FACP Battery Calculation

7/25/2017

PROJECT NAME:	60 Munjoy Hill – Portland	
Required Standby Time:	24	Hours
Required Alarm Time:	5	Minutes

AC Branch Current

AC Branch Current: Amps @ 120V

Regulated Load in Standby

Device Type	Number of Devices		Current (Amps)		Total Current (Amps)
FACP MAINBOARD	1	X	0.12000	=	0.12000
SMOKE DETECTOR	8	X	0.00030	=	0.00240
MONITOR MODULE	2	X	0.00040	=	0.00080
PULL STATION	4	X	0.00023	=	0.00092
ANNUNCIATOR	1	X	0.01500	=	0.01500
TOTAL STANDBY LOAD					0.13912

Regulated Load in ALARM

Device Type	Number of Devices		Current (Amps)		Total Current (Amps)
FACP MAINBOARD	1	X	0.20000	=	0.20000
MAX ADDRESSABLE ALARM DRAW	1	X	0.40000	=	0.40000
ANNUNCIATOR	1	X	0.00000	=	0.00000
FACP–1 (See Voltage Drop Calculations)	1	X	0.73700	=	0.73700
FACP–2 (See Voltage Drop Calculations)	1	X	0.84000	=	0.84000
TOTAL ALARM LOAD					2.21700

Battery Requirements

Standby Load			Required Standby Time in Hours		
Current (Amps)	0.13912	X	24.00000	=	3.33888
Alarm Load			Required Alarm Time in Hours		
Current (Amps)	2.21700	X	0.08333	=	0.18475
Total Ampere Hours (before derating factor)					3.52363
Derating Factor				X	1.2
TOTAL AMPERE HOURS REQUIRED				=	4.22836
BATTERIES TO BE PROVIDED (2 – 12v)					7 AH

Point to Point NAC Voltage Drop Calculation

7/25/2017

Project Name	60 Munjoy Hill – Portland			
Circuit Number	FACP–2			
Nominal System Voltage	20.4	volts	Wire Gauge	Resistance Per 1000
Minimum Device Voltage	16.0	volts		
Distance from source to 1st device	70	feet	14	3.07
Wire Gauge for balance of circuit			14	3.07
Max Output Current	2.50	amps		
Total Circuit Current	0.840	amps		
End of Line Voltage	19.76	volts		

Circuit is within limits

	Device Current	Distance previous device	Voltage at Device	Drop from source	Percent Drop
Device 1	0.078	70	20.04	0.361	1.77%
Device 2	0.078	20	19.95	0.455	2.23%
Device 3	0.176	15	19.88	0.518	2.54%
Device 4	0.176	15	19.84	0.564	2.77%
Device 5	0.078	15	19.81	0.595	2.92%
Device 6	0.078	20	19.77	0.626	3.07%
Device 7	0.176	15	19.76	0.642	3.15%
Totals	0.840	170			

Notes:
Wire resistance is doubled in the calculations for two wires (Positive and Negative).
The voltage calculated to the last device must not be lower than the manufactures listed minimum operating voltage (IE: rated operating voltage 16–33 VDC (24 VDC nominal)).

Point to Point NAC Voltage Drop Calculation

7/25/2017

Project Name	60 Munjoy Hill – Portland			
Circuit Number	FACP–1			
Nominal System Voltage	20.4	volts	Wire Gauge	Resistance Per 1000
Minimum Device Voltage	16.0	volts		
Distance from source to 1st device	25	feet	14	3.07
Wire Gauge for balance of circuit			14	3.07
Max Output Current	2.50	amps		
Total Circuit Current	0.737	amps		
End of Line Voltage	19.85	volts		

Circuit is within limits

	Device Current	Distance previous device	Voltage at Device	Drop from source	Percent Drop
Device 1	0.054	25	20.29	0.113	0.55%
Device 2	0.121	25	20.18	0.218	1.07%
Device 3	0.054	25	20.10	0.304	1.49%
Device 4	0.176	35	19.99	0.413	2.03%
Device 5	0.078	45	19.89	0.505	2.48%
Device 6	0.078	20	19.86	0.536	2.63%
Device 7	0.176	15	19.85	0.553	2.71%
Totals	0.737	190			

Notes:
Wire resistance is doubled in the calculations for two wires (Positive and Negative).
The voltage calculated to the last device must not be lower than the manufactures listed minimum operating voltage (IE: rated operating voltage 16–33 VDC (24 VDC nominal)).

