

# Index

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Harbor Freight Lillington  
129 W Cornelius Harnett BLVD  
Lillington, NC 27549

Fire Alarm

REV 0.0

**FA-00**

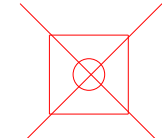
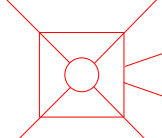








06/27/2024

# Notes/Matrix

## NOTES

- 1) Occupancy type M (IBC ), building has automatic sprinkler coverage.
- 2) Spot type coverage is required for FACU, NAC expander, Power Supplies. In the event Smoke detectors are not able to be used due to environment, spot type heat detectors shall be installed (NFPA 72 2019).
- 3) Smoke Detectors Shall be at least 36" away from any return or supply ventilation or fan.
- 4) All wire must installed no more then 6ft of separation secured to structure.
- 5) All devices are required to have a back box and be supported to structure.
- 6) All wire and devices must be secured in a manner that reduces stress on the wire and is attached to structure.
- 7) All Equipment must be protected by 120Vac surge protector installed no closer then 3 ft from the protected equipment.
- 8) Notification devices shall be installed at the lowest point of the ceiling.
- 9) Waterflows will activate alarm signal within 45-90 seconds.
- 10) Single path communication paths must be redundant and must send a polling path every 5 minutes, and must annunciator in the event there is trouble with the communicator.
- 11) All Fire alarm equipment must have 3 ft of working clearance in all directions, as per NFPA 70.
- 12) Wire shall be FPLP and installed in a manner in which to maintain survivability level 3. Which must be installed as per NFPA 70.
- 13) All pathways are required to be separate from any other and dedicated to fire alarm.
- 14) All Duct Detectors must be wire so the device is supervised by the addressable module.
- 15) All penetrations that pass through a wall shall be in a sleeve.
- 16) All penetrations that pass through a fire rated wall shall have a sleeve and be fire sealed 3 inches around the sleeve and the opening to the sleeve with a fire caulk that that is the same rating as the wall being penetrated.
- 17) Ceiling mounted horn/strobes must be within 15ft of any path of egress.

## Symbols

	Ceiling mounted strobe
	Ceiling mounted Horn/strobe
##CD	Candela rating of notification devices
	Pull Station
	Smoke Detector
	Duct Detector
	Tamper
	Waterflow
	Key Switch
	Surge Protector
	Fire Alarm Control Unit

## Order of operation

- Normal Operation
- 1) Pull station, Smoke detector, Waterflow, Heat Detector Activates.
  - 2) Panel Annunciates as well any remote annunciates and contact central station.
  - 3) Central station Dispatches Fire Department
  - 4) Audio/Visual activates and syncs.
  - 5) Door releases is activated releasing maglocks.
- Duct Detector:
- 1) Duct detector activates.
  - 2) Panel annunciators as well as remote annunciators activates.
  - 3) Supervisory Signal sent to central station.
  - 4) Associated RTU shunts.

Input	Output												
	Pre-Alarm	Alarm-signal	Audio/Visual Notification	Pre-Action	Fan shutdown	Door Release	Elevator Primary recall	Elevator Alternate recall	Elevator Fire hat	Elevator Shunt	Supervisory signal	HVAC Shunt	Trouble
WaterFlow		✓	✓		✓	✓							✓
Tamper													✓
Heat		✓	✓	✓	✓	✓							✓
Smoke Detector		✓	✓		✓	✓							✓
Duct Detector										✓		✓	✓
Pull Station		✓	✓	✓	✓	✓							✓
Short Fault													✓
Battery fault													✓
Ground fault													✓
Short Fault													✓

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Fire Alarm

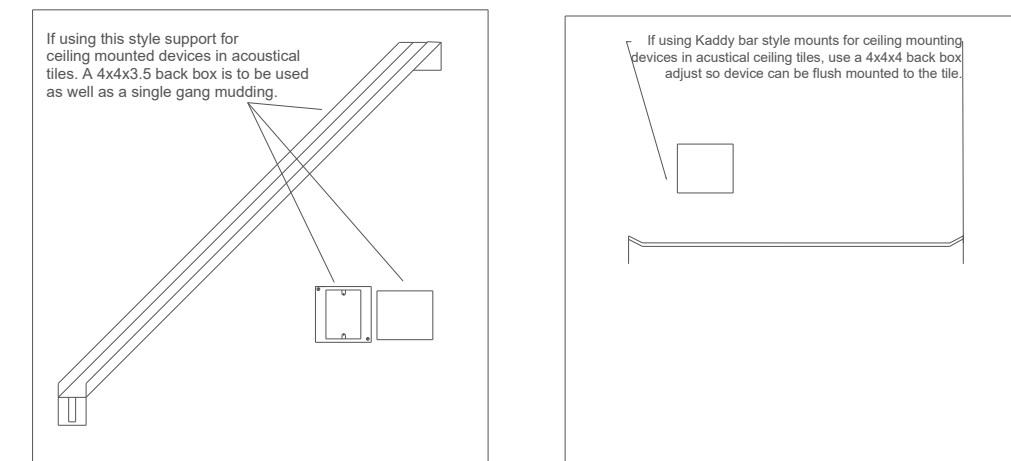
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**FA-01**

