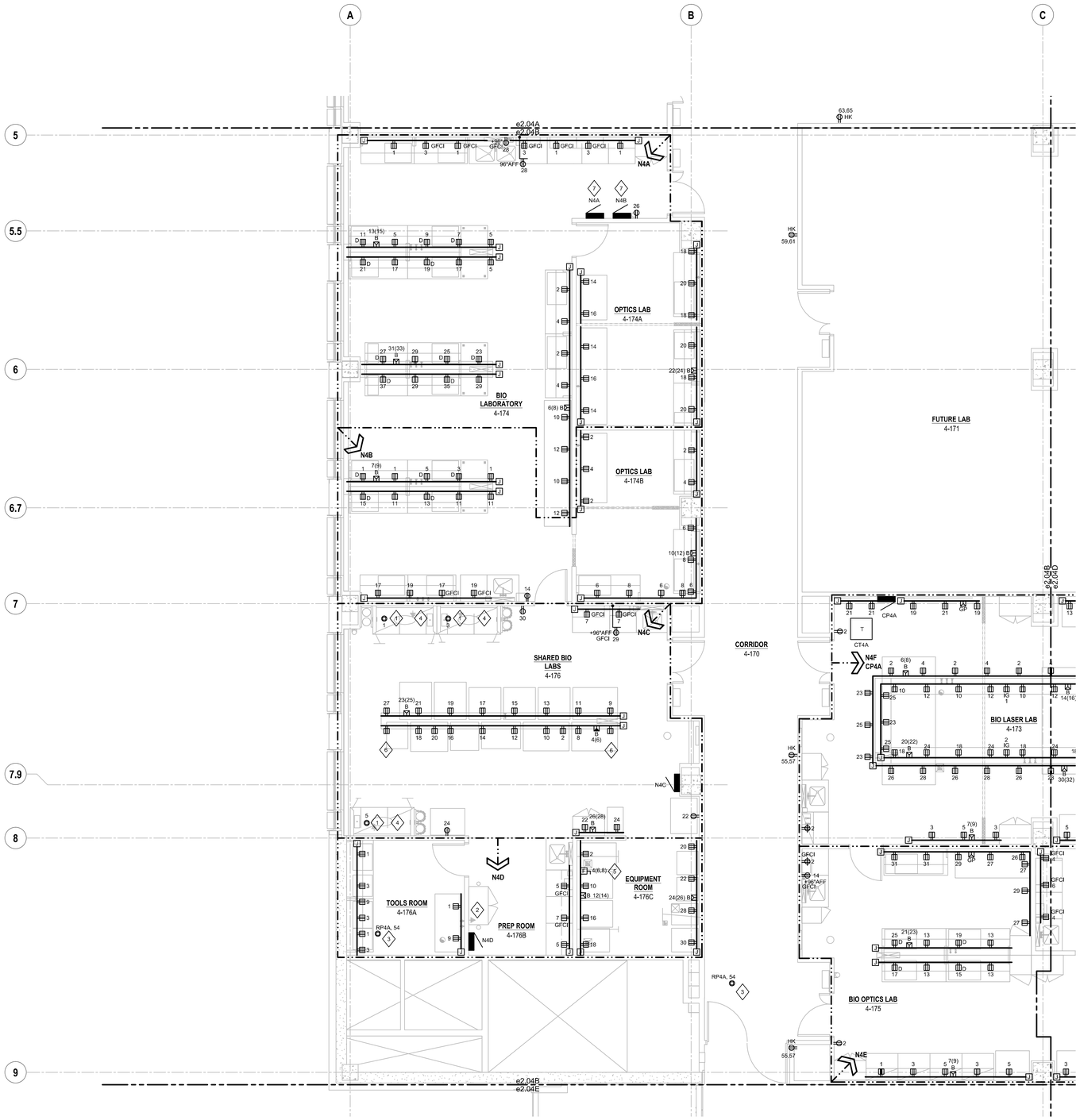
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ELECTRICAL POWER
LEVEL 4 - ZONE A

e2.04A



1 **ELECTRICAL POWER LEVEL 4 - ZONE B**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. REFER TO ℓ SERIES OF DRAWINGS FOR DETAILS AND ELEVATIONS OF SPACES INSIDE LABORATORY AREAS.
2. ALL RECEPTACLES AND EQUIPMENT CONNECTIONS ON THIS SHEET WHICH ARE SHOWN OUTSIDE OF PANEL DIVISION LINES ARE CIRCUITED FROM PANEL RP4A UNLESS OTHERWISE SHOWN.
3. DUE TO EMF INTERFERENCE CONCERNS, ALL FEEDER CONDUITS FROM DISTRIBUTION PANELS IN THE ELECTRICAL ROOMS TO BRANCH CIRCUIT PANELS LOCATED IN LABORATORIES SHALL BE ROUTED IN THE CORRIDOR SPACE AND NOT OVER OTHER LABORATORIES UNTIL THEY ENTER THE LAB ROOM WHERE THE PANEL IS LOCATED.
4. ALL CLEAN POWER TRANSFORMERS "CTXX" SHALL BE MOUNTED AT 11'-6" TO BOTTOM AND SUPPORTED BY UNISTRUT FROM STRUCTURE.
5. ALL RECEPTACLES OF TYPE "IG" SHALL BE SERVED WITH DEDICATED CIRCUIT WITH DEDICATED ISOLATED GROUND AND EQUIPMENT GROUND FROM CLEAN POWER PANEL "CPXX" INDICATED BY PANEL DIVISION LINES.

SHEET KEYNOTES

1. PROVIDE 120V FIXED POWER CONNECTION TO HOOD.
2. PROVIDE #8 AWG GROUNDING CONDUCTOR IN 1/2" CONDUIT FROM SOLVENT STORAGE CABINET TO 208/120V BRANCH PANELBOARD GROUND BUS SERVING THIS AREA.
3. PROVIDE 120V FIXED POWER CONNECTION TO DAMPER.
4. PROVIDE JUNCTION BOX BEHIND FLAMMABLE STORAGE CABINET LOCATED BELOW FUME HOOD. PROVIDE #8AWG IN 1/2" GROUND WIRE CONNECTED FROM CABINET TO THE SAME GROUND BUS IN THE PANELBOARD SERVING THE 120V CIRCUITS TO THE HOOD LOCATED ABOVE CABINET. REFER TO ℓ SERIES DRAWINGS FOR EXACT LOCATIONS.
5. PROVIDE 3 PHASE, NEUTRAL, AND GROUND FIXED CONNECTION TO AUTOCLAVE VIA 30A FUSED DISCONNECT. FIELD LOCATE DISCONNECT TO PROVIDE ACCESS TO DISCONNECT.
6. ONE RECEPTACLE LOCATED ON EACH END OF THE OVERHEAD SERVICE CARRIER IN ROOM 4-176 SHALL BE SERVED FROM PANEL EM LOCATED ON LEVEL 1. SEE NOTE 5 ON SHEET e2.01C. EACH RECEPTACLE SHALL BE SERVED WITH AN INDIVIDUAL BRANCH CIRCUIT, DUE TO VOLTAGE DROP. BRANCH CIRCUIT TO EACH RECEPTACLE ON THIS FLOOR SHALL BE 2#6 AND 1#6 GND IN 3/4" ROUTED FROM FIRST FLOOR, THROUGH ELECTRICAL ROOMS, AND TO RECEPTACLES. PIG-TAIL FROM #6 TO #12 WIRE BEFORE TERMINATING ON RECEPTACLES.
7. PROVIDE A SHEET METAL ENCLOSURE WITH SOLID BOTTOM EQUAL TO WIDTH AND DEPTH OF PANEL FROM BOTTOM OF PANEL TO A HEIGHT OF 26" AFF TO BOTTOM FOR CONFORMANCE WITH ADA. COLOR SHALL MATCH PANELBOARD ENCLSURE.

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For AFFILIATED ENGINEERS, INC.

By

Name RONALD M. PARSLEY

Date 02-24-2012 Reg. No. 25163

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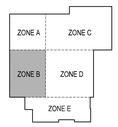
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Project

Physics and Nanotechnology Building

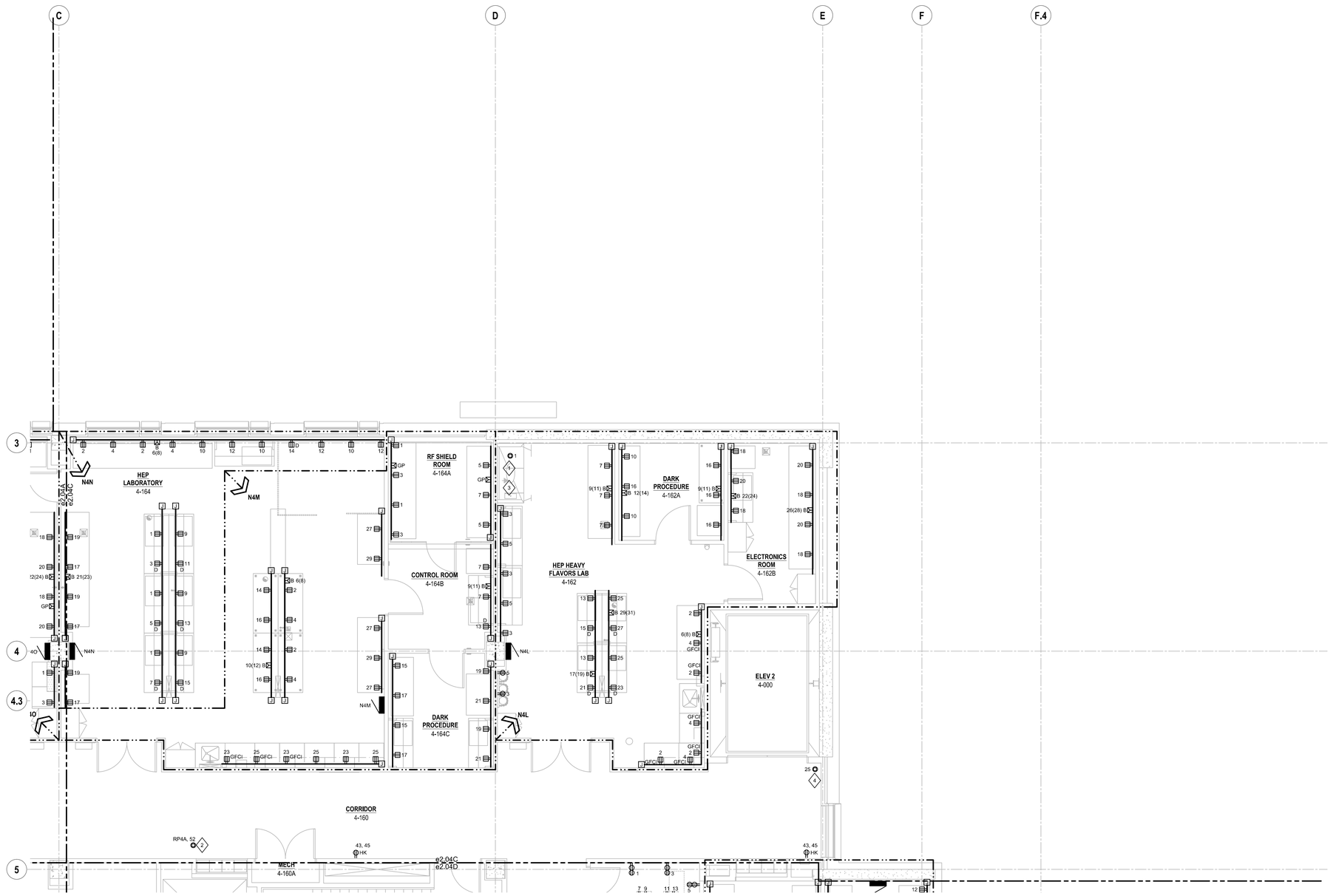
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ELECTRICAL POWER
LEVEL 4 - ZONE B

e2.04B



1 **ELECTRICAL POWER LEVEL 4 - ZONE C**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. REFER TO 1f SERIES OF DRAWINGS FOR DETAILS AND ELEVATIONS OF SPACES INSIDE LABORATORY AREAS.
2. ALL RECEPTACLES AND EQUIPMENT CONNECTIONS ON THIS SHEET WHICH ARE SHOWN OUTSIDE OF PANEL DIVISION LINES ARE CIRCUITED FROM PANEL RP4A UNLESS OTHERWISE SHOWN.
3. DUE TO EMF INTERFERENCE CONCERNS, ALL FEEDER CONDUITS FROM DISTRIBUTION PANELS IN THE ELECTRICAL ROOMS TO BRANCH CIRCUIT PANELS LOCATED IN LABORATORIES SHALL BE ROUTED IN THE CORRIDOR SPACE AND NOT OVER OTHER LABORATORIES UNTIL THEY ENTER THE LAB ROOM WHERE THE PANEL IS LOCATED.
4. ALL CLEAN POWER TRANSFORMERS "CTXX" SHALL BE MOUNTED AT 11'-6" TO BOTTOM AND SUPPORTED BY UNISTRUT FROM STRUCTURE.
5. ALL RECEPTACLES OF TYPE "IG" SHALL BE SERVED WITH DEDICATED CIRCUIT WITH DEDICATED ISOLATED GROUND AND EQUIPMENT GROUND FROM CLEAN POWER PANEL "CPXX" INDICATED BY PANEL DIVISION LINES.

SHEET KEYNOTES

1. PROVIDE 120V FIXED POWER CONNECTION TO HOOD.
2. PROVIDE 120V FIXED POWER CONNECTION TO DAMPER.
3. PROVIDE JUNCTION BOX BEHIND FLAMMABLE STORAGE CABINET LOCATED BELOW FUME HOOD. PROVIDE #8AWG IN 1/2" GROUND WIRE CONNECTED FROM CABINET TO THE SAME GROUND BUS IN THE PANELBOARD SERVING THE 120V CIRCUITS TO THE HOOD LOCATED ABOVE CABINET. REFER TO lf SERIES DRAWINGS FOR EXACT LOCATIONS.
4. PROVIDE 120V FIXED POWER CONNECTION TO SECURITY CAMERA POWER SUPPLY. VERIFY EXACT LOCATION WITH SECURITY DRAWINGS AND POWER SUPPLY PROVIDER.

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For AFFILIATED ENGINEERS, INC.

By

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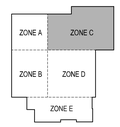
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Project

Physics and Nanotechnology Building

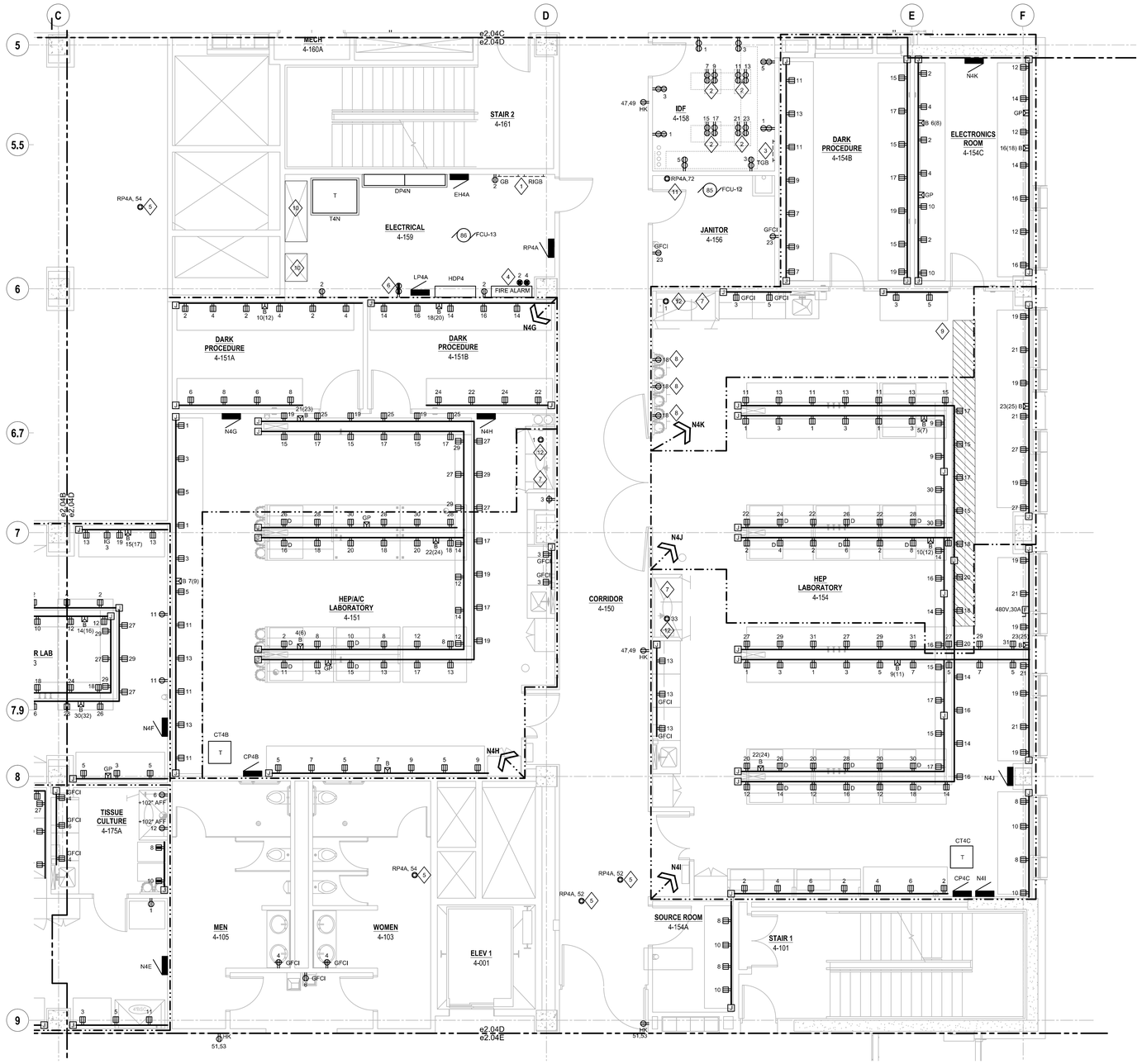
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ELECTRICAL POWER
LEVEL 4 - ZONE C

e2.04C



1 **ELECTRICAL POWER LEVEL 4 - ZONE D**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. REFER TO ff SERIES OF DRAWINGS FOR DETAILS AND ELEVATIONS OF SPACES INSIDE LABORATORY AREAS.
2. ALL RECEPTACLES AND EQUIPMENT CONNECTIONS ON THIS SHEET WHICH ARE SHOWN OUTSIDE OF PANEL DIVISION LINES ARE CIRCUITED FROM PANEL RP4A UNLESS OTHERWISE SHOWN.
3. DUE TO EMF INTERFERENCE CONCERNS, ALL FEEDER CONDUITS FROM DISTRIBUTION PANELS IN THE ELECTRICAL ROOMS TO BRANCH CIRCUIT PANELS LOCATED IN LABORATORIES SHALL BE ROUTED IN THE CORRIDOR SPACE AND NOT OVER OTHER LABORATORIES UNTIL THEY ENTER THE LAB ROOM WHERE THE PANEL IS LOCATED.
4. ALL CLEAN POWER TRANSFORMERS "CTXX" SHALL BE MOUNTED AT 11'-6" TO BOTTOM AND SUPPORTED BY UNISTRUT FROM STRUCTURE.
5. ALL RECEPTACLES OF TYPE "IG" SHALL BE SERVED WITH DEDICATED CIRCUIT WITH DEDICATED ISOLATED GROUND AND EQUIPMENT GROUND FROM CLEAN POWER PANEL "CPXX" INDICATED BY PANEL DIVISION LINES.

SHEET KEYNOTES

1. GROUND BUSBAR AND ROOM INSTRUMENT GROUND BUSBAR - REFER TO GROUNDING ONELINE. MOUNT AT 18" AFF.
2. MOUNT RECEPTACLES ON BACK OF COMMUNICATIONS RACK AT 18" AND 69" AFF.
3. TELECOM GROUND BUSBAR - REFER TO GROUNDING ONELINE. MOUNT AT 18" AFF.
4. PROVIDE 120V FIXED POWER CONNECTIONS TO FIRE ALARM NAC PANEL AND FIRE ALARM DATA GATHERING PANEL FROM PANEL EL5A.
5. PROVIDE 120V FIXED POWER CONNECTION TO DAMPER.
6. PROVIDE QUADRUPLEX RECEPTACLE AND CONDUIT AND WIRING TO PORTABLE GENERATOR CONNECTION AT LOADING DOCK FROM PANEL EM LOCATED ON LEVEL 1. SEE NOTE 5 ON SHEET e2.01C. EACH RECEPTACLE SHALL BE SERVED WITH AN INDIVIDUAL BRANCH CIRCUIT. DUE TO VOLTAGE DROP, BRANCH CIRCUIT TO EACH RECEPTACLE ON THIS FLOOR SHALL BE 2#8 AND 1#8 GND IN 3/4" ROUTED FROM FIRST FLOOR, THROUGH ELECTRICAL ROOMS, AND TO RECEPTACLES. PIG-TAIL FROM #8 TO #12 WIRE BEFORE TERMINATING ON RECEPTACLES.
7. PROVIDE JUNCTION BOX BEHIND FLAMMABLE STORAGE CABINET LOCATED BELOW FUME HOOD. PROVIDE #8AWG IN 1/2" GROUND WIRE CONNECTED FROM CABINET TO THE SAME GROUND BUS IN THE PANELBOARD SERVING THE 120V CIRCUITS TO THE HOOD LOCATED ABOVE CABINET. REFER TO ff SERIES DRAWINGS FOR EXACT LOCATIONS.
8. PROVIDE RECEPTACLE FOR GAS TANK MANIFOLD SWITCHOVER CONTROLLER. RECEPTACLE MAY BE FIXED CONNECTION DEPENDING ON MODEL SUPPLIED. COORDINATE EXACT LOCATION AND CONNECTION TYPE WITH MANIFOLD SUPPLIER.
9. ZONE INDICATED BY CROSSHATCH IS AN AREA WHICH SHALL BE KEPT CLEAR OF ALL CONDUITS FOR ALL ELECTRICAL SYSTEMS. NO ELECTRICAL DEVICES, RACEWAYS, OR EQUIPMENT SHALL BE INSTALLED IN THIS ZONE. REFER TO ARCHITECTURAL AND ff SERIES DRAWINGS FOR FURTHER INFORMATION.
10. PROVIDE OPENINGS IN FLOOR SLAB FOR CONDUITS FROM PENTHOUSE TO BASEMENT IN ELECTRICAL ROOM. PROVIDE EMBEDDED UNISTRUT INTO EAST AND WEST WALLS OF OPENINGS AND PROVIDE CROSSPIECE UNISTRUT TO SUPPORT CENTER ROW OF CONDUITS IN EACH OPENING. PROVIDE STRUCTURAL STEEL PLATE TO BE CAST INTO SLAB IN EACH FLOOR OPENING WITH PENETRATIONS MADE TO INSTALL CONDUITS. OPENING SHALL BE BACKFILLED WITH CONCRETE TO MAINTAIN FLOOR FIRE RATING. COORDINATE EMBEDDING OF STEEL PLATE, UNISTRUT EMBEDS, AND FLOOR OPENING WITH STRUCTURAL CONTRACTOR PRIOR TO POURING OF FLOOR.
11. NOT USED
12. PROVIDE 120V FIXED POWER CONNECTION TO HOOD.

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By

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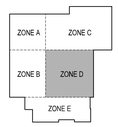
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Physics and Nanotechnology Building

U of M Project # 01-155-08-1718



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ELECTRICAL POWER
LEVEL 4 - ZONE D

e2.04D



1 **ELECTRICAL POWER LEVEL 4 - ZONE E**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. CONDUIT FOR DEVICES INSTALLED BELOW WINDOWS WALL SHALL BE RUN HORIZONTALLY IN DRYWALL TO THICKENED WALLS NEAR COLUMNS TO TURN VERTICALLY TO CEILING SPACE.
2. ALL RECEPTACLES AND EQUIPMENT CONNECTIONS ON THIS SHEET WHICH ARE SHOWN OUTSIDE OF PANEL DIVISION LINES ARE CIRCUITED FROM PANEL RP4B UNLESS OTHERWISE SHOWN.
3. IN LIEU OF OVERHEAD CONDUITS AND WIRING, MC CABLE WIRING SHALL BE PERMITTED FOR THOSE AREAS COMPROMISING OFFICE SPACE SUCH AS FACULTY, GRAD, POST DOC, ETC, ON THIS SHEET WHERE INSTALLED IN ACCORDANCE WITH SPECIFICATIONS.
4. PROVIDE SEPARATE, ALTERNATE PRICE FOR THE FOLLOWING: IN LIEU OF OVERHEAD CONDUITS AND WIRING, CONTRACTOR MAY INSTALL HOME RUN BRANCH CONDUITS OF SIZE 1" AND SMALLER FROM BRANCH PANELBOARDS TO DEVICES IN FLOOR SLAB IN PVC SCHD 40 CONDUIT. PRIOR TO CONDUIT RISING OUT OF FLOOR SLAB IT SHALL TRANSITION TO INTERMEDIATE METALLIC CONDUIT WHERE EXPOSED OR EMT WHERE BEHIND WALLS TO A MINIMUM HEIGHT OF 24". CONTRACTOR SHALL RUN CONDUITS GROUPED TOGETHER WHERE POSSIBLE AND AT RIGHT ANGLES TO BUILDING CONSTRUCTION AND NOTE LOCATIONS WITH EXACT LOCATIONS ON AS-BUILT DRAWINGS AND PROVIDE GREEN PAINT ON FLOOR OVER CONDUITS WHERE FLOOR COVERINGS WILL COVER PAINT. COORDINATE WITH ALL OTHER UTILITIES.

SHEET KEYNOTES

1. PROVIDE MOTOR RATED SWITCH FOR CONTROLLING GARBAGE DISPOSAL.
2. PROVIDE 120V, 20A DEDICATED ISOLATED GROUND CIRCUIT AND FLUSH MOUNTED DUPLEX RECEPTACLE NEXT TO AV PULL BOX.
3. PROVIDE 120V FIXED POWER CONNECTION TO SECURITY CAMERA POWER SUPPLY. VERIFY EXACT LOCATION WITH SECURITY DRAWINGS AND POWER SUPPLY PROVIDER.

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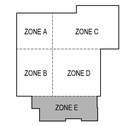
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Physics and Nanotechnology Building

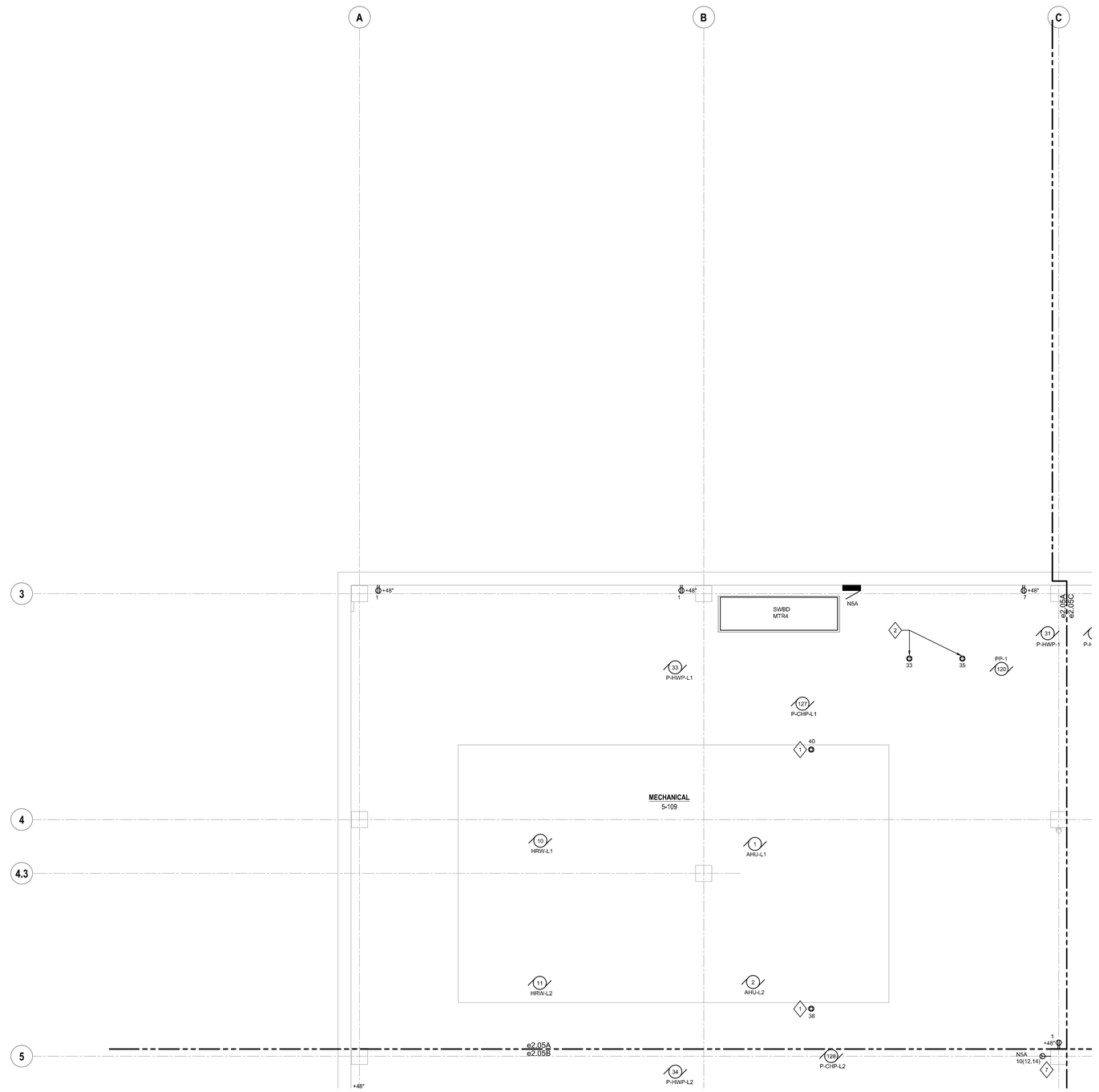
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ELECTRICAL POWER
LEVEL 4 - ZONE E

e2.04E



1 **ELECTRICAL POWER PENTHOUSE - ZONE A**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. ALL RECEPTACLES AND EQUIPMENT CONNECTIONS ON THIS SHEET WHICH ARE SHOWN OUTSIDE OF MATCHLINES ARE CIRCUITED FROM PANEL N5B UNLESS OTHERWISE SHOWN.
2. REFER TO M AND P SERIES DRAWINGS FOR EXACT LOCATIONS OF MOTORS AND VFDS.

SHEET KEYNOTES

1. PROVIDE DEDICATED 120V FIXED CONNECTION TO AIR HANDLER UNIT (AHU) FOR INTERNAL LIGHTING AND RECEPTACLES. VERIFY EXACT LOCATION WITH AHU SUPPLIER.
2. PROVIDE 120V FIXED POWER CONNECTION TO STEAM WATER HEATER CONTROLS. VERIFY EXACT LOCATION WITH SUPPLIER.

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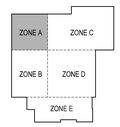
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Project

Physics and Nanotechnology Building

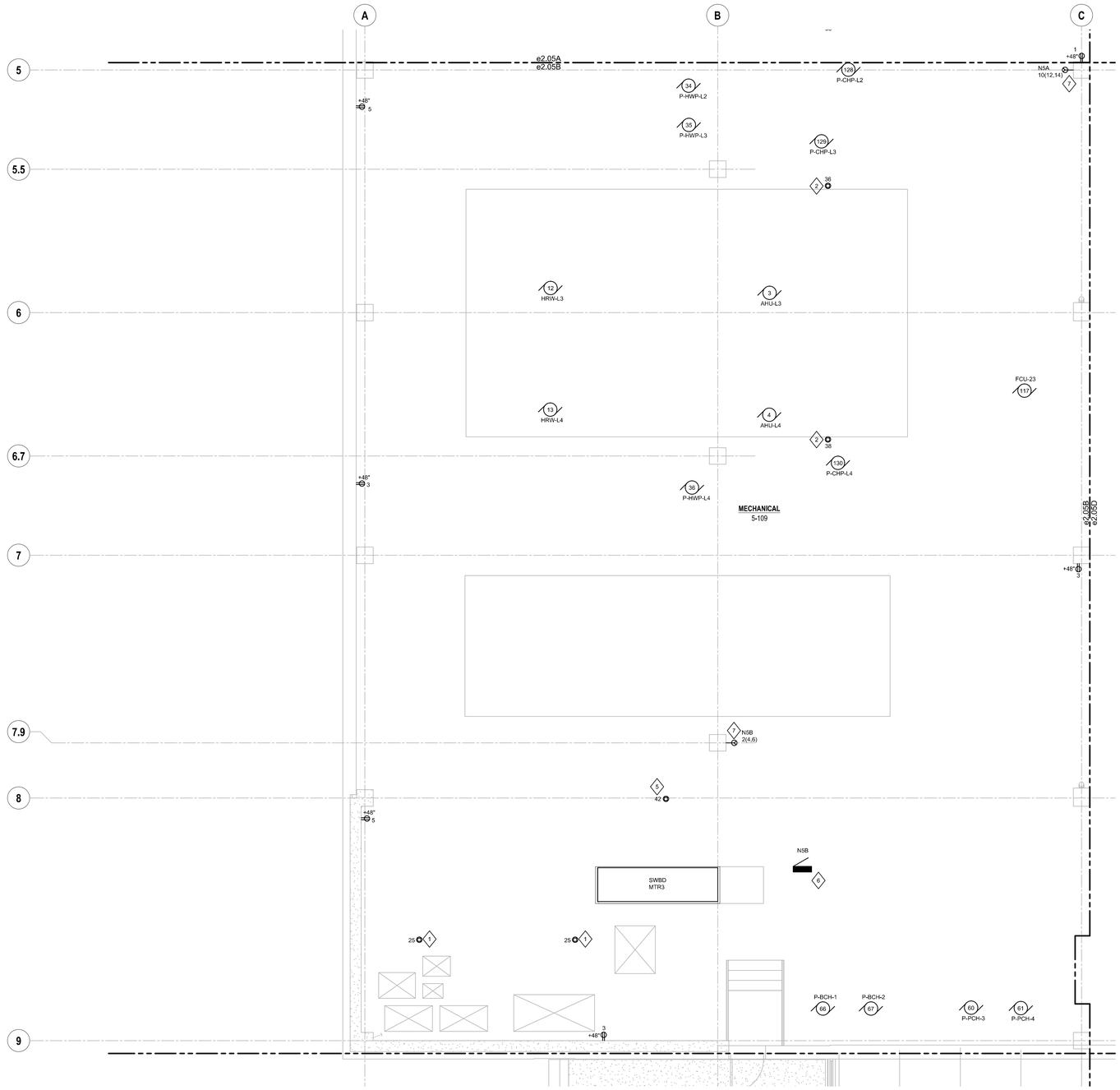
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ELECTRICAL POWER PENTHOUSE - ZONE A

e2.05A



1 **ELECTRICAL POWER PENTHOUSE - ZONE B**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. ALL RECEPTACLES AND EQUIPMENT CONNECTIONS ON THIS SHEET WHICH ARE SHOWN OUTSIDE OF MATCHLINES ARE CIRCUITED FROM PANEL N5A UNLESS OTHERWISE SHOWN.
2. REFER TO M AND P SERIES DRAWINGS FOR EXACT LOCATIONS OF MOTORS AND VFDS.

SHEET KEYNOTES

1. PROVIDE 120V FIXED POWER CONNECTION TO DAMPER.
2. PROVIDE DEDICATED 120V FIXED CONNECTION TO AIR HANDLER UNIT (AHU) FOR INTERNAL LIGHTING AND RECEPTACLES. VERIFY EXACT LOCATION WITH AHU SUPPLIER.
3. NOT USED
4. NOT USED
5. PROVIDE 120V FIXED POWER CONNECTION TO GLYCOL FILL SYSTEM POWER TERMINAL.
6. PROVIDE UNISTRUT SUPPORT BRACING FROM FLOOR FOR SUPPORT OF PANELBOARD.
7. PROVIDE NEMA 15-60R WELDING RECEPTACLE.

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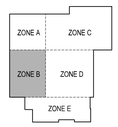
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Project

Physics and Nanotechnology Building

U of M Project # 01-155-08-1718



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ELECTRICAL POWER
PENTHOUSE - ZONE B

e2.05B

GENERAL NOTES

1. ALL RECEPTACLES AND EQUIPMENT CONNECTIONS ON THIS SHEET WHICH ARE SHOWN OUTSIDE OF MATCHLINES ARE CIRCUITED FROM PANEL N5B UNLESS OTHERWISE SHOWN.
2. REFER TO M AND P SERIES DRAWINGS FOR EXACT LOCATIONS OF MOTORS AND VFDS.

SHEET KEYNOTES

1. PROVIDE FIXED 120V 30A CONNECTION TO ELEVATOR CONTROLLER FOR ELEVATOR CAR LIGHTING AND EXHAUST. PROVIDE 30/25A/1 FUSED DISCONNECT SWITCH FROM PANEL EL5A.
2. PROVIDE FIXED 120V 30A CONNECTION TO ELEVATOR ROPE BRAKE AIR COMPRESSOR. PROVIDE 30/25A/1 FUSED DISCONNECT SWITCH FROM PANEL EL5A.
3. LOCATE OUTLET ABOVE PLATFORM.
4. LOCATE OUTLET IN SHEAVE SPACE ABOVE.
5. PROVIDE 120V FIXED POWER CONNECTIONS TO FIRE ALARM NAC PANEL AND FIRE ALARM DATA GATHERING PANEL FROM PANEL EL5A.
6. PROVIDE DEDICATED 120V FIXED CONNECTION TO AIR HANDLER UNIT (AHU) FOR INTERNAL LIGHTING AND RECEPTACLES. VERIFY EXACT LOCATION WITH AHU SUPPLIER.
7. PROVIDE 120V FIXED POWER CONNECTION FOR CONTROLS. VERIFY EXACT LOCATION WITH SUPPLIER.
8. PROVIDE 120V FIXED POWER CONNECTION FOR CLEAN STEAM GENERATOR CONTROLS. VERIFY EXACT LOCATION WITH SUPPLIER.



1 **ELECTRICAL POWER PENTHOUSE - ZONE C**
SCALE: 1/4" = 1'-0"

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For AFFILIATED ENGINEERS, INC.

By

Name RONALD M. PARSLEY

Date 02-24-2012 Reg. No. 25163

Issued for	Date
100% CD set	12-16-2011
Bid Package No. 2	02-24-2012
Project Directive No. 3	05-15-2012

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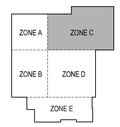
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Physics and Nanotechnology Building

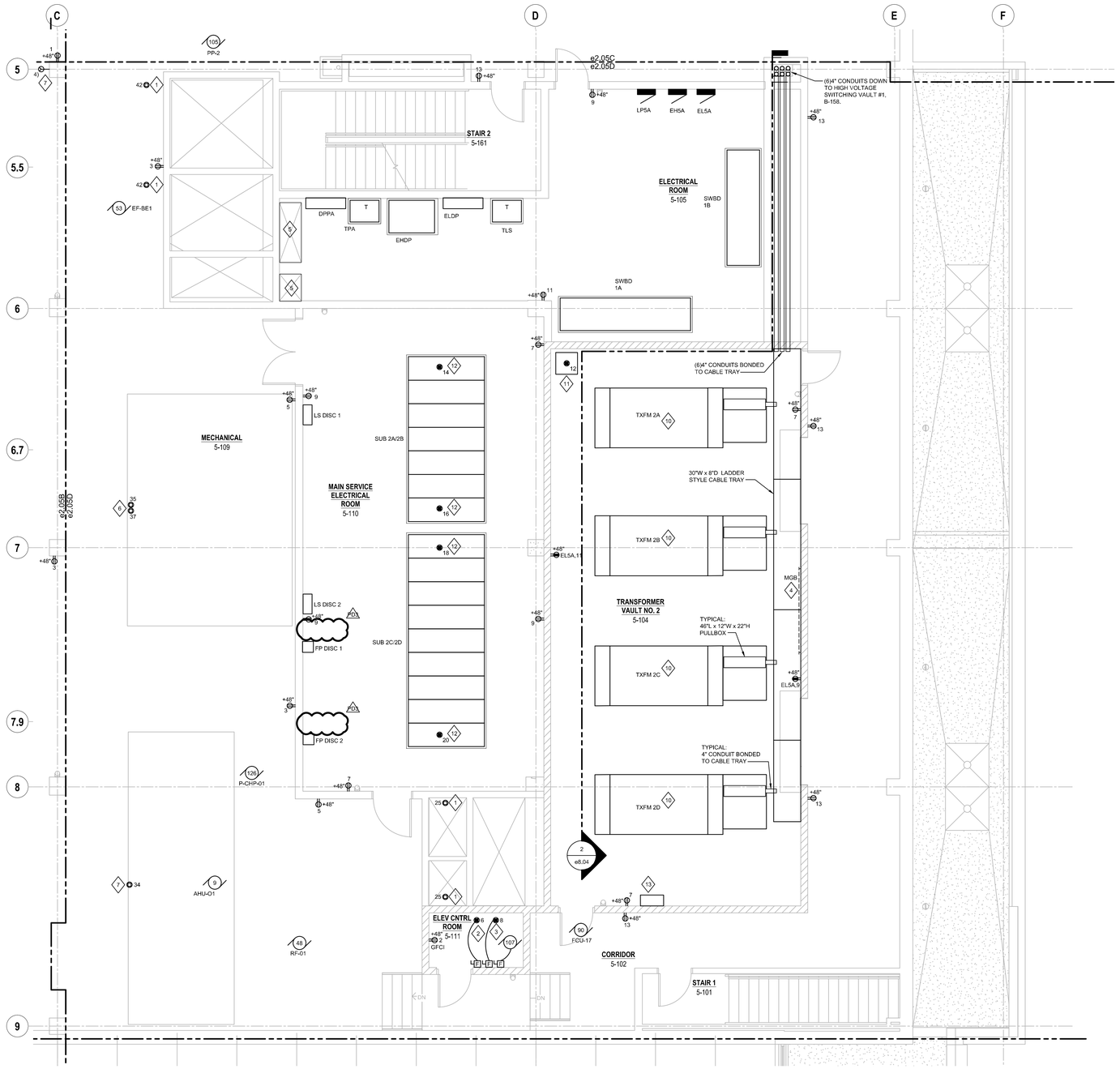
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ELECTRICAL POWER
PENTHOUSE - ZONE C

e2.05C



1 **ELECTRICAL POWER PENTHOUSE - ZONE D**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. ALL RECEPTACLES AND EQUIPMENT CONNECTIONS ON THIS SHEET WHICH ARE SHOWN OUTSIDE OF MATCHLINES ARE CIRCUITED FROM PANEL N5A UNLESS OTHERWISE SHOWN.
2. REFER TO M AND P SERIES DRAWINGS FOR EXACT LOCATIONS OF MOTORS AND VFDS.

SHEET KEYNOTES

1. PROVIDE 120V FIXED POWER CONNECTION TO DAMPER.
2. PROVIDE FIXED 120V 30A CONNECTION TO ELEVATOR CONTROLLER FOR ELEVATOR CAR LIGHTING AND EXHAUST. PROVIDE 30/25A/1 FUSED DISCONNECT SWITCH FROM PANEL EL5A.
3. PROVIDE FIXED 120V 30A CONNECTION TO ELEVATOR ROPE BRAKE AIR COMPRESSOR. PROVIDE 30/25A/1 FUSED DISCONNECT SWITCH FROM PANEL EL5A.
4. MAIN GROUNDING BUSBAR - REFER TO GROUNDING ONELINE.
5. PROVIDE OPENINGS IN FLOOR SLAB FOR CONDUITS FROM PENTHOUSE TO BASEMENT IN ELECTRICAL ROOM. PROVIDE EMBEDDED UNISTRUT INTO EAST AND WEST WALLS OF OPENINGS AND PROVIDE CROSSPIECE UNISTRUT TO SUPPORT CENTER ROW OF CONDUITS IN EACH OPENING. PROVIDE STRUCTURAL STEEL PLATE TO BE CAST INTO SLAB IN EACH FLOOR OPENING WITH PENETRATIONS MADE TO INSTALL CONDUITS. OPENING SHALL BE BACKFILLED WITH CONCRETE TO MAINTAIN FLOOR FIRE RATING. COORDINATE EMBEDDING OF STEEL PLATE, UNISTRUT EMBEDS, AND FLOOR OPENING WITH STRUCTURAL CONTRACTOR PRIOR TO POURING OF FLOOR.
6. PROVIDE (2) 120V FIXED POWER CONNECTION FOR HEAT RECOVERY UNIT. (1) FOR LIGHTING AND RECEPTACLES AND (1) FOR CONTROLS.
7. PROVIDE DEDICATED 120V FIXED CONNECTION TO AIR HANDLER UNIT (AHU) FOR INTERNAL LIGHTING AND RECEPTACLES. VERIFY EXACT LOCATION WITH AHU SUPPLIER.
8. NOT USED
9. NOT USED
10. PROVIDE POWER TO FAN CONTROL POWER TRANSFORMER FROM PANEL EL5A, 120V, LOCATED IN PENTHOUSE. PROVIDE DEDICATED CIRCUIT TO EACH FAN CONTROLLER.
11. OWNER FURNISHED SCADA RACK. PROVIDE 120V FIXED EMERGENCY POWER CONNECTION FROM PANEL EL5A.
12. PROVIDE 120V FIXED EMERGENCY POWER CONNECTION FROM PANEL EL5A TO EACH SUBSTATION SEL734 METER.
13. PROVIDE COOPER BUSSMAN SFC-FUSE-CAB SPARE FUSE CABINET MOUNTED TO WALL 36" AFF TO BOTTOM.

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By

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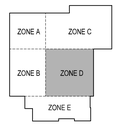
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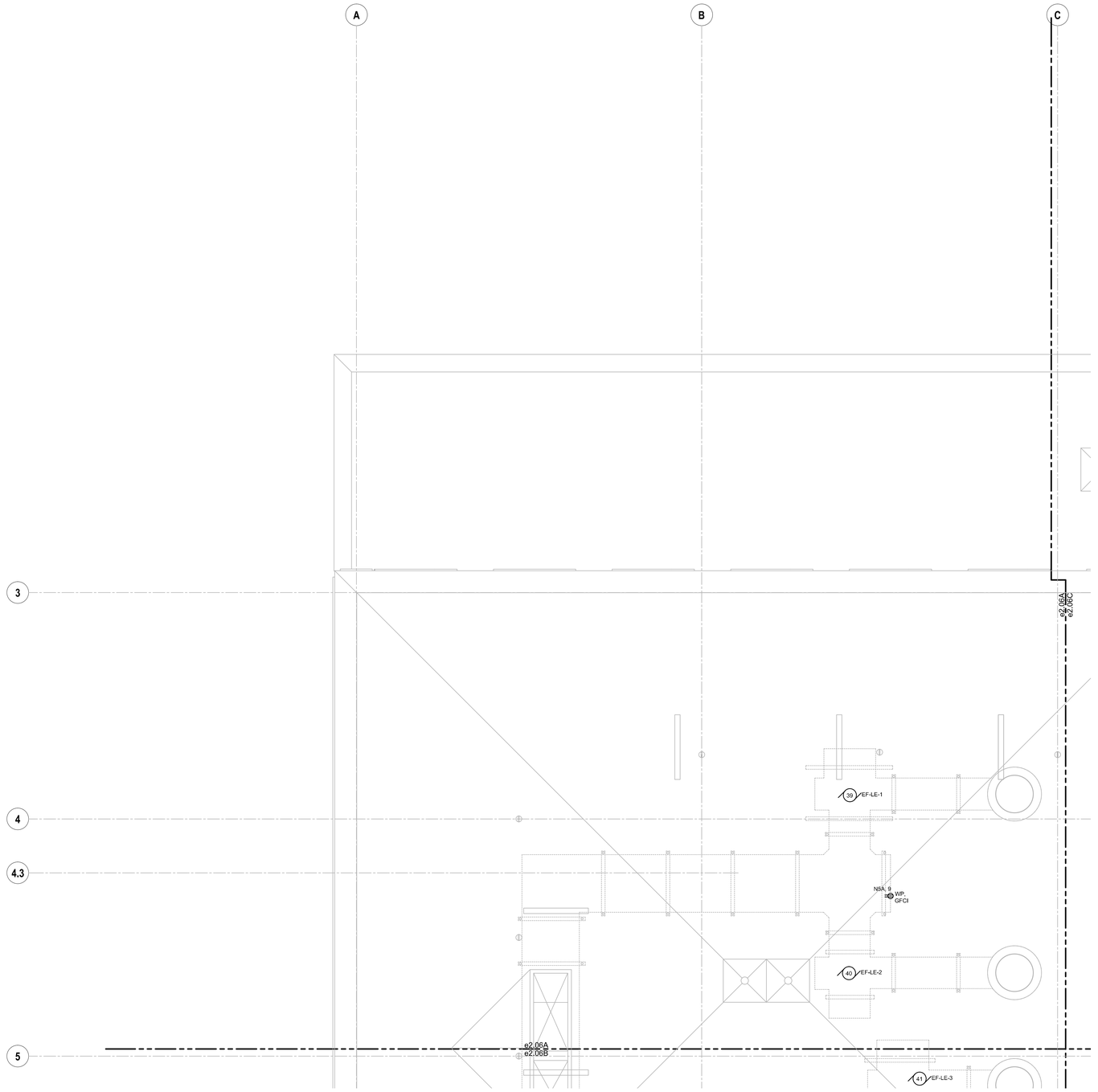
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ELECTRICAL POWER PENTHOUSE - ZONE D

e2.05D

GENERAL NOTES

1. ALL DISCONNECTS AND ELECTRICAL EQUIPMENT LOCATED ON BUILDING EXTERIOR SHALL BE IN NEMA 3R ENCLOSURES.
2. ALL RECEPTACLES ON THIS SHEET WHICH ARE SHOWN OUTSIDE OF PANEL DIVISION LINES ARE CIRCUITED FROM PANEL N5A UNLESS OTHERWISE SHOWN.
3. ALL RECEPTACLES SHOWN ON THE ROOF SHALL BE MOUNTED ON HVAC EQUIPMENT OR DUCTWORK SUPPORTS.
4. REFER TO M AND P SERIES DRAWINGS FOR EXACT LOCATIONS OF MOTORS AND VFDS.
5. ALL RECEPTACLES ON ROOF SHALL BE MOUNTED AT 36" ABOVE FINISHED ROOF UNLESS NOTED OTHERWISE.



1 **ELECTRICAL POWER ROOF - ZONE A**
SCALE: 1/4" = 1'-0"

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For AFFILIATED ENGINEERS, INC.

By

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Date 02-24-2012 Reg. No. 25163

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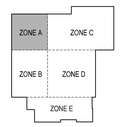
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Project

Physics and Nanotechnology Building

U of M Project # 01-155-08-1718



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ELECTRICAL POWER
ROOF - ZONE A

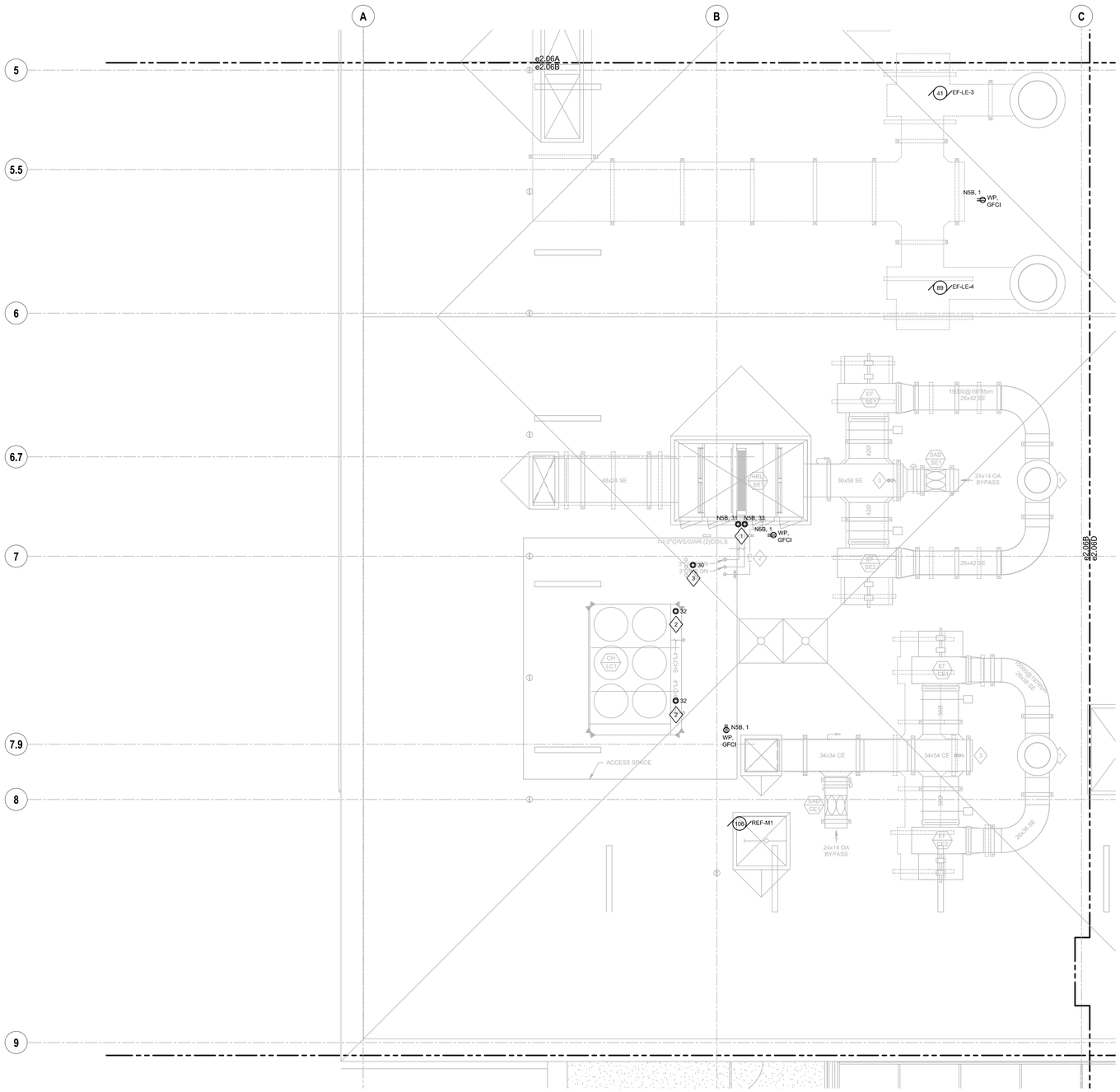
e2.06A

GENERAL NOTES

1. ALL DISCONNECTS AND ELECTRICAL EQUIPMENT LOCATED ON BUILDING EXTERIOR SHALL BE IN NEMA 3R ENCLOSURES.
2. ALL RECEPTACLES ON THIS SHEET WHICH ARE SHOWN OUTSIDE OF PANEL DIVISION LINES ARE CIRCUITED FROM PANEL N5B UNLESS OTHERWISE SHOWN.
3. ALL RECEPTACLES SHOWN ON THE ROOF SHALL BE MOUNTED ON HVAC EQUIPMENT OR DUCTWORK SUPPORTS.
4. REFER TO M AND P SERIES DRAWINGS FOR EXACT LOCATIONS OF MOTORS AND VFDS.
5. ALL RECEPTACLES ON ROOF SHALL BE MOUNTED AT 36" ABOVE FINISHED ROOF UNLESS NOTED OTHERWISE.

SHEET KEYNOTES

1. PROVIDE (2) 120V FIXED POWER CONNECTION FOR HEAT RECOVERY UNIT. (1) FOR LIGHTING AND RECEPTACLES AND (1) FOR CONTROLS.
2. PROVIDE 120V FIXED POWER CONNECTION TO HEAT TRACE.
3. PROVIDE 120V FIXED POWER CONNECTION TO HEAT TRACE DRAIN LINE.



1 **ELECTRICAL POWER ROOF - ZONE B**
SCALE: 1/4" = 1'-0"

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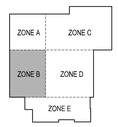
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Project

Physics and Nanotechnology Building

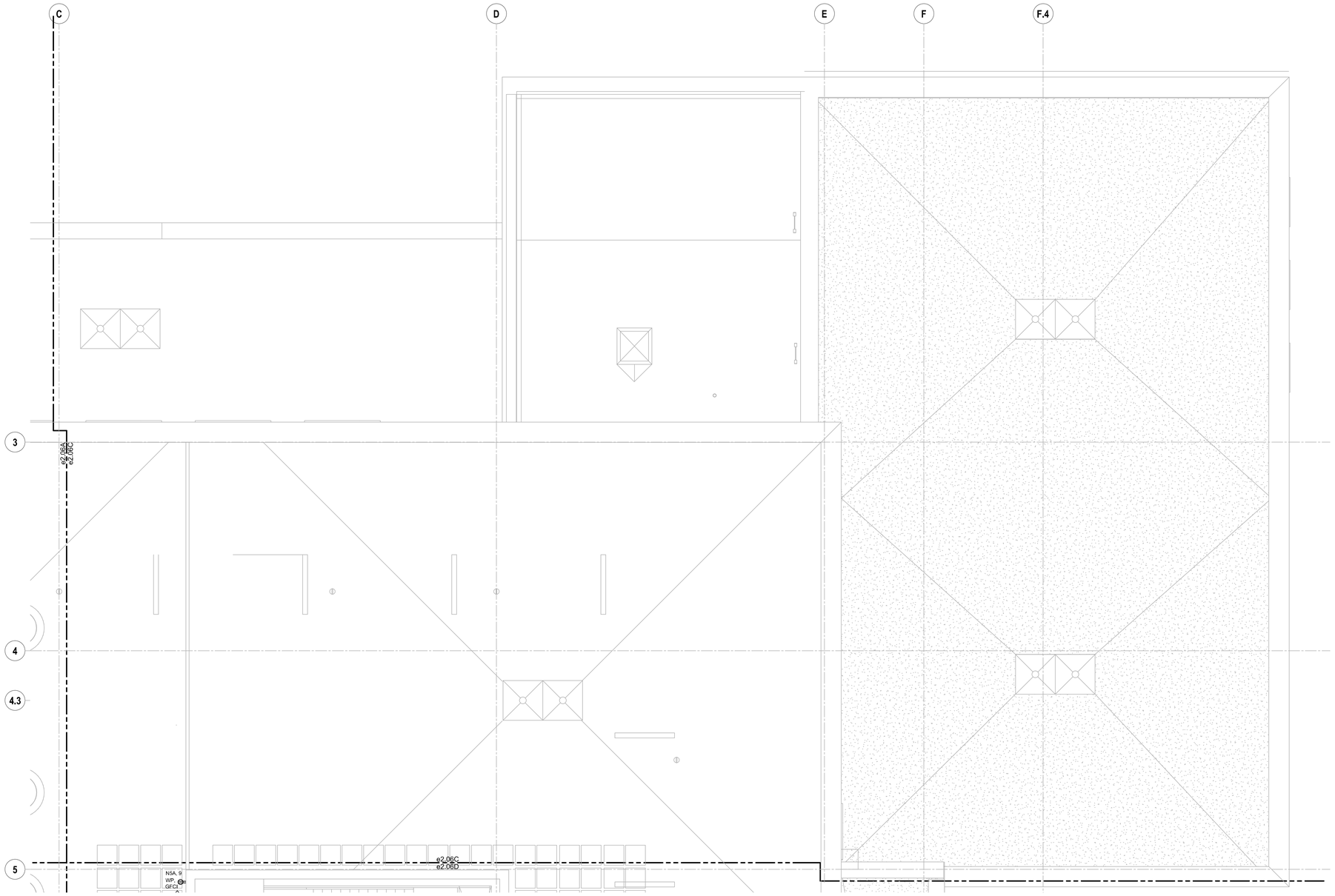
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ELECTRICAL POWER
ROOF - ZONE B

e2.06B



1 **ELECTRICAL POWER ROOF - ZONE C**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. ALL DISCONNECTS AND ELECTRICAL EQUIPMENT LOCATED ON BUILDING EXTERIOR SHALL BE IN NEMA 3R ENCLOSURES.
2. ALL RECEPTACLES ON THIS SHEET WHICH ARE SHOWN OUTSIDE OF PANEL DIVISION LINES ARE CIRCUITED FROM PANEL N5A UNLESS OTHERWISE SHOWN.
3. ALL RECEPTACLES SHOWN ON THE ROOF SHALL BE MOUNTED ON HVAC EQUIPMENT OR DUCTWORK SUPPORTS.
4. REFER TO M AND P SERIES DRAWINGS FOR EXACT LOCATIONS OF MOTORS AND VFDS.
5. ALL RECEPTACLES ON ROOF SHALL BE MOUNTED AT 36" ABOVE FINISHED ROOF UNLESS NOTED OTHERWISE.

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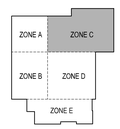
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Physics and Nanotechnology Building

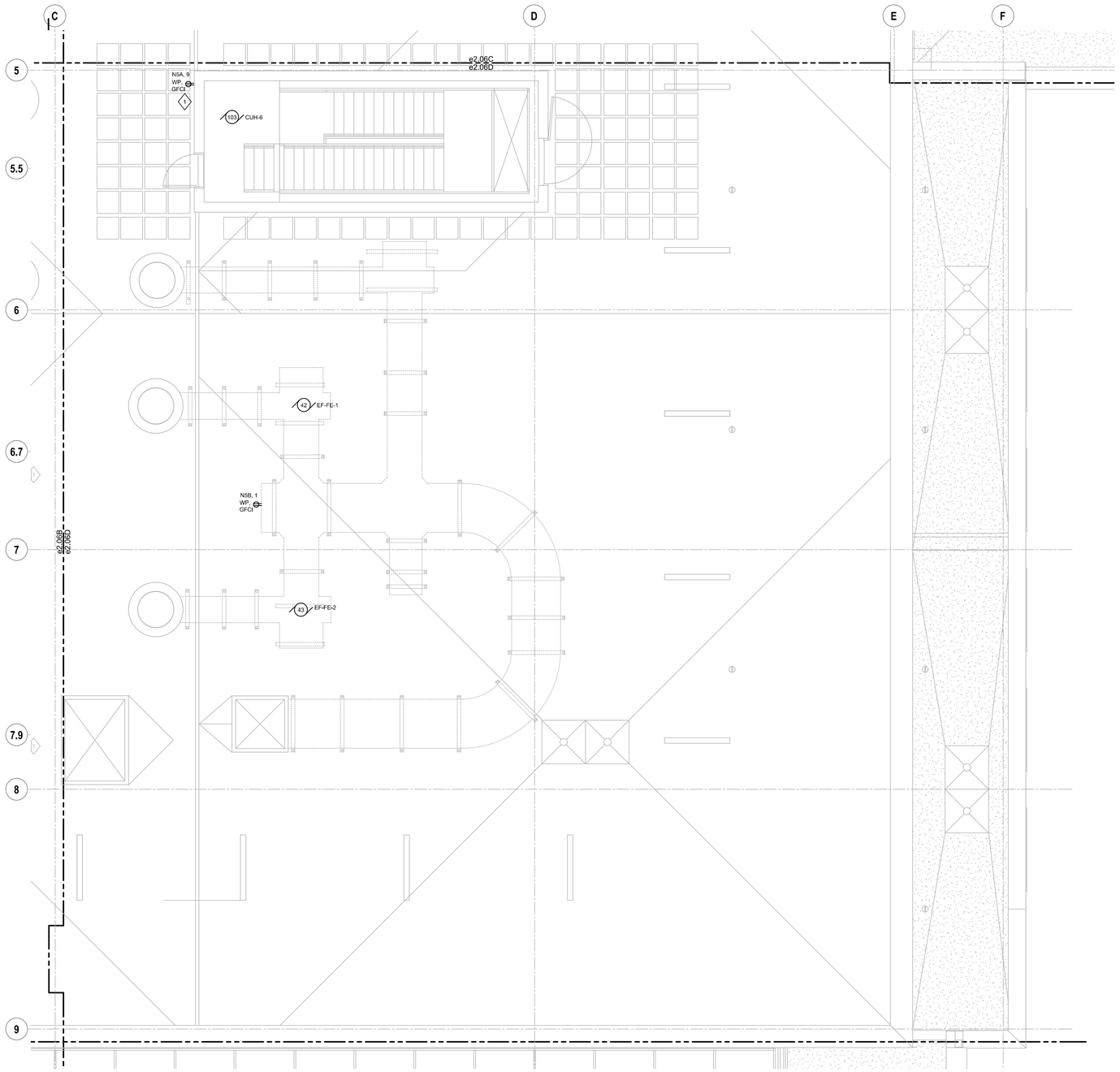
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ELECTRICAL POWER
ROOF - ZONE C

e2.06C



1 **ELECTRICAL POWER ROOF - ZONE D**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. ALL DISCONNECTS AND ELECTRICAL EQUIPMENT LOCATED ON BUILDING EXTERIOR SHALL BE IN NEMA 3R ENCLOSURES.
2. ALL RECEPTACLES ON THIS SHEET WHICH ARE SHOWN OUTSIDE OF PANEL DIVISION LINES ARE CIRCUITED FROM PANEL N5B UNLESS OTHERWISE SHOWN.
3. ALL RECEPTACLES SHOWN ON THE ROOF SHALL BE MOUNTED ON HVAC EQUIPMENT OR DUCTWORK SUPPORTS.
4. REFER TO M AND P SERIES DRAWINGS FOR EXACT LOCATIONS OF MOTORS AND VFDS.
5. ALL RECEPTACLES ON ROOF SHALL BE MOUNTED AT 36" ABOVE FINISHED ROOF UNLESS NOTED OTHERWISE.

SHEET KEYNOTES

1 RECEPTACLE SHALL BE RECESSED INTO WALL AND MOUNTED AT 24" AFF.

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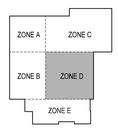
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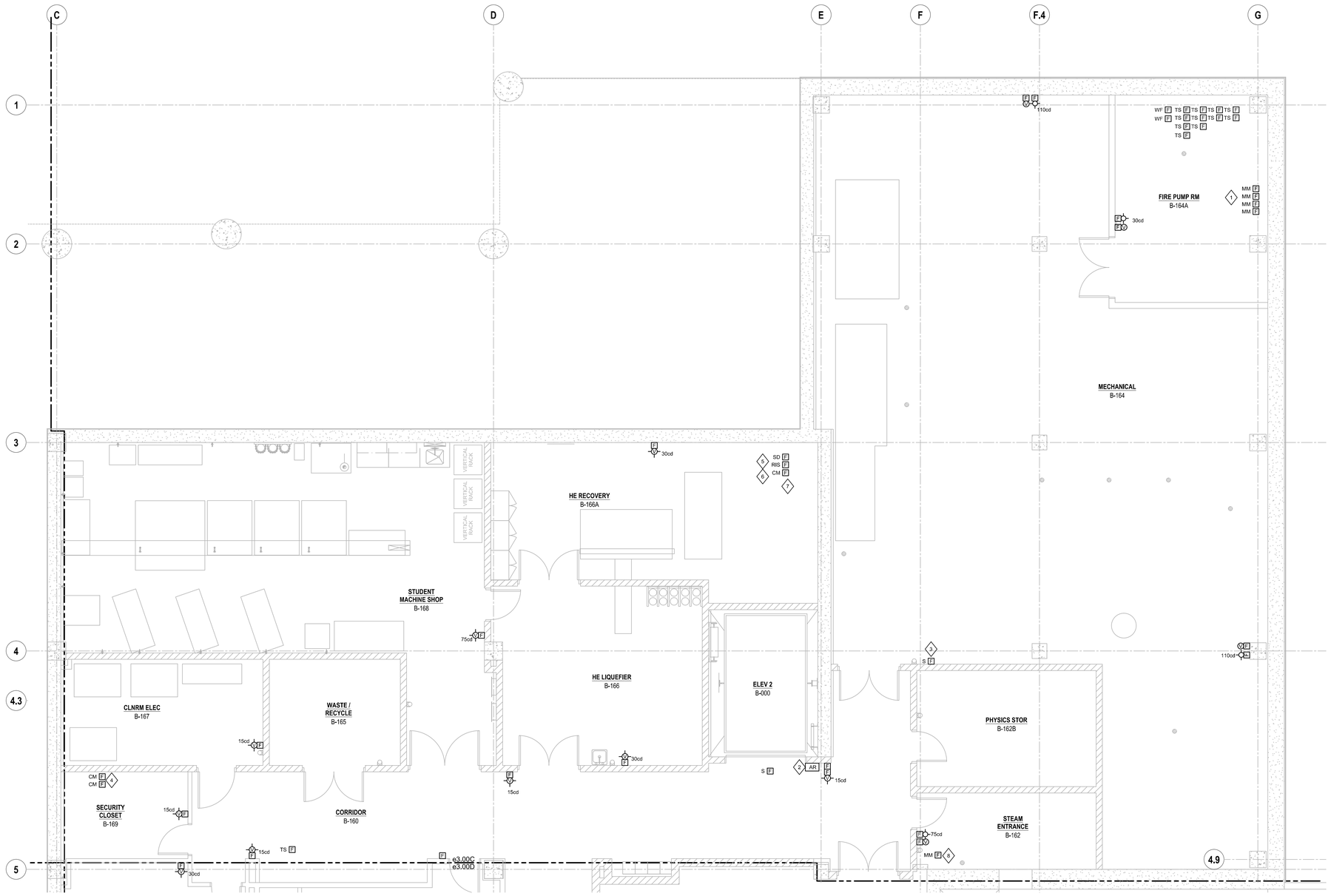
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ELECTRICAL POWER
ROOF - ZONE D

e2.06D



1 **ELECTRICAL SYSTEMS BASEMENT - ZONE C**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. ALL FIRE ALARM SPEAKERS INSTALLED IN B-162, B-164A AND B-164 SHALL BE SET TO PROVIDE 95DB AT 10 FEET REVERBERANT.
2. REFER TO FIRE PROTECTION SERIES DRAWINGS FOR LOCATIONS OF WATERFLOW AND TAMPER SWITCHES.
3. REFER TO MECHANICAL SERIES DRAWINGS FOR LOCATIONS OF DUCT MOUNTED SMOKE DETECTORS AND DAMPERS.
4. REFER TO T SERIES DRAWINGS AND DIVISION 27 AND 28 SPECIFICATIONS FOR COORDINATION WITH STRUCTURED CABLING SYSTEM, VIDEO SURVEILLANCE SYSTEM AND ACCESS CONTROL SYSTEM. PROVIDE BOXES AND CONDUIT PATHWAYS FOR THOSE SYSTEMS INDICATED ON T SERIES DRAWINGS.

SHEET KEYNOTES

1. PROVIDE FIRE ALARM MONITORING MODULES TO INDIVIDUALLY MONITOR CONDITIONS OF FIRE PUMP CONTROLLER AND AUTOMATIC TRANSFER SWITCH. MONITOR THE FOLLOWING:
   1) AC LOSS
   2) PUMP RUNNING
   3) PHASE REVERSAL
   4) LOSS OF PHASE
2. PROVIDE WIRING AND CONDUIT BETWEEN AREA OF RESCUE ASSISTANCE: REMOTE UNIT AND MASTER UNIT IN LOBBY 1-100A. UNITS. MOUNT DEVICE AT 42" AFF TO CENTER. COORDINATE EXACT LOCATION TO AVOID ELEVATOR CALL BUTTONS.
3. PROVIDE SIMPLEX 4098-XAD-100 OR EQUAL AIR ASPIRATION SMOKE DETECTOR SYSTEM FOR ELECTRICAL VAULT. MOUNT AIR ASPIRATION SMOKE DETECTORS IN MECHANICAL ROOM ADJACENT TO PANELBOARD. DETECTORS SHALL BE COMPLETELY INTELLIGENT DEVICES COMMUNICATING WITH FIRE ALARM CONTROL PANEL ON SLC INPUT CIRCUIT AND INDICATE DEVICE ALARM, TROUBLE, AND SUPERVISORY STATUS AT FIRE ALARM CONTROL PANEL. REFER TO PLAN NOTES IN ELECTRICAL VAULT ON SHEET e3.00D.
4. PROVIDE (2) ADDRESSABLE FIRE ALARM CONTROL MODULES FOR INTERFACE TO SECURITY SYSTEM. ONE MODULE SHALL BE PROVIDED WITH CONTACTS WHICH CLOSE WHEN FIRE ALARM SYSTEM IS IN TROUBLE CONDITION AND ONE MODULE PROVIDED WITH CONTACTS WHICH CLOSE WHEN FIRE ALARM SYSTEM IS IN ALARM CONDITION. COORDINATE EXACT LOCATION OF MODULES WITH SECURITY SYSTEM INSTALLER FOR INTERFACE. MODULES SHALL BE LOCATED WITHIN 3' OF SECURITY SYSTEM INTERFACE.
5. INSTALL REMOTE INDICATOR AND TEST SWITCH IN NEAREST CORRIDOR. WALL MOUNT INDICATOR.
6. TYPICAL: PROVIDE DUCT SMOKE DETECTOR IN DUCTWORK WITH SEPARATE ADDRESSABLE CONTROL MODULE WITHIN 3' OF DAMPER MOTOR OPERATOR. FIRE ALARM SYSTEM SHALL DISABLE 120V TO DAMPER DURING SMOKE DETECTION.
7. DAMPER IS ASSOCIATED WITH MOTORS IN SF-ST-1. DAMPER SHALL BE CLOSED BY FIRE ALARM SYSTEM UPON SIGNAL FROM BUILDING AUTOMATION SYSTEM UPON LOSS OF AIR FLOW. REFER TO SHEET e3.05B.
8. PROVIDE ADDRESSABLE FIRE ALARM MONITORING MODULE TO MONITOR SIGNAL FROM BAS TO INDICATE THAT MOTORS AHU-L-1,2,3 HAVE STOPPED AIR FLOW. UPON SIGNAL, CLOSE ASSOCIATED DAMPERS FOR THESE MOTORS ON ALL FLOORS INDICATED ON e3 SERIES DRAWINGS. COORDINATE EXACT LOCATION OF MONITORING MODULE WITH BUILDING CONTROLS DIVISION 23 CONTRACTOR.

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For AFFILIATED ENGINEERS, INC.

By

Name RONALD M. PARSLEY

Date 02-24-2012 Reg. No. 25163

Issued for	Date
100% CD set	12-16-2011
Bid Package No. 2	02-24-2012

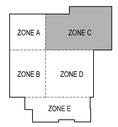
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Date 12/16/11

Project

Physics and Nanotechnology Building

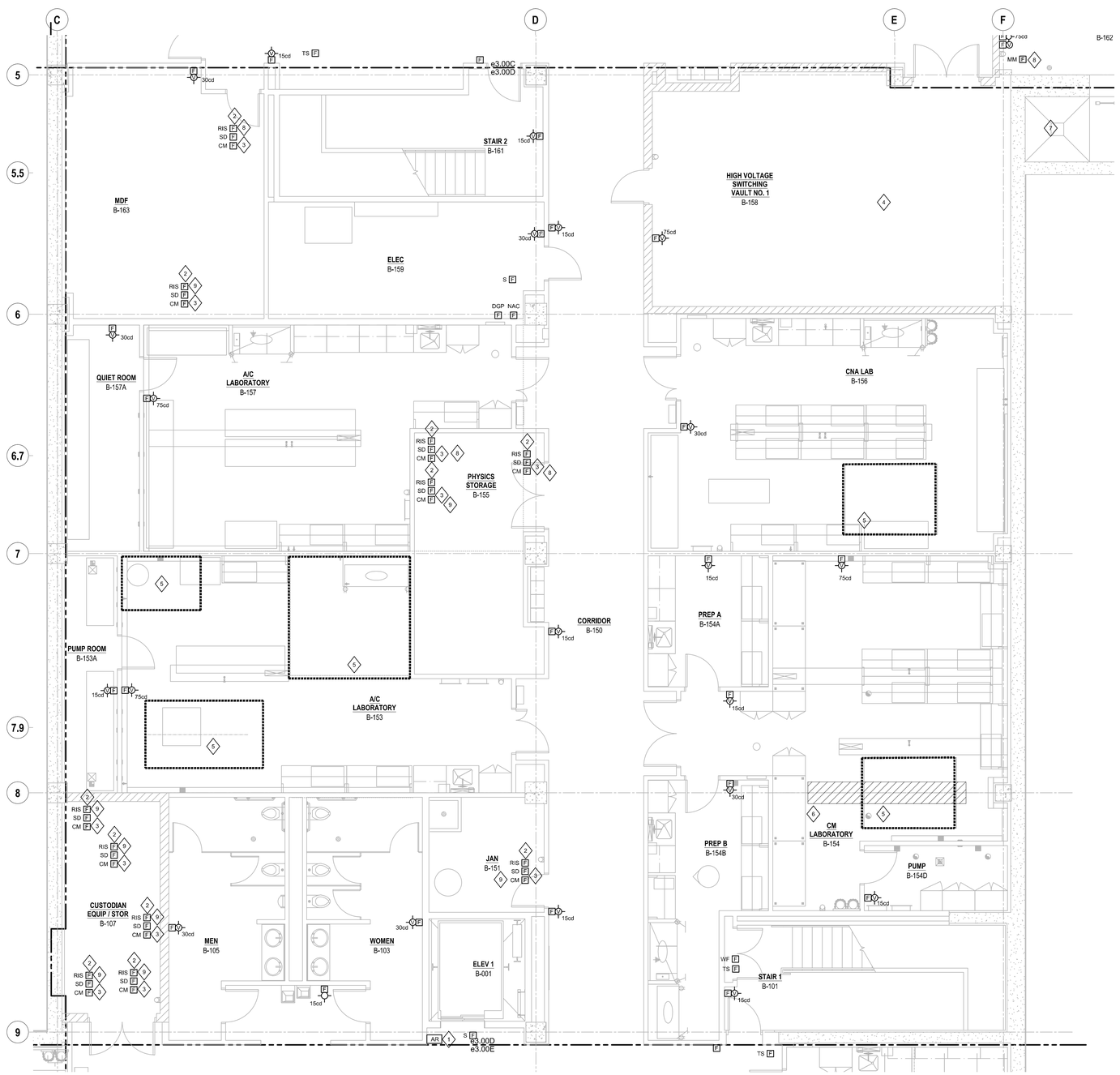
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ELECTRICAL SYSTEMS
BASEMENT - ZONE C

e3.00C



1 **ELECTRICAL SYSTEMS BASEMENT - ZONE D**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. REFER TO FIRE PROTECTION SERIES DRAWINGS FOR LOCATING OF WATERFLOW AND TAMPER SWITCHES.
2. REFER TO MECHANICAL SERIES DRAWINGS FOR LOCATIONS OF DUCT MOUNTED SMOKE DETECTORS AND DAMPERS.
3. REFER TO T SERIES DRAWINGS AND DIVISION 27 AND 28 SPECIFICATIONS FOR COORDINATION WITH STRUCTURED CABLING SYSTEM, VIDEO SURVEILLANCE SYSTEM AND ACCESS CONTROL SYSTEM. PROVIDE BOXES AND CONDUIT PATHWAYS FOR THOSE SYSTEMS INDICATED ON T SERIES DRAWINGS.

SHEET KEYNOTES

1. PROVIDE WIRING AND CONDUIT BETWEEN AREA OF RESCUE ASSISTANCE REMOTE UNIT ANT AND MASTER UNIT IN LOBBY 1-100A, UNITS. MOUNT DEVICE AT 42" AFF TO CENTER. COORDINATE EXACT LOCATION TO AVOID ELEVATOR CALL BUTTONS.
2. INSTALL REMOTE INDICATOR AND TEST SWITCH IN NEAREST CORRIDOR. WALL MOUNT INDICATOR.
3. TYPICAL: PROVIDE DUCT SMOKE DETECTOR IN DUCTWORK WITH SEPARATE ADDRESSABLE CONTROL MODULE WITHIN 3' OF DAMPER MOTOR OPERATOR. FIRE ALARM SYSTEM SHALL DISABLE 120V TO DAMPER DURING SMOKE DETECTION.
4. REFER TO SHEET e3.00C FOR DESCRIPTION OF SMOKE DETECTION FOR ELECTRICAL VAULT B-158. PROVIDE CPVC SAMPLING INTAKE PIPE FROM ELECTRICAL VAULT AND RETURN EXHAUST PIPE BACK INTO ELECTRICAL VAULT FROM DETECTOR SYSTEM LOCATED IN MECHANICAL ROOM B-164. PROVIDE UL LISTED PENETRATION OF CPVC PIPE THROUGH 3 HOUR VAULT WALL. PROVIDE SAMPLING PIPE AND POINTS AS REQUIRED AND RECOMMENDED BY MANUFACTURER FOR TOTAL ROOM DETECTION COVERAGE.
5. ZONE BORDERED BY HEAVY DASHED LINE IS AN AREA WHICH SHALL BE KEPT CLEAR OF ALL CONDUITS FOR ALL ELECTRICAL SYSTEMS EXCEPT FOR SPECIFIC EXEMPTIONS WHICH MAY BE INDICATED ON LIGHTING SHEET. NO ELECTRICAL DEVICES, RACEWAYS, OR EQUIPMENT SHALL BE INSTALLED IN THIS ZONE. REFER TO ARCHITECTURAL AND LF SERIES DRAWINGS FOR FURTHER INFORMATION.
6. ZONE INDICATED BY CROSSHATCH IS AN AREA WHICH SHALL BE KEPT CLEAR OF ALL CONDUITS FOR ALL ELECTRICAL SYSTEMS. NO ELECTRICAL DEVICES, RACEWAYS, OR EQUIPMENT SHALL BE INSTALLED IN THIS ZONE. REFER TO ARCHITECTURAL AND LF SERIES DRAWINGS FOR FURTHER INFORMATION.
7. REFER TO SHEET e7.04 FOR CONTINUATION OF STEAM TUNNEL.
8. DAMPER IS ASSOCIATED WITH MOTORS IN AHU-L-1,2,3. DAMPER SHALL BE CLOSED BY FIRE ALARM SYSTEM UPON SIGNAL FROM BUILDING AUTOMATION SYSTEM UPON LOSS OF AIR FLOW. REFER TO SHEET e3.05B.
9. DAMPER IS ASSOCIATED WITH MOTORS IN LE-1,2,3,4. DAMPER SHALL BE CLOSED BY FIRE ALARM SYSTEM UPON SIGNAL FROM BUILDING AUTOMATION SYSTEM UPON LOSS OF AIR FLOW. REFER TO SHEET e3.05B.

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For AFFILIATED ENGINEERS, INC.

By

Name RONALD M. PARSLEY

Date 02-24-2012 Reg. No. 25163

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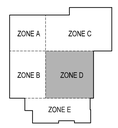
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ELECTRICAL SYSTEMS
BASEMENT - ZONE D

e3.00D

1 **ELECTRICAL SYSTEMS BASEMENT - ZONE E**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. REFER TO FIRE PROTECTION SERIES DRAWINGS FOR LOCATING OF WATERFLOW AND TAMPER SWITCHES.
2. REFER TO MECHANICAL SERIES DRAWINGS FOR LOCATIONS OF DUCT MOUNTED SMOKE DETECTORS AND DAMPERS.
3. REFER TO T SERIES DRAWINGS AND DIVISION 27 AND 28 SPECIFICATIONS FOR COORDINATION WITH STRUCTURED CABLING SYSTEM, VIDEO SURVEILLANCE SYSTEM AND ACCESS CONTROL SYSTEM. PROVIDE BOXES AND CONDUIT PATHWAYS FOR THOSE SYSTEMS INDICATED ON T SERIES DRAWINGS.

SHEET KEYNOTES

1. ZONE BORDERED BY HEAVY DASHED LINE IS AN AREA WHICH SHALL BE KEPT CLEAR OF ALL CONDUITS FOR ALL ELECTRICAL SYSTEMS EXCEPT FOR SPECIFIC EXEMPTIONS WHICH MAY BE INDICATED ON LIGHTING SHEET. NO ELECTRICAL DEVICES, RACEWAYS, OR EQUIPMENT SHALL BE INSTALLED IN THIS ZONE. REFER TO ARCHITECTURAL AND LF SERIES DRAWINGS FOR FURTHER INFORMATION.
2. ZONE INDICATED BY CROSSHATCH IS AN AREA WHICH SHALL BE KEPT CLEAR OF ALL CONDUITS FOR ALL ELECTRICAL SYSTEMS. NO ELECTRICAL DEVICES, RACEWAYS, OR EQUIPMENT SHALL BE INSTALLED IN THIS ZONE. REFER TO ARCHITECTURAL AND LF SERIES DRAWINGS FOR FURTHER INFORMATION.

