NAC #17 - 17TH FLOOR

NAC SCHEDULE / VOLTAGE DROP CALCULATION
20 % MAXIMUM VOLTAGE DROP FROM A WORSE CASE
CIRCUIT OUTPUT VOLTAGE = 19.5 (FOR CALCULATIONS)

CIRCUIT	DESCRIPTION	CIRCUIT TYPE	CEIL S/V 4906-9154 15cd 0.075000	CEIL S/V 4906-9154 30cd 0.125000	CEIL S/V 4906-9154 75cd 0.233000	CEIL S/V 4906-9154 110cd 0.316000	TOTAL CKT. LOAD (AMPS)	WIRE GAUGE (18, 16, 14, 12)	ESTIMATED CIRCUIT LENGTH	ACTUAL VOLTAGE DROP %	ACTUAL VOLTAGE DROP (VOLTS)	TOTAL CIRCUIT RESISTANCE	MAXIMUM ALLOWABLE CKT. LENGTH
CKT #1	9201:17A-N1 - LEVEL 17	B	6	4	0	1	1.266	14	400 ft.	15.24%	3.109	2.5 Ohms	450 ft.
CKT #2	9201:17A-N1 - LEVEL 17	B	3	5	0	0	0.850	14	400 ft.	10.23%	2.088	2.5 Ohms	671 ft.
CKT #3	9201:17A-N1 - LEVEL 17	B	5	4	0	0	0.875	14	400 ft.	10.53%	2.149	2.5 Ohms	651 ft.
CKT #4	9201:17A-N1 - LEVEL 17	B	3	4	2	1	1.507	14	400 ft.	18.14%	3.701	2.5 Ohms	378 ft.
CKT #5	9201:17A-N1 - LEVEL 17	B	3	5	2	0	1.316	14	400 ft.	15.84%	3.232	2.5 Ohms	433 ft.
CKT #6	9201:17A-N1 - LEVEL 17	B	5	2	3	0	1.324	14	400 ft.	15.94%	3.252	2.5 Ohms	431 ft.
CKT #7	9201:17A-N1 - LEVEL 17 (SPARE)	B	0	0	0	0	0.000	14	ft.	0.00%	0.000	0.0 Ohms	0 ft.
CKT #8	9201:17A-N1 - LEVEL 17 (SPARE)	B	0	0	0	0	0.000	14	ft.	0.00%	0.000	0.0 Ohms	0 ft.
			25	24	7	2	Total Load (AMPS) 7.138						

METHOD USED TO CALCULATE VOLTAGE DROP:
[(CIRCUIT LENGTH IN FEET X 2) (AMPS) (OHMS / FT)]

Wire Resistance At
75 Degrees Celsius
167 Degrees Fahrenheit
Ohms / ft
10GA = 0.001210
12GA = 0.001930
14GA = 0.003070
16GA = 0.004890
18GA = 0.007770

(•) SOLID COPPER CONDUCTORS
( ) STRANDED COPPER CONDUCTORS

WIRE RESISTANCE BASED ON TABLE 8 FROM NATIONAL ELECTRICAL CODE (UNCOATED SOLID COPPER WIRE)

NOTE:
LUMP SUM METHOD WAS USED TO CALCULATE ALLOWABLE VOLTAGE DROP. THIS METHOD ALLOWS FOR A SMALL MARGIN OF SAFETY, TAKING INTO CONSIDERATION THE ACTUAL INSTALLED CIRCUIT ROUTING MAY DIFFER FROM WHAT IS SHOWN ON THE SHOP DRAWINGS. IF THE ACTUAL CIRCUIT LENGTH IS GOING TO EXCEED THE MAXIMUM ALLOWABLE CIRCUIT LENGTH, CONTACT YOUR LOCAL SIMPLEXGRINNELL DISTRICT OFFICE.

