

**(E) FIRE ALARM CONTROL PANEL "FACP"**  
BATTERY CALCULATION

DESCRIPTION	QUANTITY	SPRY CURRENT EACH	98B-TOTAL	ALARM CURRENT EACH	98B-TOTAL
(E) FIRE ALARM CONTROL PANEL	1	0.300	0.300	0.350	0.350
(E) SUPERVISED OUTPUT MODULE	1	0.00022	0.00022	0.00050	0.00050
(E) ATTIC HEAT DETECTOR	12	0.00095	0.00942	0.00250	0.00250
(E) CEILING MTD SMOKE DETECTOR	12	0.00045	0.00540	0.00054	0.00288
(E) HORN/ROUNDER	2	0.00025	0.00050	0.00048	0.00092
(E) HORN/ROUNDER	2	0.00025	0.00050	0.00048	0.00092
NEW ATTIC HEAT DETECTOR	4	0.00045	0.00180	0.00054	0.00216
NEW ATTIC HEAT DETECTOR	4	0.00025	0.00100	0.00048	0.00192
TOTALS		0.00095	0.00376	0.00092	0.00376

TOTAL ALARM CURRENT OF 0.316 x 0.250 (65 MINUTES) = 0.0790 A.H.  
TOTAL SUPERVISORY CURRENT OF 0.095 x 24 HOURS = 2.280 A.H.  
TOTAL AMP HOURS REQUIRED = 2.359 A.H.  
x 1.2 SAFETY FACTOR = 2.831 A.H.

**(E) FIRE ALARM POWER EXPANDER PANEL "FAEP-NR"**  
BATTERY CALCULATION

DESCRIPTION	QUANTITY	SPRY CURRENT EACH	98B-TOTAL	ALARM CURRENT EACH	98B-TOTAL
(E) FIRE ALARM POWER EXPANDER PANEL	1	0.04	0.04	0.175	0.175
(E) SPEAKER 300D STROBE (CEILING)	12	—	—	0.288	1.248
NEW SPEAKER 300D STROBE (CEILING)	4	—	—	0.288	0.252
TOTALS		0.04	0.04	0.463	1.500

TOTAL ALARM CURRENT OF 1.583 x 0.250 (65 MINUTES) = 0.256 A.H.  
TOTAL SUPERVISORY CURRENT OF 0.04 x 24 HOURS = 0.960 A.H.  
TOTAL AMP HOURS REQUIRED = 1.216 A.H.  
x 1.2 SAFETY FACTOR = 1.459 A.H.

**(E) FIRE ALARM DIGITAL VOICE PANEL "FADV"**  
BATTERY CALCULATION

DESCRIPTION	QUANTITY	SPRY CURRENT EACH	98B-TOTAL	ALARM CURRENT EACH	98B-TOTAL
(E) FIRE ALARM DIGITAL VOICE PANEL	1	0.186	0.186	0.191	0.191
TOTALS		0.186	0.186	0.191	0.191

TOTAL ALARM CURRENT OF 0.191 x 0.250 (65 MINUTES) = 0.049 A.H.  
TOTAL SUPERVISORY CURRENT OF 0.186 x 24 HOURS = 4.464 A.H.  
TOTAL AMP HOURS REQUIRED = 4.513 A.H.  
x 1.2 SAFETY FACTOR = 5.416 A.H.

**(E) FIRE ALARM AMPLIFIER PANEL**  
BATTERY CALCULATION

DESCRIPTION	QUANTITY	SPRY CURRENT EACH	98B-TOTAL	ALARM CURRENT EACH	98B-TOTAL
(E) FIRE ALARM AMPLIFIER PANEL	1	0.312	0.312	2.114	2.114
TOTALS		0.312	0.312	2.114	2.114

TOTAL ALARM CURRENT OF 2.114 x 0.250 (65 MINUTES) = 0.342 A.H.  
TOTAL SUPERVISORY CURRENT OF 0.312 x 24 HOURS = 7.488 A.H.  
TOTAL AMP HOURS REQUIRED = 7.830 A.H.  
x 1.2 SAFETY FACTOR = 9.396 A.H.

