VOLTAGE DROP CALCULATIONS

VOLTAGE DROP = $\frac{\text{CURRENT} \times \text{WIRE LENGTH} \times 21.6}{\text{CIRC. MILS}}$

VOLTAGE DROP % = $\frac{\text{VOLTAGE DROP}}{\text{APPLIED VOLTAGE}} \times 100$

V.D. = $\frac{*.19 \times 450' \times 21.6}{6530} = 0.60$ VOLTS

* 13 HORNS

$\frac{0.60}{24} \times 100 = 2.5\%$ SIGNAL CIRCUIT #2

V.D. = $\frac{*0.396 \times 560' \times 21.6}{6530} = 0.733$ VOLTS

* 6 VISUALS
2 HORNS

$\frac{0.733}{24} \times 100 = 3.05\%$ SIGNAL CIRCUIT #3

CALCULATIONS ARE WORST CASE VOLTAGE DROP OCCURRING AT FURTHEST DISTANCE FROM FIRE EXTENDER PANEL.
MT VERNON SCHOOL

FIRE ALARM EQUIPMENT MT VERNON SCHOOL

EXIST'G FIRE ALARM PANEL — FARADAY FIREMATCH XVI 16 ZONE WITH 7.0 AMP-HOUR STANDBY

(E) EXTENDER SILENT KNIGHT #5345 (C.S.F.M. #7300-0554:123)

F SINGLE ACTION MANUAL PULL STATION @ +48" (U.O.N.) - GRINNELL #RMS-1P C.S.F.M. #7150-1493:156

H AUDIBLE FIRE ALARM MINI-HORN - MOUNT PER PLANS WHEELOCK #MIZ-24-R C.S.F.M. #7135-0785:115

H WEATHERPROOF FIRE ALARM AUDIBLE HORN WHEELOCK #MT-12/24R/10B C.S.F.M. #7135-0785:118

V VISUAL STROBE .05A 15 CANDELA WHEELOCK RSS2415M-FR (C.S.F.M. 7125-0785:141)

END OF LINE RESISTOR

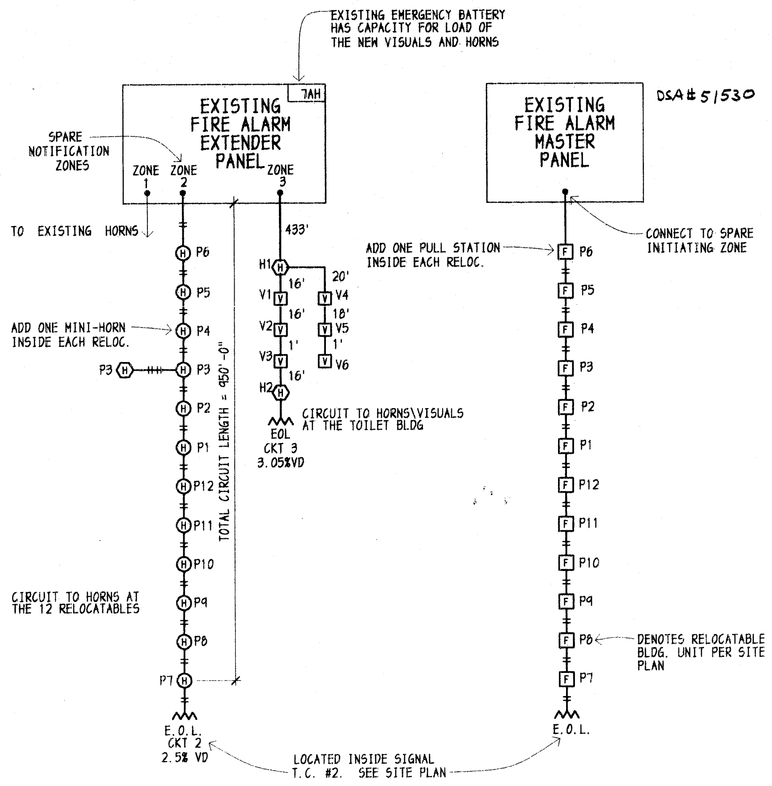
NOTE: CONTRACTOR SHALL SUBMIT ANY PROPOSED REVISION TO THE ABOVE LISTED FIRE ALARM SYSTEM EQUIPMENT TO THE ARCHITECT FOR REVIEW (FIRE ALARM SYSTEM WILL NOT BE RESUBMITTED TO O.S.A.)

