BATTERY CALCULATIONS
FAP-001 & -001A-54

ITEM	DESCRIPTION	QTY	STANDBY CURRENT PER ITEM (AMPS)	TOTAL STANDBY CURRENT PER ITEM	ALARM CURRENT PER ITEM (AMPS)	TOTAL ALARM CURRENT PER ITEM
CP-35	FACP w/2ZN'S + AUD	1	0.1750	0.1750	0.5010	0.5010
PS-35	POWER SUPPLY	2	0.0000	0.0000	0.0000	0.0000
BC-35	BATTERY CHARGER	1	0.0450	0.0450	0.0300	0.0300
AA-30U	CLASS B BELL MODULE	2	0.0065	0.0130	0.0400	0.0800
PM-32	MATRIX MODULE	1	0.0000	0.0000	0.0000	0.0000
SM-30	SWITCH MODULE	1	0.0000	0.0000	0.0450	0.0450
SR-35	8 RELAY MODULE	1	0.0000	0.0000	0.0210	0.0210
TC-30U	BATTERY TROUBLE	1	0.0300	0.0300	0.0500	0.0500
ZN-34US	SUPERVISORY MODULE	1	0.0100	0.0100	0.1100	0.1100
ZU-35	ZONE MODULE	3	0.0090	0.0270	0.1100	0.3300
ZU-35DS	ZONE MODULE/SD's	1	0.0090	0.0090	0.1100	0.1100
SMOKE	SMOKE DETECTOR	34	0.0001	0.0034	0.0010	0.0340
MOI	TRANSMITTER	1	0.1200	0.1200	0.1750	0.1750
MID	INPUT BOARD	1	0.0020	0.0020	0.0000	0.0000
PS-5A	POWER SUPPLY	1	0.0380	0.0380	0.0000	0.0000
TOTAL NOTIFICATION APPLIANCES CURRENT						1.9790
	TOTAL SYSTEM CURRENT		STANDBY	0.4724	ALARM	3.4300

MIN. BATTERY CAPACITY = {(TOT. STANDBY CURRENT X STANDBY TIME) + (TOT. ALARM CURRENT X ALARM TIME)} X 1.25

MIN. BATTERY CAPACITY = {(0.4724 A X 24 HR) + (3.43 A X 0.083 HR)} X 1.25

MIN. BATTERY CAPACITY = {11.3376 AHr + 0.2847 AHr} X 1.25 = 14.5279 AHr

FIRE ALARM SYSTEM FUNCTION CHART

SYSTEM EVENT / RESPONSE	ANNUNCIATE AT FACU	FIRE SIGNAL TO RECEIVER	TROUBLE SIGNAL TO LBNL RECEIVER	SUPERVISORY SIGNAL TO LBNL RECEIVER	OPERATE NOTIFICATION APPLIANCES
54 FIRE CALL BOXES	●	●			●
54 HEAT DETECTORS	●	●			●
54 SMOKE DETECTORS	●	●			●
54 FIRE SPRINKLER WATERFLOW SWITCHES	●	●			●
54 FIRE SPRINKLER VALVE SUPERVISORY SWITCHES	●			●	
54 DRY CHEMICAL DUMP	●		●		
54A HEAT DETECTORS	●	●			
AC POWER FAILURE	●		●		
SYSTEM FAULT	●		●		

NOTIFICATION APPLIANCE CIRCUIT VOLTAGE DROP & POWER REQUIREMENTS

CKT AV2: 54 ADDITION DESCRIPTION	QTY	CURRENT PER ITEM (AMPS)	TOTAL CURRENT PER ITEM
WHEELOCK STROBE 15 cd	–	0.5010	0.0000
WHEELOCK HORN/STROBE 15cd	–	0.0000	0.0000
WHEELOCK STROBE 30 cd	–	0.0300	0.0000
WHEELOCK HORN/STROBE 30 cd	–	0.0450	0.0000
WHEELOCK STROBE 75 cd	6	0.1650	0.9900
WHEELOCK HORN/STROBE 75 cd	–	0.1100	0.0000
WHEELOCK STROBE 110 cd	–	0.1100	0.0000
WHEELOCK HORN/STROBE 110 cd	–	0.1750	0.0000
WHEELOCK HORN	–	0.0000	0.0000
AUTOCALL BELL	4	.05000	0.2000
AUTOCALL BELL/STROBE 15 cd	–	0.1100	0.0000
AUTOCALL BELL/STROBE 30 cd	–	0.1420	0.0000
AUTOCALL BELL/STROBE 75 cd	–	0.2150	0.0000
TOTAL NOTIFICATION APPLIANCES CURRENT			1.1900