06/27/2024

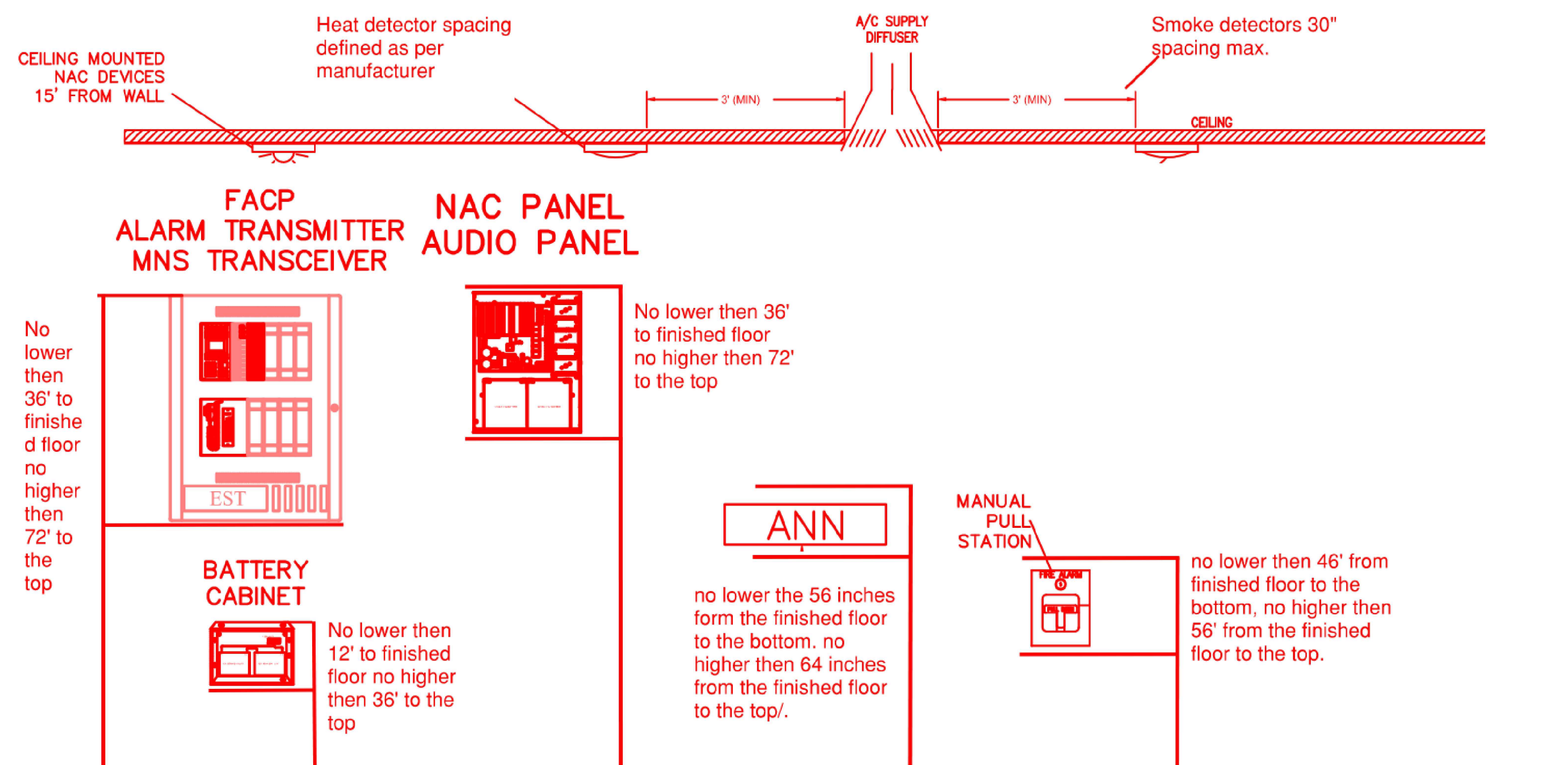
# Instillation Specifications

All devices shall be flush mounted to back box. to keep the fire rating of the wire and as per manufacture specs. this includes ceiling tiles. unless a UL listed trim plate is used between box and device. Grid ceiling supports or T-bars



