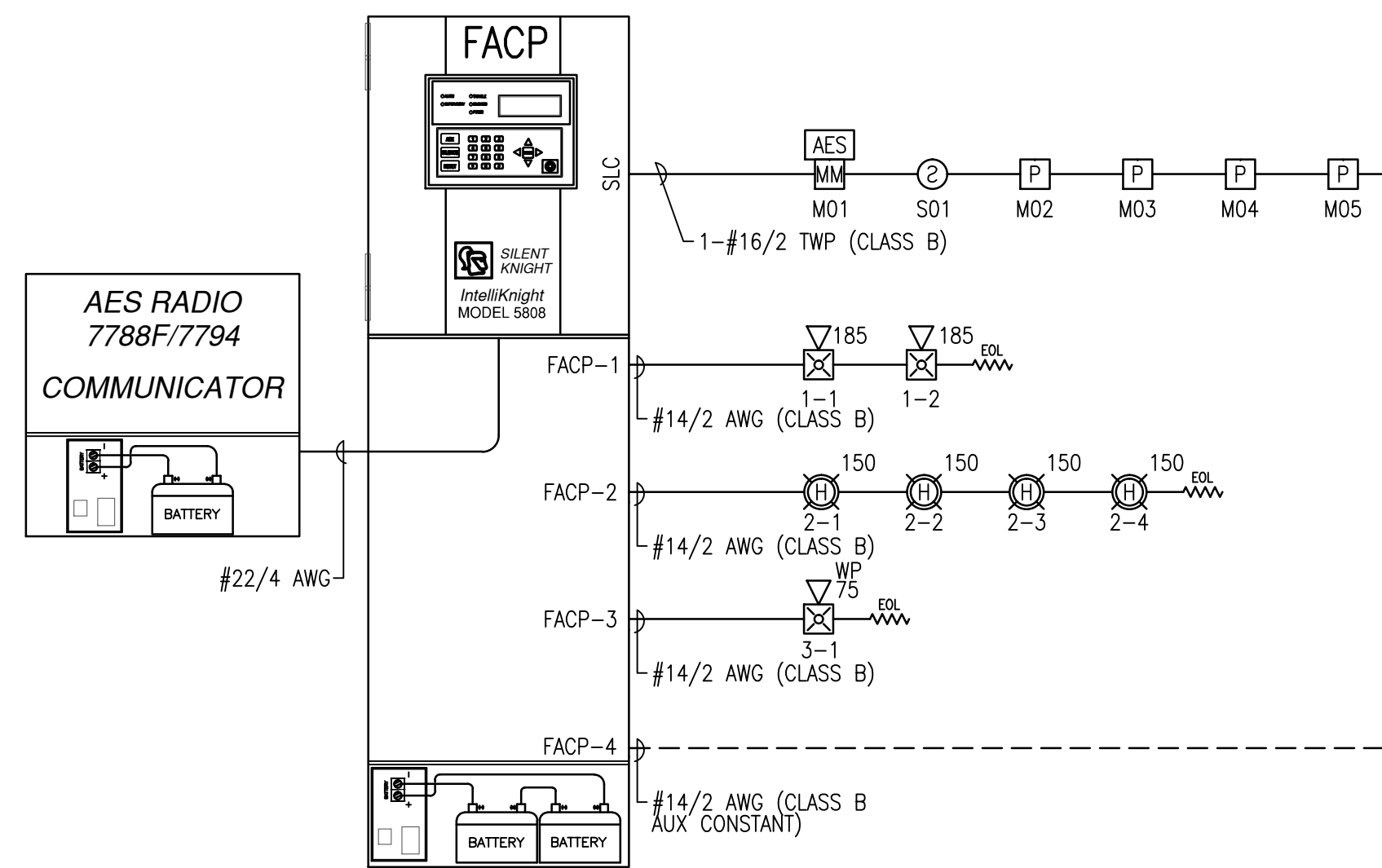


FIRE ALARM RISER DIAGRAM

SCALE: NOT TO SCALE



FIRE ALARM SYMBOL LEGEND

NOTE: ALL SYMBOLS MAY NOT BE USED ON THIS PROJECT

SYMBOL	DESCRIPTION	MOUNTING
[FACP]	FIRE ALARM CONTROL PANEL	WALL-TOP @ 66"
[AES]	FIRE ALARM POWER SUPPLY	FIELD VERIFY
[RTS]	FIRE SYSTEM ANNUNCIATOR	WALL-TOP @ 66"
(S)	SMOKE DETECTOR	CEILING
(S) with H	BEAM SMOKE DETECTOR RECEIVER W/ HEATER	FIELD VERIFY
(S) with T	BEAM SMOKE DETECTOR TRANSMITTER W/ HEATER	FIELD VERIFY
(S) with 1	HEAT DETECTOR	CEILING
[MM]	ADDRESSABLE MONITOR MODULE	FIELD VERIFY
[P]	MANUAL PULL STATION	WALL @ 48"
(S) with H	CEILING MOUNT HORN / STROBE	FIELD VERIFY
(S) with H and WP	HORN / STROBE	WALL 80"-96"
(S) with H and WP	WEATHER PROOF HORN / STROBE	WALL 80"-96"
(S)	STROBE	WALL 80"-96"

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

GENERAL NOTES:

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

APPLICABLE CODES

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

Point to Point NAC Voltage Drop Calculation 10/19/2017

Project Name: U-Haul Storage Building
Circuit Number: FACP-1

Nominal System Voltage	20.4	volts	Wire Gauge	14	Resistance Per 1000	3.07
