FIRE ALARM SYSTEM RISER DIAGRAM

COMPREHENSIVE SYSTEM OVERVIEW – ALL COMPONENTS & SUBSYSTEMS

LEGEND

- SLC / Signaling Line Circuit
- NAC / Notification Appliance Circuit
- IDC / Initiating Device Circuit
- EOL / End of Line Resistor
- Ethernet / Network
- Telephone Line / Dialer
- 24 VDC Power
- 120/240 VAC Power

ABBREVIATIONS

FACP	Fire Alarm Control Panel
SLC	Signaling Line Circuit
NAC	Notification Appliance Circuit
IDC	Initiating Device Circuit
EOL	End of Line Resistor
NPS	Notification Power Supply
CCA	Connected Control Annex
DACT	Digital Alarm Communicator Transmitter
RPS	Remote Power Supply
ANN	Annunciator
MM	Monitor Module
CM	Control Module

SYSTEM FEATURES

- Early detection of fire conditions
- Audible and visible occupant notification
- Supervision of all system components
- Firefighter communications and control
- Emergency voice evacuation capable
- Remote monitoring and off-site reporting
- Code compliant (NFPA 72)

EQUIPMENT ROOM

FACP
Fire Alarm Control Panel

ANN
Remote Annunciator

DACT
Alarm Communicator (Digital Dialer)

NPS
Notification Power Supply

RPS
Remote Power Supply

BATT
Batteries (24VDC)

120/240 VAC Input Power

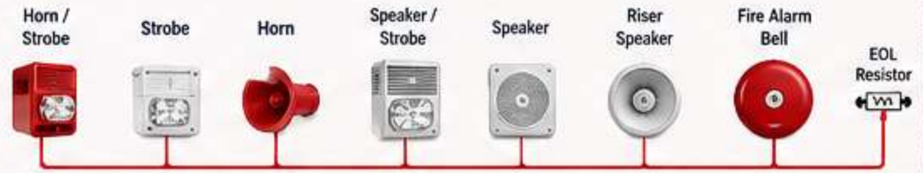
AC Disconnect (Dedicated)

Ethernet

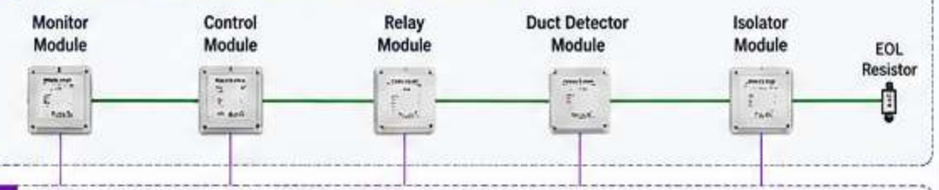
Telephone Line

1 INITIATING DEVICES (IDC – SUPERVISED)

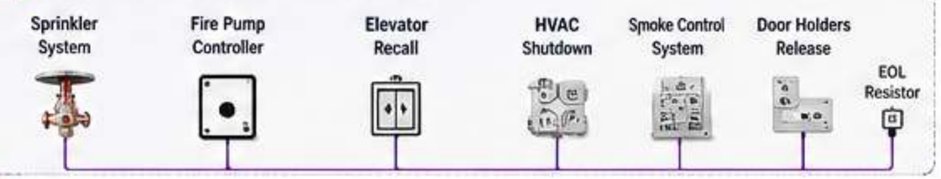
2 NOTIFICATION APPLIANCES (NAC – SUPERVISED)



3 CONTROL & MONITOR MODULES (SLC – SUPERVISED)

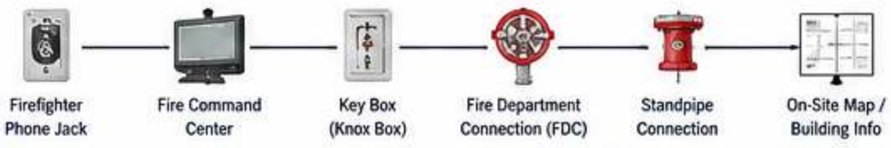


4 FIRE PROTECTION SYSTEM INTERFACES



5 MASS NOTIFICATION / VOICE EVACUATION (OPTIONAL)

6 FIRE COMMAND CENTER / FIRE DEPARTMENT CONNECTIONS



SYSTEM SUBSYSTEMS

DETECTION
Automatically detects fire conditions and sends a signal to the FACP.

ALARM
Provides audible and visible notification to building occupants.

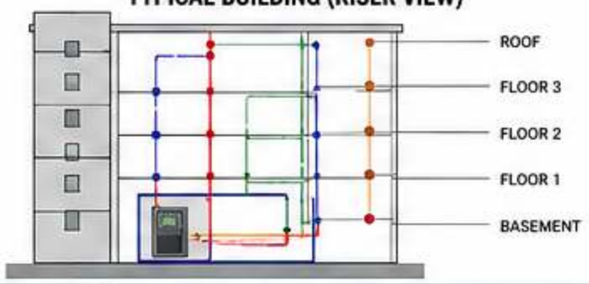
SUPERVISION
Monitors all devices, circuits, and system components.

CONTROL
Activates building systems and fire protection equipment.

COMMUNICATION
Transmits alarm signals to remote monitoring centers and firefighters.

POWER
Provides primary and backup power for reliable operation.

TYPICAL BUILDING (RISER VIEW)



- SLC (Green)
- NAC (Red)
- IDC (Orange)
- Network (Blue Dashed)
- Tel Line (Purple Dashed)
- 24 VDC (Brown)
- 120/240 VAC (Black)

KEY NOTES

1. All circuits are supervised and power-limited.
2. EOL resistors installed at the end of each circuit.
3. System designed in accordance with NFPA 72.
4. Maintain minimum 24 hours standby. 5 minutes alarm in standby batteries.
5. Perform regular testing and maintenance as required by code.

EARLY DETECTION. RAPID RESPONSE. LIFE SAFETY.

PLAN • INSTALL • TEST • MAINTAIN • COMPLY

FIRE ALARM SYSTEM – DEVICE LAYOUT DRAWING

ALL DEVICES, CIRCUITS & SUBSYSTEMS

PROJECT:
BUILDING:
DRAWN BY:
DATE: FA-100 REV: A

EQUIPMENT ROOM
(FACP LOCATION)

FACP
Fire Alarm Control Panel

ANN
Remote Annunciator

DACT
Digital Alarm Communicator Transmitter

NPS
Notification Power Supply

RPS
Remote Power Supply

BATT
Batteries (24VDC)

AC DISCONNECT (DEDICATED)

120/240 VAC INPUT POWER

ETHERNET (NETWORK)

TELEPHONE LINE

1 INITIATING DEVICES (IDC – SUPERVISED)

Smoke Detector 
Heat Detector 
Duct Detector 
Manual Pull Station 
Waterflow Switch 
Sprinkler Tamper Switch 
Gas Detector 
EOL Resistor 

IDC CIRCUIT

2 NOTIFICATION APPLIANCES (NAC – SUPERVISED)

Horn / Strobe 
Strobe 
Horn 
Speaker / Strobe 
Speaker 
Riser Speaker 
Fire Alarm Bell 
EOL Resistor 

NAC CIRCUIT

3 CONTROL & MONITOR MODULES (SLC – SUPERVISED)

Monitor Module 
Control Module 
Relay Module 
Duct Detector Module 
Isolator Module 
EOL Resistor 

SLC CIRCUIT

4 FIRE PROTECTION SYSTEM INTERFACES

Sprinkler System 
Fire Pump Controller 
Elevator Recall 
HVAC Shutdown 
Smoke Control System 
Door Holders Release 
EOL Resistor 

SLC CIRCUIT

5 MASS NOTIFICATION / VOICE EVACUATION (OPTIONAL)

Voice Evacuation Control Panel 
Zones / Speakers 
Paging Microphone 
Strobes / Speakers 
Amplifier
EOL Resistor

NAC CIRCUIT

6 FIRE COMMAND CENTER / FIRE DEPARTMENT CONNECTIONS

Firefighter Phone Jack

Fire Command Center

Key Box (Knox Box)

Fire Department Connection (FDC)

Standpipe Connection

On-Site Map / Building Info

TYPICAL RISER DIAGRAM (SCHEMATIC VIEW)

CIRCUIT LEGEND (BY COLOR)

- SLC / Signaling Line Circuit (Green)
- NAC / Notification Circuit (Red)
- IDC / Initiating Device Circuit (Orange)
- Ethernet / Network (Blue Dashed)
- Telephone Line (Purple Dashed)
- 24 VDC Power (Brown)
- 120/240 VAC Power (Black)

SYMBOL LEGEND

- Smoke Detector
- Heat Detector
- Duct Detector
- Manual Pull Station
- Strobe
- Horn
- Horn / Strobe
- Speaker
- Bell
- Control Module
- Monitor Module
- Relay Module
- End of Line Resistor

ABBREVIATIONS

FACP	Fire Alarm Control Panel
SLC	Signaling Line Circuit
NAC	Notification Appliance Circuit
IDC	Initiating Device Circuit
EOL	End of Line Resistor
NPS	Notification Power Supply
RPS	Remote Power Supply
DACT	Digital Alarm Communicator Transmitter
ANN	Annunciator

NOTES

1. All circuits are supervised and power-limited.
2. EOL resistors are installed at the end of each circuit.
3. System designed in accordance with NFPA 72.
4. Maintain minimum 24 hours standby.
5. Perform regular testing and maintenance as required by code.

FIRE ALARM SYSTEM DEVICE LAYOUT
N.T.S.

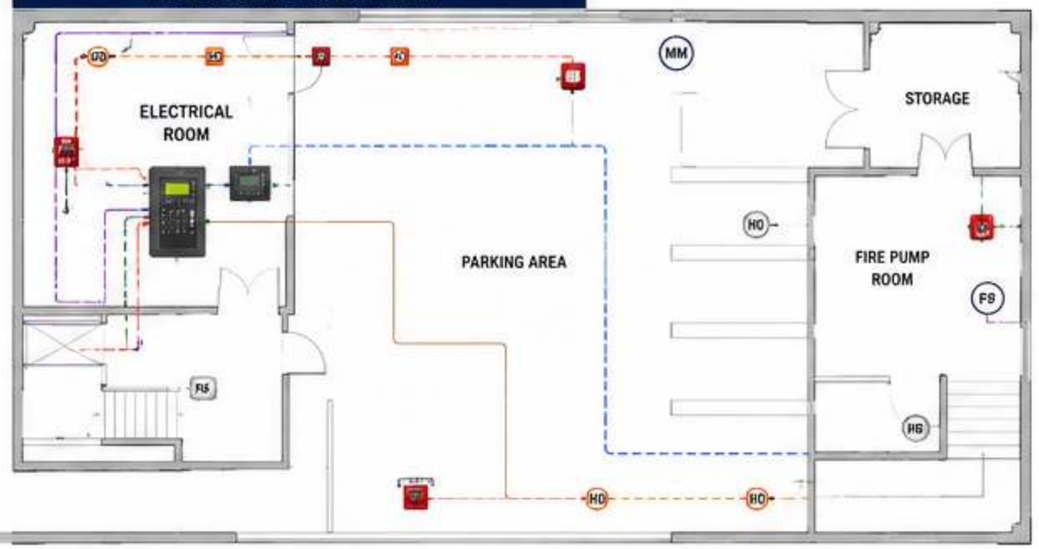
N

EARLY DETECTION. RAPID RESPONSE. LIFE SAFETY. CODE COMPLIANT. RELIABLE PROTECTION.

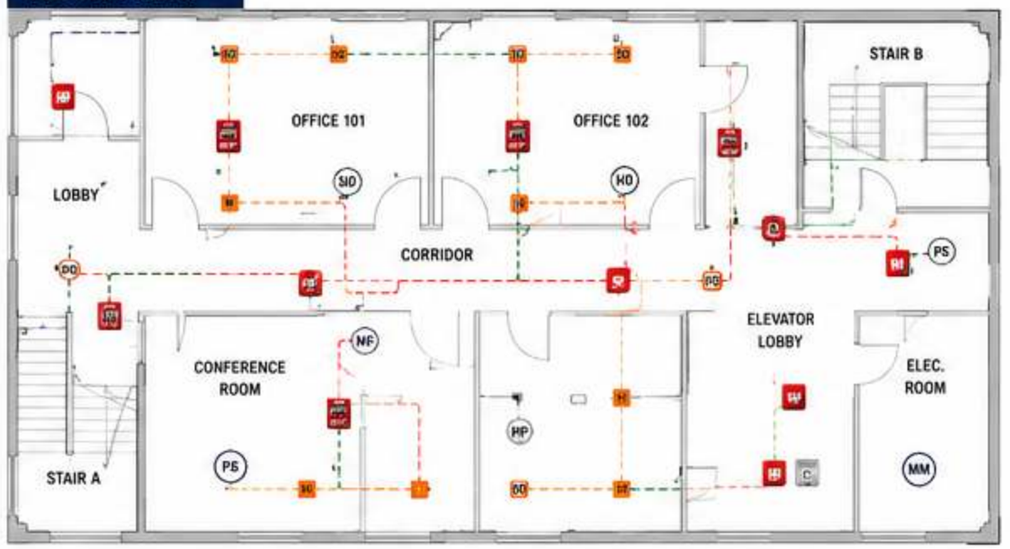
FIRE ALARM SYSTEM – DEVICE LAYOUT PLANS (PER FLOOR)

BASED ON RISER DIAGRAM – ALL DEVICES, CIRCUITS & SUBSYSTEMS

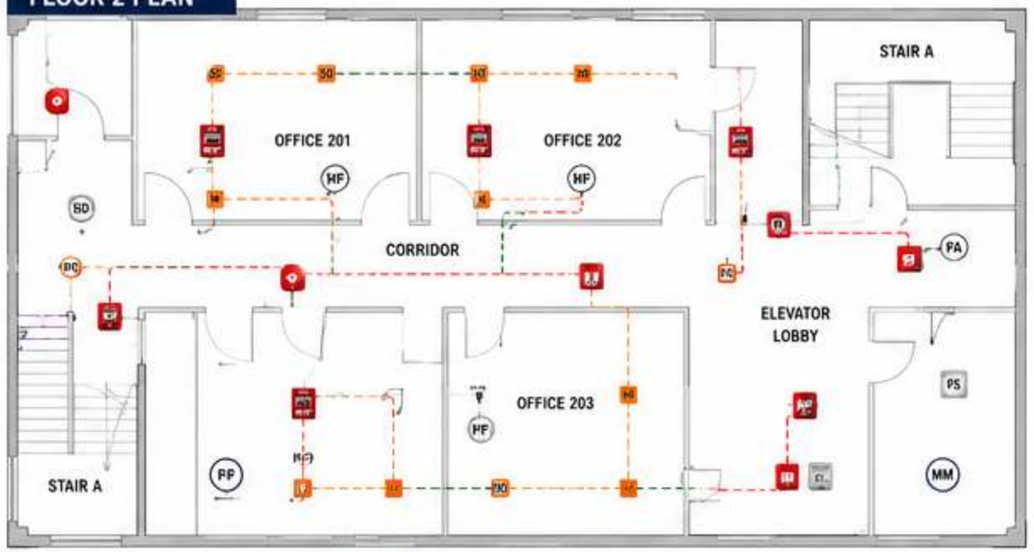
BASEMENT FLOOR PLAN



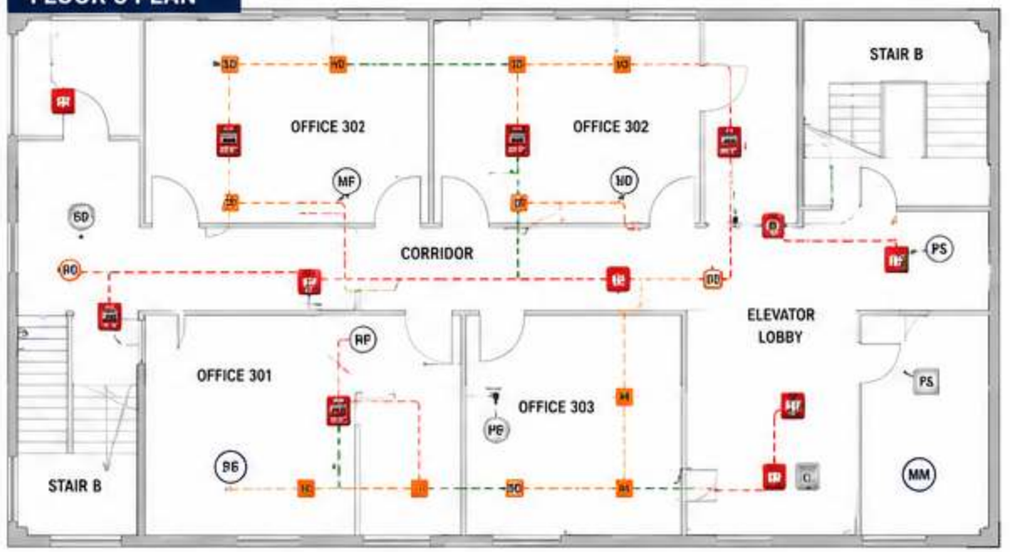
FLOOR 1 PLAN



FLOOR 2 PLAN



FLOOR 3 PLAN



DEVICE LEGEND

FACP	Fire Alarm Control Panel
ANN	Remote Annunciator
MM	Monitor Module
CM	Control Module
SD	Smoke Detector
HD	Heat Detector
CO	Carbon Monoxide Detector
MP	Manual Pull Station
H	Horn
S	Strobe
HS	Horn/Strobe
WF	Waterflow Switch
PS	Sprinkler Tamper Switch
FA	Fire Alarm Bell
CP	Ceiling Speaker
RP	Releasing Panel
EOL	End of Line Resistor

CIRCUIT LEGEND (BY COLOR)

- SLC / Signaling Line Circuit (Green)
- NAC / Notification Appliance Circuit (Red)
- IDC / Initiating Device Circuit (Orange)
- EOL / End of Line Resistor
- 24 VDC Power (Brown)
- Telephone Line / Dialer (Purple)
- Ethernet / Network (Blue Dashed)

SYMBOL NOTES

- All devices are addressable unless noted.
- EOL Resistors are installed at the end of each circuit.

NORTH

ABBREVIATIONS

FACP	Fire Alarm Control Panel	HI	Horn	WF	Sprinkler Switch
ANN	Remote Annunciator	SR	Strobe	PS	Sprinkler Switch
MM	Monitor Module	S	Strobe	FA	Fire Alarm Bell
CM	Control Module	HS	Horn/Strobe	CP	Ceiling Speaker
SD	Smoke Detector			RP	Releasing Panel
HD	Heat Detector			EOL	End of Line Resistor
CO	Carbon Monoxide Detector				

SYSTEM OVERVIEW

These plans show the device layout for each floor of the building.

All devices are connected as shown in the riser diagram using SLC, NAC, IDC and Power circuits.

Refer to the riser diagram for riser / backbone connections between floors and main equipment room details.

GENERAL NOTES

1. Install devices in accordance with NFPA 72, local codes and manufacturer instructions.
2. Maintain minimum 24" clearance from HVAC diffusers unless otherwise listed.
3. All audible/visible notification appliances shall be conspicuous and meet AHJ requirements.
4. Coordinate device locations with reflected ceiling and mechanical drawings.
5. Conduct testing and verification upon installation completion.

PROJECT INFORMATION

Project: _____

Building: _____

Drawn By: _____

Date: _____

Drawing No.: FA-200 Rev.: A

EARLY DETECTION. RAPID RESPONSE. LIFE SAFETY. CODE COMPLIANT. RELIABLE PROTECTION.

FIRE ALARM SYSTEM DESIGN PACKAGE

MULTI-STORY COMMERCIAL BUILDING

FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM

CONSTRUCTION DOCUMENTS

PROJECT INFORMATION

PROJECT TYPE:	NEW CONSTRUCTION
BUILDING USE:	COMMERCIAL OFFICE
OCCUPANCY CLASSIFICATION:	BUSINESS (B)
CONSTRUCTION TYPE:	TYPE IIB
NUMBER OF STORIES:	BASEMENT + 3 FLOORS + ROOF
BUILDING HEIGHT:	< 75 FT
SPRINKLERED:	YES (NFPA 13)
FIRE ALARM SYSTEM TYPE:	INTELLIGENT ADDRESSABLE
MONITORING:	REMOTE SUPERVISING STATION
PRIMARY POWER:	120/240 VAC, 60 Hz
SECONDARY POWER:	24 VDC BATTERY BACKUP

BUILDING SUMMARY

FLOOR	DESCRIPTION
ROOF	ROOF LEVEL
3	THIRD FLOOR
2	SECOND FLOOR
1	FIRST FLOOR
B	BASEMENT

DESIGNER OF RECORD

Applied Engineering Group

_____

SHEET IDENTIFICATION

FA-000

COVER SHEET

DATE: _____

PROJECT DESCRIPTION

This document package provides the fire alarm and emergency communication system design for a multi-story commercial facility. The system includes addressable fire alarm detection, notification appliances, voice evacuation capabilities, fire protection monitoring interfaces, emergency communications infrastructure, and supervisory monitoring functions.

The design package is intended for permitting, bidding, construction, testing, commissioning, and final acceptance.

DESIGN CRITERIA

- Provide automatic fire detection throughout protected areas.
- Provide manual fire alarm initiation capability.
- Monitor sprinkler system supervisory and alarm conditions.
- Monitor fire pump and fire protection equipment status.
- Provide audible and visible occupant notification.
- Support emergency voice evacuation functions.
- Interface with HVAC shutdown systems.
- Interface with elevator recall systems.
- Interface with smoke control systems where required.
- Interface with access-controlled egress doors where applicable.
- Provide remote alarm transmission to a supervising station.
- Meet survivability and pathway requirements as applicable.

CODE SUMMARY

CODE / STANDARD	DESCRIPTION
IBC	INTERNATIONAL BUILDING CODE
IFC	INTERNATIONAL FIRE CODE
NFPA 72	NATIONAL FIRE ALARM AND SIGNALING CODE
NFPA 70	NATIONAL ELECTRICAL CODE
NFPA 101	LIFE SAFETY CODE
NFPA 13	INSTALLATION OF SPRINKLER SYSTEMS
NFPA 14	STANDPIPE AND HOSE SYSTEMS
NFPA 20	INSTALLATION OF STATIONARY PUMPS FOR FIRE PROTECTION
NFPA 90A	AIR CONDITIONING AND VENTILATION SYSTEMS
LOCAL AMENDMENTS	APPLICABLE LOCAL CODES AND ORDINANCES

SYSTEM OVERVIEW

- Fire Alarm Control Panel (FACP)
- Remote Annunciator
- Digital Alarm Communicator Transmitter (DACT)
- Notification Power Supply
- Remote Power Supply
- Backup Batteries
- Smoke Detectors
- Heat Detectors
- Duct Smoke Detectors
- Carbon Monoxide Detectors
- Manual Pull Stations
- Waterflow Switches
- Sprinkler Tamper Switches
- Gas Detection Devices
- Monitor Modules (MON)
- Control Modules (CTRL)
- Relay Modules (RELAY)
- Isolator Modules (ISO)
- Horn/Strobes
- Speakers
- Speaker/Strobes
- Fire Alarm Bells
- Voice Evacuation Equipment
- Firefighter Communication Equipment

DRAWING INDEX

SHEET NO.	SHEET TITLE	DISCIPLINE
GENERAL		
FA-000	COVER SHEET	FA
FA-001	GENERAL NOTES AND SPECIFICATIONS	FA
FA-002	FIRE ALARM SYMBOLS AND ABBREVIATIONS	FA
FLOOR PLANS		
FA-101	BASEMENT DEVICE LAYOUT PLAN	FA
FA-102	FLOOR 1 DEVICE LAYOUT PLAN	FA
FA-103	FLOOR 2 DEVICE LAYOUT PLAN	FA
FA-104	FLOOR 3 DEVICE LAYOUT PLAN	FA
FA-105	ROOF DEVICE LAYOUT PLAN	FA
RISERS AND DIAGRAMS		
FA-201	FIRE ALARM SYSTEM RISER DIAGRAM	FA
FA-202	VOICE EVACUATION RISER DIAGRAM	FA
FA-203	FIREFIGHTER TELEPHONE RISER DIAGRAM	FA
FA-204	NETWORK ARCHITECTURE DIAGRAM	FA
FA-205	INTERFACE CONTROL DIAGRAM	FA
DETAILS		
FA-301	TYPICAL DEVICE INSTALLATION DETAILS	FA
FA-302	TYPICAL WIRING DETAILS	FA
FA-303	EQUIPMENT ROOM DETAILS	FA
FA-304	FIRE COMMAND CENTER DETAILS	FA
SCHEDULES		
FA-401	DEVICE SCHEDULE	FA
FA-402	ADDRESS SCHEDULE	FA
FA-403	EQUIPMENT SCHEDULE	FA
FA-404	NOTIFICATION APPLIANCE SCHEDULE	FA
FA-405	MODULE SCHEDULE	FA
FA-406	POWER SUPPLY SCHEDULE	FA
CALCULATIONS		
FA-501	BATTERY CALCULATIONS	FA
FA-502	VOLTAGE DROP CALCULATIONS	FA
FA-503	SLC LOOP LOADING CALCULATIONS	FA
FA-504	SPEAKER CIRCUIT CALCULATIONS	FA
FA-505	STROBE CANDELA CALCULATIONS	FA
OPERATIONS		
FA-601	SEQUENCE OF OPERATIONS	FA
FA-602	CAUSE-AND-EFFECT MATRIX	FA
FA-603	INTERFACE MATRIX	FA

GENERAL NOTES

1. All fire alarm equipment shall be listed and approved for fire alarm service.
2. All circuits shall be installed in accordance with applicable codes and manufacturer requirements.
3. Final device locations shall be coordinated with architectural, structural, mechanical, electrical, and life-safety drawings.
4. Devices shall not be installed where prohibited by code or manufacturer requirements.
5. Contractor shall verify field conditions prior to installation.
6. All system programming shall be documented and submitted prior to acceptance testing.
7. Complete testing and commissioning shall be performed before occupancy.
8. Provide record drawings and final documentation upon project completion.

PROJECT SCOPE

- Addressable fire alarm detection and notification
- Voice evacuation / mass notification system
- Fire protection equipment monitoring
- Elevator recall and control interfaces
- HVAC shutdown and smoke control interfaces
- Remote monitoring and reporting

ABBREVIATIONS

AFF	Above Finished Floor	NPS	Notification Power Supply
AHJ	Authority Having Jurisdiction	RPS	Remote Power Supply
FACP	Fire Alarm Control Panel	MM	Monitor Module
NAC	Notification Appliance Circuit	CM	Control Module
SLC	Signaling Line Circuit	RM	Relay Module
EOL	End of Line Resistor	ISO	Isolator Module

REVISION SCHEDULE

REV	DESCRIPTION	DATE

FIRE ALARM SYSTEM – GENERAL NOTES & SPECIFICATIONS

1. GENERAL

1.1 The fire alarm system shall be designed, installed, tested and maintained in accordance with the requirements of NFPA 72, the applicable codes listed, and the requirements of the Authority Having Jurisdiction (AHJ).

1.2 These documents describe the design intent. The contractor shall furnish all labor, materials, equipment and supervision necessary to complete a fully functional fire alarm system.

1.3 Where conflicts exist between these documents, the more stringent requirement shall govern. Notify the Engineer of Record immediately.

1.4 All equipment shall be listed for fire protection service and approved by the AHJ.

1.5 All wiring methods, materials and installations shall comply with NFPA 70 (NEC) and these documents.

1.6 All devices shown are addressable unless otherwise noted.

1.7 Contractor shall field verify all existing conditions and notify the Engineer of Record of any discrepancies prior to installation.

1.8 All conduit, cable, devices and equipment shall be installed neatly and professionally. No exposed wiring is allowed.

1.9 Provide identification labels for all circuits, devices, modules, panels, cables, terminations and enclosures.

1.10 These documents are not intended to show every minor detail of installation. The system shall be complete, operational and fully coordinated.

1.11 All penetrations of fire-rated assemblies shall be firestopped in accordance with applicable codes.

1.12 Do not scale drawings. Dimensions govern.

2. CODE REFERENCES

2.1 NFPA 72 – National Fire Alarm and Signaling Code (Latest Edition)

2.2 NFPA 70 – National Electrical Code (Latest Edition)

2.3 NFPA 101 – Life Safety Code (Latest Edition)

2.4 NFPA 13 – Installation of Sprinkler Systems (Latest Edition)

2.5 NFPA 14 – Standpipe and Hose Systems (Latest Edition)

2.6 NFPA 20 – Installation of Stationary Pumps for Fire Protection

2.7 NFPA 90A – Air Conditioning and Ventilation Systems

2.8 NFPA 110 – Emergency and Standby Power Systems

2.9 IBC – International Building Code (Latest Edition)

2.10 IFC – International Fire Code (Latest Edition)

All local codes, ordinances and amendments shall apply.

3. SYSTEM REQUIREMENTS

3.1 The system shall be a listed, addressable fire alarm system.

3.2 The system shall provide automatic fire detection, manual alarm initiation, occupant notification, and fire protection system monitoring.

3.3 The system shall support emergency voice evacuation in accordance with NFPA 72.

3.4 The system shall provide alarm signal transmission to a listed supervising station.

3.5 The system shall monitor and report supervisory and trouble conditions.

3.6 The system shall provide interfaces to building systems as shown on the drawings and described in the sequence of operations.

3.7 The system shall be configurable to provide cause-and-effect operations as required.

3.8 All components shall be compatible with the listed control unit and network equipment.

3.9 The system shall be capable of future expansion as indicated in the design documents.

3.10 All circuits shall be supervised for open, short and ground fault conditions.

3.11 All software, firmware and programming shall be provided by the installing contractor.

4. INSTALLATION REQUIREMENTS

4.1 Install all equipment in accordance with manufacturer's listed installation instructions.

4.2 Install devices plumb, level and in the locations shown.

4.3 Provide and install all backboxes, mounting hardware, conduit, wire, raceways and supports.

4.4 Maintain minimum clearances for service and operation.

4.5 Mount devices at heights indicated on the drawings or per NFPA 72 where not shown.

4.6 Provide barrier-free access to manual pull stations.

4.7 Install all wiring in conduit or cable as indicated.

4.8 Maintain minimum separation from non-power limited circuits per NFPA 70 and NFPA 72.

4.9 All splices shall be in listed junction boxes with cover.

4.10 Provide circuit continuity and polarity in accordance with NFPA 72.

4.11 Provide end-of-line devices as required for all supervised circuits.

5. DEVICE INSTALLATION

5.1 Install smoke detectors in accordance with NFPA 72 Chapter 17.

5.2 Install heat detectors in accordance with NFPA 72 Chapter 17.

5.3 Install duct smoke detectors in accordance with NFPA 72 Chapter 17.

5.4 Install manual pull stations in accordance with NFPA 72 Chapter 20.

5.5 Install notification appliances in accordance with NFPA 72 Chapter 18.

5.6 Install modules in accordance with NFPA 72 Chapter 19.

5.7 Install visible appliances to achieve the minimum candela requirements of NFPA 72.

5.8 Install audible appliances to achieve the minimum dBA requirements of NFPA 72.

5.9 Install voice evacuation equipment in accordance with NFPA 72 Chapter 24.

5.10 Provide device identification at all control panels and annunciators.

5.11 Do not install devices in or near potential sources of air movement, vibration, steam, dust, or other conditions that could affect operation.

5.12 Protect all devices during construction.

6. WIRING & CIRCUITS

6.1 All system circuits shall be power limited where required.

6.2 Use conductors and cable types as indicated on the drawings and in accordance with NFPA 72.

6.3 Do not exceed maximum circuit lengths or loading.

6.4 Maintain polarity on all circuits.

6.5 Provide spare capacity on all circuits as required by code (typically 20%).

6.6 Provide dedicated circuits for fire alarm equipment.

6.7 Do not share power supplies between life safety and non-life safety loads unless permitted.

6.8 Provide surge protection where indicated.

6.9 Seal all penetrations in accordance with code.

7. POWER & GROUNDING

7.1 Provide a dedicated 120/240 VAC branch circuit to each fire alarm control unit and power supply.

7.2 Power supplies shall be listed for fire alarm service and supervised.

7.3 Provide battery backup per NFPA 72 (24 hours standby plus 5 minutes alarm unless otherwise indicated).

7.4 Batteries shall be sealed, lead-acid type and located in the enclosure provided.

7.5 Ground all equipment in accordance with NFPA 70 and manufacturer's instructions.

7.6 Do not connect power limited circuits to earth ground.

7.7 Test and verify all power supplies and batteries. prior to final acceptance.

8. CONTRACTOR RESPONSIBILITIES

8.1 Review all documents and verify site conditions prior to bidding or installation.

8.2 Provide shop drawings and product data for approval prior to installation.

8.3 Furnish all listed equipment, materials and accessories required for a complete system.

8.4 Employ qualified personnel experienced in fire alarm system installation.

8.5 Install system in a neat and workmanlike manner.

8.6 Coordinate device locations with other trades to avoid conflicts.

8.7 Provide as-built drawings, device address list, and programming documentation.

8.8 Perform all required testing and verification in accordance with NFPA 72.

8.9 Obtain AHJ acceptance prior to building occupancy.

8.10 Provide training to the owner's personnel.

8.11 Provide operation and maintenance manuals.

9. TESTING, INSPECTION & COMMISSIONING

9.1 All system testing shall be in accordance with NFPA 72.

9.2 Test each initiating device for proper operation.

9.3 Test all notification appliances for audibility and visibility.

9.4 Test voice evacuation system for intelligibility and coverage.

9.5 Test all system interfaces for proper operation.

9.6 Verify all cause-and-effect operations.

9.7 Verify all supervisory and trouble signals.

9.8 Verify supervisory station transmission.

9.9 Perform full system functional test.

9.10 Provide testing reports and results to the AHJ.

ABBREVIATIONS

AHJ	Authority Having Jurisdiction	NPS	Notification Power Supply
FACP	Fire Alarm Control Panel	RPS	Remote Power Supply
NAC	Notification Appliance Circuit	MM	Monitor Module
SLC	Signaling Line Circuit	CM	Control Module
EOL	End of Line Resistor	RM	Relay Module
		ISO	Isolator Module

WIRE LEGEND

- SLC / Signaling Line Circuit
- NAC / Notification Appliance Circuit
- IDC / Initiating Device Circuit
- EOL / End of Line Resistor
- 24 VDC Power
- Telephone Line / Dialer
- Ethernet / Network

PROJECT:
MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM

DESIGNER OF RECORD:
Applied Engineering Group

DRAWING TITLE:
GENERAL NOTES & SPECIFICATIONS

DRAWING NO.:
FA-001

SHEET:
1 OF 2

DATE:
MAY 24, 2024

REVISION:
0

REVISION HISTORY

REV	DATE	DESCRIPTION

APPLICABLE CODES

IBC	INTERNATIONAL BUILDING CODE
IFC	INTERNATIONAL FIRE CODE
NFPA 72	NATIONAL FIRE ALARM AND SIGNALING CODE
NFPA 70	NATIONAL ELECTRICAL CODE
NFPA 101	LIFE SAFETY CODE
NFPA 13	INSTALLATION OF SPRINKLER SYSTEMS
NFPA 20	INSTALLATION OF STATIONARY PUMPS FOR FIRE PROTECTION
NFPA 90A	AIR CONDITIONING AND VENTILATION SYSTEMS

ALL LOCAL AMENDMENTS AND AUTHORITIES HAVING JURISDICTION SHALL APPLY.

SHEET INDEX (REFERENCE)

THIS DOCUMENT IS DIAGRAMMATIC AND INDICATES DESIGN INTENT. THE CONTRACTOR SHALL PROVIDE A COMPLETE, CODE COMPLIANT SYSTEM.

NOT FOR CONSTRUCTION UNLESS ISSUED FOR CONSTRUCTION

FIRE ALARM SYSTEM – SYMBOL LEGEND, LINE TYPES, ABBREVIATIONS & CIRCUIT DESIGNATIONS

DEVICE SYMBOLS – INITIATING DEVICES

SYMBOL		DESCRIPTION
	SD	PHOTOELECTRIC SMOKE DETECTOR
	SD/CO	SMOKE / CARBON MONOXIDE DETECTOR
	HD	FIXED TEMPERATURE HEAT DETECTOR
	HD/R	RATE-OF-RISE HEAT DETECTOR
	DD	DUCT SMOKE DETECTOR
	BEAM	BEAM SMOKE DETECTOR
CO	CO	CARBON MONOXIDE DETECTOR
	FL	FLAME DETECTOR
WP	WP	WATERFLOW SWITCH
TS	TS	SPRINKLER TAMPER SWITCH
GS	GS	GAS DETECTOR
PS	PS	PRESSURE SWITCH
PULL	PULL	MANUAL PULL STATION
RTS	RTS	REMOTE TEST STATION

DEVICE SYMBOLS – NOTIFICATION APPLIANCES

SYMBOL	DESCRIPTION
H	HORN
S	STROBE
HS	HORN / STROBE
SP	SPEAKER
SP/S	SPEAKER / STROBE
BELL	FIRE ALARM BELL
CHIME	CHIME
SPK	CEILING SPEAKER
SPK/S	CEILING SPEAKER / STROBE
V	VISIBLE APPLIANCE (STROBE ONLY)
MNS	MASS NOTIFICATION SPEAKER
MNS/S	MASS NOTIFICATION SPEAKER / STROBE

DEVICE SYMBOLS – MODULES & INTERFACES

SYMBOL	DESCRIPTION
MM	MONITOR MODULE
CM	CONTROL MODULE
RM	RELAY MODULE
CTRL	ISOLATOR MODULE
MIM	MONITOR ISOLATOR MODULE
BMM	BEAM MONITOR MODULE
RMM	RELAY MONITOR MODULE
I/O	INPUT / OUTPUT MODULE
PSM	POWER SUPERVISORY MODULE
FMM	FIRE PUMP MONITOR MODULE
EIM	ELEVATOR INTERFACE MODULE
SCM	SMOKE CONTROL MODULE
GW	GRAPHIC WORKSTATION
NCM	NETWORK CONTROL MODULE

DEVICE SYMBOLS – EQUIPMENT

SYMBOL		DESCRIPTION
	FACP	FIRE ALARM CONTROL PANEL
	ANN	REMOTE ANNUNCIATOR
	DACT	DIGITAL ALARM COMMUNICATOR TRANSMITTER
	NPS	NOTIFICATION POWER SUPPLY
	RPS	REMOTE POWER SUPPLY
	BATT	BATTERY CABINET (24 VDC)
	FP	FIREFIGHTER PHONE JACK
	FCP	FIREFIGHTER CONTROL PANEL
	FCA	FIREFIGHTER COMMAND CENTER ANNUNCIATOR
	PRN	SYSTEM PRINTER
	NETWORK	NETWORK / ETHERNET CONNECTION

LINE TYPES / WIRING LEGEND

LINE	DESCRIPTION
	SLC / SIGNALING LINE CIRCUIT
	NAC / NOTIFICATION APPLIANCE CIRCUIT
	IDC / INITIATING DEVICE CIRCUIT
	ETHERNET / NETWORK
	TELEPHONE LINE / DIALER
	24 VDC POWER
	120/240 VAC POWER
	DRY CONTACT / CONTROL WIRING
	FIBER OPTIC CABLE
	SHIELDED CABLE

CIRCUIT DESIGNATIONS

DESIGNATION	DESCRIPTION
SLC-#	SIGNALING LINE CIRCUIT NUMBER
NAC-#	NOTIFICATION APPLIANCE CIRCUIT NUMBER
IDC-#	INITIATING DEVICE CIRCUIT NUMBER
VC-#	VOICE CIRCUIT / SPEAKER CIRCUIT NUMBER
EOL	END OF LINE RESISTOR
MCC-#	MASS NOTIFICATION CIRCUIT NUMBER
FP-#	FIREFIGHTER PHONE CIRCUIT NUMBER
NET-#	NETWORK SEGMENT NUMBER
PS-#	POWER SUPPLY IDENTIFIER

ABBREVIATIONS

ABBR.	DESCRIPTION	ABBR.	DESCRIPTION
AFF	ABOVE FINISHED FLOOR	MM	MONITOR MODULE
AHJ	AUTHORITY HAVING JURISDICTION	CM	CONTROL MODULE
FACP	FIRE ALARM CONTROL PANEL	RM	RELAY MODULE
ANN	ANNUNCIATOR	ISO	ISOLATOR MODULE
NAC	NOTIFICATION APPLIANCE CIRCUIT	PS	POWER SUPPLY
SLC	SIGNALING LINE CIRCUIT	BATT	BATTERY
IDC	INITIATING DEVICE CIRCUIT	RTS	REMOTE TEST STATION
EOL	END OF LINE	SP	SPEAKER
NPS	NOTIFICATION POWER SUPPLY	HS	HORN / STROBE
RPS	REMOTE POWER SUPPLY	CO	CARBON MONOXIDE
MNS	MASS NOTIFICATION SYSTEM	WP	WATERFLOW

GENERAL NOTES

1. All devices and equipment shall be listed for fire alarm service.
2. Installation shall comply with NFPA 72, NEC and all applicable codes.
3. Symbols shown are diagrammatic. Refer to floor plans, details and schedules for exact locations, mounting heights and wiring requirements.
4. All circuits shall be supervised and power-limited where required.
5. EOL resistors shall be installed at the end of each supervised circuit.
6. Wiring methods shall be in accordance with code and manufacturer instructions.
7. Colors shown for line types are for diagram clarity only and do not represent required wire insulation colors unless specified.
8. This legend applies to all drawings in this fire alarm design package.

MOUNTING HEIGHTS (U.N.O.)