VOLTAGE DROP CALCULATION

NAC #17 - 17TH FLOOR

Module	Qty	Description		Standby Current	Total Standby	Alarm Current	Total Alarm
Panel Equipment							
4009-9201	1	4009 IDNET NAC EXTENDER, 120 VAC		0.085	0.085	0.185	0.185
4009-9807	1	NAC CARD, 4PT, IDNET		0.040	0.040	0.040	0.040
				Total Panel Stby	0.125	Total Panel Alarm	0.225
Mult-Candella Strobes							
4906-9154	25	S/V M-C NON-ADDRESS, WHT, CEIL	15cd	0.000	0.000	0.075000	1.875
4906-9154	24	S/V M-C NON-ADDRESS, WHT, CEIL	30cd	0.000	0.000	0.125000	3.000
4906-9154	7	S/V M-C NON-ADDRESS, WHT, CEIL	75cd	0.000	0.000	0.233000	1.631
4906-9154	2	S/V M-C NON-ADDRESS, WHT, CEIL	110cd	0.000	0.000	0.316000	0.632
				Total Periph Stby	0.000	Total Periph Alarm	7.138
				Total Standby Amps	0.125	Total Alarm Amps	7.363

Battery Calculations			Standby Current		Alarm Current
Control Panel Card Power			0.125		0.225
Power For External Peripheral Devices			0.000		7.138
			0.125	<-- Totals -->	7.363
Additional Battery Capacity Required	0%		0.000		0.000
Standby Time =	24	Hrs	3.000	Standby Ah	
Alarm Time =	15	Mins.	1.841	Alarm Ah	
	Standby + Alarm =		4.841		
Battery Required	2081-9274 10AH		7.740	Total Ah Required (see note below)	

Note: The total Ah required takes into account any physical and chemical properties of battery discharge rates, high alarm current draw of a battery after a long (standby) low current draw, and reflects the manufacturers discharge rates per their recommendations and UL standards.

