2155 South Bascom Ave, Ste. 200
Campbell, CA 95008
PH: 408.879.0600
FAX: 408.377.6066

Addendum 1

PROJECT: Fire Alarm Replacement at 4 Schools
Berryessa Union School District
B-15-2022-23

Date: 5/10/2023

SFA PROJECT NO: 22081, 22082, 22083, 22084

1. This Addendum shall supersede all previously issued Contract Documents wherein it modifies same. All other conditions of the Contract remain unchanged. The following changes, additions, or deletions as set forth herein shall apply to the Contract Documents and shall be made a part thereof and shall be subject to all the requirements thereof as though originally shown and/or specified.

2. Bidders shall acknowledge receipt of this Addendum on Bid Form.

3. SPECIFICATION REVISIONS

A. Document 01 10 00 - Summary of Work

1.5, B - Schedule of Work to accommodate Owner occupancy.

The project schedule has been revised as follows:

Project start date (all sites): June 24, 2023
Brooktree ES completion date: July 5, 2024
Majestic Way ES completion date: July 12, 2024
Noble ES completion date: July 19, 2024
Summerdale ES completion date: July 26, 2024
All work at all sites complete: July 31, 2024

4. Drawing Revisions

A. Replace Majestic Way plans & specifications with DSA approved plans & specifications

B. Replace Noble ES plans & specifications with DSA approved plans & specifications.

5. Pre-Bid RFI's

A. Question - Please confirm that fire alarm wiring can be run without conduit using plenum-rated cable above accessible ceilings.

A. Answer - Yes, plenum rated cable in above accessible ceiling is acceptable

B. Question - There will be areas with glue-on tiles or other similar finishes that conduit cannot be concealed. Please confirm that raceway can run exposed. Also, clarify if wire-mold AL 2100 or EMT conduit should be used in the areas where conduit cannot be concealed.

B. Answer - In such instances and where it is up high in "classrooms" wire-mold is acceptable. In such instances and where it is up high in space not typical classrooms (i.e. shops, more industrial in nature) EMT conduit is acceptable painting/finished to match ceilings/walls/etc. In all other instances assume EMT conduit exposed (painted/finished) where glue-on tiles occur.

Attachments:
Document 01 10 00 - Summary of Work
Majestic Way ES - DSA plans & specifications
Noble ES - DSA plans & specifications

End of Addendum 1

FIRE ALARM SYSTEM UPGRADE
MAJESTIC WAY ELEMENTARY SCHOOL

1855 MAJESTIC WAY, SAN JOSE, CA 95132

BERRYESSA UNION SCHOOL DISTRICT

DSA FILE NUMBER 43-7
DSA APPLICATION NUMBER 01-120703
OPSC TRACKING NUMBER 69377-129

GENERAL NOTES

PRE-BID SITE VISIT

CONTRACTOR SHALL VISIT THE PROJECT AREA IN ORDER TO BECOME FAMILIAR WITH EXISTING CONDITIONS AND THE REQUIREMENTS OF THE PROJECT. THE CONTRACTOR MAY CONTACT THE ARCHITECT DURING THE BIDDING PHASE REGARDING CLARIFICATIONS AND PROJECT REQUIREMENTS.

SAFETY

IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, THE CONTRACTOR WILL BE SOLELY AND COMPLETELY RESPONSIBLE FOR CONDITIONS OF THE JOB SITE INCLUDING SAFETY OF ALL PERSONS AND PROPERTY DURING PERFORMANCE OF THE WORK. THIS REQUIREMENT WILL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS.

DAMAGE TO STRUCTURE OR SYSTEMS TO REMAIN

CONTRACTOR SHALL REIMBURSE THE OWNER FOR REPAIR AND REPLACEMENT, INCLUDING ARCHITECT'S FEES, FOR ANY DAMAGE CAUSED TO STRUCTURES, LANDSCAPE, SITE WORK, OR EXISTING SYSTEMS TO REMAIN, AS THE RESULT OF CONSTRUCTION OPERATIONS.

EXISTING CONDITIONS

ALL EXISTING CONDITIONS ARE SHOWN BASED ON THE BEST INFORMATION AVAILABLE AT THE TIME, BUT WITHOUT GUARANTEE OF ACCURACY. THE CONTRACTOR SHALL FIELD VERIFY ALL EXISTING CONDITIONS, DIMENSIONS, AND BUILDING DATA AT THE JOB SITE. ANY DISCREPANCIES REQUIRING MODIFICATION TO THE CONSTRUCTION DOCUMENTS SHALL BE REPORTED TO THE ARCHITECT IMMEDIATELY. NO MODIFICATIONS SHALL BE MADE BY THE CONTRACTOR WITHOUT PRIOR APPROVAL FROM THE ARCHITECT.

CONTRACTOR'S EQUIPMENT

COORDINATE WITH OWNER'S REPRESENTATIVE FOR APPROVED LOCATION OF JOB SITE ACCESS, PARKING, AND LOCATION OF CONTRACTOR'S EQUIPMENT AND MATERIAL STORAGE AREA. SEE SITE PLAN FOR ADDITIONAL NOTES.

UTILITY SHUT-DOWNS AND CONNECTIONS

ALL REQUIRED UTILITY SHUT DOWNS SHALL HAVE PRIOR APPROVAL FROM THE OWNER'S REPRESENTATIVE. REQUEST SHALL BE SUBMITTED WITH ADEQUATE ADVANCE NOTICE PER PROJECT REQUIREMENTS.

ASBESTOS AND ASBESTOS PRODUCTS

THE OWNER/OPERATOR AND CONTRACTOR SHALL BE AWARE THAT BUILDINGS CONSTRUCTED PRIOR TO 1978 (OR THERE ABOUT) POSSIBILITY CONTAIN ASBESTOS IN SOME EXISTING CONSTRUCTION MATERIALS, AND WILL LIKELY BE ENCOUNTERED DURING ALTERATIONS OR REMODELING.

UNDER CALIFORNIA TITLE 8, THE OWNER AND CONTRACTOR BOTH HAVE RESPONSIBILITIES TO DETERMINE THE EXISTENCE OF ASBESTOS CONTAINING MATERIALS IN AREAS TO BE ALTERED OR REMODELED PRIOR TO COMMENCEMENT OF WORK AND TO TAKE APPROPRIATE MEASURES TO PROTECT PERSONNEL. CAL-OSHA HAS JURISDICTION OVER ASBESTOS RELATED WORK. ASBESTOS RELATED WORK SHALL BE DONE IN ACCORDANCE WITH CALIFORNIA GENERAL INDUSTRIAL SAFETY ORDERS, TITLE 8, SECTION 341.6 THROUGH 341.14. ASBESTOS IN THE WORK ENVIRONMENT IS REGULATED BY TITLE 8, SECTION 5208.

THE BAY AREA AIR QUALITY MANAGEMENT DISTRICT AND DISTRICT REGULATION 11-2-401.3 REQUIRES EVERY RENOVATION INVOLVING THE REMOVAL OF 100 SQ.FT., LN FT, OR GREATER OF REGULATED ASBESTOS CONTAINING MATERIAL, AND FOR EVERY DEMOLITION (EVEN WHEN NO ASBESTOS IS PRESENT), A NOTIFICATION MUST BE SENT TO THE BAAQMD AT LEAST 10 WORKING DAYS PRIOR TO COMMENCEMENT OF DEMOLITION / RENOVATION.

ALL BUILDING MATERIALS MUST BE ASBESTOS FREE.

THESE DOCUMENTS DO NOT ADDRESS CONTAINMENT FOR EXISTING AREAS OF ASBESTOS WHICH MAY BE DISCOVERED DURING CONSTRUCTION. THE OWNER'S ABATEMENT SUBCONTRACTOR IS SOLELY RESPONSIBLE FOR THE DETECTION, REMOVAL, AND THE DISPOSAL OF ANY EXISTING ASBESTOS MATERIAL. ARCHITECTURAL AND ENGINEERING FEES FOR ADDITIONAL DESIGN EFFORT TO OBTAIN STATE APPROVALS, AS WELL AS THE COST OF ANY REPAIRS, FOR DAMAGE CAUSED OR REPLACEMENT OF EXISTING SYSTEMS TO REMAIN, DUE TO WORK PERFORMED BY THE ASBESTOS ABATEMENT SUBCONTRACTOR, SHALL BE THE RESPONSIBILITY OF SAID SUBCONTRACTOR.

CONSTRUCTION SCHEDULING

CONTRACTOR SHALL COORDINATE ALL CONSTRUCTION OPERATIONS WITH OWNER'S REPRESENTATIVE PRIOR TO SCHEDULING AND START OF THE WORK. CONTRACTOR SHALL PROVIDE PROTECTION TO ALL EXISTING SPACES AND SYSTEMS WHICH ARE IN USE, ADJOINING THE PROJECT, AND NOT PART OF THE PROJECT.

INTERIOR FINISHES

INTERIOR FINISHES AND ALL WALL COVERING MATERIAL SHALL CONFORM TO CCR TITLE 24, PART 2, CHAPTER 8.

DRILLED-IN EXPANSION ANCHORS

WHEN INSTALLING DRILLED-IN ANCHORS AND/OR POWDER DRIVEN PINS IN EXISTING NON-PRESTRESSED REINFORCED CONCRETE, USE CARE AND CAUTION TO AVOID CUTTING OR DAMAGING THE EXISTING REINFORCING BARS. WHEN INSTALLING THEM INTO EXISTING PRESTRESSED CONCRETE (PRE- OR POST-TENSIONED), LOCATE THE PRESTRESSED TENDONS BY USING A NON-DESTRUCTIVE METHOD PRIOR TO INSTALLATION. EXERCISE EXTREME CARE AND CAUTION TO AVOID CUTTING OR DAMAGING THE TENDONS DURING INSTALLATION. MAINTAIN A MINIMUM CLEARANCE OF ONE INCH BETWEEN THE REINFORCEMENT AND THE DRILLED-IN ANCHOR AND/OR PIN.

TITLE 24 COMPLIANCE

THE INTENT OF THESE DRAWINGS AND SPECIFICATIONS IS THAT THE WORK OF THE ALTERATION, REHABILITATION OR RECONSTRUCTION IS TO BE IN ACCORDANCE WITH TITLE 24, CALIFORNIA CODE OF REGULATIONS (2019 CBC). SHOULD ANY EXISTING CONDITIONS SUCH AS DETERIORATION OR NON-COMPLYING CONSTRUCTION BE DISCOVERED NOT COVERED BY THE CONTRACT DOCUMENTS WHEREIN THE FINISHED WORK WILL NOT COMPLY WITH TITLE 24, CCR, A CONSTRUCTION CHANGE DOCUMENT OR A SEPARATE SET OF PLANS AND SPECIFICATIONS, DETAILING AND SPECIFYING THE REQUIRED WORK, SHALL BE SUBMITTED TO AND APPROVED BY THE DSA BEFORE PROCEEDING WITH THE WORK.

ADMINISTRATIVE REQUIREMENTS FROM PART 1, TITLE 24, C.C.R.

- CHANGES TO THE APPROVED DRAWINGS AND SPECIFICATIONS SHALL BE MADE BY AN ADDENDUM OR A CONSTRUCTION CHANGE DOCUMENT, AND APPROVED BY DSA, AS PER SECTION 4-338.
- A DSA CERTIFIED PROJECT INSPECTOR EMPLOYED BY THE DISTRICT AND APPROVED BY DSA SHALL PROVIDE CONTINUOUS INSPECTION OF WORK, PER SECTION 4-342.
- A DSA ACCEPTED TESTING LABORATORY DIRECTLY EMPLOYED BY THE DISTRICT SHALL CONDUCT ALL REQUIRED TEST AND INSPECTIONS FOR THE PROJECT.
- SPECIAL INSPECTION PER SECTION 4-333 (C).
- CONTRACTOR SHALL SUBMIT VERIFIED REPORT OR SECTION 4-336 & 4-343 (C)
- ADMINISTRATION OR CONSTRUCTION PER PART 1, TITLE 24, C.C.R.
- DUTIES OF ARCHITECT, STRUCTURAL ENGINEER, OR PROFESSIONAL ENGINEER PER SECTION 4-333 (A) AND 4-341
- DUTIES OF CONTRACTOR PER SECTION 4-343
- VERIFIED REPORTS PER SECTION 4-343 AND 4-336
- A COPY OF PARTS 1 TO 5 OF TITLE 24 SHALL BE KEPT AND AVAILABLE IN THE FIELD DURING CONSTRUCTION
- DSA SHALL BE NOTIFIED AT START OF CONSTRUCTION AND PRIOR TO PLACEMENT OF CONCRETE PER SECTION 4-331
- SUPERVISION BY DSA PER SECTION 4-334
- DSA IS NOT SUBJECT TO ARBITRATION

ADMINISTRATIVE REQUIREMENTS

- ADDENDA MUST BE SIGNED BY ARCHITECT AND APPROVED BY DSA
- NO CHANGES OR REVISIONS SHALL BE MADE FOLLOWING WRITTEN APPROVAL WHICH AFFECTS ACCESS COMPLIANCE ITEM UNLESS SUCH CHANGES TO REVISIONS ARE SUBMITTED TO DSA FOR APPROVAL.
- SUBSTITUTIONS AFFECTING DSA REGULATED ITEMS SHALL BE SUBMITTED AS A CONSTRUCTION CHANGE DOCUMENT OR ADDENDA, AND SHALL BE APPROVED BY DSA PRIOR TO FABRICATION AND INSTALLATION
- CONSTRUCTION CHANGE DOCUMENTS MUST BE SIGNED BY THE FOLLOWING:
  - ARCHITECT OR ENGINEER OF RECORD
  - STRUCTURAL ENGINEER (WHEN APPLICABLE)
  - DELEGATED PROFESSIONAL ENGINEER
  - DSA
- MATERIALS AND THEIR INSTALLATIONS SHALL COMPLY WITH APPLICABLE CODES.
- PER CBC 11B-104.1 "ALL DIMENSIONS ARE SUBJECT TO CONVENTIONAL INDUSTRY TOLERANCES EXCEPT WHERE THE REQUIREMENT IS STATED AS A RANGE WITH SPECIFIC MINIMUM AND MAXIMUM END POINTS.

GENERAL NOTES, cont.

CALIFORNIA ENERGY CODE

THE CALIFORNIA ENERGY CODE SECTION 10-103 REQUIRES ACCEPTANCE TESTING ON ALL NEWLY INSTALLED LIGHTING CONTROLS, MECHANICAL SYSTEMS, ENVELOPES, AND PROCESS EQUIPMENT AFTER INSTALLATION AND BEFORE PROJECT COMPLETION. AN ACCEPTANCE TEST IS A FUNCTIONAL PERFORMANCE TEST TO HELP ENSURE THAT NEWLY INSTALLED EQUIPMENT IS OPERATING AND IN COMPLIANCE WITH THE ENERGY CODE.

LIGHTING CONTROLS ACCEPTANCE TEST MUST BE PERFORMED BY A CERTIFIED LIGHTING CONTROLS ACCEPTANCE TEST TECHNICIAN (ATT).

MECHANICAL SYSTEM ACCEPTANCE TESTS MUST BE PERFORMED BY A CERTIFIED MECHANICAL ATT.

A LISTING OF CERTIFIED ATT's CAN BE FOUND AT
https://www.energy.ca.gov/programs-and-topics/programs/acceptance-test-technician-certification-provider-program/acceptance

THE ACCEPTANCE TESTING PROCEDURES MUST BE REPEATED, AND DEFICIENCIES MUST BE CORRECTED BY THE BUILDER OR INSTALLING CONTRACTOR UNTIL THE CONSTRUCTION/INSTALLATION OF THE SPECIFIED SYSTEMS CONFORM AND PASS THE REQUIRED ACCEPTANCE CRITERIA.

PROJECT INSPECTORS WILL BE COLLECTING THE FORMS TO CONFIRM THAT THE REQUIRED ACCEPTANCE TESTS HAVE BEEN COMPLETED.

COMPLIANCE WITH LOCAL ORDINANCES

GRADING PLANS, DRAINAGE IMPROVEMENTS, ROAD AND ACCESS REQUIREMENTS AND ENVIRONMENTAL HEALTH CONSIDERATIONS SHALL COMPLY WITH ALL LOCAL ORDINANCES.

ABBREVIATIONS

(REFER TO CONSULTANT DRAWINGS FOR ADDITIONAL ABBREVIATIONS)

A.F.F.	ABOVE FINISHED FLOOR	LAM.	LAMINATE
A.P.	ACCESS PANEL	LAV.	LAVATORY
ACT	ACOUSTIC TILE	M.B.	MACHINE BOLT
ADJ.	ADJUSTABLE	M.S.	MACHINE SCREW
ALUM.	ALUMINUM	M.H.	MANHOLE
A.B.	ANCHOR BOLT	MFG.	MANUFACTURER
APPROX.	APPROXIMATELY	M.B.	MARKER BOARD
ARCH.	ARCHITECT	MATL.	MATERIAL
AC	ASPHALTIC CONCRETE	MAX.	MAXIMUM
@	AT	MECH.	MECHANICAL
B.M.	BENCH MARK	MTL.	METAL
BLKG.	BLOCKING	MIN.	MINIMUM
BD.	BOARD	MISC.	MISCELLANEOUS
B.W.	BOTH WAYS	MTD.	MOUNTED
BOT.	BOTTOM	(N)	NEW
BLDG.	BUILDING	NOM.	NOMINAL
B.U.R.	BUILT-UP ROOFING	N.I.C.	NOT IN CONTRACT
C.B.	CATCH BASIN	N.T.S.	NOT TO SCALE
CLG.	CEILING	NO. or #	NUMBER
CEM.	CEMENT	OCC.	OCCUPANT(CY)
C.C. or O.C.	CENTER TO CENTER	O.C.	ON CENTER
CER. TILE	CENTERLINE CERAMIC TILE	OPNG.	OPENING
C.O.	CLEANOUT	OPP.	OPPOSITE
C.O.T.G.	CLEANOUT TO GRADE	O.H.	OPPOSITE HAND
CLR.	CLEAR	O.F.O.S.	OUTSIDE FACE OF STUD
C.A.H.R.	CLEAR ALL HEART REDWOOD	O.H.W.S.	OVAL HEAD WOOD SCREW
C.W.	COLD WATER	O.D.	OVERFLOW DRAIN and/or OUTSIDE DIAMETER
COL.	COLUMN	O.F.C.I.	OWNER FURNISHED and CONTRACTOR INSTALLED
COM.	COMMON	PR.	PAIR
CONC.	CONCRETE	PART.	PARTITION
CONST.	CONSTRUCTION	PL.	PLATE
C.H.	CONSTRUCTION HEART	PLAS.	PLASTER
C.J.	CONSTRUCTION JOINT	P.W.	PLYWOOD
CONT.	CONTINUOUS	P.V.C.	POLY VINYL CHLORIDE
CONTR.	CONTRACTOR	P.T.	PRESSURE TREATED
CTR.	COUNTER	P.L.	PROPERTY LINE
CTSK.	COUNTER SUNK	R. or RAD.	RADIUS
DET.	DETAIL	R.W.L.	RAIN WATER LEADER
DIA. or Ø	DIAMETER	RWD./R.W.	REDWOOD
DIM.	DIMENSION	REINF.	REINFORCING
D.A.	DISABLED ACCESS	REQ'D	REQUIRED
DR.	DOOR	R.A.G.	RETURN AIR GRILLE
D.S.	DOWNSPOUT	R.E.	RIM ELEVATION
DWG.	DRAWING	R.D.	ROOF DRAIN
D.F.	DRINKING FOUNTAIN and/or DOUGLAS FIR	RM.	ROOM
EA.	EACH	R.O.	ROUGH OPENING
E.W.	EACH WAY	RND.	ROUND
ELEC.	ELECTRIC or ELECTRICAL	R.H.M.S.	ROUND HEAD METAL SCREW
EL. or ELEV.	ELEVATION	R.H.W.S.	ROUND HEAD WOOD SCREW
ENCL.	ENCLOSE and/or ENCLOSURE	SSD.	SEE STRUCTURAL DRAWINGS
EQ.	EQUAL	S.T.S.M.S.	SELF TAPPING SHEET METAL SCREW
EQUIP.	EQUIPMENT	SHEATH.	SHEATHING
(E)	EXISTING	S.M.	SHEET METAL
EX.	EXPANSION	S.M.S.	SHEET METAL SCREW
E.J.	EXPANSION JOINT	SO.V.	SHUT OFF VALVE
EXP.	EXPOSED	SIM.	SIMILAR
EXT.	EXTERIOR	S.C.	SOLID CORE
F.O.C.	FACE OF CONCRETE	SPEC.	SPECIFICATION
F.O.M.	FACE OF MASONRY	SQ.	SQUARE
F.O.S.	FACE OF STUD	S.F.	SQUARE FEET
F.O.F.	FACE OF FINISH	STAG.	STAGGERED
FIN.	FINISH	STD.	STANDARD
F.F.	FINISHED FLOOR	S.S.	STAINLESS STEEL
F.S.	FINISH SLAB	STL.	STEEL
F.E.	FIRE EXTINGUISHER	STOR.	STORAGE
F.E.C.	FIRE EXTINGUISHER CABINET	T&G	TONGUE & GROOVE
F.H.	FIRE HYDRANT	STRUCT.	STRUCTURAL
F.H.M.S.	FLAT HEAD METAL SCREW	S.A.G.	SUPPLY AIR GRILLE
F.H.W.S.	FLAT HEAD WOOD SCREW	THRES.	THRESHOLD
FL. or FLR.	FLOOR	T.J.	TOOLED JOINT
F.D.	FLOOR DRAIN	T.O.B.	TOP OF BEAM
FTG.	FOOTING	T.O.C.	TOP OF CURB or CONCRETE
FND.	FOUNDATION	T.O.S.	TOP OF STEEL or SHEATHING
GALV.	GALVANIZED	T.O.W.	TOP OF WALK
G.I.	GALVANIZED IRON	TYP.	TYPICAL
GA.	GAUGE	U.O.N.	UNLESS OTHERWISE NOTED
GL.	GLASS	U.O.S.	UNLESS OTHERWISE SHOWN
GLU-LAM	GLUE-LAMINATED	V.I.F.	VERIFY IN FIELD
GRD.	GRADE	V.T.R.	VENT THROUGH ROOF
GYP. BD.	GYPSUM BOARD	VERT.	VERTICAL
HDW.	HARDWARE	V.G.	VERTICAL GRAIN
HT.	HEIGHT	V.I.F.	VERIFY IN FIELD
H.C.	HOLLOW CORE	V.C.T.	VINYL COMPOSITION TILE
H.M.	HOLLOW METAL	V.W.C.	VINYL WALL COVERING
HORIZ.	HORIZONTAL	V.O.I.P.	VOICE OVER INTERNET PROTOCOL
H.B.	HOSE BIBB	W.C.	WATER CLOSET
I.D.	INSIDE DIAMETER	W.H.	WATER HEATER
INSUL.	INSULATION	WP.	WATERPROOF
INT.	INTERIOR	W.R.	WATER RESISTANT
INV.	INVERT	W.W.M.	WELDED WIRE MESH
JT.	JOINT	W.D.	WINDOW DIMENSION
J.H.	JOIST HANGER	W/	WITH
K.D.	KILN DRIED	W/O	WITHOUT
		WD.	WOOD

BLDG. CODES & STANDARDS:

2022 2019	CALIFORNIA ADMINISTRATIVE CODE, PART 1, TITLE 24 C.C.R. CALIFORNIA BUILDING CODE (CBC), PART 2, TITLE 24, C.C.R. (2018 INTERNATIONAL BUILDING CODE, VOLUMES 1 AND 2, WITH 2019 CALIFORNIA AMENDMENTS.)	
2019	CALIFORNIA ELECTRIC CODE (CEC), PART 3, TITLE 24, C.C.R. (2017 NATIONAL ELECTRIC CODE WITH 2019 CALIFORNIA AMENDMENTS).	
2019	CALIFORNIA MECHANICAL CODE (CMC), PART 4, TITLE 24, C.C.R. (2018 UNIFORM MECHANICAL CODE WITH 2019 CALIFORNIA AMENDMENTS).	
2019	CALIFORNIA PLUMBING CODE (CPC), PART 5, TITLE 24, C.C.R. (2018 UNIFORM PLUMBING CODE WITH 2019 CALIFORNIA AMENDMENTS).	
2019	CALIFORNIA ENERGY CODE (CENC), PART 6, TITLE 24, C.C.R.	
2019	CALIFORNIA FIRE CODE (CFC), PART 9, TITLE 24, C.C.R. (2018 INTERNATIONAL FIRE CODE WITH 2019 CALIFORNIA AMENDMENTS).	
2019	CALIFORNIA GREEN BUILDING STANDARDS CODE, PART 11, TITLE 24, C.C.R.	
2019	CALIFORNIA REFERENCED STANDARDS, PART 12, TITLE 24, C.C.R.	
2016	ASME A17.1 (WA17.1a/CSA B44a-08 ADDENDA) SAFETY CODE FOR ELEVATORS AND ESCALATORS	
2010	ADA STANDARDS FOR ACCESSIBLE DESIGN (28 CFR PART 35 FOR TITLE II ENTITIES)	

CCR TITLE-19, PUBLIC SAFETY, STATE FIRE MARSHAL REGULATIONS.

NFPA 13	INSTALLATION OF SPRINKLER SYSTEMS (CA AMENDED)	2016 EDITION
NFPA 14	INSTALLATION OF STANDPIPE & HOSE SYSTEMS (CA AMENDED)	2016 EDITION
NFPA 17	DRY CHEMICAL EXTINGUISHING SYSTEMS	2017 EDITION
NFPA 17A	WET CHEMICAL EXTINGUISHING SYSTEM	2017 EDITION
NFPA 20	STATIONARY FIRE PUMPS TO FIRE PROTECTION	2016 EDITION
NFPA 22	WATER TANKS FOR PRIVATE FIRE PROTECTION	2013 EDITION
NFPA 24	PRIVATE FIRE SERVICE MAINS (CA AMENDED)	2016 EDITION
NFPA 25	INSPECTION, TESTING AND MAINTENANCE OF WATER BASED FIRE PROTECTION SYSTEMS	2013 CALIFORNIA EDITION
NFPA 72	NATIONAL FIRE ALARM CODE (CA AMENDED)	2016 EDITION
NFPA 80	FIRE DOORS AND OTHER OPENING PROTECTIVES	2016 EDITION
NFPA 92	STANDARD FOR SMOKE CONTROL SYSTEMS	2015 EDITION
NFPA 110	EMERGENCY AND STANDBY POWER SYSTEMS	2016 EDITION
NFPA 170	STANDARD FOR FIRE SAFETY AND EMERGENCY SYMBOLS	2018 EDITION
NFPA 253	CRITICAL RADIANT FLUX OF FLOOR COVERING SYSTEMS	2015 EDITION
NFPA 2001	CLEAN AGENT FIRE EXTINGUISHING SYSTEMS	2015 EDITION
ICC 300	STANDARDS FOR BLEACHERS, FOLDING AND TELESCOPIC SEATING, AND GRANDSTANDS	2017 EDITION

SFM 12-10-1	POWER OPERATED EXIT DOORS
SFM 12-10-2	SINGLE POINT LATCHING OR LOCKING DEVICES
SFM 12-10-3	EMERGENCY EXIT & PANIC HARDWARE

UL 38	MANUAL OPERATING SIGNAL BOXES	1999/2005 EDITION
UL 268	SMOKE DETECTORS FOR FIRE PROTECTIVE SIGNALING SYSTEMS	2009 EDITION
UL 268A	SMOKE DETECTORS DUCT APPLICATIONS	1998/2003 EDITION
UL 300	FIRE TESTING OF FIRE EXTINGUISHING SYSTEMS FOR PROTECTION OF COMMERCIAL COOKING EQUIPMENT	2005 (R2010)
UL 305	PANIC HARDWARE	2012 EDITION
UL 464	AUDIBLE SIGNALING DEVICES FOR FIRE ALARM AND SIGNALING SYSTEMS, AND ACCESSORIES	2003 EDITION
UL 521	HEAT DETECTORS FOR FIRE PROTECTIVE SIGNALING SYSTEMS	1999 EDITION
UL 864	CONTROL UNITS FOR FIRE PROTECTIVE SIGNALING SYSTEMS (W/ REVISIONS THROUGH DEC. 2014)	2003 EDITION
UL 1971	SIGNALING DEVICES FOR THE HEARING IMPAIRED	2002 EDITION

COMPLIANCE WITH CFC CHAPTER 33, FIRE SAFETY DURING CONSTRUCTION AND DEMOLITION AND CBC CHAPTER 33, SAFETY DURING CONSTRUCTION WILL BE ENFORCED.

DSA APPROVAL OF THESE PLANS SHALL NOT BE CONSTRUED AS THE CERTIFICATION OF COMPLIANCE FOR THE PROJECT BUILDINGS AS REQUIRED BE THE FIELD ACT, EDUCATION CODE SECTIONS 17280-17316 AND SECTIONS 81130-81147.

SYMBOLS LEGEND

SECTION / EXTERIOR ELEVATION
SECTION IDENTIFICATION
SHEET WHERE SECTION IS DRAWN

DETAIL
DETAIL IDENTIFICATION
SHEET WHERE DETAIL IS DRAWN

INTERIOR ELEVATION
INDICATES ELEVATION SHOWN
SHEET WHERE ELEVATION IS DRAWN

ROOM IDENTIFICATION
CLASSROOM
ROOM NAME
102
ROOM NUMBER

SPECIFIC NOTE

DOOR DESIGNATION

WINDOW DESIGNATION

ADDENDUM REVISION
CLOUD AROUND REVISION

CCD REVISION
CLOUD AROUND REVISION

FINISH NUMBER
SEE SPECS AND I.E. DWGS.

EQUIPMENT LETTER
SEE EQUIPMENT SCHEDULE

+6'-0"
CEILING HEIGHT

WALL TYPE

MATCH LINE

+6'-0"
ELEV. HEIGHT

CENTER OF
FACE OF

PROJECT SUMMARY

CAMPUS WIDE FIRE ALARM SYSTEM REPLACEMENT.

THERE ARE NO DEFERRED SUBMITTALS FOR THIS PROJECT.

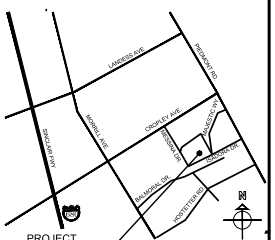
DESIGN TEAM

ARCHITECT
SUGIMURA PINNEY ARCHITECTS
2155 SOUTH BASCOM AVENUE SUITE 200
CAMPBELL, CALIFORNIA 95008
(408) 879-0600
(408) 377-6066 FAX
ATTN: MIKE BOWERS MIKE@SUGIMURA.COM

ELECTRICAL AND FIRE ALARM ENGINEER
AURUM CONSULTING ENGINEERS
1798 TECHNOLOGY DRIVE, SUITE 242
SAN JOSE, CA 95110
(408) 564-7525
ATTN: NAJIB ANWARY NAJIB@ACEMB.COM

DRAWING INDEX

VICINITY MAP



STATEMENT OF GENERAL CONFORMANCE

FOR ARCHITECTS / ENGINEERS WHO UTILIZE PLANS, INCLUDING BUT NOT LIMITED TO SHOP DRAWINGS, PREPARED BY OTHER LICENSED DESIGN PROFESSIONALS AND / OR OTHER CONSULTANTS

APPLICATION NO.: 01-120703 FILE NO.: 43-7

☐ THE DRAWINGS OR SHEETS LISTED ON THE COVER OR INDEX SHEET THIS DRAWING, PAGE OF SPECIFICATIONS / CALCULATIONS

HAVE BEEN PREPARED BY OTHER DESIGN PROFESSIONALS OR CONSULTANTS WHO ARE LICENSED AND / OR AUTHORIZED TO PREPARE SUCH DRAWINGS IN THIS STATE. IT HAS BEEN EXAMINED BY ME FOR:

1) DESIGN INTENT AND APPEARS TO MEET THE APPROPRIATE REQUIREMENTS OF TITLE 24, CALIFORNIA CODE OF REGULATIONS AND THE PROJECT SPECIFICATIONS PREPARED BY ME, AND

2) COORDINATION WITH MY PLANS AND SPECIFICATIONS AND IS ACCEPTABLE FOR INCORPORATION INTO THE CONSTRUCTION OF THIS PROJECT.

THE STATEMENT OF GENERAL CONFORMANCE *SHALL NOT BE CONSTRUED AS RELIEVING ME OF MY RIGHTS, DUTIES, AND RESPONSIBILITIES UNDER SECTIONS 7302 AND 8138 OF THE EDUCATION CODE AND SECTIONS 4-336, 4-341 AND 4-344* OF TITLE 24, PART 1, *(TITLE 24, PART 1, SECTION 4-317(B))*

I FIND THAT:

☒ ALL DRAWINGS OR SHEETS LISTED ON THE COVER OR INDEX SHEET THIS DRAWING OR PAGE

☒ IS / ARE IN GENERAL CONFORMANCE WITH THE PROJECT DESIGN, AND HAS / HAVE BEEN COORDINATED WITH THE PROJECT PLANS AND SPECIFICATIONS.

MARK PINNEY — 12/30/2022
C-2467 — 9/30/2023
LICENSE NUMBER — EXPIRATION DATE

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 01-120703 INC:
REVIEWED FOR:
SS ☐ FLS ☑ ACS ☐
DATE: 5/5/2023
(DSA STAMP AREA)

REGISTERED ARCHITECT
MARK PINNEY
NO. C-2467
EXPIRES: 9-30-2023
STATE OF CALIFORNIA

TITLE SHEET

FIRE ALARM SYSTEM UPGRADE
MAJESTIC WAY ELEMENTARY SCHOOL
1855 MAJESTIC WAY, SAN JOSE, CA 95132
BERRYESSA UNION SCHOOL DISTRICT

REVISIONS

NO.	ITEM	DATE

DRAWN BY: KNU
CHECKED BY: M.B.
SFA JOB NO: 22081
DATE: 04/03/2023

T1

* BUILDING CODE ANALYSIS

BUILDING	CONSTRUCTION TYPE OCCUPANCY TYPE	AREA (SQ.FT.)	ALLOWABLE (SQ.FT.)	# OF STORIES
MULTIPURPOSE & ADMIN	V-B / A-3, B, E & S-2	11,637	53,960	1 NON SPRINKLER
INSTRUCTIONAL MATERIAL CENTER	V-B / A-3 & E	7,342	15,500	1 NON SPRINKLER
POD A & B CLASSROOM	V-B / E	7,240	9,500	1 NON SPRINKLER
POD C & D CLASSROOM	V-B / E	7,240	9,500	1 NON SPRINKLER
POD E & F CLASSROOM	V-B / E	7,240	9,500	1 NON SPRINKLER
RELOC. P1 & P2	V-B / E	1,920	9,500	1 NON SPRINKLER
RELOC. P3, P4 & P5	V-B / E	2,880	9,500	1 NON SPRINKLER
RELOC. P6	V-B / E	960	9,500	1 NON SPRINKLER
RELOC. CSS THERAPY	V-B / E	960	9,500	1 NON SPRINKLER

* NO OCCUPANCY CHANGE, SIGNIFICANT ALTERATION, OR INCREASE IN SQUARE FOOTAGE IS PROPOSED FOR THIS PROJECT SCOPE OF WORK. BUILDINGS DO NOT REQUIRE THE ADDITION OF SPRINKLERS. EXISTING BUILDING CONSTRUCTION TYPE WILL BE MAINTAINED.

PROJECT SUMMARY

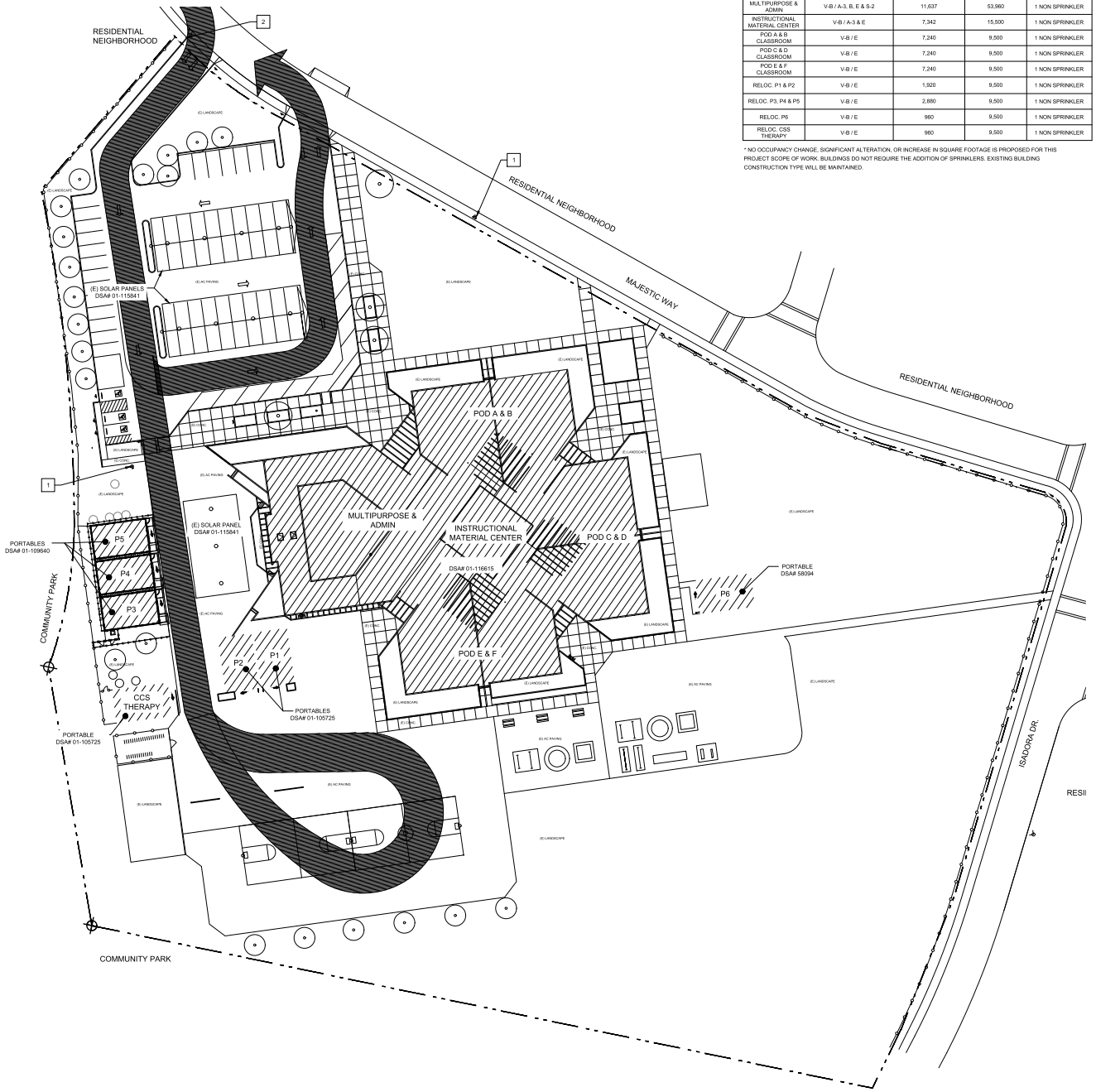
CAMPUS WIDE FIRE ALARM SYSTEM REPLACEMENT.

GENERAL NOTES

A. **THIS SHEET IS FOR FIRE LIFE SAFETY CODE RELATED ITEMS.**
B. REFER TO FIRE ALARM DRAWINGS FOR EXTENT OF OTHER RELATED WORK.

SITE PLAN - FIRE LIFE SAFETY NOTES

1. EXISTING FIRE HYDRANT.
2. (E) FIRE DEPARTMENT KNOX BOX.



1 SITE PLAN - FIRE LIFE SAFETY

1" = 60'-0"

0 15' 30' 60' 120' 180'

GRAPHIC KEY

- EXISTING PROPERTY LINE
- ROOF OVERHANG
- CHAIN LINK FENCE
- DECORATIVE FENCE
- EXISTING BUILDING
- (E) FIRE DEPARTMENT ACCESS. FIRE DEPARTMENT ACCESS IS 20'-0" WIDE AND RATED FOR 90,000 LBS.
- (E) FIRE HYDRANT
- (E) SIGN

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 01-120703 INC:
REVIEWED FOR:
SS ☐ FLS ☑ ACS ☐
DATE: 5/5/2023
(DSA STAMP AREA)

SFA

REGISTERED ARCHITECT
DIVISION OF THE STATE ARCHITECT
No. C-24873
EXPIRES: 8-30-2024
STATE OF CALIFORNIA

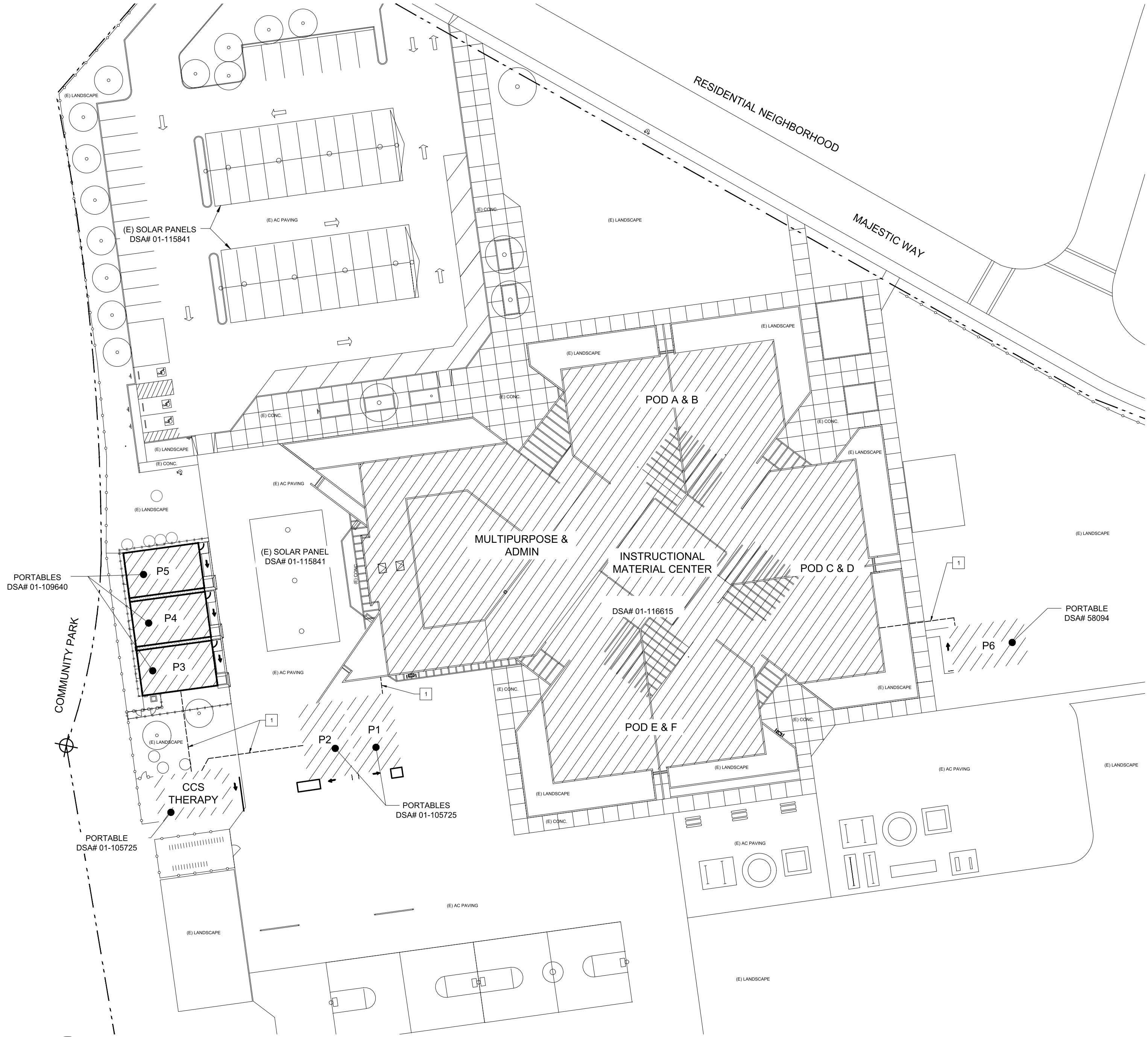
SITE PLAN
FIRE LIFE SAFETY

FIRE ALARM SYSTEM UPGRADE
MAJESTIC WAY ELEMENTARY SCHOOL
1855 MAJESTIC WAY, SAN JOSE, CA 95132
BERRYESSA UNION SCHOOL DISTRICT

REVISIONS:
NO. ITEM DATE

DRAWN BY: KNU
CHECKED BY: M.B.
SFA JOB NO: 22081
DATE: 04/03/2023

T3



1 SITE PLAN

1" = 20'-0" 0 5' 10' 20' 40' 80'

REF NORTH TRUE NORTH

GENERAL NOTES

A. REFER TO FIRE ALARM DRAWINGS FOR EXTENT OF OTHER RELATED WORK.

B. ALL EXISTING EXPOSED ELECTRICAL AND LOW VOLTAGE ROUTING REMOVED AS PART OF THIS SCOPE OF WORK IS TO HAVE THE SUB-STRAIGHT PATCHED, AS NEEDED, TO MATCH ADJACENT SURFACES IN MATERIAL AND FINISH.

SITE PLAN NOTES

1. (N) TRENCHING FOR FIRE ALARM CONDUITS, SAW CUT AND REMOVE AC PAVING AND/OR CONCRETE AS REQUIRED. SEE FIRE ALARM DRAWINGS FOR MORE INFORMATION AND DETAIL 9/FA5.1 AND 3,4 & 5/A9.1 FOR TRENCHING AND PATCHBACK, FINISH TO MATCH ADJACENT SURFACES.

GRAPHIC KEY

- EXISTING PROPERTY LINE
- ROOF OVERHANG
- CHAINLINK FENCE
- DECORATIVE FENCE
- EXISTING BUILDING

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 01-120703 INC:
REVIEWED FOR
SS ☐ FLS ☑ ACS ☐
DATE: 5/5/2023
(DSA STAMP AREA)

SUGIMURA FINNEY ARCHITECTS
SFA

LICENSED ARCHITECT
MARK C. FINNEY
NO. C-24673
REN. 9-30-23
STATE OF CALIFORNIA

SITE PLAN

FIRE ALARM SYSTEM UPGRADE
MAJESTIC WAY ELEMENTARY SCHOOL
1855 MAJESTIC WAY, SAN JOSE, CA 95132
BERRYESSA UNION SCHOOL DISTRICT

REVISIONS

NO.	ITEM	DATE

DRAWN BY: KNU
CHECKED BY: M.B.
SFA JOB NO: 22081
DATE: 04/03/2023

A0.2

1 REFLECTED CEILING PLAN - MAIN BLDG
1/8" = 1'-0"

GENERAL NOTES

A. ALL CEILING / ROOF FRAMING TO HAVE R-30 INSULATION.
B. ALL EXISTING EXPOSED ELECTRICAL AND LOW VOLTAGE ROUTING REMOVED AS PART OF THIS SCOPE OR WORK IS TO HAVE THE SUB-STRAIGHT PATCHED, AS NEEDED, TO MATCH EXISTING ADJACENT SURFACES IN MATERIAL AND FINISH.
C. CONTRACTOR TO PAINT ALL (N) CONDUITS, PULL CANS, ETC. TO MATCH BUILDING, TYP.

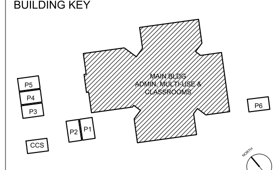
REFLECTED CEILING PLAN NOTES

1. SEE FIRE ALARM PLANS FOR PANEL LOCATIONS AND TYPES. WHERE DEMO AND NEW WORK OCCUR, PATCH AND REPAIR TO MATCH EXISTING ADJACENT.
2. WHERE NECESSARY PROVIDE AND INSTALL ACCESS PANEL FOR HEAT DETECTOR ABOVE CEILING, 18" SQ. OPENING MIN., TYP., SEE FIRE ALARM DRAWINGS FOR MORE INFORMATION AND DETAIL 1/A9.1. NOT ALL LOCATIONS ARE SHOWN.
3. (E) FIRE RATED DOORS TO RECEIVE (N) MAGNETIC DOOR HOLDER PER EA. INDIVIDUAL DOOR. CONTRACTOR TO REMOVE ANY MANUAL DOOR STOPS FROM INDICATED DOORS, SEE FIRE ALARM DRAWINGS FOR MORE INFORMATION.

GRAPHIC KEY

(E) 1-HR RATED WALL
(E) 2-HR RATED WALL
P.O.C. (N) POINT OF CONNECTION, SEE FIRE ALARM DRAWINGS

BUILDING KEY



IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 01-120703 INC:
REVIEWED FOR
SS ☐ FLS ☑ ACS ☐
DATE: 5/5/2023
(DSA STAMP AREA)

LICENSED ARCHITECT
MARK C. FINNEY
NO. C-24673
REN. 9-30-23
STATE OF CALIFORNIA

REFLECTED CEILING PLAN - MAIN BUILDING

FIRE ALARM SYSTEM UPGRADE
MAJESTIC WAY ELEMENTARY SCHOOL
1855 MAJESTIC WAY, SAN JOSE, CA 95132
BERRYESSA UNION SCHOOL DISTRICT

REVISIONS NO.	ITEM	DATE

DRAWN BY:	KNU
CHECKED BY:	M.B.
SFA JOB NO: 22081	DATE: 04/03/2023

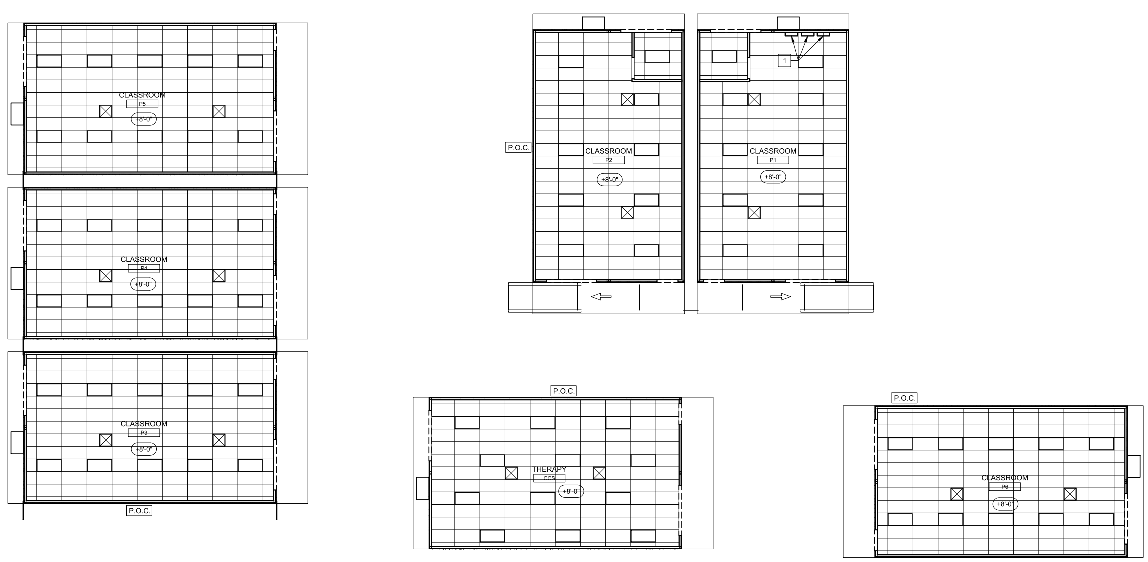
A3.1

GENERAL NOTES

A. ALL CEILING / ROOF FRAMING TO HAVE R-30 INSULATION.
B. ALL EXISTING EXPOSED ELECTRICAL AND LOW VOLTAGE ROUTING REMOVED AS PART OF THIS SCOPE OR WORK IS TO HAVE THE SUB-STRAIGHT PATCHED, AS NEEDED, TO MATCH EXISTING ADJACENT SURFACES IN MATERIAL AND FINISH.
C. CONTRACTOR TO PAINT ALL (N) CONDUITS, PULL CANS, ETC. TO MATCH BUILDING, TYP.

REFLECTED CEILING PLAN NOTES

1. SEE FIRE ALARM PLANS FOR PANEL LOCATIONS AND TYPES. WHERE DEMO AND NEW WORK OCCUR, PATCH AND REPAIR TO MATCH EXISTING ADJACENT.



1 REFLECTED CEILING PLANS - PORTABLES

1/8" = 1'-0"

0 2' 4' 8' 16' 24'

TRUE NORTH REF NORTH

GRAPHIC KEY

P.O.C. (N) POINT OF CONNECTION, SEE FIRE ALARM DRAWINGS

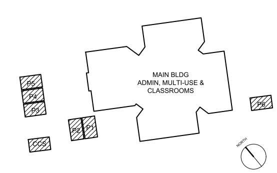
MECHANICAL

(E) SUPPLY DIFFUSER

ELECTRICAL

(E) 2' X 4' LIGHT FIXTURE

BUILDING KEY



IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 01-120703 INC:
REVIEWED FOR
SS ☐ FLS ☑ ACS ☐
DATE: 5/5/2023
(DSA STAMP AREA)

LICENSED ARCHITECT
MARK C. FINNEY
NO. C-24673
REN. 9-30-23
STATE OF CALIFORNIA

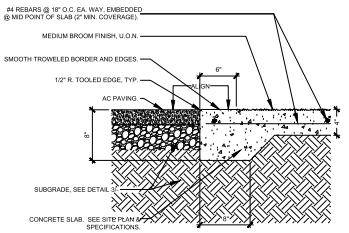
REFLECTED CEILING PLANS - PORTABLES

FIRE ALARM SYSTEM UPGRADE
MAJESTIC WAY ELEMENTARY SCHOOL
1855 MAJESTIC WAY, SAN JOSE, CA 95132
BERRYESSA UNION SCHOOL DISTRICT

REVISIONS		
NO.	ITEM	DATE

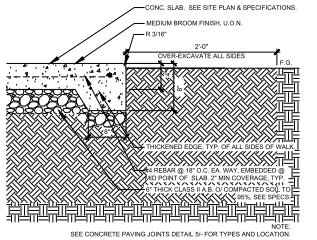
DRAWN BY:	KNU
CHECKED BY:	M.B.
SFA JOB NO:	DATE:
22081	04/03/2023

A3.2



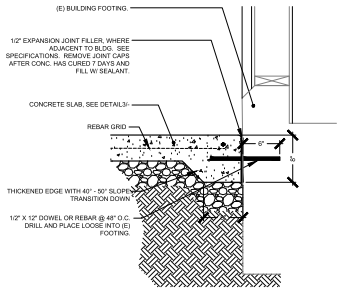
4 ASPHALT / CONCRETE JOINT

1-1/2"=1'-0"

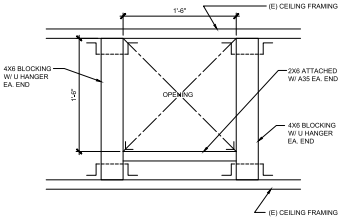


3 EDGE OF CONC. PAVING

1-1/2"=1'-0"

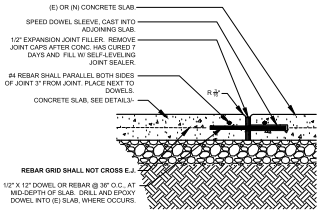


JOINT AT BUILDING

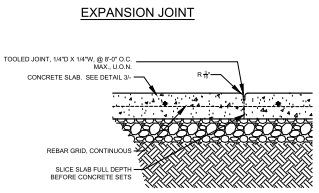


2 NEW OPENING AT CEILING

FOR ACCESS PANEL 1-1/2"=1'-0"



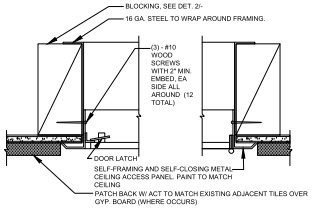
EXPANSION JOINT



TOOLED JOINT

5 CONCRETE PAVING JOINTS

1-1/2"=1'-0"



1 CEILING ACCESS PANEL

@ HARD LID CEILING 3"=1'-0"

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 01-120703 INC:
REVIEWED FOR:
SS ☐ FLS ☑ ACS ☐
DATE: 5/5/2023
(DSA STAMP AREA)

SFA

LICENSED ARCHITECT
REGISTERED PROFESSIONAL
NO. C-24573
EXPIRES 8-30-24
STATE OF CALIFORNIA

TYPICAL DETAILS

FIRE ALARM SYSTEM UPGRADE
MAJESTIC WAY ELEMENTARY SCHOOL
1855 MAJESTIC WAY, SAN JOSE, CA 95132
BERRYESSA UNION SCHOOL DISTRICT

REVISIONS
NO. ITEM DATE

DRAWN BY: KNU
CHECKED BY: M.B.
SFA JOB NO: 22081
DATE: 04/03/2023

A9.1

FIRE ALARM EQUIPMENT LIST

SYMBOL	DESCRIPTION AND MODEL NUMBER	MFGR'S PART No.	CSFM LISTING
FACP	ADDRESSABLE FIRE ALARM CONTROL PANEL AND EMERGENCY MASS NOTIFICATION SYSTEM. SILENT KNIGHT 6820 SERIES. (SEE BATTERY CALCS FOR SIZE OF BATTERIES REQUIRED.)	6820EVS	7165-0559:0500
DACT	FIRE ALARM CELLULAR COMMUNICATOR IN A METAL CABINET ENCLOSURE WITH LOCK AND KEY, SILENT KNIGHT CELL-CAB-SK SERIES.	CELL-CAB-SK	7165-0559:0500
LOC	FIRE ALARM LOCAL OPERATOR CONSOLE WITH 160 CHARACTER LIQUID CRYSTAL DISPLAY REMOTE ANNUNCIATOR AND ON-BOARD SUPERVISED MICROPHONE, SILENT KNIGHT EVS-LOC SERIES.	EVS-LOC	7165-0559:0500
FAD	FIRE ALARM DOCUMENTS CABINET TO STORE PRINTED AND DIGITAL DOCUMENTS; LOCATE NEXT TO FACP.	NF-FAD	7300-0553:0110
RPS	POWER MODULE SUPPLY, SILENT KNIGHT 5895XL SERIES.	5895XL	7165-0559:0135
MAX	INTELLIGENT 50 WATT AMPLIFIER, SILENT KNIGHT EVS-50W SERIES.	EVS-50W	7165-0559:0172
S	ADDRESSABLE PHOTOELECTRIC SMOKE DETECTOR AND BASE, SILENT KNIGHT SK-PHOTO SERIES.	SK-PHOTO-W B300-6	7272-0559:0512 7300-1653:0109
H	ADDRESSABLE FIRE ALARM HEAT DETECTOR AND BASE, 135° FIXED TEMPERATURE, SILENT KNIGHT SK-HEAT SERIES. (DEVICES WITH "A" INDICATE ABOVE CEILING).	SK-HEAT-W B300-6	7270-0559:0511 7300-1653:0109
H	ADDRESSABLE FIRE ALARM HIGH TEMPERATURE HEAT DETECTOR AND BASE, 190° FIXED TEMPERATURE, SILENT KNIGHT SK-HEAT SERIES.	SK-HEAT-HT-W B300-6	7270-0559:0511 7300-1653:0109
S	ADDRESSABLE DUCT SMOKE DETECTOR HOUSING WITH REMOTE TEST SWITCH. PROVIDE ADDRESSABLE SMOKE DETECTOR AND RELAY MODULE WITHIN HOUSING, SILENT KNIGHT SK-DUCT SERIES.	SK-DUCT-W	3242-0559:0518
P	ADDRESSABLE FIRE ALARM MANUAL PULLSTATION, DUAL-ACTION WITH KEY RESET, MOLDED POLYCARBONATE HOUSING, SILENT KNIGHT SK-PULL SERIES.	SK-PULL-DA	7150-0559:0161
M	ADDRESSABLE MONITOR MODULE, SILENT KNIGHT SK-MONITOR SERIES.	SK-MONITOR	7300-0559:0155
C	ADDRESSABLE CONTROL MODULE, SILENT KNIGHT SK-CONTROL SERIES.	SK-CONTROL	7300-0559:0155
R	ADDRESSABLE RELAY MODULE, SILENT KNIGHT SK-RELAY SERIES.	SK-RELAY	7300-0559:0155
	WALL MOUNTED MULTI-CANDELA STROBE WITH FIELD SELECTABLE CANDELA SETTINGS OF 15/30/75/110cd, SYSTEM SENSOR, SRL SERIES.	SRL	7125-1653:0504
C	CEILING MOUNTED MULTI-CANDELA STROBE WITH FIELD SELECTABLE CANDELA SETTINGS OF 15/30/75/177cd, SYSTEM SENSOR, SCR SERIES.	SCRL	7125-1653:0504
	WALL MOUNTED MULTI-CANDELA SPEAKER/STROBE WITH FIELD SELECTABLE CANDELA SETTINGS OF 15/30/75/110cd, SYSTEM SENSOR, L-SERIES.	SPSRL	7320-1653:0505
	CEILING MOUNTED MULTI-CANDELA SPEAKER/STROBE WITH FIELD SELECTABLE CANDELA SETTINGS OF 15/30/75/177cd, SYSTEM SENSOR, L-SERIES.	SPCRL	7320-1653:0505
WP	WALL MOUNTED WEATHERPROOF SPEAKER, SYSTEM SENSOR SPECTRALERT ADVANCE SERIES.	SPRK	7320-1653:0201
EOL	END OF LINE DEVICE.		

FIRE ALARM GENERAL NOTES

1. WIRING MUST BE LISTED FOR USE AS REQUIRED BY TITLE 24/CEC, ARTICLE 760.
2. WIRE USED IN WET LOCATIONS SHALL BE OF AN APPROVED TYPE IN ACCORDANCE WITH 3-310-B, 724/CEC (I.E. THHW OR EQUAL).
3. UNDER GROUND AND EXTERIOR CONDUITS TO HAVE WATERTIGHT FITTINGS AND WIRES APPROVED FOR WET LOCATION.
4. ALL CONDUCTORS SHALL BE ROUTED IN CONDUIT UNLESS SPECIFICALLY NOTED OTHERWISE ON PLANS. MINIMUM CONDUIT SIZE SHALL BE 3/4."
5. THE CONDUIT AND WIRE SHOWN ON THESE PLANS ARE SHOWN DIAGRAMMATICALLY. EXACT LOCATIONS SHALL BE DETERMINED IN THE FIELD TO SUIT FIELD CONDITIONS. "AS-BUILT" PLANS SHALL BE MAINTAINED AND BE PROVIDED AS REQUIRED BY THE PROJECT INSPECTOR OF RECORD.
6. PENETRATIONS OF FIRE RATED WALLS SHALL BE PROTECTED IN ACCORDANCE WITH CALIFORNIA BUILDING CODE, CHAPTER 7, TITLE 24. PROVIDE DETAILS OF THROUGH PENETRATION FIRE-STOP SYSTEMS FOR ALL PIPE/CABLE/CONDUIT PASSING THROUGH FIRE RATED WALLS/FLOORS REQUIRING PROTECTED OPENINGS.
7. ALL DEVICES SHALL BE "CSFM" LISTED.
8. EXTERIOR DEVICES SHALL BE LISTED FOR EXTERIOR USE BY "CSFM."
9. AUDIBLE FIRE ALARM SOUND LEVEL SHALL BE AT LEAST 15DBA ABOVE THE AVERAGE SOUND LEVEL.
10. AUDIBLE SIGNALS INTENDED FOR OPERATION IN THE PUBLIC SHALL HAVE A SOUND LEVEL OF NOT LESS THAN 75DBA AT 10 FEET OR MORE THAN 110DBA AT THE MINIMUM HEARING DISTANCES FROM THE AUDIBLE APPLIANCE.
11. WHERE VISUAL DEVICES ARE REQUIRED, VISUAL DEVICE SHOULD NOT EXCEED 2 FLASHES PER SECOND AND SHOULD NOT BE SLOWER THAN 1 FLASH EVERY SECOND. THE DEVICE SHALL HAVE A PULSING LIGHT SOURCE NOT LESS THAN 15 CANDELA. NO PLACE IN ANY ROOM SHALL BE MORE THAN 50 FEET FROM A DEVICE.
12. APPROVED BY THE "DIVISION OF THE STATE ARCHITECT/OFFICE OF REGULATION SERVICES." CONTRACTOR SHALL PROVIDE COPIES OF APPROVED PLANS TO THE PROJECT INSPECTOR OF RECORD PRIOR TO BEGINNING WORK. THE CONTRACTOR SHALL SUBMIT SHOP DRAWING TO ENGINEER PRIOR TO PURCHASE FOR REVIEW. THE FIRE PROTECTION SYSTEM SHALL NOT BE INSTALLED UNTIL SHOP DRAWINGS HAVE BEEN SUBMITTED TO AND RECEIVED BY THE ENGINEER OF RECORD.
13. FINAL ALARM TEST SHALL BE WITNESSED BY THE DSA INSPECTOR OF RECORD (IOR). BOTH THE DSA INSPECTOR OF RECORD (IOR) AND THE LOCAL FIRE AUTHORITY SHALL BE NOTIFIED OF DATE AND TIME OF FINAL FIRE ALARM TESTING BY THE FIRE ALARM CONTRACTOR. FIRE ALARM CONTRACTOR SHALL PROVIDE "RECORD OF COMPLETION" TO THE INSPECTOR OF RECORD (IOR)/DSA AFTER COMPLETION OF OPERATIONAL ACCEPTANCE TEST.
14. POWER SERVICE SHALL BE ON A DEDICATED, 120V BRANCH CIRCUIT, WITH A RED MARKING AND IDENTIFIED AS "FIRE ALARM CIRCUIT CONTROL."
15. AUTOMATIC FIRE ALARM SYSTEM SHALL TRANSMIT THE ALARM, SUPERVISORY AND TROUBLE SIGNALS TO AN APPROVED SUPERVISING STATION AS REQUIRED BY NFPA 72 AS AMENDED BY CFC CHAPTER 80. THE SUPERVISING STATION SHALL BE LISTED AS EITHER UUFX OR UUIS BY UNDERWRITERS LABORATORY OR SHALL MEET THE REQUIREMENTS OF FACTORY MUTUAL RESEARCH APPROVAL STANDARD 3011.
16. EXISTING FIELD DEVICES AND FACP SHALL REMAIN IN PLACE UNTIL NEW FIELD DEVICES ARE IN PLACE AND NEW WIRING HAS BEEN HOMERAN TO NEW LOCATION OF FACP. CONTRACTOR SHALL COORDINATE WITH SCHOOL DISTRICT TO PROVIDE AN APPROVED 24 HOUR FIRE WATCH UNTIL NEW FIRE ALARM SYSTEM IS OPERATIONAL.

GENERAL CONSTRUCTION NOTES

1. CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE CODES AND REGULATIONS. MATERIALS AND EQUIPMENT SHALL BE U.L. LISTED AND LABELED FOR THE APPLICATION.
2. THE CONTRACTOR SHALL OBTAIN AND PAY FOR ALL PERMITS, LICENSES AND INSPECTION FEES REQUIRED BY THIS CONTRACT WORK.
3. CONTRACTOR SHALL VISIT THE PROJECT SITE PRIOR TO BIDDING AND ALLOW FOR ALL FIELD CONDITIONS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ELECTRICAL WORK NOTED AND CALLED OUT ON ALL CONTRACT DOCUMENTS. THE CONTRACTOR SHALL OBTAIN INFORMATION AND BE FAMILIAR WITH ALL OTHER TRADES WORK. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION BETWEEN OTHER TRADES ON PROJECT.
4. CONTRACTOR SHALL BE RESPONSIBLE FOR THE SAFETY OF PERSONS AND PROPERTY AND SHALL PROVIDE INSURANCE COVERAGE AS NECESSARY FOR LIABILITY AND PERSONAL PROPERTY DAMAGE, TO FULLY PROTECT THE OWNER, ARCHITECT AND ENGINEER FROM ANY AND ALL CLAIMS RESULTING FROM THIS WORK.
5. CONTRACTOR SHALL MAINTAIN RECORD DRAWINGS AT THE PROJECT SITE INDICATING ALL MODIFICATIONS TO ELECTRICAL SYSTEMS. THE CONTRACTOR SHALL AT THE CONCLUSION OF THE PROJECT PROVIDE ACCURATE "AS-BUILT" DRAWINGS ACCEPTABLE TO THE ARCHITECT.
6. ALL MATERIALS PROVIDED TO THE PROJECT SHALL BE NEW. THE CONTRACTOR SHALL BE RESPONSIBLE TO PROVIDE AND INSTALL ALL INCIDENTAL MATERIALS REQUIRED FOR A COMPLETE INSTALLATION.
7. CONTRACTOR SHALL PROVIDE TO THE ARCHITECT A CONSTRUCTION SCHEDULE OF ELECTRICAL WORK. THE CONSTRUCTION SCHEDULE SHALL IDENTIFY ALL SIGNIFICANT MILESTONES WITH COMPLETION DATES.
8. CONTRACTOR SHALL PROVIDE ALL REQUIRED "CUTTING, PATCHING, EXCAVATION, BACKFILL AND REPAIRS" NECESSARY TO RESTORE DAMAGED SURFACES TO EQUAL OR BETTER THAN ORIGINAL CONDITIONS EXISTING AT START OF WORK.
9. CONTRACTOR SHALL BE RESPONSIBLE FOR PAINTING ALL EXPOSED CONDUITS AND ELECTRICAL EQUIPMENT. REFER TO ARCHITECTS PAINTING SECTION FOR REQUIREMENTS.
10. ALL ELECTRICAL EQUIPMENT INSTALLED OUTDOORS SHALL BE WEATHERPROOF. EXTERIOR CONDUITS RUN INTO BUILDINGS SHALL BE INSTALLED WITH FLASHING, CAULKED AND SEALED. CONDUITS FOR EXTERIOR ELECTRICAL DEVICES SHALL BE RUN INSIDE BUILDING UNLESS OTHERWISE NOTED ON DRAWINGS.
11. ALL CONDUITS UNLESS OTHERWISE NOTED ON DRAWINGS SHALL HAVE AS A MINIMUM: TWO (2) #12s WITH ONE (1) #12 GROUND. "TICK" MARKS SHOWN ON CIRCUITRY ARE FOR ROUGH ESTIMATING ONLY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL WIRES AND WIRE SIZES REQUIRED BY LATEST CODE.
12. ALL BRANCH CIRCUITS SHALL HAVE INDIVIDUAL NEUTRALS. SHARED NEUTRALS ON MULTIWIRE CIRCUITS IS NOT ALLOWED.
13. COORDINATE ALL CONDUIT RUNS, ELECTRICAL EQUIPMENT AND PANELS WITH ALL OTHER WORK TO AVOID CONFLICTS.
14. CONTRACTOR SHALL PROVIDE IN EVERY NEW EMPTY CONDUIT A DRAW STRING FOR USE IN FUTURE CONSTRUCTION.
15. ALL CONDUIT SHALL BE CONCEALED WHERE POSSIBLE. CUT AND PATCH EXISTING WALLS WHERE NECESSARY. WHERE IT IS NECESSARY TO CUT OR BORE EXISTING STRUCTURAL WALLS FOR NEW ELECTRICAL WORK OBTAIN PERMISSION FROM THE ARCHITECT PRIOR TO STARTING WORK. REUSE EXISTING CONDUIT WHERE POSSIBLE.
16. WHERE IT IS NOT POSSIBLE TO REUSE EXISTING CONDUIT OR RUN NEW CONCEALED CONDUIT USE NON-METALLIC SURFACE RACEWAY AND BOXES. ROUTING OF ALL NON-METALLIC RACEWAYS SHALL BE APPROVED BY THE ARCHITECT OR OWNER'S REPRESENTATIVE PRIOR TO ROUGH-IN.
17. EXTENSION RINGS OR RESET BOXES TO BE FLUSH WITH NEW WALL THICKNESS.
18. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL DAMAGE TO EXISTING UNDERGROUND SYSTEMS (GAS, WATER, TELEPHONE, ELECTRICAL, SEWER, ETC.). THE CONTRACTOR SHALL REPAIR & PAY ALL EXPENSES FOR DAMAGE TO EXISTING UNDERGROUND SYSTEMS AS A RESULT OF NEW WORK. REPAIR TO DAMAGED UNDERGROUND SYSTEMS SHALL BE TO THE OWNERS SATISFACTION WITHOUT EXTRA EXPENSE TO THE OWNER.
19. EXISTING WIRING SHOWN HAS BEEN TAKEN FROM OLD PLANS AND IS ASSUMED TO BE CORRECT. ELECTRICAL CONTRACTOR SHALL FIELD VERIFY ACTUAL CONDITIONS AND MAKE ADJUSTMENTS TO SUIT ACTUAL CONDITIONS AND TO MEET THE INTENT OF THE CONTRACT DOCUMENTS.
20. ALL INSTALLATION OF EXPOSED SURFACE MOUNTED RACEWAY IN PUBLIC AREAS SHALL BE REVIEWED BY ARCHITECT BEFORE ROUGH-IN. CONTRACTOR IS TO DETERMINE THE ACCESSIBILITY OF ATTIC, FURRED SPACE, HOLLOW MULLIONS, ETC. IN EACH AREA AND REVIEW WITH ARCHITECT. IF SYSTEM CAN BE ROUTED CONCEALED EITHER BY FISHING OR ACCESSIBILITY, CONTRACTOR IS TO DO SO. IF INACCESSIBILITY IS DETERMINED, CONTRACTOR SHALL INSTALL SURFACE MOUNTED RACEWAY IN THE MOST AESTHETICALLY PLEASING MEANS AS DETERMINED BY THE ARCHITECT. NO ALLOWANCE FOR ADDITIONAL COMPENSATION DUE TO ROUTING AS DIRECTED BY THE ARCHITECT WILL BE MADE.
21. AUDIBLE APPLIANCES SHALL PROVIDE 15dBA ABOVE AMBIENT NOISE LEVELS IN ALL OCCUPIED AREAS AND INTELLIGIBILITY WHERE REQUIRED PER CBC 907.5.2.1.1.

SYMBOLS & ABBREVIATIONS

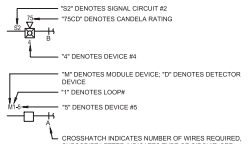
SYMBOLS

- MANUAL PULL STATION
- STROBE ONLY
- STROBE ONLY (CEILING MOUNTED)
- SPEAKER ONLY
- MINI HORN
- SPEAKER/STROBE
- SPEAKER/STROBE (CEILING MOUNTED)
- CHIME/STROBE
- HEAT DETECTOR
- HEAT DETECTOR (ABOVE ACCESSIBLE CEILING)
- SMOKE DETECTOR
- DUCT SMOKE DETECTOR
- TAMPER SWITCH
- FLOW SWITCH
- POST INDICATING VALVE
- BELL (GONG)
- FIRE ALARM CONTROL PANEL
- REMOTE POWER SUPPLY
- DIGITAL AUDIO AMPLIFIER
- END OF LINE
- JUNCTION BOX - CEILING/WALL MOUNTED, SIZE PER CODE, TAPE AND TAG WIRES
- PULLBOX
- CONDUIT - HOME RUN TO PANEL, TERMINAL CABINET, ETC. AS INDICATED RUNS MARKED WITH CROSSHATCHES INDICATE NUMBER OF #12 AWG WIRES WHEN MORE THAN TWO. SIZE CONDUIT ACCORDING TO SPECIFICATIONS AND APPLICABLE CODE. CROSS HATCHES WITH NUMBER ADJACENT INDICATES WIRE SIZE OTHER THAN #12 AWG.
- CONDUIT - EXISTING
- CONDUIT - CONCEALED IN WALLS OR CEILING.
- CONDUIT - IN OR BELOW FLOOR. 3/4"C MIN.
- CONDUIT CONTINUATION.
- SHEET NOTE REFERENCE SYMBOL; SEE ASSOCIATED NOTE ON SAME SHEET
- DETAIL OR SECTION DESIGNATION.

ABBREVIATIONS

ARCH.	ARCHITECT	FSD	FIRE SMOKE DAMPER
AWG	AMERICAN WIRE GAUGE	IDC	INITIATING DEVICE CIRCUITS
BKR	BREAKER	(N)	NEW
C	CONDUIT	NAC	NOTIFICATION APPLIANCE CIRCUITS
CO	CONDUIT ONLY	NIC	NOT IN CONTRACT
CB	CIRCUIT BREAKER	NO	NUMBER
CKT	CIRCUIT	SLC	SIGNALING LINE CIRCUITS
CLG	CEILING	TYP	TYPICAL
(E)	EXISTING	UON	UNLESS OTHERWISE NOTED
EOL	END OF LINE	WP	WEATHERPROOF
FA	FIRE ALARM		
FACP	FIRE ALARM CONTROL PANEL		
FBO	FURNISHED BY OTHERS		

TYPICAL ZONE NOMENCLATURE



FIRE ALARM SYSTEM OPERATIONAL MATRIX

CAUSE	EFFECT: ALARM	EFFECT: TROUBLE	EFFECT: SUPERVISORY	EFFECT: MISC.	REMARKS
SMOKE DETECTORS	●	●	●	●	
HEAT DETECTORS	●	●	●	●	
DUCT SMOKE DETECTORS	●	●	●	●	
MANUAL PULL STATIONS	●	●	●	●	
SYSTEM RESET			●		
SIGNAL SILENCE			●		
AC POWER FAILURE		●			
FIRE ALARM TROUBLE (OPEN, SHORTS, OR GROUNDS) ON INITIATION OR SIGNALING CIRCUITS		●			

SHEET INDEX

PROJECT DESCRIPTION

SCOPE OF WORK:
FIRE ALARM SYSTEM REPLACEMENT FOR EXISTING CAMPUS TO MEET CURRENT CODE REQUIREMENTS. THE INTENT OF THE PROJECT IS TO REPLACE EXISTING DETERIORATED FIRE ALARM SYSTEM WITH NEW AUTOMATIC FIRE ALARM SYSTEM AND EMVOICE EVACUATION SYSTEM.

NO NEW CARBON MONOXIDE DETECTION PROVIDED AS BUILDINGS WERE CONSTRUCTED AND/OR APPROVED BEFORE THE ADOPTION OF THE 2016 CALIFORNIA BUILDING STANDARDS CODE.

SYSTEM DESCRIPTION:
SLC = CLASS B
NAC = CLASS B

FIRE ALARM SYSTEM DESIGN BY:
NAJIB ANWARY

EQUIPMENT ANCHORAGE

M/E/P COMPONENT ANCHORAGE NOTES:

ALL MECHANICAL, PLUMBING AND ELECTRICAL COMPONENTS SHALL BE ANCHORED AND INSTALLED PER THE DETAILS ON THE DSA APPROVED CONSTRUCTION DOCUMENTS. WHERE NO DETAIL IS INDICATED, THE FOLLOWING COMPONENTS SHALL BE ANCHORED OR BRACED TO MEET THE FORCE AND DISPLACEMENT REQUIREMENTS PRESCRIBED IN THE 2019 CBC, SECTION 1617A.1.18 THROUGH 1617A.1.26 AND ASCE 7-16 CHAPTER 13, 28 & 30:

1. ALL PERMANENT EQUIPMENT AND COMPONENTS.
2. TEMPORARY OR MOVABLE EQUIPMENT THAT IS PERMANENTLY ATTACHED(e.g. HARD WIRE) TO THE BUILDING UTILITY SERVICES SUCH AS ELECTRICITY, GAS OR WATER. "PERMANENTLY ATTACHED" SHALL INCLUDE ALL ELECTRICAL CONNECTIONS EXCEPT PLUGS FOR 120 / 220 VOLT RECEPTACLES HAVING A FLEXIBLE CABLE.
3. TEMPORARY, MOVABLE OR MOBILE EQUIPMENT WHICH IS HEAVIER THAN 400 POUNDS OR HAS A CENTER OF MASS LOCATED 4 FEET OR MORE ABOVE THE ADJACENT FLOOR OR ROOF LEVEL THAT DIRECTLY SUPPORT THE COMPONENT IS REQUIRED TO BE RESTRAINED IN A MANNER APPROVED BY DSA.

THE FOLLOWING MECHANICAL AND ELECTRICAL COMPONENTS SHALL BE POSITIVELY ATTACHED TO THE STRUCTURE. BUT NEED NOT BE DETAILED IN THE PLANS. THESE COMPONENTS SHALL HAVE FLEXIBLE CONNECTIONS PROVIDED BETWEEN THE COMPONENT AND ASSOCIATED DUCTWORK, PIPING AND CONDUIT. FELXIBLE CONNECTIONS MUST ALLOW MOVEMENT IN BOTH TRANSVERSE AND LONGITUDINAL DIRECTIONS.

A. COMPONENTS WEIGHTING LESS THAN 400 POUNDS AND HAVE A CENTER OF MASS LOCATED 4 FEET OR LESS ABOVE THE ADJACENT FLOOR OR ROOF LEVEL THAT DIRECTLY SUPPORT THE COMPONENT.

B. COMPONENTS WEIGHTING LESS THAN 20 POUNDS, OR IN THE CASE OF DISTRIBUTED SYSTEMS, LESS THAN 5 POUNDS PER FOOT, WHICH ARE SUSPENDED FROM A ROOF OR FLOOR OR HUNG FROM A WALL.

THE ANCHORAGE OF ALL MECHANICAL, ELECTRICAL AND PLUMBING COMPONENTS SHALL BE SUBJECT OF THE APPROVAL OF THE DESIGN PROFESSIONAL IN GENERAL RESPONSIBLE CHARGE OR STRUCTURAL ENGINEER DELEGATED RESPONSIBILITY AND ACCEPTANCE BY DSA. THE PROJECT INSPECTOR WILL VERIFY THAT ALL COMPONENTS AND EQUIPMENT HAVE BEEN ANCHORED IN ACCORDANCE WITH ABOVE REQUIREMENTS.

PIPING, DUCTWORK AND ELECTRICAL DISTRIBUTION SYSTEM BRACING NOTE

PIPING, DUCTWORK AND ELECTRICAL DISTRIBUTION SYSTEMS SHALL BE BRACED TO COMPLY WITH THE FORCES AND DISPLACEMENTS PRESCRIBED IN ASCE 7-16 SECTION 13.3 AS DEFINED IN ASCE 7-16 SECTION 13.6.5, 13.6.6, 13.6.7, 13.6.8 AND 2019 CBC, SECTIONS 1617A.1.24, 1617A.1.25 AND 1617A.1.26.

THE METHOD OF SHOWING BRACING AND ATTACHMENTS TO THE STRUCTURE FOR THE IDENTIFIED DISTRIBUTION SYSTEM ARE AS NOTED BELOW. WHEN BRACING AND ATTACHMENTS ARE BASED ON PRE-APPROVED INSTALLATION GUIDE (e.g. OSHPD OPM FOR 2013 CBC OR LATER), COPIES OF THE BRACING SYSTEM INSTALLATION GUIDE OR MANUAL SHALL BE AVAILABLE ON THE JOBSITE PRIOR TO THE START OF AND DURING THE HANGING AND BRACING OF THE DISTRIBUTION SYSTEMS. THE STRUCTURAL ENGINEER OF RECORD SHALL VERIFY THE ADEQUACY OF THE STRUCTURE TO SUPPORT THE HANGER AND BRACE LOADS.
MECHANICAL PIPING (MP), MECHANICAL DUCTS (MD), PLUMBING PIPING (PP), ELECTRICAL DISTRIBUTION SYSTEMS (E):

MP ☐ MD ☐ PP ☐ E ■ - OPTION 1: DETAILED ON THE APPROVED DRAWINGS WITH PROJECT SPECIFIC NOTES AND DETAILS.
MP ☐ MD ☐ PP ☐ E ☐ - OPTION 2: SHALL COMPLY WITH THE APPLICABLE OSHPD PRE-APPROVED (OPM #) #_____.

APPLICABLE CODES & STANDARDS

CODES:

1. 2022 CALIFORNIA ADMINISTRATIVE CODE C.A.C., PART 1, TITLE 24, C.C.R.
2. 2022 CALIFORNIA BUILDING CODE (CBC) C.C.R., TITLE 24, VOL. 1 & 2 BASED ON THE 2021 INTERNATIONAL BUILDING CODE (IBC) WITH CALIFORNIA AMENDMENTS.
3. 2022 CALIFORNIA ELECTRICAL CODE (CEC) C.C.R., TITLE 24, PART 3 BASED ON THE 2020 NATIONAL ELECTRICAL CODE (NEC) WITH CALIFORNIA AMENDMENTS.
4. 2022 CALIFORNIA MECHANICAL CODE (CMC) C.C.R., TITLE 24, PART 4 BASED ON THE 2021 UNIFORM MECHANICAL CODE (UMC) WITH CALIFORNIA AMENDMENTS.
5. 2022 CALIFORNIA PLUMBING CODE (CPC) C.C.R., TITLE 24, PART 5 BASED ON THE 2021 UNIFORM PLUMBING CODE (UPC) WITH CALIFORNIA AMENDMENTS.
6. 2022 CALIFORNIA ENERGY CODE C.C.R., TITLE 24, PART 6.
7. 2022 CALIFORNIA FIRE CODE (CFC) C.C.R., TITLE 24, PART 9 BASED ON THE 2021 INTERNATIONAL FIRE CODE (IFC) WITH CALIFORNIA AMENDMENTS.
8. 2022 CALIFORNIA GREEN BUILDING STANDARDS CODE C.C.R., TITLE 24, PART 11.
9. 2022 CALIFORNIA REFERENCED STANDARDS CODE C.C.R., TITLE 24, PART 12.
10. TITLE 19 C.C.R., PUBLIC SAFETY, STATE FIRE MARSHAL REGULATIONS.
11. NATIONAL FIRE ALARM CODE (NFPA 72) 2019.

STANDARDS:

1. AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)
2. ELECTRONICS INDUSTRIES ASSOCIATION (EIA)
3. INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS (IEEE)
4. NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)
5. NATIONAL ELECTRICAL TESTING ASSOCIATION (NETA)
6. UNDERWRITER LABORATORIES (UL)
7. CALIFORNIA OCCUPATIONAL SAFETY AND HEALTH ACT STANDARDS (CAL/OSHA)

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 01-120703 INC: N/A
REVIEWED FOR:
SS ☐ FLS ☑ ACS ☐
DATE: 5/5/2023
(DSA STAMP AREA)

SFA

LICENSED ARCHITECT
NAJIB ANWARY
No. C-24873
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
NAJIB ANWARY
No. 22043
EXP. 12/31/23
ELECTRICAL
STATE OF CALIFORNIA

AURUM CONSULTING ENGINEERS
MONTEREY BAY, INC
Project No. 22-546.00
404 W. Franklin St ● Suite 100 ● Monterey, CA 93940
T 831.646.3334 ● F 831.646.3336 ● www.aceinc.com

These drawings are instruments of service and are the property of AURUM CONSULTING ENGINEERS MONTEREY BAY, INC. All designs and other information in the drawings are for use solely with the work shown hereon. They shall not be changed without the expressed written permission of AURUM CONSULTING ENGINEERS MONTEREY BAY, INC.

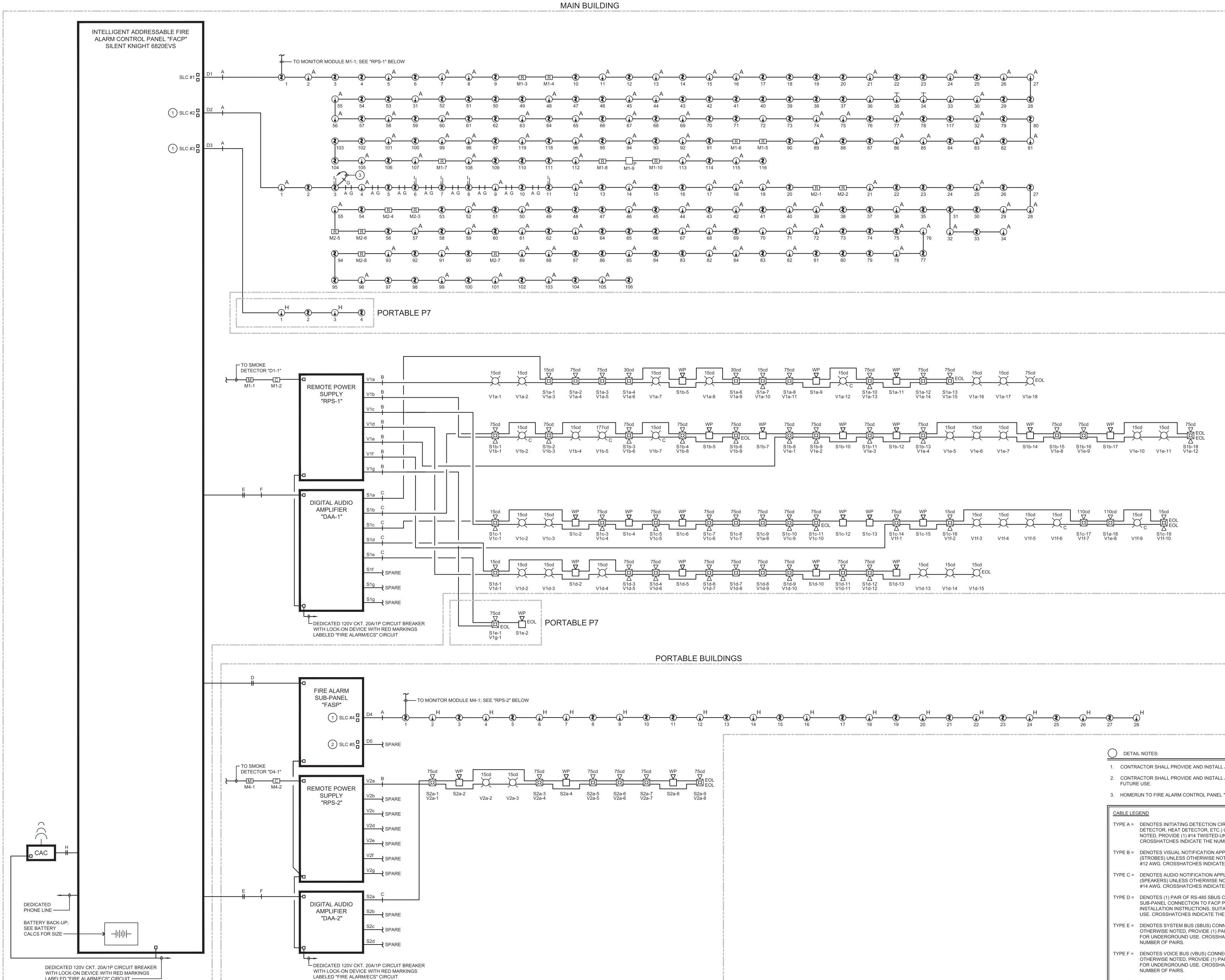
FIRE ALARM SYMBOLS, ABBRE., EQUIPMENT LIST, OPERATIONAL MATRIX, DETAILS & NOTES

FIRE ALARM UPGRADE
MAJESTIC WAY ELEMENTARY SCHOOL
1855 MAJESTIC WAY, SAN JOSE, CA 95132
BERRYESSA UNION SCHOOL DISTRICT

REVISIONS NO.	ITEM	DATE
	DSA RESUBMITTAL	03/28/23

DRAWN BY:	F.S.
CHECKED BY:	N.A.
SFA JOB NO:	DATE:
22084	03/28/2023

FA0.1



DETAIL NOTES:

1. CONTRACTOR SHALL PROVIDE AND INSTALL ADDITIONAL SLC CARD.
2. CONTRACTOR SHALL PROVIDE AND INSTALL ADDITIONAL SLC CARD FOR FUTURE USE.
3. HOMERUN TO FIRE ALARM CONTROL PANEL "FACP".