VOLTAGE DROP (VD) CALCULATIONS

VD = {(I) (D) (21.6)}/CM

WHERE: I = CIRCUIT CURRENT

D = CONDUCTOR LENGTH (FT) ONE WAY

21.6 = A CONSTANT

CM = CIRCULAR MILS

VD = {(1.19A) (300FT) (21.64)}/4110 = 1.876V

%VD = {1.876V / 24V} X 100 = 7.818%

REMAINING VOLTS = 22.124

WIRE SIZE	CIRCULAR MILS
12AWG	6530
14AWG	4110
16AWG	2580
18AWG	1620
20AWG	1020

NOTIFICATION APPLIANCE CIRCUIT VOLTAGE DROP & POWER REQUIREMENTS

CKT AV1: 54 DESCRIPTION	QTY	CURRENT PER ITEM (AMPS)	TOTAL CURRENT PER ITEM
WHEELOCK STROBE 15 cd	4	0.0600	0.2400
WHEELOCK HORN/STROBE 15cd	–	0.0000	0.0000
WHEELOCK STROBE 30 cd	2	0.0920	0.1840
WHEELOCK HORN/STROBE 30 cd	–	0.0450	0.0000
WHEELOCK STROBE 75 cd	1	0.1650	0.1650
WHEELOCK HORN/STROBE 75 cd	–	0.1100	0.0000
WHEELOCK STROBE 110 cd	–	0.1100	0.0000
WHEELOCK HORN/STROBE 110 cd	–	0.1750	0.0000
WHEELOCK HORN	–	0.0000	0.0000
AUTOCALL BELL	4	0.0500	0.2000
AUTOCALL BELL/STROBE 75 cd	–	0.0000	0.0000
TOTAL NOTIFICATION APPLIANCES CURRENT			0.7890

VOLTAGE DROP (VD) CALCULATIONS

VD = {(I) (D) (21.6)}/CM

WHERE: I = CIRCUIT CURRENT

D = CONDUCTOR LENGTH (FT) ONE WAY

21.6 = A CONSTANT

CM = CIRCULAR MILS

VD = {(0.789A) (200FT) (21.64)}/4110 = 0.829V

%VD = {0.829V / 24V} X 100 = 3.4557%

REMAINING VOLTS = 23.171

WIRE SIZE	CIRCULAR MILS
12AWG	6530
14AWG	4110
16AWG	2580
18AWG	1620
20AWG	1020

NOTIFICATION APPLIANCE CIRCUIT CURRENTS

CKT AV1	54	0.789
CKT AV2	54 ADDITION	1.190
CKT AV3	–	–
CKT AV4	–	–
CKT AV5	–	–
CKT AV6	–	–
CKT AV7	–	–
CKT AV8	–	–
	TOTAL NOTIFICATION APPLIANCES CURRENT	1.979

PROFESSIONAL SEAL (IF REVISION, APPLIES ONLY TO REVISED WORK)

AS BUILT
–
–
09/24/13

ISSUE (PROGRESS, ESTIMATE, BID, CONSTRUCTION, CONFORMED), REVISION, RECORD)

REVISION NUMBER	DRAWN BY	CHECKED BY	APPR'D BY	DATE	REMARKS
–	LDD	LDD	MCD	09/24/13	AS BUILT

BLDG 54, 54A FIRE ALARM
FUNCTION CHART & CALCULATIONS
–

UNIVERSITY OF CALIFORNIA
LAWRENCE BERKELEY NATIONAL LABORATORY
FACILITIES DIVISION

DRAWN BY	LDD	DATE 9/24/2013
CHECKED BY	LDD	9/24/2013
APPROVED BY	MCD	9/24/2013
SCALE	AS NOTED	
DRAWING NO.	4B54E033_	SHEET 1 OF 1
PROJECT NO.	000000	