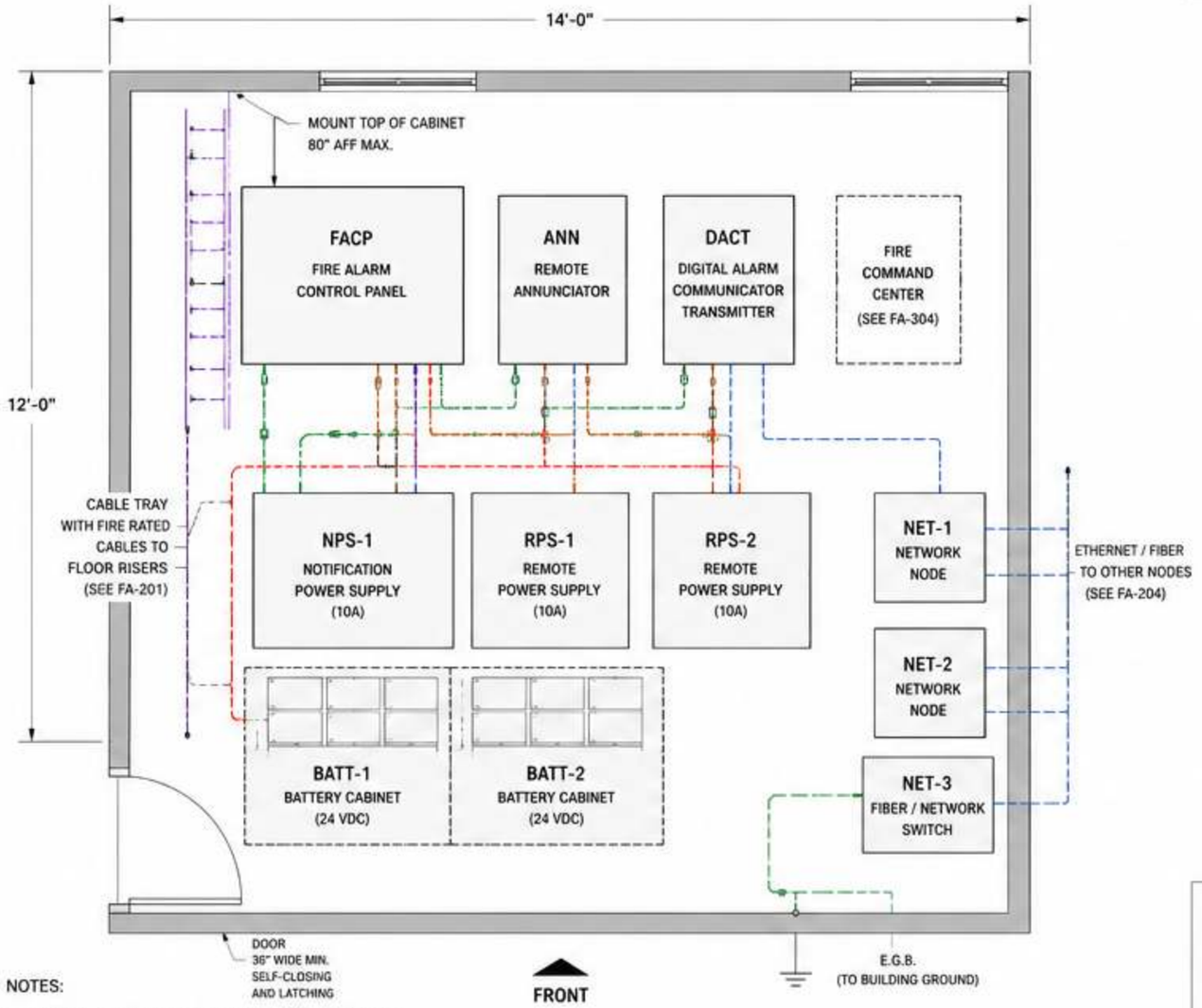
DEVICE	MOUNTING HEIGHT
MANUAL PULL STATION	42" TO 48" AFF
ANNUNCIATOR	48" TO 60" AFF
FACP	48" TO 60" AFF
HORN / STROBE	80" TO 96" AFF
SPEAKER	90" AFF TO BOTTOM OF DEVICE
CEILING MOUNTED DEVICES	SEE PLANS / DETAILS
TEST STATION (RTS)	48" AFF
FIRE PUMP CONTROLLER	SEE EQUIPMENT SCHEDULE

NOTES

- All abbreviations shall be in accordance with NFPA 72.
- All circuit numbers shall be unique within each system.
- Circuiting and device addressing shown on plans shall correspond to schedules.
- Contractor shall verify all field conditions prior to installation.
- Notify Engineer of any discrepancies before proceeding.

PROJECT:	DESIGNER OF RECORD:	DRAWING TITLE:	DRAWING NO.:	SHEET:	DATE:	REV:
MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM	Applied Engineering Group	FIRE ALARM SYMBOL LEGEND, LINE TYPES, ABBREVIATIONS & CIRCUIT DESIGNATIONS	FA-002	1 OF 1	MAY 24, 2024	0

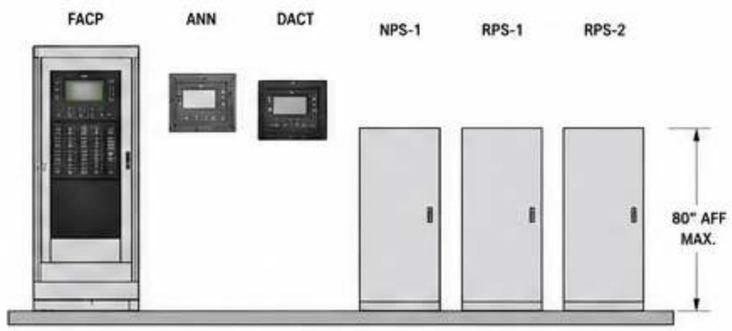
ENLARGED ELECTRICAL ROOM PLAN – FIRE ALARM EQUIPMENT



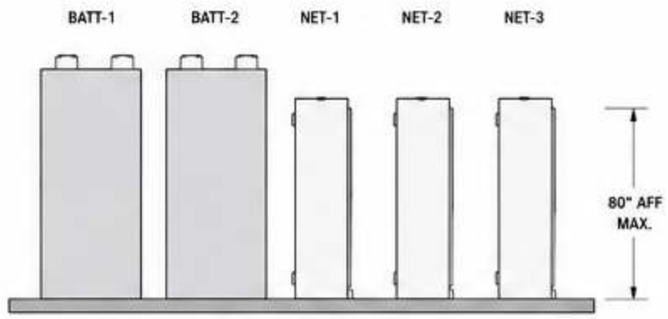
NOTES:

1. ALL EQUIPMENT SHALL BE MOUNTED LEVEL AND SECURE.
2. PROVIDE 3'-0" CLEAR WORKING SPACE IN FRONT OF ALL EQUIPMENT.
3. ALL CONDUIT AND CABLES SHALL BE FIRE STOPPED WHERE PASSING THROUGH FIRE RATED ASSEMBLIES.
4. PROVIDE DEDICATED **120/240** VAC BRANCH CIRCUIT AS INDICATED.
5. REFER TO RISER DIAGRAM **FA-201** FOR ADDITIONAL INFORMATION.

EQUIPMENT ELEVATIONS

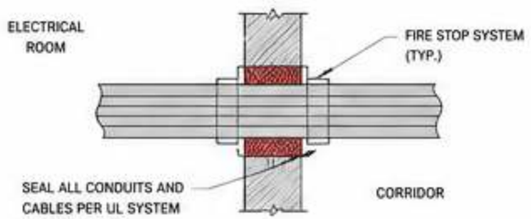


FRONT ELEVATION



SIDE ELEVATION

CONDUIT / CABLE ENTRY DETAIL



EQUIPMENT LEGEND

TAG	DESCRIPTION
FACP	FIRE ALARM CONTROL PANEL
ANN	REMOTE ANNUNCIATOR
DACT	DIGITAL ALARM COMMUNICATOR TRANSMITTER
NPS	NOTIFICATION POWER SUPPLY
RPS	REMOTE POWER SUPPLY
BATT	BATTERY CABINET (24 VDC)
NET	NETWORK NODE / SWITCH

POWER CONNECTION SCHEDULE

EQUIPMENT	VOLTAGE	PHASE	MCA	MOP
FACP	120/240 VAC	1	3.0 A	15 A
NPS-1	120 VAC	1	1.5 A	15 A
RPS-1	120 VAC	1	1.5 A	15 A
RPS-2	120 VAC	1	1.5 A	15 A
DACT	120 VAC	1	0.5 A	15 A
NET-1	120 VAC	1	0.5 A	15 A
NET-2	120 VAC	1	0.5 A	15 A
NET-3	120 VAC	1	0.5 A	15 A

MCA = MINIMUM CIRCUIT AMPS
MOP = MAXIMUM OVERCURRENT PROTECTION

NOTES

- PROVIDE LOCKABLE DISCONNECT FOR ALL POWER SUPPLIES PER NFPA 72.
- BATTERIES SHALL BE IN LISTED CABINETS AND SHALL BE A MINIMUM OF 24 HOURS STANDBY PLUS 15 MINUTES ALARM.
- ALL EQUIPMENT SHALL BE LISTED FOR FIRE ALARM SERVICE.
- MAINTAIN ALL REQUIRED CLEARANCES FOR ACCESS AND SERVICE.
- EQUIPMENT ROOM SHALL BE IN ACCORDANCE WITH NFPA 72.
- VERIFY ALL DIMENSIONS AND CONDITIONS PRIOR TO INSTALLATION.

ABBREVIATIONS

AFF	ABOVE FINISHED FLOOR
FACP	FIRE ALARM CONTROL PANEL
NPS	NOTIFICATION POWER SUPPLY
RPS	REMOTE POWER SUPPLY
DACT	DIGITAL ALARM COMMUNICATOR TRANSMITTER
MCA	MINIMUM CIRCUIT AMPS
MOP	MAXIMUM OVERCURRENT PROTECTION

WIRE LEGEND

- SLC / SIGNALING LINE CIRCUIT
- NAC / NOTIFICATION APPLIANCE CIRCUIT
- IDC / INITIATING DEVICE CIRCUIT
- 24 VDC POWER
- 120/240 VAC POWER
- ETHERNET / NETWORK
- TELEPHONE / DIALER
- GROUND

GENERAL NOTES

1. ALL WIRING SHALL BE IN ACCORDANCE WITH NFPA 72, NFPA 70 (NEC), AND APPLICABLE LOCAL CODES.
2. ALL WIRING SHALL BE SUPERVISED (POWER LIMITED) WHERE REQUIRED.
3. PROVIDE CONDUIT SLEEVES THROUGH FIRE RATED WALLS AND FLOORS.
4. ALL PENETRATIONS SHALL BE FIRE STOPPED PER UL SYSTEM.
5. REFER TO RISER DIAGRAM **FA-201** FOR CIRCUIT ROUTING.
6. ALL EQUIPMENT SHALL BE INSTALLED PER MANUFACTURER'S INSTRUCTIONS.

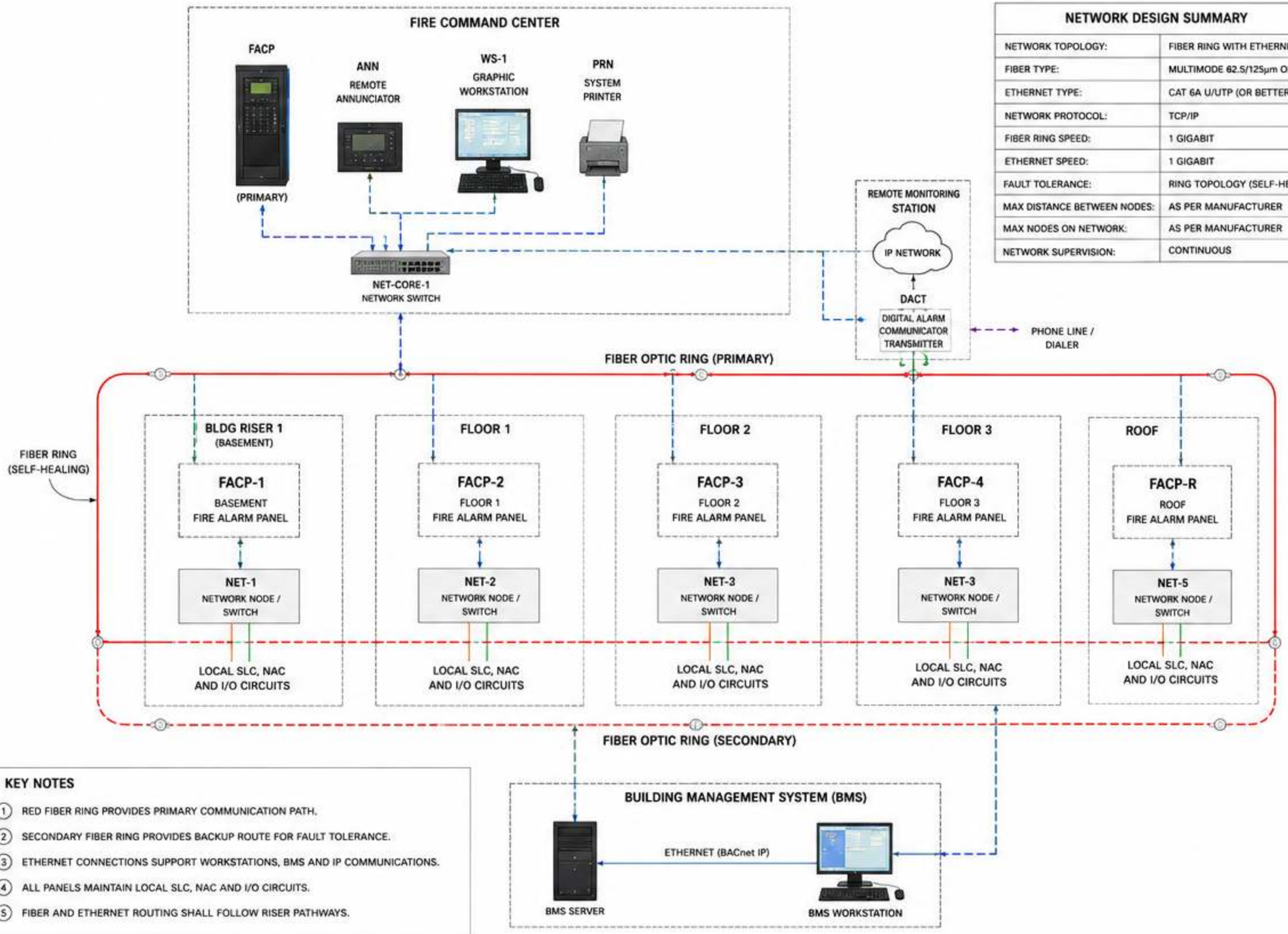
PROJECT:
MULTI-STORY COMMERCIAL BUILDING
FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM

DESIGNER OF RECORD:
Applied Engineering Group

DRAWING TITLE:
ENLARGED ELECTRICAL ROOM PLAN
FIRE ALARM EQUIPMENT

DRAWING NO.: FA-010
SHEET: 1 OF 1
DATE: MAY 24, 2024
REV: 0

FIRE ALARM SYSTEM – NETWORK ARCHITECTURE DIAGRAM



NETWORK DESIGN SUMMARY

NETWORK TOPOLOGY:	FIBER RING WITH ETHERNET DEVICES
FIBER TYPE:	MULTIMODE 62.5/125µm OR 50/125µm
ETHERNET TYPE:	CAT 6A U/UTP (OR BETTER)
NETWORK PROTOCOL:	TCP/IP
FIBER RING SPEED:	1 GIGABIT
ETHERNET SPEED:	1 GIGABIT
FAULT TOLERANCE:	RING TOPOLOGY (SELF-HEALING)
MAX DISTANCE BETWEEN NODES:	AS PER MANUFACTURER
MAX NODES ON NETWORK:	AS PER MANUFACTURER
NETWORK SUPERVISION:	CONTINUOUS

LEGEND – LINE TYPES

- FIBER OPTIC (PRIMARY RING)
- FIBER OPTIC (SECONDARY RING)
- ETHERNET (CAT 6A)
- ETHERNET (CAT 6A) – REDUNDANT
- FIRE ALARM SLC / CIRCUITS (LOCAL)
- NAC / POWER CIRCUITS (LOCAL)
- PHONE LINE / DIALER
- SUMMARY CONNECTION

ABBREVIATIONS

FACP	FIRE ALARM CONTROL PANEL
ANN	REMOTE ANNUNCIATOR
WS	WORKSTATION
PRN	PRINTER
NET	NETWORK NODE / SWITCH
EOL	END OF LINE RESISTOR

NOTES

1. ALL NETWORK DEVICES SHALL BE LISTED FOR FIRE ALARM SERVICE.
2. FIBER OPTIC CABLES SHALL BE INSTALLED IN ACCORDANCE WITH NFPA 72 AND NEC.
3. MAINTAIN MINIMUM 12" SEPARATION FROM HIGH VOLTAGE CONDUCTORS.
4. ALL ETHERNET CABLES SHALL BE CAT 6A OR BETTER AND TERMINATED PER TIA/EIA 568.
5. NETWORK RING CONFIGURED FOR SELF-HEALING IN THE EVENT OF A SINGLE PATH FAILURE.
6. REFER TO MANUFACTURER'S GUIDELINES FOR MAXIMUM NODES AND DISTANCES.
7. PROVIDE LABELING AT BOTH ENDS OF ALL NETWORK CABLING.

KEY NOTES

1. RED FIBER RING PROVIDES PRIMARY COMMUNICATION PATH.
2. SECONDARY FIBER RING PROVIDES BACKUP ROUTE FOR FAULT TOLERANCE.
3. ETHERNET CONNECTIONS SUPPORT WORKSTATIONS, BMS AND IP COMMUNICATIONS.
4. ALL PANELS MAINTAIN LOCAL SLC, NAC AND I/O CIRCUITS.
5. FIBER AND ETHERNET ROUTING SHALL FOLLOW RISER PATHWAYS.

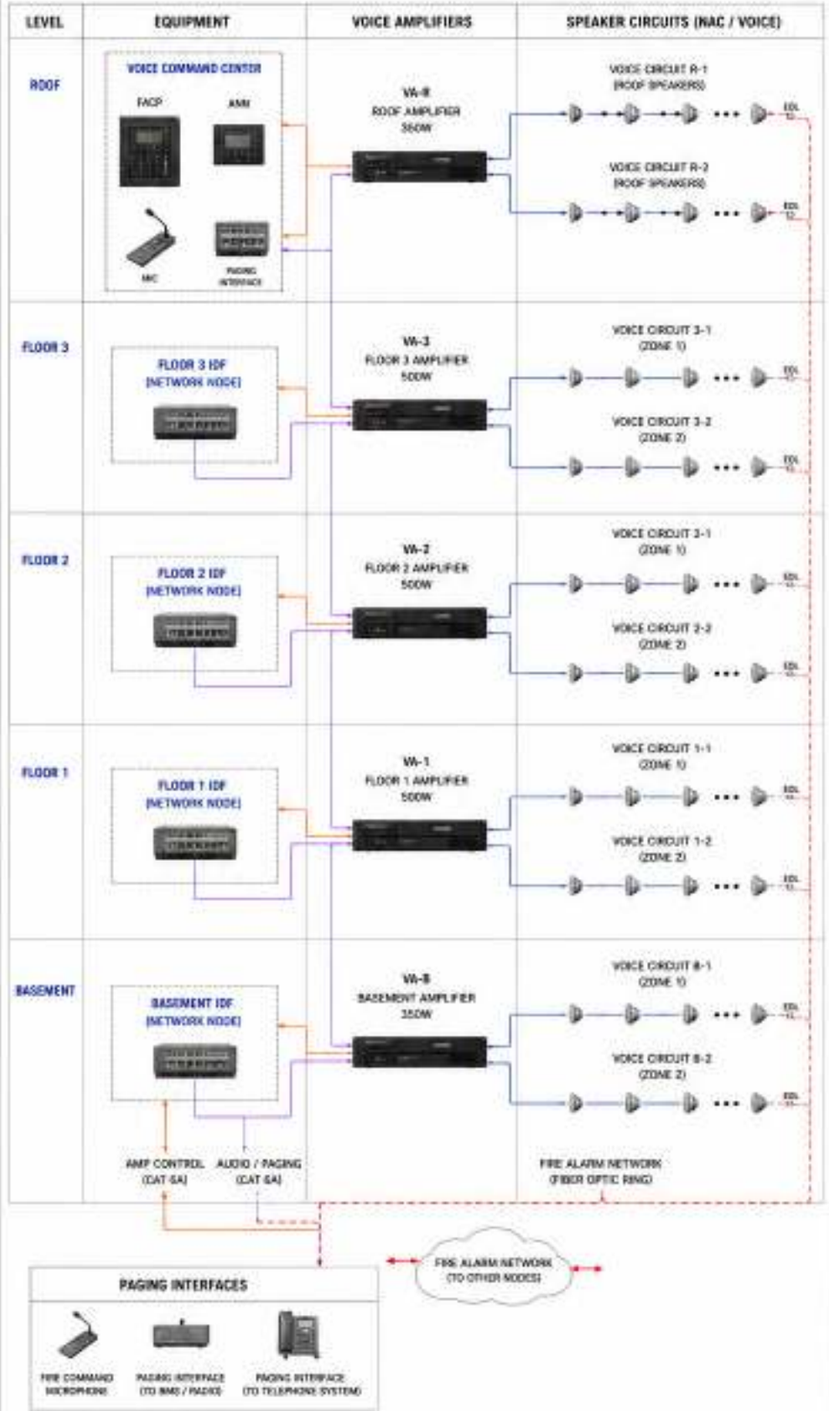
SYMBOL LEGEND

- NETWORK SWITCH
- NET-X — NETWORK NODE
- FACP — FIRE ALARM CONTROL PANEL
- FACP STBY — FIRE ALARM CONTROL PANEL (STANDBY / BACKUP)

PROJECT:	DESIGNER OF RECORD:	DRAWING TITLE:	DRAWING NO.:	SHEET:	DATE:	REV:
MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM	Applied Engineering Group	NETWORK ARCHITECTURE DIAGRAM FIRE ALARM SYSTEM	FA-012	1 OF 1	MAY 24, 2024	0

FIRE ALARM SYSTEM – VOICE EVACUATION RISER DIAGRAM

VOICE EVACUATION AND MASS NOTIFICATION SYSTEM



LEGEND – LINE TYPES

- SPEAKER CIRCUIT (VOICE / NAC)
- AUDIO / PAGING (CAT 6A)
- AMPLIFIER CONTROL (CAT 6A)
- FIRE ALARM NETWORK (FIBER RING)
- ETHERNET (CAT 6A)

NOTES

1. System designed per NFPA 72 and applicable codes.
2. All amplifiers are supervised and powered by dedicated circuits.
3. Speaker circuits are Class B (Style Y) unless otherwise noted.
4. End of Line (EOL) resistors are located at the last speaker on each circuit.
5. Audio and control cables shall be separated from power wiring.
6. Refer to plans for speaker locations and circuit routing.

SPEAKER CIRCUIT DESIGNATION

PREFIX	DESCRIPTION
R	ROOF
3-#	THIRD FLOOR CIRCUIT NUMBER
2-#	SECOND FLOOR CIRCUIT NUMBER
1-#	FIRST FLOOR CIRCUIT NUMBER
B-#	BASEMENT CIRCUIT NUMBER

(# = CIRCUIT NUMBER)

VOICE AMPLIFIER SCHEDULE

TAG	LOCATION	RATED POWER	SPEAKER CIRCUITS
VA-R	ROOF	350W	2
VA-3	FLOOR 3 IDF	500W	2
VA-2	FLOOR 2 IDF	500W	2
VA-1	FLOOR 1 IDF	500W	2
VA-B	BASEMENT IDF	350W	2

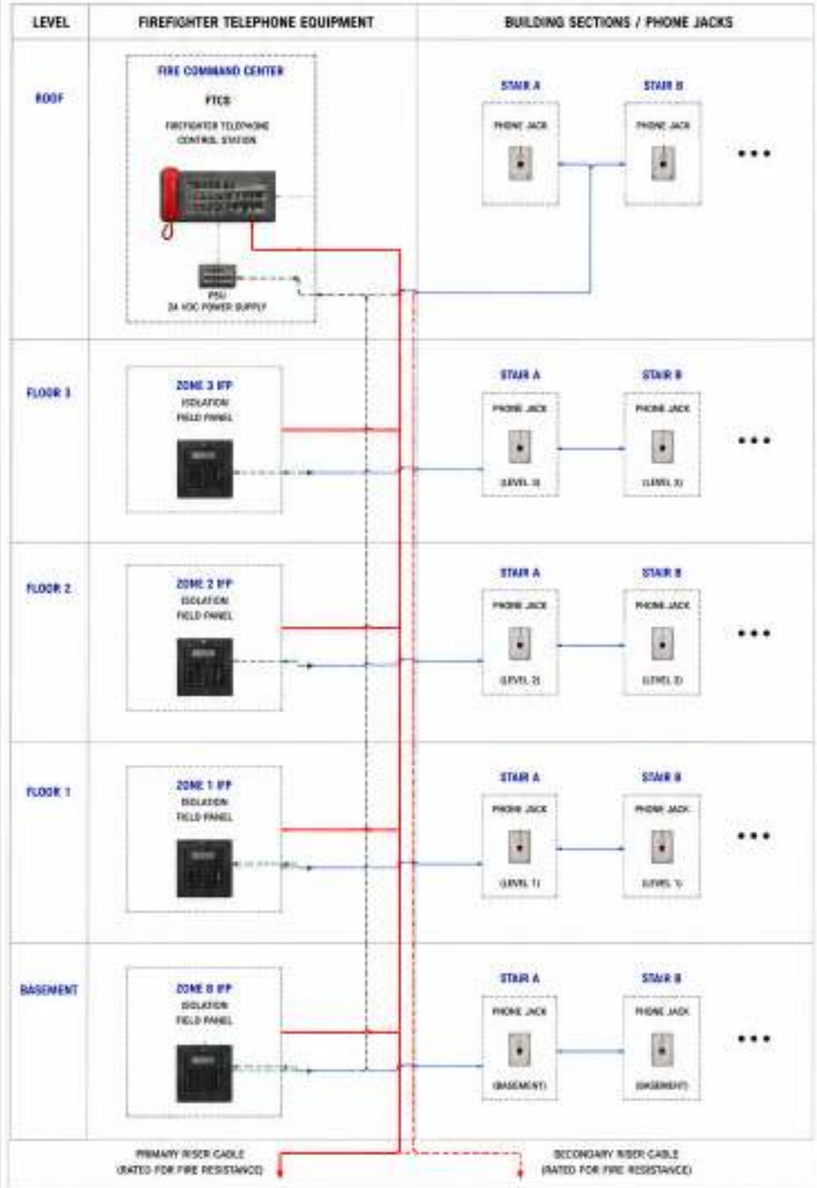
ABBREVIATIONS

FACP	Fire Alarm Control Panel
ANN	Remote Annunciator
MIC	Microphone
IDF	Intermediate Distribution Frame
VA	Voice Amplifier
EOL	End of Line Resistor
NAC	Notification Appliance Circuit

PROJECT: MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM	DESIGNER OF RECORD: Applied Engineering Group	DRAWING TITLE: VOICE EVACUATION RISER DIAGRAM	
	DRAWING NO.: FA-013	SHEET: 1 OF 1	DATE: MAY 24, 2024 / REV: 0

FIRE ALARM SYSTEM – FIREFIGHTER TELEPHONE RISER DIAGRAM

EMERGENCY COMMUNICATION SYSTEM (ECS)



LEGEND – LINE TYPES

- FIRE FIGHTER TELEPHONE RISER CABLE (PRIMARY PATH)
- FIRE FIGHTER TELEPHONE RISER CABLE (SECONDARY PATH)
- LOCAL PHONE CIRCUIT (3 PAIR SHIELDED)
- POWER (24 VDC) FROM PSU
- EQUIPMENT INTERCONNECT (CAT 6A ETHERNET)

EQUIPMENT SCHEDULE

TAG	DESCRIPTION
FTCS	FIREFIGHTER TELEPHONE CONTROL STATION
IFP	ISOLATION FIELD PANEL
PSU	24 VDC POWER SUPPLY

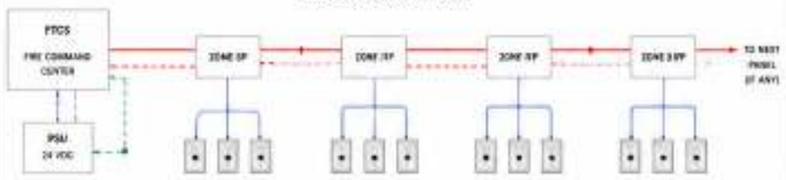
PHONE JACK SUMMARY

LOCATION	STAIR A	STAIR B	TOTAL
ROOF	1	1	2
FLOOR 3	1	1	2
FLOOR 2	1	1	2
FLOOR 1	1	1	2
BASEMENT	1	1	2
TOTAL	5	5	10

NOTES

1. SYSTEM DESIGNED PER NFPA 72, CHAPTER 24 AND ALL APPLICABLE CODES.
2. ALL RISER CABLE SHALL BE PLENUM RATED AND FIRE RESISTIVE PER CODE.
3. PHONE JACKS SHALL BE INSTALLED AT 48" A.F.F. (±3").
4. FIELD PANELS SHALL BE LOCATED IN ELECTRICAL ROOMS OR FIRE COMMAND CENTER AS INDICATED.
5. PROVIDE SIGNAGE AT ALL PHONE JACKS: "FIREFIGHTER TELEPHONE – DO NOT REMOVE COVER".
6. MAINTAIN 12" MINIMUM SEPARATION FROM POWER CONDUCTORS.

RISER SCHEMATIC (TYPICAL)



ABBREVIATIONS

FTCS	Firefighter Telephone Control Station
IFP	Isolation Field Panel
PSU	Power Supply Unit
A.F.F.	Above Finished Floor
ECS	Emergency Communication System

PROJECT: MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM	DESIGNER OF RECORD: Applied Engineering Group	DRAWING TITLE: FIREFIGHTER TELEPHONE RISER DIAGRAM	DRAWING NO.: FA-014
	SHEET: 1 OF 1	DATE: MAY 24, 2024	REV: 0

FIRE ALARM SYSTEM – SEQUENCE OF OPERATIONS

GRAPHICAL REPRESENTATION OF SYSTEM FUNCTIONS

GENERAL NOTES

1. SEQUENCE OF OPERATIONS PER NFPA 72 AND APPLICABLE CODES.
2. ALL FUNCTIONS ARE SUPERVISED AND POWER LIMITED WHERE REQUIRED.
3. TIMES SHOWN ARE TYPICAL AND MAY BE ADJUSTED IN FIELD.

LEGEND

- ALARM / ACTIVATION PATH
- SUPERVISORY / FEEDBACK PATH
- CONTROL / OUTPUT ACTION
- COMMUNICATION / INTERFACE

EVENT / INPUT	INITIATING ACTION	FIRE ALARM CONTROL PANEL (FACP)	SYSTEM OUTPUTS / ACTIONS				EXTERNAL COMMUNICATIONS	OPERATOR INTERFACE / INDICATION
			AUDIBLE / VISUAL NOTIFICATION	VOICE EVACUATION	BUILDING SYSTEMS INTERFACE	OTHER ACTIONS		
SMOKE DETECTOR ACTIVATION	DETECTOR SENSES SMOKE LEVEL ABOVE SET POINT	• INITIATIOG DEVICE ALARM • IDENTIFY DEVICE & LOCATION • LOG EVENT	ACTIVATE HORNS & STROBES	EVACUATION MESSAGE	HVAC SHUTDOWN ELEVATOR RECALL SMOKE CONTROL	TRANSMIT ALARM TO MONITORING STATION	DIGITAL ALARM COMMUNICATOR TRANSMITTER (DACT)	REMOTE ANNUNCIATOR
MANUAL PULL STATION ACTIVATION	PULL STATION ACTIVATED BY OCCUPANT	• INITIATING DEVICE ALARM • IDENTIFY DEVICE & LOCATION • LOG EVENT	ACTIVATE HORNS & STROBES	EVACUATION MESSAGE	HVAC SHUTDOWN ELEVATOR RECALL SMOKE CONTROL	TRANSMIT ALARM TO MONITORING STATION		
WATERFLOW SWITCH ACTIVATION	SPRINKLER SYSTEM WATER FLOW DETECTED	• ALARM RECEIVED • IDENTIFY DEVICE & LOCATION • LOG EVENT	ACTIVATE HORNS & STROBES	EVACUATION MESSAGE	HVAC SHUTDOWN ELEVATOR RECALL SMOKE CONTROL	TRANSMIT ALARM TO MONITORING STATION	MONITORING STATION	
DUCT SMOKE DETECTOR ALARM	DUCT SMOKE DETECTOR SENSES SMOKE	• INITIATING DEVICE ALARM • IDENTIFY DEVICE & LOCATION • LOG EVENT	ACTIVATE HORNS & STROBES	EVACUATION MESSAGE	HVAC SHUTDOWN SMOKE DAMPER CLOSE	TRANSMIT ALARM TO MONITORING STATION		FIRE COMMAND CENTER DISPLAY
CARBON MONOXIDE DETECTOR ALARM	CO DETECTOR SENSES CO LEVEL ABOVE SET POINT	• INITIATING DEVICE ALARM • IDENTIFY DEVICE & LOCATION • LOG EVENT	ALERT TONE (LOCAL)	EVACUATION MESSAGE	HVAC SHUTDOWN INCREASE VENTILATION (ALARM)	TRANSMIT ALARM TO MONITORING STATION	FIRE DEPARTMENT DISPATCH	
FIRE PUMP RUNNING	FIRE PUMP STARTED AUTOMATICALLY	• SUPERVISORY CONDITION • MONITOR FIRE PUMP STATUS • LOG EVENT	SUPERVISORY INDICATION	NO VOICE	NONE	TRANSMIT SUPERVISORY TO MONITORING STATION		
SPRINKLER VALVE TAMPER	SUPERVISORY SWITCH IN TAMPER POSITION	• SUPERVISORY CONDITION • IDENTIFY DEVICE & LOCATION • LOG EVENT	SUPERVISORY INDICATION	NO VOICE	NONE	TRANSMIT SUPERVISORY TO MONITORING STATION		EVENT LOG REPORTING (SYSTEM PRINTER)
AC POWER FAILURE	PRIMARY AC POWER LOST	• TROUBLE CONDITION • SIGNAL POWER FAILURE • INITIATE BATTERY	TROUBLE INDICATION	NO VOICE	NONE	TRANSMIT TROUBLE TO MONITORING STATION		
LOW BATTERY CONDITION	BATTERY VOLTAGE BELOW THRESHOLD	• TROUBLE CONDITION • ALERT LOW BATTERY • LOG EVENT	TROUBLE INDICATION	NO VOICE	NONE	TRANSMIT TROUBLE TO MONITORING STATION		

ALARM PRIORITY AND TIMING (TYPICAL)

INITIATING EVENT	FACP PROCESSING	NOTIFICATION ACTIVATION	VOICE EVACUATION	BUILDING SYSTEMS	TRANSMISSION	FIRE DEPARTMENT
0 SEC Device detects condition	0 – 2 SEC Alarm verification, processing and event logging	0 – 5 SEC Audible/Visual notification activated	15 – 45 SEC Pre-announce (if used) then evacuation message	0 – 30 SEC HVAC shutdown, elevator recall, smoke control, etc.	0 – 45 SEC Alarm signal transmitted to monitoring station	VARIABLE Alarm received and dispatched

PROJECT:	DESIGNER OF RECORD:	DRAWING TITLE:	DRAWING NO.:	SHEET:	DATE:	REV:
MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM	Applied Engineering Group	SEQUENCE OF OPERATIONS DIAGRAM FIRE ALARM SYSTEM	FA-015	1 OF 1	MAY 24, 2024	0

FIRE ALARM SYSTEM – INTERFACE CONTROL DIAGRAM

FIRE ALARM INTERFACES TO OTHER SYSTEMS

FIRE ALARM INITIATING DEVICES

- SMOKE DETECTORS
- HEAT DETECTORS
- DUCT SMOKE DETECTORS
- CARBON MONOXIDE DETECTORS
- MANUAL PULL STATIONS
- WATERFLOW SWITCHES
- SPRINKLER TAMPER SWITCHES
- GAS DETECTION DEVICES
- MONITOR MODULES

INTERFACES FROM OTHER SYSTEMS

SYSTEM	MONITORED BY
SPRINKLER SYSTEM	WATERFLOW, TAMPER, VALVE SUPERVISORY
FIRE PUMP CONTROLLER	RUNNING, FAILURE
HVAC SYSTEM	STATUS, FAN PROOF, SMOKE DAMPER STATUS
ELEVATOR SYSTEM	ELEVATOR STATUS, RECALL ACK
ACCESS CONTROL SYSTEM	DOOR POSITION
EMERGENCY POWER SYSTEM	NORMAL POWER LOSS
LOW AIR PRESSURE SWITCH	AIR PRESSURE STATUS

FIRE ALARM NETWORK

- REMOTE FACP PANELS (FLOORS)
- NETWORK ANNUNCIATORS
- NETWORK NODES / GATEWAYS
- FIRE COMMAND CENTER WORKSTATIONS

FACP
FIRE ALARM CONTROL PANEL

DACT
DIGITAL ALARM COMMUNICATOR TRANSMITTER

SUPERVISING STATION

INTERFACES TO OTHER SYSTEMS

SYSTEM	INTERFACE METHOD	ACTION
HVAC SYSTEM	CONTROL MODULE (FORM-C) SHUTDOWN	SHUTROWN AHU, STOP FANS, CLOSE SMOKE DAMPERS
ELEVATOR SYSTEM	CONTROL MODULE (FORM-C) ELEVATOR RECALL	RECALL ELEVATORS TO DESIGNATED FLOOR
SMOKE CONTROL SYSTEM	CONTROL MODULE (FORM-C)	OPEN SMOKE EXHAUST FANS, CLOSE DAMPERS
ACCESS CONTROL SYSTEM	CONTROL MODULE (FORM-C)	RELEASE DOORS, UNLOCK EGRESS PATHS
FIRE PUMP CONTROLLER	MONITOR MODULE (FORM-C)	START FIRE PUMP UPON WATERFLOW
EMERGENCY POWER SYSTEM	MONITOR MODULE (FORM-C)	ALARM ON POWER LOSS OR FAULT
FIRE/SMOKE DAMPER ACTUATORS	CONTROL MODULE (FORM-C)	CLOSE DAMPERS ON ALARM
BUILDING MANAGEMENT SYSTEM (BMS)	BACnet IP GATEWAY (ETHERENT)	TRANSMIT ALARM / STATUS / TROUBLE SIGNALS
MASS NOTIFICATION / PAGING SYSTEM	AUDIO / CONTROL INTERFACE	BROADCAST EVACUATION AND ALERT MESSAGES

INTERFACE LEGEND – LINE TYPES

- SIGNALING LINE CIRCUITS (SLC)
- MONITORING INPUT (FROM OTHER SYSTEMS)
- CONTROL / OUTPUT (DRY CONTACT)
- AUDIO / VOICE (ANALOG)
- ETHERNET / IP COMMUNICATION
- SUPERVISORY / COMMUNICATION TO CENTRAL STATION

INTERFACE SUMMARY

INTERFACE	METHOD	PURPOSE
HVAC SYSTEM	CONTROL MODULE	SHUTDOWN / DAMPER CONTROL
ELEVATOR SYSTEM	CONTROL MODULE	ELEVATOR RECALL
SMOKE CONTROL	CONTROL MODULE	SMOKE MANAGEMENT
ACCESS CONTROL	CONTROL MODULE	DOOR RELEASE
FIRE PUMP	MONITOR MODULE	PUMP START MONITORING
EMERGENCY POWER	MONITOR MODULE	POWER LOSS MONITORING
BMS	BACnet IP	STATUS / ALARM INTEGRATION
PAGING SYSTEM	AUDIO / CONTROL	VOICE MESSAGES
SUPERVISING STATION	DACT (IP/ETH)	ALARM TRANSMISSION

GENERAL NOTES

1. ALL INTERFACES SHALL COMPLY WITH NFPA 72 AND THE REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.
2. INTERFACE MODULES SHALL BE LISTED FOR THE APPLICATION AND INSTALLED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
3. CONTROL CONTACTS SHALL BE SUPERVISED WHERE INDICATED.
4. FIELD WIRING BETWEEN SYSTEMS SHALL BE IN CONDUIT AND RATED FOR THE APPLICATION.
5. REFER TO SPECIFICATIONS AND SEQUENCE OF OPERATIONS FOR DETAILED FUNCTIONAL REQUIREMENTS.

INTERFACE KEY NOTES

1. HVAC SHUTDOWN AND SMOKE DAMPER CONTROL ARE INITIATED ON FIRE ALARM.
2. ELEVATOR RECALL IS INITIATED ON FIRE ALARM TO DESIGNATED RECALL FLOOR.
3. DOOR RELEASED UPON ALARM TO PROVIDE UNOBSTRUCTED EGRESS.
4. VOICE EVACUATION AND ALERT TONES VIA MASS NOTIFICATION SYSTEM.
5. ALARM TRANSMITTED TO REMOTE SUPERVISING STATION 24/7.

INTERFACE SYMBOLS

- [M] MONITOR MODULE
- [C] CONTROL MODULE
- [GW] GATEWAY / INTERFACE DEVICE

NOTES:

- ALL FIELD DEVICES AND INTERFACE POINTS SHALL BE LABELED AT BOTH ENDS.
- SEE RISER DIAGRAMS AND FLOOR PLANS FOR CIRCUIT ROUTING.
- SEE SEQUENCE OF OPERATIONS (FA-601) FOR DETAILED FUNCTIONAL DESCRIPTIONS.