CABLE LEGEND

TYPE A =	DENOTES INITIATING DETECTION CIRCUITS (SMOKE DETECTOR, HEAT DETECTOR, ETC.) UNLESS OTHERWISE NOTED, PROVIDE (1) #14 TWISTED-UNSHIELDED PAIR. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.
TYPE B =	DENOTES VISUAL NOTIFICATION APPLIANCE CIRCUITS (STROBES) UNLESS OTHERWISE NOTED, PROVIDE (1) PAIR OF #12 AWG. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.
TYPE C =	DENOTES AUDIO NOTIFICATION APPLIANCE CIRCUITS (SPEAKERS) UNLESS OTHERWISE NOTED, PROVIDE (1) PAIR OF #14 AWG. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.
TYPE D =	DENOTES (1) PAIR OF RS-485 SBUS CABLE FOR FIRE ALARM SUB-PANEL CONNECTION TO FACP PER MANUFACTURE'S INSTALLATION INSTRUCTIONS, SUITABLE FOR UNDERGROUND USE. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.
TYPE E =	DENOTES SYSTEM BUS (SBUS) CONNECTION; UNLESS OTHERWISE NOTED, PROVIDE (1) PAIR OF #16 AWG. SUITABLE FOR UNDERGROUND USE. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.
TYPE F =	DENOTES VOICE BUS (VBUS) CONNECTION; UNLESS OTHERWISE NOTED, PROVIDE (1) PAIR OF #16 AWG. SUITABLE FOR UNDERGROUND USE. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.
TYPE G =	DENOTES 24VDC CONSTANT POWER CIRCUITS FOR DUCT SMOKE DETECTOR OR BEAM SMOKE DETECTOR; UNLESS OTHERWISE NOTED, PROVIDE (1) PAIR OF #12 AWG. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.
TYPE H =	DENOTES SUPERVISORY RELAY TRIPS FOR CAC. PROVIDE (2) STRANDED #14 AWG.

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 01-120703 INC:
REVIEWED FOR
SS ☐ FLS ☑ ACS ☐
DATE: 5/5/2023
(DSA STAMP AREA)

LICENSED ARCHITECT MARK C. FINNEY NO. C-24673 REN. 9-30-23 STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER NAJIB ANWARY No. E21043 EXP. 3/31/25 ELECTRICAL STATE OF CALIFORNIA

AURUM CONSULTING ENGINEERS MONTEREY BAY, INC.
Project No. 22-546.00
404 W. Franklin St. • Suite 100 • Monterey, CA 93940
T.831.646.3330 • F.831.646.3336 • www.acemb.com

FIRE ALARM RISER DIAGRAM

FIRE ALARM UPGRADE
MAJESTIC WAY ELEMENTARY SCHOOL
1855 MAJESTIC WAY, SAN JOSE, CA 95132
BERRYESSA UNION SCHOOL DISTRICT

REVISIONS

NO.	ITEM	DATE
	DSA RESUBMITTAL	03/28/23

DRAWN BY: F.S.
CHECKED BY: N.A.
SFA JOB NO: 22084
DATE: 03/28/2023

FA1.1

VOLTAGE DROP CALCULATIONS (VISUAL CIRCUITS)

VOLTAGE DROP (VD) CALCULATION - VISUAL CIRCUIT No. V1g

DEVICE #	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
GAUGE WIRE	12	12	12	12	12	12	12	12	12	12
DISTANCE (FT)	165									
AMPS OF DEVICE	0.107									
TOTAL AMPS@DEV.	0.107	0	0	0	0	0	0	0	0	0
VOLT. DROP @ DEV.	0.058	0	0	0	0	0	0	0	0	0
DEVICE #	11th	12th	13th	14th	15th	16th	17th	18th	19th	20th
GAUGE WIRE	12	12	12	12	12	12	12	12	12	12
DISTANCE (FT)										
AMPS OF DEVICE										
TOTAL AMPS@DEV.	0	0	0	0	0	0	0	0	0	0
VOLT. DROP @ DEV.	0	0	0	0	0	0	0	0	0	0
TOTAL CIRCUIT AMPS =	0.107			WIRE	RESIS.	CIRC.		FORMULA		
				SIZE	/M FT.	MILS.				
TOTAL VOLT DROP =	0.058			10	1.29	10380		I * FEET * 21.6		
				12	2.01	6530		C.M.		
CKT VOLTAGE =	20.4			14	3.19	4110				
				16	5.08	2580				
% VOLTAGE DROP =	0.3%									

VOLTAGE DROP (VD) CALCULATION - VISUAL CIRCUIT No. V1d

DEVICE #	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
GAUGE WIRE	12	12	12	12	12	12	12	12	12	12
DISTANCE (FT)	110	50	20	50	22	30	60	20	40	30
AMPS OF DEVICE	0.043	0.043	0.043	0.111	0.111	0.111	0.111	0.107	0.107	0.111
TOTAL AMPS@DEV.	1.249	1.206	1.163	1.12	1.009	0.898	0.787	0.676	0.569	0.462
VOLT. DROP @ DEV.	0.454	0.199	0.077	0.185	0.073	0.089	0.156	0.045	0.075	0.046
DEVICE #	11th	12th	13th	14th	15th	16th	17th	18th	19th	20th
GAUGE WIRE	12	12	12	12	12	12	12	12	12	12
DISTANCE (FT)	50	30	20	50	12					
AMPS OF DEVICE	0.111	0.111	0.043	0.043	0.043					
TOTAL AMPS@DEV.	0.351	0.24	0.129	0.086	0.043	0	0	0	0	0
VOLT. DROP @ DEV.	0.058	0.024	0.009	0.014	0.002	0	0	0	0	0
TOTAL CIRCUIT AMPS =	1.249			WIRE	RESIS.	CIRC.		FORMULA		
				SIZE	/M FT.	MILS.				
TOTAL VOLT DROP =	1.507			10	1.29	10380		I * FEET * 21.6		
				12	2.01	6530		C.M.		
CKT VOLTAGE =	20.4			14	3.19	4110				
				16	5.08	2580				
% VOLTAGE DROP =	7.4%									

VOLTAGE DROP (VD) CALCULATION - VISUAL CIRCUIT No. V1a

DEVICE #	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
GAUGE WIRE	12	12	12	12	12	12	12	12	12	12
DISTANCE (FT)	40	25	30	25	45	50	35	30	45	40
AMPS OF DEVICE	0.043	0.043	0.043	0.107	0.107	0.063	0.043	0.043	0.063	0.041
TOTAL AMPS@DEV.	1.262	1.219	1.176	1.133	1.026	0.919	0.856	0.813	0.77	0.707
VOLT. DROP @ DEV.	0.167	0.101	0.117	0.094	0.153	0.152	0.099	0.081	0.115	0.094
DEVICE #	11th	12th	13th	14th	15th	16th	17th	18th	19th	20th
GAUGE WIRE	12	12	12	12	12	12	12	12	12	12
DISTANCE (FT)	30	40	35	50	45	50	35	30		
AMPS OF DEVICE	0.107	0.041	0.111	0.107	0.107	0.043	0.043	0.107		
TOTAL AMPS@DEV.	0.666	0.559	0.518	0.407	0.3	0.193	0.15	0.107	0	0
VOLT. DROP @ DEV.	0.066	0.074	0.06	0.067	0.045	0.032	0.017	0.011	0	0
TOTAL CIRCUIT AMPS =	1.262			WIRE	RESIS.	CIRC.		FORMULA		
				SIZE	/M FT.	MILS.				
TOTAL VOLT DROP =	1.543			10	1.29	10380		I * FEET * 21.6		
				12	2.01	6530		C.M.		
CKT VOLTAGE =	20.4			14	3.19	4110				
				16	5.08	2580				
% VOLTAGE DROP =	7.6%									

VOLTAGE DROP (VD) CALCULATION - VISUAL CIRCUIT No. V2a

DEVICE #	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
GAUGE WIRE	12	12	12	12	12	12	12	12	12	12
DISTANCE (FT)	55	60	35	60	130	80	115	120		
AMPS OF DEVICE	0.107	0.043	0.043	0.107	0.107	0.107	0.107	0.107		
TOTAL AMPS@DEV.	0.728	0.621	0.578	0.535	0.428	0.321	0.214	0.107	0	0
VOLT. DROP @ DEV.	0.132	0.123	0.067	0.106	0.184	0.085	0.081	0.042	0	0
DEVICE #	11th	12th	13th	14th	15th	16th	17th	18th	19th	20th
GAUGE WIRE	12	12	12	12	12	12	12	12	12	12
DISTANCE (FT)										
AMPS OF DEVICE										
TOTAL AMPS@DEV.	0	0	0	0	0	0	0	0	0	0
VOLT. DROP @ DEV.	0	0	0	0	0	0	0	0	0	0
TOTAL CIRCUIT AMPS =	0.728			WIRE	RESIS.	CIRC.		FORMULA		
				SIZE	/M FT.	MILS.				
TOTAL VOLT DROP =	0.822			10	1.29	10380		I * FEET * 21.6		
				12	2.01	6530		C.M.		
CKT VOLTAGE =	20.4			14	3.19	4110				
				16	5.08	2580				
% VOLTAGE DROP =	4.0%									

VOLTAGE DROP (VD) CALCULATION - VISUAL CIRCUIT No. V1e

DEVICE #	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
GAUGE WIRE	12	12	12	12	12	12	12	12	12	12
DISTANCE (FT)	130	45	45	65	21	25	12	55	45	60
AMPS OF DEVICE	0.111	0.111	0.111	0.111	0.043	0.043	0.043	0.107	0.107	0.043
TOTAL AMPS@DEV.	0.914	0.803	0.692	0.581	0.47	0.427	0.384	0.341	0.234	0.127
VOLT. DROP @ DEV.	0.393	0.12	0.103	0.125	0.033	0.035	0.015	0.062	0.035	0.025
DEVICE #	11th	12th	13th	14th	15th	16th	17th	18th	19th	20th
GAUGE WIRE	12	12	12	12	12	12	12	12	12	12
DISTANCE (FT)	21	45								
AMPS OF DEVICE	0.043	0.041								
TOTAL AMPS@DEV.	0.084	0.041	0	0	0	0	0	0	0	0
VOLT. DROP @ DEV.	0.006	0.006	0	0	0	0	0	0	0	0
TOTAL CIRCUIT AMPS =	0.914			WIRE	RESIS.	CIRC.		FORMULA		
				SIZE	/M FT.	MILS.				
TOTAL VOLT DROP =	0.958			10	1.29	10380		I * FEET * 21.6		
				12	2.01	6530		C.M.		
CKT VOLTAGE =	20.4			14	3.19	4110				
				16	5.08	2580				
% VOLTAGE DROP =	4.7%									

VOLTAGE DROP (VD) CALCULATION - VISUAL CIRCUIT No. V1b

DEVICE #	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
GAUGE WIRE	12	12	12	12	12	12	12	12	12	12
DISTANCE (FT)	30	45	25	25	25	30	30	65	55	
AMPS OF DEVICE	0.111	0.041	0.111	0.043	0.226	0.111	0.041	0.111	0.111	
TOTAL AMPS@DEV.	0.906	0.795	0.754	0.643	0.6	0.374	0.263	0.222	0.111	0
VOLT. DROP @ DEV.	0.09	0.118	0.062	0.053	0.05	0.037	0.026	0.048	0.02	0
DEVICE #	11th	12th	13th	14th	15th	16th	17th	18th	19th	20th
GAUGE WIRE	12	12	12	12	12	12	12	12	12	12
DISTANCE (FT)										
AMPS OF DEVICE										
TOTAL AMPS@DEV.	0	0	0	0	0	0	0	0	0	0
VOLT. DROP @ DEV.	0	0	0	0	0	0	0	0	0	0
TOTAL CIRCUIT AMPS =	0.906			WIRE	RESIS.	CIRC.		FORMULA		
				SIZE	/M FT.	MILS.				
TOTAL VOLT DROP =	0.505			10	1.29	10380		I * FEET * 21.6		
				12	2.01	6530		C.M.		
CKT VOLTAGE =	20.4			14	3.19	4110				
				16	5.08	2580				
% VOLTAGE DROP =	2.5%									

VOLTAGE DROP (VD) CALCULATION - VISUAL CIRCUIT No. V1f

DEVICE #	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
GAUGE WIRE	12	12	12	12	12	12	12	12	12	12
DISTANCE (FT)	140	40	40	25	12	20	75	75	35	40
AMPS OF DEVICE	0.111	0.041	0.043	0.043	0.041	0.043	0.148	0.148	0.041	0.041
TOTAL AMPS@DEV.	0.700	0.589	0.548	0.505	0.462	0.421	0.378	0.23	0.082	0.041
VOLT. DROP @ DEV.	0.324	0.078	0.073	0.042	0.018	0.028	0.094	0.057	0.009	0.005
TOTAL CIRCUIT AMPS =	0.7			WIRE	RESIS.	CIRC.		FORMULA		
				SIZE	/M FT.	MILS.				
TOTAL VOLT DROP =	0.728			10	1.29	10380		I * FEET * 21.6		
				12	2.01	6530		C.M.		
CKT VOLTAGE =	20.4			14	3.19	4110				
				16	5.08	2580				
% VOLTAGE DROP =	3.6%									

VOLTAGE DROP (VD) CALCULATION - VISUAL CIRCUIT No. V1c

DEVICE #	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
GAUGE WIRE	12	12	12	12	12	12	12	12	12	12
DISTANCE (FT)	60	20	17	22	50	40	35	35	35	45
AMPS OF DEVICE	0.041	0.043	0.043	0.111	0.111	0.111	0.107	0.107	0.111	0.111
TOTAL AMPS@DEV.	0.896	0.855	0.812	0.769	0.658	0.547	0.436	0.329	0.222	0.111
VOLT. DROP @ DEV.	0.178	0.057	0.046	0.056	0.109	0.072	0.05	0.038	0.026	0.017
TOTAL CIRCUIT AMPS =	0.896			WIRE	RESIS.	CIRC.		FORMULA		
				SIZE	/M FT.	MILS.				
TOTAL VOLT DROP =	0.648			10	1.29	10380		I * FEET * 21.6		
				12	2.01	6530		C.M.		
CKT VOLTAGE =	20.4			14	3.19	4110				
				16	5.08	2580				
% VOLTAGE DROP =	3.2%									

BATTERY CALCULATIONS

DIGITAL AUDIO AMPLIFIER "DAA-1"

QTY	MODEL No.	DEVICE DESCRIPTION	STANDBY EACH	STANDBY TOTAL	ALARM EACH	ALARM TOTAL
1	EVS-100W	SILENT KNIGHT DIGITAL AUDIO AMPLIFIER	0.1000	0.1000	0.5800	0.5800
1	S1a	SPEAKER CIRCUIT #1a	0.0000	0.0000	0.4400	0.4400
1	S1b	SPEAKER CIRCUIT #1b	0.0000	0.0000	0.7200	0.7200
1	S1c	SPEAKER CIRCUIT #1c	0.0000	0.0000	0.7400	0.7400
1	S1d	SPEAKER CIRCUIT #1d	0.0000	0.0000	0.4800	0.4800
1	S1e	SPARE	0.0000	0.0000	0.0000	0.0000
1	S1f	SPARE	0.0000	0.0000	0.0000	0.0000
1	S1g	SPARE	0.0000	0.0000	0.0000	0.0000
1	S1h	SPARE	0.0000	0.0000	0.0000	0.0000
		PANEL STANDBY CURRENT		0.1000		
		PANEL ALARM CURRENT				2.9600

TOTAL SYSTEM CURRENT

DESCRIPTION	STANDBY		ALARM
TOTAL STANDBY CURRENT (A)	0.1000		
X 24 HOUR STANDBY	2.4000		
TOTAL ALARM CURRENT (B)			2.9600
15 MINUTES OF ALARM (X .25)			0.7400
TOTAL BATTERY REQUIREMENT (A+B)			3.1400
SAFETY MARGIN (20%)			3.7680
BATTERY SUPPLIED			(2) 12V 7AH

DIGITAL AUDIO AMPLIFIER "DAA-1" WATTAGE CALCULATION

QTY	MODEL No.	DEVICE DESCRIPTION	EACH
1	EVS-100W	100W SILENT KNIGHT DIGITAL AUDIO AMPLIFIER	100.0000
1	S1a	WATTAGE OF SPEAKERS CONNECTED	11.0000
1	S1b	WATTAGE OF SPEAKERS CONNECTED	18.0000
1	S1c	WATTAGE OF SPEAKERS CONNECTED	18.5000
1	S1d	WATTAGE OF SPEAKERS CONNECTED	12.5000
1	S1e	WATTAGE OF SPEAKERS CONNECTED	2.5000
1	S1f	SPARE	0.0000
1	S1g	SPARE	0.0000
1	S1h	SPARE	0.0000
TOTAL WATTAGE AVAILABLE			37.5000

DIGITAL AUDIO AMPLIFIER "DAA-2"

QTY	MODEL No.	DEVICE DESCRIPTION	STANDBY EACH	STANDBY TOTAL	ALARM EACH	ALARM TOTAL
1	EVS-50W	SILENT KNIGHT DIGITAL AUDIO AMPLIFIER	0.1000	0.1000	0.5800	0.5800
1	S2a	SPEAKER CIRCUIT #2a	0.0000	0.0000	0.3600	0.3600
1	S2b	SPARE	0.0000	0.0000	0.0000	0.0000
1	S2c	SPARE	0.0000	0.0000	0.0000	0.0000
1	S2d	SPARE	0.0000	0.0000	0.0000	0.0000
		PANEL STANDBY CURRENT		0.1000		
		PANEL ALARM CURRENT				0.9400

TOTAL SYSTEM CURRENT

DESCRIPTION	STANDBY		ALARM
TOTAL STANDBY CURRENT (A)	0.1000		
X 24 HOUR STANDBY	2.4000		
TOTAL ALARM CURRENT (B)			0.9400
15 MINUTES OF ALARM (X .25)			0.2350
TOTAL BATTERY REQUIREMENT (A+B)			2.6350
SAFETY MARGIN (20%)			3.1620
BATTERY SUPPLIED			(2) 12V 7AH

DIGITAL AUDIO AMPLIFIER "DAA-2" WATTAGE CALCULATION

QTY	MODEL No.	DEVICE DESCRIPTION	EACH
1	EVS-50W	50W SILENT KNIGHT DIGITAL AUDIO AMPLIFIER	50.0000
1	S2a	WATTAGE OF SPEAKERS CONNECTED	9.0000
1	S2b	SPARE	0.0000
1	S2c	SPARE	0.0000
1	S2d	SPARE	0.0000
TOTAL WATTAGE AVAILABLE			41.0000

FIRE ALARM CONTROL PANEL "FACP"

QTY	PRODUCT ID	DESCRIPTION	STANDBY EACH	STANDBY TOTAL	ALARM EACH	ALARM TOTAL
1	6820EVS	FIRE ALARM CONTROL PANEL	0.1900	0.1900	0.2500	0.2500
		PANEL STANDBY CURRENT		0.1900		
		PANEL ALARM CURRENT				0.2500

FIELD DEVICES

QTY	PRODUCT ID	DESCRIPTION	STANDBY EACH	STANDBY TOTAL	ALARM EACH	ALARM TOTAL
140	SK-PHOTO-W	ADDRESSABLE SMOKE DETECTOR	0.0002	0.0280	0.0045	0.6300
115	SK-HEAT-W	ADDRESSABLE HEAT DETECTOR	0.0002	0.0230	0.0045	0.5175
5	SK-DUCT-W	ADDRESSABLE DUCT SMOKE DETECTOR	0.0000	0.0000	0.0012	0.0060
1	SK-PULL-DA	ADDRESSABLE MANUAL PULL STATION	0.0035	0.0035	0.0035	0.0035
2	SK-MONITOR	ADDRESSABLE MONITOR MODULE	0.0004	0.0008	0.0055	0.0110
2	SK-CONTROL	ADDRESSABLE CONTROL MODULE	0.0375	0.0750	0.0375	0.0750
15	SK-RELAY	ADDRESSABLE RELAY MODULE	0.0003	0.0038	0.0026	0.0383

DESCRIPTION	STANDBY	ALARM
CONTROL PANEL	0.1900	0.2500
FIELD DEVICES	0.1341	1.2813
TOTAL STANDBY CURRENT	0.3241	
X 24 HOUR STANDBY	7.7790	
TOTAL ALARM CURRENT		1.5313
15 MINUTES OF ALARM (X .25)		0.3828
TOTAL BATTERY REQUIREMENT		8.1618
SAFETY MARGIN (20%)		9.7942
BATTERY SUPPLIED		(2) 12V 18AH

REMOTE POWER SUPPLY "RPS-1"

QTY	MODEL No.	DEVICE DESCRIPTION	STANDBY EACH	STANDBY TOTAL	ALARM EACH	ALARM TOTAL
1	SK-PS10	10 AMP SILENT KNIGHT REMOTE POWER SUPPLY	0.0400	0.0400	0.1600	0.1600
1	V1a	VISUAL CIRCUIT #1a	0.0000	0.0000	1.2620	1.2620
1	V1b	VISUAL CIRCUIT #1b	0.0000	0.0000	0.9060	0.9060
1	V1c	VISUAL CIRCUIT #1c	0.0000	0.0000	0.8960	0.8960
1	V1d	VISUAL CIRCUIT #1d	0.0000	0.0000	1.2490	1.2490
1	V1e	VISUAL CIRCUIT #1e	0.0000	0.0000	0.9140	0.9140
1	V1f	VISUAL CIRCUIT #1f	0.0000	0.0000	0.7000	0.7000
1	V1g	VISUAL CIRCUIT #1g	0.0000	0.0000	0.1070	0.1070
		PANEL STANDBY CURRENT		0.0400		
		PANEL ALARM CURRENT				6.1940

TOTAL SYSTEM CURRENT

DESCRIPTION	STANDBY		ALARM
TOTAL STANDBY CURRENT (A)	0.0400		
X 24 HOUR STANDBY	0.9600		
TOTAL ALARM CURRENT (B)			6.1940
15 MINUTES OF ALARM (X .25)			1.5485
TOTAL BATTERY REQUIREMENT (A+B)			2.5085
SAFETY MARGIN (20%)			3.0102
BATTERY SUPPLIED			(2) 12V 7AH

REMOTE POWER SUPPLY "RPS-2"

QTY	MODEL No.	DEVICE DESCRIPTION	STANDBY EACH	STANDBY TOTAL	ALARM EACH	ALARM TOTAL
1	SK-PS10	10 AMP SILENT KNIGHT REMOTE POWER SUPPLY	0.0400	0.0400	0.1600	0.1600
1	V2a	VISUAL CIRCUIT #2a	0.0000	0.0000	0.7280	0.7280
1	V2b	SPARE	0.0000	0.0000	0.0000	0.0000
1	V2c	SPARE	0.0000	0.0000	0.0000	0.0000
1	V2d	SPARE	0.0000	0.0000	0.0000	0.0000
1	V2e	SPARE	0.0000	0.0000	0.0000	0.0000
1	V2f	SPARE	0.0000	0.0000	0.0000	0.0000
1	V2g	SPARE	0.0000	0.0000	0.0000	0.0000
		PANEL STANDBY CURRENT		0.0400		
		PANEL ALARM CURRENT				0.8880

TOTAL SYSTEM CURRENT

DESCRIPTION	STANDBY		ALARM
TOTAL STANDBY CURRENT (A)	0.0400		
X 24 HOUR STANDBY	0.9600		
TOTAL ALARM CURRENT (B)			0.8880
15 MINUTES OF ALARM (X .25)			0.2220
TOTAL BATTERY REQUIREMENT (A+B)			1.1820
SAFETY MARGIN (20%)			1.4184
BATTERY SUPPLIED			(2) 12V 7AH

VOLTAGE DROP CALCULATIONS (SPEAKER CIRCUITS)

SPEAKER CIRCUIT No.S1e

Nominal Speaker Voltage (25 or 70)			25	
Minimum Device Voltage			20	
Total Circuit Current in amps	0.100		Wire	Ohm's
Total Circuit Power	2.500		Gauge	Per 1000
Distance from source to 1st device		50	14	3.07
Wire Gauge for balance of circuit			14	3.07

Device Number	Device Power	from previous device	Calculated Device Current	At Device	Voltage Drop from source	Percent Drop
Device 1	0.500	165	0.020	24.90	0.101	0.41%
Device 2	2.000	25	0.080	24.89	0.114	0.45%
END			0.000	24.89	0.114	0.45%
END			0.000	24.89	0.114	0.45%
END			0.000	24.89	0.114	0.45%
END			0.000	24.89	0.114	0.45%
END			0.000	24.89	0.114	0.45%
END			0.000	24.89	0.114	0.45%
END			0.000	24.89	0.114	0.45%
END			0.000	24.89	0.114	0.45%
END			0.000	24.89	0.114	0.45%
END			0.000	24.89	0.114	0.45%
END			0.000	24.89	0.114	0.45%
END			0.000	24.89	0.114	0.45%
END			0.000	24.89	0.114	0.45%
END			0.000	24.89	0.114	0.45%
END			0.000	24.89	0.114	0.45%
END			0.000	24.89	0.114	0.45%
END			0.000	24.89	0.114	0.45%
END			0.000	24.89	0.114	0.45%
Totals	2.500	190		End of Line Voltage		24.89

Point to Point Method			End of Line Method			Load Centering Method		
CIRCUIT IS WITHIN LIMITS			CIRCUIT IS WITHIN LIMITS			CIRCUIT IS WITHIN LIMITS		
Totals Current	Distance	Voltage Drop	Totals Current	Distance	Voltage Drop	Totals Current	Distance	Voltage Drop
0.100	190	0.11	0.100	190	0.117	0.100	190	0.058
End of Line Voltage		24.89	End of Line Voltage		24.88	End of Line Voltage		24.94
	Percent Drop	0.45%		Percent Drop	0.47%		Percent Drop	0.23%

SPEAKER CIRCUIT No.S1c

Nominal Speaker Voltage (25 or 70)			25	
Minimum Device Voltage			20	
Total Circuit Current in amps	0.740		Wire	Ohm's
Total Circuit Power	18.500		Gauge	Per 1000
Distance from source to 1st device		50	14	3.07
Wire Gauge for balance of circuit			14	3.07

Device Number	Device Power	from previous device	Calculated Device Current	At Device	Voltage Drop from source	Percent Drop
Device 1	0.500	55	0.020	24.75	0.250	1.00%
Device 2	2.000	45	0.080	24.55	0.449	1.80%
Device 3	0.500	60	0.020	24.32	0.685	2.74%
Device 4	2.000	30	0.080	24.20	0.799	3.20%
Device 5	0.500	35	0.020	24.09	0.915	3.66%
Device 6	2.000	35	0.080	23.97	1.027	4.11%
Device 7	0.500	60	0.020	23.81	1.189	4.75%
Device 8	0.500	30	0.020	23.73	1.266	5.06%
Device 9	0.500	35	0.020	23.65	1.352	5.41%
Device 10	0.500	35	0.020	23.57	1.434	5.73%
Device 11	0.500	45	0.020	23.47	1.533	6.13%
Device 12	2.000	35	0.080	23.39	1.606	6.42%
Device 13	2.000	55	0.080	23.31	1.694	6.78%
Device 14	0.500	30	0.020	23.27	1.727	6.91%
Device 15	2.000	45	0.080	23.23	1.771	7.09%
Device 16	0.500	65	0.020	23.20	1.803	7.21%
Device 17	0.500	95	0.020	23.36	1.641	6.56%
Device 18	0.500	75	0.020	23.38	1.625	6.50%
Device 19	0.500	65	0.020	23.30	1.702	6.81%
END			0.000	23.39	1.606	6.42%
Totals	18.500	930		End of Line Voltage		23.20

Point to Point Method			End of Line Method			Load Centering Method		
CIRCUIT IS WITHIN LIMITS			CIRCUIT IS WITHIN LIMITS			CIRCUIT IS WITHIN LIMITS		
Totals Current	Distance	Voltage Drop	Totals Current	Distance	Voltage Drop	Totals Current	Distance	Voltage Drop
0.740	930	1.80	0.740	930	4.226	0.740	930	2.113
End of Line Voltage		23.20	End of Line Voltage		20.77	End of Line Voltage		22.89
	Percent Drop	7.21%		Percent Drop	16.90%		Percent Drop	8.45%

SPEAKER CIRCUIT No.S1a

Nominal Speaker Voltage (25 or 70)			25	
Minimum Device Voltage			20	
Total Circuit Current in amps	0.440		Wire	Ohm's
Total Circuit Power	11.000		Gauge	Per 1000
Distance from source to 1st device		50	14	3.07
Wire Gauge for balance of circuit			14	3.07

Device Number	Device Power	from previous device	Calculated Device Current	At Device	Voltage Drop from source	Percent Drop
Device 1	0.500	55	0.020	24.85	0.149	0.59%
Device 2	0.500	25	0.020	24.79	0.213	0.85%
Device 3	0.500	45	0.020	24.68	0.324	1.29%
Device 4	0.500	50	0.020	24.56	0.440	1.76%
Device 5	2.000	40	0.080	24.47	0.529	2.11%
Device 6	0.500	50	0.020	24.39	0.615	2.46%
Device 7	0.500	40	0.020	24.32	0.678	2.71%
Device 8	0.500	30	0.020	24.28	0.723	2.89%
Device 9	2.000	20	0.080	24.25	0.750	3.00%
Device 10	0.500	60	0.020	24.20	0.801	3.21%
Device 11	2.000	45	0.080	24.17	0.834	3.34%
Device 12	0.500	25	0.020	24.16	0.841	3.36%
Device 13	0.500	45	0.020	24.15	0.846	3.38%
END			0.000	24.15	0.846	3.38%
END			0.000	24.15	0.846	3.38%
END			0.000	24.15	0.846	3.38%
END			0.000	24.16	0.841	3.36%
END			0.000	24.16	0.841	3.36%
END			0.000	24.15	0.846	3.38%
END			0.000	24.16	0.841	3.36%
Totals	11.000	530		End of Line Voltage		24.15

Point to Point Method			End of Line Method			Load Centering Method		
CIRCUIT IS WITHIN LIMITS			CIRCUIT IS WITHIN LIMITS			CIRCUIT IS WITHIN LIMITS		
Totals Current	Distance	Voltage Drop	Totals Current	Distance	Voltage Drop	Totals Current	Distance	Voltage Drop
0.440	530	0.85	0.440	530	1.432	0.440	530	0.716
End of Line Voltage		24.15	End of Line Voltage		23.57	End of Line Voltage		24.28
	Percent Drop	3.38%		Percent Drop	5.73%		Percent Drop	2.86%

SPEAKER CIRCUIT No.S2a

Nominal Speaker Voltage (25 or 70)			25	
Minimum Device Voltage			20	
Total Circuit Current in amps	0.360		Wire	Ohm's
Total Circuit Power	9.000		Gauge	Per 1000
Distance from source to 1st device		50	14	3.07
Wire Gauge for balance of circuit			14	3.07

Device Number	Device Power	from previous device	Calculated Device Current	At Device	Voltage Drop from source	Percent Drop
Device 1	0.500	55	0.020	24.88	0.122	0.49%
Device 2	2.000	25	0.080	24.83	0.174	0.70%
Device 3	0.500	110	0.020	24.65	0.349	1.40%
Device 4	2.000	120	0.080	24.47	0.526	2.10%
Device 5	0.500	25	0.020	24.45	0.551	2.20%
Device 6	0.500	80	0.020	24.38	0.620	2.48%
Device 7	0.500	115	0.020	24.30	0.704	2.82%
Device 8	2.000	25	0.080	24.28	0.720	2.88%
Device 9	0.500	110	0.020	24.27	0.733	2.93%
END			0.000	24.27	0.733	2.93%
END			0.000	24.27	0.733	2.93%
END			0.000	24.27	0.733	2.93%
END			0.000	24.27	0.733	2.93%
END			0.000	24.27	0.733	2.93%
END			0.000	24.27	0.733	2.93%
END			0.000	24.27	0.733	2.93%
END			0.000	24.27	0.733	2.93%
END			0.000	24.27	0.733	2.93%
END			0.000	24.27	0.733	2.93%
END			0.000	24.27	0.733	2.93%
Totals	9.000	665		End of Line Voltage		24.27

Point to Point Method			End of Line Method			Load Centering Method		
CIRCUIT IS WITHIN LIMITS			CIRCUIT IS WITHIN LIMITS			CIRCUIT IS WITHIN LIMITS		
Totals Current	Distance	Voltage Drop	Totals Current	Distance	Voltage Drop	Totals Current	Distance	Voltage Drop
0.360	665	0.73	0.360	665	1.470	0.360	665	0.735
End of Line Voltage		24.27	End of Line Voltage		23.53	End of Line Voltage		24.27
	Percent Drop	2.93%		Percent Drop	5.88%		Percent Drop	2.94%

SPEAKER CIRCUIT No.S1d

Nominal Speaker Voltage (25 or 70)			25	
Minimum Device Voltage			20	
Total Circuit Current in amps	0.500		Wire	Ohm's
Total Circuit Power	12.500		Gauge	Per 1000
Distance from source to 1st device		50	14	3.07
Wire Gauge for balance of circuit			14	3.07

Device Number	Device Power	from previous device	Calculated Device Current	At Device	Voltage Drop from source	Percent Drop
Device 1	0.500	110	0.020	24.66	0.338	1.35%
Device 2	2.000	60	0.080	24.49	0.515	2.06%
Device 3	0.500	50	0.020	24.36	0.637	2.55%
Device 4	0.500	45	0.020	24.26	0.742	2.97%
Device 5	2.000	45	0.080	24.16	0.842	3.37%
Device 6	0.500	35	0.020	24.10	0.902	3.61%
Device 7	0.500	30	0.020	24.05	0.950	3.80%
Device 8	0.500	45	0.020	23.98	1.016	4.06%
Device 9	0.500	30	0.020	23.94	1.057	4.23%
Device 10	2.000	45	0.080	23.89	1.112	4.45%
Device 11	0.500	35	0.020	23.86	1.138	4.55%
Device 12	0.500	45	0.020	23.83	1.165	4.66%
Device 13	2.000	50	0.080	23.81	1.190	4.76%
END			0.000	23.81	1.190	4.76%
END			0.000	23.81	1.190	4.76%
END			0.000	23.81	1.190	4.76%
END			0.000	23.83	1.165	4.66%
END			0.000	23.83	1.165	4.66%
END			0.000	23.81	1.190	4.76%
END			0.000	23.83	1.165	4.66%
Totals	12.500	625		End of Line Voltage		23.81

Point to Point Method			End of Line Method			Load Centering Method		
CIRCUIT IS WITHIN LIMITS			CIRCUIT IS WITHIN LIMITS			CIRCUIT IS WITHIN LIMITS		
Totals Current	Distance	Voltage Drop	Totals Current	Distance	Voltage Drop	Totals Current	Distance	Voltage Drop
0.500	625	1.19	0.500	625	1.919	0.500	625	0.959
End of Line Voltage		23.81	End of Line Voltage		23.08	End of Line Voltage		24.04
	Percent Drop	4.76%		Percent Drop	7.68%		Percent Drop	3.84%

SPEAKER CIRCUIT No.S1b

Nominal Speaker Voltage (25 or 70)			25	
Minimum Device Voltage			20	
Total Circuit Current in amps	0.720		Wire	Ohm's
Total Circuit Power	18.000		Gauge	Per 1000
Distance from source to 1st device		50	14	3.07
Wire Gauge for balance of circuit			14	3.07

Device Number	Device Power	from previous device	Calculated Device Current	At Device	Voltage Drop from source	Percent Drop
Device 1	0.500	30	0.020	24.87	0.133	0.53%
Device 2	0.500	60	0.020	24.61	0.391	1.56%
Device 3	0.500	45	0.020	24.42	0.578	2.31%
Device 4	0.500	45	0.020	24.24	0.761	3.04%
Device 5	2.000	35	0.080	24.10	0.898	3.59%
Device 6	0.500	35	0.020	23.98	1.019	4.07%
Device 7	2.000	50	0.080	23.82	1.184	4.74%
Device 8	0.500	80	0.020	23.59	1.410	5.64%
Device 9	0.500	50	0.020	23.45	1.545	6.18%
Device 10	2.000	45	0.080	23.34	1.661	6.65%
Device 11	0.500	45	0.020	23.24	1.755	7.02%
Device 12	2.000	35	0.080	23.18	1.824	7.30%
Device 13	0.500	40	0.020	23.12	1.883	7.53%
Device 14	2.000	55	0.080	23.04	1.957	7.83%
Device 15	0.500	40	0.020	23.01	1.992	7.97%
Device 16	0.500	45	0.020	22.98	2.025	8.10%
Device 17	2.000	45	0.080	23.15	1.852	7.41%
Device 18	0.500	40	0.020	23.17	1.829	7.32%
END			0.000	23.12	1.883	7.53%
END			0.000	23.18	1.824	7.30%
Totals	18.000	820		End of Line Voltage		22.98

Point to Point Method			End of Line Method			Load Centering Method		
CIRCUIT IS WITHIN LIMITS			CIRCUIT IS WITHIN LIMITS			CIRCUIT IS WITHIN LIMITS		
Totals Current	Distance	Voltage Drop	Totals Current	Distance	Voltage Drop	Totals Current	Distance	Voltage Drop
0.720	820	2.02	0.720	820	3.625	0.720	820	1.813
End of Line Voltage		22.98	End of Line Voltage		21.37	End of Line Voltage		23.19
	Percent Drop	8.10%		Percent Drop	14.50%		Percent Drop	7.25%

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 01-120703 INC:
REVIEWED FOR
SS ☐ FLS ☑ ACS ☐
DATE: 5/5/2023
(DSA STAMP AREA)

LICENSED ARCHITECT
MARK C. FINNEY
NO. C-24673
REN. 9-30-23
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
NAJIB ANWARY
No. E21043
EXP. 3/31/25
ELECTRICAL
STATE OF CALIFORNIA

AURUM CONSULTING ENGINEERS MONTEREY BAY, INC.
Project No. 22-546.00
404 W. Franklin St. • Suite 100 • Monterey, CA 93940
T.831.646.3330 • F.831.646.3336 • www.acemb.com

BATTERY & VOLTAGE DROP CALCULATIONS

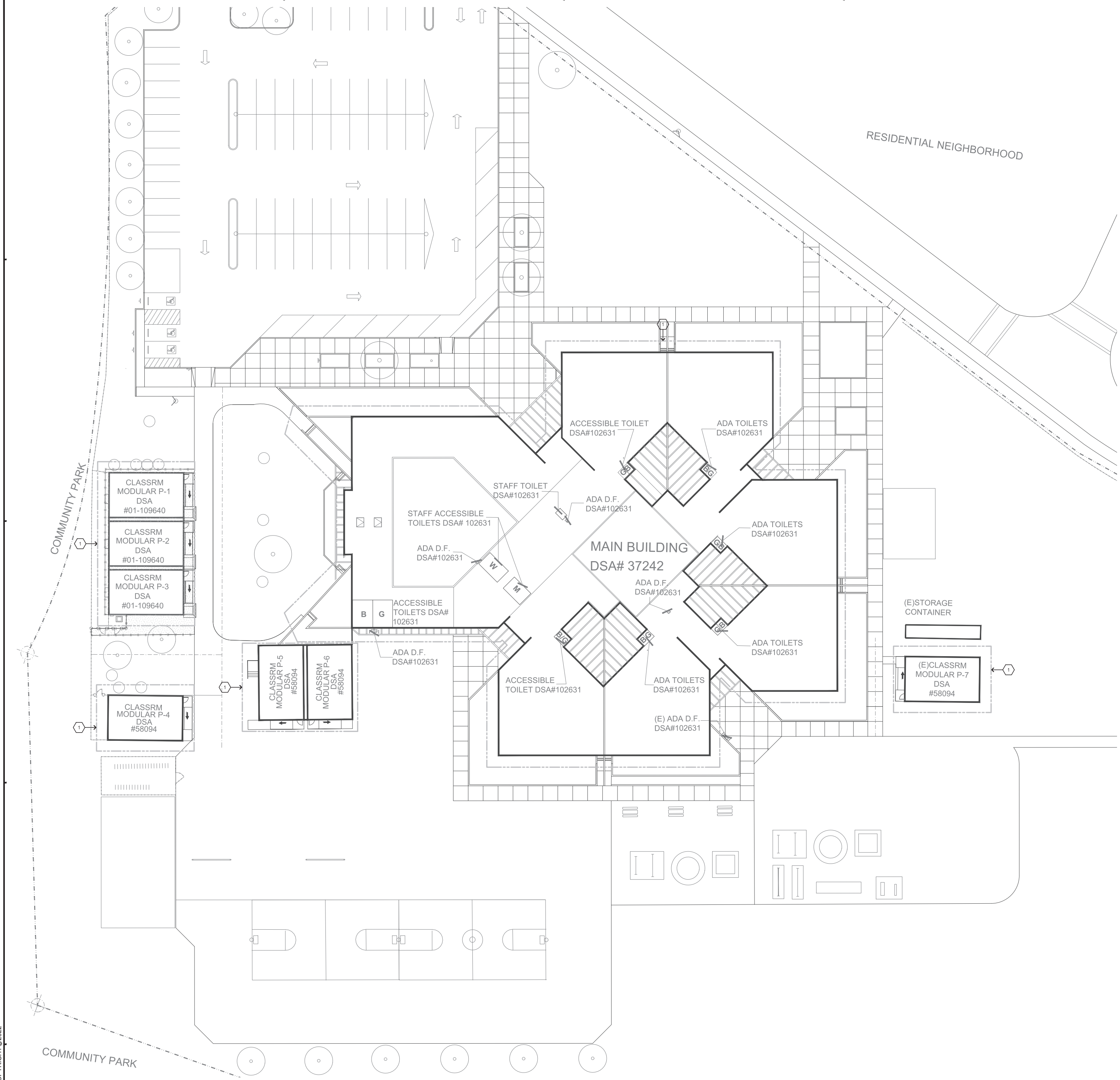
FIRE ALARM UPGRADE
MAJESTIC WAY ELEMENTARY SCHOOL
1855 MAJESTIC WAY, SAN JOSE, CA 95132
BERRYESSA UNION SCHOOL DISTRICT

REVISIONS

NO.	ITEM	DATE
	DSA RESUBMITTAL	03/28/23

DRAWN BY: F.S.
CHECKED BY: N.A.
SFA JOB NO: 22084
DATE: 03/28/2023

FA1.2



SHEET NOTES

1. CONTRACTOR SHALL DEMOLISH FIRE ALARM SYSTEM COMPLETE (FIRE ALARM CONTROL PANEL, DEVICES, WIRING, ETC.) PER GENERAL DEMOLITION NOTES ON THIS SHEET. PROVIDE AND INSTALL DEVICE COVER PLATES OVER OPENINGS TO ENSURE ALL OPENINGS ARE COMPLETELY COVERED FROM REMOVED DEVICES; PAINT/FINISH TO MATCH EXISTING WALLS. CONTRACTOR SHALL ASSUME QUANTITY OF DEVICES BEING DEMOLISHED TO BE THE SAME AS QUANTITY OF NEW DEVICES BEING ADDED AS PART OF NEW WORK. IN ADDITIONAL ALL HEAT DETECTORS IN ACCESSIBLE CEILING SPACES SHALL BE DEMOLISHED COMPLETE, ASSUME MINIMUM (2) HEAT DETECTORS PER ENCLOSED SPACE. CONTRACTOR SHALL INSTALL COVER PLATES AND PATCH WALLS/CEILINGS WHERE EXISTING DEVICES ARE REMOVED.

GENERAL DEMOLITION NOTES

A. CONTRACTOR SHALL FIELD VERIFY EXTENT OF ELECTRICAL DEMOLITION AND QUANTITIES OF ELECTRICAL TO BE REMOVED AS DICTATED BY THE REQUIREMENTS OF THE PROJECT.

B. REMOVAL SHALL INCLUDE WIRING, RACEWAY, BOXES, SWITCHES, LIGHT FIXTURES, ETC. AS INDICATED ON THE PLANS AND AS REQUIRED BY THESE DEMOLITION NOTES.

C. RACEWAYS ASSOCIATED WITH ELECTRICAL BEING DEMOLISHED WHICH ARE CONCEALED IN EXISTING REMAINING WALLS MAY BE ABANDONED IN PLACE. REMOVE WIRING FROM CONDUIT.

D. RACEWAYS ASSOCIATED WITH ELECTRICAL BEING DEMOLISHED WHICH ARE EXPOSED SHALL BE REMOVED.

E. WHERE REMOVAL OF EQUIPMENT OR WIRING IS INDICATED, IT SHALL INCLUDE ALL ASSOCIATED WIRING BACK TO LAST ACTIVE REMAINING OUTLET, DEVICE, FIXTURE OR PANEL.

F. ELECTRICAL CONTRACTOR SHALL INSURE THAT ALL REMAINING ACTIVE CIRCUITS, DEVICES, OUTLETS, LIGHT FIXTURES, ETC. HAVE NOT BEEN DISCONNECTED OR MADE INOPERATIVE DURING DEMOLITION. ELECTRICAL CONTRACTOR SHALL RESTORE ALL INTERRUPTED OR DISCONNECTED CIRCUITS TO OPERATION.

G. ELECTRICAL CONTRACTOR SHALL REMOVE AND DISPOSE OF ALL REMOVED ELECTRICAL EQUIPMENT AND MATERIAL.

H. NO REMOVED EQUIPMENT OR MATERIAL SHALL BE REUSED AS PART OF NEW WORK, U.O.N.

I. EXISTING REMAINING CONCEALED RACEWAYS MAY BE REUSED FOR NEW WORK PROVIDED THEY MEET ALL REQUIREMENTS OF THE SPECIFICATION FOR NEW WORK.

J. EXISTING FLUSH OUTLETS MAY BE REUSED FOR NEW WORK PROVIDED THEY MEET ALL REQUIREMENTS OF THE SPECIFICATION FOR NEW WORK, MEET THE REQUIREMENTS OF THE CURRENT C.E.C. FOR VOLUME AND COINCIDE WITH LOCATION SHOWN FOR THE NEW WORK.

K. FLUSH OUTLET BOXES IN EXISTING WALLS TO REMAIN MAY BE ABANDONED IN PLACE. REMOVE DEVICES AND WIRING, PLUG OPENING AND PROVIDE AND INSTALL A BLANK DEVICE PLATE.

L. EXISTING WIRING SHOWN HAS BEEN TAKEN FROM OLD PLANS AND IS ASSUMED TO BE CORRECT. ELECTRICAL CONTRACTOR SHALL FIELD VERIFY ACTUAL CONDITIONS AND MAKE ADJUSTMENTS TO SUIT ACTUAL CONDITIONS AND TO MEET THE INTENT OF THE CONTRACT DOCUMENTS.

M. WHERE TELEPHONE, COMPUTER DATA, FIBER OPTICS, FIRE ALARM OR OTHER COMMUNICATIONS OUTLETS OR WIRING IS TO BE DEMOLISHED IT SHALL BE REMOVED BACK TO THE NEXT TERMINAL POINT. ELECTRICAL CONTRACTOR SHALL COORDINATE WITH OWNER OR HIS REPRESENTATIVE TO HAVE EQUIPMENT AND WIRING DESIGNATED FOR REMOVAL OR PRESERVATION PRIOR TO REMOVAL OF OUTLET BOXES, CONDUIT OR WIRING BY ELECTRICAL CONTRACTOR.

N. COORDINATE WITH OWNER PRIOR TO START OF DEMOLITION TO MINIMIZE POWER INTERRUPTIONS, WORK MAY HAVE TO OCCUR DURING NON-REGULAR BUSINESS HOURS. COORDINATE IN WRITING WITH OWNER ONE WEEK PRIOR TO PLANNED POWER INTERRUPTIONS.

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 01-120703 INC:
REVIEWED FOR
SS ☐ FLS ☑ ACS ☐
DATE: 5/5/2023
(DSA STAMP AREA)

SFA

LICENSED ARCHITECT
MARK C. FINNEY
NO. C-24673
REN. 9-30-23
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
NAJIB ANWARY
No. E21043
EXP. 3/31/25
ELECTRICAL
STATE OF CALIFORNIA

AURUM CONSULTING ENGINEERS MONTEREY BAY, INC.
Project No. 22-546.00
404 W. Franklin St. • Suite 100 • Monterey, CA 93940
T.831.646.3330 • F.831.646.3336 • www.acemb.com

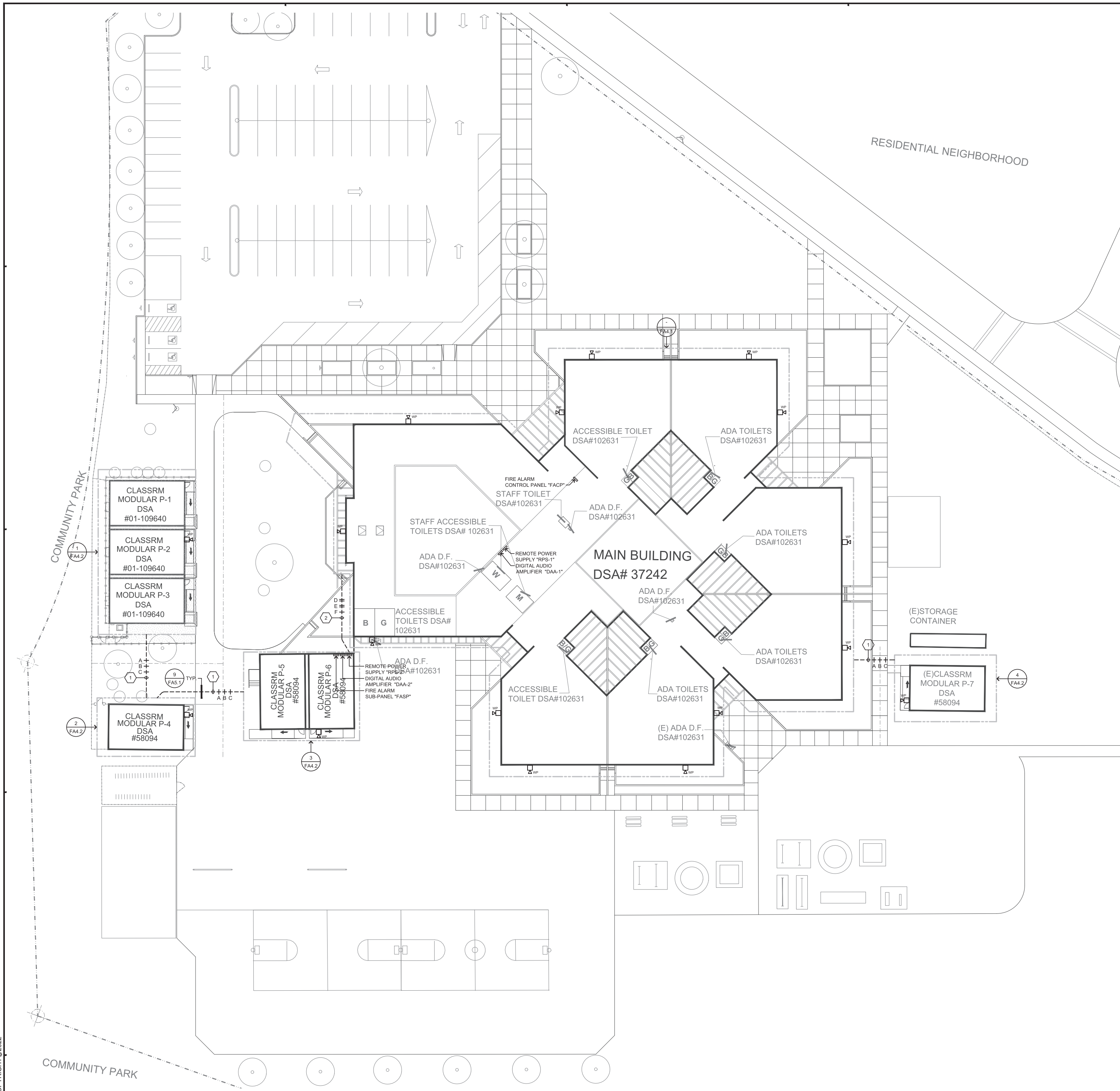
FIRE ALARM DEMOLITION PLAN

FIRE ALARM UPGRADE
MAJESTIC WAY ELEMENTARY SCHOOL
1855 MAJESTIC WAY, SAN JOSE, CA 95132
BERRYESSA UNION SCHOOL DISTRICT

REVISIONS NO.	ITEM	DATE
	DSA RESUBMITTAL	03/28/23

DRAWN BY:	F.S.
CHECKED BY:	N.A.
SFA JOB NO: 22084	DATE: 03/28/2023

FA2.1



SCALE: 1"=20'-0"

NORTH

SHEET NOTES

1. PROVIDE AND INSTALL 1"C. FOR FIRE ALARM CABLES.
2. PROVIDE AND INSTALL 2"C. FOR FIRE ALARM CABLES.

GENERAL NOTES:

A. CONTRACTOR SHALL LOCATE ALL (E) UNDERGROUND UTILITIES PRIOR TO TRENCHING AND TAKE CAUTION TO AVOID DAMAGE DURING TRENCHING. HAND TRENCH IF NECESSARY. CONTRACTOR SHALL MAKE ALL REPAIRS TO DAMAGED UTILITIES AT NO CHARGE TO DISTRICT.

B. SEAL ALL EXTERIOR/INTERIOR BUILDING PENETRATIONS, CUT AND PATCH WALLS/CEILINGS FOR CONDUIT ROUTING AS NECESSARY. PAINT/FINISH EXPOSED CONDUITS/BOXES TO MATCH BUILDING FINISH. COORDINATE WITH DISTRICT & ARCHITECT FOR EXACT REQUIREMENTS.

C. ALL BUILDING FIRE ALARM DEVICES (REMOTE POWER SUPPLIES, DIGITAL AUDIO AMPLIFIERS AND OUTDOOR SPEAKERS) ARE SHOWN FOR REFERENCE ONLY; SEE FIRE ALARM PLANS FOR EXACT LOCATIONS.

CABLE LEGEND

TYPE A = DENOTES INITIATING DETECTION CIRCUITS (SMOKE DETECTOR, HEAT DETECTOR, ETC.) UNLESS OTHERWISE NOTED, PROVIDE (1) #14 TWISTED-UNSHIELDED PAIR. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.

TYPE B = DENOTES VISUAL NOTIFICATION APPLIANCE CIRCUITS (STROBES) UNLESS OTHERWISE NOTED, PROVIDE (1) PAIR OF #12 AWG. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.

TYPE C = DENOTES AUDIO NOTIFICATION APPLIANCE CIRCUITS (SPEAKERS) UNLESS OTHERWISE NOTED, PROVIDE (1) PAIR OF #14 AWG. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.

TYPE D = DENOTES (1) PAIR OF RS-485 SBUS CABLE FOR FIRE ALARM SUB-PANEL CONNECTION TO FACP PER MANUFACTURE'S INSTALLATION INSTRUCTIONS, SUITABLE FOR UNDERGROUND USE. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.

TYPE E = DENOTES SYSTEM BUS (SBUS) CONNECTION; UNLESS OTHERWISE NOTED, PROVIDE (1) PAIR OF #16 AWG. SUITABLE FOR UNDERGROUND USE. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.

TYPE F = DENOTES VOICE BUS (VBUS) CONNECTION; UNLESS OTHERWISE NOTED, PROVIDE (1) PAIR OF #16 AWG. SUITABLE FOR UNDERGROUND USE. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.

TYPE G = DENOTES 24VDC CONSTANT POWER CIRCUITS FOR DUCT SMOKE DETECTOR OR BEAM SMOKE DETECTOR; UNLESS OTHERWISE NOTED, PROVIDE (1) PAIR OF #12 AWG. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.

TYPE H = DENOTES SUPERVISORY RELAY TRIPS FOR CAC. PROVIDE (2) STRANDED #14 AWG.

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 01-120703 INC:
REVIEWED FOR
SS ☐ FLS ☑ ACS ☐
DATE: 5/5/2023
(DSA STAMP AREA)

SFA

LICENSED ARCHITECT MARK C. FINNEY NO. C-24673 REN. 9-30-23 STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER NAJIB ANWARY No. E21043 EXP. 3/31/25 ELECTRICAL STATE OF CALIFORNIA

AURUM CONSULTING ENGINEERS MONTEREY BAY, INC.
Project No. 22-546.00
404 W. Franklin St. ● Suite 100 ● Monterey, CA 93940
T.831.646.3330 ● F.831.646.3336 ● www.acemb.com

FIRE ALARM SITE PLAN

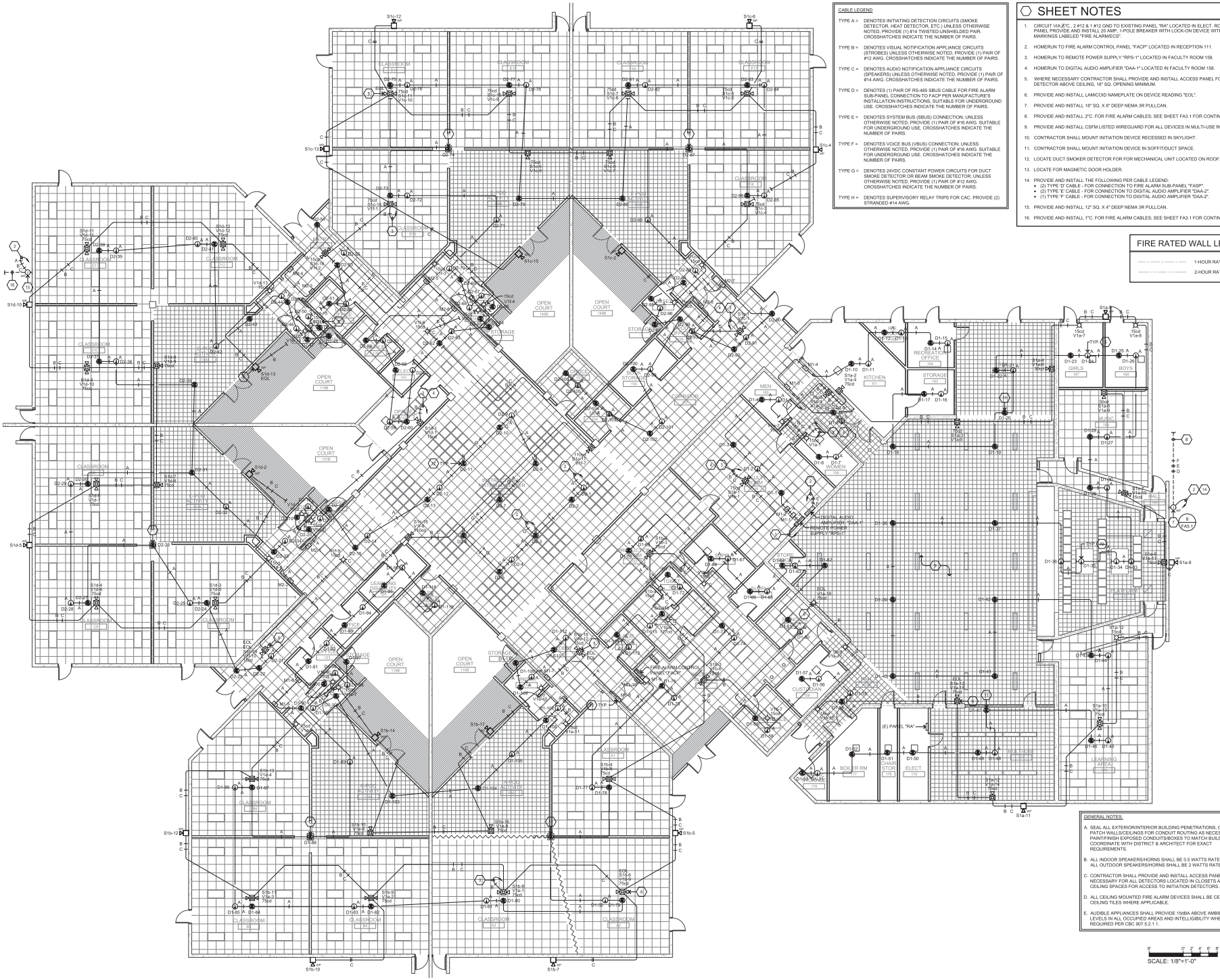
FIRE ALARM UPGRADE
MAJESTIC WAY ELEMENTARY SCHOOL
1855 MAJESTIC WAY, SAN JOSE, CA 95132
BERRYESSA UNION SCHOOL DISTRICT

REVISIONS

NO.	ITEM	DATE
	DSA RESUBMITTAL	03/28/23

DRAWN BY: F.S.
CHECKED BY: N.A.
SFA JOB NO: 22084
DATE: 03/28/2023

FA3.1



CABLE LEGEND

TYPE A = DENOTES INITIATING DETECTION CIRCUITS (SMOKE DETECTOR, HEAT DETECTOR, ETC.) UNLESS OTHERWISE NOTED, PROVIDE (1) #14 TWISTED-UNSHIELDED PAIR. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.

TYPE B = DENOTES VISUAL NOTIFICATION APPLIANCE CIRCUITS (STROBES) UNLESS OTHERWISE NOTED, PROVIDE (1) PAIR OF #12 AWG. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.

TYPE C = DENOTES AUDIO NOTIFICATION APPLIANCE CIRCUITS (SPEAKERS) UNLESS OTHERWISE NOTED, PROVIDE (1) PAIR OF #14 AWG. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.

TYPE D = DENOTES (1) PAIR OF RS-485 SBUS CABLE FOR FIRE ALARM SUB-PANEL. CONNECTION TO FACP PER MANUFACTURE'S INSTALLATION INSTRUCTIONS, SUITABLE FOR UNDERGROUND USE. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.

TYPE E = DENOTES SYSTEM BUS (SBUS) CONNECTION; UNLESS OTHERWISE NOTED, PROVIDE (1) PAIR OF #16 AWG. SUITABLE FOR UNDERGROUND USE. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.

TYPE F = DENOTES VOICE BUS (VBUS) CONNECTION; UNLESS OTHERWISE NOTED, PROVIDE (1) PAIR OF #16 AWG. SUITABLE FOR UNDERGROUND USE. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.

TYPE G = DENOTES 24VDC CONSTANT POWER CIRCUITS FOR DUCT SMOKE DETECTOR OR BEAM SMOKE DETECTOR; UNLESS OTHERWISE NOTED, PROVIDE (1) PAIR OF #12 AWG. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.

TYPE H = DENOTES SUPERVISORY RELAY TRIPS FOR CAC. PROVIDE (2) STRANDED #14 AWG.

SHEET NOTES

1. CIRCUIT VIA 'A', 'C', 2 #12 & 1 #12 GND TO EXISTING PANEL "RA" LOCATED IN ELECT. ROOM 175; AT PANEL PROVIDE AND INSTALL 20 AMP, 1-POLE BREAKER WITH LOCK-ON DEVICE WITH RED MARKINGS LABELED "FIRE ALARM/ECS".
2. HOMERUN TO FIRE ALARM CONTROL PANEL "FACP" LOCATED IN RECEPTION 111.
3. HOMERUN TO REMOTE POWER SUPPLY "RPS-1" LOCATED IN FACULTY ROOM 158.
4. HOMERUN TO DIGITAL AUDIO AMPLIFIER "DAA-1" LOCATED IN FACULTY ROOM 158.
5. WHERE NECESSARY CONTRACTOR SHALL PROVIDE AND INSTALL ACCESS PANEL FOR HEAT DETECTOR ABOVE CEILING, 18" SQ. OPENING MINIMUM.
6. PROVIDE AND INSTALL LAMICOID NAMEPLATE ON DEVICE READING "EOL".
7. PROVIDE AND INSTALL 18" SQ. X 6" DEEP NEMA 3R PULLCAN.
8. PROVIDE AND INSTALL 2"C. FOR FIRE ALARM CABLES; SEE SHEET FA3.1 FOR CONTINUATION.
9. PROVIDE AND INSTALL CSFM LISTED WIREGUARD FOR ALL DEVICES IN MULTI-USE ROOM.
10. CONTRACTOR SHALL MOUNT INITIATION DEVICE RECESSED IN SKYLIGHT.
11. CONTRACTOR SHALL MOUNT INITIATION DEVICE IN SOFFIT/DUCT SPACE.
12. LOCATE DUCT SMOKER DETECTOR FOR FOR MECHANICAL UNIT LOCATED ON ROOF.
13. LOCATE FOR MAGNETIC DOOR HOLDER.
14. PROVIDE AND INSTALL THE FOLLOWING PER CABLE LEGEND:
    - (2) TYPE 'D' CABLE - FOR CONNECTION TO FIRE ALARM SUB-PANEL "FASP".
    - (2) TYPE 'E' CABLE - FOR CONNECTION TO DIGITAL AUDIO AMPLIFIER "DAA-2".
    - (1) TYPE 'F' CABLE - FOR CONNECTION TO DIGITAL AUDIO AMPLIFIER "DAA-2".
15. PROVIDE AND INSTALL 12" SQ. X 4" DEEP NEMA 3R PULLCAN.
16. PROVIDE AND INSTALL 1"C. FOR FIRE ALARM CABLES; SEE SHEET FA3.1 FOR CONTINUATION.

FIRE RATED WALL LEGEND

1-HOUR RATED WALL

2-HOUR RATED WALL

GENERAL NOTES:

A. SEAL ALL EXTERIOR/INTERIOR BUILDING PENETRATIONS, CUT AND PATCH WALLS/CEILINGS FOR CONDUIT ROUTING AS NECESSARY. PAINT/FINISH EXPOSED CONDUITS/BOXES TO MATCH BUILDING FINISH. COORDINATE WITH DISTRICT & ARCHITECT FOR EXACT REQUIREMENTS.

B. ALL INDOOR SPEAKERS/HORNS SHALL BE 0.5 WATTS RATED MINIMUM. ALL OUTDOOR SPEAKERS/HORNS SHALL BE 2 WATTS RATED MINIMUM.

C. CONTRACTOR SHALL PROVIDE AND INSTALL ACCESS PANELS AS NECESSARY FOR ALL DETECTORS LOCATED IN CLOSETS AND ABOVE CEILING SPACES FOR ACCESS TO INITIATION DETECTORS.

D. ALL CEILING MOUNTED FIRE ALARM DEVICES SHALL BE CENTERED ON CEILING TILES WHERE APPLICABLE.

E. AUDIBLE APPLIANCES SHALL PROVIDE 15dBA ABOVE AMBIENT NOISE LEVELS IN ALL OCCUPIED AREAS AND INTELLIGIBILITY WHERE REQUIRED PER CBC 907.5.2.1.1.

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

NORTH

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 01-120703 INC:
REVIEWED FOR:
SS ☐ FLS ☑ ACS ☐
DATE: 5/5/2023
(DSA STAMP AREA)

SFA

LICENSED ARCHITECT
BRADLEY PHILLIPS
No. C-24873
EXPIRES: 8-31-2023
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
TERATTB ANNEBY
No. 22043
EXP. 12/31/23
ELECTRICAL
STATE OF CALIFORNIA

AURUM CONSULTING ENGINEERS
MONTEREY BAY, INC.
Project No. 22-546.00
404 W. Franklin St ● Suite 100 ● Monterey, CA 93940
T.831.646.3834 ● F.831.646.3836 ● www.aurumbc.com

FIRE ALARM PLAN - MAIN BUILDING

FIRE ALARM UPGRADE
MAJESTIC WAY ELEMENTARY SCHOOL
1855 MAJESTIC WAY, SAN JOSE, CA 95132
BERRYESSA UNION SCHOOL DISTRICT

REVISIONS

NO.	ITEM	DATE
	DSA RESUBMITTAL	03/28/23

DRAWN BY: F.S.
CHECKED BY: N.A.
SFA JOB NO: 22084
DATE: 03/28/2023

FA4.1

GENERAL NOTES:

A. SEAL ALL EXTERIOR/INTERIOR BUILDING PENETRATIONS, CUT AND PATCH WALLS/CEILINGS FOR CONDUIT ROUTING AS NECESSARY. PAINT/FINISH EXPOSED CONDUITS/BOXES TO MATCH BUILDING FINISH. COORDINATE WITH DISTRICT & ARCHITECT FOR EXACT REQUIREMENTS.

B. ALL INDOOR SPEAKERS/HORNS SHALL BE 0.5 WATTS RATED MINIMUM. ALL OUTDOOR SPEAKERS/HORNS SHALL BE 2 WATTS RATED MINIMUM.

C. CONTRACTOR SHALL PROVIDE AND INSTALL ACCESS PANELS AS NECESSARY FOR ALL DETECTORS LOCATED IN CLOSETS AND ABOVE CEILING SPACES FOR ACCESS TO INITIATION DETECTORS.

D. ALL CEILING MOUNTED FIRE ALARM DEVICES SHALL BE CENTERED ON CEILING TILES WHERE APPLICABLE.

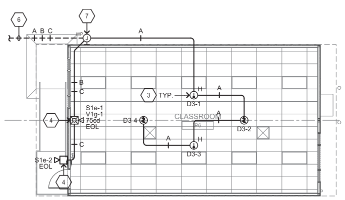
E. AUDIBLE APPLIANCES SHALL PROVIDE 15dBA ABOVE AMBIENT NOISE LEVELS IN ALL OCCUPIED AREAS AND INTELLIGIBILITY WHERE REQUIRED PER CBC 907.5.2.1.1.

CABLE LEGEND

TYPE A =	DENOTES INITIATING DETECTION CIRCUITS (SMOKE DETECTOR, HEAT DETECTOR, ETC.) UNLESS OTHERWISE NOTED, PROVIDE (1) #14 TWISTED-UNSHIELDED PAIR. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.
TYPE B =	DENOTES VISUAL NOTIFICATION APPLIANCE CIRCUITS (STROBES) UNLESS OTHERWISE NOTED, PROVIDE (1) PAIR OF #12 AWG. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.
TYPE C =	DENOTES AUDIO NOTIFICATION APPLIANCE CIRCUITS (SPEAKERS) UNLESS OTHERWISE NOTED, PROVIDE (1) PAIR OF #14 AWG. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.
TYPE D =	DENOTES (1) PAIR OF RS-485 SBUS CABLE FOR FIRE ALARM SUB-PANEL CONNECTION TO FACP PER MANUFACTURE'S INSTALLATION INSTRUCTIONS, SUITABLE FOR UNDERGROUND USE. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.
TYPE E =	DENOTES SYSTEM BUS (SBUS) CONNECTION; UNLESS OTHERWISE NOTED, PROVIDE (1) PAIR OF #16 AWG. SUITABLE FOR UNDERGROUND USE. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.
TYPE F =	DENOTES VOICE BUS (VBUS) CONNECTION; UNLESS OTHERWISE NOTED, PROVIDE (1) PAIR OF #16 AWG. SUITABLE FOR UNDERGROUND USE. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.
TYPE G =	DENOTES 24VDC CONSTANT POWER CIRCUITS FOR DUCT SMOKE DETECTOR OR BEAM SMOKE DETECTOR; UNLESS OTHERWISE NOTED, PROVIDE (1) PAIR OF #12 AWG. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.
TYPE H =	DENOTES SUPERVISORY RELAY TRIPS FOR CAC. PROVIDE (2) STRANDED #14 AWG.

SHEET NOTES

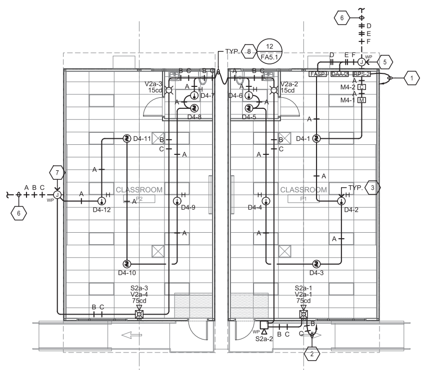
1. CIRCUIT VIA ½"C., 2 #12 & 1 #12 GND TO EXISTING PANEL LOCATED IN SAME PORTABLE BUILDING; AT PANEL PROVIDE AND INSTALL 20 AMP, 1-POLE BREAKER WITH LOCK-ON DEVICE WITH RED MARKINGS LABELED "FIRE ALARM/ECS".
2. HOMERUN TO REMOTE POWER SUPPLY "RPS-2" AND DIGITAL AUDIO AMPLIFIER "DAA-2".
3. CONTRACTOR SHALL MOUNT DEVICE IN ACCESSIBLE CEILING SPACE ABOVE.
4. PROVIDE AND INSTALL LAMICOID NAMEPLATE ON DEVICE READING "EOL".
5. PROVIDE AND INSTALL 18" SQ. X 6" DEEP NEMA 3R PULLCAN.
6. SEE SHEET FA3.1 FOR CONTINUATION.
7. PROVIDE AND INSTALL 12" SQ. X 4" DEEP NEMA 3R PULLCAN.
8. PROVIDE AND INSTALL 1"C. FOR FIRE ALARM CABLES.



4 FIRE ALARM PLAN - PORTABLE P7

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

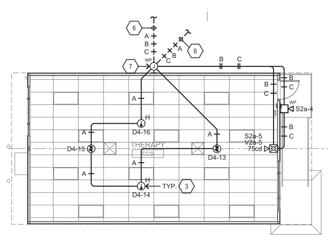
NORTH



3 FIRE ALARM PLAN - PORTABLES P5 & P6

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

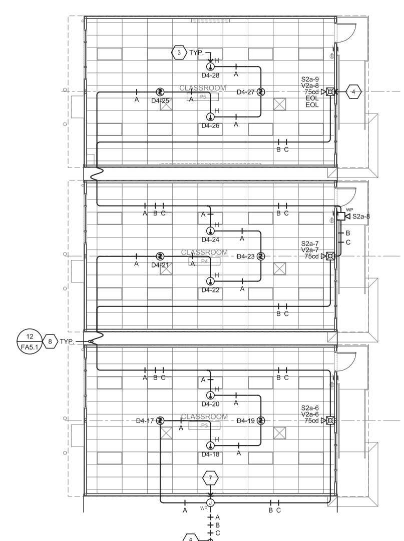
NORTH



2 FIRE ALARM PLAN - PORTABLES P4

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

NORTH



1 FIRE ALARM PLAN - PORTABLES P2-P3

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

NORTH

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 01-120703 INC:
REVIEWED FOR
SS ☐ FLS ☑ ACS ☐
DATE: 5/5/2023
(DSA STAMP AREA)

SFA

LICENSED ARCHITECT MARK C. FINNEY NO. C-24673 REN. 9-30-23 STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER NAJIB ANWARY No. E21043 EXP. 3/31/25 ELECTRICAL STATE OF CALIFORNIA

AURUM CONSULTING ENGINEERS MONTEREY BAY, INC.
Project No. 22-546.00
404 W. Franklin St. • Suite 100 • Monterey, CA 93940
T.831.646.3330 • F.831.646.3336 • www.acemb.com

FIRE ALARM PLAN - PORTABLES

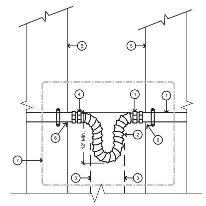
FIRE ALARM UPGRADE
MAJESTIC WAY ELEMENTARY SCHOOL
1855 MAJESTIC WAY, SAN JOSE, CA 95132
BERRYESSA UNION SCHOOL DISTRICT

REVISIONS

NO.	ITEM	DATE
	DSA RESUBMITTAL	03/28/23

DRAWN BY:	F.S.
CHECKED BY:	N.A.
SFA JOB NO: 22084	DATE: 03/28/2023

FA4.2



DETAIL NOTES:

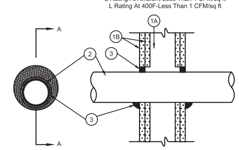
1. EMT, TYP.
2. SEALTITE FLEX CONDUIT, TYP.
3. EXPANSION JOINT.
4. WATERTIGHT CONNECTIONS.
5. RELOCATABLE CLASSROOMS.
6. PROVIDE WP J-BOXES IF BENDS IN CONDUIT RUN EXCEED 360°.
7. WHERE 12" MIN. SLACK CANNOT BE MET BY STRAIGHT RUN; CONTRACTOR SHALL PROVIDE & INSTALL 18" SQ. x 6" DEEP NEMA 3R PULLCAN AT EACH END MOUNTED AT SIDE/ROOF AND OFFSET TO ENSURE 12" SLACK IS PROVIDED OR MOUNT PULLCAN IN ACCESSIBLE CEILING SPACE.

12 CONDUIT TRANSITION BETWEEN BLDGS.
NO SCALE

SEE FLOOR PLAN DRAWINGS
FOR RATED WALL LOCATIONS

U.L. System No. W-L-1049

F Rating-1 and 2 Hr (See Item 1B)
T Rating-0 HR
L Rating At Ambient-Less Than 1 CFM/sq ft
L Rating At 400F-Less Than 1 CFM/sq ft



SECTION A-A

1. Wall Assembly-The 1 or 2 hr fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner described in the individual U300 or U400 Series Wall or Partition Design in the UL Fire Resistance Directory and shall include the following construction features:

A. Studs-Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. lumber spaced 16 in. OC. Steel studs to be min 3-5/8 in. wide and spaced max 24 in. OC. When steel studs are used and the diam of opening exceeds the width of stud cavity, the opening shall be framed on all sides using lengths of steel stud installed between the vertical studs and screw-attached to the steel studs at each end. The framed opening in the wall shall be 4 to 6 in. wider and 4 to 6 in. higher than the diam of the penetrating item such that, when the penetrating item is installed in the opening, a 2 to 3 in. clearance is present between the penetrating item and the framing on all four sides.

B. Wallboard, Gypsum*-5/8 in. thick, 4 ft wide with square or tapered edges. The gypsum wallboard type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual U300 or U400 Series Design in the UL Fire Resistance Directory. Max diam of opening is 25-3/4 in. for steel stud walls. Max diam of opening is 14-1/2 in. for wood stud walls. The hourly F Rating of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed.

2. Through Penetrant-One metallic pipe, conduit or tubing to be installed either concentrically or eccentrically within the firestop system. The annular space between pipe, conduit or tubing and periphery of opening shall be min 0 in. (point contact) to max 1-3/4 in. Pipe, conduit or tubing to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipes, conduits or tubing may be used:

A. Steel Pipe-Nom 24 in. diam (or smaller) Schedule 10 (or heavier) steel pipe.

B. Iron Pipe-Nom 24 in. diam (or smaller) cast or ductile iron pipe.

C. Conduit-Nom 4 in. diam (or smaller) steel electrical metallic tubing, nom 6 in. diam (or smaller) steel conduit or nom I in. diam (or smaller) flexible steel conduit.

D. Copper Tubing-Nom 6 in. diam (or smaller) Type L (or heavier) copper tubing.

E. Copper Pipe-Nom 6 in. diam (or smaller) Regular (or heavier) copper pipe.

3. Fill, Void or Cavity Material*-Sealant-Min 5/8 in. thickness of fill material applied within annulus, flush with both surfaces of wall. At the point contact location between through penetrant and gypsum wallboard, a min 3/8 in. diam bead of fill material shall be applied at the gypsum wallboard/through penetrant interface on both surfaces of wall.

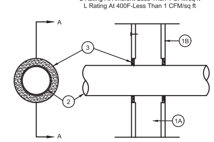
Specified Technologies Inc.-SpecSeal 100, 101, 102 or 105 Sealant
'Bearing the UL Classification Marking

11 2-HR FIRE-RATED WALL PENETRATION
NO SCALE

SEE FLOOR PLAN DRAWINGS
FOR RATED WALL LOCATIONS

U.L. System No. W-L-1062

F Rating-1 HR
T Rating-0 HR
L Rating At Ambient-Less Than 1 CFM/sq ft
L Rating At 400F-Less Than 1 CFM/sq ft



SECTION A-A

1. Wall Assembly-The fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300 or U400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:

A. Studs-Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. lumber spaced 16 in OC. Steel studs to be min 3|Q5|W/|A8|S in. wide and spaced max 24 in. OC.

B. Wallboard Gypsum*-One Layer of nom |Q5|W/|A8|S in. thick gypsum wallboard as specified in the individual Wall and Partition Design. Max diam of opening is 4|Q3|W/|A4|S in.

2. Through Penetrants-One metallic conduit to be installed within the firestop system. The space between the conduit and periphery of opening shall be a min |Q1|W/|A4|S in. to a max |Q3|W/|A8|S in. Conduit to be rigidly supported on both sides of wall assembly. A nominal 4 in. diameter (or smaller) electrical metallic tubing or steel conduit may be used.

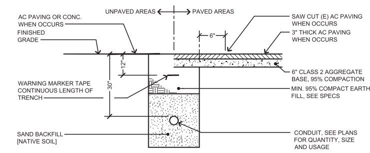
3. Fill, Void or Cavity Material*-Caulk-Min 1|Q1|W/|A2|S in. thickness of fill material applied within the annulus, flush with both surfaces of wall.

General Electric Co.-Pensit 100 Caulk.

Specified Technologies Inc.-Pensil 100 Sealant and Pensit 300 Sealant.

*Bearing the UL Classification Marking

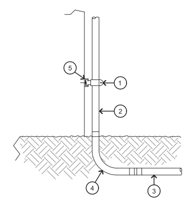
10 1-HR FIRE-RATED WALL PENETRATION
NO SCALE



NOTES:

1. SAW CUT, TRENCH & BACKFILL FOR (N) CONDUITS. PATCH WALKWAY TO MATCH (E) SURROUNDING SURFACES. CARE SHALL BE TAKEN TO PROTECT EXISTING TREES. RESEED OR RESOD (E) DISTURBED PLANTED AREAS TO ARCHITECT'S SATISFACTION.
2. EXISTING A.C. SHALL BE CUT AND REMOVED IN SUCH A MANNER SO AS NOT TO TEAR BULGE OR DISPLACE ADJACENT PAVEMENT. EDGES SHALL BE CLEAN AND VERTICAL. ALL CUTS SHALL BE PARALLEL OR PERPENDICULAR TO STREET CENTERLINE, WHEN PRACTICAL.
3. BASE MATERIAL TO BE REPLACED TO THE DEPTH OF EXISTING BASE AND COMPACTED TO A MIN. 95% RELATIVE COMPACTION. A.C. MAY BE SUBSTITUTED FOR BASE MATERIAL. WHEN USED AS BACKFILL, CLASS 100-E-100 P.C.C. MAY BE SUBSTITUTED FOR BASE MATERIAL.
4. A TACK COAT OF ASPHALTIC EMULSION OR PAVING ASPHALT SHALL BE APPLIED TO EXISTING A.C. AT ALL CONTACT SURFACES, PRIOR TO RESURFACING.
5. ASPHALTIC CONCRETE RESURFACING;
   A) MINIMUM TOTAL THICKNESS SHALL BE ONE INCH GREATER THAN EXISTING A.C.
   B) A.C. SHALL BE HOT PLANT MIX.
6. ALL A.C. RESURFACING SHALL BE SEAL COATED WITH AN EMULSIFIED ASPHALT AND COVERED WITH CLEAN SAND.

9 TYPICAL TRENCH SECTION
NO SCALE

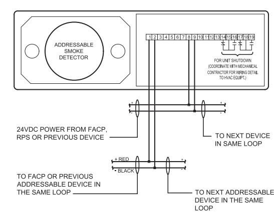


DETAIL NOTES:

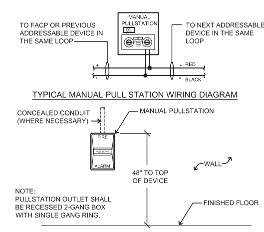
1. UNISTRUT BRACKET.
2. GALVANIZED RIGID STEEL CONDUIT.
3. SCHEDULE 40 PVC.
4. WRAPPED GALVANIZED RIGID STEEL ELBOW AND UNDERGROUND RISER.
5. UNISTRUT CHANNEL.

GENERAL NOTES:
A. FOR WOOD STUD WALL:
USE ⅜" LAG BOLT WITH MIN. ¾" EMBEDMENT INTO STUDS.
(ONE AT EACH END OF BRACKET)
B. FOR CONCRETE WALL:
USE ⅜" WEDGE ANCHOR WITH MIN. 2½" EMBEDMENT INTO CONCRETE WALL. (ONE AT EACH END OF BRACKET)

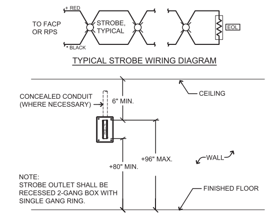
8 UNDERGROUND CONDUIT RISER DETAIL
NO SCALE



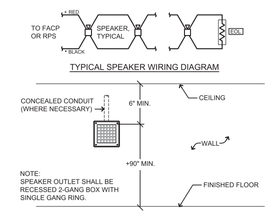
7 DUCT DETECTOR WIRING DIAGRAM
NO SCALE



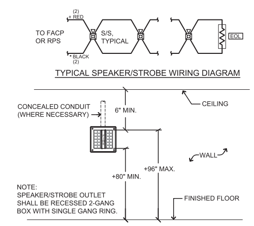
6 PULL STATION MOUNTING DETAIL
NO SCALE



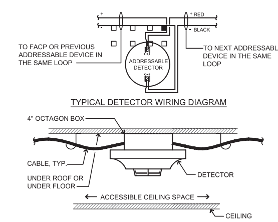
5 STROBE INSTALLATION DETAIL
NO SCALE



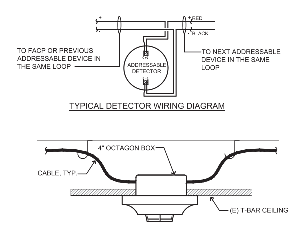
4 SPEAKER INSTALLATION DETAIL
NO SCALE



3 SPEAKER/STROBE INSTALLATION DETAIL
NO SCALE

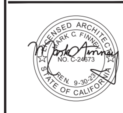


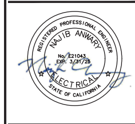
2 DETECTOR MOUNTING DETAIL
NO SCALE (ABOVE CEILING)



1 DETECTOR MOUNTING DETAIL
NO SCALE

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 01-120703 INC:
REVIEWED FOR
SS ☐ FLS ☑ ACS ☐
DATE: 5/5/2023
(DSA STAMP AREA)





AURUM CONSULTING ENGINEERS MONTEREY BAY, INC.
Project No. 22-546.00
404 W. Franklin St. • Suite 100 • Monterey, CA 93940
T.831.646.3330 • F.831.646.3336 • www.acemb.com

FIRE ALARM DETAILS

FIRE ALARM UPGRADE
MAJESTIC WAY ELEMENTARY SCHOOL
1855 MAJESTIC WAY, SAN JOSE, CA 95132
BERRYESSA UNION SCHOOL DISTRICT

REVISIONS

NO.	ITEM	DATE
	DSA RESUBMITTAL	03/28/23

DRAWN BY: F.S.
CHECKED BY: N.A.
SFA JOB NO: 22084
DATE: 03/28/2023

FA5.1

SPECIFICATIONS
SFA Project No. 22081

Majestic Way Elementary School Fire Alarm Upgrade
Majestic Way Elementary School

Berryessa Union School District
Santa Clara County, California

2155 S. Bascom Ave. Suite 200
Campbell, California 95008
(408) 879-0600

SPECIFICATIONS
SFA Project No. 22081

DSA File No. 43-07
DSA Application No. 01-120703

2155 S. Bascom Ave. Suite 200
Campbell, CA 95008
(408) 879-0600

Majestic Way Elementary School Fire Alarm Upgrade
Majestic Way Elementary School

Berryessa Union School District
Santa Clara County, California

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 01-120703 INC:
REVIEWED FOR
SS ☐ FLS ☑ ACS ☐
DATE: 5/5/2023

Division of the State Architect
California Department of General Services

LICENSED ARCHITECT
MARK C. FINNEY
NO. C-24673
REN. 9-30-23
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
NAJIB ANWARY
No. E21043
EXP. 3/31/23
ELECTRICAL
STATE OF CALIFORNIA

Mark Finney, Architect
Sugimura Finney Architects

Najib Anwary, Electrical Engineer and Fire Alarm Designer
Aurum Consulting Engineer

TABLE OF CONTENTS

DIVISION 26 – ELECTRICAL

DIVISION 27 – COMMUNICATIONS
(No work in the above division)

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

DIVISION 31 – EARTHWORK

DIVISION 32 - EXTERIOR IMPROVEMENTS

DIVISION 33
(No work in the above division)

END OF SECTION

SECTION 07 92 00 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes joint sealants for which the type and form is indicated on the drawings.

1. Exterior joints in vertical surfaces and horizontal nontraffic surfaces:

2. Exterior joints in horizontal traffic surfaces:

3. Interior joints in vertical surfaces and horizontal nontraffic surfaces:

4. Interior joints in horizontal traffic surfaces:

1.3 PERFORMANCE REQUIREMENTS

A. Provide joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.

1.4 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

C. Samples for Verification: For each type and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

D. Product Certificates: For each type of joint sealant and accessory, signed by product manufacturer.

E. SWRI Validation Certificate: For each elastomeric sealant specified to be validated by SWRI's Sealant Validation Program.

F. Qualification Data: For Installer and testing agency.

G. Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:

1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

H. Product Test Reports: Based on comprehensive testing of product formulations performed by a qualified testing agency, indicating that sealants comply with requirements.

I. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized Installer who is approved or licensed for installation of elastomeric sealants required for this Project.

B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

C. Product Testing: Obtain test results for "Product Test Reports" Paragraph in "Submittals" Article from a qualified testing agency based on testing current sealant formulations within a 36-month period preceding the Notice to Proceed with the Work.

1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated, as documented according to ASTM E 548.
2. Test elastomeric joint sealants for compliance with requirements specified by reference to ASTM C 920, and where applicable, to other standard test methods.

3. Test elastomeric joint sealants according to SWRI's Sealant Validation Program for compliance with requirements specified by reference to ASTM C 920 for adhesion and cohesion under cyclic movement, adhesion-in-peel, and indentation hardness.
4. Test other joint sealants for compliance with requirements indicated by referencing standard specifications and test methods.

D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1.6 PROJECT CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.7 WARRANTY *(Project Close-Out Item)*

A. Special Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two (2) years from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer's standard form in which elastomeric sealant manufacturer agrees to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two (2) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles.

2.2 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing and field experience.

B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.3 ELASTOMERIC JOINT SEALANTS

A. Elastomeric Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

B. Stain-Test-Response Characteristics: Where elastomeric sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

C. Suitability for Contact with Food: Where elastomeric sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.

D. Single-Component Mildew-Resistant Acid-Curing Silicone Sealant:

1. Products:

    a. Dow Corning Corporation; 786 Mildew Resistant.
    b. GE Silicones; Sanitary SCS1700.
    c. Tremco; Tremsil 200.
    d. Pecora Corporation; 863 Silicone

2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 25.
4. Use Related to Exposure: NT (nontraffic).
5. Uses Related to Joint Substrates: G, A, and, as applicable to joint substrates indicated, O.

E. Multicomponent Pourable Urethane Sealant:

1. Products:

    a. Meadows, W. R., Inc.; POURTHANE.
    b. Pacific Polymers, Inc.; Elasto-Thane 227 High Shore Type I (Self Leveling).
    c. Pacific Polymers, Inc.; Elasto-Thane 227 Type I (Self Leveling).

d. Pecora Corporation; Urexpan NR-200.
e. Tremco; THC-901.
f. Tremco; THC-900.
g. Tremco; Vulkem 245.

2. Type and Grade: M (multicomponent) and P (pourable).
3. Class: 25.
4. Use Related to Exposure: T (traffic).
5. Uses Related to Joint Substrates: M, A, and, as applicable to joint substrates indicated, O.

F. Single-Component Nonsag Urethane Sealant:

1. Products:

a. Bostik Findley; Chem-Calk 900.
b. Bostik Findley; Chem-Calk 915.
c. Bostik Findley; Chem-Calk 916 Textured.
d. Bostik Findley; Chem-Calk 2639.
e. Pecora Corporation; Dynatrol I-XL.
f. Tremco; DyMonic.
g. Tremco; Vulkem 921.

2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 25.
4. Use Related to Exposure: NT (nontraffic).
5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.

2.4 LATEX JOINT SEALANTS

A. Latex Sealant: Comply with ASTM C 834, Type OP, Grade NF.

B. Products:

1. Bostik Findley; Chem-Calk 600.
2. Pecora Corporation; AC-20+.
3. Sonneborn, Division of ChemRex Inc.; Sonolac.
4. Tremco; Tremflex 834.

2.5 ACOUSTICAL JOINT SEALANTS

A. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 and the following:

1. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
2. Flame-spread and smoke-developed indexes of less than 25 per ASTM E 84.
3. Products:

a. Pecora Corporation; AC-20 FTR Acoustical and Insulation Sealant.

b. United States Gypsum Co.; SHEETROCK Acoustical Sealant.

B. Acoustical Sealant for Concealed Joints: Manufacturer's standard, nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber sealant recommended for sealing interior concealed joints to reduce airborne sound transmission.

1. Products:

a. Pecora Corporation; BA-98.
b. Tremco; Tremco Acoustical Sealant.

2.6 FIRE RESISTANT JOINT SEALERS

A. General: Provide manufacturer's standard sealant and accessory materials with fire-resistance rating indicated which are identical to those of assemblies whose fire endurance has been determined by testing per ASRM E 814 by Underwriters Laboratory, Inc. or other testing and inspecting agency acceptable to authorities having jurisdiction.

B. Foamed in Place Fire Stopping Sealant: Two part, foamed-in-place, silicone sealant formulated for use as part of a through-penetration fire-stop system for filling openings around cables, conduit, pipes and similar penetrations through walls and floors.

1. Products:

a. Dow Corning Corporation; Dow Corning Fire Stop Foam.

b. Hilti, Inc. CP620 Fire Foam.
c. Specified Technologies, Inc.; SSS100.

C. One Part Fire Stopping Sealant: One part elastomeric sealant formulated for use as a part of a through penetration fire stop system for sealing openings around cables, conduit, pipes and similar penetrations through walls and floors.

1. Products:

a. Dow Corning Corporation; Dow Corning Fire Stop Sealant.
b. Electrical Products Division/3M Corporation; 3M Fire Barrier Caulk CP25WB+.
c. Hilti, Inc. FS-One high performance intumescent firestop sealant.

2.7 JOINT FILLERS FOR CONCRETE PAVING

A. General: Provide joint fillers of thickness and widths indicated.

1. Self-Expanding Cork Joint Filler: Preformed strips complying with ASTM D1752 for Type III.
2. Sponge Rubber Joint Filler: Preformed strips complying with ASTM D1752 for Type I.

2.8 KITCHEN SEALERS:

A. General: Provide manufacturer's standard sealant and accessory materials with mildew resistant properties as required by local health jurisdictions to all components and assemblies as

required to get final county health approval. All shelves, sinks, flooring, etc. shall receive sealants as required by local health department.

2.8 JOINT-SEALANT BACKING

A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), Type O (open-cell material), B (bicellular material with a surface skin) or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:

C. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 26 deg F. Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and to otherwise contribute to optimum sealant performance.

D. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.9 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:

    a. Concrete.
    b. Masonry.
    c. Unglazed surfaces of ceramic tile.

3. Remove laitance and form-release agents from concrete.
4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:

    a. Metal.
    b. Glass.
    c. Porcelain enamel.
    d. Glazed surfaces of ceramic tile.

B. Joint Priming: Prime joint substrates**,** where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Acoustical Sealant Application Standard: Comply with recommendations in ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.

D. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

E. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

F. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

G. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.
4. Provide flush joint configuration where indicated per Figure 5B in ASTM C 1193.
5. Provide recessed joint configuration of recess depth and at locations indicated per Figure 5C in ASTM C 1193.

    a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

H. Installation of Preformed Tapes: Install according to manufacturer's written instructions.

I. Installation of Preformed Silicone-Sealant System: Comply with the following requirements:

1. Apply masking tape to each side of joint, outside of area to be covered by sealant system.

2. Apply silicone sealant to each side of joint to produce a bead of size complying with preformed silicone-sealant system manufacturer's written instructions and covering a bonding area of not less than 3/8 inch. Hold edge of sealant bead 1/4 inch inside masking tape.
3. Within 10 minutes of sealant application, press silicone extrusion into sealant to wet extrusion and substrate. Use a roller to apply consistent pressure and ensure uniform contact between sealant and both extrusion and substrate.
4. Complete installation of sealant system in horizontal joints before installing in vertical joints. Lap vertical joints over horizontal joints. At ends of joints, cut silicone extrusion with a razor knife.

J. Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping, taking care not to pull or stretch material, producing seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures where expansion of sealant requires acceleration to produce seal, apply heat to sealant in compliance with sealant manufacturer's written instructions.

K. Installation of Fire Stopping Sealant: Install sealant, including forming, packing and other accessory materials to fill openings around mechanical and electrical services penetrating floors and walls to provide fire-stops with fire resistance ratings indicated for floor or wall assembly in which penetration occurs.

3.4 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 07 92 00 (09/07)

SECTION 09 91 00 - PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes surface preparation and field painting of exposed exterior and interior items and surfaces.

1. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.

B. Paint exposed surfaces, except where these Specifications indicate that the surface or material is not to be painted or is to remain natural. If an item or a surface is not specifically mentioned, paint the item or surface the same as similar adjacent materials or surfaces. If a color of finish is not indicated, Architect will select from standard colors and finishes available.

1. Painting includes field painting of exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron supports, and surfaces of mechanical and electrical equipment that do not have a factory-applied final finish.

C. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.

1. Labels: Do not paint over UL, FMG, or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

1.3 DEFINITIONS

A. General: Standard coating terms defined in ASTM D 16 apply to this Section.

1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
2. Eggshell refers to low-sheen finish with a gloss range between 20 and 35 when measured at a 60-degree meter.
3. Semigloss refers to medium-sheen finish with a gloss range between 35 and 70 when measured at a 60-degree meter.
4. Full gloss refers to high-sheen finish with a gloss range more than 70 when measured at a 60-degree meter.

1.4 SUBMITTALS

A. Product Data: For each paint system indicated. Include block fillers and primers.

1. Material List: An inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
2. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material.

B. Samples for Initial Selection: For each type of finish-coat material indicated.

1. After color selection, Architect will furnish color chips for surfaces to be coated.

C. Samples for Verification: For each color and material to be applied, with texture to simulate actual conditions, on representative Samples of the actual substrate.

1. Provide stepped Samples, defining each separate coat, including block fillers and primers. Use representative colors when preparing Samples for review. Resubmit until required sheen, color, and texture are achieved.
2. Provide a list of materials and applications for each coat of each Sample. Label each Sample for location and application.
3. Submit 4 Samples on the following substrates for Architect's review of color and texture only:

a. On 8-1/2 inch by 11 inch heavy cardboard, unless requested on actual substrate by Architect.
b. Include manufacturer’s product number, sheen, texture and color on reverse side.

D. Qualification Data: For Applicator.

1.5 QUALITY ASSURANCE

A. Applicator Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.

B. Source Limitations: Obtain block fillers and primers for each coating system from the same manufacturer as the finish coats.

C. Coordination of Work: Review other sections of these specifications in which prime paints are to be provided to ensure compatibility of total coating system for various substrates. Upon request from other trades, furnish information or characteristics of finish materials provided for use, to ensure compatible prime coats are used.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label and the following information:

1. Product name or title of material.

2. Manufacturer's name.
3. Fed. Spec. number, if applicable.
4. Product description (generic classification or binder type).
5. Manufacturer's stock number and date of manufacture.
6. Contents by volume, for pigment and vehicle constituents.
7. Thinning instructions.
8. Application instructions.
9. Color name and number.
10. VOC content.

B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain storage containers in a clean condition, free of foreign materials and residue.

1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily.

1.7 PROJECT CONDITIONS

A. Apply waterborne paints only when temperatures of surfaces to be painted and surrounding air are between 50 and 90 deg F.

B. Apply solvent-thinned paints only when temperatures of surfaces to be painted and surrounding air are between 45 and 95 deg F.

C. Do not apply paint in snow, rain, fog, or mist; or when relative humidity exceeds 85 percent; or at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.

1.8 EXTRA MATERIALS *(Project Close-Out Item)*

A. Furnish extra paint materials from the same production run as the materials applied and in the quantities described below. Package with protective covering for storage and identify with labels describing contents. Deliver extra materials to Owner.

1. Quantity: Furnish Owner with an additional 3 percent, but not less than 1 gal. or 1 case, as appropriate, of each material and color applied.
2. Obtain written verification of delivery from Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles or preapproved equal.

B. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:

1. Kelly-Moore Paint Co. (Kelly-Moore).
2. Dunn Edwards (D-E)
3. ICI Dulux Paint Centers (ICI Dulux Paints).
4. Sherwin-Williams Co. (Sherwin-Williams).

2.2 PAINT MATERIALS, GENERAL

A. Material Compatibility: Provide block fillers, primers, and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint-material containers not displaying manufacturer's product identification will not be acceptable.

1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed substitutions.

C. Colors: Match Architect's samples or as selected by Architect from manufacturer's full range.

D. Federal Specifications establish minimum acceptable quality for paint materials. Provide written certification from paint manufacturer that materials provided meet or exceed these minimums.

E. Lead content in pigment, if any, is limited to contain not more than 0.5% lead, as lead metal based on the total non-volatile (dry-film) of paint weight.

1. This limitation is extended to interior surfaces and those exterior surfaces, such as stairs, decks, porches, railings, windows and doors which are readily accessible to children under seven years of age.

2.3 INTERIOR PRIMERS

A. Interior Ferrous-Metal Primer: Factory-formulated quick-drying rust-inhibitive alkyd-based metal primer.
1. Kelly-Moore; 1711 Kel-Guard Alkyd White Rust-Preventative Primer: Applied at a dry film thickness of 1.5 – 2.0 mils per coat

B. Interior Zinc-Coated Metal Primer: Factory-formulated galvanized metal primer.
1. Kelly-Moore; 1725 Acry-Shield 100% Acrylic Metal Primer: Applied at a dry film thickness of 1.5 – 2.0 mils per coat

2.4 EXTERIOR FINISH COATS

A. Exterior Flat Acrylic Paint: Factory-formulated flat acrylic-emulsion latex paint for exterior application.

1. ICI Dulux Paints; 2200-XXXX Dulux Professional Exterior 100 Percent Acrylic Flat Finish: Applied at a dry film thickness of not less than 1.4 mils.
2. Kelly-Moore; 1200 Color Shield Exterior 100% Acrylic Flat Paint: Applied at a dry film thickness of 1.5 – 2.0 mils per coat
3. Sherwin-Williams; A-100 Exterior Latex Flat House & Trim Paint A6 Series: Applied at a dry film thickness of not less than 1.3 mils.
4. Dunn-Edwards; Acri-Flat, Ext. Wood Stain & Masonry Flat Paint (W 704): Applied at a dry film thickness of not less than 1.5 mils.

B. Exterior Low-Luster Acrylic Paint: Factory-formulated low-sheen (eggshell) acrylic-latex paint for exterior application.

1. ICI Dulux Paints; 2402-XXXX Dulux Professional Exterior 100 Percent Acrylic Satin Finish: Applied at a dry film thickness of not less than 1.4 mils.
2. Kelly-Moore; 1210 Color-Shield Exterior 100% Acrylic Low Sheen: Applied at a dry film thickness of 1.5 – 2.0 mils per coat.
3. Sherwin-Williams; A-100 Exterior Latex Satin House & Trim Paint A82 Series: Applied at a dry film thickness of not less than 1.5 mils.
4. Dunn-Edwards; Spartasheen, Int./Ext. Acrylic Low Sheen Paint (W 7300): Applied at a dry film thickness of not less than 1.5 mils.

C. Exterior Semigloss Acrylic Enamel: Factory-formulated semigloss waterborne acrylic-latex enamel for exterior application.

1. ICI Dulux Paints; 2406-XXXX Dulux Professional Exterior 100 Percent Acrylic Semi-Gloss Finish: Applied at a dry film thickness of not less than 1.3 mils.
2. Kelly-Moore; 1215 Color Sheild Exterior Acrylic Semi-Gloss Enamel: Applied at a dry film thickness of 1.7 o 2.2 mils per coat.
3. Sherwin-Williams; A-100 Latex Gloss A8 Series: Applied at a dry film thickness of not less than 1.3 mils.
4. Dunn-Edwards; Permasgloss, Int./Ext. Acrylic Semi-Gloss Paint (W 960): Applied at a dry film thickness of not less than 1.5 mils.

D. Exterior Full-Gloss Acrylic Enamel for Ferrous and Other Metals: Factory-formulated full-gloss waterborne acrylic-latex enamel for exterior application.

1. ICI Dulux Paints; 4208-XXXX Devoe Interior/Exterior Acrylic Gloss Finish: Applied at a dry film thickness of not less than 1.6 mils.
2. Kelly-Moore; 5880 DTM High Performance Acrylic Gloss Enamel: Applied at a dry film thickness of 1.7 – 2.2 mils per coat.
3. Sherwin-Williams; DTM Acrylic Coating Gloss (Waterborne) B66W100 Series: Applied at a dry film thickness of not less than 2.4 mils.
4. Dunn-Edwards; Permagloss, Int./Ext. Acrylic Gloss Paint (W 960V): Applied at a dry film thickness of not less than 1.5 mils.

E. Exterior Full-Gloss Latex Enamel: Factory-formulated full-gloss Latex enamel for exterior application.

1. ICI Dulux Paints; 4208-XXXX Devoe Alkyd Industrial Gloss Enamel: Applied at a dry film thickness of not less than 2.0 mils.
2. Kelly-Moore; 1700 Kel-Guard Gloss Alkyd Rust Inhibitive Enamel: Applied at a dry film thickness of 1.7 – 2.2 mils per coat.
3. Sherwin-Williams; Industrial Enamel B-54 Series: Applied at a dry film thickness of not less than 2.0 mils.
4. Dunn-Edwards; Permagloss, Rust Preventative Latex Gloss Enamel (W 960V): Applied at a dry film thickness of not less than 2.0 mils.

2.5 INTERIOR FINISH COATS

A. Interior Flat Acrylic Paint: Factory-formulated flat acrylic-emulsion latex paint for interior application.
1. Kelly-Moore; 1500 Enviro-Cote Interior Acrylic Flat Wall Paint: Applied at a dry film thickness of 1.5 – 2.0 mils per coat.

B. Interior Flat Latex-Emulsion Size: Factory-formulated flat latex-based interior paint.
1. Kelly-Moore; 450 Pro-Wall Interior Flat Latex Wall Paint: Applied at a dry film thickness of 1.5 – 2.0 mils per coat..

C. Interior Low-Luster Acrylic Enamel: Factory-formulated eggshell acrylic-latex interior enamel.
1. Kelly-Moore; 1686 Dura-Poxy + 100% Acrylic Eggshell Enamel: Applied at a dry film thickness of 1.7 - 2.2 mils per coat.

D. Interior Semi-gloss Acrylic Enamel: Factory-formulated semigloss acrylic-latex enamel for interior application.
1. Kelly-Moore; 1649 Acrylic-Latex Semi-Gloss Enamel: Applied at a dry film thickness of not less than 1.7 mils.
2. Kelly-Moore; 1685 + Dura-Poxy Semi-Gloss Acrylic Enamel: Applied at a dry film thickness of not less than 1.5 mils.

E. Interior Full-Gloss Acrylic Enamel: Factory-formulated full-gloss acrylic-latex interior enamel.
1. Kelly-Moore; 1680 + Dura-Poxy Gloss Acrylic Enamel: Applied at a dry film thickness of 1.7 – 2.2 mils per coat.

F. Interior Semigloss Acrylic Enamel: Factory-formulated semigloss enamel for interior application.
1. Kelly-Moore; 1685 Dura-Poxy + 100% Acrylic Semi-Gloss Enamel: Applied at a dry film thickness of 1.7 – 2.2 mils per coat.

G. Interior Full-Gloss Acrylic Enamel for Wood and Metal Surfaces: Factory-formulated full-gloss interior enamel.
1. Kelly-Moore; 1685 Dura-Poxy + 100% Semi-Gloss Enamel: Applied at a dry film thickness of 1.7 – 2.2 mils per coat.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for paint application.

1. Proceed with paint application only after unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
2. Start of painting will be construed as Applicator's acceptance of surfaces and conditions within a particular area.

B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.

1. Notify Architect about anticipated problems when using the materials specified over substrates primed by others.

3.2 PREPARATION

A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of size or weight of the item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.

B. Cleaning: Before applying paint or other surface treatments, clean substrates of substances that could impair bond of the various coatings. Remove oil and grease before cleaning.

1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

C. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.

1. Provide barrier coats over incompatible primers or remove and reprime.

2. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with SSPC's recommendations.

a. Blast steel surfaces clean as recommended by paint system manufacturer and according to SSPC-SP 6/NACE No. 3.
b. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
c. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with same primer as the shop coat.

D. Material Preparation: Mix and prepare paint materials according to manufacturer's written instructions.

1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
3. Use only thinners approved by paint manufacturer and only within recommended limits.

E. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

3.3 APPLICATION

A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.

1. Paint colors, surface treatments, and finishes are indicated in the paint schedules.
2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
3. Provide finish coats that are compatible with primers used.
4. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, grilles, convector covers, covers for finned-tube radiation, and similar components are in place. Extend coatings in these areas, as required, to maintain system integrity and provide desired protection.
5. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
6. Paint interior surfaces of ducts with a flat, nonspecular black paint where visible through registers or grilles.
7. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
8. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.
9. Where indicated, finish interior of mill built wall and base cabinets and similar field-finished casework to match exterior.
10. Sand lightly between each succeeding enamel or varnish coat.

B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

1. The number of coats and film thickness required are the same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
2. Omit primer over metal surfaces that have been shop primed and touchup painted.
3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give

special attention to ensure that edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.

4. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure, and until application of another coat of paint does not cause undercoat to lift or lose adhesion.

C. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.

1. Brushes: Use brushes best suited for type of material applied. Use brush of appropriate size for surface or item being painted.
2. Rollers: Use rollers of carpet, velvet-back, or high-pile sheep's wool as recommended by manufacturer for material and texture required.
3. Spray Equipment: Use airless spray equipment with orifice size as recommended by manufacturer for material and texture required.

D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate to achieve dry film thickness indicated. Provide total dry film thickness of the entire system as recommended by manufacturer.

E. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in equipment rooms and occupied spaces.

F. Mechanical items to be painted include, but are not limited to, the following:

1. Uninsulated metal piping.
2. Uninsulated plastic piping.
3. Pipe hangers and supports.
4. Tanks that do not have factory-applied final finishes.
5. Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.
6. Exposed ducts, equipment, and pipe insulation having "all-service jacket" or other paintable jacket material.
7. Mechanical equipment that is indicated to have a factory-primed finish for field painting.

G. Electrical items to be painted include, but are not limited to, the following:

1. Switchgear.
2. Panelboards.
3. Electrical equipment that is indicated to have a factory-primed finish for field painting.
4. Exposed Conduits.

H. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.

I. Prime Coats: Before applying finish coats, apply a prime coat, as recommended by manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.

J. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

K. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, runs, cloudiness, color irregularity, brush marks, orange peel, nail holes, or other surface imperfections.

1. Provide satin finish for final coats.

L. Stipple Enamel Finish: Roll and redistribute paint to an even and fine texture. Leave no evidence of rolling, such as laps, irregularity in texture, skid marks, or other surface imperfections.

M. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

3.4 FIELD QUALITY CONTROL

A. Owner reserves the right to invoke the following test procedure at any time and as often as Owner deems necessary during the period when paint is being applied:

1. Owner will engage a qualified independent testing agency to sample paint material being used. Samples of material delivered to Project will be taken, identified, sealed, and certified in the presence of Contractor.
2. Testing agency will perform appropriate tests for the following characteristics as required by Owner:

a. Abrasion resistance.
b. Apparent reflectivity.
c. Flexibility.
d. Washability.
e. Absorption.
f. Accelerated weathering.
g. Dry opacity.
h. Yellowness.
i. Recoating.
j. Skinning.
k. Color retention.
l. Alkali resistance.
m. Quantitative material analysis.

3. Owner may direct Contractor to stop painting if test results show material being used does not comply with specified requirements. Contractor shall remove noncomplying paint from Project site, pay for testing, and repaint surfaces previously coated with the noncomplying paint. If necessary, Contractor may be required to remove noncomplying paint from previously painted surfaces if, on repainting with specified paint, the two coatings are incompatible.

3.5 CLEANING

A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from Project site.

1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping without scratching or damaging adjacent finished surfaces.

3.6 PROTECTION

A. Protect work of other trades, whether being painted or not, against damage from painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.

B. Provide "Wet Paint" signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings provided by others to protect their work.

1. After work of other trades is complete, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

3.7 EXTERIOR PAINT SCHEDULE

A. Ferrous Metal: Provide the following finish systems over exterior ferrous metal. Primer is not required on shop-primed items.

1. Low-Luster Acrylic Finish: Two finish coats over a rust-inhibitive primer.

a. Primer: Exterior ferrous-metal primer.
b. Finish Coat: Exterior low-luster acrylic paint.

2. Semigloss Acrylic-Enamel Finish: Two finish coats over a rust-inhibitive primer.

a. Primer: Exterior ferrous-metal primer.
b. Finish Coats: Exterior semigloss acrylic enamel.

3. Full-Gloss Acrylic-Enamel Finish: Two finish coats over a rust-inhibitive primer.

a. Primer: Exterior ferrous-metal primer.
b. Finish Coats: Exterior full-gloss acrylic enamel for ferrous and other metals.

4. Full-Gloss Alkyd-Enamel Finish: Two finish coats over a rust-inhibitive primer.

a. Primer: Exterior ferrous-metal primer.
b. Finish Coats: Exterior full-gloss alkyd enamel.

B. Zinc-Coated Metal: Provide the following finish systems over exterior zinc-coated metal surfaces:

1. Low-Luster Finish: Two finish coats over a galvanized metal primer.

a. Primer: Exterior galvanized metal primer.

b. Finish Coat: Exterior low-luster acrylic paint.

2. Semigloss Acrylic-Enamel Finish: Two finish coats over a galvanized metal primer.

a. Primer: Exterior galvanized metal primer.
b. Finish Coats: Exterior semigloss acrylic enamel.

3. Full-Gloss Acrylic-Enamel Finish: Two finish coats over a galvanized metal primer.

a. Primer: Exterior galvanized metal primer.
b. Finish Coats: Exterior full-gloss acrylic enamel for ferrous and other metals.

3.8 INTERIOR PAINT SCHEDULE

A. Ferrous Metal: Provide the following finish systems over ferrous metal:

1. Low-Luster Acrylic-Enamel Finish: Two finish coats over a primer.

a. Primer: Interior ferrous-metal primer.
b. Finish Coats: Interior low-luster acrylic enamel.

2. Semigloss Acrylic-Enamel Finish: Two finish coats over a primer.

a. Primer: Interior ferrous-metal primer.
b. Finish Coats: Interior semigloss acrylic enamel.

B. Zinc-Coated Metal: Provide the following finish systems over interior zinc-coated metal surfaces:

1. Low-Luster Acrylic-Enamel Finish: Two finish coats over a primer.

a. Primer: Interior zinc-coated metal primer.
b. Finish Coats: Interior low-luster acrylic enamel.

2. Semigloss Acrylic-Enamel Finish: Two finish coats over a primer.

a. Primer: Interior zinc-coated metal primer.
b. Finish Coats: Interior semigloss acrylic enamel.

END OF SECTION 09 91 00

SECTION 26 05 00

GENERAL ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.01 Description of Work:

A. The work of this Section consists of providing all required labor, supervision, materials and equipment to satisfactorily complete all electrical installations that are shown on the Drawings, included in these specifications, or otherwise needed for a complete and fully operating facility.

B. Furnish and install all required in-place equipment, conduits, conductors, cables and any miscellaneous materials for the satisfactory interconnection and operation of all associated electrical systems.

1.02 Related Work:

A. This Section provides the basic Electrical Requirements which supplement the General Requirements of Division 01 and apply to all Sections of Division 26.

1.03 Submittals:

A. As specified in Division 01. Submit to the Architect shop drawings, manufacturer's data and certificates for equipment, materials and finish, and pertinent details for each system specified. Information to be submitted includes manufacturer's descriptive literature of cataloged products, equipment, drawings, diagrams, performance and characteristic curves as applicable, test data and catalog cuts. Obtain written approval before procurement, fabrication, or delivery of the items to the job site. Partial submittals are not acceptable and will be returned without review. Furnish manufacturer's name, trade name, catalog model or number, nameplate data, size, layout dimensions, capacity, project specification and paragraph reference, applicable Federal, Industry and Technical Society Publication References, and years of satisfactory service of each item required to establish contract compliance. Photographs of existing installations and data submitted in lieu of catalog data are not acceptable and will be returned without approval.

B. Organize submittals for equipment and items related to each specification section together as a package.

C. Proposed substitutions of products will not be reviewed or approved prior to awarding of the Contract.

D. Substitutions shall be proven to the Architect or Engineer to be equal or superior to the specified product. Architect’s decision is final. The Contractor shall pay all costs incurred by the Architect and Engineer in reviewing and processing any proposed substitutions whether or not a proposed substitution is accepted.

E. If a proposed substitution is rejected, the contractor shall furnish the specified product at no increase in contract price.

F. If a proposed substitution is accepted, the contractor shall be completely responsible for all dimensional changes, electrical changes, or changes to other work which are a result of the substitution. The accepted substitution shall be made at no additional cost to the owner or design consultants.

1.04 Quality Assurance:

A. Codes: All electrical equipment and materials, including installation and testing, shall conform to the latest editions following applicable codes:

1. California Electrical Code (CEC).

2. Occupational Safety and Health Act (OSHA) standards.

3. All applicable local codes, rules and regulations.

4. Electrical Contractor shall posses a C-10 license and all other licenses as may be required. Licenses shall be in effect at start of this contract and be maintained throughout the duration of this contract.

B. Variances: In instances where two or more codes are at variance, the most restrictive requirement shall apply.

C. Standards: Equipment shall conform to applicable standards of American National Standards Institute (ANSI), Electronics Industries Association (EIA), Institute of Electrical and Electronics Engineers (IEEE), and National Electrical Manufacturers Association (NEMA).

D. Underwriter Laboratories (UL) listing is required for all equipment and materials where such listing is offered by the Underwriters Laboratories. Provide service entrance labels for all equipment required by the NEC to have such labels.

E. The electrical contractor shall guarantee all work and materials installed under this contract for a period of one (1) year from date of acceptance by owner.

F. All work and materials covered by this specification shall be subject to inspection at any and all times by representatives of the owner. Work shall not be closed in or covered before inspection and approval by the owner or his representative. Any material found not conforming with these specifications shall, within 3 days after being notified by the owner, be removed from premises; if said material has been installed, entire expense of removing and replacing same, including any cutting and patching that may be necessary, shall be borne by the contractor.

1.05 Contract Documents:

A. Drawings and Specifications:

1. In the case of conflict between the drawings and specifications, the specifications shall take precedence.

2. Drawings and specifications are intended to comply with all law, ordinances, rules and regulations of constituted authorities having jurisdiction, and where referred to in the Contract Documents, said laws, ordinance, rules and regulations shall be considered as a part of said Contract Documents within the limits specified. The Contractor shall bear all expenses of correcting work done contrary to said laws, ordinance, rules and regulations if the Contractor knew or should have known that the work as performed is contrary to said laws, ordinances, rules and regulations and if the Contractor performed same (1) without first consulting the Architect for further instructions regarding said work and/or (2) disregarded the Architect’s instructions regarding said work.

B. Drawings: The Electrical Drawings shall govern the general layout of the completed construction.

1. Locations of equipment, panels, pullboxes, conduits, stub-ups, ground connections are approximate unless dimensioned; verify locations with the Architect prior to installation.

2. Review the Drawings and Specification Divisions of other trades and perform the electrical work that will be required for those installations.

3. Should there be a need to deviate from the Electrical Drawings and Specifications, submit written details and reasons for all changes to the Architect for approval.

4. The general arrangement and location of existing conduits, piping, apparatus, etc., is approximate. The drawings and specifications are for the assistance and guidance of the contractor, exact locations, distances and elevations are governed by actual field conditions. Accuracy of data given herein and on the drawings is not guaranteed. Minor changes may be necessary to accommodate work. The contractor is responsible for verifying existing conditions. Should it be necessary to deviate from the design due to interference with existing conditions or work in progress, claims for additional compensation shall be limited to those for work required by unforeseen conditions as determined by the Architect.

5. All drawings and divisions of these specifications shall be considered as whole. The contractor shall report any apparent discrepancies to the Architect prior to submitting bids.

6. The contractor shall be held responsible to have examined the site and compared it with the specifications and plans and to have satisfied himself as to the conditions under which the work is to be performed. He shall be held responsible for knowledge of all existing conditions whether or not accurately described. No subsequent allowance shall be made for any extra expense due to failure to make such examination.

1.06 Closeout Submittals:

A. Manuals: Furnish manuals for equipment where manuals are specified in the equipment specifications or are specified in Division 01.

1.07 Coordination:

A. Coordinate the electrical work with the other trades, code authorities, utilities and the Architect.

B. Provide and install all trenching, backfilling, conduit, pull boxes, splice boxes, etc. for all services to the locations indicated on the Drawings.

C. Contractor shall pay all inspection and other applicable fees and procure all permits necessary for the completion of this work.

D. Where connections must be made to existing installations, properly schedule all the required work, including the power shutdown periods.

E. When two trades join together in an area, make certain that no electrical work is omitted.

1.08 Job Conditions:

A. Operations: Perform all work in compliance with Division 01.

1. Keep the number and duration of power shutdown periods to a minimum.

2. Show all proposed shutdowns and their expected duration on the construction schedule. Schedule and carry out shutdowns so as to cause the least disruption to operation of the Owner's facilities.

3. Carry out shutdown only after the schedule has been approved, in writing, by the owner. Submit power interruption schedule 15 days prior to date of interruption.

B. Construction Power: Unless otherwise noted in Division 01 of these specifications, contractor shall make all arrangements and provide all necessary facilities for temporary construction power from the owner's on site source. Energy costs shall be paid for by the Owner.

C. Storage: Provide adequate storage for all equipment and materials which will become part of the completed facility so that it is protected from weather, dust, water, or construction operations.

1.09 Damaged Products:

A. Notify the Architect in writing in the event that any equipment or material is damaged. Obtain approval from the Architect before making repairs to damaged products.

1.10 Locations:

A. General: Use equipment, materials and wiring methods suitable for the types of locations in which they are located.

B. Dry Locations: All those indoor areas which do not fall within the definition below for Wet Locations and which are not otherwise designated on the Drawings.

C. Wet Locations: All locations exposed to the weather, whether under a roof or not, unless otherwise designated on the Drawings.

1.11 Safety and Indemnity:

A. The Contractor is solely and completely responsible for conditions of the job site including safety of all persons and property during performance of the work. This requirement will apply continually and not be limited to normal working hours. The contractor shall provide and maintain throughout the work site proper safeguards including, but not limited to, enclosures, barriers, warning signs, lights, etc. to prevent accidental injury to people or damage to property.

B. No act, service, drawing review or construction review by the Owner, the Engineer or their Consultants is intended to include reviews of the adequacy of the Contractors safety measures in or near the construction site.

C. The Contractor performing work under this Division of the Specifications shall hold harmless, indemnify, and defend the Owner, the Engineer, their consultants, and each of their officers, agents and employees from any and all liability claims, losses, or damage arising out of or alleged to arise from bodily injury, sickness, or death of a person or persons and for all damages arising out of injury to or destruction of property arising directly or indirectly out of or in connection with the performance of the work under this Division of the Specifications, and from the Contractor's negligence in the performance of the work described in the construction

contract documents, but not including liability that may be due to the sole negligence of the Owner, the Engineer, their Consultants or their officers, agents and employees.

D. If a work area is encountered that contains hazardous materials, the contractor is advised to coordinate with the owner and it's abatement consultant for abatement of hazardous material by the Owner's Representative. "Hazardous materials" means any toxic substance regulated or controlled by OSHA, EPA, State of California or local rules, regulations and laws. Nothing herein shall be construed to create a liability for Aurum Consulting Engineers regarding hazardous materials abatement measures, or discovery of hazardous materials.

1.12 Access Doors:

A. The contractor shall install access panels as required where floors, walls or ceilings must be penetrated for access to electrical, control, fire alarm or other specified electrical devices. The minimum size panel shall be 14" x 14" in usable opening. Where access by a service person is required, minimum usable opening shall be 18" x 24".

B. All access doors installed lower than 7'-0" above finished floor and exposed to public access shall have keyed locks.

C. Where specific information or details relating to access panels differ from Division 26 paragraph 1.12 of these specifications, or shown on the electrical drawings and details or under other Divisions of work, those requirements shall supersede these specifications.

1.13 Arc Flash:

A. The contractor shall install a clearly visible arc flash warning to the inside door of all panelboards and industrial control panels, as well as to the front of all switchboards and motor control centers that are a part of this project.

B. The warning shall have the following wording: line 1 "WARNING" (in large letters), line 2 "Potential Arc Flash Hazard" (in medium letters), line 3 & 4 "Appropriate Personal Protective Equipment and Tools required when working on this equipment".

1.14 Emergency Boxes:

A. All boxes and enclosures for emergency circuits shall be permanently marked with a readily visible red spray painted mark.

PART 2 - PRODUCTS

2.01 Standard of Quality:

A. Products that are specified by manufacturer, trade name or catalog number establish a standard of quality and do not prohibit the use of equal products of other manufacturers provided they are established to be equal to the specified product and approved by the Architect prior to installation.

B. Material and Equipment: Provide materials and equipment that are new and are current products of manufacturers regularly engaged in the production of such products. The standard products shall have been in satisfactory commercial or industrial use for two years prior to bid opening. The two-year period includes use of equipment and materials of similar size under similar circumstances. For uniformity, only one manufacturer will be accepted for each type of product.

C. Service Support: Submit a certified list of qualified permanent service organizations including their addresses and qualification for support of the equipment. These service organizations shall be convenient to the equipment installation and able to render service to the equipment on a regular and emergency basis during the warranty period of the contract.

D. Manufacturer's Recommendations: Where installation procedures are required to be in accordance with manufacturer's recommendations, furnish printed copies of the recommendations prior to installation. Installation of the item shall not proceed until recommendations are received. Failure to furnish recommendation shall be cause for rejection of the equipment or material.

2.02 Nameplates:

A. For each piece of electrical equipment, provide a manufacturer's nameplate showing his name, location, the pertinent ratings, the model designation, and shop order number.

B. Identify each piece of equipment and related controls with a rigid laminated engraved plastic nameplate. Unless otherwise noted, nameplates shall be melamine plastic 0.125 inch thick, white with black center core. Surface shall be matte finish. Corners shall be square. Accurately align lettering and engrave into the core. Minimum size of nameplates shall be 0.5 by 2.5 inches unless otherwise noted. Where not otherwise specified, lettering shall be a minimum of 0.25 inch high normal block style. Engrave nameplates with the inscriptions indicated on the Drawings and, if not so indicated, with the equipment name. Securely fasten nameplates in place using two stainless steel or brass screws.

2.03 Fasteners:

A. Fasteners for securing equipment to walls, floors and the like shall be either hot-dip galvanized after fabrication or stainless steel.

2.04 Finish requirements:

A. Equipment: Refer to each electrical equipment section of these Specifications for painting requirements of equipment enclosures. Repair any final paint finish which has been damaged or is otherwise unsatisfactory, to the satisfaction of the Architect.

B. Wiring System: In finished areas, paint all exposed conduits, boxes and fittings to match the color of the surface to which they are affixed.

PART 3 - EXECUTION

3.01 Workmanship:

A. Ensure that all equipment and materials fit properly in their installation.

B. Perform any required work to correct improperly fit installation at no additional expense to the owner.

C. All electrical equipment and materials shall be installed in a neat and workmanship manner in accordance with the “NECA-1 Standard Practices for Good Workmanship in Electrical Contracting”. Workmanship of the entire job shall be first class in every respect.

3.02 Equipment Installations:

A. Provide the required inserts, bolts and anchors, and securely attach all equipment and materials to their supports.

B. Do all the cutting and patching necessary for the proper installation of work and repair any damage done.

C. Earthquake restraints: all electrical equipment, including conduits over 2 inches in diameter, shall be braced or anchored to resist a horizontal force acting in any direction as per CBC Section 1616A Title 24, part 2, and ASCE7-10, Section 13.3 and 13.6 and Table 13.6-1.

D. Structural work: All core drilling, bolt anchor insertion, or cutting of existing structural concrete shall be approved by a California registered structural consulting engineer prior to the execution of any construction. At all floor slabs and structural concrete walls to be drilled, cut or bolt anchors inserted, the contractor shall find and mark all reinforcing in both faces located by means of x-ray, pach-ometer, or prof-ometer. Submit sketch showing location of rebar and proposed cuts, cores, or bolt anchor locations for approval.

3.03 Field Test:

A. Test shall be in accordance with Acceptance testing specifications issued by the National Electrical Testing Association (NETA).

B. Perform equipment field tests and adjustments. Properly calibrate, adjust and operationally check all circuits and components, and demonstrate as ready for service. Make additional calibration and adjustments if it is determined later that the initial adjustments are not satisfactory for proper performance. Perform equipment field test for equipment where equipment field tests are specified in the equipment Specifications. Give sufficient notice to the Architect prior to any test so that the tests may witnessed.

C. Provide instruments, other equipment and material required for the tests. These shall be of the type designed for the type of tests to be performed. Test instrument shall be calibrated by a recognized testing laboratory within three months prior to performing tests.

D. Operational Tests: Operationally test all circuits to demonstrate that the circuits and equipment have been properly installed and adjusted and are ready for full-time service. Demonstrate the proper functioning of circuits in all modes of operation, including alarm conditions.

E. Re-testing will be required for all unsatisfactory tests after the equipment or system has been repaired. Re-test all related equipment and systems if required by the Architect. Repair and re-test equipment and systems which have been satisfactorily tested but later fail, until satisfactory performance is obtained.

F. Maintain records of each test and submit five copies to the Architect when testing is complete. All tests shall be witnessed by the Architect. These records shall include:

1. Name of equipment tested.

2. Date of report.

3. Date of test.

4. Description of test setup.

5. Identification and rating of test equipment.

6. Test results and data.

7. Name of person performing test.

8. Owner or Architect's initials.

G. Items requiring testing shall be as noted in the additional electrical sections of these specifications.

3.04 Cleaning Equipment:

A. Thoroughly clean all soiled surfaces of installed equipment and materials.

3.05 Painting of Equipment:

A. Factory Applied: Electrical equipment shall have factory applied painting system which shall, as a minimum, meet the requirements of NEMA ICS 6 corrosion-resistance test and the additional requirements specified in the technical section.
B. Field Applied: Paint electrical equipment as required to match finish of adjacent surfaces.

3.06 Records:

A. Maintain one copy of the contract Drawing Sheets on the site of the work for recording the "as built" condition. After completion of the work, the Contractor shall carefully mark the work as actually constructed, revising, deleting and adding to the Drawing Sheets as required. The following requirements shall be complied with:

1. Cable Size and Type: Provide the size and type of each cable installed on project.

2. Substructure: Where the location of all underground conduits, pull boxes, stub ups and etc. where are found to different than shown, carefully mark the correct location on the Drawings. Work shall be dimensioned from existing improvements.

3. Size of all conduit runs.

4. Routes of concealed conduit runs and conduit runs below grade.

5. Homerun points of all branch circuit.

6. Location of all switchgear, panels, MCC, lighting control panels, pullcans, etc.

7. Changes made as a result of all approved change orders, addendums, or field authorized revisions.

8. As Builts: At the completion of the Work the Contractor shall review, certify, correct and turn over the marked up Drawings to the Architect for his use in preparing "as built" plans.

9. As built Drawings shall be delivered to the Architect within ten (10) days of completion of construction.

3.07 Clean Up:

A. Upon completion of electrical work, remove all surplus materials, rubbish, and debris that accumulated during the construction work. Leave the entire area neat, clean, and acceptable to the Architect.

3.08 Mechanical and Plumbing Electrical Work:

A. The requirements for electrical power and/or devices for all mechanical and plumbing equipment supplied and/or installed under this Contract shall be coordinated and verified with the following:

1. Mechanical and Plumbing Drawings.
2. Mechanical and Plumbing sections of these Specifications.
3. Manufacturers of the Mechanical and Plumbing equipment supplied.

B. The coordination and verification shall include the voltage, ampacity, phase, location and type of disconnect, control, and connection required. Any changes that are required as a result of this coordination and verification shall be a part of this Contract.

C. The Electrical Contractor shall furnish and install the following for all mechanical and plumbing equipment:

1. Line voltage conduit and wiring.
2. Disconnect switches.
3. Manual line motor starters.

D. Automatic line voltage controls and magnetic starters shall be furnished by the Mechanical and/or Plumbing Contractor and installed and connected by the Electrical Contractor. When subcontracted for by the Mechanical and/or Plumbing Contractor, all line voltage control wiring installed by the Electrical Contractor shall be done per directions from the Mechanical and/or Plumbing Contractor.

E. All low voltage control wiring for Mechanical and Plumbing equipment shall be installed in conduit. Furnishing, installation and connection of all low voltage conduit, boxes, wiring and controls shall be by the Mechanical and/or Plumbing Contractor.

F. Disconnects (Motor And Circuit)

1. Disconnect switches shall be as manufactured by ITE- Siemens, General Electric or Square D.

G. Disconnects (Motor: Fused):

1. Disconnect switches shall be provided and located at all motors.
2. Switches for three-phase motors shall be heavy-duty, horsepower rated three-pole, and surface mounted except as noted on drawings.
3. Switches containing more than three poles shall be as specified on the drawings.
4. Switches for single-phase, fractional horsepower motors shall be heavy-duty, horsepower rated.
5. Switches shall be horsepower rated.

H. Manual motor starters, where required, shall have toggle type operators with pilot light and melting alloy type overload relays, SQUARE D COMPANY, Class 2510, Type FG-1P (surface) or Type FS-1P (flush) or ITE, WESTINGHOUSE or GENERAL ELECTRIC equal.

END OF SECTION

SECTION 26 05 19

LINE VOLTAGE WIRE AND CABLE

PART 1 - GENERAL

1.01 Description of Work:

A. The work of this Section consists of providing all wire and cable rated 600 volts or less, including splices and terminations, as shown on the Drawings and as described herein.

1.02 Related Work:

A. See the following Specification Section for work related to the work in this Section:

1. 260542 Conduits, Raceways and Fittings.

2. 260533 Junction and Pull Boxes.

1.03 Quality Assurance

A. Field tests shall be performed as specified in paragraph 3.04 of this Section.

PART 2 - PRODUCTS

2.01 Conductors:

A. Conductors shall be copper, type THHN/THWN/MTW oil and gasoline resistant, 600 volt rated insulation.

B. Conductors shall be stranded copper.

C. Minimum power and control wire size shall be No. 12 AWG unless otherwise noted.

D. All conductors used on this Project shall be of the same type and conductor material.

2.02 Cables:

A. All individual conductors shall be copper with type THHN/THWN, 600 volt rated insulation.

D. Insulation Marking - All insulated conductors shall be identified with printing colored to contrast with the insulation color.

E. Color Coding - As specified in paragraph 3.03.

F. Special Wiring - Where special wiring is proposed by an equipment manufacturer, submit the special wiring requirements to the Owner's Representative and, if approved, provide same. Special wire shall be the type required by the equipment manufacturer.

G. Other Wiring - Wire or cable not specifically shown on the Drawings or specified, but required, shall be of the type and size required for the application and as approved by the Owner's Representative.

H. Manufacturer - Acceptable manufacturers including Cablec, Southwire, or equal.

2.03 Terminations:

A. Manufacturer - Terminals as manufactured by T&B, Burndy or equal.

B. Wire Terminations – Stranded conductors shall be terminated in clamping type terminations which serve to contain all the strands of the conductor. Curling of a stranded conductor around a screw type terminal is not allowed. For screw type terminations, use a fork type stake-on termination on the stranded conductor. Use only a stake-on tool approved for the fork terminals selected.

C. End Seals - Heat shrink plastic caps of proper size for the wire on which used.

2.04 Tape:

A. Tape used for terminations and cable marking shall be compatible with the insulation and jacket of the cable and shall be of plastic material.

PART 3 - EXECUTION

3.01 Cable Installation:

A. Clean Raceways - Clean all raceways prior to installation of cables as specified in Section 260542 - Conduits Raceway and Fittings.

B. All line voltage wiring shall be installed in conduit.

C. All feeder conductors shall be continuous from equipment to equipment. Splices in feeders are not permitted unless specifically noted or approved by the Electrical Engineer.

D. All branch circuit wiring shall be run concealed in ceiling spaces, walls, below floors or in crawl spaces unless noted otherwise.

E. Cable Pulling - Exercise care in pulling wires and cables into conduit or wireways so as to avoid kinking, putting undue stress on the cables or otherwise abrading them. No grease will be permitted in pulling cables. Only soapstone, talc, or UL listed pulling compound will be permitted. The raceway construction shall be complete and protected from the weather before cable is pulled into it. Swab conduits before installing cables and exercise care in pulling, to avoid damage to conductors.

F. Bending Radius - Cable bending radius shall be per applicable code. Install feeder cables in one continuous length.

G. Equipment Grounding Conductors - Provide an equipment grounding conductor, whether or not it is shown on the Drawings, in all conduits or all raceways.

H. Panelboard Wiring - In panels, bundle incoming wire and cables which are No. 6 AWG and smaller, lace at intervals not greater than 6 inches, neatly spread into trees and connect to their respective terminals. Allow sufficient slack in cables for alterations in terminal connections. Perform lacing with plastic cable ties or linen lacing twine. Where plastic panel wiring duct is provided for cable runs, lacing is not necessary when the cable is properly installed in the duct.

3.02 Cable Terminations and Splices:

A. Splices - UL Listed wirenuts.

B. Terminations - Shall comply with the following:

1. Make up and form cable and orient terminals to minimize cable strain and stress on device being terminated on.

2. Burnish oxide from conductor prior to inserting in oxide breaking compound filled terminal.

3.03 Circuit and Conductor Identification:

A. Color Coding - Provide color coding for all circuit conductors. Insulation color shall be white for neutrals and green for grounding conductors. Conductor colors shall be as follows:

VOLTAGE	208/120V	480/277V
Phase A	Black	Brown
Phase B	Red	Orange
Phase C	Blue	Yellow
Neutral	White	Grey
Ground	Green	Green

B. Color coding shall be in the conductor insulation for all conductors #10 AWG and smaller; for larger conductors, color shall be either in the insulation or in colored plastic tape applied at every location where the conductor is readily accessible.

C. Circuit Identification - All underground distribution and service circuits shall be provided with plastic identification tags in each secondary box and at each termination. Tags shall identify the source transformer of the circuit and the building number(s) serviced by the circuit.

3.04 Field Tests:

A. All systems shall test free from short circuits and grounds, shall be free from mechanical and electrical defects, and shall show an insulation resistance between phase conductors and ground of not less than the requirements of the CEC. All circuits shall be tested for proper neutral connections.

B. Insulation Resistance Tests: Perform insulation resistance tests on circuits with #2 AWG and larger conductors to be energized with a line-to-neutral voltage of 120 volts or more. Make these tests before all equipment has been connected. Test the insulation with a 500Vdc insulation resistance tester with a scale reading 100 megohms. The insulation resistance shall be 2 megohms or more. Submit results for review.

END OF SECTION

SECTION 26 05 33

OUTLET, JUNCTION AND PULL BOXES

PART 1 - GENERAL

1.01 Description of Work:

A. The work of this Section consists of providing all required labor, supervision, materials and equipment to satisfactorily complete all electrical installations shown on the drawings, included in these Specification, or otherwise needed for a complete and fully operating facility. The work shall include but not be limited to the following:

B. Furnish and install all required material, supports and miscellaneous material for the satisfactory interconnection of all associated electrical systems.

1.02 Related Work:

A. See the following specification sections for work related to the work of this section.

1. 26 05 00 General Electrical Requirements.

2. 26 05 42 Conduits, Raceway and Fittings.

3. 26 05 19 Line Voltage Wire and Cable.

PART 2 - PRODUCTS

2.01 Outlet boxes, Junction and Pull boxes

A. Standard Outlet Boxes: Galvanized, steel, knock-out type of size and configuration best suited to the application indicated on the Drawings. Minimum box size shall be 4 inches square (octagon for most light fixtures) by 1-1/2 inches deep with mud rings as required.

B. Switch boxes: Minimum box size shall be 4 inches square by 1-1/2 inches deep with mud rings as required. Install multiple switches in standard gang boxes with raised device covers suitable for the application indicated.

C. Conduit bodies: Cadmium plated, cast iron alloy. Conduit bodies with threaded conduit hubs and neoprene gasketed, cast iron covers. Bodies shall be used to facilitate pulling of conductors or to make changes in conduit direction only. Splices are not permitted in conduit bodies. Crouse-Hinds Form 8 Condulets, Appleton Form 35 Unilets or equal.

D. Sheet Metal Boxes: Use standard outlet or concrete ring boxes wherever possible; otherwise use a minimum 16 gauge galvanized sheet metal, NEMA I box sized to Code requirements with covers secured by cadmium plated machine screws located six inches on centers. Circle AW Products, Hoffman Engineering Company or equal.

E. Flush Mounted Pull boxes and Junction boxes: Provide overlapping covers with flush head cover retaining screws, prime coated.

PART 3 - EXECUTION

3.01 Outlet Boxes

A. General:

1. All outlet boxes shall finish flush with building walls, ceilings and floors except in mechanical and electrical rooms above accessible ceiling or where exposed work is called for on the Drawings.

2. Install raised device covers (plaster rings) on all switch and receptacle outlet boxes installed in masonry or stud walls or in furred, suspended or exposed concrete ceilings. Covers shall be of a depth to suit the wall or ceiling finish.

3. Leave no unused openings in any box. Install close-up plugs as required to seal openings.

B. Box Layout:

1. Outlet boxes shall be installed at the locations and elevations shown on the drawings or specified herein. Make adjustments to locations as required by structural conditions and to suit coordination requirements of other trades.

2. Locate switch outlet boxes on the latch side of doorways.

3. Outlet boxes shall not be installed back to back nor shall through-wall boxes be permitted. Outlet boxes on opposite sides of a common wall shall be separated horizontally by at least one stud or vertical structural member.

4. For outlets mounted above counters, benches or backsplashes, coordinate location and mounting heights with built-in units. Adjust mounting height to agree with required location for equipment served.

5. On fire rated walls, the total face area of the outlet boxes shall not exceed 100 square inches per 100 square feet of wall area.

C. Supports:

1. Outlet Boxes installed in metal stud walls shall be equipped with brackets designed for attaching directly to the studs or shall be mounted on specified box supports.

2. Fixture outlet boxes installed in suspended ceiling of gypsum board or lath and plaster construction shall be mounted to 16 gauge metal channel bars attached to main ceiling runners.

3. Fixture outlet boxes installed in suspended ceilings supporting acoustical tiles or panels shall be supported directly from the structure above where pendant mounted lighting fixture are to be installed on the box.

4. Fixture Boxes above tile ceilings having exposed suspension systems shall be supported directly from the structure above.

5. Outlet and / or junction boxes shall not be supported by grid or fixture hanger wires at any locations.

3.02 Junction and Pull Boxes

A. General:

1. Install junction or pull boxes where required to limit bends in conduit runs to not more than 360 degrees or where pulling tension achieved would exceed the maximum allowable for the cable to be installed. Note that these boxes are not shown on the Drawings.

2. Locate pull boxes and junction boxes in concealed locations above accessible ceilings or exposed in electrical rooms, utility rooms or storage areas.

3. Install raised covers (plaster rings) on boxes in stud walls or in furred, suspended or exposed concrete ceilings. Covers shall be of a depth to suit the wall or ceiling finish.

4. Leave no unused openings in any box. Install close-up plugs as required to seal openings.

5. Identify circuit numbers and panel on cover of junction box with black marker pen.

B. Box Layouts:

1. Boxes above hung ceilings having concealed suspension systems shall be located adjacent to openings for removable recessed lighting fixtures.

C. Supports:

1. Boxes installed in metal stud walls shall be equipped with brackets designed for attaching directly to the studs or shall be mounted on specified box supports.

2. Boxes installed in suspended ceilings of gypsum board or lath and plaster construction shall be mounted to 16 gauge metal channel bars attached to main ceiling runners.

3. Boxes installed in suspended ceilings supporting acoustical tiles or panels shall be supported directly from the structure above.

4. Boxes mounted above suspended acoustical tile ceilings having exposed suspension systems shall be supported directly from the structure above.

END OF SECTION

SECTION 26 05 42

CONDUITS, RACEWAYS AND FITTINGS

PART 1 - GENERAL

1.01 Description of Work:

A. The work of this section consists of furnishing and installing conduits, raceways and fittings as shown on the Drawings and as described herein.

1.02 Related Work:

A. See the following specification sections for work related to the work in this section:

1. 26 05 43 Underground Ducts
2. 26 05 44 In Grade Pull Boxes
3. 26 05 45 Wiremold AL2000 Plugmold Multioutlet System
4. 26 05 19 Line Voltage Wire and Cable
5. 26 05 33 Junction and Pull Boxes

PART 2 - PRODUCTS

2.01 Conduits, Raceways:

A. Electrical Metallic Tubing (EMT) shall be hot-dip galvanized after fabrication. Couplings shall be compression or set-screw type.

B. Flexible Conduit: Flexible metal conduit shall be galvanized steel.

C. Galvanized Rigid Steel Conduit (GRS) shall be hot-dip galvanized after fabrication. Couplings shall be threaded type.

D. Rigid Non-metallic Conduit: Rigid non-metallic conduit shall be PVC Schedule 40 (PVC-40 or NEMA Type EPC-40) conduit approved for underground use and for use with 90˚ C wires.

E. Surface Raceway: Aluminum surface metal raceway shall be Wiremold AL2000 Series.

2.02 Conduit Supports:

A. Supports for individual conduits shall be galvanized malleable iron one-hole type with conduit back spacer.

B. Supports for multiple conduits shall be hot-dipped galvanized Unistrut or Superstrut channels, or approved equal. All associated hardware shall be hot-dip galvanized.

C. Supports for EMT conduits shall be galvanized pressed steel single hole straps.

D. Clamp fasteners shall be by wedge anchors. Shot in anchors shall not be allowed.

2.03 Fittings:

A. Provide threaded-type couplings and connectors for rigid steel conduits; provide steel compression (watertight), or steel set-screw type for EMT, (die-cast zinc or malleable iron type fittings are not allowed). Provide threaded couplings and Meyers hubs for rigid steel conduit exposed to weather.

B. Fittings for flexible conduit shall be Appleton, Chicago, IL, Type ST, O-Z Gedney Series 4Q by General Signal Corp., Terryville, CT, T & B 5300 series, or approved equal.

C. Fittings for use with rigid steel shall be galvanized steel or galvanized cast ferrous metal; access fittings shall have gasketed cast covers and be Crouse Hinds Condulets, Syracuse, NY, Appleton Unilets, Chicago, IL, or approved equal. Provide threaded-type couplings and connectors; set-screw type and compression-type are not acceptable.

D. Fittings for use with rigid non-metallic conduit shall be PVC and have solvent-weld-type conduit connections.

E. Union couplings for conduits shall be the Erickson type and shall be Appleton, Chicago, IL, Type EC, O-Z Gedney 3-piece Series 4 by General Signal Corp., Terryvile, CT, or approved equal. Threadless coupling shall not be used.

F. Bushings:

1. Bushings shall be the insulated type.

2. Bushings for rigid steel shall be insulated grounding type, O-Z Gedney Type HBLG, Appleton Type GIB, or approved equal.

G. Conduit Sealants:

1. Fire Retardant Types: Fire stop material shall be reusable, non-toxic, asbestos-free, expanding, putty type material with a 3-hour rating in accordance with UL Classification 35L4 or as specified on the Drawings.

PART 3 - EXECUTION

3.01 Conduit, Raceway and Fitting Installation:

A. For conduit runs exposed to weather provide rigid metal (GRS).

B. For conduit run underground, in concrete or masonry block wall and under concrete slabs, install minimum ¾” size nonmetallic (PVC) with PVC elbows. Where conduits transition from underground or under slab to above grade install wrapped rigid metal (GRS) elbows and risers.

C. For conduit runs concealed in steel or wood framed walls or in ceiling spaces or exposed in interior spaces above six feet over the finished floor, install EMT.

D. Flexible metal conduit shall be used only for the connection of recessed lighting fixtures and motor connections unless otherwise noted on the Drawings. Liquid-tight steel flexible conduit shall be used for motor connections.

E. The minimum size raceway shall be 1/2-inch unless indicated otherwise on the Drawings.

F. Installation shall comply with the CEC.

G. From pull point to pull point, the sum of the angles of all of the bends and offset shall not exceed 360 degrees.

H. Conduit Supports: Properly support all conduits as required by the NEC. Run all conduits concealed except where otherwise shown on the drawings.

1. Exposed Conduits: Support exposed conduits within three feet of any equipment or device and at intervals not exceeding NEC requirements; wherever possible, group conduits together and support on common supports. Support exposed conduits fastened to the surface of the concrete structure by one-hole clamps, or with channels. Use conduit spacers with one-hole clamps.

   a. Conduits attached to walls or columns shall be as unobtrusive as possible and shall avoid windows. Run all exposed conduits parallel or at right angles to building lines.

   b. Group exposed conduits together. Arrange such conduits uniformly and neatly.

2. Support all conduits within three feet of any junction box, coupling, bend or fixture.

3. Support conduit risers in shafts with Unistrut Superstrut, or approved equal, channels and straps.

I. Moisture Seals: Provide in accordance with NEC paragraphs 230-8 and 300-5(g).

J. Where PVC conduit transitions from underground to above grade, provide rigid steel 90's with risers. Rigid steel shall be half-lap wrapped with 20 mil tape and extend minimum 12" above grade.

K. Provide a nylon pull cord in each empty raceway.

L. Provide galvanized rigid steel factory fittings for galvanized rigid steel conduit.

M. Slope all underground raceways to provide drainage; for example, slope conduit from equipment located inside a building to the pull box or manhole located outside the building.

N. Conduits shall be blown out and swabbed prior to pulling wires, or installation of pull cord in empty conduits.

END OF SECTION

SECTION 26 05 43

UNDERGROUND DUCTS

PART 1 - GENERAL

1.01 Description of Work:

A. The work of this section consists of furnishing and installing raceways, raceway spacers with necessary excavation.

1.02 Related Work:

A. See the following specification sections for work related to the work of this section.

1. 26 05 42 Conduit Raceway and Fittings

2. 31 23 00 Trenching, Backfilling and Compacting UR

1.03 Standards and Codes:

A. Work and material shall be in compliance with and according to the requirements of the latest revision of the following standards and codes.

1. National Electrical Code (NEC) (Latest Revision)

2. California Electrical Code (CEC).

3. Underground Installations CEC - Article 300.5

4. Rigid NonMetallic Conduit CEC - Article 347

PART 2 - PRODUCTS

2.01 Raceways:

A. As specified in Section 26 05 42 Conduits, Raceways and Fittings.

PART 3 - EXECUTION

3.01 Excavation:

A. As specified in Section 31 23 00 Trenching, Backfilling and Compacting UR and as required for the work shown on the Drawings.

3.02 Install raceways as indicated on drawings.

3.03 Sand Encasement:

A. As specified in Section 31 23 00 - Trenching, Backfilling and Compacting UR.

3.04 Backfill:

A. As specified in Section 31 23 00 - Trenching, Backfilling and Compacting UR.

END OF SECTION

SECTION 26 05 44

IN GRADE PULL BOXES

PART 1 - GENERAL

1.01 Description of Work:

A. The work of this section consists of providing all labor, supervision, tools, materials, and performing all work necessary to furnish and install pre-cast concrete vaults, and pull boxes with necessary excavation.

1.02 Related Work:

A. See the following specification sections for work related to the work of this section.

1. 26 05 43 Underground Ducts.

2. 31 23 00 Trenching, Backfilling and Compacting UR.

1.03 Submittals:

A. As specified in Section 26 05 00 and Division 01.

1. Catalog Data: Provide manufacturer's descriptive literature - Pre-cast Vaults, Pull Boxes and Accessories.

PART 2 - PRODUCTS

2.01 Materials and Equipment:

A. General Requirements:

1. Pull boxes for electrical power, controls and other communication circuits shall consist of pre-cast reinforced concrete boxes, extensions' bases, and covers as specified herein and as indicated on the Drawings. Pre-cast units shall be the product of a manufacturer regularly engaged in the manufacture of pre-cast vaults and pull boxes. Acceptable manufacturers are Christy, Utility Vault, Brooks, Associated Concrete or equal.

B. Construction:

1. Pre-cast concrete vaults and pull boxes for electrical power distribution and communication circuits with associated risers and tops shall conform to ASTM C478 and ACI 318. Pull boxes shall be the type noted on the Drawings and shall be constructed in accordance with the applicable details as shown. Tops and walls shall consist of reinforced concrete. Walls and bottom shall be of monolithic concrete construction. Duct entrances and windows shall be located near the corners of structures to facilitate cable racking.

C. Covers:

1. The word "ELECTRICAL" shall be cast in the top face of all electrical cable boxes. The word “Signal” or “Fire Alarm” shall be cast in the top of the boxes utilized for these systems.

PART 3 - EXECUTION

3.01 Installation:

A. Install pull boxes where required to limit bends in conduit runs to not more than 360 degrees or where pulling tension achieved would exceed the maximum allowable for the cable to be installed. Note that these boxes are not shown on the Drawings.

B. Pre-cast pull boxes shall be installed approximately where indicated on the Drawings. The exact location of each pull box shall be determined after careful consideration has been given to the location of other utilities, grading, and paving. All cable boxes and secondary pull boxes shall be installed with a minimum of 6-inch thick crushed rock or sand bedding.

C. Paved areas - Vaults and pull boxes located in areas to be paved shall be installed such that the top of the cover shall be flush with the finished surface of the paving.

D. Unpaved Areas - In unpaved areas, the top of vaults and pull box covers shall be approximately 2 inches above finished grade.

E. Joint Seals - Section joints of pre-cast vaults and pull boxes shall be sealed with compound as recommended by the manufacturer.

F. Trenching, Backfilling, and Compaction - Trenching, backfilling and compaction shall be as specified in Section 31 23 00 - Trenching, Backfilling and Compacting UR.

END OF SECTION

SECTION 26 28 16

CIRCUIT BREAKERS

PART 1 - GENERAL

1.01 Description of Work:

A. The work of this Section consists of providing circuit breakers as shown on the Drawings and as described herein.

1.02 Related Work: See the following Specification Sections for work related to the work in this Section.

A. 26 05 00 General Electrical Requirements

1.03 Submittals:

A. Shop Drawings - Submittals shall be in accordance with Section 26 05 00 and Division 01. For each circuit breaker furnished under this Contract, submit manufacturer's name, catalog data, and the following information:

1. Terminal connection sizes.

2. Voltage rating.

3. Breaker manufacturer, types, trip ratings and interrupting ratings.

B. Single Submittal - A single complete submittal is required for all products covered by this Section.

C. Closeout Submittals: Submit in accordance with and Section 26 05 00, operation and maintenance data for circuit breakers including nameplate data, parts lists, manufacturer's circuit breaker timer, current, coordination curves, factory and field test reports and recommended maintenance procedures.

PART 2 - PRODUCTS

2.01 Circuit Breaker: Each circuit breaker shall consist of the following:

A. A molded case breaker with an over center toggle-type mechanism, providing quick-make, quick-break action. Each circuit breaker shall have a permanent trip unit containing individual thermal and magnetic trip elements in each pole. Multipole circuit breakers shall have variable magnetic trip elements which are set by a single adjustment to assure uniform tripping characteristics in each pole. Circuit breakers shall be of the bolt-on type unless otherwise noted.

B. Breaker shall be calibrated for operation in an ambient temperature of 40°C.

C. Each circuit breaker shall have trip indication by handle position and shall be trip-free.

D. Three pole breakers shall be common trip.

E. The circuit breakers shall be constructed to accommodate the supply connection at either end of the circuit breaker. Circuit breaker shall be suitable for mounting and operation in any position.

F. Breakers shall be rated as shown on Drawings.

G. Circuit breaker and/or Fuse/circuit breaker combinations for series connected interrupting ratings shall be listed by UL as recognized component combinations for use in the end use equipment in which it is installed. Any series rated combination used shall be marked on the end use equipment per CEC section 110-22.

H. Breakers shall be UL listed. Circuit breakers shall have removable lugs.

I. Lugs shall be UL listed for copper and aluminum conductors.

J. Breakers shall be UL listed for installation of mechanical screw type lugs.

K. Circuit breakers serving HACR rated loads shall be HACR type. Circuit breakers serving other motor loads shall be motor rated.

PART 3 - EXECUTION

3.01 Mounting:

A. The highest breaker operating handle shall not be higher than 72 inches above the floor.

END OF SECTION

SECTION 28 31 00

FIRE ALARM/VOICE EVACUATION SYSTEM

PART 1 - GENERAL

1.01 Description of Work:

A. Furnish and install all materials and equipment including all required equipment, panels, raceways, conductors and connections, and provide all labor required and necessary to complete the work shown on the drawings and/or specified in all Sections of Division 26 and all other work and miscellaneous items, not specifically mentioned, but reasonably inferred for a complete addressable fire alarm installation including all accessories and appurtenances required for testing the systems. It is in the intent of the drawings and specifications that all systems will be complete, and ready for operation. No extra charge will be paid for furnishing items required by regulations, but not specified herein, or on drawings.

B. Fire Alarm system shall include a main fire alarm control panel, digital communicator for backup phone communication, a remote annunciator[s] and all devices, wiring, etc as indicated on the plans.

C. The contractor shall include all costs to de-commission the existing system before any new construction can start. The District School District shall be advised in writing the date as to when the existing system will be de-commissioned. The contractor scope of work shall not degrade any function or operation of the remaining site fire alarm system.

1.02 Related Work:

A. Division 26 General Requirements.

B. See the following specification sections for work related to the work in this section.

1. All other sections of Division 26.

1.03 Codes and Standards:

A. Devices and equipment for fire alarm systems shall be U.L. listed.
B. UL 864 Control Units, Fire Protective Signaling Systems.

C. Devices and equipment for fire alarm system shall be listed by the California State Fire Marshal for the specific purpose the device or equipment is used.

D. Work and material shall be in compliance with and according to the requirements of the latest version of the following standards and codes:

1. California Fire Code (CFC) based on the International Fire Code (IFC) with California Amendments.

2. California Building Code (CBC) based on the International Building Code (IBC) with California Amendments.

3. California Electric Code (CEC) based on the National Electric Code (NEC) and California Amendments.

4. California Mechanical Code (CMC) based on the Uniform Mechanical Code (UMC) and California Amendments.

5. California Plumbing Code (CPC) based on the Uniform Plumbing Code (UPC) and California Amendments.

6. Title 19 C.C.R., Public Safety, State Fire Marshals Regulations.

7. NFPA 72, National Fire Alarm and Signaling Code.

1.04 Submittals:

A. In accordance with Division 26.

B. Submit the following items:

1. Manufacturer's Catalog Data: Manufacturer's original catalog cuts and original description of data of all material and equipment with sufficient information provided so that the exact function of each device is known. Each item supplied shall be clearly identified including both U.L. number and a copy of the State Fire Marshal's listing.

C. Description of conductors to be used with a statement that all wire shall be in conduit. Where accessible ceiling occurs, plenum rated wire on J-hooks is acceptable.

1.05 Quality Assurance:

A. Installer: The installation firm shall be an established communications and electronics contractor with at least 10 years successful installation experience of products utilizing integrated communications systems and equipment specific to that required for this project. Only California Certified fire alarm technicians or California Certified electrician shall be used to install the fire alarm system. Provide proof to District that all employees are California Certified to install the fire alarm system.

B. All materials, unless otherwise specified, shall be new, and free from any defects. All items of equipment including wire and cable shall be designed by the manufacturer unless otherwise specified, shall function as a complete system and shall be accompanied by the manufacturer's complete service notes and drawings detailing all interconnections.

C. The Contractor shall show satisfactory evidence, upon request, that he maintains a fully equipped service organization capable of furnishing adequate inspection and service to the system. The contractor shall maintain at his facility the necessary spare parts in the proper proportion as recommended by the manufacturer to maintain and service the equipment being supplied.

D. The system manufacturer shall maintain engineering and service departments capable of rendering advice regarding installation and final adjustment of the system.

1.06 Warranties:

A. The contractor shall warrant all equipment and wiring free from inherent mechanical and electrical defect for one year (365 days) from the date of final acceptance. The contractor shall without additional expense to the School District, replace any defective materials or equipment provided by him under this contract within the warranty period.

PART 2 - PRODUCTS

2.01 System Description

A. The contractor shall furnish and install a complete 24 VDC, electrically supervised, addressable analog, microprocessor-based fire alarm control panel as specified herein. The fire alarm system shall include but not be limited to all control equipment, power supply, initiating devices, audible and visual indicating appliances as appropriate, conduit, wiring, fittings, and all other accessories necessary to provide a complete and operable system.

B. General System Operation:

1. When an alarm occurs on a zone the control panel indicates the alarm condition until manually reset.

2. An alarm may be acknowledged by actuating the “ACKNOWLEDGE” switch. This shall silence the control panel buzzer, and change the “SYSTEM ALARM” LED and the individual zone LED from flashing to steadily lit.

3. All alarm signals may be silenced by actuating the “SILENCE” switch. This shall steadily illuminate the “SIGNAL SILENCE” LED. If a subsequent alarm is activated, the alarm signal shall “resound” until again silenced. Once silenced, all alarm signals may be restored again by activating the “SILENCE” switch. Waterflow zones shall be non-silenceable.

4. If the microprocessor fails, the system shall execute a default signaling program. This program will enable the panel to sound the audible signals and summon the Fire Department. In addition, a yellow “DEGRADE” LED shall light to indicate the programming failure. Inability of the system to sound signals or summon the fire department during microprocessor failure shall not be acceptable.

C. Alarm Operation:

1. Operation of a manual pull station or automatic activation of any smoke detector, heat detector, or water flow switch zone shall cause the FACP to:

2. Sound all indicating appliances in a temporal pattern.

3. Flash all strobes.

4. Shut down all air handling units as specified herein.

5. Flash the panel “System Alarm” LED and pulse a panel audible signal.

6. Display a description of the specific analog/addressable device in alarm via an 80-character alpha-numeric display.

7. Display a description of the specific analog/Addressable device in alarm on the administrations Remote 80-character Annunciators.

8. Notify the Fire Department via the UDACT [and AES-Intellinet Radio].

D. Electrical Supervision:

1. Each initiating and signal circuit shall be electronically supervised for opens, shorts, and ground faults in the wiring. The occurrence of any fault shall activate the system trouble circuitry but shall not interfere with the proper operation of any circuit that does not have a fault connection.

2. Each initiating circuit shall be capable of being wired using Class “B” (Style B) supervised circuits (a break or ground fault in any conductor shall be reported as a trouble condition) at no extra cost.

E. Normal Power Supply:

1. Connections to the normal electrical service shall be on a dedicated branch circuit in accordance with the California Electrical Code (CEC) the circuit and connections shall be mechanically protected. The circuit disconnecting means shall be accessible only to authorized personnel and shall be clearly marked “FIRE ALARM CIRCUIT CONTROL.”

2.02 Fire Alarm Control Panel:

A. The FACP is a new Silent Knight 6820EVS with Emergency Voice Evacuation Digital Voice Command:

1. Auxiliary SPDT alarm and trouble dry contacts.

2. Auxiliary circuitry in the control panel to operate remote relays for control of air handling equipment.

3. A solid-state power transfer circuit that shall switch to standby power automatically and instantaneously if normal power fails or falls below 15% of normal (“brown out” conditions).

4. This electronic circuit shall allow the batteries to be effectively “floated” on the operating system to avoid upsetting normal microprocessor operation and minimize resultant nuisance troubles and /or alarms. This circuit shall be physically isolated from the power supply to facilitate service.

5. A ground fault detector to detect positive or negative grounds on the initiating circuits, signal circuits, power circuits, and telephone line circuit. A ground fault LED shall be illuminates and shall operate the general trouble devices as specified herein but shall not cause an alarm to be sounded.

6. Short circuit LED's for all notification appliance circuits shall be a standard feature of the fire alarm control panel. Each circuit shall be monitors for short circuits and shall have a distinct LED for visual indication of the circuit.

7. Operating trouble devices as specified herein but shall not cause an alarm to be sounded.

8. Individual circuit fuses shall be provided from the following: smoke detector (resettable) power, main power supply, battery standby power, and auxiliary (non-resettable) output.

9. A common reset and lamp test switch, labeled "RESET/LAMP TEST" shall be provided to reset the system.

10. Circuitry shall be provided in the control panel to permit transmission of trouble alarm signals over leased or privately owned telephone cables to a remote receiving panel. There shall be a remote disconnect switch to allow testing of the fire alarm signal without transmitting an alarm signal to the central station.

2.03 System Cabinet:

A. The system cabinet shall be surface mounted with a texture finish and shall be made of these three parts: backbox, backplate, and door.

B. The cabinet shall be of dead-front construction and 16-gauge cold rolled steel. The door lock system shall consist of two locks which will accept two different keys. One "OPER" key shall allow dead front access to the module display for all operator functions while one "TECH" key shall allow access to all pane electronics without further dismantling of the cabinet, control unit, or wiring.

2.04 Power Supply:

A. All AC line connections shall be isolated from the power supply unit and transformer by means of a cable-connected AC Unit per U.L. 864.

B. The 120 VAC main power shall be transformer converted to low voltage, rectified and filters 24 VDC nominal for system operation and to eliminate the possibility of line voltage being present on any internal panel components. The power supply shall be integral, filtered, nominal 24 VDC at 5 Amps, and comply with U.L. 864.

C. Primary Power outputs shall be as follows:

1. A green LED on the power supply card shall indicate the presence of primary power.

D. Power Supply outputs shall be as follows:

1. 24 VDC Non-Resettable, 3.2 Amps max., Power Limited.

2. 24 VDC Resettable, 3.2 Amps max., Power Limited.

E. NOTE: maximum combined output for both is 8.0 Amp.

2.05 Battery Charger:

A. The power supply shall contain a supervised and fused battery charger with a maximum average charging current of 1.5 Amp (this current shall be sufficient to maintain the system batteries at full charge).

B. If the system loses AC power, a System Trouble shall occur.

C. The battery charger shall be capable of charging up to 34 ampere/hour capacity, lead-acid batteries. If batteries are mounted within the control panel enclosure provide a battery shelf.

2.06 Detection Circuits:

A. Each Analog Detection Loop Unit shall provide communication with all analog/addressable devices (initiating/control) connected to the system through two (2) analog/addressable communications loops. Each loop shall communicate with a maximum of ninety-nine analog detectors and ninety-eight addressable monitor/control devices.

B. The first nine-nine addressed (1-99) on each loop shall be dedicated to analog detectors, while addresses 101-198 shall be reserved for addressable monitor/control devices.

2.07 Analog/Addressable Communications Loops:

A. All initiating devices shall be connected to their addressable loop via a two wire style 4 (class B) circuit.

2.08 Notification Appliance circuits:

A. Four (4) independent (class B) notification appliance circuits shall be provided on the SCU, each polarized and rates at 1.75 Amps DC, individually fused and supervised for opens, grounds, and short circuits. They shall be capable of being wired Class “A” (style Z) or class “B” (style Y) supervised and fused @ 2 Amps. Specifications are as follows:

Voltage	Current
24VDC Non-Regulated	3.2 Amps: Maximum Alarm
	.001 Amps: Normal Standby

2.09 Trouble Input:

A. Trouble input shall be provided rated at 5-24 Volts input and, if used, shall accept a trouble from an external source.

2.10 Trouble Dry Contacts:

A. Trouble dry contacts (form A or Form B; jumper selectable) shall be provided rated at 2 Amps at 24 VDC (resistive) and shall transfer whenever a system trouble occurs.

2.11 Alarm Dry Contacts:

A. Alarm dry contacts (form C) shall be provided rated at 2 Amps at 24 VDC (resistive) and shall transfer whenever a system alarm occurs.

2.12 Central Station Monitoring:

A. The entire fire alarm system shall be connected via leased telephone lines and radio communications to a central station and in accordance with the requirements of the fire department.

2.13 Alarm Signals:

A. All alarm signals shall be automatically “locked in” at the control panel until the operated device is returned to its normal condition and the control panel is manually reset. When used for Water flow, the silence switch shall be bypassed.

B. Alarm or Trouble Activation of Initiating Zones.

C. Alarm or Trouble activation of initiating zones shall be indicated by zone alarm and trouble LED’s.

2.14 Detection Devices:

A. Manual Pull Stations:

1. Provide non coded, addressable, semi-recessed, double-action type manual pull station with mechanical reset features. Where installed in existing buildings, boxes may be surface-mounted. Surface mounted boxes shall be the same color as the pull stations.

2. Provide separate screw terminal for each conductor connected to the manual alarm pull station. Break-glass-front pull stations will not be permitted. Provide red aluminum, housing labeled “fire”. The pull stations shall not be resettable without the use of a key.

B. Detectors:

1. Each photoelectric smoke detector and heat detector shall be interchangeable via twist-lock mounting base, to ensure matching the proper sensor to the potential hazards of the areas being protected. The system shall recognize when an improper sensor type has been installed in a previously programmed sensor type location.

C. Photoelectric Smoke Detector:

1. Provide white flame retardant plastic, addressable, analog, photoelectric type, smoke detectors. Detectors shall operate using an optical sensing chamber principal which complies with UL 268.

2. Each detector shall be capable of being set at two sensitivity settings.

3. Each detector shall have two LED visual indicators providing local 360 degree visibility of operating status and alarm indication.

4. Each detector shall be supported independently of wiring connections, and connected by separate screw terminals of each conductor.

5. The detector screen and cover assembly must be easily removable for field cleaning.

D. Combination Fixed Temperature, rate of Rise Heat Detectors:

1. Provide off-white flame retardant plastic, addressable, combination 140 degree F fixed temperature, rate of rise heat dual thermistor detectors. Detector shall initiate an alarm when temperature rises at a rate of over 15 degrees F per minute or above 140 degrees F.

2. Each detector shall have two LED visual indicators providing local 360 degree visibility of operating status and alarm indication.

3. Contacts shall be self-resetting after response to rate or rise principal. Locate detectors in accordance with UL FPD or FM P7825 listing and the requirements of NFPA 72. Temperature rating of detectors shall be in accordance with NFPA 72.

E. Addressable Monitor Module: provide addressable monitor module wired as style B (class “B”) to provide an address for normally open contact devices.

1. Provide Addressable Monitor Module to monitor status of all Water flow Switches, Valve tamper Switches and Post Indicator Valves.

2.15 Alarm Notification Devices:

A. Color of notification appliances shall be red, unless otherwise noted by District.

B. All alarm notification devices shall be synchronized throughout the school campus building.

C. Strobe Lights: Provide recessed mounted strobe light assembly suitable for use in electrically supervised circuit. Lamps shall be xenon flashtube type, powered from the fire alarm control panel alarm signaling circuit. Strobes shall provide candela ratings as indicated on the drawings candelas and flash 60 times per minute unless otherwise noted. Strobes in toilets shall provide a minimum of 15 candelas. Lamps shall be protected be a clear polycarbonate lens. Housing shall be labeled “FIRE” in red vertical lettering.

D. Speaker/Strobes: Provide recessed mounted, grille face, vibrating diaphragm type, audio alarm devices consisting of an electro-mechanical horn suitable for use in an electrically supervised circuit. Speaker/Strobes shall be provided with a red, tamper resistant grill. Speaker shall have a minimum sound rating of 90 DBA at 10 feet and have field selectable sound levels. Speakers shall be capable of providing a synchronized, field selectable, temporal code 3 tone. Strobes shall have a separate minimum candela as shown on the drawings and flash 60 times per minute unless otherwise noted. Lamps shall be protected by a clear polycarbonate lens. Housing shall be labeled “FIRE” in red vertical lettering.

E. Speakers: Provide recessed mounted, grille face, vibrating diaphragm type, audio alarm devices consisting of an electro-mechanical horn suitable for use in an electrically supervised circuit. Horns shall be provided with a red, tamper resistant grill. Horn shall have a minimum sound rating of 90 DBA at 10 feet and have field selectable sound levels. Horns shall be capable of providing a synchronized, field selectable, temporal code 3 tone. Horns shall have a separate screw terminal for each conductor connection.

F. Exterior Speakers: Provide recessed mounted, grille face, vibrating diaphragm type, audio alarm devices consisting of an electro-mechanical horn suitable for use in an electrically supervised circuit. Horns shall be provided with a red, tamper resistant grill, and a weatherproof backbox. Horn shall have a minimum sound rating of 90 DBA at 10 feet and have field selectable sound levels. Horns shall be capable of providing a synchronized, field selectable, temporal code 3 tone. Horns shall have a separate screw terminal for each conductor connection. Horns located in areas subject to moisture or exterior atmospheric conditions, shall be approved for such locations.

G. Field Charging Power Supply (FCPS):

1. The FCPS is a device designed for use as either a remote 24 volt power supply or used to power Notification Appliances.

2. The FCPS shall offer up to 6.0 amps (4.0 amps continuous) of regulated 24 volt power. It shall include an integral charger designed to charge 7.0 amp hour batteries and to support 60 hour standby.

3. The Field Charging Power Supply shall have two input triggers. The input trigger shall be a Notification Appliance Circuit (from the fire alarm control panel) or a relay. Four outputs (two Style Y or Z and two style Y) shall be available for connection to the Notification devices.

4. The FCPS shall include an attractive surface mount backbox.

5. The Field Charging Power Supply shall include the ability to delay the AC fail delay per NFPA requirements.

6. The FCPS include power limited circuitry, per 1995 UL standards.

2.16 Wiring and Conduit:

A. Provide wiring in accordance with NFPA 72.

B. Conductors shall be solid copper. Conductors for 120 volt circuits shall be No. 12 AWG minimum; conductors for low-voltage DC circuits shall be No. 14 AWG minimum for annunciation circuits and No. 14 AWG minimum for initiation circuits. All cables shall be rated and code compliant for their use.

1. All low voltage wiring not installed in conduits shall be plenum rated.

2. Provide color-coded conductors. Identify conductors by plastic-coated, self-sticking, printed markers or by heat-shrink type sleeves. Each conductor used for the same specific function shall be distinctly color coded. Use different color codes for each interior circuit. Each circuit color code wire shall remain uniform throughout the circuit.

3. Pigtail or “T” tap connections to the evacuation alarm horns, horn/strobes and strobes are not acceptable.

4. Underground circuit or circuits in wet areas shall be gel filled cables in scheduled 40 PVC conduit. There shall be no splicing of any underground cables.

C. Conduits:

1. Identification of Conduit: New conduits containing fire alarm system conductors shall be red, ¾” minimum. Junction-boxes, covers, gutters, and terminal cabinets, containing fire alarm system conductors, shall be painted red or provided red in color with engraved plastic identification signs permanently attached to the equipment.

2. Do not run fire alarm circuits in the same conduit with the non-fire alarm circuits.

3. Do not run AC circuits in the same conduit with the fire alarm circuits.

4. Provide wiring in rigid metal conduit for exterior installations or where exposed to damage.

5. Conceal conduit in finished areas of new construction and wherever practical in existing construction. Conduit runs shall be straight, neatly arranged properly supported and parallel or perpendicular to walls and partitions. Identify conductors within each enclosure where a tap, splice, or termination is made.

PART 3 - EXECUTION

3.01 Installation:

A. Equipment, materials, installation, workmanship, inspection, and testing shall be in accordance with the NFPA publications and as modified herein.

B. Follow manufacturer’s directions in all cases for installation, testing and energizing.

C. Accurately set, level, support, and fasten all equipment.

D. Smoke and heat detectors:

1. No detector shall be located closer than 12 inches to any part of any lighting fixture. Detectors, located in areas subject to moisture or exterior atmospheric conditions, or hazardous locations as defined by NFPA 70, shall be approves for such locations.

2. Provide guards for all detectors mounted in any high athletic activity areas such as gym's, wrestling rooms, shower rooms.

E. Conduit where exposed shall be installed parallel with the walls or structural elements; vertical runs to be plumb; horizontal runs to be level or parallel with structure; conduit grouped neatly together with straight runs, all bends parallel and uniformly spaced.

F. Earthquake Resistant installation/fastening of all electrical equipment shall conform to the general requirements of section 1614A of the California Building Code.

3.02 Preliminary Tests:

A. Conduct the following tests during installation of wiring and system components. Correct deficiency pertaining to these requirements prior to formal functional and operational tests of the system, preliminary tests shall be performed in the presence of the Local Fire Authority and Project inspector of Record to determine the conformance with the specified requirements.

B. Ground Resistance: Measure the resistance of each connection to ground. Ground resistance shall not exceed 10 ohms.

C. Dielectric Strength insulation Resistance: Test the dielectric strength and the Insulating resistance of the system interconnecting wiring by means of an instrument capable of generating 500 volts of DC and equipped to indicate leakage current 1000 megohms. For the purpose of this test, connect the instrument between each conductor on the line and between each conductor and ground at the control panel end of the line, with the other extremity open circuited and all series-connected devices in place. The system shall withstand the test without breakdown and shall indicate a resistance of not less than 1.0 minute with a DC potential of not less than 100 volts and not more than 500 volts.

D. Standby Battery Test: prior to formal inspection and tests, place the fire alarm system on standby battery power for 24 hours; immediately thereafter, sound the building evacuation alarm signaling devices for 5 minutes. When the test is complete, the fire alarm system battery charger shall be fully recharged within 24 hours.

E. Field Inspection and Test:

1. Before final acceptance of the work, pre-test system to demonstrate compliance with the contract requirements. System shall be subjected to complete functional and operational tests, including tests in place of each detector. When tests have been completed and corrections made, submit a signed and dated NFPA Certificate of Completion along with a completed testing matrix with the request for formal inspection and tests.

2. Where application of heat would destroy a heat detector, it may be manually activated.

3. Verify the proper receipt of the alarm signals at the central station for the UDACT provide printout of test reports. It shall be the sole obligation of the contractor to coordinate and to provide all testing documentation from the central station.

4. The communication loops and the indicating appliance circuits shall be opened in at least two locations per zone to check for the presence of correct supervisory circuitry.

5. Perform the field inspection and test in the presence of the manufacturer's representative, the School District's representative, local Fire Authority and Project Inspector of Record (IOR).

6. Test equipment: It shall be the responsibility of the installing Contractor to furnish tools, instruments, and materials required for a thorough test of the system. This includes, but is not limited to, the following:

    a. VOM meter

    b. Manufacturer's recommended smoke detector testing device and sensitivity test equipment.

    c. Heat source for testing heat detectors.

    d. Keys to all control panels.

    e. Ladders

3.03 Project Closeout:

A. As Built Drawings:

1. Provide a complete set (full size scalable) of reproducible "as-built" and AutoCAD format drawings showing installed wiring, color coding, and wire tag notations for exact locations of all installed equipment, specific interconnections between all equipment, and internal wiring of the equipment upon completion of system.

B. Operating and Instruction Manuals:

1. Operating and Instruction manuals shall be submitted prior to testing of the system. Four complete sets of operation and instructions manuals shall be delivered to the School District upon request.

2. Complete, accurate, step-by-step testing instructions giving recommended and required testing frequency of all equipment, methods for testing each individual piece of equipment, and troubleshooting manual explaining how to test the preliminary internal parts or each piece of equipment shall be delivered upon completion of the system.