All wires shall be supported every 6 ft on horizontal and 2 ft verticals. Supporting wire using raceways (with exception of a service loop), sprinkler pipe, all thread or other no unapproved pathway is illegal per code and not allowed. If zip ties are used they must be both Plenum rated and fire rated. When tying off structure made of steel with zip ties wire shall be zip tied to a zip tie that is attracted to the structure.

Grid wire can be used to support FA wire as long as it is dedicated to the fire alarm and nor part of the grid support system as well all grid wire use must have a permanently attached support including j-hooks or twisting in a ring. bat wings are not allowed to be used to secure FA wire.



All FA equipment as FACU and BPS-APS or battery boxes shall be installed using toggle bolts with washers. All wires are to be labeled and marked.

Wire Requirements	
<span style="color: green;">—</span>	Nac 1 off panel, must be 14/2 FPLP
<span style="color: blue;">—</span>	Nac 2 off panel, must be 14/2 FPLP
<span style="color: red;">—</span>	SLC off panel, must be 16/2 FPLP

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**FA-02**

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# Riser Diagram/Battery calculation

## Panel Battery calculations

FIRE-ALARM by Honeywell ES-50X Battery Calculation			
Calculation in Total Sheet			
		Required Standby Time in Hours 24 Hours	
Total Standby Current	0.1861 Amps	x 24	= 4.466 AH
		Required Alarm Time in Minutes 5 Minutes	
Total Alarm Load	1.9570 Amps	x 0.084	= 0.164 AH
		Total Current Load	
		4.630 AH	
		Multiply by the Derating Factor	
		1.2	
		x 1.20	
		Total Ampere Hours Required	
		5.56 AH	
Recommended Batteries:		BAT-1270 - 7AH Batteries	