EXISTING FIRE ALARM EXTENDER PANEL BATTERY CALCULATION MT VERNON SCHOOL

DESCRIPTION	QUANTITY	SUPV. CURRENT EACH	SUPV. CURRENT SUB-TOTAL	ALARM CURRENT EACH	ALARM CURRENT SUB-TOTAL
FIRE ALARM CONTROL PANEL	1		0.075		0.100
(E) HORNS	TOTAL	———	———	0.012	0.060
NEW MINI HORNS	12	———	———	0.012	0.144
NEW HORNS	3	———	———	0.048	0.144
NEW VISUALS	6	———	———	0.050	0.300
	TOTALS		0.075		0.768

TOTAL ALARM CURRENT OF 0.768 x .083 (5 MINUTES) ..... = 0.064 A.H.
TOTAL SUPERVISORY CURRENT OF 0.075 x 24 HOURS ..... = 1.800 A.H.
TOTAL AMP HOURS REQUIRED ..... 1.864 A.H.
SAFETY FACTOR x 1.1
2.05 A.H.

THEREFORE THE EXISTING 7 AMP HOUR BATTERIES ARE O.K.



AUDIBLE SIGNAL IS A TEMPORAL CODE

1 FIRE ALARM RISER DIAGRAM
MT VERNON SCHOOL — NTS

VOLTAGE DROP CALCULATIONS

VOLTAGE DROP = $\frac{\text{CURRENT} \times \text{WIRE LENGTH} \times 21.6}{\text{CIRC. MILS}}$

VOLTAGE DROP % = $\frac{\text{VOLTAGE DROP}}{\text{APPLIED VOLTAGE}} \times 100$

V.D. = $\frac{*.088 \times 135' \times 21.6}{6530} = 0.06$ VOLTS

* 5 HORNS

$\frac{0.06}{24} \times 100 = 0.246\%$ SIGNAL CIRCUIT #1 AT RELOATABLES

V.D. = $\frac{⊛0.396 \times 356' \times 21.6}{6530} = 0.46$ VOLTS

⊛6 VISUALS
2 HORNS

$\frac{0.46}{24} \times 100 = 1.9\%$ SIGNAL CIRCUIT #4 FREMONT SCHOOL TOILET BLDG

CALCULATIONS ARE WORST CASE VOLTAGE DROP OCCURRING AT FURTHEST DISTANCE FROM FIRE EXTENDER PANEL.
FREMONT SCHOOL

NEW FIRE ALARM CONTROL PANEL BATTERY CALCULATION FREMONT SCHOOL

DESCRIPTION	QUANTITY	SUPV. CURRENT EACH	SUPV. CURRENT SUB-TOTAL	ALARM CURRENT EACH	ALARM CURRENT SUB-TOTAL
FIRE ALARM CONTROL PANEL	1	0.100	0.100	0.560	0.560
SMOKE DETECTOR	1	0.00045	0.00045	0.052	0.052
MINI-HORN	4	———	———	0.012	0.048
EXTERIOR HORN	1	———	———	0.040	0.040
	TOTALS		0.10045		0.700

TOTAL ALARM CURRENT OF 0.700 x .083 (5 MINUTES) ..... = 0.058 A.H.
TOTAL SUPERVISORY CURRENT OF 0.10045 x 60 HOURS ..... = 6.027 A.H.
TOTAL AMP HOURS REQUIRED ..... 6.085 A.H.
SAFETY FACTOR x 1.1
6.693 A.H.

