NOTIFICATION APPLIANCE CIRCUIT VOLTAGE DROP & POWER REQUIREMENTS

CKT AV3: 84 1ST FLR EAST 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	–	0.1650	0.0000
WHEELOCK HORN/STROBE 75 cd	–	0.1100	0.0000
WHEELOCK STROBE 110 cd	2	0.2200	0.4400
WHEELOCK HORN/STROBE 110 cd	1	0.3070	0.3070
WHEELOCK HORN	3	0.0870	0.2610
AUTOCALL BELL	–	0.0500	0.0000
AUTOCALL BELL/STROBE 75 cd	–	0.2150	0.0000
TOTAL NOTIFICATION APPLIANCES CURRENT			1.0080

VOLTAGE DROP (VD) CALCULATIONS

VD = {(I) (D) (21.6)}/CM
WHERE: I = CIRCUIT CURRENT
D = CONDUCTOR LENGTH (FT) ONE WAY
21.6 = CONSTANT
CM = WIRE CROSS-SECTIONAL AREA (CIRCULAR MILS)
VD = {(1.008 A) (250 FT) (21.64)}/4110 = 1.324 V
%VD = {1.324 V / 24 V} X 100 = 5.518 %
REMAINING VOLTS = 22.676

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

NOTIFICATION APPLIANCE CIRCUIT VOLTAGE DROP & POWER REQUIREMENTS

CKT AV1: 84 B'SMNT 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	–	0.1650	0.0000
WHEELOCK HORN/STROBE 75 cd	–	0.1100	0.0000
WHEELOCK STROBE 110 cd	2	0.2200	0.4400
WHEELOCK HORN/STROBE 110 cd	2	0.3070	0.1640
WHEELOCK HORN	2	0.0870	0.1740
AUTOCALL BELL	–	0.0500	0.0000
AUTOCALL BELL/STROBE 75 cd	–	0.2150	0.0000
TOTAL NOTIFICATION APPLIANCES CURRENT			1.2280

VOLTAGE DROP (VD) CALCULATIONS

VD = {(I) (D) (21.6)}/CM
WHERE: I = CIRCUIT CURRENT
D = CONDUCTOR LENGTH (FT) ONE WAY
21.6 = CONSTANT
CM = WIRE CROSS-SECTIONAL AREA (CIRCULAR MILS)
VD = {(1.228 A) (200FT) (21.64)}/4110 = 1.291 V
%VD = {1.291 V / 24V} X 100 = 5.378 %
REMAINING VOLTS = 22.709

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

FACU POWER SUPPLY & BATTERY MXL-06-84

SUPERVISORY CURRENT

DESCRIPTION	QUANTITY	MODULE CURRENT	EOL CURRENT	DEVICE CURRENT	TOTAL ROW CURRENT
ANALOG LOOP	–	NA	NA	0.066	0.000
CZM-4	–	0.100	NA	NA	0.000
MMB-2 CONTROL BOARD	1	0.175	NA	NA	0.175
NET-4 NETWORK CARD	1	0.030	NA	NA	0.030
NIM-1W	1	0.105	NA	NA	0.105
NOTIFICATION APPLIANCE CIRCUITS	–	NA	0.050	NA	0.000
TOTAL SUPERVISORY CURRENT					0.310

ALARM CURRENT

MXLR OCCUPANT NOTIFICATION APPLIANCE CIRCUITS	TOTAL CIRCUIT CURRENT LOAD
–	0.000 AMP
TOTAL ALARM CURRENT	0.000 AMP

SUMMARY

MINIMUM BATTERY CAPACITY = {TOTAL STANDBY CURRENT X STANDBY TIME} + {TOTAL ALARM CURRENT X ALARM TIME} X 1.25

MINIMUM BATTERY CAPACITY = {0.31 X 24 HR} + {0.000 X 0.083 HR} X 1.25

MINIMUM BATTERY CAPACITY = {7.44 AHR + 0.000 AHR} X 1.25 = 9.3 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 84 NOTIFICATION DEVICES	FAN SHUTDOWN	ELEVATOR RECALL	ALTERNATE ELEVATOR RECALL	WDN DOOR RELEASE	DOOR HOLDER RELEASE	84B NOTIFICATION DEVICES
84 FIRE CALL BOX	●	●			●					●	
84 SMOKE DETECTORS	●	●			●					●	
84-107 FACP SMOKE DETECTOR	●	●			●						
84 ELEVATOR MACHINERY ROOM SMOKE DETECTOR	●	●			●		●				
84 1ST FLR ELEVATOR LOBBY SMOKE DETECTOR	●	●			●			●			
84 FAN ROOM SMOKE DETECTOR	●	●			●	●					
84 ALL FLOORS ATRIUM SMOKE DETECTORS	●	●			●				●	●	
84 FIRE SPRIKLER WATERFLOW SWITCHES	●	●			●				●	●	
84 FIRE SPRINKLER VALVE SUPERVISORY SWITCHES	●			●							
84B FIRE CALL BOXES	●	●									●
84B SMOKE DETECTORS	●	●									●
84B EMERG GEN ROOM HEAT DETECTOR	●	●									●
84B FIRE SPRINKLER WATERFLOW SWITCH	●	●									●
84B FIRE SPRINKLER VALVE SUPERVISORY SWITCHES	●			●							
84B BFP SUPERVISORY SWITCHES	●			●							
AC POWER FAILURE	●		●								
SYSTEM FAULT	●		●								