## Panel NAC 1 Voltage drop

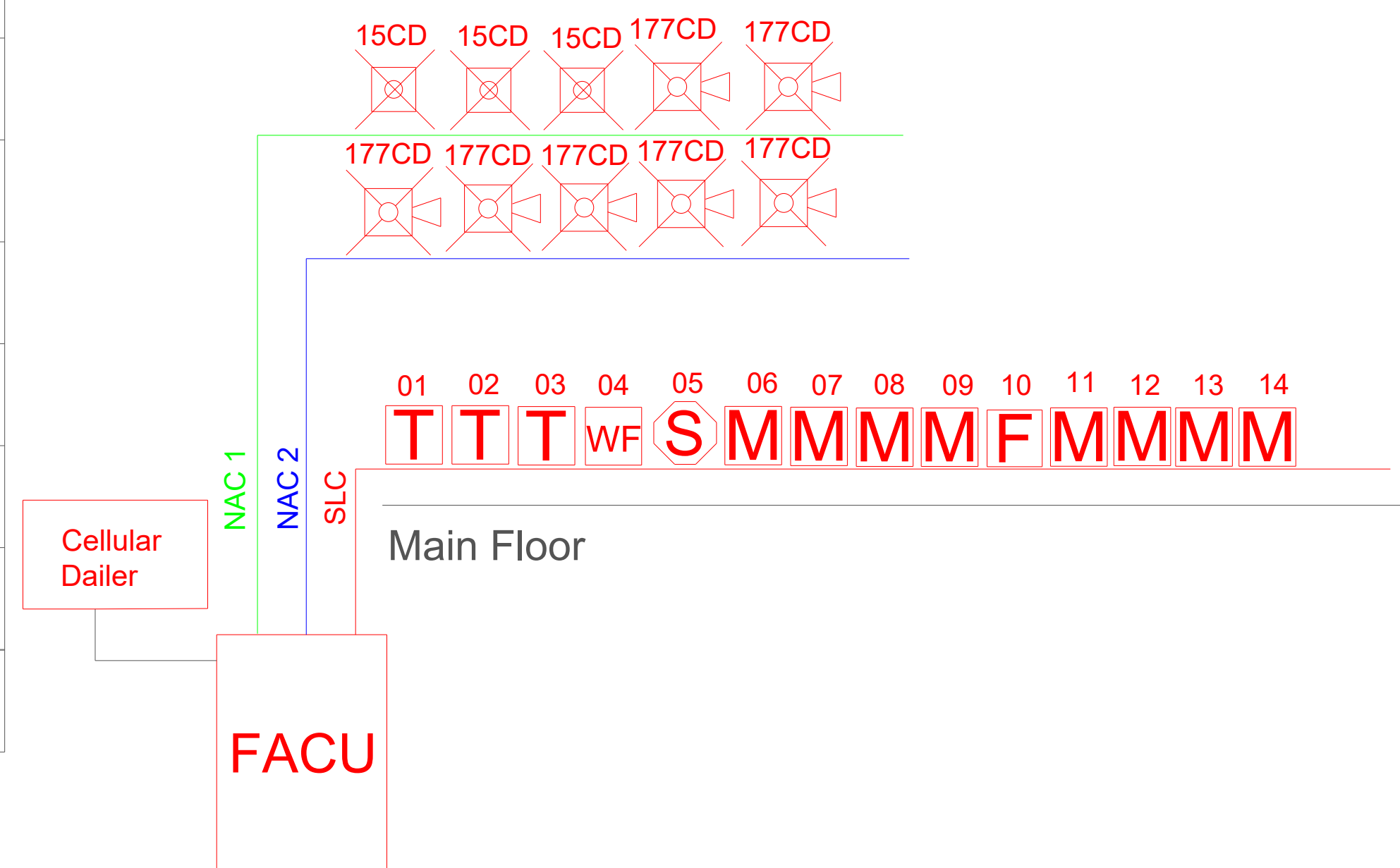
Nominal System Voltage	19.7	
Minimum Device Voltage	16	
Starting voltage w/ load factor (0.59)	19.444	
Total Circuit Current	0.434	Wire Ohm's Gauge Per 1000
		14 3.07
Distance from source to 1st device	40	14 3.07
Wire Gauge for balance of circuit	14 3.07	
Enter current in amps. .150 = 150 ma	Distance from previous device	Voltage At Device Drop from source Percent Drop
Device 1	0.018 40	19.34 0.107 0.54%
Device 2	0.018 20	19.29 0.158 0.80%
Device 3	0.018 20	19.24 0.207 1.05%
Device 4	0.190 40	19.14 0.300 1.52%
Device 5	0.190 60	19.07 0.370 1.88%
Totals	0.434 180	End of Line Voltage 0.06
Point to Point Method		
CIRCUIT IS WITHIN LIMITS		
End of Line Method		
CIRCUIT IS WITHIN LIMITS		
Load Centering Method		
CIRCUIT IS WITHIN LIMITS		
Totals		
Current	Distance	Voltage Drop
0.434	180	0.63
End of Line Voltage	End of Line Voltage	End of Line Voltage
19.07	18.96	19.20
Percent Drop	Percent Drop	Percent Drop
3.18%	2.43%	1.22%
End of Line and Load Centering Methods use only the wire gauge for the first device to source Standard Wire Resistance in Ohms per 1000 feet. 18=7.77 16=4.89 14=3.07 12=1.93 18-12 Awg = Solid Conductors		

## Panel NAC 2 Voltage drop

Nominal System Voltage	19.7	
Minimum Device Voltage	16	
Starting voltage w/ load factor (0.59)	19.14	
Total Circuit Current	0.950	Wire Ohm's Gauge Per 1000
		14 3.07
Distance from source to 1st device	40	14 3.07
Wire Gauge for balance of circuit	14 3.07	
Enter current in amps. .150 = 150 ma	Distance from previous device	Voltage At Device Drop from source Percent Drop
Device 1	0.190 40	18.91 0.233 1.18%
Device 2	0.190 60	18.63 0.513 2.61%
Device 3	0.190 60	18.42 0.723 3.67%
Device 4	0.190 60	18.28 0.863 4.38%
Device 5	0.190 60	18.21 0.933 4.74%
Totals	0.950 280	End of Line Voltage 0.17
Point to Point Method		
CIRCUIT IS WITHIN LIMITS		
End of Line Method		
CIRCUIT IS WITHIN LIMITS		
Load Centering Method		
CIRCUIT IS WITHIN LIMITS		
Totals		
Current	Distance	Voltage Drop
0.950	280	1.49
End of Line Voltage	End of Line Voltage	End of Line Voltage
18.21	17.51	18.32
Percent Drop	Percent Drop	Percent Drop
7.58%	8.29%	4.15%
End of Line and Load Centering Methods use only the wire gauge for the first device to source Standard Wire Resistance in Ohms per 1000 feet. 18=7.77 16=4.89 14=3.07 12=1.93 18-12 Awg = Solid Conductors		