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By

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Date 02-24-2012 Reg. No. 25163

Issued for	Date
100% CD set	12-16-2011
Bid Package No. 2	02-24-2012
Proposal Request No. 3	04-06-2012

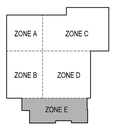
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Project

Physics and Nanotechnology Building

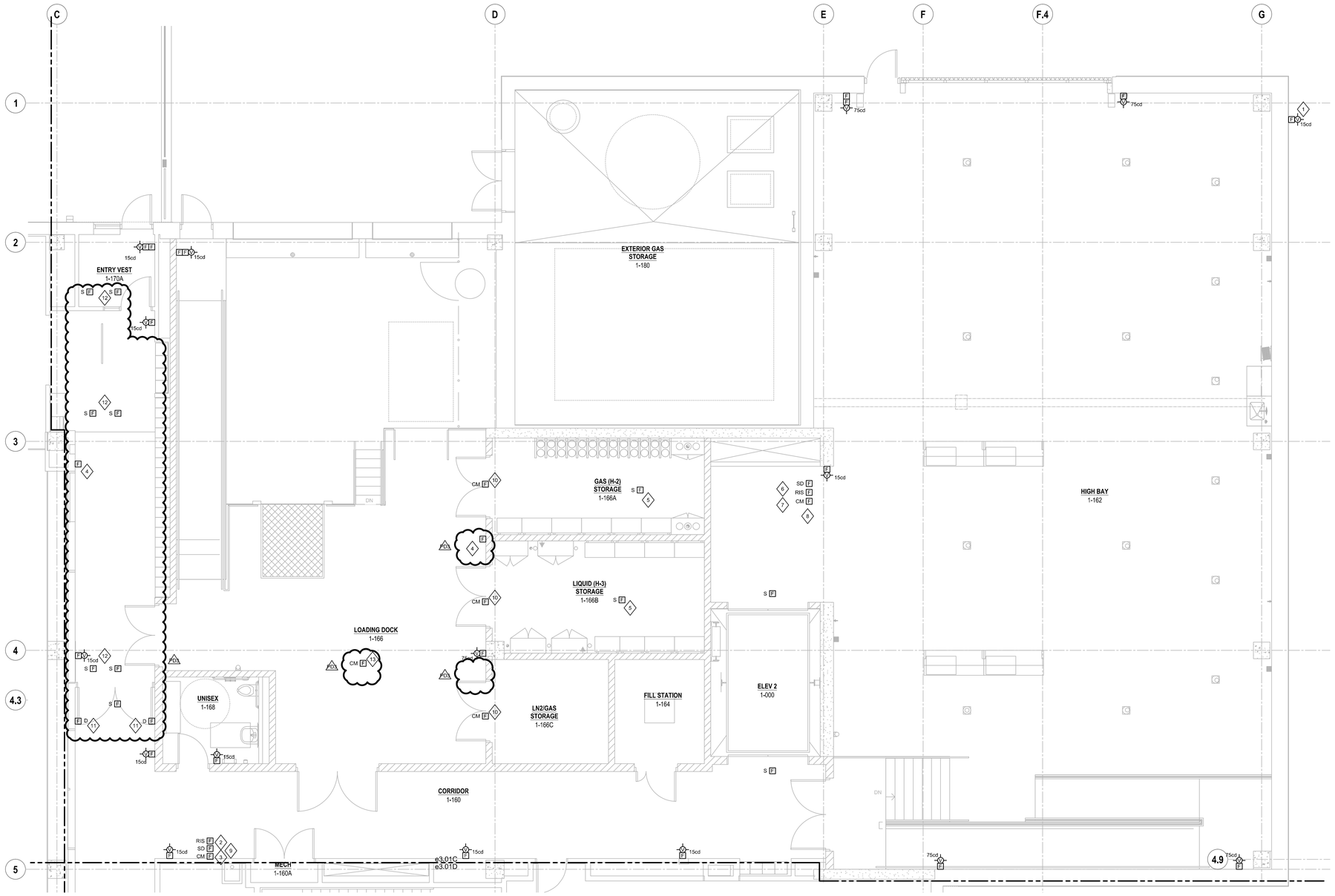
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ELECTRICAL SYSTEMS
BASEMENT - ZONE E

e3.00E



1 **ELECTRICAL SYSTEMS LEVEL 1 - ZONE C**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. REFER TO FIRE PROTECTION SERIES DRAWINGS FOR LOCATING OF WATERFLOW AND TAMPER SWITCHES.
2. REFER TO MECHANICAL SERIES DRAWINGS FOR LOCATIONS OF DUCT MOUNTED SMOKE DETECTORS AND DAMPERS.
3. ALL CONDUITS INDICATED IN HIGH BAY LAB THIS SHEET SHALL BE SURFACE MOUNTED TO WALL.
4. REFER TO T SERIES DRAWINGS AND DIVISION 27 AND 28 SPECIFICATIONS FOR COORDINATION WITH STRUCTURED CABLING SYSTEM, VIDEO SURVEILLANCE SYSTEM AND ACCESS CONTROL SYSTEM. PROVIDE BOXES AND CONDUIT PATHWAYS FOR THOSE SYSTEMS INDICATED ON T SERIES DRAWINGS.

SHEET KEYNOTES

1. PROVIDE WEATHERPROOF, FLUSH MOUNTED RED SPEAKER/STROBE TO ACTIVATE UPON ANY BUILDING FIRE ALARM WATERFLOW SIGNAL. PROVIDE WEATHERPROOF GASKET FOR MOUNT TO RECESSED ELECTRICAL BOX. LOCATE DEVICE ABOVE FIRE DEPARTMENT CONNECTION. COORDINATE EXACT LOCATION WITH APPROPRIATE CONTRACTOR.
2. INSTALL REMOTE INDICATOR AND TEST SWITCH IN NEAREST CORRIDOR. WALL MOUNT INDICATOR.
3. TYPICAL: PROVIDE DUCT SMOKE DETECTOR IN DUCTWORK WITH SEPARATE ADDRESSABLE CONTROL MODULE WITHIN 3' OF DAMPER MOTOR OPERATOR. FIRE ALARM SYSTEM SHALL DISABLE 120V TO DAMPER DURING SMOKE DETECTION.
4. PER INTERNATIONAL BUILDING CODE SECTION 414, PROVIDE A DISTINCT MANUAL PULL STATION FOR USE IN CASE OF SPILL OR OTHER EMERGENCY RELATED TO THE STORAGE OF HAZARDOUS MATERIALS IN H OCCUPANCY. PULL STATION SHALL BE DISTINCT GREEN COLOR AND LABELED "HAZARD ALARM". ACTIVATION OF PULL STATION SHALL INDICATE A SEPARATE AND DISTINCT AUDIO MESSAGE ON THE FIRE ALARM SPEAKERS AND BE TRANSMITTED AS A SEPARATE AND DISTINCT ALARM CONDITION TO BSAC AND THE VIA THE FIRE ALARM DACT. AUDIO MESSAGE ON FIRE ALARM SPEAKERS WITHIN THIS ROOM AND THROUGHOUT THE CLEANROOM FIRE ALARM SPEAKERS INDICATED ON "e-cr" SERIES DRAWINGS, ROOM 1-170A, ROOM 1-166, AND THE CORRIDOR BETWEEN 1-166 AND THE CLEAN ROOM SHALL BE A HUMAN VOICE RECORDING INDICATING THE PRESENCE OF AN EMERGENCY RELATED TO HAZARDOUS MATERIAL STORAGE. A2.5
5. SMOKE DETECTOR AND ALL WIRING WITHIN THIS ROOM SHALL BE IN ACCORDANCE WITH CLASS 1, DIVISION 2 WIRING METHODS AS REQUIRED BY THE NATIONAL ELECTRICAL CODE.
6. INSTALL REMOTE INDICATOR AND TEST SWITCH IN NEAREST CORRIDOR. WALL MOUNT INDICATOR.
7. TYPICAL: PROVIDE DUCT SMOKE DETECTOR IN DUCTWORK WITH SEPARATE ADDRESSABLE CONTROL MODULE WITHIN 3' OF DAMPER MOTOR OPERATOR. FIRE ALARM SYSTEM SHALL DISABLE 120V TO DAMPER DURING SMOKE DETECTION.
8. DAMPER IS ASSOCIATED WITH MOTORS IN SF-ST-1. DAMPER SHALL BE CLOSED BY FIRE ALARM SYSTEM UPON SIGNAL FROM BUILDING AUTOMATION SYSTEM UPON LOSS OF AIR FLOW. REFER TO SHEET e3.05B.
9. DAMPER IS ASSOCIATED WITH MOTORS IN AHU-L-1,2,3. DAMPER SHALL BE CLOSED BY FIRE ALARM SYSTEM UPON SIGNAL FROM BUILDING AUTOMATION SYSTEM UPON LOSS OF AIR FLOW. REFER TO SHEET e3.05B.
10. PROVIDE ADDRESSABLE FIRE ALARM CONTROL MODULES FOR INTERFACE TO SECURITY SYSTEM WITH CONTACTS WHICH CLOSE WHEN FIRE ALARM SYSTEM IS IN TROUBLE CONDITION OR WHEN FIRE ALARM SYSTEM IS IN ALARM CONDITION. COORDINATE EXACT LOCATION OF MODULES WITH SECURITY SYSTEM INSTALLATION CONTRACTOR.
11. PROVIDE 24VDC REVERCABLE DOOR HOLDER POWER SUPPLY AND MODULE WITHIN 3' OF DOOR HOLDERS. DOOR HOLDER CIRCUIT SHALL BE BATTERY BACKED UP FOR 5 MINUTES AT A CALCULATED AMP OF 0.08A. DOORS SHALL CLOSE UPON BUILDING FIRE ALARM CONDITION OR IN EVENT THAT PULL STATIONS IDENTIFIED IN KEYNOTE 4 IS ACTIVATED.
12. SMOKE DETECTORS INDICATED ARE FOR USE OF H-5 OCCUPANCY AREA. ONE DETECTOR SHALL BE MOUNTED TO CEILING WITH A MINIMUM 3' CLEARANCE FROM ANY AIR DIFFUSER, ONE DETECTOR SHALL BE LOCATED ABOVE ACCESSIBLE CEILING FOR DETECTION OF SMOKE ABOVE CEILING. COORDINATE EXACT LOCATION WITH MECHANICAL AND PIPING CONTRACTORS. DETECTORS SHALL BE ACCESSIBLE AND NO FURTHER THAN 30' ON CENTER.
13. PROVIDE ADDRESSABLE FIRE ALARM CONTROL MODULE FOR INTERFACE TO HVAC SYSTEM EXHAUST VENT EV 1-166. CONTACTS ON RELAY SHALL CLOSE WHEN BUILDING FIRE ALARM IS ACTIVATED OR WHEN PULL STATIONS IDENTIFIED IN KEYNOTE 4 ARE ACTIVATED. LOCATE MODULE WITHIN 3' OF EV 1-166. COORDINATE EXACT LOCATION WITH MECHANICAL CONTRACTOR.

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For AFFILIATED ENGINEERS, INC.

By

Name RONALD M. PARSLEY

Date 02-24-2012 Reg. No. 25163

Issued for	Date
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Bid Package No. 2	02-24-2012
Project Directive No. 3	05-11-2012

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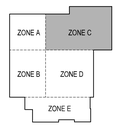
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Project

Physics and Nanotechnology Building

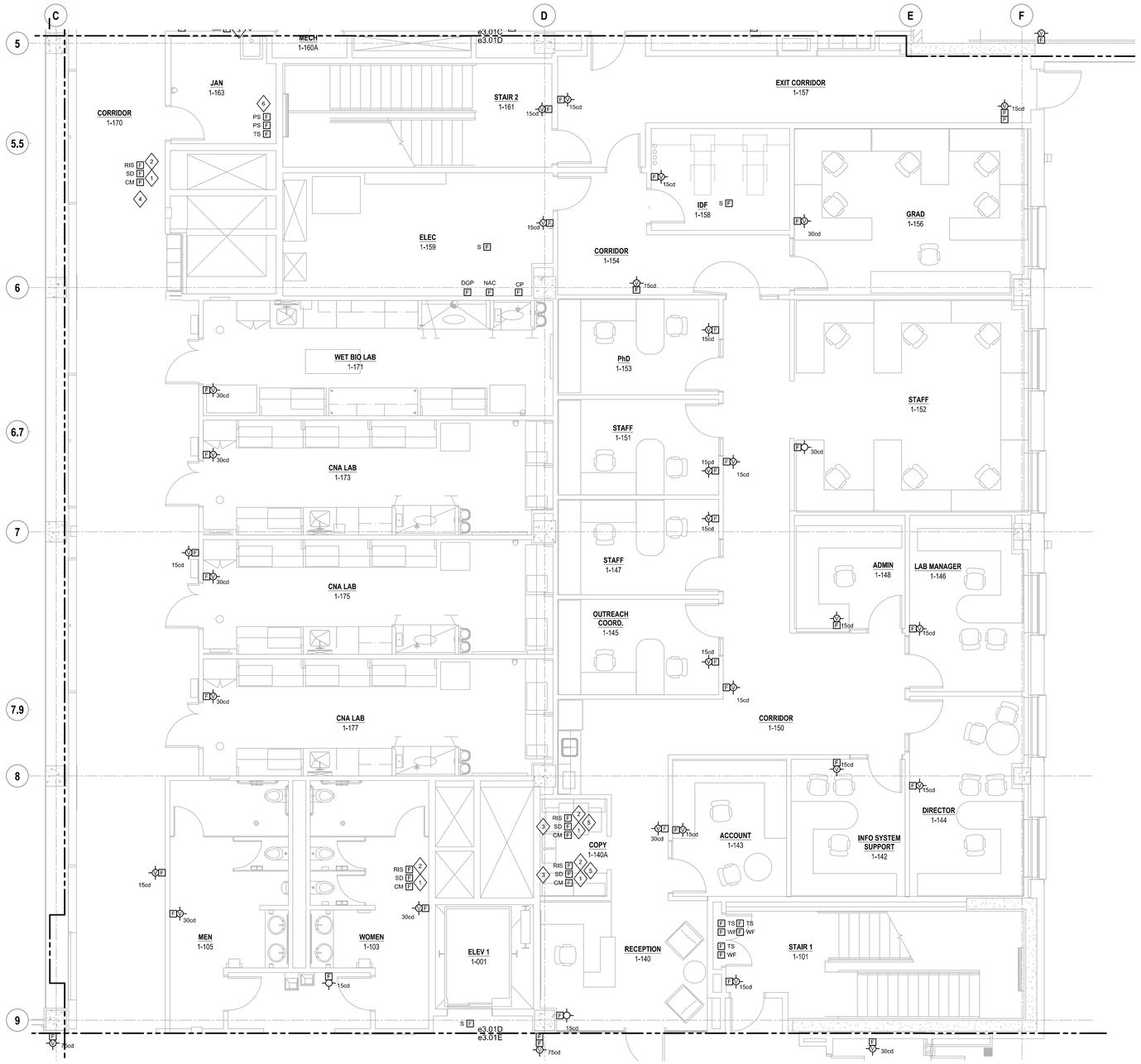
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ELECTRICAL SYSTEMS
LEVEL 1 - ZONE C

e3.01C



1 **ELECTRICAL SYSTEMS LEVEL 1 - ZONE D**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. REFER TO FIRE PROTECTION SERIES DRAWINGS FOR LOCATING OF WATERFLOW AND TAMPER SWITCHES.
2. REFER TO MECHANICAL SERIES DRAWINGS FOR LOCATIONS OF DUCT MOUNTED SMOKE DETECTORS AND DAMPERS.
3. REFER TO T SERIES DRAWINGS AND DIVISION 27 AND 28 SPECIFICATIONS FOR COORDINATION WITH STRUCTURED CABLING SYSTEM, VIDEO SURVEILLANCE SYSTEM AND ACCESS CONTROL SYSTEM. PROVIDE BOXES AND CONDUIT PATHWAYS FOR THOSE SYSTEMS INDICATED ON T SERIES DRAWINGS.

SHEET KEYNOTES

1. TYPICAL: PROVIDE DUCT SMOKE DETECTOR IN DUCTWORK WITH SEPARATE ADDRESSABLE CONTROL MODULE WITHIN 3' OF DAMPER MOTOR OPERATOR. FIRE ALARM SYSTEM SHALL DISABLE 120V TO DAMPER DURING SMOKE DETECTION.
2. INSTALL REMOTE INDICATOR AND TEST SWITCH IN NEAREST CORRIDOR. WALL MOUNT INDICATOR.
3. UPON DETECTION OF SMOKE BY THIS SMOKE DETECTOR, A RELAY SHALL CLOSE TO DISABLE THE SUPPLY FAN OF AHU-01 AND RETURN FAN RF-01. PROVIDE AN ADDRESSABLE FIRE ALARM RELAY WITHIN 3' OF THE MOTOR STARTERS/VFD FOR THESE FANS IN THE PENTHOUSE TO DISABLE FANS UPON SMOKE DETECTION.
4. DAMPER IS ASSOCIATED WITH MOTORS IN LE-1,2,3,4. DAMPER SHALL BE CLOSED BY FIRE ALARM SYSTEM UPON SIGNAL FROM BUILDING AUTOMATION SYSTEM UPON LOSS OF AIR FLOW. REFER TO SHEET e3.05B.
5. DAMPER IS ASSOCIATED WITH MOTORS IN AHU-01 AND RF-01. DAMPER SHALL BE CLOSED BY FIRE ALARM SYSTEM UPON SIGNAL FROM BUILDING AUTOMATION SYSTEM UPON LOSS OF AIR FLOW. REFER TO SHEET e3.05B.
6. PROVIDE FIRE ALARM MONITORING OF HIGH PRESSURE SWITCH ALARM, LOW PRESSURE SUPERVISORY, AND TAMPER SWITCH FOR SPRINKLER DRY PIPE SYSTEM COVERING LOADING DOCK.

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By

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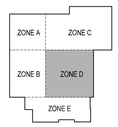
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Project

Physics and Nanotechnology Building

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ELECTRICAL SYSTEMS
LEVEL 1 - ZONE D

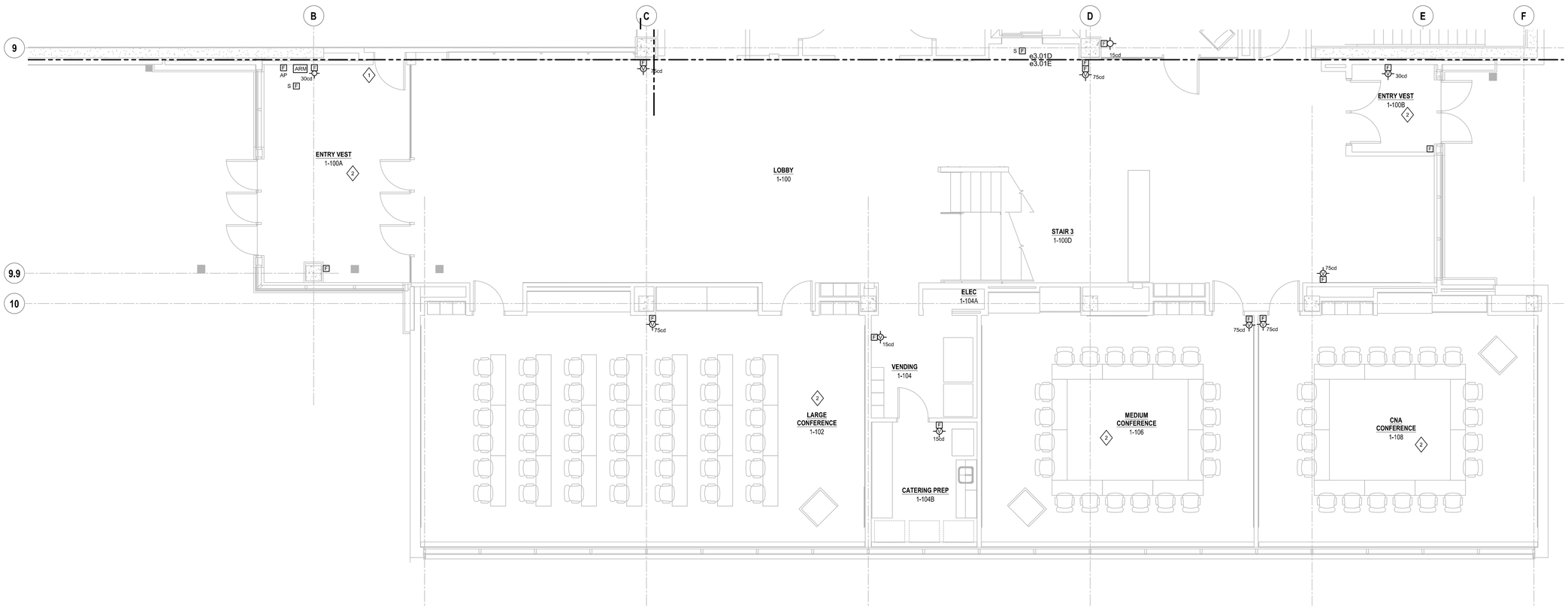
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GENERAL NOTES

1. REFER TO FIRE PROTECTION SERIES DRAWINGS FOR LOCATING OF WATERFLOW AND TAMPER SWITCHES.
2. REFER TO MECHANICAL SERIES DRAWINGS FOR LOCATIONS OF DUCT MOUNTED SMOKE DETECTORS AND DAMPERS.
3. REFER TO T SERIES DRAWINGS AND DIVISION 27 AND 28 SPECIFICATIONS FOR COORDINATION WITH STRUCTURED CABLING SYSTEM, VIDEO SURVEILLANCE SYSTEM AND ACCESS CONTROL SYSTEM. PROVIDE BOXES AND CONDUIT PATHWAYS FOR THOSE SYSTEMS INDICATED ON T SERIES DRAWINGS.

SHEET KEYNOTES

1. PROVIDE WIRING AND CONDUIT BETWEEN AREA OF RESCUE MASTER AND ASSISTANCE UNITS.
2. ROOM IS A RETURN AIR PLENUM ROOM. ALL WIRING METHODS INSTALLED IN THIS ROOM SHALL BE RATED FOR PLENUM SPACES PER THE NATIONAL ELECTRICAL CODE.



1 **ELECTRICAL SYSTEMS LEVEL 1 - ZONE E**
SCALE: 1/4" = 1'-0"

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I hereby certify that this plan or drawing was prepared by me or under my direct supervision and that I am a duly licensed ELECTRICAL ENGINEER under the laws of the State of Minnesota.

For AFFILIATED ENGINEERS, INC.

By

Name RONALD M. PARSLEY

Date 02-24-2012 Reg. No. 25163

Issued for	Date
100% CD set	12-16-2011
Bid Package No. 2	02-24-2012

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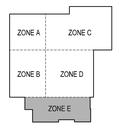
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Project

Physics and Nanotechnology Building

U of M Project # 01-155-08-1718



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ELECTRICAL SYSTEMS
LEVEL 1 - ZONE E

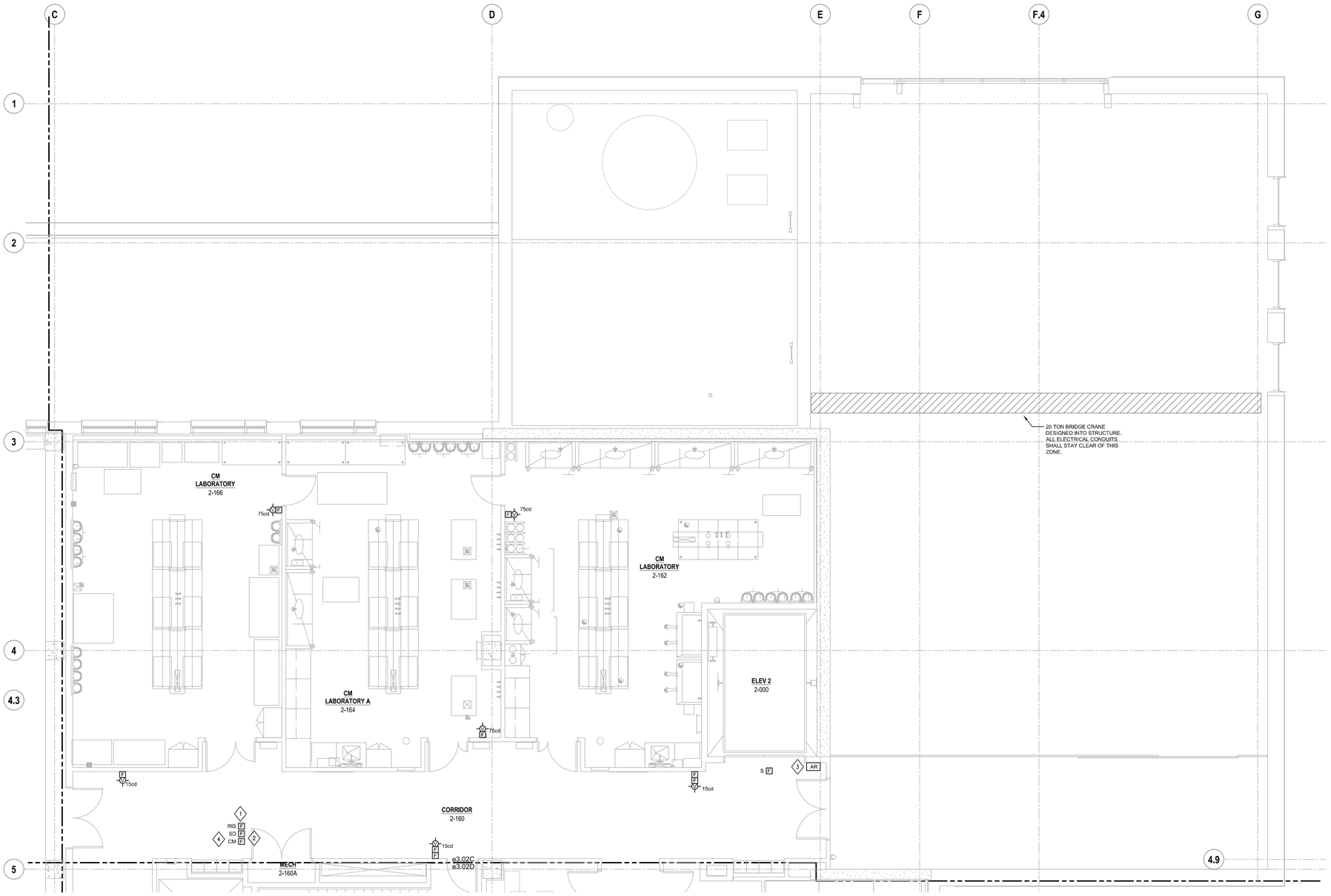
e3.01E

GENERAL NOTES

1. REFER TO FIRE PROTECTION SERIES DRAWINGS FOR LOCATING OF WATERFLOW AND TAMPER SWITCHES.
2. REFER TO MECHANICAL SERIES DRAWINGS FOR LOCATIONS OF DUCT MOUNTED SMOKE DETECTORS AND DAMPERS.
3. REFER TO T SERIES DRAWINGS AND DIVISION 27 AND 28 SPECIFICATIONS FOR COORDINATION WITH STRUCTURED CABLING SYSTEM, VIDEO SURVEILLANCE SYSTEM AND ACCESS CONTROL SYSTEM. PROVIDE BOXES AND CONDUIT PATHWAYS FOR THOSE SYSTEMS INDICATED ON T SERIES DRAWINGS.

SHEET KEYNOTES

1. INSTALL REMOTE INDICATOR AND TEST SWITCH IN NEAREST CORRIDOR. WALL MOUNT INDICATOR.
2. TYPICAL: PROVIDE DUCT SMOKE DETECTOR IN DUCTWORK WITH SEPARATE ADDRESSABLE CONTROL MODULE WITHIN 3' OF DAMPER MOTOR OPERATOR. FIRE ALARM SYSTEM SHALL DISABLE 120V TO DAMPER DURING SMOKE DETECTION.
3. PROVIDE WIRING AND CONDUIT BETWEEN AREA OF RESCUE ASSISTANCE REMOTE UNIT AND MASTER UNIT IN LOBBY 1-100A. UNITS. MOUNT DEVICE AT 42" AFF TO CENTER. COORDINATE EXACT LOCATION TO AVOID ELEVATOR CALL BUTTONS.
4. DAMPER IS ASSOCIATED WITH MOTORS IN AHU-L-1,2,3. DAMPER SHALL BE CLOSED BY FIRE ALARM SYSTEM UPON SIGNAL FROM BUILDING AUTOMATION SYSTEM UPON LOSS OF AIR FLOW. REFER TO SHEET e3.05B.



1 **ELECTRICAL SYSTEMS LEVEL 2 - ZONE C**
SCALE: 1/4" = 1'-0"

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For AFFILIATED ENGINEERS, INC.

By

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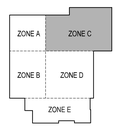
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Date 12/16/11

Project

Physics and Nanotechnology Building

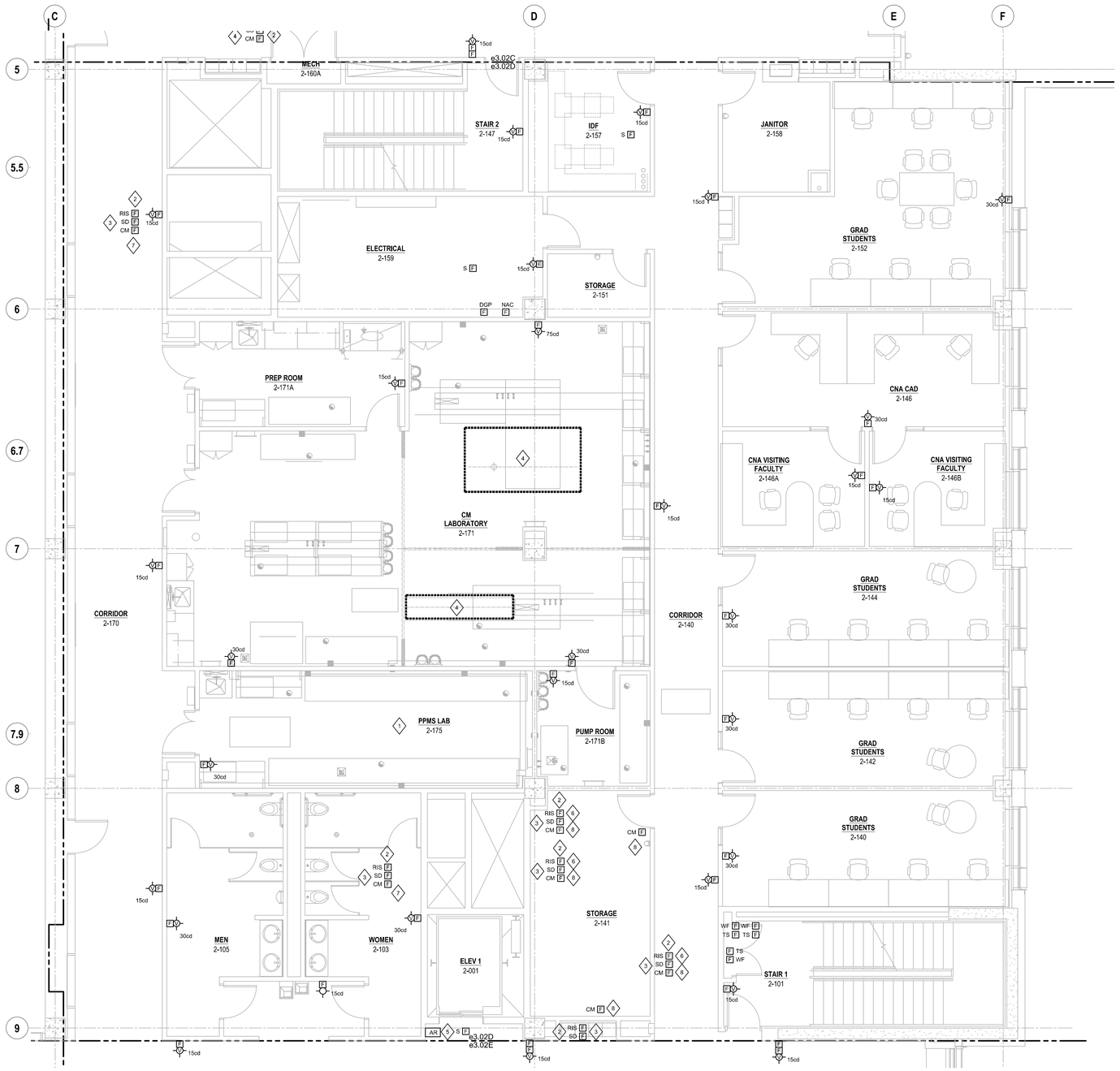
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ELECTRICAL SYSTEMS
LEVEL 2 - ZONE C

e3.02C



1 **ELECTRICAL SYSTEMS LEVEL 2 - ZONE D**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. REFER TO FIRE PROTECTION SERIES DRAWINGS FOR LOCATING OF WATERFLOW AND TAMPER SWITCHES.
2. REFER TO MECHANICAL SERIES DRAWINGS FOR LOCATIONS OF DUCT MOUNTED SMOKE DETECTORS AND DAMPERS.
3. REFER TO T SERIES DRAWINGS AND DIVISION 27 AND 28 SPECIFICATIONS FOR COORDINATION WITH STRUCTURED CABLING SYSTEM, VIDEO SURVEILLANCE SYSTEM AND ACCESS CONTROL SYSTEM. PROVIDE BOXES AND CONDUIT PATHWAYS FOR THOSE SYSTEMS INDICATED ON T SERIES DRAWINGS.

SHEET KEYNOTES

1. ALL CONDUITS FOR ALL ELECTRICAL SYSTEMS IN THIS ROOM SHALL BE RECESSED INTO WALLS. NO OVERHEAD CONDUITS SHALL BE INSTALLED OTHER THAN WHERE THEY ORIGINATE IN PANELBOARD. CONDUITS SHALL THEN IMMEDIATELY BE RECESSED INTO WALLS AND BE INSTALLED IN WALLS TO SERVE DEVICES. ONLY EXCEPTION IS FOR LIGHTING CONDUIT WHERE CONDUIT SHALL BE RUN TIGHT TO STRUCTURE.
2. INSTALL REMOTE INDICATOR AND TEST SWITCH IN NEAREST CORRIDOR. WALL MOUNT INDICATOR.
3. TYPICAL: PROVIDE DUCT SMOKE DETECTOR IN DUCTWORK WITH SEPARATE ADDRESSABLE CONTROL MODULE WITHIN 3' OF DAMPER MOTOR OPERATOR. FIRE ALARM SYSTEM SHALL DISABLE 120V TO DAMPER DURING SMOKE DETECTION.
4. ZONE BORDERED BY HEAVY DASHED LINE IS AN AREA WHICH SHALL BE KEPT CLEAR OF ALL CONDUITS FOR ALL ELECTRICAL SYSTEM EXCEPT FOR SPECIFIC EXEMPTIONS WHICH MAY BE INDICATED ON LIGHTING SHEET. NO ELECTRICAL DEVICES, RACEWAYS, OR EQUIPMENT SHALL BE INSTALLED IN THIS ZONE. REFER TO ARCHITECTURAL AND LF SERIES DRAWINGS FOR FURTHER INFORMATION.
5. PROVIDE WIRING AND CONDUIT BETWEEN AREA OF RESCUE ASSISTANCE, REMOTE UNIT AND MASTER UNIT IN LOBBY 1–100A, UNITS. MOUNT DEVICE AT 42" AFF TO CENTER. COORDINATE EXACT LOCATION TO AVOID ELEVATOR CALL BUTTONS.
6. UPON DETECTION OF SMOKE BY THIS SMOKE DETECTOR, A RELAY SHALL CLOSE TO DISABLE THE SUPPLY FAN OF AHU-O1 AND RETURN FAN RF-O1. PROVIDE AN ADDRESSABLE FIRE ALARM RELAY WITHIN 3' OF THE MOTOR STARTERS/VFD FOR THESE FANS IN THE PENTHOUSE TO DISABLE FANS UPON SMOKE DETECTION.
7. DAMPER IS ASSOCIATED WITH MOTORS IN LE-1,2,3,4. DAMPER SHALL BE CLOSED BY FIRE ALARM SYSTEM UPON SIGNAL FROM BUILDING AUTOMATION SYSTEM UPON LOSS OF AIR FLOW. REFER TO SHEET e3.05B.
8. DAMPER IS ASSOCIATED WITH MOTORS IN AHU-01 AND RF-01. DAMPER SHALL BE CLOSED BY FIRE ALARM SYSTEM UPON SIGNAL FROM BUILDING AUTOMATION SYSTEM UPON LOSS OF AIR FLOW. REFER TO SHEET e3.05B.

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For AFFILIATED ENGINEERS, INC.

By

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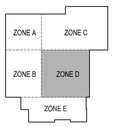
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ELECTRICAL SYSTEMS
LEVEL 2 - ZONE D

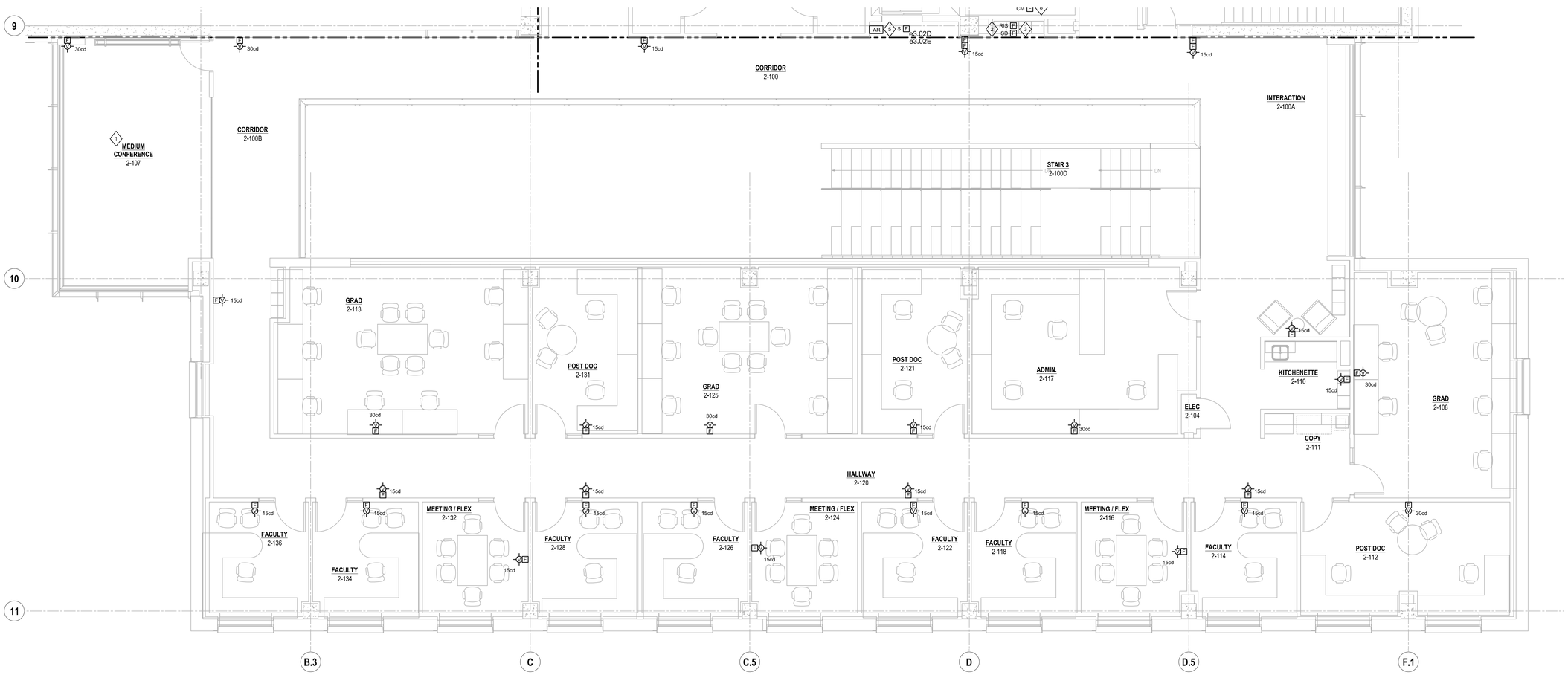
e3.02D

GENERAL NOTES

1. REFER TO FIRE PROTECTION SERIES DRAWINGS FOR LOCATING OF WATERFLOW AND TAMPER SWITCHES.
2. REFER TO MECHANICAL SERIES DRAWINGS FOR LOCATIONS OF DUCT MOUNTED SMOKE DETECTORS AND DAMPERS.
3. REFER TO T SERIES DRAWINGS AND DIVISION 27 AND 28 SPECIFICATIONS FOR COORDINATION WITH STRUCTURED CABLING SYSTEM, VIDEO SURVEILLANCE SYSTEM AND ACCESS CONTROL SYSTEM. PROVIDE BOXES AND CONDUIT PATHWAYS FOR THOSE SYSTEMS INDICATED ON T SERIES DRAWINGS.

SHEET KEYNOTES

1 ROOM 2-107 IS A RETURN AIR PLENUM ROOM. ALL WIRING METHODS INSTALLED IN THIS ROOM SHALL BE RATED FOR PLENUM SPACES PER THE NATIONAL ELECTRICAL CODE.



1 **ELECTRICAL SYSTEMS LEVEL 2 - ZONE E**
SCALE: 1/4" = 1'-0"

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For AFFILIATED ENGINEERS, INC.

By

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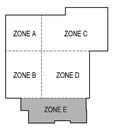
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Project

Physics and Nanotechnology Building

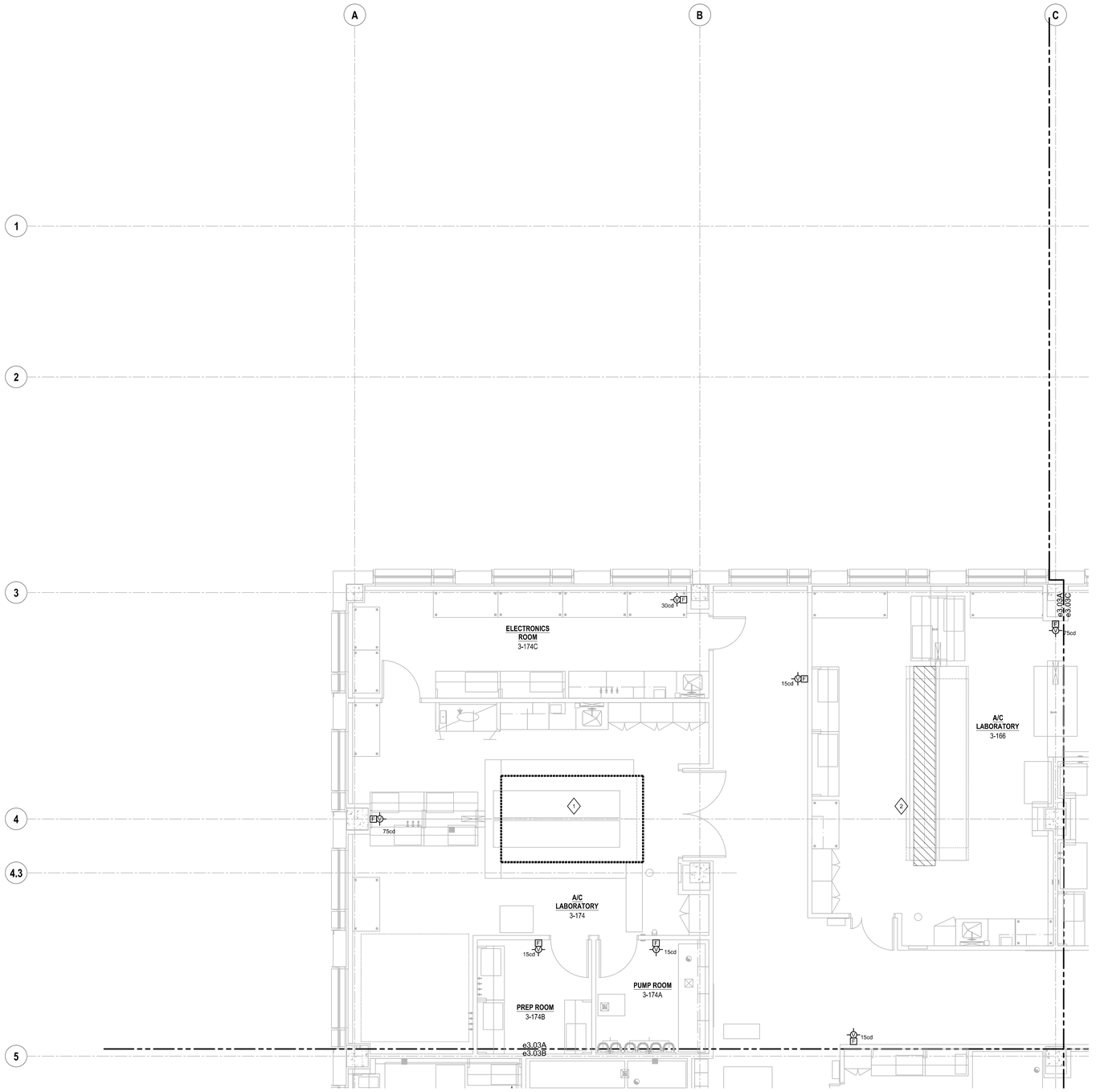
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ELECTRICAL SYSTEMS
LEVEL 2 - ZONE E

e3.02E



1 **ELECTRICAL SYSTEMS LEVEL 3 - ZONE A**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. REFER TO FIRE PROTECTION SERIES DRAWINGS FOR LOCATING OF WATERFLOW AND TAMPER SWITCHES.
2. REFER TO MECHANICAL SERIES DRAWINGS FOR LOCATIONS OF DUCT MOUNTED SMOKE DETECTORS AND DAMPERS.
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SHEET KEYNOTES

1. ZONE BORDERED BY HEAVY DASHED LINE IS AN AREA WHICH SHALL BE KEPT CLEAR OF ALL CONDUITS FOR ALL ELECTRICAL SYSTEM EXCEPT FOR SPECIFIC EXEMPTIONS WHICH MAY BE INDICATED ON LIGHTING SHEET. NO ELECTRICAL DEVICES, RACEWAYS, OR EQUIPMENT SHALL BE INSTALLED IN THIS ZONE. REFER TO ARCHITECTURAL AND LF SERIES DRAWINGS FOR FURTHER INFORMATION.
2. ZONE INDICATED BY CROSSHATCH IS AN AREA WHICH SHALL BE KEPT CLEAR OF ALL CONDUITS FOR ALL ELECTRICAL SYSTEMS. NO ELECTRICAL DEVICES, RACEWAYS, OR EQUIPMENT SHALL BE INSTALLED IN THIS ZONE. REFER TO ARCHITECTURAL AND LF SERIES DRAWINGS FOR FURTHER INFORMATION.

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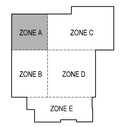
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ELECTRICAL SYSTEMS
LEVEL 3 - ZONE A

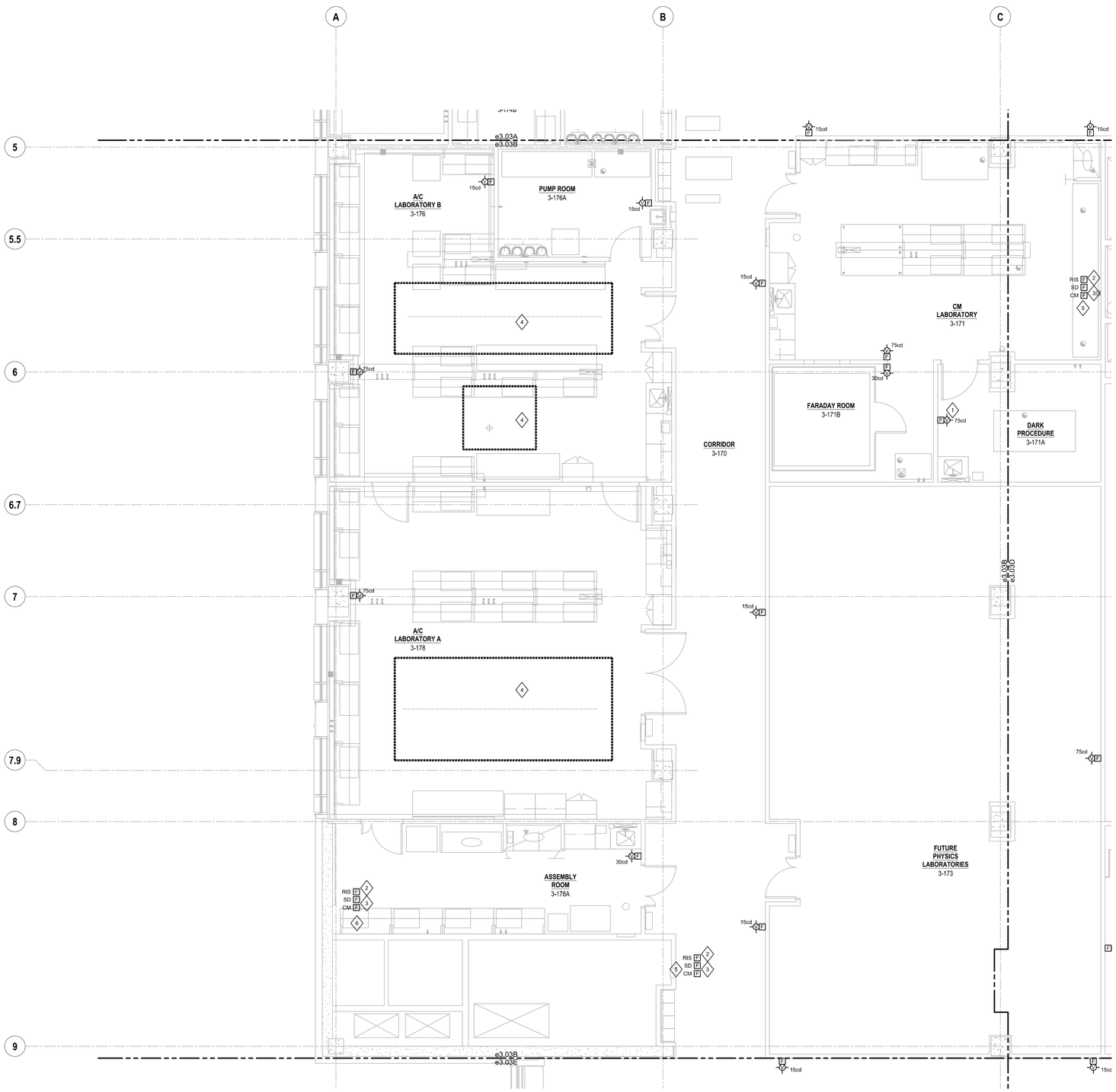
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GENERAL NOTES

1. REFER TO FIRE PROTECTION SERIES DRAWINGS FOR LOCATING OF WATERFLOW AND TAMPER SWITCHES.
2. REFER TO MECHANICAL SERIES DRAWINGS FOR LOCATIONS OF DUCT MOUNTED SMOKE DETECTORS AND DAMPERS.
3. REFER TO T SERIES DRAWINGS AND DIVISION 27 AND 28 SPECIFICATIONS FOR COORDINATION WITH STRUCTURED CABLING SYSTEM, VIDEO SURVEILLANCE SYSTEM AND ACCESS CONTROL SYSTEM. PROVIDE BOXES AND CONDUIT PATHWAYS FOR THOSE SYSTEMS INDICATED ON T SERIES DRAWINGS.

SHEET KEYNOTES

1. PROVIDE STROBE WITH RED LENS FOR DARK ROOM.
2. INSTALL REMOTE INDICATOR AND TEST SWITCH IN NEAREST CORRIDOR. WALL MOUNT INDICATOR.
3. TYPICAL: PROVIDE DUCT SMOKE DETECTOR IN DUCTWORK WITH SEPARATE ADDRESSABLE CONTROL MODULE WITHIN 3' OF DAMPER MOTOR OPERATOR. FIRE ALARM SYSTEM SHALL DISABLE 120V TO DAMPER DURING SMOKE DETECTION.
4. ZONE BORDERED BY HEAVY DASHED LINE IS AN AREA WHICH SHALL BE KEPT CLEAR OF ALL CONDUITS FOR ALL ELECTRICAL SYSTEM EXCEPT FOR SPECIFIC EXEMPTIONS WHICH MAY BE INDICATED ON LIGHTING SHEET. NO ELECTRICAL DEVICES, RACEWAYS, OR EQUIPMENT SHALL BE INSTALLED IN THIS ZONE. REFER TO ARCHITECTURAL AND LF SERIES DRAWINGS FOR FURTHER INFORMATION.
5. DAMPER IS ASSOCIATED WITH MOTORS IN AHU-L-1,2,3. DAMPER SHALL BE CLOSED BY FIRE ALARM SYSTEM UPON SIGNAL FROM BUILDING AUTOMATION SYSTEM UPON LOSS OF AIR FLOW. REFER TO SHEET e3.05B.
6. DAMPER IS ASSOCIATED WITH MOTORS IN LE-1,2,3,4. DAMPER SHALL BE CLOSED BY FIRE ALARM SYSTEM UPON SIGNAL FROM BUILDING AUTOMATION SYSTEM UPON LOSS OF AIR FLOW. REFER TO SHEET e3.05B.



1 **ELECTRICAL SYSTEMS LEVEL 3 - ZONE B**
SCALE: 1/4" = 1'-0"

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By

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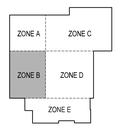
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Project

Physics and Nanotechnology Building

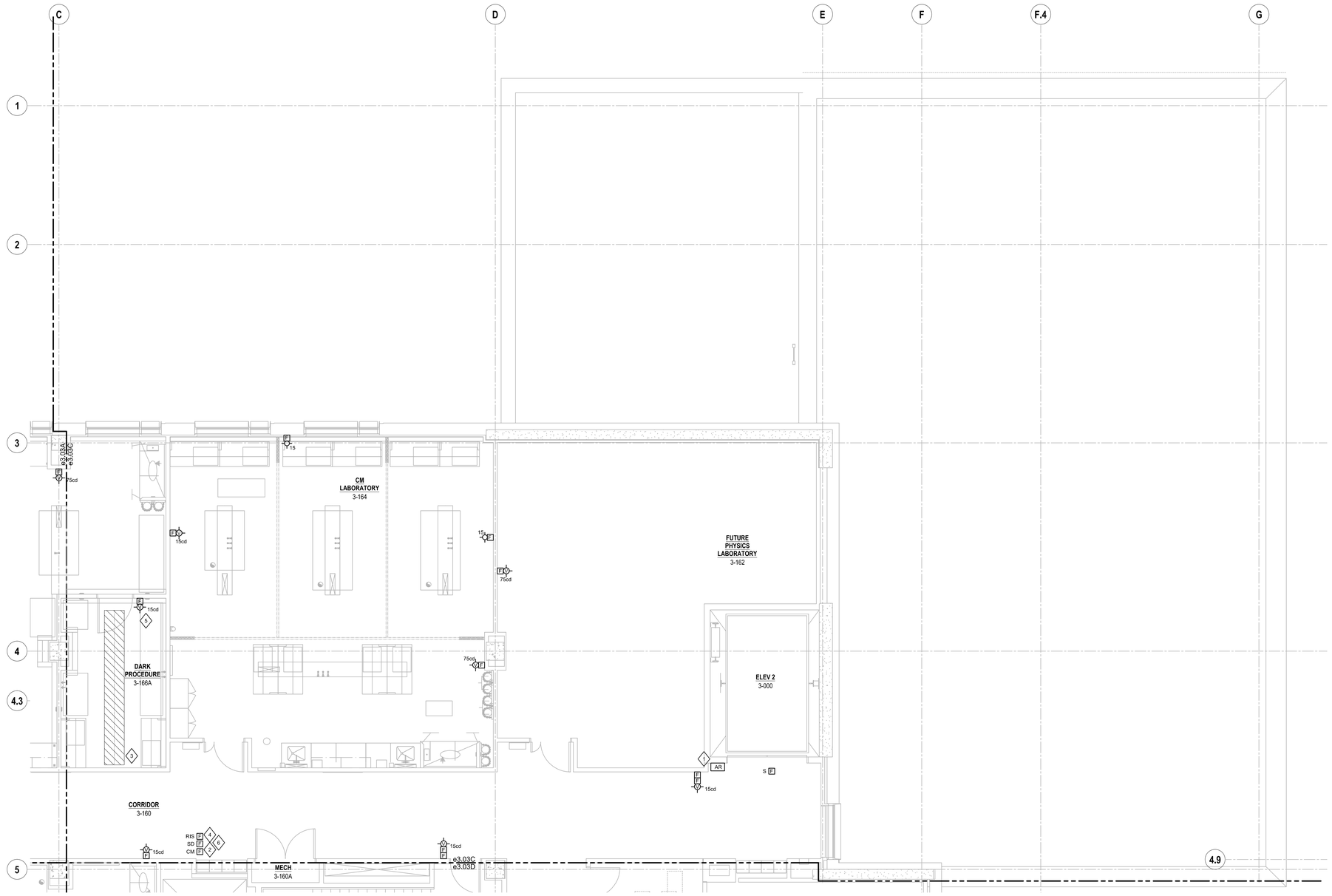
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ELECTRICAL SYSTEMS
LEVEL 3 - ZONE B

e3.03B



1 **ELECTRICAL SYSTEMS LEVEL 3 - ZONE C**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. REFER TO FIRE PROTECTION SERIES DRAWINGS FOR LOCATING OF WATERFLOW AND TAMPER SWITCHES.
2. REFER TO MECHANICAL SERIES DRAWINGS FOR LOCATIONS OF DUCT MOUNTED SMOKE DETECTORS AND DAMPERS.
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SHEET KEYNOTES

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2. TYPICAL.: PROVIDE DUCT SMOKE DETECTOR IN DUCTWORK WITH SEPARATE ADDRESSABLE CONTROL MODULE WITHIN 3' OF DAMPER MOTOR OPERATOR. FIRE ALARM SYSTEM SHALL DISABLE 120V TO DAMPER DURING SMOKE DETECTION.
3. ZONE INDICATED BY CROSSHATCH IS AN AREA WHICH SHALL BE KEPT CLEAR OF ALL CONDUITS FOR ALL ELECTRICAL SYSTEMS. NO ELECTRICAL DEVICES, RACEWAYS, OR EQUIPMENT SHALL BE INSTALLED IN THIS ZONE. REFER TO ARCHITECTURAL AND LF SERIES DRAWINGS FOR FURTHER INFORMATION.
4. INSTALL REMOTE INDICATOR AND TEST SWITCH IN NEAREST CORRIDOR. WALL MOUNT INDICATOR.
5. PROVIDE STROBE WITH RED LENS FOR DARK ROOM.
6. DAMPER IS ASSOCIATED WITH MOTORS IN AHU-L-1,2,3. DAMPER SHALL BE CLOSED BY FIRE ALARM SYSTEM UPON SIGNAL FROM BUILDING AUTOMATION SYSTEM UPON LOSS OF AIR FLOW. REFER TO SHEET e3.05B.

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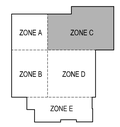
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Project

Physics and Nanotechnology Building

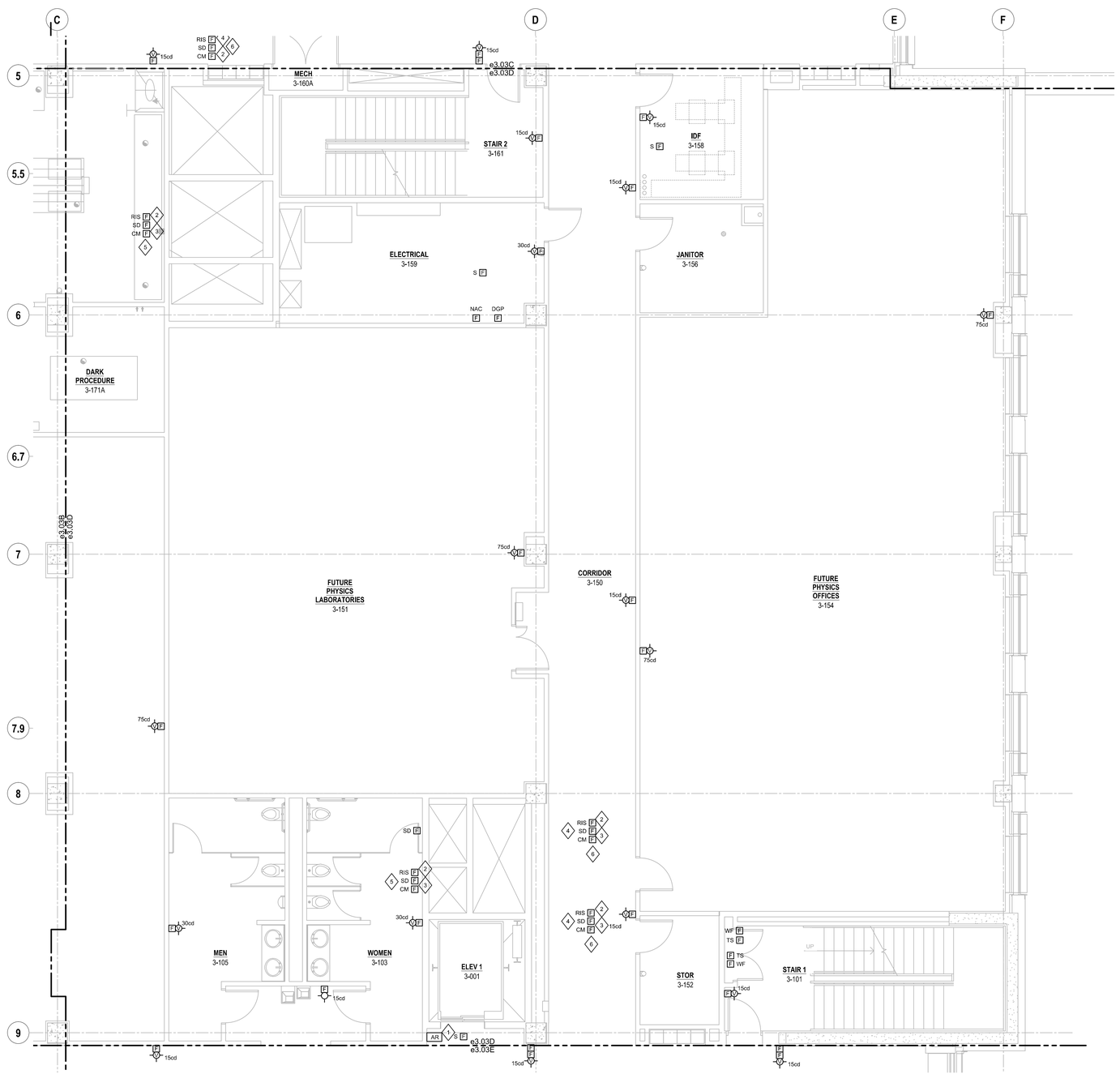
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ELECTRICAL SYSTEMS
LEVEL 3 - ZONE C

e3.03C



1 **ELECTRICAL SYSTEMS LEVEL 3 - ZONE D**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. REFER TO FIRE PROTECTION SERIES DRAWINGS FOR LOCATING OF WATERFLOW AND TAMPER SWITCHES.
2. REFER TO MECHANICAL SERIES DRAWINGS FOR LOCATIONS OF DUCT MOUNTED SMOKE DETECTORS AND DAMPERS.
3. REFER TO T SERIES DRAWINGS AND DIVISION 27 AND 28 SPECIFICATIONS FOR COORDINATION WITH STRUCTURED CABLING SYSTEM, VIDEO SURVEILLANCE SYSTEM AND ACCESS CONTROL SYSTEM. PROVIDE BOXES AND CONDUIT PATHWAYS FOR THOSE SYSTEMS INDICATED ON T SERIES DRAWINGS.

SHEET KEYNOTES

1. PROVIDE WIRING AND CONDUIT BETWEEN AREA OF RESCUE ASSISTANCE REMOTE UNIT AND MASTER UNIT IN LOBBY 1-100A. UNITS. MOUNT DEVICE AT 42" AFF TO CENTER. COORDINATE EXACT LOCATION TO AVOID ELEVATOR CALL BUTTONS.
2. INSTALL REMOTE INDICATOR AND TEST SWITCH IN NEAREST CORRIDOR. WALL MOUNT INDICATOR.
3. TYPICAL: PROVIDE DUCT SMOKE DETECTOR IN DUCTWORK WITH SEPARATE ADDRESSABLE CONTROL MODULE WITHIN 3' OF DAMPER MOTOR OPERATOR. FIRE ALARM SYSTEM SHALL DISABLE 120V TO DAMPER DURING SMOKE DETECTION.
4. UPON DETECTION OF SMOKE BY THIS SMOKE DETECTOR, A RELAY SHALL CLOSE TO DISABLE THE SUPPLY FAN OF AHU-O1 AND RETURN FAN RF-O1. PROVIDE AN ADDRESSABLE FIRE ALARM RELAY WITHIN 3' OF THE MOTOR STARTERS/VFD FOR THESE FANS IN THE PENTHOUSE TO DISABLE FANS UPON SMOKE DETECTION.
5. DAMPER IS ASSOCIATED WITH MOTORS IN LE-1,2,3,4. DAMPER SHALL BE CLOSED BY FIRE ALARM SYSTEM UPON SIGNAL FROM BUILDING AUTOMATION SYSTEM UPON LOSS OF AIR FLOW. REFER TO SHEET e3.05B.
6. DAMPER IS ASSOCIATED WITH MOTORS IN AHU-01 AND RF-01. DAMPER SHALL BE CLOSED BY FIRE ALARM SYSTEM UPON SIGNAL FROM BUILDING AUTOMATION SYSTEM UPON LOSS OF AIR FLOW. REFER TO SHEET e3.05B.

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For AFFILIATED ENGINEERS, INC.

By

Name RONALD M. PARSLEY

Date 02-24-2012 Reg. No. 25163

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Bid Package No. 2	02-24-2012

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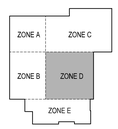
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Physics and Nanotechnology Building

U of M Project # 01-155-08-1718



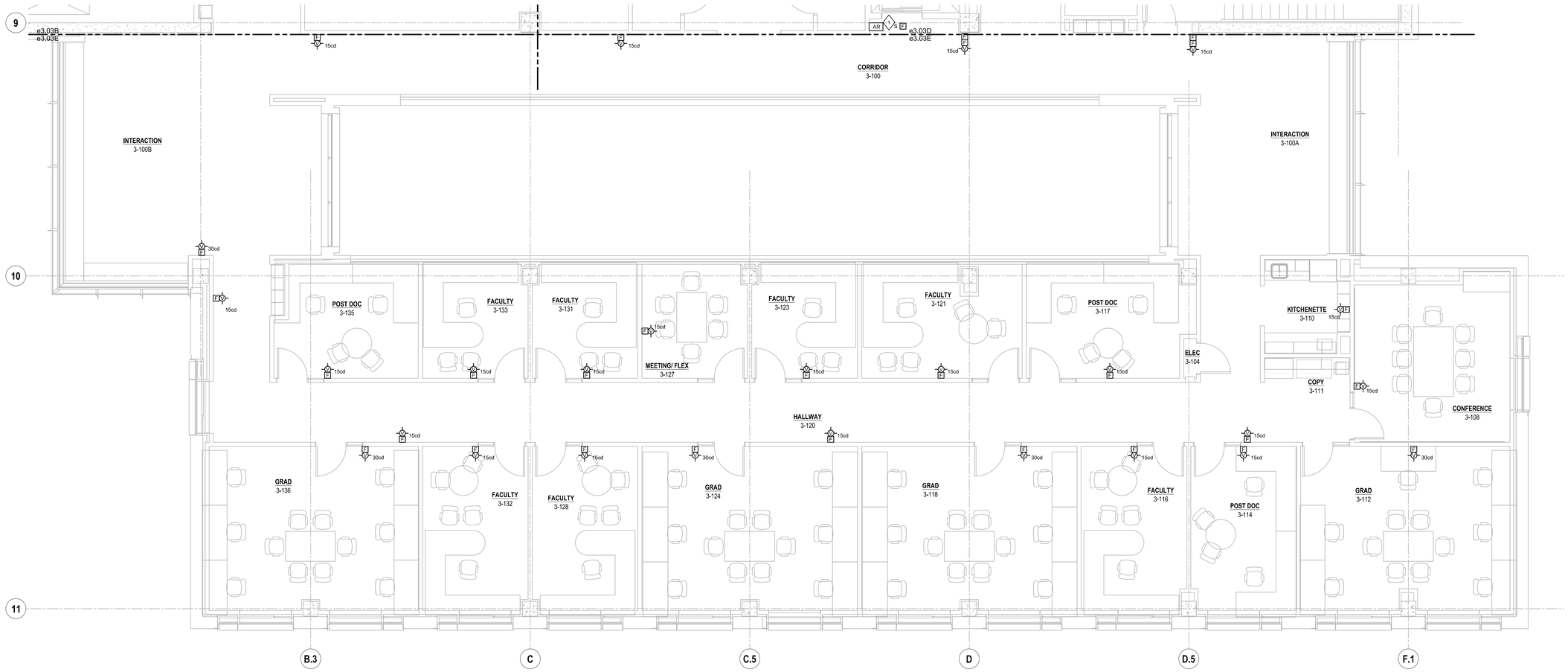
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ELECTRICAL SYSTEMS
LEVEL 3 - ZONE D

e3.03D

GENERAL NOTES

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1 **ELECTRICAL SYSTEMS LEVEL 3 - ZONE E**
SCALE: 1/4" = 1'-0"

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For AFFILIATED ENGINEERS, INC.

By

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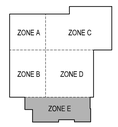
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Physics and Nanotechnology Building

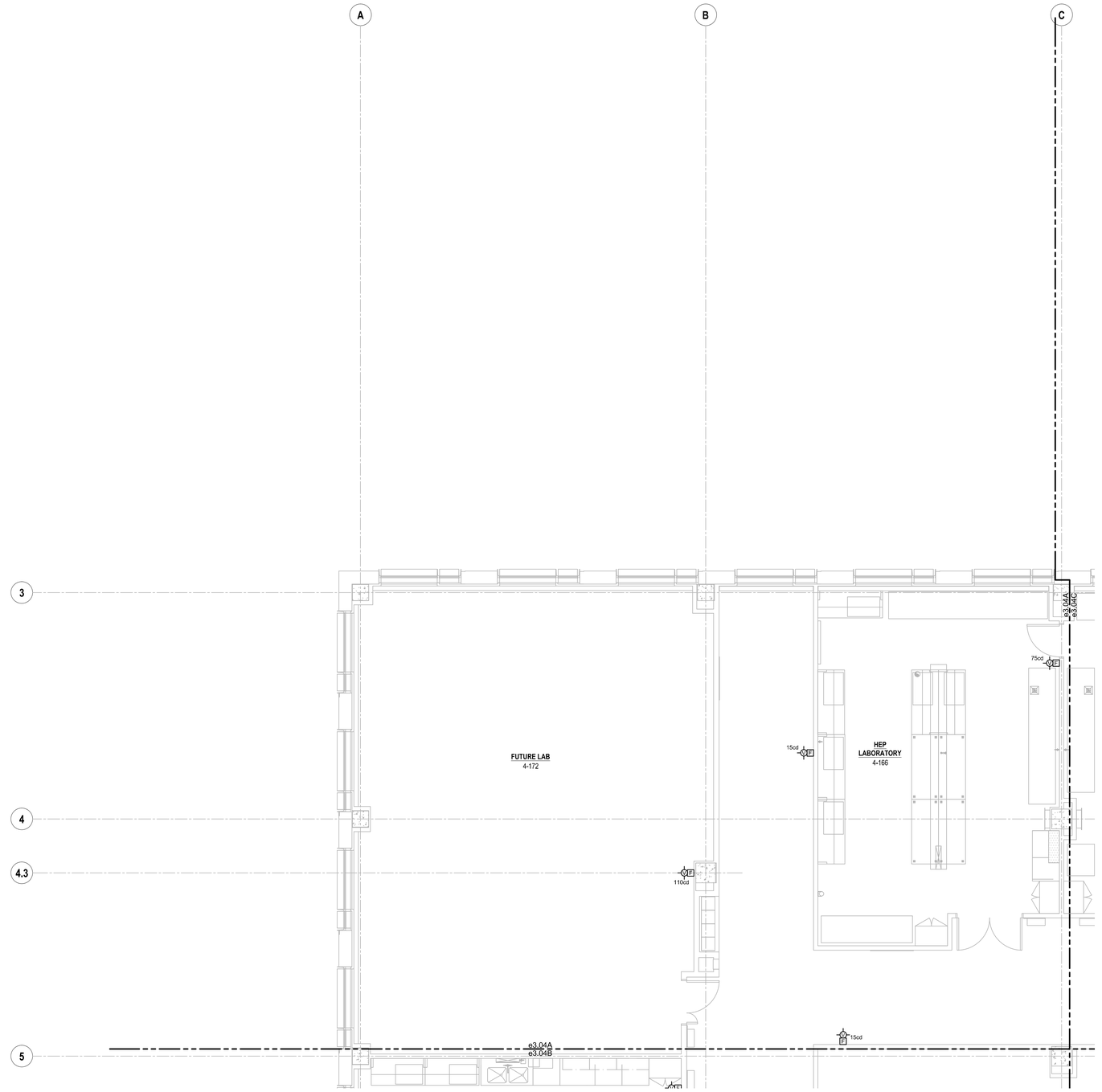
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ELECTRICAL SYSTEMS
LEVEL 3 - ZONE E

e3.03E



1 **ELECTRICAL SYSTEMS LEVEL 4 - ZONE A**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

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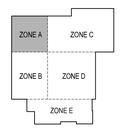
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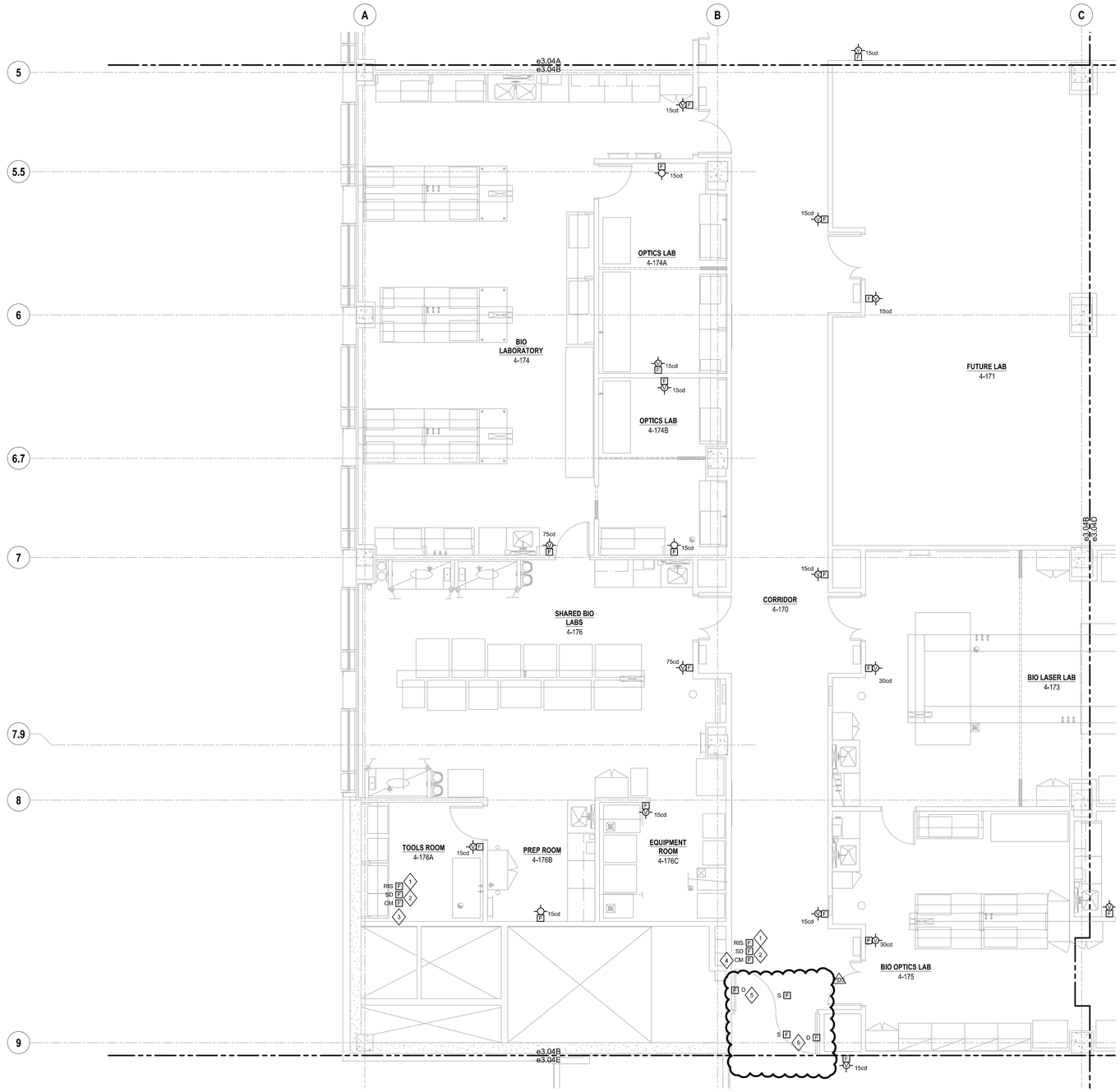
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ELECTRICAL SYSTEMS
LEVEL 4 - ZONE A

e3.04A



1 **ELECTRICAL SYSTEMS LEVEL 4 - ZONE B**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. REFER TO FIRE PROTECTION SERIES DRAWINGS FOR LOCATING OF WATERFLOW AND TAMPER SWITCHES.
2. REFER TO MECHANICAL SERIES DRAWINGS FOR LOCATIONS OF DUCT MOUNTED SMOKE DETECTORS AND DAMPERS.
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SHEET KEYNOTES

1. INSTALL REMOTE INDICATOR AND TEST SWITCH IN NEAREST CORRIDOR. WALL MOUNT INDICATOR.
2. TYPICAL: PROVIDE DUCT SMOKE DETECTOR IN DUCTWORK WITH SEPARATE ADDRESSABLE CONTROL MODULE WITHIN 3' OF DAMPER MOTOR OPERATOR. FIRE ALARM SYSTEM SHALL DISABLE 120V TO DAMPER DURING SMOKE DETECTION.
3. DAMPER IS ASSOCIATED WITH MOTORS IN LE-1,2,3,4. DAMPER SHALL BE CLOSED BY FIRE ALARM SYSTEM UPON SIGNAL FROM BUILDING AUTOMATION SYSTEM UPON LOSS OF AIR FLOW. REFER TO SHEET e3.05B.
4. DAMPER IS ASSOCIATED WITH MOTORS IN AHU-L-1,2,3. DAMPER SHALL BE CLOSED BY FIRE ALARM SYSTEM UPON SIGNAL FROM BUILDING AUTOMATION SYSTEM UPON LOSS OF AIR FLOW. REFER TO SHEET e3.05B.
5. PROVIDE 24VDC POWER TO DOOR HOLDERS BEING PROVIDED BY OTHERS. DOOR HOLDER CIRCUIT SHALL BE BATTERY BACKED UP FOR 5 MINUTES AT A CALCULATED AMP OF 0.08A. DOORS SHALL CLOSE UPON SMOKE DETECTION BY DETECTORS ON EITHER SIDE OF DOORS.

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For AFFILIATED ENGINEERS, INC.

By

Name RONALD M. PARSLEY

Date 02-24-2012 Reg. No. 25163

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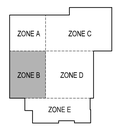
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ELECTRICAL SYSTEMS
LEVEL 4 - ZONE B

e3.04B

GENERAL NOTES

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SHEET KEYNOTES

1. PROVIDE STROBE WITH RED LENS FOR DARK ROOM.
2. PROVIDE WIRING AND CONDUIT BETWEEN AREA OF RESCUE ASSISTANCE REMOTE UNIT AND MASTER UNIT IN LOBBY 1-100A UNITS. MOUNT DEVICE AT 42" AFF TO CENTER. COORDINATE EXACT LOCATION TO AVOID ELEVATOR CALL BUTTONS.
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4. INSTALL REMOTE INDICATOR AND TEST SWITCH IN NEAREST CORRIDOR. WALL MOUNT INDICATOR.
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1 **ELECTRICAL SYSTEMS LEVEL 4 - ZONE C**
SCALE: 1/4" = 1'-0"

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By

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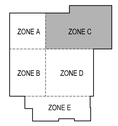
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Project

Physics and Nanotechnology Building

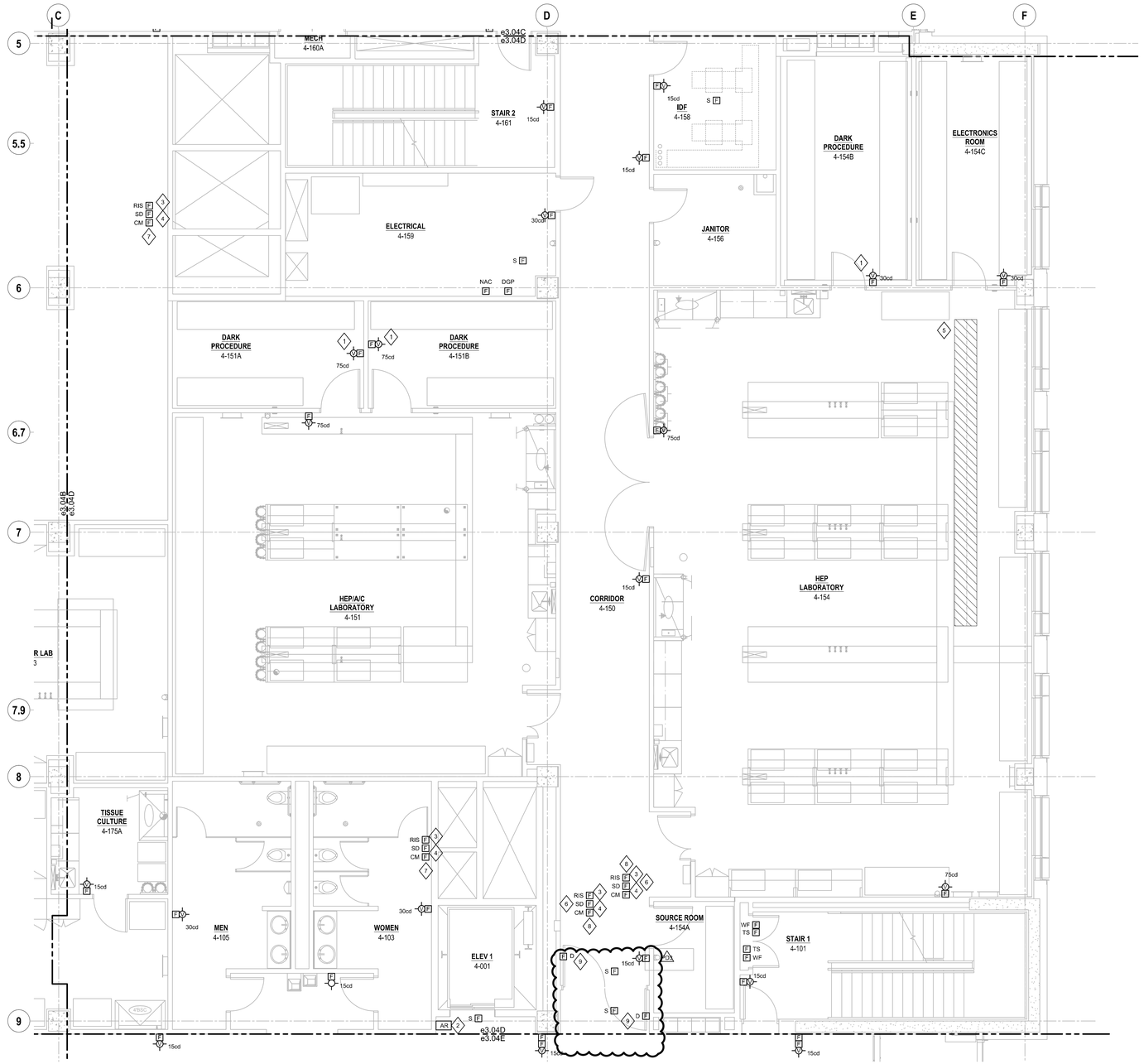
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ELECTRICAL SYSTEMS
LEVEL 4 - ZONE C

e3.04C



1 **ELECTRICAL SYSTEMS LEVEL 4 - ZONE D**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. REFER TO FIRE PROTECTION SERIES DRAWINGS FOR LOCATING OF WATERFLOW AND TAMPER SWITCHES.
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5. ZONE INDICATED BY CROSSHATCH IS AN AREA WHICH SHALL BE KEPT CLEAR OF ALL CONDUITS FOR ALL ELECTRICAL SYSTEMS. NO ELECTRICAL DEVICES, RACEWAYS, OR EQUIPMENT SHALL BE INSTALLED IN THIS ZONE. REFER TO ARCHITECTURAL AND LF SERIES DRAWINGS FOR FURTHER INFORMATION.
6. UPON DETECTION OF SMOKE BY THIS SMOKE DETECTOR, A RELAY SHALL CLOSE TO DISABLE THE SUPPLY FAN OF AHU-O1 AND RETURN FAN RF-O1. PROVIDE AN ADDRESSABLE FIRE ALARM RELAY WITHIN 3' OF THE MOTOR STARTERS/VFD FOR THESE FANS IN THE PENTHOUSE TO DISABLE FANS UPON SMOKE DETECTION.
7. DAMPER IS ASSOCIATED WITH MOTORS IN LE-1,2,3,4. DAMPER SHALL BE CLOSED BY FIRE ALARM SYSTEM UPON SIGNAL FROM BUILDING AUTOMATION SYSTEM UPON LOSS OF AIR FLOW. REFER TO SHEET e3.05B.
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By

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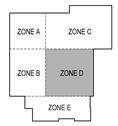
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Project

Physics and Nanotechnology Building

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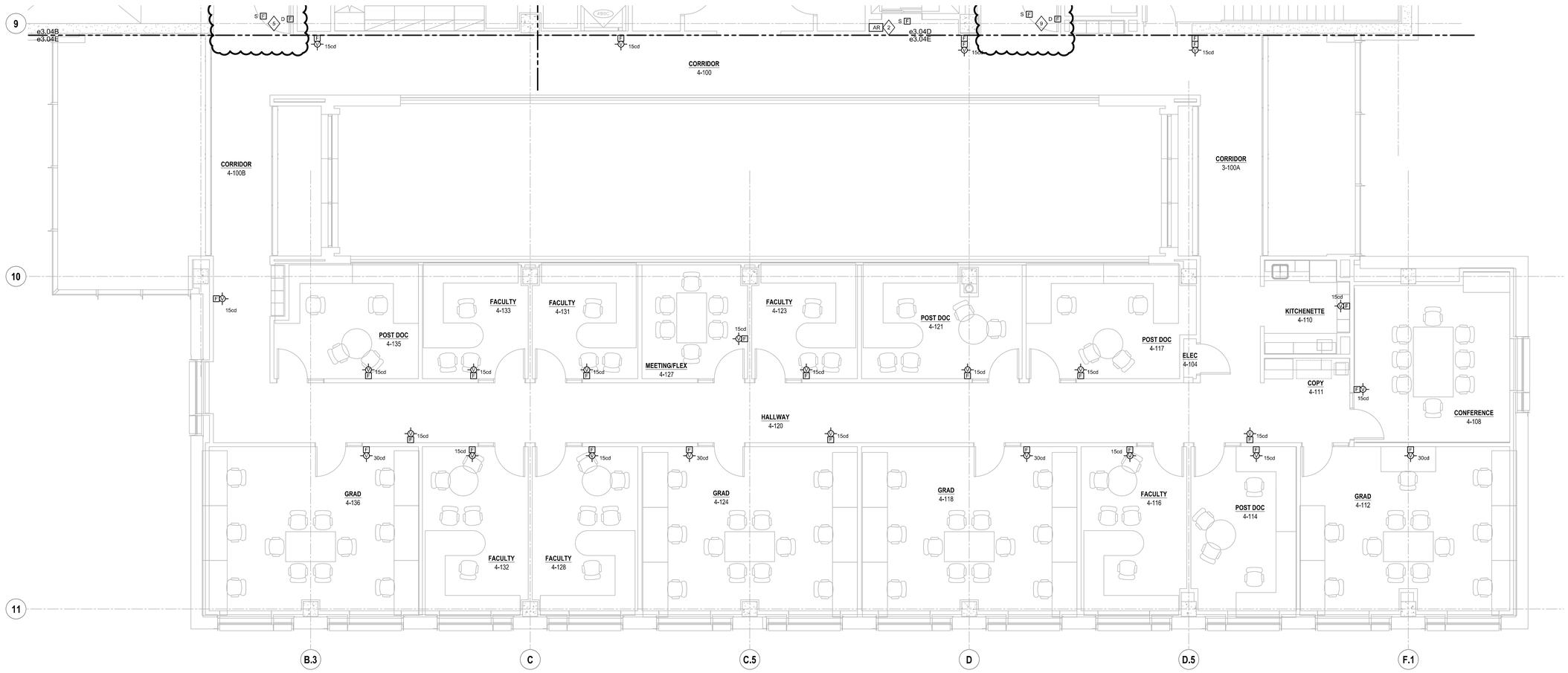
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ELECTRICAL SYSTEMS
LEVEL 4 - ZONE D

e3.04D

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2. REFER TO MECHANICAL SERIES DRAWINGS FOR LOCATIONS OF DUCT MOUNTED SMOKE DETECTORS AND DAMPERS.
3. REFER TO T SERIES DRAWINGS AND DIVISION 27 AND 28 SPECIFICATIONS FOR COORDINATION WITH STRUCTURED CABLING SYSTEM, VIDEO SURVEILLANCE SYSTEM AND ACCESS CONTROL SYSTEM. PROVIDE BOXES AND CONDUIT PATHWAYS FOR THOSE SYSTEMS INDICATED ON T SERIES DRAWINGS.



