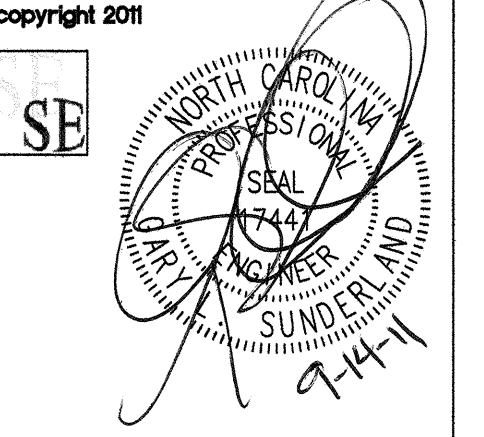


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2025 GLENN RD #202, DURHAM NC 27705
(919) 477-7000, 477-9028fax
www.sunderlandeng.com



FIRE ALARM SPECIFICATIONS

ALL ELECTRICAL WORK SHALL BE PERFORMED BY A LICENSED ELECTRICAL CONTRACTOR WHO SHALL PAY FOR THE PERMITS AND INSPECTION. WORK SHALL BE DONE AS SHOWN ON THE DRAWINGS AND WHERE NOT SHOWN SPECIFIC SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF NFPA 72 AND THE NATIONAL ELECTRICAL CODE.

CUTTING AND PATCHING FOR RECESSING NEW CONDUIT IN EXISTING WALLS AND CEILINGS SHALL BE BY PRIOR AGREEMENT BETWEEN THE G.C. AND THE ELECT. CONTR.

ALL POWER WIRE SHALL BE IN EMT CONDUIT OR MC CABLE. ALL CONTROL WIRE SHALL BE IN EMT CONDUIT OR EXPOSED CABLE WHERE ALLOWED. OUTLET BOXES SHALL BE STAMPED STEEL OR CUT-IN BOXES WHERE ALLOWED. ALL POWER WIRE SHALL BE COPPER TYPE THIN NO. 12 MINIMUM. ALL CONTROL WIRE TO BE CLASS 'B' PER MANUFACTURERS RECOMMENDATIONS. ALL WIRING TO BE COLOR-CODED AND LABELED. NO SPLICES ARE ALLOWED.