ABBREVIATIONS

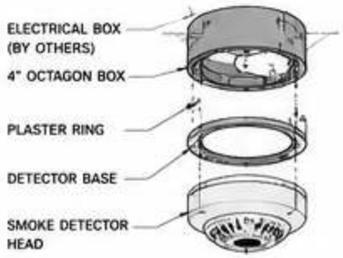
FACP	FIRE ALARM CONTROL PANEL
DACT	DIGITAL ALARM COMMUNICATOR TRANSMITTER
BMS	BUILDING MANAGEMENT SYSTEM
AHU	AIR HANDLING UNIT
SLC	SIGNALING LINE CIRCUIT
IP	INTERNET PROTOCOL
BACnet	BUILDING AUTOMATION AND CONTROL NETWORK

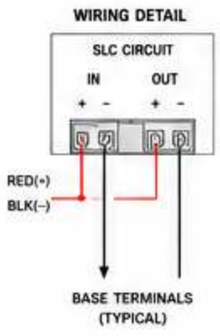
PROJECT:	DESIGNER OF RECORD:	DRAWING TITLE:	DRAWING NO.:	SHEET:	DATE:	REV:
MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM	Applied Engineering Group	INTERFACE CONTROL DIAGRAM FIRE ALARM INTERFACES TO OTHER SYSTEMS	FA-016	1 OF 1	MAY 24, 2024	0

FIRE ALARM SYSTEM – TYPICAL DEVICE INSTALLATION DETAILS

MOUNTING AND WIRING DETAILS

1 SMOKE DETECTOR (CEILING MOUNT)

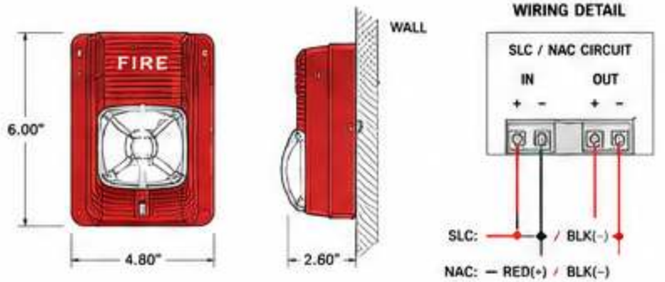




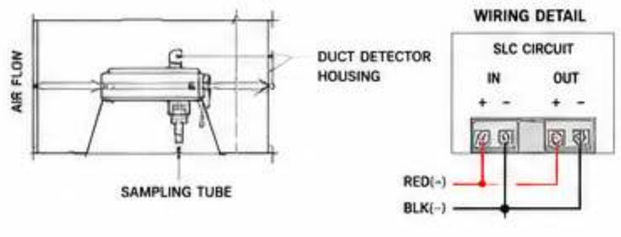
NOTE:
- MOUNT IN CENTER OF ROOM
- MAINTAIN 3 FT. MIN. FROM AIR DIFFUSERS AND RETURNS

2 MANUAL PULL STATION

3 HORN / STROBE (WALL MOUNT)

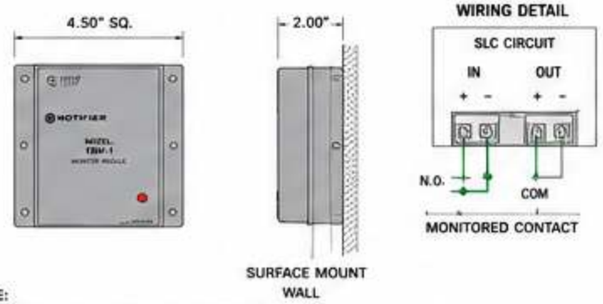


4 DUCT SMOKE DETECTOR



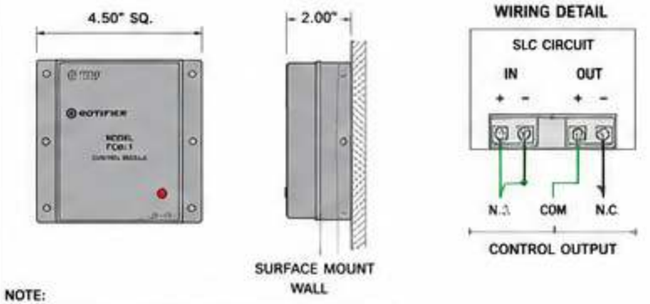
NOTE:
- MOUNT ON SUPPLY OR RETURN DUCT
- FOLLOW AIRFLOW DIRECTION MARKING

5 INPUT / MONITOR MODULE



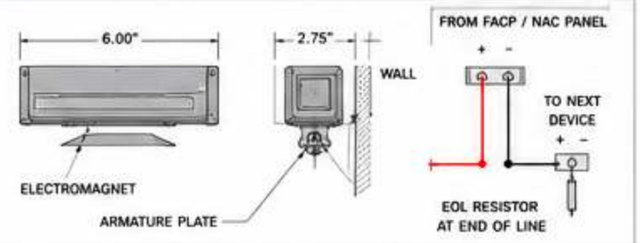
NOTE:
- FOR SUPERVISORY INPUT USE EOLR AT DEVICE

6 CONTROL MODULE

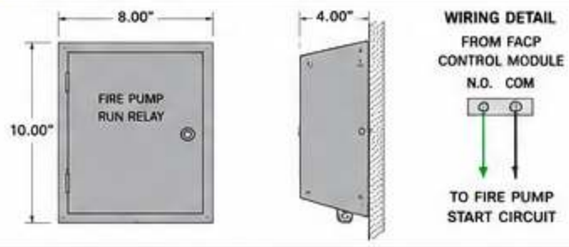


NOTE:
- USE FOR CONTROL OF HVAC, DAMPERS, DOORS, ETC.

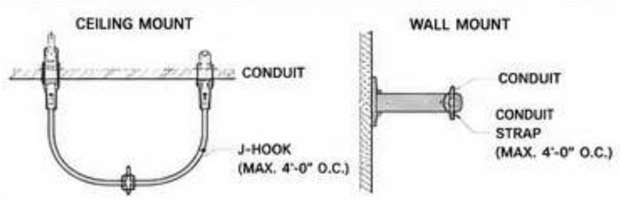
7 DOOR HOLDER / ELECTROMAGNET



8 FIRE PUMP RUN RELAY

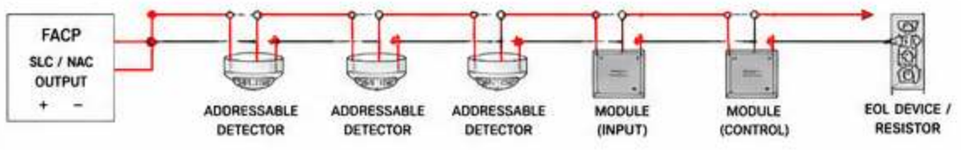


9 TYPICAL CONDUIT / WIRING SUPPORT

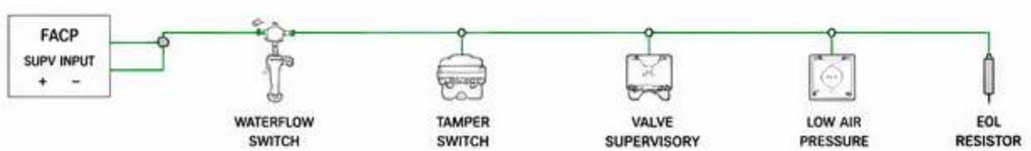


NOTE:
- INSTALL CONDUIT AND CABLE SUPPORTS PER NFPA 70 AND NFPA 72.

10 TYPICAL SLC / NAC WIRING DIAGRAM



11 TYPICAL SUPERVISORY WIRING DIAGRAM



GENERAL NOTES

1. INSTALL ALL DEVICES IN ACCORDANCE WITH NFPA 72, APPLICABLE CODES, AND MANUFACTURER'S INSTRUCTIONS.
2. ALL WIRING SHALL BE IN CONDUIT OR CABLE AS INDICATED.
3. MAINTAIN MINIMUM SEPARATION FROM HIGH VOLTAGE WIRING PER NFPA 72.
4. DO NOT PAINT DEVICES.
5. VERIFY DEVICE LOCATIONS WITH ARCHITECTURAL DRAWINGS.

WIRING LEGEND

———	SLC CIRCUIT (+)
———	SLC CIRCUIT (–)
———	NAC CIRCUIT (+)
———	NAC CIRCUIT (–)
———	SUPERVISORY / CONTACT
- - - - -	EQUIPMENT GROUND

ABBREVIATIONS

SLC	SIGNALING LINE CIRCUIT
NAC	NOTIFICATION APPLIANCE CIRCUIT
EOL	END OF LINE RESISTOR
EOLR	END OF LINE RESISTOR (SUPERVISORY)
DC	DOOR CONTACT
FACP	FIRE ALARM CONTROL PANEL

MOUNTING HEIGHTS (TYP.)

SMOKE DETECTOR (CEILING)	AS SHOWN
MANUAL PULL STATION	48" AFF (CENTER)
HORN / STROBE (WALL)	80" AFF (TOP)
HORN (CEILING)	80" AFF (BOTTOM)
DUCT SMOKE DETECTOR	AS SHOWN
MONITOR MODULE	48" AFF (CENTER)

DEVICE IDENTIFICATION

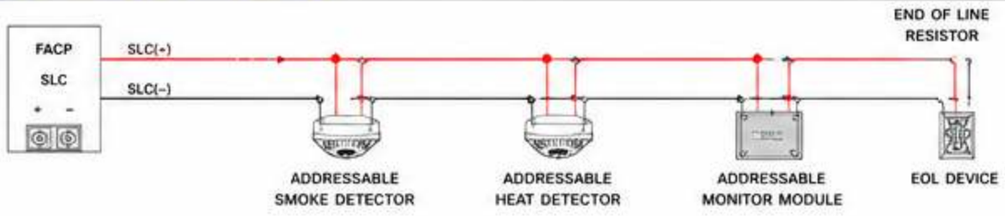
- LABEL ALL DEVICES PER PROJECT SPECIFICATIONS.
- DEVICE LABELS SHALL BE CLEARLY VISIBLE AND DURABLE.
- PROVIDE ROOM NUMBER OR DESCRIPTION AS REQUIRED.

PROJECT:	DESIGNER OF RECORD:	DRAWING TITLE:	DRAWING NO.:	SHEET:	DATE:	REV:
MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM	Applied Engineering Group	TYPICAL DEVICE INSTALLATION DETAILS MOUNTING AND WIRING DETAILS	FA-017	1 OF 1	MAY 24, 2024	0

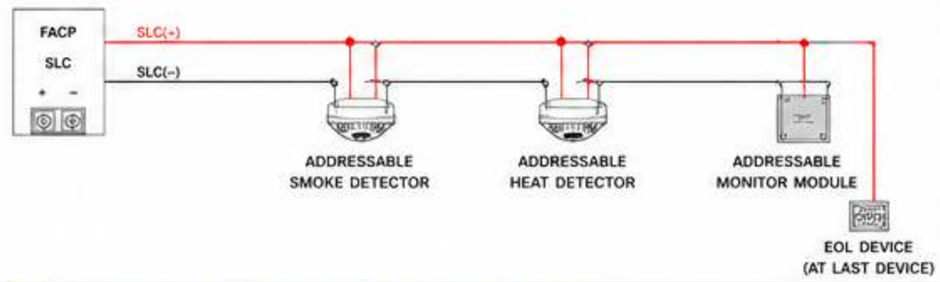
FIRE ALARM SYSTEM – TYPICAL WIRING DIAGRAMS

POINT-TO-POINT WIRING EXAMPLES

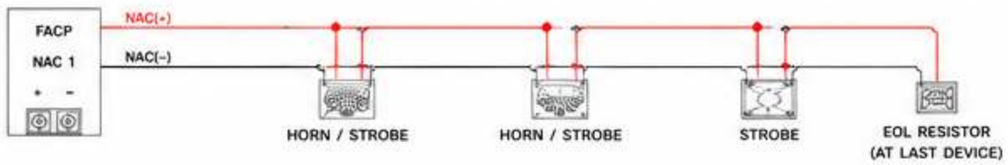
1 SLC LOOP WIRING (CLASS A)



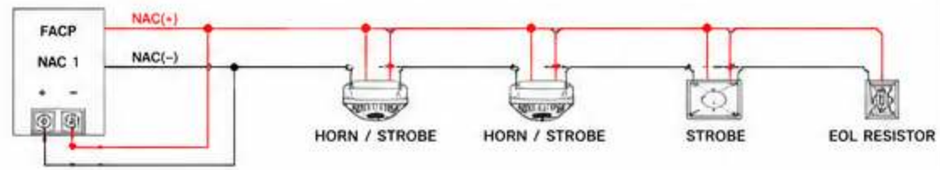
2 SLC LOOP WIRING (CLASS B)



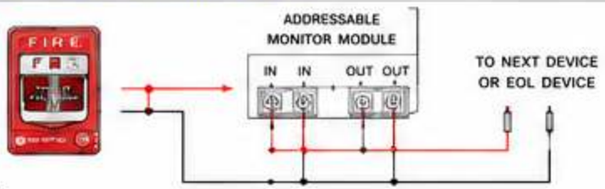
3 NOTIFICATION APPLIANCE CIRCUIT (NAC) WIRING (CLASS B)



4 NOTIFICATION APPLIANCE CIRCUIT WIRING (CLASS A)

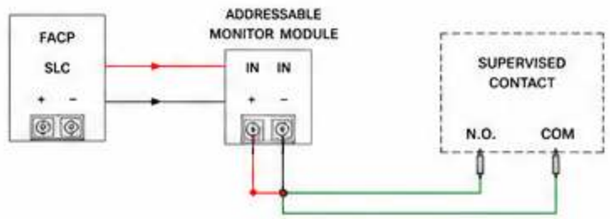


5 MANUAL PULL STATION WIRING

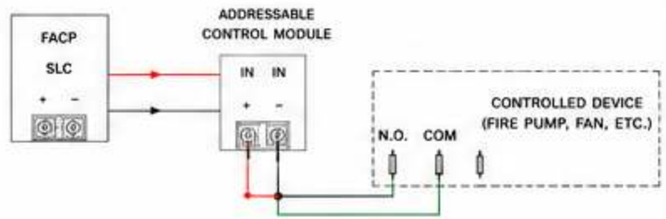


NOTE:
- INSTALL DIODE (1N4007 OR EQUIVALENT) ACROSS INCOMING TERMINALS OF PULL STATION (IF REQUIRED BY FACP)

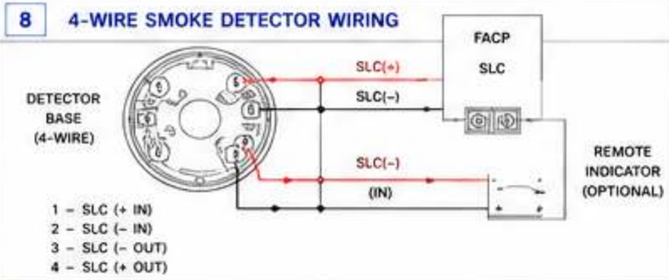
6 MONITOR MODULE WIRING (SUPERVISORY CONTACT)



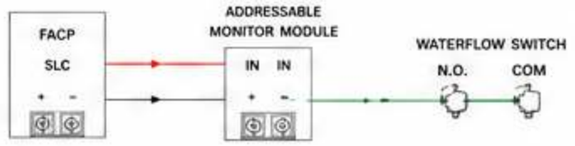
7 CONTROL MODULE WIRING (RELAY OUTPUT)



8 4-WIRE SMOKE DETECTOR WIRING

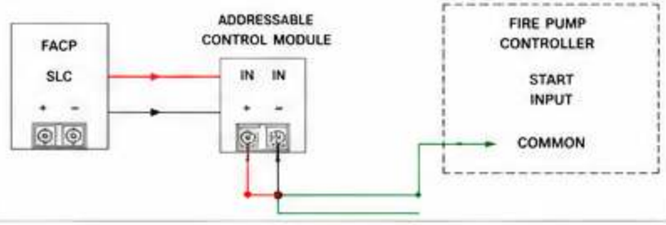


9 INPUT / MONITOR MODULE WIRING (WATERFLOW SWITCH)



NOTE:
- WATERFLOW SWITCH SHOWN IN NORMAL (NO FLOW) CONDITION

10 FIRE PUMP RUN RELAY WIRING



11 DACT (DIGITAL ALARM COMMUNICATOR TRANSMITTER) & SUPERVISING STATION

WIRING LEGEND

———	POSITIVE (+) / HOT
———	NEGATIVE (–) / COMMON
———	CONTROL / OUTPUT
- - - - -	COMMUNICATION PATH
- - - - -	SHIELD / DRAIN (IF APPLICABLE)

GENERAL NOTES

1. ALL WIRING SHALL COMPLY WITH NFPA 72, APPLICABLE CODES, AND MANUFACTURER'S INSTRUCTIONS.
2. ALL CIRCUITS SHALL BE SUPERVISED AND POWER LIMITED.
3. MAINTAIN 12" MINIMUM SEPARATION FROM POWER CONDUCTORS (IF PARALLEL).
4. WIRE GAUGE SHALL COMPLY WITH VOLTAGE DROP LIMITS PER NFPA 72 (CHAPTER 14).
5. USE TWISTED PAIR FOR SLC, AND SHIELDED CABLE WHERE INDICATED.

ABBREVIATIONS

FACP	FIRE ALARM CONTROL PANEL
SLC	SIGNALING LINE CIRCUIT
NAC	NOTIFICATION APPLIANCE CIRCUIT
EOL	END OF LINE
N.O.	NORMALLY OPEN
N.C.	NORMALLY CLOSED
COM	COMMON
DACT	DIGITAL ALARM COMMUNICATOR TRANSMITTER
PSTN	PUBLIC SWITCHED TELEPHONE NETWORK

WIRE / CABLE TYPES (TYP.)

SLC	18 AWG TWISTED PAIR, FPLR / FPLP
NAC	12 – 14 AWG, FPLR / FPLP
CONTROL	18 AWG, FPLR / FPLP
COMM	18 AWG TWISTED SHIELDED PAIR

PROJECT:	DESIGNER OF RECORD:	DRAWING TITLE:	DRAWING NO.:	SHEET:	DATE:	REV:
MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM	Applied Engineering Group	TYPICAL WIRING DIAGRAMS POINT-TO-POINT WIRING EXAMPLES	FA-018	1 OF 1	MAY 24, 2024	0

FIRE ALARM SYSTEM – DEVICE SCHEDULE

MASTER INVENTORY OF ALL DEVICES

DEVICE TYPE	QTY	DEVICE DESCRIPTION	MANUFACTURER	CATALOG / MODEL NO.	VOLTAGE	MOUNTING	LOCATION (TYP.)	NOTES
INITIATING DEVICES								
SD	184	PHOTOELECTRIC SMOKE DETECTOR	NOTIFIER	FSP-951	24 VDC	CEILING	THROUGHOUT	SLC
HD	56	HEAT DETECTOR (FIXED 135°F)	NOTIFIER	FST-951	24 VDC	CEILING	KITCHEN / MECH.	SLC
DSD	38	DUCT SMOKE DETECTOR	SYSTEM SENSOR	D4120	24 VDC	DUCT	AHU UNITS	SLC
CO	12	CARBON MONOXIDE DETECTOR	SYSTEM SENSOR	CO1224T	24 VDC	WALL	PARKING / MECH.	SLC
WFS	8	WATERFLOW SWITCH	POTTER	P32	24 VDC	PIPE	FIRE RISER RM.	SUPV
TS	14	TAMPER SWITCH	POTTER	TS-2	24 VDC	VALVE	RISER / CONTROL VALVES	SUPV
PS	24	MANUAL PULL STATION	NOTIFIER	NBG-12LX	24 VDC	WALL	EXIT DOORS	NAC
NOTIFICATION APPLIANCES								
HA	120	HORN / STROBE (WALL)	SYSTEM SENSOR	P2WL	24 VDC	WALL	CORRIDORS / ROOMS	NAC
HA-C	76	HORN / STROBE (CEILING)	SYSTEM SENSOR	PC2WL	24 VDC	CEILING	CORRIDORS / ROOMS	NAC
H	18	HORN (WALL)	SYSTEM SENSOR	HWL	24 VDC	WALL	MECH. / UTILITY	NAC
S	6	STROBE (WALL)	SYSTEM SENSOR	SWL	24 VDC	WALL	COMMON AREAS	NAC
CONTROL MODULES								
MM	36	MONITOR MODULE	NOTIFIER	FMM-1	24 VDC	WALL / FLUSH	THROUGHOUT	SLC
CM	24	CONTROL MODULE (RELAY)	NOTIFIER	FCM-1	24 VDC	WALL / FLUSH	THROUGHOUT	SLC
DCM	8	DUAL CONTROL MODULE	NOTIFIER	FCM-1(DUAL)	24 VDC	WALL / FLUSH	THROUGHOUT	SLC
IM	10	INPUT MODULE (MONITORED)	NOTIFIER	FMM-1	24 VDC	WALL / FLUSH	THROUGHOUT	SLC
CONTROL EQUIPMENT								
FACP	1	FIRE ALARM CONTROL PANEL	NOTIFIER	NFS2-640	120 VAC	RACK MOUNT	FIRE COMMAND CENTER	PRIMARY
ANN	1	NETWORK ANNUNCIATOR	NOTIFIER	NCA-2	24 VDC	WALL	SECURITY DESK	DACT
RPT	3	REMOTE ANNUNCIATOR	NOTIFIER	NOR-2000	24 VDC	WALL	ELEV. LOBBY / MECH. RM.	DACT
DACT	1	DACT / COMMUNICATOR	NOTIFIER	DACT-NET	120 VAC	WALL	FIRE COMMAND CENTER	PSTN / IP
PWS	2	POWER SUPPLY / CHARGER	NOTIFIER	PSN-106	120 VAC	RACK MOUNT	FIRE COMMAND CENTER	24 VDC / 6A
BAT	4	BATTERY CABINET	NOTIFIER	CAB-4	—	FLOOR STANDING	FIRE COMMAND CENTER	24 VDC
VOICE EVACUATION SYSTEM								
VAP	1	VOICE EVACUATION AMPLIFIER RACK	BOGEN	VU-120	120 VAC	RACK MOUNT	ELEC. ROOM	120W
SPK	220	CEILING SPEAKER	BOGEN	S86T725PG8	—	CEILING	THROUGHOUT	25/70V
SPK-W	16	WALL SPEAKER	BOGEN	S810T725PG8	—	WALL	PARKING / MECH. RM.	25/70V
MIC	3	FIRE FIGHTER MICROPHONE	BOGEN	MPS-1	—	RACK / WALL	FIRE COMMAND CENTER	PAGING
PRI	1	PAGING INTERFACE	BOGEN	PRI-1	24 VDC	RACK MOUNT	ELEC. ROOM	FACP INTERFACE
FIRE FIGHTER TELEPHONE SYSTEM								
FTCP	1	FIRE FIGHTER TELEPHONE CONTROL PANEL	NOTIFIER	NFT-100	120 VAC	WALL	FIRE COMMAND CENTER	CLASS B
PHONE	68	FIRE FIGHTER TELEPHONE JACK	NOTIFIER	NFT-JACK	—	WALL	STAIR / LOBBIES / FLOORS	CLASS B
TOTAL DEVICES	**871**							

NOTES:

- ALL DEVICES SHALL BE LISTED FOR FIRE PROTECTION SERVICE.
- DEVICES SHALL BE INSTALLED IN ACCORDANCE WITH NFPA 72, MANUFACTURER'S INSTRUCTIONS, AND APPROVED SHOP DRAWINGS.
- QUANTITIES ARE BASED ON CURRENT DESIGN. CONTRACTOR SHALL VERIFY ALL QUANTITIES IN FIELD PRIOR TO PROCUREMENT AND INSTALLATION.

DEVICE TYPE LEGEND

SD	SMOKE DETECTOR
HD	HEAT DETECTOR
DSD	DUCT SMOKE DETECTOR
CO	CARBON MONOXIDE DETECTOR
WFS	WATERFLOW SWITCH
TS	TAMPER SWITCH
PS	MANUAL PULL STATION
HA	HORN / STROBE (WALL)
HA-C	HORN / STROBE (CEILING)
H	HORN (WALL)
S	STROBE (WALL)
MM	MONITOR MODULE
CM	CONTROL MODULE (RELAY)
DCM	DUAL CONTROL MODULE
IM	INPUT MODULE
FACP	FIRE ALARM CONTROL PANEL
ANN	ANNUNCIATOR
RPT	REMOTE ANNUNCIATOR
DACT	DIGITAL ALARM COMMUNICATOR TRANSMITTER
PWS	POWER SUPPLY
BAT	BATTERY CABINET
VAP	VOICE AMPLIFIER PANEL
SPK	SPEAKER
MIC	MICROPHONE
PRI	PAGING INTERFACE
FTCP	FIRE FIGHTER TELEPHONE PANEL
PHONE	TELEPHONE JACK

MOUNTING LEGEND

CEILING	CEILING MOUNT
WALL	WALL MOUNT
FLUSH	FLUSH MOUNT
PIPE	PIPE MOUNT
RACK MOUNT	19" EQUIPMENT RACK
FLOOR STANDING	FLOOR MOUNTED

VOLTAGE LEGEND

24 VDC	24 VOLT DC
120 VAC	120 VOLT AC
—	PASSIVE / NO EXTERNAL POWER

ABBREVIATIONS

SLC	SIGNALING LINE CIRCUIT
NAC	NOTIFICATION APPLIANCE CIRCUIT
SUPV	SUPERVISORY CIRCUIT
EOL	END OF LINE
DACT	DIGITAL ALARM COMMUNICATOR TRANSMITTER
PSTN	PUBLIC SWITCHED TELEPHONE NETWORK

PROJECT:	DESIGNER OF RECORD:	DRAWING TITLE:	DRAWING NO.:	SHEET:	DATE:	REV:
MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM	Applied Engineering Group	DEVICE SCHEDULE MASTER INVENTORY OF ALL DEVICES	FA-019	1 OF 1	MAY 24, 2024	0

FIRE ALARM SYSTEM — ADDRESS SCHEDULE

SLC ADDRESSES FOR EVERY INTELLIGENT DEVICE

FACP LOCATION:	FIRE COMMAND CENTER — ROOM 101	FACP MODEL:	NOTIFIER NFS2-640	SLC LOOP:	SLC LOOP 1	SLC CLASS:	CLASS A

ADDRESS		DEVICE TYPE	DEVICE DESCRIPTION	MANUFACTURER	MODEL NO.	LOCATION			NOTES
DECIMAL	HEX					BUILDING	FLOOR	ROOM / AREA	
INITIATING DEVICES									
1	01	SMOKE DETECTOR	PHOTOELECTRIC SMOKE DETECTOR	NOTIFIER	FSP-951	A	1	CORRIDOR A-101	SLC
2	02	SMOKE DETECTOR	PHOTOELECTRIC SMOKE DETECTOR	NOTIFIER	FSP-951	A	1	CORRIDOR A-102	SLC
3	03	HEAT DETECTOR	HEAT DETECTOR (FIXED 135°F)	NOTIFIER	FST-951	A	1	KITCHEN A-110	SLC
4	04	DUCT SMOKE DETECTOR	DUCT SMOKE DETECTOR	SYSTEM SENSOR	D4120	A	1	AHU-1 (DUCT)	SLC
5	05	CARBON MONOXIDE DETECTOR	CARBON MONOXIDE DETECTOR	SYSTEM SENSOR	CO1224T	A	1	PARKING LEVEL P1	SLC
6	06	WATERFLOW SWITCH	WATERFLOW SWITCH	POTTER	P32	A	P1	FIRE RISER RM.	SUPV
7	07	TAMPER SWITCH	TAMPER SWITCH (OS&Y VALVE)	POTTER	TS-2	A	P1	RISER / CONTROL VALVES	SUPV
8	08	MANUAL PULL STATION	MANUAL PULL STATION	NOTIFIER	NBG-12LX	A	1	EXIT STAIR A	NAC
9	09	MANUAL PULL STATION	MANUAL PULL STATION	NOTIFIER	NBG-12LX	A	1	EXIT STAIR B	NAC
10	0A	MONITOR MODULE	MONITOR MODULE (WATERFLOW)	NOTIFIER	FMM-1	A	P1	FIRE PUMP ROOM	SLC
NOTIFICATION APPLIANCES									
11	0B	HORN / STROBE (WALL)	HORN/STROBE, WALL MOUNT	SYSTEM SENSOR	P2WL	A	1	CORRIDOR A-101	NAC
12	0C	HORN / STROBE (WALL)	HORN/STROBE, WALL MOUNT	SYSTEM SENSOR	P2WL	A	1	CORRIDOR A-102	NAC
13	0D	HORN / STROBE (CEILING)	HORN/STROBE, CEILING MOUNT	SYSTEM SENSOR	PC2WL	A	1	LOBBY A-100	NAC
14	0E	HORN (WALL)	HORN, WALL MOUNT	SYSTEM SENSOR	HWL	A	1	ELECTRICAL ROOM A-120	NAC
15	0F	STROBE (WALL)	STROBE, WALL MOUNT	SYSTEM SENSOR	SWL	A	1	MECHANICAL ROOM A-130	NAC
CONTROL MODULES									
16	10	MONITOR MODULE	MONITOR MODULE	NOTIFIER	FMM-1	A	1	ELEVATOR MACHINE RM.	SLC
17	11	CONTROL MODULE (RELAY)	CONTROL MODULE (RELAY)	NOTIFIER	FCM-1	A	1	SMOKE DAMPER SD-1	SLC
18	12	CONTROL MODULE (RELAY)	CONTROL MODULE (RELAY)	NOTIFIER	FCM-1	A	1	SMOKE DAMPER SD-2	SLC
19	13	INPUT MODULE	INPUT MODULE (MONITORED)	NOTIFIER	FMM-1	A	1	SPRINKLER TAMPER	SLC
20	14	INPUT MODULE	INPUT MODULE (MONITORED)	NOTIFIER	FMM-1	A	1	GENERATOR STATUS	SLC
VOICE EVACUATION SYSTEM									
21	15	AMPLIFIER	VOICE EVAC AMPLIFIER	BOGEN	VU-120	A	1	ELECTRICAL ROOM A-120	120 VAC
22	16	SPEAKER (CEILING)	CEILING SPEAKER	BOGEN	S86T725PG8	A	1	CORRIDOR A-101	25/70V
23	17	SPEAKER (CEILING)	CEILING SPEAKER	BOGEN	S86T725PG8	A	1	LOBBY A-100	25/70V
24	18	SPEAKER (WALL)	WALL SPEAKER	BOGEN	S810T725PG8	A	1	STAIR A LEVEL 1	25/70V
25	19	MICROPHONE	FIRE FIGHTER MICROPHONE	BOGEN	MPS-1	A	1	FIRE COMMAND CENTER	PAGING
26	1A	PAGING INTERFACE	PAGING INTERFACE MODULE	BOGEN	PRI-1	A	1	FIRE COMMAND CENTER	SLC
FIRE FIGHTER TELEPHONE SYSTEM									
27	1B	TELEPHONE CONTROL PANEL	FIRE FIGHTER TELEPHONE PANEL	NOTIFIER	NFT-100	A	1	FIRE COMMAND CENTER	CLASS B
28	1C	TELEPHONE JACK	TELEPHONE JACK	NOTIFIER	NFT-JACK	A	1	STAIR A LEVEL 1	CLASS B
29	1D	TELEPHONE JACK	TELEPHONE JACK	NOTIFIER	NFT-JACK	A	1	STAIR B LEVEL 1	CLASS B
30	1E	TELEPHONE JACK	TELEPHONE JACK	NOTIFIER	NFT-JACK	A	MECH	FIRE PUMP ROOM	CLASS B
31	1F	TELEPHONE JACK	TELEPHONE JACK	NOTIFIER	NFT-JACK	A	ROOF	ROOF ACCESS	CLASS B

TOTAL DEVICES ON THIS SLC LOOP:	31

ADDRESSING NOTES

1. ALL DEVICES SHALL HAVE A UNIQUE ADDRESS.
2. ADDRESS 00 IS RESERVED FOR PANEL.
3. ADDRESSING SHALL FOLLOW SEQUENTIAL ORDER AS SHOWN.
4. FIELD VERIFY ALL ADDRESSES PRIOR TO SYSTEM ACCEPTANCE TESTING.
5. REFER TO DEVICE INSTALLATION MANUALS FOR ADDRESSING PROCEDURES.

DEVICE TYPE LEGEND

SD	SMOKE DETECTOR
HD	HEAT DETECTOR
DSD	DUCT SMOKE DETECTOR
CO	CARBON MONOXIDE DETECTOR
WFS	WATERFLOW SWITCH
TS	TAMPER SWITCH
PS	MANUAL PULL STATION
HA	HORN / STROBE (WALL)
HA-C	HORN / STROBE (CEILING)
H	HORN (WALL)
S	STROBE (WALL)
MM	MONITOR MODULE
CM	CONTROL MODULE (RELAY)
DCM	DUAL CONTROL MODULE
IM	INPUT MODULE

SLC LOOP LEGEND

SLC	SIGNALING LINE CIRCUIT
CLASS A	STYLE 6 OR 7 (T-TAP)
CLASS B	STYLE 4 (RETURN)

END OF LINE RESISTOR:
CLASS A = 4.7K OHM, 1/2W
CLASS B = 4.7K OHM, 1/2W

ABBREVIATIONS

FACP	FIRE ALARM CONTROL PANEL
SLC	SIGNALING LINE CIRCUIT
NAC	NOTIFICATION APPLIANCE CIRCUIT
SUPV	SUPERVISORY CIRCUIT
EOL	END OF LINE
AHU	AIR HANDLING UNIT
RM	ROOM
VDC	VOLTAGE DC
VAC	VOLTAGE AC

PROJECT:	DESIGNER OF RECORD:	DRAWING TITLE:	DRAWING NO.:	SHEET:	DATE:	REV:
MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM	Applied Engineering Group	ADDRESS SCHEDULE SLC ADDRESSES FOR EVERY INTELLIGENT DEVICE	FA-020	1 OF 1	MAY 24, 2024	0

FIRE ALARM SYSTEM – EQUIPMENT SCHEDULE

EQUIPMENT AND POWER SUMMARY

TAG	EQUIPMENT DESCRIPTION	MANUFACTURER	CATALOG / MODEL NO.	VOLTAGE	MOUNTING	LOCATION	QTY	PRIMARY POWER	STANDBY POWER	NOTES
FIRE ALARM CONTROL AND COMMUNICATION EQUIPMENT										
FACP	FIRE ALARM CONTROL PANEL	NOTIFIER	NFS2-640	120 VAC, 60 Hz	RACK MOUNT	FIRE COMMAND CENTER	1	2.5 A	7.0 AH	PRIMARY FACP
ANN-1	NETWORK ANNUNCIATOR	NOTIFIER	NCA-2	24 VDC	WALL	SECURITY DESK	1	0.12 A	—	DACT
RPT-1	REMOTE ANNUNCIATOR	NOTIFIER	NOR-2000	24 VDC	WALL	ELEV. LOBBY / MECH. RM.	3	0.12 A	—	DACT
DACT	DACT / COMMUNICATOR	NOTIFIER	DACT-NET	120 VAC	WALL	FIRE COMMAND CENTER	1	0.18 A	—	PSTN / IP
CONTROL MODULES										
MM	MONITOR MODULE	NOTIFIER	FMM-1	24 VDC	WALL / FLUSH	THROUGHOUT	36	0.0003 A EA	—	SLC
CM	CONTROL MODULE (RELAY)	NOTIFIER	FCM-1	24 VDC	WALL / FLUSH	THROUGHOUT	24	0.0003 A EA	—	SLC
DCM	DUAL CONTROL MODULE	NOTIFIER	FCM-1(DUAL)	24 VDC	WALL / FLUSH	THROUGHOUT	8	0.0004 A EA	—	SLC
IM	INPUT MODULE (MONITORED)	NOTIFIER	FMM-1	24 VDC	WALL / FLUSH	THROUGHOUT	10	0.0003 A EA	—	SLC
POWER SUPPLIES AND BATTERIES										
PWS-1	POWER SUPPLY / CHARGER	NOTIFIER	PSN-106	120 VAC 24 VDC @ 6 A	RACK MOUNT	FIRE COMMAND CENTER	2	1.6 A EA TOTAL 3.2 A	24 VDC 18 AH	PRIMARY
BAT-1	BATTERY CABINET	NOTIFIER	CAB-4	—	FLOOR STANDING	FIRE COMMAND CENTER	4	—	24 VDC 18 AH	EACH
PWS-2	AUXILIARY POWER SUPPLY	NOTIFIER	APS-412	120 VAC 24 VDC @ 12 A	WALL	ELECTRICAL ROOM A-120	1	1.2 A	24 VDC 40 AH	VOICE EVAC / NAC
VOICE EVACUATION SYSTEM										
VAP	AMPLIFIER RACK	BOGEN	VU-120	120 VAC	RACK MOUNT	ELECTRICAL ROOM A-120	1	3.0 A	24 VDC 40 AH	120W
VAP-BATT	AMPLIFIER BATTERY	BOGEN	—	—	RACK MOUNT	ELECTRICAL ROOM A-120	1	—	24 VDC 40 AH	FOR VAP
PRI-1	PAGING INTERFACE	BOGEN	PRI-1	24 VDC	RACK MOUNT	ELEC. ROOM A-120	1	0.10 A	—	FACILITY PAGE
FIRE FIGHTER TELEPHONE EQUIPMENT										
FTCP	FIRE FIGHTER TELEPHONE CONTROL PANEL	NOTIFIER	NFT-100	120 VAC	WALL	FIRE COMMAND CENTER	1	0.6 A	24 VDC 12 AH	CLASS B
PHONE JACKS	FIRE FIGHTER TELEPHONE JACK	NOTIFIER	NFT-JACK	—	WALL	STAIR / LOBBY / FLOORS	68	—	—	CLASS B
MISCELLANEOUS EQUIPMENT										
RACK	19" EQUIPMENT RACK	MIDDLE ATLANTIC	WRK-44-27	—	RACK MOUNT	FIRE COMMAND CENTER	1	—	—	45 RU
BACKPLANE	SLC BACKPLANE CARD	NOTIFIER	NFS2-BP	24 VDC	RACK MOUNT	FACP RACK	1	0.05 A	—	INCLUDED
SLC-1	SLC LOOP CARD	NOTIFIER	NFS2-640-2LS	24 VDC	RACK MOUNT	FACP RACK	2	0.15 A EA	—	CLASS A
PRINTER	SYSTEM PRINTER	BROTHER	HL-L2460DW	120 VAC	SHELF	FIRE COMMAND CENTER	1	0.5 A	—	NETWORK
TOTAL PRIMARY POWER (120 VAC) :								9.92 A	—	—
TOTAL STANDBY BATTERY CAPACITY @ 24 VDC :									206 AH	

EQUIPMENT TYPE LEGEND

FACP	FIRE ALARM CONTROL PANEL
ANN	ANNUNCIATOR
RPT	REMOTE ANNUNCIATOR
DACT	DIGITAL ALARM COMMUNICATOR TRANSMITTER
MM	MONITOR MODULE
CM	CONTROL MODULE
DCM	DUAL CONTROL MODULE
IM	INPUT MODULE
PWS	POWER SUPPLY / CHARGER
BAT	BATTERY CABINET
VAP	VOICE EVACUATION AMPLIFIER
PRI	PAGING INTERFACE
FTCP	FIRE FIGHTER TELEPHONE CONTROL PANEL
PHONE	FIRE FIGHTER TELEPHONE JACK

MOUNTING LEGEND

RACK MOUNT	19" EQUIPMENT RACK
WALL	WALL MOUNT
WALL / FLUSH	WALL MOUNT, FLUSH
FLOOR STANDING	FLOOR MOUNTED CABINET
SHELF	EQUIPMENT SHELF

VOLTAGE LEGEND

120 VAC	120 VOLT AC, 60 Hz
24 VDC	24 VOLT DC
—	NO EXTERNAL POWER REQUIRED

ABBREVIATIONS

SLC	SIGNALING LINE CIRCUIT
NAC	NOTIFICATION APPLIANCE CIRCUIT
VDC	VOLTAGE DC
VAC	VOLTAGE AC
PSTN	PUBLIC SWITCHED TELEPHONE NETWORK
IP	INTERNET PROTOCOL
AH	AMPERE-HOUR
EA	EACH

NOTES:

- ALL EQUIPMENT SHALL BE U.L. LISTED FOR FIRE PROTECTIVE SERVICE.
- BATTERY AUTONOMY SHALL MEET OR EXCEED 24 HOURS STANDBY PLUS 5 MINUTES ALARM IN ACCORDANCE WITH NFPA 72.
- CONTRACTOR SHALL VERIFY ALL LOADS AND BATTERY CALCULATIONS PRIOR TO INSTALLATION.