C. Maintenance instructions shall be complete, easy to read, understandable, and shall provide the following information:

1. Instructions on replacing any components of the system, including internal parts.

2. Instructions on periodic cleaning and adjustment of equipment with a schedule of these functions.

3. A complete list of all equipment and components with information as to the address and telephone number of both the manufacturer and local supplier of each item.

4. User operating instructions shall be provided prominently displayed on a separate sheet located next to the control unit in accordance with U.L. Standard 864.

EMERGENCY VOICE EVACUATION SYSTEM

PART 1.0 - GENERAL

1.1. DESCRIPTION:

A. This section of the specification includes the furnishing, installation, connection and testing of the microprocessor controlled Voice Evacuation/Mass Notification control panel.

B. The Voice Evacuation/Mass Notification panel shall comply with NFPA 72 requirements.

1. The Secondary Power Source of the Voice Evacuation/Mass Notification panel will be capable of providing at least 24 hours of backup power with the ability to sustain 15 minutes in alarm at the end of the backup period.

C. The Voice Evacuation/Mass Notification panel shall be manufactured by an ISO 9001 certified company and meet the requirements of BS EN9001: ANSI/ASQC, Q9001-1994.

D. The Voice Evacuation/Mass Notification panel and peripheral devices shall be manufactured 100% by a single U.S. manufacturer (or division thereof).

Underwriters Laboratories Inc. (UL) - USA:

UL 864 Standard for Control Units for Fire Protective Signaling Systems

UL 1711 Amplifiers for Fire Protective Signaling Systems

UL 2572 Communication and Control Units for Mass Notification Systems

Other:

NEC Article 250 Grounding

NEC Article 300 Wiring Methods

NEC Article 760 Fire Protective Signaling Systems

Compliant with Unified Facilities Criteria UFC 4-021-01

1. The Voice Evacuation/Mass Notification panel shall be ANSI 864, 9th Edition Listed. Systems listed to ANSI 864, 8th edition (or previous revisions) shall not be accepted.

F. The installing company shall employ NICET (minimum Level II Fire Alarm Technology) technicians on site to guide the final check-out and to ensure the systems integrity.

1.2. SCOPE:

A. A microprocessor-controlled Voice Evacuation/Mass Notification control panel shall be installed in accordance with the project specifications and drawings.

1.3. SUBMITTALS

A. General:

1. Two copies of all submittals shall be submitted to the Architect/Engineer for review.

2. All references to manufacturer's model numbers and other pertinent information herein is intended to establish minimum standards of performance, function and quality. Equivalent compatible UL-listed equipment from other manufacturers may be substituted for the specified equipment as long as the minimum standards are met.

3 For equipment other than that specified, the contractor shall supply proof that such substitute equipment equals or exceeds the features, functions, performance, and quality of the specified equipment.

B. Shop Drawings:

1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
2. Include manufacturer's name(s), model numbers, ratings, power requirements, equipment layout, device arrangement, complete wiring point-to-point diagrams, and conduit layouts.

3. Show system layout, configurations, and terminations.

C. Manuals:

1. Submit simultaneously with the shop drawings, complete operating and maintenance manuals listing the manufacturer's name(s), including technical data sheets.

2. Wiring diagrams shall indicate internal wiring for each device and the interconnections between the items of equipment.

3. Provide a clear and concise description of operation that gives, in detail, the information required to properly operate the equipment and system.

D. Software Modifications

1. Provide the services of a qualified technician to perform all system software modifications, upgrades or changes. Response time of the technician to the site shall not exceed 4 hours.

2. Provide all hardware, software, programming tools and documentation necessary to modify the Voice Evacuation/Mass Notification Control Panel on site. Modification includes addition and deletion of messages, circuits, zones and changes to system operation. The system structure and software shall place no limit on the type or extent of software modifications on-site.

1.4. GUARANTY:

All work performed and all material and equipment furnished under this contract shall be free from defects and shall remain so for a period of at least one (1) year from the date of acceptance. The full cost of maintenance, labor and materials required to correct any defect during this one year period shall be included in the submittal bid.

1.5. MAINTENANCE:

A. Maintenance and testing shall be on a semi-annual schedule or as required by the local AHJ. A preventive maintenance schedule shall be provided by the contractor describing the protocol for preventive maintenance. The Voice Evacuation/Mass Notification Control Panel shall be tested in accordance with the requirements of NFPA 72.

B. As part of the bid/proposal, include a quote for a maintenance contract to provide all maintenance, tests, and repairs described below. Include also a quote for unscheduled maintenance/repairs, including hourly rates for technicians trained on this equipment, and response travel costs for each year of the maintenance period. Submittals that do not identify all post contract maintenance costs will not be accepted. Rates and costs shall be valid for the period of five (5) years after expiration of the guaranty.

1.6. POST CONTRACT EXPANSIONS:

A. The contractor shall have the ability to provide parts and labor to expand the system specified, if so requested, for a period of five (5) years from the date of acceptance.

B. As part of the submittal, include a quotation for all parts and material, and all installation and test labor as needed to increase the number of speakers zones or wattage by ten percent (10%).

C. The quotation shall include installation, test labor, and labor to reprogram the system for this 10% expansion. If additional Voice Evacuation/Mass Notification Control Panel hardware is required, include the material and labor necessary to install this hardware.

D. Do not include cost of conduit or wire or the cost to install conduit or wire except for labor to make final connections at the Voice Evacuation/Mass Notification Control Panel.

E. Submittals that do not include this estimate of post contract expansion cost will not be accepted.

1.7. APPLICABLE STANDARDS AND SPECIFICATIONS:

The specifications and standards listed below form a part of this specification. The system shall fully comply with the latest issue of these standards, if applicable.

A. National Fire Protection Association (NFPA) - USA:

No. 70 National Electric Code (NEC)

No. 72 National Fire Alarm Code

No. 101 Life Safety Code

B. The system and its components shall be Underwriters Laboratories, Inc. listed under the appropriate UL testing standard as listed herein for fire alarm applications and the installation shall be in compliance with the UL listing.

C. Local and State Building Codes.

D. All requirements of the Authority Having Jurisdiction (AHJ).

1.8. APPROVALS:

A. The system shall have proper listing and/or approval from the following nationally recognized agencies:

UL Underwriters Laboratories Inc (Ninth Edition)

CSFM California State Fire Marshal

MEA Material Equipment Acceptance (NYFD COA)

PART 2.0 PRODUCTS

2.1. EQUIPMENT AND MATERIAL, GENERAL:

A. All equipment and components shall be new, and the manufacturer's current model. The materials, appliances, equipment and devices shall be tested and listed by a nationally recognized approvals agency for use as part of a fire protective signaling system, meeting the National Fire Alarm Code.

B. All equipment and components shall be installed in strict compliance with manufacturers' recommendations. Consult the manufacturer's installation manuals for all wiring diagrams, schematics, physical equipment sizes, etc., before beginning system installation.

C. All equipment shall be attached to walls and ceiling/floor assemblies and shall be held firmly in place

(e.g., speakers shall not be supported solely by suspended ceilings). Fasteners and supports shall be adequate to support the required load.

D. All equipment must be available "over the counter" through the Security Equipment Distributor (SED) market and can be installed by dealerships independent of the manufacturer.

2.2. CONDUIT AND WIRE:

A. Conduit:

1. Conduit shall be in accordance with The National Electrical Code (NEC), local and state requirements.

2. Where required, all wiring shall be installed in conduit or raceway. Conduit fill shall not exceed 40 percent of interior cross sectional area where three or more cables are contained within a single conduit.

3. Cable must be separated from any open conductors of power, or Class 1 circuits, and shall not be placed in any conduit, junction box or raceway containing these conductors, per NEC Article 760.

4. All circuits shall be provided with transient suppression devices and the system shall be designed to permit simultaneous operation of all circuits without interference or loss of signals.

5. Conduit shall not enter the Voice Evacuation/Mass Notification Control Panel, or any other remotely mounted panel equipment or backboxes, except where conduit entry is specified by the Voice Evacuation/Mass Notification Control Panel manufacturer.

6. Conduit shall be 3/4 inch (19.1 mm) minimum.

B. Wire:

1. All Voice Evacuation/Mass Notification Control Panel wiring shall be new.

2. Wiring shall be in accordance with local, state and national codes (e.g., NEC Article 760) and as recommended by the manufacturer of the Voice Evacuation/Mass Notification Control Panel. Number and size of conductors shall be as recommended by the Voice Evacuation/Mass Notification Control Panel, but not less 14 AWG (1.63 mm) for Notification Appliance Circuits.

3. All wire and cable shall be listed and/or approved by a recognized testing agency for use with a protective signaling system.

4. Wire and cable not installed in conduit shall have a fire resistance rating suitable for the installation as indicated in NEC 760 (e.g., FPLR).

5. All field wiring shall be electrically supervised for open circuit and ground fault.

C. Terminal Boxes, Junction Boxes and Cabinets:

All boxes and cabinets shall be UL listed for their use and purpose.

D. The Voice Evacuation/Mass Notification Control Panel shall be connected to a separate dedicated branch circuit, maximum 20 amperes. This circuit shall be labeled at the main power distribution panel as Voice Evacuation/Mass Notification Control Panel. Voice Evacuation/Mass Notification Control Panel

primary power wiring shall be 12 AWG. The panel cabinet shall be grounded securely to either a cold water pipe or grounding rod.

1. The Voice Evacuation/Mass Notification Control Panel notification circuit (NACs 1) shall also automatically synchronize any of the following manufacturer's notification appliances connected to them: System Sensor, Wheelock, or Gentex with no need for additional synchronization modules.

2.3. Voice Evacuation/Mass Notification Control Panel:

A. The Voice Evacuation/Mass Notification Control Panel is a new Silent Knight 6820EVS (with Digital Voice Command Center) and contains a microprocessor-based Central Processing Unit (CPU). The CPU shall distribute and control emergency voice messages over the speaker circuits.

B. The system shall provide the capability to interface to **LOC** (**L**ocal **O**perator **C**onsole), Distributed Audio Amplifiers, Remote Page Unit, Remote Microphone, Fire Fighter Telephone Unit and Remote Telephone Zone Module from the same manufacturer.

C. Shall have as minimum requirements:

1. Integral 50 Watt, 25 Vrms audio amplifier with optional converter for 70.7 volt systems. The system shall be capable of expansion to 100 watts total via the insertion of an additional 50-watt audio amplifier module (can be used as a backup amplifier) into the same cabinet and expandable over 1100 watts.

2. Speaker circuit that can be wired both Class A and B.

3. Integral Digital Message Generator with a memory capacity for up to 60 seconds per messaging. The Digital Message Generator shall be capable of producing fourteen distinct messages (60 seconds each). Field-selectable message and custom message recording capability using the local microphone, a USB port, or an external audio input.

4. Built in alert tone patterns with ANSI, March Code, California,

Steady, Alert Tone, Hi-Lo, ANSI Whoop, Continuous Whoop, or No Tone is field programmable. Tone Prior to transmitting a message, the Voice Evacuation/Mass Notification Control Panel can be programmed to produce a pre-announce
and post-announce tone.

   a. Leading Tone Duration If a pre-announce tone is desired, select the length of time it will play before a message is broadcasted. Select *4*, *8*, *12*, *16*, *20*, *24*, or *28* seconds. In a pre-announce tone is not desired, select *0* seconds.
   b. Trailing Tone Duration Select the length of time for the post-message announcement tone. Select *4*, *8*, *12*, *16*, *20*, *24*, *28*, or *32* seconds from the drop-down menu.
   c. Repeat Cycle Select the number of times the message will be repeated during an alarm. A message can be repeated *0*, *1*, *2*, *3*, *4*, *5*, 6, *7*, *8*, *9*, *10*, *11*, *12*, *13*, *14*, or an *Infinite* amount of times.

5. The Voice Evacuation/Mass Notification Control Panel will be capable of detecting and annunciating the following conditions: Loss of Power (AC and DC), System Trouble, Ground Fault, Alarm, Microphone Trouble, Message Generator Trouble, Tone Generator Trouble, and Amplifier Fault.

6. The Voice Evacuation/Mass Notification Control Panel shall be fully supervised including microphone, amplifier output, message generator, speaker wiring, and tone generation.

7. Speaker outputs shall be fully power-limited.

8. Amplifiers will be supplied power independently to eliminate a short on one circuit from affecting other circuits.

9. The Voice Evacuation/Mass Notification Control Panel will provide full supervision on both active (alarm or music) and standby conditions.

10. An optional zone splitter version shall be available that permits splitting speaker circuits into 8 specific zones.

11. An optional distributed amplifiers unit shall be available that permits splitting speaker circuits up to a total of 24 speaker zones.

12. Wiring terminals shall be removable terminal blocks (Wire Gauge 12 – 18 AWG) for ease of servicing.

13. Voice Evacuation/Mass Notification Control Panel will provide 2 amp Notification Appliance Circuit (NAC) output with sync generator or follower for System Sensor, Wheelock or Gentex protocols. The NAC shall be capable of One (1) Style Y (Class B) or Style Z (Class A) circuit.

14. Shall have eight Command Input Circuits to activate messages via reverse polarity or contact closures.

15. Built in External Audio Input can be used for background music.

16. On-board battery charger which supports charging up to 26 AH batteries (cabinet holds up to 18AH batteries).

17. Programmable delay of immediate, 2 hours or 6 hours reporting of AC Loss.

18. Built in Piezo sounder for local trouble.

19. Stores the events in the 100 Event History log

20. Shall have Console Lamp Test switch and shall activate all system LEDs including Remote Consoles.

21. Shall have three Form-C relays:

AC Power Loss Relay

System Trouble Relay

MNS Active (For Mass Notification signage)

22. Shall have a Special Application (auxiliary power) output for addressable modules when interfaced with compatible addressable FACPs and End-of-Line power supervision relays.

23. Shall be capable of Speaker Volume Control. The Supervised

Volume Control will allow manual volume setting for telephone paging and background music for a specific speaker or speaker zone.

24. Shall have a Night Ring input allows a building's Private Branch Exchange (PBX) to activate the Voice Evacuation/Mass Notification panel.

25. The Voice Evacuation/Mass Notification panel can communicate in any combination up to eight (8) external remote consoles:

Optional Remote Microphone

Optional Remote Page Unit

Optional Local Operator Console

26. The Voice Evacuation/Mass Notification panel can communicate in any combination up to eight (8) external distributed audio amplifiers:

Optional Distributed Amplifier, 50 watts.

Optional Distributed Amplifier, 125 watts.

27. Shall be capable of integrating with firefighter telephone system that provides secure and reliable communications. The firefighter telephone system will allow for up to ten users to plug in to a remote telephone jack and communicate simultaneously within a building.

28. Shall be capable of secure access to the Voice Evacuation/Mass Notification panel via cell phone or other remote telephone.

29. The Voice Evacuation/Mass Notification panel can be integrated by an FACP via the ANN/ACS (EIA-485) link. Compatible FACPs include the MS-9200UDLS and MS-9600(UD)LS.

30. The Voice Evacuation/Mass Notification shall report Mass Notification events to the Central Station.

31. The Voice Evacuation/Mass Notification panel can be interface with other UL Listed Fire Alarm Control Panels via activation of reverse polarity or by contact closure.

D. Speakers:

1. All speakers shall operate on 25 or 70 VRMS with field selectable output taps from 0.25 to 2.0 Watts.
2. Speakers in corridors and public spaces shall produce a minimum sound levels of 75 dBA output at 10 feet (3m).
3. The plug-in speaker allows the installer to pre-wire mounting plates and dress the wires before plugging in the speakers.
4. Flush mount applications are achievable without the need for an extension ring.
5. Frequency response shall be a minimum of 400 HZ to 4000 HZ.
6. Rotary switch simplifies field selection of speaker voltage and power settings.

E. Enclosures:

1. The Voice Evacuation/Mass Notification panel shall be housed in a UL-listed cabinet suitable for

surface mounting. The cabinet and front shall be corrosion protected and painted red via the powder coat method with manufacturer's standard finish.

2. The back box and door shall be constructed of steel with provisions for electrical conduit connections into the sides and top.
   The door shall provide a key lock and shall provide for the viewing of all indicators.

F. Power Supply:

1. The main power supply for the Voice Evacuation/Mass Notification panel shall provide up to 7.5 amps of available power for the panel and peripheral devices.
2. Provisions will be made to allow the audio-visual power to be increased as required by adding modular expansion audio-visual power supplies.
3. The power supply shall provide an integral battery charger or may be used with an external battery and charger systems. Battery arrangement may be configured in the field.
4. The main power supply shall continuously monitor all field wires for earth ground conditions.
5. The main power supply shall operate on 120 VAC, 60 Hz or 240 VAC, 50 Hz, and shall provide all necessary power for the Voice Evacuation/Mass Notification panel.

G. BATTERIES:

1. Upon loss of Primary (AC) power to the Voice Evacuation/Mass Notification panel, the batteries shall have sufficient capacity to power the Voice Evacuation/Mass Notification panel for required standby time (24 or 60 hours) followed by 15 minutes of alarm.
2. The batteries are to be completely maintenance free. No liquids are required. Fluid level checks for refilling, spills, and leakage shall not be required.

PART 3.0 - EXECUTION

3.1. INSTALLATION:

A. Installation shall be in accordance with the NEC, NFPA 72, local and state codes, as shown on the drawings, and as recommended by the major equipment manufacturer.

B. All conduit, junction boxes, conduit supports and hangers shall be concealed in finished areas and may be exposed in unfinished areas. Smoke detectors shall not be installed prior to the system programming and test period. If construction is ongoing during this period, measures shall be taken to protect speakers from contamination and physical damage.

3.2. TEST:

The service of a competent, factory-trained engineer or technician authorized by the manufacturer of the fire alarm equipment shall be provided to technically supervise and participate during all of the adjustments and tests for the system. All testing shall be in accordance with NFPA 72.

A. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.

B. Open and short notification appliance circuits and verify that trouble signal actuates.

C. Ground all circuits and verify response of trouble signals.

D. Check presence and audibility of tone at all alarm notification devices.

E. When the system is equipped with optional features, the manufacturer's manual shall be consulted to determine the proper testing procedures. This is intended to address such items as verifying voice messages.

3.3. FINAL INSPECTION:

A. At the final inspection a minimum NICET Level II technician shall demonstrate that the system functions properly in every respect.

3.4. INSTRUCTION:

A. Instruction shall be provided as required for operating the system. Hands-on demonstrations of the operation of all system components and the entire system including program changes and functions shall be provided.

B. The contractor or installing dealer shall provide a user manual indicating "Sequence of Operation."

3.5. SUPPORT SERVICES:

A. System Start Up and Commissioning:

1. Upon completion of work, contractor shall provide a manufacturer authorized technician to provide staff & MOT training (minimum of 16-hours) of the fire alarm system operation.

END OF SECTION

SECTION 31 23 00

TRENCHING, BACKFILLING, AND COMPACTING

PART 1 - GENERAL

1.1 SUMMARY

A. Trench, backfill, and compact as specified herein and as needed for installation of underground utilities associated with the Work.

B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division l of these Specifications.

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Use equipment adequate in size, capacity, and numbers to accomplish the work in a timely manner.

C. In addition to complying with requirements of governmental agencies having jurisdiction, comply with the directions of the construction soil engineer.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. Fill and backfill materials:
1. Provide soil materials free from organic matter and deleterious substances, containing no rocks or lumps over 2" in greatest dimension, and with not more than 10% of the rocks or lumps larger than 1" in their greatest dimension.
2. Fill material is subject to the approval of the construction soil engineer, and is that material removed from excavations or imported from off-site borrow areas, predominantly granular, non- expansive soil free from roots and other deleterious matter.
3. Imported fill material shall, in addition, have 10 to 40% by weight passing the #200 sieve, a plasticity index of less than 12, and a liquid limit of less than 30%.

2.2 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 FINISH ELEVATIONS AND LINES

A. Comply with documents.

3.3 PROCEDURES

A. Utilities:
   1. Unless shown to be removed, protect active utility lines shown on the Drawings or otherwise made known to the Contractor prior to trenching. If damaged, repair or replace at no additional cost to the School District.
   2. If active utility lines are encountered, and are not shown on the Drawings or otherwise made known to the Contractor, promptly take necessary steps to assure that service is not interrupted.
   3. If service is interrupted as a result of work under this Section, immediately restore service by repairing the damaged utility at no additional cost to the School District.
   4. If existing utilities are found to interfere with the permanent facilities being constructed under this Section, immediately notify the Architect and secure his instructions.
   5. Do not proceed with permanent relocation of utilities until written instructions are received from the Architect.

B. Protection of persons and property:
   1. Barricade open holes and depressions occurring as part of the Work, and post warning lights on property adjacent to or with public access.
   2. Operate warning lights during hours from dusk to dawn each day and as otherwise required.
   3. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, washout, and other hazards created by operations under this Section.

C. De-watering:
   1. Remove all water, including rain water, encountered during trench and sub-structure work to an approved location by pumps, drains, and other approved methods.
   2. Keep trenches and site construction area free from water.

D. Use means necessary to prevent dust becoming a nuisance to the public, to neighbors, and to other work being performed on or near the site.

E. Maintain access to adjacent areas at all times.

3.4 TRENCHING

A. Provide sheeting and shoring necessary for protection of the Work and for the safety of personnel.
   1. Prior to backfilling, remove all sheeting.
   2. Do not permit sheeting to remain in the trenches except when, in the opinion of the Architect, field conditions or the type of sheeting or methods of construction such as

use of concrete bedding are such as to make removal of sheeting impracticable. In such cases, the Architect may permit portions of sheeting to be cut off and remain in the trench.

B. Open cut:
   1. Excavate for utilities by open cut.
   2. If conditions at the site prevent such open cut, and if approved by the Architect, trenching may be used.
   3. Short sections of a trench may be tunneled if, in the opinion of the Architect, the conductor can be installed safely and backfill can be compacted properly into such tunnel.
   4. Where it becomes necessary to excavate beyond the limits of normal excavation lines in order to remove boulders or other interfering objects, backfill the voids remaining after removal of the objects as directed by the construction soil engineer.
   5. When the void is below the subgrade for the utility bedding, use approved earth materials and compact to the relative density directed by the construction soil engineer, but in no case to a relative density less than 90%.
   6. When the void is in the side of the utility trench or open cut, use approved earth or sand compacted as approved by the construction soil engineer, but in no case to a relative density less than 85%.
   7. Remove boulders and other interfering objects, and backfill voids left by such removals, at no additional cost to the School District.
   8. Excavating for appurtenances:
      a. Excavate for manholes and similar structures to a distance sufficient to leave at least 12" clear between outer surfaces and the embankment or shoring that may be used to hold and protect the banks.
      b. Overdepth excavation beyond such appurtenances that has not been directed will be considered unauthorized. Fill with sand, gravel, or lean concrete as directed by the construction soil engineer, and at no additional cost to the School District.

C. Trench to the minimum width necessary for proper installation of the utility, with sides as nearly vertical as possible. Accurately grade the bottom to provide uniform bearing for the utility.

D. Depressions:
   1. Dig bell holes and depressions for joints after the trench has been graded. Provide uniform bearing for the pipe on prepared bottom of the trench.
   2. Except where rock is encountered, do not excavate below the depth indicated or specified.
   3. Where rock is encountered, excavate rock to a minimum overdepth of 4" below the trench depth indicated or specified.

E. Where utility runs traverse public property or are subject to governmental or utility company jurisdiction, provide depth, bedding, over, and other requirements as set forth by legally constituted authority having jurisdiction, but in no case less than the depth shown in the Contract Documents.

F. Where trenching occurs in existing lawns, remove turf in sections and keep damp. Replace turf upon completion of the backfilling.

G. Cover:

1. Provide minimum trench depth indicated below to maintain a minimum cover over the top of the installed item below the finish grade or subgrade, unless specifically designed and shown otherwise on the drawings:
   a. Areas subject to vehicular traffic:
      1) Sanitary sewers: 24";
      2) Storm drains: 24".
   b. Areas not subject to vehicular traffic:
      1) Sanitary sewers: 18";
      2) Storm drains: 18".
   c. All areas:
      1) Water lines: 18";
      2) Natural gas lines: 18";
      3) Electrical cables: 24";
      4) Electrical ducts: 18".
   d. Concrete encased:
      1) Pipe sleeves for water and gas lines: 18";
      2) Sanitary sewers and storm drains: 12";
      3) Electrical ducts: 18".
   e. Where utilities are under a concrete structure slab or pavement, the minimum depth need only be sufficient to completely encase the conduit or pipe sleeve, and electrical long-radius rigid metal conduit riser, provided it will not interfere with the structural integrity of the slab or pavement.
   f. Where the minimum cover is not provided, encase the pipes in concrete as indicated. Provide concrete with a minimum 28 day compressive strength of 3000 psi.

3.5 BEDDING

A. Provide bedding as indicated on the Drawings.

3.6 BACKFILLING

A. General:
   1. Do not completely backfill trenches until required pressure and leakage tests have been performed, and until the utilities systems as installed conform to the requirements specified in the pertinent Sections of these Specifications.
   2. Except as otherwise specified or directed for special conditions, backfill trenches to the ground surface with selected material approved by the construction soil engineer.
   3. Reopen trenches which have been improperly backfilled, to a depth as required for proper compaction. Refill and compact as specified, or otherwise correct to the approval of the construction soil engineer.
   4. Do not allow or cause any of the Work performed or installed to be covered up or enclosed by work of this Section prior to required inspections, tests, and approvals.
   5. Should any of the Work be so enclosed or covered up before it has been approved, uncover all such Work and, after approvals have been made, refill and compact as specified, all at no additional cost to the School District.

B. Lower portion of trench:
   1. Deposit approved backfill and bedding material in layers of 3" minimum thickness, and compact with suitable tampers to 90% relative density (85% in landscape areas), until there is a cover of not less than 24" over sewers and 12" over other utility lines.
   2. Take special care in backfilling and bedding operations to not damage pipe and pipe coatings.

C. Remainder of trench:
   1. Except for special materials for pavements, backfill the remainder of the trench with approved backfill.
   2. Deposit backfill material in layers not exceeding the thickness specified, and compact each layer to the minimum density indicated by the construction soil engineer.

D. Adjacent to buildings: Mechanically compact backfill within ten feet of buildings.

E. Consolidation of backfill by jetting with water may be permitted, when specifically approved by the construction soil engineer, in areas other than building and pavement areas.

3.7 TEST FOR DISPLACEMENT OF SEWERS AND STORM DRAINS

A. Check sewers and storm drains to determine whether displacement has occurred after the trench has been backfilled to above the pipe and has been compacted as specified.

B. Flash a light between manholes or, if the manholes have not yet been constructed, between the locations of the manholes, by means of a flashlight or by reflecting sunlight with a mirror.

C. If the illuminated interior of the pipe line shows poor alignment, displaced pipes, or any other defects, correct the defects to the specified conditions and at no additional cost to the School District.

3.8 PIPE JACKING

A. The Contractor may, at his option, install steel pipe casings, tongue-and-groove reinforced concrete pipes, and steel pipes under existing roads or pavements by jacking into place using procedures approved by the governmental agencies having jurisdiction and approved by the construction soil engineer.

3.9 TUNNELING OPERATIONS

A. The Contractor may, at his option, tunnel pipes into position using procedures approved by the construction soil engineer and the governmental agencies having jurisdiction.

3.10 FIELD QUALITY CONTROL

A. The construction soil engineer will inspect open cuts and trenches before installation of utilities, and will make the following tests:

B. Assure that trenches are not backfilled until all tests have been completed;

C. Check backfilling for proper layer thickness and compaction;

D. Verify that test results conform to the specified requirements, and that sufficient tests are performed;

E. Assure that defective work is removed and properly replaced.

END OF SECTION 312300

SECTION 32 12 16
ASPHALT PAVEMENT

PART 1 GENERAL

1.1 SUMMARY

A. Section includes asphaltic concrete paving, wearing, binder and base course; surface sealer; and aggregate base course.

B. Related Sections:
1. Section 31 05 13 - Soils for Earthwork.
2. Section 31 22 13 - Rough Grading: Preparation of site for paving and base.
3. Section 31 23 23.13 - Backfill: Compacted subbase for paving.
4. Section 32 11 23 - Aggregate Base Course.

1.2 REFERENCES

A. ASTM D946 - Penetration-Graded Asphalt Cement for Use in Pavement Construction.

B. ASTM D3381 - Viscosity Graded Asphalt Cement for Use in Pavement Construction.

C. TAI - (The Asphalt Institute) - MS-2 Mix Design Methods for Asphalt Concrete and Other Hot Mix Types.

D. TAI - (The Asphalt Institute) - MS-3 Asphalt Plant Manual.

E. TAI - (The Asphalt Institute) - MS-8 Asphalt Paving Manual.

F. TAI - (The Asphalt Institute) - MS-19 Basic Asphalt Emulsion Manual.

G. Caltrans Standard Specifications, 2010 Edition, Section 39.

1.3 SUBMITTALS

A. Product Data: Submit product information and mix design.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with Caltrans Standard Specifications.

B. Mixing Plant: Conform to Caltrans Standard Specifications.

C. Obtain materials from same source throughout.

D. Maintain one copy of each document on site.

1.5 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements.

B. Do not place asphalt when ambient air or base surface temperature is less than 40

degrees F, or surface is wet or frozen.

PART 2 PRODUCTS

2.1 MATERIALS

A. Asphalt Pavement: In accordance with Caltrans Standard Specifications.

2.2 SOURCE QUALITY CONTROL AND TESTS

A. Section 01 45 23 - Quality Control: Testing and Inspection Services: Provide mix design for asphalt.

B. Submit proposed mix design for review prior to beginning of Work.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Verify compacted granular base is dry and ready to support paving and imposed loads.

C. Verify gradients and elevations of base are correct.

3.2 SUBBASE

A. Section 32 11 23 - Aggregate Base Course forms the base construction for Work of this section.

3.3 PREPARATION - PRIMER

A. Apply primer in accordance with Caltrans Standard Specifications.

3.4 PREPARATION - TACK COAT

A. Apply tack coat in accordance with Caltrans Standard Specifications.

B. Apply tack coat to contact surfaces of curbs and gutters.

C. Coat surfaces of manhole and catch basin frames with oil to prevent bond with asphalt pavement. Do not tack coat these surfaces.

3.5 PLACING ASPHALT PAVEMENT - SINGLE COURSE

A. Install Work in accordance with Caltrans Standard Specifications.

3.6 PLACING FOG SEAL

3.7 CURBS

A. Install extruded asphalt curbs of profile as indicated on drawings.

3.8 TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Flatness: Maximum variation of 1/4 inch measured with 10-foot straight edge.

C. Scheduled Compacted Thickness: Within 1/4 inch.

D. Variation from True Elevation: Within 1/2 inch.

3.9 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Testing and inspection services
Section 01 70 00 - Execution and Closeout Requirements: Testing, adjusting, and balancing.

3.10 PROTECTION OF FINISHED WORK

A. Section 01 70 00 - Execution and Closeout Requirements: Protecting finished work.

B. Immediately after placement, protect pavement from mechanical injury for 24 hours or until surface temperature is less than 140 degrees F.

3.11 SCHEDULES

A. Pavement sections for various locations and uses are to be as shown on the drawings.

END OF SECTION

SECTION 32 13 13 – Site Concrete

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes site concrete, including but not limited to pavements and other minor site concrete.

B. Provide all labor, materials, equipment, and services to complete the work as indicated on the drawings, and in accordance with these specifications. Work includes but is not limited to the following:

Concrete formwork

Concrete reinforcement

Cast-in-place concrete items:

a. Concrete paving, sidewalks, ramps, pads, curbs, gutters, mow bands, walls, truncated domes, etc.

b. Miscellaneous concrete.

c. All imbeds including anchor bolts, tiedowns, hold downs with bolts, straps, and sleeves.

1.02 REFERENCES

A. Caltrans Standard Specifications - Standard Specifications, State of California, California State Transportation Agency, Department of Transportation (Caltrans), latest edition.

B. ASTM - American Society for Testing and Materials

C. ACI - American Concrete Institute, Manual of Concrete Practice.

D. CBC – California Building Code

1.03 DEFINITIONS

A. Percent Compaction: ASTM D1557, percentage as shown on the Drawings of the maximum in-place dry density of the same material.

1.04 SUBMITTALS

A. Conform to the requirements of Division 1, Section 01 32 19 for submittal requirements.

B. Shop Drawings Reinforcement: Submit shop drawings for fabrication, bending and placement of concrete reinforcement. Comply with ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures" showing bar

schedules, stirrup spacing, diagrams of bent bars and arrangement of concrete reinforcement. Include special reinforcement required at openings through concrete structures.

C. Concrete Design Mixes:

The preparation of design mixes will be the responsibility of the Contractor. Mix designs may be prepared by the supplier and shall be certified by a Civil Engineer registered in California. Mix designs will be designed by the supplier and approved by the District's Representative.

Written reports will be submitted to the District Representative of each proposed mix for review. Do not begin concrete production until mixes have been reviewed by the District's Representative.

Adjustment of Concrete Mixes:

Mix design adjustments may be requested by the Contractor when characteristics of materials, job conditions, weather, test results and other circumstances warrant; at no additional cost to the District and as accepted by the District's Representative. Provide submittals as in A above. Submit adjustment designs a minimum of 48 hours ahead of schedule for concrete production.

D. Product Data: Manufacturers' current catalog cuts and specifications for the following:

Expansion joint filler, sealant, backer rod and bond breaker, including manufacturer's standard color chart for sealant

Air-entrainment.

Curing Compound.

Fly Ash or Slag

MDO plywood made for forming

Water stops

Tactile warning surfacing

E. Certificates:

Reinforcing Steel: Certificate of compliance

Concrete Mix Design: Ticket for each batch delivered showing the following:

a. Mix identification.

b. Weight of cement, aggregate, water, and admixtures, aggregate sizes/proportion, and air entrainment.

1.05 QUALITY ASSURANCE

A. Comply with American Society for Testing Materials (ASTM) A-615 "Standard Specifications for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement," and "Manual of Standard Practice for Detailing Reinforced Concrete Structures," publication American Concrete Institute (ACI) 315-65 of the American Concrete Institute.

B. Comply with all pertinent recommendations contained in ACI, "Recommended Practice of Concrete Formwork, ACI-347", and the 2013 California Building Code (CBC).

C. Construct forms to sizes, shapes, lines and dimensions indicated on Drawings, and to obtain accurate alignment, location, grades, level and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in Work. Use selected materials to obtain required finish. Solidly butt joints and provide back-up at joints to prevent leakage of cement paste.

D. Provide complete forms of such strength and construction as to prevent any spread, shifting, or settling when concrete is deposited, and tight enough to avoid any leakage or washing out of cement mortar.

E. Provide at least one person who shall be present at all times during execution of this portion of the Work and who shall be thoroughly trained and experienced in placing the types of concrete specified and who shall direct all Work performed under this Section. For finishing of exposed surfaces of the concrete, use only thoroughly trained and experienced journeymen concrete finishers.

F. Conform to Section 90 of the Caltrans Standard Specifications.

G. The Contractor shall contact District's Representative of any discrepancies between field conditions and plans prior to proceeding with Work. The written dimension on Drawings shall supersede the graphic presentation. Dimensions are from back of curb, center line, base lines or as noted on the plans. All field adjustments must be approved by District's Representative prior to installation.

H. All walks and curbs shall be established in the field for review and approval prior to concrete pours. The Contractor shall layout the area or form work for review by District's Representative. If approval is not obtained, the Contractor is responsible for removal of any unauthorized field adjustments.

I. Transitions of curves to other curves, and curves to straight line tangents, shall be smooth and continuous.

J. Place expansion joint and score joints as shown on plan. Adjustments in the field shall be made only with the approval of District's Representative.

K. Where new concrete paving is placed adjacent to curbs or existing concrete paving, a construction joint (cold joint) shall be provided between the new concrete paving and curbs or existing concrete paving.

L. Sleeving shall be coordinated with concrete work. Refer to irrigation plan for sleeving location.

M. The Contractor shall be responsible for repairing, at no additional cost to District, any disturbed existing landscape designated to remain which resulted from construction of this project.

N. Some materials may require a several week order lead time. Contractor is responsible for determining any and all ordering lead times, and providing required materials at the project site in a timely manner. No unapproved substitutions will be allowed. Contact District's Representative immediately if a specified material is not available.

O. Mock-up:

One 4 foot square mock up for all poured in place finishes, including concrete paving and vertical walls, as shown on the drawings. Mock-ups shall also include finish, jointing, thickness, and edging.

Mock-ups shall be reviewed and approved by the District's Representative prior to commencing full work. Approved mock-up shall serve as a standard of quality for judging the acceptance of paving on the Project and may remain as part of the work.

P. Lines and Levels: To be established by a licensed Surveyor or registered Civil Engineer.

Q. Mix Standards: Conform to the ACI Manual and the Portland Cement Association's "Design and Control of Concrete Mixes".

R. Design of Concrete Mix: Employ approved commercial testing laboratory to design concrete mixes as follows:

Item	Minimum Cement Content	28-Day Minimum Strength	Water to Max. Slump	Aggregate Size	Gal/Bag Cement Ratio Max.
Slabs on Grade, Curbs, Exterior Walkways	517 lb/cu. yd	3,000 PSI	3 in.	¾ in	5.5

S. Fly Ash:

Source Control: The following sources of ash are not to be used:

a. Ash from a peaking plant instead of a base loaded plant.
b. Ash from plants burning different coals or blends of coal.
c. Ash from plants burning other fuels (wood chips, tires, trash) blended with coal.
d. Ash from plants using oil as a supplementary fuel.
e. Ash from plants using precipitator additives, such as ammonia.
f. Ash from start-up or shut-down phases of operation.
g. Ash from plants not operating at a "steady state."
h. Ash that is handled and stored using a wet system.

Fly ash used in concrete should be as consistent and uniform as possible. Fly ash to be used in concrete should be monitored by a quality assurance/quality control (QA/QC) program that complies with the recommended procedures in ASTM C311.(6) These procedures establish standards for methods of sampling and frequency of performing tests for fineness, loss on ignition (LOI), specific gravity, and pozzolanic activity such that the consistency of a fly ash source can be certified.

1.06 QUALIFICATION OF INSTALLER

A. Installer shall be thoroughly trained and experienced in the skills required, and shall be completely familiar with the products and their installation as specified on the Drawings and in this Section. Installer shall be present at all times during progress of Work of this Section and shall direct all Work performed.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Delivered Mixes: Coordinate delivery so that mixes may be immediately poured upon arrival at site.

B. Components and Accessories:

Fittings and Reinforcements: Protect from rust, soil and oil contamination at all times. Store on pallets above ground.

Templates: Protect from damage. Test accuracy prior to each use.

1.08 SEQUENCING AND SCHEDULING

A. Coordination: Coordinate all items of other trades to be furnished and set in place. Coordinate proper installation of all accessories embedded in the concrete and for the provision of holes, openings, etc., necessary to the execution of the work of the trades in ample time that progress of the work is not delayed.

1.09 JOB CONDITIONS

A. Cold-Weather Placement: comply with provisions of ACI 306 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

B. When air temperature has fallen to or is expected to fall below 40 deg F (4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.

   Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.

   Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators.

C. Hot-Weather Placement: When hot weather conditions exist that would impair quality and strength of concrete, place concrete complying with ACI 305 and as specified.

   Cool ingredients before mixing to maintain concrete temperature at time of placement to below 90 deg F (32 deg C). Mixing water may be chilled or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.

   Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedding in concrete.

   Fog spray form, reinforcing steel, and subgrade just before placing concrete. Keep subgade moisture uniform without puddles or dry areas.

1.10 COORDINATION

A. Secure all pipe sleeves, anchors and bolts, including those for angle frames, inserts, ties and other materials in connection with concrete construction, in position before concrete is placed.

B. Obtain information and instructions from other Trades and suppliers in ample time to schedule and coordinate the installation of items furnished by them to be embedded in concrete so provisions for their work can be made without delaying the project.

1.11 FORM CONSTRUCTION TOLERANCES

A. Set form to required grades and lines, rigidly braced and secured. Install sufficient quantity of forms to allow continuous progress of Work so that forms can remain in place for twenty-four hours after concrete placement.

B. Check completed formwork for grade and alignment to following tolerances:

C. Top of forms not more than one-eighth inch in ten feet vertical elevation.

D. Vertical face on longitudinal axis not more than one-fourth inch in ten feet horizontal width.

E. Circular or curved formwork shall be continuous, complete radii as indicated on Drawings. No straight segments in circular/curved formwork shall be accepted.

1.12 TESTS AND OBSERVATIONS

A. The following tests shall be made by District's testing laboratory or by a certified Special Inspector as determined by the District. Special inspections for Concrete Construction shall be in accordance with Section 1704.4 and Table 1704.4 of the 2010 CBC and as noted below:

Periodic Inspection of reinforcing steel and placement.

Cement: Mill analysis and test reports by supplier certifying cement conforms to Specifications is acceptable in lieu of tests at the discretion of District's Representative.

Provide free access to Work and cooperate with testing laboratory.

Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of Work.

Concrete Inspections:

a. Continuous Placement Inspection: Inspect for proper installation procedures.
b. Periodic Curing Inspection: Inspect for specified curing temperature and procedures.

Strength Test Samples:

c. Sampling Procedures: ASTM C172.
d. Cylinder Molding and Curing Procedures: ASTM C31, cylinder specimens.

Concrete cylinders: Make and cure in accordance with ASTM C31.

e. Record shall be made of the time cylinders were made and of locations of concrete from which the cylinders were taken.
f. Three identical cylinders shall be taken from each pour of 25 cubic yards or part thereof, being placed each day.
g. When volume of concrete for any class of concrete would provide less than 5 sets of cylinders, take samples from five randomly selected batches, or from every batch when less than 5 batches are used.
h. Make one additional cylinder during cold weather concreting, and field cure.

Field Testing:

i. Slump Test Method: ASTM C143.
j. Air Content Test Method: ASTM C173.

k. Temperature Test Method: ASTM C1064.
l. Measure slump and temperature for each compressive strength concrete sample.
m. Measure air content in air entrained concrete for each compressive strength concrete sample.

Cylinder Compressive Strength Testing:
n. Test Method: ASTM C39.
o. Test Acceptance: In accordance with ACI 318.
p. Test one cylinder at 7 days.
q. Test two cylinders at 28 days.

Maintain records of concrete placement. Record date, location, quantity, air temperature and test samples taken.

Should tests show that concrete is below specified strength; the Contractor shall remove all such concrete. Full cost of removal of inferior concrete, its replacement with concrete of proper specified strength and testing shall be borne by the Contractor.

1.13 CODES AND STANDARDS

A. ACI 301 "Structural Concrete for Building"

B. ACE 305 “Recommended Practice for Hot Weather Concreting”

C. ACI 306 “Recommended Practice for Cold Weather Concreting”.

D. ACI 308 “Curing Concrete”

E. ACI 309 “Recommended Practice for Consolidation of Concrete”

F. ACI 318 "Building Code Requirements for Reinforced Concrete".

G. ACI 347 “Recommended Practice for Concrete Formwork”.

H. ACI 605 “Recommended Practice for Hot Weather Concreting”.

I. ACI 614 "Recommended Practice for Measuring, Mixing, and Placing Concrete".

J. ASTM C31 “Practices for Making and Curing Concrete Test Specimens in the Field”.

K. ASTM C33-86 "Specifications for Concrete Aggregate".

L. ASTM C94-89 "Specifications for Ready Mixed Concrete".

M. ASTM C143 “Test Method for Slump Portland Cement Concrete”.

N. ASTM C150 “Portland Cement”.

O. ASTM C309 “Specifications for Liquid Membrane-forming Compounds for Curing Concrete”.

P. Western Concrete Reinforce Steel Institute (WCRSI) "Manual of Standard Practice".

Q. Where provisions of pertinent codes and standards conflict with this Specification, the more stringent provisions shall govern.

R. California Building Code (CBC), latest edition.

S. Section 90 of the Caltrans Standard Specifications.

Part 2- PRODUCTS

2.01 CONCRETE REINFORCEMENT

A. Reinforcing Bars: Deformed Billet Steel Bars, ASTM A-615, Grade 40 or 60, containing a minimum of 70% total recycled content, clean and free from rust, scale, or coating that will reduce bond.

B. Smooth Dowels for Joints: ASTM A615, Grade 40 smooth, billet-steel bars, shop painted with iron-oxide zinc-chromate primer.

C. Welded Wire Mesh: ASTM A-185 plain type and uncoated finish.

2.02 CONCRETE

A. Concrete Mix:

Ready-mixed concrete in accordance with ASTM C-94 and with aggregates comply with ASTM C-33 and Portland Cement ASTM C-150, Type II.

All mixes shall conform to applicable building code requirements listed herein or on the Drawings. All mix designs shall be submitted to the District’s Representative for approval before being used. Mix design shall show proportions of cement, fine and coarse aggregate, and water and graduation of combined aggregates. Calcium chloride shall not be added at any mix.

Concrete shall be Class B per Caltrans Standards.

Cement: All cement shall be Portland cement Type II, and shall be the product of one manufacturer. The temperature of cement delivered to the plant shall not exceed 150 degrees Fahrenheit.

Aggregates

a. Coarse aggregate shall have a minimum cleanliness value of 75.
b. Fine aggregate shall have a minimum of sand equivalent of 75.

c. Any suitable individual grading of coarse aggregates may be used.

Water: All water shall be clean and free from deleterious matter.

Admixture: No admixture of any type shall be used without prior approval of the District's Representative.

Concrete shall be as specified: Class B

d. 28-Day Minimum Strength: Refer to Table in Paragraph 1.5(R) above
e. Concrete slump: Refer to Table in Paragraph 1.5(R) above
f. Air Content: No air entrainment

B. Fly Ash: Pozzolanic admixtures, conforming to ASTM C618, Class C, with weight loss of ignition limited to not exceed 3 percent shall be used in mix designs to replace Portland Cement up to 15% by weight, unless noted otherwise on drawings.

Reference: ACI 211.4R-93.

C. Aggregate Base for Pavement:

1. Description: Class II aggregate base shall be 3/4 inch maximum and free from organic matter and other deleterious substances, and shall be of such nature that it can be compacted readily under watering and rolling to form a firm, stable base.

2. Grading Requirements:

Percent Passing	Sieve Size
100	1 in.
90-100	3/4 in.
35-60	#4
10-30	#30
2-9	#200

3. Quality Requirements:

a. Sand Equivalent: 25 min

C. Water: Clean, potable (domestic) free from injurious amounts of salts, oils, acids, alkalis, organic materials or other deleterious matter. Available from source determined by District's Representative.

D. Air Entrainment: ASTM C260.

E. Admixtures: Admixtures containing chlorides are not permitted. All admixtures shall be mixed in accordance with manufacture's written recommendations.

2.03 ACCESSORIES

A. Tie Wires: Black annealed, ASTM A-82, minimum 16 gauge.

B. Chains, Bolsters, Bar supports, Spacers: Sized and shaped for strength and support of reinforcement during installation and placement of concrete.

C. Stirrup Steel: ASTM A-82.

D. Snap Ties: Snap-off metal of fixed length capable of leaving no metal within one and one-half (1 1/2) inches of surface nor causing fractures, spall or other defects larger than one (1) inch in diameter.

E. Expansion Joint Materials:

Premolded Joint Filler: ASTM D1751, non-extruding and bituminous type resilient filler, compatible with sealant, and having a "guide strip" removable depth gauge.

Joint Sealant: ASTM C290, non-snag sealant "Dynatred" by Pecora Corporation, [214] 278-8158 or "Sonolastic Sealant Two-Part" by Sonneborn, [415] 889-9899, or equal.

a. Color shall be selected by the District's Representative from the manufacturer's full color selection.

Bond Breaker: Pressure-sensitive tape as recommended by sealant manufacturer to suit application.

F. Forms:

Steel or wood of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal.

Use forms that are straight and free of distortions and defects.

Use flexible spring forms or laminated boards to form radius bends as required.

G. Form Release Agent: Colorless non-staining, free from oils. Chemical agent shall not impair bonding of paint or other proposed coatings.

H. Form-Facing Materials:

All Surfaces: of sufficient strength to hold concrete properly in place and prevent leakage of water from forms.

Exposed Surfaces: Matte finish, coated, medium density overlay plywood made for forming. No wood-textured finish will be permitted on exposed concrete unless specified as such.

I. Curing Compound: ASTM C309, Type I-D, Class A.

J. Integral Color: As indicated on Drawings.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Verify that subgrade preparation for concrete paving has been completed prior to commencement of work.

Surface Drainage:

Report in writing conflicts discovered on the site or prior work, which would prevent positive drainage. Correct prior to performing concrete work.

Do not permit finished paving surfaces to vary more than 1/4 in. measured with a 10 ft. metal straightedge, except at grade changes. No "birdbaths" or other surface irregularities will be permitted. Properly correct irregularities.

3.02 PREPARATION

A. Templates: Use templates for all anchor plates, bolts, inserts and other items embedded in concrete. Accurately secure so that they will not be displaced during placing of concrete.

B. Piping and Conduit: Do not embed piping, other than electrical conduit, in structural concrete. Locate conduit to maintain strength of structures at maximum. Verify size, length and location of electrical conduit.

C. Exposed Tree Roots: protect

D. Aggregate Base Course: Compact base course to thicknesses and relative compaction shown on Drawings.

3.03 CONCRETE REINFORCEMENT PLACEMENT

A. Fabricate reinforcement in accordance with ACI-315, providing a minimum concrete cover of three inches or as specified in UBC, latest edition.

B. Place all reinforcement in the exact position shown on the Drawings and secure in position during the placing and compacting of concrete. Wire bars together with No.16 gauge wire with ties at all intersections except where spacing is less than twelve inches in each direction, in which case tie alternate intersections.

C. Place all sleeves, inserts, anchors and embedded items required for adjoining work or for its support prior to concreting. Fill voids in embedded items temporarily with readily removable material to prevent entry of concrete.

D. Give all contractors and subcontractors whose work is related to concrete or supported by it, ample notice and opportunity to introduce and/or furnish embedded items before concrete placement.

E. Verify that concrete reinforcement may be installed in strict accordance with all pertinent codes and regulations, the Shop Drawings and the original design.

F. Verify score joints in sidewalk slabs are constructed at 5-foot maximum intervals.

G. Bending:

Fabricate all reinforcement in strict accordance with the reviewed Shop Drawings.

Do not use bars with kinks or bends not indicated on the Drawings or on the reviewed Shop Drawings.

Do not bend or straighten steel in a manner that will injure the material.

Bend all bars cold.

Make all bends for other bars, including hooks, around a pin having diameter not less than six times the minimum thickness of the bar for number 8 and smaller and eight times the thickness for number 9 and larger.

H. Before the start of concrete placement, accurately place all concrete reinforcement, positively securing and supporting by concrete blocks, metal chairs or spacer, or by metal hangers.

I. Clearance:

Preserve clear space between bars of not less than one time the normal diameter of round bars.

In no case let the clear distance be less than 1 inch or less than 1-1/3 times the maximum size of aggregate.

Provide the following minimum concrete covering of reinforcement:

Concrete below ground deposited against forms: 3 inches.

Concrete deposited against earth: 3 inches.

Concrete elsewhere: as indicated on Drawings.

J. Splicing:

Horizontal bars:

Place bars in horizontal members with minimum laps at splices sufficient to develop the strength of the bars. Splice 40 bar diameters minimum.

Bars may be wired together at laps.

Wherever possible, stagger the splices of adjacent bars.

Wire fabric: Make all splices in wire fabric at least 1-1/2 meshes wide.

Other splices: Make only those other splices that are indicated on the approved Shop Drawings or specifically approved by District's Representative.

K. Dowels/Anchor Bolts: Place all required steel dowels/anchor bolts and securely anchor them into position before the concrete is placed. Bending the dowels after placement of concrete will not be permitted.

L. Obstruction: In the event conduits, piping, inserts, sleeves, or any other items interfere with placing reinforcement as indicated on the Drawings, or as otherwise required, immediately consult District's Representative and obtain review of new procedure before placing concrete.

3.04 CONCRETE FORMWORK CONSTRUCTION

A. Construct support, brace and maintain formwork to support vertical and lateral loads that might be applied until such loads can be supported by concrete.

B. Contractor assumes full responsibility in the removal of forms. The length of time forms must remain in place depends on the rate of time required for concrete to obtain a proper strength. Remove forms after the concrete is sufficiently hard to prevent damage to concrete.

C. Circular or curved formwork shall be continuous, complete radii as indicated on Drawings. No straight segments in circular/curved formwork shall be accepted.

D. Reuse of Forms:

Do not reuse forms if there is any evidence of surface wear or defect which would impair quality of surface.

Thoroughly clean and properly coat forms before reuse.

3.05 INSTALLATION

A. Notification: Notify the District's Representative at least 48 hours before placing concrete.

B. Placing Concrete:

a. Unless otherwise indicated or required by the Drawings, concrete paving shall be placed on compacted subgrade to thicknesses indicated on the Drawings to 95 percent compaction.

b. Place concrete in accordance with ACI-304 and Section 2605 of the California Building Code. Immediately after depositing, compact concrete thoroughly by mechanical vibration. No vibrating of form is allowed. Mixing shall be continuous, with no interruptions from the time the truck is filled until the time it is emptied. Concrete shall be placed within one and a half hours from the time water is first added.

c. Insure anchors, seats, plates, and other items to be cast into concrete are placed, held securely and will not cause hardship in placing concrete.

d. Insure reinforcement, inserts, embedded parts, etc. are not disturbed during concrete placement.

e. Pour concrete continuously between predetermined construction and control joints. Do not break or interrupt successive pours such that cold joints occur, unless otherwise indicated on the Drawings.

f. Lines and Grades: Elevations requiring accurate placement shall be set by a competent instrument man, using a professional type instrument.

g. For all concrete placed on soil, the subgrade shall be wet and compacted prior to placing.

h. Before placing concrete mixing, conveying and finishing equipment, forms and reinforcing shall be well-cleaned. Wet form before placing concrete, unless oiled forms are used.

3.06 CURING AND PROTECTION

A. Beginning immediately after placement, protect concrete from premature drying, from excessively hot or cold temperatures, and from mechanical injury. Maintain concrete with minimal moisture loss at relatively constant temperature for a period necessary for hydration of cement and hardening of concrete. In hot, dry and windy weather protect concrete from rapid moisture loss before and during finishing operations with an evaporation – control material. Apply according to manufacturer's instruction.

B. As soon as building flat work has hardened sufficiently to prevent injury to finish, apply an approved concrete curing agent in accordance with the manufacturer's recommendation.

C. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Keep continuously moist for not less than seven (7) days.

D. Excessive cracking as determined by the District's Representative which is aesthetically unacceptable or which will result in premature disintegration of paving shall result in replacement of concrete.

E. Removal of Forms: Remove no sooner than at seven days after each pour.

F. Conform to all applicable requirements for curing and protection of concrete, Sections 90-7 and 90-8 of the Caltrans Standard Specifications.

G. Spraying: Spray concrete during the curing period as frequently as drying conditions may require.

H. Curing: Cure concrete in accordance with the ACI Manual of Concrete Practice. During curing period, maintain concrete above 70 degrees F. for at least 3 days or above 50 degrees F. for at least 5 days.

I. Damage and Defacement: Protect all concrete work against damage and defacement during subsequent construction operations until final acceptance.

3.07 CLEANING AND PATCHING

A. Removal: Remove all projecting fins, bolts, wire, nails, etc., not necessary for the work, or cut them back 1 in. from the surface and patch in an inconspicuous manner.

B. Snap Ties: Immediately after removal of forms, cut off snap ties extending from the face of concrete to at least 1 in. deep in the concrete. Fill or plug as detailed in Drawings.

C. Voids: Fill holes with a 1:3 cement/sand mortar with the same color as the adjoining concrete. Mix and place the mortar as dry as possible and finish flush with the adjacent surface.

D. Corrective Patching: Correct all defects in concrete work. Chip all voids to a depth of at least 1 in. with the edges perpendicular to the surface and parallel to form markings. Fill all voids, surface irregularities, or honeycombing by patching or rubbing. Ensure that all concrete surfaces so repaired duplicate the appearance of the unpatched work.

E. Finishing: Work finish surface texture as specified below.

3.08 FINISHES

A. Medium Broom Finish:

Floating: Float surface once it has sufficiently stiffened. Check planeness of surface with a 10 ft. straightedge in all directions. Cut down high spots and fill lows. Immediately refloat to a uniform non-directional sandy texture.

Obtain by drawing a stiff bristled broom across a floated finish.

Direction of brooming to be perpendicular to direction of paving.

3.09 JOINTS

A. Construction Joints:

Locate and install joints as indicated on the Drawings so they do not impair strength or appearance of slab.

All joints and other edges shall be formed in the fresh concrete using an edging tool to provide a smooth uniform impression.

B. Score Joints:

Locate and install joints as indicated on the Drawings so they do not impair strength or appearance of slab.

Score joints shall be formed in the fresh concrete using a jointer to cut the groove so that a smooth uniform impression is obtained. All joints shall be struck before and after sandblast.

Locate and form joints with 1/4 inch radius edges and 1 inch to 1-1/4 inch deep score at the location as shown on the Drawings.

All joints and other edges shall be formed in the fresh concrete using an edging tool to provide a smooth uniform impression.

C. Expansion Joints:

Locate and install joints as indicated on the Drawings so they do not impair strength or appearance of slab.

Expansion joints shall be provided at the location and 40-foot maximum intervals as shown on the plans, and at all locations where concrete paving abuts buildings, curbs or other proposed or existing structures. Install as per detail on the Drawings.

All joints and other edges shall be formed in the fresh concrete using an edging tool to provide a smooth uniform impression.

Install backer-rod and joint sealant as indicated on the Drawings.

Sealing of Expansion Joints: After the curing period, strip out all depth gauge strips and carefully clean expansion joints. Fill with joint compound as shown on Drawings. Avoid spilling compound on paved surfaces or overflowing from joint.

Protect expansion joints from damage until placement of filler or caulk.

3.10 FIELD QUALITY CONTROL

A. Samples: Contractor shall coordinate with the District to select a qualified testing laboratory to take samples for testing during the course of the work as described in Article 1.13 Tests and Observations.

B. Field inspection and testing will be performed by a qualified testing laboratory in accordance with ACI 318 and as described in Article 1.13 Tests and Observations.

C. Cost of Testing: Contractor shall be responsible for costs associated with testing.

D. Rejected Materials: Remove off the site all concrete below specified strength.

E. Cost of Removal and Retesting: Contractor shall be responsible for costs associated with removal and costs associated with retesting.

F. Integral color: Color shall be evenly saturated in concrete mix to provide consistent, even, and distinct color in finished installation, including after medium sandblast finish is applied.

G. Defective Work: Remove in its entirety and replace all defective concrete work which after corrective patching, rubbing, etc., fails to duplicate the appearance of unpatched work and/or conform to the standards set forth in these Specifications.

H. Observe formwork continuously while concrete is being placed to see that there are no deviations from desired elevation, alignment, plumbness or camber.

I. If during construction any weakness develops and falsework shows undue settlement or discoloration, stop work, remove affected construction if permanently damaged, and strengthen falsework.

END OF SECTION

FIRE ALARM SYSTEM UPGRADE
NOBLE ELEMENTARY SCHOOL

3466 GROSSMONT DRIVE, SAN JOSE, CA 95132

BERRYESSA UNION SCHOOL DISTRICT

DSA FILE NUMBER 43-7
DSA APPLICATION NUMBER 01-120702
OPSC TRACKING NUMBER 69377-131

GENERAL NOTES

PRE-BID SITE VISIT

CONTRACTOR SHALL VISIT THE PROJECT AREA IN ORDER TO BECOME FAMILIAR WITH EXISTING CONDITIONS AND THE REQUIREMENTS OF THE PROJECT. THE CONTRACTOR MAY CONTACT THE ARCHITECT DURING THE BIDDING PHASE REGARDING CLARIFICATIONS AND PROJECT REQUIREMENTS.

SAFETY

IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, THE CONTRACTOR WILL BE SOLELY AND COMPLETELY RESPONSIBLE FOR CONDITIONS OF THE JOB SITE INCLUDING SAFETY OF ALL PERSONS AND PROPERTY DURING PERFORMANCE OF THE WORK. THIS REQUIREMENT WILL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS.

DAMAGE TO STRUCTURE OR SYSTEMS TO REMAIN

CONTRACTOR SHALL REIMBURSE THE OWNER FOR REPAIR AND REPLACEMENT, INCLUDING ARCHITECT'S FEES, FOR ANY DAMAGE CAUSED TO STRUCTURES, LANDSCAPE, SITE WORK, OR EXISTING SYSTEMS TO REMAIN, AS THE RESULT OF CONSTRUCTION OPERATIONS.

EXISTING CONDITIONS

ALL EXISTING CONDITIONS ARE SHOWN BASED ON THE BEST INFORMATION AVAILABLE AT THE TIME, BUT WITHOUT GUARANTEE OF ACCURACY. THE CONTRACTOR SHALL FIELD VERIFY ALL EXISTING CONDITIONS, DIMENSIONS, AND BUILDING DATA AT THE JOB SITE. ANY DISCREPANCIES REQUIRING MODIFICATION TO THE CONSTRUCTION DOCUMENTS SHALL BE REPORTED TO THE ARCHITECT IMMEDIATELY. NO MODIFICATIONS SHALL BE MADE BY THE CONTRACTOR WITHOUT PRIOR APPROVAL FROM THE ARCHITECT.

CONTRACTOR'S EQUIPMENT

COORDINATE WITH OWNER'S REPRESENTATIVE FOR APPROVED LOCATION OF JOB SITE ACCESS, PARKING, AND LOCATION OF CONTRACTOR'S EQUIPMENT AND MATERIAL STORAGE AREA. SEE SITE PLAN FOR ADDITIONAL NOTES.

UTILITY SHUT-DOWNS AND CONNECTIONS

ALL REQUIRED UTILITY SHUT DOWNS SHALL HAVE PRIOR APPROVAL FROM THE OWNER'S REPRESENTATIVE. REQUEST SHALL BE SUBMITTED WITH ADEQUATE ADVANCE NOTICE PER PROJECT REQUIREMENTS.

ASBESTOS AND ASBESTOS PRODUCTS

THE OWNER/OPERATOR AND CONTRACTOR SHALL BE AWARE THAT BUILDINGS CONSTRUCTED PRIOR TO 1978 (OR THERE ABOUT) POSSIBILITY CONTAIN ASBESTOS IN SOME EXISTING CONSTRUCTION MATERIALS, AND WILL LIKELY BE ENCOUNTERED DURING ALTERATIONS OR REMODELING.

UNDER CALIFORNIA TITLE 8, THE OWNER AND CONTRACTOR BOTH HAVE RESPONSIBILITIES TO DETERMINE THE EXISTENCE OF ASBESTOS CONTAINING MATERIALS IN AREAS TO BE ALTERED OR REMODELED PRIOR TO COMMENCEMENT OF WORK AND TO TAKE APPROPRIATE MEASURES TO PROTECT PERSONNEL. CAL-OSHA HAS JURISDICTION OVER ASBESTOS RELATED WORK. ASBESTOS RELATED WORK SHALL BE DONE IN ACCORDANCE WITH CALIFORNIA GENERAL INDUSTRIAL SAFETY ORDERS, TITLE 8, SECTION 341.6 THROUGH 341.14. ASBESTOS IN THE WORK ENVIRONMENT IS REGULATED BY TITLE 8, SECTION 5208.

THE BAY AREA AIR QUALITY MANAGEMENT DISTRICT AND DISTRICT REGULATION 11-2-401.3 REQUIRES EVERY RENOVATION INVOLVING THE REMOVAL OF 100 SQ.FT., LN FT, OR GREATER OF REGULATED ASBESTOS CONTAINING MATERIAL, AND FOR EVERY DEMOLITION (EVEN WHEN NO ASBESTOS IS PRESENT), A NOTIFICATION MUST BE SENT TO THE BAAQMD AT LEAST 10 WORKING DAYS PRIOR TO COMMENCEMENT OF DEMOLITION / RENOVATION.

ALL BUILDING MATERIALS MUST BE ASBESTOS FREE

THESE DOCUMENTS DO NOT ADDRESS CONTAINMENT FOR EXISTING AREAS OF ASBESTOS WHICH MAY BE DISCOVERED DURING CONSTRUCTION. THE OWNER'S ABATEMENT SUBCONTRACTOR IS SOLELY RESPONSIBLE FOR THE DETECTION, REMOVAL, AND THE DISPOSAL OF ANY EXISTING ASBESTOS MATERIAL. ARCHITECTURAL AND ENGINEERING FEES FOR ADDITIONAL DESIGN EFFORT TO OBTAIN STATE APPROVALS, AS WELL AS THE COST OF ANY REPAIRS, FOR DAMAGE CAUSED OR REPLACEMENT OF EXISTING SYSTEMS TO REMAIN, DUE TO WORK PERFORMED BY THE ASBESTOS ABATEMENT SUBCONTRACTOR, SHALL BE THE RESPONSIBILITY OF SAID SUBCONTRACTOR.

CONSTRUCTION SCHEDULING

CONTRACTOR SHALL COORDINATE ALL CONSTRUCTION OPERATIONS WITH OWNER'S REPRESENTATIVE PRIOR TO SCHEDULING AND START OF THE WORK. CONTRACTOR SHALL PROVIDE PROTECTION TO ALL EXISTING SPACES AND SYSTEMS WHICH ARE IN USE, ADJOINING THE PROJECT, AND NOT PART OF THE PROJECT.

INTERIOR FINISHES

INTERIOR FINISHES AND ALL WALL COVERING MATERIAL SHALL CONFORM TO CCR TITLE 24, PART 2, CHAPTER 8.

DRILLED-IN EXPANSION ANCHORS

WHEN INSTALLING DRILLED-IN ANCHORS AND/OR POWDER DRIVEN PINS IN EXISTING NON-PRESTRESSED REINFORCED CONCRETE, USE CARE AND CAUTION TO AVOID CUTTING OR DAMAGING THE EXISTING REINFORCING BARS. WHEN INSTALLING THEM INTO EXISTING PRESTRESSED CONCRETE (PRE- OR POST-TENSIONED), LOCATE THE PRESTRESSED TENDONS BY USING A NON-DESTRUCTIVE METHOD PRIOR TO INSTALLATION. EXERCISE EXTREME CARE AND CAUTION TO AVOID CUTTING OR DAMAGING THE TENDONS DURING INSTALLATION. MAINTAIN A MINIMUM CLEARANCE OF ONE INCH BETWEEN THE REINFORCEMENT AND THE DRILLED-IN ANCHOR AND/OR PIN.

TITLE 24 COMPLIANCE

THE INTENT OF THESE DRAWINGS AND SPECIFICATIONS IS THAT THE WORK OF THE ALTERATION, REHABILITATION OR RECONSTRUCTION IS TO BE IN ACCORDANCE WITH TITLE 24, CALIFORNIA CODE OF REGULATIONS (2019 CBC). SHOULD ANY EXISTING CONDITIONS SUCH AS DETERIORATION OR NON-COMPLYING CONSTRUCTION BE DISCOVERED NOT COVERED BY THE CONTRACT DOCUMENTS WHEREIN THE FINISHED WORK WILL NOT COMPLY WITH TITLE 24, CCR, A CONSTRUCTION CHANGE DOCUMENT OR A SEPARATE SET OF PLANS AND SPECIFICATIONS, DETAILING AND SPECIFYING THE REQUIRED WORK, SHALL BE SUBMITTED TO AND APPROVED BY THE DSA BEFORE PROCEEDING WITH THE WORK.

ADMINISTRATIVE REQUIREMENTS FROM PART 1, TITLE 24, C.C.R.

- CHANGES TO THE APPROVED DRAWINGS AND SPECIFICATIONS SHALL BE MADE BY AN ADDENDUM OR A CONSTRUCTION CHANGE DOCUMENT, AND APPROVED BY DSA, AS PER SECTION 4-338.
- A DSA CERTIFIED PROJECT INSPECTOR EMPLOYED BY THE DISTRICT AND APPROVED BY DSA SHALL PROVIDE CONTINUOUS INSPECTION OF WORK, PER SECTION 4-342.
- A DSA ACCEPTED TESTING LABORATORY DIRECTLY EMPLOYED BY THE DISTRICT SHALL CONDUCT ALL REQUIRED TEST AND INSPECTIONS FOR THE PROJECT.
- SPECIAL INSPECTION PER SECTION 4-333 (C).
- CONTRACTOR SHALL SUBMIT VERIFIED REPORT OR SECTION 4-336 & 4-343 (C)
- ADMINISTRATION OR CONSTRUCTION PER PART 1, TITLE 24, C.C.R.
- DUTIES OF ARCHITECT, STRUCTURAL ENGINEER, OR PROFESSIONAL ENGINEER PER SECTION 4-333 (A) AND 4-341
- DUTIES OF CONTRACTOR PER SECTION 4-343
- VERIFIED REPORTS PER SECTION 4-343 AND 4-336
- A COPY OF PARTS 1 TO 5 OF TITLE 24 SHALL BE KEPT AND AVAILABLE IN THE FIELD DURING CONSTRUCTION
- DSA SHALL BE NOTIFIED AT START OF CONSTRUCTION AND PRIOR TO PLACEMENT OF CONCRETE PER SECTION 4-331
- SUPERVISION BY DSA PER SECTION 4-334
- DSA IS NOT SUBJECT TO ARBITRATION

ADMINISTRATIVE REQUIREMENTS

- ADDENDA MUST BE SIGNED BY ARCHITECT AND APPROVED BY DSA
- NO CHANGES OR REVISIONS SHALL BE MADE FOLLOWING WRITTEN APPROVAL WHICH AFFECTS ACCESS COMPLIANCE ITEM UNLESS SUCH CHANGES TO REVISIONS ARE SUBMITTED TO DSA FOR APPROVAL.
- SUBSTITUTIONS AFFECTING DSA REGULATED ITEMS SHALL BE SUBMITTED AS A CONSTRUCTION CHANGE DOCUMENT OR ADDENDA, AND SHALL BE APPROVED BY DSA PRIOR TO FABRICATION AND INSTALLATION
- CONSTRUCTION CHANGE DOCUMENTS MUST BE SIGNED BY THE FOLLOWING:
  - ARCHITECT OR ENGINEER OF RECORD
  - STRUCTURAL ENGINEER (WHEN APPLICABLE)
  - DELEGATED PROFESSIONAL ENGINEER
  - DSA
- MATERIALS AND THEIR INSTALLATIONS SHALL COMPLY WITH APPLICABLE CODES.
- PER CBC 11B-104.1 "ALL DIMENSIONS ARE SUBJECT TO CONVENTIONAL INDUSTRY TOLERANCES EXCEPT WHERE THE REQUIREMENT IS STATED AS A RANGE WITH SPECIFIC MINIMUM AND MAXIMUM END POINTS.

GENERAL NOTES, cont.

CALIFORNIA ENERGY CODE

THE CALIFORNIA ENERGY CODE SECTION 10-103 REQUIRES ACCEPTANCE TESTING ON ALL NEWLY INSTALLED LIGHTING CONTROLS, MECHANICAL SYSTEMS, ENVELOPES, AND PROCESS EQUIPMENT AFTER INSTALLATION AND BEFORE PROJECT COMPLETION. AN ACCEPTANCE TEST IS A FUNCTIONAL PERFORMANCE TEST TO HELP ENSURE THAT NEWLY INSTALLED EQUIPMENT IS OPERATING AND IN COMPLIANCE WITH THE ENERGY CODE.

LIGHTING CONTROLS ACCEPTANCE TEST MUST BE PERFORMED BY A CERTIFIED LIGHTING CONTROLS ACCEPTANCE TEST TECHNICIAN (ATT).

MECHANICAL SYSTEM ACCEPTANCE TESTS MUST BE PERFORMED BY A CERTIFIED MECHANICAL ATT.

A LISTING OF CERTIFIED ATT's CAN BE FOUND AT
https://www.energy.ca.gov/programs-and-topics/programs/acceptance-test-technician-certification-provider-program#acceptance

THE ACCEPTANCE TESTING PROCEDURES MUST BE REPEATED, AND DEFICIENCIES MUST BE CORRECTED BY THE BUILDER OR INSTALLING CONTRACTOR UNTIL THE CONSTRUCTION/INSTALLATION OF THE SPECIFIED SYSTEMS CONFORM AND PASS THE REQUIRED ACCEPTANCE CRITERIA.

PROJECT INSPECTORS WILL BE COLLECTING THE FORMS TO CONFIRM THAT THE REQUIRED ACCEPTANCE TESTS HAVE BEEN COMPLETED.

COMPLIANCE WITH LOCAL ORDINANCES

GRADING PLANS, DRAINAGE IMPROVEMENTS, ROAD AND ACCESS REQUIREMENTS AND ENVIRONMENTAL HEALTH CONSIDERATIONS SHALL COMPLY WITH ALL LOCAL ORDINANCES.

ABBREVIATIONS

(REFER TO CONSULTANT DRAWINGS FOR ADDITIONAL ABBREVIATIONS)

A.F.F.	ABOVE FINISHED FLOOR	LAM.	LAMINATE
A.P.	ACCESS PANEL	LAV.	LAVATORY
ACT	ACOUSTIC TILE	M.B.	MACHINE BOLT
ADJ.	ADJUSTABLE	M.S.	MACHINE SCREW
ALUM.	ALUMINUM	M.H.	MANHOLE
A.B.	ANCHOR BOLT	MFG.	MANUFACTURER
APPROX.	APPROXIMATELY	M.B.	MARKER BOARD
ARCH.	ARCHITECT	MATL.	MATERIAL
AC	ASPHALTIC CONCRETE	MAX.	MAXIMUM
@	AT	MECH.	MECHANICAL
B.M.	BENCH MARK	MTL.	METAL
BLKG.	BLOCKING	MIN.	MINIMUM
BD.	BOARD	MISC	MISCELLANEOUS
B.W.	BOTH WAYS	MTD.	MOUNTED
BOT.	BOTTOM	(N)	NEW
BLDG.	BUILDING	NOM.	NOMINAL
B.U.R.	BUILT-UP ROOFING	N.I.C.	NOT IN CONTRACT
C.B.	CATCH BASIN	N.T.S.	NOT TO SCALE
CLG.	CEILING	NO. or #	NUMBER
CEM.	CEMENT	OCC.	OCCUPANT(CY)
C.C. or O.C.	CENTER TO CENTER	O.C.	ON CENTER
	CENTERLINE	OPNG.	OPENING
CER. TILE	CERAMIC TILE	OPP.	OPPOSITE
C.O.	CLEANOUT	O.H.	OPPOSITE HAND
C.O.T.G.	CLEANOUT TO GRADE	O.F.D.S.	OUTSIDE FACE OF STUD
CLR.	CLEAR	O.H.W.S.	OVAL HEAD WOOD SCREW
C.A.H.R.	CLEAR ALL HEART REDWOOD	O.D.	OVERFLOW DRAIN and/or OUTSIDE DIAMETER
C.W.	COLD WATER		
COL.	COLUMN	O.F.C.I.	OWNER FURNISHED and CONTRACTOR INSTALLED
COM.	COMMON		
CONC.	CONCRETE	PR.	PAIR
CONST.	CONSTRUCTION	PART.	PARTITION
C.H.	CONSTRUCTION HEART	PL.	PLATE
C.J.	CONSTRUCTION JOINT	#	PENNY (NAILS)
CONT.	CONTINUOUS	PLAS.	PLASTER
CONTR.	CONTRACTOR	PLYWD.	PLYWOOD
CTR.	COUNTER	P.V.C.	POLY VINYL CHLORIDE
CTSK.	COUNTER SUNK	P.T.	PRESSURE TREATED
DET.	DETAIL	P.L.	PROPERTY LINE
DIA. or Ø	DIAMETER	R. or RAD.	RADIUS
DIM.	DIMENSION	R.W.L.	RAIN WATER LEADER
D.A.	DISABLED ACCESS	RWD./R.W.	REDWOOD
DR.	DOOR	REINF.	REINFORCING
D.S.	DOWNSPOUT	REQ'D	REQUIRED
DWG.	DRAWING	R.A.G.	RETURN AIR GRILLE
D.F.	DRINKING FOUNTAIN and/or DOUGLAS FIR	R.E.	RIM ELEVATION
		R.D.	ROOF DRAIN
EA.	EACH	RM.	ROOM
E.W.	EACH WAY	R.O.	ROUGH OPENING
ELEC.	ELECTRIC or ELECTRICAL	RND.	ROUND
EL. or ELEV.	ELEVATION	R.H.M.S.	ROUND HEAD METAL SCREW
ENCL.	ENCLOSE and/or ENCLOSURE	R.H.W.S.	ROUND HEAD WOOD SCREW
EQ.	EQUAL	SSD.	SEE STRUCTURAL DRAWINGS
EQUIP.	EQUIPMENT	S.T.S.M.S.	SELF TAPPING SHEET METAL SCREW
(E)	EXISTING	SHEATH.	SHEATHING
EX.	EXPANSION	S.M.	SHEET METAL
E.J.	EXPANSION JOINT	S.M.S.	SHEET METAL SCREW
EXP.	EXPOSED	S.O.V.	SHUT OFF VALVE
EXT.	EXTERIOR	SIM.	SIMILAR
F.O.C.	FACE OF CONCRETE	S.C.	SOLID CORE
F.O.M.	FACE OF MASONRY	SPEC.	SPECIFICATION
F.O.S.	FACE OF STUD	SQ.	SQUARE
F.O.F.	FACE OF FINISH	S.F.	SQUARE FEET
FIN.	FINISH	STAG.	STAGGERED
F.F.	FINISHED FLOOR	STD.	STANDARD
F.S.	FINISH SLAB	S.S.	STAINLESS STEEL
F.E.	FIRE EXTINGUISHER	STL.	STEEL
F.E.C.	FIRE EXTINGUISHER CABINET	STOR.	STORAGE
F.H.	FIRE HYDRANT	STRUCT.	STRUCTURAL
F.H.M.S.	FLAT HEAD METAL SCREW	S.A.G.	SUPPLY AIR GRILLE
F.H.W.S.	FLAT HEAD WOOD SCREW	THRES.	THRESHOLD
FL. or FLR.	FLOOR	T&G	TONGUE & GROOVE
F.D.	FLOOR DRAIN	T.J.	TOOLED JOINT
FTG.	FOOTING	T.O.B.	TOP OF BEAM
FND.	FOUNDATION	T.O.C.	TOP OF CURB or CONCRETE
GALV.	GALVANIZED	T.O.S.	TOP OF STEEL or SHEATHING
G.I.	GALVANIZED IRON	T.O.W.	TOP OF WALK
GA.	GAUGE	TYP.	TYPICAL
GL.	GLASS	U.O.N.	UNLESS OTHERWISE NOTED
GLU-LAM	GLUE-LAMINATED	U.O.S.	UNLESS OTHERWISE SHOWN
GRD.	GRADE	V.T.R.	VENT THROUGH ROOF
GYP. BD.	GYPSUM BOARD	VERT.	VERTICAL
HDW.	HARDWARE	V.G.	VERTICAL GRAIN
HT.	HEIGHT	V.I.F.	VERIFY IN FIELD
H.C.	HOLLOW CORE	V.C.T.	VINYL COMPOSITION TILE
H.M.	HOLLOW METAL	V.W.C.	VINYL WALL COVERING
HORIZ.	HORIZONTAL	V.O.I.P.	VOICE OVER INTERNET PROTOCOL
H.B.	HOSE BIBB	W.C.	WATER CLOSET
I.D.	INSIDE DIAMETER	W.H.	WATER HEATER
INSUL.	INSULATION	WP.	WATERPROOF
INT.	INTERIOR	W.R.	WATER RESISTANT
INV.	INVERT	W.W.M.	WELDED WIRE MESH
JT.	JOINT	W.D.	WINDOW DIMENSION
J.H.	JOIST HANGER	W/	WITH
K.D.	KILN DRIED	W/O	WITHOUT
		WD.	WOOD

BLDG. CODES & STANDARDS:

2022	CALIFORNIA ADMINISTRATIVE CODE, PART 1, TITLE 24 C.C.R.
2019	CALIFORNIA BUILDING CODE (CBC), PART 2, TITLE 24, C.C.R. (2018 INTERNATIONAL BUILDING CODE, VOLUMES 1 AND 2, WITH 2019 CALIFORNIA AMENDMENTS.)
2019	CALIFORNIA ELECTRIC CODE (CEC), PART 3, TITLE 24, C.C.R. (2017 NATIONAL ELECTRIC CODE WITH 2019 CALIFORNIA AMENDMENTS).
2019	CALIFORNIA MECHANICAL CODE (CMC), PART 4, TITLE 24, C.C.R. (2018 UNIFORM MECHANICAL CODE WITH 2019 CALIFORNIA AMENDMENTS).
2019	CALIFORNIA PLUMBING CODE (CPC), PART 5, TITLE 24, C.C.R. (2018 UNIFORM PLUMBING CODE WITH 2019 CALIFORNIA AMENDMENTS).
2019	CALIFORNIA ENERGY CODE (CENC), PART 6, TITLE 24, C.C.R.
2019	CALIFORNIA FIRE CODE (CFC), PART 9, TITLE 24, C.C.R. (2018 INTERNATIONAL FIRE CODE WITH 2019 CALIFORNIA AMENDMENTS).
2019	CALIFORNIA GREEN BUILDING STANDARDS CODE, PART 11, TITLE 24, C.C.R.
2019	CALIFORNIA REFERENCED STANDARDS, PART 12, TITLE 24, C.C.R.
2016	ASME A17.1 (WA17.1a/CSA B44a-08 ADDENDA) SAFETY CODE FOR ELEVATORS AND ESCALATORS
2010	ADA STANDARDS FOR ACCESSIBLE DESIGN (28 CFR PART 35 FOR TITLE II ENTITIES)

CCR TITLE-19, PUBLIC SAFETY, STATE FIRE MARSHAL REGULATIONS.

NFPA 13	INSTALLATION OF SPRINKLER SYSTEMS (CA AMENDED)	2016 EDITION
NFPA 14	INSTALLATION OF STANDPIPE & HOSE SYSTEMS (CA AMENDED)	2016 EDITION
NFPA 17	DRY CHEMICAL EXTINGUISHING SYSTEMS	2017 EDITION
NFPA 17A	WET CHEMICAL EXTINGUISHING SYSTEM	2017 EDITION
NFPA 20	STATIONARY FIRE PUMPS TO FIRE PROTECTION	2016 EDITION
NFPA 22	WATER TANKS FOR PRIVATE FIRE PROTECTION	2013 EDITION
NFPA 24	PRIVATE FIRE SERVICE MAINS (CA AMENDED)	2016 EDITION
NFPA 25	INSPECTION, TESTING AND MAINTENANCE OF WATER BASED FIRE PROTECTION SYSTEMS	2013 CALIFORNIA EDITION
NFPA 72	NATIONAL FIRE ALARM CODE (CA AMENDED)	2016 EDITION
NFPA 80	FIRE DOORS AND OTHER OPENING PROTECTIVES	2016 EDITION
NFPA 92	STANDARD FOR SMOKE CONTROL SYSTEMS	2015 EDITION
NFPA 110	EMERGENCY AND STANDBY POWER SYSTEMS	2016 EDITION
NFPA 170	STANDARD FOR FIRE SAFETY AND EMERGENCY SYMBOLS	2018 EDITION
NFPA 253	CRITICAL RADIANT FLUX OF FLOOR COVERING SYSTEMS	2015 EDITION
NFPA 2001	CLEAN AGENT FIRE EXTINGUISHING SYSTEMS	2015 EDITION
ICC 300	STANDARDS FOR BLEACHERS, FOLDING AND TELESCOPIC SEATING, AND GRANDSTANDS	2017 EDITION

SFM 12-10-1	POWER OPERATED EXIT DOORS
SFM 12-10-2	SINGLE POINT LATCHING OR LOCKING DEVICES
SFM 12-10-3	EMERGENCY EXIT & PANIC HARDWARE

UL 38	MANUAL OPERATING SIGNAL BOXES	1999/2005 EDITION
UL 268	SMOKE DETECTORS FOR FIRE PROTECTIVE SIGNALING SYSTEMS	2009 EDITION
UL 268A	SMOKE DETECTORS DUCT APPLICATIONS	1998/2003 EDITION
UL 300	FIRE TESTING OF FIRE EXTINGUISHING SYSTEMS FOR PROTECTION OF COMMERCIAL COOKING EQUIPMENT	2005 (R2010)
UL 305	PANIC HARDWARE	2012 EDITION
UL 464	AUDIBLE SIGNALING DEVICES FOR FIRE ALARM AND SIGNALING SYSTEMS, AND ACCESSORIES	2003 EDITION
UL 521	HEAT DETECTORS FOR FIRE PROTECTIVE SIGNALING SYSTEMS	1999 EDITION
UL 864	CONTROL UNITS FOR FIRE PROTECTIVE SIGNALING SYSTEMS (W/ REVISIONS THROUGH DEC. 2014)	2003 EDITION
UL 1971	SIGNALING DEVICES FOR THE HEARING IMPAIRED	2002 EDITION

COMPLIANCE WITH CFC CHAPTER 33, FIRE SAFETY DURING CONSTRUCTION AND DEMOLITION AND CBC CHAPTER 33, SAFETY DURING CONSTRUCTION WILL BE ENFORCED.

DSA APPROVAL OF THESE PLANS SHALL NOT BE CONSTRUED AS THE CERTIFICATION OF COMPLIANCE FOR THE PROJECT BUILDINGS AS REQUIRED BE THE FIELD ACT, EDUCATION CODE SECTIONS 17280-17316 AND SECTIONS 81130-81147.

SYMBOLS LEGEND

- SECTION / EXTERIOR ELEVATION — SECTION IDENTIFICATION; SHEET WHERE SECTION IS DRAWN
- DETAIL — DETAIL IDENTIFICATION; SHEET WHERE DETAIL IS DRAWN
- INTERIOR ELEVATION — INDICATES ELEVATION SHOWN; SHEET WHERE ELEVATION IS DRAWN
- ROOM IDENTIFICATION — CLASSROOM; ROOM NAME; 102; ROOM NUMBER
- SPECIFIC NOTE
- DOOR DESIGNATION
- WINDOW DESIGNATION
- ADDENDUM REVISION — CLOUD AROUND REVISION
- CCD REVISION — CLOUD AROUND REVISION; CCD
- FINISH NUMBER — SEE SPECS AND I.E. DWGS.
- EQUIPMENT LETTER — SEE EQUIPMENT SCHEDULE
- CEILING HEIGHT
- WALL TYPE
- MATCH LINE
- ELEV. HEIGHT
- CENTER OF / FACE OF

PROJECT SUMMARY

CAMPUS WIDE FIRE ALARM SYSTEM REPLACEMENT.

THERE ARE NO DEFERRED SUBMITTALS FOR THIS PROJECT.

DESIGN TEAM

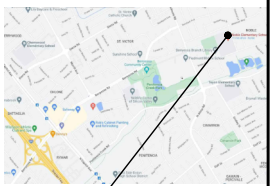
ARCHITECT
SUGIMURA PINNEY ARCHITECTS
2155 SOUTH BASCOM AVENUE SUITE 200
CAMPBELL, CALIFORNIA 95008
(408) 879-0600
(408) 377-6066 FAX
ATTN: MIKE BOWERS MIKE@SUGIMURA.COM

ELECTRICAL AND FIRE ALARM ENGINEER
AURUM CONSULTING ENGINEERS
1798 TECHNOLOGY DRIVE, SUITE 242
SAN JOSE, CA 95110
(408) 564-7525
ATTN: NAJIB ANWARY NAJIB@ACEMB.COM

DRAWING INDEX

SHEET TOTAL = 20

VICINITY MAP



PROJECT LOCATION

STATEMENT OF GENERAL CONFORMANCE

FOR ARCHITECTS / ENGINEERS WHO UTILIZE PLANS, INCLUDING BUT NOT LIMITED TO SHOP DRAWINGS, PREPARED BY OTHER LICENSED DESIGN PROFESSIONALS AND / OR OTHER CONSULTANTS

APPLICATION NO.: 01-120702 FILE NO.: 43-7

THE DRAWINGS OR SHEETS LISTED ON THE COVER OR INDEX SHEET THIS DRAWING, PAGE OF SPECIFICATIONS / CALCULATIONS

HAVE BEEN PREPARED BY OTHER DESIGN PROFESSIONALS OR CONSULTANTS WHO ARE LICENSED AND / OR AUTHORIZED TO PREPARE SUCH DRAWINGS IN THIS STATE. IT HAS BEEN EXAMINED BY ME FOR:

1) DESIGN INTENT AND APPEARS TO MEET THE APPROPRIATE REQUIREMENTS OF TITLE 24, CALIFORNIA CODE OF REGULATIONS AND THE PROJECT SPECIFICATIONS PREPARED BY ME, AND

2) COORDINATION WITH MY PLANS AND SPECIFICATIONS AND IS ACCEPTABLE FOR INCORPORATION INTO THE CONSTRUCTION OF THIS PROJECT.

THE STATEMENT OF GENERAL CONFORMANCE *SHALL NOT BE CONSTRUED AS RELIEVING ME OF MY RIGHTS, DUTIES, AND RESPONSIBILITIES UNDER SECTIONS 17302 AND 81138 OF THE EDUCATION CODE AND SECTIONS 4-336, 4-341 AND 4-344* OF TITLE 24, PART 1, *(TITLE 24, PART 1, SECTION 4-317(B))*

I FIND THAT:

☒ ALL DRAWINGS OR SHEETS LISTED ON THE COVER OR INDEX SHEET THIS DRAWING OR PAGE

☒ IS / ARE IN GENERAL CONFORMANCE WITH THE PROJECT DESIGN, AND HAS / HAVE BEEN COORDINATED WITH THE PROJECT PLANS AND SPECIFICATIONS.