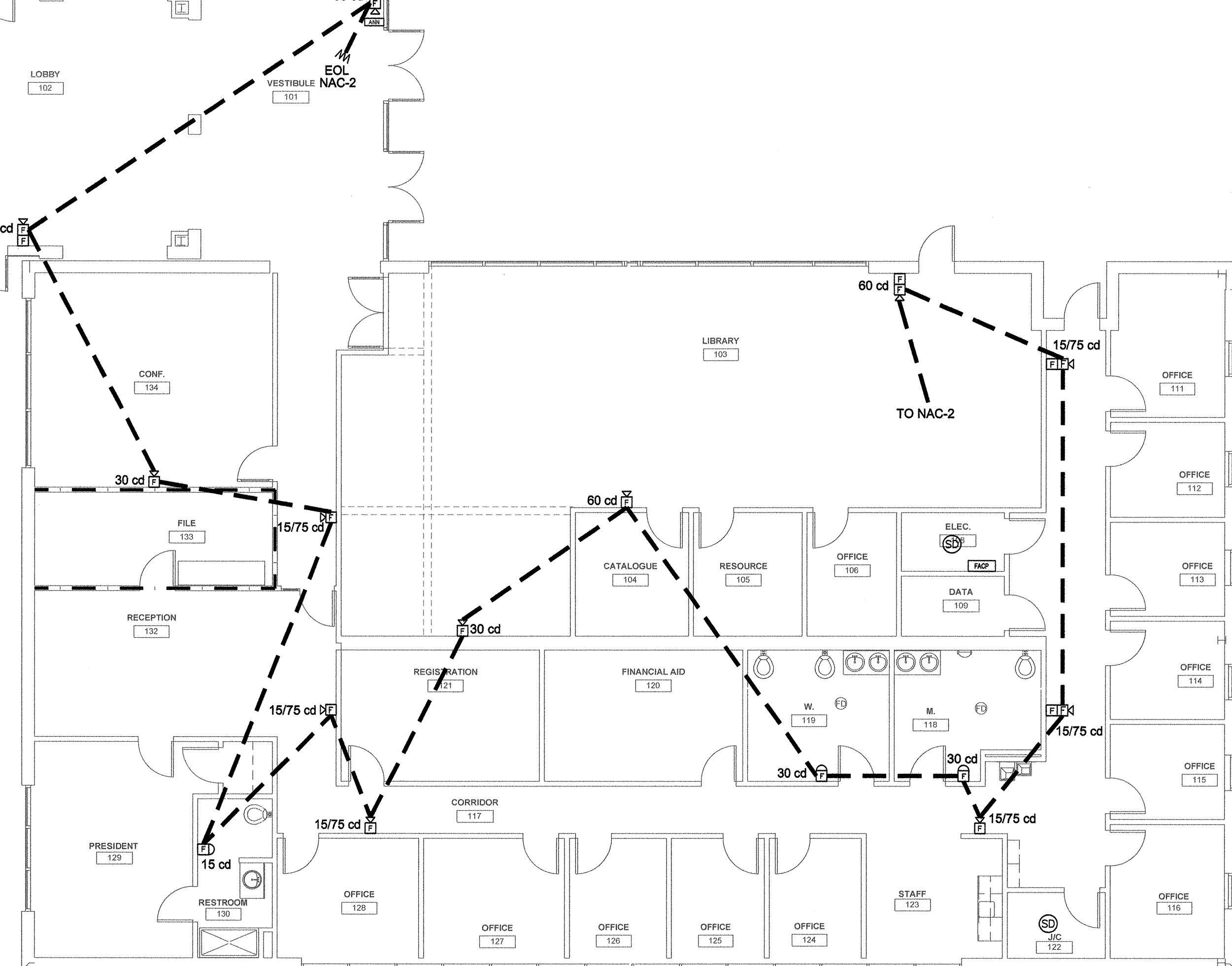
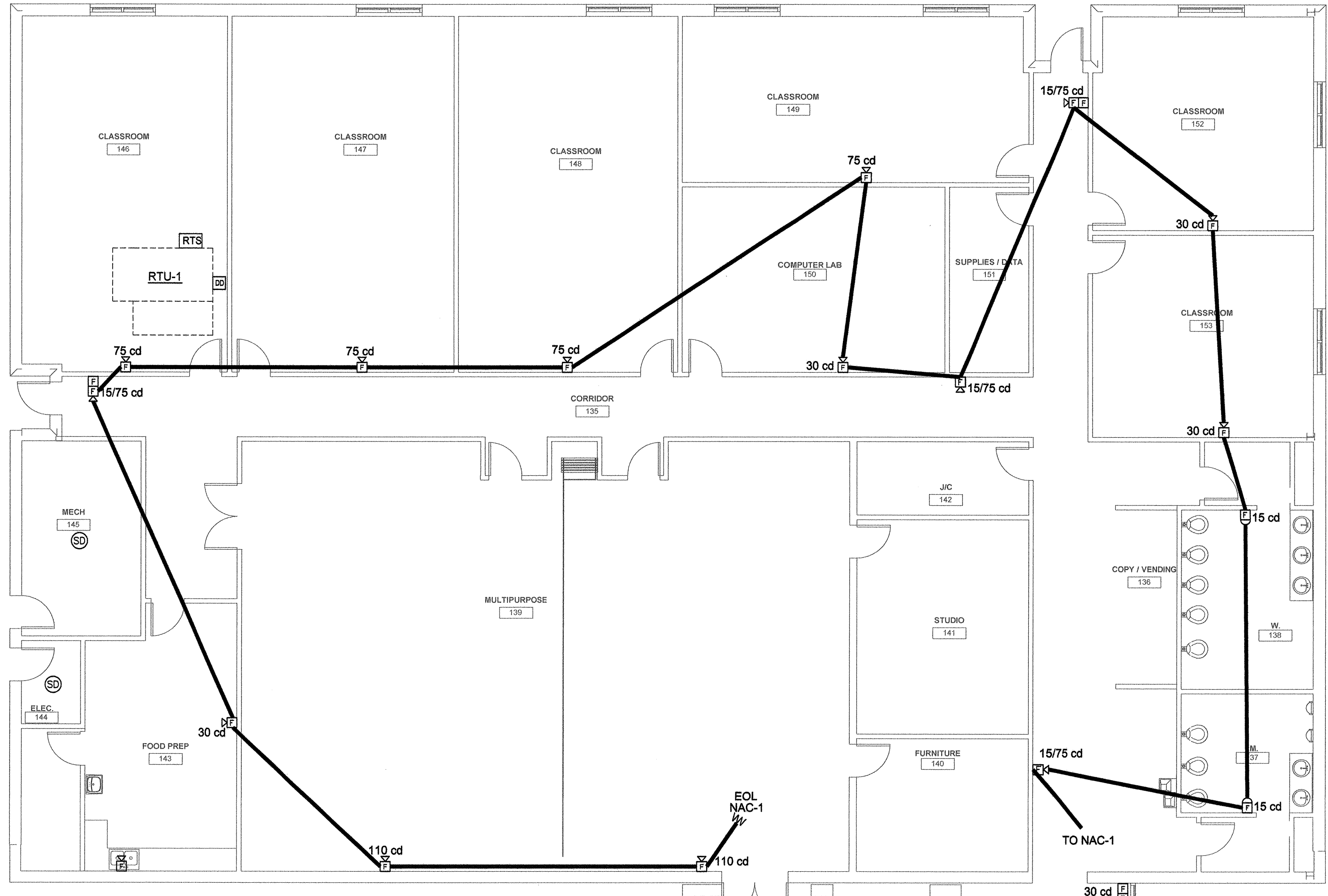
FIRE ALARM SYSTEM SHALL BE HARD-WIRED ADDRESSABLE SYSTEM INSTALLED PER MANUFACTURERS RECOMMENDATIONS. PROVIDE A COMPLETE SYSTEM TO MEET ALL REQUIREMENTS OF LOCAL JURISDICTION. PROVIDE INITIATION AND NOTIFICATION DEVICES AS INDICATED ON DRAWINGS. PROVIDE ALL PROGRAMMING AND FINAL CONNECTIONS BY A FACTORY TRAINED TECHNICIAN.