4009-9201 BATTERY CALCULATION

GENERAL NOTES

1. THESE DRAWINGS DEPICT GENERAL LOCATIONS OF LIFE SAFETY EQUIPMENT & FIELD DEVICES. EXACT ROUTING OF CONDUITS IS TO BE DETERMINED IN THE FIELD BY THE INSTALLING CONTRACTOR TO SUIT CONDITIONS. ALL CHANGES SHALL BE CLEARLY INDICATED ON THE RECORD DRAWINGS.
2. SHOULD ANY CONDITIONS EXIST THAT DIFFER FROM WHAT IS INDICATED ON THESE DRAWINGS WHICH CAUSE MAJOR DEVIATIONS IN THE WORK SHOWN, THE CONTRACTOR SHALL CONTACT JOHNSON CONTROLS IN A TIMELY MANNER SO AS NOT TO IMPAIR THE CONSTRUCTION SCHEDULE.
3. CONTRACTOR IS RESPONSIBLE FOR MAKING AND OBTAINING APPROVAL FOR ALL NECESSARY ADJUSTMENTS IN CIRCUITING AS REQUIRED TO ACCOMMODATE THE RELOCATION OF EQUIPMENT AND/OR DEVICES WHICH ARE AFFECTED BY ANY AUTHORIZED CHANGE. ALL CHANGES SHALL BE CLEARLY INDICATED ON THE RECORD DRAWINGS.
4. A STAMPED SET OF APPROVED FIRE ALARM DRAWINGS SHALL BE AT THE JOB SITE AND SHALL BE USED FOR INSTALLATION.
5. THE POWER CIRCUIT TO THE FACP AND TO THE FIRE ALARM POWER SUPPLIES SHALL BE ON A DEDICATED 120V, 20A BRANCH CIRCUIT BREAKER, AND SHALL HAVE A RED MARKING, LOCK-ON PROVISION AND SHALL BE IDENTIFIED AS "FIRE ALARM CIRCUIT CONTROL." THE LOCATION OF THE CIRCUIT DISCONNECT MEANS (CIRCUIT BREAKER) SHALL BE PERMANENTLY IDENTIFIED AT THE FIRE ALARM CONTROL UNIT.
6. UPDATE THE AS-BUILT DRAWING SET DAILY WITH JOB PROGRESS. RETURN THE AS-BUILT DRAWING SET TO JOHNSON CONTROLS NO LATER THAN 7 DAYS AFTER FINAL TEST.
7. THE CONTRACTOR WILL MAINTAIN ALL AREAS OF THE BUILDING IN A NEAT AND WORKMANLIKE MANNER.
8. DO NOT APPLY POWER EXCEPT IN THE PRESENCE OF A FACTORY TRAINED JOHNSON CONTROLS TECHNICAL REPRESENTATIVE.
9. ANY SMOKE DETECTOR HEAD INSTALLED BEFORE THE BUILDING IS CLEANED AND ACCEPTED SHALL BE COVERED TO PROTECT FROM DUST. ANY FALSE ALARMS DUE TO DIRT CONTAMINATED HEADS SHALL BE THE RESPONSIBILITY OF THE FIRE ALARM INSTALLER.
10. THE FIRE ALARM INSTALLER WILL MAINTAIN THE FIRE RESISTANCE INTEGRITY OF ALL WALL, CEILING, AND ROOF ASSEMBLIES ANY TIME THAT WORK IS NOT ACTIVELY BEING PERFORMED.
11. INSTALLATION OF DEVICES SHALL BE IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. POWER LIMITED AND NON-POWER LIMITED FIELD WIRING MUST BE INSTALLED WITHIN THE FACP ENCLOSURE IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS AND APPLICABLE ELECTRICAL CODES. REFER TO APPLICABLE CODES & STANDARDS FOR SPECIFIC CODE REFERENCES.
12. ALL WIRING SHALL BE INSTALLED ACCORDING TO APPLICABLE ELECTRICAL CODES.
13. FIRE ALARM CIRCUITS SHALL BE IDENTIFIED IN ACCORDANCE WITH APPLICABLE ELECTRICAL CODES. MARK ALL FIRE ALARM WIRES IN ACCORDANCE WITH APPLICABLE ELECTRICAL CODE SECTIONS FOR POWER LIMITED AND NON-POWER LIMITED WIRE.
14 FIRE ALARM CABLE INSTALLED IN DUCTS, PLENUM, AND OTHER SPACES USED FOR ENVIRONMENTAL AIR SHALL BE TYPE FPLP.
15. FIRE ALARM CABLE INSTALLED IN THE VERTICAL RUNS AND PENETRATING MORE THAN ONE FLOOR OR CABLES INSTALLED IN VERTICAL RUNS IN SHAFTS SHALL BE TYPE FPLR.
16. FIRE ALARM CABLE INSTALLED IN UNDERGROUND CONDUIT OR OTHER WET LOCATIONS SHALL BE UL LISTED FOR WET LOCATIONS.
17. FIRE ALARM CIRCUITS EXTENDING BEYOND ONE BUILDING AND RUN OUTDOORS SHALL BE INSTALLED IN ACCORDANCE APPLICABLE ELECTRICAL CODES, WHERE APPLICABLE.
18. ALL WIRING, INCLUDING SHIELDS MUST BE DRY AND FREE OF SHORTS AND GROUNDS.
19. ALL SHIELDED WIRE MUST HAVE SHIELD CONTINUITY AT FULL LENGTH OF THE WIRE.
20. ONLY SYSTEM WIRING CAN BE RUN IN THE SAME CONDUIT.
21. 120VAC IS NOT PERMITTED IN THE SAME CONDUIT WITH LOW VOLTAGE WIRING.
22. MAINTAIN MAXIMUM CONDUIT FILL RATIO AS PER APPLICABLE ELECTRICAL CODES REQUIREMENTS.
23. EXISTING CONDUITS MAY BE USED BY THE INSTALLATION CONTRACTOR AS DEEMED NECESSARY; HOWEVER, ANY EXISTING CONDUIT WILL BE USED ONLY IF CONDUITS MEET CURRENT STANDARDS AND CODES. JOHNSON CONTROLS MAKES NO STATEMENTS WRITTEN OR VERBAL AS TO THE CONDITION OF EXISTING CONDUITS.