MARK PINNEY — 12/30/2022
C-2467 — 9/30/2023
LICENSE NUMBER — EXPIRATION DATE

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 01-120702 INC:
REVIEWED FOR:
SS ☐ FLS ☑ ACS ☐
DATE: 5/5/2023
(DSA STAMP AREA)

REGISTERED ARCHITECT — MARK PINNEY — NO. C-2467 — EXPIRES 9-30-2023 — STATE OF CALIFORNIA

TITLE SHEET

FIRE ALARM SYSTEM UPGRADE
NOBLE ELEMENTARY SCHOOL
3466 GROSSMONT DRIVE, SAN JOSE, CA 95132
BERRYESSA UNION SCHOOL DISTRICT

REVISIONS

NO.	ITEM	DATE

DRAWN BY:	KNU
CHECKED BY:	M.B.
SFA JOB NO:	DATE:
22084	04/03/2023

T1

* BUILDING CODE ANALYSIS				
BUILDING	CONSTRUCTION TYPE OCCUPANCY TYPE	AREA (SQ.FT.)	ALLOWABLE (SQ.FT.)	# OF STORIES
BUILDING A	V-B / E	5,202	9,500	1 NON SPRINKLER
BUILDING B	V-B / E	6,707	9,500	1 NON SPRINKLER
BUILDING C	V-B / E	7,520	9,500	1 NON SPRINKLER
BUILDING D	V-B / E	7,426	9,500	1 NON SPRINKLER
BUILDING E	V-1HR / B	5,600	9,000	1 NON SPRINKLER
BUILDING F	V-1HR / A2.1, E	6,553	11,288	1 NON SPRINKLER
PORTABLES (P1 + P2)	V-B / E	1,920	9,500	1 NON SPRINKLER

* NO OCCUPANCY CHANGE, SIGNIFICANT ALTERATION, OR INCREASE IN SQUARE FOOTAGE IS PROPOSED FOR THIS PROJECT SCOPE OF WORK. BUILDINGS DO NOT REQUIRE THE ADDITION OF SPRINKLERS. EXISTING BUILDING CONSTRUCTION TYPE WILL BE MAINTAINED.

PROJECT SUMMARY

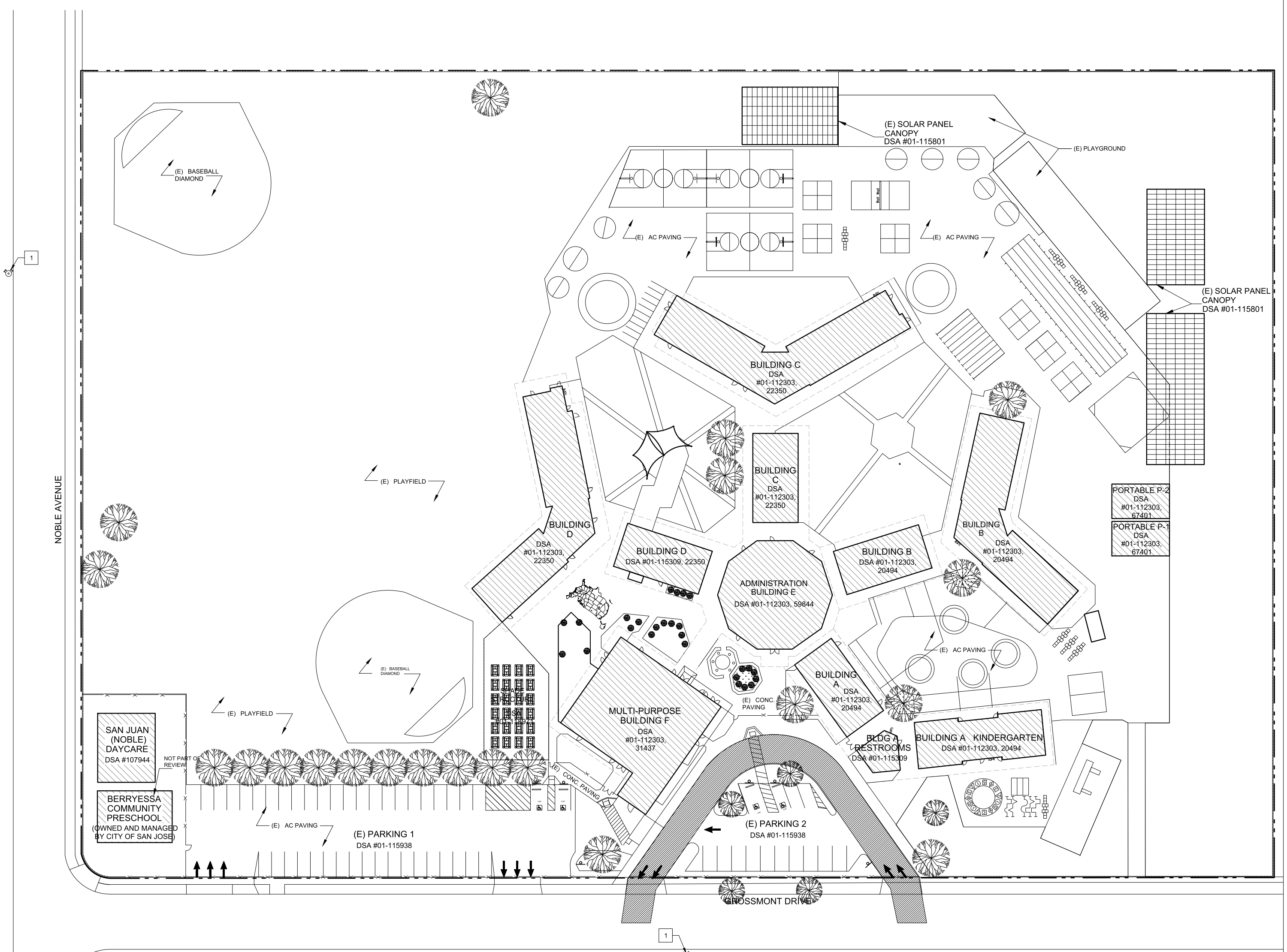
CAMPUS WIDE FIRE ALARM SYSTEM REPLACEMENT.

GENERAL NOTES

A. THIS SHEET IS FOR FIRE LIFE SAFETY CODE RELATED ITEMS.
B. REFER TO FIRE ALARM DRAWINGS FOR EXTENT OF OTHER RELATED WORK.

SITE PLAN - FIRE LIFE SAFETY NOTES

1. EXISTING FIRE HYDRANT.



1 SITE PLAN - FIRE LIFE SAFETY

1" = 30'-0" 0 7.5' 15' 30' 60' 90' REF NORTH TRUE NORTH

GRAPHIC KEY

- EXISTING PROPERTY LINE
- ROOF OVERHANG
- CHAIN LINK FENCE
- DECORATIVE FENCE
- EXISTING BUILDING
- FIRE DEPARTMENT ACCESS. FIRE DEPARTMENT ACCESS IS 20'-0" WIDE AND RATED FOR 96,000 LBS.
- (E) FIRE HYDRANT
- (E) SIGN

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 01-120702 INC:
REVIEWED FOR
SS ☐ FLS ☑ ACS ☐
DATE: 5/5/2023
(DSA STAMP AREA)

SUGIMURA FINNEY ARCHITECTS
SFA

LICENSED ARCHITECT
MARK C. FINNEY
NO. C-24673
REN. 9-30-23
STATE OF CALIFORNIA

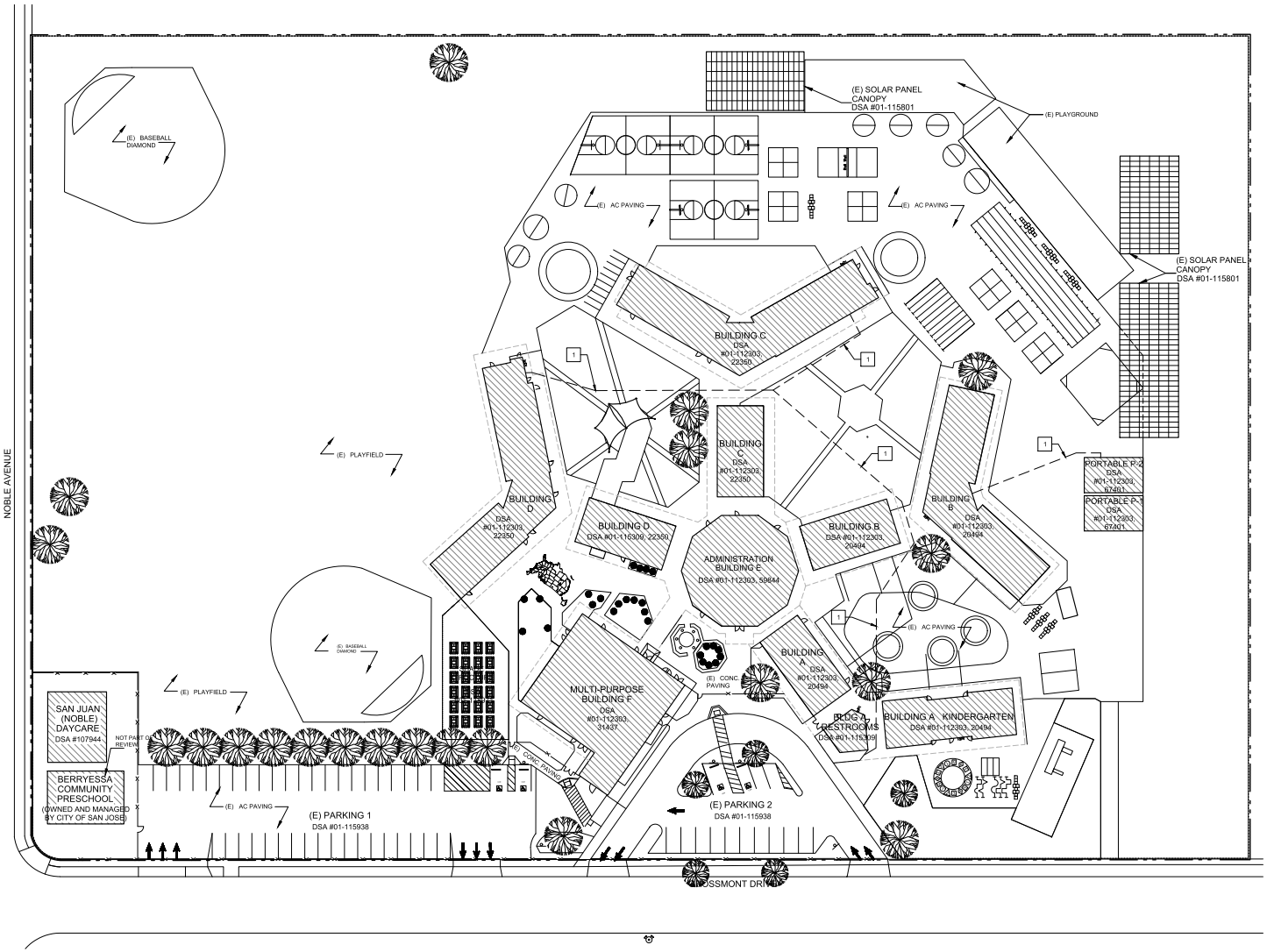
SITE PLAN
FIRE LIFE SAFETY

FIRE ALARM SYSTEM UPGRADE
NOBLE ELEMENTARY SCHOOL
3466 GROSSMONT DRIVE, SAN JOSE, CA 95132
BERRYESSA UNION SCHOOL DISTRICT

REVISIONS NO.	ITEM	DATE

DRAWN BY: KNU
CHECKED BY: M.B.
SFA JOB NO: 22084
DATE: 04/03/2023

T3



1 SITE PLAN

1" = 30'-0"

0 7.5' 15' 30' 60' 90'

GENERAL NOTES

A. REFER TO FIRE ALARM DRAWINGS FOR EXTENT OF OTHER RELATED WORK.

B. ALL EXISTING EXPOSED ELECTRICAL AND LOW VOLTAGE ROUTING REMOVED AS PART OF THIS SCOPE OF WORK IS TO HAVE THE SUB-STRAIGHT PATCHED, AS NEEDED, TO MATCH ADJACENT SURFACES IN MATERIAL AND FINISH.

NEW SITE PLAN NOTES

1. (N) TRENCHING FOR FIRE ALARM CONDUITS, SAW CUT AND REMOVE AC PAVING AND/OR CONCRETE AS REQUIRED. SEE FIRE ALARM DRAWINGS FOR MORE INFORMATION AND DETAIL 9/FA5.1 AND 3,4 & 5/A5.1 FOR TRENCHING AND PATCHBACK, FINISH TO MATCH ADJACENT SURFACES.

GRAPHIC KEY

- EXISTING PROPERTY LINE
- ROOF OVERHANG
- CHAINLINK FENCE
- WOOD FENCE
- DECORATIVE FENCE
- EXISTING BUILDING
- (E) FIRE HYDRANT
- (E) SIGN

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 01-120702 INC:
REVIEWED FOR:
SS ☐ FLS ☑ ACS ☐
DATE: 5/5/2023
(DSA STAMP AREA)

SFA

LICENSED ARCHITECT
REGISTERED PROFESSIONAL
No. C-24873
STATE OF CALIFORNIA
EXPIRES: 8-30-2024

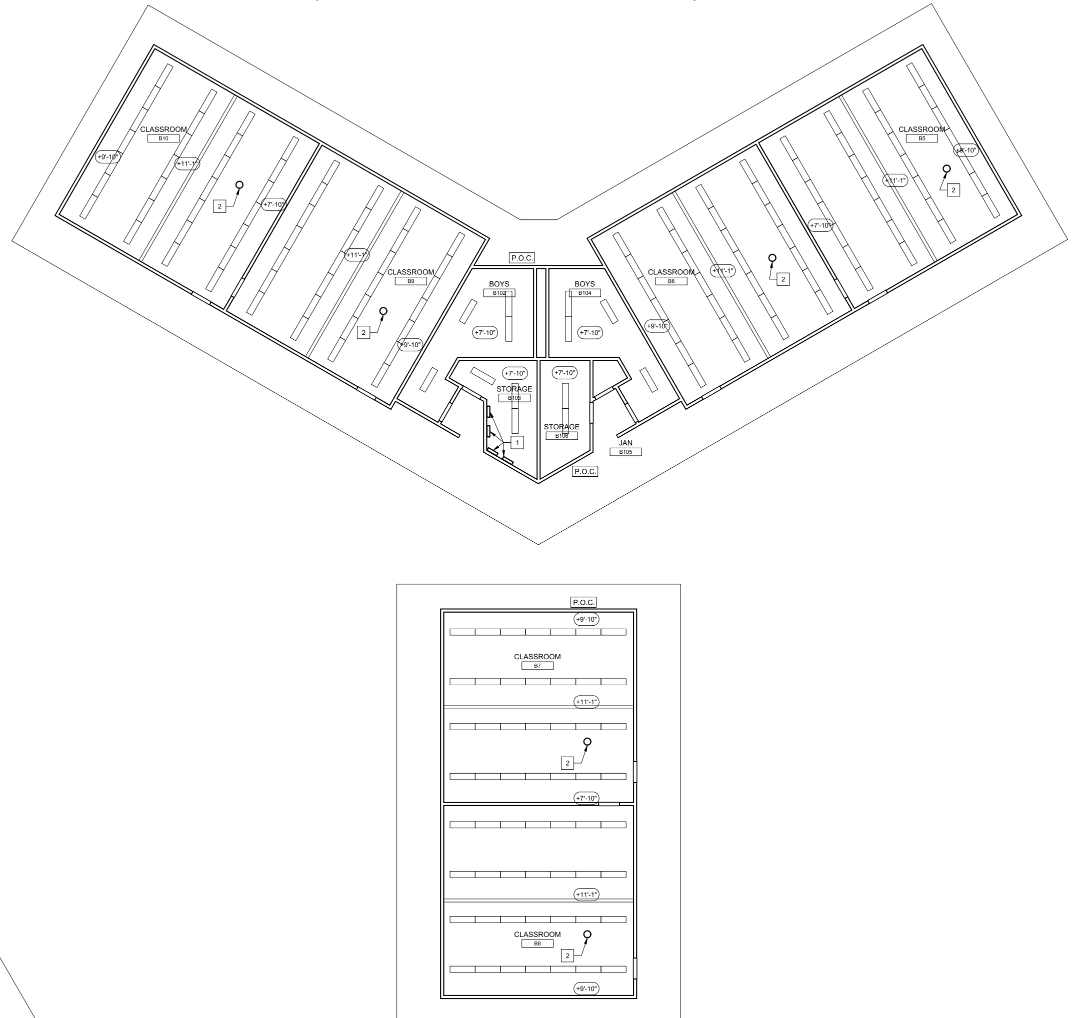
SITE PLAN

FIRE ALARM SYSTEM UPGRADE
NOBLE ELEMENTARY SCHOOL
3466 GROSSMONT DRIVE, SAN JOSE, CA 95132
BERRYESSA UNION SCHOOL DISTRICT

REVISIONS
NO. ITEM DATE

DRAWN BY: KNU
CHECKED BY: M.B.
SFA JOB NO: 22084 DATE: 04/03/2023

A0.2

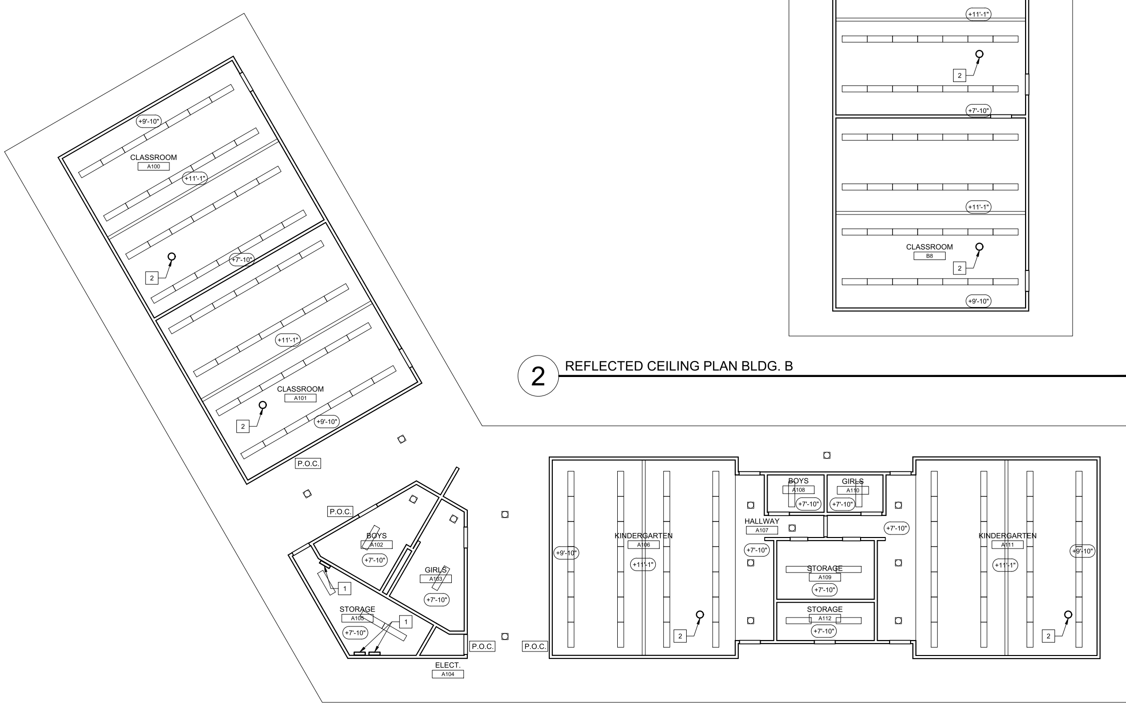


2 REFLECTED CEILING PLAN BLDG. B

1/8" = 1'-0"

0 2' 4' 8' 16' 24'

TRUE NORTH



1 REFLECTED CEILING PLAN BLDG. A

1/8" = 1'-0"

0 2' 4' 8' 16' 24'

REF NORTH

TRUE NORTH

GENERAL NOTES

A. ALL CEILING / ROOF FRAMING TO HAVE R-30 INSULATION.

B. ALL EXISTING EXPOSED ELECTRICAL AND LOW VOLTAGE ROUTING REMOVED AS PART OF THIS SCOPE OR WORK IS TO HAVE THE SUB-STRAIGHT PATCHED, AS NEEDED, TO MATCH EXISTING ADJACENT SURFACES IN MATERIAL AND FINISH.

C. CONTRACTOR TO PAINT ALL (N) CONDUITS, PULL CANS, ETC. TO MATCH BUILDING, TYP.

REFLECTED CEILING PLAN NOTES

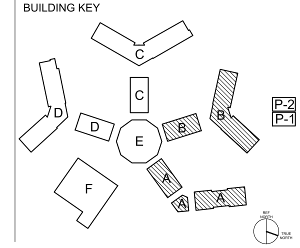
1. SEE FIRE ALARM PLANS FOR PANEL LOCATIONS AND TYPES. WHERE DEMO AND NEW WORK OCCUR, PATCH AND REPAIR TO MATCH EXISTING ADJACENT.
2. PROVIDE AND INSTALL HEAT DETECTOR BELOW FLOOR LEVEL INSIDE CRAWL SPACE AREA, SEE FIRE ALARM PLANS FOR MORE INFORMATION.

GRAPHIC KEY

—— - —— (E) 1-HR RATED WALL

P.O.C. (N) POINT OF CONNECTION, SEE FIRE ALARM DRAWINGS

BUILDING KEY



IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 01-120702 INC:
REVIEWED FOR
SS ☐ FLS ☑ ACS ☐
DATE: 5/5/2023
(DSA STAMP AREA)

SUGIMURA FINNEY ARCHITECTS
SFA

LICENSED ARCHITECT
MARK C. FINNEY
NO. C-24673
REN. 9-30-23
STATE OF CALIFORNIA

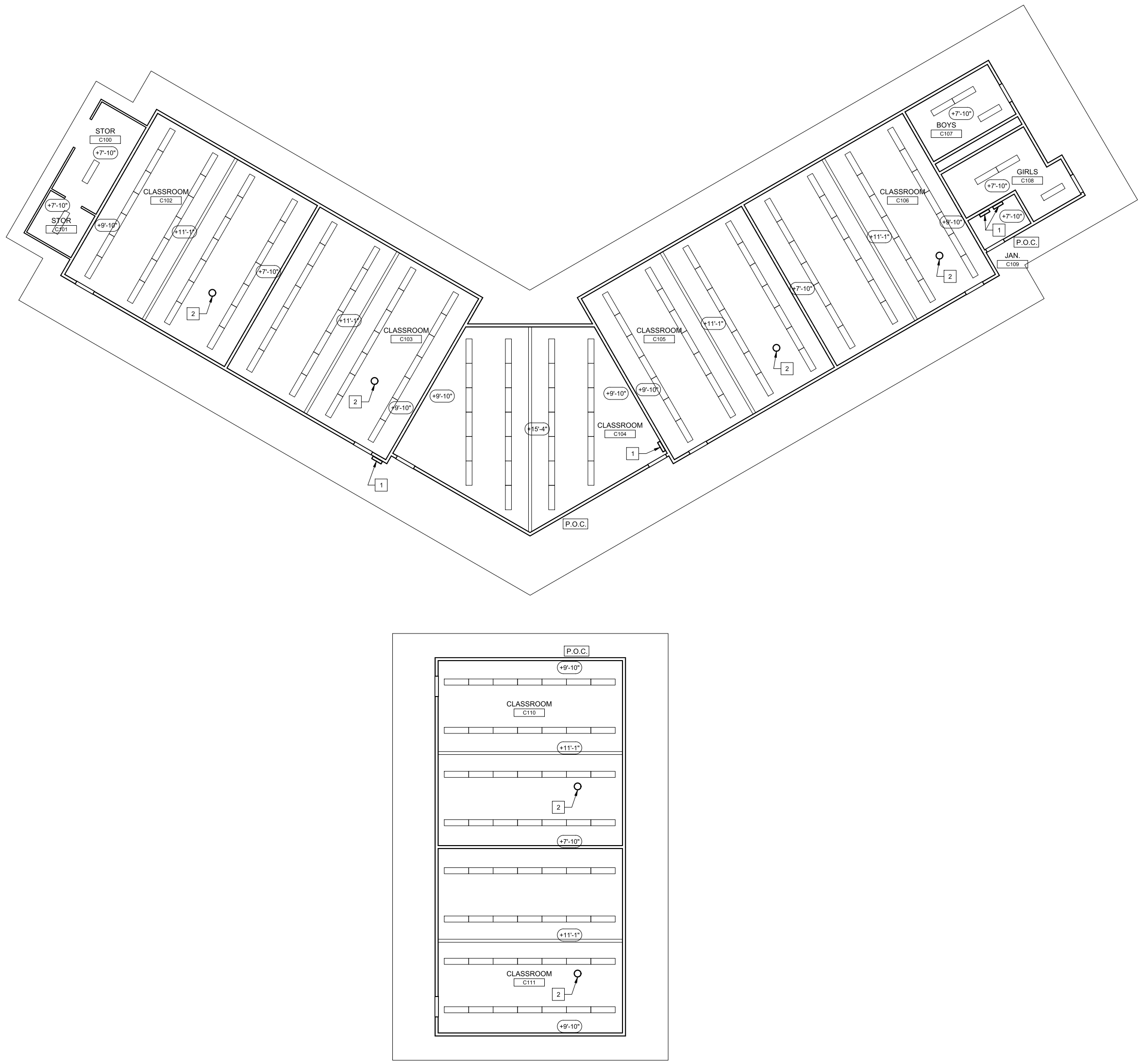
REFLECTED CEILING PLAN BUILDINGS A & B

FIRE ALARM SYSTEM UPGRADE
NOBLE ELEMENTARY SCHOOL
3466 GROSSMONT DRIVE, SAN JOSE, CA 95132
BERRYESSA UNION SCHOOL DISTRICT

REVISIONS NO.	ITEM	DATE

DRAWN BY:	KNU
CHECKED BY:	M.B.
SFA JOB NO: 22084	DATE: 04/03/2023

A3.1



1 REFLECTED CEILING PLAN BLDG. C

1/8" = 1'-0"

0 2' 4' 8' 16' 24'

REF NORTH / TRUE NORTH

GENERAL NOTES

A. ALL CEILING / ROOF FRAMING TO HAVE R-30 INSULATION.

B. ALL EXISTING EXPOSED ELECTRICAL AND LOW VOLTAGE ROUTING REMOVED AS PART OF THIS SCOPE OR WORK IS TO HAVE THE SUB-STRAIGHT PATCHED, AS NEEDED, TO MATCH EXISTING ADJACENT SURFACES IN MATERIAL AND FINISH.

C. CONTRACTOR TO PAINT ALL (N) CONDUITS, PULL CANS, ETC. TO MATCH BUILDING, TYP.

REFLECTED CEILING PLAN NOTES

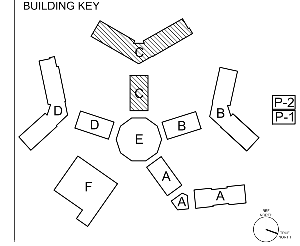
1. SEE FIRE ALARM PLANS FOR PANEL LOCATIONS AND TYPES. WHERE DEMO AND NEW WORK OCCUR, PATCH AND REPAIR TO MATCH EXISTING ADJACENT.
2. PROVIDE AND INSTALL HEAT DETECTOR BELOW FLOOR LEVEL INSIDE CRAWL SPACE AREA, SEE FIRE ALARM PLANS FOR MORE INFORMATION.

GRAPHIC KEY

(E) 1-HR RATED WALL

P.O.C. (N) POINT OF CONNECTION, SEE FIRE ALARM DRAWINGS

BUILDING KEY



IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 01-120702 INC:
REVIEWED FOR
SS ☐ FLS ☑ ACS ☐
DATE: 5/5/2023
(DSA STAMP AREA)

SUGIMURA FINNEY ARCHITECTS
SFA

LICENSED ARCHITECT
MARK C. FINNEY
NO. C-24673
REN. 9-30-23
STATE OF CALIFORNIA

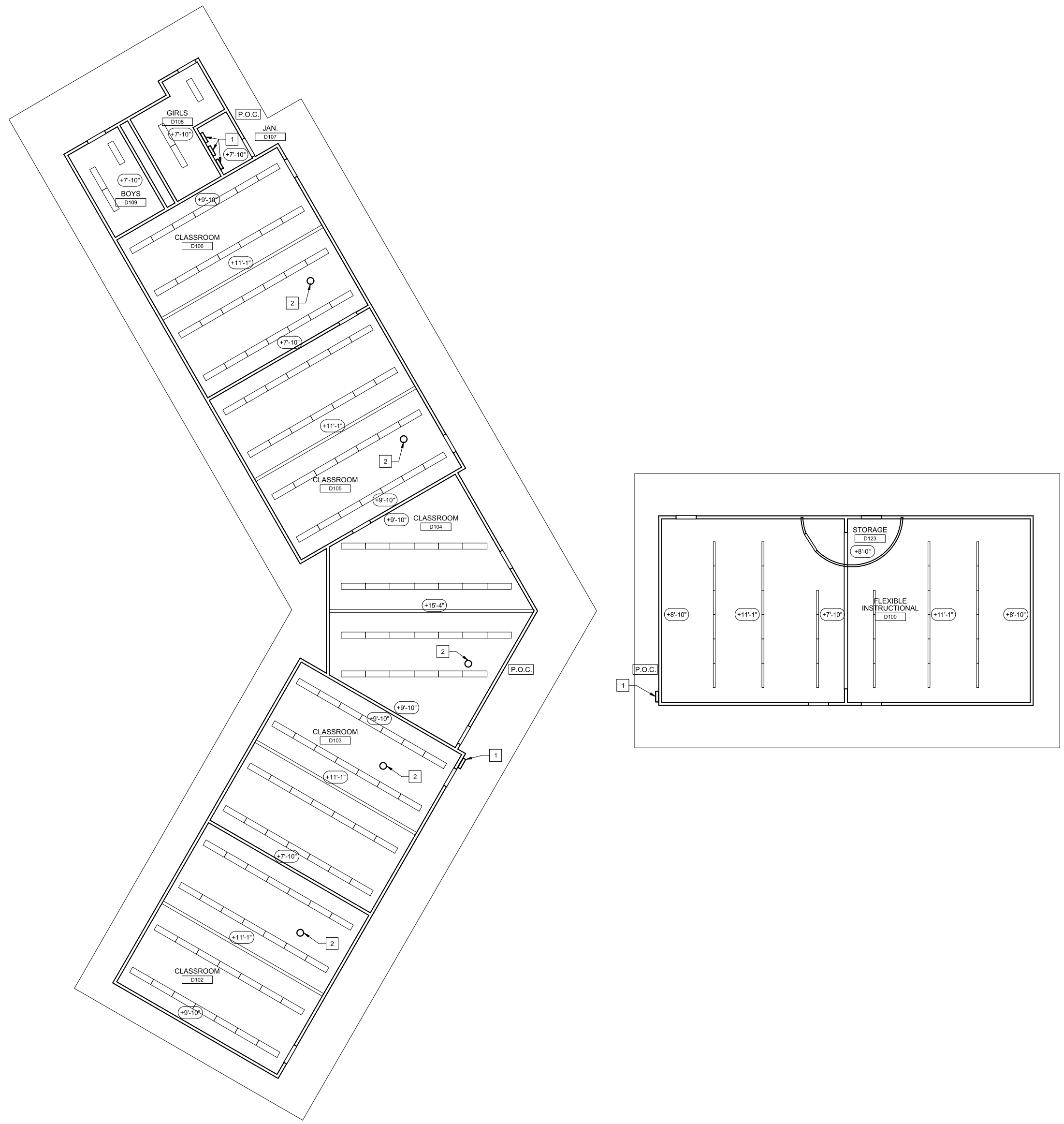
REFLECTED CEILING PLAN
BUILDING C

FIRE ALARM SYSTEM UPGRADE
NOBLE ELEMENTARY SCHOOL
3466 GROSSMONT DRIVE, SAN JOSE, CA 95132
BERRYESSA UNION SCHOOL DISTRICT

REVISIONS		
NO.	ITEM	DATE

DRAWN BY:	KNU
CHECKED BY:	M.B.
SFA JOB NO:	DATE:
22084	04/03/2023

A3.2



1 REFLECTED CEILING PLAN BLDG. D

1/8" = 1'-0"   0 2' 4' 8' 16' 24'

REF NORTH / TRUE NORTH

GENERAL NOTES

A. ALL CEILING / ROOF FRAMING TO HAVE R-30 INSULATION.
B. ALL EXISTING EXPOSED ELECTRICAL AND LOW VOLTAGE ROUTING REMOVED AS PART OF THIS SCOPE OR WORK IS TO HAVE THE SUB-STRAIGHT PATCHED, AS NEEDED, TO MATCH EXISTING ADJACENT SURFACES IN MATERIAL AND FINISH.
C. CONTRACTOR TO PAINT ALL (N) CONDUITS, PULL CANS, ETC. TO MATCH BUILDING, TYP.

REFLECTED CEILING PLAN NOTES

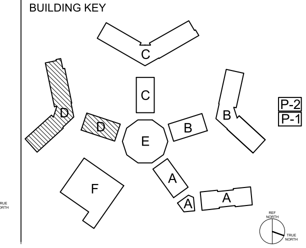
1. SEE FIRE ALARM PLANS FOR PANEL LOCATIONS AND TYPES. WHERE DEMO AND NEW WORK OCCUR, PATCH AND REPAIR TO MATCH EXISTING ADJACENT.
2. PROVIDE AND INSTALL HEAT DETECTOR BELOW FLOOR LEVEL INSIDE CRAWL SPACE AREA, SEE FIRE ALARM PLANS FOR MORE INFORMATION.

GRAPHIC KEY

— - — (E) 1-HR RATED WALL

P.O.C. (N) POINT OF CONNECTION, SEE FIRE ALARM DRAWINGS

BUILDING KEY



IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 01-120702 INC:
REVIEWED FOR
SS ☐ FLS ☑ ACS ☐
DATE: 5/5/2023
(DSA STAMP AREA)

SUGIMURA FINNEY ARCHITECTS
SFA

LICENSED ARCHITECT
MARK C. FINNEY
NO. C-24673
REN. 9-30-23
STATE OF CALIFORNIA

REFLECTED CEILING PLAN
BUILDING D

FIRE ALARM SYSTEM UPGRADE
NOBLE ELEMENTARY SCHOOL
3466 GROSSMONT DRIVE, SAN JOSE, CA 95132
BERRYESSA UNION SCHOOL DISTRICT

REVISIONS NO.	ITEM	DATE

DRAWN BY:	KNU
CHECKED BY:	M.B.
SFA JOB NO: 22084	DATE: 04/03/2023

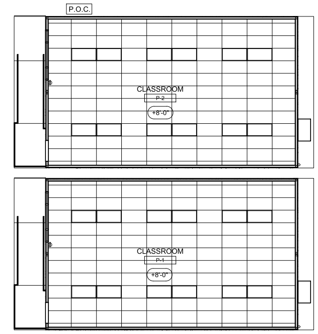
A3.3

GENERAL NOTES

A. ALL CEILING / ROOF FRAMING TO HAVE R-30 INSULATION.

B. ALL EXISTING EXPOSED ELECTRICAL AND LOW VOLTAGE ROUTING REMOVED AS PART OF THIS SCOPE OR WORK IS TO HAVE THE SUB-STRAIGHT PATCHED, AS NEEDED, TO MATCH EXISTING ADJACENT SURFACES IN MATERIAL AND FINISH.

C. CONTRACTOR TO PAINT ALL (N) CONDUITS, PULL CANS, ETC. TO MATCH BUILDING, TYP.

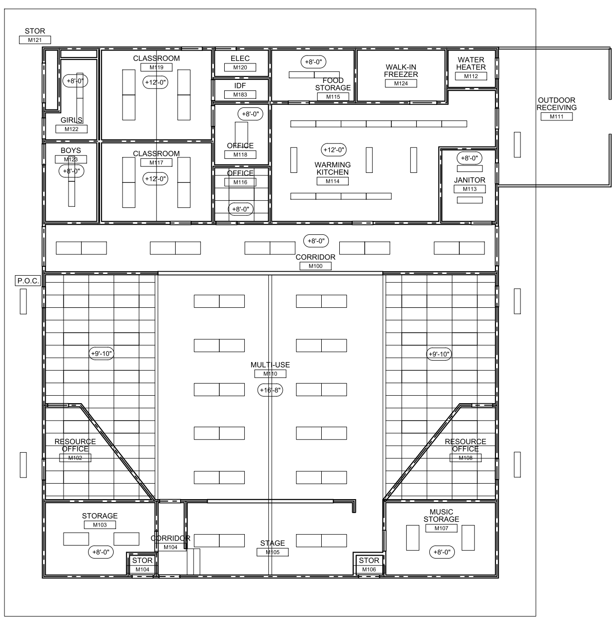


3 REFLECTED CEILING PLAN PORTABLES

1/8" = 1'-0"

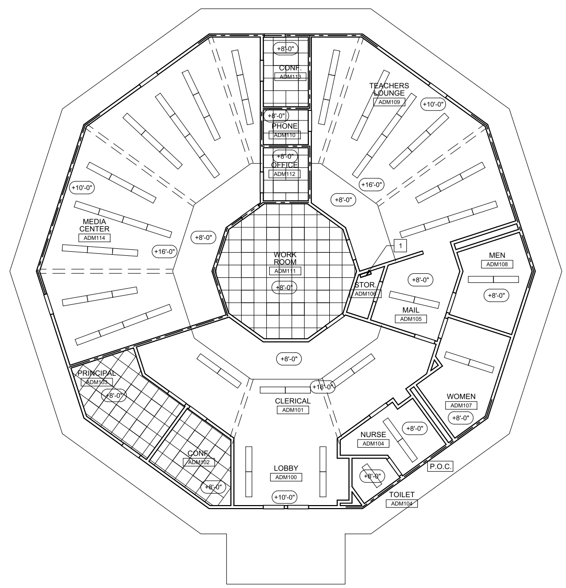
REFLECTED CEILING PLAN NOTES

1. SEE FIRE ALARM PLANS FOR PANEL LOCATIONS AND TYPES. WHERE DEMO AND NEW WORK OCCUR, PATCH AND REPAIR TO MATCH EXISTING ADJACENT.



2 REFLECTED CEILING PLAN BLDG. F

1/8" = 1'-0"



1 REFLECTED CEILING PLAN BLDG. E

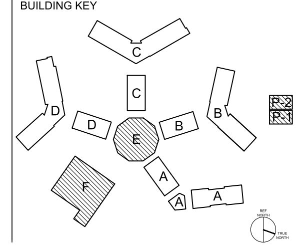
1/8" = 1'-0"

GRAPHIC KEY

(E) 1-HR RATED WALL

P.O.C. (N) POINT OF CONNECTION, SEE FIRE ALARM DRAWINGS

BUILDING KEY



IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 01-120702 INC:
REVIEWED FOR
SS ☐ FLS ☑ ACS ☐
DATE: 5/5/2023
(DSA STAMP AREA)

SUGIMURA FINNEY ARCHITECTS
SFA

LICENSED ARCHITECT
MARK C. FINNEY
NO. C-24673
REN. 9-30-23
STATE OF CALIFORNIA

REFLECTED CEILING PLAN
BUILDINGS E, F & PORTABLES

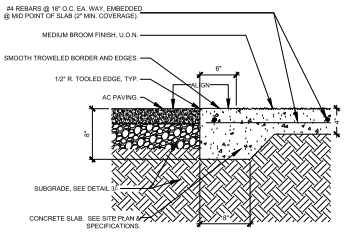
FIRE ALARM SYSTEM UPGRADE
NOBLE ELEMENTARY SCHOOL
3466 GROSSMONT DRIVE, SAN JOSE, CA 95132
BERRYESSA UNION SCHOOL DISTRICT

REVISIONS

NO.	ITEM	DATE

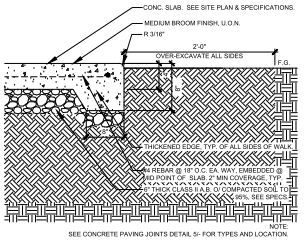
DRAWN BY: KNU
CHECKED BY: M.B.
SFA JOB NO: 22084
DATE: 04/03/2023

A3.4



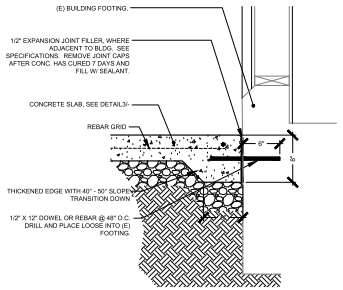
4 ASPHALT / CONCRETE JOINT

1-1/2"=1'-0"

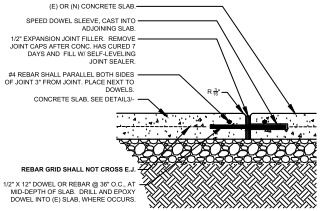


3 EDGE OF CONC. PAVING

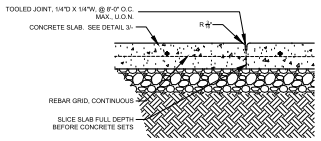
1-1/2"=1'-0"



JOINT AT BUILDING



EXPANSION JOINT



TOOLED JOINT

5 CONCRETE PAVING JOINTS

1-1/2"=1'-0"

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 01-120702 INC:
REVIEWED FOR:
SS ☐ FLS ☑ ACS ☐
DATE: 5/5/2023
(DSA STAMP AREA)

SFA

LICENSED ARCHITECT
RENEWAL 8-30-2024
STATE OF CALIFORNIA

TYPICAL DETAILS

FIRE ALARM SYSTEM UPGRADE
NOBLE ELEMENTARY SCHOOL
3466 GROSSMONT DRIVE, SAN JOSE, CA 95132
BERRYESSA UNION SCHOOL DISTRICT

REVISIONS:
NO. ITEM DATE

DRAWN BY: KNU
CHECKED BY: M.B.
SFA JOB NO: 22084 DATE: 04/03/2023

A9.1

FIRE ALARM EQUIPMENT LIST

SYMBOL	DESCRIPTION AND MODEL NUMBER	MFGR'S PART No.	CSFM LISTING
FACP	ADDRESSABLE FIRE ALARM CONTROL PANEL AND EMERGENCY MASS NOTIFICATION SYSTEM. SILENT KNIGHT 6820 SERIES. (SEE BATTERY CALCS FOR SIZE OF BATTERIES REQUIRED.)	6820EVS	7165-0559:0500
CAC	FIRE ALARM CELLULAR COMMUNICATOR IN A METAL CABINET ENCLOSURE WITH LOCK AND KEY, SILENT KNIGHT CELL-CAB-SK SERIES.	CELL-CAB-SK	7165-0559:0500
SUB	FIRE ALARM SUB-PANEL WITH POWER SUPPLY AND (2) 6815 SIGNALING LINE CIRCUIT EXPANDERS, SILENT KNIGHT 5895XL SERIES.	5895XL 6815	7165-0559:0135 7165-0559:0500
ANN	FIRE ALARM LOCAL OPERATOR CONSOLE WITH 160 CHARACTER LIQUID CRYSTAL DISPLAY REMOTE ANNUNCIATOR AND ON-BOARD SUPERVISED MICROPHONE, SILENT KNIGHT EVS-LOC SERIES.	EVS-LOC	7165-0559:0500
FAD	FIRE ALARM DOCUMENTS CABINET TO STORE PRINTED AND DIGITAL DOCUMENTS; LOCATE NEXT TO FACP.	NF-FAD	7300-0553:0110
RPS	10 AMP REMOTE POWER SUPPLY WITH (7) NAC OUTPUT CIRCUITS, SILENT KNIGHT SK-PS10 SERIES; SEE RISER DIAGRAM & BATTERY CALCULATIONS FOR WATTAGE REQUIRED.	SK-PS10	7315-0559:0522
AMP	INTELLIGENT 50/100 WATT AMPLIFIER, SILENT KNIGHT EVS-50/100W SERIES; SEE BATTERY CALCULATIONS FOR WATTAGE REQUIRED.	EVS-50W EVS-100W	7165-0559:0500
	ADDRESSABLE PHOTOELECTRIC SMOKE DETECTOR AND BASE, SILENT KNIGHT SK-PHOTO SERIES.	SK-PHOTO-W B300-6	7272-0559:0512 7300-1653:0109
	ADDRESSABLE FIRE ALARM HEAT DETECTOR AND BASE, 135° FIXED TEMPERATURE, SILENT KNIGHT SK-HEAT SERIES.	SK-HEAT-W B300-6	7270-0559:0511 7300-1653:0109
U	ADDRESSABLE FIRE ALARM HEAT DETECTOR AND BASE, 135° FIXED TEMPERATURE, SILENT KNIGHT SK-HEAT SERIES. MOUNT UNDER FLOOR INSIDE CRAWL SPACE.	SK-HEAT-W B300-6	7270-0559:0511 7300-1653:0109
H	ADDRESSABLE FIRE ALARM HIGH TEMPERATURE HEAT DETECTOR AND BASE, 190° FIXED TEMPERATURE, SILENT KNIGHT SK-HEAT SERIES.	SK-HEAT-HT-W B300-6	7270-0559:0511 7300-1653:0109
	ADDRESSABLE DUCT SMOKE DETECTOR HOUSING WITH REMOTE TEST SWITCH, PROVIDE ADDRESSABLE SMOKE DETECTOR AND RELAY MODULE WITHIN HOUSING, SILENT KNIGHT SK-DUCT SERIES.	SK-DUCT-W	3242-0559-0518
P	ADDRESSABLE FIRE ALARM MANUAL PULLSTATION, DUAL-ACTION WITH KEY RESET, MOLDED POLYCARBONATE HOUSING, SILENT KNIGHT SK-PULL SERIES.	SK-PULL-DA	7150-0559:0161
M	ADDRESSABLE MONITOR MODULE, SILENT KNIGHT SK-MONITOR SERIES.	SK-MONITOR	7300-0559:0155
C	ADDRESSABLE CONTROL MODULE, SILENT KNIGHT SK-CONTROL SERIES.	SK-CONTROL	7300-0559:0155
R	ADDRESSABLE RELAY MODULE, SILENT KNIGHT SK-CONTROL SERIES.	SK-RELAY	7300-0559:0155
	WALL MOUNTED MULTI-CANDELA STROBE WITH FIELD SELECTABLE CANDELA SETTINGS OF 15/30/75/110cd, SYSTEM SENSOR, SRL SERIES.	SRL	7125-1653:0504
	WALL MOUNTED MULTI-CANDELA SPEAKER/STROBE WITH FIELD SELECTABLE CANDELA SETTINGS OF 15/30/75/110cd, SYSTEM SENSOR, L-SERIES.	SPSRL	7320-1653:0505
	CEILING MOUNTED MULTI-CANDELA SPEAKER/STROBE WITH FIELD SELECTABLE CANDELA SETTINGS OF 15/30/75/177cd, SYSTEM SENSOR, L-SERIES.	SPCRL	7320-1653:0505
WP	WALL MOUNTED WEATHERPROOF SPEAKER, SYSTEM SENSOR SPECTRALERT ADVANCE SERIES.	SPRK	7320-1653:0201
EOL	END OF LINE DEVICE.		

FIRE ALARM GENERAL NOTES

1. WIRING MUST BE LISTED FOR USE AS REQUIRED BY TITLE 24/CEC, ARTICLE 760.
2. WIRE USED IN WET LOCATIONS SHALL BE OF AN APPROVED TYPE IN ACCORDANCE WITH 3-310-8, T24/CEC (I.E. THHW OR EQUAL).
3. UNDER GROUND AND EXTERIOR CONDUITS TO HAVE WATERTIGHT FITTINGS AND WIRES APPROVED FOR WET LOCATION.
4. ALL CONDUCTORS SHALL BE ROUTED IN CONDUIT UNLESS SPECIFICALLY NOTED OTHERWISE ON PLANS. MINIMUM CONDUIT SIZE SHALL BE 3/4."
5. THE CONDUIT AND WIRE SHOWN ON THESE PLANS ARE SHOWN DIAGRAMMATICALLY. EXACT LOCATIONS SHALL BE DETERMINED IN THE FIELD TO SUIT FIELD CONDITIONS. "AS-BUILT" PLANS SHALL BE MAINTAINED AND BE PROVIDED AS REQUIRED BY THE PROJECT INSPECTOR OF RECORD.
6. PENETRATIONS OF FIRE RATED WALLS SHALL BE PROTECTED IN ACCORDANCE WITH CALIFORNIA BUILDING CODE, CHAPTER 7, TITLE 24. PROVIDE DETAILS OF THROUGH PENETRATION FIRE-STOP SYSTEMS FOR ALL PIPE/CABLE/CONDUIT PASSING THROUGH FIRE RATED WALLS/FLOORS REQUIRING PROTECTED OPENINGS.
7. ALL DEVICES SHALL BE "CSFM" LISTED.
8. EXTERIOR DEVICES SHALL BE LISTED FOR EXTERIOR USE BY "CSFM."
9. AUDIBLE FIRE ALARM SOUND LEVEL SHALL BE AT LEAST 15DBA ABOVE THE AVERAGE SOUND LEVEL.
10. AUDIBLE SIGNALS INTENDED FOR OPERATION IN THE PUBLIC SHALL HAVE A SOUND LEVEL OF NOT LESS THAN 75DBA AT 10 FEET OR MORE THAN 110DBA AT THE MINIMUM HEARING DISTANCES FROM THE AUDIBLE APPLIANCE.
11. WHERE VISUAL DEVICES ARE REQUIRED, VISUAL DEVICE SHOULD NOT EXCEED 2 FLASHES PER SECOND AND SHOULD NOT BE SLOWER THAN 1 FLASH EVERY SECOND. THE DEVICE SHALL HAVE A PULSING LIGHT SOURCE NOT LESS THAN 15 CANDELA. NO PLACE IN ANY ROOM SHALL BE MORE THAN 50 FEET FROM A DEVICE.
12. APPROVED BY THE "DIVISION OF THE STATE ARCHITECT/OFFICE OF REGULATION SERVICES." CONTRACTOR SHALL PROVIDE COPIES OF APPROVED PLANS TO THE PROJECT INSPECTOR OF RECORD PRIOR TO BEGINNING WORK. THE CONTRACTOR SHALL SUBMIT SHOP DRAWING TO ENGINEER PRIOR TO PURCHASE FOR REVIEW. THE FIRE PROTECTION SYSTEM SHALL NOT BE INSTALLED UNTIL SHOP DRAWINGS HAVE BEEN SUBMITTED TO AND RECEIVED BY THE ENGINEER OF RECORD.
13. FINAL ALARM TEST SHALL BE WITNESSED BY THE DSA INSPECTOR OF RECORD (IOR). BOTH THE DSA INSPECTOR OF RECORD (IOR) AND THE LOCAL FIRE AUTHORITY SHALL BE NOTIFIED OF DATE AND TIME OF FINAL FIRE ALARM TESTING BY THE FIRE ALARM CONTRACTOR. FIRE ALARM CONTRACTOR SHALL PROVIDE "RECORD OF COMPLETION" TO THE INSPECTOR OF RECORD (IOR)/DSA AFTER COMPLETION OF OPERATIONAL ACCEPTANCE TEST.
14. POWER SERVICE SHALL BE ON A DEDICATED, 120V BRANCH CIRCUIT, WITH A RED MARKING AND IDENTIFIED AS "FIRE ALARM CIRCUIT CONTROL."
15. AUTOMATIC FIRE ALARM SYSTEM SHALL TRANSMIT THE ALARM, SUPERVISORY AND TROUBLE SIGNALS TO AN APPROVED SUPERVISING STATION AS REQUIRED BY NFPA 72 AS AMENDED BY CFC CHAPTER 80. THE SUPERVISING STATION SHALL BE LISTED AS EITHER UUFX OR UUJS BY UNDERWRITERS LABORATORY OR SHALL MEET THE REQUIREMENTS OF FACTORY MUTUAL RESEARCH APPROVAL STANDARD 3011.
16. EXISTING FIELD DEVICES AND FACP SHALL REMAIN IN PLACE UNTIL NEW FIELD DEVICES ARE IN PLACE AND NEW WIRING HAS BEEN HOMERAN TO NEW LOCATION OF FACP. CONTRACTOR SHALL COORDINATE WITH SCHOOL DISTRICT TO PROVIDE AN APPROVED 24 HOUR FIRE WATCH UNTIL NEW FIRE ALARM SYSTEM IS OPERATIONAL.
17. THE GROUP E BUILDING WAS CONSTRUCTED BEFORE THE ADOPTION OF THE 2016 CALIFORNIA BUILDING STANDARDS CODE AND WILL NOT REQUIRE CARBON MONOXIDE DETECTION PER CEBC SECTION 503.15.1.

GENERAL CONSTRUCTION NOTES

1. CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE CODES AND REGULATIONS. MATERIALS AND EQUIPMENT SHALL BE U.L. LISTED AND LABELED FOR THE APPLICATION.
2. THE CONTRACTOR SHALL OBTAIN AND PAY FOR ALL PERMITS, LICENSES AND INSPECTION FEES REQUIRED BY THIS CONTRACT WORK.
3. CONTRACTOR SHALL VISIT THE PROJECT SITE PRIOR TO BIDDING AND ALLOW FOR ALL FIELD CONDITIONS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ELECTRICAL WORK NOTED AND CALLED OUT ON ALL CONTRACT DOCUMENTS. THE CONTRACTOR SHALL OBTAIN INFORMATION AND BE FAMILIAR WITH ALL OTHER TRADES WORK. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION BETWEEN OTHER TRADES ON PROJECT.
4. CONTRACTOR SHALL BE RESPONSIBLE FOR THE SAFETY OF PERSONS AND PROPERTY AND SHALL PROVIDE INSURANCE COVERAGE AS NECESSARY FOR LIABILITY AND PERSONAL, PROPERTY DAMAGE, TO FULLY PROTECT THE OWNER, ARCHITECT AND ENGINEER FROM ANY AND ALL CLAIMS RESULTING FROM THIS WORK.
5. CONTRACTOR SHALL MAINTAIN RECORD DRAWINGS AT THE PROJECT SITE INDICATING ALL MODIFICATIONS TO ELECTRICAL SYSTEMS. THE CONTRACTOR SHALL AT THE CONCLUSION OF THE PROJECT PROVIDE ACCURATE "AS-BUILT" DRAWINGS ACCEPTABLE TO THE ARCHITECT.
6. ALL MATERIALS PROVIDED TO THE PROJECT SHALL BE NEW. THE CONTRACTOR SHALL BE RESPONSIBLE TO PROVIDE AND INSTALL ALL INCIDENTAL MATERIALS REQUIRED FOR A COMPLETE INSTALLATION.
7. CONTRACTOR SHALL PROVIDE TO THE ARCHITECT A CONSTRUCTION SCHEDULE OF ELECTRICAL WORK. THE CONSTRUCTION SCHEDULE SHALL IDENTIFY ALL SIGNIFICANT MILESTONES WITH COMPLETION DATES.
8. CONTRACTOR SHALL PROVIDE ALL REQUIRED "CUTTING, PATCHING, EXCAVATION, BACKFILL AND REPAIRS" NECESSARY TO RESTORE DAMAGED SURFACES TO EQUAL OR BETTER THAN ORIGINAL CONDITIONS EXISTING AT START OF WORK.
9. CONTRACTOR SHALL BE RESPONSIBLE FOR PAINTING ALL EXPOSED CONDUITS AND ELECTRICAL EQUIPMENT. REFER TO ARCHITECTS PAINTING SECTION FOR REQUIREMENTS.
10. ALL ELECTRICAL EQUIPMENT INSTALLED OUTDOORS SHALL BE WEATHERPROOF. EXTERIOR CONDUITS RUN INTO BUILDINGS SHALL BE INSTALLED WITH FLASHING, CAULKED AND SEALED. CONDUITS FOR EXTERIOR ELECTRICAL DEVICES SHALL BE RUN INSIDE BUILDING UNLESS OTHERWISE NOTED ON DRAWINGS.
11. ALL CONDUITS UNLESS OTHERWISE NOTED ON DRAWINGS SHALL HAVE AS A MINIMUM: TWO (2) #12s WITH ONE (1) #12 GROUND. "TICK" MARKS SHOWN ON CIRCUITRY ARE FOR ROUGH ESTIMATING ONLY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL WIRES AND WIRE SIZES REQUIRED BY LATEST CODE.
12. ALL BRANCH CIRCUITS SHALL HAVE INDIVIDUAL NEUTRALS. SHARED NEUTRALS ON MULTIWIRE CIRCUITS IS NOT ALLOWED.
13. COORDINATE ALL CONDUIT RUNS, ELECTRICAL EQUIPMENT AND PANELS WITH ALL OTHER WORK TO AVOID CONFLICTS.
14. CONTRACTOR SHALL PROVIDE IN EVERY NEW EMPTY CONDUIT A DRAW STRING FOR USE IN FUTURE CONSTRUCTION.
15. ALL CONDUIT SHALL BE CONCEALED WHERE POSSIBLE. CUT AND PATCH EXISTING WALLS WHERE NECESSARY. WHERE IT IS NECESSARY TO CUT OR BORE EXISTING STRUCTURAL WALLS FOR NEW ELECTRICAL WORK OBTAIN PERMISSION FROM THE ARCHITECT PRIOR TO STARTING WORK. REUSE EXISTING CONDUIT WHERE POSSIBLE.
16. WHERE IT IS NOT POSSIBLE TO REUSE EXISTING CONDUIT OR RUN NEW CONCEALED CONDUIT USE NON-METALLIC SURFACE RACEWAY AND BOXES. ROUTING OF ALL NON-METALLIC RACEWAYS SHALL BE APPROVED BY THE ARCHITECT OR OWNER'S REPRESENTATIVE PRIOR TO ROUGH-IN.
17. EXTENSION RINGS OR RESET BOXES TO BE FLUSH WITH NEW WALL THICKNESS.
18. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL DAMAGE TO EXISTING UNDERGROUND SYSTEMS (GAS, WATER, TELEPHONE, ELECTRICAL, SEWER, ETC.). THE CONTRACTOR SHALL REPAIR & PAY ALL EXPENSES FOR DAMAGE TO EXISTING UNDERGROUND SYSTEMS AS A RESULT OF NEW WORK. REPAIR TO DAMAGED UNDERGROUND SYSTEMS SHALL BE TO THE OWNERS SATISFACTION WITHOUT EXTRA EXPENSE TO THE OWNER.
19. EXISTING WIRING SHOWN HAS BEEN TAKEN FROM OLD PLANS AND IS ASSUMED TO BE CORRECT. ELECTRICAL CONTRACTOR SHALL FIELD VERIFY ACTUAL CONDITIONS AND MAKE ADJUSTMENTS TO SUIT ACTUAL CONDITIONS AND TO MEET THE INTENT OF THE CONTRACT DOCUMENTS.
20. WHERE NON-METALLIC SHEATHED CONDUCTORS ARE FOUND, THE CONTRACTOR SHALL REMOVE TO FULLEST EXTENT PER THE GENERAL DEMOLITION NOTES AND REPLACE WITH CONDUIT. METAL CLAD CABLE WILL BE PERMITTED ON A CASE-BY-CASE BASIS ONLY BY WRITTEN APPROVAL FROM THE ARCHITECT.
21. ALL INSTALLATION OF EXPOSED SURFACE MOUNTED RACEWAY IN PUBLIC AREAS SHALL BE REVIEWED BY ARCHITECT BEFORE ROUGH-IN. CONTRACTOR IS TO DETERMINE THE ACCESSIBILITY OF ATTIC, FURRED SPACE, HOLLOW MULLIONS, ETC. IN EACH AREA AND REVIEW WITH ARCHITECT. IF SYSTEM CAN BE ROUTED CONCEALED EITHER BY FISHING OR ACCESSIBILITY, CONTRACTOR IS TO DO SO. IF INACCESSIBILITY IS DETERMINED, CONTRACTOR SHALL INSTALL SURFACE MOUNTED RACEWAY IN THE MOST AESTHETICALLY PLEASING MEANS AS DETERMINED BY THE ARCHITECT. NO ALLOWANCE FOR ADDITIONAL COMPENSATION DUE TO ROUTING AS DIRECTED BY THE ARCHITECT WILL BE MADE.
22. AUDIBLE APPLIANCES SHALL PROVIDE 15-dBA ABOVE AMBIENT NOISE LEVELS IN ALL OCCUPIED AREAS AND INTELLIBIGILITY WHERE REQUIRED CBC 907.5.2.1.1.

SYMBOLS & ABBREVIATIONS

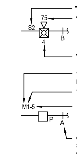
SYMBOLS

MANUAL PULL STATION	BELL (GONG)
STROBE ONLY	FACP — FIRE ALARM CONTROL PANEL
STROBE ONLY (CEILING MOUNTED)	RPS — REMOTE POWER SUPPLY
SPEAKER ONLY	AMP — DIGITAL AUDIO AMPLIFIER
MINI HORN	EOL — END OF LINE
SPEAKER/STROBE	JUNCTION BOX - CEILING/WALL MOUNTED, SIZE PER CODE, TAPE AND TAG WIRES
SPEAKER/STROBE (CEILING MOUNTED)	PULLBOX
CHIME/STROBE	#10 — CONDUIT - HOME RUN TO PANEL, TERMINAL CABINET, ETC. AS INDICATED RUNS MARKED WITH CROSSHATCHES INDICATE NUMBER OF #12 AWG WIRES WHEN MORE THAN TWO. SIZE CONDUIT ACCORDING TO SPECIFICATIONS AND APPLICABLE CODE. CROSS HATCHES WITH NUMBER ADJACENT INDICATES WIRE SIZE OTHER THAN #12 AWG.
HEAT DETECTOR	
HEAT DETECTOR (ABOVE ACCESSIBLE CEILING)	
SMOKE DETECTOR	CONDUIT - EXISTING
DUCT SMOKE DETECTOR	CONDUIT - CONCEALED IN WALLS OR CEILING.
	CONDUIT - IN OR BELOW FLOOR: 3/4"C MIN.
TAMPER SWITCH	CONDUIT CONTINUATION.
FLOW SWITCH	SHEET NOTE REFERENCE SYMBOL; SEE ASSOCIATED NOTE ON SAME SHEET.
POST INDICATING VALVE	DETAIL OR SECTION DESIGNATION.

ABBREVIATIONS

ARCH.	ARCHITECT	FSD	FIRE SMOKE DAMPER
AWG	AMERICAN WIRE GAUGE	IDC	INITIATING DEVICE CIRCUITS
BKR	BREAKER	(N)	NEW
C	CONDUIT	NAC	NOTIFICATION APPLIANCE CIRCUITS
CO	CONDUIT ONLY		
CB	CIRCUIT BREAKER	NIC	NOT IN CONTRACT
CKT	CIRCUIT	NO	NUMBER
CLG	CEILING	SLC	SIGNALING LINE CIRCUITS
(E)	EXISTING		
EOL	END OF LINE	TYP	TYPICAL
FA	FIRE ALARM	UON	UNLESS OTHERWISE NOTED
FACP	FIRE ALARM CONTROL PANEL	WP	WEATHERPROOF
FBO	FURNISHED BY OTHERS		

TYPICAL ZONE NOMENCLATURE



"S2" DENOTES SIGNAL CIRCUIT #2
"75CD" DENOTES CANDELA RATING
"4" DENOTES DEVICE #4
"M" DENOTES MODULE DEVICE; "D" DENOTES DETECTOR DEVICE
"1" DENOTES LOOP#
"5" DENOTES DEVICE #5
CROSSHATCH INDICATES NUMBER OF WIRES REQUIRED, SUBSCRIPT LETTER INDICATES TYPE OF CIRCUIT. SEE GENERAL NOTES THIS SHEET FOR NUMBER & TYPE OF WIRES AND CIRCUIT TYPE.

FIRE ALARM SYSTEM OPERATIONAL MATRIX

EFFECT — ALARM / TROUBLE / SUPERVISORY / MISC.

CAUSE	ALARM AT FACP	ALARM AT ANNUNCIATOR	ALARM AT OFF SITE REPORTING	ACTIVATE VISUALS	ACTIVATE VOICE EVAC.	TROUBLE AT FACP	TROUBLE AT ANNUNCIATOR	TROUBLE AT OFF SITE REPORTING	SUPERVISORY AT FACP	SUPERVISORY AT ANNUNCIATOR	SUPERVISORY AT OFF SITE REPORTING	FAN SHUT DOWN	DEACTIVATE AUDIBLES	DEACTIVATE VISUALS	DEACTIVATE AUDIO/VISUALS	SYSTEM NORMAL	SHUT FIRE SMOKE DAMPERS	REMARKS
SMOKE DETECTORS	•	•	•	•	•							•						
HEAT DETECTORS	•	•	•	•	•													
SMOKE BEAM DETECTORS	•	•	•	•	•													
DUCT SMOKE DETECTORS	•	•	•	•	•							•					•	
MANUAL PULL STATIONS	•	•	•	•	•													
SYSTEM RESET													•	•	•	•		
SIGNAL SILENCE													•					
AC POWER FAILURE						•	•	•										
FIRE ALARM TROUBLE (OPEN, SHORTS, OR GROUNDS) ON INITIATION OR SIGNALING CIRCUITS						•	•	•										

SHEET INDEX

PROJECT DESCRIPTION

SCOPE OF WORK:
FIRE ALARM SYSTEM REPLACEMENT FOR EXISTING CAMPUS TO MEET CURRENT CODE REQUIREMENTS. THE INTENT OF THE PROJECT IS TO REPLACE EXISTING FIRE ALARM SYSTEM WITH NEW AUTOMATIC FIRE ALARM SYSTEM AND EM/VOICE EVACUATION SYSTEM.

SYSTEM DESCRIPTION:
SLC = CLASS B
IDC = CLASS B
NAC = CLASS B

FIRE ALARM SYSTEM DESIGN BY:
NAJIB ANWARY

EQUIPMENT ANCHORAGE

M/E/P COMPONENT ANCHORAGE NOTES:

ALL MECHANICAL, PLUMBING AND ELECTRICAL COMPONENTS SHALL BE ANCHORED AND INSTALLED PER THE DETAILS ON THE DSA APPROVED CONSTRUCTION DOCUMENTS. WHERE NO DETAIL IS INDICATED, THE FOLLOWING COMPONENTS SHALL BE ANCHORED OR BRACED TO MEET THE FORCE AND DISPLACEMENT REQUIREMENTS PRESCRIBED IN THE 2019 CBC, SECTION 1617A.1.18 THROUGH 1617A.1.26 AND ASCE 7-16 CHAPTER 13, 26 & 30:

1. ALL PERMANENT EQUIPMENT AND COMPONENTS.
2. TEMPORARY OR MOVABLE EQUIPMENT THAT IS PERMANENTLY ATTACHED(e.g. HARD WIRE) TO THE BUILDING UTILITY SERVICES SUCH AS ELECTRICITY, GAS OR WATER. "PERMANENTLY ATTACHED" SHALL INCLUDE ALL ELECTRICAL CONNECTIONS EXCEPT PLUGS FOR 120 / 220 VOLT RECEPTACLES HAVING A FLEXIBLE CABLE.
3. TEMPORARY, MOVABLE OR MOBILE EQUIPMENT WHICH IS HEAVIER THAN 400 POUNDS OR HAS A CENTER OF MASS LOCATED 4 FEET OR MORE ABOVE THE ADJACENT FLOOR OR ROOF LEVEL THAT DIRECTLY SUPPORT THE COMPONENT IS REQUIRED TO BE RESTRAINED IN A MANNER APPROVED BY DSA.

THE FOLLOWING MECHANICAL AND ELECTRICAL COMPONENTS SHALL BE POSITIVELY ATTACHED TO THE STRUCTURE, BUT NEED NOT BE DETAILED IN THE PLANS. THESE COMPONENTS SHALL HAVE FLEXIBLE CONNECTIONS PROVIDED BETWEEN THE COMPONENT AND ASSOCIATED DUCTWORK, PIPING AND CONDUIT. FELXIBLE CONNECTIONS MUST ALLOW MOVEMENT IN BOTH TRANSVERSE AND LONGITUDINAL DIRECTIONS.

A. COMPONENTS WEIGHTING LESS THAN 400 POUNDS AND HAVE A CENTER OF MASS LOCATED 4 FEET OR LESS ABOVE THE ADJACENT FLOOR OR ROOF LEVEL THAT DIRECTLY SUPPORT THE COMPONENT.
B. COMPONENTS WEIGHTING LESS THAN 20 POUNDS, OR IN THE CASE OF DISTRIBUTED SYSTEMS, LESS THAN 5 POUNDS PER FOOT, WHICH ARE SUSPENDED FROM A ROOF OR FLOOR OR HUNG FROM A WALL.

THE ANCHORAGE OF ALL MECHANICAL, ELECTRICAL AND PLUMBING COMPONENTS SHALL BE SUBJECT OF THE APPROVAL OF THE DESIGN PROFESSIONAL IN GENERAL RESPONSIBLE CHARGE OR STRUCTURAL ENGINEER DELEGATED RESPONSIBILITY AND ACCEPTANCE BY DSA. THE PROJECT INSPECTOR WILL VERIFY THAT ALL COMPONENTS AND EQUIPMENT HAVE BEEN ANCHORED IN ACCORDANCE WITH ABOVE REQUIREMENTS.

PIPING, DUCTWORK AND ELECTRICAL DISTRIBUTION SYSTEM BRACING NOTE

PIPING, DUCTWORK AND ELECTRICAL DISTRIBUTION SYSTEMS SHALL BE BRACED TO COMPLY WITH THE FORCES AND DISPLACEMENTS PRESCRIBED IN ASCE 7-16 SECTION 13.3 AS DEFINED IN ASCE 7-16 SECTION 13.6.5, 13.6.6, 13.6.7, 13.6.8 AND 2019 CBC, SECTIONS 1617A.1.24, 1617A.1.25 AND 1617A.1.26.

THE METHOD OF SHOWING BRACING AND ATTACHMENTS TO THE STRUCTURE FOR THE IDENTIFIED DISTRIBUTION SYSTEM ARE AS NOTED BELOW. WHEN BRACING AND ATTACHMENTS ARE BASED ON PRE-APPROVED INSTALLATION GUIDE (e.g. OSHPD OPM FOR 2013 CBC OR LATER), COPIES OF THE BRACING SYSTEM INSTALLATION GUIDE OR MANUAL SHALL BE AVAILABLE ON THE JOBSITE PRIOR TO THE START OF AND DURING THE HANGING AND BRACING OF THE DISTRIBUTION SYSTEMS. THE STRUCTURAL ENGINEER OF RECORD SHALL VERIFY THE ADEQUACY OF THE STRUCTURE TO SUPPORT THE HANGER AND BRACE LOADS.
MECHANICAL PIPING (MP), MECHANICAL DUCTS (MD), PLUMBING PIPING (PP), ELECTRICAL DISTRIBUTION SYSTEMS (E):

MP ☐ MD ☐ PP ☐ E ■ - OPTION 1: DETAILED ON THE APPROVED DRAWINGS WITH PROJECT SPECIFIC NOTES AND DETAILS.
MP ☐ MD ☐ PP ☐ E ☐ - OPTION 2: SHALL COMPLY WITH THE APPLICABLE OSHPD PRE-APPROVED (OPM #) #__________.

APPLICABLE CODES & STANDARDS

CODES:

1. 2022 CALIFORNIA ADMINISTRATIVE CODE C.C.R., TITLE 24, PART 1.
2. 2019 CALIFORNIA BUILDING CODE (CBC) C.C.R., TITLE 24, VOL. 1 & 2 BASED ON THE 2018 INTERNATIONAL BUILDING CODE (IBC) WITH CALIFORNIA AMENDMENTS.
3. 2019 CALIFORNIA ELECTRICAL CODE (CEC) C.C.R., TITLE 24, PART 3 BASED ON THE 2017 NATIONAL ELECTRICAL CODE (NEC) WITH CALIFORNIA AMENDMENTS.
4. 2019 CALIFORNIA MECHANICAL CODE (CMC) C.C.R., TITLE 24, PART 4 BASED ON THE 2018 UNIFORM MECHANICAL CODE (UMC) WITH CALIFORNIA AMENDMENTS.
5. 2019 CALIFORNIA PLUMBING CODE (CPC) C.C.R., TITLE 24, PART 5 BASED ON THE 2018 UNIFORM PLUMBING CODE (UPC) WITH CALIFORNIA AMENDMENTS.
6. 2019 CALIFORNIA ENERGY CODE C.C.R., TITLE 24, PART 6.
7. 2019 CALIFORNIA FIRE CODE (CFC) C.C.R., TITLE 24, PART 9 BASED ON THE 2018 INTERNATIONAL FIRE CODE (IFC) WITH CALIFORNIA AMENDMENTS.
8. 2019 CALIFORNIA GREEN BUILDING STANDARDS CODE C.C.R., TITLE 24, PART 11.
9. 2019 CALIFORNIA REFERENCED STANDARDS CODE C.C.R., TITLE 24, PART 12.
10. TITLE 19 C.C.R., PUBLIC SAFETY, STATE FIRE MARSHAL REGULATIONS.
11. NATIONAL FIRE ALARM CODE (NFPA 72) 2016.

STANDARDS:

1. AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)
2. ELECTRONICS INDUSTRIES ASSOCIATION (EIA)
3. INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS (IEEE)
4. NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)
5. NATIONAL ELECTRICAL TESTING ASSOCIATION (NETA)
6. UNDERWRITER LABORATORIES (UL)
7. CALIFORNIA OCCUPATIONAL SAFETY AND HEALTH ACT STANDARDS (CAL/OSHA)
8. NATIONAL FIRE PROTECTION ASSOCIATION; INSTALLATION OF CARBON MONOXIDE (NFPA 720)

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 01-120702 INC:
REVIEWED FOR
SS ☐ FLS ☑ ACS ☐
DATE: 5/5/2023
(DSA STAMP AREA)

SFA

LICENSED ARCHITECT
MARK C. FINNEY
NO. C-24673
REN. 9-30-23
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
NAJIB ANWARY
No. E21043
EXP. 3/31/25
ELECTRICAL
STATE OF CALIFORNIA

AURUM CONSULTING ENGINEERS MONTEREY BAY, INC.
Project No. 22-547.00
404 W. Franklin St. • Suite 100 • Monterey, CA 93940
T.831.646.3330 • F.831.646.3336 • www.acemb.com

FIRE ALARM SYMBOLS, ABBREVIATIONS, EQUIPMENT LIST, OPERATIONAL MATRIX, DETAILS & NOTES

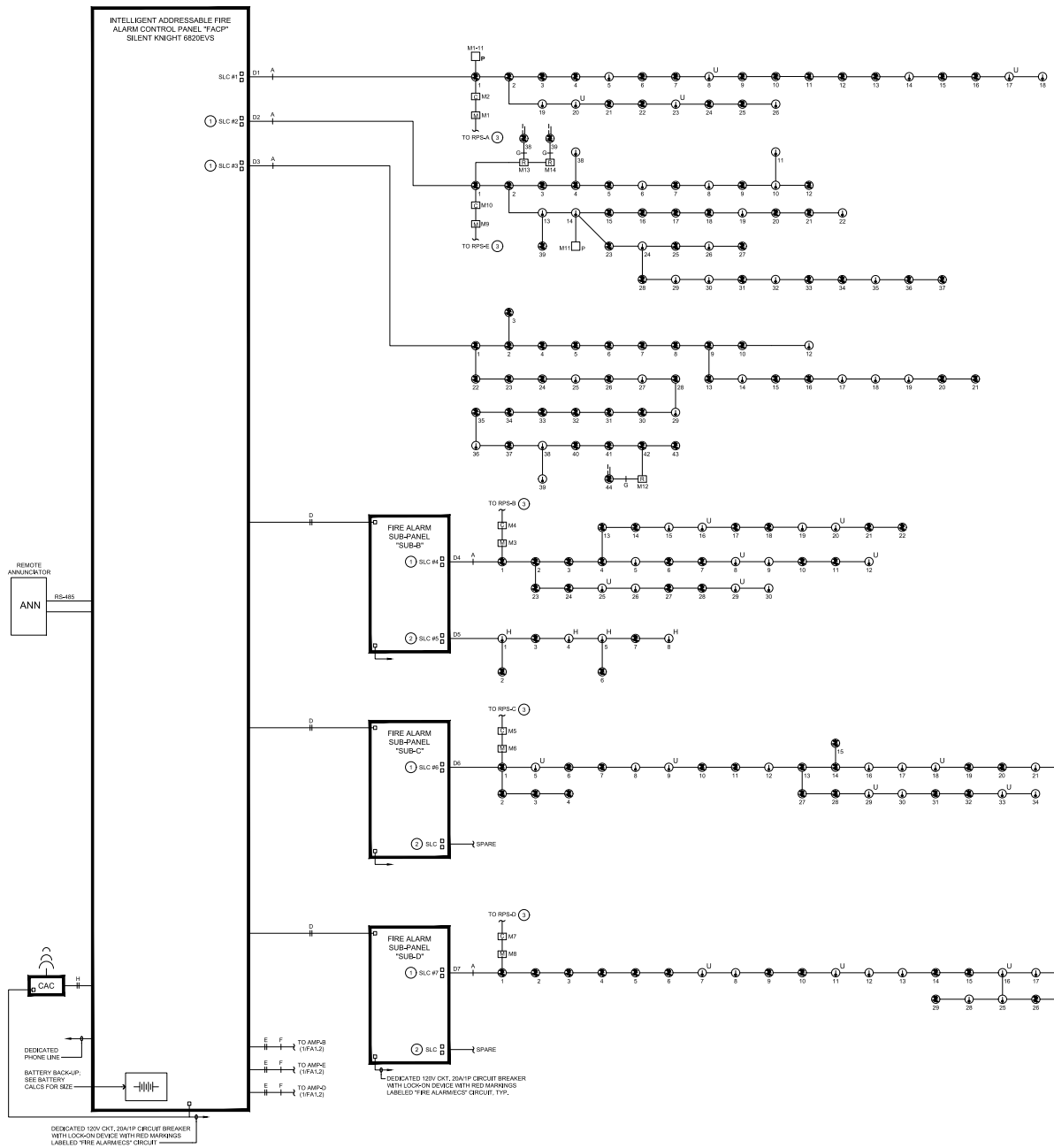
FIRE ALARM UPGRADE
NOBLE ELEMENTARY SCHOOL
3466 GROSSMONT DRIVE, SAN JOSE, CA 95132
BERRYESSA UNION SCHOOL DISTRICT

REVISIONS

NO.	ITEM	DATE

DRAWN BY: M.M.
CHECKED BY: N.A.
SFA JOB NO: 22084
DATE: 09/25/2022

FA0.1



DETAIL NOTES:

1. CONTRACTOR SHALL PROVIDE AND INSTALL ADDITIONAL SLC CARD.
2. CONTRACTOR SHALL PROVIDE AND INSTALL ADDITIONAL SLC CARD FOR FUTURE USE.
3. SEE SHEET FA1.2.

CABLE LEGEND

TYPE A = DENOTES INITIATING DETECTION CIRCUITS (SMOKE DETECTOR, HEAT DETECTOR, ETC.); UNLESS OTHERWISE NOTED, PROVIDE (1) #14 TWISTED-UNSHIELDED PAIR. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.

TYPE B = DENOTES VISUAL NOTIFICATION APPLIANCE CIRCUITS (STROBES) UNLESS OTHERWISE NOTED, PROVIDE (1) PAIR OF #12 AWG. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.

TYPE C = DENOTES AUDIO NOTIFICATION APPLIANCE CIRCUITS (SPEAKERS) UNLESS OTHERWISE NOTED, PROVIDE (1) PAIR OF #14 AWG. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.

TYPE D = DENOTES (1) PAIR OF RS-485 SBUS CABLE FOR FIRE ALARM SUB-PANEL CONNECTION TO FACP PER MANUFACTURER'S INSTALLATION INSTRUCTIONS. SUITABLE FOR UNDERGROUND USE. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.

TYPE E = DENOTES SYSTEM BUS (SBUS) CONNECTION; UNLESS OTHERWISE NOTED, PROVIDE (1) PAIR OF #16 AWG. SUITABLE FOR UNDERGROUND USE. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.

TYPE F = DENOTES VOICE BUS (VBUS) CONNECTION; UNLESS OTHERWISE NOTED, PROVIDE (1) PAIR OF #16 AWG. SUITABLE FOR UNDERGROUND USE. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.

TYPE G = DENOTES RELEASING CIRCUITS (FSD, DOOR HOLDER, FAN SHUT-OFF, ETC.). UNLESS OTHERWISE NOTED, PROVIDE (1) OF #16 AWG.

TYPE H = DENOTES SUPERVISORY RELAY TRIPS FOR CAC. PROVIDE (2) STRANDED #14 AWG.

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 01-120702 INC: 1
REVIEWED FOR
SS ☐ FLS ☑ ACS ☐
DATE: 5/5/2023
(DSA STAMP AREA)

SFA

LICENSED ARCHITECT
NO. C-24813
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
NATIB ANWARI
NO. E21343
EXP. 3/31/25
ELECTRICAL
STATE OF CALIFORNIA

AURUM CONSULTING ENGINEERS
MONTEREY BAY, INC.
Project No. 22-547.00
650 W. Franklin St. • Suite 204 • Monterey, CA 93940
T 831.646.3336 • F 831.646.3338 • www.aurumbay.com

FIRE ALARM RISER DIAGRAM

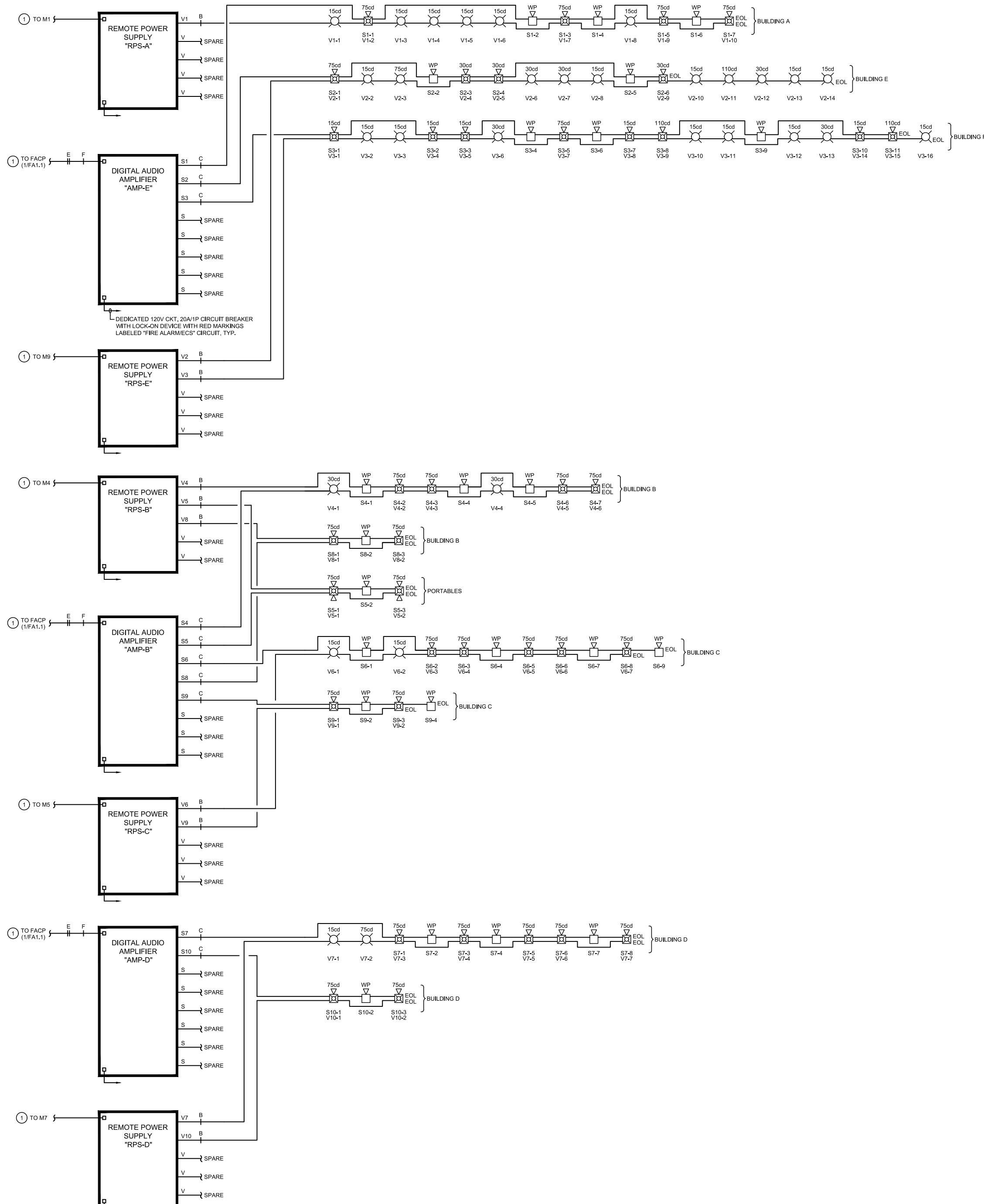
FIRE ALARM UPGRADE
NOBLE ELEMENTARY SCHOOL
3466 GROSSMONT DRIVE, SAN JOSE, CA 95132
BERRYESSA UNION SCHOOL DISTRICT

REVISIONS

NO.	ITEM	DATE

DRAWN BY: N.M.
CHECKED BY: N.A.
SFA JOB NO: 22084
DATE: 09/25/2022

FA1.1



DETAIL NOTES:

1. SEE SHEET FA1.1.

CABLE LEGEND

TYPE A = DENOTES INITIATING DETECTION CIRCUITS (SMOKE DETECTOR, HEAT DETECTOR, ETC.) UNLESS OTHERWISE NOTED, PROVIDE (1) #14 TWISTED-UNSHIELDED PAIR. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.

TYPE B = DENOTES VISUAL NOTIFICATION APPLIANCE CIRCUITS (STROBES) UNLESS OTHERWISE NOTED, PROVIDE (1) PAIR OF #12 AWG. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.

TYPE C = DENOTES AUDIO NOTIFICATION APPLIANCE CIRCUITS (SPEAKERS) UNLESS OTHERWISE NOTED, PROVIDE (1) PAIR OF #14 AWG. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.

TYPE D = DENOTES (1) PAIR OF RS-485 SBUS CABLE FOR FIRE ALARM SUB-PANEL CONNECTION TO FACP PER MANUFACTURE'S INSTALLATION INSTRUCTIONS, SUITABLE FOR UNDERGROUND USE. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.

TYPE E = DENOTES SYSTEM BUS (SBUS) CONNECTION; UNLESS OTHERWISE NOTED, PROVIDE (1) PAIR OF #16 AWG. SUITABLE FOR UNDERGROUND USE. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.

TYPE F = DENOTES VOICE BUS (VBUS) CONNECTION; UNLESS OTHERWISE NOTED, PROVIDE (1) PAIR OF #16 AWG. SUITABLE FOR UNDERGROUND USE. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.

TYPE G = DENOTES 24VDC CONSTANT POWER CIRCUITS FOR DUCT SMOKE DETECTOR OR BEAM SMOKE DETECTOR; UNLESS OTHERWISE NOTED, PROVIDE (1) PAIR OF #12 AWG. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.

TYPE H = DENOTES SUPERVISORY RELAY TRIPS FOR CAC. PROVIDE (2) STRANDED #14 AWG.