This calculator provided voltage drop calculations in three formats (Point to Point, End of Line, and Load Centering). Make sure that you know what method is accepted by, and the results do not exceed the limits set by the respective jurisdiction.

Project Name	APEX SCHOOL OF THEOLOGY	Point to Point Method	End of Line Method	Load Centering Method			
Date	8/28/2011	CIRCUIT IS WITHIN LIMITS	CIRCUIT IS WITHIN LIMITS	CIRCUIT IS WITHIN LIMITS			
Circuit Number	NAC-1	End of Line and Load Centering Methods use only the wire gauge for the first device to source					
Area Covered	NORTH HALF						
Normal System Voltage	24	Standard Wire Resistance in Ohms per 1000 feet					
Minimum Device Voltage	16	18=7.77 16=4.89 14=3.07 12=1.98 10=1.24					
Total Circuit Current	0.215	Wire Gauge Per 1000 Notes: 18-14 Awg = Solid Conductors 12-10 Awg = Stranded Conductors					
Distance from source to 1st device	100	Wire resistance is doubled in the calculations for two wires (Positive and Negative)					
Wire Gauge for balance of circuit	18	The voltage calculated to the last device in any method must not be lower than the manufactures listed minimum operating voltage (IE: rated operating voltage 20-32 VDC).					
Enter current in amps	150 = 150 ma	Alternate Calculations					
Device Number	Device Current	Distance from previous device	At Device Voltage	Drop Voltage	Percent Drop	End of Line Method Totals	Load Centering Method Totals
Device 1	0.016	100	23.78	0.210	0.88%	Current Distance Drop	Current Distance Drop
Device 2	0.007	18	23.76	0.246	1.02%	0.215 404 0.880	0.215 404 0.425
Device 3	0.008	7	23.68	0.305	1.27%	End of Line Voltage 23.16	End of Line Voltage 23.67
Device 4	0.008	18	23.68	0.337	1.40%	Percent Drop 3.54%	Percent Drop 1.77%
Device 5	0.016	18	23.64	0.383	1.51%	Device Manufacturer FCI	
Device 6	0.016	27	23.60	0.404	1.69%	Model # Candela Current @Rated Voltage	
Device 7	0.008	10	23.58	0.417	1.74%		
Device 8	0.016	16	23.56	0.438	1.82%		
Device 9	0.016	32	23.53	0.473	1.97%	HORN STROBE 75 0.016	
Device 10	0.016	18	23.51	0.491	2.04%	HORN STROBE 110 0.021	
Device 11	0.016	21	23.49	0.508	2.11%	HORN STROBE 30 0.008	
Device 12	0.016	3	23.46	0.510	2.12%	STROBE 16 0.006	
Device 13	0.008	42	23.47	0.550	2.31%		
Device 14	0.021	23	23.46	0.539	2.25%		
Device 15	0.021	28	23.45	0.545	2.27%		
Device 16	0.021	23	23.45	0.545	2.27%		
END			23.45	0.545	2.27%		
END			23.45	0.545	2.27%		
END			23.45	0.545	2.27%		
END			23.45	0.545	2.27%		
Totals	0.215	404	End of Line Voltage	23.45			