SQUARE FOOTAGE : 5,055 S.F
OCCUPANCY TYPE : B (BUSINESS)
FIRE SPRINKLERS : YES
OCCUPANCY LOAD : 20 OCCUPENT

AHJ : CITY OF PHOENIX

FIRE ALARM WIRE LIST

CIRCUIT DESCRIPTION	CONSTRUCTION	GAUGE	CIRCUIT PROPERTIES	ACCEPTABLE CABLE TYPES: FPLR	FPLP	THHN	THTN	OUTDOOR	CL
VISUAL SIGNAL	2 COND. SOLID	14 AWG		X	X				
IDNET	UTP SOLID	18 AWG		X	X				
AUDIO	UTP SOLID	18 AWG	30pf/ft. MAX CAPACITANCE RECOMMENDED	X	X				

CONDUIT SIZE	MAX CONDUCTOR AREA	CONDUIT SIZE	MAX CONDUCTOR AREA	NOTES
1/2"	0.12 SQ INCH *	1-1/4"	0.60 SQ INCH *	*40% FILL PER N.E.C.
3/4"	0.21 SQ INCH *	1-1/2"	0.82 SQ INCH *	SUBSCRIPT "u": UNSHIELDED CABLES MIXED WITH
1"	0.34 SQ INCH *	2"	1.34 SQ INCH *	SHIELDED CABLES OF SAME CIRCUIT DESIGNATION.

****OUTDOOR AERIAL CABLE REQUIRES MESSENGER**
ITEMS SUCH AS CAPACITANCE BETWEEN CONDUCTORS AND WIRE GAUGE CAN BE CRUCIAL TO THE CIRCUIT DESIGN OF THIS SYSTEM INSTALLATION. THE INSTALLING CONTRACTOR IS RESPONSIBLE FOR SELECTING AND INSTALLING CABLE MANUFACTURER AND MODEL THAT MEETS OR EXCEEDS THE ABOVE REQUIREMENTS. RECOMMENDED CABLE MANUFACTURERS AND MODEL NUMBERS ARE AVAILABLE UPON REQUEST.

QTY	SYMBOL	DESCRIPTION	BRAND	MODEL	BOX CODE	WIRE TYPE
		MODULES & RELAYS				
5	AIM	DUAL RELAY IAM	SIMPLEX	4090-9008	4H	M R
		NOTIFICATION APPLIANCES			** TAP ALL SPEAKERS AT 25 VOLTS **	
13	SP	SPEAKER, CEILING MOUNT	SIMPLEX	4902-9721	4C MFG	S V
11	CS	MULTI-CANDELA SPEAKER/STROBE, CEILING MOUNT, WHITE, FIRE, CLEAR LENS	SIMPLEX	4906-9154	4C MFG	S V
		MISCELLANEOUS DEVICES				
	10K	END-OF-LINE RESISTOR 10K (EOL)	SIMPLEX	4081-9008		
		BACKBOX CODES				

