NOTIFICATION APPLIANCE CIRCUIT VOLTAGE DROP & POWER REQUIREMENTS

CKT AV4 – MEZZANINE NORTHWEST 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	5	0.2200	1.1000
WHEELOCK HORN/STROBE 110 cd	–	0.3070	0.0000
WHEELOCK HORN	–	0.0870	0.0000
AUTOCALL BELL	5	0.0500	0.2500
AUTOCALL BELL/STROBE 75 cd	–	0.2150	0.0000
TOTAL NOTIFICATION APPLIANCES CURRENT			1.3500

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 = {(1.35 A) (480FT) (21.64)}/4110 = 3.406 V
%VD = {3.406 V / 24V} X 100 = 14.190 %
REMAINING VOLTS = 20.594

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

NOTIFICATION APPLIANCE CIRCUIT VOLTAGE DROP & POWER REQUIREMENTS

CKT AV2 – NORTHEAST 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	–	0.2200	0.0000
WHEELOCK HORN/STROBE 110 cd	–	0.3070	0.0000
WHEELOCK HORN	–	0.0870	0.0000
AUTOCALL BELL	8	0.0500	0.4000
AUTOCALL BELL/STROBE 75 cd	–	0.2150	0.0000
TOTAL NOTIFICATION APPLIANCES CURRENT			0.4000

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 = {(0.4 A) (450FT) (21.64)}/4110 = 0.946 V
%VD = {0.946 V / 24V} X 100 = 3.942 %
REMAINING VOLTS = 23.054

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

BATTERY CALCULATIONS FAP–001,–001A–06

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	11	0.0065	0.0715	0.0400	0.4400
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	4	0.0000	0.0000	0.0450	0.1800
SR–32	6 RELAY MODULE	–	0.0000	0.0000	0.0450	0.0000
SR–35	8 RELAY MODULE	11	0.0000	0.0000	0.0210	0.2310
TC–30U	BATTERY TRANSFER	1	0.0300	0.0300	0.0150	0.0150
ZN–34US	SUPERVISORY MODULE	6	0.0100	0.0600	0.1100	0.6600
ZU–35	ZONE MODULE	4	0.0090	0.0360	0.1100	0.4400
ZU–35DS	ZONE MODULE/SD's	19	0.0090	0.1710	0.1100	2.0900
SMOKE	SMOKE DETECTOR	–	0.0001	0.0000	0.0010	0.0000
MOI	TRANSMITTER	1	0.1200	0.1200	0.1750	0.1750
MID	INPUT BOARD	5	0.0020	0.0100	0.0000	0.0000
PS–5A	POWER SUPPLY	1	0.0380	0.0380	0.0000	0.0000
TOTAL NOTIFICATION APPLIANCES CURRENT						11.8840
TOTAL SYSTEM CURRENT			STANDBY	0.7565	ALARM	16.6460

MIN. BATTERY CAPACITY = {(TOT. STANDBY CURRENT X STANDBY TIME) + (TOT. ALARM CURRENT X ALARM TIME)} X 1.25
MIN. BATTERY CAPACITY = {(0.7565 A X 24 HR) + (16.646 A X 0.083 HR)} X 1.25
MIN. BATTERY CAPACITY = {18.156AHr + 1.3816 AHr} X 1.25 = 24.422 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 DEVICES	ELEVATOR RECALL TO 1ST FLOOR	ELEVATOR RECALL TO 2ND FLOOR	FIRE/SMOKE DAMPER CLOSE	AHU-15 SHUTDOWN	AHU-16 SHUTDOWN	BL-48 SHUTDOWN	DOOR HOLDER RELEASE
1ST & 2ND FLOOR FIRE CALL BOXES	●	●			●							●
1ST & 2ND FLOOR SMOKE DETECTORS	●	●			●							●
RM 1998 FACP SMOKE DETECTOR	●	●			●							●
ELEVATOR 2ND FLR LOBBY & EQUIP RM SMOKE DETECTOR	●	●			●	●						●
ELEVATOR 1ST FLR LOBBY SMOKE DETECTOR	●	●			●		●					●
ELEVATOR EQUIP RM WATERFLOW SWITCH	●	●			●							●
2ND FLR CORRIDOR SMOKE DETECTORS	●	●			●						●	●
AHU–15 DUCT SMOKE DETECTOR	●	●			●				●		●	●
AHU–16 SMOKE DUCT SMOKE DETECTOR	●	●			●					●		●
BL–48 DUCT SMOKE DETECTOR	●	●			●						●	●
HSSD SMOKE DETECTOR – LEVEL 1	●	●										
HSSD SMOKE DETECTOR – LEVEL 2	●	●										
HSSD SMOKE DETECTOR – LEVEL 3	●	●			●							●
HSSD SMOKE DETECTOR SUPERVISION	●		●									
1ST & 2ND FLOOR WATERFLOW SWITCHES	●	●			●							
DOME WATERFLOW SWITCH	●	●			●							
TUNNEL & STORAGE RING WATERFLOW SWITCH	●	●			●							
BOOSTER RING WATERFLOW SWITCH	●	●			●							●
1ST & 2ND FLR VALVE SUPERVISORY SWITCHES	●			●								●
DOME VALVE SUPERVISORY SWITCH	●			●								●
TUNNEL & BOOSTER RING VALVE SUPERVISORY SWITCH	●			●								
BOOSTER RING VALVE SUPERVISORY SWITCH	●	●		●								
AC POWER FAILURE	●		●									
SYSTEM FAULT	●		●									