PROJECT:	DESIGNER OF RECORD:	DRAWING TITLE:	DRAWING NO.:	SHEET:	DATE:	REV:
MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM	Applied Engineering Group	EQUIPMENT SCHEDULE FIRE ALARM SYSTEM	FA-021	1 OF 1	MAY 24, 2024	0

FIRE ALARM SYSTEM – SMOKE DETECTOR SCHEDULE

ADDRESS		DEVICE DESCRIPTION	MODEL NO.	MANUFACTURER	SENSITIVITY SETTING	BASE MODEL (4-WIRE)	SLC LOOP	LOCATION			NOTES
DECIMAL	HEX							BUILDING	FLOOR	ROOM / AREA	
BASEMENT FLOOR											
1	01	PHOTOELECTRIC SMOKE DETECTOR	FSP-951	NOTIFIER	2.0 %/FT	B501	1	A	B	ELEC. ROOM B-01	
2	02	PHOTOELECTRIC SMOKE DETECTOR	FSP-951	NOTIFIER	2.0 %/FT	B501	1	A	B	STORAGE B-02	
3	03	PHOTOELECTRIC SMOKE DETECTOR	FSP-951	NOTIFIER	2.0 %/FT	B501	1	A	B	CORRIDOR B-COR	
4	04	PHOTOELECTRIC SMOKE DETECTOR	FSP-951	NOTIFIER	2.0 %/FT	B501	1	A	B	PUMP ROOM B-03	DAMPER PROXIMITY
FLOOR 1											
5	05	PHOTOELECTRIC SMOKE DETECTOR	FSP-951	NOTIFIER	2.0 %/FT	B501	1	A	1	LOBBY 1-01	
6	06	PHOTOELECTRIC SMOKE DETECTOR	FSP-951	NOTIFIER	2.0 %/FT	B501	1	A	1	CORRIDOR 1-COR	
7	07	PHOTOELECTRIC SMOKE DETECTOR	FSP-951	NOTIFIER	2.0 %/FT	B501	1	A	1	OFFICE 1-02	
8	08	PHOTOELECTRIC SMOKE DETECTOR	FSP-951	NOTIFIER	2.0 %/FT	B501	1	A	1	CONFERENCE 1-03	
9	09	PHOTOELECTRIC SMOKE DETECTOR	FSP-951	NOTIFIER	2.0 %/FT	B501	1	A	1	JANITOR 1-04	
FLOOR 2											
10	0A	PHOTOELECTRIC SMOKE DETECTOR	FSP-951	NOTIFIER	2.0 %/FT	B501	1	A	2	CORRIDOR 2-COR	
11	0B	PHOTOELECTRIC SMOKE DETECTOR	FSP-951	NOTIFIER	2.0 %/FT	B501	1	A	2	OFFICE 2-01	
12	0C	PHOTOELECTRIC SMOKE DETECTOR	FSP-951	NOTIFIER	2.0 %/FT	B501	1	A	2	OFFICE 2-02	
13	0D	PHOTOELECTRIC SMOKE DETECTOR	FSP-951	NOTIFIER	2.0 %/FT	B501	1	A	2	OPEN OFFICE 2-03	
14	0E	PHOTOELECTRIC SMOKE DETECTOR	FSP-951	NOTIFIER	2.0 %/FT	B501	1	A	2	PANTRY 2-04	
FLOOR 3											
15	0F	PHOTOELECTRIC SMOKE DETECTOR	FSP-951	NOTIFIER	2.0 %/FT	B501	1	A	3	CORRIDOR 3-COR	
16	10	PHOTOELECTRIC SMOKE DETECTOR	FSP-951	NOTIFIER	2.0 %/FT	B501	1	A	3	OFFICE 3-01	
17	11	PHOTOELECTRIC SMOKE DETECTOR	FSP-951	NOTIFIER	2.0 %/FT	B501	1	A	3	OFFICE 3-02	
18	12	PHOTOELECTRIC SMOKE DETECTOR	FSP-951	NOTIFIER	2.0 %/FT	B501	1	A	3	MEETING 3-03	
19	13	PHOTOELECTRIC SMOKE DETECTOR	FSP-951	NOTIFIER	2.0 %/FT	B501	1	A	3	STORAGE 3-04	
ROOF LEVEL											
20	14	PHOTOELECTRIC SMOKE DETECTOR	FSP-951	NOTIFIER	2.0 %/FT	B501	1	A	R	MECH. ROOM R-01	
21	15	PHOTOELECTRIC SMOKE DETECTOR	FSP-951	NOTIFIER	2.0 %/FT	B501	1	A	R	ELEV. ROOM R-02	
22	16	PHOTOELECTRIC SMOKE DETECTOR	FSP-951	NOTIFIER	2.0 %/FT	B501	1	A	R	CORRIDOR R-COR	DAMPER PROXIMITY
23	17	PHOTOELECTRIC SMOKE DETECTOR	FSP-951	NOTIFIER	2.0 %/FT	B501	1	A	R	STAIR R-01	

TOTAL SMOKE DETECTORS: 23

SENSITIVITY SETTINGS

SETTING (%/FT)	APPLICATION
0.5 %/FT	VERY CLEAN ENVIRONMENTS
1.0 %/FT	CLEAN ENVIRONMENTS
2.0 %/FT	GENERAL PURPOSE
3.0 %/FT	DIRTY / DUSTY ENVIRONMENTS
4.0 %/FT	VERY DIRTY ENVIRONMENTS

DEVICE TYPE LEGEND

FSP-951	PHOTOELECTRIC SMOKE DETECTOR
B501	4" STANDARD BASE (4-WIRE)

LOCATION LEGEND

A	BUILDING A
B	BASEMENT FLOOR
1	FLOOR 1
2	FLOOR 2
3	FLOOR 3
R	ROOF LEVEL
COR	CORRIDOR
MECH. RM.	MECHANICAL ROOM
ELEC. RM	ELECTRICAL ROOM
STOR	STORAGE ROOM
OFF	OFFICE
CONF	CONFERENCE ROOM
JAN	JANITOR ROOM
PUMP RM	PUMP ROOM
ELEV. RM	ELEVATOR MACHINE ROOM
PANTRY	PANTRY
STAIR	STAIRWELL

ABBREVIATIONS

SLC	SIGNALING LINE CIRCUIT
%/FT	PERCENT PER FOOT
MECH.	MECHANICAL
ELEC.	ELECTRICAL

NOTES:

1. ALL SMOKE DETECTORS ARE PHOTOELECTRIC TYPE WITH BUILT-IN THERMAL COMPENSATION.
2. ALL DETECTORS SET TO 2.0 %/FT SENSITIVITY UNLESS OTHERWISE NOTED.
3. PROVIDE DUCT SMOKE DETECTORS WHERE INDICATED ON DRAWINGS.
4. DEVICE ADDRESSES SHALL FOLLOW SEQUENTIAL ORDER ON SLC LOOP 1 AS SHOWN.
5. REFER TO FLOOR PLANS FOR EXACT DEVICE LOCATIONS.

PROJECT:	DESIGNER OF RECORD:	DRAWING TITLE:	DRAWING NO.:	SHEET:	DATE:	REV:
MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM	Applied Engineering Group	SMOKE DETECTOR SCHEDULE ADDRESS, SENSITIVITY, LOCATION, MODEL	FA-022	1 OF 1	MAY 24, 2024	0

FIRE ALARM SYSTEM – HEAT DETECTOR SCHEDULE

ADDRESS		DEVICE DESCRIPTION	DETECTOR TYPE	TEMPERATURE RATING	FIXED TEMP / RATE-OF-RISE	BASE MODEL (4-WIRE)	SLC LOOP	LOCATION			NOTES
DECIMAL	HEX							BUILDING	FLOOR	ROOM / AREA	
BASEMENT FLOOR											
1	01	HEAT DETECTOR	FIXED TEMPERATURE	135°F (57°C)	FIXED	B501	1	A	B	ELECTRICAL ROOM B-01	
2	02	HEAT DETECTOR	FIXED TEMPERATURE	135°F (57°C)	FIXED	B501	1	A	B	MECHANICAL ROOM B-02	
3	03	HEAT DETECTOR	FIXED TEMPERATURE	135°F (57°C)	FIXED	B501	1	A	B	STORAGE B-03	
4	04	HEAT DETECTOR	FIXED TEMPERATURE	190°F (88°C)	FIXED	B501	1	A	B	GENERATOR ROOM B-04	
FLOOR 1											
5	05	HEAT DETECTOR	FIXED TEMPERATURE	135°F (57°C)	FIXED	B501	1	A	1	KITCHEN 1-01	
6	06	HEAT DETECTOR	FIXED TEMPERATURE	135°F (57°C)	FIXED	B501	1	A	1	JANITOR 1-02	
7	07	HEAT DETECTOR	RATE-OF-RISE	135°F (57°C)	RATE-OF-RISE	B501	1	A	1	ELEVATOR LOBBY 1-03	
8	08	HEAT DETECTOR	FIXED TEMPERATURE	135°F (57°C)	FIXED	B501	1	A	1	ELECTRICAL CLOSET 1-04	
9	09	HEAT DETECTOR	RATE-OF-RISE	135°F (57°C)	RATE-OF-RISE	B501	1	A	1	CORRIDOR 1-COR	
10	0A	HEAT DETECTOR	FIXED TEMPERATURE	190°F (88°C)	FIXED	B501	1	A	1	TRASH ROOM 1-05	
FLOOR 2											
11	0B	HEAT DETECTOR	FIXED TEMPERATURE	135°F (57°C)	FIXED	B501	1	A	2	MECHANICAL ROOM 2-01	
12	0C	HEAT DETECTOR	RATE-OF-RISE	135°F (57°C)	RATE-OF-RISE	B501	1	A	2	CORRIDOR 2-COR	
13	0D	HEAT DETECTOR	FIXED TEMPERATURE	190°F (88°C)	FIXED	B501	1	A	2	STORAGE 2-02	
14	0E	HEAT DETECTOR	FIXED TEMPERATURE	135°F (57°C)	FIXED	B501	1	A	2	ELEC. ROOM 2-03	
15	0F	HEAT DETECTOR	RATE-OF-RISE	135°F (57°C)	RATE-OF-RISE	B501	1	A	2	PUMP ROOM 2-04	
16	10	HEAT DETECTOR	FIXED TEMPERATURE	190°F (88°C)	FIXED	B501	1	A	2	PAINT ROOM 2-05	
ROOF LEVEL											
17	11	HEAT DETECTOR	FIXED TEMPERATURE	190°F (88°C)	FIXED	B501	1	A	R	HVAC EQUIPMENT AREA R-01	
18	12	HEAT DETECTOR	RATE-OF-RISE	135°F (57°C)	RATE-OF-RISE	B501	1	A	R	STAIR ROOF ACCESS R-02	
19	13	HEAT DETECTOR	FIXED TEMPERATURE	190°F (88°C)	FIXED	B501	1	A	R	GENERATOR EXHAUST R-03	
20	14	HEAT DETECTOR	RATE-OF-RISE	135°F (57°C)	RATE-OF-RISE	B501	1	A	R	CORRIDOR ROOF R-COR	
21	15	HEAT DETECTOR	FIXED TEMPERATURE	190°F (88°C)	FIXED	B501	1	A	R	SOLAR INVERTER ROOM R-04	

TOTAL HEAT DETECTORS:	21

NOTES:

1. ALL HEAT DETECTORS ARE INTELLIGENT TYPE, 4-WIRE, COMPATIBLE WITH NOTIFIER B501 BASE.
2. RATE-OF-RISE DETECTORS ARE SET FOR 15°F/MIN RATE OF RISE.
3. FIXED TEMPERATURE DETECTORS SHALL ALARM AT THE LISTED TEMPERATURE RATING.
4. REFER TO FLOOR PLANS FOR EXACT DEVICE LOCATIONS.

HEAT DETECTOR TYPE LEGEND

FIXED TEMPERATURE	Detects a fixed temperature threshold.
RATE-OF-RISE	Detects rapid temperature increase within a set time.

TEMPERATURE RATING LEGEND

135°F (57°C)	GENERAL PURPOSE
190°F (88°C)	HIGH TEMPERATURE
212°F (100°C)	EXTRA HIGH TEMPERATURE

LOCATION LEGEND

B	BASEMENT FLOOR
1	FLOOR 1
2	FLOOR 2
3	FLOOR 3
R	ROOF LEVEL
COR	CORRIDOR
MECH. RM.	MECHANICAL ROOM
ELEC. RM.	ELECTRICAL ROOM
STOR	STORAGE ROOM
JAN	JANITOR ROOM
PUMP RM.	PUMP ROOM
TRASH	TRASH / REFUSE ROOM
HVAC	HVAC EQUIPMENT AREA

SLC LOOP LEGEND

1	SLC LOOP 1
2	SLC LOOP 2
etc.	ADDITIONAL LOOPS AS REQUIRED

ABBREVIATIONS

SLC	SIGNALING LINE CIRCUIT
°F (°C)	TEMPERATURE FAHRENHEIT (CELSIUS)
FIXED	FIXED TEMPERATURE
ROR	RATE-OF-RISE
RTU	ROOFTOP UNIT

PROJECT:	DESIGNER OF RECORD:	DRAWING TITLE:	DRAWING NO.:	SHEET:	DATE:	REV:
MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM	Applied Engineering Group	HEAT DETECTOR SCHEDULE TYPE, TEMPERATURE RATING, LOCATION	FA-023	1 OF 1	MAY 24, 2024	0

FIRE ALARM SYSTEM – NOTIFICATION APPLIANCE SCHEDULE

ADDRESS		DEVICE TYPE	DESCRIPTION / PURPOSE	MANUFACTURER	MODEL NO.	VOLTAGE (VDC)	CURRENT @ VDC (A)	SOUND OUTPUT		LOCATION			NOTES
DECIMAL	HEX							dBA @ 10 ft	TONE	BUILDING	FLOOR	ROOM / AREA	
HORNS													
1	01	HORN	FIRE ALARM HORN	SYSTEM SENSOR	HRK	24	0.070	93	TEMPORAL 3	A	1	CORRIDOR 1-COR	WALL
2	02	HORN	FIRE ALARM HORN	SYSTEM SENSOR	HRK	24	0.070	93	TEMPORAL 3	A	1	STAIR A LEVEL 1	WALL
3	03	HORN	FIRE ALARM HORN	SYSTEM SENSOR	HRK	24	0.070	93	TEMPORAL 3	A	1	ELECTRICAL ROOM 1-06	WALL
4	04	HORN	FIRE ALARM HORN	SYSTEM SENSOR	HRK	24	0.070	93	TEMPORAL 3	A	P1	FIRE PUMP ROOM	WALL
STROBES													
5	05	STROBE	STROBE LIGHT	SYSTEM SENSOR	SCR	24	0.110	—	—	A	1	LOBBY 1-01	CEILING
6	06	STROBE	STROBE LIGHT	SYSTEM SENSOR	SCR	24	0.110	—	—	A	1	CONFERENCE 1-03	CEILING
7	07	STROBE	STROBE LIGHT	SYSTEM SENSOR	SCR	24	0.110	—	—	A	2	OFFICE 2-01	CEILING
8	08	STROBE	STROBE LIGHT	SYSTEM SENSOR	SCR	24	0.110	—	—	A	R	MECHANICAL ROOM	WALL
SPEAKERS													
9	09	SPEAKER	CEILING SPEAKER	BOSCH	LC1-UM06E-1	25/70V	0.50W @25V	87	EVAC / ALERT	A	1	CORRIDOR 1-COR	CEILING
10	0A	SPEAKER	CEILING SPEAKER	BOSCH	LC1-UM06E-1	25/70V	0.50W @25V	87	EVAC / ALERT	A	2	OPEN OFFICE 2-02	CEILING
11	0B	SPEAKER	WALL SPEAKER	BOSCH	LH1-UC15E	25/70V	1.0W @25V	91	EVAC / ALERT	A	R	STAIR A ROOF ACCESS	WALL
12	0C	SPEAKER	CEILING SPEAKER	BOSCH	LC1-UM06E-1	25/70V	0.50W @25V	87	EVAC / ALERT	A	P1	PARKING LEVEL P1	CEILING
SPEAKER-STROBES													
13	0D	SPKR-STROBE	CEILING SPEAKER STROBE	SYSTEM SENSOR	SPSCWL	25/70V / 24V	0.5W / 0.110A	87 / 75 cd	EVAC / ALERT	A	1	AUDITORIUM 1-10	CEILING
14	0E	SPKR-STROBE	WALL SPEAKER STROBE	SYSTEM SENSOR	SPSW	25/70V / 24V	1.0W / 0.110A	87 / 75 cd	EVAC / ALERT	A	2	TRAINING ROOM 2-05	WALL
15	0F	SPKR-STROBE	CEILING SPEAKER STROBE	SYSTEM SENSOR	SPSCWL	25/70V / 24V	0.5W / 0.110A	87 / 75 cd	EVAC / ALERT	A	3	MULTIPURPOSE ROOM 3-01	CEILING
16	10	SPKR-STROBE	CEILING SPEAKER STROBE	SYSTEM SENSOR	SPSCWL	25/70V / 24V	0.5W / 0.110A	87 / 75 cd	EVAC / ALERT	A	R	ROOF MECHANICAL AREA	CEILING

TOTAL NOTIFICATION APPLIANCES:	16

NOTES:

1. ALL NOTIFICATION APPLIANCES SHALL BE LISTED FOR FIRE PROTECTIVE SERVICE IN ACCORDANCE WITH UL 1971.
2. HORN AND STROBE APPLIANCES SHALL USE TEMPORAL 3 TONE.
3. SPEAKER AND SPEAKER-STROBE APPLIANCES SHALL BE USED FOR VOICE EVACUATION WHERE INDICATED ON PLANS.
4. MOUNTING HEIGHTS AND LOCATIONS SHALL FOLLOW NFPA 72 REQUIREMENTS.

DEVICE TYPE LEGEND

HORN	HORN
STROBE	STROBE LIGHT
SPEAKER	SPEAKER (AUDIO ONLY)
SPKR-STROBE	SPEAKER-STROBE

TONE LEGEND

TEMPORAL 3	NFPA STANDARD
EVAC / ALERT	VOICE OR ALERT TONE

MOUNTING LEGEND

WALL	WALL MOUNTED
CEILING	CEILING MOUNTED
WP	WEATHERPROOF

LOCATION LEGEND

A	BUILDING A
P1	PARKING LEVEL 1
1	FLOOR 1
2	FLOOR 2
3	FLOOR 3
R	ROOF LEVEL
COR	CORRIDOR
STAIR	STAIRWELL
ELEC. RM.	ELECTRICAL ROOM
MECH. RM.	MECHANICAL ROOM

ABBREVIATIONS

VDC	VOLTS DC
dBA	DECIBELS A-WEIGHTED
cd	CANDELA
A	AMPS
EVAC	EVACUATION
ALERT	ALERT

PROJECT:	DESIGNER OF RECORD:	DRAWING TITLE:	DRAWING NO.:	SHEET:	DATE:	REV:
MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM	Applied Engineering Group	NOTIFICATION APPLIANCE SCHEDULE HORNS, STROBES, SPEAKERS, SPEAKER-STROBES	FA-025	1 OF 1	MAY 24, 2024	0

FIRE ALARM SYSTEM – NAC CIRCUIT SCHEDULE

NAC CIRCUIT NO.	DESIGNATION	FUNCTION (TONE)	VOLTAGE (VDC)	CABLE INFORMATION		MAX. CIRCUIT CURRENT (A)	TOTAL CONNECTED LOAD			SPARE CAPACITY (A)	SUPERVISION TYPE	MOUNTING CONFIG.	NOTES
				AWG	TYPE		APPLIANCE LOAD (A)	CABLE LOSS (A)	TOTAL (A)				
1	NAC-1	ALERT (TEMP. 3) BUILDING A – FLOOR 1	24	14	FPLR	3.0	2.10	0.23	2.33	0.67	CLASS B	WALL / CEILING	
	DEVICES ON CIRCUIT: 10 HORN, 10 STROBE, 4 SPEAKER, 2 SPKR-STROBE												
2	NAC-2	ALERT (TEMP. 3) BUILDING A – FLOOR 2	24	14	FPLR	3.0	1.85	0.20	2.05	0.95	CLASS B	WALL / CEILING	
	DEVICES ON CIRCUIT: 8 HORN, 8 STROBE, 4 SPEAKER, 1 SPKR-STROBE												
3	NAC-3	ALERT (TEMP. 3) BUILDING A – FLOOR 3	24	14	FPLR	3.0	1.60	0.18	1.78	1.22	CLASS B	WALL / CEILING	
	DEVICES ON CIRCUIT: 6 HORN, 6 STROBE, 2 SPEAKER, 1 SPKR-STROBE												
4	NAC-4	ALERT (TEMP. 3) BUILDING A – ROOF LEVEL	24	14	FPLR	3.0	1.20	0.15	1.35	1.65	CLASS B	WALL / CEILING	
	DEVICES ON CIRCUIT: 4 HORN, 4 STROBE, 2 SPEAKER												
5	NAC-5	ALERT (TEMP. 3) BUILDING A – BASEMENT	24	14	FPLR	3.0	1.35	0.16	1.51	1.49	CLASS B	WALL / CEILING	
	DEVICES ON CIRCUIT: 5 HORN, 5 STROBE, 2 SPEAKER												
6	NAC-6	ALERT (TEMP. 3) PARKING LEVEL 1	24	14	FPLR	3.0	2.25	0.25	2.50	0.50	CLASS B	CEILING	SEE NOTE 2
	DEVICES ON CIRCUIT: 10 HORN, 10 STROBE, 4 SPEAKER, 2 SPKR-STROBE												
7	NAC-7	ALERT (TEMP. 3) PARKING LEVEL 2	24	14	FPLR	3.0	2.00	0.22	2.22	0.78	CLASS B	CEILING	
	DEVICES ON CIRCUIT: 9 HORN, 8 STROBE, 3 SPEAKER, 1 SPKR-STROBE												
8	NAC-8	ALERT (TEMP. 3) STAIRWELLS A & B	24	14	FPLR	3.0	0.80	0.10	0.90	2.10	CLASS B	WALL	STAIR DOORS
	DEVICES ON CIRCUIT: 4 HORN, 4 STROBE												
9	NAC-9	ALERT (TEMP. 3) ELEVATOR LOBBIES	24	14	FPLR	3.0	0.55	0.07	0.62	2.38	CLASS B	WALL / CEILING	
	DEVICES ON CIRCUIT: 2 HORN, 2 STROBE												
10	NAC-10	ALERT (TEMP. 3) MECHANICAL AREAS	24	14	FPLR	3.0	0.45	0.06	0.51	2.49	CLASS B	WALL	HVAC ROOMS
	DEVICES ON CIRCUIT: 2 HORN, 2 STROBE												
11	NAC-11	ALERT (TEMP. 3) EXTERIOR AREAS	24	12	FPLX	3.0	1.10	0.20	1.30	1.70	CLASS B	WEATHERPROOF	WP DEVICES
	DEVICES ON CIRCUIT: 3 HORN, 3 STROBE, 2 SPEAKER												
12	NAC-12	RESERVED / FUTURE	24	14	FPLR	3.0	—	—	—	3.00	CLASS B	—	SPARE
		TOTAL NAC LOAD CONNECTED:					**12.16 A**	**1.82 A**	**13.98 A**	**22.02 A**			

TONES PER CIRCUIT

FUNCTION	TONE
ALERT	TEMPORAL 3
EVACUATION	EVACUATION (NFPA)
SUPERVISORY	TEMPORAL 4
SECURITY	STEADY

CABLE TYPE LEGEND

FPLR	FIRE POWER LIMITED RATED CABLE
FPLX	FIRE POWER LIMITED RATED CABLE (EXTERIOR)

SUPERVISION TYPE LEGEND

CLASS B	STYLE B (NOTIFICATION APPLIANCE CIRCUIT)

MOUNTING CONFIGURATION

WALL	WALL MOUNTED
CEILING	CEILING MOUNTED
WALL / CEILING	WALL OR CEILING MOUNTED
WEATHERPROOF	OUTDOOR WEATHERPROOF

NOTES

1. DEVICE COUNTS AND LOADS ARE BASED ON MANUFACTURER DATA AT 24 VDC.
2. PARKING LEVELS ARE DESIGNED FOR MAXIMUM ALLOWABLE LOAD.
3. ALL NAC CIRCUITS ARE POWER LIMITED AND SUPERVISED.
4. REFER TO FLOOR PLANS FOR EXACT APPLIANCE LOCATIONS.

ABBREVIATIONS

NAC	NOTIFICATION APPLIANCE CIRCUIT
VDC	VOLTS DC
AWG	AMERICAN WIRE GAUGE
A	AMPERES
WP	WEATHERPROOF

PROJECT:	DESIGNER OF RECORD:	DRAWING TITLE:	DRAWING NO.:	SHEET:	DATE:	REV:
MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM	Applied Engineering Group	NAC CIRCUIT SCHEDULE LOADS AND CIRCUIT ASSIGNMENTS	FA-026	1 OF 1	MAY 24, 2024	0

FIRE ALARM SYSTEM – MODULE SCHEDULE

ADDRESS		MODULE TYPE	MODULE DESCRIPTION	MODEL NO.	MANUFACTURER	SLC LOOP	BASE MODEL (4-WIRE)	LOCATION			NOTES
DECIMAL	HEX							BUILDING	FLOOR	ROOM / AREA	
MONITOR MODULES											
1	01	MONITOR MODULE	WATERFLOW SWITCH	FMM-1	NOTIFIER	1	B501	A	P1	FIRE RISER RM.	SLC
2	02	MONITOR MODULE	TAMPER SWITCH (OS&Y VALVE)	FMM-1	NOTIFIER	1	B501	A	P1	RISER ROOM	SLC
3	03	MONITOR MODULE	FLOW SWITCH (SPRINKLER)	FMM-1	NOTIFIER	1	B501	A	P1	FIRE PUMP ROOM	SLC
4	04	MONITOR MODULE	LOW AIR PRESSURE SWITCH	FMM-1	NOTIFIER	1	B501	A	R	COMPRESSOR ROOM	SLC
5	05	MONITOR MODULE	GENERATOR RUN STATUS	FMM-1	NOTIFIER	1	B501	A	R	GENERATOR ROOM	SLC
6	06	MONITOR MODULE	SMOKE DAMPER POSITION	FMM-1	NOTIFIER	1	B501	A	2	CORRIDOR 2-COR	SLC
7	07	MONITOR MODULE	ELEVATOR RECALL STATUS	FMM-1	NOTIFIER	1	B501	A	1	ELEVATOR LOBBY 1-03	SLC
8	08	MONITOR MODULE	FUEL TANK LEVEL SWITCH	FMM-1	NOTIFIER	1	B501	A	R	FUEL STORAGE RM.	SLC
CONTROL MODULES (RELAY OUTPUT)											
9	09	CONTROL MODULE	FIRE ALARM HORN (ZONE 1)	FCM-1	NOTIFIER	1	B501	A	1	CORRIDOR / ROOMS	NAC
10	0A	CONTROL MODULE	STROBE CIRCUIT (ZONE 1)	FCM-1	NOTIFIER	1	B501	A	1	CORRIDOR / ROOMS	NAC
11	0B	CONTROL MODULE	HVAC SHUTDOWN	FCM-1	NOTIFIER	1	B501	A	R	HVAC EQUIPMENT RM.	HVAC
12	0C	CONTROL MODULE	SMOKE DAMPER CLOSE	FCM-1	NOTIFIER	1	B501	A	2	ALL ZONES	HVAC
13	0D	CONTROL MODULE	ELEVATOR RECALL	FCM-1	NOTIFIER	1	B501	A	1	ALL ELEVATORS	ELEV
14	0E	CONTROL MODULE	DOOR HOLDER RELEASE	FCM-1	NOTIFIER	1	B501	A	1	STAIR DOORS	ACCESS
15	0F	CONTROL MODULE	FIRE PUMP START	FCM-1	NOTIFIER	1	B501	A	P1	FIRE PUMP ROOM	PUMP
16	10	CONTROL MODULE	GENERATOR START	FCM-1	NOTIFIER	1	B501	A	R	GENERATOR ROOM	GEN
DUAL CONTROL MODULES (TWO INDEPENDENT CIRCUITS)											
17	11	DUAL CONTROL MODULE	HORN (ZONE 2) / STROBE (ZONE 2)	FCM-1(DUAL)	NOTIFIER	1	B501	A	2	CORRIDORS / ROOMS	NAC
18	12	DUAL CONTROL MODULE	HORN (ZONE 3) / STROBE (ZONE 3)	FCM-1(DUAL)	NOTIFIER	1	B501	A	3	CORRIDORS / ROOMS	NAC
RELAY MODULES											
19	13	RELAY MODULE	FAN SHUTDOWN RELAY	FRM-1	NOTIFIER	1	B501	A	R	MECHANICAL ROOM	HVAC
20	14	RELAY MODULE	SECURITY SYSTEM INTERFACE	FRM-1	NOTIFIER	1	B501	A	1	SECURITY ROOM	SEC
21	15	RELAY MODULE	PUBLIC ADDRESS OVERRIDE	FRM-1	NOTIFIER	1	B501	A	1	TELECOM ROOM	PA
22	16	RELAY MODULE	FUEL SHUTOFF VALVE	FRM-1	NOTIFIER	1	B501	A	R	FUEL ROOM	FUEL
ISOLATOR MODULES											
23	17	ISOLATOR MODULE	SLC ISOLATOR	ISO-X	NOTIFIER	1	B501	A	1	CORRIDOR 1-COR	SLC
24	18	ISOLATOR MODULE	SLC ISOLATOR	ISO-X	NOTIFIER	1	B501	A	2	CORRIDOR 2-COR	SLC
25	19	ISOLATOR MODULE	SLC ISOLATOR	ISO-X	NOTIFIER	1	B501	A	3	CORRIDOR 3-COR	SLC
26	1A	ISOLATOR MODULE	SLC ISOLATOR	ISO-X	NOTIFIER	1	B501	A	R	ROOF LEVEL	SLC

TOTAL MODULES: 26

NOTES:

1. ALL MODULES ARE INTELLIGENT TYPE AND COMPATIBLE WITH NOTIFIER B501 BASE.
2. MODULES SHALL BE INSTALLED IN LISTED ENCLOSURES AS REQUIRED BY NFPA 72.
3. REFER TO FLOOR PLANS AND RISER DIAGRAMS FOR EXACT LOCATION AND WIRING.
4. ALL RELAY AND CONTROL CIRCUITS SHALL BE SUPERVISED.

MODULE TYPE LEGEND

FMM-1	MONITOR MODULE
FCM-1	CONTROL MODULE (RELAY)
FCM-1(DUAL)	DUAL CONTROL MODULE
FRM-1	RELAY MODULE
ISO-X	ISOLATOR MODULE

MODULE TYPE DESCRIPTION

MONITOR MODULE	Supervises dry contact input devices.
CONTROL MODULE	Provides supervised relay output for control.
DUAL CONTROL MODULE	Two independent control outputs in one module.
RELAY MODULE	Provides Form-C relay output for general use.
ISOLATOR MODULE	Protects SLC loop by isolating short circuits.

SLC LOOP LEGEND

1	SLC LOOP 1
2	SLC LOOP 2
etc.	ADDITIONAL LOOPS AS REQUIRED

LOCATION LEGEND

A	BUILDING A
P1	PUMP ROOM / LEVEL 1
1	FLOOR 1
2	FLOOR 2
3	FLOOR 3
R	ROOF LEVEL

ABBREVIATIONS

SLC	SIGNALING LINE CIRCUIT
NAC	NOTIFICATION APPLIANCE CIRCUIT
HVAC	HEATING, VENTILATION AND AIR CONDITIONING
SEC	SECURITY SYSTEM
PA	PUBLIC ADDRESS
GEN	GENERATOR
PUMP	PUMP
N.O.	NORMALLY OPEN
N.C.	NORMALLY CLOSED

PROJECT:	DESIGNER OF RECORD:	DRAWING TITLE:	DRAWING NO.:	SHEET:	DATE:	REV:
MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM	Applied Engineering Group	MODULE SCHEDULE MONITOR, CONTROL, RELAY, ISOLATOR MODULES	FA-024	1 OF 1	MAY 24, 2024	0

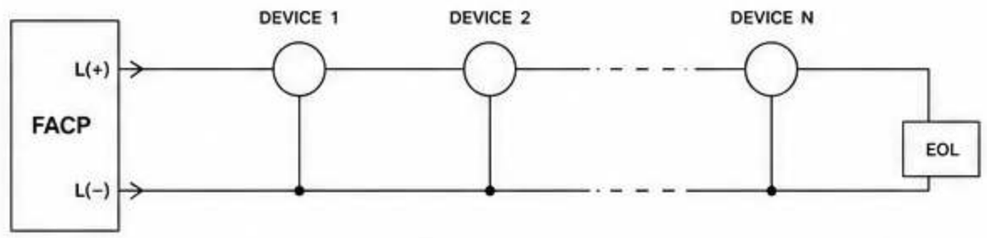
FIRE ALARM SYSTEM – SLC LOOP SCHEDULE

SLC LOOP INFORMATION						DEVICE COUNTS ON LOOP						LOOP TOTALS		
LOOP NO.	LOOP IDENTIFICATION	PANEL TERMINALS	VOLTAGE (VDC)	WIRE SIZE (AWG)	MAX. LOOP CURRENT (mA)	SMOKE DETECTORS	HEAT DETECTORS	MONITOR MODULES	CONTROL MODULES	RELAY MODULES	ISOLATOR MODULES	TOTAL DEVICES	EST. LOOP CURRENT (mA)	NOTES
1	SLC LOOP 1 (LEVELS B & 1)	L1(+) / L1(–) ON FACP	24	14	250	9	8	8	8	4	2	39	198	BASEMENT FLOOR AND FLOOR 1 NORTH WING
2	SLC LOOP 2 (LEVEL 2)	L2(+) / L2(–) ON FACP	24	14	250	6	6	6	6	3	2	29	146	FLOOR 2 ALL AREAS
3	SLC LOOP 3 (LEVEL 3)	L3(+) / L3(–) ON FACP	24	14	250	5	6	6	6	4	2	29	149	FLOOR 3 ALL AREAS
4	SLC LOOP 4 (ROOF LEVEL)	L4(+) / L4(–) ON FACP	24	14	250	3	5	4	4	3	2	21	108	ROOF LEVEL MEP AREAS
TOTALS	–	–	–	–	–	23	25	24	24	14	8	118	601	–

SLC LOOP LOADING SUMMARY

DESCRIPTION	VALUE	REMARKS
FACP SLC LOOP CAPACITY (MAX.)	250 mA per loop	Per manufacturer data
TOTAL ESTIMATED LOOP CURRENT (ALL LOOPS)	601 mA	Sum of all loop estimated currents
TOTAL AVAILABLE LOOP CURRENT (ALL LOOPS)	1000 mA	4 loops x 250 mA
LOOP CURRENT UTILIZATION	60%	601 mA / 1000 mA
MAX. DEVICES PER LOOP (PRACTICAL)	127 devices	Per manufacturer limitations
HIGHEST CURRENT LOOP	SLC LOOP 1 (198 mA)	Within allowable limit

TYPICAL SLC LOOP WIRING (CLASS B)



EOL = END OF LINE RESISTOR PER MANUFACTURER REQUIREMENTS

DEVICE TYPE LEGEND

SD	SMOKE DETECTOR
HD	HEAT DETECTOR
MM	MONITOR MODULE
CM	CONTROL MODULE
RM	RELAY MODULE
IM	ISOLATOR MODULE

SLC LOOP LEGEND

L1	SLC LOOP 1
L2	SLC LOOP 2
L3	SLC LOOP 3
L4	SLC LOOP 4

NOTES

1. DEVICE COUNTS INCLUDE ALL DEVICES PHYSICALLY ON EACH LOOP.
2. ESTIMATED LOOP CURRENT IS BASED ON MANUFACTURER'S CURRENT DRAW.
3. ALL SLC LOOPS ARE CONFIGURED FOR CLASS B WIRING.
4. REFER TO FLOOR PLANS FOR EXACT DEVICE LOCATIONS.

ABBREVIATIONS

SLC	SIGNALING LINE CIRCUIT
FACP	FIRE ALARM CONTROL PANEL
VDC	VOLTS DC
mA	MILLIAMPERES
AWG	AMERICAN WIRE GAUGE
EOL	END OF LINE

PROJECT:	DESIGNER OF RECORD:	DRAWING TITLE:	DRAWING NO.:	SHEET:	DATE:	REV:
MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM	Applied Engineering Group	SLC LOOP SCHEDULE DEVICE COUNTS AND LOOP ASSIGNMENTS	FA-027	1 OF 1	MAY 24, 2024	0

FIRE ALARM SYSTEM – VOICE EVACUATION CIRCUIT SCHEDULE

ZONE NO.	ZONE NAME / DESCRIPTION	EVAC FUNCTION	AUDIO AMPLIFIER ASSIGNMENT			SPEAKER CIRCUIT (70V / 25V)				SPEAKER INFORMATION		CABLE INFORMATION		MONITOR MODULE ID	NOTES
			AMPLIFIER ID	LOCATION	RATED POWER (W)	CIRCUIT ID (NAC)	VOLTAGE (V)	MAX. LOAD (W)	CONNECTED LOAD (W)	SPEAKER COUNT	SPKR. TYPE	CABLE TYPE	AWG		
1	FLOOR 1 – NORTH WING CORRIDORS & COMMON AREAS	EVAC + ALERT	AMP-1	ELEC. ROOM 1ST FLOOR	500	NAC-VA-1	70	500	235	28	SPKR	FPLR	14	MM-VA-1	—
2	FLOOR 1 – SOUTH WING CORRIDORS & COMMON AREAS	EVAC + ALERT	AMP-1	ELEC. ROOM 1ST FLOOR	500	NAC-VA-2	70	500	290	34	SPKR	FPLR	14	MM-VA-2	—
3	FLOOR 2 – NORTH WING CORRIDORS & COMMON AREAS	EVAC + ALERT	AMP-2	ELEC. ROOM 2ND FLOOR	500	NAC-VA-3	70	500	310	36	SPKR	FPLR	14	MM-VA-3	—
4	FLOOR 2 – SOUTH WING CORRIDORS & COMMON AREAS	EVAC + ALERT	AMP-2	ELEC. ROOM 2ND FLOOR	500	NAC-VA-4	70	500	285	33	SPKR	FPLR	14	MM-VA-4	—
5	FLOOR 3 – NORTH WING CORRIDORS & COMMON AREAS	EVAC + ALERT	AMP-3	ELEC. ROOM 3RD FLOOR	500	NAC-VA-5	70	500	300	35	SPKR	FPLR	14	MM-VA-5	—
6	FLOOR 3 – SOUTH WING CORRIDORS & COMMON AREAS	EVAC + ALERT	AMP-3	ELEC. ROOM 3RD FLOOR	500	NAC-VA-6	70	500	270	32	SPKR	FPLR	14	MM-VA-6	—
7	PARKING LEVEL 1	EVAC + ALERT	AMP-4	ELEC. ROOM P1	500	NAC-VA-7	70	500	260	30	SPKR	FPLR	14	MM-VA-7	—
8	PARKING LEVEL 2	EVAC + ALERT	AMP-4	ELEC. ROOM P1	500	NAC-VA-8	70	500	245	28	SPKR	FPLR	14	MM-VA-8	—
9	PENTHOUSE / ROOF LEVEL	EVAC + ALERT	AMP-5	ELEC. ROOM ROOF	250	NAC-VA-9	70	250	120	12	SPKR	FPLR	14	MM-VA-9	—
10	ELEVATOR LOBBIES (ALL FLOORS)	ALERT ONLY	AMP-6	ELEC. ROOM 1ST FLOOR	250	NAC-VA-10	70	250	110	10	SPKR	FPLR	14	MM-VA-10	—
11	STAIRWELLS (ALL FLOORS)	EVAC + ALERT	AMP-6	ELEC. ROOM 1ST FLOOR	250	NAC-VA-11	70	250	130	14	SPKR	FPLR	14	MM-VA-11	—
12	TOILETS & SMALL ROOMS	ALERT ONLY	AMP-6	ELEC. ROOM 1ST FLOOR	250	NAC-VA-12	70	250	90	9	SPKR	FPLR	14	MM-VA-12	—
TOTALS								2,950 W	2,645 W	311 W					

SPEAKER TYPE LEGEND

SPKR	CEILING MOUNT SPEAKER
SPKRS	SURFACE MOUNT SPEAKER
SPKR-ST	CEILING SPEAKER-STROBE
SPKR/WP	WEATHERPROOF SPEAKER

EVAC FUNCTION LEGEND

EVAC	VOICE EVACUATION
ALERT	VOICE ALERT ONLY
EVAC + ALERT	VOICE EVACUATION AND ALERT

CABLE TYPE LEGEND

FPLR	FIRE POWER LIMITED RATED CABLE
FPLX	FIRE POWER LIMITED RATED CABLE (EXTERIOR)

MONITOR MODULE LEGEND

MM	MONITOR MODULE (SPEAKER CIRCUIT)

AMPLIFIER SUMMARY

AMPLIFIER ID	LOCATION	RATED POWER (W)	OUTPUT CIRCUITS (NAC)	TOTAL CONNECTED LOAD (W)	SPARE CAPACITY (W)
AMP-1	ELEC. ROOM – 1ST FLOOR	500	NAC-VA-1, NAC-VA-2	525	(25) *
AMP-2	ELEC. ROOM – 2ND FLOOR	500	NAC-VA-3, NAC-VA-4	595	(95) *
AMP-3	ELEC. ROOM – 3RD FLOOR	500	NAC-VA-5, NAC-VA-6	570	(70) *
AMP-4	ELEC. ROOM – P1	500	NAC-VA-7, NAC-VA-8	505	((5) *
AMP-5	ELEC. ROOM – ROOF	250	NAC-VA-9	120	130
AMP-6	ELEC. ROOM – 1ST FLOOR	250	NAC-VA-10, NAC-VA-11, NAC-VA-12	330	(80) *

* SPARE CAPACITY IS AVAILABLE POWER.

NOTES

1. ALL VOICE EVACUATION SPEAKER CIRCUITS ARE SUPERVISED FOR OPEN, SHORT, AND GROUND FAULTS.
2. SYSTEM OPERATES AT 70V DISTRIBUTED SPEAKER CIRCUITS.
3. SPEAKER COUNT IS BASED ON CONNECTED LOADS PER MANUFACTURER CALCULATIONS.
4. REFER TO FLOOR PLANS FOR EXACT SPEAKER LOCATIONS.
5. VOICE EVACUATION SYSTEM COMPLIES WITH NFPA 72, NFPA 70, AND IBC REQUIREMENTS.

ABBREVIATIONS

NAC	NOTIFICATION APPLIANCE CIRCUIT
EVAC	EVACUATION
ALERT	ALERT ONLY
VDC	VOLTS DC
W	WATTS
AWG	AMERICAN WIRE GAUGE

PROJECT:	DESIGNER OF RECORD:	DRAWING TITLE:	DRAWING NO.:	SHEET:	DATE:	REV:
MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM	Applied Engineering Group	VOICE EVACUATION CIRCUIT SCHEDULE SPEAKER ZONES AND AMPLIFIER ASSIGNMENTS	FA-028	1 OF 1	MAY 24, 2024	0

FIRE ALARM SYSTEM – POWER SUPPLY SCHEDULE

POWER SUPPLY ID	LOCATION	MANUFACTURER	MODEL NO.	INPUT			DC OUTPUT			BATTERY CAPACITY (AH)	ENCLOSURE TYPE	CONNECTED LOADS		REMARKS
				VOLTAGE (VAC)	FREQUENCY (Hz)	CURRENT (A)	VOLTAGE (VDC)	CURRENT (A)	POWER (W)			DESCRIPTION	TOTAL LOAD (A)	
PS-1 (FACP PSU)	ELECTRICAL ROOM 1ST FLOOR	NOTIFIER	NFW-100X	120	60	3.2	24	10.0	240	18 AH	CABINET (BB-100X)	FACP (NFW-100X) SLC LOOP 1 SLC LOOP 2 ANNUNCIATOR (AA-30) SYSTEM AUXILIARY LOADS	6.75	
PS-2 (NAC PSU)	ELECTRICAL ROOM 1ST FLOOR	NOTIFIER	NFS-320	120	60	4.5	24	10.0	240	18 AH	CABINET (NFS-320)	NAC CIRCUITS: NAC-1, NAC-2, NAC-3, NAC-4, NAC-5, NAC-6	7.20	
PS-3 (VOICE PSU)	ELECTRICAL ROOM 2ND FLOOR	NOTIFIER	NFS-320	120	60	4.5	24	10.0	240	18 AH	CABINET (NFS-320)	VOICE EVAC AMPLIFIERS AMP-1, AMP-2, AMP-3, AMP-4, AMP-5, AMP-6	8.60	
PS-4 (AUX PSU)	ELEC. ROOM – 1ST FLOOR (IDF RM)	NOTIFIER	NFS-640	120	60	6.8	24	20.0	480	40 AH	CABINET (NFS-640)	CONTROL MODULES RELAY MODULES ISOLATOR MODULES AUXILIARY LOADS	12.40	
PS-5 (REMOTE PSU)	ROOF LEVEL MEP ROOM	NOTIFIER	NFS-320	120	60	4.5	24	10.0	240	18 AH	CABINET (NFS-320)	NAC-7, NAC-8 STROBE CIRCUITS ROOF SMOKE CONTROL	3.80	
TOTAL SYSTEM DC LOAD								49.0	1,440				38.75	

ENCLOSURE TYPE LEGEND

CABINET	CABINET / WALL MOUNT WITH LOCK
BB-100X	BACKBOX FOR FACP POWER SUPPLY

ABBREVIATIONS

FACP	FIRE ALARM CONTROL PANEL
NAC	NOTIFICATION APPLIANCE CIRCUIT
SLC	SIGNALING LINE CIRCUIT
PSU	POWER SUPPLY UNIT
VDC	VOLTS DC
VAC	VOLTS AC
AH	AMPERE-HOURS

GENERAL NOTES

1. ALL POWER SUPPLIES SHALL BE LISTED FOR FIRE PROTECTIVE SERVICE.
2. BATTERY CAPACITY PROVIDES 24 HOURS STANDBY AND 5 MINUTES ALARM OPERATION IN ACCORDANCE WITH NFPA 72.
3. ALL WIRING BETWEEN POWER SUPPLIES AND LOADS SHALL BE SUPERVISED AS REQUIRED BY NFPA 72.
4. REFER TO FLOOR PLANS AND RISER DIAGRAMS FOR EXACT CONNECTIONS.