**BATTERY CALCULATION NOTES:**  
(A) THIS IS MAXIMUM VALUE WITH ALL OPTIONS USED.  
(B) THIS IS MAXIMUM VALUE OF THE 800 WATT AMPLIFIER.

**FIRE ALARM SYSTEM EQUIPMENT SPECIFICATIONS**

SYMBOL	DESCRIPTION	MODEL #	CFR LISTING #	BACKBOX REQUIREMENTS (B)	NOTING HEIGHT (TO CENTER LOAD)
(E)	(E) FIRE ALARM CONTROL PANEL "FACP"	HCK401	7165-0410-054	INCLUDED	45"
(E)	(E) FIRE ALARM MTD POWER EXPANDER	HCK401	7165-0410-046	INCLUDED	45"
(E)	(E) BATTERY CABINET	HCK401	7165-0410-054	INCLUDED	45"
(E)	(E) FIRE ALARM DIGITAL VOICE COMMUNICATIONS CONTROL PANEL	HCK401	6411-0410-015	INCLUDED	45"
(E)	(E) FIRE ALARM AMPLIFIER (8 CHANNEL)	HCK401	6411-0410-015	INCLUDED	45"
(E)	(E) DUAL SYNC MODULE	GENEX	7125-0544-023	4" SQ. X 2.18" D	—
(E)	(E) HORN/ROUNDER	HCK401	7300-0410-050	4" SQ. X 2.18" D	—
(E)	(E) SUPERVISED OUTPUT MODULE	HCK401	7300-0410-050	4" SQ. X 2.18" D	—
(E)	(E) ADDRESSABLE SMOKE DETECTOR WITH CARBON MONOXIDE SENSING GEL WITH MOUNTING BASE	HCK401	1215-0410-053	3"9" OCTAGON BOX OR 4" OCTAGON BOX WITH RAISED ROUND COVER	PER DETAIL 4522
(E)	(E) ATTIC HEAT DETECTOR (NO FIBER) WITH MOUNTING BASE	HCK401	1215-0410-053	3"9" OCTAGON BOX OR 4" OCTAGON BOX WITH RAISED ROUND COVER	PER DETAIL 4522
(E)	(E) EXTERIOR WEATHERPROOF SPEAKER WITH MOUNTING BASE	GENEX	7320-0410-041	4" SQ. X 1.12" D	(C) (D)
(E)	(E) COMBINATION SPEAKER/STROBE	HCK401	7320-0410-044	4" SQ. X 2.18" D	—
(E)	(E) END OF LINE RESISTOR	—	—	—	—
(E)	(E) ADDRESSABLE FIRE ALARM CABLE (INDOORS)	WEST PEN	7161-0814-001	—	—
(E)	(E) ADDRESSABLE FIRE ALARM CABLE (OUTDOORS)	WEST PEN	7161-0814-001	—	—
(E)	(E) FIRE ALARM SPEAKER CABLE (INDOORS)	WEST PEN	7161-0814-001	—	—
(E)	(E) FIRE ALARM SPEAKER CABLE (OUTDOORS)	WEST PEN	7161-0814-001	—	—
(E)	(E) FIRE ALARM NOTIFICATION WIRE CABLE	WEST PEN	7161-0814-001	—	—

**NOTES (FIRE ALARM SYSTEM EQUIPMENT SPECIFICATIONS):**

- 1. END OF LINE RESISTORS FOR NOTIFICATION APPLIANCE CIRCUITS SHALL BE 30K OHM (1/2 WATT).
- 2. VERIFY BACKBOX REQUIREMENTS WITH FIRE ALARM SYSTEM EQUIPMENT SUPPLIER PRIOR TO ORDERING.
- 3. SEE FIRE ALARM PLAN FOR MOUNTING HEIGHT.
- 4. EXTERIOR SPEAKER SHALL BE SHIELD WITH A WEATHERPROOF BACKBOX (GENEX MODEL).