1 **ELECTRICAL SYSTEMS LEVEL 4 - ZONE E**
SCALE: 1/4" = 1'-0"

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For AFFILIATED ENGINEERS, INC.

By

Name RONALD M. PARSLEY

Date 02-24-2012 Reg. No. 25163

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Bid Package No. 2	02-24-2012

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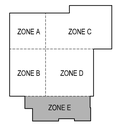
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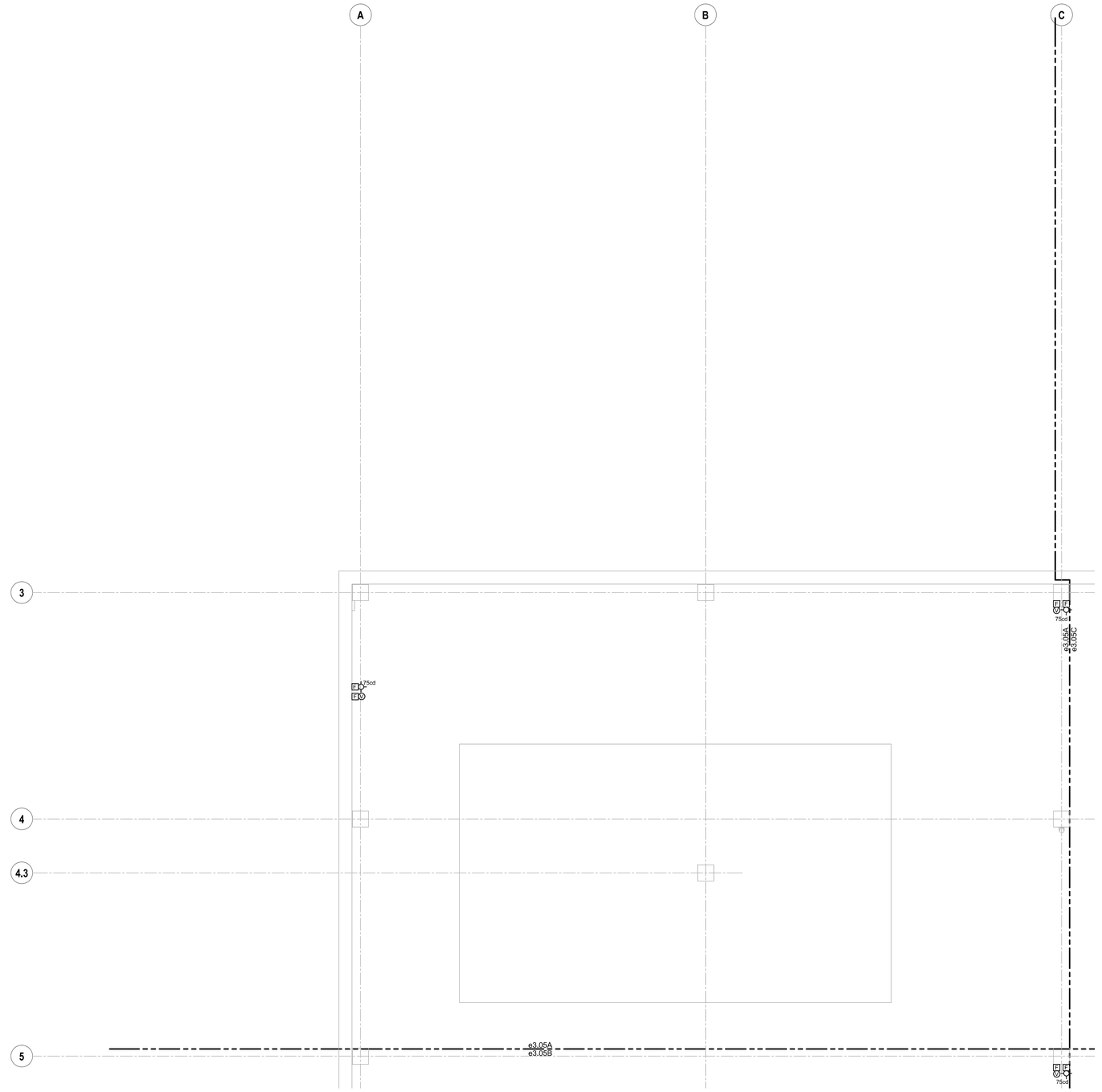
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ELECTRICAL SYSTEMS
LEVEL 4 - ZONE E

e3.04E

GENERAL NOTES

1. ALL FIRE ALARM LOUDSPEAKERS INSTALLED ON THIS FLOOR SHALL BE SET TO PROVIDE 95DB AT 10 FEET REVERBERANT.
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3. REFER TO MECHANICAL SERIES DRAWINGS FOR LOCATIONS OF DUCT MOUNTED SMOKE DETECTORS AND DAMPERS.
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1 **ELECTRICAL SYSTEMS PENTHOUSE - ZONE A**
SCALE: 1/4" = 1'-0"

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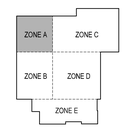
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Physics and Nanotechnology Building

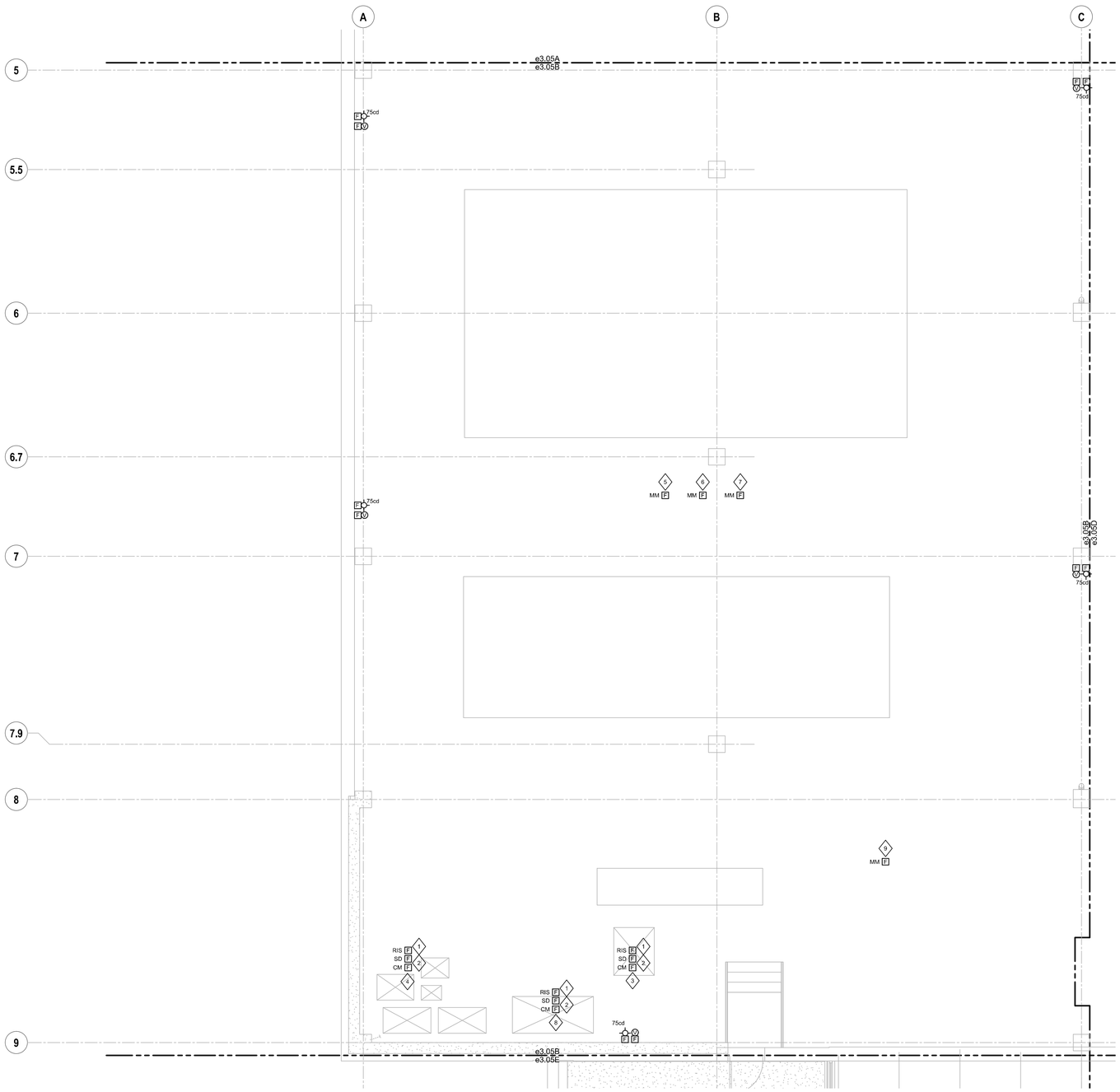
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ELECTRICAL SYSTEMS
PENTHOUSE - ZONE A

e3.05A



1 **ELECTRICAL SYSTEMS PENTHOUSE - ZONE B**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. ALL FIRE ALARM LOUDSPEAKERS INSTALLED ON THIS FLOOR SHALL BE SET TO PROVIDE 95DB AT 10 FEET REVERBERANT.
2. REFER TO FIRE PROTECTION SERIES DRAWINGS FOR LOCATING OF WATERFLOW AND TAMPER SWITCHES.
3. REFER TO MECHANICAL SERIES DRAWINGS FOR LOCATIONS OF DUCT MOUNTED SMOKE DETECTORS AND DAMPERS.
4. REFER TO T SERIES DRAWINGS AND DIVISION 27 AND 28 SPECIFICATIONS FOR COORDINATION WITH STRUCTURED CABLING SYSTEM, VIDEO SURVEILLANCE SYSTEM AND ACCESS CONTROL SYSTEM. PROVIDE BOXES AND CONDUIT PATHWAYS FOR THOSE SYSTEMS INDICATED ON T SERIES DRAWINGS.

SHEET KEYNOTES

1. INSTALL REMOTE INDICATOR AND TEST SWITCH IN NEAREST CORRIDOR. WALL MOUNT INDICATOR.
2. TYPICAL: PROVIDE DUCT SMOKE DETECTOR IN DUCTWORK WITH SEPARATE ADDRESSABLE CONTROL MODULE WITHIN 3' OF DAMPER MOTOR OPERATOR. FIRE ALARM SYSTEM SHALL DISABLE 120V TO DAMPER DURING SMOKE DETECTION.
3. DAMPER IS ASSOCIATED WITH MOTORS IN AHU-L-1,2,3. DAMPER SHALL BE CLOSED BY FIRE ALARM SYSTEM UPON SIGNAL FROM BUILDING AUTOMATION SYSTEM UPON LOSS OF AIR FLOW.
4. DAMPER IS ASSOCIATED WITH MOTORS IN LE-1,2,3,4. DAMPER SHALL BE CLOSED BY FIRE ALARM SYSTEM UPON SIGNAL FROM BUILDING AUTOMATION SYSTEM UPON LOSS OF AIR FLOW.
5. PROVIDE ADDRESSABLE FIRE ALARM MONITORING MODULE TO MONITOR SIGNAL FROM BAS TO INDICATE THAT MOTORS AHU-L-1,2,3 HAVE STOPPED AIR FLOW, UPON SIGNAL, CLOSE ASSOCIATED DAMPERS FOR THESE MOTORS ON ALL FLOORS INDICATED ON e3 SERIES DRAWINGS. LOCATE WITHIN 3' OF INPUT FROM BUILDING AUTOMATION SYSTEM CONTROLLER. COORDINATE EXACT LOCATION OF MONITORING MODULE WITH BUILDING CONTROLS DIVISION 23 CONTRACTOR.
6. PROVIDE ADDRESSABLE FIRE ALARM MONITORING MODULE TO MONITOR SIGNAL FROM BAS TO INDICATE THAT MOTORS LE-1,2,3,4 HAVE STOPPED AIR FLOW. UPON SIGNAL, CLOSE ASSOCIATED DAMPERS FOR THESE MOTORS ON ALL FLOORS INDICATED ON e3 SERIES DRAWINGS. LOCATE WITHIN 3' OF INPUT FROM BUILDING AUTOMATION SYSTEM CONTROLLER. COORDINATE EXACT LOCATION OF MONITORING MODULE WITH BUILDING CONTROLS DIVISION 23 CONTRACTOR.
7. PROVIDE ADDRESSABLE FIRE ALARM MONITORING MODULE TO MONITOR SIGNAL FROM BAS TO INDICATE THAT MOTORS AHU-01 AND RF-01 HAVE STOPPED AIR FLOW. UPON SIGNAL, CLOSE ASSOCIATED DAMPERS FOR THESE MOTORS ON ALL FLOORS INDICATED ON e3 SERIES DRAWINGS. LOCATE WITHIN 3' OF INPUT FROM BUILDING AUTOMATION SYSTEM CONTROLLER. COORDINATE EXACT LOCATION OF MONITORING MODULE WITH BUILDING CONTROLS DIVISION 23 CONTRACTOR.
8. DAMPER IS ASSOCIATED WITH MOTORS IN AHU-C-1. DAMPER SHALL BE CLOSED BY FIRE ALARM SYSTEM UPON SIGNAL FROM BUILDING AUTOMATION SYSTEM UPON LOSS OF AIR FLOW.
9. PROVIDE ADDRESSABLE FIRE ALARM MONITORING MODULE TO MONITOR SIGNAL FROM BAS TO INDICATE THAT MOTORS AHU-C-1 HAVE STOPPED AIR FLOW. UPON SIGNAL, CLOSE ASSOCIATED DAMPERS FOR THESE MOTORS ON ALL FLOORS INDICATED ON e3 AND o=e3 SERIES DRAWINGS. LOCATE WITHIN 3' OF INPUT FROM BUILDING AUTOMATION SYSTEM CONTROLLER. COORDINATE EXACT LOCATION OF MONITORING MODULE WITH CLEAN ROOM BUILDING CONTROLS DIVISION 25 CONTRACTOR.

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For AFFILIATED ENGINEERS, INC.

By

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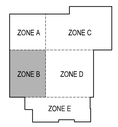
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U of M Project # 01-155-08-1718



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ELECTRICAL SYSTEMS
PENTHOUSE - ZONE B

e3.05B

GENERAL NOTES

1. ALL FIRE ALARM LOUDSPEAKERS INSTALLED ON THIS FLOOR SHALL BE SET TO PROVIDE 95DB AT 10 FEET REVERBERANT.
2. REFER TO FIRE PROTECTION SERIES DRAWINGS FOR LOCATING OF WATERFLOW AND TAMPER SWITCHES.
3. REFER TO MECHANICAL SERIES DRAWINGS FOR LOCATIONS OF DUCT MOUNTED SMOKE DETECTORS AND DAMPERS.
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SHEET KEYNOTES

1. AT ELEVATOR CONTROLLER PROVIDE (1) CONTROL MODULE FOR PRIMARY LEVEL RECALL, AND (1) CONTROL MODULE FOR SECONDARY LEVEL RECALL BASED ON SMOKE DETECTION FROM DETECTORS IN ELEVATOR LOBBIES AND MACHINE ROOM. PROVIDE (1) CONTROL MODULE FOR "FIRE HAT" NOTIFICATION IN ELEVATOR CAR TO ELEVATOR CONTROLLER BASED ON MACHINE ROOM SMOKE DETECTOR.
2. NOT USED.
3. PROVIDE FIRE ALARM SPEAKER TO ELEVATOR CONTRACTOR FOR INSTALLATION IN ELEVATOR CAR. ELEVATOR SHALL BE ON AN INDIVIDUAL ADDRESSABLE ONE-WAY PAGING ZONE SELECTED AT FIRE ALARM CONTROL PANEL AND ANNUNCIATOR.



1 **ELECTRICAL SYSTEMS PENTHOUSE - ZONE C**
SCALE: 1/4" = 1'-0"

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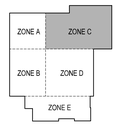
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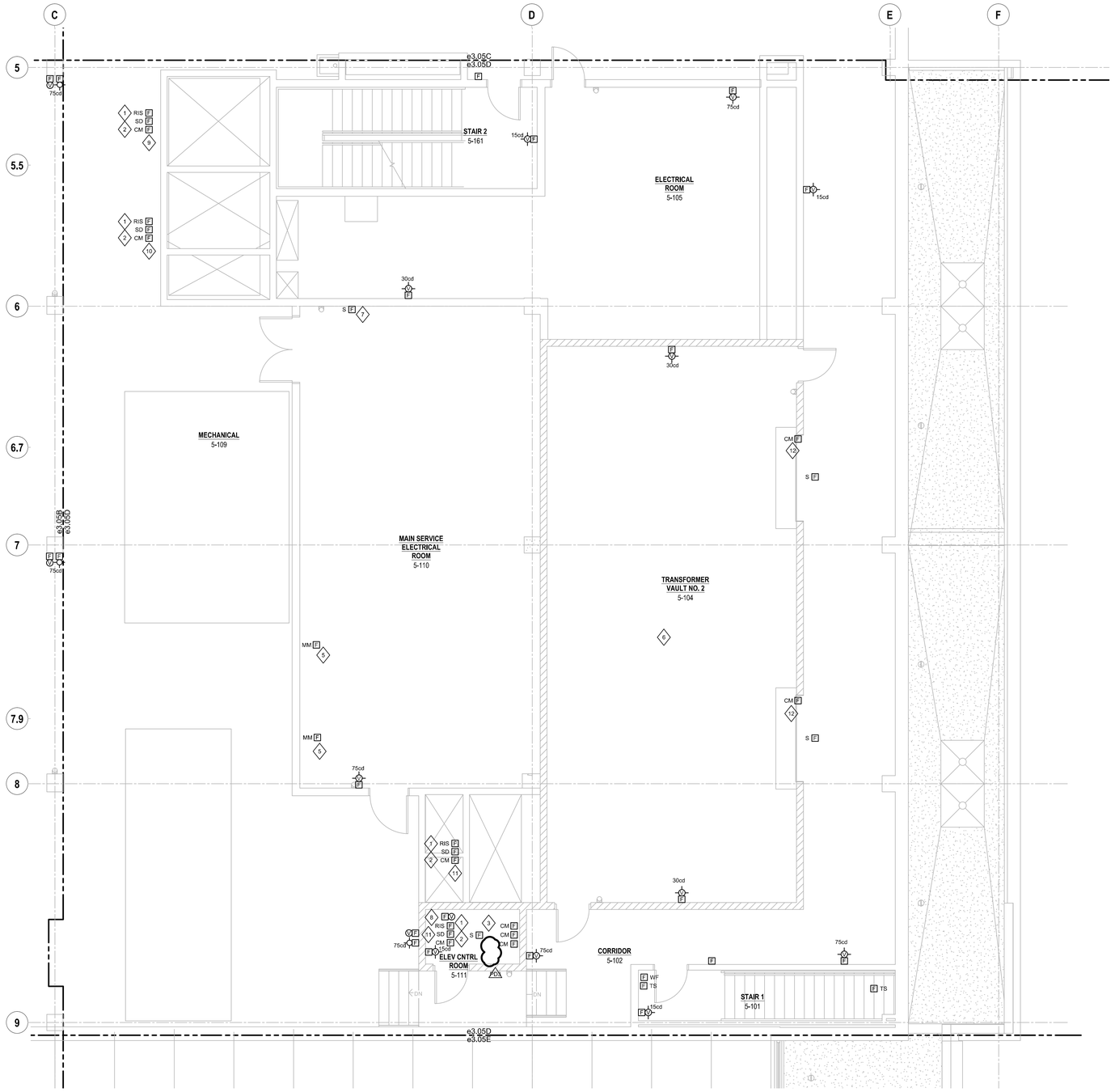
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ELECTRICAL SYSTEMS
PENTHOUSE - ZONE C

e3.05C



1 **ELECTRICAL SYSTEMS PENTHOUSE - ZONE D**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. ALL FIRE ALARM LOUDSPEAKERS INSTALLED ON THIS FLOOR SHALL BE SET TO PROVIDE 95DB AT 10 FEET REVERBERANT.
2. REFER TO FIRE PROTECTION SERIES DRAWINGS FOR LOCATING OF WATERFLOW AND TAMPER SWITCHES.
3. REFER TO MECHANICAL SERIES DRAWINGS FOR LOCATIONS OF DUCT MOUNTED SMOKE DETECTORS AND DAMPERS.
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SHEET KEYNOTES

1. INSTALL REMOTE INDICATOR AND TEST SWITCH IN NEAREST CORRIDOR. WALL MOUNT INDICATOR.
2. TYPICAL: PROVIDE DUCT SMOKE DETECTOR IN RF-1 DUCTWORK. PROVIDE SEPARATE ADDRESSABLE CONTROL MODULE WITHIN 3' OF RF-1 MOTOR OPERATOR. FIRE ALARM SYSTEM SHALL DISABLE RF-1 DURING SMOKE DETECTION.
3. AT ELEVATOR CONTROLLER PROVIDE (1) CONTROL MODULE FOR PRIMARY LEVEL RECALL, AND (1) CONTROL MODULE FOR SECONDARY LEVEL RECALL BASED ON SMOKE DETECTION FROM DETECTORS IN ELEVATOR LOBBIES AND MACHINE ROOM. PROVIDE (1) CONTROL MODULE FOR "FIRE HAT" NOTIFICATION IN ELEVATOR CAR TO ELEVATOR CONTROLLER BASED ON MACHINE ROOM SMOKE DETECTOR.
4. NOT USED.
5. PROVIDE FIRE ALARM ADDRESSABLE MONITORING MODULES WITHIN 3' OF EACH FIRE PUMP DISCONNECT SWITCH. MODULES SHALL MONITOR FOR POSITION OF FIRE PUMP DISCONNECT AND PROVIDE SUPERVISORY SIGNAL IF DISCONNECTS ARE MOVED TO OFF POSITION.
6. PROVIDE CPVC SAMPLING INTAKE PIPE FROM ELECTRICAL VAULT AND RETURN EXHAUST PIPE BACK INTO ELECTRICAL VAULT FROM DETECTOR SYSTEM LOCATED IN ROOM 5-110. PROVIDE UL LISTED PENETRATION OF CPVC PIPE THROUGH 3 HOUR VAULT WALL. PROVIDE SAMPLING PIPE AND POINTS AS REQUIRED AND RECOMMENDED BY MANUFACTURER FOR TOTAL ROOM DETECTION COVERAGE.
7. PROVIDE SIMPLEX 4098-XAD-100 OR EQUAL AIR ASPIRATION SMOKE DETECTOR SYSTEM FOR ELECTRICAL VAULT. DETECTORS SHALL BE COMPLETELY INTELLIGENT DEVICES COMMUNICATING WITH FIRE ALARM CONTROL PANEL ON SLC INPUT CIRCUIT AND INDICATE DEVICE ALARM, TROUBLE, AND SUPERVISORY STATUS AT FIRE ALARM CONTROL PANEL.
8. PROVIDE FIRE ALARM SPEAKER TO ELEVATOR CONTRACTOR FOR INSTALLATION IN ELEVATOR CAR. ELEVATOR SHALL BE ON AN INDIVIDUAL ADDRESSABLE ONE-WAY PAGING ZONE SELECTED AT FIRE ALARM CONTROL PANEL AND ANNUNCIATOR.
9. DAMPER IS ASSOCIATED WITH MOTORS IN AHU-L-1,2,3. DAMPER SHALL BE CLOSED BY FIRE ALARM SYSTEM UPON SIGNAL FROM BUILDING AUTOMATION SYSTEM UPON LOSS OF AIR FLOW. REFER TO SHEET e3.05B.
10. DAMPER IS ASSOCIATED WITH MOTORS IN LE-1,2,3,4. DAMPER SHALL BE CLOSED BY FIRE ALARM SYSTEM UPON SIGNAL FROM BUILDING AUTOMATION SYSTEM UPON LOSS OF AIR FLOW. REFER TO SHEET e3.05B.
11. DAMPER IS ASSOCIATED WITH MOTORS IN AHU-01 AND RF-01. DAMPER SHALL BE CLOSED BY FIRE ALARM SYSTEM UPON SIGNAL FROM BUILDING AUTOMATION SYSTEM UPON LOSS OF AIR FLOW. REFER TO SHEET e3.05B.
12. PROVIDE FIRE ALARM CONTROL MODULE RELAY TO RELEASE 3 HOUR FIRE DOOR AT VAULT WALL UPON DETECTION OF SMOKE EITHER BY DETECTOR OUTSIDE VAULT OR BY ASPIRATING SMOKE DETECTOR ALARM INDICATED IN KEYNOTE 7. PROVIDE 120V POWER TO EACH DOOR FROM DEDICATED CIRCUIT IN PANEL EL5A.

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By

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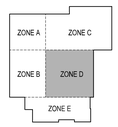
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ELECTRICAL SYSTEMS
PENTHOUSE - ZONE D

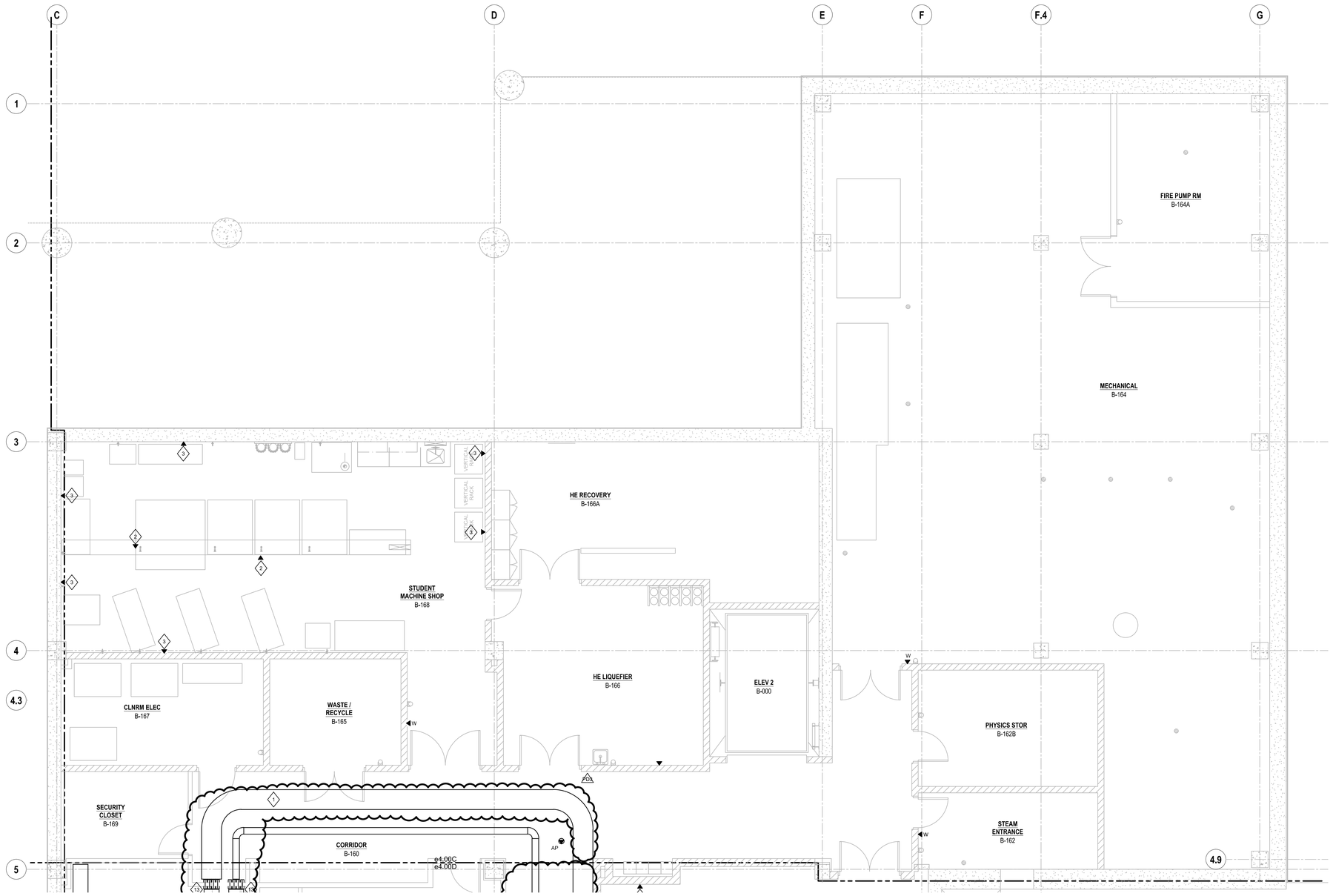
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GENERAL NOTES

1. VOICE/DATA OUTLETS PLACED IN A FIRE RATED WALL SHALL MEET NEC CODE TO MAINTAIN FIRE RATING.
2. ALL CONDUIT PLACEMENT AND FINAL INSTALLATION IS SUBJECT TO UNIVERSITY OF MINNESOTA OIT APPROVAL. CPPM PROJECT MANAGER SHALL IMMEDIATELY REMEDIATE ANY VOICE/DATA OUTLETS, CABLE TRAY, CONDUIT RUNS, OR BUSHINGS THAT ARE IDENTIFIED AS NOT BEING IN COMPLIANCE WITH OIT WIRING STANDARDS. OIT WOULD PREFER TO SIGN-OFF ON EACH FLOOR AFTER CONDUITS, CABLE TRAY, AND BUSHING ARE INSTALLED AND BEFORE CONTRACTOR MOVES TO THE NEXT FLOOR IN ORDER TO IDENTIFY ISSUES BEFORE THEY ARE REPEATED THROUGHOUT THE BUILDING.
3. REFER TO ARCHITECTURAL DRAWINGS AND ELEVATIONS FOR COORDINATION AND PLACEMENT OF TELECOM BOXES WITH CASEWORK AND FURNITURE.

SHEET KEYNOTES

1. PROVIDE 24" X 4" CABLE TRAY FOR TELECOM BACKBONE WIRING BETWEEN MDF AND FIRST FLOOR IDF ROOM. FOA
2. PROVIDE OUTLET ON OVERHEAD SERVICE CARRIER.
3. PROVIDE OUTLET 2" ABOVE POWER SURFACE RACEWAY TO BOTTOM OF BOX.
4. NOT USED. FOA



1 **ELECTRICAL TELECOM BASEMENT - ZONE C**
SCALE: 1/4" = 1'-0"

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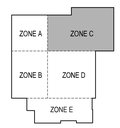
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Project

Physics and Nanotechnology Building

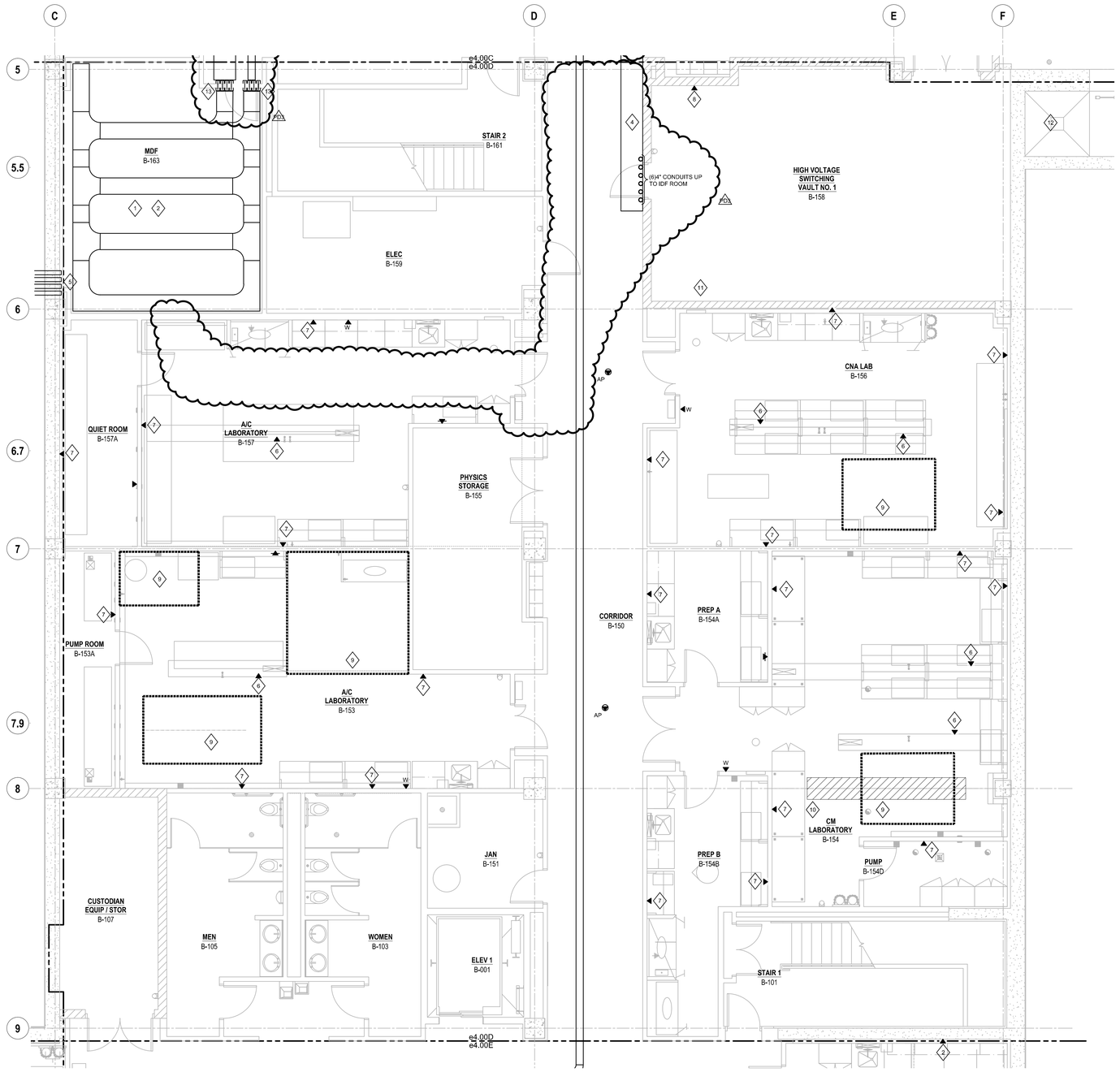
U of M Project # 01-155-08-1718



UNIVERSITY OF MINNESOTA
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ELECTRICAL TELECOM
BASEMENT - ZONE C

e4.00C



1 **ELECTRICAL TELECOM BASEMENT - ZONE D**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. VOICE/DATA OUTLETS PLACED IN A FIRE RATED WALL SHALL MEET NEC CODE TO MAINTAIN FIRE RATING.
2. ALL CONDUIT PLACEMENT AND FINAL INSTALLATION IS SUBJECT TO UNIVERSITY OF MINNESOTA OIT APPROVAL. CPPM PROJECT MANAGER SHALL IMMEDIATELY REMEDIATE ANY VOICE/DATA OUTLETS, CABLE TRAY, CONDUIT RUNS, OR BUSHINGS THAT ARE IDENTIFIED AS NOT BEING IN COMPLIANCE WITH OIT WIRING STANDARDS. OIT WOULD PREFER TO SIGN-OFF ON EACH FLOOR AFTER CONDUITS, CABLE TRAY, AND BUSHING ARE INSTALLED AND BEFORE CONTRACTOR MOVES TO THE NEXT FLOOR IN ORDER TO IDENTIFY ISSUES BEFORE THEY ARE REPEATED THROUGHOUT THE BUILDING.
3. REFER TO ARCHITECTURAL DRAWINGS AND ELEVATIONS FOR COORDINATION AND PLACEMENT OF TELECOM BOXES WITH CASEWORK AND FURNITURE.

SHEET KEYNOTES

1. LINE ALL FOUR WALLS OF IDF WITH 8'x4' 3/4" CD GRADE OR BETTER PLYWOOD TO A HEIGHT OF 8'4" AFF. MOUNT SHEETS WITH SMOOTH SIDE OUT.
2. MDF ROOM CABLE TRAY SHALL BE 24" LADDER RACK (CHATSWORTH MODEL # 10250-124) AND SUPPORTED AT 8" AFF. SUPPORT EVERY 5' AND NO MORE THAN 2' FROM EACH END OR JOINT.
3. NOT USED.
4. PROVIDE 24" X 4" CABLE TRAY FOR TELECOM BACKBONE WIRING BETWEEN MDF AND FIRST FLOOR IDF ROOM. FDX
5. PROVIDE FOUR 4" CONDUITS FOR BUILDING ENTRANCE, PLUGGED AND UL-LISTED AS PER PROJECT. REFER TO SHEET e0.02 IN BP-1 FOR CONTINUATION.
6. PROVIDE OUTLET ON OVERHEAD SERVICE CARRIER.
7. PROVIDE OUTLET 3" ABOVE POWER SURFACE RACEWAY TO BOTTOM OF BOX.
8. PROVIDE BACKBOX AND CONDUIT STUB-UP TO CABLE TRAY FOR UNIVERSITY PRIVATE NETWORK USE ON SCADA SYSTEM. WIRING BY BUILDING AUTOMATION SUBCONTRACTOR.
9. ZONE BORDERED BY HEAVY DASHED LINE IS AN AREA WHICH SHALL BE KEPT CLEAR OF ALL CONDUITS FOR ALL ELECTRICAL SYSTEMS EXCEPT FOR SPECIFIC EXEMPTIONS WHICH MAY BE INDICATED ON LIGHTING SHEET. NO ELECTRICAL DEVICES, RACEWAYS, OR EQUIPMENT SHALL BE INSTALLED IN THIS ZONE. REFER TO ARCHITECTURAL AND cnf SERIES DRAWINGS FOR FURTHER INFORMATION.
10. ZONE INDICATED BY CROSSHATCH IS AN AREA WHICH SHALL BE KEPT CLEAR OF ALL CONDUITS FOR ALL ELECTRICAL SYSTEMS. NO ELECTRICAL DEVICES, RACEWAYS, OR EQUIPMENT SHALL BE INSTALLED IN THIS ZONE. REFER TO ARCHITECTURAL AND cnf SERIES DRAWINGS FOR FURTHER INFORMATION.
11. PROVIDE 3/4" C. FROM G&W ATC-451 AUTOMATIC CONTROLLER INDICATED ON SHEET e2.00D TO SCADA RACK IN NOTE 8.
12. REFER TO SHEET e7.04 FOR CONTINUATION OF STEAM TUNNEL.
13. PROVIDE FOUR 4" EZ-PATH FIRE RATED SLEEVES AT 10'6" AFF TO BOTTOM. FDX

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I hereby certify that this plan or drawing was prepared by me or under my direct supervision and that I am a duly licensed ELECTRICAL ENGINEER under the laws of the State of Minnesota.

For AFFILIATED ENGINEERS, INC.

By

Name RONALD M. PARSLEY

Date 02-24-2012 Reg. No. 25163

Issued for	Date
100% CD set	12-16-2011
Bid Package No. 2	02-24-2012
Project Directive No. 3	05-15-2012

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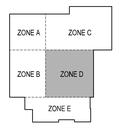
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Date 12/16/11

Project

Physics and Nanotechnology Building

U of M Project # 01-155-08-1718



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ELECTRICAL TELECOM BASEMENT - ZONE D

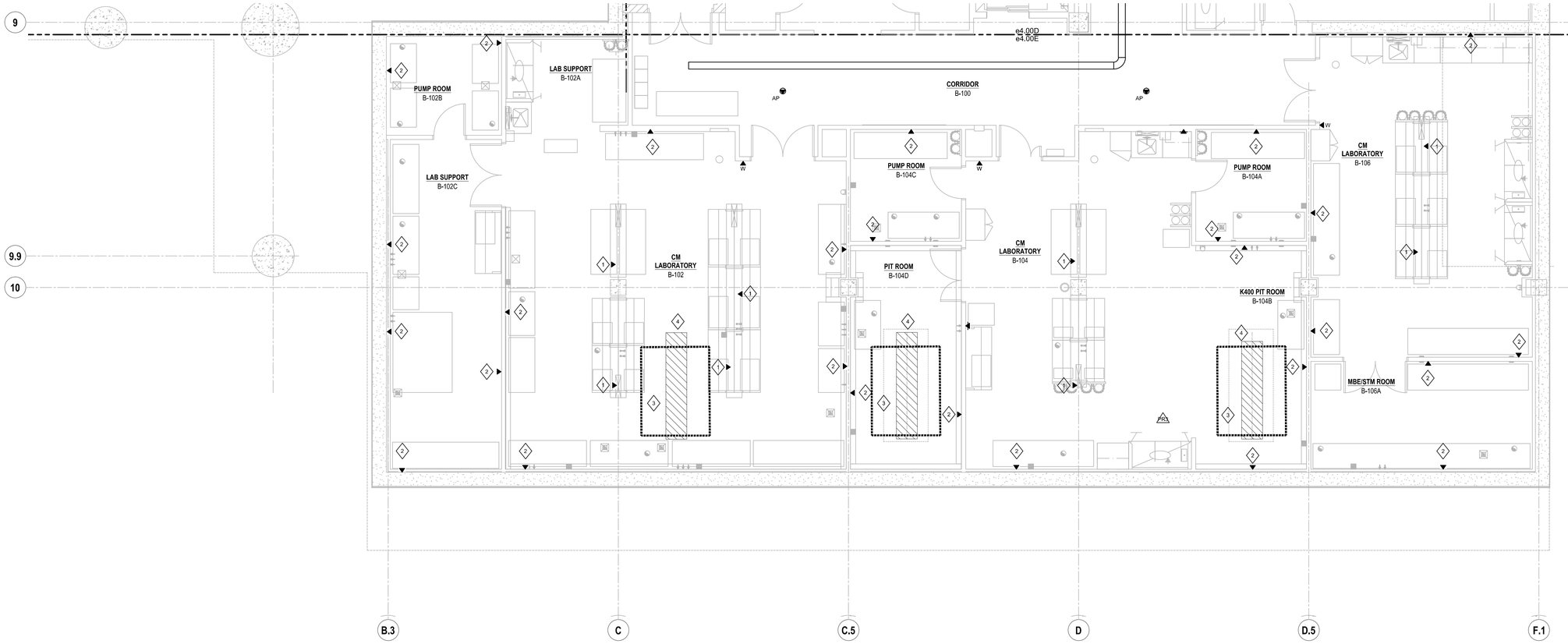
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3. REFER TO ARCHITECTURAL DRAWINGS AND ELEVATIONS FOR COORDINATION AND PLACEMENT OF TELECOM BOXES WITH CASEWORK AND FURNITURE.

SHEET KEYNOTES

1. PROVIDE OUTLET ON OVERHEAD SERVICE CARRIER.
2. PROVIDE OUTLET 2" ABOVE POWER SURFACE RACEWAY TO BOTTOM OF BOX.
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4. ZONE INDICATED BY CROSSHATCH IS AN AREA WHICH SHALL BE KEPT CLEAR OF ALL CONDUITS FOR ALL ELECTRICAL SYSTEMS. NO ELECTRICAL DEVICES, RACEWAYS, OR EQUIPMENT SHALL BE INSTALLED IN THIS ZONE. REFER TO ARCHITECTURAL AND crtf SERIES DRAWINGS FOR FURTHER INFORMATION.



1 **ELECTRICAL TELECOM BASEMENT - ZONE E**
SCALE: 1/4" = 1'-0"

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For AFFILIATED ENGINEERS, INC.

By

Name RONALD M. PARSLEY

Date 02-24-2012 Reg. No. 25163

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Proposal Request No. 3	04-06-2012

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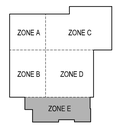
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Project

Physics and Nanotechnology Building

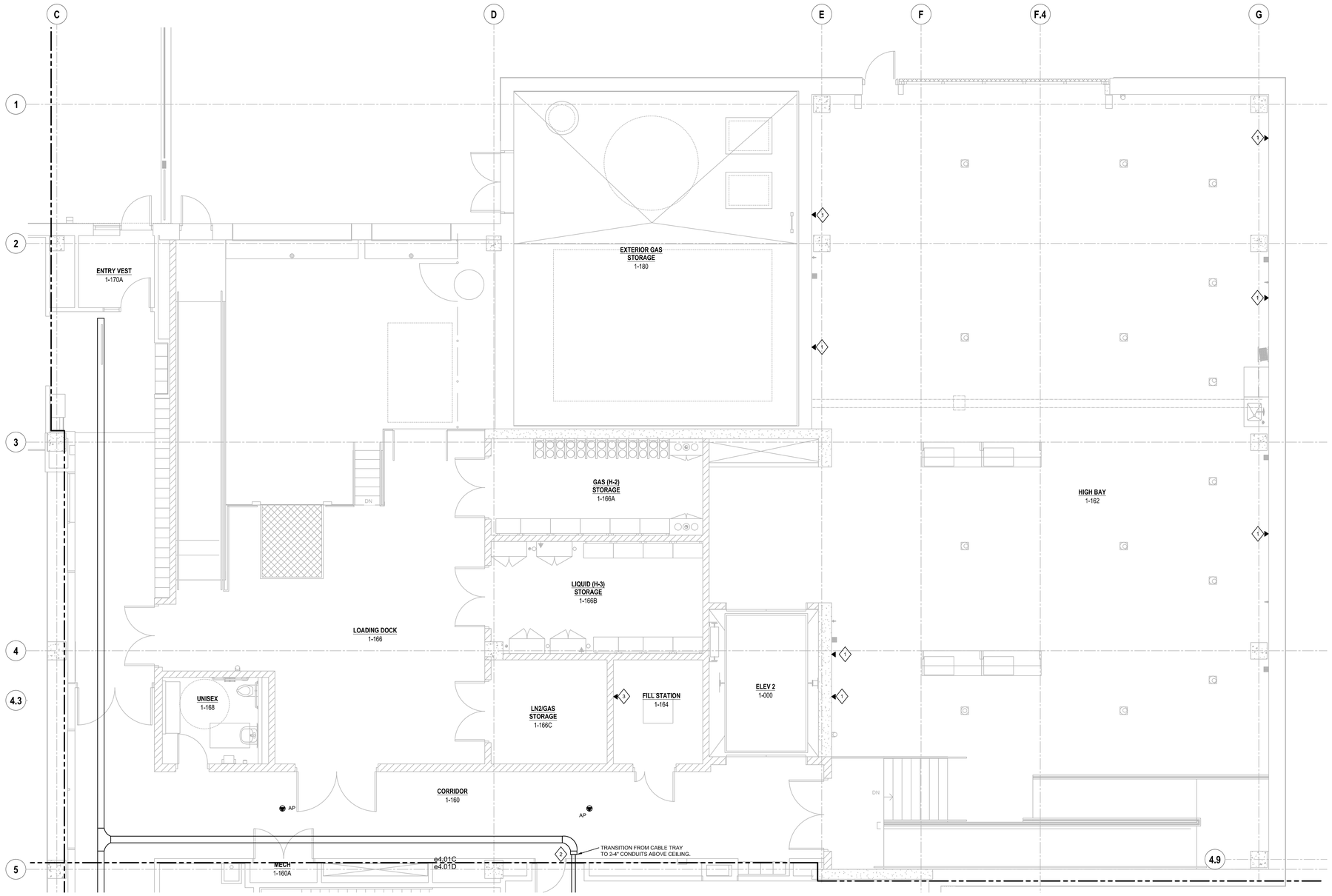
U of M Project # 01-155-08-1718



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ELECTRICAL TELECOM
BASEMENT - ZONE E

e4.00E



1 **ELECTRICAL TELECOM LEVEL 1 - ZONE C**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

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3. REFER TO ARCHITECTURAL DRAWINGS AND ELEVATIONS FOR COORDINATION AND PLACEMENT OF TELECOM BOXES WITH CASEWORK AND FURNITURE.
4. REFER TO SHEET e2.02C FOR EXAMPLES OF REQUIRED CONDUIT ROUTING IN HIGH BAY. HIGH BAY TELECOM SHALL BE SERVED FROM FIRST FLOOR TELECOM ROOM.

SHEET KEYNOTES

1. PROVIDE OUTLET 2" ABOVE POWER SURFACE RACEWAY TO BOTTOM OF BOX.
2. BOND (2) 4"C TO CABLE TRAY WITH #6 GROUND WIRE.
3. PROVIDE TELE/DATA CONNECTION TO IN FLOOR SCALE DATA OUTPUT. COORDINATE EXACT LOCATION WITH SCALE INSTALLER AND INSTALLATION DRAWINGS.

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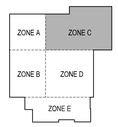
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Project

Physics and Nanotechnology Building

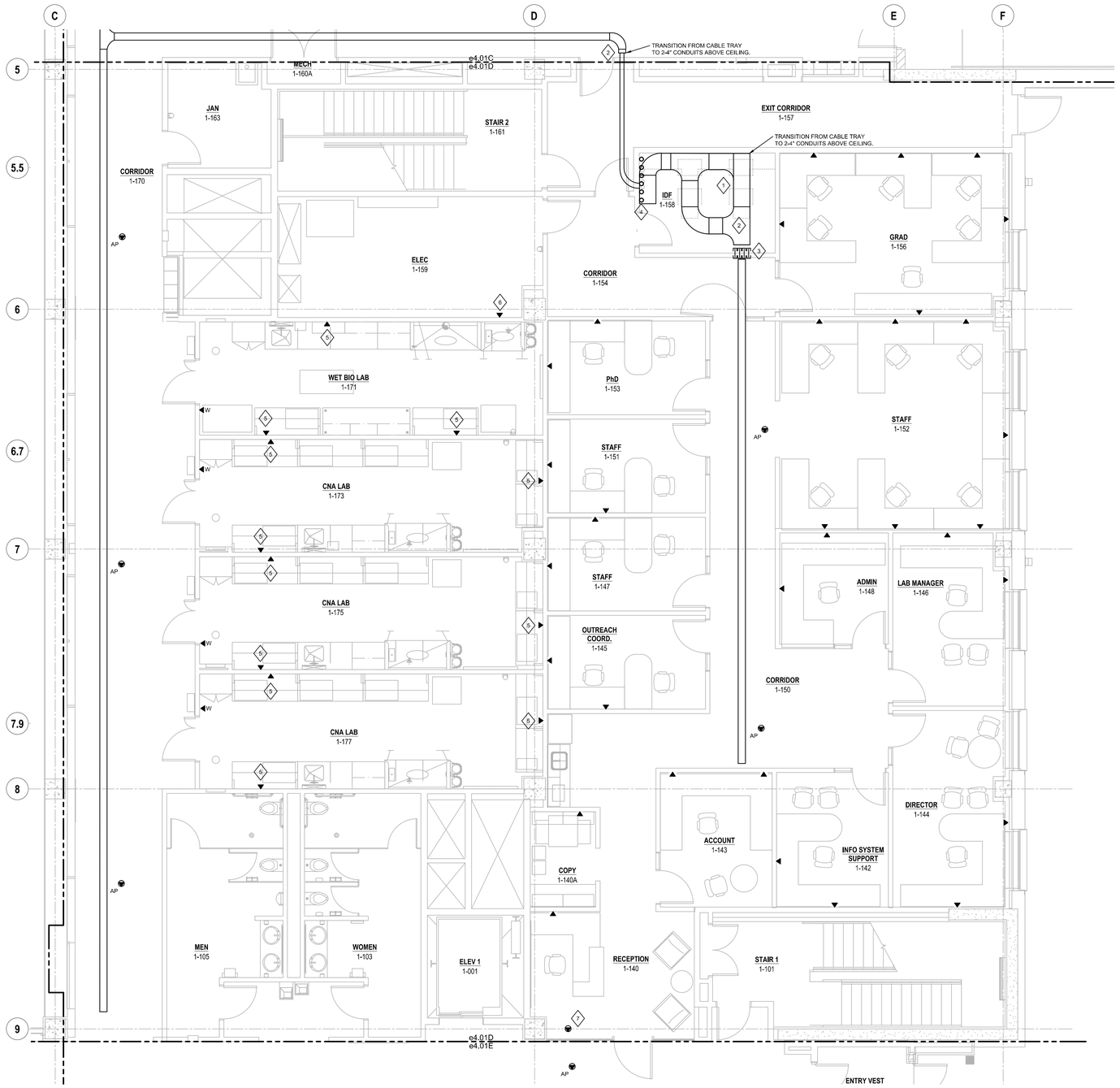
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ELECTRICAL TELECOM
LEVEL 1 - ZONE C

e4.01C



1 **ELECTRICAL TELECOM LEVEL 1 - ZONE D**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

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3. REFER TO ARCHITECTURAL DRAWINGS AND ELEVATIONS FOR COORDINATION AND PLACEMENT OF TELECOM BOXES WITH CASEWORK AND FURNITURE.

SHEET KEYNOTES

1. LINE ALL FOUR WALLS OF IDF WITH 8'x4' 3/4" CD GRADE OR BETTER FIRE RETARDANT PLYWOOD TO A HEIGHT OF 8'4" AFF. MOUNT SHEETS WITH SMOOTH SIDE OUT.
2. IDF ROOM CABLE TRAY SHALL BE 18"x6" AND SUPPORTED AT 8" AFF. SUPPORT EVERY 5' AND NO MORE THAN 2' FROM EACH END OR JOINT.
3. PROVIDE FOUR 4" EZ-PATH FIRE RATED SLEEVES AT 10'6" AFF TO BOTTOM.
4. PROVIDE SIX 4" CONDUITS TO BASEMENT FLOOR MDF CABLE TRAY. STUB CONDUITS 2"-3" AFF. PROVIDE INSULATED BUSHINGS AND #6 GROUND TO TELECOMM GROUNDING BUS. PROVIDE UL-LISTED, 2-HOUR RE-ENTERABLE FIRE STOP SYSTEM.
5. PROVIDE OUTLET 2" ABOVE POWER SURFACE RACEWAY TO BOTTOM OF BOX.
6. PROVIDE TELE/DATA CONNECTIONS TO FIRE ALARM CONTROL PANEL FOR OFF-SITE NOTIFICATION OF FIRE ALARM CONDITIONS.
7. PROVIDE CEILING MOUNTED TELE/DATA OUTLET FOR DISPLAY MONITOR.

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By

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Date 02-24-2012 Reg. No. 25163

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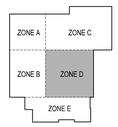
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Project

Physics and Nanotechnology Building

U of M Project # 01-155-08-1718



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ELECTRICAL TELECOM
LEVEL 1 - ZONE D

e4.01D

GENERAL NOTES

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3. REFER TO ARCHITECTURAL DRAWINGS AND ELEVATIONS FOR COORDINATION AND PLACEMENT OF TELECOM BOXES WITH CASEWORK AND FURNITURE.

SHEET KEYNOTES

7 PROVIDE TELE/DATA OUTLET FOR DISPLAY MONITOR. COORDINATE EXACT LOCATION WITH DISPLAY CABINET.

1 LEGRAND RC3 SERIES POWER AND DATA POKE-THRU. FOUR DATA OUTLETS AND DUPLEX 120V RECEPTACLE EACH. VERIFY FINAL LOCATIONS WITH ARCHITECT.

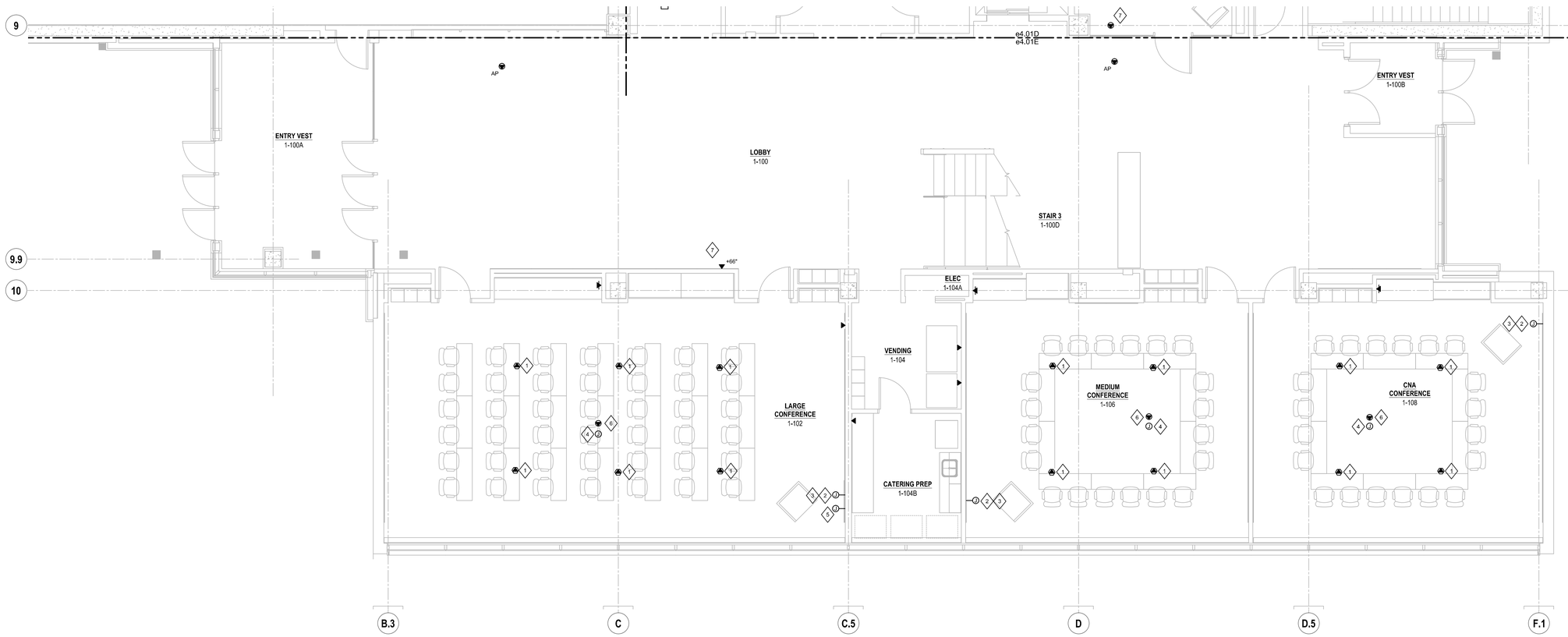
2 PULL BOX #1. PROVIDE ONE 12"X12"X4" JUNCTION BOX, WITH HINGED COVER, (HOFFMAN A3G12X12X4 WITH APDF1212P OR EQUIVALENT) FLUSH MOUNTED IN WALL AT 18" AFF. TO CENTER. PAINT TO MATCH WALL. PROVIDE TWO 1" CONDUITS, RUN FROM BOX #1 AND STUBBED OUT AT AND BONDED TO THE CABLE TRAY. U OF M NETWORK TELECOMMUNICATIONS SERVICES (NTS) TO PROVIDE 4 DATA CIRCUIT SURFACE JACKS (3 ACTIVE & 1 FUTURE).

3 PULL BOX #2. PROVIDE ONE DOUBLE GANG, EXTRA DEEP BOX, WITH DOUBLE GANG MUD RING, FLUSH MOUNTED IN WALL BELOW BOX #1. PROVIDE TWO 1-1/4" CONDUITS, RUN FROM THE BOX TO PULL BOX #1.

4 PULL BOX #3. PROVIDE ONE DOUBLE GANG, EXTRA DEEP BOX, WITH DOUBLE GANG MUD RING, FLUSH MOUNTED IN CEILING. EXACT LOCATION TO BE VERIFIED WITH CTS. PROVIDE ONE 1-1/4" CONDUIT, RUN FROM THE BOX TO PULL BOX #1.

5 PULL BOX #4. PROVIDE ONE DOUBLE GANG BOX WITH SINGLE GANG MUD RING, FLUSH MOUNTED AT SWITCH HEIGHT. RUN ONE 3/4" CONDUIT, RUN FROM THE BOX TO PULL BOX #1 AND ONE 3/4" CONDUIT, RUN FROM THE BOX TO THE LOW VOLTAGE SIDE OF THE SCREEN CASE.

6 INSTALL ONE PEERLESS #CMJ-310, CEILING PLATE (PROVIDED BY CLASSROOM TECHNICAL SERVICES) PROVIDE ONE 1-1/2" NPT PIPE (THREADED ON BOTH ENDS) AND ATTACH TO THE CEILING PLATE. THE PIPE SHOULD EXTEND DOWN TO BE 2" BELOW THE CEILING. EXACT LOCATION TO BE VERIFIED WITH CTS.



1 **ELECTRICAL TELECOM LEVEL 1 - ZONE E**
SCALE: 1/4" = 1'-0"

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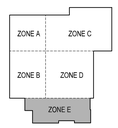
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Physics and Nanotechnology Building

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ELECTRICAL TELECOM
LEVEL 1 - ZONE E

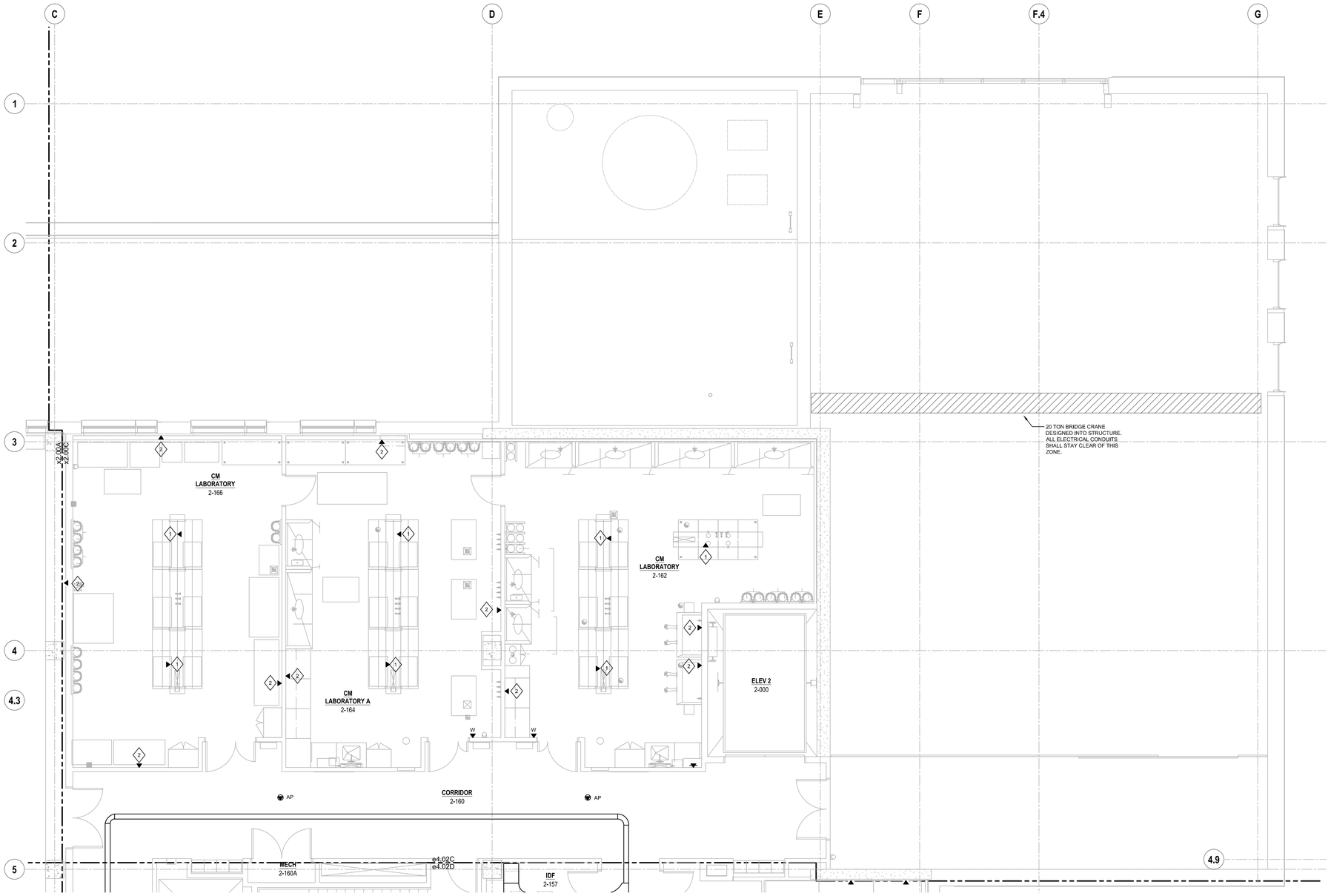
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3. REFER TO ARCHITECTURAL DRAWINGS AND ELEVATIONS FOR COORDINATION AND PLACEMENT OF TELECOM BOXES WITH CASEWORK AND FURNITURE.

SHEET KEYNOTES

1. PROVIDE OUTLET ON OVERHEAD SERVICE CARRIER.
2. PROVIDE OUTLET 3" ABOVE POWER SURFACE RACEWAY TO BOTTOM OF BOX.



1 **ELECTRICAL TELECOM LEVEL 2 - ZONE C**
SCALE: 1/4" = 1'-0"

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For AFFILIATED ENGINEERS, INC.

By

Name RONALD M. PARSLEY

Date 02-24-2012 Reg. No. 25163

Issued for	Date
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Bid Package No. 2	02-24-2012

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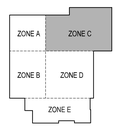
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Project

Physics and Nanotechnology Building

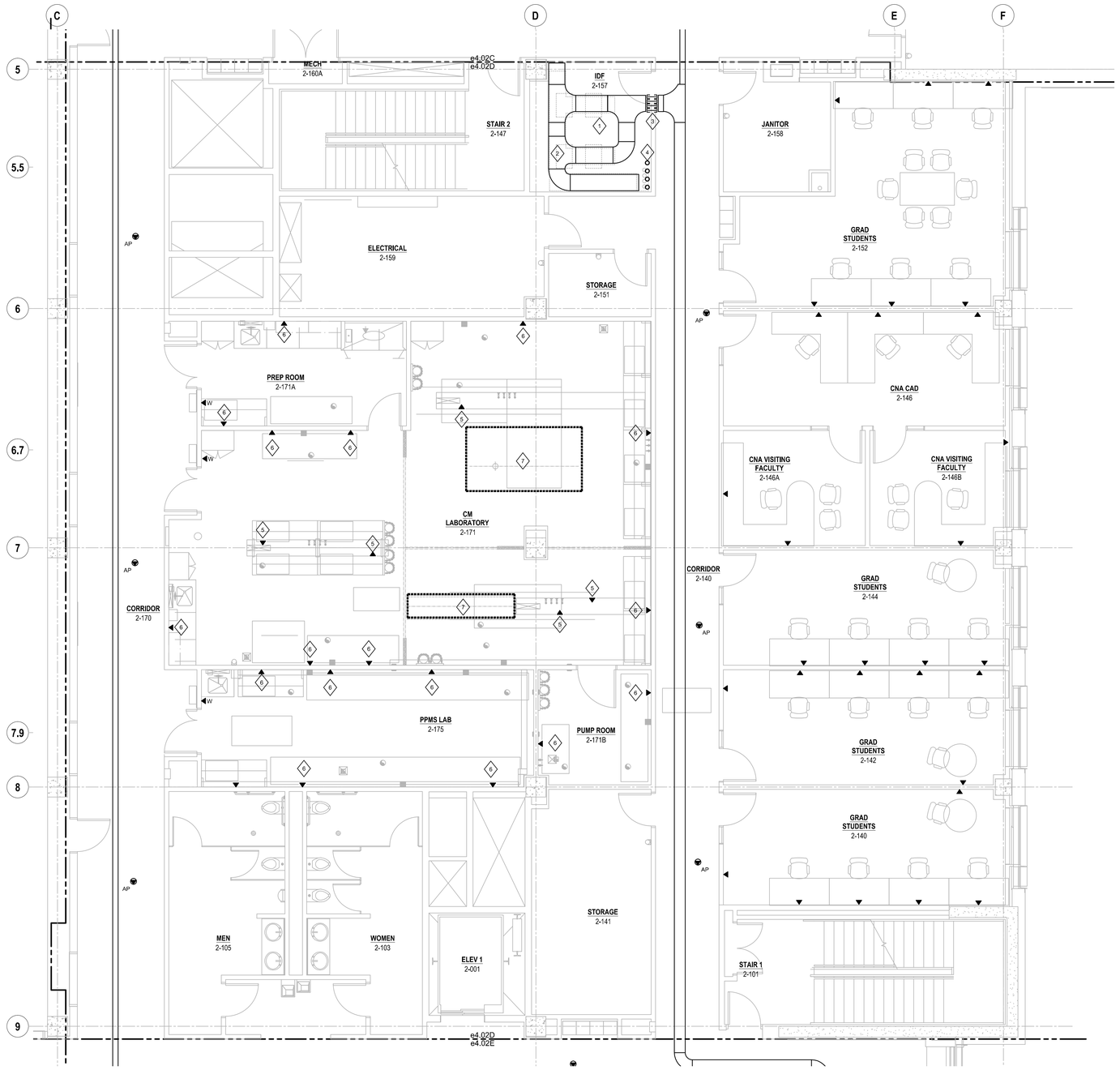
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ELECTRICAL TELECOM
LEVEL 2 - ZONE C

e4.02C



1 **ELECTRICAL TELECOM LEVEL 2 - ZONE D**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. VOICE/DATA OUTLETS PLACED IN A FIRE RATED WALL SHALL MEET NEC CODE TO MAINTAIN FIRE RATING.
2. ALL CONDUIT PLACEMENT AND FINAL INSTALLATION IS SUBJECT TO UNIVERSITY OF MINNESOTA OIT APPROVAL. CPPM PROJECT MANAGER SHALL IMMEDIATELY REMEDIATE ANY VOICE/DATA OUTLETS, CABLE TRAY, CONDUIT RUNS, OR BUSHINGS THAT ARE IDENTIFIED AS NOT BEING IN COMPLIANCE WITH OIT WIRING STANDARDS. OIT WOULD PREFER TO SIGN-OFF ON EACH FLOOR AFTER CONDUITS, CABLE TRAY, AND BUSHING ARE INSTALLED AND BEFORE CONTRACTOR MOVES TO THE NEXT FLOOR IN ORDER TO IDENTIFY ISSUES BEFORE THEY ARE REPEATED THROUGHOUT THE BUILDING.
3. REFER TO ARCHITECTURAL DRAWINGS AND ELEVATIONS FOR COORDINATION AND PLACEMENT OF TELECOM BOXES WITH CASEWORK AND FURNITURE.

SHEET KEYNOTES

1. LINE ALL FOUR WALLS OF IDF WITH 8'x4' 3/4" CD GRADE OR BETTER FIRE RETARDANT PLYWOOD TO A HEIGHT OF 8'4" AFF. MOUNT SHEETS WITH SMOOTH SIDE OUT.
2. IDF ROOM CABLE TRAY SHALL BE 18"x6" AND SUPPORTED AT 8" AFF. SUPPORT EVERY 5' AND NO MORE THAN 2' FROM EACH END OR JOINT.
3. PROVIDE FOUR 4" EZ-PATH FIRE RATED SLEEVES AT 10'6" AFF TO BOTTOM.
4. PROVIDE FOUR 4" CONDUITS TO FIRST FLOOR IDF CABLE TRAY. STUB CONDUITS 2"-3" AFF. PROVIDE INSULATED BUSHINGS AND #6 GROUND TO TELECOMM GROUNDING BUS. PROVIDE UL-LISTED, 2-HOUR RE-ENTERABLE FIRE STOP SYSTEM.
5. PROVIDE OUTLET ON OVERHEAD SERVICE CARRIER.
6. PROVIDE OUTLET 2" ABOVE POWER SURFACE RACEWAY TO BOTTOM OF BOX.
7. ZONE BORDERED BY HEAVY DASHED LINE IS AN AREA WHICH SHALL BE KEPT CLEAR OF ALL CONDUITS FOR ALL ELECTRICAL SYSTEM EXCEPT FOR SPECIFIC EXEMPTIONS WHICH MAY BE INDICATED ON LIGHTING SHEET. NO ELECTRICAL DEVICES, RACEWAYS, OR EQUIPMENT SHALL BE INSTALLED IN THIS ZONE. REFER TO ARCHITECTURAL AND cnf SERIES DRAWINGS FOR FURTHER INFORMATION.

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By

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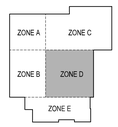
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Date 12/16/11

Project

Physics and Nanotechnology Building

U of M Project # 01-155-08-1718



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ELECTRICAL TELECOM
LEVEL 2 - ZONE D

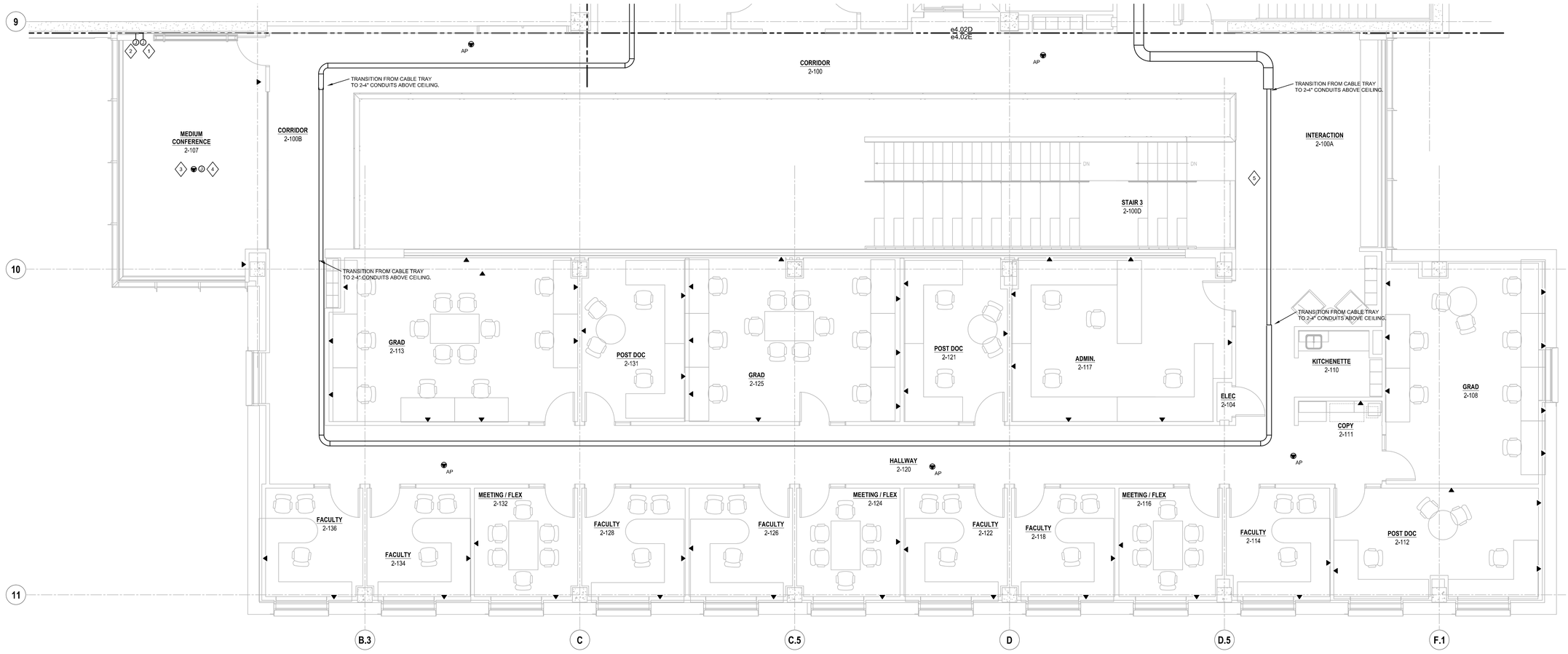
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GENERAL NOTES

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3. CONDUIT FOR DEVICES INSTALLED BELOW WINDOWS WALL SHALL BE RUN HORIZONTALLY IN DRYWALL TO THICKENED WALLS NEAR COLUMNS TO TURN VERTICALLY AND CONNECT TO CABLE TRAY. MAXIMUM (2) 90 DEGREE BENDS ALLOWED BEFORE A PULL BOX SHALL BE PROVIDED FOR EACH TELE/DATA CONDUIT INSTALLATION.
4. REFER TO ARCHITECTURAL DRAWINGS AND ELEVATIONS FOR COORDINATION AND PLACEMENT OF TELECOM BOXES WITH CASEWORK AND FURNITURE.

SHEET KEYNOTES

1. PULL BOX #1. PROVIDE ONE DOUBLE GANG, EXTRA DEEP BOX, WITH DOUBLE GANG MUD RING, FLUSH MOUNTED IN WALL AT LOCATION SHOWN. BOX TO BE AT 18" AFF. TO CENTER.
2. PULL BOX #2. PROVIDE ONE DOUBLE GANG, EXTRA DEEP BOX, WITH SINGLE GANG MUD RING, FLUSH MOUNTED IN WALL ADJACENT TO BOX #2. PROVIDE ONE 1" CONDUIT, RUN FROM BOX #1 AND STUBBED OUT AT AND BONDED TO THE COMMUNICATIONS TRAY. U OF M NETWORK TELECOMMUNICATIONS SERVICES (NTS) TO PROVIDE 2 DATA CIRCUIT JACKS (1 ACTIVE & 1 FUTURE).
3. PULL BOX #3. PROVIDE ONE DOUBLE GANG, EXTRA DEEP BOX, WITH DOUBLE GANG MUD RING, FLUSH MOUNTED IN CEILING. EXACT LOCATION TO BE VERIFIED WITH CTS. PROVIDE ONE 1-1/4" CONDUIT, RUN FROM THE BOX TO PULL BOX #1.
4. INSTALL ONE PEERLESS #CMJ-310, CEILING PLATE (PROVIDED BY CLASSROOM TECHNICAL SERVICES) PROVIDE ONE 1-1/2" NPT PIPE (THREADED ON BOTH ENDS) AND ATTACH TO THE CEILING PLATE THE PIPE SHOULD EXTEND DOWN TO BE FLUSH WITH BOTTOM OF THE PROJECTION SCREEN CASE. EXACT LOCATION TO BE VERIFIED WITH CTS.
5. BOND (2) 4" CONDUITS TO CABLE TRAY AT BOTH ENDS WITH #6 GROUND WIRE.