CONNECTED LOAD SUMMARY BY TYPE

LOAD TYPE	TOTAL LOAD (A)	PERCENT OF TOTAL
FACP & SYSTEM ELECTRONICS	6.75	17.4%
NOTIFICATION APPLIANCE CIRCUITS (NACs)	11.00	28.4%
VOICE EVACUATION SYSTEM	8.60	22.2%
CONTROL & RELAY MODULES	9.20	23.8%
AUXILIARY / MISCELLANEOUS	3.20	8.2%
TOTAL SYSTEM LOAD	38.75	100%

BATTERY SUMMARY

POWER SUPPLY ID	BATTERY CAPACITY (AH)	QUANTITY	TOTAL AH
PS-1	18	2	36
PS-2	18	2	36
PS-3	18	2	36
PS-4	40	2	80
PS-5	18	2	36
TOTAL SYSTEM BATTERY CAPACITY			224 AH

NOTES

- ALL POWER SUPPLIES ARE 24 VDC REGULATED AND POWER LIMITED.
- BATTERIES SHALL BE SEALED LEAD ACID, MAINTENANCE-FREE, UL LISTED.
- INSTALL POWER SUPPLIES IN A DEDICATED, VENTILATED, LOCKABLE ENCLOSURE OR CABINET.
- MAINTAIN 20% SPARE CAPACITY ON EACH POWER SUPPLY.
- PROVIDE AC DISCONNECT SWITCH FOR EACH POWER SUPPLY PER NFPA 72.
- ALL CIRCUITS POWERED BY THESE SUPPLIES SHALL BE IDENTIFIED AT BOTH ENDS.

PROJECT:	DESIGNER OF RECORD:	DRAWING TITLE:	DRAWING NO.:	SHEET:	DATE:	REV:
MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM	Applied Engineering Group	POWER SUPPLY SCHEDULE POWER SUPPLIES AND CONNECTED LOADS	FA-029	1 OF 1	MAY 24, 2024	0

FIRE ALARM SYSTEM – ELEVATOR INTERFACE SCHEDULE

ELEVATOR NO.	ELEVATOR DESIGNATION	ELEVATOR CONTROLLER LOCATION	RECALL (FIRE EMERGENCY OPERATION)				SHUNT TRIP (POWER DROP)			MONITORING POINTS					REMARKS
			RECALL PROVIDED	RECALL METHOD	RECALL ZONE / SOURCE	RECALL DESTINATION (FLOOR)	SHUNT TRIP PROVIDED	SHUNT TRIP METHOD	SHUNT TRIP ZONE / SOURCE	ELEVATOR IN NORMAL POSITION	ELEVATOR AT RECALL FLOOR	ELEVATOR CAR DOOR OPEN	ELEVATOR CAR DOOR CLOSED	ELEVATOR OUT OF SERVICE	
1	ELEVATOR 1	ELEV. MACHINE ROOM 1 (ROOF)	YES	FACP OUTPUT	FIRE ALARM ZONE 1 (FIRE COMMAND)	LEVEL 1 (MAIN LOBBY)	YES	FACP OUTPUT	FIRE ALARM ZONE 1	YES	YES	YES	YES	YES	PRIMARY PASSENGER ELEVATOR
2	ELEVATOR 2	ELEV. MACHINE ROOM 1 (ROOF)	YES	FACP OUTPUT	FIRE ALARM ZONE 1 (FIRE COMMAND)	LEVEL 1 (MAIN LOBBY)	YES	FACP OUTPUT	FIRE ALARM ZONE 1	YES	YES	YES	YES	YES	SECONDARY PASSENGER ELEVATOR
3	ELEVATOR 3	ELEV. MACHINE ROOM 2 (PENTHOUSE)	YES	FACP OUTPUT	FIRE ALARM ZONE 2 (FIRE COMMAND)	LEVEL 1 (MAIN LOBBY)	YES	FACP OUTPUT	FIRE ALARM ZONE 2	YES	YES	YES	YES	YES	SERVICE ELEVATOR
4	ELEVATOR 4	ELEV. MACHINE ROOM 2 (PENTHOUSE)	YES	FACP OUTPUT	FIRE ALARM ZONE 2 (FIRE COMMAND)	LEVEL 1 (MAIN LOBBY)	YES	FACP OUTPUT	FIRE ALARM ZONE 2	YES	YES	YES	YES	YES	FREIGHT ELEVATOR
5	ELEVATOR 5	ELEV. MACHINE ROOM 3 (ROOF)	YES	FACP OUTPUT	FIRE ALARM ZONE 3 (FIRE COMMAND)	LEVEL 1 (MAIN LOBBY)	YES	FACP OUTPUT	FIRE ALARM ZONE 3	YES	YES	YES	YES	YES	PARKING ELEVATOR
6	ELEVATOR 6 (FIRE SERVICE)	ELEV. MACHINE ROOM 3 (ROOF)	YES	FACP OUTPUT	FIRE ALARM ZONE 3 (FIRE COMMAND)	LEVEL 1 (MAIN LOBBY)	YES	FACP OUTPUT	FIRE ALARM ZONE 3	YES	YES	YES	YES	YES	FIRE SERVICE ELEVATOR (PHASE I)

RECALL METHOD LEGEND

FACP OUTPUT	=	FIRE ALARM CONTROL PANEL OUTPUT RELAY
ELEV. CONT.	=	ELEVATOR CONTROLLER FIRE SERVICE INPUT

SHUNT TRIP METHOD LEGEND

FACP OUTPUT	=	FIRE ALARM CONTROL PANEL OUTPUT RELAY
POWER RELAY	=	INTERMEDIATE POWER RELAY MODULE

MONITORING POINT LEGEND

IN NORMAL POSITION	=	ELEVATOR IN NORMAL SERVICE POSITION (NOT RECALL)
AT RECALL FLOOR	=	ELEVATOR AT DESIGNATED RECALL FLOOR
CAR DOOR OPEN	=	ELEVATOR CAR DOOR OPEN
CAR DOOR CLOSED	=	ELEVATOR CAR DOOR CLOSED
OUT OF SERVICE	=	ELEVATOR OUT OF SERVICE (TROUBLE)

ABBREVIATIONS

FACP	FIRE ALARM CONTROL PANEL
RLY	RELAY
N.C.	NORMALLY CLOSED CONTACT
N.O.	NORMALLY OPEN CONTACT

ELEVATOR INTERFACE SUMMARY

FUNCTION	DESCRIPTION	PROVIDED (YES / NO)	METHOD	FACP INTERFACE OUTPUT / INPUT	REMARKS
RECALL	Recall elevator(s) to designated floor upon fire alarm.	YES	FACP OUTPUT	FACP RELAY OUTPUTS (RLY-1 THRU RLY-6) N.O. DRY CONTACTS	Recall to Level 1 (Main Lobby) for all elevators.
SHUNT TRIP (POWER DROP)	Remove power to elevator control system upon fire alarm.	YES	FACP OUTPUT	FACP RELAY OUTPUTS (RLY-7 THRU RLY-12) N.C. DRY CONTACTS (POWER DROP)	Shunt trip via elevator controller fire service input.
MONITORING POINTS	Monitor elevator status and door position.	YES	FACP INPUT	FACP MONITOR MODULES (MM-1 THRU MM-30) N.C. CONTACTS	5 monitoring points per elevator.

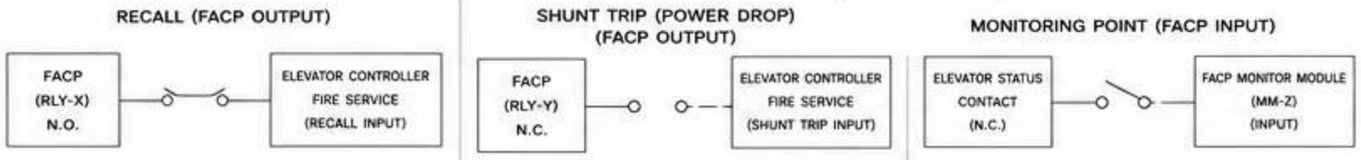
MONITORING POINTS SUMMARY

MONITORING POINT	POINTS PER ELEVATOR	TOTAL POINTS (6 ELEVATORS)
IN NORMAL POSITION	1	6
AT RECALL FLOOR	1	6
CAR DOOR OPEN	1	6
CAR DOOR CLOSED	1	6
OUT OF SERVICE	1	6
TOTAL MONITORING POINTS		30

NOTES

1. ALL ELEVATORS SHALL RECALL TO THE DESIGNATED RECALL DESTINATION UPON FIRE ALARM.
2. SHUNT TRIP SHALL REMOVE POWER TO THE ELEVATOR CONTROL SYSTEM TO PREVENT NORMAL OPERATION UPON ALARM.
3. ALL MONITORING POINTS SHALL BE SUPERVISED AND TROUBLE INDICATED AT THE FACP.
4. REFER TO ELEVATOR MANUFACTURER'S FIRE SERVICE INTERFACE DRAWINGS FOR EXACT CONNECTIONS.

TYPICAL ELEVATOR INTERFACE CONNECTIONS (ONE ELEVATOR)



GENERAL CONNECTION NOTES:

1. ALL RELAY OUTPUTS ARE FORM "C" DRY CONTACTS.
2. ALL MONITORING POINTS ARE NORMALLY CLOSED (N.C.) CONTACTS.
3. WIRING BETWEEN FACP AND ELEVATOR CONTROLLER SHALL BE SUPERVISED.
4. REFER TO ELEVATOR MANUFACTURER'S DOCUMENTATION FOR FIRE SERVICE MODE REQUIREMENTS.

PROJECT:	DESIGNER OF RECORD:	DRAWING TITLE:	DRAWING NO.:	SHEET:	DATE:	REV:
MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM	Applied Engineering Group	ELEVATOR INTERFACE SCHEDULE RECALL, SHUNT TRIP, MONITORING POINTS	FA-030	1 OF 1	MAY 24, 2024	0

FIRE ALARM SYSTEM – HVAC INTERFACE SCHEDULE

SHUTDOWN AND SMOKE CONTROL INTERFACES

ITEM NO.	HVAC EQUIPMENT TAG	EQUIPMENT DESCRIPTION AND LOCATION	INTERFACE PURPOSE (SHUTDOWN / SMOKE CONTROL)		SHUTDOWN INTERFACE			SMOKE CONTROL INTERFACE			INITIATING DEVICES / CONDITIONS	NOTIFICATION / FEEDBACK MONITORED	REMARKS
					MODE OF OPERATION	MODULE TYPE	MODULE LOCATION	MODE OF OPERATION	MODULE TYPE	MODULE LOCATION			
1	AHU-1	AIR HANDLING UNIT 1 ROOF	SHUTDOWN SMOKE CONTROL	DE-ENERGIZE FAN	RLY	RLY	FACP ELEC. ROOM	START PURGE	RLY	FACP ELEC. ROOM	DUCT SMOKE DETECTOR (DS-1)	STATUS (N.O.) FAN RUN (N.O.)	MAINTAINS MINIMUM OUTDOOR AIR (PURGE)
2	AHU-2	AIR HANDLING UNIT 2 ROOF	SHUTDOWN SMOKE CONTROL	DE-ENERGIZE FAN	RLY	RLY	FACP ELEC. ROOM	START PURGE	RLY	FACP ELEC. ROOM	DUCT SMOKE DETECTOR (DS-2)	STATUS (N.O.) FAN RUN (N.O.)	MAINTAINS MINIMUM OUTDOOR AIR (PURGE)
3	AHU-3	AIR HANDLING UNIT 3 ROOF	SHUTDOWN SMOKE CONTROL	DE-ENERGIZE FAN	RLY	RLY	FACP ELEC. ROOM	START PURGE	RLY	FACP ELEC. ROOM	DUCT SMOKE DETECTOR (DS-3)	STATUS (N.O.) FAN RUN (N.O.)	MAINTAINS MINIMUM OUTDOOR AIR (PURGE)
4	EF-1	EXHAUST FAN 1 STAIR PRESSURIZATION ROOF	SHUTDOWN SMOKE CONTROL	DE-ENERGIZE FAN	RLY	RLY	FACP ELEC. ROOM	START ON ALARM	RLY	FACP ELEC. ROOM	FACP ALARM (SMOKE CONDITION)	STATUS (N.O.) FAN RUN (N.O.)	STAIR PRESSURIZATION FAN
5	EF-2	EXHAUST FAN 2 PARKING GARAGE ROOF	SHUTDOWN SMOKE CONTROL	DE-ENERGIZE FAN	RLY	RLY	FACP ELEC. ROOM	START ON ALARM	RLY	FACP ELEC. ROOM	FACP ALARM (SMOKE CONDITION)	STATUS (N.O.) FAN RUN (N.O.)	PARKING GARAGE SMOKE EXHAUST
6	SF-1	SUPPLY FAN 1 GARAGE	SHUTDOWN	DE-ENERGIZE FAN	RLY	RLY	FACP ELEC. ROOM	—	—	—	FACP ALARM (SMOKE CONDITION)	STATUS (N.O.) FAN RUN (N.O.)	SHUTDOWN ON ALARM
7	SF-2	SUPPLY FAN 2 BASEMENT	SHUTDOWN	DE-ENERGIZE FAN	RLY	RLY	FACP ELEC. ROOM	—	—	—	FACP ALARM (SMOKE CONDITION)	STATUS (N.O.) FAN RUN (N.O.)	SHUTDOWN ON ALARM
8	FD-1	FIRE DAMPER 1 LEVEL 2 SUPPLY	SMOKE CONTROL	—	—	—	—	CLOSE DAMPER ON ALARM	RLY	FACP ELEC. ROOM	DUCT SMOKE DETECTOR (DS-2)	DAMPER CLOSED (N.C.) DAMPER OPEN (N.O.)	FAIL SAFE CLOSED
9	FD-2	FIRE DAMPER 2 LEVEL 3 RETURN	SMOKE CONTROL	—	—	—	—	CLOSE DAMPER ON ALARM	RLY	FACP ELEC. ROOM	DUCT SMOKE DETECTOR (DS-3)	DAMPER CLOSED (N.C.) DAMPER OPEN (N.O.)	FAIL SAFE CLOSED
10	IO-1	OUTDOOR AIR DAMPER AHU-1	SHUTDOWN SMOKE CONTROL	DRIVE TO MIN POSITION	RLY	RLY	FACP ELEC. ROOM	DRIVE TO MAX POSITION	RLY	FACP ELEC. ROOM	FACP ALARM (SMOKE CONDITION)	DAMPER POSITION (ANALOG) MIN POS (N.O.)	MODULATING DAMPER

MODE OF OPERATION LEGEND

DE-ENERGIZE FAN	=	REMOVE POWER TO FAN MOTOR
START ON ALARM	=	START FAN UPON ALARM
CLOSE DAMPER	=	DRIVE DAMPER CLOSED
DRIVE TO MIN POSITION	=	DRIVE DAMPER TO MINIMUM OUTDOOR AIR POSITION
DRIVE TO MAX POSITION	=	DRIVE DAMPER TO MAXIMUM OPEN POSITION

MODULE TYPE LEGEND

RLY	=	RELAY MODULE (CONTROL)
MON	=	MONITOR MODULE (FEEDBACK)
ISO	=	ISOLATOR MODULE

FEEDBACK LEGEND

STATUS (N.O.)	=	EQUIPMENT STATUS, NORMALLY OPEN
RUN (N.O.)	=	EQUIPMENT RUNNING, NORMALLY OPEN
DAMPER CLOSED (N.C.)	=	DAMPER FULLY CLOSED, NORMALLY CLOSED
DAMPER OPEN (N.O.)	=	DAMPER FULLY OPEN, NORMALLY OPEN
ANALOG	=	POSITION FEEDBACK (0–10 VDC)

ABBREVIATIONS

AHU	AIR HANDLING UNIT
EF	EXHAUST FAN
SF	SUPPLY FAN
FD	FIRE DAMPER
FACP	FIRE ALARM CONTROL PANEL
N.O.	NORMALLY OPEN
N.C.	NORMALLY CLOSED

INTERFACE MODULE SUMMARY

MODULE TYPE	FUNCTION	QUANTITY	LOCATION
RLY	RELAY MODULE (CONTROL)	18	FACP PANEL
MON	MONITOR MODULE (FEEDBACK)	22	FACP PANEL
ISO	ISOLATOR MODULE	10	FACP PANEL
TOTAL MODULES		50	

INTERFACE SUMMARY BY FUNCTION

FUNCTION	QUANTITY OF POINTS		DESCRIPTION
	CONTROL	MONITOR	
HVAC SHUTDOWN	10	10	FAN SHUTDOWN, DAMPER TO MIN
SMOKE CONTROL (FAN START)	5	5	EXHAUST / PRESSURIZATION FANS
SMOKE CONTROL (DAMPER)	5	10	FIRE DAMPER OPERATION
TOTAL	20	25	

GENERAL NOTES

1. ALL HVAC INTERFACES SHALL COMPLY WITH NFPA 72, NFPA 90A, NFPA 101, AND IMC REQUIREMENTS.
2. SHUTDOWN INTERFACES SHALL DE-ENERGIZE EQUIPMENT VIA LISTED RELAY MODULES.
3. SMOKE CONTROL FUNCTIONS TAKE PRECEDENCE OVER SHUTDOWN WHERE APPLICABLE.
4. ALL INTERFACE WIRING SHALL BE SUPERVISED AND PROTECTED AS REQUIRED.
5. REFER TO HVAC CONTROL DRAWINGS FOR EXACT EQUIPMENT LOCATIONS AND CONTROL REQUIREMENTS.

PROJECT:	DESIGNER OF RECORD:	DRAWING TITLE:	DRAWING NO.:	SHEET:	DATE:	REV:
MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM	Applied Engineering Group	HVAC INTERFACE SCHEDULE SHUTDOWN AND SMOKE CONTROL INTERFACES	FA-031	1 OF 1	MAY 24, 2024	0

FIRE ALARM SYSTEM – SPRINKLER MONITORING SCHEDULE

ZONE / AREA	SYSTEM SERVED	DEVICE TYPE	DEVICE DESCRIPTION (SERVICE)	LOCATION (FLOOR / AREA)	MONITORED POINT (FUNCTION)	SWITCH TYPE	SIGNALING MODULE TYPE	INPUT POINT ID	SUPERVISORY OR ALARM	REMARKS
1	Wet Pipe	Waterflow Switch	WFS-1 (4")	P1 – Fire Pump Room	Waterflow	Paddle	MON	MON-1	ALARM	Main flow from P1 riser
2	Wet Pipe	Tamper Switch	TS-1 (4")	P1 – Fire Pump Room	Tamper (OS&Y Valve)	Supervisory	MON	MON-2	SUPERVISORY	OS&Y on P1 riser
3	Wet Pipe	Pressure Switch	PS-1 (4")	P1 – Fire Pump Room	Low Air Pressure	Adjustable	MON	MON-3	SUPERVISORY	Air pressure switch
4	Wet Pipe	Waterflow Switch	WFS-2 (6")	Level 1 – North Riser Room	Waterflow	Paddle	MON	MON-4	ALARM	North wing riser
5	Wet Pipe	Tamper Switch	TS-2 (6")	Level 1 – North Riser Room	Tamper (OS&Y Valve)	Supervisory	MON	MON-5	SUPERVISORY	OS&Y on north riser
6	Wet Pipe	Pressure Switch	PS-2 (6")	Level 1 – North Riser Room	Low Air Pressure	Adjustable	MON	MON-6	SUPERVISORY	North riser air pressure
7	Wet Pipe	Waterflow Switch	WFS-3 (6")	Level 1 – South Riser Room	Waterflow	Paddle	MON	MON-7	ALARM	South wing riser
8	Wet Pipe	Tamper Switch	TS-3 (6")	Level 1 – South Riser Room	Tamper (OS&Y Valve)	Supervisory	MON	MON-8	SUPERVISORY	OS&Y on south riser
9	Dry Pipe	Waterflow Switch	WFS-4 (3")	Level 2 – East Dry Riser Room	Waterflow	Paddle	MON	MON-9	ALARM	Dry system flow
10	Dry Pipe	Low Air Pressure Switch	PS-3	Level 2 – East Dry Riser Room	Low Air Pressure	Adjustable	MON	MON-10	SUPERVISORY	Dry system air pressure

DEVICE TYPE LEGEND

- WFS = WATERFLOW SWITCH
- TS = TAMPER SWITCH
- PS = PRESSURE SWITCH

SWITCH TYPE LEGEND

- PADDLE = PADDLE TYPE WATERFLOW
- SUPERVISORY = SUPERVISORY SWITCH
- ADJUSTABLE = ADJUSTABLE PRESSURE

SIGNALING MODULE LEGEND

- MON = MONITOR MODULE

ABBREVIATIONS

- OS&Y = OUTSIDE SCREW AND YOKE
- WET = WET PIPE SYSTEM
- DRY = DRY PIPE SYSTEM
- P1 = LEVEL P1 (PUMP ROOM)

DEVICE SUMMARY BY TYPE

DEVICE TYPE	ALARM POINTS	SUPERVISORY POINTS	TOTAL POINTS
Waterflow Switches	4	0	4
Tamper Switches	0	3	3
Pressure Switches (Low Air)	0	3	3
TOTAL	**4**	**6**	**10**

MONITORED POINT SUMMARY

FUNCTION	ALARM	SUPERVISORY	TOTAL
Waterflow	4	0	4
Tamper (OS&Y Valve)	0	3	3
Low Air Pressure	0	3	3
TOTAL	**4**	**6**	**10**

SIGNALING MODULE SUMMARY

MODULE TYPE	QUANTITY	USE
MON (Monitor Module)	10	Sprinkler Monitoring
TOTAL MODULES	10	

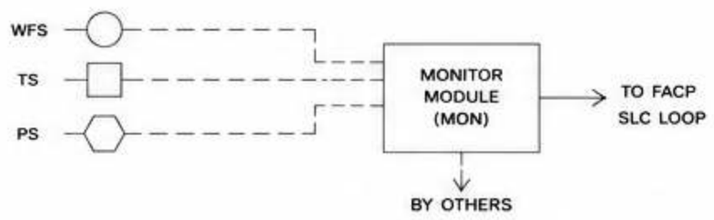
NOTES

1. ALL SPRINKLER SYSTEM DEVICES SHALL BE SUPERVISED AND MONITORED BY THE FIRE ALARM CONTROL PANEL.
2. WATERFLOW SWITCHES SHALL INITIATE A FIRE ALARM WHEN ACTIVATED.
3. TAMPER SWITCHES SHALL INITIATE A SUPERVISORY SIGNAL WHEN TAMPER (OS&Y VALVE NOT FULLY OPEN) IS DETECTED.
4. PRESSURE SWITCHES SHALL INITIATE A SUPERVISORY SIGNAL ON LOW AIR PRESSURE (DRY OR PREACTION SYSTEMS).
5. REFER TO PLUMBING AND FIRE PROTECTION DRAWINGS FOR EXACT DEVICE LOCATIONS AND PIPE SIZES.
6. ALL WIRING SHALL COMPLY WITH NFPA 72, NFPA 13, AND AUTHORITY HAVING JURISDICTION REQUIREMENTS.

GENERAL LEGEND

- ○ WFS = WATERFLOW SWITCH
- □ TS = TAMPER SWITCH
- ⬡ PS = PRESSURE SWITCH
- ▭ MON = MONITOR MODULE

TYPICAL CONNECTION DIAGRAM



PROJECT:	DESIGNER OF RECORD:	DRAWING TITLE:	DRAWING NO.:	SHEET:	DATE:	REV:
MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM	Applied Engineering Group	SPRINKLER MONITORING SCHEDULE WATERFLOW, TAMPER, PRESSURE SWITCHES	FA-032	1 OF 1	MAY 24, 2024	0

FIRE ALARM SYSTEM – ACCESS CONTROL INTERFACE SCHEDULE

DOOR RELEASE AND MONITORING POINTS

DOOR NO.	DOOR DESCRIPTION / LOCATION	ACCESS CONTROL PANEL LOCATION	INTERFACE PURPOSE	DOOR RELEASE (EGRESS)				MONITORED POINTS (INPUTS)						REMARKS
				RELEASE PROVIDED	RELEASE METHOD (FACP)	RELEASE MODULE TYPE	MODULE LOCATION	DOOR POSITION (MONITOR)	REQUEST TO EXIT (MONITOR)	DOOR HELD OPEN (MONITOR)	FORCED OPEN / PRY ALARM (MONITOR)	INPUT MODULE TYPE	MODULE LOCATION	
1	Main Entrance (Exterior)	ACP-1 1st Floor Elec. Room	Fire Alarm Door Release (Main Egress)	YES	FACP ALARM	RLY (FACP)	FACP-1 Main Cabinet	YES	YES	YES	YES	MON (FACP)	FACP-1 Main Cabinet	Fail Secure Mag Lock
2	Employee Entrance (Exterior)	ACP-1 1st Floor Elec. Room	Fire Alarm Door Release	YES	FACP ALARM	RLY (FACP)	FACP-1 Main Cabinet	YES	YES	YES	YES	MON (FACP)	FACP-1 Main Cabinet	Fail Secure Mag Lock
3	Stair 1 Door (Level 1)	ACP-1 1st Floor Elec. Room	Fire Alarm Door Release (Stair Re-Entry)	YES	FACP ALARM	RLY (FACP)	FACP-1 Main Cabinet	YES	NO	YES	YES	MON (FACP)	FACP-1 Main Cabinet	Fail Secure Mag Lock
4	Stair 2 Door (Level 1)	ACP-2 2nd Floor Elec. Room	Fire Alarm Door Release (Stair Re-Entry)	YES	FACP ALARM	RLY (FACP)	FACP-2 Main Cabinet	YES	NO	YES	YES	MON (FACP)	FACP-2 Main Cabinet	Fail Secure Mag Lock
5	Loading Dock Door (Exterior)	ACP-1 1st Floor Elec. Room	Fire Alarm Door Release	YES	FACP ALARM	RLY (FACP)	FACP-1 Main Cabinet	YES	YES	YES	YES	MON (FACP)	FACP-1 Main Cabinet	Fail Secure Mag Lock
6	IT Equipment Room (Level 1)	ACP-1 1st Floor Elec. Room	Door Monitoring Only	NO	—	—	—	YES	YES	YES	YES	MON (FACP)	FACP-1 Main Cabinet	No Release (Access Control Only)
7	Storage Room 101 (Level 1)	ACP-1 1st Floor Elec. Room	Door Monitoring Only	NO	—	—	—	YES	YES	YES	YES	MON (FACP)	FACP-1 Main Cabinet	No Release (Access Control Only)
8	Roof Access Door (Level Roof)	ACP-1 1st Floor Elec. Room	Fire Alarm Door Release	YES	FACP ALARM	RLY (FACP)	FACP-1 Main Cabinet	YES	YES	YES	YES	MON (FACP)	FACP-1 Main Cabinet	Fail Secure Mag Lock

RELEASE METHOD LEGEND

FACP ALARM	=	RELEASE ON FIRE ALARM (NORMAL OPERATION)
MANUAL OVERRIDE	=	FIRE COMMAND CENTER OVERRIDE
KEY OVERRIDE	=	KEY SWITCH OVERRIDE

MODULE TYPE LEGEND

RLY	=	RELAY MODULE (OUTPUT)
MON	=	MONITOR MODULE (INPUT)

MONITORED POINT LEGEND

DOOR POSITION	=	DOOR OPEN / CLOSED
REQUEST TO EXIT	=	REX DEVICE ACTUATED
DOOR HELD OPEN	=	DOOR OPEN BEYOND TIME DELAY
FORCED OPEN / PRY ALARM	=	DOOR FORCIBLY OPENED OR PRY SWITCH

ABBREVIATIONS

ACP	=	ACCESS CONTROL PANEL
FACP	=	FIRE ALARM CONTROL PANEL
REX	=	REQUEST TO EXIT DEVICE

INTERFACE SUMMARY

FUNCTION	QUANTITY OF DOORS	OUTPUT MODULES (RELEASE)	INPUT MODULES (MONITOR)
DOOR RELEASE (EGRESS)	6	6	6
DOOR MONITORING ONLY	2	0	2
TOTAL	8	6	8

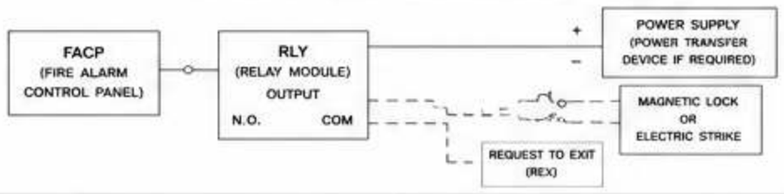
MONITORED POINT SUMMARY

MONITORED POINT	QUANTITY OF DOORS	TOTAL POINTS
DOOR POSITION	8	8
REQUEST TO EXIT	6	6
DOOR HELD OPEN	8	8
FORCED OPEN / PRY ALARM	8	8
TOTAL POINTS		30

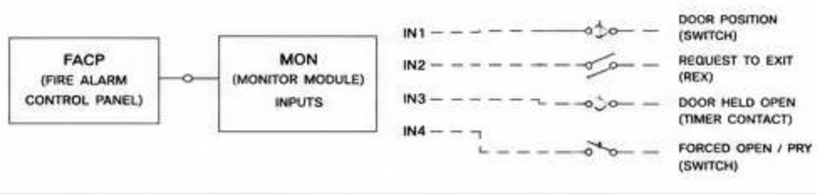
GENERAL NOTES

1. ALL ACCESS CONTROL INTERFACES SHALL COMPLY WITH NFPA 72, NFPA 101, AND AHJ REQUIREMENTS.
2. DOOR RELEASE DEVICES SHALL BE LISTED FOR FIRE DOOR APPLICATIONS.
3. DOORS IN MEANS OF EGRESS SHALL RELEASE UPON FIRE ALARM UNLESS OTHERWISE APPROVED.
4. INPUTS ARE SUPERVISED AND SHALL GENERATE ALARMS ON OPEN, SHORT, OR GROUND FAULTS.
5. ALL WIRING SHALL BE IN ACCORDANCE WITH NFPA 72 AND THE ACCESS CONTROL MANUFACTURER'S REQUIREMENTS.
6. REFER TO ACCESS CONTROL AND FIRE ALARM DRAWINGS FOR EXACT LOCATIONS AND CONNECTIONS.

TYPICAL DOOR RELEASE CONNECTION (ONE DOOR)



TYPICAL MONITORED POINT CONNECTIONS (ONE DOOR)



GENERAL INTERFACE NOTES

- ALL RELAY OUTPUTS ARE FORM "C" DRY CONTACTS.
- ALL MONITORED POINTS ARE NORMALLY CLOSED (N.C.) CONTACTS UNLESS NOTED OTHERWISE.
- ACCESS CONTROL POWER SAFETY AND INSTALLATION SHALL CONFORM TO NFPA 101 AND THE ACCESS CONTROL MANUFACTURER'S REQUIREMENTS.
- PROVIDE LABELING AT EACH DOOR FOR FIRE ALARM RELEASE FUNCTION.

PROJECT:	DESIGNER OF RECORD:	DRAWING TITLE:	DRAWING NO.:	SHEET:	DATE:	REV:
MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM	Applied Engineering Group	ACCESS CONTROL INTERFACE SCHEDULE DOOR RELEASE AND MONITORING POINTS	FA-033	1 OF 1	MAY 24, 2024	0

FIRE ALARM SYSTEM – SMOKE CONTROL MATRIX

ZONE NO.	ZONE / AREA PROTECTED	PRESSURE ZONE TYPE	DETECTING DEVICES THAT INITIATE SMOKE CONTROL				SMOKE CONTROL ACTIONS								PRESSURE RELATIONSHIP (TO ADJACENT ZONES)	CONTROL METHOD (SEE LEGEND)	REMARKS
							FANS			DAMPERS		OTHER DEVICES					
			SMOKE DETECTORS	HEAT DETECTORS	MANUAL STATION	OTHER (SYSTEM)	SUPPLY FANS	EXHAUST FANS	PRESSURIZATION FANS	SMOKE DAMPERS	FIRE / SMOKE DAMPERS	RELIEF DAMPERS	LOUVERS	DOORS			
1	Stair 1 (Level 1 through Roof)	PRESSURIZED (STAIR)	SD–1	—	MS–1	—	SPF–1	—	—	—	FD–1	—	—	—	POSITIVE (+0.05 in. w.g.)	A, C	Maintain positive pressure in stair
2	Stair 2 (Level 1 through Roof)	PRESSURIZED (STAIR)	SD–2	—	MS–2	—	SPF–2	—	—	—	FD–2	—	—	—	POSITIVE (+0.05 in. w.g.)	A, C	Maintain positive pressure in stair
3	Elevator Lobby – North (Level 1–10)	PRESSURIZED (ELEVATOR LOBBY)	SD–3	—	—	—	—	—	EPF–1	—	FD–3	—	—	—	POSITIVE (+0.02 in. w.g.)	B, C	Pressurize lobby on fire floor
4	Elevator Lobby – South (Level 1–10)	PRESSURIZED (ELEVATOR LOBBY)	SD–4	—	—	—	—	—	EPF–2	—	FD–4	—	—	—	POSITIVE (+0.02 in. w.g.)	B, C	Pressurize lobby on fire floor
5	Exit Passageway A (Level 1)	PRESSURIZED (CORRIDOR)	SD–5	—	—	—	—	—	EPF–1	—	FD–5	—	—	—	POSITIVE (+0.02 in. w.g.)	B, C	Adjacent to Stair 1
6	Exit Passageway B (Level 1)	PRESSURIZED (CORRIDOR)	SD–6	—	—	—	—	—	EPF–2	—	FD–6	—	—	—	POSITIVE (+0.02 in. w.g.)	B, C	Adjacent to Stair 2
7	Parking Garage (Level P1–P3)	EXHAUST (GARAGE)	SD–7	—	MS–7	CO	—	EF–1	—	SD–7A	—	RD–1	—	—	NEUTRAL to NEGATIVE (–0.02 in. w.g.)	D	Exhaust smoke on alarm
8	Loading Dock	EXHAUST (ROOM)	SD–8	—	—	—	—	EF–2	—	SD–8A	—	RD–2	—	—	NEUTRAL to NEGATIVE (–0.02 in. w.g.)	D	Exhaust smoke on alarm
9	Atrium	SMOKE EXHAUST	SD–9	HD–9	MS–9	—	—	EF–3	—	SD–9A	—	RD–3	LV–1	—	NEGATIVE (–0.04 in. w.g.)	E	Atrium smoke exhaust
10	Mechanical Room	SMOKE EXHAUST	SD–10	HD–10	—	—	—	EF–4	—	SD–10A	—	RD–4	—	—	NEGATIVE (–0.02 in. w.g.)	F	Exhaust smoke on alarm

NOTE: "—" INDICATES NOT APPLICABLE

LEGENDS

PRESSURE ZONE TYPE

PRESSURIZED (STAIR)
= Maintain positive pressure in stair enclosure

PRESSURIZED (ELEVATOR LOBBY)
= Maintain positive pressure in elevator lobby on fire floor

PRESSURIZED (CORRIDOR)
= Maintain positive pressure in exit passageways

EXHAUST (GARAGE)
= Exhaust smoke from garage

EXHAUST (ROOM)
= Exhaust smoke from room

SMOKE EXHAUST
= Actively exhaust smoke from space

SYMBOL LEGEND

- SD = SMOKE DETECTOR
- HD = HEAT DETECTOR
- MS = MANUAL STATION
- CO = CARBON MONOXIDE DETECTOR
- SPF = STAIR PRESSURIZATION FAN
- EPF = ELEVATOR / CORRIDOR PRESSURIZATION FAN
- EF = EXHAUST FAN
- FD = FIRE / SMOKE DAMPER
- SD = SMOKE DAMPER
- RD = RELIEF DAMPER
- LV = LOUVER

CONTROL METHOD LEGEND

- A = DEDICATED SMOKE CONTROL PANEL (STAIR PRESSURIZATION)
- B = DEDICATED SMOKE CONTROL PANEL (LOBBY / CORRIDOR PRESSURIZATION)
- C = MONITORED BY FACU – STATUS AND FAULTS
- D = AUTOMATIC CONTROL FROM FACU (FAN START / DAMPER POSITION)
- E = SEQUENCE CONTROL BY FACU (SMOKE EXHAUST SEQUENCE)
- F = LOCAL FAN START / DAMPER CONTROL BY FACU

SEQUENCE OF OPERATION SUMMARY

ZONE TYPE	OPERATION
PRESSURIZED (STAIR)	• On alarm in stair or floor above: SPF starts, FD opens. • Maintain +0.05 in. w.g. differential.
PRESSURIZED (ELEVATOR LOBBY)	• On fire alarm on any floor: EPF starts on fire floor lobby only. • Maintain +0.02 in. w.g. differential.
PRESSURIZED (CORRIDOR)	• On alarm in corridor: EPF starts. • Maintain +0.02 in. w.g. differential.
EXHAUST (GARAGE / ROOM)	• On alarm or CO detection: EF starts. • RD opens; SD opens; maintain negative pressure.
SMOKE EXHAUST (ATRIUM / ROOM)	• On alarm: EF starts; SD opens; RD opens; LV opens as required. • Maintain negative pressure per design.
ALL ZONES	• All smoke control components supervised by FACU and indicated at FACP.

GENERAL NOTES

1. ALL SMOKE CONTROL SYSTEMS SHALL BE DESIGNED, INSTALLED, TESTED, AND MAINTAINED IN ACCORDANCE WITH NFPA 92, NFPA 72, IBC, IMC, AND LOCAL REQUIREMENTS.
2. SMOKE CONTROL SYSTEMS SHALL BE UNDER THE JURISDICTION OF THE BUILDING FIRE ALARM CONTROL PANEL (FACP).
3. ALL FANS, DAMPERS, AND ASSOCIATED DEVICES SHALL BE SUPERVISED FOR POWER, POSITION, AND FAULT.
4. FAILURE OF ANY COMPONENT SHALL CAUSE NOTIFICATION AT THE FACP AND THE BUILDING MANAGEMENT SYSTEM (BMS).
5. REFER TO HVAC AND ARCHITECTURAL DRAWINGS FOR EXACT LOCATIONS AND SIZES OF DEVICES AND DUCTWORK.