## Symbols

	Ceiling mounted strobe
	Ceiling mounted Horn/strobe
##CD	Candela rating of notification devices
F	Pull Station
S	Smoke Detector
S	Duct Detector
T	Tamper
WF	Waterflow
KS	Key Switch
SRG	Surge Protector
FACU	Fire Alarm Control Unit
M	Monitor Module



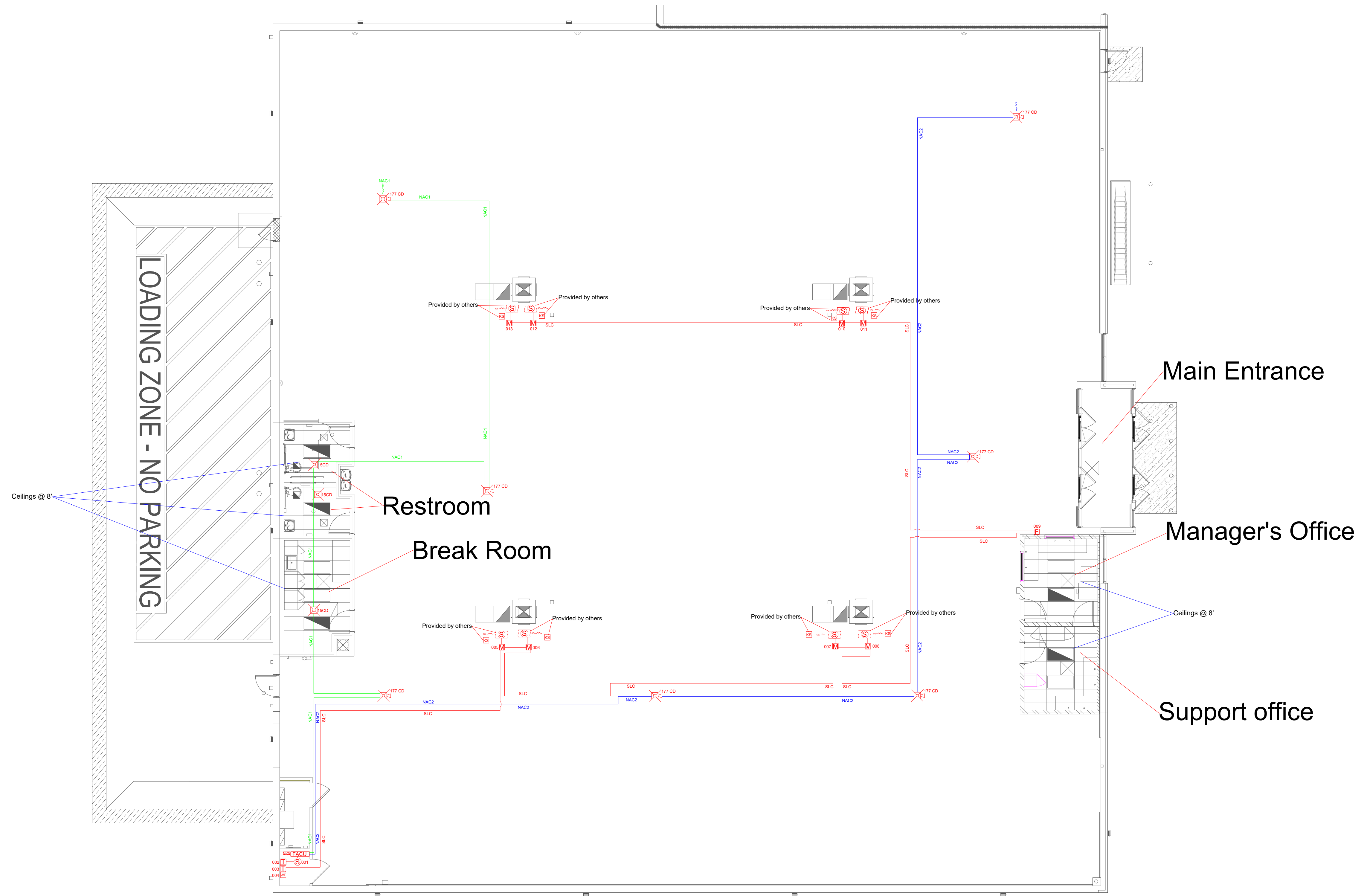
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FA-03  
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# Floor Plan



Scale: 3/32" = 1'0"  
 FA Deck @ 18'2 5/8"

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**FA-04**  
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