CODE	BOX SPECIFICATIONS	CODE	BOX SPECIFICATIONS
4C	4" SQ. BOX 1 1/2" DEEP W/ 1 1/2" EXT. RING	1G	SINGLE GANG BOX 2 3/4" DEEP
4G	4" SQ. BOX 2 1/8" DEEP W/ SINGLE GANG COVER	2C	TWO GANG BOX 2 3/4" DEEP
4H	4" SQ. BOX 2 1/8" DEEP W/ TWO GANG COVER	5A	5 GANG BOX 2 1/2" DEEP
4K	4" OCT. BOX 1 1/2" DEEP	6B	6 GANG BOX
4R	4" SQ. BOX 1 1/2" DEEP W/RACO 787 OR EQUIV.	MBD	MOUNTS IN BOX BEHIND DETECTOR
1A	SINGLE GANG BOX 1 1/2" DEEP	DT	DESK TOP MOUNT
1B	SINGLE GANG BOX 2" DEEP	DS	REFER TO PRODUCT DATASHEET
1C	SINGLE GANG BOX 2 1/8" DEEP	NR	NO BACKBOX REQUIRED
1D	SINGLE GANG BOX 2 1/8" DEEP W/COVER	TRM	3.5" WIDE SNAP TRACK W/MOUNTING SCREWS

FOR ADDITIONAL BACK BOX OPTIONS, REFER TO THE XX-700 SERIES DRAWINGS OR PRODUCT DATA SHEETS AND INSTALLATION INSTRUCTIONS.

ACCESS CONTROL SYMBOL LEGEND

QTY	SYMBOL	DESCRIPTION	BRAND	MODEL
		MODULES & RELAYS		
1	PSU	POWER SUPPLY UNIT	ALTRONIX	AL600ULACM
2	CR	CARD READER	HID	5395 WIEGAND INTERFACE
2	MD	MOTION DETECTOR	BOSCH	DS150i
1	REX	REQUEST TO EXIT SWITCH	SDC	463NU
1	ES	ELECTRIC STRIKE	ASSA ABLOY	HES 5000

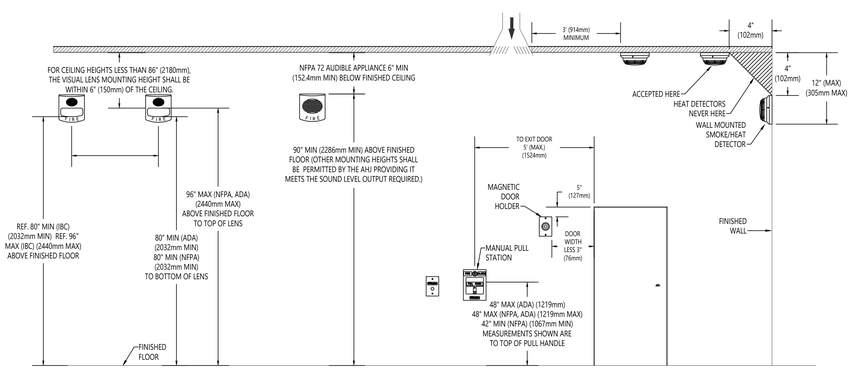
OUTPUTS

SEND WATERFLOW SIGNAL TO CENTRAL STATION MONITORING	SEND SUPERVISORY SIGNAL TO CENTRAL STATION MONITORING	SEND TROUBLE SIGNAL TO CENTRAL STATION MONITORING	SEND ALARM SIGNAL TO CENTRAL STATION MONITORING	INDICATE ZONE ON ANNUNCIATOR AT FACP	SOUND LOCAL PIEZO AT FACP	OPERATE ALL AREA AUDIO/VISUAL SIGNALS	ILLUMINATE LED ON DETECTOR	INPUTS
			●	●	●	●	●	SMOKE DETECTOR IN ALARM
			●	●	●	●	●	MANUAL PULL STATION
●			●	●	●	●	●	SPRINKLER WATERFLOW
	●			●	●	●		SPRINKLER TAMPER SWITCH
		●				●		TROUBLE
		●				●		BATTERY FAULT
		●				●		GROUND FAULT
		●				●		OPEN CIRCUIT
		●				●		LOSS OF PRIMARY POWER
		●				●		LOSS OF COMMUNICATION