Minimum Device Voltage	16.0	volts				
Distance from source to 1st device	25	feet				
Wire Gauge for balance of circuit				14		3.07

Max Output Current: 3.00 amps
Total Circuit Current: 0.490 amps
End of Line Voltage: 20.14 volts

Device	Current	Distance previous device	Voltage at Device	Drop from source	Percent Drop
Device 1	0.245	25	20.32	0.075	0.37%
Device 2	0.245	120	20.14	0.256	1.25%
Totals	0.490	145			

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

Point to Point NAC Voltage Drop Calculation 10/19/2017

Project Name: U-Haul Storage Building
Circuit Number: FACP-2

Nominal System Voltage	20.4	volts	Wire Gauge	14	Resistance Per 1000	3.07
Minimum Device Voltage	16.0	volts				
Distance from source to 1st device	55	feet				
Wire Gauge for balance of circuit				14		3.07

Max Output Current: 3.00 amps
Total Circuit Current: 0.868 amps
End of Line Voltage: 19.76 volts

Device	Current	Distance previous device	Voltage at Device	Drop from source	Percent Drop
Device 1	0.217	55	20.11	0.293	1.44%
Device 2	0.217	25	20.01	0.393	1.93%
Device 3	0.217	80	19.79	0.606	2.97%
Device 4	0.217	25	19.76	0.640	3.14%
Totals	0.868	185			