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 01-120702 INC:
REVIEWED FOR
SS ☐ FLS ☑ ACS ☐
DATE: 5/5/2023
(DSA STAMP AREA)

LICENSED ARCHITECT
MARK C. FINNEY
NO. C-24673
REN. 9-30-23
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
NAJIB ANWARY
No. E21043
EXP. 3/31/25
ELECTRICAL
STATE OF CALIFORNIA

AURUM CONSULTING ENGINEERS MONTEREY BAY, INC.
Project No. 22-547.00
404 W. Franklin St. • Suite 100 • Monterey, CA 93940
T.831.646.3330 • F.831.646.3336 • www.acemb.com

FIRE ALARM RISER DIAGRAM

FIRE ALARM UPGRADE
NOBLE ELEMENTARY SCHOOL
3466 GROSSMONT DRIVE, SAN JOSE, CA 95132
BERRYESSA UNION SCHOOL DISTRICT

REVISIONS NO.	ITEM	DATE

DRAWN BY:	M.M.
CHECKED BY:	N.A.
SFA JOB NO: 22084	DATE: 09/25/2022

FA1.2

WATTAGE CALCULATIONS

AMPLIFIER WATTAGE CALCULATION FOR AMP-B

QTY	MODEL No.	DEVICE DESCRIPTION	WATTS EACH
1	EVS-50W	50 WATT SILENT KNIGHT DIGITAL AUDIO AMPLIFIER	50.0000
1	S4	WATTAGE OF SPEAKERS CONNECTED TO THIS CIRCUIT	8.0000
1	S5	WATTAGE OF SPEAKERS CONNECTED TO THIS CIRCUIT	3.0000
1	S6	WATTAGE OF SPEAKERS CONNECTED TO THIS CIRCUIT	10.5000
1	S8	WATTAGE OF SPEAKERS CONNECTED TO THIS CIRCUIT	3.0000
1	S9	WATTAGE OF SPEAKERS CONNECTED TO THIS CIRCUIT	5.0000
TOTAL WATTAGE AVAILABLE			20.5000

AMPLIFIER WATTAGE CALCULATION FOR AMP-D

QTY	MODEL No.	DEVICE DESCRIPTION	WATTS EACH
1	EVS-50W	50 WATT SILENT KNIGHT DIGITAL AUDIO AMPLIFIER	50.0000
1	S7	WATTAGE OF SPEAKERS CONNECTED TO THIS CIRCUIT	8.5000
1	S10	SPARE	3.0000
1	-	SPARE	0.0000
1	-	SPARE	0.0000
TOTAL WATTAGE AVAILABLE			38.5000

AMPLIFIER WATTAGE CALCULATION FOR AMP-E

QTY	MODEL No.	DEVICE DESCRIPTION	WATTS EACH
1	EVS-50W	50 WATT SILENT KNIGHT DIGITAL AUDIO AMPLIFIER	50.0000
1	S1	WATTAGE OF SPEAKERS CONNECTED TO THIS CIRCUIT	8.0000
1	S2	WATTAGE OF SPEAKERS CONNECTED TO THIS CIRCUIT	6.0000
1	S3	WATTAGE OF SPEAKERS CONNECTED TO THIS CIRCUIT	10.0000
1	-	SPARE	
TOTAL WATTAGE AVAILABLE			26.0000

BATTERY CALCULATIONS

FIRE ALARM CONTROL PANEL "FACP"

QTY	PRODUCT ID	DESCRIPTION	STANDBY EACH	STANDBY TOTAL	ALARM EACH	ALARM TOTAL
1	6820EVS	FIRE ALARM CONTROL PANEL	0.1900	0.1900	0.2500	0.2500
		PANEL STANDBY CURRENT		0.1900		
		PANEL ALARM CURRENT				0.2500

FIELD DEVICES

QTY	PRODUCT ID	DESCRIPTION	STANDBY EACH	STANDBY TOTAL	ALARM EACH	ALARM TOTAL
132	SK-PHOTO-W	ADDRESSABLE SMOKE DETECTOR	0.0002	0.0264	0.0045	0.5940
76	SK-HEAT-W	ADDRESSABLE HEAT DETECTOR	0.0002	0.0152	0.0045	0.3420
3	SK-DUCT-W	ADDRESSABLE DUCT SMOKE DETECTOR	0.0000	0.0000	0.0012	0.0036
1	SK-PULL-DA	ADDRESSABLE MANUAL PULL STATION	0.0035	0.0035	0.0035	0.0035
5	SK-MONITOR	ADDRESSABLE MONITOR MODULE	0.0004	0.0020	0.0055	0.0275
5	SK-CONTROL	ADDRESSABLE CONTROL MODULE	0.0375	0.1875	0.0375	0.1875
		DESCRIPTION	STANDBY		ALARM	
		CONTROL PANEL		0.1900		0.2500
		FIELD DEVICES		0.2346		1.1581
		TOTAL STANDBY CURRENT		0.4246		
		X 24 HOUR STANDBY		10.1904		
		TOTAL ALARM CURRENT				1.4081
		15 MINUTES OF ALARM (X .25)				0.3520
		TOTAL BATTERY REQUIREMENT				10.5424
		SAFETY MARGIN (20%)				12.6509
		BATTERY SUPPLIED				(2) 12V 18AH

BATTERY CALCULATION AMP-B

QTY	MODEL No.	DEVICE DESCRIPTION	STANDBY EACH	STANDBY TOTAL	ALARM EACH	ALARM TOTAL
1	EVS-50W	SILENT KNIGHT DIGITAL AUDIO AMPLIFIER	0.2830	0.2830	0.6850	0.6850
1	S4	SPEAKER CIRCUIT No.4	0.0000	0.0000	0.3200	0.3200
1	S5	SPEAKER CIRCUIT No.5	0.0000	0.0000	0.1200	0.1200
1	S6	SPEAKER CIRCUIT No.6	0.0000	0.0000	0.4200	0.4200
1	S8	SPEAKER CIRCUIT No.8	0.0000	0.0000	0.1200	0.1200
1	S9	SPEAKER CIRCUIT No.9	0.0000	0.0000	0.2000	0.2000
		PANEL STANDBY CURRENT		0.2830		
		PANEL ALARM CURRENT				1.8650

TOTAL SYSTEM CURRENT	STANDBY		ALARM
DESCRIPTION	STANDBY		ALARM
TOTAL STANDBY CURRENT (A)	0.2830		
X 24 HOUR STANDBY	6.7920		
TOTAL ALARM CURRENT (B)			1.8650
15 MINUTES OF ALARM (X .25)			0.4663
TOTAL BATTERY REQUIREMENT (A+B)			7.2583
SAFETY MARGIN (20%)			8.7099
BATTERY SUPPLIED (2) 18AH			18AH

BATTERY CALCULATION AMP-D

QTY	MODEL No.	DEVICE DESCRIPTION	STANDBY EACH	STANDBY TOTAL	ALARM EACH	ALARM TOTAL
1	EVS-50W	SILENT KNIGHT DIGITAL AUDIO AMPLIFIER	0.2830	0.2830	0.6850	0.6850
1	S7	SPEAKER CIRCUIT No.7	0.0000	0.0000	0.3400	0.3400
1	S10	SPEAKER CIRCUIT No.10	0.0000	0.0000	0.1200	0.1200
1	-	SPARE	0.0000	0.0000	0.0000	0.0000
1	-	SPARE	0.0000	0.0000	0.0000	0.0000
		PANEL STANDBY CURRENT		0.2830		
		PANEL ALARM CURRENT				1.1450

TOTAL SYSTEM CURRENT	STANDBY		ALARM
DESCRIPTION	STANDBY		ALARM
TOTAL STANDBY CURRENT (A)	0.2830		
X 24 HOUR STANDBY	6.7920		
TOTAL ALARM CURRENT (B)			1.1450
15 MINUTES OF ALARM (X .25)			0.2863
TOTAL BATTERY REQUIREMENT (A+B)			7.0783
SAFETY MARGIN (20%)			8.4939
BATTERY SUPPLIED (2) 18AH			18AH

BATTERY CALCULATION AMP-E

QTY	MODEL No.	DEVICE DESCRIPTION	STANDBY EACH	STANDBY TOTAL	ALARM EACH	ALARM TOTAL
1	EVS-50W	SILENT KNIGHT DIGITAL AUDIO AMPLIFIER	0.2830	0.2830	0.6850	0.6850
1	S1	SPEAKER CIRCUIT No.9	0.0000	0.0000	0.3200	0.3200
1	S2	SPEAKER CIRCUIT No.10	0.0000	0.0000	0.2400	0.2400
1	S3	SPARE	0.0000	0.0000	0.4000	0.4000
1	-	SPARE	0.0000	0.0000	0.0000	0.0000
		PANEL STANDBY CURRENT		0.2830		
		PANEL ALARM CURRENT				1.6450

TOTAL SYSTEM CURRENT	STANDBY		ALARM
DESCRIPTION	STANDBY		ALARM
TOTAL STANDBY CURRENT (A)	0.2830		
X 24 HOUR STANDBY	6.7920		
TOTAL ALARM CURRENT (B)			1.6450
15 MINUTES OF ALARM (X .25)			0.4113
TOTAL BATTERY REQUIREMENT (A+B)			7.2033
SAFETY MARGIN (20%)			8.6439
BATTERY SUPPLIED (2) 18AH			18AH

BATTERY CALCULATION RPS-A

QTY	MODEL No.	DEVICE DESCRIPTION	STANDBY EACH	STANDBY TOTAL	ALARM EACH	ALARM TOTAL
1	SK-PS6	SILENT KNIGHT REMOTE POWER SUPPLY	0.1560	0.1560	0.1850	0.1850
1	V1	VISUAL CIRCUIT No.1	0.0000	0.0000	0.6860	0.6860
1	-	SPARE	0.0000	0.0000	0.0000	0.0000
1	-	SPARE	0.0000	0.0000	0.0000	0.0000
1	-	SPARE	0.0000	0.0000	0.0000	0.0000
		PANEL STANDBY CURRENT		0.1560		
		PANEL ALARM CURRENT				0.8710

TOTAL SYSTEM CURRENT	STANDBY		ALARM
DESCRIPTION	STANDBY		ALARM
TOTAL STANDBY CURRENT (A)	0.1560		
X 24 HOUR STANDBY	3.7440		
TOTAL ALARM CURRENT (B)			0.8710
15 MINUTES OF ALARM (X .25)			0.2178
TOTAL BATTERY REQUIREMENT (A+B)			3.9618
SAFETY MARGIN (20%)			4.7541
BATTERY SUPPLIED (2) 18AH			18AH

BATTERY CALCULATION RPS-B

QTY	MODEL No.	DEVICE DESCRIPTION	STANDBY EACH	STANDBY TOTAL	ALARM EACH	ALARM TOTAL
1	SK-PS6	SILENT KNIGHT REMOTE POWER SUPPLY	0.1560	0.1560	0.1850	0.1850
1	V4	VISUAL CIRCUIT No.4	0.0000	0.0000	0.5540	0.5540
1	V5	VISUAL CIRCUIT No.5	0.0000	0.0000	0.2220	0.2220
1	V8	VISUAL CIRCUIT No.8	0.0000	0.0000	0.2140	0.2140
1	-	SPARE	0.0000	0.0000	0.0000	0.0000
		PANEL STANDBY CURRENT		0.1560		
		PANEL ALARM CURRENT				1.1750

TOTAL SYSTEM CURRENT	STANDBY		ALARM
DESCRIPTION	STANDBY		ALARM
TOTAL STANDBY CURRENT (A)	0.1560		
X 24 HOUR STANDBY	3.7440		
TOTAL ALARM CURRENT (B)			1.1750
15 MINUTES OF ALARM (X .25)			0.2938
TOTAL BATTERY REQUIREMENT (A+B)			4.0378
SAFETY MARGIN (20%)			4.8453
BATTERY SUPPLIED (2) 18AH			18AH

BATTERY CALCULATION RPS-C

QTY	MODEL No.	DEVICE DESCRIPTION	STANDBY EACH	STANDBY TOTAL	ALARM EACH	ALARM TOTAL
1	SK-PS6	SILENT KNIGHT REMOTE POWER SUPPLY	0.1560	0.1560	0.1850	0.1850
1	V6	VISUAL CIRCUIT No.6	0.0000	0.0000	0.6210	0.6210
1	V9	VISUAL CIRCUIT No.9	0.0000	0.0000	0.2140	0.2140
1	-	SPARE	0.0000	0.0000	0.0000	0.0000
1	-	SPARE	0.0000	0.0000	0.0000	0.0000
		PANEL STANDBY CURRENT		0.1560		
		PANEL ALARM CURRENT				1.0200

TOTAL SYSTEM CURRENT	STANDBY		ALARM
DESCRIPTION	STANDBY		ALARM
TOTAL STANDBY CURRENT (A)	0.1560		
X 24 HOUR STANDBY	3.7440		
TOTAL ALARM CURRENT (B)			1.0200
15 MINUTES OF ALARM (X .25)			0.2550
TOTAL BATTERY REQUIREMENT (A+B)			3.9990
SAFETY MARGIN (20%)			4.7988
BATTERY SUPPLIED (2) 18AH			18AH

BATTERY CALCULATION RPS-D

QTY	MODEL No.	DEVICE DESCRIPTION	STANDBY EACH	STANDBY TOTAL	ALARM EACH	ALARM TOTAL
1	SK-S6	SILENT KNIGHT REMOTE POWER SUPPLY	0.1560	0.1560	0.1850	0.1850
1	V7	VISUAL CIRCUIT No.7	0.0000	0.0000	0.6210	0.6210
1	V10	VISUAL CIRCUIT No.10	0.0000	0.0000	0.2140	0.2140
1	-	SPARE	0.0000	0.0000	0.0000	0.0000
1	-	SPARE	0.0000	0.0000	0.0000	0.0000
		PANEL STANDBY CURRENT		0.1560		
		PANEL ALARM CURRENT				1.0200

TOTAL SYSTEM CURRENT	STANDBY		ALARM
DESCRIPTION	STANDBY		ALARM
TOTAL STANDBY CURRENT (A)	0.1560		
X 24 HOUR STANDBY	3.7440		
TOTAL ALARM CURRENT (B)			1.0200
15 MINUTES OF ALARM (X .25)			0.2550
TOTAL BATTERY REQUIREMENT (A+B)			3.9990
SAFETY MARGIN (20%)			4.7988
BATTERY SUPPLIED (2) 18AH			18AH

BATTERY CALCULATION RPS-E

QTY	MODEL No.	DEVICE DESCRIPTION	STANDBY EACH	STANDBY TOTAL	ALARM EACH	ALARM TOTAL
1	SK-PS6	SILENT KNIGHT REMOTE POWER SUPPLY	0.1560	0.1560	0.1850	0.1850
1	V2	VISUAL CIRCUIT No.2	0.0000	0.0000	0.9980	0.9980
1	V3	VISUAL CIRCUIT No.3	0.0000	0.0000	1.0020	1.0020
1	-	SPARE	0.0000	0.0000	0.0000	0.0000
1	-	SPARE	0.0000	0.0000	0.0000	0.0000
		PANEL STANDBY CURRENT		0.1560		
		PANEL ALARM CURRENT				2.1850

TOTAL SYSTEM CURRENT	STANDBY		ALARM
DESCRIPTION	STANDBY		ALARM
TOTAL STANDBY CURRENT (A)	0.1560		
X 24 HOUR STANDBY	3.7440		
TOTAL ALARM CURRENT (B)			2.1850
15 MINUTES OF ALARM (X .25)			0.5463
TOTAL BATTERY REQUIREMENT (A+B)			4.2903
SAFETY MARGIN (20%)			5.1483
BATTERY SUPPLIED (2) 18AH			18AH

VOLTAGE DROP CALCULATIONS

SPEAKER CIRCUIT No.S1

Nominal Speaker Voltage (25 or 70)			25	
Minimum Device Voltage			20	
Total Circuit Current in amps	0.320		Wire	Ohm's
Total Circuit Power	8.000		Gauge	Per 1000
Distance from source to 1st device		50	14	3.07
Wire Gauge for balance of circuit			14	3.07

Device Number	Device Power	from previous device	Calculated Device Current	At Device	Voltage Drop from source	Percent Drop
Device 1	0.500	230	0.020	24.55	0.452	1.81%
Device 2	2.000	110	0.080	24.35	0.655	2.62%
Device 3	0.500	50	0.020	24.28	0.722	2.89%
Device 4	2.000	40	0.080	24.23	0.771	3.08%
Device 5	0.500	260	0.020	24.04	0.963	3.85%
Device 6	2.000	25	0.080	24.02	0.978	3.91%
Device 7	0.500	25	0.020	24.02	0.981	3.92%
END			0.000	24.02	0.981	3.92%
END			0.000	24.02	0.981	3.92%
END			0.000	24.02	0.981	3.92%
END			0.000	24.02	0.981	3.92%
END			0.000	24.02	0.981	3.92%
END			0.000	24.02	0.981	3.92%
END			0.000	24.02	0.981	3.92%
END			0.000	24.02	0.981	3.92%
END			0.000	24.02	0.981	3.92%
Totals	8.000	740		End of Line Voltage	24.02	

Point to Point Method			End of Line Method			Load Centering Method		
CIRCUIT IS WITHIN LIMITS			CIRCUIT IS WITHIN LIMITS			CIRCUIT IS WITHIN LIMITS		
Totals Current	Distance	Voltage Drop	Totals Current	Distance	Voltage Drop	Totals Current	Distance	Voltage Drop
0.320	740	0.98	0.320	740	1.454	0.320	740	0.727
End of Line Voltage		24.02	End of Line Voltage		23.55	End of Line Voltage		24.27
Percent Drop		3.92%	Percent Drop		5.82%	Percent Drop		2.91%

SPEAKER CIRCUIT No.S2

Nominal Speaker Voltage (25 or 70)			25	
Minimum Device Voltage			20	
Total Circuit Current in amps	0.240		Wire	Ohm's
Total Circuit Power	6.000		Gauge	Per 1000
Distance from source to 1st device		50	14	3.07
Wire Gauge for balance of circuit			14	3.07

Device Number	Device Power	from previous device	Calculated Device Current	At Device	Voltage Drop from source	Percent Drop
Device 1	0.500	25	0.020	24.96	0.037	0.15%
Device 2	2.000	60	0.080	24.88	0.118	0.47%
Device 3	0.500	35	0.020	24.85	0.148	0.59%
Device 4	0.500	35	0.020	24.83	0.174	0.70%
Device 5	2.000	55	0.080	24.79	0.208	0.83%
Device 6	0.500	25	0.020	24.79	0.211	0.84%
END			0.000	24.79	0.211	0.84%
END			0.000	24.79	0.211	0.84%
END			0.000	24.79	0.211	0.84%
END			0.000	24.79	0.211	0.84%
END			0.000	24.79	0.211	0.84%
END			0.000	24.79	0.211	0.84%
END			0.000	24.79	0.211	0.84%
END			0.000	24.79	0.211	0.84%
END			0.000	24.79	0.211	0.84%
END			0.000	24.79	0.211	0.84%
Totals	6.000	235		End of Line Voltage	24.79	

Point to Point Method			End of Line Method			Load Centering Method		
CIRCUIT IS WITHIN LIMITS			CIRCUIT IS WITHIN LIMITS			CIRCUIT IS WITHIN LIMITS		
Totals Current	Distance	Voltage Drop	Totals Current	Distance	Voltage Drop	Totals Current	Distance	Voltage Drop
0.240	235	0.21	0.240	235	0.346	0.240	235	0.173
End of Line Voltage		24.79	End of Line Voltage		24.65	End of Line Voltage		24.83
Percent Drop		0.84%	Percent Drop		1.39%	Percent Drop		0.69%

SPEAKER CIRCUIT No.S3

Nominal Speaker Voltage (25 or 70)			25	
Minimum Device Voltage			20	
Total Circuit Current in amps	0.400		Wire	Ohm's
Total Circuit Power	10.000		Gauge	Per 1000
Distance from source to 1st device		50	14	3.07
Wire Gauge for balance of circuit			14	3.07

Device Number	Device Power	from previous device	Calculated Device Current	At Device	Voltage Drop from source	Percent Drop
Device 1	0.500	300	0.020	24.26	0.737	2.95%
Device 2	0.500	30	0.020	24.19	0.807	3.23%
Device 3	0.500	20	0.020	24.15	0.851	3.40%
Device 4	2.000	80	0.080	23.98	1.018	4.07%
Device 5	0.500	30	0.020	23.93	1.066	4.26%
Device 6	2.000	30	0.080	23.89	1.110	4.44%
Device 7	0.500	35	0.020	23.86	1.144	4.58%
Device 8	0.500	50	0.020	23.81	1.187	4.75%
Device 9	2.000	40	0.080	23.78	1.217	4.87%
Device 10	0.500	65	0.020	23.77	1.233	4.93%
Device 11	0.500	30	0.020	23.76	1.237	4.95%
END			0.000	23.76	1.237	4.95%
END			0.000	23.76	1.237	4.95%
END			0.000	23.76	1.237	4.95%
END			0.000	23.76	1.237	4.95%
END			0.000	23.76	1.237	4.95%
Totals	10.000	710		End of Line Voltage	23.76	

Point to Point Method			End of Line Method			Load Centering Method		
CIRCUIT IS WITHIN LIMITS			CIRCUIT IS WITHIN LIMITS			CIRCUIT IS WITHIN LIMITS		
Totals Current	Distance	Voltage Drop	Totals Current	Distance	Voltage Drop	Totals Current	Distance	Voltage Drop
0.400	710	1.24	0.400	710	1.744	0.400	710	0.872
End of Line Voltage		23.76	End of Line Voltage		23.26	End of Line Voltage		24.13
Percent Drop		4.95%	Percent Drop		6.98%	Percent Drop		3.49%

SPEAKER CIRCUIT No.S4

Nominal Speaker Voltage (25 or 70)			25	
Minimum Device Voltage			20	
Total Circuit Current in amps	0.320		Wire	Ohm's
Total Circuit Power	8.000		Gauge	Per 1000
Distance from source to 1st device		50	14	3.07
Wire Gauge for balance of circuit			14	3.07

Device Number	Device Power	from previous device	Calculated Device Current	At Device	Voltage Drop from source	Percent Drop
Device 1	2.000	85	0.080	24.83	0.167	0.67%
Device 2	0.500	25	0.020	24.80	0.204	0.82%
Device 3	0.500	40	0.020	24.74	0.258	1.03%
Device 4	2.000	140	0.080	24.57	0.430	1.72%
Device 5	2.000	75	0.080	24.51	0.485	1.94%
Device 6	0.500	30	0.020	24.51	0.492	1.97%
Device 7	0.500	50	0.020	24.50	0.499	1.99%
END			0.000	24.50	0.499	1.99%
END			0.000	24.50	0.499	1.99%
END			0.000	24.50	0.499	1.99%
END			0.000	24.50	0.499	1.99%
END			0.000	24.50	0.499	1.99%
END			0.000	24.50	0.499	1.99%
END			0.000	24.50	0.499	1.99%
END			0.000	24.50	0.499	1.99%
END			0.000	24.50	0.499	1.99%
Totals	8.000	445		End of Line Voltage	24.50	

Point to Point Method			End of Line Method			Load Centering Method		
CIRCUIT IS WITHIN LIMITS			CIRCUIT IS WITHIN LIMITS			CIRCUIT IS WITHIN LIMITS		
Totals Current	Distance	Voltage Drop	Totals Current	Distance	Voltage Drop	Totals Current	Distance	Voltage Drop
0.320	445	0.50	0.320	445	0.874	0.320	445	0.437
End of Line Voltage		24.50	End of Line Voltage		24.13	End of Line Voltage		24.56
Percent Drop		1.99%	Percent Drop		3.50%	Percent Drop		1.75%

SPEAKER CIRCUIT No.S5

Nominal Speaker Voltage (25 or 70)			25	
Minimum Device Voltage			20	
Total Circuit Current in amps	0.120		Wire	Ohm's
Total Circuit Power	3.000		Gauge	Per 1000
Distance from source to 1st device		50	14	3.07
Wire Gauge for balance of circuit			14	3.07

Device Number	Device Power	from previous device	Calculated Device Current	At Device	Voltage Drop from source	Percent Drop
Device 1	0.500	140	0.020	24.90	0.103	0.41%
Device 2	2.000	35	0.080	24.88	0.125	0.50%
Device 3	0.500	55	0.020	24.87	0.131	0.53%
END			0.000	24.87	0.131	0.53%
END			0.000	24.87	0.131	0.53%
END			0.000	24.87	0.131	0.53%
END			0.000	24.87	0.131	0.53%
END			0.000	24.87	0.131	0.53%
END			0.000	24.87	0.131	0.53%
END			0.000	24.87	0.131	0.53%
END			0.000	24.87	0.131	0.53%
END			0.000	24.87	0.131	0.53%
END			0.000	24.87	0.131	0.53%
END			0.000	24.87	0.131	0.53%
END			0.000	24.87	0.131	0.53%
END			0.000	24.87	0.131	0.53%
Totals	3.000	230		End of Line Voltage	24.87	

Point to Point Method			End of Line Method			Load Centering Method		
CIRCUIT IS WITHIN LIMITS			CIRCUIT IS WITHIN LIMITS			CIRCUIT IS WITHIN LIMITS		
Totals Current	Distance	Voltage Drop	Totals Current	Distance	Voltage Drop	Totals Current	Distance	Voltage Drop
0.120	230	0.13	0.120	230	0.169	0.120	230	0.085
End of Line Voltage		24.87	End of Line Voltage		24.83	End of Line Voltage		24.92
Percent Drop		0.53%	Percent Drop		0.68%	Percent Drop		0.34%

SPEAKER CIRCUIT No.S6

Nominal Speaker Voltage (25 or 70)			25	
Minimum Device Voltage			20	
Total Circuit Current in amps	0.420		Wire	Ohm's
Total Circuit Power	10.500		Gauge	Per 1000
Distance from source to 1st device		50	14	3.07
Wire Gauge for balance of circuit			14	3.07

Device Number	Device Power	from previous device	Calculated Device Current	At Device	Voltage Drop from source	Percent Drop
Device 1	2.000	320	0.080	24.17	0.825	3.30%
Device 2	0.500	35	0.020	24.10	0.898	3.59%
Device 3	0.500	40	0.020	24.02	0.977	3.91%
Device 4	2.000	60	0.080	23.91	1.087	4.35%
Device 5	0.500	30	0.020	23.87	1.128	4.51%
Device 6	0.500	70	0.020	23.79	1.214	4.86%
Device 7	2.000	55	0.080	23.73	1.275	5.10%
Device 8	0.500	20	0.020	23.71	1.287	5.15%
Device 9	2.000	20	0.080	23.70	1.297	5.19%
END			0.000	23.70	1.297	5.19%
END			0.000	23.70	1.297	5.19%
END			0.000	23.70	1.297	5.19%
END			0.000	23.70	1.297	5.19%
END			0.000	23.70	1.297	5.19%
END			0.000	23.70	1.297	5.19%
END			0.000	23.70	1.297	5.19%
Totals	10.500	650		End of Line Voltage	23.70	

Point to Point Method			End of Line Method			Load Centering Method		
CIRCUIT IS WITHIN LIMITS			CIRCUIT IS WITHIN LIMITS			CIRCUIT IS WITHIN LIMITS		
Totals Current	Distance	Voltage Drop	Totals Current	Distance	Voltage Drop	Totals Current	Distance	Voltage Drop
0.420	650	1.30	0.420	650	1.676	0.420	650	0.838
End of Line Voltage		23.70	End of Line Voltage		23.32	End of Line Voltage		24.16
Percent Drop		5.19%	Percent Drop		6.70%	Percent Drop		3.35%

SPEAKER CIRCUIT No.S7

Nominal Speaker Voltage (25 or 70)			25	
Minimum Device Voltage			20	
Total Circuit Current in amps	0.340		Wire	Ohm's
Total Circuit Power	8.500		Gauge	Per 1000
Distance from source to 1st device		50	14	3.07
Wire Gauge for balance of circuit			14	3.07

Device Number	Device Power	from previous device	Calculated Device Current	At Device	Voltage Drop from source	Percent Drop
Device 1	0.500	55	0.020	24.89	0.115	0.46%
Device 2	2.000	50	0.080	24.79	0.213	0.85%
Device 3	0.500	25	0.020	24.75	0.250	1.00%
Device 4	2.000	60	0.080	24.67	0.331	1.32%
Device 5	0.500	15	0.020	24.66	0.344	1.38%
Device 6	0.500	60	0.020	24.61	0.388	1.55%
Device 7	2.000	25	0.080	24.60	0.403	1.61%
Device 8	0.500	55	0.020	24.59	0.410	1.64%
END			0.000	24.59	0.410	1.64%
END			0.000	24.59	0.410	1.64%
END			0.000	24.59	0.410	1.64%
END			0.000	24.59	0.410	1.64%
END			0.000	24.59	0.410	1.64%
END			0.000	24.59	0.410	1.64%
END			0.000	24.59	0.410	1.64%
END			0.000	24.59	0.410	1.64%
Totals	8.500	345		End of Line Voltage	24.59	

Point to Point Method			End of Line Method			Load Centering Method		
CIRCUIT IS WITHIN LIMITS			CIRCUIT IS WITHIN LIMITS			CIRCUIT IS WITHIN LIMITS		
Totals Current	Distance	Voltage Drop	Totals Current	Distance	Voltage Drop	Totals Current	Distance	Voltage Drop
0.340	345	0.41	0.340	345	0.720	0.340	345	0.360
End of Line Voltage		24.59	End of Line Voltage		24.28	End of Line Voltage		24.64
Percent Drop		1.64%	Percent Drop		2.88%	Percent Drop		1.44%

SPEAKER CIRCUIT No.S8

Nominal Speaker Voltage (25 or 70)			25	
Minimum Device Voltage			20	
Total Circuit Current in amps	0.120		Wire	Ohm's
Total Circuit Power	3.000		Gauge	Per 1000
Distance from source to 1st device		50	14	3.07
Wire Gauge for balance of circuit			14	3.07

Device Number	Device Power	from previous device	Calculated Device Current	At Device	Voltage Drop from source	Percent Drop
Device 1	0.500	80	0.020	24.94	0.059	0.24%
Device 2	2.000	50	0.080	24.91	0.090	0.36%
Device 3	0.500	25	0.020	24.91	0.093	0.37%
END			0.000	24.91	0.093	0.37%
END			0.000	24.91	0.093	0.37%
END			0.000	24.91	0.093	0.37%
END			0.000	24.91	0.093	0.37%
END			0.000	24.91	0.093	0.37%
END			0.000	24.91	0.093	0.37%
END			0.000	24.91	0.093	0.37%
END			0.000	24.91	0.093	0.37%
END			0.000	24.91	0.093	0.37%
END			0.000	24.91	0.093	0.37%
END			0.000	24.91	0.093	0.37%
END			0.000	24.91	0.093	0.37%
END			0.000	24.91	0.093	0.37%
Totals	3.000	155		End of Line Voltage	24.91	

Point to Point Method			End of Line Method			Load Centering Method		
CIRCUIT IS WITHIN LIMITS			CIRCUIT IS WITHIN LIMITS			CIRCUIT IS WITHIN LIMITS		
Totals Current	Distance	Voltage Drop	Totals Current	Distance	Voltage Drop	Totals Current	Distance	Voltage Drop
0.120	155	0.09	0.120	155	0.114	0.120	155	0.057
End of Line Voltage		24.91	End of Line Voltage		24.89	End of Line Voltage		24.94
Percent Drop		0.37%	Percent Drop		0.46%	Percent Drop		0.23%

SPEAKER CIRCUIT No.S9

Nominal Speaker Voltage (25 or 70)			25	
Minimum Device Voltage			20	
Total Circuit Current in amps	0.200		Wire	Ohm's
Total Circuit Power	5.000		Gauge	Per 1000
Distance from source to 1st device		50	14	3.07
Wire Gauge for balance of circuit			14	3.07

Device Number	Device Power	from previous device	Calculated Device Current	At Device	Voltage Drop from source	Percent Drop
Device 1	0.500	180	0.020	24.78	0.221	0.88%
Device 2	2.000	40	0.080	24.73	0.265	1.06%
Device 3	0.500	40	0.020	24.71	0.290	1.16%
Device 4	2.000	30	0.080	24.70	0.305	1.22%
END			0.000	24.70	0.305	1.22%
END			0.000	24.70	0.305	1.22%
END			0.000	24.70	0.305	1.22%
END			0.000	24.70	0.305	1.22%
END			0.000	24.70	0.305	1.22%
END			0.000	24.70	0.305	1.22%
END			0.000	24.70	0.305	1.22%
END			0.000	24.70	0.305	1.22%
END			0.000	24.70	0.305	1.22%
END			0.000	24.70	0.305	1.22%
END			0.000	24.70	0.305	1.22%
END			0.000	24.70	0.305	1.22%
Totals	5.000	290		End of Line Voltage	24.70	

Point to Point Method			End of Line Method			Load Centering Method		
CIRCUIT IS WITHIN LIMITS			CIRCUIT IS WITHIN LIMITS			CIRCUIT IS WITHIN LIMITS		
Totals Current	Distance	Voltage Drop	Totals Current	Distance	Voltage Drop	Totals Current	Distance	Voltage Drop
0.200	290	0.30	0.200	290	0.356	0.200	290	0.178
End of Line Voltage		24.70	End of Line Voltage		24.64	End of Line Voltage		24.82
Percent Drop		1.22%	Percent Drop		1.42%	Percent Drop		0.71%

SPEAKER CIRCUIT No.S10

Nominal Speaker Voltage (25 or 70)			25	
Minimum Device Voltage			20	
Total Circuit Current in amps	0.120		Wire	Ohm's
Total Circuit Power	3.000		Gauge	Per 1000
Distance from source to 1st device		50	14	3.07
Wire Gauge for balance of circuit			14	3.07

Device Number	Device Power	from previous device	Calculated Device Current	At Device	Voltage Drop from source	Percent Drop
Device 1	0.500	140	0.020	24.90	0.103	0.41%
Device 2	2.000	40	0.080	24.87	0.128	0.51%
Device 3	0.500	60	0.020	24.86	0.135	0.54%
END			0.000	24.86	0.135	0.54%
END			0.000	24.86	0.135	0.54%
END			0.000	24.86	0.135	0.54%
END			0.000	24.86	0.135	0.54%
END			0.000	24.86	0.135	0.54%
END			0.000	24.86	0.135	0.54%
END			0.000	24.86	0.135	0.54%
END			0.000	24.86	0.135	0.54%
END			0.000	24.86	0.135	0.54%
END			0.000	24.86	0.135	0.54%
END			0.000	24.86	0.135	0.54%
END			0.000	24.86	0.135	0.54%
END			0.000	24.86	0.135	0.54%
Totals	3.000	240		End of Line Voltage	24.86	

Point to Point Method			End of Line Method			Load Centering Method		
CIRCUIT IS WITHIN LIMITS			CIRCUIT IS WITHIN LIMITS			CIRCUIT IS WITHIN LIMITS		
Totals Current	Distance	Voltage Drop	Totals Current	Distance	Voltage Drop	Totals Current	Distance	Voltage Drop
0.120	240	0.14	0.120	240	0.177	0.120	240	0.088
End of Line Voltage		24.86	End of Line Voltage		24.82	End of Line Voltage		24.91
Percent Drop		0.54%	Percent Drop		0.71%	Percent Drop		0.35%

VOLTAGE DROP (VD) CALCULATION - VISUAL CIRCUIT No. V1

DEVICE #	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
GAUGE WIRE	12	12	12	12	12	12	12	12	12	12
DISTANCE (FT)	25	30	50	20	20	20	75	240	60	40
AMPS OF DEVICE	0.043	0.107	0.043	0.043	0.043	0.043	0.107	0.043	0.107	0.107
TOTAL AMPS@DEV.	0.686	0.643	0.536	0.493	0.45	0.407	0.364	0.257	0.214	0.107
VOLT. DROP @ DEV.	0.057	0.064	0.089	0.033	0.03	0.027	0.09	0.204	0.042	0.014

		WIRE SIZE	RESIS. /M FT.	CIRC. MILS.	FORMULA
TOTAL CIRCUIT AMPS =	0.686				
TOTAL VOLT DROP =	0.649	10	1.29	10380	I * FEET * 21.6 / C.M.
		12	2.01	6530	
CKT VOLTAGE =	20.4	14	3.19	4110	
		16	5.08	2580	
% VOLTAGE DROP =	3.2%				

VOLTAGE DROP (VD) CALCULATION - VISUAL CIRCUIT No. V2

DEVICE #	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
GAUGE WIRE	12	12	12	12	12	12	12	12	12	12
DISTANCE (FT)	25	20	10	35	35	20	15	25	30	30
AMPS OF DEVICE	0.107	0.043	0.107	0.063	0.063	0.063	0.063	0.043	0.063	0.043
TOTAL AMPS@DEV.	0.998	0.891	0.848	0.741	0.678	0.615	0.552	0.489	0.446	0.383
VOLT. DROP @ DEV.	0.083	0.059	0.028	0.086	0.078	0.041	0.027	0.04	0.044	0.038

DEVICE #	11th	12th	13th	14th	15th	16th	17th	18th	19th	20th
GAUGE WIRE	12	12	12	12	12	12	12	12	12	12
DISTANCE (FT)	10	20	15	20	25					
AMPS OF DEVICE	0.148	0.043	0.063	0.043	0.043					
TOTAL AMPS@DEV.	0.34	0.192	0.149	0.086	0.043	0	0	0	0	0
VOLT. DROP @ DEV.	0.011	0.013	0.007	0.006	0.004	0	0	0	0	0

		WIRE SIZE	RESIS. /M FT.	CIRC. MILS.	FORMULA
TOTAL CIRCUIT AMPS =	0.998				
TOTAL VOLT DROP =	0.565	10	1.29	10380	I * FEET * 21.6 / C.M.
		12	2.01	6530	
CKT VOLTAGE =	20.4	14	3.19	4110	
		16	5.08	2580	
% VOLTAGE DROP =	2.8%				

VOLTAGE DROP (VD) CALCULATION - VISUAL CIRCUIT No. V3

DEVICE #	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
GAUGE WIRE	12	12	12	12	12	12	12	12	12	12
DISTANCE (FT)	300	25	20	10	20	45	70	65	50	20
AMPS OF DEVICE	0.043	0.043	0.043	0.043	0.043	0.063	0.107	0.043	0.148	0.043
TOTAL AMPS@DEV.	1.002	0.959	0.916	0.873	0.83	0.787	0.724	0.617	0.574	0.426
VOLT. DROP @ DEV.	0.994	0.079	0.061	0.029	0.055	0.117	0.168	0.133	0.095	0.028

DEVICE #	11th	12th	13th	14th	15th	16th	17th	18th	19th	20th
GAUGE WIRE	12	12	12	12	12	12	12	12	12	12
DISTANCE (FT)	20	30	40	10	25	15				
AMPS OF DEVICE	0.043	0.043	0.063	0.043	0.148	0.043				
TOTAL AMPS@DEV.	0.383	0.34	0.297	0.234	0.191	0.043	0	0	0	0
VOLT. DROP @ DEV.	0.025	0.034	0.039	0.008	0.016	0.002	0	0	0	0

		WIRE SIZE	RESIS. /M FT.	CIRC. MILS.	FORMULA
TOTAL CIRCUIT AMPS =	1.002				
TOTAL VOLT DROP =	1.883	10	1.29	10380	I * FEET * 21.6 / C.M.
		12	2.01	6530	
CKT VOLTAGE =	20.4	14	3.19	4110	
		16	5.08	2580	
% VOLTAGE DROP =	9.2%				

VOLTAGE DROP (VD) CALCULATION - VISUAL CIRCUIT No. V4

DEVICE #	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
GAUGE WIRE	12	12	12	12	12	12	12	12	12	12
DISTANCE (FT)	45	70	40	160	75	50				
AMPS OF DEVICE	0.063	0.107	0.107	0.063	0.107	0.107				
TOTAL AMPS@DEV.	0.554	0.491	0.384	0.277	0.214	0.107	0	0	0	0
VOLT. DROP @ DEV.	0.082	0.114	0.051	0.147	0.053	0.018	0	0	0	0

		WIRE SIZE	RESIS. /M FT.	CIRC. MILS.	FORMULA
TOTAL CIRCUIT AMPS =	0.554				
TOTAL VOLT DROP =	0.464	10	1.29	10380	I * FEET * 21.6 / C.M.
		12	2.01	6530	
CKT VOLTAGE =	20.4	14	3.19	4110	
		16	5.08	2580	
% VOLTAGE DROP =	2.3%				

VOLTAGE DROP (VD) CALCULATION - VISUAL CIRCUIT No.V5

DEVICE #	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
GAUGE WIRE	12	12	12	12	12	12	12	12	12	12
DISTANCE (FT)	140	75								
AMPS OF DEVICE	0.111	0.111								
TOTAL AMPS@DEV.	0.222	0.111	0	0	0	0	0	0	0	0
VOLT. DROP @ DEV.	0.103	0.028	0	0	0	0	0	0	0	0

		WIRE SIZE	RESIS. /M FT.	CIRC. MILS.	FORMULA
TOTAL CIRCUIT AMPS =	0.222				
TOTAL VOLT DROP =	0.13	10	1.29	10380	I * FEET * 21.6 / C.M.
		12	2.01	6530	
CKT VOLTAGE =	20.4	14	3.19	4110	
		16	5.08	2580	
% VOLTAGE DROP =	0.6%				

VOLTAGE DROP (VD) CALCULATION - VISUAL CIRCUIT No.V6

DEVICE #	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
GAUGE WIRE	12	12	12	12	12	12	12	12	12	12
DISTANCE (FT)	30	40	30	40	80	70	70			
AMPS OF DEVICE	0.043	0.043	0.107	0.107	0.107	0.107	0.107			
TOTAL AMPS@DEV.	0.621	0.578	0.535	0.428	0.321	0.214	0.107	0	0	0
VOLT. DROP @ DEV.	0.062	0.076	0.053	0.057	0.085	0.05	0.025	0	0	0

		WIRE SIZE	RESIS. /M FT.	CIRC. MILS.	FORMULA
TOTAL CIRCUIT AMPS =	0.621				
TOTAL VOLT DROP =	0.407	10	1.29	10380	I * FEET * 21.6 / C.M.
		12	2.01	6530	
CKT VOLTAGE =	20.4	14	3.19	4110	
		16	5.08	2580	
% VOLTAGE DROP =	2.0%				

VOLTAGE DROP (VD) CALCULATION - VISUAL CIRCUIT No.V7

DEVICE #	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
GAUGE WIRE	12	12	12	12	12	12	12	12	12	12
DISTANCE (FT)	20	25	20	70	60	60	65			
AMPS OF DEVICE	0.043	0.043	0.107	0.107	0.107	0.107	0.107			
TOTAL AMPS@DEV.	0.621	0.578	0.535	0.428	0.321	0.214	0.107	0	0	0
VOLT. DROP @ DEV.	0.041	0.048	0.035	0.099	0.064	0.042	0.023	0	0	0

		WIRE SIZE	RESIS. /M FT.	CIRC. MILS.	FORMULA
TOTAL CIRCUIT AMPS =	0.621				
TOTAL VOLT DROP =	0.353	10	1.29	10380	I * FEET * 21.6 / C.M.
		12	2.01	6530	
CKT VOLTAGE =	20.4	14	3.19	4110	
		16	5.08	2580	
% VOLTAGE DROP =	1.7%				

VOLTAGE DROP (VD) CALCULATION - VISUAL CIRCUIT No. V8

DEVICE #	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
GAUGE WIRE	12	12	12	12	12	12	12	12	12	12
DISTANCE (FT)	80	75								
AMPS OF DEVICE	0.107	0.107								
TOTAL AMPS@DEV.	0.214	0.107	0	0	0	0	0	0	0	0
VOLT. DROP @ DEV.	0.057	0.027	0	0	0	0	0	0	0	0

		WIRE SIZE	RESIS. /M FT.	CIRC. MILS.	FORMULA
TOTAL CIRCUIT AMPS =	0.214				
TOTAL VOLT DROP =	0.083	10	1.29	10380	I * FEET * 21.6 / C.M.
		12	2.01	6530	
CKT VOLTAGE =	20.4	14	3.19	4110	
		16	5.08	2580	
% VOLTAGE DROP =	0.4%				

VOLTAGE DROP (VD) CALCULATION - VISUAL CIRCUIT No. V9

DEVICE #	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
GAUGE WIRE	12	12	12	12	12	12	12	12	12	12
DISTANCE (FT)	180	75								
AMPS OF DEVICE	0.107	0.107								
TOTAL AMPS@DEV.	0.214	0.107	0	0	0	0	0	0	0	0
VOLT. DROP @ DEV.	0.127	0.027	0	0	0	0	0	0	0	0

		WIRE SIZE	RESIS. /M FT.	CIRC. MILS.	FORMULA
TOTAL CIRCUIT AMPS =	0.214				
TOTAL VOLT DROP =	0.154	10	1.29	10380	I * FEET * 21.6 / C.M.
		12	2.01	6530	
CKT VOLTAGE =	20.4	14	3.19	4110	
		16	5.08	2580	
% VOLTAGE DROP =	0.8%				

VOLTAGE DROP (VD) CALCULATION - VISUAL CIRCUIT No. V10

DEVICE #	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
GAUGE WIRE	12	12	12	12	12	12	12	12	12	12
DISTANCE (FT)	140	100								
AMPS OF DEVICE	0.107	0.107								
TOTAL AMPS@DEV.	0.214	0.107	0	0	0	0	0	0	0	0
VOLT. DROP @ DEV.	0.099	0.035	0	0	0	0	0	0	0	0

		WIRE SIZE	RESIS. /M FT.	CIRC. MILS.	FORMULA
TOTAL CIRCUIT AMPS =	0.214				
TOTAL VOLT DROP =	0.134	10	1.29	10380	I * FEET * 21.6 / C.M.
		12	2.01	6530	
CKT VOLTAGE =	20.4	14	3.19	4110	
		16	5.08	2580	
% VOLTAGE DROP =	0.7%				

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 01-120702 INC:
REVIEWED FOR
SS ☐ FLS ☑ ACS ☐
DATE: 5/5/2023
(DSA STAMP AREA)

SFA

LICENSED ARCHITECT MARK C. FINNEY NO. C-24673 REN. 9-30-23 STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER NAJIB ANWARY No. E21043 EXP. 3/31/25 ELECTRICAL STATE OF CALIFORNIA

AURUM CONSULTING ENGINEERS MONTEREY BAY, INC.
Project No. 22-547.00
404 W. Franklin St. • Suite 100 • Monterey, CA 93940
T.831.646.3330 • F.831.646.3336 • www.acemb.com

FIRE ALARM BATTERY & VOLTAGE DROP CALCULATIONS

FIRE ALARM UPGRADE
NOBLE ELEMENTARY SCHOOL
3466 GROSSMONT DRIVE, SAN JOSE, CA 95132
BERRYESSA UNION SCHOOL DISTRICT

REVISIONS

NO.	ITEM	DATE

DRAWN BY: M.M.
CHECKED BY: N.A.
SFA JOB NO: 22084
DATE: 09/25/2022

FA1.3

SHEET NOTES

1. CONTRACTOR SHALL DEMOLISH ALL EXISTING FIRE ALARM DEVICES AND ASSOCIATED WIRING PER GENERAL DEMOLITION NOTES ON THIS SHEET. PROVIDE AND INSTALL DEVICE COVER PLATES OVER OPENINGS TO ENSURE ALL OPENINGS ARE COMPLETELY COVERED FROM REMOVED DEVICES; PAINT/FINISH TO MATCH EXISTING WALLS. CONTRACTOR SHALL ASSUME QUANTITY OF DEVICES BEING DEMOLISHED TO BE THE SAME AS QUANTITY OF NEW DEVICES BEING ADDED AS PART OF NEW WORK. IN ADDITIONAL ALL HEAT DETECTORS IN ACCESSIBLE CEILING SPACES SHALL BE DEMOLISHED COMPLETE, ASSUME MINIMUM (2) HEAT DETECTORS PER ENCLOSED SPACE
2. CONTRACTOR SHALL DEMOLISH FIRE ALARM CONTROL PANEL COMPLETE PER GENERAL DEMOLITION NOTES ON THIS SHEET.

GENERAL DEMOLITION NOTES

A. CONTRACTOR SHALL FIELD VERIFY EXTENT OF ELECTRICAL DEMOLITION AND QUANTITIES OF ELECTRICAL TO BE REMOVED AS DICTATED BY THE REQUIREMENTS OF THE PROJECT.

B. REMOVAL SHALL INCLUDE WIRING, RACEWAY, BOXES, SWITCHES, LIGHT FIXTURES, ETC. AS INDICATED ON THE PLANS AND AS REQUIRED BY THESE DEMOLITION NOTES.

C. RACEWAYS ASSOCIATED WITH ELECTRICAL BEING DEMOLISHED WHICH ARE CONCEALED IN EXISTING REMAINING WALLS MAY BE ABANDONED IN PLACE. REMOVE WIRING FROM CONDUIT.

D. RACEWAYS ASSOCIATED WITH ELECTRICAL BEING DEMOLISHED WHICH ARE EXPOSED SHALL BE REMOVED.

E. WHERE REMOVAL OF EQUIPMENT OR WIRING IS INDICATED, IT SHALL INCLUDE ALL ASSOCIATED WIRING BACK TO LAST ACTIVE REMAINING OUTLET, DEVICE, FIXTURE OR PANEL.

F. ELECTRICAL CONTRACTOR SHALL INSURE THAT ALL REMAINING ACTIVE CIRCUITS, DEVICES, OUTLETS, LIGHT FIXTURES, ETC. HAVE NOT BEEN DISCONNECTED OR MADE INOPERATIVE DURING DEMOLITION. ELECTRICAL CONTRACTOR SHALL RESTORE ALL INTERRUPTED OR DISCONNECTED CIRCUITS TO OPERATION.

G. ELECTRICAL CONTRACTOR SHALL REMOVE AND DISPOSE OF ALL REMOVED ELECTRICAL EQUIPMENT AND MATERIAL.

H. NO REMOVED EQUIPMENT OR MATERIAL SHALL BE REUSED AS PART OF NEW WORK, U.O.N.

I. EXISTING REMAINING CONCEALED RACEWAYS MAY BE REUSED FOR NEW WORK PROVIDED THEY MEET ALL REQUIREMENTS OF THE SPECIFICATION FOR NEW WORK.

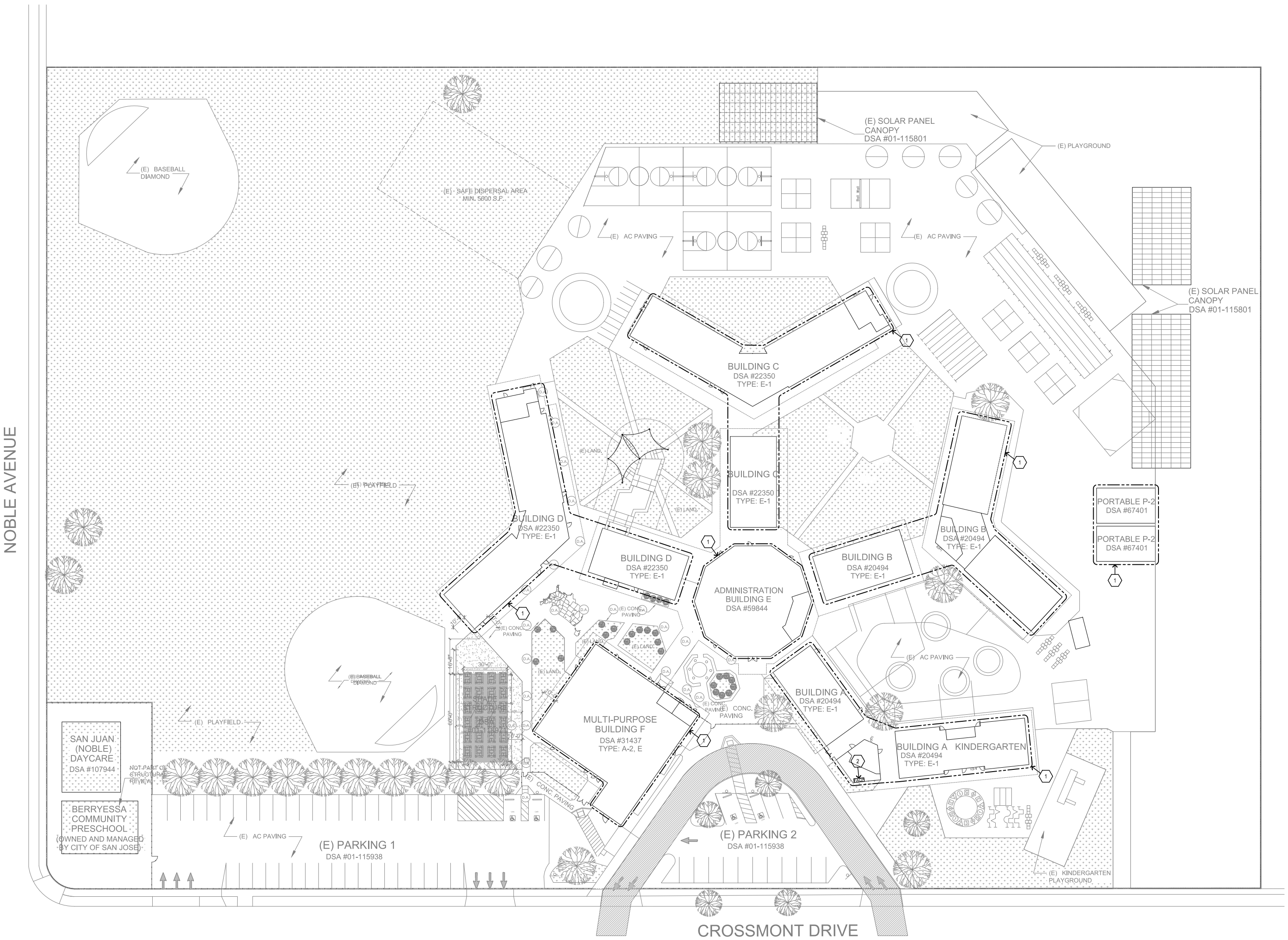
J. EXISTING FLUSH OUTLETS MAY BE REUSED FOR NEW WORK PROVIDED THEY MEET ALL REQUIREMENTS OF THE SPECIFICATION FOR NEW WORK, MEET THE REQUIREMENTS OF THE CURRENT C.E.C. FOR VOLUME AND COINCIDE WITH LOCATION SHOWN FOR THE NEW WORK.

K. FLUSH OUTLET BOXES IN EXISTING WALLS TO REMAIN MAY BE ABANDONED IN PLACE. REMOVE DEVICES AND WIRING, PLUG OPENING AND PROVIDE AND INSTALL A BLANK DEVICE PLATE.

L. EXISTING WIRING SHOWN HAS BEEN TAKEN FROM OLD PLANS AND IS ASSUMED TO BE CORRECT. ELECTRICAL CONTRACTOR SHALL FIELD VERIFY ACTUAL CONDITIONS AND MAKE ADJUSTMENTS TO SUIT ACTUAL CONDITIONS AND TO MEET THE INTENT OF THE CONTRACT DOCUMENTS.

M. WHERE TELEPHONE, COMPUTER DATA, FIBER OPTICS, FIRE ALARM OR OTHER COMMUNICATIONS OUTLETS OR WIRING IS TO BE DEMOLISHED IT SHALL BE REMOVED BACK TO THE NEXT TERMINAL POINT. ELECTRICAL CONTRACTOR SHALL COORDINATE WITH OWNER OR OWNER'S REPRESENTATIVE TO HAVE EQUIPMENT AND WIRING DESIGNATED FOR REMOVAL OR PRESERVATION PRIOR TO REMOVAL OF OUTLET BOXES, CONDUIT OR WIRING BY ELECTRICAL CONTRACTOR.

N. COORDINATE WITH OWNER PRIOR TO START OF DEMOLITION TO MINIMIZE POWER INTERRUPTIONS, WORK MAY HAVE TO OCCUR DURING NON-REGULAR BUSINESS HOURS. COORDINATE IN WRITING WITH OWNER ONE WEEK PRIOR TO PLANNED POWER INTERRUPTIONS.



1 FIRE ALARM DEMOLITION PLAN

SCALE: 1"=30'-0"

30' 0' 15' 30'

NORTH

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 01-120702 INC:
REVIEWED FOR
SS ☐ FLS ☑ ACS ☐
DATE: 5/5/2023
(DSA STAMP AREA)

SFA

LICENSED ARCHITECT MARK C. FINNEY NO. C-24673 REN. 9-30-23 STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER NAJIB ANWARY No. E21043 EXP. 3/31/25 ELECTRICAL STATE OF CALIFORNIA

AURUM CONSULTING ENGINEERS MONTEREY BAY, INC.
Project No. 22-547.00
404 W. Franklin St. • Suite 100 • Monterey, CA 93940
T.831.646.3330 • F.831.646.3336 • www.acemb.com

FIRE ALARM DEMOLITION PLAN

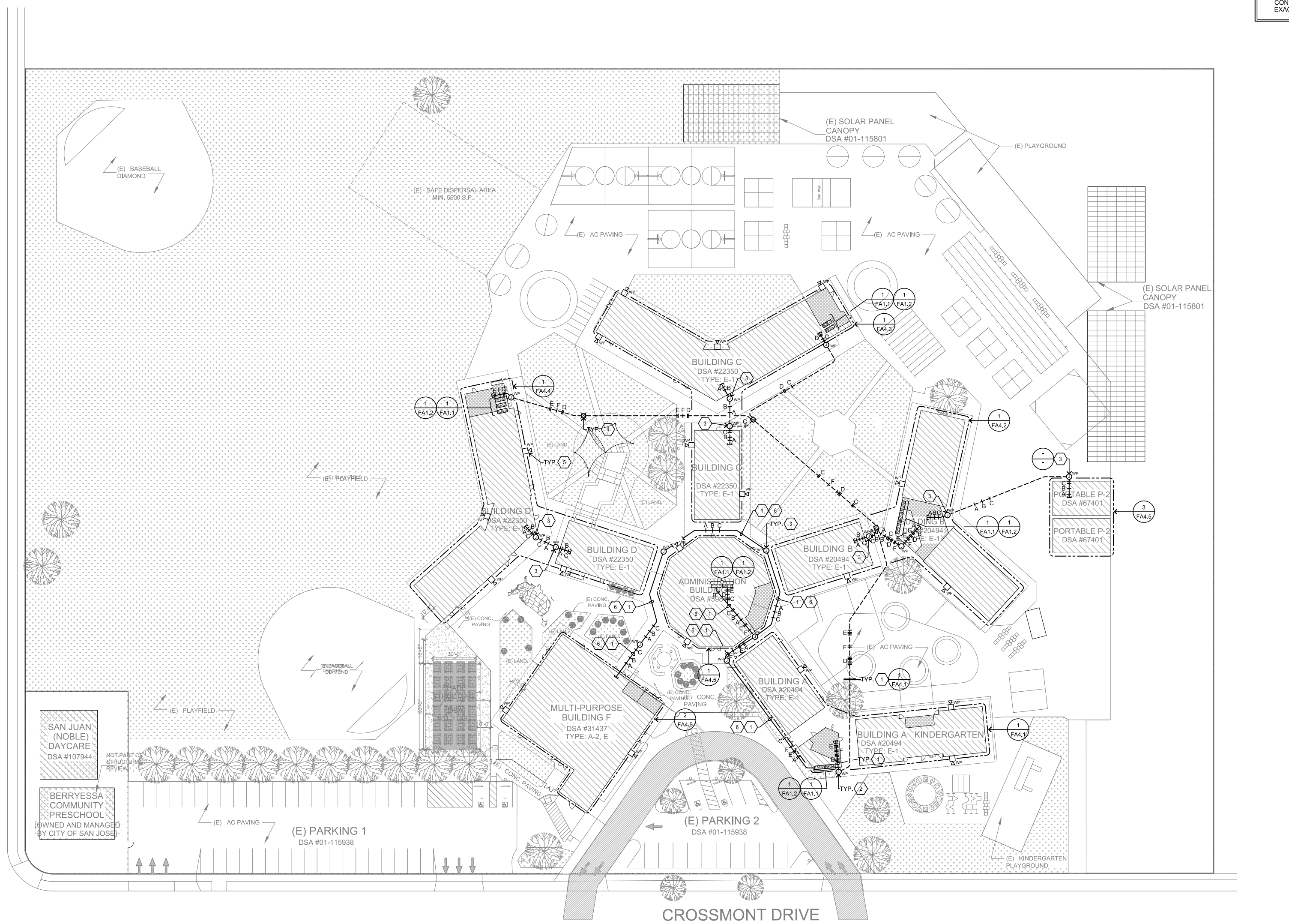
FIRE ALARM UPGRADE
NOBLE ELEMENTARY SCHOOL
3466 GROSSMONT DRIVE, SAN JOSE, CA 95132
BERRYESSA UNION SCHOOL DISTRICT

REVISIONS

NO.	ITEM	DATE

DRAWN BY:	M.M.
CHECKED BY:	N.A.
SFA JOB NO: 22084	DATE: 09/25/2022

FA2.1



1 OVERALL FIRE ALARM SITE PLAN

SCALE: 1"=30'-0"

SHEET NOTES

1. PROVIDE & INSTALL 2"C. WITH FIRE ALARM CABLES.
2. UNLESS OTHERWISE NOTED, PROVIDE & INSTALL 18" SQ. x 8" DEEP, NEMA 3R PULLCAN.
3. PROVIDE & INSTALL 12" SQ. x 6" DEEP, NEMA 3R PULLCAN.
4. PROVIDE & INSTALL IN-GRADE CHRISTY #N16 PULLBOX WITH LID LABELED "FIRE ALARM".
5. FOR REFERENCE ONLY.
6. ROUTE FIRE ALARM CONDUIT ON ROOF.

GENERAL NOTES:

A. CONTRACTOR SHALL LOCATE ALL (E) UNDERGROUND UTILITIES PRIOR TO TRENCHING AND TAKE CAUTION TO AVOID DAMAGE DURING TRENCHING. HAND TRENCH IF NECESSARY. CONTRACTOR SHALL MAKE ALL REPAIRS TO DAMAGED UTILITIES AT NO CHARGE TO OWNER.

B. CONTRACTOR SHALL REPAIR/REFINISH SURFACE WHERE TRENCHING OCCURS TO EQUAL OR BETTER THAN EXISTING CONDITIONS.

C. SEAL ALL EXTERIOR/INTERIOR BUILDING PENETRATIONS, CUT AND PATCH WALLS/CEILINGS FOR CONDUIT ROUTING AS NECESSARY. PAINT/FINISH EXPOSED CONDUITS/BOXES TO MATCH BUILDING FINISH. COORDINATE WITH ARCHITECT FOR EXACT REQUIREMENTS.

CABLE LEGEND

TYPE A = DENOTES INITIATING DETECTION CIRCUITS (SMOKE DETECTOR, HEAT DETECTOR, ETC.) UNLESS OTHERWISE NOTED, PROVIDE (1) #14 TWISTED-UNSHIELDED PAIR. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.

TYPE B = DENOTES VISUAL NOTIFICATION APPLIANCE CIRCUITS (STROBES) UNLESS OTHERWISE NOTED, PROVIDE (1) PAIR OF #12 AWG. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.

TYPE C = DENOTES AUDIO NOTIFICATION APPLIANCE CIRCUITS (SPEAKERS) UNLESS OTHERWISE NOTED, PROVIDE (1) PAIR OF #14 AWG. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.

TYPE D = DENOTES (1) PAIR OF RS-485 SBUS CABLE FOR FIRE ALARM SUB-PANEL CONNECTION TO FACP PER MANUFACTURER'S INSTALLATION INSTRUCTIONS, SUITABLE FOR UNDERGROUND USE. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.

TYPE E = DENOTES SYSTEM BUS (SBUS) CONNECTION; UNLESS OTHERWISE NOTED, PROVIDE (1) PAIR OF #16 AWG. SUITABLE FOR UNDERGROUND USE. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.

TYPE F = DENOTES VOICE BUS (VBUS) CONNECTION; UNLESS OTHERWISE NOTED, PROVIDE (1) PAIR OF #16 AWG. SUITABLE FOR UNDERGROUND USE. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.

TYPE H = DENOTES SUPERVISORY RELAY TRIPS FOR CAC. PROVIDE (2) STRANDED #14 AWG.

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 01-120702 INC:
REVIEWED FOR
SS ☐ FLS ☑ ACS ☐
DATE: 5/5/2023
(DSA STAMP AREA)

SFA

LICENSED ARCHITECT
MARK C. FINNEY
NO. C-24673
REN. 9-30-23
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
NAJIB ANWARY
No. E21043
EXP. 3/31/25
ELECTRICAL
STATE OF CALIFORNIA

AURUM CONSULTING ENGINEERS
MONTEREY BAY, INC.
Project No. 22-547.00
404 W. Franklin St. • Suite 100 • Monterey, CA 93940
T.831.646.3330 • F.831.646.3336 • www.acemb.com

OVERALL FIRE ALARM SITE PLAN

FIRE ALARM UPGRADE
NOBLE ELEMENTARY SCHOOL
3466 GROSSMONT DRIVE, SAN JOSE, CA 95132
BERRYESSA UNION SCHOOL DISTRICT

REVISIONS

NO.	ITEM	DATE

DRAWN BY: M.M.
CHECKED BY: N.A.
SFA JOB NO: 22084
DATE: 09/25/2022

FA3.1

SHEET NOTES

1. PROVIDE & INSTALL ENGRAVED LAMICOID NAMEPLATE ON FACE OF DEVICE READING "EOL".
2. MOUNT TO STRUCTURE IN SOFFIT ABOVE ACCESSIBLE CEILING SPACE.
3. PROVIDE & INSTALL HEAT DETECTOR BELOW FLOOR LEVEL INSIDE CRAWLSPACE AREA.
4. CIRCUIT VIA XYC, 2 #12 & 1 #12 GND TO NEAREST ELECTRICAL PANEL; AT PANEL PROVIDE & INSTALL 20 AMP, 1-POLE BREAKER WITH LOCK-ON DEVICE WITH RED MARKINGS LABELED "FIRE ALARM/ECS". NEW BREAKER SHALL MATCH EXISTING IN AIC RATING AND TYPE.
5. MOUNT DEVICE WITHIN 3'-0" OF PEAK OF CEILING.

GENERAL NOTES:

A. CONTRACTOR SHALL LOCATE ALL (E) UNDERGROUND UTILITIES PRIOR TO TRENCHING AND TAKE CAUTION TO AVOID DAMAGE DURING TRENCHING. HAND TRENCH IF NECESSARY. CONTRACTOR SHALL MAKE ALL REPAIRS TO DAMAGED UTILITIES AT NO CHARGE TO OWNER.

B. ALL INDOOR SPEAKERS SHALL BE 0.5 WATTS RATED MINIMUM.
ALL OUTDOOR SPEAKERS SHALL BE 2 WATTS RATED MINIMUM.

C. CONTRACTOR SHALL PROVIDE & INSTALL ACCESS PANELS AS NECESSARY FOR ALL DETECTORS LOCATED IN CLOSETS AND ABOVE CEILING SPACES FOR ACCESS TO INITIATION DETECTORS.

D. CONTRACTOR SHALL REPAIR/REFINISH SURFACE WHERE TRENCHING OCCURS TO EQUAL OR BETTER THAN EXISTING CONDITIONS.

E. SEAL ALL EXTERIOR/INTERIOR BUILDING PENETRATIONS, CUT AND PATCH WALLS/CEILINGS FOR CONDUIT ROUTING AS NECESSARY. PAINT/FINISH EXPOSED CONDUITS/BOXES TO MATCH BUILDING FINISH. COORDINATE WITH DISTRICT & ARCHITECT FOR EXACT REQUIREMENTS.

F. AUDIBLE APPLIANCES SHALL PROVIDE 15<dBA ABOVE AMBIENT NOISE LEVELS IN ALL OCCUPIED AREAS AND INTELLIGIBILITY WHERE REQUIRED CBC 907.5.2.2/1.1.

CABLE LEGEND

TYPE A = DENOTES INITIATING DETECTION CIRCUITS (SMOKE DETECTOR, HEAT DETECTOR, ETC.) UNLESS OTHERWISE NOTED. PROVIDE (1) #14 TWISTED+UNSHIELDED PAIR. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.

TYPE B = DENOTES VISUAL NOTIFICATION APPLIANCE CIRCUITS (STROBES) UNLESS OTHERWISE NOTED. PROVIDE (1) PAIR OF #12 AWG. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.

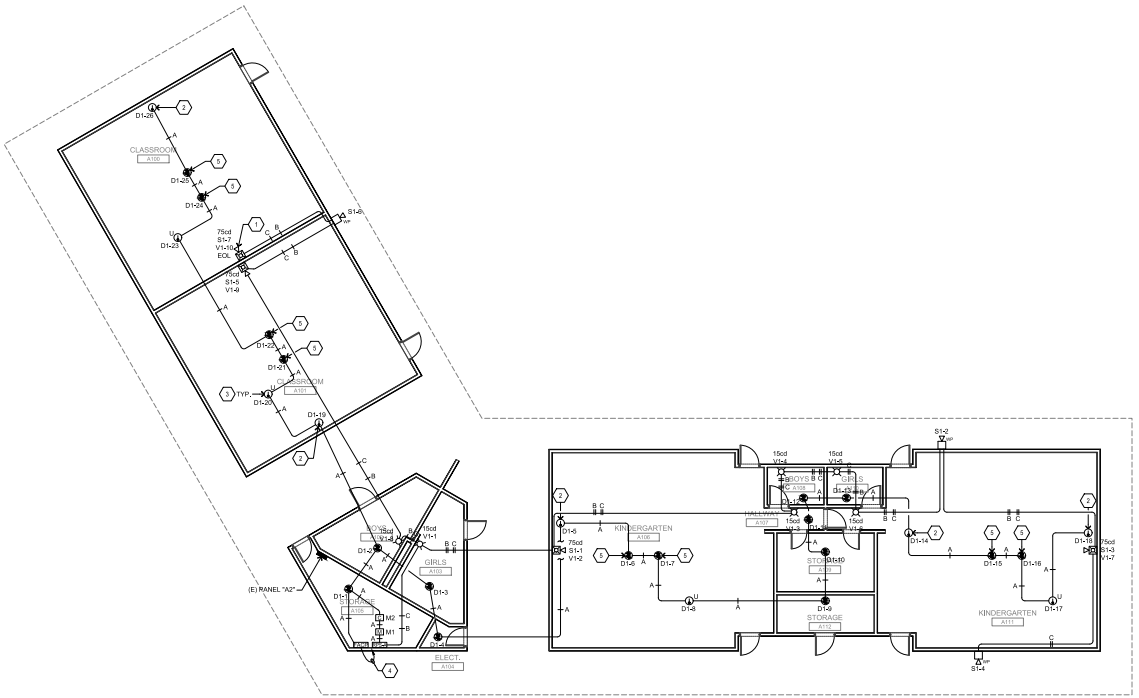
TYPE C = DENOTES AUDIO NOTIFICATION APPLIANCE CIRCUITS (SPEAKERS) UNLESS OTHERWISE NOTED. PROVIDE (1) PAIR OF #14 AWG. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.

TYPE D = DENOTES (1) PAIR OF RS-485 SBUS CABLE FOR FIRE ALARM SUB-PANEL CONNECTION TO FACP PER MANUFACTURER'S INSTALLATION INSTRUCTIONS. SUITABLE FOR UNDERGROUND USE. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.

TYPE E = DENOTES SYSTEM BUS (SBUS) CONNECTION. UNLESS OTHERWISE NOTED, PROVIDE (1) PAIR OF #16 AWG. SUITABLE FOR UNDERGROUND USE. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.

TYPE F = DENOTES VOICE BUS (VBUS) CONNECTION. UNLESS OTHERWISE NOTED, PROVIDE (1) PAIR OF #16 AWG. SUITABLE FOR UNDERGROUND USE. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.

TYPE H = DENOTES SUPERVISORY RELAY TRIPS FOR CAC. PROVIDE (2) STRANDED #14 AWG.

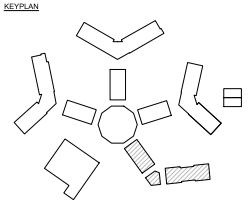


1 FIRE ALARM PLAN - BUILDING A
SCALE: 1/8"=1'-0"

8' 0' 2' 4' 6' 8'

NORTH

KEYPLAN



IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 01-120702 INC:
REVIEWED FOR
SS ☐ FLS ☑ ACS ☐
DATE: 5/5/2023
(DSA STAMP AREA)

SFA

LICENSED ARCHITECT
NO. C-24973
REGISTERED PROFESSIONAL ENGINEER
MATTHEW ANDREWS
NO. E21043
EXP. 3/31/25
ELECTRICAL
STATE OF CALIFORNIA

AURUM CONSULTING ENGINEERS
MONTEREY BAY, INC.
Project No. 22-547.00
650 W. Franklin St. • Suite 205 • Monterey, CA 93940
T 831.646.3336 • F 831.646.3338 • www.aurumbay.com

FIRE ALARM PLAN - BUILDING A

FIRE ALARM UPGRADE
NOBLE ELEMENTARY SCHOOL
3466 GROSSMONT DRIVE, SAN JOSE, CA 95132
BERRYESSA UNION SCHOOL DISTRICT

REVISIONS
NO. ITEM DATE

DRAWN BY: M.M.
CHECKED BY: N.A.
SFA JOB NO: 22084
DATE: 09/25/2022

FA4.1

SHEET NOTES

1. PROVIDE & INSTALL ENGRAVED LAMICOID NAMEPLATE ON FACE OF DEVICE READING "EOL".
2. MOUNT TO STRUCTURE IN SOFFIT ABOVE ACCESSIBLE CEILING SPACE.
3. PROVIDE & INSTALL HEAT DETECTOR BELOW FLOOR LEVEL INSIDE CRAWLSPACE AREA.
4. CIRCUIT VIA X'C. 2 #12 & 1 #12 GND TO NEAREST ELECTRICAL PANEL; AT PANEL PROVIDE & INSTALL 20 AMP. 1-POLE BREAKER WITH LOCK-ON DEVICE WITH RED MARKINGS LABELED "FIRE ALARM/ECS". NEW BREAKER SHALL MATCH EXISTING IN AIC RATING AND TYPE.
5. HOMERUN TO REMOTE POWER SUPPLY "RPS-B" AND DIGITAL AUDIO AMPLIFIER "AMP-B".
6. SEE FA3.1 FOR CONDUIT TRANSITION.
7. MOUNT DEVICE WITHIN 3'-0" OF PEAK OF CEILING.

GENERAL NOTES:

A. CONTRACTOR SHALL LOCATE ALL (E) UNDERGROUND UTILITIES PRIOR TO TRENCHING AND TAKE CAUTION TO AVOID DAMAGE DURING TRENCHING. HAND TRENCH IF NECESSARY. CONTRACTOR SHALL MAKE ALL REPAIRS TO DAMAGED UTILITIES AT NO CHARGE TO OWNER.

B. ALL INDOOR SPEAKERS SHALL BE 0.5 WATTS RATED MINIMUM.
ALL OUTDOOR SPEAKERS SHALL BE 2 WATTS RATED MINIMUM.

C. CONTRACTOR SHALL PROVIDE & INSTALL ACCESS PANELS AS NECESSARY FOR ALL DETECTORS LOCATED IN CLOSETS AND ABOVE CEILING SPACES FOR ACCESS TO INITIATION DETECTORS.

D. CONTRACTOR SHALL REPAIR/REFINISH SURFACE WHERE TRENCHING OCCURS TO EQUAL OR BETTER THAN EXISTING CONDITIONS.

E. SEAL ALL EXTERIOR/INTERIOR BUILDING PENETRATIONS, CUT AND PATCH WALLS/CEILINGS FOR CONDUIT ROUTING AS NECESSARY. PAINT/FINISH EXPOSED CONDUITS/BOXES TO MATCH BUILDING FINISH. COORDINATE WITH DISTRICT & ARCHITECT FOR EXACT REQUIREMENTS.

F. AUDIBLE APPLIANCES SHALL PROVIDE 15<dBA ABOVE AMBIENT NOISE LEVELS IN ALL OCCUPIED AREAS AND INTELLIGIBILITY WHERE REQUIRED CBC 907.5.2.2/1.1.

CABLE LEGEND

TYPE A = DENOTES INITIATING DETECTION CIRCUITS (SMOKE DETECTOR, HEAT DETECTOR, ETC.) UNLESS OTHERWISE NOTED. PROVIDE (1) #14 TWISTED-UNSHIELDED PAIR. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.

TYPE B = DENOTES VISUAL NOTIFICATION APPLIANCE CIRCUITS (STROBES) UNLESS OTHERWISE NOTED. PROVIDE (1) PAIR OF #12 AWG. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.

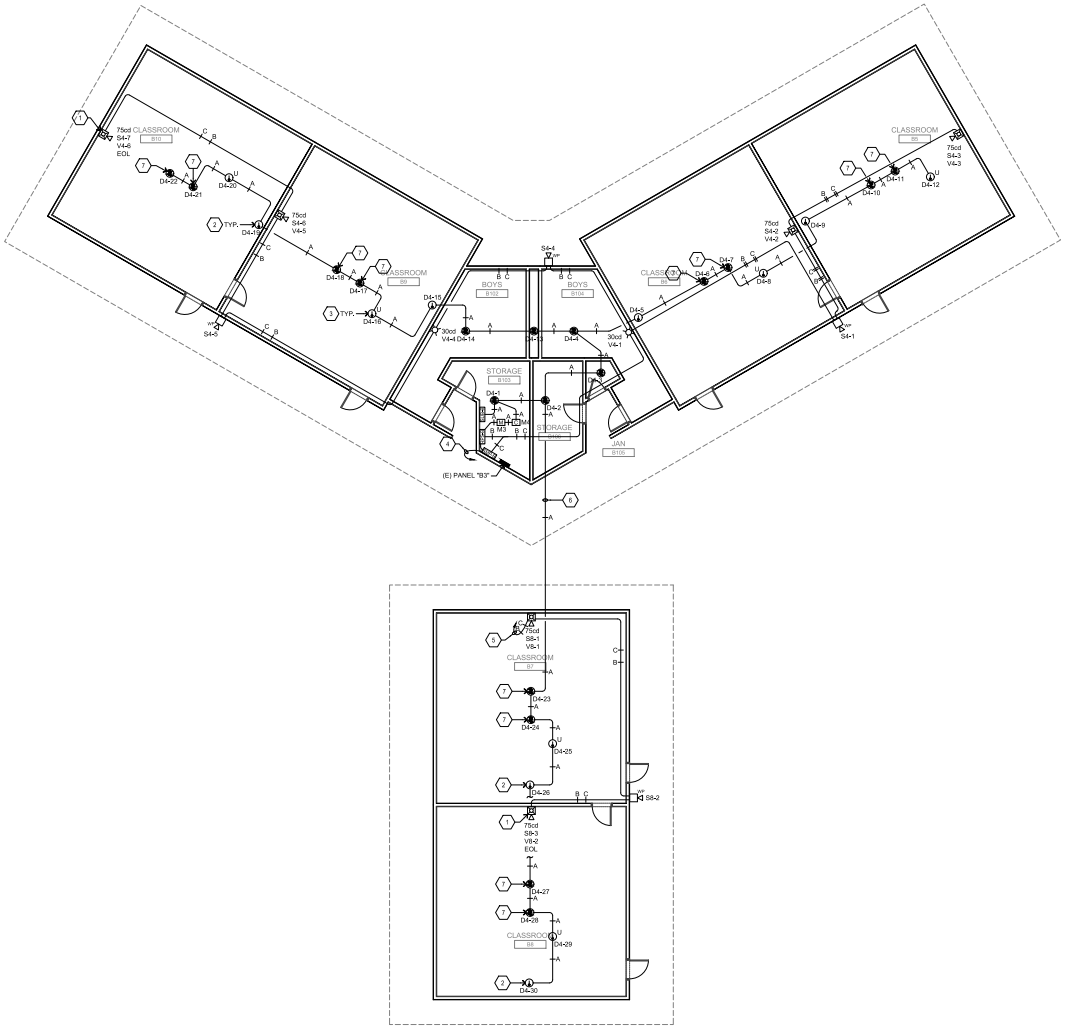
TYPE C = DENOTES AUDIO NOTIFICATION APPLIANCE CIRCUITS (SPEAKERS) UNLESS OTHERWISE NOTED. PROVIDE (1) PAIR OF #14 AWG. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.

TYPE D = DENOTES (1) PAIR OF RS-485 SBUS CABLE FOR FIRE ALARM SUB-PANEL. CONNECTION TO FACP PER MANUFACTURER'S INSTALLATION INSTRUCTIONS. SUITABLE FOR UNDERGROUND USE. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.

TYPE E = DENOTES SYSTEM BUS (SBUS) CONNECTION. UNLESS OTHERWISE NOTED. PROVIDE (1) PAIR OF #16 AWG. SUITABLE FOR UNDERGROUND USE. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.

TYPE F = DENOTES VOICE BUS (VBUS) CONNECTION. UNLESS OTHERWISE NOTED. PROVIDE (1) PAIR OF #16 AWG. SUITABLE FOR UNDERGROUND USE. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.

TYPE H = DENOTES SUPERVISORY RELAY TRIPS FOR CAC. PROVIDE (2) STRANDED #14 AWG.

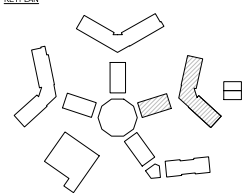


1 FIRE ALARM PLAN - BUILDING B
SCALE: 1/8"=1'-0"

8' 0' 2' 4' 6' 8'

NORTH

KEYPLAN



IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 01-120702 INC:
REVIEWED FOR:
SS ☐ FLS ☑ ACS ☐
DATE: 5/5/2023
(DSA STAMP AREA)

SFA

LICENSED ARCHITECT
NO. C-24617
REGISTERED PROFESSIONAL ENGINEER
NATIB ANWAR
No. E21043
EXP. 3/31/25
ELECTRICAL
STATE OF CALIFORNIA

AURUM CONSULTING ENGINEERS
MONTEREY BAY, INC.
Project No. 22-417.00
650 W. Franklin St. ● Monterey, CA 93940
T 831.646.3336 ● F 831.646.3338 ● www.aurumbay.com

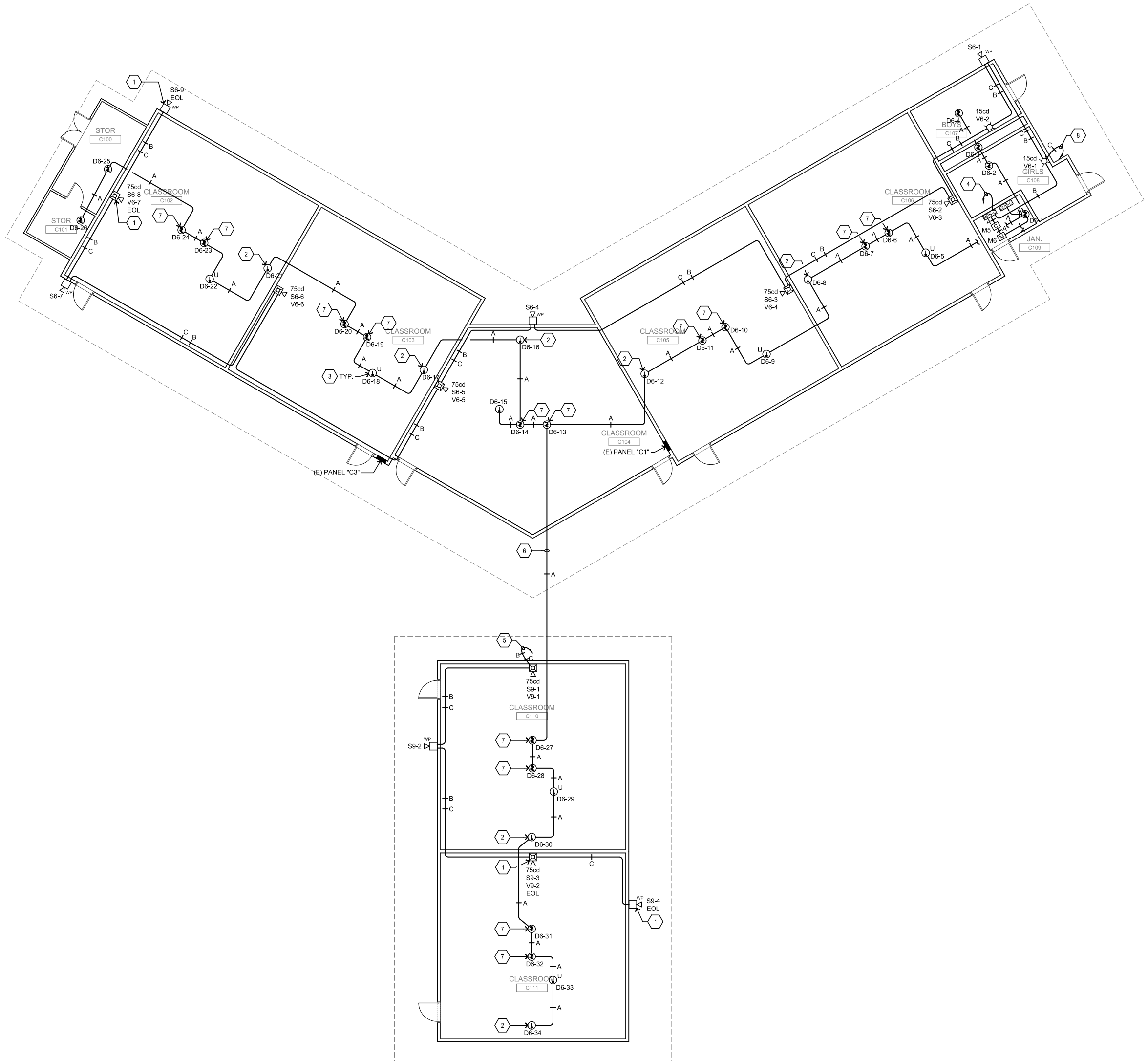
FIRE ALARM PLAN - BUILDING B

FIRE ALARM UPGRADE
NOBLE ELEMENTARY SCHOOL
3466 GROSSMONT DRIVE, SAN JOSE, CA 95132
BERRYESSA UNION SCHOOL DISTRICT

REVISIONS
NO. ITEM DATE

DRAWN BY: N.M.
CHECKED BY: N.A.
SFA JOB NO: 22084
DATE: 09/25/2022

FA4.2



1 FIRE ALARM PLAN - BUILDING C

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

8' 0' 2' 4' 6' 8'

NORTH

SHEET NOTES

1. PROVIDE & INSTALL ENGRAVED LAMICOID NAMEPLATE ON FACE OF DEVICE READING "EOL".
2. MOUNT TO STRUCTURE IN SOFFIT ABOVE ACCESSIBLE CEILING SPACE.
3. PROVIDE & INSTALL HEAT DETECTOR BELOW FLOOR LEVEL INSIDE CRAWLSPACE AREA.
4. CIRCUIT VIA ½"C., 2 #12 & 1 #12 GND TO NEAREST ELECTRICAL PANEL; AT PANEL PROVIDE & INSTALL 20 AMP, 1-POLE BREAKER WITH LOCK-ON DEVICE WITH RED MARKINGS LABELED "FIRE ALARM/ECS". NEW BREAKER SHALL MATCH EXISTING IN AIC RATING AND TYPE.
5. HOMERUN REMOTE POWER SUPPLY "RPS-C" AND DIGITAL AUDIO AMPLIFIER "AMP-B".
6. SEE FA3.1 FOR CONDUIT TRANSITION.
7. MOUNT DEVICE WITHIN 3'-0" OF PEAK OF CEILING.
8. HOMERUN TO NEW PULLCAN VIA ½"C. FOR FIRE ALARM CABLES. SEE FA3.1 FOR NEW PULLCAN LOCATION.

GENERAL NOTES:

A. CONTRACTOR SHALL LOCATE ALL (E) UNDERGROUND UTILITIES PRIOR TO TRENCHING AND TAKE CAUTION TO AVOID DAMAGE DURING TRENCHING. HAND TRENCH IF NECESSARY. CONTRACTOR SHALL MAKE ALL REPAIRS TO DAMAGED UTILITIES AT NO CHARGE TO OWNER.

B. ALL INDOOR SPEAKERS SHALL BE 0.5 WATTS RATED MINIMUM.
ALL OUTDOOR SPEAKERS SHALL BE 2 WATTS RATED MINIMUM.

C. CONTRACTOR SHALL PROVIDE & INSTALL ACCESS PANELS AS NECESSARY FOR ALL DETECTORS LOCATED IN CLOSETS AND ABOVE CEILING SPACES FOR ACCESS TO INITIATION DETECTORS.

D. CONTRACTOR SHALL REPAIR/REFINISH SURFACE WHERE TRENCHING OCCURS TO EQUAL OR BETTER THAN EXISTING CONDITIONS.

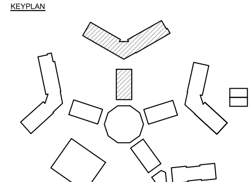
E. SEAL ALL EXTERIOR/INTERIOR BUILDING PENETRATIONS, CUT AND PATCH WALLS/CEILINGS FOR CONDUIT ROUTING AS NECESSARY. PAINT/FINISH EXPOSED CONDUITS/BOXES TO MATCH BUILDING FINISH. COORDINATE WITH DISTRICT & ARCHITECT FOR EXACT REQUIREMENTS.

F. AUDIBLE APPLIANCES SHALL PROVIDE 15-dBA ABOVE AMBIENT NOISE LEVELS IN ALL OCCUPIED AREAS AND INTELLIGIBILITY WHERE REQUIRED CBC 907.5.2.21.1.

CABLE LEGEND

TYPE A =	DENOTES INITIATING DETECTION CIRCUITS (SMOKE DETECTOR, HEAT DETECTOR, ETC.) UNLESS OTHERWISE NOTED, PROVIDE (1) #14 TWISTED-UNSHIELDED PAIR. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.
TYPE B =	DENOTES VISUAL NOTIFICATION APPLIANCE CIRCUITS (STROBES) UNLESS OTHERWISE NOTED, PROVIDE (1) PAIR OF #12 AWG. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.
TYPE C =	DENOTES AUDIO NOTIFICATION APPLIANCE CIRCUITS (SPEAKERS) UNLESS OTHERWISE NOTED, PROVIDE (1) PAIR OF #14 AWG. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.
TYPE D =	DENOTES (1) PAIR OF RS-485 SBUS CABLE FOR FIRE ALARM SUB-PANEL CONNECTION TO FACP PER MANUFACTURER'S INSTALLATION INSTRUCTIONS, SUITABLE FOR UNDERGROUND USE. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.
TYPE E =	DENOTES SYSTEM BUS (SBUS) CONNECTION; UNLESS OTHERWISE NOTED, PROVIDE (1) PAIR OF #16 AWG. SUITABLE FOR UNDERGROUND USE. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.
TYPE F =	DENOTES VOICE BUS (VBUS) CONNECTION; UNLESS OTHERWISE NOTED, PROVIDE (1) PAIR OF #16 AWG. SUITABLE FOR UNDERGROUND USE. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.
TYPE H =	DENOTES SUPERVISORY RELAY TRIPS FOR CAC. PROVIDE (2) STRANDED #14 AWG.