FIRE ALARM SYMBOL LEGEND

NOTE: ALL SYMBOLS MAY NOT BE USED ON THIS PROJECT

SYMBOL	DESCRIPTION	MOUNTING
FACP	FIRE ALARM CONTROL PANEL	WALL–TOP @ 66"
FSA	FIRE SYSTEM ANNUNCIATOR	WALL–TOP @ 66"
	SMOKE DETECTOR	CEILING
MM	ADDRESSABLE MONITOR MODULE	FIELD VERIFY
P	MANUAL PULL STATION	WALL @ 48"
WF	WATER FLOW SWITCH	BY OTHERS
VS	VALVE SUPERVISORY SWITCH	BY OTHERS
	MINI HORN	WALL @ 10'–0
WP	WEATHER PROOF HORN / STROBE	WALL 80"–96"
	HORN / STROBE	WALL 80"–96"

ABBREVIATION	DESCRIPTION
E	EXISTING
G	WITH GUARD
P	PENDANT MOUNT
R	RESIDENTIAL (110V)
S	SOUNDER BASE
WP	WEATHER PROOF
EOL	END OF LINE RESISTOR
EOLR	END OF LINE RELAY
AWG	AMERICAN WIRE GAUGE
TWP	TWISTED PAIR
TWSP	TWISTED SHIELDED PAIR
FPLP	FIRE POWER LIMITED PLENUM
FPLR	FIRE POWER LIMITED RISER
NAC	NOTIFICATION APPLIANCE CIRCUIT
SLC	SIGNALING LINE CIRCUIT

SPEAKER WATTAGE (2W) 75 STROBE CANDELA 30

DEVICE ADDRESS
L10001 OR D01
(L – DENOTES LOOP #)
(D or M – DENOTES DETECTOR OR MODULE #)

1–#16/2 TWP
WIRE TYPE ABBREVIATED
CONDUCTOR COUNT
WIRE SIZE
OF CABLES (IF OMITTED ONLY 1 CABLE NEEDED)

GENERAL NOTES:

1. SCOPE OF WORK: THIS PROJECT SHALL INCLUDE THE INSTALLATION OF A NEW ADDRESSABLE FIRE ALARM SYSTEM WITH MANUAL PULL STATIONS LOCATED AT EACH MAIN EXIT.
2. THESE DRAWINGS ARE DIAGRAMMATIC. REFER TO THE ARCHITECTURAL DRAWINGS FOR EXACT DIMENSIONS.
3. INSTALLATION SHALL COMPLY WITH NEC, NFPA 72 AND ALL OTHER APPLICABLE CODES AS REQUIRED BY THE LOCAL AUTHORITY HAVING JURISDICTION.
4. WIRING DEPICTED ON THESE PLANS IS SCHEMATIC – ACTUAL WIRE LOCATIONS MAY DIFFER FROM THESE PLANS. WIRING SHALL BE PERFORMED AS ACTUAL BUILDING CONSTRUCTION CONDITIONS ALLOW AND TO MINIMIZE PENETRATIONS THROUGH AREA SEPARATION WALLS AND FIRE WALLS. THE USE OF A RACEWAY IS PERMITTED AS LONG AS NO 110V OR HIGHER VOLTAGE CABLES ARE IN THE SAME RACEWAY.
5. FIRE RATINGS SHALL BE MAINTAINED FOR ALL PENETRATIONS THROUGH FIRE–RATED CONSTRUCTION.
6. POWER FOR ALL FIRE ALARM PANELS AND FIRE ALARM POWER SUPPLIES MUST BE PROVIDED BY A DEDICATED AC BRANCH CIRCUIT. THE LOCATION OF THE BRANCH CIRCUIT BREAKER SHALL BE PERMANENTLY IDENTIFIED AT THE CONTROL UNIT AND SHALL HAVE A RED MARKING IN ACCORDANCE WITH NFPA 72.
7. POWER–LIMITED AND NONPOWER–LIMITED CIRCUIT WIRING MUST REMAIN SEPARATED IN CABINET. ALL POWER–LIMITED CIRCUIT WIRING MUST REMAIN AT LEAST 0.25" AWAY FROM ANY NONPOWER–LIMITED CIRCUIT WIRING. FURTHERMORE, ALL POWER–LIMITED AND NONPOWER–LIMITED CIRCUIT WIRING MUST ENTER AND EXIT THE CABINET THROUGH DIFFERENT KNOCK OUTS AND/OR SEPARATE CONDUITS.
8. WHEN UTILIZING CLASS "A" CIRCUITS, SEPARATE OUTGOING AND RETURN CONDUCTORS OF CLASS "A" CIRCUITS BY A MINIMUM OF 12" WHERE RUN VERTICALLY AND 48" WHERE RUN HORIZONTALLY.
9. WHEN UTILIZING SHIELDED CABLE TIE SHIELDS THROUGH AND INSULATE AT EACH JUNCTION BOX. INSULATE AND TAPE BACK AT END.
10. ALL FIRE ALARM CABLING SHALL BE ACCEPTABLE TO THE FIRE ALARM EQUIPMENT MANUFACTURER FOR THE INTENDED PURPOSE.
11. SMOKE DETECTORS SHALL NOT BE INSTALLED UNTIL AFTER CONSTRUCTION CLEAN–UP IS COMPLETED AND FINAL.
12. LOCATE SMOKE DETECTORS A MINIMUM OF THREE (3) FEET FROM MECHANICAL DIFFUSERS. WALL–MOUNTED SMOKE DETECTORS SHALL BE LOCATED A MINIMUM OF 4" AND A MAXIMUM OF 12" FROM CEILING. CEILING–MOUNTED SMOKE DETECTORS SHALL BE MOUNTED ON CEILINGS AND NOT ON THE BOTTOMS OF BEAMS OR JOISTS.
13. PROVIDE SYNCHRONIZATION OF ALL VISUAL NOTIFICATION APPLIANCE CIRCUITS. PROVIDE ALL REQUIRED SYNC MODULES. PROVIDE A MULTI–SYNC MODE SLAVE CONNECTION BETWEEN ALL SYNC MODULES.
14. VERIFY ALL FIELD SELECTABLE AUDIBILITY SETTINGS OF NOTIFICATION APPLIANCES WITH FIRE ALARM CONTRACTOR.
15. UPON COMPLETION OF THE FIRE ALARM SYSTEM INSTALLATION AND PROGRAMMING, THE INSTALLING CONTRACTOR SHALL PERFORM FINAL TESTING OF THE ENTIRE SYSTEM, PER ALL APPLICABLE CODES, AND SHALL COORDINATE AND PERFORM A FINAL FIRE ALARM SYSTEM INSPECTION.
16. PROVIDE OFF–SITE MONITORING AS REQUIRED BY THE INTERNATIONAL FIRE CODE, SECTION 907.6.5 AND THE LOCAL AUTHORITY HAVING JURISDICTION.
17. INSTALLING CONTRACTOR SHALL, PHYSICALLY, LABEL ALL INITIATING DEVICES AND NOTIFICATION APPLIANCE CIRCUIT END OF LINE (WHEN WIRING CLASS "B"). THESE LABELS SHALL BE IN PLACE PRIOR TO START–UP AND TESTING.