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

Point to Point NAC Voltage Drop Calculation 10/19/2017

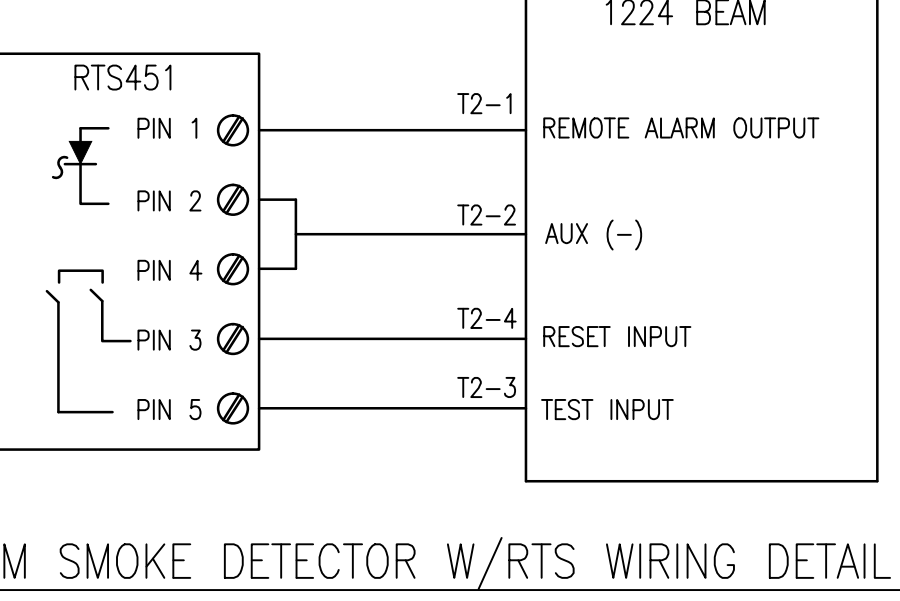
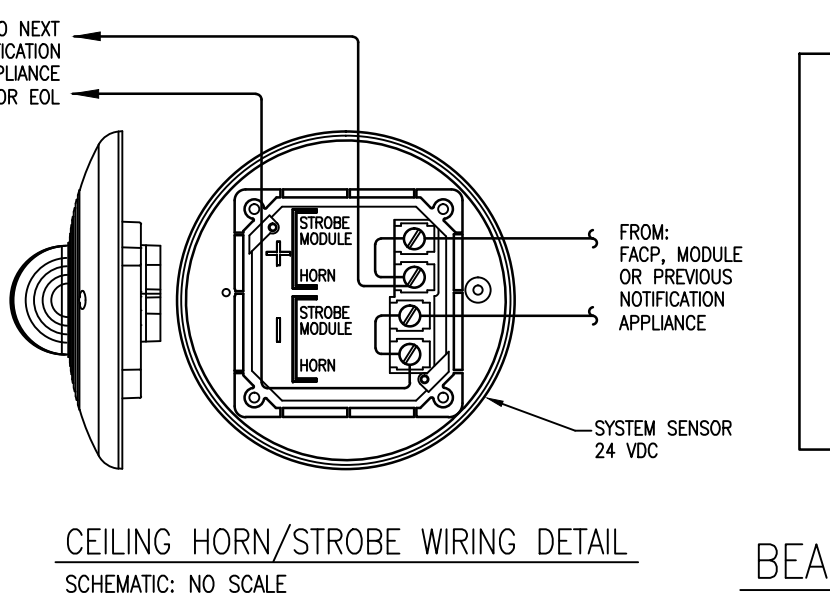
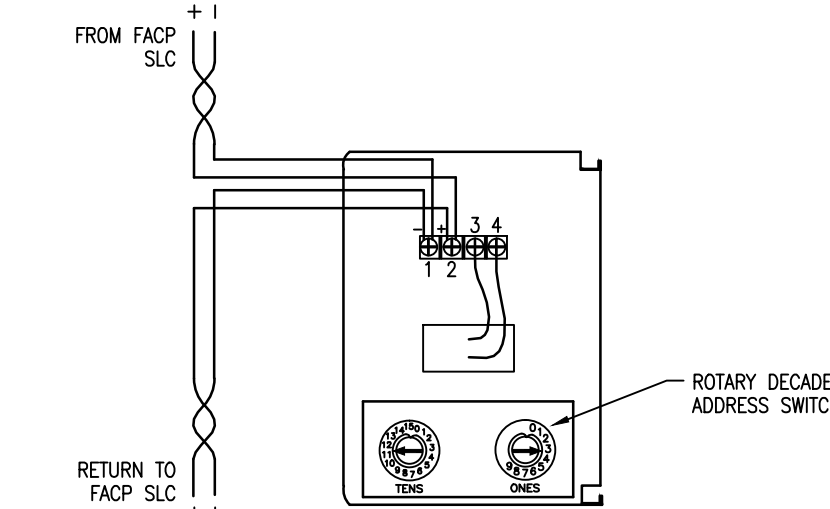
Project Name: U-Haul Storage Building
Circuit Number: FACP-3

Nominal System Voltage	20.4	volts	Wire Gauge	14	Resistance Per 1000	3.07
Minimum Device Voltage	16.0	volts				
Distance from source to 1st device	30	feet				
Wire Gauge for balance of circuit				14		3.07

Max Output Current: 3.00 amps
Total Circuit Current: 0.176 amps
End of Line Voltage: 20.37 volts

Device	Current	Distance previous device	Voltage at Device	Drop from source	Percent Drop
Device 1	0.176	30	20.37	0.032	0.16%
Totals	0.176	30			