This calculator provided voltage drop calculations in three formats (Point to Point, End of Line, and Load Centering). Make sure that you know what method is accepted by, and the results do not exceed the limits set by the respective jurisdiction.

Project Name	APEX SCHOOL OF THEOLOGY	Point to Point Method	End of Line Method	Load Centering Method			
Date	8/28/2011	CIRCUIT IS WITHIN LIMITS	CIRCUIT IS WITHIN LIMITS	CIRCUIT IS WITHIN LIMITS			
Circuit Number	NAC-2	End of Line and Load Centering Methods use only the wire gauge for the first device to source					
Area Covered	SOUTH HALF						
Normal System Voltage	24	Standard Wire Resistance in Ohms per 1000 feet					
Minimum Device Voltage	16	18=7.77 16=4.89 14=3.07 12=1.98 10=1.24					
Total Circuit Current	0.175	Wire Gauge Per 1000 Notes: 18-14 Awg = Solid Conductors 12-10 Awg = Stranded Conductors					
Distance from source to 1st device	25	Wire resistance is doubled in the calculations for two wires (Positive and Negative)					
Wire Gauge for balance of circuit	18	The voltage calculated to the last device in any method must not be lower than the manufactures listed minimum operating voltage (IE: rated operating voltage 20-32 VDC).					
Enter current in amps	150 = 150 ma	Alternate Calculations					
Device Number	Device Current	Distance from previous device	At Device Voltage	Drop Voltage	Percent Drop	End of Line Method Totals	Load Centering Method Totals
Device 1	0.012	25	23.58	0.243	0.18%	Current Distance Drop	Current Distance Drop
Device 2	0.016	15	23.53	0.097	0.28%	0.175 283 0.880	0.175 283 0.242
Device 3	0.016	28	23.49	0.107	0.44%	End of Line Voltage 23.62	End of Line Voltage 23.76
Device 4	0.016	11	23.48	0.121	0.50%	Percent Drop 2.01%	Percent Drop 1.01%
Device 5	0.008	4	23.47	0.125	0.52%	Device Manufacturer FCI	
Device 6	0.008	12	23.46	0.138	0.57%	Model # Candela Current @Rated Voltage	
Device 7	0.012	28	23.44	0.185	0.69%		
Device 8	0.008	17	23.42	0.179	0.75%		
Device 9	0.016	17	23.41	0.192	0.80%		
Device 10	0.016	9	23.40	0.198	0.82%	HORN STROBE 75 0.016	
Device 11	0.007	16	23.40	0.205	0.85%	HORN STROBE 110 0.021	
Device 12	0.016	20	23.38	0.216	0.90%	HORN STROBE 30 0.008	
Device 13	0.008	15	23.38	0.219	0.91%	HORN STROBE 60 0.012	
Device 14	0.008	20	23.38	0.225	0.93%	STROBE 16 0.006	
Device 15	0.008	35	23.37	0.226	0.94%		
END			23.37	0.226	0.94%		
END			23.37	0.226	0.94%		
END			23.37	0.226	0.94%		
END			23.37	0.226	0.94%		
Totals	0.175	283	End of Line Voltage	23.77			



SYSTEM INPUTS

1	2	3	4	5	6	7	8
MANUAL FIRE ALARM STATIONS	X	X	X	X	X	X	X
SMOKE DETECTORS (IF PROVIDED)	X	X	X	X	X	X	X
HEAT DETECTORS (IF PROVIDED)	X	X	X	X	X	X	X
DUCT DETECTORS	X	X	X	X	X	X	X