1 **ELECTRICAL TELECOM LEVEL 2 - ZONE E**
SCALE: 1/4" = 1'-0"

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By

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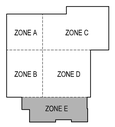
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Project

Physics and Nanotechnology Building

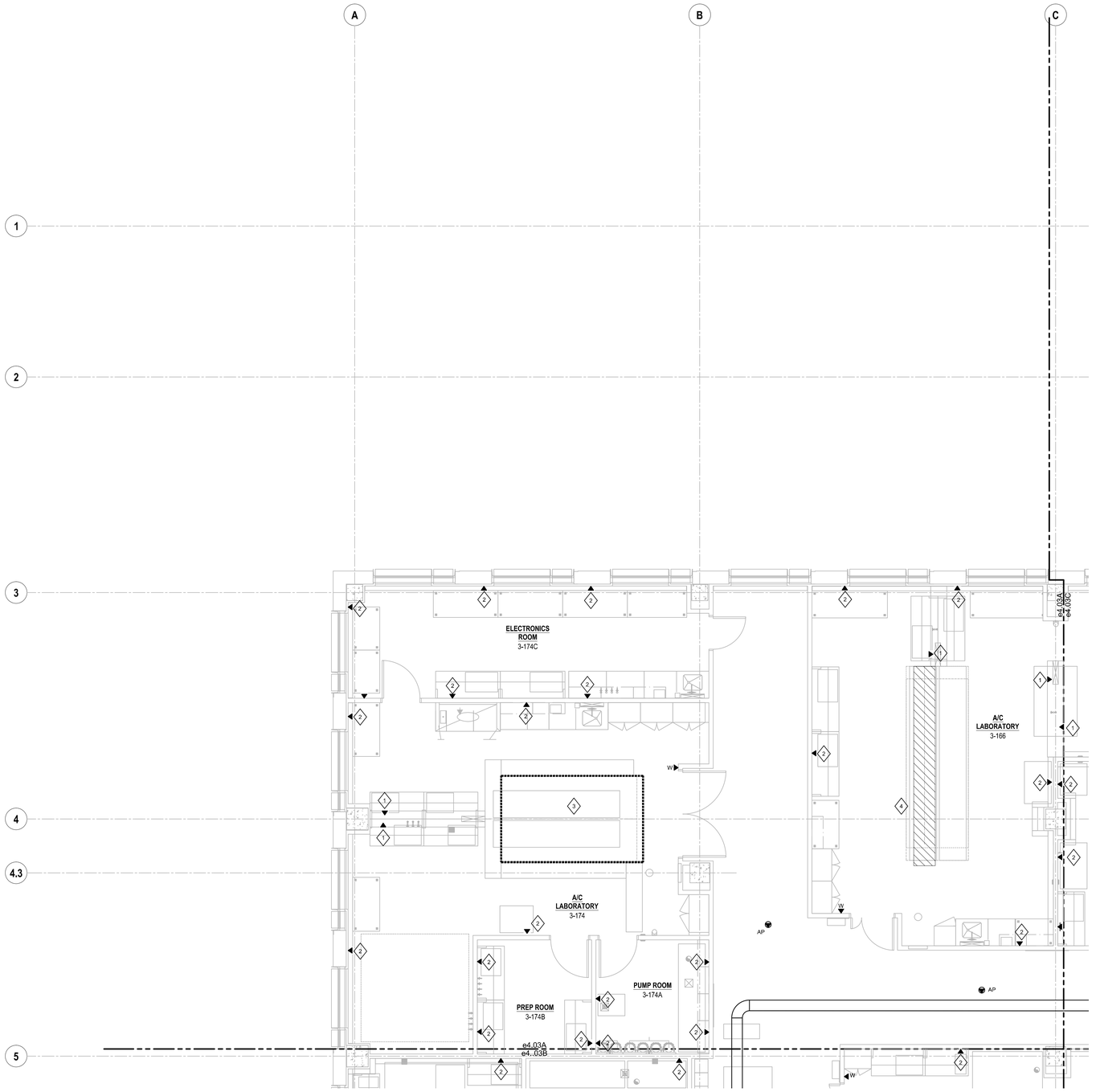
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ELECTRICAL TELECOM
LEVEL 2 - ZONE E

e4.02E



1 **ELECTRICAL TELECOM LEVEL 3 - ZONE A**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

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By

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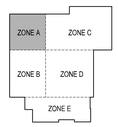
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Project

Physics and Nanotechnology Building

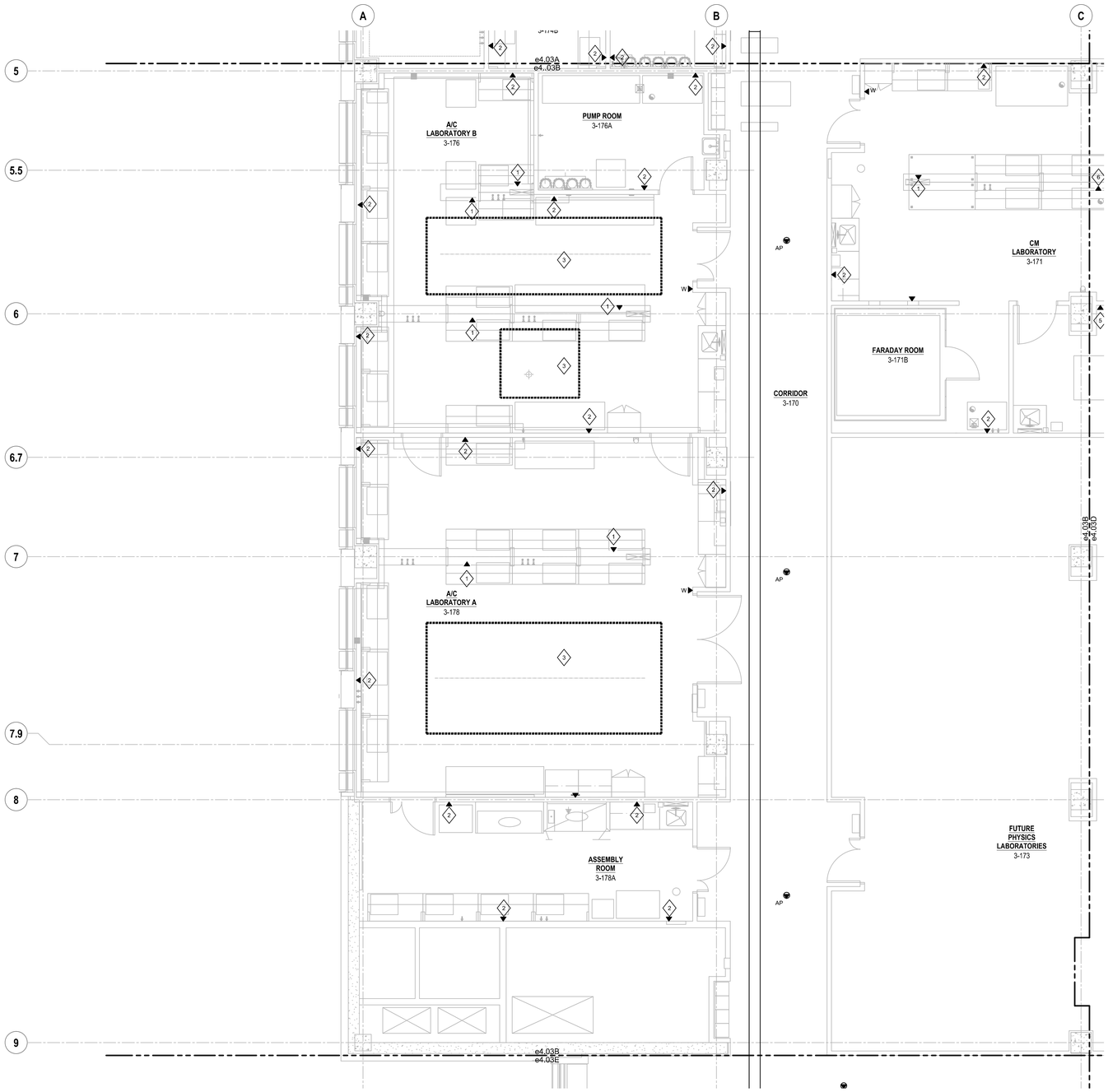
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ELECTRICAL TELECOM
LEVEL 3 - ZONE A

e4.03A



1 **ELECTRICAL TELECOM LEVEL 3 - ZONE B**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

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SHEET KEYNOTES

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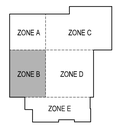
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Project

Physics and Nanotechnology Building

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ELECTRICAL TELECOM
LEVEL 3 - ZONE B

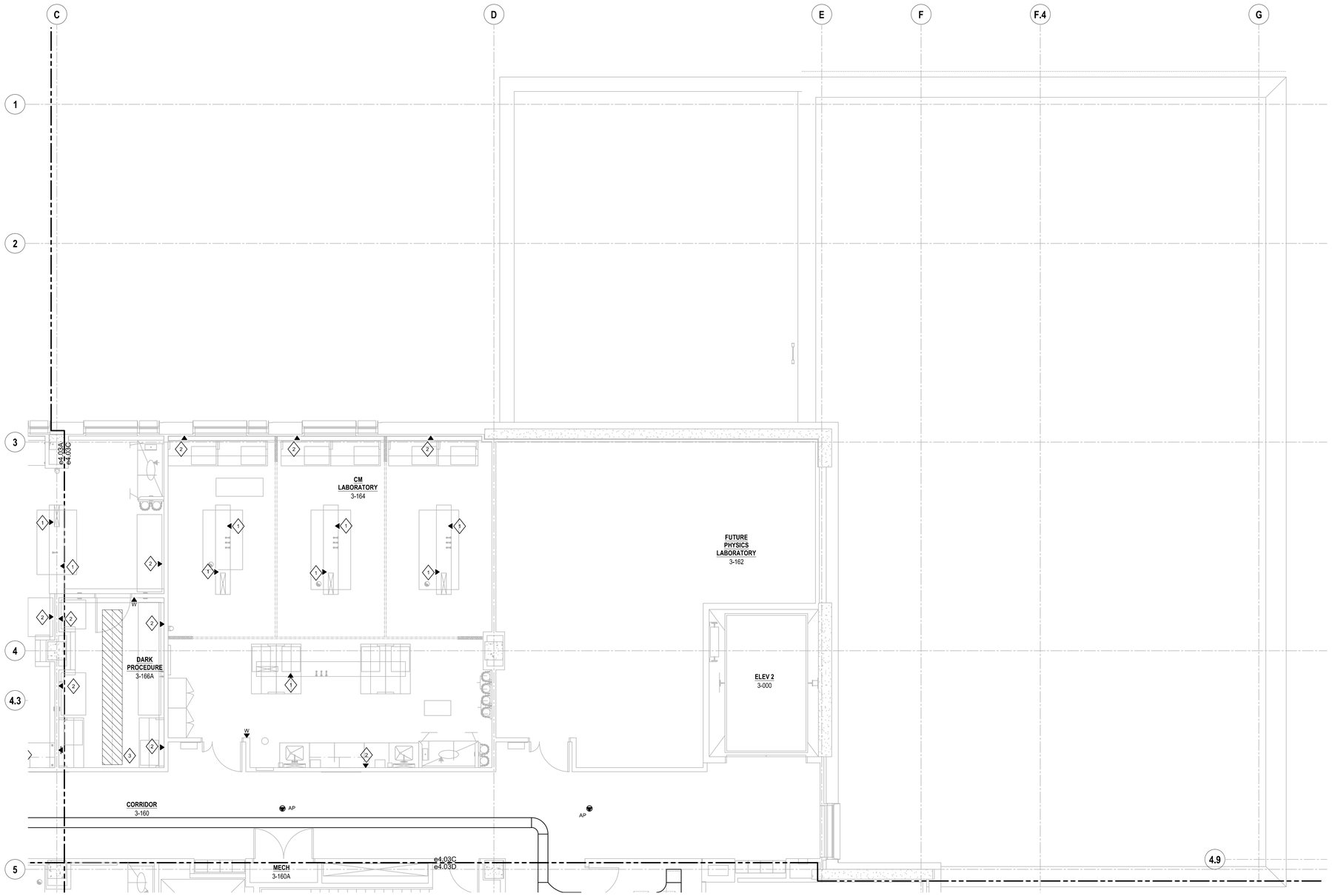
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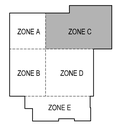
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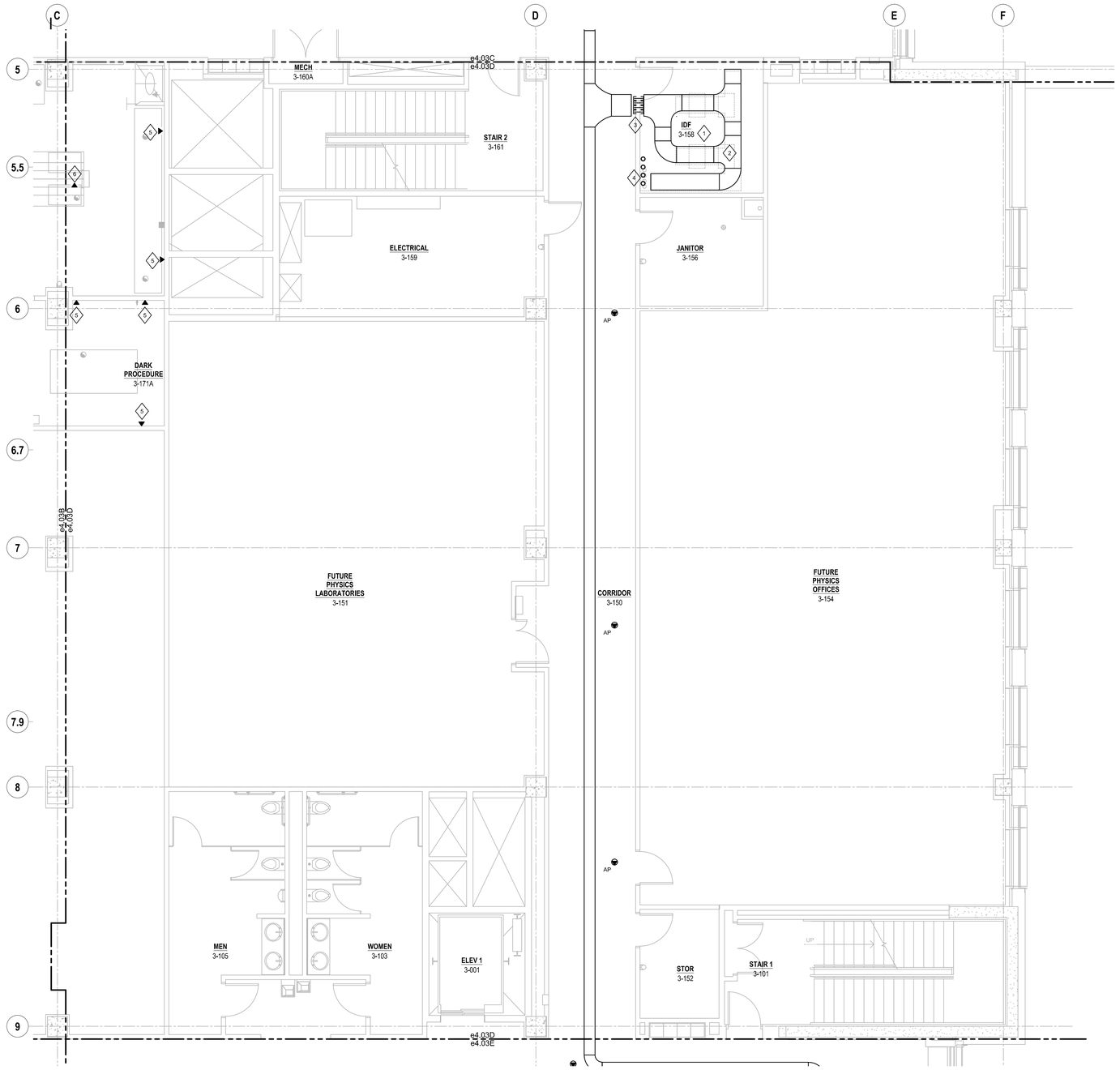
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ELECTRICAL TELECOM
LEVEL 3 - ZONE C

e4.03C



1 **ELECTRICAL TELECOM LEVEL 3 - ZONE D**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. VOICE/DATA OUTLETS PLACED IN A FIRE RATED WALL SHALL MEET NEC CODE TO MAINTAIN FIRE RATING.
2. ALL CONDUIT PLACEMENT AND FINAL INSTALLATION IS SUBJECT TO UNIVERSITY OF MINNESOTA OIT APPROVAL. CPPM PROJECT MANAGER SHALL IMMEDIATELY REMEDIATE ANY VOICE/DATA OUTLETS, CABLE TRAY, CONDUIT RUNS, OR BUSHINGS THAT ARE IDENTIFIED AS NOT BEING IN COMPLIANCE WITH OIT WIRING STANDARDS. OIT WOULD PREFER TO SIGN-OFF ON EACH FLOOR AFTER CONDUITS, CABLE TRAY, AND BUSHING ARE INSTALLED AND BEFORE CONTRACTOR MOVES TO THE NEXT FLOOR IN ORDER TO IDENTIFY ISSUES BEFORE THEY ARE REPEATED THROUGHOUT THE BUILDING.
3. REFER TO ARCHITECTURAL DRAWINGS AND ELEVATIONS FOR COORDINATION AND PLACEMENT OF TELECOM BOXES WITH CASEWORK AND FURNITURE.

SHEET KEYNOTES

1. LINE ALL FOUR WALLS OF IDF WITH 8'x4' 3/4" CD GRADE OR BETTER FIRE RETARDANT PLYWOOD TO A HEIGHT OF 8'4" AFF. MOUNT SHEETS WITH SMOOTH SIDE OUT.
2. IDF ROOM CABLE TRAY SHALL BE 18"x6" AND SUPPORTED AT 8' AFF. SUPPORT EVERY 5' AND NO MORE THAN 2' FROM EACH END OR JOINT.
3. PROVIDE FOUR 4" EZ-PATH FIRE RATED SLEEVES AT 10'6" AFF TO BOTTOM.
4. PROVIDE FOUR 4" CONDUITS TO SECOND FLOOR IDF CABLE TRAY. STUB CONDUITS 2"-3" AFF. PROVIDE INSULATED BUSHINGS AND #6 GROUND TO TELECOMM GROUNDING BUS. PROVIDE UL-LISTED, 2-HOUR RE-ENTERABLE FIRE STOP SYSTEM.
5. PROVIDE OUTLET 2" ABOVE POWER SURFACE RACEWAY TO BOTTOM OF BOX.
6. PROVIDE OUTLET ON OVERHEAD SERVICE CARRIER.

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For AFFILIATED ENGINEERS, INC.

By

Name RONALD M. PARSLEY

Date 02-24-2012 Reg. No. 25163

Issued for	Date
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Bid Package No. 2	02-24-2012

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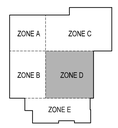
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Project

Physics and Nanotechnology Building

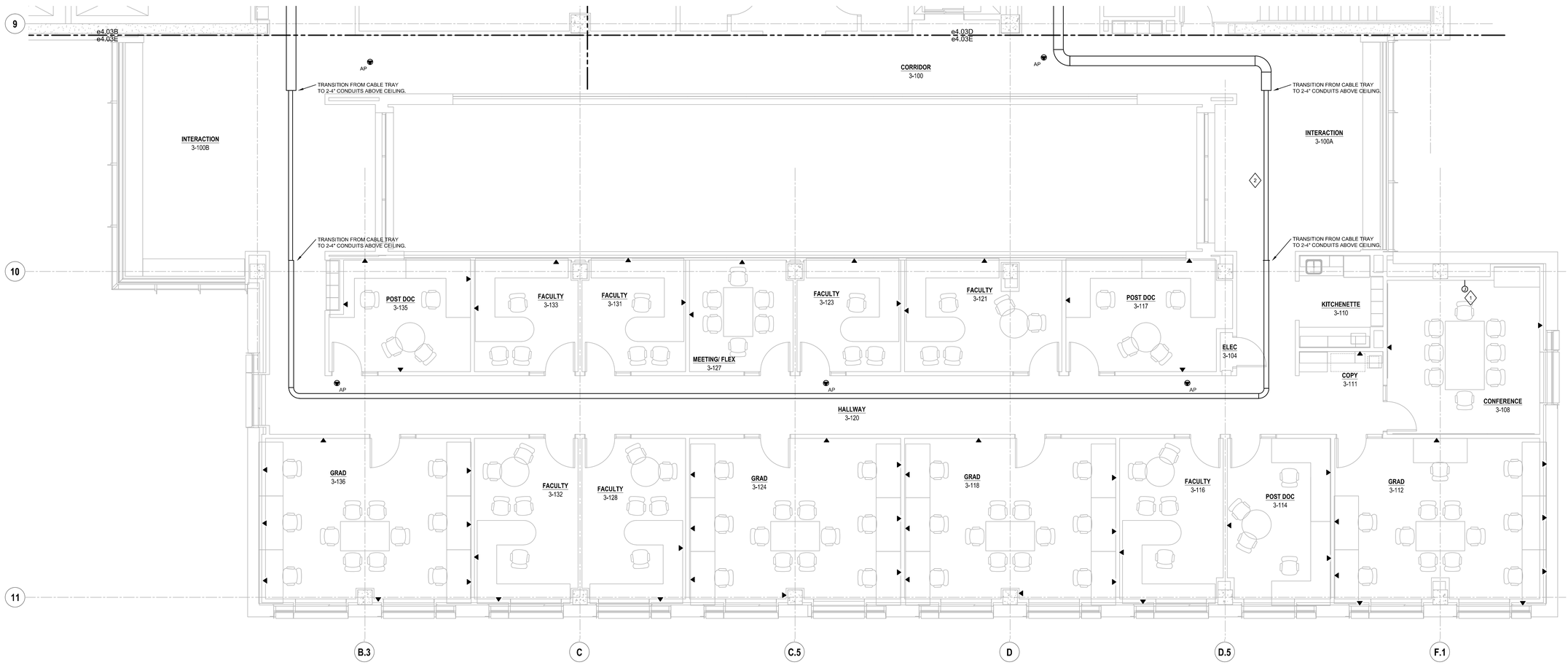
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ELECTRICAL TELECOM
LEVEL 3 - ZONE D

e4.03D



1 **ELECTRICAL TELECOM LEVEL 3 - ZONE E**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. VOICE/DATA OUTLETS PLACED IN A FIRE RATED WALL SHALL MEET NEC CODE TO MAINTAIN FIRE RATING.
2. ALL CONDUIT PLACEMENT AND FINAL INSTALLATION IS SUBJECT TO UNIVERSITY OF MINNESOTA OIT APPROVAL. CPPM PROJECT MANAGER SHALL IMMEDIATELY REMEDIATE ANY VOICE/DATA OUTLETS, CABLE TRAY, CONDUIT RUNS, OR BUSHINGS THAT ARE IDENTIFIED AS NOT BEING IN COMPLIANCE WITH OIT WIRING STANDARDS. OIT WOULD PREFER TO SIGN-OFF ON EACH FLOOR AFTER CONDUITS, CABLE TRAY, AND BUSHING ARE INSTALLED AND BEFORE CONTRACTOR MOVES TO THE NEXT FLOOR IN ORDER TO IDENTIFY ISSUES BEFORE THEY ARE REPEATED THROUGHOUT THE BUILDING.
3. REFER TO ARCHITECTURAL DRAWINGS AND ELEVATIONS FOR COORDINATION AND PLACEMENT OF TELECOM BOXES WITH CASEWORK AND FURNITURE.
4. CONDUIT FOR DEVICES INSTALLED BELOW WINDOWS WALL SHALL BE RUN HORIZONTALLY IN DRYWALL TO THICKENED WALLS NEAR COLUMNS TO TURN VERTICALLY AND CONNECT TO CABLE TRAY. MAXIMUM (2) 90 DEGREE BENDS ALLOWED BEFORE A PULL BOX SHALL BE PROVIDED FOR EACH TELE/DATA CONDUIT INSTALLATION.

SHEET KEYNOTES

1 PROVIDE ONE DOUBLE GANG, EXTRA DEEP BOX, WITH SINGLE GANG MUD RING, FLUSH MOUNTED IN WALL AT 18" AFF. TO CENTER. PROVIDE ONE 1" CONDUIT, RUN FROM BOX #1 AND STUBBED OUT AT AND BONDED TO THE COMMUNICATIONS TRAY. U OF M NETWORK TELECOMMUNICATIONS SERVICES (NTS) TO PROVIDE 2 DATA CIRCUIT JACKS (1 ACTIVE & 1 FUTURE). EXACT LOCATION TO BE VERIFIED WITH CTS.

2 BOND (2) 4" CONDUITS TO CABLE TRAY AT BOTH ENDS WITH #6 GROUND WIRE.

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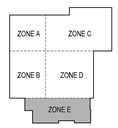
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Physics and Nanotechnology Building

U of M Project # 01-155-08-1718



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ELECTRICAL TELECOM
LEVEL 3 - ZONE E

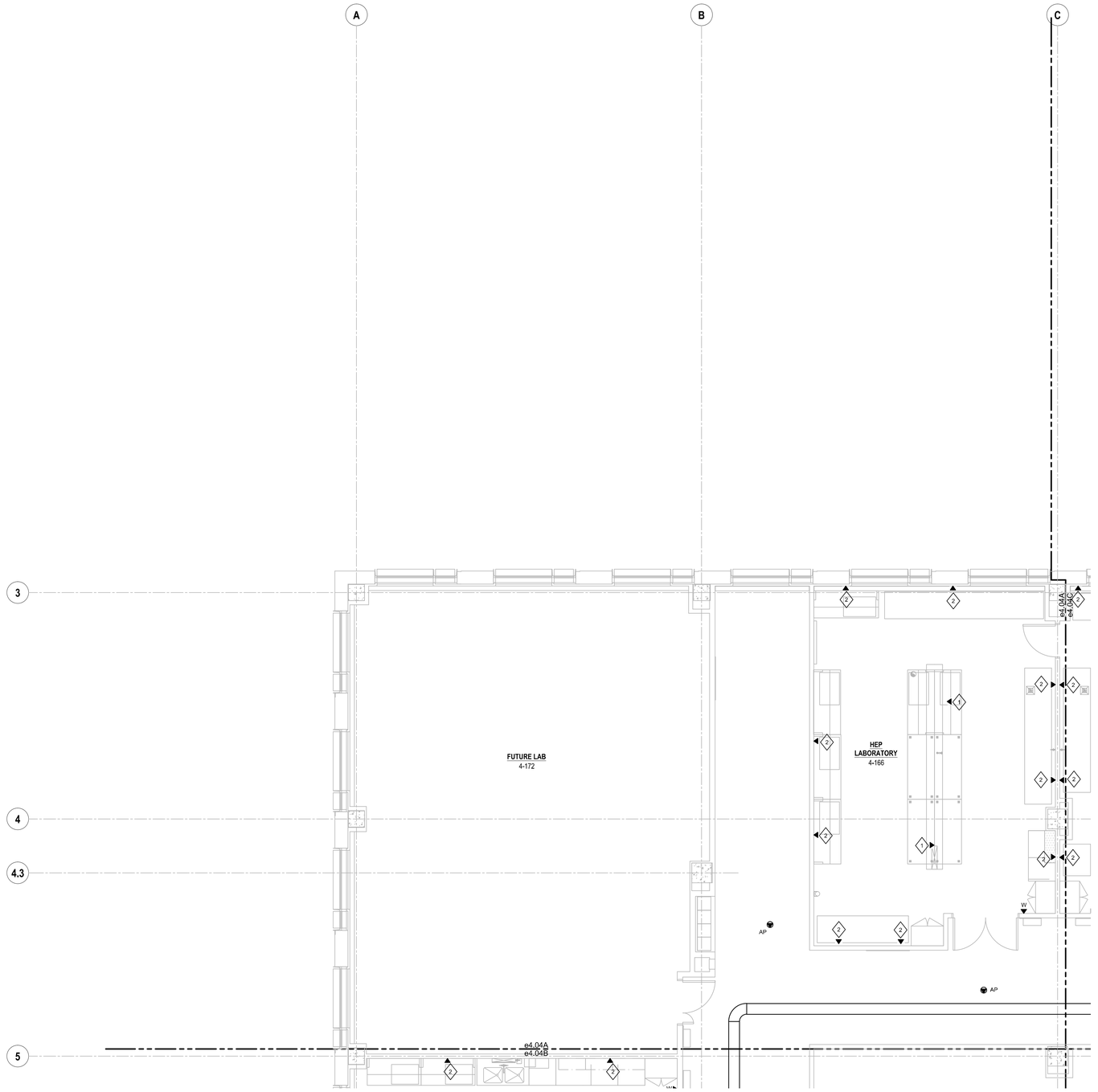
e4.03E

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3. REFER TO ARCHITECTURAL DRAWINGS AND ELEVATIONS FOR COORDINATION AND PLACEMENT OF TELECOM BOXES WITH CASEWORK AND FURNITURE.

SHEET KEYNOTES

1. PROVIDE OUTLET ON OVERHEAD SERVICE CARRIER.
2. PROVIDE OUTLET 2" ABOVE POWER SURFACE RACEWAY TO BOTTOM OF BOX.



1 **ELECTRICAL TELECOM LEVEL 4 - ZONE A**
SCALE: 1/4" = 1'-0"

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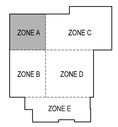
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Project

Physics and Nanotechnology Building

U of M Project # 01-155-08-1718



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ELECTRICAL TELECOM
LEVEL 4 - ZONE A

e4.04A



1 **ELECTRICAL TELECOM LEVEL 4 - ZONE B**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

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3. REFER TO ARCHITECTURAL DRAWINGS AND ELEVATIONS FOR COORDINATION AND PLACEMENT OF TELECOM BOXES WITH CASEWORK AND FURNITURE.

SHEET KEYNOTES

1. PROVIDE OUTLET ON OVERHEAD SERVICE CARRIER.
2. PROVIDE OUTLET 2" ABOVE POWER SURFACE RACEWAY TO BOTTOM OF BOX.

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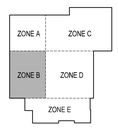
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Project

Physics and Nanotechnology Building

U of M Project # 01-155-08-1718



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ELECTRICAL TELECOM
LEVEL 4 - ZONE B

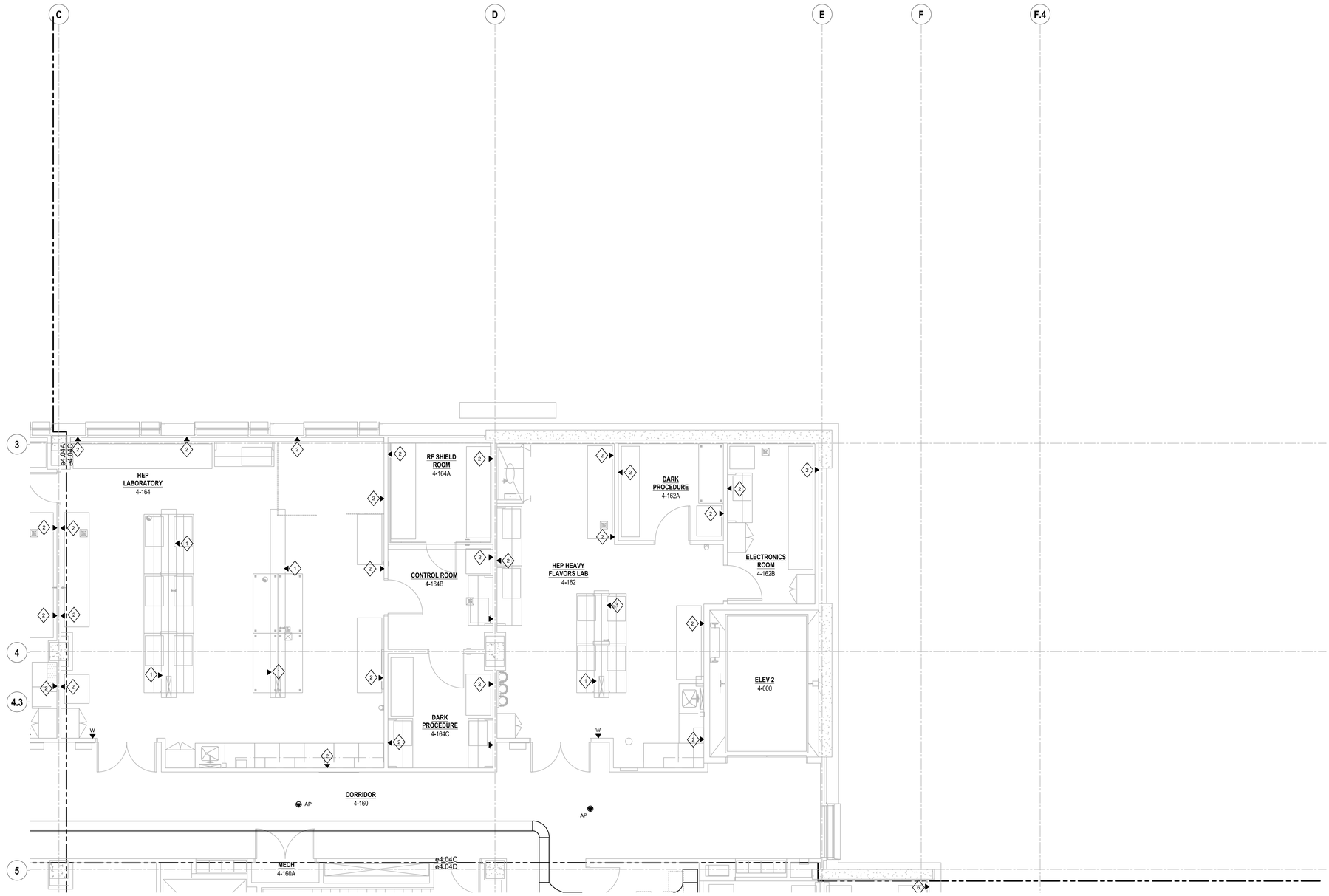
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3. REFER TO ARCHITECTURAL DRAWINGS AND ELEVATIONS FOR COORDINATION AND PLACEMENT OF TELECOM BOXES WITH CASEWORK AND FURNITURE.

SHEET KEYNOTES

1. PROVIDE OUTLET ON OVERHEAD SERVICE CARRIER.
2. PROVIDE OUTLET 2" ABOVE POWER SURFACE RACEWAY TO BOTTOM OF BOX.



1 **ELECTRICAL TELECOM LEVEL 4 - ZONE C**
SCALE: 1/4" = 1'-0"

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For AFFILIATED ENGINEERS, INC.

By

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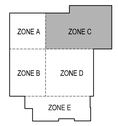
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Project

Physics and Nanotechnology Building

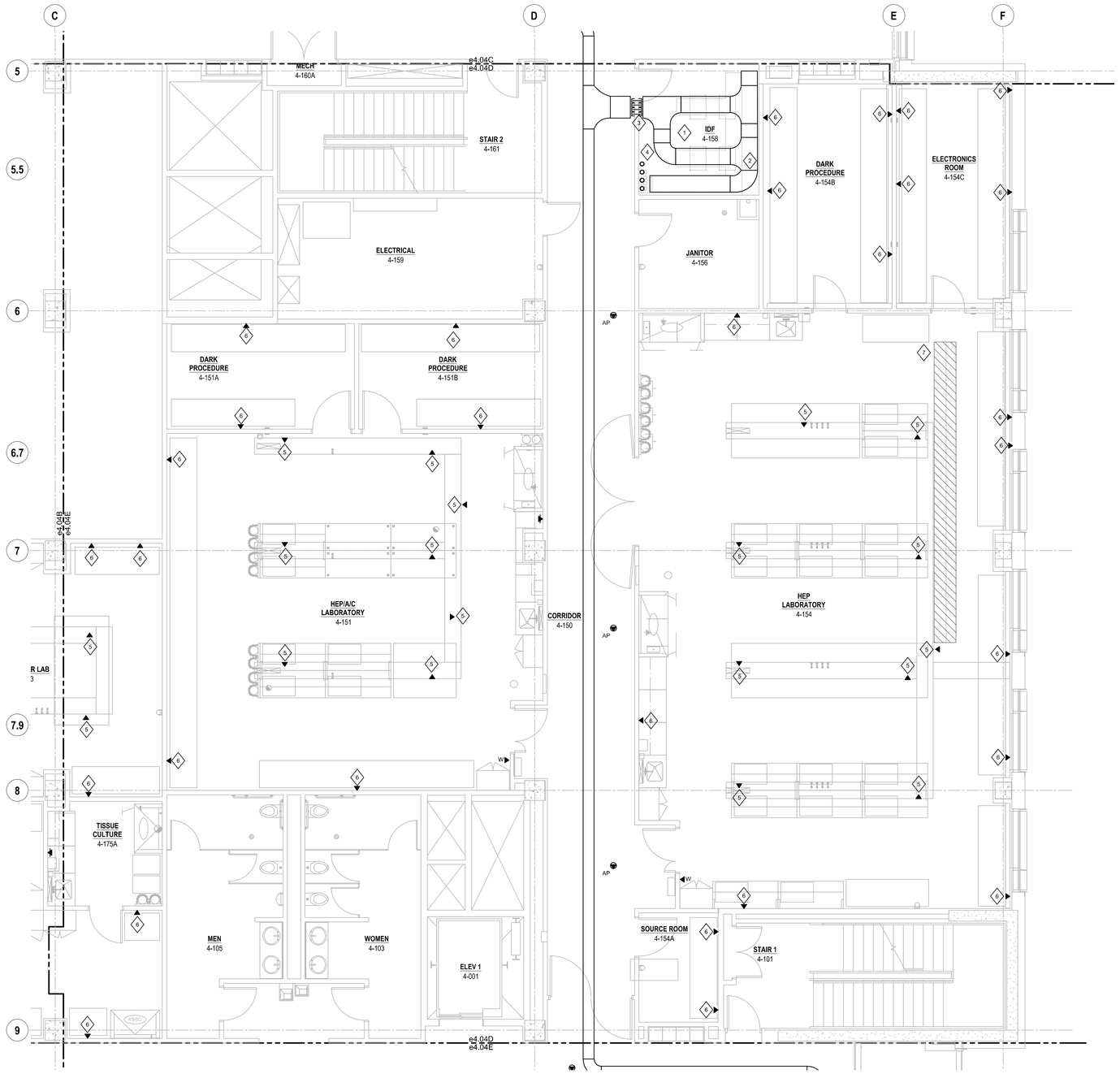
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ELECTRICAL TELECOM
LEVEL 4 - ZONE C

e4.04C



1 **ELECTRICAL TELECOM LEVEL 4 - ZONE D**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. VOICE/DATA OUTLETS PLACED IN A FIRE RATED WALL SHALL MEET NEC CODE TO MAINTAIN FIRE RATING.
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3. REFER TO ARCHITECTURAL DRAWINGS AND ELEVATIONS FOR COORDINATION AND PLACEMENT OF TELECOM BOXES WITH CASEWORK AND FURNITURE.

SHEET KEYNOTES

1. LINE ALL FOUR WALLS OF IDF WITH 8'x4' 3/4" CD GRADE OR BETTER FIRE RETARDANT PLYWOOD TO A HEIGHT OF 8'4" AFF. MOUNT SHEETS WITH SMOOTH SIDE OUT.
2. IDF ROOM CABLE TRAY SHALL BE 18"x6" AND SUPPORTED AT 8" AFF. SUPPORT EVERY 5' AND NO MORE THAN 2' FROM EACH END OR JOINT.
3. PROVIDE FOUR 4" EZ-PATH FIRE RATED SLEEVES AT 10'6" AFF TO BOTTOM.
4. PROVIDE FOUR 4" CONDUITS TO THIRD FLOOR IDF CABLE TRAY. STUB CONDUITS 2'-3" AFF. PROVIDE INSULATED BUSHINGS AND #6 GROUND TO TELECOMM GROUNDING BUS. PROVIDE UL-LISTED, 2-HOUR RE-ENTERABLE FIRE STOP SYSTEM.
5. PROVIDE OUTLET ON OVERHEAD SERVICE CARRIER.
6. PROVIDE OUTLET 2" ABOVE POWER SURFACE RACEWAY TO BOTTOM OF BOX.
7. ZONE INDICATED BY CROSSHATCH IS AN AREA WHICH SHALL BE KEPT CLEAR OF ALL CONDUITS FOR ALL ELECTRICAL SYSTEMS. NO ELECTRICAL DEVICES, RACEWAYS, OR EQUIPMENT SHALL BE INSTALLED IN THIS ZONE. REFER TO ARCHITECTURAL AND crtl SERIES DRAWINGS FOR FURTHER INFORMATION.

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For AFFILIATED ENGINEERS, INC.

By

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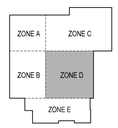
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Project

Physics and Nanotechnology Building

U of M Project # 01-155-08-1718



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ELECTRICAL TELECOM
LEVEL 4 - ZONE D

e4.04D

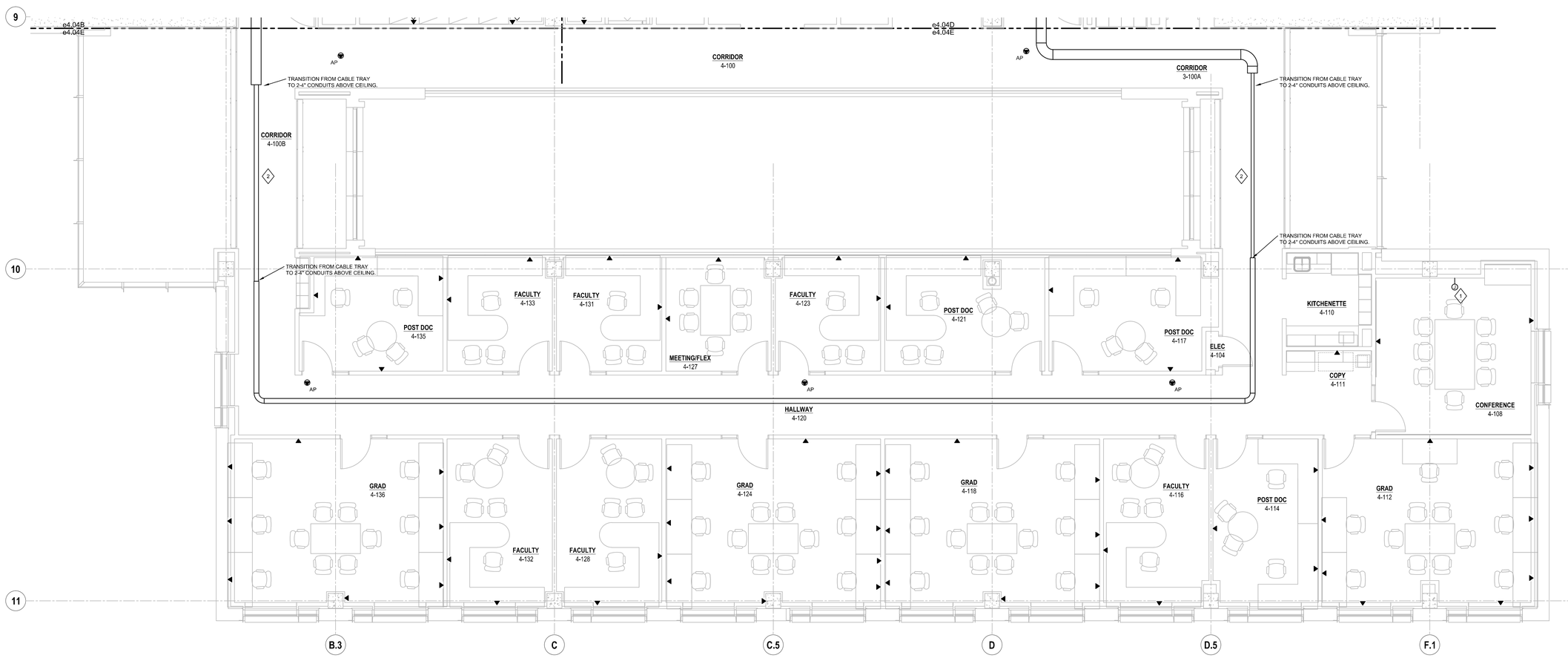
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4. CONDUIT FOR DEVICES INSTALLED BELOW WINDOWS WALL SHALL BE RUN HORIZONTALLY IN DRYWALL TO THICKENED WALLS NEAR COLUMNS TO TURN VERTICALLY AND CONNECT TO CABLE TRAY. MAXIMUM (2) 90 DEGREE BENDS ALLOWED BEFORE A PULL BOX SHALL BE PROVIDED FOR EACH TELE/DATA CONDUIT INSTALLATION.

SHEET KEYNOTES

1 PROVIDE ONE DOUBLE GANG, EXTRA-DEEP BOX, WITH SINGLE GANG MUD RING, FLUSH MOUNTED IN WALL AT 18" AFF. TO CENTER. PROVIDE ONE 1" CONDUIT. RUN FROM BOX #1 AND STUBBED OUT AT AND BONDED TO THE COMMUNICATIONS TRAY. U OF M NETWORK TELECOMMUNICATIONS SERVICES (NTS) TO PROVIDE 2 DATA CIRCUIT JACKS (1 ACTIVE & 1 FUTURE). EXACT LOCATION TO BE VERIFIED WITH CTS.

2 BOND (2)-4" CONDUITS TO CABLE TRAY AT BOTH ENDS WITH #6 GROUND WIRE.



1 **ELECTRICAL TELECOM LEVEL 4 - ZONE E**
SCALE: 1/4" = 1'-0"

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For AFFILIATED ENGINEERS, INC.

By

Name RONALD M. PARSLEY

Date 02-24-2012 Reg. No. 25163

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Bid Package No. 2	02-24-2012

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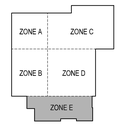
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ELECTRICAL TELECOM
LEVEL 4 - ZONE E

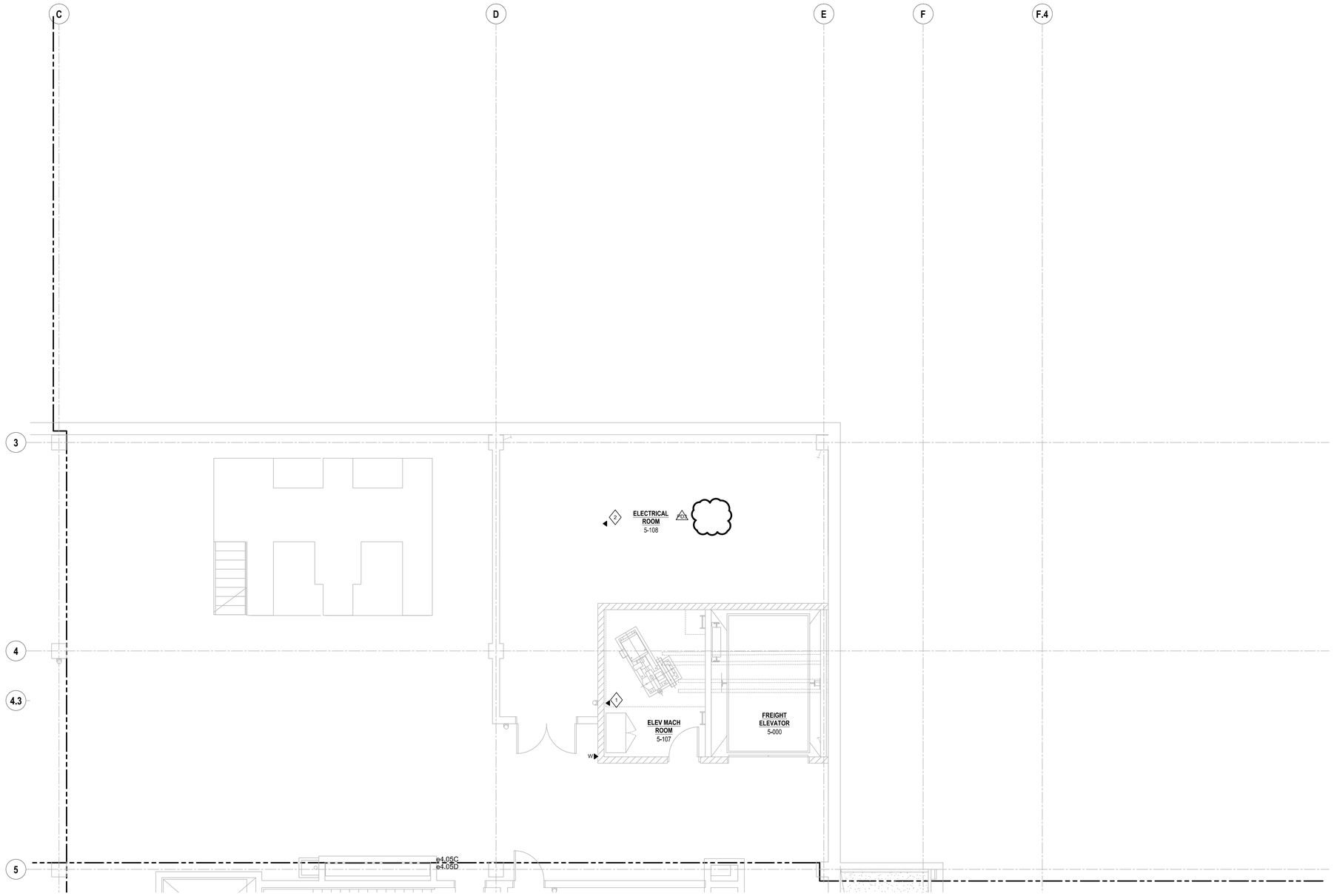
e4.04E

GENERAL NOTES

1. VOICE/DATA OUTLETS PLACED IN A FIRE RATED WALL SHALL MEET NEC CODE TO MAINTAIN FIRE RATING.
2. ALL CONDUIT PLACEMENT AND FINAL INSTALLATION IS SUBJECT TO UNIVERSITY OF MINNESOTA OIT APPROVAL. CPPM PROJECT MANAGER SHALL IMMEDIATELY REMEDIATE ANY VOICE/DATA OUTLETS, CABLE TRAY, CONDUIT RUNS, OR BUSHINGS THAT ARE IDENTIFIED AS NOT BEING IN COMPLIANCE WITH OIT WIRING STANDARDS. OIT WOULD PREFER TO SIGN-OFF ON EACH FLOOR AFTER CONDUITS, CABLE TRAY, AND BUSHING ARE INSTALLED AND BEFORE CONTRACTOR MOVES TO THE NEXT FLOOR IN ORDER TO IDENTIFY ISSUES BEFORE THEY ARE REPEATED THROUGHOUT THE BUILDING.
3. REFER TO -otf SERIES DRAWINGS FOR TELECOM DEVICE LOCATIONS. EC TO INSTALL BACK BOXES AND CONDUIT AS INDICATED ON THIS DRAWING.
4. ALL TELE/DATA PORTS ON THIS LEVEL SHALL BE SERVED BY CONDUIT PATHWAY TO LEVEL 4 CABLE TRAY.

SHEET KEYNOTES

1. OUTLET FOR CONNECTION TO ELEVATOR CAR TELEPHONE.
2. PROVIDE 1" CONDUIT STUB UP CONNECTION FROM TRANSFER SWITCH METER TO LEVEL 4 CABLE TRAY.



1 **ELECTRICAL TELECOM PENTHOUSE - ZONE C**
SCALE: 1/4" = 1'-0"

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For AFFILIATED ENGINEERS, INC.

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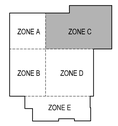
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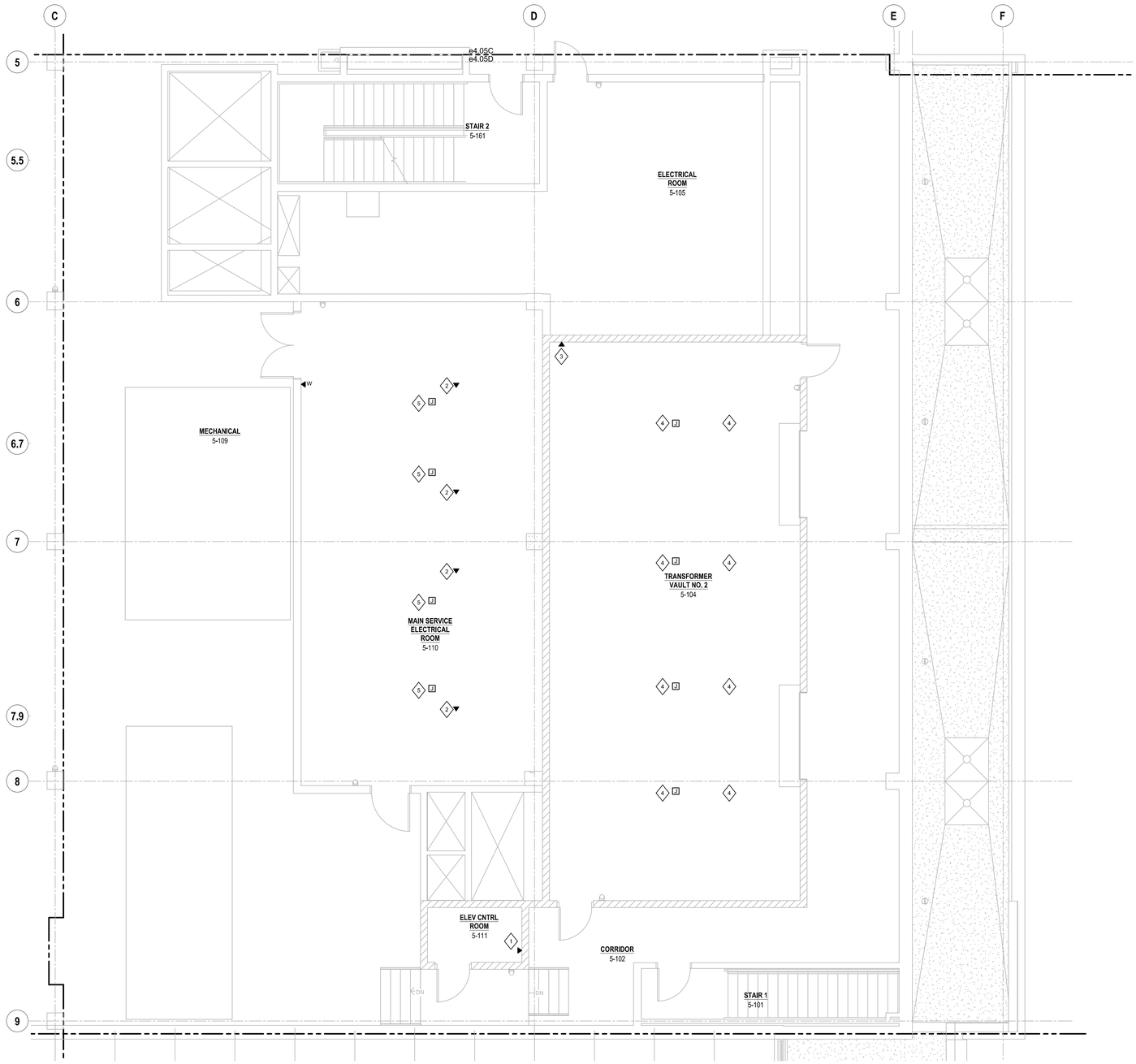
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ELECTRICAL TELECOM PENTHOUSE - ZONE C

e4.05C



1 **ELECTRICAL TELECOM PENTHOUSE - ZONE D**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. VOICE/DATA OUTLETS PLACED IN A FIRE RATED WALL SHALL MEET NEC CODE TO MAINTAIN FIRE RATING.
2. ALL CONDUIT PLACEMENT AND FINAL INSTALLATION IS SUBJECT TO UNIVERSITY OF MINNESOTA OIT APPROVAL. CPPM PROJECT MANAGER SHALL IMMEDIATELY REMEDIATE ANY VOICE/DATA OUTLETS, CABLE TRAY, CONDUIT RUNS, OR BUSHINGS THAT ARE IDENTIFIED AS NOT BEING IN COMPLIANCE WITH OIT WIRING STANDARDS. OIT WOULD PREFER TO SIGN-OFF ON EACH FLOOR AFTER CONDUITS, CABLE TRAY, AND BUSHING ARE INSTALLED AND BEFORE CONTRACTOR MOVES TO THE NEXT FLOOR IN ORDER TO IDENTIFY ISSUES BEFORE THEY ARE REPEATED THROUGHOUT THE BUILDING.
3. REFER TO cnf SERIES DRAWINGS FOR TELECOM DEVICE LOCATIONS. EC TO INSTALL BACK BOXES AND CONDUIT AS INDICATED ON THIS DRAWING.
4. ALL TELE/DATA PORTS ON THIS LEVEL SHALL BE SERVED BY CONDUIT PATHWAY TO LEVEL 4 CABLE TRAY.

SHEET KEYNOTES

1. OUTLET FOR CONNECTION TO ELEVATOR CAR TELEPHONE.
2. PROVIDE 1" CONDUIT CONNECTION FROM SUBSTATION METER TO OWNER FURNISHED SCADA RACK LOCATION INDICATED IN NOTE 3.
3. PROVIDE BACKBOX AND CONDUIT STUB-UP TO CABLE TRAY FOR UNIVERSITY PRIVATE NETWORK USE ON SCADA SYSTEM. WIRING BY BUILDING AUTOMATION SUBCONTRACTOR.
4. PROVIDE 3/4" CONDUIT FROM 15KV PRIMARY SWITCH AND FROM TRANSFORMER TEMPERATURE MONITOR PANEL IN EACH SUBSTATION CONNECTED TO AN ACCESSIBLE JUNCTION BOX LOCATED OUTSIDE FOOTPRINT OF EACH SUBSTATION. EXTEND CONDUIT FROM JUNCTION BOX TO SCADA RACK INDICATED IN PLAN NOTE 3.
5. PROVIDE 3/4" CONDUIT FROM PHASE LOSS RELAY AT MAIN SUBSTATION BREAKERS TO NEAREST BUILDING AUTOMATION DDC PANEL. COORDINATE EXACT LOCATION WITH DIVISION 23 CONTRACTOR.

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By

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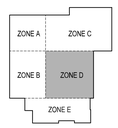
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Project

Physics and Nanotechnology Building

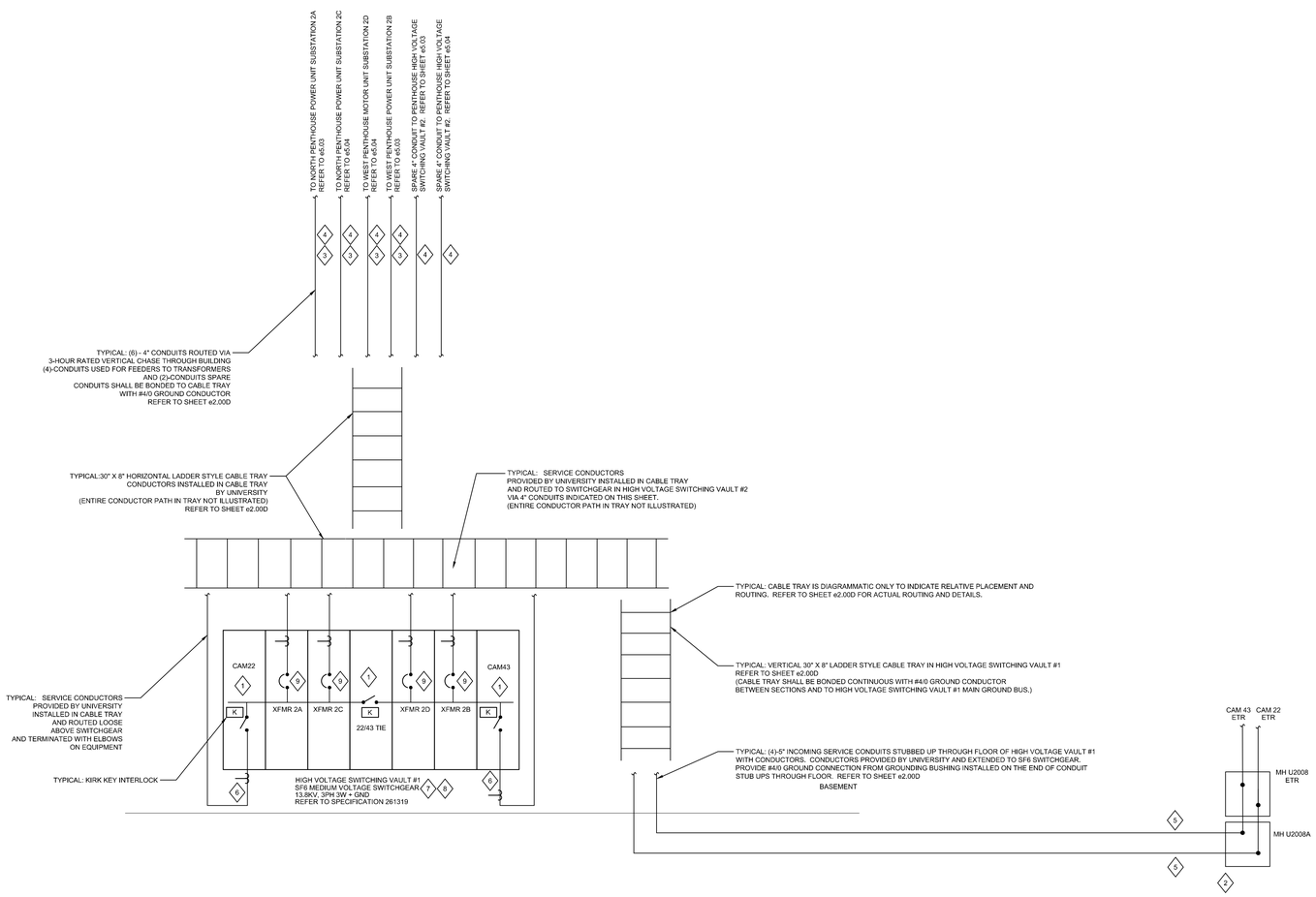
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ELECTRICAL TELECOM PENTHOUSE - ZONE D

e4.05D



1 **ELECTRICAL ONE-LINE DIAGRAM**
SCALE: NONE

GENERAL NOTES

1. MEDIUM VOLTAGE CABLES ARE PROVIDED BY UNIVERSITY. REFER TO SPECIFICATIONS FOR REQUIREMENTS FOR PROVIDING INCOMING MEDIUM VOLTAGE SERVICE CONDUCTORS FROM MANHOLES TO THE SWGR, AND SPECIFIC REQUIREMENTS OF THE UNIVERSITY OF MINNESOTA ON THE PURCHASE, INSTALLATION, AND TERMINATION OF CABLES.
2. UNIVERSITY IS PROVIDING ALL MEDIUM VOLTAGE CONDUCTORS. CONTRACTOR SHALL COORDINATE WITH UNIVERSITY ON INSTALLATION. PER EMF CONSULTANT RECOMMENDATION, ALL MEDIUM VOLTAGE CONDUCTORS INSTALLED IN CABLE TRAY SHALL BE TIED AND BUNDLED TOGETHER WITH TIES AT 5' INTERVALS TO MINIMIZE EMF RADIATION FROM EXPOSED CABLES NOT IN CONDUIT. COORDINATE THIS REQUIREMENT WITH UNIVERSITY STAFF.

SHEET KEYNOTES

1. PROVIDE SPLIT-BUS PRIMARY SELECTIVE OPERATION OF SWITCHES WITH SOURCE TRANSFER CONTROL. CONTROL SHALL UTILIZE SPLIT-BUS PRIMARY SELECTIVE SYSTEM. NORMAL OPERATION SHALL BE BOTH SWITCHES CLOSED AND BUS-TIE SWITCH INTERRUPTER OPEN SO THAT EACH SECTION OF BUS IS ENERGIZED BY ASSOCIATED SOURCE. CONTROL SHALL MONITOR POWER CONDITION OF BOTH SOURCES. WHEN VOLTAGE IS LOST ON EITHER SOURCE FOR A PERIOD OF TIME SUFFICIENT TO CONFIRM NON-TRANSIENT VOLTAGE DROP, AUTOMATIC SWITCHING SHALL OPEN SOURCE WHERE POWER IS LOST AND CLOSE BUS-TIE INTERRUPTER SWITCH TO RESTORE POWER TO AFFECTED SECTION OF BUS.
2. REFER TO SHEET e0.02 IN BP-1 FOR ELECTRICAL SITE DRAWINGS.
3. PROVIDE 4" CONDUITS FOR UNIVERSITY PROVIDED MEDIUM VOLTAGE CONDUCTORS.
4. CONDUITS SHALL BE INSTALLED IN A SINGLE RUN WITHOUT PULL BOXES FROM THE BASEMENT ELECTRICAL VAULT UP TO THE PENTHOUSE ELECTRICAL VAULT. COORDINATE WITH GENERAL CONTRACTOR AND PROVIDE ALL COSTS TO PROVIDE A 3 HOUR RATED DRYWALL ENCLOSURE AROUND CONDUITS WHERE THE CONDUITS ARE NOT INSIDE THE 3 HOUR RATED BASEMENT OR PENTHOUSE VAULTS. CONDUITS SHALL BE ROUTED VERTICALLY VIA ELECTRICAL ROOMS ON EACH FLOOR. PROVIDE 3 HOUR DRYWALL CHASE CONSTRUCTION IN ELECTRICAL ROOMS FOR VERTICAL PORTION AND HORIZONTAL 3 HOUR DRYWALL CHASE CONSTRUCTION WHERE CONDUIT PASSES HORIZONTALLY ON BASEMENT OR PENTHOUSE FLOORS.
5. SERVICE CONDUCTORS ARE PROVIDED BY UNIVERSITY IN CONTRACTOR INSTALLED DUCTBANK. FEEDERS ARE 15KV CONDUCTORS, 500KCMIL FOR EACH FEEDER.
6. SWITCHGEAR SHALL BE PROVIDED WITH (6) EXTERNAL 3 PHASE CURRENT TRANSFORMERS FOR SOURCE TRANSFER SCHEME WITH POLARITY DOT FACING DOWN TOWARD INCOMING SOURCES. EXTERNAL CTS SHALL BE SHIPPED UNATTACHED FROM MOUNTING FRAME WITH 30' OF SECONDARY CABLE PROVIDED. CTS RATIO SHALL BE 100:5.
7. SWITCHGEAR SHALL BE G&W SF6 VACUUM INTERRUPTER SWITCHES AS SPECIFIED. PROVIDE ATC451-4 IN NEMA 4 ENCLOSURE POWERED BY DUAL AC INPUT POWER SUPPLY WITH BATTERY BACKUP. AUTOMATIC TRANSFER CONTROL SHALL OPERATE MOTORS ON (2) INCOMING WAYS AND TIE WAY. PROVIDE (3) SETS OF FORM C AUXILIARY CONTACTS ON EACH WAY OPERATOR WIRED TO CONTROL CABINET.
8. PROVIDE ELBOW MOUNTED DIGITAL VOLTAGE SENSORS (RW138000X7PXX) FOR INCOMING WAYS. SENSORS SHALL BE SHIPPED UNASSEMBLED FROM THE SWITCH. VOLTAGE SENSORS SHALL BE CONNECTED TO NON-LOAD BREAK ELBOWS ON INCOMING LINES AND WIRED TO ATC-451 CONTROLLER INDICATED IN SPECIFICATION 261319.
9. OVERCURRENT DEVICES IN EACH WAY SHALL BE CONFIGURED TO MIMIC OPERATION OF A 125E S&C SM-5 FUSE THROUGH THEIR OWN FUSE EMULATOR.

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By

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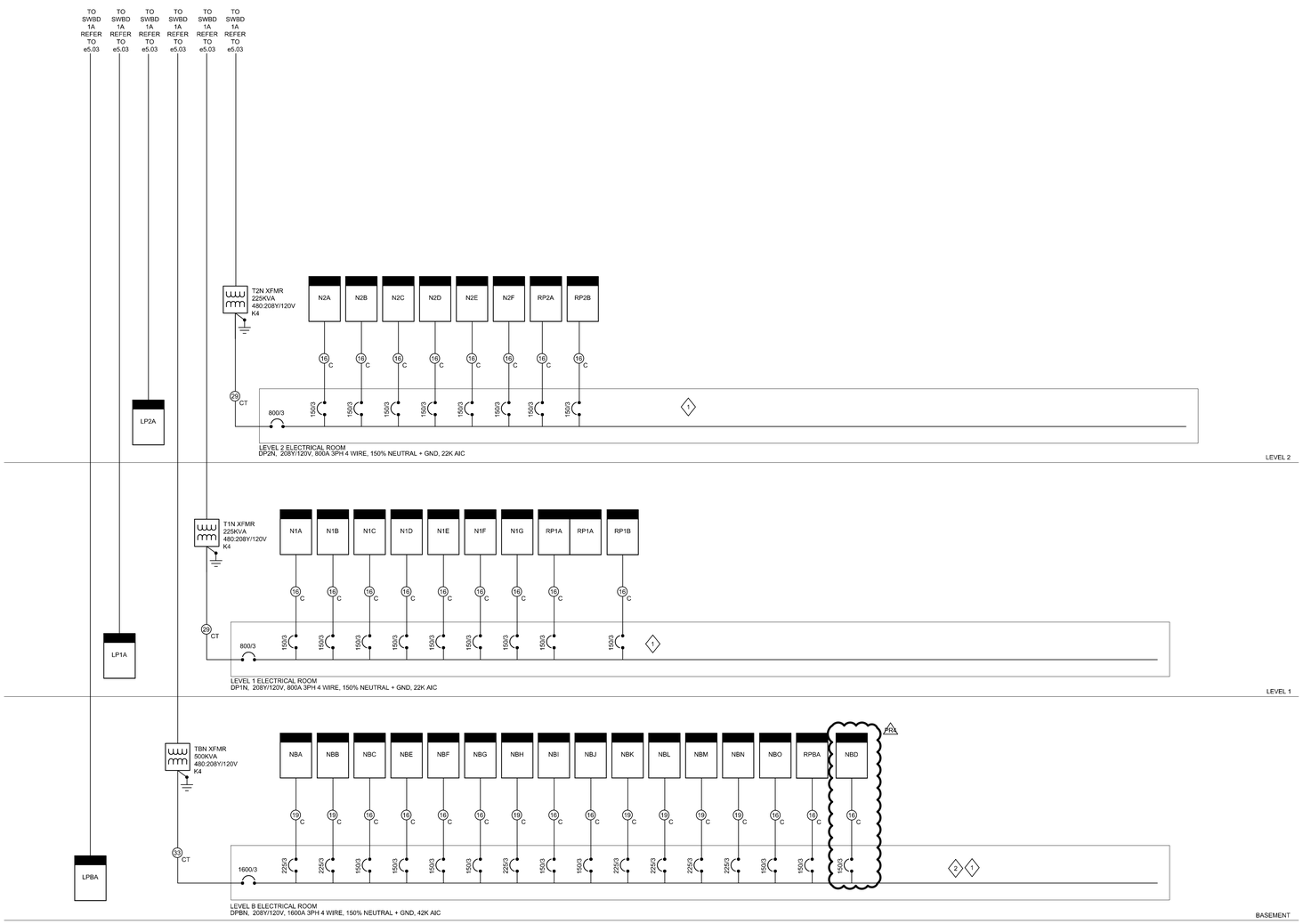
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ELECTRICAL
ONE-LINE DIAGRAM

e5.01



1 ELECTRICAL ONE-LINE DIAGRAM

SCALE: NONE

SHEET KEYNOTES

1. PROVIDE ADDITIONAL 25% SPARE AND 25% SPACES OF ALL CIRCUIT BREAKERS INDICATED IN PANEL.
2. REFER TO MOTOR SCHEDULES AND CLEANROOM MOTOR SCHEDULE FOR MOTORS SERVED FROM THIS EQUIPMENT. PROVIDE BRANCH BREAKERS AS INDICATED IN THE MOTOR SCHEDULE.

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ELECTRICAL
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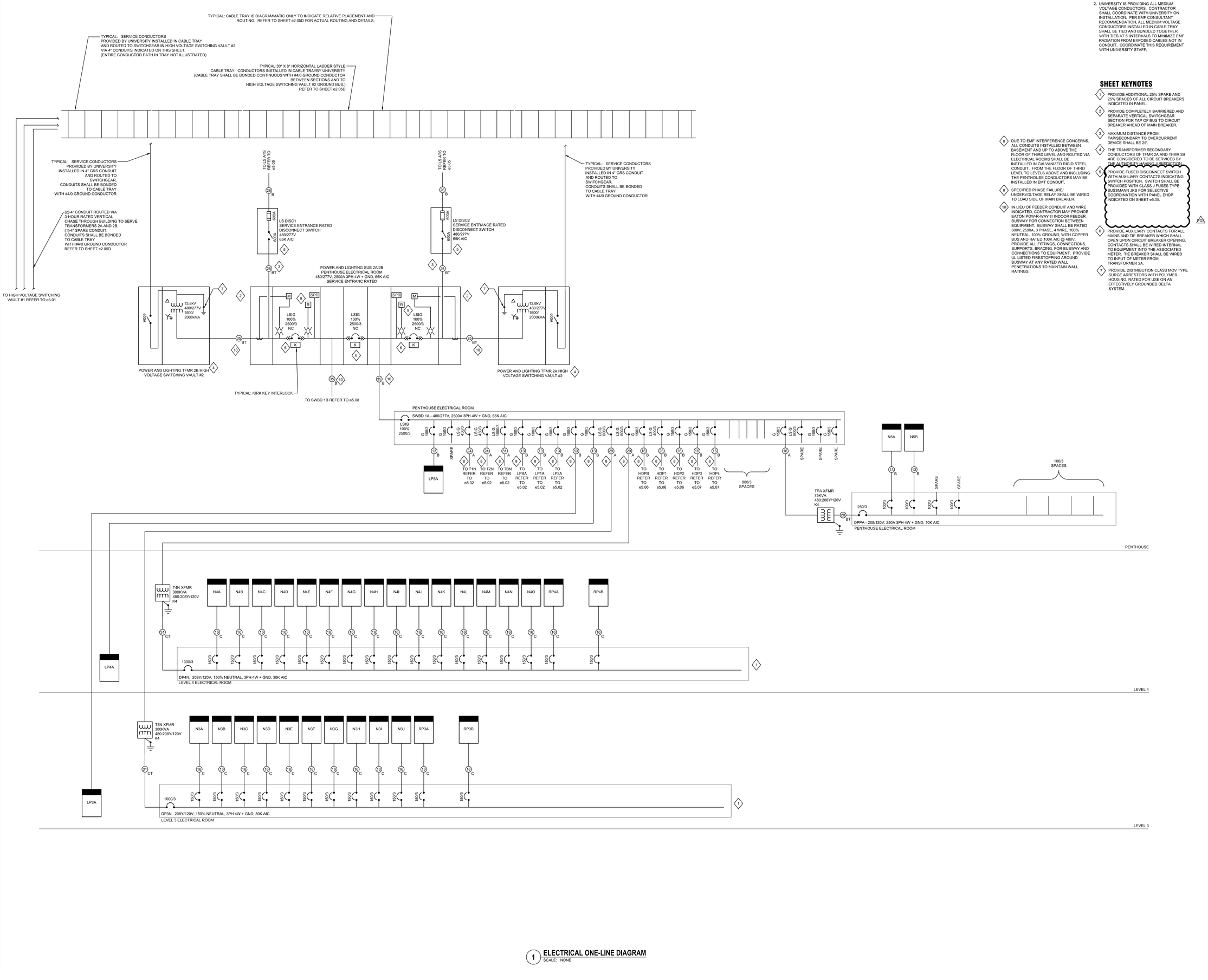
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GENERAL NOTES

1. LSI(G) = FULLY ADJUSTABLE LONG TIME PICKUP/DELAY, SHORT TIME PICKUP/DELAY, INSTANTANEOUS ADJUSTMENT, AND GROUND FAULT ADJUSTMENTS.
2. UNIVERSITY IS PROVIDING ALL MEDIUM VOLTAGE CONDUCTORS. CONTRACTOR SHALL COORDINATE WITH UNIVERSITY ON INSTALLATION. PER EMF CONSULTANT RECOMMENDATION, ALL MEDIUM VOLTAGE CONDUCTORS INSTALLED IN CABLE TRAY SHALL BE TIED AND BUNDLED TOGETHER WITH TIES AT 5' INTERVALS TO MINIMIZE EMF RADIATION FROM EXPOSED CABLES NOT IN CONDUIT. COORDINATE THIS REQUIREMENT WITH UNIVERSITY STAFF.

SHEET KEYNOTES

1. PROVIDE ADDITIONAL 25% SPARE AND 25% SPACES OF ALL CIRCUIT BREAKERS INDICATED IN PANEL.
2. PROVIDE COMPLETELY BARRIERED AND SEPARATE VERTICAL SWITCHGEAR SECTION FOR TAP OF BUS TO CIRCUIT BREAKER AHEAD OF MAIN BREAKER.
3. MAXIMUM DISTANCE FROM TAP/SECONDARY TO OVERCURRENT DEVICE SHALL BE 25'.
4. THE TRANSFORMER SECONDARY CONDUCTORS OF TFMR 2A AND TFMR 2B ARE CONSIDERED TO BE SERVICES BY THE AUTHORITY HAVING JURISDICTION.
5. PROVIDE FUSED DISCONNECT SWITCH WITH AUXILIARY CONTACTS INDICATING SWITCH POSITION. SWITCH SHALL BE PROVIDED WITH CLASS J FUSES TYPE BUSSMANN JKS FOR SELECTIVE COORDINATION WITH PANEL EHDP INDICATED ON SHEET e5.05.
6. PROVIDE AUXILIARY CONTACTS FOR ALL MAINS AND TIE BREAKER WHICH SHALL OPEN UPON CIRCUIT BREAKER OPENING. CONTACTS SHALL BE WIRED INTERNAL TO EQUIPMENT INTO THE ASSOCIATED METER. TIE BREAKER SHALL BE WIRED TO INPUT OF METER FROM TRANSFORMER 2A.
7. PROVIDE DISTRIBUTION CLASS MOV TYPE SURGE ARRESTORS WITH POLYMER HOUSING, RATED FOR USE ON AN EFFECTIVELY GROUNDED DELTA SYSTEM.
8. DUE TO EMF INTERFERENCE CONCERNS, ALL CONDUITS INSTALLED BETWEEN BASEMENT AND UP TO ABOVE THE FLOOR OF THIRD LEVEL AND ROUTED VIA ELECTRICAL ROOMS SHALL BE INSTALLED IN GALVANIZED RIGID STEEL CONDUIT, FROM THE FLOOR OF THIRD LEVEL TO LEVELS ABOVE AND INCLUDING THE PENTHOUSE CONDUCTORS MAY BE INSTALLED IN EMT CONDUIT.
9. SPECIFIED PHASE FAILURE/ UNDERVOLTAGE RELAY SHALL BE WIRED TO LOAD SIDE OF MAIN BREAKER.
10. IN LIEU OF FEEDER CONDUIT AND WIRE INDICATED, CONTRACTOR MAY PROVIDE EATON POW-R-WAY III INDOOR FEEDER BUSWAY FOR CONNECTION BETWEEN EQUIPMENT. BUSWAY SHALL BE RATED 600V, 2500A, 3 PHASE, 4 WIRE, 100% NEUTRAL, 100% GROUND, WITH COPPER BUS AND RATED 100K AIC @ 480V. PROVIDE ALL FITTINGS, CONNECTIONS, SUPPORTS, BRACING, FOR BUSWAY AND CONNECTIONS TO EQUIPMENT. PROVIDE UL LISTED FIRESTOPPING AROUND BUSWAY AT ANY RATED WALL PENETRATIONS TO MAINTAIN WALL RATINGS.



1 **ELECTRICAL ONE-LINE DIAGRAM**
SCALE: NONE

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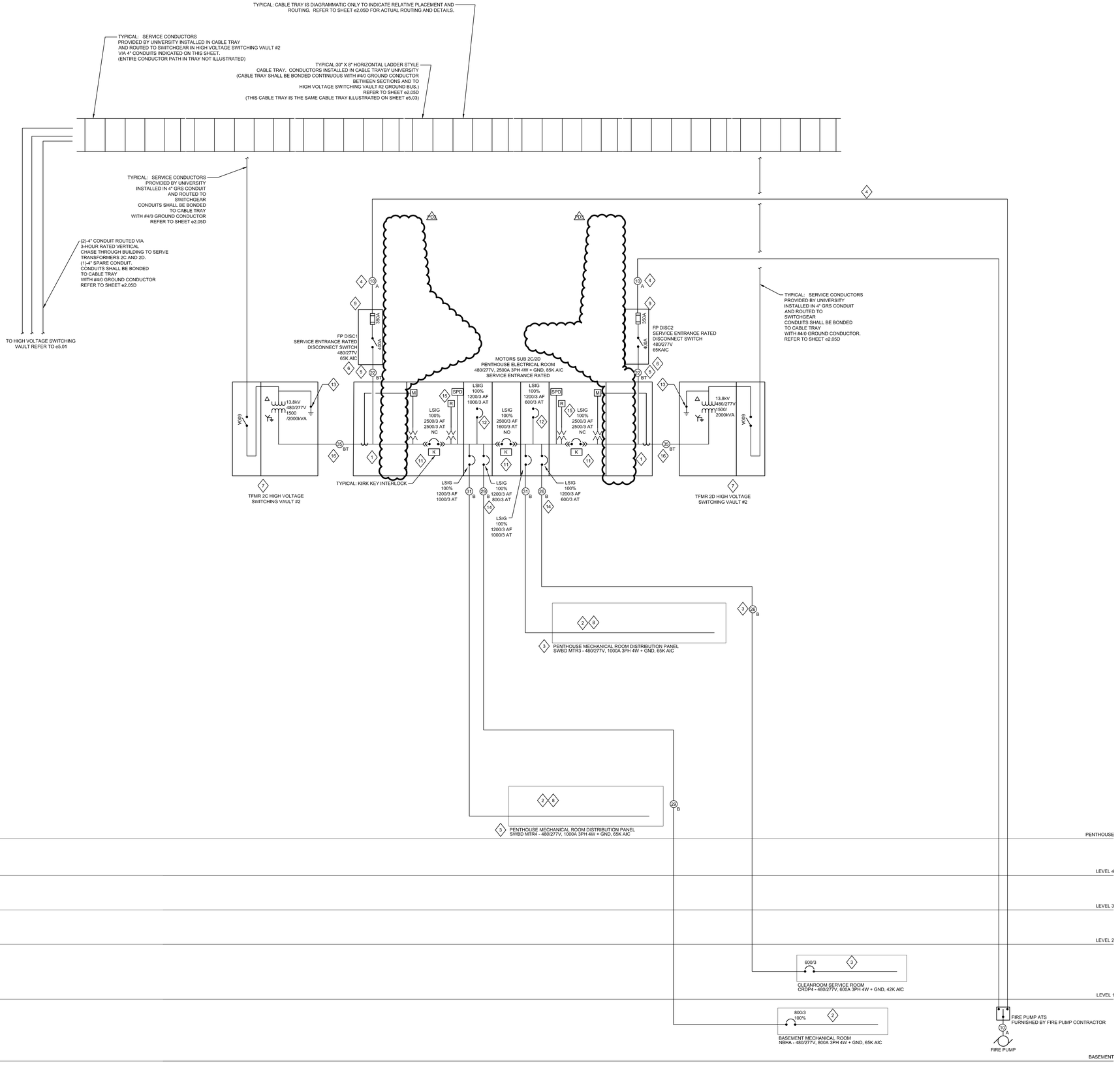
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ELECTRICAL
ONE-LINE DIAGRAM

e5.03



1 **ELECTRICAL ONE-LINE DIAGRAM**
SCALE: NONE

GENERAL NOTES

1. LSI(G) = FULLY ADJUSTABLE LONG TIME PICKUP/DELAY, SHORT TIME PICKUP/DELAY, INSTANTANEOUS ADJUSTMENT, AND GROUND FAULT ADJUSTMENTS.
2. UNIVERSITY IS PROVIDING ALL MEDIUM VOLTAGE CONDUCTORS. CONTRACTOR SHALL COORDINATE WITH UNIVERSITY ON INSTALLATION. PER EMF CONSULTANT RECOMMENDATION, ALL MEDIUM VOLTAGE CONDUCTORS INSTALLED IN CABLE TRAY SHALL BE TIED AND BUNDLED TOGETHER WITH TIES AT 5' INTERVALS TO MINIMIZE EMF RADIATION FROM EXPOSED CABLES NOT IN CONDUIT. COORDINATE THIS REQUIREMENT WITH UNIVERSITY STAFF.

SHEET KEYNOTES

1. PROVIDE COMPLETELY BARRIERED AND SEPARATE VERTICAL SWITCHGEAR SECTION FOR TAP OF BUS TO CIRCUIT BREAKER AHEAD OF MAIN BREAKER.
2. REFER TO MOTOR SCHEDULES AND CLEANROOM MOTOR SCHEDULE FOR MOTORS SERVED FROM THIS EQUIPMENT. PROVIDE BRANCH BREAKERS AS INDICATED IN THE MOTOR SCHEDULE. PROVIDE ADDITIONAL 25% SPARE AND 25% SPACES OF ALL CIRCUIT BREAKERS INDICATED IN EQUIPMENT ON SCHEDULES.
3. REFER TO SHEET cr-e5.01 FOR FURTHER INFORMATION. PANEL AND FEEDER SHALL BE INSTALLED AS PART OF CLEAN ROOM PROJECT.
4. PROVIDE 2 HOUR RATING FOR ELECTRICAL CIRCUIT TO FIRE PUMP WITH RHW CONDUCTORS INSTALLED IN CONDUIT.
5. MAXIMUM DISTANCE FROM TAP/SECONDARY TO OVERCURRENT DEVICE SHALL BE 25'.
6. PROVIDE AUXILIARY CONTACTS ON FIRE PUMP CIRCUIT BREAKER DISCONNECTS. CONTACTS SHALL CLOSE WHEN CIRCUIT BREAKER IS IN THE OFF/OPEN POSITION FOR MONITORING BY THE FIRE ALARM SYSTEM.
7. THE TRANSFORMER SECONDARY CONDUCTORS OF TFMR 2C AND TFMR 2D ARE CONSIDERED TO BE SERVICES BY THE AUTHORITY HAVING JURISDICTION.
8. ALL CIRCUIT BREAKERS IN THIS BOARD SHALL HAVE ADJUSTABLE GROUND FAULT TRIP SETTINGS.
9. PROVIDE FUSED DISCONNECT SWITCH WITH AUXILIARY CONTACTS INDICATING SWITCH POSITION.
10. NOT USED.
11. PROVIDE AUXILIARY CONTACTS FOR ALL MAINS AND TIE BREAKER WHICH SHALL OPEN UPON CIRCUIT BREAKER OPENING. CONTACTS SHALL BE WIRED INTERNAL TO EQUIPMENT INTO THE ASSOCIATED METER. TIE BREAKER SHALL BE WIRED TO INPUT OF METER FROM TRANSFORMER 2C.
12. BREAKER INDICATED SHALL BE SPARE BREAKER FOR USE BY OWNER. INSTALL IN SWITCHBOARD IF POSSIBLE WHILE MAINTAINING NO ADDITIONAL SECTIONS. IF ADDITIONAL SECTIONS ARE REQUIRED, PROVIDE BREAKER LOOSE FOR STORAGE BY OWNER.
13. PROVIDE DISTRIBUTION CLASS MOV TYPE SURGE ARRESTORS WITH POLYMER HOUSING, RATED FOR USE ON AN EFFECTIVELY GROUNDED DELTA SYSTEM.
14. DUE TO EMF INTERFERENCE CONCERNS, ALL CONDUITS INSTALLED BETWEEN BASEMENT AND UP TO ABOVE THE FLOOR OF THIRD LEVEL AND ROUTED VIA ELECTRICAL ROOMS SHALL BE INSTALLED IN GALVANIZED RIGID STEEL CONDUIT. FROM THE FLOOR OF THIRD LEVEL TO LEVELS ABOVE AND INCLUDING THE PENTHOUSE CONDUCTORS MAY BE INSTALLED IN EMT CONDUIT.
15. SPECIFIED PHASE FAILURE/ UNDERVOLTAGE RELAY SHALL BE WIRED TO LOAD SIDE OF MAIN BREAKER.
16. IN LIEU OF FEEDER CONDUIT AND WIRE INDICATED, CONTRACTOR MAY PROVIDE EATON POW-R-WAY III INDOOR FEEDER BUSWAY FOR CONNECTION BETWEEN EQUIPMENT. BUSWAY SHALL BE RATED 600V, 2500A, 3 PHASE, 4 WIRE, 100% NEUTRAL, 100% GROUND, WITH COPPER BUS AND RATED 100K AIC @ 480V. PROVIDE ALL FITTINGS, CONNECTIONS, SUPPORTS, BRACING, FOR BUSWAY AND CONNECTIONS TO EQUIPMENT. PROVIDE UL LISTED FIRESTOPPING AROUND BUSWAY AT ANY RATED WALL PENETRATIONS TO MAINTAIN WALL RATINGS.

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For AFFILIATED ENGINEERS, INC.

By

Name RONALD M. PARSLEY

Date 02-24-2012 Reg. No. 25163

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Bid Package No. 2	02-24-2012
Project Directive No. 3	05-15-2012

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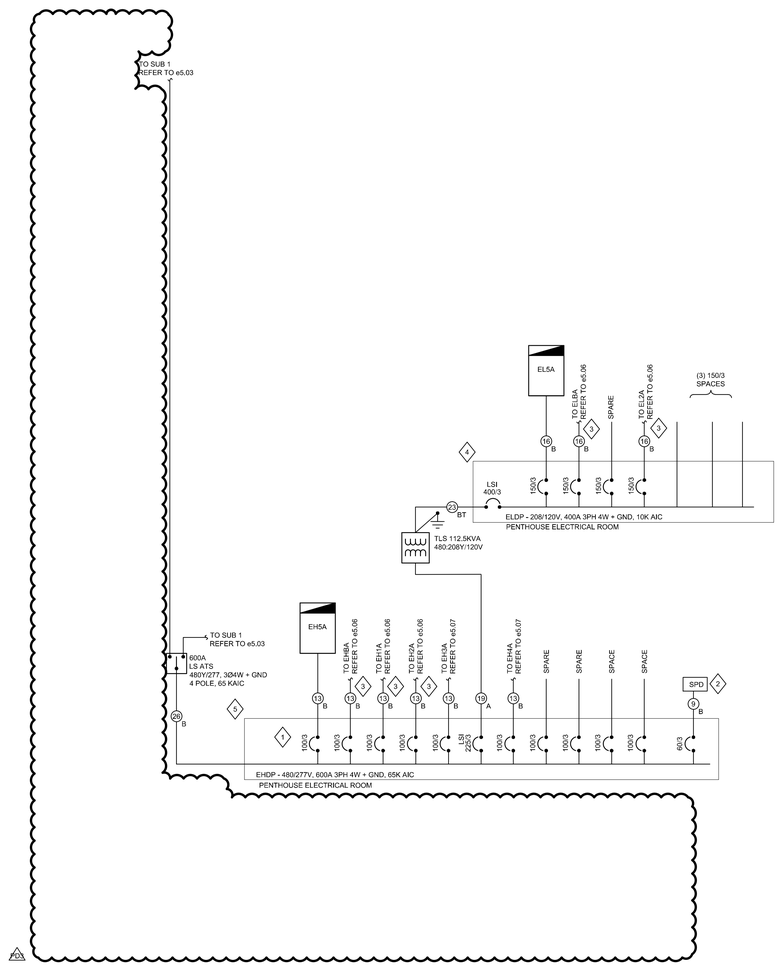
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GENERAL NOTES

1. LSI(G) = FULLY ADJUSTABLE LONG TIME PICKUP/DELAY, SHORT TIME PICKUP/DELAY, INSTANTANEOUS ADJUSTMENT, AND GROUND FAULT ADJUSTMENTS.