KEYPLAN



IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 01-120702 INC:
REVIEWED FOR
SS ☐ FLS ☑ ACS ☐
DATE: 5/5/2023
(DSA STAMP AREA)

SFA

LICENSED ARCHITECT
MARK C. FINNEY
NO. C-24673
REN. 9-30-23
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
NAJIB ANWARY
No. E21043
EXP. 3/31/25
ELECTRICAL
STATE OF CALIFORNIA

AURUM CONSULTING ENGINEERS MONTEREY BAY, INC.
Project No. 22-547.00
404 W. Franklin St. • Suite 100 • Monterey, CA 93940
T.831.646.3330 • F.831.646.3336 • www.acemb.com

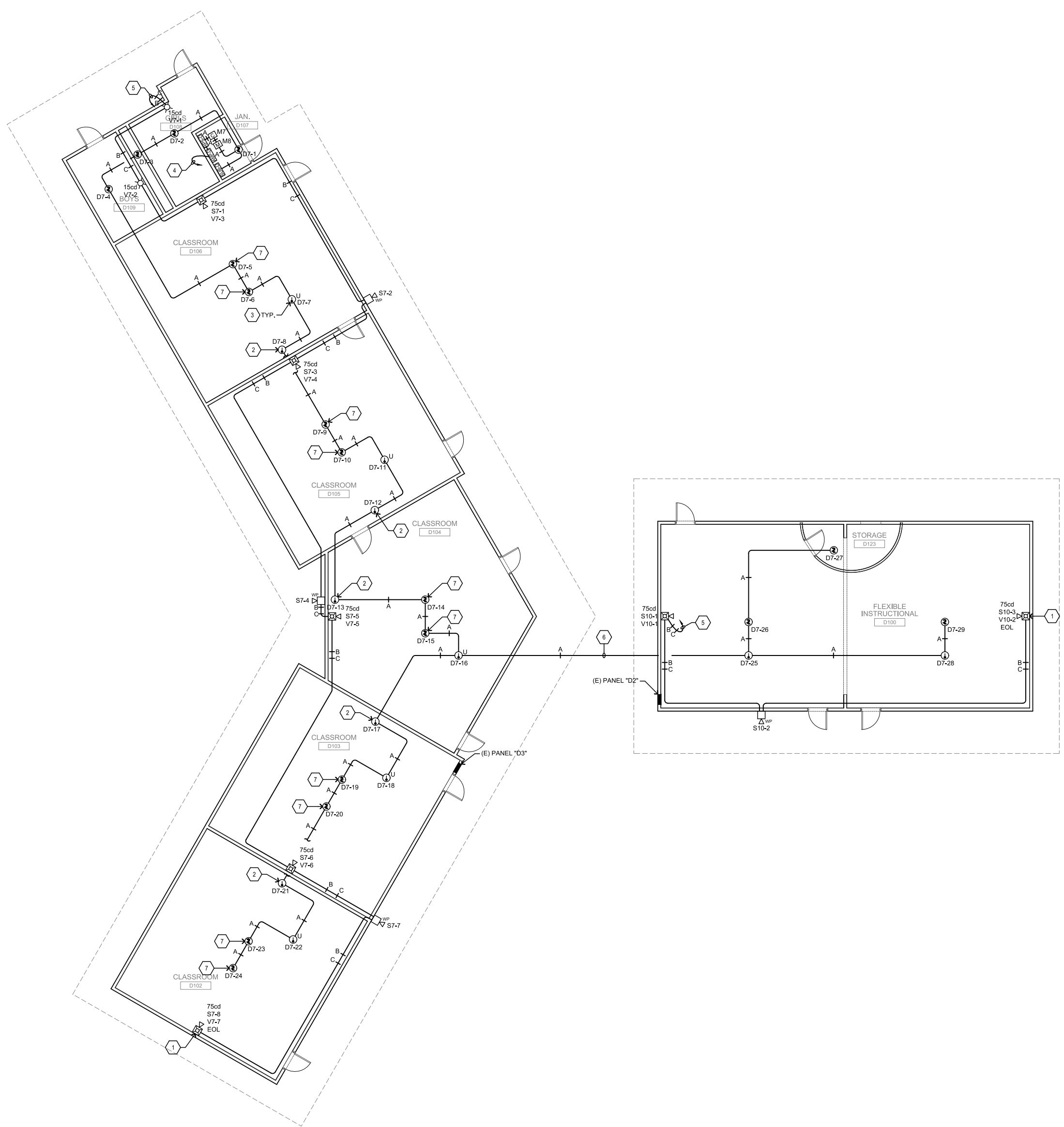
FIRE ALARM PLAN - BUILDING C

FIRE ALARM UPGRADE
NOBLE ELEMENTARY SCHOOL
3466 GROSSMONT DRIVE, SAN JOSE, CA 95132
BERRYESSA UNION SCHOOL DISTRICT

REVISIONS NO.	ITEM	DATE

DRAWN BY:	M.M.
CHECKED BY:	N.A.
SFA JOB NO: 22084	DATE: 09/25/2022

FA4.3



SHEET NOTES

1. PROVIDE & INSTALL ENGRAVED LAMICOID NAMEPLATE ON FACE OF DEVICE READING "EOL".
2. MOUNT TO STRUCTURE IN SOFFIT ABOVE ACCESSIBLE CEILING SPACE.
3. PROVIDE & INSTALL HEAT DETECTOR BELOW FLOOR LEVEL INSIDE CRAWLSPACE AREA.
4. CIRCUIT VIA ½"C., 2 #12 & 1 #12 GND TO NEAREST ELECTRICAL PANEL; AT PANEL PROVIDE & INSTALL 20 AMP, 1-POLE BREAKER WITH LOCK-ON DEVICE WITH RED MARKINGS LABELED "FIRE ALARM/ECS". NEW BREAKER SHALL MATCH EXISTING IN AIC RATING AND TYPE.
5. HOMERUN TO REMOTE POWER SUPPLY "RPS-D" AND DIGITAL AUDIO AMPLIFIER "AMP-D".
6. SEE FA3.1 FOR CONDUIT TRANSITION.
7. MOUNT DEVICE WITHIN 3'-0" OF PEAK OF CEILING.

GENERAL NOTES:

A. CONTRACTOR SHALL LOCATE ALL (E) UNDERGROUND UTILITIES PRIOR TO TRENCHING AND TAKE CAUTION TO AVOID DAMAGE DURING TRENCHING. HAND TRENCH IF NECESSARY. CONTRACTOR SHALL MAKE ALL REPAIRS TO DAMAGED UTILITIES AT NO CHARGE TO OWNER.

B. ALL INDOOR SPEAKERS SHALL BE 0.5 WATTS RATED MINIMUM.
ALL OUTDOOR SPEAKERS SHALL BE 2 WATTS RATED MINIMUM.

C. CONTRACTOR SHALL PROVIDE & INSTALL ACCESS PANELS AS NECESSARY FOR ALL DETECTORS LOCATED IN CLOSETS AND ABOVE CEILING SPACES FOR ACCESS TO INITIATION DETECTORS.

D. CONTRACTOR SHALL REPAIR/REFINISH SURFACE WHERE TRENCHING OCCURS TO EQUAL OR BETTER THAN EXISTING CONDITIONS.

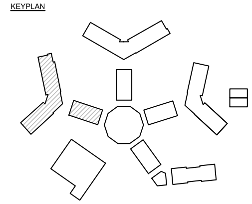
E. SEAL ALL EXTERIOR/INTERIOR BUILDING PENETRATIONS, CUT AND PATCH WALLS/CEILINGS FOR CONDUIT ROUTING AS NECESSARY. PAINT/FINISH EXPOSED CONDUITS/BOXES TO MATCH BUILDING FINISH. COORDINATE WITH DISTRICT & ARCHITECT FOR EXACT REQUIREMENTS.

F. AUDIBLE APPLIANCES SHALL PROVIDE 15-dBA ABOVE AMBIENT NOISE LEVELS IN ALL OCCUPIED AREAS AND INTELLIGIBILITY WHERE REQUIRED CBC 907.5.2.21.1.

CABLE LEGEND

TYPE A =	DENOTES INITIATING DETECTION CIRCUITS (SMOKE DETECTOR, HEAT DETECTOR, ETC.) UNLESS OTHERWISE NOTED, PROVIDE (1) #14 TWISTED-UNSHIELDED PAIR. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.
TYPE B =	DENOTES VISUAL NOTIFICATION APPLIANCE CIRCUITS (STROBES) UNLESS OTHERWISE NOTED, PROVIDE (1) PAIR OF #12 AWG. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.
TYPE C =	DENOTES AUDIO NOTIFICATION APPLIANCE CIRCUITS (SPEAKERS) UNLESS OTHERWISE NOTED, PROVIDE (1) PAIR OF #14 AWG. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.
TYPE D =	DENOTES (1) PAIR OF RS-485 SBUS CABLE FOR FIRE ALARM SUB-PANEL CONNECTION TO FACP PER MANUFACTURER'S INSTALLATION INSTRUCTIONS, SUITABLE FOR UNDERGROUND USE. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.
TYPE E =	DENOTES SYSTEM BUS (SBUS) CONNECTION; UNLESS OTHERWISE NOTED, PROVIDE (1) PAIR OF #16 AWG. SUITABLE FOR UNDERGROUND USE. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.
TYPE F =	DENOTES VOICE BUS (VBUS) CONNECTION; UNLESS OTHERWISE NOTED, PROVIDE (1) PAIR OF #16 AWG. SUITABLE FOR UNDERGROUND USE. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.
TYPE H =	DENOTES SUPERVISORY RELAY TRIPS FOR CAC. PROVIDE (2) STRANDED #14 AWG.

KEYPLAN



1 FIRE ALARM PLAN - BUILDING D
SCALE: 1/8"=1'-0"

8' 0' 2' 4' 6' 8'
NORTH

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 01-120702 INC:
REVIEWED FOR
SS ☐ FLS ☑ ACS ☐
DATE: 5/5/2023
(DSA STAMP AREA)

LICENSED ARCHITECT
MARK C. FINNEY
NO. C-24673
REN. 9-30-23
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
NAJIB ANWARY
No. E21043
EXP. 3/31/25
ELECTRICAL
STATE OF CALIFORNIA

AURUM CONSULTING ENGINEERS MONTEREY BAY, INC.
Project No. 22-547.00
404 W. Franklin St. • Suite 100 • Monterey, CA 93940
T.831.646.3330 • F.831.646.3336 • www.acemb.com

FIRE ALARM PLAN - BUILDING D

FIRE ALARM UPGRADE
NOBLE ELEMENTARY SCHOOL
3466 GROSSMONT DRIVE, SAN JOSE, CA 95132
BERRYESSA UNION SCHOOL DISTRICT

REVISIONS

NO.	ITEM	DATE

DRAWN BY:	M.M.
CHECKED BY:	N.A.
SFA JOB NO: 22084	DATE: 09/25/2022

FA4.4

SHEET NOTES

1. PROVIDE & INSTALL ENGRAVED LAMICOID NAMEPLATE ON FACE OF DEVICE READING "EOL".
2. MOUNT TO STRUCTURE IN SOFFIT ABOVE ACCESSIBLE CEILING SPACE.
3. CONTRACTOR SHALL MOUNT DEVICE ABOVE ACCESSIBLE CEILING SPACE.
4. CIRCUIT VIA ½"C., 2 #12 & 1 #12 GND TO NEAREST ELECTRICAL PANEL; AT PANEL PROVIDE & INSTALL 20 AMP, 1-POLE BREAKER WITH LOCK-ON DEVICE WITH RED MARKINGS LABELED "FIRE ALARM/ECS". NEW BREAKER SHALL MATCH EXISTING IN AIC RATING AND TYPE.
5. WHERE NECESSARY CONTRACTOR SHALL PROVIDE & INSTALL ACCESS PANEL FOR HEAT DETECTOR ABOVE CEILING, 18" SQ. OPENING MINIMUM.
6. SEE FA3.1 FOR CONTINUATION/CONDUIT ROUTING.
7. MOUNT DEVICE WITHIN 3'-0" OF PEAK OF CEILING.
8. HOMERUN TO REMOTE POWER SUPPLY "RPS-E" AND DIGITAL AUDIO AMPLIFIER "AMP-E".
9. MOUNT DEVICE IN SKYLIGHT/OPENING AREA.
10. COORDINATE EXACT LOCATION WITH ARCHITECT PRIOR TO ROUGH-IN.
11. HOMERUN TO FACP LOCATED IN BUILDING "A" STORAGE ROOM A105.

GENERAL NOTES:

A. CONTRACTOR SHALL LOCATE ALL (E) UNDERGROUND UTILITIES PRIOR TO TRENCHING AND TAKE CAUTION TO AVOID DAMAGE DURING TRENCHING. HAND TRENCH IF NECESSARY. CONTRACTOR SHALL MAKE ALL REPAIRS TO DAMAGED UTILITIES AT NO CHARGE TO OWNER.

B. ALL INDOOR SPEAKERS SHALL BE 0.5 WATTS RATED MINIMUM. ALL OUTDOOR SPEAKERS SHALL BE 2 WATTS RATED MINIMUM.

C. CONTRACTOR SHALL PROVIDE & INSTALL ACCESS PANELS AS NECESSARY FOR ALL DETECTORS LOCATED IN CLOSETS AND ABOVE CEILING SPACES FOR ACCESS TO INITIATION DETECTORS.

D. CONTRACTOR SHALL REPAIR/REFINISH SURFACE WHERE TRENCHING OCCURS TO EQUAL OR BETTER THAN EXISTING CONDITIONS.

E. SEAL ALL EXTERIOR/INTERIOR BUILDING PENETRATIONS, CUT AND PATCH WALLS/CEILINGS FOR CONDUIT ROUTING AS NECESSARY. PAINT/FINISH EXPOSED CONDUITS/BOXES TO MATCH BUILDING FINISH. COORDINATE WITH DISTRICT & ARCHITECT FOR EXACT REQUIREMENTS.

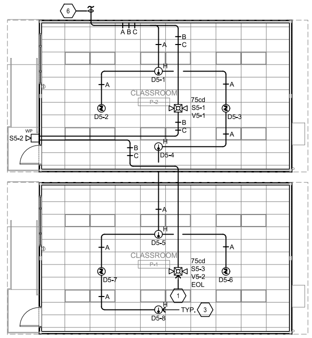
F. AUDIBLE APPLIANCES SHALL PROVIDE 15-dBA ABOVE AMBIENT NOISE LEVELS IN ALL OCCUPIED AREAS AND INTELLIGIBILITY WHERE REQUIRED CBC 907.5.2.21.1.

CABLE LEGEND

TYPE A =	DENOTES INITIATING DETECTION CIRCUITS (SMOKE DETECTOR, HEAT DETECTOR, ETC.) UNLESS OTHERWISE NOTED, PROVIDE (1) #14 TWISTED-UNSHIELDED PAIR. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.
TYPE B =	DENOTES VISUAL NOTIFICATION APPLIANCE CIRCUITS (STROBES) UNLESS OTHERWISE NOTED, PROVIDE (1) PAIR OF #12 AWG. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.
TYPE C =	DENOTES AUDIO NOTIFICATION APPLIANCE CIRCUITS (SPEAKERS) UNLESS OTHERWISE NOTED, PROVIDE (1) PAIR OF #14 AWG. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.
TYPE D =	DENOTES (1) PAIR OF RS-485 SBUS CABLE FOR FIRE ALARM SUB-PANEL CONNECTION TO FACP PER MANUFACTURER'S INSTALLATION INSTRUCTIONS, SUITABLE FOR UNDERGROUND USE. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.
TYPE E =	DENOTES SYSTEM BUS (SBUS) CONNECTION; UNLESS OTHERWISE NOTED, PROVIDE (1) PAIR OF #16 AWG. SUITABLE FOR UNDERGROUND USE. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.
TYPE F =	DENOTES VOICE BUS (VBUS) CONNECTION; UNLESS OTHERWISE NOTED, PROVIDE (1) PAIR OF #16 AWG. SUITABLE FOR UNDERGROUND USE. CROSSHATCHES INDICATE THE NUMBER OF PAIRS.
TYPE H =	DENOTES SUPERVISORY RELAY TRIPS FOR CAC. PROVIDE (2) STRANDED #14 AWG.
TYPE G =	DENOTES RELEASING CIRCUITS (FSD, DOOR HOLDER, FAN SHUT-OFF, ETC.). UNLESS OTHERWISE NOTED, PROVIDE (1) OF 16 AWG.

LINE TYPE LEGEND

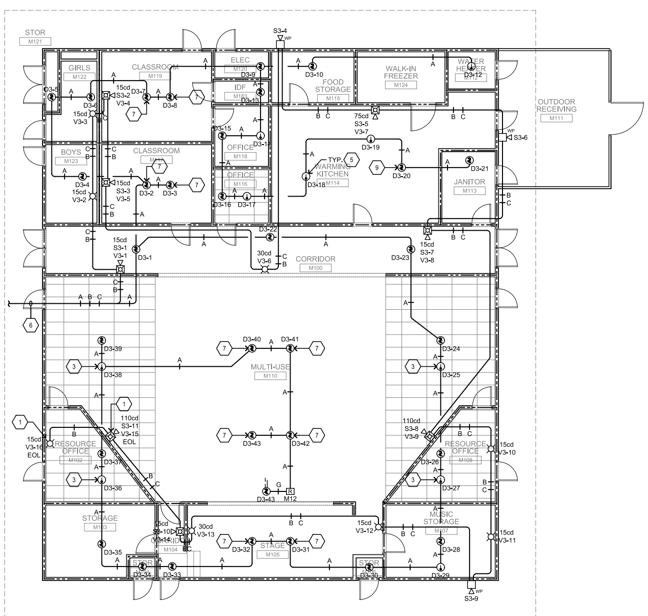
1-HOURE FIRE RATED WALL



3 FIRE ALARM PLAN - PORTABLES

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

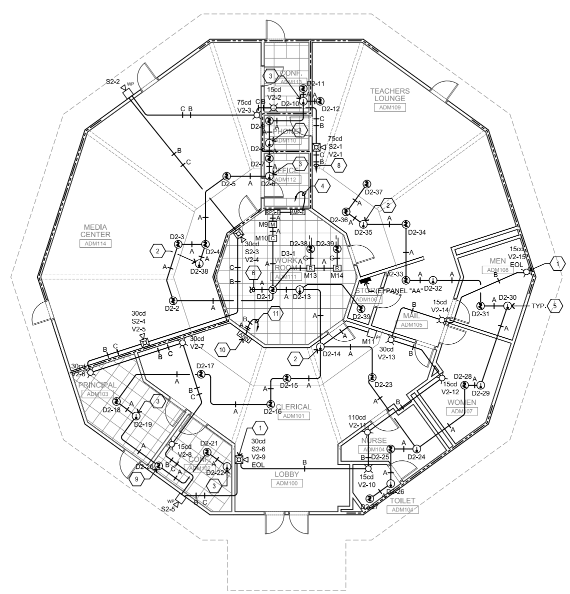
NORTH



2 FIRE ALARM PLAN - BUILDING F

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

NORTH

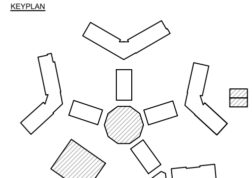


1 FIRE ALARM PLAN - BUILDING E

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

NORTH

KEYPLAN



IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 01-120702 INC:
REVIEWED FOR
SS ☐ FLS ☑ ACS ☐
DATE: 5/5/2023
(DSA STAMP AREA)

SFA

LICENSED ARCHITECT MARK C. FINNEY NO. C-24673 REN. 9-30-23 STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER NAJIB ANWARY No. E21043 EXP. 3/31/25 ELECTRICAL STATE OF CALIFORNIA

AURUM CONSULTING ENGINEERS MONTEREY BAY, INC.
Project No. 22-547.00
404 W. Franklin St. • Suite 100 • Monterey, CA 93940
T.831.646.3330 • F.831.646.3336 • www.acemb.com

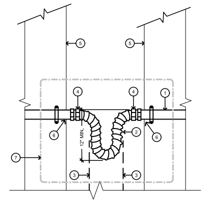
FIRE ALARM PLAN - BUILDING E, F & PORTABLES

FIRE ALARM UPGRADE
NOBLE ELEMENTARY SCHOOL
3466 GROSSMONT DRIVE, SAN JOSE, CA 95132
BERRYESSA UNION SCHOOL DISTRICT

REVISIONS NO.	ITEM	DATE

DRAWN BY:	M.M.
CHECKED BY:	N.A.
SFA JOB NO: 22084	DATE: 09/25/2022

FA4.5



DETAIL NOTES:

1. EMT, TYP.
2. SEALTITE FLEX CONDUIT, TYP.
3. EXPANSION JOINT.
4. WATERTIGHT CONNECTIONS.
5. RELOCATABLE CLASSROOMS.
6. PROVIDE WP J-BOXES IF BENDS IN CONDUIT RUN EXCEED 360°.
7. WHERE 12" MIN. SLACK CANNOT BE MET BY STRAIGHT RUN; CONTRACTOR SHALL PROVIDE & INSTALL 12" SQ. x 6" DEEP NEMA 3R PULLCAN AT EACH END MOUNTED AT SIDE/ROOF AND OFFSET TO ENSURE 12" SLACK IS PROVIDED OR MOUNT PULLCAN IN ACCESSIBLE CEILING SPACE.

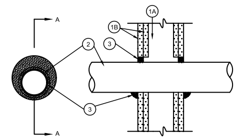
12 CONDUIT TRANSITION BETWEEN BLDGS.

NO SCALE

SEE FLOOR PLAN DRAWINGS
FOR RATED WALL LOCATIONS

U.L. System No. W-L-1049

F Rating-1 and 2 Hr (See Item 1B)
T Rating-0 HR
L Rating At Ambient-Less Than 1 CFM/sq ft
L Rating At 400F-Less Than 1 CFM/sq ft



SECTION A-A

1. Wall Assembly-The 1 or 2 hr fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner described in the individual U300 or U400 Series Wall or Partition Design in the UL Fire Resistance Directory and shall include the following construction features:

A. Studs-Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. lumber spaced 16 in. OC. Steel studs to be min 3-5/8 in. wide and spaced max 24 in. OC. When steel studs are used and the diam of opening exceeds the width of stud cavity, the opening shall be framed on all sides using lengths of steel stud installed between the vertical studs and screw-attached to the steel studs at each end. The framed opening in the wall shall be 4 to 6 in. wider and 4 to 6 in. higher than the diam of the penetrating item such that, when the penetrating item is installed in the opening, a 2 to 3 in. clearance is present between the penetrating item and the framing on all four sides.

B. Wallboard, Gypsum*-5/8 in. thick, 4 ft wide with square or tapered edges. The gypsum wallboard type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual U300 or U400 Series Design in the UL Fire Resistance Directory. Max diam of opening is 25-3/4 in. for steel stud walls. Max diam of opening is 14-1/2 in. for wood stud walls. The hourly F Rating of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed.

2. Through Penetrant-One metallic pipe, conduit or tubing to be installed either concentrically or eccentrically within the firestop system. The annular space between pipe, conduit or tubing and periphery of opening shall be min 0 in. (point contact) to max 1-3/4 in. Pipe, conduit or tubing to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipes, conduits or tubing may be used:

A. Steel Pipe-Nom 24 in. diam (or smaller) Schedule 10 (or heavier) steel pipe.

B. Iron Pipe-Nom 24 in. diam (or smaller) cast or ductile iron pipe.

C. Conduit-Nom 4 in. diam (or smaller) steel electrical metallic tubing, nom 6 in. diam (or smaller) steel conduit or nom l in. diam (or smaller) flexible steel conduit.

D. Copper Tubing-Nom 6 in. diam (or smaller) Type L (or heavier) copper tubing.

E. Copper Pipe-Nom 6 in. diam (or smaller) Regular (or heavier) copper pipe.

3. Fill, Void or Cavity Material*-Sealant-Min 5/8 in. thickness of fill material applied within annulus, flush with both surfaces of wall. At the point contact location between through penetrant and gypsum wallboard, a min 3/8 in. diam bead of fill material shall be applied at the gypsum wallboard/through penetrant interface on both surfaces of wall.

Specified Technologies Inc.-SpecSeal 100, 101, 102 or 105 Sealant
'Bearing the UL Classification Marking

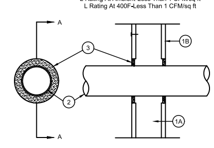
11 2-HR FIRE-RATED WALL PENETRATION

NO SCALE

SEE FLOOR PLAN DRAWINGS
FOR RATED WALL LOCATIONS

U.L. System No. W-L-1062

F Rating-1 HR
T Rating-0 HR
L Rating At Ambient-Less Than 1 CFM/sq ft
L Rating At 400F-Less Than 1 CFM/sq ft



SECTION A-A

1. Wall Assembly-The fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300 or U400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:

A. Studs-Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. lumber spaced 16 in OC. Steel studs to be min 3|Q5|W/|A8|S in. wide and spaced max 24 in. OC.

B. Wallboard Gypsum*-One Layer of nom |Q5|W/|A8|S in. thick gypsum wallboard as specified in the individual Wall and Partition Design. Max diam of opening is 4|Q3|W/|A4|S in.

2. Through Penetrants-One metallic conduit to be installed within the firestop system. The space between the conduit and periphery of opening shall be a min |Q1|W/|A4|S in. to a max |Q3|W/|A8|S in. Conduit to be rigidly supported on both sides of wall assembly. A nominal 4 in. diameter (or smaller) electrical metallic tubing or steel conduit may be used.

3. Fill, Void or Cavity Material*-Caulk-Min 1|Q1|W/|A2|S in. thickness of fill material applied within the annulus, flush with both surfaces of wall.

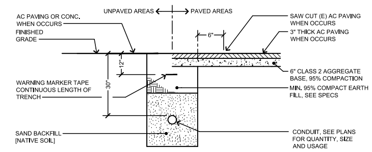
General Electric Co.-Pensit 100 Caulk.

Specified Technologies Inc.-Pensil 100 Sealant and Pensit 300 Sealant.

*Bearing the UL Classification Marking

10 1-HR FIRE-RATED WALL PENETRATION

NO SCALE

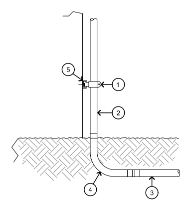


NOTES:

1. SAW CUT, TRENCH & BACKFILL FOR (N) CONDUITS, PATCH WALKWAY TO MATCH (E) SURROUNDING SURFACES. CARE SHALL BE TAKEN TO PROTECT EXISTING TREES. RESEED OR RESOD (E) DISTURBED PLANTED AREAS TO ARCHITECT'S SATISFACTION.
2. EXISTING A.C. SHALL BE CUT AND REMOVED IN SUCH A MANNER SO AS NOT TO TEAR BULGE OR DISPLACE ADJACENT PAVEMENT. EDGES SHALL BE CLEAN AND VERTICAL. ALL CUTS SHALL BE PARALLEL OR PERPENDICULAR TO STREET CENTERLINE, WHEN PRACTICAL.
3. BASE MATERIAL TO BE REPLACED TO THE DEPTH OF EXISTING BASE AND COMPACTED TO A MIN. 95% RELATIVE COMPACTION. A.C. MAY BE SUBSTITUTED FOR BASE MATERIAL. WHEN USED AS BACKFILL, CLASS 100-E-100 P.C.C. MAY BE SUBSTITUTED FOR BASE MATERIAL.
4. A TACK COAT OF ASPHALTIC EMULSION OR PAVING ASPHALT SHALL BE APPLIED TO EXISTING A.C. AT ALL CONTACT SURFACES, PRIOR TO RESURFACING.
5. ASPHALTIC CONCRETE RESURFACING;
   A) MINIMUM TOTAL THICKNESS SHALL BE ONE INCH GREATER THAN EXISTING A.C.
   B) A.C. SHALL BE HOT PLANT MIX.
6. ALL A.C. RESURFACING SHALL BE SEAL COATED WITH AN EMULSIFIED ASPHALT AND COVERED WITH CLEAN SAND.

9 TYPICAL TRENCH SECTION

NO SCALE



DETAIL NOTES:

1. UNISTRUT BRACKET.
2. GALVANIZED RIGID STEEL CONDUIT.
3. SCHEDULE 40 PVC.
4. WRAPPED GALVANIZED RIGID STEEL ELBOW AND UNDERGROUND RISER.
5. UNISTRUT CHANNEL.

GENERAL NOTES:

A. FOR WOOD STUD WALL:
   USE ⅜" LAG BOLT WITH MIN. ¾" EMBEDMENT INTO STUDS.
   (ONE AT EACH END OF BRACKET)

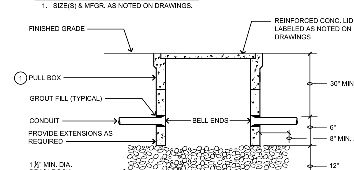
B. FOR CONCRETE WALL:
   USE ⅜" WEDGE ANCHOR WITH MIN. 2½" EMBEDMENT INTO CONCRETE WALL. (ONE AT EACH END OF BRACKET)

8 UNDERGROUND CONDUIT RISER DETAIL

NO SCALE

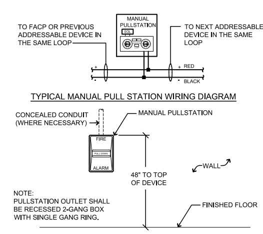
DETAIL NOTES:

1. SIZE(S) & MFGR. AS NOTED ON DRAWINGS.



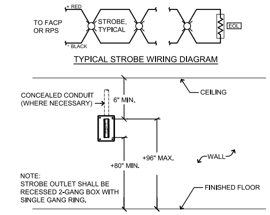
7 TYPICAL PULLBOX DETAIL

NO SCALE



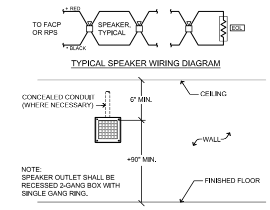
6 PULL STATION MOUNTING DETAIL

NO SCALE



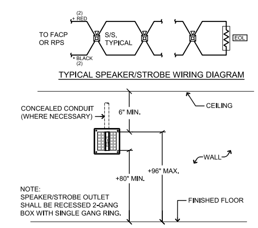
5 STROBE INSTALLATION DETAIL

NO SCALE



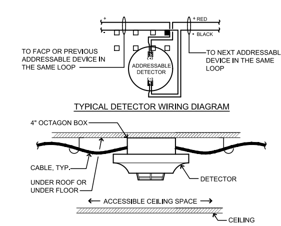
4 SPEAKER INSTALLATION DETAIL

NO SCALE



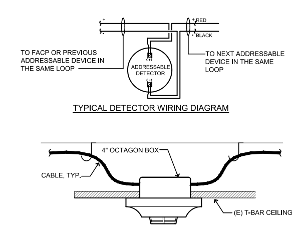
3 SPEAKER/STROBE INSTALLATION DETAIL

NO SCALE



2 DETECTOR MOUNTING DETAIL

NO SCALE (ABOVE CEILING)

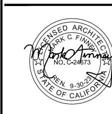


1 DETECTOR MOUNTING DETAIL

NO SCALE

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 01-120702 INC:
REVIEWED FOR
SS ☐ FLS ☑ ACS ☐
DATE: 5/5/2023
(DSA STAMP AREA)

SFA



AURUM CONSULTING ENGINEERS
MONTEREY BAY, INC.
Project No. 22-547.00
404 W. Franklin St. • Suite 100 • Monterey, CA 93940
T.831.646.3330 • F.831.646.3336 • www.acemb.com

FIRE ALARM DETAILS

FIRE ALARM UPGRADE
NOBLE ELEMENTARY SCHOOL
3466 GROSSMONT DRIVE, SAN JOSE, CA 95132
BERRYESSA UNION SCHOOL DISTRICT

REVISIONS

NO.	ITEM	DATE

DRAWN BY:	M.M.
CHECKED BY:	N.A.
SFA JOB NO: 22084	DATE: 09/25/2022

FA5.1

SPECIFICATIONS
SFA Project No. 22084

Noble Elementary School Fire Alarm Upgrade
Noble Elementary School

Berryessa Union School District
Santa Clara County, California

2155 S. Bascom Ave. Suite 200
Campbell, California 95008
(408) 879-0600

No FLS comments

SPECIFICATIONS
SFA Project No. 22084

DSA File No. 43-07
DSA Application No. 01-120702

2155 S. Bascom Ave. Suite 200
Campbell, CA 95008
(408) 879-0600

Noble Elementary School Fire Alarm Upgrade
Noble Elementary School

Berryessa Union School District
Santa Clara County, California

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 01-120702 INC:
REVIEWED FOR
SS ☐ FLS ☑ ACS ☐
DATE: 5/5/2023

Division of the State Architect
California Department of General Services

LICENSED ARCHITECT
MARK C. FINNEY
NO. C-24673
REN. 9-30-23
STATE OF CALIFORNIA

Mark Finney, Architect
Sugimura Finney Architects

REGISTERED PROFESSIONAL ENGINEER
NAJIB ANWARY
No. E21043
EXP. 3/31/24
ELECTRICAL
STATE OF CALIFORNIA

Najib Anwary, Electrical Engineer and Fire Alarm Designer
Aurum Consulting Engineer

TABLE OF CONTENTS

DIVISION 26 – ELECTRICAL

DIVISION 27 – COMMUNICATIONS
(No work in the above division)

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

DIVISION 31 – EARTHWORK

DIVISION 32 - EXTERIOR IMPROVEMENTS

DIVISION 33
(No work in the above division)

END OF SECTION

SECTION 07 92 00 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes joint sealants for which the type and form is indicated on the drawings.

1. Exterior joints in vertical surfaces and horizontal nontraffic surfaces:

2. Exterior joints in horizontal traffic surfaces:

3. Interior joints in vertical surfaces and horizontal nontraffic surfaces:

4. Interior joints in horizontal traffic surfaces:

1.3 PERFORMANCE REQUIREMENTS

A. Provide joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.

1.4 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

C. Samples for Verification: For each type and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

D. Product Certificates: For each type of joint sealant and accessory, signed by product manufacturer.

E. SWRI Validation Certificate: For each elastomeric sealant specified to be validated by SWRI's Sealant Validation Program.

F. Qualification Data: For Installer and testing agency.

G. Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:

1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

H. Product Test Reports: Based on comprehensive testing of product formulations performed by a qualified testing agency, indicating that sealants comply with requirements.

I. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized Installer who is approved or licensed for installation of elastomeric sealants required for this Project.

B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

C. Product Testing: Obtain test results for "Product Test Reports" Paragraph in "Submittals" Article from a qualified testing agency based on testing current sealant formulations within a 36-month period preceding the Notice to Proceed with the Work.

1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated, as documented according to ASTM E 548.
2. Test elastomeric joint sealants for compliance with requirements specified by reference to ASTM C 920, and where applicable, to other standard test methods.

3. Test elastomeric joint sealants according to SWRI's Sealant Validation Program for compliance with requirements specified by reference to ASTM C 920 for adhesion and cohesion under cyclic movement, adhesion-in-peel, and indentation hardness.
4. Test other joint sealants for compliance with requirements indicated by referencing standard specifications and test methods.

D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1.6 PROJECT CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.7 WARRANTY *(Project Close-Out Item)*

A. Special Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two (2) years from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer's standard form in which elastomeric sealant manufacturer agrees to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two (2) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles.

2.2 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing and field experience.

B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.3 ELASTOMERIC JOINT SEALANTS

A. Elastomeric Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

B. Stain-Test-Response Characteristics: Where elastomeric sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

C. Suitability for Contact with Food: Where elastomeric sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.

D. Single-Component Mildew-Resistant Acid-Curing Silicone Sealant:

1. Products:

    a. Dow Corning Corporation; 786 Mildew Resistant.
    b. GE Silicones; Sanitary SCS1700.
    c. Tremco; Tremsil 200.
    d. Pecora Corporation; 863 Silicone

2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 25.
4. Use Related to Exposure: NT (nontraffic).
5. Uses Related to Joint Substrates: G, A, and, as applicable to joint substrates indicated, O.

E. Multicomponent Pourable Urethane Sealant:

1. Products:

    a. Meadows, W. R., Inc.; POURTHANE.
    b. Pacific Polymers, Inc.; Elasto-Thane 227 High Shore Type I (Self Leveling).
    c. Pacific Polymers, Inc.; Elasto-Thane 227 Type I (Self Leveling).

d. Pecora Corporation; Urexpan NR-200.
e. Tremco; THC-901.
f. Tremco; THC-900.
g. Tremco; Vulkem 245.

2. Type and Grade: M (multicomponent) and P (pourable).
3. Class: 25.
4. Use Related to Exposure: T (traffic).
5. Uses Related to Joint Substrates: M, A, and, as applicable to joint substrates indicated, O.

F. Single-Component Nonsag Urethane Sealant:

1. Products:

a. Bostik Findley; Chem-Calk 900.
b. Bostik Findley; Chem-Calk 915.
c. Bostik Findley; Chem-Calk 916 Textured.
d. Bostik Findley; Chem-Calk 2639.
e. Pecora Corporation; Dynatrol I-XL.
f. Tremco; DyMonic.
g. Tremco; Vulkem 921.

2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 25.
4. Use Related to Exposure: NT (nontraffic).
5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.

2.4 LATEX JOINT SEALANTS

A. Latex Sealant: Comply with ASTM C 834, Type OP, Grade NF.

B. Products:

1. Bostik Findley; Chem-Calk 600.
2. Pecora Corporation; AC-20+.
3. Sonneborn, Division of ChemRex Inc.; Sonolac.
4. Tremco; Tremflex 834.

2.5 ACOUSTICAL JOINT SEALANTS

A. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 and the following:

1. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
2. Flame-spread and smoke-developed indexes of less than 25 per ASTM E 84.
3. Products:

a. Pecora Corporation; AC-20 FTR Acoustical and Insulation Sealant.

b. United States Gypsum Co.; SHEETROCK Acoustical Sealant.

B. Acoustical Sealant for Concealed Joints: Manufacturer's standard, nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber sealant recommended for sealing interior concealed joints to reduce airborne sound transmission.

1. Products:

a. Pecora Corporation; BA-98.
b. Tremco; Tremco Acoustical Sealant.

2.6 FIRE RESISTANT JOINT SEALERS

A. General: Provide manufacturer's standard sealant and accessory materials with fire-resistance rating indicated which are identical to those of assemblies whose fire endurance has been determined by testing per ASRM E 814 by Underwriters Laboratory, Inc. or other testing and inspecting agency acceptable to authorities having jurisdiction.

B. Foamed in Place Fire Stopping Sealant: Two part, foamed-in-place, silicone sealant formulated for use as part of a through-penetration fire-stop system for filling openings around cables, conduit, pipes and similar penetrations through walls and floors.

1. Products:

a. Dow Corning Corporation; Dow Corning Fire Stop Foam.

b. Hilti, Inc. CP620 Fire Foam.
c. Specified Technologies, Inc.; SSS100.

C. One Part Fire Stopping Sealant: One part elastomeric sealant formulated for use as a part of a through penetration fire stop system for sealing openings around cables, conduit, pipes and similar penetrations through walls and floors.

1. Products:

a. Dow Corning Corporation; Dow Corning Fire Stop Sealant.
b. Electrical Products Division/3M Corporation; 3M Fire Barrier Caulk CP25WB+.
c. Hilti, Inc. FS-One high performance intumescent firestop sealant.

2.7 JOINT FILLERS FOR CONCRETE PAVING

A. General: Provide joint fillers of thickness and widths indicated.

1. Self-Expanding Cork Joint Filler: Preformed strips complying with ASTM D1752 for Type III.
2. Sponge Rubber Joint Filler: Preformed strips complying with ASTM D1752 for Type I.

2.8 KITCHEN SEALERS:

A. General: Provide manufacturer's standard sealant and accessory materials with mildew resistant properties as required by local health jurisdictions to all components and assemblies as

required to get final county health approval. All shelves, sinks, flooring, etc. shall receive sealants as required by local health department.

2.8 JOINT-SEALANT BACKING

A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), Type O (open-cell material), B (bicellular material with a surface skin) or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:

C. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 26 deg F. Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and to otherwise contribute to optimum sealant performance.

D. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.9 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:

    a. Concrete.
    b. Masonry.
    c. Unglazed surfaces of ceramic tile.

3. Remove laitance and form-release agents from concrete.
4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:

    a. Metal.
    b. Glass.
    c. Porcelain enamel.
    d. Glazed surfaces of ceramic tile.

B. Joint Priming: Prime joint substrates**,** where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Acoustical Sealant Application Standard: Comply with recommendations in ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.

D. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

E. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

F. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

G. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.
4. Provide flush joint configuration where indicated per Figure 5B in ASTM C 1193.
5. Provide recessed joint configuration of recess depth and at locations indicated per Figure 5C in ASTM C 1193.

    a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

H. Installation of Preformed Tapes: Install according to manufacturer's written instructions.

I. Installation of Preformed Silicone-Sealant System: Comply with the following requirements:

1. Apply masking tape to each side of joint, outside of area to be covered by sealant system.

2. Apply silicone sealant to each side of joint to produce a bead of size complying with preformed silicone-sealant system manufacturer's written instructions and covering a bonding area of not less than 3/8 inch. Hold edge of sealant bead 1/4 inch inside masking tape.
3. Within 10 minutes of sealant application, press silicone extrusion into sealant to wet extrusion and substrate. Use a roller to apply consistent pressure and ensure uniform contact between sealant and both extrusion and substrate.
4. Complete installation of sealant system in horizontal joints before installing in vertical joints. Lap vertical joints over horizontal joints. At ends of joints, cut silicone extrusion with a razor knife.

J. Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping, taking care not to pull or stretch material, producing seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures where expansion of sealant requires acceleration to produce seal, apply heat to sealant in compliance with sealant manufacturer's written instructions.

K. Installation of Fire Stopping Sealant: Install sealant, including forming, packing and other accessory materials to fill openings around mechanical and electrical services penetrating floors and walls to provide fire-stops with fire resistance ratings indicated for floor or wall assembly in which penetration occurs.

3.4 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 07 92 00 (09/07)

SECTION 09 91 00 - PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes surface preparation and field painting of exposed exterior and interior items and surfaces.

1. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.

B. Paint exposed surfaces, except where these Specifications indicate that the surface or material is not to be painted or is to remain natural. If an item or a surface is not specifically mentioned, paint the item or surface the same as similar adjacent materials or surfaces. If a color of finish is not indicated, Architect will select from standard colors and finishes available.

1. Painting includes field painting of exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron supports, and surfaces of mechanical and electrical equipment that do not have a factory-applied final finish.

C. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.

1. Labels: Do not paint over UL, FMG, or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

1.3 DEFINITIONS

A. General: Standard coating terms defined in ASTM D 16 apply to this Section.

1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
2. Eggshell refers to low-sheen finish with a gloss range between 20 and 35 when measured at a 60-degree meter.
3. Semigloss refers to medium-sheen finish with a gloss range between 35 and 70 when measured at a 60-degree meter.
4. Full gloss refers to high-sheen finish with a gloss range more than 70 when measured at a 60-degree meter.

1.4 SUBMITTALS

A. Product Data: For each paint system indicated. Include block fillers and primers.

1. Material List: An inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
2. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material.

B. Samples for Initial Selection: For each type of finish-coat material indicated.

1. After color selection, Architect will furnish color chips for surfaces to be coated.

C. Samples for Verification: For each color and material to be applied, with texture to simulate actual conditions, on representative Samples of the actual substrate.

1. Provide stepped Samples, defining each separate coat, including block fillers and primers. Use representative colors when preparing Samples for review. Resubmit until required sheen, color, and texture are achieved.
2. Provide a list of materials and applications for each coat of each Sample. Label each Sample for location and application.
3. Submit 4 Samples on the following substrates for Architect's review of color and texture only:

a. On 8-1/2 inch by 11 inch heavy cardboard, unless requested on actual substrate by Architect.
b. Include manufacturer’s product number, sheen, texture and color on reverse side.

D. Qualification Data: For Applicator.

1.5 QUALITY ASSURANCE

A. Applicator Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.

B. Source Limitations: Obtain block fillers and primers for each coating system from the same manufacturer as the finish coats.

C. Coordination of Work: Review other sections of these specifications in which prime paints are to be provided to ensure compatibility of total coating system for various substrates. Upon request from other trades, furnish information or characteristics of finish materials provided for use, to ensure compatible prime coats are used.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label and the following information:

1. Product name or title of material.

2. Manufacturer's name.
3. Fed. Spec. number, if applicable.
4. Product description (generic classification or binder type).
5. Manufacturer's stock number and date of manufacture.
6. Contents by volume, for pigment and vehicle constituents.
7. Thinning instructions.
8. Application instructions.
9. Color name and number.
10. VOC content.

B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain storage containers in a clean condition, free of foreign materials and residue.

1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily.

1.7 PROJECT CONDITIONS

A. Apply waterborne paints only when temperatures of surfaces to be painted and surrounding air are between 50 and 90 deg F.

B. Apply solvent-thinned paints only when temperatures of surfaces to be painted and surrounding air are between 45 and 95 deg F.

C. Do not apply paint in snow, rain, fog, or mist; or when relative humidity exceeds 85 percent; or at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.

1.8 EXTRA MATERIALS *(Project Close-Out Item)*

A. Furnish extra paint materials from the same production run as the materials applied and in the quantities described below. Package with protective covering for storage and identify with labels describing contents. Deliver extra materials to Owner.

1. Quantity: Furnish Owner with an additional 3 percent, but not less than 1 gal. or 1 case, as appropriate, of each material and color applied.
2. Obtain written verification of delivery from Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles or preapproved equal.

B. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:

1. Kelly-Moore Paint Co. (Kelly-Moore).
2. Dunn Edwards (D-E)
3. ICI Dulux Paint Centers (ICI Dulux Paints).
4. Sherwin-Williams Co. (Sherwin-Williams).

2.2 PAINT MATERIALS, GENERAL

A. Material Compatibility: Provide block fillers, primers, and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint-material containers not displaying manufacturer's product identification will not be acceptable.

1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed substitutions.

C. Colors: Match Architect's samples or as selected by Architect from manufacturer's full range.

D. Federal Specifications establish minimum acceptable quality for paint materials. Provide written certification from paint manufacturer that materials provided meet or exceed these minimums.

E. Lead content in pigment, if any, is limited to contain not more than 0.5% lead, as lead metal based on the total non-volatile (dry-film) of paint weight.

1. This limitation is extended to interior surfaces and those exterior surfaces, such as stairs, decks, porches, railings, windows and doors which are readily accessible to children under seven years of age.

2.3 INTERIOR PRIMERS

A. Interior Ferrous-Metal Primer: Factory-formulated quick-drying rust-inhibitive alkyd-based metal primer.
1. Kelly-Moore; 1711 Kel-Guard Alkyd White Rust-Preventative Primer: Applied at a dry film thickness of 1.5 – 2.0 mils per coat

B. Interior Zinc-Coated Metal Primer: Factory-formulated galvanized metal primer.
1. Kelly-Moore; 1725 Acry-Shield 100% Acrylic Metal Primer: Applied at a dry film thickness of 1.5 – 2.0 mils per coat

2.4 EXTERIOR FINISH COATS

A. Exterior Flat Acrylic Paint: Factory-formulated flat acrylic-emulsion latex paint for exterior application.

1. ICI Dulux Paints; 2200-XXXX Dulux Professional Exterior 100 Percent Acrylic Flat Finish: Applied at a dry film thickness of not less than 1.4 mils.
2. Kelly-Moore; 1200 Color Shield Exterior 100% Acrylic Flat Paint: Applied at a dry film thickness of 1.5 – 2.0 mils per coat
3. Sherwin-Williams; A-100 Exterior Latex Flat House & Trim Paint A6 Series: Applied at a dry film thickness of not less than 1.3 mils.
4. Dunn-Edwards; Acri-Flat, Ext. Wood Stain & Masonry Flat Paint (W 704): Applied at a dry film thickness of not less than 1.5 mils.

B. Exterior Low-Luster Acrylic Paint: Factory-formulated low-sheen (eggshell) acrylic-latex paint for exterior application.

1. ICI Dulux Paints; 2402-XXXX Dulux Professional Exterior 100 Percent Acrylic Satin Finish: Applied at a dry film thickness of not less than 1.4 mils.
2. Kelly-Moore; 1210 Color-Shield Exterior 100% Acrylic Low Sheen: Applied at a dry film thickness of 1.5 – 2.0 mils per coat.
3. Sherwin-Williams; A-100 Exterior Latex Satin House & Trim Paint A82 Series: Applied at a dry film thickness of not less than 1.5 mils.
4. Dunn-Edwards; Spartasheen, Int./Ext. Acrylic Low Sheen Paint (W 7300): Applied at a dry film thickness of not less than 1.5 mils.

C. Exterior Semigloss Acrylic Enamel: Factory-formulated semigloss waterborne acrylic-latex enamel for exterior application.

1. ICI Dulux Paints; 2406-XXXX Dulux Professional Exterior 100 Percent Acrylic Semi-Gloss Finish: Applied at a dry film thickness of not less than 1.3 mils.
2. Kelly-Moore; 1215 Color Sheild Exterior Acrylic Semi-Gloss Enamel: Applied at a dry film thickness of 1.7 o 2.2 mils per coat.
3. Sherwin-Williams; A-100 Latex Gloss A8 Series: Applied at a dry film thickness of not less than 1.3 mils.
4. Dunn-Edwards; Permasgloss, Int./Ext. Acrylic Semi-Gloss Paint (W 960): Applied at a dry film thickness of not less than 1.5 mils.

D. Exterior Full-Gloss Acrylic Enamel for Ferrous and Other Metals: Factory-formulated full-gloss waterborne acrylic-latex enamel for exterior application.

1. ICI Dulux Paints; 4208-XXXX Devoe Interior/Exterior Acrylic Gloss Finish: Applied at a dry film thickness of not less than 1.6 mils.
2. Kelly-Moore; 5880 DTM High Performance Acrylic Gloss Enamel: Applied at a dry film thickness of 1.7 – 2.2 mils per coat.
3. Sherwin-Williams; DTM Acrylic Coating Gloss (Waterborne) B66W100 Series: Applied at a dry film thickness of not less than 2.4 mils.
4. Dunn-Edwards; Permagloss, Int./Ext. Acrylic Gloss Paint (W 960V): Applied at a dry film thickness of not less than 1.5 mils.

E. Exterior Full-Gloss Latex Enamel: Factory-formulated full-gloss Latex enamel for exterior application.

1. ICI Dulux Paints; 4208-XXXX Devoe Alkyd Industrial Gloss Enamel: Applied at a dry film thickness of not less than 2.0 mils.
2. Kelly-Moore; 1700 Kel-Guard Gloss Alkyd Rust Inhibitive Enamel: Applied at a dry film thickness of 1.7 – 2.2 mils per coat.
3. Sherwin-Williams; Industrial Enamel B-54 Series: Applied at a dry film thickness of not less than 2.0 mils.
4. Dunn-Edwards; Permagloss, Rust Preventative Latex Gloss Enamel (W 960V): Applied at a dry film thickness of not less than 2.0 mils.

2.5 INTERIOR FINISH COATS

A. Interior Flat Acrylic Paint: Factory-formulated flat acrylic-emulsion latex paint for interior application.
   1. Kelly-Moore; 1500 Enviro-Cote Interior Acrylic Flat Wall Paint: Applied at a dry film thickness of 1.5 – 2.0 mils per coat.

B. Interior Flat Latex-Emulsion Size: Factory-formulated flat latex-based interior paint.
   1. Kelly-Moore; 450 Pro-Wall Interior Flat Latex Wall Paint: Applied at a dry film thickness of 1.5 – 2.0 mils per coat..

C. Interior Low-Luster Acrylic Enamel: Factory-formulated eggshell acrylic-latex interior enamel.
   1. Kelly-Moore; 1686 Dura-Poxy + 100% Acrylic Eggshell Enamel: Applied at a dry film thickness of 1.7 - 2.2 mils per coat.

D. Interior Semi-gloss Acrylic Enamel: Factory-formulated semigloss acrylic-latex enamel for interior application.
   1. Kelly-Moore; 1649 Acrylic-Latex Semi-Gloss Enamel: Applied at a dry film thickness of not less than 1.7 mils.
   2. Kelly-Moore; 1685 + Dura-Poxy Semi-Gloss Acrylic Enamel: Applied at a dry film thickness of not less than 1.5 mils.

E. Interior Full-Gloss Acrylic Enamel: Factory-formulated full-gloss acrylic-latex interior enamel.
   1. Kelly-Moore; 1680 + Dura-Poxy Gloss Acrylic Enamel: Applied at a dry film thickness of 1.7 – 2.2 mils per coat.

F. Interior Semigloss Acrylic Enamel: Factory-formulated semigloss enamel for interior application.
   1. Kelly-Moore; 1685 Dura-Poxy + 100% Acrylic Semi-Gloss Enamel: Applied at a dry film thickness of 1.7 – 2.2 mils per coat.

G. Interior Full-Gloss Acrylic Enamel for Wood and Metal Surfaces: Factory-formulated full-gloss interior enamel.
   1. Kelly-Moore; 1685 Dura-Poxy + 100% Semi-Gloss Enamel: Applied at a dry film thickness of 1.7 – 2.2 mils per coat.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for paint application.

1. Proceed with paint application only after unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
2. Start of painting will be construed as Applicator's acceptance of surfaces and conditions within a particular area.

B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.

1. Notify Architect about anticipated problems when using the materials specified over substrates primed by others.

3.2 PREPARATION

A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of size or weight of the item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.

B. Cleaning: Before applying paint or other surface treatments, clean substrates of substances that could impair bond of the various coatings. Remove oil and grease before cleaning.

1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

C. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.

1. Provide barrier coats over incompatible primers or remove and reprime.

2. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with SSPC's recommendations.

a. Blast steel surfaces clean as recommended by paint system manufacturer and according to SSPC-SP 6/NACE No. 3.
b. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
c. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with same primer as the shop coat.

D. Material Preparation: Mix and prepare paint materials according to manufacturer's written instructions.

1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
3. Use only thinners approved by paint manufacturer and only within recommended limits.

E. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

3.3 APPLICATION

A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.

1. Paint colors, surface treatments, and finishes are indicated in the paint schedules.
2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
3. Provide finish coats that are compatible with primers used.
4. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, grilles, convector covers, covers for finned-tube radiation, and similar components are in place. Extend coatings in these areas, as required, to maintain system integrity and provide desired protection.
5. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
6. Paint interior surfaces of ducts with a flat, nonspecular black paint where visible through registers or grilles.
7. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
8. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.
9. Where indicated, finish interior of mill built wall and base cabinets and similar field-finished casework to match exterior.
10. Sand lightly between each succeeding enamel or varnish coat.

B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

1. The number of coats and film thickness required are the same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
2. Omit primer over metal surfaces that have been shop primed and touchup painted.
3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give

special attention to ensure that edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.

4. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure, and until application of another coat of paint does not cause undercoat to lift or lose adhesion.

C. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.

1. Brushes: Use brushes best suited for type of material applied. Use brush of appropriate size for surface or item being painted.
2. Rollers: Use rollers of carpet, velvet-back, or high-pile sheep's wool as recommended by manufacturer for material and texture required.
3. Spray Equipment: Use airless spray equipment with orifice size as recommended by manufacturer for material and texture required.

D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate to achieve dry film thickness indicated. Provide total dry film thickness of the entire system as recommended by manufacturer.

E. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in equipment rooms and occupied spaces.

F. Mechanical items to be painted include, but are not limited to, the following:

1. Uninsulated metal piping.
2. Uninsulated plastic piping.
3. Pipe hangers and supports.
4. Tanks that do not have factory-applied final finishes.
5. Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.
6. Exposed ducts, equipment, and pipe insulation having "all-service jacket" or other paintable jacket material.
7. Mechanical equipment that is indicated to have a factory-primed finish for field painting.

G. Electrical items to be painted include, but are not limited to, the following:

1. Switchgear.
2. Panelboards.
3. Electrical equipment that is indicated to have a factory-primed finish for field painting.
4. Exposed Conduits.

H. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.

I. Prime Coats: Before applying finish coats, apply a prime coat, as recommended by manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.

J. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

K. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, runs, cloudiness, color irregularity, brush marks, orange peel, nail holes, or other surface imperfections.

1. Provide satin finish for final coats.

L. Stipple Enamel Finish: Roll and redistribute paint to an even and fine texture. Leave no evidence of rolling, such as laps, irregularity in texture, skid marks, or other surface imperfections.

M. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

3.4 FIELD QUALITY CONTROL

A. Owner reserves the right to invoke the following test procedure at any time and as often as Owner deems necessary during the period when paint is being applied:

1. Owner will engage a qualified independent testing agency to sample paint material being used. Samples of material delivered to Project will be taken, identified, sealed, and certified in the presence of Contractor.
2. Testing agency will perform appropriate tests for the following characteristics as required by Owner:

a. Abrasion resistance.
b. Apparent reflectivity.
c. Flexibility.
d. Washability.
e. Absorption.
f. Accelerated weathering.
g. Dry opacity.
h. Yellowness.
i. Recoating.
j. Skinning.
k. Color retention.
l. Alkali resistance.
m. Quantitative material analysis.

3. Owner may direct Contractor to stop painting if test results show material being used does not comply with specified requirements. Contractor shall remove noncomplying paint from Project site, pay for testing, and repaint surfaces previously coated with the noncomplying paint. If necessary, Contractor may be required to remove noncomplying paint from previously painted surfaces if, on repainting with specified paint, the two coatings are incompatible.

3.5 CLEANING

A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from Project site.

1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping without scratching or damaging adjacent finished surfaces.

3.6 PROTECTION

A. Protect work of other trades, whether being painted or not, against damage from painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.

B. Provide "Wet Paint" signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings provided by others to protect their work.

1. After work of other trades is complete, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

3.7 EXTERIOR PAINT SCHEDULE

A. Ferrous Metal: Provide the following finish systems over exterior ferrous metal. Primer is not required on shop-primed items.

1. Low-Luster Acrylic Finish: Two finish coats over a rust-inhibitive primer.

a. Primer: Exterior ferrous-metal primer.
b. Finish Coat: Exterior low-luster acrylic paint.

2. Semigloss Acrylic-Enamel Finish: Two finish coats over a rust-inhibitive primer.

a. Primer: Exterior ferrous-metal primer.
b. Finish Coats: Exterior semigloss acrylic enamel.

3. Full-Gloss Acrylic-Enamel Finish: Two finish coats over a rust-inhibitive primer.

a. Primer: Exterior ferrous-metal primer.
b. Finish Coats: Exterior full-gloss acrylic enamel for ferrous and other metals.

4. Full-Gloss Alkyd-Enamel Finish: Two finish coats over a rust-inhibitive primer.

a. Primer: Exterior ferrous-metal primer.
b. Finish Coats: Exterior full-gloss alkyd enamel.

B. Zinc-Coated Metal: Provide the following finish systems over exterior zinc-coated metal surfaces:

1. Low-Luster Finish: Two finish coats over a galvanized metal primer.

a. Primer: Exterior galvanized metal primer.

b. Finish Coat: Exterior low-luster acrylic paint.

2. Semigloss Acrylic-Enamel Finish: Two finish coats over a galvanized metal primer.

a. Primer: Exterior galvanized metal primer.
b. Finish Coats: Exterior semigloss acrylic enamel.

3. Full-Gloss Acrylic-Enamel Finish: Two finish coats over a galvanized metal primer.

a. Primer: Exterior galvanized metal primer.
b. Finish Coats: Exterior full-gloss acrylic enamel for ferrous and other metals.

3.8 INTERIOR PAINT SCHEDULE

A. Ferrous Metal: Provide the following finish systems over ferrous metal:

1. Low-Luster Acrylic-Enamel Finish: Two finish coats over a primer.

a. Primer: Interior ferrous-metal primer.
b. Finish Coats: Interior low-luster acrylic enamel.

2. Semigloss Acrylic-Enamel Finish: Two finish coats over a primer.

a. Primer: Interior ferrous-metal primer.
b. Finish Coats: Interior semigloss acrylic enamel.

B. Zinc-Coated Metal: Provide the following finish systems over interior zinc-coated metal surfaces:

1. Low-Luster Acrylic-Enamel Finish: Two finish coats over a primer.

a. Primer: Interior zinc-coated metal primer.
b. Finish Coats: Interior low-luster acrylic enamel.

2. Semigloss Acrylic-Enamel Finish: Two finish coats over a primer.

a. Primer: Interior zinc-coated metal primer.
b. Finish Coats: Interior semigloss acrylic enamel.

END OF SECTION 09 91 00

SECTION 26 05 00

GENERAL ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.01 Description of Work:

A. The work of this Section consists of providing all required labor, supervision, materials and equipment to satisfactorily complete all electrical installations that are shown on the Drawings, included in these specifications, or otherwise needed for a complete and fully operating facility.

B. Furnish and install all required in-place equipment, conduits, conductors, cables and any miscellaneous materials for the satisfactory interconnection and operation of all associated electrical systems.

1.02 Related Work:

A. This Section provides the basic Electrical Requirements which supplement the General Requirements of Division 01 and apply to all Sections of Division 26.

1.03 Submittals:

A. As specified in Division 01. Submit to the Architect shop drawings, manufacturer's data and certificates for equipment, materials and finish, and pertinent details for each system specified. Information to be submitted includes manufacturer's descriptive literature of cataloged products, equipment, drawings, diagrams, performance and characteristic curves as applicable, test data and catalog cuts. Obtain written approval before procurement, fabrication, or delivery of the items to the job site. Partial submittals are not acceptable and will be returned without review. Furnish manufacturer's name, trade name, catalog model or number, nameplate data, size, layout dimensions, capacity, project specification and paragraph reference, applicable Federal, Industry and Technical Society Publication References, and years of satisfactory service of each item required to establish contract compliance. Photographs of existing installations and data submitted in lieu of catalog data are not acceptable and will be returned without approval.

B. Organize submittals for equipment and items related to each specification section together as a package.

C. Proposed substitutions of products will not be reviewed or approved prior to awarding of the Contract.

D. Substitutions shall be proven to the Architect or Engineer to be equal or superior to the specified product. Architect’s decision is final. The Contractor shall pay all costs incurred by the Architect and Engineer in reviewing and processing any proposed substitutions whether or not a proposed substitution is accepted.

E. If a proposed substitution is rejected, the contractor shall furnish the specified product at no increase in contract price.

F. If a proposed substitution is accepted, the contractor shall be completely responsible for all dimensional changes, electrical changes, or changes to other work which are a result of the substitution. The accepted substitution shall be made at no additional cost to the owner or design consultants.

1.04 Quality Assurance:

A. Codes: All electrical equipment and materials, including installation and testing, shall conform to the latest editions following applicable codes:

1. California Electrical Code (CEC).

2. Occupational Safety and Health Act (OSHA) standards.

3. All applicable local codes, rules and regulations.

4. Electrical Contractor shall posses a C-10 license and all other licenses as may be required. Licenses shall be in effect at start of this contract and be maintained throughout the duration of this contract.

B. Variances: In instances where two or more codes are at variance, the most restrictive requirement shall apply.

C. Standards: Equipment shall conform to applicable standards of American National Standards Institute (ANSI), Electronics Industries Association (EIA), Institute of Electrical and Electronics Engineers (IEEE), and National Electrical Manufacturers Association (NEMA).

D. Underwriter Laboratories (UL) listing is required for all equipment and materials where such listing is offered by the Underwriters Laboratories. Provide service entrance labels for all equipment required by the NEC to have such labels.

E. The electrical contractor shall guarantee all work and materials installed under this contract for a period of one (1) year from date of acceptance by owner.

F. All work and materials covered by this specification shall be subject to inspection at any and all times by representatives of the owner. Work shall not be closed in or covered before inspection and approval by the owner or his representative. Any material found not conforming with these specifications shall, within 3 days after being notified by the owner, be removed from premises; if said material has been installed, entire expense of removing and replacing same, including any cutting and patching that may be necessary, shall be borne by the contractor.

1.05 Contract Documents:

A. Drawings and Specifications:

1. In the case of conflict between the drawings and specifications, the specifications shall take precedence.

2. Drawings and specifications are intended to comply with all law, ordinances, rules and regulations of constituted authorities having jurisdiction, and where referred to in the Contract Documents, said laws, ordinance, rules and regulations shall be considered as a part of said Contract Documents within the limits specified. The Contractor shall bear all expenses of correcting work done contrary to said laws, ordinance, rules and regulations if the Contractor knew or should have known that the work as performed is contrary to said laws, ordinances, rules and regulations and if the Contractor performed same (1) without first consulting the Architect for further instructions regarding said work and/or (2) disregarded the Architect’s instructions regarding said work.

B. Drawings: The Electrical Drawings shall govern the general layout of the completed construction.

1. Locations of equipment, panels, pullboxes, conduits, stub-ups, ground connections are approximate unless dimensioned; verify locations with the Architect prior to installation.

2. Review the Drawings and Specification Divisions of other trades and perform the electrical work that will be required for those installations.

3. Should there be a need to deviate from the Electrical Drawings and Specifications, submit written details and reasons for all changes to the Architect for approval.

4. The general arrangement and location of existing conduits, piping, apparatus, etc., is approximate. The drawings and specifications are for the assistance and guidance of the contractor, exact locations, distances and elevations are governed by actual field conditions. Accuracy of data given herein and on the drawings is not guaranteed. Minor changes may be necessary to accommodate work. The contractor is responsible for verifying existing conditions. Should it be necessary to deviate from the design due to interference with existing conditions or work in progress, claims for additional compensation shall be limited to those for work required by unforeseen conditions as determined by the Architect.

5. All drawings and divisions of these specifications shall be considered as whole. The contractor shall report any apparent discrepancies to the Architect prior to submitting bids.

6. The contractor shall be held responsible to have examined the site and compared it with the specifications and plans and to have satisfied himself as to the conditions under which the work is to be performed. He shall be held responsible for knowledge of all existing conditions whether or not accurately described. No subsequent allowance shall be made for any extra expense due to failure to make such examination.

1.06 Closeout Submittals:

A. Manuals: Furnish manuals for equipment where manuals are specified in the equipment specifications or are specified in Division 01.

1.07 Coordination:

A. Coordinate the electrical work with the other trades, code authorities, utilities and the Architect.

B. Provide and install all trenching, backfilling, conduit, pull boxes, splice boxes, etc. for all services to the locations indicated on the Drawings.

C. Contractor shall pay all inspection and other applicable fees and procure all permits necessary for the completion of this work.

D. Where connections must be made to existing installations, properly schedule all the required work, including the power shutdown periods.

E. When two trades join together in an area, make certain that no electrical work is omitted.

1.08 Job Conditions:

A. Operations: Perform all work in compliance with Division 01.

1. Keep the number and duration of power shutdown periods to a minimum.

2. Show all proposed shutdowns and their expected duration on the construction schedule. Schedule and carry out shutdowns so as to cause the least disruption to operation of the Owner's facilities.

3. Carry out shutdown only after the schedule has been approved, in writing, by the owner. Submit power interruption schedule 15 days prior to date of interruption.

B. Construction Power: Unless otherwise noted in Division 01 of these specifications, contractor shall make all arrangements and provide all necessary facilities for temporary construction power from the owner's on site source. Energy costs shall be paid for by the Owner.

C. Storage: Provide adequate storage for all equipment and materials which will become part of the completed facility so that it is protected from weather, dust, water, or construction operations.

1.09 Damaged Products:

A. Notify the Architect in writing in the event that any equipment or material is damaged. Obtain approval from the Architect before making repairs to damaged products.

1.10 Locations:

A. General: Use equipment, materials and wiring methods suitable for the types of locations in which they are located.

B. Dry Locations: All those indoor areas which do not fall within the definition below for Wet Locations and which are not otherwise designated on the Drawings.

C. Wet Locations: All locations exposed to the weather, whether under a roof or not, unless otherwise designated on the Drawings.

1.11 Safety and Indemnity:

A. The Contractor is solely and completely responsible for conditions of the job site including safety of all persons and property during performance of the work. This requirement will apply continually and not be limited to normal working hours. The contractor shall provide and maintain throughout the work site proper safeguards including, but not limited to, enclosures, barriers, warning signs, lights, etc. to prevent accidental injury to people or damage to property.

B. No act, service, drawing review or construction review by the Owner, the Engineer or their Consultants is intended to include reviews of the adequacy of the Contractors safety measures in or near the construction site.

C. The Contractor performing work under this Division of the Specifications shall hold harmless, indemnify, and defend the Owner, the Engineer, their consultants, and each of their officers, agents and employees from any and all liability claims, losses, or damage arising out of or alleged to arise from bodily injury, sickness, or death of a person or persons and for all damages arising out of injury to or destruction of property arising directly or indirectly out of or in connection with the performance of the work under this Division of the Specifications, and from the Contractor's negligence in the performance of the work described in the construction

contract documents, but not including liability that may be due to the sole negligence of the Owner, the Engineer, their Consultants or their officers, agents and employees.

D. If a work area is encountered that contains hazardous materials, the contractor is advised to coordinate with the owner and it's abatement consultant for abatement of hazardous material by the Owner's Representative. "Hazardous materials" means any toxic substance regulated or controlled by OSHA, EPA, State of California or local rules, regulations and laws. Nothing herein shall be construed to create a liability for Aurum Consulting Engineers regarding hazardous materials abatement measures, or discovery of hazardous materials.

1.12 Access Doors:

A. The contractor shall install access panels as required where floors, walls or ceilings must be penetrated for access to electrical, control, fire alarm or other specified electrical devices. The minimum size panel shall be 14" x 14" in usable opening. Where access by a service person is required, minimum usable opening shall be 18" x 24".

B. All access doors installed lower than 7'-0" above finished floor and exposed to public access shall have keyed locks.

C. Where specific information or details relating to access panels differ from Division 26 paragraph 1.12 of these specifications, or shown on the electrical drawings and details or under other Divisions of work, those requirements shall supersede these specifications.

1.13 Arc Flash:

A. The contractor shall install a clearly visible arc flash warning to the inside door of all panelboards and industrial control panels, as well as to the front of all switchboards and motor control centers that are a part of this project.

B. The warning shall have the following wording: line 1 "WARNING" (in large letters), line 2 "Potential Arc Flash Hazard" (in medium letters), line 3 & 4 "Appropriate Personal Protective Equipment and Tools required when working on this equipment".

1.14 Emergency Boxes:

A. All boxes and enclosures for emergency circuits shall be permanently marked with a readily visible red spray painted mark.

PART 2 - PRODUCTS

2.01 Standard of Quality:

A. Products that are specified by manufacturer, trade name or catalog number establish a standard of quality and do not prohibit the use of equal products of other manufacturers provided they are established to be equal to the specified product and approved by the Architect prior to installation.

B. Material and Equipment: Provide materials and equipment that are new and are current products of manufacturers regularly engaged in the production of such products. The standard products shall have been in satisfactory commercial or industrial use for two years prior to bid opening. The two-year period includes use of equipment and materials of similar size under similar circumstances. For uniformity, only one manufacturer will be accepted for each type of product.

C. Service Support: Submit a certified list of qualified permanent service organizations including their addresses and qualification for support of the equipment. These service organizations shall be convenient to the equipment installation and able to render service to the equipment on a regular and emergency basis during the warranty period of the contract.

D. Manufacturer's Recommendations: Where installation procedures are required to be in accordance with manufacturer's recommendations, furnish printed copies of the recommendations prior to installation. Installation of the item shall not proceed until recommendations are received. Failure to furnish recommendation shall be cause for rejection of the equipment or material.

2.02 Nameplates:

A. For each piece of electrical equipment, provide a manufacturer's nameplate showing his name, location, the pertinent ratings, the model designation, and shop order number.

B. Identify each piece of equipment and related controls with a rigid laminated engraved plastic nameplate. Unless otherwise noted, nameplates shall be melamine plastic 0.125 inch thick, white with black center core. Surface shall be matte finish. Corners shall be square. Accurately align lettering and engrave into the core. Minimum size of nameplates shall be 0.5 by 2.5 inches unless otherwise noted. Where not otherwise specified, lettering shall be a minimum of 0.25 inch high normal block style. Engrave nameplates with the inscriptions indicated on the Drawings and, if not so indicated, with the equipment name. Securely fasten nameplates in place using two stainless steel or brass screws.

2.03 Fasteners:

A. Fasteners for securing equipment to walls, floors and the like shall be either hot-dip galvanized after fabrication or stainless steel.

2.04 Finish requirements:

A. Equipment: Refer to each electrical equipment section of these Specifications for painting requirements of equipment enclosures. Repair any final paint finish which has been damaged or is otherwise unsatisfactory, to the satisfaction of the Architect.

B. Wiring System: In finished areas, paint all exposed conduits, boxes and fittings to match the color of the surface to which they are affixed.

PART 3 - EXECUTION

3.01 Workmanship:

A. Ensure that all equipment and materials fit properly in their installation.

B. Perform any required work to correct improperly fit installation at no additional expense to the owner.

C. All electrical equipment and materials shall be installed in a neat and workmanship manner in accordance with the “NECA-1 Standard Practices for Good Workmanship in Electrical Contracting”. Workmanship of the entire job shall be first class in every respect.

3.02 Equipment Installations:

A. Provide the required inserts, bolts and anchors, and securely attach all equipment and materials to their supports.

B. Do all the cutting and patching necessary for the proper installation of work and repair any damage done.

C. Earthquake restraints: all electrical equipment, including conduits over 2 inches in diameter, shall be braced or anchored to resist a horizontal force acting in any direction as per CBC Section 1616A Title 24, part 2, and ASCE7-10, Section 13.3 and 13.6 and Table 13.6-1.

D. Structural work: All core drilling, bolt anchor insertion, or cutting of existing structural concrete shall be approved by a California registered structural consulting engineer prior to the execution of any construction. At all floor slabs and structural concrete walls to be drilled, cut or bolt anchors inserted, the contractor shall find and mark all reinforcing in both faces located by means of x-ray, pach-ometer, or prof-ometer. Submit sketch showing location of rebar and proposed cuts, cores, or bolt anchor locations for approval.

3.03 Field Test:

A. Test shall be in accordance with Acceptance testing specifications issued by the National Electrical Testing Association (NETA).

B. Perform equipment field tests and adjustments. Properly calibrate, adjust and operationally check all circuits and components, and demonstrate as ready for service. Make additional calibration and adjustments if it is determined later that the initial adjustments are not satisfactory for proper performance. Perform equipment field test for equipment where equipment field tests are specified in the equipment Specifications. Give sufficient notice to the Architect prior to any test so that the tests may witnessed.

C. Provide instruments, other equipment and material required for the tests. These shall be of the type designed for the type of tests to be performed. Test instrument shall be calibrated by a recognized testing laboratory within three months prior to performing tests.

D. Operational Tests: Operationally test all circuits to demonstrate that the circuits and equipment have been properly installed and adjusted and are ready for full-time service. Demonstrate the proper functioning of circuits in all modes of operation, including alarm conditions.

E. Re-testing will be required for all unsatisfactory tests after the equipment or system has been repaired. Re-test all related equipment and systems if required by the Architect. Repair and re-test equipment and systems which have been satisfactorily tested but later fail, until satisfactory performance is obtained.

F. Maintain records of each test and submit five copies to the Architect when testing is complete. All tests shall be witnessed by the Architect. These records shall include:

1. Name of equipment tested.

2. Date of report.

3. Date of test.

4. Description of test setup.

5. Identification and rating of test equipment.

6. Test results and data.

7. Name of person performing test.

8. Owner or Architect's initials.

G. Items requiring testing shall be as noted in the additional electrical sections of these specifications.

3.04 Cleaning Equipment:

A. Thoroughly clean all soiled surfaces of installed equipment and materials.

3.05 Painting of Equipment:

A. Factory Applied: Electrical equipment shall have factory applied painting system which shall, as a minimum, meet the requirements of NEMA ICS 6 corrosion-resistance test and the additional requirements specified in the technical section.
B. Field Applied: Paint electrical equipment as required to match finish of adjacent surfaces.

3.06 Records:

A. Maintain one copy of the contract Drawing Sheets on the site of the work for recording the "as built" condition. After completion of the work, the Contractor shall carefully mark the work as actually constructed, revising, deleting and adding to the Drawing Sheets as required. The following requirements shall be complied with:

1. Cable Size and Type: Provide the size and type of each cable installed on project.

2. Substructure: Where the location of all underground conduits, pull boxes, stub ups and etc. where are found to different than shown, carefully mark the correct location on the Drawings. Work shall be dimensioned from existing improvements.

3. Size of all conduit runs.

4. Routes of concealed conduit runs and conduit runs below grade.

5. Homerun points of all branch circuit.

6. Location of all switchgear, panels, MCC, lighting control panels, pullcans, etc.

7. Changes made as a result of all approved change orders, addendums, or field authorized revisions.

8. As Builts: At the completion of the Work the Contractor shall review, certify, correct and turn over the marked up Drawings to the Architect for his use in preparing "as built" plans.

9. As built Drawings shall be delivered to the Architect within ten (10) days of completion of construction.

3.07 Clean Up:

A. Upon completion of electrical work, remove all surplus materials, rubbish, and debris that accumulated during the construction work. Leave the entire area neat, clean, and acceptable to the Architect.

3.08 Mechanical and Plumbing Electrical Work:

A. The requirements for electrical power and/or devices for all mechanical and plumbing equipment supplied and/or installed under this Contract shall be coordinated and verified with the following:

1. Mechanical and Plumbing Drawings.
2. Mechanical and Plumbing sections of these Specifications.
3. Manufacturers of the Mechanical and Plumbing equipment supplied.

B. The coordination and verification shall include the voltage, ampacity, phase, location and type of disconnect, control, and connection required. Any changes that are required as a result of this coordination and verification shall be a part of this Contract.

C. The Electrical Contractor shall furnish and install the following for all mechanical and plumbing equipment:

1. Line voltage conduit and wiring.
2. Disconnect switches.
3. Manual line motor starters.

D. Automatic line voltage controls and magnetic starters shall be furnished by the Mechanical and/or Plumbing Contractor and installed and connected by the Electrical Contractor. When subcontracted for by the Mechanical and/or Plumbing Contractor, all line voltage control wiring installed by the Electrical Contractor shall be done per directions from the Mechanical and/or Plumbing Contractor.

E. All low voltage control wiring for Mechanical and Plumbing equipment shall be installed in conduit. Furnishing, installation and connection of all low voltage conduit, boxes, wiring and controls shall be by the Mechanical and/or Plumbing Contractor.

F. Disconnects (Motor And Circuit)

1. Disconnect switches shall be as manufactured by ITE- Siemens, General Electric or Square D.

G. Disconnects (Motor: Fused):

1. Disconnect switches shall be provided and located at all motors.
2. Switches for three-phase motors shall be heavy-duty, horsepower rated three-pole, and surface mounted except as noted on drawings.
3. Switches containing more than three poles shall be as specified on the drawings.
4. Switches for single-phase, fractional horsepower motors shall be heavy-duty, horsepower rated.
5. Switches shall be horsepower rated.

H. Manual motor starters, where required, shall have toggle type operators with pilot light and melting alloy type overload relays, SQUARE D COMPANY, Class 2510, Type FG-1P (surface) or Type FS-1P (flush) or ITE, WESTINGHOUSE or GENERAL ELECTRIC equal.

END OF SECTION

SECTION 26 05 19

LINE VOLTAGE WIRE AND CABLE

PART 1 - GENERAL

1.01 Description of Work:

A. The work of this Section consists of providing all wire and cable rated 600 volts or less, including splices and terminations, as shown on the Drawings and as described herein.

1.02 Related Work:

A. See the following Specification Section for work related to the work in this Section:

1. 260542 Conduits, Raceways and Fittings.

2. 260533 Junction and Pull Boxes.

1.03 Quality Assurance

A. Field tests shall be performed as specified in paragraph 3.04 of this Section.

PART 2 - PRODUCTS

2.01 Conductors:

A. Conductors shall be copper, type THHN/THWN/MTW oil and gasoline resistant, 600 volt rated insulation.

B. Conductors shall be stranded copper.

C. Minimum power and control wire size shall be No. 12 AWG unless otherwise noted.

D. All conductors used on this Project shall be of the same type and conductor material.

2.02 Cables:

A. All individual conductors shall be copper with type THHN/THWN, 600 volt rated insulation.

D. Insulation Marking - All insulated conductors shall be identified with printing colored to contrast with the insulation color.

E. Color Coding - As specified in paragraph 3.03.

F. Special Wiring - Where special wiring is proposed by an equipment manufacturer, submit the special wiring requirements to the Owner's Representative and, if approved, provide same. Special wire shall be the type required by the equipment manufacturer.

G. Other Wiring - Wire or cable not specifically shown on the Drawings or specified, but required, shall be of the type and size required for the application and as approved by the Owner's Representative.

H. Manufacturer - Acceptable manufacturers including Cablec, Southwire, or equal.

2.03 Terminations:

A. Manufacturer - Terminals as manufactured by T&B, Burndy or equal.

B. Wire Terminations – Stranded conductors shall be terminated in clamping type terminations which serve to contain all the strands of the conductor. Curling of a stranded conductor around a screw type terminal is not allowed. For screw type terminations, use a fork type stake-on termination on the stranded conductor. Use only a stake-on tool approved for the fork terminals selected.

C. End Seals - Heat shrink plastic caps of proper size for the wire on which used.

2.04 Tape:

A. Tape used for terminations and cable marking shall be compatible with the insulation and jacket of the cable and shall be of plastic material.

PART 3 - EXECUTION

3.01 Cable Installation:

A. Clean Raceways - Clean all raceways prior to installation of cables as specified in Section 260542 - Conduits Raceway and Fittings.

B. All line voltage wiring shall be installed in conduit.

C. All feeder conductors shall be continuous from equipment to equipment. Splices in feeders are not permitted unless specifically noted or approved by the Electrical Engineer.

D. All branch circuit wiring shall be run concealed in ceiling spaces, walls, below floors or in crawl spaces unless noted otherwise.

E. Cable Pulling - Exercise care in pulling wires and cables into conduit or wireways so as to avoid kinking, putting undue stress on the cables or otherwise abrading them. No grease will be permitted in pulling cables. Only soapstone, talc, or UL listed pulling compound will be permitted. The raceway construction shall be complete and protected from the weather before cable is pulled into it. Swab conduits before installing cables and exercise care in pulling, to avoid damage to conductors.

F. Bending Radius - Cable bending radius shall be per applicable code. Install feeder cables in one continuous length.

G. Equipment Grounding Conductors - Provide an equipment grounding conductor, whether or not it is shown on the Drawings, in all conduits or all raceways.

H. Panelboard Wiring - In panels, bundle incoming wire and cables which are No. 6 AWG and smaller, lace at intervals not greater than 6 inches, neatly spread into trees and connect to their respective terminals. Allow sufficient slack in cables for alterations in terminal connections. Perform lacing with plastic cable ties or linen lacing twine. Where plastic panel wiring duct is provided for cable runs, lacing is not necessary when the cable is properly installed in the duct.

3.02 Cable Terminations and Splices:

A. Splices - UL Listed wirenuts.

B. Terminations - Shall comply with the following:

1. Make up and form cable and orient terminals to minimize cable strain and stress on device being terminated on.

2. Burnish oxide from conductor prior to inserting in oxide breaking compound filled terminal.

3.03 Circuit and Conductor Identification:

A. Color Coding - Provide color coding for all circuit conductors. Insulation color shall be white for neutrals and green for grounding conductors. Conductor colors shall be as follows:

VOLTAGE	208/120V	480/277V
Phase A	Black	Brown
Phase B	Red	Orange
Phase C	Blue	Yellow
Neutral	White	Grey
Ground	Green	Green

B. Color coding shall be in the conductor insulation for all conductors #10 AWG and smaller; for larger conductors, color shall be either in the insulation or in colored plastic tape applied at every location where the conductor is readily accessible.

C. Circuit Identification - All underground distribution and service circuits shall be provided with plastic identification tags in each secondary box and at each termination. Tags shall identify the source transformer of the circuit and the building number(s) serviced by the circuit.

3.04 Field Tests:

A. All systems shall test free from short circuits and grounds, shall be free from mechanical and electrical defects, and shall show an insulation resistance between phase conductors and ground of not less than the requirements of the CEC. All circuits shall be tested for proper neutral connections.

B. Insulation Resistance Tests: Perform insulation resistance tests on circuits with #2 AWG and larger conductors to be energized with a line-to-neutral voltage of 120 volts or more. Make these tests before all equipment has been connected. Test the insulation with a 500Vdc insulation resistance tester with a scale reading 100 megohms. The insulation resistance shall be 2 megohms or more. Submit results for review.

END OF SECTION

SECTION 26 05 33

OUTLET, JUNCTION AND PULL BOXES

PART 1 - GENERAL

1.01 Description of Work:

A. The work of this Section consists of providing all required labor, supervision, materials and equipment to satisfactorily complete all electrical installations shown on the drawings, included in these Specification, or otherwise needed for a complete and fully operating facility. The work shall include but not be limited to the following:

B. Furnish and install all required material, supports and miscellaneous material for the satisfactory interconnection of all associated electrical systems.

1.02 Related Work:

A. See the following specification sections for work related to the work of this section.

1. 26 05 00 General Electrical Requirements.

2. 26 05 42 Conduits, Raceway and Fittings.

3. 26 05 19 Line Voltage Wire and Cable.

PART 2 - PRODUCTS

2.01 Outlet boxes, Junction and Pull boxes

A. Standard Outlet Boxes: Galvanized, steel, knock-out type of size and configuration best suited to the application indicated on the Drawings. Minimum box size shall be 4 inches square (octagon for most light fixtures) by 1-1/2 inches deep with mud rings as required.

B. Switch boxes: Minimum box size shall be 4 inches square by 1-1/2 inches deep with mud rings as required. Install multiple switches in standard gang boxes with raised device covers suitable for the application indicated.

C. Conduit bodies: Cadmium plated, cast iron alloy. Conduit bodies with threaded conduit hubs and neoprene gasketed, cast iron covers. Bodies shall be used to facilitate pulling of conductors or to make changes in conduit direction only. Splices are not permitted in conduit bodies. Crouse-Hinds Form 8 Condulets, Appleton Form 35 Unilets or equal.

D. Sheet Metal Boxes: Use standard outlet or concrete ring boxes wherever possible; otherwise use a minimum 16 gauge galvanized sheet metal, NEMA I box sized to Code requirements with covers secured by cadmium plated machine screws located six inches on centers. Circle AW Products, Hoffman Engineering Company or equal.

E. Flush Mounted Pull boxes and Junction boxes: Provide overlapping covers with flush head cover retaining screws, prime coated.

PART 3 - EXECUTION

3.01 Outlet Boxes

A. General:

1. All outlet boxes shall finish flush with building walls, ceilings and floors except in mechanical and electrical rooms above accessible ceiling or where exposed work is called for on the Drawings.

2. Install raised device covers (plaster rings) on all switch and receptacle outlet boxes installed in masonry or stud walls or in furred, suspended or exposed concrete ceilings. Covers shall be of a depth to suit the wall or ceiling finish.

3. Leave no unused openings in any box. Install close-up plugs as required to seal openings.

B. Box Layout:

1. Outlet boxes shall be installed at the locations and elevations shown on the drawings or specified herein. Make adjustments to locations as required by structural conditions and to suit coordination requirements of other trades.

2. Locate switch outlet boxes on the latch side of doorways.

3. Outlet boxes shall not be installed back to back nor shall through-wall boxes be permitted. Outlet boxes on opposite sides of a common wall shall be separated horizontally by at least one stud or vertical structural member.

4. For outlets mounted above counters, benches or backsplashes, coordinate location and mounting heights with built-in units. Adjust mounting height to agree with required location for equipment served.

5. On fire rated walls, the total face area of the outlet boxes shall not exceed 100 square inches per 100 square feet of wall area.

C. Supports:

1. Outlet Boxes installed in metal stud walls shall be equipped with brackets designed for attaching directly to the studs or shall be mounted on specified box supports.

2. Fixture outlet boxes installed in suspended ceiling of gypsum board or lath and plaster construction shall be mounted to 16 gauge metal channel bars attached to main ceiling runners.

3. Fixture outlet boxes installed in suspended ceilings supporting acoustical tiles or panels shall be supported directly from the structure above where pendant mounted lighting fixture are to be installed on the box.

4. Fixture Boxes above tile ceilings having exposed suspension systems shall be supported directly from the structure above.

5. Outlet and / or junction boxes shall not be supported by grid or fixture hanger wires at any locations.

3.02 Junction and Pull Boxes

A. General:

1. Install junction or pull boxes where required to limit bends in conduit runs to not more than 360 degrees or where pulling tension achieved would exceed the maximum allowable for the cable to be installed. Note that these boxes are not shown on the Drawings.

2. Locate pull boxes and junction boxes in concealed locations above accessible ceilings or exposed in electrical rooms, utility rooms or storage areas.

3. Install raised covers (plaster rings) on boxes in stud walls or in furred, suspended or exposed concrete ceilings. Covers shall be of a depth to suit the wall or ceiling finish.

4. Leave no unused openings in any box. Install close-up plugs as required to seal openings.

5. Identify circuit numbers and panel on cover of junction box with black marker pen.

B. Box Layouts:

1. Boxes above hung ceilings having concealed suspension systems shall be located adjacent to openings for removable recessed lighting fixtures.

C. Supports:

1. Boxes installed in metal stud walls shall be equipped with brackets designed for attaching directly to the studs or shall be mounted on specified box supports.

2. Boxes installed in suspended ceilings of gypsum board or lath and plaster construction shall be mounted to 16 gauge metal channel bars attached to main ceiling runners.

3. Boxes installed in suspended ceilings supporting acoustical tiles or panels shall be supported directly from the structure above.

4. Boxes mounted above suspended acoustical tile ceilings having exposed suspension systems shall be supported directly from the structure above.

END OF SECTION

SECTION 26 05 42

CONDUITS, RACEWAYS AND FITTINGS

PART 1 - GENERAL

1.01 Description of Work:

A. The work of this section consists of furnishing and installing conduits, raceways and fittings as shown on the Drawings and as described herein.

1.02 Related Work:

A. See the following specification sections for work related to the work in this section:

1. 26 05 43 Underground Ducts
2. 26 05 44 In Grade Pull Boxes
3. 26 05 45 Wiremold AL2000 Plugmold Multioutlet System
4. 26 05 19 Line Voltage Wire and Cable
5. 26 05 33 Junction and Pull Boxes

PART 2 - PRODUCTS

2.01 Conduits, Raceways:

A. Electrical Metallic Tubing (EMT) shall be hot-dip galvanized after fabrication. Couplings shall be compression or set-screw type.

B. Flexible Conduit: Flexible metal conduit shall be galvanized steel.

C. Galvanized Rigid Steel Conduit (GRS) shall be hot-dip galvanized after fabrication. Couplings shall be threaded type.

D. Rigid Non-metallic Conduit: Rigid non-metallic conduit shall be PVC Schedule 40 (PVC-40 or NEMA Type EPC-40) conduit approved for underground use and for use with 90˚ C wires.

E. Surface Raceway: Aluminum surface metal raceway shall be Wiremold AL2000 Series.

2.02 Conduit Supports:

A. Supports for individual conduits shall be galvanized malleable iron one-hole type with conduit back spacer.

B. Supports for multiple conduits shall be hot-dipped galvanized Unistrut or Superstrut channels, or approved equal. All associated hardware shall be hot-dip galvanized.

C. Supports for EMT conduits shall be galvanized pressed steel single hole straps.

D. Clamp fasteners shall be by wedge anchors. Shot in anchors shall not be allowed.

2.03 Fittings:

A. Provide threaded-type couplings and connectors for rigid steel conduits; provide steel compression (watertight), or steel set-screw type for EMT, (die-cast zinc or malleable iron type fittings are not allowed). Provide threaded couplings and Meyers hubs for rigid steel conduit exposed to weather.

B. Fittings for flexible conduit shall be Appleton, Chicago, IL, Type ST, O-Z Gedney Series 4Q by General Signal Corp., Terryville, CT, T & B 5300 series, or approved equal.

C. Fittings for use with rigid steel shall be galvanized steel or galvanized cast ferrous metal; access fittings shall have gasketed cast covers and be Crouse Hinds Condulets, Syracuse, NY, Appleton Unilets, Chicago, IL, or approved equal. Provide threaded-type couplings and connectors; set-screw type and compression-type are not acceptable.

D. Fittings for use with rigid non-metallic conduit shall be PVC and have solvent-weld-type conduit connections.

E. Union couplings for conduits shall be the Erickson type and shall be Appleton, Chicago, IL, Type EC, O-Z Gedney 3-piece Series 4 by General Signal Corp., Terryvile, CT, or approved equal. Threadless coupling shall not be used.

F. Bushings:

1. Bushings shall be the insulated type.

2. Bushings for rigid steel shall be insulated grounding type, O-Z Gedney Type HBLG, Appleton Type GIB, or approved equal.

G. Conduit Sealants:

1. Fire Retardant Types: Fire stop material shall be reusable, non-toxic, asbestos-free, expanding, putty type material with a 3-hour rating in accordance with UL Classification 35L4 or as specified on the Drawings.

PART 3 - EXECUTION

3.01 Conduit, Raceway and Fitting Installation:

A. For conduit runs exposed to weather provide rigid metal (GRS).

B. For conduit run underground, in concrete or masonry block wall and under concrete slabs, install minimum ¾” size nonmetallic (PVC) with PVC elbows. Where conduits transition from underground or under slab to above grade install wrapped rigid metal (GRS) elbows and risers.