PROVIDE 10.0 AMP HOUR BATTERIES

EXISTING FIRE ALARM CONTROL PANEL BATTERY CALCULATION FREMONT SCHOOL

DESCRIPTION	QUANTITY	SUPV. CURRENT EACH	SUPV. CURRENT SUB-TOTAL	ALARM CURRENT EACH	ALARM CURRENT SUB-TOTAL
FIRE ALARM CONTROL PANEL			0.17112	0.560	0.540
(E) HORNS	TOTAL				0.145
NEW HORNS	2	———	———	0.048	0.096
NEW VISUALS	6			0.050	0.300
	TOTALS		0.17112		1.131

TOTAL ALARM CURRENT OF 1.131 x .083 (5 MINUTES) ..... = 0.093 A.H.
TOTAL SUPERVISORY CURRENT OF 0.17112 x 24 HOURS ..... = 4.106 A.H.
TOTAL AMP HOURS REQUIRED ..... 4.199 A.H.
SAFETY FACTOR x 1.1
4.62 A.H.

EXISTING PANEL HAS 7.0 AMP HOUR BATTERIES

FIRE ALARM EQUIPMENT FREMONT SCHOOL

FACP FIRE ALARM CONTROL PANEL WITH AUDIBLE ALARM EXPANSION BOARD AND MASTER CODE MODULE THORN/GRINNELL #FIREQUEST 300/#AAC/#MC3 C.S.F.M. #7165-1493:162

F MANUAL PULL STATION THORN/GRINNELL #RMS-1P C.S.F.M. #7150-1493:156

SD PHOTOELECTRONIC SMOKE DETECTOR W/BASE THORN/GRINNELL #1SC-350P/1BC-351 C.S.F.M. #7212-1493:155

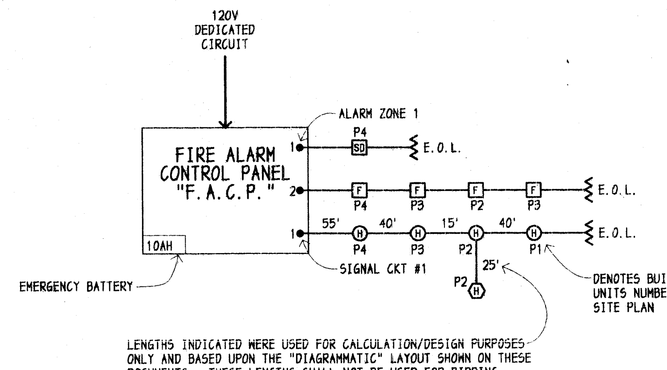
H INTERIOR MINI-HORN WHEELOCK #MI2-24 C.S.F.M. #7135-0785:115

H EXTERIOR HORN WITH WEATHERPROOF BACKBOX WHEELOCK #MT-12/24-R-10B C.S.F.M. #7135-0785:110

V VISUAL STROBE .05A 15 CANDELA WHEELOCK RSS2415M-FR (C.S.F.M. 7125-0785:141)

END OF LINE RESISTOR

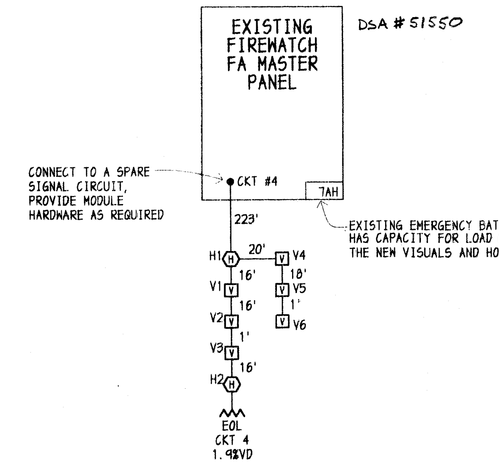
NOTE: CONTRACTOR SHALL SUBMIT ANY PROPOSED REVISION TO THE ABOVE LISTED FIRE ALARM SYSTEM EQUIPMENT TO THE ARCHITECT FOR REVIEW (FIRE ALARM SYSTEM WILL NOT BE RESUBMITTED TO O.S.A.)