SHEET KEYNOTES

1. REFER TO MOTOR SCHEDULES AND CLEAN ROOM MOTOR SCHEDULE FOR MOTORS SERVED FROM THIS EQUIPMENT. PROVIDE BRANCH BREAKERS AS INDICATED IN THE MOTOR SCHEDULE.
2. LOCATE SPD IMMEDIATELY ADJACENT TO PANELBOARD.
3. DUE TO EMF INTERFERENCE CONCERNS, ALL CONDUITS INSTALLED BETWEEN BASEMENT AND UP TO ABOVE THE FLOOR OF THIRD LEVEL AND ROUTED VIA ELECTRICAL ROOMS SHALL BE INSTALLED IN GALVANIZED RIGID STEEL CONDUIT. FROM THE FLOOR OF THIRD LEVEL TO LEVELS ABOVE AND INCLUDING THE PENTHOUSE CONDUCTORS MAY BE INSTALLED IN EMT CONDUIT.
4. EMERGENCY/LIFE SAFETY 208V SYSTEM SHALL MAINTAIN SELECTIVE COORDINATION DOWN TO 0.1 SECONDS. ESTIMATED FAULT CURRENT ON SECONDARY OF TRANSFORMER IS 7K AIC. BASIS OF DESIGN IS TO PROVIDE A SQUARE D LA-MC 400A MAIN BREAKER, HD 150A BRANCH BREAKER, AND QO/B BREAKERS IN DOWNSTREAM PANELS EL5A, ELBA, AND EL2A. CONTRACTOR SHALL PROVIDE BREAKERS BASED ON MANUFACTURER'S RECOMMENDATIONS WHICH ARE SHOWN TO PROVIDE SELECTIVE COORDINATION DOWN TO AT LEAST 0.1 SECONDS FOR THE AVAILABLE FAULT CURRENT. SUBMITTALS SHALL DOCUMENT SELECTIVE COORDINATION TO THIS LEVEL OR CONTRACTOR SHALL MODIFY EQUIPMENT AS REQUIRED TO PROVIDE BREAKERS WHICH PROVIDE SELECTIVE COORDINATION TO AT LEAST 0.1 SECONDS.
5. EMERGENCY/LIFE SAFETY 480V SYSTEM SHALL MAINTAIN SELECTIVE COORDINATION DOWN TO 0.1 SECONDS. ESTIMATED FAULT CURRENT AT PANEL EHDP IS 42K AIC. BASIS OF DESIGN IS TO PROVIDE SQUARE D LX BRANCH BREAKERS OF SIZES INDICATED AND SQUARE D EJ STYLE BRANCH BREAKERS IN DOWNSTREAM PANELS EH5A, EH4A, EH3A, EH2A, EH1A, AND EH8A. CONTRACTOR SHALL PROVIDE BREAKERS BASED ON MANUFACTURER'S RECOMMENDATIONS WHICH ARE SHOWN TO PROVIDE SELECTIVE COORDINATION DOWN TO AT LEAST 0.1 SECONDS FOR THE AVAILABLE FAULT CURRENT. SUBMITTALS SHALL DOCUMENT SELECTIVE COORDINATION TO THIS LEVEL OR CONTRACTOR SHALL MODIFY EQUIPMENT AS REQUIRED TO PROVIDE BREAKERS WHICH PROVIDE SELECTIVE COORDINATION TO AT LEAST 0.1 SECONDS.
6. LEGALLY REQUIRED 480V SYSTEM SHALL MAINTAIN SELECTIVE COORDINATION DOWN TO 0.1 SECONDS. CONTRACTOR SHALL PROVIDE BREAKERS BASED ON MANUFACTURER'S RECOMMENDATIONS WHICH ARE SHOWN TO PROVIDE SELECTIVE COORDINATION DOWN TO AT LEAST 0.1 SECONDS FOR THE AVAILABLE FAULT CURRENT. SUBMITTALS SHALL DOCUMENT SELECTIVE COORDINATION TO THIS LEVEL OR CONTRACTOR SHALL MODIFY EQUIPMENT AS REQUIRED TO PROVIDE BREAKERS WHICH PROVIDE SELECTIVE COORDINATION TO AT LEAST 0.1 SECONDS. ESTIMATED FAULT CURRENT AT THIS LOCATION IS 30K AIC.



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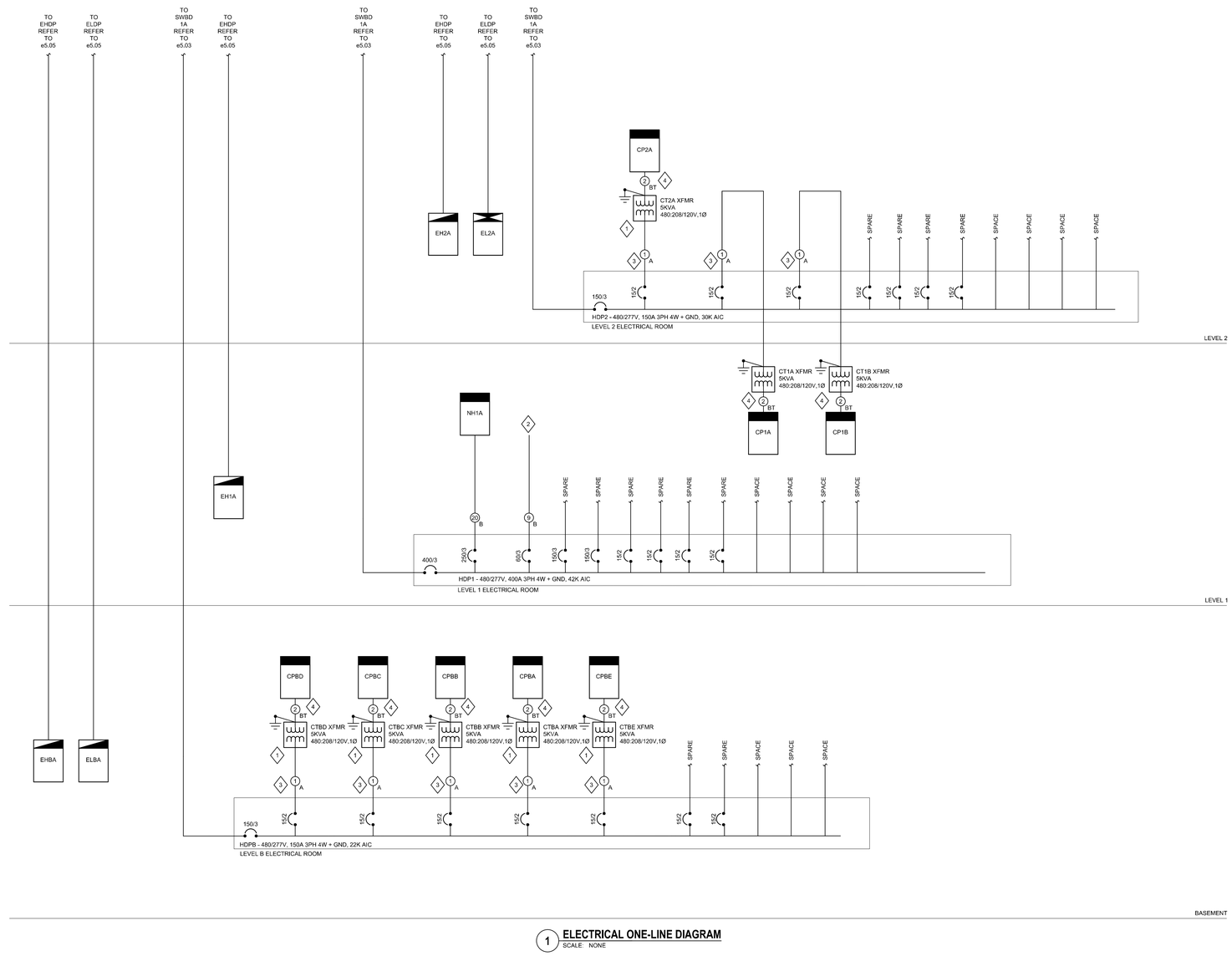
e5.05

GENERAL NOTES

1. ALL 5KVA CLEAN POWER TRANSFORMERS SHALL BE PROVIDED WITH A #8 GROUND WIRE BACK TO GROUND BUS IN THE ELECTRICAL ROOM ON EACH FLOOR.

KEYED NOTES

1. TRANSFORMER SHALL BE SHIELDED ISOLATION TRANSFORMER EQUAL TO CONTROL POWER COMPANY ULTRA-K 5DLX-5K6-4-BF, 5KVA ISOLATION TRANSFORMER WITH 480V SINGLE PHASE PRIMARY, 208/120V SINGLE PHASE SECONDARY.
2. BRANCH CIRCUIT TO SERVE 480V DISCONNECT IN ROOM 2-171. REFER TO SHEET e2.02D.
3. PROVIDE ONLY (2) PHASE CONDUCTORS WITH GROUND FOR THIS FEEDER.
4. PROVIDE ONLY (2) PHASE CONDUCTORS, (1) NEUTRAL, WITH GROUND FOR THIS FEEDER.



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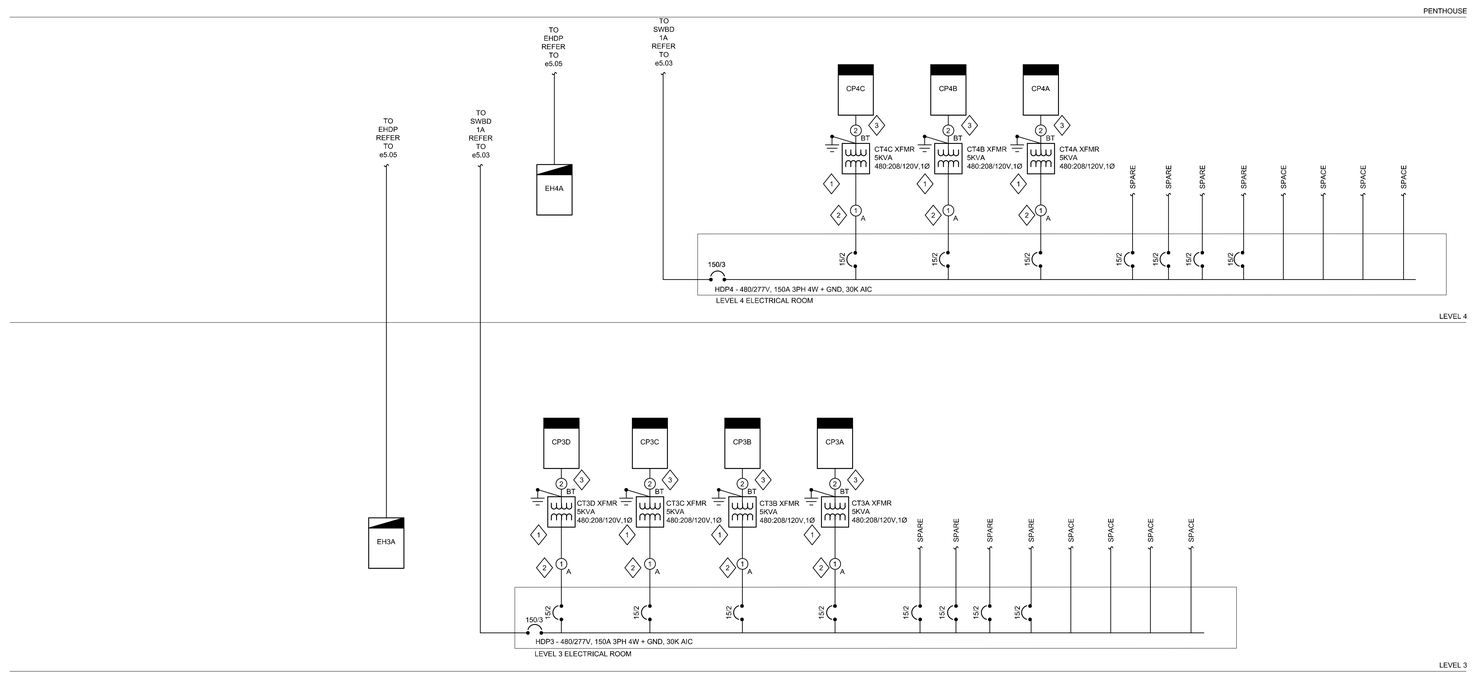
e5.06

GENERAL NOTES

1. ALL 5KVA CLEAN POWER TRANSFORMERS SHALL BE PROVIDED WITH A #8 GROUND WIRE BACK TO GROUND BUS IN THE ELECTRICAL ROOM ON EACH FLOOR.

KEYED NOTES

1. TRANSFORMER SHALL BE SHIELDED ISOLATION TRANSFORMER EQUAL TO CONTROL POWER COMPANY ULTRA-K 5DLX-5K6-4-BF, 5KVA ISOLATION TRANSFORMER WITH 480V SINGLE PHASE PRIMARY, 208/120V SINGLE PHASE SECONDARY.
2. PROVIDE ONLY (2) PHASE CONDUCTORS WITH GROUND FOR THIS FEEDER.
3. PROVIDE ONLY (2) PHASE CONDUCTORS, (1) NEUTRAL, WITH GROUND FOR THIS FEEDER.



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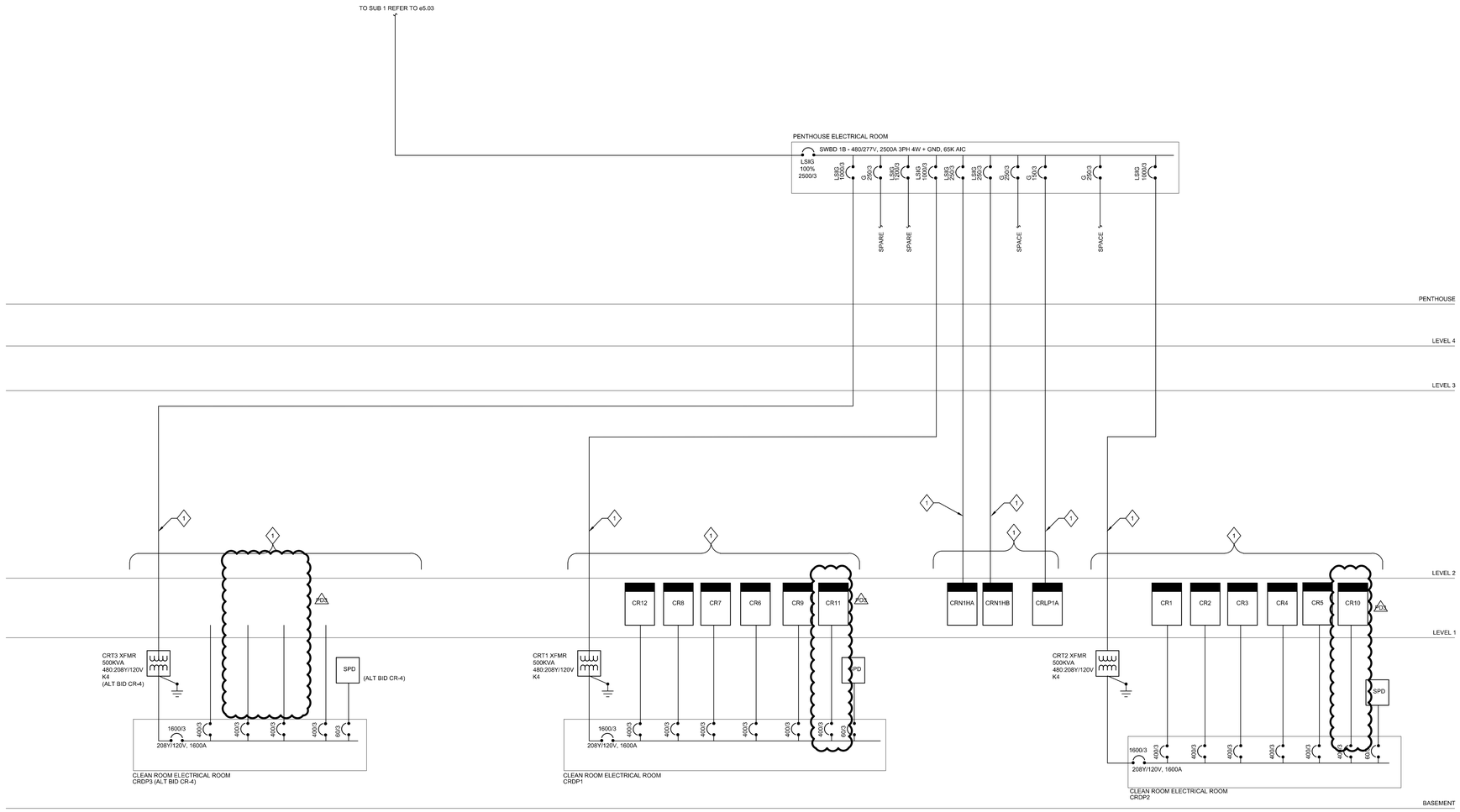
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GENERAL NOTES

1. LSI(G) = FULLY ADJUSTABLE LONG TIME PICKUP/DELAY, SHORT TIME PICKUP/DELAY, INSTANTANEOUS ADJUSTMENT, AND GROUND FAULT ADJUSTMENTS.

SHEET KEYNOTES

1 REFER TO SHEET cr-e5.01 FOR FURTHER INFORMATION. PANELS, TRANSFORMERS, AND FEEDERS SHALL BE INSTALLED AS PART OF CLEAN ROOM PROJECT.



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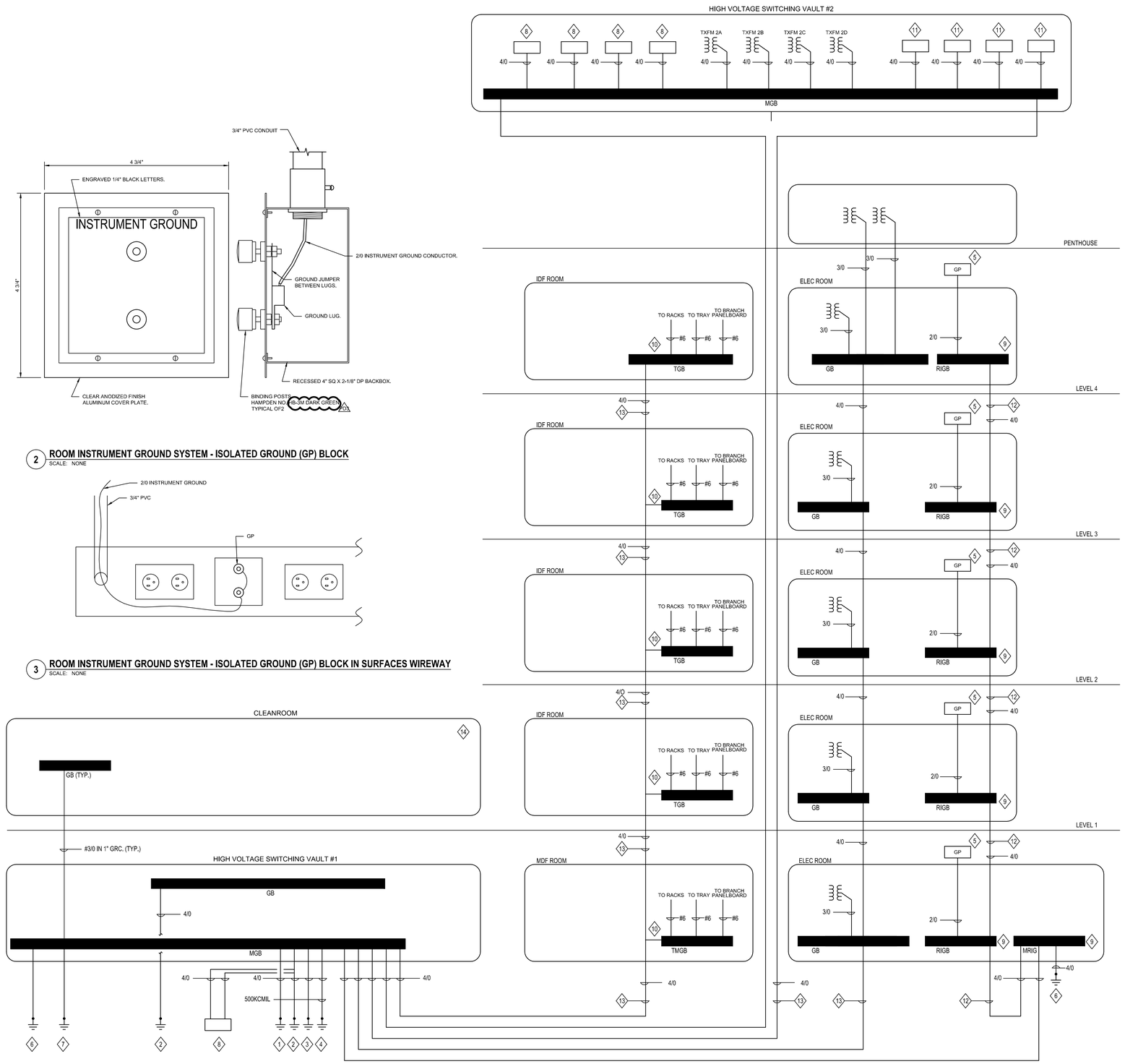
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2 ROOM INSTRUMENT GROUND SYSTEM - ISOLATED GROUND (GP) BLOCK

SCALE: NONE

3 ROOM INSTRUMENT GROUND SYSTEM - ISOLATED GROUND (GP) BLOCK IN SURFACES WIREWAY

SCALE: NONE



1 GROUNDING ONE-LINE DIAGRAM

SCALE: NONE

GENERAL NOTES

1. EXPOSE ALL GROUND RODS IN TEST WELLS.
2. ALL GROUND CONDUCTORS SHALL BE RUN IN 1" CONDUIT UNLESS SIZE NOTED OTHERWISE.
3. ALL GROUND CONDUCTORS SHALL BE BONDED AT BOTH ENDS OF CONDUIT TO GROUND BUSBAR. BONDING JUMPER SHALL BE THE SAME AS GROUNDING CONDUCTOR.

SHEET KEYNOTES

1. GROUNDING ELECTRODE CONDUCTOR TO WATER MAIN. PROVIDE BONDING JUMPER AROUND WATER METER.
2. A #4/0 AWG BARE COPPER GROUND GRID SHALL BE INSTALLED AT 12" BELOW SLAB THROUGHOUT THE HIGH VOLTAGE SWITCHING VAULT #1. 3/4" x 16' DRIVEN COPPER GROUND RODS SHALL BE INSTALLED AND CONNECTED TO THIS GROUND GRID. REFER TO DETAIL 6/e8.03. GROUND GRID SHALL BE INSTALLED IN CONFORMANCE WITH IEEE 80.
3. PROVIDE A BARE COPPER CONDUCTOR AT LEAST 20' LONG LOCATED IN AND NEAR THE BOTTOM OF THE NEAREST FOUNDATION OR FOOTING THAT IS IN CONTACT WITH THE EARTH. ELECTRODE SHALL BE ENCASED IN MINIMUM 2" OF CONCRETE. BOND TO REBAR OF FOOTING.
4. GROUNDING ELECTRODE CONDUCTOR 500KCMIL TO UFER GROUNDING SYSTEM. ENCASE CONDUCTOR IN CONCRETE FOOTING 3" FROM BOTTOM FOR A MINIMUM OF 25' AND BOND EACH END TO GROUND ROD.
5. TYPICAL IN LABORATORIES: FOR EACH INDIVIDUAL ROOM INSTRUMENT GROUND TERMINAL BLOCK (GP), PROVIDE #2/0 CONDUCTOR IN 3/4" PVC CONDUIT BACK TO NEAREST ROOM INSTRUMENT GROUND BUSBAR (RIGB). REFER TO FLOOR PLANS FOR LOCATIONS OF ROOM INSTRUMENT GROUND TERMINAL BLOCKS IN SURFACE WIRING OR FLUSH IN WALLS. REFER TO DETAILS 2 AND 3, THIS SHEET, FOR ROOM INSTRUMENT GROUND TERMINAL BLOCK.
6. GROUND RODS SPACED AT EACH CORNER OF ELECTRICAL ROOM AND UNDER GRID. REFER TO DETAIL 6/e8.03.
7. PROVIDE #4/0 BURIED GROUND RING AROUND THE ENTIRE PERIMETER OF BUILDING. REFER TO BID PACKAGE 1.
8. 15KV SWITCHGEAR GROUND BUS. CONNECT TO EACH END OF BUS.
9. PROVIDE INSTRUMENT GROUND LABEL WITH 1/4" H LETTERS.
10. PROVIDE ENGRAVED LABEL ABOVE TERMINATION ON BUSBAR "TELECOMMUNICATIONS GROUND - DO NOT REMOVE". TELECOM GROUNDING BACKBONE SHALL BE CONTINUOUS WITHOUT SPLICES FROM MDF TO LEVEL 4 IDF. BONDING TAPS MADE FROM #4/0 BACKBONE IN EACH ROOM SHALL BE MADE USING IRREVERSIBLE COMPRESSION CONNECTORS. ALL CONNECTIONS TO TGB SHALL BE MADE USING IRREVERSIBLE COMPRESSION CONNECTORS WITH TWO-HOLE LUGS. TGB SHALL BE ELECTROLYTIC TIN PLATED COPPER AND SHALL BE PRE-DRILLED TO ACCOMMODATE TWO-HOLE LUGS (7/16" DIAMETER, 1" SPACING) AND (5/16" DIAMETER, 5/8" SPACING). REFER TO UNIVERSITY OF MINNESOTA WIRING STANDARDS FOR DETAILS AND ACCEPTABLE PART NUMBERS.
11. TYPICAL: PROVIDE GROUND CONDUCTOR TO ALL UNIT SUBSTATION TRANSFORMER LIGHTING ARRESTERS.
12. 1" PVC CONDUIT.
13. 1" EMT CONDUIT.
14. REFER TO cn-e SERIES DRAWINGS FOR CLEANROOM GROUND BUS REQUIREMENTS.

SYMBOLS AND ABBREVIATION KEY

TRANSFORMER
GROUNDING ELECTRODE CONDUCTOR
GROUNDING ELECTRODE CONDUCTOR
BONDING JUMPER UNLESS NOTED OTHERWISE
GROUNDING ELECTRODE SYSTEM

MGB	MAIN GROUNDING BUSBAR, 96"LX4"HX1/4"W
GB	GROUNDING BUSBAR, 24"LX4"HX1/4"W
GP	ROOM INSTRUMENT GROUND TERMINAL BLOCK
MRIG	MAIN ROOM INSTRUMENT GROUNDING BUSBAR, 48"LX4"HX1/4"W
RIGB	ROOM INSTRUMENT GROUND BUSBAR, 24"LX4"HX1/4"W
TMGB	TELECOM MAIN GROUND BUSBAR, 72"LX4"HX1/4"W
TGB	TELECOM GROUNDING BUSBAR, 24"LX2"HX1/4"W

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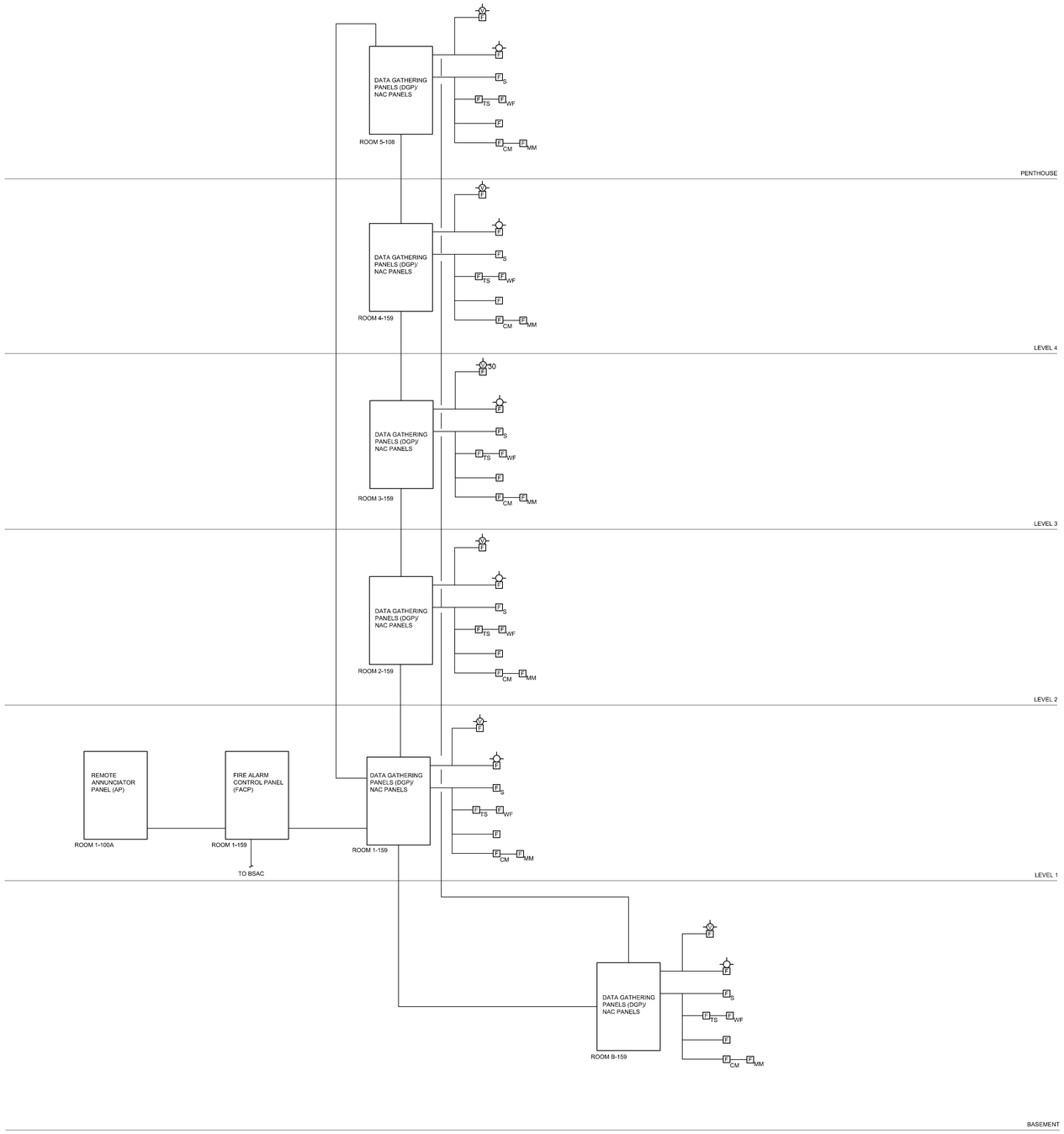
Physics and Nanotechnology Building

U of M Project # 01-155-08-1718

UNIVERSITY OF MINNESOTA
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GROUNDING
ONE-LINE DIAGRAM

e5.09



1 **FIRE ALARM ONE-LINE DIAGRAM**
SCALE: NONE

UPON ACTIVATION OF ANY DEVICE LISTED THE FOLLOWING SHALL OCCUR.	ACTUATE FLOOR ALARM	ACTUATE FLOOR ALARM SILENCE	ACTUATE FLOOR SUPERVISORY	ACTUATE FLOOR SUPERVISORY SILENCE	ACTUATE FLOOR TROUBLE	ACTUATE FLOOR TROUBLE SILENCE	ACTUATE BUILDING ALARM	STOP ALL AIRFLOW	TRANSMIT FIRE ALARM SIGNAL VIA PRIMARY & SECONDARY PATHS	TRANSMIT SUPERVISORY SIGNAL VIA PRIMARY & SECONDARY PATHS	TRANSMIT TROUBLE SIGNAL VIA PRIMARY & SECONDARY PATHS	RECALL ELEVATORS TO PRIMARY	RECALL ELEVATORS TO ALTERNATE	RELEASE MAGNETIC DOOR HOLDERS	SHUT DOWN ASSOCIATED AHU	OUTDOOR SPEAKER/STROBE ON	UNLOCK NOTED EGRESS DOOR LOCKS
MANUAL FIRE ALARM BOXES	X	X					X	X	X			X					X
SMOKE DETECTORS	X	X					X	X	X			X					X
SMOKE DETECTORS - 1ST FLOOR ELEVATOR LOBBY	X	X					X	X	X			X		X			X
SMOKE DETECTORS - 2ND FLOOR ELEVATOR LOBBY	X	X					X	X	X			X	X				X
SMOKE DETECTORS - 3RD FLOOR ELEVATOR LOBBY	X	X					X	X	X			X	X				X
SMOKE DETECTORS - 4TH FLOOR ELEVATOR LOBBY	X	X					X	X	X			X	X				X
SMOKE DETECTORS - 5TH FLOOR ELEVATOR LOBBY	X	X					X	X	X			X	X				X
IN-DUCT SMOKE DETECTOR	X	X					X	X	X			X		X			X
WATERFLOW	X	X					X	X	X			X				X	X
SPRINKLER CONTROL VALVE			X	X				X		X							
DRY PIPE PRESSURE SWITCH			X	X				X		X							
FIRE PUMP RUNNING	X	X						X	X							X	
FIRE PUMP POWER FAILURE/PHASE REVERSAL			X	X				X		X							
FIRE ALARM AC POWER FAILURE			X	X				X		X							
FIRE ALARM SYSTEM LOW BATTERY					X	X					X						
OPEN CIRCUIT					X	X					X						
GROUND FAULT					X	X					X						
NOTIFICATION APPLIANCE SHORT CCT					X	X					X						

GENERAL NOTES

1. REFER TO SPECIFICATIONS FOR FIRE ALARM SYSTEM WIRING REQUIREMENTS AND CLASS/STYLE OF WIRING BETWEEN DEVICES.
2. RISER DIAGRAM IS PARTIAL IN CONTENT AND IS NOT INTENDED TO SHOW ENTIRE SYSTEM. REFER TO FLOOR PLANS, SPECIFICATIONS AND PROVIDE AND INSTALL NECESSARY EQUIPMENT.
3. WIRING SHALL BE INSTALLED IN ACCORDANCE WITH THE SPECIFICATIONS AND MANUFACTURER'S SHOP DRAWINGS.

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Low Voltage Consultant
Elert & Associates
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Stillwater, MN 55082
(651) 705-1242

I hereby certify that this plan or drawing was prepared by me or under my direct supervision and that I am a duly licensed ELECTRICAL ENGINEER under the laws of the State of Minnesota.

For AFFILIATED ENGINEERS, INC.

By

Name RONALD M. PARSLEY

Date 02-24-2012 Reg. No. 25163

Issued for	Date
100% CD set	12-16-2011
Bid Package No. 2	02-24-2012

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Comm. No. 2030037

Drawn SDM

Checked SDM

Date 12/16/11

Project

Physics and Nanotechnology Building

U of M Project # 01-155-08-1718

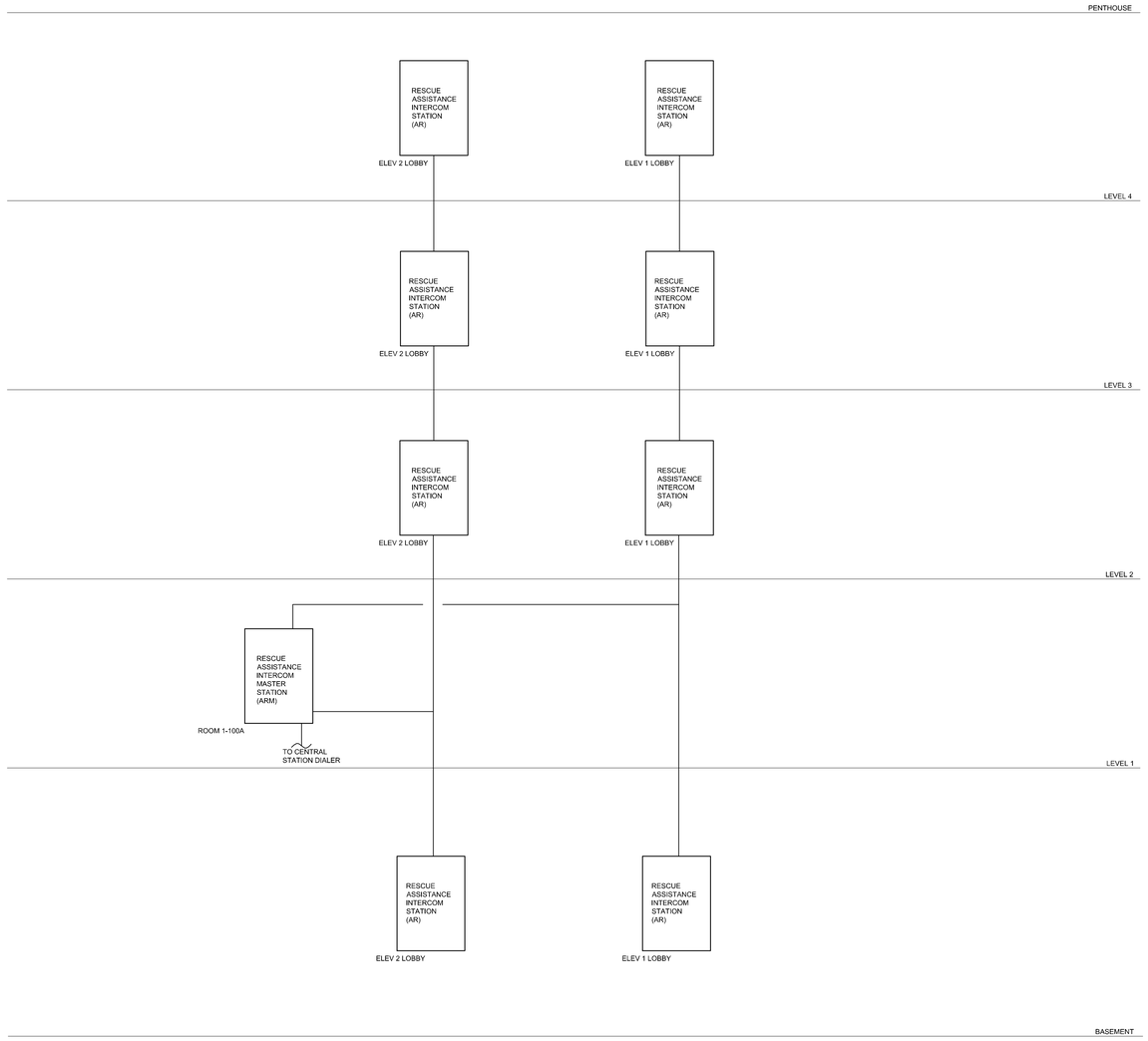
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FIRE ALARM
ONE-LINE DIAGRAM

e5.10

GENERAL NOTES

1. REFER TO SPECIFICATIONS FOR AREA OF RESCUE ASSISTANCE INTERCOM SYSTEM WIRING REQUIREMENTS AND AND MANUFACTURER'S REQUIREMENTS FOR WIRING BETWEEN DEVICES. ALL WIRING SHALL BE IN CONDUIT. WIRING FROM MASTER STATION TO EACH INDIVIDUAL INTERCOM STATIONS MAY SHARE CONDUIT IF ALLOWED BY MANUFACTURER AND AS SIZED APPROPRIATELY FOR STATIONS SERVED AND CONDUIT FILL.



1 **RESCUE ASSISTANCE INTERCOM ONE-LINE DIAGRAM**
SCALE: NONE

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Project

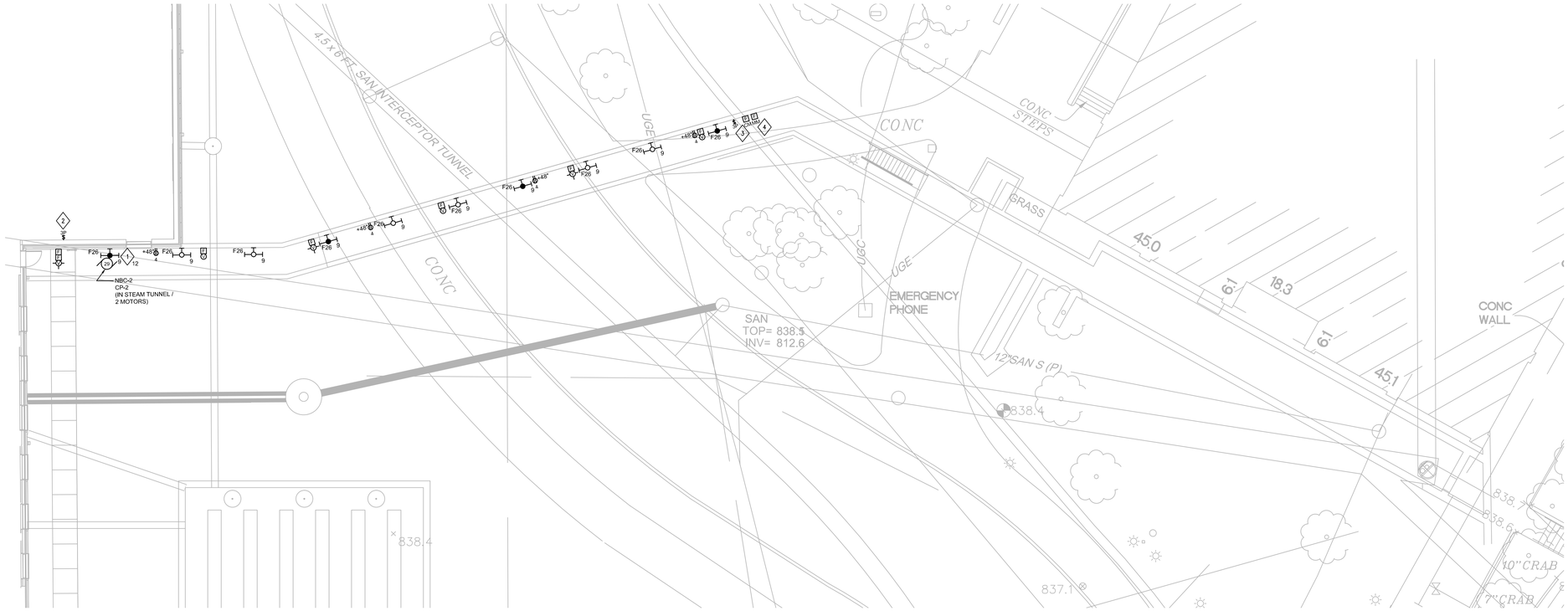
Physics and Nanotechnology Building

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RESCUE ASSISTANCE INTERCOM ONE-LINE DIAGRAM

e5.11



1 **STEAM TUNNEL ELECTRICAL LIGHTING, POWER AND SYSTEMS PLAN**
SCALE: 1" = 10'-0"

1' 5' 10' 20'
GRAPHIC SCALE

NORTH

GENERAL NOTES

1. ALL 277V NORMAL POWER THIS SHEET FED FROM PANEL LPBA.
2. ALL 277V EMERGENCY LIFE SAFETY POWER THIS SHEET FED FROM PANEL EHBA.
3. ALL 120V NORMAL POWER THIS SHEET FED FROM PANEL NBC.
4. COORDINATE LOCATION OF LIGHT FIXTURES WITH MECHANICAL PIPING. LIGHTS SHALL BE MOUNTED ON OPPOSITE WALL THAT PIPING IS MOUNTED ON. MOUNT LIGHT AS HIGH AS POSSIBLE ON WALL.
5. COORDINATE LOCATION OF FIRE ALARM DEVICES AND RECEPTACLES WITH MECHANICAL PIPING. FIRE ALARM DEVICES AND RECEPTACLES SHALL BE MOUNTED ON OPPOSITE WALL THAT PIPING IS MOUNTED ON.
6. ALL LIGHT SWITCHES IN STEAM TUNNEL SHALL BE ILLUMINATED PILOT LIGHTS AND ALL CONDUIT USED IN TUNNEL SHALL BE RIGID GALVANIZED STEEL WITH CAST BOXES/FITTINGS.

SHEET KEYNOTES

1. ALL LIGHTING ON EMERGENCY POWER IS SWITCHED. PROVIDE TRANSFER DEVICE, BODINE GTD 20A FOR EACH SWITCHED CIRCUIT. PROVIDE UNSWITCHED EMERGENCY POWER CIRCUIT #12 AND UNSWITCHED NORMAL POWER TO TRANSFER DEVICE. REFER TO SWITCHED EMERGENCY LIGHTING TRANSFER DEVICE DETAIL 3/e48.03 .
2. LOCATE SWITCH AT TOP OF LADDER AT ENTRANCE TO STEAM TUNNEL.
3. PROVIDE FIRE ALARM CONTROL MODULE TO CLOSE UPON FIRE ALARM INITIATING IN PHYSICS/NANO BUILDING TO SIGNAL UNIVERSITY RECREATION CENTER FIRE ALARM SYSTEM. COORDINATE WITH RECREATION CENTER CONTRACTOR.
4. PROVIDE FIRE ALARM MONITOR MODULE TO SIGNAL PHYSICS/NANO BUILDING FIRE ALARM SYSTEM UPON FIRE ALARM INITIATING IN UNIVERSITY RECREATION CENTER FIRE ALARM SYSTEM. COORDINATE WITH RECREATION CENTER CONTRACTOR.

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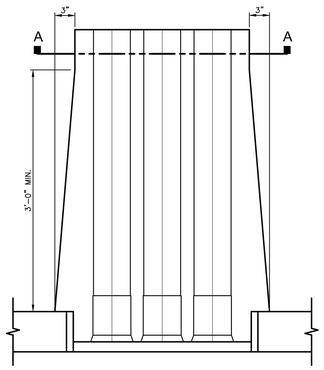
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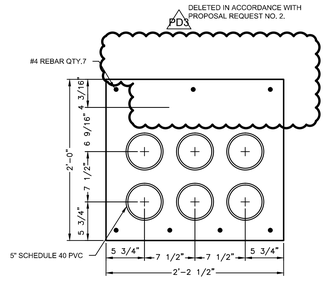
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STEAM TUNNEL ELECTRICAL LIGHTING, POWER AND SYSTEMS PLAN

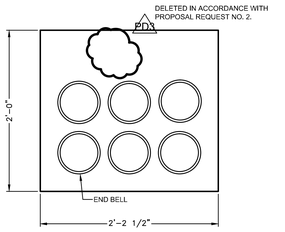
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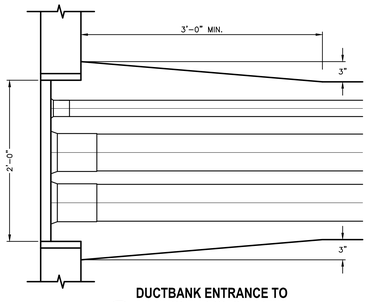
C **DUCTBANK ENTRANCE TO MANHOLE (PLAN VIEW)**



A **SECTION A-A**



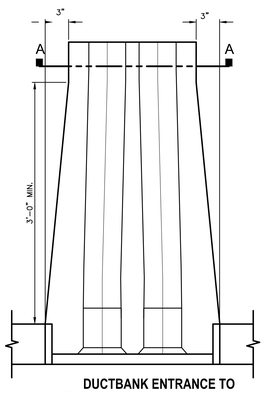
D **END VIEW (WINDOW OPENING)**



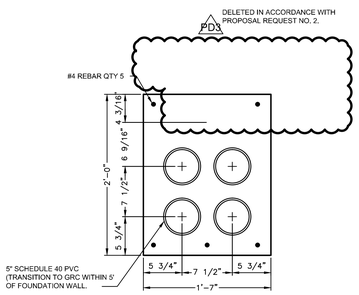
B **DUCTBANK ENTRANCE TO MANHOLE (PROFILE VIEW)**

3 PRIMARY DUCTBANK - 6 BBL (6) 5" CONDUITS AND (1) 1" CONDUIT

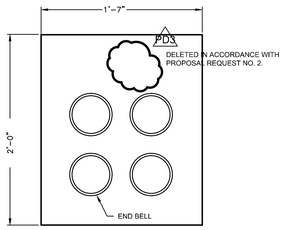
SCALE: NONE



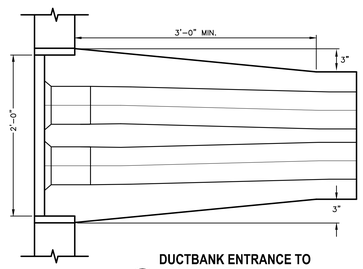
C **DUCTBANK ENTRANCE TO MANHOLE (PLAN VIEW)**



A **SECTION A-A**



D **END VIEW (WINDOW OPENING)**



B **DUCTBANK ENTRANCE TO MANHOLE (PROFILE VIEW)**

4 PRIMARY DUCTBANK - 4 BBL (4) 5" CONDUITS AND (1) 1" CONDUIT

SCALE: NONE

GENERAL NOTES

1. REFER TO SITE/CIVIL C-SERIES DRAWINGS FOR FURTHER INFORMATION ON SITE UTILITIES. COORDINATE ALL ROUTING OF UTILITIES WITH EXISTING CONDITIONS AND OTHER UTILITIES.
2. BENDS, KICKS, OFFSETS, AND ENTRANCE TO MANHOLES OR STRUCTURES SHALL BE MADE WITH RIGID GALVANIZED STEEL CONDUIT. PVC CONDUIT IS ACCEPTABLE WHERE DUCTBANK CONTINUES THROUGH WINDOW OPENING.
3. FIELD CUT ALL MANHOLE WINDOW OPENINGS. FIELD VERIFY ALL WINDOW LOCATIONS WITH EXISTING UTILITIES AND SUBSEQUENT DUCTBANK LOCATIONS.
4. FOR SAW CUTS INTO EXISTING MANHOLES, COORDINATE LOCATIONS OF SAW CUTS AND SCHEDULING WITH OWNER.
5. INSTALL END BELLS ON ALL CONDUITS AS THEY TERMINATE AT PRIMARY ELECTRICAL MANHOLES. END BELLS NEED TO BE TIGHT AND SEALED TO WINDOW BULKHEAD PRIOR TO POURING CONCRETE.
6. ALL BARRELS SHALL BE CLEANED WITH A BRUSH AND PROVEN WITH A MANDREL UNDER WITNESS OF COMMISSIONING AGENT.
7. LEAVE EACH BARREL WITH A PULL STRING.
8. THE INSIDE OF MANHOLES SHALL BE PAINTED WHITE.
9. DUCTBANK WINDOW TO MAINTAIN 1'-6" OF CLEARANCE FROM CEILING OF MANHOLE AND 1'-6" OF CLEARANCE FROM CORNERS OF MANHOLE UNLESS NOTED OTHERWISE..
10. REFER TO DUCTBANK DETAILS FOR BLOCK-OUT WINDOW DIMENSIONS.

SHEET KEYNOTES

PD3 DELETED IN ACCORDANCE WITH PROPOSAL REQUEST NO. 2.

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For AFFILIATED ENGINEERS, INC.

By

Name MICHAEL J. BROGE

Date 02-24-2012 Reg. No. 25364

Issued for	Date
Bid Package No. 1	10-14-2011
Project Directive No. 3	05-15-2012

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Drawn MM

Checked SDM

Date 10/14/11

Project

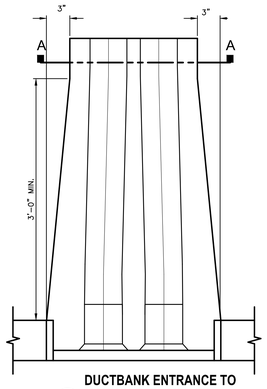
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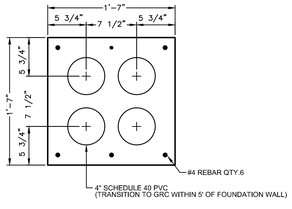
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ELECTRICAL SITE WORK DETAILS

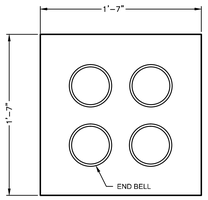
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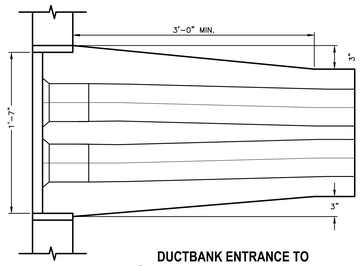
C **DUCTBANK ENTRANCE TO MANHOLE (PLAN VIEW)**



A **SECTION A-A**



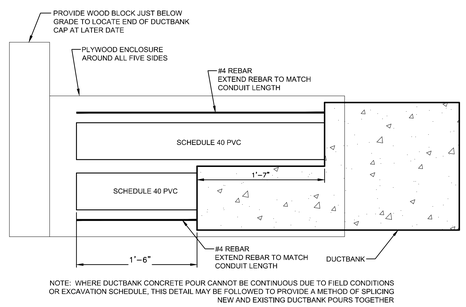
D **END VIEW (WINDOW OPENING)**



B **DUCTBANK ENTRANCE TO MANHOLE (PROFILE VIEW)**

OIT (TELECOM) DUCTBANK DETAIL - 4 BBL (4) 4" CONDUITS

3 SCALE: NONE



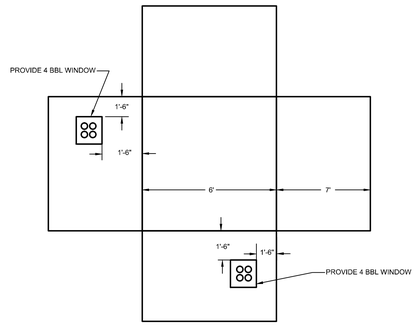
4 **DUCTBANK SPLICE DETAIL**

SCALE: NONE

REV 001

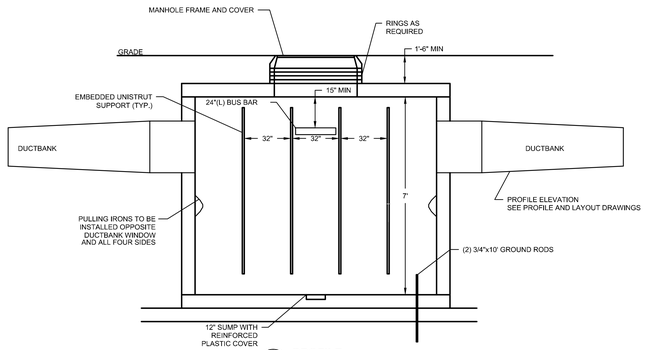
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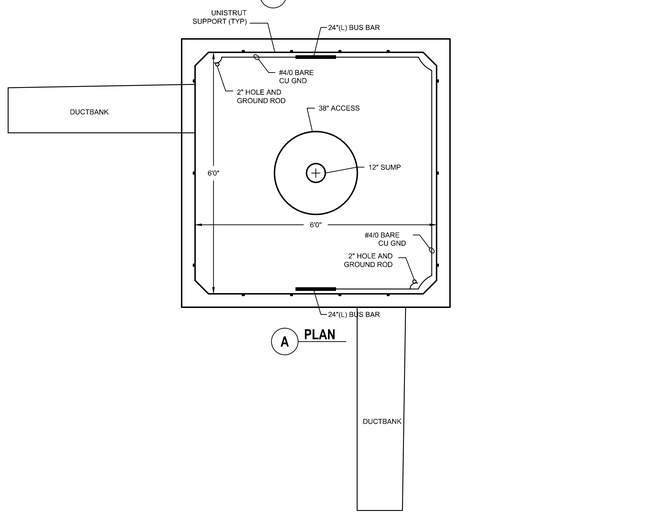


1 **NEW OIT (TELECOM) VAULT BUTTERFLY SECTION**

SCALE: NONE



B **PROFILE**



A **PLAN**

2 **TYPICAL OIT (TELECOM) PRECAST PRIMARY MANHOLE DETAIL**

SCALE: NONE

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Date 10/14/11

Project

Physics and Nanotechnology Building

U of M Project # 01-155-08-1718

UNIVERSITY OF MINNESOTA
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ELECTRICAL SITE WORK DETAILS

e8.02

LUMINAIRE CONTROL SCHEDULE

RELAY PANEL: BRP

Zone/ Relay #	Load Type	Panel	Circuit No.	Load Watts	Input Type	Function	Control	Notes
r1	FL	EH8A	4		BAS	ON/OFF	Programmed-On/Off	Corridor Luminaires Emergency
r2	FL	LP8A	5		BAS	ON/OFF	Programmed-On/Off	Corridor Luminaires Normal
r3	FL	LP8A	5		BAS	ON/OFF	Programmed-On/Off	Corridor Luminaires at Lab Entry Normal
r4	FL	EH8A	4		BAS	ON/OFF	Programmed-On/Off	Corridor Luminaires Emergency
r5	FL	LP8A	5		BAS	ON/OFF	Programmed-On/Off	Corridor Luminaires Normal
r6	FL	EH8A	10		BAS	ON/OFF	Programmed-On/Off	Stair 2 Emergency
r7	FL	EH8A	8		BAS	ON/OFF	Programmed-On/Off	Stair 1 Emergency
r8	HID	LP8A	11			ON/OFF	Photocell-On/Off	Site Lighting east
r9	HID	LP8A	13			ON/OFF	Photocell-On/Off	Site Lighting north
r10	LED	EL8A	8			ON/OFF	Photocell-On/Off	Site Lighting building mounted east
r11								Spare
r12								Spare

Relay cabinet shall be surface mounted. Hinged locking access cover. 24V Power Supply 120/277. Temperature Control contractor to coordinate programming of relays with owner and Lighting designer. Blink warn function to reside with relay panel. Provide interface modules as necessary to allow communication between programmable lighting controllers and Building Automation System. Contractor is responsible for providing communications interface with BAS, regardless of which BAS system is awarded bid. System shall be commission by the supplying vendor and shall demonstrate the performance of the system. Provide barrier in panel for emergency relays or a separate enclosure.

Load Types: INC=Incandescent, IND=Induction, FL=Fluorescent, HID=High Intensity Discharge, LED= Light Emitting Diode

LUMINAIRE CONTROL SCHEDULE

RELAY PANEL: 1RP

Zone/ Relay #	Load Type	Panel	Circuit No.	Load Watts	Input Type	Function	Control	Notes
r1	FL	EH1A	6		BAS	ON/OFF	Atrium Photocell and Programmed-On/Off	Lobby Luminaires Emergency
r2	FL	LP1A	6		BAS	ON/OFF	Atrium Photocell and Programmed-On/Off	Lobby Luminaires Normal
r3	FL	LP1A	6		BAS	ON/OFF	Atrium Photocell and Programmed-On/Off	Lobby Luminaires Normal
r4	LED	LP1A	6		BAS	ON/OFF	Atrium Photocell and Programmed-On/Off	Lobby Luminaires Normal
r5	LED	LP1A	6		BAS	ON/OFF	Atrium Photocell and Programmed-On/Off	Lobby Luminaires Normal
r6								Spare
r7								Spare
r8	LED	LP1A	8		BAS	ON/OFF	Programmed-On/Off	Spare
r9	FL	LP1A	3		BAS	ON/OFF	Programmed-On/Off	Corridor Luminaires Normal
r10	FL	EH1A	6		BAS	ON/OFF	Programmed-On/Off	Corridor Luminaires Emergency
r11	FL	LP1A	3		BAS	ON/OFF	Programmed-On/Off	Corridor Lab Entry Luminaires Normal
r12	LED	LP1A	8		BAS	ON/OFF	Exterior Photocell and Programmed-On/Off	Exterior Canopy Luminaires Normal
r13	LED	LP1A	8		BAS	ON/OFF	Exterior Photocell and Programmed-On/Off	Exterior Column Luminaires Normal
r14								Spare
r15								Spare
r16								Spare

Relay cabinet shall be surface mounted. Hinged locking access cover. 24V Power Supply 120/277. Temperature Control contractor to coordinate programming of relays with owner and Lighting designer. Blink warn function to reside with relay panel. Provide interface modules as necessary to allow communication between programmable lighting controllers and Building Automation System. Contractor is responsible for providing communications interface with BAS, regardless of which BAS system is awarded bid. System shall be commission by the supplying vendor and shall demonstrate the performance of the system. Provide barrier in panel for emergency relays or a separate enclosure.

Load Types: INC=Incandescent, IND=Induction, FL=Fluorescent, HID=High Intensity Discharge, LED= Light Emitting Diode

LUMINAIRE CONTROL SCHEDULE

RELAY PANEL: 2RP

Zone/ Relay #	Load Type	Panel	Circuit No.	Load Watts	Input Type	Function	Control	Notes
r1	FL	EH2A	6		BAS	ON/OFF	Atrium Photocell and Programmed-On/Off	Corridor Luminaires Emergency
r2	FL	LP2A	4		BAS	ON/OFF	Atrium Photocell and Programmed-On/Off	Corridor Luminaires Normal
r3	FL	LP2A	4		BAS	ON/OFF	Atrium Photocell and Programmed-On/Off	Corridor Lobby Luminaires H4
r4								Spare
r5	FL	LP2A	3		BAS	ON/OFF	Programmed-On/Off	Lab/Office Corridor Luminaires Normal
r6	FL	LP2A	4		BAS	ON/OFF	Programmed-On/Off	Office Corridor Luminaires Normal
r7	FL	EH2A	6		BAS	ON/OFF	Programmed-On/Off	Office Corridor Luminaires Emergency
r8	LED	LP2A	4		BAS	ON/OFF	Programmed-On/Off	Restroom Entry Luminaires
r9	FL	LP2A	3		BAS	ON/OFF	Programmed-On/Off	Lab Corridor Luminaires Normal
r10	FL	EH2A	6		BAS	ON/OFF	Programmed-On/Off	Lab/Office Corridor Luminaires Emergency
r11	FL	LP2A	3		BAS	ON/OFF	Programmed-On/Off	Corridor Lab Entry Luminaires Normal
r12								Spare

Relay cabinet shall be surface mounted. Hinged locking access cover. 24V Power Supply 120/277. Temperature Control contractor to coordinate programming of relays with owner and Lighting designer. Blink warn function to reside with relay panel. Provide interface modules as necessary to allow communication between programmable lighting controllers and Building Automation System. Contractor is responsible for providing communications interface with BAS, regardless of which BAS system is awarded bid. System shall be commission by the supplying vendor and shall demonstrate the performance of the system.

Load Types: INC=Incandescent, IND=Induction, FL=Fluorescent, HID=High Intensity Discharge, LED= Light Emitting Diode

LUMINAIRE CONTROL SCHEDULE

RELAY PANEL: 3RP

Zone/ Relay #	Load Type	Panel	Circuit No.	Load Watts	Input Type	Function	Control	Notes
r1	FL	EH3A	6		BAS	ON/OFF	Atrium Photocell and Programmed-On/Off	Corridor Luminaires Emergency
r2	FL	LP3A	4		BAS	ON/OFF	Atrium Photocell and Programmed-On/Off	Corridor Luminaires Normal
r3								Spare
r4								Spare
r5	FL	LP3A	3		BAS	ON/OFF	Programmed-On/Off	Lab/Office Corridor Luminaires Normal
r6	FL	LP3A	4		BAS	ON/OFF	Programmed-On/Off	Office Corridor Luminaires Normal
r7	FL	EH3A	6		BAS	ON/OFF	Programmed-On/Off	Office Corridor Luminaires Emergency
r8	LED	LP3A	4		BAS	ON/OFF	Programmed-On/Off	Restroom Entry Luminaires
r9	FL	LP3A	3		BAS	ON/OFF	Programmed-On/Off	Lab Corridor Luminaires Normal
r10	FL	EH3A	6		BAS	ON/OFF	Programmed-On/Off	Lab/Office Corridor Luminaires Emergency
r11	FL	LP3A	3		BAS	ON/OFF	Programmed-On/Off	Corridor Lab Entry Luminaires Normal
r12								Spare

Relay cabinet shall be surface mounted. Hinged locking access cover. 24V Power Supply 120/277. Temperature Control contractor to coordinate programming of relays with owner and Lighting designer. Blink warn function to reside with relay panel. Provide interface modules as necessary to allow communication between programmable lighting controllers and Building Automation System. Contractor is responsible for providing communications interface with BAS, regardless of which BAS system is awarded bid. System shall be commission by the supplying vendor and shall demonstrate the performance of the system. Provide barrier in panel for emergency relays or a separate enclosure.

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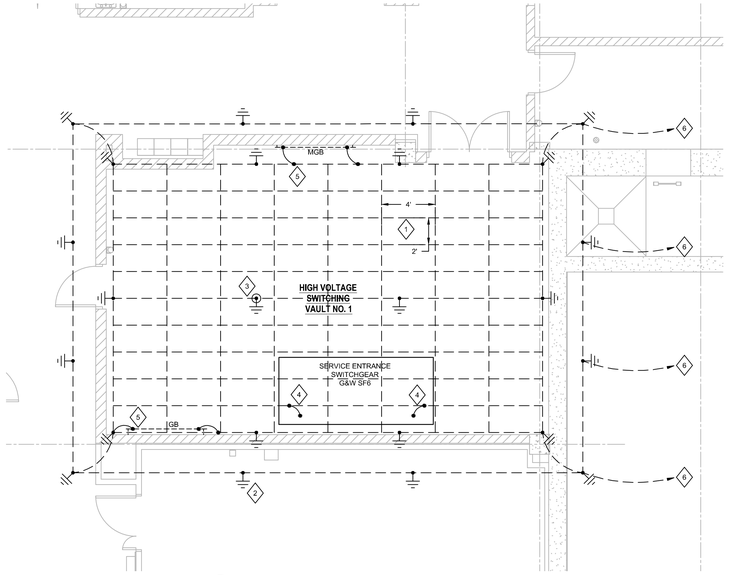
LUMINAIRE CONTROL SCHEDULE

RELAY PANEL: 4RP

Zone/ Relay #	Load Type	Panel	Circuit No.	Load Watts	Input Type	Function	Control	Notes
r1	FL	EH4A	6		BAS	ON/OFF	Atrium Photocell and Programmed-On/Off	Corridor Luminaires Emergency
r2	FL	LP4A	4		BAS	ON/OFF	Atrium Photocell and Programmed-On/Off	Corridor Luminaires Normal
r3								Spare
r4								Spare
r5	FL	LP4A	3		BAS	ON/OFF	Programmed-On/Off	Lab/Office Corridor Luminaires Normal
r6	FL	LP4A	4		BAS	ON/OFF	Programmed-On/Off	Office Corridor Luminaires Normal
r7	FL	EH4A	6		BAS	ON/OFF	Programmed-On/Off	Office Corridor Luminaires Emergency
r8	LED	LP4A	4		BAS	ON/OFF	Programmed-On/Off	Restroom Entry Luminaires
r9	FL	LP4A	3		BAS	ON/OFF	Programmed-On/Off	Lab Corridor Luminaires Normal
r10	FL	EH4A	6		BAS	ON/OFF	Programmed-On/Off	Lab/Office Corridor Luminaires Emergency
r11	FL	LP4A	3		BAS	ON/OFF	Programmed-On/Off	Corridor Lab Entry Luminaires Normal
r12								Spare

Relay cabinet shall be surface mounted. Hinged locking access cover. 24V Power Supply 120/277. Temperature Control contractor to coordinate programming of relays with owner and Lighting designer. Blink warn function to reside with relay panel. Provide interface modules as necessary to allow communication between programmable lighting controllers and Building Automation System. Contractor is responsible for providing communications interface with BAS, regardless of which BAS system is awarded bid. System shall be commission by the supplying vendor and shall demonstrate the performance of the system. Provide barrier in panel for emergency relays or a separate enclosure.

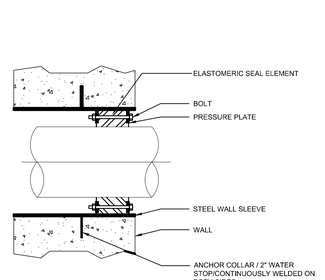
Load Types: INC=Incandescent, IND=Induction, FL=Fluorescent, HID=High Intensity Discharge, LED= Light Emitting Diode



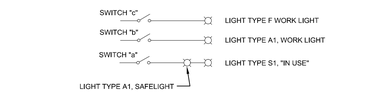
6 HV SWITCHING VAULT NO. 1 GROUNDING GRID
SCALE: 1/4" = 1'-0"

DETAIL KEYNOTES

1. PROVIDE GROUNDING GRID OF #4/0 BARE COPPER CONDUCTORS EACH WAY (SPACING AS NOTED) WITH ALL INTERSECTIONS EXOTHERMICALLY WELDED. MINIMUM DEPTH 12" DEEP BELOW FLOOR SLAB.
2. TYPICAL 3/4" x 16'-0" GROUND ROD.
3. TEST WELL GROUND ROD SHALL BE 3/4" x 16'-0".
4. PROVIDE (2) #4/0 BARE COPPER MEDIUM VOLTAGE SWITCH GROUNDING ELECTRODE CONDUCTORS BURIED BELOW SLAB AND CONNECTED TO GROUND GRID FROM MAIN GROUND BUSBAR. PROVIDE IN 1" PVC CONDUIT THROUGH FLOOR SLAB. STUB CONDUIT UP 6" ABOVE FINISHED FLOOR FOR EXTENSION OF MEDIUM VOLTAGE SWITCH GROUNDING ELECTRODE CONDUCTOR. CONNECT #4/0 TO EACH END OF EQUIPMENT GROUND BUSBAR.
5. CONNECT COPPER GROUND BAR TO GROUNDING GRID WITH #4/0 BARE COPPER CONDUCTOR.
6. CONNECT GROUNDING ELECTRODE TO BUILDING GROUND RING WITH #4/0 WITH BARE COPPER CONDUCTOR. REFER TO BID PACKAGE 1.

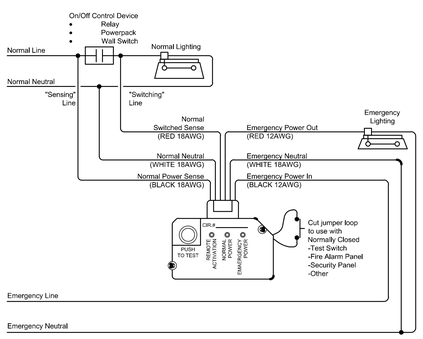


5 LINK-SEAL OR EQUAL WALL PENETRATION DETAIL
SCALE: NTS



NOTE: SWITCH FOR WORK LIGHTS MOUNTED AT 48" AFF, SAFE LIGHT SWITCH MOUNTED AT 42" AFF. SWITCHES SHALL BE SPACED AT A MINIMUM OF 6" HORIZONTALLY.

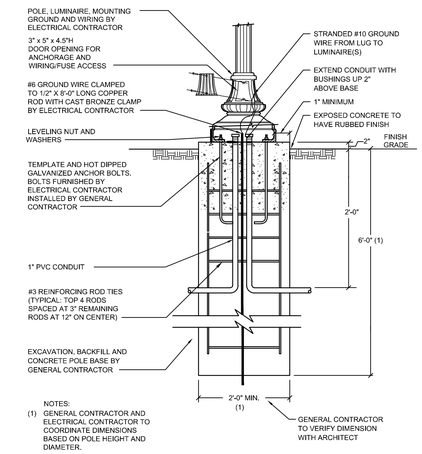
4 DARKROOM LIGHT WIRING
SCALE: NTS



NORMAL OPERATION (SHOWN)
AC LIGHTING BALLAST SUPPLIED BY NORMAL PANEL AND CONTROLLED BY WALL SWITCH/RELAY

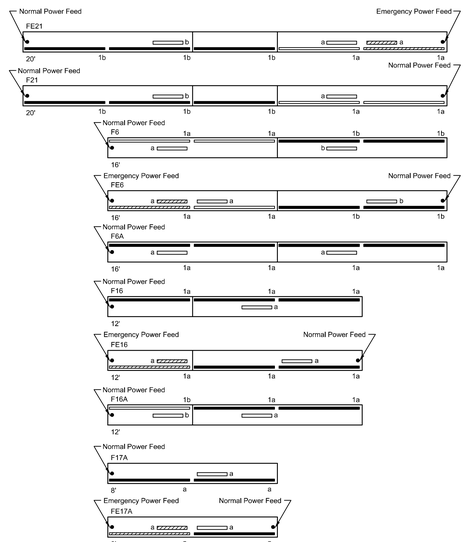
EMERGENCY OPERATION
AC LIGHTING BALLAST SUPPLIED BY GENERATOR THROUGH THE EMERGENCY PANEL AND INDEPENDENT OF WALL SWITCH/RELAY POSITION.

3 SWITCHED EMERGENCY LIGHTING TRANSFER DEVICE
SCALE: NTS



NOTES:
(1) GENERAL CONTRACTOR AND ELECTRICAL CONTRACTOR TO COORDINATE DIMENSIONS BASED ON POLE HEIGHT AND DIAMETER.

2 CONCRETE POLE BASE DETAILS (TYPE H2)
SCALE: NTS



Note:
Refer to Switched Emergency Lighting Transfer Device Detail for additional information.

1 LUMINAIRE SWITCHING DETAIL
SCALE: NTS

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I hereby certify that this plan or drawing was prepared by me or under my direct supervision and that I am a duly licensed ELECTRICAL ENGINEER under the laws of the State of Minnesota.

For AFFILIATED ENGINEERS, INC.

By

Name RONALD M. PARSLEY

Date 02-24-2012 Reg. No. 25163

Issued for	Date
100% CD set	12-16-2011
Bid Package No. 2	02-24-2012

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Date 12/16/11

Project

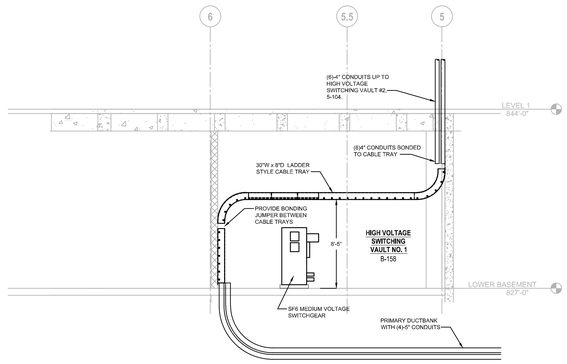
Physics and Nanotechnology Building

U of M Project # 01-155-08-1718

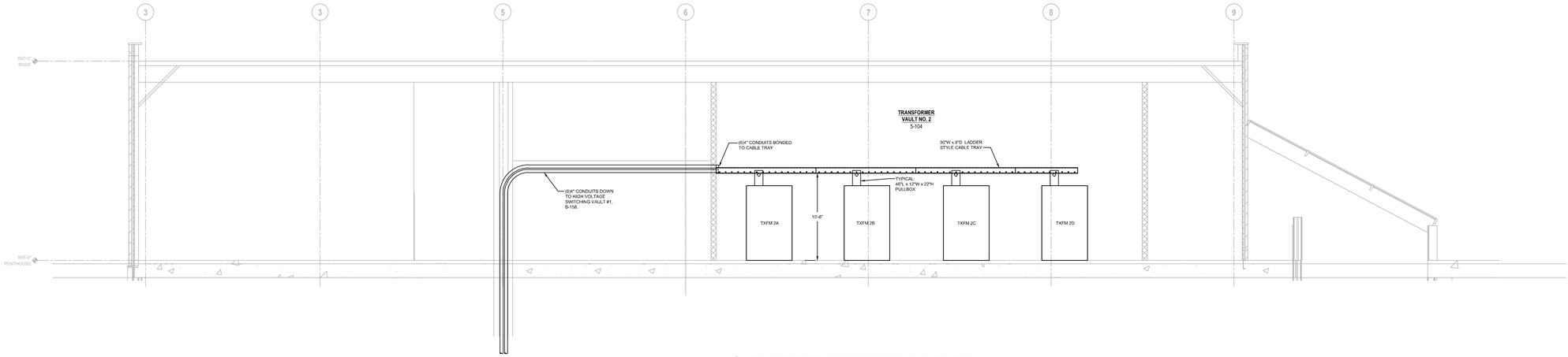
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ELECTRICAL DETAILS

e8.03



1 TRANSFORMER VAULT NO.1/RM B-158 ELEVATION
SCALE: NONE



2 TRANSFORMER VAULT NO.2/RM 5-104 ELEVATION
SCALE: NONE

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I hereby certify that this plan or drawing was prepared by me or under my direct supervision and that I am a duly licensed ELECTRICAL ENGINEER under the laws of the State of Minnesota.

For AFFILIATED ENGINEERS, INC.

By

Name RONALD M. PARSLEY

Date 02-24-2012 Reg. No. 25163

Issued for	Date
Bid Package No. 2	02-24-2012

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Comm. No. 2039037

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Date 02/24/12

Project

Physics and Nanotechnology Building

U of M Project # 01-155-08-1718

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ELECTRICAL DETAILS

e8.04

LUMINAIRE SCHEDULE

Type	Description	Manufacturer	Catalog Number	Lamps Qty	Lamps Type	Lamps Color Temp	Lamps Watts	Volts	Ballast Type	Ballast Qty	Ballast Model No.	Mounting Type	Mounting Height	Remarks
F20	4" wide continuous grid fluorescent wall washer. Steel housing with extruded aluminum frame. Verify length of luminaire with field conditions prior to ordering. Verify ceiling type mounting with Architect. Manufacturer shall provide job specific shop drawings. Refer to luminaire schedule notes.	Axis	BBR SW S8' T5 1 W UNV ERS1 TB	1	T5	SPX41	26(32)	277	Electronic Prog Rapid Start	1		Recessed	Ceiling	
		NeoRay	23XR 1T5 **ETG 8' D U EB SI											
F20A	4" wide continuous grid fluorescent wall washer. Steel housing with extruded aluminum frame. Verify length of luminaire with field conditions prior to ordering. Verify ceiling type mounting with Architect. Manufacturer shall provide job specific shop drawings. Refer to luminaire schedule notes.	Axis	BBR SW S16' T5 1 W UNV ERS1 TB	1	T5	SPX41	26(114)	277	Electronic Prog Rapid Start	1		Recessed	Ceiling	
		NeoRay	23XR 1T5 **ETG 16' D U EB SI											
F21	20' - 0" Semi-direct linear pendant. Steel housing painted white, rectalinear profile. Distribution shall be symmetric. Provide with fully adjustable aircraft cable for mounting. Refer to luminaire schedule notes.	Ledalite or Approved Equal	Jump 1201 T10 Q S 20' 1 2 E W E Luminous	1	T8	SPX41	25(114)	277	Electronic Prog Rapid Start	4		Aircraft cable	Ceiling	Refer to switch detail 1 on e8.03.
FE21	Same as F21 with Emergency circuit. Refer to luminaire schedule notes.	Ledalite or Approved Equal	Jump 1201 T10 Q S 20' 3 2 E W E Luminous	1	T8	SPX41	25(114)	277	Electronic Prog Rapid Start	4		Aircraft cable	Ceiling	Refer to switch detail 1 on e8.03.
F22	1'X4' wrap with acrylic lens and fiberglass housing. Wet location listed. Class 1 Div 2 listed. Refer to luminaire schedule notes.	Guth	CCP 4 A 2 F32 2 /G	2	T8	SPX41	25(46)	277	Electronic Prog Rapid Start	1		Surface	Ceiling	
		Columbia	FSPH4 232 DR EPU											
F23 F23A	1" diameter extruded linear wall mounted pendant. Field adjustable housing with locking. Remote mounted ballast. * Finish selected by Architect. Refer to luminaire schedule notes. ** F23 = +9", F23A = +26'	SPI Delray	Stile SFWB 053 1F28 277 ** ICS 006 *PT TS APS F	1	T5	SPX41	26(325)	277	Electronic Prog Rapid Start	1		Surface	Wall	Remote ballast.
F24	4.5" X 48" recessed flanged fluorescent slot with flush frosted acrylic lens. * Verify ceiling type mounting with Architect. Refer to luminaire schedule notes.	Axis	BBR S FL 4' T5 1 M0 W UNV ERS1 *DF	1	T5	SPX41	26(32)	277	Electronic Prog Rapid Start	1		Recessed	Ceiling	
		NeoRay	23DR 2T5 *FSR 4' U EB S93											
F25 Series	4" wide by 4' linear fluorescent. Pendant mounted with aircraft cable. Extruded aluminum housing and die cast endcaps. Refer to luminaire schedule notes. F25A = 6' with staggered lamps, F25B = 8', F25C = 12'	Axis Focal Point NeoRay	BBD S FL 4' T5 02 M0 W UNV ERS1 CA36	2	T5	SPX41	26(57)	277	Electronic Prog Rapid Start	2		Aircraft cable	Ceiling	
		NeoRay	23DP 2T5 SCETC 4' U EB DU S93											
F26	1'X4' fluorescent vapor tight wrap with acrylic lens and fiberglass housing. Wet location listed. Stainless steel latches, Refer to luminaire schedule notes.	Cooper (Metalux) HE Williams	VT3-228T5DR-UNV-ER81-SSL-WL	2	T5	SPX41	25(46)	277	Electronic Prog Rapid Start	1		Surface	Ceiling	
H1	Full cutoff wall pack. Die-cast aluminum housing. Hinged door, sealed and gasketed. Refer to luminaire schedule notes.	Cooper (Lumark) Lithonia McPhilben	MP WP FC 50 MT F1	1	PSMH		50	277	Pulse start	1		Surface	Wall	
		Hubbell	LMC 50P9 1 F4											
H2	U MN Street Lighting East Bank - Historic Area Campus Roads. Decorative acorn post top luminaire with spike finial, decorative band, ribs and medallion. Finish shall be black. Refer to luminaire schedule notes.	Holophane	Mast Arm Mount Utility Series WAU-10MH-MD-BS-B6-F14-amp	1	MXR100 /U/MED	3500K	100	277	Magnetic HPF	1		Pole		
H2 pole	U MN Street Lighting East Bank - Historic Area Campus Roads. Die cast aluminum decorative fluted 10' pole and 17" decorative base. Provide single in-line fuse in base of pole and accessible from handhole. Finish shall be black. Refer to luminaire schedule notes.	Holophane	Wadsworth W10C/17-CA-BK.										Base	
H3	14' tall bollard 12" diameter cylinder, surface mounted, die cast and extruded aluminum housing, painted black. Refer to luminaire schedule notes.	Bega	8950MH	1	MH T6 G12	3500K	150	277	Electronic	1		Surface	Base	
H4	6" diameter recessed adjustable luminaire. Provideo with 40 deg vertical tilt, Semi specular trim, self flanged. Refer to luminaire schedule notes.	Lightolier	C6T6ACLP MHT6RNF C6A39T6E2	1	MH T6 G12	3500K	39(44)	277	Electronic	1		Recessed	Ceiling	
H5	U MN Street Lighting East Bank - Historic Area Pedestrian walkways. Decorative acorn post top luminaire with spike finial, decorative band, ribs and medallion. Finish shall be black. Refer to luminaire schedule notes.	Holophane	Mast Arm Mount Utility Series WAU-10MH-MD-BS-B6-F14-amp	1	MXR100 /U/MED	3500K	100	277	Magnetic HPF	1		Pole		
H5 pole	U MN Street Lighting East Bank - Historic Area Pedestrian Walkway. Die cast aluminum decorative fluted 8' pole(verify height with existing lights that were removed and stored for reinstallation) and 17" decorative base. Provide single in-line fuse in base of pole and accessible from handhole. Finish shall be black. Refer to luminaire schedule notes.	Holophane	Wadsworth W8C/17-CA-BK.										Base	
H6	Existing U MN Street Lighting East Bank - Non-Historic Area Pedestrian Walkway Lighting. Decorative acrylic sphere post top luminaire with Wadsworth fluted pole and decorative base. Light and pole shall be obtained from University. Reinstall on new pole base at new location shown. Relamp after installation.	Holophane	Prismasphere Series	1	MXR100 /U/MED	3500K	100	277	Magnetic HPF	1		Pole		
H7	Existing U MN Street Lighting East Bank - Historic Area Pedestrian walkway. Decorative acorn post top luminaire with Wadsworth fluted pole and decorative base. Light and pole shall be obtained from University. Reinstall on new pole base at new location shown. Relamp after installation.	Holophane	Washington Utility Series	1	MXR100 /U/MED	3500K	100	277	Magnetic HPF	1		Pole		
H8	Wall mounted indirect luminaire, forward throw distribution, Die-cast aluminum housing, Remote mounted ballast, Color selected by architect from standard selection. Refer to luminaire schedule notes.	SPI	Echo EIW10981 FT 1M150 277 F	1	PSMH		150	277	Pulse start	1		Surface	Wall	
L1	Rectangular recessed step light in pre-cast concrete. Die cast louvered face plate. Housing constructed of die cast aluminum. * Architect to select face plate color from standard finishes available. Wet location listed. Refer to luminaire schedule notes.	Bega	2038LED	3	LED	3300K	11	120	N/A		N/A	Recessed	Wall	
L2	Full cutoff wall pack. Die-cast aluminum housing. Sealed and gasketed. Photosensor. Refer to luminaire schedule notes.	Lumark	XT0R2A N PC2	1	LED	3500K	20	277	N/A	1		Surface	Wall	
L3	6" diameter recessed LED luminaire. Semi specular trim, self flanged trim. Provide with remote phosphor Philips Fortimo LED lamping module with 2000 lumen output. Refer to luminaire schedule notes.	Focal Point Lightolier Portfollo	FL6D 20LED L35 277 RO T L6 RO DN CD NP	1	LED	3500K	20(38)	277	N/A		N/A	Recessed	Ceiling	
		Lightolier	C6L20N2 C6L1520DL35K WCLP											
L4	4.5" Square recess downlight with clear iridescence free reflector, regressed clear lens and self flanged trim, Wet location listed. Provide with remote phosphor Philips Fortimo LED lamping module with 1100 lumen output. Refer to luminaire schedule notes.	Focal Point or Approved Equal	FL44 13LED L35 277 SO T L44 SO RLMG CD AL	1	LED	3500K	13(23)	277	N/A		N/A	Recessed	Ceiling	
L5	6" Diameter recess downlight with clear iridescence free reflector, flush mounted clear lens and self flanged matte white trim, LED lamping.	Kenall	CDL6VL2-30L30K-DV-PAFW-T MRIPS-312	1	LED	3000K	30	120	N/A		N/A	Recessed	Ceiling	
L6	6" diameter recessed LED luminaire. Provide with remote phosphor Philips Fortimo LED lamping module with 2000 lumen output. Semi specular trim, self flanged. Refer to luminaire schedule notes.	Focal Point Lightolier Portfollo	FL6D 20LED L35 277 RO T L6 RO DN CD NP	1	LED	3500K	20(38)	277	N/A		N/A	Recessed	Ceiling	
		Prescolite	LF6LED 6LFLED7 35kK											
L7	Full cutoff wall pack, LED module, Die-cast aluminum housing, Sealed and gasketed. Refer to luminaire schedule notes.	Erco	33531.023	1	LED	4000K	6,7	277	N/A			Surface	Wall	
S1	IN USE luminaire, Wall mounted, Aluminum housing with white finish, Lettering shall be red on white, Refer to luminaire schedule notes.	Cole	S293-L-ROF-IN USE	2	LED		3	120	N/A		N/A	Surface	Wall	
		Hubbell	SES/RW SW3											
		Sure-Lites	SLX6 SR5											
X1	Exit Sign/Light combination, Single face, self-contained. White aluminum recessed housing, Edge-lit red letters on clear acrylic panel with mirror background, direction arrows and mounting as indicated on plans. Provide with battery backup, self diagnostics. Provide with 5 laser pointers.	Cooper (Sure-Lites)	ELC 7 0 WH R SD LASER		LED							Universal		
X1A	Exit Sign, Single face, self-contained. Wall back mounted. Brushed aluminum recessed housing, Edge-lit red letters on clear acrylic panel with mirror background. Provide with battery backup, self diagnostics.	Cooper (Sure-Lites)	ELX7 1 70 00 R W SD		LED							Wall		
X1B	Exit Sign, Single face, self-contained. Ceiling mounted. White aluminum recessed housing, Edge-lit red letters on clear acrylic panel with mirror background, direction arrows and mounting as indicated on plans. Provide with battery backup, self diagnostics.	Cooper (Sure-Lites)	ELX7 1 70 00 WH R C SD		LED							Ceiling		
X2	Exit Sign/Light combination, Double face, self-contained. White aluminum recessed housing, Edge-lit red letters on clear acrylic panel with mirror background, direction arrows and mounting as indicated on plans. Provide with battery backup, self diagnostics.	Cooper (Sure-Lites)	ELC 7 0 WH R SD LASER		LED							Universal		
X2A	Exit Sign, Double face, self-contained. Ceiling mounted. White aluminum recessed housing, Edge-lit red letters on clear acrylic panel with mirror background, direction arrows and mounting as indicated on plans. Provide with battery backup, self diagnostics.	Cooper (Sure-Lites)	ELX7 2 70 00 WH R C SD		LED							Ceiling		
X3	Exit Sign/Light combination, Single face, universal mounting with direction arrows and mounting as indicated on plans. White thermoplastic housing. Red letters. Provide with battery backup, self diagnostics.	Cooper (Sure-Lites)	LPX7 SD		LED							Universal		
		Hubbell	LTU RW 3 I											
X3A	Exit Sign, single face, universal mounting with direction arrows and mounting as indicated on plans. White thermoplastic housing. Red letters. Provide with battery backup, self diagnostics.	Cooper (Sure-Lites)	LPX7 0 R WH DH SD		LED							Universal		
X4	Exit Sign/Light combination, double face, universal mounting with direction arrows and mounting as indicated on plans. White thermoplastic housing. Red letters. Provide with NiCad battery backup.	Cooper (Sure-Lites)	LPX7 0 R WH DH SD		LED							Universal		
		Hubbell	LTU RW 3 I											
X4A	Exit Sign, double face, universal mounting with direction arrows and mounting as indicated on plans. White thermoplastic housing. Red letters. Provide with battery backup, self diagnostics.	Cooper (Sure-Lites)	LPX7 SD		LED							Universal		
EM1	Thermoplastic emergency light with 2 adjustable halogen lamps. White housing. Maintenance free lead-calcium battery. Output volts 6, 5.4W output for 90 minutes.	Cooper (Sure-Lites)	APEL		LED		3.6VDC							

Luminaire Schedule Notes:

1. Coordinate with manufacturer the quantity and wiring of luminaire to provide dual level switching as indicated on plan drawings. Refer to specification for additional requirements.
2. Luminaires shall be provided complete with necessary accessories for proper installation.
3. Industrial type luminaires in unfinished areas, which are near obstructions such as ducts and pipes, shall be:
   a). Suspended so that bottom of luminaire is no higher than bottom of obstruction.
   b). Located at height of lowest luminaire.
   c). Minimum height: 8'-0".
   d). Shall not be located until locations of obstructions are determined.
4. Specifications and drawings convey the features, and functions of luminaires only and do not show every item or detail necessary for the work.
5. All steel fabricated luminaires shall be PAF (painted after fabrication) or post painted.
6. Refer to division one documents for alternate submittal procedure.
7. Rooms with timer switch control shall have one lamp with red sleeve installed. Owner shall provide requirements for red sleeve.
8. Provide detailed drawings of linear and suspended luminaires including dimensions, support spacing, suspension type, power feed type and locations, lamp combinations, ballast locations, luminaire joint locations and end plates.
9. Provide detailed drawings for each cove and linear wall system configuration including dimensions, lens/louver length's, power feed locations, ballast locations, luminaire joint locations, extension plates for end and corner sections and end plates.
10. Provide dimensioned drawings and sections for fluorescent strip luminaires mounted in architectural coves. Include louver/lens cut sheet.
11. Where specific finish or color is not specified and options exist, submit color or finish samples to Architect/Engineer for selection.
12. Verify compact fluorescent lamp compatibility with end-of-life ballast.