SYSTEM OUTPUTS

1	2	3	4	5	6	7	8
ANNUNCIATION AT CONTROL PANEL	X	X	X	X	X	X	X
FIRE DEPARTMENT NOTIFICATION	X	X	X	X	X	X	X

TROUBLE CONDITIONS

7	8	9
AC POWER FAILURE	X	X
LOW BATTERY VOLTAGE	X	X
CIRCUIT FAULT	X	X

SUPERVISORY SIGNALS

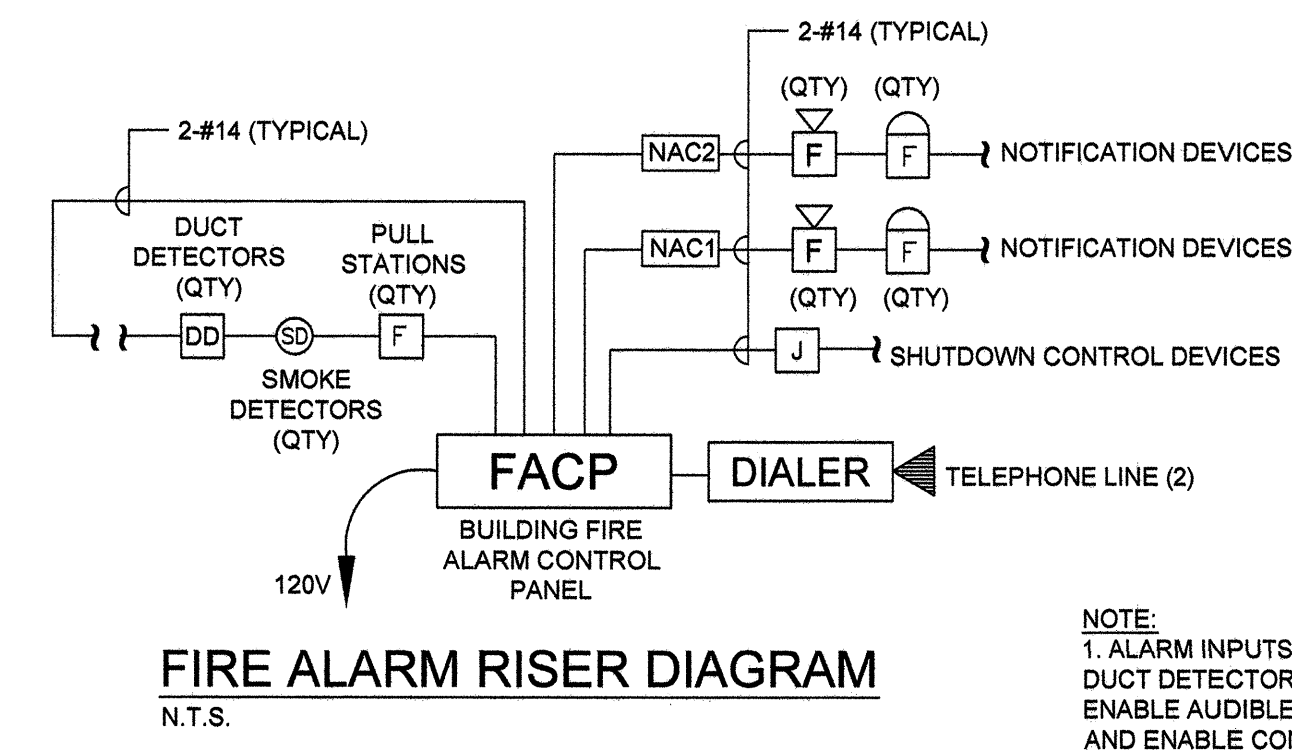
10	11	12	13
DEVICE OR CONTROL COMPONENT COMMON TROUBLE	X	X	X
TEMPERATURE MONITORING SYSTEM (IF PROVIDED)	X	X	X

1 FIRE ALARM PLAN
SCALE: 1/8" = 1'-0"

RATED WALL LEGEND
1 HR RATED
CEILING IS NOT RATED

SYMBOL LEGEND

SYMBOL	DESCRIPTION	FIRELITE NO.
FACP	FIRE ALARM CONTROL PANEL	MB-4 (E)
NAC	NAC PANEL	LD68P
F	MANUAL PULL STATION	8013LX
W	WALL STROBE	SR
H	FIRE ALARM HORN / STROBE	P2R
C	CEILING MOUNTED FIRE ALARM HORN STROBE	PC2R
SD	CEILING MOUNTED SMOKE DETECTOR	SD355
RTS	REMOTE TEST SWITCH	RTS41
DD	DUCT SMOKE DETECTOR	DH100PL
DD	NAC-1 CIRCUIT	N/A
DD	NAC-2 CIRCUIT	N/A



FIRE ALARM RISER DIAGRAM
N.T.S.