NOTIFICATION APPLIANCE CIRCUIT VOLTAGE DROP & POWER REQUIREMENTS

CKT AV5 – MEZZANINE NORTH 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	5	0.2200	1.1000
WHEELOCK HORN/STROBE 110 cd	–	0.3070	0.0000
WHEELOCK HORN	2	0.0870	0.1740
AUTOCALL BELL	5	0.0500	0.2500
AUTOCALL BELL/STROBE 75 cd	–	0.2150	0.0000
TOTAL NOTIFICATION APPLIANCES CURRENT			1.5240

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 = {(1.524 A) (390FT) (21.64)}/4110 = 3.124V
%VD = {3.124 V / 24V} X 100 = 13.015 %
REMAINING VOLTS = 20.876

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

NOTIFICATION APPLIANCE CIRCUIT VOLTAGE DROP & POWER REQUIREMENTS

CKT AV3 – SOUTHEAST 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	–	0.3070	0.0000
WHEELOCK HORN	–	0.0870	0.0000
AUTOCALL BELL	5	0.0500	0.2500
AUTOCALL BELL/STROBE 75 cd	–	0.2150	0.0000
TOTAL NOTIFICATION APPLIANCES CURRENT			0.9100

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 = {(0.91 A) (290FT) (21.64)}/4110 = 1.387 V
%VD = {1.387 V / 24V} X 100 = 5.779 %
REMAINING VOLTS = 22.613

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

NOTIFICATION APPLIANCE CIRCUIT VOLTAGE DROP & POWER REQUIREMENTS

CKT AV1 – 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	–	0.2200	0.0000
WHEELOCK HORN/STROBE 110 cd	–	0.3070	0.0000
WHEELOCK HORN	–	0.0870	0.0000
AUTOCALL BELL	7	0.0500	0.3500
AUTOCALL BELL/STROBE 75 cd	–	0.2150	0.0000
TOTAL NOTIFICATION APPLIANCES CURRENT			0.3500

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 = {(0.35 A) (450FT) (21.64)}/4110 = 0.828 V
%VD = {0.828 V / 24V} X 100 = 3.499 %
REMAINING VOLTS = 23.172

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

NOTIFICATION APPLIANCE CIRCUIT CURRENTS

CKT AV1	WEST	0.350
CKT AV2	NORTHESAT	0.400
CKT AV3	SOUTHEAST	0.910
CKT AV4	MEAZZANINE NORTHWEST	1.350
CKT AV5	MEZZANINE NORTH	1.524
CKT AV6	MEZZANINE NORTH	1.524
CKT AV7	MEZZANINE NORTH	1.524
CKT AV8	MEZZANINE SOUTH	1.524
CKT AV9	MEZZANINE SOUTHEAST	1.524
CKT AV10	MEZZANINE SOUTHEAST	1.254
	TOTAL NOTIFICATION APPLIANCES CURRENT	11.884

FIELD VERIFY
–
09/11/13

PROFESSIONAL SEAL (IF REVISION, APPLIES ONLY TO REVISED WORK)
ISSUE (PROGRESS, ESTIMATE, BID, CONSTRUCTION, CONFORMED, REVISION, RECORD)

REVISION NUMBER	DRAWN BY	CHECKED BY	APPR'D BY	DATE	REMARKS
_	LDD	LDD	MCD	09/11/13	AS BUILT

BLDG 6,6A FIRE ALARM
FUNCTION CHART & CALCULATIONS

UNIVERSITY OF CALIFORNIA
LAWRENCE BERKELEY NATIONAL LABORATORY
FACILITIES DIVISION

DRAWN BY	LDD	DATE 09/11/2013
CHECKED BY	LDD	09/11/2013
APPROVED BY	MCD	09/11/2013
SCALE	AS NOTED	
DRAWING NO.	4B06E352_	SHEET 1 OF 2
PROJECT NO.	000000	