LUMINAIRE SCHEDULE

Type	Description	Manufacturer	Catalog Number	Lamps Qty	Lamps Type	Lamps Color Temp	Lamps Watts	Volts	Ballast Type	Ballast Qty	Ballast Model No.	Mounting Type	Mounting Height	Remarks
A1	Wall mounted darkroom light. Uplight is clear glass and downlight has colored lens. * Colored lens shall be selected by the owner. Downlight and uplight are wired independently. Mount at 7'-0" A.F.F. to bottom of luminaire.	Cole	PHB-810-*	1 1	A19 A15		150 15	120	N/A		N/A	Surface	Wall	
		Alkco	2059											
C1	Wall mounted vapor tight luminaire. Provide with guard.	Canlet	68-22-OG-09	1	Biax	3500K	28	277	Electronic Prog	1		Surface	Wall	
		Hubbell	NV2FG6BHG						Rapid Start					
		Lumark	PLVS W GG 26 UNV											
C2	4.5" Square recess downlight with clear iridescence free reflector, regressed clear lens and self flanged trim. Refer to luminaire schedule notes.	Focal Point or Approved Equal	FL44 26TT S 277 SO T D44 SO DN CD AL	1	GX24q-3	3500K	26(32)	277	Electronic Prog Rapid Start	1		Recessed	Ceiling	
C2A	4.5" Square recess downlight with clear iridescence free reflector, regressed clear lens and self flanged trim. Dimmable. Refer to luminaire schedule notes.	Focal Point or Approved Equal	FL44 26TT S 277 SO T D44 SO DN CD AL	1	GX24q-3	3500K	26(32)	277	Electronic Prog Rapid Start	1		Recessed	Ceiling	
C3	6" diameter recess downlight with clear iridescence free reflector, self flanged trim and decorative element. Refer to luminaire schedule notes.	Lightolier	8021CCLP S6132BU Vetro D6A03	1	GX24q-3	3500K	26(32)	277	Dimming Electronic Prog. Rapid Start 5%-100%	1		Recessed	Ceiling	
F1	1'X4' fluorescent vapor tight wrap with acrylic lens and fiberglass housing. Wet location listed. Refer to luminaire schedule notes.	Cooper (Metalux) HE Williams	VT3-232DR-UNV-ER81-WL	2	T8	SPX41	25(46)	277	Electronic Prog Rapid Start	1		Surface	Ceiling	
		Hubbell	LUN4-232-EPU-DR											
F2	Surface mounted luminaire, metal fixture housing channel. Mounted horizontally above bathroom mirrors. Refer to luminaire schedule notes.	Axis	Air ARW S4 T82 AP UNV ERS 1	1	T8	SPX41	26(32)	277	Electronic Prog Rapid Start	1		Surface	Wall	
		Alkio												
F3	1'X4' fluorescent linear surface wrap with acrylic lens. Refer to luminaire schedule notes.	Cooper (Metalux)	WN-232A-UNV-ER81	2	T8	SPX41	25(46)	277	Electronic Prog Rapid Start	1		Surface	Ceiling	
		Columbia	WC4-232-EPU											
F4	4.5" X 48" recessed grid mounted fluorescent slot with flush frosted acrylic lens. Refer to luminaire schedule notes.	Axis Focal Point	BBR S FL 4' T5 2 M0 W UNV ERS1 TB	2	T5	SPX41	26(65)	277	Electronic Prog Rapid Start	1		Recessed	Ceiling	
		Neoray	23DR 2T5 * 4 U EB SI S93											
F4A FE4A	4.5" wide recessed grid mounted fluorescent slot with flush frosted acrylic lens. Verify ceiling type mounting with Architect. Refer to luminaire schedule notes. FE4A same as F4A except emergency power feed.	Axis Focal Point NeoRay	BBR S FL 16' T5 2 M0 W UNV ERS1 TB	2	T5	SPX41	26(258)	277	Electronic Prog Rapid Start	2		Recessed	Ceiling	
		Neoray	23DR 2T5 * 4 U EB SI S93											
F4B	4.5" wide recessed grid mounted fluorescent slot with flush frosted acrylic lens. Verify ceiling type mounting with Architect. Refer to luminaire schedule notes.	Axis Focal Point NeoRay	BBR S FL 8' T5 2 M0 W UNV ERS1 TB	2	T5	SPX41	26(130)	277	Electronic Prog Rapid Start	1		Recessed	Ceiling	
		Neoray	23DR 2T5 * 8 U EB SI S93											
F5	4' Heavy duty industrial. White reflector with 10% uplight. Refer to luminaire schedule notes.	Cooper (Metalux)	IAF 232-277 ER81	2	T8	SPX41	25(46)	277	Electronic Prog Rapid Start	1		Surface/ Suspended	Ceiling	
		Columbia	KL4 232 U EPU											
F6 F6-RF	16' - 0" Semi-direct linear pendant. Steel housing painted white, rectalinear profile. Distribution shall be symmetric. Provide with fully adjustable aircraft cable for mounting. Refer to luminaire schedule notes. RF = RF Sheilding	Ledalite or Approved Equal	Jump 1201 T10 Q S 16' 2 2 E W E Luminous A3 96	1	T8	SPX41	25(92)	277	Electronic Prog Rapid Start	2		Aircraft cable	Ceiling	Refer to switch detail 1 on e8.03.
FE6 FE6-RF	Same as F6 with Emergency circuit. Refer to luminaire schedule notes. RF = RF Sheilding	Ledalite or Approved Equal	Jump 1201 T10 Q S 16' 4 2 E W E Luminous A3 96	1	T8	SPX41	25(92)	277	Electronic Prog Rapid Start	3		Aircraft cable	Ceiling	Refer to switch detail 1 on e8.03.
F6A	Similar to F6 with different switching. Refer to luminaire schedule notes.	Ledalite or Approved Equal	Jump 1201 T10 Q S 16' 1 2 E W E Luminous A3 96	1	T8	SPX41	25(92)	277	Electronic Prog Rapid Start	1		Aircraft cable	Ceiling	Refer to switch detail 1 on e8.03.
FE6A	Similar to F6 with Emergency circuit. Refer to luminaire schedule notes.	Ledalite or Approved Equal	Jump 1201 T10 Q S 16' 3 2 E W E Luminous A3 96	1	T8	SPX41	25(92)	277	Electronic Prog Rapid Start	2		Aircraft cable	Ceiling	Refer to switch detail 1 on e8.03.
F7	4' - 0" Direct/Indirect linear wall mounted. Steel housing, rectangular profile. Distribution shall be symmetric. Provide with dust cover. Refer to luminaire schedule notes.	Ledalite	Sync 7408 F01 Q N 4' 1 2 E W Dust cover	1	T5	SPX41	26(32)	277	Electronic Prog Rapid Start	1		Surface	Wall	
		Axis	Cubic CUW VL 5 T5 1 W 0 FP ERS UNV 1 D											
F8	not used													
F8A	8' - 0" Direct/indirect linear pendant. Steel housing painted white, rectangular profile. Distribution shall be symmetric. Provide with fully adjustable aircraft cable for mounting. Refer to luminaire schedule notes.	Ledalite	Chopstick 7505 F02 Q N 8' 1 2 E W Dust cover A3	2	T5	SPX41	26(130)	277	Electronic Prog Rapid Start	1		Aircraft cable	Ceiling	Refer to switch detail 1 on e8.03.
		Axis	Twig TWR VL 8 T5 2 W UNV ERS 1 CA96 D											
FE8B FE8C	Direct/indirect linear pendant. Continuous 24'-0" run consisting of 8' - 0" modules. Die-formed steel housing painted white, rectangular profile. Distribution shall be symmetric. Provide with fully adjustable aircraft cable for mounting. Refer to luminaire schedule notes. FE8C = 24'-0"	Ledalite	Chopstick 7505 F02 Q N 24' 3 2 E W Dust cover A3	2	T5	SPX41	26(504)	277	Electronic Prog Rapid Start	2		Aircraft cable	Ceiling	Refer to switch detail 1 on e8.03.
		Axis	Twig TWR VL 24 T5 2 W UNV ERS 1+E CA96 D											
F9	not used													
F10	1'X4' direct grid mounted fluorescent troffer with center prismatic frosted acrylic lens. Low profile housing with maximum height of 4". Provide with step-dimmed or bi-level dimming ballast. Refer to luminaire schedule notes.	Cooper (Corelite) Lightolier	R3-W-L-2-T8-1-D-UNV-14-T1-SD	2	T8	SPX41	25(46)	277	Step-Dimming Prog Rapid Start	1	Sylvania 49157-QHESZ32T8 /UNV PSN-SC	Recessed	Ceiling	
		Axis	Day DAYF 14 S T8 2 W UNV T 1 TB9											
F10A	not used													
F10B	not used													
F10C	1'X4' direct grid mounted fluorescent troffer with center prismatic frosted acrylic lens. Low profile housing with maximum height of 4". Provide with step-dimmed or bi-level dimming ballast. Provide with plaster flange kit. Refer to luminaire schedule notes.	Cooper (Corelite)	R3-W-L-2-T8-2-SD-UNV-14-T1-SD-DF-14W-U	2	T8	SPX41	25(46)	277	Step-Dimming Prog Rapid Start	1	Sylvania 49157-QHESZ32T8 /UNV PSN-SC	Recessed	Ceiling	
		Axis	Day DAYF 14 S T8 2 W UNV T 1 DF											
F11	2'X4' fluorescent troffer with #12 pattern .125 acrylic lens. Refer to luminaire schedule notes.	Cooper (Metalux)	2FC8 228T8 A125 UNV HR8 ER81 PAF	2	T8	SPX41	25(46)	277	Electronic Prog Rapid Start	1		Recessed	Ceiling	
		Columbia	ST824 232F FSA12125 EPU PAF											
F12 F12-RF	2'X4' fluorescent troffer with #12 pattern .125 acrylic lens. Refer to luminaire schedule notes. RF = RF Sheilding	Cooper (Metalux)	2FC8 328T8 A125 UNV HR8 ER81 PAF	3	T8	SPX41	25(69)	277	Electronic Prog Rapid Start	1		Recessed	Ceiling	
		Columbia	ST824 332F FSA12125 3EPU PAF											
F13	2'X4' fluorescent highbay troffer with acrylic lens and door frame. Mount 2' +4" from underside of structure to B.O.L. and centered within east west structural members. Provide with modular power cord and plug. Refer to luminaire schedule notes.	Cooper (Metalux)	HBI 447T5 M A/WG UNV EHT2 UPL PAF MPC6-277	4	T5HO	SPX41	47(210)	277	Electronic Prog Rapid Start	2		Suspended	Ceiling	
		Columbia	LHV4 454 M4RU EPU CAWG O6TL15277 LHVQM*											
F13A	2'X4' fluorescent highbay troffer with acrylic lens and door frame. Mount 2' -4" from underside of structure to B.O.L. and centered within east west structural members. Provide with modular power cord and plug. Refer to luminaire schedule notes.	Cooper (Metalux) HE Williams Lightolier	HBI 447T5 M A/WG UNV EHT2 UPL PAF MPC6-277	4	T5HO	SPX41	47(210)	277	Electronic Prog Rapid Start	2		Suspended	Ceiling	
F14	4' Under counter fluorescent with acrylic lens and solid front. Refer to luminaire schedule notes.	HE Williams Kenall Alkco	2SF-48-132-EB1-277	1	T8	SPX41	25(24)	277	Electronic Prog Rapid Start	1		Surface	Cabinet	
		Legion	316 132 ACL EBO PRS											
F15 F15A	4' fluorescent strip with wireguard. Refer to luminaire schedule notes. F15A = 120Volt in elevator pit.	HE Williams	76-4-232-WG-7611-EBR2-277	2	T8	SPX41	25(46)	277	Electronic Prog Rapid Start	1		Surface	Cabinet	
		Columbia	CS4 232 EPU CSWG4											
		Cooper (Metalux)	SSF 232 UNV ER81 WG SSF 4FT U											
F16 F16-RF	12" - 0" Semi-direct linear pendant. Steel housing painted white, rectalinear profile. Distribution shall be symmetric. Provide with fully adjustable aircraft cable for mounting. Refer to luminaire schedule notes. RF = RF Sheilding	Ledalite or Approved Equal	Jump 1201 T10 Q S 12' 1 2 E W E Luminous A3 96	1	T8	SPX41	25(69)	277	Electronic Prog Rapid Start	1		Aircraft cable	Ceiling	Refer to switch detail 1 on e8.03.
FE16	Similar to F16 with Emergency circuit. Refer to luminaire schedule notes.	Ledalite or Approved Equal	Jump 1201 T10 Q S 12' 3 2 E W E Luminous A3 96	1	T8	SPX41	25(69)	277	Electronic Prog Rapid Start	2		Aircraft cable	Ceiling	Refer to switch detail 1 on e8.03.
F16A	Similar to F16 with different switching. Refer to luminaire schedule notes.	Ledalite or Approved Equal	Jump 1201 T10 Q S 12' 2 2 E W E Luminous A3 96	1	T8	SPX41	25(69)	277	Electronic Prog Rapid Start	2		Aircraft cable	Ceiling	Refer to switch detail 1 on e8.03.
F17	NOT USED.													
F17A F17A-RF	8' - 0" Semi-direct linear pendant. Steel housing painted white, rectalinear profile. Distribution shall be symmetric. Provide with fully adjustable aircraft cable for mounting. Refer to luminaire schedule notes. RF = RF Sheilding	Ledalite or Approved Equal	Jump 1201 T10 Q S 8' 1 2 E W E Luminous A3 96	1	T8	SPX41	25(46)	277	Electronic Prog Rapid Start	1		Aircraft cable	Ceiling	Refer to switch detail 1 on e8.03.
FE17A	Similar to F17A with Emergency circuiting. Refer to luminaire schedule notes.	Ledalite or Approved Equal	Jump 1201 T10 Q S 8' 3 2 E W E Luminous A3 96	1	T8	SPX41	25(46)	277	Electronic Prog Rapid Start	1		Aircraft cable	Ceiling	Refer to switch detail 1 on e8.03.
F18 FE18	4' - 0" Semi-direct linear pendant. Steel housing painted white, rectalinear profile. Distribution shall be symmetric. Provide with fully adjustable aircraft cable for mounting. Refer to luminaire schedule notes.	Ledalite or Approved Equal	Jump 1201 T10 Q S 4' 1 2 E W E Luminous A3 96	1	T8	SPX41	25(23)	277	Electronic Prog Rapid Start	1		Aircraft cable	Ceiling	Refer to switch detail 1 on e8.03.
F19	4" wide continuous grid mounted fluorescent wall washer. Steel housing with extruded aluminum frame. Verify length of luminaire with field conditions prior to ordering. ** Verify ceiling type mounting with Architect. Manufacturer shall provide job specific shop drawings. Refer to luminaire schedule notes.	Axis Focal Point	BBR SW S20' T5 1 C UNV ERS1 **DF	1	T5	SPX41	26(150)	277	Electronic Prog Rapid Start	1		Recessed	Ceiling	
		NeoRay	23XR 1T5 **FSR 20' D U EB SI											
F19A	4" wide continuous grid mounted fluorescent wall washer. Steel housing with extruded aluminum frame. Verify length of luminaire with field conditions prior to ordering. ** Verify ceiling type mounting with Architect. Manufacturer shall provide job specific shop drawings. Refer to luminaire schedule notes.	Axis Focal Point NeoRay	BBR SW S9' T5 1 C UNV ERS1 **DF	1	T5	SPX41	26(65)	277	Electronic Prog Rapid Start	1		Recessed	Ceiling	
		NeoRay	23XR 1T5 **FSR 9' D U EB SI											

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I hereby certify that this plan or drawing was prepared by me or under my direct supervision and that I am a duly licensed ELECTRICAL ENGINEER under the laws of the State of Minnesota.

For AFFILIATED ENGINEERS, INC.

By

Name RONALD M. PARSLEY

Date 02-24-2012 Reg. No. 25163

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Project

Physics and Nanotechnology Building

U of M Project # 01-155-08-1718

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LUMINAIRE SCHEDULE

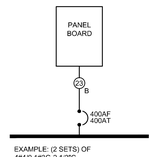
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LEGEND OF CONDUIT AND WIRE SIZES						
Nominal Ampere Rating	Reference Tag	Conductors (SUBSCRIPT A) 3W,+G	Conductors (SUBSCRIPT B) 4W,+G 100%N	Conductors (SUBSCRIPT BT) 4W,+G 100%N	Conductors (SUBSCRIPT C) 4W,+G 150%N	Conductors (SUBSCRIPT CT) 4W,+G 150%N
15	1	3#12,1#12G-3/4"C	4#12,1#12G-3/4"C		3#12,1#12N,1#12G-3/4"C	
20	2	3#12,1#12G-3/4"C	4#12,1#12G-3/4"C		3#12,1#10N,1#12G-3/4"C	
25	3	3#10,1#10G-3/4"C	4#10,1#10G-3/4"C		3#10,1#8N,1#10G-3/4"C	
30	4	3#10,1#10G-3/4"C	4#10,1#10G-3/4"C		3#10,1#6N,1#10G-3/4"C	
35	5	3#8,1#10G-3/4"C	4#8,1#10G-3/4"C	4#8,1#8SBJ-1"C	3#8,1#6N,1#10G-1"C	3#8,1#6N,1#6SBJ-1"C
40	6	3#8,1#10G-3/4"C	4#8,1#10G-3/4"C		3#8,1#6N,1#10G-1"C	
45	7	3#6,1#10G-3/4"C	4#6,1#10G-3/4"C		3#6,1#4N,1#10G-1"C	
50	8	3#6,1#10G-3/4"C	4#6,1#10G-3/4"C	4#6,1#8SBJ-1"C	3#6,1#4N,1#10G-1"C	3#6,1#4N,1#6SBJG-1"C
60	9	3#4,1#10G-1"C	4#4,1#10G-1 1/4"C		3#4,1#2N,1#10G-1 1/4"C	
70	10	3#4,1#8G-1"C	4#4,1#8G-1 1/4"C		3#4,1#1N,1#8G-1 1/4"C	
80	11	3#3,1#8G-1 1/4"C	4#3,1#8G-1 1/4"C		3#3,1#1N,1#8G-1 1/4"C	
90	12	3#2,1#8G-1 1/4"C	4#2,1#8G-1 1/4"C		3#2,1#1/0N,1#8G-1 1/4"C	
100	13	3#1,1#8G-1 1/4"C	4#1,1#8G-1 1/2"C	4#1,1#6SBJ-1 1/2"C	3#1,2#1/0N,1#8G-2"C	3#1,2#1/0N,1#6SBJ-2"C
110	14	3#1,1#6G-1 1/4"C	4#1,1#6G-1 1/2"C		3#1,2#1/0N,1#6G-2"C	
125	15	3#1,1#6G-1 1/4"C	4#1/0,1#4G-2"C		3#1/0,2#1/0N,1#4G-2"C	
150	16	3#1/0,1#6G-1 1/2"C	4#2/0,1#4G-2"C	4#2/0,1#4SBJ-2"C	3#2/0,2#1/0N,1#4G-2"C	3#2/0,2#1/0N,1#4SBJ-2"C
175	17	3#2/0,1#6G-1 1/2"C	4#3/0,1#4G-2"C		3#3/0,2#1/0N,1#4G-2"C	
200	18	3#3/0,1#6G-2"C	4#4/0,1#4G-2 1/2"C		3#4/0,2#2/0N,1#4G-2 1/2"C	
225	19	3#300AL,1#4G-2"C	4#400AL,1#3G-2 1/2"C		3#350AL,2#250AL,1#3G-3"C	
250	20		4#500AL,1#3G-3"C	4#500AL,1#2SBJ-3"C		
300	21					
350	22		(2 SETS) 4#3/0,1#3G-2"C	(2 SETS) 4#3/0,1#1/0SBJ-2 1/2"C	(2 SETS) 3#3/0,2#1/0N,1#3G-2 1/2"C	
400	23	(2 SETS) 3#3/0,1#3G-2"C	(2 SETS) 4#300AL,1#2G-2 1/2"C	(2 SETS) 4#300AL,1#1/0SBJ-2 1/2"C	(2 SETS) 3#300AL,2#4/0AL,1#2G-2 1/2"C	
450	24	(2 SETS) 3#300AL,1#2G-2-1/2"C				
500	25					
600	26		(2 SETS) 4#600AL,1#1/0G-3-1/2"C	(2 SETS) 4#500AL, 1#2/0SBJ-3"C		
700	27					
750	28					
800	29	(3 SETS) 3#400AL,1#1/0G-2 1/2"C	(3 SETS) 4#500AL,1#2/0G-3"C			(3 SETS) 3#500AL,2#300AL,1#4/0SBJ-4"C
900	30					
1000	31	(3 SETS) 3#600AL,1#2/0G-3"C				(3 SETS) 3#750AL,2#500AL,1#300SBJ-4"C
1200	32					
1600	33		(5 SETS) 4#750AL,1#300G-4"C	(5 SETS) 4#750AL,1#500G-4"C		(5 SETS) 3#750AL,2#500AL,1#500SBJ-4"C
2000	34					
2500	35		(8 SETS) 4#750AL,1#400G-4"C	(8 SETS) 4#750AL,1#750G-4"C		
3000	36					
4000	37					
5000	38					

NOTES:

1) SEE SPECIFICATION SECTION 260519 AND 260519.CR FOR ACCEPTABLE CONDUCTOR TYPES.

2) ALL CONDUCTORS TO BE COPPER UNLESS FOLLOWED BY AN "AL".



EXAMPLE: (2 SETS) OF
4#4/0,1#3G-2 1/2"C

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I hereby certify that this plan or drawing was prepared by me or under my direct supervision and that I am a duly licensed ELECTRICAL ENGINEER under the laws of the State of Minnesota.

For AFFILIATED ENGINEERS, INC.

By

Name RONALD M. PARSLEY

Date 02-24-2012 Reg. No. 25163

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Project

Physics and Nanotechnology Building

U of M Project # 01-155-08-1718

UNIVERSITY OF MINNESOTA
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ELECTRICAL FEEDER SCHEDULE

e9.02

3 Phase Panelboard Schedule

Panel Designation: N4A Floor: FOURTH Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 10 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
4-174 Wrmld	20/1	1	0.72			0.36			2	20/1	4-174 Wrmld
4-174 Wrmld	20/1	3		0.72			0.36		4	20/1	4-174 Wrmld
4-174 OHSC	20/1	5			0.54			1	6	30/2	4-174 Wrmld
4-174 OHSC	20/1	7	0.5			1			8	|	|
4-174 OHSC	20/1	9		0.5			1		10	20/1	4-174 Wrmld
4-174 OHSC	20/1	11			0.5			1	12	20/1	4-174 Wrmld
4-174 OHSC	30/2	13	1			1			14	20/1	4-174A Wrmld
|	|	15		1		1		16	20/1	4-174A Wrmld
4-174 OHSC	20/1	17			0.36			0.54	18	20/1	4-174A Wrmld
4-174 OHSC	20/1	19	0.5			0.54			20	20/1	4-174A Wrmld
4-174 OHSC	20/1	21		0.5			1		22	30/2	4-174A Wrmld
4-174 OHSC	20/1	23			0.5			1	24	|	|
4-174 OHSC	20/1	25	0.5			0.18			26	20/1	4-174 Rcpt
4-174 OHSC	20/1	27		0.5			0.5		28	20/1	4-174 Water Polisher
4-174 OHSC	20/1	29							30	20/1	Spare
4-174 OHSC	30/2	31	1						32	20/1	Spare
|	|	33		1				34	20/1	Spare
4-174 OHSC	20/1	35			0.5				36	20/1	Spare
4-174 OHSC	20/1	37	0.5						38	20/1	Spare
Spare	20/1	39							40	20/1	Spare
Spare	20/1	41							42	20/1	Spare

Recep(R): 21.3 kVA
Left Side Subtotal 4.7 4.2 2.4 Continuous(C): 0.0 kVA
Right Side Subtotal 3.1 3.9 3.5 Non-continuous(N): 0.5 kVA
Total Load per Phase 7.8 8.1 5.9 Total Connected Load: 21.8 kVA
Total Demand Load (D): 16.2 kVA

3 Phase Panelboard Schedule

Panel Designation: N4B Floor: FOURTH Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 10 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
4-174 OHSC	20/1	1	0.54			1			2	20/1	4-174B Wrmld
4-174 OHSC	20/1	3		0.5			1		4	20/1	4-174B Wrmld
4-174 OHSC	20/1	5			0.5			0.72	6	20/1	4-174B Wrmld
4-174 OHSC	30/2	7	0.5			0.54			8	20/1	4-174B Wrmld
|	|	9		0.5			1	10	30/2	4-174B Wrmld
4-174 OHSC	20/1	11			0.54			1	12	|	|
4-174 OHSC	20/1	13	0.5			0.18			14	20/1	4-174 Rcpt
4-174 OHSC	20/1	15		0.5					16	20/1	Spare
4-174 Wrmld	20/1	17			0.36				18	20/1	Spare
4-174 Wrmld	20/1	19	0.36						20	20/1	Spare
Spare	20/1	21							22	20/1	Spare
Spare	20/1	23							24	20/1	Spare
Spare	20/1	25							26	20/1	Spare
Spare	20/1	27							28	20/1	Spare
Spare	20/1	29							30	20/1	Spare
Spare	20/1	31							32	20/1	Spare
Spare	20/1	33							34	20/1	Spare
Spare	20/1	35							36	20/1	Spare
Spare	20/1	37							38	20/1	Spare
Spare	20/1	39							40	20/1	Spare
Spare	20/1	41							42	20/1	Spare

Recep(R): 10.2 kVA
Left Side Subtotal 1.9 1.5 1.4 Continuous(C): 0.0 kVA
Right Side Subtotal 1.7 2.0 1.7 Non-continuous(N): 0.0 kVA
Total Load per Phase 3.6 3.5 3.1 Total Connected Load: 10.2 kVA
Total Demand Load (D): 10.1 kVA

3 Phase Panelboard Schedule

Panel Designation: N4C Floor: FOURTH Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 10 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
4-176 Hood	20/1	1	1			1.2			2	20/1	4-176 OHSC
4-176 Hood	20/1	3		1			1		4	30/2	4-176 OHSC
4-176 Hood	20/1	5			1			1	6	|	|
4-176 Wrmld	20/1	7	0.36			1.2			8	20/1	4-176 OHSC
4-176 OHSC	20/1	9		1.2			1.2		10	20/1	4-176 OHSC
4-176 OHSC	30/2	11			1			1.2	12	20/1	4-176 OHSC
|	|	13	1			1.2			14	20/1	4-176 OHSC
4-176 OHSC	20/1	15		1.2			1.2		16	20/1	4-176 OHSC
4-176 OHSC	20/1	17			1.2			1.2	18	20/1	4-176 OHSC
4-176 OHSC	20/1	19	1.2			1.2			20	20/1	4-176 OHSC
4-176 OHSC	20/1	21		1.2			1		22	20/1	4-176 Wrmld
4-176 OHSC	30/2	23			1			1	24	20/1	4-176 Wrmld
|	|	25	1			0.5			26	30/2	4-176 Wrmld
4-175 OHSC	20/1	27		1			0.5		28	|	|
4-176 Water Polisher	20/1	29			0.5			0.18	30	20/1	4-176 Rcpt
Spare	20/1	31							32	20/1	Spare
Spare	20/1	33							34	20/1	Spare
Spare	20/1	35							36	20/1	Spare
Spare	20/1	37							38	20/1	Spare
Spare	20/1	39							40	20/1	Spare
Spare	20/1	41							42	20/1	Spare

Recep(R): 26.1 kVA
Left Side Subtotal 4.6 5.6 4.7 Continuous(C): 3.0 kVA
Right Side Subtotal 5.3 4.9 4.6 Non-continuous(N): 0.5 kVA
Total Load per Phase 9.9 10.5 9.3 Total Connected Load: 29.6 kVA
Total Demand Load (D): 21.6 kVA

3 Phase Panelboard Schedule

Panel Designation: N4D Floor: FOURTH Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 10 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
4-176A Wrmld	20/1	1	0.54			1.2			2	20/1	4-176C Wrmld
4-176A Wrmld	20/1	3		0.54			1		4	30/3	4-176C Wrmld
4-176A Wrmld	20/1	5			0.36			1	6	|	|
4-176A Wrmld	20/1	7	0.18			1			8	|	|
4-176A Wrmld	20/1	9		0.36			1.2		10	20/1	4-176C Wrmld
Spare	20/1	11						1	12	30/2	4-176C Wrmld
Spare	20/1	13				1			14	|	|
Spare	20/1	15					1.2		16	20/1	4-176C Wrmld
Spare	20/1	17						1.2	18	20/1	4-176C Wrmld
Spare	20/1	19				1.2			20	20/1	4-176C Wrmld
Spare	20/1	21					1.2		22	20/1	4-176C Wrmld
Spare	20/1	23						1	24	30/2	4-176C Wrmld
Spare	20/1	25				1			26	|	|
Spare	20/1	27					1.2		28	20/1	4-176C Wrmld
Spare	20/1	29						1.2	30	20/1	4-176C Wrmld
Spare	20/1	31							32	20/1	Spare
Spare	20/1	33							34	20/1	Spare
Spare	20/1	35							36	20/1	Spare
Spare	20/1	37							38	20/1	Spare
Spare	20/1	39							40	20/1	Spare
Spare	20/1	41							42	20/1	Spare

Recep(R): 18.6 kVA
Left Side Subtotal 0.7 0.9 0.4 Continuous(C): 0.0 kVA
Right Side Subtotal 5.4 5.8 5.4 Non-continuous(N): 0.0 kVA
Total Load per Phase 6.1 6.7 5.8 Total Connected Load: 18.6 kVA
Total Demand Load (D): 14.3 kVA

3 Phase Panelboard Schedule

Panel Designation: N4E Floor: FOURTH Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 10 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
4-175 Wrmld	20/1	1	1			0.18			2	20/1	4-175 Rcpts
4-175 Wrmld	20/1	3		0.36			0.54		4	20/1	4-175A Wrmld
4-175 Wrmld	20/1	5			0.36			0.54	6	20/1	4-175A Wrmld
4-175 Wrmld	30/2	7	1			1.2			8	20/1	4-175A Wrmld
|	|	9		1			1.2	10	20/1	4-175A Wrmld
4-175 Wrmld	20/1	11			1.2			1.2	12	20/1	4-175A BSC Rcpt
4-175 OHSC	20/1	13	0.72			0.5			14	20/1	4-175 Water Polisher
4-175 OHSC	20/1	15		0.5					16	20/1	Spare
4-175 OHSC	20/1	17			0.5				18	20/1	Spare
4-175 OHSC	20/1	19	0.5						20	20/1	Spare
4-175 OHSC	30/2	21		1					22	30/2	Spare
|	|	23		1				24	|	|
4-175 OHSC	20/1	25	0.5						26	20/1	Spare
4-175 OHSC	20/1	27		0.54					28	20/1	Spare
4-175 OHSC	20/1	29			0.54				30	20/1	Spare
4-175 OHSC	30/2	31	1						32	20/1	Spare
|	|	33		1				34	20/1	Spare
Spare	20/1	35							36	20/1	Spare
Spare	20/1	37							38	20/1	Spare
Spare	20/1	39							40	20/1	Spare
Spare	20/1	41							42	20/1	Spare

Recep(R): 17.6 kVA
Left Side Subtotal 4.7 4.4 3.6 Continuous(C): 0.0 kVA
Right Side Subtotal 1.9 1.7 1.7 Non-continuous(N): 0.5 kVA
Total Load per Phase 6.6 6.1 5.3 Total Connected Load: 18.1 kVA
Total Demand Load (D): 14.3 kVA

3 Phase Panelboard Schedule

Panel Designation: N4F Floor: FOURTH Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 10 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
4-173 Rcpts	20/1	1	0.36			0.54			2	20/1	4-173 OHSC
4-173 Wrmld	20/1	3		0.54			0.54		4	20/1	4-173 OHSC
4-173 Wrmld	20/1	5			0.54			1	6	30/2	4-173 OHSC
4-173 Wrmld	30/2	7	1			1			8	|	|
|	|	9		1		0.54		10	20/1	4-173 OHSC
4-173 Rcpts	20/1	11			0.36			0.54	12	20/1	4-173 OHSC
4-173 Wrmld	20/1	13	1			1			14	30/2	4-173 OHSC
4-173 Wrmld	30/2	15		1			1		16	|	|
|	|	17		1			0.54	18	20/1	4-173 OHSC
4-173 Wrmld	20/1	19	1			1			20	30/2	4-173 OHSC
4-173 Wrmld	20/1	21		1			1		22	|	|
4-173 OHSC	20/1	23			0.54			0.54	24	20/1	4-173 OHSC
4-173 OHSC	20/1	25	0.54			0.54			26	20/1	4-173 OHSC
4-173 OHSC	20/1	27		0.54			0.54		28	20/1	4-173 OHSC
4-173 OHSC	20/1	29			0.54			1	30	30/2	4-173 OHSC
Spare	20/1	31				1			32	|	|
Spare	20/1	33							34	20/1	Spare
Spare	20/1	35							36	20/1	Spare
Spare	20/1	37							38	20/1	Spare
Spare	20/1	39							40	20/1	Spare
Spare	20/1	41							42	20/1	Spare

Recep(R): 23.3 kVA
Left Side Subtotal 3.9 4.1 3.0 Continuous(C): 0.0 kVA
Right Side Subtotal 5.1 3.6 3.6 Non-continuous(N): 0.0 kVA
Total Load per Phase 9.0 7.7 6.6 Total Connected Load: 23.3 kVA
Total Demand Load (D): 16.6 kVA

3 Phase Panelboard Schedule

Panel Designation: N4G Floor: FOURTH Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 14 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
4-151 Wrmld	20/1	1	1			1			2	20/1	4-151A Wrmld
4-151 Wrmld	20/1	3		1			1		4	20/1	4-151A Wrmld
4-151 Wrmld	20/1	5			1			1	6	20/1	4-151A Wrmld
4-151 Wrmld	30/2	7	1			1			8	20/1	4-151A Wrmld
|	|	9		1			1	10	30/2	4-151A Wrmld
4-151 Wrmld	20/1	11			1			1	12	|	|
4-151 Wrmld	20/1	13	1			1			14	20/1	4-151A Wrmld
4-151 OHSC	20/1	15		0.54			1		16	20/1	4-151A Wrmld
4-151 OHSC	20/1	17			0.54			1	18	30/2	4-151A Wrmld
4-151 OHSC	20/1	19	0.54			1			20	|	|
4-151 OHSC	30/2	21		1			1		22	20/1	4-151A Wrmld
|	|	23		1			1	24	20/1	4-151A Wrmld
4-151 OHSC	20/1	25	0.54			0.9			26	20/1	Darkroom Lights
4-151 OHSC	20/1	27		0.54					28	20/1	Spare
4-151 OHSC	20/1	29			0.54				30	20/1	Spare
Spare	20/1	31							32	20/1	Spare
Spare	20/1	33							34	20/1	Spare
Spare	20/1	35							36	20/1	Spare
Spare	20/1	37							38	20/1	Spare
Spare	20/1	39							40	20/1	Spare
Spare	20/1	41							42	20/1	Spare

Recep(R): 25.1 kVA
Left Side Subtotal 4.1 4.1 4.1 Continuous(C): 0.0 kVA
Right Side Subtotal 4.9 4.0 4.0 Non-continuous(N): 0.0 kVA
Total Load per Phase 9.0 8.1 8.1 Total Connected Load: 25.1 kVA
Total Demand Load (D): 17.6 kVA

3 Phase Panelboard Schedule

Panel Designation: N4H Floor: FOURTH Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 14 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
4-151A Hood	20/1	1	1			0.5			2	20/1	4-151 OHSC
4-151 Wrmld	20/1	3		0.54			1		4	30/2	4-151 OHSC
4-151 Wrmld	20/1	5			1			1	6	|	|
4-151 Wrmld	20/1	7	1			0.54			8	20/1	4-151 OHSC
4-151 Wrmld	20/1	9		1			0.5		10	20/1	4-151 OHSC
4-151 OHSC	20/1	11			0.5			0.36	12	20/1	4-151 OHSC
4-151 OHSC	20/1	13	0.54			0.36			14	20/1	4-151 OHSC
4-151 OHSC	20/1	15		0.5			0.5		16	20/1	4-151 OHSC
4-151 OHSC	20/1	17			0.54			0.54	18	20/1	4-151 OHSC
4-151 OHSC	20/1	19	0.54			0.36			20	20/1	4-151 OHSC
4-151 OHSC	20/1	21		0.5			1		22	30/2	4-151 OHSC
Spare	20/1	23						1	24	|	|
Spare	20/1	25				0.5			26	20/1	4-151 OHSC
Spare	20/1	27					0.54		28	20/1	4-151 OHSC
Spare	20/1	29						0.36	30	20/1	4-151 OHSC
Spare	20/1	31							32	20/1	Spare
Spare	20/1	33							34	20/1	Spare
Spare	20/1	35							36	20/1	Spare
Spare	20/1	37							38	20/1	Spare
Spare	20/1	39							40	20/1	Spare
Spare	20/1	41							42	20/1	Spare

Recep(R): 16.7 kVA
Left Side Subtotal 3.1 2.5 2.0 Continuous(C): 0.0 kVA
Right Side Subtotal 2.3 3.5 3.3 Non-continuous(N): 0.0 kVA
Total Load per Phase 5.3 6.1 5.3 Total Connected Load: 16.7 kVA
Total Demand Load (D): 13.4 kVA

3 Phase Panelboard Schedule

Panel Designation: N4J Floor: FOURTH Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 150 A 10 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
4-154 OHSC	20/1	1	1			0.54			2	20/1	4-154 Wrmld
4-154 OHSC	20/1	3		1			0.54		4	20/1	4-154 Wrmld
4-154 OHSC	20/1	5			0.54			0.36	6	20/1	4-154 Wrmld
4-154 OHSC	20/1	7	0.54			1			8	20/1	4-154 Wrmld
4-154 OHSC	30/2	9		1			1		10	20/1	4-154 Wrmld
|	|	11		1			0.54	12	20/1	4-154 OHSC
4-154 Wrmld	20/1	13	0.36			0.5			14	20/1	4-154 OHSC
4-154 OHSC	20/1	15		0.36			0.5		16	20/1	4-154 OHSC
4-154 OHSC	20/1	17			0.36			0.5	18	20/1	4-154 OHSC
4-154 Wrmld	20/1	19	1			0.54			20	20/1	4-154 OHSC
4-154 Wrmld	20/1	21		1			1		22	30/2	4-154 OHSC
4-154 Wrmld	30/2	23			1			1	24	|	|
|	|	25	1		0.5			26	20/1	4-154 OHSC
4-154 OHSC	20/1	27		0.54			0.5		28	20/1	4-154 OHSC
4-154 OHSC	20/1	29			0.54			0.5	30	20/1	4-154 OHSC
4-154 OHSC	20/1	31	0.54						32	20/1	Spare
4-154 Hood	20/1	33		1					34	20/1	Spare
Spare	20/1	35							36	20/1	Spare
Spare	20/1	37							38	20/1	Spare
Spare	20/1	39							40	20/1	Spare
Spare	20/1	41							42	20/1	Spare

Recep(R): 21.3 kVA
Left Side Subtotal 4.4 4.9 3.4 Continuous(C): 1.0 kVA
Right Side Subtotal 3.1 3.5 2.9 Non-continuous(N): 0.0 kVA
Total Load per Phase 7.5 8.4 6.3 Total Connected Load: 22.3 kVA
Total Demand Load (D): 16.7 kVA

3 Phase Panelboard Schedule

Panel Designation: N4K Floor: FOURTH Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 10 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
4-154 Hood	20/1	1	1			1			2	20/1	4-154C Wrmld
4-154 Wrmld	20/1	3		0.54			1		4	20/1	4-154C Wrmld
4-154 Wrmld	20/1	5			0.54			1	6	30/2	4-154C Wrmld
4-154B Wrmld	20/1	7	1			1			8	|	|
4-154B Wrmld	20/1	9		1			1		10	20/1	4-154C Wrmld
4-154B Wrmld	20/1	11			1			1	12	20/1	4-154C Wrmld
4-154B Wrmld	20/1	13	1			1			14	20/1	4-154C Wrmld
4-154B Wrmld	20/1	15		1			1		16	20/1	4-154C Wrmld
4-154B Wrmld	20/1	17			1			0.5	18	20/1	4-154 Manifold
4-154B Wrmld	20/1	19	1			0.6			20	20/1	Dark Room Lighting
Spare	20/1	21							22	20/1	Spare
Spare	20/1	23							24	20/1	Spare
Spare	20/1	25							26	20/1	Spare
Spare	20/1	27							28	20/1	Spare
Spare	20/1	29							30	20/1	Spare
Spare	20/1	31							32	20/1	Spare
Spare	20/1	33							34	20/1	Spare
Spare	20/1	35							36	20/1	Spare
Spare	20/1	37							38	20/1	Spare
Spare	20/1	39							40	20/1	Spare
Spare	20/1	41							42	20/1	Spare

Recep(R): 16.7 kVA
Left Side Subtotal 4.0 2.5 2.5 Continuous(C): 1.0 kVA
Right Side Subtotal 3.6 3.0 2.5 Non-continuous(N): 0.5 kVA
Total Load per Phase 7.6 5.5 5.0 Total Connected Load: 18.2 kVA
Total Demand Load (D): 14.8 kVA

3 Phase Panelboard Schedule

Panel Designation: N4L Floor: FOURTH Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 10 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
4-162 Hood	20/1	1	1			0.54			2	20/1	4-162 Wrmld
4-162 Wrmld	20/1	3		0.54			0.54		4	20/1	4-162 Wrmld
4-162 Wrmld	20/1	5			0.54			1	6	30/2	4-162 Wrmld
4-162 Wrmld	20/1	7	0.54			1			8	|	|
4-162 Wrmld	30/2	9		1			1		10	20/1	4-162A Wrmld
|	|	11		1			1	12	30/2	4-162 Wrmld
4-162 OHSC	20/1	13	0.36			1			14	|	|
4-162 OHSC	20/1	15		0.5			1		16	20/1	4-162A Wrmld
4-162 OHSC	30/2	17			1			1	18	20/1	4-162B Wrmld
|	|	19	1			1			20	20/1	4-162B Wrmld
4-162 OHSC	20/1	21		0.5			1		22	30/2	4-162B Wrmld
4-162 OHSC	20/1	23			0.5			1	24	|	|
4-162 OHSC	20/1	25	0.36				1		26	30/2	4-162B Wrmld
4-162 OHSC	20/1	27		0.5				1	28	|	|
4-162 OHSC	30/2	29			1			0.3	30	20/1	Darkroom Lights
|	|	31	1						32	20/1	Spare
Spare	20/1	33							34	20/1	Spare
Spare	20/1	35							36	20/1	Spare
Spare	20/1	37							38	20/1	Spare
Spare	20/1	39							40	20/1	Spare
Spare	20/1	41							42	20/1	Spare

Recep(R): 23.7 kVA
Left Side Subtotal 4.3 3.0 4.0 Continuous(C): 1.0 kVA
Right Side Subtotal 4.5 4.5 4.3 Non-continuous(N): 0.0 kVA
Total Load per Phase 8.8 7.6 8.3 Total Connected Load: 24.7 kVA
Total Demand Load (D): 17.9 kVA

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I hereby certify that this plan or drawing was prepared by me or under my direct supervision and that I am a duly licensed ELECTRICAL ENGINEER under the laws of the State of Minnesota.
For AFFILIATED ENGINEERS, INC.
By
Name RONALD M. PARSLEY
Date 02-24-2012 Reg. No. 25163

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Bid Package No. 2	03-24-2012
Project Directive No. 3	05-11-2012

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Physics and Nanotechnology Building
U of M Project # 01-155-08-1718

UNIVERSITY OF MINNESOTA
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ELECTRICAL PANEL SCHEDULES

3 Phase Panelboard Schedule

Panel Designation: N4M Floor: FOURTH Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 10 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
4-164A Wrmld	20/1	1	1			0.54			2	20/1	4-164 OHSC
4-164A Wrmld	20/1	3		1			0.54		4	20/1	4-164 OHSC
4-164A Wrmld	20/1	5			1			1	6	30/2	4-164 OHSC
4-164A Wrmld	20/1	7	1			1			8	|	|
4-164B Wrmld	30/2	9		1			1		10	30/2	4-164 OHSC
|	|	11			1			12	|	|
4-164B Wrmld	20/1	13	1			0.54			14	20/1	4-164 OHSC
4-164C Wrmld	20/1	15		1			0.54		16	20/1	4-164 OHSC
4-164C Wrmld	20/1	17			1			0.45	18	20/1	Darkroom Lights
4-164C Wrmld	20/1	19	1						20	20/1	Spare
4-164C Wrmld	20/1	21		1					22	20/1	Spare
4-164 Wrmld	20/1	23			0.54				24	20/1	Spare
4-164 Wrmld	20/1	25	0.54						26	20/1	Spare
4-164 Wrmld	20/1	27		1					28	20/1	Spare
4-164 Wrmld	20/1	29			1				30	20/1	Spare
Spare	30/2	31							32	20/1	Spare
Spare	|	33							34	20/1	Spare
Spare	20/1	35							36	20/1	Spare
Spare	20/1	37							38	20/1	Spare
Spare	20/1	39							40	20/1	Spare
Spare	20/1	41							42	20/1	Spare
											Recep(R): 20.7 kVA
Left Side Subtotal			4.5	5.0	4.5						Continuous(C): 0.0 kVA
Right Side Subtotal			2.1	2.1	2.5						Non-continuous(N): 0.0 kVA
Total Load per Phase			6.6	7.1	7.0						Total Connected Load: 20.7 kVA
											Total Demand Load (D): 15.3 kVA

3 Phase Panelboard Schedule

Panel Designation: N4N Floor: FOURTH Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 14 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
4-164 OHSC	20/1	1	0.54			1			2	20/1	4-164 Wrmld
4-164 OHSC	20/1	3		0.5			1		4	20/1	4-164 Wrmld
4-164 OHSC	20/1	5			0.5			1	6	30/2	4-164 Wrmld
4-164 OHSC	20/1	7	0.5			1			8	|	|
4-164 OHSC	20/1	9		0.54			1		10	20/1	4-164 Wrmld
4-164 OHSC	20/1	11			0.5			1	12	20/1	4-164 Wrmld
4-164 OHSC	20/1	13	0.5			0.5			14	20/1	Spare
4-164 OHSC	20/1	15		0.5					16	20/1	Spare
4-164 Wrmld	20/1	17			1				18	20/1	Spare
4-164 Wrmld	20/1	19	1						20	20/1	Spare
4-164 Wrmld	30/2	21		1					22	20/1	Spare
|	|	23			1			24	20/1	Spare
Spare	20/1	25							26	20/1	Spare
Spare	20/1	27							28	20/1	Spare
Spare	20/1	29							30	20/1	Spare
Spare	20/1	31							32	20/1	Spare
Spare	20/1	33							34	20/1	Spare
Spare	20/1	35							36	20/1	Spare
Spare	20/1	37							38	20/1	Spare
Spare	20/1	39							40	20/1	Spare
Spare	20/1	41							42	20/1	Spare
											Recep(R): 14.6 kVA
Left Side Subtotal			2.5	2.5	3.0						Continuous(C): 0.0 kVA
Right Side Subtotal			2.5	2.0	2.0						Non-continuous(N): 0.0 kVA
Total Load per Phase			5.0	4.5	5.0						Total Connected Load: 14.6 kVA
											Total Demand Load (D): 12.3 kVA

3 Phase Panelboard Schedule

Panel Designation: N4O Floor: FOURTH Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 10 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
4-166 Wrmld	20/1	1	1			0.54			2	20/1	4-166 OHSC
4-166 Wrmld	20/1	3		1			0.5		4	20/1	4-166 OHSC
4-166 Wrmld	30/2	5			1			0.5	6	|	4-166 OHSC
|	|	7	1			0.5			8	20/1	4-166 OHSC
4-166 Wrmld	20/1	9		0.54			0.54		10	20/1	4-166 OHSC
4-166 Wrmld	30/2	11			1			0.5	12	20/1	4-166 OHSC
|	|	13	1			0.5			14	20/1	4-166 OHSC
4-166 Wrmld	20/1	15		0.54			0.5		16	20/1	4-166 OHSC
4-166 Wrmld	20/1	17			1			1	18	20/1	4-166 OHSC
4-166 Wrmld	20/1	19	1			1			20	20/1	4-166 OHSC
4-166 Wrmld	20/1	21		1			1		22	30/2	4-166 OHSC
Spare	20/1	23						1	24	|	|
Spare	20/1	25							26	20/1	Spare
Spare	20/1	27							28	20/1	Spare
Spare	20/1	29							30	20/1	Spare
Spare	20/1	31							32	20/1	Spare
Spare	20/1	33							34	20/1	Spare
Spare	20/1	35							36	20/1	Spare
Spare	20/1	37							38	20/1	Spare
Spare	20/1	39							40	20/1	Spare
Spare	20/1	41							42	20/1	Spare
											Recep(R): 18.2 kVA
Left Side Subtotal			4.0	3.1	3.0						Continuous(C): 0.0 kVA
Right Side Subtotal			2.5	2.5	3.0						Non-continuous(N): 0.0 kVA
Total Load per Phase			6.5	5.6	6.0						Total Connected Load: 18.2 kVA
											Total Demand Load (D): 14.1 kVA

3 Phase Panelboard Schedule

Panel Designation: RP4A Floor: FOURTH Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 22 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus
Panel is a 1 section, 72 pole panel

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
4-158 Recpts	20/1	1	1.08			0.54			2	20/1	4-159 Recpts
4-158 Recpts	20/1	3		1.08			0.36		4	20/1	4-105 Recpts
4-158 Recpts	20/1	5			1.08			0.5	6	20/1	4-105 wtr cooler
4-158 Recpts	20/1	7	0.36			0.36			8	20/1	4-154 Recpts
4-158 Recpts	20/1	9		0.36			0.36		10	20/1	4-154 Recpts
4-158 Recpts	20/1	11			0.36				12	20/1	Spare
4-158 Recpts	20/1	13	0.36						14	20/1	Spare
4-158 Recpts	20/1	15		0.36					16	20/1	Spare
4-158 Recpts	20/1	17			0.36				18	20/1	Spare
4-158 Recpts	20/1	19	0.36						20	20/1	Spare
4-158 Recpts	20/1	21		0.36					22	20/1	Spare
4-156 Recpts	20/1	23			0.36				24	20/1	Spare
4-160 Camera PS	20/1	25	0.5						26	20/1	Spare
Spare	20/1	27							28	20/1	Spare
Spare	20/1	29							30	20/1	Spare
Spare	20/1	31							32	20/1	Spare
Spare	20/1	33							34	20/1	Spare
Spare	20/1	35							36	20/1	Spare
Spare	20/1	37							38	20/1	Spare
Spare	20/1	39							40	20/1	Spare
Spare	20/1	41							42	20/1	Spare
											Recep(R): 8.6 kVA
Left Side Subtotal			2.7	2.2	2.2						Continuous(C): 0.0 kVA
Right Side Subtotal			0.9	0.7	0.5						Non-continuous(N): 0.5 kVA
Total Load per Phase			3.6	2.9	2.7						Total Connected Load: 9.1 kVA
											Total Demand Load (D): 9.1 kVA

3 Phase Panelboard Schedule

Panel Designation: RP4A Floor: FOURTH Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 22 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus
Panel is a 1 section, 72 pole panel

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
4-160 HK Recepts	20/2	43	0.18						44	20/1	Spare
|	|	45		0.18				46	20/1	Spare
4-150 HK Recepts	20/2	47			0.36				48	20/1	Spare
|	|	49	0.36					50	20/1	Spare
4-100, 4-150 HK Recepts	20/2	51		0.36			0.2		52	20/1	Dampers
|	|	53			0.36		0.2	54	20/1	Dampers
4-170 HK Recepts	20/2	55	0.36			0.29			56	15/3	FCU-10
|	|	57		0.36		0.29			58	|	|
4-170 HK Recepts	20/2	59			0.36		0.29		60	|	|
|	|	61	0.36			0.29			62	15/3	FCU-11
4-160 HK Recepts	20/2	63		0.36		0.29			64	|	|
|	|	65			0.36		0.29	66	|	|
Spare	20/1	67				1.18			68	15/1	UH-7
Spare	20/1	69					1.18		70	15/1	UH-8
Spare	20/1	71							72	20/1	Spare
											Recep(R): 5.7 kVA
Left Side Subtotal			1.3	1.3	1.4						Continuous(C): 2.4 kVA
Right Side Subtotal			1.8	2.0	0.8						Non-continuous(N): 0.4 kVA
Total Load per Phase			3.0	3.2	2.2						Total Connected Load: 8.5 kVA
											Total Demand Load (D): 8.5 kVA

3 Phase Panelboard Schedule

Panel Designation: RP4B Floor: FOURTH Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 10 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus
Panel is a 1 section, 72 pole panel

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
4-136 Recpts	20/1	1	1.08			1.08			2	20/1	4-123 Recpts
4-136 Recpts	20/1	3		1.08			1.08		4	20/1	4-121 Recpts
4-136 Recpts	20/1	5			0.9			1.08	6	20/1	4-117 Recpts
4-132 Recpts	20/1	7	1.08			0.18			8	20/1	4-110 Recpts
4-128 Recpts	20/1	9		1.08			0.18		10	20/1	4-110 Recpts
4-124 Recpts	20/1	11			1.08			0.18	12	20/1	4-110 Recpts
4-124 Recpts	20/1	13	1.08			0.54			14	20/1	4-110 Recpts
4-124 Recpts	20/1	15		0.9			0.36		16	20/1	4-110 Recpts
4-118 Recpts	20/1	17			1.08			0.18	18	20/1	4-110 Recpts
4-118 Recpts	20/1	19	1.08			0.36			20	20/1	Copy Area Recpts
4-118 Recpts	20/1	21		0.9			0.5		22	20/1	Copy Area Recpts
4-116 Recpts	20/1	23			1.08			0.18	24	20/1	4-108 AV Recpts
4-114 Recpts	20/1	25	1.08			0.72			26	20/1	4-108 Recpts
4-112 Recpts	20/1	27		1.08			1.08		28	20/1	4-108 Recpts
4-112 Recpts	20/1	29			1.08			0.5	30	20/1	4-110 Garbage Disp.
4-112 Recpts	20/1	31	0.9						32	20/1	Spare
4-135 Recpts	20/1	33		0.72					34	20/1	Spare
4-135 Recpts	20/1	35			0.72				36	20/1	Spare
4-133 Recpts	20/1	37	0.9						38	20/1	Spare
4-131 Recpts	20/1	39		1.08					40	20/1	Spare
4-127 Recpts	20/1	41			1.08				42	20/1	Spare
											Recep(R): 28.8 kVA
Left Side Subtotal			7.2	6.8	7.0						Continuous(C): 0.0 kVA
Right Side Subtotal			2.9	3.2	2.1						Non-continuous(N): 0.5 kVA
Total Load per Phase			10.1	10.0	9.1						Total Connected Load: 29.3 kVA
											Total Demand Load (D): 19.9 kVA

3 Phase Panelboard Schedule

Panel Designation: RP4B Floor: FOURTH Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 10 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus
Panel is a 1 section, 72 pole panel

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
4-120 HK Recpts	20/2	43	0.18						44	20/1	Spare
4-120 HK Recpts	|	45		0.18					46	20/1	Spare
4-120 HK Recpts	20/2	47			0.18				48	20/1	Spare
4-120 HK Recpts	|	49	0.18						50	20/1	Spare
Camera PS 4-136	20/1	51		0.5					52	20/1	Spare
Spare	20/1	53							54	20/1	Spare
Spare	20/1	55							56	20/1	Spare
Spare	20/1	57							58	20/1	Spare
Spare	20/1	59							60	20/1	Spare
Spare	20/1	61							62	20/1	Spare
Spare	20/1	63							64	20/1	Spare
Spare	20/1	65							66	20/1	Spare
Spare	20/1	67							68	20/1	Spare
Spare	20/1	69							70	20/1	Spare
Spare	20/1	71							72	20/1	Spare
											Recep(R): 1.2 kVA
Left Side Subtotal			0.4	0.7	0.2						Continuous(C): 0.0 kVA
Right Side Subtotal			0.0	0.0	0.0						Non-continuous(N): 0.0 kVA
Total Load per Phase			0.4	0.7	0.2						Total Connected Load: 1.2 kVA
											Total Demand Load (D): 1.2 kVA

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I hereby certify that this plan or drawing was prepared by me or under my direct supervision and that I am a duly licensed ELECTRICAL ENGINEER under the laws of the State of Minnesota.

For AFFILIATED ENGINEERS, INC.

By

Name RONALD M. PARSLEY

Date 02-24-2012 Reg. No. 25163

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UNIVERSITY OF MINNESOTA
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ELECTRICAL PANEL SCHEDULES

e9.04

3 Phase Panelboard Schedule

Panel Designation: N3A Floor: THIRD — Project No. 08643-00
208/120 Volt 3 Phase — 4 Wire + Ground
Bus Rating: 225 A Main Lugs — 225 A 10 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
3-178A Wrmld	20/1	1	0.54			0.54			2	20/1	3-178 Wrmld
3-178A Hood	20/1	3		1			0.54		4	20/1	3-178 Wrmld
3-178A Hood	20/1	5			1			1	6	30/2	3-178 Wrmld
3-178A Wrmld	20/1	7	0.54			1			8	|	|
3-178A Wrmld	20/1	9		0.54			0.36		10	20/1	3-178 Wrmld
3-178A Wrmld	30/3	11			1			0.36	12	20/1	3-178 Wrmld
|	|	13	1			0.5		14	20/1	3-178 Wrmld
|	|	15		1			0.5		16	20/1	3-178 Wrmld
3-178A Wrmld	20/1	17			0.36			0.5	18	20/1	3-178 Wrmld
3-178A Wrmld	30/2	19	1			1			20	30/2	3-178 Wrmld
|	|	21		1			1	22	|	|
3-178A Wrmld	20/1	23			0.36			1	24	30/3	3-178 Wrmld
3-178 Wrmld	20/1	25	0.54			1			26	|	|
3-178 Wrmld	20/1	27		0.36			1		28	|	|
3-178 Alarm Pnl	20/1	29			1				30	20/1	Spare
3-178 Wrmld	30/2	31	1						32	20/1	Spare
|	|	33		1				34	20/1	Spare
3-178 Wrmld	30/3	35			1				36	20/1	Spare
|	|	37	1						38	20/1	Spare
|	|	39		1				40	20/1	Spare
Spare	20/1	41							42	20/1	Spare
											Recep(R): 23.5 kVA
Left Side Subtotal			5.6	5.9	4.7						Continuous(C): 3.0 kVA
Right Side Subtotal			4.0	3.4	2.9						Non-continuous(N): 0.0 kVA
Total Load per Phase			9.7	9.3	7.6						Total Connected Load: 26.5 kVA
											Total Demand Load (D): 19.8 kVA

3 Phase Panelboard Schedule

Panel Designation: N3B Floor: THIRD — Project No. 08643-00
208/120 Volt 3 Phase — 4 Wire + Ground
Bus Rating: 225 A Main Lugs — 225 A 10 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
3-178 Wrmld	20/1	1	0.36			0.54			2	20/1	3-178 Wrmld
3-178 Wrmld	20/1	3		0.18					4	20/1	Spare
3-178 Wrmld	20/1	5			0.5				6	20/1	Spare
3-178 Wrmld	30/2	7	1						8	20/1	Spare
|	|	9		1				10	20/1	Spare
3-178 Wrmld	20/1	11			0.54				12	20/1	Spare
3-178 Wrmld	20/1	13	0.36						14	20/1	Spare
3-178 Wrmld	20/1	15		0.5					16	20/1	Spare
3-178 Wrmld	20/1	17			0.5				18	20/1	Spare
3-178 Wrmld	30/2	19	1						20	20/1	Spare
|	|	21		1				22	20/1	Spare
3-178 Wrmld	20/1	23			0.54				24	20/1	Spare
3-178 Wrmld	20/1	25	0.36						26	20/1	Spare
3-178 Wrmld	20/1	27		1					28	20/1	Spare
Spare	20/1	29			1				30	20/1	Spare
Spare	20/1	31							32	20/1	Spare
Spare	20/1	33							34	20/1	Spare
Spare	20/1	35							36	20/1	Spare
Spare	20/1	37							38	20/1	Spare
Spare	20/1	39							40	20/1	Spare
Spare	20/1	41							42	20/1	Spare
											Recep(R): 10.4 kVA
Left Side Subtotal			3.1	3.7	3.1						Continuous(C): 0.0 kVA
Right Side Subtotal			0.5	0.0	0.0						Non-continuous(N): 0.0 kVA
Total Load per Phase			3.6	3.7	3.1						Total Connected Load: 10.4 kVA
											Total Demand Load (D): 10.2 kVA

3 Phase Panelboard Schedule

Panel Designation: N3C Floor: THIRD — Project No. 08643-00
208/120 Volt 3 Phase — 4 Wire + Ground
Bus Rating: 225 A Main Lugs — 225 A 10 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
3-176 Wrmld	20/1	1	1			0.54			2	20/1	3-176 Wrmld
3-176 Wrmld	20/1	3		1			0.54		4	20/1	3-176 Wrmld
3-176 Wrmld	20/1	5			0.36			1	6	30/2	3-176 Wrmld
3-176 Wrmld	30/2	7	1			1			8	|	|
|	|	9		1				10	20/1	3-176 Wrmld
3-176 Wrmld	20/1	11			0.54			0.36	12	20/1	3-176 Wrmld
3-176 Wrmld	30/2	13	1			0.5			14	20/1	3-176 Wrmld
|	|	15		1		0.5		16	20/1	3-176 Wrmld
3-176 Wrmld	20/1	17			0.54			0.5	18	20/1	3-176 Wrmld
3-176 Wrmld	20/1	19	0.54			0.54			20	20/1	3-176 Wrmld
3-176 Wrmld	20/1	21		0.5			1		22	30/2	3-176 Wrmld
3-176 Wrmld	30/2	23			1			1	24	|	|
|	|	25	1			0.36		26	20/1	3-176 Wrmld
3-176 Wrmld	30/2	27		1			1		28	30/3	3-176 Wrmld
|	|	29			1			1	30	|	|
Spare	20/1	31				1			32	|	|
Spare	20/1	33					1		34	30/3	3-176 Wrmld
Spare	20/1	35						1	36	|	|
Spare	20/1	37				1			38	|	|
Spare	20/1	39							40	20/1	Spare
Spare	20/1	41							42	20/1	Spare
											Recep(R): 26.9 kVA
Left Side Subtotal			4.5	4.5	3.4						Continuous(C): 0.0 kVA
Right Side Subtotal			4.9	4.6	4.9						Non-continuous(N): 0.0 kVA
Total Load per Phase			9.5	9.1	8.3						Total Connected Load: 26.9 kVA
											Total Demand Load (D): 18.4 kVA

3 Phase Panelboard Schedule

Panel Designation: N3D Floor: THIRD — Project No. 08643-00
208/120 Volt 3 Phase — 4 Wire + Ground
Bus Rating: 225 A Main Lugs — 225 A 10 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
3-176 Wrmld	20/1	1	0.18			0.54			2	20/1	3-176A Wrmld
3-176 Wrmld	20/1	3		0.36			1		4	30/3	3-176A Wrmld
3-176 OHSC	20/1	5			0.5			1	6	|	|
3-176 OHSC	20/1	7	0.36			1			8	|	|
3-176 OHSC	30/2	9		1			1		10	30/2	3-176A Wrmld
|	|	11			1			1	12	|	|
3-176 OHSC	30/3	13	1			1			14	20/1	3-176A Wrmld
|	|	15		1			1		16	30/3	3-176A Wrmld
|	|	17			1			1	18	|	|
3-176 Wrmld	20/1	19	0.36			1			20	|	|
3-176 Wrmld	20/1	21		0.18			1		22	30/3	3-176A Wrmld
Spare	20/1	23						1	24	|	|
Spare	20/1	25				1			26	|	|
Spare	20/1	27					0.5		28	20/1	3-176A Wrmld
Spare	20/1	29						0.36	30	20/1	3-176A Wrmld
Spare	20/1	31							32	20/1	Spare
Spare	20/1	33							34	20/1	Spare
Spare	20/1	35							36	20/1	Spare
Spare	20/1	37							38	20/1	Spare
Spare	20/1	39							40	20/1	Spare
Spare	20/1	41							42	20/1	Spare
											Recep(R): 20.3 kVA
Left Side Subtotal			1.9	2.5	2.5						Continuous(C): 0.0 kVA
Right Side Subtotal			4.5	4.5	4.4						Non-continuous(N): 0.0 kVA
Total Load per Phase			6.4	7.0	6.9						Total Connected Load: 20.3 kVA
											Total Demand Load (D): 15.2 kVA

3 Phase Panelboard Schedule

Panel Designation: N3E Floor: THIRD — Project No. 08643-00
208/120 Volt 3 Phase — 4 Wire + Ground
Bus Rating: 225 A Main Lugs — 225 A 10 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
3-174A Wrmld	20/1	1	0.36			0.54			2	20/1	3-174B Wrmld
3-174A Wrlmld	30/3	3		1			0.54		4	20/1	3-174B Wrmld
|	|	5			1			1	6	30/2	3-174B Wrmld
|	|	7	1			1			8	|	|
3-174A Wrlmld	30/2	9		1			0.54		10	20/1	3-174B Wrmld
|	|	11			1			0.54	12	20/1	3-174B Wrmld
3-174A Wrmld	20/1	13	0.36			1			14	30/2	3-174B Wrmld
3-174A Wrmld	20/1	15		0.36			1		16	|	|
3-174A Wrlmld	30/3	17			1			0.54	18	20/1	3-174B Wrmld
|	|	19	1			0.54			20	20/1	3-174B Wrmld
|	|	21		1			0.54		22	20/1	3-174B OHSC
3-174A Wrlmld	30/2	23			1			0.54	24	20/1	3-174B OHSC
|	|	25	1			0.54			26	20/1	3-174B OHSC
3-174A Manifold	20/1	27		0.5			0.54		28	20/1	3-174B OHSC
Spare	20/1	29						2.8	30	40/1	3-174 Clean Room
Spare	20/1	31							32	20/1	Spare
Spare	20/1	33							34	20/1	Spare
Spare	20/1	35							36	20/1	Spare
Spare	20/1	37							38	20/1	Spare
Spare	20/1	39							40	20/1	Spare
Spare	20/1	41							42	20/1	Spare
											Recep(R): 23.3 kVA
Left Side Subtotal			3.7	3.9	4.0						Continuous(C): 0.5 kVA
Right Side Subtotal			3.6	3.2	5.4						Non-continuous(N): 0.0 kVA
Total Load per Phase			7.3	7.0	9.4						Total Connected Load: 23.8 kVA
											Total Demand Load (D): 17.1 kVA

3 Phase Panelboard Schedule

Panel Designation: N3F Floor: THIRD — Project No. 08643-00
208/120 Volt 3 Phase — 4 Wire + Ground
Bus Rating: 225 A Main Lugs — 225 A 10 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
3-172 Wrmld	20/1	1	0.54			0.54			2	20/1	3-174 OHSC
3-172 Wrmld	20/1	3		0.54			0.54		4	20/1	3-174 OHSC
3-172 Wrmld	30/2	5			1			0.54	6	20/1	3-174 OHSC
|	|	7	1			0.54			8	20/1	3-174 OHSC
3-172 Wrmld	20/1	9		0.54			1		10	30/2	3-174 OHSC
3-172 Wrmld	20/1	11			0.54			1	12	|	|
3-172 Wrmld	30/2	13	1			0.36			14	20/1	3-174 OHSC
|	|	15		1			0.36	16	20/1	3-174 OHSC
3-172 Wrmld	20/1	17			0.54			0.36	18	20/1	3-174 OHSC
3-172 Wrmld	30/2	19	1			0.5			20	20/1	3-174 OHSC
|	|	21		1			0.5		22	20/1	3-174 OHSC
3-174 Wrlmd	20/1	23			0.54			0.5	24	20/1	3-174 OHSC
3-174 Wrlmd	30/2	25	1						26	20/1	Spare
|	|	27		1				28	20/1	Spare
3-174 Hood	20/1	29			1				30	20/1	Spare
3-174 Wrlmd	20/1	31	0.54						32	20/1	Spare
3-174 OHSC	20/1	33							34	20/1	Spare
Spare	20/1	35							36	20/1	Spare
Spare	20/1	37							38	20/1	Spare
Spare	20/1	39							40	20/1	Spare
Spare	20/1	41							42	20/1	Spare
											Recep(R): 19.5 kVA
Left Side Subtotal			5.1	4.1	3.6						Continuous(C): 0.0 kVA
Right Side Subtotal			1.9	2.4	2.4						Non-continuous(N): 0.0 kVA
Total Load per Phase			7.0	6.5	6.0						Total Connected Load: 19.5 kVA
											Total Demand Load (D): 14.8 kVA

3 Phase Panelboard Schedule

Panel Designation: N3G Floor: THIRD — Project No. 08643-00
208/120 Volt 3 Phase — 4 Wire + Ground
Bus Rating: 225 A Main Lugs — 225 A 10 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
3-171 Wrmld	20/1	1	0.54			0.54			2	20/1	3-171 OHSC
3-171 Wrmld	20/1	3		0.54			0.5		4	20/1	3-171 OHSC
3-171 Wrmld	20/1	5			1			0.5	6	20/1	3-171 OHSC
3-171 Wrmld	20/1	7	1			0.5			8	20/1	3-171 OHSC
3-171 Wrmld	30/2	9		1			1		10	30/2	3-171 OHSC
|	|	11			1			1	12	|	|
3-171 Wrmld	20/1	13	1			1			14	20/1	3-171B Wrmld
3-171 Wrmld	20/1	15		1			1		16	20/1	3-171B Wrmld
3-171 OHSC	20/1	17			0.54			1	18	30/2	3-171B Wrmld
3-171 OHSC	30/2	19	1			1			20	|	|
|	|	21		1		0.54		22	20/1	3-171B Wrmld
3-171 OHSC	20/1	23			0.5			0.54	24	20/1	3-171B Wrmld
3-171 OHSC	20/1	25	0.5			1			26	30/2	3-171B Wrmld
3-171 OHSC	20/1	27		0.5			1		28	|	|
3-171 Wrmld	20/1	29			0.36			0.54	30	20/1	3-171A Wrmld
3-171 Hood	20/1	31	1			1			32	30/2	3-171A Wrmld
3-171 Rept	30/2	33		1			1		34	|	|
|	|	35			1		0.54	36	20/1	3-171A Wrmld
Darkroom Lights	20/1	37	0.45			0.36			38	20/1	3-171A Wrmld
Spare	20/1	39					1		40	30/2	3-171A Wrmld
Spare	20/1	41						1	42	|	|
											Recep(R): 30.5 kVA
Left Side Subtotal			5.5	5.0	4.4						Continuous(C): 1.0 kVA
Right Side Subtotal			5.4	6.0	5.1						Non-continuous(N): 0.0 kVA
Total Load per Phase			10.9	11.1	9.5						Total Connected Load: 31.5 kVA
											Total Demand Load (D): 21.2 kVA

3 Phase Panelboard Schedule

Panel Designation: N3H Floor: THIRD — Project No. 08643-00
208/120 Volt 3 Phase — 4 Wire + Ground
Bus Rating: 225 A Main Lugs — 225 A 10 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
3-166 Wrmld	20/1	1	1			0.54			2	20/1	3-166 Wrmld
3-166 Wrmld	20/1	3		0.54			0.54		4	20/1	3-166 Wrmld
3-166 Wrmld	20/1	5			0.5			1	6	20/1	3-166 Wrmld
3-166 Wrmld	30/3	7	1			1			8	20/1	
|	|	9		1		1		10	30/2	3-166 Wrmld
|	|	11			1		1	12	|	|
3-166 Wrmld	30/2	13	1			1			14	30/3	3-166 Wrmld
|	|	15		1			1	16	|	|
3-166 Wrmd	20/1	17			0.54			1	18	|	|
3-166 Wrmd	20/1	19	0.54			0.36			20	20/1	3-166 Wrmld
3-166 OHSC	20/1	21		0.54					22	20/1	Spare
3-166 OHSC	20/1	23			0.5				24	20/1	Spare
3-166 OHSC	20/1	25	0.5						26	20/1	Spare
3-166 OHSC	20/1	27		1					28	20/1	Spare
|	20/1	29			1				30	20/1	Spare
Spare	20/1	31							32	20/1	Spare
Spare	20/1	33							34	20/1	Spare
Spare	20/1	35							36	20/1	Spare
Spare	20/1	37							38	20/1	Spare
Spare	20/1	39							40	20/1	Spare
Spare	20/1	41							42	20/1	Spare
											Recep(R): 20.1 kVA
Left Side Subtotal			4.0	4.1	3.5						Continuous(C): 0.0 kVA
Right Side Subtotal			2.9	2.5	3.0						Non-continuous(N): 0.0 kVA
Total Load per Phase			6.9	6.6	6.5						Total Connected Load: 20.1 kVA
											Total Demand Load (D): 15.1 kVA

3 Phase Panelboard Schedule

Panel Designation: N3I Floor: THIRD — Project No. 08643-00
208/120 Volt 3 Phase — 4 Wire + Ground
Bus Rating: 225 A Main Lugs — 225 A 10 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
3-166 Hood	20/1	1	1			0.6			2	20/1	Darkroom Lights
3-166 Wrmld	20/1	3		0.54					4	20/1	Spare
3-166 Wrmld	20/1	5			0.54				6	20/1	Spare
3-166 Wrmld	30/3	7	1						8	20/1	Spare
|	|	9		1				10	30/2	Spare
|	|	11			1			12	|	Spare
3-166A Wrmld	20/1	13	1						14	30/3	Spare
3-166A Wrmld	20/1	15		1					16	|	Spare
3-166A Wrmld	20/1	17			1				18	|	Spare
3-166A Wrmld	20/1	19	1						20	20/1	Spare
3-166A Wrmld	30/3	21		1					22	20/1	Spare
|	|	23			1			24	20/1	Spare
|	|	25	1						26	20/1	Spare
3-166A Wrmld	20/1	27		1					28	20/1	Spare
3-166A Wrmld	20/1	29			1				30	20/1	Spare
3-166A Wrmld	30/2	31	1						32	20/1	Spare
|	|	33		1				34	20/1	Spare
Spare	20/1	35							36	20/1	Spare
Spare	20/1	37							38	20/1	Spare
Spare	20/1	39							40	20/1	Spare
Spare	20/1	41							42	20/1	Spare
											Recep(R): 15.7 kVA
Left Side Subtotal			6.0	5.5	4.5						Continuous(C): 1.0 kVA
Right Side Subtotal			0.6	0.0	0.0						Non-continuous(N): 0.0 kVA
Total Load per Phase			6.6	5.5	4.5						Total Connected Load: 16.7 kVA
											Total Demand Load (D): 13.8 kVA

3 Phase Panelboard Schedule

Panel Designation: N3J Floor: THIRD — Project No. 08643-00
208/120 Volt 3 Phase — 4 Wire + Ground
Bus Rating: 225 A Main Lugs — 225 A 10 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
3-164 Hood	20/1	1	1			0.54			2	20/1	3-164 OHSC
3-164 Wrmld	20/1	3		0.36			0.54		4	20/1	3-164 OHSC
3-164 Wrmld	20/1	5			0.36			1	6	30/2	3-164 OHSC
3-164 OHSC	20/1	7	0.54			1			8	|	|
3-164 OHSC	20/1	9		0.54			1		10	30/2	3-164 OHSC
3-164 OHSC	30/2	11			1			1	12	|	|
|	|	13	1			0.54			14	20/1	3-164 OHSC
3-164 OHSC	20/1	15		0.5			0.54		16	20/1	3-164 OHSC
3-164 OHSC	20/1	17			0.36			1	18	30/2	3-164 OHSC
3-164 OHSC	20/1	19	0.5			1			20	|	|
3-164 OHSC	20/1	21		0.54			1		22	30/2	3-164 OHSC
3-164 OHSC	20/1	23			0.54			1	24	|	|
3-164 OHSC	30/2	25	1			0.5			26	20/1	3-164 Manifold
|	|	27		1				28	20/1	Spare
3-164 OHSC	30/2	29			1				30	20/1	Spare
|	|	31	1						32	20/1	Spare
Spare	20/1	33							34	20/1	Spare
Spare	20/1	35							36	20/1	Spare
Spare	20/1	37							38	20/1	Spare
Spare	20/1	39							40	20/1	Spare
Spare	20/1	41							42	20/1	Spare
											Recep(R): 20.4 kVA
Left Side Subtotal			5.0	2.9	3.3						Continuous(C): 1.5 kVA
Right Side Subtotal			3.6	3.1	4.0						Non-continuous(N): 0.0 kVA
Total Load per Phase			8.6	6.0	7.3						Total Connected Load: 21.9 kVA
											Total Demand Load (D): 16.7 kVA

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I hereby certify that this plan or drawing was prepared by me or under my direct supervision and that I am a duly licensed ELECTRICAL ENGINEER under the laws of the State of Minnesota.
For AFFILIATED ENGINEERS, INC.
By
Name RONALD M. PARSLEY
Date 02-24-2012 Reg. No. 25163

Issued for	Date
100% CD set	12-16-2011
Bid Package No. 2	02-24-2012
Project Directive No. 3	05-11-2012

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Checked SDM
Date 12/16/11
Project

Physics and Nanotechnology Building
U of M Project # 01-155-08-1718

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ELECTRICAL PANEL SCHEDULES

3 Phase Panelboard Schedule

Panel Designation: RP3A Floor: THIRD Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 22 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus
Panel is a 1 section, 72 pole panel

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
3-158 Rcpts	20/1	1	1.08			0.54			2	20/1	3-159 Rcpts
3-158 Rcpts	20/1	3		1.08			0.36		4	20/1	3-105 Rcpts
3-158 Rcpts	20/1	5			0.72			0.5	6	20/1	3-105 wtr cooler
3-158 Rcpts	20/1	7	0.36			0.18			8	20/1	3-152 Rcpt
3-158 Rcpts	20/1	9		0.36					10	20/1	Spare
3-158 Rcpts	20/1	11			0.36				12	20/1	Spare
3-158 Rcpts	20/1	13	0.36						14	20/1	Spare
3-158 Rcpts	20/1	15		0.36					16	20/1	Spare
3-158 Rcpts	20/1	17			0.36				18	20/1	Spare
3-158 Rcpts	20/1	19	0.36						20	20/1	Spare
3-158 Rcpts	20/1	21		0.36					22	20/1	Spare
3-156 Rcpts	20/1	23			0.36				24	20/1	Spare
Spare	20/1	25							26	20/1	Spare
Spare	20/1	27							28	20/1	Spare
Spare	20/1	29							30	20/1	Spare
Spare	20/1	31							32	20/1	Spare
Spare	20/1	33							34	20/1	Spare
Spare	20/1	35							36	20/1	Spare
Spare	20/1	37							38	20/1	Spare
Spare	20/1	39							40	20/1	Spare
Spare	20/1	41							42	20/1	Spare

Recep(R): 7.2 kVA
Left Side Subtotal 2.2 2.2 1.8 Continuous(C): 0.0 kVA
Right Side Subtotal 0.7 0.4 0.5 Non-continuous(N): 0.5 kVA
Total Load per Phase 2.9 2.5 2.3 Total Connected Load: 7.7 kVA
Total Demand Load (D): 7.7 kVA

3 Phase Panelboard Schedule

Panel Designation: RP3A Floor: THIRD Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 22 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus
Panel is a 1 section, 72 pole panel

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
4-160 HK Recepts	20/2	43	0.18						44	20/1	Spare
|	|	|	45		0.18				46	20/1	Spare
4-150 HK Recepts	20/2	47			0.36				48	20/1	Spare
|	|	|	49	0.36					50	20/1	Spare
4-100, 4-150 HK Rece	20/2	51		0.36					52	20/1	Spare
|	|	|	53		0.36				54	20/1	Spare
4-170 HK Recepts	20/2	55	0.36						56	20/1	Spare
|	|	|	57		0.36			0.29	58	15/3	FCU-10
4-170 HK Recepts	20/2	59			0.36			0.29	60	|	|
|	|	|	61	0.36			0.29		62	|	|
Spare	20/1	63		0.36			0.2		64	20/1	Dampers
Spare	20/1	65						0.2	66	20/1	Dampers
FCU-11	15/3	67	0.29			1.18			68	15/1	UH-5
|	|	|	69		0.29		1.18		70	15/1	UH-6
|	|	|	71			0.29			72	20/1	Spare

Recep(R): 3.6 kVA
Left Side Subtotal 1.6 1.6 1.4 Continuous(C): 4.1 kVA
Right Side Subtotal 1.5 1.7 0.5 Non-continuous(N): 0.4 kVA
Total Load per Phase 3.0 3.2 1.9 Total Connected Load: 8.1 kVA
Total Demand Load (D): 8.1 kVA

3 Phase Panelboard Schedule

Panel Designation: RP3B Floor: THIRD Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 10 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus
Panel is a 1 section, 72 pole panel

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
3-136 Rcpts	20/1	1	1.08			1.08			2	20/1	3-123 Rcpts
3-136 Rcpts	20/1	3		1.08			1.08		4	20/1	3-121 Rcpts
3-136 Rcpts	20/1	5			0.9			1.08	6	20/1	3-117 Rcpts
3-132 Rcpts	20/1	7	1.08			0.18			8	20/1	3-110 Rcpts
3-128 Rcpts	20/1	9		1.08			0.18		10	20/1	3-110 Rcpts
3-124 Rcpts	20/1	11			1.08			0.18	12	20/1	3-110 Rcpts
3-124 Rcpts	20/1	13	1.08			0.54			14	20/1	3-110 Rcpts
3-124 Rcpts	20/1	15		0.9			0.36		16	20/1	3-110 Rcpts
3-118 Rcpts	20/1	17			1.08			0.18	18	20/1	3-110 Rcpts
3-118 Rcpts	20/1	19	1.08			0.36			20	20/1	Copy Area Rcpts
3-118 Rcpts	20/1	21		0.9			0.5		22	20/1	Copy Area Rcpts
3-116 Rcpts	20/1	23			1.08			0.18	24	20/1	3-108 AV Rcpts
3-114 Rcpts	20/1	25	1.08			0.72			26	20/1	3-108 Rcpts
3-112 Rcpts	20/1	27		1.08			1.08		28	20/1	3-108 Rcpts
3-112 Rcpts	20/1	29			1.08			0.5	30	20/1	3-110 Garbage Disp.
3-112 Rcpts	20/1	31	0.9			0.36			32	20/1	3-100A Rcpts
3-135 Rcpts	20/1	33		0.72			0.36		34	20/1	3-100A Rcpts
3-135 Rcpts	20/1	35			0.72			0.36	36	20/1	3-100B Rcpts
3-133 Rcpts	20/1	37	0.9			0.36			38	20/1	3-100B Rcpts
3-131 Rcpts	20/1	39		1.08					40	20/1	Spare
3-127 Rcpts	20/1	41			1.08				42	20/1	Spare

Recep(R): 29.7 kVA
Left Side Subtotal 7.2 6.8 7.0 Continuous(C): 0.0 kVA
Right Side Subtotal 3.6 3.6 2.5 Non-continuous(N): 1.0 kVA
Total Load per Phase 10.8 10.4 9.5 Total Connected Load: 30.7 kVA
Total Demand Load (D): 20.9 kVA

3 Phase Panelboard Schedule

Panel Designation: RP3B Floor: THIRD Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 10 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus
Panel is a 1 section, 72 pole panel

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
3-120 HK Rcpts	20/2	43	0.18						44	20/1	Spare
|	|	|	45		0.18				46	20/1	Spare
3-120 HK Rcpts	20/2	47			0.18				48	20/1	Spare
|	|	|	49	0.18					50	20/1	Spare
Spare	20/1	51							52	20/1	Spare
Spare	20/1	53							54	20/1	Spare
Spare	20/1	55							56	20/1	Spare
Spare	20/1	57							58	20/1	Spare
Spare	20/1	59							60	20/1	Spare
Spare	20/1	61							62	20/1	Spare
Spare	20/1	63							64	20/1	Spare
Spare	20/1	65							66	20/1	Spare
Spare	20/1	67							68	20/1	Spare
Spare	20/1	69							70	20/1	Spare
Spare	20/1	71							72	20/1	Spare

Recep(R): 0.7 kVA
Left Side Subtotal 0.4 0.2 0.2 Continuous(C): 0.0 kVA
Right Side Subtotal 0.0 0.0 0.0 Non-continuous(N): 0.0 kVA
Total Load per Phase 0.4 0.2 0.2 Total Connected Load: 0.7 kVA
Total Demand Load (D): 0.7 kVA

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I hereby certify that this plan or drawing was prepared by me or under my direct supervision and that I am a duly licensed ELECTRICAL ENGINEER under the laws of the State of Minnesota.

