## BATTERY CALCULATIONS
## FAP–001–82

| 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 | 1 | 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 | – | 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 | 1 | 0.0000 | 0.0000 | 0.0450 | 0.0450 |
| SR–32 | 6 RELAY MODULE | – | 0.0000 | 0.0000 | 0.0450 | 0.0000 |
| SR–35 | 8 RELAY MODULE | 1 | 0.0000 | 0.0000 | 0.0210 | 0.0210 |
| TC–30U | BATTERY TRANSFER | – | 0.0000 | 0.0000 | 0.0500 | 0.0000 |
| TL–30U | TIME LIMIT | – | 0.0300 | 0.0000 | 0.0150 | 0.0000 |
| ZN–34US | SUPERVISORY MODULE | 5 | 0.0100 | 0.0500 | 0.1100 | 0.5500 |
| ZU–35 | ZONE MODULE | – | 0.0090 | 0.0000 | 0.1100 | 0.0000 |
| ZU–35DS | ZONE MODULE/SD's | – | 0.0090 | 0.0000 | 0.1100 | 0.0000 |
| SMOKE | SMOKE DETECTOR | 1 | 0.0001 | 0.0001 | 0.0010 | 0.0010 |
| 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 | | | | | | 0.2150 |
| TOTAL SYSTEM CURRENT | | | STANDBY | 0.4300 | ALARM | 1.5370 |

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

MIN. BATTERY CAPACITY = {(0.43 A X 24 HR) + (1.537 A X 0.083 HR)} X 1.25

MIN. BATTERY CAPACITY = {10.32 AHr + 0.1276 AHr} X 1.25 = 13.0595 AHr

## NOTIFICATION APPLIANCE CIRCUIT
## VOLTAGE DROP & POWER REQUIREMENTS

| CKT AV1: 82 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 | – | 0.165 | 0.0000 |
| WHEELOCK HORN/STROBE 75 cd | – | 0.1100 | 0.0000 |
| WHEELOCK STROBE 110 cd | – | 0.2200 | 0.0000 |
| WHEELOCK HORN/STROBE 110 cd | – | 0.1750 | 0.0000 |
| WHEELOCK HORN | – | 0.0000 | 0.0000 |
| AUTOCALL BELL | – | 0.0500 | 0.0000 |
| AUTOCALL BELL/STROBE 75 cd | 1 | 0.2150 | 0.2150 |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| TOTAL NOTIFICATION APPLIANCES CURRENT | | | 0.2150 |

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 = {(0.215) (50FT) (21.64)}/4110 = 0.056V

%VD = {0.056V / 24V} X 100 = 0.235%

REMAINING VOLTS = 23.944

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

## 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 80,80A NOTIFICATION DEVICES |
|---|---|---|---|---|---|
| 82 FIRE CALL BOXE | ● | ● | | | ● |
| 82 FACP SMOKE DETECTOR | ● | ● | | | ● |
| 82 FIRE SPRINKLER WATERFLOW SWITCH | ● | ● | | | ● |
| VALVE SUPERVISION – PUMP SUCTION | ● | | | ● | |
| WATER TANK EMPTY SUPERVISION | ● | | | ● | |
| PUMP CONTROLLER NOT IN AUTO | ● | | ● | | |
| PUMP CONTROLLER POWER FAILURE | ● | | ● | | |
| ENGINE COMMON TROUBLE | ● | | ● | | |
| FIRE PUMP RUNNING | ● | | ● | | |
| CIRCULATING PUMP TROUBLE | ● | | ● | | |
| TANK WATER LEVEL LOW | ● | | ● | | |
| TANK WATER LEVEL HIGH | ● | | ● | | |
| DIESEL FUEL LOW | ● | | ● | | |
| AC POWER FAILURE | ● | | ● | | |
| SYSTEM FAULT | ● | | ● | | |

AS BUILT
–
–
10/23/13

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 | 10/23/13 | AS BUILT |

82 FIRE ALARM SYSTEM
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. | 4B82E007_ | SHEET FA |
| PROJECT NO. | 000000 | 1 OF 1 |