APPLICABLE CODES

MAINE UNIFORM ENERGY & BUILDING CODE
PORTLAND CITY CODE, CHAPTER 10, FIRE PREVENTION & PROTECTION
NFPA 1, FIRE CODE& NFPA 101, LIFE SAFETY CODE

FIRE ALARM DEVICE MOUNTING HEIGHTS

SCALE: NOT TO SCALE

FIRE ALARM RISER DIAGRAM

SCHEMATIC: NO SCALE

MANUAL PULL STATION WIRING DETAIL

SCHEMATIC: NO SCALE

ADDRESSABLE DETECTOR WIRING DETAIL

SCHEMATIC: NO SCALE

WATERFLOW / TAMPER WIRING DETAIL

SCHEMATIC: NO SCALE

TYPICAL HORN/STROBE WIRING DETAIL

SCHEMATIC: NO SCALE

OPERATIONS MATRIX

FIRE ALARM INPUT	FIRE ALARM OUTPUT: ACTIVATE ALARM INDICATOR	ACTIVATE AUDIBLE ALARM	ACTIVATE SUPERVISORY INDICATOR	ACTIVATE AUDIBLE SUPERVISORY SIGNAL	ACTIVATE TROUBLE INDICATOR	ACTIVATE AUDIBLE TROUBLE INDICATOR	TRANSMIT ALARM SIGNAL	TRANSMIT SUPERVISORY SIGNAL	TRANSMIT TROUBLE SIGNAL	ACTIVATE NOTIFICATION APPLIANCES
SMOKE DETECTORS	●	●					●			●
PULL STATIONS	●	●					●			●
WATERFLOW SWITCHES	●	●					●			●
VALVE TAMPER SWITCHES			●	●				●		
FIRE ALARM AC POWER FAIL					●	●			●	
FIRE ALARM LOW BATTERY					●	●			●	
OPEN CIRCUIT					●	●			●	
GROUND FAULT					●	●			●	
NAC SHORT CIRCUIT					●	●			●	
LOSS OF AC TO BUILDING					●	●			●	

RESERVED FOR CITY STAMP

REVISION	DESCRIPTION	DATE
0	ISSUED FOR REVIEW & APPROVAL	7/25/2017

Reviewed for Code Compliance Inspectional Services Department Approved
Date: 11/06/17

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NOTES, DETAILS, RISER DIAGRAM & CALCULAITONS

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