For AFFILIATED ENGINEERS, INC.

By

Name RONALD M. PARSLEY

Date 02-24-2012 Reg. No. 25163

Issued for	Date
100% CD set	12-16-2011
Bid Package No. 2	02-24-2012

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Date 12/16/11

Project

Physics and Nanotechnology Building

U of M Project # 01-155-08-1718

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ELECTRICAL PANEL SCHEDULES

e9.06

3 Phase Panelboard Schedule

Panel Designation: N2A Floor: SECOND Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 10 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
2-166 Wrmld	20/1	1	1			0.54			2	20/1	2-166 OHSC
2-166 Wrmld	20/1	3		1			0.5		4	20/1	2-166 OHSC
2-166 Wrmld	20/1	5			0.36			0.36	6	20/1	2-166 OHSC
Spare	20/1	7				1			8	30/2	2-166 OHSC
Spare	20/1	9					1		10	|	|
2-166 Wrmld	20/1	11			0.5			1	12	20/1	2-166 Wrmld
2-166 Wrmld	20/1	13	0.54			1			14	20/1	2-166 Wrmld
2-166 Wrmld	20/1	15		0.54			1		16	20/1	2-166 Wrmld
2-166 Wrmld	20/1	17			0.36			0.5	18	20/1	2-166 Manifold
2-166 OHSC	20/1	19	0.54			1			20	30/3	2-166 Wrmld
2-166 OHSC	20/1	21		0.36			1		22	|	|
2-166 OHSC	20/1	23			0.5			1	24	|	|
2-166 OHSC	30/2	25	1			1			26	30/3	2-166 Wrmld
|	|	27		1			1	28	|	|
Spare	20/1	29						1	30	|	|
Spare	20/1	31				1			32	30/3	2-166 Wrmld
Spare	20/1	33					1		34	|	|
Spare	20/1	35						1	36	|	|
Spare	20/1	37							38	20/1	Spare
Spare	20/1	39							40	20/1	Spare
Spare	20/1	41							42	20/1	Spare
										Recep(R):	23.1 kVA
Left Side Subtotal			3.1	2.9	1.7					Continuous(C):	0.5 kVA
Right Side Subtotal			5.5	5.5	4.9					Non-continuous(N):	0.0 kVA
Total Load per Phase			8.6	8.4	6.6					Total Connected Load:	23.6 kVA
										Total Demand Load (D):	17.1 kVA

3 Phase Panelboard Schedule

Panel Designation: N2B Floor: SECOND Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 10 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
2-164 Hood	20/1	1	1			0.5			2	20/1	2-164 Wrmld
2-164 Hood	20/1	3		1			0.5		4	20/1	2-164 Wrmld
2-164 Wrmld	20/1	5			0.54			1	6	30/2	2-164 Wrmld
2-164 Wrmld	20/1	7	0.54			1			8	|	|
2-164 Wrmld	20/1	9		0.54			0.5		10	20/1	2-164 Wrmld
2-164 Wrmld	20/1	11			0.54			0.5	12	20/1	2-164 Wrmld
2-164 OHSC	20/1	13	0.5			0.5			14	20/1	2-164 Wrmld
2-164 OHSC	20/1	15		0.54			0.5		16	20/1	2-164 Wrmld
2-164 OHSC	20/1	17			0.5			0.5	18	20/1	2-164 Manifold
2-164 OHSC	20/1	19	0.5			0.5			20	20/1	2-164 Water Polisher
2-164 OHSC	30/2	21		1			1		22	30/3	2-164 Wrmld
|	|	23			1			24	|	|
2-164 OHSC	30/2	25	1			1			26	|	|
|	|	27		1			1	28	30/3	2-164 Wrmld
2-164 OHSC	20/1	29						1	30	|	|
2-164 OHSC	20/1	31	0.54			1			32	|	|
2-164 OHSC	20/1	33		0.5			1		34	30/3	2-164 Wrmld
2-164 OHSC	20/1	35			0.5			1	36	|	|
Spare	20/1	37				1			38	|	|
Spare	20/1	39							40	20/1	Spare
Spare	20/1	41							42	20/1	Spare
										Recep(R):	24.2 kVA
Left Side Subtotal			4.1	4.6	3.6					Continuous(C):	3.0 kVA
Right Side Subtotal			5.5	4.5	5.0					Non-continuous(N):	0.0 kVA
Total Load per Phase			9.6	9.1	8.6					Total Connected Load:	27.2 kVA
										Total Demand Load (D):	20.1 kVA

3 Phase Panelboard Schedule

Panel Designation: N2C Floor: SECOND Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 10 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
2-162 Hood	20/1	1	1			1			2	20/1	2-162 Wrmld
2-162 Hood	20/1	3		1			1		4	30/2	2-162 Wrmld
2-162 Hood	20/1	5			1			1	6	|	|
2-162 Hood	20/1	7	1			1			8	20/1	2-162 Wrmld
2-162 Hood	20/1	9		1			0.54		10	20/1	2-162 OHSC
2-162 Hood	20/1	11			1			0.54	12	20/1	2-162 OHSC
2-162 OHSC	20/1	13	0.5			1			14	30/2	2-162 OHSC
2-162 OHSC	20/1	15		0.54			1		16	|	|
2-162 OHSC	20/1	17			0.5			0.2	18	20/1	2-162 Manifold
2-162 OHSC	20/1	19	0.5			0.5			20	20/1	2-162 Water Polisher
2-162 OHSC	30/2	21		1			0.54		22	20/1	2-162 Wrmld
|	|	23			1		0.2	24	20/1	2-162 Manifold
2-162 OHSC	20/1	25	0.54			0.2			26	20/1	2-162 Manifold
2-162 OHSC	30/2	27		1					28	20/1	Spare
|	|	29			1			30	20/1	Spare
2-162 OHSC	20/1	31	1						32	20/1	Spare
2-162 OHSC	20/1	33		1					34	20/1	Spare
Spare	20/1	35							36	20/1	Spare
Spare	20/1	37							38	20/1	Spare
Spare	20/1	39							40	20/1	Spare
Spare	20/1	41							42	20/1	Spare
										Recep(R):	16.6 kVA
Left Side Subtotal			4.5	5.5	4.5					Continuous(C):	6.7 kVA
Right Side Subtotal			3.7	3.1	1.9					Non-continuous(N):	0.0 kVA
Total Load per Phase			8.2	8.6	6.4					Total Connected Load:	23.3 kVA
										Total Demand Load (D):	20.0 kVA

3 Phase Panelboard Schedule

Panel Designation: N2D Floor: SECOND Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 10 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
2-175 Wrmld	20/1	1	1						2	20/1	Spare
2-175 Wrmld	20/1	3		1					4	20/1	Spare
2-175 Wrmld	30/2	5			1				6	|	|
|	|	7	1					8	20/1	Spare
2-175 Wrmld	20/1	9		1					10	20/1	Spare
2-175 Wrmld	20/1	11			1				12	20/1	Spare
2-175 Wrmld	20/1	13	1						14	20/1	Spare
2-175 Wrmld	20/1	15		1					16	20/1	Spare
2-175 Wrmld	20/1	17			1				18	20/1	Spare
2-175 Wrmld	20/1	19	1						20	20/1	Spare
2-175 Wrmld	30/2	21		1					22	20/1	Spare
|	|	23		1				24	20/1	Spare
2-175 Wrmld	20/1	25	0.5						26	20/1	Spare
Spare	20/1	27							28	20/1	Spare
Spare	20/1	29							30	20/1	Spare
Spare	20/1	31							32	20/1	Spare
Spare	20/1	33							34	20/1	Spare
Spare	20/1	35							36	20/1	Spare
Spare	20/1	37							38	20/1	Spare
Spare	20/1	39							40	20/1	Spare
Spare	20/1	41							42	20/1	Spare
										Recep(R):	12.5 kVA
Left Side Subtotal			4.5	4.0	4.0					Continuous(C):	0.0 kVA
Right Side Subtotal			0.0	0.0	0.0					Non-continuous(N):	0.0 kVA
Total Load per Phase			4.5	4.0	4.0					Total Connected Load:	12.5 kVA
										Total Demand Load (D):	11.3 kVA

3 Phase Panelboard Schedule

Panel Designation: N2E Floor: SECOND Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 10 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
2-171 Wrmld	20/1	1	0.36			1			2	30/3	2-171B Disc Sw
2-171 Wrmld	20/1	3		1			1		4	|	|
2-171 Wrmld	20/1	5			1			1	6	|	|
2-171 Wrmld	30/2	7	1			1			8	20/1	2-171B Wrmld
|	|	9		1		1		10	30/2	2-171B Wrmld
2-171 Wrmld	20/1	11			1			1	12	|	|
2-171 Wrmld	20/1	13	1			1			14	20/1	2-171B Wrmld
2-171 Wrmld	30/2	15		1			1		16	20/1	2-171B Wrmld
|	|	17			1			1	18	30/2	2-171B Wrmld
2-171 OHSC	20/1	19	0.54			1			20	|	|
2-171 OHSC	20/1	21		0.54			1		22	20/1	2-171 Wrmld
2-171 OHSC	30/2	23			1			1	24	20/1	2-171 Wrmld
|	|	25	1						26	20/1	Spare
2-171 OHSC	30/2	27		1					28	20/1	Spare
|	|	29			1				30	20/1	Spare
Spare	20/1	31							32	20/1	Spare
Spare	20/1	33							34	20/1	Spare
Spare	20/1	35							36	20/1	Spare
Spare	20/1	37							38	20/1	Spare
Spare	20/1	39							40	20/1	Spare
Spare	20/1	41							42	20/1	Spare
										Recep(R):	22.4 kVA
Left Side Subtotal			3.9	4.5	5.0					Continuous(C):	0.0 kVA
Right Side Subtotal			4.0	4.0	4.0					Non-continuous(N):	3.0 kVA
Total Load per Phase			7.9	8.5	9.0					Total Connected Load:	25.4 kVA
										Total Demand Load (D):	19.2 kVA

3 Phase Panelboard Schedule

Panel Designation: N2F Floor: SECOND Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 10 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
2-171 Wrmld	20/1	1	0.36			1			2	20/1	2-171 Wrmld
2-171 Wrmld	20/1	3		0.36			0.5		4	20/1	2-171 Wrmld
2-171 Wrmld	30/2	5			1			1	6	30/2	2-171 Wrmld
|	|	7	1			1			8	|	|
2-171 Wrmld	20/1	9		0.54			0.54		10	20/1	2-171 OHSC
2-171 Wrmld	20/1	11			0.54			0.5	12	20/1	2-171 OHSC
2-171 OHSC	20/1	13	0.5			0.5			14	20/1	2-171 OHSC
2-171 OHSC	20/1	15		0.54			0.54		16	20/1	2-171 OHSC
2-171 OHSC	20/1	17			0.36			0.5	18	20/1	2-171 OHSC
2-171 OHSC	20/1	19	0.54			0.5			20	20/1	2-171 OHSC
2-171 OHSC	20/1	21		0.54			1		22	30/2	2-171 OHSC
2-171 OHSC	30/2	23			1			1	24	|	|
|	|	25	1					26	20/1	Spare
2-171 OHSC	20/1	27		0.36					28	20/1	Spare
2-171A Hood	20/1	29			1				30	20/1	Spare
2-171A Wrmld	20/1	31	0.54						32	20/1	Spare
2-171A Wrmld	20/1	33		0.54					34	20/1	Spare
2-171A Wrmld	20/1	35			0.36				36	20/1	Spare
2-171A Wrmld	30/2	37	1						38	20/1	Spare
|	|	39		1				40	20/1	Spare
Spare	20/1	41							42	20/1	Spare
										Recep(R):	21.7 kVA
Left Side Subtotal			4.9	3.9	4.3					Continuous(C):	0.0 kVA
Right Side Subtotal			3.0	2.6	3.0					Non-continuous(N):	0.0 kVA
Total Load per Phase			7.9	6.5	7.3					Total Connected Load:	21.7 kVA
										Total Demand Load (D):	15.8 kVA

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I hereby certify that this plan or drawing was prepared by me or under my direct supervision and that I am a duly licensed ELECTRICAL ENGINEER under the laws of the State of Minnesota.
For AFFILIATED ENGINEERS, INC.
By
Name RONALD M. PARSLEY
Date 02-24-2012 Reg. No. 25163

Issued for	Date
100% CD set	12-16-2011
Bid Package No. 2	02-24-2012
Project Directive No. 3	05-11-2012

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Checked SDM
Date 12/16/11

Project

Physics and Nanotechnology Building

U of M Project # 01-155-08-1718

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ELECTRICAL PANEL SCHEDULES

e9.07

3 Phase Panelboard Schedule

Panel Designation: RP2A Floor: SECOND Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 14 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus
Panel is a 1 section, 72 pole panel

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
2-152 Repts	20/1	1	1.08			0.72			2	20/1	2-157 Repts
2-152 Repts	20/1	3		1.08			0.72		4	20/1	2-157 Repts
2-152 Repts	20/1	5			1.08			0.72	6	20/1	2-157 Repts
2-146 Repts	20/1	7	1.08			0.36			8	20/1	2-157 Repts
2-146 Repts	20/1	9		0.54			0.36		10	20/1	2-157 Repts
2-146A Repts	20/1	11			0.9			0.36	12	20/1	2-157 Repts
2-146A Repts	20/1	13	0.9			0.36			14	20/1	2-157 Repts
2-144 Repts	20/1	15		0.9			0.36		16	20/1	2-157 Repts
2-144 Repts	20/1	17			0.54			0.36	18	20/1	2-157 Repts
2-144 Repts	20/1	19	0.9			0.36			20	20/1	2-157 Repts
2-142 Repts	20/1	21		0.72			0.36		22	20/1	2-157 Repts
2-142 Repts	20/1	23			0.72			0.54	24	20/1	2-159 Repts
2-142 Repts	20/1	25	0.54			0.36			26	20/1	2-105 Repts
2-140 Repts	20/1	27		0.72			0.9		28	20/1	2-105 Repts
2-140 Repts	20/1	29			0.72			0.36	30	20/1	2-141 Repts
2-140 Repts	20/1	31	0.54						32	20/1	Spare
Spare	20/1	33							34	20/1	Spare
Spare	20/1	35							36	20/1	Spare
Spare	20/1	37							38	20/1	Spare
Spare	20/1	39							40	20/1	Spare
Spare	20/1	41							42	20/1	Spare
											Recep(R): 20.2 kVA
Left Side Subtotal			5.0	4.0	4.0						Continuous(C): 0.0 kVA
Right Side Subtotal			2.2	2.7	2.3						Non-continuous(N): 0.0 kVA
Total Load per Phase			7.2	6.7	6.3						Total Connected Load: 20.2 kVA
											Total Demand Load (D): 15.1 kVA

3 Phase Panelboard Schedule

Panel Designation: RP2A Floor: SECOND Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 14 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus
Panel is a 1 section, 72 pole panel

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
2-160 HK Repts	20/2	43	0.18						44	20/1	Spare
		45		0.18					46	20/1	Spare
2-170 HK Repts	20/2	47			0.18				48	20/1	Spare
		49	0.18						50	20/1	Spare
2-140 HK Repts	20/2	51		0.18			0.1		52	20/1	Dampers
		53			0.18			0.2	54	20/1	Dampers
2-100, 2-140 HK Repts	20/2	55	0.18			0.2			56	20/1	Dampers
		57		0.18			0.29		58	15/3	FCU-8
2-100 HK Repts	20/2	59			0.18			0.29	60	|	|
	|	61	0.18			0.29			62	|	|
2-158 Repts	20/1	63		0.36			0.29		64	15/3	FCU-9
Spare	20/1	65						0.29	66	|	|
Spare	20/1	67				0.29			68	|	|
Spare	20/1	69							70	20/1	Spare
Spare	20/1	71							72	20/1	Spare
											Recep(R): 2.2 kVA
Left Side Subtotal			0.7	0.9	0.5						Continuous(C): 1.7 kVA
Right Side Subtotal			0.8	0.7	0.8						Non-continuous(N): 0.5 kVA
Total Load per Phase			1.5	1.6	1.3						Total Connected Load: 4.4 kVA
											Total Demand Load (D): 4.4 kVA

3 Phase Panelboard Schedule

Panel Designation: RP2B Floor: SECOND Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 10 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus
Panel is a 1 section, 72 pole panel

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
2-136 Repts	20/1	1	0.9			0.18			2	20/1	2-125 Repts
2-136 Repts	20/1	3		0.9			1.08		4	20/1	2-125 Repts
2-134 Repts	20/1	5			0.72			1.08	6	20/1	2-125 Repts
2-132 Repts	20/1	7	1.08			1.26			8	20/1	2-125 Repts
2-128 Repts	20/1	9		0.72			0.72		10	20/1	2-121 Repts
2-126 Repts	20/1	11			0.72			0.54	12	20/1	2-121 Repts
2-124 Repts	20/1	13	1.08			1.08			14	20/1	2-117 Repts
2-122 Repts	20/1	15		0.72			1.08		16	20/1	2-117 Repts
2-118 Repts	20/1	17			1.08			0.9	18	20/1	2-117 Repts
2-116 Repts	20/1	19	0.72			0.18			20	20/1	2-110 Repts
2-114 Repts	20/1	21		0.54			0.18		22	20/1	2-110 Repts
2-112 Repts	20/1	23			0.72			0.18	24	20/1	2-110 Repts
2-112 Repts	20/1	25	0.54			0.54			26	20/1	2-110 Repts
2-112 Repts	20/1	27		0.72			0.36		28	20/1	2-111 Repts
2-108 Repts	20/1	29			1.08			0.5	30	20/1	2-111 Repts
2-108 Repts	20/1	31	1.08			0.5			32	20/1	2-110 Garbage Disp.
2-108 Repts	20/1	33		0.9			0.36		34	20/1	2-107 Rcpt
2-135 Repts	20/1	35			1.08			0.5	36	20/1	2-107 Projector
2-135 Repts	20/1	37	1.08			0.3			38	20/1	2-107 Shades
2-135 Repts	20/1	39		1.08			0.18		40	20/1	2-107 AV Rcpt
2-131 Repts	20/1	41			0.72				42	20/1	Spare
											Recep(R): 28.6 kVA
Left Side Subtotal			6.5	5.6	6.1						Continuous(C): 0.0 kVA
Right Side Subtotal			4.0	4.0	3.7						Non-continuous(N): 1.3 kVA
Total Load per Phase			10.5	9.5	9.8						Total Connected Load: 29.9 kVA
											Total Demand Load (D): 20.6 kVA

3 Phase Panelboard Schedule

Panel Designation: RP2B Floor: SECOND Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 10 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus
Panel is a 1 section, 72 pole panel

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
2-120 HK Repts	20/2	43	0.36						44	20/1	Spare
		45		0.36					46	20/1	Spare
2-120 HK Repts	20/2	47			0.36				48	20/1	Spare
		49	0.36						50	20/1	Spare
2-120 HK Repts	20/2	51		0.18					52	20/1	Spare
		53			0.18				54	20/1	Spare
2-100A Repts	20/1	55	1.2						56	20/1	Spare
2-100A Repts	20/1	57		1.08					58	20/1	Spare
2-100A Repts	20/1	59			1.08				60	20/1	Spare
Spare	20/1	61							62	20/1	Spare
Spare	20/1	63							64	20/1	Spare
Spare	20/1	65							66	20/1	Spare
Spare	20/1	67							68	20/1	Spare
Spare	20/1	69							70	20/1	Spare
Spare	20/1	71							72	20/1	Spare
											Recep(R): 5.2 kVA
Left Side Subtotal			1.9	1.6	1.6						Continuous(C): 0.0 kVA
Right Side Subtotal			0.0	0.0	0.0						Non-continuous(N): 0.0 kVA
Total Load per Phase			1.9	1.6	1.6						Total Connected Load: 5.2 kVA
											Total Demand Load (D): 5.2 kVA

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I hereby certify that this plan or drawing was prepared by me or under my direct supervision and that I am a duly licensed ELECTRICAL ENGINEER under the laws of the State of Minnesota.

For AFFILIATED ENGINEERS, INC.

By

Name RONALD M. PARSLEY

Date 02-24-2012 Reg. No. 25163

Issued for	Date
100% CD set	12-16-2011
Bid Package No. 2	02-24-2012

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Date 12/16/11

Project

Physics and Nanotechnology Building

U of M Project # 01-155-08-1718

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ELECTRICAL PANEL SCHEDULES

e9.08

3 Phase Panelboard Schedule

Panel Designation: N1A Floor: FIRST Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 10 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
1-177 Hood	20/1	1	1						2	20/1	Spare
1-177 Wrmld	20/1	3		0.36					4	20/1	Spare
1-177 Wrmld	20/1	5			0.36				6	20/1	Spare
1-177 Wrmld	20/1	7	0.54						8	30/2	Spare
1-177 Wrmld	20/1	9		0.36					10	|	|
1-177 Wrmld	30/2	11			1				12	20/1	Spare
|	|	13	1					14	20/1	Spare
1-177 Wrmld	20/1	15		0.5					16	20/1	Spare
1-177 Wrmld	30/3	17			1				18	20/1	Spare
|	|	19	1					20	20/1	Spare
|	|	21		1				22	20/1	Spare
1-177 Wrmld	20/1	23			0.36				24	20/1	Spare
1-177 Wrmld	20/1	25	0.5						26	20/1	Spare
1-177 Wrmld	20/1	27		0.5					28	20/1	Spare
Spare	20/1	29							30	20/1	Spare
Spare	20/1	31							32	20/1	Spare
Spare	20/1	33							34	20/1	Spare
Spare	20/1	35							36	20/1	Spare
Spare	20/1	37							38	20/1	Spare
Spare	20/1	39							40	20/1	Spare
Spare	20/1	41							42	20/1	Spare
											Recep(R): 8.5 kVA
Left Side Subtotal			4.0	2.7	2.7						Continuous(C): 1.0 kVA
Right Side Subtotal			0.0	0.0	0.0						Non-continuous(N): 0.0 kVA
Total Load per Phase			4.0	2.7	2.7						Total Connected Load: 9.5 kVA
											Total Demand Load (D): 9.5 kVA

3 Phase Panelboard Schedule

Panel Designation: N1B Floor: FIRST Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 10 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
Spare	20/1	1				1			2	20/1	1-175 Hood
Spare	20/1	3					0.36		4	20/1	1-175 Wrmld
Spare	20/1	5						0.36	6	20/1	1-175 Wrmld
Spare	20/1	7				0.72			8	20/1	1-175 Wrmld
Spare	20/1	9					0.36		10	20/1	1-175 Wrmld
Spare	30/2	11						1	12	30/2	1-175 Wrmld
|	|	13			1			14	|	|	
Spare	20/1	15					1		16	20/1	1-175 Wrmld
Spare	30/3	17						1	18	30/3	1-175 Wrmld
|	|	19			1			20	|	|	
|	|	21				0.5		22	|	|	
Spare	20/1	23						0.36	24	20/1	1-175 Wrmld
Spare	30/2	25				0.5			26	20/1	1-175 Wrmld
|	|	27				0.5			28	20/1	1-175 Wrmld
Spare	20/1	29							30	20/1	Spare
Spare	20/1	31							32	20/1	Spare
Spare	20/1	33							34	20/1	Spare
Spare	20/1	35							36	20/1	Spare
Spare	20/1	37							38	20/1	Spare
Spare	20/1	39							40	20/1	Spare
Spare	20/1	41							42	20/1	Spare
											Recep(R): 8.7 kVA
Left Side Subtotal			0.0	0.0	0.0						Continuous(C): 1.0 kVA
Right Side Subtotal			4.2	2.7	2.7						Non-continuous(N): 0.0 kVA
Total Load per Phase			4.2	2.7	2.7						Total Connected Load: 9.7 kVA
											Total Demand Load (D): 9.7 kVA

3 Phase Panelboard Schedule

Panel Designation: N1C Floor: FIRST Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 10 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
1-173 Hood	20/1	1	1						2	20/1	Spare
1-173 Wrmld	20/1	3		0.36					4	20/1	Spare
1-173 Wrmld	20/1	5			0.36				6	20/1	Spare
1-173 Wrmld	20/1	7	0.54						8	30/2	Spare
1-173 Wrmld	20/1	9		0.36					10	|	|
1-173 Wrmld	30/2	11			1				12	20/1	Spare
|	|	13	1					14	20/1	Spare
1-173 Wrmld	20/1	15		0.5					16	20/1	Spare
1-173 Wrmld	30/3	17			1				18	20/1	Spare
|	|	19	1					20	20/1	Spare
|	|	21		1				22	20/1	Spare
1-173 Wrmld	20/1	23			0.36				24	20/1	Spare
1-173 Wrmld	20/1	25	0.5						26	20/1	Spare
1-173 Wrmld	20/1	27		0.5					28	20/1	Spare
Spare	20/1	29							30	20/1	Spare
Spare	20/1	31							32	20/1	Spare
Spare	20/1	33							34	20/1	Spare
Spare	20/1	35							36	20/1	Spare
Spare	20/1	37							38	20/1	Spare
Spare	20/1	39							40	20/1	Spare
Spare	20/1	41							42	20/1	Spare
											Recep(R): 8.5 kVA
Left Side Subtotal			4.0	2.7	2.7						Continuous(C): 0.0 kVA
Right Side Subtotal			0.0	0.0	0.0						Non-continuous(N): 1.0 kVA
Total Load per Phase			4.0	2.7	2.7						Total Connected Load: 9.5 kVA
											Total Demand Load (D): 9.5 kVA

3 Phase Panelboard Schedule

Panel Designation: N1D Floor: FIRST Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 10 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
Spare	20/1	1				1			2	20/1	1-171 Hood
Spare	20/1	3					1		4	20/1	1-171 BSC
Spare	20/1	5						0.54	6	20/1	1-171 Wrmld
Spare	20/1	7				0.36			8	20/1	1-171 Wrmld
Spare	20/1	9					0.54		10	20/1	1-171 Wrmld
Spare	20/1	11						0.54	12	20/1	1-171 Wrmld
Spare	20/1	13				1			14	30/2	1-171 Wrmld
Spare	20/1	15					1		16	|	|
Spare	20/1	17						0.54	18	20/1	1-171 Wrmld
Spare	20/1	19				0.36			20	20/1	1-171 Wrmld
Spare	20/1	21					1		22	30/3	1-171 Wrmld
Spare	20/1	23						1	24	|	|
Spare	20/1	25				1			26	|	|
Spare	20/1	27							28	20/1	Spare
Spare	20/1	29							30	20/1	Spare
Spare	20/1	31							32	20/1	Spare
Spare	20/1	33							34	20/1	Spare
Spare	20/1	35							36	20/1	Spare
Spare	20/1	37							38	20/1	Spare
Spare	20/1	39							40	20/1	Spare
Spare	20/1	41							42	20/1	Spare
											Recep(R): 8.9 kVA
Left Side Subtotal			0.0	0.0	0.0						Continuous(C): 1.0 kVA
Right Side Subtotal			3.7	3.5	2.6						Non-continuous(N): 0.0 kVA
Total Load per Phase			3.7	3.5	2.6						Total Connected Load: 9.9 kVA
											Total Demand Load (D): 9.9 kVA

3 Phase Panelboard Schedule

Panel Designation: N1E Floor: FIRST Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 10 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
166 Wrmld	20/1	1	0.54			1			2	30/3	1-162 Disc
166 Wrmld	20/1	3		0.54			1		4	|	|
166 Wrmld	20/1	5			0.54			1	6	|	|
166 Wrmld	20/1	7	0.36			1			8	30/2	1-162 Disc
166 Wrmld	20/1	9		0.36			1		10	|	|
166 Wrmld	20/1	11			0.36			1	12	30/2	1-162 Disc
166 Wrmld	20/1	13	0.36			1			14	|	|
166 Wrmld	20/1	15		0.36			1		16	30/3	1-162 Disc
166 Wrmld	20/1	17			0.36			1	18	|	|
Spare	20/1	19				1			20	|	|
Spare	20/1	21							22	20/1	Spare
Spare	20/1	23							24	20/1	Spare
Spare	20/1	25							26	20/1	Spare
Spare	20/1	27							28	20/1	Spare
Spare	20/1	29							30	20/1	Spare
Spare	20/1	31							32	20/1	Spare
Spare	20/1	33							34	20/1	Spare
Spare	20/1	35							36	20/1	Spare
Spare	20/1	37							38	20/1	Spare
Spare	20/1	39				0.87			40	15/1	UH-3
Spare	20/1	41						0.87	42	15/1	UH-4
											Recep(R): 3.8 kVA
Left Side Subtotal			1.3	1.3	1.3						Continuous(C): 1.7 kVA
Right Side Subtotal			4.0	3.9	3.9						Non-continuous(N): 10.0 kVA
Total Load per Phase			5.3	5.1	5.1						Total Connected Load: 15.5 kVA
											Total Demand Load (D): 15.5 kVA

3 Phase Panelboard Schedule

Panel Designation: N1F Floor: FIRST Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 10 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
1-162 Wrmld	20/1	1	0.54			1			2	30/3	1-162 Disc
1-162 Wrmld	20/1	3		0.54			1		4	|	|
1-162 Wrmld	20/1	5			0.54			1	6	|	|
1-162 Wrmld	20/1	7	0.54			1			8	30/2	1-162 Disc
1-162 Wrmld	20/1	9		0.54			1		10	|	|
1-162 Wrmld	20/1	11			0.54				12	20/1	Spare
1-162 Wrmld	20/1	13	0.18						14	20/1	Spare
1-162 Wrmld	20/1	15		0.18					16	20/1	Spare
1-162 Wrmld	20/1	17			0.18				18	20/1	Spare
Spare	20/1	19							20	20/1	Spare
Spare	20/1	21							22	20/1	Spare
Spare	20/1	23							24	20/1	Spare
Spare	20/1	25							26	20/1	Spare
Spare	20/1	27							28	20/1	Spare
Spare	20/1	29							30	20/1	Spare
Spare	20/1	31							32	20/1	Spare
Spare	20/1	33							34	20/1	Spare
Spare	20/1	35							36	20/1	Spare
Spare	20/1	37							38	20/1	Spare
Spare	20/1	39							40	20/1	Spare
Spare	20/1	41							42	20/1	Spare
											Recep(R): 3.8 kVA
Left Side Subtotal			1.3	1.3	1.3						Continuous(C): 0.0 kVA
Right Side Subtotal			2.0	2.0	1.0						Non-continuous(N): 5.0 kVA
Total Load per Phase			3.3	3.3	2.3						Total Connected Load: 8.8 kVA
											Total Demand Load (D): 8.8 kVA

3 Phase Panelboard Schedule

Panel Designation: N1G Floor: FIRST Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 10 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
1-162 Wrmld	20/1	1	0.54			1			2	30/3	1-162 Disc
1-162 Wrmld	20/1	3		0.54			1		4	|	|
1-162 Wrmld	20/1	5			0.54			1	6	|	|
1-162 Wrmld	20/1	7	0.54			1			8	30/2	1-162 Disc
1-162 Wrmld	20/1	9		0.54			1		10	|	|
1-162 Wrmld	20/1	11			0.54			1	12	60/2	1-162 OH Door
1-162 Rcpts	20/1	13	0.36			1			14	|	|
1-162 Cameras	20/1	15		0.3					16	20/1	Spare
Spare	20/1	17							18	20/1	Spare
Spare	20/1	19							20	20/1	Spare
Spare	20/1	21							22	20/1	Spare
Spare	20/1	23							24	20/1	Spare
Spare	20/1	25							26	20/1	Spare
Spare	20/1	27							28	20/1	Spare
Spare	20/1	29							30	20/1	Spare
Spare	20/1	31							32	20/1	Spare
Spare	20/1	33							34	20/1	Spare
Spare	20/1	35							36	20/1	Spare
Spare	20/1	37							38	20/1	Spare
Spare	20/1	39							40	20/1	Spare
Spare	20/1	41							42	20/1	Spare
											Recep(R): 3.6 kVA
Left Side Subtotal			1.4	1.4	1.1						Continuous(C): 0.3 kVA
Right Side Subtotal			3.0	2.0	2.0						Non-continuous(N): 7.0 kVA
Total Load per Phase			4.4	3.4	3.1						Total Connected Load: 10.9 kVA
											Total Demand Load (D): 10.9 kVA

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I hereby certify that this plan or drawing was prepared by me or under my direct supervision and that I am a duly licensed ELECTRICAL ENGINEER under the laws of the State of Minnesota.

For AFFILIATED ENGINEERS, INC.

By

Name RONALD M. PARSLEY

Date 02-24-2012 Reg. No. 25163

Issued for	Date
100% CD set	12-16-2011
Bid Package No. 2	02-24-2012
Project Directive No. 3	05-11-2012

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Drawn MM

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Date 12/16/11

Project

Physics and Nanotechnology Building

U of M Project # 01-155-08-1718

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ELECTRICAL PANEL SCHEDULES

3 Phase Panelboard Schedule

Panel Designation: RP1A Floor: FIRST Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 10 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus
Provide feed through lugs to section 2

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
1-156 Rcpts	20/1	1	0.72			1.08			2	20/1	1-158 Recpt
1-156 Rcpts	20/1	3		0.72			0.72		4	20/1	1-158 Recpt
1-156 Rcpts	20/1	5			0.72			0.72	6	20/1	1-158 Recpt
1-153 Rcpts	20/1	7	0.9			0.36			8	20/1	1-158 Recpt
1-151 Rcpts	20/1	9		0.9			0.36		10	20/1	1-158 Recpt
1-147 Rcpts	20/1	11			0.9			0.36	12	20/1	1-158 Recpt
1-145 Rcpts	20/1	13	0.9			0.36			14	20/1	1-158 Recpt
1-143 Rcpts	20/1	15		0.9			0.36		16	20/1	1-158 Recpt
1-152 Rcpts	20/1	17			0.72			0.36	18	20/1	1-158 Recpt
1-152 Rcpts	20/1	19	0.72			0.36			20	20/1	1-158 Recpt
1-152 Rcpts	20/1	21		0.72			0.36		22	20/1	1-158 Recpt
1-152 Rcpts	20/1	23			0.54			0.54	24	20/2	1-160 HK Rcpts
1-148 Rcpts	20/1	25	0.9			0.54			26	|	|
1-146 Rcpts	20/1	27		1.08			0.54		28	20/2	1-160 HK Rcpts
1-144 Rcpts	20/1	29			1.08			0.54	30	|	|
1-142 Rcpts	20/1	31	0.7			0.36			32	20/1	1-166 Rcpts
1-140 Rcpts	20/1	33		0.9			0.36		34	20/1	1-166 Rcpts
1-140A Rcpts	20/1	35			0.5			0.8	36	20/1	1-166 OH Door
1-140A Rcpts	20/1	37	0.5			0.8			38	20/1	1-166 OH Door
1-140A Rcpts	20/1	39		0.5				40	20/1	1-166 Dock Leveler
1-140A Rcpts	20/1	41			0.5			0.2	42	20/1	1-164 Scale
											Recep(R): 22.3 kVA
Left Side Subtotal			5.3	5.7	5.0						Continuous(C): 0.0 kVA
Right Side Subtotal			3.9	2.7	3.5						Non-continuous(N): 3.8 kVA
Total Load per Phase			9.2	8.4	8.5						Total Connected Load: 26.1 kVA
											Total Demand Load (D): 20.0 kVA

3 Phase Panelboard Schedule

Panel Designation: RP1A Floor: FIRST Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 10 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus
Section 2. * Provide 30mA GFCI breaker for heat trace circuits

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
1-17A Doors	20/1	43	0.5			0.36			44	30/2	1-150 HK Rcpts
1-168 Door	20/1	45		0.5			0.36		46	|	|
1-163 Rcpts	20/1	47			0.5			0.36	48	30/2	1-154 HK Rcpts
1-105 Rcpts	20/1	49	0.36			0.36			50	|	|
1-105 Doors	20/1	51		0.5			0.36		52	30/2	1-170 HK Rcpts
1-105 wtr cooler	20/1	53			0.5			0.36	54	|	|
UH-1	15/1	55	0.87			0.2			56	20/1	Dampers
UH-2	15/1	57		0.87			1.18		58	20/1	Sprinkler Comp.
FCU-14	20/1	59			0.87			0.27	60	15/1	CUH-3
FCU-6	15/3	61	0.29			0.12			62	15/1	CUH-4
|	|	63		0.29			0.12	64	15/1	CUH-5
|	|	65			0.29			0.42	66	15/3	FCU-24
FCU-7	15/3	67	0.29			0.42			68	|	|
|	|	69		0.29			0.42		70	|	|
|	|	71			0.29			0.18	72	20/1	N Exterior Rcpt
1-159 Rcpts	20/1	73	0.36					0.5	74	20/1	1-166 Cameras
LN2 Tank Exterior	20/1	75		0.5			0.18		76	20/1	Sprinkler Ctrl
Site Heat Trace	30/1*	77			0.5			0.2	78	20/1	Sprinkler Ctrl
Door 1-166 Security	20/1	79	0.5			0.2			80	20/1	Sprinkler Ctrl
Spare	20/1	81					0.2		82	20/1	Sprinkler Ctrl
Spare	20/1	83						0.2	84	20/1	Sprinkler Ctrl
											Recep(R): 4.9 kVA
Left Side Subtotal			3.2	3.0	3.0						Continuous(C): 8.3 kVA
Right Side Subtotal			2.2	2.8	2.0						Non-continuous(N): 2.9 kVA
Total Load per Phase			5.3	5.8	4.9						Total Connected Load: 16.0 kVA
											Total Demand Load (D): 16.0 kVA

3 Phase Panelboard Schedule

Panel Designation: RP1B Floor: FIRST Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 10 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus
* Provide 30mA GFCI breaker for heat trace circuits

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
1-102 Rcpts	20/1	1	0.72			0.36			2	20/2	1-100 HK Rcpts
1-102 Rcpts	20/1	3		0.72			0.36		4	|	|
1-102 Rcpts	20/1	5			0.36			0.36	6	20/2	1-100 HK Rcpts
1-102 Floor Box	20/1	7	0.72			0.36			8	|	|
1-102 Floor Box	20/1	9		0.72			0.36		10	20/1	1-108 Rcpts
1-102 Projector	20/1	11			0.5			0.36	12	20/1	1-108 Floor Box
1-102 Shades	20/1	13	0.5			0.36			14	20/1	1-108 Floor Box
1-102 Screen	20/1	15		0.5			0.5		16	20/1	1-108 Projector
1-104B Rcpts	20/1	17			0.36			0.54	18	20/1	1-108 Rcpts
1-104B Rcpts	20/1	19	0.36			0.72			20	20/1	1-108 Rcpts
1-104 Vending	20/1	21		0.5			0.5		22	20/1	1-108 Shades
1-104 Vending	20/1	23			0.5			0.18	24	20/1	1-107 A V Rcpt
1-106 Rcpts	20/1	25	0.36			0.5			26	20/1	1-100A Door
1-106 Floor Box	20/1	27		0.36			0.5		28	20/1	1-100B Door
1-106 Floor Box	20/1	29			0.36			1	30	30/1*	1-100A Heat Trace
1-106 Projector	20/1	31	0.5			1			32	30/1*	1-100B Heat Trace
1-106 Rcpts	20/1	33		0.54			0.54		34	20/1	Bench 1-100
1-106 Rcpts	20/1	35			0.72			0.5	36	20/1	Exterior Rcp/Camera
1-106 Shades	20/1	37	0.5			0.42			38	15/3	FCU-19
1-102 A V Rcpt	20/1	39		0.18			0.42		40	|	|
1-106 A V Rcpt	20/1	41			0.18			0.42	42	|	|
											Recep(R): 14.7 kVA
Left Side Subtotal			3.7	3.5	3.0						Continuous(C): 2.3 kVA
Right Side Subtotal			3.7	3.2	3.4						Non-continuous(N): 3.5 kVA
Total Load per Phase			7.4	6.7	6.3						Total Connected Load: 20.4 kVA
											Total Demand Load (D): 18.1 kVA

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I hereby certify that this plan or drawing was prepared by me or under my direct supervision and that I am a duly licensed ELECTRICAL ENGINEER under the laws of the State of Minnesota.
For AFFILIATED ENGINEERS, INC.
By
Name RONALD M. PARSLEY
Date 02-24-2012 Reg. No. 25163

Issued for	Date
100% CD set	12-16-2011
Bid Package No. 2	02-24-2012
Project Directive No. 3	05-11-2012

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Checked SDM
Date 12/16/11

Project

Physics and Nanotechnology Building

U of M Project # 01-155-08-1718

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ELECTRICAL PANEL SCHEDULES

e9.10

3 Phase Panelboard Schedule

Panel Designation: NBA Floor: BASEMENT Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs: 225 A 22 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
B-168 Starline	150/3	1	1			1			2	60/3	B-168 Starline
|	|	3		1			1	4	|	|
|	|	5			1			1	6	|	|
Spare	20/1	7				1			8	30/2	B-168 Wrmld
Spare	20/1	9						1	10	|	|
Spare	30/2	11							0.36	12	20/1	B-168 Wrmld
|	|	13				0.36			14	20/1	B-168 Wrmld
Spare	20/1	15							16	20/1	Spare
Spare	30/3	17							18	20/1	Spare
|	|	19						20	20/1	Spare
|	|	21						22	20/1	Spare
Spare	20/1	23							24	20/1	Spare
Spare	20/1	25							26	20/1	Spare
Spare	20/1	27							28	20/1	Spare
Spare	20/1	29							30	20/1	Spare
Spare	20/1	31							32	20/1	Spare
Spare	20/1	33							34	20/1	Spare
Spare	20/1	35							36	20/1	Spare
Spare	20/1	37							38	20/1	Spare
Spare	20/1	39							40	20/1	Spare
Spare	20/1	41							42	20/1	Spare
											Recep(R): 8.7 kVA
Left Side Subtotal			1.0	1.0	1.0						Continuous(C): 0.0 kVA
Right Side Subtotal			2.4	2.0	1.4						Non-continuous(N): 0.0 kVA
Total Load per Phase			3.4	3.0	2.4						Total Connected Load: 8.7 kVA
											Total Demand Load (D): 8.7 kVA

3 Phase Panelboard Schedule

Panel Designation: NBB Floor: BASEMENT Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs: 225 A 22 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
B-168 Starline	150/3	1	1			1			2	60/3	B-168 Starline
|	|	3		1			1	4	|	|
|	|	5			1			1	6	|	|
B-168 Wrmld	20/1	7	0.36						8	20/1	Spare
B-168 Wrmld	20/1	9		0.36					10	20/1	Spare
B-168 Wrmld	30/2	11			1				12	30/2	Spare
|	|	13	1					14	|	|
Spare	20/1	15							16	20/1	Spare
Spare	30/3	17							18	20/1	Spare
|	|	19						20	|	|
|	|	21						22	|	|
Spare	20/1	23							24	20/1	Spare
Spare	30/2	25							26	20/1	Spare
|	|	27							28	20/1	Spare
Spare	20/1	29							30	20/1	Spare
Spare	20/1	31							32	20/1	Spare
Spare	20/1	33							34	20/1	Spare
Spare	20/1	35							36	20/1	Spare
Spare	20/1	37							38	20/1	Spare
Spare	20/1	39							40	20/1	Spare
Spare	20/1	41							42	20/1	Spare
											Recep(R): 8.7 kVA
Left Side Subtotal			2.4	1.4	2.0						Continuous(C): 0.0 kVA
Right Side Subtotal			1.0	1.0	1.0						Non-continuous(N): 0.0 kVA
Total Load per Phase			3.4	2.4	3.0						Total Connected Load: 8.7 kVA
											Total Demand Load (D): 8.7 kVA

3 Phase Panelboard Schedule

Panel Designation: NBC Floor: BASEMENT Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 14 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
B-164 Rcpts	20/1	1	0.36			0.18			2	20/1	Elev 2 Pit
B-164 Rcpts	20/1	3		0.36			0.54		4	20/1	Steam Tunnel Rcpts
B-164 Rcpts	20/1	5			0.36				6	30/3	Spare
B-164 Rcpts	20/1	7	0.36						8	|	|
B-162B Rcpt	20/1	9		0.18					10	|	|
B-162 Rcpts	20/1	11			0.36				12	20/1	Spare
Elev Lights	20/1	13	0.9						14	20/1	Spare
Spare	20/1	15							16	20/1	Spare
Spare	20/1	17							18	15/3	Spare
Spare	20/1	19							20	|	|
Spare	20/1	21							22	|	|
Spare	20/1	23						1	24	60/3	B-164 Welding
Spare	20/1	25				1			26	|	|
Spare	20/1	27					1		28	|	|
Spare	20/1	29							30	20/1	Spare
Spare	20/1	31				0.03			32	15/3	FCU-2
CP-2 (Two Mtrs)	30/1	33		1.73			0.29		34	|	|
Spare	20/1	35						0.29	36	|	|
Water Softener Ctrls	20/1	37	0.2						38	20/1	Spare
Air Dryer (AD-2)	20/1	39		0.5					40	20/1	Spare
Air Dryer (AD-1)	20/1	41			0.5				42	20/1	Spare
											Recep(R): 6.6 kVA
Left Side Subtotal			1.8	2.8	1.2						Continuous(C): 3.5 kVA
Right Side Subtotal			1.2	1.8	1.3						Non-continuous(N): 0.0 kVA
Total Load per Phase			3.0	4.6	2.5						Total Connected Load: 10.1 kVA
											Total Demand Load (D): 10.1 kVA

3 Phase Panelboard Schedule

Panel Designation: NBD Floor: BASEMENT Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 14 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
Spare	20/1	1							2	20/1	Spare
Spare	20/1	3							4	20/1	Spare
Spare	20/1	5						0.5	6	20/1	Motor 72 Starter
Spare	20/1	7							8	20/1	Spare
Spare	20/1	9							10	20/1	Spare
Spare	20/1	11							12	20/1	Spare
Spare	20/1	13							14	20/1	Spare
B-166A Rcpts	20/1	15		0.36					16	20/1	Spare
B-166A Rcpts	20/1	17			0.36			4	18	40/3	B-166 Disc
B-166A He Bag Ctrl	20/1	19	0.3			4			20	|	|
B-166 He Liq Ctrl	20/1	21		0.3			4		22	|	|
B-166 Rcpts	20/1	23			0.54				24	20/1	Space
B-166 Rcpts	20/1	25	0.54						26	20/1	Space
Space	20/1	27							28	20/1	Space
Space	20/1	29							30	20/1	Space
Space	20/1	31							32	20/1	Space
Space	30/1	33							34	20/1	Space
Space	20/1	35							36	20/1	Space
Space	20/1	37							38	20/1	Space
Space	20/1	39							40	20/1	Space
Space	20/1	41							42	20/1	Space
											Recep(R): 2.9 kVA
Left Side Subtotal			0.8	0.7	0.9						Continuous(C): 12.0 kVA
Right Side Subtotal			4.0	4.0	4.5						Non-continuous(N): 0.0 kVA
Total Load per Phase			4.8	4.7	5.4						Total Connected Load: 14.9 kVA
											Total Demand Load (D): 14.9 kVA

3 Phase Panelboard Schedule

Panel Designation: NBE Floor: BASEMENT Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 14 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
B-156 Wrmld	20/1	1	0.54			1			2	30/2	B-156 6-30R
B-156 CFM	20/1	3		0.5			1		4	|	|
B-156 Wrmld	20/1	5			1			1	6	30/2	B-156 6-30R
B-156 Wrmld	20/1	7	1			1			8	|	|
B-156 Wrmld	20/1	9		1					10	20/1	Spare
B-156 Wrmld	20/1	11			0.54				12	20/1	Spare
B-156 Wrmld	20/1	13	0.54						14	20/1	Spare
B-156 Wrmld	20/1	15		1					16	20/1	Spare
B-156 Wrmld	20/1	17			1				18	20/1	Spare
B-156 Wrmld	20/1	19	0.5						20	20/1	Spare
B-156 Wrmld	20/1	21		0.54					22	20/1	Spare
B-156 Wrmld	20/1	23			0.5				24	20/1	Spare
B-156 Wrmld	20/1	25	0.5						26	20/1	Spare
B-156 Wrmld	20/1	27		0.5					28	20/1	Spare
B-156 Wrmld	20/1	29			0.5				30	20/1	Spare
B-156 Wrmld	20/1	31	0.5						32	20/1	Spare
B-156 Wrmld	20/1	33		0.54					34	20/1	Spare
B-156 6-30R	30/2	35			2.8				36	20/1	Spare
|	|	37	2.8					38	20/1	Spare
B-156 6-30R	30/2	39		2.8					40	20/1	Spare
|	|	41			0.28				42	20/1	Spare
											Recep(R): 23.4 kVA
Left Side Subtotal			6.4	6.9	6.6						Continuous(C): 0.5 kVA
Right Side Subtotal			2.0	1.0	1.0						Non-continuous(N): 0.0 kVA
Total Load per Phase			8.4	7.9	7.6						Total Connected Load: 23.9 kVA
											Total Demand Load (D): 17.2 kVA

3 Phase Panelboard Schedule

Panel Designation: NBF Floor: BASEMENT Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 10 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
B-154A Wrmld	20/1	1	0.54						2	20/1	Spare
B-154A Wrmld	20/1	3		0.54					4	20/1	Spare
B-154 Wrmld	20/1	5			0.54				6	20/1	Spare
B-154 Wrmld	20/1	7	0.54						8	20/1	Spare
B-154 Wrmld	20/1	9		0.54					10	20/1	Spare
B-154 Wrmld	20/1	11			0.54				12	20/1	Spare
B-154 OHSC	20/1	13	0.54						14	20/1	Spare
B-154 OHSC	20/1	15		0.54					16	20/1	Spare
B-154 OHSC	20/1	17			0.54				18	20/1	Spare
B-154 6-30R	30/2	19	1						20	20/1	Spare
|	|	21		1				22	20/1	Spare
B-154 OHSC	20/1	23			0.54				24	20/1	Spare
B-154 OHSC	20/1	25	0.54						26	20/1	Spare
B-154 OHSC	20/1	27		0.54					28	20/1	Spare
B-154 OHSC	20/1	29			0.36				30	20/1	Spare
B-154 OHSC	20/1	31	0.36						32	20/1	Spare
B-154 6-30R	30/2	33		1					34	20/1	Spare
|	|	35			1			36	20/1	Spare
B-154 OHSC	20/1	37	0.36						38	20/1	Spare
B-154 OHSC	20/1	39		0.36					40	20/1	Spare
Spare	20/1	41							42	20/1	Spare
											Recep(R): 11.9 kVA
Left Side Subtotal			3.9	4.5	3.5						Continuous(C): 0.0 kVA
Right Side Subtotal			0.0	0.0	0.0						Non-continuous(N): 0.0 kVA
Total Load per Phase			3.9	4.5	3.5						Total Connected Load: 11.9 kVA
											Total Demand Load (D): 11.0 kVA

3 Phase Panelboard Schedule

Panel Designation: NBG Floor: BASEMENT Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 14 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
B-157A Wrmld	20/1	1	1			2.9			2	30/3	B-157 15-30R
B-157A Wrmld	20/1	3		1			2.9		4	|	|
B-157A Wrmld	20/1	5			1			2.9	6	|	|
B-157A Wrmld	20/1	7	0.86						8	30/3	Spare
B-157 Wrmld	20/1	9		1					10	|	|
B-157 Wrmld	20/1	11			0.68				12	|	|
B-157 Wrmld	20/1	13	0.54			2.5			14	30/2	B-157 6-30R
B-157 CFM	20/1	15		0.5			2.5		16	|	|
B-157 Wrmld	20/1	17			1			2.5	18	30/2	B-157 6-30R
B-157 Wrmld	20/1	19	1			2.5			20	|	|
B-157 Wrmld	20/1	21		1					22	20/1	Spare
B-157 Wrmld	20/1	23			1				24	20/1	Spare
B-157 Wrmld	20/1	25	1						26	20/1	Spare
B-157 Wrmld	20/1	27		1					28	20/1	Spare
B-157 Wrmld	20/1	29			0.86				30	20/1	Spare
B-157 Wrmld	20/1	31	1						32	20/1	Spare
B-157 Wrmld	20/1	33		1					34	20/1	Spare
B-157 Wrmld	20/1	35			0.5				36	20/1	Spare
B-157 Wrmld	20/1	37	0.68						38	20/1	Spare
B-157 Wrmld	20/1	39		0.54					40	20/1	Spare
Spare	20/1	41							42	20/1	Spare
											Recep(R): 35.9 kVA
Left Side Subtotal			6.1	6.0	5.0						Continuous(C): 0.0 kVA
Right Side Subtotal			7.9	5.4	5.4						Non-continuous(N): 0.0 kVA
Total Load per Phase			14.0	11.4	10.4						Total Connected Load: 35.9 kVA
											Total Demand Load (D): 22.9 kVA

3 Phase Panelboard Schedule

Panel Designation: NBH Floor: BASEMENT Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 10 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
B-102 Wrmld	20/1	1	0.54			0.54			2	20/1	B-102A Wrmld
B-102 CFH	20/1	3		0.5			2.5		4	30/2	B-102A 6-30R
B-102 Rcpt	20/1	5			0.18			2.5	6	|	|
B-102B Wrmld	20/1	7	1			1			8	20/2	B-102 208V Rcpt
B-102B Wrmld	20/1	9		1			1		10	|	|
B-102B Wrmld	20/1	11			1			1	12	20/2	B-102 208V Rcpt
B-102B Wrmld	20/1	13	1			1			14	|	|
B-102A Wrmld	20/1	15		1			1		16	20/3	B-102B 208V Rcpt
B-102A Wrmld	20/1	17			0.81			1	18	|	|
B-102A 15-30R	30/3	19	2.9			1			20	|	|
|	|	21	2.9			1		22	20/3	B-102B 208V Rcpt
|	|	23		2.9			1	24	|	|
B-102A Wrmld	20/1	25	0.54			1			26	|	|
B-102A 60A/3 FD	60/3	27		5.8			1		28	20/3	B-102B 208V Rcpt
|	|	29			5.8			1	30	|	|
|	|	31	5.8			1			32	|	|
B-102A Wrmld	20/1	33		1					34	20/1	Spare
B-102A Wrmld	20/1	35			0.5				36	20/1	Spare
B-102A 6-30r	30/2	37	2.5						38	20/1	Spare
|	|	39		2.5				40	20/1	Spare
B-102A Wrmld	20/1	41			0.54				42	20/1	Spare
											Recep(R): 59.2 kVA
Left Side Subtotal			14.3	14.7	11.7						Continuous(C): 0.0 kVA
Right Side Subtotal			5.5	6.5	6.5						Non-continuous(N): 0.0 kVA
Total Load per Phase			19.8	21.2	18.2						Total Connected Load: 59.2 kVA
											Total Demand Load (D): 34.6 kVA

3 Phase Panelboard Schedule

Panel Designation: NBI Floor: BASEMENT Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 14 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
B-153 Wrmld	20/1	1	0.54			1.9			2	20/3	B-153A 15-20R
B-153 Wrmld	20/1	3		0.54			1.9		4	|	|
B-153 Wrmld	20/1	5			0.36			1.9	6	|	|
B-153 Wrmld	20/1	7	0.36			1			8	20/1	B-153A Wrmld
B-153 Wrmld	20/1	9		0.54			1		10	20/1	B-153A Wrmld
B-153 Wrmld	20/1	11			0.5			1.9	12	20/3	B-153A 15-20R
B-153 Wrmld	20/1	13	1			1.9			14	|	|
B-153 Wrmld	20/1	15		1			1.9		16	|	|
B-153 6-30R	30/2	17			2.5			2.9	18	30/3	B-153A 15-30R
|	|	19	2.5			2.9			20	|	|
B-153 Wrmld	20/1	21		0.36			2.9		22	|	|
B-153 Wrmld	20/1	23			0.68			2.8	24	40/1	B-153 Cleanroom
B-153 Wrmld	20/1	25	0.54						26	20/1	Spare
B-153 LFH Rcpt	20/1	27		0.5					28	20/1	Spare
B-153 Wrmld	20/1	29			0.54				30	20/1	Spare
B-153 Wrmld	20/1	31	1						32	20/1	Spare
B-153A Wrmld	20/1	33		1					34	20/1	Spare
B-153A Wrmld	20/1	35			0.5				36	20/1	Spare
B-153A 15-20R	20/3	37	1.9						38	20/1	Spare
|	|	39		1.9				40	20/1	Spare
|	|	41			1.9				42	20/1	Spare
											Recep(R): 45.6 kVA
Left Side Subtotal			7.8	5.8	7.0						Continuous(C): 0.0 kVA
Right Side Subtotal			7.7	7.7	9.5						Non-continuous(N): 0.0 kVA
Total Load per Phase			15.5	13.5	16.5						Total Connected Load: 45.6 kVA
											Total Demand Load (D): 27.8 kVA

3 Phase Panelboard Schedule

Panel Designation: NBJ Floor: BASEMENT Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 10 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
B-154 Wrmld	20/1	1	0.36						2	20/1	Spare
B-154 Wrmld	20/1	3		0.36					4	20/1	Spare
B-154D Wrmld	20/1	5			0.54				6	20/1	Spare
B-154D Wrmld	20/1	7	0.36						8	20/1	Spare
B-154D 15-30R	30/3	9		1					10	20/1	Spare
|	|	11			1			12	20/1	Spare
|	|	13	1						14	20/1	Spare
B-154D 6-30R	30/2	15			2.8				16	20/1	Spare
|	|	17							18	20/1	Spare
B-154B BSC	20/1	19	0.8						20	20/1	Spare
B-154B Hood	20/1	21		1					22	20/1	Spare
B-154B Wrmld	20/1	23			0.36				24	20/1	Spare
B-154B Wrmld	20/1	25	0.36						26	20/1	Spare
B-154B Wrmld	20/1	27		0.54					28	20/1	Spare
B-154D 15-30R	30/3	29			1				30	20/1	Spare
|	|	31	1						32	20/1	Spare
|	|	33		1					34	20/1	Spare
Spare	20/1	35							36	20/1	Spare
Spare	20/1	37							38	20/1	Spare
Spare	20/1	39							40	20/1	Spare
Spare	20/1	41							42	20/1	Spare
											Recep(R): 10.7 kVA
Left Side Subtotal			3.9	3.9	2.9						Continuous(C): 0.0 kVA
Right Side Subtotal			0.0	0.0	0.0						Non-continuous(N): 0.0 kVA
Total Load per Phase			3.9	3.9	2.9						Total Connected Load: 10.7 kVA
											Total Demand Load (D): 10.3 kVA

3 Phase Panelboard Schedule

Panel Designation: NBK Floor: BASEMENT Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 10 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
B-102 Wrmld	20/1	1	1			0.54			2	20/1	B-102 Wrmld
B-102 Wrmld	20/1	3		0.36			0.54		4	20/1	B-102 Wrmld
B-102 Wrmld	20/1	5			0.54			2.5	6	30/2	B-102 6-30R
B-102 Wrmld	20/1	7	0.54			2.5			8	|	|
B-102 Wrmld	20/1	9		0.54			1		10	20/1	B-102 Wrmld
B-102 15-30R	30/3	11			2.8			1	12	20/1	B-102 Wrmld
|	|	13	2.8			1			14	20/1	B-102 Wrmld
|	|	15		2.8			2.5		16	30/2	B-102 6-30R
B-102 15-30R	30/3	17			2.8			2.5	18	|	|
|	|	19	2.8			1			20	20/1	B-102 Wrmld
|	|	21		2.8			2.5		22	30/2	B-102 6-30R
B-102 Wrmld	20/1	23			0.36			2.5	24	|	|
B-102 Wrmld	20/1	25	0.54			0.36			26	20/1	B-102 Wrmld
B-102 Wrmld	20/1	27		0.54			6.5		28	60/3	B-102 15-60R
B-102 6-30R	30/2	29			2.5			6.5	30	|	|
|	|	31	2.5			6.5			32	|	|
B-102 Wrmld	20/1	33		0.54			0.36		34	20/1	B-102 Wrmld
B-102 Wrmld	20/1	35			0.54			0.36	36	20/1	B-102 Wrmld
B-102 Wrmld	20/1	37	0.54			0.36			38	20/1	B-102 Wrmld
B-102 Wrmld	20/1	39		2.5					40	20/1	Spare
B-102 Wrmld	20/1	41			2.5				42	20/1	Spare
											Recep(R): 73.9 kVA
Left Side Subtotal			10.7	10.1	12.0						Continuous(C): 0.0 kVA
Right Side Subtotal			12.3	13.4	15.4						Non-continuous(N): 0.0 kVA
Total Load per Phase			23.0	23.5	27.4						Total Connected Load: 73.9 kVA
											Total Demand Load (D): 41.9 kVA

3 Phase Panelboard Schedule

Panel Designation: NBL Floor: BASEMENT Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 10 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
B-104, B-104A Rcpt	20/1	1	0.18			0.36			2	20/1	B-104 Wrmld
B-104A Wrmld	20/1	3		1			0.5		4	20/1	B-104 Wrmld
B-104A Wrmld	20/1	5			1			0.54	6	20/1	B-104 Wrmld
B-104A Wrmld	20/1	7	1			0.54			8	20/1	B-104 Wrmld
B-104A Wrmld	20/1	9		0.5			1		10	20/1	B-104 Wrmld
B-104A L6-20R	20/2	11			1.6			1	12	20/1	B-104 Wrmld
|	|	13	1.6			1			14	20/1	B-104 Wrmld
B-104A L15-20R	20/3	15		1.9			1		16	20/2	B-104B L6-20R
|	|	17			1.9			1	18	|	|
|	|	19	1.9			1			20	20/3	B-104B L15-20R
B-104B Wrmld	20/1	21		0.68			1		22	|	|
B-104B Wrmld	20/1	23			0.36			1	24	|	|
B-104B Wrmld	20/1	25	0.36				1		26	30/2	B-104B 208V
B-104B Wrmld	20/1	27		0.54				1	28	|	|
B-104B Wrmld	20/1	29			0.54			1	30	30/2	B-104 208V
B-

3 Phase Panelboard Schedule

Panel Designation: NBM Floor: BASEMENT Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 10 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
B-106 Wrmld	20/1	1	1			1.66			2	20/2	B-106A L6-20R
B-106 Wrmld	20/1	3		1			1.66		4	|	|
B-106 Wrmld	20/1	5			1			1.66	6	20/2	B-106A L6-20R
B-106 Wrmld	20/1	7	1			1.66			8	|	|
B-106 Wrmld	20/1	9		1			4.16		10	50/2	B-106A L15-50R
B-106 Wrmld	20/1	11			0.54			4.16	12	|	|
B-106 Wrmld	20/1	13	0.36			0.5			14	20/1	B-106 CFH
B-106 Wrmld	20/1	15		0.54			0.5		16	20/1	B-106 CFH
B-106 Wrmld	20/1	17			0.36			1	18	30/2	B-106 208V
B-106 Wrmld	20/1	19	0.36			1			20	|	|
B-106 Wrmld	20/1	21		0.36					22	30/2	B-106 208V OHSC
B-106 Wrmld	20/1	23			1				24	|	|
B-106 Wrmld	20/1	25	1			1			26	30/2	B-106 208V OHSC
B-106 Rcpt	20/1	27		0.5			1		28	|	|
B-106 Wrmld	20/1	29			1				30	20/1	Spare
B-106 Wrmld	20/1	31	1						32	20/1	Spare
B-106 Wrmld	20/1	33		1					34	20/1	Spare
B-106 Wrmld	20/1	35			0.5				36	20/1	Spare
Spare	20/1	37							38	20/1	Spare
Spare	20/1	39							40	20/1	Spare
Spare	20/1	41							42	20/1	Spare
											Recep(R): 32.5 kVA
Left Side Subtotal			4.7	4.4	4.4						Continuous(C): 0.0 kVA
Right Side Subtotal			5.8	7.3	6.8						Non-continuous(N): 1.0 kVA
Total Load per Phase			10.5	11.7	11.2						Total Connected Load: 33.5 kVA
											Total Demand Load (D): 22.2 kVA

3 Phase Panelboard Schedule

Panel Designation: NBN Floor: BASEMENT Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 10 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
B-106A L15-20R	20/3	1	1.9			5.76			2	60/3	B-106A L15-60R
|	|	|	3	1.9			5.76	4	|	|
|	|	|	5		1.9			5.76	6	|	|
B-106A L15-20R	20/3	7	1.9			5.76			8	60/3	B-106A L15-60R
|	|	|	9	1.9			5.76		10	|	|
|	|	|	11		1.9			5.76	12	|	|
B-106A L15-20R	20/3	13	1.9			5.76			14	60/3	B-106A L15-60R
|	|	|	15	1.9			5.76		16	|	|
|	|	|	17		1.9			5.76	18	|	|
Spare	20/1	19								20	20/1	Spare
Spare	20/1	21								22	20/1	Spare
Spare	20/1	23								24	20/1	Spare
Spare	20/1	25								26	20/1	Spare
Spare	20/1	27								28	20/1	Spare
Spare	20/1	29								30	20/1	Spare
Spare	20/1	31								32	20/1	Spare
Spare	20/1	33								34	20/1	Spare
Spare	20/1	35								36	20/1	Spare
Spare	20/1	37								38	20/1	Spare
Spare	20/1	39								40	20/1	Spare
Spare	20/1	41								42	20/1	Spare
											Recep(R): 68.9 kVA
Left Side Subtotal			5.7	5.7	5.7						Continuous(C): 0.0 kVA
Right Side Subtotal			17.3	17.3	17.3						Non-continuous(N): 0.0 kVA
Total Load per Phase			23.0	23.0	23.0						Total Connected Load: 68.9 kVA
											Total Demand Load (D): 39.5 kVA

3 Phase Panelboard Schedule

Panel Designation: NBO Floor: BASEMENT Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 10 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
B-104C Wrmld	20/1	1	0.68						2	20/1	Spare
B-104C Wrmld	20/1	3		1					4	20/1	Spare
B-104C Wrmld	20/1	5			0.68				6	20/1	Spare
B-104C Wrmld	20/1	7	0.5						8	20/1	Spare
B-104C Wrmld	20/1	9		0.5					10	20/1	Spare
B-104C Wrmld	20/1	11			1				12	20/1	Spare
B-104C Wrmld	20/1	13	0.54						14	20/1	Spare
B-104C Wrmld	20/1	15		0.54					16	20/1	Spare
B-104C Wrmld	20/1	17			0.36				18	20/1	Spare
B-104C L6-20	20/2	19	1.6						20	20/1	Spare
|	|	21		1.6				22	20/1	Spare
B-104C L15-20	20/3	23			1.9				24	20/1	Spare
|	|	25	1.9					26	20/1	Spare
|	|	27		1.9				28	20/1	Spare
B-104D L6-20	20/2	29			1.6				30	20/1	Spare
|	|	31	1.6						32	20/1	Spare
B-104D L15-20	20/3	33		1.9					34	20/1	Spare
|	|	35			1.9				36	20/1	Spare
|	|	37	1.9						38	20/1	Spare
B-104D 208V Rcpt	30/2	39		1					40	20/1	Spare
|	|	41			1			42	20/1	Spare
											Recep(R): 25.6 kVA
Left Side Subtotal			8.7	8.4	8.4						Continuous(C): 0.0 kVA
Right Side Subtotal			0.0	0.0	0.0						Non-continuous(N): 0.0 kVA
Total Load per Phase			8.7	8.4	8.4						Total Connected Load: 25.6 kVA
											Total Demand Load (D): 17.8 kVA

3 Phase Panelboard Schedule

Panel Designation: RPBA Floor: BASEMENT Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 22 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus
Panel is a 1 section, 72 pole panel

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
B-160 HK	20/2	1	0.36			0.36			2	20/1	B-163 Recpt
|	|	3		0.36			0.36	4	20/1	B-163 Recpt
B-160 HK	20/2	5			0.36			0.36	6	20/1	B-163 Recpt
|	|	7	0.36			0.36		8	20/1	B-163 Recpt
B-160 HK	20/2	9		0.36			0.18		10	20/1	Elev 1 Pit
|	|	11			0.36			0.54	12	20/1	B-159 Recpts
B-163 Recpt	20/1	13	0.72			0.36			14	20/1	B-105 Recpts
B-163 Recpt	20/1	15		0.72			0.5		16	20/1	B-105 wtr cooler
B-163 Recpt	20/1	17			0.72			0.36	18	20/1	B-158 Recpts
B-163 Recpt	20/1	19	0.72			0.36			20	20/1	B-155 Recpts
B-163 Recpt	20/1	21		1.08			0.36		22	20/1	B-155 Recpts
B-163 Recpt	20/1	23			0.72			0.54	24	20/1	B-107 Recpts
B-163 Recpt	20/1	25	0.72			0.36			26	20/1	B-151 Recpts
B-163 Recpt	20/1	27		0.36			0.9		28	20/1	Elev 1 Pit Lights
B-163 Recpt	20/1	29			0.36			0.36	30	20/1	B-169 Sec Eq
B-163 Recpt	20/1	31	0.36			0.36			32	20/1	B-169 Sec Eq
B-163 Recpt	20/1	33		0.36					34	20/1	Spare
B-163 Recpt	20/1	35			0.36				36	20/1	Spare
B-163 Recpt	20/1	37	0.36						38	20/1	Spare
B-163 Recpt	20/1	39		0.36					40	20/1	Spare
B-163 Recpt	20/1	41			0.36				42	20/1	Spare
											Recep(R): 16.4 kVA
Left Side Subtotal			3.6	3.6	3.2						Continuous(C): 0.2 kVA
Right Side Subtotal			2.2	2.3	2.2						Non-continuous(N): 0.5 kVA
Total Load per Phase			5.8	5.9	5.4						Total Connected Load: 17.1 kVA
											Total Demand Load (D): 13.9 kVA

3 Phase Panelboard Schedule

Panel Designation: RPBA Floor: BASEMENT Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 22 kAIC Fault Current Rating
Remarks: Provide 150% Rated Neutral Bus
Panel is a 1 section, 72 pole panel

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
Spare	20/2	43				0.5			44	20/1	G+W Ctrl
|	|	45						46	20/1	Spare
Spare	20/2	47							48	20/1	Spare
|	|	49						50	20/1	Spare
Spare	20/2	51							52	20/1	Spare
|	|	53						54	20/1	Spare
Spare	20/2	55				0.2			56	20/1	Dampers
|	|	57				0.2			58	20/1	Dampers
Spare	20/1	59					0.2		60	20/1	Dampers
Spare	20/1	61				0.2			62	20/1	Dampers
FCU-5	20/1	63		0.87			0.2		64	20/1	Dampers
FCU-3	20/3	65			0.8			0.29	66	15/3	FCU-4
|	|	67	0.8			0.29		68	|	|
|	|	69		0.8			0.29	70	|	|
FCU-21	20/1	71			0.87				72	20/1	Spare
											Recep(R): 1.4 kVA
Left Side Subtotal			0.8	1.7	1.7						Continuous(C): 4.1 kVA
Right Side Subtotal			1.2	0.7	0.5						Non-continuous(N): 1.0 kVA
Total Load per Phase			2.0	2.4	2.2						Total Connected Load: 6.5 kVA
											Total Demand Load (D): 6.5 kVA

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I hereby certify that this plan or drawing was prepared by me or under my direct supervision and that I am a duly licensed ELECTRICAL ENGINEER under the laws of the State of Minnesota.

For AFFILIATED ENGINEERS, INC.

By

Name RONALD M. PARSLEY

Date 02-24-2012 Reg. No. 25163

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Project

Physics and Nanotechnology Building

U of M Project # 01-155-08-1718

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ELECTRICAL PANEL SCHEDULES

e9.12

3 Phase Panelboard Schedule

Panel Designation: CP4A Floor: FOURTH Project No. 08643-00
208/120 Volt: 1 Phase 3 Wire + Ground
Bus Rating: 60 A Main Breaker: 30 A 10 kAIC Fault Current Rating
Remarks:

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
4-173 OHSC	20/1	1	0.18						2	20/1	4-173 OHSC
4-173 Wrmld	20/1	3							4	20/1	Spare
Spare	20/1	5							6	20/1	Spare
Spare	20/1	7							8	20/1	Spare
Spare	20/1	9							10	20/1	Spare
Spare	20/1	11							12	20/1	Spare
Spare	20/1	13							14	20/1	Spare
Spare	20/1	15							16	20/1	Spare
Spare	20/1	17							18	20/1	Spare
Spare	20/1	19							20	20/1	Spare
Spare	20/1	21							22	20/1	Spare
Spare	20/1	23							24	20/1	Spare
Spare	20/1	25							26	20/1	Spare
Spare	20/1	27							28	20/1	Spare
Spare	20/1	29							30	20/1	Spare
		31							32		
		33							34		
		35							36		
		37							38		
		39							40		
		41							42		
											Recep(R): 0.0 kVA
Left Side Subtotal			0.2	0.0	0.0						Continuous(C): 0.2 kVA
Right Side Subtotal			0.0	0.0	0.0						Non-continuous(N): 0.0 kVA
Total Load per Phase			0.2	0.0	0.0						Total Connected Load: 0.2 kVA
											Total Demand Load (D): 0.2 kVA

1 Phase Panelboard Schedule

Panel Designation: CP4B Floor: FOURTH Project No. 08643-00
208/120 Volt: 1 Phase 3 Wire + Ground
Bus Rating: 60 A Main Breaker: 30 A 10 kAIC Fault Current Rating
Remarks:

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
Spare	20/1	1							2	20/1	Spare
Spare	20/1	3							4	20/1	Spare
Spare	20/1	5							6	20/1	Spare
Spare	20/1	7							8	20/1	Spare
Spare	20/1	9							10	20/1	Spare
Spare	20/1	11							12	20/1	Spare
Spare	20/1	13							14	20/1	Spare
Spare	20/1	15							16	20/1	Spare
Spare	20/1	17							18	20/1	Spare
Spare	20/1	19							20	20/1	Spare
Spare	20/1	21							22	20/1	Spare
Spare	20/1	23							24	20/1	Spare
Spare	20/1	25							26	20/1	Spare
Spare	20/1	27							28	20/1	Spare
Spare	20/1	29							30	20/1	Spare
		31							32		
		33							34		
		35							36		
		37							38		
		39							40		
		41							42		
											Recep(R): 0.0 kVA
Left Side Subtotal			0.0	0.0	0.0						Continuous(C): 0.0 kVA
Right Side Subtotal			0.0	0.0	0.0						Non-continuous(N): 0.0 kVA
Total Load per Phase			0.0	0.0	0.0						Total Connected Load: 0.0 kVA
											Total Demand Load (D): 0.0 kVA

1 Phase Panelboard Schedule

Panel Designation: CP4C Floor: FOURTH Project No. 08643-00
208/120 Volt: 1 Phase 3 Wire + Ground
Bus Rating: 60 A Main Breaker: 30 A 10 kAIC Fault Current Rating
Remarks:

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
Spare	20/1	1							2	20/1	Spare
Spare	20/1	3							4	20/1	Spare
Spare	20/1	5							6	20/1	Spare
Spare	20/1	7							8	20/1	Spare
Spare	20/1	9							10	20/1	Spare
Spare	20/1	11							12	20/1	Spare
Spare	20/1	13							14	20/1	Spare
Spare	20/1	15							16	20/1	Spare
Spare	20/1	17							18	20/1	Spare
Spare	20/1	19							20	20/1	Spare
Spare	20/1	21							22	20/1	Spare
Spare	20/1	23							24	20/1	Spare
Spare	20/1	25							26	20/1	Spare
Spare	20/1	27							28	20/1	Spare
Spare	20/1	29							30	20/1	Spare
		31							32		
		33							34		
		35							36		
		37							38		
		39							40		
		41							42		
											Recep(R): 0.0 kVA
Left Side Subtotal			0.0	0.0	0.0						Continuous(C): 0.0 kVA
Right Side Subtotal			0.0	0.0	0.0						Non-continuous(N): 0.0 kVA
Total Load per Phase			0.0	0.0	0.0						Total Connected Load: 0.0 kVA
											Total Demand Load (D): 0.0 kVA

1 Phase Panelboard Schedule

Panel Designation: CP3A Floor: THIRD Project No. 08643-00
208/120 Volt: 1 Phase 3 Wire + Ground
Bus Rating: 60 A Main Breaker: 30 A 10 kAIC Fault Current Rating
Remarks:

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
3-174 Wrmld	20/1	1	0.18			0.18			2	20/1	3-174 Wrmld
3-174 Wrmld	20/1	3		0.18			0.18		4	20/1	3-174 Wrmld
Spare	20/1	5							6	20/1	Spare
Spare	20/1	7							8	20/1	Spare
Spare	20/1	9							10	20/1	Spare
Spare	20/1	11							12	20/1	Spare
Spare	20/1	13							14	20/1	Spare
Spare	20/1	15							16	20/1	Spare
Spare	20/1	17							18	20/1	Spare
Spare	20/1	19							20	20/1	Spare
Spare	20/1	21							22	20/1	Spare
Spare	20/1	23							24	20/1	Spare
Spare	20/1	25							26	20/1	Spare
Spare	20/1	27							28	20/1	Spare
Spare	20/1	29							30	20/1	Spare
		31							32		
		33							34		
		35							36		
		37							38		
		39							40		
		41							42		
											Recep(R): 0.7 kVA
Left Side Subtotal			0.2	0.2	0.0						Continuous(C): 0.0 kVA
Right Side Subtotal			0.2	0.2	0.0						Non-continuous(N): 0.0 kVA
Total Load per Phase			0.4	0.4	0.0						Total Connected Load: 0.7 kVA
											Total Demand Load (D): 0.7 kVA

1 Phase Panelboard Schedule

Panel Designation: CP3B Floor: THIRD Project No. 08643-00
208/120 Volt: 1 Phase 3 Wire + Ground
Bus Rating: 60 A Main Breaker: 30 A 10 kAIC Fault Current Rating
Remarks: *** Provide 6mA GFCI breaker for this circuit

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
3-176 Wrmld	20/1	1	0.18			0.18			2	20/1	3-176 Wrmld
3-176 Wrmld	20/1	3		0.18			0.18		4	20/1	3-176 Wrmld
3-176 Wrmld	20/1	5			0.18			0.18	6	20/1	3-176 Wrmld
3-176 Wrmld	20/1	7	0.18			0.18			8	20/1	3-176 Wrmld
3-176 Wrmld	20/1	9		0.18			0.18		10	20/1	3-176 Wrmld
3-176 Wrmld ***	20/1	11			0.18			0.18	12	20/1	3-176 Wrmld
3-176 Wrmld	20/1	13	0.18			0.18			14	20/1	3-178 Wrmld
3-178 Wrmld	20/1	15		0.18			0.18		16	20/1	3-178 OHSC
3-178 OHSC	20/1	17			0.18			0.18	18	20/1	3-178 OHSC
3-178 OHSC	20/1	19	0.18			0.18			20	20/1	3-178 OHSC
3-178 OHSC	20/1	21		0.18			0.18		22	20/1	3-178 Wrmld
3-178 Wrmld	20/1	23			0.18			0.18	24	20/1	3-178 Wrmld
3-178 Wrmld	20/1	25	0.18			0.18			26	20/1	3-178 Wrmld
3-178 Wrmld ***	20/1	27		0.18			0.18		28	20/1	3-178A Wrmld
3-178 Wrmld	20/1	29			0.18			0.18	30	20/1	3-178A Wrmld
		31							32		
		33							34		
		35							36		
		37							38		
		39							40		
		41							42		
											Recep(R): 5.4 kVA
Left Side Subtotal			0.9	0.9	0.9						Continuous(C): 0.0 kVA
Right Side Subtotal			0.9	0.9	0.9						Non-continuous(N): 0.0 kVA
Total Load per Phase			1.8	1.8	1.8						Total Connected Load: 5.4 kVA
											Total Demand Load (D): 5.4 kVA

1 Phase Panelboard Schedule

Panel Designation: CP3C Floor: THIRD Project No. 08643-00
208/120 Volt: 3 Phase 4 Wire + Ground
Bus Rating: 60 A Main Breaker: 30 A 10 kAIC Fault Current Rating
Remarks:

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
3-171 Wrmld	20/1	1	0.18			0.18			2	20/1	3-171A Wrmld
3-171 OHSC	20/1	3		0.18			0.18		4	20/1	3-171A Wrmld
3-171B Wrmld	20/1	5			0.18			0.18	6	20/1	3-171B Wrmld
3-171B Wrmld	20/1	7	0.18			0.18			8	20/1	3-171B Wrmld
3-171B Wrmld	20/1	9		0.18			0.18		10	20/1	3-171 Wrmld
Spare	20/1	11						0.18	12	20/1	3-171 Wrmld
Spare	20/1	13							14	20/1	Spare
Spare	20/1	15							16	20/1	Spare
Spare	20/1	17							18	20/1	Spare
Spare	20/1	19							20	20/1	Spare
Spare	20/1	21							22	20/1	Spare
Spare	20/1	23							24	20/1	Spare
Spare	20/1	25							26	20/1	Spare
Spare	20/1	27							28	20/1	Spare
Spare	20/1	29							30	20/1	Spare
		31							32		
		33							34		
		35							36		
		37							38		
		39							40		
		41							42		
											Recep(R): 2.0 kVA
Left Side Subtotal			0.4	0.4	0.2						Continuous(C): 0.0 kVA
Right Side Subtotal			0.4	0.4	0.4						Non-continuous(N): 0.0 kVA
Total Load per Phase			0.7	0.7	0.5						Total Connected Load: 2.0 kVA
											Total Demand Load (D): 2.0 kVA

1 Phase Panelboard Schedule

Panel Designation: CP3D Floor: THIRD Project No. 08643-00
208/120 Volt: 1 Phase 3 Wire + Ground
Bus Rating: 60 A Main Breaker: 30 A 10 kAIC Fault Current Rating
Remarks:

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
3-166 Wrmld	20/1	1	0.18			0.18			2	20/1	3-166 Wrmld
3-166 OHSC	20/1	3		0.18			0.18		4	20/1	3-166A Wrmld
3-166A Wrmld	20/1	5			0.18			0.18	6	20/1	3-166A Wrmld
3-166 Wrmld	20/1	7	0.18						8	20/1	Spare
Spare	20/1	9							10	20/1	Spare
Spare	20/1	11							12	20/1	Spare
Spare	20/1	13							14	20/1	Spare
Spare	20/1	15							16	20/1	Spare
Spare	20/1	17							18	20/1	Spare
Spare	20/1	19							20	20/1	Spare
Spare	20/1	21							22	20/1	Spare
Spare	20/1	23							24	20/1	Spare
Spare	20/1	25							26	20/1	Spare
Spare	20/1	27							28	20/1	Spare
Spare	20/1	29							30	20/1	Spare
		31							32		
		33							34		
		35							36		
		37							38		
		39							40		
		41							42		
											Recep(R): 1.3 kVA
Left Side Subtotal			0.4	0.2	0.2						Continuous(C): 0.0 kVA
Right Side Subtotal			0.2	0.2	0.2						Non-continuous(N): 0.0 kVA
Total Load per Phase			0.5	0.4	0.4						Total Connected Load: 1.3 kVA
											Total Demand Load (D): 1.3 kVA

1 Phase Panelboard Schedule

Panel Designation: CP2A Floor: SECOND Project No. 08643-00
208/120 Volt: 1 Phase 3 Wire + Ground
Bus Rating: 60 A Main Breaker: 30 A 10 kAIC Fault Current Rating
Remarks: *** Provide 6mA GFCI breaker for this circuit

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
2-175 Wrmld	20/1	1	0.18			0.18			2	20/1	2-171 Wrmld
2-175 Wrmld	20/1	3		0.18			0.18		4	20/1	2-171 Wrmld
2-175 Wrmld	20/1	5			0.18			0.18	6	20/1	2-171 OHSC
2-175 Wrmld	20/1	7				0.18			8	20/1	2-171 Wrmld
2-175 Wrmld	20/1	9					0.18		10	20/1	2-171 Wrmld
2-175 Wrmld ***	20/1	11						0.18	12	20/1	2-171 Wrmld
Spare	20/1	13				0.18			14	20/1	2-171 Wrmld
Spare	20/1	15					0.18		16	20/1	2-171 Wrmld
Spare	20/1	17						0.18	18	20/1	2-171 Wrmld
Spare	20/1	19				0.18			20	20/1	2-171 Wrmld
Spare	20/1	21					0.18		22	20/1	2-171 Wrmld
Spare	20/1	23						0.18	24	20/1	2-171 Wrmld
Spare	20/1	25				0.18			26	20/1	2-171 Wrmld
Spare	20/1	27					0.18		28	20/1	2-171 OHSC
Spare	20/1	29						0.18	30	20/1	2-171 OHSC
		31							32		
		33							34		
		35							36		
		37							38		
		39							40		
		41							42		
											Recep(R): 2.9 kVA
Left Side Subtotal			0.2	0.2	0.2						Continuous(C): 0.4 kVA
Right Side Subtotal			0.9	0.9	0.9						Non-continuous(N): 0.0 kVA
Total Load per Phase			1.1	1.1	1.1						Total Connected Load: 3.2 kVA
											Total Demand Load (D): 3.2 kVA

1 Phase Panelboard Schedule

Panel Designation: CP1A Floor: FIRST Project No. 08643-00
208/120 Volt: 1 Phase 3 Wire + Ground
Bus Rating: 60 A Main Breaker: 30 A 10 kAIC Fault Current Rating
Remarks:

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
1-162 Rcpts	20/1	1	0.18						2	20/1	Spare
Spare	20/1	3							4	20/1	Spare
Spare	20/1	5							6	20/1	Spare
Spare	20/1	7							8	20/1	Spare
Spare	20/1	9							10	20/1	Spare
Spare	20/1	11							12	20/1	Spare
Spare	20/1	13							14	20/1	Spare
Spare	20/1	15							16	20/1	Spare
Spare	20/1	17							18	20/1	Spare
Spare	20/1	19							20	20/1	Spare
Spare	20/1	21							22	20/1	Spare
Spare	20/1	23							24	20/1	Spare
Spare	20/1	25							26	20/1	Spare
Spare	20/1	27							28	20/1	Spare
Spare	20/1	29							30	20/1	Spare
		31							32		
		33							34		
		35							36		
		37							38		
		39							40		
		41							42		
											Recep(R): 0.2 kVA
Left Side Subtotal			0.2	0.0	0.0						Continuous(C): 0.0 kVA
Right Side Subtotal			0.0	0.0	0.0						Non-continuous(N): 0.0 kVA
Total Load per Phase			0.2	0.0	0.0						Total Connected Load: 0.2 kVA
											Total Demand Load (D): 0.2 kVA

1 Phase Panelboard Schedule

Panel Designation: CP1B Floor: FIRST Project No. 08643-00
208/120 Volt: 1 Phase 3 Wire + Ground
Bus Rating: 60 A Main Breaker: 30 A 10 kAIC Fault Current Rating
Remarks:

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
1-162 Rcpts	20/1	1	0.18						2	20/1	Spare
Spare	20/1	3							4	20/1	Spare
Spare	20/1	5							6	20/1	Spare
Spare	20/1	7							8	20/1	Spare
Spare	20/1	9							10	20/1	Spare
Spare	20/1	11							12	20/1	Spare
Spare	20/1	13							14	20/1	Spare
Spare	20/1	15							16	20/1	Spare
Spare	20/1	17							18	20/1	Spare
Spare	20/1	19							20	20/1	Spare
Spare	20/1	21							22	20/1	Spare
Spare	20/1	23							24	20/1	Spare
Spare	20/1	25							26	20/1	Spare
Spare	20/1	27							28	20/1	Spare
Spare	20/1	29							30	20/1	Spare
		31							32		
		33							34		
		35							36		
		37							38		
		39							40		
		41							42		
											Recep(R): 0.2 kVA
Left Side Subtotal			0.2	0.0	0.0						Continuous(C): 0.0 kVA
Right Side Subtotal			0.0	0.0	0.0						Non-continuous(N): 0.0 kVA
Total Load per Phase			0.2	0.0	0.0						Total Connected Load: 0.2 kVA
											Total Demand Load (D): 0.2 kVA

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I hereby certify that this plan or drawing was prepared by me or under my direct supervision and that I am a duly licensed ELECTRICAL ENGINEER under the laws of the State of Minnesota.