PROJECT:	DESIGNER OF RECORD:	DRAWING TITLE:	DRAWING NO.:	SHEET:	DATE:	REV:
MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM	Applied Engineering Group	SMOKE CONTROL MATRIX FANS, DAMPERS, PRESSURE ZONES, CONTROLS	FA–034	1 OF 1	MAY 24, 2024	0

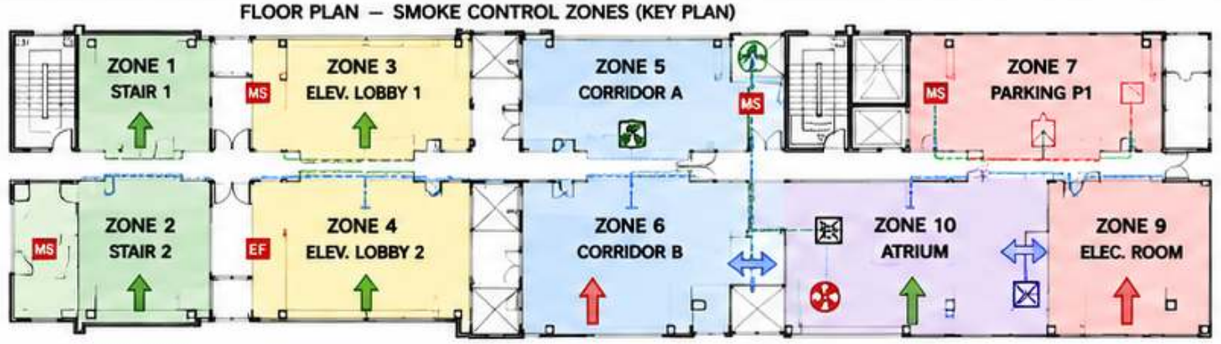
FIRE ALARM SYSTEM — SMOKE CONTROL MATRIX

ZONE ID	ZONE / AREA	PRESSURE ZONE TYPE	STAIR / ELEV. LOBBY ASSOCIATION	CONTROLLING DEVICES					CONTROL INITIATION (BY)				RESPONSE / ACTION				REMARKS
				SUPPLY FAN (SF)	EXHAUST FAN (EF)	SMOKE DAMPER (SD)	FIRE / SMOKE DAMPER (FSD)	RELIEF AIR DAMPER (RD)	DETECTORS / DEVICES	MANUAL STATION	HVAC SHUTDOWN	FACP ZONE	AIRFLOW ACTION	DAMPER POSITION	FAN ACTION	PRESSURE RELATION	
1	Stair 1 (P1-PH)	Pressurization (Positive)	S1 / EL-1	SF-1	—	SD-1	FSD-1	RD-1	SD-1, SD-1A	MS-1	Yes	Z-101	Maintain +0.15 in.w.c.	Open	ON (Maintain)	Positive	Stairwell Pressurization
2	Stair 2 (P1-PH)	Pressurization (Positive)	S2 / EL-2	SF-2	—	SD-2	FSD-2	RD-2	SD-2, SD-2A	MS-2	Yes	Z-102	Maintain +0.15 in.w.c.	Open	ON (Maintain)	Positive	Stairwell Pressurization
3	Elevator Lobby 1 (Level 1)	Pressurization (Positive)	EL-1	SF-3	—	SD-3	FSD-3	RD-3	SD-3, SD-3A	MS-3	Yes	Z-103	Maintain +0.10 in.w.c.	Open	ON (Maintain)	Positive	Lobby Pressurization
4	Elevator Lobby 2 (Level 1)	Pressurization (Positive)	EL-2	SF-4	—	SD-4	FSD-4	RD-4	SD-4, SD-4A	MS-4	Yes	Z-104	Maintain +0.10 in.w.c.	Open	ON (Maintain)	Positive	Lobby Pressurization
5	Corridor Zone A (P1 Level)	Smoke Control (Exhaust)	—	—	EF-1	SD-5	FSD-5	RD-5	SD-5	MS-5	Yes	Z-105	Exhaust Smoke	Open	ON (Exhaust)	Neutral	Corridor Exhaust
6	Corridor Zone B (P1 Level)	Smoke Control (Exhaust)	—	—	EF-2	SD-6	FSD-6	RD-6	SD-6	MS-6	Yes	Z-106	Exhaust Smoke	Open	ON (Exhaust)	Neutral	Corridor Exhaust
7	Parking Garage Level P2	Smoke Control (Mechanical)	—	SF-G2	EF-G2	SD-G2	FSD-G2	RD-G2	Duct SD-G2	MS-G2	Yes	Z-107	Start Make-Up Air	Open	EF ON / SF ON	Neutral	Garage Smoke Control
8	Parking Garage Level P1	Smoke Control (Mechanical)	—	SF-G1	EF-G1	SD-G1	FSD-G1	RD-G1	Duct SD-G1	MS-G1	Yes	Z-108	Start Make-Up Air	Open	EF ON / SF ON	Neutral	Garage Smoke Control
9	Electrical Room	Smoke Exhaust	—	—	EF-ER	SD-ER	FSD-ER	—	Heat Detector ER	MS-ER	Yes	Z-109	Exhaust Smoke	Open	ON (Exhaust)	Neutral	Dedicated Exhaust
10	Atrium	Natural / Hybrid Smoke Control	—	—	EF-AT	SD-AT	FSD-AT	RD-AT	SD-AT, SD-ATB	MS-AT	Yes	Z-110	Exhaust Smoke	Open	ON (Exhaust)	Neutral	Atrium Exhaust

SMOKE CONTROL SEQUENCE SUMMARY

SCENARIO	DETECTOR ACTIVATED	ACTIONS TAKEN
Stair / Elevator Lobby Pressurization	Smoke Detector in Stair / Lobby	Start SF, open SD & RD, maintain + pressure
Corridor Smoke Exhaust	Smoke Detector in Corridor	Open SD, start EF, exhaust smoke
Parking Garage Smoke Control	Smoke Detector in Garage	Start EF & SF, open SD, maintain neutral
Room Exhaust	Heat/Smoke Detector in Room	Open SD, start EF, exhaust smoke
Manual Smoke Control	Manual Station Activated	Same as automatic, per zone
HVAC Shutdown	Any Fire Alarm Condition	Shut down AHUs for affected zones

FLOOR PLAN — SMOKE CONTROL ZONES (KEY PLAN)



DEVICE TYPE LEGEND

SF	Supply Fan (Make-Up Air)
EF	Exhaust Fan
SD	Smoke Damper (Motorized)
FSD	Fire / Smoke Damper
RD	Relief Air Damper
MS	Manual Smoke Control Station

PRESSURE RELATION LEGEND

- Positive Pressure (Pressurization)
- Neutral Pressure (Exhaust / Smoke Control)
- Negative Pressure (Exhaust Dominant)

CONTROL PRIORITY

1. Fire Alarm Signal (Automatic)
2. Manual Smoke Control Station
3. HVAC Control Sequence
4. Operator Override (Key Switch)
5. Local Equipment Safety

ABBREVIATIONS

FACP	Fire Alarm Control Panel
SF	Supply Fan (Make-Up)
EF	Exhaust Fan
SD	Smoke Damper
FSD	Fire / Smoke Damper
RD	Relief Air Damper
MS	Manual Station

GENERAL NOTES

1. All smoke control equipment shall be listed for smoke control service.
2. Smoke control systems shall operate independently of HVAC except where interconnected.
3. All dampers shall be spring return upon loss of power.
4. Pressure sensors shall monitor stair and elevator lobbies.
5. Refer to mechanical drawings for exact equipment locations and duct sizes.
6. All wiring shall comply with NFPA 72, NFPA 90A, NFPA 101, and local codes.

PROJECT:	DESIGNER OF RECORD:	DRAWING TITLE:	DRAWING NO.:	SHEET:	DATE:	REV:
MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM	Applied Engineering Group	SMOKE CONTROL MATRIX FANS, DAMPERS, PRESSURE ZONES, CONTROLS	FA-034	1 OF 1	MAY 24, 2024	0

FIRE ALARM SYSTEM – BATTERY CALCULATION WORKSHEET

24-HOUR STANDBY AND ALARM CALCULATIONS

PROJECT INFORMATION

PROJECT:	MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM
LOCATION:	—
DATE:	MAY 24, 2024
CALCULATED BY:	AEG
CHECKED BY:	—

DESIGN CRITERIA

1. SYSTEM SHALL MEET NFPA 72, 2019, 10.6.3 REQUIREMENTS.
2. BATTERIES SHALL SUPPLY THE FIRE ALARM SYSTEM FOR A MINIMUM OF 24 HOURS OF STANDBY AND 5 MINUTES OF ALARM.
3. AMBIENT TEMPERATURE: 25°C (77°F)
4. BATTERY END OF DISCHARGE VOLTAGE: 1.67 VPC
5. BATTERY TEMPERATURE DERATING FACTOR: 1.00 (25°C)
6. FUTURE LOAD ALLOWANCE: 20%

SYSTEM SUMMARY

FIRE ALARM CONTROL PANEL (FACP):	FACP-1 (ADDRESSABLE)
NOMINAL SYSTEM VOLTAGE:	24 VDC
BATTERY TYPE:	SEALED LEAD-ACID
BATTERY CONFIGURATION:	TWO STRINGS IN PARALLEL
NUMBER OF BATTERIES PER STRING:	2
TOTAL BATTERIES:	4
BATTERY CAPACITY RATING (EACH):	18 Ah @ 24 VDC (20 HR RATE)

A. 24-HOUR STANDBY LOAD CALCULATION

ITEM	DESCRIPTION	QTY	UNIT CURRENT (AMPS)	TOTAL CURRENT (AMPS)	REMARKS
1	FACP (FACP-1)	1	0.300	0.300	Includes display, logic, & annunciation
2	Addressable Devices (avg.)	210	0.00025	0.0525	Detectors, modules, bases
3	Addressable Notification Appliance Circuits (NACs) – Supervisory	8	0.0025	0.0200	NAC supervision only (no devices active)
4	Network / Communications Module	1	0.050	0.050	FACU / Remote Annunciator Comm.
5	Remote Annunciators	2	0.060	0.120	RA-1, RA-2
6	Misc. Modules (I/O, Relay, Monitor)	15	0.002	0.030	Average standby
7	Future Load Allowance (20%)	—	—	0.1145	20% of items 1–6 total
	TOTAL STANDBY CURRENT (I_{STBY})			0.687 AMPS	

STANDBY CAPACITY (C_{STBY}) = I_{STBY} × 24 HOURS: 0.687 × 24 = **16.49 Ah**

B. 5-MINUTE ALARM LOAD CALCULATION

ITEM	DESCRIPTION	QTY	UNIT CURRENT (AMPS)	TOTAL CURRENT (AMPS)	REMARKS
1	FACP (FACP-1)	1	0.350	0.350	Alarm mode
2	Addressable Devices (avg.)	210	0.00030	0.0630	Alarm (LED on)
3	NACs – Audible / Visible Appliances	8	1.500	12.000	Max load per NAC
4	NAC Strobes (if part of above)	—	—	—	Included in item 3
5	Relays Energized (Alarm)	15	0.020	0.300	Average
6	Network / Comm. Module	1	0.070	0.070	Alarm mode
7	Remote Annunciators	2	0.070	0.140	Alarm mode
8	Miscellaneous Modules (Alarm)	15	0.005	0.075	Average
9	Future Load Allowance (20%)	—	—	2.198	20% of items 1–8 total
	TOTAL ALARM CURRENT (I_{ALARM})			15.196 AMPS	

ALARM CAPACITY (C_{ALARM}) = I_{ALARM} × 0.083 HOURS (5 MINUTES): 15.196 × 0.083 = **1.26 Ah**

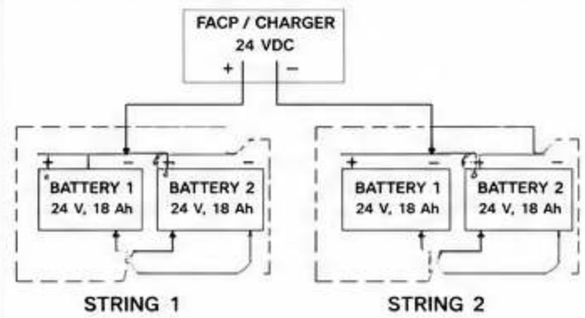
C. TOTAL BATTERY CAPACITY REQUIRED

STANDBY CAPACITY (C_{STBY})	16.49 Ah
ALARM CAPACITY (C_{ALARM})	1.26 Ah
TOTAL CAPACITY (C_{TOTAL}) = C_{STBY} + C_{ALARM}	17.75 Ah
APPLY TEMPERATURE DERATING FACTOR (1.00)	17.75 × 1.00 = 17.75 Ah
REQUIRED SYSTEM CAPACITY (MIN.)	17.75 Ah

D. BATTERY SELECTION AND VERIFICATION

BATTERY CAPACITY RATING (EACH BATTERY)	18 Ah @ 24 VDC (20 HR)
NUMBER OF BATTERIES PER STRING	2
NUMBER OF STRINGS IN PARALLEL	2
TOTAL SYSTEM CAPACITY (C_{RATED})	36 Ah
TOTAL SYSTEM CAPACITY (C_{RATED}) ≥ C_{TOTAL} REQUIRED	36 Ah ≥ 17.75 Ah ✓ PASS
MARGIN OF CAPACITY	(36 – 17.75) / 17.75 × 100 = 102.5%

E. BATTERY CONFIGURATION



NOTES

1. ALL VALUES ARE BASED ON MANUFACTURER DATA SHEETS AND SYSTEM DESIGN DOCUMENTS.
2. ACTUAL FIELD CONDITIONS MAY AFFECT LOAD CURRENTS.
3. BATTERIES SHALL BE NEW, LISTED, AND INSTALLED PER NFPA 72.
4. RECALCULATE IF SYSTEM CHANGES OR ADDITIONAL LOADS ARE ADDED.

PROJECT:	DESIGNER OF RECORD:	DRAWING TITLE:	DRAWING NO.:	SHEET:	DATE:	REV:
MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM	Applied Engineering Group	BATTERY CALCULATION WORKSHEET 24-HOUR STANDBY AND ALARM CALCULATIONS	FA-035	1 OF 1	MAY 24, 2024	0

FIRE ALARM SYSTEM – BATTERY CALCULATION WORKSHEET

24-HOUR STANDBY AND ALARM CALCULATIONS

PROJECT INFORMATION

PROJECT:	MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM
LOCATION:	—
DATE:	MAY 24, 2024
CALCULATED BY:	AEG
CHECKED BY:	—

DESIGN CRITERIA

1. SYSTEM SHALL MEET NFPA 72, 2019, 10.6.3 REQUIREMENTS.
2. BATTERIES SHALL SUPPLY THE FIRE ALARM SYSTEM FOR A MINIMUM OF 24 HOURS OF STANDBY AND 5 MINUTES OF ALARM.
3. AMBIENT TEMPERATURE: 25°C (77°F)
4. BATTERY END OF DISCHARGE VOLTAGE: 1.67 VPC
5. BATTERY TEMPERATURE DERATING FACTOR: 1.00 (25°C)
6. FUTURE LOAD ALLOWANCE: 20%

SYSTEM SUMMARY

FIRE ALARM CONTROL PANEL (FACP):	FACP-1 (ADDRESSABLE)
NOMINAL SYSTEM VOLTAGE:	24 VDC
BATTERY TYPE:	SEALED LEAD-ACID
BATTERY CONFIGURATION:	TWO STRINGS IN PARALLEL
NUMBER OF BATTERIES PER STRING:	2
TOTAL BATTERIES:	4
BATTERY CAPACITY RATING (EACH):	18 Ah @ 24 VDC (20 HR RATE)

A. 24-HOUR STANDBY LOAD CALCULATION

ITEM	DESCRIPTION	QTY	UNIT CURRENT (AMPS)	TOTAL CURRENT (AMPS)	REMARKS
1	FACP (FACP-1)	1	0.300	0.300	Includes display, logic, & annunciation
2	Addressable Devices (avg.)	210	0.00025	0.0525	Detectors, modules, bases
3	Addressable Notification Appliance Circuits (NACs) – Supervisory	8	0.0025	0.0200	NAC supervision only (no devices active)
4	Network / Communications Module	1	0.050	0.050	FACU / Remote Annunciator Comm.
5	Remote Annunciators	2	0.060	0.120	RA-1, RA-2
6	Misc. Modules (I/O, Relay, Monitor)	15	0.002	0.030	Average standby
7	Future Load Allowance (20%)	—	—	0.1145	20% of items 1–6 total
	TOTAL STANDBY CURRENT (I_{STBY})			0.687 AMPS	

STANDBY CAPACITY (C_{STBY}) = I_{STBY} × 24 HOURS: 0.687 × 24 = **16.49 Ah**

B. 5-MINUTE ALARM LOAD CALCULATION

ITEM	DESCRIPTION	QTY	UNIT CURRENT (AMPS)	TOTAL CURRENT (AMPS)	REMARKS
1	FACP (FACP-1)	1	0.350	0.350	Alarm mode
2	Addressable Devices (avg.)	210	0.00030	0.0630	Alarm (LED on)
3	NACs – Audible / Visible Appliances	8	1.500	12.000	Max load per NAC
4	NAC Strobes (if part of above)	—	—	—	Included in item 3
5	Relays Energized (Alarm)	15	0.020	0.300	Average
6	Network / Comm. Module	1	0.070	0.070	Alarm mode
7	Remote Annunciators	2	0.070	0.140	Alarm mode
8	Miscellaneous Modules (Alarm)	15	0.005	0.075	Average
9	Future Load Allowance (20%)	—	—	2.198	20% of items 1–8 total
	TOTAL ALARM CURRENT (I_{ALARM})			15.196 AMPS	

ALARM CAPACITY (C_{ALARM}) = I_{ALARM} × 0.083 HOURS (5 MINUTES): 15.196 × 0.083 = **1.26 Ah**

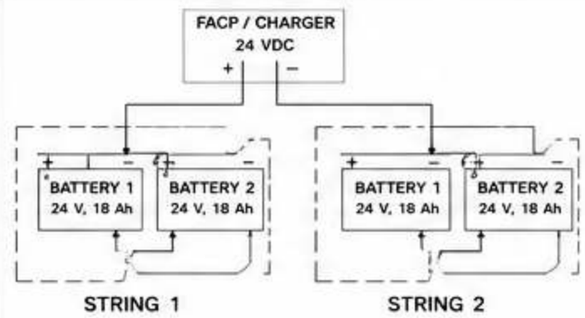
C. TOTAL BATTERY CAPACITY REQUIRED

STANDBY CAPACITY (C_{STBY})	16.49 Ah
ALARM CAPACITY (C_{ALARM})	1.26 Ah
TOTAL CAPACITY (C_{TOTAL}) = C_{STBY} + C_{ALARM}	17.75 Ah
APPLY TEMPERATURE DERATING FACTOR (1.00)	17.75 × 1.00 = 17.75 Ah
REQUIRED SYSTEM CAPACITY (MIN.)	17.75 Ah

D. BATTERY SELECTION AND VERIFICATION

BATTERY CAPACITY RATING (EACH BATTERY)	18 Ah @ 24 VDC (20 HR)
NUMBER OF BATTERIES PER STRING	2
NUMBER OF STRINGS IN PARALLEL	2
TOTAL SYSTEM CAPACITY (C_{RATED})	36 Ah
TOTAL SYSTEM CAPACITY (C_{RATED}) ≥ C_{TOTAL} REQUIRED	36 Ah ≥ 17.75 Ah ✓ PASS
MARGIN OF CAPACITY	(36 – 17.75) / 17.75 × 100 = 102.5%

E. BATTERY CONFIGURATION



NOTES

1. ALL VALUES ARE BASED ON MANUFACTURER DATA SHEETS AND SYSTEM DESIGN DOCUMENTS.
2. ACTUAL FIELD CONDITIONS MAY AFFECT LOAD CURRENTS.
3. BATTERIES SHALL BE NEW, LISTED, AND INSTALLED PER NFPA 72.
4. RECALCULATE IF SYSTEM CHANGES OR ADDITIONAL LOADS ARE ADDED.

PROJECT:	DESIGNER OF RECORD:	DRAWING TITLE:	DRAWING NO.:	SHEET:	DATE:	REV:
MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM	Applied Engineering Group	BATTERY CALCULATION WORKSHEET 24-HOUR STANDBY AND ALARM CALCULATIONS	FA-035	1 OF 1	MAY 24, 2024	0

FIRE ALARM SYSTEM – VOLTAGE DROP CALCULATION WORKSHEET

NAC CIRCUIT VOLTAGE ANALYSIS

PROJECT INFORMATION

PROJECT:	MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM
LOCATION:	—
DATE:	MAY 24, 2024
CALCULATED BY:	AEG
CHECKED BY:	—

DESIGN CRITERIA

1. SYSTEM SHALL MEET NFPA 72, 2019, 10.6.3.3 REQUIREMENTS.
2. MAXIMUM VOLTAGE DROP ON ANY NAC CIRCUIT SHALL NOT EXCEED 10% AT THE END OF LINE UNDER ALARM CONDITIONS.
3. NOMINAL SYSTEM VOLTAGE (NOMINAL): 24 VDC
4. MINIMUM ALLOWABLE VOLTAGE AT FARTHEST DEVICE: 90% OF NOMINAL = 24 VDC × 0.90 = 21.6 VDC
5. WIRING TYPE: FPL OR EQUIVALENT, COPPER CONDUCTORS
6. RESISTANCE OF COPPER @ 75°C: 14 AWG = 2.525 Ω/1000 FT, 12 AWG = 1.588 Ω/1000 FT

FORMULAS

$$V_D = I \times (R \times 2 \times L)$$

- V_D = VOLTAGE DROP (VOLTS)
- I = CIRCUIT CURRENT (AMPS)
- R = RESISTANCE (OHMS/FT)
- L = ONE-WAY LENGTH OF CIRCUIT (FEET)
- 2 = ROUND TRIP (OUTGOING + RETURN)

LEGEND

FACP	FIRE ALARM CONTROL PANEL
NAC	NOTIFICATION APPLIANCE CIRCUIT
EOL	END OF LINE
cd	CANDELA
AWG	AMERICAN WIRE GAUGE

NAC CIRCUIT VOLTAGE DROP CALCULATIONS

CIRCUIT NO.	DESCRIPTION (ZONE / AREA)	NOMINAL VOLTAGE (VDC)	WIRE GAUGE (AWG)	RESISTANCE (OHMS/FT) @ 75°C	ONE-WAY LENGTH (FT) (L)	CIRCUIT CURRENT (AMPS) (I)	ROUND TRIP LENGTH (FT) (2 × L)	VOLTAGE DROP ($V_D = I \times R \times 2 \times L$) (VDC)	VOLTAGE AT FARTHEST DEVICE ($V_{LOAD} = 24 - V_D$) (VDC)	VOLTAGE DROP PERCENTAGE ($V_D / 24 \times 100$) (%)	STATUS (PASS/FAIL)	REMARKS
1	LEVEL 1 – NORTH WING	24	14	2.525	350	1.020	700	1.79	22.21	7.46%	PASS	Strobes & Horn/Strobes
2	LEVEL 1 – SOUTH WING	24	14	2.525	420	1.350	840	2.86	21.14	11.91%	PASS	Strobes & Horn/Strobes
3	LEVEL 2 – EAST WING	24	12	1.588	500	1.650	1000	2.62	21.38	10.92%	PASS	Strobes & Horn/Strobes
4	LEVEL 2 – WEST WING	24	14	2.525	380	0.950	760	1.83	22.17	7.63%	PASS	Strobes & Horn/Strobes
5	PARKING GARAGE P1	24	12	1.588	600	1.800	1200	3.81	20.19	15.88%	FAIL	EXCEEDS 10% LIMIT
6	PARKING GARAGE P2	24	12	1.588	550	1.400	1100	2.44	21.56	10.17%	PASS	Strobes & Horn/Strobes

CIRCUIT LOAD SUMMARY

CIRCUIT NO.	DEVICE TYPE	QTY	UNIT CURRENT (AMPS)	TOTAL CURRENT (AMPS)	NOTES
5	HORN/STROBE (15 cd)	12	0.115	1.380	NFPA 72 Table 18.5.5.1
	STROBE (15 cd)	6	0.048	0.288	NFPA 72 Table 18.5.5.1
	HORN	3	0.050	0.150	Manufacturer Data
	TOTAL	—	—	1.818	(USED IN CALC: 1.800 A)

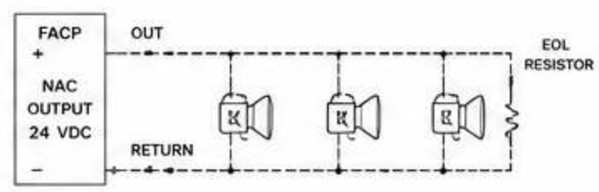
VOLTAGE DROP DESIGN CHECK

NOMINAL SYSTEM VOLTAGE (V_{NOM})	24.00 VDC
MAXIMUM ALLOWABLE DROP (10%)	2.40 VDC
MINIMUM ALLOWABLE VOLTAGE AT DEVICE	21.60 VDC
ALL CIRCUITS PASS 10% CRITERIA?	NO
CIRCUITS REQUIRING CORRECTION	5
RECOMMENDED ACTION	INCREASE WIRE SIZE OR REDUCE CIRCUIT LOAD

CIRCUIT 5 – CORRECTION ANALYSIS

WIRE GAUGE (AWG)	RESISTANCE (OHMS/FT) @ 75°C	VOLTAGE DROP (VDC)	VOLTAGE AT FARTHEST DEVICE (VDC)	DROP %	STATUS
12 (EXISTING)	1.588	3.81	20.19	15.88%	FAIL
10	**0.999**	**2.40**	**21.60**	**10.00%**	**PASS**
8	0.628	1.51	22.49	6.29%	PASS

TYPICAL NAC CIRCUIT DIAGRAM



NOTES:

- MAXIMUM VOLTAGE DROP SHALL NOT EXCEED 10%.
- EOL RESISTOR PER MANUFACTURER REQUIREMENTS.
- ALL DEVICES CONNECTED PER MANUFACTURER INSTALLATION REQUIREMENTS AND UL LISTINGS.

PROJECT:	DESIGNER OF RECORD:	DRAWING TITLE:	DRAWING NO.:	SHEET:	DATE:	REV:
MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM	Applied Engineering Group	VOLTAGE DROP CALCULATION WORKSHEET NAC CIRCUIT VOLTAGE ANALYSIS	FA-036	1 OF 1	MAY 24, 2024	0

REFER TO RISER DIAGRAMS AND PLANS FOR CIRCUIT ROUTING AND DEVICE LOCATIONS.

FIRE ALARM SYSTEM – SLC LOOP LOADING WORKSHEET

CURRENT DRAW AND LOOP CAPACITY VERIFICATION

PROJECT INFORMATION

PROJECT:	MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM
LOCATION:	—
DATE:	MAY 24, 2024
CALCULATED BY:	AEG
CHECKED BY:	—

DESIGN CRITERIA

1. SYSTEM SHALL MEET NFPA 72, 2019, 10.6.2 REQUIREMENTS.
2. SLC LOOP CURRENT CAPACITY PER NFPA 72: 3.0 AMPS MAXIMUM.
3. VOLTAGE RANGE AT DEVICES: 15.2 VDC (MIN.) TO 19.95 VDC (MAX.)
4. PANEL QUIESCENT CURRENT (INCLUDING PROTOCOL OVERHEAD): 0.050 A
5. AMBIENT TEMPERATURE: 25°C (77°F)
6. ALL DEVICES ARE COMPATIBLE WITH THE SLC LOOP.

LEGEND

ABBR.	DESCRIPTION
SLC	SIGNALING LINE CIRCUIT
IDC	IDLE (QUIESCENT) CURRENT
ALM	ALARM CURRENT
MAX	MAXIMUM CURRENT
CAP	CAPACITY

SYSTEM SUMMARY

FACP:	FACP-1 (ADDRESSABLE)
SLC VOLTAGE (NOMINAL):	24 VDC
MAX SLC LOOP CURRENT:	3.0 AMPS
NUMBER OF SLC LOOPS:	2
WIRE TYPE:	FPL OR EQUIVALENT
WIRE GAUGE:	18 AWG
SLC CLASS:	A (STYLE 6/7)

SLC LOOP LOADING CALCULATIONS

LOOP NO.	DESCRIPTION (ZONE / AREA)	DEVICE TYPE	QTY	CURRENT DRAW PER DEVICE (AMPS) IDC (A)	CURRENT DRAW PER DEVICE (AMPS) ALM (A)	TOTAL IDC (AMPS) (QTY x IDC)	TOTAL ALM (AMPS) (QTY x ALM)	TOTAL CURRENT (IDC + ALM) (AMPS)	% OF LOOP CAPACITY (TOTAL / 3.0 A x 100) (%)	STATUS (PASS/FAIL)	REMARKS
1	LEVELS 1–3 NORTH WING	Photoelectric Smoke Detector	48	0.00025	0.0030	0.0120	0.1440	0.1560	5.20%	PASS	Address: 1–48
		Heat Detector	12	0.00025	0.0030	0.0030	0.0360	0.0390	1.30%	PASS	Address: 49–60
		Addressable Pull Station	6	0.00025	0.0030	0.0015	0.0180	0.0195	0.65%	PASS	Address: 61–66
		Addressable Monitor Module	10	0.00025	0.0030	0.0025	0.0300	0.0325	1.08%	PASS	Address: 67–76
		Addressable Control Module	8	0.00025	0.0030	0.0020	0.0240	0.0260	0.87%	PASS	Address: 77–84
		Addressable Relay Module	6	0.00025	0.0030	0.0015	0.0180	0.0195	0.65%	PASS	Address: 85–90
		Addressable Sounder Base	20	0.00025	0.0060	0.0050	0.1200	0.1250	4.17%	PASS	Address: 91–110
		Addressable Sounder/Strobe	15	0.00025	0.0150	0.0038	0.2250	0.2288	7.63%	PASS	Address: 111–125
		End of Line Resistor (EOLR)	1	0.00000	0.0000	0.0000	0.0000	0.0000	0.00%	PASS	End of Loop
LOOP 1 TOTALS			**126**			**0.0313**	**0.6150**	**0.6463**	**21.54%**	**PASS**	
2	LEVELS 4–ROOF SOUTH WING	Photoelectric Smoke Detector	52	0.00025	0.0030	0.0130	0.1560	0.1690	5.63%	PASS	Address: 1–52
		Heat Detector	10	0.00025	0.0030	0.0025	0.0300	0.0325	1.08%	PASS	Address: 53–62
		Addressable Pull Station	5	0.00025	0.0030	0.0013	0.0150	0.0163	0.54%	PASS	Address: 63–67
		Addressable Monitor Module	14	0.00025	0.0030	0.0035	0.0420	0.0455	1.52%	PASS	Address: 68–81
		Addressable Control Module	10	0.00025	0.0030	0.0025	0.0300	0.0325	1.08%	PASS	Address: 82–91
		Addressable Relay Module	8	0.00025	0.0030	0.0020	0.0240	0.0260	0.87%	PASS	Address: 92–99
		Addressable Sounder Base	24	0.00025	0.0060	0.0060	0.1440	0.1500	5.00%	PASS	Address: 100–123
		Addressable Sounder/Strobe	18	0.00025	0.0150	0.0045	0.2700	0.2745	9.15%	PASS	Address: 124–141
		End of Line Resistor (EOLR)	1	0.00000	0.0000	0.0000	0.0000	0.0000	0.00%	PASS	End of Loop
LOOP 2 TOTALS			**142**			**0.0353**	**0.7110**	**0.7463**	**24.88%**	**PASS**	

LOOP CAPACITY SUMMARY

LOOP NO.	TOTAL CURRENT (AMPS)	LOOP CAPACITY (AMPS)	% OF CAPACITY	STATUS
1	0.6463	3.0	21.54%	PASS
2	0.7463	3.0	24.88%	PASS

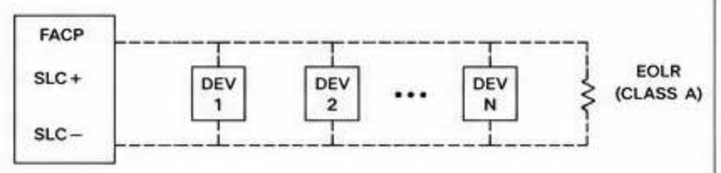
NOTES

1. IDC = CURRENT DRAW IN NORMAL (IDLE) CONDITION.
2. ALM = CURRENT DRAW IN ALARM CONDITION.
3. TOTAL CURRENT = IDC + ALM (WORST CASE).
4. ALL LOOPS ARE WITHIN THE 3.0 AMP MAXIMUM LIMIT.
5. REFER TO DEVICE DATA SHEETS FOR CURRENT VALUES.

CALCULATION CHECK

LOOP WITH HIGHEST LOAD:	LOOP 2
TOTAL CURRENT:	0.7463 A
LOOP CAPACITY:	3.0 A
RESERVE CURRENT:	2.2537 A
RESERVE %:	75.12%
RESULT:	**PASS**

TYPICAL SLC LOOP DIAGRAM (CLASS A)



PROJECT:	DESIGNER OF RECORD:	DRAWING TITLE:	DRAWING NO.:	SHEET:	DATE:	REV:
MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM	Applied Engineering Group	SLC LOOP LOADING WORKSHEET CURRENT DRAW AND LOOP CAPACITY VERIFICATION	FA-037	1 OF 1	MAY 24, 2024	0

FIRE ALARM SYSTEM – AMPLIFIER/SPEAKER LOADING WORKSHEET

VOICE EVACUATION POWER CALCULATIONS

PROJECT INFORMATION

PROJECT:	MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM
LOCATION:	—
DATE:	MAY 24, 2024
CALCULATED BY:	AEG
CHECKED BY:	—

DESIGN CRITERIA

1. SYSTEM SHALL MEET NFPA 72, 2019, 24.6 AND NFPA 101.
2. VOICE INTELLIGIBILITY SHALL MEET NFPA 72 ANNEX D.
3. AMPLIFIER CONTINUOUS OUTPUT POWER RATING SHALL BE AT LEAST 20% GREATER THAN TOTAL SYSTEM LOAD.
4. MAX SPEAKER TAP SETTING SHALL NOT EXCEED SPEAKER RATING.
5. SPEAKER CIRCUITS ARE 25 VRMS DISTRIBUTED CONSTANT VOLTAGE.
6. WIRING: FPL OR EQUIVALENT, 18 AWG MINIMUM.

FORMULAS

P_{spkr} = (TAP (W) × QTY)

P_{line} = P_{spkr} / EFFICIENCY

P_{total} = Σ P_{line} (ALL CIRCUITS)

$P_{required}$ = P_{total} × 1.20 (20% HEADROOM)

I_{amp} (A) = $P_{required}$ / V_{system}

WHERE:

V_{system} = 25 VRMS (SPEAKER CIRCUITS)

EFFICIENCY = 1.00 (25V DISTRIBUTED SYSTEM)

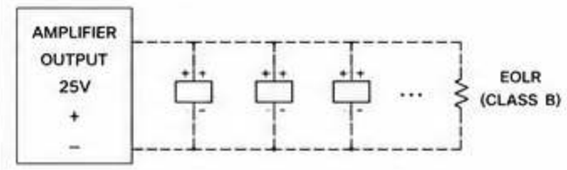
SYSTEM SUMMARY

VOICE EVACUATION SYSTEM:	YES
SYSTEM VOLTAGE:	25 VRMS
AMPLIFIER OUTPUTS:	2
SPEAKER CIRCUITS:	2 (CLASS B)
HEADROOM FACTOR:	20%
SPEAKER WIRING:	CLASS B
WIRE SIZE (MIN):	18 AWG

SPEAKER CIRCUIT LOADING

CIRCUIT NO.	ZONE / AREA	SPEAKER MODEL	SPEAKER RATING (W)	TAP SETTING (W) 70V	25V	70.7V	QTY	TOTAL SPEAKER POWER (W) P_{spkr} = TAP × QTY	LINE POWER (W) P_{line} = P_{spkr} / EFF.	CABLE LENGTH (FT)	WIRE SIZE (AWG)	STATUS (PASS/FAIL)
1	LEVELS 1–3 NORTH WING	EV-S8 8" Ceiling Speaker	8	—	8	—	28	224	224	420	18	Room Speakers
		EV-S8 8" Ceiling Speaker	8	—	4	—	12	48	48	380	18	Corridor Speakers
		EV-HS6 Horn Speaker	15	—	15	—	4	60	60	450	18	High Ceiling / Atrium
		EV-WM Wall Speaker	6	—	3	—	6	18	18	300	18	Stairwell Speakers
		CIRCUIT 1 TOTALS					50	350	350			PASS
2	LEVELS 4–ROOF SOUTH WING	EV-S8 8" Ceiling Speaker	8	—	8	—	30	240	240	430	18	Room Speakers
		EV-S8 8" Ceiling Speaker	8	—	4	—	10	40	40	360	18	Corridor Speakers
		EV-HS6 Horn Speaker	15	—	15	—	4	60	60	420	18	High Ceiling / Atrium
		EV-WM Wall Speaker	6	—	3	—	6	18	18	280	18	Stairwell Speakers
		CIRCUIT 2 TOTALS					50	358	358			PASS
SYSTEM TOTALS (ALL SPEAKER CIRCUITS)							100	708	708			PASS

TYPICAL SPEAKER CIRCUIT DIAGRAM (CLASS B)



LEGEND

- CEILING / WALL SPEAKER
- HORN SPEAKER
- AMPLIFIER
- EOLR END-OF-LINE RESISTOR

POWER CALCULATION SUMMARY

TOTAL LINE POWER (P_{total})	708 W
REQUIRED HEADROOM (20%)	142 W
TOTAL REQUIRED POWER ($P_{required}$)	850 W
SYSTEM VOLTAGE (V_{system})	25 VRMS
AMPLIFIER CURRENT REQUIRED (I_{amp}) = $P_{required}$ / V_{system}	34.0 A

AMPLIFIER SELECTION CHECK

SELECTED AMPLIFIER MODEL:	BOGEN CSD2x240
RATED OUTPUT POWER @ 25V:	240 W PER CHANNEL
NUMBER OF OUTPUT CHANNELS:	2
TOTAL AVAILABLE POWER @ 25V:	480 W
TOTAL AVAILABLE CURRENT:	19.2 A PER CHANNEL
STATUS:	FAIL – INSUFFICIENT CAPACITY

RECOMMENDED AMPLIFIER CONFIGURATION

REQUIRED TOTAL POWER:	850 W
RECOMMENDED AMPLIFIER:	BOGEN CSD4x250
RATED OUTPUT POWER @ 25V:	250 W PER CHANNEL
NUMBER OF OUTPUT CHANNELS:	4
TOTAL AVAILABLE POWER @ 25V:	1000 W
TOTAL AVAILABLE CURRENT:	40.0 A PER CHANNEL
STATUS:	PASS

NOTES

1. ALL SPEAKER TAPS SET AT OR BELOW RATED POWER.
2. MAINTAIN POLARITY THROUGHOUT CIRCUIT.
3. DO NOT EXCEED MAXIMUM AMPLIFIER OUTPUT CURRENT.
4. EOLR VALUES PER MANUFACTURER REQUIREMENTS.
5. SPEAKER COVERAGE AND SPACING PER NFPA 72 ANNEX D.
6. REFER TO PLANS FOR CIRCUIT ROUTING AND DEVICE LOCATIONS.

PROJECT:	DESIGNER OF RECORD:	DRAWING TITLE:	DRAWING NO.:	SHEET:	DATE:	REV:
MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM	Applied Engineering Group	AMPLIFIER/SPEAKER LOADING WORKSHEET VOICE EVACUATION POWER CALCULATIONS	FA-038	1 OF 1	MAY 24, 2024	0

FIRE ALARM SYSTEM – STROBE CANDELA CALCULATION WORKSHEET

NFPA 72 VISUAL COVERAGE COMPLIANCE

PROJECT INFORMATION

PROJECT:	MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM
LOCATION:	—
DATE:	MAY 24, 2024
CALCULATED BY:	AEG
CHECKED BY:	—

DESIGN CRITERIA

1. SYSTEM SHALL MEET NFPA 72, 2019 REQUIREMENTS.
2. VISUAL APPLIANCES (STROBES) SHALL COMPLY WITH NFPA 72, 18.5.
3. MINIMUM STROBE INTENSITY (cd) SHALL BE PER TABLE 18.5.5.1.
4. LIGHT OUTPUT RATING SHALL BE PER ANSI/UL 1971.
5. MOUNTING HEIGHT IS MEASURED FROM THE FINISHED FLOOR TO THE TOP OF THE VISUAL APPLIANCE.
6. ALL SPACES SHALL MEET OR EXCEED THE REQUIRED CANDELA.

FORMULAS

$C_{required}$ = VALUE FROM NFPA 72 TABLE 18.5.5.1 (cd)

$C_{adjusted} = C_{required} \times MF \times DF$

WHERE:

MF = MOUNTING HEIGHT FACTOR

DF = DISTANCE FACTOR

$C_{available}$ = CANDELA RATING OF APPLIANCE (cd)

COMPLIANT IF: $C_{available} \geq C_{adjusted}$

SYSTEM SUMMARY

SYSTEM VOLTAGE:	25 VRMS
APPLIANCE CIRCUITS:	2 (CLASS B)
APPLIANCE TYPE:	WALL MOUNT STROBE
MANUFACTURER:	SYSTEM SENSOR
MODEL:	SCRK
CANDELA SETTINGS:	15 / 30 / 75 / 110 / 150 (FIELD SELECTABLE)
MOUNTING:	WALL

STROBE CANDELA CALCULATIONS

AREA (ZONE / ROOM)	LOCATION DESCRIPTION	MOUNTING HEIGHT (FT)	COVERAGE DISTANCE (FT)		REQUIRED MINIMUM CANDELA (cd) FROM NFPA 72 TABLE 18.5.5.1		MOUNTING HEIGHT FACTOR (MF)	DISTANCE FACTOR (DF)	ADJUSTED REQUIRED CANDELA $C_{adjusted} = C_{req} \times MF \times DF$		SELECTED STROBE SETTING (cd)	AVAILABLE CANDELA (cd)*	STATUS (PASS/FAIL)
			ALONG WALL (S)	ACROSS ROOM (D)	ALONG WALL (S)	ACROSS ROOM (D)			ALONG WALL (cd)	ACROSS ROOM (cd)			
1	LEVEL 1 – LOBBY	8	25	25	30	30	1.00	1.0	30	30	75	75	PASS
2	LEVEL 1 – CORRIDOR 101	8	40	20	75	30	1.00	1.0	75	30	75	75	PASS
3	LEVEL 2 – OPEN OFFICE	8	30	30	30	30	1.00	1.0	30	30	75	75	PASS
4	LEVEL 2 – CONFERENCE 205	8	18	18	15	15	1.00	1.0	15	15	15	15	PASS
5	LEVEL 3 – CORRIDOR 301	8	45	15	75	15	1.00	1.0	75	15	75	75	PASS
6	LEVEL 3 – STAIR A	7	15	15	15	15	0.88	1.0	13	13	15	15	PASS
7	BASEMENT – BOILER ROOM	9	20	20	30	30	1.15	1.0	35	35	75	75	PASS

* AVAILABLE CANDELA IS THE EFFECTIVE CANDELA AT INDICATED SETTING PER UL 1971.

NFPA 72 TABLE 18.5.5.1 – MINIMUM REQUIRED CANDELA (cd) BASED ON COVERAGE DISTANCE AND MOUNTING HEIGHT

COVERAGE DISTANCE (HORIZONTAL)	MOUNTING HEIGHT ABOVE FINISHED FLOOR (FT)			
	≤ 10 FT	>10 FT TO 20 FT	>20 FT TO 30 FT	>30 FT TO 40 FT
≤ 15 FT	15	18	22	30
>15 FT TO 30 FT	30	36	45	60
>30 FT TO 45 FT	75	90	110	150
>45 FT TO 60 FT	110	135	185	—
>60 FT	150	185	—	—

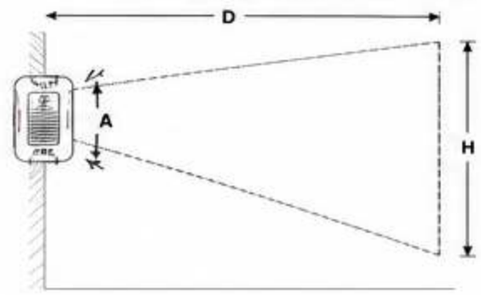
MOUNTING HEIGHT FACTOR (MF)

MOUNTING HEIGHT (FT)	FACTOR (MF)
≤ 7	0.88
>7 TO 10	1.00
>10 TO 16	1.15
>16 TO 20	1.30
>20 TO 30	1.45
>30 TO 40	1.60

DISTANCE FACTOR (DF)

DISTANCE FACTOR	DESCRIPTION
1.0	APPLIANCE LOCATED WITHIN THE REQUIRED DISTANCE
1.25	APPLIANCE LOCATED BEYOND THE REQUIRED DISTANCE BUT WITHIN 1.5 TIMES
1.50	APPLIANCE LOCATED MORE THAN 1.5 TIMES THE REQUIRED DISTANCE (NOT RECOMMENDED)

TYPICAL VISUAL COVERAGE – WALL MOUNT



A = COVERAGE DISTANCE ALONG WALL

D = COVERAGE DISTANCE ACROSS ROOM

H = MOUNTING HEIGHT (TOP OF APPLIANCE)

CIRCUIT LOAD SUMMARY

CIRCUIT NO.	STROBE MODEL	QTY	CANDELA SETTING (cd)	CURRENT DRAW EACH (A)	TOTAL CURRENT (A)
NAC-1	SCRK	36	75	0.110	3.96
NAC-2	SCRK	28	75	0.110	3.08
TOTAL CURRENT (ALL STROBES)					7.04 A

NAC CIRCUIT CAPACITY CHECK

MAX NAC CURRENT (PANEL):	3.0 A
TOTAL STROBE CURRENT:	7.04 A
NAC CAPACITY ADEQUATE?	NO

RECOMMENDED ACTION: REDUCE STROBE SETTINGS OR ADD ADDITIONAL CIRCUIT(S)

EXAMPLE ADJUSTED CANDELA CALCULATION (ROW 2)

$C_{required}$ (ALONG WALL 40 FT, H = 8 FT) =	75 cd
MF (H = 8 FT) =	1.00
DF (WITHIN DISTANCE) =	1.0
$C_{adjusted} = 75 \times 1.00 \times 1.00 =$	75 cd
$C_{available}$ (SELECTED SETTING 75 cd) =	75 cd
RESULT:	PASS (75 ≥ 75)

NOTES

1. ALL STROBES SHALL BE LISTED PER UL 1971.
2. VERIFY ALL SPACES FOR VISUAL COVERAGE PER NFPA 72, 18.5.
3. SELECT HIGHER CANDELA SETTING ONLY AS REQUIRED.
4. MAINTAIN MINIMUM CLEARANCE FROM CEILING AND CORNERS.
5. REFER TO FLOOR PLANS FOR STROBE LOCATIONS.