**FIRE ALARM SYSTEM SEQUENCE OF OPERATIONS**

RESULT OF OPERATION	INITIAL	AREA SMOKE/HEAT DETECTOR	LOSS OF POWER	SHORT CIRCUIT FROM SHUNT	FIRE SPRINKLER	FIRE SPRINKLER
ANNUNCIATE ALARM AT FIRE	YES	YES	YES	YES	YES	YES
ALARM CONTROL PANEL	YES	YES	YES	YES	YES	YES
ALARM CONTROL PANEL	YES	YES	YES	YES	YES	YES
ACTIVATE ALL AUDIBLE ALARMS	YES	YES	YES	YES	YES	YES
ACTIVATE ALL VISUAL ALARMS	YES	YES	YES	YES	YES	YES
TRANSFER TO BATTERY BACKUP	YES	YES	YES	YES	YES	YES
ANNUNCIATE AT 24"R	YES	YES	YES	YES	YES	YES
CENTRAL STATION FOR ATTENDED LOCATION	YES	YES	YES	YES	YES	YES
CENTRAL STATION FOR UNATTENDED LOCATION (CONTROLLED THROUGH)	YES	YES	YES	YES	YES	YES
CENTRAL STATION FOR UNATTENDED (BATTERY BACKUP)	YES	YES	YES	YES	YES	YES

**SPEAKER DR. LOSS CALCULATION**

SPEAKER	WIRE SIZE	FEET	RESISTANCE PER FOOT ON CIRCUIT	WIRE	TOTAL MATTER OF POWER	SPEAKER RESISTANCE ON CIRCUIT	WIRE SIZE	VOLTAGE AT WIRE AT LOAD	ACTUAL DB LOSS
53	18	0.128	145	2.44	6	0.24	18	24.48V	5.22dB

NOTE: CALCULATION IS BASED ON EACH OF THE INTERIOR SPEAKERS TAPPED AT 1 WATT AND EACH OF THE EXTERIOR SPEAKERS TAPPED AT 2 WATTS.

**SCOPE OF WORK**

- 1. EXTEND THE EXISTING FIRE ALARM SYSTEM TO THE NEW MODULAR CLASSROOMS.
- 2. PROVIDE NEW ADDRESSABLE INITIATION DEVICES, NOTIFICATION APPLIANCES, CONTROL CABLES AND CONDUITS AS SHOWN ON THE DRAWINGS.

**FIRE ALARM MONITORING NOTE**

AUTOMATIC FIRE ALARM SYSTEMS SHALL TRANSFER THE ALARM SUPERVISORY AND MONITOR SIGNALS TO AN APPROVED SUPERVISORY STATION. THE SUPERVISORY STATION SHALL BE MONITORED BY A PERSONNEL AT ALL TIMES. THE SUPERVISORY STATION SHALL BE MONITORED BY A PERSONNEL AT ALL TIMES. THE SUPERVISORY STATION SHALL BE MONITORED BY A PERSONNEL AT ALL TIMES.

**SCHOOLS FIRE ALARM REQUIREMENTS**

THE FIRE ALARM SYSTEM SHALL CONFORM TO CALIFORNIA BUILDING CODE SECTION 40712.3, CALIFORNIA ELECTRICAL CODE ARTICLE 760 AND CALIFORNIA FIRE CODE CHAPTER 4, SECTION 901.

UPON COMPLETION OF THE INSTALLATION OF THE FIRE PROTECTIVE SIGNALING EQUIPMENT, A SATISFACTORY TEST OF THE FIRE SYSTEM SHALL BE MADE IN THE PRESENCE OF THE ARCHITECT. THE TEST SHALL BE MADE OVER AMBIENT NOISE LEVELS. ADDITIONAL FIRE ALARM SIGNALING DEVICES MAY BE REQUIRED BY THE FIRE PROTECTIVE SIGNALING AGENCY.