SEQUENCE OF OPERATION

DEVICE MOUNTING HEIGHT REFERENCE

PER NFPA 72



JOHN MOCKER, SET
John Mocker
NICET LEVEL IV - FIRE ALARM
TECHNICIAN ID: 137219
EXPIRES: 11/1/2019

ISSUE LOC	DATE	CAD	CHK	DESCRIPTION
MARK				
REV 1	1/15/19	JM	JM	REVISED PLANS PER UPDATED ARCH PLANS
REV 2	5/24/19	JM	JM	ADDED ACCESS CONTROL DEVICES

Revisions shown with ▲ symbol

DRAWN BY:	JM
CHECKED BY:	JM
ISSUE DATE:	4/16/2019
JOB #:	
PROJECT #:	

SYSTEM: **FIRE ALARM SYSTEM**

SHEET: **LEGENDS & CALCULATION**

FA-01

30" x 42" - Arch E1 Size

FIRE ALARM WIRE LIST

CIRCUIT DESCRIPTION	CONSTRUCTION GAUGE		CIRCUIT PROPERTIES	ACCEPTABLE CABLE TYPES				
				FPLR	FPLP	THHN	TFFN	OUTDOOR C.L.
V VISUAL SIGNAL	2 COND. SOLID	14 AWG		X	X			
M IDNET	UTP SOLID	18 AWG		X	X			
S AUDIO	UTP SOLID	18 AWG	30pf/ft. MAX CAPACITANCE RECOMMENDED	X	X			

CONDUIT SIZE	MAX CONDUCTOR AREA	CONDUIT SIZE	MAX CONDUCTOR AREA	NOTES
1/2"	0.12 SQ INCH *	1-1/4"	0.60 SQ INCH *	*40% FILL PER N.E.C.
3/4"	0.21 SQ INCH *	1-1/2"	0.82 SQ INCH *	SUBSCRIPT "s" : UNSHIELDED CABLES MIXED WITH
1"	0.34 SQ INCH *	2"	1.34 SQ INCH *	SHIELDED CABLES OF SAME CIRCUIT DESIGNATION.

****OUTDOOR AERIAL CABLE REQUIRES MESSENGER**

ITEMS SUCH AS CAPACITANCE BETWEEN CONDUCTORS AND WIRE GAUGE CAN BE CRUCIAL TO THE CIRCUIT DESIGN OF THIS SYSTEM INSTALLATION. THE INSTALLING CONTRACTOR IS RESPONSIBLE FOR SELECTING AND INSTALLING CABLE MANUFACTURER AND MODEL THAT MEETS OR EXCEEDS THE ABOVE REQUIREMENTS. RECOMMENDED CABLE MANUFACTURERS AND MODEL NUMBERS ARE AVAILABLE UPON REQUEST.

FIRE ALARM SYMBOL LEGEND

QTY	SYMBOL	DESCRIPTION	BRAND	MODEL	BOX CODE	WIRE TYPE
		MODULES & RELAYS				
5	AM	DUAL RELAY IAM	SIMPLEX	4090-9008	4H	M R
		NOTIFICATION APPLIANCES				***** TAP ALL SPEAKERS AT 25 VOLTS *****
13	SP	SPEAKER, CEILING MOUNT	SIMPLEX	4902-9721	4C MFG	S V
11	SR	MULTI-CANDELA SPEAKER/STROBE, CEILING MOUNT, WHITE, FIRE, CLEAR LENS	SIMPLEX	4906-9154	4C MFG	S V
		MISCELLANEOUS DEVICES				
	10K	END-OF-LINE RESISTOR 10K (EOL)	SIMPLEX	4081-9008		