PROJECT:	DESIGNER OF RECORD:	DRAWING TITLE:	DRAWING NO.:	SHEET:	DATE:	REV:
MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM	Applied Engineering Group	STROBE CANDELA CALCULATION WORKSHEET NFPA 72 VISUAL COVERAGE COMPLIANCE	FA-039	1 OF 1	MAY 24, 2024	0

FIRE ALARM SYSTEM – CAUSE-AND-EFFECT MATRIX

OPERATIONAL WORKSHEET

PROJECT INFORMATION	
PROJECT:	MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM
LOCATION:	—
DATE:	MAY 24, 2024
PREPARED BY:	AEG
CHECKED BY:	—

SYSTEM DESCRIPTION	
FIRE ALARM CONTROL PANEL:	FACP-1 (ADDRESSABLE)
SYSTEM VOLTAGE:	24 VDC
SLC LOOPS:	2
NAC CIRCUITS:	2 (CLASS B)
APPLICABLE CODES:	NFPA 72, 2019
SYSTEM SOFTWARE VERSION:	X.X.X

LEGEND

- ● = ACTION TAKEN (OUTPUT)
- O = CONDITIONAL ACTION (IF APPLICABLE)
- — = NO ACTION

DLY = DELAY (SECONDS)
RST = RESET REQUIRED

NOTES

1. ALL CAUSE-AND-EFFECTS SHALL COMPLY WITH NFPA 72.
2. MATRIX INCLUDES PRIMARY LIFE SAFETY FUNCTIONS.
3. ADDITIONAL FUNCTIONS MAY BE PROGRAMMED PER OWNER REQUIREMENTS.
4. REFER TO SEQUENCE OF OPERATIONS NARRATIVE FOR DETAILS.

	INITIATING EVENT (CAUSE)	CONDITION / POINT TYPE	RESULTING ACTION (EFFECT)													
			GENERAL ALARM (AUDIBLE/VISUAL)	TROUBLE INDICATION	FIRE DEPT. NOTIFICATION	ELEVATOR RECALL	HVAC / SMOKE CONTROL: SUPPLY FANS	HVAC / SMOKE CONTROL: RETURN / EXHAUST FANS	HVAC / SMOKE CONTROL: DAMPERS (SMOKE)	DOOR RELEASE	DOOR CLOSURE	NAC STROBES	VOICE EVACUATION	SMOKE CONTROL PRESSURIZATION	BUILDING MANAGEMENT SYSTEM	DELAY / NOTES
FIRE DETECTION EVENTS																
1	Smoke Detector in Alarm (Any)	Smoke	●	—	●	●	● (OFF)	● (OFF)	● (CLOSE)	● (ALL)	—	●	●	●	●	DLY 0
2	Heat Detector in Alarm (Any)	Heat	●	—	●	●	● (OFF)	● (OFF)	● (CLOSE)	● (ALL)	—	●	●	●	●	DLY 0
3	Duct Smoke Detector in Alarm (Any)	Duct	●	—	●	—	● (OFF)	—	● (CLOSE)	—	—	●	—	—	●	DLY 0
4	Flame Detector in Alarm (Any)	Flame	●	—	●	●	● (OFF)	● (OFF)	● (CLOSE)	● (ALL)	—	●	●	●	●	DLY 0
5	Manual Pull Station Activated (Any)	MPS	●	—	●	●	● (OFF)	● (OFF)	● (CLOSE)	● (ALL)	—	●	●	●	●	DLY 0
6	Waterflow Switch (Sprinkler) (Any)	Waterflow	●	—	●	●	● (OFF)	● (OFF)	● (CLOSE)	● (ALL)	—	●	●	●	●	DLY 0
SUPERVISORY EVENTS																
7	Tamper Switch Activated (Any)	Tamper	—	●	—	—	—	—	—	—	—	—	—	—	●	RST
8	Duct Detector Maintenance (Any)	Supervisory	—	●	—	—	—	—	—	—	—	—	—	—	●	RST
9	Low Air Pressure (Duct) (Any)	Supervisory	—	●	—	—	—	—	—	—	—	—	—	—	●	RST
10	Waterflow (System Test) (Any)	Supervisory	—	●	—	—	—	—	—	—	—	—	—	—	●	RST
SYSTEM TROUBLE EVENTS																
11	AC Power Failure (Panel)	Trouble	—	●	—	—	—	—	—	—	—	—	—	—	●	RST
12	Battery Trouble (Panel)	Trouble	—	●	—	—	—	—	—	—	—	—	—	—	●	RST
13	SLC Loop Fault (Panel)	Trouble	—	●	—	—	—	—	—	—	—	—	—	—	●	RST
14	NAC Circuit Open / Short (Panel)	Trouble	—	●	—	—	—	—	—	—	—	—	—	—	●	RST
15	Ground Fault (Panel)	Trouble	—	●	—	—	—	—	—	—	—	—	—	—	●	RST
MANUAL OPERATOR ACTIONS																
16	Alarm Silence (Operator)	Manual	O (SILENCE)	—	—	—	—	—	—	—	—	O (SILENCE)	O (SILENCE)	—	—	N/A
17	Reset System (Operator)	Manual	O (RESET)	O (CLEAR)	O (RESET)	—	—	—	—	—	—	—	—	—	O (RESET)	N/A
18	Evacuate (Manual Page) (Operator)	Manual	—	—	—	—	—	—	—	—	—	●	● (PAGE)	—	—	DLY 0
19	Drill (Walk Test Mode) (Operator)	Manual	O (TEST)	O (TEST)	O (TEST)	O (TEST)	O (TEST)	O (TEST)	O (TEST)	O (TEST)	—	O (TEST)	O (TEST)	O (TEST)	O (TEST)	N/A

NOTES: DLY 0 = NO DELAY DLY X = DELAY (X SECONDS) RST = RESET REQUIRED AFTER CONDITION CLEARED

PROJECT:	DESIGNER OF RECORD:	DRAWING TITLE:	DRAWING NO.:	SHEET:	DATE:	REV:
MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM	Applied Engineering Group	CAUSE-AND-EFFECT MATRIX OPERATIONAL WORKSHEET	FA-040	1 OF 1	MAY 24, 2024	0

FIRE ALARM SYSTEM – NETWORK BANDWIDTH WORKSHEET

BANDWIDTH CALCULATIONS AND CAPACITY VERIFICATION

PROJECT INFORMATION	
PROJECT:	MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM
LOCATION:	—
DATE:	MAY 24, 2024
CALCULATED BY:	AEG
CHECKED BY:	—

DESIGN CRITERIA

1. SYSTEM SHALL MEET NFPA 72, 2019, 24.6.6 AND MANUFACTURER REQUIREMENTS.
2. FIRE ALARM NETWORK SHALL BE DEDICATED AND SUPERVISED.
3. MINIMUM AVAILABLE BANDWIDTH: 20% HEADROOM REQUIRED.
4. QUALITY OF SERVICE (QoS) SHALL PRIORITIZE FIRE ALARM TRAFFIC.
5. ETHERNET: 100/1000 Mbps FULL DUPLEX.
6. ALL DEVICES SHALL BE COMPATIBLE WITH THE NETWORK INFRASTRUCTURE.

BANDWIDTH ASSUMPTIONS	
CONTROL PANEL REPORT (AVG):	1.0 kbps
DEVICE POLLING / SUPERVISION:	0.5 kbps per device
EVENT / ALARM BURST (PEAK):	5.0 kbps per panel
TIME SYNC (NTP):	0.1 kbps per device
VIDEO (IF ANY, FUTURE):	N/A
PROTOCOL OVERHEAD:	20%

LEGEND

AVG = AVERAGE (TYPICAL)
PEAK = MAXIMUM (BURST)
kbps = KILOBITS PER SECOND
Mbps = MEGABITS PER SECOND
UTIL. = UTILIZATION
SW = NETWORK SWITCH
FACP = FIRE ALARM CONTROL PANEL

1. NETWORK DEVICE BANDWIDTH LOAD SUMMARY

DEVICE TYPE	DESCRIPTION	QTY	AVERAGE BANDWIDTH		PEAK (BURST) BANDWIDTH		NOTES
			PER DEVICE (kbps)	TOTAL (kbps)	PER DEVICE (kbps)	TOTAL (kbps)	
FACP	Fire Alarm Control Panel	2	1.0	2.0	5.0	10.0	Regular polling and event reporting
ANN-80	Annunciator	2	0.5	1.0	1.0	2.0	Status & command traffic
LCD-80	LCD Annunciator / Remote Display	4	0.3	1.2	0.5	2.0	Status updates
NAC expander / I/O	Addressable I/O Module	40	0.5	20.0	0.5	20.0	Supervision & status
Smoke / Heat Detector	Addressable Detectors	600	0.1	60.0	0.2	120.0	Supervision polling
Manual Stations	Addressable Pull Stations	60	0.1	6.0	0.2	12.0	Supervision polling
Other Addressable Devices	Modules, Relays, Bases, etc.	300	0.1	30.0	0.2	60.0	Supervision polling
Network Heartbeat / Keepalive	Per Network Device	—	0.1	10.0	0.1	10.0	Keepalive & protocol
Time Sync (NTP)	Per Network Device	—	0.1	10.0	0.1	10.0	Time synchronization
	TOTAL (SYSTEM)			140.2 kbps		246.0 kbps	

2. NETWORK SEGMENT BANDWIDTH UTILIZATION

SEGMENT ID	DESCRIPTION (SEGMENT / LOCATION)	CONNECTED DEVICES (SEE NOTES)	LINK SPEED (Mbps)	USABLE BANDWIDTH (Mbps) (80% OF LINK)	AVERAGE LOAD (kbps)	PEAK LOAD (kbps)	AVERAGE UTILIZATION (%)	PEAK UTILIZATION (%)	COMPLIANT (PASS/FAIL)	NOTES
SEG-1	IDF-1 – Level 1	FACP-1, ANN-1, I/O (20), Devices	100	80.0	45.2	75.0	0.06%	0.09%	PASS	< 80% Util.
SEG-2	IDF-2 – Level 2	I/O (20), Devices	100	80.0	45.0	75.0	0.06%	0.09%	PASS	< 80% Util.
SEG-3	IDF-3 – Level 3	I/O (20), Devices	100	80.0	45.0	75.0	0.06%	0.09%	PASS	< 80% Util.
SEG-4	ROOF / MEP	I/O (10), Devices	100	80.0	25.0	40.0	0.03%	0.05%	PASS	< 80% Util.
UPLINK-1	IDF-1 to MDF	All IDF Traffic Aggregated	1000	800.0	160.0	270.0	0.02%	0.03%	PASS	< 80% Util.
MDF CORE	MDF Core Switch	All System Traffic	1000	800.0	160.0	270.0	0.02%	0.03%	PASS	< 80% Util.

3. TOTAL SYSTEM BANDWIDTH CHECK

TOTAL AVERAGE LOAD:	140.2 kbps
TOTAL PEAK LOAD (BURST):	246.0 kbps
RECOMMENDED HEADROOM (20%):	49.2 kbps
MAX RECOMMENDED LOAD (80% OF LINK): (FOR 1000 Mbps LINK)	800,000 kbps
SYSTEM COMPLIANT:	YES

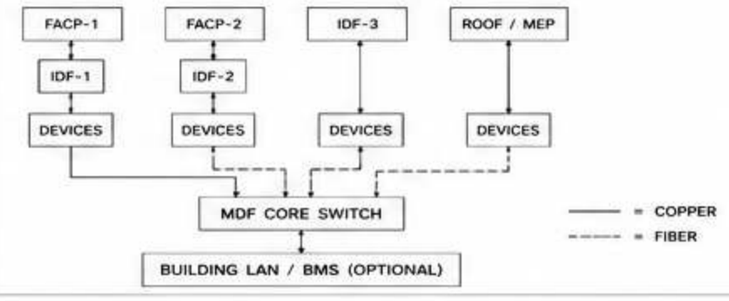
4. QUALITY OF SERVICE (QoS) RECOMMENDATION

TRAFFIC TYPE	DSCP VALUE	PRIORITY
FIRE ALARM (CONTROL / EVENTS)	EF (46)	HIGHEST
VOICE EVACUATION (IF IP BASED)	AF41 (34)	HIGH
TIME SYNC / MANAGEMENT	CS2 (16)	NORMAL
GENERAL / OTHER	CS0 (0)	LOW

5. NOTES

1. BANDWIDTH VALUES ARE BASED ON MANUFACTURER RECOMMENDATIONS AND TYPICAL SYSTEM BEHAVIOR.
2. PEAK LOAD ASSUMES MULTIPLE ALARM EVENTS OCCURRING SIMULTANEOUSLY.
3. ENSURE NETWORK INFRASTRUCTURE (SWITCHES, CABLING) SUPPORTS THE REQUIRED SPEED AND QoS.
4. MAINTAIN AT LEAST 20% AVAILABLE BANDWIDTH AT ALL TIMES.
5. REFER TO NETWORK DIAGRAMS FOR SEGMENT DETAILS.

6. TYPICAL NETWORK TOPOLOGY (FIRE ALARM SYSTEM)



PROJECT:	DESIGNER OF RECORD:	DRAWING TITLE:	DRAWING NO.:	SHEET:	DATE:	REV:
MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM	Applied Engineering Group	NETWORK BANDWIDTH WORKSHEET BANDWIDTH CALCULATIONS AND CAPACITY VERIFICATION	FA-040	1 OF 1	MAY 24, 2024	0

FIRE ALARM SYSTEM – FIBER RING DESIGN DRAWING

FACP NETWORK – FIBER OPTIC RING TOPOLOGY

PROJECT INFORMATION

PROJECT:	MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM
LOCATION:	—
DATE:	MAY 24, 2024
DESIGNED BY:	AEG
CHECKED BY:	—

DESIGN CRITERIA

1. NETWORK SHALL COMPLY WITH NFPA 72, 2019.
2. FIBER NETWORK SHALL BE A DUAL FIBER RING (CLASS A) TO SURVIVE A SINGLE OPEN.
3. FIBER TYPE: OM3 MULTIMODE, 50/125 µm.
4. RING SPEED: 1 Gbps.
5. MAX HOP COUNT BETWEEN ANY TWO DEVICES: 6 (RECOMMENDED).
6. ALL DEVICES SHALL BE COMPATIBLE WITH THE FIRE ALARM NETWORK.

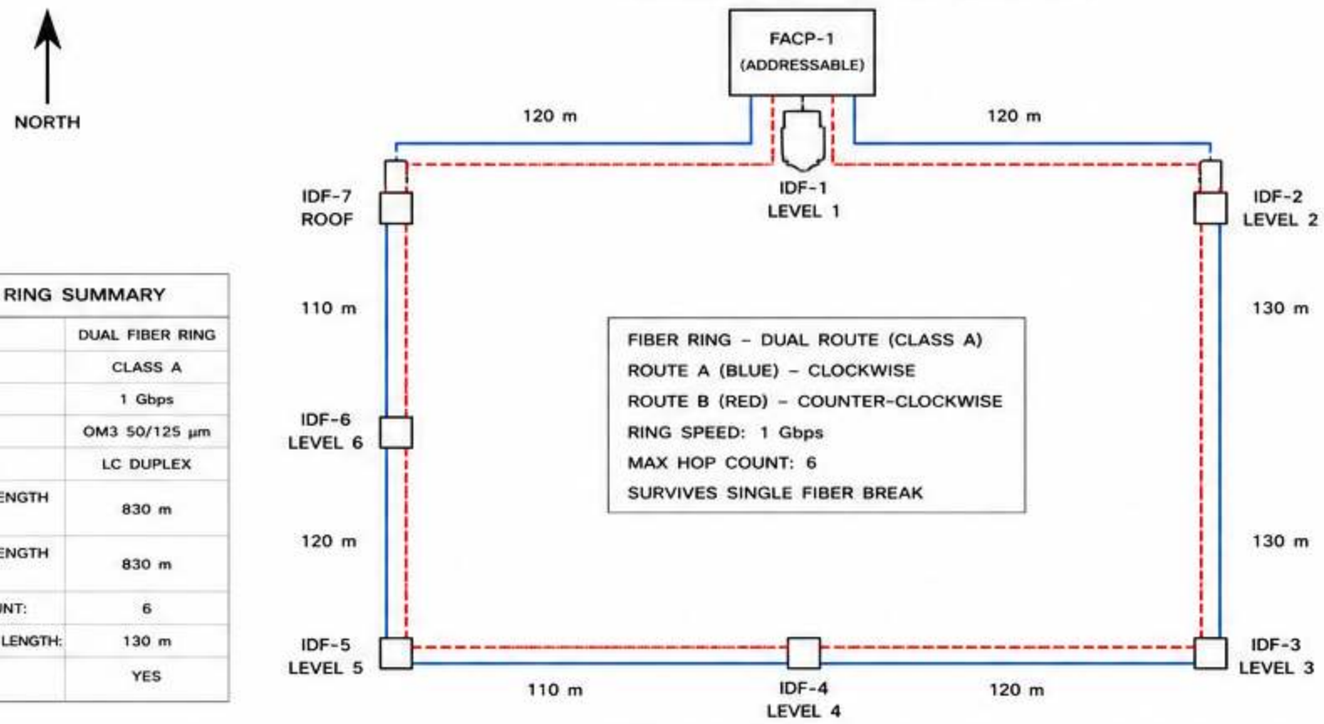
FIBER AND NETWORK NOTES

- FIBER CABLE: 50/125 µm OM3 MULTIMODE
- CONNECTORS: LC DUPLEX
- INSTALLATION: IN CONDUIT / CABLE TRAY
- MINIMUM BEND RADIUS: 2 in. (50 mm)
- TESTING: PER TIA-568.3-D AND MANUFACTURER REQUIREMENTS
- LABEL ALL FIBER PAIRS AT BOTH ENDS

LEGEND

FACP	FIRE ALARM CONTROL PANEL
NAC EXP	NETWORK ANNUNCIATOR / EXPANDER
□	NETWORK NODE (FIBER INTERFACE MODULE)
○	FIBER SPLICE / TERMINATION
———	FIBER ROUTE A (CLOCKWISE)
- - - -	FIBER ROUTE B (COUNTER-CLOCKWISE)

1. FIBER RING TOPOLOGY – OVERALL LAYOUT



FIBER RING SUMMARY

TOPOLOGY:	DUAL FIBER RING
RING TYPE:	CLASS A
RING SPEED:	1 Gbps
FIBER TYPE:	OM3 50/125 µm
CONNECTOR:	LC DUPLEX
TOTAL RING LENGTH (ROUTE A):	830 m
TOTAL RING LENGTH (ROUTE B):	830 m
MAX HOP COUNT:	6
MAX SEGMENT LENGTH:	130 m
COMPLIANT:	YES

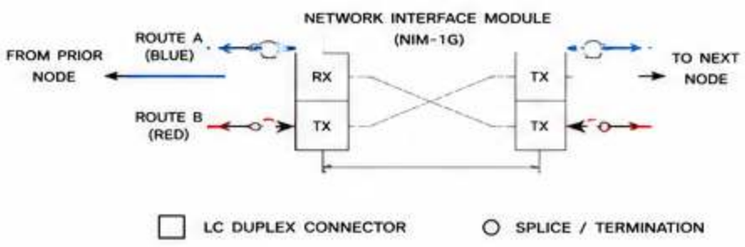
2. FIBER PATH SCHEDULE

FROM	TO	ROUTE A (m)	ROUTE B (m)	TOTAL (m)	CABLE COUNT	FIBER TYPE
FACP-1 (IDF-1)	IDF-2 (L2)	120	120	240	(2)	OM3
IDF-2 (L2)	IDF-3 (L3)	130	130	260	(2)	OM3
IDF-3 (L3)	IDF-4 (L4)	120	120	240	(2)	OM3
IDF-4 (L4)	IDF-5 (L5)	110	110	220	(2)	OM3
IDF-5 (L5)	IDF-6 (L6)	120	120	240	(2)	OM3
IDF-6 (L6)	IDF-7 (ROOF)	110	110	220	(2)	OM3
IDF-7 (ROOF)	FACP-1 (IDF-1)	120	120	240	(2)	OM3
TOTAL RING LENGTH		830	830	1,660	(2)	OM3

3. DEVICE SUMMARY

DEVICE	LOCATION	QTY	NETWORK INTERFACE TYPE	NOTES
FACP-1	IDF-1 / LEVEL 1	1	BUILT-IN	RING MANAGER
IDF-2	LEVEL 2	1	NIM-1G	FIBER NODE
IDF-3	LEVEL 3	1	NIM-1G	FIBER NODE
IDF-4	LEVEL 4	1	NIM-1G	FIBER NODE
IDF-5	LEVEL 5	1	NIM-1G	FIBER NODE
IDF-6	LEVEL 6	1	NIM-1G	FIBER NODE
IDF-7	ROOF	1	NIM-1G	FIBER NODE
TOTAL DEVICES ON RING		7		

4. TYPICAL FIBER CONNECTION DETAIL (EACH NODE)



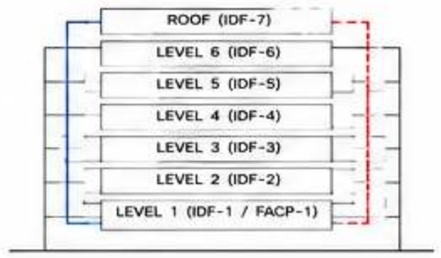
5. DESIGN NOTES

1. MAINTAIN FIBER POLARITY THROUGHOUT THE RING.
2. A SINGLE FIBER CUT WILL NOT INTERRUPT COMMUNICATIONS.
3. ALL FIBER CABLES SHALL BE PLENUM RATED.
4. SEPARATE FROM ELECTRICAL CIRCUITS PER NFPA 70.
5. TEST AND CERTIFY ALL FIBER LINKS AFTER INSTALLATION.

6. FIBER SPECIFICATIONS

FIBER TYPE:	OM3 MULTIMODE 50/125 µm
CORE/CLADDING DIAMETER:	50 / 125 µm
CABLE TYPE:	INDOOR PLENUM
CONNECTOR TYPE:	LC DUPLEX
MIN BEND RADIUS:	2 in. (50 mm)
MAX PULL TENSION:	100 lbf (445 N)
TEST STANDARD:	TIA-568.3-D

7. KEY PLAN (NOT TO SCALE)



PROJECT:	DESIGNER OF RECORD:	DRAWING TITLE:	DRAWING NO.:	SHEET:	DATE:	REV:
MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM	Applied Engineering Group	FIBER RING DESIGN DRAWING FACP NETWORK – FIBER OPTIC RING TOPOLOGY	FA-040A	1 OF 1	MAY 24, 2024	0

FIRE ALARM SYSTEM – ANNUNCIATOR LAYOUT DRAWING

REMOTE ANNUNCIATOR – GRAPHIC LCD / LED INDICATOR

PROJECT INFORMATION

PROJECT:	MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM
LOCATION:	—
DATE:	MAY 24, 2024
DESIGNED BY:	AEG
CHECKED BY:	—

DESIGN CRITERIA

1. COMPLY WITH NFPA 72, 2019.
2. ANNUNCIATOR SHALL BE ULC LISTED / FM APPROVED.
3. PROVIDE REMOTE ANNUNCIATOR AT EACH MANNED LOCATION.
4. LCD DISPLAY SHALL SHOW SYSTEM STATUS, ALARMS AND EVENTS.
5. ANNUNCIATOR CONNECTS TO FACP VIA SLC OR NETWORK.
6. MOUNTING HEIGHT: CENTER OF DISPLAY 48" AFF (TYP.).

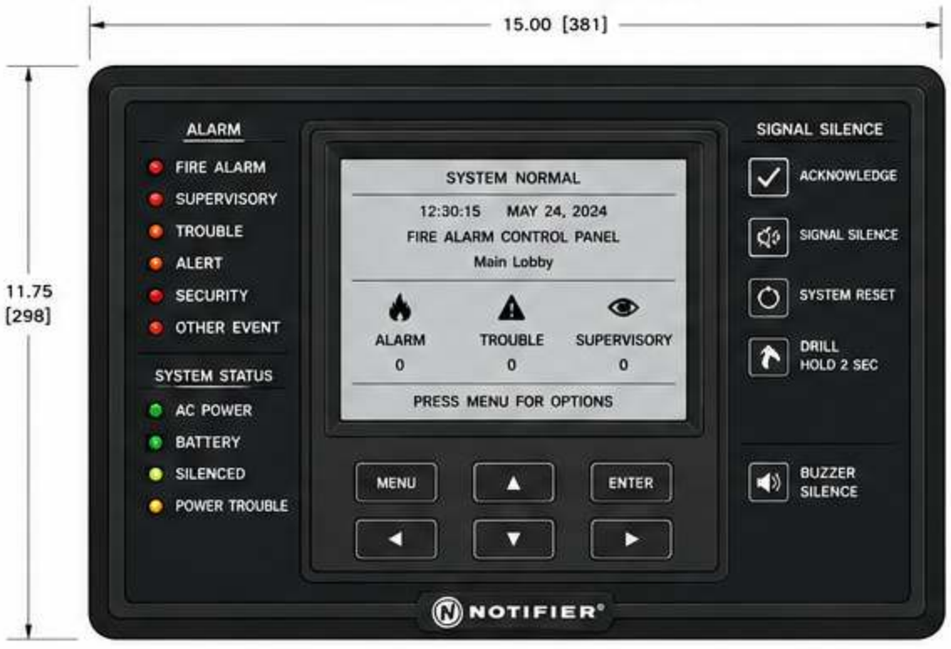
ANNUNCIATOR SPECIFICATIONS

MANUFACTURER:	NOTIFIER
MODEL:	NCA-2 ANNUNCIATOR
DISPLAY:	320 x 240 GRAPHIC LCD
INDICATORS:	LED STATUS INDICATORS
CONNECTION:	SLC (CLASS B) / RS-485
OPERATING VOLTAGE:	24 VDC
CURRENT DRAW:	60 mA (STANDBY), 90 mA (ALARM)
MOUNTING:	SURFACE / SEMI-FLUSH

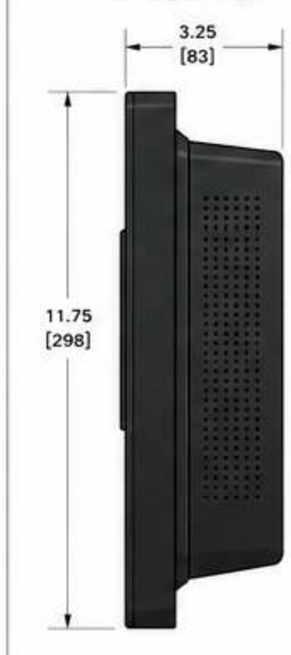
GENERAL NOTES

1. ANNUNCIATOR SHALL MIRROR FACP ALARM CONDITIONS.
2. ALL ALARM AND TROUBLE CONDITIONS SHALL BE INDICATED WITH AUDIBLE AND VISIBLE SIGNALS.
3. VERIFY MOUNTING LOCATION WITH ARCHITECT.
4. PROVIDE DEDICATED CIRCUIT PER MANUFACTURER.
5. REFER TO RISER DIAGRAM FOR CONNECTION DETAILS.

1. ANNUNCIATOR FRONT VIEW



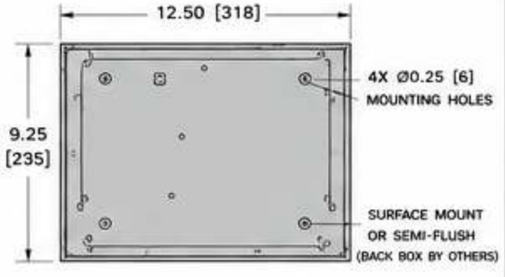
2. SIDE VIEW



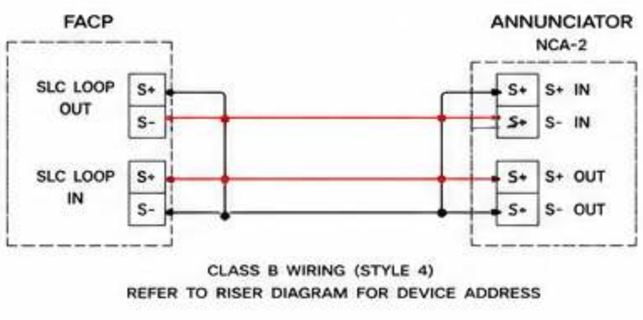
3. INDICATOR / CONTROL FUNCTIONS

ITEM	COLOR	DESCRIPTION
ALARM INDICATORS		
FIRE ALARM	Steady Red	Fire Alarm Condition
SUPERVISORY	Steady Amber	Supervisory Condition
TROUBLE	Steady Amber	Trouble Condition
ALERT	Steady Amber	Alert Condition
SECURITY	Steady Amber	Security Event
OTHER EVENT	Steady Amber	Other Events
SYSTEM STATUS INDICATORS		
AC POWER	Steady Green	AC Power Normal
BATTERY	Steady Green	Battery Normal
SILENCED	Steady Yellow	System / Signals Silenced
POWER TROUBLE	Steady Yellow	AC Power Trouble
CONTROL BUTTONS		
ACKNOWLEDGE	Silence buzzer and acknowledge events	
SIGNAL SILENCE	Silence building signals (if allowed)	
SYSTEM RESET	Reset the fire alarm system	
DRILL (HOLD 2 SEC)	Activate drill function (programmable)	
BUZZER SILENCE	Silence internal buzzer	

4. MOUNTING DETAIL



5. CONNECTION DIAGRAM (SLC – CLASS B)

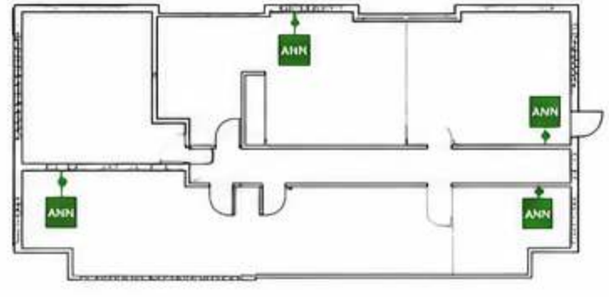


CLASS B WIRING (STYLE 4)
REFER TO RISER DIAGRAM FOR DEVICE ADDRESS

6. MOUNTING INFORMATION

MOUNTING TYPE:	SURFACE OR SEMI-FLUSH
MOUNTING HEIGHT:	CENTER 48" AFF (TYP.)
ENVIRONMENT:	INDOOR, DRY LOCATION
OPERATING TEMP:	32°F TO 120°F (0°C TO 49°C)
RELATIVE HUMIDITY:	10% TO 93% NON-CONDENSING
ENCLOSURE MATERIAL:	STEEL
FINISH / COLOR:	BLACK
ACCESS CLEARANCE:	36" WIDE x 30" DEEP IN FRONT

7. TYPICAL LOCATION PLAN (NOT TO SCALE)



ANN = REMOTE ANNUNCIATOR LOCATION

PROJECT:	DESIGNER OF RECORD:	DRAWING TITLE:	DRAWING NO.:	SHEET:	DATE:	REV:
MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM	Applied Engineering Group	ANNUNCIATOR LAYOUT DRAWING REMOTE ANNUNCIATOR DETAILS	FA-041	1 OF 1	MAY 24, 2024	0

FIRE ALARM & EMERGENCY COMMUNICATION SYSTEM (ECS) PLANS

NFPA 72 COMPLIANT – TWO-WAY EMERGENCY COMMUNICATION SYSTEM

PROJECT INFORMATION

PROJECT:	MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM
LOCATION:	—
DATE:	MAY 24, 2024
DESIGNED BY:	AEG
CHECKED BY:	—

DESIGN CRITERIA

1. COMPLY WITH NFPA 72, 2019, CHAPTER 24.
2. TWO-WAY COMMUNICATION SHALL BE PROVIDED IN ALL AREAS OF REFUGE, ELEVATOR CABS, AND FIRE COMMAND CENTER.
3. SYSTEM SHALL BE POWER-LIMITED AND SUPERVISED.
4. MINIMUM 99% AREA OF REFUGE COVERAGE.
5. ECS SPEAKER SHALL MEET ADA REQUIREMENTS.

SYSTEM SUMMARY

ECS TYPE:	TWO-WAY
SYSTEM VOLTAGE:	24 VDC
POWER SOURCE:	FACP NAC POWER
BATTERY BACKUP:	24 HRS STANDBY
SIGNALING METHOD:	DIGITAL / SUPERVISED
WIRING CLASS:	CLASS B
CABLE TYPE:	2 COND. FPLR/CL2P

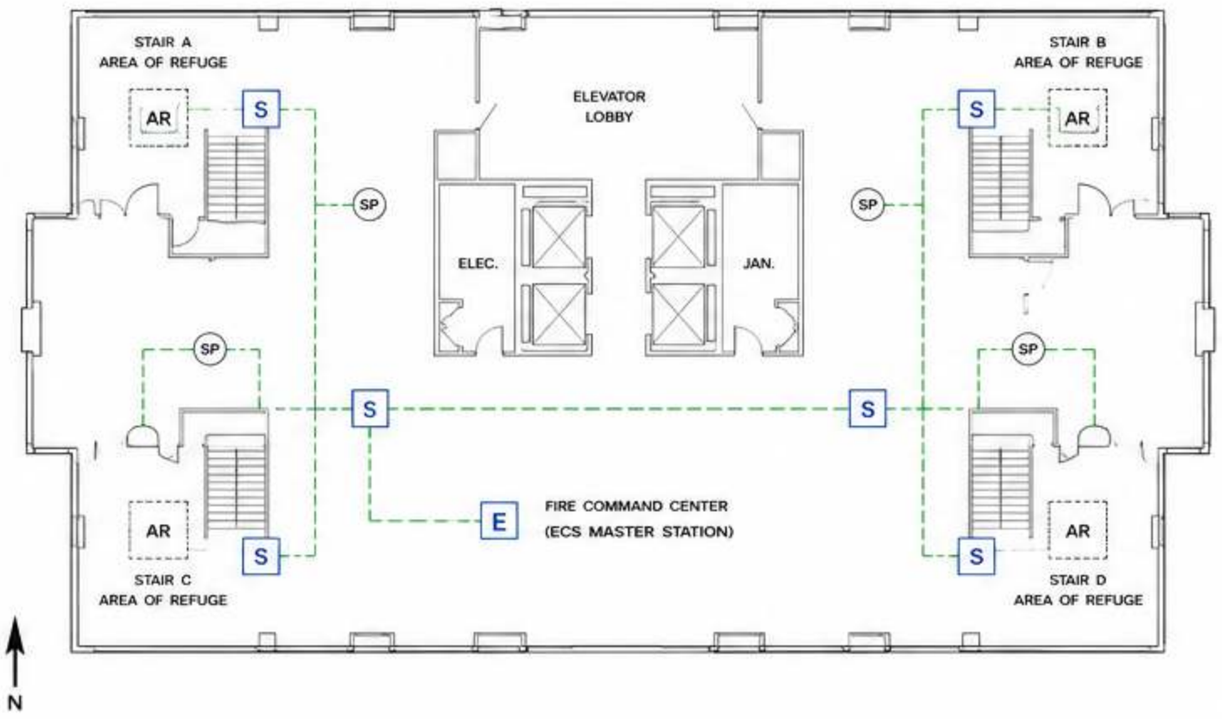
ECS NOTES

1. ALL ECS DEVICES SHALL BE U.L. LISTED FOR EMERGENCY COMMUNICATION.
2. WIRING SHALL BE IN CONDUIT / RACEWAY.
3. ECS SHALL BE OPERATIONAL DURING POWER LOSS.
4. ADA COMPLIANT PER ICC A117.1 SECTION 703.
5. VERIFY MOUNTING HEIGHTS AS SHOWN BELOW.

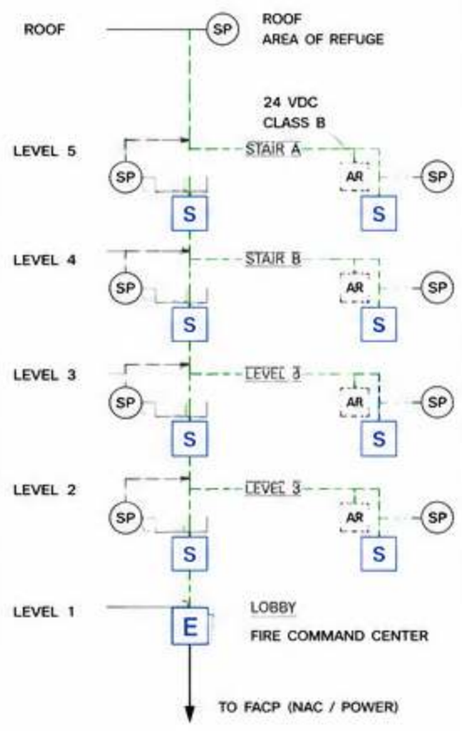
LEGEND

- E — ECS MASTER STATION
- S — ECS SUB-STATION
- SP — ECS SPEAKER / MICROPHONE
- AR — AREA OF REFUGE
- ECS CIRCUIT (CLASS B)
- CAT6 / ETHERNET

1. TYPICAL FLOOR PLAN – ECS DEVICE LAYOUT (LEVEL 3)



2. ECS RISER DIAGRAM



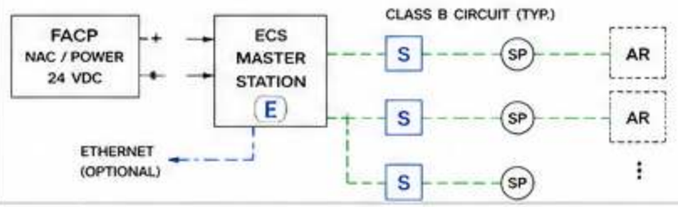
3. ECS DEVICE SCHEDULE

MARK	DESCRIPTION	QTY	MOUNTING HEIGHT	NOTES
E	ECS MASTER STATION	1	48" AFF	FIRE COMMAND CENTER
S	ECS SUB-STATION	8	48" AFF	IN AREAS OF REFUGE & ELEVATOR LOBBIES
SP	ECS SPEAKER / MICROPHONE	16	80" AFF	CEILING MOUNT
AR	AREA OF REFUGE	8	—	STAIR ENCLOSURES

4. ECS CIRCUIT MATRIX (CLASS B)

CIRCUIT ID	FROM (ECS PANEL)	TO (END DEVICE)	DEVICE COUNT (MAX. 50 PER CIRCUIT)	CABLE AWG
ECS-1	E	LEVEL 1 – ROOF	16	18 AWG
ECS-2	E	STAIR C – STAIR D	16	18 AWG
ECS-3	E	STAIR A – STAIR B	16	18 AWG
ECS-4	E	ELEVATOR LOBBIES	8	18 AWG

5. ECS SYSTEM CONNECTION DETAIL



6. TYPICAL DEVICE MOUNTING DETAILS

7. GENERAL NOTES

1. THE ECS SHALL BE FULLY SUPERVISED AND VISUALLY INDICATE FAULTS AT THE FACP.
2. COMMUNICATION SHALL BE TWO-WAY BETWEEN THE FIRE COMMAND CENTER AND ALL AREAS OF REFUGE.
3. ALL DEVICES SHALL BE U.L. LISTED AND COMPATIBLE WITH THE FACP.
4. MAINTAIN ACOUSTIC PRIVACY BETWEEN ADJACENT AREAS OF REFUGE.
5. TEST AND CERTIFY THE ENTIRE ECS SYSTEM PER NFPA 72 REQUIREMENTS.

8. ABBREVIATIONS

- ECS = EMERGENCY COMMUNICATION SYSTEM
- FACP = FIRE ALARM CONTROL PANEL
- AR = AREA OF REFUGE
- AFF = ABOVE FINISHED FLOOR
- NAC = NOTIFICATION APPLIANCE CIRCUIT
- SP = SPEAKER / MICROPHONE

PROJECT:	DESIGNER OF RECORD:	DRAWING TITLE:	DRAWING NO.:	SHEET:	DATE:	REV:
MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM	Applied Engineering Group	EMERGENCY COMMUNICATION SYSTEM (ECS) PLANS TWO-WAY EMERGENCY COMMUNICATION SYSTEM	FA-042	1 OF 1	MAY 24, 2024	0

FIRE ALARM & MASS NOTIFICATION SYSTEM – SPEAKER LAYOUTS

NFPA 72 COMPLIANT – MASS NOTIFICATION SYSTEM

PROJECT INFORMATION

PROJECT:	MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM
LOCATION:	–
DATE:	MAY 24, 2024
DESIGNED BY:	AEG
CHECKED BY:	–

DESIGN CRITERIA

1. COMPLY WITH NFPA 72, 2019, CHAPTER 24.
2. SPEAKERS SHALL BE LISTED FOR FIRE PROTECTIVE SIGNALING SERVICE (UL 1480).
3. MINIMUM AVERAGE SOUND LEVEL: 15 dBA ABOVE AMBIENT OR 5 dBA ABOVE MAXIMUM AVERAGE.
4. INTELLIGIBILITY: STI ≥ 0.50 (0.60 PREFERRED).
5. SPEAKER MOUNTING HEIGHT: 7'-6" AFF (TYP.)
6. ALL AREAS OF REFUGE SHALL BE COVERED.

SYSTEM SUMMARY

SYSTEM TYPE:	MASS NOTIFICATION
SYSTEM VOLTAGE:	25 / 70.7 V
POWER SOURCE:	FROM FACP
AMPLIFIER LOCATION:	IDF-1 – LEVEL 1
AMP OUTPUT POWER:	240 W PER CHANNEL
BACKUP POWER:	24 HRS STANDBY
WIRING METHOD:	CLASS B
CABLE TYPE:	FPLR / CL2P

SPEAKER NOTES

1. ALL MASS NOTIFICATION SPEAKERS SHALL BE APPROVED FOR FIRE ALARM USE.
2. WIRING SHALL BE IN CONDUIT IN ACCORDANCE WITH NEC AND LOCAL CODES.
3. SPEAKERS SHALL BE PHASED PER DESIGN TO MAINTAIN INTELLIGIBILITY.
4. MOUNT SPEAKERS CLEAR OF HVAC GRILLES, LIGHTS, AND OBSTRUCTIONS.