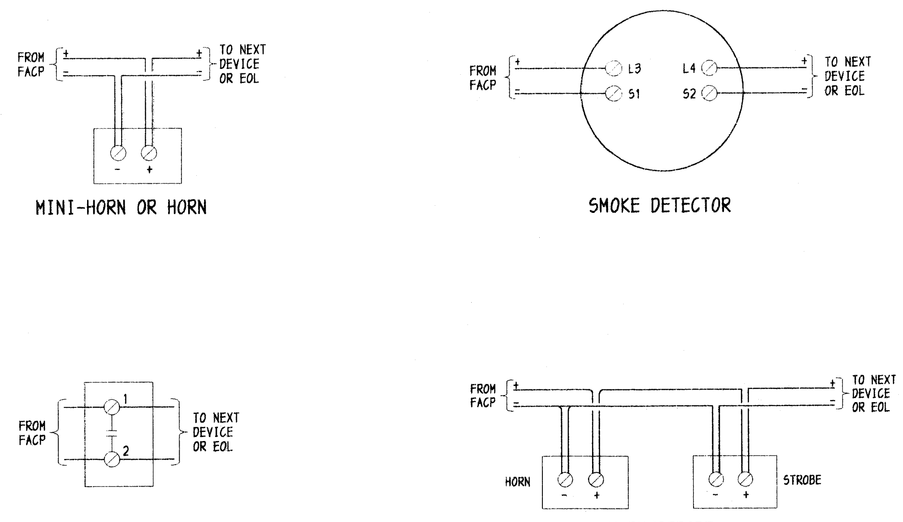
LENGTHS INDICATED WERE USED FOR CALCULATION/DESIGN PURPOSES ONLY AND BASED UPON THE "DIAGRAMMATIC" LAYOUT SHOWN ON THESE DOCUMENTS. THESE LENGTHS SHALL NOT BE USED FOR BIDDING.

THIS IS A NEW 'STAND ALONE' SYSTEM FOR THIS GROUP OF RELOCATABLES AUDIBLE SIGNAL IS A TEMPORAL CODE

2 FIRE ALARM RISER DIAGRAM
FREMONT SCHOOL — NTS



3 FA RISER DIAGRAM
FREMONT SCHOOL TOILET BLDG — NTS



4 FIRE ALARM EQUIPMENT WIRING DIAGRAMS
NTS

CODE, RULES & REGULATIONS

ALL WORK AND MATERIALS SHALL COMPLY WITH THE LATEST REGULATIONS OF THE STATE FIRE MARSHAL, CALIFORNIA CODE OF REGULATIONS, SERVING UTILITY COMPANIES AND OTHER APPLICABLE STATE ORDINANCES. NOTHING IN THESE PLANS OR SPECIFICATIONS IS TO BE CONSTRUED AS TO PERMIT WORK NOT CONFORMING TO THESE CODES. WHERE WORK OF A HIGHER DEGREE IS INDICATED IN THE PLANS OR SPECIFICATIONS THIS REQUIREMENT SHALL GOVERN.

FIRE ALARM SYSTEM SEQUENCE OF OPERATIONS

RESULT OF OPERATION	INITIATION: MANUAL PULL STATION	HEAT DETECTOR	LOSS OF POWER	SHORT CIRCUIT/ GROUND FAULT
ANNUNCIATE ALARM	YES	YES	———	———
ANNUNCIATE TROUBLE	———	———	YES	YES
ACTIVATE ALL AUDIBLE ALARMS	YES	YES	———	———
ACTIVATE ALL VISUAL ALARMS	YES	YES	———	———
TRANSFER TO BATTERY BACK-UP	———	———	YES	———

FIRE ALARM SYSTEM REQUIREMENTS

THE FIRE ALARM SYSTEM SHALL CONFORM TO CALIFORNIA BUILDING CODE, SECTION 305.9, CALIFORNIA ELECTRICAL CODE, ARTICLE 760 AND CALIFORNIA FIRE CODE, ARTICLE 10.

UPON COMPLETION OF THE INSTALLATION OF THE FIRE PROTECTIVE SIGNALING EQUIPMENT, A SATISFACTORY TEST OF THE ENTIRE SYSTEM SHALL BE MADE IN THE PRESENCE OF THE ENFORCING FIRE AGENCY PER NFPA 72. IF TESTING RESULTS DETERMINE FIRE ALARM AUDIBILITY DOES NOT MEET 15db OVER AMBIENT NOISE LEVELS, ADDITIONAL FIRE ALARM SIGNALING DEVICES MAY BE REQUIRED BY THE ENFORCING AGENCY PER CALIFORNIA FIRE CODE.