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



Point to Point NAC Voltage Drop Calculation 11/15/2017

Project Name: U-Haul Storage Building
Circuit Number: FACP-4

Nominal System Voltage	20.4	volts	Wire Gauge	14	Resistance Per 1000	3.07
Minimum Device Voltage	16.0	volts				
Distance from source to 1st device	45	feet				
Wire Gauge for balance of circuit				14		3.07

Max Output Current: 3.00 amps
Total Circuit Current: 0.964 amps
End of Line Voltage: 19.71 volts

Device	Current	Distance previous device	Voltage at Device	Drop from source	Percent Drop
Device 1	0.092	45	20.13	0.266	1.31%
Device 2	0.390	5	20.11	0.293	1.44%
Device 3	0.092	130	19.72	0.678	3.32%
Device 4	0.390	5	19.71	0.690	3.38%
Totals	0.964	185			

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

FACP Battery Calculation 11/15/2017

PROJECT NAME: U-Haul Storage Building
Required Standby Time: 24 Hours
Required Alarm Time: 5 Minutes

AC Branch Current: Amps @ 120V

Regulated Load in Standby				
Device Type	Number of Devices	Current (Amps)		Total Current (Amps)
FACP MAINBOARD	1	X	0.17000	= 0.17000
SMOKE DETECTOR	1	X	0.00030	= 0.00030
HEAT DETECTOR	1	X	0.00030	= 0.00030
MONITOR MODULE	2	X	0.00040	= 0.00080
BEAM HEATERS	1	X	0.39000	= 0.39000
BEAM SMOKE	1	X	0.01700	= 0.01700
PULL STATION	7	X	0.00030	= 0.00210
TOTAL STANDBY LOAD				0.58050

Regulated Load in ALARM				
Device Type	Number of Devices	Current (Amps)		Total Current (Amps)
FACP MAINBOARD	1	X	0.36500	= 0.36500
SMOKE DETECTOR	1	X	0.00650	= 0.00650
HEAT DETECTOR	1	X	0.00650	= 0.00650
MONITOR MODULE	2	X	0.00550	= 0.01100
BEAM SMOKE	1	X	0.03900	= 0.03900
PULL STATION	7	X	0.00030	= 0.00210
FACP-1 (See Voltage Drop Calculations)	1	X	0.49000	= 0.49000
FACP-2 (See Voltage Drop Calculations)	1	X	0.86800	= 0.86800
FACP-3 (See Voltage Drop Calculations)	1	X	0.17600	= 0.17600
FACP-4 (AUX CONSTANT)	1	X	0.96400	= 0.96400
TOTAL ALARM LOAD				2.92810

Battery Requirements

Standby Load		Required Standby Time in Hours	
Current (Amps)	0.58050	X	24.00000 = 13.93200
Alarm Load		Required Alarm Time in Hours	
Current (Amps)	2.92810	X	0.08333 = 0.24401
Total Ampere Hours (before derating factor)			14.17601
Derating Factor		X	1.2
TOTAL AMPERE HOURS REQUIRED			17.01121
BATTERIES TO BE PROVIDED (2 - 12v)			20 AH

OPERATIONS MATRIX

	FIRE ALARM INPUT	FIRE ALARM OUTPUT	ACTIVATE ALARM INDICATOR	ACTIVATE AUDIBLE ALARM	ACTIVATE TROUBLE INDICATOR	ACTIVATE AUDIBLE TROUBLE INDICATOR	TRANSMIT ALARM SIGNAL	TRANSMIT TROUBLE SIGNAL	ACTIVATE NOTIFICATION APPLIANCES
SMOKE DETECTORS (SPOT OR BEAM)			●	●			●		●
HEAT DETECTORS			●	●			●		●
PULL STATIONS			●	●			●		●
FIRE ALARM AC POWER FAIL					●	●			
FIRE ALARM LOW BATTERY					●	●			
OPEN CIRCUIT					●	●			
GROUND FAULT					●	●			
NAC SHORT CIRCUIT					●	●			
LOSS OF AC TO BUILDING					●	●			

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Wayne B. Hawes / Signature
Date: 11/15/17
Fire Protection Engineering
Technology
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PORTLAND, ME

NOTES, DETAILS, RISER DIAGRAM & CALCULATIONS

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