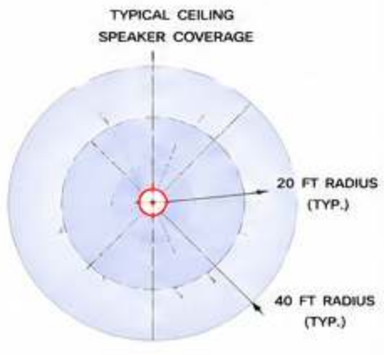
LEGEND

- CEILING SPEAKER (SP)
- HORN SPEAKER (HS)
- SPEAKER CIRCUIT (CLASS B)
- AMPLIFIER TO FACP

1. TYPICAL FLOOR PLAN – SPEAKER LAYOUT (LEVEL 3)

SPEAKER MOUNTING HEIGHT: 7'-6" AFF (TYP.)

2. SPEAKER COVERAGE DIAGRAM



COVERAGE ASSUMPTIONS	
CEILING HEIGHT:	9'-0" AFF
SPEAKER SPACING:	40 FT (MAX.)
MOUNTING HEIGHT:	7'-6" AFF
MIN. SPL AT 40 FT:	70 dBA (MIN.)
AMBIENT NOISE LEVEL:	45 dBA (TYP.)
MIN. REQUIRED SPL:	50 dBA (15 dBA ABOVE AMBIENT)

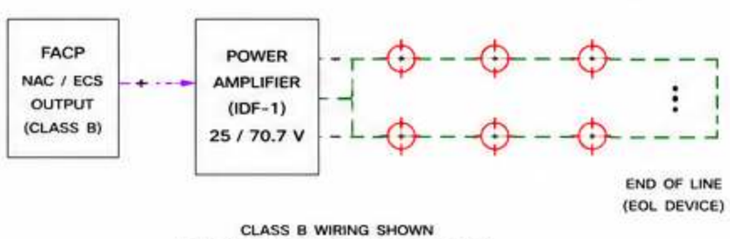
3. SPEAKER SCHEDULE

SYMBOL	DESCRIPTION	QTY	MOUNTING	AREA / LOCATION	NOTES
⊕	CEILING SPEAKER (25/70.7V)	48	7'-6" AFF	OFFICE AREAS, CORRIDORS, CONFERENCE ROOMS, LOBBIES	TYPICAL COVERAGE 40 FT RADIUS
□	HORN SPEAKER (WEATHERPROOF)	4	WALL / EXTERIOR	STAIR EXITS, PARKING GARAGE ENTRANCES	WEATHER RATED
TOTAL		52			

4. SPEAKER CIRCUIT SCHEDULE

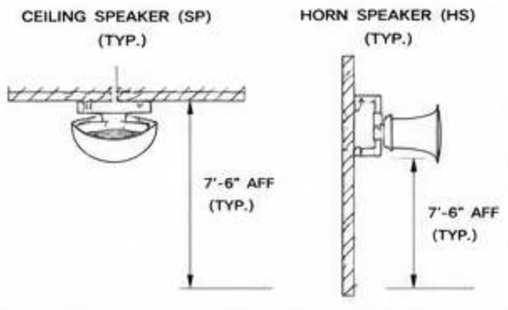
CIRCUIT ID	FROM (AMPLIFIER CH.)	TO (END OF LINE)	QTY SPEAKERS	WATTAGE (TOTAL)	CABLE AWG	NOTES
SPK-1	CH-1	SPEAKER 12	12	48 W	16	CLASS B
SPK-2	CH-2	SPEAKER 24	12	48 W	16	CLASS B
SPK-3	CH-3	SPEAKER 36	12	48 W	16	CLASS B
SPK-4	CH-4	SPEAKER 48	12	48 W	16	CLASS B
HS-1	CH-5	HORN SPEAKER 2	2	30 W	16	CLASS B
HS-2	CH-6	HORN SPEAKER 4	2	30 W	16	CLASS B
TOTAL			52	252 W		

5. SPEAKER WIRING DIAGRAM (CLASS B)

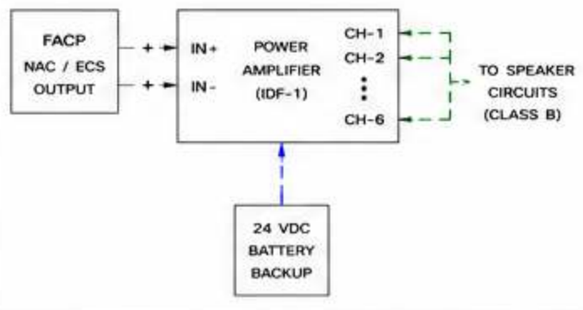


CLASS B WIRING SHOWN
(TYPICAL FOR ALL SPEAKER CIRCUITS)

6. SPEAKER MOUNTING DETAILS



7. AMPLIFIER / FACP CONNECTION DETAIL



8. GENERAL NOTES

1. ALL SPEAKERS SHALL BE LISTED FOR FIRE PROTECTIVE SIGNALING SERVICE.
2. VERIFY SOUND PRESSURE LEVELS (SPL) IN ALL AREAS PRIOR TO FINAL ACCEPTANCE.
3. COORDINATE SPEAKER LOCATIONS WITH ARCHITECT AND OTHER TRADES.
4. PROVIDE POLARITY MEGGER TEST FOR ALL SPEAKER CIRCUITS PRIOR TO ENERGIZATION.
5. REFER TO RISER DIAGRAM AND PANEL SCHEDULES FOR ADDITIONAL INFORMATION.

PROJECT:	DESIGNER OF RECORD:	DRAWING TITLE:	DRAWING NO.:	SHEET:	DATE:	REV:
MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM	Applied Engineering Group	MASS NOTIFICATION SYSTEM SPEAKER LAYOUTS – LEVEL 3 PLAN	FA-043	1 OF 1	MAY 24, 2024	0

FIRE ALARM SYSTEM – INPUT / OUTPUT POINT LIST

NFPA 72 COMPLIANT

PROJECT INFORMATION

PROJECT:	MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM
LOCATION:	—
DATE:	MAY 24, 2024
DESIGNED BY:	AEG
CHECKED BY:	—

DESIGN CRITERIA

1. COMPLY WITH NFPA 72, 2019.
2. ALL INPUT / OUTPUT POINTS SHALL BE SUPERVISED.
3. ALL DEVICES SHALL BE U.L. LISTED AND COMPATIBLE WITH THE FACP.
4. POINT DESCRIPTIONS SHALL MATCH SEQUENCE OF OPERATIONS AND RISER DIAGRAMS.
5. COORDINATE ALL POINTS WITH ARCHITECTURAL, MECHANICAL, AND ELECTRICAL DRAWINGS.

SYSTEM SUMMARY

FACP LOCATION:	IDF-1 – LEVEL 1
FACP MODEL:	NOTIFIER NFS2-640
TOTAL INPUT POINTS:	214
TOTAL OUTPUT POINTS:	156
SIGNALING LINE CIRCUITS:	4 (CLASS B)
NOTIFICATION CIRCUITS:	12 (CLASS B)
NAC POWER:	24 VDC, 20 A PER NAC

NOTES

1. ALL POINTS SHOWN ARE SUPERVISED AND ADDRESSABLE.
2. "*" INDICATES POINT IS USED IN MULTIPLE FUNCTIONS.
3. REFER TO CAUSE-AND-EFFECT MATRIX FOR ACTIONS.
4. REFER TO RISER DIAGRAMS FOR CIRCUIT DETAILS.
5. REFER TO DEVICE LOCATION PLANS FOR ADDRESSES.

LEGEND

INPUT DEVICES

- MANUAL PULL STATION
- DETECTOR / DEVICE
- MONITOR MODULE / CONTACT
- OTHER INPUT DEVICE

OUTPUT DEVICES

- NOTIFICATION APPLIANCE
- CONTROL RELAY / MODULE
- AUXILIARY OUTPUT

INPUT POINT LIST

POINT	TYPE	DESCRIPTION	DEVICE / LOCATION	ADDRESS	SLC LOOP	MODULE / MONITOR POINT	REMARKS
I-0001	■	FIRE ALARM PULL STATION	MAIN LOBBY – LEVEL 1	01-001	SLC-1	—	*
I-0002	■	FIRE ALARM PULL STATION	STAIR A – LEVEL 1	01-002	SLC-1	—	*
I-0003	●	SMOKE DETECTOR	OPEN OFFICE 101 – LEVEL 1	01-003	SLC-1	—	
I-0004	●	SMOKE DETECTOR	CONFERENCE ROOM 103 – L1	01-004	SLC-1	—	
I-0005	●	HEAT DETECTOR	ELEC. ROOM – LEVEL 1	01-005	SLC-1	—	*
I-0006	□	WATERFLOW SWITCH	FIRE RISER ROOM – LEVEL 1	01-006	SLC-1	MM-101	*
I-0007	□	SPRINKLER TAMPER SWITCH	FIRE RISER ROOM – LEVEL 1	01-007	SLC-1	MM-102	
I-0008	□	FIRE PUMP RUNNING	FIRE PUMP ROOM – LEVEL 1	01-008	SLC-1	MM-103	
I-0009	□	FIRE PUMP FAILURE	FIRE PUMP ROOM – LEVEL 1	01-009	SLC-1	MM-104	*
I-0010	△	ELEVATOR RECALL STATUS	ELEVATOR CONTROLLER – L1	01-010	SLC-1	MM-105	*
I-0011	□	HVAC SMOKE SHUTDOWN	AHU-1 – MECHANICAL ROOM	01-011	SLC-1	MM-106	*
I-0012	□	GENERATOR RUNNING	GENERATOR ROOM – LEVEL 1	01-012	SLC-1	MM-107	
I-0013	□	GENERATOR FAILURE	GENERATOR ROOM – LEVEL 1	01-013	SLC-1	MM-108	*
I-0014	△	SECURITY SYSTEM TROUBLE	SECURITY ROOM – LEVEL 1	01-014	SLC-2	MM-109	
⋮	⋮	⋮	⋮	⋮	⋮	⋮	
TOTAL INPUT POINTS							214

OUTPUT POINT LIST

POINT	TYPE	DESCRIPTION	DEVICE / LOCATION	ADDRESS	NAC / RELAY	MODULE / OUTPUT POINT	REMARKS
O-0001	●	AV HORN / STROBE	MAIN LOBBY – LEVEL 1	NAC-1-001	NAC-1	—	*
O-0002	●	SPEAKER	MAIN LOBBY – LEVEL 1	NAC-1-002	NAC-1	—	
O-0003	●	AV HORN / STROBE	STAIR A – LEVEL 1	NAC-1-003	NAC-1	—	*
O-0004	●	SPEAKER	STAIR A – LEVEL 1	NAC-1-004	NAC-1	—	
O-0005	■	FIRE ALARM RELAY	FIRE COMMAND CENTER	RLY-1	RLY-1	CRM-101	*
O-0006	■	SUPERVISORY RELAY	SUPERVISORY PANEL	RLY-2	RLY-1	CRM-102	
O-0007	■	WATERFLOW ALARM RELAY	BMS PANEL	RLY-3	RLY-1	CRM-103	
O-0008	■	HVAC SHUTDOWN RELAY	AHU-1 – MECHANICAL RM	RLY-4	RLY-2	CRM-104	*
O-0009	■	ELEVATOR RECALL RELAY	ELEVATOR CONTROLLER	RLY-5	RLY-2	CRM-105	*
O-0010	■	DOOR RELEASE RELAY	MAG LOCK DOORS (EGRESS)	RLY-6	RLY-2	CRM-106	
O-0011	◆	LED ANNUNCIATOR	SECURITY ROOM – LEVEL 1	AUX-1	AUX-1	XRM-101	
O-0012	●	SPEAKER CIRCUIT	LEVEL 2 – ZONE 1	NAC-2-001	NAC-2	—	
O-0013	●	AV HORN / STROBE	PARKING GARAGE – LEVEL P1	NAC-3-001	NAC-3	—	
O-0014	■	FIRE PUMP START RELAY	FIRE PUMP CONTROLLER	RLY-7	RLY-3	CRM-107	*
⋮	⋮	⋮	⋮	⋮	⋮	⋮	
TOTAL OUTPUT POINTS							156

POINT COUNT SUMMARY

INPUT POINTS					OUTPUT POINTS				SLC / CIRCUIT SUMMARY		
DETECTORS	MANUAL STATIONS	MONITOR MODULES / CONTACTS	OTHER INPUTS	TOTAL	NOTIFICATION APPLIANCES	CONTROL RELAYS	AUXILIARY OUTPUTS	TOTAL	SLC LOOPS (CLASS B)	NAC CIRCUITS (CLASS B)	RELAY / AUX MODULES
92	38	68	16	214	108	40	8	156	4	12	16

PROJECT:	DESIGNER OF RECORD:	DRAWING TITLE:	DRAWING NO.:	SHEET:	DATE:	REV:
MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM	Applied Engineering Group	INPUT / OUTPUT POINT LIST	FA-050	1 OF 1	MAY 24, 2024	0

FIRE ALARM & EMERGENCY COMMUNICATION SYSTEM ACCEPTANCE TEST FORM

NFPA 72 COMPLIANT

PROJECT INFORMATION	SYSTEM INFORMATION	TEST REQUIREMENTS	RESULTS LEGEND
PROJECT: MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM LOCATION: – DATE: MAY 24, 2024 CONTRACTOR: APPLIED ENGINEERING GROUP TESTED BY: _____ WITNESSED BY: _____	SYSTEM TYPE: ADDRESSABLE FACP LOCATION: IDF-1 – LEVEL 1 FACP MODEL: NOTIFIER NFS2-640 FACP S/N: NFS2-640-123456 SOFTWARE VERSION: V3.6 TOTAL POINTS: 214 INPUT / 150 OUTPUT SIGNALING LINE CIRCUITS: 4 (CLASS B) NOTIFICATION CIRCUITS: 12 (CLASS B) NAC POWER: 24 VDC, 20 A PER NAC BATTERY BACKUP: 24 HRS STANDBY	ALL TESTS SHALL COMPLY WITH: • NFPA 72, 2019 EDITION • PROJECT SPECIFICATIONS • MANUFACTURER'S REQUIREMENTS TEST METHODOLOGY: FUNCTIONAL TESTS PER NFPA 72 CHAPTER 14 AND PROJECT SPECS. DEFICIENCIES SHALL BE RESOLVED AND RE-TESTED PRIOR TO ACCEPTANCE.	[P] PASS [F] FAIL [NA] NOT APPLICABLE COMMENTS / DEFICIENCIES REQUIRE RE-TEST AND APPROVAL.

SECTION	DESCRIPTION	TEST PROCEDURE / CRITERIA	RESULT	COMMENTS / DEFICIENCIES
1.00	DOCUMENTATION REVIEW • Shop Drawings / As-Builts • Calculations • O&M Manuals • Device Listings / Certificates	Verify all required documentation is complete, current, and in compliance with NFPA 72 and project requirements.	[P] [F] [ ] NA	
2.00	VISUAL INSPECTION • Installation • Mounting / Clearances • Labeling / Identification • Wiring / Conduit	Verify system components are installed in accordance with drawings, specifications, and NFPA 72.	[P] [F] [ ] NA	
3.00	POWER SUPPLY TEST • Primary AC Power • Battery Backup • Grounding	Verify AC power present, battery connected and charging, and ground continuity. Verify system operates on battery power for minimum 24 hours.	[P] [F] [ ] NA	
4.00	FACP OPERATION • Normal Operation • LCD Display / Controls • Time / Date	Verify FACP indicates normal condition. Verify display, controls, time, and date operate correctly.	[P] [F] [ ] NA	
5.00	INITIATING DEVICE TEST • Smoke Detectors • Heat Detectors • Manual Stations • Waterflow Switches • Sprinkler Supervisory	Activate each initiating device. Verify correct point identification at FACP. Verify appropriate outputs occur.	[P] [F] [ ] NA	
6.00	SIGNALING LINE CIRCUITS • SLC Supervision • Open / Short Conditions • Ground Fault	Simulate open, short, and ground fault conditions. Verify trouble indications at FACP.	[P] [F] [ ] NA	
7.00	NOTIFICATION APPLIANCE TEST • Audible Appliances • Visible Appliances • Synchronization	Activate each NAC circuit. Verify all notification appliances operate correctly and are synchronized.	[P] [F] [ ] NA	
8.00	OUTPUT / RELAY TEST • Control Relays • Door Holders • Elevator Recall • HVAC Shutdown • Fire Pump Start	Verify each programmed output / relay operates as intended. Verify correct sequence and timing.	[P] [F] [ ] NA	
9.00	FIRE ALARM SIGNAL VERIFICATION • General Alarm • Alarm Transmission • Remote Annunciation	Verify general alarm occurs. Verify alarm signal received at remote annunciator(s) and monitoring station.	[P] [F] [ ] NA	
10.00	TROUBLE SIGNAL VERIFICATION • System Troubles • Supervisory Signals	Verify trouble conditions are annunciated at FACP and transmitted as required.	[P] [F] [ ] NA	
11.00	EMERGENCY COMMUNICATION SYSTEM • Master Station • Sub-Stations • Speaker / Microphone • Audible / Visual Signals	Verify two-way communication between master station and all sub-stations. Verify audible and visible signals per NFPA 72.	[P] [F] [ ] NA	
12.00	SYSTEM FUNCTIONS TEST • Cause-and-Effect Sequences • Delays • Cross-Zones	Verify all cause-and-effect sequences operate as designed. Verify all delays and cross-zone functions.	[P] [F] [ ] NA	
13.00	FINAL SYSTEM TEST • Complete System Test • Verify All Functions	Perform complete end-to-end system test. Verify all functions operate in accordance with requirements.	[P] [F] [ ] NA	

TEST RESULT (CHECK ONE)

- [ ] **SYSTEM ACCEPTED**
  ALL TESTS PASSED. SYSTEM ACCEPTED.
- [ ] **SYSTEM ACCEPTED WITH DEFICIENCIES**
  DEFICIENCIES NOTED SHALL BE CORRECTED AND RE-TESTED.
- [ ] **SYSTEM NOT ACCEPTED**
  MAJOR DEFICIENCIES EXIST. SYSTEM NOT ACCEPTED.

DEFICIENCIES / COMMENTS
(Use additional sheets if necessary)

_____
_____
_____
_____
_____
_____

CERTIFICATION

I certify that the fire alarm and emergency communication system has been tested in accordance with NFPA 72, the project specifications, and manufacturer's requirements, and the results are as recorded above.

TESTED BY: _____
SIGNATURE: _____
DATE: _____
WITNESSED BY: _____
SIGNATURE: _____
DATE: _____

PROJECT	DESIGNER OF RECORD	DRAWING TITLE	DRAWING NO.	SHEET	DATE	REV
MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM	APPLIED ENGINEERING GROUP	ACCEPTANCE TEST FORM	FA-060	1 OF 1	MAY 24, 2024	0

FIRE ALARM & EMERGENCY COMMUNICATION SYSTEM

RECORD DRAWING (AS-BUILT)

NFPA 72 COMPLIANT

PROJECT INFORMATION	
Project:	Multi-Story Commercial Building
Address:	123 Business Park Drive
City, State:	Anytown, USA 12345
Contractor:	Applied Engineering Group
Project No.:	P-2401
Date:	May 24, 2024

RECORD DRAWING INFORMATION

This drawing is a record of the system installation as constructed.

All information shown is based on field verification and redline markups.

Date of Field Survey: May 20 – May 23, 2024

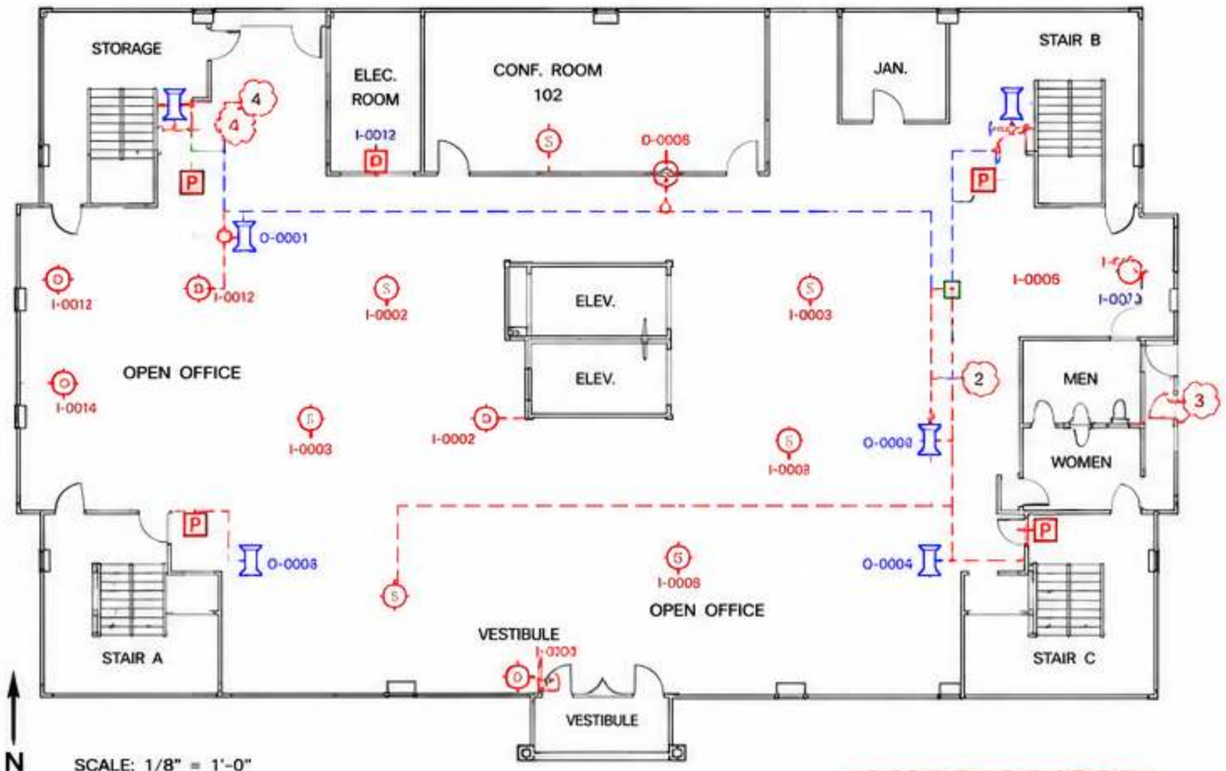
Drawn By: AEG

Checked By: JSJ

REVISION HISTORY

REV	DESCRIPTION	DATE	BY
0	ISSUED FOR RECORD	05/24/24	AEG
1	AS-BUILT UPDATE	05/24/24	AEG

LEVEL 1 – FIRE ALARM PLAN (AS-BUILT)



GENERAL NOTES (AS-BUILT)

1. All devices shown are installed as indicated.
2. Device locations are based on field survey measurements and verified in the field.
3. Circuit routing is shown diagrammatically. Refer to panel schedules for additional information.
4. All field changes are clouded and noted.

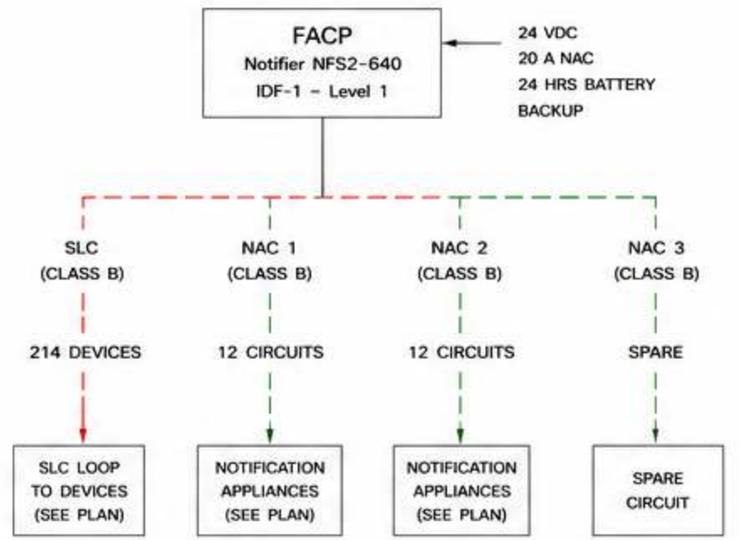
AS-BUILT LEGEND

- Field Change / Deviation
- Circuit Routing (Verified)
- SLC Circuit (Verified)
- NAC Circuit (Verified)
- Δ Device Relocated (See Notes)

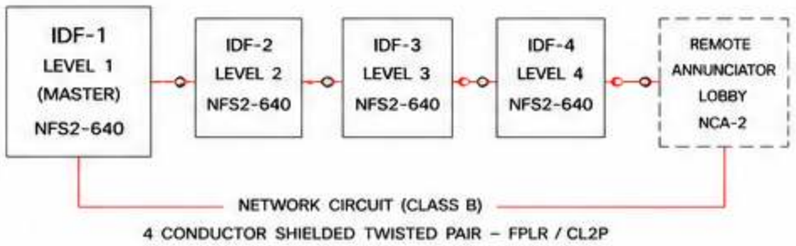
FIELD CHANGES / DEVIATIONS

1. Smoke detector I-0009 relocated 6' west.
2. Horn/strobe O-0003 relocated 4' south.
3. Pull station I-0006 mounted 48" AFF (was 42" AFF).
4. Added spare pull station in storeroom (I-0015).

FACP RISER DIAGRAM (AS-BUILT)



FACP PANEL INTERCONNECTION (AS-BUILT)



SYMBOL LEGEND (AS-BUILT)

SYMBOL	DESCRIPTION
P	MANUAL PULL STATION
S	SMOKE DETECTOR
H	HEAT DETECTOR
	WATERFLOW SWITCH
	SPRINKLER TAMPER SWITCH
	HORN / STROBE
	SPEAKER
	CONTROL MODULE
	MONITOR MODULE
	AUXILIARY DEVICE

CIRCUIT SUMMARY (AS-BUILT)

CIRCUIT	TYPE	CLASS	DEVICES
SLC LOOP	SLC	B	214
NAC 1	NOTIF.	B	12
NAC 2	NOTIF.	B	12
NAC 3 (SPARE)	NOTIF.	B	0

ABBREVIATIONS

FACP	Fire Alarm Control Panel
SLC	Signaling Line Circuit
NAC	Notification Appliance Circuit
NCA	Network Control Annunciator
AFF	Above Finished Floor
IDF	Intermediate Distribution Frame
FPLR	Fire Power Limited Riser
CL2P	Class 2 Power Limited

AEG
APPLIED ENGINEERING GROUP
123 Innovation Way, Suite 100
Anytown, USA 12345
(555) 123-4567

PROJECT	DRAWING TITLE	DRAWN BY	SCALE	DRAWING NO.	REV.
Multi-Story Commercial Building 123 Business Park Drive Anytown, USA 12345	FIRE ALARM & EMERGENCY COMMUNICATION SYSTEM RECORD DRAWING (AS-BUILT) LEVEL 1 PLAN, RISER & DETAILS	AEG	As Shown	FA-100R	1
		CHECKED BY: JSJ	DATE: 05/24/2024	SHEET: 1 OF 6	

FIRE ALARM & EMERGENCY COMMUNICATION SYSTEM INSPECTION & TESTING REPORT

NFPA 72 COMPLIANT

PROJECT INFORMATION	
PROJECT:	MULTI-STORY COMMERCIAL BUILDING FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM
LOCATION:	123 BUSINESS PARK DRIVE ANYTOWN, ST 12345
DATE:	MAY 24, 2024
CONTRACTOR:	APPLIED ENGINEERING GROUP
TECHNICIAN(S):	J. SMITH / R. JOHNSON
WEATHER / CONDITIONS:	72°F / CLEAR

SYSTEM INFORMATION	
SYSTEM TYPE:	ADDRESSABLE
FACP LOCATION:	IDF-1 – LEVEL 1
FACP MODEL:	NOTIFIER NFS2-640
FACP S/N:	NFS2-640-123456
SOFTWARE VERSION:	V3.0
TOTAL POINTS:	216 INPUT / 156 OUTPUT
SIGNALING LINE CIRCUITS:	4 (CLASS B)
NOTIFICATION CIRCUITS:	12 (CLASS B)
NAC POWER:	24 VDC, 2.0 A PER NAC
BATTERY BACKUP:	24 HRS STANDBY

REPORT INFORMATION	
REPORT NO.:	ITR-240524-01
INSPECTION / TEST DATE(S):	MAY 22 – MAY 24, 2024
SCOPE:	COMPLETE SYSTEM INSPECTION, TESTING, AND VERIFICATION PER NFPA 72 AND PROJECT SPECIFICATIONS.
TEST METHOD:	FUNCTIONAL TESTING

RESULTS SUMMARY	
TOTAL INSPECTION ITEMS:	78
PASSED:	74
FAILED:	2
NOT APPLICABLE:	2

OVERALL RESULT:

- [x] PASS
- [ ] FAIL
- [ ] CONDITIONAL

ITEM NO.	INSPECTION / TEST ITEM	REFERENCE (NFPA 72)	REQUIREMENT / TEST PROCEDURE	RESULT	COMMENTS / DEFICIENCIES
1	DOCUMENTATION REVIEW	7.4	Verify all required documentation is available, current, and accurate.	[x] PASS [ ] FAIL [ ] N/A	–
2	VISUAL INSPECTION	7.4.1	Verify installation, labeling, wiring, and device placement per drawings and requirements.	[x] PASS [ ] FAIL [ ] N/A	–
3	POWER SUPPLY / BATTERY	10.6	Verify AC power present, battery connected, and system operates on battery for minimum 24 hours.	[x] PASS [ ] FAIL [ ] N/A	Voltage: 27.2 VDC Load Test: 24 hr 15 min
4	FACP OPERATION	7.4.2	Verify indicator lights, display, controls, and internal functions operate correctly.	[x] PASS [ ] FAIL [ ] N/A	All functions normal
5	INITIATING DEVICE TEST	14.4	Test all initiating devices for proper alarm transmission and point identification.	[x] PASS [ ] FAIL [ ] N/A	All devices tested
6	SIGNALING LINE CIRCUITS	10.5	Test open, short, and ground conditions. Verify trouble indications at FACP.	[x] PASS [ ] FAIL [ ] N/A	All SLCs normal
7	NOTIFICATION APPLIANCE TEST	18.4	Test all notification appliances for operation and proper supervision.	[x] PASS [ ] FAIL [ ] N/A	All appliances functional
8	OUTPUT / RELAY TEST	18.5	Verify all control outputs / relays operate as programmed.	[x] PASS [ ] FAIL [ ] N/A	All relays operated
9	FIRE ALARM SIGNAL VERIFICATION	7.4.3	Verify alarm signal received at remote supervising station and monitoring.	[x] PASS [ ] FAIL [ ] N/A	Signal received at Central Station
10	TROUBLE SIGNAL VERIFICATION	7.4.3	Verify trouble signals are transmitted and displayed at FACP and remote station.	[ ] PASS [x] FAIL [ ] N/A	AC Loss Trouble not received at Central Station. See Deficiency #1.
11	EMERGENCY COMMUNICATION SYSTEM	24.4	Test two-way communication between all master station and sub-stations.	[x] PASS [ ] FAIL [ ] N/A	All circuits normal
12	MASS NOTIFICATION SYSTEM	24.6	Verify messages audible, intelligible, and synchronized as required.	[x] PASS [ ] FAIL [ ] N/A	All zones within requirements

DEFICIENCIES / OBSERVATIONS

1. AC Loss Trouble signal not received at Central Station.
   Cause: Incorrect programming of trouble report code.
   Corrective Action: Reprogrammed and retested – Passed.
2. Corridor Horn Speaker on Level 5 not secured properly.
   Cause: Loose mounting bracket.
   Corrective Action: Tightened and retested – Passed.
3.
4.
5.

NOTES

- System tested in accordance with NFPA 72, 2019 Edition, and project specifications.
- All testing performed using calibrated instruments.
- All devices were in normal condition at time of test.
- Any deficiencies have been corrected and retested unless otherwise noted.

TEST EQUIPMENT USED

EQUIPMENT	MANUFACTURER	MODEL	SERIAL NO.	CAL DUE DATE
Multimeter	Fluke	117	98820345	11/15/2024
Battery Analyzer	Midtronics	MDX-600	81234567	10/20/2024
Smoke Tester	Solo	330	5330-7891	09/30/2024
Sound Level Meter	Extech	407730	170820456	12/01/2024

CONTRACTOR / TESTER

I certify that the above-identified system was inspected, tested, and verified in accordance with NFPA 72 and the project specifications.

NAME: JAMES SMITH
SIGNATURE: James Smith
TITLE: NICET Level IV – Fire Alarm Systems
DATE: MAY 24, 2024

OWNER / REPRESENTATIVE

I acknowledge receipt of this Inspection & Testing Report and that the system has been demonstrated as operational.

NAME: MICHAEL BROWN
SIGNATURE: Michael Brown
TITLE: FACILITY MANAGER
DATE: MAY 24, 2024

AHJ / INSPECTOR (if applicable)

Review of this report and field verification of the system was completed.

NAME:
SIGNATURE:
TITLE:
DATE:

FIRE ALARM

FIRE ALARM & EMERGENCY COMMUNICATION SYSTEM
INSPECTION & TESTING REPORT
NFPA 72 COMPLIANT

Report No.: ITR-2024-001
Date of Test: May 24, 2024

PROJECT INFORMATION		SYSTEM INFORMATION		TEST INFORMATION	
Project:	Multi-Story Commercial Building	FACP Location:	IDF-1 – Level 1	Date(s) of Inspection:	May 22 – May 24, 2024
Location:	—	FACP Model:	Notifier NFS2-640	Start Time:	08:30 AM
Address:		FACP S/N:	NFS2-640-123456	End Time:	04:45 PM
Contractor:	Applied Engineering Group	Total Points:	214 Input / 156 Output	Weather / Conditions:	Indoor
Project No.:	P-2401	SL Circuits:	4 (Class B)	Test Performed By:	John Smith (NICET III #123456)
System Type:	Addressable FACP	Notification Circuits:	12 (Class B)	Assisted By:	Mike Brown (NICET II #789012)
Standard:	NFPA 72 (2019 Edition)	NAC Power:	24 VDC, 20 A per NAC	Witness / Owner Rep.:	Steve Johnson
		Battery Backup:	24 Hrs Standby	Purpose:	☑ New System ☐ Periodic ☑ Acceptance

ITEM NO.	INSPECTION / TEST DESCRIPTION	REFERENCE (NFPA 72)	TEST METHOD / CRITERIA	RESULT			REMARKS / DEFICIENCIES
				PASS	FAIL	NA	
1.0	Documentation Review (Drawings, O&M, Certificates)	72-24.14	Verify complete, current and compliant	✓			Complete
2.0	Visual Inspection – Installation & Mounting	72-14.4	Verify per plans, clearances, labeling	✓			No deficiencies
3.0	Power Supply – AC Power	72-10.6	Verify primary power present, polarity	✓			120 VAC Normal
4.0	Battery Backup	72-10.6.3	Verify battery voltage 24 VDC, charged	✓			24.6 VDC Normal
5.0	Fire Alarm Control Panel Operation	72-14.4	Verify LCD, time/date, indicators, keys	✓			All functions normal
6.0	Initiating Devices Test	72-14.4	Test each device, verify correct point ID	✓			All points OK
7.0	Notification Appliances Test (Audible/Visual)	72-18.4	Verify operation; dBA & candela per design	✓			All NACs tested
8.0	Speaker / ECS System Test	72-24.4	Verify intelligibility & volume at all areas	✓			Avg. 72 dBA / Clarity 0.75
9.0	Strobe / Visual Appliance Test	72-18.5	Verify candela output at rated locations	✓			All within range
10.0	Control Relays & Outputs	72-14.4	Verify each relay/output energizes correctly	✓			All relays OK
11.0	Supervisory Signal Test	72-14.4	Open circuits / missing devices	✓			All supervised OK
12.0	Trouble Signal Verification	72-14.4	Simulate troubles; verify annunciation	✓			All troubles annunciated
13.0	Network / Communication Test	72-24.5	Verify device communication & latency	✓			All devices online
14.0	Emergency Communication System (ECS)	72-24.4	Two-way communication; audibility	✓			ECS operational
15.0	Functional Test (Cause & Effect)	72-14.4	Verify sequences, cross-zones, delays	✓			All sequences OK

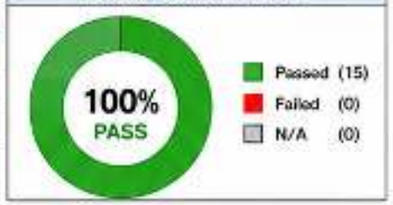
TEST RESULTS SUMMARY

Total Items Tested	15
Passed	15
Failed	0
Not Applicable	0
Overall Result	PASS

DEFICIENCIES / CORRECTIVE ACTIONS (If Any)

Item No.	Description of Deficiency	Corrective Action Taken	Date Closed
	--- NONE ---		

RESULT SUMMARY CHART



TEST EQUIPMENT USED

Equipment / Instrument	Make / Model	Serial No.	Calibration Due Date
Digital Multimeter	Fluke 87V	9876543	02/12/2025
Sound Level Meter	Extech 407730	SML-11234	03/15/2025
Candela Meter	Sekonic C-7000	CMD-55678	03/01/2025
Battery Load Tester	Midtronics MDX-640	BLT-33445	01/28/2025

GENERAL NOTES

- All testing performed in accordance with NFPA 72 (2019 Edition).
- All devices were tested through FACP and by manual activation.
- All results are true and correct at time of testing.
- System is fully functional as designed unless noted otherwise.
- Report contains inspection and test results for entire system.

TESTED BY	ASSISTED BY	WITNESSED BY (Owner/Rep.)	APPROVED BY (Contractor)
John Smith	Mike Brown	Steve Johnson	David Lee
John Smith	Mike Brown	Steve Johnson	David Lee
NICET III #123456	NICET II #789012		Project Manager
Date: May 24, 2024	Date: May 24, 2024	Date: May 24, 2024	Date: May 24, 2024

✓ SYSTEM ACCEPTED
All Tests Passed

FIRE ALARM SYSTEM INSPECTION

Protect Lives. Protect Property. Stay Compliant.

Regular inspection and maintenance of fire alarm systems ensures reliable operation when it matters most. This inspection is performed in accordance with **NFPA 72 – National Fire Alarm and Signaling Code.**

PURPOSE

To verify that all components of the fire alarm system are operating properly and in accordance with applicable codes and standards.

INSPECTION FREQUENCY

- Visual Inspection: Monthly
- Functional Testing: Quarterly
- Full System Test: Annually (or as required by AHJ)

WHO SHOULD PERFORM THE INSPECTION?

A qualified individual trained in fire alarm systems and familiar with NFPA 72 requirements.

SIGNS YOUR SYSTEM NEEDS ATTENTION

- Trouble or alarm signals
- Device beeping or chirping
- Visible damage
- System component missing
- Building changes or renovations
- After fire, smoke, water or severe weather

COMMON FIRE ALARM SYSTEM COMPONENTS

- Control Panel
- Smoke Detectors
- Heat Detectors
- Manual Pull Stations
- Notification Appliances (Strobes, Horns, Speakers)
- Wiring / Circuits

FIRE ALARM SYSTEM INSPECTION CHECKLIST

INSPECTION ITEM	STATUS		
	PASS	FAIL	N/A
1. CONTROL PANEL			
• Panel operating normally (no trouble/alarm)	☐	☐	☐
• Date and time are correct	☐	☐	☐
• All annunciator LEDs functional	☐	☐	☐
• Battery condition normal	☐	☐	☐
• Adequate printer paper (if applicable)	☐	☐	☐
• No loose or damaged wiring	☐	☐	☐
2. INITIATING DEVICES			
• Smoke detectors clean and undamaged	☐	☐	☐
• Heat detectors clean and undamaged	☐	☐	☐
• Duct smoke detectors functional	☐	☐	☐
• Manual pull stations accessible and unobstructed	☐	☐	☐
• Waterflow switches in normal position	☐	☐	☐
3. NOTIFICATION APPLIANCES			
• Horns, strobes, and speakers functional	☐	☐	☐
• Visible notification appliances unobstructed	☐	☐	☐
• Appliance covers in place and undamaged	☐	☐	☐
• Correct candela settings (for strobes)	☐	☐	☐
4. WIRING / CIRCUITS			
• No open or short circuits	☐	☐	☐
• All wiring secure and protected	☐	☐	☐
• Conduit and raceways intact	☐	☐	☐
• Circuit labels are accurate and legible	☐	☐	☐
5. BACKUP POWER			
• Batteries within manufacturer date	☐	☐	☐
• Voltage within acceptable range	☐	☐	☐
• Charger operation normal	☐	☐	☐
• No corrosion or leaks	☐	☐	☐
6. SYSTEM FUNCTIONS			
• Alarm signal initiates properly	☐	☐	☐
• Notification appliances activate	☐	☐	☐
• Supervisory signals operate	☐	☐	☐
• Trouble signals operate	☐	☐	☐
• Signals received at monitoring station (if applicable)	☐	☐	☐
7. DOCUMENTATION & COMPLIANCE			
• Record of inspections up to date	☐	☐	☐
• Correct drawings and device maps available	☐	☐	☐
• System modifications documented	☐	☐	☐
• Complies with NFPA 72 and AHJ requirements	☐	☐	☐

BENEFITS OF REGULAR INSPECTIONS

- ✓ Ensures system reliability
- ✓ Protects occupants and property
- ✓ Meets code and insurance requirements
- ✓ Reduces false alarms
- ✓ Extends equipment life
- ✓ Provides peace of mind

INSPECTION RESULT

PASS	System is operating as intended.
FAIL	Issues found – corrective action required.
N/A	Not applicable to this system.

AFTER A FAILED INSPECTION

All deficiencies must be corrected promptly.

Re-inspection may be required to verify corrections.

IMPORTANT REMINDERS

- Do not block or paint over devices.
- Keep system components accessible.
- Report any alarms or troubles immediately.
- Schedule regular inspections with a qualified provider.

INSPECTION RECORD

Date: _____

Inspector: _____

Company: _____

Signature: _____

Next Inspection Due: _____