A CERTIFICATE OF COMPLETION SHALL BE PROVIDED TO THE OWNER PER NFPA 72, CHAPTER 1 AND THE CALIFORNIA FIRE CODE.

FIRE ALARM LEVEL OF AUDIBILITY

ALARM INDICATING DEVICES OF A FIRE ALARM SYSTEM INTENDED TO ALERT ALL OCCUPANTS SHALL BE SO LOCATED AND UNOBSTRUCTED AS TO CAUSE A LEVEL OF AUDIBILITY OF NOT LESS THAN 15 db ABOVE AMBIENT NOISE LEVELS MEASURED FOUR FEET ABOVE THE FLOOR INSIDE BUILDING.

AMBIENT NOISE LEVELS SHALL BE CONSTRUED TO MEAN THAT WHICH CAN NORMALLY BE EXPECTED TO EXIST WHEN THE FACILITY, BUILDING, ROOM OR AREA IS FUNCTIONING UNDER NORMAL OPERATIVE OR WORKING CONDITIONS.

SEISMIC ANCHORAGE REQUIREMENTS

ALL ELECTRICAL EQUIPMENT SHALL BE BRACED OR ANCHORED TO RESIST A HORIZONTAL FORCE ACTING IN ANY DIRECTION USING THE FOLLOWING CRITERIA:

EQUIPMENT ON GRADE — 20 % OF OPERATING WEIGHT

EQUIPMENT ON STRUCTURE — 30 % OF OPERATING WEIGHT

FOR FLEXIBLY MOUNTED EQUIPMENT, USE 4 x THE ABOVE VALUES, AND FOR SIMULTANEOUS VERTICAL FORCE USE 1/3 x THE HORIZONTAL FORCE.

THE ABOVE VALUES ARE FOR AN IMPORTANCE FACTOR OF I = 1.0 AND SEISMIC ZONE, Z= 0.4.

FOR MULTI-PURPOSE BUILDINGS, PERCENTAGE OF OPERATING WEIGHT SHALL BE 125% OF VALUES NOTED ABOVE.

WHERE ANCHORAGE DETAILS ARE NOT SHOWN ON THE DRAWINGS, THE FIELD INSTALLATION SHALL BE SUBJECT TO THE APPROVAL OF THE ELECTRICAL ENGINEER AND THE FIELD ENGINEER OF THE DIVISION OF THE STATE ARCHITECT.

DIVISION OF THE STATE ARCHITECT APPLICABLE CODES AND STANDARDS

CODES:

1995 CALIFORNIA BUILDING CODE, PART 1 AND PART 2, TITLE 24 (1994 UNIFORM BUILDING CODE AND CALIFORNIA AMENDMENTS)

1995 CALIFORNIA ELECTRICAL CODE, PART 3, TITLE 24 (1993 NATIONAL ELECTRICAL CODE AND CALIFORNIA AMENDMENTS)

1995 CALIFORNIA MECHANICAL CODE, PART 4, TITLE 24 (1994 UNIFORM MECHANICAL CODE AND CALIFORNIA AMENDMENTS)

1995 CALIFORNIA PLUMBING CODE, PART 5, TITLE 24 (1994 UNIFORM PLUMBING CODE AND CALIFORNIA AMENDMENTS).

1995 CALIFORNIA FIRE CODE, PART 9, TITLE 24 (1994 UNIFORM FIRE CODE AND CALIFORNIA AMENDMENTS)

CALIFORNIA REFERENCED STANDARDS CODE, PART 12, TITLE 24 (1994 UNIFORM BUILDING CODE STANDARDS AND CALIFORNIA AMENDMENTS)

PUBLIC SAFETY, TITLE 19, CALIFORNIA CODE OF REGULATIONS, STATE FIRE MARSHAL REGULATIONS

STANDARDS AND GUIDES:

NFPA 72, NATIONAL FIRE ALARM CODE 1993 EDITION.