THE FIRE ALARM SYSTEM IDENTIFICATION AND DESCRIPTION SHALL BE PROVIDED FOR TESTING AND A PLASTIC LAMINATED COPY SHALL REMAIN WITH INSTRUCTIONS AT THE FIRE ALARM CONTROL PANEL PER NFPA 72.

THE FIRE ALARM CERTIFICATE OF COMPLETION FORM IN NFPA 72 SHALL BE COMPLETED, SIGNED AND SUBMITTED.

**FIRE ALARM LEVEL OF AUDIBILITY**

ALARM INDICATING DEVICES OF A FIRE ALARM SYSTEM INTENDED TO ALERT ALL OCCUPANTS SHALL BE SO LOCATED AND INSTALLED AS TO GIVE A LEVEL OF SOUND ABOVE THE FLOOR INDEED BUILDING.

ALARM NOTING DEVICES SHALL BE CONSIDERED TO MEAN THAT INDICATING DEVICES SHALL BE SO LOCATED AND INSTALLED AS TO GIVE A LEVEL OF SOUND ABOVE THE FLOOR INDEED BUILDING.

THE FIRE ALARM SIGNAL SHALL CONFORM WITH THE CALIFORNIA ELECTRICAL CODE, SECTION 40712.3 AND 30024, AND BE A THERMAL PATTERNS CODE 3.

**GENERAL NOTES:**

- 1. SMOKE DETECTORS SHALL BE INSTALLED 3' AWAY FROM SHUTTL AND RETURN AIR REGISTERS.
- 2. FINAL FIRE ALARM TEST OF ALL DEVICES SHALL BE WITNESSED BY THE PROJECT INSPECTOR. TEST SHALL INCLUDE ALL INFORMATION PER NFPA 72 FIGURE 12.3.6J AND FIELD OUT VERIFICATION FROM CENTER STATION.
- 3. INTERSECTION AND EXTERIOR CONDUITS WILL HAVE WATER-TIGHT FITTINGS. (C.F.E. 100.11 AND 300.06)
- 4. AUDIBLE DEVICES SHALL BE AT LEAST 15 DBA ABOVE AVERAGE AMBIENT SOUND LEVEL, BUT NOT LESS THAN 75 DBA AT 10' OR MORE THAN 110 DBA IN TOTAL. (C.F.E. 100.11 AND 300.06)
- 5. AUDIBLE DEVICES SHALL SOUND THE CALIFORNIA CODE IN THERMAL PATTERNS. (C.F.E. 100.11 AND 300.06)
- 6. VISUAL DEVICES SHALL NOT EXCEED TWO FLASHES PER SECOND AND SHALL NOT BE SLOWER THAN ONE FLASH PER SECOND PER NFPA 72 12.3.5.11)
- 7. REMOVE A COPY OF THE REVISED BATTERY CALCULATION AT THE EXISTING FIRE ALARM CONTROL PANEL. THE REVISED CALCULATION SHALL BE MAINTAINED AT THE EXISTING FIRE ALARM POWER EXPANDER PANEL. BATTERY CALCULATION SHALL CONTAIN INFORMATION AS NOTED ON SCHEDULES AND BE PLASTIC LAMINATED. MOUNT ONTO INSIDE FACE OF DOOR.
- 8. MORE THAN TWO VARIABLE NOTIFICATION APPLIANCES OR GROUPS OF SYNCHRONIZED APPLIANCES IN THE SAME ROOM OR ADJACENT SPACES WITHIN THE FIELD OF VIEW SHALL FLASH IN SYNCHRONIZATION. (NFPA 72 12.3.5.4.2)
- 9. THE AUTOMATIC ALARM SYSTEM SHALL BE INSTALLED, TESTED AND MAINTAINED IN ACCORDANCE WITH THE STATE FIRE MARSHAL'S REGULATIONS (C.F.E. 407.12).