NOTE:
1. ALARM INPUTS FROM MANUAL PULL STATIONS, DUCT DETECTORS AND SMOKE DETECTORS SHALL ENABLE AUDIBLE/VISUAL SIGNALS IN THE BUILDING, AND ENABLE CONTROLLED FUNCTIONS OF FIRE DOORS, DOOR HOLDERS, AIR HANDLER SHUTDOWN, ETC. FIRE ALARM CONTROL PANEL SHALL USE DIGITAL DIALER TO REPORT TO U.I. LISTED CENTRAL MONITORING STATION.

SUNDERLAND ENGINEERING, PLLC FIRE ALARM BATTERY CALCULATION

JOB NAME: SCHOOL OF THEOLOGY
NOTES: 21115
DATE: 4/25/2011

STANDBY AND ALARM TIMES AS REQUIRED BY NFPA 72 SEC 1-5.2.6

SYSTEM	DESCRIPTION	QUANTITY	STANDBY CURRENT (AMPS)	TOTAL STANDBY CURRENT (AMPS)	ALARM CURRENT (AMPS)	TOTAL ALARM CURRENT (AMPS)
BAT. BOOST-1	FCI 110cd HORN STROBE	2	0.000	0.000	0.021	0.042
	FCI 30cd HORN STROBE	10	0.000	0.000	0.008	0.080
	FCI 75cd HORN STROBE	14	0.000	0.000	0.016	0.221
	FCI 15cd STROBE	3	0.000	0.000	0.001	0.003
	MODULE	1	0.000	0.000	0.001	0.001
	DIALER	1	0.000	0.000	0.003	0.003
	SMOKE DETECTORS	0	0.000	0.000	0.000	0.000
	SUBJECT DETECTORS	1	0.000	0.000	0.070	0.070
	FCI 60cd HORN STROBE	2	0.000	0.000	0.001	0.002
	NAC PANEL	2	0.030	0.060	0.001	0.001
	FCI PULL STATIONS	7	0.000	0.000	0.001	0.004
	ANNUNCIATOR PANEL	1	0.050	0.050	0.075	0.075
	FACP	1	0.075	0.075	0.175	0.175
	TOTAL SYSTEM CURRENT			STANDBY	0.188	ALARM
AMP CAPACITY PROVIDED						
9						

SYSTEM	REQUIRED STANDBY TIME (HOURS)	TOTAL STANDBY CURRENT (AMPS)	REQUIRED CAPACITY (AMP-HRS)	REQUIRED ALARM TIME (MINUTES)	TOTAL ALARM CURRENT (AMPS)	REQUIRED ALARM CAPACITY (AMP-HRS)
BAT. BOOST-1	24	0.188	4.508	5	0.695	0.058

SYSTEM	REQUIRED STANDBY CAPACITY (AMP-HRS)	REQUIRED ALARM CAPACITY (AMP-HRS)	+ 20% DERATING FACTOR	TOTAL ADJ. REQUIRED CAPACITY (AMP-HRS)	AMP-HRS PROVIDED
BAT. BOOST-1	4.5078	0.0558	4.566	0.913	5.479

APEX SCHOOL OF THEOLOGY
 1704 TW ALEXANDER,
 DURHAM NORTH CAROLINA

PRINCIPAL IN CHARGE: GLS
PROJECT MANAGER: GLS
DRAWN BY: ZLT/TMR/ERC

REVISIONS

NO.	ISSUED FOR PRICING	DATE
1	ISSUED FOR PERMIT	06/06/11
2	ISSUED FOR PERMIT	06/06/11

SHEET TITLE: _____

PROJECT NO.: HDG201009
SE 21115

ISSUE DATE: 09/13/11
SHEET NUMBER: **FA-1**

2 FIRE ALARM MATRIX
N.T.S.