C. For conduit runs concealed in steel or wood framed walls or in ceiling spaces or exposed in interior spaces above six feet over the finished floor, install EMT.

D. Flexible metal conduit shall be used only for the connection of recessed lighting fixtures and motor connections unless otherwise noted on the Drawings. Liquid-tight steel flexible conduit shall be used for motor connections.

E. The minimum size raceway shall be 1/2-inch unless indicated otherwise on the Drawings.

F. Installation shall comply with the CEC.

G. From pull point to pull point, the sum of the angles of all of the bends and offset shall not exceed 360 degrees.

H. Conduit Supports: Properly support all conduits as required by the NEC. Run all conduits concealed except where otherwise shown on the drawings.

1. Exposed Conduits: Support exposed conduits within three feet of any equipment or device and at intervals not exceeding NEC requirements; wherever possible, group conduits together and support on common supports. Support exposed conduits fastened to the surface of the concrete structure by one-hole clamps, or with channels. Use conduit spacers with one-hole clamps.

   a. Conduits attached to walls or columns shall be as unobtrusive as possible and shall avoid windows. Run all exposed conduits parallel or at right angles to building lines.

   b. Group exposed conduits together. Arrange such conduits uniformly and neatly.

2. Support all conduits within three feet of any junction box, coupling, bend or fixture.

3. Support conduit risers in shafts with Unistrut Superstrut, or approved equal, channels and straps.

I. Moisture Seals: Provide in accordance with NEC paragraphs 230-8 and 300-5(g).

J. Where PVC conduit transitions from underground to above grade, provide rigid steel 90's with risers. Rigid steel shall be half-lap wrapped with 20 mil tape and extend minimum 12" above grade.

K. Provide a nylon pull cord in each empty raceway.

L. Provide galvanized rigid steel factory fittings for galvanized rigid steel conduit.

M. Slope all underground raceways to provide drainage; for example, slope conduit from equipment located inside a building to the pull box or manhole located outside the building.

N. Conduits shall be blown out and swabbed prior to pulling wires, or installation of pull cord in empty conduits.

END OF SECTION

SECTION 26 05 43

UNDERGROUND DUCTS

PART 1 - GENERAL

1.01 Description of Work:

A. The work of this section consists of furnishing and installing raceways, raceway spacers with necessary excavation.

1.02 Related Work:

A. See the following specification sections for work related to the work of this section.

1. 26 05 42 Conduit Raceway and Fittings

2. 31 23 00 Trenching, Backfilling and Compacting UR

1.03 Standards and Codes:

A. Work and material shall be in compliance with and according to the requirements of the latest revision of the following standards and codes.

1. National Electrical Code (NEC) (Latest Revision)

2. California Electrical Code (CEC).

3. Underground Installations CEC - Article 300.5

4. Rigid NonMetallic Conduit CEC - Article 347

PART 2 - PRODUCTS

2.01 Raceways:

A. As specified in Section 26 05 42 Conduits, Raceways and Fittings.

PART 3 - EXECUTION

3.01 Excavation:

A. As specified in Section 31 23 00 Trenching, Backfilling and Compacting UR and as required for the work shown on the Drawings.

3.02 Install raceways as indicated on drawings.

3.03 Sand Encasement:

A. As specified in Section 31 23 00 - Trenching, Backfilling and Compacting UR.

3.04 Backfill:

A. As specified in Section 31 23 00 - Trenching, Backfilling and Compacting UR.

END OF SECTION

SECTION 26 05 44

IN GRADE PULL BOXES

PART 1 - GENERAL

1.01 Description of Work:

A. The work of this section consists of providing all labor, supervision, tools, materials, and performing all work necessary to furnish and install pre-cast concrete vaults, and pull boxes with necessary excavation.

1.02 Related Work:

A. See the following specification sections for work related to the work of this section.

1. 26 05 43 Underground Ducts.

2. 31 23 00 Trenching, Backfilling and Compacting UR.

1.03 Submittals:

A. As specified in Section 26 05 00 and Division 01.

1. Catalog Data: Provide manufacturer's descriptive literature - Pre-cast Vaults, Pull Boxes and Accessories.

PART 2 - PRODUCTS

2.01 Materials and Equipment:

A. General Requirements:

1. Pull boxes for electrical power, controls and other communication circuits shall consist of pre-cast reinforced concrete boxes, extensions' bases, and covers as specified herein and as indicated on the Drawings. Pre-cast units shall be the product of a manufacturer regularly engaged in the manufacture of pre-cast vaults and pull boxes. Acceptable manufacturers are Christy, Utility Vault, Brooks, Associated Concrete or equal.

B. Construction:

1. Pre-cast concrete vaults and pull boxes for electrical power distribution and communication circuits with associated risers and tops shall conform to ASTM C478 and ACI 318. Pull boxes shall be the type noted on the Drawings and shall be constructed in accordance with the applicable details as shown. Tops and walls shall consist of reinforced concrete. Walls and bottom shall be of monolithic concrete construction. Duct entrances and windows shall be located near the corners of structures to facilitate cable racking.

C. Covers:

1. The word "ELECTRICAL" shall be cast in the top face of all electrical cable boxes. The word “Signal” or “Fire Alarm” shall be cast in the top of the boxes utilized for these systems.

PART 3 - EXECUTION

3.01 Installation:

A. Install pull boxes where required to limit bends in conduit runs to not more than 360 degrees or where pulling tension achieved would exceed the maximum allowable for the cable to be installed. Note that these boxes are not shown on the Drawings.

B. Pre-cast pull boxes shall be installed approximately where indicated on the Drawings. The exact location of each pull box shall be determined after careful consideration has been given to the location of other utilities, grading, and paving. All cable boxes and secondary pull boxes shall be installed with a minimum of 6-inch thick crushed rock or sand bedding.

C. Paved areas - Vaults and pull boxes located in areas to be paved shall be installed such that the top of the cover shall be flush with the finished surface of the paving.

D. Unpaved Areas - In unpaved areas, the top of vaults and pull box covers shall be approximately 2 inches above finished grade.

E. Joint Seals - Section joints of pre-cast vaults and pull boxes shall be sealed with compound as recommended by the manufacturer.

F. Trenching, Backfilling, and Compaction - Trenching, backfilling and compaction shall be as specified in Section 31 23 00 - Trenching, Backfilling and Compacting UR.

END OF SECTION

SECTION 26 28 16

CIRCUIT BREAKERS

PART 1 - GENERAL

1.01 Description of Work:

A. The work of this Section consists of providing circuit breakers as shown on the Drawings and as described herein.

1.02 Related Work: See the following Specification Sections for work related to the work in this Section.

A. 26 05 00 General Electrical Requirements

1.03 Submittals:

A. Shop Drawings - Submittals shall be in accordance with Section 26 05 00 and Division 01. For each circuit breaker furnished under this Contract, submit manufacturer's name, catalog data, and the following information:

1. Terminal connection sizes.

2. Voltage rating.

3. Breaker manufacturer, types, trip ratings and interrupting ratings.

B. Single Submittal - A single complete submittal is required for all products covered by this Section.

C. Closeout Submittals: Submit in accordance with and Section 26 05 00, operation and maintenance data for circuit breakers including nameplate data, parts lists, manufacturer's circuit breaker timer, current, coordination curves, factory and field test reports and recommended maintenance procedures.

PART 2 - PRODUCTS

2.01 Circuit Breaker: Each circuit breaker shall consist of the following:

A. A molded case breaker with an over center toggle-type mechanism, providing quick-make, quick-break action. Each circuit breaker shall have a permanent trip unit containing individual thermal and magnetic trip elements in each pole. Multipole circuit breakers shall have variable magnetic trip elements which are set by a single adjustment to assure uniform tripping characteristics in each pole. Circuit breakers shall be of the bolt-on type unless otherwise noted.

B. Breaker shall be calibrated for operation in an ambient temperature of 40°C.

C. Each circuit breaker shall have trip indication by handle position and shall be trip-free.

D. Three pole breakers shall be common trip.

E. The circuit breakers shall be constructed to accommodate the supply connection at either end of the circuit breaker. Circuit breaker shall be suitable for mounting and operation in any position.

F. Breakers shall be rated as shown on Drawings.

G. Circuit breaker and/or Fuse/circuit breaker combinations for series connected interrupting ratings shall be listed by UL as recognized component combinations for use in the end use equipment in which it is installed. Any series rated combination used shall be marked on the end use equipment per CEC section 110-22.

H. Breakers shall be UL listed. Circuit breakers shall have removable lugs.

I. Lugs shall be UL listed for copper and aluminum conductors.

J. Breakers shall be UL listed for installation of mechanical screw type lugs.

K. Circuit breakers serving HACR rated loads shall be HACR type. Circuit breakers serving other motor loads shall be motor rated.

PART 3 - EXECUTION

3.01 Mounting:

A. The highest breaker operating handle shall not be higher than 72 inches above the floor.

END OF SECTION

SECTION 28 31 00

FIRE ALARM/VOICE EVACUATION SYSTEM

PART 1 - GENERAL

1.01 Description of Work:

A. Furnish and install all materials and equipment including all required equipment, panels, raceways, conductors and connections, and provide all labor required and necessary to complete the work shown on the drawings and/or specified in all Sections of Division 26 and all other work and miscellaneous items, not specifically mentioned, but reasonably inferred for a complete addressable fire alarm installation including all accessories and appurtenances required for testing the systems. It is in the intent of the drawings and specifications that all systems will be complete, and ready for operation. No extra charge will be paid for furnishing items required by regulations, but not specified herein, or on drawings.

B. Fire Alarm system shall include a main fire alarm control panel, digital communicator for backup phone communication, a remote annunciator[s] and all devices, wiring, etc as indicated on the plans.

C. The contractor shall include all costs to de-commission the existing system before any new construction can start. The District School District shall be advised in writing the date as to when the existing system will be de-commissioned. The contractor scope of work shall not degrade any function or operation of the remaining site fire alarm system.

1.02 Related Work:

A. Division 26 General Requirements.

B. See the following specification sections for work related to the work in this section.

1. All other sections of Division 26.

1.03 Codes and Standards:

A. Devices and equipment for fire alarm systems shall be U.L. listed.
B. UL 864 Control Units, Fire Protective Signaling Systems.

C. Devices and equipment for fire alarm system shall be listed by the California State Fire Marshal for the specific purpose the device or equipment is used.

D. Work and material shall be in compliance with and according to the requirements of the latest version of the following standards and codes:

1. California Fire Code (CFC) based on the International Fire Code (IFC) with California Amendments.

2. California Building Code (CBC) based on the International Building Code (IBC) with California Amendments.

3. California Electric Code (CEC) based on the National Electric Code (NEC) and California Amendments.

4. California Mechanical Code (CMC) based on the Uniform Mechanical Code (UMC) and California Amendments.

5. California Plumbing Code (CPC) based on the Uniform Plumbing Code (UPC) and California Amendments.

6. Title 19 C.C.R., Public Safety, State Fire Marshals Regulations.

7. NFPA 72, National Fire Alarm and Signaling Code.

1.04 Submittals:

A. In accordance with Division 26.

B. Submit the following items:

1. Manufacturer's Catalog Data: Manufacturer's original catalog cuts and original description of data of all material and equipment with sufficient information provided so that the exact function of each device is known. Each item supplied shall be clearly identified including both U.L. number and a copy of the State Fire Marshal's listing.

C. Description of conductors to be used with a statement that all wire shall be in conduit. Where accessible ceiling occurs, plenum rated wire on J-hooks is acceptable.

1.05 Quality Assurance:

A. Installer: The installation firm shall be an established communications and electronics contractor with at least 10 years successful installation experience of products utilizing integrated communications systems and equipment specific to that required for this project. Only California Certified fire alarm technicians or California Certified electrician shall be used to install the fire alarm system. Provide proof to District that all employees are California Certified to install the fire alarm system.

B. All materials, unless otherwise specified, shall be new, and free from any defects. All items of equipment including wire and cable shall be designed by the manufacturer unless otherwise specified, shall function as a complete system and shall be accompanied by the manufacturer's complete service notes and drawings detailing all interconnections.

C. The Contractor shall show satisfactory evidence, upon request, that he maintains a fully equipped service organization capable of furnishing adequate inspection and service to the system. The contractor shall maintain at his facility the necessary spare parts in the proper proportion as recommended by the manufacturer to maintain and service the equipment being supplied.

D. The system manufacturer shall maintain engineering and service departments capable of rendering advice regarding installation and final adjustment of the system.

1.06 Warranties:

A. The contractor shall warrant all equipment and wiring free from inherent mechanical and electrical defect for one year (365 days) from the date of final acceptance. The contractor shall without additional expense to the School District, replace any defective materials or equipment provided by him under this contract within the warranty period.

PART 2 - PRODUCTS

2.01 System Description

A. The contractor shall furnish and install a complete 24 VDC, electrically supervised, addressable analog, microprocessor-based fire alarm control panel as specified herein. The fire alarm system shall include but not be limited to all control equipment, power supply, initiating devices, audible and visual indicating appliances as appropriate, conduit, wiring, fittings, and all other accessories necessary to provide a complete and operable system.

B. General System Operation:

1. When an alarm occurs on a zone the control panel indicates the alarm condition until manually reset.

2. An alarm may be acknowledged by actuating the “ACKNOWLEDGE” switch. This shall silence the control panel buzzer, and change the “SYSTEM ALARM” LED and the individual zone LED from flashing to steadily lit.

3. All alarm signals may be silenced by actuating the “SILENCE” switch. This shall steadily illuminate the “SIGNAL SILENCE” LED. If a subsequent alarm is activated, the alarm signal shall “resound” until again silenced. Once silenced, all alarm signals may be restored again by activating the “SILENCE” switch. Waterflow zones shall be non-silenceable.

4. If the microprocessor fails, the system shall execute a default signaling program. This program will enable the panel to sound the audible signals and summon the Fire Department. In addition, a yellow “DEGRADE” LED shall light to indicate the programming failure. Inability of the system to sound signals or summon the fire department during microprocessor failure shall not be acceptable.

C. Alarm Operation:

1. Operation of a manual pull station or automatic activation of any smoke detector, heat detector, or water flow switch zone shall cause the FACP to:

2. Sound all indicating appliances in a temporal pattern.

3. Flash all strobes.

4. Shut down all air handling units as specified herein.

5. Flash the panel “System Alarm” LED and pulse a panel audible signal.

6. Display a description of the specific analog/addressable device in alarm via an 80-character alpha-numeric display.

7. Display a description of the specific analog/Addressable device in alarm on the administrations Remote 80-character Annunciators.

8. Notify the Fire Department via the UDACT [and AES-Intellinet Radio].

D. Electrical Supervision:

1. Each initiating and signal circuit shall be electronically supervised for opens, shorts, and ground faults in the wiring. The occurrence of any fault shall activate the system trouble circuitry but shall not interfere with the proper operation of any circuit that does not have a fault connection.

2. Each initiating circuit shall be capable of being wired using Class “B” (Style B) supervised circuits (a break or ground fault in any conductor shall be reported as a trouble condition) at no extra cost.

E. Normal Power Supply:

1. Connections to the normal electrical service shall be on a dedicated branch circuit in accordance with the California Electrical Code (CEC) the circuit and connections shall be mechanically protected. The circuit disconnecting means shall be accessible only to authorized personnel and shall be clearly marked “FIRE ALARM CIRCUIT CONTROL.”

2.02 Fire Alarm Control Panel:

A. The FACP is a new Silent Knight 6820EVS with Emergency Voice Evacuation Digital Voice Command:

1. Auxiliary SPDT alarm and trouble dry contacts.

2. Auxiliary circuitry in the control panel to operate remote relays for control of air handling equipment.

3. A solid-state power transfer circuit that shall switch to standby power automatically and instantaneously if normal power fails or falls below 15% of normal (“brown out” conditions).

4. This electronic circuit shall allow the batteries to be effectively “floated” on the operating system to avoid upsetting normal microprocessor operation and minimize resultant nuisance troubles and /or alarms. This circuit shall be physically isolated from the power supply to facilitate service.

5. A ground fault detector to detect positive or negative grounds on the initiating circuits, signal circuits, power circuits, and telephone line circuit. A ground fault LED shall be illuminates and shall operate the general trouble devices as specified herein but shall not cause an alarm to be sounded.

6. Short circuit LED's for all notification appliance circuits shall be a standard feature of the fire alarm control panel. Each circuit shall be monitors for short circuits and shall have a distinct LED for visual indication of the circuit.

7. Operating trouble devices as specified herein but shall not cause an alarm to be sounded.

8. Individual circuit fuses shall be provided from the following: smoke detector (resettable) power, main power supply, battery standby power, and auxiliary (non-resettable) output.

9. A common reset and lamp test switch, labeled "RESET/LAMP TEST" shall be provided to reset the system.

10. Circuitry shall be provided in the control panel to permit transmission of trouble alarm signals over leased or privately owned telephone cables to a remote receiving panel. There shall be a remote disconnect switch to allow testing of the fire alarm signal without transmitting an alarm signal to the central station.

2.03 System Cabinet:

A. The system cabinet shall be surface mounted with a texture finish and shall be made of these three parts: backbox, backplate, and door.

B. The cabinet shall be of dead-front construction and 16-gauge cold rolled steel. The door lock system shall consist of two locks which will accept two different keys. One "OPER" key shall allow dead front access to the module display for all operator functions while one "TECH" key shall allow access to all pane electronics without further dismantling of the cabinet, control unit, or wiring.

2.04 Power Supply:

A. All AC line connections shall be isolated from the power supply unit and transformer by means of a cable-connected AC Unit per U.L. 864.

B. The 120 VAC main power shall be transformer converted to low voltage, rectified and filters 24 VDC nominal for system operation and to eliminate the possibility of line voltage being present on any internal panel components. The power supply shall be integral, filtered, nominal 24 VDC at 5 Amps, and comply with U.L. 864.

C. Primary Power outputs shall be as follows:

1. A green LED on the power supply card shall indicate the presence of primary power.

D. Power Supply outputs shall be as follows:

1. 24 VDC Non-Resettable, 3.2 Amps max., Power Limited.

2. 24 VDC Resettable, 3.2 Amps max., Power Limited.

E. NOTE: maximum combined output for both is 8.0 Amp.

2.05 Battery Charger:

A. The power supply shall contain a supervised and fused battery charger with a maximum average charging current of 1.5 Amp (this current shall be sufficient to maintain the system batteries at full charge).

B. If the system loses AC power, a System Trouble shall occur.

C. The battery charger shall be capable of charging up to 34 ampere/hour capacity, lead-acid batteries. If batteries are mounted within the control panel enclosure provide a battery shelf.

2.06 Detection Circuits:

A. Each Analog Detection Loop Unit shall provide communication with all analog/addressable devices (initiating/control) connected to the system through two (2) analog/addressable communications loops. Each loop shall communicate with a maximum of ninety-nine analog detectors and ninety-eight addressable monitor/control devices.

B. The first nine-nine addressed (1-99) on each loop shall be dedicated to analog detectors, while addresses 101-198 shall be reserved for addressable monitor/control devices.

2.07 Analog/Addressable Communications Loops:

A. All initiating devices shall be connected to their addressable loop via a two wire style 4 (class B) circuit.

2.08 Notification Appliance circuits:

A. Four (4) independent (class B) notification appliance circuits shall be provided on the SCU, each polarized and rates at 1.75 Amps DC, individually fused and supervised for opens, grounds, and short circuits. They shall be capable of being wired Class “A” (style Z) or class “B” (style Y) supervised and fused @ 2 Amps. Specifications are as follows:

Voltage	Current
24VDC Non-Regulated	3.2 Amps: Maximum Alarm
	.001 Amps: Normal Standby

2.09 Trouble Input:

A. Trouble input shall be provided rated at 5-24 Volts input and, if used, shall accept a trouble from an external source.

2.10 Trouble Dry Contacts:

A. Trouble dry contacts (form A or Form B; jumper selectable) shall be provided rated at 2 Amps at 24 VDC (resistive) and shall transfer whenever a system trouble occurs.

2.11 Alarm Dry Contacts:

A. Alarm dry contacts (form C) shall be provided rated at 2 Amps at 24 VDC (resistive) and shall transfer whenever a system alarm occurs.

2.12 Central Station Monitoring:

A. The entire fire alarm system shall be connected via leased telephone lines and radio communications to a central station and in accordance with the requirements of the fire department.

2.13 Alarm Signals:

A. All alarm signals shall be automatically “locked in” at the control panel until the operated device is returned to its normal condition and the control panel is manually reset. When used for Water flow, the silence switch shall be bypassed.

B. Alarm or Trouble Activation of Initiating Zones.

C. Alarm or Trouble activation of initiating zones shall be indicated by zone alarm and trouble LED’s.

2.14 Detection Devices:

A. Manual Pull Stations:

1. Provide non coded, addressable, semi-recessed, double-action type manual pull station with mechanical reset features. Where installed in existing buildings, boxes may be surface-mounted. Surface mounted boxes shall be the same color as the pull stations.

2. Provide separate screw terminal for each conductor connected to the manual alarm pull station. Break-glass-front pull stations will not be permitted. Provide red aluminum, housing labeled “fire”. The pull stations shall not be resettable without the use of a key.

B. Detectors:

1. Each photoelectric smoke detector and heat detector shall be interchangeable via twist-lock mounting base, to ensure matching the proper sensor to the potential hazards of the areas being protected. The system shall recognize when an improper sensor type has been installed in a previously programmed sensor type location.

C. Photoelectric Smoke Detector:

1. Provide white flame retardant plastic, addressable, analog, photoelectric type, smoke detectors. Detectors shall operate using an optical sensing chamber principal which complies with UL 268.

2. Each detector shall be capable of being set at two sensitivity settings.

3. Each detector shall have two LED visual indicators providing local 360 degree visibility of operating status and alarm indication.

4. Each detector shall be supported independently of wiring connections, and connected by separate screw terminals of each conductor.

5. The detector screen and cover assembly must be easily removable for field cleaning.

D. Combination Fixed Temperature, rate of Rise Heat Detectors:

1. Provide off-white flame retardant plastic, addressable, combination 140 degree F fixed temperature, rate of rise heat dual thermistor detectors. Detector shall initiate an alarm when temperature rises at a rate of over 15 degrees F per minute or above 140 degrees F.

2. Each detector shall have two LED visual indicators providing local 360 degree visibility of operating status and alarm indication.

3. Contacts shall be self-resetting after response to rate or rise principal. Locate detectors in accordance with UL FPD or FM P7825 listing and the requirements of NFPA 72. Temperature rating of detectors shall be in accordance with NFPA 72.

E. Addressable Monitor Module: provide addressable monitor module wired as style B (class “B”) to provide an address for normally open contact devices.

1. Provide Addressable Monitor Module to monitor status of all Water flow Switches, Valve tamper Switches and Post Indicator Valves.

2.15 Alarm Notification Devices:

A. Color of notification appliances shall be red, unless otherwise noted by District.

B. All alarm notification devices shall be synchronized throughout the school campus building.

C. Strobe Lights: Provide recessed mounted strobe light assembly suitable for use in electrically supervised circuit. Lamps shall be xenon flashtube type, powered from the fire alarm control panel alarm signaling circuit. Strobes shall provide candela ratings as indicated on the drawings candelas and flash 60 times per minute unless otherwise noted. Strobes in toilets shall provide a minimum of 15 candelas. Lamps shall be protected be a clear polycarbonate lens. Housing shall be labeled “FIRE” in red vertical lettering.

D. Speaker/Strobes: Provide recessed mounted, grille face, vibrating diaphragm type, audio alarm devices consisting of an electro-mechanical horn suitable for use in an electrically supervised circuit. Speaker/Strobes shall be provided with a red, tamper resistant grill. Speaker shall have a minimum sound rating of 90 DBA at 10 feet and have field selectable sound levels. Speakers shall be capable of providing a synchronized, field selectable, temporal code 3 tone. Strobes shall have a separate minimum candela as shown on the drawings and flash 60 times per minute unless otherwise noted. Lamps shall be protected by a clear polycarbonate lens. Housing shall be labeled “FIRE” in red vertical lettering.

E. Speakers: Provide recessed mounted, grille face, vibrating diaphragm type, audio alarm devices consisting of an electro-mechanical horn suitable for use in an electrically supervised circuit. Horns shall be provided with a red, tamper resistant grill. Horn shall have a minimum sound rating of 90 DBA at 10 feet and have field selectable sound levels. Horns shall be capable of providing a synchronized, field selectable, temporal code 3 tone. Horns shall have a separate screw terminal for each conductor connection.

F. Exterior Speakers: Provide recessed mounted, grille face, vibrating diaphragm type, audio alarm devices consisting of an electro-mechanical horn suitable for use in an electrically supervised circuit. Horns shall be provided with a red, tamper resistant grill, and a weatherproof backbox. Horn shall have a minimum sound rating of 90 DBA at 10 feet and have field selectable sound levels. Horns shall be capable of providing a synchronized, field selectable, temporal code 3 tone. Horns shall have a separate screw terminal for each conductor connection. Horns located in areas subject to moisture or exterior atmospheric conditions, shall be approved for such locations.

G. Field Charging Power Supply (FCPS):

1. The FCPS is a device designed for use as either a remote 24 volt power supply or used to power Notification Appliances.

2. The FCPS shall offer up to 6.0 amps (4.0 amps continuous) of regulated 24 volt power. It shall include an integral charger designed to charge 7.0 amp hour batteries and to support 60 hour standby.

3. The Field Charging Power Supply shall have two input triggers. The input trigger shall be a Notification Appliance Circuit (from the fire alarm control panel) or a relay. Four outputs (two Style Y or Z and two style Y) shall be available for connection to the Notification devices.

4. The FCPS shall include an attractive surface mount backbox.

5. The Field Charging Power Supply shall include the ability to delay the AC fail delay per NFPA requirements.

6. The FCPS include power limited circuitry, per 1995 UL standards.

2.16 Wiring and Conduit:

A. Provide wiring in accordance with NFPA 72.

B. Conductors shall be solid copper. Conductors for 120 volt circuits shall be No. 12 AWG minimum; conductors for low-voltage DC circuits shall be No. 14 AWG minimum for annunciation circuits and No. 14 AWG minimum for initiation circuits. All cables shall be rated and code compliant for their use.

1. All low voltage wiring not installed in conduits shall be plenum rated.

2. Provide color-coded conductors. Identify conductors by plastic-coated, self-sticking, printed markers or by heat-shrink type sleeves. Each conductor used for the same specific function shall be distinctly color coded. Use different color codes for each interior circuit. Each circuit color code wire shall remain uniform throughout the circuit.

3. Pigtail or “T” tap connections to the evacuation alarm horns, horn/strobes and strobes are not acceptable.

4. Underground circuit or circuits in wet areas shall be gel filled cables in scheduled 40 PVC conduit. There shall be no splicing of any underground cables.

C. Conduits:

1. Identification of Conduit: New conduits containing fire alarm system conductors shall be red, ¾” minimum. Junction-boxes, covers, gutters, and terminal cabinets, containing fire alarm system conductors, shall be painted red or provided red in color with engraved plastic identification signs permanently attached to the equipment.

2. Do not run fire alarm circuits in the same conduit with the non-fire alarm circuits.

3. Do not run AC circuits in the same conduit with the fire alarm circuits.

4. Provide wiring in rigid metal conduit for exterior installations or where exposed to damage.

5. Conceal conduit in finished areas of new construction and wherever practical in existing construction. Conduit runs shall be straight, neatly arranged properly supported and parallel or perpendicular to walls and partitions. Identify conductors within each enclosure where a tap, splice, or termination is made.

PART 3 - EXECUTION

3.01 Installation:

A. Equipment, materials, installation, workmanship, inspection, and testing shall be in accordance with the NFPA publications and as modified herein.

B. Follow manufacturer’s directions in all cases for installation, testing and energizing.

C. Accurately set, level, support, and fasten all equipment.

D. Smoke and heat detectors:

1. No detector shall be located closer than 12 inches to any part of any lighting fixture. Detectors, located in areas subject to moisture or exterior atmospheric conditions, or hazardous locations as defined by NFPA 70, shall be approves for such locations.

2. Provide guards for all detectors mounted in any high athletic activity areas such as gym's, wrestling rooms, shower rooms.

E. Conduit where exposed shall be installed parallel with the walls or structural elements; vertical runs to be plumb; horizontal runs to be level or parallel with structure; conduit grouped neatly together with straight runs, all bends parallel and uniformly spaced.

F. Earthquake Resistant installation/fastening of all electrical equipment shall conform to the general requirements of section 1614A of the California Building Code.

3.02 Preliminary Tests:

A. Conduct the following tests during installation of wiring and system components. Correct deficiency pertaining to these requirements prior to formal functional and operational tests of the system, preliminary tests shall be performed in the presence of the Local Fire Authority and Project inspector of Record to determine the conformance with the specified requirements.

B. Ground Resistance: Measure the resistance of each connection to ground. Ground resistance shall not exceed 10 ohms.

C. Dielectric Strength insulation Resistance: Test the dielectric strength and the Insulating resistance of the system interconnecting wiring by means of an instrument capable of generating 500 volts of DC and equipped to indicate leakage current 1000 megohms. For the purpose of this test, connect the instrument between each conductor on the line and between each conductor and ground at the control panel end of the line, with the other extremity open circuited and all series-connected devices in place. The system shall withstand the test without breakdown and shall indicate a resistance of not less than 1.0 minute with a DC potential of not less than 100 volts and not more than 500 volts.

D. Standby Battery Test: prior to formal inspection and tests, place the fire alarm system on standby battery power for 24 hours; immediately thereafter, sound the building evacuation alarm signaling devices for 5 minutes. When the test is complete, the fire alarm system battery charger shall be fully recharged within 24 hours.

E. Field Inspection and Test:

1. Before final acceptance of the work, pre-test system to demonstrate compliance with the contract requirements. System shall be subjected to complete functional and operational tests, including tests in place of each detector. When tests have been completed and corrections made, submit a signed and dated NFPA Certificate of Completion along with a completed testing matrix with the request for formal inspection and tests.

2. Where application of heat would destroy a heat detector, it may be manually activated.

3. Verify the proper receipt of the alarm signals at the central station for the UDACT provide printout of test reports. It shall be the sole obligation of the contractor to coordinate and to provide all testing documentation from the central station.

4. The communication loops and the indicating appliance circuits shall be opened in at least two locations per zone to check for the presence of correct supervisory circuitry.

5. Perform the field inspection and test in the presence of the manufacturer's representative, the School District's representative, local Fire Authority and Project Inspector of Record (IOR).

6. Test equipment: It shall be the responsibility of the installing Contractor to furnish tools, instruments, and materials required for a thorough test of the system. This includes, but is not limited to, the following:

    a. VOM meter

    b. Manufacturer's recommended smoke detector testing device and sensitivity test equipment.

    c. Heat source for testing heat detectors.

    d. Keys to all control panels.

    e. Ladders

3.03 Project Closeout:

A. As Built Drawings:

1. Provide a complete set (full size scalable) of reproducible "as-built" and AutoCAD format drawings showing installed wiring, color coding, and wire tag notations for exact locations of all installed equipment, specific interconnections between all equipment, and internal wiring of the equipment upon completion of system.

B. Operating and Instruction Manuals:

1. Operating and Instruction manuals shall be submitted prior to testing of the system. Four complete sets of operation and instructions manuals shall be delivered to the School District upon request.

2. Complete, accurate, step-by-step testing instructions giving recommended and required testing frequency of all equipment, methods for testing each individual piece of equipment, and troubleshooting manual explaining how to test the preliminary internal parts or each piece of equipment shall be delivered upon completion of the system.

C. Maintenance instructions shall be complete, easy to read, understandable, and shall provide the following information:

1. Instructions on replacing any components of the system, including internal parts.

2. Instructions on periodic cleaning and adjustment of equipment with a schedule of these functions.

3. A complete list of all equipment and components with information as to the address and telephone number of both the manufacturer and local supplier of each item.

4. User operating instructions shall be provided prominently displayed on a separate sheet located next to the control unit in accordance with U.L. Standard 864.

EMERGENCY VOICE EVACUATION SYSTEM

PART 1.0 - GENERAL

1.1. DESCRIPTION:

A. This section of the specification includes the furnishing, installation, connection and testing of the microprocessor controlled Voice Evacuation/Mass Notification control panel.

B. The Voice Evacuation/Mass Notification panel shall comply with NFPA 72 requirements.

1. The Secondary Power Source of the Voice Evacuation/Mass Notification panel will be capable of providing at least 24 hours of backup power with the ability to sustain 15 minutes in alarm at the end of the backup period.

C. The Voice Evacuation/Mass Notification panel shall be manufactured by an ISO 9001 certified company and meet the requirements of BS EN9001: ANSI/ASQC, Q9001-1994.

D. The Voice Evacuation/Mass Notification panel and peripheral devices shall be manufactured 100% by a single U.S. manufacturer (or division thereof).

Underwriters Laboratories Inc. (UL) - USA:

UL 864 Standard for Control Units for Fire Protective Signaling Systems

UL 1711 Amplifiers for Fire Protective Signaling Systems

UL 2572 Communication and Control Units for Mass Notification Systems

Other:

NEC Article 250 Grounding

NEC Article 300 Wiring Methods

NEC Article 760 Fire Protective Signaling Systems

Compliant with Unified Facilities Criteria UFC 4-021-01

1. The Voice Evacuation/Mass Notification panel shall be ANSI 864, 9th Edition Listed. Systems listed to ANSI 864, 8th edition (or previous revisions) shall not be accepted.

F. The installing company shall employ NICET (minimum Level II Fire Alarm Technology) technicians on site to guide the final check-out and to ensure the systems integrity.

1.2. SCOPE:

A. A microprocessor-controlled Voice Evacuation/Mass Notification control panel shall be installed in accordance with the project specifications and drawings.

1.3. SUBMITTALS

A. General:

1. Two copies of all submittals shall be submitted to the Architect/Engineer for review.

2. All references to manufacturer's model numbers and other pertinent information herein is intended to establish minimum standards of performance, function and quality. Equivalent compatible UL-listed equipment from other manufacturers may be substituted for the specified equipment as long as the minimum standards are met.

3 For equipment other than that specified, the contractor shall supply proof that such substitute equipment equals or exceeds the features, functions, performance, and quality of the specified equipment.

B. Shop Drawings:

1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
2. Include manufacturer's name(s), model numbers, ratings, power requirements, equipment layout, device arrangement, complete wiring point-to-point diagrams, and conduit layouts.

3. Show system layout, configurations, and terminations.

C. Manuals:

1. Submit simultaneously with the shop drawings, complete operating and maintenance manuals listing the manufacturer's name(s), including technical data sheets.

2. Wiring diagrams shall indicate internal wiring for each device and the interconnections between the items of equipment.

3. Provide a clear and concise description of operation that gives, in detail, the information required to properly operate the equipment and system.

D. Software Modifications

1. Provide the services of a qualified technician to perform all system software modifications, upgrades or changes. Response time of the technician to the site shall not exceed 4 hours.

2. Provide all hardware, software, programming tools and documentation necessary to modify the Voice Evacuation/Mass Notification Control Panel on site. Modification includes addition and deletion of messages, circuits, zones and changes to system operation. The system structure and software shall place no limit on the type or extent of software modifications on-site.

1.4. GUARANTY:

All work performed and all material and equipment furnished under this contract shall be free from defects and shall remain so for a period of at least one (1) year from the date of acceptance. The full cost of maintenance, labor and materials required to correct any defect during this one year period shall be included in the submittal bid.

1.5. MAINTENANCE:

A. Maintenance and testing shall be on a semi-annual schedule or as required by the local AHJ. A preventive maintenance schedule shall be provided by the contractor describing the protocol for preventive maintenance. The Voice Evacuation/Mass Notification Control Panel shall be tested in accordance with the requirements of NFPA 72.

B. As part of the bid/proposal, include a quote for a maintenance contract to provide all maintenance, tests, and repairs described below. Include also a quote for unscheduled maintenance/repairs, including hourly rates for technicians trained on this equipment, and response travel costs for each year of the maintenance period. Submittals that do not identify all post contract maintenance costs will not be accepted. Rates and costs shall be valid for the period of five (5) years after expiration of the guaranty.

1.6. POST CONTRACT EXPANSIONS:

A. The contractor shall have the ability to provide parts and labor to expand the system specified, if so requested, for a period of five (5) years from the date of acceptance.

B. As part of the submittal, include a quotation for all parts and material, and all installation and test labor as needed to increase the number of speakers zones or wattage by ten percent (10%).

C. The quotation shall include installation, test labor, and labor to reprogram the system for this 10% expansion. If additional Voice Evacuation/Mass Notification Control Panel hardware is required, include the material and labor necessary to install this hardware.

D. Do not include cost of conduit or wire or the cost to install conduit or wire except for labor to make final connections at the Voice Evacuation/Mass Notification Control Panel.

E. Submittals that do not include this estimate of post contract expansion cost will not be accepted.

1.7. APPLICABLE STANDARDS AND SPECIFICATIONS:

The specifications and standards listed below form a part of this specification. The system shall fully comply with the latest issue of these standards, if applicable.

A. National Fire Protection Association (NFPA) - USA:

No. 70 National Electric Code (NEC)

No. 72 National Fire Alarm Code

No. 101 Life Safety Code

B. The system and its components shall be Underwriters Laboratories, Inc. listed under the appropriate UL testing standard as listed herein for fire alarm applications and the installation shall be in compliance with the UL listing.

C. Local and State Building Codes.

D. All requirements of the Authority Having Jurisdiction (AHJ).

1.8. APPROVALS:

A. The system shall have proper listing and/or approval from the following nationally recognized agencies:

UL Underwriters Laboratories Inc (Ninth Edition)

CSFM California State Fire Marshal

MEA Material Equipment Acceptance (NYFD COA)

PART 2.0 PRODUCTS

2.1. EQUIPMENT AND MATERIAL, GENERAL:

A. All equipment and components shall be new, and the manufacturer's current model. The materials, appliances, equipment and devices shall be tested and listed by a nationally recognized approvals agency for use as part of a fire protective signaling system, meeting the National Fire Alarm Code.

B. All equipment and components shall be installed in strict compliance with manufacturers' recommendations. Consult the manufacturer's installation manuals for all wiring diagrams, schematics, physical equipment sizes, etc., before beginning system installation.

C. All equipment shall be attached to walls and ceiling/floor assemblies and shall be held firmly in place

(e.g., speakers shall not be supported solely by suspended ceilings). Fasteners and supports shall be adequate to support the required load.

D. All equipment must be available "over the counter" through the Security Equipment Distributor (SED) market and can be installed by dealerships independent of the manufacturer.

2.2. CONDUIT AND WIRE:

A. Conduit:

1. Conduit shall be in accordance with The National Electrical Code (NEC), local and state requirements.

2. Where required, all wiring shall be installed in conduit or raceway. Conduit fill shall not exceed 40 percent of interior cross sectional area where three or more cables are contained within a single conduit.

3. Cable must be separated from any open conductors of power, or Class 1 circuits, and shall not be placed in any conduit, junction box or raceway containing these conductors, per NEC Article 760.

4. All circuits shall be provided with transient suppression devices and the system shall be designed to permit simultaneous operation of all circuits without interference or loss of signals.

5. Conduit shall not enter the Voice Evacuation/Mass Notification Control Panel, or any other remotely mounted panel equipment or backboxes, except where conduit entry is specified by the Voice Evacuation/Mass Notification Control Panel manufacturer.

6. Conduit shall be 3/4 inch (19.1 mm) minimum.

B. Wire:

1. All Voice Evacuation/Mass Notification Control Panel wiring shall be new.

2. Wiring shall be in accordance with local, state and national codes (e.g., NEC Article 760) and as recommended by the manufacturer of the Voice Evacuation/Mass Notification Control Panel. Number and size of conductors shall be as recommended by the Voice Evacuation/Mass Notification Control Panel, but not less 14 AWG (1.63 mm) for Notification Appliance Circuits.

3. All wire and cable shall be listed and/or approved by a recognized testing agency for use with a protective signaling system.

4. Wire and cable not installed in conduit shall have a fire resistance rating suitable for the installation as indicated in NEC 760 (e.g., FPLR).

5. All field wiring shall be electrically supervised for open circuit and ground fault.

C. Terminal Boxes, Junction Boxes and Cabinets:

All boxes and cabinets shall be UL listed for their use and purpose.

D. The Voice Evacuation/Mass Notification Control Panel shall be connected to a separate dedicated branch circuit, maximum 20 amperes. This circuit shall be labeled at the main power distribution panel as Voice Evacuation/Mass Notification Control Panel. Voice Evacuation/Mass Notification Control Panel

primary power wiring shall be 12 AWG. The panel cabinet shall be grounded securely to either a cold water pipe or grounding rod.

1. The Voice Evacuation/Mass Notification Control Panel notification circuit (NACs 1) shall also automatically synchronize any of the following manufacturer's notification appliances connected to them: System Sensor, Wheelock, or Gentex with no need for additional synchronization modules.

2.3. Voice Evacuation/Mass Notification Control Panel:

A. The Voice Evacuation/Mass Notification Control Panel is a new Silent Knight 6820EVS (with Digital Voice Command Center) and contains a microprocessor-based Central Processing Unit (CPU). The CPU shall distribute and control emergency voice messages over the speaker circuits.

B. The system shall provide the capability to interface to **LOC** (**L**ocal **O**perator **C**onsole), Distributed Audio Amplifiers, Remote Page Unit, Remote Microphone, Fire Fighter Telephone Unit and Remote Telephone Zone Module from the same manufacturer.

C. Shall have as minimum requirements:

1. Integral 50 Watt, 25 Vrms audio amplifier with optional converter for 70.7 volt systems. The system shall be capable of expansion to 100 watts total via the insertion of an additional 50-watt audio amplifier module (can be used as a backup amplifier) into the same cabinet and expandable over 1100 watts.

2. Speaker circuit that can be wired both Class A and B.

3. Integral Digital Message Generator with a memory capacity for up to 60 seconds per messaging. The Digital Message Generator shall be capable of producing fourteen distinct messages (60 seconds each). Field-selectable message and custom message recording capability using the local microphone, a USB port, or an external audio input.

4. Built in alert tone patterns with ANSI, March Code, California,

Steady, Alert Tone, Hi-Lo, ANSI Whoop, Continuous Whoop, or No Tone is field programmable. Tone Prior to transmitting a message, the Voice Evacuation/Mass Notification Control Panel can be programmed to produce a pre-announce
and post-announce tone.

   a. Leading Tone Duration If a pre-announce tone is desired, select the length of time it will play before a message is broadcasted. Select *4*, *8*, *12*, *16*, *20*, *24*, or *28* seconds. In a pre-announce tone is not desired, select *0* seconds.
   b. Trailing Tone Duration Select the length of time for the post-message announcement tone. Select *4*, *8*, *12*, *16*, *20*, *24*, *28*, or *32* seconds from the drop-down menu.
   c. Repeat Cycle Select the number of times the message will be repeated during an alarm. A message can be repeated *0*, *1*, *2*, *3*, *4*, *5*, 6, *7*, *8*, *9*, *10*, *11*, *12*, *13*, *14*, or an *Infinite* amount of times.

5. The Voice Evacuation/Mass Notification Control Panel will be capable of detecting and annunciating the following conditions: Loss of Power (AC and DC), System Trouble, Ground Fault, Alarm, Microphone Trouble, Message Generator Trouble, Tone Generator Trouble, and Amplifier Fault.

6. The Voice Evacuation/Mass Notification Control Panel shall be fully supervised including microphone, amplifier output, message generator, speaker wiring, and tone generation.

7. Speaker outputs shall be fully power-limited.

8. Amplifiers will be supplied power independently to eliminate a short on one circuit from affecting other circuits.

9. The Voice Evacuation/Mass Notification Control Panel will provide full supervision on both active (alarm or music) and standby conditions.

10. An optional zone splitter version shall be available that permits splitting speaker circuits into 8 specific zones.

11. An optional distributed amplifiers unit shall be available that permits splitting speaker circuits up to a total of 24 speaker zones.

12. Wiring terminals shall be removable terminal blocks (Wire Gauge 12 – 18 AWG) for ease of servicing.

13. Voice Evacuation/Mass Notification Control Panel will provide 2 amp Notification Appliance Circuit (NAC) output with sync generator or follower for System Sensor, Wheelock or Gentex protocols. The NAC shall be capable of One (1) Style Y (Class B) or Style Z (Class A) circuit.

14. Shall have eight Command Input Circuits to activate messages via reverse polarity or contact closures.

15. Built in External Audio Input can be used for background music.

16. On-board battery charger which supports charging up to 26 AH batteries (cabinet holds up to 18AH batteries).

17. Programmable delay of immediate, 2 hours or 6 hours reporting of AC Loss.

18. Built in Piezo sounder for local trouble.

19. Stores the events in the 100 Event History log

20. Shall have Console Lamp Test switch and shall activate all system LEDs including Remote Consoles.

21. Shall have three Form-C relays:

AC Power Loss Relay

System Trouble Relay

MNS Active (For Mass Notification signage)

22. Shall have a Special Application (auxiliary power) output for addressable modules when interfaced with compatible addressable FACPs and End-of-Line power supervision relays.

23. Shall be capable of Speaker Volume Control. The Supervised

Volume Control will allow manual volume setting for telephone paging and background music for a specific speaker or speaker zone.

24. Shall have a Night Ring input allows a building's Private Branch Exchange (PBX) to activate the Voice Evacuation/Mass Notification panel.

25. The Voice Evacuation/Mass Notification panel can communicate in any combination up to eight (8) external remote consoles:

Optional Remote Microphone

Optional Remote Page Unit

Optional Local Operator Console

26. The Voice Evacuation/Mass Notification panel can communicate in any combination up to eight (8) external distributed audio amplifiers:

Optional Distributed Amplifier, 50 watts.

Optional Distributed Amplifier, 125 watts.

27. Shall be capable of integrating with firefighter telephone system that provides secure and reliable communications. The firefighter telephone system will allow for up to ten users to plug in to a remote telephone jack and communicate simultaneously within a building.

28. Shall be capable of secure access to the Voice Evacuation/Mass Notification panel via cell phone or other remote telephone.

29. The Voice Evacuation/Mass Notification panel can be integrated by an FACP via the ANN/ACS (EIA-485) link. Compatible FACPs include the MS-9200UDLS and MS-9600(UD)LS.

30. The Voice Evacuation/Mass Notification shall report Mass Notification events to the Central Station.

31. The Voice Evacuation/Mass Notification panel can be interface with other UL Listed Fire Alarm Control Panels via activation of reverse polarity or by contact closure.

D. Speakers:

1. All speakers shall operate on 25 or 70 VRMS with field selectable output taps from 0.25 to 2.0 Watts.
2. Speakers in corridors and public spaces shall produce a minimum sound levels of 75 dBA output at 10 feet (3m).
3. The plug-in speaker allows the installer to pre-wire mounting plates and dress the wires before plugging in the speakers.
4. Flush mount applications are achievable without the need for an extension ring.
5. Frequency response shall be a minimum of 400 HZ to 4000 HZ.
6. Rotary switch simplifies field selection of speaker voltage and power settings.

E. Enclosures:

1. The Voice Evacuation/Mass Notification panel shall be housed in a UL-listed cabinet suitable for

surface mounting. The cabinet and front shall be corrosion protected and painted red via the powder coat method with manufacturer's standard finish.

2. The back box and door shall be constructed of steel with provisions for electrical conduit connections into the sides and top.
   The door shall provide a key lock and shall provide for the viewing of all indicators.

F. Power Supply:

1. The main power supply for the Voice Evacuation/Mass Notification panel shall provide up to 7.5 amps of available power for the panel and peripheral devices.
2. Provisions will be made to allow the audio-visual power to be increased as required by adding modular expansion audio-visual power supplies.
3. The power supply shall provide an integral battery charger or may be used with an external battery and charger systems. Battery arrangement may be configured in the field.
4. The main power supply shall continuously monitor all field wires for earth ground conditions.
5. The main power supply shall operate on 120 VAC, 60 Hz or 240 VAC, 50 Hz, and shall provide all necessary power for the Voice Evacuation/Mass Notification panel.

G. BATTERIES:

1. Upon loss of Primary (AC) power to the Voice Evacuation/Mass Notification panel, the batteries shall have sufficient capacity to power the Voice Evacuation/Mass Notification panel for required standby time (24 or 60 hours) followed by 15 minutes of alarm.
2. The batteries are to be completely maintenance free. No liquids are required. Fluid level checks for refilling, spills, and leakage shall not be required.

PART 3.0 - EXECUTION

3.1. INSTALLATION:

A. Installation shall be in accordance with the NEC, NFPA 72, local and state codes, as shown on the drawings, and as recommended by the major equipment manufacturer.

B. All conduit, junction boxes, conduit supports and hangers shall be concealed in finished areas and may be exposed in unfinished areas. Smoke detectors shall not be installed prior to the system programming and test period. If construction is ongoing during this period, measures shall be taken to protect speakers from contamination and physical damage.

3.2. TEST:

The service of a competent, factory-trained engineer or technician authorized by the manufacturer of the fire alarm equipment shall be provided to technically supervise and participate during all of the adjustments and tests for the system. All testing shall be in accordance with NFPA 72.

A. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.

B. Open and short notification appliance circuits and verify that trouble signal actuates.

C. Ground all circuits and verify response of trouble signals.

D. Check presence and audibility of tone at all alarm notification devices.

E. When the system is equipped with optional features, the manufacturer's manual shall be consulted to determine the proper testing procedures. This is intended to address such items as verifying voice messages.

3.3. FINAL INSPECTION:

A. At the final inspection a minimum NICET Level II technician shall demonstrate that the system functions properly in every respect.

3.4. INSTRUCTION:

A. Instruction shall be provided as required for operating the system. Hands-on demonstrations of the operation of all system components and the entire system including program changes and functions shall be provided.

B. The contractor or installing dealer shall provide a user manual indicating "Sequence of Operation."

3.5. SUPPORT SERVICES:

A. System Start Up and Commissioning:

1. Upon completion of work, contractor shall provide a manufacturer authorized technician to provide staff & MOT training (minimum of 16-hours) of the fire alarm system operation.

END OF SECTION

SECTION 31 23 00

TRENCHING, BACKFILLING, AND COMPACTING

PART 1 - GENERAL

1.1 SUMMARY

A. Trench, backfill, and compact as specified herein and as needed for installation of underground utilities associated with the Work.

B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division l of these Specifications.

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Use equipment adequate in size, capacity, and numbers to accomplish the work in a timely manner.

C. In addition to complying with requirements of governmental agencies having jurisdiction, comply with the directions of the construction soil engineer.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. Fill and backfill materials:
1. Provide soil materials free from organic matter and deleterious substances, containing no rocks or lumps over 2" in greatest dimension, and with not more than 10% of the rocks or lumps larger than 1" in their greatest dimension.
2. Fill material is subject to the approval of the construction soil engineer, and is that material removed from excavations or imported from off-site borrow areas, predominantly granular, non- expansive soil free from roots and other deleterious matter.
3. Imported fill material shall, in addition, have 10 to 40% by weight passing the #200 sieve, a plasticity index of less than 12, and a liquid limit of less than 30%.

2.2 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 FINISH ELEVATIONS AND LINES

A. Comply with documents.

3.3 PROCEDURES

A. Utilities:
1. Unless shown to be removed, protect active utility lines shown on the Drawings or otherwise made known to the Contractor prior to trenching. If damaged, repair or replace at no additional cost to the School District.
2. If active utility lines are encountered, and are not shown on the Drawings or otherwise made known to the Contractor, promptly take necessary steps to assure that service is not interrupted.
3. If service is interrupted as a result of work under this Section, immediately restore service by repairing the damaged utility at no additional cost to the School District.
4. If existing utilities are found to interfere with the permanent facilities being constructed under this Section, immediately notify the Architect and secure his instructions.
5. Do not proceed with permanent relocation of utilities until written instructions are received from the Architect.

B. Protection of persons and property:
1. Barricade open holes and depressions occurring as part of the Work, and post warning lights on property adjacent to or with public access.
2. Operate warning lights during hours from dusk to dawn each day and as otherwise required.
3. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, washout, and other hazards created by operations under this Section.

C. De-watering:
1. Remove all water, including rain water, encountered during trench and sub-structure work to an approved location by pumps, drains, and other approved methods.
2. Keep trenches and site construction area free from water.

D. Use means necessary to prevent dust becoming a nuisance to the public, to neighbors, and to other work being performed on or near the site.

E. Maintain access to adjacent areas at all times.

3.4 TRENCHING

A. Provide sheeting and shoring necessary for protection of the Work and for the safety of personnel.
1. Prior to backfilling, remove all sheeting.
2. Do not permit sheeting to remain in the trenches except when, in the opinion of the Architect, field conditions or the type of sheeting or methods of construction such as

use of concrete bedding are such as to make removal of sheeting impracticable. In such cases, the Architect may permit portions of sheeting to be cut off and remain in the trench.

B. Open cut:
   1. Excavate for utilities by open cut.
   2. If conditions at the site prevent such open cut, and if approved by the Architect, trenching may be used.
   3. Short sections of a trench may be tunneled if, in the opinion of the Architect, the conductor can be installed safely and backfill can be compacted properly into such tunnel.
   4. Where it becomes necessary to excavate beyond the limits of normal excavation lines in order to remove boulders or other interfering objects, backfill the voids remaining after removal of the objects as directed by the construction soil engineer.
   5. When the void is below the subgrade for the utility bedding, use approved earth materials and compact to the relative density directed by the construction soil engineer, but in no case to a relative density less than 90%.
   6. When the void is in the side of the utility trench or open cut, use approved earth or sand compacted as approved by the construction soil engineer, but in no case to a relative density less than 85%.
   7. Remove boulders and other interfering objects, and backfill voids left by such removals, at no additional cost to the School District.
   8. Excavating for appurtenances:
      a. Excavate for manholes and similar structures to a distance sufficient to leave at least 12" clear between outer surfaces and the embankment or shoring that may be used to hold and protect the banks.
      b. Overdepth excavation beyond such appurtenances that has not been directed will be considered unauthorized. Fill with sand, gravel, or lean concrete as directed by the construction soil engineer, and at no additional cost to the School District.

C. Trench to the minimum width necessary for proper installation of the utility, with sides as nearly vertical as possible. Accurately grade the bottom to provide uniform bearing for the utility.

D. Depressions:
   1. Dig bell holes and depressions for joints after the trench has been graded. Provide uniform bearing for the pipe on prepared bottom of the trench.
   2. Except where rock is encountered, do not excavate below the depth indicated or specified.
   3. Where rock is encountered, excavate rock to a minimum overdepth of 4" below the trench depth indicated or specified.

E. Where utility runs traverse public property or are subject to governmental or utility company jurisdiction, provide depth, bedding, over, and other requirements as set forth by legally constituted authority having jurisdiction, but in no case less than the depth shown in the Contract Documents.

F. Where trenching occurs in existing lawns, remove turf in sections and keep damp. Replace turf upon completion of the backfilling.

G. Cover:

1. Provide minimum trench depth indicated below to maintain a minimum cover over the top of the installed item below the finish grade or subgrade, unless specifically designed and shown otherwise on the drawings:
   a. Areas subject to vehicular traffic:
      1) Sanitary sewers: 24";
      2) Storm drains: 24".
   b. Areas not subject to vehicular traffic:
      1) Sanitary sewers: 18";
      2) Storm drains: 18".
   c. All areas:
      1) Water lines: 18";
      2) Natural gas lines: 18";
      3) Electrical cables: 24";
      4) Electrical ducts: 18".
   d. Concrete encased:
      1) Pipe sleeves for water and gas lines: 18";
      2) Sanitary sewers and storm drains: 12";
      3) Electrical ducts: 18".
   e. Where utilities are under a concrete structure slab or pavement, the minimum depth need only be sufficient to completely encase the conduit or pipe sleeve, and electrical long-radius rigid metal conduit riser, provided it will not interfere with the structural integrity of the slab or pavement.
   f. Where the minimum cover is not provided, encase the pipes in concrete as indicated. Provide concrete with a minimum 28 day compressive strength of 3000 psi.

3.5 BEDDING

A. Provide bedding as indicated on the Drawings.

3.6 BACKFILLING

A. General:
   1. Do not completely backfill trenches until required pressure and leakage tests have been performed, and until the utilities systems as installed conform to the requirements specified in the pertinent Sections of these Specifications.
   2. Except as otherwise specified or directed for special conditions, backfill trenches to the ground surface with selected material approved by the construction soil engineer.
   3. Reopen trenches which have been improperly backfilled, to a depth as required for proper compaction. Refill and compact as specified, or otherwise correct to the approval of the construction soil engineer.
   4. Do not allow or cause any of the Work performed or installed to be covered up or enclosed by work of this Section prior to required inspections, tests, and approvals.
   5. Should any of the Work be so enclosed or covered up before it has been approved, uncover all such Work and, after approvals have been made, refill and compact as specified, all at no additional cost to the School District.

B. Lower portion of trench:
   1. Deposit approved backfill and bedding material in layers of 3" minimum thickness, and compact with suitable tampers to 90% relative density (85% in landscape areas), until there is a cover of not less than 24" over sewers and 12" over other utility lines.
   2. Take special care in backfilling and bedding operations to not damage pipe and pipe coatings.

C. Remainder of trench:
   1. Except for special materials for pavements, backfill the remainder of the trench with approved backfill.
   2. Deposit backfill material in layers not exceeding the thickness specified, and compact each layer to the minimum density indicated by the construction soil engineer.

D. Adjacent to buildings: Mechanically compact backfill within ten feet of buildings.

E. Consolidation of backfill by jetting with water may be permitted, when specifically approved by the construction soil engineer, in areas other than building and pavement areas.

3.7 TEST FOR DISPLACEMENT OF SEWERS AND STORM DRAINS

A. Check sewers and storm drains to determine whether displacement has occurred after the trench has been backfilled to above the pipe and has been compacted as specified.

B. Flash a light between manholes or, if the manholes have not yet been constructed, between the locations of the manholes, by means of a flashlight or by reflecting sunlight with a mirror.

C. If the illuminated interior of the pipe line shows poor alignment, displaced pipes, or any other defects, correct the defects to the specified conditions and at no additional cost to the School District.

3.8 PIPE JACKING

A. The Contractor may, at his option, install steel pipe casings, tongue-and-groove reinforced concrete pipes, and steel pipes under existing roads or pavements by jacking into place using procedures approved by the governmental agencies having jurisdiction and approved by the construction soil engineer.

3.9 TUNNELING OPERATIONS

A. The Contractor may, at his option, tunnel pipes into position using procedures approved by the construction soil engineer and the governmental agencies having jurisdiction.

3.10 FIELD QUALITY CONTROL

A. The construction soil engineer will inspect open cuts and trenches before installation of utilities, and will make the following tests:

B. Assure that trenches are not backfilled until all tests have been completed;

C. Check backfilling for proper layer thickness and compaction;

D. Verify that test results conform to the specified requirements, and that sufficient tests are performed;

E. Assure that defective work is removed and properly replaced.

END OF SECTION 312300

SECTION 32 12 16
ASPHALT PAVEMENT

PART 1 GENERAL

1.1 SUMMARY

A. Section includes asphaltic concrete paving, wearing, binder and base course; surface sealer; and aggregate base course.

B. Related Sections:
1. Section 31 05 13 - Soils for Earthwork.
2. Section 31 22 13 - Rough Grading: Preparation of site for paving and base.
3. Section 31 23 23.13 - Backfill: Compacted subbase for paving.
4. Section 32 11 23 - Aggregate Base Course.

1.2 REFERENCES

A. ASTM D946 - Penetration-Graded Asphalt Cement for Use in Pavement Construction.

B. ASTM D3381 - Viscosity Graded Asphalt Cement for Use in Pavement Construction.

C. TAI - (The Asphalt Institute) - MS-2 Mix Design Methods for Asphalt Concrete and Other Hot Mix Types.

D. TAI - (The Asphalt Institute) - MS-3 Asphalt Plant Manual.

E. TAI - (The Asphalt Institute) - MS-8 Asphalt Paving Manual.

F. TAI - (The Asphalt Institute) - MS-19 Basic Asphalt Emulsion Manual.

G. Caltrans Standard Specifications, 2010 Edition, Section 39.

1.3 SUBMITTALS

A. Product Data: Submit product information and mix design.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with Caltrans Standard Specifications.

B. Mixing Plant: Conform to Caltrans Standard Specifications.

C. Obtain materials from same source throughout.

D. Maintain one copy of each document on site.

1.5 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements.

B. Do not place asphalt when ambient air or base surface temperature is less than 40

degrees F, or surface is wet or frozen.

PART 2 PRODUCTS

2.1 MATERIALS

A. Asphalt Pavement: In accordance with Caltrans Standard Specifications.

2.2 SOURCE QUALITY CONTROL AND TESTS

A. Section 01 45 23 - Quality Control: Testing and Inspection Services: Provide mix design for asphalt.

B. Submit proposed mix design for review prior to beginning of Work.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Verify compacted granular base is dry and ready to support paving and imposed loads.

C. Verify gradients and elevations of base are correct.

3.2 SUBBASE

A. Section 32 11 23 - Aggregate Base Course forms the base construction for Work of this section.

3.3 PREPARATION - PRIMER

A. Apply primer in accordance with Caltrans Standard Specifications.

3.4 PREPARATION - TACK COAT

A. Apply tack coat in accordance with Caltrans Standard Specifications.

B. Apply tack coat to contact surfaces of curbs and gutters.

C. Coat surfaces of manhole and catch basin frames with oil to prevent bond with asphalt pavement. Do not tack coat these surfaces.

3.5 PLACING ASPHALT PAVEMENT - SINGLE COURSE

A. Install Work in accordance with Caltrans Standard Specifications.

3.6 PLACING FOG SEAL

3.7 CURBS

A. Install extruded asphalt curbs of profile as indicated on drawings.

3.8 TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Flatness: Maximum variation of 1/4 inch measured with 10-foot straight edge.

C. Scheduled Compacted Thickness: Within 1/4 inch.

D. Variation from True Elevation: Within 1/2 inch.

3.9 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Testing and inspection services
Section 01 70 00 - Execution and Closeout Requirements: Testing, adjusting, and balancing.

3.10 PROTECTION OF FINISHED WORK

A. Section 01 70 00 - Execution and Closeout Requirements: Protecting finished work.

B. Immediately after placement, protect pavement from mechanical injury for 24 hours or until surface temperature is less than 140 degrees F.

3.11 SCHEDULES

A. Pavement sections for various locations and uses are to be as shown on the drawings.

END OF SECTION

SECTION 32 13 13 – Site Concrete

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes site concrete, including but not limited to pavements and other minor site concrete.

B. Provide all labor, materials, equipment, and services to complete the work as indicated on the drawings, and in accordance with these specifications. Work includes but is not limited to the following:

Concrete formwork

Concrete reinforcement

Cast-in-place concrete items:

a. Concrete paving, sidewalks, ramps, pads, curbs, gutters, mow bands, walls, truncated domes, etc.

b. Miscellaneous concrete.

c. All imbeds including anchor bolts, tiedowns, hold downs with bolts, straps, and sleeves.

1.02 REFERENCES

A. Caltrans Standard Specifications - Standard Specifications, State of California, California State Transportation Agency, Department of Transportation (Caltrans), latest edition.

B. ASTM - American Society for Testing and Materials

C. ACI - American Concrete Institute, Manual of Concrete Practice.

D. CBC – California Building Code

1.03 DEFINITIONS

A. Percent Compaction: ASTM D1557, percentage as shown on the Drawings of the maximum in-place dry density of the same material.

1.04 SUBMITTALS

A. Conform to the requirements of Division 1, Section 01 32 19 for submittal requirements.

B. Shop Drawings Reinforcement: Submit shop drawings for fabrication, bending and placement of concrete reinforcement. Comply with ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures" showing bar

schedules, stirrup spacing, diagrams of bent bars and arrangement of concrete reinforcement. Include special reinforcement required at openings through concrete structures.

C. Concrete Design Mixes:

The preparation of design mixes will be the responsibility of the Contractor. Mix designs may be prepared by the supplier and shall be certified by a Civil Engineer registered in California. Mix designs will be designed by the supplier and approved by the District's Representative.

Written reports will be submitted to the District Representative of each proposed mix for review. Do not begin concrete production until mixes have been reviewed by the District's Representative.

Adjustment of Concrete Mixes:

Mix design adjustments may be requested by the Contractor when characteristics of materials, job conditions, weather, test results and other circumstances warrant; at no additional cost to the District and as accepted by the District's Representative. Provide submittals as in A above. Submit adjustment designs a minimum of 48 hours ahead of schedule for concrete production.

D. Product Data: Manufacturers' current catalog cuts and specifications for the following:

Expansion joint filler, sealant, backer rod and bond breaker, including manufacturer's standard color chart for sealant

Air-entrainment.

Curing Compound.

Fly Ash or Slag

MDO plywood made for forming

Water stops

Tactile warning surfacing

E. Certificates:

Reinforcing Steel: Certificate of compliance

Concrete Mix Design: Ticket for each batch delivered showing the following:

a. Mix identification.

b. Weight of cement, aggregate, water, and admixtures, aggregate sizes/proportion, and air entrainment.

1.05 QUALITY ASSURANCE

A. Comply with American Society for Testing Materials (ASTM) A-615 "Standard Specifications for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement," and "Manual of Standard Practice for Detailing Reinforced Concrete Structures," publication American Concrete Institute (ACI) 315-65 of the American Concrete Institute.

B. Comply with all pertinent recommendations contained in ACI, "Recommended Practice of Concrete Formwork, ACI-347", and the 2013 California Building Code (CBC).

C. Construct forms to sizes, shapes, lines and dimensions indicated on Drawings, and to obtain accurate alignment, location, grades, level and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in Work. Use selected materials to obtain required finish. Solidly butt joints and provide back-up at joints to prevent leakage of cement paste.

D. Provide complete forms of such strength and construction as to prevent any spread, shifting, or settling when concrete is deposited, and tight enough to avoid any leakage or washing out of cement mortar.

E. Provide at least one person who shall be present at all times during execution of this portion of the Work and who shall be thoroughly trained and experienced in placing the types of concrete specified and who shall direct all Work performed under this Section. For finishing of exposed surfaces of the concrete, use only thoroughly trained and experienced journeymen concrete finishers.

F. Conform to Section 90 of the Caltrans Standard Specifications.

G. The Contractor shall contact District's Representative of any discrepancies between field conditions and plans prior to proceeding with Work. The written dimension on Drawings shall supersede the graphic presentation. Dimensions are from back of curb, center line, base lines or as noted on the plans. All field adjustments must be approved by District's Representative prior to installation.

H. All walks and curbs shall be established in the field for review and approval prior to concrete pours. The Contractor shall layout the area or form work for review by District's Representative. If approval is not obtained, the Contractor is responsible for removal of any unauthorized field adjustments.

I. Transitions of curves to other curves, and curves to straight line tangents, shall be smooth and continuous.

J. Place expansion joint and score joints as shown on plan. Adjustments in the field shall be made only with the approval of District's Representative.

K. Where new concrete paving is placed adjacent to curbs or existing concrete paving, a construction joint (cold joint) shall be provided between the new concrete paving and curbs or existing concrete paving.

L. Sleeving shall be coordinated with concrete work. Refer to irrigation plan for sleeving location.

M. The Contractor shall be responsible for repairing, at no additional cost to District, any disturbed existing landscape designated to remain which resulted from construction of this project.

N. Some materials may require a several week order lead time. Contractor is responsible for determining any and all ordering lead times, and providing required materials at the project site in a timely manner. No unapproved substitutions will be allowed. Contact District's Representative immediately if a specified material is not available.

O. Mock-up:

One 4 foot square mock up for all poured in place finishes, including concrete paving and vertical walls, as shown on the drawings. Mock-ups shall also include finish, jointing, thickness, and edging.

Mock-ups shall be reviewed and approved by the District's Representative prior to commencing full work. Approved mock-up shall serve as a standard of quality for judging the acceptance of paving on the Project and may remain as part of the work.

P. Lines and Levels: To be established by a licensed Surveyor or registered Civil Engineer.

Q. Mix Standards: Conform to the ACI Manual and the Portland Cement Association's "Design and Control of Concrete Mixes".

R. Design of Concrete Mix: Employ approved commercial testing laboratory to design concrete mixes as follows:

Item	Minimum Cement Content	28-Day Minimum Strength	Water to Max. Slump	Aggregate Size	Gal/Bag Cement Ratio Max.
Slabs on Grade, Curbs, Exterior Walkways	517 lb/cu. yd	3,000 PSI	3 in.	¾ in	5.5

S. Fly Ash:

Source Control: The following sources of ash are not to be used:

a. Ash from a peaking plant instead of a base loaded plant.
b. Ash from plants burning different coals or blends of coal.
c. Ash from plants burning other fuels (wood chips, tires, trash) blended with coal.
d. Ash from plants using oil as a supplementary fuel.
e. Ash from plants using precipitator additives, such as ammonia.
f. Ash from start-up or shut-down phases of operation.
g. Ash from plants not operating at a "steady state."
h. Ash that is handled and stored using a wet system.

Fly ash used in concrete should be as consistent and uniform as possible. Fly ash to be used in concrete should be monitored by a quality assurance/quality control (QA/QC) program that complies with the recommended procedures in ASTM C311.(6) These procedures establish standards for methods of sampling and frequency of performing tests for fineness, loss on ignition (LOI), specific gravity, and pozzolanic activity such that the consistency of a fly ash source can be certified.

1.06 QUALIFICATION OF INSTALLER

A. Installer shall be thoroughly trained and experienced in the skills required, and shall be completely familiar with the products and their installation as specified on the Drawings and in this Section. Installer shall be present at all times during progress of Work of this Section and shall direct all Work performed.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Delivered Mixes: Coordinate delivery so that mixes may be immediately poured upon arrival at site.

B. Components and Accessories:

Fittings and Reinforcements: Protect from rust, soil and oil contamination at all times. Store on pallets above ground.

Templates: Protect from damage. Test accuracy prior to each use.

1.08 SEQUENCING AND SCHEDULING

A. Coordination: Coordinate all items of other trades to be furnished and set in place. Coordinate proper installation of all accessories embedded in the concrete and for the provision of holes, openings, etc., necessary to the execution of the work of the trades in ample time that progress of the work is not delayed.

1.09 JOB CONDITIONS

A. Cold-Weather Placement: comply with provisions of ACI 306 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

B. When air temperature has fallen to or is expected to fall below 40 deg F (4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.

   Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.

   Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators.

C. Hot-Weather Placement: When hot weather conditions exist that would impair quality and strength of concrete, place concrete complying with ACI 305 and as specified.

   Cool ingredients before mixing to maintain concrete temperature at time of placement to below 90 deg F (32 deg C). Mixing water may be chilled or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.

   Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedding in concrete.

   Fog spray form, reinforcing steel, and subgrade just before placing concrete. Keep subgade moisture uniform without puddles or dry areas.

1.10 COORDINATION

A. Secure all pipe sleeves, anchors and bolts, including those for angle frames, inserts, ties and other materials in connection with concrete construction, in position before concrete is placed.

B. Obtain information and instructions from other Trades and suppliers in ample time to schedule and coordinate the installation of items furnished by them to be embedded in concrete so provisions for their work can be made without delaying the project.

1.11 FORM CONSTRUCTION TOLERANCES

A. Set form to required grades and lines, rigidly braced and secured. Install sufficient quantity of forms to allow continuous progress of Work so that forms can remain in place for twenty-four hours after concrete placement.

B. Check completed formwork for grade and alignment to following tolerances:

C. Top of forms not more than one-eighth inch in ten feet vertical elevation.

D. Vertical face on longitudinal axis not more than one-fourth inch in ten feet horizontal width.

E. Circular or curved formwork shall be continuous, complete radii as indicated on Drawings. No straight segments in circular/curved formwork shall be accepted.

1.12 TESTS AND OBSERVATIONS

A. The following tests shall be made by District's testing laboratory or by a certified Special Inspector as determined by the District. Special inspections for Concrete Construction shall be in accordance with Section 1704.4 and Table 1704.4 of the 2010 CBC and as noted below:

Periodic Inspection of reinforcing steel and placement.

Cement: Mill analysis and test reports by supplier certifying cement conforms to Specifications is acceptable in lieu of tests at the discretion of District's Representative.

Provide free access to Work and cooperate with testing laboratory.

Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of Work.

Concrete Inspections:

a. Continuous Placement Inspection: Inspect for proper installation procedures.
b. Periodic Curing Inspection: Inspect for specified curing temperature and procedures.

Strength Test Samples:

c. Sampling Procedures: ASTM C172.
d. Cylinder Molding and Curing Procedures: ASTM C31, cylinder specimens.

Concrete cylinders: Make and cure in accordance with ASTM C31.

e. Record shall be made of the time cylinders were made and of locations of concrete from which the cylinders were taken.
f. Three identical cylinders shall be taken from each pour of 25 cubic yards or part thereof, being placed each day.
g. When volume of concrete for any class of concrete would provide less than 5 sets of cylinders, take samples from five randomly selected batches, or from every batch when less than 5 batches are used.
h. Make one additional cylinder during cold weather concreting, and field cure.

Field Testing:

i. Slump Test Method: ASTM C143.
j. Air Content Test Method: ASTM C173.

k. Temperature Test Method: ASTM C1064.
l. Measure slump and temperature for each compressive strength concrete sample.
m. Measure air content in air entrained concrete for each compressive strength concrete sample.

Cylinder Compressive Strength Testing:
n. Test Method: ASTM C39.
o. Test Acceptance: In accordance with ACI 318.
p. Test one cylinder at 7 days.
q. Test two cylinders at 28 days.

Maintain records of concrete placement. Record date, location, quantity, air temperature and test samples taken.

Should tests show that concrete is below specified strength; the Contractor shall remove all such concrete. Full cost of removal of inferior concrete, its replacement with concrete of proper specified strength and testing shall be borne by the Contractor.

1.13 CODES AND STANDARDS

A. ACI 301 "Structural Concrete for Building"

B. ACE 305 “Recommended Practice for Hot Weather Concreting”

C. ACI 306 “Recommended Practice for Cold Weather Concreting”.

D. ACI 308 “Curing Concrete”

E. ACI 309 “Recommended Practice for Consolidation of Concrete”

F. ACI 318 "Building Code Requirements for Reinforced Concrete".

G. ACI 347 “Recommended Practice for Concrete Formwork”.

H. ACI 605 “Recommended Practice for Hot Weather Concreting”.

I. ACI 614 "Recommended Practice for Measuring, Mixing, and Placing Concrete".

J. ASTM C31 “Practices for Making and Curing Concrete Test Specimens in the Field”.

K. ASTM C33-86 "Specifications for Concrete Aggregate".

L. ASTM C94-89 "Specifications for Ready Mixed Concrete".

M. ASTM C143 “Test Method for Slump Portland Cement Concrete”.

N. ASTM C150 “Portland Cement”.

O. ASTM C309 “Specifications for Liquid Membrane-forming Compounds for Curing Concrete”.

P. Western Concrete Reinforce Steel Institute (WCRSI) "Manual of Standard Practice".

Q. Where provisions of pertinent codes and standards conflict with this Specification, the more stringent provisions shall govern.

R. California Building Code (CBC), latest edition.

S. Section 90 of the Caltrans Standard Specifications.

Part 2- PRODUCTS

2.01 CONCRETE REINFORCEMENT

A. Reinforcing Bars: Deformed Billet Steel Bars, ASTM A-615, Grade 40 or 60, containing a minimum of 70% total recycled content, clean and free from rust, scale, or coating that will reduce bond.

B. Smooth Dowels for Joints: ASTM A615, Grade 40 smooth, billet-steel bars, shop painted with iron-oxide zinc-chromate primer.

C. Welded Wire Mesh: ASTM A-185 plain type and uncoated finish.

2.02 CONCRETE

A. Concrete Mix:

Ready-mixed concrete in accordance with ASTM C-94 and with aggregates comply with ASTM C-33 and Portland Cement ASTM C-150, Type II.

All mixes shall conform to applicable building code requirements listed herein or on the Drawings. All mix designs shall be submitted to the District’s Representative for approval before being used. Mix design shall show proportions of cement, fine and coarse aggregate, and water and graduation of combined aggregates. Calcium chloride shall not be added at any mix.

Concrete shall be Class B per Caltrans Standards.

Cement: All cement shall be Portland cement Type II, and shall be the product of one manufacturer. The temperature of cement delivered to the plant shall not exceed 150 degrees Fahrenheit.

Aggregates

a. Coarse aggregate shall have a minimum cleanliness value of 75.
b. Fine aggregate shall have a minimum of sand equivalent of 75.

c. Any suitable individual grading of coarse aggregates may be used.

Water: All water shall be clean and free from deleterious matter.

Admixture: No admixture of any type shall be used without prior approval of the District's Representative.

Concrete shall be as specified: Class B

d. 28-Day Minimum Strength: Refer to Table in Paragraph 1.5(R) above
e. Concrete slump: Refer to Table in Paragraph 1.5(R) above
f. Air Content: No air entrainment

B. Fly Ash: Pozzolanic admixtures, conforming to ASTM C618, Class C, with weight loss of ignition limited to not exceed 3 percent shall be used in mix designs to replace Portland Cement up to 15% by weight, unless noted otherwise on drawings.

Reference: ACI 211.4R-93.

C. Aggregate Base for Pavement:

1. Description: Class II aggregate base shall be 3/4 inch maximum and free from organic matter and other deleterious substances, and shall be of such nature that it can be compacted readily under watering and rolling to form a firm, stable base.

2. Grading Requirements:

Percent Passing	Sieve Size
100	1 in.
90-100	3/4 in.
35-60	#4
10-30	#30
2-9	#200

3. Quality Requirements:

a. Sand Equivalent: 25 min

C. Water: Clean, potable (domestic) free from injurious amounts of salts, oils, acids, alkalis, organic materials or other deleterious matter. Available from source determined by District's Representative.

D. Air Entrainment: ASTM C260.

E. Admixtures: Admixtures containing chlorides are not permitted. All admixtures shall be mixed in accordance with manufacture's written recommendations.

2.03 ACCESSORIES

A. Tie Wires: Black annealed, ASTM A-82, minimum 16 gauge.

B. Chains, Bolsters, Bar supports, Spacers: Sized and shaped for strength and support of reinforcement during installation and placement of concrete.

C. Stirrup Steel: ASTM A-82.

D. Snap Ties: Snap-off metal of fixed length capable of leaving no metal within one and one-half (1 1/2) inches of surface nor causing fractures, spall or other defects larger than one (1) inch in diameter.

E. Expansion Joint Materials:

Premolded Joint Filler: ASTM D1751, non-extruding and bituminous type resilient filler, compatible with sealant, and having a "guide strip" removable depth gauge.

Joint Sealant: ASTM C290, non-snag sealant "Dynatred" by Pecora Corporation, [214] 278-8158 or "Sonolastic Sealant Two-Part" by Sonneborn, [415] 889-9899, or equal.

a. Color shall be selected by the District's Representative from the manufacturer's full color selection.

Bond Breaker: Pressure-sensitive tape as recommended by sealant manufacturer to suit application.

F. Forms:

Steel or wood of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal.

Use forms that are straight and free of distortions and defects.

Use flexible spring forms or laminated boards to form radius bends as required.

G. Form Release Agent: Colorless non-staining, free from oils. Chemical agent shall not impair bonding of paint or other proposed coatings.

H. Form-Facing Materials:

All Surfaces: of sufficient strength to hold concrete properly in place and prevent leakage of water from forms.

Exposed Surfaces: Matte finish, coated, medium density overlay plywood made for forming. No wood-textured finish will be permitted on exposed concrete unless specified as such.

I. Curing Compound: ASTM C309, Type I-D, Class A.

J. Integral Color: As indicated on Drawings.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Verify that subgrade preparation for concrete paving has been completed prior to commencement of work.

Surface Drainage:

Report in writing conflicts discovered on the site or prior work, which would prevent positive drainage. Correct prior to performing concrete work.

Do not permit finished paving surfaces to vary more than 1/4 in. measured with a 10 ft. metal straightedge, except at grade changes. No "birdbaths" or other surface irregularities will be permitted. Properly correct irregularities.

3.02 PREPARATION

A. Templates: Use templates for all anchor plates, bolts, inserts and other items embedded in concrete. Accurately secure so that they will not be displaced during placing of concrete.

B. Piping and Conduit: Do not embed piping, other than electrical conduit, in structural concrete. Locate conduit to maintain strength of structures at maximum. Verify size, length and location of electrical conduit.

C. Exposed Tree Roots: protect

D. Aggregate Base Course: Compact base course to thicknesses and relative compaction shown on Drawings.

3.03 CONCRETE REINFORCEMENT PLACEMENT

A. Fabricate reinforcement in accordance with ACI-315, providing a minimum concrete cover of three inches or as specified in UBC, latest edition.

B. Place all reinforcement in the exact position shown on the Drawings and secure in position during the placing and compacting of concrete. Wire bars together with No.16 gauge wire with ties at all intersections except where spacing is less than twelve inches in each direction, in which case tie alternate intersections.

C. Place all sleeves, inserts, anchors and embedded items required for adjoining work or for its support prior to concreting. Fill voids in embedded items temporarily with readily removable material to prevent entry of concrete.

D. Give all contractors and subcontractors whose work is related to concrete or supported by it, ample notice and opportunity to introduce and/or furnish embedded items before concrete placement.

E. Verify that concrete reinforcement may be installed in strict accordance with all pertinent codes and regulations, the Shop Drawings and the original design.

F. Verify score joints in sidewalk slabs are constructed at 5-foot maximum intervals.

G. Bending:

Fabricate all reinforcement in strict accordance with the reviewed Shop Drawings.

Do not use bars with kinks or bends not indicated on the Drawings or on the reviewed Shop Drawings.

Do not bend or straighten steel in a manner that will injure the material.

Bend all bars cold.

Make all bends for other bars, including hooks, around a pin having diameter not less than six times the minimum thickness of the bar for number 8 and smaller and eight times the thickness for number 9 and larger.

H. Before the start of concrete placement, accurately place all concrete reinforcement, positively securing and supporting by concrete blocks, metal chairs or spacer, or by metal hangers.

I. Clearance:

Preserve clear space between bars of not less than one time the normal diameter of round bars.

In no case let the clear distance be less than 1 inch or less than 1-1/3 times the maximum size of aggregate.

Provide the following minimum concrete covering of reinforcement:

Concrete below ground deposited against forms: 3 inches.

Concrete deposited against earth: 3 inches.

Concrete elsewhere: as indicated on Drawings.

J. Splicing:

Horizontal bars:

Place bars in horizontal members with minimum laps at splices sufficient to develop the strength of the bars. Splice 40 bar diameters minimum.

Bars may be wired together at laps.

Wherever possible, stagger the splices of adjacent bars.

Wire fabric: Make all splices in wire fabric at least 1-1/2 meshes wide.

Other splices: Make only those other splices that are indicated on the approved Shop Drawings or specifically approved by District's Representative.

K. Dowels/Anchor Bolts: Place all required steel dowels/anchor bolts and securely anchor them into position before the concrete is placed. Bending the dowels after placement of concrete will not be permitted.

L. Obstruction: In the event conduits, piping, inserts, sleeves, or any other items interfere with placing reinforcement as indicated on the Drawings, or as otherwise required, immediately consult District's Representative and obtain review of new procedure before placing concrete.

3.04 CONCRETE FORMWORK CONSTRUCTION

A. Construct support, brace and maintain formwork to support vertical and lateral loads that might be applied until such loads can be supported by concrete.

B. Contractor assumes full responsibility in the removal of forms. The length of time forms must remain in place depends on the rate of time required for concrete to obtain a proper strength. Remove forms after the concrete is sufficiently hard to prevent damage to concrete.

C. Circular or curved formwork shall be continuous, complete radii as indicated on Drawings. No straight segments in circular/curved formwork shall be accepted.

D. Reuse of Forms:

Do not reuse forms if there is any evidence of surface wear or defect which would impair quality of surface.

Thoroughly clean and properly coat forms before reuse.

3.05 INSTALLATION

A. Notification: Notify the District's Representative at least 48 hours before placing concrete.

B. Placing Concrete:

a. Unless otherwise indicated or required by the Drawings, concrete paving shall be placed on compacted subgrade to thicknesses indicated on the Drawings to 95 percent compaction.

b. Place concrete in accordance with ACI-304 and Section 2605 of the California Building Code. Immediately after depositing, compact concrete thoroughly by mechanical vibration. No vibrating of form is allowed. Mixing shall be continuous, with no interruptions from the time the truck is filled until the time it is emptied. Concrete shall be placed within one and a half hours from the time water is first added.

c. Insure anchors, seats, plates, and other items to be cast into concrete are placed, held securely and will not cause hardship in placing concrete.

d. Insure reinforcement, inserts, embedded parts, etc. are not disturbed during concrete placement.

e. Pour concrete continuously between predetermined construction and control joints. Do not break or interrupt successive pours such that cold joints occur, unless otherwise indicated on the Drawings.

f. Lines and Grades: Elevations requiring accurate placement shall be set by a competent instrument man, using a professional type instrument.

g. For all concrete placed on soil, the subgrade shall be wet and compacted prior to placing.

h. Before placing concrete mixing, conveying and finishing equipment, forms and reinforcing shall be well-cleaned. Wet form before placing concrete, unless oiled forms are used.

3.06 CURING AND PROTECTION

A. Beginning immediately after placement, protect concrete from premature drying, from excessively hot or cold temperatures, and from mechanical injury. Maintain concrete with minimal moisture loss at relatively constant temperature for a period necessary for hydration of cement and hardening of concrete. In hot, dry and windy weather protect concrete from rapid moisture loss before and during finishing operations with an evaporation – control material. Apply according to manufacturer's instruction.

B. As soon as building flat work has hardened sufficiently to prevent injury to finish, apply an approved concrete curing agent in accordance with the manufacturer's recommendation.

C. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Keep continuously moist for not less than seven (7) days.

D. Excessive cracking as determined by the District's Representative which is aesthetically unacceptable or which will result in premature disintegration of paving shall result in replacement of concrete.

E. Removal of Forms: Remove no sooner than at seven days after each pour.

F. Conform to all applicable requirements for curing and protection of concrete, Sections 90-7 and 90-8 of the Caltrans Standard Specifications.

G. Spraying: Spray concrete during the curing period as frequently as drying conditions may require.

H. Curing: Cure concrete in accordance with the ACI Manual of Concrete Practice. During curing period, maintain concrete above 70 degrees F. for at least 3 days or above 50 degrees F. for at least 5 days.

I. Damage and Defacement: Protect all concrete work against damage and defacement during subsequent construction operations until final acceptance.

3.07 CLEANING AND PATCHING

A. Removal: Remove all projecting fins, bolts, wire, nails, etc., not necessary for the work, or cut them back 1 in. from the surface and patch in an inconspicuous manner.

B. Snap Ties: Immediately after removal of forms, cut off snap ties extending from the face of concrete to at least 1 in. deep in the concrete. Fill or plug as detailed in Drawings.

C. Voids: Fill holes with a 1:3 cement/sand mortar with the same color as the adjoining concrete. Mix and place the mortar as dry as possible and finish flush with the adjacent surface.

D. Corrective Patching: Correct all defects in concrete work. Chip all voids to a depth of at least 1 in. with the edges perpendicular to the surface and parallel to form markings. Fill all voids, surface irregularities, or honeycombing by patching or rubbing. Ensure that all concrete surfaces so repaired duplicate the appearance of the unpatched work.

E. Finishing: Work finish surface texture as specified below.

3.08 FINISHES

A. Medium Broom Finish:

Floating: Float surface once it has sufficiently stiffened. Check planeness of surface with a 10 ft. straightedge in all directions. Cut down high spots and fill lows. Immediately refloat to a uniform non-directional sandy texture.

Obtain by drawing a stiff bristled broom across a floated finish.

Direction of brooming to be perpendicular to direction of paving.

3.09 JOINTS

A. Construction Joints:

Locate and install joints as indicated on the Drawings so they do not impair strength or appearance of slab.

All joints and other edges shall be formed in the fresh concrete using an edging tool to provide a smooth uniform impression.

B. Score Joints:

Locate and install joints as indicated on the Drawings so they do not impair strength or appearance of slab.

Score joints shall be formed in the fresh concrete using a jointer to cut the groove so that a smooth uniform impression is obtained. All joints shall be struck before and after sandblast.

Locate and form joints with 1/4 inch radius edges and 1 inch to 1-1/4 inch deep score at the location as shown on the Drawings.

All joints and other edges shall be formed in the fresh concrete using an edging tool to provide a smooth uniform impression.

C. Expansion Joints:

Locate and install joints as indicated on the Drawings so they do not impair strength or appearance of slab.

Expansion joints shall be provided at the location and 40-foot maximum intervals as shown on the plans, and at all locations where concrete paving abuts buildings, curbs or other proposed or existing structures. Install as per detail on the Drawings.

All joints and other edges shall be formed in the fresh concrete using an edging tool to provide a smooth uniform impression.

Install backer-rod and joint sealant as indicated on the Drawings.

Sealing of Expansion Joints: After the curing period, strip out all depth gauge strips and carefully clean expansion joints. Fill with joint compound as shown on Drawings. Avoid spilling compound on paved surfaces or overflowing from joint.

Protect expansion joints from damage until placement of filler or caulk.

3.10 FIELD QUALITY CONTROL

A. Samples: Contractor shall coordinate with the District to select a qualified testing laboratory to take samples for testing during the course of the work as described in Article 1.13 Tests and Observations.

B. Field inspection and testing will be performed by a qualified testing laboratory in accordance with ACI 318 and as described in Article 1.13 Tests and Observations.

C. Cost of Testing: Contractor shall be responsible for costs associated with testing.

D. Rejected Materials: Remove off the site all concrete below specified strength.

E. Cost of Removal and Retesting: Contractor shall be responsible for costs associated with removal and costs associated with retesting.

F. Integral color: Color shall be evenly saturated in concrete mix to provide consistent, even, and distinct color in finished installation, including after medium sandblast finish is applied.

G. Defective Work: Remove in its entirety and replace all defective concrete work which after corrective patching, rubbing, etc., fails to duplicate the appearance of unpatched work and/or conform to the standards set forth in these Specifications.

H. Observe formwork continuously while concrete is being placed to see that there are no deviations from desired elevation, alignment, plumbness or camber.

I. If during construction any weakness develops and falsework shows undue settlement or discoloration, stop work, remove affected construction if permanently damaged, and strengthen falsework.

END OF SECTION