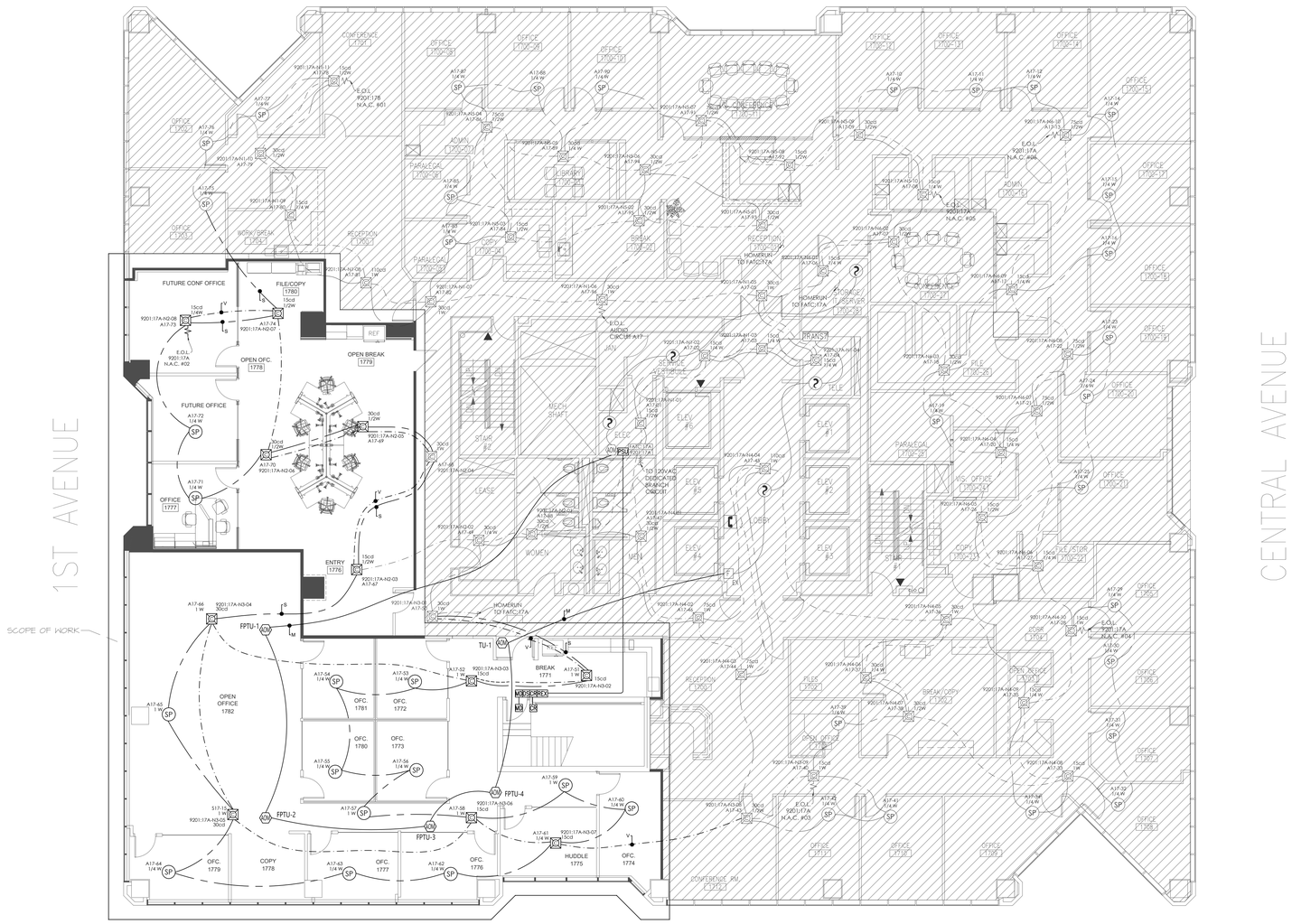
BACKBOX CODES

CODE	BOX SPECIFICATIONS	CODE	BOX SPECIFICATIONS
4C	4" SQ. BOX 1 1/2" DEEP W/ 1 1/2" EXT. RING	1G	SINGLE GANG BOX 2 3/4" DEEP
4G	4" SQ. BOX 2 1/8" DEEP W/ SINGLE GANG COVER	2C	TWO GANG BOX 2 3/4" DEEP
4H	4" SQ. BOX 2 1/8" DEEP W/ TWO GANG COVER	5A	5 GANG BOX 2 1/2" DEEP
4K	4" OCT. BOX 1 1/2" DEEP	6B	6 GANG BOX
4R	4" SQ. BOX 1 1/2" DEEP W/RACO 787 OR EQUIV.	MBD	MOUNTS IN BOX BEHIND DETECTOR
1A	SINGLE GANG BOX 1 1/2" DEEP	DT	DESK TOP MOUNT
1B	SINGLE GANG BOX 2" DEEP	DS	REFER TO PRODUCT DATASHEET
1C	SINGLE GANG BOX 2 1/8" DEEP	NR	NO BACKBOX REQUIRED
1D	SINGLE GANG BOX 2 1/8" DEEP W/COVER	TRM	5"* WIDE SNAP TRACK W/MOUNTING SCREWS

FOR ADDITIONAL BACK BOX OPTIONS, REFER TO THE XX-700 SERIES DRAWINGS OR PRODUCT DATA SHEETS AND INSTALLATION INSTRUCTIONS.