**VOLTAGE DROP CALCULATION (OHM'S LAW)**

$$VOLTAGE\ DROP = 2 \left( I \times R \right) \left( \frac{LENGTH\ OF\ CIRCUIT}{1000} \right) \left( CURRENT \right)$$

PERCENT VOLTAGE DROP =  $\frac{VOLTAGE\ DROP}{NOMINAL\ VOLTAGE} \times 100$

1. NEW NOTIFICATION APPLIANCE CIRCUIT W/3' :

$$2 \left( 4 \times 0.0084 \times \frac{0.250}{1000} \right) \left( 0.250 \right) \left( 0.250 \right) = 0.263A$$

$$VOLTAGE\ DROP = 2 \left( 1.048 \times \frac{180}{1000} \right) \left( 0.250 \right) = 0.251V.D$$

PERCENT VOLTAGE DROP =  $\frac{0.251}{24} \times 100 = 1.05\%$

**COMPLETE AUTOMATIC FIRE ALARM SYSTEM PLAN SUBMITTAL**

THE FIRE ALARM SYSTEM SHOWN ON THESE PLANS HAS BEEN SUBMITTED AND APPROVED BY THE ARCHITECT. THE CONTRACTOR SHALL PAY ANY ADDITIONAL FEES THAT ARE INCURRED DUE TO THIS SUBMITTAL.

THE FIRE ALARM SYSTEM SHALL BE A TOTAL (COMPLETE) AUTOMATIC HEAT AND SMOKE DETECTION SYSTEM PER C.F.E. SECTION 40712.3.6 AND SHALL COVER EVERY ROOM AND CORRIDOR AREA WITHIN THE AUTOMATIC FIRE ALARM SYSTEM. THE FIRE ALARM SYSTEM SHALL BE A TOTAL (COMPLETE) AUTOMATIC HEAT AND SMOKE DETECTION SYSTEM PER C.F.E. SECTION 40712.3.6 AND SHALL COVER EVERY ROOM AND CORRIDOR AREA WITHIN THE AUTOMATIC FIRE ALARM SYSTEM. THE FIRE ALARM SYSTEM SHALL BE A TOTAL (COMPLETE) AUTOMATIC HEAT AND SMOKE DETECTION SYSTEM PER C.F.E. SECTION 40712.3.6 AND SHALL COVER EVERY ROOM AND CORRIDOR AREA WITHIN THE AUTOMATIC FIRE ALARM SYSTEM.

MARK	DATE	REVISIONS

CHECK AND VERIFY ALL DIMENSIONS BEFORE PROCEEDING WITH THE WORK. THE CONTRACTOR SHALL CONSTRUCT TO THE ARCHITECT. ALL CONSTRUCTION SHALL CONFORM TO THE C.B.C.

**SITE IMPROVEMENTS FOR (2)-24'x40' MODULAR CLASSROOMS AT HORACE MANN ELEMENTARY SCHOOL**  
2710 NILES ST, BAKERSFIELD, CA 93306  
FOR  
BAKERSFIELD CITY SCHOOL DISTRICT  
BAKERSFIELD, KERN COUNTY, CALIFORNIA

REGISTRATION STATE: CALIFORNIA  
OFFICE OF REGULATION SERVICES  
DATE: 09/12/2017  
FILE: 13-0  
SEP 12 2017  
PRN: 63321-285

**ARCHITECT**  
1601 NEW SINE ROAD, SUITE 280  
BAKERSFIELD, CA 93309  
PH: (661) 397-4377  
FAX: (661) 397-4378  
WWW.SCARCHITECT.COM

**ROSE SHIN AND ASSOCIATES, INC.**  
131 S. EMBURY AVENUE  
YARVIS, CALIFORNIA 93292-6795

**FIRE ALARM SYSTEM EQUIPMENT SPECIFICATIONS, NOTES, BATTERY AND VOLTAGE DROP CALCULATIONS**

JOB NO. 1244  
DRAWN: U  
CHECKED: U  
DATE: 09/01/17

31 OF 31 SHEETS