For AFFILIATED ENGINEERS, INC.

By

Name RONALD M. PARSLEY

Date 02-24-2012 Reg. No. 25163

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Project

Physics and Nanotechnology Building

U of M Project # 01-155-08-1718

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ELECTRICAL PANEL SCHEDULES

1 Phase Panelboard Schedule

Panel Designation: CPBA Floor: BASEMENT — Project No. 08643-00
208/120 Volt 1 Phase — 3 Wire + Ground
Bus Rating: 60 A Main Breaker: 30 A — 10 kAIC Fault Current Rating
Remarks:

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
B-106 Rcpt	20/1	1	0.18			0.18			2	20/1	B-104B Rcpt
B-106 Rcpt	20/1	3		0.18			0.18		4	20/1	B-104B Rcpt
B-106A Rcpt	20/1	5			0.18				6	20/1	Spare
B-104 Rcpt	20/1	7	0.18						8	20/1	Spare
B-104 Rcpt	20/1	9		0.18					10	20/1	Spare
B-104 Rcpt	20/1	11			0.18				12	20/1	Spare
B-104D Rcpt	20/1	13	0.18						14	20/1	Spare
B-104D Rcpt	20/1	15		0.18					16	20/1	Spare
B-104D Rcpt	20/1	17			0.18				18	20/1	Spare
Spare	20/1	19							20	20/1	Spare
Spare	20/1	21							22	20/1	Spare
Spare	20/1	23							24	20/1	Spare
Spare	20/1	25							26	20/1	Spare
Spare	20/1	27							28	20/1	Spare
Spare	20/1	29							30	20/1	Spare
		31							32		
		33							34		
		35							36		
		37							38		
		39							40		
		41							42		
Left Side Subtotal			0.5	0.5	0.5					Recep(R):	2.0 kVA
Right Side Subtotal			0.2	0.2	0.0					Continuous(C):	0.0 kVA
Total Load per Phase			0.7	0.7	0.5					Non-continuous(N):	0.0 kVA
										Total Connected Load:	2.0 kVA
										Total Demand Load (D):	2.0 kVA

1 Phase Panelboard Schedule

Panel Designation: CPBB Floor: BASEMENT — Project No. 08643-00
208/120 Volt 1 Phase — 3 Wire + Ground
Bus Rating: 60 A Main Breaker: 30 A — 10 kAIC Fault Current Rating
Remarks:

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
B-153 Rcpt	20/1	1	0.18						2	20/1	Spare
B-153 Rcpt	20/1	3		0.18					4	20/1	Spare
B-153 Rcpt	20/1	5			0.18				6	20/1	Spare
B-157 Rcpt	20/1	7	0.18						8	20/1	Spare
B-157 Rcpt	20/1	9		0.18					10	20/1	Spare
Spare	20/1	11							12	20/1	Spare
Spare	20/1	13							14	20/1	Spare
Spare	20/1	15							16	20/1	Spare
Spare	20/1	17							18	20/1	Spare
Spare	20/1	19							20	20/1	Spare
Spare	20/1	21							22	20/1	Spare
Spare	20/1	23							24	20/1	Spare
Spare	20/1	25							26	20/1	Spare
Spare	20/1	27							28	20/1	Spare
Spare	20/1	29							30	20/1	Spare
		31							32		
		33							34		
		35							36		
		37							38		
		39							40		
		41							42		
Left Side Subtotal			0.4	0.4	0.2					Recep(R):	0.9 kVA
Right Side Subtotal			0.0	0.0	0.0					Continuous(C):	0.0 kVA
Total Load per Phase			0.4	0.4	0.2					Non-continuous(N):	0.0 kVA
										Total Connected Load:	0.9 kVA
										Total Demand Load (D):	0.9 kVA

1 Phase Panelboard Schedule

Panel Designation: CPBC Floor: BASEMENT — Project No. 08643-00
208/120 Volt 1 Phase — 3 Wire + Ground
Bus Rating: 60 A Main Breaker: 30 A — 10 kAIC Fault Current Rating
Remarks:

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
B-154 Rcpt	20/1	1	0.18						2	20/1	Spare
B-154 Rcpt	20/1	3		0.18					4	20/1	Spare
B-154 Rcpt	20/1	5			0.18				6	20/1	Spare
B-154 Rcpt	20/1	7	0.18						8	20/1	Spare
Spare	20/1	9							10	20/1	Spare
Spare	20/1	11							12	20/1	Spare
Spare	20/1	13							14	20/1	Spare
Spare	20/1	15							16	20/1	Spare
Spare	20/1	17							18	20/1	Spare
Spare	20/1	19							20	20/1	Spare
Spare	20/1	21							22	20/1	Spare
Spare	20/1	23							24	20/1	Spare
Spare	20/1	25							26	20/1	Spare
Spare	20/1	27							28	20/1	Spare
Spare	20/1	29							30	20/1	Spare
		31							32		
		33							34		
		35							36		
		37							38		
		39							40		
		41							42		
Left Side Subtotal			0.4	0.2	0.2					Recep(R):	0.7 kVA
Right Side Subtotal			0.0	0.0	0.0					Continuous(C):	0.0 kVA
Total Load per Phase			0.4	0.2	0.2					Non-continuous(N):	0.0 kVA
										Total Connected Load:	0.7 kVA
										Total Demand Load (D):	0.7 kVA

1 Phase Panelboard Schedule

Panel Designation: CPBD Floor: BASEMENT — Project No. 08643-00
208/120 Volt 1 Phase — 3 Wire + Ground
Bus Rating: 60 A Main Breaker: 30 A — 10 kAIC Fault Current Rating
Remarks:

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
B-154 Rcpt	20/1	1	0.18						2	20/1	Spare
B-154 Rcpt	20/1	3		0.18					4	20/1	Spare
B-154 Rcpt	20/1	5			0.18				6	20/1	Spare
B-154 Rcpt	20/1	7	0.18						8	20/1	Spare
Spare	20/1	9							10	20/1	Spare
Spare	20/1	11							12	20/1	Spare
Spare	20/1	13							14	20/1	Spare
Spare	20/1	15							16	20/1	Spare
Spare	20/1	17							18	20/1	Spare
Spare	20/1	19							20	20/1	Spare
Spare	20/1	21							22	20/1	Spare
Spare	20/1	23							24	20/1	Spare
Spare	20/1	25							26	20/1	Spare
Spare	20/1	27							28	20/1	Spare
Spare	20/1	29							30	20/1	Spare
		31							32		
		33							34		
		35							36		
		37							38		
		39							40		
		41							42		
Left Side Subtotal			0.4	0.2	0.2					Recep(R):	0.7 kVA
Right Side Subtotal			0.0	0.0	0.0					Continuous(C):	0.0 kVA
Total Load per Phase			0.4	0.2	0.2					Non-continuous(N):	0.0 kVA
										Total Connected Load:	0.7 kVA
										Total Demand Load (D):	0.7 kVA

3 Phase Panelboard Schedule

Panel Designation: LP5A Floor: PENTHOUSE — Project No. 08643-00
480Y/277 Volt 3 Phase — 4 Wire + Ground
Bus Rating: 100 A Main Lugs 100 A — 30 kAIC Fault Current Rating
Remarks:

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
Spare	20/1	1				2.1			2	20/1	Lighting
Spare	20/1	3					1.1		4	20/1	Lighting
Spare	20/1	5						0.1	6	20/1	Lighting Elev Rm
Spare	20/1	7				0.1			8	20/1	Lighting Elev Rm
Spare	20/1	9							10	20/1	Spare
Spare	20/1	11							12	20/1	Spare
Spare	20/1	13							14	20/1	Spare
Spare	20/1	15							16	20/1	Spare
Spare	20/1	17							18	20/1	Spare
Spare	20/1	19							20	20/1	Spare
Space	20/1	21							22	20/1	Space
Space	20/1	23							24	20/1	Space
Space	20/1	25							26	20/1	Space
Space	20/1	27							28	20/1	Space
Space	20/1	29							30	20/1	Space
		31							32		
		33							34		
		35							36		
		37							38		
		39							40		
		41							42		
Left Side Subtotal			0.0	0.0	0.0					Recep(R):	0.0 kVA
Right Side Subtotal			2.2	1.1	0.1					Continuous(C):	3.4 kVA
Total Load per Phase			2.2	1.1	0.1					Non-continuous(N):	0.0 kVA
										Total Connected Load:	3.4 kVA
										Total Demand Load (D):	3.4 kVA

3 Phase Panelboard Schedule

Panel Designation: LP4A Floor: FOURTH — Project No. 08643-00
480Y/277 Volt 3 Phase — 4 Wire + Ground
Bus Rating: 100 A Main Lugs 100 A — 22 kAIC Fault Current Rating
Remarks:

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
Lighting Labs	20/1	1	1.5			3.4			2	20/1	Lighting Offices
Lighting Corridors	20/1	3		1.5			3.2		4	20/1	Lighting Corridors
Lighting Grad Offices	20/1	5			2.4			0.9	6	20/1	Lighting Labs
Lighting Labs	20/1	7	2			0.5			8	20/1	Lighting Corridors
Lighting Labs	20/1	9		3					10	20/1	Spare
Spare	20/1	11							12	20/1	Spare
Spare	20/1	13							14	20/1	Spare
Spare	20/1	15							16	20/1	Spare
Spare	20/1	17							18	20/1	Spare
Spare	20/1	19							20	20/1	Spare
Space	20/1	21							22	20/1	Space
Space	20/1	23							24	20/1	Space
Space	20/1	25							26	20/1	Space
Space	20/1	27							28	20/1	Space
Space	20/1	29							30	20/1	Space
		31							32		
		33							34		
		35							36		
		37							38		
		39							40		
		41							42		
Left Side Subtotal			3.5	4.5	2.4					Recep(R):	0.0 kVA
Right Side Subtotal			3.9	3.2	0.9					Continuous(C):	18.4 kVA
Total Load per Phase			7.4	7.7	3.3					Non-continuous(N):	0.0 kVA
										Total Connected Load:	18.4 kVA
										Total Demand Load (D):	18.4 kVA

3 Phase Panelboard Schedule

Panel Designation: LP3A Floor: THIRD — Project No. 08643-00
480Y/277 Volt 3 Phase — 4 Wire + Ground
Bus Rating: 100 A Main Lugs 100 A — 22 kAIC Fault Current Rating
Remarks:

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
Lighting Labs	20/1	1	1.5			3.4			2	20/1	Lighting Offices
Lighting Corridors	20/1	3		1.5			3.2		4	20/1	Lighting Corridors
Lighting Grad Offices	20/1	5			2.4			0.9	6	20/1	Lighting Labs
Lighting Labs	20/1	7	2						8	20/1	Spare
Lighting Labs	20/1	9		3					10	20/1	Spare
Spare	20/1	11							12	20/1	Spare
Spare	20/1	13							14	20/1	Spare
Spare	20/1	15							16	20/1	Spare
Spare	20/1	17							18	20/1	Spare
Spare	20/1	19							20	20/1	Spare
Space	20/1	21							22	20/1	Space
Space	20/1	23							24	20/1	Space
Space	20/1	25							26	20/1	Space
Space	20/1	27							28	20/1	Space
Space	20/1	29							30	20/1	Space
		31							32		
		33							34		
		35							36		
		37							38		
		39							40		
		41							42		
Left Side Subtotal			3.5	4.5	2.4					Recep(R):	0.0 kVA
Right Side Subtotal			3.4	3.2	0.9					Continuous(C):	17.9 kVA
Total Load per Phase			6.9	7.7	3.3					Non-continuous(N):	0.0 kVA
										Total Connected Load:	17.9 kVA
										Total Demand Load (D):	17.9 kVA

3 Phase Panelboard Schedule

Panel Designation: LP2A Floor: SECOND — Project No. 08643-00
480Y/277 Volt 3 Phase — 4 Wire + Ground
Bus Rating: 100 A Main Lugs 100 A — 22 kAIC Fault Current Rating
Remarks:

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
Lighting Labs	20/1	1	1.5			3.4			2	20/1	Lighting Offices
Lighting Corridors	20/1	3		1.5			3.2		4	20/1	Lighting Corridors
Lighting Grad Offices	20/1	5			2.4			2	6	20/1	Lighting High Bay
Lighting Labs	20/1	7	2			2.7			8	20/1	Lighting High Bay
Spare	20/1	9							10	20/1	Spare
Spare	20/1	11							12	20/1	Spare
Spare	20/1	13							14	20/1	Spare
Spare	20/1	15							16	20/1	Spare
Spare	20/1	17							18	20/1	Spare
Spare	20/1	19							20	20/1	Spare
Space	20/1	21							22	20/1	Space
Space	20/1	23							24	20/1	Space
Space	20/1	25							26	20/1	Space
Space	20/1	27							28	20/1	Space
Space	20/1	29							30	20/1	Space
		31							32		
		33							34		
		35							36		
		37							38		
		39							40		
		41							42		
Left Side Subtotal			3.5	1.5	2.4					Recep(R):	0.0 kVA
Right Side Subtotal			6.1	3.2	2.0					Continuous(C):	18.7 kVA
Total Load per Phase			9.6	4.7	4.4					Non-continuous(N):	0.0 kVA
										Total Connected Load:	18.7 kVA
										Total Demand Load (D):	18.7 kVA

3 Phase Panelboard Schedule

Panel Designation: LP1A Floor: FIRST — Project No. 08643-00
480Y/277 Volt 3 Phase — 4 Wire + Ground
Bus Rating: 100 A Main Lugs 100 A — 22 kAIC Fault Current Rating
Remarks:

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
Lighting Labs	20/1	1	1.4			2.45			2	20/1	Lighting Conf Rms
Lighting Labs	20/1	3		1.4			1.8		4	20/1	Lighting Conf Rms
Lighting Offices	20/1	5			3			2.7	6	20/1	Lighting Lobby
Lighting Labs	20/1	7	1.5			0.6			8	20/1	Lighting Exterior
Spare	20/1	9							10	20/1	Spare
Spare	20/1	11							12	20/1	Spare
Spare	20/1	13							14	20/1	Spare
Spare	20/1	15							16	20/1	Spare
Spare	20/1	17							18	20/1	Spare
Spare	20/1	19							20	20/1	Spare
Space	20/1	21							22	20/1	Space
Space	20/1	23							24	20/1	Space
Space	20/1	25							26	20/1	Space
Space	20/1	27							28	20/1	Space
Space	20/1	29							30	20/1	Space
		31							32		
		33							34		
		35							36		
		37							38		
		39							40		
		41							42		
Left Side Subtotal			2.9	1.4	3.0					Recep(R):	0.0 kVA
Right Side Subtotal			3.1	1.8	2.7					Continuous(C):	14.9 kVA
Total Load per Phase			6.0	3.2	5.7					Non-continuous(N):	0.0 kVA
										Total Connected Load:	14.9 kVA
										Total Demand Load (D):	14.9 kVA

3 Phase Panelboard Schedule

Panel Designation: LPBA Floor: BASEMENT — Project No. 08643-00
480Y/277 Volt 3 Phase — 4 Wire + Ground
Bus Rating: 100 A Main Lugs 100 A — 22 kAIC Fault Current Rating
Remarks:

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
Lighting	20/1	1	3.17						2	20/1	Spare
Lighting	20/1	3		2.8					4	20/1	Spare
Lighting	20/1	5			1.39				6	20/1	Spare
Lighting	20/1	7	2.4						8	20/1	Spare
Lighting tunnel	20/1	9		0.4					10	20/1	Spare
Site Lighting	20/1	11			1.9				12	20/1	Spare
Site Lighting	20/1	13	1.3						14	20/1	Spare
Spare	20/1	15							16	20/1	Spare
Spare	20/1	17							18	20/1	Spare
Spare	20/1	19							20	20/1	Spare
Space	20/1	21							22	20/1	Space
Space	20/1	23							24	20/1	Space
Space	20/1	25							26	20/1	Space
Space	20/1	27							28	20/1	Space
Space	20/1	29							30	20/1	Space
Space	20/1	31							32	20/1	Space
Space	20/1	33							34	20/1	Space
Space	20/1	35							36	20/1	Space
Space	20/1	37							38	20/1	Space
Space	20/1	39							40	20/1	Space
Space	20/1	41							42	20/1	Space
Left Side Subtotal			6.9	3.2	3.3					Recep(R):	0.0 kVA
Right Side Subtotal			0.0	0.0	0.0					Continuous(C):	13.4 kVA
Total Load per Phase			6.9	3.2	3.3					Non-continuous(N):	0.0 kVA
										Total Connected Load:	13.4 kVA
										Total Demand Load (D):	13.4 kVA

1 Phase Panelboard Schedule

Panel Designation: CPBE Floor: BASEMENT — Project No. 08643-00
208/120 Volt 3 Phase — 3 Wire + Ground
Bus Rating: 60 A Main Breaker: 30 A — 10 kAIC Fault Current Rating
Remarks:

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
B-102 Rcpt	20/1	1	0.18						2	20/1	Spare
B-102 Rcpt	20/1	3		0.18					4	20/1	Spare
B-102 Rcpt	20/1	5			0.18				6	20/1	Spare
B-102 Rcpt	20/1	7	0.18						8	20/1	Spare
B-102 Rcpt	20/1	9		0.18					10	20/1	Spare
B-102 Rcpt	20/1	11			0.18				12	20/1	Spare
B-102 Rcpt	20/1	13	0.18						14	20/1	Spare
B-102 Rcpt	20/1	15		0.18					16	20/1	Spare
B-102 Rcpt	20/1	17			0.18				18	20/1	Spare
B-102 Rcpt	20/1	19	0.18						20	20/1	Spare
Spare	20/1	21							22	20/1	Spare
Spare	20/1	23							24	20/1	Spare
Spare	20/1	25							26	20/1	Spare
Spare	20/1	27							28	20/1	Spare
Spare	20/1	29							30	20/1	Spare
		31							32		
		33							34		
		35							36		
		37							38		
		39							40		
		41							42		
Left Side Subtotal			0.7	0.5	0.5					Recep(R):	1.8 kVA
Right Side Subtotal			0.0	0.0	0.0					Continuous(C):	0.0 kVA
Total Load per Phase			0.7	0.5	0.5					Non-continuous(N):	0.0 kVA
										Total Connected Load:	1.8 kVA
										Total Demand Load (D):	1.8 kVA

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I hereby certify that this plan or drawing was prepared by me or under my direct supervision and that I am a duly licensed ELECTRICAL ENGINEER under the laws of the State of Minnesota.

For AFFILIATED ENGINEERS, INC.

By

Name RONALD M. PARSLEY

Date 02-24-2012 Reg. No. 25163

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Project

Physics and Nanotechnology Building

U of M Project # 01-155-08-1718

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ELECTRICAL PANEL SCHEDULES

3 Phase Panelboard Schedule

Panel Designation: EH5A Floor: PENTHOUSE Project No. 08643-00
480Y/277 Volt 3 Phase 4 Wire + Ground
Bus Rating: 100 A Main Lugs: 100 A 30 kAIC Fault Current Rating
Remarks:

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
Spare	20/1	1				0.6			2	20/1	Lighting
Spare	20/1	3					0.4		4	20/1	Exits
Spare	20/1	5						1.1	6	20/1	Lighting
Spare	20/1	7							8	20/1	Spare
Spare	20/1	9							10	20/1	Spare
Spare	20/1	11							12	20/1	Spare
Spare	20/1	13							14	20/1	Spare
Spare	20/1	15							16	20/1	Spare
Spare	20/1	17							18	20/1	Spare
Spare	20/1	19							20	20/1	Spare
Space	20/1	21							22	20/1	Space
Space	20/1	23							24	20/1	Space
Space	20/1	25							26	20/1	Space
Space	20/1	27							28	20/1	Space
Space	20/1	29							30	20/1	Space
		31							32		
		33							34		
		35							36		
		37							38		
		39							40		
		41							42		

Recep(R): 2.1 kVA
Left Side Subtotal 0.0 0.0 0.0 Continuous(C): 0.0 kVA
Right Side Subtotal 0.6 0.4 1.1 Non-continuous(N): 0.0 kVA
Total Load per Phase 0.6 0.4 1.1 Total Connected Load: 2.1 kVA
Total Demand Load (D): 2.1 kVA

3 Phase Panelboard Schedule

Panel Designation: EH4A Floor: FOURTH Project No. 08643-00
480Y/277 Volt 3 Phase 4 Wire + Ground
Bus Rating: 100 A Main Lugs: 100 A 30 kAIC Fault Current Rating
Remarks:

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
Spare	20/1	1				0.5			2	20/1	Exits
Spare	20/1	3					1.5		4	20/1	Lighting Labs
Spare	20/1	5						1.6	6	20/1	Lighting Corridor
Spare	20/1	7				0.2			8	20/1	Lighting
Spare	20/1	9							10	20/1	Spare
Spare	20/1	11							12	20/1	Spare
Spare	20/1	13							14	20/1	Spare
Spare	20/1	15							16	20/1	Spare
Spare	20/1	17							18	20/1	Spare
Spare	20/1	19							20	20/1	Spare
Space	20/1	21							22	20/1	Space
Space	20/1	23							24	20/1	Space
Space	20/1	25							26	20/1	Space
Space	20/1	27							28	20/1	Space
Space	20/1	29							30	20/1	Space
		31							32		
		33							34		
		35							36		
		37							38		
		39							40		
		41							42		

Recep(R): 3.8 kVA
Left Side Subtotal 0.0 0.0 0.0 Continuous(C): 0.0 kVA
Right Side Subtotal 0.7 1.5 1.6 Non-continuous(N): 0.0 kVA
Total Load per Phase 0.7 1.5 1.6 Total Connected Load: 3.8 kVA
Total Demand Load (D): 3.8 kVA

3 Phase Panelboard Schedule

Panel Designation: EH3A Floor: THIRD Project No. 08643-00
480Y/277 Volt 3 Phase 4 Wire + Ground
Bus Rating: 100 A Main Lugs: 100 A 30 kAIC Fault Current Rating
Remarks:

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
Spare	20/1	1				0.5			2	20/1	Exits
Spare	20/1	3					1.5		4	20/1	Lighting Labs
Spare	20/1	5						1.6	6	20/1	Lighting Corridor
Spare	20/1	7				0.2			8	20/1	Lighting
Spare	20/1	9							10	20/1	Spare
Spare	20/1	11							12	20/1	Spare
Spare	20/1	13							14	20/1	Spare
Spare	20/1	15							16	20/1	Spare
Spare	20/1	17							18	20/1	Spare
Spare	20/1	19							20	20/1	Spare
Space	20/1	21							22	20/1	Space
Space	20/1	23							24	20/1	Space
Space	20/1	25							26	20/1	Space
Space	20/1	27							28	20/1	Space
Space	20/1	29							30	20/1	Space
		31							32		
		33							34		
		35							36		
		37							38		
		39							40		
		41							42		

Recep(R): 3.8 kVA
Left Side Subtotal 0.0 0.0 0.0 Continuous(C): 0.0 kVA
Right Side Subtotal 0.7 1.5 1.6 Non-continuous(N): 0.0 kVA
Total Load per Phase 0.7 1.5 1.6 Total Connected Load: 3.8 kVA
Total Demand Load (D): 3.8 kVA

3 Phase Panelboard Schedule

Panel Designation: EH2A Floor: SECOND Project No. 08643-00
480Y/277 Volt 3 Phase 4 Wire + Ground
Bus Rating: 100 A Main Lugs: 100 A 30 kAIC Fault Current Rating
Remarks:

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
Spare	20/1	1				0.4			2	20/1	Exits
Spare	20/1	3					1.5		4	20/1	Lighting Labs
Spare	20/1	5						1.6	6	20/1	Lighting Corridor
Spare	20/1	7				0.2			8	20/1	Lighting
Spare	20/1	9							10	20/1	Spare
Spare	20/1	11							12	20/1	Spare
Spare	20/1	13							14	20/1	Spare
Spare	20/1	15							16	20/1	Spare
Spare	20/1	17							18	20/1	Spare
Spare	20/1	19							20	20/1	Spare
Space	20/1	21							22	20/1	Space
Space	20/1	23							24	20/1	Space
Space	20/1	25							26	20/1	Space
Space	20/1	27							28	20/1	Space
Space	20/1	29							30	20/1	Space
		31							32		
		33							34		
		35							36		
		37							38		
		39							40		
		41							42		

Recep(R): 3.7 kVA
Left Side Subtotal 0.0 0.0 0.0 Continuous(C): 0.0 kVA
Right Side Subtotal 0.6 1.5 1.6 Non-continuous(N): 0.0 kVA
Total Load per Phase 0.6 1.5 1.6 Total Connected Load: 3.7 kVA
Total Demand Load (D): 3.7 kVA

3 Phase Panelboard Schedule

Panel Designation: EH1A Floor: FIRST Project No. 08643-00
480Y/277 Volt 3 Phase 4 Wire + Ground
Bus Rating: 100 A Main Lugs: 100 A 30 kAIC Fault Current Rating
Remarks:

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
Ltg Cleanroom Exits	20/1	1	0.4			0.1			2	20/1	Lighting Exterior
Lighting Cleanroom	20/1	3		0.9			0.4		4	20/1	Exits
Lighting Cleanroom	20/1	5			1.5			0.5	6	20/1	Lighting Corridor
Ltg Cleanroom Int	20/1	7	0.8			0.1			8	20/1	Lighting
Spare	20/1	9							10	20/1	Spare
Spare	20/1	11							12	20/1	Spare
Spare	20/1	13							14	20/1	Spare
Spare	20/1	15							16	20/1	Spare
Spare	20/1	17							18	20/1	Spare
Spare	20/1	19							20	20/1	Spare
Space	20/1	21							22	20/1	Space
Space	20/1	23							24	20/1	Space
Space	20/1	25							26	20/1	Space
Space	20/1	27							28	20/1	Space
Space	20/1	29							30	20/1	Space
		31							32		
		33							34		
		35							36		
		37							38		
		39							40		
		41							42		

Recep(R): 4.7 kVA
Left Side Subtotal 1.2 0.9 1.5 Continuous(C): 0.0 kVA
Right Side Subtotal 0.2 0.4 0.5 Non-continuous(N): 0.0 kVA
Total Load per Phase 1.4 1.3 2.0 Total Connected Load: 4.7 kVA
Total Demand Load (D): 4.7 kVA

3 Phase Panelboard Schedule

Panel Designation: EHBA Floor: BASEMENT Project No. 08643-00
480Y/277 Volt 3 Phase 4 Wire + Ground
Bus Rating: 100 A Main Lugs: 100 A 30 kAIC Fault Current Rating
Remarks:

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
Spare	20/1	1				0.4			2	20/1	Exits
Spare	20/1	3					0.6		4	20/1	Lighting Corridor
Spare	20/1	5						0.2	6	20/1	Lighting
Spare	20/1	7				0.3			8	20/1	Lighting Stair #1
Spare	20/1	9					0.3		10	20/1	Lighting Stair #2
Spare	20/1	11						0.2	12	20/1	Lighting Tunnel
Spare	20/1	13				0.2			14	20/1	Lighting
Spare	20/1	15							16	20/1	Spare
Spare	20/1	17							18	20/1	Spare
Spare	20/1	19							20	20/1	Spare
Space	20/1	21							22	20/1	Space
Space	20/1	23							24	20/1	Space
Space	20/1	25							26	20/1	Space
Space	20/1	27							28	20/1	Space
Space	20/1	29							30	20/1	Space
		31							32		
		33							34		
		35							36		
		37							38		
		39							40		
		41							42		

Recep(R): 2.2 kVA
Left Side Subtotal 0.0 0.0 0.0 Continuous(C): 0.0 kVA
Right Side Subtotal 0.9 0.9 0.4 Non-continuous(N): 0.0 kVA
Total Load per Phase 0.9 0.9 0.4 Total Connected Load: 2.2 kVA
Total Demand Load (D): 2.2 kVA

3 Phase Panelboard Schedule

Panel Designation: EL5A Floor: PENTHOUSE Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 10 kAIC Fault Current Rating
Remarks:

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
5-108 Fire Alarm	20/1	1	0.5			0.5			2	20/1	4-159 Fire Alarm
5-108 Fire Alarm	20/1	3		0.5			0.5		4	20/1	4-159 Fire Alarm
Elev 1 Lts	20/1	5			1			1	6	30/1	Elev 2 Lts
Elev 1 Brk	30/1	7	1			1			8	30/1	Elev 2 Brk
5-104 Rcpts	30/1	9		0.18			0.2		10	20/1	5-109 PLC panel
5-104 Rcpts	20/1	11			0.18			0.2	12	20/1	5-104 Scada
Spare	20/1	13				0.1			14	20/1	5-104 Sub Meter
Spare	20/1	15					0.1		16	20/1	5-104 Sub Meter
Spare	20/1	17						0.1	18	20/1	5-104 Sub Meter
Spare	20/1	19				0.1			20	20/1	5-104 Sub Meter
Space	20/1	21							22	20/1	Space
Space	20/1	23							24	20/1	Space
Space	20/1	25							26	20/1	Space
Space	20/1	27							28	20/1	Space
Space	20/1	29							30	20/1	Space
		31							32		
		33							34		
		35							36		
		37							38		
		39							40		
		41							42		

Recep(R): 1.2 kVA
Left Side Subtotal 1.5 0.7 1.2 Continuous(C): 6.0 kVA
Right Side Subtotal 1.7 0.8 1.3 Non-continuous(N): 0.0 kVA
Total Load per Phase 3.2 1.5 2.5 Total Connected Load: 7.2 kVA
Total Demand Load (D): 7.2 kVA

3 Phase Panelboard Schedule

Panel Designation: EL2A Floor: SECOND Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 10 kAIC Fault Current Rating
Remarks:

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
1-159 Fire Alarm	20/1	1	0.5			0.5			2	20/1	2-159 Fire Alarm
1-159 Fire Alarm	20/1	3		0.5			0.5		4	20/1	2-159 Fire Alarm
1-159 Fire Alarm	20/1	5			0.5			0.5	6	20/1	3-159 Fire Alarm
2-180 Damper	20/1	7	0.2						8	20/1	3-159 Fire Alarm
2-180 PLC panel	20/1	9		0.2					10	20/1	Spare
2-180 PLC panel	20/1	11			0.2				12	20/1	Spare
2-180 PLC panel	20/1	13	0.2						14	20/1	Spare
Spare	20/1	15							16	20/1	Spare
Spare	20/1	17							18	20/1	Spare
Spare	20/1	19							20	20/1	Spare
Space	20/1	21							22	20/1	Space
Space	20/1	23							24	20/1	Space
Space	20/1	25							26	20/1	Space
Space	20/1	27							28	20/1	Space
Space	20/1	29							30	20/1	Space
		31							32		
		33							34		
		35							36		
		37							38		
		39							40		
		41							42		

Recep(R): 0.8 kVA
Left Side Subtotal 0.9 0.7 0.7 Continuous(C): 3.0 kVA
Right Side Subtotal 0.5 0.5 0.5 Non-continuous(N): 0.0 kVA
Total Load per Phase 1.4 1.2 1.2 Total Connected Load: 3.8 kVA
Total Demand Load (D): 3.8 kVA

3 Phase Panelboard Schedule

Panel Designation: ELBA Floor: BASEMENT Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 225 A Main Lugs 225 A 10 kAIC Fault Current Rating
Remarks:

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
B-159 Fire Alarm	20/1	1	0.5			0.2			2	20/1	G-W Ctrl
B-159 Fire Alarm	20/1	3		0.5			0.5		4	20/1	Clean Room PLC
B-158 Rcpts	20/1	5			0.18			0.5	6	20/1	Clean Room Doors
B-158 Rcpts	20/1	7	0.18			0.1			8	20/1	Exterior Ltg
B-158 Scada	20/1	9		0.18					10	20/1	Spare
B-164 PLC panel	20/1	11			0.2				12	20/1	Spare
B-164 Rcpt	20/1	13	0.18						14	20/1	Spare
B-162 Rcpt	20/1	15		0.18					16	20/1	Spare
B-164 Rcpt	20/1	17			0.18				18	20/1	Spare
Spare	20/1	19							20	20/1	Spare
Space	20/1	21							22	20/1	Space
Space	20/1	23							24	20/1	Space
Space	20/1	25							26	20/1	Space
Space	20/1	27							28	20/1	Space
Space	20/1	29							30	20/1	Space

Recep(R): 2.4 kVA
Left Side Subtotal 0.9 0.9 0.6 Continuous(C): 1.2 kVA
Right Side Subtotal 0.3 0.5 0.5 Non-continuous(N): 0.0 kVA
Total Load per Phase 1.2 1.4 1.1 Total Connected Load: 3.6 kVA
Total Demand Load (D): 3.6 kVA

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For AFFILIATED ENGINEERS, INC.
By
Name RONALD M. PARSLEY
Date 02-24-2012 Reg. No. 25163

Issued for	Date
100% CD set	12-16-2011
Bid Package No. 2	02-24-2012
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Physics and Nanotechnology Building

U of M Project # 01-155-08-1718

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ELECTRICAL PANEL SCHEDULES

3 Phase Panelboard Schedule

Panel Designation: NH1A Floor: FIRST Project No. 08643-00
480Y/277 Volt 3 Phase 4 Wire + Ground
Bus Rating: 250 A Main Lugs 250 A 22 kAIC Fault Current Rating
Remarks:

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
High Bay Crane	60/3	1	9						2	20/1	Spare
|	|	3		9				4	20/1	Spare
|	|	5			9			6	20/1	Spare
Spare	20/1	7							8	20/1	Spare
Spare	20/1	9							10	20/1	Spare
Spare	20/1	11							12	20/1	Spare
Spare	20/1	13							14	20/1	Spare
Spare	20/1	15							16	20/1	Spare
Spare	20/1	17							18	20/1	Spare
Spare	20/1	19							20	20/1	Spare
Spare	20/1	21							22	20/1	Spare
Spare	20/1	23							24	20/1	Spare
Spare	20/1	25							26	20/1	Spare
Spare	20/1	27							28	20/1	Spare
Spare	20/1	29							30	20/1	Spare
Spare	20/1	31							32	20/1	Spare
Spare	20/1	33							34	20/1	Spare
Spare	20/1	35							36	20/1	Spare
Spare	20/1	37							38	20/1	Spare
Spare	20/1	39							40	20/1	Spare
Space	20/1	41							42	20/1	Spare
											Recep(R): 0.0 kVA
Left Side Subtotal			9.0	9.0	9.0						Continuous(C): 0.0 kVA
Right Side Subtotal			0.0	0.0	0.0						Non-continuous(N): 27.0 kVA
Total Load per Phase			9.0	9.0	9.0						Total Connected Load: 27.0 kVA
											Total Demand Load (D): 27.0 kVA

3 Phase Panelboard Schedule

Panel Designation: N5A Floor: PENTHOUSE Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 100 A Main Lugs 100 A 10 kAIC Fault Current Rating
Remarks:

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
5-109 Rcpts	20/1	1	0.54			0.18			2	20/1	5-111 Rcpt
5-108 Rcpts	20/1	3		0.54			0.18		4	20/1	5-107 Rcpt
5-108 Rcpts	20/1	5			0.54			0.18	6	20/1	5-107 Rcpt
5-109 Rcpts	20/1	7	0.54			0.18			8	20/1	5-107 Rcpt
Roof Rcpts	20/1	9		0.36			1		10	60/3	Mech Rm Welding
Spare	20/1	11						1	12	|	|
Spare	20/1	13				1			14	|	|
Spare	20/1	15							16	20/1	Spare
Spare	20/1	17							18	20/1	Spare
Spare	20/1	19							20	20/1	Spare
Space	20/1	21							22	20/1	Space
Space	20/1	23							24	20/1	Space
Space	20/1	25							26	20/1	Space
Space	20/1	27							28	20/1	Space
PP-1	20/1	29			1.2			0.92	30	25/2	HRW-L1
PP-2	20/1	31	0.5			0.92			32	|	|
Water Heater Ctrls	20/1	33		0.2			0.92		34	25/2	HRW-L2
Water Heater Ctrls	20/1	35			0.2			0.92	36	|	|
CUH-6	15/1	37	0.2			0.6			38	20/1	AHU LTG & Rcpts
AHU LTG & Rcpts	20/1	39		0.6			0.6		40	20/1	AHU LTG & Rcpts
CV-1, 2 Ctrls	20/1	41			0.4			0.2	42	20/1	CSG-1 Ctrls
											Recep(R): 8.3 kVA
Left Side Subtotal			1.8	1.7	2.3						Continuous(C): 6.1 kVA
Right Side Subtotal			2.9	2.7	3.2						Non-continuous(N): 0.2 kVA
Total Load per Phase			4.7	4.4	5.6						Total Connected Load: 14.6 kVA
											Total Demand Load (D): 14.6 kVA

3 Phase Panelboard Schedule

Panel Designation: N5B Floor: PENTHOUSE Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 100 A Main Lugs 100 A 10 kAIC Fault Current Rating
Remarks: * Provide 30mA GFCI breaker for heat trace circuits

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
Roof Rcpts	20/1	1	0.72			1			2	60/3	Mech Rm Welding
5-109 Rcpts	20/1	3		0.72			1		4	|	|
5-109 Rcpts	20/1	5			0.72			1	6	|	|
5-106,10 Rcpts	20/1	7	0.72						8	20/1	Spare
5-105,6,10 Rcpts	20/1	9		0.72					10	20/1	Spare
5-105,6 Rcpts	20/1	11			0.54				12	20/1	Spare
5-102 Rcpts	20/1	13	0.72						14	20/1	Spare
Spare	20/1	15							16	20/1	Spare
Spare	20/1	17							18	20/1	Spare
Spare	20/1	19							20	20/1	Spare
Space	20/1	21					0.92		22	25/2	HRW-L1
Space	20/1	23						0.92	24	|	|
Dampers	20/1	25	0.2			0.92			26	25/2	HRW-L2
Spare	20/1	27					0.92		28	|	|
AHU LTG & Rcpts	20/1	29			0.5			0.2	30	20/1*	Heat Trace drain
HRU Ctrls	20/1	31	0.2			0.6			32	20/1*	Heat Trace
HRU LTG & Rcpts	20/1	33		0.6			0.6		34	20/1	AHU LTG & Rcpts
HRU Ctrls	20/1	35			0.2			0.6	36	20/1	AHU LTG & Rcpts
HRU LTG & Rcpts	20/1	37	0.6			0.6			38	20/1	AHU LTG & Rcpts
CSG-CR1 Ctrls	20/1	39		0.2			0.2		40	20/1	Dampers
Spare	20/1	41						0.87	42	20/1	Glycol Fill System
											Recep(R): 7.9 kVA
Left Side Subtotal			3.2	2.2	2.0						Continuous(C): 9.5 kVA
Right Side Subtotal			3.1	3.6	3.6						Non-continuous(N): 0.4 kVA
Total Load per Phase			6.3	5.9	5.6						Total Connected Load: 17.7 kVA
											Total Demand Load (D): 17.7 kVA

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For AFFILIATED ENGINEERS, INC.

By

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Project

Physics and Nanotechnology Building

U of M Project # 01-155-08-1718

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ELECTRICAL PANEL SCHEDULES

e9.16

Motor Schedule

Motor Number Tag	Motor Name	Location	EM Power	Panel	Overcurrent Protection Device	Volts	Phase	HP or Amps	Wire and Conduit Minimum Size	NEMA STARTER/ VFD	LOCAL FUSED DISC. AT MOTOR. AMP/FUSE/POLES	REMARKS
1	AHU-L1	5-109		SWBD MTR4	110/3	480	3	60 HP	1 1/4" - 3#3, 1#6 GND	VFD BY MC		PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, VFD, AND MOTOR.
2	AHU-L2	5-109		SWBD MTR4	110/3	480	3	60 HP	1 1/4" - 3#3, 1#6 GND	VFD BY MC		PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, VFD, AND MOTOR.
3	AHU-L3	5-109		SWBD MTR4	110/3	480	3	60 HP	1 1/4" - 3#3, 1#6 GND	VFD BY MC		PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, VFD, AND MOTOR.
4	AHU-L4	5-109		SWBD MTR4	110/3	480	3	60 HP	1 1/4" - 3#3, 1#6 GND	VFD BY MC		PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, VFD, AND MOTOR.
9	AHU-O1	5-109		SWBD MTR3	110/3	480	3	60 HP	1 1/4" - 3#3, 1#6 GND	VFD BY MC		PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, VFD, AND MOTOR.
10	HRW-L1	5-109		N5A	25/2	208	1	1 HP	3/4" - 2#12, 1#12 GND	VFD BY MC		PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, VFD, AND MOTOR.
11	HRW-L2	5-109		N5A	25/2	208	1	1 HP	3/4" - 2#12, 1#12 GND	VFD BY MC		PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, VFD, AND MOTOR.
12	HRW-L3	5-109		N5B	25/2	208	1	1 HP	3/4" - 2#12, 1#12 GND	VFD BY MC		PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, VFD, AND MOTOR.
13	HRW-L4	5-109		N5B	25/2	208	1	1 HP	3/4" - 2#12, 1#12 GND	VFD BY MC		PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, VFD, AND MOTOR.
28	NOT USED											
29	CP-2 (TWO MOTORS)	STEAM TUNNEL		NBC	30/1	120	1	2 x 1/3 HP	3/4" - 2#10, 1#10 GND	FVNR BY MC		PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTORS.
30	NOT USED											
31	P-HWP-1	5-109		SWBD MTR4	90/3	480	3	40 HP	1 1/4" - 3#4, 1#8 GND	VFD BY MC		PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, VFD, AND MOTOR. ONLY ONE OF THE TWO PUMPS RUNS AT A TIME.
32	P-HWP-2	5-109		SWBD MTR4	90/3	480	3	40 HP	1 1/4" - 3#4, 1#8 GND	VFD BY MC		PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, VFD, AND MOTOR. ONLY ONE OF THE TWO PUMPS RUNS AT A TIME.
33	P-HWP-L1	5-109		SWBD MTR3	15/3	480	3	1.5 HP	3/4" - 3#12, 1#12 GND	COMBINATION NEMA 0 FVNR AND FUSED DISCONNECT BY EC	30/4.5/3	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR. LOCATE STARTER/DISC WITHIN 3' OF MOTOR.
34	P-HWP-L2	5-109		SWBD MTR3	15/3	480	3	1.5 HP	3/4" - 3#12, 1#12 GND	COMBINATION NEMA 0 FVNR AND FUSED DISCONNECT BY EC	30/4.5/3	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR. LOCATE STARTER/DISC WITHIN 3' OF MOTOR.
35	P-HWP-L3	5-109		SWBD MTR3	15/3	480	3	1.5 HP	3/4" - 3#12, 1#12 GND	COMBINATION NEMA 0 FVNR AND FUSED DISCONNECT BY EC	30/4.5/3	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR. LOCATE STARTER/DISC WITHIN 3' OF MOTOR.
36	P-HWP-L4	5-109		SWBD MTR4	15/3	480	3	1.5 HP	3/4" - 3#12, 1#12 GND	COMBINATION NEMA 0 FVNR AND FUSED DISCONNECT BY EC	30/4.5/3	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR. LOCATE STARTER/DISC WITHIN 3' OF MOTOR.
39	EF-LE-1	ROOF		SWBD MTR4	110/3	480	3	60 HP	1 1/4" 3#3, 1#6 GND	VFD BY MC	200/100/3 NEMA 3R	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, VFD IN PENTHOUSE, MOTOR DISCONNECT AND MOTOR. ONLY 3 OF 4 RUN AT A TIME.
40	EF-LE-2	ROOF		SWBD MTR4	110/3	480	3	60 HP	1 1/4" 3#3, 1#6 GND	VFD BY MC	200/100/3 NEMA 3R	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, VFD IN PENTHOUSE, MOTOR DISCONNECT AND MOTOR. ONLY 3 OF 4 RUN AT A TIME.
41	EF-LE-3	ROOF		SWBD MTR4	110/3	480	3	60 HP	1 1/4" 3#3, 1#6 GND	VFD BY MC	200/100/3 NEMA 3R	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, VFD IN PENTHOUSE, MOTOR DISCONNECT AND MOTOR. ONLY 3 OF 4 RUN AT A TIME.
42	EF-FE-1	ROOF		SWBD MTR3	110/3	480	3	60 HP	1 1/4" - 3#3, 1#6 GND	VFD BY MC	200/100/3 NEMA 3R	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, VFD IN PENTHOUSE, MOTOR DISCONNECT AND MOTOR. ONLY 1 OF 2 RUN AT A TIME.
43	EF-FE-2	ROOF		SWBD MTR3	110/3	480	3	60 HP	1 1/4" - 3#3, 1#6 GND	VFD BY MC	200/100/3 NEMA 3R	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, VFD IN PENTHOUSE, MOTOR DISCONNECT AND MOTOR. ONLY 1 OF 2 RUN AT A TIME.
48	RF-01	5-109		SWBD MTR3	80/3	480	3	25 HP	3/4" 3#8, 1#8 GND	VFD BY MC		PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, VFD, AND MOTOR.
53	EF-BE1	5-109		SWBD MTR4	20/3	480	3	1.5	3/4" 3#12, 1#12 GND	VFD BY MC	30/10/3 NEMA 3R	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, VFD IN PENTHOUSE, MOTOR DISCONNECT, AND MOTOR.
54	NOT USED											
55	P-CH-1	B-164		NBHA	175/3	480	3	100 HP	2" - 3#2/0, 1#6 GND	VFD BY MC		PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, VFD, AND MOTOR. ONLY 1 OF 2 RUN AT A TIME.
56	P-CH-2	B-164		NBHA	175/3	480	3	100 HP	2" - 3#2/0, 1#6 GND	VFD BY MC		PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, VFD, AND MOTOR. ONLY 1 OF 2 RUN AT A TIME.
57	SF-ST-1	B164		NBHA	15/3	480	3	1.5 HP	3/4" - 3#12, 1#12 GND	COMBINATION NEMA 0 FVNR AND FUSED DISCONNECT BY EC	30/4/3	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR.
60	P-PCH-3	5-109		SWBD MTR3	70/3	480	3	20 HP	3/4" - 3#8, 1#8 GND	VFD BY MC		PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, VFD, AND MOTOR. ONLY 1 OF 2 RUN AT A TIME.
61	P-PCH-4	5-109		SWBD MTR3	70/3	480	3	20 HP	3/4" - 3#8, 1#8 GND	VFD BY MC		PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, VFD, AND MOTOR. ONLY 1 OF 2 RUN AT A TIME.
66	P-BCH-1	5-109		SWBD MTR3	30/3	480	3	7.5 HP	3/4" - 3#12, 1#12 GND	VFD BY MC		PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, VFD, AND MOTOR. ONLY 1 OF 2 RUN AT A TIME.
67	P-BCH-2	5-109		SWBD MTR3	30/3	480	3	7.5 HP	3/4" - 3#12, 1#12 GND	VFD BY MC		PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, VFD, AND MOTOR. ONLY 1 OF 2 RUN AT A TIME.
70	HE COMPRESSOR 1	B-166A		NBHA	40/3	480	3	40A	1" - 3#8, 1#10 GND	W/ UNIT	60/40/3	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, FUSED DISCONNECT,AND MOTOR.
71	HE COMPRESSOR 2	B-166A		NBHA	40/3	480	3	40A	1" - 3#8, 1#10 GND	W/ UNIT	60/40/3	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, FUSED DISCONNECT,AND MOTOR.
72	SCREW COMPRESSOR	B-166A		NBHA	200/3	480	3	124A	2" - 3#3/0, 1#6 GND	W/ UNIT	200/175/3	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, FUSED DISCONNECT,AND MOTOR.
74	DUNHAM BUSH COMPRESSOR	B-166A		DPBN	200/3	208	3	124 A	2" - 3#3/0, 1#6 GND	W/ UNIT	200/175/3	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, FUSED DISCONNECT, AND MOTOR.
75	FCU-2	B-164		NBC	15/3	208	3	0.5 HP	3/4" - 3#12, 1#12 GND	COMBINATION NEMA 0 FVNR AND FUSED DISCONNECT BY EC	30/3/3	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR. LOCATE STARTER/DISC WITHIN 3' OF MOTOR.
76	FCU-3	B-163		RPBA	20/3	208	3	1.5 HP	3/4" - 3#12, 1#12 GND	COMBINATION NEMA 0 FVNR AND FUSED DISCONNECT BY EC	30/6/3	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR. LOCATE STARTER/DISC WITHIN 3' OF MOTOR.
77	FCU-4	B-159		RPBA	15/3	208	3	0.5 HP	3/4" - 3#12, 1#12 GND	COMBINATION NEMA 0 FVNR AND FUSED DISCONNECT BY EC	30/3/3	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR. LOCATE STARTER/DISC WITHIN 3' OF MOTOR.
78	FCU-5	B-160		RPBA	20/1	120	1	0.33 HP	3/4" - 2#12, 1#12 GND	COMBINATION NEMA 0 FVNR AND FUSED DISCONNECT BY EC	30/6/1	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR. LOCATE STARTER/DISC WITHIN 3' OF MOTOR.
79	FCU-6	1-154		RP1A	15/3	208	3	0.5 HP	3/4" - 3#12, 1#12 GND	COMBINATION NEMA 0 FVNR AND FUSED DISCONNECT BY EC	30/3/3	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR. LOCATE STARTER/DISC WITHIN 3' OF MOTOR.
80	FCU-7	1-159		RP1A	15/3	208	3	0.5 HP	3/4" - 3#12, 1#12 GND	COMBINATION NEMA 0 FVNR AND FUSED DISCONNECT BY EC	30/3/3	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR. LOCATE STARTER/DISC WITHIN 3' OF MOTOR.
81	FCU-8	2-151		RP2A	15/3	208	3	0.5 HP	3/4" - 3#12, 1#12 GND	COMBINATION NEMA 0 FVNR AND FUSED DISCONNECT BY EC	30/3/3	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR. LOCATE STARTER/DISC WITHIN 3' OF MOTOR.
82	FCU-9	2-159		RP2A	15/3	208	3	0.5 HP	3/4" - 3#12, 1#12 GND	COMBINATION NEMA 0 FVNR AND FUSED DISCONNECT BY EC	30/3/3	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR. LOCATE STARTER/DISC WITHIN 3' OF MOTOR.
83	FCU-10	3-156		RP3A	15/3	208	3	0.5 HP	3/4" - 3#12, 1#12 GND	COMBINATION NEMA 0 FVNR AND FUSED DISCONNECT BY EC	30/3/3	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR. LOCATE STARTER/DISC WITHIN 3' OF MOTOR.
84	FCU-11	3-159		RP3A	15/3	208	3	0.5 HP	3/4" - 3#12, 1#12 GND	COMBINATION NEMA 0 FVNR AND FUSED DISCONNECT BY EC	30/3/3	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR. LOCATE STARTER/DISC WITHIN 3' OF MOTOR.
85	FCU-12	4-156		RP4A	15/3	208	3	0.5 HP	3/4" - 3#12, 1#12 GND	COMBINATION NEMA 0 FVNR AND FUSED DISCONNECT BY EC	30/3/3	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR. LOCATE STARTER/DISC WITHIN 3' OF MOTOR.
86	FCU-13	4-159		RP4A	15/3	208	3	0.5 HP	3/4" - 3#12, 1#12 GND	COMBINATION NEMA 0 FVNR AND FUSED DISCONNECT BY EC	30/3/3	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR. LOCATE STARTER/DISC WITHIN 3' OF MOTOR.
87	FCU-14	1-140		RP1A	15/1	120	1	0.33 HP	3/4" - 2#12, 1#12 GND	COMBINATION NEMA 0 FVNR AND FUSED DISCONNECT BY EC	30/6/1	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR. LOCATE STARTER/DISC WITHIN 3' OF MOTOR.
88	FCU-24	1-170		RP1A	15/3	208	3	0.75 HP	3/4" - 3#12, 1#12 GND	COMBINATION NEMA 0 FVNR AND FUSED DISCONNECT BY EC	30/4.5/3	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR. LOCATE STARTER/DISC WITHIN 3' OF MOTOR.
89	EF-LE-4	ROOF		SWBD MTR4	110/3	480	3	60 HP	1 1/4" 3#3, 1#6 GND	VFD BY MC	200/100/3 NEMA 3R	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, VFD IN PENTHOUSE, MOTOR DISCONNECT AND MOTOR. ONLY 3 OF 4 RUN AT A TIME.
90	FCU-17	5-102		SWBD MTR3	15/3	480	3	0.5 HP	3/4" - 3#12, 1#12 GND	COMBINATION NEMA 0 FVNR AND FUSED DISCONNECT BY EC	30/1.4/3	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR. LOCATE STARTER/DISC WITHIN 3' OF MOTOR.
91	FCU-18	5-102		SWBD MTR4	15/3	480	3	0.75 HP	3/4" - 3#12, 1#12 GND	COMBINATION NEMA 0 FVNR AND FUSED DISCONNECT BY EC	30/2/3	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR. LOCATE STARTER/DISC WITHIN 3' OF MOTOR.
92	FCU-19	1-104B		RP1B	15/3	208	3	0.75 HP	3/4" - 3#12, 1#12 GND	COMBINATION NEMA 0 FVNR AND FUSED DISCONNECT BY EC	30/4.5/3	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR. LOCATE STARTER/DISC WITHIN 3' OF MOTOR.
96	UH-1	1-160		RP1A	15/1	120	1	0.33 HP	3/4" - 2#12, 1#12 GND	W/ UNIT	20A NON FUSED	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, DISCONNECT, AND LOAD.
97	UH-2	1-160		RP1A	15/1	120	1	0.33 HP	3/4" - 2#12, 1#12 GND	W/ UNIT	20A NON FUSED	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, DISCONNECT, AND LOAD.
98	UH-3	1-162		N1E	15/1	120	1	0.33 HP	3/4" - 2#12, 1#12 GND	W/ UNIT	20A NON FUSED	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, DISCONNECT, AND LOAD.
99	UH-4	1-162		N1E	15/1	120	1	0.33 HP	3/4" - 2#12, 1#12 GND	W/ UNIT	20A NON FUSED	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, DISCONNECT, AND LOAD.
100	CUH-3	1-161B		RP1A	15/1	120	1	0.08 HP	3/4" - 2#12, 1#12 GND	W/ UNIT	W/ UNIT	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER AND LOAD.
101	CUH-4	1-170A		RP1A	15/1	120	1	0.03 HP	3/4" - 2#12, 1#12 GND	W/ UNIT	W/ UNIT	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER AND LOAD.
102	CUH-5	1-101		RP1A	15/1	120	1	0.03 HP	3/4" - 2#12, 1#12 GND	W/ UNIT	W/ UNIT	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER AND LOAD.
103	CUH-6	STAIR 2 - ROOF		N5A	15/1	120	1	0.03 HP	3/4" - 2#12, 1#12 GND	W/ UNIT	W/ UNIT	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER AND LOAD.
105	PP-2	5-109		N5A	20/1	120	1	1/6	3/4" - 2#12, 1#12 GND	NON-FUSED DISCONNECT BY EC		PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, DISCONNECT, AND LOAD.
106	REF-M1	ROOF		SWBD MTR3	30/3	480	3	7.5 HP	3/4" - 3#12, 1#12 GND	COMBINATION FVNR AND FUSED DISCONNECT BY EC	30/15/3	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR.
107	PASSENGER ELEVATOR	5-111		SWBD MTR3	110/3	480	3	50HP (75 FLA)	1 1/4" - 3#3, 1#6 GND	W/ UNIT	200/100/3	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, LOCAL DISCONNECT, AND CONTROL PANEL.
108	FREIGHT ELEVATOR	5-107		SWBD MTR4	175/3	480	3	75HP (126 FLA)	2" - 3#2/0, 1#6 GND	W/ UNIT	200/175/3	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, LOCAL DISCONNECT, AND CONTROL PANEL.
109	FIRE PUMP	B-164A	X	SUB 3	SEE ONELINE	480	3	40 HP	SEE ONELINE	W/UNIT		PROVDE WIRING AND CONDUIT BETWEEN SWITCHBOARD, TRANSFER SWITCH, AND MOTOR (SEE ONELINE).
110	JOCKEY PUMP	B-164A	X	NBHA	15/3	480	3	0.75 HP	3/4" - 3#12, #12 GND	W/ UNIT		PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR.
111	SPRINKLER AIR COMPRESSOR	1-163		RP1A	25/1	120	1	0.5 HP	3/4" - 2#12, 1#12 GND	W/ UNIT		PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER AND LOAD.
112	PURE WATER PUMPS	B-164		NBHA	20/3	480	3	20A	3/4" - 3#12, 1#12 GND	W/ UNIT		PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER AND SKID CONTROL PANEL.
113	LVP-1	B-164		NBHA	100/3	480	3	3x15 HP	1 1/4" - 3#3, 1#6 GND	W/ UNIT		PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER AND SKID CONTROL PANEL.
117	FCU-23	5-109		SWBD MTR3	15/3	480	3	1.5 HP	3/4" - 3#12, 1#12 GND	COMBINATION NEMA 0 FVNR AND FUSED DISCONNECT BY EC	30/4/3	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR. LOCATE STARTER/DISC WITHIN 3' OF MOTOR.
118	FCU-20	B-169		RPBA	20/1	120	1	0.33 HP	3/4" - 2#12, 1#12 GND	COMBINATION NEMA 0 FVNR AND FUSED DISCONNECT BY EC	30/6/1	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR. LOCATE STARTER/DISC WITHIN 3' OF MOTOR.
119	FCU-21	B-167		NBHA	15/3	480	3	2 HP	3/4" - 3#12, 1#12 GND	COMBINATION NEMA 0 FVNR AND FUSED DISCONNECT BY EC	30/6/1	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR. LOCATE STARTER/DISC WITHIN 3' OF MOTOR.
120	PP-1	5-109		N5A	20/1	120	1	2/5 HP	3/4" - 3#12, 1#12 GND	NON-FUSED DISCONNECT BY EC		PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, DISCONNECT, AND LOAD.
125	AHU-E1	5-109		SWBD MTR3	30/3	480	3	7.5 HP	3/4" - 3#8, 1#10 GND	VFD BY MC		PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, VFD, AND MOTOR.
126	P-CHP-01	5-109		SWBD MTR3	15/3	480	3	1 HP	3/4" - 3#12, 1#12 GND	COMBINATION NEMA 0 FVNR AND FUSED DISCONNECT BY EC	30/4/3	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR. LOCATE STARTER/DISC WITHIN 3' OF MOTOR.
127	P-CHP-L1	5-109		SWBD MTR4	15/3	480	3	1 HP	3/4" - 3#12, 1#12 GND	COMBINATION NEMA 0 FVNR AND FUSED DISCONNECT BY EC	30/4/3	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR. LOCATE STARTER/DISC WITHIN 3' OF MOTOR.
128	P-CHP-L2	5-109		SWBD MTR4	15/3	480	3	1 HP	3/4" - 3#12, 1#12 GND	COMBINATION NEMA 0 FVNR AND FUSED DISCONNECT BY EC	30/4/3	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR. LOCATE STARTER/DISC WITHIN 3' OF MOTOR.
129	P-CHP-L3	5-109		SWBD MTR4	15/3	480	3	1 HP	3/4" - 3#12, 1#12 GND	COMBINATION NEMA 0 FVNR AND FUSED DISCONNECT BY EC	30/4/3	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR. LOCATE STARTER/DISC WITHIN 3' OF MOTOR.
130	P-CHP-L4	5-109		SWBD MTR4	15/3	480	3	1 HP	3/4" - 3#12, 1#12 GND	COMBINATION NEMA 0 FVNR AND FUSED DISCONNECT BY EC	30/4/3	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR. LOCATE STARTER/DISC WITHIN 3' OF MOTOR.
133	UH-5	3-154		RP3A	15/1	120	1	0.05 HP	3/4" - 2#12, 1#12 GND	W/ UNIT	20A NON FUSED	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, DISCONNECT, AND MOTOR.
134	UH-6	3-154		RP3A	15/1	120	1	0.05 HP	3/4" - 2#12, 1#12 GND	W/ UNIT	20A NON FUSED	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, DISCONNECT, AND MOTOR.
135	UH-7	3-162		RP3A	15/1	120	1	0.05 HP	3/4" - 2#12, 1#12 GND	W/ UNIT	20A NON FUSED	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, DISCONNECT, AND MOTOR.
136	UH-8	4-172		RP4A	15/1	120	1	0.05 HP	3/4" - 2#12, 1#12 GND	W/ UNIT	20A NON FUSED	PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, DISCONNECT, AND MOTOR.
137	SP-1	B-164		NBHA	15/3	480	3	1 HP	3/4" - 3#12, 1#12 GND	W/ UNIT		PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, DISCONNECT, AND LOAD.
138	SP-2	B-151		NBHA	15/3	480	3	1 HP	3/4" - 3#12, 1#12 GND	W/ UNIT		PROVDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, DISCONNECT, AND LOAD.

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I hereby certify that this plan or drawing was prepared by me or under my direct supervision and that I am a duly licensed ELECTRICAL ENGINEER under the laws of the State of Minnesota.

For AFFILIATED ENGINEERS, INC.

By

Name RONALD M. PARSLEY

Date 02-24-2012 Reg. No. 25163

Issued for	Date
100% CD set	12-16-2011
Bid Package No. 2	02-24-2012
Proposal Request No.4	05-09-2012
Project Directive No. 3	05-11-2012

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Checked SDM

Date 12/16/11

Project

Physics and Nanotechnology Building

U of M Project # 01-155-08-1718

UNIVERSITY OF MINNESOTA
Driven to Discover℠

ELECTRICAL MOTOR SCHEDULE

e9.17

TECHNOLOGY SYSTEMS FOR
University of Minnesota
Physics and Nanotechnology Building
Minneapolis, MN

Index of Drawings

General

T100 - Title/Index

Technology Floor Plans

T200 - Basement Level Floor Plan
CR T201 - Clean Room Floor Plan
T201 - Level 1 Floor Plan
T202 - Level 2 Floor Plan
T203 - Level 3 Floor Plan
T204 - Level 4 Floor Plan
T205 - Penthouse Level Floor Plan

Technology Details

T300 - Technology Details

Structured Cabling Legend

(Sections: 270000, 271000, 271100, 271300, 271500 & 271800)

- # — Number of Cat 5E Voice/Data Cables/Jacks
- Telecommunications Outlet
- W — Wall Mount Phone (One Cat 5E Jack/Cable)
- Device Mounted In Floor Mounted Box. Box By Others
- (AP) — Ceiling Mounted Outlet for Wireless AP (2 Cat5E Cables/Jacks)
- Cabling Sleeve (1-1/4" unless noted otherwise)
- Typical Ladder Rack (12" unless noted otherwise)
- Typical Basket Tray (12"x2" unless noted otherwise)
- Ceiling Mounted Device

Premise Security Legend

(Sections: 270000, 276000, 276100 & 276200)

- (CR) — Card Reader (Standard Single Gain reader)
- (CR)ML — Card Reader (Mullion Style Reader) Mounted on Frame UNO
- (DC) — Door Contact (3/4" Recessed, Magnetic Provided by this Contractor)
- (DC)OHD — Door Contact (Surface Mounted, Overhead Door, Provided by this Contractor)
- (REX) — Request to Exit (PIR Provided by this Contractor)
- • DC — Connect to door Contact. Door Contact Provided by Others
- •REX — Connect to Request to Exit (REX) Switch. REX Switch provided in Door Hardware (Door Hardware furnished by others)
- •EL — Connect to Electrified Latch (mortise or Panic Hardware) Hardware furnished by others
- •ELR — Connect to Electric Lock (mortise or Panic Hardware) with Remote Electric Dogging or Electric Latch Retraction. This Door will have a Local Lock Power Supply. Lock and Power Supply Switch furnished by others
- •ES — Connect to Electric Strike. Hardware by Others.
- (C) — Camera (Ceiling Mounted)
- (C) — Camera (Wall Mounted)
- PTZ — Pan Tilt Zoom
- PS Lock — Local Lock Power Supply furnished by Division 8 and installed by PSC. 120V connection by Electrical Contractor. Mount on wall in accessible ceiling space.
- PS Cam — Camera Power Supply furnished and installed by PSC. 120V connection by Electrical Contractor. Mount on wall in accessible ceiling space.

General Legend

- Detail Number / Sheet Number
- Detail Notations
- NORTH — North Arrow
- # — Keynotes

MER	Main Equipment Room
TR	Telecommunications Room
ETR	Existing to Remain
PBO	Provided by Others
AFF	Above Finished Floor
AC	Above Counter
EC	Division 26 Electrical Contractor
PSC	Physical Security Contractor
SCC	Structural Cabling Contractor
AVC	AV/Multimedia Contractor
UNO	Unless Noted Otherwise

General Notes

1. All cables shall be concealed.
2. All conduit measurements refer to standard conduit trade sizes.
3. Provide all required materials for a neatly dressed cabling pathway system as required and as indicated on these drawings and specifications.
4. Not all keynotes will be used on every sheet.
5. All grounding shall be provided by others.
6. No Patch Cords shall be provided by this Contractor.
7. Pathways and spaces, including cable tray, by Electrical Contractor. See Electrical Drawings for layout.
8. Structured Cabling Contractor shall be responsible for a complete horizontal cabling system including horizontal patch panels, horizontal cable, and work area outlets. Provide all materials, installation, testing, labeling, and warranty as required.
9. Structured Cabling Contractor shall not be responsible for TR (IDF/MDF) build out or backbone of any kind. Others will provide racks/ladder rack in TR's. Coordinate with owner for horizontal patch panel mounting locations.

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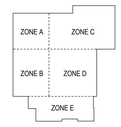
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Project

Physics and Nanotechnology Building
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Title/ Index Sheet

Not For Construction
T100



1 BASEMENT LEVEL FLOOR PLAN

1/8 = 1'-0"

KEYNOTES:

1. CARD READER, DOOR CONTACT, AND CONNECTION TO ELECTRIFIED DOOR HARDWARE/REX PROVIDED AS PART OF ALTERNATE #T-1.
2. CARD READER, DOOR CONTACT, AND CONNECTION TO ELECTRIFIED DOOR HARDWARE/REX PROVIDED AS PART OF ALTERNATE #T-2.
3. OUTLET MOUNTED IN OVERHEAD SERVICE CHASE. PATHWAYS AND SPACES PROVIDED BY OTHERS.
4. DEVICES PROVIDED AS PART OF ALTERNATIVE (CR-1)
5. ROUGH IN ONLY THIS DOOR. CARD ACCESS PROVIDED BY OTHERS FOR THIS DOOR.
6. ALL HORIZONTAL CABLES THIS SHEET TERMINATE IN THIS ROOM. HORIZONTAL PATCH PANELS PROVIDED BY THIS CONTRACTOR. RACKS AND CLOSET BUILD OUT BY OTHERS. COORDINATE PATCH PANEL MOUNTING WITH OWNER/RACK PROVIDER.
7. ALL HORIZONTAL CABLES THIS SHEET TERMINATE IN 4TH FLOOR IDF. COORDINATE PATCH PANEL MOUNTING WITH OWNER/RACK PROVIDER.
8. ALL HORIZONTAL CABLES IN THE CLEAN ROOM TERMINATE IN 2ND FLOOR IDF. COORDINATE PATCH PANEL MOUNTING WITH OWNER/RACK PROVIDER.
9. CEILING MOUNTED DATA OUTLET FOR DISPLAY MONITOR. DISPLAY PROVIDED BY OTHERS.
10. CORNER MOUNTED CAMERA PROVIDE SEAL TIGHT CONNECTION W/DRIP LOOP FROM SURFACE MOUNT BOX ON SIDE WALL TO CAMERA/MOUNT.
11. STAIRWELL DOORS SHALL UNLOCK AND REMAIN POSITIVELY LATCHED DURING A FIRE ALARM. FIRE ALARM CONTRACTOR SHALL PROVIDE A FIRE ALRAM RELAY IN SECURITY CLOSET B-169 FOR THESE DOORS.
12. 120V POWER, LOCAL POWER SUPPLY, AND FIRE ALARM RELAY REQUIRED AT THIS DOOR. POWER SUPPLY FURNISHED BY DIVISION 8 AND INSTALLED BY THIS CONTRACTOR.

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For ····

By ····

Name ····

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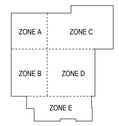
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Date 02-24-2012

Project

Physics and Nanotechnology Building

U of M Project # 01-155-08-1718

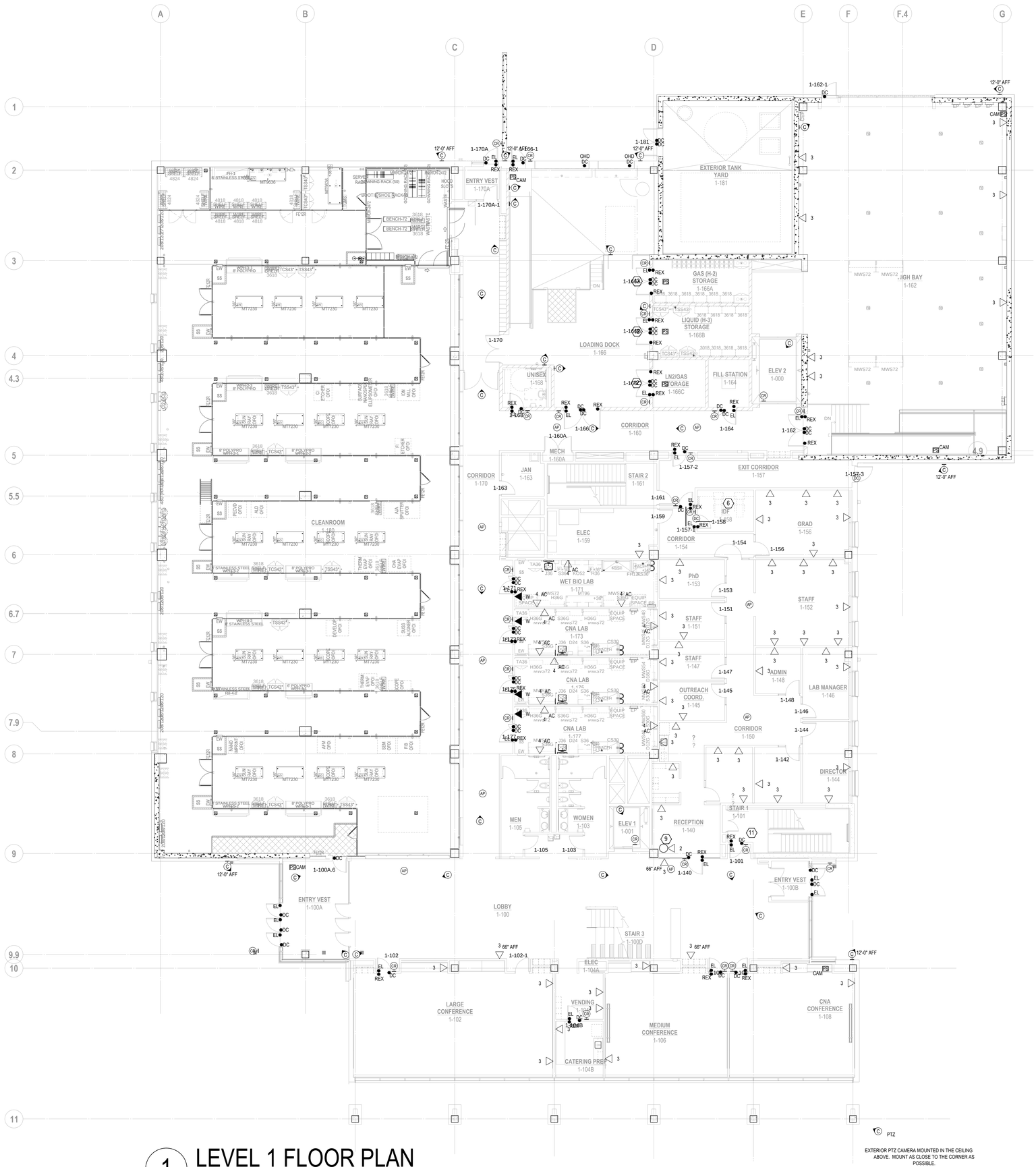


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Basement Level Floor Plan

Not For Construction

T200



EXTERIOR PTZ CAMERA MOUNTED IN THE CEILING ABOVE. MOUNT AS CLOSE TO THE CORNER AS POSSIBLE.

1 LEVEL 1 FLOOR PLAN

1/8 = 1'-0"

KEYNOTES:

1. CARD READER, DOOR CONTACT, AND CONNECTION TO ELECTRIFIED DOOR HARDWARE/REX PROVIDED AS PART OF ALTERNATE #T-1.
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12. 120V POWER, LOCAL POWER SUPPLY, AND FIRE ALARM RELAY REQUIRED AT THIS DOOR. POWER SUPPLY FURNISHED BY DIVISION 8 AND INSTALLED BY THIS CONTRACTOR.

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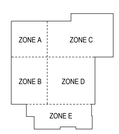
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Level 1 Floor Plan

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T201



1 LEVEL 2 FLOOR PLAN

1/8 = 1'-0"

KEYNOTES:

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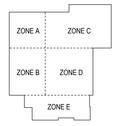
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Level 2 Floor Plan

Not For Construction

T202



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1 LEVEL 3 FLOOR PLAN

1/8 = 1'-0"

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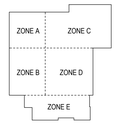
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Level 3 Floor Plan

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T203



1 LEVEL 4 FLOOR PLAN

1/8 = 1'-0"

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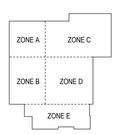
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Project

Physics and Nanotechnology Building

U of M Project # 01-155-08-1718

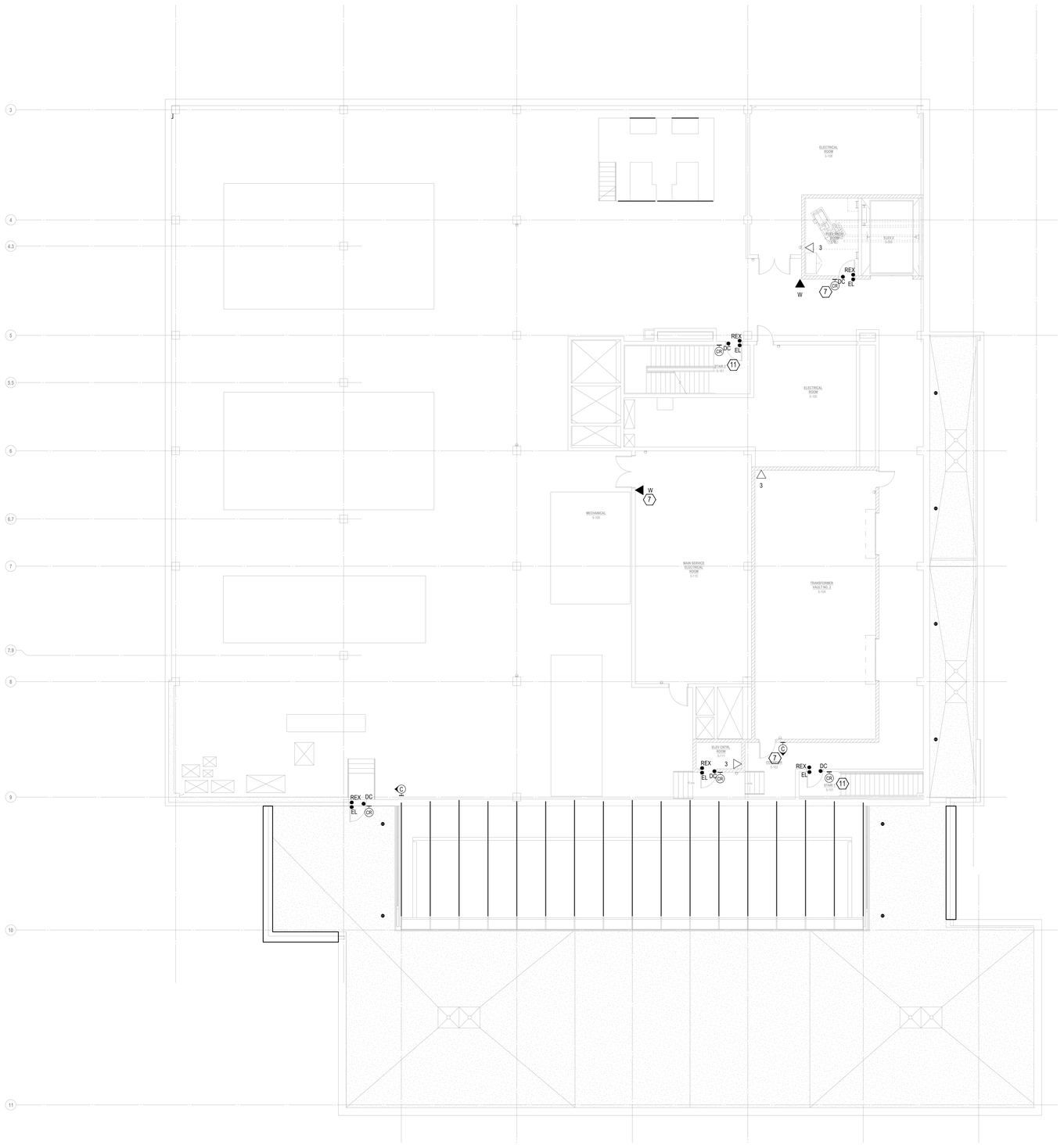


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Level 4 Floor Plan

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T204



1 PENTHOUSE FLOOR PLAN

1/8 = 1'-0"

KEYNOTES:

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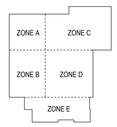
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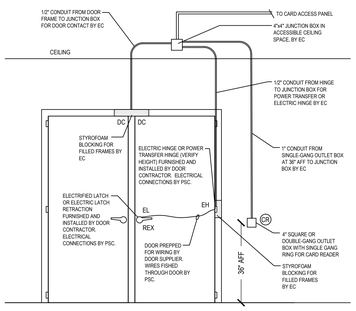


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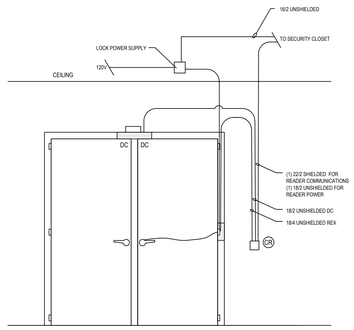
Penthouse Floor Plan

Not For Construction

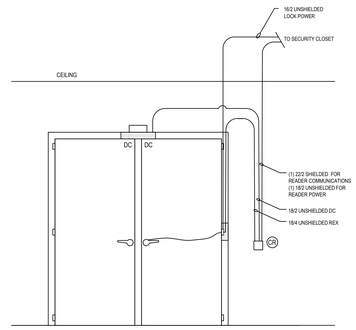
T205



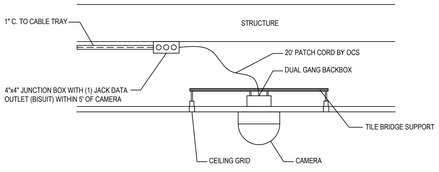
1 DOOR PREP AND COORDINATION DETAIL
SCALE: NONE



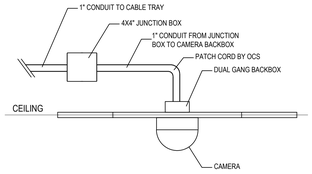
2 DOOR WIRING DETAIL (LOCAL LOCK POWER SUPPLY)
SCALE: NONE



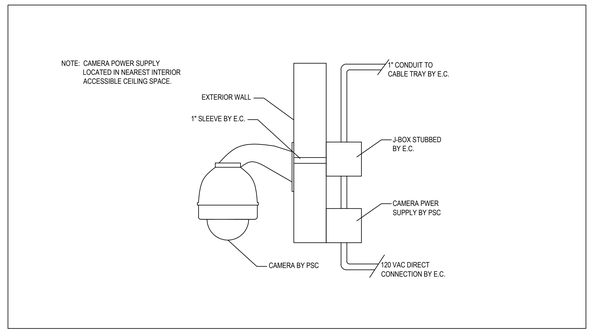
3 DOOR WIRING DETAIL (REMOTE LOCK POWER SUPPLY)
SCALE: NONE



4 INTERIOR SECURITY CAMERA MOUNTING DETAIL (CEILING-MOUNTED)
SCALE: NONE



5 EXTERIOR SECURITY CAMERA MOUNTING DETAIL (CEILING-MOUNTED)
SCALE: NONE



6 EXTERIOR SECURITY CAMERA MOUNTING DETAIL (WALL-MOUNTED)
SCALE: NONE

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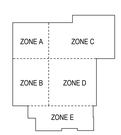
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Security Details

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T300