ACCESS CONTROL SYMBOL LEGEND

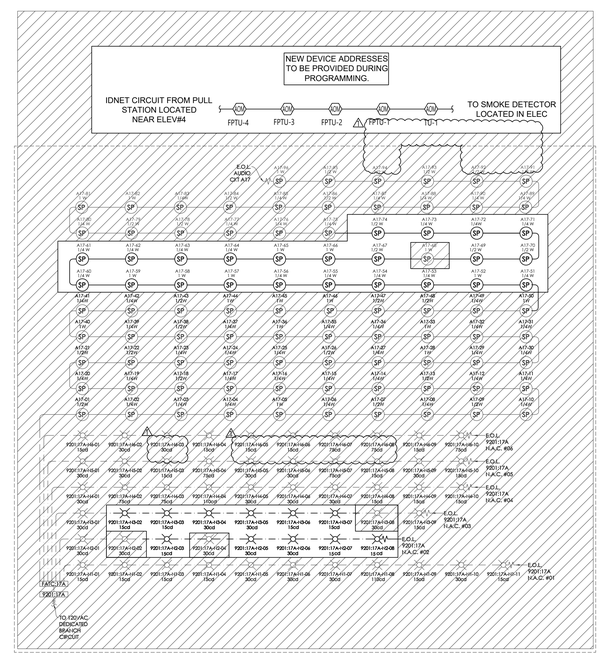
QTY	SYMBOL	DESCRIPTION	BRAND	MODEL
		MODULES & RELAYS		
1	PSU	POWER SUPPLY UNIT	ALTRONIX	AL600ULACM
2	CR	CARD READER	HID	5395 WIEGAND INTERFACE
2	MD	MOTION DETECTOR	BOSCH	DS150i
1	RQX	REQUEST TO EXIT SWITCH	SDC	463NU
1	DS	ELECTRIC STRIKE	ASSA ABLOY	HES 5000



TOWER FLOOR PLAN 17

SCALE: 1/8"=1'-0"

NORTH



RISER DIAGRAM

JOHN MOCKER, SET
NICET LEVEL IV - FIRE ALARM
TECHNICIAN ID: 137219
EXPIRES: 11/1/2019

Revisions shown with ▲ symbol

ISSUE LOG				
MARK	DATE	DRN	CKD	DESCRIPTION
REV 1	5/3/19	JM	JM	ADD DEVICES, PAGE PLAN UPDATED
REV 2	5/24/19	JM	JM	ADDED ACCESS CONTROL DEVICES

DRAWN BY:	JM
CHECKED BY:	JM
ISSUE DATE:	4/16/2019
JOB #:	
PROJECT #:	

SYSTEM: **FIRE ALARM SYSTEM**

SHEET: **DEVICE LAYOUT & RISER DIAGRAM**

FA-02

30" x 42" - Arch E1 Size