NOTIFICATION APPLIANCE CIRCUIT VOLTAGE DROP & POWER REQUIREMENTS

CKT AV4: 84 2ND FLR EAST 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	–	0.1650	0.0000
WHEELOCK HORN/STROBE 75 cd	–	0.1100	0.0000
WHEELOCK STROBE 110 cd	2	0.2200	0.4400
WHEELOCK HORN/STROBE 110 cd	3	0.3070	0.9210
WHEELOCK HORN	4	0.0870	0.3480
AUTOCALL BELL	–	0.0500	0.0000
AUTOCALL BELL/STROBE 75 cd	–	0.2150	0.0000
TOTAL NOTIFICATION APPLIANCES CURRENT			1.7090

VOLTAGE DROP (VD) CALCULATIONS

VD = {(I) (D) (21.6)}/CM
WHERE: I = CIRCUIT CURRENT
D = CONDUCTOR LENGTH (FT) ONE WAY
21.6 = CONSTANT
CM = WIRE CROSS-SECTIONAL AREA (CIRCULAR MILS)
VD = {(1.709 A) (280 FT) (21.64)}/4110 = 2.515 V
%VD = {2.515 V / 24 V} X 100 = 10.479 %
REMAINING VOLTS = 23.172

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

NOTIFICATION APPLIANCE CIRCUIT VOLTAGE DROP & POWER REQUIREMENTS

CKT AV2: 84 1ST FLR WEST 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	–	0.1650	0.0000
WHEELOCK HORN/STROBE 75 cd	–	0.1100	0.0000
WHEELOCK STROBE 110 cd	3	0.2200	0.6600
WHEELOCK HORN/STROBE 110 cd	3	0.3070	0.9210
WHEELOCK HORN	5	0.0870	0.4350
AUTOCALL BELL	–	0.0500	0.0000
AUTOCALL BELL/STROBE 75 cd	–	0.2150	0.0000
TOTAL NOTIFICATION APPLIANCES CURRENT			2.0160

VOLTAGE DROP (VD) CALCULATIONS

VD = {(I) (D) (21.6)}/CM
WHERE: I = CIRCUIT CURRENT
D = CONDUCTOR LENGTH (FT) ONE WAY
21.6 = CONSTANT
CM = WIRE CROSS-SECTIONAL AREA (CIRCULAR MILS)
VD = {(2.016 A) (140FT) (21.64)}/4110 = 1.483 V
%VD = {1.483 V / 24V} X 100 = 6.180 %
REMAINING VOLTS = 22.517

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

BATTERY CALCULATIONS FAP-001,-002-84

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	7	0.0065	0.0455	0.0400	0.2800
AE-30U	CLASS B BELL MODULE	–	0.0065	0.0000	0.0400	0.0000
PM-32	MATRIX MODULE	1	0.0000	0.0000	0.0000	0.0000
RM-30U	RELEASE MODULE	–	0.0050	0.0000	1.5000	0.0000
SM-30	SWITCH MODULE	3	0.0000	0.0000	0.0450	0.1350
SR-32	6 RELAY MODULE	–	0.0000	0.0000	0.0450	0.0000
SR-35	8 RELAY MODULE	2	0.0000	0.0000	0.0210	0.0420
TC-30U	BATTERY TRANSFER	–	0.0300	0.0000	0.0150	0.0000
ZN-34US	SUPERVISORY MODULE	3	0.0100	0.0300	0.1100	0.3300
ZU-35	ZONE MODULE	4	0.0090	0.0360	0.1100	0.4400
ZU-35DS	ZONE MODULE/SD's	5	0.0090	0.0450	0.1100	0.5500
SMOKE	SMOKE DETECTOR	58	0.0001	0.0058	0.0010	0.0580
MOI	TRANSMITTER	1	0.1200	0.1200	0.1750	0.1750
MID	INPUT BOARD	2	0.0020	0.0040	0.0000	0.0000
PS-5A	POWER SUPPLY	1	0.0380	0.0380	0.0000	0.0000
TOTAL NOTIFICATION APPLIANCES CURRENT						8.8650
TOTAL SYSTEM CURRENT			STANDBY	0.5443	ALARM	11.4060

MIN. BATTERY CAPACITY = {(TOT. STANDBY CURRENT X STANDBY TIME) + (TOT. ALARM CURRENT X ALARM TIME)} X 1.25
MIN. BATTERY CAPACITY = {(0.5443 A X 24 HR) + (11.406 A X 0.083 HR)} X 1.25
MIN. BATTERY CAPACITY = {13.0632AHr + 0.9467 AHr} X 1.25 = 17.5124 AHr

NOTIFICATION APPLIANCE CIRCUIT CURRENTS

CKT AV1	84 B'SMNT	1.228
CKT AV2	84 1ST FLOOR WEST	2.016
CKT AV3	84 1ST FLOOR EAST	1.008
CKT AV4	84 2ND FLOOR EAST	1.709
CKT AV5	84 2ND FLOOR WEST	1.008
CKT AV6	84 3RD FLOOR WEST	0.788
CKT AV7	84 3RD FLOOR EAST	1.008
CKT AV8	84B	0.100
	TOTAL NOTIFICATION APPLIANCES CURRENT	8.865

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

ISSUE (PROGRESS, ESTIMATE, BID, CONSTRUCTION, CONFORMED, REVISION, RECORD): AS BUILT – – 10/23/13

REVISION NUMBER	DRAWN BY	CHECKED BY	APPR'D BY	DATE	REMARKS
_	LDD	LDD	MCD	10/23/13	AS BUILT

BLDG 84, 84B FIRE ALARM FUNCTION CHART & CALCULATIONS

UNIVERSITY OF CALIFORNIA
LAWRENCE BERKELEY NATIONAL LABORATORY
FACILITIES DIVISION

		DATE
DRAWN BY	LDD	10/23/2013
CHECKED BY	LDD	10/23/2013
APPROVED BY	MCD	10/23/2013
SCALE	AS NOTED	
DRAWING NO.	4B84E203_	SHEET FA
PROJECT NO.	000000	1 OF 2