POLICY #95-03, FIRE AND LIFE SAFETY, DIVISION OF THE STATE ARCHITECT - OFFICE OF REGULATION SERVICES.

MATERIAL SPECIFICATIONS

CONDUIT

UNDERGROUND RUNS - PVC 40 OR FULL WT. GALV. STEEL 24" MIN. COVER

CONCEALED IN BLDG. - EMT OR METALLIC FLEX.

ANY RIGID STEEL USED UNDERGROUND TO BE WRAPPED WITH PVC TAPE BY THE CONTRACTOR, OR FACTORY APPLIED PVC COATING.

EXPOSED OUTSIDE - EMT WITH W.P. FITTINGS

WIRE (INCLUDING FA WIRING, U.O.N.)

ALL SIZES - COPPER THHN.

DISCONNECTS

PROVIDE WEATHERPROOF, HEAVY DUTY FUSED DISCONNECTS FOR ALL MOTORS, HVAC UNITS AND PUMPS IF NOT PROVIDED BY OTHERS. USE DUAL ELEMENT FUSES PER EQUIPMENT SUPPLIER RECOMMENDATION.

NOTE: ALL SPARE/EMPTY CONDUITS ARE TO BE EQUIPPED WITH A NYLON PULL ROPE FOR FUTURE USE.

FIRE ALARM SYSTEM CONDUCTOR SCHEDULE

1. FOR INITIATION CIRCUITS:
   #14 AWG STRANDED COPPER CONDUCTORS, THHN/THWN INSULATION

2. FOR NOTIFICATION APPLIANCE CIRCUITS:
   #12 AWG STRANDED COPPER CONDUCTORS, THHN/THWN INSULATION

COMPLETE FIRE ALARM PLAN SUBMITTAL

THE FIRE ALARM SYSTEM SHOWN ON THESE PLANS HAS BEEN SUBMITTED AND APPROVED BY THE DIVISION OF THE STATE ARCHITECT. ANY SUBSTITUTION OF THE FIRE ALARM SYSTEM SHALL BE RESUBMITTED TO THE ARCHITECT FOR REVIEW AND APPROVAL. THE CONTRACTOR SHALL PAY ANY ADDITIONAL FEES THAT ARE INCURRED DUE TO THIS SUBSTITUTION.

SCArchitect,Inc.
1801 L Street
Bakersfield, CA 93301
(661) 327-1682

Stephen C. Arrington, NCARB, AIA

REGISTERED PROFESSIONAL ENGINEER — GERALD S. CORNELIUS — No. 7198 — Exp. 8/30/02 — ELECTRICAL — STATE OF CALIFORNIA

CORNELIUS CONSULTING GROUP, INC.
Consulting Electrical Engineers
131 S. Dunworth - Ph.733-2611
Visalia, California 93292-6705

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
OFFICE OF REGULATION SERVICES
APPL: 03-102897
FILE: 15-6
AC FLS SS AC
DATE 2/2/00

RESTROOM BUILDINGS AND RELOCATABLE CLASSROOMS FOR FREMONT AND MT. VERNON ELEMENTARY SCHOOLS FOR BAKERSFIELD CITY SCHOOL DISTRICT

BAKERSFIELD, KERN COUNTY, CALIFORNIA

FA RISER DIAGRAMS, DETAILS AND CODES

CHECK AND VERIFY ALL DIMENSIONS BEFORE PROCEEDING WITH THE WORK. REPORT DISCREPANCIES TO THE ARCHITECT AND CONTRACTOR SHALL CONFORM TO THE LATEST

MARK	DATE	REVISIONS
1		
2		
3		
4		
5		

JOB NO.	972
DRAWN	EMS-RPS
CHECKED	RPS
DATE	01-12-2000

SHEET 6 OF 6 SHEETS

REVISED 04-08-99 BY: EMS JOB #
X:\JOBS\SCHOOLS\SOFFIELD\DSA\WMF-FOT\15BR.2D REVISED 1-12-00 BY Z